IDEC

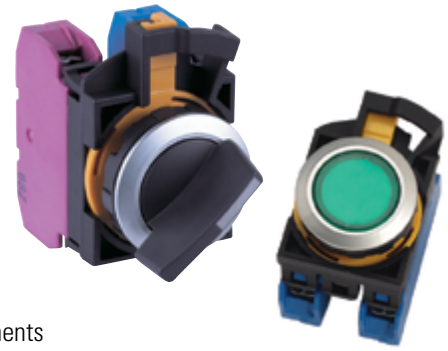
# INDUSTRIAL CONTROL & AUTOMATION CATALOG

*Think Automation and beyond...*

# kodawari

*\kō-dä-wȯ-rē\ — (noun) the uncompromising and relentless pursuit of perfection. A time-honored philosophy originating from ancient Japan, it reflects a commitment to attaining the highest degree of excellence.*

**Every detail has a purpose.** For more than 65 years, the philosophy of Kodawari has been the driving force inspiring us to design the best in industrial control products. Our meticulous attention to detail and fierce dedication to quality and safety produces products that exceed the highest industry standards.



At IDEC, we believe even a simple switch must do more than just turn a piece of equipment on or off, it must deliver an unparalleled experience. From the overall concept to the smallest detail, we want to enhance the efficiency and comfort of human interaction with our products. IDEC engineers spend years researching and testing just to develop the ideal shape, size and feel for our switches. These small, but critical improvements ensure you are satisfied every time you touch an IDEC switch.

Our enduring commitment to this philosophy has also found unmistakable expression in the sharp, crisp images and superior visibility of our operator interface touchscreens. IDEC displays are a testament to our tenacious desire to meet our customers' every need. Through diligence and hard work, we have been able to generate intense, true-to-life screens by originating a process in which a dual-screen memory buffer produces a smoother transition between screens.

In the mastery of extraordinary workmanship, we strive to manufacture superior products by exploring all the options available to us. Influenced by an architectural method used for thousands of years to build Japanese shrines and temples without nails, we designed our heavy-duty LED lighting with precision-fitted joints for improved strength and durability. The result is a more resilient product for harsh environments.

The cornerstone of our success lies in the intrinsic presence of Kodawari in all our products. Known as a pioneer in the micro PLC market, in recent years, IDEC made a bold decision to develop the fastest micro-PLC in its class. By adding a Logic Engine to our micro PLCs, we enabled them to process

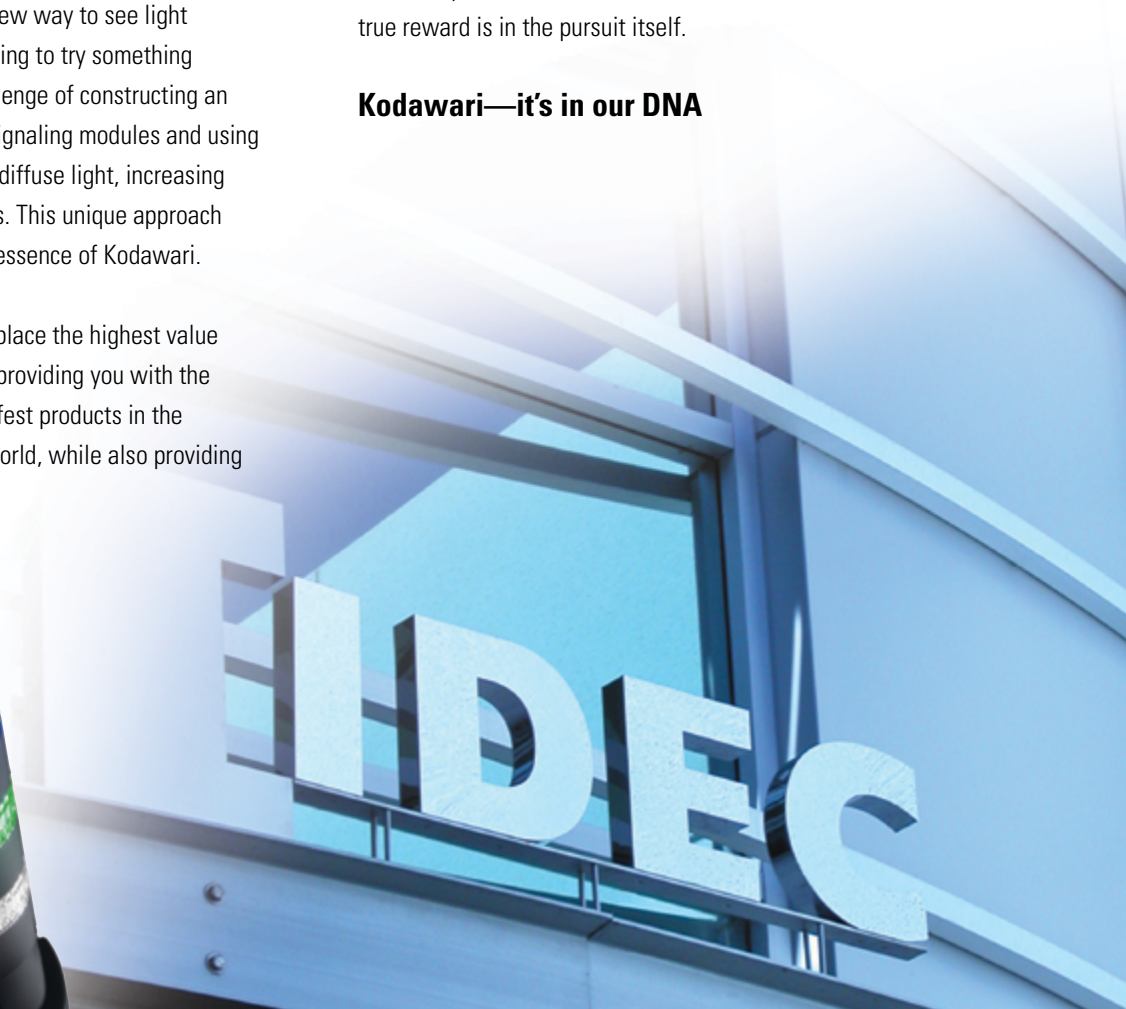
instructions faster, freeing up the main processor for additional functions like PID, complex math and communications. As we move forward, we continue to add instructions, making complex machine automation simpler for the engineers designing them. In this era of great technological change, we are dedicated to offering our customers the most innovative products.

With each generation of IDEC products, we get closer to attaining perfection. Although light towers have been available in the market for many years, traditional designs let light bleed between modules, often making it difficult to view status. We imagined a new way to see light towers—a better way. Endeavoring to try something different, we undertook the challenge of constructing an improved design by separating signaling modules and using a one-of-a-kind elliptical lens to diffuse light, increasing brightness and visibility of status. This unique approach and aesthetic style are the very essence of Kodawari.

We place the highest value on providing you with the safest products in the world, while also providing an exceptional experience. Existing safety standards for emergency stops only protect users under normal circumstances, but are not sufficient when the emergency device itself is damaged. At IDEC, our unique "Safe Break Action" is incorporated into our Emergency Stop switches, surpassing existing safety standards and making them the safest on the market.

As IDEC moves into the future, we are dedicated to our vision of a future where people, technology, and information come together in a perfect blend. The greatest reward for our commitment and adherence to the Kodawari philosophy is a sense of fulfillment and pride, knowing that we have made a difference in the daily lives of our customers. Although perfection can never truly be achieved, for us the true reward is in the pursuit itself.

**Kodawari—it's in our DNA**



# Lumifa - LED Lighting

**General Lighting** pg page 13

- Six different lengths (134 to 1,080mm)
- Space saving: Width 27.5mm, Thickness 16mm
- Long life: Five times longer than fluorescent lamps
- Vibration and shock resistant

**General Lighting** pg page 11

- Energy saving: One-third of fluorescent lamps
- Long life: 40,000 hours (Half-life)
- Multiple sizes and color configurations
- Rated voltage up to 24V DC

**Heavy Duty Tool Lighting** pg page 4

- Brightest in their class at up to 67.2 Lumens/Watt
- Life: 70% of initial luminance at 50,000 hours
- Durable, stainless steel cover
- Standard or recessed mounting for lower profile

**Hazardous Location Lighting** pg page 18

- Explosion-proof LED illumination
- Two types of light distribution
- On/off switch for ease of operation
- Adjustable or fixed angle mounting

# Automation & Sensing

**OI Touchscreens** pg 28

- Super-bright, sharp LCD screens
- Up to 65K colors supported
- Remote access, monitor and control plus multimedia
- Basic and high-performance models with wide range of connectivity

**PLCs** pg 53

- Fastest micro PLC in the market
- Maximum 512 I/Os
- Embedded Ethernet and USB ports
- All models meet the highest safety standards

**Power Supplies** pg 167

- Slim, standard or metal frame
- 10W, 15W, 30W, 60W, 90W, 120W and 240W
- Convenient mounting options
- Worldwide approvals

**Sensors** pg 201

- Vision, application, universal photoelectric and proximity
- Variety of housing sizes, styles and functions
- High reliability and precision
- High-speed response times

# Safety Page 269

**E-Stops** pg 275, 481, 553, 558, 592

- 16mm, 22mm and 30mm
- Unique "safe-break action" technology
- Turn reset and push-pull functions built-in
- Available in both plastic or metal bezel and finger-safe contacts

**Interlock Switches** pg 297

- Basic and solenoid locking models
- Subminiature to full-size models
- Up to 6 contacts
- Integrated cable or screw termination

**Enabling Switches** pg 391

- Ergonomic three-position functionality
- Variety of contact configurations
- DPDT contacts
- Available with or without rubber covers for watertight seal

**Safety Relays** pg 423

- EN ISO 13849-1 PLe, Safety Category 4 compliant and EN 62061 SIL 3
- Removable and fixed terminal models
- LED status indicators
- Finger-safe protection

# Switching & Controls

**Switches & Pilot Devices** pg 485

- 8mm, 16mm, 22mm and 30mm
- Illuminated pushbuttons, pushbuttons, pilot lights, selector switches and key selector switches
- Solder terminals, screw terminals or PC board pins for direct board mounting
- Metallic or black bezels, standard or flush mount models

**Signaling Lights** pg 775

- 360-degree visibility of status
- LED or incandescent lamp illumination
- Steady and flashing units with optional alarm
- Five mounting styles

**Relays** pg 829

- General purpose, PCB, latching and force-guided models
- Contact ratings up to 16A
- Correlating sockets available
- DIN rail, panel or PCB mounting

**Circuit Breakers** pg 1015

- Available in 1, 2 or 3 poles
- Current ratings up to 50A
- Standard and electronic time delay curves
- DIN rail, socket or panel mount options

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# Lumifa

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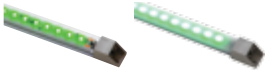
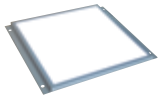
**www.IDEC.com/usa/LED**

# Selection Guide

| | | | | | Application Examples | Illumination Color [1] | Reference Illumination [2] | Power Consumption | Operating Voltage | Page |
|---|---|---|---|---|---|---|---|---|---|---|
| **LF1D/2D** | Mini | LF1D-C (IP67f/IP67/IP69K) | | | · Machine tools<br>· Food processing machines<br>· Automatic manufacturing machines<br>· Printing machines<br>· Production system<br>· Test equipment | White (5,700K) | 180lx | 4.6W | 24V DC | 4 |
| | Slim and Wide | LF1D/2D Classic (IP67f/IP67) | Slim | | | White (5,700K) | Clear Surface: 1,100lx (4,400lx directly below at .5m)<br>Diffused surface: 1,000lx (4,000lx directly below at .5m) | 9W | 24V DC | |
| | | | Wide | | | | | 12.5W | | |
| | | LF1D/2D-*H Wide-angle and High Luminance (IP67f/IP67/IP69K) | Slim | | | White (5,700K) | 1,450lx | 11W | 24V DC | |
| | | | Wide | | | | 1,200lx | 12.5W | | |
| | Long | LF1D-H (IP67f/IP67/IP69K) | | | · Machine tools<br>· Food processing machines<br>· Automatic manufacturing machines<br>· Printing machines<br>· Production system<br>· Test equipment | Neutral White (4,700K) [3] | 560lx | 18.4W | 24V DC | |
| | | LF1D-J (IP67f/IP67/IP69K) | | | | | 840lx | 27.6W | | |
| **LF2B (IP65)** | | | Clear Cover | | · Various machines and systems<br>· Control panel<br>· Plant<br>· Solar power equipment | White (6,500K) | ·LF2B-B: 290lx<br>·LF2B-C: 540lx<br>·LF2B-D: 1065lx<br>·LF2B-E: 1385lx<br>·LF2B-F: 1520x | 12/24V DC<br>LF2B-B: 2.6W<br>LF2B-C: 4.9W<br>LF2B-D: 10.6W | 12/24V DC | 11 |
| | | | White Cover | | | | ·LF2B-B: 265lx<br>·LF2B-C: 500lx<br>·LF2B-D: 980lx<br>·LF2B-E: 1275lx<br>·LF2B-F: 1400lx | 100 to 240V AC<br>LF2B-B: 3.8W<br>LF2B-C: 7.5W<br>LF2B-D: 9.2W<br>LF2B-E: 14.3W<br>LF2B-F: 21.8W | 100 to 240V AC | |

1. K: Color Temperature (typ.), mm: Dominant Wavelength (typ.).
2. Directly below at 1m unless otherwise noted.
3. To match traditional cool fluorescent lamps.

| | | | Application Examples | Illumination VColor [1] | Reference Illumination [2] | Power Consumption | Operating Voltage | Page |
|---|---|---|---|---|---|---|---|---|
| **LF1B-N (IP65)** | Clear/ White Cover | | · Control panel<br>· Display Cases<br>· Plant equipment<br>· Test equipment | Cool white (6,500K) | LF1B-NA: 95lx<br>LF1B-NF: 1350lx | Cool white/Warm white/Blue<br>LF1B-NA: 1.5W<br>LF1B-NB: 2.9W<br>LF1B-NC: 4.4W<br>LF1B-ND: 8.7W<br>LF1B-NE: 13.0W<br>LF1B-NF: 17.3W<br><br>Yellow/Red/Green<br>LF1B-NA: 1.0W<br>LF1B-NB: 2.0W<br>LF1B-NC: 2.9W<br>LF1B-ND: 5.8W<br>LF1B-NE: 8.7W<br>LF1B-NF: 11.6W | 24V DC | 13 |
| | | | · Food processing machines<br>· Cosmetic plant<br>· Chemical plant<br>· Show cases | Warm white (2,900K) | LF1B-NA: 60lx<br>LF1B-NF: 620lx | | | |
| | | | · Semiconductor manufacturing equipment<br>· IC foundry | Yellow (590nm) | LF1B-NA: 20lx<br>LF1B-NF: 180lx | | | |
| | | | · Photosensitive material<br>· Semiconductor manufacturing equipment<br>· Darkroom experiment | Red (620nm) | | | | |
| | | | · Advertising Display<br>· Light ornaments | Blue (455nm) | LF1B-NA: 10lx<br>LF1B-NF: 80lx | | | |
| | |  | | Green (525nm) | LF1B-NA: 30lx<br>LF1B-NF: 300lx | | | |
| **LF1A (IP40)** | Clear Cover | | · Control Panels<br>· Manufacturing Equipment | Cool white (5,500K) | LED Array 3x2: 190lx<br>LED Array 6x2: 380lx<br>LED Array 12x2: 760lx | LED Array 3x2: 1.8W<br>LED Array 6x2: 3.6W<br>LED Array 12x2: 7.2W | 24V DC | 16 |
| | | | | Warm white (2,800K) | LED Array 3x2: 130lx<br>LED Array 6x2: 260lx<br>LED Array 12x2: 52lx | | | |
| | | | | Yellow (590nm) | LED Array 3x2: 130lx<br>LED Array 6x2: 260lx<br>LED Array 12x2: 52lx | LED Array 3x2: 2.2W<br>LED Array 6x2: 4.4W<br>LED Array 12x2: 8.7W | | |
| | | | | Red (625nm) | LED Array 3x2: 85lx<br>LED Array 6x2: 170lx<br>LED Array 12x2: 340lx | | | |
| **EF1A (IP67)** | | | For Hazardous Locations:<br>· Oil, gas and mining industries<br>· Printing factory<br>· Gas station<br>· Water Treatment | White (5,700K) | Clear glass surface:<br>1,100lx (condensing light)<br>205lx (diffused light)<br>Translucent glass:<br>450lx (condensing light)<br>175lx (diffused light) | 19W | 100 to 240V AC | 18 |
| | | | | | | 17W | 24V DC | |
| **LF1F** | |  | · Visual inspection<br>· Elevator ceiling | 8,500K | 5,800lx | 11W | 21.6 ~ 26.4V DC | 22 |

1. K: Color Temperature (typ.), mm: Dominant Wavelength (typ.).
2. Directly below at .5m unless otherwise noted.
3. Light output using clear cover.

# LF1D (IP69K) and LF2D (IP67, IP67f) Series

## Machine Tools • Food and Beverage Processing Equipment • Vision Systems

### Key features

With their rugged construction, the LF1D/2D series of light units are ideal for machine tools, automated label and package inspection equipment, and food and beverage processing equipment. Their design provides equally brilliant light at the center or edges of the units. Plus with their ratings, the LF1D (IP67, IP67f, IP69K) and LF2D (IP67, IP67f) can be used where high-pressure and high-temperature washdowns are used.

**Mini** (LF1D-C)

- Compact unit only 100 x 50 x 25mm
- Single phosphor LED module design eliminates multiple shadows while distributing light over a wide area (120°)

**Slim & Wide** (LF1D/2D-E, EH, F, FH)

- Brightness: Standard Models: up to 1,100lx at 1m
  High-Luminance Models: up to 1,450lx at 1m
- Available with terminal block or spring clamp connections for easy installation
- Angle adjustable mounting brackets provide installation flexibility

**Long** (LF1D-H/J)

- Two lengths available: 365mm and 510mm
- The flat light design reduces glare and multiple shadows, improving visibility from a distance

## Part Numbers

### Mini (LF1D-C)

| Cable | | Part Number |
|---|---|---|
| Location | Length | |
| | | |
| Side | 3m | LF1D-C2F-2W-330 |
| | 5m | LF1D-C2F-2W-350 |
| Back | 3m | LF1D-C2F-2W-430 |
| | 5m | LF1D-C2F-2W-450 |

### Long (LF1D-J 365mm)

| Cable | | Part Number |
|---|---|---|
| Location | Length | |
| | | |
| Side | 5m | LF1D-H2F-2N-350 |
| | 1.5m + M12 connector | LF1D-H2F-2N-3B0 |
| Back | 5m | LF1D-H2F-2N-450 |
| | 1.5m + M12 connector | LF1D-H2F-2N-4B0 |

### Long (LF1D-J 510mm)

| Cable | | Part Number |
|---|---|---|
| Location | Length | |
| | | |
| Side | 5m | LF1D-J2F-2N-350 |
| | 1.5m + M12 connector | LF1D-J2F-2N-3B0 |
| Back | 5m | LF1D-J2F-2N-450 |
| | 1.5m + M12 connector | LF1D-J2F-2N-4B0 |

### Slim and Wide Surface Mounting (LF1D/-E, EH, F, FH)

| Model | | | Slim Model (10 LEDs × 1 row) | | Wide Model (7 LEDs × 2 rows) | |
|---|---|---|---|---|---|---|
| Cable Gland LF9Z-A11 | Cable LF9Z-C05 | Mounting Bracket LF9Z-B11,B12 | Clear Reinforced Glass | Clear Polycarbonate | Clear Reinforced Glass | Clear Polycarbonate |
| | | | | | | |
| — (hole on the side) | — | — √ | LF1D-E①2F-2W LF1D-E①2F-2W-101 | LF1D-E①3G-2W LF1D-E①3G-2W-101 | LF1D-F①2F-2W LF1D-F①2F-2W-101 | LF1D-F①3G-2W LF1D-F①3G-2W-101 |
| — (hole on the back) | — | — √ | LF1D-E①2F-2W-200 LF1D-E①2F-2W-201 | LF1D-E①3G-2W-200 LF1D-E①3G-2W-201 | LF1D-F①2F-2W-200 LF1D-F①2F-2W-201 | LF1D-F①3G-2W-200 LF1D-F①3G-2W-201 |
| √ (Side) | — | — √ | LF1D-E①2F-2W-300 LF1D-E①2F-2W-301 | LF1D-E①3G-2W-300 LF1D-E①3G-2W-301 | LF1D-F①2F-2W-300 LF1D-F①2F-2W-301 | LF1D-F①3G-2W-300 LF1D-F①3G-2W-301 |
| | √ | — √ | LF1D-E①2F-2W-350 LF1D-E①2F-2W-A | LF1D-E①3G-2W-350 LF1D-E①3G-2W-A | LF1D-F①2F-2W-350 LF1D-F①2F-2W-A | LF1D-F①3G-2W-350 LF1D-F①3G-2W-A |
| √ (Back) | — | — √ | LF1D-E①2F-2W-400 LF1D-E①2F-2W-401 | LF1D-E①3G-2W-400 LF1D-E①3G-2W-401 | LF1D-F①2F-2W-400 LF1D-F①2F-2W-401 | LF1D-F①3G-2W-400 LF1D-F①3G-2W-401 |
| | √ | — √ | LF1D-E①2F-2W-450 LF1D-E①2F-2W-451 | LF1D-E①3G-2W-450 LF1D-E①3G-2W-451 | LF1D-F①2F-2W-450 LF1D-F①2F-2W-451 | LF1D-F①3G-2W-450 LF1D-F①3G-2W-451 |

*In place of ① insert H for High-Lluminance or leave blank for Standard models.

## Slim and Wide Recessed Mounting (LF2D/-E, EH, F, FH)

| Model | | Slim Model (10 LEDs × 1 row) | | Wide Model (7 LEDs × 2 rows) | |
|---|---|---|---|---|---|
| Cable Gland LF9Z-A11 | Cable LF9Z-C05 | Clear Reinforced Glass | Clear Polycarbonate | Clear Reinforced Glass | Clear Polycarbonate |
| | | | | | |
| — | — | LF2D-E①2F-2W | LF2D-E①3G-2W | LF2D-F①2F-2W | LF2D-F①3G-2W |
| — | — | LF2D-E①2F-2W-200 | LF2D-E①3G-2W-200 | LF2D-F①2F-2W-200 | LF2D-F①3G-2W-200 |
| √ (Side) | — | LF2D-E①2F-2W-300 | LF2D-E①3G-2W-300 | LF2D-F①2F-2W-300 | LF2D-F①3G-2W-300 |
| | √ | LF2D-E①2F-2W-A | LF2D-E①3G-2W-A | LF2D-F①2F-2W-A | LF2D-F①3G-2W-A |
| √ (Back) | — | LF2D-E①2F-2W-400 | LF2D-E①3G-2W-400 | LF2D-F①2F-2W-400 | LF2D-F①3G-2W-400 |
| | √ | LF2D-E①2F-2W-450 | LF2D-E①3G-2W-450 | LF2D-F①2F-2W-450 | LFD-F①3G-2W-450 |

*In place of ① insert H for High-Lluminance or leave blank for Standard models.

## Accessories

| Item | Mounting Bracket | | | | Cable Gland | Cable |
|---|---|---|---|---|---|---|
| | Fixed | | Adjustable Angle | | | |
| Part Number | LF9Z-B11 | LF9Z-B12 | LF9Z-1MDE1 | LF9Z-1MDF1 | LF9Z-A11 | LF9Z-C05 |
| Applicable Unit | LF1D (Slim) | LF1D (Wide) | LF1D (Slim) | LF1D (Wide) | LF1D/2D (Slim & Wide) | |
| Material | Stainless Steel | | | | Brass | PVC |
| Notes | 1 pair, Left and Right | | | | M8* | Length: 5m |

*Applicable wire size (10-12 AWG)

## Part Number Structure (use for interpreting part numbers only)

LF 2 D – E H 2 F – 2 W – 3 0 0

Shape
1: Surface mount
2: Recessed mount

Size (LED arrangement)
C: Mini 100mm (3.94")
E: Slim Model (10 LEDs × 1 row)
F: Wide Model (7 LEDs × 2 rows)
H: Long 365mm (14.37")
J: Long 510mm (20.08")

Illumination Models (Wide & Slim only)
blank: Standard
H: large area, High Luminance

Degree of Protection
F: Clear reinforced glass IP67f (LF2D), IP67f/IP69K (LF1D)
G: Clear polycarbonate IP67 (LF2D), IP67/IP69K (LF1D)

Illumination Surface
2: Clear, Reinforced glass
3: Clear, Polycarbonate
5: Diffused, Polycarbonate (standard wide and slim)
9: Diffused, Reinforced glass (standard wide & slim)

Illumination Color
W: white
N: neutral

### Cable Gland

| Code | Cable Gland | Cable Gland Hole Location | Cable | Mounting Bracket |
|---|---|---|---|---|
| Blank | – | side | – | – |
| A | √ | side | 5m | √ [1] |
| 101 | – | side | – | √ [1] |
| 200 | – | back | – | – |
| 201 | – | back | – | √ [1] |
| 300 | √ | side | – | – |
| 3B0 | √ | side | 1.5m [3] | – |
| 301 | - | side | – | √ [1] |
| 330 | √ | side | 3m | – |
| 350 [2] | √ | side | 5m | – |
| 400 | - | back | – | – |
| 401 | - | back | – | √ [1] |
| 430 | √ | back | 3m | – |
| 450 | √ | back | 5m | – |
| 451 | √ | back | 5m | √ [1] |
| 4B0 | √ | back | 1.5m [3] | – |

1. Mounting bracket available for LF1D (wide and slim) only.
2. Only available for LF1D (wide and slim) models.
3. 1.5m cable with M12 connector for Long only (LF1D-H, J).

# Specifications

## LED Optical Specifications

| Model | Mini | Standard | | | | High-Luminance | | | | Long | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | LF1D-C | Slim (LF1D/2D-E) | | Wide (LF1D/2D-F) | | Slim (LF1D/2D-EH | | Wide (LF12D-FH) | | LF1D-H | LF1D-J |
| Illumination Surface | Clear | Clear | Diffused | Clear | Diffused | Clear | Diffused | Clear | Diffused | Clear | |
| Illumination Color | Cool White | | | | | | | | | Neutral White | |
| Total Luminous Flux | 560lm | 600lm | | 840lm | | 1,000lm | | 1,260lm | | 2,000lm | 3,000lm |
| Color Temperature | 5700K | | | | | | | | | 4700K | |
| Reference Illuminance at 1.0m | 180lx | 1,100lx | 1,000lx | 1,100lx | 1,000lx | 1,450lx | 1,200lx | 1,450lx | 1,200lx | 560lx | 840lx |

LED modules and illumination units may vary in color and brilliance. Luminous flux, color temperature, and illuminance values shown above are typical.

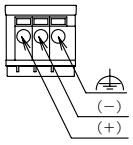
## General Specifications

| Model | Mini | Standard | | High-Luminance | | Long | |
|---|---|---|---|---|---|---|---|
| | LF1D-C | Slim (LF1D/2D-E) | Wide (LF1D/2D-F) | Slim (LF1D/2D-EH | Wide (LF1D/2D-FH) | LF1D-H | LF1D-J |
| Rated Voltage | 24V DC | | | | | | |
| Voltage Range | 21.6 to 26.4V DC | | | | | | |
| Rated Power (typ.) | 4.6W | 9W | 12.5W | 11W | 12.5W | 18.4W | 27.6W |
| Insulation Resistance | 100MΩ minimum (500V DC megger) | | | | | | |
| Dielectric Strength | 1,000V AC, 50/60Hz, 1 minute | | | | | | |
| Vibration Resistance (damage limits) | Frequency 5 to 55Hz, amplitude 0.5mm | | | | | | |
| Shock Resistance (damage limits) | 1000m/s$^2$ | | | | | | |
| Operating Temperature | –30 to +55°C (no freezing) | | | | | | |
| Operating Humidity | 45 to 85% RH (no condensation) | | | | | | |
| Storage Temperature | –35 to +70°C (no freezing) | | | | | | |
| Operating Environment | No corrosive gases | | | | | | |
| Life [1] | 50,000 hours (The illumination duration in which the illuminance maintains a minimum of 70% of the initial value at 25°C.) | | | | | | |
| Degree of Protection [2] | IP67f (LF2D: reinforced glass), IP67 (LF2D: polycarbonate), IP69K (LF1D) | | | | | | |
| Material [3] | Housing: Diecast aluminum (LF1D/LF2D), Lens: Reinforced glass or polycarbonate (LF1D/LF2D)<br>Cover: Stainless steel (LF1D), Flange cover: Diecast aluminum (LF2D) | | | | | | |
| Weight (approx.) | 420g | LF1D-E*-2W*: 750g<br>LF1D-E*-2W-A*: 950g<br>LF2D-E*-2W*: 850g<br>LF2D-E*-2W-A*: 1,000g | LF1D-F*-2W*: 800g<br>LF1D-F*-2W-*: 1,000g<br>LF2D-F*-2W*: 900g<br>LF2D-F*-2W-A*: 1,050g | LF1D-E*-2W*: 750g<br>LF1D-E*-2W-A*: 950g<br>LF2D-E*-2W*: 850g<br>LF2D-E*-2W-A*: 1,000g | LF1D-F*-2W*: 800g<br>LF1D-F*-2W-*: 1,000g<br>LF2D-F*-2W*: 900g<br>LF2D-F*-2W-A*: 1,050g | 1200g | 1600g |

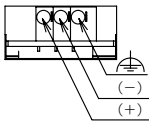
1. LED life depends on the operating environment.
2. Waterproof or oil-proof characteristics specified by IEC 60529 and JEM1030. For illumination units without accessories, use a cable gland and cables that satisfy IP67f or IP67 degree of protection.
3. The reinforced glass and polycarbonate illumination surfaces have the same appearance, but have different degrees of protection (IP67f or IP67).

## Terminal Block Wiring

Slim Type



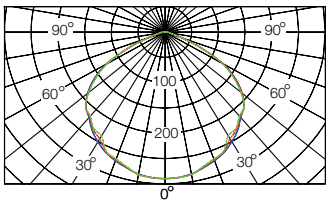

Wide Type



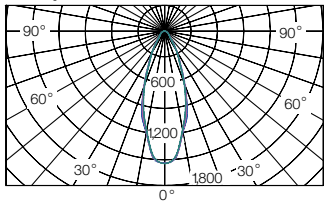

Applicable ferrules: 0.25 to 0.75 mm$^2$
Recommended source - Phoenix Contact:
AI 0,25-12 BU, AI 0,34-12 TQ,
AI 0,5-12 WH, AI 0,75-12 GY

## Illuminance Charts

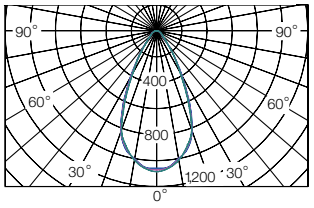
### LF1D-C



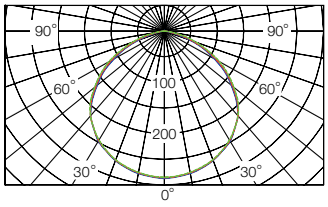

### LF1D/2D-EH



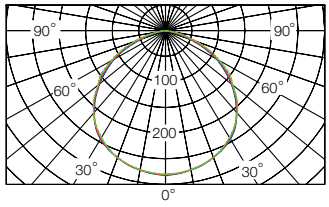

### LF1D/2D-FH

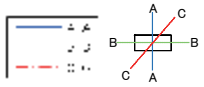



### LF1D-H



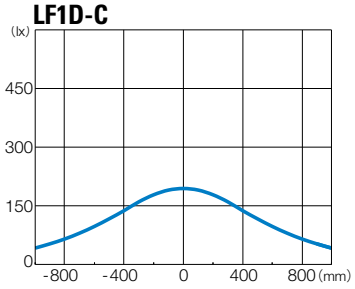

### LF1D-J



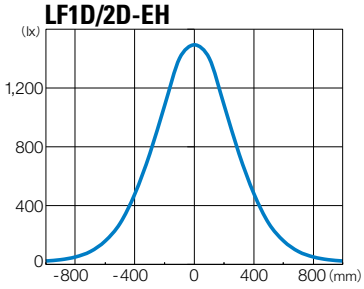



## Distribution Characteristics

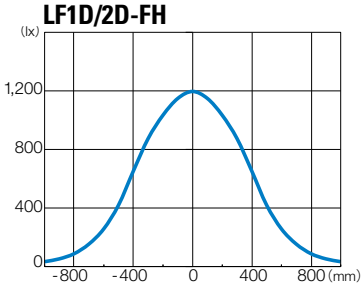
### LF1D-C



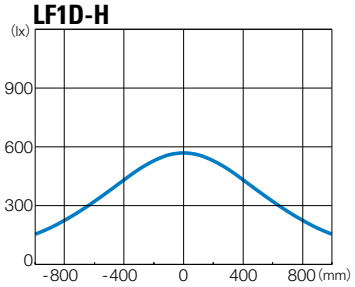

### LF1D/2D-EH



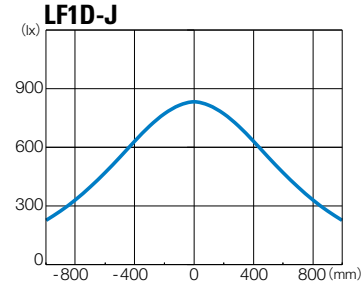

### LF1D/2D-FH




### LF1D-H

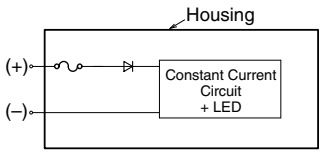



### LF1D-J

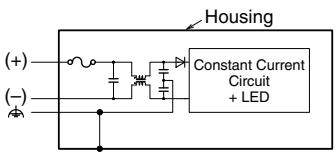



## Internal Circuit

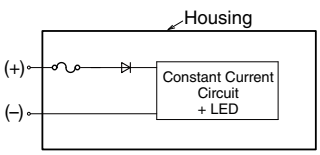
### LF1D-C




### LF1D/2D-E, EH, F, FH

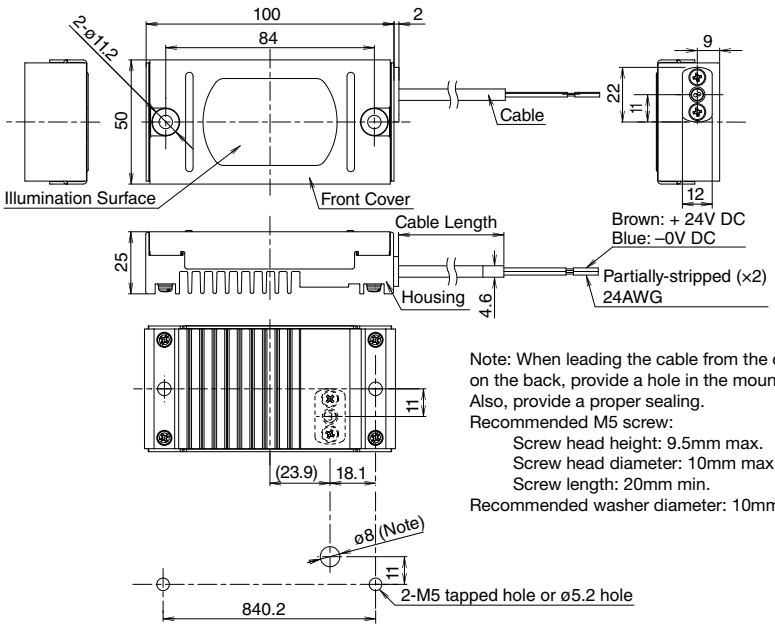



### LF1D-H/J



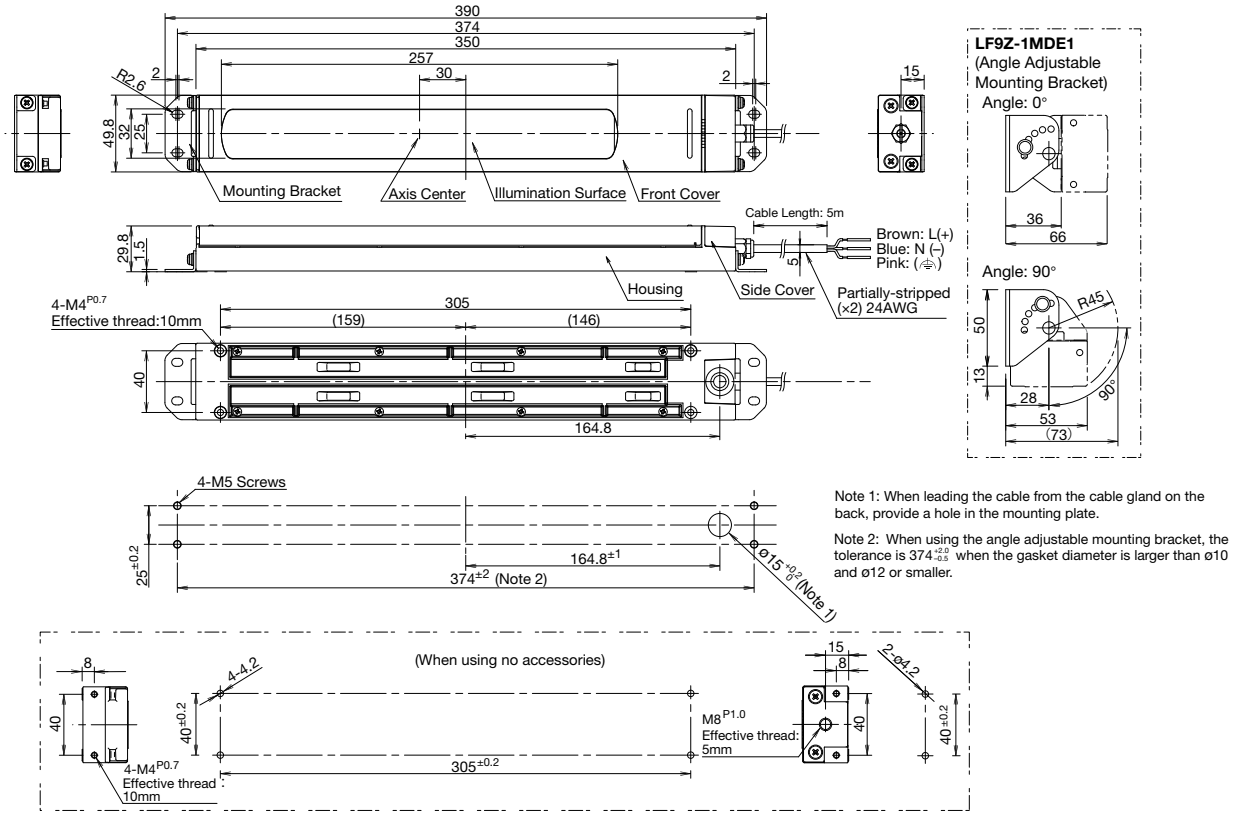

## Dimensions (mm)

### LF1D-C Mini




Note: When leading the cable from the cable gland on the back, provide a hole in the mounting plate. Also, provide a proper sealing.
Recommended M5 screw:
Screw head height: 9.5mm max.
Screw head diameter: 10mm max.
Screw length: 20mm min.
Recommended washer diameter: 10mm max.

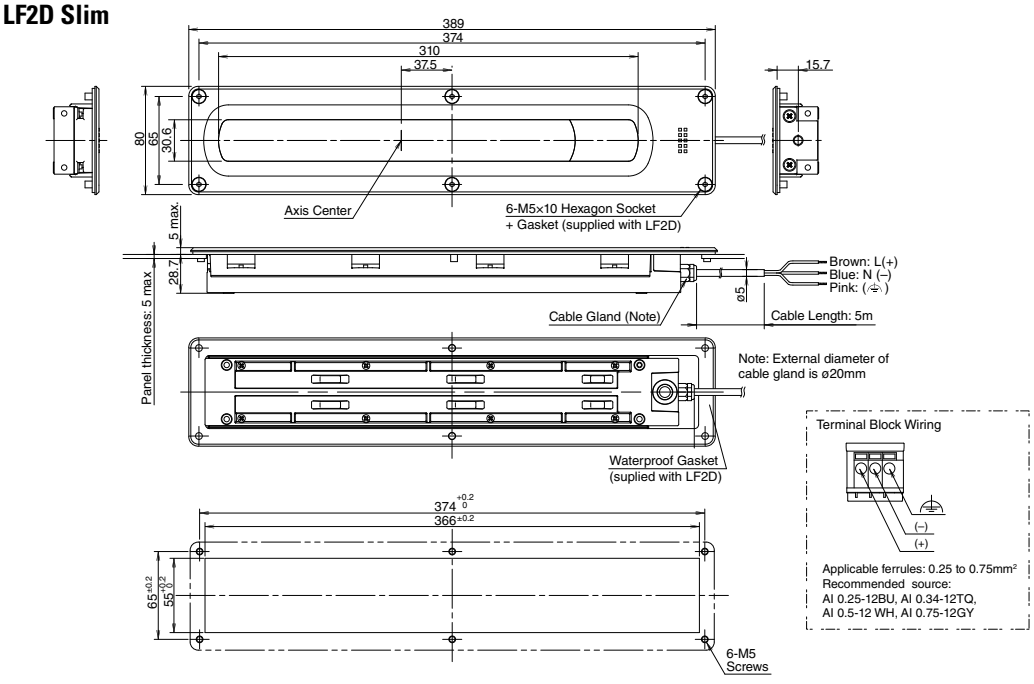
## LF1D Slim



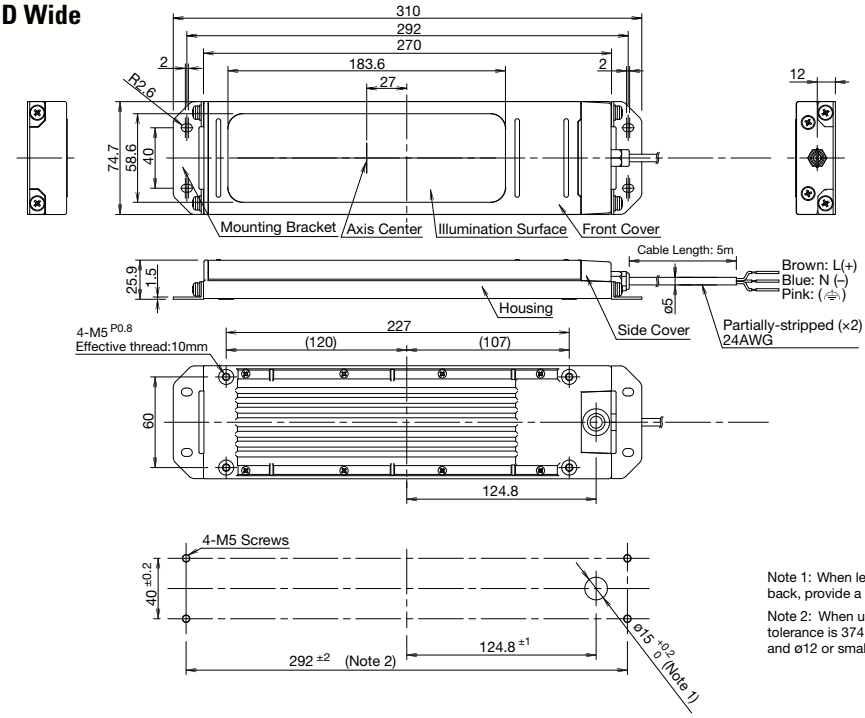

Note 1: When leading the cable from the cable gland on the back, provide a hole in the mounting plate.

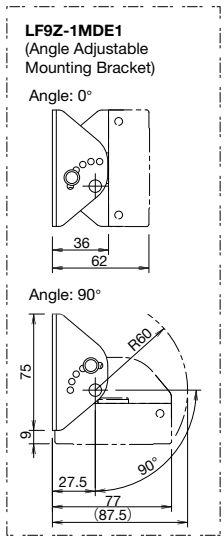
Note 2: When using the angle adjustable mounting bracket, the tolerance is 374 +0.0 −0.5 when the gasket diameter is larger than ø10 and ø12 or smaller.

## LF2D Slim



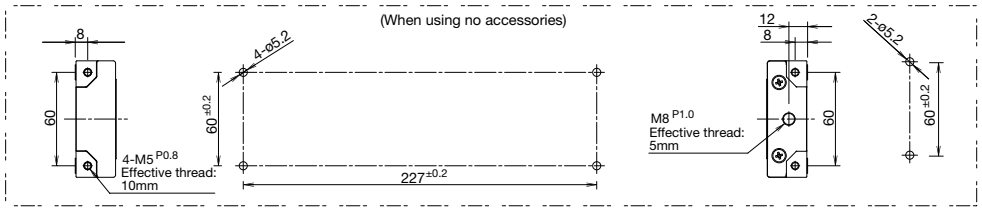
## LF1D Wide



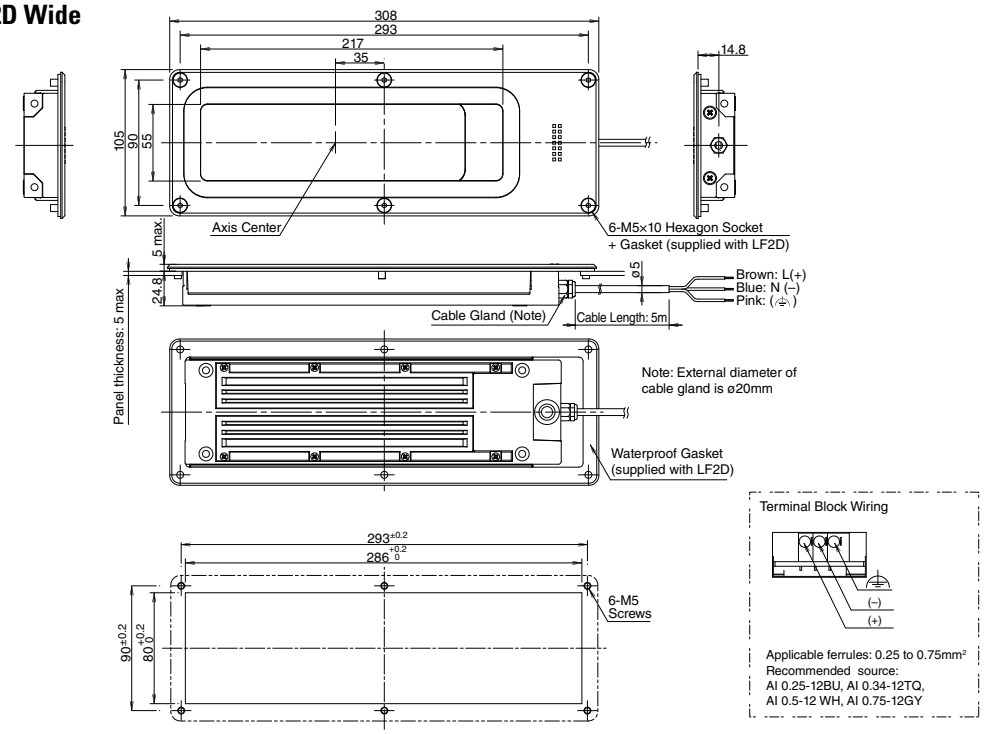




Note 1: When leading the cable from the cable gland on the back, provide a hole in the mounting plate.

Note 2: When using the angle adjustable mounting bracket, the tolerance is $374^{+2.0}_{-0.5}$ when the gasket diameter is larger than ø10 and ø12 or smaller.




## LF2D Wide

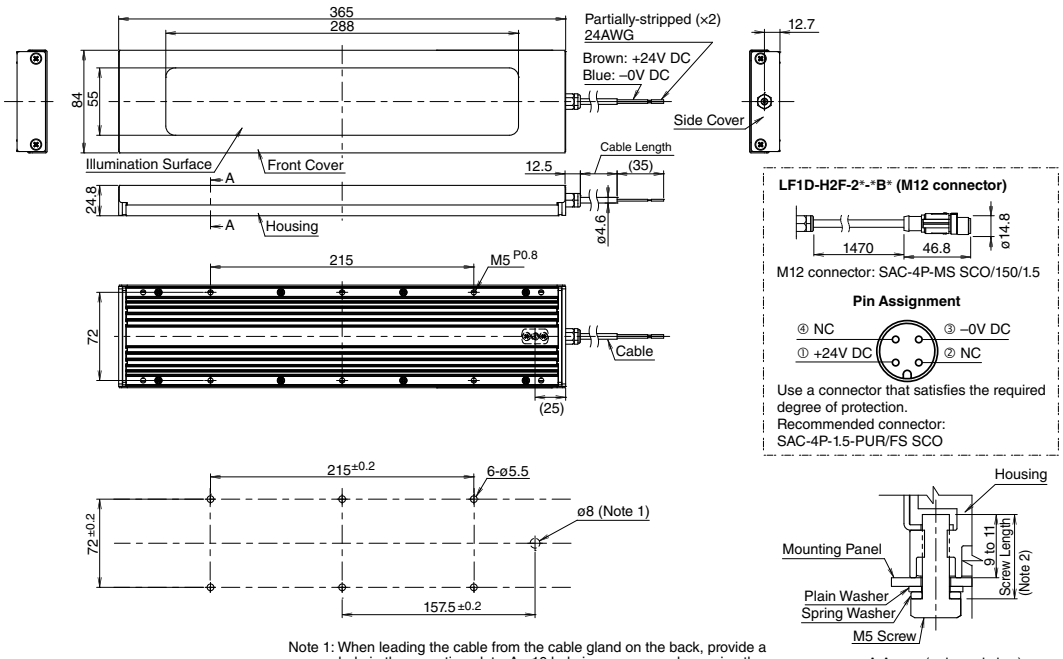






Applicable ferrules: 0.25 to 0.75mm²
Recommended source:
AI 0.25-12BU, AI 0.34-12TQ,
AI 0.5-12 WH, AI 0.75-12GY

## LF1D-H Long




**LF1D-H2F-2*-*B* (M12 connector)**




M12 connector: SAC-4P-MS SCO/150/1.5

**Pin Assignment**



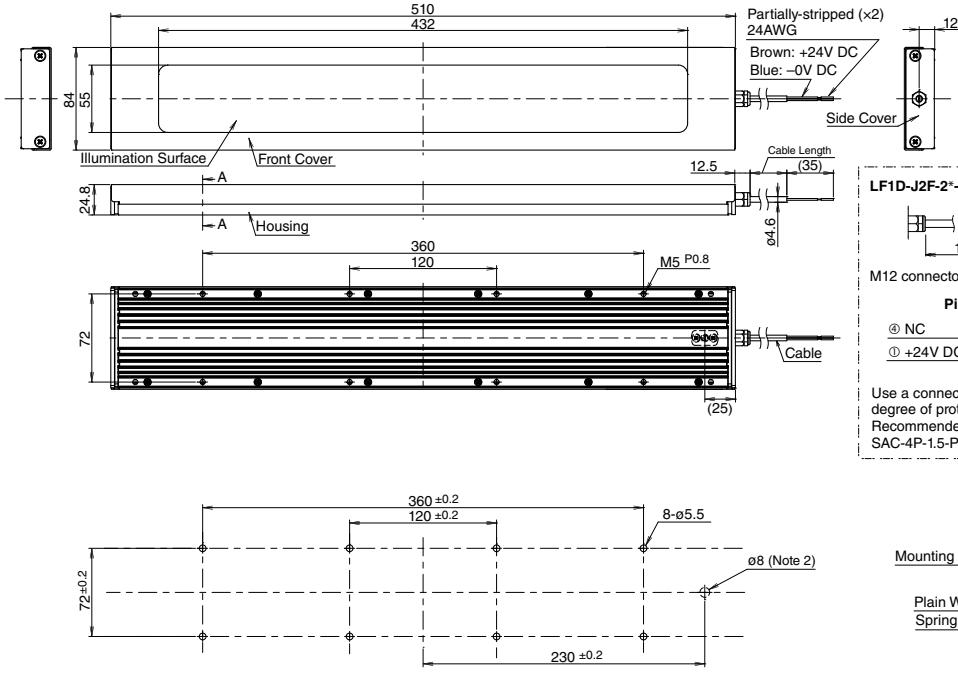

Use a connector that satisfies the required degree of protection.
Recommended connector:
SAC-4P-1.5-PUR/FS SCO



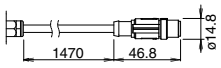

A-A sec. (enlarged view)
(When M5 screw is installed)

Note 1: When leading the cable from the cable gland on the back, provide a hole in the mounting plate. A ø16 hole is necessary when using the LF1D-*2F-2N-*B* (M12 connector type).
Note 2: Choose mounting screws in consideration of mounting plate thickness.

## LF1D-J Long

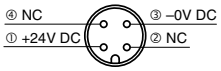



**LF1D-J2F-2*-*B* (M12 connector)**

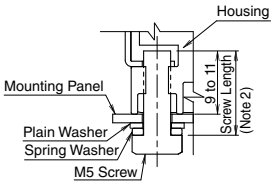



M12 connector: SAC-4P-MS SCO/150/1.5

**Pin Assignment**




Use a connector that satisfies the required degree of protection.
Recommended connector:
SAC-4P-1.5-PUR/FS SCO




A-A sec. (enlarged view)
(When M5 screw is installed)

Note 1: When leading the cable from the cable gland on the back, provide a hole in the mounting plate. A ø16 hole is necessary when using the LF1D-*2F-2N-*B* (M12 connector type).
Note 2: Choose mounting screws in consideration of mounting plate thickness.

# LF2B Series

## Control Panels • Industrial Equipment • Commercial Products

### Key features

Wide range of input voltages (100 - 240V AC) for commercial applications, and 12/24V DC are available for battery or industrial usage. Slim units can be used in many applications and installations where space is limited. Rated IP65 (protection from water and dust), LF2B is great for environments where there is water spray.

- Slim units: 40mm wide x 29mm high
- One-step installation in a narrow space is possible when using mounting brackets
- Five Lengths (210/330/580/830/1,080mm) are offered to meet length requirements and illumination coverages
- Bright and clear white LED illuminates the shapes and colors of target objects
- Two covers: clear or white

*UL applies for DC units only.

## Part Numbers

| Illumination Color | White | | | |
|---|---|---|---|---|
| Cover | Clear Cover | | White Cover | |
| | | | | |
| Rated Voltage | 100 - 240V AC | 12V/24V DC | 100-240V AC | 12V/24V DC |
| LF2B-B (210mm) | LF2B-B3P-ATHWW2-1M | LF2B-B3P-BTHWW2-1M | LF2B-B4P-ATHWW2-1M | LF2B-B4P-BTHWW2-1M |
| LF2B-C (330mm) | LF2B-C3P-ATHWW2-1M | LF2B-C3P-BTHWW2-1M | LF2B-C4P-ATHWW2-1M | LF2B-C4P-BTHWW2-1M |
| LF2B-D (580mm) | LF2B-D3P-ATHWW2-1M | LF2B-D3P-BTHWW2-1M | LF2B-D4P-ATHWW2-1M | LF2B-D4P-BTHWW2-1M |
| LF2B-E (830mm) | LF2B-E3P-ATHWW2-1M | | LF2B-E4P-ATHWW2-1M | |
| LF2B-F (1,080mm) | LF2B-F3P-ATHWW2-1M | | LF2B-F4P-ATHWW2-1M | |

DC12V/24V Length: B (210mm), C (330mm), D (580mm) only

### Part Number Structure (use for interpreting part numbers only)

LF2B - C 3 P - ATHWW2 - 1M

- Length
  - B: 210mm (8.27")
  - C: 330mm (12.99")
  - D: 580mm (22.83")
  - E: 830mm (32.68")
  - F: 1,080mm (42.52")
- Cover
  - 3: Clear
  - 4: White
- Rated Voltage
  - A: 100/240V AC
  - B: 12V/24V DC

DC12V/24V Length: B (210mm), C (330mm), D (580mm) only

### Accessories

| Item | Part Number | Remarks |
|---|---|---|
| Mounting Bracket (U-shape) | LF9Z-1SB21 | Comes with the product (see Note below) |
| Mounting Bracket (L-shape) | LF9Z-1SB22 | Order separately |

LF2B-B and -C includes 2 brackets each; LF2B-E 3 brackets, and LF2B-F 4 brackets.

## Specifications

### LED Optical Specifications

| Model | LF2B-B (210mm) | | LF2B-C (330mm) | | LF2B-D (580mm) | | LF2B-E (830mm) | | LF2B-F (1,080mm) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Illumination Color | White | | | | | | | | | |
| Color Temperature | 6,500K | | | | | | | | | |
| Luminous Flux (typ.) | 180lm | | 360lm | | 720lm | | 1,080lm | | 1,440lm | |
| Cover | Clear | White | Clear | White | Clear | White | Clear | White | Clear | White |
| Reference Illuminance (typ.) at 0.5m directly below | 290lx | 265lx | 540lx | 500lx | 1065lx | 980lx | 1385lx | 1275lx | 1520lx | 1400lx |

LED modules and illumination units may vary in illumination colors and illuminance.

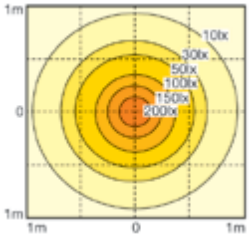
## General Specifications

| Model | | LF2B-B (210mm) | LF2B-C (330mm) | LF2B-D (580mm) | LF2B-E (830mm) | LF2B-F (1,080mm) |
|---|---|---|---|---|---|---|
| Rated Voltage | | 100-240V AC 50/60Hz (Voltage range: 90-264V AC) | | | | |
| | | 12V/24V DC (Voltage range: 10.8-30V DC) | | | | |
| Input Current (typical) (at the rated voltage) [1] | AC100~240V AC | 33mA | 67mA | 96mA | 149mA | 226mA |
| | 12V/24V DC | 215mA | 409mA | 880mA | – | |
| Rated Power (at the rated voltage) | 100~240V AC | 3.8W | 7.5W | 9.2W | 14.3W | 21.8W |
| | 12V/24V DC | 2.6W | 4.9W | 10.6W | – | |
| Insulation Resistance | | 100MΩ minimum (500V DC megger) | | | | |
| Dielectric Strength | 100~240V AC | 2,000V AC | | | | |
| | 12V/24V DC | 1,000V AC | | | – | |
| Vibration Resistance | | Frequency 5 - 55Hz, Amplitude 0.17mm, speed acceleration 20m/s$^2$, 3 directions, 2 hours each | | | | |
| Shock Resistance | | 300m/s$^2$, 6 directions, 5 times each | | | | |
| Operating Temperature | | –30 to +55°C (no freezing) | | | | |
| Operating Humidity | | 45 to 85% RH (no condensation) | | | | |
| Storage Temperature | | –35 to +70°C (no freezing) | | | | |
| Operating Atmosphere | | No corrosive gases | | | | |
| Life [2] | | 40,000 hours (Ta = 25°C) (The total illumination life in which the brightness maintains a minimum of 70% of the initial value.) | | | | |
| Degree of Protection | | IP65 (IEC 60529) | | | | |
| Material | | Front Cover: Polycarbonate Resin; End Cover/Cable Gland: Polyamide Resin; Cable: PVC sheathing (24AWG) | | | | |
| Weight (approx.) | 100~240V AC | 200g | 255g | 400g | 520g | 645g |
| | 12V/24V DC | 175g | 235g | 370g | – | |

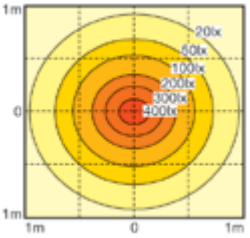
1. 100V AC input for 100 - 240V AC; 12V DC input for 12V/24V DC. 2. LED life is dependent on the operating environment and conditions.

## Illuminance Charts (Clear light at 0.5m)

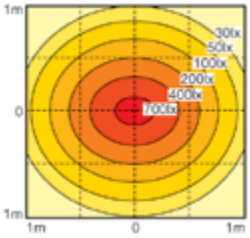
### LF2B-B (210mm)



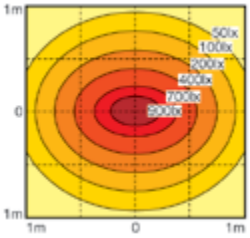

### LF2B-C (330mm)



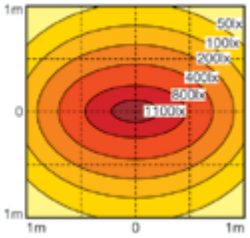

### LF2B-D (580mm)



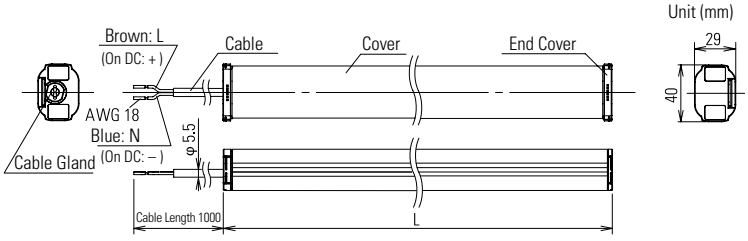

### LF2B-E (830mm)




### LF2B-F (1,080mm)



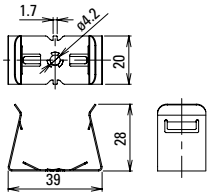

## Dimensions (mm)



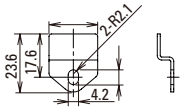

### Dimension Table

| Part Number | L (mm) | Inch |
|---|---|---|
| LF2B-B□P-◇THWW2-1M | 210 | 8.27 |
| LF2B-C□P-◇THWW2-1M | 330 | 12.99 |
| LF2B-D□P-◇THWW2-1M | 580 | 22.83 |
| LF2B-E□P-◇THWW2-1M | 830 | 32.68 |
| LF2B-F□P-◇THWW2-1M | 1,080 | 42.52 |

### Mounting bracket LF9Z-1SB21




### Mounting bracket LF9Z-1SB22



# LF1B-N Series

## Control Panels • Industrial Machines • Commercial Display Cases

### Key features

The LF1B-N series LED light strips are slim and perfect for applications where space is a concern. They come in six different lengths and six distinct colors, making them a very flexible lighting solution.

- Compact design: 27.5mm wide, 16mm high, and 134 to 1,080mm long
- 6 Colors: cool white, warm white, yellow, red, blue, green
- All units come standard with 3 meter connection cables
- 2 Cover options: clear, white
- IP65 degree of protection (waterproof, dustproof), suitable for use in wet locations

CE c UL us

## Part Numbers

| Illumination Color | Cool White | Warm White | Yellow | Red | Blue | Green |
|---|---|---|---|---|---|---|
| Appearance | | | | | | |
| | | | | | | |
| LF1B-NA (134mm) | LF1B-NA①P-2THWW2-3M | LF1B-NA①P-2TLWW2-3M | LF1B-NA①P-2SHY2-3M | LF1B-NA①P-2SHR2-3M | LF1B-NA①P-2THS2-3M | LF1B-NA①P-2SHG2-3M |
| LF1B-NB (210mm) | LF1B-NB①P-2THWW2-3M | LF1B-NB①P-2TLWW2-3M | LF1B-NB①P-2SHY2-3M | LF1B-NB①P-2SHR2-3M | LF1B-NB①P-2THS2-3M | LF1B-NB①P-2SHG2-3M |
| LF1B-NC (330mm) | LF1B-NC①P-2THWW2-3M | LF1B-NC①P-2TLWW2-3M | LF1B-NC①P-2SHY2-3M | LF1B-NC①P-2SHR2-3M | LF1B-NC①P-2THS2-3M | LF1B-NC①P-2SHG2-3M |
| LF1B-ND (580mm) | LF1B-ND①P-2THWW2-3M | LF1B-ND①P-2TLWW2-3M | LF1B-ND①P-2SHY2-3M | LF1B-ND①P-2SHR2-3M | LF1B-ND①P-2THS2-3M | LF1B-ND①P-2SHG2-3M |
| LF1B-NE (830mm) | LF1B-NE①P-2THWW2-3M | LF1B-NE①P-2TLWW2-3M | LF1B-NE①P-2SHY2-3M | LF1B-NE①P-2SHR2-3M | LF1B-NE①P-2THS2-3M | LF1B-NE①P-2SHG2-3M |
| LF1B-NF (1,080mm) | LF1B-NF①P-2THWW2-3M | LF1B-NF①P-2TLWW2-3M | LF1B-NF①P-2SHY2-3M | LF1B-NF①P-2SHR2-3M | LF1B-NF①P-2THS2-3M | LF1B-NF①P-2SHG2-3M |

In place of ① insert 3 for clear cover and 4 for white cover.

**Part Number Structure** (use for interpreting part numbers only)

LF1B - NC 3 P - 2 THWW2 - 3M

- Length
  - A: 134mm (5.28")
  - B: 210mm (8.27")
  - C: 330mm (12.99")
  - D: 580mm (22.83")
  - E: 830mm (32.68")
  - F: 1,080mm (42.52")
- Cover
  - 3: Clear
  - 4: White
- Illumination Color
  - THWW2: Cool white
  - TLWW2: Warm white
  - SHY2: Yellow
  - SHR2: Red
  - THS2: Blue
  - SHG2: Green
- Cable Length
  - 3M: 3m

### Accessory

| Item | Mounting Bracket- Adjustable Angle |
|---|---|
| Part No. | LF9Z-1MB1 |
| Material | Stainless Steel |

1. 1 pair, Left and Right.
2. Not applicable to LF1B-ND.

# Specifications

## LED Optical Specifications

| Illumination Color | | Cool White | | Warm White | | Yellow | | Red | | Green | | Blue | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cover | | Clear | White | Clear | White | Clear | White | Clear | White | Clear | White | Clear | White |
| Color Temperature/ Dominant Wavelength (typ.) | | 6,500K | | 2,900K | | 590nm | | 620nm | | 525nm | | 455nm | |
| Reference Brightness (typ.) at 0.5m | LF1B-NA | 95lx | 85lx | 60lx | 55lx | 20lx | 18lx | 20lx | 18lx | 30lx | 27lx | 10lx | 9lx |
| | LF1B-NB | 240lx | 215lx | 145lx | 130lx | 40lx | 36lx | 40lx | 36lx | 60lx | 55lx | 20lx | 18lx |
| | LF1B-NC | 455lx | 410lx | 250lx | 225lx | 75lx | 65lx | 75lx | 65lx | 110lx | 100lx | 30lx | 27lx |
| | LF1B-ND | 840lx | 750lx | 455lx | 410lx | 125lx | 110lx | 125lx | 110lx | 190lx | 170lx | 50lx | 45lx |
| | LF1B-NE | 1100lx | 995lx | 560lx | 500lx | 160lx | 145lx | 160lx | 145lx | 260lx | 235lx | 60lx | 55lx |
| | LF1B-NF | 1350lx | 1210lx | 620lx | 555lx | 180lx | 160lx | 180lx | 160lx | 300lx | 270lx | 80lx | 70lx |

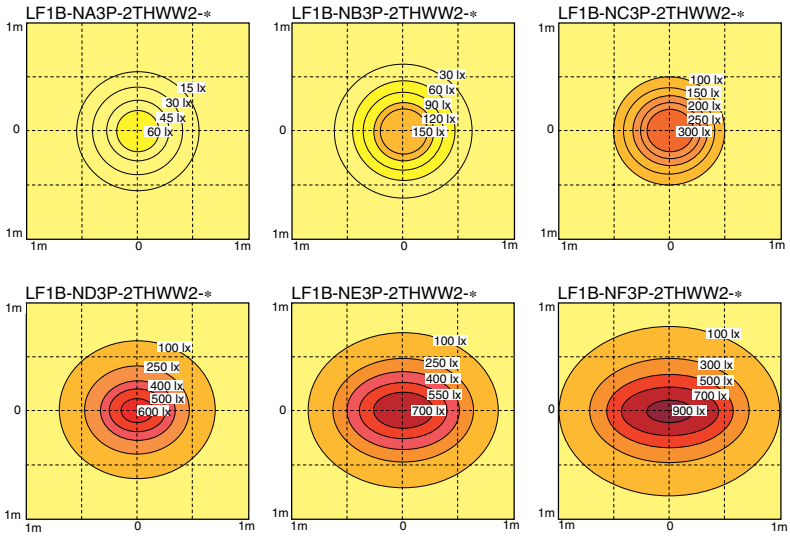
LED modules and illumination units may vary in illumination colors and brightness.

## General Specifications

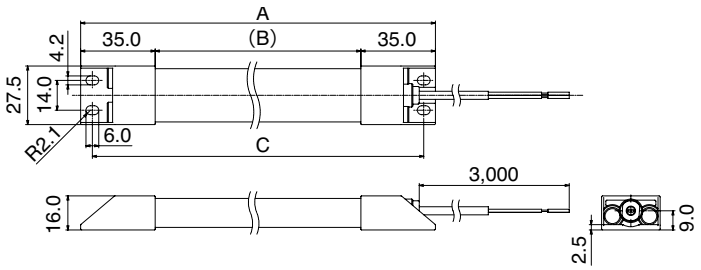
| Model | | LF1B-NA (134mm) | LF1B-NB (210mm) | LF1B-NC (330mm) | LF1B-ND (580mm) | LF1B-NE (830mm) | LF1B-NF (1,080mm) |
|---|---|---|---|---|---|---|---|
| Rated Voltage | | 24V DC (operating voltage range: 21.6 to 26.4V) | | | | | |
| Input Current (typ.) (at the rated current) | cool white/warm white/blue | 60mA | 120mA | 180mA | 360mA | 540mA | 720mA |
| | red/yellow/green | 40mA | 80mA | 120mA | 240mA | 360mA | 480mA |
| Power Consumption (typ.) (at the rated voltage) | cool white/warm white/blue | 1.5W | 2.9W | 4.4W | 8.7W | 13.0W | 17.3W |
| | red/yellow/green | 1.0W | 2.0W | 2.9W | 5.8W | 8.7W | 11.6W |
| Insulation Resistance | | 100MΩ minimum (500V DC megger) | | | | | |
| Dielectric Strength | | 1,000V AC, 1 minute (between live and dead parts) | | | | | |
| Vibration Resistance (damage limits) | | Frequency: 5 to 55Hz, Amplitude 0.5mm Acceleration 60m/s$^2$ (6G), 2 hours each in 3 axes | | | | Frequency: 5 to 55Hz, Amplitude 0.17mm Acceleration 20m/s$^2$ (2G), 2 hours each in 3 axes | |
| Shock Resistance (damage limits) | | 1,000m/s$^2$ (100G), 5 shocks each in 6 axes | | | | 300m/s$^2$ (30G), 5 shocks each in 6 axes | |
| Operating Temperature | | –30 to +55°C (no freezing) | | | | | |
| Operating Humidity | | 45 to 85% RH (no condensation) | | | | | |
| Storage Temperature | | –35 to +70°C (no freezing) | | | | | |
| Operating Atmosphere | | No corrosive gases | | | | | |
| Life (Note) | | 40,000 hours (Ta = 25°C) (The total illumination life in which the brightness maintains a minimum of 70% of the initial value.) | | | | | |
| Degree of Protection | | IP65 (IEC 60529) | | | | | |
| Material | | Cover: polycarbonate, End cover/cable gland: polyamide, Wire: PVC (24AWG) | | | | | |
| Weight (approx.) | | 95g | 125g | 165g | 255g | 430g | 740g |

1. LED life depends on the operating environment.

## Brilliance Distribution at 0.5m (reference value)




## Dimensions (mm)




### Dimension Table

| Model | A | | B | | C | |
|---|---|---|---|---|---|---|
| | mm | inch | mm | inch | mm | inch |
| LF1B-NA | 134 | 5.28 | 64 | 2.52 | 123 | 4.84 |
| LF1B-NB | 210 | 8.27 | 140 | 5.51 | 199 | 7.83 |
| LF1B-NC | 330 | 12.99 | 260 | 10.24 | 319 | 12.56 |
| LF1B-ND | 580 | 22.83 | 510 | 20.08 | 569 | 22.40 |
| LF1B-NE | 830 | 32.68 | 760 | 29.92 | 819 | 32.24 |
| LF1B-NF | 1080 | 42.52 | 1010 | 39.76 | 1069 | 42.09 |

# LF1A Series

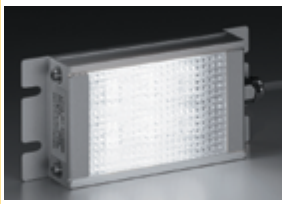
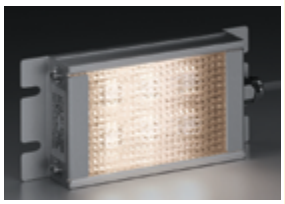
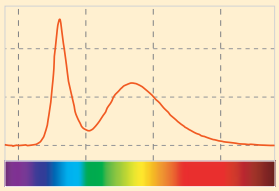
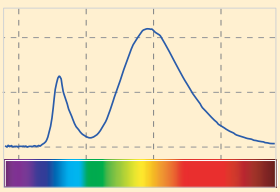
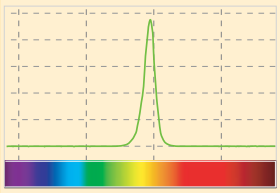
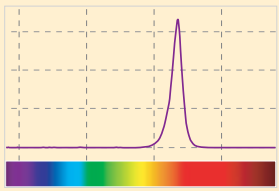
## Control Panels • Manufacturing Equipment

### Key Features

LF1A LED strips use super-bright multi-chip LEDs providing illumination equivalent to a 25W fluorescent lamp, while consuming only one-third the power. They come in a thin housing available in three sizes with four color configurations: cool white (5500K), warm white (2800K), yellow (590nm) and red (625nm).

- Brightness: 66.6 Lumens/Watt
- Energy savings: One-third of fluorescent lamps
- Long life: 40,000 hrs (Half-life)
- UL Listed
- RoHS Compliant
- IP40

### Part Numbers

| Color | Cool White | Warm White | Yellow | Red |
|---|---|---|---|---|
| Part No. | LF1A-*-2THWW6 | LF1A-*-2TLWW6 | LF1A-*-2SHY8 | LF1A-*-2SHR8 |
| Appearance |  |  | | |
| Light Spectrum |  |  |  |  |

*LED Array A1 = 3x2 , B1 = 6x2, D1 = 12x2

### Part Number Structure (use for interpreting part numbers only)

L F 1 A – A1 – 2 THWW6

LED Module Arrangement
A1: 3 LEDs × 2 rows
B1: 6 LEDs × 2 rows
D1: 12 LEDs × 2 rows

LED Illumination Color
THWW6: Cool White
TLWW6: Warm white
SHY8: Yellow
SHR8: Red

### Accessory

| Item | Mounting Bracket- Adjustable Angle |
|---|---|
| Part No. | LF9Z-1MA1 |
| Material | Stainless Steel |

1 pair, Left and Right

# Specifications

## LED Optical Specifications

| Model | | LF1A-*-2THWW6 | LF1A-*-2TLWW6 | LF1A-*-2SHY8 | LF1A-*-2SHR8 |
|---|---|---|---|---|---|
| Illumination Color | | Cool White | Warm White | Yellow | Red |
| Luminous Intensity (Single LED module) | | 6,000mcd | 4,000mcd | 4,000mcd | 2,500mcd |
| Color Temperature / Dominant Wavelength | | 5,500K | 2,800K | 590nm | 625nm |
| Reference Illuminance at 0.5m | LED Array 3 x 2 | 190lx | 130lx | 130lx | 85lx |
| | LED Array 6 x 2 | 380lx | 260lx | 260lx | 170lx |
| | LED Array 12 x 2 | 760lx | 520lx | 520lx | 340lx |

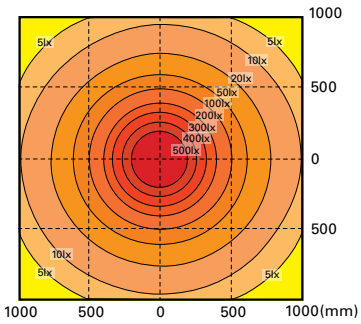
*LED Array A1 = 3x2 , B1 = 6x2, D1 = 12x2

## General Specifications

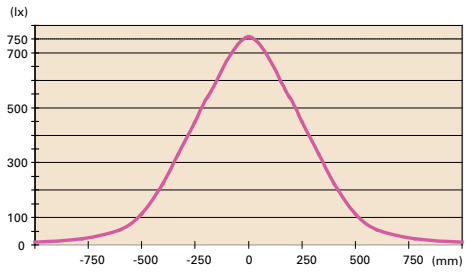
| Model | | LF1A-*-2THWW6 | LF1A-*-2TLWW6 | LF1A-*-2SHY8 | LF1A-*-2SHR8 |
|---|---|---|---|---|---|
| Rated Voltage | | 24V DC (non-polarized) | | | |
| Input Current (at rated voltage) | LED Array 3 x 2 | 75mA | | 90mA | |
| | LED Array 6 x 2 | 150mA | | 180mA | |
| | LED Array 12 x 2 | 300mA | | 360mA | |
| Rated Power (at rated voltage) | LED Array 3 x 2 | 1.8W | | 2.2W | |
| | LED Array 6 x 2 | 3.6W | | 4.4W | |
| | LED Array 12 x 2 | 7.2W | | 8.7W | |
| Dielectric Strength | | Between live and dead parts: 1000V AC, 1 minute | | | |
| Insulation Resistance | | Between live and dead parts: 100 MΩ (500V DC megger) | | | |
| Operating Temperature | | -20 to +50°C | | | |
| Storage Temperature | | -25 to +70°C | | | |
| Operating/Storage Humidity | | 45 to 85% RH (no condensation) | | | |
| Life (half luminance) [2] | | 40,000 hours | | | |
| Weight (approx.) | | LF1A-A1: 190g, LF1A-B1: 270g, LF1A-D1: 470g | | | |
| Degree of Protection | | IP40 | | | |

1. *LED Array A1 = 3x2 , B1 = 6x2, D1 = 12x2
2. LED life depends upon operating environment.

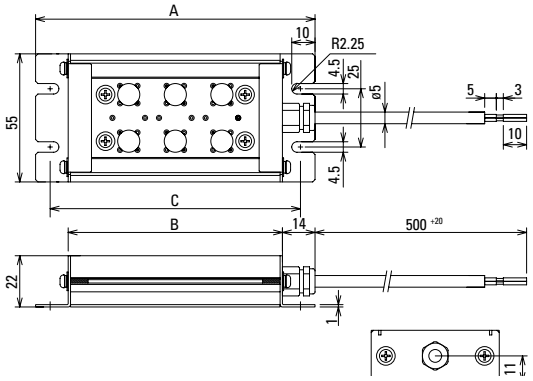
## Illuminance Chart LF1A-D1-2THWW6




## Light Distribution at 0.5m LF1A-D1-THWW6 (Cool White)




## Dimensions (mm)




### Dimension Table

| Part No. | A | B | C |
|---|---|---|---|
| LF1A-A1- | 120 | 92 | 108 |
| LF1A-B1- | 180 | 152 | 168 |
| LF1A-D1- | 300 | 272 | 288 |

# EF1A Series

## Hazardous locations: Oil & Gas, Water Treatment, Chemical Plants, Painting Booths

**Key features:**

- Hazardous location LED flood lights (Class I, Zone 1 and Zone 2)
- Heavy-duty aluminum housing with reinforced glass lens
- Narrow-angle and wide-angle beam models available
- Clear or translucent lenses
- Available with adjustable, fixed angle or no mounting bracket
- Four conduit sizes available
- Type 4X (IP67) without switch
- Type 3S (IP65) with switch

### Certifications and Compliances

| NEC and CEC | IEC and ATEX (94/9/EC) |
|---|---|
| Cl. I, Zone 1, Groups IIB, IIA | Zones 1 & 21 and 2 & 22 |
| UL: Class I, Zone 1, AEx d IIB T4 Gb | ATEX: II 2G Ex d IIB T4 Gb<br>II 2D Ex tb IIIC T 130°C Db IP67 (or IP65) |
| cUL: Ex d IIB T4 Gb X | IECEx: Ex d IIB T4 Gb<br>Ex tb IIIC T 130°C Db IP67 (or IP65) |
| Certificate/file number: UL/cUL E353024 | Certificate numbers: DEMKO 14 ATEX 1208667X<br>IECEx UL 14.0048X |

### Part Numbers

### Without pushbutton switch - Type 4X (IP67)

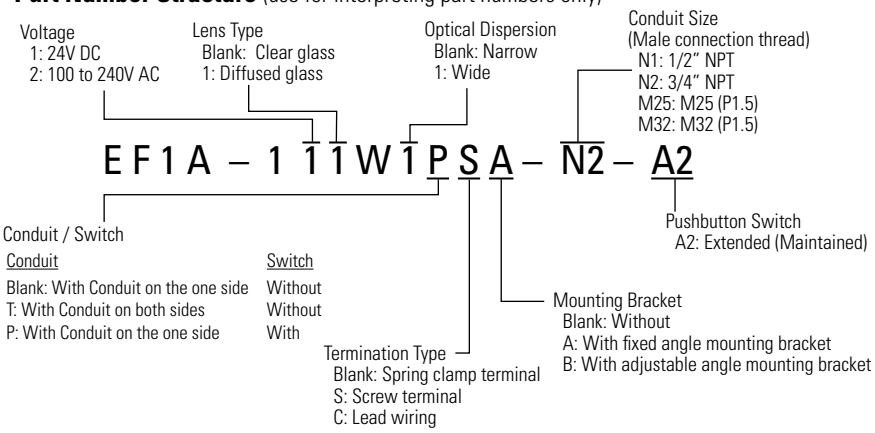
| Rated Voltage | Optical Dispersion | Mounting Bracket | Lens Type ① | Conduit Entry ② | Termination Type ③ | Conduit Size (Male connection thread) ④ | Part No. |
|---|---|---|---|---|---|---|---|
| 100 to 240V AC | Narrow | Without (4-M6 screw on the back of EF1A) | Blank: Clear glass<br>1: Diffused glass | Blank: One Side<br>T: Both Sides | Blank: Spring Clamp Terminal<br>S: Screw Terminal<br>C: Lead Wire | N1: 1/2" NPT<br>N2: 3/4" NPT<br>M25: M25 (P1.5)<br>M32: M32 (P1.5) | EF1A-12①W②③-④ |
| | | With (Fixed angle) | | | | | EF1A-12①W②③A-④ |
| | | With (Adjustable angle) | | | | | EF1A-12①W②③B-④ |
| | Wide | Without (4-M6 screw on the back of EF1A) | | | | | EF1A-12①W1②③-④ |
| | | With (Fixed angle) | | | | | EF1A-12①W1②③A-④ |
| | | With (Adjustable angle) | | | | | EF1A-12①W1②③B-④ |
| 24V DC | Narrow | Without (4-M6 screw on the back of EF1A) | | | | | EF1A-11①W②③-④ |
| | | With (Fixed angle) | | | | | EF1A-11①W②③A-④ |
| | | With (Adjustable angle) | | | | | EF1A-11①W②③B-④ |
| | Wide | Without (4-M6 screw on the back of EF1A) | | | | | EF1A-11①W1②③-④ |
| | | With (Fixed angle) | | | | | EF1A-11①W1②③A-④ |
| | | With (Adjustable angle) | | | | | EF1A-11①W1②③B-④ |

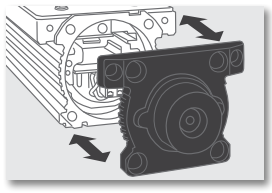
### With pushbutton - Type 3S (IP65)

| Rated Voltage | Optical Dispersion | Mounting Bracket | Lens Type ① | Conduit Entry ② | Termination Type ③ | Conduit Size (Male connection thread) ④ | Part No. |
|---|---|---|---|---|---|---|---|
| 100 to 240V AC | Narrow | Without (4-M6 screw on the back of EF1A) | Blank: Clear glass<br>1: Diffused glass | P: One Side (Another Side Switch) * | Blank: Spring Clamp Terminal<br>S: Screw Terminal<br>C: Lead Wire | N1: 1/2" NPT<br>N2: 3/4" NPT<br>M25: M25 (P1.5)<br>M32: M32 (P1.5) | EF1A-12①WP③-④-A2 |
| | | With (Fixed angle) | | | | | EF1A-12①WP③A-④-A2 |
| | | With (Adjustable angle) | | | | | EF1A-12①WP③B-④-A2 |
| | Wide | Without (4-M6 screw on the back of EF1A) | | | | | EF1A-12①W1P③-④-A2 |
| | | With (Fixed angle) | | | | | EF1A-12①W1P③A-④-A2 |
| | | With (Adjustable angle) | | | | | EF1A-12①W1P③B-④-A2 |
| 24V DC | Narrow | Without (4-M6 screw on the back of EF1A) | | | | | EF1A-11①WP③-④-A2 |
| | | With (Fixed angle) | | | | | EF1A-11①WP③A-④-A2 |
| | | With (Adjustable angle) | | | | | EF1A-11①WP③B-④-A2 |
| | Wide | Without (4-M6 screw on the back of EF1A) | | | | | EF1A-11①W1P③-④-A2 |
| | | With (Fixed angle) | | | | | EF1A-11①W1P③A-④-A2 |
| | | With (Adjustable angle) | | | | | EF1A-11①W1P③B-④-A2 |

* End of Part No. is marking A2 (pushbutton switch)

**Part Number Structure** (use for interpreting part numbers only)



**Termination Type**

Spring clamp terminal

Screw terminal

Lead wiring

## General Specifications

| Model | EF1A -11 | EF1A -12 |
|---|---|---|
| Rated Voltage | 24V DC | 100 to 240V AC |
| Voltage Range | 21.6 to 26.4V DC | 90 to 264V AC |
| Rated Power (typ.) | 17W (at rated voltage) | 19W (at rated voltage) |
| Dielectric Strength | 500V AC 1 minute input - FG | 2000V AC 1 minute input - FG |
| Insulation Resistance | 100MΩ minimum (500V DC megger) input - FG | |
| Vibration Resistance (damage limits) | Frequency 5 to 55Hz, amplitude 0.5mm | |
| Shock Resistance (damage limits) | 1000m/s$^2$ | |
| Operating Temperature | -20 to +50°C (no freezing) | |
| Operating Humidity | 45 to 85% RH (no condensation) | |
| Storage Temperature | -35 to +70°C (no freezing) | |
| Life | Over 50,000 hours (The illumination duration in which the brightness maintains a minimum of 70% of initial value at 25°C) | |
| Material | Housing: aluminum, front panel: stainless steel, mounting bracket: stainless steel<br>Lens surface: reinforced glass | |
| Weight (approx.) | 2.9Kg (without mounting bracket), 3.1Kg (with mounting bracket) | |

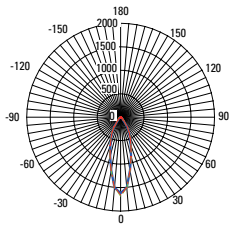
## LED Optical Specifications

| Lens Type | Clear | | Diffused | |
|---|---|---|---|---|
| Collecting Lens (Optical Dispersion) | With | Without | With | Without |
| Number of LEDs | 16 | | | |
| Color Temperature (typ.) | 5700K (Cool White) | | | |
| Total Luminous Flux (typ.) | 960lm | | | |
| Reference Illuminance (typ.) At 1.0m directory below | 1100lx | 450lx | 205lx | 175lx |

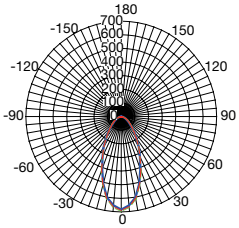
## Optical Dispersion (cd/1000lm)

Narrow

Clear glass

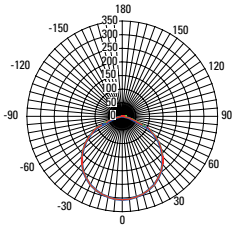



Diffused glass

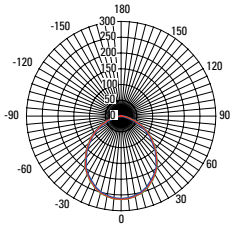


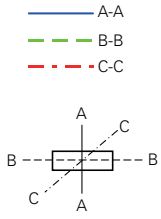

Wide

Clear glass




Diffused glass

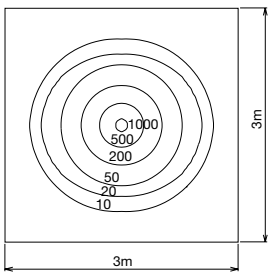


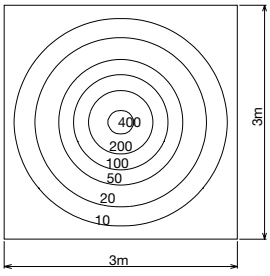

## Illuminance Distribution (at 1.0m)

Narrow (lx)

Clear glass

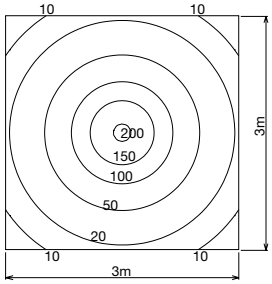



Diffused glass

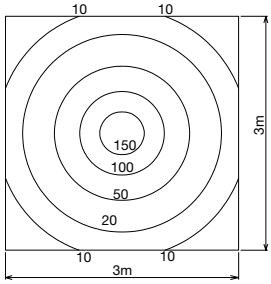



Wide (lx)

Clear glass

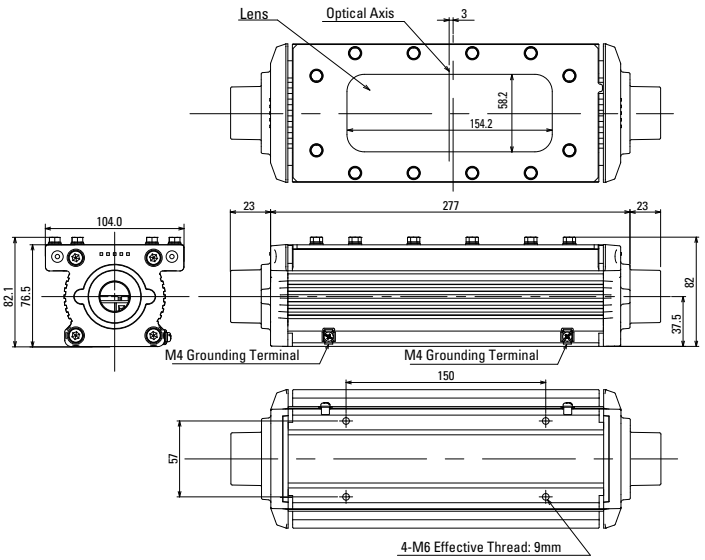



Diffused glass

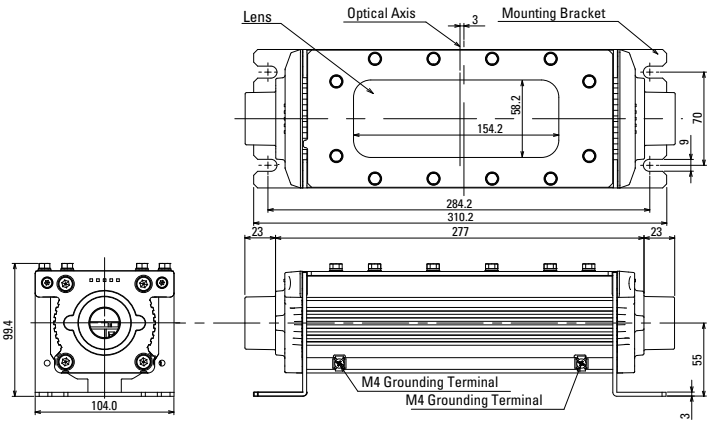


## Dimensions (mm)

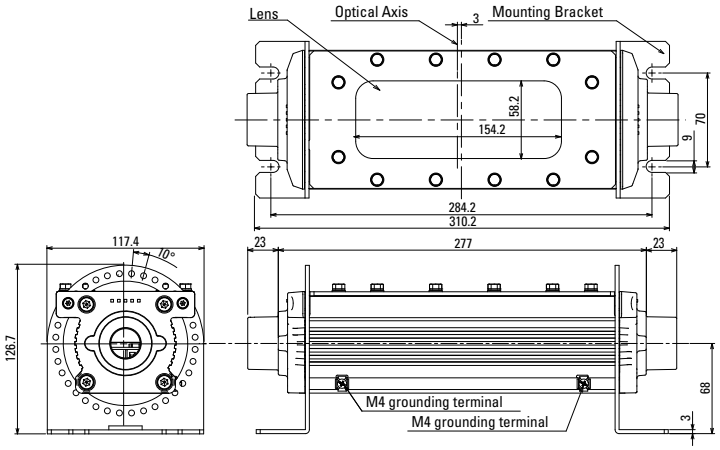
1) Direct mounting




2) With fixed mounting bracket

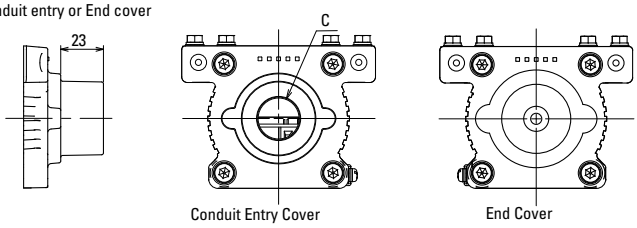



3) With angle adjustable bracket



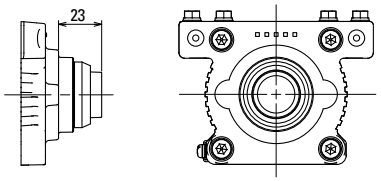

(4) Dimension of conduit entry and ON/OFF switch and end cover

Conduit entry or End cover

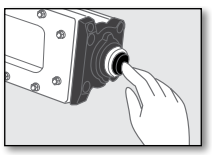



| Conduit entry size | C |
|---|---|
| N1 | 1/2 " NPT |
| N2 | 3/4 " NPT |
| M25 | M25 P1.5 |
| M32 | M32 P1.5 |

With ON/OFF Switch

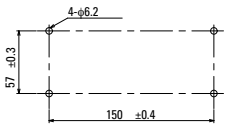



Optional integrated switch to turn the LED on and off

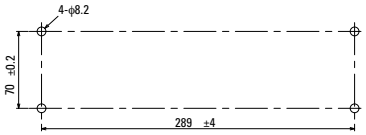


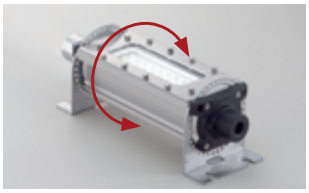
(5) Mounting hole layout

1) Direct mounting




2) With mounting bracket/angle adjustable bracket



With angle adjustable bracket

(6) Attachments

Instruction Manual……..1
Hexagon Wrench (3)……1 (only with bracket)
Hexagon Wrench (5)……1

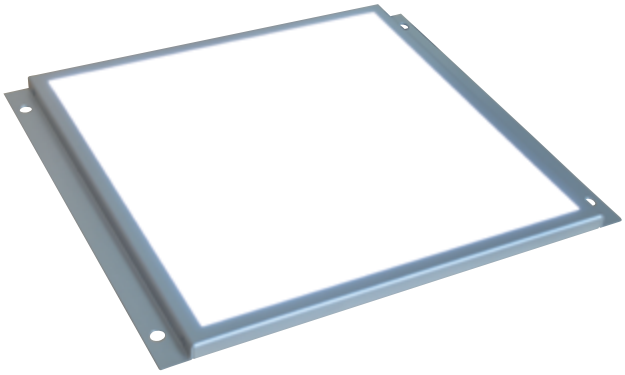
# LF1F Series

## Visual Inspection Lighting • Elevator Ceiling Lighting

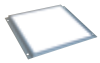
### Key features

Unlike fluorescent lights, LED lights do not flicker and therefore illuminate objects evenly. Uneven surfaces, such as scratches and flaws, are more visible providing more accurate inspections. The LF1F provides steady light regardless of ambient temperature and the narrow profile saves space allowing mounting flexibility.

- Energy saving
- Long operating life
- Maintenance free
- 12mm-thin bezel saves space
- 300mm square illuminated surface
- Wider operating temperature range than fluorescent lighting



## Part Numbers

| Appearance | Model | Cable Length | Size | Color Temperature |
|---|---|---|---|---|
|  | LF1F-B4-2D1 | 1m | 300mm square | 8,500K |
| | LF1F-B4-2D3 | 3m | | |

## Specifications

### LED Optical Specifications

| Model | LF1F |
|---|---|
| Color Temperature | 8,500K |
| Reference Illuminance at 1.0m | 5,800lx minimum (panel center) |

### Operating Specifications

| Model | LF1F |
|---|---|
| Operating Voltage Range | 21.6 ~ 26.4V DC |
| Wattage (typ.) | 11W |
| Insulation Resistance | 100MΩ minimum |
| Dielectric Strength | 1,000V, 50/60Hz, 1 minute |
| Vibration Resistance | 5 ~ 55Hz, amplitude 0.5mm, 60m/s$^2$ (3 directions, 2 hours each) |
| Shock Resistance | 1,000m/s$^2$ |
| Operating Temperature | -10° ~ 60 (no freezing) |
| Operating Humidity | 45 ~ 85% RH (no condensation) |
| Storage Temperature | -20° ~ 70°C (no freezing) |
| Operating Environment | No corrosive gases, no harmful dust |
| Life [1] | 40,000 hours |
| Degree of Protection | IP20 (IEC60529) |
| Materials | Housing: Aluminum<br>Light emitting part: acrylic;<br>Cover: acrylic |
| Weight (approx.) | 1.1kg |

1. LED life depends upon operating environment.

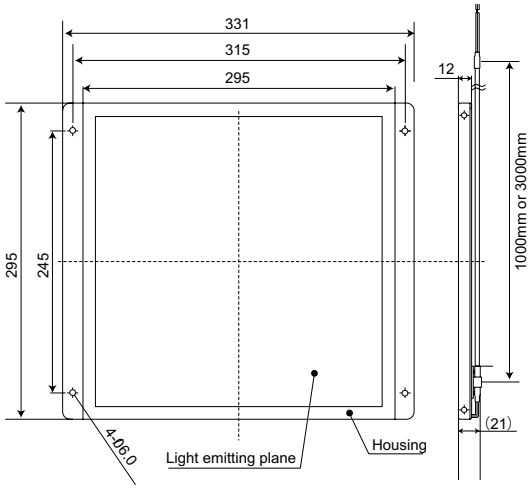
## Applications

Ideal for visual inspection, as the LF1F makes it easy to see even the slightest surface flaws.

Application examples for product inspections

- Detect uneven plastic and rubber part surfaces
- Detect dust on glass or plastic plates
- Illuminate marks on metal surfaces during cutting and marking
- Detect flaws on painted or plated surfaces
- Detect scratches and unevenness on embossed materials
- Detect scratches and foreign materials on silicon wafers
- Elevator illumination

### Dimensions (mm)




(Light emitting plane: 271 x 271)

## Safety Precautions

- To avoid electric shock, fire, or malfunction do not disassemble, repair, or modify the unit.
- Turn power off before wiring. To prevent electric shock or damage, ensure wiring is correct.
- Do not stare directly into the LF1B-N unit while it is lit, and do not project the light towards other people, as their eyes may be injured.
- The LF1B-N is a general-purpose industrial electric device. Do not use with electronic equipment which may cause harm or injury to anyone in case a malfunction or failure occurs.
- Please adhere to the operating temperature specification. A rise in internal temperature may damage the product.

## Instructions

- LED modules may vary slightly in color and brightness.
- Before designing equipment and powering up units, confirm the specifications described in the instruction sheet.
- Apply voltage within the rated values, otherwise the LED elements may be damaged.
- The unit is vulnerable to static electricity. Take sufficient measures for protection against static electricity and voltage surges.
- Make sure that the unit is not dropped during transportation, installation, and operation, otherwise damage may result.
- Do not pull or push the cable, otherwise damage may result. Allow sufficient slack to the cable while wiring.
- Do not apply excessive force. Do not leave a damaged unit unattended or use a damaged unit.
- Ensure the correct operating temperature, as rise in internal temperature may result in damage to the unit.
- Do not use or store in a location subject to vibration and shock.
- Do not use in the following locations:
  - Exposure to direct sunlight, near heaters, high temperatures
  - Subject to chemicals, and corrosive gases
  - Cold storage warehouses (make sure that no freezing occurs)
  - Places with high humidity such as basements and greenhouses
- Do not loosen screws, otherwise, the protection characteristics will be impaired.
- To clean the cover use a soft cloth with water or neutral detergent. Do not use solvents such as thinners, benzene, or alkaline, otherwise discoloration, deterioration, or decrease in strength may occur.
- The edge of the cable sheath is not waterproof. Moisture may be drawn in to the unit if water splashes directly onto the cable sheath.

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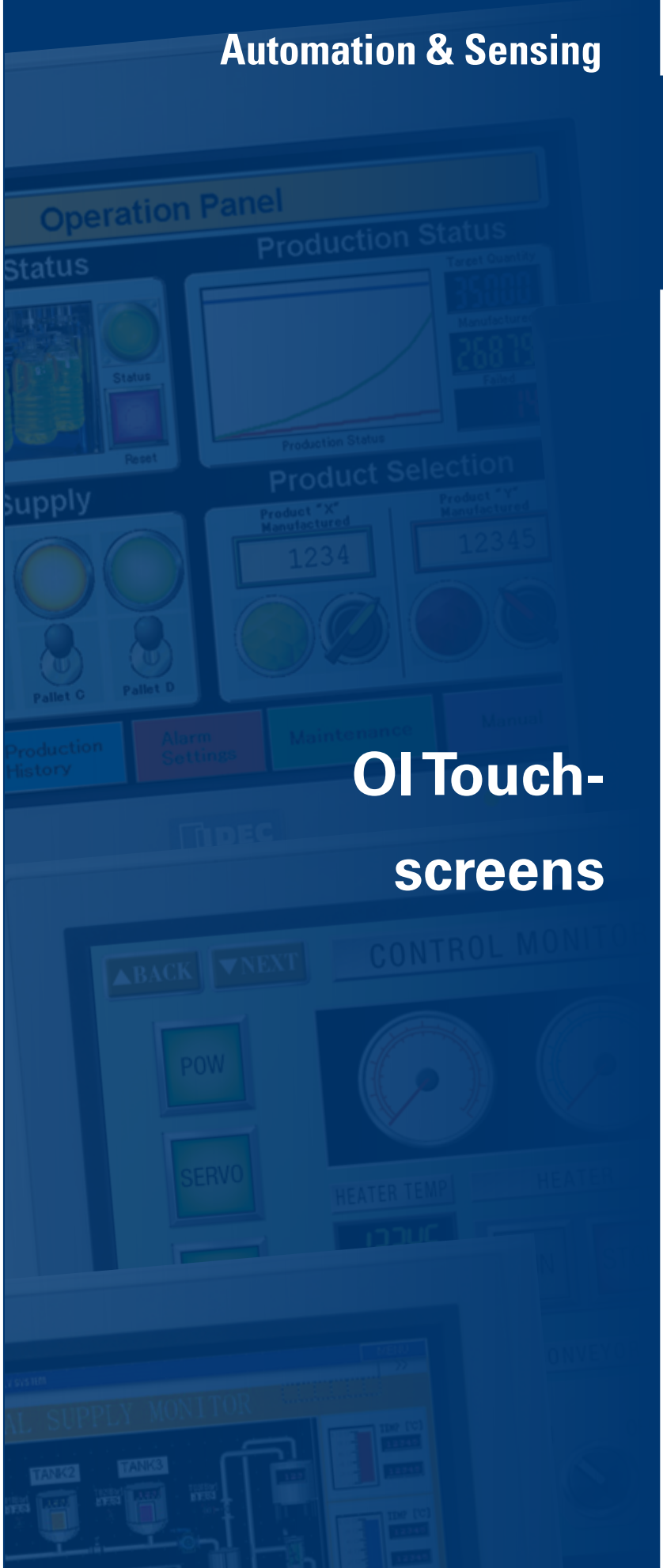
# OI Touch-screens




IDEC

**www.IDEC.com/oi**

# Selection Guide

| | Compact Series | Basic Series | Enhanced Series | |
|---|---|---|---|---|
| | 4.3" | 4.6" | 5.7" | |
| | | | | |
| Display Type | Color-TFT | Monochrome | Monochrome | Color–TFT |
| Color Depth | 65,536 | 2 | 2 | 65,536 |
| Rated Power Voltage | 12 to 24 VDC | 24VDC | 12 to 24VDC | 12 to 24 VDC |
| Resolution | 480 x 272 | 300 x 100 | 320 x 240 | 320 x 240 |
| Mount Portrait or Landscape | ✓ | ✓ | ✓ | ✓ |
| Brightness (cd / m²) | 800 | 500 | 1100 | 500 |
| SD Card Slot | – | – | – | – |
| Expansion I/O module | | | | |
| Serial Ports | 1 (RS-232), 1 (RS-485, RS-422) | RS232 RS485(422) | 1 (RS232, RS485,RS422) | 1 (RS232, RS485,RS422) |
| Ethernet Port | Standard | – | Standard | Standard |
| USB Ports | 1 Type A/ 1 MiniB | | 1 Type A/ 1 MiniB | 1 TypeA / 1 MiniB |
| Video In *1 | – | | – | – |
| Audio In/Out *2 | – | | | |
| Remote Control / Monitor | ✓ | | ✓ | ✓ |
| Multiple Protocols | ✓ | ✓ | ✓ | ✓ |
| FTP Server Function | ✓ | ✓ | ✓ | ✓ |
| Approvals | IP66F/IP67F, UL508, CSA C22.2 No. 142, 213 ANSI/ ISA - 12/12.01, Type 4X & 13, Class 1 Div 2 | IP65, Type 13,UL508, UL1604, CSA C22.2 No.213 | IP66F, UL508, CSA C22.2 NO 142.213 ANSI/ISA:12.12.01 Type 4x & 13 Class I Div 2 | IP66F,UL508, CSA C22.2 No.142/213, ANSI/ISA:12.12.01 Type 4x & 13 Class I Div 2 |
| Bezel – Light Gray | - | HG1F-SB22BF-W HG1F-SB22YF-W | HG2G-5TN22TF-W | HG2G-5TT22TF-W |
| Bezel – Black | HG1G-4VT22TF-B | HG1F-SB22BF-B HG1F-SB22YF-B | HG2G-5TN22TF-B | HG2G-5TT22TF-B |
| Bezel – Silver | HG1G-4VT22TF-S | – – | HG2G-5TN22TF-S | HG2G-5TT22TF-S |

*1. Composite Video RCA connector (NTSC or PAL).
*2. 3.5mm audio mini jack(stereo).
*3. Calendar, Battery Life and Power Failure Backup Data are not available for HG2G-5ST22VF

| | | High Performance Series | | | |
|---|---|---|---|---|---|
| | | 5.7" | 8.4" | 10.4" | 12.1" |
| | | | | | |
| Display Type | | Color–TFT | Color–TFT | Color–TFT | Color–TFT |
| Color Depth | | 65,536 | 65,536 | 65,536 | 65,536 |
| Rated Power Voltage | | 24VDC | 24VDC | 24VDC | 24VDC |
| Resolution | | 640 x 480 | 800 x 600 | 800 x 600 | 800 x 600 |
| Mount Portrait or Landscape | | ✓ | ✓ | ✓ | ✓ |
| Brightness (cd / $m^2$) | | 800 | 600 | 700 | 550 |
| SD Card Slot | | ✓ | ✓ | ✓ | ✓ |
| Expansion I/O module | | ✓ | ✓ | ✓ | ✓ |
| Serial Ports | | 2 (RS232, RS485,RS422) | 2 (RS232, RS485,RS422) | 2 (RS232, RS485,RS422) | 1 (RS-232), 1 (RS485, RS422) |
| Ethernet Port | | Standard | Standard | Standard | Standard |
| USB Ports | | 1 TypeA / 1 MiniB | 1 TypeA / 1 Mini B | 1 TypeA / 1 MiniB | 1 TypeA / 1 MiniB |
| Video In *1 | | – | ✓ | ✓ | ✓ |
| Audio In/Out *2 | | | – | Audio In/Out | Audio In/Out |
| Remote Control / Monitor | | ✓ | ✓ | ✓ | ✓ |
| Multiple Protocols | | ✓ | ✓ | ✓ | ✓ |
| FTP Server Function | | ✓ | ✓ | ✓ | ✓ |
| Approvals | | IP66,UL 508, CSA C22.2 No.142, ABS, LR, NK, Type 4X & 13 Class I Div 2 | IP66, UL508, CSA C22.2 No.142/213, ANSI/ISA-12.12.01-2007, ABS, LR, NK, Type 4X & 13 Class I Div 2 | IP66, UL508, CSA C22.2 No.142/213, ANSI/ISA-12.12.01-2007, ABS, LR, NK, Type 4X & 13 Class I Div 2 | IP66,UL508, CSA C22.2 No.142, ANSI/ISA-12 12.01-2007, ABS, LR, NK Type 4X & 13 Class I Div 2 |
| Bezel | Light Gray | HG2G-5FT22TF-W | HG3G-8JT22MF-W | HG3G-AJT22MF-W | – |
| | Black | HG2G-5FT22TF-B | HG3G-8JT22MF-B | HG3G-AJT22MF-B | HG4G-CJT22MF-B |
| | Silver | HG2G-5FT22TF-S | – | – | – |

# High Performance Series

**Key Features:**

- 5.7", 8.4", 10.4", and 12.1" sizes
- 65,536 Color TFT LCD
- Mounts Portrait or Landscape
- Video and Audio Interface on select units
- Super Bright: Up to 800 cd/m$^2$
- Supports Expansion Discrete I/O modules
- Remote Access, Monitor and Control
- Serial, Ethernet, and USB ports

Our high-performance OI Touchscreens are so vivid thanks to cutting-edge color conversion technology, the same technology used in LCDTVs. These screens deliver a superior experience with intense screens.

## High-Definition Quality TFT LCD displays

### Brightest on the market

With an LED backlight shining up to 800 cd/m$^2$, OI Touchscreens create a very powerful visual presentation. Immediately after the touchscreen is turned on, the screen lights up and lasts much longer than a CCFL (Cold Cathode Florescent Lamp) with a lifespan of 50,000 hours or greater. A 48-level adjustment also provides flexibility, allowing you to determine the brightness.

### SVGA resolution

The High Definition Quality TFT LCD Screens with SVGA resolution (8.4", 10.4" and 12.1" OI Touchscreens) provide sharp images and superior visibility. The high resolution also gives you more space to create additional images and parts for your project, while enjoying exceptional clarity.

### 65,536 Colors

With so many colors, screen views are realistic and crisp, providing true-to-life images and making it easy to view precise readings of data and images. Distinctly different from 8-bit, 256 color screens, the high-performance series offers an intense depth-of-color perfect for graphical displays.

## Real-time video monitoring

### Play movie files and audio right on your touchscreen

The high-performance series (8.4", 10.4" and 12.1" OI Touchscreens) feature a built-in video interface (Video In) and audio interface (Audio In/Out). That means a video camera, microphone and speaker can be connected to the OI Touchscreen and used in the following ways:

- Display video images on the touchscreen display
- Play movie files on the touchscreen display (MP4 supported)
- Play audio files on the touchscreen display
- Video recording function

Using the video and audio interfaces, you can monitor machine conditions on the plant floor simply by using a video camera and microphone and setting it to display on the OI Touchscreen. You can also play your operation manual as a movie or play movie files to give information or instructions to a user or customer. This makes it easy to explain detailed information and makes it a useful feature when you are troubleshooting.

## Remote access, monitoring and control

### Connect anytime, anywhere using your PC, PDA or Smart Phone

Distance isn't an issue with our high-performance line of OI Touchscreens. When you need access to your machine or equipment, but can't get to the factory floor or even to the office, all you need is a computer, PDA or Smartphone and you can remotely access, monitor and control your touchscreen through a web browser. It's that simple!

Monitor current values or processes, click pushbuttons to control operation, print, switch screens or even change program values just as if you were in front of your touchscreen on site. You can also troubleshoot, test and do maintenance.

- No additional software tools or modules needed to use the Remote Monitor and Control function
- Up to 5 clients can remotely monitor and control simultaneously
- Simple configuration to enable remote access

## Expand your control

With a wide range of connectivity options, our high-performance OI Touchscreens offer a communication solution for every application. Store programming or log data with up to 12MB of user memory, communicate with multiple controllers and devices and even remotely monitor and control. If extra storage is needed, an SD card or USB flash drive can easily be used.

### SD Card

- Supports up to a 32GB SD card for storage
- Store IDEC MicroSmart ladder and touchscreen programs, pictures, log data, alarm logs, screen hard copies, recipe data, operation logs, audio and video files

### USB Port A (USB 2.0)

- Connect a USB flash drive
  - Store IDEC MicroSmart ladder and touchscreen programs, log data and screen capture (if transferred from SD card)
- Connect barcode readers

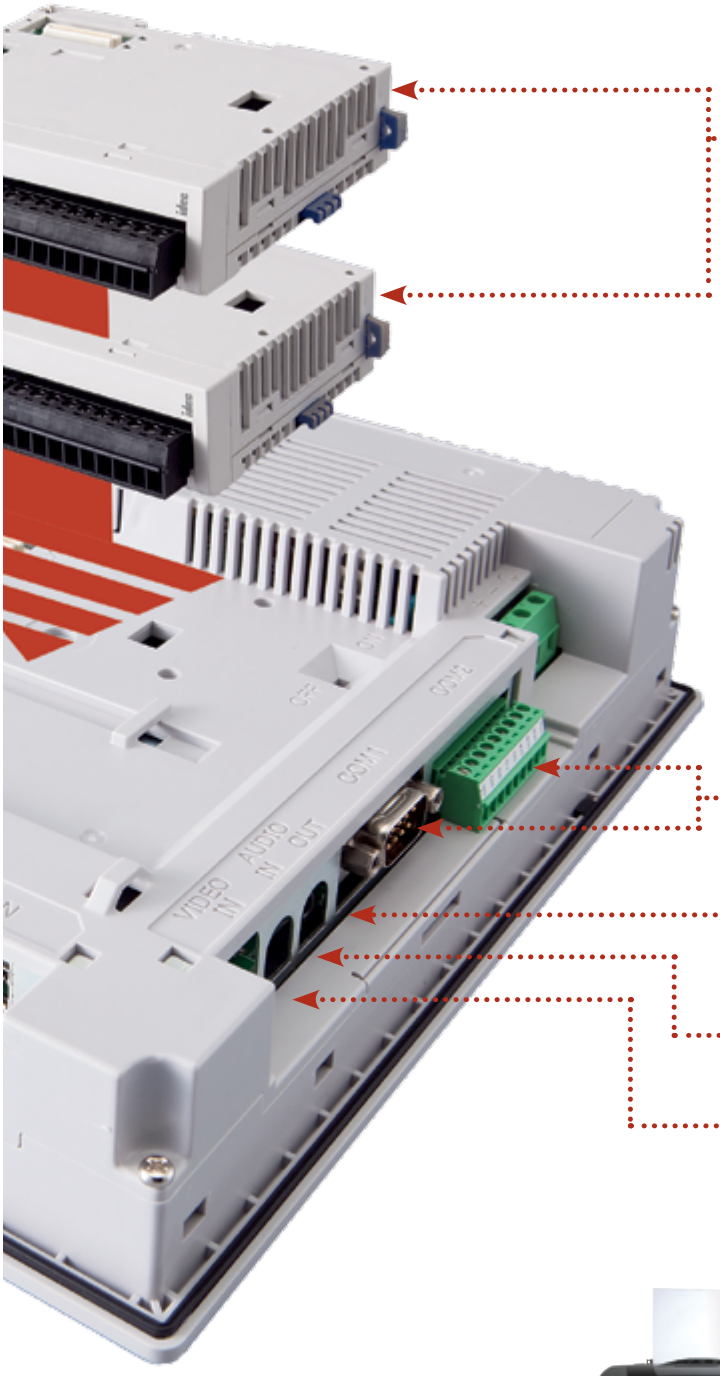
### USB Port mini B

- Connect PC directly to OI Touchscreen for high speed transfer of program upload, download, or monitoring
- Connect to a USB printer

### Ethernet Port

- 10BaseT or 100Base-TX connection
- Remote communication with the PLC and download, upload or monitor PLC and OI Touchscreen projects
- Allows remote access for monitor and control

## The connectivity you want, the flexibility you need




### Expansion Module

Depending on your application and OI Touchscreen size, up to 4 MicroSmart expansion digital I/O modules can be connected. They easily snap on the back of any High-performance Series OI Touchscreen to offer simple I/O control with the option to perform independently of the touchscreen scan time using Cyclic Script.

### 2 Serial Ports
### RS232 and RS485 (422)

- Host – Communicate with a PLC/device using 1:1 or 1:N PLC communication
- Sub Host – Communicate with an IDEC MicroSmart PLC or Modbus RTU device
- O/I Link – Various PLCs including the IDEC MicroSmart PLC can network with multiple OI Touchscreens, where one is a master and up to 15 slaves are connected
- User – Communicate using transmit or receive instructions to build your own protocol

### Audio Out Port:

- Connects to speakers to playback pre-saved .WAV audio files for custom alarms or alerts

### Audio In Port

- Connects to a microphone to listen and monitor audio sounds

### Video In Port

- Connects to a video camera to display video images on the touchscreen

## Fast. Flexible. Environmentally-friendly!

Portrait

Landscape

### Mounting Flexibility

All High-Performance series can be mounted with the screen orientation set to portrait or landscape mode depending on space requirements. This allows you the flexibility of mounting the touchscreen according to your specific application needs. Plus OI Touchscreens are designed with a slim body style, providing a big advantage in situations where panel space is at a premium.

### Low Energy Consumption

Designed with an energy-saving design and LED backlight, these touchscreens use 50% less energy compared with conventional models. While all OI Touchscreens in the high-performance series consume a maximum of 27 Watts of power (depending on model size), if a USB Host and Expansion I/O are not used, less wattage is used. For instance, the 8.4" and 10.4" consume a maximum of 15 Watts when not using these devices. Similarly, having full control of how and when the LED backlight dims or goes to sleep mode allows you to save more energy.

### Approvals

We are dedicated to ensuring the safety of life and property at sea. To that end, IDEC OI Touchscreens are trusted and approved by leading maritime classification agencies, such as the American Bureau of Shipping (ABS Type Approval), Lloyd's Register and NK. This means our touchscreens meet technical and safety needs that allow them to be used in marine, offshore structures and shore-based installations. All high-performance models are also CE-marked and c-UL-us listed.

### High-speed CPU

The fastest in its class, a 400MHz RISC processor means that these touchscreens have quick operation and response times, as well as exceptional performance. Not to mention, start-up is 3 seconds from power on, so you can start working without delay.

## Enhanced Series

### 5.7" HG2G-5T LCD OI Touchscreen

**Key Features**

- 5.7-inch TFT LCD HMI
- 65K color
- 16 shade monochrome
- Super-bright display:
  - 500 cd/m² (color)
  - 1100 cd/m² (monochrome)
- Support up to four protocols simultaneously
- Operating temperatures: -20°C to 60°C
- Backlight Longevity: >100,000 hours
- Remote monitor and control
- Portrait and landscape mounting

## Compact Series

### 4.3" HG1G OI Touchscreen

**Key Features**

- 4.3-inch TFT LCD HMI
- Supports up to four protocols simultaneously
- Remote monitor and control
- FTP Server Function
- Operating temperatures: -20°C to 55°C
- 65,536 colors with 800cd/m2
- 480 x 272 Pixel Resolution
- LED backlight lifespan: >70,000 hours
- Portrait and landscape mounting
- Rated power voltage: 12-24V DC
- Two Serial ports, 2 USB ports and an Ethernet port
- IP66F/IP67F, Type 4X, Type 13, Class 1 Div 2

## Basic Series

### 4.6" HG1F LCD OI Touchscreen

**Key Features**

- 16 level Monochrome
- Available in RS232 or RS422/RS485 version
- Super bright LCD screen with 500 cd/m²
- Analog resistive touch panel enables flexible screen layout
- High resolution: 300x100 pixels
- Screen orientation: landscape or portrait
- Large memory capacity of 1MB

# Automation Organizer Suite

## Programming Software

**Part Number**

| | |
|---|---|
| SW1A-W1C | Automation Organizer Software Suite |

Automation Organizer (AO), the IDEC software suite combining the latest versions of our popular PLC programming software (WindLDR) and OI programming software (WindO/I-NV2 ) and (WindO/I-NV4) with new system configuration software (WindCFG) , is made to enable you to see the layout of your system design and basic configuration of devices. AO gives you a powerful and easy-to-use tool to design, debug, and document control systems, saving valuable time and money.

Intuitively working with you, WindO/I-NV2 and WindO/I-NV4 walks you through an easy step-by-step configuration of your images and your workspace. Dragging and dropping makes screen creation fast, even for beginners. Plus debugging, previewing and editing can be handled through the easy-to-use graphic user interface. Designed with a modern look and feel, similar to MS Office 2007 style, a customizable toolbar and workspace with drop down menu and ribbon control make it simple to select parts, objects and functions. You can also change the toolbar by adding icons frequently used on your project, saving programming time and allowing you to customize your workspace.

For more information, see page 151.

Automation Organizer **WindLDR**

PLC programming with WindLDR

Automation Organizer **WindO/I-NV2**

OI programming with WindO/I-NV2

Automation Organizer **WindCFG**

System Configuration with WindCFG

Automation Organizer **WindO/I-NV4**

Programming software for HG2G-5T

# Supported Drivers

| Manufacturer | Series | Applicable CPU | Communication Module | Comm. Type | Host I/F Driver | Support OI Touchscreens Series | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 12.1" HG4G | 8.4"and 10.4" HG3G | 5.7" HG2G | 4.6" HG1F |
| IDEC | MicroSmart/ Pentra MicroSmart (FC4A/FC5A) | FC4A, FC5A | Built-in Port or Comm. Module | RS232 | OpenNet(FC3A), MicroSmart (FC4A/FC5A) | x | x | x | x |
| | | | | RS485 (422) | | x | x | x | x |
| | | | Built-in or Web Server Unit (FC4A-SX5ES1E) | Ethernet | Web Server Unit (FC3A/FC4A/ FC5A) | x | x | x | – |
| | OpenNet | FC3A | Built-in Port | RS232 | OpenNet(FC3A), MicroSmart (FC4A/FC5A) | x | x | x | x |
| | | | | RS485 | | x | x | x | x |
| | | | Web Server Unit (FC4A-SX5ES1E) | Ethernet | Web Server Unit (FC3A/FC4A/ FC5A) | x | x | x | – |
| Allen Bradley | MicroLogix | MicroLogix 1000 | Built-in Port | RS 232 | MicroLogix / SLC 500 Full Duplex | x | x | x | x |
| | | | 1761-NET-ENI | Ethernet | Ethernet / IP | x | x | x | – |
| | | MicroLogix 1100 | Built-in Port | RS 232 | MicroLogix / SLC 500 Full Duplex | x | x | x | x |
| | | | Built-in or 1761-NET-ENI | Ethernet | Ethernet / IP | x | x | x | – |
| | | MicroLogix 1200 | Built-in Port | RS 232 | MicroLogix / SLC 500 Full Duplex | x | x | x | x |
| | | | 1761-NET-ENI | Ethernet | Ethernet / IP | x | x | x | – |
| | | MicroLogix 1500 | Built-in Port | RS 232 | MicroLogix / SLC 500 Full Duplex | x | x | x | x |
| | | | 1761-NET-ENI | Ethernet | Ethernet / IP | x | x | x | – |
| | ControlLogix | ControlLogix 5550 | RS232 | Built-in Port | Logix DF1 (Full Duplex) | x | x | x | x |
| | | | 1756-ENBT | Ethernet | Ethernet / IP | x | x | x | – |
| | | | | | Ethernet / IP (Native Tag) | x | x | x [1] | – |
| | | ControlLogix 5555 | RS232 | Built-in Port | Logix DF1 (Full Duplex) | x | x | x | x |
| | | | 1756-ENBT | Ethernet | Ethernet / IP | x | x | x | – |
| | | | | | Ethernet / IP (Native Tag) | x | x | x [1] | – |
| | CompactLogix | 1768 CompactLogix | Built-in Port | RS232 | Logix DF1 (Full Duplex) | x | x | x | x |
| | | 1769 CompactLogix | Built-in Port | RS232 | Logix DF1 (Full Duplex) | x | x | x | x |
| | | | | Ethernet | Ethernet / IP (Native Tag) | x | x | x [1] | – |
| | | | | | Ethernet / IP | x | x | x | – |
| | FlexLogix | 1794-L33 | Built-in Port | RS232 | Logix DF1 (Full Duplex) | x | x | x | x |
| | | 1794-L34 | | | | | | | |
| | PLC-5 | PLC-5 | 1770-KF2 | RS232 or RS485 | PLC-5 (Half Duplex) | x | x | x | x |
| | | | Built-in Port | | | | | | |
| | | | 1785-ENET | Ethernet | Ethernet / IP | x | x | x | – |
| | | PLC-5E | Built-in Port | | | | | | |
| | SLC 500 | SLC 5/03, 5/04, 5/05 | Built-in Port | RS 232 | SLC 500 Half Duplex or Mi-croLogix / SLC 500 Full Duplex | x | x | x | x |
| | | | 1761-NET-ENI | Ethernet | Ethernet / IP | x | x | x | – |

1. HG2G-5FT only.

Drivers continued on next page.

## Supported Drivers, con't

| Manufacturer | Series | Applicable CPU | Communication Module | Comm. Type | Host I/F Driver | Support OI Touchscreens Series | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 12.1" HG4G | 8.4"and 10.4" HG3G | 5.7" HG2G | 4.6" HG1F |
| Automation Direct (Koyo) | DirectLOGIC 05 | DL05 | D0-ECOM, D0-ECOM100 | Ethernet | DirectLOGIC (Ethernet) | x | x | x | – |
| | DirectLOGIC 06 | DL06 | | | | x | x | x | – |
| | DirectLOGIC | D2-240, D2-250, D2-250-1, D2-260 | D2-ECOM, D2-ECOM-F, D2-ECOM100 | | | x | x | x | – |
| | DirectLogic DL205 | D2-240 | Built-in Port | RS232 | DirectLogic DL 205/405 | x | x | x | x |
| | DirectLogic DL405 | D4-430, D4-440 | Built-in Port | RS232 | | x | x | x | x |
| | | | | RS485(422) | | x | x | x | x |
| | | D4-440 | D4-DCM | RS232 | | x | x | x | x |
| | | D4-430, D4-440, D4-450 | D4-ECOM, D4-ECOM-F, D4-ECOM100 | Ethernet | DirectLOGIC (Ethernet) | x | x | x | – |
| Emerson | Fisher Roc Driver | FloBoss | FloBoss 107 | Built-in | RS232, RS485 | x | x | x | – |
| FANUC | Power Mate | Power Mate-MODEL D | Built-in Port | RS422 | Power Mate-MODEL D/Series 16i | x | x | x | x |
| | Series | 16i, 160i, 18i, 180i, 30i, 31i, 32i | Built-in Port | RS232 | | x | x | x | x |
| FUJI | FLEX-PC | NB1, NB2, NB3, NJ-CPU-E4, NJ-CPU-A8, NJ-CPU-B16, NS | Built-in Port | RS232, RS485 | FLEX-PC (CPU) | x | x | x | x |
| | | NB1, NB2, NB3 | NB-RS1-AC/DC | RS232, RS485 | FLEX-PC(LINK) | x | x | x | x |
| | | NJ-CPU-E4, NJ-CPU-A8, NJ-CPU-B16 | NJ-RS2, NJ-RS4 | RS232, RS485 | | x | x | x | x |
| | | NS | NS-RS1 | RS232, RS485 | | x | x | x | x |
| | MICREX-F | FS5 | NV1L-RS2 | RS232 | MICREX-F | x | x | x | x |
| | | F70 | NC1L-RS2 | RS232 | | x | x | x | x |
| | | | NC1L-RS4 | RS485 | | x | x | x | x |
| | | F80H, F120H, F120S, F140S, F150S | FFU120B | RS232 | | x | x | x | x |
| | | F30, F50, F50H, F55, F60, F70, F70S, F80H, F81, F120H, F120S, F140S, F150S, F250 | FFK120A-C10 | RS232, RS485 | | x | x | x | x |
| GE Fanuc Automation | Series 90-30 | CPU331, CPU341, CPU350, CPU351, CPU352, CPU360, CPU363, CPU364, CPU374 | IC693CMM311 | RS232 | Series 90 (XNP-X) | x | x | x | x |
| | | | | RS485(422) | | x | x | x | x |
| | | CPU311, CPU313, CPU323, CPU331, CPU341, CPU350, CPU351, CPU352, CPU360, CPU363, CPU374 | Built-in Port | RS485(422) | | x | x | x | x |
| | VersaMax | Nano, Micro (14point), Micro (23, 28 point) | Built-in Port | RS232 | | x | x | x | x |
| | | | | RS485 | | x | x | x | x |

Drivers continued on next page.

## Supported Drivers, con't

| Manufacturer | Series | Applicable CPU | Communication Module | Comm. Type | Host I/F Driver | Support OI Touchscreens Series | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 12.1" HG4G | 8.4"and 10.4" HG3G | 5.7" HG2G | 4.6" HG1F |
| Hitachi | S10mini | S10mini | Built-in Port | RS485(422) | S10mini | x | x | x | x |
| | | | LQE160, LQE560 | RS232 | | x | x | x | x |
| | | | LQE165, LQE565 | RS485(422) | | x | x | x | x |
| | S10V | LQP510 | Built-in Port | RS232, RS485 | | x | x | x | x |
| | | | LQE560 | RS232 | | x | x | x | x |
| | | | LQE565 | RS485(422) | | x | x | x | x |
| INVERTER | FREQROL | FREQROL-E500, FREQROL-S500 | Built-in Port | RS485(422) | FREQROL | x | x | x | x |
| JTEKT (Toyoda) | TOYOPUC-PC2J | PC2J | Built-in Port | RS485(422) | TOYOPUC-PC3J | x | x | x | x |
| | TOYOPUC-PC3J | PC3J, PC3JD, PC3JG | | | | x | x | x | x |
| Keyence | KV-700/1000/ 3000/5000 | KV-700, KV-1000, KV-3000 | Built-in Port | RS232 | KV-700/1000 | x | x | x | x |
| | | KV-700, KV-1000, KV-3000, KV-5000 | KV-L-20R | RS232 (Port 1,2), RS422/485 | | x | x | x | x |
| | | | KV-LE20A, KV-LE20V | Ethernet | KV (Ethernet) | x | x | x | – |
| | | KV-5000 | Built-in Port | | | x | x | x | – |
| | Visual KV | KV-10, 16, 24, 40 | Built-in Port | RS232 | KV/KZ | x | x | x | x |
| | Conventional KV | KV-10, 16, 24, 40/80 | | | | x | x | x | x |
| LS Industrial Systems | MASTER-K | K10S1, K80S, K120S, K200S | Built-in Port | RS232 | MASTER-K | x | x | x | x |
| | | K80S | G7L-CUEB, G7L-CUEC | | | x | x | x | x |
| | | K200S | G6L-CUEB, G6L-CUEC | | | x | x | x | x |
| | | K300S | G4L-CUEA | | | x | x | x | x |
| Mitsubishi | MELSEC-A | A1N, A2N, A3N | AJ71C24-S3/S6/ S8 or AJ71UC24 | RS232 | MELSEC-AnN (LINK) | x | x | x | x |
| | | A1SH | A1SJ71C24-R2/ R4 or A1S-J71UC24-R2/R4 | RS232 | | x | x | x | x |
| | | A2CCPUC24 | Built-in-Port | RS232 | | x | x | x | x |
| | | A0J2, A0J2H | A0J2-C214-S1 | RS232 | | x | x | x | x |
| | | | | RS485 | | x | x | x | x |
| | | A2A, A3A, A2U, A3U, A4U | AJ71C24-S6/-8, AJ71UC24 | RS232 | | x | x | x | x |
| | | | | RS485 | | x | x | x | x |
| | | A2US, A2USH-S1 | A1SJ71C24-R2, A1SJ71UC24-R2 | RS232 | | x | x | x | x |
| | | | A1SJ71C24-R4 | RS485 | | x | x | x | x |
| | | A2N, , A2A, A3A,A2US, A2USH, A2U, A2USH-S1 | Built-in Port | RS485(422) | MELSEC-AnA (CPU) | x | x | x | x |
| | | A1SH, A2SH, A2C, A0J2H | | | MELSEC-A1S/A2C(CPU) | x | x | x | x |

Drivers continued on next page.

## Supported Drivers, con't

| Manufacturer | Series | Applicable CPU | Communication Module | Comm. Type | Host I/F Driver | Support OI Touchscreens Series | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 12.1" HG4G | 8.4"and 10.4" HG3G | 5.7" HG2G | 4.6" HG1F |
| Mitsubishi | MELSEC-QnA | Q4ACPU, Q4AR-CPU, Q3ACPU-S1, Q2ACPU | AJ71QC24N-R2, AJ71QC24N, | RS232 | MELSEC-Q/QnA (LINK) | x | x | x | x |
| | | | | RS485 | | x | x | x | x |
| | | | AJ71QC24N-R4 | | | x | x | x | x |
| | | | AJ71QE71N3-T, AJ71QE71N-B2, AJ71QE71N-B5 | Ethernet | MELSEC-Q/QnA (Ethernet) | x | x | x | – |
| | MELSEC-QnA | Q2ASHCPU-S1, Q2ASHCPU, Q2ASCPU-S1, Q2ASCPU | A1SJ71QC24N-R2 | RS232 | MELSEC-Q/QnA (LINK) | x | x | x | x |
| | | | A1SJ7AQC24N | | | x | x | x | x |
| | | | | RS485 | | x | x | x | x |
| | | | A1S-J71QE71N3-T, A1S-J71QE71N-B2, A1SJ71QE71N-B5 | Ethernet | MELSEC-Q/QnA (Ethernet) | x | x | x | – |
| | MELSEC-Q | Q00CPU, Q01CPU | Built-in Port | RS232 | MELSEC-Q/QnA (LINK) | x | x | x | x |
| | | Q02CPU, Q02HCPU, Q06HCPU, Q12PH-CPU, Q25HCPU | QJ71C24N-R2 | RS232 | | x | x | x | x |
| | | | QJ71C24, QJ71C24N | | | x | x | x | x |
| | | | | RS485 | | x | x | x | x |
| | | Q02CPU, Q02HCPU | Built-in Port | RS232 | MELSEC-Q (CPU) | x | x | x | x |
| | | Q02CPU-A | | | MELSEC-AnU(CPU) | – | – | – | x |
| | | Q00JCPU, Q00CPU, Q01CPU | QJ71E71-100, QJ71E71-B5, QJ71E71-B2 | Ethernet | MELSEC-Q/QnA (Ethernet) | x | x | x | – |
| | | Q02CPU, Q02HCPU, Q06HCPU, Q12H-CPU, Q25HCPU | | | | x | x | x | – |
| | MELSEC-FX | FX1, FX2, FX2C | Built-in Port | RS485(422) | MELSEC-FX (CPU) | x | x | x | x |
| | | FX0, FX0N, (FX1N), FX0S, FX1S | | | | x | x | x | x |
| | | FX2N, FX2NC, FX1N, FX1NC | | | MELSEC-FX2N (CPU) | x | x | x | x |
| | | | FX2NC-232ADP | RS232 | | x | x | x | x |
| | | FX2N | FX2N-232-BD | RS232 | | x | x | x | x |
| | | | FX2N-422-BD | RS485(422) | | x | x | x | x |
| | | FX1N | FX1N-232-BD | RS232 | | x | x | x | x |
| | | | FX1N-422-BD | RS485(422) | | x | x | x | x |
| | | FX3UC, FX3U | Built-in Port | RS485(422) | MELSEC-FX3UC(CPU) | x | x | x | x |
| | | | FX3U-232ADP, FX3U-232-BD | RS232 | | x | x | x | x |
| | | FX3G | Built-in Port | RS485(422) | | x | x | x | x |
| | | | FX3U-232ADP | RS232 | | x | x | x | x |

Drivers continued on next page.

## Supported Drivers, con't

| Manufacturer | Series | Applicable CPU | Communication Module | Comm. Type | Host I/F Driver | Support OI Touchscreens Series | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 12.1" HG4G | 8.4"and 10.4" HG3G | 5.7" HG2G | 4.6" HG1F |
| Omron | SYSMAC-C | C500, C500F, C1000H, C2000, C2000H | C120-LK201-V1 | RS232 | SYSMAC-C Series | x | x | x | x |
| | | | C120-LK202-V1 | RS485(422) | | x | x | x | x |
| | | | C500-LK201-V1 | RS232 | | x | x | x | x |
| | | | | RS485(422) | | x | x | x | x |
| | | | C500-LK203 | RS232 | | x | x | x | x |
| | | | | RS485(422) | | x | x | x | x |
| | | C1000HF | C500-LK203 | RS232 | | x | x | x | x |
| | | | | RS485(422) | | x | x | x | x |
| | | C200HS | C200H-LK201 | RS232 | | x | x | x | x |
| | | | C200H-LK202 | RS485(422) | | x | x | x | x |
| | | C200HE, C200HG, C200HX | C200H-LK201, C200HW-COM02/ COM04/COM05/ COM06 | RS232 | | x | x | x | x |
| | | | C200H-LK202, C200HW-COM03/ COM06 | RS485(422) | | x | x | x | x |
| | | C120, C120F | C120-LK201-V1 | RS232 | | x | x | x | x |
| | | | C120-LK202-V1 | RS485(422) | | x | x | x | x |
| | | C20H, C28H, C40H, C60H | Built-in Port | RS232 | | x | x | x | x |
| | | CQM1H, C200HS-CPU21/ 23/31/33 | | | | x | x | x | x |
| | | C200HE-CPU42, C200HG-CPU43/63, C200HX-CPU44/64 | | | | x | x | x | x |
| | | CPM1, CPM1A, CPM2A | CPM1-CIF01 | | | x | x | x | x |
| | | | CPM1-C1F11 | RS485(422) | | x | x | x | x |
| | | CMP2A | Built-in Port | RS232 | | x | x | x | x |
| | SYSMAC-CS1 | CS1G, CS1H | Built-in Port | RS232 | SYSMAC-CS1 Series | x | x | x | x |
| | | | CS1W-SCB41 (Port1) | | | x | x | x | x |
| | | | CS1W-SCB41 (Port2) | RS485(422) | | x | x | x | x |
| | | | CS1W-ENT01, CS1W-ENT11, CS1W-ENT21, CJ1W-ENT21 | Ethernet | SYSMAC-CS1 CJ Series (Ethernet) | x | x | x | – |
| | SYSMAC-CJ1 | CJ1M, CJ1H, CJ1G | Built-in Port | RS232 | SYSMAC-CS1 Series | x | x | x | x |
| | | | CS1W-ENT01, CS1W-ENT11, CS1W-ENT21, CJ1W-ENT21 | Ethernet | SYSMAC-CS1 CJ Series (Ethernet) | x | x | x | – |
| | SYSMAC-CJ2 | CJ2H | Built-in Port | | | x | x | x | – |
| | SYSMAC-CP1 | CP1H | CP1W-CIF01 | RS232 | SYSMAC-CS1 Series | x | x | x | x |
| | | | CP1W-CIF11 | RS485(422) | | x | x | x | x |

Drivers continued on next page.

## Supported Drivers, con't

| Manufacturer | Series | Applicable CPU | Communication Module | Comm. Type | Host I/F Driver | Support OI Touchscreens Series | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 12.1" HG4G | 8.4"and 10.4" HG3G | 5.7" HG2G | 4.6" HG1F |
| Panasonic (Aromat) | FP Series | FP0, FP1 | Built-in Port | RS232 | MEWNET | x | x | x | x |
| | | FP(SIGMA symbol) | Built-in Port | RS232 | | x | x | x | x |
| | | | AFPG801 | | | x | x | x | x |
| | | | AFPG802 | | | x | x | x | x |
| | | | AFPG803 | RS485 | | x | x | x | x |
| | | FP10, FP10SH | Built-in Port | RS232 | | x | x | x | x |
| | | | AFP3462 | | | x | x | x | x |
| | | FP2, FP2SH | Built-in Port | | | x | x | x | x |
| | | | AFP2462 | | | x | x | x | x |
| Sharp | New Satellite JW | JW-10 | Built-in Port | RS422-MMI Port, RS485 | JW | x | x | x | x |
| | | JW-21CPU, JW-22CU, JW-31CUH/H1, JW-32CUH/H1, JW-33CUH1/H2/3 | JW-21CM | RS485(422) | | x | x | x | x |
| | | JW-50CU/CUH | JW-10CM | | | x | x | x | x |
| | | JW-70CU/CUH | | | | x | x | x | x |
| | | JW-100CU/CUH | | | | x | x | x | x |
| | | JW-22CU, JW-70CU/CUH, JW-100CU/CUH | Built-in Port | RS232 | | x | x | x | x |
| | | JW-32CUH/H1, JW-33CUH/H1/H2/H3 | | RS485(422) | | x | x | x | x |
| SIEMENS | S7-200 | CPU212,CPU214, CPU215, CPU216, CPU221, CPU222, CPU224, CPU224XP, CPU226, CPU226XM | Built-in Port | RS485(422) | S7-200 (PPI) | x | x | x | x |
| | S7-300 | CPU313, CPU314, CPU315, CPU315-2DP, CPU 316, CPU 318 | CP-340, CP-341 | RS232 | S7-300 3964(R)/RK512 | x | x | x | x |
| | | | | RS485(422) | | x | x | x | x |
| | | CPU313-2PtP | Built-in Port | RS485(422) | S7-MP1 | x | x | x | x |
| | S7-400 | CPU 412, CPU 414, CPU416, CPU 416F-2, CPU417 | CP-440, CP-441 | RS232, RS485(422) | S7-300 3964(R)/RK512 | x | x | x | x |

Drivers continued on next page.

## Supported Drivers, con't

| Manufacturer | Series | Applicable CPU | Communication Module | Comm. Type | Host I/F Driver | Support OI Touchscreens Series | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 12.1" HG4G | 8.4"and 10.4" HG3G | 5.7" HG2G | 4.6" HG1F |
| Toshiba | PROSEC T | T1 (T1-16, T1-28, T1-40) | Built-in Port | RS232, RS485(422) | PROSEC T | x | x | x | x |
| | | | CU111 | | | x | x | x | x |
| | | T1S (T1-40S) | Built-in Port | RS232, RS485(422) | | x | x | x | x |
| | | | CU111 | | | x | x | x | x |
| | | T2 (PU224) | Built-in Port | RS485 | | x | x | x | x |
| | | T2E ( PU234E) | CM231E | RS485 | | x | x | x | x |
| | | | CM232E | RS232 | | x | x | x | x |
| | | T2N (PU215N, PU235N, PU245N) | Built-in Port | RS232 | | x | x | x | x |
| | | | | RS485 | | x | x | x | x |
| | | T3, T3H (PU315, PU325, PU325H, PU326H) | Built-in Port | RS485 | | x | x | x | x |
| | V Series | S2T, S2E, L1, S2, S3 (PU672T, PU662T, PU612E, L1PU11H, L1PU12H, S2PU82, S2PU72, S2PU32, S2PU22, S3PU65, S3PU55, S3PU45, S3PU21 | Built-in Port | RS485 | | x | x | x | x |
| Toshiba Machine Works | TC200 | TC3-13B1 | Built-in Port | RS232 | TC200 | x | x | x | x |
| | TCmini | TC03-01, TC03-02 | | | | x | x | x | x |
| VIGOR | VB or VH | VB: V0, VB1, VB2 or VH: VH | Built-in Port | RS232 | VB/VH | x | x | x | x |
| | | | VB-485A | RS485 | | x | x | x | x |
| | | | VB-CADP | RS232 | | x | x | x | x |
| | | | | RS485 | | x | x | x | x |
| | | | VB-232 | RS232 | | x | x | x | x |
| | | | VB-485 | RS485 | | x | x | x | x |
| YASKAWA | Machine Controller | MP920, MP930 | Built-in Port | RS232, RS422, RS485 | MP920_R | x | x | x | x |
| | | | 217IF | | | x | x | x | x |
| | | MP2300 | 217IF-01 | RS232, RS422, RS485 | | x | x | x | x |
| YOKOGAWA | FA-M3 | FA-M3 (F3SP05, F3SP20, F3SP21, F3SP25, F3SP30, F3SP35, F3SP38, F3SP53, F3SP58, F3FP36, F3BP20, F3BP30) | F3LC11-1N | RS232 | FA-M3 | x | x | x | x |
| | | | F3LC11-2N | RS485 | | x | x | x | x |
| | | FA-M3 (F3SP05, F3SP21, F3SP25, F3SP28, F3SP35, F3SP38, F3SP53, F3SP58) | Built-in Port | RS232 | | x | x | x | x |

# Part Numbers

| Style | | | Part Numbers | Bezel Color | Description |
|---|---|---|---|---|---|
| High Performance Series | 12.1 " | | HG4G-CJT22MF-B | Black | 12.1" 65K Color TFT, Video In, Audio In/Out |
| | 10.4" | | HG3G-AJT22MF-W | Light Gray | 10.4" 65K Color TFT, Video In, Audio In/Out |
| | | | HG3G-AJT22MF-B | Black | |
| | 8.4" | | HG3G-8JT22MF-W | Light Gray | 8.4" 65K Color TFT, Video In, Audio In/Out |
| | | | HG3G-8JT22MF-B | Black | |
| | 5.7" | | HG2G-5FT22TF-W | Light Gray | 5.7" 65K Color TFT |
| | | | HG2G-5FT22TF-B | Black | |
| | | | HG2G-5FT22TF-S | Silver | |
| Enhanced Series | 5.7" | | HG2G-5TT22TF-W | Light Gray | 5.7" 65K Color TFT, Ethernet Port, 12-24V DC |
| | | | HG2G-5TT22TF-B | Black | |
| | | | HG2G-5TT22TF-S | Silver | |
| | | | HG2G-5TN22TF-W | Light Gray | 5.7" Monochrome, TFT, Etherenet Port, 12-24V DC |
| | | | HG2G-5TN22TF-B | Black | |
| | | | HG2G-5TN22TF-S | Silver | |
| Compact Series | 4.3" | | HG1G-4VT22TF-S | Silver | 4.3" 65K Color TFT |
| | | | HG1G-4VT22TF-B | Black | 4.3" 65K Color TFT |
| Basic Series | 4.6" | | HG1F-SB22BF-W | Light Gray | 4.6" Monochrome, RS232 Type |
| | | | HG1F-SB22BF-B | Black | |
| | | | HG1F-SB22YF-W | Light Gray | 4.6" Monochrome, RS-485 / RS-422 Type |
| | | | HG1F-SB22YF-B | Black | |

## Starter Kits and Solution Packages

### Touchscreen Starter Kits

| | | Operator Interface Touchscreen | Power Supply | Software and Cable | Part Number |
|---|---|---|---|---|---|
| Compact Series | | 4.3" 65K color TFT Display, HG1G-4VT22TF-B | 30W | √ | SMARTTOUCH-1G-B |
| Basic Series | | 4.6" Monochrome, RS232, HG1F-SB22BF-B | 30W | √ | SMARTTOUCH-1F |
| Enhanced Series | | 5.7" Monochrome, USB mini-B Ethernet Port 12-24V DC, HG2G-5TN22TF-B | 30W | √ | SMARTTOUCH-2G-5TN |
| | | 5.7" 65K Color TFT LCD, 12-24V DC, HG2G-5TT22TF-B | 30W | √ | SMARTTOUCH-2G-5TT |
| High-Performance Series | | 8.4" 65K Color TFT , Video In, Audio In/Out, HG3G-8JT22MF-B | 60W | √ | SMARTTOUCH-3G8HP |
| | | 10.4" 65K Color TFT, Video In, Audio In/Out, HG3G-AJT22MF-B | 60W | √ | SMARTTOUCH-3GAHP |
| | | 12.1" 65K Color TFT, Video In, Audio In/Out, HG4G-CJT22MF-B | 60W | √ | SMARTTOUCH-4GHP |

*All packages come with Automation Organizer software suite and a communication cable.

### Automation Solution Packages

| Operator Interface Touchscreen | | CPU | Power Supply | Part Number |
|---|---|---|---|---|
| | 4.3" 65K color TFT Display, HG1G-4VT22TF-B | 16 I/O, FC6A-C16R1AE | 60W | KIT-FC6A-16-RA-HG1G |
| | 4.3" 65K color TFT Display, HG1G-4VT22TF-B | 16 I/O, FC6A-C16R1CE | 60W | KIT-FC6A-16-RC-HG1G |
| | 4.3" 65K color TFT Display, HG1G-4VT22TF-B | 24 I/O, FC6A-C24R1AE | 60W | KIT-FC6A-24-RA-HG1G |
| | 4.3" 65K color TFT Display, HG1G-4VT22TF-B | 24 I/O, FC6A-C24R1CE | 60W | KIT-FC6A-24-RC-HG1G |
| | 4.6" Monochrome, RS232, HG1F-SB22BF-B | 24 I/O, FC5A-C24R2C CPU | 60W | KIT-PENTRA-24-HG1F |
| | 4.6" Monochrome, RS232, HG1F-SB22BF-B | 12 I/O, FC5A-D12S1E, Ethernet CPU | 60W | KIT-PENTRA-12-HG1F |
| | 5.7" Monochrome, 12-24V DC, Ethernet, HG2G-5TN22TF-B | 24 I/O, FC5A-C24R2C CPU | 60W | KIT-PENTRA-24-HG2G-5TN |
| | 5.7" Monochrome, 12-24V DC, Ethernet, HG2G-5TN22TF-B | 12 I/O, FC5A-D12S1E, Ethernet CPU | 60W | KIT-PENTRA-12-HG2G-5TN |
| | 5.7" 65K Color TFT, 12-24 VDC, Ethernet, HG2G-5TT22TF-B | 24 I/O, FC5A-C24R2C CPU | 60W | KIT-PENTRA-24-HG2G-5TT |
| | 5.7" 65K Color TFT, 12-24 VDC Ethernet, HG2G-5TT22TF-B | 12 I/O, FC5A-D12S1E, Ethernet CPU | 60W | KIT-PENTRA-12-HG2G-5TT |
| | 5.7" 65K Color TFT, HG2G-5FT22TF-B | 16 I/O, FC5A-D16RS1 CPU | 60W | KIT-PENTRA-16-HG2G-HP |
| | 5.7" 65K Color TFT, HG2G-5FT22TF-B | 24 I/O, FC5A-C24R2C CPU | 60W | KIT-PENTRA-24-HG2G-HP |
| | 5.7" 65K Color TFT,HG2G-5FT22TF-B | 12 I/O, FC5A-D12S1E, Ethernet CPU | 60W | KIT-PENTRA-12-HG2G-HP |
| | 8.4" 65K Color TFT, Video In, Audio In/Out, HG3G-8JT22MF-B | 16 I/O, FC5A-D16RS CPU | 60W | KIT-PENTRA-16-HG3G-8HP |
| | 8.4" 65K Color TFT, Video In, Audio In/Out, HG3G-8JT22MF-B | 12 I/O, FC5A-D12S1E, Ethernet CPU | 60W | KIT-PENTRA-12-HG3G-8HP |
| | 10.4" 65K Color TFT, Video In, Audio In/Out, HG3G-AJT22MF-B | 16 I/O, FC5A-D16RS1 CPU | 60W | KIT-PENTRA-16-HG3G-AHP |
| | 10.4" 65K Color TFT, Video In, Audio In/Out, HG3G-AJT22MF-B | 12 I/O, FC5A-D12S1E, Ethernet CPU | 60W | KIT-PENTRA-12-HG3G-AHP |
| | 12.1" 65K Color TFT, Video In, Audio In/Out, HG4G-CJT22MF-B | 16 I/O, FC5A-D16RS1 CPU | 60W | KIT-PENTRA-16-HG4G-HP |
| | 12.1" 65K Color TFT, Video In, Audio In/Out, HG4G-CJT22MF-B | 12 I/O, FC5A-D12S1E, Ethernet CPU | 60W | KIT-PENTRA-12-HG4G-HP |

OI Touchscreens have black bezels. All packages come with Automation Organizer software suite and communication cables.

## Accessories

| Item | Part Number | Description | Applicable Models | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 12.1" | 8.4" and 10.4" | 5.7" | | | 4.3" | 4.6" |
| | | | HG4G-CJT22MF | HG3G-8JT/AJT | HG2G-5FT | HG2G-5TT | HG2G-5TN | HG1G | HG1F |
| Programming Tools | SW1A-W1C | Automation Organizer (includes WiindLDR, WindOI-NV2, and WindCFG Programming Software) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | HG9Z-XCM2A | USB Programming Cable USB-miniB (2m) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |
| | HG9Z-XCM1A | Cable connecting PC to Touchscreen via RS-232 Serial Port | – | – | – | – | – | – | ✓ |
| | FC4A-USB | USB to RS-232 Converter for PCs without Serial Ports | – | – | – | – | – | – | ✓ |
| Mounting Clips | SLD-K02 | Replacement clips (4 pcs are supplied with HMI) | – | – | ✓ | ✓ | ✓ | ✓ | ✓ |
| | HG9Z-4K2PN04 | Replacement clips (4 pcs are supplied with HMI) | ✓ | ✓ | – | – | – | ✓ | – |
| Host Communication Plug | HG9Z-XT09V | Replacement terminal block plug. (1 is supplied with HMI) | – | – | ✓ | ✓ | ✓ | ✓ | – |
| | HG9Z-XT09 | Replacement terminal block plug. (1 is supplied with HMI) | ✓ | ✓ | – | – | – | – | – |
| Replacement Battery | HG9Z-XR1 | Lithium battery CR2032 (one battery is supplied with HMI) | ✓ | ✓ | ✓ | ✓ | ✓ | – | ✓ |
| USB Cable Lock Pin | HG9Z-XU1 | Used to lock USB cable (for USB2) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |
| USB panel-mount extension cable | HG9Z-XCE11 | For USB-A port (1m) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |
| | HG9Z-XCE21 | For USB-mini B PORT (1m) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |
| Memory Card | HG9Z-XMS2 | SD Memory Card (2GB) | ✓ | ✓ | ✓ | – | – | – | – |
| Protective Cover | HG9Z-2E2 | Use with 5.7" HMI. Covers entire front of HMI. | – | – | ✓ | ✓ | ✓ | – | – |
| Protective Sheet [1] | HG9Z-2D5 | Use with 5.7" HMI. Sheet lays over LCD area. | – | – | ✓ | ✓ | ✓ | – | – |
| | HG9Z-3D8 | Use with 8.4" HMI. Sheet lays over LCD area. | – | ✓ | – | – | – | – | – |
| | HG9Z-3DA2 | Use with 10.4" HMI. Sheet lays over LCD area. | – | ✓ | – | – | – | – | – |
| | HG9Z-4DC | Use with 12.1" HMI. Sheet lays over LCD area. | ✓ | – | – | – | – | – | – |
| | HG9Z-1D | Use with 4.6" HMI. Sheet lays over LCD area. | – | – | – | – | – | – | ✓ |
| | HG9Z-1DPN05 | Use with 4.3" HMI. Sheet lays over LCD area. (5 pcs/pack) | | | | | | ✓ | |
| Expansion Module Clamp [2] | HG9Z-XJ3 | Short type for installing expansion I/O modules (Total width 17.6 to 41.1mm) | ✓ | ✓ | ✓ | – | – | – | – |
| | HG9Z-XJ4 | Long type for installing expansion I/O modules (Total width 47 to 68.8 mm) | ✓ | ✓ | ✓ | – | – | – | – |
| | HG9Z-XJ5 | Extra-Long type for installing expansion I/O modules (Total width 70.1 to 93.9 mm) | ✓ | ✓ | ✓ | – | – | – | – |
| L-shaped Terminal Block Connector for I/O Module | HG9Z-PMT10L | For 10 pole MicroSmart I/O Module (min. 2 pcs) | ✓ | ✓ | ✓ | – | – | – | – |
| | HG9Z-PMT11L | For 11 pole MicroSmart I/O Module (min. 2 pcs) | ✓ | ✓ | ✓ | – | – | – | – |
| Replacement Backlight | HG9Z-1FB | Replacement backlight for 4.6" HG1F | – | – | – | – | – | – | ✓ |
| O/I Link Unit | HG9Z-2G1 | Communication module for O/I Link mode | – | – | – | – | – | – | ✓ |
| Panel Mount Adaptor | HG9Z-2A1 | Adaptor for mounting HG2G to the panel cut-out of HG2F | – | – | ✓ | ✓ | ✓ | – | – |
| | HG9Z-2A2 | Adaptor for mounting HG2G to 156 x 123.5 mm panel cut-out (other mfr.) | – | – | ✓ | ✓ | ✓ | – | – |
| Converters | HG9Z-GWDF1DH485-4 | AB SLC500 (w/RJ45 connector)DF1 / DH485 Communication Pakg for 4.6" HG1F | – | – | – | – | – | – | ✓ |
| | HG9Z-GWDF1DH485-5 | AB SLC500 (w/RJ45 connector)DF1 / DH485 Communication Pakg for HG2G/HG3G/HG4G | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | – |

1. The protective sheet is UV resistant, however, resistance against direct sunlight in outdoor usage is not guaranteed.
2. Use the expansion module clamp when using expansion modules.
   Order the module clamp by referring to the width of the module shown in the dimensions of each module.
   Note: When connecting more than 3 expansion modules to the HG3G/4G, note the limits shown below:
   -Current flow rate at 5V: 130 mA max. Total width: 92.3 mm max.
   -Current flow rate at 24V: 150 mA max.

## Expansion Modules (Applicable for 12.1" HG4G, 8.4" and 10.4" HG3G, and 5.7" HG2G-5FT22TF)

| | Input Type | Part No. (Ordering No.) | Connector | Dimensions (L × W × H mm) | Consumption Current (mA) | |
|---|---|---|---|---|---|---|
| | | | | | 5V | 24V |
| Input Modules | 8 points/AC Input | FC4A-N08A11 | Removable Terminal Block | 90.0 × 23.5 × 70.0 | 25 | 0 |
| | 8 points/DC Input | FC4A-N08B1 | | 90.0 × 23.5 × 70.0 | 25 | 0 |
| | 16 points/DC Input | FC4A-N16B1 | | 90.0 × 23.5 × 70.0 | 40 | 0 |
| | 16 points/DC Input | FC4A-N16B3 | MIL Connector | 90.0 × 17.6 × 70.0 | 35 | 0 |
| | 32 points/DC Input | FC4A-N32B3 | | 90.0 × 29.7 × 70.0 | 65 | 0 |
| Output Modules | 8 points/Relay Output | FC4A-R081 | Removable Terminal Block | 90.0 × 23.5 × 70.0 | 30 | 40 |
| | 16 points/Relay Output | FC4A-R161 | | 90.0 × 23.5 × 70.0 | 45 | 75 |
| | 8 points/Transistor Sink Output | FC4A-T08K1 | | 90.0 × 23.5 × 70.0 | 10 | 20 |
| | 8 points/Transistor Source Output | FC4A-T08S1 | | 90.0 × 23.5 × 70.0 | 10 | 20 |
| | 16 points/Transistor Sink Output | FC4A-T16K3 | MIL Connector | 90.0 × 17.6 × 70.0 | 10 | 40 |
| | 16 points/Transistor Source Output | FC4A-T16S3 | | 90.0 × 17.6 × 70.0 | 10 | 40 |
| | 32 points/Transistor Sink Output | FC4A-T32K3 | | 90.0 × 29.7 × 70.0 | 20 | 70 |
| | 32 points/Transistor Source Output | FC4A-T32S3 | | 90.0 × 29.7 × 70.0 | 20 | 70 |
| Mixed I/O Modules | 4 points/DC Input<br>4 points/Relay Output | FC4A-M08BR1 | Removable Terminal Block | 90.0 × 23.5 × 70.0 | 25 | 20 |
| | 16 points/DC Input<br>8 points/Relay Output | FC4A-M24BR2 | Non-removable Terminal Block | 90.0 × 39.1 × 70.0 | 65 | 45 |

1. Use the expansion module bracket when using expansion modules.
2. Order the module bracket (S), (L) or (XL) by referring to the width of the module shown in the dimensions of each module.
3. When connecting more than 3 expansion modules to HG3G/4G, note the limits shown below:
   **Limits**
   Current flow rate at 5V: 130 mA max.
   Total width: 92.3mm max.
   Current flow rate at 24V: 150 mA max.
4. See instruction manual for details on MicroSmart expansion modules.

# Cables

| Description | | | | | Part Numbers: Communication Cable between PLC and OI Touchscreen | | |
|---|---|---|---|---|---|---|---|
| Manufacturer | Series | Applicable CPU | Comm. Type | Communication Module | 4.6" HG1F | 4.3" (HG1G) 5.7" (HG2G-5TT, HG2G-5FT), 8.4" and 10.4" (HG3G-8JT/-AJT), 12.1" (HG4G-CJT22MF) | 4.3" (HG1G) 5.7" (HG2G-5FT), 8.4" and 10.4" (HG3G-8JT/-AJT), 12.1" (HG4G-CJT22MF) |
| | | | | | | Terminal Block Type | 9 Pin D-sub Type |
| IDEC | MicroSmart/ Pentra MicroSmart (FC4A/FC5A/ FC6A) | FC4A, FC5A, FC6A | RS232 | Built-in Port | FC4A-KC1CA | HG9Z-AC102 | HG9Z-AC501 |
| | | | | FC4A-PC1/HPC1 | HG9Z-XC183 or FC4A-KC1CA | HG9Z-AC102 | HG9Z-AC501 |
| | | | | FC5A-SIF2 | N/A | HG9Z-AC312 | N/A |
| | | | | Built-in Port | N/A | FC6A-KC1C | FC6A-KC2C |
| | | | RS485 | FC4A-PC2/HPC2 | HG9Z-1C12A | HG9Z-AC172 | N/A |
| | | | | FC4A-PC3/HPC3 | HG9Z-1C131A | Use Shielded Pair | HG9Z-AC502 |
| | | | | FC5A-SIF4 | N/A | Use Shielded Pair | HG9Z-AC502 |
| | | | | Built-in Port | N/A | FC6A-KC1C | FC6A-KC2C |
| | | | Ethernet | FC4A-SX5ES1E | N/A | Use CAT 5 Ethernet cable | CAT 5 Ethernet Crossover cable |
| | | | | Built-in | Not Supported | CAT 5 Ethernet Crossover cable | CAT 5 Ethernet Crossover cable |
| | OpenNet | FC3A | RS232 | Built-in Port | HG9Z-XC183 | HG9Z-AC162 | HG9Z-AC501 |
| | | | RS485 | Built-in Port | HG9Z-1C131A | Use Shielded Pair | HG9Z-AC502 |
| Allen Bradley | SLC 500 | SLC-5/03, SLC-5/04, SLC-5/05 | RS232 | Built-in Port | HG9Z-XC100 | HG9Z-AC112 | HG9Z-AC504 |
| | | | DH485 | Built-in Port | HG9Z-GWDF1DH485-4 | HG9Z-GWDF1DH485-5 | N/A |
| | | | Ethernet | Built-in(SLC-5/05), 1761-NET-ENI | N/A | CAT 5 Ethernet Crossover cable | CAT 5 Ethernet Crossover cable |
| | MicroLogix | 1000, 1200, 1500 | RS232 | Built-in Port | HG9Z-XC500 | HG9Z-AC122 | HG9Z-AC511 |
| | | | Ethernet | 1761-NET-ENI | Not Supported | CAT 5 Ethernet Crossover cable | CAT 5 Ethernet Crossover cable |
| | | 1500 | RS232 | Built-in Port (9 Pin Dsub) | N/A | HG9Z-AC132 | HG9Z-AC505 |
| | | 1100, 1400 | RS232 | Built-in Port | N/A | HG9Z-AC152 | HG9Z-AC518 |
| | | 1100 | Ethernet | Built-in Port | Not Supported | CAT 5 Ethernet Crossover cable | CAT 5 Ethernet Crossover cable |
| | ControlLogix | 5550, 5555 | RS232 | Built-in Port | N/A | HG9Z-AC142 | HG9Z-AC503 |
| | | | Ethernet | 1756-ENBT | Not Supported | CAT 5 Ethernet Crossover cable | CAT 5 Ethernet Crossover cable |
| | CompactLogix | 1768, 1769 | RS232 | Built-in Port | N/A | HG9Z-AC142 | HG9Z-AC503 |
| | | | Ethernet | Built-in Port | N/A | CAT 5 Ethernet Crossover cable | CAT 5 Ethernet Crossover cable |
| | FlexLogix | 1794-L33, 1794-L34 | RS232 | Built-in Port | N/A | HG9Z-AC142 | HG9Z-AC503 |
| Automation Direct (Koyo) | Direct Logic 05/06 | DL05 , DL06 | Ethernet | D0-ECOM, D0-ECOM100 | Not Supported | CAT 5 Ethernet Crossover cable | CAT 5 Ethernet Crossover cable |
| | Direct Logic | D2-240,-250,-250-1, -260 | Ethernet | D2-ECOM,-ECOMF,-ECOM100 | Not Supported | CAT 5 Ethernet Crossover cable | CAT 5 Ethernet Crossover cable |
| | Direct Logic 205 | D2-240 | RS232 | Built-in Port | HG9Z-XC400 | N/A | HG9Z-AC508 |
| | Direct Logic 405 | D4-430, D4-440 | RS232 | Built-in Port | N/A | N/A | HG9Z-AC506 |
| | | | RS422 | Built-in Port | N/A | N/A | HG9Z-AC507 |
| | | D4-430,-440,450 | RS232 | D4-DCM | N/A | N/A | HG9Z-AC506 |
| | | | Ethernet | D4-ECOM, -ECOM-F, ECOM100 | Not Supported | CAT 5 Ethernet Crossover cable | CAT 5 Ethernet Crossover cable |
| GE Fanuc | Series 90-30 | CPU331, 341, 350, 351, 352, 360, 363 | RS232 | IC693CMM311 | N/A | N/A | HG9Z-AC510 |
| | | | RS485 | | | | |

### Cables, con't

| Description | | | | | Part Numbers: Communication Cable between PLC and OI Touchscreen | | |
|---|---|---|---|---|---|---|---|
| Manufacturer | Series | Applicable CPU | Comm. Type | Communication Module | 4.6" HG1F | 4.3" (HG1G) 5.7" (HG2G-5TT, HG2G-5FT), 8.4" and 10.4" (HG3G-8JT/-AJT), 12.1" (HG4G-CJT22MF) | 4.3" (HG1G) 5.7" (HG2G-5FT), 8.4" and 10.4" (HG3G-8JT/-AJT), 12.1" (HG4G-CJT22MF) |
| | | | | | | Terminal Block Type | 9 Pin D-sub Type |
| Mitsubishi | MELSEC A | A1N, A2N, A3N, A0J2, A0J2H, A2A, A3A, A2U, A3U, A4U | RS232 | AJ71C24/-S3/-S6/-S8, AJ71UC24, AOJ2-C214-S1, AJY1C24-S6/-S8, AJ71UC24, | HG9Z-XC145 | HG9Z-AC192 | N/A |
| | MELSEC-QnA | Q4A, Q4AR, Q3A, Q2ACPU-S1, Q2ACPU | | AJ71QC24N-R2, AJ71QC24N | | | |
| | MELSEC Q | Q02CPU, Q02HCPU, Q06HCPU, Q12PH-CPU, Q25HCPU | RS232 | QJ71C24N-R2, QJ71C24, QJ71C24N | HG9Z-XC203 | N/A | N/A |
| | MELSEC-FX | FX0, FX0N, FX1N, FX0S, FX1S | RS485(422) | Built-in Port | N/A | HG9Z-AC182 | N/A |
| Siemens | S7-300 | CPU 313-2PtP | RS485 | Built-in Port | N/A | N/A | HG9Z-AC510 |

Note: For complete listing of supported PLC/Host Device manufacturers/models type or protocols, wiring diagram, and setting details, please refer to WindOI-NV2 Users Manual - Communication Manual (pdf)
N/A: Cable Not Available to purchase. For wiring diagram, refer to WindOI-NV2 Manual (pdf only) - Communication Manual.

# Specifications

## High Performance Series Specifications

### Display Specifications

| | 5.7" | 8.4" | 10.4" | 12.1" |
|---|---|---|---|---|
| Model | HG2G-5FT22TF | HG3G-8JT22MF | HG3G-AJT22MF | HG4G-CJT22MF |
| Display Type | Color TFT LCD | Color TFT LCD | Color TFT LCD | Color TFT LCD |
| Color Depth | 65,536 | 65,536 | 65,536 | 65,536 |
| Portrait or Landscape Mounting | √ | √ | √ | √ |
| User Memory | 12MB | 12MB | 12MB | 12MB |
| Display Resolution | 640W × 480H pixels | 800W × 600H pixels | 800W × 600H pixels | 800W × 600H pixels |
| Backlight | LED | LED | LED | LED |
| Backlight Life [1] | 100,000 hours | 100,000 hours | 100,000 hours | 100,000 hours |
| Brightness [2] | 800 cd/m$^2$ | 600 cd/m$^2$ | 700 cd/m$^2$ | 550 cd/m$^2$ |
| Brightness Adjustment | 48 scales | 48 scales | 48 scales | 48 scales |
| SD Card Slot | √ | √ | √ | √ |
| MicroSmart Digital I/O Cards Supported | 2 | 4 | 4 | 4 |
| Ethernet Port | 1 RJ-45 | 1 RJ-45 | 1 RJ-45 | 1 RJ-45 |
| USB Port | 1 Type A and 1 mini-B | 1 Type A and 1 mini-B | 1 Type A and 1 mini-B | 1 Type A and 1 mini-B |
| Serial Ports | 2 (RS-232, RS-485, RS-422 configurable) | 2 (RS-232, RS-485, RS-422 configurable) | 2 (RS-232, RS-485, RS-422 configurable) | 2 (RS-232, RS-485, RS-422 configurable) |
| Video In | – | Composite Video RCA connector (NTSC or PAL) | Composite Video RCA connector (NTSC or PAL) | Composite Video RCA connector (NTSC or PAL) |
| Audio In/Out | – | 3.5mm audio mini-jack (Stereo) | 3.5mm audio mini-jack (Stereo) | 3.5mm audio mini-jack (Stereo) |
| Remote Monitor and Control | √ | √ | √ | √ |

1. The backlight life refers to the time until the surface brightness reduces by half after continuous use at 25°C.
2. Brightness of the LCD only.

## General Specifications

| | 5.7" | 8.4" | 10.4" | 12.1" |
|---|---|---|---|---|
| Model | HG2G-5FT22TF | HG3G-8JT22MF | HG3G-AJT22MF | HG4G-CJT22MF |
| Rated Power Voltage | 24V DC | 24V DC | | 24V DC |
| Power Voltage Range | 20.4 to 28.8V DC | 20.4 to 28.8V DC | | 20.4 to 28.8V DC |
| Power Consumption | 19W maximum<br>10W maximum when not using USB interface (USB2) or expansion module interface (EXT) | 25W maximum<br>15W maximum when not using USB interface (USB2) or expansion module interface (EXT) | | 27W maximum<br>18W maximum when not using USB interface (USB2) or expansion module interface (EXT) |
| Allowable Momentary Power Interruption | 10 ms maximum | 10 ms maximum | | 10 ms maximum |
| Inrush Current | 30A maximum | 30A maximum | | 30A maximum |
| Dielectric Strength | 1,000V AC, 10 mA,<br>1 minute between power and FG terminals | 1,000V AC, 10 mA,<br>1 minute between power and FG terminals | | 1,000V AC, 10 mA,<br>1 minute between power and FG terminals |
| Insulation Resistance | 10 MΩ minimum between power and FG terminals (500V DC megger) | 10 MΩ minimum between power and FG terminals (500V DC megger) | | 10 MΩ minimum between power and FG terminals (500V DC megger) |
| Operating Temperature | 0 to +50°C (no freezing) | 0 to +50°C (no freezing) | | 0 to +50°C (no freezing) |
| Operating Humidity | 10 to 90% RH (no condensation) | 10 to 90% RH (no condensation) | | 10 to 90% RH (no condensation) |
| Storage Temperature | –20 to +60°C (no freezing) | –20 to +60°C (no freezing) | | –20 to +60°C (no freezing) |
| Storage Humidity | 10 to 90% RH (no condensation) | 10 to 90% RH (no condensation) | | 10 to 90% RH (no condensation) |
| Pollution Degree | 2 | 2 | | 2 |
| Vibration Resistance | 5 to 8.4 Hz amplitude 3.5 mm,<br>8.4 to 150 Hz, acceleration 9.8 $m/s^2$<br>10 cycles (100 minutes) on each of three mutually perpendicular axes | 5 to 8.4 Hz amplitude 3.5 mm,<br>8.4 to 150 Hz, acceleration 9.8 $m/s^2$<br>10 cycles (100 minutes) on each of three mutually perpendicular axes | | 5 to 8.4 Hz amplitude 3.5 mm,<br>8.4 to 150 Hz, acceleration 9.8 $m/s^2$<br>10 cycles (100 minutes) on each of three mutually perpendicular axes |
| Shock Resistance | 147 $m/s^2$, 11 ms<br>5 shocks on each of three mutually perpendicular axes | 147 $m/s^2$, 11 ms<br>5 shocks on each of three mutually perpendicular axes | | 147 $m/s^2$, 11 ms<br>5 shocks on each of three mutually perpendicular axes |
| Noise Immunity | Fast transient/burst test,<br>Power terminals: ±1 kV, Communication line: ±0.5 kV (IEC/EN61131-2: 2007) | Fast transient/burst test,<br>Power terminals: ±2 kV, Communication line: ±1 kV (IEC 61131-2: 2007) | | Fast transient/burst test,<br>Power terminals: ±2 kV, Communication line: ±1 kV (IEC/EN61131-2: 2007) |
| Electrostatic Discharge | ESD-3 (RH-1), Level 3 (Contact ±6 kV, air ±8 kV) (IEC/EN61131-2: 2007) | ESD-3 (RH-1), Contact ±6 kV, air ±8 kV (IEC 61131-2: 2007) | | ESD-3 (RH-1), Level 3 (Contact ±6 kV, air ±8 kV) (IEC/EN61131-2: 2007) |
| Corrosion Immunity | Free from corrosive gases | Free from corrosive gases | | Free from corrosive gases |
| Degree of Protection | IP66 (IEC 60529) (front part when mounted)<br>Type 4X, Type 13 | IP66 (IEC 60529) (front part when mounted)<br>Type 4X and 13 | | IP66 (IEC 60529) (front part when mounted)<br>Type 4X and 13 |
| Switching Element | Analog resistive membrane | Analog resistive membrane | | Analog resistive membrane |
| Operating Force | 3N maximum | 0.55 to 2.3N | 0.55 to 2.3N | 3N maximum |
| Mechanical Life | 1,000,000 operations | 1,000,000 operations | | 1,000,000 operations |
| Sound Acknowledgement | Electronic buzzer | Electronic buzzer or speaker output | | Electronic buzzer or speaker output |
| Dimensions | 167.2W × 134.7H × 54.4D mm | 231W × 176H × 54.4D mm | 270W × 212H × 52.7D mm | 314W × 240H × 54.1D mm |
| Weight (approx.) | 0.65 kg | 1.25 kg | 1.65 kg | 2.1 kg |
| Approvals | Safety Standards: UL508, CSA C22.2 No.142,<br>Ship Classification Standards: ABS, LR, NK, DNV | Safety Standards: UL508, CSA C22.2 No.142, CSA C22.2 No.213, ANSI/ISA-12.12.01-2007<br>Ship Classification Standards: ABS, LR, NK, DNV, Type 4X and 13 | | Safety Standards: UL508, CSA C22.2 No.142,<br>Ship Classification Standards: ABS, LR, NK, DNV, Type 4X and 13 |

Do not use the touchscreen in an environment subject to strong ultraviolet rays, otherwise the LCD quality will deteriorate.
*1 Protection degree of the front surface after mounting. Operation not guaranteed in certain environments.

# Enhanced Series Specifications

## Display Specifications

| Model | 5.7" HG2G-5TT | 5.7" HG2G-5TN |
|---|---|---|
| Display | TFT Color LCD | TFT Monochrome LCD |
| Color/Shade | 65,536 | 16 shades |
| Effective Display Area | 115.2W × 86.4H mm | |
| Display Resolution | 320W × 240H pixels | |
| View Angle | Right and left 80°, up 80°, down 80° | Right and left 65°, up 80°, down 60° |
| Backlight | LED | |
| Backlight Life | 100,000 hours minimum*1 | |
| Backlight Control | Automatic off | |
| Brightness | 500 cd/m$^2$ *2 | 1100 cd/m$^2$ *2 |
| Brightness Adjustment | 32 levels | |
| Backlight Replacement | Not possible | |

*1 The backlight life refers to the time until the brightness reduces by half after use at 25°C.
*2 Brightness of the LCD only.

## General Specifications

| Model | HG2G-5TT (Color) / HG2G-5TN (Monochrome) |
|---|---|
| Rated Power Voltage | 12 to 24 V DC |
| Power Voltage Range | 10.2 to 28 VDC |
| Power Consumption | 8W maximum<br>4W maximum when not using USB interface (USB2) |
| Allowable Momentary Power Interruption | 10ms maximum (Voltage 20.4 to 28.8V DC)<br>1ms maximum (Voltage 10.2 to 20.4V DC) |
| Inrush Current | 40A maximum |
| Dielectric Strength | 1000V AC, 10 mA, 1 minute between power and FG terminals |
| Insulation Resistance | 50 MΩ minimum between power and FG terminals (500V DC megger) |
| Operating Temperature | -20 to +60°C (no freezing) |
| Operating Humidity | 10 to 90% RH (no condensation) |
| Storage Temperature | –20 to +70°C (no freezing) |
| Storage Humidity | 10 to 90% RH (no condensation) |
| Pollution Degree | 2 |
| Vibration Resistance | 5 to 8.4 Hz amplitude 3.5 mm, 8.4 to 150 Hz, acceleration 9.8 m/s$^2$ 10 cycles (100 minutes) on each of three mutually perpendicular axes |
| Shock Resistance | 147 m/s$^2$, 11 ms 5 shocks on each of three mutually perpendicular axes |
| Noise Immunity | Fast transient/burst test, Power terminals: ±2 kV, Communication line: ±1 kV (IEC/EN61000-4-4) |
| Electrostatic Discharge | ESD-3 (RH-1) Level 3 (Contact ±6 kV, air ±8 kV) (IEC/EN61000-4-2) |
| Corrosion Immunity | Free from corrosive gases |
| Mounting | Panel mounting |
| Degree of Protection | IP66F (IEC 60529) (front part when mounted)*1 TYPE 4X TYPE 13 *2 |
| Dimensions | 167.2 W ×134.7 H × 40.9 D mm |
| Weight (approx.) | 0.5 kg |

Do not use the HG2G in an environment subject to strong ultraviolet rays, otherwise the LCD quality will deteriorate.
*1 Protection degree of the front surface after mounting. Operation not guaranteed
*2 Operation not guaranteed when used with certain types of oils under certain environments.

## Operation Specifications

| Model | HG2G-5TT (Color) / HG2G-5TN (Monochrome) |
|---|---|
| Switching Element | Analog resistive membrane |
| Operating Force | 3N maximum |
| Mechanical Life | 1,000,000 operations |
| Acknowledgement Sound | Electronic buzzer |

## Function Specifications

| Model | HG2G-5TT (Color) / HG2G-5TN (Monochrome) |
|---|---|
| Screen Types | Base screen, popup screen, system screen |
| No. of Screens | Base screen: 3,000 max.<br>Popup screen: 3,015 max. |
| User Memory | 5 MB (including expansion fonts) |
| Parts | Bit Button, Word Button, Goto Screen,Print Button Key Button, Multi Button, Keypad, Selector Switch, Potentiometer, Numerical Input, Character Input, Pilot Lamp, Multi-State Lamp, Picture Display, Message Display, Message Switching Display, Alarm List Display, Alarm Log Display, Numerical Display, Bar Graph, Trend Chart, Pie Chart, Meter, Calendar, Bit Write Command, Word Write Command, Goto Screen Command,Print Command Screen Script Command, Multi Command,Timer |
| Calendar | Year, Month, Day, Hour, Min., Sec., Day of Week<br>±60 sec per month (at 25 °C) |
| Power Failure Backup Data | Calendar, log data, keep internal relay, keep internal register |
| Battery | Recommended replacement span: every 4 years (at 25°C) |

## Interface Specifications

| Model | | HG2G-5TT Color / HG2G-5TN Monochrome | |
|---|---|---|---|
| Serial Interface 1 (COM1)* | RS232C | Electrical Characteristics | EIA RS232C compliant |
| | | Transmission Speed | 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps |
| | | Synchronization | Asynchronous |
| | | Communication Method | Half or full duplex |
| | | Control System | Hardware control or none |
| | | Connector | Detachable 9-pin terminal block |
| | EIA RS422/485 | Electrical Characteristics | EIA RS422/485 compliant |
| | | Transmission Speed | 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 187500 bps (Note) |
| | | Synchronization | Asynchronous |
| | | Communication Method | Half or full duplex |
| | | Control System | None |
| | | Connector | Detachable 9-pin terminal block |
| Ethernet Interface (LAN) | | Interface | IEEE802.3u (10BASE-T/100BASE-TX) compliant |
| | | Connector | Connector (RJ-45) |
| USB Interface (USB2) | | Interface | USB 2.0 full speed (12 Mbps) |
| | | Connector | USB Type Mini-A connector |
| USB Interface (USB1) | | Interface | USB 2.0 high speed (480 Mbps) |
| | | Connector | USB Type Mini-B connector |

*RS232C and RS 422/485 can be used simultaneously.
Note: 187,500 bps is available only with SIEMENS SIMATIC S7-300/400 series (MPI port direct connection).

# Basic and Compact Series Specifications

## General Specifications

| Model | 4.6" HG1F Monochrome |
|---|---|
| Voltage | 24V DC |
| Voltage Range | 20.4 to 28.8V DC |
| Power Consumption | 10W maximum |
| Inrush Current | 20A maximum |
| Allowable Momentary Power Interruption | 10 ms minimum |
| Dielectric Strength | 1,000V AC, 10 mA, 1 minute between power and FG terminals |
| Insulation Resistance | 50 MΩ minimum between power and FG terminals (500V DC megger) |
| Backup Battery | CR2032 lithium battery<br>Life approx. 4 years (25ºC) |
| Operating Temperature | 0 to 50°C (no freezing) |
| Operating Humidity | 10 to 90% RH (no condensation) |
| Storage Temperature | –20 to +60°C (no freezing) |
| Storage Humidity | 10 to 90% RH (no condensation) |
| Pollution Degree | 2 (IEC 60664-1) |
| Corrosion Immunity | Atmosphere free from corrosive gases |
| Vibration Resistance (damage limits) | 10 to 20Hz amplitude 0.625 mm, 20 to 55Hz acceleration 9.8 m/s² (1G), 2 hours per axis on each of three mutually perpendicular axes |
| Shock Resistance (damage limits) | 147 m/s² (15G), 11 ms, 5 shocks on each of three mutually perpendicular axes |
| Noise Immunity | Fast transient/burst test, common mode: Level 3, power terminals: ±2 kV, communication line: ±1 kV (IEC/EN 61000-4-4) |
| Electrostatic Discharge | ESD-3 (RH-1), Level 3, (contact ±6 kV, aerial ±8 kV) (IEC/EN 61000-4-2) |
| Mounting | Panel mounting |
| Degree of Protection | IP65 TYPE 13, ANSI/ISA-12.12.01-2007 |
| Dimensions (mm) | 147W x 47H x 39.3D |
| Weight (approx.) | 280g |

## Operation Specifications

| Model | 4.6" HG1F Monochrome |
|---|---|
| Switching Element | Resistive membrane |
| Touch Region Resolution | 1 x 1 |
| CC Switch Quantity | |
| Operating Force | 0.2 to 0.8N |
| Mechanical Life | 1,000,000 operations |
| Acknowledge Sound | Electronic buzzer |
| Screen Types | Base screen, popup screen, system screen |
| Number of Screens | Base screen: 3000 max.,<br>popup screen: 3015 max. |
| User Memory | 1MB (including expansion fonts) |
| Parts | Bit Button, Word Button, Goto Screen Button, Print Button, Key Button, Keypad, Selector Switch, Potentiometer, Numerical Input, Character Input, Pilot Lamp, Multi-state Lamp, Picture Display, Message Display, Message Switching Display, Alarm List Display, Alarm Log Display, Numerical Display, Bar Graph, Trend Chart, Pie Chart, Meter, Calendar, Bit Write Command, Word Write Command, Goto Screen Command, Timer, Print Command, Screen Script Command |

## Operation Specifications con't

| Model | 4.6" HG1F Monochrome |
|---|---|
| Calendar | Year, Month, Day, Hour, Min., Sec., Day of Week |
| Print Function (support) | ESC/P, PC-PR: Epson VP-700<br>SII: DPU414 |
| Power Failure Backup | Backup data: Calendar, log data, keep internal relay, keep internal register |
| Backup Duration | 1 month (at 25°C) after full charging for two days |
| Battery Life | 4 years (at 25ºC) |

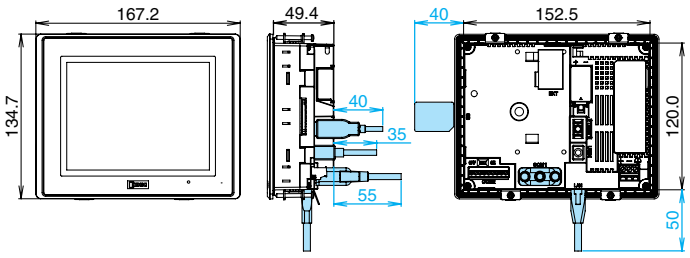
*2MB for OS

## General Specifications

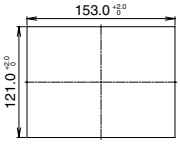
| | Model | 4.3" HG1G Color |
|---|---|---|
| Electrical Specifications | Rated Power Voltage | 12-24V DC |
| | Power Voltage Range | 10.2 to 28.8V DC |
| | Power Consumption | 8W maximum<br>4W maximum when not using USB interface (USB2) |
| | Allowable Momentary Power Interruption | 10ms maximum (voltage 20.4 to 28.8V DC)<br>1ms maximum (voltage 10.2 to 20.4V DC) |
| | Inrush Current | 40A maximum |
| | Dielectric Strength | 1,000V AC, 10mA, 1 minute between power and FG terminals |
| Environmental Specifications | Operating Temperature | –20 to +55°C (no freezing) |
| | Operating Humidity | 10 to 90% RH (no condensation) |
| | Storage Temperature | –20 to +70°C (no freezing) |
| | Storage Humidity | 10 to 90% RH (no condensation) |
| | Pollution Degree | 2 |
| | Vibration Resistance | 5 to 8.4Hz amplitude 3.5 mm,<br>8.4 to 150Hz, acceleration 9.8m/s²<br>10 cycles (100 minutes) on each of three mutually perpendicular axes |
| | Shock Resistance | 147m/s², 11ms<br>5 shocks on each of three mutually perpendicular axes |
| | Noise Immunity | Fast transient/burst test,<br>Power terminals: ±2kV,<br>Communication line: ±1kV<br>(IEC/EN 61131-2, IEC/EN 61000-4-4) |
| | Electrostatic Discharge | Contact ±6kV, air ±8kV<br>(IEC/EN 61131-2, IEC/EN 61000-4-2) |
| | Corrosion Immunity | Free from corrosive gases |
| Structure | Mounting | Panel mounting (panel thickness: 1.0 to 5.0mm) |
| | Degree of Protection | IP66F/IP67F (IEC 60529, JIS C0920) (see JIS C 0920 Annex 1 for "F") (front part when mounted) *1<br>IP65F/IP67F when panel thickness is below 1.5mm<br>TYPE 4X TYPE 13 *2, Class I Div 2 |
| | Dimensions | 128 W ×102 H × 31.8 D mm |
| | Weight (approx.) | 300g |

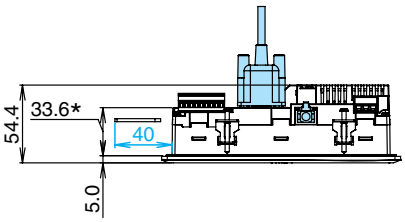
# High-Performance Series Dimensions and Panel Cutouts (mm)

## 5.7" HG2G-5FT22TF

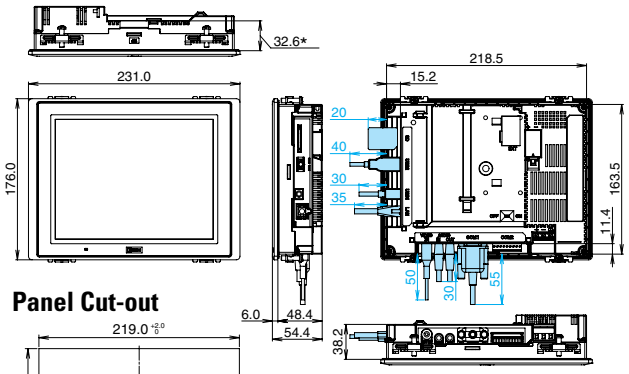



### Panel Cut-out

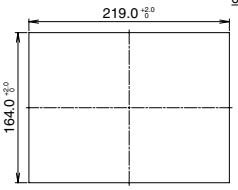


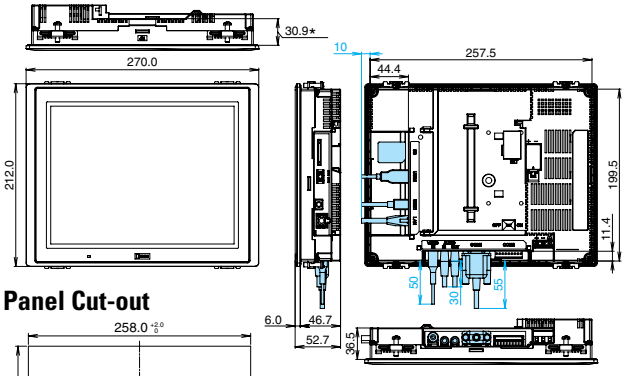

## 8.4" HG3G-8JT22MF



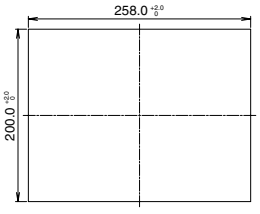

### Panel Cut-out



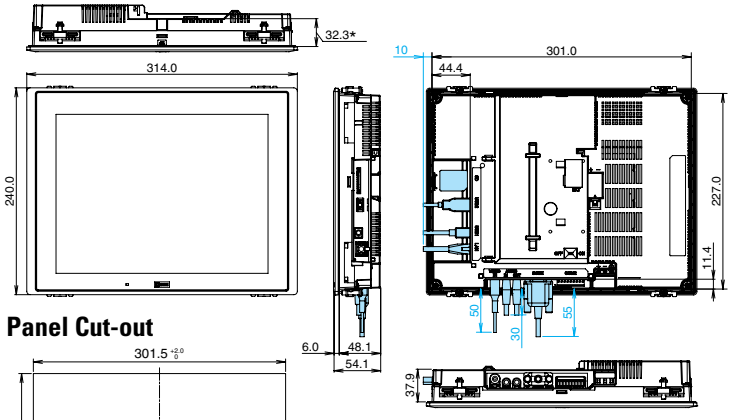

## 10.4" HG3G-AJT22MF



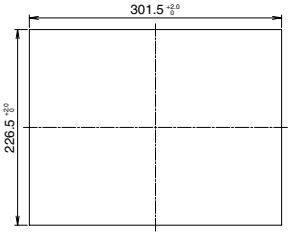

### Panel Cut-out




## 12.1" HG4G-CJT22MF



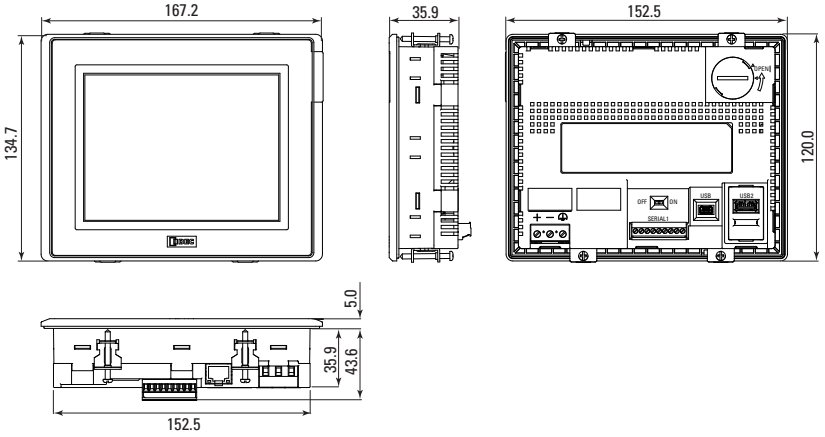

### Panel Cut-out



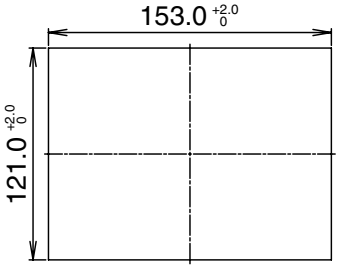

1. Dimensions in blue show the mounting dimensions of the cable.
2. Dimensions in the figure vary depending on the type of cable connected.

# Enhanced Series Dimensions and Panel Cutouts (mm)

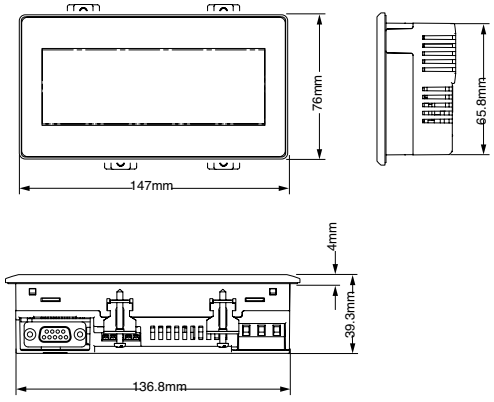
## 5.7" HG2G-5TT22TF/HG2G-5TN22TF



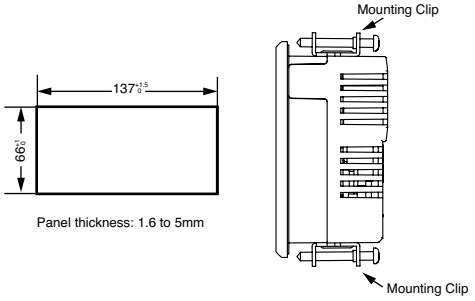

### Panel Cut-out



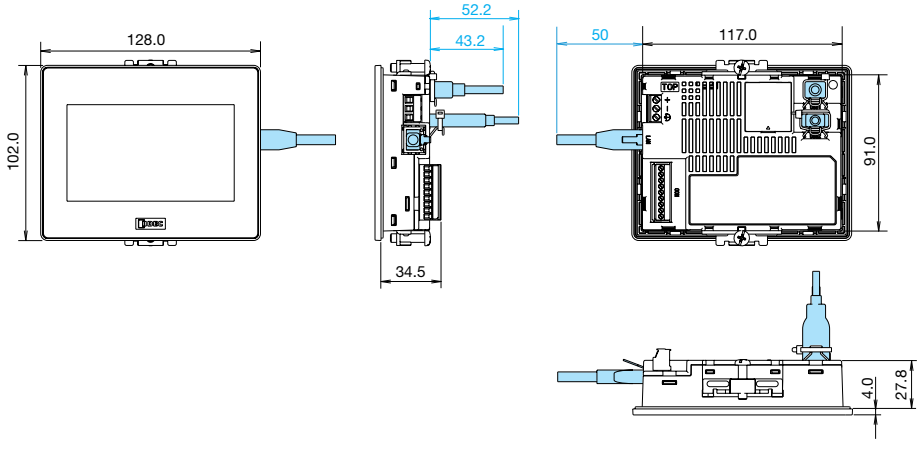

## 4.6" HG1F (Monochrome)



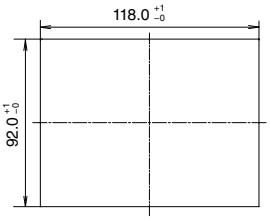

### Panel Cut-out




## 4.3" HG1G




### Panel Cut-out




1. Dimensions in blue show the mounting dimensions of the cable.
2. Dimensions in the figure vary depending on the type of cable connected.
3. Install the HG2G into a panel cut-out by tightening the four mounting clips (supplied) to a torque of 0.2 to 0.3 N·m.
Do not tighten with excessive force, otherwise the HG2G and screen may be distorted. Also waterproof characteristics may be lost.

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# PLCs

IDEC

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# Selection Guide

## Programmable Logic Controllers

| Series | MicroSmart Family | | | SmartAXIS | | IDEC SmartRelay |
|---|---|---|---|---|---|---|
| | MicroSmart FC6A | MicroSmart Pentra FC5A | MicroSmart FC4A | Controller | Touch | |
| Appearance | | | | | | |
| Page Number | 55 | 73 | 81 | 120 | | 140 |
| Rated Voltage | 12 VDC, 24 VDC, 100-240 VAC | 12 VDC, 24 VDC, 100-240 VAC | 24 VDC, 100-240 VAC | 24 VDC, 100-240 VAC | 24 VDC | 12-24 VDC, 24 VAC/DC, 100-240 VAC/DC |
| Max. Digital I/O | 520 | 512 | 264 | "48 (local) | 12 (local)<br>156 (Remote I/O) | 44 |
| Max. Analog I/O | 192 (remote I/O)" | "14 (local) | 56 | 8 (Local)<br>32 (Remote I/O) | 8 | 16 |
| Base CPU I/O Configuration | 158 (remote I/O)" | 44 | Slim style: 20, 40 I/Os | 12, 24, 40, 48 | 12 | 12 I/O |
| | 126 | 56 | 56 | | | |
| Maximum Program Capacity | 32 (remote I/O)" | 8 | 16 | 48KB | 5 MB/48K bytesx | 2K bytes |
| Max. Communication Ports | 16, 24, 40 | "Slim: 12 I/O w/ Ethernet, 16, 32 | 2 | 4 | 3 | 1 |
| Embedded Ethernet | Brick: 10, 16, 24" | "Slim: 20, 40 | – | Yes | Yes | Yes |
| Modbus TCP | Brick: 10, 16, 24" | 12, 24, 40, 48 | 12, 14 | 12 | Yes | – |
| Modbus TCP | 640K Bytes | 128K Bytes | 31.2K Bytes | 48K Bytes | 48K Bytes | 2K Bytes |
| Modbu RTU and ASCII | 3 | 7 | 2 | 4 | 3 | 1 |
| CAN J1939 | Yes | Yes | - | Yes | Yes | Yes |
| Web Server | Yes | Yes | - | Yes | Yes | - |
| Email and Text Message | Yes | Yes | - | Yes | Yes | - |
| User Web Page | Yes | - | - | - | - | - |
| USB Maintenance Port | Yes | Yes | - | - | - | Yes |
| 32-bit Data & Floating Point Math | Yes | Yes | - | - | - | - |
| High Speed I/O Frequency | Yes | Yes | - | - | - | - |
| | Yes | Yes | - | Yes | Yes | - |
| | Yes | Yes | - | Yes | Yes | - |
| | 100 Khz | 100 Khz | 20 Khz | 100 Khz | 10 Khz | 5 Khz |

## Power, Performance, Connectivity
## MicroSmart FC6A

**16x**

### Fast Execution
MicroSmart FC6A execution time is comparable to those of PAC controller. It's 16 time faster than FC5A MicroSmart Pentra.

### Expanded Memory
Program memory is 640 kB (80,000 steps) with 1,024 timers and 512 counters, six high-speed at rates up to 100kHz. Double the capacity of a typical micro PLC, allows handling of large programs with complex control requirements such as PID, flow totalization and recipes.

### High Speed Outputs
Allows implementation of PAC-like features including:
ARAMP — Ramp pulse output with table
JOG — Jog control
ABS — Initialize Absolute Counter

### Upgradable Firmware
Get the latest features without changing CPU or expansion module hardware

**6x**

### Fast I/O Refresh
Expansion I/O refresh is 6 time faster than FC5A MicroSmart Pentra resulting in more efficient and faster machines.

### Up to 520 Discrete and Analog I/O
Maximum of 126 analog I/O, much more than a typical micro PLC, and approaching PAC capacity

### Time-Base Applications
Use built-in real time clock or obtain time from SNTP server

# MicroSmart FC6A PLC CPU Module Specifications

## Key Features

- Embedded Ethernet port
- Embedded SD memory port
- Modbus TCP and RTU
- Embedded RS232C/RS485 user selectable
- Maximum 520 digital I/O
- Maximum 126 analog I/O
- Data Logging
- Web Server Functions
- Large programming and data memory
- CAN J1939 CPU
- Built-in Web Page Editor for user webpage

## Standard Base Module

| Part Number | Total I/O | Power Voltage | Input Voltage | Output Type | Maximum Digital I/O | Maximum Analog I/O |
|---|---|---|---|---|---|---|
| FC6A-C16R1AE | 16 (9 inputs, 7 outputs) | 100-240V AC | 24V DC Sink/Source | Relay | 400 | 100 |
| FC6A-C16R1CE | | 24V DC | | Relay | | |
| FC6A-C16P1CE | | | | Transistor Source | | |
| FC6A-C16K1CE | | | | Transistor Sink | | |
| FC6A-C24R1AE | 24 (14 inputs, 10 outputs) | 100-240V AC | | Relay | 504 | 124 |
| FC6A-C24R1CE | | 24V DC | | Relay | | |
| FC6A-C24P1CE | | | | Transistor Source | | |
| FC6A-C24K1CE | | | | Transistor Sink | | |
| FC6A-C40R1AE | 40 (24 inputs, 16 outputs) | 100-240V AC | | Relay | 520 | 126 |
| FC6A-C40R1CE | | 24V DC | | Relay | | |
| FC6A-C40P1CE | | | | Transistor Source | | |
| FC6A-C40K1CE | | | | Transistor Sink | | |
| FC6A-C40R1DE | | 12V DC | 12V DC Sink/Source | Relay | 40 | 6 |
| FC6A-C40P1DE | | | | Transistor Source | | |
| FC6A-C40K1DE | | | | Transistor Sink | | |

## CAN J1939 Base Module

| Part Number | Total I/O | Power Voltage | Input Voltage | Output Type | Maximum Digital I/O | Maximum Analog I/O |
|---|---|---|---|---|---|---|
| FC6A-C40R1AEJ | 40 (24 inputs, 16 outputs) | 100-240V AC | 24V DC Sink/Source | Relay | 520 | 126 |
| FC6A-C40R1CEJ | | 24V DC | | Relay | | |
| FC6A-C40P1CEJ | | | | Transistor Source | | |
| FC6A-C40K1CEJ | | | | Transistor Sink | | |
| FC6A-C40R1DEJ | | 12V DC | 12V DC Sink/Source | Relay | 40 | 6 |
| FC6A-C40P1DEJ | | | | Transistor Source | | |
| FC6A-C40K1DEJ | | | | Transistor Sink | | |

## Specifications

| Part Number | | FC6A-C16R1AE<br>FC6A-C16R1CE<br>FC6A-C16P1CE<br>FC6A-C16K1CE | FC6A-C24R1AE<br>FC6A-C24R1CE<br>FC6A-C24P1CE<br>FC6A-C24K1CE | FC6A-C40R1AE<br>FC6A-C40R1CE<br>FC6A-C40P1CE<br>FC6A-C40K1CE<br>FC6A-C40R1DE<br>FC6A-C40P1DE<br>FC6A-C40K1DE | FC6A-C40R1AEJ<br>FC6A-C40R1CEJ<br>FC6A-C40P1CEJ<br>FC6A-C40K1CEJ<br>FC6A-C40R1DEJ<br>FC6A-C40P1DEJ<br>FC6A-C40K1DEJ |
|---|---|---|---|---|---|
| Rated Power Voltage | | AC: 100 to 240V AC, DC: 24V DC, 12V DC | | | |
| Allowable Voltage Range | | AC: 85 to 264V AC 24V DC: 20.4 to 28.8V DC (including ripple), 12V DC: 10.2 to 18.0V | | | |
| Rated Frequency | | AC: 50/60Hz (47 to 63 Hz) | | | |
| Maximum Power Consumption (CPU module) | AC | FC6A-C16R1AE: 100-240V AC, 33VA<br>FC6A-C24R1AE: 100-240V AC, 35VA<br>FC6A-C40R1AE: 100-240V AC, 41VA<br>FC6A-C40R1AEJ: 100-240V AC, 37VA | | | |
| | DC | FC6A-C16R1CE: 24V DC 140mA, 3.36W<br>FC6A-C24R1CE: 24V DC 155mA, 3.72W<br>FC6A-C40R1CE: 24V DC 195mA, 4.68W<br>FC6A-C16P1CE: 24V DC 190mA, 4.6W | FC6A-C24P1CE: 24V DC 200mA, 4.8W<br>FC6A-C40P1CE: 24V DC 205mA, 5.0W<br>FC6A-C40P1CEJ: 24V DC 175mA, 4.2W<br>FC6A-C40K1CEJ: 24V DC 175mA, 4.2W | FC6A-C40R1DEJ: 12V DC 340mA, 4.08W<br>FC6A-C40P1DEJ: 12V DC 320mA, 3.9W<br>FC6A-C40K1DEJ: 12V DC 320mA, 3.9W | |
| Allowable Momentary Power Interruption | | 10 ms (at rated voltage) | | | |
| Dielectric Strength | | Between power and ground terminals: 1,500V AC, 1 minute<br>Between I/O and ground terminals: 1,500V AC, 1 minute | | | |
| Insulation Resistance | | Between power and ground terminals: 100 MΩ minimum (500V DC megger)<br>Between I/O and ground terminals: 100 MΩ minimum (500V DC megger) | | | |
| Noise Resistance | | AC or DC power terminal: 1.5kV (DC type: 1kV), 50 ns to 1 µs<br>I/O terminals (coupling clamp): 1.5kV, 50ns to 1µs coupling adapter | | | |
| Inrush Current | | AC: 40A maximum<br>24V DC: 35A maximum<br>12V DC: 35A maximum | | | |
| Power Supply Wire | | AWG22, AWG18 | | | |
| Operating Temperature | | -10 to +55°C (no freezing) | | | |
| Storage Temperature | | -25 to +70°C (no freezing) | | | |
| Relative Humidity | | Level RH1 (IEC 61131-2-10 to 95% (no condensation) | | | |
| Altitude | | Operation: 0 to 2,000m, 795 to 1,013hPa, Transport: 0 to 3,000m, 701 to 1,013hPa | | | |
| Pollution Degree | | 2 (IEC 60664-1) | | | |
| Corrosion Immunity | | Free from corrosive gases | | | |
| Degree of Protection | | IP20 (IEC 60529) | | | |
| Ground | | D-type ground (Class 3 ground) | | | |
| Grounding Wire | | AWG16 | | | |
| Vibration Resistance | | 5 to 8.4 Hz amplitude 3.5 mm, 8.4 to 150 Hz acceleration 9.8 m/s2 (1G),<br>2 hours per axis on each of three mutually perpendicular axes (IEC 61131-2) | | | |
| Shock Resistance | | 147 m/s2 (15G), 11 ms duration, 3 shocks per axis on three mutually perpendicular axes | | | |
| Mounting | | DIN rail or panel mounting | | | |
| Weight | | AC: 350g<br>DC: 340g | AC: 420g<br>DC: 400g | AC: 560g<br>DC (relay): 530g<br>DC (transistor): 480g | AC: 560g<br>DC (relay/24V DC): 530g<br>DC (relay/12V DC): 560g<br>DC (transistor/24V DC): 480g<br>DC (transistor/12V DC): 530g |

## Specifications Cont.

| Part Number | | | FC6A-C16R1AE FC6A-C16R1CE FC6A-C16P1CE FC6A-C16K1CE | FC6A-C24R1AE FC6A-C24R1CE FC6A-C24P1CE FC6A-C24K1CE | FC6A-C40R1AE FC6A-C40R1CE FC6A-C40P1CE FC6A-C40K1CE FC6A-C40R1DE FC6A-C40P1DE FC6A-C40K1DE | FC6A-C40R1AEJ FC6A-C40R1CEJ FC6A-C40P1CEJ FC6A-C40K1CEJ FC6A-C40R1DEJ FC6A-C40P1DEJ FC6A-C40K1DEJ |
|---|---|---|---|---|---|---|
| Control System | | | Stored program system | | | |
| Instruction Words | | Basic | 42 | | | |
| | | Advanced | 124 | | | |
| Program Capacity [1] | | | 384KB (48,000 steps)/72KB (9,000 steps) [2] | | | 640KB (80,000) 72KB (9,000 steps) [2] |
| User Program Storage | | | Serial Flash Memory (100,000 times rewritable) | | | |
| Processing Time | | Basic Instruction | 42us/1,000 steps | | | |
| | | END Processing [3] | 1ms maximum | | | |
| I/O Points | | Input | 9 points | 14 points | 24 points | |
| | | Output | 7 points | 10 points | 16 points | |
| Expandable Modules | | | 4 modules | 7 modules | | |
| Expandable I/O Points with Expansion Modules | | | 128 points | 224 points | | |
| Expandable Modules with Expansion Interface Modules | | | 8 modules | | | |
| Expandable I/O Points with Expansion Interface Modules | | | 256 points | | | |
| Internal Relay | | | 12,400 points | | | |
| Special Internal Relay | | | 256 points | | | |
| Shift Register | | | 256 points | | | |
| Data Register | | | 54,000 points | | | |
| Special Data Register | | | 500 points | | | |
| Counter | | | 512 points | | | |
| Timer (1ms, 10ms, 100ms, 1s) | | | 1,024 points | | | |
| Clock | | | Clock accuracy: ±30 sec/month (typical) at 25°C | | | |
| RAM Backup | | Backup Data | Internal relay, shift register, counter, data register, timer, special data register, special internal relay | | | |
| | | Battery | Lithium primary battery (BR2032) | | | |
| | | Battery Life | Approx. 4 years | | | |
| | | Replaceability | Possible | | | |
| Self-diagnostic Function | | | Keep data, user program sum check (EEPROM), user program sum check (RAM), timer/counter preset value sum check,user program syntax check, user program execution check, WDT check, user program write check, power failure, clock error,data ink connection check, I/O bus initialization check | | | |
| Input Filter | | | 0 ms (without filter), 3 to 15ms (selectable in increments of 1ms) | | | |
| Catch Input/Interrupt Input | | | Six inputs I0, I1, I6, I7 Minimum turn on pulse width: 5µs max. Minimum turn off pulse width: 5µs max. | | I3, I4 Minimum turn on pulse width: 35µs max. Minimum turn off pulse width: 35µs max. | |
| High-speed Counter | | Maximum Counting Frequency and High-speed Counter Points | Total 6 points Single/two-phase selectable: 100 kHz (single-phase: 4 points, two-phase: 2 points) Single-phase: 5 kHz (2 points) | | | |
| | | Counting Range | 0 to 4,294,967,295 (32 bits) | | | |
| | | Operation Mode | Rotary encoder mode, adding counter mode, frequency measurement mode | | | |
| Analog Potentiometer | | Quantity | 1 point | | | – |
| | | Data Range | 0 to 1,000 | | | – |
| Analog Voltage Input | | Quantity | 1 point | | | – |
| | | Input Voltage Range | 0 to 10V | | | – |
| | | Input Impedance | Approx. 100KΩ | | | – |
| | | Digital Resolution | Approx. 1,000 steps (10 bits) | | | – |
| Pulse Output | | Quantity | 4 points | | | |
| | | Maximum Frequency | High speed output port: 100 kHz (2 points) maximum Middle speed output port: 5 kHz (2 points maximum) | | | High speed output port: 100 kHz maximum |
| External Power Supply for Sensor (AC only) | | Output Voltage/Current | 24V (+10%, -15%) / 250mA | | | |
| | | Overload Detection | Impossible | | | |
| | | Isolation from the internal circuit | Transformer-isolated | | | |
| USB Port | | | USB mini-B (maintenance communication) | | | |
| Serial Port 1, CAN Port | | | RS232C or RS485 [4] | | | CAN J1939 |
| Ethernet Port 1 | | | Ethernet (maintenance communication, user communication, user communication, Modbus TCP server/client) | | | |
| SD Card Slot | | | Embedded | | | |
| Cartridge (option) | | | One cartridge can be added | | Two cartridges can be added | |
| HMI Module (option) | | | Yes | Yes | Yes | Yes |

Note: The maximum number of relay outputs that can be turned on simultaneously is limited.
Note 1: 1 step equals 8 bytes.
Note 2: When 72KB is selected, download function can be used during RUN.
Note 3: Not including expansion I/O service time, counter timer processing time, data link processing time, and interrupt processing time.
Note 4: Maintenance communication, user communication, data link, Modbus RTU master/slave communication.

## Specifications Cont.

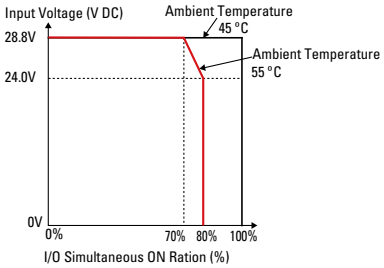
| Part Number | | | FC6A-C16R1AE FC6A-C16R1CE FC6A-C16P1CE FC6A-C16K1CE | FC6A-C24R1AE FC6A-C24R1CE FC6A-C24P1CE FC6A-C24K1CE | FC6A-C40R1AE FC6A-C40R1CE FC6A-C40P1CE FC6A-C40K1CE FC6A-C40R1DE FC6A-C40P1DE FC6A-C40K1DE | FC6A-C40R1AEJ FC6A-C40R1CEJ FC6A-C40P1CEJ FC6A-C40K1CEJ FC6A-C40R1DEJ FC6A-C40P1DEJ FC6A-C40K1DEJ |
|---|---|---|---|---|---|---|
| Control System | | | Stored program system | | | |
| Instruction Words | | Basic | 42 | | | |
| | | Advanced | 124 | | | |
| Program Capacity [1] | | | 384KB (48,000 steps)/72KB (9,000 steps) [2] | | | 640KB (80,000) 72KB (9,000 steps) [2] |
| User Program Storage | | | Serial Flash Memory (100,000 times rewritable) | | | |
| Processing Time | | Basic Instruction | 42us/1,000 steps | | | |
| | | END Processing [3] | 1ms maximum | | | |
| I/O Points | | Input | 9 points | 14 points | 24 points | |
| | | Output | 7 points | 10 points | 16 points | |
| Expandable Modules | | | 4 modules | 7 modules | | |
| Expandable I/O Points with Expansion Modules | | | 128 points | 224 points | | |
| Expandable Modules with Expansion Interface Modules | | | 8 modules | | | |
| Expandable I/O Points with Expansion Interface Modules | | | 256 points | | | |
| Internal Relay | | | 12,400 points | | | |
| Special Internal Relay | | | 256 points | | | |
| Shift Register | | | 256 points | | | |
| Data Register | | | 54,000 points | | | |
| Special Data Register | | | 500 points | | | |
| Counter | | | 512 points | | | |
| Timer (1ms, 10ms, 100ms, 1s) | | | 1,024 points | | | |
| Clock | | | Clock accuracy: ±30 sec/month (typical) at 25°C | | | |
| RAM Backup | | Backup Data | Internal relay, shift register, counter, data register, timer, special data register, special internal relay | | | |
| | | Battery | Lithium primary battery (BR2032) | | | |
| | | Battery Life | Approx. 4 years | | | |
| | | Replaceability | Possible | | | |
| Self-diagnostic Function | | | Keep data, user program sum check (EEPROM), user program sum check (RAM), timer/counter preset value sum check,user program syntax check, user program execution check, WDT check, user program write check, power failure, clock error,data ink connection check, I/O bus initialization check | | | |
| Input Filter | | | 0 ms (without filter), 3 to 15ms (selectable in increments of 1ms) | | | |
| Catch Input/Interrupt Input | | | Six inputs I0, I1, I6, I7 Minimum turn on pulse width: 5µs max. Minimum turn off pulse width: 5µs max. | | I3, I4 Minimum turn on pulse width: 35µs max. Minimum turn off pulse width: 35µs max. | |
| High-speed Counter | | Maximum Counting Frequency and High-speed Counter Points | Total 6 points Single/two-phase selectable: 100 kHz (single-phase: 4 points, two-phase: 2 points) Single-phase: 5 kHz (2 points) | | | |
| | | Counting Range | 0 to 4,294,967,295 (32 bits) | | | |
| | | Operation Mode | Rotary encoder mode, adding counter mode, frequency measurement mode | | | |
| Analog Potentiometer | | Quantity | 1 point | | | – |
| | | Data Range | 0 to 1,000 | | | – |
| Analog Voltage Input | | Quantity | 1 point | | | – |
| | | Input Voltage Range | 0 to 10V | | | – |
| | | Input Impedance | Approx. 100KΩ | | | – |
| | | Digital Resolution | Approx. 1,000 steps (10 bits) | | | – |
| Pulse Output | | Quantity | 4 points | | | |
| | | Maximum Frequency | High speed output port: 100 kHz (2 points) maximum Middle speed output port: 5 kHz (2 points maximum) | | | High speed output port: 100 kHz maximum |
| External Power Supply for Sensor (AC only) | | Output Voltage/Current | 24V (+10%, -15%) / 250mA | | | |
| | | Overload Detection | Impossible | | | |
| | | Isolation from the internal circuit | Transformer-isolated | | | |
| USB Port | | | USB mini-B (maintenance communication) | | | |
| Serial Port 1, CAN Port | | | RS232C or RS485 [4] | | | CAN J1939 |
| Ethernet Port 1 | | | Ethernet (maintenance communication, user communication, user communication, Modbus TCP server/client) | | | |
| SD Card Slot | | | Embedded | | | |
| Cartridge (option) | | | One cartridge can be added | | Two cartridges can be added | |
| HMI Module (option) | | | Yes | Yes | Yes | Yes |

Note: The maximum number of relay outputs that can be turned on simultaneously is limited.
Note 1: 1 step equals 8 bytes.
Note 2: When 72KB is selected, download function can be used during RUN.
Note 3: Not including expansion I/O service time, counter timer processing time, data link processing time, and interrupt processing time.
Note 4: Maintenance communication, user communication, data link, Modbus RTU master/slave communication.

## Temperature derating curves: Input voltage vs. I/O Simultaneous ON Ratio (%)

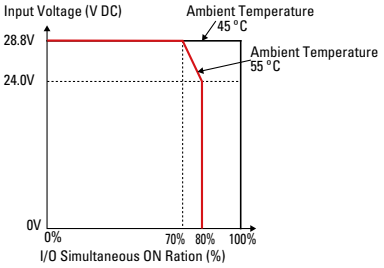
Input (with cartridge)

FC6A-C16K1CE FC6A-C40K1DE
FC6A-C24K1CE FC6A-C40K1CEJ
FC6A-C40K1CE FC6A-C40K1DEJ



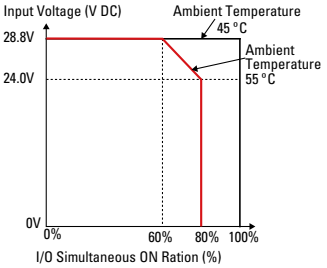

Output (with cartridge)

FC6A-C16K1CE FC6A-C40K1DE
FC6A-C24K1CE FC6A-C40K1CEJ
FC6A-C40K1CE FC6A-C40K1DEJ



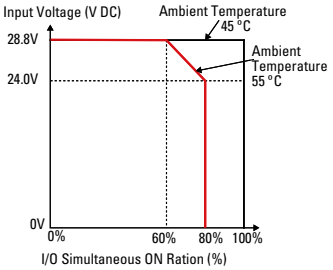

Input (w/o cartridge)

FC6A-C24P1CE FC6A-C40P1CEJ
FC6A-C40P1CE FC6A-C40P1DEJ
FC6A-C40P1DE



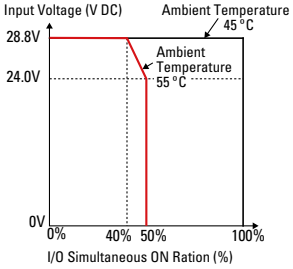

Output (w/o cartridge)

FC6A-C24P1CE FC6A-C40P1CEJ
FC6A-C40P1CE FC6A-C40P1DEJ
FC6A-C40P1DE



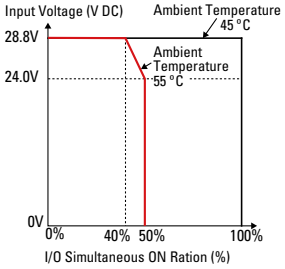

Input (with cartridge)

FC6A-C24P1CE FC6A-C40P1CEJ
FC6A-C40P1CE FC6A-C40P1DEJ
FC6A-C40P1DE



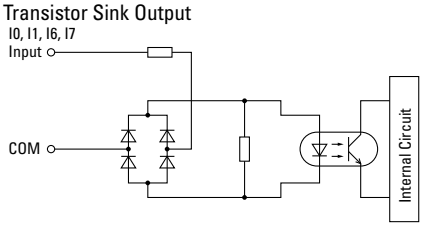

Output (with cartridge)

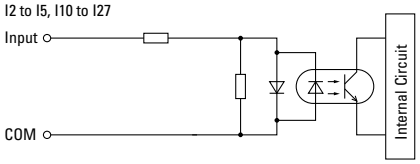
FC6A-C24P1CE FC6A-C40P1CEJ
FC6A-C40P1CE FC6A-C40P1DEJ
FC6A-C40P1DE



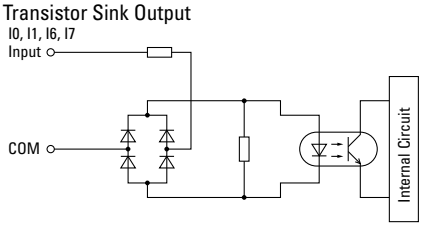

## Input Internal Circuit

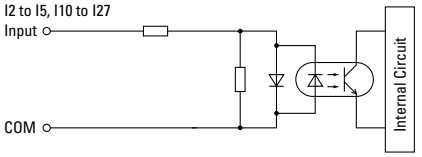
100V to 240V AC, 24V DC
Transistor Sink Output



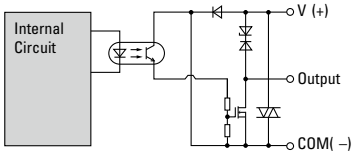

12V DC
Transistor Sink Output



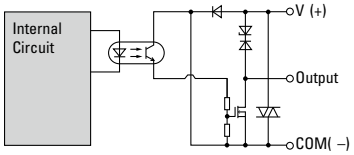




## Output Internal Circuit

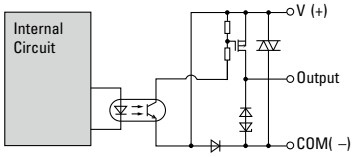
100V to 240V AC, 24V DC
Transistor Sink Output



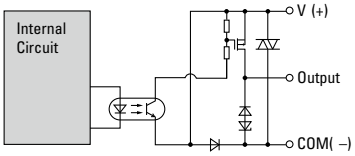

12V DCå
Transistor Sink Output




100V to 240V AC, 24V DC
Transistor Source Output




12V DC
Transistor Source Output



# MicroSmart FC6A PLC Digital I/O Specifications

**Key Features**

- 16 modules to choose from
- Screw or MIL type terminal block
- 8/16/32 points I/O module

## Specifications

### Input Module Specifications

| Part Number | | FC6A-N08B1 | FC6A-N16B1 | FC6A-N16B3 | FC6A-N32B3 | FC6A-N08A11 |
|---|---|---|---|---|---|---|
| Input Points | | 8 (8/1 common) | 16 (16/1 common) | | 32 (16/1 common) | 8 (4/1 common) |
| Rated Input Voltage | | 24V DC sink/source input signal | | | | 100 to 120V AC |
| Input Voltage Range | | 0 to 28.8V DC | | | | 0 to 132V AC (50/60 Hz) |
| Rated Input Current | | 7 mA/point (24V DC) | | 5 mA/point (24V DC) | | 17 mA/point (120V AC, 60 Hz) |
| Input Impedance | | 3.4 kΩ | | 4.4 kΩ | | 0.8 kΩ (60 Hz) |
| OFF Voltage | | 5V maximum | | | | 20V maximum |
| ON Voltage | | 15V minimum | | | | 79V minimum |
| OFF Current | | 1.2 mA maximum | | 0.9 mA maximum | | — |
| ON Current | | 4.2 mA minimum (at 15V DC) | | 3.2 mA minimum (at 15V DC) | | |
| Input Delay Time (24V DC) | | Turn ON: 4.1ms, Turn OFF: 4.1ms | | | | Turn ON: 25ms, Turn OFF: 30ms |
| Isolation | | Between input terminals: Not isolated<br>Internal circuit: Photocoupler-isolated | | | | Between input terminals in the same common: Not isolated<br>Between input terminals in different commons: Isolated<br>Between input terminals and internal circuits: Photocoupler-isolated |
| External Load for I/O Interconnection | | Not needed | | | | |
| Signal Determination Method | | Static | | | | |
| Effect of Improper Input Connection | | Both sink and source input signals can be connected. If any input exceeding the rated value is applied, permanent damage may be caused. | | | | If any input exceeding the rated value is applied, permanent damage may be caused. |
| Cable Length | | 3m in compliance with electromagnetic immunity | | | | — |
| Connector Insertion/ Removal Durability | | 100 times minimum | | | | |
| Applicable Ferrule | | 1-wire: AI 0.5-8 WH (Phoenix Contact)<br>2-wire: AI-TWIN 2×0.5-10 (Phoenix Contact) | | — | | |
| Internal Current Draw | All Inputs ON | 30mA (5V DC)<br>0mA (24V DC) | 40mA (5V DC)<br>0mA (24V DC) | 40mA (5V DC)<br>0mA (24V DC) | 65mA (5V DC)<br>0mA (24V DC) | 40mA (5V DC)<br>0mA (24V DC) |
| | All Inputs OFF | 17mA (5V DC)<br>0mA (24V DC) | 17mA (5V DC)<br>0mA (24V DC) | 17mA (5V DC)<br>0mA (24V DC) | 17mA (5V DC)<br>0mA (24V DC) | 17mA (5V DC)<br>0mA (24V DC) |
| Internal Power Consumption (at 24V DC while all inputs ON) | | 0.20W | 0.27W | 0.27W | 0.44W | 0.27W |
| Weight (approx.) | | 110g | 105g | 75g | 110g | 110g |

## Relay Output Module Specifications

| Part Number | | FC6A-R081 | FC6A-R161 |
|---|---|---|---|
| Output Points | | 8 (4/1 common) | 16 (8/1 common) |
| Output Type | | 1NO | |
| Maximum Load Current | | 2A per point | |
| | | 7A per common | 8A per common |
| Minimum Switching Load | | 1 mA/ 5V DC (reference value) | |
| Initial Contact Resistance | | 30 mΩ maximum | |
| Electrical Life | | 100,000 operations minimum<br>(rated load 1,800 operations/hour) | |
| Mechanical Life | | 20,000,000 operations minimum<br>(no load 18,000 operations/hour) | |
| Rated Load | | Resistive load: 240V AC 2A, 30V DC 2A<br>Inductive load: 240V AC 2A (cos ø = 0.4)<br>30V DC 2A (L/R =7 ms) | |
| Dielectric Strength | | Between output and ground terminals: 1,500V AC, 1 minute<br>Between output terminal and internal circuit: 1,500V AC, 1 minute<br>Between output terminals (COMs): 1,500V AC, 1 minute | |
| Connector Insertion/ Removal Durability | | 100 times minimum | |
| Applicable Ferrule | | 1-wire: AI 0.5-10 (Phoenix Contact)<br>2-wire: AI-TWIN 2×0.5-10 (Phoenix Contact) | |
| Internal Current Draw | All outputs ON | 35mA (5V DC)<br>50mA (24V DC) | 50mA (5V DC)<br>100mA (24V DC) |
| | All outputs OFF | 17mA (5V DC)<br>0mA (24V DC) | 17mA (5V DC)<br>0mA (24V DC) |
| Internal Power Consumption (at 24V DC while all outputs ON) | | 1.44W | 2.74W |
| Weight (approx.) | | 130g | 140g |

## Transistor Output Module Specifications

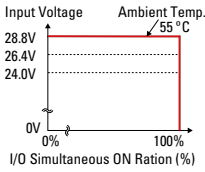
| Part Number | | FC6A-T08K1<br>FC6A-T08P1 | FC6A-T16K1<br>FC6A-T16P1 | FC6A-T16K3<br>FC6A-T16P3 | FC6A-T32K3<br>FC6A-T32P3 |
|---|---|---|---|---|---|
| Output Points | | 8 (8/1 common) | 16 (16/1 common) | | 32 (16/1 common) |
| Output Type | | FC6A-T□K□: Transistor sink output<br>FC6A-T□P□: Transistor source output | | | |
| Rated Load Voltage | | 24V DC | | | |
| Operating Load Voltage Range | | 19.2 to 28.8V DC | | | |
| Maximum Load Current | | 0.5A per point | | 0.1A per point | |
| | | 3A per common | | 1A per common | |
| Voltage Drop (ON Voltage) | | 1V maximum (voltage between COM and output terminals when output is on) | | | |
| Inrush Current | | 1A maximum | | | |
| Leakage Current | | 0.1mA maximum | | | |
| Clamping Voltage | | Approx. 50V | | | |
| Maximum Lamp Load | | 12W | | 2.4W | |
| Inductive Load | | L/R = 10ms (28.8V DC 1Hz) | | | |
| External Current Draw | | FC6A-T□K□: 100 mA maximum, 24V DC (power voltage at the +V terminal)<br>FC6A-T□P□: 100 mA maximum, 24V DC (power voltage at the -V terminal) | | | |
| Overcurrent Protection | | Transistor Sink Output: No<br>Transistor Source Output: Yes | | | |
| Isolation | | Between output terminal and internal circuit: Photocoupler-isolated<br>Between output terminals: Not isolated | | | |
| Connector Insertion/ Removal Durability | | 100 times minimum | | | |
| Applicable Ferrule | | 1-wire: AI 0.5-10 (Phoenix Contact) 2-wire: AI-TWIN 2×0.5-10 (Phoenix Contact) | | | |
| Internal Current Draw | All outputs ON | 25mA (5V DC)<br>15mA (24V DC) | 30mA (5V DC)<br>25mA (24V DC) | | 45mA (5V DC)<br>50mA (24V DC) |
| | All outputs OFF | 17mA (5V DC)<br>0mA (24V DC) | 17mA (5V DC)<br>0mA (24V DC) | 17mA (5V DC)<br>0mA (24V DC) | 17mA (5V DC)<br>0mA (24V DC) |
| Internal Power Consumption (at 24V DC while all outputs ON) | | 0.53W | 0.80W | | 1.50W |
| Output Delay | Turn ON Time | 400 µs maximum | | | |
| | Turn OFF Time | 450 µs maximum | | | |
| Weight (approx) | | 110g | 105g | 75g | 115g |

## Mixed I/O Module Specifications

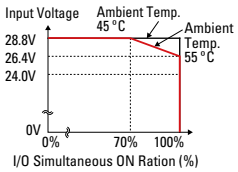
| | Part Number | | FC6A-M08BR1 | FC6A-M24BR1 |
|---|---|---|---|---|
| Input Specification | Input Points | | 4 (4/1 common) | 16 (16/1 common) |
| | Rated Input Voltage | | 24V DC sink/source input signal | |
| | Input Voltage Range | | 0 to 28.8V DC | |
| | Rated Input Current | | 7 mA/point (24V DC) | |
| | Input Impedance | | 3.4 kΩ | |
| | OFF Voltage | | 5V maximum | |
| | ON Voltage | | 15V minimum | |
| | OFF Current | | 1.2 mA maximum | |
| | ON Current | | 4.2 mA minimum (at 15V DC) | |
| | Input Delay Time (24V DC) | | Turn ON Time: 4.1ms, Turn OFF Time: 4.1ms | |
| | Isolation | | Between input terminals: Not isolated Internal circuit: Photocoupler-isolated | |
| | External Load for I/O Interconnection | | Not needed | |
| | Signal Determination Method | | Static | |
| | Effect of Improper Input Connection | | Both sinking and sourcing input signals can be connected. If any input exceeding the rated value is applied, permanent damage may be caused. | |
| | Cable Length | | 3m in compliance with electromagnetic immunity | |
| Output Specifications | Output Points | | 4 (4/1 common) | 8 (4/1 common) |
| | Output Type | | 1NO | |
| | Maximum Load Current | | 2A per point<br>7A per common | |
| | Minimum Switching Load | | 1 mA/ 5V DC (reference value) | |
| | Initial Contact Resistance | | 30 mΩ maximum | |
| | Electrical Life | | 100,000 operations minimum (rated load 1,800 operations/hour) | |
| | Mechanical Life | | 20,000,000 operations minimum (no load 18,000 operations/hour) | |
| | Rated Load | | Resistive load: 240V AC 2A, 30V DC 2A<br>Inductive load: 240V AC 2A (cos ø = 0.4), 30V DC 2A (L/R =7 ms) | |
| | Dielectric Strength | | Between output and PE terminals: 1,500V AC, 1 minute<br>Between output terminal and internal circuit: 1,500V AC, 1 minute<br>Between output terminals (COMs): 1,500V AC, 1 minute | |
| | Connector Insertion/Removal Durability | | 100 times minimum | |
| | Applicable Ferrule | | 1-wire: AI 0.5-10 (Phoenix Contact), 2-wire: AI-TWIN 2×0.5-10 (Phoenix Contact) | |
| | Internal Current Draw | All I/Os ON | 30mA (5V DC), 25mA (24V DC) | 55mA (5V DC), 25mA (24V DC) |
| | | All I/Os OFF | 17mA (5V DC), 0mA (24V DC) | 17mA (5V DC), 0mA (24V DC) |
| | Internal Power Consumption (at 24V DC while all I/Os are ON) | | 0.80W | 0.97W |
| | Weight (approx.) | | 120g | 165g |

## Temperature derating curves: Input voltage vs. I/O Simultaneous ON Ratio (%)

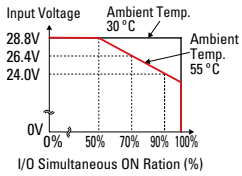
FC6A-N08B1



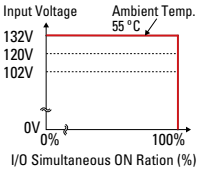

FC6A-N16B1



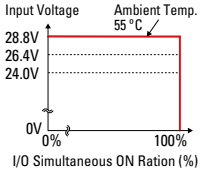

FC6A-N16B3/FC6A-N32B3



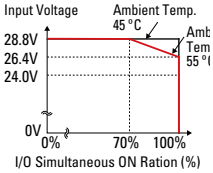

FC6A-N08A11




FC6A-M08BR1

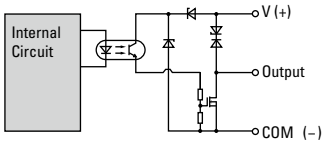



FC6A-M24BR1

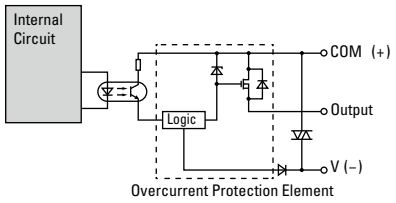



## Output Internal Circuit

FC6A-T08K1/FC6A-T16K1
FC6A-T16K3/FC6A-T32K3

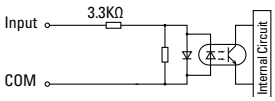



FC6A-T08P1/FC6A-T16P1
FC6A-T16P3/FC6A-T32P3

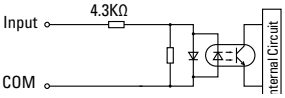



## Input Internal Circuit

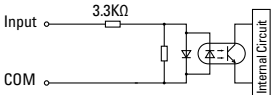
FC6A-N08B1/FC6A-N16B1



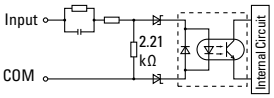

FC6A-N16B3/FC6A-N32B3




FC6A-M08BR1/FC6A-M24BR1

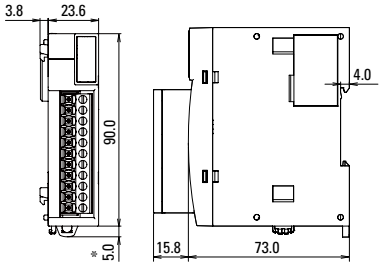



FC6A-N08A11

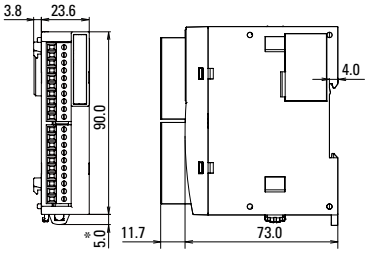



## Dimensions (all dimensions are in mm)

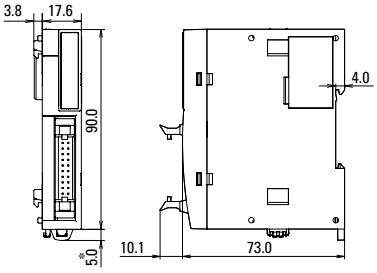
FC6A-N08B1/FC6A-N08A11/FC6A-R081
FC6A-T08K1/FC6A-T08P1/FC6A-M08BR1
FC6A-J2C1/FC6A-K4A1/FC6A-L03CN1



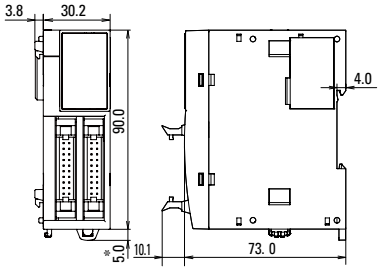

FC6A-N16B1/FC6A-R161
FC6A-T16K1/FC6A-T16P1
FC6A-J4A1/FC6A-J8A1
FC6A-J4CN1/FC6A-J8CU1
FC6A-L06A1



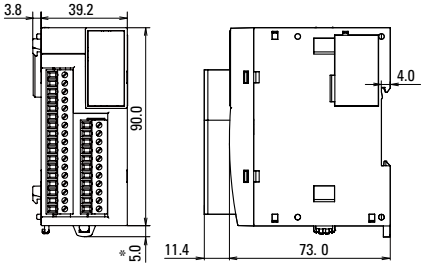

FC6A-N16B3/FC6A-T16K3
FC6A-T16P3




FC6A-N32B3/FC6A-T32K3
FC6A-T32P3




FC6A-M24BR1/FC6A-F2M1
FC6A-F2MR1




∗ 9.3 mm when the clamp is pulled out.

# MicroSmart FC6A PLC Analog I/O Module Specifications

### Key Features

- 8 modules to choose from
- Up to 16-bit resolution
- Fast sampling rate
- Wide range of signals:
- 0/4-20mA, 0-10V DC, -10 to 10V DC, Type K, J, R, S, B, E, T, N, C thermocouple and RTD

## Specifications

### Analog I/O Module Specifications

| Part Number | FC6A-J2C1 | FC6A-J4A1 | FC6A-J8A1 | FC6A-L06A1 | FC6A-L03CN1 | FC6A-J4CN1 | FC6A-J8CU1 | FC6A-K4A1 |
|---|---|---|---|---|---|---|---|---|
| Input Points | 2 | 4 | 8 | 4 | 2 | 4 | 8 | – |
| Input Signal Type | Voltage (0 to 10V)<br>Current (0 to 20mA) | | Voltage (-10 to +10V)<br>Current (4 to 20mA) | | Voltage (0 to 10V)<br>Voltage (-10 to +10V)<br>Current (0 to 20mA)<br>Current (4 to 20mA)<br>Thermocouple Resistance Thermometer | | Thermocouple<br>Thermistor<br>(NTC, PTC) | – |
| Output Points | – | – | – | 2 | 1 | – | – | 4 |
| Output Signal Style | – | – | – | Voltage (0 to 10V)<br>Voltage (-10 to +10V)<br>Current (0 to 20mA)<br>Current (4 to 20mA) | | – | – | Voltage (0 to 10V)<br>Voltage (–10 to +10V)<br>Current (0 to 20mA)<br>Current (4 to 20mA) |
| External Power Supply | Rated Power Voltage 24V DC, Allowable Voltage Range 20.4 to 28.8V DC | | | | | | | |
| External Current Draw (24V DC) [1] | 25mA | 30mA | 40mA | 100mA | 80mA | 40mA | 30mA | 125mA |
| Connector Insertion/ Removal Durability | 100 times minimum | | | | | | | |
| Applicable Ferrule | 1-wire: AI 0.5-10 (Phoenix Contact), 2-wire: AI-TWIN 2×0.5-10 (Phoenix Contact) | | | | | | | |
| Internal Power Consumption (5V DC) | 40mA max. | 45mA max. | 40mA max. | 55mA max. | 55mA max. | 50mA max. | 45mA max. | 50mA max. |
| Internal Power Consumption (at 24V DC while all I/Os are ON) | 0.27W | 0.30W | 0.27W | 0.37W | 0.37W | 0.34W | 0.30W | 0.34W |
| Weight (approx.) | 115g | 110g | 110g | 110g | 115g | 110g | 110g | 115g |

Note 1: The external current draw is the value when all the analog inputs are used and the analog output value is at 100%.

## Analog Input Specifications (1)

| Part Number | | FC6A-J2C1 | | FC6A-J4A1/FC6A-J8A1/FC6A-L06A1 | |
|---|---|---|---|---|---|
| Input Signal Type | | Voltage Input | Current Input | Voltage Input | Current Input |
| Input Range | | 0 to 10V<br>-10 to +10V | 0 to 20mA<br>4 to 20mA | 0 to 10V<br>-10 to +10V | 0 to 20mA<br>4 to 20mA |
| Input Impedance | | 1MΩ maximum | 50Ω maximum | 1MΩ maximum | 50Ω maximum |
| Input Detection Current | | – | – | – | – |
| AD Conversion | Sampling Duration Time | 1ms | | 1ms or 10ms (selectable with application software) | |
| | Sampling Repetition Time | Sampling time × valid input channels | | | |
| | Total Input System Transfer Time | Sampling time + sampling interval + 1 scan time | | | |
| | Type of Input | Single-ended input | | | |
| | Operating Mode | Self-scan | | | |
| | Conversion Method | ∑ Δ type ADC | | | |
| Input Error | Maximum Error at 25°C | ±0.1% of full scale | | ±0.2% of full scale | |
| | Cold Junction Compensation Error | – | – | – | – |
| | Temperature Coefficient | ±0.006% of full scale/°C | | ±0.01% of full scale/°C | |
| Data | Digital Resolution | 65,536 increments (16 bits) | | 4,096 increments (12 bits) | |
| | Input per Resolution | 0 to 10V: 0.15mV<br>-10 to +10V: 0.30mV | 0 to 20mA: 0.30µA<br>4 to 20mA: 0.244µA | 0 to 10V: 2.44mV<br>-10 to +10V: 4.88mV | 0 to 20mA: 4.88µA<br>4 to 20mA: 3.91µA |
| | Data Type in Application Program | Optional: -32,768 to 32,767 (selectable for each channel) [1] | | | |
| | Monotonicity | Yes | | | |
| | Input Data Out of Range | Detectable [2] | | | |
| Noise Resistance | Input Filter | Soft filter (0 to 10 s, selectable in increments of 0.1 s) | | | |
| | Recommended Cable for Noise Immunity | Twisted pair shielded cable | | | |
| | Crosstalk | 1LSB maximum | | | |
| Isolation | | Between input and power circuit: Transformer-isolated<br>Between input and internal circuit: Photocoupler-isolated | | | |
| Effect of Improper Input Connection | | No damage | | | |
| Maximum Permanent Allowed Overload (No Damage) | | 13V DC | 40mA | 13V DC | 40mA |
| Selection of Analog Input Signal Type | | Using programming software | | | |
| Calibration or Verification to Maintain Rated Accuracy | | Not possible | | | |

Note 1: The data processed in the analog I/O module can be linear-converted to a value between -32,768 and 32,767. The optional range designation, and analog I/O data minimum and maximum values can be selected using data registers allocated to analog I/O modules.
Note 2: When an error is detected, a corresponding error code is stored to a data register allocated to analog I/O operating status.

## Analog Input Specifications (2)

| Part Number | | FC6A-L03CN1/FC6A-J4CN1 | | | | FC6A-J8CU1 | | |
|---|---|---|---|---|---|---|---|---|
| Input Signal Type | | Voltage Input | Current Input | Resistance Thermometer | Thermocouple | Thermocouple | NTC Thermistor | PTC Thermistor |
| Input Range | | 0 to 10V DC<br>-10 to +10V | 0 to 20mA<br>4 to 20mA | Pt100, Pt1000 3-wire type (-200 to 850°C)<br>Ni100, Ni1000 3-wire type (-60 to 180°C) | Type K (-200 to +1,300°C)<br>Type J (-200 to +1,000°C)<br>Type R (0 to 1,760°C)<br>Type S (0 to 1,760°C)<br>Type B (0 to 1,820°C)<br>Type E (-200 to +800°C)<br>Type T (-200 to +400°C)<br>Type N (-200 to +1,300°C)<br>Type C (0 to 2,315°C) | Type K (-200 to +1,300°C)<br>Type J (-200 to +1,000°C)<br>Type R (0 to 1,760°C)<br>Type S (0 to 1,760°C)<br>Type B (0 to 1,820°C)<br>Type E (-200 to +800°C)<br>Type T (-200 to +400°C)<br>Type N (-200 to +1,300°C)<br>Type C (0 to 2,315°C) | -90 to +150°C | 100 to 10,000Ω |
| Input Impedance | | 1 MΩ minimum | 50Ω maximum | 1 MΩ minimum | 1 MΩ minimum | 1 MΩ minimum | 1 MΩ minimum | |
| Input Detection Current | | — | — | 0.1mA maximum | 0.1mA maximum | 0.1mA maximum | 0.1mA maximum | |
| AD Conversion | Sampling Duration Time | 10ms, 100ms or 104ms (selectable using application software) | | | | 104ms | | |
| | Sampling Repetition Time | Sampling time × valid input channels | | | | | | |
| | Total Input System Transfer Time | Sampling time + sampling interval + 1 scan time | | | | | | |
| | Type of Input | Single-ended input | | | | | | |
| | Operating Mode | Self-scan | | | | | | |
| | Conversion Method | ∑ Δ type ADC | | | | | | |
| Input Error | Maximum Error at 25°C | ±0.2% of full scale | | FC6A-L03CN1: ±0.1% of full scale + cold junction compensation error<br>FC6A-J4CN1: ±0.2% of full scale + cold junction compensation error [3] | | ±0.2% of full scale + cold junction compensation error [3] | | |
| | Cold Junction Compensation Error | — | — | ±4°C maximum | | ±4°C maximum | | |
| | Temperature Coefficient | FC6A-L03CN1: 0.006%/°C of full scale<br>FC6A-J4CN1: 0.01%/°C of full scale | | | | 0.01%/°C of full scale | | |
| Data | Digital Resolution | 65,536 increments (16 bits) | | Pt100: approx. 10,500 increments (14 bits)<br>Pt1,000: approx. 8,000 increments (13 bits)<br>Ni100: approx. 2,400 increments (12 bits)<br>Ni1,000: approx. 2,400 increments (12 bits) | Type K: approx. 15,000 increments (14 bits)<br>Type J: approx. 12,000 increments (14 bits)<br>Type R: approx. 17,600 increments (15 bits)<br>Type S: approx. 17,600 increments (15 bits)<br>Type B: approx. 18,200 increments (15 bits)<br>Type E: approx. 10,000 increments (14 bits)<br>Type T: approx. 6,000 increments (13 bits)<br>Type N: approx. 15,000 increments (14 bits)<br>Type C: approx. 23,150 increments (15 bits) | Type K: approx. 15,000 increments (14 bits)<br>Type J: approx. 12,000 increments (14 bits)<br>Type R: approx. 17,600 increments (15 bits)<br>Type S: approx. 17,600 increments (15 bits)<br>Type B: approx. 18,200 increments (15 bits)<br>Type E: approx. 10,000 increments (14 bits)<br>Type T: approx. 6,000 increments (13 bits)<br>Type N: approx. 15,000 increments (14 bits)<br>Type C: approx. 23,150 increments (15 bits) | NTC: approx. 2,400 increments (12 bits)<br>PTC: approx. 9,900 increments (14 bits) | |
| | Input Value of LSB | 0 to 10V: 0.15mV<br>-10 to +10V: 0.30mV | 0 to 20mA: 0.30µA<br>4 to 20mA: 0.244µA | 0.1°C | 0.1°C | 0.1°C | 0.1°C | 1Ω |
| | Data Type in Application Program | Optional: selectable for each channel from -32,768 to 32,767 [1] | | | | | | |
| | Monotonicity | Yes | | | | | | |
| | Input Data Out of Range | Detectable [2] | | | | | | |
| Noise Resistance | Input Filter | Software | | | | | | |
| | Recommended Cable for Noise Immunity | Twisted pair shielded cable | | Twisted pair cable | | | | |
| | Crosstalk | 1 LSB maximum | | | | | | |
| Isolation | | Between input and power circuit: Transformer-isolated<br>Between input and internal circuit: Photocoupler-isolated | | | | | | |
| Effect of Improper Input Connection | | No damage | | | | | | |
| Maximum Permanent Allowed Overload (No Damage) | | 13V DC<br>40mA | | | | | | |
| Selection of Input Signal Type and Input Range | | Using programming software | | | | | | |
| Calibration or Verification to Maintain Rated Accuracy | | Not possible | | | | | | |

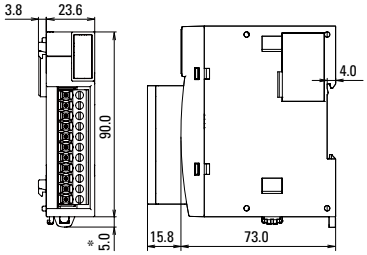
Note 1: The data processed in the analog I/O module can be linear-converted to a value between -32,768 and 32,767. The optional range designation, and analog I/O data minimum and maximum values can be selected using data registers allocated to analog I/O modules.
Note 2: When an error is detected, a corresponding error code is stored to a data register allocated to analog I/O operating status.
Note 3: R, S: ±6 (0 to 200°C) B: no compensation K, J, E, T, N: ±0.4% of full scale (0°C maximum)

Analog Output Specifications

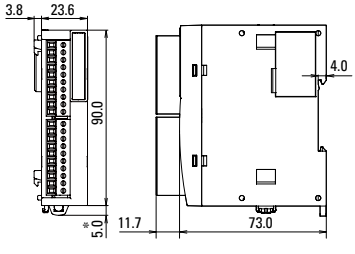
| Part Number | | | FC6A-K4A1 | FC6A-L06A1 | FC6A-L03CN1 |
|---|---|---|---|---|---|
| Output Signal Style/Output Range | | Voltage | 0 to 10V DC<br>-10 to +10V DC | | |
| | | Current | 0 to 20mA<br>4 to 20mA | | |
| Load | Impedance | | Voltage output: 1 kΩ minimum<br>Current output: 300Ω maximum | | |
| | Load Type | | Resistive load | | |
| DA Conversion | DA Conversion Time | | 1ms | | |
| | Output Update Interval | | 1ms | | |
| | Total Output System Transfer Time | | DA Conversion Time +Output Update Interval + 1 scan time | | |
| Output Error | Maximum Error at 25°C | | ±0.2% of full scale | ±0.1% of full scale | ±0.2% of full scale |
| | Temperature Coefficient | | ±0.01%/°C of full scale | ±0.006%/°C of full scale | ±0.01%/°C of full scale |
| | Repeatability after Stabilization Time | | ±0.4% of full scale | | |
| | Output Voltage Drop | | No damage | | |
| | Non-lineality | | ±0.2% of full scale | ±0.01%/°C of full scale | ±0.2% of full scale |
| | Output Ripple | | 20mV maximum | | |
| | Overshoot | | 0% | | |
| | Total Error | | ±1% of full scale | | |
| Data | Digital Resolution | | 4,096 increments (12 bits) | | |
| | Output Value of LSB | Voltage | 0 to 10V DC: 2.44mV<br>-10 to +10V DC: 4.88mV | | |
| | | Current | 0 to 20mA: 4.88µA<br>4 to 20mA: 3.91µA | | |
| | Data Type in Application Program | | Optional: -32,768 to 32,767 (selected for each channel) | | |
| | Monotonicity | | Yes | | |
| | Current Loop Open | | Undetectable | | |
| Noise Resistance | Recommended Cable for Noise Immunity | | Twisted pair shielded cable | | |
| | Crosstalk | | 1LSB | | |
| Isolation | Between output and power circuit | | Transformer-isolated | | |
| | Between output and internal circuit | | Photocoupler-isolated | | |
| Effect of Improper Output Connection | | | No damage | | |
| Selection of Analog Output Signal Type | | | Using software programming | | |
| Calibration or Verification to Maintain Rated Accuracy | | | Impossible | | |

## **Dimensions** (all dimensions are in mm)

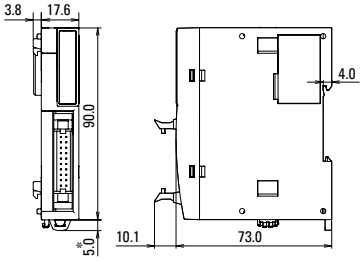
FC6A-N08B1/FC6A-N08A11/FC6A-R081
FC6A-T08K1/FC6A-T08P1/FC6A-M08BR1
FC6A-J2C1/FC6A-K4A1/FC6A-L03CN1



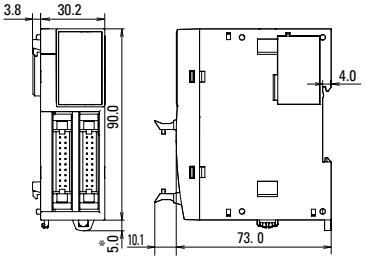

FC6A-N16B1/FC6A-R161
FC6A-T16K1/FC6A-T16P1
FC6A-J4A1/FC6A-J8A1
FC6A-J4CN1/FC6A-J8CU1
FC6A-L06A1




FC6A-N16B3/FC6A-T16K3
FC6A-T16P3




FC6A-N32B3/FC6A-T32K3
FC6A-T32P3



## Specifications

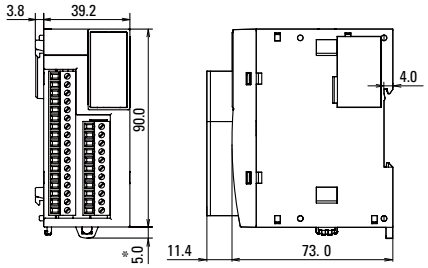
### Input Range

| Part Number | FC6A-F2MR1<br>FC6A-F2M1 | | |
|---|---|---|---|
| Input | Input Range (Digital Resolution) | | Input Value of LSB |
| K | -200 to 1,370°C | -328 to 2,498°F | 1°C (°F) |
| | -200.0 to 400.0°C | -328.0 to 752.0°F | 0.1°C (°F) |
| J | -200 to 1,000°C | -328 to 1,832°F | 1°C (°F) |
| R | 0 to 1,760°C | 32 to 3,200°F | 1°C (°F) |
| S | 0 to 1,760°C | 32 to 3,200°F | 1°C (°F) |
| B | 0 to 1,820°C | 32 to 3,308°F | 1°C (°F) |
| E | -200 to 800°C | -328 to 1,472°F | 1°C (°F) |
| T | -200.0 to 400.0°C | -328.0 to 752.0°F | 0.1°C (°F) |
| N | -200 to 1,300°C | -328 to 2,372°F | 1°C (°F) |
| PL-II | 0 to 1,390°C | 32 to 2,534°F | 1°C (°F) |
| C (W/Re5-26) | 0 to 2,315°C | 32 to 4,199°F | 1°C (°F) |
| Pt100 | -200 to 850°C | -328 to 1,562°F | 1°C (°F) |
| | -200.0 to 850.0°C | -328.0 to 1,562.0°F | 0.1°C (°F) |
| JPt100 | -200 to 500°C | -328 to 932°F | 1°C (°F) |
| | -200.0 to 500.0°C | -328.0 to 932.0°F | 0.1°C (°F) |
| DC 4 to 20mA | -2,000 to 10,000 (12,000 increments) [1] | | 1.333µA |
| DC 0 to 20mA | -2,000 to 10,000 (12,000 increments) [1] | | 1.666µA |
| DC 0 to 1V | -2,000 to 10,000 (12,000 increments) [1] | | 0.083mA |
| DC 0 to 5V | -2,000 to 10,000 (12,000 increments) [1] | | 0.416mA |
| DC 1 to 5V | -2,000 to 10,000 (12,000 increments) [1] | | 0.333mA |
| DC 0 to 10V | -2,000 to 10,000 (12,000 increments) [1] | | 0.833mA |

Note 1: Linear-conversion is possible.

### Dimensions

FC6A-M24BR1/FC6A-F2M1 FC6A-F2MR1




* 9.3 mm when the clamp is pulled out.

# MicroSmart FC6A PLC PID Module Specifications

## Key Features

- Configure up to 15 modules
- Maximum 30 PID loops
- 2 analog inputs and 2 relay or 4-20mA Non-contact voltage output for SSR drive

## Ratings

| Part Number | | FC6A-F2MR1 | FC6A-F2M1 |
|---|---|---|---|
| Control Mode | Independent PID Control | Possible | |
| | Heating/Cooling Control | Possible (overwrapping deadband settings available) [1] | |
| | Difference Input Temperature Control | Possible [1] | |
| | Cascade Control | Possible [1] | |
| Input Points | | 2ch | |
| Input Type Input Range | Thermocouple | K, J, R, S, B, E, T, N, PL-II, C (W/Re5-26) External resistance: 100Ω maximum | |
| | Resistance Thermometer | Pt100, JPt100, 3-wire type | |
| | Current Input | 0 to 20 mA DC, 4 to 20 mA DC Input impedance: 50Ω | |
| | Voltage Input | 0 to 1V DC Input impedance: 1MΩ minimum | |
| | | 0 to 5V DC, 1 to 5V DC, 0 to 10V DC Input impedance: 100kΩ minimum | |
| AD Conversion | Sampling Duration Time | 100 ms | |
| | Sampling Repetition Time | 100 ms | |
| | Total Input System Transfer Time | Sampling time + sampling interval + 1 scan time | |
| | Type of Input | Differential input | |
| | Conversion Method | ∑ Δ type ADC | |
| Maximum Error at 25°C | Thermocouple Input | ±0.2% of full scale or ±2°C (4°F), whichever is greater However, R, S inputs: 0 to 200°C (0 to 400°F): ±6°C (12°F) B input: 0 to 300°C (0 to 600°F) Accuracy is not guaranteed. K, J, E, T, N inputs: Less than 0°C (32°F): ±0.4% of full scale | |
| | Resistance Thermometer Input | ±0.1% of full scale or ±1°C (2°F), whichever is greater | |
| | Voltage/Current Inputs | ±0.2% of full scale | |
| Cold Junction Temperature Compensation Accuracy | | ±1°C at 0 to 55°C | |
| Temperature Coefficient | | ±0.005%/°C of full scale | |
| Noise Resistance | Input Filter | Yes | |
| | Recommended Cable for Noise Immunity | Twisted pair shielded cable (current/voltage) / Twisted pair cable (temperature input) | |
| | Cross Talk | None | |
| Isolation | Between input and power circuit | Transformer-isolated | |
| | Between input and internal circuit | Photocoupler-isolated | |
| Output Points | | 2ch | |
| Output | | Relay output 1NO<br>Rated load 5A 250V AC/30V DC (resistive load)<br>3A 250V AC (inductive load cos ø=0.4)<br>3A 30V DC (resistive load VR=7ms)<br>Minimum open/closed load:<br>10 mA 5V DC (reference value)<br>Electrical life: 100,000 cycles<br>(at the maximum rating of resistive load) | Non-contact voltage output (for SSR drive)<br>12V DC±15%<br>Maximum 40 mA (short circuit protected)<br>Analog current output<br>4 to 20 mA DC<br>Load resistance: 550Ω maximum<br>Analog output digital resolution: 1,000<br>LSB input value: 0.016 mA |
| Noise Resistance | Recommended Cable for Noise Immunity | — | Twisted pair shielded cable |
| | Cross Talk | — | None |
| Isolation | | Between input and power circuit: Transformer-isolated<br>Between input/output and internal circuits: Photocoupler-isolated<br>Between input circuits: Photocoupler-isolated | |
| Power Voltage | | 24V DC (External power), 5V DC (Internal power) | |
| Allowable Voltage Range | | 20.4 to 28.8V DC | |
| Maximum Power Consumption | | 3.6W | |
| Internal Power Consumption | | 65mA (5V DC) | |
| Weight (approx.) | | 140g | |

Note 1: Dual channel input is required for one loop control.

# MicroSmart FC6A PLC HMI and Communication Adapter Specification s

## Key Features

- Add 2nd Ethernet port
- Add additional serial port
- HMI module supports User Web Page
- HMI module supports Web Server Functions
- HMI module supports Email and Text Message notifications

## HMI Module Specifications

### General Specifications

| Part Number | FC6A-PH1 |
|---|---|
| Power Consumption Inside Module (without connection cartridge) | 100mA (5V)<br>1.5mA (24V) |
| Cartridge (option) | One analog cartridge can be added |
| Weight (approx.) | 170g |

### Display Specifications

| Part Number | | FC6A-PH1 |
|---|---|---|
| Display | | TFT Monochrome LCD |
| Color/Shade | | Monochrome |
| Effective Display Area | | 47.98W × 8.22H mm |
| Display Resolution | | 192W × 64H pixels |
| View Angle | | Right and left 30°,up 20°, down 40° |
| Contrast adjustment | | Impossible |
| Backlight | | LED (green) |
| Brightness | | 45 cd/m$^2$ |
| Brightness Adjustment | | Impossible |
| Backlight Control | | ON/OFF |
| Backlight Replacement | | Impossible |
| Display Character Size | 1/2 size | 8 × 16 pixels (JIS 8-bit code, Western European language ISO 8859-1, Cyrillic ANSI1251) |
| | Full size | 16 × 16 pixels (Japanese JIS first level characters, simplified Chinese) |
| Quantity of Characters | 1/2 size | 24 characters × 4 lines |
| | Full size | 12 characters × 4 lines |
| Character Attribute | | Blink, reverse, |

### Communication Adapter

| Part Number | | FC6A-PC1 | FC6A-PC3 |
|---|---|---|---|
| Standards | | EIA RS232C | EIA RS485 |
| Maximum Baud Rate | | 115,200bps | |
| Maintenance Communication | | Possible | Possible |
| User Communication | | Possible | Possible |
| Data Link Communication | | — | Possible |
| Half-duplex Communication | | — | Possible |
| Maximum Cable Length | | 5m | 200m |
| Quantity of Slave Stations | | — | 31 |
| Isolation between Internal Circuit and Communication Port | | Not isolated | |
| RS485 Cable | Cable | — | 3-core shielded cable with a minimum core wire of 0.3 mm$^2$ |
| | Conductor Resistance | | 85 Ω/km maximum |
| | Shield Resistance | | 20 Ω/km maximum |

### Operation Specifications

| Part Number | FC6A-PH1 |
|---|---|
| Operation Method | Rubber Switch |
| Operating Force | 2.0N minimum |
| Mechanical Life | 10,000 operations |
| Multiple Operation | Possible |

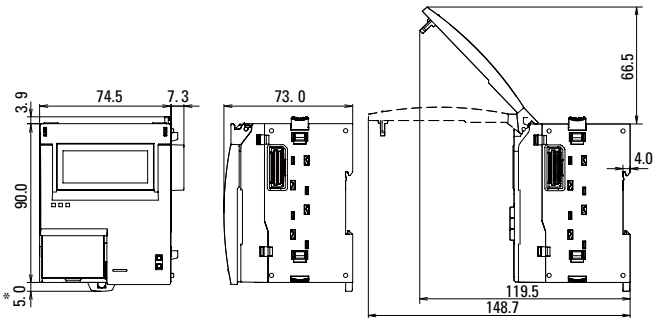
### HMI Ethernet Port Specifications

| Part Number | | FC6A-PH1 |
|---|---|---|
| Communication | | Complies with IEEE802.3 |
| Transmission speed | | 10BASE-T, 100BASE-TX |
| Protocol | | Datalink layer: IP/ARP<br>Network layer: TCP/UDP, ICMP<br>Application layer: DHCP, DNS, HTTP, SMTP |
| Connector | | RJ45 |
| Cable | | CAT 5. STP |
| Maximum Cable Length | | 100m |
| Isolation from Internal Circuit | | Pulse transformer isolation |
| Major Functions | Remote Maintenance | Uploading, downloading and monitoring using WindLDR<br>Number of connections: 8 |
| | Web Server | Page data of 5MB maximum (total of system web page and user web page) can be stored. (System web page: approx. 450 KB)<br>Number of connections: 8 maximum<br>Authentic method: digest authentication |
| | Send E-mail | Sends preregistered e-mails.<br>Up to 255 types of e-mails can be sent.<br>Authentic method: SMTP-Auth (login), SMTP-Auth (CRAM-MD5), SMTPs<br>Encoding method: BASE64 |
| | E-mail Size | The maximum size of texts for To or Cc is 512 bytes. [1]<br>E-mail subject: 255 bytes maximum<br>E-mail body: 4096 bytes maximum<br>Attached CSV file: 4096 bytes maximum<br>(includes spaces, separator characters, and newlines) |

Note 1: Comma (,) is inserted as a separating character between e-mail addresses.

## Dimensions

FC6A-PH1



# MicroSmart FC6A PLC Expansion Interface Module Specifications

## Key Features

- Required when expanding to more than 7 expansion modules
- Allows FC6A to expand an additional 8 expansion modules

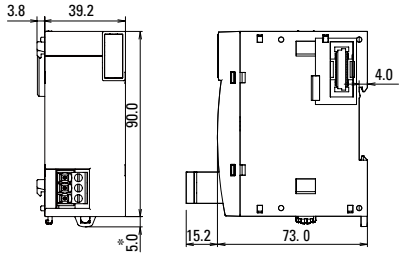
## Expansion Interface Module Specifications

| Part Number | | FC6A-EXM2 |
|---|---|---|
| Rated Power Voltage | | 24V DC |
| Allowable Voltage Range | | 20.4 to 28.8V DC |
| Power Consumption | | Internal power (supplied from CPU module):<br>20 mA (5V DC), 0 mA (24V DC)<br>External power: With I/O modules [1] 750 mA (26.4V DC) |
| Maximum Power Consumption (External Power) [1] | | 0.5W (24V DC) |
| Allowable Momentary Power Interruption | | 10ms minimum (24V DC) |
| I/O Expansion | | Between CPU module and expansion interface module<br>Connectable I/O modules: 7 maximum (224 I/Os maximum)<br>Beyond the expansion interface module<br>Connectable I/O modules: 8 maximum (256 I/Os maximum) |
| Isolation from Internal Circuit | | Not isolated |
| Connector | Insertion/Removal Durability | 100 times minimum |
| | Applicable Ferrules | 1-wire: AI 0.5-10 (Phoenix Contact)<br>2-wire: AI-TWIN 2×0.5-10 (Phoenix Contact) |
| Weight (approx.) | | 150g |

Note 1: Power consumption by the expansion interface module and eight I/O modules.

## **Dimensions** (all dimensions are in mm)

FC6A-EXM2



## The Power to Control. Anywhere. Anytime.

### Power, Performance, Connectivity

Maximize efficiency and cut development time! MicroSmart Pentra PLCs combine advanced networking capabilities with unparalleled power, performance and connectivity. Designed to meet all your communication requirements, now and in the future, MicroSmart Pentra PLCs give you the flexibility to expand your system with as many as fifteen modules! Our new Embedded Ethernet PLC with built-in Modbus TCP also lets you remotely monitor status in real-time, receive email alerts and customize your own web page.

### Safety

All MicroSmart Pentra PLCs meet the highest standards for safety including: cULus listed for Class 1 Division 2 hazardous locations*, CE compliant, as well as certified for marine use by ABS, DNV, and Lloyd's Registry*.

*Not applicable for all models. Visit www.IDEC.com/approvals for details.

### The MicroSmart Pentra PLC Family: Everything you need in a controller

Embedded Ethernet Port

Email and text notifications

Modbus TCP, RTU and ASCII

USB programming port

Seven communication ports

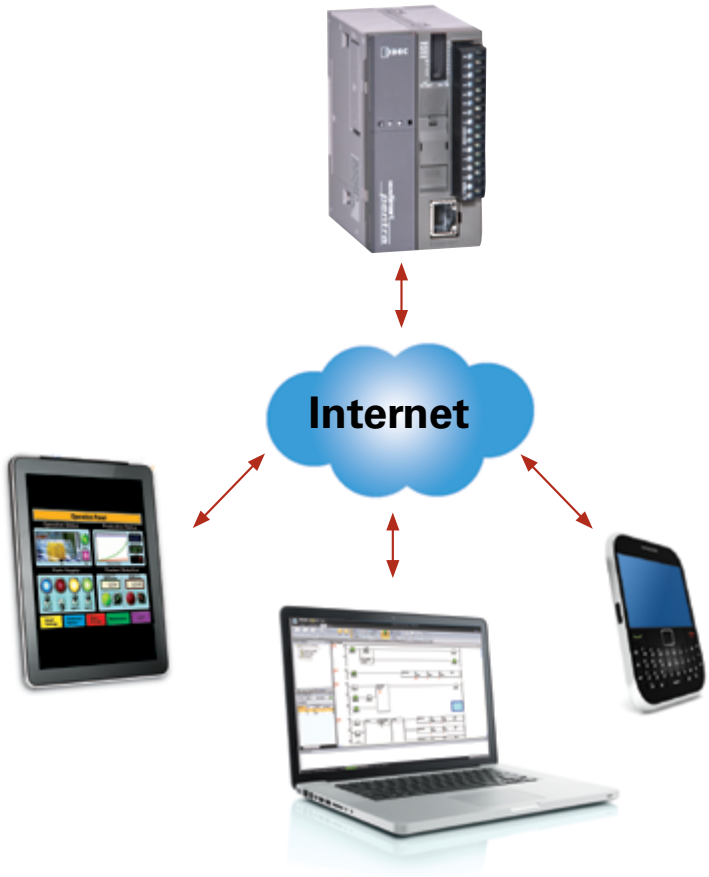
NEW Advanced PID control modules

User web page

Battery-less models

## MicroSmart Pentra Performance

### Embedded Ethernet Port




#### Remote Access and Control

The new MicroSmart Pentra PLC with an embedded Ethernet port, you can configure the MicroSmart Pentra PLC for remote monitoring and control. Using WindLDR software, you can remotely monitor or update the PLC programs without having to be near the PLC.

#### Web Server Functions

Using standard web browsers like Internet Explorer or Firefox, you can remotely log-in and access web pages that are stored directly on the MicroSmart Pentra PLC. Up to 1 MB of memory is dedicated for web page storage! Use the built-in web pages or create your own using an HTML editor.

#### 14 Simultaneous Connections

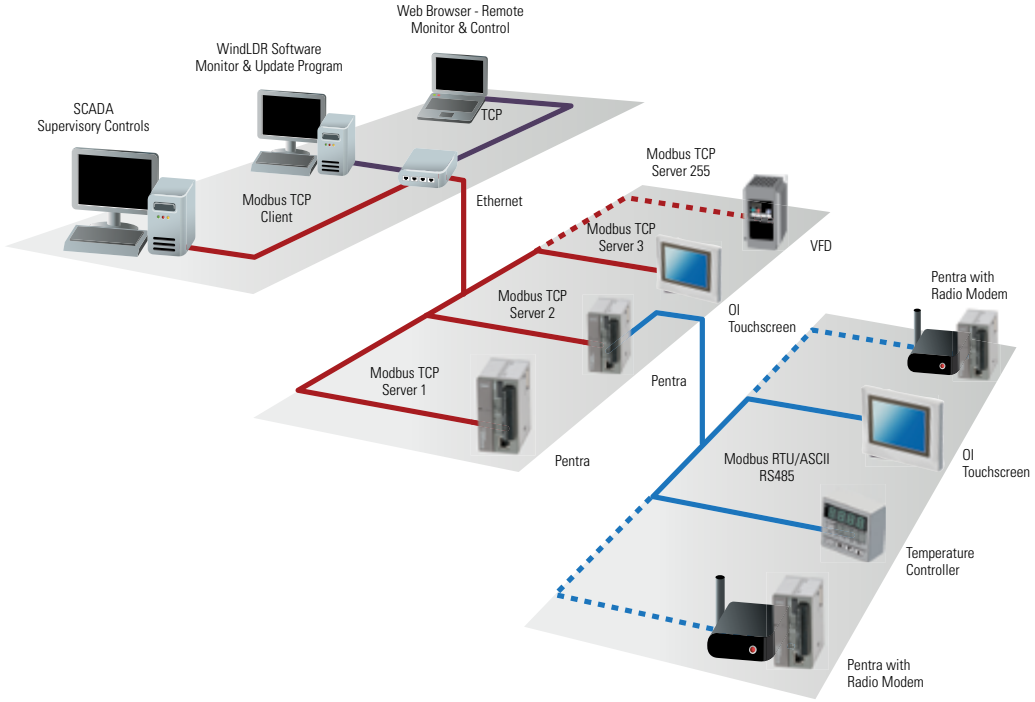
The new embedded Ethernet Pentra supports up to 14 simultaneous connections through its Ethernet port. Through the Ethernet port, the embedded Ethernet Pentra can be configured to communicate to WindLDR for maintenance communications, to an Operator Interface touchscreen, and to VFD using Modbus TCP communications, all simultaneously.

### Embedded USB Maintenance Port

The new MicroSmart Pentra PLC with an embedded Ethernet PLC port also has an embedded mini-B USB port for maintenance.

You can now easily connect your PC to this PLC using a standard USB cable.

## Modbus TCP, RTU and ASCII




Using intuitive WindLDR software, you can configure the MicroSmart Pentra to be a Master or Slave device on a Modbus network. All MicroSmart Pentra PLCs support Modbus RTU/ASCII protocols and our CPU with embedded Ethernet port also supports Modbus TCP protocol.

## Email and Text Message

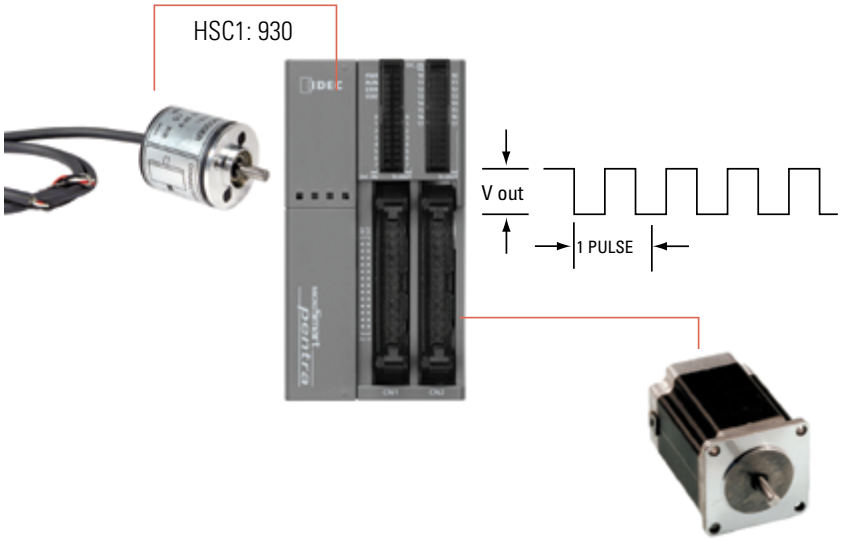
Easily configure the MicroSmart Pentra PLCs to send out system status and alarms to your email or mobile phone. Data registers values in the PLC can also be incorporated in the body of the email. It also supports email login authentication so third party email server like Yahoo can be used. Up to 255 email templates can be configured with multiple recipients can be included.

## User Web Pages

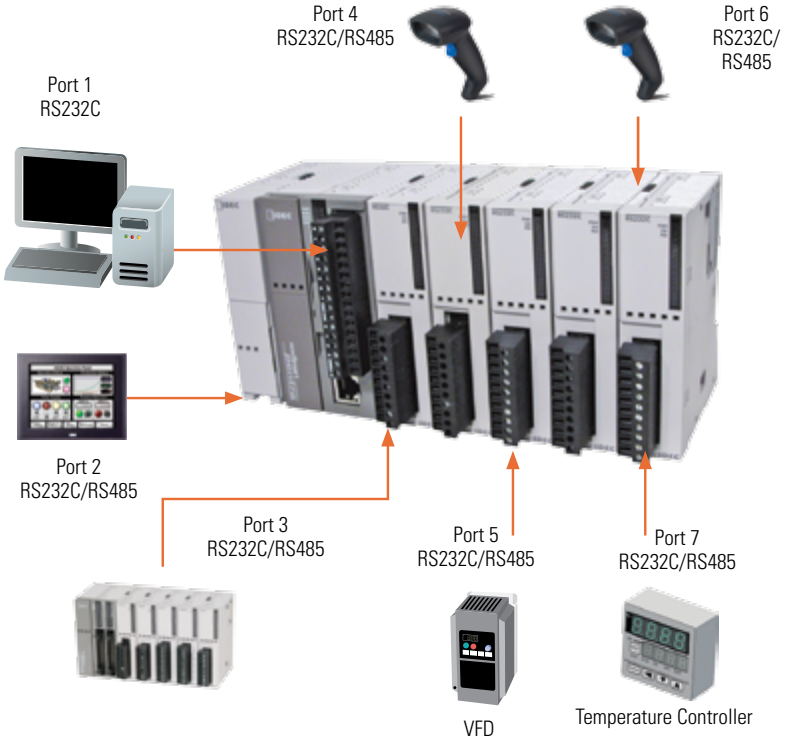
With IDEC MicroSmart Pentra, users do not need to know JAVA programming to embed dynamic values and parts on their PLC web pages. Even novice HTML programmer can take full advantage of the integrated IDEC system library of numerical display/input, horizontal and vertical bar graphs, trend chart, ON/OFF pilot lights and pushbuttons. Up to 1MB of memory is reserved for user web pages.

## Integrated 100KHz Fast Inputs and Outputs

Configure up to four high-speed inputs from high-speed output devices such as rotary encoders or proximity switches at a maximum frequency of 100KHz, independent of the scan time. Up to three high-speed outputs can be used for simple positioning controls for stepper or servo motors.



## Maximum 7 Communication Ports




With MicroSmart Pentra PLCs, you don't have to worry about limited communication capabilities. It doesn't matter if you're just starting out or a current user expanding your MicroSmart Pentra PLC, you can rest assured that these communication modules will provide reliable and seamless communication. If RS485 modules are used for all six ports, up to 186 RS485 slave devices can be connected with as high as a 115K baud rate available for fast transmission.

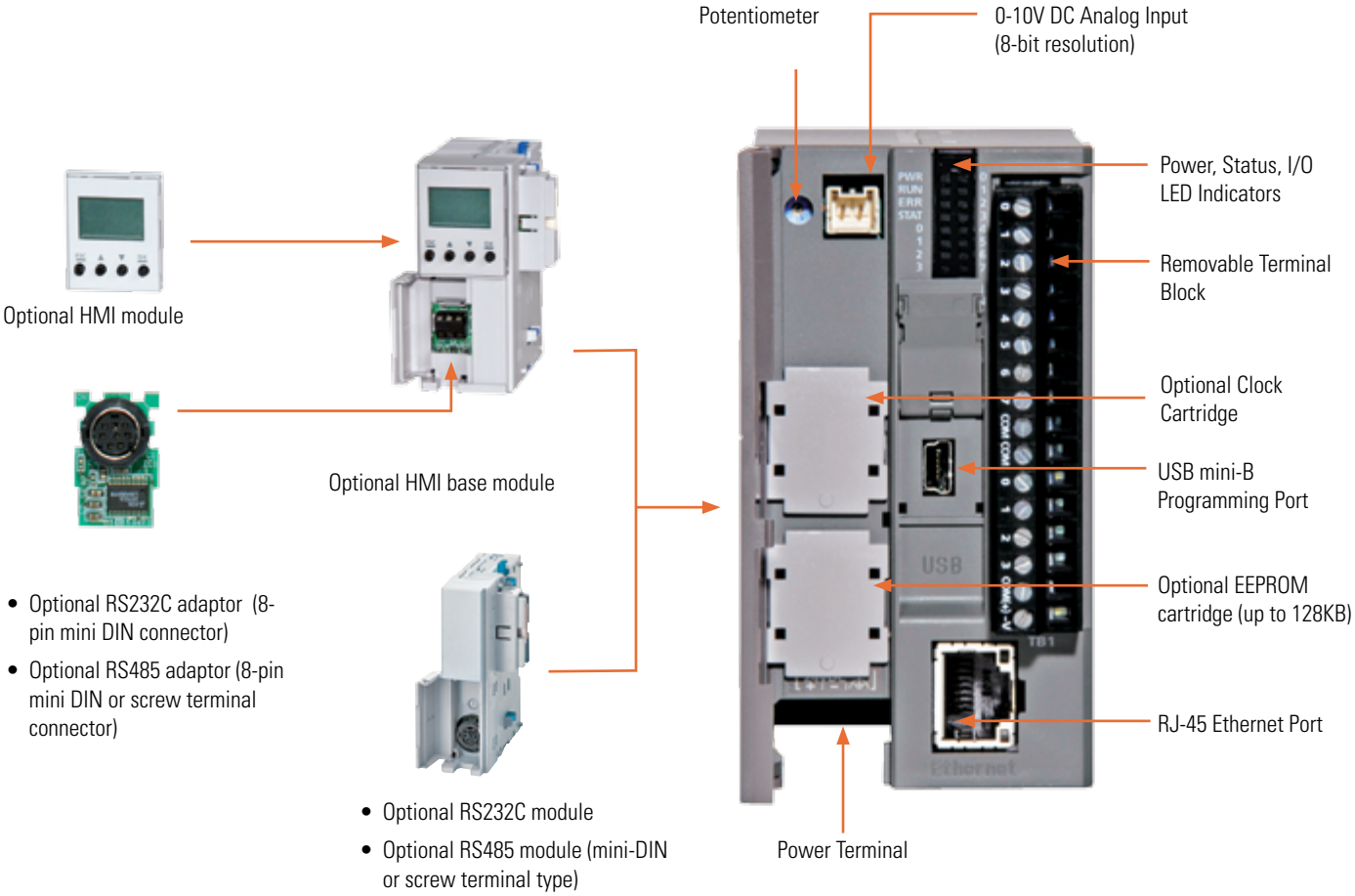
## Battery-less CPUs

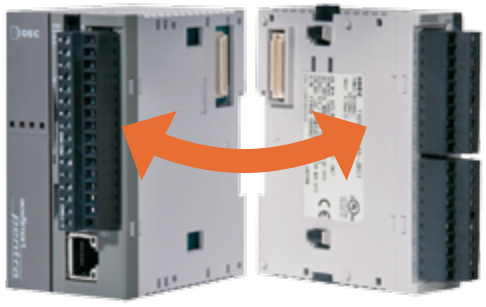
With most PLCs, dynamic values are stored and backed up by a rechargeable lithium battery. In most instances, this battery can only back up data for up to 30 days when the PLC is not powered, otherwise all data will be reset. Not only that, but most lithium battery only last up to 5 years. In that case the battery needs to be replaced or in some cases the entire unit.

Now, thanks to the MRAM memory designed into our new FC5A controllers, these limitations are a thing of the past! Values can be stored permanently to eliminate the hassle and worry of losing dynamic and preloaded data. This makes them ideal for applications that need to retain critical data permanently

## Choose a CPU for every application

With three controller types to choose from, MicroSmart Pentra PLCs offer the features you need for your applications. Built to allow you the flexibility to expand when you need to, MicroSmart Pentra PLCs are the best way to get everything you need in just one controller.

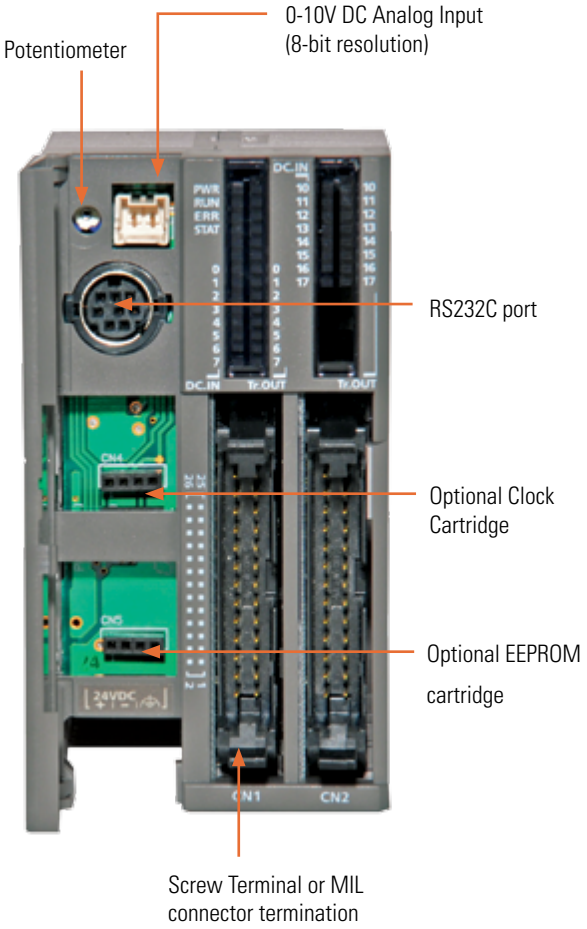


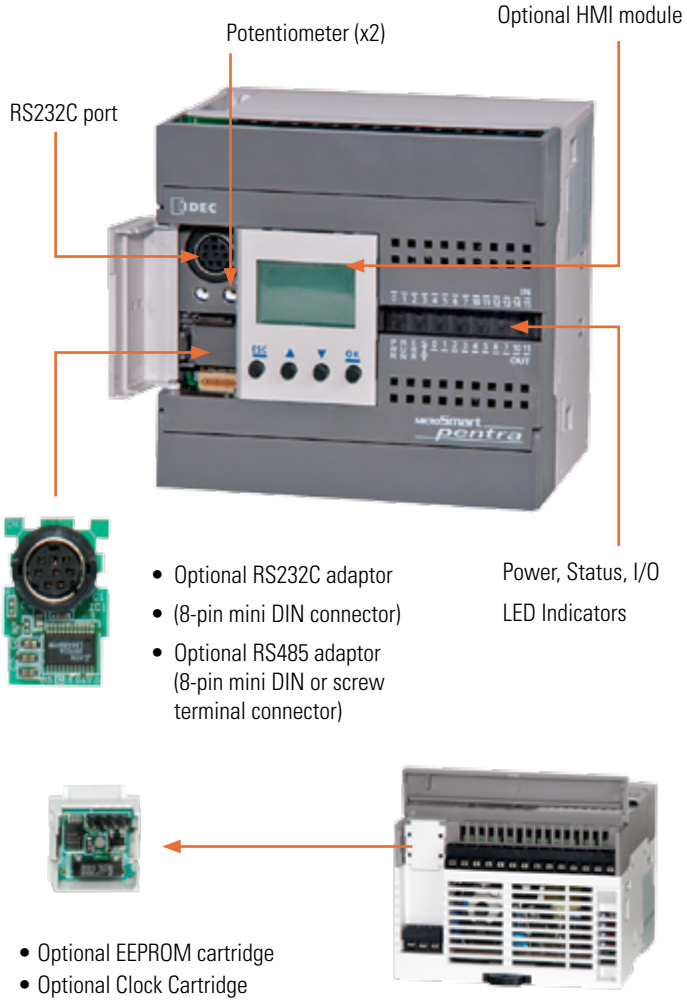



Modules snap together easily without the need for additional tools.

### Slim CPU with Ethernet Port

The perfect design when you need Ethernet capability, this slim CPU with embedded Ethernet port is available with 24V DC power and equipped with eight DC inputs and four transistor outputs (sink or source). Up to seven functional modules, including analog and communication modules can be mounted on the right-hand expansion bus. Using an expansion interface module, an additional eight discrete expansion modules can be mounted.




## Slim CPU

If you don't need Ethernet, but still want a high-performance CPU, the MicroSmart Pentra slim CPU is your best choice! Available with 24V DC power, this controller has all the functionalities you need in 16 and 32 I/O configurations. Each 16 I/O CPU is equipped with eight DC inputs, two transistor outputs (sink or source) and six relay outputs, while the 32 I/O CPU is equipped with 16 DC inputs and 16 transistor outputs (sink or source).

## All-in-One CPU

Available with 12V DC, 24V DC and 100-240V AC power, you can choose from 10, 16 and 24 I/O configurations. The 10 I/O CPU is equipped with six DC inputs and four relay outputs, while the 16 I/O CPU is equipped with nine DC inputs and seven relay outputs. The 24 I/O CPU is equipped with 14 DC inputs and ten relay outputs. The 24 I/O CPU (24V DC and 100-240V AC models) can also be expanded with a maximum of four functional or discreet expansion modules.

# MicroSmart Pentra CPU Part Numbers

## Slim Base Module with Embedded Ethernet

| Style | Part Number | Permanent Data Backup | Embedded I/Os | Operating Voltage | Ethernet & USB Port | Output | Maximum No. of Expansion Modules |
|---|---|---|---|---|---|---|---|
| | FC5A-D12K1E | — | 12 (8in/4out) | 24V DC | Yes | Transistor Sink | 15 (Maximum 492 digital I/Os) |
| | FC5A-D12S1E | | | | | Transistor Source | |
| | FC5A-D12K1E-DS0838 | Yes | | | | Transistor Sink | |
| | FC5A-D12S1E-DS0838 | | | | | Transistor Source | |

## Slim Base Module

| Style | Part Number | | Operating Voltage | Ethernet & USB Port | Output | Maximum No. of Expansion Modules |
|---|---|---|---|---|---|---|
| | FC5A-D16RK1 | 16 (8in/8out) | 24V DC | — | 6 Relays, 2 Trans. Sink | 15 (Maximum 496 digital I/Os) |
| | FC5A-D16RS1 | | | | 6 Relays, 2 Trans. Source | |
| | FC5A-D32K3 | 32 (16in/16out) | | | Transistor Sink | 15 (Maximum 512 digital I/Os) |
| | FC5A-D32S3 | | | | Transistor Source | |

## All-in-One Base Module

| Style | Part Number | | Operating Voltage | Ethernet & USB Port | Output | Maximum No. of Expansion Modules |
|---|---|---|---|---|---|---|
| | FC5A-C10R2 | 10 (6in/4out) | 120-240V AC | — | Relay | — |
| | FC5A-C10R2C | | 24V DC | | | |
| | FC5A-C10R2D | | 12V DC | | | |
| | FC5A-C16R2 | 16 (9in/7out) | 120-240V AC | | | |
| | FC5A-C16R2C | | 24V DC | | | |
| | FC5A-C16R2D | | 12V DC | | | |
| | FC5A-C24R2 | 24 (14in/10out) | 120-240V AC | | | 4 (Maximum 88 digital I/Os) |
| | FC5A-C24R2C | | 24V DC | | | |
| | FC5A-C24R2D | | 12V DC | | | — |

# MicroSmart Performance

**Key features:**

- Available in 10, 16, 20, 24, and 40 I/O CPUs.
- PID Controls
  -Program up to 14 PID loops
- High Speed I/O
  -Built-in 4 high speed inputs
  -Single or Dual Phase
  -Max. 20KHz frequency
- Built-in 2 High speed outputs (Slim model only)
- Configure up to 264 I/O Points
- Data link up to 32 MicroSmart and Pentra CPUs
- Using RS485 communication module/port, you can create a network of up to 32 CPUs.
- Worldwide Approvals
  -cULus listed, CE marked
  -Class 1 Div. 2 for hazardous locations
  -Lloyds Registered and ABS approved for shipping industry

# MicroSmart CPU Part Numbers

**All-in-One**

| Style | Part Number | Power | I/O Points | Input | Output | Maximum No. of Expansion Modules |
|---|---|---|---|---|---|---|
| | FC4A-C10R2C | 24V DC | 10 (6 in/ 4 out) | 24V DC (Sink/Source) | Relay | — |
| | FC4A-C10R2 | 100-240V AC | | | | |
| | FC4A-C16R2C | 24V DC | 16 (9 in/ 7 out) | | | |
| | FC4A-C16R2 | 100-240V AC | | | | |
| | FC4A-C24R2C | 24V DC | 24 (14 in/ 10 out) | | | 4 (Maximum 88 digital I/Os) |
| | FC4A-C24R2 | 100-240V AC | | | | |

## MicroSmart CPU Part Numbers

### Slim

| Style | Part Number | Power | I/O Points | Input | Output | Maximum No. of Expansion Modules |
|---|---|---|---|---|---|---|
| | FC4A-D20RK1 | 24V DC | 20 (12 in/8 out) | 24V DC (Sink/Source) | 6 Relays, 2 Transistor Sink | 7 (Maximum 244 digital I/Os) |
| | FC4A-D20RS1 | | | | 6 Relays, 2 Transistor Source | |
| | FC4A-D20K3 | | | | Transistor Sink | 7 (Maximum 148 digital I/Os) |
| | FC4A-D20S3 | | | | Transistor Source | |
| | FC4A-D40K3 | | 40 (24 in/16 out) | | Transistor Sink | 7 (Maximum 264 digital I/Os) |
| | FC4A-D40S3 | | | | Transistor Source | |

# Digital I/O Expansion Modules

**Key features:**

- 15 modules to choose from
- Available with Screw or MIL connectors
- Easy snap-on
- Available 8, 16 or 32 point modules
- Up to 512 I/O can be configured in the Pentra and 264 I/O in the MicroSmart system

## Input Modules

| Style | Part Number | Input | Input Points | Terminal |
|---|---|---|---|---|
| | FC4A-N08A11 | 100-120V AC | 8 | Removable Screw Terminals |
| | FC4A-N08B1 | 24V DC | | |
| | FC4A-N16B1 | | 16 | |
| | FC4A-N16B3 | | | MIL Connector (ribbon cable) |
| | FC4A-N32B3 | | 32 | |

# Digital I/O Expansion Modules

## Output Modules

| Style | Part Number | Output | Output Points | Terminal |
|---|---|---|---|---|
| | FC4A-R081 | Relay | 8 | Removable Screw Terminals |
| | FC4A-R161 | | 16 | |
| | FC4A-T08K1 | Transistor Sink | 8 | |
| | FC4A-T16K3 | | 16 | MIL Connector (ribbon cable) |
| | FC4A-T32K3 | | 32 | |

# Digital I/O Expansion Modules

## Output Modules (cont.)

| Style | Part Number | Output | Output Points | Terminal |
|---|---|---|---|---|
| | FC4A-T08S1 | Transistor Source | 8 | Removable Screw Terminals |
| | FC4A-T16S3 | | 16 | MIL Connector (ribbon cable) |
| | FC4A-T32S3 | | 32 | |

## Combination I/O Modules

| Style | Part Number | Input | Output | I/O Points | Terminal |
|---|---|---|---|---|---|
| | FC4A-M08BR1 | 24V DC (Sink/Source) | Relay | 8 (4 in/4 out) | Removable Screw Terminals |
| | FC4A-M24BR2 | | | 24 (16 in/ 8 out) | Wire Spring Clamp |

# Analog I/O Expansion Modules

**Key features:**

- 9 different modules to choose from
- 0-10V, 4-20mA, RTD, Thermocouple, Thermistor inputs, 0-10V DC or -10V DC to 10V DC output
- 12 or 16-bit resolution
- Fast conversion time
- Maximum of 56 I/O can be configured in the MicroSmart Pentra system
- Easy to configure using a Macro instruction in WindLDR

**Modules**

| Style | Part Number | I/O Points | Input | Output | Resolution | Terminal |
|---|---|---|---|---|---|---|
| | FC4A-J8C1 | 8 (8 inputs) | 0-10V DC, 4-20mA | – | 16-bit (0-50000) | Removable Screw Terminals |
| | FC4A-L03A1 | 3 (2 inputs, 1 output) | | 0-10V DC, 4-20mA | 12-bit (0-4095) | |
| | FC4A-J2A1 | 2 (2 inputs) | | – | | |
| | FC4A-J4CN1 | 4 (4 inputs) | 0-10V DC, 4-20mA, RTD, Thermocouple | – | 16-bit (0-50000) | |
| | FC4A-L03AP1 | 3 (2 inputs, 1 output) | RTD, Thermocouple | 0-10V DC, 4-20mA | 12-bit (0-4095) | |

# Analog I/O Expansion Modules

## Modules (cont.)

| Style | Part Number | I/O Points | Input | Output | Resolution | Terminal |
|---|---|---|---|---|---|---|
| | FC4A-J8AT1 | 8 (8 inputs) | Thermistor (NTC/PTC) | – | 12-bit (0-4000) | Removable Screw Terminals |
| | FC4A-K2C1 | 2 (2 outputs) | – | -10 to 10V DC, 4-20mA | 16-bit (0-50000) | |
| | FC4A-K1A1 | 1 (1 output) | – | 0-10V DC, 4-20mA | 12-bit (0-4095) | |
| | FC4A-K4A1 | 4 (4 outputs) | | | | |

# Communication Modules

## Web Server Module

**Features:**

- Easy to configure
- Comes with interface cable and Quick Start Guide

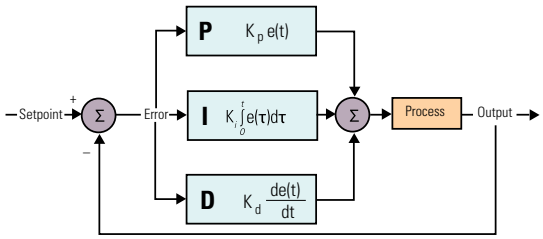
**Part Numbers**

| Style | Part Number | Description |
|---|---|---|
| | FC4A-ENET | Web Server Module (includes cable and Quick Start Guide) |

| Style | Part Number | Description |
|---|---|---|
| | FC9Y-QS100-0 | Quick Start Guide |

# Advanced PID for precision control

PID (Proportional Integral Derivative) is the most commonly used feedback control loop in industrial control systems. PID calculates an error value as the difference between a measured process variable and a desired set point. The controller then attempts to minimize the error by adjusting the process control. With MicroSmart Pentra PLCs, PID implementation can be deployed in two ways: integrated PID controls or a dedicated Process Control module, which can be mounted on the MicroSmart Pentra expansion bus.




## Advanced PID Control Module Part Numbers

| Style | Part Number | Description |
|---|---|---|
| | FC5A-F2M2 | PID Control Module with 2x analog inputs and 2x 4-20mA/non-contact voltage for SSR drive |
| | FC5A-F2MR2 | PID Controls Module with 2x analog inputs and 2x Relay Outputs |

## Advanced PID Control Module

A dedicated PID Control module is available for extreme stability and complex applications. This particular module has more functionalities than you will find in any other controller on the market. Independent of CPU scan time, the PID Control module does the work, reducing PLC scan time without taking up PLC memory space.

## PID Control Module Highlights:

- Precise, stable and accurate PID control with less than a 0.2% error
- Available in two models:
  - Built-in 2 analog inputs, 2 x 4-20mA/ non-contact voltage for SSR drive
  - Built-in 2 analog inputs, 2 x relay outputs
- Each input individually configured to accept different signal types
- Up to seven modules can be mounted on the MicroSmart Pentra
- Maximum 14 PID loops with auto-tuning
- 14-bit resolution
- ARW (anti-reset windup)
- Accepts many different input types including:
  - Type K, J, R, S, B, E, T, C, PL-II and N thermocouples
  - RTD
  - 0-20 mA and 4-20 mA
  - 0-1V, 0-5V, 1-5V, and 0-10V DC
- Numerous control methods including:
  - Cascade
  - External set point
  - Heating and cooling control action
  - Difference input control

# Communication Module

| Style | Part Number | Description |
|---|---|---|
| | FC5A-SIF4 | RS485 Communication Module for MicroSmart Pentra configure as port 3 to 7 |
| | FC5A-SIF2 | RS232 Communication Module for MicroSmart Pentra configure as port 3 to 7 |

**Communicate with up to seven different serial devices**

Only IDEC offers communication modules that enable you to configure up to seven serial devices! Now you can connect your operator interface, PC, barcode reader, RFID equipment, printer and more. Just imagine the possibilities.

Using the MicroSmart Pentra slim CPU,you can configure up to seven communication ports. Using the All-in-one MicroSmart Pentra you can communicate with up to five serial devices.

# Optional Modules

| Style | Part Number | Description | Usage |
|---|---|---|---|
| | FC4A-HPH1 | HMI Base Module | For mounting HMI module and communication ports with slim model CPU module (HMI module is not included) |
| | FC4A-PH1 | HMI Module | For displaying and changing operands |
| | FC4A-PM32 | EEPROM memory cartridge | 32KB EEPROM memory cartridge |
| | FC4A-PM64 | EEPROM memory cartridge | 64KB EEPROM memory cartridge |
| | FC4A-PM128 | EEPROM memory cartridge | 128KB EEPROM memory cartridge |
| | FC4A-PT1 | Clock cartridge | Real-time clock cartridge |

## Communication Ports

| Style | Part Number | Description | Terminal |
|---|---|---|---|
| | FC4A-PC1 | RS232C | Mini DIN |
| | FC4A-PC2 | RS485 | Mini DIN |
| | FC4A-PC3 | RS485 | Screw Terminal |

### Communication Module — for Slim CPU

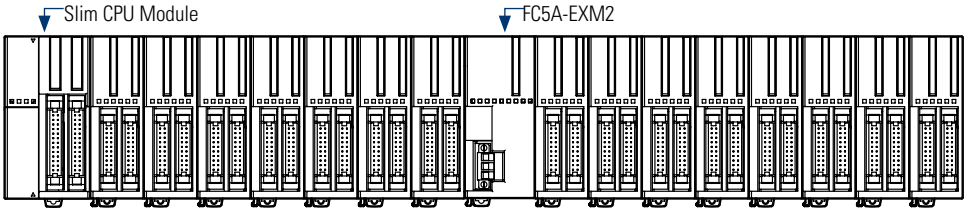
| Style | Part Number | Description | Terminal |
|---|---|---|---|
| | FC4A-HPC1 | RS232C | Mini DIN |
| | FC4A-HPC2 | RS485 | Mini DIN |
| | FC4A-HPC3 | RS485 | Screw Terminal |

### Expansion Power Supply Module

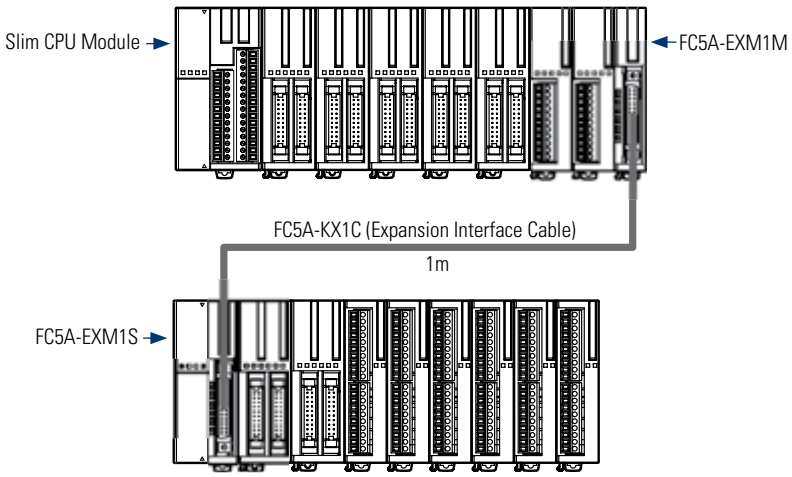
| Style | Part Number | Description |
|---|---|---|
| | FC5A-EXM1M | Master Expansion Power Supply For MicroSmart Pentra |
| | FC5A-EXM1S | Slave Expansion Power Supply For MicroSmart Pentra |
| | FC5A-EXM2 | Expansion Power Supply For MicroSmart Pentra |

## Expansion Power Supply System Configuration

### FC5A-EXM2 (Expansion Interface Module)




### FC5A-EXM1M and FC5A-EXM1S (Expansion Interface Master & Salve Modules)



# Cables

## Communication Cables

| Appearance | Part Number | Length | Expanded Description |
|---|---|---|---|
| | FC4A-KC4CA | 5ft. (1.53m) | Programming cable (Maintenance/User Communication Mode selectable) |
| | FC4A-USB | 6ft. (1.83m) | USB to Serial Converter |
| | FC4A-KC3C | 0.33ft. (100mm) | Web Server Module interface cable |
| | HG9Z-XCM2A | 6ft. (1.83m) | USB programming cable for embedded Ethernet CPU |

| Appearance | Part Number | Length | Expanded Description |
|---|---|---|---|
| | FC2A-KM1C | 9.84 Ft. (3m) | Modem cable. Used to connect a modem to the MicroSmart RS232C port. |
| | FC2A-KP1C | 9.84 Ft. (3m) | User communication cable. Used to connect RS232C equipment to the MicroSmart RS232C port. |
| | FC5A-KX1C | 3.28 Ft. (1m) | MicroSmart Pentra expansion power supply interface cable. Used to connect expansion interface master and expansion slave modules. |

## MIL Connector Cables (use with Breakout Modules)

| Use with | Part Number | Model | Length |
|---|---|---|---|
| CPU Module (26-wire) BX1D-S26A, BX1D-T26A | FC9Z-H050B26 | Non-shielded | 1.64ft. (0.5m) |
| | FC9Z-H100B26 | | 3.28ft. (1m) |
| | FC9Z-H200B26 | | 6.56ft (2m) |
| | FC9Z-H300B26 | | 9.85ft. (3m) |
| | FC9Z-H050A26 | Shielded | 1.64ft. (0.5m) |
| | FC9Z-H100A26 | | 3.28ft. (1m) |
| | FC9Z-H200A26 | | 6.56ft (2m) |
| | FC9Z-H300A26 | | 9.85ft. (3m) |
| | FC9Z-H100C26A | Shielded Single Connectors | 5ft. (1.5m) |

| Use with | Part Number | Model | Length |
|---|---|---|---|
| I/O Expansion Modules (20-wire) BX1D-S20A, BX1D-T20A | FC9Z-H050B20 | Non-shielded | 1.64ft. (0.5m) |
| | FC9Z-H100B20 | | 3.28ft. (1m) |
| | FC9Z-H200B20 | | 6.56ft (2m) |
| | FC9Z-H300B20 | | 9.85ft. (3m) |
| | FC9Z-H050A20 | Shielded | 1.64ft. (0.5m) |
| | FC9Z-H100A20 | | 3.28ft. (1m) |
| | FC9Z-H200A20 | | 6.56ft (2m) |
| | FC9Z-H300A20 | | 9.85ft. (3m) |
| | FC9Z-H100C20A | Shielded Single Connectors | 5ft. (1.5m) |

## Breakout Modules

| Use with | Part Number | Descrption |
|---|---|---|
| 26-wire MIL connector cable | BX1D-S26A | 26-terminal breakout module |
| | BX1D-T26A | 26-terminal touch-down terminal breakout module |
| 20-wire MIL connector cable | BX1D-S20A | 20-terminal breakout module |
| | BX1D-T20A | 20-terminal touch-down terminal breakout module |

# Accessories

| Part Number | Use with | Description |
|---|---|---|
| FC4A-PMT13 | CPU module | 13-position left-side terminal block for FC4A-D20RK1/-D20RS1 CPU |
| FC5A-PMT13 | | 13-position left-side terminal block for FC5A-D16RK1/-D16RS1 CPU |
| FC4A-PMTS16 | | 16-position right-side terminal block for FC4A-D20RS1 and FC5A-D16RS1 CPU |
| FC4A-PMTK16 | | 16-position right-side terminal block for FC4A-D20RK1 and FC5A-D16RK1 CPU |
| FC4A-PMT11 | I/O expansion modules | 11-position terminal block for 8-pt I/O expansion modules |
| FC4A-PMT10 | | 10-position terminal block for 16-pt I/O expansion modules |
| FC4A-PMC20 | | 20-position connector socket for MIL connector I/O expansion modules |
| FC4A-PMC26 | | 26-position connector socket for MIL connector CPU modules |
| FC4A-PSP1 | | Direct mounting strips for mounting on a panel |
| FC4A-PMAC2 | | Analog voltage input cable for slim CPU |
| FC4A-DS824-SW14 | | 14-pt input simulator switch for 24 I/O CPU |
| FC4A-DS824-SW9 | | 9-pt input simulator switch for 16 I/O CPU |
| FC4A-DS824-SW6 | | 6-pt input simulator switch for 10 I/O CPU |
| FC9Y-B812-0A | | MicroSmart user manual |
| FC9Y-B1138-0 | | MicroSmart Pentra user manual |
| SW1A-W1C | | Automation Organizer Software Suite |

## RV8 Series 6mm Interface Relays

### Key Features

- Space-saving 6mm width
- Only 70mm in height from DIN rail
- Gold-plated contacts
- Pre-assembled relay and DIN mount socket
- Universal screw terminals (flat and Phillips)
- Universal AC/DC socket with built-in surge suppression and green LED
- Lever for easy locking and removal of relay
- Wide input voltage range: 6 to 240V
- High dielectric strength and impulse withstand voltages
- Sensitive coil 170mW
- Reverse Polarity protected
- 400V AC maximum switching voltage
- 1500VA maximum switching power
- RoHS compliant

(when using combination of RV1H relay and SV1H socket)

### Part Numbers

| Coil Voltage | | Screw Terminal | Spring Clamp |
|---|---|---|---|
| DC | 6V | **RV8H-L-D6** | **RV8H-S-D6** |
| | 9V | RV8H-L-D9 | RV8H-S-D9 |
| | 12V | **RV8H-L-D12** | **RV8H-S-D12** |
| | 18V | RV8H-L-D18 | RV8H-S-D18 |
| | 24V | **RV8H-L-D24** | **RV8H-S-D24** |
| AC/DC | 12V | **RV8H-L-AD12** | **RV8H-S-AD12** |
| | 18V | RV8H-L-AD18 | RV8H-S-AD18 |
| | 24V | **RV8H-L-AD24** | **RV8H-S-AD24** |
| | 48V | RV8H-L-AD48 | RV8H-S-AD48 |
| | 60V | RV8H-L-AD60 | RV8H-S-AD60 |
| | 110V - 125V | **RV8H-L-AD110** | **RV8H-S-AD110** |
| | 220V - 240V | **RV8H-L-AD220** | **RV8H-S-AD220** |

Standard stock models in bold.

### Accessories

| Item | | Color | Part Number |
|---|---|---|---|
| Jumper (20 combs) [1] | | Black | SV9Z-J20B |
| | | Gray | SV9Z-J20W |
| | | Blue | SV9Z-J20S |
| Spacer (circuit separator) [2] | | - | SV9Z-SA2W |
| Marking plate (10 pcs) | | - | SV9Z-PW10 |

1. Jumper combs come with 20 points, if shorter lengths are needed simply cut off the excess points.
2. Width of spacer: 2mm

Note: When using a cut jumper, please use a spacer on the cut side. For additional information see instruction sheet.

# Starter Kits and Solution Packages

## MicroSmart Starter Kits

| Item | | Part Numbers | Controller | Power Supply | Software (Prog. Cables Included) |
|---|---|---|---|---|---|
| MicroSmart | | MM-SMART-10 | 10 I/O FC4A-C10R2 CPU | – | Automation Organizer Software Suite |
| | | MM-SMART-16 | 16 I/O FC4A-C16R2 CPU | – | |
| | | MM-SMART-20 | 20 I/O FC4A-D20RK1 CPU | 15W | |
| | | MM-SMART-24 | 24 I/O FC4A-C24R2 CPU | – | |
| | | MM-SMART-40 | 40 I/O FC4A-D40K3 Slim CPU | 15W | |
| MicroSmart Pentra | | MM-PENTRA-16 | 16 I/Os FC5A-D16RS1 CPU | 30W | |
| | | MM-PENTRA-24 | 24 I/Os FC5A-C24R2 CPU | – | |
| | | MM-PENTRA-12 | 12 I/Os FC5A-D12S1E Embedded Ethernet | 30W | |

## MicroSmart Solution Packages

KIT-PENTRA-12-HG3G-AHP shown

| Part Numbers | Operator Interface | Controller | Power Supply | Software (Prog. Cables Included) |
|---|---|---|---|---|
| KIT-PENTRA-24-HG1F | 4.6" HG1F Mono | 24 I/O FC5A-C24R2C CPU | 60W | Automation Organizer Software Suite |
| KIT-PENTRA-12-HG1F | 4.6" HG1F Mono | 12 I/O FC5A-D12S1E Embedded Ethernet CPU | 60W | |
| KIT-PENTRA-24-HG2G-M | 5.7" HG2G Color TFT LCD | 24 I/O FC5A-C24R2C CPU | 60W | |
| KIT-PENTRA-12-HG2G-M | 5.7" HG2G Color TFT LCD | 12 I/O FC5A-D12S1E Embedded Ethernet CPU | 60W | |
| KIT-PENTRA-24-HG2G-TE | 5.7" HG2G Color TFT LCD | 24 I/O FC5A-C24R2C CPU | 60W | |
| KIT-PENTRA-12-HG2G-TE | 5.7" HG2G Color TFT LCD | 12 I/O FC5A-D12S1E Embedded Ethernet CPU | 60W | |
| KIT-PENTRA-24-HG2G-HP | 5.7" HG2G Color TFT LCD | 24 I/O FC5A-C24R2C CPU | 60W | |
| KIT-PENTRA-16-HG2G-HP | 5.7" HG2G Color TFT LCD | 16 I/O FC5A-D16RS1 CPU | 60W | |
| KIT-PENTRA-12-HG2G-HP | 5.7" HG2G Color TFT LCD | 12 I/O FC5A-D12S1E Embedded Ethernet CPU | 60W | |
| KIT-PENTRA-16-HG3G-8HP | 8.4" HG3G Color TFT LCD | 16 I/O FC5A-D16RS1 CPU | 60W | |
| KIT-PENTRA-12-HG3G-8HP | 8.4" HG3G Color TFT LCD | 12 I/O FC5A-D12S1E Embedded Ethernet CPU | 60W | |
| KIT-PENTRA-16-HG3G-AHP | 10.4" HG3G Color TFT LCD | 16 I/O FC5A-D16RS1 CPU | 60W | |
| KIT-PENTRA-12-HG3G-AHP | 10.4" HG3G Color TFT LCD | 12 I/O FC5A-D12S1E Embedded Ethernet CPU | 60W | |
| KIT-PENTRA-16-HG4G-HP | 12.1" HG4G Color TFT LCD | 16 I/O FC5A-D16RS1 CPU | 60W | |
| KIT-PENTRA-12-HG4G-HP | 12.1" HG4G Color TFT LCD | 12 I/O FC5A-D12S1E Embedded Ethernet CPU | 60W | |

OI Touchscreens have black bezels. All packages come with Automation Organizer software suite and communication cables.

# Automation Organizer Suite

## Programming Software

Automation Organizer (AO) is a powerful software suite containing PLC programming software (WindLDR), OI touchscreen configuration software (WindO/I-NV2/NV3) and system configuration software (WindCFG). AO boasts a completely new graphic user interface and redesigned menu icons. AO is a one-stop automation software package for IDEC MicroSmart Pentra PLCs and IDEC OI touchscreens, and is compatible with Windows XP, Vista (32 bit) and Windows 7 and 8 (32 and 64-bit).

Automation Organizer **WindLDR**

All IDEC MicroSmart Pentra PLCs are programmable with WindLDR ladder logic software. This icon-driven programming tool combines logic and intuition with an incredibly easy-to-use interface to allow you to take advantage of MicroSmart features. Even without ladder program experience, you can use the built-in editors, shortcuts and debuggers to configure programs. WindLDR is an excellent, long-term investment for your control solutions.

### Simulation Mode

WindLDR allows you to simulate ladder programs with built-in Simulation mode. You can easily test and verify functionality of your ladder program without actual hardware.

### Online Editing

Shutting down your PLC for minor changes can be a major hassle, so WindLDR allows you to edit and download programs without interrupting PLC operation. You can write new values to counters, timers and registers at any time without switching between editor mode (for programming) and monitor mode.

### Firmware Download

With WindLDR version 6.4 or later, you have the option to upgrade or downgrade your CPU system program. It's as simple as clicking on the checkbox in the Download dialog box. Now you can easily update your PLC system firmware with the click of a button.

### FREE Upgrades

The Automation Organizer suite comes with free lifetime upgrades. Once you make the initial purchase, upgrades are absolutely free.

Automation Organizer **WindO/I-NV2**

Automation Organizer **WindO/I-NV3**

Automation Organizer **WindO/I-NV4**

WindO/I-NV2/NV3/NV4 software is the programming tool available for all IDEC OI touchscreens and FT1A Touch. It is used to create projects or programs that can display information from a PLC, process status, or can be used to input data with virtual switches or keypads to make changes to a process. The objects are extremely easy to configure with the help of step- by-step navigation. It lets you quickly create colorful graphical screens in no time using drop-down menus and intuitive drag and drop functionality for the objects. A workspace is available to help you organize and manage projects, objects and screens.

Automation Organizer **WindCFG**

WindCFG is a system layout and configuration tool for IDEC PLCs and OI touchscreens. Using WindCFG, you can create a visual layout of the system design and basic configuration of your PLC and OI touchscreens.

Part Number

| Part Number | Description |
|---|---|
| SW1A-W1C | Automation Organizer software suite |

For more information, see page 149.

## Specifications

### Slim Type

| Model | FC5A-D12K1E-DS0838<br>FC5A-D12S1E-DS0838 | FC5A-D12K1E<br>FC5A-D12S1E | FC5A-D16RK1<br>FC5A-D16RS1 | FC5A-D32K3<br>FC5A-D32S3 | FC4A-D20K3<br>FC4A-D20S3 | FC4A-D20RK1<br>FC4A-D20RS1 | FC4A-D40K3<br>FC4A-D40S3 |
|---|---|---|---|---|---|---|---|
| Rated Power Voltage | 24V DC | | | | | | |
| Allowable Voltage Range | 20.4 to 26.4V DC (including ripple) | | | | | | |
| Maximum Input Current | 700 mA (26.4V DC)[1] | | | | 560 mA (26.4V DC)[1] | 700 mA (26.4V DC)[1] | |
| Maximum Power Consumption | 19W (26.4V DC)[1] | | | | 14W (26.4V DC)[1] | 17W (26.4V DC)[1] | |
| Allowable Momentary Power Interruption | 10 ms (at 24V DC) | | | | | | |
| Dielectric Strength | Between power and ⏚ terminals: 500V AC, 1 minute<br>Between I/O and ⏚ terminals: 500V AC, 1 minute | | | | | | |
| Insulation Resistance | Between power and ⏚ terminals: 10 MΩ minimum (500V DC megger)<br>Between I/O and ⏚ terminals: 10 MΩ minimum (500V DC megger) | | | | | | |
| Noise Resistance | DC power terminals: 1.0 kV, 50 ns to 1 µs<br>I/O terminals (coupling clamp): 1.5 kV, 50 ns to 1 µs | | | | | | |
| Inrush Current | 50A maximum (24V DC) | | | | | | |
| Power Supply Wire | UL1015, AWG22, UL1007 AWG18 | | | | | | |
| Operating Temperature | 0 to 55°C | | | | | | |
| Storage Temperature | –25 to +70°C (no freezing) | | | | | | |
| Relative Humidity | Level RH1 (IEC61131-2), 10 to 95% (no condensation) | | | | | | |
| Altitude | Operation: 0 to 2,000m, Transport: 0 to 3,000m | | | | | | |
| Pollution Degree | 2 (IEC60664-1) | | | | | | |
| Corrosion Immunity | Free from corrosive gases | | | | | | |
| Degree of Protection | IP20 (IEC60529) | | | | | | |
| Grounding Wire | UL1015, AWG22, UL1007, AWG18 | | | | | | |
| Vibration Resistance | When mounted on a DIN rail or panel surface:<br>5 to 8.4 Hz amplitude 3.5 mm, 8.4 to 150 Hz acceleration 9.8 m/s$^2$ (1G),<br>2 hours per axis on each of three mutually perpendicular axes (IEC61131-2) | | | | | | |
| Shock Resistance | 147 m/s$^2$ (15G), 11 ms duration, 3 shocks per axis on three mutually perpendicular axes (IEC61131-2) | | | | | | |
| Weight | 200g | | 230g | 190g | 140g | 185g | 180g |

1. CPU module + 7 I/O modules

## All-in-One Type

| Model | | FC5A-C10R2<br>FC5A-C10R2C<br>FC5A-C10R2D | FC5A-C16R2<br>FC5A-C16R2C<br>FC5A-C16R2D | FC5A-C24R2<br>FC5A-C24R2C<br>FC5A-C24R2D | FC4A-C10R2<br>FC4A-C10R2C | FC4A-C16R2<br>FC4A-C16R2C | FC4A-C24R2<br>FC4A-C24R2C |
|---|---|---|---|---|---|---|---|
| Rated Power Voltage | | AC power type: 100 to 240V AC, DC power type: 24V DC, 12V DC | | | | | |
| Allowable Voltage Range | | AC power type: 85 to 264V AC, 24V DC power type: 20.4 to 28.8V DC (including ripple), 12V DC type: 10.2 to 18.0V DC | | | | | |
| Rated Power Frequency | | AC power type: 50/60 Hz (47 to 63 Hz) | | | | | |
| Maximum Input Current | | 250 mA (85V AC)<br>160 mA (24V DC) | 300 mA (85V AC)<br>190 mA (24V DC) | 450 mA (85V AC)[1]<br>360 mA (24V DC)[2] | 250 mA (85V AC)<br>160 mA (24V DC) | 300 mA (85V AC)<br>190 mA (24V DC) | 450 mA (85V AC)[1]<br>360 mA (24V DC)[2] |
| Maximum Power Consumption | AC Power | FC5A-C10R2/FC4A-C10R2: 30VA (264V AC), 20VA (100V AC)[3]<br>FC5A-C16R2/FC4A-C16R2: 31VA (264 V AC), 22VA (100V AC )[3]<br>FC5A-C24R2/FC4A-C24R2: 40VA (264V AC), 33VA (100V AC)[1] | | | | | |
| | DC Power | FC5A-C10R2C/FC4A-C10R2C: 3.9W (24V DC) *5 FC5A-C10R2D: 2.8W (12V DC)[4]<br>FC5A-C16R2C/FC4A-C16R2C: 4.6W (24V DC) *5 FC5A-C16R2D: 3.4W (12V DC)[4]<br>FC5A-C24R2C/FC4A-C24R2C: 8.7W (24V DC) *3 FC5A-C24R2D: 4.2W (12V DC)[4] | | | | | |
| Allowable Momentary Power Interruption | | 10 ms (rated power voltage) | | | | | |
| Dielectric Strength | | Between power and ⏚ or ⏥ terminals: 1,500V AC, 1 minute<br>Between I/O and ⏚ or ⏥ terminals: 1,500V AC, 1 minute | | | | | |
| Insulation Resistance | | Between power and ⏚ or ⏥ terminals: 10 MΩ minimum (500V DC megger)<br>Between I/O and ⏚ or ⏥ terminals: 10 MΩ minimum (500V DC megger) | | | | | |
| Noise Resistance | | AC power terminals: 1.5 kV, 50 ns to 1 µs<br>DC power terminals: 1.0 kV, 50 ns to 1 µs<br>I/O terminals (coupling clamp): 1.5 kV, 50 ns to 1 µs | | | | | |
| Inrush Current | | FC5A-C10R2/FC5A-C10R2C/FC5A-C16R2/<br>FC5A-C16R2C: 35A<br>FC5A-C10R2D/FC5A-C16R2D: 20A | | FC5A-C24R2/<br>FC5A-C24R2C: 40A<br>FC5A-C24R2D: 20A | 35A | | 40A |
| Power Supply Wire | | UL1015 AWG22, UL1007 AWG18 | | | | | |
| Operating Temperature | | 0 to 55°C | | | | | |
| Storage Temperature | | –25 to +70°C (no freezing) | | | | | |
| Relative Humidity | | Level RH1 (IEC61131-2), 10 to 95% (no condensation) | | | | | |
| Altitude | | Operation: 0 to 2,000m, Transport: 0 to 3,000m | | | | | |
| Pollution Degree | | 2 (IEC60664-1) | | | | | |
| Corrosion Immunity | | Free from corrosive gases | | | | | |
| Degree of Protection | | IP20 (IEC60529) | | | | | |
| Ground | | Ground resistance 100Ω (max.) | | | | | |
| Grounding Wire | | UL1007, AWG16 | | | | | |
| Vibration Resistance | | When mounted on a DIN rail or panel surface:<br>5 to 8.4 Hz amplitude 3.5 mm, 8.4 to 150 Hz acceleration 9.8 m/s$^2$ (1G),<br>2 hours per axis on each of three mutually perpendicular axes (IEC61131-2) | | | | | |
| Shock Resistance | | 147 m/s$^2$ (15G), 11 ms duration, 3 shocks per axis on three mutually perpendicular axes (IEC61131-2) | | | | | |
| Weight | | AC type: 230g<br>DC type: 240g | AC type: 250g<br>DC type: 260g | AC type: 305g<br>DC type: 310g | AC type: 230g<br>DC type: 240g | AC type: 250g<br>DC type: 260g | AC type: 305g<br>DC type: 310g |

1. CPU module (including 250 mA sensor power) + 4 I/O modules
2. CPU module + 4 I/O modules
3. CPU module (including 250 mA sensor power)
4. CPU module

## Slim Type Function Specifications

| Model | FC5A-D12K1E-DS0838<br>FC5A-D12S1E-DS0838 | FC5A-D12K1E<br>FC5A-D12S1E | FC5A-D16RK1<br>FC5A-D16RS1 | FC5A-D32K3<br>FC5A-D32S3 | FC4A-D20K3<br>FC4A-D20S3 | FC4A-D20RK1<br>FC4A-D20RS1 | FC4A-D40K3<br>FC4A-D40S3 |
|---|---|---|---|---|---|---|---|
| Control System | Stored program system | | | | | | |
| Instruction Words | 42 basic<br>152 advanced | | 126 advanced | 130 advanced | 35 basic<br>53 advanced | 72 advanced | |
| Program Capacity [1] | 127.8 KB (21,300 steps) | | 62.4 KB (10,400 steps) | | 27 KB (4,500 steps) | 31.2 KB (5,200 steps) [2] | |
| User Program Storage | Flash ROM (10,000 times rewritable) | | EEPROM (10,000 times rewritable) | | | | |
| Processing Time — Basic Instruction | 83 µs (1,000 steps) | | | | 1.65 ms (1,000 steps) | | |
| Processing Time — END Processing [3] | 0.35 ms | | | | 0.64 ms | | |
| Expandable I/O Modules | 7 modules + additional 8 modules using the expansion interface module | | | | 7 modules | | |
| I/O Points — Input | 8 | Expansion: 224 | 8 Expansion: 224 | 8 Expansion: 224 | 16 Expansion: 224 | 12 Expansion: 128 | 12 Expansion: 224 | 24 Expansion: 224 |
| I/O Points — Output | 4 | Additional: 256 | 4 Additional: 256 | 8 Additional: 256 | 16 Additional: 256 | 8 | 8 | 16 |
| Internal Relay | 2,048 points | | | | 1,024 points | | |
| Shift Register | 256 points | | | | 128 points | | |
| Data Register | 42,000 points | | | 42,000 points [4] | 1,300 points | | |
| Expansion Data Register | 6,000 points | | | | — | 6,000 points | |
| Counter | 256 points | | | | 100 points | | |
| Timer (1-sec, 100-ms, 10-ms, 1-ms) | 256 points | | | | 100 points | | |
| RAM Backup — Backup Data | Internal relay, shift register, counter, data register, expansion data register | | | | | | |
| RAM Backup — Backup Method | Non-volatile memory (MRAM) | Battery | | | | | |
| RAM Backup — Backup Retension | Approx. 10 yrs without Backup Cycle | Approx. 30 days (typical) at 25°C after backup battery fully charged | | | | | |
| RAM Backup — Battery | Lithium secondary battery | | | | | | |
| RAM Backup — Charging Time | Approx. 15 hours for charging from 0% to 90% of full charge | | | | | | |
| RAM Backup — Battery Life | 5 years in cycles of 9-hour charging and 15-hour discharging | | | | | | |
| RAM Backup — Replaceability | Not possible to replace battery | | | | | | |
| Self-diagnostic Function | Power failure, watchdog timer, data link connection, user program ROM sum check, timer/counter preset value sum check, user program RAM sum check, keep data, user program syntax, user program writing, CPU module, clock IC, I/O bus initialize, user program execution | | | | | | |
| Input Filter | Without filter, 3 to 15 ms (selectable in increments of 1 ms) | | | | | | |
| Catch Input/Interrupt Input | Four inputs<br>(I2 and I5) Minimum turn on pulse width: 40 µs maximum<br>Minimum turn off pulse width: 150 µs maximum<br>(I3 and I4) Minimum turn on pulse width: 5 µs maximum<br>Minimum turn off pulse width: 5 µs maximum | | | | Four inputs<br>(I2 through I5)<br>Minimum turn on pulse width: 40 µs maximum<br>Minimum turn off pulse width: 150 µs maximum | | |
| High-speed Counter — Maximum Counting Frequency and High-speed Counter Points | Total 4 points Single/two-phase selectable: 100 kHz (2 points)<br>Single-phase: 100 kHz (2 points) | | | | Total 4 points Single/two-phase selectable: 20 kHz (2 points)<br>Single-phase: 5 kHz (2 points) | | |
| High-speed Counter — Counting Range | 0 to 4,294,967,295 (32 bits) | | | | 0 to 65,535 (16 bits) | | |
| High-speed Counter — Operation Mode | Rotary encoder mode and adding counter mode | | | | | | |
| Analog Potentiometer — Quantity | 1 point | | | | | | |
| Analog Potentiometer — Data Range | 0 to 255 | | | | | | |
| Analog Voltage Input — Quantity | 1 point | | | | | | |
| Analog Voltage Input — Input Voltage Range | 0 to 10V DC | | | | | | |
| Analog Voltage Input — Input Impedance | Approx. 100 kΩ | | | | | | |
| Analog Voltage Input — Data Range | 0 to 255 (8 bits) | | | | | | |
| Pulse Output — Quantity | 3 points | | 2 points | 3 points | 2 points | | |
| Pulse Output — Maximum Frequency | 100 kHz | | | | 20 kHz | | |

Note: The maximum number of relay outputs that can be turned on simultaneously is 54 including those on the CPU module. Modem communication not possible on FC5A-D12K1E/D12S1E modules.

1. 1 step equals 6 bytes.
2. Expandable up to 62.4 KB when a memory cartridge is used.
3. Not including expansion I/O service time, clock function processing time, data link processing time, and interrupt processing time.
4. Extra data registers D10000 through D49999 are enabled using WindLDR Function Area Settings, then run-time program download cannot be used.
5. Maintenance communication (change monitor device values, upload/download user programs, download system program)
6. Maintenance communication, user communication, modem communication, data link, Modbus ASCII/RTU master/slave communication (FC5A only).

## Slim Type Function Specifications (con't)

| Model | | FC5A-D12K1E-DS0838<br>FC5A-D12S1E-DS0838 | FC5A-D12K1E<br>FC5A-D12S1E | FC5A-D16RK1<br>FC5A-D16RS1 | FC5A-D32K3<br>FC5A-D32S3 | FC4A-D20K3<br>FC4A-D20S3 | FC4A-D20RK1<br>FC4A-D20RS1 | FC4A-D40K3<br>FC4A-D40S3 |
|---|---|---|---|---|---|---|---|---|
| Ethernet Port | Ethernet Specifications | Electrical Characteristics:<br>Complies with IEEE802.3<br>Transmission Speed:<br>10BASE-T/100BASE-TX | | — | | | | |
| | Ethernet Interface | RJ45 | | | | | | |
| | User Web Page Area | 1 MB | | | | | | |
| | Compliant Browser | Internet Explorer 7 and 8, Firefox 3 | | | | | | |
| | Protocol | Data Link Layer: IP, ARP<br>Network Layer: UDP, TCP, ICMP<br>Application Layer: SMTP, DHCP, HTTP, NBNS, DNS, SNTP | | | | | | |
| | Function (see table next page) | Web server, Send email, PING, Maintenance commnunication server, Modbus TCP server/client, User communication server/client, SNTP | | | | | | |
| Port 1 | | USB mini-B (CDC class)<br>Maintenance<br>Communication[5] | | RS232C – maintenance communication, user communications, Modbus slave ASCII/RTU communication (FC5A only) | | | | |
| Port 2 Communication Adapter/ Module (option)[6] | | Possible | | | | | | |
| Clock Cartridge (option) | | Possible | | | | | | |
| Memory Cartridge (option) | | Possible | | | | | | |
| HMI Module (option) | | Possible | | | | | | |

Note: The maximum number of relay outputs that can be turned on simultaneously is 54 including those on the CPU module. Modem communication not possible on FC5A-D12K1E/D12S1E modules.

1. 1 step equals 6 bytes.
2. Expandable up to 62.4 KB when a memory cartridge is used.
3. Not including expansion I/O service time, clock function processing time, data link processing time, and interrupt processing time.
4. Extra data registers D10000 through D49999 are enabled using WindLDR Function Area Settings, then run-time program download cannot be used.
5. Maintenance communication (change monitor device values, upload/download user programs, download system program)
6. Maintenance communication, user communication, modem communication, data link, Modbus ASCII/RTU master/slave communication (FC5A only).

## All-in-One Type Function Specifications

| Model | FC5A-C10R2<br>FC5A-C10R2C<br>FC5A-C10R2D | FC5A-C16R2<br>FC5A-C16R2C<br>FC5A-C16R2D | FC5A-C24R2<br>FC5A-C24R2C<br>FC5A-C24R2D | FC4A-C10R2<br>FC4A-C10R2C | FC4A-C16R2<br>FC4A-C16R2C | FC4A-C24R2<br>FC4A-C24R2C |
|---|---|---|---|---|---|---|
| Control System | Stored program system | | | | | |
| Instruction Words | 42 basic<br>103 advanced | 103 advanced | 115 advanced | 35 basic<br>38 advanced | 40 advanced | 48 advanced |
| Program Capacity [1] | 13.8 KB (2,300 steps) | 27 KB (4,500 steps) | 54 KB (9,000 steps) | 4.8 KB (800 steps) | 15 KB (2,500 steps) | 27 KB (4,500 steps) |
| User Program Storage | EEPROM (10,000 times rewritable) | | | | | |
| Processing Time – Basic Instruction | 1.16 ms (1,000 steps) | | | 1.65 ms (1,000 steps) | | |
| Processing Time – END Processing [2] | 0.64 ms | | | 0.64 ms | | |
| Expandable I/O Module | — | | 4 modules | — | | 4 modules |
| I/O Points – Input | 6 | 9 | 14 | 6 | 9 | 14 |
| I/O Points – Output | 4 | 7 | 10 | 4 | 7 | 10 |
| I/O Points – Expansion | Expansion: 64 [3] | | | Expansion: 64 | | |
| Internal Relay | 2,048 points | | | 256 points | 1,024 points | |
| Shift Register | 128 points | | | 64 points | 128 points | |
| Data Register | 2,000 points | | | 400 points | 1,300 points | |
| Expansion Data Register | — | | | — | | |
| Counter | 256 points | | | 32 points | 100 points | |
| Timer (1-sec, 100-ms, 10-ms, 1-ms) | 256 points | | | 32 points | 100 points | |
| RAM Backup – Backup Data | Internal relay, shift register, counter, data register | | | | | |
| RAM Backup – Backup Duration | Approx. 30 days (typical) at 25°C after backup battery fully charged | | | | | |
| RAM Backup – Battery | Lithium secondary battery | | | | | |
| RAM Backup – Charging Time | Approx. 15 hours for charging from 0% to 90% of full charge | | | | | |
| RAM Backup – Battery Life | 5 years in cycles of 9-hours charging and 15-hours discharging | | | | | |
| RAM Backup – Replaceability | Not possible to replace battery | | | | | |
| Self-diagnostic Function | Power failure, watchdog timer, data link connection, user program EPPROM sum check, timer/counter preset value sum check, user program RAM sum check, keep data, user program syntax, user program writing, CPU module, clock IC, I/O bus initialize, user program execution | | | | | |
| Input Filter | Without filter, 3 to 15 ms (selectable in increments of 1 ms) | | | | | |
| Catch Input/Interrupt Input | Four inputs (I2 through I5)<br>Minimum turn on pulse width: 40 µs maximum<br>Minimum turn off pulse width: 150 µs maximum | | | | | |
| High-speed Counter – Maximum Counting Frequency and High-speed Counter Points | Total 4 points<br>Single/two-phase selectable: 50 kHz (1 point)<br>Single-phase: 5 kHz (3 points) | | | Total 4 points<br>Single/two-phase selectable: 20 kHz (1 point)<br>Single-phase: 5 kHz (3 points) | | |
| High-speed Counter – Counting Range | 0 to 65,535 (16 bits) | | | | | |
| High-speed Counter – Operation Mode | Rotary encoder mode and adding counter mode | | | | | |
| Analog Potentiometer – Quantity | 1 point | | 2 points | 1 point | | 2 points |
| Analog Potentiometer – Data Range | 0 to 255 | | | | | |
| Analog Voltage Input – Quantity<br>Analog Voltage Input – Input Voltage Range<br>Analog Voltage Input – Input Impedance<br>Analog Voltage Input – Data Range | — | | | | | |
| Pulse Output – Quantity<br>Pulse Output – Max. Frequency | — | | | | | |
| Sensor Power Supply (AC Power Type Only) – Output Voltage/Current | 24V DC (+10% to –15%), 250 mA | | | | | |
| Sensor Power Supply (AC Power Type Only) – Overload Detection | Not available | | | | | |
| Sensor Power Supply (AC Power Type Only) – Isolation | Isolated from the internal circuit | | | | | |
| Port 1 | RS232C – maintenance communication, user communications, Modbus ASCII/RTU slave communication (FC5A only) | | | | | |
| Port 2 Communication Adapter (option) [4] | Possible | Possible | Possible | — | Possible | Possible |
| Clock Cartridge (option) | Possible | Possible | Possible | Possible | Possible | Possible |
| Memory Cartridge (option) | Possible | Possible | Possible | Possible | Possible | Possible |
| HMI Module (option) | Possible | Possible | Possible | Possible | Possible | Possible |

1. 1 step equals 6 bytes.
2. Not including expansion I/O service time, clock function processing time, data link processing time, and interrupt processing time.
3. Expansion modules cannot be connected to FC5A-C24R2D.
4. Maintenance communication, user communication, Modem communication, data link, Modbus ASCII/RTU master/slave communication (FC5A only).

Note: The maximum number of relay outputs that can be turned on simulatneously is 33 including those on the CPU module.

## Communication Port (Port 1) Specifications

| CPU Module | FC5A-D12K1E/D12S1E | Slim CPU | All-in-One CPU |
|---|---|---|---|
| Standards | USB 2.0 | EIA RS232C | |
| Maximum Baud Rate | USB 2.0 | FC5A: 57,600 bps (maintenance communication)<br>FC4A: 19,200 bps (maintenance communication) | |
| Cable | HG9Z-XCM2A | FC2A-KC4C, FC2A-KP1C, FC4A-KC1C, FC4A-KC2C | |
| Isolation between Internal Circuit and Communication Port | Not isolated | Not isolated | |

## Slim Type Input Specifications

| Model | | FC5A-D12K1E-DS0838<br>FC5A-D12S1E-DS0838 | FC5A-D12K1E<br>FC5A-D12S1E | FC4A-D20K3<br>FC4A-D20S3 | FC5A-D16RK1<br>FC5A-D16RS1 | FC4A-D20RK1<br>FC4A-D20RS1 | FC5A-D32K3<br>FC5A-D32S3 | FC4A-D40K3<br>FC4A-D40S3 |
|---|---|---|---|---|---|---|---|---|
| Input Points | | 8<br>(8/1 common) | 8<br>(8/1 common) | 12<br>(12/1 common) | 8<br>(8/1 common) | 12<br>(12/1 common) | 16<br>(8/1 common) | 24<br>(12/1 common) |
| Rated Input Voltage | | 24V DC sink/source input signal | | | | | | |
| Input Voltage Range | | 20.4 to 26.4V DC | | | | | | |
| Rated Input Current | | FC5A: I0, I1, I3, I4, I6, I7: 4.5 mA/point (24V DC); I2, I5, I10 to I17: 7 mA/point (24V DC)<br>FC4A: I0, I1, I6, I7: 5 mA/point (24V DC); I2 to I5, I10 to I27: 7 mA/point (24V DC) | | | | | | |
| Input Impedance | | FC5A: I0, I1, I3, I4, I6, I7: 4.9 kΩ; I2, I5, I10 to I17: 3.4 kΩ<br>FC4A: I0, I1, I6, I7: 5.7 kΩ; I2 to I5, I10 to I27: 3.4 kΩ | | | | | | |
| Turn ON Time | | FC5A: I0, I1, I3, I4, I6, I7: 5 µs + filter value; I2 and I5: 35 µs + filter value; I10 to I17: 40 µs + filter value<br>FC4A: I0, I1, I6, I7: 35 µs + filter value; I2 to I5: 35 µs + filter value; I10 to I27: 40 µs + filter value | | | | | | |
| Turn OFF Time | | FC5A: I0, I1, I3, I4, I6, I7: 5 µs + filter value; I2 and I5: 150 µs + filter value; I10 to I17: 150 µs + filter value<br>FC4A: I0, I1, I6, I7: 45 µs + filter value; I2 to I5: 150 µs + filter value; I10 to I27: 150 µs + filter value | | | | | | |
| Connector | On Mother Board | MC1.5/16-G-3.81BK (Phoenix Contact) | | FL26A2MA (Oki Electric Cable) | MC1.5/13-G-3.81BK (Phoenix Contact) | | FL26A2MA (Oki Electric Cable) | |
| | Insertion Durability | 100 times minimum | | | | | | |
| Isolation | | Between input terminals: Optocoupler isolated<br>Internal circuit: Not isolated | | | | | | |
| Input Type | | Type 1 (IEC61131-2) | | | | | | |
| External Load for I/O Interconnection | | Not needed | | | | | | |
| Single Determination Method | | Static | | | | | | |
| Effect of Improper Input Connection | | Both sinking and sourcing input signals can be connected, therefore reverse connection does not cause permanent damage.<br>If any input exceeding the rated value is applied, permanent damage may be caused. | | | | | | |
| Cable Length | | 3m in compliance with electromagnetic immunity | | | | | | |

## All-in-One Type Input Specifications

| Model | FC5A-C10R2<br>FC5A-C10R2C<br>FC4A-C10R2<br>FC4A-C10R2C | FC5A-C16R2<br>FC5A-C16R2C<br>FC4A-C16R2<br>FC4A-C16R2C | FC5A-C24R2<br>FC5A-C24R2C<br>FC4A-C24R2<br>FC4A-C24R2C | FC5A-C10R2D<br>— | FC5A-C16R2D<br>— | FC5A-C24R2D<br>— |
|---|---|---|---|---|---|---|
| Input Points | 6<br>(6/1 common) | 9<br>(9/1 common) | 14<br>(14/1 common) | 6<br>(6/1 common) | 9<br>(9/1 common) | 14<br>(14/1 common) |
| Rated Input Voltage | 24V DC sink/source input signal | | | 12V DC sink/source input signal | | |
| Input Voltage Range | 20.4 to 28.8V DC | | | 10.2 to 18.0V DC | | |
| Rated Input Current | FC5A I0 and I1: 6.4 mA/point<br>I2 to I7, I10 to I15: 7 mA/point (24V DC)<br>FC4A I0 and I1: 11 mA<br>I2 to I7, I10 to I15: 7 mA/point (24V DC) | | | I0 and I1: 6 mA<br>I2 to I7, I10 to I15: 6 mA | | |
| Input Impedance | FC5A I0 and I1: 3.7 kΩ<br>I2 to I7, I10 to I15: 3.4 kΩ<br>FC4A I0 and I1: 2.1 kΩ<br>I2 to I7, I10 to I15: 3.4 kΩ | | | I0 and I1: 1.8 kΩ<br>I2 to I7, I10 to I15: 2.0 kΩ | | |
| Turn ON Time | FC5A I0 and I1: 2 µs + filter value<br>I2 to I5: 35 µs + filter value<br>I6, I7, I10 to I15: 40 µs + filter value<br>FC4A I0 and I1: 35 µs + filter value<br>I2 to I5: 35 µs + filter value<br>I6, I7, I10 to I15: 40 µs + filter value | | | I0 and I1: 2 µs + filter value<br>I2 to I5: 35 µs + filter value<br>I6, I7, I10 to I15: 40 µs + filter value | | |
| Turn OFF Time | FC5A I0 and I1: 16 µs + filter value<br>I2 to I5: 150 µs + filter value<br>I6, I7, I10 to I15: 150 µs + filter value<br>FC4A I0 and I1: 45 µs + filter value<br>I2 to I5: 150 µs + filter value<br>I6, I7, I10 to I15: 150 µs + filter value | | | I0 and I1: 16 µs + filter value<br>I2 to I5: 150 µs + filter value<br>I6, I7, I10 to I15: 150 µs + filter value | | |
| Isolation | Between input terminals: Optocoupler isolated<br>Internal circuit: Not isolated | | | | | |
| Input Type | Type 1 (IEC61131-2) | | | | | |
| External Load for I/O Interconnection | Not needed | | | | | |
| Single Determination Method | Static | | | — | | |
| Effect of Improper Input Connection | Both sinking and sourcing input signals can be connected, therefore reverse connection does not cause permanent damage.<br>If any input exceeding the rated value is applied, permanent damage may be caused. | | | | | |
| Cable Length | 3m in compliance with electromagnetic immunity | | | | | |

## Transistor Sink and Source Output Specifications

| Model | | FC5A-D12K1E-DS0838<br>FC5A-D12S1E-DS0838 | FC5A-D12K1E<br>FC5A-D12S1E | — | FC5A-D16RK1<br>FC5A-D16RS1 | FC5A-D32K3<br>FC5A-D32S3 |
|---|---|---|---|---|---|---|
| | | | — | FC4A-D20RK1<br>FC4A-D20RS1 | — | FC4A-D40K3<br>FC4A-D40S3 |
| Transistor Output Points | | 4 (4/1 common) | 4 (4/1 common) | 2 (2/1 common) | 2 (2/1 common) | 16 (8/1 common) |
| Output Type | Transistor Sink | FC5A-D12K1E/D16RK1/D32K3<br>FC4A-D20K3/D20RK1/D40K3 | | | | |
| | Transistor Source | FC5A-D12S1E/D16RS1/D32S3<br>FC4A-D20S3/D20RS1/D40S3 | | | | |
| Rated Load Voltage | | 24V DC | | | | |
| Operating Load Voltage Range | | 20.4 to 28.8V DC | | | | |
| Rated Load Current | | 0.3A per output point | | | | |
| Maximum Load Current | | 1A per common | | | | |
| Voltage Drop (ON Voltage) | | 1V maximum (voltage between COM and output terminals when output is on) | | | | |
| Inrush Current | | 1A | | | | |
| Leakage Current | | 0.1 mA maximum | | | | |
| Clamping Voltage | | 39V±1V | | | | |
| Maximum Lamp Load | | 8W | | | | |
| Inductive Load | | L/R = 10 ms (28.8V DC, 1 Hz) | | | | |
| External Current Draw | | Sink output: 100 mA maximum, 24V DC (power voltage at the +V terminal)<br>Source output: 100 mA maximum, 24V DC (power voltage at the –V terminal) | | | | |
| Isolation | | Between output terminal and Internal circuit: Photocoupler isolated<br>Between output terminals: Not isolated | | | | |
| Connector on Mother Board | | MC1.5/16-G-3.81BK<br>(Phoenix Contact) | | FL26A2MA<br>(Oki Electric Cable) | MC1.5/16-G-3.81BK<br>(Phoenix Contact) | FL26A2MA<br>(Oki Electric Cable) |
| Connector Insertion/ Removal Durability | | 100 times minimum | | | | |
| Output Delay | Turn ON Time | FC5A: Q0 to Q2: 5 µs max.; Q3 to Q7, Q10 to Q17: 300 µs max.<br>FC4A: Q0, Q1: 5 µs max.; Q2 to Q7, Q10 to Q17: 300 µs max. | | | | |
| | Turn OFF Time | FC5A: Q0 to Q2: 5 µs max.; Q3 to Q7, Q10 to Q17: 300 µs max.<br>FC4A: Q0, Q1: 5 µs max.; Q2 to Q7, Q10 to Q17: 300 µs max. | | | | |

## Relay Output Specifications

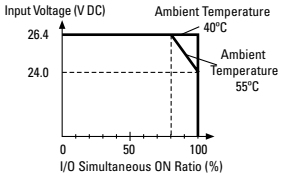
| Model | | FC5A-C10R2<br>FC5A-C10R2C<br>FC5A-C10R2D<br>FC4A-C10R2<br>FC4A-C10R2C | FC5A-C16R2<br>FC5A-C16R2C<br>FC5A-C16R2D<br>FC4A-C16R2<br>FC4A-C16R2C | FC5A-C24R2<br>FC5A-C24R2C<br>FC5A-C24R2D<br>FC4A-C24R2<br>FC4A-C24R2C | FC5A-D16RK1<br>FC5A-D16RS1<br>FC4A-D20RK1<br>FC4A-D20RS1 |
|---|---|---|---|---|---|
| Relay Output Points | | 4 | 7 | 10 | 6 |
| Output Points per Common Line | COM0 | 3 | 4 | 4 | — |
| | COM1 | 1 | 2 | 4 | 3 |
| | COM2 | — | 1 | 1 | 2 |
| | COM3 | — | — | 1 | 1 |
| Output Type | | 1NO | | | |
| Maximum Load Current | | 2A per point<br>8A per common line | | | |
| Minimum Switching Load | | 1 mA/ 5V DC (reference value) | | | |
| Initial Contact Resistance | | 30 mΩ maximum | | | |
| Electrical Life | | 100,000 operations minimum (rated load 1,800 operations/hour) | | | |
| Mechanical Life | | 20,000,000 operations minimum (no load 18,000 operations/hour) | | | |
| Rated Load | | 240V AC/2A (resistive load, inductive load cos ø = 0.4)<br>30V DC/2A (resistive load, inductive load L/R =7 ms) | | | |
| Dielectric Strength | | Between output and ⏚ terminals: 1,500V AC, 1 minute<br>Between output terminal and internal circuit: 1,500V AC, 1 minute<br>Between output terminals (COMs): 1,500V AC, 1 minute | | | |
| Connector on Mother Board | | — | | | *1 |
| Connector Insertion/ Removal Durability | | — | | | 100 times minimum |

1. MC1.5/16-G-3.81BK (Phoenix Contact)

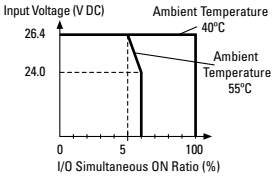
## Input Usage Limits

### Slim CPU

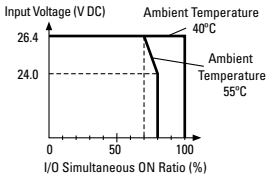
FC5A-D16RK1/D16RS1
FC5A-D12K1E/D12S1E



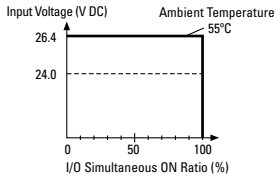

FC5A-D32K3/D32S3
FC4A-D40K3/D40S3




FC4A-D20K3/D20S3

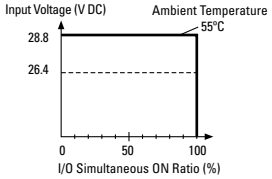



FC4A-D20RK1/D20RS1

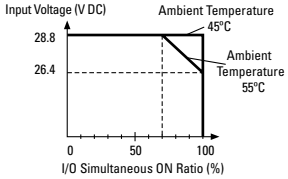



### All-in-One CPU

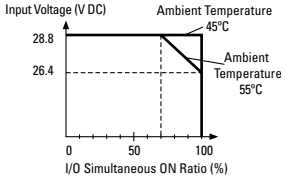
FC5A-C10R2
FC5A-C10R2C
FC4A-C10R2
FC4A-C10R2C




FC5A-C16R2
FC5A-C16R2C
FC4A-C16R2
FC4A-C16R2C




FC5A-C24R2
FC5A-C24R2C
FC4A-C24R2
FC4A-C24R2C

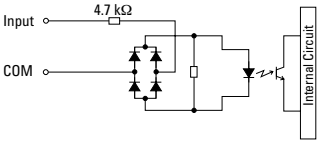



CAUTION: When using at an operating ambient temperature above 40°C, reduce the input voltage or the quantity of I/O points that turn on simultaneously.

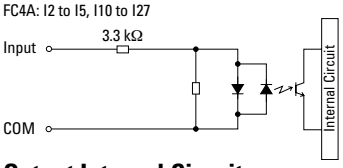
## Input Internal Circuit

### Slim CPU

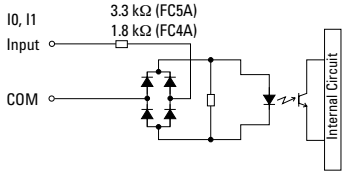
FC5A: I0, I1, I3, I4, I6, I7
FC4A: I0, I1, I6, I7

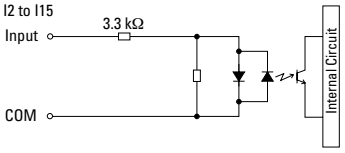



FC5A: I2, I5, I10 to I17
FC4A: I2 to I5, I10 to I27

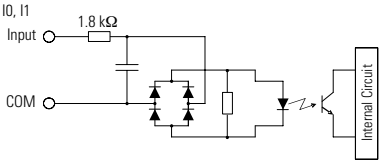


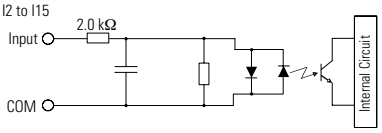

### All-in-One CPU




### FC5A All-in-One CPU 12V DC Type

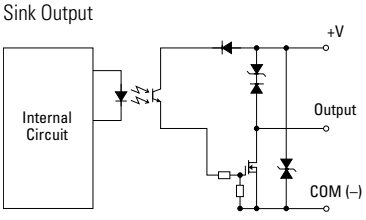


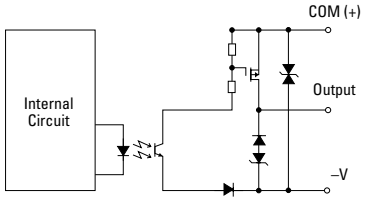

## Output Internal Circuit

### Slim CPU

Sink Output




Source Output



## Communication Adapter/Module Specifications

| Model | | FC4A-PC1<br>FC4A-HPC1 | FC4A-PC2<br>FC4A-HPC2 | FC4A-PC3<br>FC4A-HPC3 |
|---|---|---|---|---|
| Standards | | EIA RS232C | EIA RS485 | EIA RS485 |
| Maximum Baud Rate | | FC5A: 57,600 bps[1]<br>FC4A: 19,200 bps | FC5A: 57,600 bps[1]<br>FC4A: 19,200 bps | FC5A: 57,600 bps[1]<br>FC4A: 19,200 bps<br>(38,400 bps[2]) |
| Maintenance Communication | | Possible | Possible | Possible |
| User Communication | | Possible | Possible[3] | Possible[3] |
| Data Link Communication | | — | Possible | Possible |
| Half-duplex Communication | | — | Possible | Possible |
| Maximum Cable Length | | Special cable[4] | Special cable[5] | 200m |
| Quantity of Slave Stations | | — | 31 | 31 |
| Isolation between Internal Circuit and Communication Port | | Not isolated | | |
| RS485 Cable | Cable | — | | Twisted-pair shielded cable with a minimum core wire of 0.3 mm² |
| | Conductor Resistance | | | 85 Ω/km maximum |
| | Shield Resistance | | | 20 Ω/km maximum |

1. Maximum speed is 115,200 bps for FC5A-D12*1E.
2. Maximum speed when data link is used.
3. FC5A (all types), FC4A-D20RK1, FC4A-D20RS1, FC4A-D40K3, FC4A-D40S3
4. FC2A-KC4C, FC2A-KM1C, FC4A-KC1C, FC4A-KC2C, FC2A-KP1C
5. FC2A-KP1C

## HMI Module Specifications

| Model | FC4A-PH1 |
|---|---|
| Power Voltage | 5V DC (supplied from the CPU module) |
| Weight | 20g |

## Memory Cartridge Specifications

| Model | FC4A-PM32 | FC4A-PM64[6] | FC4A-PM128[6] |
|---|---|---|---|
| Memory Type | EEPROM | | |
| Accessible Memory Capacity | 32 KB | 64 KB | 128 KB |
| Hardware for Storing Data | CPU Module | | |
| Software for Storing Data | WindLDR | | |
| Quantity of Stored Programs | One user program can be stored on one memory cartridge | | |

6. Even when using a large-capacity memory cartridge, the program capacity of the CPU module takes effect, except when using FC4A-D20RK1, FC4A-D20RS1, FC4A-D40K3, and FC4A-D40S3 CPU modules, the program capacity expands to 64KB.

## Clock Cartridge Specifications

| Model | FC4A-PT1 |
|---|---|
| Accuracy | ±30 sec/month (typical) at 25°C |
| Backup Duration | Approx. 30 days (typical) at 25°C after backup battery fully charged |
| Battery | Lithium secondary battery |
| Charging Time | Approx. 10 hours for charging from 0% to 90% of full charge |
| Replaceability | Not possible to replace battery |

## Expansion Serial Communication Module General Specifications (Expansion RS232C Communication Module)

| Model | FC5A-SIF2 |
|---|---|
| No. of Port | 1 |
| Synchronization | Synchronization Start-stop synchronization |
| Electrical Characteristics | Electrical Characteristics EIA RS232C compliant |
| Maximum Delay in One Scan | Approx. 4 ms |
| Operating Temperature | 0 to 55°C |
| Relative Humidity | 10 to 95% (no condensation) |
| Recommended Cable Specifications | Shielded multi-core cable: 24AWG x 6<br>Dielectric strength: 2,000V AC/min<br>Insulation resistance: 100 MΩ/km |
| Recommended Cable | KIDU-SB 24 AWG×6C<br>(Nihon Electric Wire & Cable) |
| Connector on Mother Board | MC1.5/10-G-3.81BK (Phoenix Contact)<br>Applicable terminal block: FC4A-PMT10P |
| Connector Insertion/Removal Durability | 100 times minimum |
| Isolation from Internal Circuit | Transformer isolated |
| Quantity of Applicable Expansion RS232C Communication Modules | All-in-One 24-I/O type CPU module: 3 maximum [1]<br>Slim type CPU module: 5 maximum |
| Internal Current Draw | 40 mA (5V/24V DC) [5] |
| Weight | 100g |

Note: FC5A-SIF2 cannot be connected to FC4A CPU modules.

1. FC5A All-in-One 24-I/O CPU module cannot use the FC5A-SIF2/SIF4 module in combination with the function modules listed in the table on the left. When using these modules in combination with the FC5A-SIF2/SIF4 module, use the slim type CPU module.

| Function Modules | Type No. |
|---|---|
| Analog Modules | FC4A-L03A1, FC4A-L03AP1, FC4A-J2A1, FC4A-K1A1, FC4A-J4CN1, FC4A-J8C1, FC4A-J8AT1, FC4A-K2C1, FC4A-K4A1 |
| AS-Interface Master Module | FC4A-AS62M |

5. 85 mA (5V DC), 0 mA (24V DC) when the communication module version is lower than V200.

## (Expansion RS485 Communication Module)

| Model | FC5A-SIF4 |
|---|---|
| No. of Port | 1 |
| Synchronization | Synchronization Start-stop synchronization |
| Electrical Characteristics | Electrical Characteristics EIA RS485 compliant |
| Maximum Baud Rate | 115,200 bps |
| Operating Temperature | 0 to 55°C |
| Relative Humidity | 10 to 95% (no condensation) |
| Recommended Cable Specifications | Shielded twisted pair cable:<br>22 AWG (0.3 mm2 x 2P)<br>Conductor Resistance:<br>67 MΩ/km maximum (at 20°C) |
| Connector on Mother Board | MC1.5/10-G-3.81BK (Phoenix Contact)<br>Applicable terminal block: FC4A-PMT10P |
| Connector Insertion/ Removal Durability | 100 times minimum |
| Isolation from Internal Circuit | Transformer isolated |
| Quantity of Applicable Expansion RS485C Communication Modules | All-in-One 24-I/O type CPU module: 3 maximum [1]<br>Slim type CPU module: 5 maximum |
| Internal Current Draw | 40 mA (5V/24V DC) |
| Weight | 100g |

Note: FC5A-SIF4 cannot be connected to FC4A CPU modules.

## Communication Specifications

| Model | FC5A-SIF2 | FC5A-SIF4 |
|---|---|---|
| Maximum Baud Rate | 1,200/2,400/4,800/9,600/19,200/38,400/57,600[4]/115,200 [4] | |
| Maintenance Communication | Possible[2] | |
| Modbus Communication | Modbus ASCII master<br>Modbus ASCII slave<br>Modbus RTU master<br>Modbus RTU slave | |
| Data Link | - | 0 [3] |
| Max Cable Length | 10m | 1,200m |
| Quantity of Slave Stations | 1 | 31 |

2. Run-time program download is not possible.
3. Data Link can be used only on one of the communication ports.
4. Can be used when the communication module is version V200 or higher.

# Specifications (I/O Modules)

## Input Module Specifications

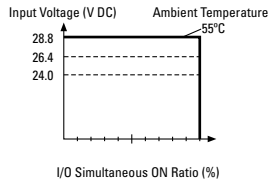
| Model | | FC4A-N08B1 | FC4A-N16B1 | FC4A-N16B3 | FC4A-N32B3 | FC4A-N08A11 |
|---|---|---|---|---|---|---|
| Input Points | | 8 (8/1 common) | 16 (16/1 common) | | 32 (16/1 common) | 8 (4/1 common) |
| Rated Input Voltage | | 24V DC sink/source input signal | | | | 100 to 120V AC (50/60 Hz) |
| Input Voltage Range | | 20.4 to 28.8V DC | | | | 85 to 132V AC |
| Rated Input Current | | 7 mA/point (24V DC) | | 5 mA/point (24V DC) | | 17 mA/point (120V AC, 60 Hz) |
| Input Impedance | | 3.4 kΩ | | 4.4 kΩ | | 0.8 kΩ (60 Hz) |
| ON Voltage | | 15V minimum | | | | 79V minimum |
| OFF Voltage | | 5V maximum | | | | 20V maximum |
| ON Current | | 4.2 mA minimum (at 15V DC) | | 3.2 mA minimum (at 15V DC) | | — |
| OFF Current | | 1.2 mA maximum | | 0.9 mA maximum | | — |
| Turn ON Time | | 4 ms | | | | 25 ms |
| Turn OFF Time | | 4 ms | | | | 30 ms |
| Isolation | | Between input terminals: Not isolated<br>Internal circuit: Photocoupler isolated | | | | Between input terminals in the same common: Not isolated<br>Between input terminals in different commons: Isolated<br>Between input terminals and internal circuits: Photocoupler isolated |
| External Load for I/O Interconnection | | Not needed | | | | Not needed |
| Single Determination Method | | Static | | | | Static |
| Effect of Improper Input Connection | | Both sink and source input signals can be connected. If any input exceeding the rated value is applied, permanent damage may be caused. | | | | If any input exceeding the rated value is applied, permanent damage may be caused. |
| Cable Length | | 3m in compliance with electromagnetic immunity | | | | — |
| Connector on Mother Board | | MC1.5/10-G-3.81BK (Phoenix Contact) | | FL20A2MA (Oki Electric Cable) | | MC1.5/11-G-3.81BK (Phoenix Contact) |
| Connector Insertion/ Removal Durability | | 100 times minimum | | | | |
| Applicable Ferrule | | 1-wire: AI 0.5-8 WH (Phoenix Contact)<br>2-wire: AI-TWIN 2×0.5-8 WH (Phoenix Contact) | | — | | — |
| Internal Current Draw | All Inputs ON | 25 mA (5V DC) | 40 mA (5V DC) | 35 mA (5V DC) | 65 mA (5V DC) | 60 mA (5V DC), 0 mA (24V DC) |
| | All Inputs OFF | 5 mA (5V DC) | 5 mA (5V DC) | 5 mA (5V DC) | 10 mA (5V DC) | 30 mA (5V DC), 0 mA (24V DC) |
| Internal Power Consumption (at 24V DC while all inputs ON) | | 0.17W | 0.27W | 0.24W | 0.44W | — |
| Weight | | 85g | 100g | 65g | 100g | 80g |

## Mixed I/O Module Specifications

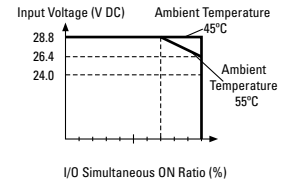
| Model | | | FC4A-M08BR1 | FC4A-M24BR2 |
|---|---|---|---|---|
| Input Specifications | Input Points | | 4 (4/1 common) | 16 (16/1 common) |
| | Rated Input Voltage | | 24V DC sink/source input signal | |
| | Input Voltage Range | | 20.4 to 28.8V DC | |
| | Rated Input Current | | 7 mA/point (24V DC) | |
| | Input Impedance | | 3.4 kΩ | |
| | ON Voltage | | 15V minimum | |
| | OFF Voltage | | 5V maximum | |
| | ON Current | | 4.2 mA minimum (at 15V DC) | |
| | OFF Current | | 1.2 mA maximum | |
| | Turn ON Time | | 4 ms (24V DC) | |
| | Turn OFF Time | | 4 ms (24V DC) | |
| | Isolation | | Between input terminals: Not isolated<br>Internal circuit: Photocoupler isolated | |
| | External Load for I/O Interconnection | | Not needed | |
| | Signal Determination Method | | Static | |
| | Effect of Improper Input Connection | | Both sinking and sourcing input signals can be connected.<br>If any input exceeding the rated value is applied, permanent damage may be caused. | |
| | Cable Length | | 3m in compliance with electromagnetic immunity | |
| Output Specifications | Output Points | | 4 (4/1 common) | 8 (4/1 common) |
| | Output Type | | 1NO | |
| | Maximum Load Current | | 2A per point<br>7A per common | |
| | Minimum Switching Load | | 1 mA/ 5V DC (reference value) | |
| | Initial Contact Resistance | | 30 mΩ maximum | |
| | Electrical Life | | 100,000 operations minimum (rated load 1,800 operations/hour) | |
| | Mechanical Life | | 20,000,000 operations minimum (no load 18,000 operations/hour) | |
| | Rated Load | | 240V AC/2A (resistive load, inductive load cos ø = 0.4)<br>30V DC/2A (resistive load, inductive load L/R = 7 ms) | |
| | Dielectric Strength | | Between output and ⏚ or ⏚ terminals: 1,500V AC, 1 minute<br>Between output terminal and internal circuit: 1,500V AC, 1 minute<br>Between output terminals (COMs): 1,500V AC, 1 minute | |
| Connector on Mother Board | | | MC1.5/11-G-3.81BK<br>(Phoenix Contact) | Input: F6018-17P (Fujicon)<br>Output: F6018-11P (Fujicon) |
| Connector Insertion/Removal Durability | | | 100 times minimum | Not removable |
| Applicable Ferrule | | | 1-wire: AI 0.5-8 WH (Phoenix Contact), 2-wire: AI-TWIN 2×0.5-8 WH (Phoenix Contact) | |
| Internal Current Draw | | All I/Os ON | 25 mA (5V DC), 20 mA (24V DC) | 65 mA (5V DC), 45 mA (24V DC) |
| | | All I/Os OFF | 5 mA (5V DC), 0 mA (24V DC) | 10 mA (5V DC), 0 mA (24V DC) |
| Internal Power Consumption (at 24V DC while all I/Os are ON) | | | 0.65W | 1.52W |
| Weight | | | 95g | 140g |

## Input Usage Limits

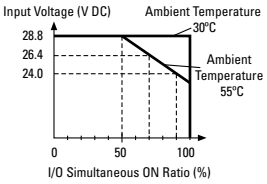
FC4A-N08B1



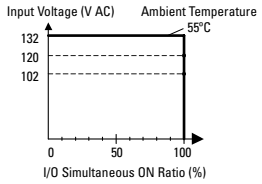

FC4A-N16B1



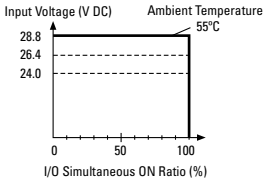

FC4A-N16B3/N32B3



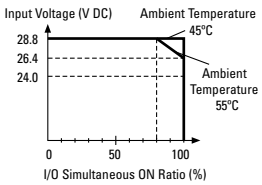

FC4A-N08A11




FC4A-M08BR1



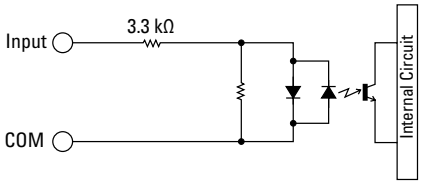

FC4A-M24BR2



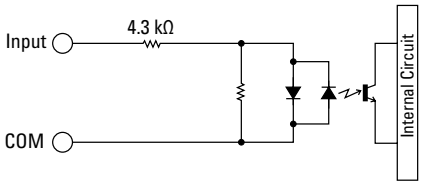

When using at an operating ambient temperature above 40°C, reduce the input voltage or the quantity of I/O points that turn on simultaneously.

## Input Internal Circuit

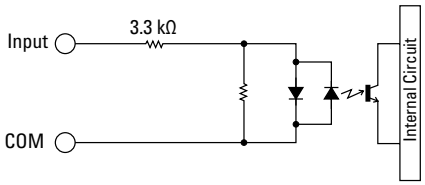
FC4A-N08B1, FC4A-N16B1



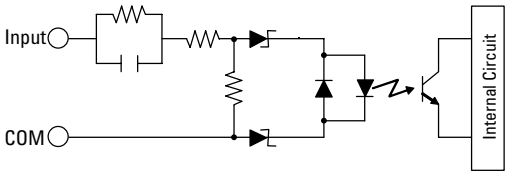

FC4A-N16B3, FC4A-N32B3




FC4A-M08BR1, FC4A-M24BR2

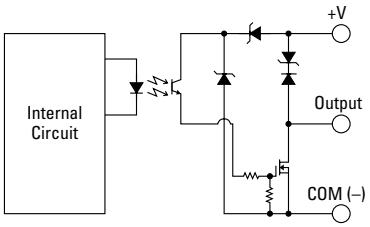



FC4A-N08A11

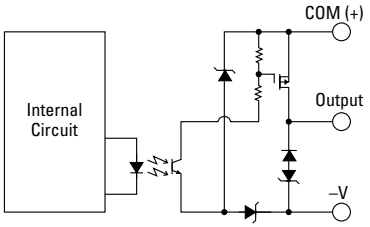



## Output Internal Circuit

FC4A-T08K1, FC4A-T16K3, FC4A-T32K3




FC4A-T08S1, FC4A-T16S3, FC4A-T32S3



# Specifications (Analog I/O Modules)

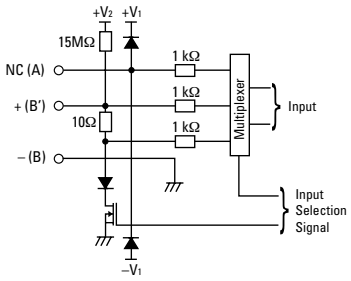
## Analog I/O Module Specifications

| Model | FC4A-L03A1 | FC4A-L03AP1 | FC4A-J2A1 | FC4A-J4CN1 | FC4A-J8C1 | FC4A-J8AT1 | FC4A-K4A1 | FC4A-K1A1 | FC4A-K2C1 |
|---|---|---|---|---|---|---|---|---|---|
| Input Points | 2 | 2 | 2 | 4 | 8 | 8 | — | — | — |
| Output Points | 1 | 1 | — | — | — | — | 4 | 1 | 2 |
| Power Voltage | 24V DC | | | | | | | | |
| Allowable Voltage Range | 20.4 to 28.8V DC | | | | | | | | |
| External Current Draw * (24V DC) | 45 mA | 40 mA | 35 mA | 55 mA | 50 mA | 55 mA | 130 mA | 40 mA | 85 mA |
| Connector on Mother Board | MC1.5/11-G-3.81BK (Phoenix Contact) | | | MC1.5/10-G-3.81BK (Phoenix Contact) | | | MC1.5/11-G-3.81BK (Phoenix Contact) | | MC1.5/10-G-3.81BK (Phoenix Contact) |
| Connector Insertion/ Removal Durability | 100 times minimum | | | | | | | | |
| Applicable Ferrule | 1-wire: AI 0.5-8 WH (Phoenix Contact), 2-wire: AI-TWIN 2×0.5-8 WH (Phoenix Contact) | | | | | | | | |
| Internal Power Consumption (5V DC) | 50 mA | 50 mA | 50 mA | 50 mA | 40 mA | 45 mA | 65 mA | 50 mA | 60 mA |
| Internal Power Consumption (at 24V DC while all I/Os are ON) | 0.34W | 0.34W | 0.34W | 0.34W | 0.27W | 0.30W | 0.44W | 0.34W | 0.40W |
| Weight | 85g | 85g | 85g | 140g | 140g | 125g | 100g | 85g | 110g |

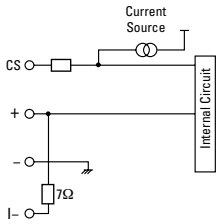
* The external current draw is the value when all the analog inputs are used and the analog output value is at 100%.

## Input Circuit

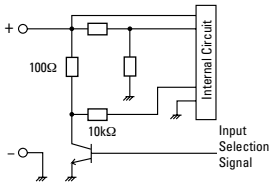
FC4A-L03A1, FC4A-L03AP1
FC4A-J2A1



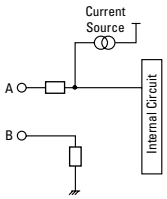

FC4A-J4CN1




FC4A-J8C1




FC4A-J8AT1



## Analog Input Specifications (1)

| Model | | FC4A-L03A1, FC4A-J2A1 | | FC4A-L03AP1 | |
|---|---|---|---|---|---|
| Input Signal Type | | Voltage Input<br>0 to 10V DC | Current Input<br>4 to 20 mA | Resistance Thermometer<br>Pt100 3-wire type<br>(–100 to 500°C) | Thermocouple<br>Type K (0 to 1,300°C)<br>Type J (0 to 1,200°C)<br>Type T (0 to 400°C) |
| Input Impedance | | 1 MΩ minimum | 10Ω | 1 MΩ minimum | 1 MΩ minimum |
| Input Detection Current | | — | — | 1.0 mA maximum | — |
| AD Conversion | Sampling Duration Time | 10 ms maximum | | 20 ms maximum | 10 ms maximum |
| | Sampling Repetition Time | 20 ms maximum | | 40 ms maximum | 20 ms maximum |
| | Total Input System Transfer Time | 60 ms + 1 scan time | | 80 ms + 1 scan time | 60 ms + 1 scan time |
| | Type of Input | Single-ended input | Differential input | | |
| | Operating Mode | Self-scan | | | |
| | Conversion Method | ∑ Δ type ADC | | | |
| Input Error | Maximum Error at 25°C | ±0.2% of full scale | | | ±0.2% of full scale plus cold junction compensation error (±4°C maximum) |
| | Temperature Coefficient | ±0.006% of full scale /°C | | | |
| | Repeatability after Stabilization Time | ±0.5% of full scale | | | |
| | Non-linearity | ±0.2% of full scale | | | |
| | Maximum Error | ±1% of full scale | | | |
| Data | Digital Resolution | 4096 increments (12 bits) | | 6,000 increments (14 bits) | Type K: 13,000 increments (14 bits)<br>Type J: 12,000 increments (14 bits)<br>Type T: 4,000 increments (14 bits) |
| | Input Value of LSB | 2.5 mV | 4 µA | 0.1°C | Type K: 0.1°C<br>Type J: 0.1°C<br>Type T: 0.1°C |
| | Data Type in Application Program | Default: 0 to 4,095<br>Optional: –32,768 to 32,767 (selectable for each channel)[1] | | | |
| | Monotonicity | Yes | | | |
| | Input Data Out of Range | Detectable [2] | | | |
| Noise Resistance | Maximum Temporary Deviation during Electrical Noise Tests | ±3% maximum when a 500V clamp voltage is applied to the power supply and I/O lines [3] | | | |
| | Input Filter | No | | | |
| | Recommended Cable for Noise Immunity | Twisted pair shielded cable | | — | |
| | Crosstalk | 2 LSB maximum | | | |
| Isolation | | Between input and power circuit: Isolated<br>Between input and internal circuit: Photocoupler-isolated | | | |
| Effect of Improper Input Connection | | No damage | | | |
| Maximum Permanent Allowed Overload (No Damage) | | 13V DC | 40 mA | — | |
| Selection of Analog Input Signal Type | | Using programming software | | | |
| Calibration or Verification to Maintain Rated Accuracy | | Impossible | | | |

1: The data processed in the analog I/O module can be linear-converted to a value between –32,768 and 32,767. The optional range designation, and analog I/O data minimum and maximum values can be selected using data registers allocated to analog I/O modules.
2: When an error is detected, a corresponding error code is stored to a data register allocated to analog I/O operating status.
3: The accuracy of the thermocouple input is not guaranteed when noise is applied.

## Analog Input Specifications (2)

| Model | | FC4A-J4CN1, FC4A-J8C1 | | FC4A-J4CN1 | | FC4A-J8AT1 | |
|---|---|---|---|---|---|---|---|
| Input Signal Type | | Voltage Input | Current Input | Thermocouple | Resistance Thermometer | NTC Thermistor | PTC Thermistor |
| Input Range | | 0 to 10V DC | 4 to 20 mA | Type K (0 to 1,300°C)<br>Type J (0 to 1,200°C)<br>Type T (0 to 400°C) | Pt100, Pt1000 3-wire type (–100 to 500°C)<br>Ni100, Ni1000 3-wire type (–60 to 180°C) | –50 to 150°C | |
| Input Impedance | | 1 MΩ | 7 Ω (FC4A-J4CN1)<br>100Ω (FC4A-J8C1) | 1 MΩ | — | — | |
| Input Detection Current | | — | — | — | 0.1 mA | 0.1 mA | |
| AD Conversion | Sampling Duration Time | 2 ms maximum | | | | | |
| | Sampling Repetition Time | FC4A-J4CN1: 10 ms maximum<br>FC4A-J8C1: 2 ms maximum | | 30 ms maximum | 10 ms maximum | 2 ms × channels | |
| | Total Input System Transfer Time | FC4A-J4CN1: 50 ms × channels + 1 scan time<br>FC4A-J8C1: 8 ms × channels + 1 scan time | | 85 ms × channels + 1 scan time | 50 ms × channels + 1 scan time | 10 ms × channels + 1 scan time | |
| | Type of Input | Single-ended input | | | | | |
| | Operating Mode | Self-scan | | | | | |
| | Conversion Method | ∑ Δ type ADC (FC4A-J4CN1), Successive approximation register method (FC4A-J8C1, FC4A-J8AT1) | | | | | |
| Input Error | Maximum Error at 25°C | ±0.2% of full scale | | ±0.2% of full scale +cold junction compensation error (±3°C maximum) | Pt100, Ni100: ±0.4% of full scale<br>Pt1000, Ni1000: ±0.2% of full scale | ±0.2% of full scale | |
| | Cold Junction Compensation Error | — | — | ±3°C maximum | — | — | |
| | Temperature Coefficient | ±0.005% of full scale/°C | | | | | |
| | Repeatability after Stabilization Time | ±0.5% of full scale | | | | | |
| | Non-linearity | ±0.04% of full scale | | | | Non-linear | |
| | Maximum Error | ±1% of full scale | | | | | |
| Data | Digital Resolution | 50,000 increments (16 bits) | | Type K: Approx. 24,000 increments (15 bits)<br>Type J: Approx. 33,000 increments (15 bits)<br>Type T: Approx. 10,000 increments (14 bits) | Pt100: Approx. 6,400 increments (13 bits)<br>Pt1000: Approx. 64,000 increments (16 bits)<br>Ni100: Approx. 4,700 increments (13 bits)<br>Ni1000: Approx. 47,000 increments (16 bits) | Approx. 4,000 increments (12 bits) | |
| | Input Value of LSB | 0.2 mV | 0.32 µA | Type K: 0.058°C<br>Type J: 0.038°C<br>Type T: 0.042°C | Pt100: 0.086°C<br>Pt1000: 0.0086°C<br>Ni100: 0.037°C<br>Ni1000: 0.0037°C | 0.05°C | |
| | Data Type in Application Program | Default: 0 to 50,000<br>Optional: –32,768 to 32,767 (selectable for each channel) [1] | | | | Default: 0 to 4,000<br>Optional: –32,768 to 32,767 (selectable for each channel) [1]<br>Resistance: 0 to 10,000 | |
| | | | | | | Temperature: °C, °F | — |
| | Monotonicity | Yes | | | | | |
| | Input Data Out of Range | Detectable[2] | | | | | |

1: The data processed in the analog I/O module can be linear-converted to a value between –32,768 and 32,767. The optional range designation, and analog I/O data minimum and maximum values can be selected using data registers allocated to analog I/O modules.

Analog Input Specifications (2) con't on next page.

## Analog Input Specifications (2), con't

| Model | | FC4A-J4CN1, FC4A-J8C1 | FC4A-J4CN1 | | FC4A-J8AT1 |
|---|---|---|---|---|---|
| Noise Resistance | Maximum Temporary Deviation during Electrical Noise Tests | ±3% maximum (when a 500V clamp voltage is applied to the power supply and I/O lines) | | Not assured | ±3% maximum (when a 500V clamp voltage is applied to the power supply and I/O lines) |
| | Input Filter | Software | | | |
| | Recommended Cable for Noise Immunity | Twisted pair cable | — | | |
| | Crosstalk | 2 LSB maximum | | | |
| Isolation | | Between input and power circuit: Isolated<br>Between input and internal circuit: Optocoupler-isolated | | | |
| Effect of Improper Input Connection | | No damage | | | |
| Maximum Permanent Allowed Overload (No Damage) | | 11V DC | 22 mA DC | — | |
| Selection of Analog Input Signal Type | | Using programming software | | | |
| Calibration or Verification to Maintain Rated Accuracy | | Impossible | | | |

## Analog Ouput Specifications

| Model | | | FC4A-K4A1 | FC4A-L03A1 | FC4A-L03AP1 | FC4A-K1A1 | FC4A-K2C1 |
|---|---|---|---|---|---|---|---|
| Output Range | | Voltage | 0 to 10V DC | | | | –10 to 10V DC |
| | | Current | 4 to 20 mA | | | | |
| Load | Impedance | | Voltage output: 1 kΩ minimum<br>Current output: 300Ω maximum | | | | |
| | Load Type | | Resistive load | | | | |
| DA Conversion | Settling Time | | 2 ms/ch | 10 ms | 10 ms | 10 ms | 1 ms/ch |
| | Total Output System Transfer Time | | 2 ms/ch + 1 scan time | 10 ms + 1 scan time | 10 ms + 1 scan time | 10 ms + 1 scan time | 1 ms × channels + 1 scan time |
| Output Error | Maximum Error at 25°C | | ±0.2% of full scale | | | | |
| | Temperature Coefficient | | ±0.015% of full scale/°C | | | | ±0.005% of full scale/°C |
| | Repeatability after Stabilization Time | | ±0.5% of full scale | | | | |
| | Output Voltage Drop | | ±1% of full scale | | | | |
| | Non-lineality | | ±0.2% of full scale | | | | |
| | Output Ripple | | 20 mV maximum | | | | ±0.1% of full scale |
| | Overshoot | | 0% | | | | |
| | Total Error | | ±1% of full scale | | | | |
| Data | Digital Resolution | | 4096 increments (12 bits) | | | | 50,000 increments (16 bits) |
| | Output Value of LSB | Voltage | 2.5 mV | | | | 0.4 mV |
| | | Current | 4 µA | | | | 0.32 µA |
| | Data Type in Application Program | | Default: 0 to 4,095 (voltage, current) | | | | –25,000 to 25,000 (voltage)<br>0 to 50,000 (current) |
| | | | Optional: –32,768 to 32,767 (selected for each channel)[1] | | | | |
| | Monotonicity | | Yes | | | | |
| | Current Loop Open | | Undetectable | | | | |

1: The data processed in the analog I/O module can be linear-converted to a value between –32,768 and 32,767. The optional range designation, and analog I/O data minimum and maximum values can be selected using data registers allocated to analog I/O modules.

Analog Input Specifications con't on next page.

## Analog Ouput Specifications, con't

| Model | | FC4A-K4A1 | FC4A-L03A1 | FC4A-L03AP1 | FC4A-K1A1 | FC4A-K2C1 |
|---|---|---|---|---|---|---|
| Noise Resistance | Maximum Temporary Deviation during Electrical Noise Tests | ±3% maximum when a 500V clamp voltage is applied to the power and I/O lines | | | | |
| | Recommended Cable for Noise Immunity | Twisted pair shielded cable | | | | Twisted pair cable |
| | Crosstalk | 2LSB maximum | None | | | 2 LSB maximum |
| Isolation | Between output and power circuit | Isolated | | | | |
| | Between output and internal circuit | Photocoupler-isolated | | | | |
| Effect of Improper Output Connection | | No damage | | | | |
| Selection of Analog Output Signal Type | | Using software programming | | | | |
| Calibration or Verification to Maintain Rated Accuracy | | Impossible | | | | |

## PID Module Specifications

| Model | | FC5A-F2MR2 | FC5A-F2M2 |
|---|---|---|---|
| Control Mode | Independent PID Control | Possible | |
| | Heating/Cooling Control | Possible (overlapping deadband settings available) * | |
| | Difference Input Temperature Control | Possible * | |
| | Cascade Control | Possible * | |
| Input Points | | 2ch | 2ch |
| Types of Inputs | Thermocouple | K, J, R, S, B, E, T, N, PL-II, C (W/Re5-26)<br>External resistance: 100Ω maximum<br>However, external resistance of B input: 40Ω maximum | |
| | Resistance Thermometer | Pt100, JPt100, 3-wire type<br>Allowable conductor resistance (per wire): 10Ω maximum | |
| | Current Input | 0 to 20 mA DC, 4 to 20 mA DC<br>Input impedance: 50Ω<br>Maximum permanent allowed overload (no damage): 50 mA maximum | |
| | Voltage Input | 0 to 1V DC<br>Input impedance: 1MΩ minimum<br>Maximum permanent allowed overload (No damage): 5V DC<br>Allowable output impedance: 2 kΩ<br>0 to 5V DC, 1 to 5V DC, 0 to 10V DC<br>Input impedance: 100kΩ minimum<br>Maximum permanent allowed overload (No damage): 15V DC maximum<br>Allowable output impedance: 100Ω maximum | |
| AD Conversion | Sampling Duration Time | 100 ms | |
| | Sampling Repetition Time | 125 ms | |
| | Type of Input | Differential input | |
| | Conversion Method | ∑ Δ type ADC | |
| Maximum Error at 25°C | Thermocouple Input | ±0.2% of full scale or ±2°C (4°F), whichever is greater<br>However, R, S inputs: 0 to 200°C (0 to 400°F): ±6°C (12°F)<br>B input: 0 to 300°C (0 to 600°F) Accuracy is not guranteed.<br>K, J, E, T, N inputs: Less than 0°C (32°F): ±0.4% of full scale | |
| | Resistance Thermometer Input | ±0.1% of full scale or ±1°C (2°F), whichever is greater | |
| | Voltage/Current Inputs | ±0.2% of full scale | |
| Input Accuracy (at 0 to 55°C) | Thermocouple Input | ±0.7% of full scale<br>However, R, S input,:0 to 200°C (0 to 400°F): ±6°C (12°F)<br>B input: 0 to 300°C (0 to 600°F) Accuracy is not guranteed.<br>K, J, E, T, N inputs: Less than 0°C (32°F): ±0.9% of full scale | |
| | Resistance Thermometer Input | ±0.6% of full scale | |
| | Voltage/Current Inputs | ±0.7% of full scale | |

*Dual channel input is required for one loop circuit.

PID Module Specifications con't on next page.

## PID Module Specifications, con't

| Model | | FC5A-F2MR2 | FC5A-F2M2 |
|---|---|---|---|
| Noise Resistance | Maximum Temporary Deviation during Electrical Noise Tests | Voltage input, current input ±3% maximum when a 500V clamp voltage is applied to the power supply and I/O lines<br>Termocouple, Resistance Thermometer Not assured | |
| | Input Filter | None | |
| | Recommended Cable for Noise Immunity | Twisted pair cable | |
| | Cross Talk | None | |
| Isolation | | Between input and power circuit: Transformer Isolated<br>Between input and internal circuit: Optocoupler isolated | |
| Data Accuracy | | Maximum error at 25°C±Minimum digital resolution of each input range | |
| Cold Junction Temperature Compensation Accuracy | | ±1°C at 0 to 55°C | |
| Sampling Period | | 125 ms | |
| Output Points | | 2ch | |
| Output | | Relay output 1NO<br>Rated load 5A 250V AC/30V DC (resistive load)<br>3A 250V AC (inductive load cos ø=0.4)<br>Minimum open/closed load: 10 mA 5V DC<br>Electrical life: 100,000 cycles (at the maximum rating of resistive load) | Non-contact voltage output (for SSR drive) 12V DC±15%<br>Maximum 40 mA (short circuit protected)<br>Leakage current: 0.3 mA maximum<br>Analog current output<br>4 to 20 mA DC<br>Maximum Error: ±0.5% Full Scale at 25°C<br>±1.0% Full Scale at 55°C<br>Load resistance: 550Ω maximum<br>Analog output digital resolution: 1,000 LSB<br>input value: 0.016 mA |
| Noise Resistance | Maximum Temporary Deviation during Electrical Noise Tests | — | ±3% maximum when a 500V clamp voltage is applied to the power supply and I/O lines |
| | Recommended Cable for Noise Immunity | — | Twisted pair cable |
| | Cross Talk | — | None |
| Isolation | | Between output and power circuit: Transformer Isolated | Between output and power circuit: Transformer Isolated<br>Between output and internal circuit: Optocoupler isolated |
| Power Voltage | | 24V DC (External power), 5V DC (Internal power) | |
| Allowable Voltage Range | | 20.4 to 28.8V DC | |
| External Power Consumption | | Approx. 3.5W maximum | |
| Internal Power Consumption (at 24V DC while all I/Os are on) | | 65mA (5V DC) | |
| Connector on Mother Board | | Input: F6018-17P (Fujicon) | Output: F6018-11P (Fujicon) |
| Weight (approx.) | | 140g | |

## Input Range

| Input | | Input Range (Digital Resolution) | | Input Value of LSB |
|---|---|---|---|---|
| Input Type | K | -200 to 1,370°C | -328 to 2,498°F | 1°C (°F) |
| | | -200.0 to 400.0°C | -328.0 to 752.0°F | 0.1°C (°F) |
| | J | -200 to 1,000°C | -328 to 1,832°F | 1°C (°F) |
| | R | 0 to 1,760°C | 32 to 3,200°F | 1°C (°F) |
| | S | 0 to 1,760°C | 32 to 3,200°F | 1°C (°F) |
| | B | 0 to 1,820°C | 32 to 3,308°F | 1°C (°F) |
| | E | -200 to 800°C | -328 to 1,472°F | 1°C (°F) |
| | T | -200.0 to 400.0°C | -328.0 to 752.0°F | 0.1°C (°F) |
| | N | -200 to 1,300°C | -328 to 2,372°F | 1°C (°F) |
| | PL-II | 0 to 1,390°C | 32 to 2,534°F | 1°C (°F) |
| | C (W/Re5-26) | 0 to 2,315°C | 32 to 4,199°F | 1°C (°F) |
| | Pt100 | -200.0 to 850.0°C | -328.0 to 1,562.0°F | 0.1°C (°F) |
| | | -200 to 850°C | -328 to 1,562°F | 1°C (°F) |
| | JPt100 | -200.0 to 500.0°C | -328.0 to 932.0°F | 0.1°C (°F) |
| | | -200 to 500°C | -328 to 932°F | 1°C (°F) |
| | 4 to 20mA DC | -2,000 to 10,000 (12,000 increments) | | 1.333 µA |
| | 0 to 20mA DC | -2,000 to 10,000 (12,000 increments) | | 1.666 µA |
| | 0 to 1V DC | -2,000 to 10,000 (12,000 increments) | | 0.083 mA |
| | 0 to 5V DC | -2,000 to 10,000 (12,000 increments) | | 0.416 mA |
| | 1 to 5V DC | -2,000 to 10,000 (12,000 increments) | | 0.333 mA |
| | 0 to 10V DC | -2,000 to 10,000 (12,000 increments) | | 0.833 mA |

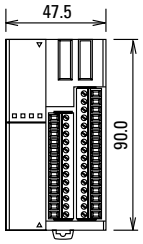
## Expansion Interface Module Specifications

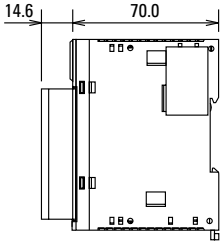
| Type No. | | FC5A-EXM1M (Expansion Interface Master Module) | FC5A-EXM1S (Expansion Interface Slave Module) | FC5A-EXM2 (Expansion Interface Module) |
|---|---|---|---|---|
| Rated Power Voltage | | — | 24V DC (supplied from external power) | 24V DC (supplied from external power) |
| Allowable Voltage Range | | — | 20.4 to 26.4V DC (including ripple) | 20.4 to 26.4V DC (including ripple) |
| Current Draw (Internal Power/External Power) | | Internal power (supplied from CPU module): 90 mA (5V DC) 0 mA (24V DC) | Internal power (supplied from CPU module): 0 mA (5V DC) 0 mA (24V DC) External power: With I/O modules 750 mA (26.4V DC)[1] | Internal power (supplied from CPU module): 50 mA (5V DC) 0 mA (24V DC) External power: With I/O modules 750 mA (26.4V DC)[1] |
| Maximum Power Consumption (External Power)[1] | | — | 19W (26.4V DC) | 19W (26.4V DC) |
| Allowable Momentary Power Interruption | | — | 10 ms minimum (24V DC) | 10 ms minimum (24V DC) |
| I/O Expansion | | Between CPU module and expansion interface module Connectable CPU modules: FC5A-D16RK1/D16RS1/D32K3/D32S3/D12K1E/D12S1E Connectable I/O modules: 7 maximum Beyond the expansion interface module Connectable I/O modules: 8 digital I/O modules maximum (AC input modules are not applicable)[2] | | |
| Maximum I/O Refresh Time[3] | | 3.6 ms | | 2.8 ms |
| Communication between CPU Module and Expansion Interface Module | | Asynchronous communication (I/O refresh of I/O modules on both sides of the expansion interface module is asynchronous.) | | |
| Isolation from Internal Circuit | | Only communication interface part is isolated | | Not isolated |
| EMC Compliant Cable Length | | 1m (FC5A-KX1C) | | — |
| Power Supply Connector | Connector on Mother Board | — | MKDSN1.5/3-5.08-BK (Phoenix Contact) | MSTB2.5/3-GF-5.08BK (Phoenix Contact) |
| | Connector Insertion/Removal Durability | — | — | 100 times minimum |
| Expansion Cable Connector | Connector on Mother Board | FCN-365P024-AU (Fujitsu Component) | | — |
| | Connector Insertion/Removal Durability | 100 times minimum | | — |
| Weight | | 70g | 135g | 140g |

1: Power consumption by the expansion interface module and eight I/O modules.
2: The maximum number of relay outputs that can be turned on simultaneously is 54 points.
3: Maximum I/O refresh time of the expansion interface module. D8252 stores the refresh time.

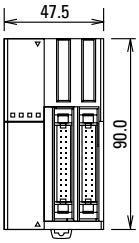
## Dimensions (mm)

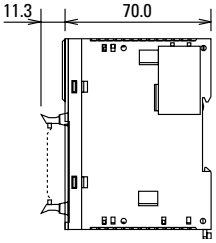
FC5A-D16RK1, FC5A-D16RS1, FC4A-D20RK1, FC4A-D20RS1



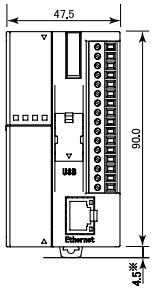



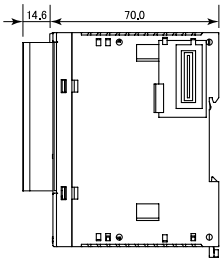

FC5A-D32K3, FC5A-D32S3, FC4A-D40K3, FC4A-D40S3



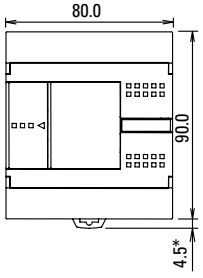



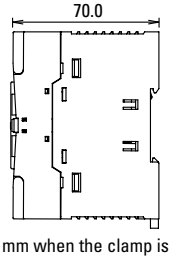

FC5A-D12K1E, FC5A-D12S1E



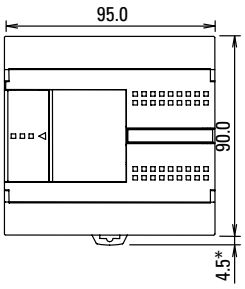

FC5A-C10R2, FC5A-C16R2, FC5A-C10R2C, FC5A-C16R2C, FC5A-C10R2D, FC5A-C16R2D, FC4A-C10R2, FC4A-C16R2, FC4A-C10R2C, FC4A-C16R2C

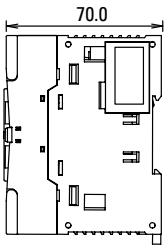



*8.5 mm when the clamp is pulled out.

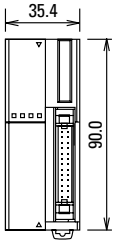
FC5A-C24R2, FC5A-C24R2C, FC5A-C24R2D, FC4A-C24R2, FC4A-C24R2C

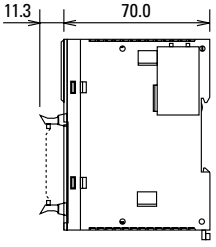



*8.5 mm when the clamp is pulled out.

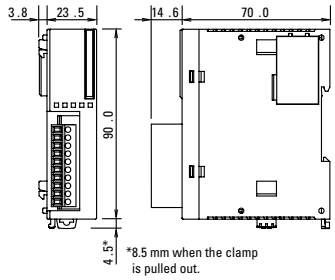
FC4A-D20K3, FC4A-D20S3



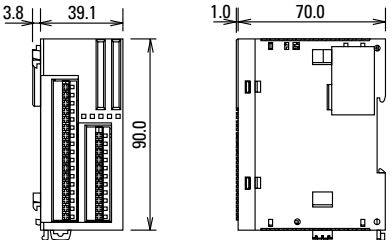



## Dimensions cont. (mm)

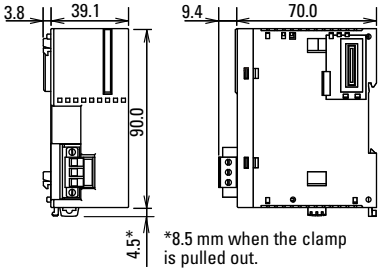
FC5A-SIF2, FC5A-SIF4,
FC4A-AS62M, FC4A-N08A11,
FC4A-J2A1, FC4A-N08B1,
FC4A-K1A1, FC4A-R081,
FC4A-K2C1, FC4A-T08K1,
FC4A-L03A1, FC4A-T08S1,
FC4A-L03AP1, FC4A-K4A1,
FC4A-M08BR1



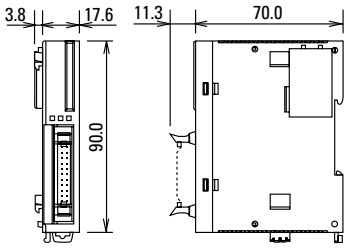

FC5A-F2MR2, FC5A-F2M2, FC4A-M24BR2



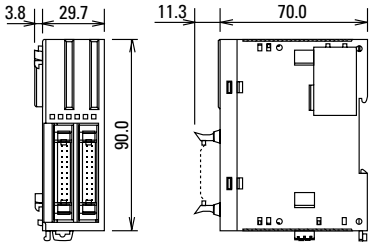

FC5A-EXM2



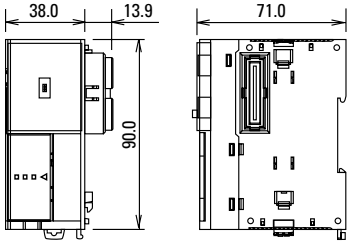

FC4A-N16B3, FC4A-T16K3, FC4A-T16S3



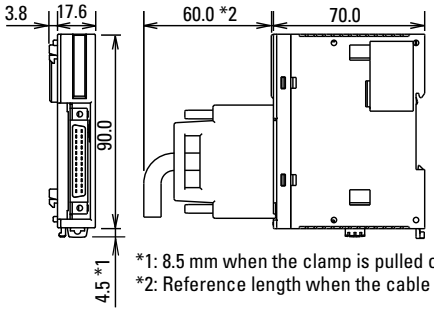

FC4A-N32B3, FC4A-T32K3, FC4A-T32S3



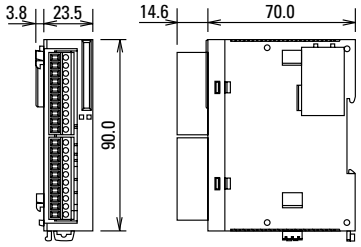

FC4A-HPH1



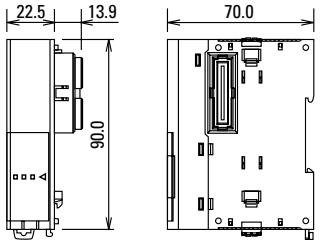

FC5A-EXM1M



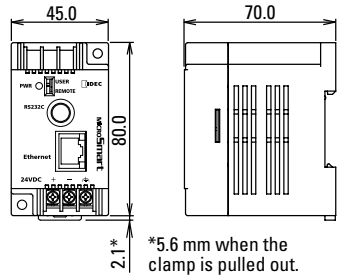

FC4A-N16B1, FC4A-R161, FC4A-J4CN1,
FC4A-J8C1, FC4A-J8AT1



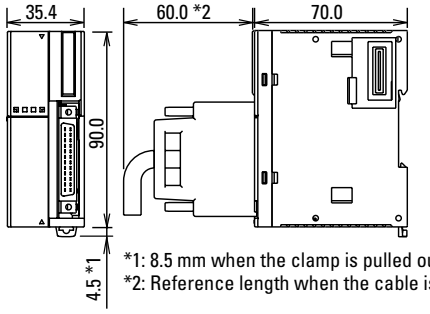

FC4A-HPC1, FC4A-HPC2, FC4A-HPC3




FC4A-SX5ES1E

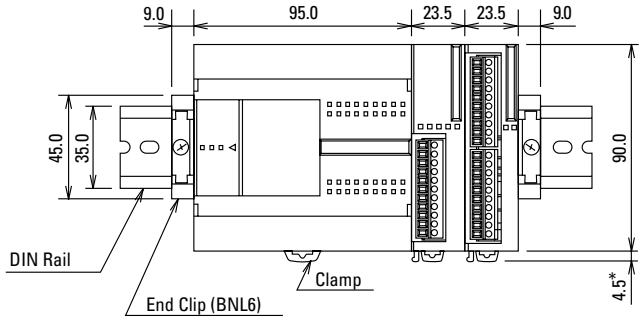



FC5A-EXM1S




### Example

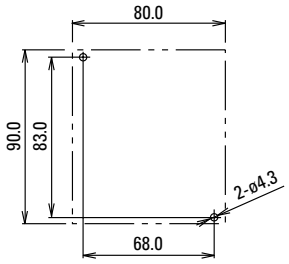
The following figure illustrates a system setup consisting of the all-in-one 24-I/O type CPU module, an 8-point relay output module, and a 16-point DC input module mounted on a 35-mm-wide-DIN rail using BNL6 end clips.



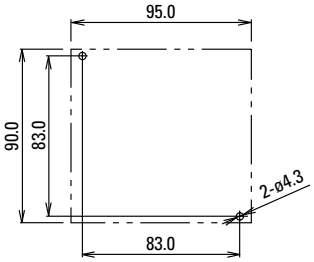

*8.5 mm when the clamp is pulled out.

## Mounting Hole Layouts

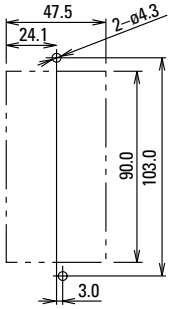
FC5A-C10R2, FC5A-C10R2C,
FC5A-C10R2D, FC5A-C16R2,
FC5A-C16R2C, FC5A-C16R2D
FC4A-C10R2, FC4A-C10R2C
FC4A-C16R2, FC4A-C16R2C



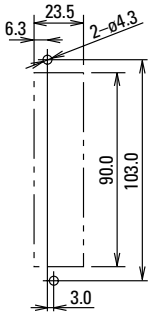

FC5A-C24R2
FC5A-C24R2C
FC5A-C24R2D
FC4A-C24R2
FC4A-C24R2C



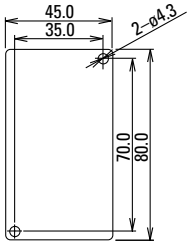

FC5A-D12K1E, FC5A-D12S1E
FC5A-D16RK1, FC5A-D16RS1
FC5A-D32K3, FC5A-D32S3
FC4A-D20RK1, FC4A-D20RS1
FC4A-D40K3, FC4A-D40S3



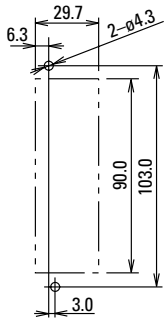

FC5A-SIF2, FC5A-SIF4
FC4A-AS62M, FC4A-N08A11,
FC4A-J2A1, FC4A-N08B1,
FC4A-J4CN1, FC4A-N16B1,
FC4A-J8AT1, FC4A-R081, FC4A-
J8C1, FC4A-R161, FC4A-K1A1,
FC4A-T08K1, FC4A-K2C1, FC4A-
T08S1, FC4A-L03A1, FC4A-K4A1,
FC4A-L03AP1, FC4A-M08BR1



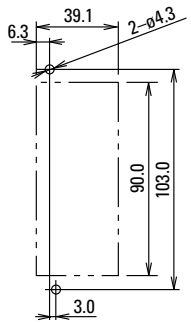

FC4A-SX5ES1E



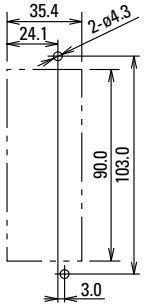

FC4A-N32B3
FC4A-T32K3
FC4A-T32S3



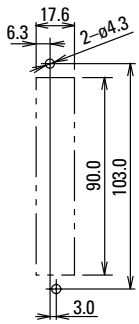

FC5A-F2MR2
FC5A-F2M2
FC5A-EXM2
FC4A-M24BR2



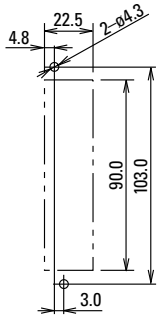

FC5A-EXM1S
FC4A-D20K3
FC4A-D20S3



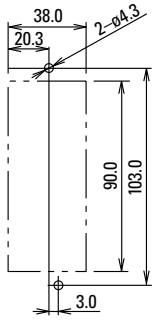

FC5A-EXM1M
FC4A-N16B3
FC4A-T16K3
FC4A-T16S3




FC4A-HPC1
FC4A-HPC2
FC4A-HPC3

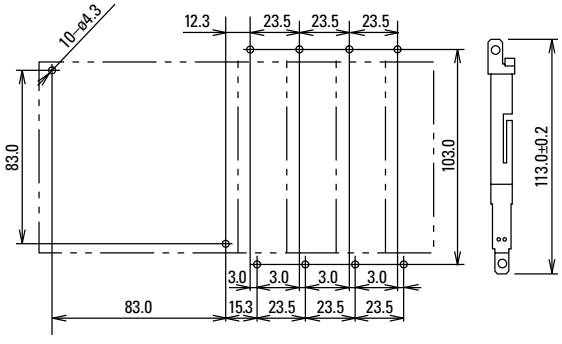



FC4A-HPH1



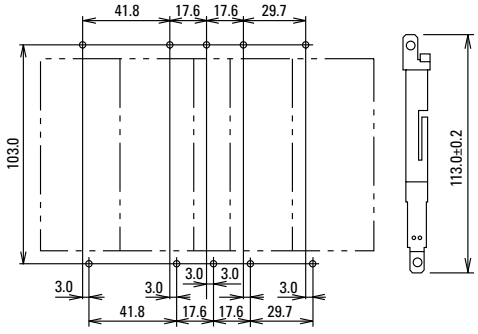

### Example

Mounting hole layout for FC5A-C24R2 or FC4A-C24R2 and four 23.5mm-wide I/O modules




### Example

Mounting hole layout from left, FC4A-HPH1, FC4A-D20K3, FC4A-N16B3, FC4A-N32B3, and FC4A-M24R2 modules




All dimensions in mm.

## FT1A Touch HMI + PLC
## A Breed of Its Own

The perfect combination of PLC processing and HMI monitoring and control, the 3.8-inch FT1A Touch is an all-in-one touchscreen interface and logic controller. With a compact body and full complement of features, FT1A Touch is perfect for small systems that require a graphical user interface along with versatile I/O controls at a truly affordable price.

### USB-A Port

Embedded USB-A port for data logging and recipe data, as well as for performing program updates.

### Analog Expansion Cartridges (Transistor Output Models)

- Up to 2 analog expansion adapters can be configured on the FT1A Touch with 12-bit resolution.
- Maximum combination of 2in/6out, 4in/4out, or 6in/2out analog I/O can be configured.

### RS232C and RS485 ports

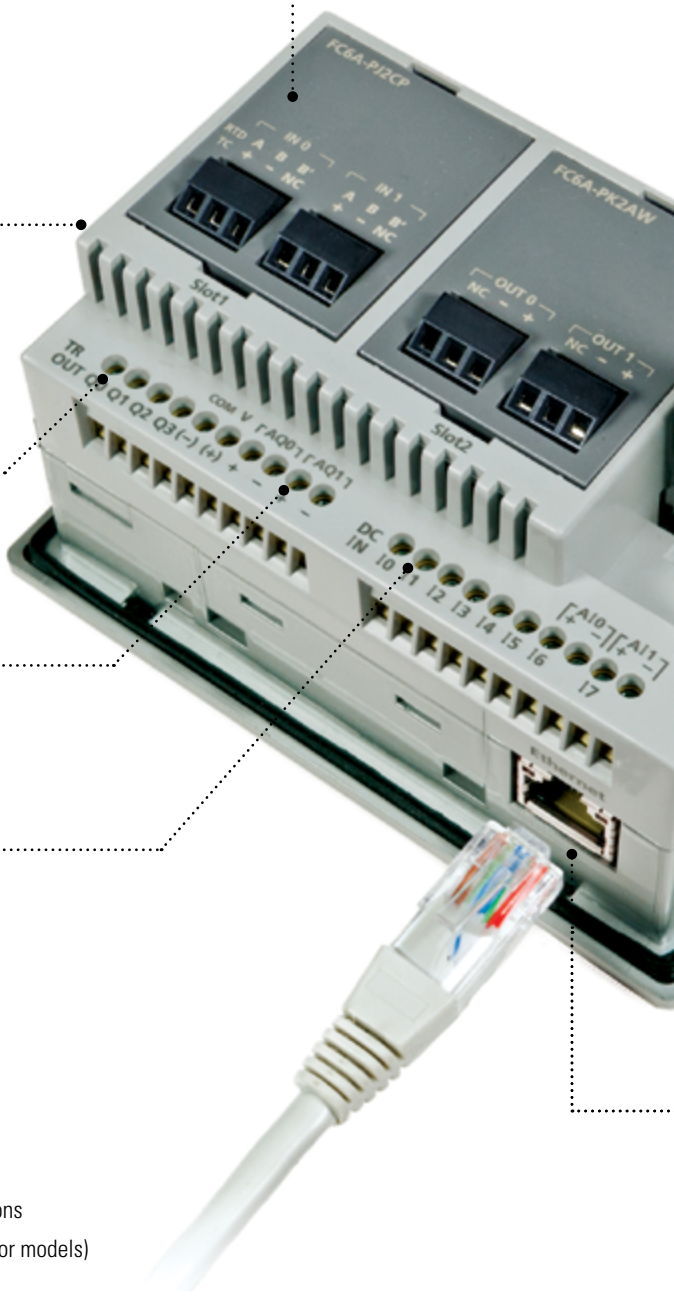
- Built-in RS232C, RS422/485 interface for serial communication.
- Communication with IDEC or other PLCs also supported through this serial port.

### Relay or Transistor Outputs

- Relay output type equipped with 10A contact, so no interposing relays required.
- Transistor output type equipped with 300mA per channel.

### Analog Outputs (Transistor Output Models)

2 built-in 0-10V DC, 4-20mA analog outputs.




### Digital, Analog and High-speed Inputs

8 built-in DC inputs

- 2 inputs (I6 and I7) can be configured as 0-10V DC or 4-20mA analog inputs (transistor output models)
  - 10-bit resolution
- 4 high-speed counters
  - Up to 10kHz

### Harsh Enviroments

- Class I, Division 2 for hazardous locations
- -20 to 55°C operating temperature (color models)

**USB Mini-B**

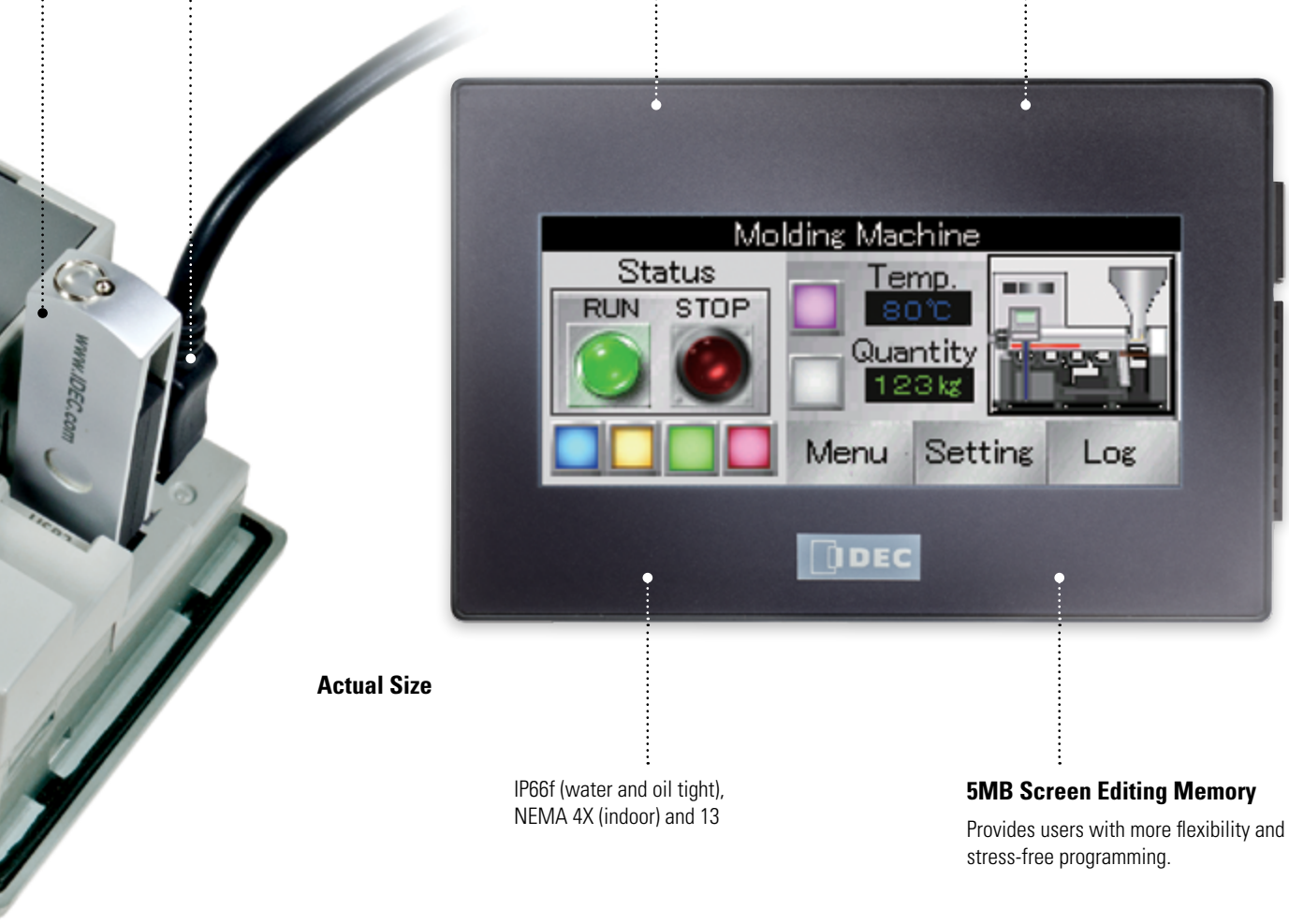
Embedded USB mini-B port for programming.

**3 Bezel Colors**

Available in silver, light gray and dark gray bezel.

**STN Monochrome or 65K TFT Color**

- 400cd/m$^2$ color
- 740cd/m$^2$ monochrome




**Actual Size**

IP66f (water and oil tight), NEMA 4X (indoor) and 13

**5MB Screen Editing Memory**

Provides users with more flexibility and stress-free programming.

**RJ45 Ethernet Port**

- Supports remote Ethernet communication and Modbus TCP.
- Communication with IDEC or other PLCs also supported through the Ethernet port.

## FT1A Controllers

FT1A controllers are designed for a range of applications that demand powerful and abundant features. Available with 12, 24, 40 and 48 I/O with and without embedded LCD/keypad, these controllers enable engineers to design cost-effective solutions.

### Universal Voltages

24V DC or 100-240V AC

### Smart LCD Screen

The display (24 digits x 4 lines) can provide visual feedback of system status, I/O status, user configurable messages with dynamic data, bar graph, and ladder program monitor and controls.

### Non-LCD Model

FT1A controllers are also available without embedded LCD/keypad. It's a cost-effective, tamper-proof solution.

### USB mini-B

With the USB mini-B port, communication with FT1A controllers is extremely convenient as standard USB Type A to mini-B cables can be used.

Actual Size

Note: Features available on specific models.
See page 14 for selection guide.

### Memory Cartridge

The optional memory cartridge can be used to easily transfer programs from the internal ROM memory of FT1A controllers to a memory cartridge or vice versa. It's a convenient method to update the PLC program in the field.

800.262.4332

www.IDEC.com/FT1A

### Digital, Analog and High-speed Inputs

Inputs on the 24V DC power models can be configured as digital, 0-10V DC analog or high-speed counters. Up to 8 analog inputs with 10-bit resolution and up to 6 HSC 100kHz can be configured.

### RJ45 Ethernet Port

The embedded Ethernet port on the FT1A controllers provides users with easy access for remote maintenance and communication. It also supports industry standard Modbus TCP protocol. With Ethernet Remote I/O capability, the FT1A controller's I/O can be easily expanded.

### Real-Time Clock

Every FT1A controller is equipped with an embedded real-time clock for time-controlled applications. With the built-in, real-time clock, log data can also be tracked and, with just a click, daylight savings time can easily be setup.

### RS232C and RS485 Ports

Up to two RS232C and/or RS485 communication cartridges can be plugged into the FT1A controllers to allow the PLC to communicate with other serial devices. It also supports industry standard Modbus RTU protocol.

### Large Programming Memory

With up to 47.4KB (11,850 steps) of programming memory, FT1A controllers have enough memory for even complex PLC programming.

### SD Memory Card

With the embedded SD memory slot, critical data can be easily logged and retrieved over Ethernet connections or simply remove the SD card and plug it into your PC.

### 10A Relay and High-speed Outputs

The FT1A controller with relay outputs is equipped with four 10A relay contacts. The transistor outputs model is also equipped with two 100kHz high-speed outputs for simple positioning controls. With remote I/O capability, additional outputs can easily be added.

## Part Numbers

| Touch | Part Number | Screen Type | Total I/O | Input Type | Embedded Analog Inputs | Embedded Analog Outputs | Output Type | Analog Expansion Cartridges | Power Voltage | Remote I/O Master |
|---|---|---|---|---|---|---|---|---|---|---|
| | FT1A-M14KA-W | 3.7" STN Monochrome (8 shades) | 14 I/O (8 in, 6 out) | Source | 2pt (0-10V DC, 4-20mA, 10-bit Resolution) | 2pt (0-10V DC, 4-20mA, 10-bit Resolution) | Transistor Sink | Yes, up to 2 cartridges - see page page 126 for part number. | 24V DC | Yes |
| | FT1A-M14KA-B | | | | | | | | | |
| | FT1A-M14KA-S | | | | | | | | | |
| | FT1A-M14SA-W | | | Sink | | | Transistor Source | | | |
| | FT1A-M14SA-B | | | | | | | | | |
| | FT1A-M14SA-S | | | | | | | | | |
| | FT1A-C14KA-W | 3.8" TFT 65,536 colors | | Source | | | Transistor Sink | | | |
| | FT1A-C14KA-B | | | | | | | | | |
| | FT1A-C14KA-S | | | | | | | | | |
| | FT1A-C14SA-W | | | Sink | | | Transistor Source | | | |
| | FT1A-C14SA-B | | | | | | | | | |
| | FT1A-C14SA-S | | | | | | | | | |
| | FT1A-M12RA-W | 3.7" STN Monochrome (8 shades) | 12 I/O (8 in, 4 out) | Sink | 2pt (0-10V DC, 10-bit Resolution) | – | Relay | – | | – |
| | FT1A-M12RA-B | | | | | | | | | |
| | FT1A-M12RA-S | | | | | | | | | |
| | FT1A-C12RA-W | 3.8" TFT 65,536 colors | | | | | | | | |
| | FT1A-C12RA-B | | | | | | | | | |
| | FT1A-C12RA-S | | | | | | | | | |

| 12 I/O CPU | Part Number | Power Voltage | Total I/O | Input Type | Output Type | Ethernet Port | Screen Type | Embedded Analog Inputs | High-Speed Counter | SD Memory Slot | RS232C, RS485 Port |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FT1A-H12RC | 100-240V AC | 12 I/O (8 in, 4 out) | Contact | Relay | — | 2.1" Mono-chrome | — | — | — | — |
| | FT1A-H12RA | 24V DC | | Sink | | | | 2pt, 0-10V DC, 10-bit | 4 x 100kHz | | |
| | FT1A-B12RC | 100-240V AC | | Contact | | | — | — | — | | |
| | FT1A-B12RA | 24V DC | | Sink | | | | 2pt, 0-10V DC, 10-bit | 4 x 100kHz | | |
| **24 I/O CPU** | | | | | | | | | | | |
| | FT1A-H24RC | 100-240V AC | 24 I/O (16 in, 8 out) | Sink/ Source | Relay | Yes | 2.1" Mono-chrome | — | — | — | Optional Adapter |
| | FT1A-H24RA | 24V DC | | Sink | | | | 4pt, 0-10V DC, 10-bit | 6 x 100kHz | | |
| | FT1A-B24RC | 100-240V AC | | Sink/ Source | | | — | — | — | | |
| | FT1A-B24RA | 24V DC | | Sink | | | | 4pt, 0-10V DC, 10-bit | 6 x 100kHz | | |
| **40 I/O CPU** | | | | | | | | | | | |
| | FT1A-H40RC | 100-240V AC | 40 I/O (24 in, 16 out) | Sink/ Source | Relay | Yes | 2.1" Mono-chrome | — | — | Yes | Optional Adapters (x2) |
| | FT1A-H40RKA | 24V DC | | Source | Relay/Trans. Sink | | | 6pt, 0-10V DC, 10-bit | 6 x 100kHz | | |
| | FT1A-H40RSA | | | Sink | Relay/Trans. Source | | | | | | |
| | FT1A-B40RC | 100-240V AC | | Sink/ Source | Relay | | — | — | — | | |
| | FT1A-B40RKA | 24V DC | | Source | Relay/Trans. Sink | | | 6pt, 0-10V DC, 10-bit | 6 x 100kHz | | |
| | FT1A-B40RSA | | | Sink | Relay/Trans. Source | | | | | | |

| 48 I/O CPU | Part Number | Power Voltage | Total I/O | Input Type | Output Type | Ethernet Port | Screen Type | Embedded Analog Inputs | High-Speed Counter | SD Memory Slot | RS232C, RS485 Port |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FT1A-H48SC | 100-240V AC | 48 I/O (30 in, 18 out) | Sink/ Source | Transistor Source | Yes | 2.1" Monochrome | — | — | Yes | Optional Adapters (x2) |
| | FT1A-H48SA | 24V DC | | Sink | | | | 8pt, 0-10VDC, 10-bit | 6 x 100kHz | | |
| | FT1A-H48KC | 100-240V AC | | Sink/ Source | Transistor Sink | | | — | — | | |
| | FT1A-H48KA | 24V DC | | Source | | | | 8pt, 0-10VDC, 10-bit | 6 x 100kHz | | |
| | FT1A-B48SC | 100-240V AC | | Sink/ Source | Transistor Source | | — | — | — | | |
| | FT1A-B48SA | 24V DC | | Sink | | | | 8pt, 0-10VDC, 10-bit | 6 x 100kHz | | |
| | FT1A-B48KC | 100-240V AC | | Sink/ Source | Transistor Sink | | | — | — | | |
| | FT1A-B48KA | 24V DC | | Source | | | | 8pt, 0-10VDC, 10-bit | 6 x 100kHz | | |

## Starter Kits

| | Type | Part Number | Description |
|---|---|---|---|
| | Touch | KIT-TOUCH-□KW | FT1A Touch Starter Kit, Transistor sink output type, Light bezel, USB cable, 30W PS and software |
| | | KIT-TOUCH-□KB | FT1A Touch Starter Kit, Transistor sink output type, Dark bezel, USB cable, 30W PS and software |
| | | KIT-TOUCH-□KS | FT1A Touch Starter Kit, Transistor sink output type, Silver bezel, USB cable, 30W PS and software |
| | | KIT-TOUCH-□SW | FT1A Touch Starter Kit, Transistor source output type, Light bezel, USB cable, 30W PS and software |
| | | KIT-TOUCH-□SB | FT1A Touch Starter Kit, Transistor source output type, Dark bezel, USB cable, 30W PS and software |
| | | KIT-TOUCH-□SS | FT1A Touch Starter Kit, Transistor source output type, Silver bezel, USB cable, 30W PS and software |
| | | KIT-TOUCH-□W | FT1A Touch Starter Kit, Relay output type, Light bezel, USB cable, 30W PS and software |
| | | KIT-TOUCH-□B | FT1A Touch Starter Kit, Relay output type, Dark bezel, USB cable, 30W PS and software |
| | | KIT-TOUCH-□S | FT1A Touch Starter Kit, Relay output type, Silver bezel, USB cable, 30W PS and software |
| | | In place □ of insert code for display type: C = color, M = monochrome | |
| | 12 I/O CPU | KIT-SMART-12-□AC | SmartAXIS Starter Kit, 12 I/O AC, USB cable and software |
| | | KIT-SMART-12-□DC | SmartAXIS Starter Kit, 12 I/O DC, USB cable, 30W PS and software |
| | 24 I/O CPU | KIT-SMART-24-□AC | SmartAXIS Starter Kit, 24 I/O AC, USB cable and software |
| | | KIT-SMART-24-□DC | SmartAXIS Starter Kit, 24 I/O DC, USB cable, 30W PS and software |
| | 40 I/O CPU | KIT-SMART-40-□AC-R | SmartAXIS Starter Kit, 40 I/O AC, USB cable and software |
| | | KIT-SMART-40-□DC-RK | SmartAXIS Starter Kit, 40 I/O DC, Sink, USB cable, 30W PS and software |
| | | KIT-SMART-40-□DC-RS | SmartAXIS Starter Kit, 40 I/O DC, Source, USB cable, 30W PS and software |
| | 48 I/O CPU | KIT-SMART-48-□AC-K | SmartAXIS Starter Kit, 48 I/O AC, Sink, USB cable and software |
| | | KIT-SMART-48-□AC-S | SmartAXIS Starter Kit, 48 I/O AC, Source, USB cable and software |
| | | KIT-SMART-48-□DC-K | SmartAXIS Starter Kit, 48 I/O DC, Sink, USB cable, 30W PS and software |
| | | KIT-SMART-48-□DC-S | SmartAXIS Starter Kit, 48 I/O DC, Source, USB cable, 30W PS and software |
| | | In place of □ insert code: H = includes display/keypad, B = without display/keypad | |

## Touch Accessories

| Part Number | Description |
|---|---|
| FC6A-PJ2A | 2-pt 0-10V, 4-20mA Analog input cartridge |
| FC6A-PJ2CP | 2-pt RTD, Thermocouple cartridge |
| FC6A-PK2AV | 2-pt 0-10V Analog output cartridge |
| FC6A-PK2AW | 2-pt 4-20mA Analog output cartridge |
| FT9Z-1D3PN05 | FT1A Touch screen protective sheet (5 per pack) |
| FT9Z-1E3PN05 | FT1A Touch protective cover (5 per pack) |
| FT9Z-1A01 | FT1A Touch rear mount adapter |
| FT9Z-1T09 | FT1A Touch extra communication terminal block |
| FT9Z-1X03 | FT1A Touch extra power supply terminal block |
| HG9Z-4K2PN04 | FT1A Touch extra mounting brackets (4 per pack) |
| HG9Z-XU1PN05 | USB cable lock-in (5 per pack) |
| HG9Z-XCM2A | USB programming cable |
| SW1A-W1C | Automation Organizer Software Suite |

## Controller Accessories

| Part Number | Description |
|---|---|
| FT1A-PC1 | RS232C communication adapter, mini-DIN type |
| FT1A-PC2 | RS485 communication adapter, mini-DIN type |
| FT1A-PC3 | RS485 communication adapter, screw terminal type |
| FT1A-PM1 | Optional memory cartridge |
| FT9Z-PSP1PN05 | Extra direct mounting hook (5 per pack) |
| SW1A-W1C | Automation Organizer Software Suite |
| HG9Z-XCM2A | USB programming cable |

## General Specifications

| Part No. | FT1A-✻12RA-✻ | FT1A-✻14KA-✻ / FT1A-✻14SA-✻ |
|---|---|---|
| Output | Relay output | Transistor output |
| Rated Power Voltage/ Power Supply Isolation | 24V DC/Not isolated | |
| Allowable Voltage Range | 20.4 to 28.8V DC (including ripple) | |
| Power Consumption | 9.2 W maximum | 11W maximum |
| Allowable Momentary Power Interruption | 10 ms maximum | |
| Dielectric Strength | Between power terminal and FE terminal: 500V AC, 5 mA, 1 minute<br>Between power terminal and output terminal: 2,300V AC, 5 mA, 1 minute | Between power terminal and FE terminal: 500V AC, 5 mA, 1 minute<br>Between power terminal and output terminal: 500V AC, 5 mA, 1 minute |
| EMC Immunity | IEC/EN 61131-2:2007 compliant | |
| Inrush Current | 50A maximum (5ms maximum) | |
| Operating Temperature | Color display: –20 to +55°C, Monochrome display: 0 to +55°C (Note 1) (Note 2) | |
| Storage Temperature | –20 to +60°C (no freezing) | |
| Relative Humidity | 10 to 95% RH (no condensation) | |
| Pollution Degree | 2 (IEC 60664-1) | |
| Corrosion Immunity | Atmosphere free from corrosive gases | |
| Degree of Protection | IP66F TYPE 4X TYPE 13 (Panel front) (Note 3), IP20 (Rear) | |
| Ground | Functional grounding | |
| Protective grounding conductor | UL1007 AWG16 | |
| Vibration Resistance | 5 to 8.4 Hz half amplitude 3.5 mm, 8.4 to 150 Hz, acceleration 9.8 $m/s^2$ (1G), 2 hours per axis on each of three mutually perpendicular axis (IEC 61131-2) | |
| Shock Resistance | 147 $m/s^2$, 11 ms, X, Y, Z directions 3 times (IEC 61131-2) | |
| Mounting Structure | Panel mount | |
| Weight (approx.) | 300g | 250g |

Note 1: FT1A-*12RA-* hardware version V130 (indicated on hardware) and earlier is UL, c-UL listed at 50°C (maximum operating temperature).
Note 2: See SmartAXIS Touch User's Manual FT9Y-B1390(2) for I/O derating.
Note 3: Operation not guaranteed when used with certain types of oils.

## General Specifications

| Part Number | | 12-I/O Type<br>H12RC H12RA<br>B12RC B12RA | 24-I/O Type<br>H24RC H24RA<br>B24RC B24RA | 40-I/O Type<br>H40RC H40RKA H40RSA<br>B40RC B40RKA B40RSA | 48-I/O Type<br>H48KC H48SC H48KA H48SA<br>B48KC B48SC B48KA B48SA |
|---|---|---|---|---|---|
| Rated Power Voltage | | AC power: 100 to 240V AC, DC power: 24V DC | | | |
| Allowable Voltage Range | | AC power: 85 to 264V AC, DC power: 20.4 to 28.8V DC (including ripple) | | | |
| Rated Power Frequency | | AC power: 50 to 60Hz (47 to 63Hz) | | | |
| Power Consumption | AC Power | 12-I/O: 18VA maximum, 24-I/O: 41VA maximum, 40-I/O: 48VA maximum, 48-I/O: 43VA maximum | | | |
| | DC Power | 12-I/O: 4.3W maximum, 24-I/O: 4.8W maximum, 40-I/O: 7.9W maximum, 48-I/O: 6.0W maximum | | | |
| Allowable Momentary Power Interruption | | AC power: 20ms maximum; DC power: 10ms maximum | | | |
| Dielectric Strength | | AC power type: Between power/input and PE terminals: 1,500V AC, 1 minute<br>Between transistor output and PE terminals: 1,500V AC, 1 minute<br>Between relay output and PE terminals: 2,300V AC, 1 minute<br>Between power and input terminals: 1,500V AC, 1 minute<br>Between power/input and transistor output terminals: 1,500V AC, 1 minute<br>Between power/input and relay output terminals: 2,300V AC, 1 minute<br>DC power type: Between power/input and FE terminals: 500V AC, 1 minute<br>Between transistor output and FE terminals: 500V AC, 1 minute<br>Between relay output and FE terminals: 2,300V AC, 1 minute<br>Between power/input and transistor output terminals: 500V AC, 1 minute<br>Between power/input and relay output terminals: 2,300V AC, 1 minute | | | |
| EMC Immunity | | IEC/EN 61131-2:2007 compliant | | | |
| Inrush Current | | AC power: 35A maximum (Cold start with Ta=25°C, 200V AC); DC power: 30A maximum (5ms maximum) | | | |
| Operating Temperature | | 0 to +55°C Note 1 | | | |
| Storage Temperature | | –25 to +70°C (no freezing) | | | |
| Relative Humidity | | 10 to 95% RH (no condensation) | | | |
| Pollution Degree | | 2 (IEC 60664-1) | | | |
| Corrosion Immunity | | Atmosphere free from corrosive gases | | | |
| Degree of Protection | | IP20 (IEC 60529) | | | |
| Ground | | D-type ground (Class 3 ground) | | | |
| Protective Grounding Conductor | | UL1007 AWG16 | | | |
| Vibration Resistance | | 5 to 8.4Hz half amplitude 3.5mm, 8.4 to 150Hz,<br>Acceleration 9.8m/s$^2$ (1G) 2 hours per axis on each of three mutually perpendicular axis (IEC 61131-2) | | | |
| Shock Resistance | | 147m/s$^2$, 11ms, X, Y, Z directions 3 times (IEC 61131-2) | | | |
| Mounting Structure | | DIN rail or direct mount | | | |
| Weight (approx.) | AC Power | 12-I/O: 230g, 24-I/O: 400g, 40-I/O: 580g, 48-I/O: 540g | | | |
| | DC Power | 12-I/O: 190g, 24-I/O: 310g, 40-I/O: 420g, 48-I/O: 380g | | | |

1. FT1A Version V110 are UL, c-UL Listed at 0 to +55°C.

## Function Specifications

| | | | FT1A-✻12RA-✻ | FT1A-✻14KA-✻ | FT1A-✻14SA-✻ |
|---|---|---|---|---|---|
| Control System | | | Stored program system | | |
| Ladder Program | Instruction Words | Basic Instructions | 42 types | | |
| | | Advanced Instructions | 98 types | 99 types | |
| | Program Capacity | | Program size: 47.4 kB, Configuration memory capacity: 5 MB | | |
| | Processing Time | Basic Instruction | 1850µs/1,000 steps | | |
| | | END Processing | 5 msec minimum | | |
| FBD | FB | | 37 types | | |
| | Program Capacity | | Program size: 38kB, Configuration memory capacity: 5MB | | |
| | No. of FB | FB (Note 1) | 1,000 | | |
| | | Timer (T) | 200 | | |
| | | Counter (C) | 200 | | |
| | Processing Time | Basic Instruction | 4ms/100 | | |
| | | END Processing | 5ms minimum | | |
| User Program Storage | | | Flash ROM (100,000 times) | | |
| I/O Points | Inputs | | 8 (V3.90 or above: 90 max. can be added with remote I/O master function) | 8 (90 additional can be added with remote I/O master function) | |
| | Outputs | | 4 (V3.90 or above: 54 max. can be added with remote I/O master function) | 4 (54 additional can be added with remote I/O master function) | |
| Analog Input | | | 2 (V3.90 or above: 24 max. can be added with remote I/O master function) | 2 (4 additional can be added with analog cartridge, and 24 max. can be added with remote master function) | |
| Analog Output | | | — | 2 (4 additional can be added with analog cartridge) | |
| Internal Relays | | | 1,024 | | |
| Shift Registers | | | 128 | | |
| Data Registers | | | 2000 | | |
| Special Data Registers | | | 200 | | |
| Counters | | | 200 | | |
| Timer (1ms, 10 ms, 100 ms, 1s) | | | 200 | | |
| Clock | | | Precision: ±30 seconds/month (25°C, typical) | | |
| RAM Backup | Backup Data | | Internal relays, shift registers, counters, data registers, clock data | | |
| | Backup Duration | | Approximately 30 days (typical) at 25°C after backup battery is fully charged | | |
| | Battery | | Lithium secondary battery | | |
| | Charging Time | | Approximately 15 hours required to charge from 0 to 90% | | |
| | Replaceability | | Not possible | | |
| Self-Diagnostic Functions | | | Keep data check, power failure check, watchdog timer check,timer/counter preset value change error check, user program syntax check, user program execution check. | | |
| Input Filter | | | No filter, 3 to 15 ms (selectable in increments of 1 ms) | | |
| Catch Input/Interrupt Input | | | 4/4 | | |
| High-speed Counter | Maximum Counting Frequency and Points | Single/two-phase selectable | 1 (5 kHz, multiple 2/4, single-phase cannot be used) | | |
| | | Single-phase | 4 (x 10 kHz) | | |
| | Counting Range | | 0 to 4,294,967,295 (32 bits) | | |
| | Operation Mode | | Rotary encoder mode and adding counter mode | | |
| Analog Voltage Inputs | Built-in Points | | 2 | | |
| | Input Range | | 0 to 10V DC | 0 to 10V DC (voltage input) /4 to 20 mA (current input) | |
| | Input Impedance | | 78 kΩ | 78 kΩ (voltage input) / 250 Ω (current input) | |
| | Digital Resolution | | 0 to 1,000 (10 bits) | | |
| Number of Relay Outputs | | | 10A relay: 4 | — | |
| Number of Transistor Outputs | | | — | 4 (sink) | 4 (source) |
| Analog Output | Built-in Points | | — | 2 | |
| | Output Range | | — | 0 to 10V DC (voltage output) /4 to 20 mA (current output) | |
| | Digital Resolution | | — | 0 to 1,000 (10 bits) | |
| USB-mini B (Note 2) | | | × | | |
| USB-A (Note 2) | | | × | | |
| RS232C (Note 2) | | | × | | |
| RS485/422 (Note 2) | | | × | | |
| Ethernet | | | × | | |
| Expansion Communication Ports | | Port 2 | — | | |
| | | Port 3 | — | | |
| Memory Cartridge | | | — | | |
| SD Memory Card | | | — | | |
| Analog Cartridge Interface | | Number of Ports | — | 2 | |
| | | Connectable Cards | — | 4 (FC6A-PJ2A, FC6A-PK2AV, FC6A-PK2AW, FC6A-PJ2CP) | |

Note 1: Except for timer, counter, input FB, and output FB.
Note 2: Not isolated from internal circuits.

## Function Specifications

| Part Number | | | H12RA B12RA | H12RC B12RC | H24RA B24RA | H24RC B24RC | H40RKA H40RSA B40RKA B40RSA | H40RC B40RC | H48KA H48SA B48KA B48SA | H48KC H48SC B48KC B48SC |
|---|---|---|---|---|---|---|---|---|---|---|
| Control System | | | Stored program system | | | | | | | |
| Instruction Words | Basic Instructions | | | | | | | | | |
| | Advanced Instructions | | 99 types | | 107 types | | DC power type: 125 types, AC power type: 111 types | | | |
| Program Capacity | | | 12KB | | 48KB | | | | | |
| User Program Storage | | | Built-in Flash ROM (10,000 times rewritable) | | | | | | | |
| Processing Time | Basic Instruction | | 950µs/1000 steps | | | | | | | |
| | END Processing | | 2 ms (Pro) /640 µs (Lite) | | | | | | | |
| I/O Points | Inputs | | 8 | | 16 | | 24 | | 30 | |
| | Outputs | | 4 | | 8 | | 16 | | 18 | |
| Internal Relays | | | 256 | | 1024 | | | | | |
| Shift Registers | | | 128 | | 128 | | | | | |
| Data Registers | | | 400 | | 2000 | | | | | |
| Special Data Registers | | | 200 | | 200 | | | | | |
| Adding/Reversible Counters | | | 100 | | 200 | | | | | |
| Timer (1ms, 10ms, 10ms, 1s) | | | 100 | | 200 | | | | | |
| Clock | | | | | | | | | | |
| RAM Backup | Backup Data | | Internal relays, shift registers, counters, data registers, clock data | | | | | | | |
| | Backup Duration | | Approximately 30 days (typical) at 25°C after backup battery is fully charged | | | | | | | |
| | Battery | | Lithium secondary battery | | | | | | | |
| | Charging Time | | Approximately 15 hours required to charge from 0 to 90% | | | | | | | |
| | Replaceability | | Not possible | | | | | | | |
| Self-Diagnostic Functions | | | Keep data check, power failure check, clock error check, watchdog timer check, timer/counter preset value change error check, user program syntax check, user program execution check, system error check, memory cartridge transfer error check (Pro/Lite only) | | | | | | | |
| Input Filter | | | No filter, 3 to 15ms (selectable in increments of 1ms) | | | | | | | |
| Catch Input/Interrupt Input | | | 4/4 | | 6/6 | | | | | |
| High-speed Counter | Maximum Counting Frequency & Points | Single/two-phase Selectable | 2 (100kHz /50kHz) Note 1 | — | 2 (100kHz /50kHz) Note 1 | — | 2 (100kHz /50kHz) Note 1 | — | 2 (100kHz /50kHz) Note 1 | — |
| | | Single-phase | 2 (x 100kHz) | — | 4 (x 100kHz) | — | 4 (x 100kHz) | — | 4 (x 100kHz) | — |
| | Counting Range | | 0 to 4,294,967,295 (32 bits) | | | | | | | |
| | Operation Mode | | Rotary encoder mode and adding counter mode | | | | | | | |
| Analog Voltage Inputs | Points | | 2 | None | 4 | None | 6 | None | 8 | None |
| | Input Range | | 0 to 10V DC | | | | | | | |
| | Input Impedance | | 78 kΩ | | | | | | | |
| | Digital Resolution | | 10-bit (0 to 1000) | | | | | | | |
| Pulse Outputs | 100 kHz | No. of Outputs | — | — | — | — | 2 | — | 2 | |
| | | Function | — | — | — | — | PULS, PWM, RAMP, ARAMP, ZRN | — | PULS, PWM, RAMP, ARAMP, ZRN | |
| | 5 kHz | No. of Outputs | — | — | — | — | 2 | — | 2 | |
| | | Function | — | — | — | — | PULS, PWM | — | PULS, PWM | |
| External Output Power Supply for Sensor | Output Voltage | | — | — | — | 24V DC (+10%,-15%) | — | 24V DC (+10%, -15%) | — | 24V DC (+10%, -15%) |
| | Output Current | | — | — | — | 250mA | — | 300mA | — | 300mA |
| | Overload Detection | | — | — | — | Not Available | — | Not Available | — | Not Available |
| | Insulation | | — | — | — | Internal Circuit | — | Internal Circuit | — | Internal Circuit |
| USB-mini B | | | X | | X | | X | | X | |
| USB-A | | | — | | — | | — | | — | |
| RS232C | | | — | | X Note 2 | | X Note 2 | | X Note 2 | |
| RS485/422 | | | — | | X Note 2 | | X Note 2 | | X Note 2 | |
| Ethernet | | | — | | X | | X | | X | |
| Expansion Communication Ports | | Port 2 | — | | X | | X | | X | |
| | | Port 3 | — | | — | | X | | X | |
| Memory Cartridge | | | X | | X | | X | | X | |
| SD Memory Card | | | — | | — | | X Note 3 | | X Note 3 | |

## Display Specifications

| | | Touch | | Pro (Built-in LCD) |
|---|---|---|---|---|
| Display Element | | TFT color LCD | STN monochrome LCD | STN monochrome LCD |
| Colors/Shades | | 65,536 colors | Monochrome 8 shades | Monochrome |
| Effective Display Area | | 88.92 W x 37.05 H mm | 87.59 W x 35.49 H mm | 47.98 W x 18.22 H mm |
| Display Resolution | | 240 W x 100 H pixels | | 192 W x 64 H pixels |
| View Angle | | Left/right 40°, top 20°, bottom 60° | Left/right/top/bottom: 45° | Left/right 30°, top 20°, bottom 40° |
| Contrast Adjustment | | Not Available | 32 levels | Not Available |
| Backlight | | LED | LED (white, red, pink) | LED (green) |
| Backlight Life | | 50,000 hours Note 1 | | — |
| Brightness | | 400cd/m$^2$ Note 2 | 740cd/m$^2$ Note 2 | 45cd/m$^2$ Note 2 |
| Brightness Adjustment | | 32 levels | | Not Available |
| Backlight Control | | On/off | | |
| Backlight Replacement | | Not Available | | |
| Display Character Size | 1/4 Size | 8 x 8 pixels (Japanese Katakana, JIS 8-bit code, ISO 8859-1 [Latin 1], ANSI 1250 [Central Europe]), ANSI 1257 (Baltic), ANSI 1251 (Cyrillic) | | — |
| | 1/2 Size | 8 x 16 pixels (Japanese Katakana, JIS 8-bit code, ISO 8859-1 [Latin 1], ANSI 1250 [Central Europe]), ANSI 1257 (Baltic), ANSI 1251 (Cyrillic) | | 8 x 16 pixels Japanese Katakana, JIS 8-bit code, ISO 8859-1 (Latin 1), ANSI 1251 (Cyrillic) |
| | | 16 x 32 pixels, 24 x 48 pixels, 32 x 64 pixels (Western European languages: ISO 8859-1) | | — |
| | Full Size | 16 x 16 pixels (Japanese JIS first and second level characters, simplified Chinese, traditional Chinese, Korean) | | 16 x 16 pixels (Japanese JIS first level characters, Chinese) |
| | Double Size | 32 x 32 pixels (Japanese JIS first level characters, Mincho font) | | — |
| No. of Characters | 1/4 Size | 30 characters x 12 lines/screen | | — |
| | 1/2 Size | 30 characters x 6 lines/screen | | 24 characters x 4 lines |
| | Full Size | 15 characters x 6 lines/screen | | 12 characters x 4 lines |
| | Double Size | 7 characters x 3 lines/screen | | — |
| Character Magnification | | 0.5x, 1x, 2x, 3x, 4x, 5x, 6x, 7x, 8x, vertically and horizontally | | — |
| Character Attributes | | Blink, reverse, bold, shadowed (blink is 1 or 0.5sec) | | Blink, reverse |
| Graphics | | Line, polyline, polygon, rectangle, circle, ellipse, arc, pie, equilateral polygons (3, 4, 5, 6, 8), fill, picture | | — |
| Window Display | | 3 pop-up screens + 1 system screen | | — |

1. The backlight life refers to the time until the brightness reduces by half after use at 25°C.
2. Brightness of LCD only (monochrome LCD: when lit white).

Note 1: The backlight life refers to the time until the brightness reduces by half after use at 25°C.
Note 2: Brightness of LCD only (monochrome LCD: when lit white).

## Operation Specifications

| | |
|---|---|
| Switching Element | Analog resistive membrane (touch panel) |
| Operating Force | 0.2 to 2.5N |
| Mechanical Life | 1 million operations |
| Acknowledgment Sound | Electric Buzzer |
| Multiple Press | Not possible |

## HMI Function Specifications

| | |
|---|---|
| Functions | Drawings, bit button, word button, goto screen button, key button, multi-button, keypad, selector switch, potentiometer, numerical input, character input, pilot lamp, picture display, message display, message switching display, alarm list display, alarm log display, numerical display, bar chart, line chart, pie chart, meter, calendar, bit write command, word write command, goto screen command, timer, script command, multi-command, system area, start time, Auto Backlight OFF, O/I Link, user communication, maintenance communication, DM Link Communication, PLC Link Communication, alarm log, data log, operation log, data storage area, preventive maintenance, recipe, text group, global script, user account, project data transfer using external memory, downloading logged data in external memory, USB auto-run function |

## Input Specifications

| | | | *12RA-* | *14KA-* | *14SA-* | H12RA B12RA | H12RC B12RA | H24RA B24RA | H24RC B24RC | H40RKA B40RKA | H40RSA B40RSA | H40RC B40RC | H48KA B48KA | H48SA B48SA | H48KC B48KC | H48SC B48SC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Digital Input | Input Points | | 6 | | | 6 | 8 | 12 | 16 | 18 | | 24 | 22 | | 30 | |
| | Input Type | | Sink | Source | Sink | Sink | No-voltage (with contact) | Sink | Sink/ Source | Source | Sink | Sink/ Source | Source | Sink | Sink/Source | |
| | Input Voltage Range | | 0 to 28.8V DC | | | | | | | | | | | | | |
| | Rated Input Current | | 4.4 mA | 5.2 mA | 4.4 mA | No-voltage type and sink/source type: 5.3 mA, sink type: 4.4 mA, source type: 5.2 mA | | | | | | | | | | |
| | Input Impedance | | 5.5 kΩ | 4.7 kΩ | 5.5 kΩ | No-voltage type and sink/source type: 4.3 kΩ, sink type: 5.5 kΩ, source type: 4.7 kΩ | | | | | | | | | | |
| | Input Delay Time | OFF -ON | 2.5 µs + soft filter setting | | | 40 µs + filter value (high-speed input section: 2.5 µs + soft filter value) | | | | | | | | | | |
| | | ON - OFF | 5 µs + soft filter setting | | | 150 µs + filter value (high-speed input section: 5 µs + soft filter value) | | | | | | | | | | |
| | Isolation | Between input terminals | Not isolated | | | Not isolated | | | | | | | | | | |
| | | Internal circuit | Not isolated | | | No-voltage type and sink/source type: photocoupler isolated, sink type and source type: not isolated | | | | | | | | | | |
| | Input Type | | Type 1 (IEC 61131-2) | | | | | | | | | | | | | |
| | External Load for I/O Interconnection | | Not needed | | | | | | | | | | | | | |
| | Operating Level | OFF voltage | Sink type: 5V DC max. Source type: 15V DC min. | | | No-voltage type: 18 kΩ min., sink/source type and sink type: 5V DC max., source type: 15V DC min. | | | | | | | | | | |
| | | ON voltage | Sink type: 15V DC min. Source type: 5V DC max. | | | No-voltage type: 2 kΩ max., sink/source type and sink type: 15V DC min., source type: 5V DC max. | | | | | | | | | | |
| | | OFF current | Sink type: 0.9 mA max. Source type: –1.0 mA min. | | | No-voltage type and sink/source type: 1.1 mA max., sink type: 0.9 mA max., source type: –1.0 mA min. | | | | | | | | | | |
| | | ON current | Sink type: 2.7 mA min. Source type: –3.0 mA max. | | | No-voltage type and sink/source type: 3.0 mA min., sink type: 2.7 mA min., source type: –3.0 mA max. | | | | | | | | | | |

| | | | *12RA-* | *14KA-* | *14SA-* | H12RA B12RA | H12RC B12RA | H24RA B24RA | H24RC B24RC | H40RKA B40RKA | H40RSA B40RSA | H48KA B48KA | H48SA B48SA | H48KC B48KC | H48SC B48SC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analog Input | Input Points | | 2 | | | 2 | — | 4 | — | 6 | | — | 8 | | — |
| | Input Type | | Voltage input | Voltage/Current input | | Voltage input | | Voltage input | | Voltage input | | | Voltage input | | |
| | Input Range | | 0 to 10.0V DC | 0 to 10.0V DC / 4 to 20 mA | | 0 to 10.0V DC | | 0 to 10.0V DC | | 0 to 10.0V DC | | | 0 to 10.0V DC | | |
| | Sampling Duration Time | | 2 ms maximum | | | 2 ms maximum | | 2 ms maximum | | 2 ms maximum | | | 2 ms maximum | | |
| | Total Input System Transfer Time | | 3 ms + sampling time + scan time | 3 ms + sampling time + scan time (voltage input)<br>12 ms + sampling time + scan time (current input) | | 2 ms + filtering time + scan time | | 2 ms + filtering time + scan time | | 2 ms + filtering time + scan time | | | 2 ms + filtering time + scan time | | |
| | Digital Resolution | | 0 to 1,000 (10 bits) | | | 0 to 1,000 (10 bits) | | 0 to 1,000 (10 bits) | | 0 to 1,000 (10 bits) | | | 0 to 1,000 (10 bits) | | |
| | Input Error | 25°C | ±3% of full scale | | | ±1.5% of full scale | | ±1.5% of full scale | | ±1.5% of full scale | | | ±1.5% of full scale | | |
| | | Total | ±5% of full scale | | | ±5% of full scale | | ±5% of full scale | | ±5% of full scale | | | ±5% of full scale | | |
| | Isolation | Between input terminals | Not isolated | | | Not isolated | | Not isolated | | Not isolated | | | Not isolated | | |
| | | Internal circuit | Not isolated | | | Not isolated | | Not isolated | | Not isolated | | | Not isolated | | |
| | When used as digital input | Digital I/O | Type 1 (not conforming to IEC 61131-2 digital I/O type) | | | | | | | | | | | | |
| | | Operation Level | OFF voltage: 5V maximum | | | | | | | | | | | | |
| | | | ON voltage: 15V minimum | | | | | | | | | | | | |
| | | | OFF current: 0.06 mA maximum | | | | | | | | | | | | |
| | | | ON current: 0.20 mA minimum | | | | | | | | | | | | |
| | External Power for Input | Input Voltage Range | — | | | — | | — | 20.4 to 26.4V DC | — | | 20.4 to 26.4V DC | — | | 20.4 to 26.4V DC |
| | | Output Current Capacity | — | | | — | | — | 250 mA | — | | 300 mA | — | | 300 mA |

## Output Specifications

| Part Number | | | ✻12RA-✻ | ✻14KA-✻ | ✻14SA-✻ |
|---|---|---|---|---|---|
| Transistor Output | Output Points | Transistor Sink Output | — | 4 | — |
| | | Transistor Source Output | | — | 4 |
| | Rated Load Voltage | | | 24V DC | |
| | Input Voltage Range | | | 20.4 to 28.8V DC | |
| | Maximum Load Current | 1 point | | 0.3A maximum | |
| | | 1 common | | 1A maximum | |
| | Voltage Drop (ON Voltage) | | | 1V maximum (voltage between COM and output terminals when output is ON) | |
| | Inrush Current | | | 1A | |
| | Leakage Current | | | 0.1 mA maximum | |
| | Clamping Voltage | | | 39V ± 1V | |
| | Maximum Lamp Load | | | 8 W maximum | |
| | Inductive Load | | | L/R = 10 ms (28.8V DC, 1 Hz) | |
| | External Current Draw | | | 100 mA maximum, 24V DC | |
| | Isolation | Between output terminal and internal circuit | | Photocoupler isolated | |
| | | Between output terminals | | Not isolated | |
| | Output Delay | OFF ☐ ON | | 100µS max. | |
| | | ON ☐ OFF | | 200µS max. | |
| Relay Output Common | Electrical Life | | 100,000 operations minimum (resistive load 1,800 operations/h) | — | — |
| | Mechanical Life | | 20 million operations minimum (no load 18,000 operations/h) | — | — |
| | Dielectric Strength | Between output terminal and internal circuit | 2,300V AC, 1 minute | — | — |
| | | Between output terminals (between COMs) | 2,300V AC, 1 minute | — | — |
| Analog Output | Output Points | | — | 2 | |
| | Analog Output Signal Type | | | Voltage/Current output (Selectable) | |
| | Analog Output Range | | | 0 to 10V DC / 4 to 20mA | |
| | Load Impedance | | | 2kΩ min (voltage input) / 500 Ω max (current input) | |
| | Applicable Load Type | | | Resistive Load | |
| | Maximum Deviation at 25°C | | | ±0.3% of full scale | |
| | Temperature Coefficient | | | ±0.02%/°C of full scale | |
| | Repeatability After Stabilization Time | | | ±0.4% of full scale | |
| | Non-linearity | | | ±0.01% of full scale | |
| | Output Ripple | | | 30mV max. (spike noise not included) | |
| | Overshoot | | | 0% (Note 2) | |
| | Total Error | | | ±1.0% of full scale including ripple | |
| | Effect of Improper Output Connection | | | No damage | |
| | Digital Resolution | | | 0 to 1,000 (10 bits) | |
| | Output Value of LSB | | | 10mV (0-10V) / 16µA (4-20mA) | |
| | Monotonicity | | | Yes | |
| | Current loop open | | | Not detectable | |

Note 1: High-speed output terminal (100 kHz pulse output terminal): 5 µs max. Normal output terminal (including 5kHz pulse output terminal): 100 µs max.
Note 2: Overshoot may occur under light load conditions. Overshoot can be suppressed by inserting a damping resistor. Damping resistor value: approx. 150Ω including the input impedance.

## Output Specifications

| | | | H12RA B12RA | H12RC B12RC | H24RA B24RA | H24RC B24RC | H40RKA B40RKA | H40RSA B40RSA | H40RC B40RC | H48KC B48KC | H48SC B48SC | H48KA B48KA | H48SA B48SA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Transistor Output | Output Points | Transistor Sink Output | — | — | — | — | 4 | — | — | 18 | — | 18 | — |
| | | Transistor Source Output | | | | | — | 4 | | — | 18 | — | 18 |
| | Rated Load Voltage | | | | | | 24V DC | | | 24V DC | | | |
| | Input Voltage Range | | | | | | 20.4 to 28.8V DC | | | 20.4 to 28.8V DC | | | |
| | Maximum Load Current | 1 point | | | | | 0.3A maximum | | | 0.3A maximum | | | |
| | | 1 common | | | | | 1A maximum | | | 1A maximum | | | |
| | Voltage Drop (ON Voltage) | | | | | | 1V maximum (voltage between COM and output terminals when output is ON) | | | 1V maximum (voltage between COM and output terminals when output is ON) | | | |
| | Inrush Current | | | | | | 1A | | | 1A | | | |
| | Leakage Current | | | | | | 0.1 mA maximum | | | 0.1 mA maximum | | | |
| | Clamping Voltage | | | | | | 39V ± 1V | | | 39V ± 1V | | | |
| | Maximum Lamp Load | | | | | | 8 W maximum | | | 8 W maximum | | | |
| | Inductive Load | | | | | | L/R = 10 ms (28.8V DC, 1 Hz) | | | L/R = 10 ms (28.8V DC, 1 Hz) | | | |
| | External Current Draw | | | | | | 100 mA maximum, 24V DC (V terminal supply power) | | | 100 mA maximum, 24V DC (V terminal supply power) | | | |
| | Isolation | Between output terminal and internal circuit | | | | | Photocoupler isolated | | | Photocoupler isolated | | | |
| | | Between output terminals | | | | | Same common line: Not isolated Separate common line: isolated | | | Same common line: Not isolated Separate common line: isolated | | | |
| | Output Delay | OFF -+ ON | | | | | (Note) | | | (Note) | | | |
| | | ON -+ OFF | | | | | (Note) | | | (Note) | | | |
| 10A relay | Output Points | | 4 | | | | | | | — | — | — | — |
| | Output Type | | 1a contact | | | | | | | | | | |
| | Rated Load Current | | 240V AC 10A, 30V DC 10A | | | | | | | | | | |
| | Minimum Switching Load | | 10 mA/5V DC (reference value) | | | | | | | | | | |
| | Initial Contact Resistance | | 100 mΩ maximum (1A, at 6V DC) | | | | | | | | | | |
| 2A relay | Output Points | | — | — | 4 | 4 | 8 | 8 | 12 | | | | |
| | Output Points per Common Line | COM4 | | | 4 | 4 | 4 | 4 | 4 | | | | |
| | | COM5 | | | — | — | 4 | 4 | 4 | | | | |
| | | COM6 | | | — | — | — | — | 4 | | | | |
| | Output Type | | | | 1a contact | | | | | | | | |
| | Maximum Load Current | 1 point | | | 240V AC 2A, 30V DC 2A | | | | | | | | |
| | | 1 common | | | 8A maximum | | | | | | | | |
| | Minimum Switching Load | | | | 1 mA/5V DC (reference value) | | | | | | | | |
| | Initial Contact Resistance | | | | 30 mΩ maximum (1A, at 6V DC) | | | | | | | | |
| Relay Output Common | Electrical Life | | 100,000 operations minimum (resistive load 1,800 operations/h) | | | | | | | | | | |
| | Mechanical Life | | 20 million operations minimum (no load 18,000 operations/h) | | | | | | | | | | |
| | Dielectric Strength | Between output terminal and internal circuit | 2,300V AC, 1 minute | | | | | | | | | | |
| | | Between output terminals (between COMs) | 2,300V AC, 1 minute | | | | | | | | | | |

# Analog Expansion Cartridge Specifications (FC6A-P)

## General Specifications

| Part No. | FC6A-PJ2A | FC6A-PJ2CP | FC6A-PK2AV | FC6A-PK2AW |
|---|---|---|---|---|
| Type | Voltage/Current Input | Temperature Input | Voltage Output | Current Output |
| Number of Input/Output | 2 | 2 | 2 | 2 |
| Rated Voltage | 5.0V, 3.3V (supplied from the Touch) | | | |
| Consumption Current | 5.0V: –<br>3.3V: 30mA | | 5.0V: 70mA<br>3.3V: 30mA | 5.0V: 185mA<br>3.3V: 30mA |
| Weight | 15g | | | |

## Output Specifications

| Part Number | | FC6A-PK2AV | FC6A-PK2AW |
|---|---|---|---|
| | | Voltage Output | Current Output |
| Output Type | Voltage Output | 0 to 10V DC | — |
| | Current Output | — | 4 to 20mA DC |
| Load | Impedance | 2kΩ min. | 500 kΩ max. |
| | Load Type | Resistance Load | |
| D/A Conversion | Cycle Time | 20ms | |
| | Settling Time | 40ms max. | 20ms max. |
| | Total Output System Transfer Type | 60ms+1 scan | 40ms+1 scan |
| Output error | Maximum Error at 25°C | ±0.3% of full scale | |
| | Temperature Coefficient | ±0.02%/°C of full scale | |
| | Reproducibility after Stabilization Time | ±0.4% of full scale | |
| | Non-linearity | ±0.01% of full scale | |
| | Output Ripple | 30mV max. | |
| | Overshoot | 0% | |
| | Maximum Error | ±1.0% of full scale | |
| | Effect of Improper Output Terminal Connection | No damage | |
| Data | Digital Resolution | 4096 (12 bits) | |
| | LSB Output Value | 2.44mV (0 to 10V) | 3.91µA (4 to 20mA) |
| | Data Format in Application | 0 to 4095 (0 to 10V) | 0 to 4095 (4 to 20mA) |
| | Monotonicity | Yes | |
| | Open Current Loop | — | Cannot be detected |
| Noise Resistance | Maximum Temporary Deviation during Electrical Noise Tests | ±4.0 of full scale | |
| | Recommended Cable | Shieleded twisted pair | |
| | Crosstalk | 1 LSB max. | |
| Isolation | | None | |
| Calibration to Maintain Rated Accuracy | | Impossible | |
| Selection of Output Signal Type | | Voltage output only | Current output only |

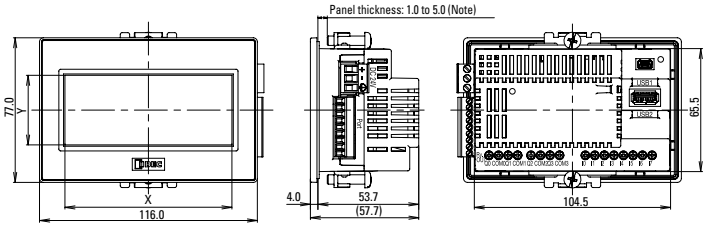
## Input Specifications

| Part No. | | FC6A-PJ2A | | FC6A-PJ2CP | |
|---|---|---|---|---|---|
| Input Type | | Voltage Input | Current Input | Resistance Thermometer | Thermocouple |
| Input Range | | 0 to 10V DC | 4 to 20mA DC<br>0 to 20mA DC | Pt100: –200 to +850°C<br>Pt1000: –200 to +600°C<br>Ni100: –60 to +180°C<br>Ni1000: –60 to +180°C<br>3-wire RTD | K: –200 to 1300°C<br>J: –200 to 1000°C<br>R: 0 to 1760°C<br>S: 0 to 1760°C<br>B: 0 to 1820°C<br>E: –200 to 800°C<br>T: –200 to 400°C<br>N: –200 to 1300°C<br>C: 0 to 2315°C |
| Input Impedance | | 1MΩ min. | 250Ω max. | 1MΩ min. | |
| Allowable Conductor Resistance | | — | | 10Ω max. | — |
| Input Detection Current | | — | | Typ: 0.2mA, 1.0mA max. | — |
| AD Conversion | Sample Duration Time | 10ms | | 250ms | |
| | Sample Interval | 20ms | | 500ms | |
| | Total Input System Transfer Time | 20ms + 1 scan | | 500ms + 1 scan | |
| | Type of Input | Single-ended input | | | |
| | Operating Mode | Self-scan | | | |
| | Conversion Method | SAR | | | |
| Input Error | Maximum Error at 25°C | ±0.1% of full scale | | ±0.1% of full scale | ±0.1% of full scale<br>Cold junction compensation accuracy ±4.0°C or less<br>Exceptions<br>R, S thermocouple error: ±6.0°C (0 to 200 °C range only)<br>B thermocouple error: Not guaranteed (0 to 300 °C range only)<br>K, J, E, T, N thermocouple error: ±0.4% of full scale (0°C or lower range only |
| | Temperature Coefficient | ±0.02%/°C of full scale | | | |
| | Reproducibility After Stabilization Time | ±0.5% of full scale | | | |
| | Non-liniarity | ±0.01% of full scale | | | |
| | Maximum Error | ±1.0% of full scale | | | |
| Data | Digital Resolution | 4096 (12 bits) | | Pt100: 10,500 (14 bits)<br>Pt1000: 8000 (13 bits)<br>Ni100: 2400 (12 bits)<br>Ni1000: 2400 (12 bits) | K: 15,000 (14 bits)<br>J: 12,000 (14 bits)<br>R: 17,600 (15 bits)<br>S: 17,600 (15 bits)<br>B: 18,200 (15 bits)<br>E: 10,000 (14 bits)<br>T: 6,000 (13 bits)<br>N: 15,000 (14 bits)<br>C: 23,150 (15 bits) |
| Noise Resistance | LSB Input Value | 2.44mV (0 to 10V DC) | 4.88µA (DC0 to 20mA)<br>3.91µA (DC4 to 20mA) | 0.1°C 0.18°F | |
| | Data Format in Application | Can be arbitrarily set for each channel in the range of –32,768 to 32,773 | | | |
| | Monotonicity | Yes | | | |
| | Maximum Temporary Deviation during Electrical Noise Tests | ±4.0% of full scale | | | |
| | Recommended Cable | Shielded twisted pair | | Twisted pair | |
| | Crosstalk | 1LSB max. | | | |
| Isolation | | None | | | |
| Effect When Input is Incorrectly Wired | | No damage | | | |
| Maximum Allowable Constant Load (non-destructive) | | 13V DC | 40mA | 13V DC | |
| Input Type Modification | | Software programming | | | |
| Calibration to Maintain Rated Accuracy | | Impossible | | | |

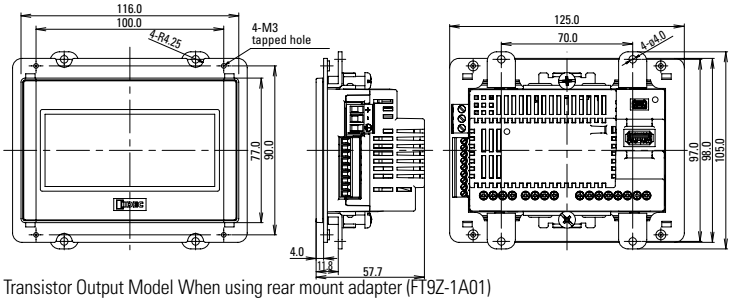
# Dimensions (mm)

## Touch

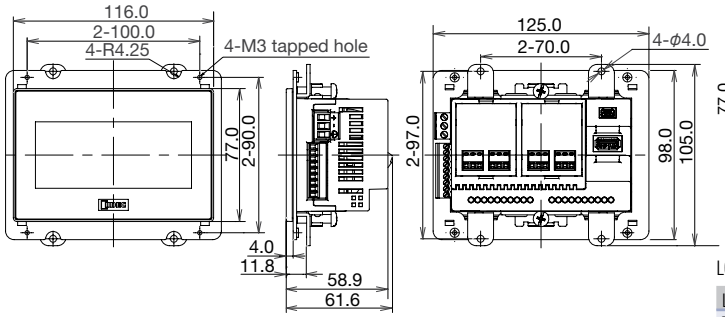
Relay Output Model When using mounting bracket (HG9Z-4K2PN04)



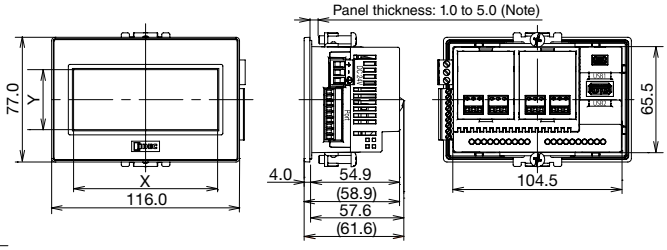

Relay Output Model When using rear mount adapter (FT9Z-1A01)




Transistor Output Model When using mounting bracket HG9Z-4K2PN04




Transistor Output Model When using rear mount adapter (FT9Z-1A01)



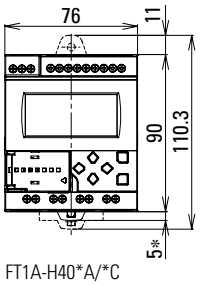

LCD Active Area

| LCD Type | X | Y |
|---|---|---|
| TFT | 88.92 | 37.05 |
| STN | 87.59 | 35.49 |

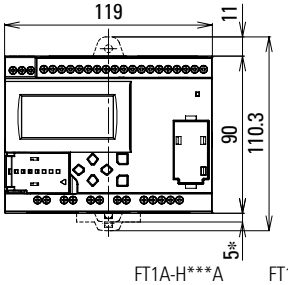
Note: Waterproof characteristics depend on panel material and size.

### With LCD

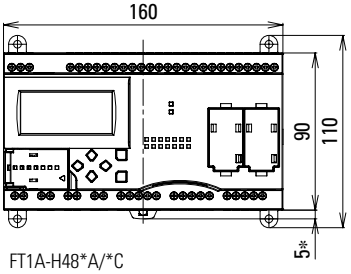
FT1A-H12*A/*C



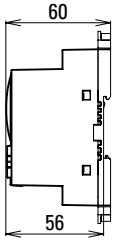

FT1A-H24*A/*C



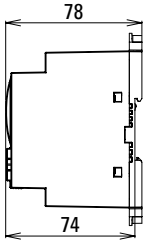

FT1A-H40*A/*C



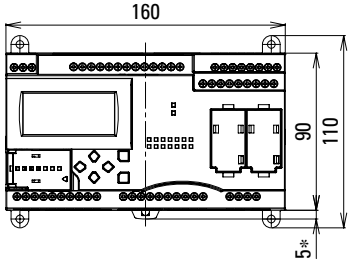

FT1A-H***A

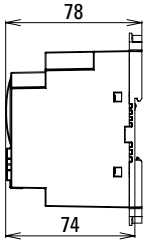



FT1A-H***C




FT1A-H48*A/*C

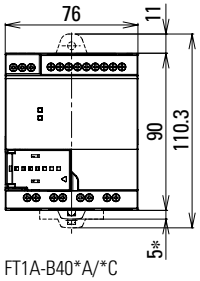


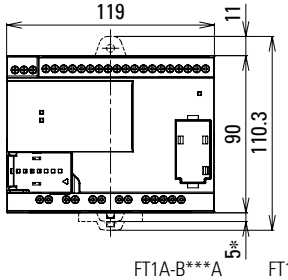

Note: 9.3 mm when the clamp is pulled out.

### Without LCD

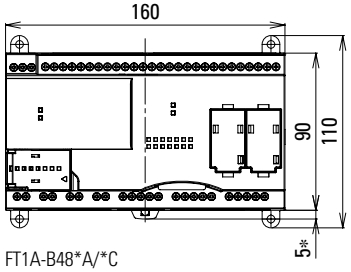
FT1A-B12*A/*C



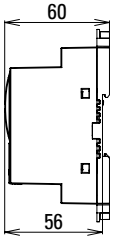

FT1A-B24*A/*C



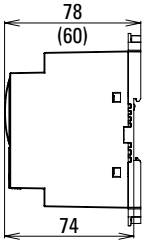

FT1A-B40*A/*C



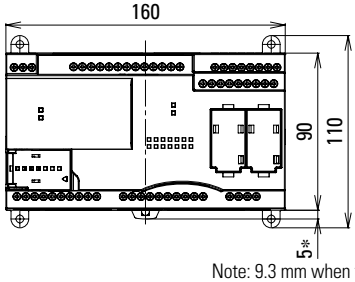

FT1A-B***A

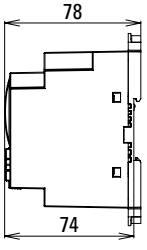



FT1A-B***C




FT1A-B48*A/*C

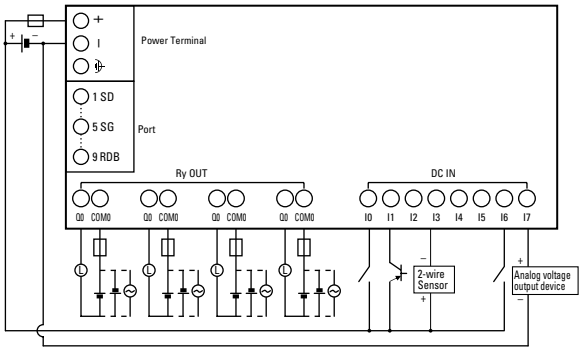


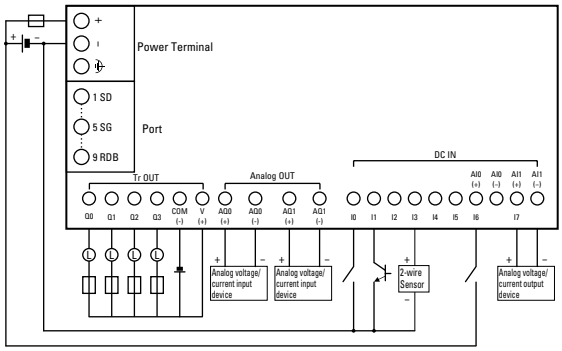

Note: 9.3 mm when the clamp is pulled out.

## Terminal Arrangement and I/O Wiring Diagram Examples

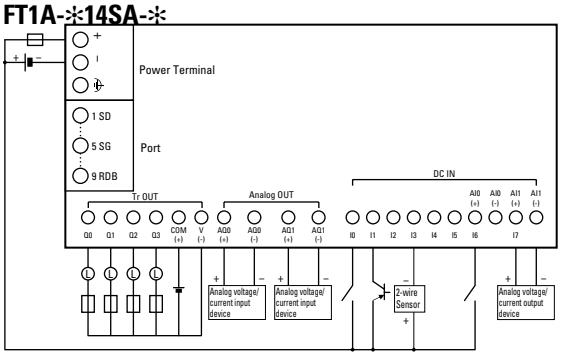
### FT1A-*12RA-*




### FT1A-*14KA-*

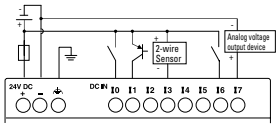



### FT1A-*14SA-*

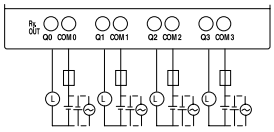



### FT1A-*12RA

Input Side

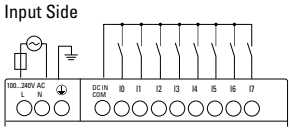



Output Side

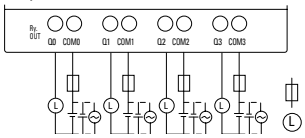


### FT1A-*12RC

Input Side



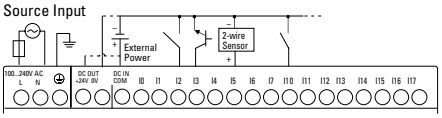
Output Side



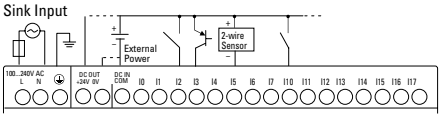

### FT1A-*24RC-①

Input Side (sink/source)

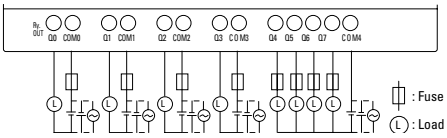
Source Input




Sink Input



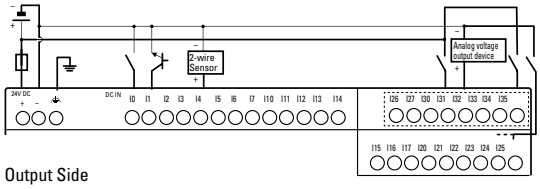

Output Side




### FT1A-*48SA-②

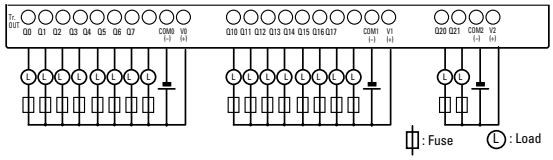
Input Side

Source Input (Analog/Digital Shared Input is Sink Input)




Output Side

Sink Output

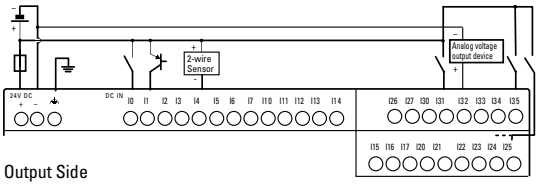



See ① for FT1A-*40RC, ① and ② for FT1A-*40RSA, and ① and ③ for FT1A-*40RKA.

### FT1A-*48KA-③

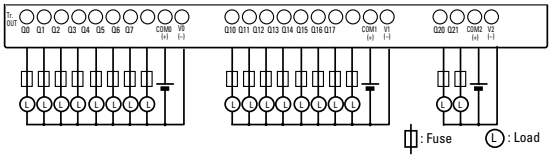
Input Side

Sink Input



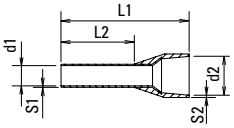

Output Side

Source Output

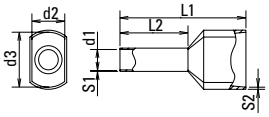


# Recommended Ferrules

For 1-wire connection



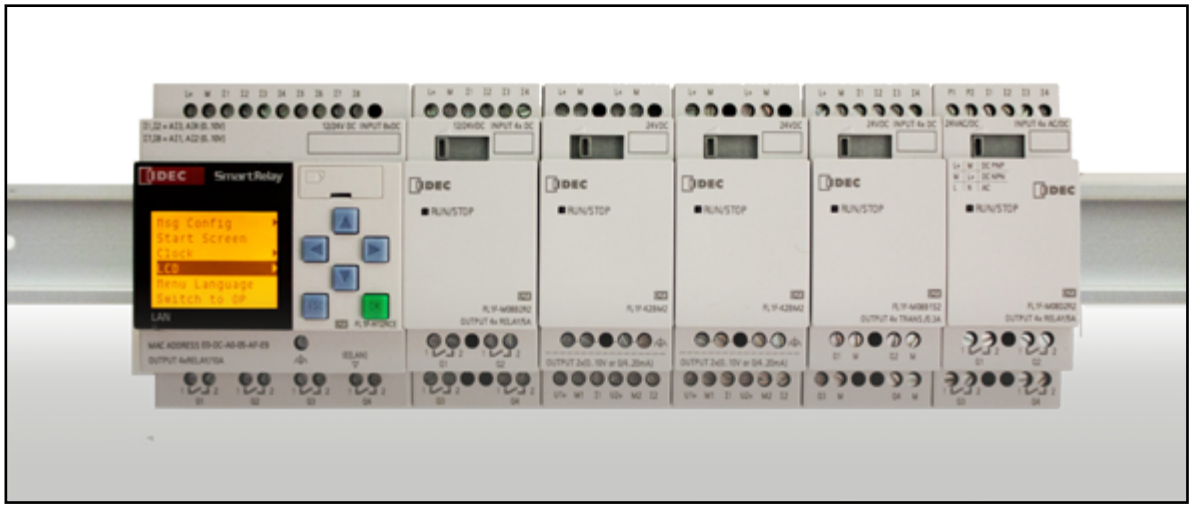

For 2-wire connection




| | Cross Section (mm2) | AWG | Phoenix Contact Part No. | Touch | | | | Pro/Lite | | L1 | L2 | d1 | S1 | d2 | d3 | S2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Power Supply | Serial Interface | I/O | | Power Supply | I/O | | | | | | | |
| | | | | | | Relay Output Model | Transistor Output Model | | | | | | | | | |
| 1-wire connection | 0.25 | 24 | AI0.25-8YE | — | | | | × | | 12.5 | 8.0 | 0.8 | 0.15 | 1.8 | — | 0.25 |
| | 0.34 | 22 | AI0.34-8TQ | × | × | × | × | — | | 12.5 | 8.0 | 0.8 | 0.15 | 2.0 | | 0.25 |
| | 0.5 | 20 | AI0.5-8WH | × | × | × | × | | | 14.0 | 8.0 | 1.1 | 0.15 | 2.5 | | 0.25 |
| | 0.75 | 18 | AI0.75-8GY | × | — | × | — | | | 14.0 | 8.0 | 1.3 | 0.15 | 2.8 | | 0.25 |
| | 1.0 | | AI1-8RD | × | | — | | × | | 14.0 | 8.0 | 1.5 | 0.15 | 3.0 | | 0.3 |
| | | | AI1-10RD | — | — | × | — | — | | 16.0 | 10.0 | 1.5 | 0.15 | 3.0 | | 0.3 |
| | 1.5 | 16 | AI1.5-8BK | × | | — | | × | | 14.0 | 8.0 | 1.8 | 0.15 | 3.4 | | 0.3 |
| | | | AI1.5-10BK | — | | × | | — | | 18.0 | 10.0 | 1.8 | 0.15 | 3.4 | | 0.3 |
| 2-wire connection | 0.5 | 20 | AI-TWIN2×0.5-8WH | × | × | — | × | — | | 15.0 | 8.0 | 1.5 | 0.15 | 2.5 | 4.6 | 0.25 |
| | 0.75 | 18 | AI-TWIN2×0.75-8GY | × | — | | — | × | | 15.0 | 8.0 | 1.8 | 0.15 | 2.8 | 5.2 | 0.25 |
| | | | AI-TWIN2×0.75-10GY | — | | × | | — | | 17.0 | 10.0 | 1.8 | 0.15 | 2.8 | 5.2 | 0.25 |
| Screwdriver | | | SZS 0.6×3.5 | × | — | × | — | × | | | | | | | | |
| | | | SZS 0.4×2.5 | — | × | — | × | — | | | | | | | | |

Note: Crimping pliers - Phoenix Contact part number CRIMPFOX ZA3 (12101882)

# IDEC SmartRelay –The Intelligent Choice



Look around. IDEC SmartRelays are in everything from lighting controls to ice-making machines and grocery store misters. Proving reliable time after time, these intelligent logic modules are the ideal controller for simple automation tasks. A new sixth-generation of SmartRelays offer functions to give you even more flexibility and convenience.

Advances include embedded Ethernet port with web server functions, micro SD port for data logging and program storage, extended memory, a brighter display with higher LCD contrast, improved analog and high-speed inputs, an external text display, and upgraded programming software.

## Industrial Facility Systems

- Conveyor systems
- Elevator controls
- Exhaust and filtering systems
- Automatic food dispensing machines
- Water treatment and irrigation systems
- Motor, pump and valve controls

## Unique Solutions

- Solar-electric systems
- Marine systems
- Extreme environmental conditions
- Display panels and traffic light controls
- Energy management

## Housing and Building Management

- Lighting controls (outside and inside)
- Door and gate controls
- Heating and cooling systems
- Shutter, sun blind and awning controls
- Water and sprinkler systems
- Ventilation systems

## Monitoring Systems

- Access controls
- Alarm systems
- Limit level monitoring
- Parking Lot monitoring
- Baggage control

**www.IDEC.com/smartrelay**

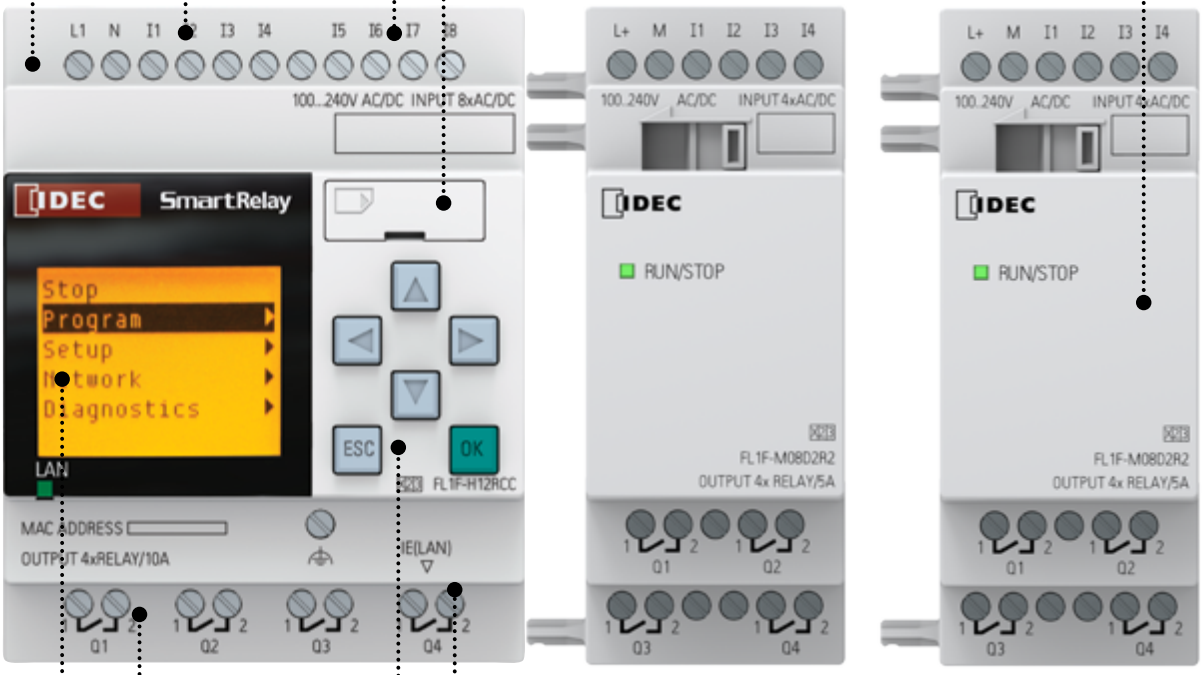
### Universal Supply Voltage
- 12-24V DC, 24V DC, 24V AC/DC and 100-240V AC/DC models

### Built-in Analog Inputs
- 4 x 0-10V DC, 10-bit resolution

### High Speed Inputs
- Up to 4 inputs can be configured as 5 KHz high speed inputs

### Micro SD card
- Every IDEC SmartRelay is now equipped with a micro SD slot for program storage, transfer and data logging
- Special memory cartridge is no longer required

### Expansion interface
- Add expansion modules for additional I/O
- Up to 12 expansion modules can be added
- Total maximum I/O: 24 digital inputs, 20 digital outputs, 8 analog inputs, 8 analog outputs




### Digital Outputs
- 10A relay or transistor outputs

### Operational Control Buttons
- Using built-in LCD screen and buttons, simple program can be created without PC and software
- Change preset values such as Timers and Counters

### Embedded RJ45 Ethernet Port
- Remote program download, upload and monitor
- Integrated web server for remote monitoring and control
- Easily create, monitor and control web pages with no HTML programing

### New and improved LCD display
- 6 lines (16/10 characters per line)
- 3 backlight colors (white, amber, red)

Class 1, Div 2

# Part Numbers

## Base Modules – with and without LCD

| Style | Part Number | Rated Power Voltage | Input Signal | I/O Points | Output | Display | With Clock | Weight |
|---|---|---|---|---|---|---|---|---|
| | FL1F-H12SCD | 24V DC | DC<br>I1, I2, I7 and I8 are used for digital/analog inputs | 8/4 points | Transistor | Yes | Yes | 195g |
| | FL1F-H12RCE | 12/24V DC | | 8/4 points | Relay | Yes | | 204g |
| | FL1F-B12RCE | | | | | — | | 200g |
| | FL1F-H12RCA | 24V AC/DC | AC/DC | 8/4 points | Relay | Yes | | 240g |
| | FL1F-B12RCA | | | | | — | | 200g |
| | FL1F-H12RCC | 100 to 240V AC/DC | AC/DC | 8/4 points | Relay | Yes | | 240g |
| | FL1F-B12RCC | | | | | — | | 200g |

## Text Message Display

| Style | Part Number | Rated Voltage | Description | Weight |
|---|---|---|---|---|
| | FL1F-RD1 | 12 V DC, 24 V AC/DC | FL1F Text Display Panel | 220g |

## Digital and Analog I/O Expansion Modules

- 8-pt expansion module (4 in/4 out)
- Max. 4 digital expansion modules, 4 analog input modules, and 4 analog output modules

| Style | Part Number | Total I/O | Input Power | Input Signal | Output Signal | Weight |
|---|---|---|---|---|---|---|
| | FL1F-M08B1S2 | 4/4 points | 24V DC | DC | Transistor | 95g |
| | FL1F-M08B2R2 | 4/4 points | 12/24V DC | DC | Relay | 130g |
| | FL1F-M08D2R2 | 4/4 points | 24V AC/DC[2] | AC/DC[2] | Relay | 130g |
| | FL1F-M08C2R2 | 4/4 points | 100 to 240V AC/DC | AC/DC | Relay | 130g |
| | FL1F-J2B2 | 2/0 points | 12/24V DC | Analog | — | 95g |
| | FL1F-K2BM2 | 0/2 points | 24V DC | — | Analog | 95g |

## Starter Kits

IDEC SmartRelay Starter Kit is an economical and ideal solution for first time IDEC SmartRelay users

- Package includes a base module, WindLGC programming software, simulator switch (DC models only) and a 15W power supply (DC models only).

| CPU | | LCD Screen | Software | Part Number |
|---|---|---|---|---|
| | 12 I/O, 24V AC/DC, FL1F-B12RCA CPU | – | √ | KIT-SMARTRELAY-BAF |
| | 12 I/O, 100-240V AC/DC, FL1F-B12RCC CPU | – | √ | KIT-SMARTRELAY-BCF |
| | 12 I/O, 12-24V AC/DC, FL1F-B12RCE CPU | – | √ | KIT-SMARTRELAY-BEF |
| | 12 I/O, 24V AC/DC FL1F-H12RCA CPU | √ | √ | KIT-SMARTRELAY-HAF |
| | 12 I/O, 100-240V AC/DC, FL1F-H12RCC CPU | √ | √ | KIT-SMARTRELAY-HCF |
| | 12 I/O, 12/24V DC, FL1F-H12RCE CPU | √ | √ | KIT-SMARTRELAY-HEF |
| | 12 I/O, 24V DC, FL1F-H12SCD CPU | √ | √ | KIT-SMARTRELAY-HDF |

## Accessories

| Description | Part Number | Package Quantity | Remarks |
|---|---|---|---|
| Application Software: WindLGC | FL9Y-LP1CDW | 1 | DVD-ROM (incl. online help manual) |
| Mounting Clip for Base Module | FL1F-PSP1PN05 | 5 | Supplied with a module[3] |
| Mounting Clip and Waterproof Gasket for Text Display | FL1F-KW1 | 1 | Supplied with text display[4] |
| IDEC SmartRelay User's Manual (English) | | | Downloadable from: http://www.idec.com/download |

3 Supplied with a base module and an expansion module.
4 Supplied with a text display, it includes a gasket, four mounting clips, and a power supply connector.

# WindLGC

## Programming Software

WindLGC is the exclusive programming software for the IDEC SmartRelay using Windows®. Edit, save, and print out your programs.

**Key features:**

- Ladder programming
- Online Monitor
- Program Comparison
- Time Simulation
- Simplified connection of the functions
- Programs can be saved in PDF or JPG format

Just click the function blocks you need and link function blocks for easy wiring. Devise complicated circuits using the convenient functions of WindLGC.

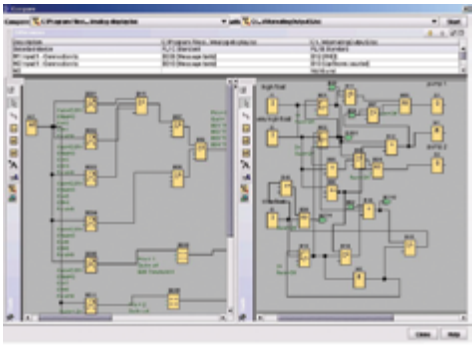
### Part Number

| Part Number | Description |
|---|---|
| FL9Y-LP1CDW | WindLGC programming software for IDEC SmartRelay |

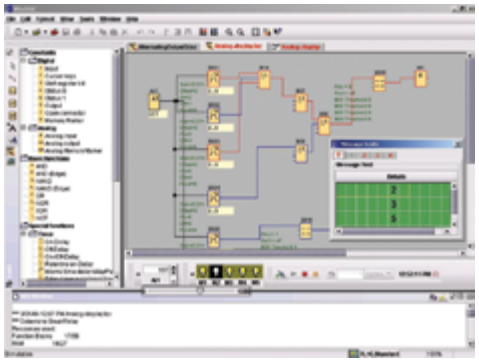
### WindLGC system requirements:

- OS: Windows XP, Vista, 7 and 8.
- CPU recommendation: Pentium 266MHz or higher
- Memory: 64MB or more
- RAM recommendation: 128MB
- Hard disk space: 90MB or more for installing WindLGC software.
- Monitor Recommendation: Display more than 800 x 600 dots and 256 colors

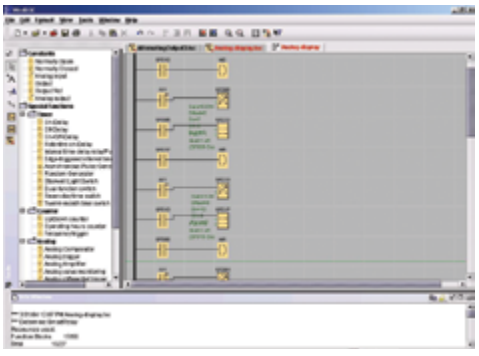
### Program Comparison



### Simulation Mode/Online Monitor



### Ladder Programming



For more information, see the Automation Software section.

Visit **www.IDEC.com/downloads** for free upgrades or a free demo version.

# Specifications

## Base Modules

| | Base Module Type No. | | FL1F-H12SCD | FL1F-H12RCE<br>FL1F-B12RCE | FL1F-H12RCA<br>FL1F-B12RCA | FL1F-H12RCC<br>FL1F-B12RCC |
|---|---|---|---|---|---|---|
| Power Supply | Rated Power Voltage | | 24V DC | 12/24V DC | 24V AC/DC | 100 to 240V AC/DC |
| | Allowable Voltage Range | | 20.4 to 28.8V DC | 10.8 to 28.8V DC | 20.4 to 26.4V AC<br>20.4 to 28.8V DC | 85 to 265V AC<br>100 to 253V DC |
| | Rated Frequency | | — | — | 47 to 63Hz | 47 to 63Hz |
| | Current Draw | | 15 to 50 mA (24V DC)<br>1.2A (with max. load on digital output) | 30 to 140 mA (12V DC)<br>15 to 90 mA (24V DC) | 15 to 150mA (12V DC)<br>15 to 130mA (24V DC) | 15 to 40mA (100V AC) 5 to 10mA (100V DC)<br>15 to 25mA (240V AC) 2 to 8mA (240V DC) |
| | Allowable Momentary Power Interruption | | — | 2ms Typ. (12V DC)<br>5ms Typ. (24V DC) | 5ms Typ. (24V AC/DC) | 10ms Typ. (100V AC/DC)<br>20ms Typ. (240V AC/DC) |
| | Power Consumption | | 1.2 W (24V DC) | 1.7W (12V DC)<br>2.2W (24V DC) | 3.6 W (24V AC)<br>3.2 W (24V DC) | 4.6W (100V AC) 1.2W (100V DC)<br>6.0W (240V AC) 2.0W (240V DC) |
| | Reverse Polarity Protection | | Yes | Yes | — | — |
| Clock | Backup Duration | | 20 days | 20 days | 20 days | 20 days |
| | Clock Accuracy | | ±2 sec/day (Typ.) | ±2 sec/day (Typ.) | ±2 sec/day (Typ.) | ±2 sec/day (Typ.) |
| Input | Input Signal | | DC | DC | AC/DC | AC/DC |
| | Input Points | | 8 (I1 to I8) | 8 (I1 to I8) | 8 (I1 to I8) | 8 (I1 to I8) |
| | High-speed Input[1] | | 4 (I3, I4, I5, I6), 5kHz maximum | 4 (I3, I4, I5, I6), 5kHz maximum | — | — |
| | Analog Input Points | | 4 (I1, I2, I7, I8) | 4 (I1, I2, I7, I8) | — | — |
| | Analog Input Range | | 0 to 10V DC (max. rated input: 28.8V DC) | 0 to 10V DC (max. rated input: 28.8V DC) | — | — |
| | Analog Input Error | | ±1.5 (of full scale) | ±1.5 (of full scale) | — | — |
| | Analog Input Resolution | | 10 bits (0 to 1000) | 10 bits (0 to 1000) | — | — |
| | Cycle time | | 300ms | 300ms | 300ms | 300ms |
| | Allowable Voltage Range | | 0 to 28.8V DC | 0 to 28.8V DC | 0 to 26.4V AC<br>0 to 28.8V DC | 0 to 265V AC<br>0 to 253V DC |
| | Input Impedance | Digital Input | 5.8kΩ | 5.8kΩ | 4.8kΩ | 610kΩ |
| | | Analog Input | 72kΩ | 72kΩ | — | — |
| | Isolation | | — | — | — | — |
| | Operating Range | OFF Voltage | < 5V DC | < 5V DC | < 5V AC/DC | < 40V AC<br>< 30V DC |
| | | ON Voltage | ≥ 12V DC | ≥ 8.5 V DC | ≥ 12V AC/DC | ≥ 79V AC ≥ 79V DC |
| | | OFF Current | < 0.9mA (I3 to I6) < 0.07mA (I1, I2, I7, I8) | < 0.88mA (I3 to I6) < 0.07mA (I1, I2, I7, I8) | < 1.2mA | < 0.05mA (AC) < 0.06mA (DC) |
| | | ON Current | ≥ 2.1mA (I3 to I6) ≥ 0.18mA (I1, I2, I7, I8) | ≥ 1.5mA (I3 to I6) ≥ 0.12mA (I1, I2, I7, I8) | ≥ 2.6mA | ≥ 0.08mA (AC) ≥ 0.13mA (DC) |
| | Turn ON Time | | 1.5ms (Typ.)<br>≤ 1.0ms (I3 to I6) | 1.5ms (Typ.)<br>≤ 1.0ms (I3 to I6) | 1.5ms (Typ.) | 100V AC: 40ms (Typ.), 240V AC: 30ms (Typ.)<br>100V DC: 25ms (Typ.), 240V DC: 20ms (Typ.) |
| | Turn OFF Time | | 1.5ms (Typ.)<br>≤ 1.0ms (I3 to I6) | 1.5ms (Typ.)<br>≤ 1.0ms (I3 to I6) | 15ms (Typ.) | 100V AC: 45ms (Typ.), 240V AC: 70ms (Typ.)<br>100V DC: 60ms (Typ.), 240V DC: 75ms (Typ.) |
| | Wire Length[2] | | 100m | 100m | 100m | 100m |
| Output | Output Signal | | Transistor source output | Relay output | Relay output | Relay output |
| | Output Points/ Contact Configuration | | 4 points (separate) | 4NO contacts | 4NO contacts | 4NO contacts |
| | Isolation | | — | Isolated | Isolated | Isolated |
| | Dielectric Strength (between power/input terminals and output terminals) | | — | 2500V AC, 1 minute<br>500V DC, 1 minute | 2500V AC, 1 minute<br>500V DC, 1 minute | 2500V AC, 1 minute<br>500V DC, 1 minute |
| | Output Voltage | | External power voltage | — | — | — |
| | Maximum Load Current | | 0.3A maximum | Resistive load<br>10A at 12/24V AC/DC, 10A at 100/120V AC, 10A at 230/240V AC, 0.2A at 120V DC, 0.1A at 240V DC<br>Inductive load<br>2A at 12/24V AC/DC, 3A at 100/120V AC, 3A at 230/240V AC, 0.2A at 120V DC, 0.1A at 240V DC | |
| | Surge Current | | — | 30A maximum | 30A maximum | 30A maximum |
| | Short-circuit Protection | | Built-in current limiting resistor:<br>Approx. 1A | External fuse required:<br>16A maximum | External fuse required:<br>16A maximum | External fuse required:<br>16A maximum |
| | Minimum Switching Load | | — | 10mA, 12V DC (reference value) | 10mA, 12V DC (reference value) | 10mA, 12V DC (reference value) |
| | Initial Contact Resistance | | — | 100mΩ maximum<br>(at 1A, 24V DC) | 100mΩ maximum<br>(at 1A, 24V DC) | 100mΩ maximum<br>(at 1A, 24V DC) |
| | Mechanical Life | | — | 10 million operations<br>(no load, 10Hz) | 10 million operations<br>(no load, 10Hz) | 10 million operations<br>(no load, 10Hz) |
| | Electrical Life | | — | 100,000 operations<br>(rated resistive load)<br>1800 operations/hour | 100,000 operations<br>(rated resistive load)<br>1800 operations/hour | 100,000 operations<br>(rated resistive load)<br>1800 operations/hour |

1 When selecting frequency trigger function and up/down counter function.
2 10m when connected to analog input (twisted pair cable)
Initialization Time: After power-up, the FL1F takes a maximum of 9 seconds (when using a micro SD card) for initialization. When initialization is complete, the FL1F is automatically set to RUN mode.

## Expansion I/O Module

| Expansion I/O Module Type No. | | | FL1F-M08B1S2 | FL1F-M08B2R2 | FL1F-M08D2R2 | FL1F-M08C2R2 | FL1F-J2B2 | FL1F-K2BM2 |
|---|---|---|---|---|---|---|---|---|
| Power Supply | Rated Power Voltage | | 24V DC | 12/24V DC | 24V AC/DC | 100 to 240V AC/DC | 12/24V DC | 24V DC |
| | Allowable Voltage Range | | 20.4 to 28.8V DC | 10.8 to 28.8V DC | 20.4 to 26.4V AC<br>20.4 to 28.8V DC | 85 to 265V AC<br>100 to 253V DC | 10.8 to 28.8V DC | 20.4 to 28.8V DC |
| | Rated Frequency | | — | — | 50/60Hz (47 to 63Hz) | 50/60Hz (47 to 63Hz) | — | — |
| | Current Draw | | 15 to 40mA | 10 to 80mA (12V DC)<br>10 to 40mA (24V DC) | 20 to 100mA (24V AC)<br>8 to 50mA (24V DC) | 10 to 30mA (100V AC)<br>10 to 20mA (240V AC)<br>5 to 15mA (100V DC)<br>5 to 10mA (240V DC) | 15 to 30mA | 15 to 82mA |
| | Allowable Momentary Power Interruption | | — | 2 ms (typ.) (12V DC)<br>5 ms (typ.) (24V DC) | 5 ms (typ.) (24V AC/DC) | 10ms (typ) (100V AC/DC)<br>20ms (typ.) (240V AC/DC) | 10ms (typ.) (12/24V DC) | 10ms (typ.) |
| | Power Consumption | | 1.0W | 1.0W (12V DC)<br>1.0W (24V DC) | 2.4W (24V AC)<br>1.2W (24V DC) | 3.5W (100V AC) 1.8W (100V DC)<br>4.8W (240V AC) 2.4W (240V DC) | 0.4W (12V DC)<br>0.8W (24V DC) | 2.0W |
| | Reverse Polarity Protection | | Yes | Yes | — | — | Yes | Yes |
| Input | Input Signal | | DC input | DC input | AC/DC input | AC/DC input | Analog input | — |
| | Input Points | | 4 | 4 | 4 | 4 | — | — |
| | Isolation | | — | — | — | — | — | — |
| | Allowable Voltage Range | | 20.4 to 28.8V DC | 10.8 to 28.8V DC | 20.4 to 26.4V AC<br>20.4 to 28.8V DC | 85 to 265V AC<br>100 to 253V DC | — | — |
| | Operating Range | OFF Voltage | < 5V DC | < 5V DC | < 5V AC/DC | < 40V AC < 30V DC | — | — |
| | | ON Voltage | ≥ 12V DC | ≥ 8.5V DC | ≥ 12V AC/DC | ≥ 79V AC ≥ 79V DC | — | — |
| | | OFF Current | < 0.88mA | < 0.88mA | < 1.1mA | < 0.05mA (AC)<br>< 0.06mA (DC) | — | — |
| | | ON Current | ≥ 2.1mA | ≥ 1.5mA | ≥ 2.63mA | ≥ 0.08mA (AC)<br>≥ 0.13mA (DC) | — | — |
| | Turn ON Time | | 1.5ms (Typ.) | 1.5ms (typ.) | 1.5ms (typ.) | 100V AC: 40 ms (typ.)<br>240V AC: 30 ms (typ.)<br>100V DC: 25 ms (typ.)<br>240V DC: 20 ms (typ.) | — | — |
| | Turn OFF Time | | 1.5ms (Typ.) | 1.5ms (typ.) | 15ms (typ.) | 100V AC: 45 ms (typ.)<br>240V AC: 70 ms (typ.)<br>100V DC: 60 ms (typ.)<br>240V DC: 75 ms (typ.) | — | — |
| | Analog Input Points | | — | — | — | — | 2 | — |
| | Analog Input Range | | — | — | — | — | 0 to 10V (max. rated input: 28.8V)<br>0 to 20mA (max. rated input: 40mA) | — |
| | Digital Resolution | | — | — | — | — | 10 bits (0 to 1000) | — |
| | Input Error | | — | — | — | — | ±1.5% (of full scale) | — |
| | Input Impedance | | — | — | — | — | 76kΩ (0 to 10V)<br>250Ω (0 to 20mA) | — |
| | Sampling Cycle | | — | — | — | — | 50ms | — |
| Output | Wire Length | | 100m | 100m | 100m | 100m | 10m (twisted-pair shielded cable) | — |
| | Output Signal | | Transistor source output | Relay output | Relay output | Relay output | — | — |
| | Output Points/ Contact Configuration | | 4 points (separate) | 4NO contacts | 4NO contacts | 4NO contacts | — | — |
| | Isolation | | — | Isolated | Isolated | Isolated | — | — |
| | Dielectric Strength **(between power/input terminals and output terminals)** | | — | 2500V AC, 1 minute<br>500V DC, 1 minute | 2500V AC, 1 minute<br>500V DC, 1 minute | 2500V AC, 1 minute<br>500V DC, 1 minute | — | — |
| | Output Voltage | | External power voltage (20.4 to 28.8V DC) | — | — | — | — | — |
| | Maximum Load Current | | 0.3A maximum | Resistive load<br>5A at 12/24V AC/DC, 5A at 100/120V AC, 5A at 230/240V AC, 0.2A at 120V DC, 0.1A at 240V DC<br>Inductive load<br>2A at 12/24V AC/DC, 3A at 100/120V AC, 3A at 230/240V AC, 0.2A at 120V DC, 0.1A at 240V DC | | — | — |
| | Short-circuit Protection | | Built-in current limiting resistor: Approx. 1A | External fuse required: 16A maximum | External fuse required: 16A maximum | External fuse required: 16A maximum | — | Yes |
| | Minimum Switching Load | | — | 10mA, 12V DC (reference value) | 10mA, 12V DC (reference value) | 10mA, 12V DC (reference value) | — | — |
| | Initial Contact Resistance | | — | 100mΩ maximum (at 1A, 24V DC) | 100mΩ maximum (at 1A, 24V DC) | 100 mΩ maximum (at 1A, 24V DC) | — | — |
| | Mechanical Life | | — | 10 million operations (no load, 10Hz) | 10 million operations (no load, 10Hz) | 10 million operations (no load, 10Hz) | — | — |
| | Electrical Life | | — | 100,000 operations (rated resistive load)<br>1800 operations/hour | 100,000 operations (rated resistive load)<br>1800 operations/hour | 100,000 operations (rated resistive load)<br>1800 operations/hour | — | — |
| | Analog Output Points | | — | — | — | — | — | 2 |
| | Analog Output Range | | — | — | — | — | — | Voltage: 0-10V DC<br>Current: 0-20, 4-20 mA |
| | Digital Resolution | | — | — | — | — | — | 10 bits (0 to 1000) |
| | Output Error (of full scale) | | — | — | — | — | — | Voltage output: ±2.5%<br>Current output: ±3% |
| | Output Impedance | | — | — | — | — | — | Voltage: 5kΩ min<br>Current: 250Ω max |
| | Analog Value Conversion Interval | | — | — | — | — | — | 50ms (typ.) |
| | Wire Length | | — | — | — | — | — | 10m (twisted-pair shielded cable) |

## General

| Style | | Specification | Standard |
|---|---|---|---|
| Operating Temperature | Horizontal Mounting | 0 to 55°C (no freezing) | Cold: IEC60068-2-1<br>Hot: IEC60068-2-2 |
| | Vertical Mounting | 0 to 55°C (no freezing) | |
| Storage/Transportation Temperature | | –40 to +70°C (no freezing) | — |
| Relative Humidity | | 10 to 95% RH (no condensation) | IEC60068-2-30 |
| Atmospheric Pressure | | 795 to 1080 hPa | — |
| Operating Condition | | No corrosive gas | — |
| Degree of Protection | | IP20 | — |
| Vibration Resistance | | 5 to 8.4Hz, amplitude 3.5mm<br>8.4 to 150Hz, acceleration 9.8m/s$^2$ | IEC60068-2-6 |
| Shock Resistance | | 147m/s$^2$ | IEC60068-2-27 |
| Drop Test | | 0.3m | IEC60068-2-31 |
| Drop Test (packaged) | | 1m | IEC60068-2-32 |
| Emission | | Class B Group 1[1] | EN55011 |
| Electrostatic Discharge | | 8kV air discharge, 6kV contact discharge [2] | IEC61000-4-2 |
| Radiation Field Immunity | | Field Strength: 1V/m and 10V/m | IEC61000-4-3 |
| Burst Pulses | | 2kV (power line), 1kV (I/O signal line) [3] | IEC61000-4-4 |
| Surge Immunity1<br>(FL1F-H12RCC, FL1F-B12RCC only) | | 1kV (power line) normal<br>2kV (power line) common | IEC61000-4-5 |
| Communication Cable | | 0.5 to 2.5mm$^2$ (one wire), 0.5 to 1.5mm$^2$ (two wires) | — |
| Terminal Style | | Finger-safe type [5] | — |

1: For protection against surge noise on DC power supply types (FL1F-H12RCE/B12RCE, FL1F-H12SCD, FL1F-H12RCA/B12RCA), use surge absorbers, noise cut transformers or noise filters. Use of a surge protection device (DEHN + SÖHNE GmbH + Co, BVT AD 24 Part No. 918 402) is recommended.
2: Tightening torque 0.5 to 0.6N·m

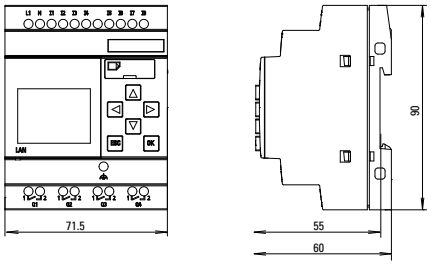
## Text Display

| Part Number | | | FL1F-RD1 |
|---|---|---|---|
| Keyboard Display | | | FSTN graphic display<br>(W × H: 160 × 96 dots)<br>LED backlight<br>(White, Amber, Red) |
| Dimensions (W × H × D) | | | 128.2 × 86 × 38.7 mm |
| Installation | | | Panel cut-out using mounting clips |
| Font Type | | | English, Spanish, Russian, Chinese, Italian, Turkish, German, Dutch, French, Japanese |
| Keyboard | | | Membrane keypad with 10 keys |
| Power Supply | Input Voltage | | 24V AC/DC, 12V DC |
| | Allowable Voltage Range | | 20.4 to 26.4V AC<br>10.2 to 28.8V DC |
| | Rated Frequency | | 47 to 63Hz |
| | Current Draw | | 30 to 55mA (24V DC) |
| | Power Consumption | 12V DC | 145mA (Typ.) |
| | | 24V DC | 70mA (Typ.) |
| | | 24V AC | 75mA (Typ.) |
| | Data Transmission Rate | | 10/100M full/half duplex data transmission rate |
| LCD Display | Backlight lifetime [1] | | 20,000 hours |
| | Display lifetime [2] | | 50,000 hours |
| Weight | | | 220g |

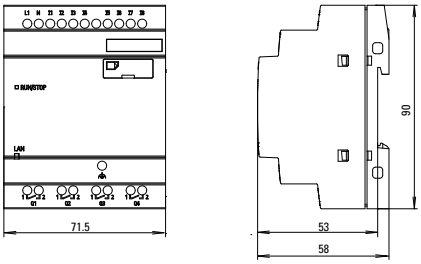
1 For protection against surge noise on DC power supply types (FL1F-H12RCE/B12RCE, FL1F-H12SCD, FL1F-H12RCA/B12RCA), use surge absorbers, noise cut transformers, or noise filters. Use of a surge protection device (DEHN + SÖHNE GmbH + Co, BVT AD 24 Part No. 918 402) is recommended.
2 Tightening torque 0.5 to 0.6N·m

# Dimensions (mm)

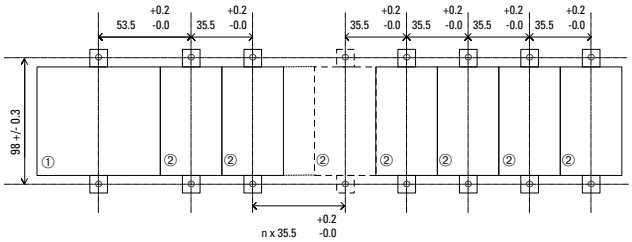
## Base Module (with Display)



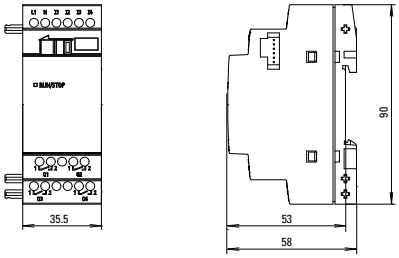

## Base Module (without Display)



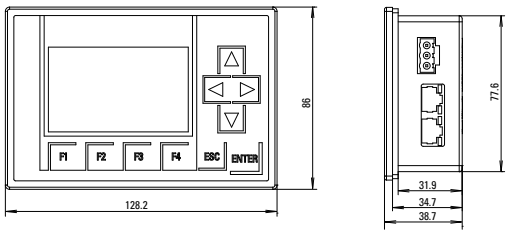

## Mounting Hole Layout (Using Mounting Slides)



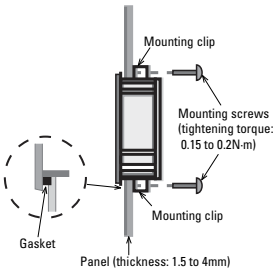

## Expansion I/O Module



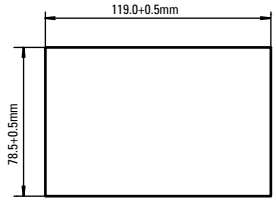

## Text Display




## Installation




## Mounting Hole Layout



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# Automation Software

IDEC

**www.IDEC.com/software**

# Selection Guide

| Series | Automation Organizer Software Suite | | | | WindSRV | WindLGC | WindMSG |
|---|---|---|---|---|---|---|---|
| | Wind O/I-NV2 and NV4 | Wind O/I-NV3 | WindLDR | WindCFG | | | |
| Appearance | | | | | | | |
| Page Number | 152 | 152 | 157 | 161 | 163 | 166 | visit www.IDEC.com/software |
| Application | OI Touchscreens | FTIA Touch | PLCs | System Configuration Tool for OI Touchscreens & PLCs | OPC Server for PLCs | SmartRelay | Character Displays |

# Automation Organizer Suite

## A one-stop automation software package for all IDEC PLC and OI Touchscreens

Automation Organizer (AO), the IDEC software suite combining our popular PLC programming software (WindLDR) , WindO/I-NV3 programming software for FT1A Touch, and OI programming software (WindO/I-NV2 and WindO/I-NV4) with system configuration software (WindCFG), is made to enable you to see the layout of your system design and basic configuration of devices. AO gives you a powerful and easy-to-use tool to design, debug, and document control systems, saving valuable time and money.

### FREE Upgrades

The Automation Organizer suite comes with free lifetime upgrades. Once you make the initial purchase, upgrades are absolutely free.

### Part Number

| Part Number | Description |
|---|---|
| SW1A-W1C | Automation Organizer software suite |

Automation Organizer **WindO/I-NV2**

Automation Organizer **WindO/I-NV4**

WindO/I-NV2 and NV4 software is the simplest programming tool for all IDEC OI Touchscreens. It is used to create projects or programs that can display information from a PLC, process status, or can be used to input data with virtual switches or keypads to make changes to a process. The objects are extremely easy to configure with the help of step-by-step navigation. It lets you quickly create colorful graphical screens in no time using drop-down menus and intuitive drag and drop functionality for the objects. A workspace is available to help you organize and manage projects, objects and screens.

Automation Organizer **WindO/I-NV3**

WindO/I-NV3 is our exclusive configuration software for FT1A Touch. Using the same platform as WindO/I-NV2 OI Touchscreen programming software, WindO/I-NV3 provides users with the same intuitive experience. Users can easily display alarm screens, trend and bar graphs, scrolling texts and meters. With thousands of industry-standard bitmap libraries, creating a professional interface is just a click away.

Automation Organizer **WindLDR**

All IDEC micro controllers are programmable with WindLDR ladder logic software. This icon-driven programming tool combines logic and intuition with an incredibly easy-to-use interface to allow you to take advantage of every MicroSmart feature. Even without ladder program experience, you can use the built-in editors, shortcuts and debuggers to configure programs.

Automation Organizer **WindCFG**

WindCFG is a System Configuration tool. You can create a visual layout of your system design and basic configuration of the IDEC PLCs, OI Touchscreens, barcode readers, & other peripheral devices for the purpose of creating manuals or other documentation.

# Automation Organizer Suite - WindO/I-NV2/NV3/NV4

## Programming Software for IDEC OI Touchscreens & FT1A Touch

Automation Organizer WindO/I-NV2

Automation Organizer WindO/I-NV3

Automation Organizer WindO/I-NV4

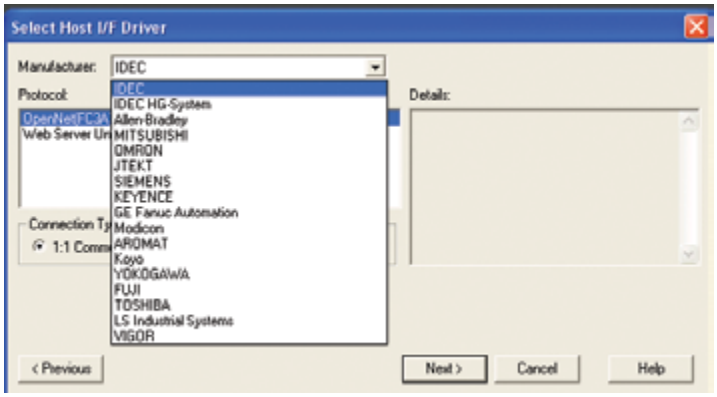
### Key Features

- Built-in Serial and Network Protocols
- Pass-thru function
- Extensive Image Library
- Intuitive Drag & Drop Functionality
- Flexible Screen Display for Efficient Editing
- Workspace – easy to manage projects & screens

## It's as easy as 1, 2, 3!

### 1 Create

Creating a project is simple! Just name a project file and select your parameters (OI type and model, protocol type, and optional settings).

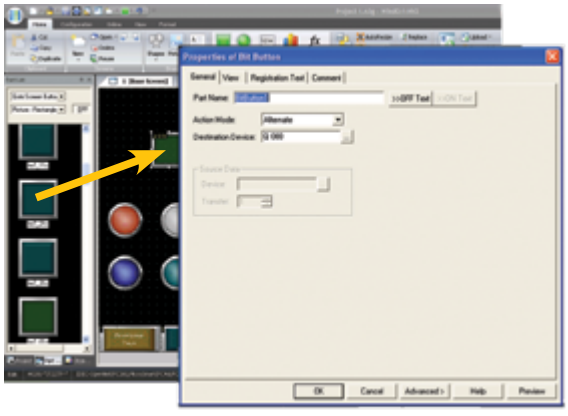



### 2 Configure

Select a functional part and assign a device address. The other tabs allow you to change image, color, or add more parameters.

**Drag and Drop Screen Design**

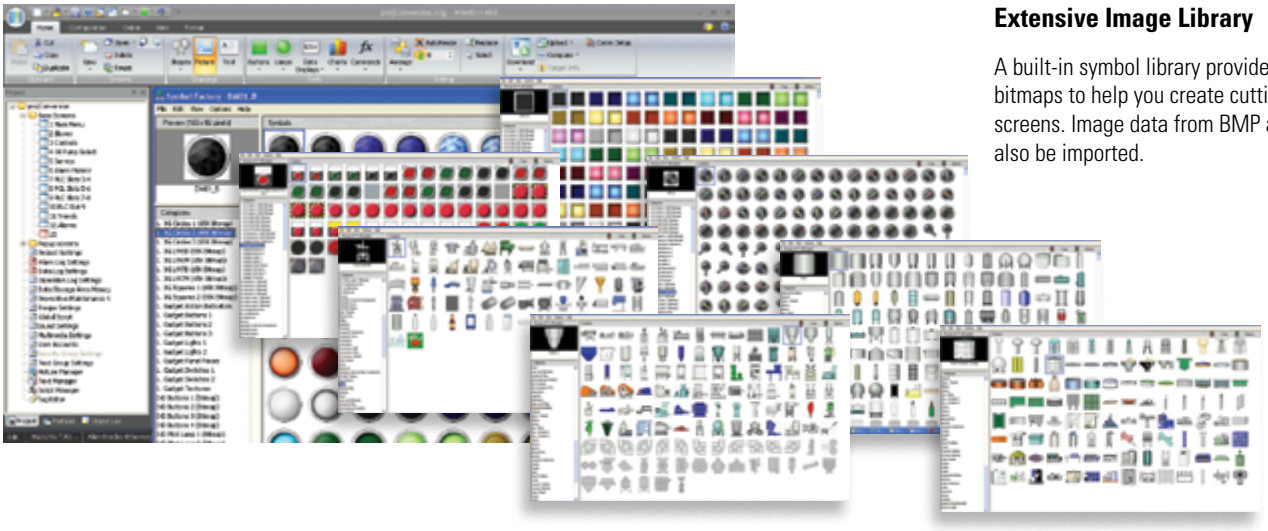
**Easy step-by-step configuration**



### 3 Download

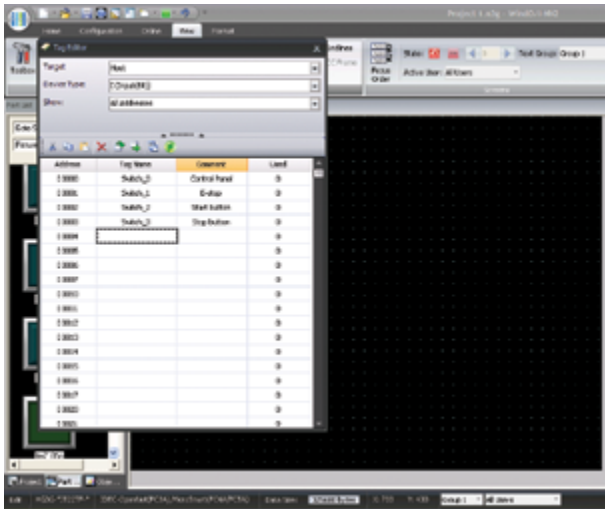
Once your project is ready to be downloaded to the touchscreen, select "Online" and then "Download." You can now debug or monitor your program as needed. It's as simple as that!

## Create a powerful graphical display



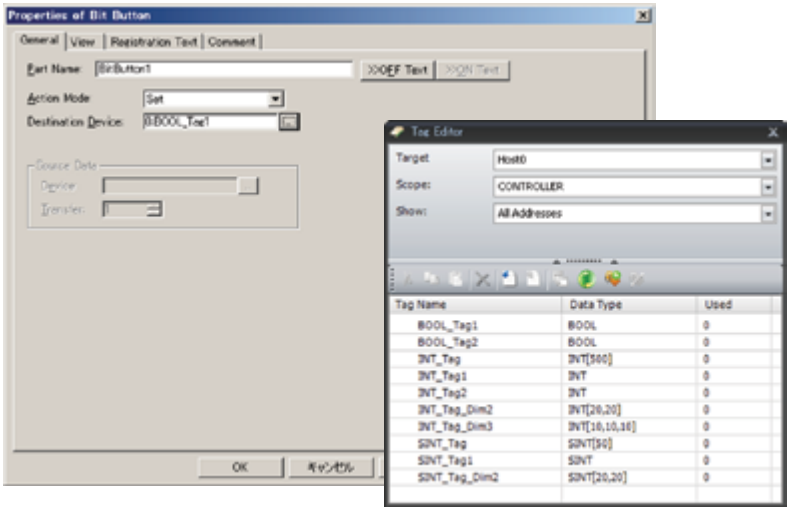
### Extensive Image Library

A built-in symbol library provides over 7,000 bitmaps to help you create cutting-edge graphical screens. Image data from BMP and JPG files can also be imported.



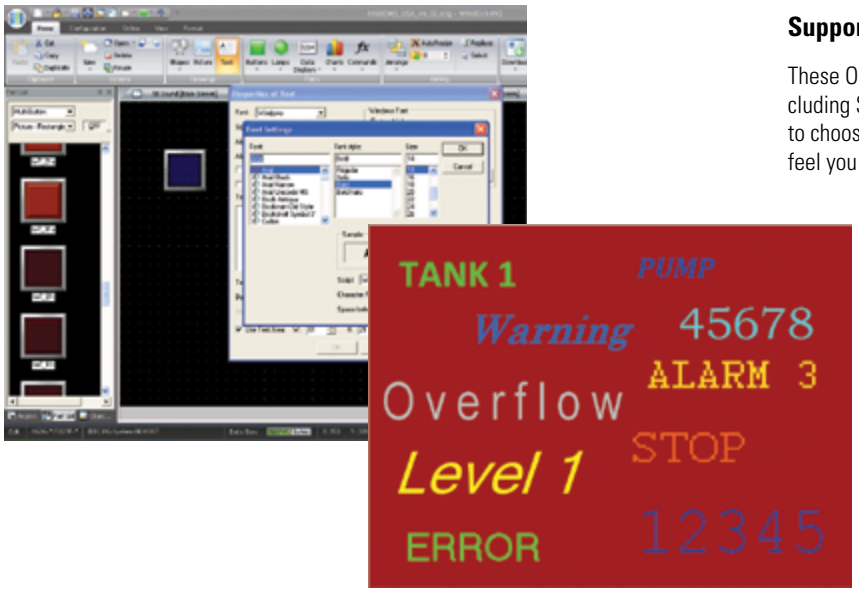
### Tag Database

You can create a database of device addresses, including Tag Names, which help you label each address to best match your information or documentation. By creating a Tag database, you can choose addresses used to read data from the PLC or Host device, or write data to the PLC or device. Even more convenient, if you have a list of IDEC PLC addresses already made in WindLDR, you can easily import it to the Tag Database.




### Allen Bradley Logix Native Tag Import

The High-Performance models support "Allen Bradley Logix Native Tag Import," which means you can easily import any tag database file (L5K or CSV file) created with Allen Bradley PLC software. Once registered in the Tag Editor, you simply select the Tag name for your part.

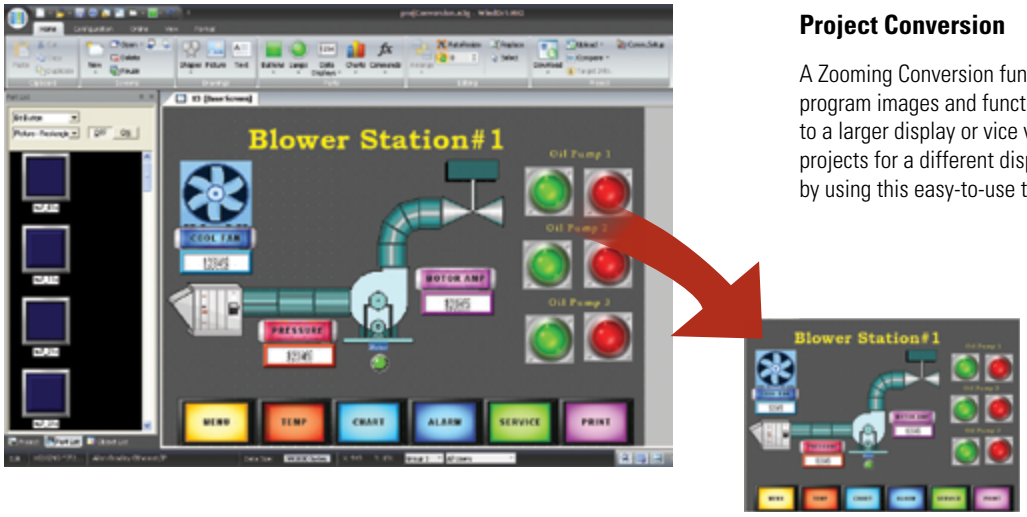



### Supports Standard Windows Fonts

These OI Touchscreens support all fonts used in Windows, including Stroke and 7 Segment Display fonts, making it possible to choose from a variety of text styles to create the look and feel you want to achieve.

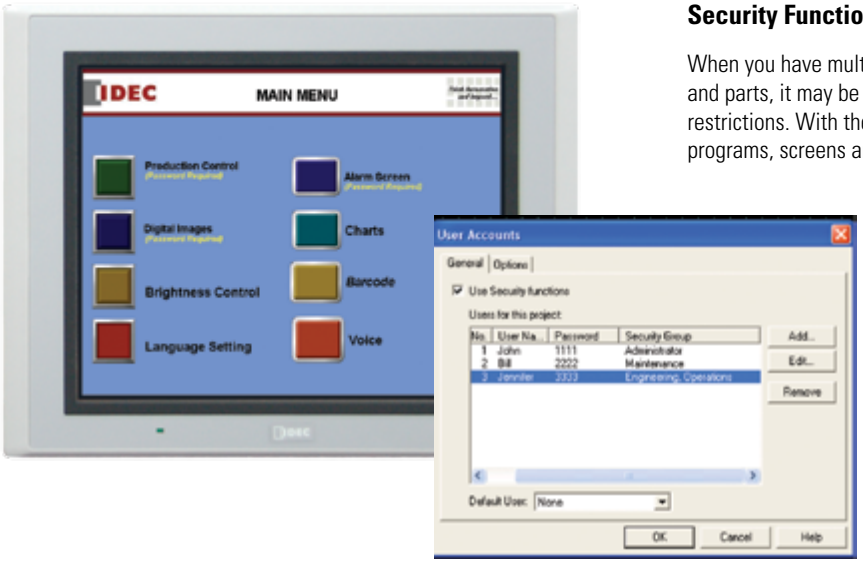
### Multilingual Capabilities for Global Applications

The IDEC Touchscreen family supports many different languages. Using the Text Group function you can create a text database in Japanese, Chinese, Korean, Taiwanese, as well as Baltic, Cyrillic and other European languages. Plus, you can easily switch text messages from English to Japanese or any other supported language with the touch of a button.




### Project Conversion

A Zooming Conversion function makes it easy to convert existing program images and functional parts, created for a small display, to a larger display or vice versa. Don't waste time recreating projects for a different display when you can save time and energy by using this easy-to-use tool!



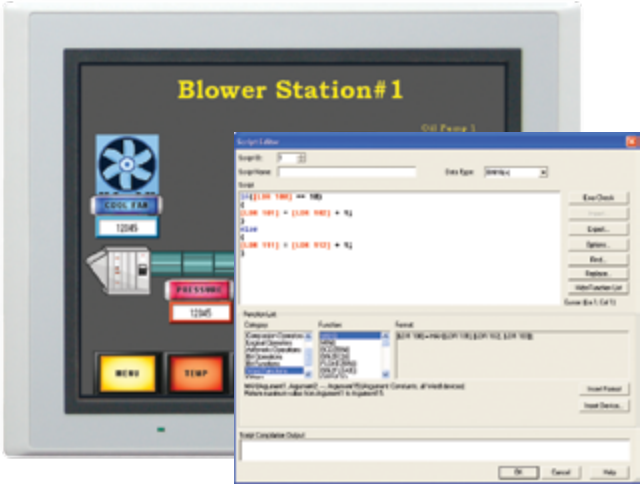

## Security Function

When you have multiple users editing projects or displaying screens and parts, it may be necessary to have different levels of security and restrictions. With the Security Function, you can password protect programs, screens and parts from other users.

| Target Events for Record | Record Information | | | | | | |
|---|---|---|---|---|---|---|---|
| | Sampling Time | User | Screen No. | Event Name | Part Name | Device | Change to |
| Power ON | X | - | X | X | - | - | - |
| Switch to Base Screens | X | X | X | X | - | - | X |
| Change Users | X | X | X | X | - | - | X |
| Change Operation Modes | X | X | X | X | - | - | X |
| Press Buttons | X | X | X | X | X | - | - |
| Write Data any Devices | X | X | X | X | - | X | X |

## Operation and Alarm Log Functions

The operating log helps investigate, analyze and solve problems and system errors by checking who, when, what and where operations were performed. Plus, once you setup up the Alarm Log function for messages and alerts, it can monitor alarm conditions from a PLC and store historical events with a date and time stamp on a memory card (in CSV format). The high-performance series also meets ISA standards for visual alarm management.




## Script Function

Users with basic programming knowledge in "C" can use a Script function to combine conditional statements, mathematical operations and other functions to create simple and complex processes, reducing the programming required in the PLC. A Syntax Check function is also available providing easy program troubleshooting.

### Switches, Pilot Lamps, and Meters

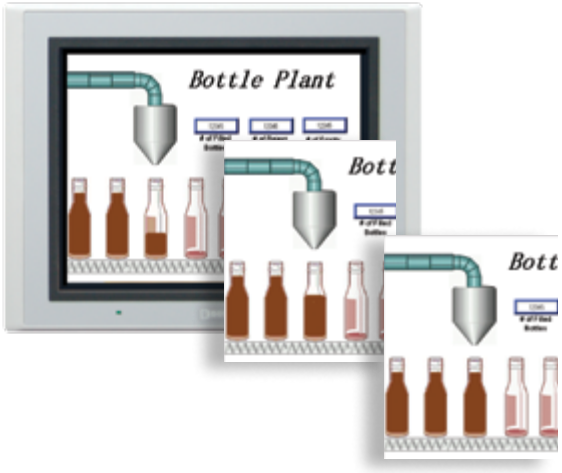
Hundreds of colorful pushbuttons, switches and meter images can give your display a realistic appearance mimicking a real panel. Pushbuttons and switches are used to set a bit, move data, switch screens or print screen images, while pilot lamps or multi-state lamps read and display statuses from single or multiple bits on the PLC or device.

### Bar Graphs and Trend Charts

Use the Bar graphs and numerical displays to show range or flow for analog values from your PLC or device, or create Trend Charts to closely monitor critical data points. Display historical data (based on a fixed time period or event) with the option to show date & time on the x-axis or store it (in csv format) on the memory card or internal memory for easy viewing and data manipulation on your PC.

### Recipe

A Recipe function allows you to conveniently set operational parameters, which can be individually defined for different processes. There are 1,024 available channels, which can store up to 8,192 parameters per channel. Plus you can easily upload or download parameters to and from your PLC.




### Animation

Want to give your screen a “WOW” factor? It’s simple to display animation by using the Picture Display function and configuration is a breeze. Simply import a series of images when using the Picture Display Function. Those images will then be displayed depending on the device value or constant time period.

# Automation Organizer Suite - WindLDR

## Programming Software for IDEC PLCs

**Key Features**

- Online Edit
- Simulation Mode
- Comment download

Automation Organizer
WindLDR

### Single Platform for all IDEC PLCs

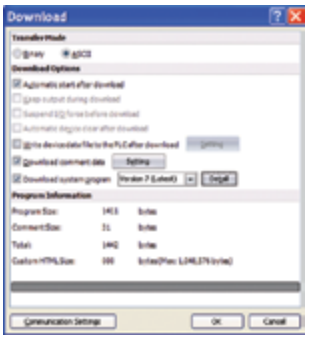
WindLDR is an excellent, long-term investment for your control solutions. It programs every IDEC PLC including the OpenNet Controller, MicroSmart and the fastest micro-controller on the market, MicroSmart Pentra. It's adaptable to whatever hardware you need today and down the road.

### Simple-to-use Editors

Use the tag editor to access and edit coil data. Edit comments and rung comments. Simulation mode allows you to test your program in WindLDR to guarantee that it works the way you expected, rather than downloading it to your PLC.

### Firmware Download

With WindLDR version 6.4 or later, you have the option to upgrade or downgrade your CPU system program. It's as simple as clicking on the checkbox in the Download dialog box. Now you can easily update your PLC system firmware with the click of a button.




### User-friendly Interfaces

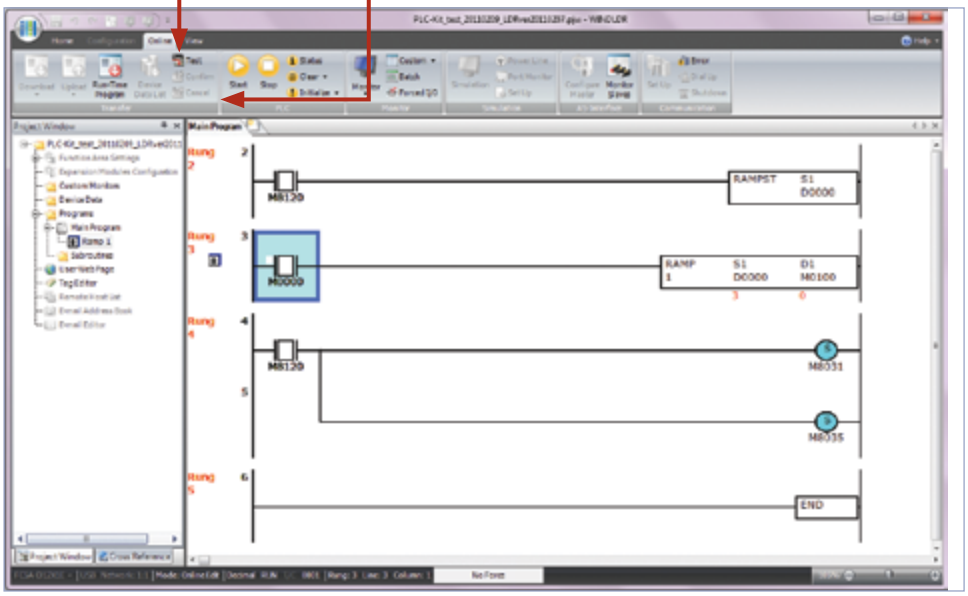
Icon-based toolbars and drag-and-drop functionality make basic ladder programming accessible to anyone. But WindLDR also shows you how to display parameters and settings and how to input your parameters, and the built-in shortcuts and tutorials will keep you on the right track.

### Free Lifetime Upgrade

Not only is WindLDR the easiest and most convenient ladder programming software on the market, it also comes with a very special price with no strings attached. Our software comes with a free-lifetime upgrade. That means that you no longer need to spend thousands of dollars for a software that has to be renewed every year costing you additional money. Save yourself money by using an IDEC PLC and WindLDR programming software.

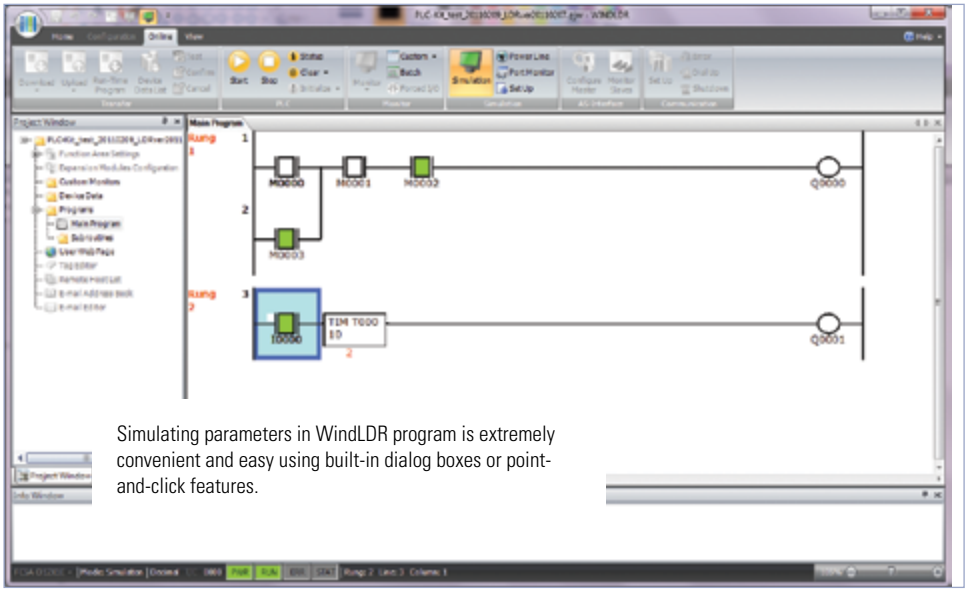
The Confirm and Cancel options allow users to select whether to permanently accept the changes (Confirm) or revert the program back to the original settings (Cancel).

This unique Debug tool allows users to download any changes in the program to a temporary memory location in the PLC. With this option, users can verify the changes they make before selecting whether to accept or cancel them.



## Online Editing

Shutting down for minor changes can be a major hassle, so WindLDR allows you to edit and download programs while the PLC is still in Run mode. You'll be able to make changes to the PLC, verify the results and cancel or accept these changes.



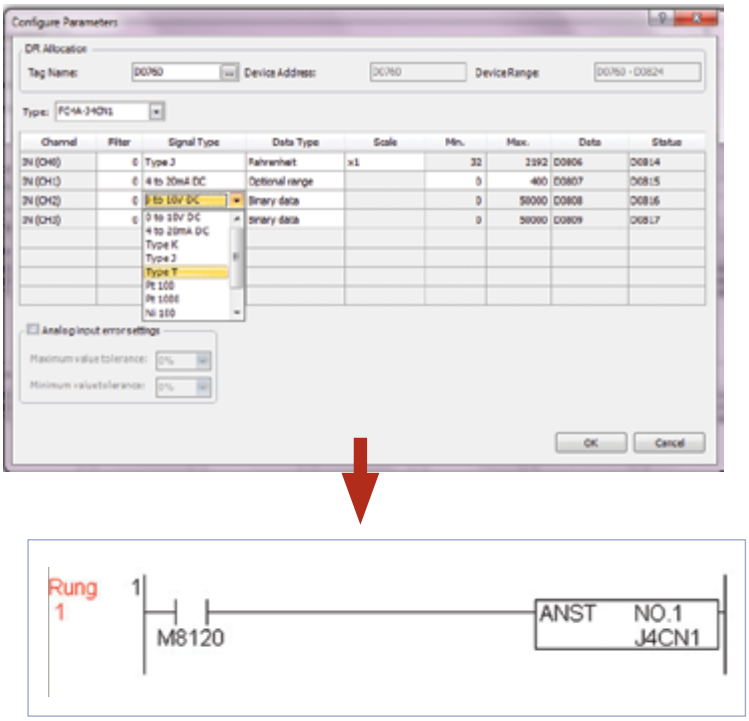
Simulating parameters in WindLDR program is extremely convenient and easy using built-in dialog boxes or point-and-click features.

## Simulation Mode

WindLDR has a built-in simulation mode that allows users to write and debug programs without needing a PLC. Test your program in WindLDR to guarantee it works the way you expected, rather than downloading it to your PLC.

### Analog Macro

Setting up analog controls with WindLDR software just got a lot easier. The analog macro instruction allows users to point and select modules, signal and data type in a matter of seconds. And, all of these configurations convert into just one ladder line instruction.

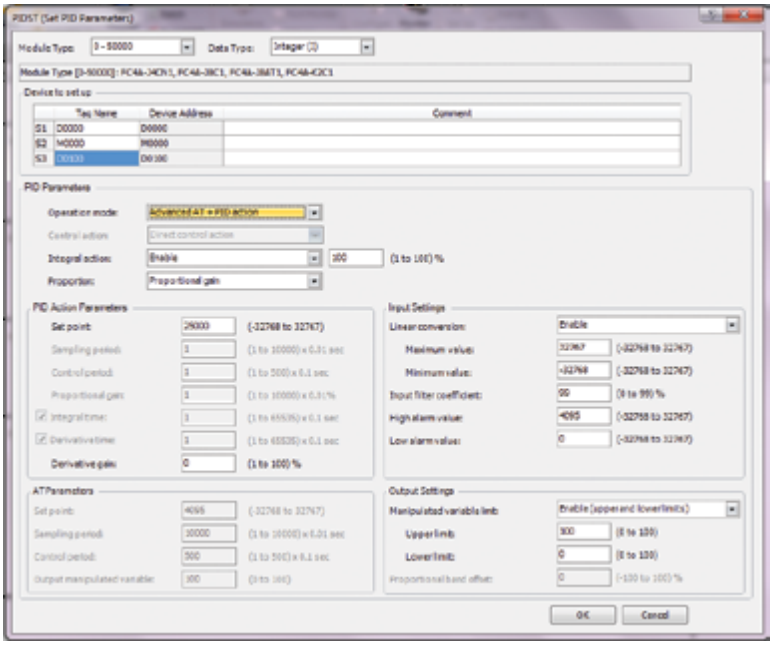






### Simple-to-use PID

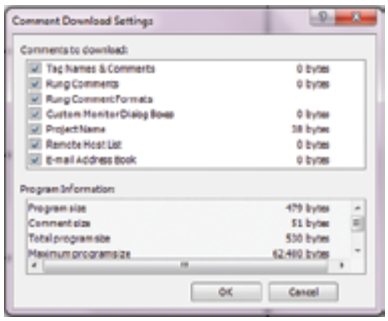
Configuring PID loops with WindLDR software is a snap using the built-in PID dialog box. The PID dialog allows users to quickly select and fine tune the desired controls without needing to remember each and every parameter of a PID algorithm. A maximum of 56 PID loops can be utilized in the MicroSmart Pentra.



## Powerful Debugging Tools

### Comment Download Settings

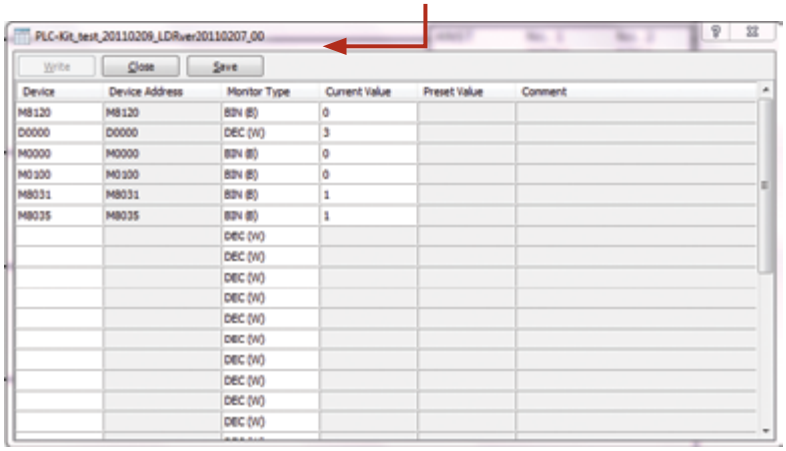
The comment download settings allow users to choose whether to download Tag names, rung comments, custom monitor dialog boxes and file names into the MicroSmart Pentra. The biggest advantage of utilizing these settings is that once a program is retrieved from the PLC, all these important parameters will be available.




### Custom Monitor Dialog Box

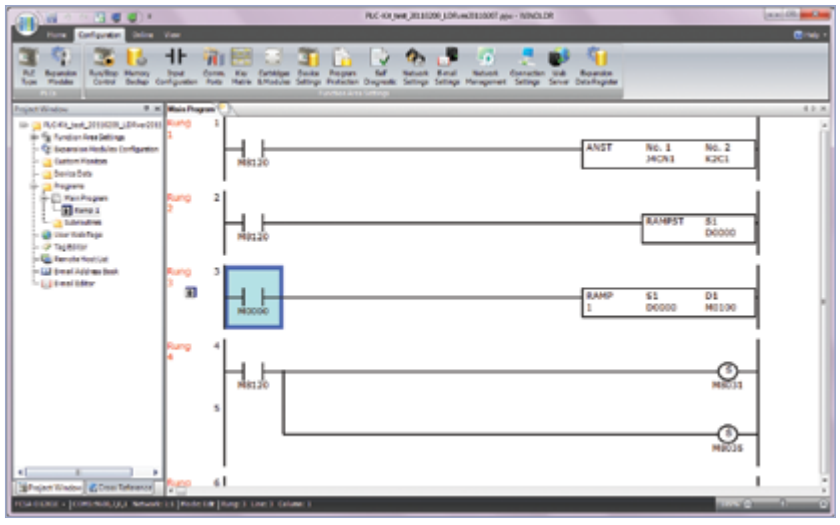
Compile and enter a list of parameters you want to monitor, then save it and access it again and again, instead of re-entering your data every time.

Users can create, save and download the custom monitor dialog into the MicroSmart Pentra controller.




### Bookmark Functions

Bookmark function is a great debugging tool. It allows users to quickly jump to a bookmarked location in the ladder program allowing for easier program modifications and updates.



# Automation Organizer Suite - WindCFG

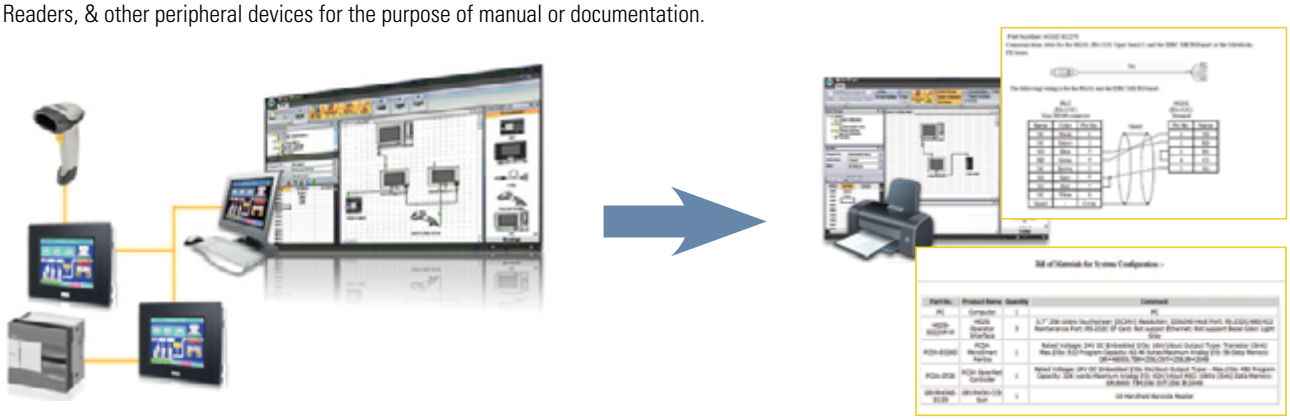
## Configuration Tool for IDEC PLCs and OI Touchscreens

### Key Features

- Create a visual layout of your system design for documentation
- Central Database for configuration and information
- Manage one single program file.
- Share Tag database between WindOI-NV2 and WindLDR SOFTWARE
- WindOI-NV2 and WindLDR can be launched directly from the system configuration screen

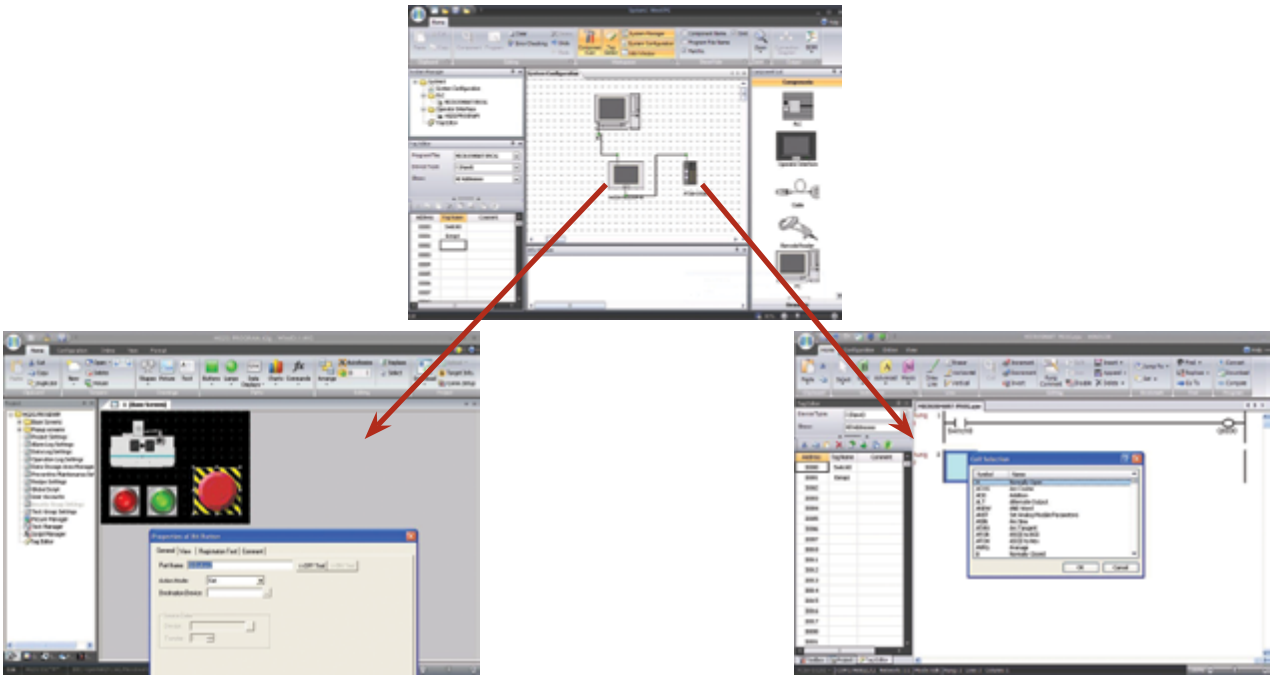
Automation Organizer
**WindCFG**

**WindCFG** is a System Configuration tool. It let's you create a visual layout of your system design and basic configuration of the IDEC PLCs and OI Touchscreens, Barcode Readers, & other peripheral devices for the purpose of manual or documentation.

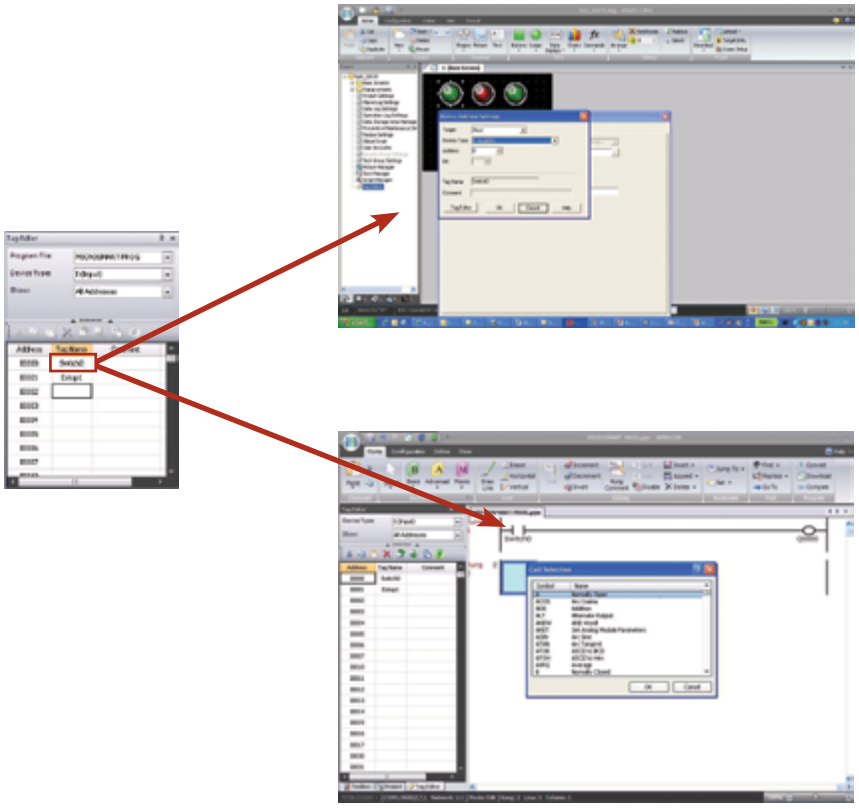


### Central Database Configuration & Information :

- In WindCFG, you can manage one single program file!
  Create a layout of the IDEC OI & PLC and launch WindOI-NV2 and WindLDR directly from the configuration system to build the program files.

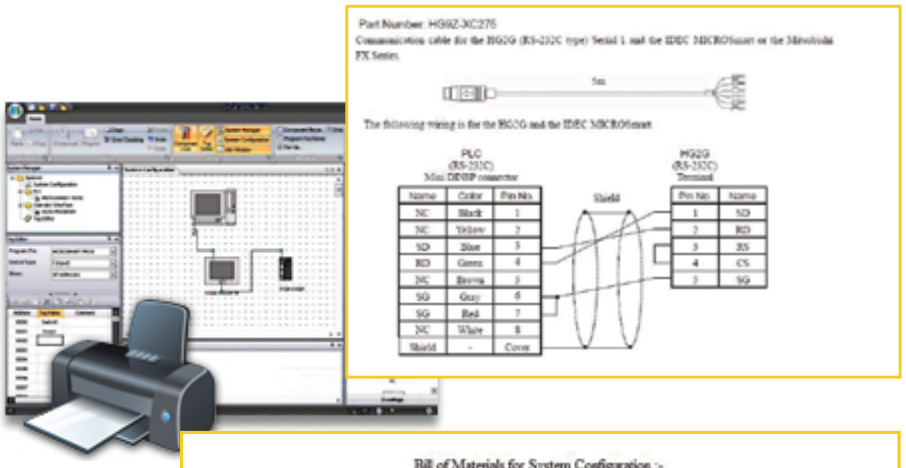


Address, Tag Names, Comments, and other type of data will be easily accessible and shared between WindO/I-NV2 & WindLDR software.



**Create a visual layout of your system design for documentation:**

- Print configuration of each component used & the option to print BOM (Bill of Material) for documentation purposes.
- View cable part numbers and wiring diagrams for documentation purposes



Part Number: HG9Z-XC275

Bill of Materials for System Configuration :-

| Part No. | Product Name | Quantity | Comment |
|---|---|---|---|
| PC | Computer | 1 | PC |
| HG2G-S522/F-IV | HG2G Operator Interface | 3 | 5.7" 256 colors touchscreen (DC24V) Resolution: 320x240 Host Port: RS-232C/485/422 Maintenance Port: RS-232C CF Card: Not support Ethernet: Not support Bezel Color: Light Gray |
| FC5A-D32K3 | FC5A MicroSmart Pentra | 1 | Rated Voltage: 24V DC Embedded I/Os: 16in/16out Output Type: Transistor (Sink) Max.I/Os: 512 Program Capacity: 62.4K bytes Maximum Analog I/O: 56 Data Memory: DR=48000, TM=256,CNT=256,IR=2048 |
| FC3A-CP2K | FC3A OpenNet Controller | 1 | Rated Voltage: 24V DC Embedded I/Os: 6in/6out Output Type: - Max.I/Os: 480 Program Capacity: 32K words Maximum Analog I/O: 42in/14out HSC: 10Khz (Sink) Data Memory: DR:8000 TM:256 CNT:256 IR:2048 |
| GRYPHONE-D130 | GRYPHON CCD Gun | 1 | 1D Handheld Barcode Reader |

# WindSRV Software

## OPC Server for IDEC PLCs

### Key Features

- On-line full time
- Support MicroSmart Pentra 32-bit and floating point
- Support Ethernet and modem communications
- Built-in Quick Client interface

### A True Plug-and-Play OPC Server

Looking for a fast and flawless controls solution? Want your control systems centralized, easy-to-manage and able to take advantage of all the components you already have? WindSRV, also known as KEPServerEX, is an OPC server that provides direct connectivity between client applications and IDEC PLCs. It's a true plug-and-play OPC Server with effortless data management, acquisition, monitoring and control.

| Part Number | Description |
|---|---|
| WINDSRV-1 | Single device connection. One PLC can be connected to the server. |
| WINDSRV-4 | Four device connections. Up to 4 PLCs can be connected to the server. |
| WINDSRV-U | Unlimited device connections. Up to 100 PLCs can be connected to the server. |

## Use Microsoft Excel

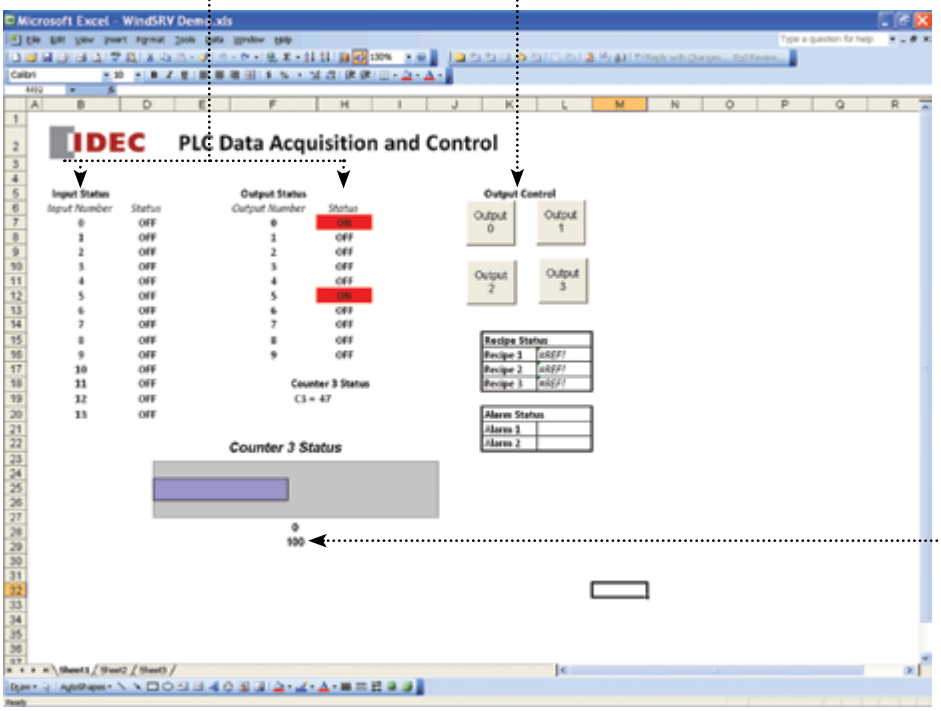
### Using Microsoft Excel as Client Applications

Using Microsoft Excel, available on most PCs, customers can create a visual central monitoring station quickly and effectively. System status such as sensor inputs, motor outputs, etc. can be monitored and controlled. It's a cost-effective, real-time central monitoring system that can be customized to your needs. With just KEPServerEX server and Excel, up to 100 PLCs can be monitored and controlled in real time.

## Sample application using Microsoft Excel

Input and output status such as switches, sensors, flow meters, E-stops, motors, etc. can be monitored in real time.

Output devices such as motors and valves, can be controlled with just a single click.

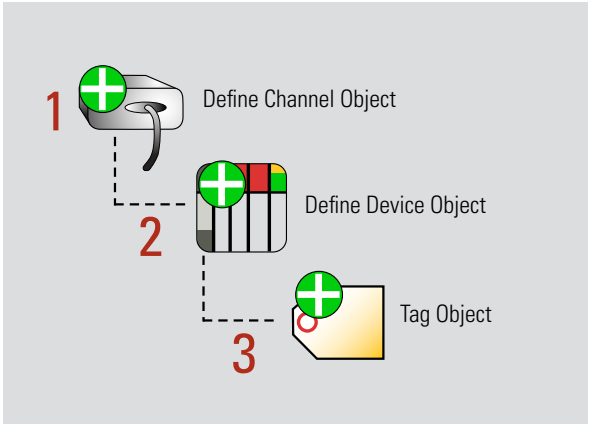


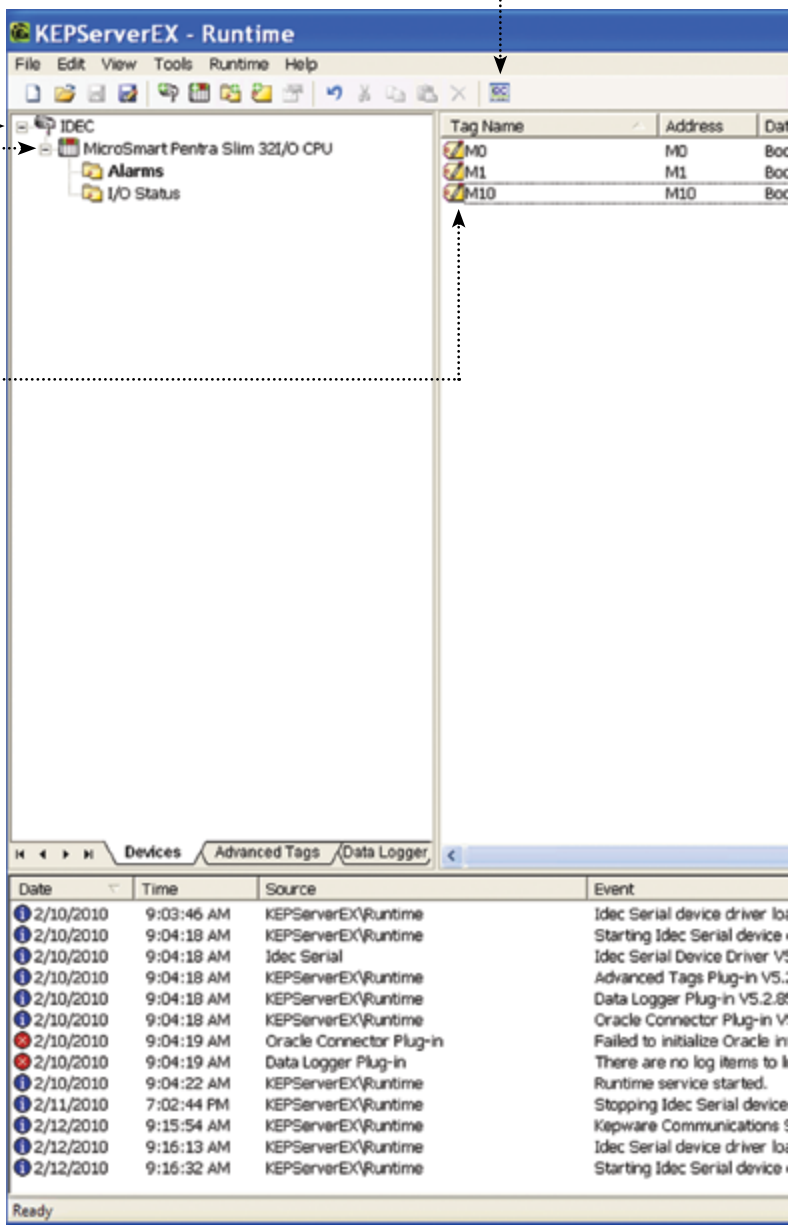

Using the graph feature in Excel, users can create a custom presentation to monitor water tank levels or production counts. And that isn't all, there is so much more you can do and create using Excel.

## Easy to use and set up

### It's as simple as 1-2-3

KEPServerEX is designed to allow quick and easy configuration of your communications.




### Step 1

#### Select a driver

Each protocol or driver used in the KEPServerEX server and project is referred to as a channel. Channels are specific communication drivers such as RS232C, Ethernet or Dial-up modems. A project can consist of many channels.

### Step 2

#### Specify the device

Configure the PLC you want to communicate with the server. KEPServerEX supports MicroSmart Pentra, MicroSmart, OpenNet controllers and even older FA and Micro3 series.

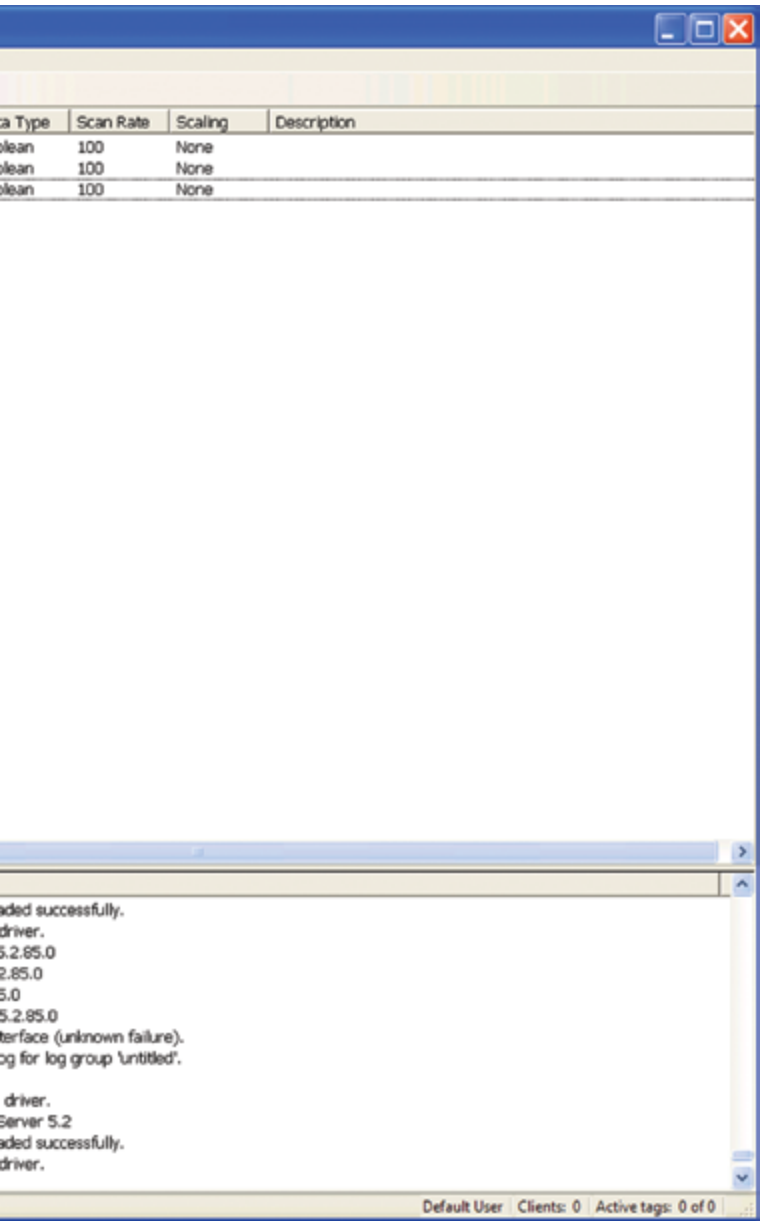
### Step 3

#### Create tags

A tag is memory allocation in the PLC. You can monitor input, outputs, internal relays and data registers. You can also create a Tag Group that allows you to monitor each set of PLC parameters such as I/O status, alarm conditions, etc.

### Quick Client

Once tags or tag groups are created in your project, click on the Quick Client icon to start monitoring these parameters. Quick Client is a quick way to determine if the server is connected to the PLCs.




### Auto Demotion

This device allows a driver to temporarily place a KEPServerEX device off-line in the event that a physical device is not responding. By placing a non-responsive device off-line, the driver can continue to optimize communication with the device.

### Tag Creation and Management

Tag Grouping, Drag and Drop editing and CSV Import/Export are basic features to make it easier for you to organize your next project. Another feature that you will find useful is Automatic Tag Database Generation. KEPServerEX supports automatic regeneration of tags for select communication drivers. Drivers that support this feature can either read tag information directly from a device or generate tags from stored tag data. You no longer need to enter OPC tags into the server.

### On-Line Full-time

KEPServerEX is on-line all the time, allowing your application to be modified while the server is communicating with client applications. Almost all parameters can be changed while the server is running, including com port and baud rate configuration, along with tag editing and additions.

### Supports MicroSmart Pentra 32-bit registers and floating point data

KEPServerEX version 5 now supports MicroSmart Pentra complete addressing, including 32-bit data and floating point data.

# WindLGC Software

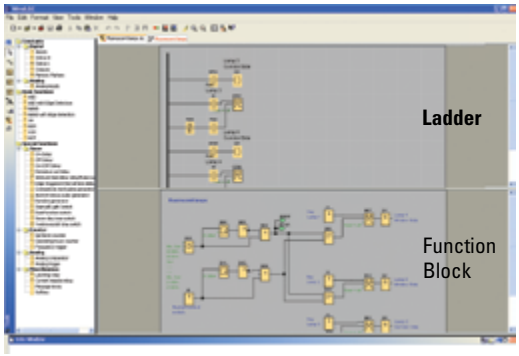
## Programming Software for IDEC SmartRelay

### Key Features

- Function Block or Ladder programming
- Online Test features
- Program Simulation

### Create

Create, simulate, test and save your program using drag and drop functions. Eight basic functions make it easy to create a simple switching program in just a matter of seconds, while 31 additional special functions make it just as uncomplicated to create complex programs. Choose function block diagrams or ladder programming; you can always convert from one to the other with the click of an icon.

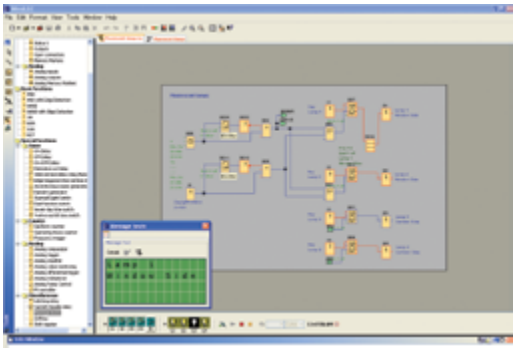



### Simulate

Offline program simulation (without the need for an actual SmartRelay) enables testing of the entire program from a PC.

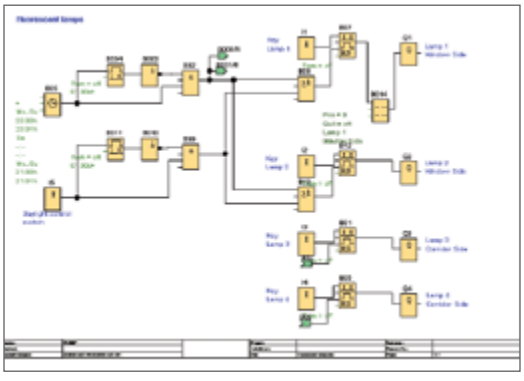
### Test

Once you verify your control program works in Simulation Mode, WindLGC allows you to directly monitor your IDEC SmartRelay during operation using an Online Test mode.



### Document

You can create and save your WindLGC program as a PDF, BMP or JPG file. Professional documentation is included with all the necessary configuration information, such as comments and program settings.



**Visit IDEC at www.IDEC.com/smartrelay for additional information on FREE software upgrades, demo software, FAQs, manuals and brochures.**

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# Power Supplies

IDEC

**www.IDEC.com/powersupply**

# Selection Guide

| Series | | PS6R | PS5R-V | PS5R Slim Line | PS5R | PS3X | PS3L |
|---|---|---|---|---|---|---|---|
| Appearance | | | | | | | |
| Page | | 169 | 176 | 184 | 190 | 195 | Visit www.IDEC.com/powersupply |
| Housing | | Metal | Plastic | | | Metal | Metal |
| Mounting | | DIN Rail | DIN Rail or surface mount; 6 direction | DIN Rail or surface mount | | Direct or DIN Rail mount | Panel or bracket mount |
| Wattage Range | | 120W to 480W | 7.5W to 240W | 10W to 240W | 7.5W to 480W | 15W to 100W | 10W to 300W |
| Input Voltage | | 100 to 240 V A, 110 to 350V DC | 85 to 264V AC, 100 to 370V DC | 85 to 264 V AC, 100-370 V DC (100-350V DC, 120W & 240W) | 85 to 264V AC, 105 to 370V DC | 85 to 264V AC, 120 to 375V DC | 85 to 264V AC, 105 to 370V DC |
| Output Current Ratings | 5V DC | 2A | 1.5A, 2.0A | 2.0A | 1.5A, 2.5A | 3A, 5A, 12A, 16A | 2A, 3A, 6A |
| | 12V DC | 1A | 0.6A, 1.3A, 2.5A | 1.2A, 2.5A | 0.6A, 1.2A, 2.5A | 1.3A, 2.1A, 4.2A, 6A, 8.5A | 0.90A, 1.4A, 2.5A, 4.3A, 8.5A, 13A |
| | 24VDC | 5A, 10A, 20A | 0.3A, 0.65A, 1.3A, 2.5A, 3.75A, 5.0A, 10.0A | 0.65A, 1.3A, 2.5A, 3.75A, 5A, 10A | 0.30A, 0.60A, 1.3A, 2.1A, 3.1A, 4.2A, 5A, 10A, 20A | 0.63A, 1.1A, 2.2A, 3.2A, 4.5A | 0.50A, 0.70A, 1.3A, 2.2A, 4.5A, 6.5A, 12.5A |
| Typical Efficiency | 5V DC | up to 93% | up to 77% | 69% | 69% | 77% | 70-75% |
| | 12V DC | | up to 85% | 75%, 78% | 73% to 75% | 81% to 82% | 74% to 80% |
| | 24V DC | | up to 90% | 80% to 84% | 75% to 91% | 82% to 84% | 78% to 82% |
| Voltage Adjustments | | +/-10% | +/-10% (+/- 5% for 90W) | +/-10% (V.ADJ control on front) | | | |
| Ripple Voltage | | 1.5%peak to peak max (including noise) | - | 2% peak to peak max (including noise) | | – | 160mV maximum |
| Overvoltage Protection (input) | | 120% | - | 120% or more, auto reset | 120% typical | 115% typical | 120% typical |
| Overcurrent Protection (output) | | 105 to 120% (auto reset) | 105% minimum (101% for 90W), auto reset | 105% min shutdown | 105% minimum (Zener or auto reset) | | |
| Operating Temperature | | -10° to +70°C (14° to 140°F) | -25°C to +75°C | -10° to +70°C (14° to 140°F) | | -10° to +85°C | -10° to +60°C (14° to 140°F) |
| Termination | | M3.5 phillip/slotted, spring loaded, captive (fingersafe) | | | | M3 or M3.5 | IEC Style screw terminals (fingersafe) |
| Approvals | | ANSI/ISA-12.12.01-2011 Listed File#E234997 | ANSI/ISA-12.12.01-2011 Listed File#E234997 | ANSI/ISA-12.12.01-2011 Listed File#E234997 (SEMI F47 120W & 240W only) | UL508 Listed File #E177168 Cert No. BL980213332392 | | UL508 Listed File #E177168 |

# PS6R Series Switching Power Supplies

## Expandable and space-saving switching power supplies. High efficiency reduces operation costs.

- 93% efficiency
- Plug-in output modules for additional output voltages
- Plug-in branch terminal module for additional terminals
- Power Range: 120W, 240W, 480W
- Input voltage: 100 to 240V AC
  (voltage range: 85 to 264V AC/110 to 350V DC)
- Up to 70ºC (158ºF) operating temperature
- DC low LED indicator and output contact
- The terminals are captive spring-up screws. Ring or fork terminals can be used.
- Finger-safe construction prevents electric shocks.
- Panel mount bracket and side-mount panel mounting bracket. Can be attached to a DIN rail or directly to a panel surface.
- RoHS compliant
- UL listed for Class 1, Division 2 Hazardous Locations
- Meets SEMI F47 Sag Immunity
- ABS Certified for maritime use

| Applicable Standards | Mark | File No. or Organization |
|---|---|---|
| UL508<br>CSA C22.2 No. 107.1 | c UL us LISTED | UL/c-UL Listed<br>File No. E177168 |
| EN60950-1<br>EN50178<br>EN61204-3 | TÜV | TÜV SÜD |
| | CE | EU Low Voltage Directive<br>EMCD |

## Part Numbers

### PS6R

| Output Capacity* | Part No. | Input Voltage | Output Voltage | Output Current |
|---|---|---|---|---|
| 120W | **PS6R-F24** | 85 to 264V AC | 21.6 to 26.4V | 5A |
| 240W | **PS6R-G24** | | | 10A |
| 480W | **PS6R-J24** | | | 20A |

*Output voltage × output current = output capacity

120W shown with Branch Terminal module attached.

### Accessories

| Item | Part No. | Note |
|---|---|---|
| Output Voltage Expansion Module Note 1 | PS9Z-6RM1 | Output: +5V, 2A, 10W |
| | PS9Z-6RM2 | Output: +12V, 1A, 12W |
| | PS9Z-6RM3 | Output: +5V, 1A/-5V, 1A, 10W |
| | PS9Z-6RM4 | Output: +15V, 0.4A/-15V, 0.4A, 12W |
| | PS9Z-6RM5 | Output: +5V, 1A/+12V, 0.5A, 11W |
| | PS9Z-6RM6 | Output: +12V, 0.5A/-12V, 0.5A, 12W |
| Branch Terminal Module Note 2 | PS9Z-6RS1 | Additional screw terminals for wiring: 2 + terminals / 2 - terminals |
| Panel Mounting Bracket | PS9Z-6R1F | |
| Side-mount Panel Mounting Bracket | PS9Z-6R2F | Supplied with M3 × 6 countersunk mounting screws |
| DIN Rail | BNDN1000 | 1,000mm |
| DIN Rail End Clip | BNL6 | |

1. When using an output voltage expansion module, reduce 1A from the output current of PS6R.
2. When using a branch terminal module, the total voltage/current of PS6R and the branch terminal module should not exceed the rated current/voltage of PS6R

## Specifications

### PS6R

| Part No. | | | PS6R-F24 | PS6R-G24 | PS6R-J24 |
|---|---|---|---|---|---|
| Input | Input Voltage | | 100 to 240V AC (Voltage range: 85 to 264V AC/110 to 350V DC) (Load ≤ 80% at 85 to 100V AC, 110 to 140V DC) Note 1 | | |
| | Frequency | | 50/60Hz | | |
| | Input Current | 100V AC | 1.4A typ | 2.7A typ | 5.5A typ. |
| | | 230V AC | 0.7A typ | 1.2A typ | 2.3A typ. |
| | Inrush Current | 100V AC | 9A max. (Ta=25°C, 100V AC cold start) | | |
| | | 230V AC | 20A max. (Ta=25°C, 230V AC cold start) | | |
| | Leakage Current | 120V AC | 0.5mA max. | | |
| | | 230V AC | 1mA max. | | |
| | Efficiency (Typical) | 100V AC | 90% | 90% | 91% |
| | | 230V AC | 90% | 91% | 93% |
| | Power Factor (Typical) | 100V AC | 0.99 | 0.99 | 0.98 |
| | | 230V AC | 0.96 | 0.97 | 0.97 |
| Output | Rated Voltage/Current | | 24V/5A | 24V/10A | 24V/20A |
| | Adjustable Voltage Range | | ±10% | | |
| | Output Holding Time | | 20ms min. (at rated input and output) | | |
| | Start Time | | 800ms max. (at rated input and output) | | |
| | Rise Time | | 200ms max. (at rated input and output) | | |
| | Regulation | Total Fluctuation | ±5% max. | | |
| | | Input Fluctuation | 0.4% max. | | |
| | | Load Fluctuation | 0.6% max. | | |
| | | Temperature Change | 0.05%/°C max. (–10 to +60°C) | | |
| | | Ripple (including noise) | 1% p-p max. (0 to +60°C) | | |
| | | | 1.5% p-p max. (–10 to 0°C) | | |
| Supplementary Functions | Overcurrent Protection | | 105 to 120% (auto reset) (output current when voltage drops by 5%) | | |
| | Overvoltage Protection | | Output off at 120% Note 2 | | |
| | Operation Indicator | | LED (green) | | |
| | Voltage Low Indication | | LED (amber) | | |
| Dielectric Strength | Between input and output terminals | | 3000V AC, 1 minute | | |
| | Between input and ground terminals | | 2000V AC, 1 minute | | |
| | Between output and ground terminals | | 500V AC, 1 minute | | |
| Insulation Resistance | | | 100MΩ min. 500V DC megger (between input and output terminals/between input and ground terminals) (at room temperature and normal humidity) | | |
| Operating Temperature | | | –10 to +70°C (no freezing) Note 3 | | |
| Operating Humidity | | | 20 to 90% RH (no condensation) | | |
| Storage Temperature | | | –25 to +75°C (no freezing) | | |
| Storage Humidity | | | 20 to 90% RH (no condensation) | | |
| Vibration Resistance | | | 10 to 55 Hz, amplitude 0.375 mm (0.187mm using PS9Z-6R1F) 2 hours each in 3 axes, 6 directions | | |
| Shock Resistance | | | 300 m/s$^2$ (150 m/s$^2$ when using a PS9Z-6R1F panel mounting bracket) | | |
| EMC | EMI | | EN61204-3 (Class B) | | |
| | EMS | | EN61204-3 (industrial) | | |
| Degree of Protection | | | IP20 (IEC 60529) | | |
| Weight (approx.) | | | 630g | 960g | 1400g |
| Terminal Screw | | | M3.5 (See last page for wire sizes) | | |

1. DC input voltage is not subjected to safety standards.
2. One minute after the output has been turned off, turn on the input again.
3. See the output derating curves.

**Easily Expandable**

**Output Voltage Expansion Module**
In addition to the standard 24V output, additional 5, 12, and 15V outputs can be added.

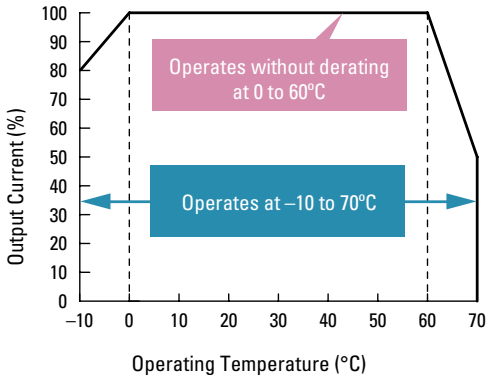
**Branch Terminal Module**
Two terminals can be added. No wiring is required, reducing installation space.

## Accessories (For use with PS6R)

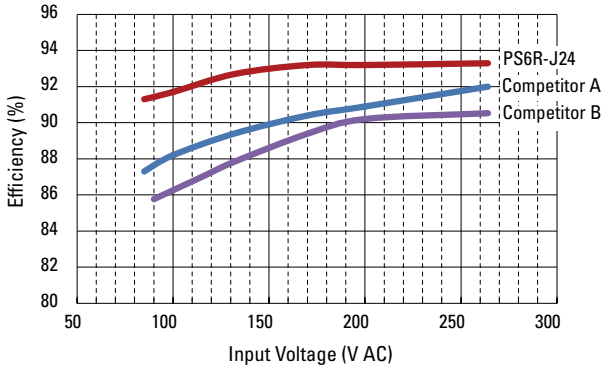
| Part No. | | | Output Voltage Expansion Module | | | | | | Branch Terminal Module |
|---|---|---|---|---|---|---|---|---|---|
| | | | PS9Z-6RM1 | PS9Z-6RM2 | PS9Z-6RM3 | PS9Z-6RM4 | PS9Z-6RM5 | PS9Z-6RM6 | PS9Z-6RS1 |
| Input Voltage | | | 24V DC | | | | | | |
| Output Capacity | | | 10W max. | 12W max. | 10W max. | 12W max. | 11W max. | 12W max. | — |
| Output | Rated Voltage/Current | | 5V/2A | 12V/1A | ±5V 2A | ±15V 0.4A | 5V/1A, 12V/0.5A | ±12V 0.5A | 24V/10A max. Note 1 |
| | Adjustable Voltage Range | | Not available | | | | | | |
| | Voltage Accuracy | | ±5% max. | | | | | | — |
| | Start Time | | 200 ms max. (at rated input and output) | | | | | | — |
| | Regulation | Input Fluctuation | 0.5% max. | | | | | | — |
| | | Load Fluctuation | 1.0% max. | | | | | | |
| | | Temperature Change | 0.05%/max. (–10 to +60°C) | | | | | | |
| | | Ripple (including noise) | 100mV max. | 150mV max. | | 100mV max., 150mV max. | | | |
| Supplementary Functions | Overcurrent Protection | | 105% (auto reset) | | | | | | — |
| | Overvoltage Protection | | Output off at 120% | | | | | | |
| Operating Temperature | | | –10 to +70°C (no freezing) Note 2 | | | | | | |
| Operating Humidity | | | 20 to 90%RH (no condensation) | | | | | | |
| Storage Temperature | | | –25 to +75°C (no freezing) | | | | | | |
| Storage Humidity | | | 20 to 90% RH (no condensation) | | | | | | |
| Vibration Resistance | | | 10 to 55 Hz, amplitude 0.375 mm, 2 hours each in 3 axes, 6 directions (in combination with PS6R-J24) | | | | | | |
| Shock Resistance | | | 300 m/s$^2$ (150 m/s$^2$ when using a PS9Z-6R1F panel mounting bracket), 3 shocks each in 6 axes (in combination with PS6R-J24) | | | | | | |
| EMC | EMI | | EN61204-3 (Class B) (in combination with PS6R-□24) | | | | | | — |
| | EMS | | EN61204-3 (industrial) (in combination with PS6R-□24) | | | | | | |
| Safety Standards | | | UL508 (Listing), CSA C22.2 No.107.1, IEC/EN60950-1, EN50178 (in combination with PS6R-□24) | | | | | | |
| Degree of Protection | | | IP20 (IEC 60529) | | | | | | |
| Weight (approx.) | | | 90g | | | | | | 30g |
| Terminal Screw | | | M3.5 (See last page for wire sizes.) | | | | | | |

1. Ensure that the current does not exceed the rated current of the PS6R.
2. See the output derating curves.

### Wide Operating Termperature Range




### Energy-saving 93% Efficiency (480W)



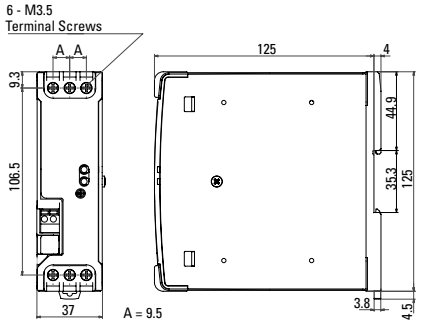

### Easy Maintenance - LED Indicator

| Status | Normal | Overload or Input Voltage Low* | Output short-circuit | Output OFF |
|---|---|---|---|---|
| DC ON (green LED) | ● | ● | ● | ● |
| DC Low (amber LED) | ● | ● | ● | ● |

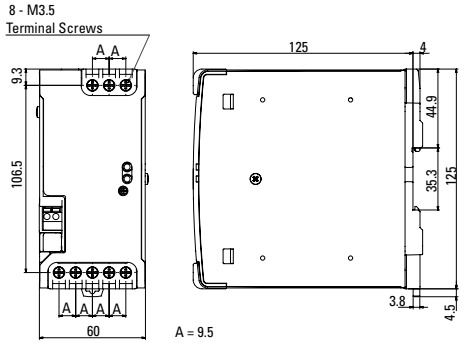
*The LEDs turn on when the input voltage drops.

## Dimensions (mm)

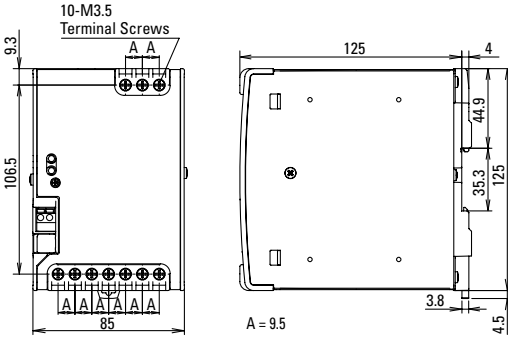
### PS6R-F24



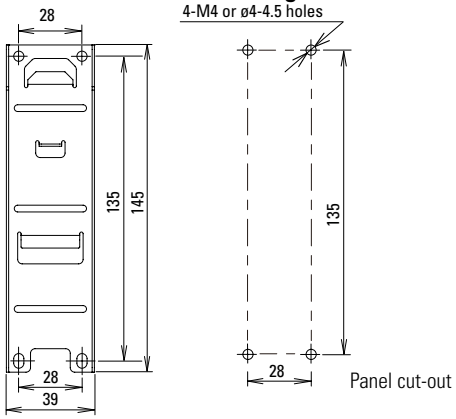

### PS6R-G24



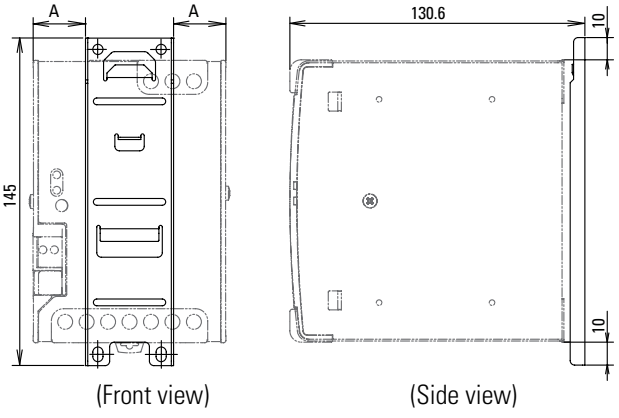

### PS6R-J24



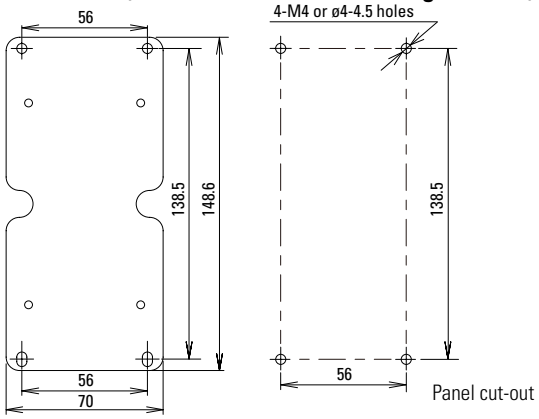

### PS9Z-6R1F Panel Mounting Bracket



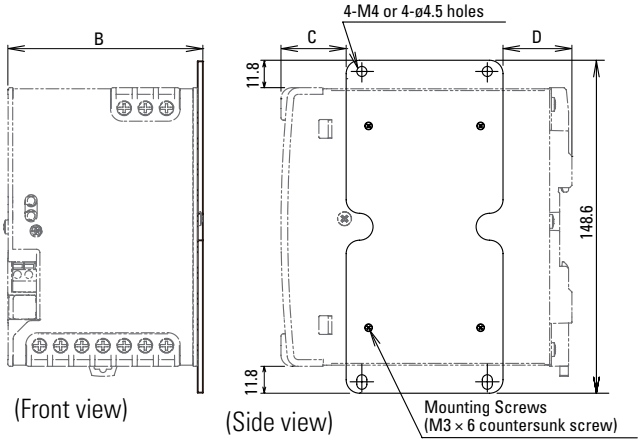

### When a PS9Z-6R1F is installed on PS6R




### PS9Z-6R2F (Side-mount Panel Mounting Bracket)

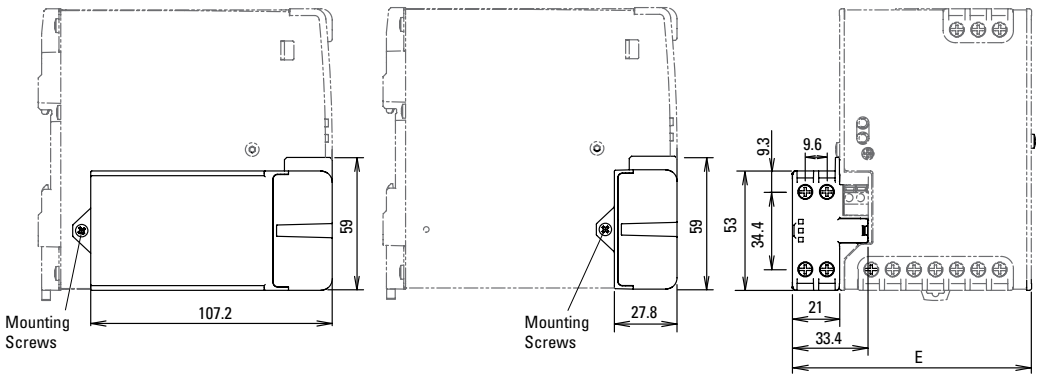



### When a PS9Z-6R2F is installed on PS6R




### When using a PS9Z-6RM* Output Voltage Expansion Module

### When using a PS9Z-6RS1 Branch Terminal Module




Dimension Table

| | A | B | C | D | E |
|---|---|---|---|---|---|
| PS6R-F24 | – | 39.3 | 29.5 | 29.5 | 58 |
| PS6R-G24 | 10.5 | 62.3 | 29.5 | 31 | 81 |
| PS6R-J24 | 23 | 87.3 | 29.5 | 31 | 106 |

## Operating Instructions

The PS6R should be placed in a proper enclosure. It is designed to be used with general electrical equipment and industrial electric devices

### Operation Notes

1. Output interruption may indicate blown fuses. Contact IDEC.
2. The PS6R contains an internal fuse for AC input. When using DC input, install an external fuse or DC input. To avoid blown fuses, select a fuse in consideration of the rated current of the internal fuse.

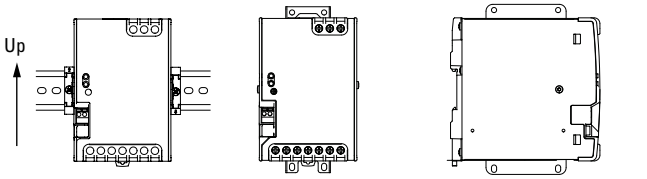
Rated Current of Internal Fuses

| Part No. | Internal Fuse Rated Current |
|---|---|
| PS6R-F24 | 4A |
| PS6R-G24 | 6.3A |
| PS6R-J24 | 10A |

- Avoid overload and short-circuit for a long period of time, otherwise internal elements may be damaged.
- DC input operation is not subjected to safety standards.

### Installation Notes

- The PS6R can be installed in the direction shown below only.

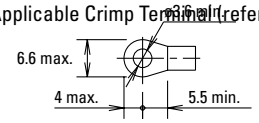



Vertical | When using PS9Z-6R1F Panel Mounting Bracket | When using PS9Z-6R2F Side-mount Panel Mounting Bracket

- Do not close the top and bottom openings of the PS6R to allow for heat radiation by convection.
- Maintain a minimum of 20mm clearance around the PS6R, except for the top and bottom openings.
- When derating of the output does not work, provide forced air-cooling.
- Make sure to wire the ground terminal correctly.
- For wiring, use wires with heat resistance of 60°C or higher. Use copper wire of the following sizes. Wires of the following sizes must be used to comply with UL508, CSA C22.2 No. 107.1.

| Model | Terminal | Wire Size/No. of Wire | Wire Type | Torque, in-lbs (N·m) |
|---|---|---|---|---|
| PS6R-F24 PS6R-G24 | Input | 18-14 AWG, 1-wire | Copper Solid/Stranded | 7.0 (0.8) |
| | Output | 18-14 AWG, 1-wire, (18 AWG - 7A, 16 AWG - 10A, 14 AWG - 15A) | | |
| | DC OK Output | 22-14 AWG, 1-wire (stripped wire length: 6 to 7mm) | | |
| PS6R-J24 | Input | 18-14 AWG, 1-wire | | |
| | Output | 18-14 AWG, 2-wire Use the same size wire for each terminal (18 AWG - 7A, 16 AWG - 10A, 14 AWG - 15A) | | |
| | | 12 AWG, 1-wire | Copper Solid/Stranded Use with UL-listed ring/ fork crimp terminal. | |
| | DC OK Output | 22-14 AWG, 1-wire (stripped wire length: 6 to 7mm) | Copper Solid/Stranded | — |
| PS9Z-6R□ | Output | 18-14 AWG, 1-wire (18 AWG - 7A, 16 AWG -10A, 14 AWG - 15A) | | 7.0 (0.8) |

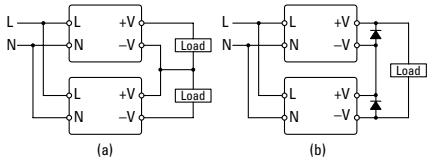
Applicable Crimp Terminal (reference)




- Recommended tightening torque of the input and output terminals is 0.8N·m.
- The output voltage can be adjusted within ±10% of the rated output voltage by using the V.ADJ control. Note that overvoltage protection may work when increasing the output voltage.
- When large shocks or heavy vibrations on the PS6R are expected, the use of DIN rail or PS9Z-6R2F side-mount panel mounting bracket is recommended.

### Series Operation

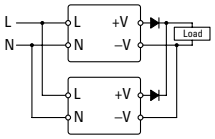
The following series operation is allowed. Connect Schottky barrier diodes as shown below. Output voltage expansion modules cannot be connected in series.




Select a Schottky diode in consideration of the rated current. The diode's reverse voltage must be higher than the PS6R's output voltage.

### Parallel Operation

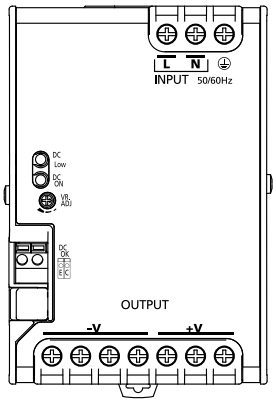
Parallel operation is possible to increase the output capacity. Output voltage expansion modules cannot be connected in series.



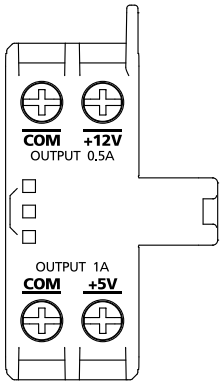

When increasing the capacity, observe the following.

1. Maintain the operating temperature below 40°C.
2. Output cannot be connected directly in parallel operation. Connect a diode to the output of each PS6R.
3. Output terminal voltage of both power supplies must be the same. Also, maintain the voltage difference between the power supplies below 30mV.
4. Use load lines of the same diameter and length.
5. Set the output voltage higher for the amount of diode forward voltage drop.
6. Turn on the inputs at the same time.
7. Select a diode in consideration of:
   Diode's reverse voltage must be higher than the PS6R's output voltage.
   Diode's current must be three times the PS6R's output current. Provide a heat sink for heat dissipation.

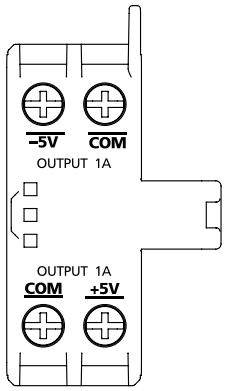
**PS6R-J24**




**PS6R-6RM1/M2/M3**
Output Voltage Expansion Module

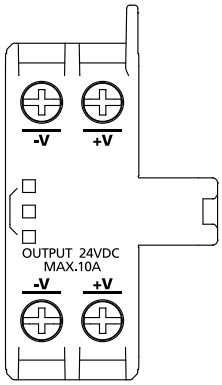



**PS9Z-6RM3/M4/M6**
Output Voltage Expansion Module




(PS6R-6RM5 shown)

**PS6R-6RS1**
Branch Terminal Module




PS6R-☐24/PS9Z-6RS1

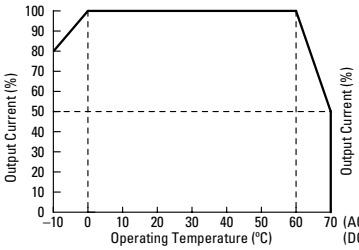
| Marking | Name | Description |
|---|---|---|
| L, N | Input Terminal | Voltage range: 85 to 264V AC/110 to 350V DC |
| ⏚ | Ground Terminal | Be sure to connect this terminal to a proper ground. |
| +V, –V | DC Output Terminals | +V: Positive output terminal<br>–V: Negative output terminal |
| VR.ADJ | Output Voltage Adjustment | Allows adjustment within ±10%. Turning clockwise increases the output voltage. |
| DC ON | Operation Indicator (green) | Lights on when the output voltage is on. |
| DC LOW | Output Low Indicator (Amber) | Lights on when the output voltage drops approximately 80% of the rated value. |
| DC OK | DC OK Output | Lights on when the output voltage is more than 80% of the rated value.<br>NPN transistor output (50V DC max., 50 mA max.) |

PS9Z-6RM☐

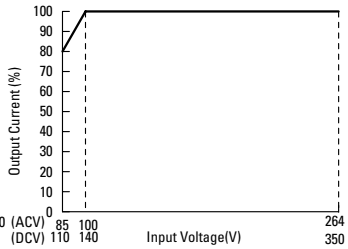
| Marking | Name | Description |
|---|---|---|
| +5V, +12V, +15V | DC Output Terminal | +5V side, +12V side, +15V side |
| -5V, -12V, -15V | DC Output Terminal | -5V side, -12V side, -15V side |
| COM | DC Output Terminal | 0V side (wired internally to –V of PR6R-J24) |

## Characteristics

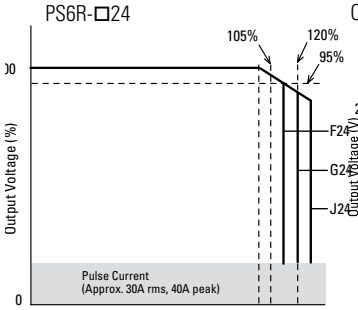
Operating Temperature vs. Output Current (Derating Curves)



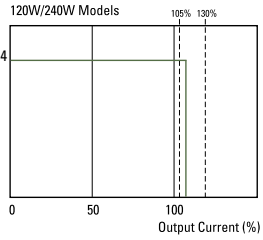

Output Current vs. Input Voltage (Derating Curves) (Ta=25°C)




Overcurrent Protection Characteristics PS6R-☐24




Overcurrent Protection Characteristics PS9Z-6RM∗

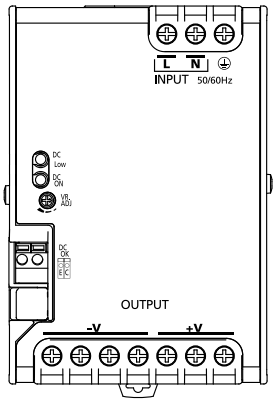



## Operating Temperature approved by Safety Standards

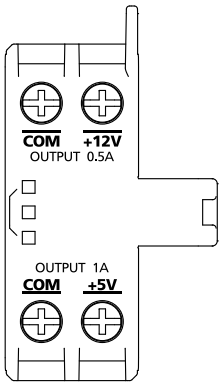
| Part No. | UL508, CSA C22.2 No. 107. 1 | EN60950-1, EN50178 |
|---|---|---|
| PS6R-F24 | 60°C | 60°C |
| PS6R-G24 | 60°C | 60°C |
| PS6R-J24 | 55°C | 60°C |
| PS9Z-6R☐☐ | 55°C | 60°C |

## Parts Description

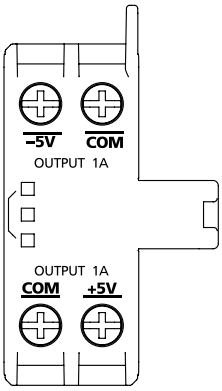
**PS6R-J24**




**PS6R-6RM1/M2/M3**
Output Voltage Expansion Module

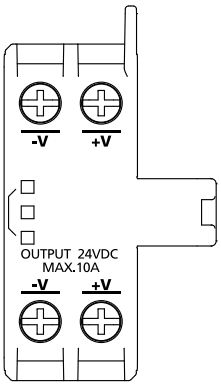



**PS9Z-6RM3/M4/M6**
Output Voltage Expansion Module




(PS6R-6RM5 shown)

**PS6R-6RS1**
Branch Terminal Module




### PS6R-☐24/PS9Z-6RS1

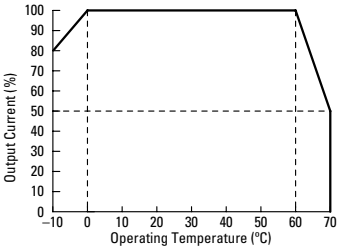
| Marking | Name | Description |
|---|---|---|
| L, N | Input Terminal | Voltage range: 85 to 264V AC/110 to 350V DC |
| ⏚ | Ground Terminal | Be sure to connect this terminal to a proper ground. |
| +V, –V | DC Output Terminals | +V: Positive output terminal<br>–V: Negative output terminal |
| VR.ADJ | Output Voltage Adjustment | Allows adjustment within ±10%. Turning clockwise increases the output voltage. |
| DC ON | Operation Indicator (green) | Lights on when the output voltage is on. |
| DC LOW | Output Low Indicator (Amber) | Lights on when the output voltage drops approximately 80% of the rated value. |
| DC OK | DC OK Output | Lights on when the output voltage is more than 80% of the rated value.<br>NPN transistor output (50V DC max., 50 mA max.) |

### PS9Z-6RM☐

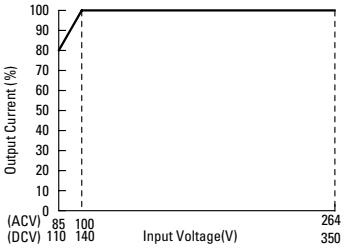
| Marking | Name | Description |
|---|---|---|
| +5V, +12V, +15V | DC Output Terminal | +5V side, +12V side, +15V side |
| -5V, -12V, -15V | DC Output Terminal | -5V side, -12V side, -15V side |
| COM | DC Output Terminal | 0V side (wired internally to –V of PR6R-J24) |

## Characteristics

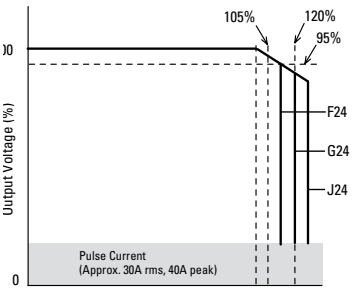
Operating Temperature vs.
Output Current (Derating Curves)



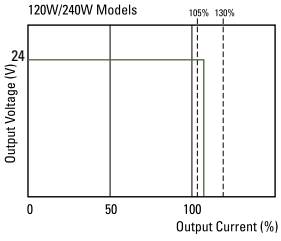

Output Current vs. Input Voltage
(Derating Curves) (Ta=25°C)




Overcurrent Protection Characteristics PS6R-☐24




Overcurrent Protection Characteristics PS9Z-6RM∗




### Operating Temperature approved by Safety Standards

| Part No. | UL508, CSA C22.2 No. 107. 1 | EN60950-1, EN50178 |
|---|---|---|
| PS6R-F24 | 60°C | 60°C |
| PS6R-G24 | 60°C | 60°C |
| PS6R-J24 | 55°C | 60°C |
| PS9Z-6R☐☐ | 55°C | 60°C |

# PS5R-V Series
## Switching Power Supplies

DIN-rail mount switching power supplies with global approvals for both industrial and hazardous locations

### Key Features

- Compact size preserves panel space
- Slim size (width):
  22.5mm (10W/15W/30W)
  36mm (60W/90W)
  45mm (7.5W)
  46mm (120W)
  60mm (240W)
- Universal Voltage Input:
  85-264V AC/100-370V DC
- Wide operating temperature range
- Spring-up terminals accept ring & fork terminals
- Approved for use in Class I Division 2 hazardous locations
- Can be installed in 6 directions
- 7.5W ~ 90W meet NEC Class 2 output ratings
- Overcurrent protection with auto-reset
- Meets SEMI F47 Sag Immunity (208V AC input)
- RoHS compliant
- Five-year factory warranty

### Standards Compliance

| Applicable Standards | Mark | File No. or Organization |
|---|---|---|
| UL508<br>UL1310[1]<br>ANSI/ISA 12.12.01<br>CSA C22.2 No.107.1<br>CSA C22.2 No.213<br>CSA C22.2 No.223[1] | c UL us | UL/c-UL Listed<br>File No. E467154, E177168 |
| EN60950-1<br>EN50178<br>EN61204-3<br>EN50581 | TÜV<br>CE | TÜV SÜD[2]<br>EU Low Voltage Directive,<br>EMC Directive<br>RoHS Directive |
| SEMI F47 | — | EPRI |

Note 1: PS5R-VA/VB/VC/VD/VE only
Note 2: EN60950-1, EN50178 only

### Part Numbers

| Output Capacity | Part Number | Input Voltage | Output Voltage | Output Current |
|---|---|---|---|---|
| 7.5W | PS5R-VA05 | 100 to 240V AC<br>(Voltage range: 85 to 264V AC /<br>100 to 370V DC) | 5V | 1.5A |
| | PS5R-VA12 | | 12V | 0.6A |
| | PS5R-VA24 | | 24V | 0.3A |
| 10W | PS5R-VB05 | | 5V | 2.0A |
| 15W | PS5R-VB12 | | 12V | 1.3A |
| | PS5R-VB24 | | 24V | 0.65A |
| 30W | PS5R-VC12 | | 12V | 2.5A |
| | PS5R-VC24 | | 24V | 1.3A |
| 60W | PS5R-VD24 | | 24V | 2.5A |
| 90W | PS5R-VE24 | | 24V | 3.75A |
| 120W | PS5R-VF24 | | 24V | 5.0A |
| 240W | PS5R-VG24 | | 24V | 10.0A |

### Part Number Structure

**PS5R - V □ □**

Output Capacity
A: 7.5W
B: 10W/15W
C: 30W
D: 60W
E: 90W
F: 120W
G: 240W

Output Voltage
05: 5V[3]
12: 12V[4]
24: 24V

Note 3: PS5R-VA/VB only
Note 4: PS5R-VA/VB/VC only
Use only for interpreting part numbers.
Do not use for developing part numbers.

## Specifications

| Model | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 5V DC output | PS5R-VA05 | PS5R-VB05 | - | - | - | - | - |
| | 12V DC output | PS5R-VA12 | PS5R-VB12 | PS5R-VC12 | - | - | - | - |
| | 24V DC output | PS5R-VA24 | PS5R-VB24 | PS5R-VC24 | PS5R-VD24 | PS5R-VE24 | PS5R-VF24 | PS5R-VG24 |
| Output Capacity | | 7.5W | 15W (5V Model is 10W) | 30W | 60W | 90W | 120W | 240W |
| Input | Rated Input Voltage (Single-phase two-wire)[1] | 100 to 240V AC (Voltage range: 85 to 264V AC/100 to 370V DC) (Load ≤ 80% at 100-105V DC) | | | | | | |
| | Frequency | 50/60 Hz | | | | | | |
| | Input Current (Typ.) 100V AC | 5V: 0.20A 12V, 24V: 0.18A | 5V: 0.25A 12V, 24V: 0.35A | 0.7A | 1.3A | 1.1A | 1.4A | 2.7A |
| | Input Current (Typ.) 230V AC | 5V: 0.12A 12V, 24V: 0.10A | 5V: 0.14A 12V, 24V: 0.19A | 0.3A | 0.8A | 0.6A | 0.7A | 1.2A |
| | Inrush Current (Typ.) (Ta=25°C, cold start) 100V AC | 15A | 18A | | | | | 14A |
| | Inrush Current (Typ.) (Ta=25°C, cold start) 230V AC | 36A | 45A | | | | 41A | 30A |
| | Leakage Current 120V AC | 0.5mA max. | | | | | | |
| | Leakage Current 230V AC | 1.0mA max. | | | | | | |
| | Efficiency (Typ.) (at rated output)[2] 100V AC | 5V: 74%, 12V: 79%, 24V: 80% | 5V: 77%, 12V: 82%, 24V: 84% | 12V: 83%, 24V: 85% | 86% | 88% 89% | | 89% |
| | Efficiency (Typ.) (at rated output)[2] 230V AC | 5V: 73%, 12V: 77%, 24V: 76% | 5V: 73%, 12V: 80%, 24V: 81% | 12V: 85%, 24V: 87% | 86% | | | 90% |
| | Power Factor (Typ.) 100V AC | — | — | — | — | 0.99 | | |
| | Power Factor (Typ.) 230V AC | — | — | — | — | 0.86 | 0.92 | 0.96 |
| Output | Rated Voltage/Current | 5V/1.5A, 12V/0.6A, 24V/0.3A | 5V/2.0A[3], 12V/1.3A, 24V/0.65A | 12V/2.5A, 24V/1.3A | 24V/2.5A | 24V/3.75A | 24V/5A | 24V/10A |
| | Adjustable Voltage Range | ±10% | | | | ±5% | ±10% | |
| | Output Holding Time (Typ.) (at rated output) 100V AC | 45ms | 5V: 53ms, 12V: 34ms, 24V: 36ms | 12V: 13ms, 24V: 15ms | 13ms | 20ms | 30ms | |
| | Output Holding Time (Typ.) (at rated output) 230V AC | 285ms | 5V: 330ms 12V: 215ms 24V: 230ms | 12V: 110ms 24V: 110ms | 105ms | 30ms | 33ms | 40ms |
| | Start Time (at rated input and output) | 500ms max. | 500ms max. | 600ms max. | 800ms max. | | 700ms max. | 800ms max. |
| | Rise Time (at rated input and output) | 5V, 12V: 200ms max 24V: 250ms max | 5V, 12V: 200ms max. 24V: 250ms max. | 200ms max. | | | | |
| | Regulation: Input Fluctuation | 0.4% max. | | | | | | |
| | Regulation: Load Fluctuation | 5V: 2.5% max. 12V, 24V: 1.0% max. | | 1.0% max. | | | | |
| | Regulation: Temperature Change | 0.04%/°C max. (-10 to +65°C ) | 0.05%/°C max. (-10 to +65°C ) | 12V: 0.05%/°C max. (-10 to +50°C) 24V: 0.05%/°C max. (-10 to +55°C) | 0.05%/°C max. (-10 to +55°C ) | 0.05%/°C max. (-10 to +50°C ) | 0.05%/°C max. (-25 to +55°C ) | 0.05%/°C max. (-25 to +50°C) |
| | Regulation: Ripple (including noise) | 5V: 8% p-p max. (-25 to -10°C) 12V: 6% p-p max. (-25 to -10°C) 24V: 4% p-p max. (-25 to -10°C) | 5V: 8% p-p max. (-25 to -10°C) 12V: 6% p-p max. (-25 to -10°C) 24V: 4% p-p max. (-25 to -10°C) | 12V: 6% p-p max. (-25 to -10°C) 24V: 4% p-p max. (-25 to -10°C) | 4% p-p max. (-25 to -10°C) | | | |
| | Regulation: Ripple (including noise) | 5V: 5% p-p max. (-10 to +0°C) 12V: 2.5% p-p max. (-10 to +0°C) 24V: 1.5% p-p max. (-10 to +0°C) | 5V: 5% p-p max. (-10 to +0°C) 12V: 2.5% p-p max. (-10 to +0°C) 24V: 1.5% p-p max. (-10 to +0°C) | 12V: 2.5% p-p max. (-10 to +0°C) 24V: 1.5% p-p max. (-10 to +0°C) | 1.5% p-p max. (-10 to +0°C) | | | |
| | Regulation: Ripple (including noise) | 5V: 2.5% p-p max. (0 to +65°C) 12V: 1.5% p-p max. (0 to +65°C) 24V: 1% p-p max. (0 to +65°C) | 5V: 2.5% p-p max. (0 to +65°C) 12V: 1.5% p-p max. (0 to +65°C) 24V: 1% p-p max. (0 to +65°C) | 12V: 1.5% p-p max. (0 to +50°C) 24V: 1% p-p max. (0 to +55°C) | 1% p-p max. (0 to +55°C) | 1% p-p max. (0 to +50°C) | 1% p-p max. (0 to +55°C) | 1% p-p max. (0 to +50°C) |
| Overcurrent Protection | | 105% min. (auto reset) | | | | 101% min. (auto reset) | 105% min. (auto reset) | |
| Operation Indicator | | LED (green) | | | | | | |
| Dielectric Strength | Between input and output terminals | 3,000V AC, 1 minute | | | | | | |
| Dielectric Strength | Between input and ground terminals | 2,000V AC, 1 minute | | | | | | |
| Dielectric Strength | Between output and ground terminals | 500V AC, 1 minute | | | | | | |
| Insulation Resistance | | Between input and output terminals: 100MΩ min. (500V DC megger) Between input and ground terminals: 100MΩ min. (500V DC megger) | | | | | | |
| Operating Temperature[4] (No freezing) | | -25 to +75°C | | -25 to +70°C | | -25 to +65°C | | |
| Operating Humidity | | 20 to 90% RH (no condensation) | | | | | | |
| Storage Temperature (No freezing) | | -25 to +75°C | | | | | | |
| Storage Humidity | | 20 to 90% RH (no condensation) | | | | | | |
| Vibration Resistance | | 10 to 55Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with BNL6 end clips) | | | 10 to 55Hz, amplitude 0.33mm, 2 hours each in 3 axes (when used with BNL6 end clips) 10 to 55Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with BNL8 end clips) | | 10 to 55Hz, amplitude 0.21mm, 2 hours each in 3 axes (when used with BNL6 end clips) 10 to 55Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with BNL8 end clips) | 10 to 55 Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with part no. BNL6 mounting clips) |
| Shock Resistance | | 300 m/s$^2$ (30G), 3 times each in 6 directions | | | | | | |
| Expected Life[5] | | 8 years minimum (at the rated input, 50% load, operating temperature +40°C, standard mounting direction) | | | | | | |
| EMC | EMI | EN61204-3 (Class B) | | | | | | |
| EMC | EMS | EN61204-3 (industrial) | | | | | | |
| Safety Standards | | UL508 (Listing), UL1310 Class 2, ANSI/ISA-12.12.01 CSA C22.2 No. 107.1, 213, 223 EN60950-1, EN50178 | | | | | UL508 (Listing) ANSI/ISA-12.12.01 CSA C22.2 No. 107.1, 213 EN60950-1, EN50178 | |
| Other Standard | | SEMI F47 (at 208V AC input only) | | | | | | |
| Degree of Protection | | IP20 (EN60529) | | | | | | |
| Dimensions (mm) | | 75H × 45W × 70D | 90H × 22.5W × 95D | | 95H × 36W × 108D | | 115H × 46W × 121D | 125H × 60W × 125D |
| Weight (approx.) | | 130g | 140g | 150g | 260g | 310g | 470g | 960g |
| Terminal Screw | | M3.5 | | | | | | |

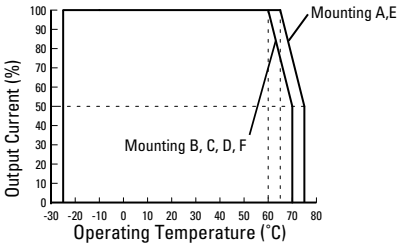
*At normal temperature and humidity unless otherwise specified.
Note 1: DC input voltage is not subject to safety standards. When using on DC input, connect a fuse to the input terminal for DC input protection.
Note 2: Under stable state.
Note 3: PS5R-VB05 (5V DC/2.0A) is 10W (Up to 3.0A at Ta = 0 to 40°C. Not subject to safety standards above 2.0A.)
Note 4: See the output derating curves.
Note 5: Calculation of the expected life is based on the actual life of the aluminum electrolytic capacitor. The expected life depends on operating conditions.

## Characteristics

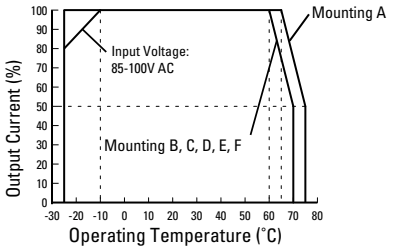
### Operating Temperature vs. Output Current (Derating Curves)

Conditions: Natural air cooling (Operating temperature is the temperature around the switching power supply.)

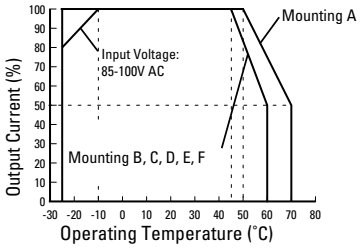
**PS5R-VA05, -VA12, -VA24**



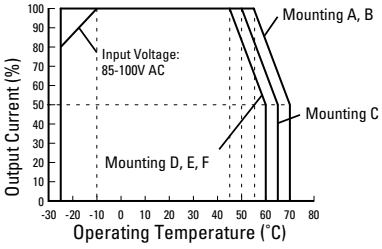

**PS5R-VB05, -VB12, -VB24**



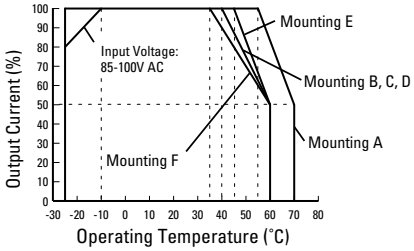

**PS5R-VC12**



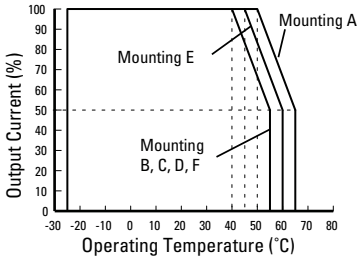

**PS5R-VC24**



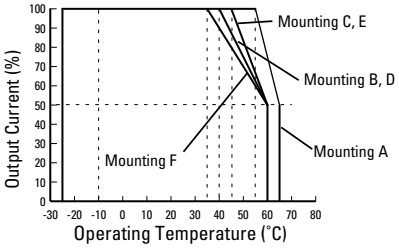

**PS5R-VD24**



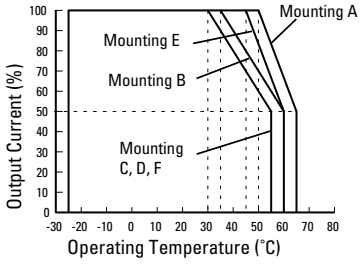

**PS5R-VE24**



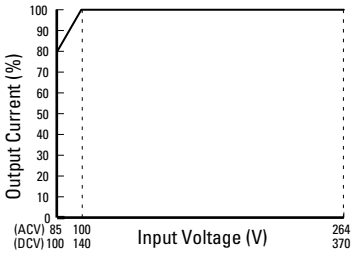

**PS5R-VF24**



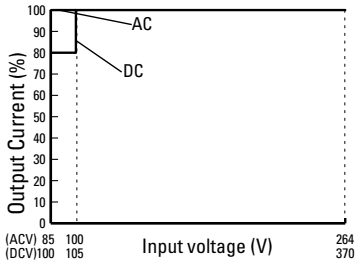

**PS5R-VG24**




**Input Voltage vs. Output Current (Derating Curves) Ta=25°C**
**PS5R-VB05, -VB12, -VB24, -VC12, -VC24, -VD24, -VE24, -VF24**

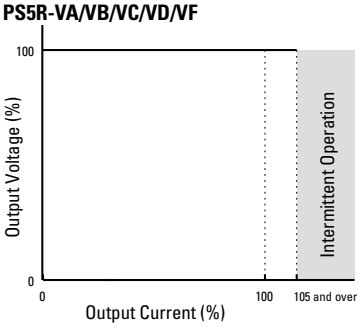



**PS5R-VA05, -VA12, -VA24, -VG24**

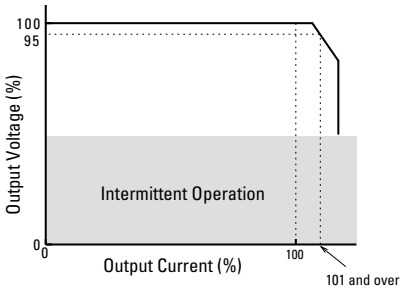



### Overcurrent Protection Characteristics

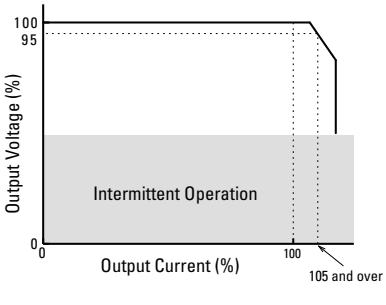
**PS5R-VA/VB/VC/VD/VF**




**PS5R-VE24**



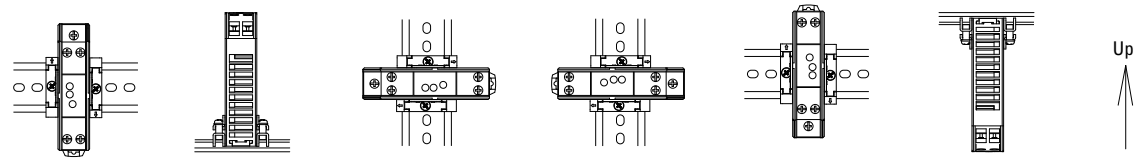

**PS5R-VG24**



## Operating Temperature Approved by Safety Standards

| Part Number | UL508, CSA C22.2 No.107.1, ANSI/ISA12.12.01, EN60950-1, EN50178 | | | | | |
|---|---|---|---|---|---|---|
| | Mounting A | Mounting B | Mounting C | Mounting D | Mounting E | Mounting F |
| PS5R-A05, -VB12, -VB24 | 65 | 60 | 60 | 60 | 65 | 60 |
| PS5R-VB05, -VB12, -VB24 | 65 | 60 | 60 | 60 | 60 | 60 |
| PS5R-VC12 | 50 | 45 | 45 | 45 | 45 | 45 |
| PS5R-VC24 | 55 | 55 | 50 | 45 | 45 | 45 |
| PS5R-VD24 | 55 | 40 | 40 | 40 | 45 | 35 |
| PS5R-VE24 | 50 | 40 | 40 | 40 | 45 | 40 |
| PS5R-VF24 | 55 | 40 | 45 | 40 | 45 | 35 |
| PS5R-VG24 | 50 | 35 | 30 | 30 | 45 | 30 |

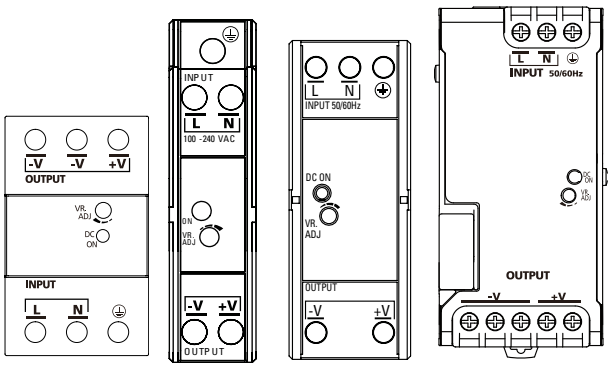
## Mounting Style




Mounting A (Vertical, standard) | Mounting B (Upright) | Mounting C (Right side up) | Mounting D (Left side up) | Mounting E (Upside down) | Mounting F (Downward)

## Front Panel

**PS5R-VA** **PS5R-VB/VC** **PS5R-VD/ VE/VF** **PS5R-VG**




| Marking | Name | Description |
|---|---|---|
| L, N | AC Input Terminal | Voltage range: 85 to 264V AC/100 to 370V DC |
| ⏚ | Ground Terminal | Be sure to connect this terminal to a proper ground. |
| +V, -V | DC Output Terminals | +V: Positive output terminal<br>-V: Negative output terminal |
| VR.ADJ | Output Voltage Adjustment | Allows adjustment within ±10%. (VE = ±5%)<br>Turning clockwise increases the output voltage.<br>Turning counterclockwise decreases the output voltage. |
| DC ON | Operation Indicator (green) | Illuminates when the output voltage is on. |

## Accessories

### Panel Mounting Bracket[2]

| Applicable Switching Power Supply | Part Number | Remarks |
|---|---|---|
| PS5R-VB<br>PS5R-VC | PS9Z-5R1B | — |
| | PS9Z-5R2B | For side mounting |
| PS5R-VD<br>PS5R-VE | PS9Z-5R1C | — |
| PS5R-VF | PS9Z-5R1E | — |
| PS5R-VG | PS9Z-6R1F | — |
| | PS9Z-6R2F | For side mounting |

Note 2: Used when installing on a panel directly, PS5R-VA model does not require panel mounting bracket.

### DIN Rail (35mm-wide)

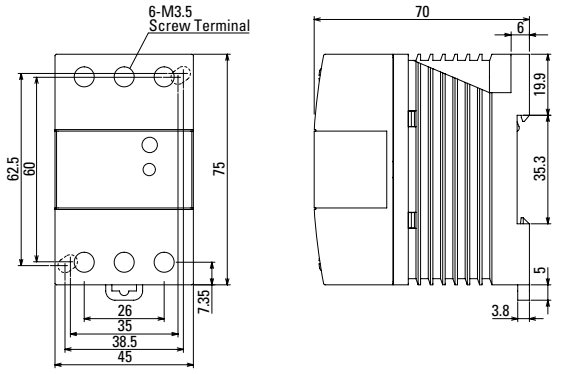
| Length | Part Number | Material |
|---|---|---|
| 1000mm | BNDN1000 | Aluminum |

### End Clip

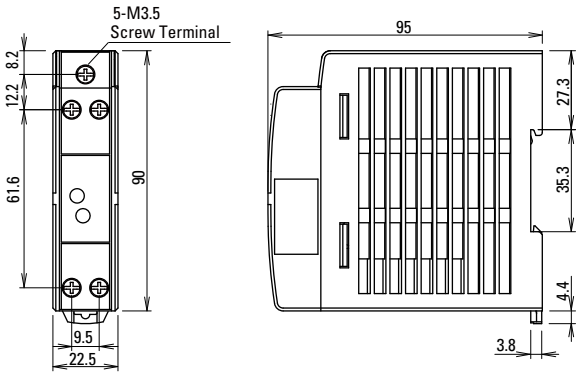
| Part Number |
|---|
| BNL6 |
| BNL8 |

## Dimensions (mm)

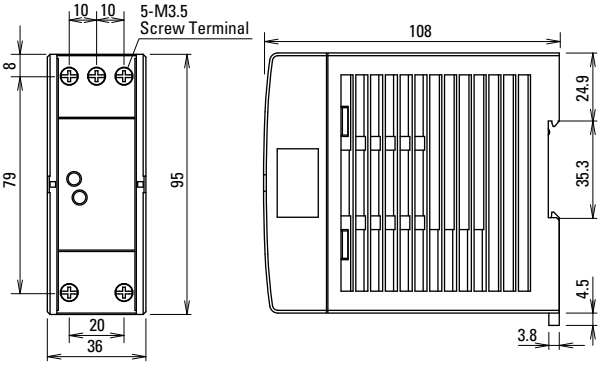
### PS5R-VA



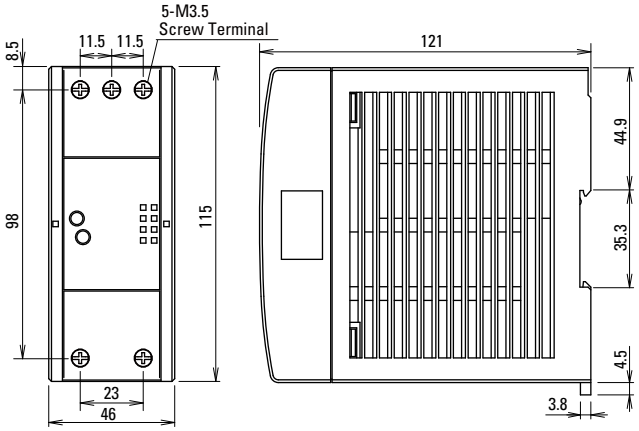

### PS5R-VB/VC



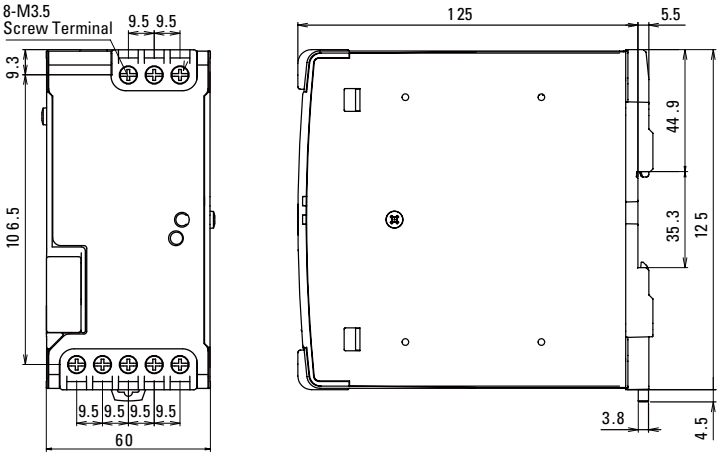

### PS5R-VD/VE




### PS5R-VF




### PS5R-VG




## MTBF*

| | |
|---|---|
| PS5R-VA: | 1,150,000H minimum |
| PS5R-VB: | 900,000H minimum |
| PS5R-VC: | 650,000H minimum |
| PS5R-VD: | 450,000H minimum |
| PS5R-VE: | 380,000H minimum |
| PS5R-VF: | 350,000H minimum |
| PS5R-VG: | 290,000H minimum |

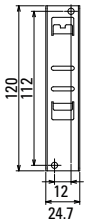
MIL-HDBK-217FN2
(GB, 30°C)

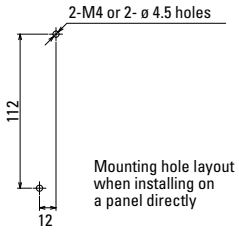
*MTBF stands for Mean Time Between Failure, which is calculated according to statistical device failures, and indicates reliability of a device. It is the statistical representation of the likelihood of the unit to fail and does not necessarily represent the expected life of a product.

* 3-Phase

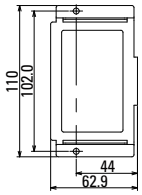
## Panel Mounting Bracket

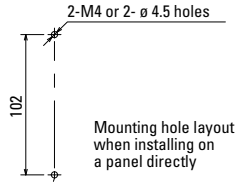
### PS9Z-5R1B



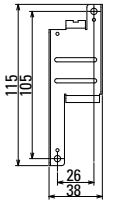



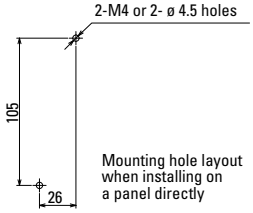

### PS9Z-5R2B Side-mount



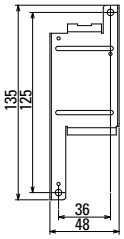



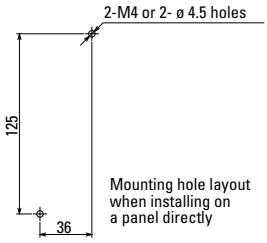

### PS9Z-5R1C



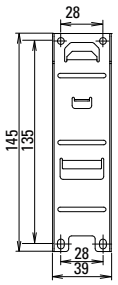



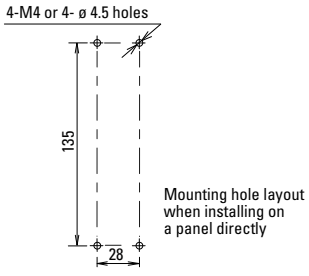

### PS9Z-5R1E



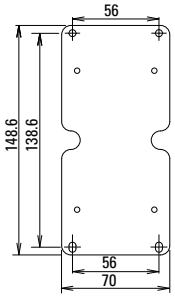



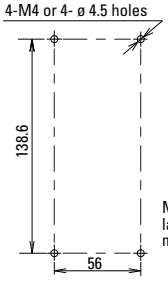

### PS9Z-6R1F



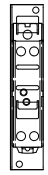




### PS9Z-6R2F Side-mount

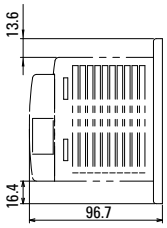


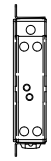

## When installed on switching power supply



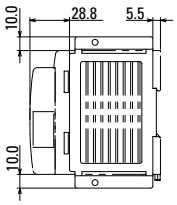
Front View



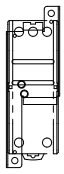

Side View



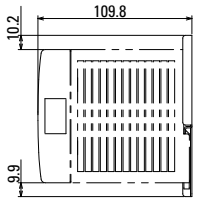
Side View



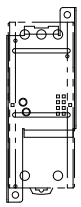

Front View



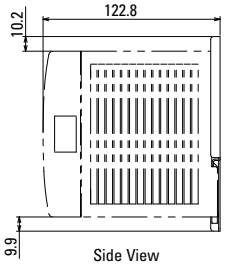
Front View



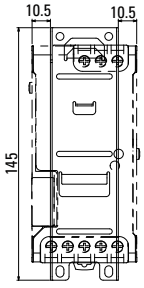

Side View



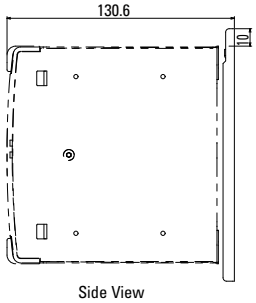
Front View



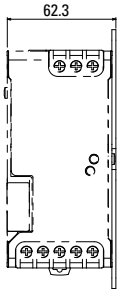

Side View



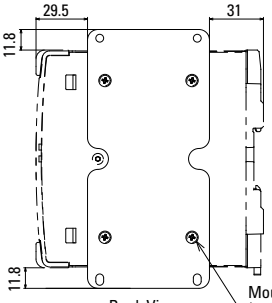

Front View




Side View




Side View




Back View

Mounting Screws
(4 -M3×6 countersunk screws)

## Safety Precautions

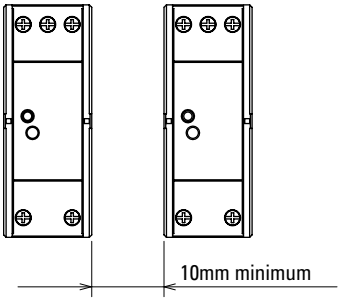
The PS5R-V should be placed in a proper enclosure. It is designed to be used with general electrical equipment and industrial electric devices

- Do not use switching power supplies with electric equipment whose malfunction or inadvertent operation may damage the human body or life directly.
- Make sure that the input voltage and output current do not exceed the ratings. If the input voltage and output current exceed the ratings, electric shock, fire, or malfunction may occur.
- Do not touch the terminals of the switching power supply while input voltage is applied, otherwise electric shock may occur.
- Provide the final product with protection against malfunction or damage that may be caused by malfunction of the switching power supply.
- Operating temperatures should not exceed the ratings. Be sure to note the derating characteristics. If the operating temperature exceeds the ratings, electric shock, fire, or malfunction may occur.
- Blown fuses indicate that the internal circuits are damaged. Contact IDEC for repair. Do not just replace the fuse and reoperate, otherwise electric shock, fire, or malfunction may occur.
- Do not use the switching power supplies to charge rechargeable batteries.
- Do not overload or short-circuit the switching power supply for a long period of time, otherwise the internal elements may be damaged.
- Do not disassemble, repair, or modify the power supplies, otherwise the high voltage internal part may cause electric shock, fire, or malfunction.
- The fuse inside the PS5R-V switching power supply is for AC input. Use an external fuse for DC input.

## Operating Instructions

### Notes for installation

- Do not close the top or bottom openings of the PS5R-V to allow for heat radiation by convection.
- When mounting multiple PS5R-V switching power supplies side by side, maintain a minimum of 10 mm clearance. Observe the derating curves in consideration of the ambient temperature.

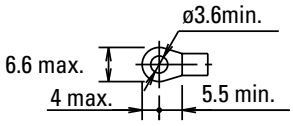



- When the derating voltage may exceed the recommended value, provide forced air-cooling.
- Make sure to wire the ground terminal correctly.
- For wiring, use wires of heat resistance of 60°C or higher (PS5R-VB: 80°C or higher). Use copper wire of the following sizes, according to the rated current.

| Terminal | Wire Size (allowable current) | Wire Type |
|---|---|---|
| Input | AWG 18 to 14 | Copper Solid/Stranded |
| Output | AWG18 to 14 (AWG18: 7A, AWG16: 10A, AWG14: 15A) | |

Cross-Sectional are AWG18: 0.82mm$^2$, AWG16: 1.31mm$^2$, AWG14: 2.0mm$^2$

### Applicable crimp terminal (reference)



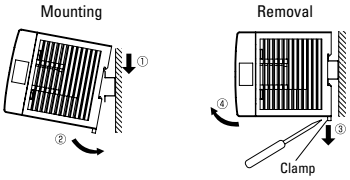

- Recommended tightening torque of the input and output terminals is 1.0 to 1.3Nm (0.8N·m for UL).

### Mounting on DIN Rails

1. Use a 35mm-wide DIN rail.
2.Place the PS5R-V on the DIN rail as shown with input terminal side up (①), and press the PS5R-V towards the DIN rail (②). Make sure that the PS5R-V is installed firmly.
3. Use BNL6 end clips to ensure power supplies do not slide off the end of the DIN rail. Use of BNL8 end clips is recommended when excessive vibration or shock is anticipated.

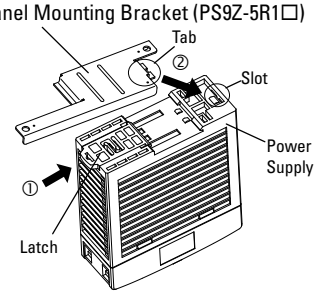
### Removal

- Insert a flat screwdriver into the slot in the clamp, and pull out until it clicks (①). The lock mechanism is released and the PS5R-V can be removed (②). When mounting the PS5R-V again, push in the latch first.

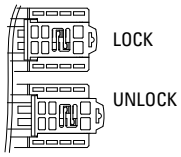



### Installing a Panel Mounting Bracket

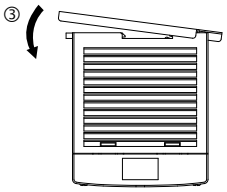
Panel Mounting Bracket (PS9Z-5R1☐)



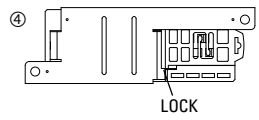

① Push in the latch to LOCK position.




② Install the tab on the panel mounting bracket into the slot on the power supply.

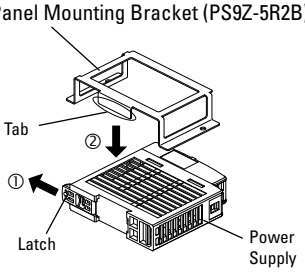



③ Install the brackets as shown on the left.

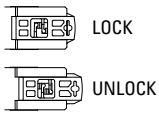



④ Ensure that the panel mounting bracket is locked by the latch.

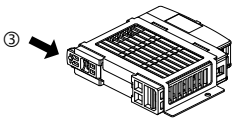
Panel Mounting Bracket (PS9Z-5R2B)



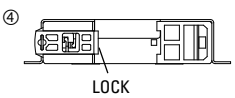

① Pull out the latch to UNLOCK position.




② Insert the tab on the panel mounting bracket into the slot on the power supply.



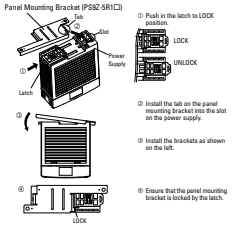

③ Push in the latch to LOCK position.

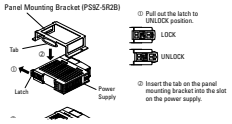



④ Ensure that the panel mounting bracket is locked by the latch.

## Installing PS9Z-6R2F Side-mount Panel Mounting Bracket

Install the bracket on the switching power supply using four M3 × 6 countersunk screws supplied with the bracket. Recommended tightening torque is 0.5 to 0.6N.m (should be in the center positions)




## Adjustment of Output Voltage

The output voltage can be adjusted within ±10% (VE: ±5%) of the rated output voltage by using the VR.ADJ control on the front. Turning the VR.ADJ clockwise increases the output voltage. Turning the VR.ADJ counterclockwise decreases the output voltage.

## Overcurrent Protection

The output voltage drops automatically when an overcurrent flows due to an overload or short circuit. Normal voltage is automatically restored when the load returns to normal conditions.

## Insulation/Dielectric Test

When performing an insulation/dielectric test, short-circuit the input (between L and N) and output (between +V and -V). Do not apply or interrupt the voltage quickly, otherwise surge voltages may be generated and the PS5R-V may be damaged.

## Notes for Operation

- Output interruption may indicate blown fuses. Contact IDEC.
- The PS5R-V switching power supply contains an internal fuse for AC input. When using DC input, install an external fuse. To avoid blown fuses, select a fuse in consideration of the rated current of the internal fuse.

## Rated Current of Internal Fuses

| Part Number | Internal FuseRated Current |
|---|---|
| PS5R-VB/VC | 2A |
| PS5R-VD/VE/VF | 4A |
| PS5R-VG | 6.3A |

- Avoid overload and short-circuit for a long period of time, otherwise the internal elements may be damaged.
- DC input operation is not subject to safety standards.

## Rust and Scratches on Metal parts

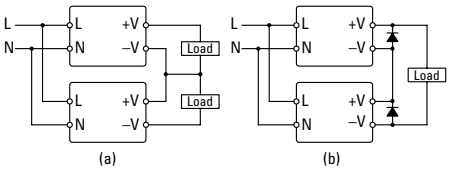
Bonded metal parts are used for the PS5R-V. Rust on the edge and scratches on the surfaces may be developed depending on the storage condition, but the performance of the PS5R-V is not affected.

## Noise

Small acoustic noise inside the PS5R-V may be heard depending on the input voltage and load, but the performance of the PS5R-V is not affected.

## Series Operation

Series operation is allowed. Connect Schottky barrier diodes D as shown below. Select a Schottky diode in consideration of the rated current. The diode's reverse voltage must be higher than the PS5R-V's output voltage.

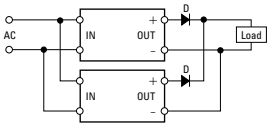



## Parallel Operation

Parallel operation is not possible to increase the output capacity, because the internal elements and load may be damaged.

## Backup Operation

Backup operation is a connection method of two switching power supplies in parallel for emergency. Normally one switching power supply has a sufficient output. If one switching power supply fails, another one operates to continue the output. Make sure that the sum of power
consumption by load and diode is not greater than the rated wattage (rated voltage × rated
current) of one switching power supply.




Select a diode in consideration of:
Diode's current must be more than double the PS5R-V's output current. Take heat dissipation into consideration.

## Warranty

IDEC warranties the PS5R-V switching power supply for a period of five years from the date of shipment.

### Scope

IDEC agrees to repair or replace the PS5R-V switching power supply if the product has been
operated under the following conditions. The maximum value of output capacity is within the range shown in "Operating Temperature vs.
Output Current on page 3.

1. Average operating temperature (ambient temperature of switching power supply) is 40°C maximum.
2. The load is 80% maximum.
3. Input voltage is the rated input voltage.
4. Standard mounting style

IDEC shall not be liable for other damages including consequential, contingent or incidental
damages. Warranty does not apply if the PS5R-V switching power supply was subject to:

1. Inappropriate handling, or operation beyond specifications.
2. Modification or repair by other than IDEC.
3. Failure caused by other than the PS5R-V switching power supply.
4. Failure caused by natural disasters.

# PS5R Slim Line Series

## Switching Power Supplies

**Key features:**

- Lightweight and compact in size
- Wide power range: 10W-240W
- Universal input:
  10W to 90W: 85-264V AC/100-370V DC
  120W and 240W: 85-264V AC/100-350V DC
- Power Factor Correction for 60W to 240W (EN61000-3-2)
- Meets SEMI F47 Sag Immunity (120W & 240W only)
- UL Listed for Class 1, Div. 2 Hazardous Locations
- Overcurrent protection, auto-reset
- Overvoltage protection, shut down
- Spring-up screw terminal type, IP20
- DIN rail or panel surface mount
- Approvals:

| | |
|---|---|
| CE Marked | ANSI/ISA-12.12.01-2011 (Hazardous locations) |
| TÜV | EN50178:1997 |
| c-UL, UL508 | LVD: EN60950:2000 |
| UL1310 (PS5R-SB, -SC, -SD) | EMC: Directive EN61204-3:2000 (EMI: Class B, EMS: Industrial) |

File #E234997

(SEMI F47 120W & 240W only)

## Designed with Accessibility & Convenience in Mind

### DC Low Indicator (15W, 120W & 240W Slim Line Only)

The indicator turns on when the output voltage drops below 80% of the rated value. This assists in troubleshooting power supply problems.

### DC ON Indicator

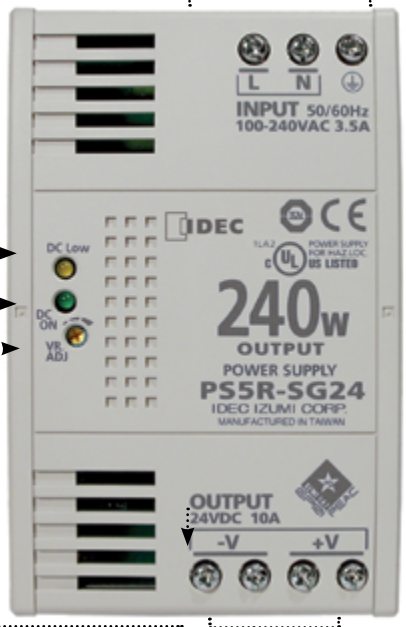
The indicator turns on when the unit is powered up. This is a convenient way to know when the power supply is receiving power.

### Output Voltage Adjustment

The output voltage can be easily adjusted within ± 10% of the rated voltage.

### Fingersafe, Spring-up Screw Terminals

Terminals are captive spring-up screws, which makes using them as easy as pushing a screw down and tightening it.
They are shock and vibration resistant, and work with ring lugs, fork connectors or stripped wire connections. The terminals are rated IP20 (when tightened) meaning they are recessed to keep fingers and objects from touching the input contacts.




### Universal Input Power

The applied input power has a range of 85-264V AC (100-350V DC) without the use of jumpers or slide switches. This makes IDEC power supplies suitable for use anywhere in the world.

### Long Life Expectancy

IDEC power supplies are very reliable, with a life expectancy of 70,000 hrs. (minimum) or longer, depending on usage. Power factor correction has also been included to minimize harmonic distortion, resulting in a longer operating life and increased reliability.

### Output Channel

With very low output ripples of less than 1% peak to peak, the 120W and 240W power supplies are some of the best in the industry. The output comes with overload protection that avoids damaging the power supply and the spring-up, fingersafe, screw terminals add a level of safety and ease for the user. The 240W power supply also has the convenience of two output terminals.

Top View

### Ventilation Grill

Provides cooling for the power supply and prevents small objects from falling into the power supply circuitry.

## Part Numbers

| Style | Output Capacity | Input Voltage | Output Voltage | Rated Current | Part Number |
|---|---|---|---|---|---|
| | 10 | 85 to 264V AC | 5V DC | 2.0A | PS5R-SB05 |
| | 15 | | 12V DC | 1.2A | PS5R-SB12 |
| | | | 24V DC | 0.65A | PS5R-SB24 |
| | 30 | | 12V DC | 2.5A | PS5R-SC12 |
| | | | 24V DC | 1.3A | PS5R-SC24 |
| | 60 | | 24V DC | 2.5A | PS5R-SD24 |

| Style | Output Capacity | Input Voltage | Output Voltage | Rated Current | Part Number |
|---|---|---|---|---|---|
| | 90 | 85 to 264V AC | 24V DC | 3.75A | PS5R-SE24 |
| | 120 | | 24V DC | 5A | PS5R-SF24 |
| | 240 | | 24V DC | 10A | PS5R-SG24 |

## Accessories

| Appearance | Description | Part Number |
|---|---|---|
| | Panel Mounting Bracket for PS5R-SB | PS9Z-5R1B |
| | Panel Mounting Bracket for PS5R-SB (flat side mounting) | PS9Z-5R2B |
| | Panel Mounting Bracket for PS5R-SC and PS5R-SD | PS9Z-5R1C |
| | Panel Mounting Bracket for PS5R-SE | PS9Z-5R1E |
| | Panel Mounting Bracket for PS5R-SF & PS5R-SG | PS9Z-5R1G |
| | DIN rail (1000mm) | BNDN1000 |
| | DIN rail end clip | BNL5 |

## Specifications

| Model | | | 5V DC output | PS5R-SB05 | – | – | – | – | – |
|---|---|---|---|---|---|---|---|---|---|
| | | | 12V DC output | PS5R-SB12 | PS5R-SC12 | – | – | – | – |
| | | | 24V DC output | PS5R-SB24 | PS5R-SC24 | PS5R-SD24 | PS5R-SE24 | PS5R-SF24 | PS5R-SG24 |
| Output Capacity | | | | 15W (5V Model is 10W) | 30W | 60W | 90W | 120W | 240W |
| Input | Input Voltage (single-phase, 2-wire) | | | 85 to 264V AC, 100 to 370V DC | | | | 85 to 264V AC, 100 to 350V DC | |
| | Input Current (maximum) | | 100VAC | 0.45A | 0.9A | 1.7A | 2.3A | 1.8A | 3.5A |
| | | | 200VAC | 0.3A | 0.6A | 1.0A | 1.4A | 1.0A | 1.7A |
| | Internal Fuse Rating | | | 2A | 3.15A | | 4A | | 6.3A |
| | Inrush Current (cold start) | | | 50A maximum (at 200V AC) | | | | | |
| | Leakage Current (at no load) | | | 132V AC: 0.38 mA maximum<br>264V AC: 0.75 mA maximum | 0.75mA maximum | | | 1mA maximum | |
| | Typical Efficiency | | 5V DC | 69% | – | – | – | – | – |
| | | | 12V DC | 75% | 78% | – | – | – | – |
| | | | 24V DC | 79% | 80% | 83% | 82% | 84% | |
| Output | Output Current Ratings | | 5V DC | 2.0A | – | – | – | – | – |
| | | | 12V DC | 1.2A | 2.5A | – | – | – | – |
| | | | 24V DC | 0.65A | 1.3A | 2.5A | 3.75A | 5A | 10A |
| | Voltage Adjustment | | | ±10% (V. ADJ control on front) | | | | | |
| | Output Holding Time | | | 20ms minimum (at rated input and output) | | | | | |
| | Starting Time | | | 200ms maximum | – | – | – | 650ms maximum | 500ms maximum |
| | Rise Time | | | 100ms maximum (at rated input and output) | | | | 200ms maximum | |
| | Line Regulation | | | 0.4% maximum | | | | | |
| | Load Regulation | | | 1.5% maximum | | | | | 0.8% max |
| | Temperature Regulation | | | 0.05% degree C maximum | | | | | |
| | Ripple Voltage | | | 2% peak to peak maximum (including noise) | | | | 1% peak to peak maximum (including noise) | |
| | Overcurrent Protection | | | 105% or more, auto reset | | | 105 to 130%, auto reset | 103 to 110%, auto reset | |
| | Overvoltage Protection | | | 120% min. SHUTDOWN | | | | | |
| | Operation Indicator | | | LED (green) | | | | | |
| | Voltage Low Indication | | | LED (amber) | – | – | – | LED (amber) | |
| Dielectric Strength | | | | Between Input and Ground: 2000 V AC, 1 minute<br>Between input and output: 3000V AC, 1 minute;<br>Between output and ground: 500V AC, 1 minute. | | | | | |
| Insulation Resistance | | | | Between Input & Output Terminals: 100 MΩ Min | | | | | |
| Operating Temperature | | | | –10 to +65°C (14 to 149°F) | -10 to 60°C (14 to 140°F) | | | | |
| Storage Temperature | | | | -25 to 75°C (-13 to +167°F) | | | | | |
| Operating Humidity | | | | 20 to 90% relative humidity (no condensation) | | | | | |
| Vibration Resistance | | | | Frequency 10 to 55Hz, Amplitude 0.375mm | | | | | |
| Shock Resistance | | | | 300m/s$^2$ (30G) 3 times each in 6 axes | | | | | |
| Approvals | | | | EMC: EN61204-3 (EMI: Class B, EMS: Industrial), c-UL (CSA 22.2 No. 14), ANSI/ISA-12.12.01-2011, UL508, LVD: EN60950, EN50178 | | | | | |
| | | | | UL1310 Class 2, c-UL (CSA 22.2 No. 213 and 223) | | | – | SEMI F47 | |
| Harmonic Directive | | | | N/A | | | EN61000-3-2 A14 class A | | |
| Weight (approx.) | | | | 160g | 250g | 285g | 440g | 630g | 1000g |
| Terminal Screw | | | | M3.5 slotted-Phillips head screw (screw terminal type) | | | | | |
| IP protection | | | | IP20 fingersafe | | | | | |
| Dimensions H x W x D (mm) | | | | 90 x 22.5 x 95 | 95 x 36 x 108 | | 115 x 46 x 121 | 115 x 50 x 129 | 125 x 80 x 149.5 |
| Dimensions H x W x D (inches) | | | | 3.54 x 0.89 x 3.74 | 3.74 x 1.42 x 4.25 | | 4.53 x 1.81 x 4.76 | 4.53 x 1.97 x 5.08 | 4.92 x 3.15 x 5.89 |

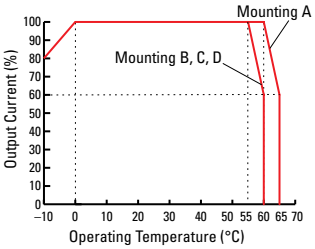
1. For dimensions, see page 188.

## Temperature Derating Curves

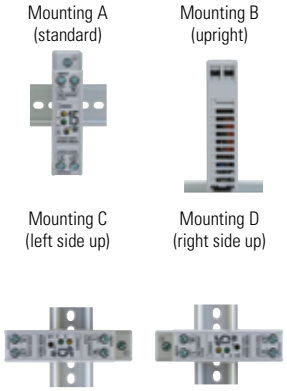
All IDEC Slim Line power supplies are listed to UL508, which allows operation at 100% capacity inside a panel. This eliminates the need to use oversize power supplies or utilize two power supplies derated at 50% of their rated output.

The charts below show that the PS5R Slim 10W (at 60ºC) and 15W (at 60ºC), 30W/60W/90W (at 55ºC), 120W (at 40ºC), and 240W (at 45ºC) meet the elevated, operating temperature required by UL508 and EN60950 standards to operate at an output current of 100%. The output current starts to derate beyond the required temperature.

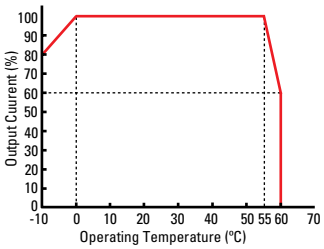
**PS5R-SB**



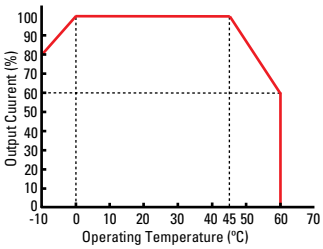

Dearting curve for PS5R-SB varies depending on mounting method (see right).



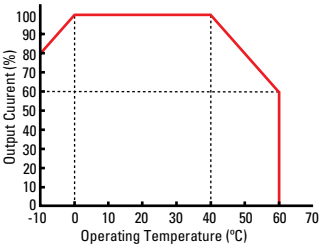

**PS5R-SC**



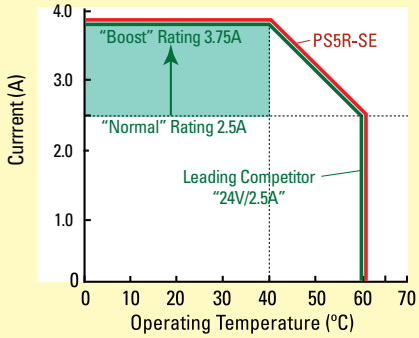

**PS5R-SG**




**PS5R-SD, -SE, -SF**




**PS5R-SE 90W/3.75A/24V DC** versus a Leading Competitor
Standard derating curve (operating temperature vs. output current)

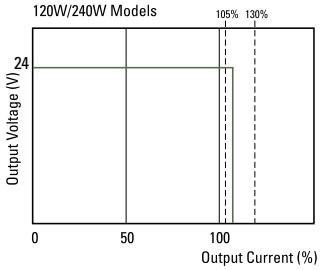



### Don't Believe the Hype

Other companies use slick marketing to sell you 60W power supplies with a "BOOST," but what they don't tell you is that these are merely 90W power supplies that have been renamed to fool you into thinking they have a unique feature. IDEC 90W power supplies are just what they claim, 90W power supplies. The truth is IDEC led the market by incorporating UL508 DIN rail mount power supplies as a standard product. Don't let the other guys pull a fast one on you by claiming to provide features that just aren't true, or even possible. See what IDEC has to offer, no strings attached.

## Overload Protection

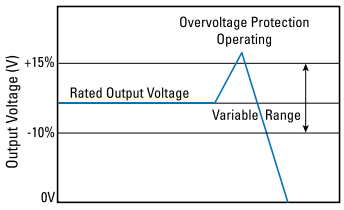
Overload protection prevents the power supply from being damaged when an overload occurs. There are two kinds of protection.




**Overcurrent Protection**
**PS5R-SF, -SG**

### Overcurrent Protection

When the output current exceeds 105% of the rated current, overload protection is triggered, and the output voltage starts decreasing. When the output current returns within the rated range, the overload protection function is automatically cleared.

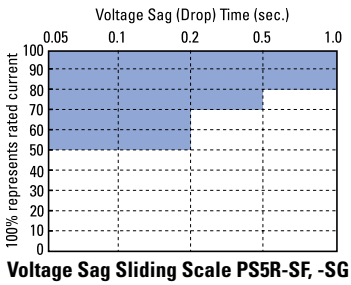



**Overvoltage Protection**

### Overvoltage Protection

When the output voltage of the power supply rises to 120% or more of the rated value, the output will shut off. To restore power, only manual reset is available which is an advantage in troubleshooting.

## SEMI-F47 Approved




**Voltage Sag Sliding Scale PS5R-SF, -SG**

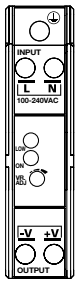
The SEMI F47 (Semiconductor Processing Equipment Voltage Sag Immunity) defines the minimum voltage sag ride-through requirements for semiconductor processing, automated test equipment and other equipment. It requires that the equipment be able to tolerate voltage sags on an AC power line without interrupting operations. This avoids the loss of production and money.

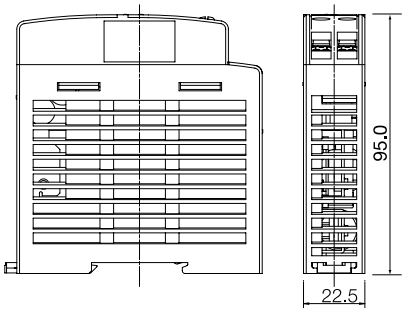
The graph shows how the equipment must tolerate sags to 50% for 200ms, sags to 70% for up to 0.5 seconds and sags to 80% for up to 1 second.

## Dimensions and Terminal Markings

**PS5R-SB**

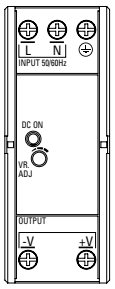
Height 90mm
Width 22.5mm
Depth 95mm

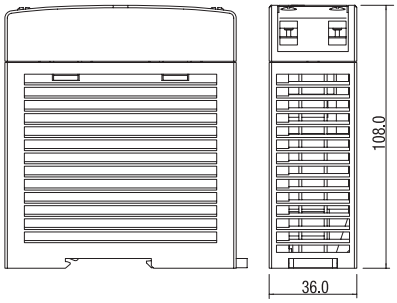



**PS5R-SC**
**PS5R-SD**

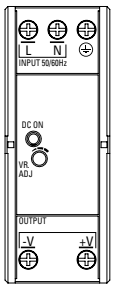
Height 95.0mm
Width 36.0mm
Depth 108.0mm

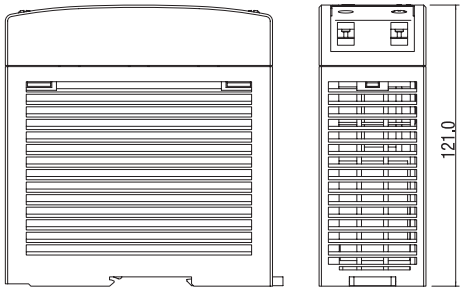



**PS5R-SE**

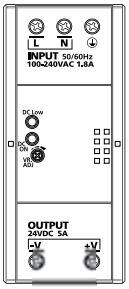
Height 115.0mm
Width 46.0mm
Depth 121.0mm

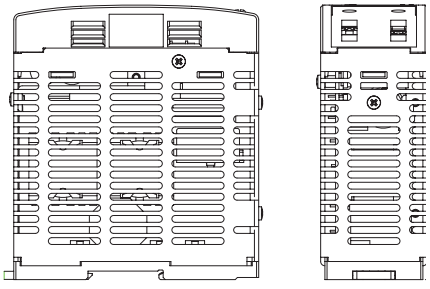



**PS5R-SF**

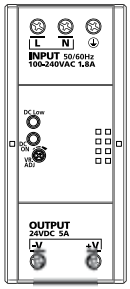
Height 115.0mm
Width 50.0mm
Depth 129.0mm

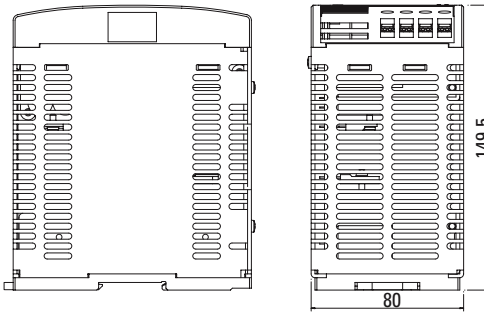


**PS5R-SG**

Height 125.0 mm
Width 80.0 mm
Depth 149.5 mm



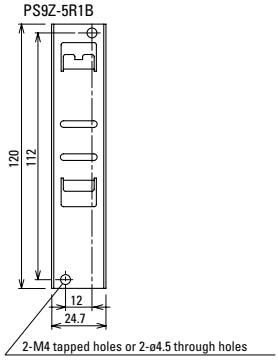




### Front Panel (terminals)

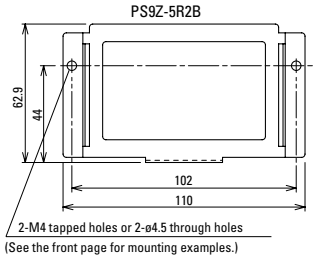
| Markings | Name | Description |
|---|---|---|
| V. ADJ | Voltage adjustment | Adjusts within ±10%; turn clockwise to increase output voltage. |
| DC ON | Operation indicator | Green LED is lit when output voltage is on. |
| DC Low | Output indicator | Amber LED is lit when output voltage drops below 80% of rated voltage. |
| +V, –V | DC output terminals | +V: Positive output Terminal<br>–V: Negative output terminal |
| ⏚ | Frame ground | Ground this terminal to reduce high-frequency noise caused by switching power supply. |
| L, N | Input terminals | Accept a wide range of voltages and frequencies (no polarity at DC input). |

## Mounting Bracket Dimensions (mm)

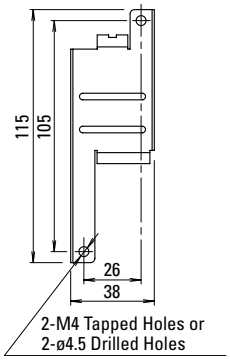
**PS9Z-5R1B** (for PS5R-SB)



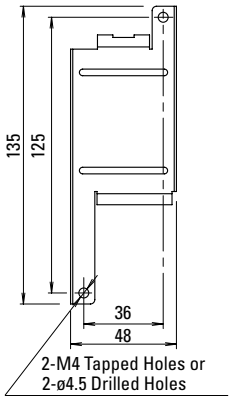

**PS9Z-5R2B** (for PS5R-SB)



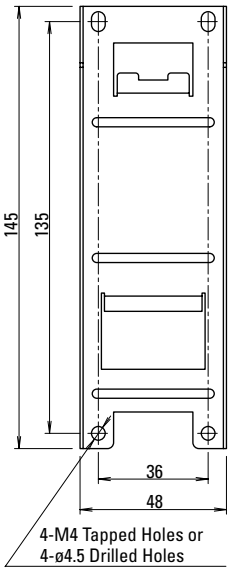

**PS9Z-5R1C** (for PS5R-SC & PS5R-SD)




**PS9Z-5R1E** (for PS5R-SE)




**PS9Z-5R1G** (for PS5R-SF & PS5R-SG)



# PS5R Standard Series
## Switching Power Supplies

**Key features:**

- Wide power range: 7.5W-480W
- Universal input :
  7.5W-50W: 85-264V AC/105-370V DC
  100W: 85-132V AC/170-264V AC
  240-370V DC (selectable)
  75W, 120W, 240W: 85-264V AC/110-350V DC
  480W: 3 phase: 320- 575V AC
  3 phase: 360- 575V AC
- Overcurrent/overvoltage protection
- Power Factor Correction (75W, 120W, 240W models)
  EN61000-3-3
  EN61000-3-2
- Voltage adjustment +10%
- Spring-up crew terminal, IP20 (finger-safe)
- DIN rail or panel surface mount
- Approvals:
  CE marked
  UL 508 Listed
  c-UL
  TÜV approved
  LVD EN60950:2000

EMC Directives:
EN50081-2
EN50082-2
EN61000-6-2

UL 508 Listed
File #E177168

Cert No.
BL980213332392

## Part Numbers

| Style | Output Capacity | Input Voltage | Output Voltage | Rated Current | Part Number |
|---|---|---|---|---|---|
| | 7.5 | 85 to 264V AC | 5V DC | 1.5A | PS5R-A05 |
| | | | 12V DC | 0.6A | PS5R-A12 |
| | | | 24V DC | 0.3A | PS5R-A24 |
| | 15 | | 5V DC | 2.5A | PS5R-B05 |
| | | | 12V DC | 1.2A | PS5R-B12 |
| | | | 24V DC | 0.6A | PS5R-B24 |
| | 30 | | 12V DC | 2.5A | PS5R-C12 |
| | | | 24V DC | 1.3A | PS5R-C24 |
| | 50 | | 24V DC | 2.1A | PS5R-D24 |

| Style | Output Capacity | Input Voltage | Output Voltage | Rated Current | Part Number |
|---|---|---|---|---|---|
| | 75 | 85 to 264V AC | 24V DC | 3.1A | PS5R-Q24 |
| | 100 | 100 to 240V AC | 24V DC | 4.2A | PS5R-E24 |
| | 120 | | 24V DC | 5A | PS5R-F24 |
| | 240 | | 24V DC | 10A | PS5R-G24 |
| | 480 | 320 to 575V AC (3 phase)<br>360 to 575V AC (2 phase) | 24V DC | 20A | PS5R-TJ24* |

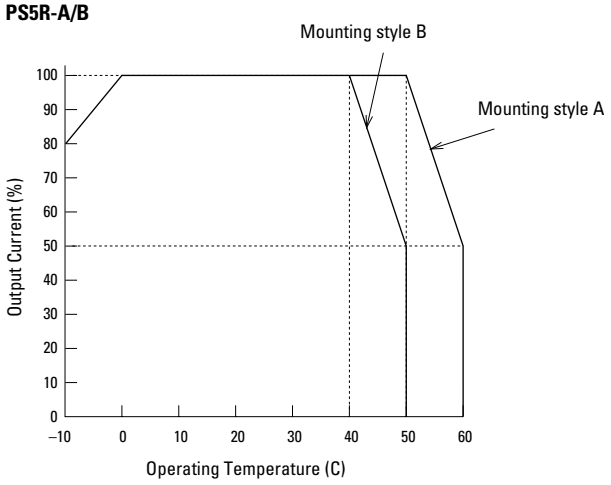
## Specifications

| Model | | PS5R-A05<br>PS5R-A12<br>PS5R-A24 | PS5R-B05*<br>PS5R-B12<br>PS5R-B24 | —<br>PS5R-C12<br>PS5R-C24 | —<br>—<br>PS5R-D24 | PS5R-Q24 | —<br>—<br>PS5R-E24 | PS5R-F24 | —<br>—<br>PS5R-G24 | PS5R-TJ24 |
|---|---|---|---|---|---|---|---|---|---|---|
| Output Capacity | | 7.5W | 15W | 30W | 50W | 75W | 100W | 120W | 240W | 480W |
| Input | Input Voltage (single-phase, 2-wire) | 100 to 240V AC nominal (85 to 264V AC), 50/60Hz (47 to 63Hz)<br>110 to 340V DC nominal (105 to 370V DC) | | | | | 100 to 120V AC, 50/60Hz<br>200 to 240V AC, 50/60Hz (jumper selectable)<br>240 to 370V DC | 100 to 240V AC, 50/60Hz,<br>110 to 340V DC | | 3 phase:<br>320 to 575V AC<br>2 phase:<br>360 to 575V AC |
| | Input Current (typical) | 0.17A at 100V AC | 0.3A at 100V AC | 0.68A at 100V AC | 1.15A at 100V AC | 1.1A at 100V AC | 2.5A at 100V AC<br>1.5A at 200V AC | 1.8A at 100V AC | 4A at 100V AC | 3 x 1.1A<br>3 x 0.8A |
| | Internal Fuse Rating | 2A | 2A | 3.15A | 3.15A | 3.15A | 4A | 4A | 6.3A | |
| | Inrush Current | 50A maximum (at cold start at 200V AC) | | | | 70A maximum (at cold start at 230V AC) | 50A maximum (at cold start at 200V AC) | 70A maximum (at cold start at 230V AC) | | 21A na |
| | Leakage Current (at no load) | 0.75mA maximum (60Hz, measured in conformance with UL, CSA, VDE) | | | | | | | | <3.5ml |
| | Typical Efficiency | 69% at 5V<br>75% at 12V<br>79% at 24V | | 75% at 12V<br>75% at 24V | 79% at 24V | 83% at 24V | 85% at 24V | 83% at 24V | | 91% |
| | Overvoltage Protection | Outputs turns off at 105% (typical) | | | | | | | | |
| Output | Voltage and Current Ratings | 5V, 1.5A<br>12V, 0.6A<br>24V, 0.3A | 5V, 2.5A<br>12V, 1.2A<br>24V, 0.6A | 12V, 2.5A<br>24V, 1.3A | 24V, 2.1A | 24V, 3.1A | 24V, 4.2A | 24V, 5A | 24V, 10A | 24V, 20A |
| | Voltage Adjustments | ±10% (V.ADJ screw on top) | | | | | | | | |
| | Output Holding Time | 20ms minimum (at full rated input and output) | | | | | | | | 10ms typical |
| | Rise Time | 200ms maximum (at full rated input and output) | | | | | | | 150ms max. | ? |
| | Line Regulation | 0.4% maximum | | | | | | | | 1.0% max |
| | Load Regulation | 1.5% maximum | | | | | | | | 2.0% max |
| | Fluctuation due to Ambient Temperature Change | 0.05% maximum | | | | | | | | |
| | Ripple Voltage | 2% peak to peak maximum (including noise) | | | | | | | | < 10mVpp |
| | Overload Protection | 120% typical (Zener-limiting) | | 120% typical, auto reset | | | | | | 125% typical, auto reset |
| Operation Indicator | | LED (green) | | | | | | | | |
| Parallel Operation Allowed | | PS5R-A | PS5R-B | PS5R-C | PS5R-D | PS5R-Q | PS5R-E | PS5R-F | PS5R-G | |
| | | No | | | | Yes | No | Yes | | Yes |
| Dielectric Strength | | Between input and output terminals: 3,000V AC, 1 minute<br>Between input terminals and housing: 2,000V AC, 1 minute<br>Between output terminal and housing: 500V AC, 1 minute | | | | | | | | |
| Insulation Resistance | | Between input and output terminals/input terminals and housing: 100MΩ minimum (500V DC megger) | | | | | | | | 2kV AC, 500V DG |
| Operating Temperature | | –10˚ to +60˚C (14˚ to 140˚F) (see derating curves) | | | | | | | | -25 to +70 C |
| Storage Temperature | | –30˚ to +85˚C (-22˚ to 185˚F) | | | | | | | | -40 to +85 C |
| Operating Humidity | | 20 to 90% relative humidity (no condensation) | | | | | | | | 95% max (at 25 C, no condensation) |
| Vibration Resistance | | 45m/s$^2$, 10 to 55Hz, 2 hours on each of 3 axes | | | | 10 to 50Hz, 0.75mm p-p, 2 hrs on each of 3 axes | | | | <15Hz amplitude +/- 2.5mm in accordance with IEC 60068-2-6 15 to 150Hz, 2.3g, 90 min. |
| Shock Resistance | | 300m/s$^2$(30G), 3 shocks in each of 6 directions | | | | | | | | 30g in all directions in accordance with IEC 60068-2-27 |
| Approvals | | Conforms to EMC Directives EN50081-2 & EN50082-2. LVD Directive EN60529 — Certified to EN60950.<br>UL508 listed. c-UL, TUV approved. CE marked. EN61000-3-2 | | | | | | | | |
| Weight | | 150g | 170g | 360g | 390g | 800g | 600g | 1200g | 2000g | 2000g |
| Termination | | Spring-up, fingersafe terminals with captive M3.5 screws | | | | | | | | |
| IP protection | | IP20 (finger safe) | | | | | | | | |
| Dimensions H x W x D (mm) | | 75 x 45 x 70 | 75 x 45 x95 | 75 x 90 x 95 | 75 x 90 x 95 | 120 x 85 x 140 | 75 x 145 x 95 | 120 x 115 x140 | 120 x 200x 140 | 130 x 115 x 152.5 |
| Dimensions H x W x D (inches) | | 2.95 x 1.77 x 2.76 | 2.95 x 1.77 x 3.74 | 2.95 x 3.54 x 3.74 | 2.95 x 3.54 x 3.74 | 4.72 x 3.35 x 5.52 | 2.95 x 5.71 x 3.74 | 4.72 x 4.53 x 5.52 | 4.72 x 7.87 x 5.51 | 5.12 x 4.53 x 6.00 |

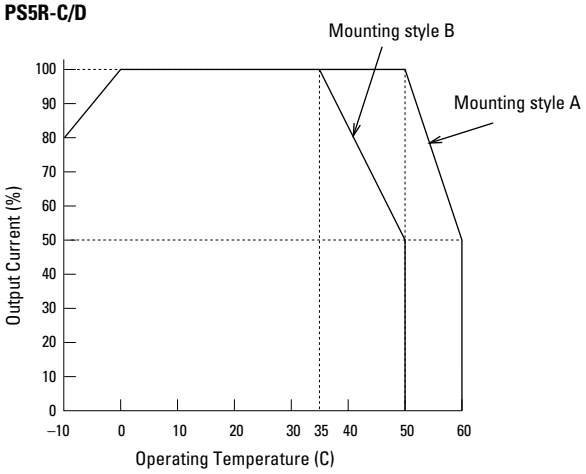
1. For dimensions, see page 194.
2. For usage instructions, see page 193.
3. *12.5W for 5VDC model.

## Temperature Derating Curves

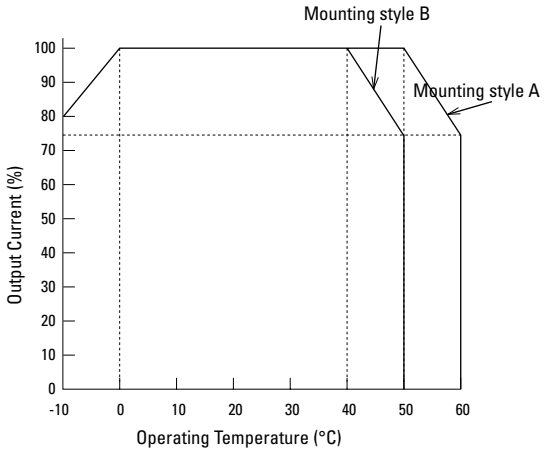
**PS5R-A/B**



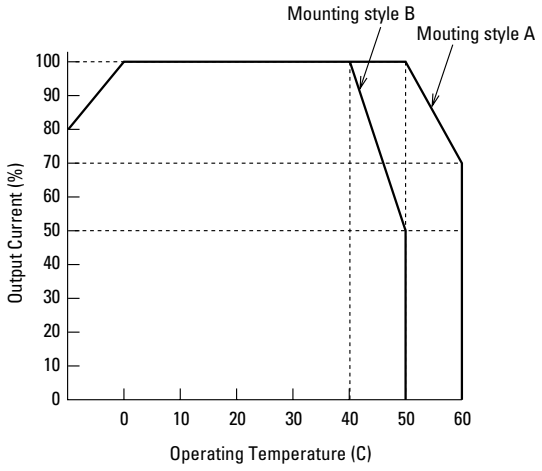

**PS5R-C/D**



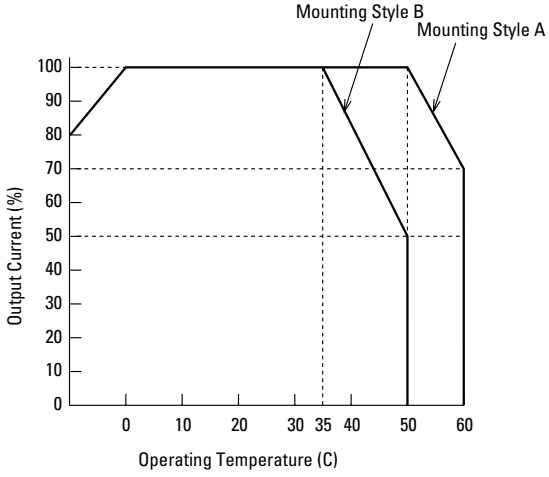

**PS5R-E**



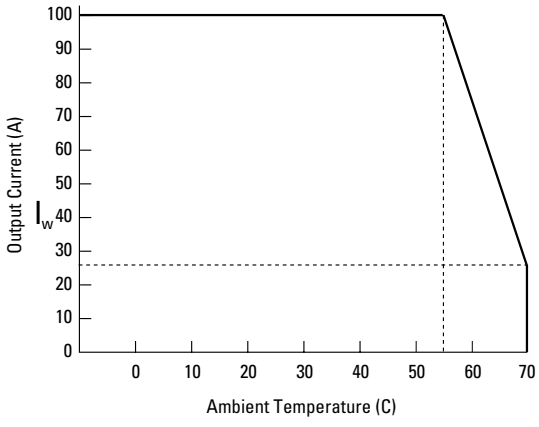

**PS5R-Q**



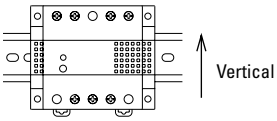

**PS5R-F/G**



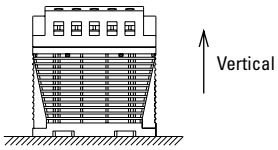

**PS5R-TJ**




A Mounting (standard)




B Mounting (Facing Upward)



## Accessories

### Part Numbers: PS5R Accessories

| Appearance | Description | Part Number |
|---|---|---|
| | DIN rail (1000mm) | BNDN1000 |
| | DIN rail end clip | BNL5 |

## Installation Instructions

### Time-Saving Spring-up Terminals

The innovative terminals on the PS5R series use a spring-loaded screw. This makes installation as easy as pushing down and turning with a screwdriver. Installation time is cut in half since the screws do not need to be backed out to install wiring. The screws are held captive once installed and are 100% finger-safe. Screw terminals accept bare wire or ring or fork connectors.

1. Insert the wire connector into the slot on the side of the power supply.

2. Using a flat head or Phillips screwdriver, push down and turn the screw.

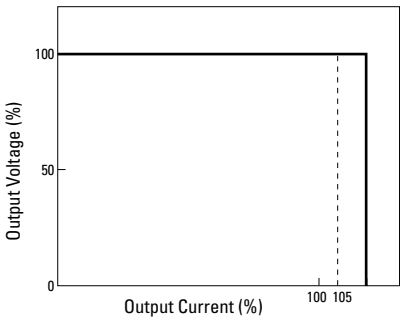
The wire is now connected, and the screw terminal is fingersafe!

### Front Panel (terminals)

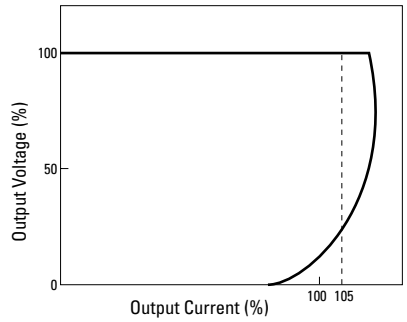
| Markings | Name | Description |
|---|---|---|
| V. ADJ | Voltage adjustment | Adjusts within ±10%; turn clockwise to increase output voltage |
| DC ON | Operation indicator | Green LED is lit when output voltage is on |
| +V, –V | DC output terminals | +V: Positive output Terminal<br>–V: Negative output terminal |
| ⏚ | Frame ground | Ground this terminal to reduce high-frequency currents caused by switching |
| L, N | Input terminals | Accept a wide range of voltages and frequencies (no polarity at DC input) |
| NC | No connection | Do not insert wires here, as this may damage the power supply |

## Overcurrent Protection Characteristics

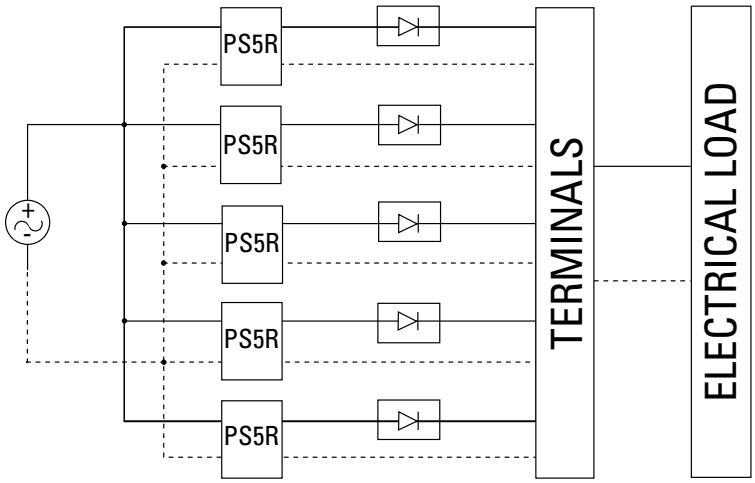
**PS5R-A/B**




**PS5R-C/D/E**



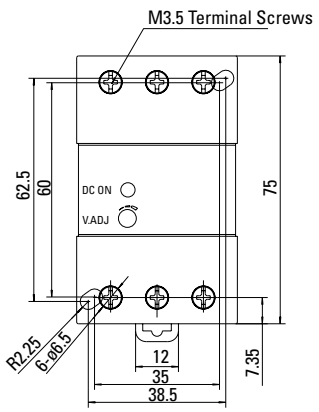

## Parallel Operation



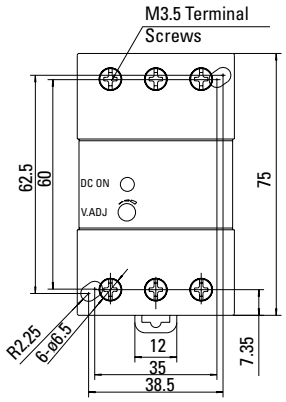

1. Parallel operation only recommended for PS5R-Q24, PS5R-F24 and PS5R-G24.
2. Factory recommended diode ST Microelectronics BYV54V-50, BYV54V-100, BYV54V-200, BYV541V-200 or with equivalent electrical specifications.
3. Using the voltage adjustment make sure out-voltage is the same for all power supplies.

## Dimensions

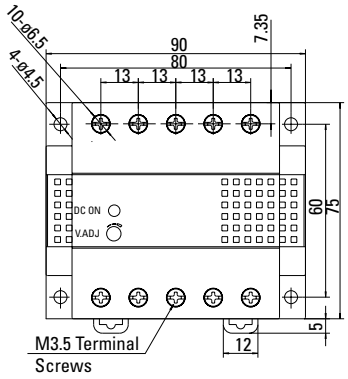
**PS5R-A** (7.5W)



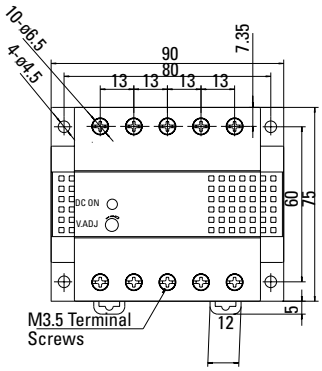

**PS5R-B** (15W)



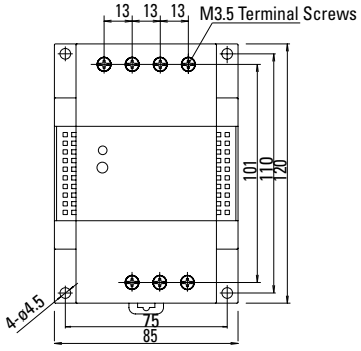

**PS5R-C** (30W)



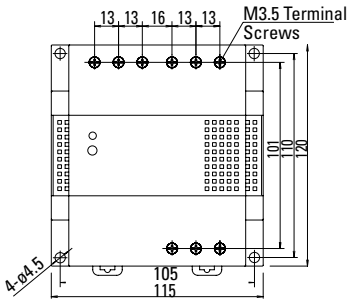

**PS5R-D** (50W)



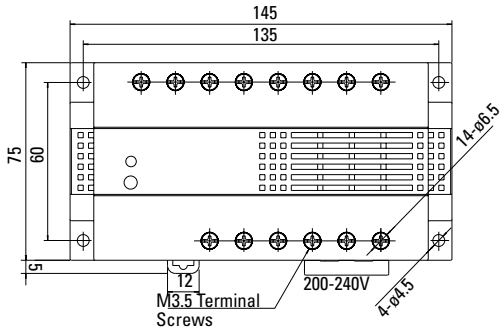

**PS5R-Q** (75W)



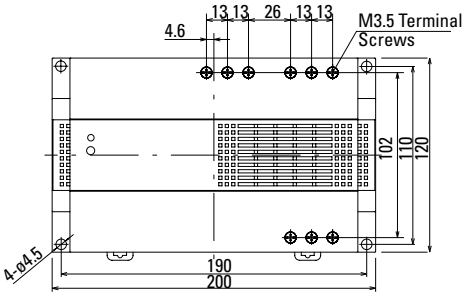

**PS5R-F** (120W)



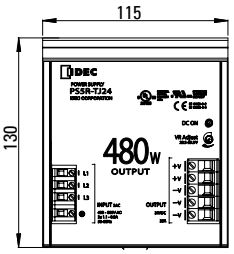

**PS5R-E** (100W)




**PS5R-G** (240W)

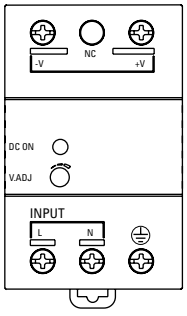



**PS5R-TJ24**

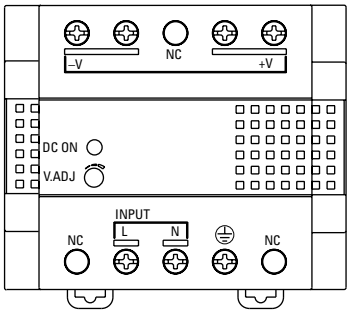



## Terminal Markings

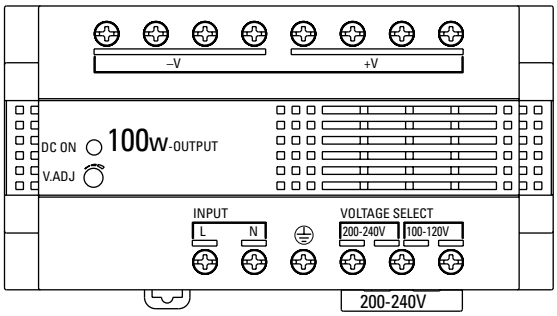
**PS5R-A/B**




**PS5R-C/D/Q/F/G**




**PS5R-E**



# PS3X Series

**Key features:**

- Compact size
- Universal AC input voltage
- 5V, 12V and 24V DC outputs
- Available with mounting brackets for direct or DIN rail mounting
- Overcurrent/overvoltage protection
- EMC, EN55022 Class B compliant
- UL/c-UL recognized, TUV

## Part Numbers

### Power Supply

| Style | Output Capacity | Part Number | Input Voltage | Output Voltage | Output Current |
|---|---|---|---|---|---|
| | 15W | PS3X-B05AFC<br>PS3X-B12AFC<br>PS3X-B24AFC | 100 to 240V AC | 5V<br>12V<br>24V | 3.0A<br>1.3A<br>0.63A |
| | 25W | PS3X-C05AFC<br>PS3X-C12AFC<br>PS3X-C24AFC | | 5V<br>12V<br>24V | 5.0A<br>2.1A<br>1.1A |
| | 50W | PS3X-D12AFG<br>PS3X-D24AFG | | 12V<br>24V | 4.2A<br>2.2A |
| | 75W | PS3X-Q05AFG<br>PS3X-Q12AFG<br>PS3X-Q24AFG | | 5V<br>12V<br>24V | 12.0A<br>6.0A<br>3.2A |
| | 100W | PS3X-E05AFG<br>PS3X-E12AFG<br>PS3X-E24AFG | | 5V<br>12V<br>24V | 16.0A<br>8.5A<br>4.5A |

### L-shaped Mounting Bracket (optional)

| Applicable Power Supply | Part Number |
|---|---|
| PS3X-B | PS9Z-3N3A |
| PS3X-C | PS9Z-3N3B |
| PS3X-D | PS9Z-3E3B |
| PS3X-Q | PS9Z-3N3E |
| PS3X-E | |

### DIN-rail Mounting Bracket (optional)

| Applicable Power Supply | Part Number |
|---|---|
| PS3X-B | PS9Z-3N4B |
| PS3X-C | |
| PS3X-D | PS9Z-3E4C |
| PS3X-Q | PS9Z-3E4D |
| PS3X-E | |

### DIN Rail

| Appearance | Part Number | Length | Material | Weight (g) |
|---|---|---|---|---|
| | BNDN1000 | 1000mm | Aluminum | 200 |

### End Clips

| Appearance | Part Number | Description |
|---|---|---|
| | BNL5 | small DIN rail end clip |
| | BNL6 | medium DIN rail end clip (the BNL6 has a higher profile than BNL5) |

## Part Number Configuration

PS3X - B 05 AF C

Output Capacity
B: 15W
C: 25W
D: 50W
Q: 75W
E: 100W

Output Voltage
05: 5V DC (15W, 25W, 75W, 100W)
12: 12V DC
24: 24V DC

Input Voltage
AF: 100 to 240V AC

Cover and Terminal Style
C: w/Standard cover, Horizontal terminal block (PS3X-B/C models)
G: w/Standard cover, Vertical terminal block (PS3X-D/Q/E models)

## Specifications

| Model | | | [15W] PS3X-B05/B12/B24 | [25W] PS3X-C05/C12/C24 | [50W] PS3X-D12/D24 | [75W] PS3X-Q05/Q12/Q24 | [100W] PS3X-E05/E12/E24 |
|---|---|---|---|---|---|---|---|
| Input | Rated Input Voltage | | 100 to 240V AC | | | | |
| | Voltage Range (Note 1) | | 85 to 264V AC/ 120 to 375V DC | 88 to 264V AC / 125 to 375V DC | | | |
| | Frequency | | 47 to 63 Hz | | | | |
| | Input Current | | 0.5A max. | 0.65A max. | 1.3A max. | 1.8A max. | 2.5A max. |
| | Inrush Current (Ta = –25°C, ACV cold start) | at 115V AC | 40A max. | 30A max. | 30A max. | 30A max. | 35A max. |
| | | at 230V AC | 60A max. | 50A max. | 50A max. | 50A max. | 70A max. |
| | Leakage Current | | 0.5mA max. | 1.5mA max. | 1.5mA max. | 1.5mA max. | 1.5mA max. |
| | Efficiency (Typ.) (230V AC at input/ rated output) | 5V | 77% | 77% | — | 77% | 77% |
| | | 12V | 81% | 81% | 81% | 82% | 81% |
| | | 24V | 82% | 84% | 84% | 84% | 84% |
| Output | Rated Voltage/Current | | 5V, 3A | 5V, 5A | — | 5V, 12A | 5V, 16A |
| | | | 12V, 1.3A | 12V, 2.1A | 12V, 4.2A | 12V, 6A | 12V, 8.5A |
| | | | 24V, 0.63A | 24V, 1.1A | 24V, 2.2A | 24V, 3.2A | 24V, 4.5A |
| | Adjustable Voltage Range | | ±10% | | | | |
| | Output Holding Time | | 13 ms typ. (100V AC) 60 ms minimum (230V AC) | 10 ms typ. (100V AC) 60 ms minimum (230V AC) | 23 ms typ. (100V AC) 60 ms minimum (230V AC) | 14 ms typ. (100V AC) 60 ms minimum (230V AC) | 17 ms typ. (100V AC) 80 ms minimum (230V AC) |
| | Start Time | | 1000 ms max. (230V AC input, rated output) | | | | |
| | Rise Time | | 50 ms max. (230V AC input, rated output) | 30 ms max. (230V AC input, rated output) | 30 ms max. (230V AC input, rated output) | 30 ms max. (230V AC input, rated output) | 30 ms max. (230V AC input, rated output) |
| | Regulation | Input Fluctuation | 0.5% max. | | | | |
| | | Overvoltage Fluctuation | 5V: ±2% max. 12V, 24V: ±1% max. | | | | |
| | | Temperature Fluctuation | 0.04% / °C max. (–20 to +50°C) | | 0.04% / °C max. (–10 to +45°C) | | |
| | Ripple (including noise) | –20 to –10°C | 5V: 200mV max. 12V/24V: 200mV max. | 5V: 140mV max. 12V: 240mV max. 24V: 300mV max. | – | – | – |
| | | –10 to 0°C | 5V: 160mV max. 12V/24V: 200mV max. | 5V: 140mV max. 12V: 240mV max. 24V: 300mV max. | 12V: 240mV max. 24V: 300mV max. | 5V: 140mV max. 12V: 240mV max. 24V: 300mV max. | 5V: 160mV max. 12V: 240mV max. 24V: 300mV max. |
| | | PS3X-B, C: 0 to +50°C PS3X-D, Q, E: 0 to +45°C | 5V: 100mV max. 12V/24V: 150mV max. | 5V: 70mV max. 12V: 120mV max. 24V: 150mV max. | 12V: 120mV max. 24V: 150mV max. | 5V: 70mV max. 12V: 120mV max. 24V: 150mV max. | 5V: 100mV max. 12V: 120mV max. 24V: 150mV max. |
| Supplementary Functions | Overcurrent Protection | | 105% min. (auto reset) [2] | | | | |
| | Overvoltage Protection | | Voltage limitation at 115% min. | | Intermittent operation or output off at 115% min. [3] | | |
| | Operation Indicator | | green LED | | | | |
| Dielectric Strength | Between input and output terminals | | 3000V AC, 1 minute | | | | |
| | Between input and ground terminals | | 2000V AC, 1 minute | | | | |
| | Between output and ground terminals | | 500V DC, 1 minute | | | | |
| Insulation Resistance | | | 100MΩ minimum, 500V DC megger (between input and output terminals, between input and ground terminals) | | | | |
| Operating Temperature | | | –20 to +70°C (no freezing, see output derating) | | –10 to +70°C (no freezing, see output derating) | | |
| Operating Humidity | | | 20 to 85% RH (no condensation) | | | | |
| Storage Temperature | | | –40 to +85°C (no freezing) | | | | |
| Storage Humidity | | | 10 to 95% RH (no condensation) | | | | |
| Vibration Resistance | | | 10 to 55 Hz, 20m/s$^2$ constant, 2 hours each in 3 axes | | | | |
| Shock Resistance | | | 200m/s$^2$, 1 shock each in 3 axes | | | | |
| EMC | EMI | | EN55022 Class B | | | | |
| | EMS | | EN55024 | | | | |
| Safety Standards | | | IEC/EN60950-1, UL60950-1, CSA C22.2 No. 60950-1 | | | | |
| Dimensions (H × W × D) (mm) | | | 50.8H × 28W × 62D | 50.8H × 28.5W × 79D | 82H × 35W × 99D | 95H × 38W × 129D | 95H × 38W × 159D |
| Weight (approx.) | | | 130g | 180g | 340g | 500g | 700g |
| Terminal Screw | | | M3 | | M3.5 | | |

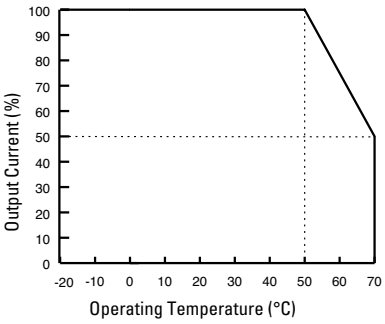
1. See "Output Current vs. Input Voltage" characteristics next page. Not subject to safety standards. When using DC input, connect a fuse to the input terminal for DC input protection.
2. Overload for 30 seconds or longer may damage the internal elements.
3. One minute after the output has been turned off, turn on the AC input again.

# Characteristics

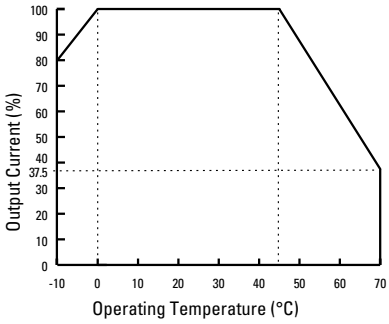
## Operating Temperature vs. Output Current (Derating Curves)

Conditions: Natural air cooling (operating temperature is the temperature around the power supply)

**PS3X-B/C**

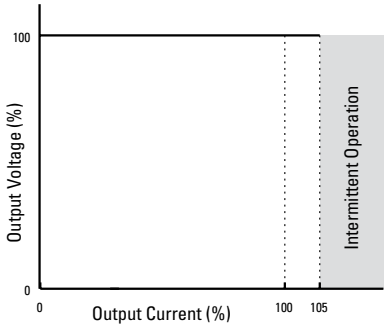



**PS3X-D/Q/E**



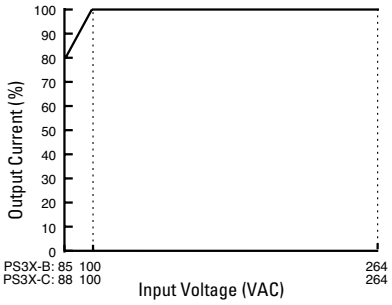

## Overcurrent Protection Characteristics

**PS3X**

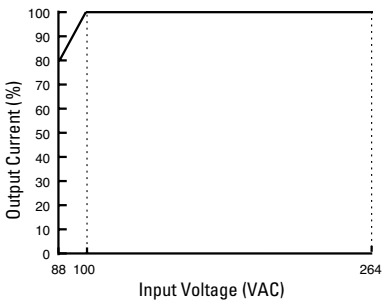



## Output Current vs. Input Voltage (TA = 25°C)

**PS3X-B/C**

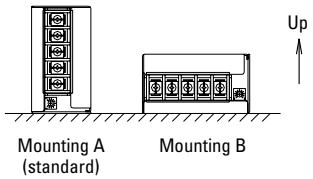



**PS3X-D/Q/E**




## Operating Temperature by Safety Standards

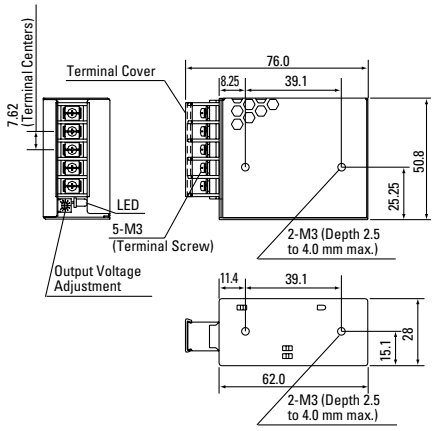
| Power Supplies | UL/EN60950-1 |
|---|---|
| | Mounting A, B |
| PS3X-B05, -B12, -B24<br>PS3X-C05, -C12, -C24 | 50°C |
| PS3X-D12, -D24<br>PS3X-Q05, -Q12, -Q24<br>PS3X-E05, -E12, -E24 | 45°C |



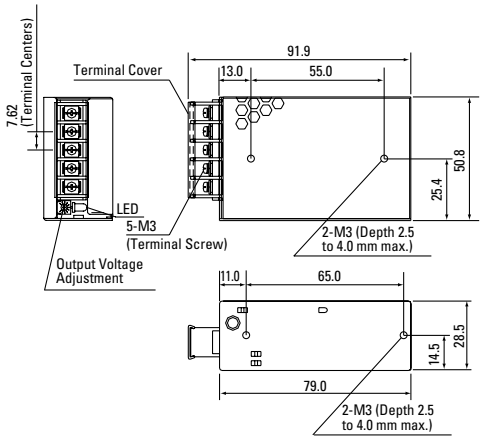

Note: Observe the derating curves when operating PS3X power supplies.

## Dimensions

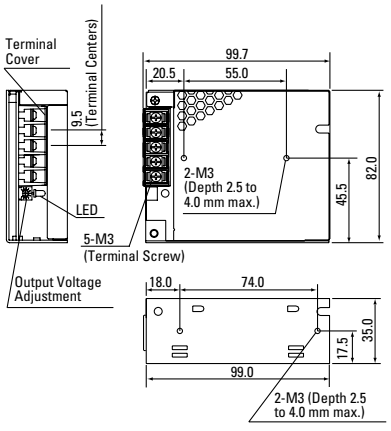
### PS3X-B



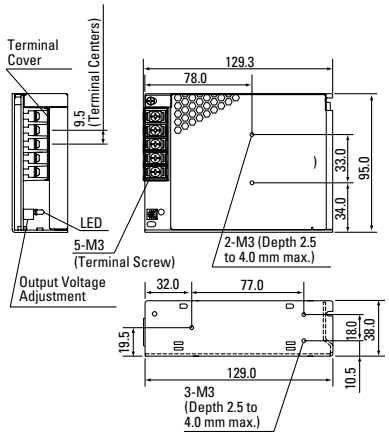

### PS3X-C



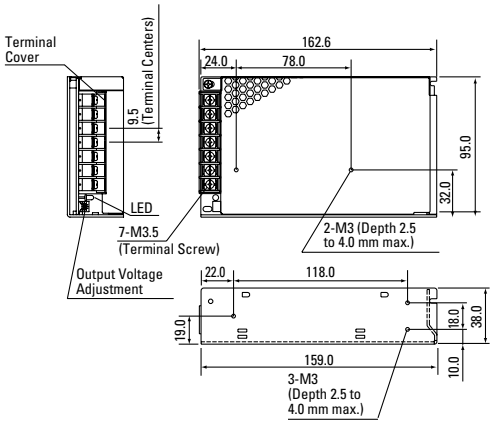

### PS3X-D




### PS3X-Q

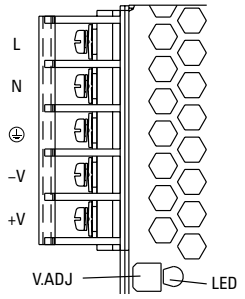



### PS3X-E

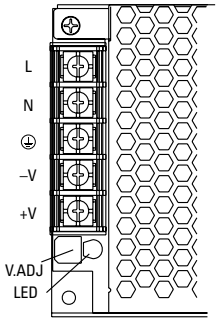



## Terminal Markings

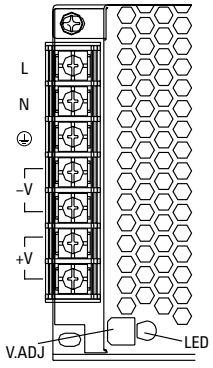
### PS3X-B/C




### PS3X-D/Q



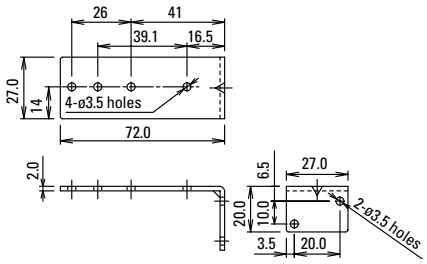

### PS3X-E



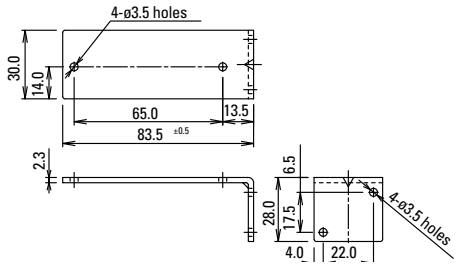

| Marking | Name | Description |
|---|---|---|
| L, N | AC Input Terminal | Accepts a wide range of voltage and frequency. Polarity does not matter when using DC input. |
| ⏚ | Ground Terminal | Be sure to connect this terminal to a proper ground. |
| +V, –V | DC Output Terminals | Positive and negative output terminals |
| V.ADJ | Output Voltage Adjustment | Allows adjustment within ±10%. Turning clockwise increases the output voltage. |
| LED | Power status | Illuminates (green) when input power is applied. |

## L-shaped Mounting Bracket

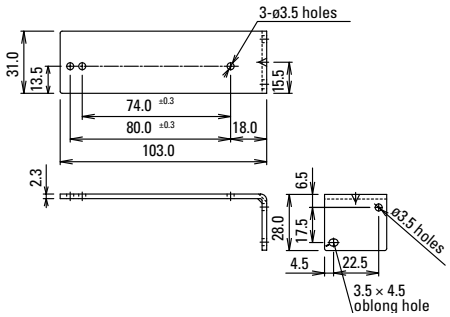
### PS9Z-3N3A (for 15W)



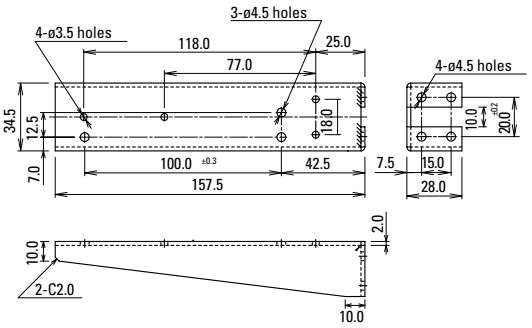

### PS9Z-3N3B (for 25W)



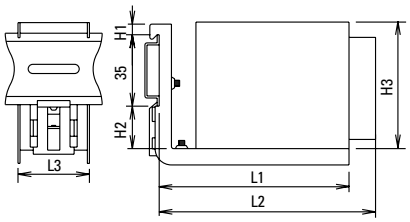

### PS9Z-3E3B (for 50W)




### PS9Z-3N3E (for 75W/100W)




## DIN-rail Mounting Bracket

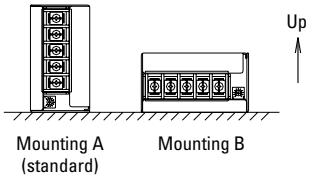



| Part Number | Applicable Power Supply | L1 | L2 | L3 | H1 | H2 | H3 |
|---|---|---|---|---|---|---|---|
| PS9Z-3N4B | PS3X-B | 95 | 105.5 | 35 | 5.2 | 20.5 | 50.8 |
| | PS3X-C | 95 | 113 | 35 | 5.2 | 20.5 | 50.8 |
| PS9Z-3E4C | PS3X-D | 136 | 117* | 35 | 5.2 | 20.5 | 82 |
| PS9Z-3E4D | PS3X-Q | 188 | 141* | 39.5 | 5.2 | 19.7 | 95 |
| | PS3X-E | 188 | 173* | 39.5 | 5.2 | 19.7 | 95 |

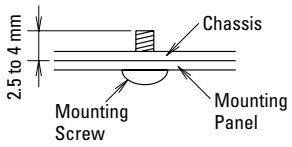
* Note that L2 is shorter than L1.

## Instructions

### Installation Notes




1. When mounting the PS3X switching power supply, see the figure on the right.
2. See dimension drawings for mounting hole layouts.
3. Use M3 screws for mounting. Choose screws that protrude 2.5 to 4mm from the surface of the switching power supply.




4. Do not cover the openings of the switching power supply. Ensure proper heat dissipation by convection.
5. Maintain a minimum of 20mm clearance around the power supply.
6. When derating of the output does not work, provide forced air-cooling.
7. Make sure to wire the ground terminal correctly.
8. For wiring, use wires with heat resistance of 60°C or higher. Use copper wire.
9. Recommended tightening torque of terminal screws: 0.8 N·m

### Adjustment of Output Voltage

The output voltage can be adjusted within ±10% of the rated output voltage by using the V.ADJ control. Turning the V.ADJ clockwise increases the output voltage. Turning counterclockwise decreases the output voltage. Note that overvoltage protection may work when increasing the output voltage.

### Overcurrent Protection

The output voltage drops automatically when an overcurrent flows, resulting in intermittent operation. Normal voltage is automatically restored when the load returns to normal conditions. However, overcurrent for a prolonged period of time or short-circuit causes the internal elements to deteriorate or break down.

### Overvoltage Protection

PS3X-B/C: Voltage limit and auto-recovery method. The switching power supplies operate normally when voltage returns to normal.

PS3X-D/Q/E: The output is turned off when an overvoltage is applied. When the output voltage has dropped due to an overvoltage, turn the input off, and after one minute, turn the input on again.

### Series Operation

When connecting two switching power supplies in a series, insert a Schottky diode to each output.

### Parallel Operation

Parallel operation is not possible.

### Insulation/Dielectric Test

When performing an insulation/dielectric test, short the input (between AC) and output (between + and –). Do not apply or interrupt the voltage suddenly, otherwise surge voltage may be generated and the power supply may be damaged.

## Safety Precautions

- Do not use switching power supplies with equipment where failure or inadvertent operation may harm anyone, such as medical, aerospace, railway, nuclear, etc. PS3X switching power supplies are designed for use in general electric equipment such as office, communication, measuring, and industrial electric devices.
- Do not disassemble, repair, or modify the power supplies, otherwise electric shock, fire, or failure may occur.
- Do not install the switching power supply in places where someone will touch it when input voltage is applied. Do not touch the switching power supply while input voltage is applied and right after the power is turned off, because high temperature and high voltage may cause burns and electric shocks.
- Do not short circuit the output terminals or output lead wires, otherwise fire or damage may occur.
- Provide the final product with protection against failure or damage that may be caused by malfunction of the switching power supply. Damaged switching power supply may cause overvoltage on the output terminals, or may cause voltage drop.
- Turn off power before wiring. Also, make sure to wire correctly. Improper wiring may cause electric fire or damage.
- Do not use switching power supplies to charge rechargeable batteries.
- Make sure that the input voltage does not exceed the rating. Note polarity of input and output terminals and wire correctly. Incorrect wiring may cause blown fuses (AC input power), smoke or fire.
- Do not touch the inside of the switching power supply, and make sure that foreign objects do not enter the switching power supply, otherwise an accident or failure may occur.
- Observe the temperature derating curves. Operating temperature refers to the temperature around the lower part of the switching power supply. Failure to observe the derating curves could result in an internal temperature rise and possible failure of the switching power supply.
- The fuse inside the switching power supply is for AC input. When using with DC input, install an external fuse.
- Do not set the V. ADJ control over the setting range, otherwise performance deterioration or failure may occur.
- When failure or error occurs, shut down the input to the switching power supply, and contact IDEC.
- Do not use or store the switching power supply in a place subject to extreme vibration or shocks, otherwise failure will result.
- Do not use the switching power supply where it is subject to or near:
  - Direct sunlight, heat or high temperatures
  - Metal powder, oil, chemicals or hydrogen sulfide
  - Highly humid areas, such as a basement or conservatory
  - Inside freezers or refrigerators, near cooler exhaust, or other cold environments

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# Sensors

IDEC

**www.IDEC.com/sensors**

## IDEC Sensors Selection Guide

| | | | | |
|---|---|---|---|---|
| | | | | |
| | | Page | 212 | 228 |
| | | Series | SA1E | SA1U |
| Optic Function | Through-beam (SA1E Class 1 Laser models available) | | 0 15m | 0 - 50m |
| | Polarized Retro-reflective (on R2 reflector) | | 0.05 - 4m | 0.2 - 7m |
| | Diffuse Proximity (SA1E Class 1 Laser models available) | | 0 -700mm<br>50 - 150mm | 0 - 1m |
| | Small-beam reflective | | 50 - 150mm | – |
| | Background Suppression (SA1E Class 1 Laser models available) | | 50 - 250mm | 0.2 - 2m |
| | Convergent | | 5 - 35mm | – |
| | Transparent | | 2m | – |
| Specifications | Power Supply | V DC | 10 - 30 | 10 -30 |
| | | V AC/V DC | | 21.6 - 264 V AC<br>10.8 - 264 V DC |
| | Output | PNP | √ | √ |
| | | NPN | √ | √ |
| | Connection | cable | √ | |
| | | connector | √ | |
| | | terminal block | | √ |
| | Dimensions | | 11 x 31 x 19 | 25 x 67.5 x 90 |
| | Housing Material | | PC/PBT | PBT |
| | Mechanical Protection | | IP67 | IP67 |
| | Approvals | | | |

## Datalogic Vision Sensor

| Series | DATAVS1 | DATAVS2 |
|---|---|---|
| Appearance | | |
| Page | visit www.IDEC.com/sensors | |
| Highlights | • Immediate Setup without PC<br>• VSC Configurator with 3.5" LCD display<br>• Completely embedded sensor<br>• Stand-alone functioning<br>• Real time monitoring<br>• Object Recognition tools and OCV | • Versatile PC setup<br>• Wizard-based software<br>• Ethernet communication<br>• Object recognition or identification tools<br>• 360˚ pattern match<br>• Monitoring and tuning via VSM monitor<br>• Multiple controls<br>• IP discovery function |
| Tools | | |
| 360˚ Pattern Match | | √ |
| Object Recognition (Brightness, Contrast, Width, Position, Contour Match, Pattern Match, Edge Count) | √ | √ |
| Barcode and Datamatrix | | √ |
| Optical Character Verification | √ | √ |

**For more information, visit www.IDEC.com/sensors**

## Datalogic M18 Tubular Photoelectric

| Series | | S5 | S10 | S15 | S50 | S51 |
|---|---|---|---|---|---|---|
| Appearance | | | | | | |
| Page | | visit www.IDEC.com/sensors | | | | |
| Operating Distances | Through-beam | 0 - 12m | 0 - 18m | 0 - 20m | 0 - 20m, 0 - 60m class 1 laser | 0 - 20m |
| | Retro-reflective | 0.1 - 4m | 0.1 - 4m | 0.1 - 4m | 0.1 - 4m | 0.1 - 4m |
| | Polarized Retro-reflective | 0.1 - 3m | 0.1 - 3m | 0.1 - 3m | 0.1 - 4m, 0.1 - 16m class 1 laser | 0.1 - 3m |
| | Transparent | 0.1 - 0.8m | 0.1 - 0.8m | – | 0.1 - 1.3m | – |
| | Diffuse | 1 - 100mm, 1 - 350mm, 0 - 600mm | 1 - 100mm, 1 - 350mm, 0 - 600mm | 1 - 100mm, 1 - 350mm | 0 - 100mm, 0 - 350mm, 0 - 700mm, 0 - 350mm class 1 laser | 0 - 100mm |
| | Fixed focus | 15mm | 14mm | – | 100mm | 1 - 450mm |
| | Background suppression | – | – | – | 5 - 100mm | – |
| | Foreground suppression | – | – | – | 4 - 100mm | – |
| | Distance sensor | – | – | – | 5 - 100mm | – |
| | Through-beam with fiber optic | 0 - 85mm | – | – | 0 - 100mm | – |
| | Diffuse with fiber optic | 0 - 22mm | – | – | 0 - 30mm | – |
| Technical | Power supply | 10 - 30VDC, 15 - 264VAC | 10 - 30VDC | 12 -30VDC | 10 - 30VDC | 10 - 30VDC |
| | Approximate dimensions (mm) | M18 x 55/68 | M18 x 55/67 | M18 x 40 | M18 x 55/68 | M18 x 55/68 |
| | Housing material | ABS | NI plated brass, AISI-316L stainless steel | ABS | PBT, NI plated brass | PBT, NI plated brass |
| | Mechanical protection | IP67 | IP69K | IP69K | IP67 | IP67 |
| Highlights | | Varied optic functions can be chosen from fixed focus or diffuse proximity models with short, medium or long operating distances. A red LED indicates the output status, while versions with trimmer adjustment present also have a green LED signaling switching stability. | Suitable for applications in the mechanical or food industries, IP69K mechanical protection guarantees resistance to wash down at high temperatures and pressure. AISI-316L stainless steel versions are available for resistance to chemical agents. | A housing length of only 40mm is perfect for applications with reduced space. Available optic functions include: polarized retro-reflective, non-polarized retro-reflective, diffuse proximity and through beam. These sensors are ideal for critical applications with harsh environmental conditions. | With universal sensing functions of proximity, polarized retro-reflective and through beam, as well as more advanced functions of background suppression, background/foreground suppression, analog displacement, contrast and luminescence, the S50 is one housing for all applications. | The S51 series offers a cost-effective solution, with a wide range of operating distances from 10cm fixed operating distance with the diffuse proximity models up to 4m with the standard retro-reflective models. The emitter and receiver models, used for longer operating distances, reach 18 meters. |

## Datalogic Miniature and Fiber Optic Photoelectric

| Series | | SMall | S40 | S41 | S8 | S7 |
|---|---|---|---|---|---|---|
| Appearance | | | | | | |
| Page | | visit www.IDEC.com/sensors | | | | |
| Operating Distances | Through-beam | 0 - 2m | 0.1 - 6m | 0.1 - 6m | – | – |
| | Retro-reflective | 50 - 1500mm | 0.1 - 3m | – | – | – |
| | Polarized Retro-reflective | 0.1 - 1m | 0.1 - 2.5m, 0.1 - 6m class 2 laser | 0.1 - 2.5m | 0 - 10m class 2 laser, 0.1 - 5m | – |
| | Transparent | – | 0.1 - 0.7m | 0.1 - 0.7m | 0 - 0.8m | – |
| | Diffuse | – | 50 - 300mm, 40 - 150mm class 2 laser | 2 - 350mm | 0 - 500mm | – |
| | Fixed focus | 3 - 15mm, 3 - 20mm, 3 - 30mm, 3 - 50mm | 15 - 100mm, 20 - 600mm class 2 laser | 110mm | – | – |
| | Background suppression | – | – | – | 20 - 200mm class 2 laser, 50 - 300mm | – |
| | Through-beam with fiber optic | – | – | – | – | 0 - 300mm, 0 - 150mm, 0 - 75mm |
| | Diffuse with fiber optic | – | – | – | – | 0 - 100mm, 0 - 50mm, 0 - 25mm |
| Technical | Power supply | 10 - 30VDC | 10 - 30VDC | 10 - 30VDC | 12 - 30VDC | 12 - 24VDC |
| | Approximate dimensions (mm) | 8 x 23 x 12 | 12 x 32 x 20 | 12 x 32 x 20 | 14 x 42 x 25 | 10 x 40 x 65 |
| | Housing material | polycarbonate | ABS | ABS | ABS | ABS |
| | Mechanical protection | IP67 | IP67 | IP67 | IP67 | IP65 |
| Highlights | | This subminiature series, suitable for applications with reduced space, offers through beam, retro-reflective polarized and accurate fixed focus proximity models to guarantee precise detection. A red LED emission simplifies installation procedures. | With innovative miniature housing, these sensors offer all the main optic functions with the advantages of microprocessor control and automatic Teach-in, as well as Remote setting with EASYtouchTM procedure. | A basic line of photoelectric sensors in miniature housing, these sensors are ideal for applications that require reduced dimensions and costs. | This series offers excellent detection performances, usually associated with sensors that have larger dimensions and a higher price. The S8 series is a solution for packaging lines, food and beverage industries, automotive, test and assembling machines and electronic plants. | At 10mm wide and as the first fiber optic amplifier to be manufactured in Europe and equipped with a full 4 digit display, the S7 represents the ideal solution for all applications requiring high accuracy sensing combined with compact dimensions. |

## Datalogic Compact Photoelectric

| Series | | S6 | S60 | S62 | S90 |
|---|---|---|---|---|---|
| Appearance | | | | | |
| Page | | visit www.IDEC.com/sensors | | | |
| Operating Distances | Through-beam | 0 - 20m | 0 - 20m, 0 - 60 class 1 laser | – | 0 - 20m, 0 - 60m class 1 laser |
| | Retro-reflective | 0.1 - 6m | – | – | – |
| | Polarized Retro-reflective | 0.1 - 5m | 0 - 3.2m, 0.1 - 6.5m, 0.1 - 20m class 1 laser | 0.5 - 8.5m, 0.3 - 20m class 2 laser | 0 - 3.2m, 0.1 - 6.5m, 0.1 - 20m class 1 laser |
| | Transparent | 0.1 - 1m | 0 - 1.7m | – | 0 - 1.7m |
| | Diffuse | 10 - 900mm, 50 - 2000mm | 10 - 1000mm, 50 - 2000mm, 0 - 600mm class 1 laser | – | 10 - 1000mm, 50 - 2000mm, 0 - 600mm class 1 laser |
| | Background suppression | 1 - 100mm, 30 - 250mm, 100 - 500mm | 70 - 200mm, 50 - 100mm class 1 laser | 30 - 300mm, 60 - 600mm, 60 - 1200mm, 200 - 2000mm, 30 - 150mm class 2 laser, 50 350mm class 2 laser | 70 - 200mm, 50 - 100mm class 1 laser |
| | Foreground supression | 50 - 200mm | 70 - 200mm | – | 70 - 200mm |
| | Distance sensor | – | 50 - 150mm | 80 +/- 40mm class 2 laser | – |
| Technical | Power supply | 10 - 30VDC, 15 - 264VAC | 10 - 30VDC | 10 - 30VDC | 10 - 30VDC |
| | Approximate dimensions (mm) | 18 x 50 x 50 | 15 x 50 x 50 | 18 x 50 x 50 | 15 x 50 x 41 |
| | Housing material | ABS | ABS | ABS | zinc plated aluminum |
| | Mechnical protection | IP65 | IP67 | IP67 | IP67 |
| Highlights | | The S6 series, thanks to the excellent detection performances and the variety of power supply and connection possibilities, offers the most complete universal sensor range in a compact 50x50 mm housing. | A sensitivity adjustment provides quick and precise setting of the switching threshold. These sensors also have an M12 connection that can be used straight or rotated to a right-angle position. | These sensors allow the operating distance to be adjusted to obtain the maximum immunity against color differences of the detected object or of the background, even if very reflective. | These sensors offer all the application and universal optic functions along with safety class 1 laser emission. |

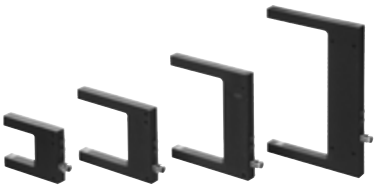
## Datalogic Maxi Photoelectric

| Series | | S20 |
|---|---|---|
| Appearance | | |
| Page | | visit www.IDEC.com/sensors |
| Operating Distances | Through-beam | 0.1 - 50m |
| | Retro-reflective | - |
| | Polarized Retro-reflective | 0.1 - 8m |
| | Diffuse | 0.1 - 2m |
| | Background suppression | 10 - 50cm |
| Technical | Power supply | 12 - 24VDC, 12 - 240VAC/DC |
| | Approximate dimensions (mm) | 26 x 65 x 55 |
| | Housing material | ABS |
| | Mechnical protection | IP66 |

## Datalogic Proximity

| Series | M4 | M5 | M8 | M12 | M18 | M30 |
|---|---|---|---|---|---|---|
| Appearance | | | | | | |
| Page | visit www.IDEC.com/sensors | | | | | |
| Operating Distance | 0.8mm | 0.8mm | 2mm shielded models, 3mm unshielded models | 2mm shielded models, 4mm unshielded models | 5mm shielded models, 8mm unshielded models | 10mm shielded models, 15mm unshielded models |
| Repeatibility | ≤ 1% | ≤ 1% | ≤ 3% | ≤ 3% | ≤ 3% | ≤ 3% |
| Hysterisis | < 10% | < 10% | < 10% | < 10% | < 10% | < 10% |
| Ripple | ≥ 10% | ≥ 10% | ≥ 10% | ≥ 10% | ≥ 10% | ≥ 10% |
| Switching Frequency | 2000 Hz | 2000 Hz | 1000 Hz | 1000 Hz | 1000 Hz | 300 Hz |
| Indicators | Yellow LED | Yellow LED | Yellow LED | Yellow LED | Yellow LED | Yellow LED |
| Power supply | 10 - 30VDC | 10 - 30VDC | 10 - 30VDC | 10 - 30VDC | 10 - 30VDC | 10 - 30VDC |
| Output | 2 wires NO/NC | 2 wires NO/NC | 2 wires NO/NC | 2 wires NO/NC, 3 wires NPN/PNP NO/NC, 4 wires NPN/PNP NO/NC, 4 wires programmable | 2 wires NO/NC, 3 wires NPN/PNP NO/NC, 4 wires NPN/PNP NO/NC, 4 wires programmable | 2 wires NO/NC, 3 wires NPN/PNP NO/NC, 4 wires NPN/PNP NO/NC, 4 wires programmable |
| Connections | cable, M8 connector | cable, M8 connector | cable, M8 connector, M12 connector | cable, M8 connector, M12 connector | cable, M8 connector, M12 connector | cable, M8 connector, M12 connector |
| Housing | standard | standard | standard, short | standard, short | standard, short | standard, short |
| Housing material | AISI-316L stainless steel | AISI-316L stainless steel | NI plated brass | NI plated brass, AISI-316L stainless steel | NI plated brass, AISI-316L stainless steel | NI plated brass |
| Mechnical protection | IP67 | IP67 | IP67 | IP67 | IP67 | IP67 |

## Datalogic Slot Sensors

| Series | SR21 | SR22 | SRF |
|---|---|---|---|
| Appearance | | |  |
| Page | visit www.IDEC.com/sensors | | |
| Slot Sensor | 2mm | 2mm | 30mm, 50mm, 80mm, 120mm |
| Slot depth | 50mm | 40mm | 34mm, 54mm |
| Switching Frequency | 25 kHz | 10 kHz | 1.5 kHz, 3 kHz |
| Light emission | IR LED, red/green LED | IR LED | red LED, class 2 red Laser |
| Setting | AUTO-SET push button | trimmer | trimmer |
| Power supply | 10 - 30VDC | 24VDC | 10 - 30VDC |
| Output | PNP, NPN | PNP, NPN | PNP, NPN |
| Connections | connector | connector | connector |
| Approximate dimensions (mm) | 20 x 90 x 26 | 14 x 68 x 37 | 10x50x59, 10x70x79, 10x100x79, 10x140x84 |
| Housing material | zinc plated aluminum | aluminum | aluminum |
| Mechnical protection | IP65 | IP60 | IP65 |

## Datalogic Contrast Sensors

| Series | TL46 | TLμ | TL50 |
|---|---|---|---|
| Appearance | | | |
| Page | visit www.IDEC.com/sensors | | |
| Distance | 6 - 60mm | 6 - 60mm, fiber optic: 0 - 3mm, 0 - 10mm | 9mm |
| Switching Frequency | 15 kHz, 20 kHz, 30 kHz | 10 kHz, 20 kHz | 15 kHz |
| Light emission | RGB LED | red/green LED, white LED | RGB LED |
| Setting | +/- SET pushbutton | MARK and BACKGROUND pushbuttons | MARK and BACKGROUND pushbuttons |
| Power Supply | 10 - 30VDC | 10 - 30VDC | 10 - 30VDC |
| Output | PNP/NPN | PNP, NPN | NPN/PNP |
| Connection | cable, connector | cable, connector | connector |
| Approximate dimensions (mm) | 31 x 81 x 58 | 31 x 81 x 58 | 31 x 81 x 53 |
| Housing material | aluminum | zama | ABS |
| Mechanical protection | IP67 | IP67 | IP67 |

## Datalogic Luminescence Sensors

| Series | LD46 | LDμ | LD50 |
|---|---|---|---|
| Appearance | | | |
| Page | visit www.IDEC.com/sensors | | |
| Distance | 10 - 100mm | 10 - 100mm, fiber optic: 0 - 30mm | 0 - 60mm |
| Switching Frequency | 2 kHz | 2 kHz | 2 kHz |
| Light emission | UV-HP LED | UV LED | UV-HP LED |
| Setting | +/- SET pushbuttons | MARK and BACKGROUND pushbuttons | +/- SET pushbuttons |
| Power Supply | 15 - 30VDC | 10 - 30VDC | 15 - 30VDC |
| Output | NPN/PNP, 0-5V | PNP, NPN, 0 - 7V | NPN/PNP |
| Connection | cable, connector | cable, connector | connector |
| Approximate dimensions (mm) | 31 x 81 x 58 | 31 x 81 x 58 | 31 x 81 x 53 |
| Housing material | aluminum | zama | ABS |
| Mechanical protection | IP67 | IP67 | IP67 |

## Datalogic Color Sensors

| Series | S65-V |
|---|---|
| Appearance | |
| Page | visit www.IDEC.com/sensors |
| Distance | 5 - 45mm |
| Switching Frequency | 1.5 kHz (V09 version), 500 Hz (V19 version |
| Light emission | RGB LED |
| Serial Interface | RS485 |
| Setting | SET and SEL pushbuttons |
| Power Supply | 10 - 30VDC |
| Output | PNP, NPN |
| Connection | connector |
| Approximate dimensions (mm) | 50 x 50 x 25 |
| Housing material | ABS |
| Mechanical protection | IP67 |

## Datalogic Distance Sensors

| Series | S80 | S81 |
|---|---|---|
| Appearance | | |
| Page | visit www.IDEC.com/sensors | |
| Distance | 0.3 - 4m, 0.3 - 7m, 0.3 - 20.3m, 0.3 - 100.3m | 0.3 - 4m |
| Digital Resolution | 0.9mm, 0.4mm, 0.6mm, 6mm | 0.9mm |
| Linearity | 0.3%, 0.25%, 0.15% | – |
| Switching Frequency | 100 Hz (Normal), 500 Hz (Fast) | 80 Hz |
| Light Emission | Class 2 red laser | Class 2 red laser |
| Response time | 5 ms (Normal), 1ms (Fast) | 6 ms |
| Serial Interface | RS485 | – |
| Setting | Teach-in | Teach-in |
| Hysterisis | – | 30 mm |
| Power supply | 15 - 30VDC | 15 - 30VDC |
| Output | PNP, 4-20mA | PNP, NPN, 0 - 10V |
| Connection | M12 connector | M12 connector |
| Approximate dimensions (mm) | 34 x 90 x 73 | 58 x 31 x 31 |
| Housing material | aluminum | ABS |
| Mechanical protection | IP67 | IP67 |

## Datalogic Area Sensors

| Series | AS1-HR | AS1-SR |
|---|---|---|
| Appearance | | |
| Page | visit www.IDEC.com/sensors | |
| Height | 100 mm | 100 mm |
| Resolution | 0.2 x 75mm, ø 6 mm | 0.2 x 200mm, ø 18 mm |
| Switching Frequency | 500 Hz | 500 Hz |
| Light Emission | IR LED | IR LED |
| Operating Distance | 0.3 - 1.9m, 0.8 - 3m | 0.3 - 1.9m, 0.8 - 3m |
| Power supply | 10 - 30VDC | 10 - 30VDC |
| Output | PNP | PNP |
| Connection | connector | connector |
| Approximate dimensions (mm) | 20 x 41 x 150 | 20 x 41 x 150 |
| Housing material | aluminum | aluminum |
| Mechanical protection | IP67 | IP67 |

## Datalogic Measurement Light Arrays

| Series | DS1 | DS2 | DS3 |
|---|---|---|---|
| Appearance | | | |
| Page | visit www.IDEC.com/sensors | | |
| Controlled Height | 100 - 300mm | 150 - 1650mm | 150 - 600mm |
| Resolution | 4 - 10mm | Digital resolution : 12/35mm,<br>Absolute measure precision: 6/22.5mm | 0.5/0.8mm (crossed beams),<br>6mm (parallel beams) |
| Number of beams | 16 - 48 | 21 - 231 (res=12mm), 1 - 36 (res=35mm) | 24 - 96 |
| Light emission | IR | IR | IR |
| Response time | 1 - 2.75ms | 5 - 90ms | 3 - 12ms (crossed beams),<br>23 - 92 ms (parallel beams) |
| Serial Interface | – | RS485, Ethernet | – |
| Setting | Trimmer | Dip-switch, Graphic interface | Teach-in |
| Operating Distance | 0.15 - 0.8m, 0.15 - 2.1m, 0.2 - 4m | 0.3 - 5m (res=12mm), 0.3 - 10m (res=35mm) | 0.2 - 2m |
| Power Supply | 24VDC | 24VDC | 24VDC |
| Output | PNP, 0 - 10VDC | PNP, 0 - 10VDC | PNP, 0 - 10VDC |
| Approximate dimensions (mm) | 20 x 41 | 35 x 40 | 35 x 40 |
| Housing material | aluminum | aluminum | aluminum |
| Mechanical protection | IP65 | IP66 | IP66 |

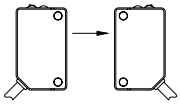
# SA1E Miniature Photoelectric Switches

**Key features:**

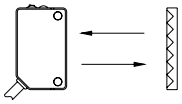
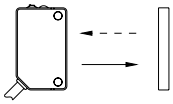
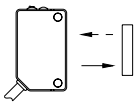
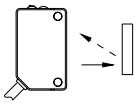
- Seven sensing methods: through-beam, polarized retroreflective, small beam reflective, diffuse, background suppression, convergent, and transparent.
- 2m cable type and M8 connector.
- NPN output, PNP output, light ON, dark ON can be selected.
- Coaxial polarized retro-reflective type (SA1E-X) available for sensing transparent objects.
- Background suppression (SA1E-B) type detects objects only, ignoring the background.
- Red LED available for easy alignment in long distance applications (SA1E-T, -P, -N, and -B)
- Convergent reflective type (SA1E-G) is ideal for detecting objects at a short distance with a background.
- Also available without sensitivity adjustment (SA1E-T, -P)
- Air blower mounting block for installing an air blower to clean the lens surface. Ideal to maintain a clean lens surface and sensor performance.
- UL Listed and CE marked
- IP67

## Part Numbers

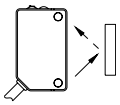
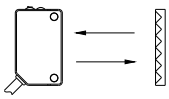
### Photoelectric Switches

| Sensing Method | | | | Sensing Range | Connection | Cable Length | Operation Mode | Part No. | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | NPN Output | PNP Output |
| Through-beam | Infrared LED | w/Sensitivity Adjustment |  | 10m | Cable | 2m | Light ON | SA1E-TN1-2M | SA1E-TP1-2M |
| | | | | | | | Dark ON | SA1E-TN2-2M | SA1E-TP2-2M |
| | | | | | Connector | – | Light ON | SA1E-TN1C | SA1E-TP1C |
| | | | | | | | Dark ON | SA1E-TN2C | SA1E-TP2C |
| | | w/o Sensitivity Adjustment | | 15m | Cable | 2m | Light ON | SA1E-TN1-NA-2M | SA1E-TP1-NA-2M |
| | | | | | | | Dark ON | SA1E-TN2-NA-2M | SA1E-TP2-NA-2M |
| | | | | | Connector | – | Light ON | SA1E-TN1C-NA | SA1E-TP1C-NA |
| | | | | | | | Dark ON | SA1E-TN2C-NA | SA1E-TP2C-NA |
| | Red LED | w/Sensitivity Adjustment | | 10m | Cable | 2m | Light ON | SA1E-TAN1-2M | SA1E-TAP1-2M |
| | | | | | | | Dark ON | SA1E-TAN2-2M | SA1E-TAP2-2M |
| | | | | | Connector | – | Light ON | SA1E-TAN1C | SA1E-TAP1C |
| | | | | | | | Dark ON | SA1E-TAN2C | SA1E-TAP2C |
| | Class 1 Laser | w/Sensitivity Adjustment | | 30m | Cable | 2m | Light ON/ Dark ON | SA1E-LTN3-2M | SA1E-LTP3-2M |
| | | | | | Connector | – | Light ON/ Dark ON | SA1E-LTN3C | SA1E-LTP3C |

## Photoelectric Switches

| Sensing Method | | | | Sensing Range | Connection | Cable Length | Operation Mode | Part No. | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | NPN Output | PNP Output |
| Polarized Retroflective | Red LED | w/Sensitivity Adjustment |  (Note) Note: Maintain at least the distance shown in the ( ) between the SA1E photoelectric switch and reflector. Reflectors are not supplied and must be ordered separately. See the characteristics on page 220. | 2.5m (100 mm) When using IAC-R5/R8<br>1.5m (100 mm) When using IAC-R6<br>1.3m (150 mm) When using IAC-RS2<br>1.0m (150 mm) When using IAC-RS1<br>0.8m (100 mm) When using IAC-R5/R8□ | Cable | 2m | Light ON | SA1E-PN1-2M | SA1E-PP1-2M |
| | | | | | | | Dark ON | SA1E-PN2-2M | SA1E-PP2-2M |
| | | | | | Connector | – | Light ON | SA1E-PN1C | SA1E-PP1C |
| | | | | | | | Dark ON | SA1E-PN2C | SA1E-PP2C |
| | | w/o Sensitivity Adjustment | | 3.0m (100 mm) When using IAC-R5/R8<br>2.0m (100 mm) When using IAC-R6<br>1.4m (150 mm) When using IAC-RS2<br>1.1m (150 mm) When using IAC-RS1<br>1.0m (100 mm) When using IAC-R7□ | Cable | 2m | Light ON | SA1E-PN1-NA-2M | SA1E-PP1-NA-2M |
| | | | | | | | Dark ON | SA1E-PN2-NA-2M | SA1E-PP2-NA-2M |
| | | | | | Connector | – | Light ON | SA1E-PN1C-NA | SA1E-PP1C-NA |
| | | | | | | | Dark ON | SA1E-PN2C-NA | SA1E-PP2C-NA |
| | Class 1 Laser | w/Sensitivity Adjustment | | 10m | Cable | 2m | Light ON/ Dark ON | SA1E-LPN3-2M | SA1E-LPP3-2M |
| | | | | | Connector | – | Light ON/ Dark ON | SA1E-LPN3C | SA1E-LPP3C |
| Diffuse-reflective | Infrared LED | w/Sensitivity Adjustment |  | 700 mm | Cable | 2m | Light ON | SA1E-DN1-2M | SA1E-DP1-2M |
| | | | | | | | Dark ON | SA1E-DN2-2M | SA1E-DP2-2M |
| | | | | | Connector | – | Light ON | SA1E-DN1C | SA1E-DP1C |
| | | | | | | | Dark ON | SA1E-DN2C | SA1E-DP2C |
| Small-beam Reflective | Red LED | w/Sensitivity Adjustment |  | 50 to 150 mm | Cable | 2m | Light ON | SA1E-NN1-2M | SA1E-NP1-2M |
| | | | | | | | Dark ON | SA1E-NN2-2M | SA1E-NP2-2M |
| | | | | | Connector | – | Light ON | SA1E-NN1C | SA1E-NP1C |
| | | | | | | | Dark ON | SA1E-NN2C | SA1E-NP2C |
| Background Suppression | Red LED | w/Sensing Range Adjustment |  | 20 to 200 mm<br>20 to 200 mm<br>Adjustable Sensing Range | Cable | 2m | Light ON | SA1E-BN1-2M | SA1E-BP1-2M |
| | | | | | | | Dark ON | SA1E-BN2-2M | SA1E-BP2-2M |
| | | | | | Connector | – | Light ON | SA1E-BN1C | SA1E-BP1C |
| | | | | | | | Dark ON | SA1E-BN2C | SA1E-BP2C |
| | Class 1 Laser | w/Sensitivity Adjustment | | 20 to 300 mm<br>20 to 300 mm<br>Adjustable Sensing Range | Cable | 2m | Light ON/ Dark ON | SA1E-LBN3-2M | SA1E-LBP3-2M |
| | | | | | Connector | – | Light ON/ Dark ON | SA1E-LBN3C | SA1E-LBP3C |

## Photoelectric Switches

| Sensing Method | | | | Sensing Range | Connection | Cable Length | Operation Mode | Part No. | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | NPN Output | PNP Output |
| Convergent Reflective | Infrared LED | w/Sensitivity Adjustment |  | 5 to 35 mm | Cable | 2m | Light ON | SA1E-GN1-2M | SA1E-GP1-2M |
| | | | | | | | Dark ON | SA1E-GN2-2M | SA1E-GP2-2M |
| | | | | | Connector | – | Light ON | SA1E-GN1C | SA1E-GP1C |
| | | | | | | | Dark ON | SA1E-GN2C | SA1E-GP2C |
| Coaxial Polarized Retro-reflective | Red LED | w/Sensitivity Adjustment |  Note: Reflector is not supplied and must be ordered separately. See characteristics diagrams on page 220. | 2.0m (when using IAC-R9)<br>1.0m [100 mm] (when using IAC-R10)<br>1.0m [100 mm] (when using IAC-R11) | Cable | 2m | Light ON | SA1E-XN1-2M | SA1E-XP1-2M |
| | | | | | | | Dark ON | SA1E-XN2-2M | SA1E-XP2-2M |
| | | | | | Connector | – | Light ON | SA1E-XN1C | SA1E-XP1C |
| | | | | | | | Dark ON | SA1E-XN2C | SA1E-XP2C |

## Specifications

| Sensing Method | Through-beam | Polarized Retroreflective | Diffuse-reflective | Small-beam Reflective | Background Suppression (BGS) | Convergent Reflective | Transparent |
|---|---|---|---|---|---|---|---|
| Part No. | SA1E-☐T | SA1E-☐P | SA1E-D | SA1E-N | SA1E-☐B | SA1E-G | SA1E-X |
| Power Voltage | 12 to 24V DC (Operating range: 10 to 30V DC)<br>Equipped with reverse-polarity protection | | | | | | |
| Current Draw | Projector: 15 mA<br>Receiver: 20 mA<br>Laser<br>Receiver: 30 mA | 30 mA<br>with laser: 35 mA | | | | | 20 mA maximum |
| Sensing Range | With sensitivity adjustment: 10m<br>Laser models: 30m | With sensitivity adjustment:<br>2.5m (IAC-R5/R8)<br>1.5m (IAC-R6)<br>1.3m (IAC-RS2)<br>1.0m (IAC-RS1)<br>0.8m (IAC-R7☐) [1]<br>Laser models<br>0.3-10m | 700 mm<br>(using 200 × 200 mm white mat paper) | 50 to 150 mm<br>(using 100 × 100 mm white mat paper) | 20 mm to preset<br>(using 200 × 200 mm white mat paper)<br>with laser: 20 - 300mm | 5 to 35 mm<br>(using 100 × 100 mm white mat paper) | 2m<br>(when using IAC-R9) |
| | Without sensitivity adjustment: 15m | Without sensitivity adjustment:<br>3.0m (IAC-R5/R8)<br>2.0m (IAC-R6)<br>1.4m (IAC-RS2)<br>1.1m (IAC-RS1)<br>1.0m (IAC-R7☐) [1] | | | | | |
| Adjustable Sensing Range | — | | | | 40 to 200 mm<br>with laser: 40-300mm | — | — |
| Detectable Object | Opaque | | Opaque/Transparent | | Opaque | Opaque/ Transparent | Opaque, transparent and mirror-like objects |
| Hysteresis | — | | 20% maximum | | 10% maximum | 20% maximum | — |
| Response Time | 1 ms maximum<br>with laser: 250us | | | | | | 500 µs maximum |
| Sensitivity Adjustment | Adjustable using a potentiometer (approx. 260°)<br>Through-beam type and polarized retroreflective type are also available without sensitivity adjustment.<br>Laser models: 2 turn adjustment | | | | — | Adjustable using a potentiometer (approx. 260°) | Adjustable using a potentiometer (approx. 240°) |
| Sensing Range Adjustment | — | | | | 6-turn control knob | — | — |
| Light Source Element | Infrared LED<br>Red LED<br>Red laser diode | Red LED<br>Red laser diode | Infrared LED | Red LED | Red LED<br>Red laser diode | Infrared LED | Red LED |
| Operation Mode | Light ON/Dark ON | | | | | | |
| Control Output | NPN open collector or PNP open collector<br>30V DC, 100 mA maximum<br>Voltage drop: 1.2V maximum (BGS type: 2V maximum)<br>Short-circuit protection | | | | | | |
| LED Indicators | Operation LED: Yellow<br>Stable LED: Green<br>Power LED: Green (Through-beam type projector) | | | | Operation LED: Yellow<br>Stable LED: None | Operation LED: Yellow<br>Stable LED: Green | Operation LED: Yellow<br>Stable LED: None |
| Interference Prevention | — | Two units can be mounted in close proximity. | | | | | |
| Degree of Protection | IP67 (IEC 60529) | | | | | | |
| Extraneous Light Immunity | Sunlight: 10,000 lux maximum, Incandescent lamp: 5,000 lux maximum (at receiver) | | | | | | |

1. Maintain at least the distance shown below between the SA1E photoelectric switch and reflector.
   IAC-R5/R6/R7☐/R8: 100 mm
   IAC-RS1/RS2: 150 mm
   The detection distance cannot be guaranteed if the reflector is deformed or the tape type reflector is applied on uneven surface.
2. Cable length: 1m (50g when the cable length is 2m, 55g for laser models. 110g when the cable length is 5m, 120g for laser models.)
3. Cable length: 1m (55g when the cable length is 2m. 120g when the cable length is 5m.)
4. For laser models insert L in place of ☐.

## Specifications, con't

| Sensing Method | | Through-beam | Polarized Retroreflective | Diffuse-reflective | Small-beam Reflective | Background Suppression (BGS) | Convergent Reflective | Transparent |
|---|---|---|---|---|---|---|---|---|
| Part No. | | SA1E-T | SA1E-P | SA1E-D | SA1E-N | SA1E-B | SA1E-G | SA1E-X |
| Operating Temperature | | –25 to +55°C (no freezing) | | | | | | |
| Operating Humidity | | 35 to 85% RH (no condensation) | | | | | | |
| Storage Temperature | | –40 to +70°C (no freezing) | | | | | | |
| Insulation Resistance | | Between live part and mounting bracket: 20 MΩ maximum (500V DC megger) | | | | | | |
| Dielectric Strength | | Between live part and mounting bracket: 1000V AC, 50/60 Hz, 1 minute | | | | | | |
| Vibration Resistance | | Damage limits: 10 to 55 Hz, Amplitude 0.75 mm, 20 cycles in each of 3 axes | | | | | | |
| Shock Resistance | | Damage limits: 500 m/s$^2$, 10 shocks in each of 3 axes | | | | | | |
| Material | | Housing: PC/PBT, Lens: PC (Polarized retroreflective / coaxial polarized retro-reflective: PMMA), Indicator cover: PC | | | | | | |
| Attachments | | Instruction sheet | | | | | | |
| Weight (approx.) | Cable Model | Projector: 30g<br>Laser Projector: 35g<br>Receiver: 30g [2]<br>Laser Receiver: 35g | 30g [2]<br>with laser: 35g | | | 35g [3] | 30g [2] | 35g [3] |
| | Connector Model | Projector: 10g<br>Laser Projector: 20g<br>Receiver: 10g<br>Laser Receiver: 20g | 10g<br>with Laser 20g | | | 20g | 10g | 20g |
| Connection Method | Cable Model | ø3.5 mm, 3-core, 0.2 mm$^2$, 1-m vinyl cabtyre cable (2-core for the projector of through-beam type) | | | | | | |
| | Connector Model | M8 connector (4-pin) | | | | | | |

1. Maintain at least the distance shown below between the SA1E photoelectric switch and reflector.
   IAC-R5/R6/R7☐/R8: 100 mm
   IAC-RS1/RS2: 150 mm
   The detection distance cannot be guaranteed if the reflector is deformed or the tape type reflector is applied on uneven surface.
2. Cable length: 1m (50g when the cable length is 2m, 55g for laser models. 110g when the cable length is 5m, 120g for laser models.)
3. Cable length: 1m (55g when the cable length is 2m. 120g when the cable length is 5m.)
4. For laser models insert L in place of ☐.

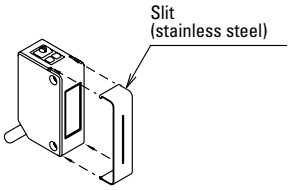
### Slit and Sensing Range

A slit, which changes the beam size of through-beam sensors, can easily be attached to the sensing side of the through-beam projector and receiver. Three different slit widths are available.

| Slit | | w/Sensitivity Adjustment | | | | w/o Sensitivity Adjustment | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Sensing Range (m) | | Minimum Detectable Object Width (mm) | | Sensing Range (m) | | Minimum Detectable Object Width (mm) | |
| Part No. | Slit Width: A | Used on one side | Used on both sides | Used on one side | Used on both sides | Used on one side | Used on both sides | Used on one side | Used on both sides |
| SA9Z-S06 | 0.5 mm | 2.5 | 1.0 | 7.0 | 0.5 | 5.0 | 1.5 | 7.0 | 0.5 |
| SA9Z-S07 | 1.0 mm | 3.5 | 1.5 | 7.0 | 1.0 | 7.0 | 3.0 | 7.0 | 1.0 |
| SA9Z-S08 | 2.0 mm | 6.0 | 3.5 | 7.0 | 2.0 | 9.0 | 5.5 | 7.0 | 2.0 |
| SA9Z-S09 | 0.5 mm | 2.0 | 0.7 | 7.0 | 0.4 | 4.0 | 1.5 | 7.0 | 0.5 |
| SA9Z-S10 | 1.0 mm | 3.0 | 1.5 | 7.0 | 0.7 | 7.0 | 2.5 | 7.0 | 0.8 |
| SA9Z-S11 | 2.0 mm | 5.5 | 3.0 | 7.0 | 1.5 | 9.0 | 5.0 | 7.0 | 1.5 |
| SA9Z-S12 | 0.5 mm | 0.8 | 0.08 | 5.0 | 0.3 | 1.3 | 0.1 | 5.0 | 0.5 |
| SA9Z-S13 | 1.0 mm | 1.5 | 0.3 | 5.0 | 0.6 | 2.5 | 0.3 | 5.0 | 0.6 |
| SA9Z-S14 | 2.0 mm | 2.5 | 1.2 | 5.0 | 1.5 | 5.5 | 1.6 | 5.0 | 1.7 |

Used on one side: Slit is attached to the receiver only.

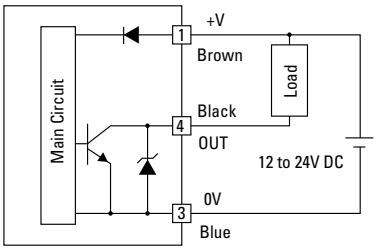
The slit can be pressed to snap onto the front easily.



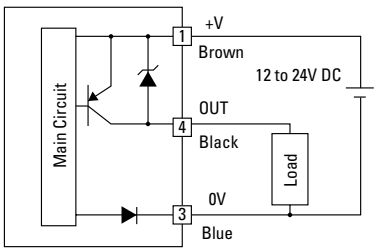

Horizontal slits and round slits have an orientation. Make sure that the TOP marking comes on top of the sensor (LED side).

## Output Circuit & Wiring Diagram

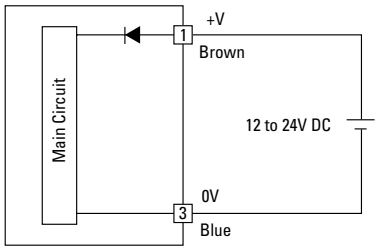
**NPN Output**



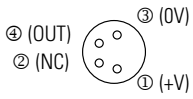

**PNP Output**



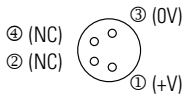

**Through-beam Type Projector**




(Connector Pin Assignment)

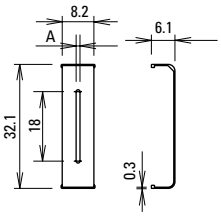



(Connector Pin Assignment)

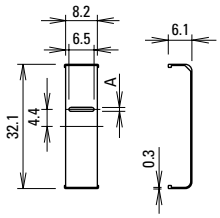



## Dimensions (mm)

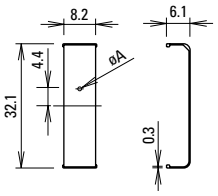
**Vertical Slit**
SA9Z-S06
SA9Z-S07
SA9Z-S08




**Horizontal Slit**
SA9Z-S09
SA9Z-S10
SA9Z-S11




**Round Slit**
SA9Z-S12
SA9Z-S13
SA9Z-S14



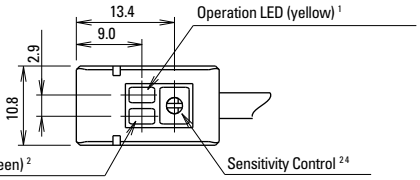

Material: Stainless Steel

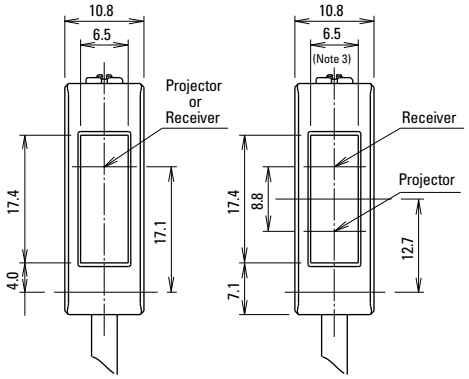
### Cable Model

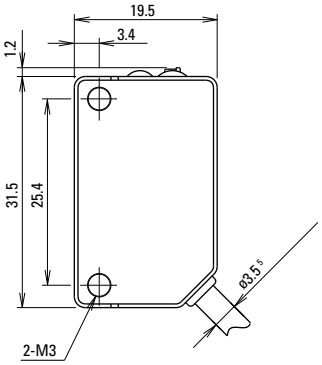
Through-beam

Polarized retroreflective
Diffuse-reflective
Small-beam reflective
Convergent reflective

- Through-beam
- Polarized retroreflective
- Diffuse-reflective
- Small-beam reflective
- Convergent Reflective



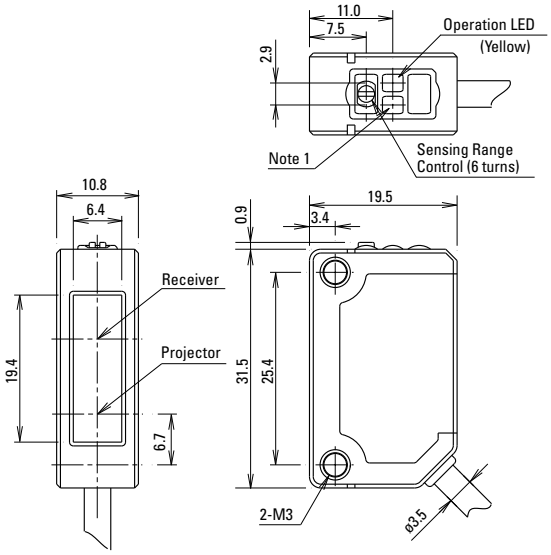




1. Power ON LED (green) for through-beam projector
2. No sensitivity control and stable LED are attached on the through-beam projector.
3. 5.2 mm for polarized retroreflective type
4. No sensitivity control is installed on the type without sensitivity adjustment.

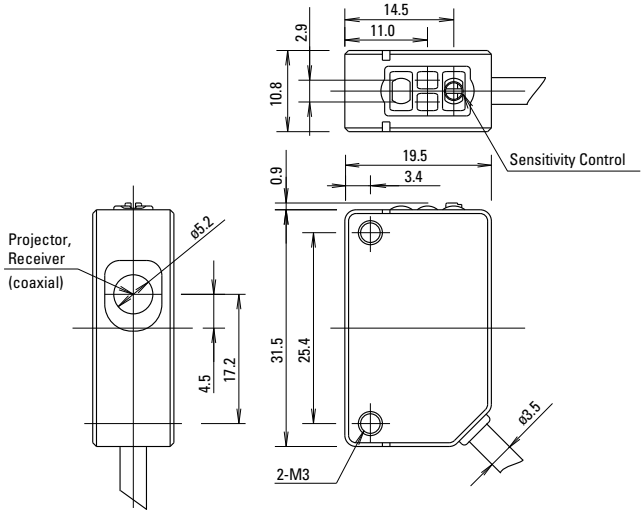
## Cable Model
Background Suppression (BGS)

1. Stable LED is not provided on the background suppression type.



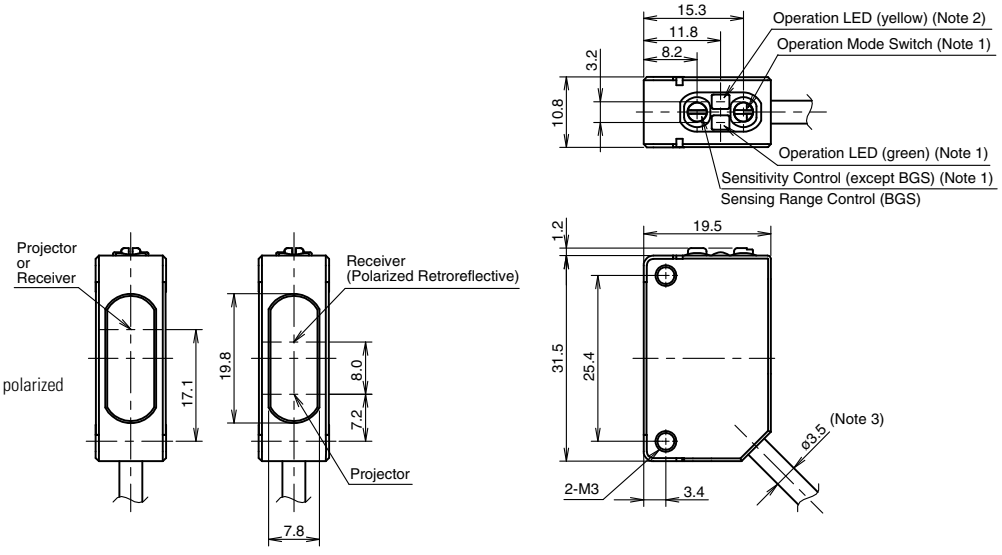

## Cable Model
Coaxial Polarized Retro-reflective

1. Stable LED is not provided on the coaxial polarized retro-reflective type.




## Cable Model (Laser)
Through-beam
Polarized Retroreflective
Background Suppression

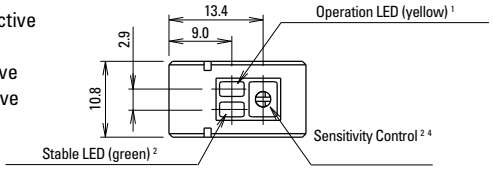
1. Stable LED is not provided on the coaxial polarized retro-reflective type.

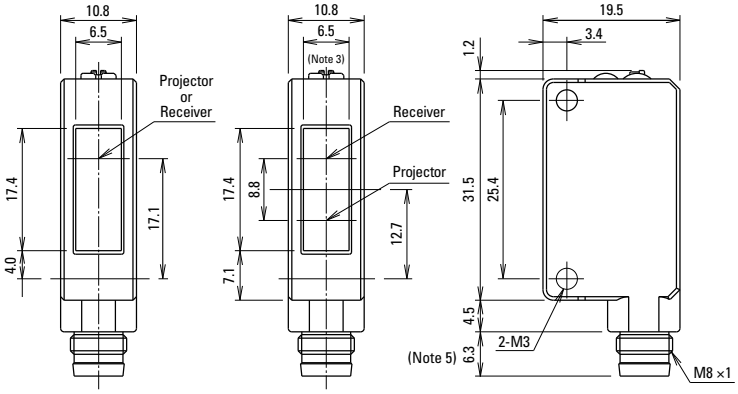


## Connector Model

Through-beam

- Through-beam
- Polarized retroreflective
- Diffuse-reflective
- Small-beam reflective
- Convergent Reflective



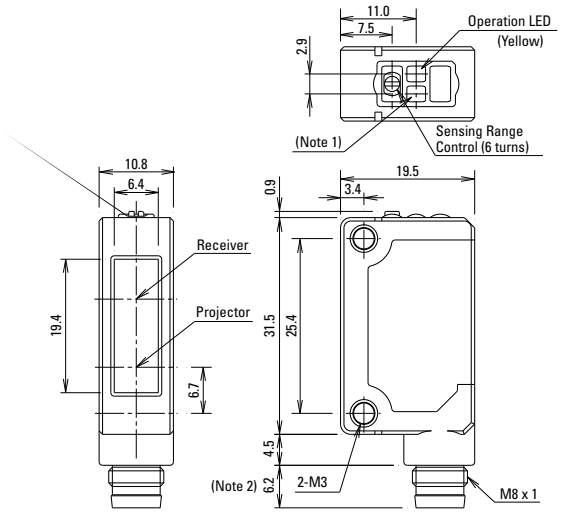

Polarized retroreflective
Diffuse-reflective
Small-beam reflective
Convergent reflective

1. Power ON LED (green) for through-beam projector
2. No sensitivity control and stable LED are attached on the through-beam projector.
3. 5.2 mm for polarized retroreflective type
4. No sensitivity control is installed on the type without sensitivity adjustment.

## Connector Model

Background Suppression (BGS)

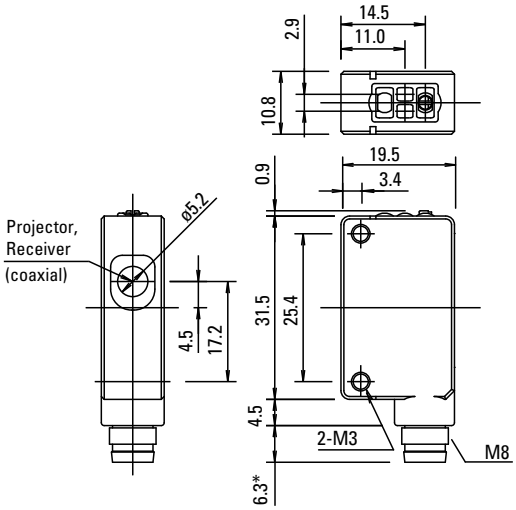
1. Stable LED is not provided on the background suppression type.
2. The connector length is 18 mm when a right-angle connector cable.




## Connector Model

Coaxial Polarized Retro-reflective

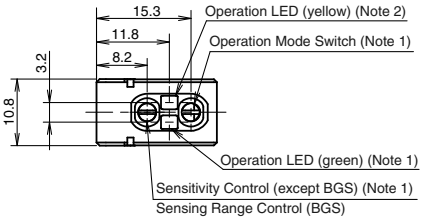
1. Stable LED is not provided on the coaxial polarized retro-reflective type.

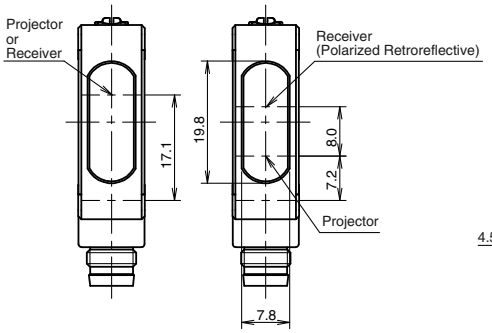


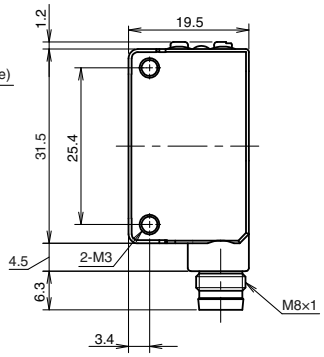
## Connector Model (Laser)

Through-beam
Polarized Retroreflective
Background Suppression

1. Stable LED is not provided on the coaxial polarized retro-reflective type.



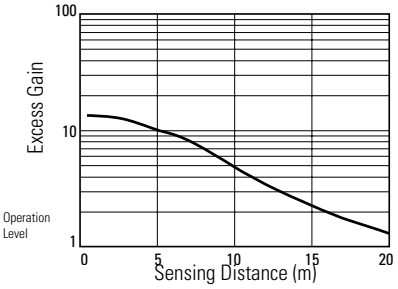



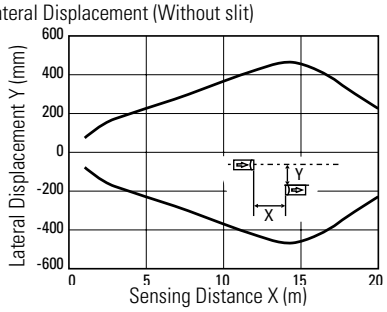

## Characteristics (Typical)

1-1. Through-beam SA1E-T (Infrared LED w/sensitivity adjustment)
SA1E-TA (Red LED) w/sensitivity adjustment)

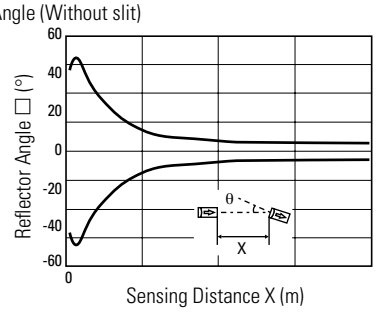
Excess Gain (Without slit)



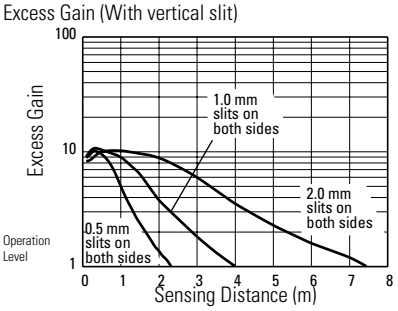

Lateral Displacement (Without slit)



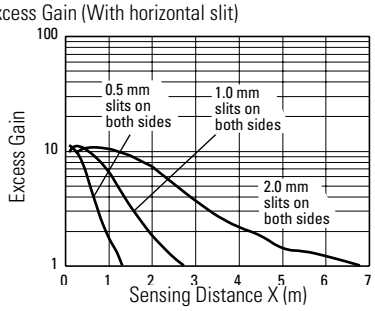

Angle (Without slit)



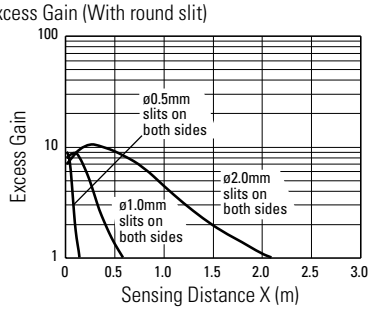

Excess Gain (With vertical slit)



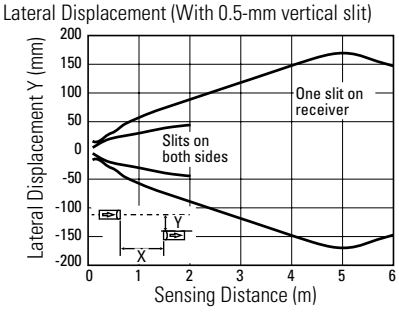

Excess Gain (With horizontal slit)



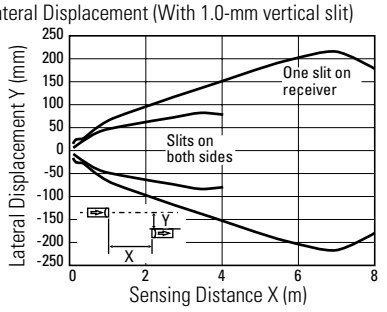

Excess Gain (With round slit)



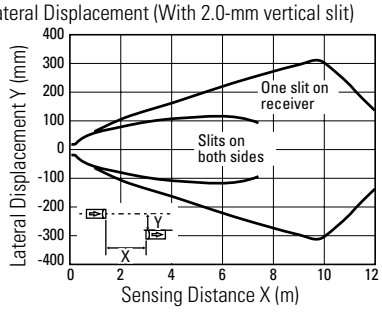

Lateral Displacement (With 0.5-mm vertical slit)




Lateral Displacement (With 1.0-mm vertical slit)

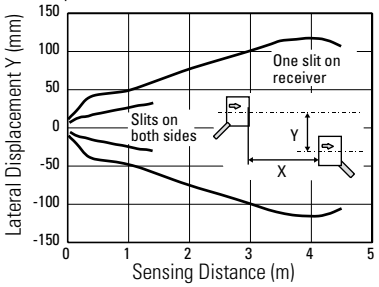



Lateral Displacement (With 2.0-mm vertical slit)

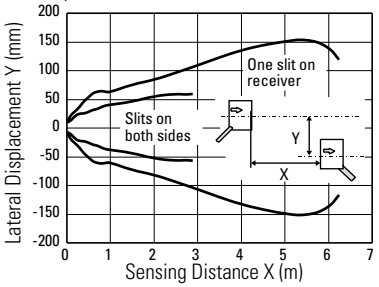


## Characteristics (Typical)

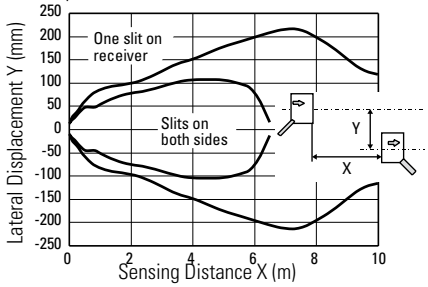
Lateral Displacement (With 0.5-mm horizontal slit)



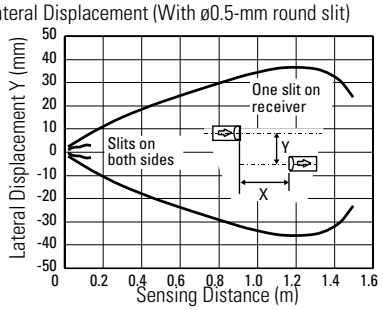

Lateral Displacement (With 1.0-mm horizontal slit)



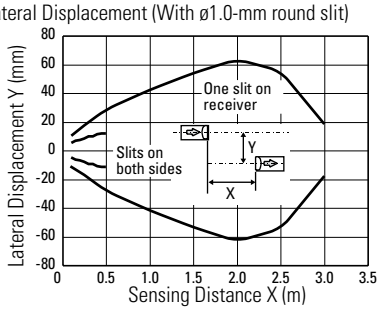

Lateral Displacement (With 2.0-mm horizontal slit)



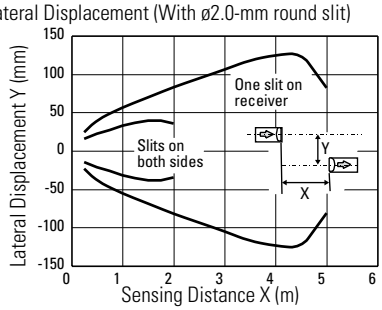

Lateral Displacement (With ø0.5-mm round slit)




Lateral Displacement (With ø1.0-mm round slit)

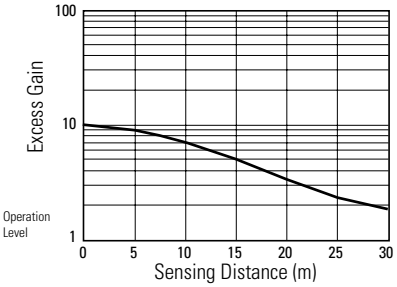



Lateral Displacement (With ø2.0-mm round slit)

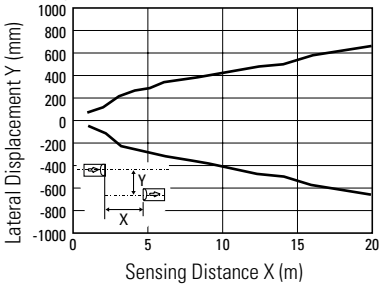



1-2. Through-beam SA1E-T□-NA (Infrared LED w/o sensitivity adjustment)

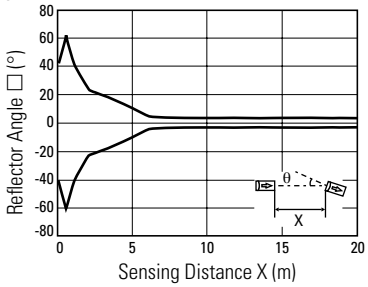
Excess Gain (Without slit)



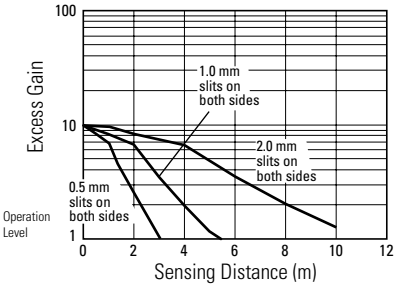

Lateral Displacement (Without slit)



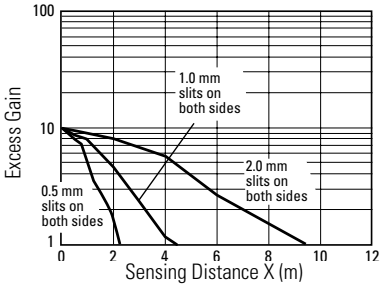

Angle (Without slit)



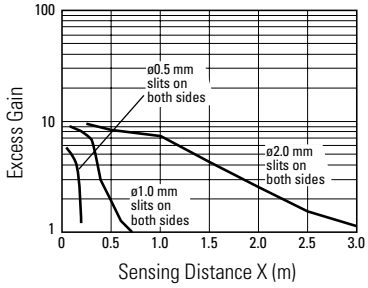

Excess Gain (With vertical slit)



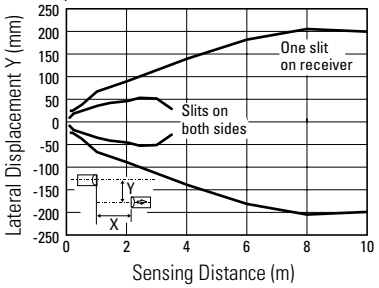

Excess Gain (With horizontal slit)



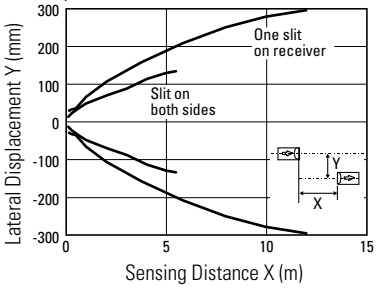

Excess Gain (With round slit)



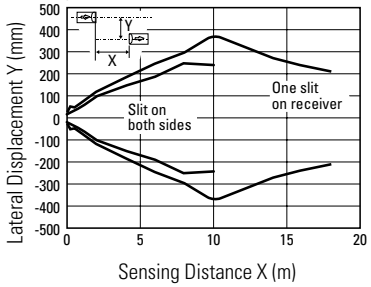

Lateral Displacement (With 0.5-mm vertical slit)




Lateral Displacement (With 1.0-mm vertical slit)

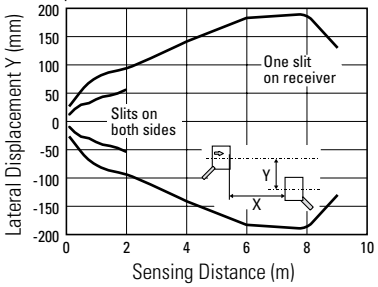



Lateral Displacement (With 2.0-mm vertical slit)

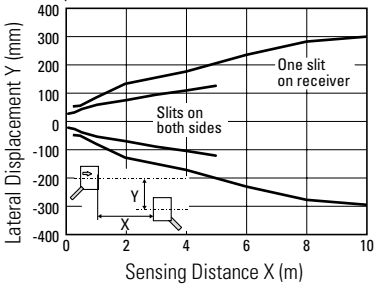


## Characteristics (Typical)

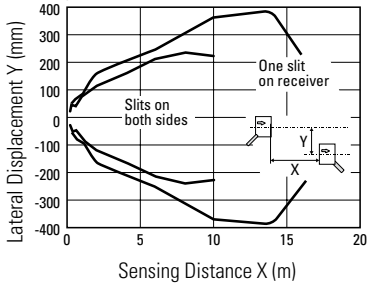
Lateral Displacement (With 0.5-mm horizontal slit)



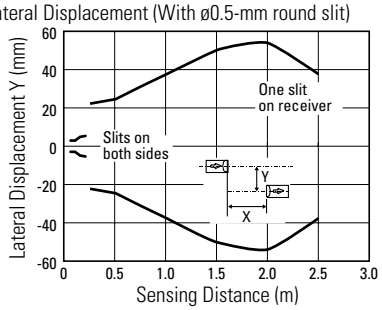

Lateral Displacement (With 1.0-mm horizontal slit)



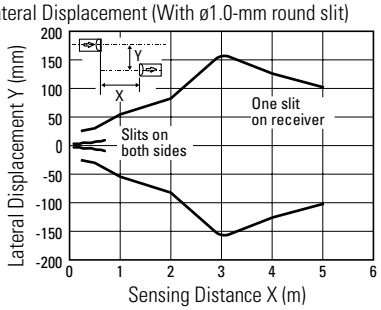

Lateral Displacement (With 2.0-mm horizontal slit)



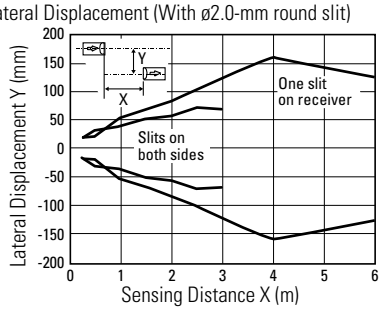

Lateral Displacement (With ø0.5-mm round slit)




Lateral Displacement (With ø1.0-mm round slit)

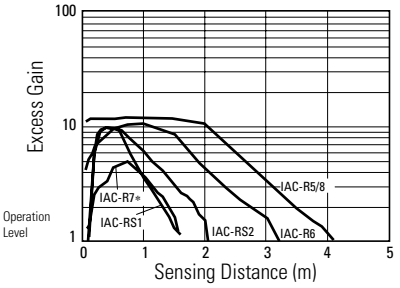



Lateral Displacement (With ø2.0-mm round slit)

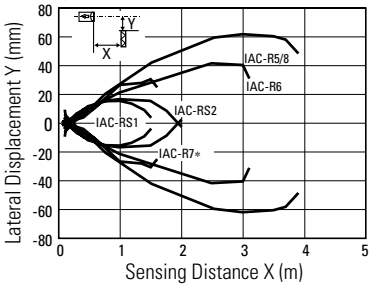



2-1. Polarized Retroreflective SA1E-P (Red LED w/sensitivity adjustment)

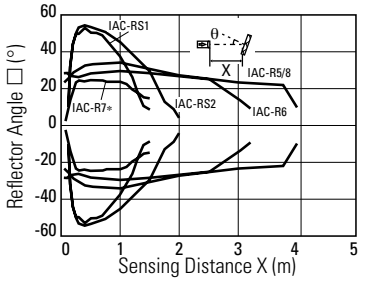
Excess Gain




Lateral Displacement

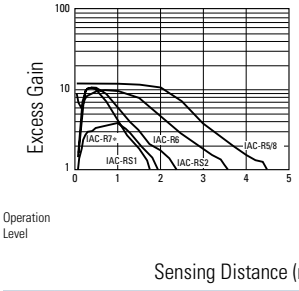



Angle (when using IAC-R5/-R8)

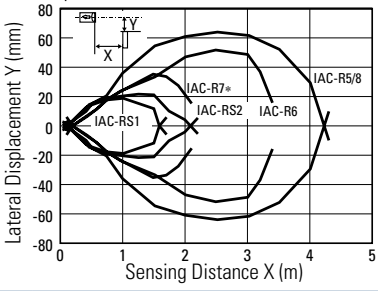



2-2. Polarized Retroreflective SA1E-P☐-NA (Red LED w/o sensitivity adjustment)

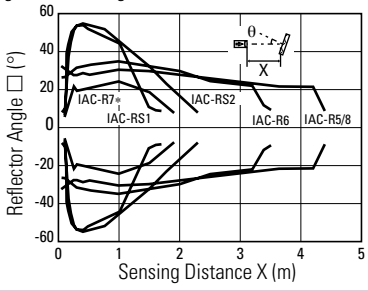
Excess Gain




Lateral Displacement



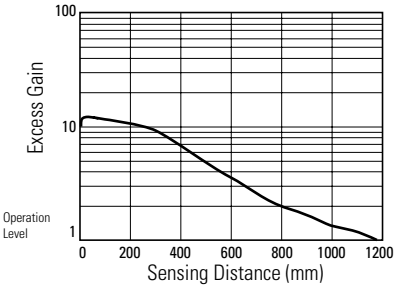

Angle (when using IAC-R5/-R8)



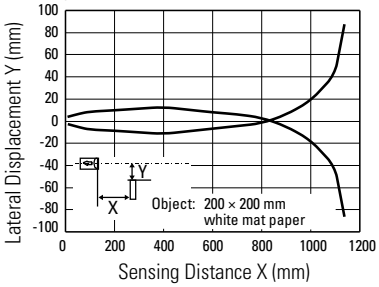
## Characteristics (Typical)

3. Diffuse-Reflective SA1E-D (Infrared LED w/sensitivity adjustment)

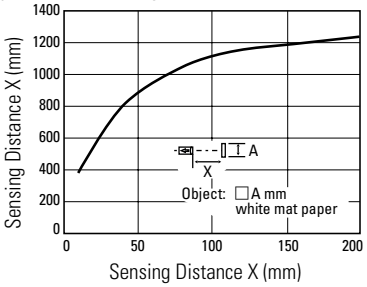
Excess Gain




Lateral Displacement

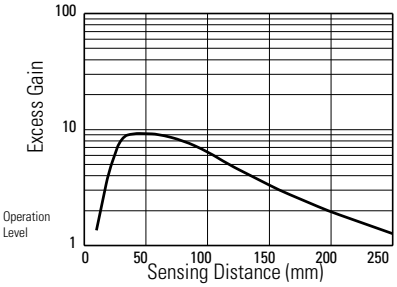



Object Size vs. Sensing Distance

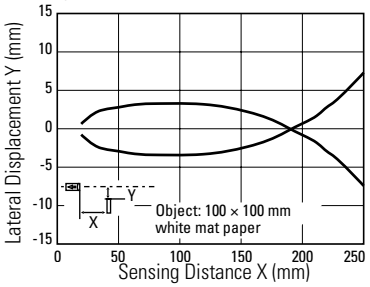



4. Small-beam Reflective SA1E-N (Red LED w/sensitivity adjustment)

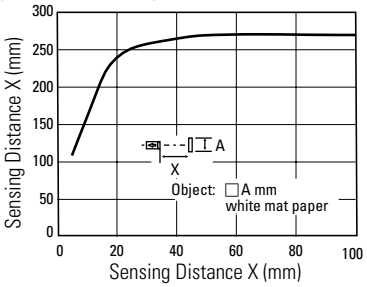
Excess Gain




Lateral Displacement

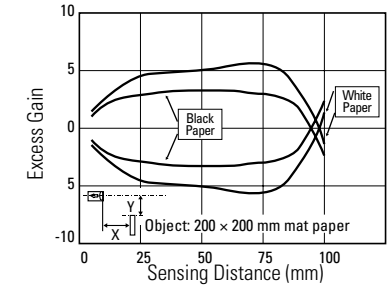



Object Size vs. Sensing Distance

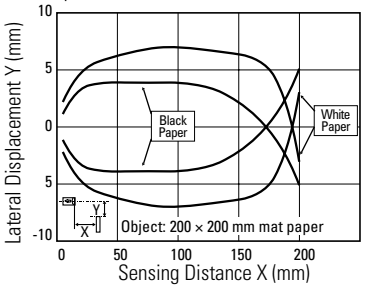



5. Background Suppression SA1E-B (Red LED w/sensitivity adjustment)

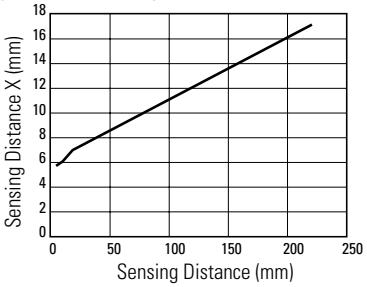
Excess Gain



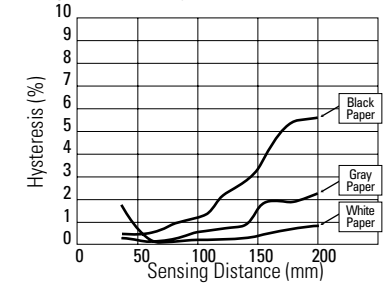

Lateral Displacement



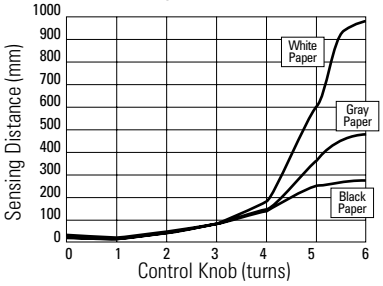

Object Size vs. Sensing Distance



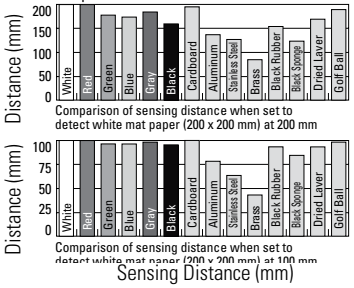

Sensing Distance vs. Hysteresis




Control Knob vs. Sensing Distance



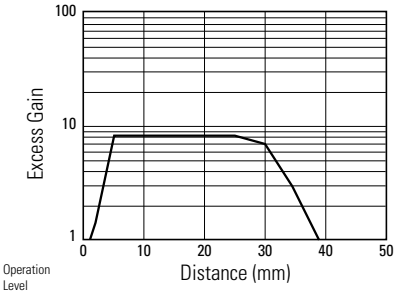

Color Mat Paper and Other Materials



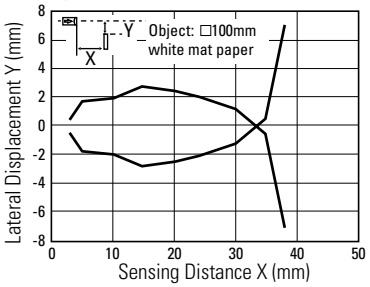
## Characteristics (Typical)

6. Convergent Reflective SA1E-G (Infrared LED w/sensitivity adjustment)

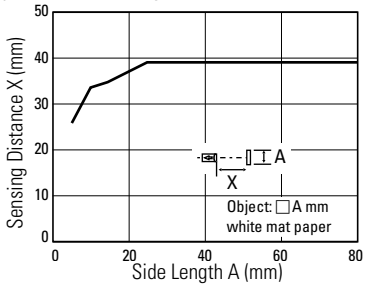
Excess Gain



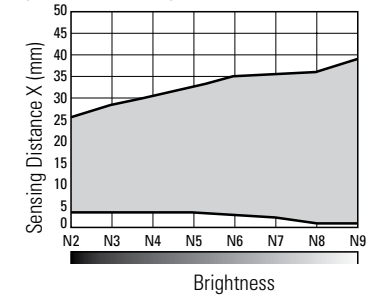

Lateral Displacement




Object Size vs. Sensing Distance

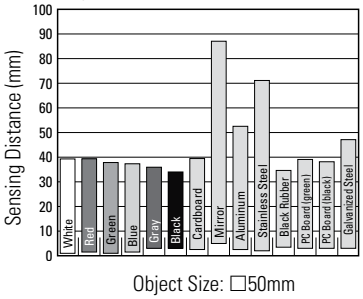



Brightness vs. Sensing Distance




Object: Colour chips of colour standards according to JIS Z8721 (Non Glossy Edition)

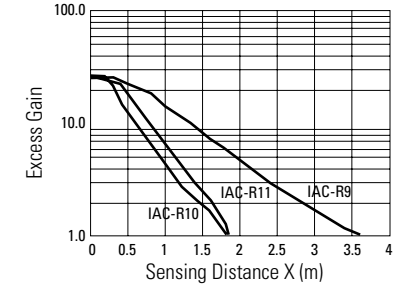
Color Mat Paper and Other Materials



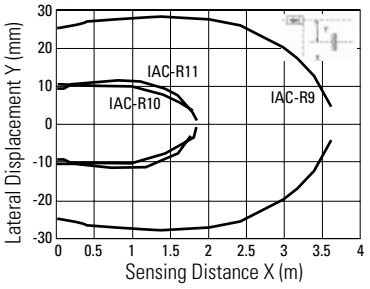

- The graph on the left shows the sensing distances for different colors and materials and can be used as a reference when setting the distance. Because sensing distance depends on the object's size and surface condition, provide a sufficient distance.
- Note that sensing may be affected by reflective object behind the sensing object.
- Referring to the graph on the left, provide a sufficient distance between the photoelectric switch and background.

7. Coaxial Polarized Retro-reflective SA1E-X

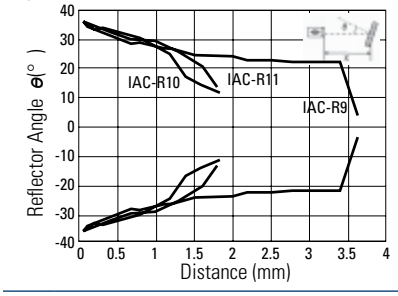
Excess Gain



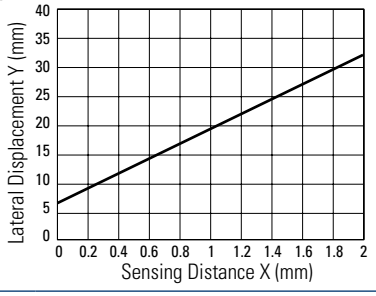

Lateral Displacement




Angle




Light Beam Diameter

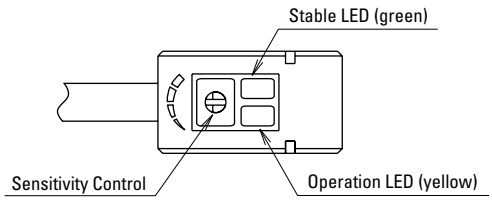


## Safety Precautions

Turn off power to the SA1E Miniature Photoelectric Switches before installation, removal, wiring, maintenance, and inspection.
Failure to turn power off may cause electrical shock or fire hazard.

## Instructions

**1. Indicator and Output Operation**
(except for background suppression type)




| Receiving Light Intensity Level | | Light Receiving Status | Stable LED (green) | Operation LED (yellow)/ Control Output | |
|---|---|---|---|---|---|
| | | | | Light ON | Dark ON |
| Operation Level | 1.2 and over | Stable Incident | ON | ON | OFF |
| | 1.0 | Unstable Incident | OFF | | |
| | | Unstable Interruption | | OFF | ON |
| | 0.8 and below | Stable Interruption | ON | | |

- The operation LED turns on (yellow) when the control output is on.
- The stable LED turns on (green) either at stable incident or stable interruption. Make sure to use the photoelectric switch after the stable operation is ensured.
- In the light ON operation, the output turns on when the receiving light intensity level is 1.0 or over as shown on the right.
- In the dark-ON operation, the output turns on when the receiving light intensity level is 1.0 or less as shown on the right.

**2. Optical Axis Alignment (Light ON)**

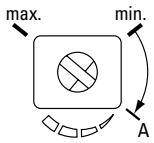
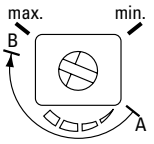
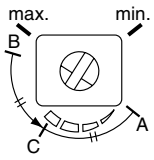
Through-beam
Fasten the receiver temporarily. Place the projector to face the receiver. Move the projector up, down, right and left to find the range where the operation LED turns on. Fasten the projector in the middle of the range. Next, move the receiver up, down, right and left in the same manner and fasten in the middle of the range where the operation LED turns on. Make sure that stable LED turns on at stable incident and stable interruption.

Polarized retroreflective
Install the reflector perpendicularly to the optical axis. Move the SA1E photoelectric switch up, down, right and left to find the range where the operation LED turns on. Fasten the switch in the middle of the range. Polarized retroreflective type can be installed also by finding the position where the reflection of projected red light is most intense, while observing the reflection on the reflector from behind the switch. Make sure that stable LED turns on at stable incident and stable interruption.

Diffuse-reflective/Small-beam reflective/Convergent reflective
Place the SA1E photoelectric switch where the switch can detect the object. Move the switch up, down, right and left to find the range where the operation LED tuns on. Fasten the switch in the middle of the range. Make sure that stable LED turns on at stable incident and stable interruption. Because the light source element of small-beam reflective type is a red LED, visual inspection is possible as well.

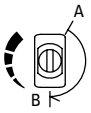
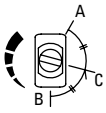
### 3. Sensitivity Adjustment

- Referring to the table to the right, adjust the sensitivity of the SA1E photoelectric switch when necessary, in such cases as the through-beam type is used to detect small or translucent objects or the reflective type is affected by background. The table explains the status of operation LED when the operation mode is set to light ON.
- After adjusting the sensitivity, make sure that stable LED turns on at stable incident and stable interruption. For detecting objects too small to turn on the stable LED, use an optional slit.
- Sensitivity is set to the maximum at the factory before shipment. When adjusting the sensitivity, use the screwdriver supplied with the SA1E photoelectric switch to turn the control as shown below, to a torque of 0.05 N·m maximum.

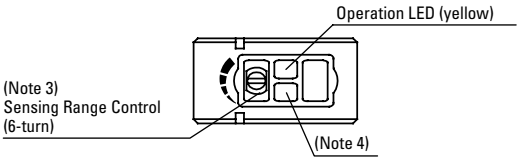
| Step | Photoelectric Switch Status | Sensitivity Control | Adjusting Procedure |
|---|---|---|---|
| 1 | Receiving light<br>• Through-beam, polarized reflective: No object detected<br>• Diffuse reflective, small-beam reflective, convergent reflective: Object detected |  | Turn the control counter-clockwise to the minimum. Then turn clockwise until the operation LED turns on (turns off with dark ON type) (point A). |
| 2 | Light is interrupted<br>• Through-beam, polarized reflective: Object detected<br>• Diffuse reflective, small-beam reflective, convergent reflective: No object detected |  | At interruption status, turn the control clockwise from point A, until the operation LED turns on (turns off with dark ON type) (point B).<br>If the operation LED does not turn on (turn off with dark ON type) even though the control has reached the maximum, set the maximum position as point B. |
| 3 | – |  | Set the middle point between point A and B as point C. |

### 4. Adjustment of Sensing Range for Background Suppression (BGS) Type

- When adjusting the sensing range, follow the instructions below.

| Step | Distance Control | Adjusting Procedure |
|---|---|---|
| 1 | | Turn the control counter-clockwise to the minimum. Then turn clockwise until the operation LED turns on (turns off with dark ON type) (point A). |
| 2 |  | At interruption status, turn the control clockwise from point A, until the operation LED turns on (turns off with dark ON type) (point B).<br>If the operation LED does not turn on (turn off with dark ON type) even though the control has reached the maximum, set the maximum position as point B. |
| 3 |  | Set the middle point between point A and B as point C. |

1. When the background is far off and not detected, turn the control 360°, and set the point as point C.
2. Because the control is multi-turn, it may take more than one turn to move from point A to point B.




3. Turning the control clockwise lengthens the sensing distance.
4. Background suppression (BGS) type is not provided with a stable LED.

### 5. Power Supply and Wiring

- Do not use the SA1E photoelectric switch at the transient status immediately after turning on the power (approx. 100 ms, background suppression type: 200 ms). When the load and switch use different power supplies, make sure to power up the switch first.
- Use a power supply with little noise and inrush current, and use the photoelectric switch within the rated voltage range. Make sure that ripple factor is within the allowable limit. Do not apply AC voltage, otherwise the switch may blow out or burn.
- When using a switching power supply, make sure to ground the FG (frame ground) terminal, otherwise high-frequency noise may affect the photoelectric switch.
- Turn power off before inserting/removing the connector on photoelectric switch. Make sure that excessive mechanical force is not applied to the connector. Connect the connector cable to a tightening torque of 0.5 N·m maximum.
- To ensure the degree of protection, use the applicable connector cable for the connector type. Connector cables are ordered separately.
- Avoid parallel wiring with high-voltage or power lines in the same conduit, otherwise noise may cause malfunction and damage. When wiring is long, use a separate conduit for wiring.
- Use a cable of 0.3 $mm^2$ minimum core wires, then the cable can be extended up to 100m.

## 6. Installation

### Installing the Photoelectric Switch

- Do not install the SA1E photoelectric switches in an area where the switches are subject to the following conditions, otherwise malfunction and damage may be caused.
  Inductive devices or heat source
  Extreme vibration or shock
  Large amount of dust
  Toxic gases
  Water, oil, chemicals
  Outdoor
- Make sure to prevent sunlight, fluorescent light, and especially the fluorescent light of inverters from entering the receiver of the photoelectric switch directly. Keep the through-beam type receiver away from intense extraneous light.
- Interference prevention allows two SA1E switches to be mounted in close proximity. However, the through-beam type is not equipped with interference prevention. Maintain appropriate distance between the switches referring to the lateral displacement characteristics on pages 220, 221, and 222.
- Because the SA1E photoelectric switches are IP67 waterproof, the SA1E can be exposed to water. However, wipe water drops and smears from the lens and slit using a soft cloth to make sure of the best detecting performance.
- Polycarbonate or acrylic resins are used for optical elements. Do not use ammonia or caustic soda for cleaning, otherwise optical elements will be dissolved. To remove dust and moisture build-up, use soft dry cloth.
- Tighten the mounting screws (M3) to a torque of 0.5 N·m. Do not tighten the mounting screws excessively or hit the switch with a hammer, otherwise the protection degree cannot be maintained.

### Installing the Reflector

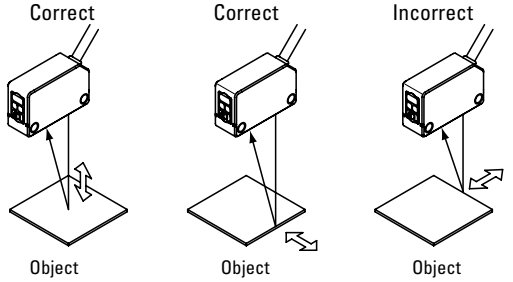
- Use M4 mounting screws for the IAC-R5 reflector and M5 mounting screws for the IAC-R6 reflector. Tighten the mounting screws to a tightening torque of 0.5 N·m maximum. Mounting screws are not supplied with the switch.
- Use the M3 self-tapping screw, flat washer, and spring washer to tighten the IAC-R7 reflector to a torque of 0.5 to 0.6 N·m.
- While optional reflector mounting bracket IAC-L2 is not supplied with mounting screws or nuts, the IAC-L3 and IAC-L5 are supplied with mounting screws for mounting the reflector on the bracket.
- Reflector IAC-RS1 and IAC-RS2 can be installed directly on a flat surface using the adhesive tape attached to the back of the reflector. Before attaching the reflector, clean the board surface to ensure secure attachment.

### Installing the air blower mounting block SA9Z-A02

- When installing the SA9Z-A02 on the SA1E photoelectric switch, use the attached M3 × 20 mounting screws and tighten to a torque of 0.5 N·m maximum.
- Do not use the mounting screw (M3 × 12) supplied with the mounting bracket (SA9Z-K01) to mount the SA1E photoelectric switches.
- The SA9Z-A02 cannot be used with the through-beam slits (SA9Z-S06 to S14).
- The air tube fitting (M5) can be installed to either the top or side. The air tube is not supplied.
- Close the unused port using the supplied air supply port plugging screw and gasket to a tightening torque of 1 to 2 N·m maximum. The recommended air pressure is 0.1 to 0.3 MPa.

### Installing the background suppression (BGS) type

- This sensor can detect objects correctly when the sensor head is installed perpendicular to the moving object. Install the sensor head as shown below to minimize sensing errors.

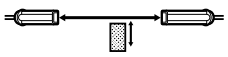
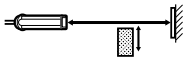
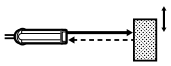
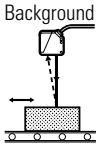


# SA1U Heavy Duty Photoelectric Sensors

**Key features:**

- Universal voltage
  AC Universal Type: 24 to 240V AC and 12 to 240V DC.
  DC Type: 12 to 24V DC.
- IP67 rated
- Four sensing methods: through-beam, polarized retro-reflective, diffuse-reflective, and background suppression.
- Mounting hole centers: 40, 50 to 55 mm
- Operation and stable LED indicators.
- SPDT contact for relay output type.
- Transistor output type has NPN and PNP open collector dual outputs.
- Interference prevention allows two units to be mounted in close proximity (except through-beam type).
- Spring-up terminal block structure enables easy wiring. Wiring can be extended to up to 100m using ø8 to ø10 mm round cables.

## Part Numbers

| Sensing Method | Detectable Object | Sensing Range | Power Voltage | Control Output | Time Delay Functions | Part No. |
|---|---|---|---|---|---|---|
| Through-Beam  | Opaque | 50m max. | 24 to 240V AC (50/60Hz)<br>12 to 240V DC | Relay contact SPDT<br>250V AC/3A, 30V DC/3A (resistive load) | Without | SA1U-T50M |
| | | | | | With | SA1U-T50MT |
| | | | 12 to 24V DC | NPN/PNP open collector | Without | SA1U-T50MW |
| | | | | | With | SA1U-T50MWT |
| Polarized Retroreflective  | Opaque Mirror surface | 7m max. | 24 to 240V AC (50/60Hz)<br>12 to 240V DC | Relay contact SPDT<br>250V AC/3A, 30V DC/3A (resistive load) | Without | SA1U-P07M |
| | | | | | With | SA1U-P07MT |
| | | | 12 to 24V DC | NPN/PNP open collector | Without | SA1U-P07MW |
| | | | | | With | SA1U-P07MWT |
| Diffuse  | Opaque Transparent | 1m max. | 24 to 240V AC (50/60Hz)<br>12 to 240V DC | Relay contact SPDT<br>250V AC/3A, 30V DC/3A (resistive load) | Without | SA1U-D01M |
| | | | | | With | SA1U-D01MT |
| | | | 12 to 24V DC | NPN/PNP open collector | Without | SA1U-D01MW |
| | | | | | With | SA1U-D01MWT |
| Background Suppression  | Opaque | 2m max. | 24 to 240V AC (50/60Hz)<br>12 to 240V DC | Relay contact SPDT<br>250V AC/3A, 30V DC/3A (resistive load) | Without | SA1U-B02M |
| | | | | | With | SA1U-B02MT |
| | | | 12 to 24V DC | NPN/PNP open collector | Without | SA1U-B02MW |
| | | | | | With | SA1U-B02MWT |

# Specifications

## Universal Voltage Models

| Sensing Method | Through-Beam | Polarized Retroreflective | Diffuse | Background Suppression |
|---|---|---|---|---|
| Part Number | SA1U-T50M<br>SA1U-T50MT | SA1U-P07M<br>SA1U-P07MT | SA1U-D01M<br>SA1U-D01MT | SA1U-B02M<br>SA1U-B02MT |
| Power Voltage | 24 to 240V AC (21.6 to 264V AC) 50/60Hz, 12 to 240V DC (10.8 to 264V DC) compatible | | | |
| Power Consumption | Projector: 3 VA maximum<br>Receiver: 3 VA maximum | 3 VA maximum | | |
| Control Output | Relay contact SPDT, switching capacity: 250V AC/3A (resistive load), 30V DC/3A (resistive load)<br>Electrical life (minimum operations): 100,000 (NO contact), 50,000 (NC contact)<br>Mechanical life (minimum operations): 50,000,000 | | | |
| Minimum Applicable Load | 5V DC, 10 mA minimum (reference value) | | | |
| Response Time | 20 ms maximum | | | |
| Insulation Resistance | Between power and output terminals: 20 MΩ minimum (500V DC megger) | | | |
| Dielectric Strength | Between power and output terminals: 1500V AC, 1 minute, Between output terminals: 750V AC, 1 minute | | | |
| Weight (approx.) | Projector: 115g, Receiver: 130g | 130g | | |

## DC Power Models

| Sensing Method | | Through-Beam | Polarized Retroreflective | Diffuse-Reflective | Background Suppression |
|---|---|---|---|---|---|
| Part Number | | SA1U-T50MW<br>SA1U-T50MWT | SA1U-P07MW<br>SA1U-P07MWT | SA1U-D01MW<br>SA1U-D01MWT | SA1U-B02MW<br>SA1U-B02MWT |
| Power Voltage | | 12 to 24V DC (10 to 30V DC) ripple rate 10% p-p maximum | | | |
| Current Draw | | Projector: 20 mA maximum<br>Receiver: 25 mA maximum | 30 mA maximum | | |
| Control Output | Type | NPN, PNP open collector (dual output) | | | |
| | Load Current | NPN: 100 mA maximum, PNP: 100 mA maximum | | | |
| | Applied Voltage | 30V DC maximum | | | |
| | Voltage Drop | NPN: 2.4V maximum, PNP: 2.4V maximum | | | |
| Response Time | | 1 ms maximum | | | |
| Insulation Resistance | | Between live and dead parts: 20 MΩ minimum (500V DC megger) | | | |
| Dielectric Strength | | Between live and dead parts: 1000V AC, 1 minute | | | |
| Weight (approx.) | | Projector: 105g, Receiver: 110g | 110g | | |

## Common Specifications

| Sensing Method | Through-Beam | Polarized Retroreflective | Diffuse | Background Suppression |
|---|---|---|---|---|
| Sensing Distance | 50m maximum | 0.2 to 7m (when using supplied reflector IAC-R5) | 1m maximum (200 × 200 mm white mat paper) | 0.2 to 2m (200 × 200 mm white mat paper) |
| Preset Distance | | — | | 0.4 to 2m (200 × 200 mm white mat paper) |
| Detectable Object | Opaque | Opaque/Mirror surface | Opaque/Transparent | Opaque |
| Hysteresis | — | — | 20% of sensing distance max. | 15% of sensing distance max. |
| Operation Mode | Light ON or Dark ON (mode selector) | | | |
| Control Output | [Projector] Power LED: Green<br>[Receiver] Operation LED: Yellow<br>Stable LED: Green | Operation LED: Yellow<br>Stable LED: Green | | Operation LED: Yellow |
| Light Emitting Element | Infrared LED (870 nm) | Red LED (660 nm) | Infrared LED (870 nm) | |
| Sensitivity Adjustment | 1-turn control knob | | | 8-turn control knob |
| Extraneous Light Immunity | Sunlight: 10,000 lux maximum, Incandescent lamp: 5,000 lux maximum | | | |
| Vibration Resistance | Damage limits: 10 to 55 Hz, amplitude 1.5 mm, 30 minutes in each axis | | | |
| Shock Resistance | Damage limits: 500 m/s$^2$, 3 shocks each in 6 axes 3 consecutive times | | | |
| Operating Temperature | –25 to +60°C (no freezing), storage temperature: –40 to +70°C | | | |
| Operating Humidity | 35 to 85% RH (no condensation), storage humidity: 35 to 85% RH | | | |
| Connection Method | Terminal block with M3 spring-up screws | | | |
| Applicable Cable | Outside diameter ø8 to ø10 mm (core 0.3 to 0.75 mm$^2$) | | | |
| Cable Extension | Extendable up to 100m with a cabtyre cable of 0.3 mm$^2$ minimum | | | |
| Housing Material | PBT (indicator cover: PC) | | | |
| Lens Material | PC/PET | PMMA | PC/PET | |
| Degree of Protection | IP67 (IEC/EN60529) | | | |

## Time Delay Specifications

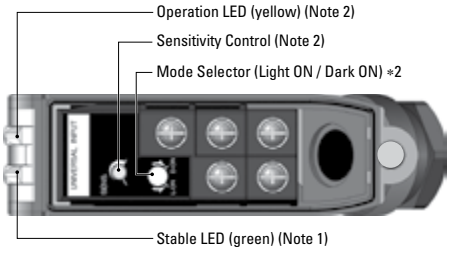
| Sensing Method | Through-Beam | Polarized Retroreflective | Diffuse | Background Suppression |
|---|---|---|---|---|
| Type No. | SA1U-T50MT<br>SA1U-T50MWT | SA1U-P07MT<br>SA1U-P07MWT | SA1U-D01MT<br>SA1U-D01MWT | SA1U-B02MT<br>SA1U-B02MWT |
| Time Range | 0.1 to 5.0 sec (adjusted with the 1-turn control knob) | | | |
| Time Delay Function | One shot, ON delay, OFF delay, and normal (no delay limit operation) modes | | | |
| Temperature Effect of Time Delay | ±10% maximum of the time delay for 20°C temperature rise within the operating temperature range | | | |
| Repetitive Accuracy of Time Delay | ±1.0% maximum of the time delay for repetitive inputs at 10 seconds or more | | | |

## Descriptions

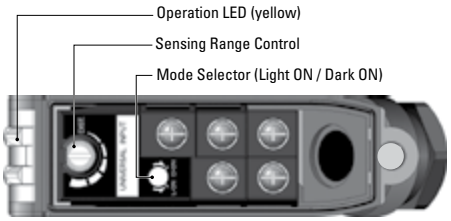
Without Time Delay

### Part Numbers

SA1U-T50M∗
SA1U-P07M∗
SA1U-D01M∗




SA1U-B02M∗

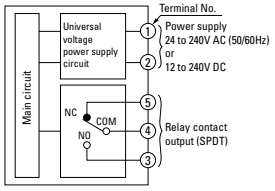



1. Power LED for through-beam projector
2. Not available on through-beam projector

### Output Circuit / Connection Diagram

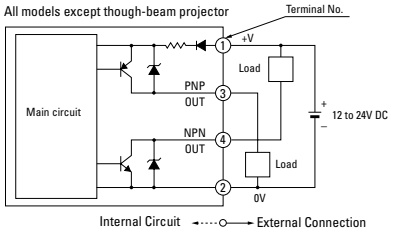
[Univervsal Voltage Type]

All models except though-beam projector

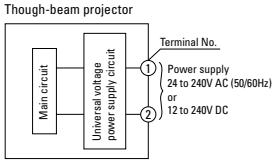



[DC Power Type]

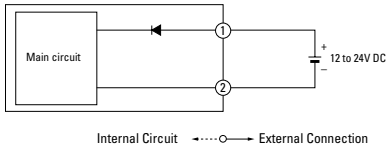
All models except though-beam projector



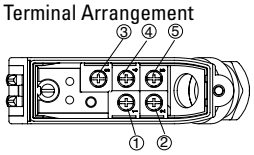

Though-beam projector




Though-beam projector

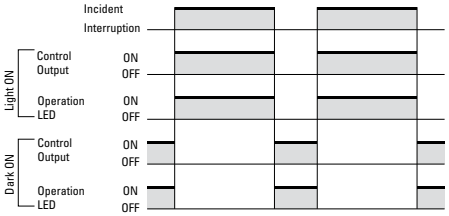



### Terminal Arrangement




*Terminal ⑤ not available on DC power types.

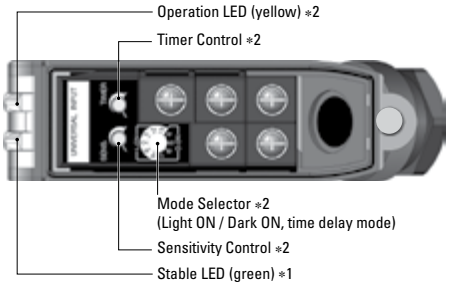
### Operation Chart



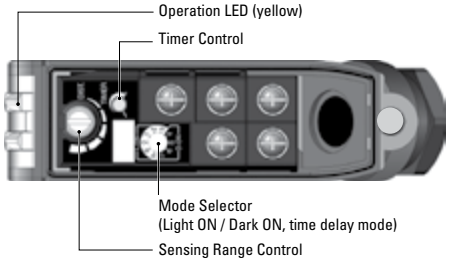

Without Time Delay

### Part Numbers

SA1U-T50M∗T
SA1U-P07M∗T
SA1U-D01M∗T




SA1U-B02M∗T




1. Power LED for through-beam projector
2. Not available on through-beam projector

### Output Circuit / Connection Diagram

See the "Output Circuit / Connection Diagram" diagram above.

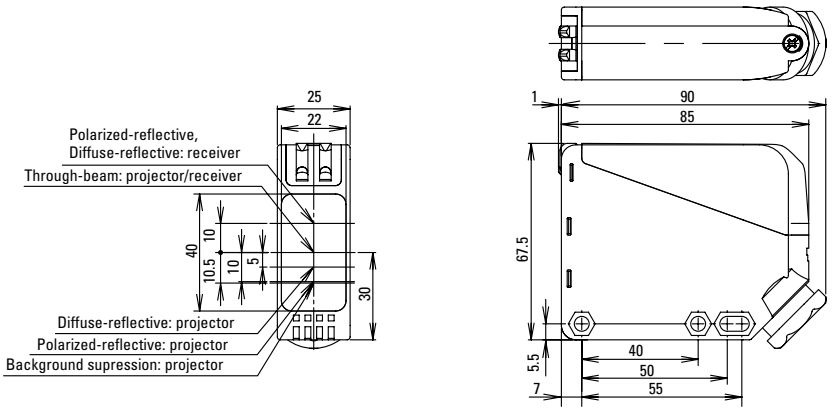
### Terminal Arrangement

See the "Terminal Arrangement" diagram above.

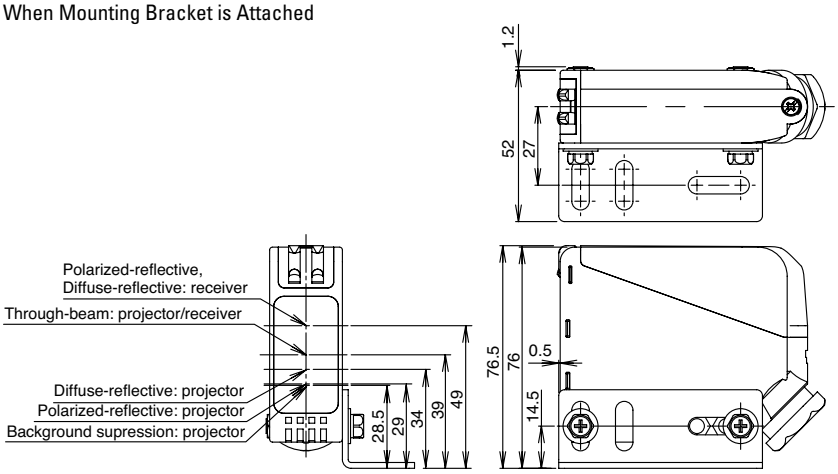
### Operation Chart

| Operation Mode | | Mode Selector Position | Incident Interruption |
|---|---|---|---|
| Light ON | OFF delay | 0 | ON / OFF, T |
| | Normal | 1 | ON / OFF |
| | One shot | 2 | ON / OFF, T |
| | ON delay | 3 | ON / OFF, T |
| Dark ON | OFF delay | 4 | ON / OFF, T |
| | Normal | 5 | ON / OFF |
| | One shot | 6 | ON / OFF, T |
| | ON delay | 7 | ON / OFF, T |
| Light ON | Normal | 8 | ON / OFF |
| | | 9 | |

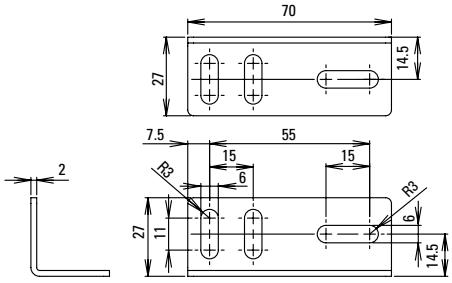
## Dimensions (mm)




When Mounting Bracket is Attached



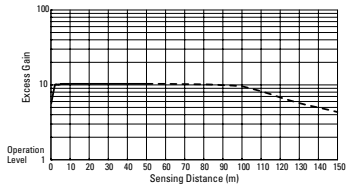

Mounting Bracket



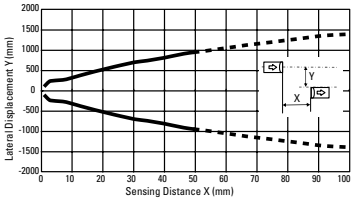

## Characteristics (Typical)

Through-beam SA1U-T50M

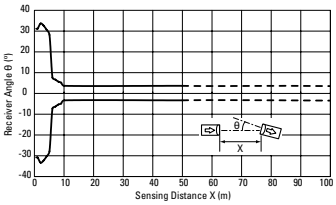
Excess Gain
(transparency 1% ND filter is used)




Lateral Displacement
(transparency 2.8% ND filter is used)

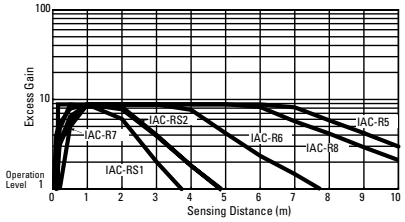



Angle

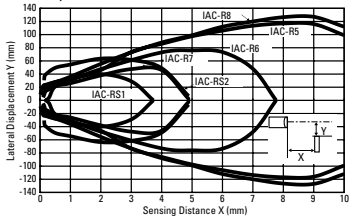



Polarized Retroreflective SA1U-P07M*

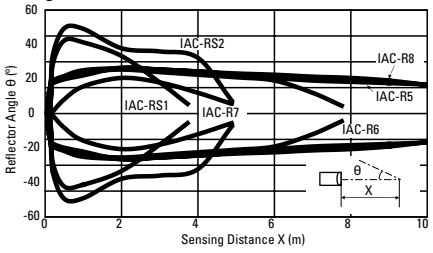
Excess Gain




Lateral Displacement



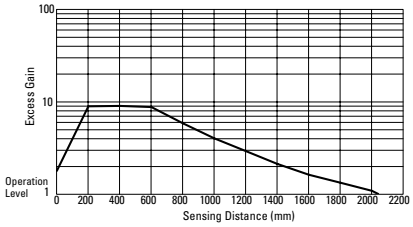

Angle



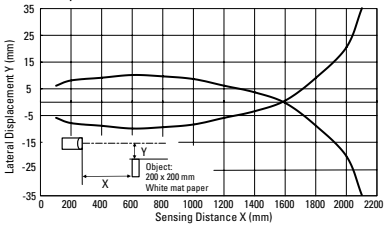
## Characteristics (Typical)

Diffuse SA1U-D01M*

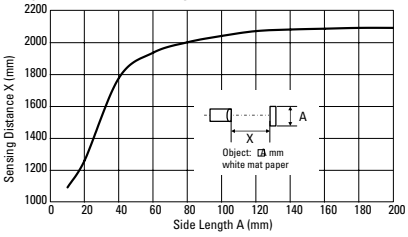
Excess Gain




Lateral Displacement

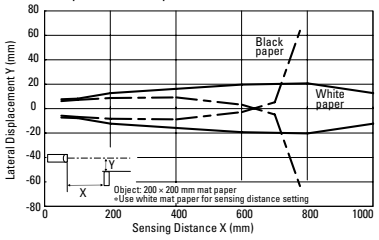



Object Size vs. Sensing Distance

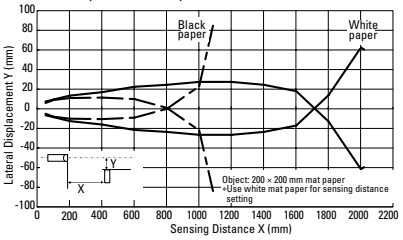



Background Suppression SA1U-B02M*

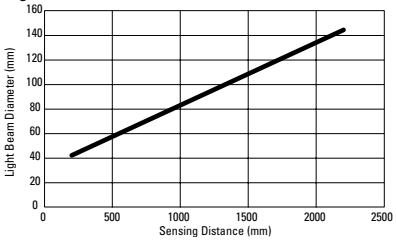
Lateral Displacement (preset 1m)



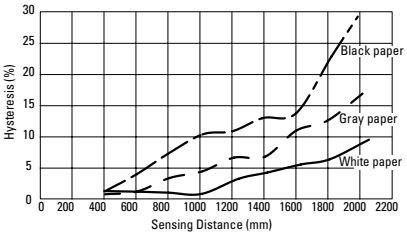

Lateral Displacement (preset 2m)



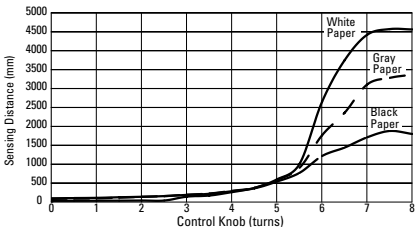

Light Beam Diameter



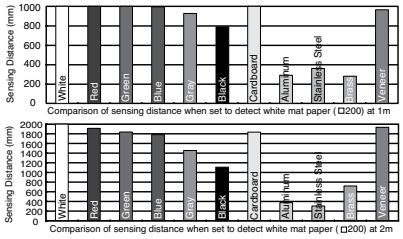

Sensing Distance vs. Hysteresis




Control Knob vs. Sensing Distance



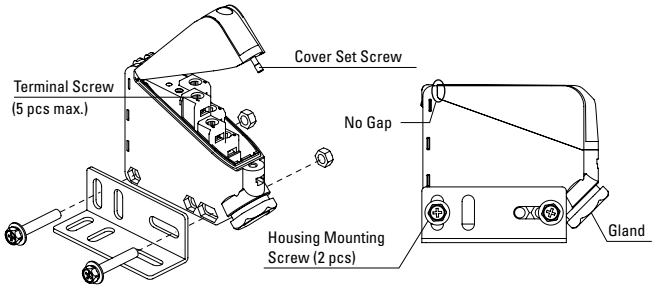

Color Mat Paper and Other Materials



## Instructions

### Installation

Make sure that there are no gaps between the cover and the housing as shown in the diagram below.




To maintain waterproof characteristics, tighten the screws within the range of the recommended tightening torque.

Excessive tightening may cause damage.

### Screw Tightening Torque

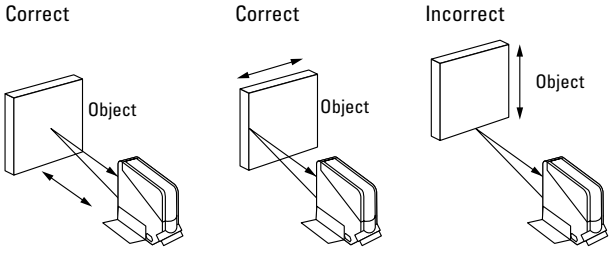
| Screw | Recommended Tightening Torque (N·m) |
|---|---|
| Terminal screw | 0.6 to 1.0 |
| Gland | 4.0 to 6.0 |
| Cover set screw | 0.5 to 0.8 |
| Housing mounting screw | 0.8 to 1.2 |

### Notes

- When installing photoelectric switches, take into consideration the reflecting light from the floor or walls as it may affect sensing of through-beam and background suppression types.
- Make sure to prevent sunlight, fluorescent light, and fluorescent light of inverters from entering the receiver of the photoelectric switch directly. Keep the through-beam type receiver away from intense extraneous light.
- When installing SA1U photoelectric switches, do not tighten the mounting screws excessively or hit the switch with a hammer, otherwise the protection degree cannot be maintained.
- Make sure that the supply voltage is within the rated values.
- When using a switching regulator, be sure to ground the FG (frame ground) terminal.
- To suppress a transient state at start-up, a circuit to turn off the output is installed (universal voltage type: 50 ms, DC power type: 100 ms). The timer will start after resetting the off output.
- To meet European Union Low Voltage Directives, install an EN approved fuse on the outside of the power terminal or output terminal of the universal voltage type SA1U photoelectric switches.
- Attach the cover properly to maintain waterproof characteristics.
- Interference prevention allows two SA1U photoelectric switches to be mounted in close proximity. However, the through-beam type is not equipped with interference prevention. Maintain appropriate distance between the switches referring to the lateral displacement characteristics on pages 232 and 233.
- Polycarbonate or acrylic resins are used for optical elements. Do not use ammonia or caustic soda for cleaning, otherwise optical elements will dissolve. To remove dust and moisture build-up, use soft dry cloth.
- When mounting the reflector, do not tighten the mounting screws excessively, otherwise the screw hole of the reflector may be damaged.
- Use M4 mounting screws for the IAC-R5 and IAC-R8 reflectors and M3 mounting screws for the IAC-R6 reflector. Tighten the mounting screws to a tightening torque of 0.5 N·m maximum.
- Use the M3 self-tapping screw, flat washer, and spring washer to tighten the IAC-R7 reflector to a torque of 0.5 to 0.6 N·m. While optional reflector mounting bracket IAC-L2 is not supplied with mounting screws or nuts, the IAC-L3 and IAC-L5 are supplied with mounting screws for mounting the reflector on the bracket.
- IAC-RS1 and IAC-RS2 reflectors can be installed directly on a flat surface using the adhesive tape attached to the back of the reflector. Before attaching the reflector, clean the surface to ensure secure attachment.

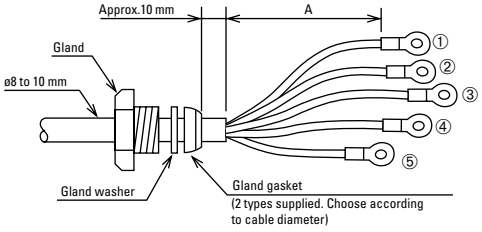
## Installing the Background Suppression (BGS) Model

Install the sensor head as shown below to minimize sensing errors.




## Wiring

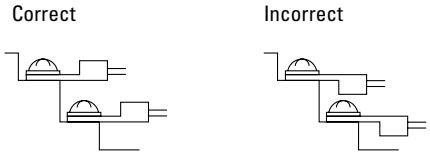
Connecting Cables



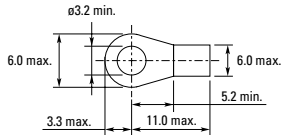
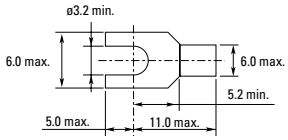

Recommended insulation length (A)

| Terminal No. | ① | ② | ③ | ④ | ⑤ |
|---|---|---|---|---|---|
| Length "A" (mm) | 45 | 30 | 55 | 40 | 25 |

- Connect the cables to the correct terminal number. Connect the lower terminal screws first.
- Attach the cover and secure with the set screw.
  To maintain waterproof and dustproof characteristics, use cabtyre cables (do not use soft cables as it may fall out) with ø8 to ø10 mm diameter. Install the attached gland gasket and washer and tighten the gland securely. For the small gland gasket, use a cable with ø8 to ø10 mm diameter. For the large gland gasket, use a cable with ø9 to ø10 mm diameter. The cable sheath should be 10 mm approx. Make sure that the gland washer fits in the groove of the gasket.
- When wiring, make sure that the power is turned off.
- Incorrect wiring may cause damage to the internal circuit.
- Avoid parallel wiring with high-voltage or power lines (especially inverters) in the same conduit, otherwise noise may cause malfunction and damage.
- When wiring is long or may be affected by power lines, use a separate conduit for wiring.
- Use a cable of 0.3 $mm^2$ minimum core wires. The cable can be extended up to 100m. For DC power types, voltage drop due to resistance of the cable lead wire should be taken into consideration.
- When using crimp terminals, make sure that the terminals do not come into contact with adjacent terminals. For correct installation, see the figure below.




## Dimension of Applicable Crimping Terminals

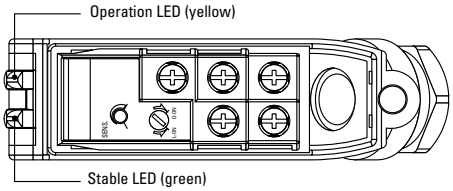
| Ring Terminal | Spade Terminal |
|---|---|
|  |  |



Dimensions in mm.

- When using insulation for ring terminals, use an insulating sheath.
- Install the insulation sheath to the crimp part before wiring.
- Only one crimp terminal can be connected per terminal.

## Indicator and Output Operation




The operation LED turns on (yellow) when the control output is on. The stable LED turns on (green) either at stable incident or stable interruption. Make sure to use the SA1U photoelectric switch after the stable LED is on.

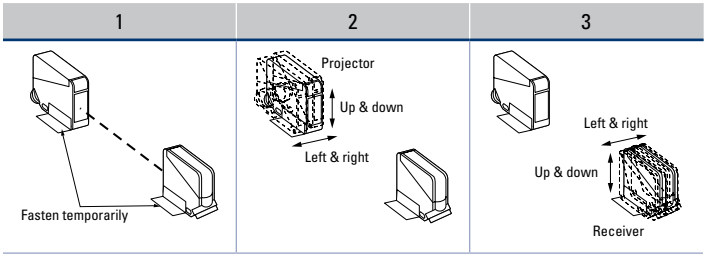
See the table below.

| Light Receiving Status | Stable LED (green) | Operation LED (yellow)/ Control Output | |
|---|---|---|---|
| | | Light ON | Dark ON |
| Stable Incident | ON | ON | OFF |
| UnstableIncident | OFF | | |
| Unstable Interruption | | OFF | ON |
| Stable Interruption | ON | | |

## Optical Axis Alignment (Light ON)

### 1. Through-Beam Type

Fasten the receiver temporarily. Place the projector facing the receiver. Move the projector up, down, right and left to find the range where the operation LED turns on. Fasten the projector in the middle of the range. Next, move the receiver up, down, right, and left in the same manner and fasten in the middle of the range where the operation LED turns on. Make sure that stable LED turns on at stable incident and stable interruption.




### 2. Polarized Retroreflective

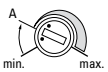
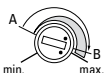
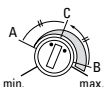
Install the reflector perpendicularly to the optical axis. Move the SA1U photoelectric switch up, down, right, and left to find the range where the operation LED turns on. Fasten the switch in the middle of the range. Polarized retroreflective type can be installed also by finding the position where the reflection of projected red light is most intense, while observing the reflection on the reflector from behind the switch. Make sure that stable LED turns on at stable incident and stable interruption.

### 3. Diffuse-Reflective

Place the SA1U photoelectric switch where the switch can detect an object. Move the switch up, down, right, and left to find the range where the operation LED tuns on. Fasten the switch in the middle of the range. Make sure that stable LED turns on at stable incident and stable interruption.

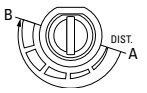
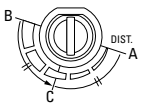
## Sensitivity Adjustment (except Background Supression)

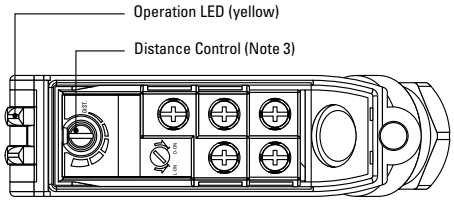
- Referring to the table below, adjust the sensitivity of the SA1U photoelectric switch when necessary, such as when the through-beam type is used to detect small or translucent objects or the reflective type is affected by background. The table explains the status of operation LED when the operation mode is set to light ON.
- After adjusting the sensitivity, make sure that stable LED turns on at stable incident and stable interruption.
- Sensitivity is set to the maximum at the factory before shipment.When adjusting the sensitivity, use the screwdriver supplied with the SA1U photoelectric switch to turn the control as shown below, to a torque of 0.03 N·m maximum.

| Step | Photoelectric Switch Status | Sensitivity Control | Adjusting Procedure |
|---|---|---|---|
| 1 | Receiving light<br>Through-beam, polarized reflective:<br>No object detected<br>Diffuse reflective:<br>Object detected |  | Turn the control counterclockwise to the minimum. Then turn clockwise until the operation LED turns on (turns off with dark ON type) (point A). |
| 2 | Light is interrupted<br>Through-beam, polarized reflective: Object detected<br>Diffuse reflective:<br>No object detected |  | At interruption status, turn the control clockwise from point A, until the operation LED turns on (turns off with dark ON type) (point B).<br>If the operation LED does not turn on (turn off with dark ON type) even though the control has reached the maximum, set the maximum position as point B. |
| 3 | — |  | Set the middle point between point A and B as point C. |

## Adjustment of Sensing Range for Background Suppression

When adjusting the sensing range, follow the instruction below.

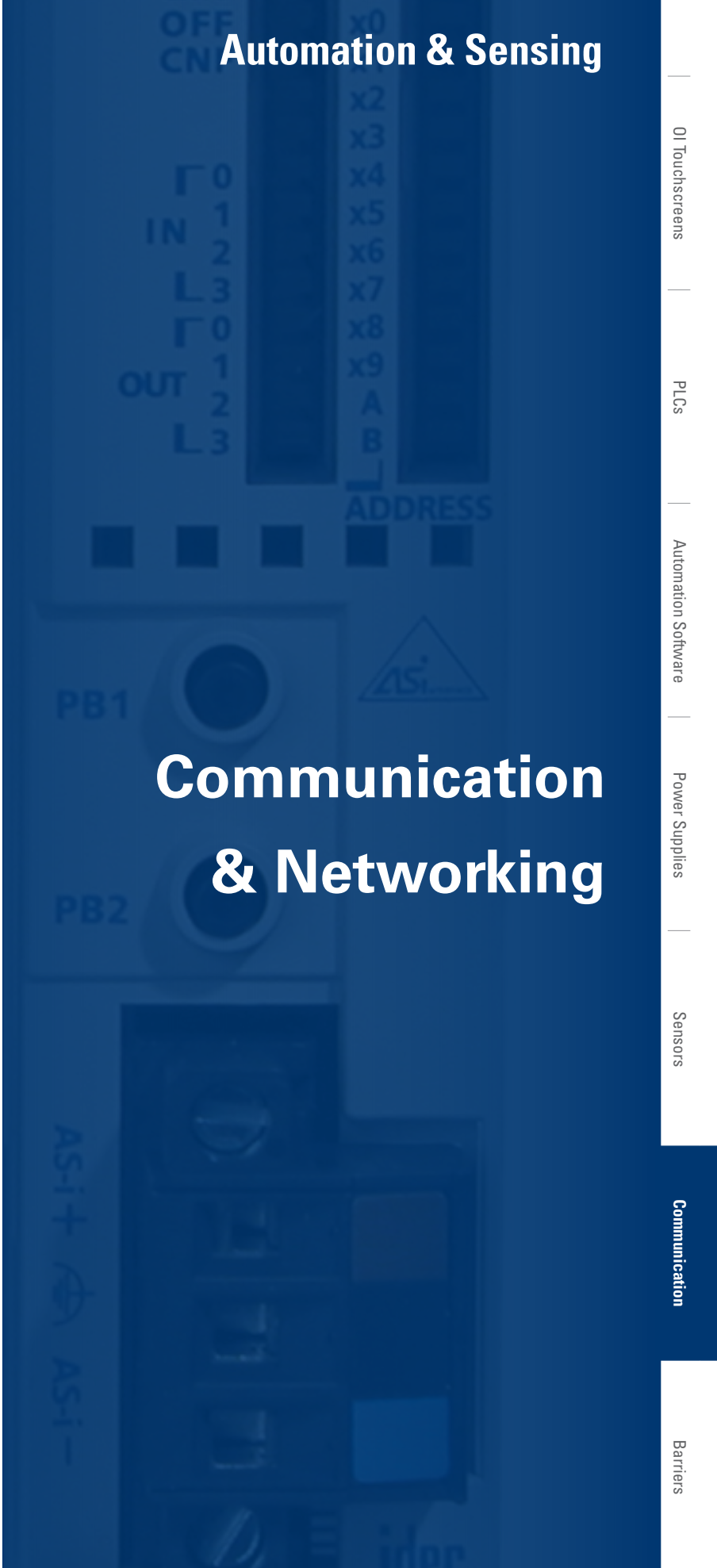
| Step | Distance Control | Adjusting Procedure |
|---|---|---|
| 1 | | Install the photoelectric switch and the object firmly. Turn the control counterclockwise until the operation LED turns off (turns on with dark ON type). From this point, turn the control clockwise until the operation LED turns on (turns off with dark ON type) (point A). |
| 2 |  | Remove the object, and confirm that the operation LED turns off (turns on with dark ON type). Turn the control clockwise until the operation LED turns on (detecting the background) (turns off with dark ON type) (point B). [1] |
| 3 |  | Set the middle point between point A and B as point C. [2] |




1. When the background distance is too far and not detected, turn the control 360°, and set the point as point C.
2. Because the control is multi-turn, it may take more than one turn to move from point A to point B.
3. Turning the control clockwise lengthens the sensing distance.
4. Background suppression (BGS) type is not provided with a stable LED.

AS Interface Overview ..... 466

# Communication & Networking



IDEC

**www.IDEC.com/communication**

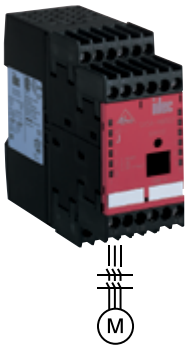
# AS-Interface Overview
## (Actuator Sensor Interface)

MicroSmart
Pentra

See PLC section for more information.

73W 145W

Visit www.IDEC.com/powersupply



SX5A AS-Interface Safety
Contact IDEC for more information.

AS-Interface Flat
Cable Connector

SX5A AS-Interface I/O modules

4 inputs
2 inputs/2 outputs

4 inputs/3 outputs

4 inputs
4 inputs/3 outputs

Contact IDEC for more information

SX5A AS-Interface Safety Communication
Terminal (Safety Slave)

Emergency Stop
Switch Box

Safety Interlock Switches
Contact IDEC for more information

IDEC SmartRelay
(See PLC section for more information)

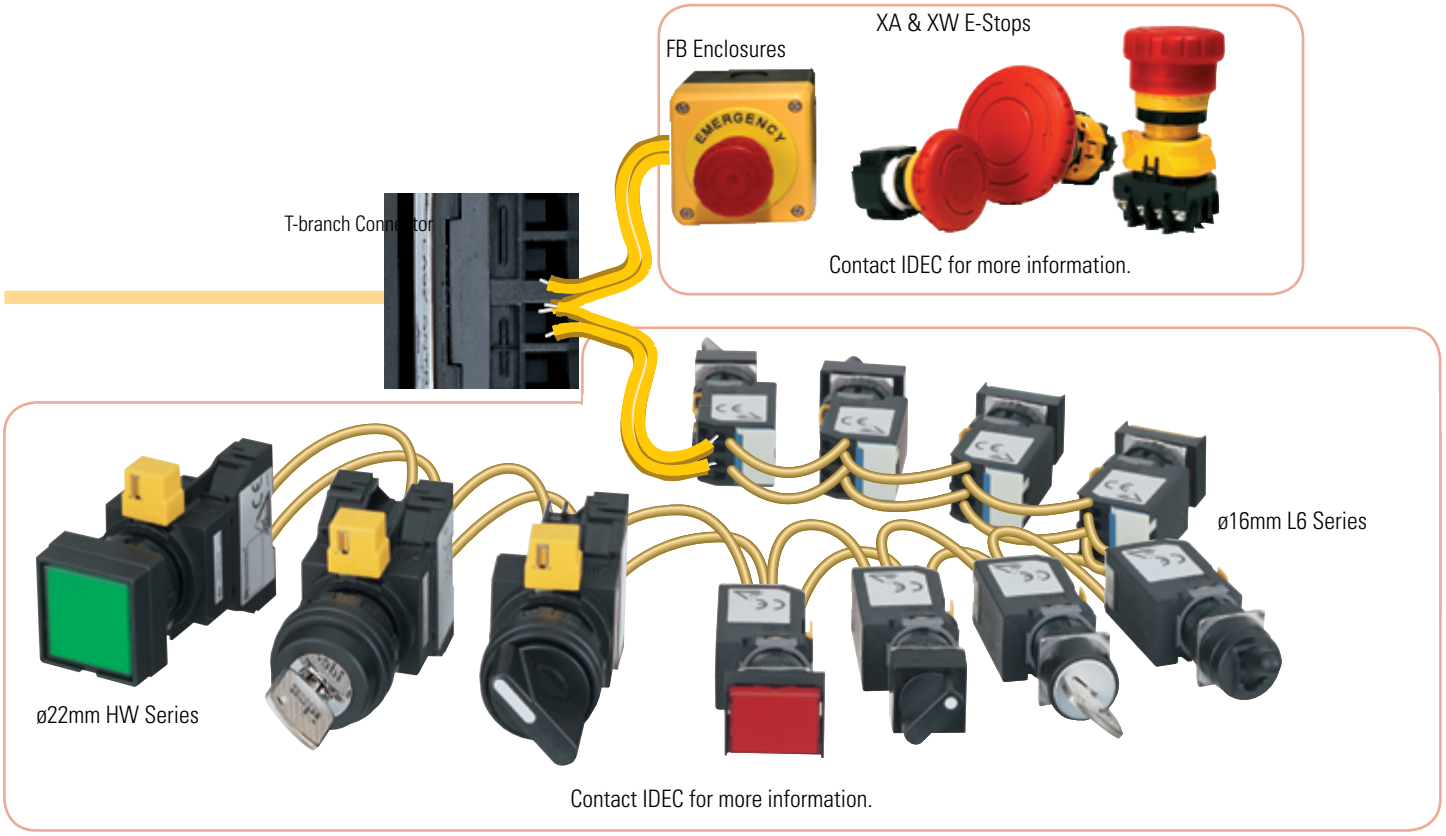
## Link to the world and reduce wiring at the same time!

### SwitchNet Control Units directly connect to an AS-Interface network

Panels can be built with substantially less wiring at a lower total cost.

- Signals and power are carried through two wires.
- A maximum of 62 switches and pilot lights can be connected. The wire length can be extended to 300m by using two repeaters.
- Spring clamp terminals save wiring time.

Each control switch or pilot light contains a communication chip (AS-Interface Ver. 2.1).

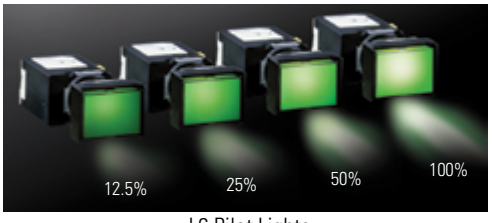



Contact IDEC for more information.

Contact IDEC for more information.

### Pilot lights & Illuminated Pushbuttons Brightness Control

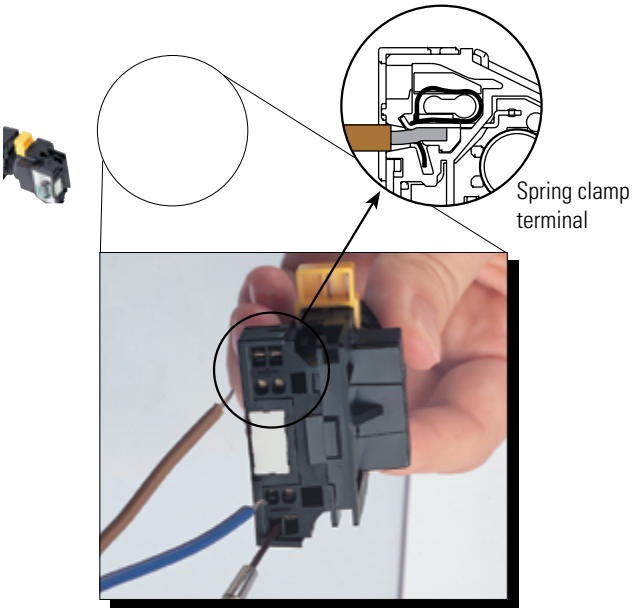
Illumination can be controlled at four levels according to a command from the AS-Interface master. Dynamic displays and energy savings are possible.




L6 Pilot Lights
See Switch & Pilot Light section.

## Easy & Flexible

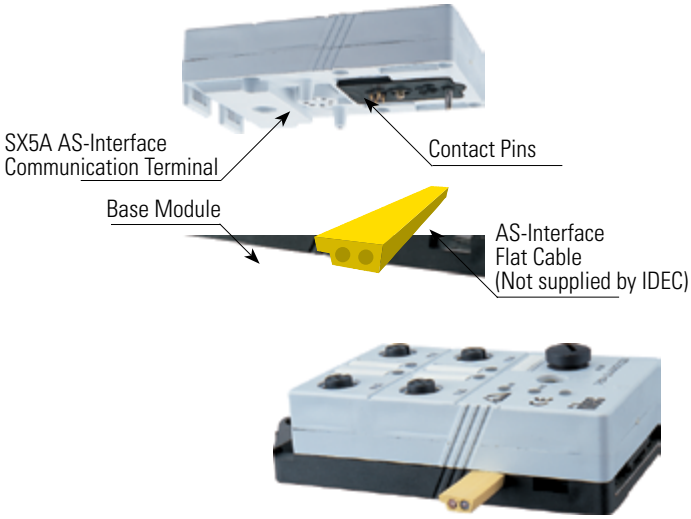
### Quick & Secure Connection



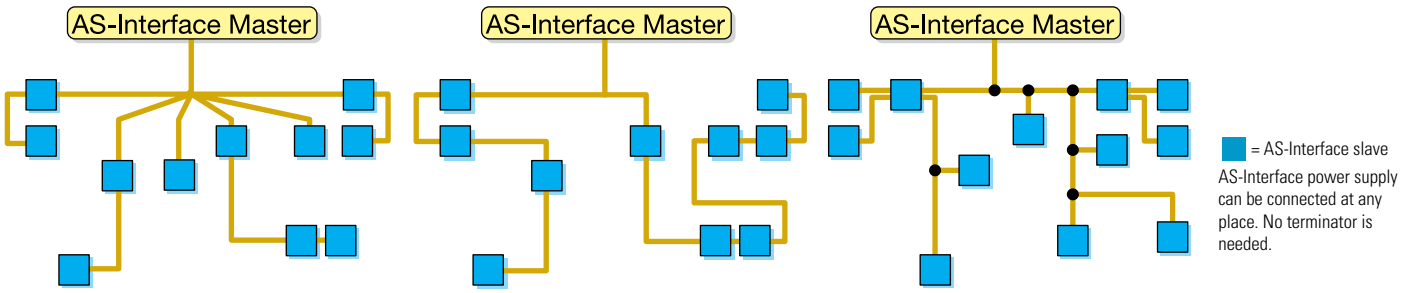

**Spring clamp reduces wiring time**

SwitchNet control units feature spring clamp terminals, eliminating the need for tightening screws.

### Easy Wiring



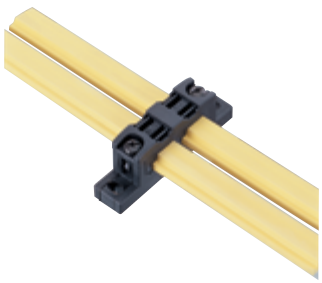

Contact pins pierce through the cable's insulation and make secure contact with the copper conductor. After disconnecting the AS-Interface communication terminal, the elasticity of the sheath closes the pierced holes and maintains insulation.



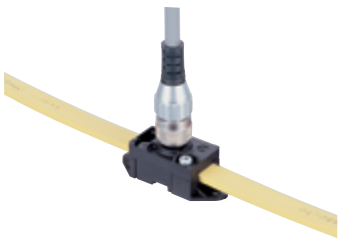

Tree Structure | Line Structure | Star Structure

### Connectors

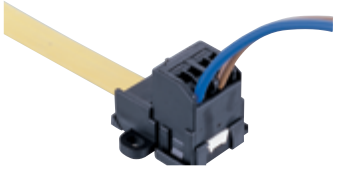
Three types of connectors are available for designing the panel layout.



AS-Interface Flat Cable Branch Connector (IP65)

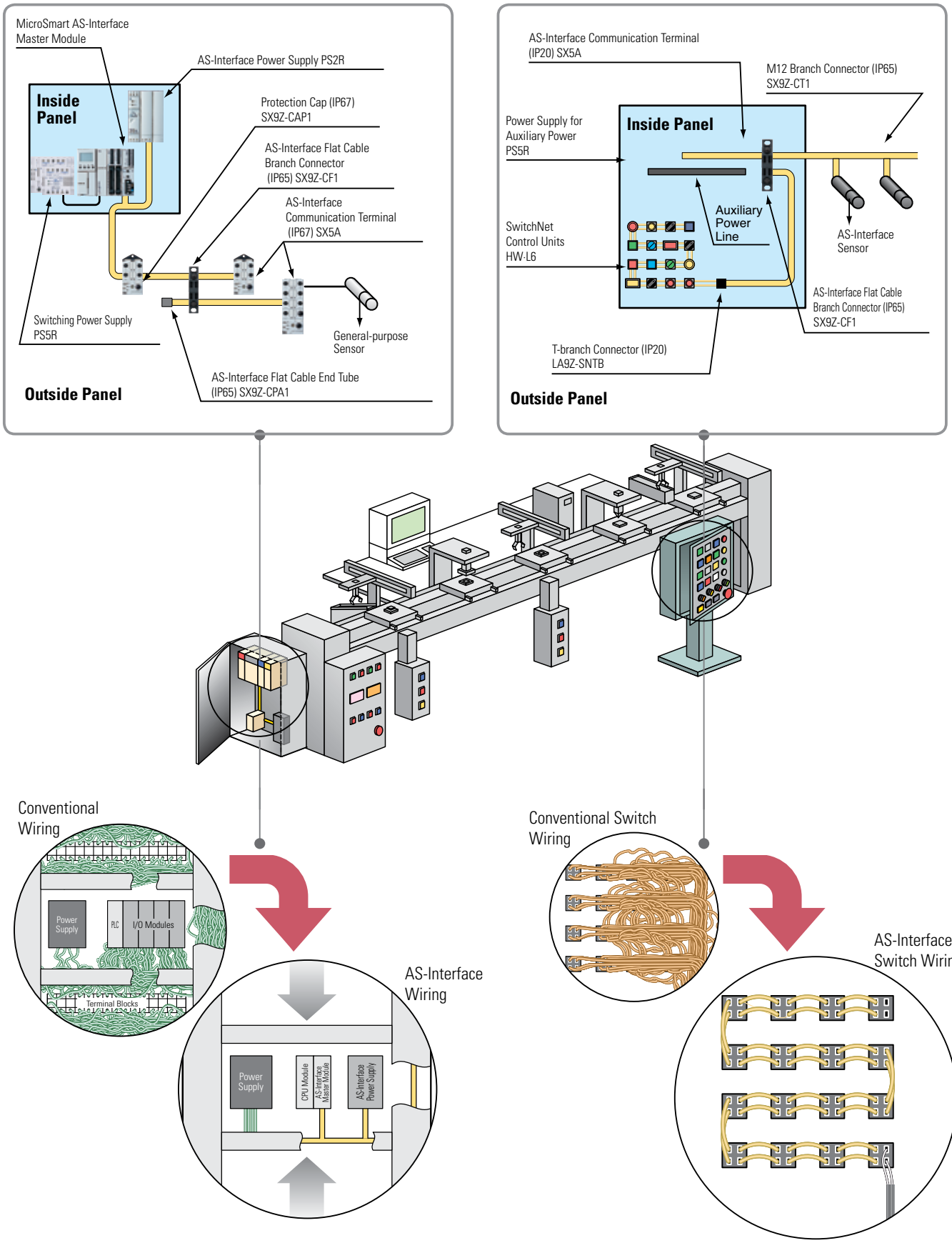


M12 Branch Connector (IP65)



T-branch Connector (IP20)

## Space & Wire Savings

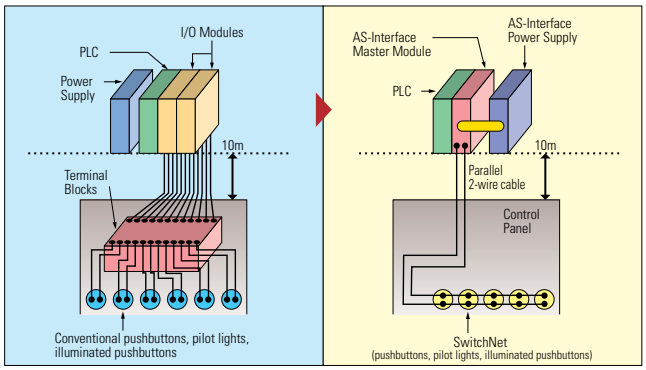


# Cost Savings

## Inside-Panel Wiring Example: Cost Savings Approximately 25%

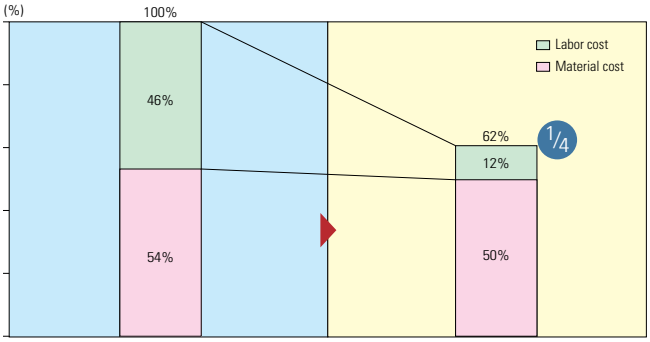
### Wiring Comparison

**Conventional Wiring** | **AS-Interface & SwitchNet Wiring**




### Cost Comparison

**Conventional Wiring** | **AS-Interface & SwitchNet Wiring**




#### Conventional Wiring

When using conventional wiring that involves a PLC and terminal blocks, the inside of the control panel is filled with wires for switches, pilot lights and other devices. Approximately half of the total panel cost is attributable to labor costs for wiring.

#### AS-Interface & SwitchNet Wiring

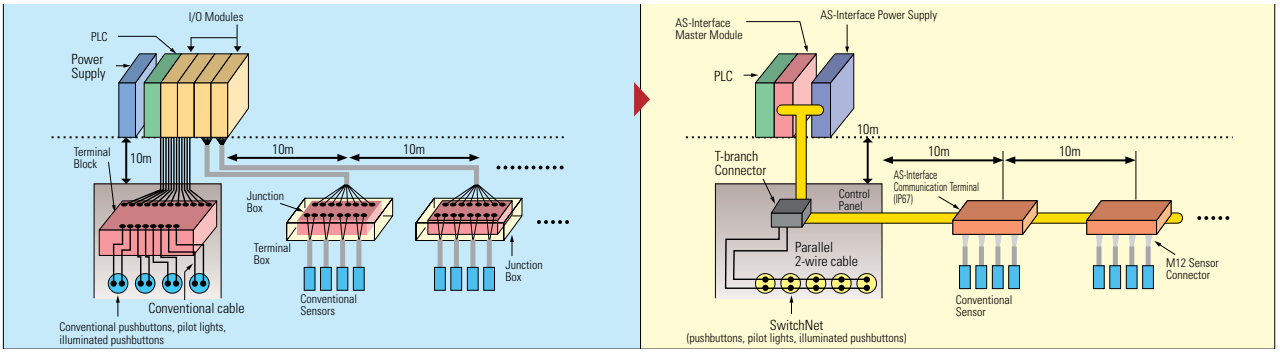
All SwitchNet units are connected to the AS-Interface master module using 2-wire cables. Wiring time is reduced to approximately 1/4 of the time needed for the conventional method and the total cost can be reduced up to 40%. In addition, maintenance is much easier.

1. Comparisons were made using IDEC products.
2. Cost comparison is based on control panel configuration using 60 buttons and lights.

## Inside & Outside-Panel Wiring Example: Cost Savings Approximately 25%

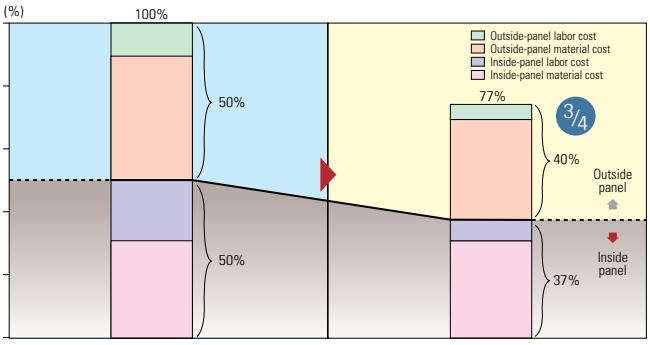
### Wiring Comparison

**Conventional Wiring** | **AS-Interface & SwitchNet Wiring**




### Cost Comparison

**Conventional Wiring** | **AS-Interface & SwitchNet Wiring**




#### Conventional Wiring

A large amount of space and cost is required by wiring to and inside junction boxes.

#### AS-Interface & SwitchNet Wiring

SwitchNet wiring reduces costs for inside-panel wiring resulting in a total cost reduction of approximately 25%.

1. Comparisons were made using IDEC products.
2. Cost comparison is based on control panel configuration using 60 buttons and lights.

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# Barriers

IDEC

**www.IDEC.com/barriers**

# Selection Guide

## Discrete Input Barrier

| Model | EB3C-**AN | EB3C-**DN | EB3N-**D |
|---|---|---|---|
| Appearance | | | |
| Page | 246 | | 256 |
| Ratings | UL: Class I, II, III Div1 / Group A, B, C, D, E, F, and G<br>Class I, Zone 0 / [AExia] II C<br>FM: Class I, II, III Div1 / Group A, B, C, D, E, F, and G<br>Class I, Zone 0 / [AExia] II C<br>PTB (ATEX): II(1)G [Exia] IIC: Gas vapor<br>II(1) D[Exia] IIIC: Dust<br>PTB (IECEx) [Exia]IIIC<br>IEC Ex: [Exia] II C<br>CQST: [Ex ia Ga] IIC<br>TIIS: Discrete input barrier [Exia] IIC<br>Switch (EB9Z-A) Exia IICT6<br>Switch (EB9Z-A1) Exia IIBT6<br>NK: [Exia] II C<br>KCs: [Exia] II C, [Exia D]<br>KR: [Exia] IIC, [Exia] III C (pending) | | UL: Class I, II, III, Div. 1, Groups A, B, C, D, E, F and G<br>Class I, Zone 0, [AExia] II C<br>PTB (IECEx): [Exia] II C<br>PTB (ATEX): II (1) G [Exia] II C<br>II (1) D [ExiaD]<br>CQST: [Exia] II C<br>TIIS: [Exia] II C |
| Degree of Protection | IP20 | IP20 | IP20 |
| Number of Channels | Relay Output: 1,2,3,5,6,8,10<br>Transistor Output: 1,2,3,5,6,8,10,16 | Relay Output: 1,2,3,5,6,8,10<br>Transistor Output: 1,2,3,5,6,8,10,16 | EB3N-□2ND: 2 safety circuits<br>EB3N-□2R5D: 2 safety circuits, 5 auxiliary circuits |
| Power Voltage | 100 to 240V AC (UL rating: 100- 120VAC) | 24V DC | 24V DC |
| Output | Relay<br>Transistor<br>(Sink/Source) | Relay<br>Transistor<br>(Sink/Source) | Relay |
| Connection | Screw Terminal | Screw Terminal, Connector | Screw Terminal |
| Mounting | 35-mm-wide DIN rail<br>Panel mounting | 35-mm-wide DIN rail<br>Panel mounting | 35-mm-wide DIN rail / Panel mounting |
| Size (excluding projections) | 42W×75H×77.5D (1 channel)<br>65W×75H×77.5D (2, 3 channels)<br>110.5W×75H×77.5D (5, 6, 8 channels (common))<br>171.5W×75H×77.5D (8, 10 channels) | 42W×75H×77.5D (1 channel)<br>65W×75H×77.5D (2, 3 channels)<br>110.5W×75H×77.5D (5, 6, 8 channels (common))<br>171.5W×75H×77.5D (8, 10, 16 channels (common)) | 65.0W×75.0H×77.5D (EB3N-□2ND)<br>110.5W×75.0H×77.5D (EB3N-□2R5D) |
| Weight (approx.) | 380g (EB3C-R10AN) | 390g (EB3C-R16CDN) | 220g (EB3N-□2ND)<br>300g (EB3N-□2R5D) |

## Discrete Output Barrier

| Model | EB3L-**AN | EB3L-**DN |
|---|---|---|
| Appearance | | |
| Page | 261 | |
| Ratings | UL: Class I, II, III Div1 / Group A, B, C, D, E, F, and G<br>Class I, Zone 0 / [AExia] II C<br>FM: Class I, II, III Div1 / Group A, B, C, D, E, F, and G<br>Class I, Zone 0 / [AExia] II C<br>PTB (ATEX): II(1)G [Exia] IIC: Gas vapor<br>II(1)D [Exia] IIIC: Dust<br>PTB (IEC-Ex) [Exia] IIC<br>[Exia] IIIC<br>CQST: Ex ia Ga<br>IEC Ex: [Exia] II C<br>TIIS: Discrete output barrier [Exia] II C<br>NK: [Exia] II C<br>KCS: [Exia] II C, [Exia D]<br>KR: [Exia] IIC, [Exia] III C (pending) | |
| Degree of Protection | IP20 | IP20 |
| Number of Channels | 1, 2, 3, 5, 6, 8, 10 | 1, 2, 3, 5, 6, 8, 10, 16 |
| Power Voltage | 100 to 240V AC (UL rating: 100 ~ 120V AC) | 24V DC |
| Input | Transistor input (sink)<br>Transistor input (source) | Transistor input (sink)<br>Transistor input (source) |
| Connection | Screw Terminal | Screw Terminal, Connector |
| Mounting | 35-mm-wide DIN rail<br>Panel mounting | 35-mm-wide DIN rail<br>Panel mounting |
| Size (excluding projections) | 42W×75H×77.5D (1 channel)<br>65W×75H×77.5D (2, 3 channels)<br>110.5W×75H×77.5D (5, 6, 8 channels)<br>171.5W×75H×77.5D (8, 10 channels) | 42W×75H×77.5D (1 channel)<br>65W×75H×77.5D (2, 3 channels)<br>110.5W×75H×77.5D (5, 6, 8 channels)<br>171.5W×75H×77.5D (8, 10, 16 channels (common)) |
| Weight (approx.) | 360g (EB3L-S10SAN) | 360g (EB3L-S16CSDN) |

## Switches and Pilot Lights

Page 269

**Pilot Light and Miniature Pilot Light**
IP65 (IEC60529) (except for terminals)
EB3P-LU/IPL1: IP40

**Illuminated Switch**
IP65 (IEC60529) (except for terminals)
EB3P-LSAW**: IP54

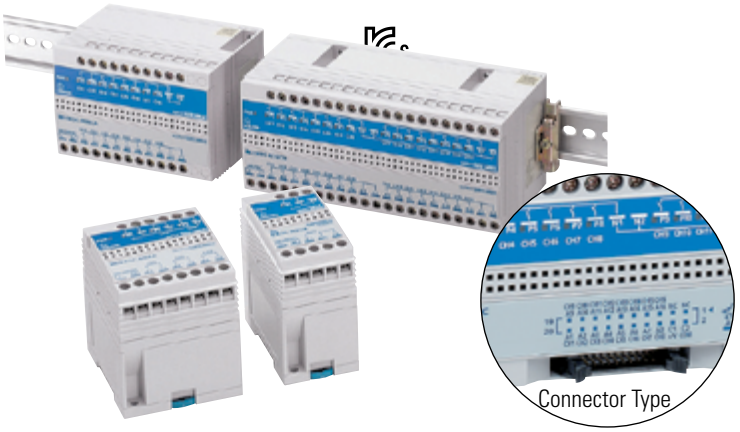
**Buzzer**
IP20 (IEC60529) (except for terminals)

# Intrinsically Safe: EB3C Discrete Input Barriers

## Key features:

- Applicable Standards
  IEC60079 compliant
  Dry-contact switches can be connected to the EB3C
- 8- and 16-circuit types are available in common wiring types, ideal for connection to PLCs (DC voltage only)
- Universal AC power voltage (100 to 240V AC) or 24V DC power (UL rating: 100 ~ 120V AC)
- No grounding required
- IDEC's original spring-up terminals minimize wiring time
- Installation: 35-mm-wide DIN rail mounting or direct screw mounting
- Global usage

| | |
|---|---|
| USA: | UL/FM |
| Europe: | CE marking, |
| Global: | IECEx ATEX |
| Japan: | TIIS |
| China: | CQST |
| Korea: | KCs |
| Ship class: | NK (Japan), KR (Korea pending) |




## Entity Barrier Parameters

Ta= 60°C, Um= 250V, (Um=125V UL only), Uo=13.2V, Io= 14.2mA, Po= 46.9mW at each channel
Pn-Nn Io=227.2mA, Po= 750mW at max 16 channels Pn-Nn

| Io(mA) | 14.2 | 28.4 | 42.6 | 56.8 | 71.0 | 85.2 | 99.4 | 113.6 | 127.8 | 142.0 | 156.2 | 170.4 | 184.6 | 198.8 | 213.0 | 227.2 | Combined Lo(mH) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Po(mW) | 46.9 | 93.8 | 140.6 | 187.5 | 234.3 | 281.2 | 328.1 | 375.9 | 421.8 | 468.7 | 515.5 | 562.4 | 609.2 | 656.1 | 702.9 | 750 | |
| Co(μF) | 0.67 | 0.65 | 0.63 | 0.61 | 0.59 | 0.57 | 0.55 | 0.53 | 0.51 | 0.49 | 0.47 | 0.44 | 0.42 | 0.39 | - | - | 1.0 |
| | 0.79 | 0.77 | 0.76 | 0.75 | 0.73 | 0.72 | 0.70 | 0.69 | 0.67 | 0.66 | 0.64 | 0.62 | 0.61 | 0.59 | 0.57 | 0.55 | 0.5 |
| | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.93 | 0.92 | 0.91 | 0.90 | 0.88 | 0.87 | 0.86 | 0.85 | 0.84 | 0.2 |
| | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.1 |

Note 1 Added to above table, the next values combined Lo and Co are allowable;

| Io(mA) | 14.2 | | | | | | 28.4 | | | | | | 227.2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lo(mH) | 175* | 87.5 | 30.0 | 2.5 | 0.55 | 0.25 | 43.5* | 21.5 | 20.0 | 3.5 | 0.43 | 0.25 | 0.68* | 0.34 | 0.68 | 0.6 | 0.22 | 0.13 |
| Co(μF) | 0.90* | 0.45 | 0.33 | 0.54 | 0.77 | 0.90 | 0.90* | 0.45 | 0.30 | 0.48 | 0.80 | 0.90 | 0.90* | 0.45 | 0.45 | 0.49 | 0.80 | 0.90 |

TIIS, NK only
Ta=60°C, Um=250V

| | 1 ch Seperate | 16 ch Common 16 |
|---|---|---|
| Uo | 13.2V | 13.2V |
| Io | 14.2mA | 227.2mA |
| Po | 46.9mW | 750mW |
| Co | 0.47μF | 0.365μF |
| Lo | 87.5mH | 0.425mH |

Note 2 The intrinsic safe apparatus and wirings shall be accordance to following formulas; for example: Ui ≥ Uo Ii ≥ Io Pi ≥ Po Ci+Cc ≤ Co Li+Lc ≤ Lo
*: Therefore, the values are allowable only at Li ≤ 1%Lo and Ci ≤ 1%Co of the intrinsic safe apparatus. (In the case of 50% of Co and Lo parameters are applicable,the maximum capacitance allowed shall not be more than Co = 1 μF for IIB and Co= 600 nF for IIC.)

## Dry Contact Switches

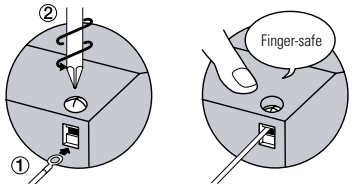
Dry-contact switches can be connected to the EB3C.

LB Series

CW Series

HW Series

## Spring-up Fingersafe Terminals Reduce Wiring Time




## Connector Type

MIL connector on the non-hazardous side

- Easy connection to PLCs
- Wiring reduced
- Various 20-pin MIL connectors can be connected

## Common Wiring for PLC Inputs

8- and 16-circuit types are available in common wiring types, ideal for connection to PLCs (DC voltage only).

# Specifications

## EB3C Electrical Specifications

| | | | | |
|---|---|---|---|---|
| Ratings | | | See Certification Numbers table below | |
| Degree of Protection | | | IP20 (IEC60529) | |
| Installation Location | Discrete Input Barrier | | Safe indoor place (non-hazardous area) | |
| Non-intrinsically Safe Circuit Maximum Voltage (Um) | | | 250V AC 50/60Hz, 250V DC<br>125V AC 50/60Hz, 125V DC (UL rating) | |
| Intrinsically Safe Circuits | Wiring Method | | 1-channel Separate Wiring | 16-channel Common Wiring |
| | Rated Operating Voltage | | 12V DC ±10% | |
| | Rated Operating Current | | 10 mA DC ±20% | |
| Non-intrinsically Safe Circuits | Relay Output | Contact Configuration | 1NO | |
| | | Rated Insulation Voltage (Ui) | 250V AC (UL rating: 125V AC), 125V DC | |
| | | Thermal Current (Ith) | 3A (common terminal: 8A) | |
| | | Contact Allowable Power — Resistive Load | AC: 750 VA, DC: 72W | |
| | | Contact Allowable Power — Inductive Load | AC: 750 VA (cos ø = 0.3 to 0.4)<br>DC: 48W (L/R = 7 ms) | |
| | | Rated Load — Resistive Load | 250V AC 3A, 24V DC 3A | |
| | | Rated Load — Inductive Load | 250V AC 3A (cos ø = 0.3 to 0.4)<br>24V DC 2A (L/R = 7 ms) | |
| | | Minimum Applicable Load | 0.1V DC, 0.1 mA (reference value) | |
| | | Contact Resistance | 50 mΩ maximum (initial value) | |
| | | ON Time | 12 ms maximum (rated voltage) | |
| | | OFF Time | 10 ms maximum (rated voltage) | |
| | | Mechanical Life | 20,000,000 operations minimum (at 18,000 operations/hour, without load) | |
| | | Electrical Life | 100,000 operations minimum (at 1,800 operations/hour, rated load) | |
| | | Short-circuit Protection | None | |
| | Transistor Output | Rated Voltage | 24V DC | |
| | | Maximum Voltage | 30V DC | |
| | | Maximum Current | 100 mA (connector type: 15 mA) | |
| | | Leakage Current | 0.1 mA maximum | |
| | | Voltage Drop | 1.5V maximum | |
| | | Clamping Voltage | 33V (1W) | |
| | | Inrush Current | 0.5A maximum (1 sec) | |
| | | ON Time | 0.1 ms maximum (resistive load) | |
| | | OFF Time | 0.4 ms (typical) (resistive load) | |
| | | Short-circuit Protection | None | |

## EB3C General Specifications

| | AC | DC |
|---|---|---|
| Rated Voltage | 100 to 240V AC<br>(UL rating: 100 ~ 120V AC) | 24V DC |
| Allowable Voltage Range | 85 to 264V AC<br>(UL rating: 85 ~ 125V AC) | 21.6 to 26.4V DC |
| Rated Frequency | 50/60 Hz (allowable range: 47 to 63 Hz) | — |
| Inrush Current | 10A (100V AC)<br>20A (200V AC) | 10A |

| | | |
|---|---|---|
| Dielectric Strength (1 minute, 1 mA) | | Between intrinsically safe circuit and non-intrinsically safe circuit: 1526.4V AC |
| | | Between AC power and output terminal: 1500V AC |
| | | Between DC power and transistor output terminal: 1000V AC |
| Operating Temperature | | –20 to +60°C (no freezing) |
| Storage Temperature | | –20 to +60°C (no freezing) |
| Operating Humidity | | 45 to 85% RH (no condensation) |
| Atmosphere | | 800 to 1100 hPa |
| Pollution Degree | | 2 (IEC60664) |
| Insulation Resistance | | 10 MΩ minimum (500V DC megger, between the same poles as the dielectric strength) |
| Vibration Resistance | Damage Limits | Panel mounting: 10 to 55 Hz, amplitude 0.75 mm |
| | | DIN rail mounting: 10 to 55 Hz, amplitude 0.35 mm |
| | Operation Extremes (relay output only) | Panel mounting: 10 to 55 Hz, amplitude 0.5 mm |
| | | DIN rail mounting: 10 to 55 Hz, amplitude 0.35 mm |
| Shock Resistance | Damage Limits | Panel mounting: 500 m/s² (3 times each on X, Y, Z) |
| | | DIN rail mounting: 300 m/s² (3 times each on X, Y, Z) |
| Terminal Style | | M3 screw terminal |
| Mounting | | 35-mm-wide DIN rail or panel mounting (M4 screw) |
| Power Consumption (approx.) | | 9.6 VA (EB3C-R10AN at 200V AC)<br>4.8 W (EB3C-R16CDN at 24V DC) |
| Weight (approx.) | | 390g (EB3C-R16CDN) |

## EBC3 Certification Numbers

| Certification Organization | Ratings | Certification Number |
|---|---|---|
| UL | Class I, II, III Div. 1<br>Group A, B, C, D,E, F, and G<br>Class I, Zone 0 / [AExia] II C | E234997 |
| FM | Class I, II, III Div. 1<br>Group A, B, C, D,E, F, and G<br>Class I, Zone 0 / [AExia] II C | 3047250 |
| PTB (ATEX) | II(1)G [Exia] II C: Gas Vapour,<br>II(1)D [Exia] III C: Dust | PTB09 ATEX2046 |
| PTB (IEC-EX) | [Exia] II C: Gas, Vapour [Exia] III C: Dust | IECEx PTB10.0015 |
| TIIS Japan | Relay barrier: [Exia] II C<br>Switch (EB9Z-A) : Exia II C T6<br>Switch (EB9Z-A1) : Exia II B T6 | TC 20541<br>TC15758<br>TC15961 |
| Class NK | [Exia] II C | TYPE TEST No. 13T606 |
| CQST | [Exia Ga] II C | CNEx 14.0047 |
| KCs | Relay Barrier : [Exia] II C | 14-AV4BO-0373 |
| KR | [Exia] IIC | Pending |

Class NK is Japan Shipping agency approval, Class KR is Korean shipping agency approval.

## Part Numbers

### Discrete Input Barriers

| Power Voltage | Connection to Non-intrinsically Safe Circuit | Input Wiring Method | Output | | Number of Channels | Part Number | Weight (approx) g |
|---|---|---|---|---|---|---|---|
| 100 to 240V AC (UL rating: 100 ~ 120V AC) | Screw Terminal | Separate/Common Wiring Compatible | Relay | | 1 | EB3C-R01AN | 150 |
| | | | | | 2 | EB3C-R02AN | 180 |
| | | | | | 3 | EB3C-R03AN | 190 |
| | | | | | 5 | EB3C-R05AN | 260 |
| | | | | | 6 | EB3C-R06AN | 270 |
| | | | | | 8 | EB3C-R08AN | 300 |
| | | | | | 10 | EB3C-R10AN | 380 |
| | | Common Wiring Only | | | 8 | EB3C-R08CAN | 280 |
| | | Separate/Common Wiring Compatible | Transistor (Sink/Source) | | 1 | EB3C-T01AN | 140 |
| | | | | | 2 | EB3C-T02AN | 170 |
| | | | | | 3 | EB3C-T03AN | 180 |
| | | | | | 5 | EB3C-T05AN | 250 |
| | | | | | 6 | EB3C-T06AN | 260 |
| | | | | | 8 | EB3C-T08AN | 320 |
| | | | | | 10 | EB3C-T10AN | 340 |
| | | Common Wiring Only | Transistor | Sink | 8 | EB3C-T08CKAN | 260 |
| | | | | | 16 | EB3C-T16CKAN | 260 |
| | | | | Source | 8 | EB3C-T08CSAN | 260 |
| | | | | | 16 | EB3C-T16CSAN | 260 |
| 24V DC | | Separate/Common Wiring Compatible | Relay | | 1 | EB3C-R01DN | 130 |
| | | | | | 2 | EB3C-R02DN | 170 |
| | | | | | 3 | EB3C-R03DN | 180 |
| | | | | | 5 | EB3C-R05DN | 250 |
| | | | | | 6 | EB3C-R06DN | 260 |
| | | | | | 8 | EB3C-R08DN | 260 |
| | | | | | 10 | EB3C-R10DN | 360 |
| | | Common Wiring Only | | | 8 | EB3C-R08CDN | 270 |
| | | | | | 16 | EB3C-R16CDN | 390 |
| | | Separate/Common Wiring Compatible | Transistor (Sink/Source) | | 1 | EB3C-T01DN | 120 |
| | | | | | 2 | EB3C-T02DN | 160 |
| | | | | | 3 | EB3C-T03DN | 170 |
| | | | | | 5 | EB3C-T05DN | 240 |
| | | | | | 6 | EB3C-T06DN | 250 |
| | | | | | 8 | EB3C-T08DN | 250 |
| | | | | | 10 | EB3C-T10DN | 320 |
| | | Common Wiring Only | Transistor | Sink | 8 | EB3C-T08CKDN | 250 |
| | | | | | 16 | EB3C-T16CKDN | 350 |
| | | | | Source | 8 | EB3C-T08CSDN | 250 |
| | | | | | 16 | EB3C-T16CSDN | 350 |
| | Connector | Common Wiring | | Sink | 16 | EB3C-T16CKD-CN | 330 |
| | | | | Source | | EB3C-T16CSD-CN | 330 |

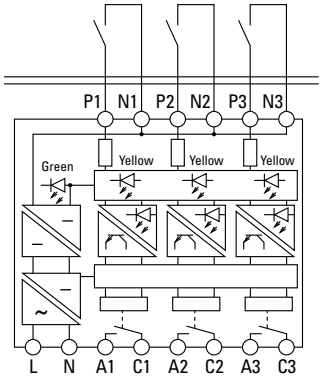
### Accessories

| Item | Part Number | Description |
|---|---|---|
| DIN Rail | BAP1000 | Steel (1m long, 7.5mm high) |
| | BAA1000 | Aluminum (1m long, 10.5mm high) |
| End Clip | BNL6 | Medium DIN rail end clip |
| Static Electricity Caution Plate | EB9Z-N1 | Polyester 20 (W) x 6 (H) mm |

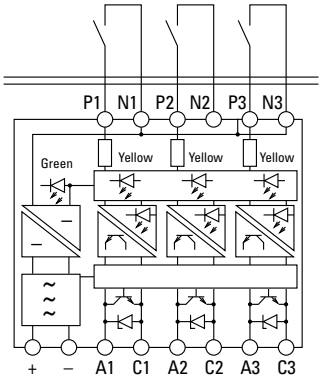
# Circuit Diagrams

## Internal Circuit Block Diagrams

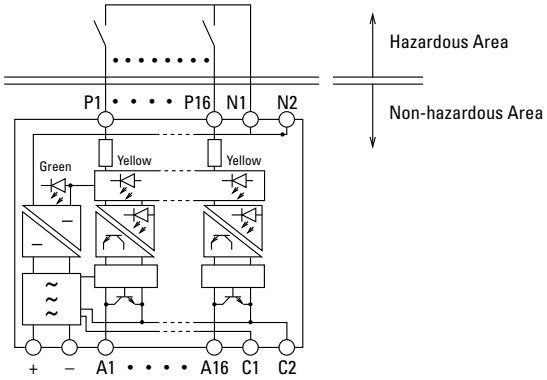
AC Power, Relay Output Type




DC Power, Transistor Output Type



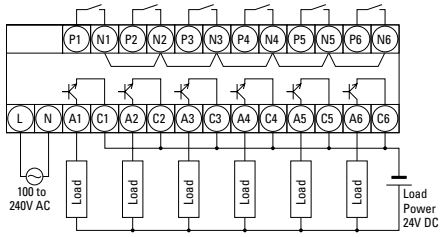

Connector Wiring, Sink Output Type




# Wiring Examples

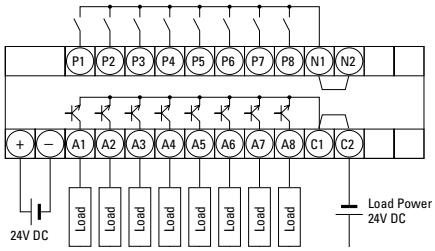
## External Wiring Examples

Transistor Output Type (Ex.: EB3C-T06AN)

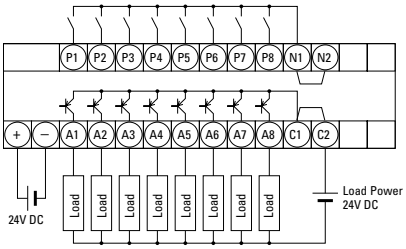



Note: On the sink/source transistor output type, terminals A can be used as a positive common line.

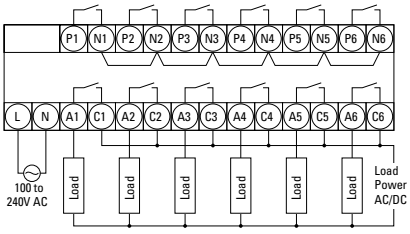
Transistor Sink Output Type (Ex.: EB3C-T08CKDN)



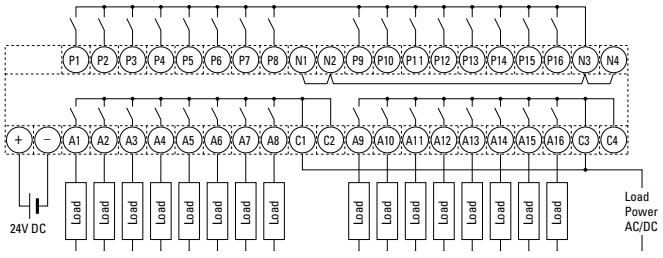

Transistor Source Output Type (Ex.: EB3C-T08CSDN)




Relay Output Type (Ex.: EB3C-R06AN)

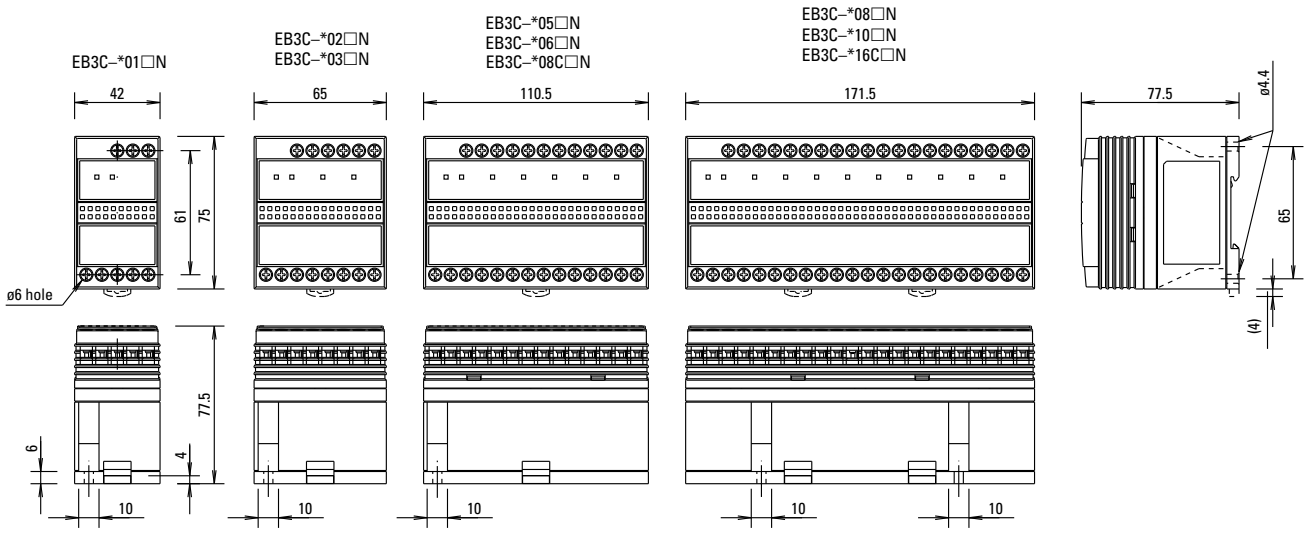



Relay Output Common Wiring Type (Ex.: EB3C-R016CDN)

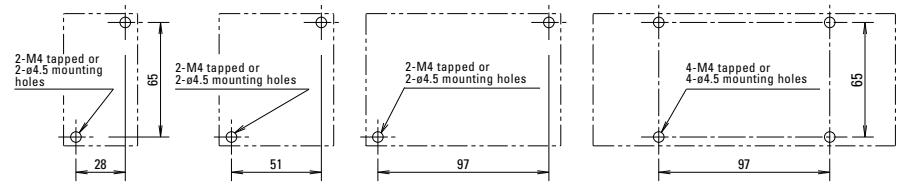


## Dimensions (mm)

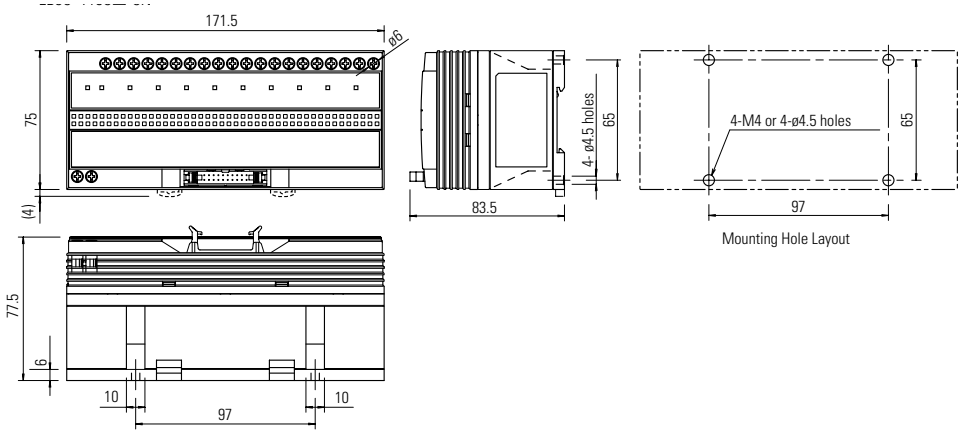
Screw Terminal




Mounting Hole Layout (Screw Mounting)

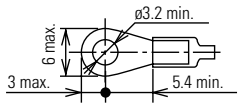



Connector Type

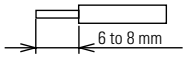



Mounting Hole Layout

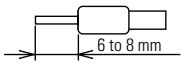
Applicable Crimping Terminal




Solid Wire - Strip wire end

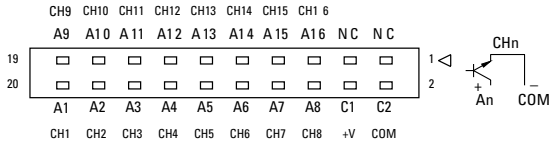


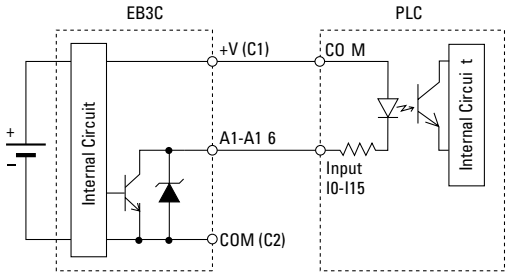

Stranded Wire - use a ferrule



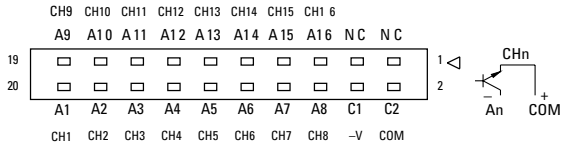
**Connector Wiring Terminal Arrangement**

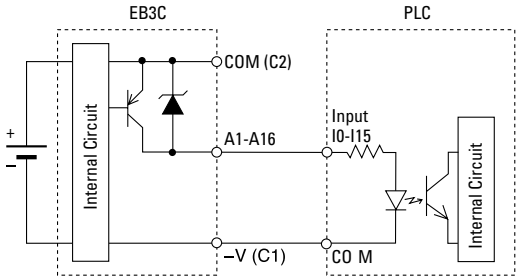
EB3C-T16CKD-CN (Sink)




EB3C-T16CSD-CN (Source)



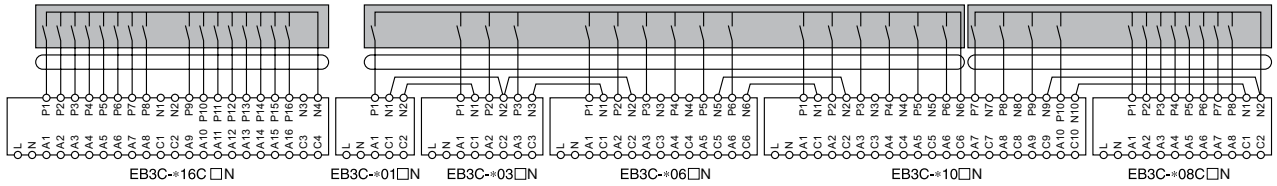

| EB3C-T16CKD-CN | | FC4A-N16B3 | | EB3C-T16CSD-CN | | FC4A-N16B3 | |
|---|---|---|---|---|---|---|---|
| Terminal | Output | Input | Terminal | Terminal | Output | Input | Terminal |
| 20 | A1 | I0 | 20 | 20 | A1 | I0 | 20 |
| 19 | A9 | I10 | 19 | 19 | A9 | I10 | 19 |
| 18 | A2 | I1 | 18 | 18 | A2 | I1 | 18 |
| 17 | A10 | I11 | 17 | 17 | A10 | I11 | 17 |
| 16 | A3 | I2 | 16 | 16 | A3 | I2 | 16 |
| 15 | A11 | I12 | 15 | 15 | A11 | I12 | 15 |
| 14 | A4 | I3 | 14 | 14 | A4 | I3 | 14 |
| 13 | A12 | I13 | 13 | 13 | A12 | I13 | 13 |
| 12 | A5 | I4 | 12 | 12 | A5 | I4 | 12 |
| 11 | A13 | I14 | 11 | 11 | A13 | I14 | 11 |
| 10 | A6 | I5 | 10 | 10 | A6 | I5 | 10 |
| 9 | A14 | I15 | 9 | 9 | A14 | I15 | 9 |
| 8 | A7 | I6 | 8 | 8 | A7 | I6 | 8 |
| 7 | A15 | I16 | 7 | 7 | A15 | I16 | 7 |
| 6 | A8 | I7 | 6 | 6 | A8 | I7 | 6 |
| 5 | A16 | I17 | 5 | 5 | A16 | I17 | 5 |
| 4 | +V | COM | 4 | 4 | -V | COM | 4 |
| 3 | NC | COM | 3 | 3 | NC | COM | 3 |
| 2 | COM | NC | 2 | 2 | COM | NC | 2 |
| 1 | NC | NC | 1 | 1 | NC | NC | 1 |

Note: The wiring in dashed line does not affect the operation of the EB3C.
Applicable connector is IDEC JE1S-201.
Output power for PLC outputs is supplied by the EB3C, therefore the PLC output does not need an external power supply.

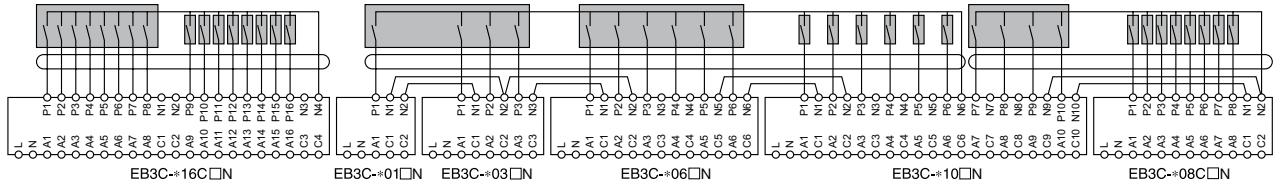
### Wiring Example of Intrinsically Safe External Inputs

## 1. Common Wiring (Maximum 16 circuits)

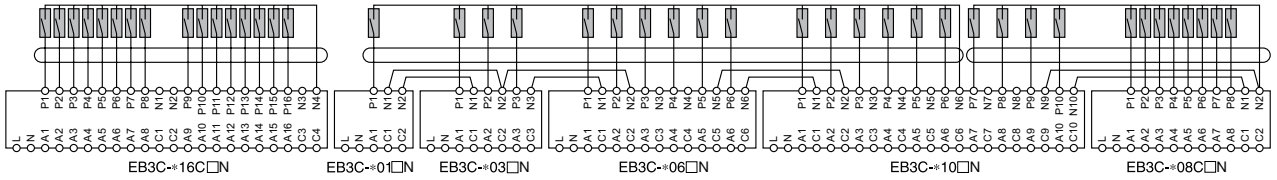
All input lines are wired to a common line inside the intrinsically safe switch (one common line per intrinsically safe circuit).




Some input lines are wired to a common line inside the intrinsically safe switches, while others are outside switches (one common line per intrinsically safe circuit).




**All input lines are wired to a common line outside the intrinsically safe switch (one common line per intrinsically safe circuit).**




## 2. Separate Wiring

Each input line of the EB3C makes up one independent intrinsically safe circuit.

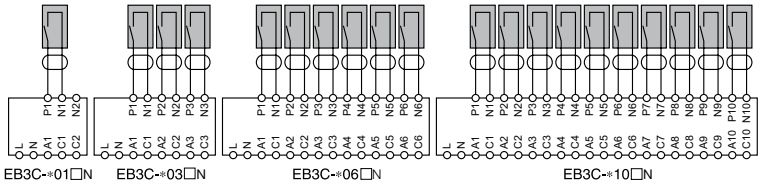
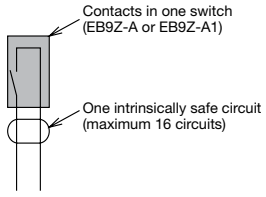
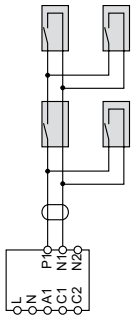



**Diagram Symbols**



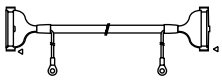
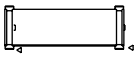
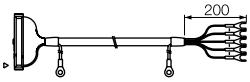
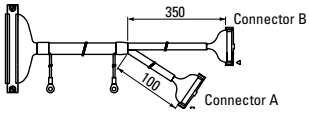

**Serial-Parallel Connection of Switches**



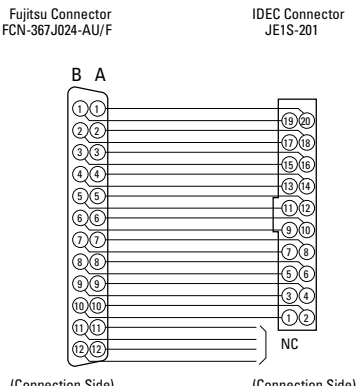
Notes

- As shown in the diagram on the left, the required number of "contacts in one switch" (3 contacts in the example at left) can be added to the "contacts in one switch" connected to one input channel.
- Similarly, a required number of "contacts in one switch" can be added to a common line connected to multiple input channels.
- The capacitance and inductance of the added "contacts in one switch" must be included in the calculation of the wiring capacitance and inductance in "Precautions for Operation, 5. Wiring for Intrinsic Safety, (7)".
- In addition, a required number of contacts can be added in the enclosure of "contacts in one switch." In this case, however, do not include the capacitance and inductance in the calculation of the wiring capacitance and inductance. Instead, make sure that the internal capacitance (Ci) and internal inductance (Li) are within the values shown in the table "Switch Explosion-Protection Specifications (Japan only)".

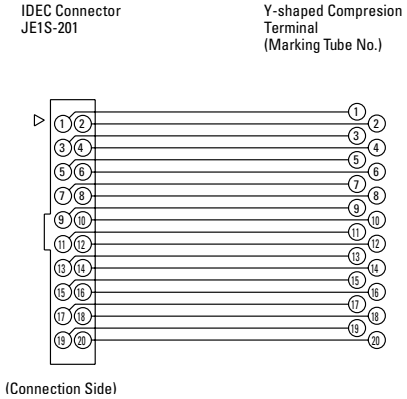
## Recommended Connector Cable for Connector Types

| Description | | No. of Poles | Length (m) | Part Number | Shape | Applicable Type |
|---|---|---|---|---|---|---|
| I/O Terminal Cable | With Shield | 20 | 0.5 | FC9Z-H050A20 |  | IDEC MicroSmart I/O Module |
| | | | 1 | FC9Z-H100A20 | | |
| | | | 2 | FC9Z-H200A20 | | |
| | | | 3 | FC9Z-H300A20 | | |
| | Without Shield | | 0.5 | FC9Z-H050B20 |  | IDEC MicroSmart I/O Module |
| | | | 1 | FC9Z-H100B20 | | |
| | | | 2 | FC9Z-H200B20 | | |
| | | | 3 | FC9Z-H300B20 | | |
| Cable with Crimping Terminal | | | 1 | BX9Z-H100E4 |  | Screw Terminal |
| | | | 2 | BX9Z-H200E4 | | |
| | | | 3 | BX9Z-H300E4 | | |
| 40-pin Cable for PLC | | | 1 | BX9Z-H100B |  | Mitsubishi A Series Input Module (positive common) ↓ EB3C-T16CKD-CN |
| | | | 2 | BX9Z-H200B | | |
| | | | 3 | BX9Z-H300B | | |

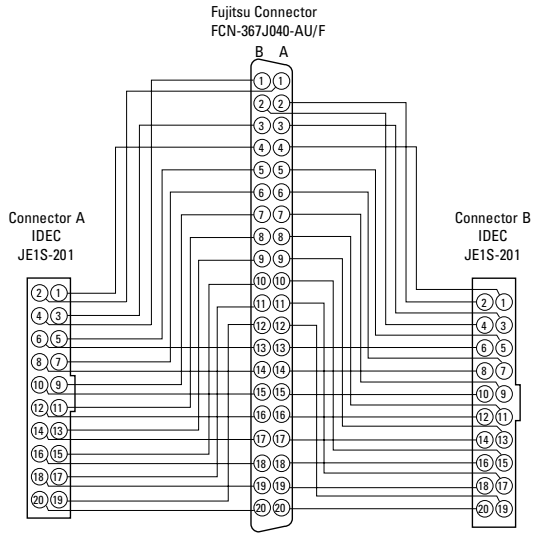
**FC9Z-H□□□A, FC9Z-H□□□B Internal Connection**




**FC9Z-H□□□ E4 Internal Connection**




**BX9Z-H□□□B Internal Connection**

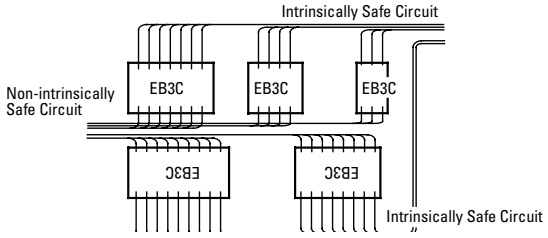


## Installing the EB3C Intrinsically Safe Barriers

1. The EB3C can be installed in any direction.
2. Install the EB3C intrinsically safe barrier in a safe area (non-hazardous area) in accordance with intrinsic safety ratings and parameters. To avoid mechanical shocks, install the EB3C in an enclosure which suppresses shocks.
3. When installing or wiring the EB3C, prevent electromagnetic and electrostatic inductions in the intrinsically safe circuit. Also prevent the intrinsically safe circuits from contacting with another intrinsically safe circuit and any other circuits.

   Maintain at least 50mm clearance, or provide a metallic separating board between the intrinsically safe circuit and non-intrinsically safe circuit. When providing a metallic separating board, make sure that the board fits closely to the enclosure (top, bottom, and both sides). Allowable clearance between the enclosure and board is 1.5mm at the maximum.

   The clearance of 50mm between the intrinsically safe circuit and non-intrinsically safe circuit may not be sufficient when a motor circuit or high-voltage circuit is installed nearby. In this case, provide a wider clearance between the circuits referring to 5 (3) "Minimum Parallel Distance between the Intrinsically Safe Circuit and Other Circuits."
4. In order to prevent contact between intrinsically safe circuits and non-intrinsically safe circuits, mount EB3C units with terminals arranged in the same direction.




5. Maintain at least 6mm (or 3mm according to IEC60079-11: 1999) clearance between the terminal of an intrinsically safe circuit and the grounded metal part of a metal enclosure, and between the relay terminal block of an intrinsically safe circuit and the grounded metal part of a metal enclosure.
6. For installing the EB3C, mount on a 35mm-wide DIN rail or directly on a panel using screws. Make sure to install securely to withstand vibration. When mounting on a DIN rail, push in the clamp completely. Use the BNL6 end clips on both sides of the EB3C to prevent from moving sideways.
7. Excessive extraneous noise may cause malfunction and damage to the EB3C. When extraneous noise activates the voltage limiting circuit (thyristor), remove the noise source and restore the power.

## Terminal Wiring

1. Using a ø5.5mm or smaller screw driver, tighten the terminal screws (including unused terminal screws) to a torque of 0.6 to 1.0N·m (recommended value).
2. Make sure that IP20 is achieved when wiring. Use insulation tubes on bare crimping terminals.
3. To prevent disengaged wires from contacting with other intrinsically safe circuits, bind together the wires of one intrinsically safe circuit.
4. When the adjacent terminal is connected to another intrinsically safe circuit, provide an insulation distance of at least 6mm.

## Switches in the Hazardous Area

1. A switch contains the switch contact, enclosure, and internal wiring. A switch contact refers to an ordinary switching device which consists of contacts only, such as a pushbutton switch. See below.

## Applicable Switches

| | | |
|---|---|---|
| Control Switches | Push-pull Switches | Pushbutton, Foot, Trigger, Rocker, Grip |
| | Twisting Switches | Rotary, Selector, Cam, Drum, Thumb wheel |
| | Lever and Slide Switches | Toggle, Multidirectional, Wobble stick, Lever, Slide switch |
| Sensing Switches | Displacement Switches | Microswitch, Limit, Magnetic proximity, Door, Reed, Mercury |
| | Level Switches | Liquid level |
| | Others | Pressure, Temperature |

Note: For installation in hazardous areas and connection to the EB3C, use switches which are certified, approved, or considered to be simple apparatus in relevant standards in each country.

2. When the switch has internal wiring or lead wire, make sure that the values of internal inductance (Li) and capacitance (Ci) are within the certified values.
3. Enclose the switch contact's bare, live part in an enclosure of IP20 or higher protection.
4. Depending on the explosion-protection specifications according to TIIS, the exposed area of the plastic switch operator is limited as follows:

   Exia II CT6 (EB9Z-A): 20cm$^2$ maximum
   Exia II BT6 (EB9Z-A1): 100cm$^2$ maximum
5. Attach the certification mark supplied with the EB3C on the EB9Z-A or EB9Z-A1 switch (for Japanese applications).
6. When the switch operator of the plastic enclosure has a wider exposed area than the following limits, attach a caution label.

II C: 20 cm$^2$ maximum
II B: 100 cm$^2$ maximum

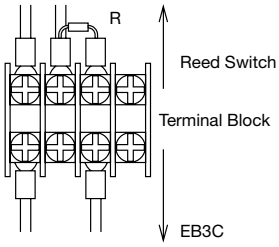
Caution
To prevent electrostatic charges, do not rub the switch surface during operation.
Use a soft cloth dipped with water for cleaning.

Caution Label Example

7. For the 1-circuit separate wiring, a resistor to prevent reed switch contact welding and an LED miniature pilot light can be connected in series with the contact. See below. Use the terminal screw of M3 or larger.

## Applicable Resistor Ratings

| | |
|---|---|
| Resistance | 100Ω maximum |
| Rated Wattage | 0.5 to 3W |
| Type | Metal (oxide) film resistors |




## IPL1 series LED miniature pilot lights Output Specifications

1. When wiring the output from the EB3C, connect the non-intrinsically safe circuit to terminals A and C. The EB3C output circuit is not equipped with short-circuit protection. If required, provide a protection in the external circuit.
2. Relay Output

   Some types of loads generate reverse emf (such as solenoids) or cause a large inrush current (incandescent lamps), resulting in a shorter operation life of output relay contacts. The operation life of contacts can be extended by preventing the reverse emf using a diode, RC, or varistor, or by suppressing the inrush current using a resistor or RL.

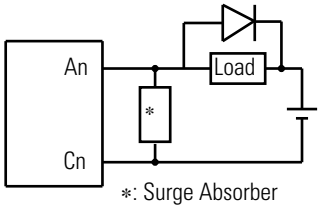
   Contacts are made of gold-clad silver. When using at a small current and a low voltage (reference value: 0.1mA, 0.1V), test the contact on the actual circuit in advance.

3. Transistor Output

When connecting a small load, the load may not turn off because of a leakage current, even though the transistor output is turned off. If this is the case, connect a resistor in parallel with the load to bypass the leakage current.

When an excessively high voltage (clamps at 33V, 1W) or a reverse voltage is applied to the output terminals, the clamping circuit or output transistor may be damaged.

When driving an inductive load, be sure to connect a diode across the load to absorb reverse emf.




*: Surge Absorber

**Example of Overvoltage Absorption Circuit**

4. In the common wiring only types, the output terminals are not isolated from each other.

5. When connecting the connector type EB3C's in parallel, use one power supply to power the EB3C's. Do not connect any wiring to the C1 and C2 terminals.

## Wiring for Intrinsic Safety

1. The voltage applied on the general circuit connected to the non-intrinsically safe circuit terminals of the EB3C relay barrier must be 250V AC, 50/60Hz, or 250V DC at the maximum under any conditions, including the voltage of the input power and the internal circuit.

2. When wiring, take into consideration the prevention of electromagnetic and electrostatic charges on intrinsically safe circuits. Also, prevent intrinsically safe circuits from contacting with other circuits.

3. The intrinsically safe circuits must be separated from non-intrinsically safe circuits. Contain intrinsically safe circuits in a metallic tube or duct, or separate the intrinsically safe circuits referring to the table below.

Note: Cables with a magnetic shield, such as a metallic sheath, prevent electromagnetic induction and electrostatic induction, however, a non-magnetic shield prevents electrostatic induction only. For non-magnetic shields, take a preventive measure against electromagnetic induction.

Finely twisted pair cables prevent electromagnetic induction. Adding shields to the twisted pair cables provides protection against electrostatic induction.

### Minimum Parallel Distance between the Intrinsically Safe Circuit and Other Circuits (mm)

| Voltage and Current of Other Circuits | Over 100A | 100A or less | 50A or less | 10A or less |
|---|---|---|---|---|
| Over 440V | 2000 | 2000 | 2000 | 2000 |
| 440V or less | 2000 | 600 | 600 | 600 |
| 220V or less | 2000 | 600 | 600 | 500 |
| 110V or less | 2000 | 600 | 500 | 300 |
| 60V or less | 2000 | 500 | 300 | 150 |

4. When identifying intrinsically safe circuits by color, use light blue terminal blocks and cables.

5. When using two or more EB3C's to set up one intrinsically safe circuit in the common wiring configuration, interconnect two neutral terminals (N1 through N10) on each EB3C between adjacent EB3C's in parallel.

6. Make sure that the power of the EB3C and contact are turned off before starting inspection or replacement.

7. When wiring the intrinsically safe circuit, determine the distance to satisfy the wiring parameters shown below. Note that parameters are different between separate wiring and common wiring.

a. Wiring capacitance Cw ≤ Co – (Ci + N × 2 nF)
   Co: Maximum external capacitance of the EB3C
   Ci: Internal capacitance of the switch
   N: The number of switches connected in series or parallel (the number is infinite)

b. Wiring inductance Lw ≤ Lo – (Li + N × 5 μH)
   Lo: Maximum external inductance of the EB3C
   Li: Internal inductance of the switch
   N: The number of switches connected in series or parallel (the number is infinite)

c. Wiring resistance ≤ Rw
   Rw: Allowable wiring resistance

d. Allowable wiring distance D (km) is the smallest value of those calculated from the capacitance, inductance, and resistance.

   D ≤ Cw/C  C (nF/km): Capacitance of cable per km
   D ≤ Lw/L  L (mH/km): Inductance of cable per km
   D ≤ Rw/2R  R (Ω/km): Resistance of cable per km

Note: For the details of wiring the intrinsically safe circuits, refer to a relevant test guideline for explosion-proof electric equipment in each country.

8) Applicable Wire Size

0.5 to 2.0mm$^2$ (AWG20 to AWG14): two wires

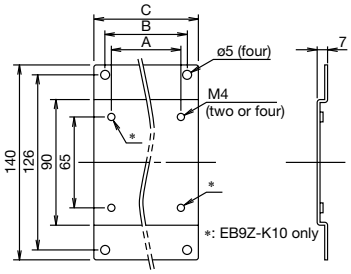
However, one wire for 2.0 mm$^2$ (AWG14)

## Mounting Bracket

The following mounting brackets can be used to install the EB3C relay barriers and EB3L lamp barriers on the mounting holes of IBRC contact signal transducer, IBPL pilot relay barrier, and IBZ buzzer.

| No. of Channels | Part No. | Dimension (mm) | | |
|---|---|---|---|---|
| | | A | B | C |
| 1 | EB9Z-K01 | 28.0 | 44.0 | 61.0 |
| 2 | EB9Z-K02 | 51.0 | 59.5 | 76.0 |
| 3 | EB9Z-K03 | 51.0 | 75.0 | 91.5 |
| 5 | EB9Z-K05 | 97.0 | 105.0 | 122.0 |
| 6 | EB9Z-K06 | 97.0 | 120.0 | 137.0 |
| 10 | EB9Z-K10 | 97.0 | 181.0 | 198.0 |

## Dimensions



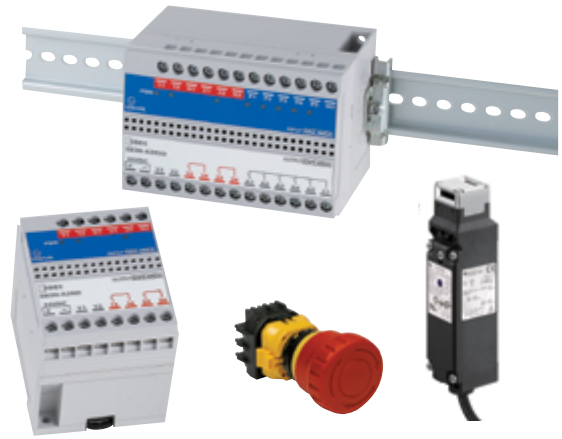

All dimensions in mm.

# EB3N Discrete Input Barrier with Redundant Output

**Build a safety system in an explosive atmosphere.**
**Key features:**

| Safety Performance | Performance level e Category 4 |
|---|---|

- [Exia] II C
- Ensures safety and machine safety in an explosive atmosphere
- Machine safety system can be built in compliance with ISO13849-1 Category 4, Performance level e.
- Safety input devices applicable in any explosive gas and hazardous areas are available.
- Available with auxiliary inputs (5 points) used to monitor the operating status of safety input devices
- Global usage
  USA (UL),
  Global IEC-Ex,
  Europe (ATEX),
  Japan (TIIS),
  China (CQST)
  Machine safety: TÜV Rheinland
- No grounding required



## Entity Barrier Parameters

Ta= 60°C, Um= 250V, (Um=125V UL only), Uo=13.2V, Io= 14.2mA, Po= 46.9mW at each channel
Pn-Nn Io=227.2mA, Po= 750mW at max 16 channels Pn-Nn

| Io(mA) | 14.2 | 28.4 | 42.6 | 56.8 | 71.0 | 85.2 | 99.4 | 113.6 | 127.8 | 142.0 | 156.2 | 170.4 | 184.6 | 198.8 | 213.0 | 227.2 | Combined Lo(mH) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Po(mW) | 46.9 | 93.8 | 140.6 | 187.5 | 234.3 | 281.2 | 328.1 | 375.9 | 421.8 | 468.7 | 515.5 | 562.4 | 609.2 | 656.1 | 702.9 | 750 | |
| Co(μF) | 0.67 | 0.65 | 0.63 | 0.61 | 0.59 | 0.57 | 0.55 | 0.53 | 0.51 | 0.49 | 0.47 | 0.44 | 0.42 | 0.39 | - | - | 1.0 |
| | 0.79 | 0.77 | 0.76 | 0.75 | 0.73 | 0.72 | 0.70 | 0.69 | 0.67 | 0.66 | 0.64 | 0.62 | 0.61 | 0.59 | 0.57 | 0.55 | 0.5 |
| | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.93 | 0.92 | 0.91 | 0.90 | 0.88 | 0.87 | 0.86 | 0.85 | 0.84 | 0.2 |
| | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.1 |

Note 1 Added to above table, the next values combined Lo and Co are allowable;

| Io(mA) | 14.2 | | | | | | 28.4 | | | | | | 227.2 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lo(mH) | 175* | 87.5 | 30.0 | 2.5 | 0.55 | 0.25 | 43.5* | 21.5 | 20.0 | 3.5 | 0.43 | 0.25 | 0.68* | 0.34 | 0.68 | 0.6 | 0.22 | 0.13 |
| Co(μF) | 0.90* | 0.45 | 0.33 | 0.54 | 0.77 | 0.90 | 0.90* | 0.45 | 0.30 | 0.48 | 0.80 | 0.90 | 0.90* | 0.45 | 0.45 | 0.49 | 0.80 | 0.90 |

TIISI only
Ta=60°C, Um=250V

| | 1 ch Seperate | 5 ch Common |
|---|---|---|
| Uo | 13.2V | 13.2V |
| Io | 14.2mA | 227.2mA |
| Po | 46.9mW | 750mW |
| Co | 0.47μF | 0.28μF |
| Lo | 87.5mH | 0.56mH |

Note 2 The intrinsic safe apparatus and wirings shall be accordance to following formulas; for example: Ui ≥ Uo Ii ≥ Io Pi ≥ Po Ci+Cc ≤ Co Li+Lc ≤ Lo
*: Therefore, the values are allowable only at Li ≤ 1%Lo and Ci ≤ 1%Co of the intrinsic safe apparatus. (In the case of 50% of Co and Lo parameters are applicable,the maximum capacitance allowed shall not be more than Co = 1 μF for IIB and Co= 600 nF for IIC.)

### Discrete Input Barrier with Redundant Output

| Safety Input Points | Safety Output Points | Auxiliary Input Points [1] | Auxiliary Output Points (Relay Output) | Reset (Start) [2 3] | Part Number |
|---|---|---|---|---|---|
| 2 | 2NO | Without | Without | Auto reset (Auto start) | EB3N-A2ND |
| | | | | Manual reset (Manual start) | EB3N-M2ND |
| 2 | 2NO | 5 (1 common) | 5NO (1 common) | Auto reset (Auto start) | EB3N-A2R5D |
| | | | | Manual reset (Manual start) | EB3N-M2R5D |

1. A maximum of five monitor contacts from safety input devices can be connected to the auxiliary input terminals. In addition, non-safety input devices can also be connected to the auxiliary input terminals.
2. On auto reset (auto start) models, when the safety condition is met (two safety inputs are both on), safety outputs are turned on automatically.
   Connect the reset (start) input terminals Y1 and Y2 together except for the following cases:
   When connecting a contactor or force guided relay to the safety output of the EB3N, connect the NC contacts of the contactor or force guided relay to the reset (start) input terminals Y1 and Y2 of the EB3N for use as a backcheck input signal.
3. On manual reset (manual start) models, while the safety condition is met (two safety inputs are both on), safety outputs are turned on at the falling edge of the reset switch (start switch) signal (OFF → ON → OFF) (start off check).
   Manual reset (manual start) models have a monitoring function of reset switch contacts (detection of welded contacts). Use NO contacts of a momentary switch for the reset (start) input.
   When connecting a contactor or force guided relay to the safety output of the EB3N, connect the NC contacts of the contactor or force guided relay to the reset (start) input terminals Y1 and Y2 of the EB3N for use as a backcheck input signal.

## Selection Guide

1. Selecting the reset (start) function

Auto reset (auto start): Select this model when connecting safety control devices, such as safety relay modules or safety controllers, to the EB3N safety outputs to set up a safety system, using the reset (start) function of the safety control device.

Select this model when connecting contactors or force guided relays to the EB3N safety outputs to set up a safety system, and a risk assessment on the entire system has not found any safety problem in using auto reset (auto start).

Manual reset (manual start): Select this model when connecting contactors or force guided relays to the EB3N safety outputs to set up a safety system, and a risk assessment on the entire system has found that manual reset (manual start) is necessary.

2. Selecting the auxiliary outputs

Without auxiliary outputs: Select this model when the operating status of safety input devices are not monitored.

With auxiliary outputs: Select this model when the operating status of safety input devices are monitored or when non-safety input devices are also connected.

# Specifications

## EB3N General Specifications

| | | | |
|---|---|---|---|
| Rated Power Voltage | | | 24V DC |
| Power Voltage Range | | | 20.4 to 26.4V DC |
| Operating Temperature | | | –20 to +60°C (no freezing)<br>UL: –20 to +40°C<br>(no freezing) |
| Operating Humidity | | | 45 to 85% RH<br>(no condensation) |
| Power Consumption | Without auxiliary output | | 5.5W maximum |
| | With auxiliary output | | 7.0W maximum |
| Safety Output | Contacts | 13-14, 23-24 | 2NO |
| | Rated Load | Resistive | 30V DC, 1A |
| | | Inductive | DC-13, 24V, 1A |
| | Response (rated voltage) | Turn on | 100 ms maximum |
| | | Turn off | 20 ms maximum |
| Auxiliary Output | Contacts | A* - C1 | 5NO/1 common |
| | Rated Load | Resistive | 24V DC, 3A,<br>common terminal 5A max. |
| | Response (rated voltage) | Turn on | 15 ms maximum |
| | | Turn off | 10 ms maximum |
| Mounting | | | DIN rail or panel mounting |

*: Channel Numbers: 1 to 5

## EB3N Safety Specifications

| | |
|---|---|
| Category | 4 |
| Performance Level (PL) | e |
| Mean Time to Dangerous Failure (MTTFd) | 100 years |
| Diagnostic Range | 99% minimum |

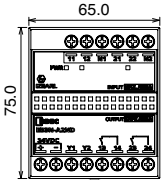
Calculation conditions for MTTFd
$t_{cycle}$: Mean operation cycle = 1 hour
$h_{op}$: Mean operation hours per day = 24 hours
$d_{op}$: Mean operation days per year = 365 days
Note: When $t_{cycle}$ is shorter than 1 hour, MTTFd will decrease

## EB3N Certifications

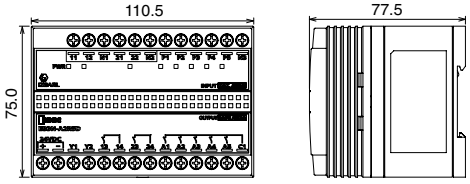
| Certification Organization | Ratings | Certification Number |
|---|---|---|
| UL | Class I, Zone 0, [AExia] II C<br>Class I, II, III, Div. 1, Groups A, B, C, D, E, F and G | E234997 |
| PTB (IEC-Ex) | [Exia] II C, [Exia D] | IEC Ex PTB 10.0015 |
| PTB (ATEX) | II (1) G [Exia] II C<br>II (1) D [Exia D] | PTB 09 ATEX 2046 |
| TIIS | Discrete Input Barriers with Redundant Output [Exia] II C<br>Switch (EB9Z-A) Exia II CT6<br>Switch (EB9Z-A1) Exia II BT6 | TC18753<br>TC15758<br>TC15961 |
| CQST | [Exia] IIC | CNEx11.0038 |

## Dimensions (mm)

EB3N-A2ND
EB3N-M2ND




EB3N-A2R5D
EB3N-M2R5D



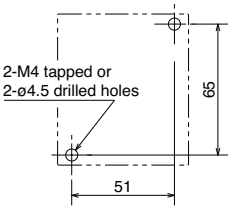

### Terminal Functions

| | |
|---|---|
| 24V DC | Power |
| Y1-Y2 | Reset input (Start input) |
| 11-12 | Safety input 1 |
| 21-22 | Safety input 2 |
| N1, N2 | Signal ground |
| P*-N3 | Auxiliary input |
| 13-14 | Safety output 1 |
| 23-24 | Safety output 2 |
| A*-C1 | Auxiliary output |

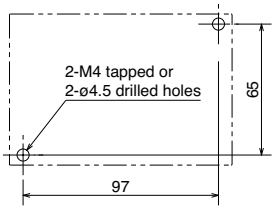
*: 1 to 5

### Mounting Hole Layout

EB3N-A2ND
EB3N-M2ND

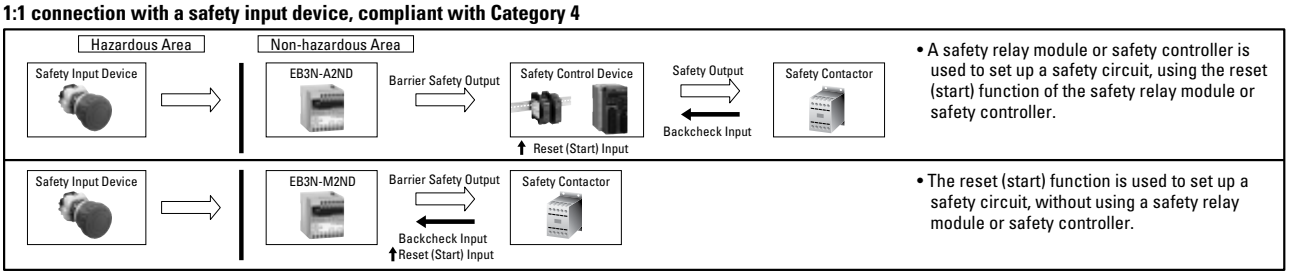



EB3N-A2R5D
EB3N-M2R5D




### EB3N System Configuration Examples

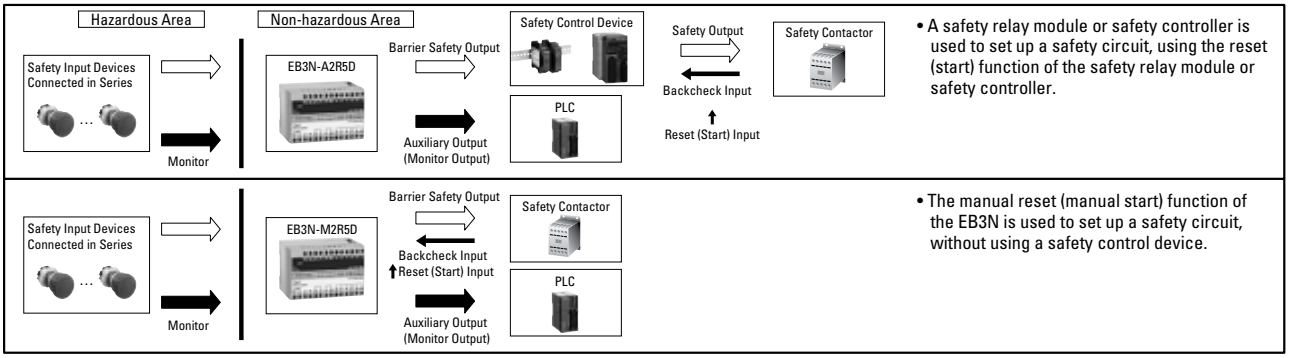
**1:1 connection with a safety input device, compliant with Category 4**




- A safety relay module or safety controller is used to set up a safety circuit, using the reset (start) function of the safety relay module or safety controller.
- The reset (start) function is used to set up a safety circuit, without using a safety relay module or safety controller.

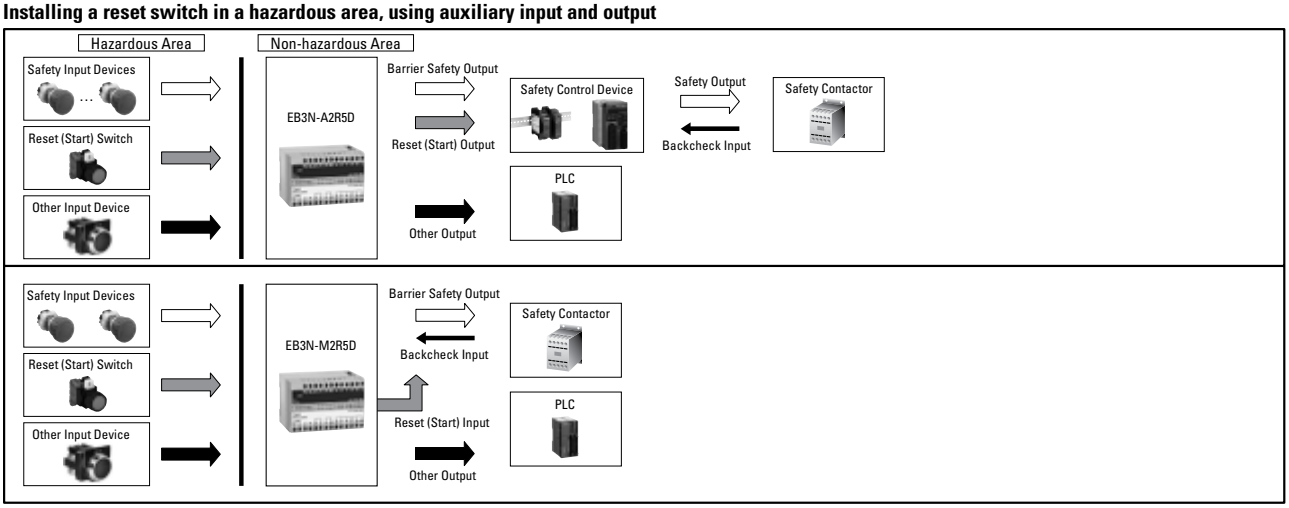
**Connection with multiple safety input devices, capable of monitoring up to 5 contact operations, compliant with Category 3**

For monitoring operating statuses of safety input devices located in a non-hazardous area




- A safety relay module or safety controller is used to set up a safety circuit, using the reset (start) function of the safety relay module or safety controller.
- The manual reset (manual start) function of the EB3N is used to set up a safety circuit, without using a safety control device.

**Installing a reset switch in a hazardous area, using auxiliary input and output**




### Safety Input Devices Connectable to Safety Input Terminals (Examples)

Emergency stop switch: (Non-illuminated) XW1E-BV402M-R, XN4E-BL412MRH
Safety switch: HS6B-02B05, HS1B-02R

## Instructions

### Notes for Operation

1. Do not disassemble, repair, or modify the EB3N discrete input barrier with redundant output, otherwise the safety characteristics may be impaired.
2. Use the EB3N within its specification values.
3. The EB3N can be mounted in any direction.
4. Mount the EB3N on a 35-mm-wide DIN rail or directly on a panel surface using screws. When mounting on a DIN rail, push in the clamp and use end clips to secure the EB3N. When mounting on a panel surface, tighten the screws firmly.
5. Excessive noise may cause malfunction or damage to the EB3N. When the internal voltage limiting circuit (thyristor) has shut down the power due to noise, remove the cause of the noise before powering up again.
6. The internal power circuit contains an electronic fuse to suppress overcurrents. When the electronic fuse has tripped, shut down the power, remove the cause of the overcurrent before powering up again.
7. Use crimping terminals with insulation sheath for wiring. Tighten the terminal screws, including unused terminal screws, to a recommended tightening torque of 0.6 to N·m using a screwdriver of ø5.5 mm in diameter.
8. Before inspecting or replacing the EB3N, turn off the power.

### Notes for Machine Safety

1. Operate the safety input device to check the EB3N functionality everyday.
2. For safety input devices, such as safety switches or emergency stop switches, connected to the EB3N, use safety standard-compliant devices with direct opening action and 2NC contacts.
3. Do not use the auxiliary input as a safety input.
4. For safety control devices connected with the EB3N, use machine safety standard-compliant devices with a disparity detection function.
5. Use safety inputs and safety outputs in a circuit configuration compliant with safety requirements.
6. To calculate the safety distance, take into consideration the response time of all devices comprising the system, such as the EB3N and safety devices connected to the EB3N.
7. Separate the input and output wiring from power lines and motor lines.
8. When using multiple EB3N discrete input barriers with redundant output, do not connect one switch to more than one EB3N. Use separate switches for each EB3N.
9. To ensure EMC, use shielded cables for safety inputs and auxiliary inputs. Connect the shield to the FG of the control panel on which the EB3N is mounted.
10. For protection against overcurrents, connect an IEC60127-2-compliant 2A fast-blow fuse (5 × 20 mm).
11. Evaluate the ISO 13849-1 category and performance level in consideration of the entire system.

## Safety Notes

1. Install the EB3N in an enclosure capable of protecting against mechanical shocks at a hazardous location in accordance with intrinsic safety ratings and parameters.
2. Install and wire the EB3N so that the EB3N is not subject to electromagnetic and electrostatic induction and does not contact with other circuits.
   For example, keep a minimum spacing of 50 mm between intrinsically safe and non-intrinsically safe circuits, or provide a metallic separating board between the intrinsically safe circuit and non-intrinsically safe circuit. When providing a metallic separating board, make sure that the board fits closely to the enclosure (top, bottom, and both sides). Allowable clearance between the board and the enclosure is 1.5 mm at the maximum.
   When a motor circuit or high-voltage circuit is installed nearby, keep a wider spacing than 50 mm between intrinsically safe and non-intrinsically safe circuits.
3. Keep a minimum spacing of 3 mm between the terminal or relay terminal block of the intrinsically safe circuit and the grounded metal parts of the metal enclosure.
4. Connect the terminals so that IP20 is ensured.
5. To prevent disengaged wires from contacting with other intrinsically safe circuits, bind together the end of wires.
6. Make sure that the voltage of the power supply for the devices connected to the non-intrinsically safe circuit or the internal voltage of such devices does not exceed 250V AC/DC 50/60 Hz (UL rating: 125V AC 50/60 Hz) or 250V DC (UL rating: 200V DC) under any normal and abnormal conditions.
7. Make sure that the wiring of intrinsically safe circuits does not contact with other circuits or is not subject to electromagnetic and electrostatic inductions, otherwise protection from hazards is not ensured.
8. When identifying intrinsically safe circuits by color, use light blue terminal blocks and cables.
9. When wiring the intrinsically safe circuit, determine the distance to satisfy the wiring parameters shown below.
   a) Wiring capacitance $Cw \leq Co - Ci$
      Co: Intrinsically safe circuit allowable capacitance
      Ci: Internal capacitance of switches
   b) Wiring inductance $Lw \leq Lo - Li$
      Lo: Intrinsically safe circuit allowable inductance
      Li: Internal inductance of switches
   c) Wiring resistance $\leq Rw$
      Rw: Allowable wiring resistance

## Switches in the Hazardous Area

1. A switch contains the switch contact, enclosure, and internal wiring. A switch contact refers to an ordinary switching device which consists of contacts only.
2. When the switch has internal wiring or lead wire, make sure that the values of internal capacitance (Ci) and inductance (Li) are within the certified values.
3. Enclose the bare live part of the switch contact in an enclosure of IP20 or higher protection.

# EB3L Discrete Output Barriers

126 types of pilot lights and buzzers can be connected. Illuminated pushbuttons and illuminated selector switches can be connected by combining with the EB3C discrete input barrier. No grounding required.

### Key features:

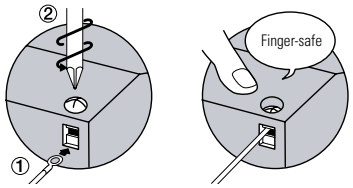
| Ratings | |
|---|---|
| Discrete Output Barrier | [Exia] II C |
| Pilot Light (separate wiring) | Exia II CT6 |
| Pilot Light (common wiring) | Exia II CT4 |
| Illuminated Pushbutton | Exia II CT4 |
| Illuminated Selector Switch | Exia II CT4 |
| Buzzer (separate wiring) | Exiab II CT6 |

- IEC60079 compliant
- Compact and lightweight
- 8- and 16-channel types are available in common wiring types, ideal for connection to PLCs. 16-circuit types are also available with a connector.
- Universal AC power voltage (100 to 240V AC or 24V DC power [UL rating: 100 ~ 120V AC])
- No grounding required
- IDEC's original spring-up terminal minimizes wiring time.
- Installation, 35-mm-wide DIN rail mounting or direct screw mounting
- ø6, ø8, ø10, ø22 and ø30 pilot lights available
- Illuminated pushbuttons and illuminated selector switches can be connected by combining with the EB3C discrete input barrier. Illumination colors: Amber, blue, green, red, white, and yellow (pushlock turn reset type: red only)
- Continuous and intermittent sound types are available for buzzers (ø30).
- Global usage
  USA: UL/FM
  Europe: CE marking
  Global: IECEx, ATEX
  Japan: TIIS
  China: CQST
  Korea: KCs
- Ship class: NK (Japan), KR (Korea)

### Illuminated Pushbutton/Selector Switches

Illuminated pushbutton/selector switches can be used with the combination of EB3C and EB3L.

### Spring-up Fingersafe Terminals Reduce Wiring Time




### Entity Barrier Parameters

Ta= 60°C, Um= 250V, (Um=125V UL only), Uo=13.2V, Io= 14.2mA, Po= 46.9mW at each channel
Pn-Nn Io=227.2mA, Po= 750mW at max 16 channels Pn-Nn

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Io(mA) | 14.2 | 28.4 | 42.6 | 56.8 | 71.0 | 85.2 | 99.4 | 113.6 | 127.8 | 142.0 | 156.2 | 170.4 | 184.6 | 198.8 | 213.0 | 227.2 | Combined Lo(mH) | |
| Po(mW) | 46.9 | 93.8 | 140.6 | 187.5 | 234.3 | 281.2 | 328.1 | 375.9 | 421.8 | 468.7 | 515.5 | 562.4 | 609.2 | 656.1 | 702.9 | 750 | | |
| Co(µF) | 0.67 | 0.65 | 0.63 | 0.61 | 0.59 | 0.57 | 0.55 | 0.53 | 0.51 | 0.49 | 0.47 | 0.44 | 0.42 | 0.39 | - | - | 1.0 | |
| | 0.79 | 0.77 | 0.76 | 0.75 | 0.73 | 0.72 | 0.70 | 0.69 | 0.67 | 0.66 | 0.64 | 0.62 | 0.61 | 0.59 | 0.57 | 0.55 | 0.5 | |
| | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.93 | 0.92 | 0.91 | 0.90 | 0.88 | 0.87 | 0.86 | 0.85 | 0.84 | 0.2 | |
| | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.1 | |
| Note 1 Added to above table, the next values combined Lo and Co are allowable; | | | | | | | | | | | | | | | | | | |
| Io(mA) | 14.2 | | | | | | 28.4 | | | | | | 227.2 | | | | | |
| Lo(mH) | 175* | 87.5 | 30.0 | 2.5 | 0.55 | 0.25 | 43.5* | 21.5 | 20.0 | 3.5 | 0.43 | 0.25 | 0.68* | 0.34 | 0.68 | 0.6 | 0.22 | 0.13 |
| Co(µF) | 0.90* | 0.45 | 0.33 | 0.54 | 0.77 | 0.90 | 0.90* | 0.45 | 0.30 | 0.48 | 0.80 | 0.90 | 0.90* | 0.45 | 0.45 | 0.49 | 0.80 | 0.90 |

TIIS, NK only
Ta=60°C, Um=250V

| | 1 ch Seperate | 16 ch Common 16 |
|---|---|---|
| Uo | 13.2V | 13.2V |
| Io | 14.2mA | 227.2mA |
| Po | 46.9mW | 750mW |
| Co | 0.47µF | 0.365µF |
| Lo | 87.5mH | 0.425mH |

Note 2 The intrinsic safe apparatus and wirings shall be accordance to following formulas; for example: Ui ≥ Uo Ii ≥ Io Pi ≥ Po Ci+Cc ≤ Co Li+Lc ≤ Lo
*: Therefore, the values are allowable only at Li ≤ 1%Lo and Ci ≤ 1%Co of the intrinsic safe apparatus. (In the case of 50% of Co and Lo parameters are applicable,the maximum capacitance allowed shall not be more than Co = 1 µF for IIB and Co= 600 nF for IIC.)

### Common Wiring for PLC Inputs

8- and 16-circuit types are available in common wiring types, ideal for connection to PLCs (DC voltage only).

### Connector Type

MIL connector on the non-hazardous side

- Easy connection to PLCs
- Wiring is reduced by 90%
- Various 20-pin MIL connectors can be connected.

# Specifications

## Electrical Specifications

| Ratings | | Intrinsic safety type (IEC compliant) [Exia] II C |
|---|---|---|
| Degree of Protection | | IP20 (IEC60529) |
| Installation Location | Discrete Output Barrier | Safe indoor place (non-hazardous area) |
| | Pilot Light, Illuminated Switch, | For zone 0, 1, 2 hazardous areas |
| | Buzzer | For zone 1 and 2 hazardous areas |
| Non-intrinsically Safe Circuit Maximum Voltage (Um) | | 250V AC 50/60Hz, 250V DC<br>UL value: 125V AC |
| Operation | | Input ON, Output ON (1:1) |

## Certifications

| Certification Organization | Ratings | Certification No. |
|---|---|---|
| UL | Class I, II, III Div. 1<br>Group A, B, C, D, E, F, and G<br>Class I, Zone 0 [AExia] II C | E234997 |
| FM | Class I, II, III Div. 1<br>Group A, B, C, D, E, F, and G<br>Class I, Zone 0 [AExia] II C | 3047250 |
| PTB (IEC-Ex) | [Exia] IIC: Gas vapor | IECEx PTB 10.0015 |
| PTB (ATEX) | II(1)G [Exia] IIC: Gas vapor<br>II(1)D [Exia] IIIC: Dust | PTB09 ATEX2046 |
| TIIS | Discrete output barrier: [Exia] II C | TC20541 |
| | Pilot light/miniature pilot light: (separate wiring): Exia II CT6 | TC16361 |
| | Pilot light/miniature pilot light: (common wiring): Exia II CT4 | TC16360 |
| | Illuminated switch: Exia II CT4 | TC16362 |
| | Buzzer: Exib II CT6 | TC20797 |
| NK | Discrete output barrier: [Exia] II C<br>Buzzer: Exib II CT6 | Type Test No. 13T606<br>pending |
| CQST | [Exia Ga] IIC | CNEx 14.0047 |
| KCs | Discrete output barrier: [Exia] II C<br>Buzzer: Exib II CT6 | KCS14-AV4BO-0375<br>pending |
| KR | [Exia] IIC | pending |

Note: Illuminated switches, pilot lights, and miniature pilot lights are certified by TIIS and NK only. Other certification organizations, such as UL, regard these units as simple apparatus, and require no certification.

## General Specifications

| Power Voltage Type | AC Power | DC Power |
|---|---|---|
| Rated Power Voltage | 100 to 240V AC<br>(UL rating: 100 ~ 120V AC) | 24V DC |
| Allowable Voltage Range | 85 to 264V AC<br>(UL rating: 85 ~ 125V AC) | 21.6 to 26.4V DC |
| Rated Frequency | 50/60 Hz (allowable range: 47 to 63 Hz) | — |
| Inrush Current | 10A (100V AC)<br>20A (200V AC) | 10A |
| Dielectric Strength (1 minute, 1 mA) | Between intrinsically safe circuit and non-intrinsically safe circuit: 1526.4V AC | |
| | Between AC power and signal input: 1500V AC | |
| Operating Temperature | –20 to +60°C (no freezing) | |
| Storage Temperature | –20 to +60°C (no freezing) | |
| Operating Humidity | 45 to 85% RH (no condensation) | |
| Atmosphere | 800 to 1100 hPa | |
| Pollution Degree | 2 (IEC60664) | |
| Insulation Resistance | 10 MΩ minimum (500V DC megger, between the same poles as the dielectric strength) | |
| Vibration Resistance (damage limits) | Panel mounting: 10 to 55 Hz, amplitude 0.75 mm (2 hours each on X, Y, Z) | |
| | DIN rail mounting: 10 to 55 Hz, amplitude 0.35 mm (2 hours each on X, Y, Z) | |
| Shock Resistance (damage limits) | Panel mounting: 500 $m/s^2$ (3 times each on X, Y, Z) | |
| | DIN rail mounting: 300 $m/s^2$ (3 times each on X, Y, Z) | |
| Terminal Style | M3 screw terminal | |
| Mounting | 35-mm-wide DIN rail or panel mounting (M4 screw) | |
| Power Consumption (approx.) | 8.8 VA (EB3L-S10SAN at 200V AC)<br>5.2 W (EB3L-S16CSDN at 24V DC) | |

## Part Numbers

### Discrete Output Barriers

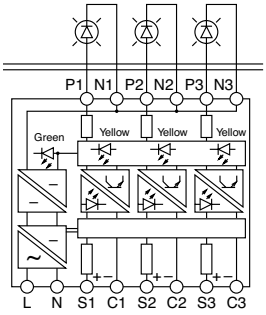
| Power Voltage | Connection to Non-intrinsically Safe Circuit | Input | Input Wiring Method | Number of Channels | Part Number | Weight (g) |
|---|---|---|---|---|---|---|
| 100 to 240V AC (UL rating: 100 ~ 120V AC) | Screw Terminal | Source | Separate/Common Wiring Compatible | 1 | EB3L-S01SAN | 150 |
| | | | | 2 | EB3L-S02SAN | 180 |
| | | | | 3 | EB3L-S03SAN | 190 |
| | | | | 5 | EB3L-S05SAN | 250 |
| | | | | 6 | EB3L-S06SAN | 260 |
| | | | | 8 | EB3L-S08SAN | 330 |
| | | | | 10 | EB3L-S10SAN | 360 |
| | | | Common Wiring Only | 8 | EB3L-S08CSAN | 260 |
| | | Sink | Separate/Common Wiring Compatible | 1 | EB3L-S01KAN | 150 |
| | | | | 2 | EB3L-S02KAN | 180 |
| | | | | 3 | EB3L-S03KAN | 190 |
| | | | | 5 | EB3L-S05KAN | 250 |
| | | | | 6 | EB3L-S06KAN | 260 |
| | | | | 8 | EB3L-S08KAN | 330 |
| | | | | 10 | EB3L-S10KAN | 360 |
| | | | Common Wiring Only | 8 | EB3L-S08CKAN | 260 |
| 24V DC | Screw Terminal | Source | Separate/Common Wiring Compatible | 1 | EB3L-S01SDN | 130 |
| | | | | 2 | EB3L-S02SDN | 160 |
| | | | | 3 | EB3L-S03SDN | 170 |
| | | | | 5 | EB3L-S05SDN | 240 |
| | | | | 6 | EB3L-S06SDN | 250 |
| | | | | 8 | EB3L-S08SDN | 310 |
| | | | | 10 | EB3L-S10SDN | 250 |
| | | | Common Wiring Only | 8 | EB3L-S08CSDN | 340 |
| | | | | 16 | EB3L-S16CSDN | 350 |
| | | Sink | Separate/Common Wiring Compatible | 1 | EB3L-S01KDN | 130 |
| | | | | 2 | EB3L-S02KDN | 160 |
| | | | | 3 | EB3L-S03KDN | 170 |
| | | | | 5 | EB3L-S05KDN | 240 |
| | | | | 6 | EB3L-S06KDN | 250 |
| | | | | 8 | EB3L-S08KDN | 310 |
| | | | | 10 | EB3L-S10KDN | 340 |
| | | | Common Wiring Only | 8 | EB3L-S08CKDN | 250 |
| | | | | 16 | EB3L-S16CKDN | 350 |
| | Connector | Source | Common Wiring Only | 16 | EB3L-S16CSD-CN | 350 |
| | | Sink | | 16 | EB3L-S16CKD-CN | 350 |

### Accessories

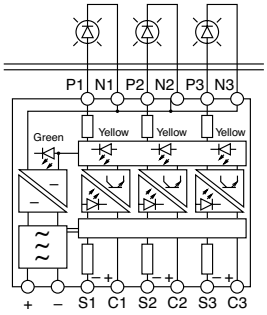
| Name | Part Number | Description |
|---|---|---|
| DIN Rail | BAA1000 | Aluminum (1m long, 10.5mm high) |
| | BAP1000 | Steel (1m long, 7.5mm high) |
| End Clip | BNL6 | Medium DIN rail end clip |

## Internal Circuit Block Diagram

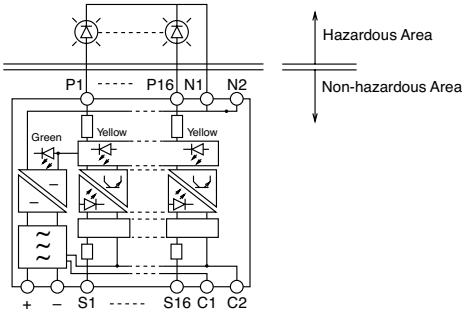
AC Power Source Input




DC Power Sink Input

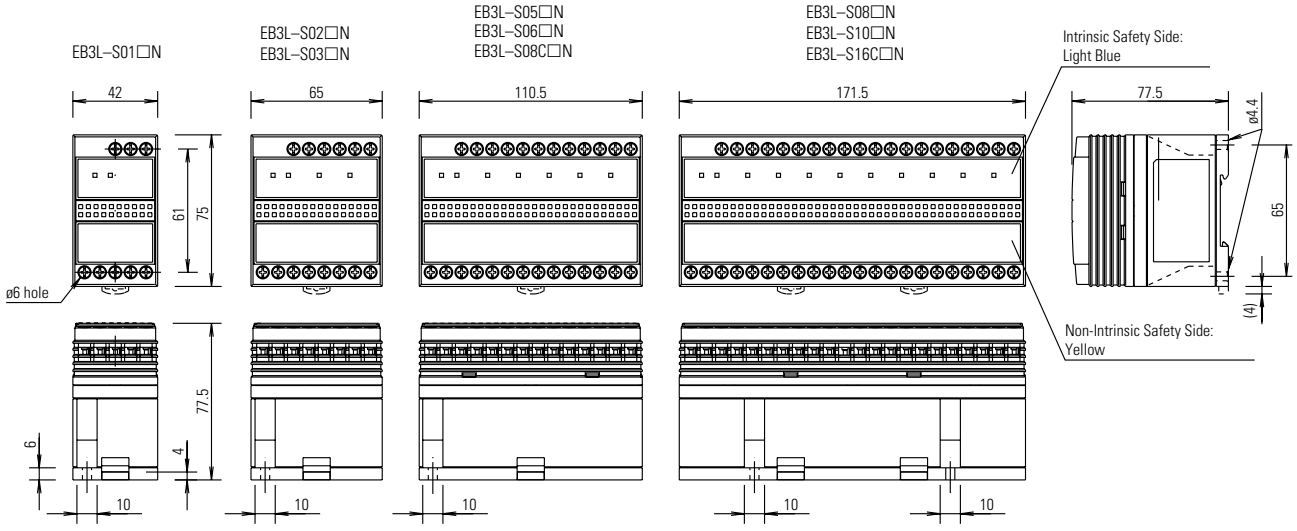



Connector Wiring Source Input

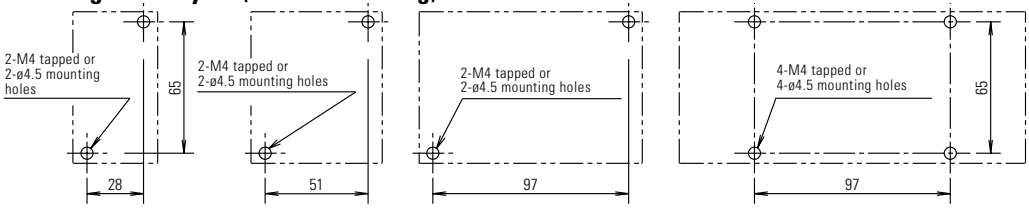



## Dimensions (mm)

### Terminal

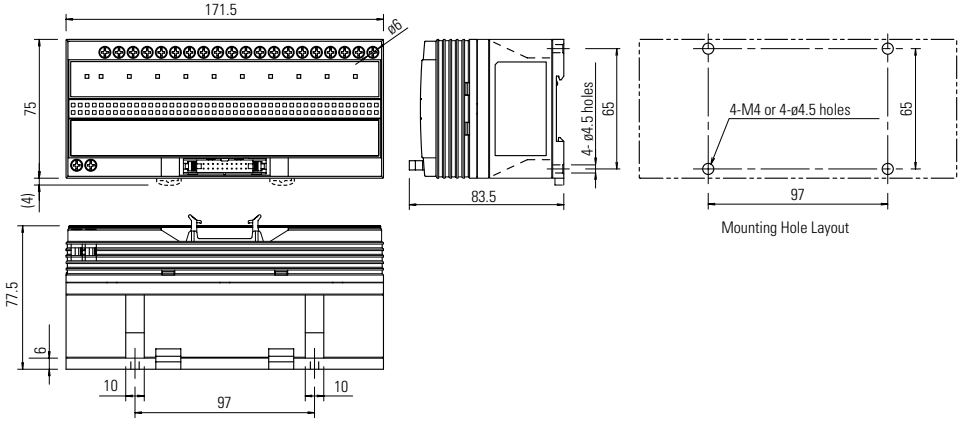



### Mounting Hole Layout (Screw Mounting)

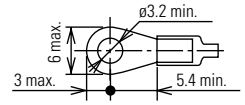


## Connector

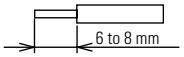
EB3L–S16C☐D



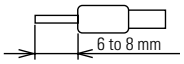

## Applicable Crimping Terminal




Solid Wire - Strip wire end

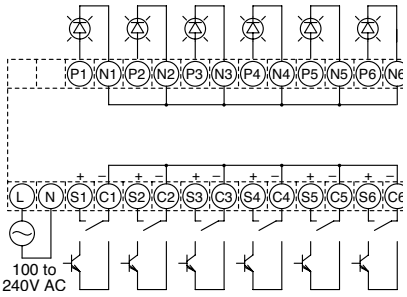



Stranded Wire - use a ferrule

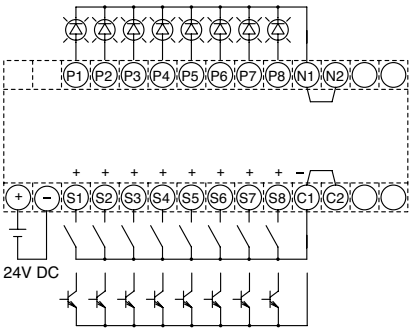



## Non-intrinsically Safe External Input Wiring Examples

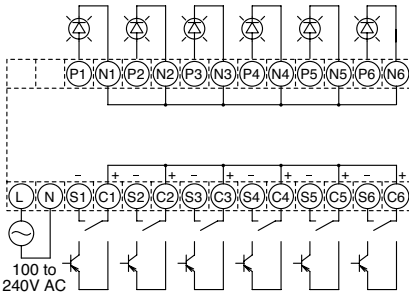
6-channel Source
(Ex.: EB3L-S06SAN)



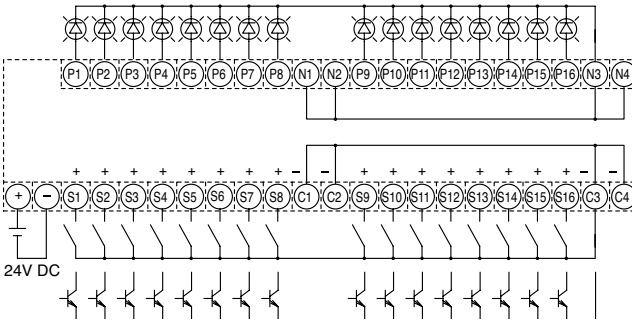

8-channel Common Wiring, Source
(Ex.: EB3L-S08CSDN)




6-channel Sink
(Ex. EB3L-S06KAN)

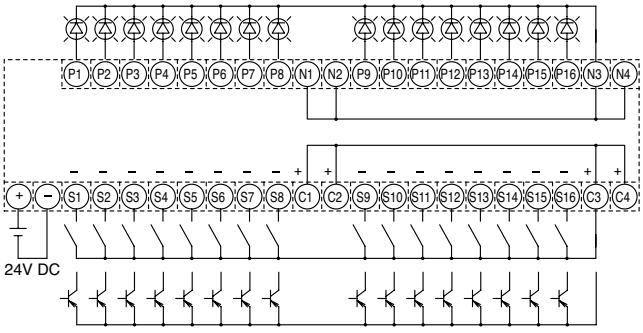



16-channel Common Wiring, Source
(Ex.: EB3L-S16CSDN)




Note: Source input type can be connected to PLC sink output type C terminal is the negative common line.

16-channel Common Wiring, Sink
(Ex.: EB3L-S16CKDN)

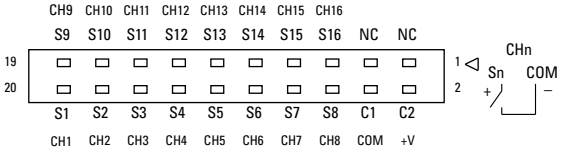


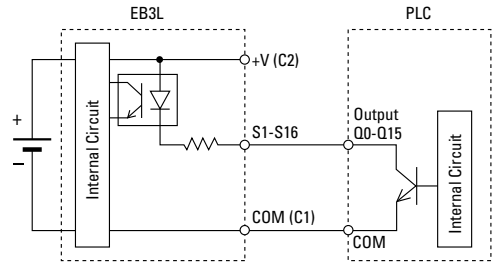

Note: Sink input type can be connected to PLC source output type C terminal is the positive common line.

All dimensions are in mm

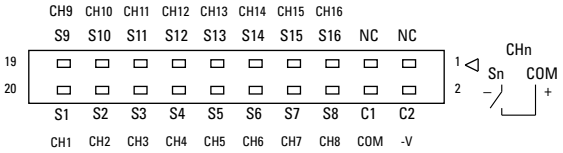
## Connector Wiring Terminal Arrangement

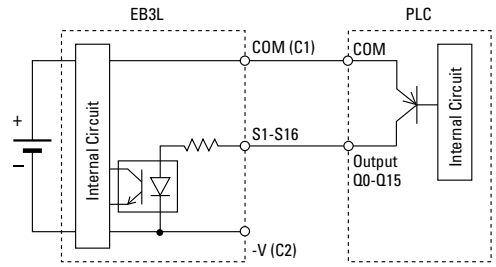
EB3L-S16CSD-CN




EB3L-S16CKD-CN




Wiring Example with IDEC's MicroSmart PLC Output Modules

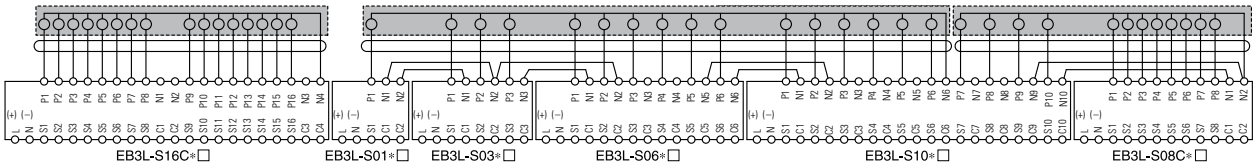
| FC4A-T16K3 | | EB3L-S16CSD-CN | | FC4A-T16S3 | | EB3L-S16CKD-CN | |
|---|---|---|---|---|---|---|---|
| Terminal | Output | Input | Terminal | Terminal | Output | Input | Terminal |
| 20 | Q0 | S1 | 20 | 20 | Q0 | S1 | 20 |
| 19 | Q10 | S9 | 19 | 19 | Q10 | S9 | 19 |
| 18 | Q1 | S2 | 18 | 18 | Q1 | S2 | 18 |
| 17 | Q11 | S10 | 17 | 17 | Q11 | S10 | 17 |
| 16 | Q2 | S3 | 16 | 16 | Q2 | S3 | 16 |
| 15 | Q12 | S11 | 15 | 15 | Q12 | S11 | 15 |
| 14 | Q3 | S4 | 14 | 14 | Q3 | S4 | 14 |
| 13 | Q13 | S12 | 13 | 13 | Q13 | S12 | 13 |
| 12 | Q4 | S5 | 12 | 12 | Q4 | S5 | 12 |
| 11 | Q14 | S13 | 11 | 11 | Q14 | S13 | 11 |
| 10 | Q5 | S6 | 10 | 10 | Q5 | S6 | 10 |
| 9 | Q15 | S14 | 9 | 9 | Q15 | S14 | 9 |
| 8 | Q6 | S7 | 8 | 8 | Q6 | S7 | 8 |
| 7 | Q16 | S15 | 7 | 7 | Q16 | S15 | 7 |
| 6 | Q7 | S8 | 6 | 6 | Q7 | S8 | 6 |
| 5 | Q17 | S16 | 5 | 5 | Q17 | S16 | 5 |
| 4 | COM | COM | 4 | 4 | COM | COM | 4 |
| 3 | COM | NC | 3 | 3 | COM | NC | 3 |
| 2 | +V | +V | 2 | 2 | –V | –V | 2 |
| 1 | +V | NC | 1 | 1 | –V | NC | 1 |

Note: The wiring in dashed line does not affect the operation of the EB3L.
Applicable connector is IDEC's JE1S-201.
Output power for PLC outputs is supplied by the EB3L, therefore the PLC output does not need an external power supply.

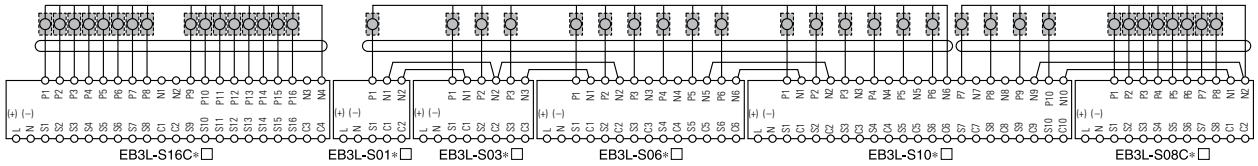
## Wiring Example of Intrinsically Safe External Outputs

### 1. Common Wiring (Maximum 16 circuits) (Buzzers cannot be wired in a common line.)*

All output lines are wired to a common line inside the intrinsically safe equipment (one common line per intrinsically safe circuit) - DC input models only.

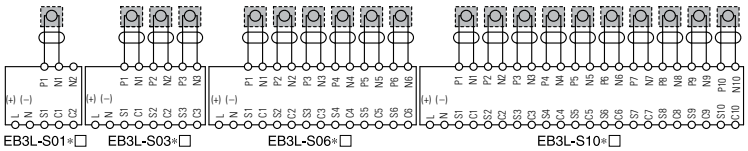



All input lines are wired to a common line outside the intrinsically safe equipment (one common line per intrinsically safe circuit).




### 2. Separate Wiring

Each output line of the EB3L makes up one independent intrinsically safe circuit of a pilot light or buzzer.




When using two or more EB3L's to set up one intrinsically safe circuit in the common wiring configuration, interconnect two neutral terminals (N1 through N10) on each EB3L between adjacent EB3L's in a parallel.

### 3. Wiring Illuminated Pushbuttons and Illuminated Selector Switches

(A maximum of 16 channels of EB3L and EB3C can be wired to a common line.)

The following example illustrates the wiring for a total of 10 contacts used by three illuminated pushbuttons (LB1 to LB3) and three illuminated selector switches (LS1 to LS3).

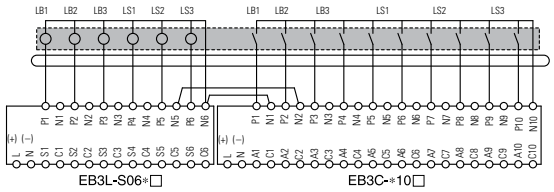
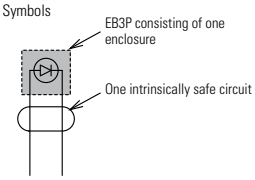
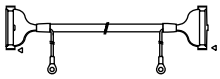
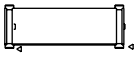
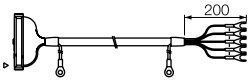
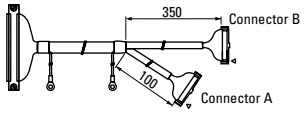



Diagram Symbols

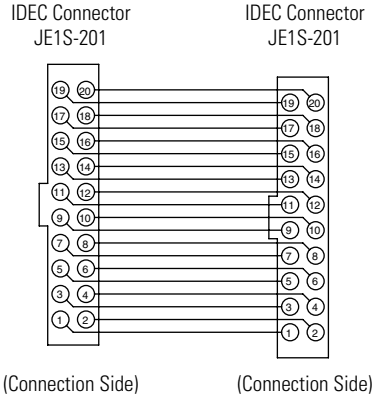



*This is permitted under TIIS approvals

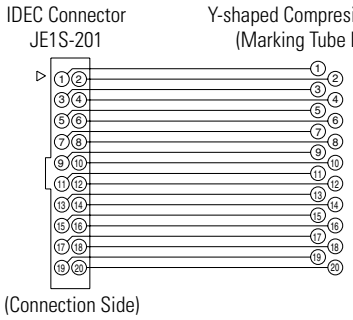
## Recommended Connector Cable for Connector Types

| Description | | No. of Poles | Length (m) | Part Number | Shape | Applicable Type |
|---|---|---|---|---|---|---|
| I/O Terminal Cable | With Shield | 20 | 0.5 | FC9Z-H050A20 |  | IDEC MicroSmart I/O Module |
| | | | 1 | FC9Z-H100A20 | | |
| | | | 2 | FC9Z-H200A20 | | |
| | | | 3 | FC9Z-H300A20 | | |
| | Without Shield | | 0.5 | FC9Z-H050B20 |  | IDEC MicroSmart I/O Module |
| | | | 1 | FC9Z-H100B20 | | |
| | | | 2 | FC9Z-H200B20 | | |
| | | | 3 | FC9Z-H300B20 | | |
| Cable with Crimping Terminal | | | 1 | BX9Z-H100E4 |  | Screw Terminal |
| | | | 2 | BX9Z-H200E4 | | |
| | | | 3 | BX9Z-H300E4 | | |
| 40-pin Cable for PLC | | | 1 | BX9Z-H100B |  | Mitsubishi A Series Output Module (sink) ↓ EB3L-S16CSD-CN |
| | | | 2 | BX9Z-H200B | | |
| | | | 3 | BX9Z-H300B | | |

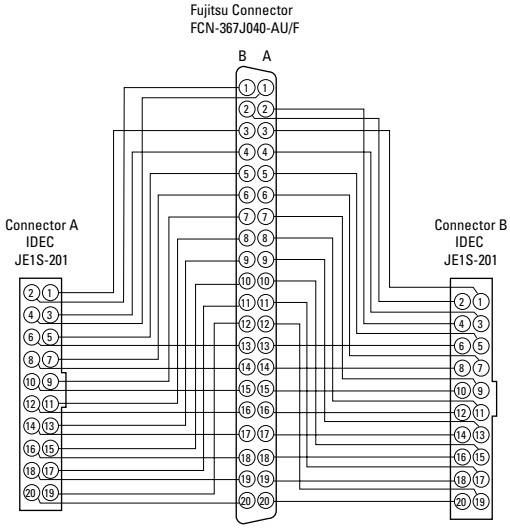
**FC9Z-H□□□A, FC9Z-H□□□B Internal Connection**




**FC9Z-H□□□ E4 Internal Connection**




**BX9Z-H□□□B Internal Connection**



# Switches and Pilot Devices

## General Specifications for Pilot Light, Illuminated Pushbutton, Illuminated Selector Switch, and Buzzer

| | | |
|---|---|---|
| Operating Temperature | | –20 to +60°C (no freezing) |
| Operating Humidity | | 45 to 85% RH (no condensation) |
| Dielectric Strength (1 mA, 1 minute) | | EB3P: 1000V AC<br>IPL1: 500V AC<br>(between intrinsically safe circuit and dead parts) |
| Insulation Resistance | | 10 MΩ minimum (500V DC megger, between the same poles as the dielectric strength) |
| Pilot Light and Miniature Pilot Light | Degree of Protection | IP65 (IEC60529) (except for terminals)<br>EB3P-LU/IPL1: IP40 |
| | Lens/Illumination Color | Pilot light: Amber, blue, green, red, white, yellow<br>Miniature pilot light: Amber, green, red, white, yellow |
| | Intrinsic Safety Ratings and Parameters | 1-channel Separate Wiring<br>Maximum input voltage (Ui): 13.2V<br>Maximum input current (Ii): 14.2 mA<br>Maximum input power (Pi): 46.9 mW<br>Internal capacitance (Ci): ≤ 2 nF<br>Internal inductance (Li): ≤ 5 µH<br>16-channel Common Wiring<br>Maximum input voltage (Ui): 13.2V<br>Maximum input current (Ii): 227.2 mA<br>Maximum input power (Pi): 750 mW<br>Internal capacitance (Ci): ≤ 32 nF<br>Internal inductance (Li): ≤ 80 µH |

| | | |
|---|---|---|
| Illuminated Switch | Degree of Protection | IP65 (IEC60529) (except for terminals)<br>EB3P-LSAW**: IP54 |
| | Illumination Color | Amber, blue, green, red, white, yellow |
| | Contact Voltage/Current | 12V DC ±10%, 10 mA ±20%<br>(when connecting to the EB3C) |
| | Intrinsic Safety Ratings and Parameters | 16-channel Common Wiring<br>Maximum input voltage (Ui): 13.2V<br>Maximum input current (Ii): 227.2 mA<br>Maximum input power (Pi): 750 mW<br>Internal capacitance (Ci): ≤ 32 nF<br>Internal inductance (Li): ≤ 80 µH |
| Buzzer | Degree of Protection | IP20 (IEC60529) (except for terminals) |
| | Sound Volume | 75 dB minimum (at 1 m) |
| | Sound Source | Piezoelectric oscillator (continuous or intermittent) |
| | Intrinsic Safety Ratings and Parameters | 1-channel Separate Wiring<br>Maximum input voltage (Ui): 13.2V<br>Maximum input current (Ii): 14.2 mA<br>Maximum input power (Pi): 46.9 mW<br>Internal capacitance (Ci): ≤ 260 nF<br>Internal inductance (Li): ≤ 80 mH |
| | Weight | 100g |

Note: Connect buzzers in separate wiring. Buzzers cannot be used in common wiring.

## Part Numbers for Pilot Lights, Illuminated Pushbuttons, Illuminated Selector Switches, and Buzzers

| Unit | Size | Series [1] | Shape | Operation Mode | Contact | Ordering Number | Lens Color/ Illumination Color Code* | Operation |
|---|---|---|---|---|---|---|---|---|
| Pilot Light | ø30 | N | Dome | — | — | EB3P-LAN1-* | A: Amber<br>G: Green<br>R: Red<br>S: Blue<br>W: White<br>[5]Y: Yellow | — |
| | | | Square | — | — | EB3P-LUN3B-* | | |
| | | | Rectangular w/Metal Bezel | — | — | EB3P-LUN4-* | | |
| | | | Dome w/Diecast Sleeve | — | — | EB3P-LAD1-* | | |
| | ø22 | TW | Flush | — | — | EB3P-LAW1-* | | |
| | | | Flush(Marking Type) | — | — | EB3P-LAW1B-* | | |
| | | | Dome | — | — | EB3P-LAW2-* | | |
| | | | Square Flush (Marking Type) | — | — | EB3P-LUW1B-* | | |
| | | HW | Round Flush | — | — | EB3P-LHW1-* | | |
| | | | Dome | — | — | EB3P-LHW2-* | | |
| | | | Square Flush | — | — | EB3P-LHW4-* | | |
| | | LW | Round | — | — | EB3P-LLW1-* | | |
| | | | Square | — | — | EB3P-LLW2-* | | |
| | | | Round w/ Square Bezel | — | — | EB3P-LLW3-* | | |
| Miniature Pilot Light | ø10 | UP | Extended | — | — | IPL1-18-* | A: Amber<br>G: Green<br>R: Red<br>W: White<br>[5]Y: Yellow | — |
| | | | Dome | — | — | IPL1-19-* | | |
| | ø8 | | Flush | — | — | IPL1-87-* | | |
| | | | Extended | — | — | IPL1-88-* | | |
| | | | Dome | — | — | IPL1-89-* | | |
| | ø6 | | Flush | — | — | IPL1-67-* | | |
| | | | Extended | — | — | IPL1-68-* | | |
| | | | Dome | — | — | IPL1-69-* | | |

## Part Numbers for Pilot Lights, Illuminated Pushbuttons, Illuminated Selector Switches, and Buzzers, con't

| Unit | Size | Series [1] | Shape | Operation Mode | Contact | Ordering Number [2] | Lens Color/ Illumination Color Code* | Operation |
|---|---|---|---|---|---|---|---|---|
| Illuminated Pushbutton | ø30 | N | Extended | Momentary | 1NO-1NC | EB3P-LBAN211-* | A: Amber G: Green R: Red S: Blue W: White [5]Y: Yellow | — |
| | | | | Maintained | 1NO-1NC | EB3P-LBAON211-* | | |
| | | | Mushroom | Pushlock Turn Reset | 1NO-1NC | EB3P-LBAVN311-R | Red only | |
| | ø22 | TW | Extended | Momentary | 1NO-1NC | EB3P-LBAW211-* | A: Amber G: Green R: Red S: Blue W: White [5]Y: Yellow | |
| | | | | Maintained | 1NO-1NC | EB3P-LBAOW211-* | | |
| | | | Mushroom | Pushlock Turn Reset | 1NO-1NC | EB3P-LBAVW411-R | Red only | |
| | | HW | Round | Momentary | 1NO | EB3P-LBH1W110-* | | |
| | | | | Maintained | 1NO | EB3P-LBHA1W110-* | | |
| | | LW | Round | Momentary | DPDT | EB3P-LBL1W1C2-* | | |
| | | | | Maintained | DPDT | EB3P-LBLA1W1C2-* | | |
| | | | Square | Momentary | DPDT | EB3P-LBL2W1C2-* | | |
| | | | | Maintained | DPDT | EB3P-LBLA2W1C2-* | | |
| Illuminated Selector Switch [3] | ø30 | N | Round | 2-position | 1NO-1NC | EB3P-LSAN211-* | | Maintained |
| | | | | 3-position | 2NO | EB3P-LSAN320-* | | Maintained |
| | ø22 | TW | Round | 2-position | 1NO-1NC | EB3P-LSAW211-* | A: Amber G: Green R: Red S: Blue W: White [5]Y: Yellow | Maintained |
| | | | | 2-position, return from right | 1NO-1NC | EB3P-LSAW2111-* | | Spring return from right |
| | | | | 3-position | 2NO | EB3P-LSAW320-* | | Maintained |
| | | | | 3-position, return from right | 2NO | EB3P-LSAW3120-* | | Spring return from right |
| | | | | 3-position,return from left | 2NO | EB3P-LSAW3220-* | | Spring return from left |
| | | | | 3-position,2-way return | 2NO | EB3P-LSAW3320-* | | 2-way spring return |
| | | HW | Round | 2-position | 1NO-1NC | EB3P-LSHW211-* | | Maintained |
| | | | | 3-position | 2NO | EB3P-LSHW320-* | | Maintained |
| | | LW | Round | 2-position | DPDT | EB3P-LSL1W2C2-* | | Maintained |
| | | | Round w/Square Bezel | 3-position | DPDT | EB3P-LSL3W3C2-* | | Maintained |
| Buzzer | ø30 | — | — | Continuous sound | — | EB3P-ZUN12CN | — | Approx. 3 Hz |
| | | | | Intermittent sound | — | EB3P-ZUN12FN | — | |

1. Codes N, TW, HW, LW, and UP are the series names of IDEC's control units.
2. Specify a color code in place of *.
3. Above parts are recommended for EB3L barriers. However, none of these parts are UL recognized.
4. Buzzers are not rated for Zone 0, but only Zones 1 and 2.
5. Use PW (pure white) LED for yellow lenses

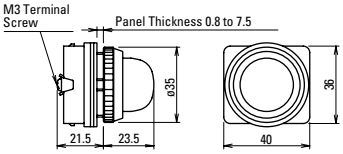
## Accessory

| Name | Ordering Number | Package Quantity | Remarks |
|---|---|---|---|
| LED Lamp | EB9Z-LDS1-* | 1 | Specify a color code in place of * in the ordering number. A: amber, G: green, R: red, S: blue, W: white, PW: pure white (for yellow use PW with yellow lens) Use PW (pure white) LED for yellow lenses |
| Static Electricity Caution Plate | EB9Z-N1PN10 | 10 | Polyester 20(W) x 6(H) mm |

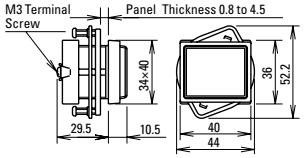
Above part is recommended for EB3L barriers. However, this part is not UL recognized.

## Pilot Lights

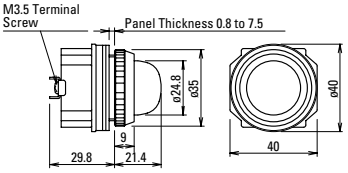
### ø30 EB3P-LAN1
Terminal Cover: APN-PVL
(sold separately)



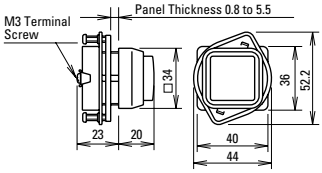

### ø30 EB3P-LUN4
Terminal Cover: APN-PVL
(sold separately)



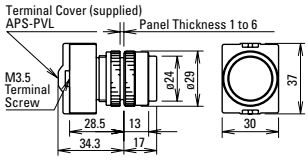

### ø30 EB3P-LAD
Terminal Cover: APD-PVL
(sold separately)



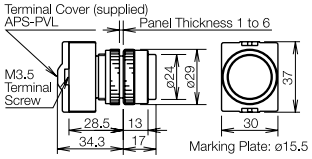

### ø30 EB3P-LUN3B
Terminal Cover: APN-PVL
(sold separately)



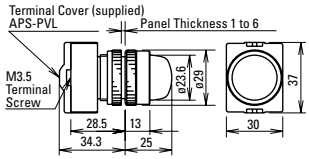

### ø22 EB3P-LAW1



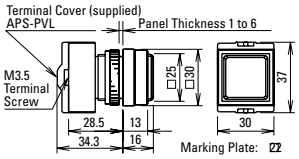

### ø22 EB3P-LAW1B



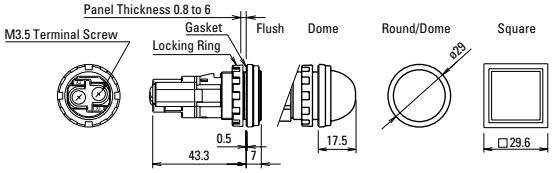

### ø22 EB3P-LAW2



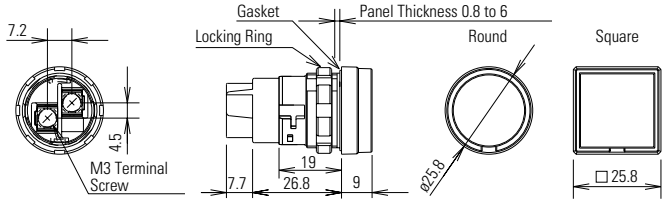

### ø22 EB3P-LUW1B




### ø22 EB3P-LHW1/EB3P-LHW2/EB3P-LHW4
Terminal cover attached.

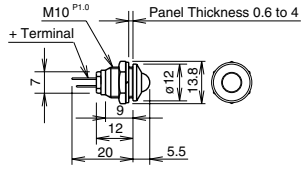



### ø22 EB3P-LLW1/EB3P-LLW2/EB3P-LLW3
Terminal cover attached.

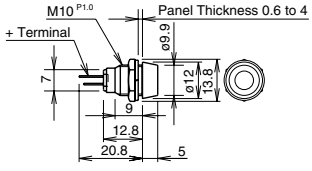



## Miniature Pilot Lights (Terminal cover not available)

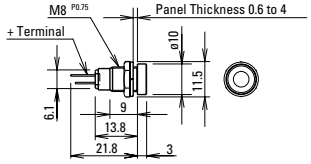
### ø10 IPL1-18



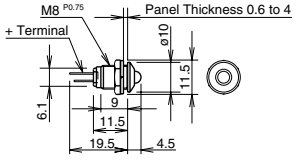

### ø10 IPL1-19



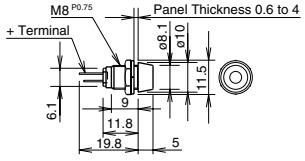

### ø8 IPL1-87



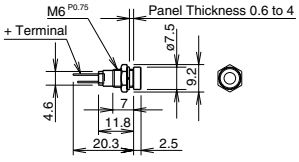

### ø8 IPL1-88



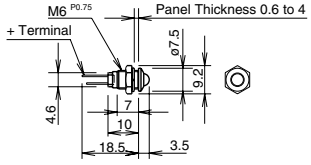

### ø8 IPL1-89



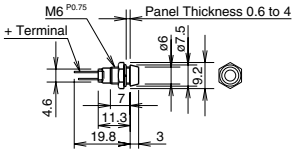

### ø6 IPL1-67




### ø6 IPL1-68

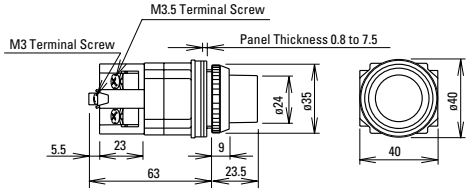



### ø6 IPL1-69

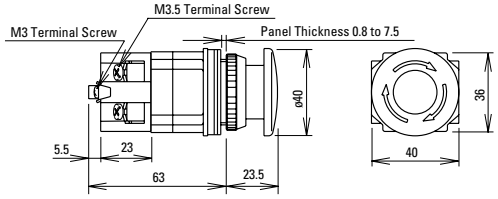


## Illuminated Pushbuttons

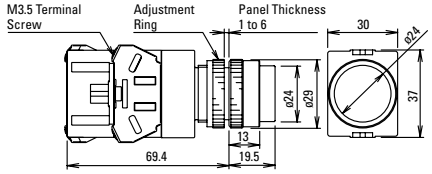
### ø30 EB3P-LBAN211/LBA0N211
Terminal cover: N-VL4 (2 pcs.) (sold separately)



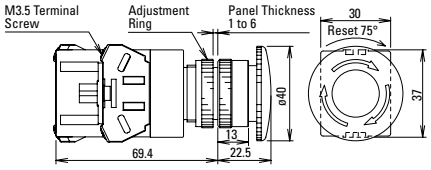

### ø30 EB3P-LBAVN311-R
Terminal cover: N-VL4 (2 pcs.) (sold separately)



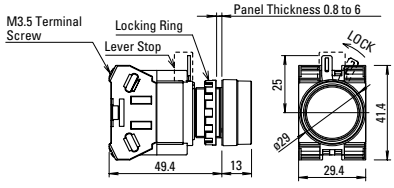

### ø22 EB3P-LBAW211/LBA0W211
Terminal cover attached.



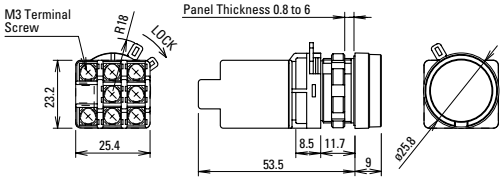

### ø22 EB3P-LBAVW411-R
Terminal cover attached.



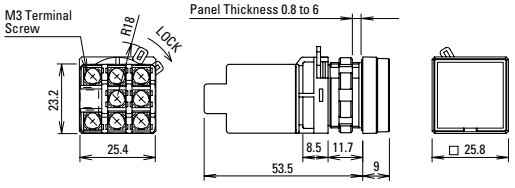

### ø22 EB3P-LBH1W110/LBHA1W110
Terminal cover attached.




### ø22 EB3P-LBL1W1C2/LBLA1W1C2
Terminal cover: LW-VL2M (sold separately)



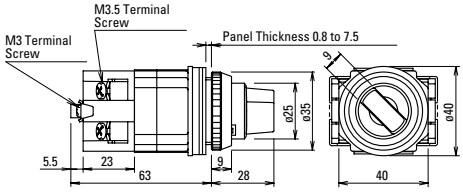

### ø22 EB3P-LBL2W1C2/LBLA2W1C2
Terminal cover: LW-VL2M (sold separately)



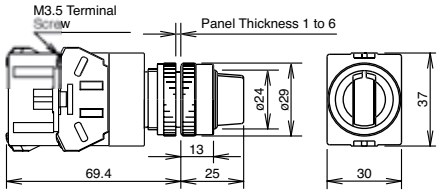

All dimensions in mm.

## Illuminated Selector Switches

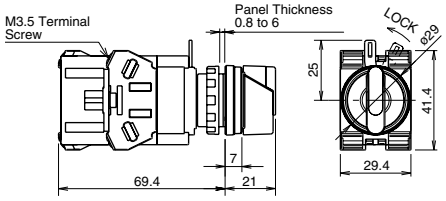
### ø30 EB3P-LSAN211/EB3P-LSAN320
Terminal cover: N-VL4 (2 pcs.) (sold separately)



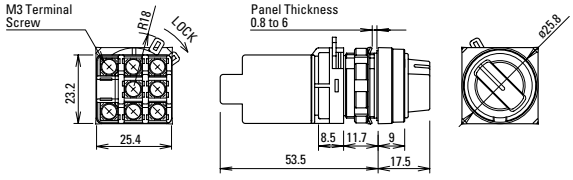

### ø22 EB3P-LSAW***
Terminal cover attached




### ø22 EB3P-LSHW211/EB3P-LSHW320
Terminal cover attached

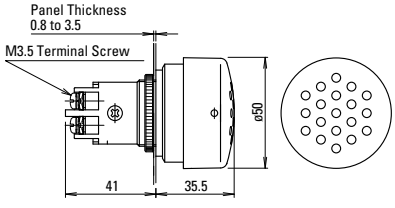



### ø22 EB3P-LSL1W2C2/EB3P-LSL3W3C2
Terminal cover: LW-VL2M (sold separately)

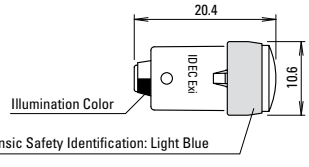



## Buzzer

### ø30 EB3P-ZUN12CN/ZUN12FN
Terminal cover: AZ-VL5 (sold separately)




### EB9Z-LDS1




Illumination color is marked on the terminal.

## Polarity Identification

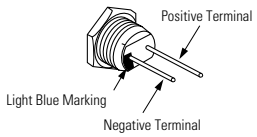
### Pilot Lights/Illuminated Pushbuttons/Illuminated Selector Switches

Positive terminal: X1
Negative terminal: X2

### Miniature Pilot Lights

Positive terminal: Long pin terminal
Negative terminal: Short pin terminal

Pin Terminals

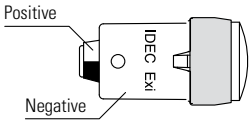



A light blue marking is indicated on the negative terminal side to identify intrinsically safe usage.

### Buzzer

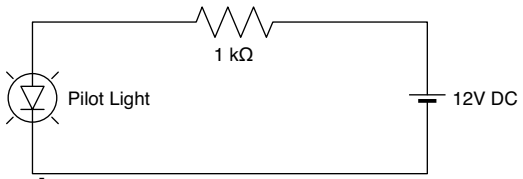
Positive terminal: +
Negative terminal: –

### LED Lamp



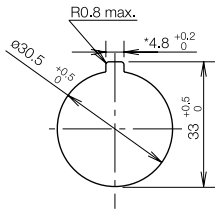

## Lamp Test

When checking the lamp lighting without using the EB3L discrete output barrier, first make sure that the atmosphere is free from explosive gases. Connect a 12V DC power supply and a protection resistor of 1 kΩ in series to turn on the pilot light.

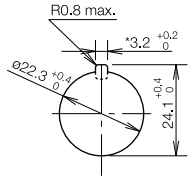



### Panel Cut-out
### Pilot Lights/Illuminated Pushbuttons/Illuminated Selector Switches/Buzzers

ø30

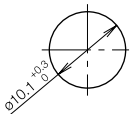



ø22

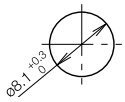



### Miniature Pilot Lights

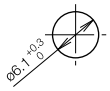
ø10




ø8




ø6




* The 4.8 or 3.2 recess is needed only when using an anti-rotation ring or a nameplate with an anti-rotation projection.
EB3P-LHW does not have an anti-rotation groove.

All dimensions in mm.

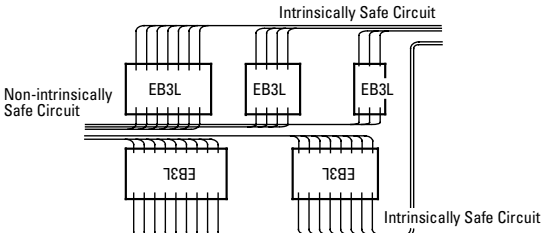
## Precautions for Operation

### Installation of EB3L Discrete Output Barriers

1. The EB3L can be installed in any direction.
2. Install the EB3L discrete output barrier in a safe area (non-hazardous area) in accordance with intrinsic safety ratings and parameters. To avoid mechanical shocks, install the EB3L in an enclosure which suppresses shocks.
3. When installing or wiring the EB3L, prevent electromagnetic and electrostatic inductions in the intrinsically safe circuit. Also prevent the intrinsically safe circuits from contacting with another intrinsically safe circuit and any other circuits.

   Maintain at least 50 mm clearance, or provide a metallic separating board between the intrinsically safe circuit and non-intrinsically safety circuit. When providing a metallic separating board, make sure that the board fits closely to the enclosure (top, bottom, and both sides). Allowable clearance between the enclosure and board is 1.5 mm at the maximum.

   The clearance of 50 mm between the intrinsically safe circuit and non-intrinsically safe circuit may not be sufficient when a motor circuit or high-voltage circuit is installed nearby. In this case, provide a wider clearance between the circuits referring to 6. (3) "Minimum Parallel Distance between the Intrinsically Safe Circuit and Other Circuits."
4. In order to prevent contact between intrinsically safe circuits and non-intrinsically safe circuits, mount EB3L units with terminals arranged in the same direction.




5. Maintain at least 6 mm (or 3 mm according to IEC60079-11: 1999) clearance between the terminal of intrinsically safe circuit and the grounded metal part of a metal enclosure, and between the relay terminal block of an intrinsically safe circuit and the grounded metal part of a metal enclosure.
6. For installing the EB3L, mount on a 35-mm-wide DIN rail or directly on a panel using screws. The EB3L can be installed in any direction. Make sure to install securely to withstand vibration. When mounting on a DIN rail, push in the clamp completely. Use the BNL6 end clips on both sides of the EB3L to prevent from moving sideways.
7. Excessive extraneous noise may cause malfunction and damage to the EB3L. When extraneous noise activates the voltage limiting circuit (thyristor), remove the noise source and restore the power.

### Terminal Wiring

1. Using a ø5.5 mm or smaller screw driver, tighten the terminal screws (including unused terminal screws) to a torque of 0.6 to 1.0 N·m (recommended value).
2. Make sure that IP20 is achieved when wiring. Use insulation tubes on bare crimping terminals.
3. To prevent disengaged wires from contacting with other intrinsically safe circuits, bind together the wires of one intrinsically safe circuit.
4. When the adjacent terminal is connected to another intrinsically safe circuit, provide an insulation distance of at least 6 mm.

### Signal Input

1. Connect the EB3L to the switches or output equipment which have a low leakage current (0.1 mA maximum).
2. The EB3L is equipped with power supply. Do not apply external power to the EB3L.
3. When connecting the EB3L's of connector type in parallel, make sure that the same power supply is used. When using C1 and C2 terminals to supply power to outside equipment, maintain the current at 50 mA maximum.

### Power Voltage

1. Do not apply an excessive power voltage, otherwise the EB3L may be damaged.
2. The EB3L of AC power type may operate at a low voltage (approx. 20V).

### Pilot Lights, Illuminated Switches, and Buzzers in the Hazardous Area

1. EB3P and IPL1 units shown on page 269 can be used with the EB3L. Buzzers cannot be connected in common wiring.
2. Install the EB3P and IPL1 units on enclosures of IP20 or higher protection. Use a metallic enclosure with magnesium content of 7.5% or less (steel and aluminum are acceptable).
3. When wiring, make sure of correct polarities of the EB3P and IPL1.
4. Certification mark is supplied with the units. Attach it on the visible area of the EB3P or IPL1 (for Japan application).
5. EB3P (except for buzzers) and IPL1 illuminated units, which are simple apparatuses in accordance with relevant standards of each country, can be installed in the hazardous area and connected to the EB3L located in the safe area.
6. When connecting illuminated switches to the EB3L discrete output barrier and the EB3C discrete input barrier, a maximum of 16 channels can be connected in common wiring.

### Wiring for Intrinsic Safety

1. The voltage applied on the general circuit connected to the non-intrinsically safe circuit terminals of the EB3L discrete output barrier must be 250V AC, 50/60Hz (UL rating: 125V AC 50/60Hz), or 250V DC (UL rating: 125V DC) at the maximum under any conditions, including the voltage of the power line and the internal circuit.
2. When wiring, take into consideration the prevention of electromagnetic and electrostatic charges on intrinsically safe circuits. Also, prevent intrinsically safe circuits from contacting with other circuits.
3. The intrinsically safe circuits must be separated from non-intrinsically safe circuits. Contain intrinsically safe circuits in a metallic tube or duct, or separate the intrinsically safe circuits referring to the table at right.

Note: Cables with a magnetic shield, such as a metallic sheath, prevent electromagnetic induction and electrostatic induction, however, a non-magnetic shield prevents electrostatic induction only. For non-magnetic shields, take a preventive measure against electromagnetic induction.

Finely twisted pair cables prevent electromagnetic induction. Adding shields to the twisted pair cables provides protection against electrostatic induction.

| Voltage and Current of Other Circuits | Over 100A | 100A or less | 50A or less | 10A or less |
|---|---|---|---|---|
| Over 440V | 2000 | 2000 | 2000 | 2000 |
| 440V or less | 2000 | 600 | 600 | 600 |
| 220V or less | 2000 | 600 | 600 | 500 |
| 110V or less | 2000 | 600 | 500 | 300 |
| 60V or less | 2000 | 500 | 300 | 150 |

Note: Above chart is applicable under TIIS standards only.

### Minimum Parallel Distance between the Intrinsically Safe Circuit and Other Circuits (mm)

1. When identifying intrinsically safe circuits by color, use light blue terminal blocks and cables.
2. When using two or more EB3L's to set up one intrinsically safe circuit in the common wiring configuration, interconnect two neutral terminals (N1 through N10) on each EB3L between adjacent EB3L's in parallel.
3. Make sure that the power of the EB3L, pilot lights, and other connected units are turned off before starting inspection or replacement.
4. When wiring the intrinsically safe circuit, determine the distance to satisfy the wiring parameters shown below. Note that parameters are different between separate wiring and common wiring and depend on the connected units, such as pilot lights, illuminated pushbuttons, and buzzers.

   a) Wiring capacitance Cw ≤ Co – Ci
   Co: Maximum external capacitance of the EB3L
   Ci: Internal capacitance of the connected unit

   b) Wiring inductance Lw ≤ Lo – Li
   Lo: Maximum external inductance of the EB3L
   Li: Internal inductance of the connected unit

   c) Wiring resistance ≤ Rw
   Rw: Allowable wiring resistance

   d) Allowable wiring distance D (km) is the smallest value of those calculated from the capacitance, inductance, and resistance.

   D ≤ Cw/C  C (nF/km): Capacitance of cable per km
   D ≤ Lw/L  L (mH/km): Inductance of cable per km
   D ≤ Rw/2R  R (Ω/km): Resistance of cable per km

Note: For the details of wiring the intrinsically safe circuits, refer to a relevant test guideline for explosion-proof electric equipment in each country.

### Safety Precautions

Do not use the EB3C Discrete Input Barrier and EB3L Discrete Output Barrier for other than explosion protection purposes.

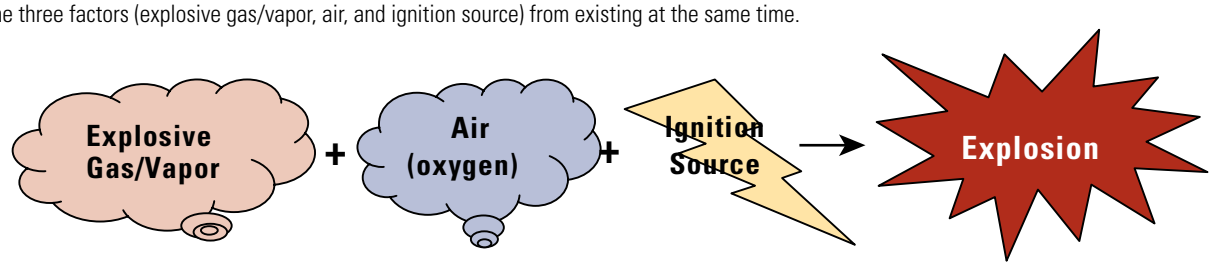
Read the user's manual to make sure of correct operation before starting installation, wiring, operation, maintenance, and inspection of the EB3C Discrete Input Barrier and EB3L Discrete Output Barrier.

# General Information

## What is Explosion Protection?

### Explosion Mechanism

For an explosion to occur, both hazardous atmosphere (mixture of explosive gas/vapor and air) and ignition source from electrical equipment must exist. The first step for explosion prevention is to prevent the three factors (explosive gas/vapor, air, and ignition source) from existing at the same time.




Ignition source: Electrical equipment which originates electrical sparks or has a high temperature, capable of causing ignition in a hazardous atmosphere.

Explosion protection types:

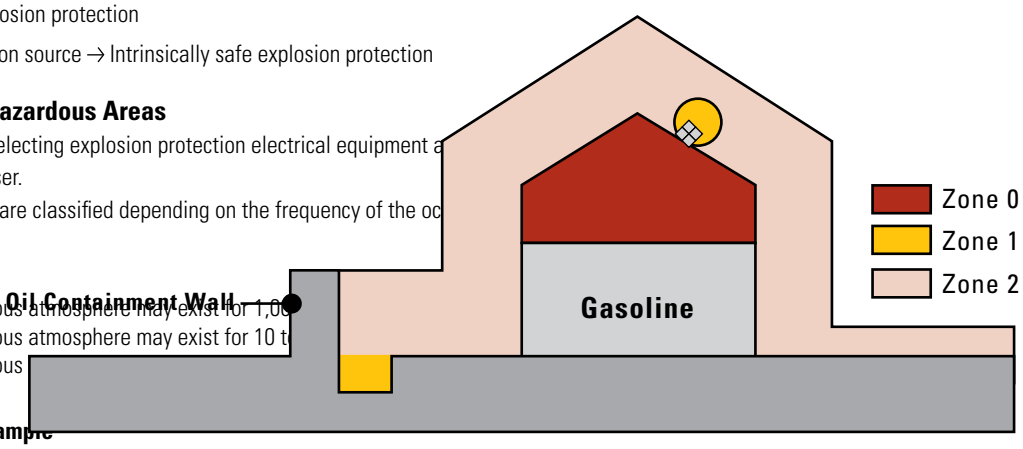
1. Separation of explosive gas/vapor and ignition source
   → Flameproof explosion protection
   → Pressurized explosion protection
2. Low power on ignition source → Intrinsically safe explosion protection

### Classification of Hazardous Areas

- Required when selecting explosion protection electrical equipment a
- Determined by user.
- Hazardous areas are classified depending on the frequency of the oc

### IEC Classification

Zone 0: Where hazardous atmosphere may exist for 1,0
Zone 1: Where hazardous atmosphere may exist for 10 t
Zone 2: Where hazardous

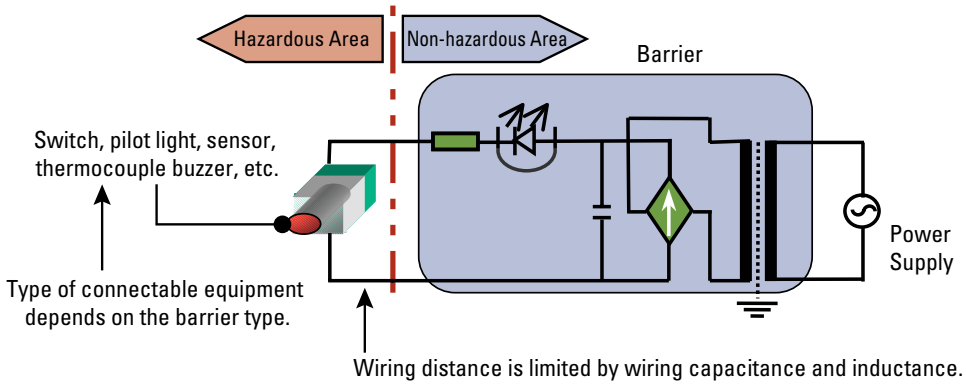



**Gasoline Tank Example**

## Explosion Protection Types

Intrinsically Safe Structure

- Structure in which voltage and current are limited so that no sparks, arc, and thermal effect produced by electric equipment (switch, pilot light, etc) in hazardous areas are capable of causing ignition of explosive gas/vapor.




Features:

- Barrier is installed in non-hazardous area, and is connected to the switches or pilot lights in hazardous area.
- The intrinsically safe system can be used in zone 0.
- Because voltage and current to the electric equipment are limited, the variety of devices that can be connected to the barrier is restricted.
- Wiring is required between hazardous and non-hazardous areas.
- Grounding (grounding resistance 10Ω max.) may be required (EB3C, EB3L do not require grounding).

Grounding - The procedure to achieve required resistance value by inserting a grounding wire into a hole in the ground and furnishing the surrounding with material of superior electrical conductivity.

Non-insulated barrier (Zener barrier): grounding resistance 10Ω max.

- While the voltage difference between the circuits is limited in Zener barriers, the voltage difference between the circuits and grounding is unlimited. When a short-circuit occurs between the circuits and ground, high voltage/current may be generated in the circuits, causing a possible explosion. The 0V line of circuits, therefore, must be provided with grounding (resistance 10Ω max.) so that the voltage/current can be shunted to the ground.

Insulated barrier: grounding resistance 100Ω max.

- Intrinsically safe and non-intrinsically safe parts are electrically isolated by an isolation transformer. If a sufficient isolation distance is not provided on the isolation transformer, however, the transformer may short-circuit between primary and secondary when an abnormal voltage occurs. This may generate high voltage/current in the intrinsically safe circuit, causing a possible explosion. A transformer with metallic isolator must be used between primary and secondary, and grounding (resistance 100Ω max.) must be provided.

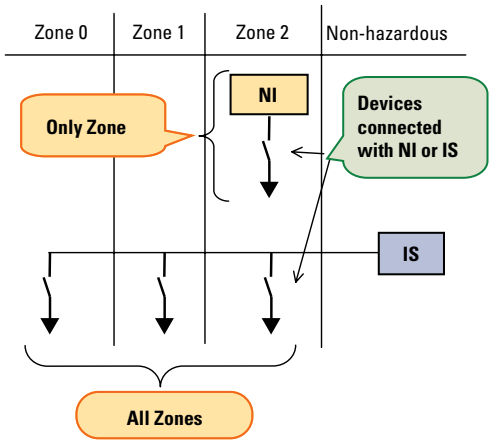
## Difference between NI (Non-incendive) & IS (Intrinsic Safety)

Standard

- NI: Installed in areas that are Zone 2 hazardous locations.
- IS: Installed in areas that are non-hazardous.

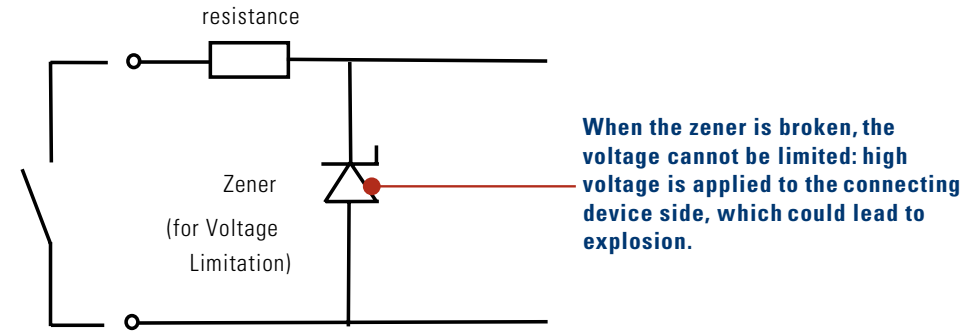
Advantages & Disadvantages

- NI: Small and inexpensive. Devices connected with NI are also installed only in the Zone 2 area.
- IS: Small but more expensive. Devices connected with IS can be used in the Zone 0, 1 and 2 areas (all zones).

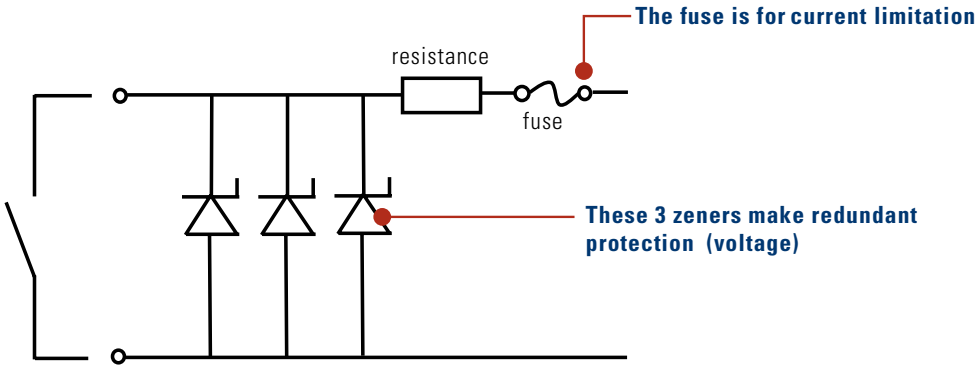


## Structure

NI Structure




IS Structure




Note : Instead of zeners, thyristors are used in EB3C for better energy effeciency.

## Explosion Protection Marking

Gas is categorized into groups by explosiveness and ignition temperature.

Technical standard: Determines the gas type which can be used with the apparatus.

Ex ia IIC T6

**Temperature:** maximum surface temperature of electrical equipment
T1: 450°C
T2: 300°C
T3: 200°C
T4: 135°C
T5: 100°C
T6: 85°C

**Electrical Equipment:**
IIA: Applicable to group IIA gas
IIB: Applicable to groups IIA and IIB gasses
IIC: Applicable to groups IIA, IIB, and IIC gasses

**Explosion Protection:**
d: Flameproof type
e: Increased safety type
p: Pressurized type
ia, ib: Intrinsic safety type
de: Flameproof and increased safety type
d(ia): Intrinsic safety and flameproof type

**Shows compliance with the standard**

Examples: ExdeIIBT4, EXeIICT4, ExpIIBT4, ExiaIICT5

## EB3C/EB3L Features

### Small and lightweight

| | | | |
|---|---|---|---|
| EB3C (10-circuit) | Weight:<br>Dimensions: | 380g<br>171.5 L × 75 W × 77.5 H (mm) | • Plastic housing<br>• Small system design |
| EB3L (10-circuit) | Weight:<br>Dimensions: | 360g<br>171.5 L × 75 W × 77.5 H (mm) | |

### No grounding required: less labor, less cost

No explosion protection grounding.

Isolation transformer is used. All isolations – not only between primary and secondary, but also cores and bobbins – are reinforced.

↓

No isolator = No grounding

No electrical equipment grounding.

| | |
|---|---|
| Power supply part: | Electric shock is prevented with reinforced isolation. Conforms to IEC standard. |
| Output part: | The small power & EMC design requires no grounding. Conforms to IEC switch output standard. |

Shield wire treatment
Shield wires of intrinsically safe circuits are grounded to the panel in non-hazardous area, and not connected to the N terminal on the barrier.

### Common Type and Connector Type

1. Common type → For 8 and 16 circuits. Easy connection to PLC.
2. Connector type
   - Flat cable connection between non-intrinsically safe part and PLC.
   - Connectable to IDEC's FC5A, and FC4A.

## Standards

1. CE
   Conforms to EMC directive and LVD.
   EMC directive:
   Electromagnetism generated by the barrier does not affect other communication equipment. Also, electromagnetism generated by other communication equipment does not affect the barrier.
   LVD (Low Voltage Directive):
   For rated voltages 50 to 1000V AC, 75 to 1500V DC.
2. ATEX
   Adopted by EU, this directive covers electrical and mechanical equipment and protective systems, which may be used in potentially explosive atmospheres (Europe). EN50014 series is adopted.
3. FM (Factory Mutual Approval)
   A private US certification organization for waterproof and intrinsic safety. Widely recognized for more intrinsic safety than UL.
4. CSA (Canadian Standards Association)
   A Canadian certification organization for electrical equipment.
5. NK: Class NK (Nippon Kaiji Kyokai)
   Required for ships with Japanese ship registration.
6. Underwriters Laboratories (UL) - A US certification agency for all electrical and hazardous location products.

## Less labor

1. Finger-safe spring-up terminal
   The finger-safe, captive spring-up terminals prevent electric shock (IP20), and make installation easy. No screw loss.
2. Universal voltage
   100 to 240V AC (UL rating 100 ~ 120VAC).
3. Installation
   Direct and DIN-rail mountable.

**EB3 series: Screws cannot be touched by fingers even when loosened.**

## Switches connectable to EB3C

Switches which are configured only with mechanical contacts (dry contacts) can be connected to the EB3C.

Pushbutton, selector, cam, toggle, limit, micro, reed, foot, pressure, and temperature switches can be used.

Note: Contact rating must be 13.2V, 14.2 mA minimum. Contact material such as silver oxide cadmium and silver tungsten may cause conduction failure at 10 mA due to the film generated on the surface.

## Equipment connectable to EB3L

Common wiring: Only EB3P-L type pilot lights, which have been approved, can be connected to the EB3L discrete output barrier.

Separate wiring: No approval is required for pilot lights and buzzers to be connected to the EB3L discrete output barrier. However, users must make sure that the temperature rise of the equipment is below the rated value with the current and voltage supplied from the discrete input barrier. Also take the ratings of intrinsically safe circuit into consideration. IDEC's EB3P-L type pilot light lights and EB3P-Z type buzzers satisfy the ratings.

EB3P-L Pilot light: ø22 and ø30, a total of 78 types

- Super LED installed
- Lens colors: amber, blue, green, red, white, and yellow
- Accessories and maintenance parts are the same as standard control units. See IDEC's control units catalogs.

ø30: APN, UPQN equivalent
ø22: APW, HW,LW,UPQW equivalent

IPL1 Miniature pilot light: ø6, ø8, and ø10, a total of 40 types

- Low price
- Illumination colors: amber, green, red, white, and yellow

EB3P-Z buzzer: Continuous and intermittent sound, ø30 mounting hole, terminal block type

- Degree of protection: IP20
- Common wiring is not available due to high inductance value.
- Approved by TIIS only

When connecting one buzzer and 15 pilot lights to EB3L-S16CSD, do not connect the negative lines of buzzer and pilot lights in common. Connect the buzzer and pilot lights to the barrier using separate lines (15 pilot lights can be wired with one common line).

### Connecting Illuminated Switches

Made possible with the combination of EB3L and EB3C.

User benefits

- Flexibility of control panel design
  Explosion protected panels can be designed in a similar manner to non-explosion protected panels (non-explosion protected panels can be used as explosion protected panels without any changes).
- Control panel becomes smaller.

Connectable illuminated switch: 134 types

**EB3P-LB**
Illuminated Pushbutton Switch
- ø30: ALN2 equivalent
- ø22: ALW2, HW, LW equivalent

**EB3P-LS**
Illuminated Selector Switch
- ø30: ASLN equivalent
- ø22: ASLW, HW, LW equivalent

Super LED installed.
Lens color: amber, blue, green, red, white, yellow

Connection Method

1. Difference between EB3C and EB3L

EB3C: ON/OFF output signals to other equipment.
→ Connection to PLC's inputs.

EB3L: ON/OFF input signals to pilot lights and buzzers.
→ Connection from PLC's outputs.

2. Sink and Source
   Available combination: Sink Output + Source Input or Source Output + Sink Input. Sink output (source input) is mainly adopted in Japan (Europe: source output).

Other information

- Up to 16 channels, including both pilot lights and contacts, can be connected in common wiring.
- Connect the common wires of pilot lights and contacts separately to the N terminals of each barrier.
- Use two wires to connect the common terminals (N terminals) EB3C and EB3L barriers.
- Accessories and maintenance parts are the same as the standard control units. See IDEC's control units catalogs for details.

## Safety Precautions

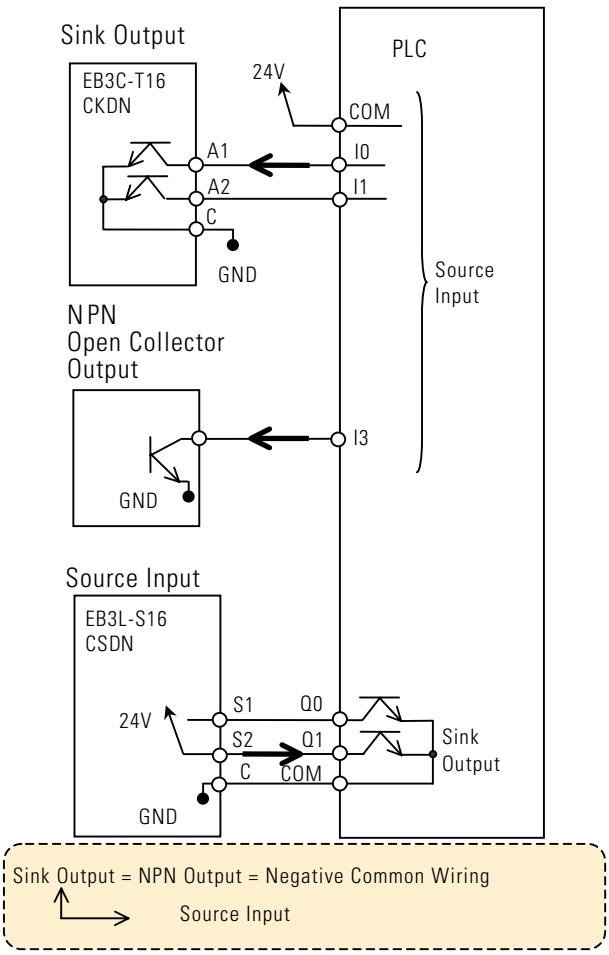
### Electrostatic protection: Prevention of fire ignition and explosion caused by electrostatic charges.

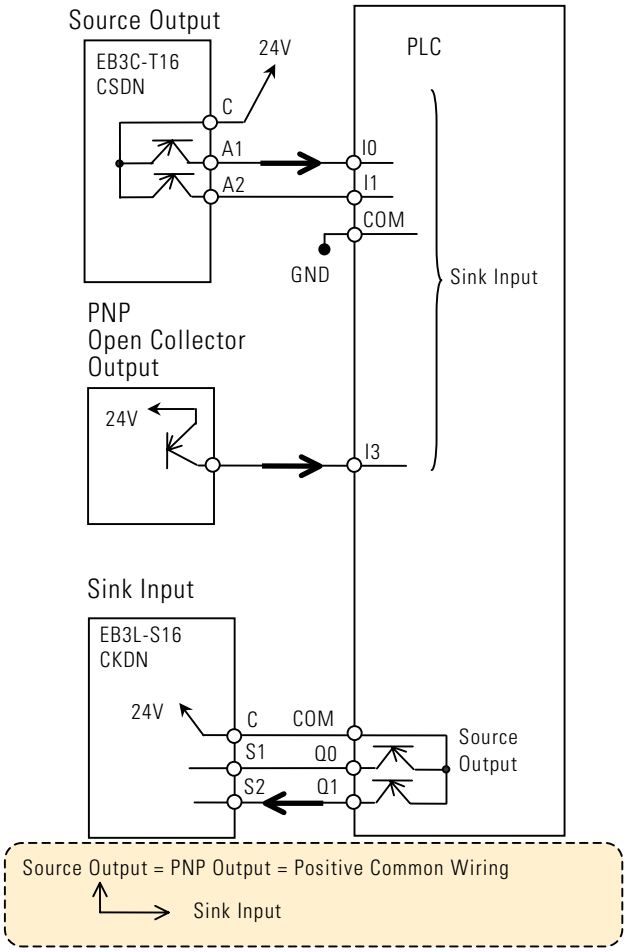
- As required by IEC60079-11, limit the exposed surface of plastic equipment (switch, pilot light) installed in hazardous areas.
- 20 $cm^2$ max. for IIC gas atmosphere.
- 100 $cm^2$ max. for IIB and IIA gas atmosphere.
- When the surface area of other than operating parts exceeds the limit, attach a caution plate.
- Pushbutton, knob, or other parts which are frequently touched by operators.

### EB3C Separate and Common Types

1. Separate Wiring Type
   The output circuit is isolated for each channel. Both sink and source outputs can be connected.
2. Common Wiring Type
   The output circuit is not isolated from each other and uses common terminal C. Sink and source outputs are available on different modules.

## Sink/Source Definition




## Relay Terminal Block

When connecting a discrete input barrier to the switches and pilot lights installed in hazardous area, use a relay terminal block.

A relay terminal block can be eliminated when using EB3C and EB3L, as these barriers are considered as relay terminal blocks.

## Cable Extension and Intrinsic Safety Parameter

- For wiring between the barrier and the switches and pilot lights installed in hazardous area, use a cable of 2.0 $mm^2$.
  The cable can be extended up to approximately 1 km.
- For EB3L of common wiring type, use a cable of 2.0 $mm^2$ . The cable can be extended up to approximately 600 m. Longer cables cause dim LED lighting.

Make sure that wiring parameters (inductance, capacitance, resistance) do not exceed the maximum limit.

## Noise Countermeasure

- The LED connected to the EB3L may blink due to noises.
- Check the wiring so that noise is not imposed on the EB3L (eg. separation from power line).
- Noise can be avoided also by inserting a noise filter for AC line into the barrier's power input part.

Recommended noise filters:

| TDK-Lambda | | | Schaffner |
|---|---|---|---|
| RSEL-2002W | RSEL-2002A | ZCB2203-11 => RSEL-2003A | FN670-3/06 |
| RSEL-2003W | RSEL-2003A | ZCB2206-11 => RSEL-2006A | |
| RSEL-2006W | RSEL-2006 | | |

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# Safety Overview

IDEC

www.IDEC.com/safety

# Safety Overview

**Solenoid Interlock Switch**
This safety switch serves as an interlock that enables the machine to start only when the guard is closed and locked. The guard is unlocked by the solenoid.
page 290

**Safety Product Accessories**

**Teaching Pendant**

For information on the Teaching Pendant visit www.IDEC.com/oi/pendant

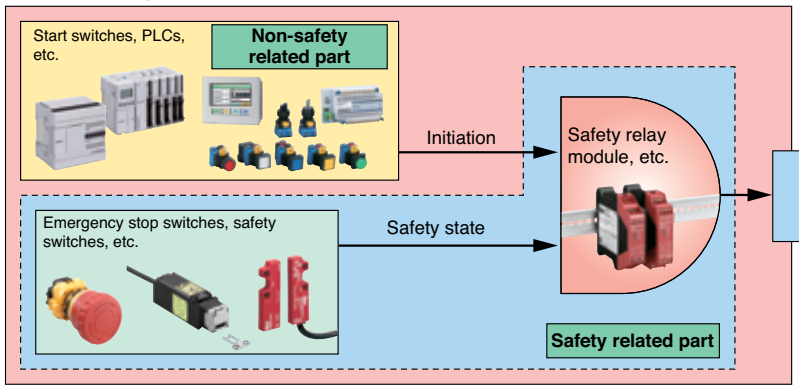
**Grip Switch / Enabling Switch**
Safety devices are intended to help the operator avoid dangers of unexpected machine operation during work within hazardous areas.
page 380

**Emergency Stop Switch**
page 654

Padlockable type

**SignaLight Tower**
page 704

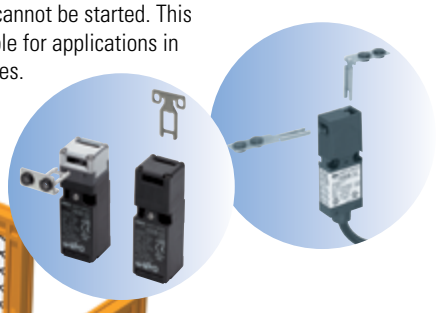
**Production System**




**Safety Relay Module**
This device is intended to start the machine only when the safety control system is functioning normally and safety information from safety devices (safety switch, emergency stop switch, etc.) is relayed to the machine.
page 393

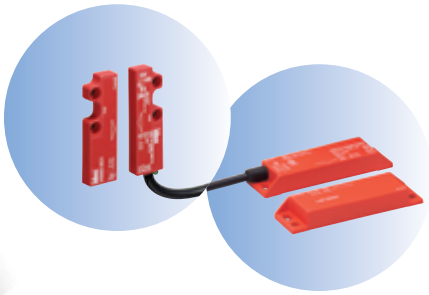
### Interlock Switch

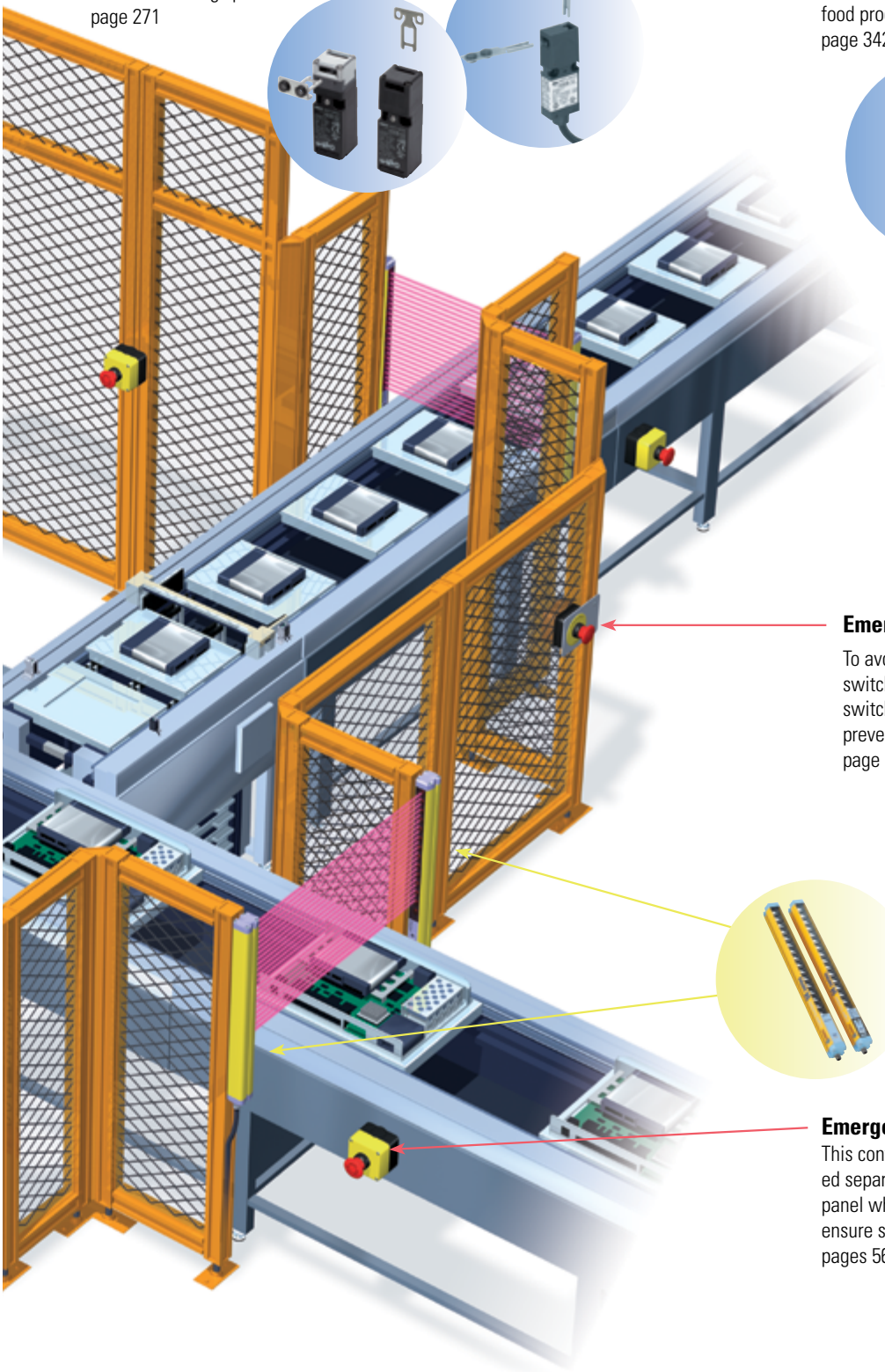
This safety switch serves as an interlock that enables the machine to start only when the guard is closed. Once the guard is opened, the machine stops or cannot be started. This safety switch is suitable for applications in limited mounting spaces.
page 271

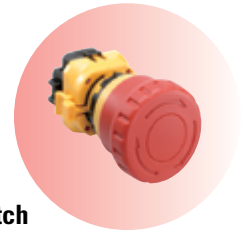


### Non-contact Safety Interlock Switch

This safety switch is an interlock switch that can detect the open/close status of the door without mechanical contact. Taking advantage of dust-proof and water-proof construction as well as miniature size, the non-contact safety switch is suitable for semiconductor manufacturing systems, food processing systems, and assembly lines.
page 342

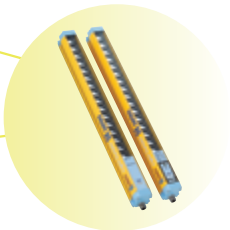






### Emergency Stop Switch

To avoid accidents in an emergency, this switch is used to stop the machine. This switch provides a safety lock mechanism to prevent accidental startup of the machine.
page 259

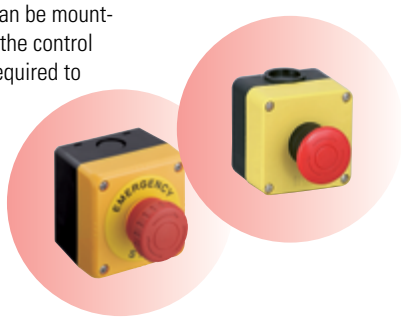


### Safety Light Curtain

This device detects the entry of a person or object into the hazardous area by the interruption of light beams.
page 429

### Emergency Stop Control Box

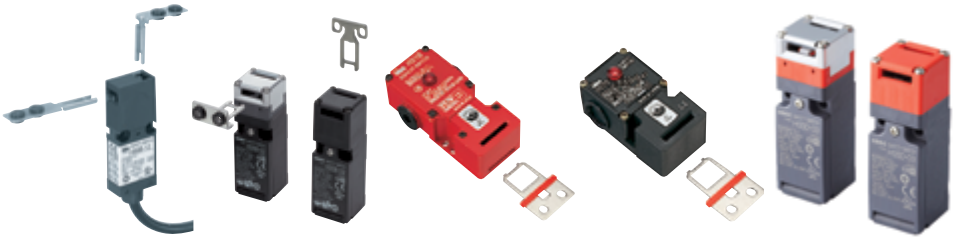
This control box can be mounted separate from the control panel wherever required to ensure safety.
pages 562 & 652



## Safety Components

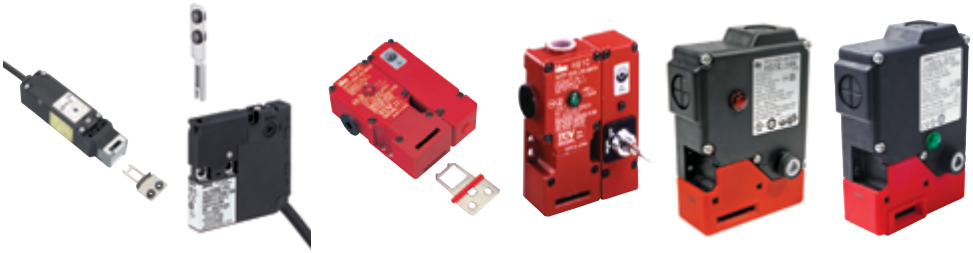
**Emergency Stop Switches** pages 287, 275, 480, 497, 501, 580, 611, 623, 580 & 716

**Safety Interlock Switches** page 299



**Key Locking Safety Switches** page 357

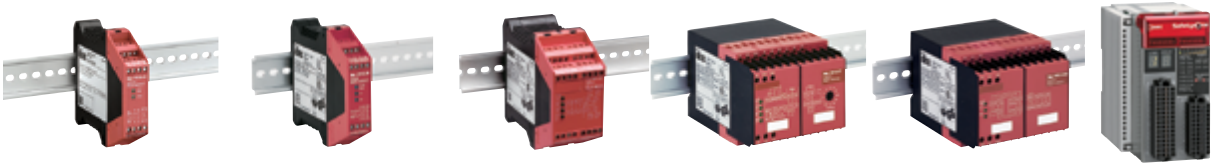
**Solenoid Safety Interlock Switches** page 318



**Door Handle Gate System** page 382

**Enabling Switches / Grip Switches** page 391

**Safety Control Modules** page 421



**Non-contact Safety Switches** page 370

**Safety Light Curtains** page 459

Selection Guide..... 290
ø22mm XW E-Stops..... 291

# XW Series E-Stops

IDEC

**www.IDEC.com/usa/estop**

# Revolutionary "Safe Break Action" Design

The IDEC Emergency Stop switches, the X6, XA, XW, and XN series, include revolutionary new technology that have changed the way E-Stop switches are designed. This "safe break action" concept provides greater levels of human safety and is the first of its kind in the world!

## Innovative Design

Conventional E-Stop switches are designed with spring pressure on the Normally Closed (NC) contacts, keeping them in the closed position and allowing the machine to operate. Improper installation or excessive force to the stop button in an emergency may break or dislodge a vital part, causing the spring loaded contact to stay closed. This situation renders the E-Stop incapable of stopping the machine, and can lead to catastrophic events, personal injury and possible loss of life.

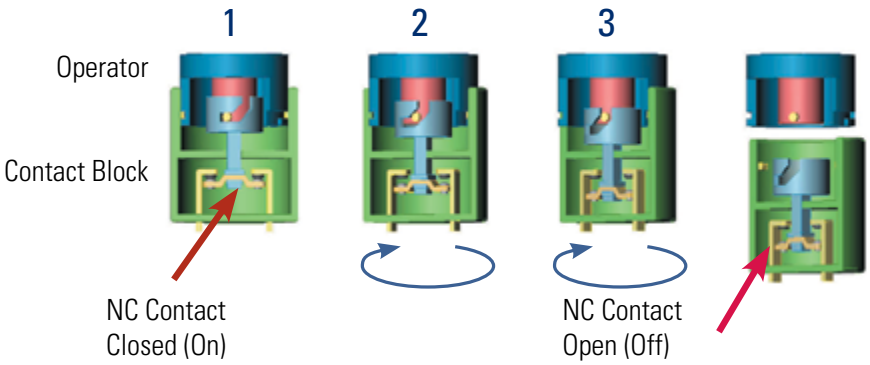
## Safe Break Action Design

This one-of-a-kind "safe break action" design, found only in the IDEC XA, XW, and XN series, reverses the energy direction and uses the spring-pressure to assure that the NC contacts will open if the emergency switch is damaged or the contact blocks separate due to excessive force. The NC contacts will reliably open, even if they are welded, and stop the machine. Combined with IDEC quality, this is the E-Stop switch you want in a life threatening situation.

## Level 4 Safety

**X6, XA, XW & XN Series, The Safe Break Action E-Stops!**

**Internal view while removing the contact block**




## Reach for the "Safe Break Action"

When the contact block is removed from the operator the main contact (NC) is forced to open (OFF). When removing the contact block, the cam provides a direct opening action to open the contact.

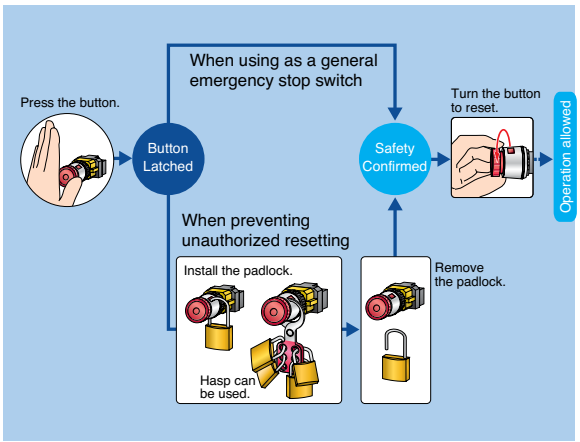
The X Series of E-Stop switches include up to four contacts in a very compact package. In today's automated world, more customers are requiring E-Stop switches with at least three contacts. (Two of the contacts trip the power and the third contact is used to alert a safety-monitoring relay.) Both the XA and XW series switches offer up to four "safe-break" contacts with a depth behind the panel that is half the size of conventional E-Stop switches. This means that there is an additional contact available and the **switches can be used in Level 4 safety category applications.**

IDEC's new E-Stop switches are secured from the rear of the control panel so that the E-Stop cannot be removed from the front. Another unique feature of the XA & XW E-Stop switches is that either a push-turn or push-pull reset method can be used to reset the switches. This eliminates any possible confusion for operators when resetting the switch. The durability and quality of these new E-Stop switches make them extremely reliable. They can withstand the increased high stress caused by panic or a reaction to an emergency situation.

## Padlock E-Stops

As shown in the diagram, upon latching a traditional E-stop, it is up to the technician to verify and confirm that the machine area is clear and there are no other technicians working before resetting the E-stop and turning on the machine. There is always a chance that the technician might miss someone in the work area before resetting the E-stop, potentially causing injury to that person.

The solution is XN4E series padlock E-Stops, which allow technicians to install their personal padlocks at the spot of actuation of the E-Stop ensuring their own safety. The diagram shows how personal padlocks can be installed. Each one blocks the resetting of the E-stop until all the padlocks are removed. This provides added safety and prevents unauthorized or accidental resetting of the E-stops. A maximum of 20 padlocks can be installed by using lockout hasps.



## Important Safety Information

### Reverse Energy Structure

With X Series E-Stops, the potential energy level of the latched status is lower than that of the normal status. When the switch is damaged due to excessive shocks, the NC contacts will turn off, thus stopping the machine (patented design).

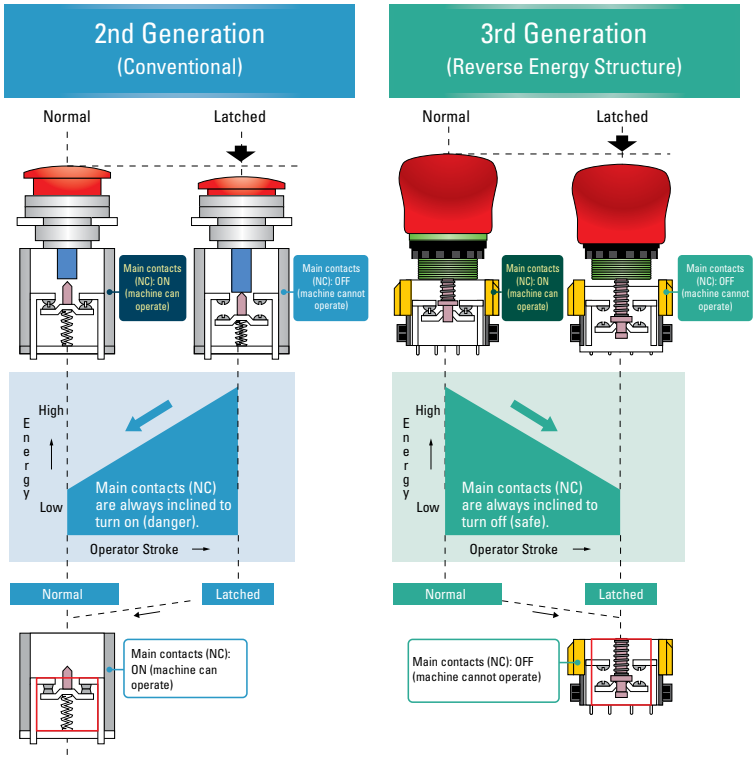
### Direct Opening Action

Even if the contacts are welded, the force applied on the button directly opens the contact.

Rated Insulation Voltage: 250V
Rated Thermal Current: 2.5A

### Safety Interlock Mechanism

Contacts are opened when the operator is locked, and remain opened until the operator is unlocked intentionally. (IEC60947-5; 6:2)



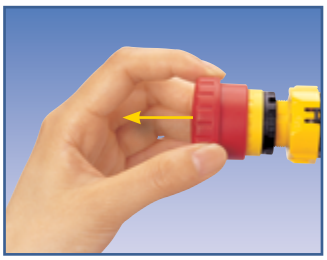

## Two E-Stops in One

### Pushlock Pull or Turn Reset

The X Series E-Stops can be reset either by pulling or turning the button. This ensures that the reset action will always be different from the make action. With traditional E-Stops, you need to choose between Push-Pull or Pushlock Turn Reset. With the IDEC X Series E-Stops you get both in one switch.

XN4E, padlock type is Turn Reset only.

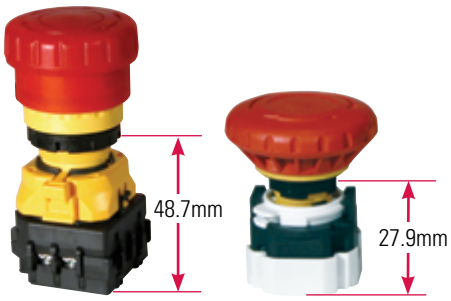
**Pull Reset**



**Turn Reset**

## Compact

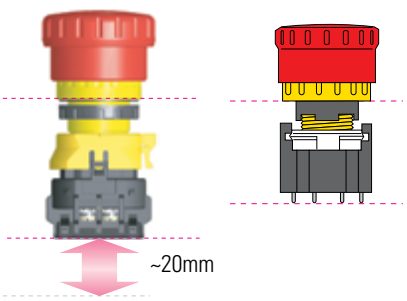
**Compact Body with Four Contacts**



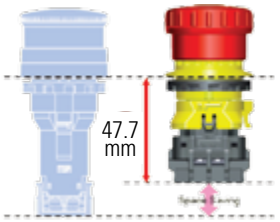

**Traditional E-Stop**



**22mm XW and 16mm XA Series**




**XN Series**



X Series E-Stops



## Selection Guide

| Series | X6 | XA | XW | XN |
|---|---|---|---|---|
| Appearance | | | | |
| Page | see Switches & Pilot Devices section | see Switches & Pilot Devices section | 291 | see Switches & Pilot Devices section |
| Mounting Hole | 16mm | 16mm | 22mm | 30mm |
| Operator Type | Non-Illuminated E-Stops: Pushlock Pull/Turn Reset | Illuminated & Non-Illuminated E-Stops: Pushlock/Turn Reset, Push-Pull | | |
| Reset Action | Pushlock Pull or Turn Reset (both actions available in each switch, except XN4E) | | | |
| Contact Configuration | 1NC, 2NC | 1NO - 1NC, 2NC, 1NO-3NC, 4NC | | |
| Electrical Life | 100,000 Minimum | | | |
| Mechanical Life | 100,000 Minimum | 250,000 Minimum | | |
| Termination | Solder/Tab Terminals | PCB & Solder Terminals | Screw Terminals | |
| Degree of Protection | IP65 (IEC 60529) | IP65 (IEC60529) | Operator: IP65 (IEC60529)<br>Terminal: IP20 (when XW9Z-VL2MF is installed) | |
| Approvals | | | | |

X6 and XA series UL recognized.

# 22mm XW E-Stops

**Key features:**

- The depth behind the panel can be as little as 46.4 mm for 1 to 4 contacts (with terminal cover) for illuminated and non-illuminated units.
- IDEC's original "Safe break action" ensures that the NC contacts open when the contact block is detached from the operator.
- 1 to 4NC main contacts and 1 or 2NO monitor contacts
- Push-to-lock, Pull or Turn-to-reset operator
- Models with mechanical indicator on the operator body show the normal/latched status (green: normal).
- Safety lock mechanism (IEC60947-5-5, 6.2)
- Degree of protection IP65 (IEC60529)
- Fingersafe (IP20) terminals
- Three button sizes: ø38, ø40 and ø60 mm
- Push-ON illumination type available (40mm mushroom head)
- Direct opening action mechanism (IEC60947-5-5, 5.2, IEC60947-5-1, Annex K)
- RoHS compliant (EU directive 2002/95/EC).
- UL c-UL listed. EN compliant
- UL NISD category emergency stop device (File# E305148)

UL File #E68961

CCC No. 2005010305150897

## Specifications

| | |
|---|---|
| Applicable Standards | IEC60947-5-5, EN60947-5-5, JIS C8201-5-1, UL508, UL991, NFPA79, CSA C22.2 No. 14, GB14048.5 |
| Operating Temperature | Non-illuminated: –25 to +60°C (no freezing), Illuminated: –25 to +55°C (no freezing) |
| Operating Humidity | 45 to 85% RH (no condensation) |
| Storage Temperature | –45 to +80°C |
| Operating Force | Push-to-lock: 32N<br>Pull-to-reset: 21N<br>Turn-to-reset: 0.27N·m |
| Minimum Force Required for Direct Opening Action | 80N |
| Min Operator Stroke Required for Direct Opening Action | 4mm |
| Maximum Operator Stroke | 4.5mm |
| Contact Resistance | 50mΩ maximum (initial value) |
| Contact Material | Gold plated silver |
| Insulation Resistance | 100MΩ minimum (500V DC megger) |
| Impulse Withstand Voltage | 2.5kV |
| Pollution Degree | 3 |
| Operation Frequency | 900 operations/hour |
| Shock Resistance | Operating extremes: 150m/s$^2$ (15G), Damage limits: 1000m/s$^2$ (100G) |
| Vibration Resistance | Operating extremes: 10 to 500Hz, amplitude 0.35mm acceleration 50m/s$^2$<br>Damage limits: 10 to 500Hz, amplitude 0.35mm acceleration 50m/s$^2$ |
| Mechanical Life | 250,000 operations minimum |
| Electrical Life | 100,000 operations minimum, (250,000 operations minimum @ 24V AC/DC, 100mA) |
| Degree of Protection | Operator: IP65 (IEC60529)<br>Terminal: IP20 (when XW9Z-VL2MF is installed) |
| Terminal Style | M3.0 screw terminal |
| Recommended Tightening Torque for Locking Ring | 2.0N·m |
| Wire Size | 16 AWG max |
| Weight | ø40mm: 72g<br>ø60mm: 81g |

# Part Numbers

## Standard Button Without Mechanical Indicator

| Style | Operator Type | Monitor Contact | Main Contact | Part Number |
|---|---|---|---|---|
| Non-Illuminated | 40mm Mushroom | 1NO | 1NC | XW1E-BV411M-R |
| | | – | 2NC | XW1E-BV402M-R |
| | | 2NO | 2NC | XW1E-BV422M-R |
| | | 1NO | 3NC | XW1E-BV413M-R |
| | | – | 4NC | XW1E-BV404M-R |
| | 60mm Mushroom | 1NO | 1NC | XW1E-BV511M-R |
| | | – | 2NC | XW1E-BV502M-R |
| | | 2NO | 2NC | XW1E-BV522M-R |
| | | 1NO | 3NC | XW1E-BV513M-R |
| | | – | 4NC | XW1E-BV504M-R |
| Illuminated [1] | 40mm Mushroom with built-in 24V AC/DC LED | 1NO | 1NC | XW1E-LV411Q4M-R |
| | | – | 2NC | XW1E-LV402Q4M-R |
| | | 2NO | 2NC | XW1E-LV422Q4M-R |
| | | 1NO | 3NC | XW1E-LV413Q4M-R |
| | | – | 4NC | XW1E-LV404Q4M-R |
| | 40mm Mushroom Push-ON LED [2] | 1NO | 2NC | XW1E-TV412Q4M-R |

1. The light is independent of the position of the switch, except for push-on LED type.
2. The light only operates when the switch is pressed as it is internally wired.

## Smooth Button With Mechanical Indicator

| Style | Operator Type | Monitor Contact | Main Contact | Part Number |
|---|---|---|---|---|
| Non-Illuminated | 38mm Mushroom | – | 1NC | XW1E-BV4TG01MR |
| | | – | 2NC | XW1E-BV4TG02MR |
| | | – | 3NC | XW1E-BV4TG03MR |
| | | – | 4NC | XW1E-BV4TG04MR |
| | | 1NO | 1NC | XW1E-BV4TG11MR |
| | | 1NO | 2NC | XW1E-BV4TG12MR |
| | | 1NO | 3NC | XW1E-BV4TG13MR |
| | | 2NO | 4NC | XW1E-BV4TG22MR |
| Illuminated | 38mm Mushroom with built-in 24V AC/DC LED [1] | – | 1NC | XW1E-LV4TG01Q4MR |
| | | – | 2NC | XW1E-LV4TG02Q4MR |
| | | – | 3NC | XW1E-LV4TG03Q4MR |
| | | – | 4NC | XW1E-LV4TG04Q4MR |
| | | 1NO | 1NC | XW1E-LV4TG11Q4MR |
| | | 1NO | 2NC | XW1E-LV4TG12Q4MR |
| | | 1NO | 3NC | XW1E-LV4TG13Q4MR |
| | | 2NO | 2NC | XW1E-LV4TG22Q4MR |

Note: Pushlock pull/turn reset switches are locked when pressed, and reset when pulled or turned clockwise.
1. LED lamp is not removable.

## XW Series EMO Switches

| Style | NC Main Contact | NO Monitor Contact | Part Number |
|---|---|---|---|
| 40mm Mushroom | 1NC | - | XW1E-BV401M-RH-EMO |
| | 2NC | - | XW1E-BV402M-RH-EMO |
| | 3NC | - | XW1E-BV403M-RH-EMO |
| | 4NC | - | XW1E-BV404M-RH-EMO |
| | 1NC | 1NO | XW1E-BV411M-RH-EMO |
| | 2NC | 1NO | XW1E-BV412M-RH-EMO |
| | 3NC | 1NO | XW1E-BV413M-RH-EMO |
| | 2NC | 2NO | XW1E-BV422M-RH-EMO |

## FB Enclosures with XW E-Stops

| Style | Style | NC Contact | NO Contact | Part Number |
|---|---|---|---|---|
| | 40mm Push-lock Turn/Pull Reset Non-Illuminated | 2NC | – | FB1W-XW1E-BV402MR |
| | | 1NC | 1NO | FB1W-XW1E-BV411MR |
| | | 2NC | 2NO | FB1W-XW1E-BV422MR |
| | | 3NC | 1NO | FB1W-XW1E-BV413MR |
| | | 4NC | – | FB1W-XW1E-BV404MR |
| | 40mm Push-lock Turn/Pull Reset Illuminated* | 2NC | – | FB1W-XW1E-LV402MR |
| | | 1NC | 1NO | FB1W-XW1E-LV411MR |
| | | 2NC | 2NO | FB1W-XW1E-LV422MR |
| | | 3NC | 1NO | FB1W-XW1E-LV413MR |
| | | 4NC | – | FB1W-XW1E-LV404MR |
| | 60mm Push-lock Turn/Pull Reset Non-Illuminated | 2NC | – | FB1W-XW1E-BV502MR |
| | | 1NC | 1NO | FB1W-XW1E-BV511MR |
| | | 2NC | 2NO | FB1W-XW1E-BV522MR |
| | | 3NC | 1NO | FB1W-XW1E-BV513MR |
| | | 4NC | – | FB1W-XW1E-BV504MR |

For added safety, Switch Guards and Nameplates can be used with E-Stop Enclosures

*LED illumination voltage: 24V AC/DC

## Contact Ratings

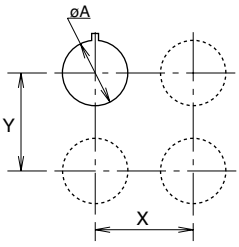
| | | | | | |
|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | | 250V | |
| Rated Current (Ith) | | | | 5A | |
| Rated Operating Voltage (Ue) | | | | 30V | 125V | 250V |
| Rated Operating Current | Main Contacts (NC) | AC 50/60Hz | Resistive Load (AC-12) | – | 5A | 3A |
| | | | Inductive Load (AC-15) | – | 3A | 1.5A |
| | | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |
| | Monitor Contacts (NO) | AC 50/60Hz | Resistive Load (AC-12) | – | 1.2A | 0.6A |
| | | | Inductive Load (AC-14) | – | 0.6A | 0.3A |
| | | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |

Minimum applicable load: 5V AC/DC, 1mA (reference value).
The rated operating currents are measured at resistive/inductive load types specified in IEC 60947-5-1.

## Illuminated Unit LED Ratings

| Operating Voltage | Current |
|---|---|
| 24V AC/DC ±10% | 15mA |

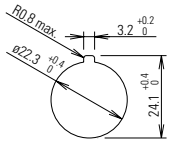
## Mounting Hole Layout




Measurements

| Size | øA | X & Y |
|---|---|---|
| 40mm | $22.3^{+0.4}$ | 70mm min |

## Panel Cutout




## Depth Behind the Panel

| Depth (mm) | Description |
|---|---|
| 46.4 | with indicator, 1 - 4 contacts, both illuminated and non-illuminated |
| 48.7 | w/o indicator, 1 - 4 contacts, both illuminated and non-illuminated |

## Part Number Key

# XW1E - L V 4 TG 11 Q4MR

**Illumination**
B: Non-Illuminated
L: Illuminated LED
T: Illuminated Push-ON LED

**Indicator**
TG: w/green mechanical indicator
blank: w/o indicator

**Contact Configuration**
11: 1NO - 1NC
02: 2NC
13: 1NO - 3NC
04: 4NC
22: 2NO-2NC
12: 1NO-2NC (Push-ON LED only)
01: 1NC (EMO switch only)
03: 3NC (EMO switch only)

**Color**
R: red with indicator
-R: red w/o indicator
-RH-EMO: red w/o indicator with EMO engraving

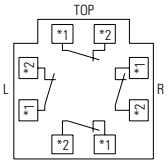
**Mushroom Size**
4: ø40mm
5: ø60mm (non-illuminated only)

**Voltage Code**
Blank: Non-illuminated
Q4: Illuminated 24V AC/DC

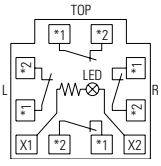
## Terminal Arrangements (Bottom View)

**4NC**

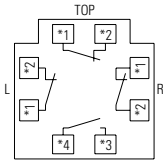
Non-Illuminated

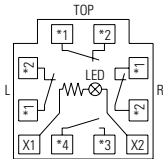



Illuminated

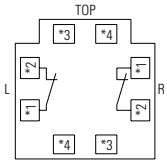


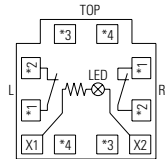

**1NO-3NC**



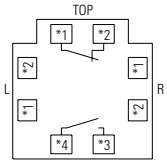



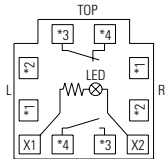

**2NC**



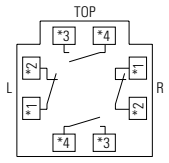



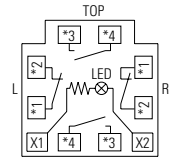

**1NO-1NC**




**2NO-2NC**

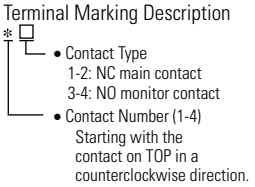



**1NO-2NC**

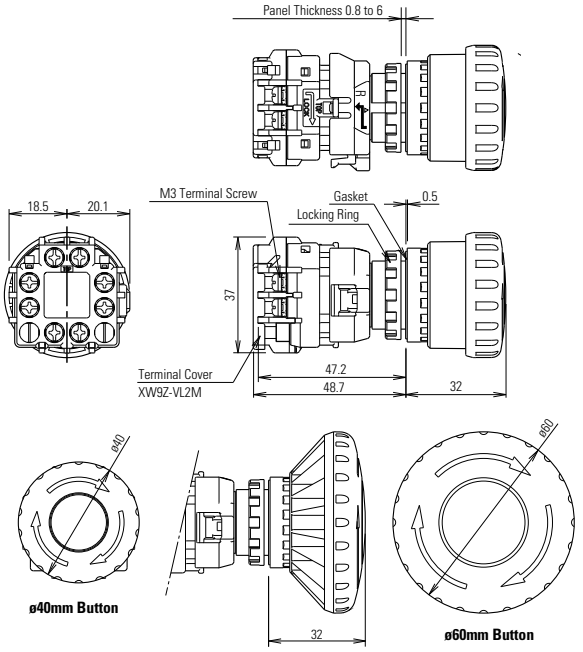
Push-ON

Terminal Marking Description

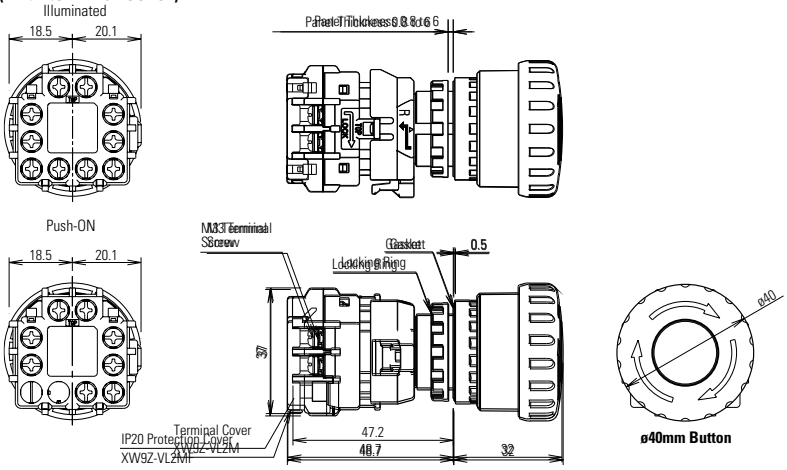


# Dimensions (mm)

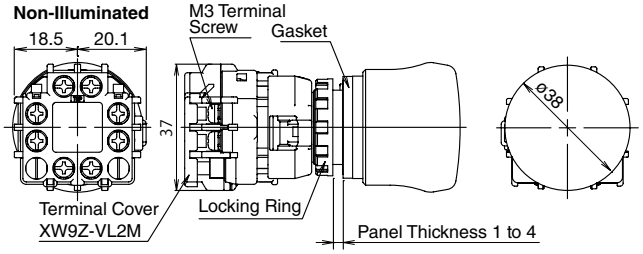
## XW Standard Button Non-Illuminated Without Indicator (with terminal cover)



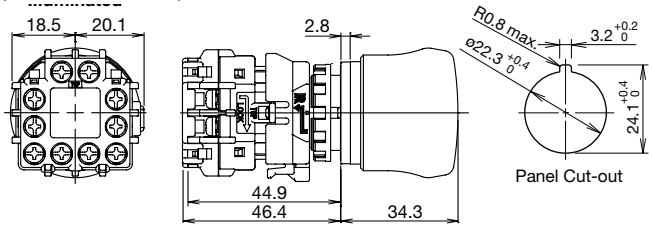

## XW Standard Button LED Illuminated/Push-ON Without Indicator (with terminal cover)



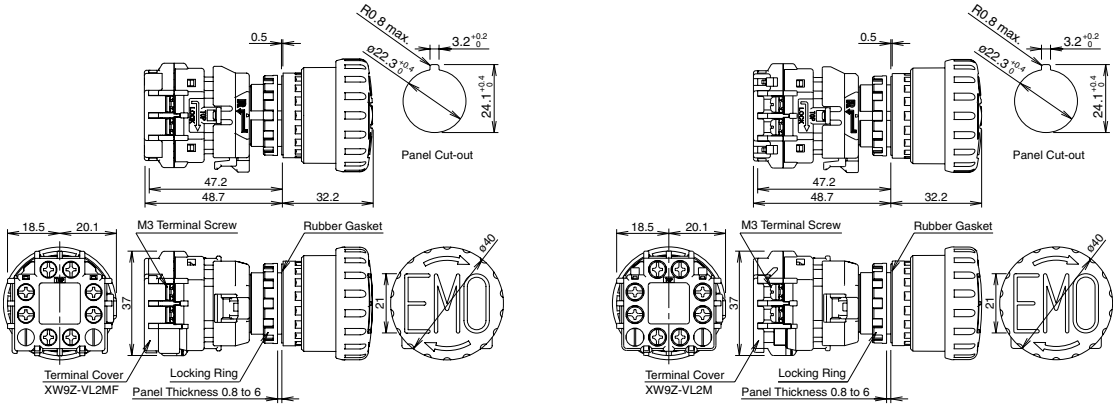

## XW Smooth Button Non-Illuminated With Indicator (with terminal cover)




## XW Smooth Button LED Illuminated/Push-ON With Indicator (with terminal cover)




## EMO



### Accessories: Terminal Covers

| Appearance | Description | Part Numbers |
|---|---|---|
| | Terminal Cover for contact block | XW9Z-VL2M |
| | IP20 Fingersafe Cover | XW9Z-VL2MF |

### Accessories: Nameplates

| Appearance | Legend | Part Number | Inner Ø | Outer Ø |
|---|---|---|---|---|
| | (blank) | HWAV-0 | 22mm | 60mm |
| | "Emergency Stop" | HWAV-27 | 22mm | 60mm |
| | (blank) | HWAV5-0 | 22mm | 80mm |
| | "Emergency Stop" | HWAV5-27 | 22mm | 80mm |

Use 60mm nameplates for 39mm and 40mm mushroom buttons and 80mm nameplates for 60mm mushroom buttons.

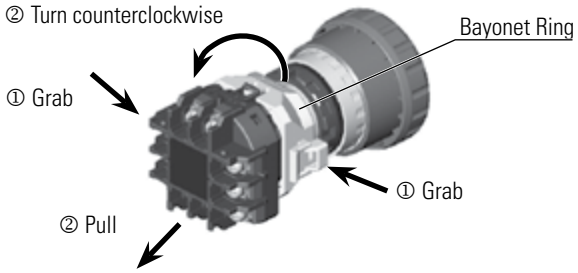
### Accessories: Shrouds

| Appearance | Part Numbers | E-Stop Types | Applicable Standards |
|---|---|---|---|
| | HW9Z-KG1 | 38mm, 40mm Mushroom Head | SEMI S2-0703, 12.5.1 Compliant |
| | HW9Z-KG2 | 38mm, 40mm, and 60mm Mushroom Head | SEMI S2-0703, 12.5.1 & SEMATECH Compliant |
| | HW9Z-KG3 | 38mm, 40mm Mushroom Head | SEMI S2 Compliant (Approved by TUV) |
| | HW9Z-KG4 | 38mm, 40mm Mushroom Head | SEMI S2 Compliant (Approved by TUV) & SEMATECH |

## Operating Instructions

### Removing the Contact Block

First unlock the operator button. Grab the bayonet ring ① and pull back the bayonet ring until the latch pin clicks ②, then turn the contact block counter-clockwise and pull out ③.

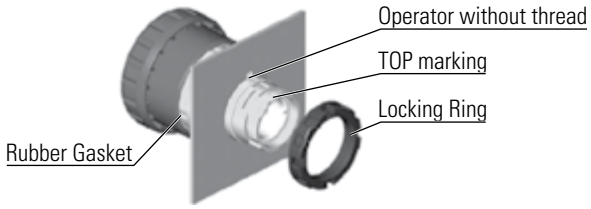



#### Notes for removing the contact block

1. When the contact block is removed, the monitor contact (NO contact) is closed.
2. While removing the contact block, do not exert excessive force, otherwise the switch may be damaged.
3. An LED lamp is built into the contact block for illuminated pushbuttons. When removing the contact block, pull the contact block straight to prevent damage to the LED lamp. If excessive force is exerted, the LED lamp may be damaged and fail to light.

### Panel Mounting

Remove the locking ring from the operator and check that the rubber gasket is in place. Insert the operator from panel front into the panel hole. Face the side without thread on the operator with TOP marking upward, and tighten the locking ring using ring wrench MW9Z-T1 to a torque of 2.0 N·m maximum.

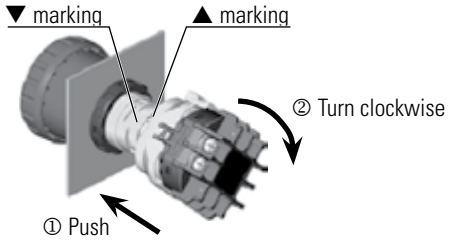



#### Notes for Panel Mounting

To prevent the XW emergency stop switch from rotating when resetting from the latched position, use of an anti-rotation ring (HW9Z-RL) or a nameplate is recommended.

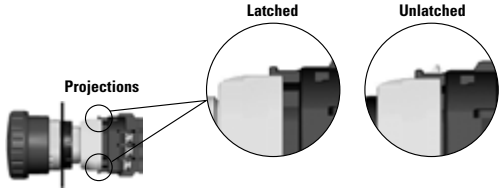
### Installing the Contact Block

First unlock the operator button. Align the small ▼ marking on the edge of the operator with the small ▲ marking on the yellow bayonet ring. Hold the contact block, not the bayonet ring. Press the contact block onto the operator and turn the contact block clockwise until the bayonet ring clicks.



### Notes for installing the contact block

Make sure that the bayonet ring is in the locked position. Check that the two projections on the bayonet ring are securely in place.




## Wiring

The applicable wire size is 16 AWG maximum.

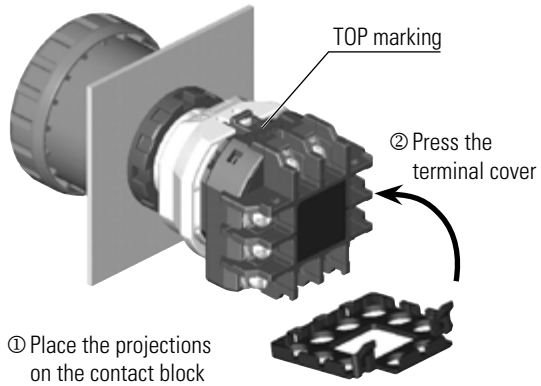
### Screw Terminal

1. Wire thickness: AWG18 to 16
2. Tighten the M3 terminal screw to a tightening torque of 0.6 to 1.0 N·m.

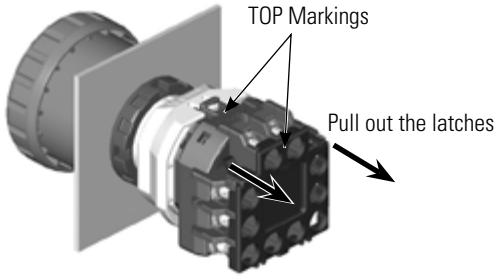
## Installing and Removing Terminal Covers

### XW9Z-VL2M

To install the terminal cover, align the TOP marking on the terminal cover with the TOP marking on the contact block. Place the two projections on the bottom side of the contact block into the slots in the terminal cover. Press the terminal cover toward the contact block.

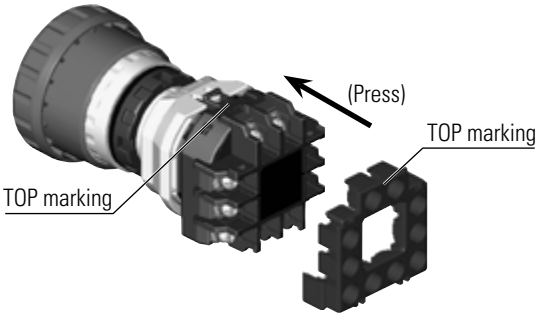



To remove the terminal cover, pull out the two latches on the top side of the terminal cover. Do not exert excessive force to the latches, otherwise the latches may break.




### IP20 Protection Terminal Cover XW9Z-VL2MF

To install the IP20 protection cover, align the TOP marking on the cover with the TOP marking on the contact block, and press the cover toward the contact block.




1. Once installed, the XW9Z-VL2MF cannot be removed.
2. The XW9Z-VL2MF cannot be installed after wiring.
3. With the XW9Z-VL2MF installed, crimping terminals cannot be used.
4. Make sure that the XW9Z-VL2MF is securely installed. IP20 protection cannot be achieved when installed loosely, and electric shocks may occur.

## Contact Bounce

When the button is reset by pulling or turning, the NC main contacts will bounce. When pressing the button, the NO monitor contacts will bounce.

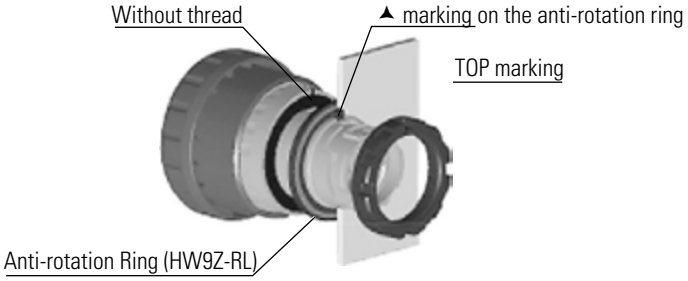
When designing a control circuit, take the contact bounce time into consideration (reference value: 20 ms).

## LED Illuminated Switches

LED lamp is built into the contact block and cannot be replaced.

## Installing the Anti-rotation Ring HW9Z-RL

Align the side without thread on the operator with TOP marking, the small s marking on the anti-rotation ring, and the recess on the mounting panel.



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# Interlock Switches

IDEC

**www.IDEC.com/safety**

# Selection Guide

## Standard Interlock Safety Switches

| Series | Subminiature | Miniature | | Full Size | |
|---|---|---|---|---|---|
| | HS6B | HS5B | HS5D | HS2B | HS1B |
| Appearance | | | | | |
| Page | 299 | www.IDEC.com/safety | 304 | 311 | 315 |
| Size (mm) | 30 x 15 x 78mm | 91 x 30 x 30mm | 30 x 30 x 90mm | 52 x 35 x 98mm | 52 x 35 x 125mm |
| Contacts | 2 or 3 | 2 | 2 or 3 | 2 | 2 |
| Termination | Integrated cable | Screw | Screw | Screw | Screw |
| Material | Plastic body | Plastic body | Metal or plastic head | Plastic head | Die-cast aluminum body |

## Solenoid Locking Safety Switches

| Series | Subminiature | Miniature | Full Size | | |
|---|---|---|---|---|---|
| | HS6E | HS5E | HS1E | HS1C | HS1L |
| Appearance | | | | | |
| Page | 318 | 327 | 343 | 349 | 354 |
| Size (mm) | 75 x 15 x 75mm<br>500N | 35 x 40 x 146mm<br>1400N | 104 x 35 x 129mm<br>1500N | 106 x 35 x 125mm<br>1500N | 104 x 35 x 129mm<br>3000N |
| Contacts | 5 | 4 | 3 or 4 | 3 or 4 | 6 |
| Termination | Integrated cable | Integrated cable | Screw | Screw | Screw |
| Material | Plastic body | Metal head, plastic body | Plastic body | Die-cast aluminum body | Plastic body |

## Key Locking Safety Switch

| Series | HS5E-K |
|---|---|
| Appearance | |
| Page | 357 |
| Size (mm) | 35 x 40 x 146 |
| Contacts | 4 |
| Termination | Integrated cable |
| Material | Metal head, plastic body |

## Non-contact Safety Switch

| HS7A-DMC | HS7A-DMP | HS3A |
|---|---|---|
| | | |
| 370 | 374 | 378 |
| 7 x 16 x 51 | 13 x 25 x 88 | 40 x 47 x 70mm |
| 2 | 3 | 3 |
| Integrated cable | Integrated cable | M12 |
| PBT | PBT | PBT |

# HS6B Subminiature Interlock Switches

**Key features:**

- Only 78 x 30 x 15mm
- Two actuator entrances provide flexibility for installation options
- Integrated molded cable reduces wiring time
- IP67 (IEC60529)
- Direct Opening Action
- Actuators comply with ISO14119 and EN1088

GS-ET-15
BG standard in Germany

Direct Opening Action

Double Insulation

## Part Numbers

| Contact Configuration | Cable Length | Part Number |
|---|---|---|
| 1NC-1NO | 1m | HS6B-11B01 |
| | 3m | HS6B-11B03 |
| | 5m | HS6B-11B05 |
| 2NC | 1m | HS6B-02B01 |
| | 3m | HS6B-02B03 |
| | 5m | HS6B-02B05 |
| 2NC-1NO | 1m | HS6B-12B01 |
| | 3m | HS6B-12B03 |
| | 5m | HS6B-12B05 |
| 3NC | 1m | HS6B-03B01 |
| | 3m | HS6B-03B03 |
| | 5m | HS6B-03B05 |

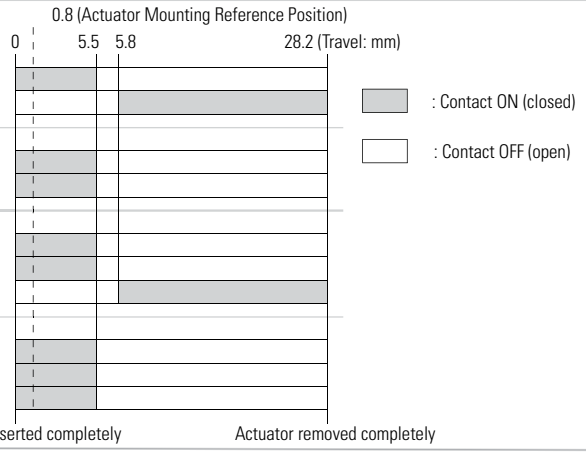
## Actuator Keys (order separately)

| Appearance | Part Number | Shape |
|---|---|---|
| | HS9Z-A61 | Straight |
| | HS9Z-A62 | Right-angle |
| | HS9Z-A65 | Adjustable actuator 90° angle |
| | HS9Z-A66 | Adjustable actuator 180° angle |

Actuators are not included and must be ordered separately.

## Contact Configuration & Operation Chart

| Type | Contact Configuration | Contact Operation Chart |
|---|---|---|
| HS6B-11 | 1NC-1NO | 11-12, 33-34 |
| HS6B-02 | 2NC | 11-12, 31-32 |
| HS6B-12 | 2NC-1NO | 11-12, 21-22, 33-34 |
| HS6B-03 | 3NC | 11-12, 21-22, 31-32 |



## Specifications

| | | |
|---|---|---|
| Conforming to Standards | | EN1088, IEC60947-5-1, EN60947-5-1, GS-ET-15, IEC60664-1, IEC60204-1, EN60204-1, UL508, CSA C22.2 No. 14 |
| Operating Temperature | | –25 to +70°C (no freezing) |
| Storage Temperature | | –40 to +80°C (no freezing) |
| Relative Humidity | | 45 to 85% RH (no condensation) |
| Storage Humidity | | 95% maximum (no condensation) |
| Altitude | | 2,000m maximum |
| Pollution Degree | | 3 |
| Rated Insulation Voltage ($U_i$) | | 300V |
| Impulse Withstand Voltage ($U_{imp}$) | | 4kv |
| Insulation Resistance | | Between live & dead metal parts: 100MΩ maximum |
| | | Between positive & negative live parts: 100MΩ minimum |
| Electric Shock Protection Class | | Class II |
| Degree of Protection | | IP67 (IEC60529) |
| Vibration Resistance | Operating Extremes | 5 to 55 Hz, half amplitude 0.5 mm |
| | Damage Limits | 30Hz, half amplitude 1.5mm |
| Contact Resistance | | 300mΩ maximum |
| Shock Resistance | Operating Extremes | 300m/s² (30G) |
| | Damage Limits | 1000m/s² (100G) |
| Direct Opening Travel | | 8mm minimum |
| Direct Opening Force | | 60N minimum |
| Thermal Current ($I_{th}$) | | 2.5A |
| Operating Frequency | | 1200 operations/hour |
| Mechanical Life | | 1,000,000 operations (GS-ET-15) |
| Recommended Actuation Speed | | 0.05 to 1.0m/s |
| Wire Tensile Strength | | 50N minimum |
| Electrical Life | | 100,000 operations (at full rated load) |
| Conditional Short-Circuit Current | | 50A 250V (IEC60947-5-1, IEC60269-1, -2) |
| Weight | | 120g |

## Contact Ratings

| | | | | | |
|---|---|---|---|---|---|
| Rated Operating Current ($I_e$) | Operating Voltage ($U_e$) | | 30V | 125V | 250V |
| | AC | Resistive load (AC-12) | – | 2.5A | 1.5A |
| | | Inductive load (AC-15) | – | 1.5A | 0.75A |
| | DC | Resistive load (DC-12) | 2.5A | 1.1A | 0.55A |
| | | | (2A) | (0.4)A | (0.2A) |
| | | Inductive load (DC-13) | 2.3A | 0.55A | 0.27A |
| | | | (1A) | (0.22A) | (0.1A) |

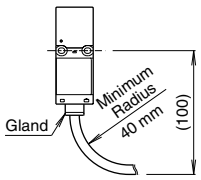
## Installation Notes

### Recommended Screw Torque

- Safety switch body installation (M4 screw): 1.0~1.5N-m
- Actuator installation (M4 screw): 1.0~1.5N-m

### Handling Cables

- Do not tighten or loosen the fastened cable conduit of the safety switch
- Minimum bend radius of installed cable: 40mm

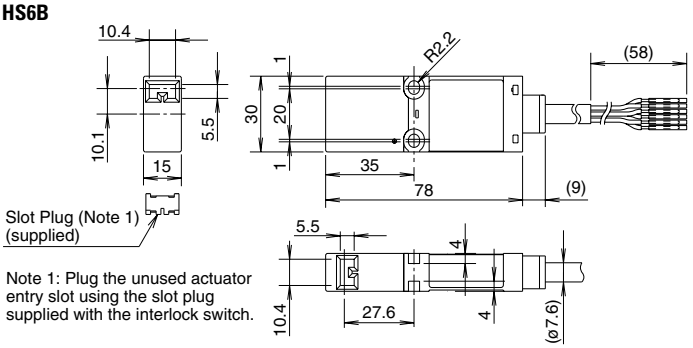



## Wiring Designations

| Part Number | Contact | Terminal # | Color |
|---|---|---|---|
| HS6B-12B01 (2NC-1NO) | NC | 11-12 | blue-blue/white |
| | NC | 21-22 | brown-brown/white |
| | NO | 33-34 | orange-orange/white |
| HS6B-03B01 (3NC) | NC | 11-12 | blue-blue/white |
| | NC | 21-22 | brown-brown/white |
| | NC | 31-32 | orange-orange/white |
| HS6B-11B01 (1NC-1NO) | NC | 11-12 | blue-blue/white |
| | NO | 33-34 | orange-orange/white |
| HS6B-02B01 (2NC) | NC | 11-12 | blue-blue/white |
| | NC | 31-32 | orange-orange/white |

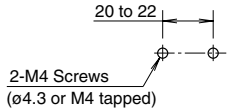
### Dimensions (mm)

**HS6B**



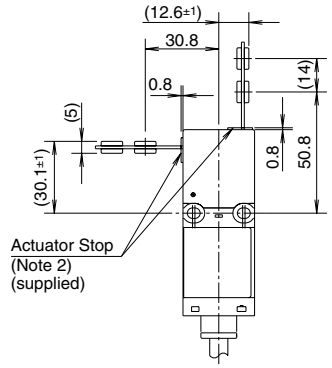

Note 1: Plug the unused actuator entry slot using the slot plug supplied with the interlock switch.

### Installation

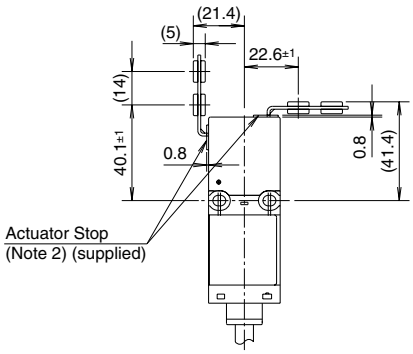



The interlock switch can be mounted in two directions.

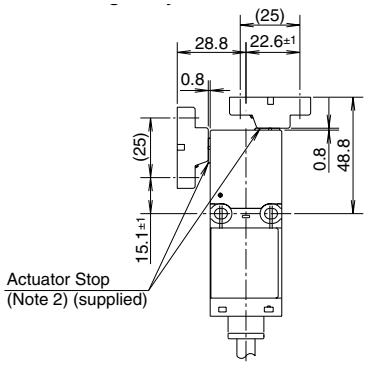
### Using straight actuator (HS9Z-A61)



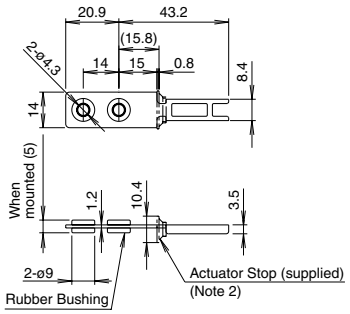

### Using Right-angle actuator (HS9Z-A62)



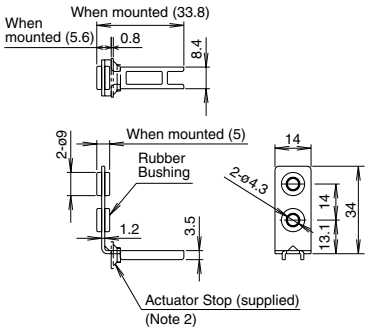

### Using Angle Adjustable Actuator (HS9Z-A65/A66)



### Straight actuator (HS9Z-A61)

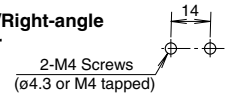



### Right-angle actuator (HS9Z-A62)

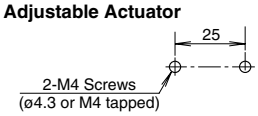



### Actuator Installation

**Straight/Right-angle Actuator**

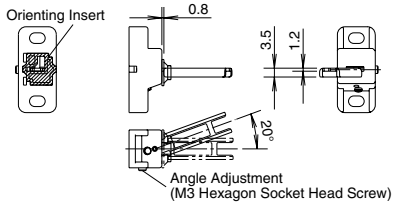



**Angle Adjustable Actuator**

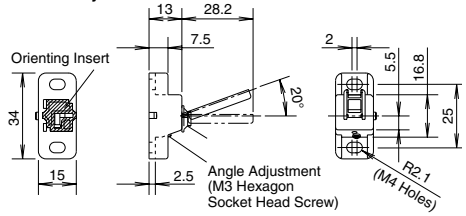



### Adjustable Actuator (HS9Z-A65)

**Horizontal Adjustment**




**Vertical Adjustment**




The orientation of actuator adjustment (horizontal/vertical) can be changed using the orienting insert (white plastic) installed on the back of the actuator.

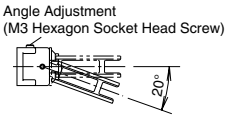
The base is made of glass-reinforced PA66 (66 nylon). Angle adjustment screws are stainless steel. When using adhesive on screws, take material compatibility into consideration.

Note 2: After mounting the actuator, remove the actuator stop from the interlock switch.

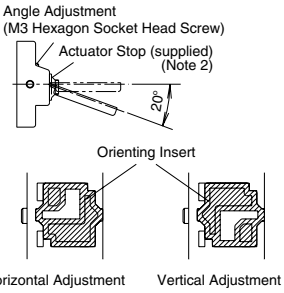
### Adjustable Actuator (HS9Z-A66)

The HS9Z-A65 and HS9Z-A66 have the metal key inserted in opposite directions.

**Horizontal Adjustment**




**Vertical Adjustment**



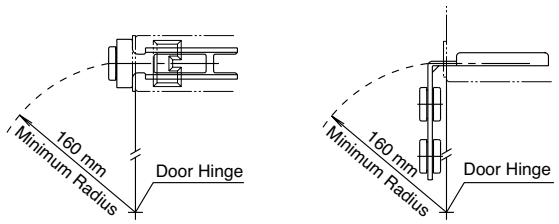
## Minimum Radius of Hinged Door

- When using the interlock switch for a hinged door, refer to the minimum radius of doors shown below. For doors with small minimum radius, use angle adjustable actuators (HS9Z-A65 or HS9Z-A66).

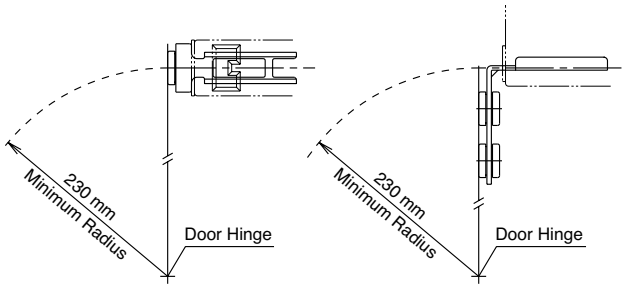
Note: Because deviation or dislocation of hinged door may occur in actual applications, make sure of the correct operation before installation.

### HS9Z-A62 Actuator

- When the door hinge is on the extension line of the interlock switch surface:



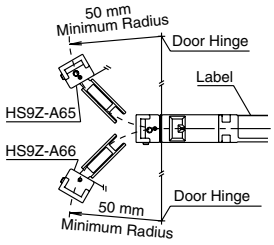

- When the door hinge is on the extension line of the actuator mounting surface:



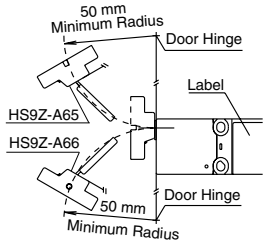

### When using the HS9Z-A65/HS9Z-A66 Angle Adjustable (vertical) Actuator

- When the door hinge is on the extension line of the interlock switch surface:

**Horizontal Swing**

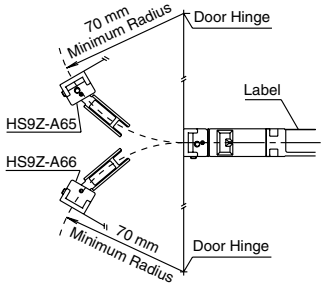



**Vertical Swing**

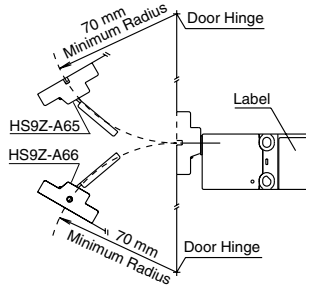



- When the door hinge is on extension line of the actuator mounting surface:

**Horizontal Swing**




**Vertical Swing**




### Actuator Angle Adjustment for the HS9Z-A65/HS9Z-A66

- Using the angle adjustment screw, the actuator angle can be adjusted (see figures on page 370).
- Adjustable angle: 0 to 20°
- The larger the adjusted angle of the actuator, the smaller the applicable radius of the door opening.
- After installing the actuator, open the door. Then adjust the actuator so that its edge can enter properly into the actuator entry slot of the interlock switch.
- After adjusting the actuator angle, apply Loctite to the adjustment screw so that the screw will not become loose.

# HS5D Miniature Interlock Switches

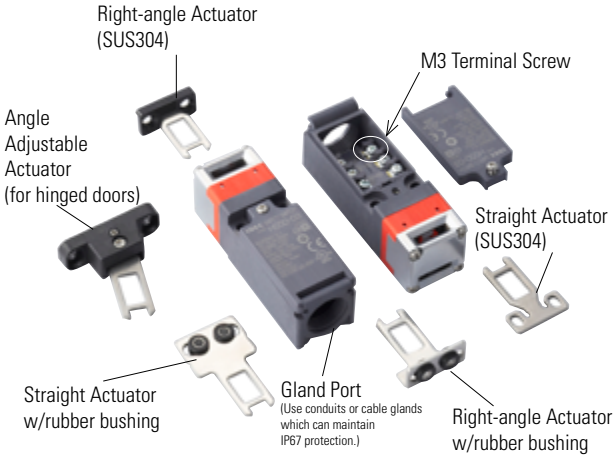
## Key features:

- Detects detachment of head for enhanced safety
- Compact dimensions with up to three contacts
- The head orientation can be rotated, allowing 8 different actuator entries
- NC contacts with direct opening action (IEC/EN60947-5-1)
- M3 terminal screws for easy wiring
- Gold-plated contacts suitable for small loads

## Part Numbers

| Contact Configuration | Gland Port Size | Plastic Head Type | Metal Head Type |
|---|---|---|---|
| 1NC-1NO<br>Zb<br>Main Circuit 11 12<br>Monitor Circuit 23 24 | G1/2 | HS5D-11RN | HS5D-11ZRN |
| | PG13.5 | HS5D-11RNP | HS5D-11ZRNP |
| | M20 | HS5D-11RNM | HS5D-11ZRNM |
| 2NC<br>Zb<br>Main Circuit 11 12<br>Monitor Circuit 21 22 | G1/2 | HS5D-02RN | HS5D-02ZRN |
| | PG13.5 | HS5D-02RNP | HS5D-02ZRNP |
| | M20 | HS5D-02RNM | HS5D-02ZRNM |
| 2NC-1NO<br>Zb<br>Main Circuit 11 12<br>Main Circuit 21 22<br>Monitor Circuit 33 34 | G1/2 | HS5D-12RN | HS5D-12ZRN |
| | PG13.5 | HS5D-12RNP | HS5D-12ZRNP |
| | M20 | HS5D-12RNM | HS5D-12ZRNM |
| 3NC<br>Zb<br>Main Circuit 11 12<br>Main Circuit 21 22<br>Monitor Circuit 31 32 | G1/2 | HS5D-03RN | HS5D-03ZRN |
| | PG13.5 | HS5D-03RNP | HS5D-03ZRNP |
| | M20 | HS5D-03RNM | HS5D-03ZRNM |

## Parts Description



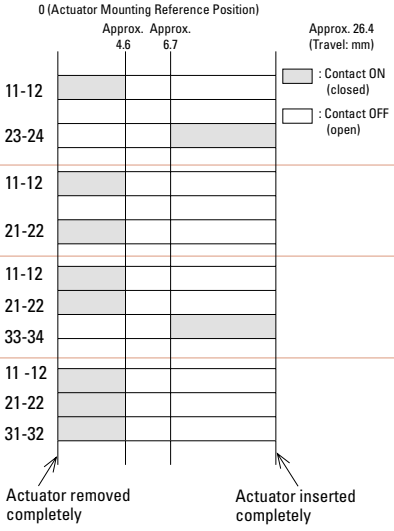

## Actuator Keys (order separately)

| Item | Part Number | Description |
|---|---|---|
| | HS9Z-A51 | Straight |
| | HS9Z-A51A | Straight w/rubber bushings |
| | HS9Z-A52 | Right-angle |
| | HS9Z-A52A | Right-angle w/rubber bushings |
| | HS9Z-A55 | Angle Adjustable (vertical/horizontal) |
| | HS9Z-A5P | Plug Actuator |
| | HS9Z-SH5 | Sliding Actuator |
| | HS9Z-PH5 | Padlock Hasp |

Actuators are not included and must be ordered separately.

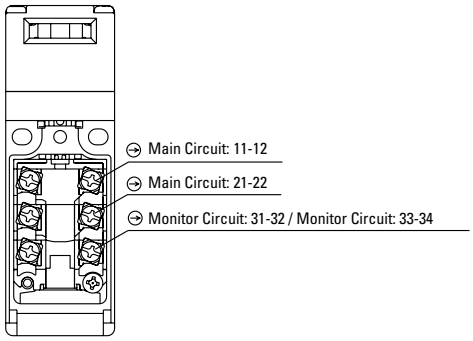
## Contact Configuration & Operation Chart

| Type | Contact Configuration | Contact Operation Chart (reference) |
|---|---|---|
| HS5D-11* | Main Circuit 11 12<br>Monitor Circuit 23 24 | 11-12<br>23-24 |
| HS5D-02* | Main Circuit 11 12<br>Main Circuit 21 22 | 11-12<br>21-22 |
| HS5D-12* | Main Circuit 11 12<br>Main Circuit 21 22<br>Monitor Circuit 33 34 | 11-12<br>21-22<br>33-34 |
| HS5D-03* | Main Circuit 11 12<br>Main Circuit 21 22<br>Monitor Circuit | 11 -12<br>21-22<br>31-32 |




The operation characteristics shown in the chart above are for the HS9Z-A51. For other actuator types, add 1.3 mm.
The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch

## Terminal Arrangement




## Specifications

| | |
|---|---|
| Applicable Standards | ISO14119, EN1088, IEC60947-5-1, EN60947-5-1 (TÜV approval), GS-ET-15 (TÜV approval), UL508, CSA C22.2 No. 14, GB14048.5 (CCC approval), IEC60204-1/EN60204-1 (applicable standards for use) |
| Operating Temperature | –30 to +70°C (no freezing) |
| Relative Humidity | 45 to 85% (no condensation) |
| Storage Temperature | –40 to +80°C (no freezing) |
| Pollution Degree | 3 |
| Impulse Withstand Voltage | 4 kV |
| Contact Resistance | 50 mΩ maximum (initial value) |
| Insulation Resistance (500V DC megger) | Between live and dead metal parts: 100 MΩ minimum<br>Between terminals of different poles: 100 MΩ minimum |
| Electric Shock Protection Class | Class II (IEC61140) |
| Degree of Protection | IP67 (IEC60529) |
| Shock Resistance | Damage limits: 1000 m/s$^2$ |
| Vibration Resistance | Operating extremes: 10 to 55 Hz, amplitude 0.5 mm<br>Damage limits: 30 Hz, amplitude 1.5 mm |
| Actuator Operating Speed | 0.05 to 1.0 m/s |
| Direct Opening Travel | 10 mm minimum |
| Direct Opening Force | 50N minimum |
| Operating Frequency | 900 operations per hour |
| Mechanical Durability | 1,000,000 operations minimum (GS-ET-15) |
| Electrical Durability | 100,000 operations minimum (AC-12 250V, 6A)<br>1,000,000 operations minimum (24V AC/DC,100 mA)<br>(operation frequency: 900 operations per hour) |
| Performance of Terminals 11-12 of Removed Head Unit | Mechanical damage limits: 10 operations min.<br>Insulation resistance: 100 MΩ (initial value)<br>Dielectric strength: 1000V, 1 minute (initial value) |
| Conditional Short-circuit Current | 100A (250V) (note) |
| Weight (approx.) | Plastic head: 80g<br>Metal head: 110g |

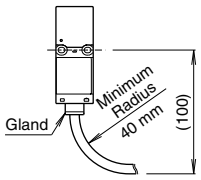
## Contact Ratings

| | | | | | |
|---|---|---|---|---|---|
| Rated Operating Current ($I_e$) | Operating Voltage ($U_e$) | | 30V | 125V | 250V |
| | AC | Resistive load (AC-12) | – | 2.5A | 1.5A |
| | | Inductive load (AC-15) | – | 1.5A | 0.75A |
| | DC | Resistive load (DC-12) | 2.5A | 1.1A | 0.55A |
| | | | (1A) | (0.22A) | (0.1A) |

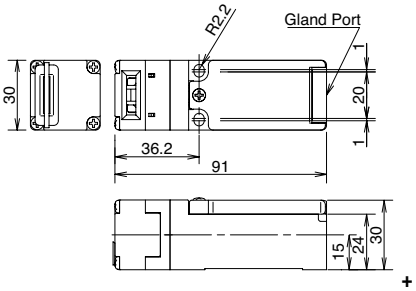
## Installation Notes

### Recommended Screw Torque

- Safety switch body installation (M4 screw): 1.0~1.5N-m
- Actuator installation (M4 screw): 1.0~1.5N-m

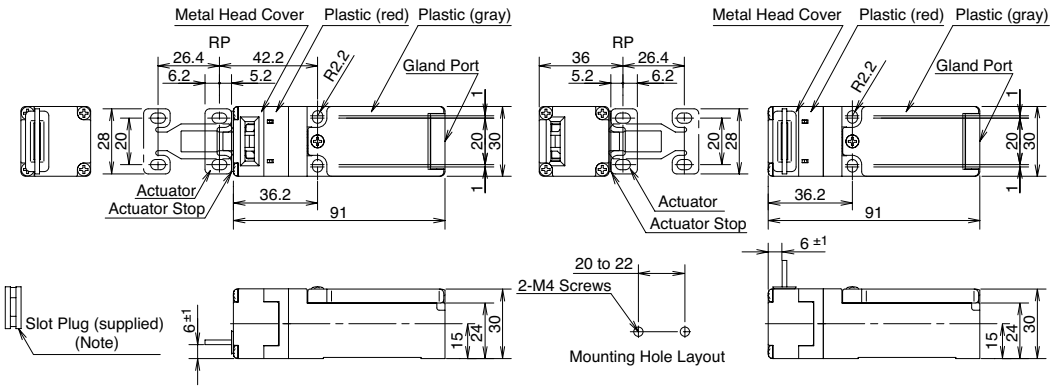



## Dimensions and Mounting Hole Layouts

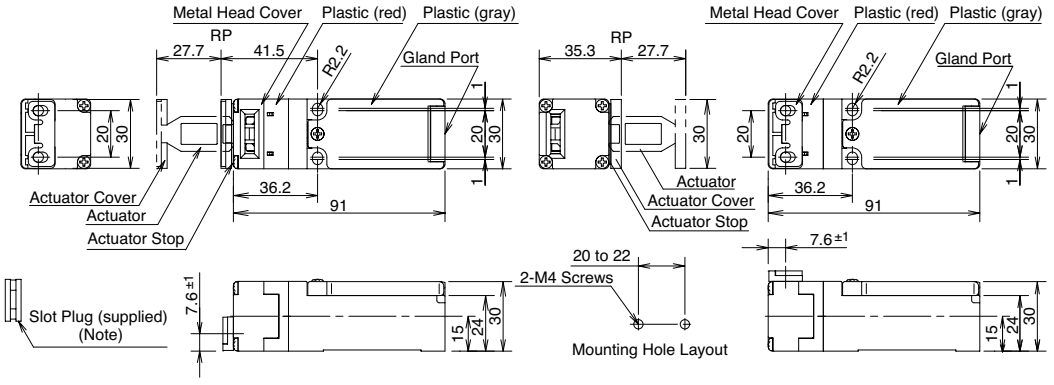



**HS5D-□□ZRN□ (Metal Head)**
**With HS9Z-A51 Straight Actuator**

RP: Reference mounting position.

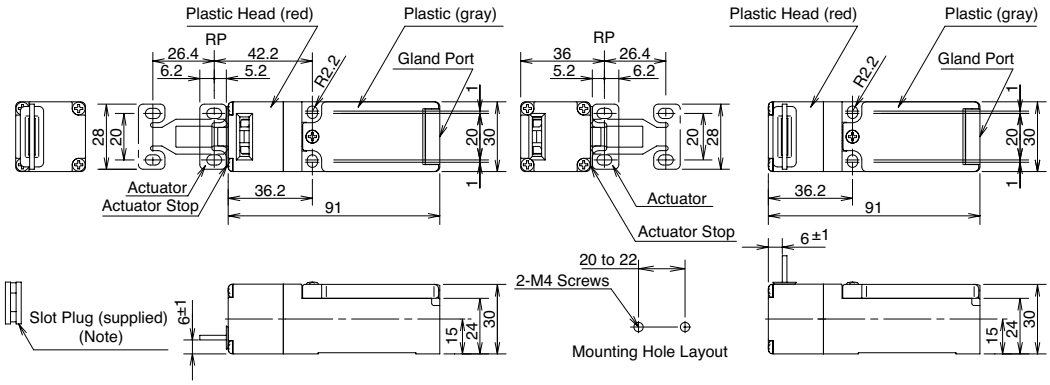



**With HS9Z-A52 Right-angle Actuator**

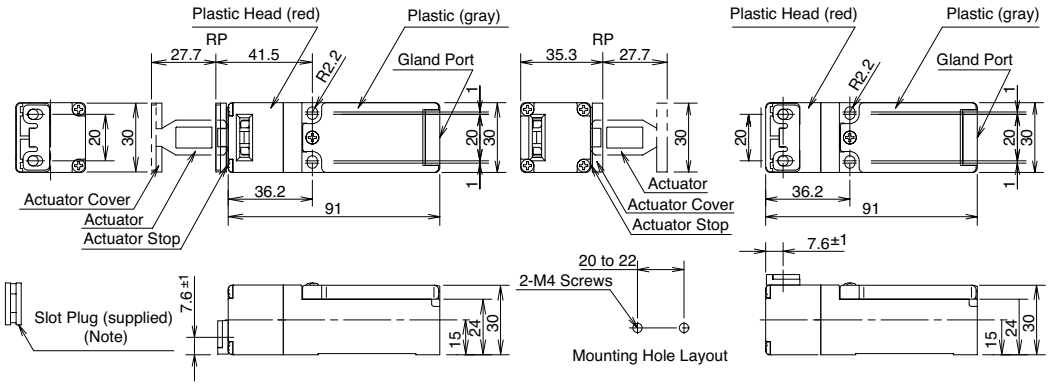



All dimensions in mm.

**HS5D-□□RN□ (Plastic Head)**
**With HS9Z-A51 Straight Actuator**




**With HS9Z-A52 Right-angle Actuator**

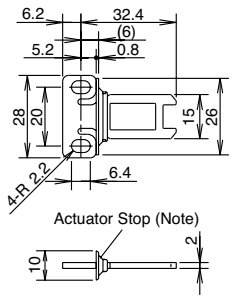



All dimensions in mm.

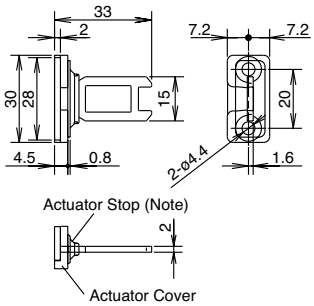
Note: Plug the unused actuator insertion slot using the slot plug supplied with the safety interlock switch.

## Actuator Dimensions

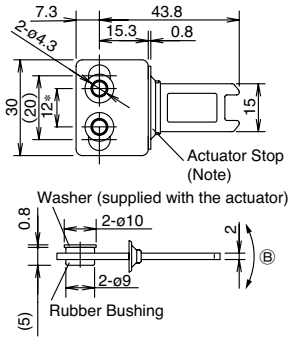
### Straight (HS9Z-A51)



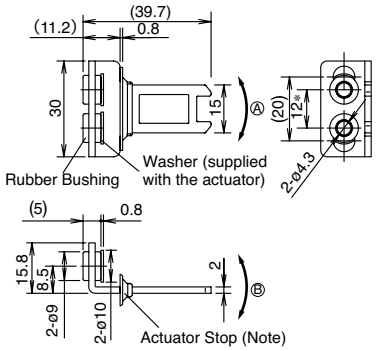

### Right-angle (HS9Z-A52)



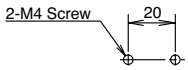

### Straight w/rubber bushing (HS9Z-A51A)




### Right-angle w/rubber bushing (HS9Z-A52A)

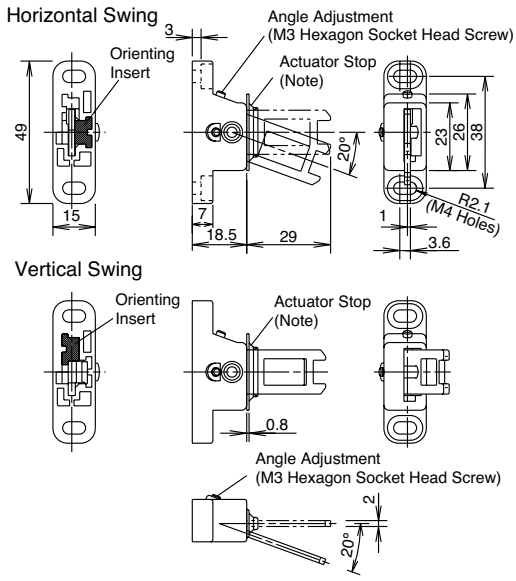



### Actuator Mounting Hole Layout (Straight, Right-angle)

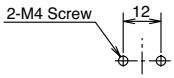



The mounting center distance is set to 12 mm at factory. When 20-mm distance is required, adjust the distance by moving the rubber bushings.
ⒶⒷ The actuator has flexibility to the directions indicated by the arrows. When 20-mm distance is selected, the actuator swings vertically.

### Angle Adjustable (HS9Z-A55)




### Actuator Mounting Hole Layout (Straight w/rubber bushing) (Right-angle w/rubber bushing)

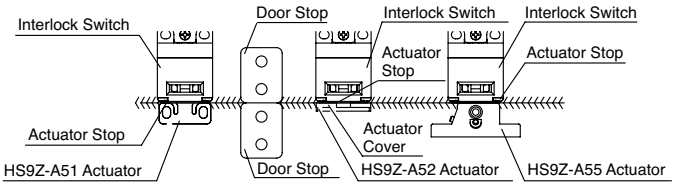



*Mounting centers can be widened to 20 mm by moving the rubber cushions.

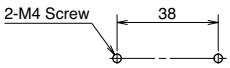
### Actuator Mounting Reference Position

As shown in the figure below, the mounting reference position of the actuator when inserted in the interlock switch is where the actuator stop placed on the actuator lightly touches the interlock switch.

Note: After mounting the actuator, remove the actuator stop from the actuator.




### Actuator Mounting Hole Layout (Straight, Right-angle)




Note: The actuator stop is supplied with the actuator and used when adjusting the actuator position. Remove the actuator stop after the actuator position is determined.

### Actuator Orientation (Angle Adjustable)

The angle of actuator swing can be changed using the orienting insert (white plastic) installed on the back of the actuator. Do not lose the orienting insert, otherwise the actuator will not operate properly.

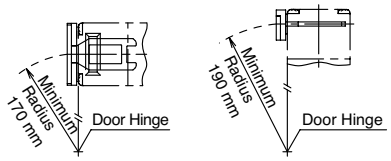
## Minimum Radius of Hinged Door

- When using the interlock switch for a hinged door, refer to the minimum radius of doors shown below. For the doors with small minimum radius, use angle adjustable actuators (HS9Z-A55).

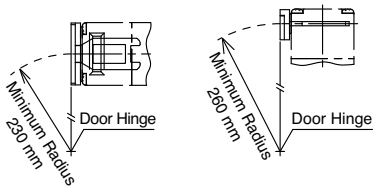
Note: Because deviation or dislocation of hinged door may occur in actual applications, make sure of the correct operation before installation.

### HS9Z-A52 Actuator

- When the door hinge is on the extension line of the interlock switch surface:

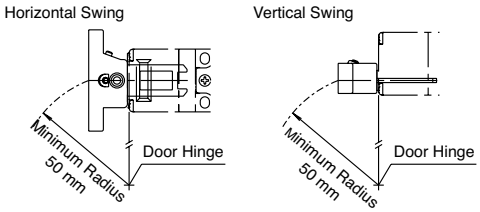



- When the door hinge is on the extension line of the actuator mounting surface:

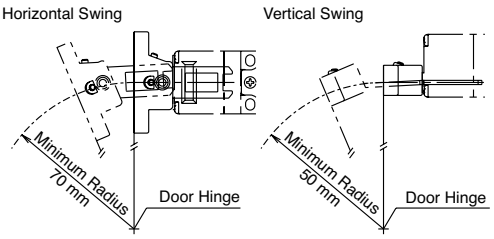



### When using the HS9Z-A55 Angle Adjustable Actuator

- When the door hinge is on the extension line of the interlock switch surface:




- When the door hinge is on extension line of the actuator mounting surface:



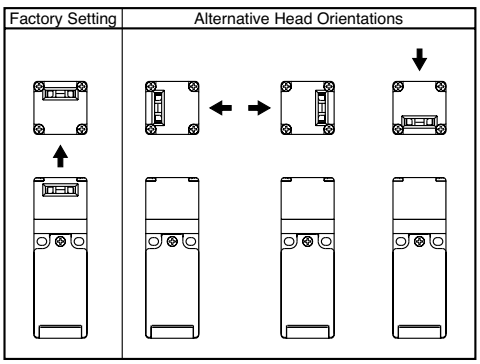

### Actuator Angle Adjustment for the HS9Z-A55

- Using the angle adjustment screw, the actuator angle can be adjusted (see figures "Actuator Dimensions" on page 13). Adjustable angle: 0 to 20°
- The larger the adjusted angle of the actuator, the smaller the applicable radius of the door opening. After installing the actuator, open the door. Then adjust the actuator so that its edge can be inserted properly into the actuator entry slot of the interlock switch.
- After adjusting the actuator angle, apply Loctite to the adjustment screw so that the screw will not loosen.

## Instructions

### Rotating the Head

- The head of the HS5D can be rotated by removing the four screws from the corners of the HS5D head and reinstalling the head in the desired orientation. When reinstalling the head, make sure that no foreign object enters the interlock switch. Tighten the screws tightly, because loose tightening may cause malfunction.
- Recommended screw tightening torque: 0.9 to 1.1 N·m




### Head Removal Detection Function

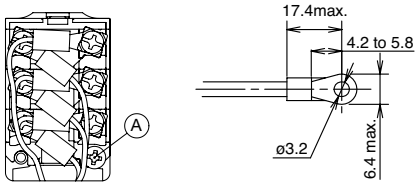
Only the NC contact of the main circuit (11-12) turns OFF (open) when the head is removed, such as when rotating the head. Because NC contacts of other than the main circuit (11-12) turn ON (closed), be sure to connect the main circuit (11-12) to the safety circuit.

### Recommended Tightening Torque

- Interlock Switch Mounting Screw: 1.8 ± 2.2 N·m (two M4 screws)
- Housing Lid Screw: 0.2 to 0.4 N·m (M3 screw)
- Terminal Screw: 0.6 to 0.8 N·m (M3 screw)
- Connector: 2.7 to 3.3 N·m
- Actuators
  - HS9Z-A51: 1.8 ± 2.2 N·m (two M4 screws)
  - HS9Z-A52: 0.8 ± 1.2 N·m (two M4 Phillips screws)
  - HS9Z-A51A/A52A: 1.0 to 1.5 N·m (two M4 screws)
  - HS9Z-A55: 1.0 to 1.5 N·m (two M4 screws)
- The above recommended tightening torques of the mounting screws are the values confirmed with hex socket head bolts. When other screws are used and tightened to a smaller torque, make sure that the screws do not come loose after mounting.
- Mounting bolts must be provided by the user.
- To avoid unauthorized or unintended removal of the interlock switch and the actuator, it is recommended that the interlock switch and the actuator be installed in an unremovable manner, for example using special screws or welding the screws.

## Applicable Crimping Terminal

When using crimping terminals, be sure to install insulation tubes on the crimping terminals to prevent electric shocks. When using stranded wires, make sure that loose wires do not cause short circuit. Also do not solder the terminal to prevent loose wires.




Applicable wire size (with insulation tube): 0.2 to 0.5 mm$^2$ (20 ~ 24 AWG)

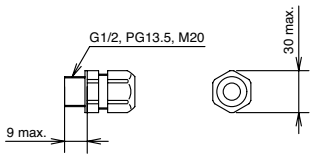
Note: Do not remove screw A during wiring. Removing the screw may cause malfunction or damage.

## Applicable Wire Size

0.5 to 1.5 mm$^2$ (16 ~ 20 AWG)

## Applicable Cable Glands

Use a cable gland with a degree of protection IP67.



# HS2B Full Size Interlock Switches

**Key features:**

- Direct Opening Action: If the door is forced open, the contacts are disconnected even if they are welded or stuck
- Available with or without an indicator (red or green)
- Flexible Installation: Two actuator entries and three conduit ports are provided
- 1NC-1NO contacts
- Compact and lightweight plastic housing
- Degree of Contact Protection: IP67

EN1088
EN60947-5-1
IEC60947-5-1

GS-ET-15
BG standard in Germany

Direct Opening Action

Double Insulation

**Part Numbers**

## Body

| Model | | Contact Configuration | Pilot Light | Part Number |
|---|---|---|---|---|
| | HS2B (plastic housing) | 1NC-1NO | Without | **HS2B-11NB** |
| | | | With red LED | HS2B-114NB-R |
| | | | With green LED | **HS2B-114NB-G** |

Order the actuators separately (not supplied with the switch).
Standard stock items in bold.

## Actuator Keys & Accessories (order separately)

| Appearance | Part Number | Description |
|---|---|---|
| | HS9Z-A1 | Straight Actuator (Mainly for sliding doors) |
| | HS9Z-A2 | Right-angle Actuator (Mainly for rotating doors) |
| | HS9Z-A3 | Adjustable Actuator |
| | HS9Z-P1 | Conduit Opening Plug |

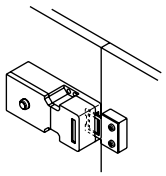
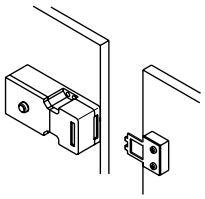
## Specifications

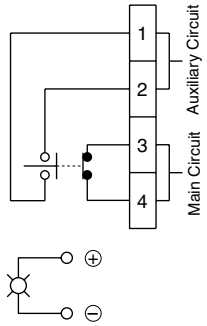
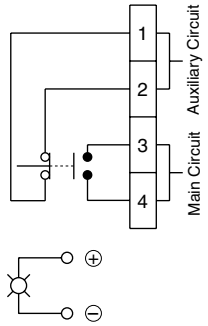
| | | |
|---|---|---|
| Conforming to Standards | | IEC60947-5-1, EN60947-5-1, GS-ET-15, UL508 |
| Operating Temperature | | –25 to +70°C (no freezing) |
| Storage Temperature | | –40 to +80°C |
| Operating Humidity | | 85% RH maximum (no condensation) |
| Altitude | | 2,000m maximum |
| Rated Insulation Voltage (Ui) | | 300V (between LED and ground: 60V) |
| Impulse Withstand Voltage (Uimp) | | 4 kV (between LED and ground: 2.5 kV) |
| Insulation Resistance | | Between live and dead metal parts: 100 MΩ minimum<br>Between live metal part and ground: 100 MΩ minimum<br>Between live metal parts: 100 MΩ minimum<br>Between terminals of the same pole: 100 MΩ minimum |
| Electric Shock Protection Class | | Class II (IEC61140) |
| Pollution Degree | | 3 (IEC60947-5-1) |
| Degree of Protection | | IP67 (IEC60529) |
| Vibration Resistance | Operating Extremes | 10 to 55 Hz, amplitude 0.5mm |
| | Damage Limits | 60 m/sec$^2$ (approx. 6G) |
| Shock Resistance | | 1,000 m/sec$^2$ (approx. 100G) |
| Actuator Operating Speed | | 1 m/sec maximum |
| Positive Opening Travel | | 11 mm minimum |
| Positive Opening Force | | 36N minimum |
| Thermal Current (Ith) | | 10A |
| Operating Frequency | | 900 operations/hour |
| Mechanical Life | | 1,000,000 operations |
| Electrical Life | | 100,000 operations (rated load) |
| Conditional Short-circuit Current | | 100A (IEC60947-5-1) |
| Recommended Short Circuit Protection | | 250V, 10A fuse (Type D01 based on IEC60269-1, 60269-2) |
| Indicator | Operating Voltage | 24V DC |
| | Current | 10 mA |
| | Light Source | LED lamp |
| | Lens Color | Red or Green (12 mm dia. Lens) |
| Weight | | Approx. 130g |

## Contact Ratings

| | | | | | |
|---|---|---|---|---|---|
| Rated Operating Current (Ie) | Operating Voltage (Ue) | | 30V | 125V | 250V |
| | AC | Resistive load (AC12) | 10A | 10A | 6A |
| | | Inductive load (AC15) | 10A | 5A | 3A |
| | DC | Resistive load (DC12) | 8A | 2.2A | 1.1A |
| | | Inductive load (DC13) | 4A | 1.1A | 0.6A |

## Application Examples and Circuit Diagrams

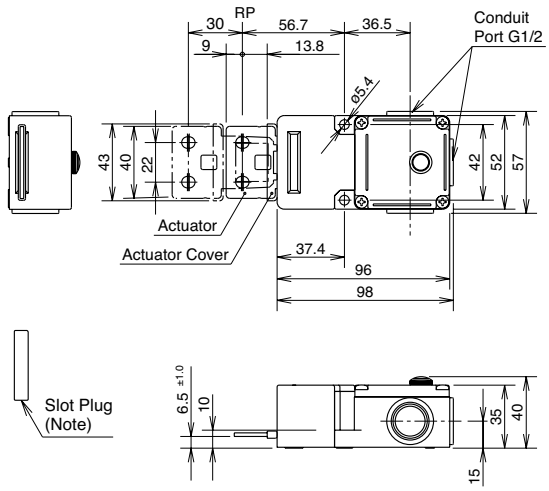
| | Status 1 | Status 2 |
|---|---|---|
| Door/ Switch Status | Door Closed<br>Machine ready to operate | Door opened<br>Machine cannot be started |
| Door |  |  |
| Main Circuit | 3-4: Closed | 3-4: Open |
| Aux. Circuit | 1-2: Open | 1-2: Closed |

| | Status 1 | Status 2 |
|---|---|---|
| Door/ Switch Status | Door Closed<br>Machine ready to operate | Door opened<br>Machine cannot be started |
| HS2B-11 (1NO-1NC)<br>Circuit Diagram |  |  |
| Main Circuit | 3-4: Closed | 3-4: Open |
| Aux. Circuit | 1-2: Open | 1-2: Closed |

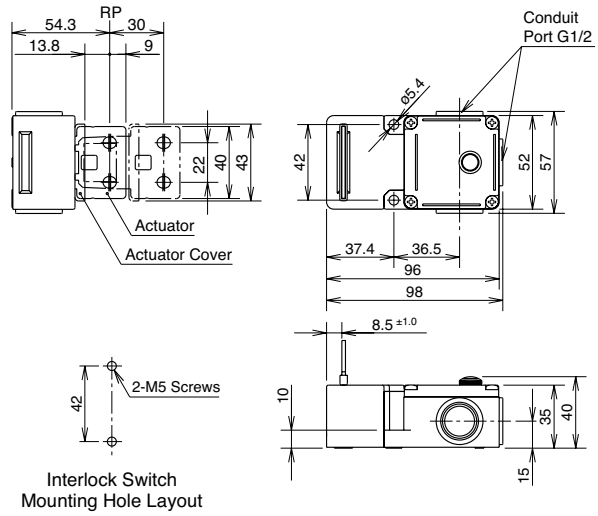
1. Main Circuit: used to enable the machine to start only when the main circuit is closed. Auxiliary Circuit: used to indicate whether the main circuit or door is open or closed.
2. Terminals + and - are used for the LED indicator, and are isolated from door status.

**Dimensions (mm)**
**Using the straight actuator (HS9Z-A1)**

(Horizontal Mounting)




(Vertical Mounting)

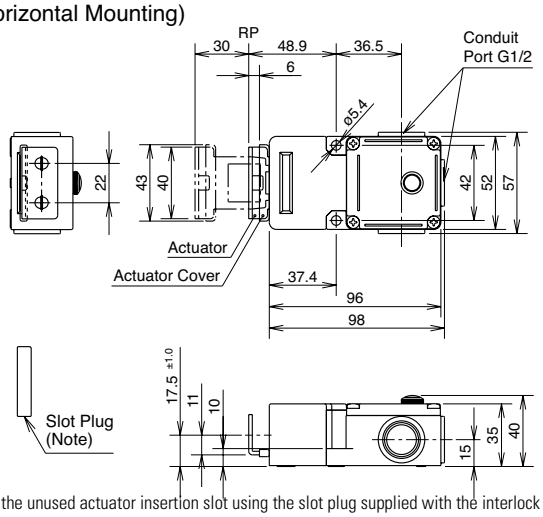



Interlock Switch Mounting Hole Layout

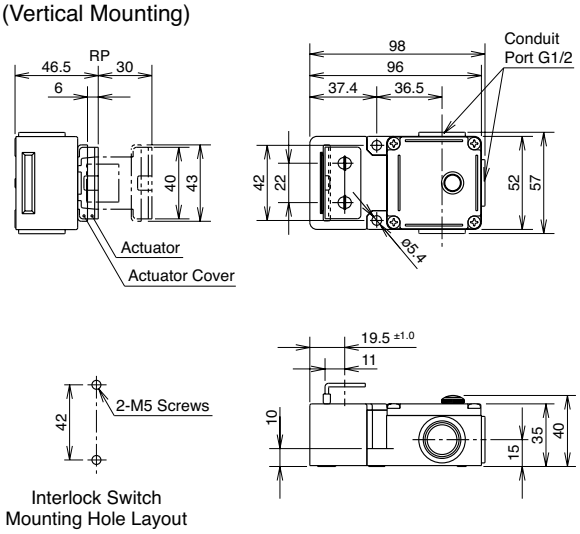
## Dimensions (mm), continued

**Using the Right-angle actuator (HS9Z-A2)**

(Horizontal Mounting)



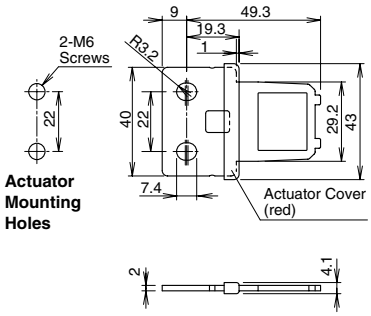

(Vertical Mounting)



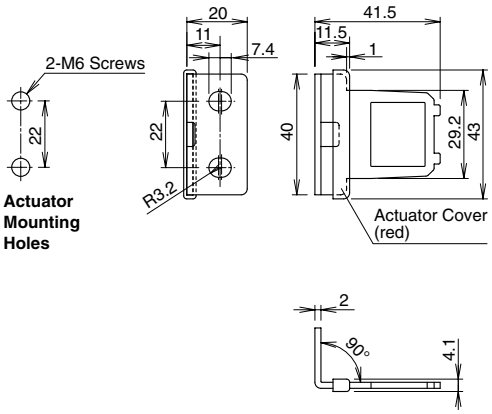

Plug the unused actuator insertion slot using the slot plug supplied with the interlock switch.

## Actuator Dimensions

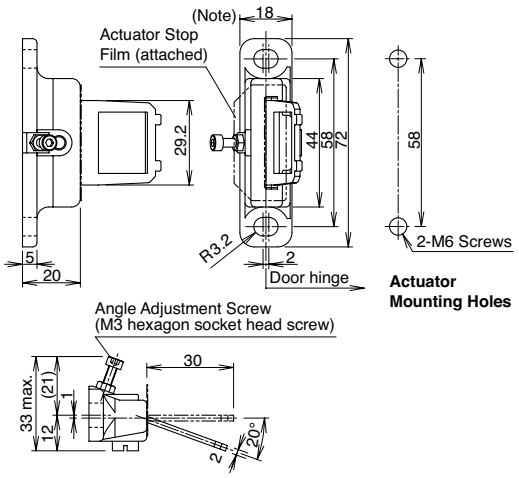
**Straight Actuator HS9Z-A1**




**Right-angle Actuator HS9Z-A2**




**Angle-adjustable Actuator HS9Z-A3**




### Adjustable Actuator

The actuator angle is adjustable (0˚ to 20˚) for hinged doors.

The minimum radius of the door opening can be as small as 100mm.

### Actuator Angle Adjustment

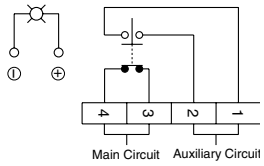
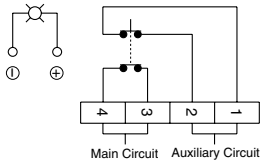
- Using the screw (M3 hex socket head screw), the actuator angle can be adjusted (refer to the dimensional drawing). Adjustable angle: (0˚) to 20˚
- The larger the adjusted angle of the actuator, the smaller the applicable radius of the door opening.
- After installing the actuator, open the door. Then adjust the actuator so that its edge can be inserted properly into the entry slot of the safety switch.
- Recommended tightening torque: 0.8 N-m (approx. 8.0 kgf-cm)
- After adjusting the actuator angle, apply loctite or the like to the adjustment screw to prevent it from loosening.

# HS1B Full Size Interlock Switches

**Key features:**

- Rugged aluminum die-cast housing
- Direct Opening Action
- Available with or without an indicator (red or green)
- Flexible Installation: Two actuator entries and three conduit ports are provided
- Select from two circuit configurations (1NO-1NC or 2NC).
- IP67

## Part Numbers
### Body

| Model | Contact Configuration | Pilot Light | Part Number |
|---|---|---|---|
|  | 1NC-1NO | Without | **HS1B-11R** |
| | | Red LED | HS1B-114R-R |
| | | Green LED | HS1B-114R-G |
|  | 2NC | Without | **HS1B-02R** |
| | | Red LED | HS1B-024R-R |
| | | Green LED | **HS1B-024R-G** |

Standard stock items in bold.

### Actuator Keys and Accessories (order separately)

| Appearance | Part Number | Description |
|---|---|---|
| | HS9Z-A1 | Straight Actuator (Mainly for sliding doors) |
| | HS9Z-A2 | Right-angle Actuator (Mainly for rotating doors) |
| | HS9Z-A3 | Adjustable Actuator |
| | HS9Z-T1 | Key Wrench (included with switch) |
| | HS9Z-P1 | Conduit Opening Plug |

Actuators are not included and must be ordered separately.

## Specifications

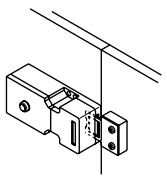
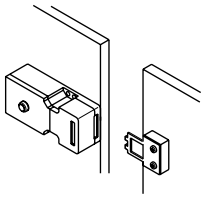
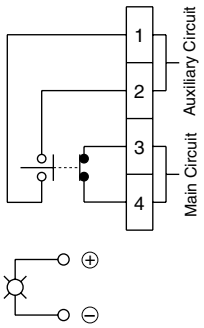
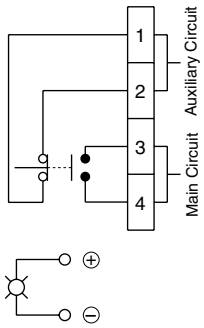
| | | |
|---|---|---|
| Conforming to Standards | | IEC60947-5-1, EN60947-5-1, GS-ET-15, UL508, CSA C22.2 No. 14 |
| Operating Temperature | | –20 to +70°C (no freezing) |
| Storage Temperature | | –40 to +80°C |
| Relative Humidity | | 45 to 85% (no condensation) |
| Altitude | | 2,000m maximum |
| Rated Insulation Voltage ($U_i$) | | 300V (between LED and ground: 60V) |
| Impulse Withstand Voltage ($U_{imp}$) | | 4 kV (between LED and ground: 2.5 kV) |
| Insulation Resistance | | Between live and dead metal parts: 100 MΩ minimum<br>Between live metal part and ground: 100 MΩ minimum<br>Between live metal parts: 100 MΩ minimum<br>Between terminals of the same pole: 100 MΩ minimum |
| Electric Shock Protection Class | | Class I (IEC61140) |
| Pollution Degree | | 3 (IEC60947-5-1) |
| Degree of Protection | | IP67 (IEC60529) |
| Vibration Resistance | Operating Extremes | 10 to 55 Hz, amplitude 0.5mm p-p |
| | Damage Limits | 60 m/sec$^2$ (approx. 6G) |

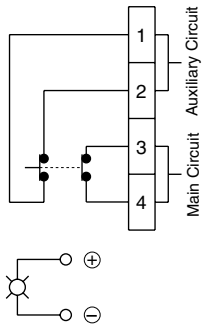
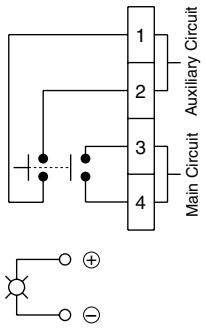
| | | |
|---|---|---|
| Shock Resistance | | 1,000 m/sec$^2$ (approx. 100G) |
| Actuator Operating Speed | | 0.05 to 1.0m/s |
| Direct Opening Travel | | 11 mm minimum |
| Direct Opening Force | | 20N minimum |
| Thermal Current ($I_{th}$) | | 10A |
| Operating Frequency | | 900 operations/hour |
| Mechanical Life | | 1,000,000 operations |
| Electrical Life | | 100,000 operations (rated load) |
| Conditional Short-circuit Current | | 100A (IEC60947-5-1) |
| Recommended Short Circuit Protection | | 250V, 10A fuse (Type D01 based on IEC60269-1, 60269-2) |
| Indicator | Operating Voltage | 24V DC |
| | Current | 10 mA |
| | Light Source | LED lamp |
| | Lens Color | Red or Green (12 mm dia. Lens) |
| Weight | | Approx. 280g |

## Contact Ratings

| | | | 30V | 125V | 250V |
|---|---|---|---|---|---|
| Rated Operating Current ($I_e$) | Operating Voltage ($U_e$) | | | | |
| | AC | Resistive load (AC12) | 10A | 10A | 6A |
| | | Inductive load (AC15) | 10A | 5A | 3A |
| | DC | Resistive load (DC12) | 8A | 2.2A | 1.1A |
| | | Inductive load (DC13) | 4A | 1.1A | 0.6A |

## Application Examples and Circuit Diagrams

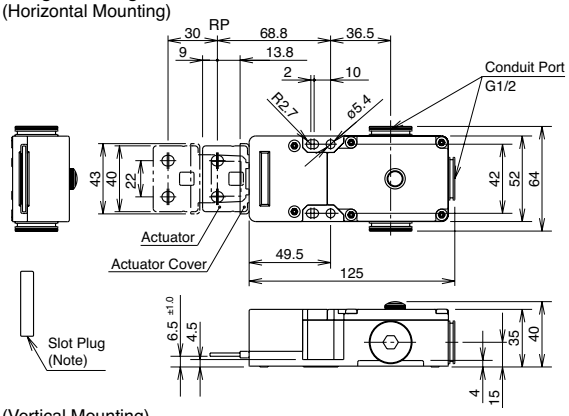
| | Status 1 | Status 2 |
|---|---|---|
| Door/ Switch Status | Door Closed<br>Machine ready to operate | Door opened<br>Machine cannot be started |
| Door |  |  |
| HS1B-11 (1NO-1NC)<br>Circuit Diagram |  |  |
| Main Circuit | 3-4: Closed | 3-4: Open |
| Aux. Circuit | 1-2: Open | 1-2: Closed |

| | Status 1 | Status 2 |
|---|---|---|
| Door/ Switch Status | Door Closed<br>Machine ready to operate | Door opened<br>Machine cannot be started |
| HS1B-02 (2NC)<br>Circuit Diagram |  |  |
| Main Circuit | 3-4: Closed | 3-4: Open |
| Aux. Circuit | 1-2: Closed | 1-2: Open |

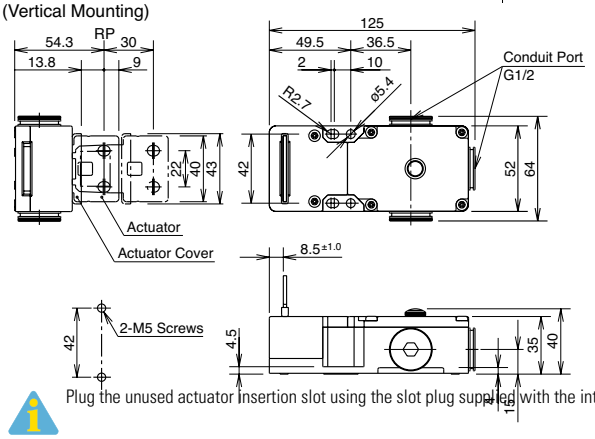
1. Main Circuit: used to enable the machine to start only when the main circuit is closed. Auxiliary Circuit: used to indicate whether the main circuit or door is open or closed.
2. Terminals + and - are used for the LED indicator, and are isolated from door status. Wire the terminals only when needed.

## Dimensions (mm)

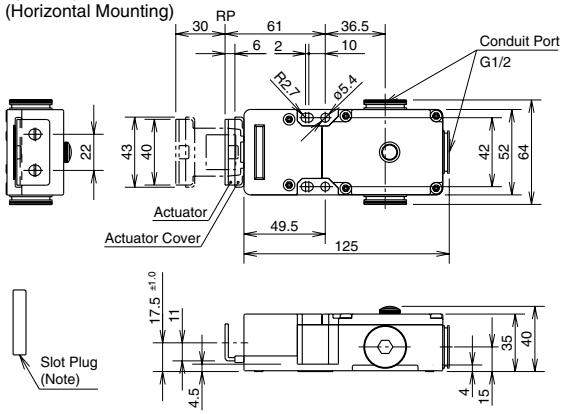
**Using the straight actuator (HS9Z-A1)**
(Horizontal Mounting)



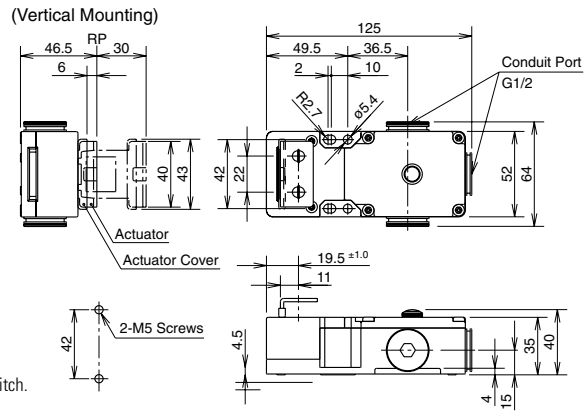

(Vertical Mounting)




**Using the Right-angle actuator (HS9Z-A2)**
(Horizontal Mounting)



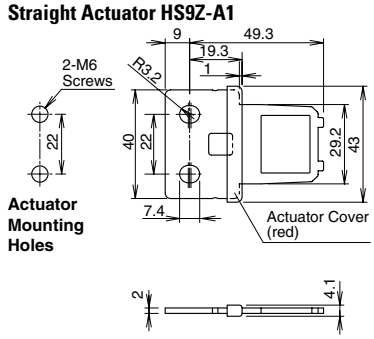

(Vertical Mounting)



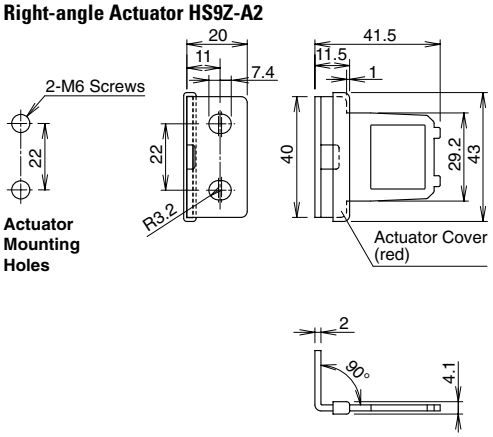

Plug the unused actuator insertion slot using the slot plug supplied with the interlock switch.

## Actuator Dimensions

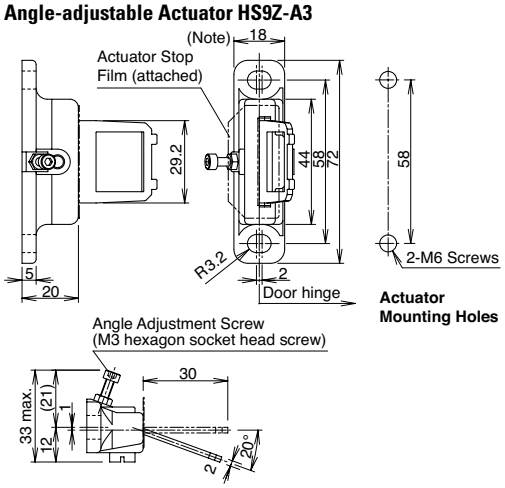
**Straight Actuator HS9Z-A1**




**Right-angle Actuator HS9Z-A2**




**Angle-adjustable Actuator HS9Z-A3**




### Adjustable Actuator

The actuator angle is adjustable (0˚ to 20˚) for hinged doors.

The minimum radius of the door opening can be as small as 100mm.

### Actuator Angle Adjustment

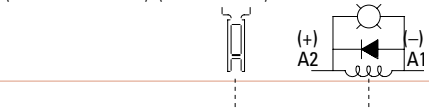
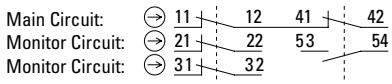
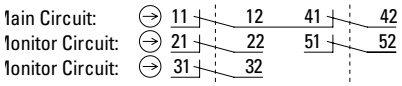
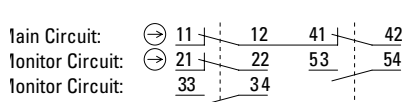
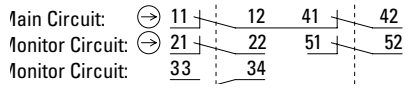
- Using the screw (M3 hex socket head screw), the actuator angle can be adjusted (refer to the dimensional drawing). Adjustable angle: (0˚) to 20˚
- The larger the adjusted angle of the actuator, the smaller the applicable radius of the door opening.
- After installing the actuator, open the door. Then adjust the actuator so that its edge can be inserted properly into the entry slot of the safety switch.
- Recommended tightening torque: 0.8 N-m (approx. 8.0 kgf-cm)
- After adjusting the actuator angle, apply loctite or the like to the adjustment screw to prevent it from loosening.

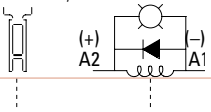
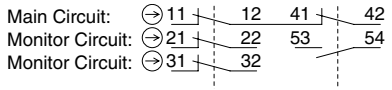
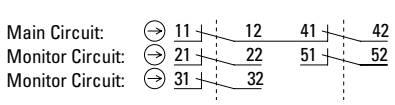
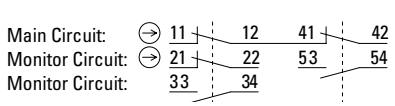
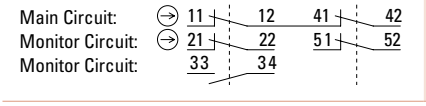
# HS6E Subminiature Interlock Switches with Solenoid

**Key features:**

- Compact body: 75 × 15 × 75mm
  15mm wide, thinnest solenoid interlock switch in the world
- Reversible mounting and angled cable allow four actuator insertion directions
- Energy saving: 24V DC, 110mA (solenoid: 100mA, LED: 10mA)
- Manual unlocking possible on three sides
- LED indicator shows solenoid operation
- 500N locking retention force

## Part Numbers

| Mechanical Spring Lock (power solenoid to unlock) | | |
|---|---|---|
| Contact Configuration | Cable Length | Part Number |
| (Actuator inserted) (Solenoid OFF)   | | |
|   | 1m<br>3m<br>5m | HS6E-L44B01-G<br>**HS6E-L44B03-G**<br>**HS6E-L44B05-G** |
|   | 1m<br>3m<br>5m | **HS6E-M44B01-G**<br>**HS6E-M44B03-G**<br>**HS6E-M44B05-G** |
|   | 1m<br>3m<br>5m | **HS6E-N44B01-G**<br>**HS6E-N44B03-G**<br>HS6E-N44B05-G |
|   | 1m<br>3m<br>5m | HS6E-P44B01-G<br>**HS6E-P44B03-G**<br>**HS6E-P44B05-G** |

| Solenoid Lock (remove power to solenoid to unlock) | | |
|---|---|---|
| Contact Configuration | Cable Length | Part Number |
| (Actuator inserted) (Solenoid ON)   | | |
|   | 1m<br>3m<br>5m | **HS6E-L7Y4B01-G**<br>**HS6E-L7Y4B03-G**<br>**HS6E-L7Y4B05-G** |
|   | 1m<br>3m<br>5m | **HS6E-M7Y4B01-G**<br>**HS6E-M7Y4B03-G**<br>**HS6E-M7Y4B05-G** |
|   | 1m<br>3m<br>5m | **HS6E-N7Y4B01-G**<br>**HS6E-N7Y4B03-G**<br>**HS6E-N7Y4B05-G** |
|   | 1m<br>3m<br>5m | HS6E-P7Y4B01-G<br>**HS6E-P7Y4B03-G**<br>HS6E-P7Y4B05-G |

1. Contact configuration shows the contact status when actuator is inserted and solenoid off for spring lock.
2. Contact configuration shows the contact status when actuator is inserted and solenoid on for solenoid lock.
3. Indicator LED color is green.
4. Actuator keys are not supplied with the interlock switch and must be ordered separately.
5. Manual unlock key is included with the interlock switch.
6. Standard stock items in bold.

## Actuator Keys

| Appearance | Item | Ordering Part Number | Remarks |
|---|---|---|---|
| | Straight Actuator | HS9Z-A61 | The retention force of HS9Z-A61 actuator is 500N maximum.<br>Do not apply excessive load. |
| | Right-angle Actuator | HS9Z-A62 | The retention force of HS9Z-A62 actuator is 100N maximum.<br>Do not apply excessive load.<br>When retention force of 100N or more is required, use the HS9Z-A62S actuator. |
| | Right-angle Actuator with Mounting Plate | HS9Z-A62S | The retention force of HS9Z-A62S actuator is 500N maximum.<br>Do not apply excessive load. |
| | Horizontal/Vertical Angle Adjustable Actuator | HS9Z-A65 | The HS9Z-A65 and HS9Z-A66 have their metal actuator installed in opposite directions. Select actuator by determining the required moving direction in consideration of the door and interlock switch.<br>See page 322 for more information.<br>The retention force of HS9Z-A65 and HS9Z-A66 500N maximum. |
| | Horizontal/Vertical Angle Adjustable Actuator | HS9Z-A66 | |

## Specifications

| | | |
|---|---|---|
| Conforming to Standards | | UL 508 (UL listed), CSA C22.2, No. 14 (c-UL listed), ISO 14119<br>IEC 60947-5-1, EN 60947-5-1 (TÜV approval), EN 1088 (TÜV approval), GS-ET-19<br>IEC 60204-1/EN 60204-1 (applicable standards for use) |
| Operating Temperature | | –25 to +50°C (no freezing) |
| Storage Temperature | | –40 to +80°C (no freezing) |
| Operating Humidity | | 45 to 85% (no condensation) |
| Rated Insulation Voltage ($U_i$) | | 300V (between LED and ground: 60V) |
| Impulse Withstand Voltage ($U_{imp}$) | | Main & lock monitor circuits: 1.5 KV<br>Door monitor circuit: 2.5 kV<br>Between solenoid/LED and ground: 0.5 kV |
| Insulation Resistance (500V DC megger) | | Between live and dead metal parts: 100 MΩ minimum<br>Between terminals of different poles: 100 MΩ minimum. |
| Contact Resistance | | 300 mΩ maximum (initial value, 1m cable)<br>500 mΩ maximum (initial value, 3m cable)<br>700 mΩ maximum (initial value, 5m cable) |
| Electric Shock Protection Class | | Class II (IEC 61140) |
| Pollution Degree | | 3 |
| Degree of Protection | | IP67 (IEC 60529) |
| Vibration Resistance | Operating Extremes | 10 to 55 Hz, amplitude 0.35mm |
| | Damage Limits | 30 Hz, amplitude 1.5 mm |
| Shock Resistance | Operating Extremes | 100 m/s$^2$ (10G) |
| | Damage Limits | 1000 m/s$^2$ (100G) |
| Actuator Operating Speed | | 0.05 to 1.0 m/s |
| Direct Opening Travel | | 8.0 mm minimum |
| Direct Opening Force | | 60N minimum |
| Actuator Retention Force | | 500N maximum (GS-ET-19) |
| Operating Frequency | | 900 operations/hour |
| Mechanical Life | | 1,000,000 operations minimum (GS-ET-19) |

| | |
|---|---|
| Electrical Life | 100,000 operations minimum (rated load)<br>1,000,000 operations minimum (24V AC/DC, 100 mA)<br>(operating frequency 900 operations/hr) |
| Conditional Short-circuit Current | 50A (250V) (Use 250V/10A fast-blow fuse for short-circuit protection.) |
| Cable | 22 AWG (12-core: 0.3 $mm^2$ or equivalent/core) |
| Cable Diameter | ø7.6 mm |
| Weight | Approx. 200g |

1. UL, c-UL rating: Main/Lock monitor circuit: 125V AC, 1A Pilot duty, 125V DC, 0.22A Pilot duty
   Door monitor circuit:240V AC, 0.75A Pilot duty250V DC, 0.27A Pilot duty
2. TÜV rating: Main/Lock monitor circuit: AC-15 125V/1A, DC-13 125V/0.22A
   Door monitor circuit: AC-15 240V/0.75A, DC-13 250V/0.27A

## Solenoid/Indicator

| | | |
|---|---|---|
| Locking Mechanism | | Spring Lock Type or Solenoid Lock Type |
| Rated Voltage | | 24V DC |
| Current | | 110 mA (solenoid 100 mA, LED 10 mA) |
| Solenoid | Coil Resistance | 240Ω (at 20°C) |
| | Pickup Voltage | Rated voltage × 85% maximum (at 20°C) |
| | Dropout Voltage | Rated voltage × 10% minimum (at 20°C) |
| | Maximum Continuous Applicable Voltage | Rated voltage × 110% |
| | Maximum Continuous Applicable Time | Continuous |
| | Insulation Class | Class F |
| Indicator | Light Source | LED |
| | Illumination Color | Green |

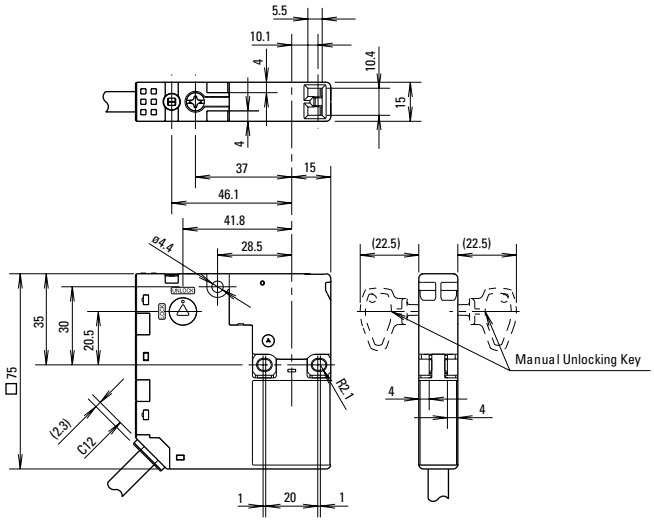
## Contact Ratings

| | Operating Voltage ($U_e$) | | | 30V | 125V | 250V |
|---|---|---|---|---|---|---|
| Rated Operating Current ($I_e$) | Main and Lock Monitor Circuits | AC | Resistive load (AC-12)<br>Inductive load (AC-15) | – | 2A<br>1A | – |
| | | DC | Resistive load (DC-12)<br>Inductive load (DC-13) | 2A<br>1A | 0.4A<br>0.22A | – |
| | Door Monitor Circuit | AC | Resistive load (AC-12)<br>Inductive load (AC-15) | – | 2.5A<br>1.5A | 1.5A<br>0.75A |
| | | DC | Resistive load (DC-12)<br>Inductive load (DC-13) | 2.5A<br>2.3A | 1.1A<br>0.55A | 0.55A<br>0.27A |

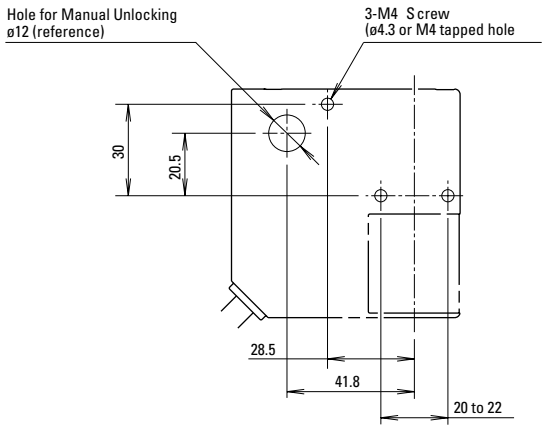
1. UL, c-UL rating: Main/Lock monitor circuit: 125V AC, 1A Pilot duty, 125V DC, 0.22A Pilot duty
   Door monitor circuit:240V AC, 0.75A Pilot duty250V DC, 0.27A Pilot duty
2. TÜV rating: Main/Lock monitor circuit: AC-15 125V/1A, DC-13 125V/0.22A
   Door monitor circuit: AC-15 240V/0.75A, DC-13 250V/0.27A

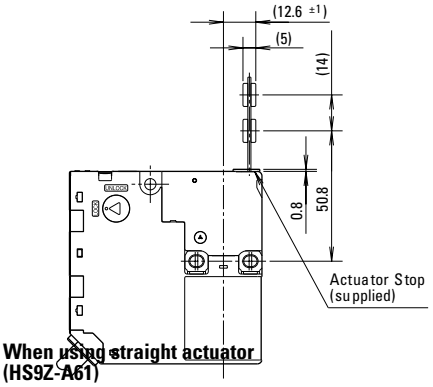
## Dimensions (mm)

### Interlock Switch

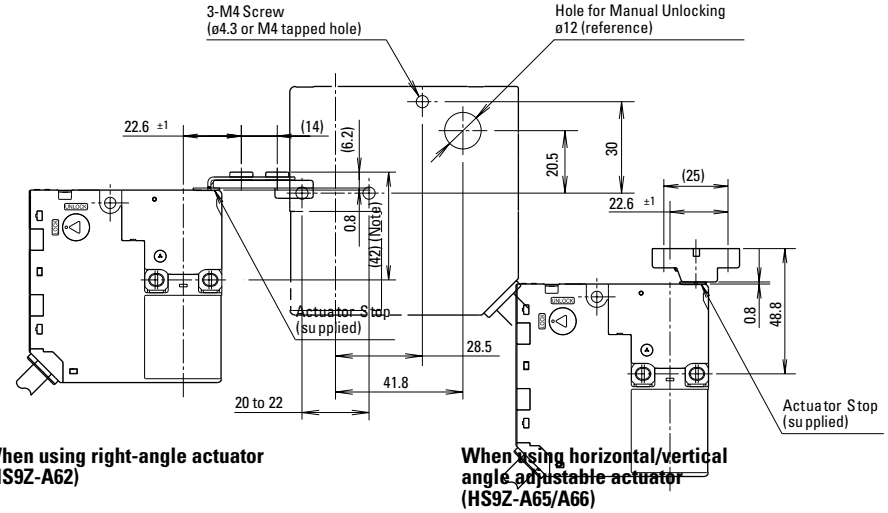



### Mounting Hole Layout




**When using straight actuator (HS9Z-A61)**




**When using right-angle actuator (HS9Z-A62)**

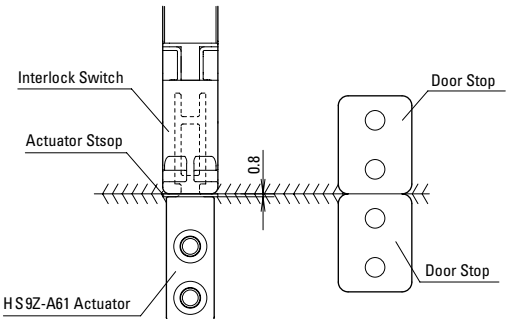
**When using horizontal/vertical angle adjustable actuator (HS9Z-A65/A66)**

## Actuator Mounting Reference Position

As shown in the figure on the right, the mounting reference position of the actuator key when inserted in the interlock switch is:

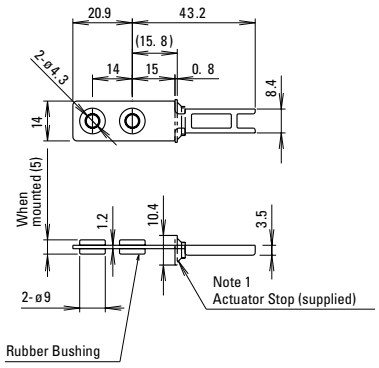
The actuator stop on the actuator lightly touches the interlock switch.

After mounting the actuator, remove the actuator stop from the actuator.



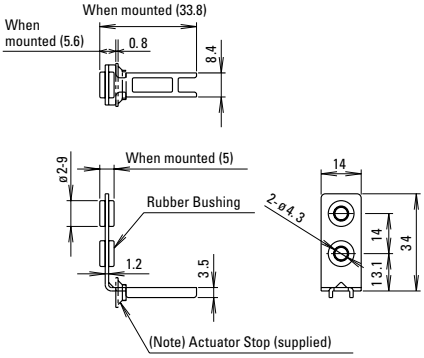
## Actuator Key Dimensions (mm)

### Straight Actuator (HS9Z-A61)



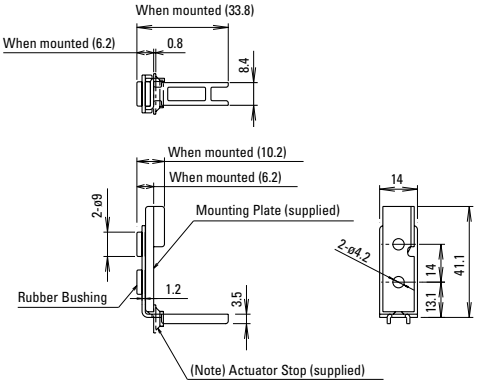

### Straight Actuator (HS9Z-A61) Right-angle Actuator (HS9Z-A62)

The retention force of the HS9Z-A62 actuator is 100N. When tensile force exceeding 100N is expected, use the HS9Z-A62S actuator.




### Right-angle Actuator with Mounting Plate (HS9Z-A62S)

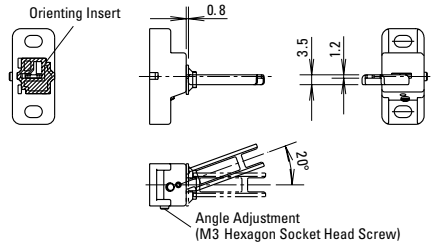
Note: See page 325 for actuator installation.



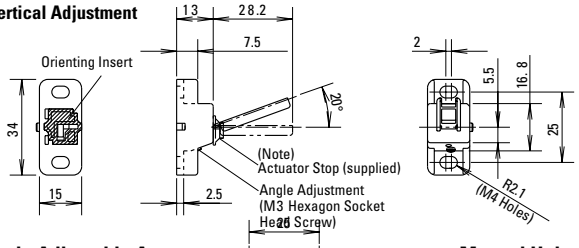

The actuator stop is used to adjust the actuator position. Remove after the actuator position is mounted.

### Angle Adjustable Actuator (HS9Z-A65)

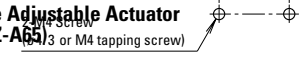
**Horizontal Adjustment**




**Vertical Adjustment**



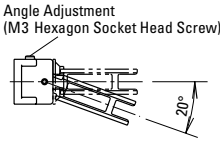

### Angle Adjustable Actuator (HS9Z-A65)



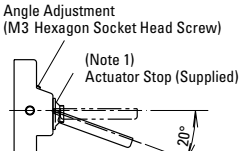

### Angle Adjustable Actuator (HS9Z-A66)

The HS9Z-A65 and HS9Z-A66 have the metal actuator inserted in opposite directions.

**Horizontal Adjustment**

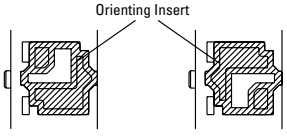



**Vertical Adjustment**



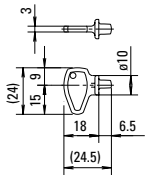

### Actuator Adjustment Orientation

The orientation of actuator adjustment (horizontal/vertical) can be changed using the orienting insert (white plastic) installed on the back of the actuator.

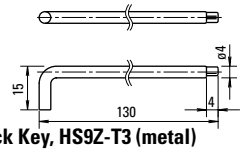



### Manual Unlock Key (plastic)

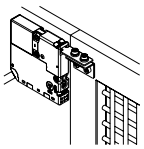
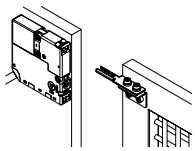
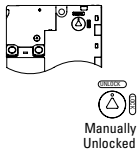
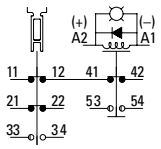
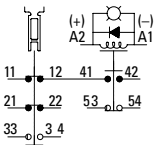
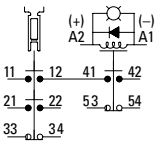
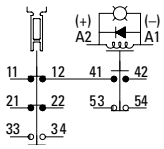
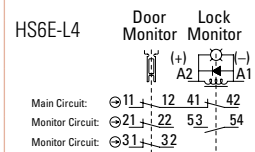
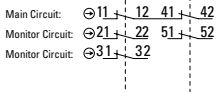
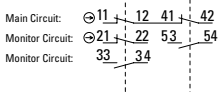
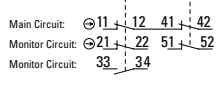
(supplied with switch, not replaceable)




### Manual Unlock Key, HS9Z-T3 (metal)

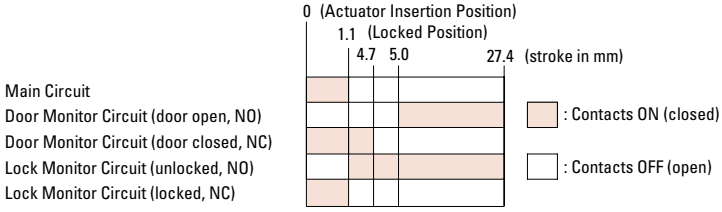


## Circuit Diagrams and Operating Characteristics

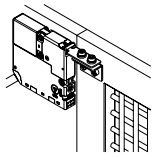
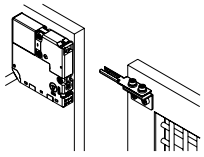
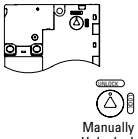
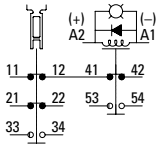
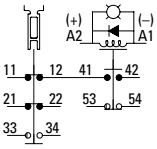
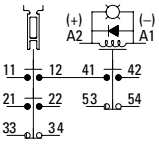
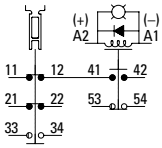
| Spring Lock Type | Status 1 | Status 2 | Status 3 | Status 4 | Unlocking Using Manual Unlock Key |
|---|---|---|---|---|---|
| Interlock Switch Status | Door closed<br>**Machine ready to operate**<br>Solenoid de-energized | Door opened<br>Machine cannot be operated<br>Solenoid energized | Door open<br>Machine cannot be operated<br>Solenoid energized | Door open<br>Machine cannot be operated<br>Solenoid de-energized | Door closed<br>Machine cannot be operated<br>Solenoid de-energized |
| Door Status |  | |  | |  |
| Circuit Diagram (Example: HS6E-N4) |  |  |  | |  |
| **Door** | **Closed (locked)** | **Closed (unlocked)** | **Open** | **Open** | **Closed (unlocked)** |
| Part Number and Circuit Diagram: HS6E-L4  | | | | | |
| Main Circuit 11-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| Door Monitor Circuit (door closed) 21-22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| Door Monitor Circuit (door closed) 31-32 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| Lock Monitor Circuit (unlocked) 53-54 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| HS6E-M4  | | | | | |
| Main Circuit 11-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| Door Monitor Circuit (door closed) 21-22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| Door Monitor Circuit (door closed) 31-32 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| Lock Monitor Circuit (locked) 51-52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS6E-N4  | | | | | |
| Main Circuit 11-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| Door Monitor Circuit (door closed) 21-22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| Door Monitor Circuit (door open) 33-34 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| Lock Monitor Circuit (unlocked) 53-54 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| HS6E-P4  | | | | | |
| Main Circuit 11-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| Door Monitor Circuit (door closed) 21-22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| Door Monitor Circuit (door open) 33-34 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| Lock Monitor Circuit (locked) 51-52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| **Solenoid Power A1-A2 (all types)** | **OFF (de-energized)** | **ON (energized)** | **ON (energized)** | **OFF (de-energized)** | **OFF (de-energized)** |

Main circuit: Connected to the machine drive control circuit, sending the interlock signals of the protective door.
Monitor circuit: Sends the monitoring signals of open/closed and lock/unlocked statuses of the protective door.

### Operation Characteristics (reference)



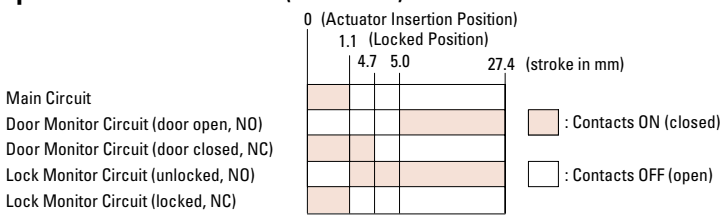

The characteristics shown in the chart above are of the HS9Z-A61, -A62, -A65, and -A66 actuators. For the HS9Z-A62S actuator, subtract 0.6 mm.
The characteristics show the contact status when the actuator enters an entry slot of an interlock switch.

| Solenoid Lock Type | Status 1 | Status 2 | Status 3 | Status 4 | Unlocking Using Manual Unlock Key |
|---|---|---|---|---|---|
| Interlock Switch Status | Door closed<br>**Machine ready to operate**<br>Solenoid energized | Door closed<br>Machine cannot be operated<br>Solenoid de-energized | Door open<br>Machine cannot be operated<br>Solenoid de-energized | Door open<br>Machine cannot be operated<br>Solenoid de-energized | Door open<br>Machine cannot be operated<br>Solenoid de-energized |
| Door Status |  | |  | |  |
| Circuit Diagram (Example: HS6E-N7Y) |  |  |  | |  |
| **Door** | **Closed (locked)** | **Closed (unlocked)** | **Open** | **Open** | **Closed (unlocked)** |
| Part Number and Circuit Diagram — HS6E-L7Y | Main Circuit 11-42: ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | Door Monitor Circuit (door closed) 21-22: ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | Door Monitor Circuit (door closed) 31-32: ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | Lock Monitor Circuit (unlocked) 53-54: OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| HS6E-M7Y | Main Circuit 11-42: ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | Door Monitor Circuit (door closed) 21-22: ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | Door Monitor Circuit (door closed) 31-32: ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | Lock Monitor Circuit (locked) 51-52: ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS6E-N7Y | Main Circuit 11-42: ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | Door Monitor Circuit (door closed) 21-22: ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | Door Monitor Circuit (door open) 33-34: OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| | Lock Monitor Circuit (unlocked) 53-54: OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| HS6E-P7Y | Main Circuit 11-42: ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | Door Monitor Circuit (door closed) 21-22: ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | Door Monitor Circuit (door open) 33-34: OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| | Lock Monitor Circuit (locked) 51-52: ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| **Solenoid Power A1-A2 (all types)** | **ON (energized)** | **OFF (de-energized)** | **OFF (de-energized)** | **ON (energized) (Note 2)** | OFF (de-energized) to ON (re-energized) (Note 1) (Note 2) |

Main circuit: Connected to the machine drive control circuit, sending the interlock signals of the protective door.
Monitor circuit: Sends the monitoring signals of open/closed and lock/unlocked statuses of the protective door.

Note 1: Do not attempt manual unlocking while the solenoid is energized.
Note 2: Do not energize the solenoid for a long period of time while the door is open or while the door is unlocked manually using the manual unlock key.

## Operation Characteristics (reference)




The characteristics shown in the chart above are of the HS9Z-A61, -A62, -A65, and -A66 actuators. For the HS9Z-A62S actuator, subtract 0.6 mm.
The characteristics show the contact status when the actuator enters an entry slot of an interlock switch.

# Operating Instructions

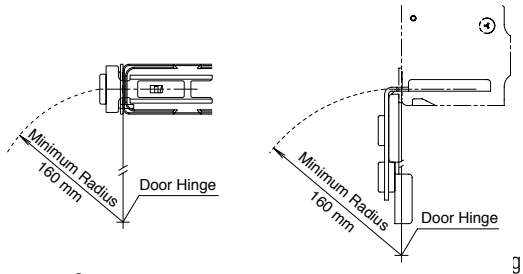
## Minimum Radius of Hinged Door

- When using the interlock switch on hinged doors, refer to the minimum radius of doors shown below. When using on doors with small minimum radius, use the angle adjustable actuator (HS9Z-A65 and HS9Z-A66).

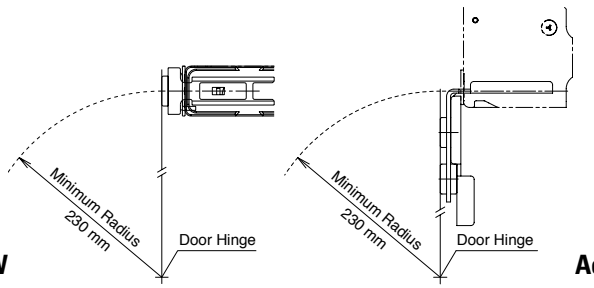
Note: Because deviation or dislocation of hinged doors may occur in actual applications, make sure of the correct operation before installation.

## When Using the HS9Z-A62/A62S Right-angle Actuator

- When door hinge is on the extension line of the interlock switch surface:



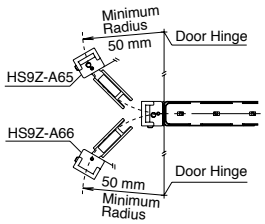

- g surface:



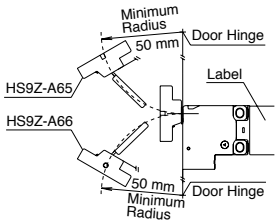

**W** **Actuator**

- When door hinge is on the extension line of the interlock switch surface

**Horizontal Adjustment**

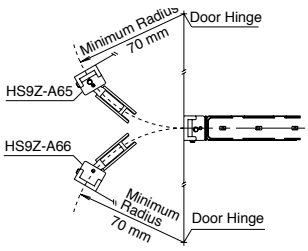



**Vertical Adjustment**

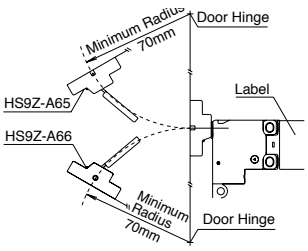



- When door hinge is on the extension line of the actuator mounting surface

**Horizontal Adjustment**




**Vertical Adjustment**

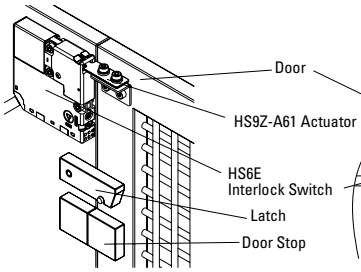



## Actuator Angle Adjustment for the HS9Z-A65/HS9Z-A66

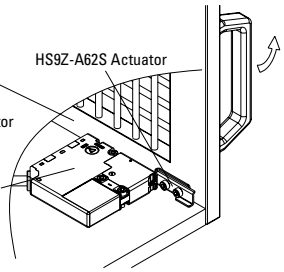
- Using the angle adjustment screw, the actuator angle can be adjusted (see figures on page 370).
  Adjustable angle: 0 to 20°
- The larger the adjusted angle of the actuator, the smaller the applicable radius of the door opening.
- After installing the actuator, open the door. Then adjust the actuator so that its edge can enter properly into the actuator entry slot of the interlock switch.
- After adjusting the actuator angle, apply Loctite to the adjustment screw so that the screw will not become loose.

## Mounting Examples

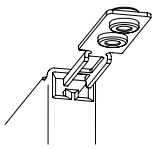
**Application on Sliding Doors**




**Application on Hinged Doors**

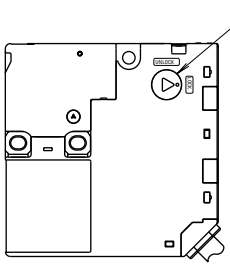



Note: When mounting the actuator, make sure that the actuator enters the slot in the correct direction, as shown on the right.



## For Manual Unlocking

### When using the manual unlock key



Normal Position

Manual Unlocking Position

- Using the interlock switch with the actuator not fully turned (less than 90°) may cause damage to the interlock switch or operation failures (when manually unlocked, the switch will keep the main circuit disconnected and the door unlocked).
- Do not apply excessive force (0.45 N·m or more) to the manual unlock part, otherwise the manual unlock part will become damaged.

Manual Unlock Key
(supplied with the interlock switch)

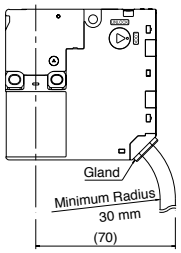
See instruction manual for full details.

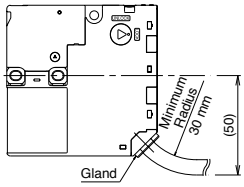
### Recommended Tightening Torque of Mounting Screws

- Interlock switch: 1.0 to 1.5 N·m (three M4 screws)
- Actuators: 1.0 to 1.5 N·m (two M4 screws)

### Cables

- Do not fasten or loosen the gland at the bottom of the interlock switch.
- When bending the cable during wiring, make sure that the cable radius is kept at 30 mm minimum.
- When wiring, make sure that water or oil does not enter from the end of the cable.
- Do not open the lid of the interlock switch. Otherwise the interlock switch will be damaged.
- The solenoid has polarity. Make sure of the correct polarity when wiring.




### Wire Identification

- Wires can be identified by color and or a white line printed on the wire.

| No. | Insulation Color | No. | Insulation Color |
|---|---|---|---|
| 1 | Blue/White | 7 | White |
| 2 | Gray | 8 | Black |
| 3 | Pink | 9 | Pink/White |
| 4 | Orange | 10 | Brown/White |
| 5 | Orange/White | 11 | Brown |
| 6 | Gray/White | 12 | Blue |

### Terminal Number Identification

- When wiring, identify the terminal number of each contact by the color of the insulation.
- The following table shows the identification of terminal numbers.
- When wiring, cut unused wires to avoid incorrect wiring.

| Type | Contact Arrangement |
|---|---|
| HS6E-L | Door Monitor / Lock Monitor<br>(+) White A2 (–) A1 Black<br>Main circuit: Blue 11 12 41 42 Blue/White<br>Monitor circuit: Brown 21 22 Brown/White Pink 53 54 Pink/White<br>Monitor circuit: Orange 31 32 Orange/White |
| HS6E-M | Main circuit: Blue 11 12 41 42 Blue/White<br>Monitor circuit: Brown 21 22 Brown/White Pink 51 52 Pink/White<br>Monitor circuit: Orange 31 32 Orange/White |
| HS6E-N | Main circuit: Blue 11 12 41 42 Blue/White<br>Monitor circuit: Brown 21 22 Brown/White Pink 53 54 Pink/White<br>Monitor circuit: Orange 33 34 Orange/White |
| HS6E-P | Main circuit: Blue 11 12 41 42 Blue/White<br>Monitor circuit: Brown 21 22 Brown/White Pink 51 52 Pink/White<br>Monitor circuit: Orange 33 34 Orange/White |

Note: The contact arrangements show the contact status when the actuator is inserted and locked.

# HS5E Miniature Interlock Switches with Solenoid

**Spring Lock Type Features:**

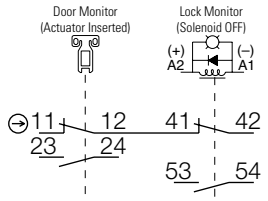
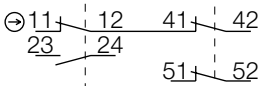
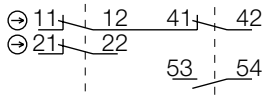
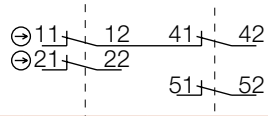
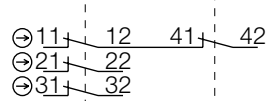
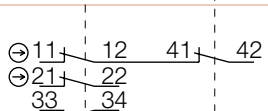
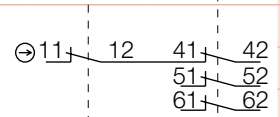
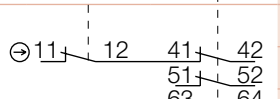
- Automatically locks the actuator without power applied to the solenoid
- After the machine stops, unlocking is completed by the solenoid, providing high safety features
- Manual unlocking is possible in the event of power failure or maintenance
- Gold-plated contacts

**Solenoid Lock Type Features:**

- The actuator is locked when energized
- The actuator is unlocked when de-energized
- Flexible locking function can be achieved for an application where locking is not required and sudden stopping of machine must be prevented
- Gold-plated contacts

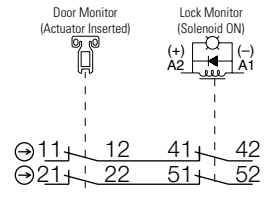
## Part Numbers

### Spring Lock Type (Power Solenoid to Unlock)

| Circuit Code | Contact Configuration | Cable Length | Part Number | | |
|---|---|---|---|---|---|
| | | | Without LED | With LED | With LED and Rear Unlock Button |
| A<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 1NO**<br>**Lock Monitor Circuit: 1NO** |  | 1m | **HS5E-A4001** | **HS5E-A4401-G** | HS5E-A44L01-G |
| | | 3m | **HS5E-A4003** | **HS5E-A4403-G** | HS5E-A44L03-G |
| | | 5m | **HS5E-A4005** | **HS5E-A4405-G** | HS5E-A44L05-G |
| B<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 1NO**<br>**Lock Monitor Circuit: 1NC** |  | 1m | HS5E-B4001 | HS5E-B4401-G | |
| | | 3m | HS5E-B4003 | HS5E-B4403-G | |
| | | 5m | HS5E-B4005 | **HS5E-B4405-G** | |
| C<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 1NC**<br>**Lock Monitor Circuit: 1NO** |  | 1m | **HS5E-C4001** | HS5E-C4401-G | HS5E-C44L01-G |
| | | 3m | **HS5E-C4003** | HS5E-C4403-G | HS5E-C44L03-G |
| | | 5m | **HS5E-C4005** | **HS5E-C4405-G** | HS5E-C44L05-G |
| D<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 1NC**<br>**Lock Monitor Circuit: 1NC** |  | 1m | **HS5E-D4001** | **HS5E-D4401-G** | **HS5E-D44L01-G** |
| | | 3m | **HS5E-D4003** | **HS5E-D4403-G** | **HS5E-D44L03-G** |
| | | 5m | **HS5E-D4005** | **HS5E-D4405-G** | **HS5E-D44L05-G** |
| F<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 2NC** |  | 1m | **HS5E-F4001** | **HS5E-F4401-G** | **HS5E-F44L01-G** |
| | | 3m | **HS5E-F4003** | **HS5E-F4403-G** | **HS5E-F44L03-G** |
| | | 5m | HS5E-F4005 | **HS5E-F4405-G** | **HS5E-F44L05-G** |
| G<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 1NC, 1NO** |  | 1m | HS5E-G4001 | **HS5E-G4401-G** | HS5E-G44L01-G |
| | | 3m | HS5E-G4003 | HS5E-G4403-G | HS5E-G44L03-G |
| | | 5m | **HS5E-G4005** | **HS5E-G4405-G** | HS5E-G44L05-G |
| H<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 2NC** |  | 1m | HS5E-H4001 | HS5E-H4401-G | |
| | | 3m | HS5E-H4003 | HS5E-H4403-G | |
| | | 5m | HS5E-H4005 | HS5E-H4405-G | |
| J<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 1NC, 1NO** |  | 1m | HS5E-J4001 | HS5E-J4401-G | |
| | | 3m | HS5E-J4003 | HS5E-J4403-G | |
| | | 5m | HS5E-J4005 | HS5E-J4405-G | |

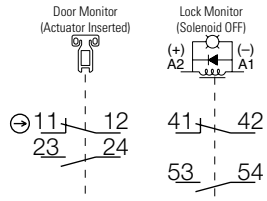
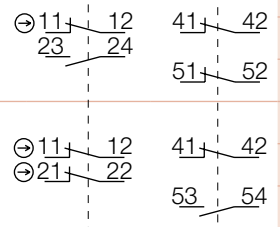
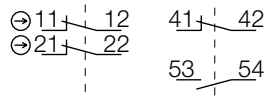
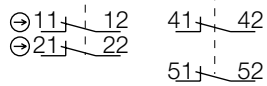
The contact configuration shows the status when the actuator is inserted and the switch is locked.
The contact configuration shows the status when the indicator is installed.
Actuators are not supplied with the interlock switch and must be ordered separately.
Standard stock items in bold

### Dual Safety Circuit type

| Circuit Code | Contact Configuration | Cable Length | Part Number |
|---|---|---|---|
| DD<br>**Main Circuit: 1NC+1NC**<br>**1NC+1NC** |  | 1m | **HS5E-DD4401-G** |
| | | 3m | **HS5E-DD4403-G** |
| | | 5m | **HS5E-DD4405-G** |

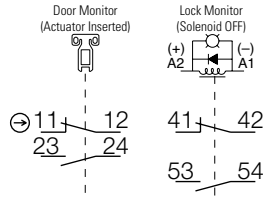
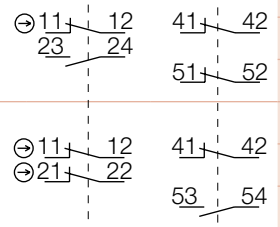
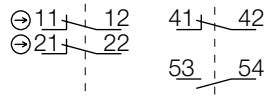
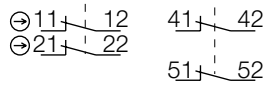
1. The contact configuration shows the status when the actuator is inserted and the switch is locked.
2. Manual unlock key is included with the interlock switch.
3. Actuators are not supplied with the interlock switch and must be ordered separately.
4. Standard stock items in bold

## Four-circuit Independent Output Type (Spring Lock)

| Circuit Code | Contact Configuration | Cable Length | Part Number |
|---|---|---|---|
| VA<br>**Door Monitor Circuit: 1NC, 1NO**<br>**Lock Monitor Circuit: 1NC, 1NO** |  | 1m | **HS5E-VA4401-G** |
| | | 3m | HS5E-VA4403-G |
| | | 5m | HS5E-VA4405-G |
| VB<br>**Door Monitor Circuit: 1NC, 1NO**<br>**Lock Monitor Circuit: 2NC** |  | 1m | HS5E-VB4401-G |
| | | 3m | HS5E-VB4403-G |
| | | 5m | HS5E-VB4405-G |
| VC<br>**Door Monitor Circuit: 2NC**<br>**Lock Monitor Circuit: 1NC, 1NO** |  | 1m | HS5E-VC4401-G |
| | | 3m | HS5E-VC4403-G |
| | | 5m | HS5E-VC4405-G |
| VD<br>**Door Monitor Circuit: 2NC**<br>**Lock Monitor Circuit: 2NC** |  | 1m | HS5E-VD4401-G |
| | | 3m | HS5E-VD4403-G |
| | | 5m | **HS5E-VD4405-G** |

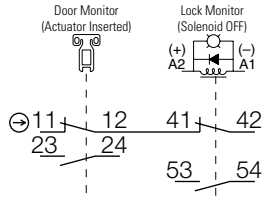
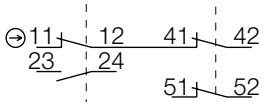
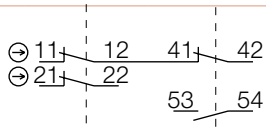
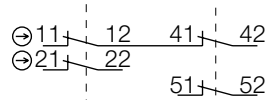
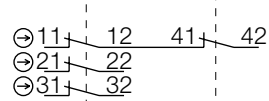
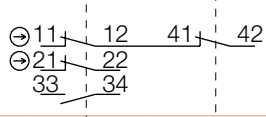
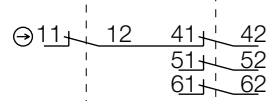
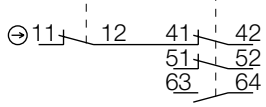
The contact configuration shows the status when the actuator is inserted and the switch is locked.
Actuators are not supplied with the interlock switch and must be ordered separately.
Standard stock items in bold.

## Four-circuit Independent Output Type (Solenoid Lock)

| Circuit Code | Contact Configuration | Cable Length | Part Number |
|---|---|---|---|
| VA<br>**Door Monitor Circuit: 1NC, 1NO**<br>**Lock Monitor Circuit: 1NC, 1NO** |  | 1m | **HS5E-VA7Y401-G** |
| | | 3m | HS5E-VA7Y403-G |
| | | 5m | **HS5E-VA7Y405-G** |
| VB<br>**Door Monitor Circuit: 1NC, 1NO**<br>**Lock Monitor Circuit: 2NC** |  | 1m | HS5E-VB7Y401-G |
| | | 3m | HS5E-VB7Y403-G |
| | | 5m | HS5E-VB7Y405-G |
| VC<br>**Door Monitor Circuit: 2NC**<br>**Lock Monitor Circuit: 1NC, 1NO** |  | 1m | **HS5E-VC7Y401-G** |
| | | 3m | HS5E-VC7Y403-G |
| | | 5m | HS5E-VC7Y405-G |
| VD<br>**Door Monitor Circuit: 2NC**<br>**Lock Monitor Circuit: 2NC** |  | 1m | **HS5E-VD7Y401-G** |
| | | 3m | **HS5E-VD7Y403-G** |
| | | 5m | **HS5E-VD7Y405-G** |

The contact configuration shows the status when the actuator is inserted and the switch is locked.
Actuators are not supplied with the interlock switch and must be ordered separately.
Standard stock items in bold.

## Solenoid Lock Type (Remove Power to Unlock)

| Circuit Code | Contact Configuration | Cable Length | Part Number | |
|---|---|---|---|---|
| | | | Without LED | With LED |
| A<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 1NO**<br>**Lock Monitor Circuit: 1NO** |  | 1m | **HS5E-A7Y001** | **HS5E-A7Y401-G** |
| | | 3m | **HS5E-A7Y003** | **HS5E-A7Y403-G** |
| | | 5m | **HS5E-A7Y005** | **HS5E-A7Y405-G** |
| B<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 1NO**<br>**Lock Monitor Circuit: 1NC** |  | 1m | HS5E-B7Y001 | HS5E-B7Y401-G |
| | | 3m | HS5E-B7Y003 | HS5E-B7Y403-G |
| | | 5m | HS5E-B7Y005 | HS5E-B7Y405-G |
| C<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 1NC**<br>**Lock Monitor Circuit: 1NO** |  | 1m | **HS5E-C7Y001** | **HS5E-C7Y401-G** |
| | | 3m | **HS5E-C7Y003** | **HS5E-C7Y403-G** |
| | | 5m | HS5E-C7Y005 | **HS5E-C7Y405-G** |
| D<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 1NC**<br>**Lock Monitor Circuit: 1NC** |  | 1m | **HS5E-D7Y001** | **HS5E-D7Y401-G** |
| | | 3m | **HS5E-D7Y003** | **HS5E-D7Y403-G** |
| | | 5m | **HS5E-D7Y005** | **HS5E-D7Y405-G** |
| F<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 2NC** |  | 1m | **HS5E-F7Y001** | **HS5E-F7Y401-G** |
| | | 3m | **HS5E-F7Y003** | **HS5E-F7Y403-G** |
| | | 5m | **HS5E-F7Y005** | **HS5E-F7Y405-G** |
| G<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 1NC, 1NO** |  | 1m | **HS5E-G7Y001** | HS5E-G7Y401-G |
| | | 3m | **HS5E-G7Y003** | **HS5E-G7Y403-G** |
| | | 5m | **HS5E-G7Y005** | **HS5E-G7Y405-G** |
| H<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 2NC** |  | 1m | HS5E-H7Y001 | HS5E-H7Y401-G |
| | | 3m | HS5E-H7Y003 | HS5E-H7Y403-G |
| | | 5m | HS5E-H7Y005 | HS5E-H7Y405-G |
| J<br>**Main Circuit: 1NC+1NC**<br>**Door Monitor Circuit: 1NC, 1NO** |  | 1m | HS5E-J7Y001 | HS5E-J7Y401-G |
| | | 3m | HS5E-J7Y003 | HS5E-J7Y403-G |
| | | 5m | HS5E-J7Y005 | HS5E-J7Y405-G |

The contact configuration shows the status when the actuator is inserted and the switch is locked.
The contact configuration shows the status when the indicator is installed.
Actuators are not supplied with the interlock switch and must be ordered separately.
Standard stock items in bold

## Actuator Keys & Accessories (order separately)

| Appearance | Part Number | Description |
|---|---|---|
| | HS9Z-A51 | Straight |
| | HS9Z-A52 | Right-angle |
| | HS9Z-A53 | Angle adjustable vertical operation |
| | HS9Z-A55 | Angle adjustable horizontal/vertical operation [1] |
| | HS9Z-A5P | Plug Actuator (allows switch to be used as interlock plug unit) |

| Item | Part Number | Description |
|---|---|---|
| | HS9Z-PH5 | Padlock Hasp (prevents unauthorized insertion of actuator) |
| | HS9Z-SP51 | Mounting Plate (allows easy mounting to aluminum frames) |
| | HS9Z-T3 | Manual unlock key (long type - metal) |
| | HS9Z-SH5 | Sliding Actuator |

1. The actuator tensile strength is 500N minimum.
2. Actuators are not included and must be included separately.

**Specifications**

| | |
|---|---|
| Conforming Standards | ISO14119, IEC60947-5-1, EN60947-5-1 (TÜV approval), EN1088, GS-ET-19 (BG approval), UL508, CSA C22.2, No. 14, GB 140485.5 (CCC approval) IEC60204-1/EN60204-1 |
| Application Standards | IEC60204-1/EN60204-1 |
| Operating Temperature | –25 to 50°C (no freezing) |
| Relative Humidity | 45 to 85% (no condensation) |
| Storage Temperature | –40 to +80°C (no freezing) |
| Operating Environment | Degree of pollution: 3 |
| Impulse Withstand Voltage | 2.5 kV (between LED, solenoid and grounding: 0.5 kV) |
| Insulation Resistance (DC megger) | Between live and dead metal parts: 100 MΩ minimum<br>Between live metal part and ground: 100 MΩ minimum<br>Between live metal parts: 100 MΩ minimum<br>Between Terminals of the same pole: 100 MΩ minimum |
| Electric Shock Protection Class | Class II (IEC61140) |
| Degree of Protection | IP67 (IEC60529) |
| Shock Resistance | Operating extremes: 100 m/s$^2$ (10 G)<br>Damage limits: 1000 m/s$^2$ (100 G) |
| Vibration Resistance | Operating extremes: 10 to 55 H, amplitude 0.35 mm minimum<br>Damage limits: 30 Hz, amplitude 1.5 mm minimum |
| Actuator Operating Speed | 0.05 to 1.0m/s |
| Direct Opening Travel | Actuator HS9Z-A51: 11mm minimum<br>Actuator HS9Z-A52/A53/A55: 12mm minimum |
| Direct Opening Force | 80N minimum |
| Actuator Retention Force | 1400N minimum (GS-ET-19) |
| Operating Frequency | 900 operations per hour |
| Mechanical Life | 1,000,000 operations minimum (GS-ET-19) |
| Electrical Life | 100,000 operations minimum (operating frequency 900 operations per hour, rated load AC-12, 250V, 1A) |
| Conditional Short-circuit Current | 50A (250V) (Note: Use 250V/10A fast acting type fuse for short circuit protection.) |
| Cable | 21AWG - 8-core: 0.5mm$^2$ or equivalent/core<br>(HS5E-V types: No. 22AWG - 12-core :0.3mm$^2$ on equivalent/ core) |
| Cable Diameter | ø7.6 mm |
| Weight (approx.) | 400g - 1m cable type, 580g - 3m cable type, 760g - 5m cable type |

**Specifications**

| | |
|---|---|
| Rated Voltage | 24V DC |
| Current | 266 mA |
| Coil Resistance | 90Ω (at 20°C) |
| Operating Voltage | Rated voltage x 85% or less (at 20°C) |
| Return Voltage | Rated voltage x 10% or more (at 20°C) |
| Maximum Continuous Applying Voltage | Rated voltage x 110% |
| Insulation Class | Class F |

**Pilot Light**

| | |
|---|---|
| Rated Voltage | 24V DC |
| Current | 10mA |
| Light Source | LED |
| Light Color | Green |

**Current Ratings**

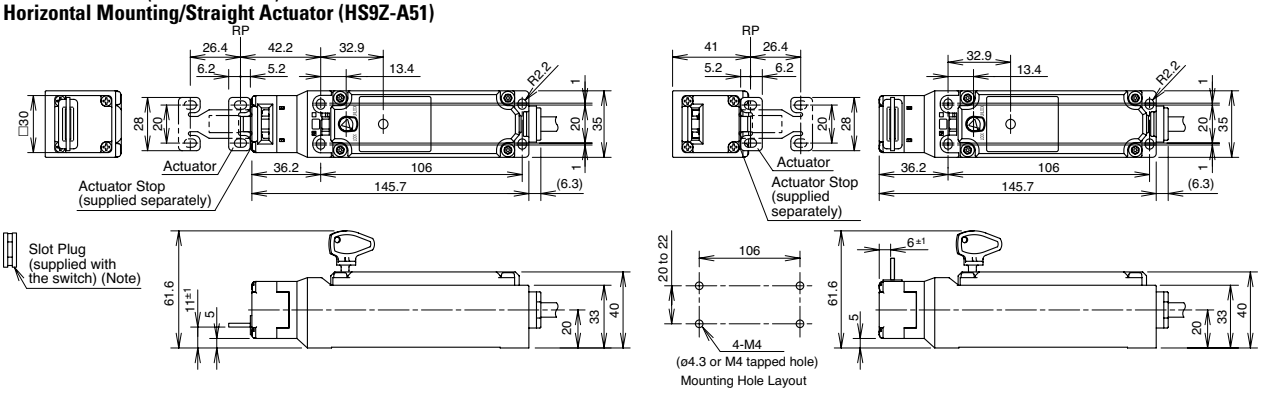
| | | | | | |
|---|---|---|---|---|---|
| **Rated Insulation Voltage ($U_i$)** [2] | | | 250V (between LED, solenoid and grounding: 30V) | | |
| Thermal Current ($I_{th}$) | | | 2.5A | | |
| Rated Voltage ($U_e$) | | | 30V | 125V | 250V |
| Rated Current (Ie) [3] | AC | Resistive load (AC12) | — | 2.5A | 1.5A |
| | | Inductive Load (AC15) | — | 1.5A | 0.75A |
| | DC | Resistive load (DC12) | 2.5A | 1.1A | 0.55A |
| | | Inductive Load (DC13) | 2.3A | 0.55A | 0.27A |

1. Minimum applicable load (reference value): 3V AC/DC, 5 mA
2. UL rating: 125V
3. TUV, BG rating: AC-15, 0.5A/250V, DC-13, 0.22A/125V
   UL, c-UL rating: Pilot duty AC 0.5A/125V, Pilot duty DC 0.22A/125V

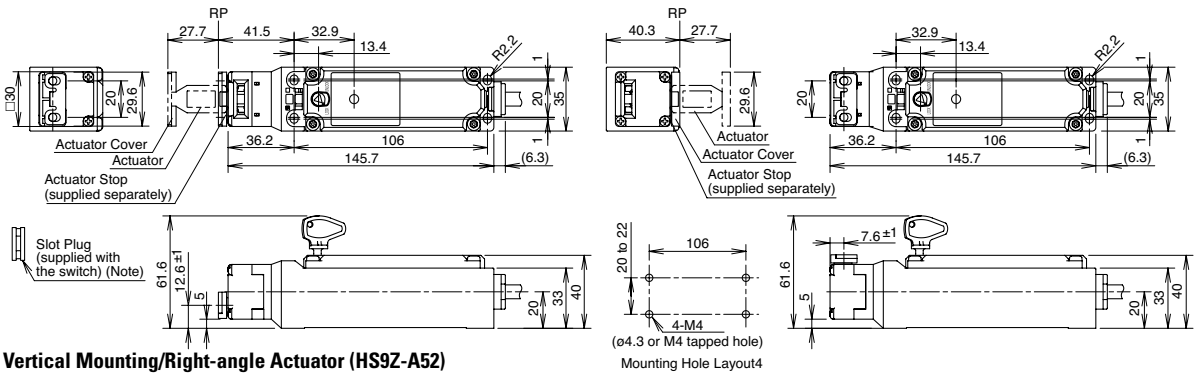
## Dimensions (mm) and Mounting Hole Layouts

### HS5E-□□4□-G (with indicator)

### Horizontal Mounting/Straight Actuator (HS9Z-A51)

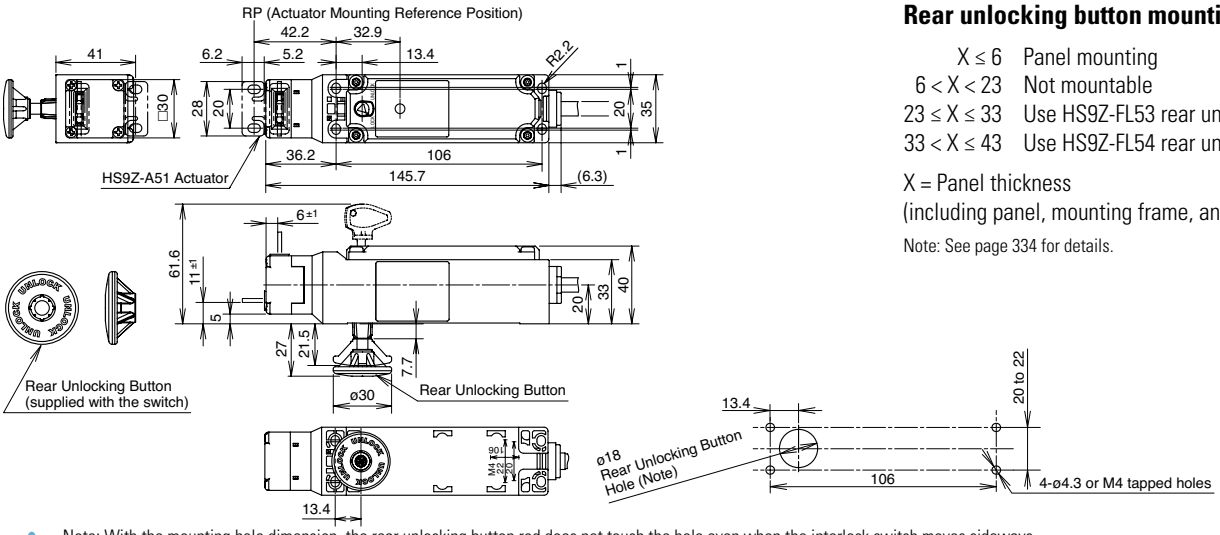



### Vertical Mounting/Right-angle Actuator (HS9Z-A52)




### HS5E-□44L□-G (rear unlocking button type)

### Horizontal Mounting/Straight Actuator (HS9Z-A51)




### Rear unlocking button mounting

| | |
|---|---|
| X ≤ 6 | Panel mounting |
| 6 < X < 23 | Not mountable |
| 23 ≤ X ≤ 33 | Use HS9Z-FL53 rear unlocking button kit (Note) |
| 33 < X ≤ 43 | Use HS9Z-FL54 rear unlocking button kit (Note) |

X = Panel thickness
(including panel, mounting frame, and mounting plate)

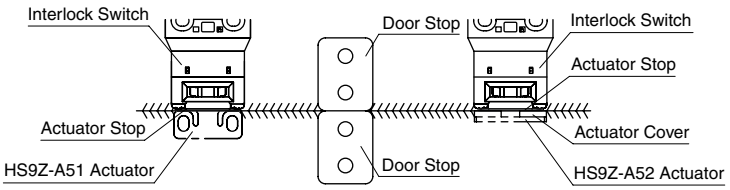
Note: See page 334 for details.

Note: With the mounting hole dimension, the rear unlocking button rod does not touch the hole even when the interlock switch moves sideways.

## Actuator Mounting Reference Position

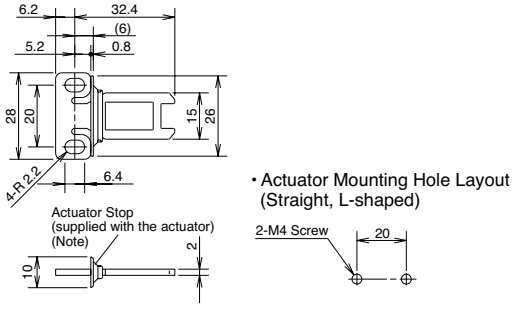
As shown in the figure on the right, the mounting reference position of the actuator when inserted in the interlock switch is where the actuator stop placed on the actuator lightly touches the interlock switch.

Note: After mounting the actuator, remove the actuator stop from the actuator.

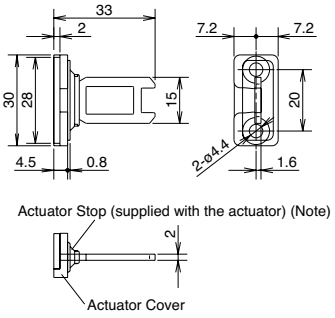


## Dimensions and Mounting Hole Layouts, continued

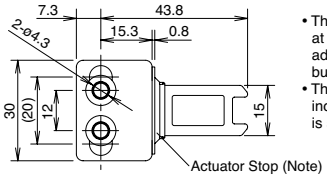
### Straight Actuator (HS9Z-A51)



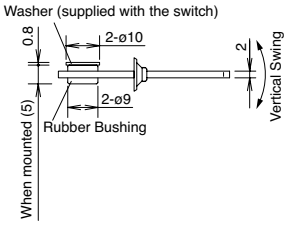

### Right-angle Actuator (HS9Z-A52)




### Straight Actuator w/Rubber Bushings (HS9Z-A51A)

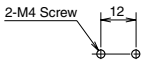



- The mounting center distance is set to 12 mm at factory. When 20-mm distance is required, adjust the distance by moving the rubber bushings.
- The actuator has flexiblity to the direction indicated by the arrows. When 20-mm distance is selected, the actuator swings vertically.

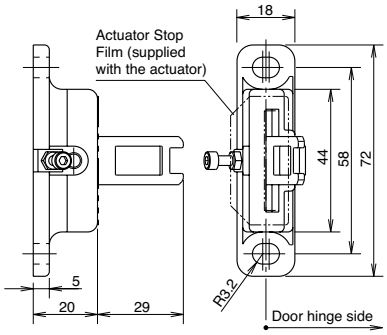


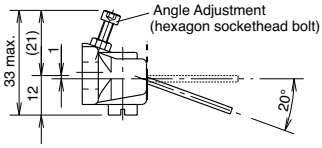

• Actuator Mounting Hole Layout

Straight type (with rubber bushings)
Right-angle type (with rubber bushings)

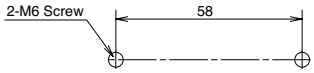



Note: Mounting centers can be widened to 20 mm by moving the rubber bushings.



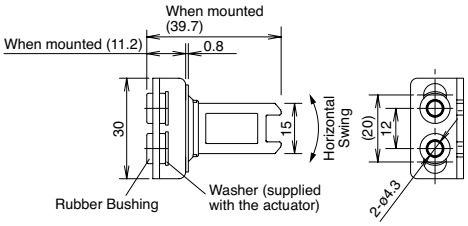

• Actuator Mounting Hole Layout
(vertical swing)

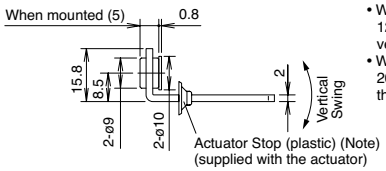



### Actuator Orientation

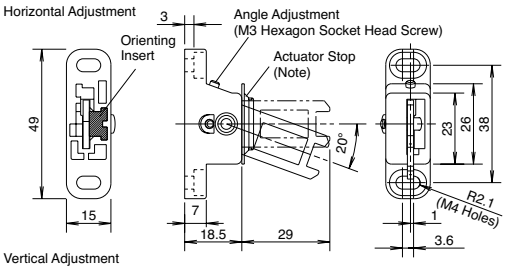
The orientation of actuator swing (horizontal/vertical) can be changed using the orienting insert (white plastic) installed on the back of the actuator. Do not lose the orientating insert, otherwise the actuator will not swing properly.

### Right-angle Actuator w/Rubber Bushings (HS9Z-A52A)

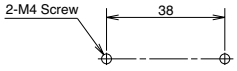



- When the mounting center distance is set to 12 mm, the actuator has flexibility both vertically and horizontally.
- When the mounting center distance is set to 20 mm, the actuator swings vertically. Adjust the distance by moving the rubber bushings.

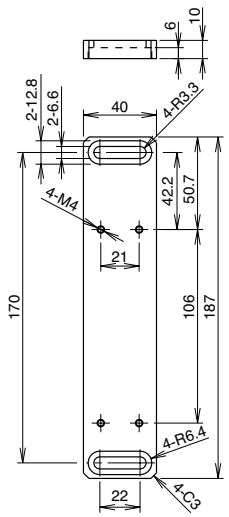



• Actuator Mounting Hole Layout
(horizontal/vertical swing)

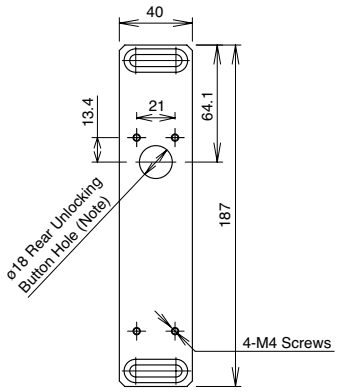


## Dimensions and Mounting Hole Layouts, continued

### Mounting Plate (HS9Z-SP51)

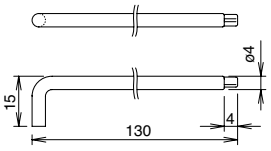



### Drilling Rear Unlocking Button Hole

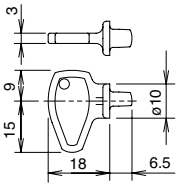



When installing the HS5E-□44L□-G (rear unlocking button type), provide a rear unlocking button hole on the HS9Z-SP51.

### Manual Unlocking Key (Metal) (HS9Z-T3)

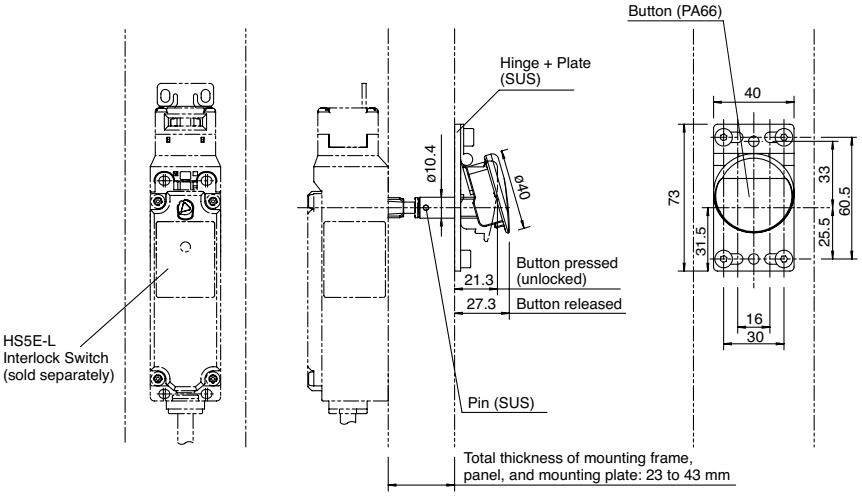


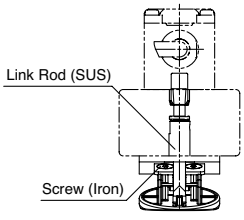

### Manual Unlocking Key (plastic)



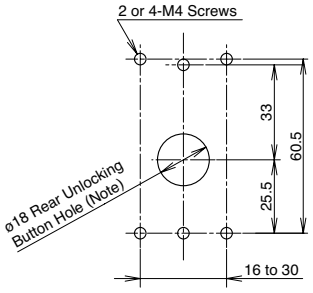

Material: Anodized aluminum A6063
Weight: Approx. 180g

### Rear Unlocking Button Kit (HS9Z-FL5□)



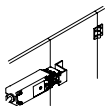
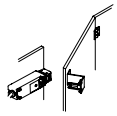
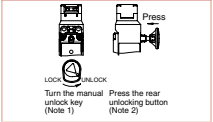
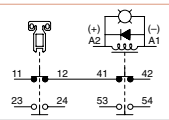
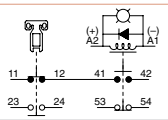
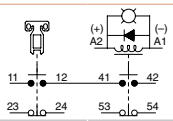
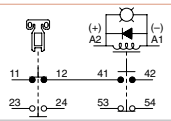

### Rear Unlocking Button Kit Mounting Hole Layout




Note: With the mounting hole dimension, the rear unlocking button rod does not touch the hole even when the interlock switch moves sideways.

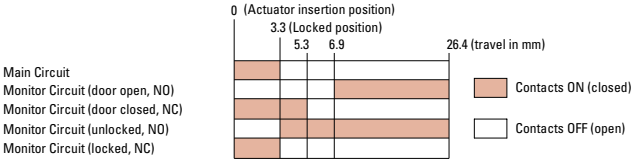
# Circuit Diagrams and Operating Characteristics

## Standard and Rear Unlocking Type - Spring Lock Type

| Interlock Switch Status | | Status 1 | Status 2 | Status 3 | Status 4 | Manual Unlock |
|---|---|---|---|---|---|---|
| | | • Door Closed<br>• Machine ready to operate<br>• Solenoid de-energized | • Door Closed<br>• Machine cannot be operated<br>• Solenoid de-energized | • Door Open<br>• Machine cannot be operated<br>• Solenoid de-energized | • Door Open<br>• Machine cannot be operated<br>• Solenoid energized | • Door Closed<br>• Machine cannot be operated<br>• Solenoid de-energized → energized |
| Door Status | |  | |  | |  |
| Circuit Diagram (HS5E-A4) | |  |  |  | |  |
| Door | | Closed (locked) | Closed (unlocked) | Open | Open | Closed (unlocked) |
| Contact Configuration | HS5E-A4<br>Door Monitor (Actuator Inserted)<br>Lock Monitor (Solenoid OFF)<br>Main Circuit: 11 12 41 42<br>Monitor Circuit: 23 24<br>Monitor Circuit: 53 54 | Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) |
| | | Monitor Circuit (door open) 23–24 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| | | Monitor Circuit (unlocked) 53–54 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| | HS5E-B4<br>Main Circuit: 11 12 41 42<br>Monitor Circuit: 23 24<br>Monitor Circuit: 51 52 | Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | | Monitor Circuit (door open) 23–24 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| | | Monitor Circuit (locked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | HS5E-C4<br>Main Circuit: 11 12 41 42<br>Monitor Circuit: 21 22<br>Monitor Circuit: 53 54 | Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | | Monitor Circuit (door closed) 21–22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | | Monitor Circuit (unlocked) 53–54 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| | HS5E-D4<br>Main Circuit: 11 12 41 42<br>Monitor Circuit: 21 22<br>Monitor Circuit: 51 52 | Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | | Monitor Circuit (door closed) 21–22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | | Monitor Circuit (locked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | HS5E-F4<br>Main Circuit: 11 12 41 42<br>Monitor Circuit: 21 22<br>Monitor Circuit: 31 32 | Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | | Monitor Circuit (door closed) 21–22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | | Monitor Circuit (door closed) 31–32 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | HS5E-G4<br>Main Circuit: 11 12 41 42<br>Monitor Circuit: 21 22<br>Monitor Circuit: 33 34 | Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | | Monitor Circuit (door closed) 21–22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | | Monitor Circuit (door open) 33–34 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| | HS5E-H4<br>Main Circuit: 11 12 41 42<br>Monitor Circuit: 51 52<br>Monitor Circuit: 61 62 | Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | | Monitor Circuit (locked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | | Monitor Circuit (locked) 61–62 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | HS5E-J4<br>Main Circuit: 11 12 41 42<br>Monitor Circuit: 51 52<br>Monitor Circuit: 63 64 | Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | | Monitor Circuit (locked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | | Monitor Circuit (unlocked) 63–64 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| Solenoid Power A1-A2 (all types) | | | OFF (de-energized) | ON (energized) | ON (energized) | OFF (de-energized) | OFF (de-energized) |

The above contact configuration shows the status when the actuator is inserted and locked.
Main Circuit: Connected to the control circuit of machine drive part, sending interlock signals of the protective door.
Monitor Circuit: Sends monitoring signals of protective door open/closed status or protective door lock/unlock status.

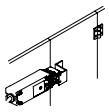
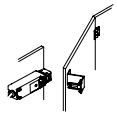
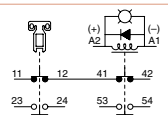
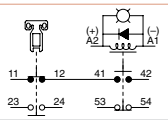
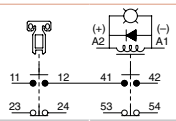
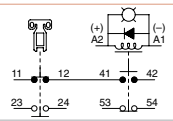
## Operation Characteristics (reference)




The operation characteristics shown in the chart above are of the HS9Z-A51. For other actuator types, add 1.3 mm.

The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

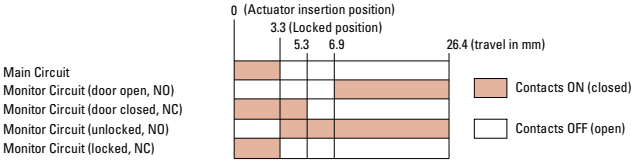
## Standard Type - Solenoid Lock Type

| Interlock Switch Status | Status 1 | Status 2 | Status 3 | Status 4 | Manual Unlock |
|---|---|---|---|---|---|
| | • Door Closed<br>• Machine ready to operate<br>• Solenoid de-energized | • Door Closed<br>• Machine cannot be operated<br>• Solenoid de-energized | • Door Open<br>• Machine cannot be operated<br>• Solenoid de-energized | • Door Open<br>• Machine cannot be operated<br>• Solenoid energized | • Door Closed<br>• Machine cannot be operated<br>• Solenoid de-energized → energized |
| Door Status |  | |  | | |
| Circuit Diagram (HS5E-A7Y) |  |  |  | |  |
| Door | Closed (locked) | Closed (unlocked) | Open | Open | Closed (unlocked) |
| Contact Configuration — HS5E-A7Y (Door Monitor (Actuator inserted), Lock Monitor (Solenoid ON)) — Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-A7Y — Monitor Circuit (door open) 23-24 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| HS5E-A7Y — Monitor Circuit (unlocked) 53–54 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| HS5E-B7Y — Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-B7Y — Monitor Circuit (door open) 23–24 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| HS5E-B7Y — Monitor Circuit (locked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-C7Y — Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-C7Y — Monitor Circuit (door closed) 21–22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| HS5E-C7Y — Monitor Circuit (unlocked) 53–54 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| HS5E-D7Y — Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-D7Y — Monitor Circuit (door closed) 21–22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| HS5E-D7Y — Monitor Circuit (locked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-F7Y — Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-F7Y — Monitor Circuit (door closed) 21–22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| HS5E-F7Y — Monitor Circuit (door closed) 31–32 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| HS5E-G7Y — Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-G7Y — Monitor Circuit (door closed) 21–22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| HS5E-G7Y — Monitor Circuit (door open) 33–34 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| HS5E-H7Y — Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-H7Y — Monitor Circuit (locked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-H7Y — Monitor Circuit (locked) 61–62 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-J7Y — Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-J7Y — Monitor Circuit (locked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-J7Y — Monitor Circuit (unlocked) 63–64 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| Solenoid Power A1-A2 (all types) | ON (energized) | OFF (de-energized) | OFF (de-energized) | ON (energized)[2] | OFF to ON [1, 2] |

The above contact configuration shows the status when the actuator is inserted and locked.
Main Circuit: Connected to the control circuit of machine drive part, sending interlock signals of the protective door.
Monitor Circuit: Sends monitoring signals of protective door open/closed status or protective door lock/unlock status.

1: Actuator can be unlocked manually for confirming the door movement before wiring and energizing, and also for emergency situation such as power failure.
2: When the operator is confined in a hazardous zone, the actuator can be unlocked manually by pressing the rear unlocking button.

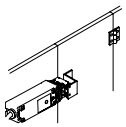
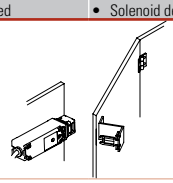
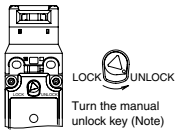
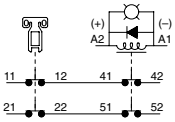
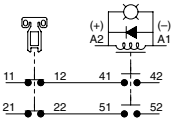
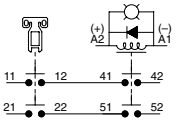
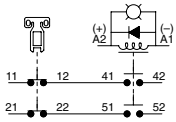
### Operation Characteristics (reference)

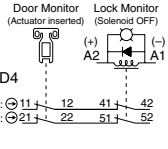



The operation characteristics shown in the chart above are of the HS9Z-A51. For other actuator types, add 1.3 mm.

The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

### Dual Safety Circuit Type

| Interlock Switch Status | Status 1 | Status 2 | Status 3 | Status 4 | Manual Unlock |
|---|---|---|---|---|---|
| | • Door Closed<br>• Machine ready to operate<br>• Solenoid de-energized | • Door Closed<br>• Machine cannot be operated<br>• Solenoid energized | • Door Open<br>• Machine cannot be operated<br>• Solenoid energized | • Door Open<br>• Machine cannot be operated<br>• Solenoid de-energized | • Door Closed<br>• Machine cannot be operated<br>• Solenoid de-energized |
| Door Status |  | |  | |  |
| Circuit Diagram (HS5E-A7Y) |  |  |  | |  |
| Door | Closed (locked) | Closed (unlocked) | Open | Open | Closed (unlocked) |
| Contact Configuration — Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| Contact Configuration — Main Circuit 21–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| Solenoid Power A1-A2 (all types) | OFF (de-energized) | ON (energized) | ON (energized) | OFF (de-energized) | OFF (de-energized) |




The above contact configuration shows the status when the actuator is inserted and locked.
Main Circuit: Connected to the control circuit of machine drive part, sending interlock signals of the protective door.

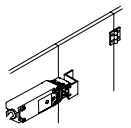
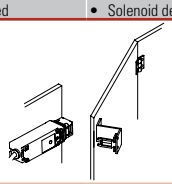
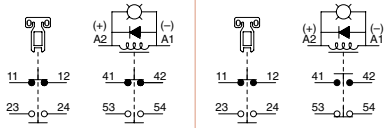
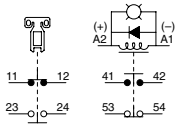
Note: Actuator can be unlocked manually for confirming the door movement before wiring and energizing, and also for emergency situation such as power failure.

### Operation Characteristics (reference)

The operation characteristics shown in the chart above are of the HS9Z-A51. For other actuator types, add 1.3 mm.

The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

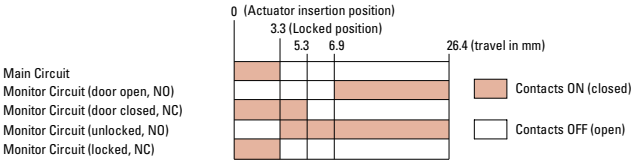
## Standard Type - Solenoid Lock Type

| Interlock Switch Status | Status 1 | Status 2 | Status 3 | Status 4 | Manual Unlock |
|---|---|---|---|---|---|
| | • Door Closed<br>• Machine ready to operate<br>• Solenoid de-energized | • Door Closed<br>• Machine cannot be operated<br>• Solenoid energized | • Door Open<br>• Machine cannot be operated<br>• Solenoid energized | • Door Open<br>• Machine cannot be operated<br>• Solenoid de-energized | • Door Closed<br>• Machine cannot be operated<br>• Solenoid de-energized |
| Door Status |  | |  | | |
| Circuit Diagram (HS5E-VA4) |  | | | |  |
| Door | Closed (locked) | Closed (unlocked) | Open | Open | Closed (unlocked) |
| Contact Configuration – HS5E-VA4 – Main Circuit 11–42 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| HS5E-VA4 – Monitor Circuit (door open) 23-24 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| HS5E-VA4 – Monitor Circuit (door open) 41-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-VA4 – Monitor Circuit (unlocked) 53–54 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| HS5E-VB4 – Main Circuit 11–42 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| HS5E-VB4 – Monitor Circuit (door open) 23–24 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| HS5E-VB4 – Monitor Circuit (door open) 41-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-VB4 – Monitor Circuit (locked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-VC4 – Main Circuit 11–42 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| HS5E-VC4 – Monitor Circuit (door closed) 21–22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| HS5E-VC4 – Monitor Circuit (door open) 41-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-VC4 – Monitor Circuit (unlocked) 53–54 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| HS5E-VD4 – Main Circuit 11–42 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| HS5E-VD4 – Monitor Circuit (door closed) 21–22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| HS5E-VD4 – Monitor Circuit (door open) 41-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-VD4 – Monitor Circuit (locked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| Solenoid Power A1-A2 (all types) | OFF (de-energized) | ON (energized) | ON (energized) | OFF (de-energized) | OFF (de-energized) |

The above contact configuration shows the status when the actuator is inserted and locked.
Monitor Circuit: Sends monitoring signals of protective door open/closed status or protective door lock/unlock status.

Note: Actuator can be unlocked manually for confirming the door movement before wiring and energizing, and also for emergency situation such as power failure.

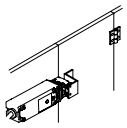
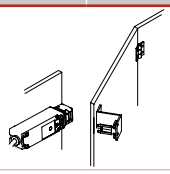
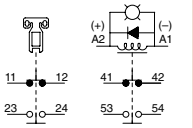
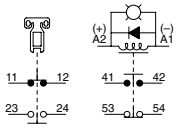
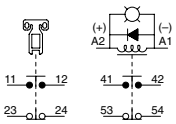
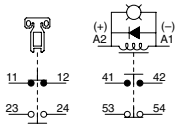
### Operation Characteristics (reference)




The operation characteristics shown in the chart above are of the HS9Z-A51. For other actuator types, add 1.3 mm.

The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

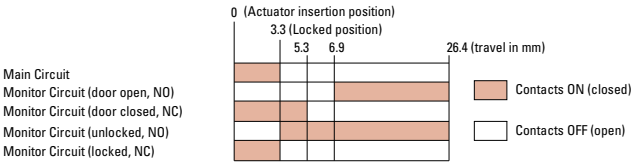
## Standard Type - Solenoid Lock Type

| Interlock Switch Status | Status 1 | Status 2 | Status 3 | Status 4 | Manual Unlock |
|---|---|---|---|---|---|
| | • Door Closed<br>• Machine ready to operate<br>• Solenoid energized | • Door Closed<br>• Machine cannot be operated<br>• Solenoid de-energized | • Door Open<br>• Machine cannot be operated<br>• Solenoid de-energized | • Door Open<br>• Machine cannot be operated<br>• Solenoid energized | • Door Closed<br>• Machine cannot be operated<br>• Solenoid de-energized<br>→ energized |
| Door Status |  | |  | | |
| Circuit Diagram (HS5E-VA4) |  |  |  | |  |
| Door | Closed (locked) | Closed (unlocked) | Open | Open | Closed (unlocked) |
| Contact Configuration<br>HS5E-VA7Y | Main Circuit 11–42 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | Monitor Circuit (door open) 23-24 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| | Monitor Circuit (door open) 41-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | Monitor Circuit (unlocked) 53–54 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| HS5E-VB7Y | Main Circuit 11–42 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | Monitor Circuit (door open) 23–24 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| | Monitor Circuit (door open) 41-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | Monitor Circuit (locked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| HS5E-VC7Y | Main Circuit 11–42 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | Monitor Circuit (door closed) 21–22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | Monitor Circuit (door open) 41-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | Monitor Circuit (unlocked) 53–54 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| HS5E-VD7Y | Main Circuit 11–42 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | Monitor Circuit (door closed) 21–22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | Monitor Circuit (door open) 41-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | Monitor Circuit (locked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| Solenoid Power A1-A2 (all types) | | OFF (de-energized) | ON (energized) | ON (energized) | OFF (de-energized) | OFF (de-energized) |

The above contact configuration shows the status when the actuator is inserted and locked.
Monitor Circuit: Sends monitoring signals of protective door open/closed status or protective door lock/unlock status.

Note: Actuator can be unlocked manually for confirming the door movement before wiring and energizing, and also for emergency situation such as power failure.

### Operation Characteristics (reference)




The operation characteristics shown in the chart above are of the HS9Z-A51. For other actuator types, add 1.3 mm.

The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

# Operating Instructions

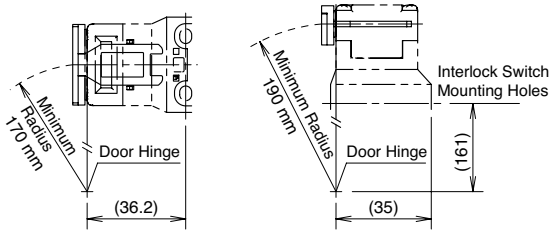
## Minimum Radius of Hinged Door

- When using the interlock switch for a hinged door, refer to the minimum radius of doors shown below. For the doors with small minimum radius, use angle adjustable actuators (HS9Z-A53 or HS9Z-A55).

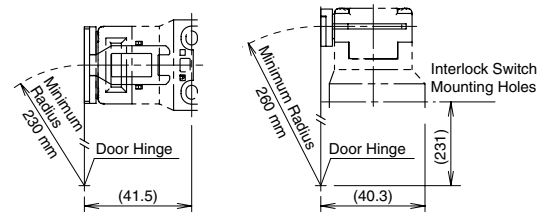
Because deviation or dislocation of hinged door may occur in actual applications, make sure of the correct operation before installation.

## HS9Z-A52 Actuator

When the door hinge is on the extension line of the interlock switch surface:

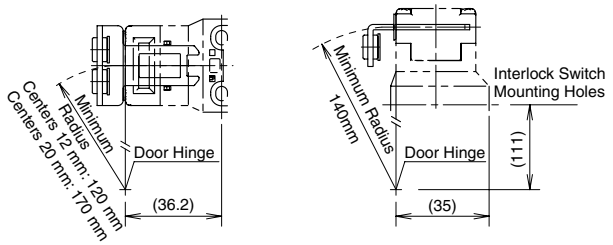



When the door hinge is on the extension line of the actuator mounting surface:

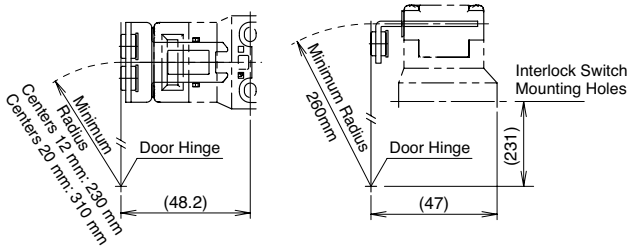



## HS9Z-A52 Actuator (w/rubber bushings)

When the door hinge is on the extension line of the interlock switch surface:




When the door hinge is on the extension line of the actuator mounting surface:



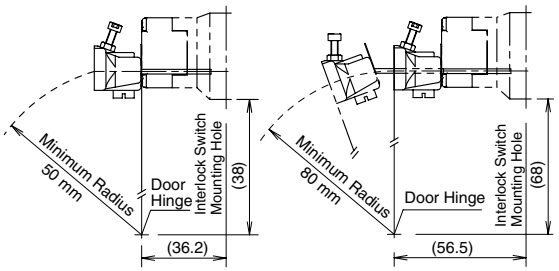

## Actuator Angle Adjustment

- Using the angle adjustment screw, the actuator angle can be adjusted (refer to the dimensional drawing on pagepage 332).
  Adjustable angle: 0 to 20°
- The larger the adjusted angle of the actuator, the smaller the applicable radius of the door opening.
- After installing the actuator, open the door. Then adjust the actuator so that its edge can be inserted properly into the actuator entry slot of the interlock switch.
- After adjusting the actuator angle, apply Loctite to the adjustment screw so that the screw will not move.

## When using the HS9Z-A53 Angle Adjustable (vertical) Actuator

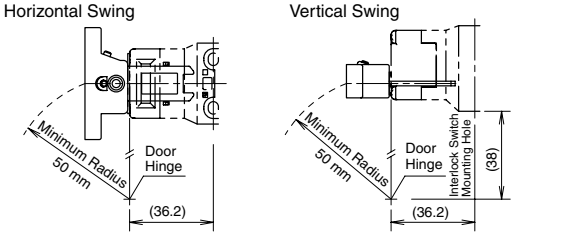
When the door hinge is on the extension line of the interlock switch surface: 50 mm

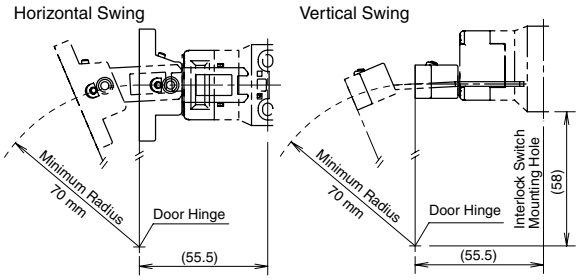
When the door hinge is on the extension line of the actuator mounting surface: 80 mm




## When using the HS9Z-A55 Angle Adjustable (vertical/horizontal) Actuator

When the door hinge is on the extension line of the interlock switch surface: 50 mm

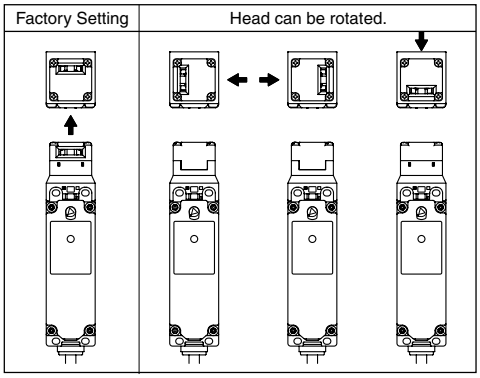



When the door hinge is on the extension line of the actuator mounting surface: 70 mm

## Rotating the Head

The head of the HS5E can be rotated by removing the four screws from the corners of the HS5E head and reinstalling the head in the desired orientation. Before wiring the HS5E, replace the head if necessary. Before replacing the head, turn the manual unlock to the UNLOCK position using the manual unlock key. When reinstalling the head, make sure that no foreign object enters the interlock switch. Tighten the screws tightly, without leaving space between the head and body, otherwise the interlock switch may malfunction.
Recommended tightening torque: 0.9 to 1.1 N·m.



## Instructions, continued

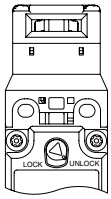
### For Manual Unlocking

### Spring lock type

The HS5E allows manual unlocking of the actuator to pre-check proper door movement before wiring or turning power on, as well as for emergency use such as a power failure.

### Solenoid lock type

The solenoid lock type interlock switch normally does not need the manual unlock. However, only when the interlock switch would not release the actuator even though the solenoid is de-energized, the interlock switch can be unlocked manually. Unlock the interlock switch manually only when the solenoid is de-energized. Do not unlock the interlock switch manually when the solenoid is energized.



Normal Position

Manual Unlocking Position

When locking or unlocking the interlock switch manually, turn the key fully using the manual unlock key supplied with the interlock switch.

Using the interlock switch with the key not fully turned (less than 90°) may cause damage to the interlock switch or operation failures (when manually unlocked, the interlock switch will keep the main circuit disconnected and the door unlocked).

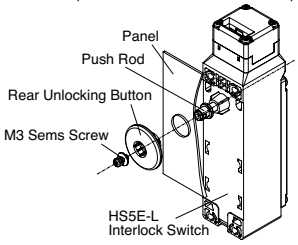
Do not apply excessive force to the manual unlock, otherwise the manual unlock will become damaged.

Do not leave the manual unlock key attached to the interlock switch during operation. This is dangerous because the interlock switch can always be unlocked while the machine is in operation.

Manual Unlocking Key
(supplied with the switch)

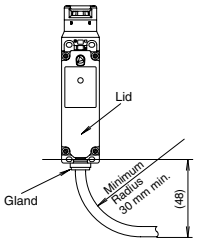
### Installing the Rear Unlocking Button

After installing the interlock switch on the panel, place the rear unlocking button (supplied with the switch) on the push rod on the back of the interlock switch, and fasten the button using the M3 sems screw. Rear unlocking button can be installed alone when the total thickness of mounting frame and panel is 6 mm or less. When the total thickness of mounting frame, panel, and mounting plate is 23 to 43 mm, use the rear unlocking button kit (HS9Z-FL53 or HS9Z-FL54) sold separately.



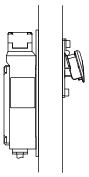

### Cables

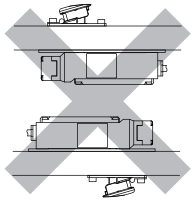
- When bending the cable during wiring, make sure that the cable radius is kept at 30 mm minimum.
- Solenoid has polarity. Be sure of the correct polarity when wiring.




### Safety Precautions

Install the rear unlocking button kit in the correct direction as shown below. Do not install the kit in incorrect directions, otherwise malfunction will be caused.

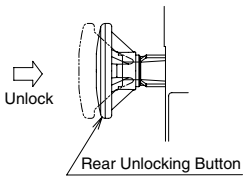

Correct

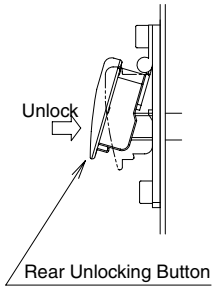

Incorrect

Do not apply strong force exceeding 100 m/s2 to the interlock switch while the rear unlocking button is not pressed, otherwise malfunction will be caused.

### Manual Unlocking using the Rear Unlocking Button

The rear unlocking button is used by the operator confined in a hazardous area for emergent escape.




### How to operate

When the rear unlocking button is pressed, the interlock switch is unlocked and the door can be opened.

To lock the interlock switch, pull back the button.

When the button remains pressed, the interlock switch cannot be locked even if the door is closed, and the main circuit remains open.

### Recommended Tightening Torque

- HS5E interlock switch: 1.8 to 2.2 N·m (four M4 screws) (Note)
- Rear unlocking button: 0.5 to 0.7 N·m
- Rear unlocking button kit: 4.8 to 5.2 N·m (M5 screw)
- Actuators
  HS9Z-A51: 1.8 to 2.2 N·m (two M4 screws)
  HS9Z-A52: 0.8 to 1.2 N·m (two M4 Phillips screws)
  HS9Z-A51A/A52A: 1.0 to 1.5 N·m (two M4 screws)
  HS9Z-A53: 4.5 to 5.5 N·m (two M6 screws)
  HS9Z-A55: 1.0 to 1.5 N·m (two M4 screws)

Note: The above recommended tightening torque of the mounting screws are the values with hex socket head bolts. When other screws are used and tightened to a smaller torque, make sure that the screws do not become loose after mounting.

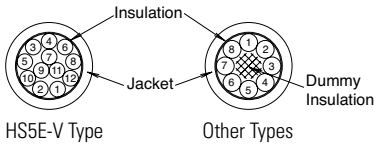
## Instructions, continued

### Wire Identification

Wires can be identified by color and a white line printed on the wire.

- HS5E-V: Wires of gray and gray/white insulation cannot be used.
- HS5E-DD: Wires of brown and brown/white insulation cannot be used.

| No. | Insulation | No. | Insulation | No. | Insulation | No. | Insulation |
|---|---|---|---|---|---|---|---|
| 1 | White | 4 | Blue | 7 | Blue/White | 10 | Pink/White |
| 2 | Black | 5 | Brown/White | 8 | Orange/White | 11 | Gray |
| 3 | Brown | 6 | Orange | 9 | Pink | 12 | Gray/White |




### Terminal Number Identification

- When wiring, the terminal number of each contact can be identified by wire color.
- The following table shows the identification of terminal numbers.

| Type | Circuit Diagram |
|---|---|
| HS5E-A | Main Circuit: Blue 11 12 41 42 Blue/White<br>Monitor Circuit: Orange 23 24 Orange/White<br>Monitor Circuit: Brown 53 54 Brown/White |
| HS5E-B | Main Circuit: Blue 11 12 41 42 Blue/White<br>Monitor Circuit: Orange 23 24 Orange/White<br>Monitor Circuit: Brown 51 52 Brown/White |
| HS5E-C | Main Circuit: Blue 11 12 41 42 Blue/White<br>Monitor Circuit: Orange 21 22 Orange/White<br>Monitor Circuit: Brown 53 54 Brown/White |
| HS5E-D | Main Circuit: Blue 11 12 41 42 Blue/White<br>Monitor Circuit: Orange 21 22 Orange/White<br>Monitor Circuit: Brown 51 52 Brown/White |
| HS5E-F | Main Circuit: Blue 11 12 41 42 Blue/White<br>Monitor Circuit: Orange 21 22 Orange/White<br>Monitor Circuit: Brown 31 32 Brown/White |
| HS5E-G | Main Circuit: Blue 11 12 41 42 Blue/White<br>Monitor Circuit: Orange 21 22 Orange/White<br>Monitor Circuit: Brown 33 34 Brown/White |
| HS5E-H | Main Circuit: Blue 11 12 41 42 Blue/White<br>Monitor Circuit: Brown 51 52 Brown/White<br>Monitor Circuit: Orange 61 62 Orange/White |
| HS5E-J | Main Circuit: Blue 11 12 41 42 Blue/White<br>Monitor Circuit: Brown 51 52 Brown/White<br>Monitor Circuit: Orange 63 64 Orange/White |
| HS5E-DD | Main Circuit: Blue 11 12 41 42 Blue/White<br>Main Circuit: Orange 21 22 51 52 Orange/White |

When wiring, cut unnecessary wires such as the dummy insulation (white) and any unused wires.

| Type | Circuit Diagram |
|---|---|
| HS5E-VA | Monitor Circuit: Blue 11 12 Blue/White Pink 41 42 Pink/White<br>Monitor Circuit: Orange 23 24 Orange/White<br>Monitor Circuit: Brown 53 54 Brown/White |
| HS5E-VB | Monitor Circuit: Blue 11 12 Blue/White Pink 41 42 Pink/White<br>Monitor Circuit: Orange 23 24 Orange/White<br>Monitor Circuit: Brown 51 52 Brown/White |
| HS5E-VC | Monitor Circuit: Blue 11 12 Blue/White Pink 41 42 Pink/White<br>Monitor Circuit: Orange 21 22 Orange/White<br>Monitor Circuit: Brown 53 54 Brown/White |
| HS5E-VD | Monitor Circuit: Blue 11 12 Blue/White Pink 41 42 Pink/White<br>Monitor Circuit: Orange 21 22 Orange/White<br>Monitor Circuit: Brown 51 52 Brown/White |

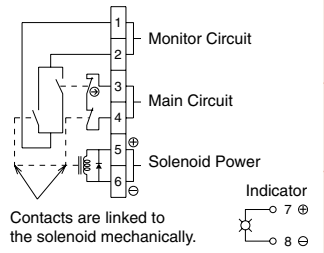
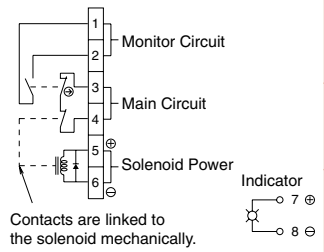
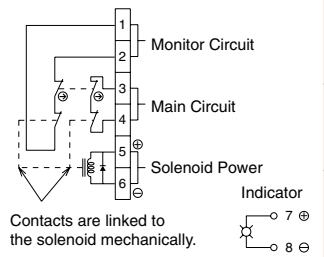
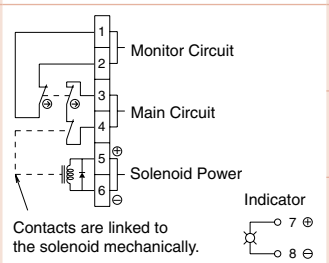
The above contact configuration shows the status when the actuator is inserted and locked.

# HS1E Full Size Solenoid Locking Switches

**Key features:**

- Plastic Housing: Lightweight
- 1500N locking retention force
- Available with a red or green indicator
- Choose from 4 circuit configurations
- Flexible Installation: The actuator can be accessed from two directions
- Ease of Wiring: M3.5 termination screws

**Part Numbers (Mechanical Spring Lock Only)**

| Contact Configuration | | LED | Standard | Manual Unlock Key |
|---|---|---|---|---|
| Main circuit: 1NC + 1NC<br>Monitor circuit: 1NO/1NO |  | None | HS1E-40R | HS1E-40KR |
| | | Green | HS1E-44R-G | HS1E-44KR-G |
| | | Red | HS1E-44R-R | HS1E-44KR-R |
| Main circuit: 1NC + 1NC<br>Monitor circuit: 1NO |  | None | HS1E-140R | HS1E-140KR |
| | | Green | HS1E-144R-G | HS1E-144KR-G |
| | | Red | HS1E-144R-R | HS1E-144KR-R |
| Main circuit: 1NC + 1NC<br>Monitor circuit: 1NC + 1NC |  | None | HS1E-240R | HS1E-240KR |
| | | Green | HS1E-244R-G | HS1E-244KR-G |
| | | Red | HS1E-244R-R | HS1E-244KR-R |
| Main circuit: 1NC + 1NC<br>Monitor circuit: 1NC |  | None | HS1E-340R | HS1E-340KR |
| | | Green | HS1E-344R-G | HS1E-344KR-G |
| | | Red | HS1E-344R-R | HS1E-344KR-R |

**Actuator Keys & Accessories**

| Appearance | Part Number | Description |
|---|---|---|
| | HS9Z-A1 | Straight Actuator |
| | HS9Z-A2 | Right-angle Actuator |
| | HS9Z-A3 | Adjustable Actuator |
| | HS9Z-T1 | Key Wrench (included with switch) |
| | HS9Z-P1 | Conduit Opening Plug (G1/2) |

1. Key wrench for TORX screws (HS9Z-T1) is supplied with the interlock switch.
2. Actuator is not supplied with the interlock switch, and must be ordered separately.
3. Manual unlock key is included with the interlock switch.
4. TORX is a registered trademark of Camcar Textron.

## Specifications

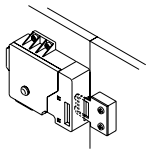
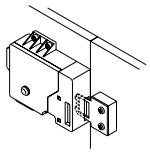
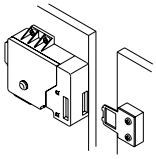
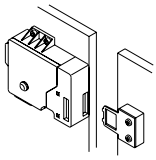
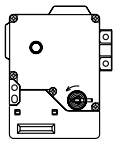
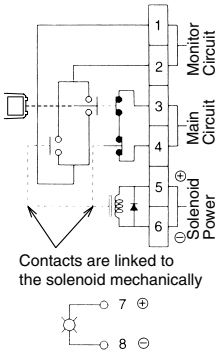
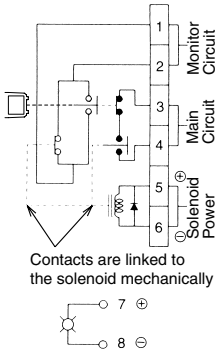
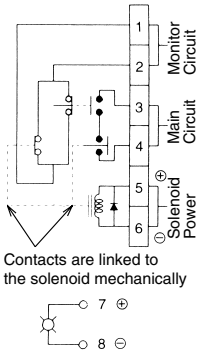
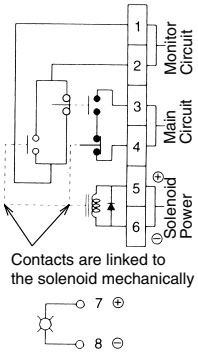
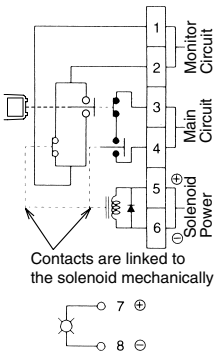
| | | |
|---|---|---|
| Conforming to Standards | | EN1088, IEC60947-5-1, EN60947-5-1(TUV), ISO14119, GS-ET-19 (BG), UL508, CSA C22.2 No. 14, GB14048.5 (CCC approval), IEC60204-1, EN60204-1 (applicable standards for use) |
| Operating Temperature | | –20 to +40°C (no freezing) |
| Storage Temperature | | –40 to +80°C |
| Relative Humidity | | 40 - 85% RH (no condensation) |
| Altitude | | 2,000m maximum |
| Rated Insulation Voltage (Ui) | | 300V (between LED or solenoid and ground: 60V) |
| Impulse Withstand Voltage (Uimp) | | 4 kV (between LED or solenoid and ground: 2.5 kV) |
| Insulation Resistance (measured with 500V DC megger) | | Between live and dead metal parts: 100 MΩ minimum<br>Between live metal part and ground: 100 MΩ minimum<br>Between live metal parts: 100 MΩ minimum<br>Between terminals of the same pole: 100 MΩ minimum |
| Electric Shock Protection | | Class II (according to IEC61140) |
| Pollution Degree | | 3 (IEC60947-5-1) |
| Degree of Protection | | IP67 (IEC60529) |
| Vibration Resistance | Operating Extremes | 10 to 55 Hz, minimum (amplitude 0.35 mm) |
| | Damage Limits | 50 m/sec$^2$ (approx. 5G) |
| Shock Resistance | | 1,000 m/sec$^2$ (approx. 100G) |
| Actuator Retention Force | | 1,500N minimum (per GS-ET-19) |
| Actuator Operating Speed | | 0.05 to 1.0m/s |
| Direct Opening Travel | | 11mm minimum |
| Direct Opening Force | | 20N minimum |
| Thermal Current ($I_{th}$) | | Main circuit: 10A, Auxiliary circuit: 3A |
| Contact Gap | | Main circuit: 1.7 mm min., Auxiliary circuit: 1.2 mm min. |
| Operating Frequency | | 900 operations/hour max. |
| Mechanical Life | | 1,000,000 operations min. (at full rated load)<br>900 ops/hr (AC-12/250V, 6A) |
| Electrical Life | | 100,000 operations (rated load) |
| Conditional Short-circuit Current | | 100A (per IEC60947-5-1) |
| Recommended Short Circuit Protection | | 250V, 10A fuse (Type D01 based on IEC60269-1, 60269-2) |
| Solenoid Unit | Operating Voltage | 24V DC |
| | Current | 292mA (initial value) |
| | Coil Resistance | 102Ω (at 20°C) |
| | Pickup Voltage | 20.4V maximum (at 20°C) |
| | Drop Out Voltage | 2.4V minimum (at 20°C) |
| | Allowable Voltage | 26.4V max (continuous) |
| | Insulation Class | Class F |
| Indicator | Operating Voltage | 24V DC |
| | Current | 10mA |
| | Light Source | LED lamp |
| | Lens Color | Red or Green |
| Weight (approx.) | | 500g |

## Contact Ratings

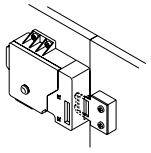
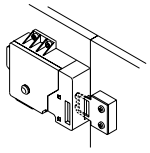
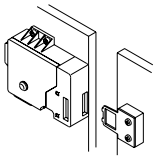
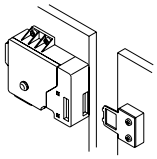
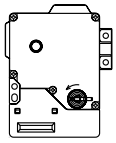
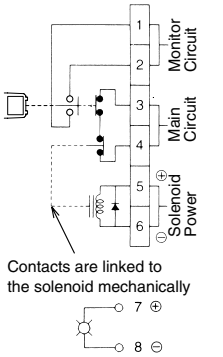
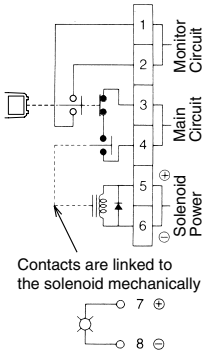
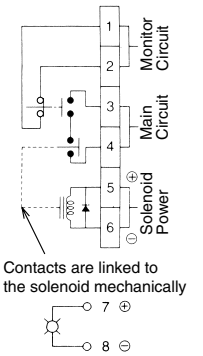
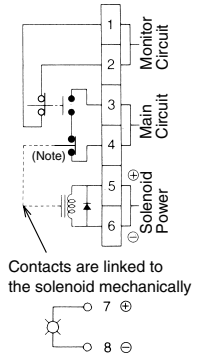
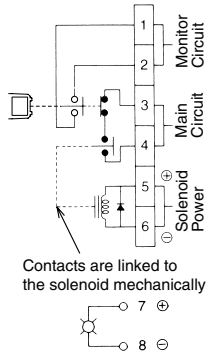
| | | | | Operating Voltage (Ue) | 30V | 125V | 250V |
|---|---|---|---|---|---|---|---|
| Rated Operating Current (Ie) | Main Circuit | AC | Resistive load (AC12)<br>Inductive load (AC15) | | 10A<br>10A | 10A<br>5A | 6A<br>3A |
| | | DC | Resistive load (DC12)<br>Inductive load (DC13) | | 6A<br>3A | –<br>0.9A | –<br>– |
| | Auxiliary Circuit | AC | Resistive load (AC12)<br>Inductive load (AC15) | | –<br>– | 3A<br>– | 3A<br>3A |
| | | DC | Resistive load (DC12)<br>Inductive load (DC13) | | 3A<br>– | –<br>0.9A | –<br>– |

## Application Examples and Circuit Diagrams

### HS1E-4 (Main Circuit: 1NC-1NC, Auxiliary Circuit: 1NO/1NO)

| | Status 1 | Status 2 | Status 3 | Status 4 | Unlocked Manually |
|---|---|---|---|---|---|
| Switch/Door Status | Door Closed<br>Machine ready to operate<br>Solenoid de-energized | Door Closed<br>Machine cannot be started<br>Solenoid de-energized | Door Opened<br>Machine cannot be started<br>Solenoid energized | Door Opened<br>Machine cannot be started<br>Solenoid de-energized | Door Closed<br>Machine cannot be started<br>Solenoid de-energized |
| Door |  |  |  |  |  |
| Circuit Diagram |  |  |  |  |  |
| Main Circuit | 3-4: Closed | 3-4: Open | 3-4: Open | 3-4: Closed | 3-4: Open |
| Aux. Circuit | 1-2: Open | 1-2: Closed | 1-2: Closed | 1-2: Closed | 1-2: Closed |
| Solenoid | 5-6: Power OFF | 5-6: Power ON | 5-6: Power ON | 5-6: Power OFF | 5-6: Power OFF |

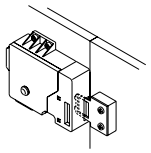
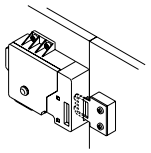
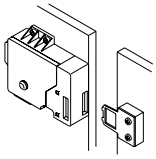
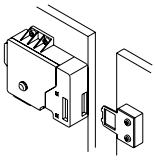
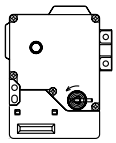
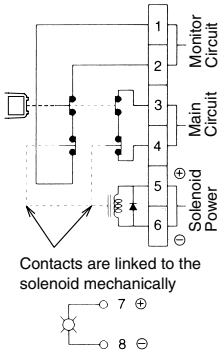
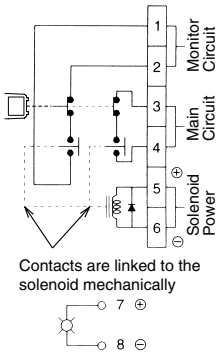
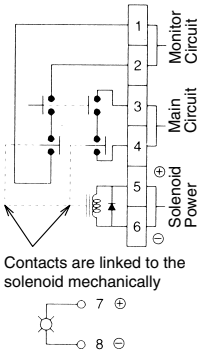
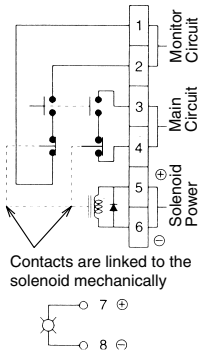
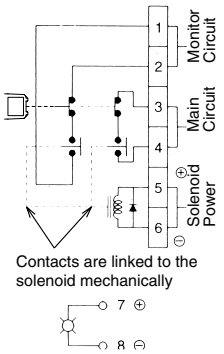
### HS1E-14 (Main Circuit: 1NC-1NC, Auxiliary Circuit: 1NO)

| | Status 1 | Status 2 | Status 3 | Status 4 | Unlocked Manually |
|---|---|---|---|---|---|
| Switch/Door Status | Door Closed<br>Machine ready to operate<br>Solenoid de-energized | Door Closed<br>Machine cannot be started<br>Solenoid energized | Door Opened<br>Machine cannot be started<br>Solenoid energized | Door Opened<br>Machine cannot be started<br>Solenoid de-energized | Door Closed<br>Machine cannot be started<br>Solenoid de-energized |
| Door |  |  |  |  |  |
| Circuit Diagram |  |  |  |  |  |
| Main Circuit | 3-4: Closed | 3-4: Open | 3-4: Open | 3-4: Open | 3-4: Open |
| Aux. Circuit | 1-2: Open | 1-2: Open | 1-2: Closed | 1-2: Closed | 1-2: Open |
| Solenoid | 5-6: Power OFF | 5-6: Power ON | 5-6: Power ON | 5-6: Power OFF | 5-6: Power OFF |

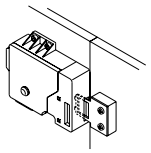
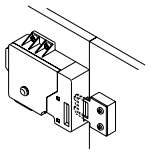
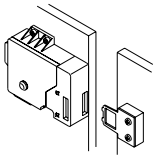
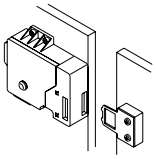
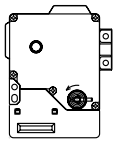
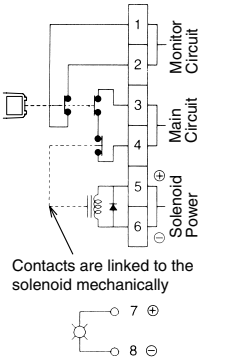
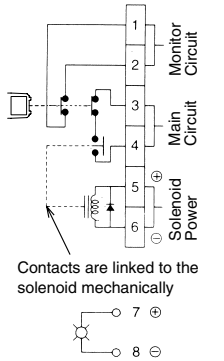
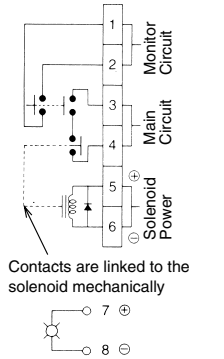
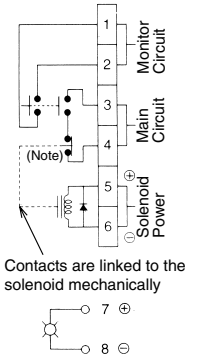
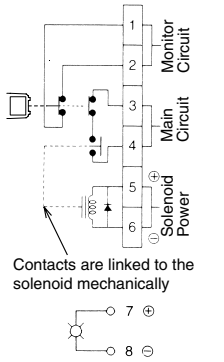
1. Main Circuit: used to enable the machine to start only when the main circuit is closed.
2. Auxiliary Circuit: used to indicate whether the machine circuit or door is open or closed.
3. Terminals 7 and 8 are used for the LED indicator, and are isolated from solenoid and door status.

## Application Examples and Circuit Diagrams, continued

### HS1E-24 (Main Circuit: 1NC+1NC, Auxiliary Circuit: 1NC+NC)

| | Status 1 | Status 2 | Status 3 | Status 4 | Unlocked Manually |
|---|---|---|---|---|---|
| Switch/Door Status | Door Closed<br>Machine ready to operate<br>Solenoid de-energized | Door Closed<br>Machine cannot be started<br>Solenoid energized | Door Opened<br>Machine cannot be started<br>Solenoid energized | Door Opened<br>Machine cannot be started<br>Solenoid de-energized | Door Closed<br>Machine cannot be started<br>Solenoid de-energized |
| Door |  |  |  |  |  |
| Circuit Diagram |  |  |  |  |  |
| Main Circuit | 3-4: Closed | 3-4: Open | 3-4: Open | 3-4: Open | 3-4: Open |
| Aux. Circuit | 1-2: Closed | 1-2: Open | 1-2: Open | 1-2: Open | 1-2: Open |
| Solenoid | 5-6: Power OFF | 5-6: Power ON | 5-6: Power ON | 5-6: Power OFF | 5-6: Power OFF |

### HS1E-34 (Main Circuit: 1NC+1NC, Auxiliary Circuit: 1NC)

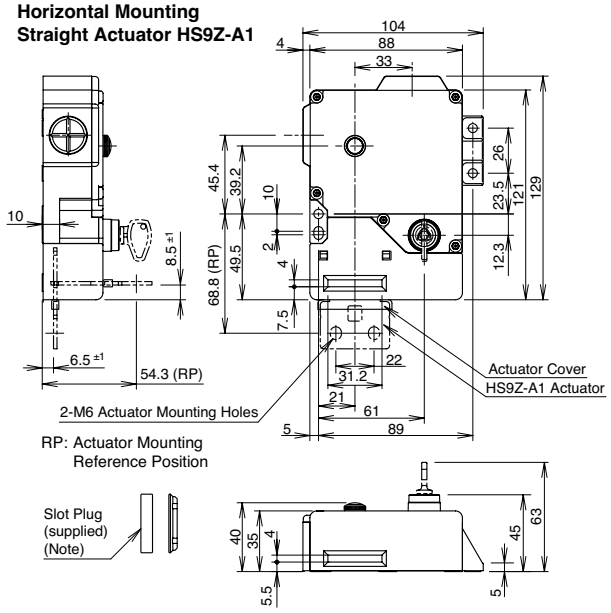
| | Status 1 | Status 2 | Status 3 | Status 4 | Unlocked Manually |
|---|---|---|---|---|---|
| Switch/Door Status | Door Closed<br>Machine ready to operate<br>Solenoid de-energized | Door Closed<br>Machine cannot be started<br>Solenoid energized | Door Opened<br>Machine cannot be started<br>Solenoid energized | Door Opened<br>Machine cannot be started<br>Solenoid de-energized | Door Closed<br>Machine cannot be started<br>Solenoid de-energized |
| Door |  |  |  |  |  |
| Circuit Diagram |  |  |  |  |  |
| Main Circuit | 3-4: Closed | 3-4: Open | 3-4: Open | 3-4: Open | 3-4: Open |
| Aux. Circuit | 1-2: Closed | 1-2: Closed | 1-2: Open | 1-2: Open | 1-2: Closed |
| Solenoid | 5-6: Power OFF | 5-6: Power ON | 5-6: Power ON | 5-6: Power OFF | 5-6: Power OFF |

1. Main Circuit: used to enable the machine to start only when the main circuit is closed.
2. Auxiliary Circuit: used to indicate whether the machine circuit or door is open or closed.
3. Terminals 7 and 8 are used for the LED indicator, and are isolated from solenoid or door status.

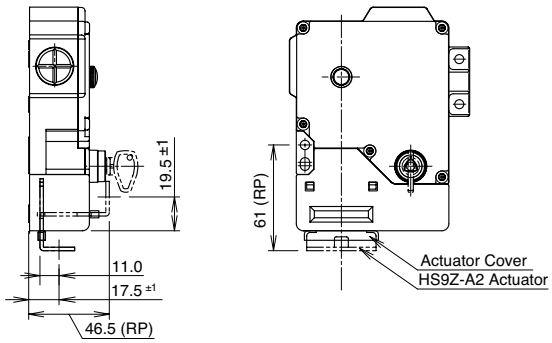
## Dimensions (mm)

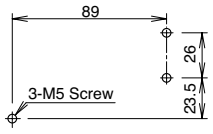
**HS1E with indicator - using 1500N operating force**

**Horizontal Mounting**
**Straight Actuator HS9Z-A1**




**Vertical Mounting**
**Right-angle Actuator HS9Z-A2**



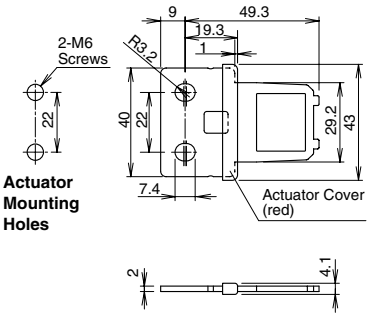




**Mounting Hole Layout**

Note: Plug the unused actuator entry slot using the slot plug supplied with the interlock switch.

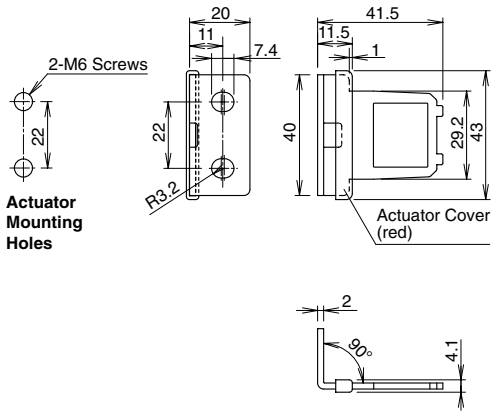
## Accessories

**Straight Actuator (mainly for sliding doors) HS9Z-A1**




**Right-angle Actuator (mainly for hinged doors) HS9Z-A2**

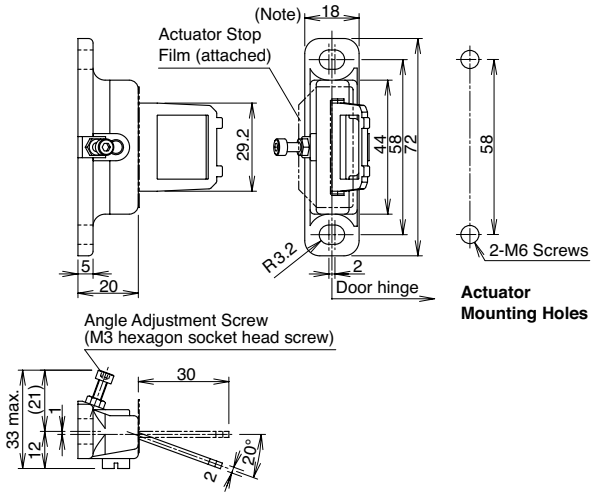
*After installing the actuator, remove the actuator cover.




**Adjustable Actuator**

- The actuator angle is adjustable (0° to 20°) for hinged doors.
- The minimum radius of the door opening can be as small as 100mm.

**For HS1/HS2 Series (HS9Z-A3)**




All dimensions in mm.

## Accessories, continued

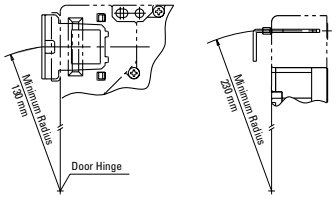
**Minimum Radius of Hinged Door**

- When using the interlock switch for a hinged door, refer to the minimum radius of doors shown below. For the doors with small minimum radius, use angle adjustable actuators (HS9ZA3 or HS9Z-A3S).

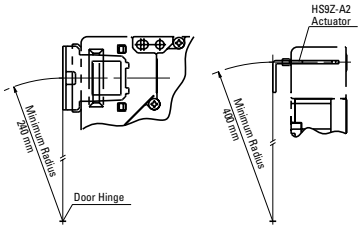
  Note: Because deviation or dislocation of hinged door may occur in actual applications, make sure of the correct operation before installation.

### HS9Z-A2 Actuator

- When the door hinge is on the extension line of the interlock switch surface:

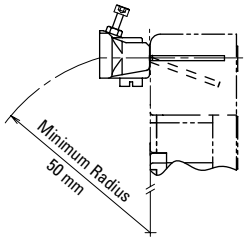



- When the door hinge is on the extension line of the actuator mounting surface:

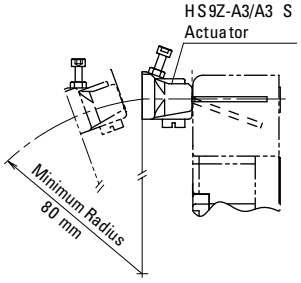



### When using the HS9Z-A3 Angle Adjustable (vertical) Actuator

- When the door hinge is on the extension line of the interlock switch surface:




- When the door hinge is on the extension line of the actuator mounting surface:

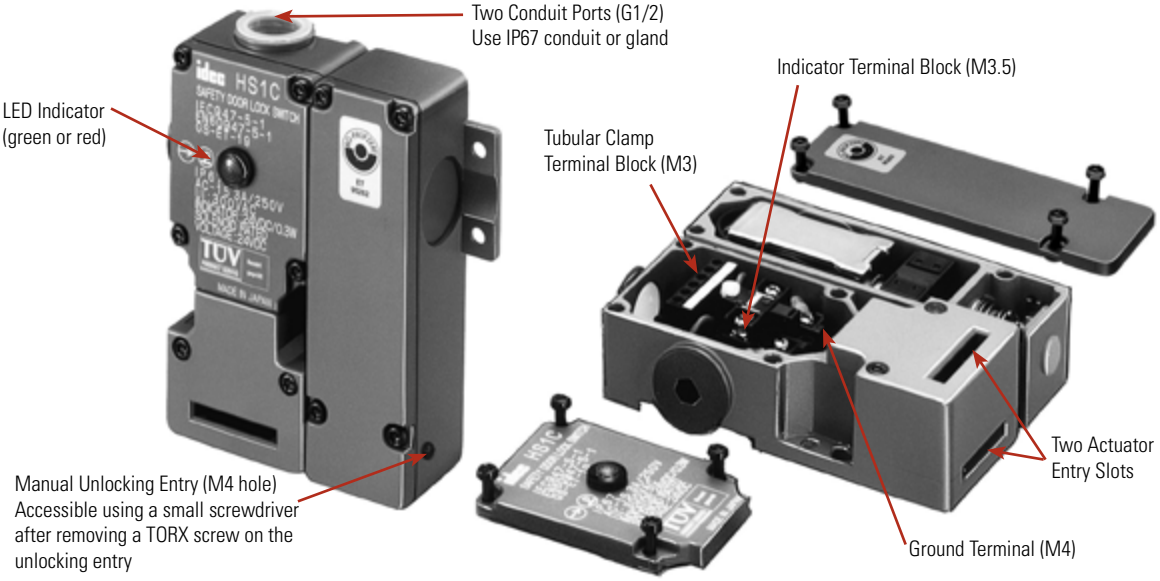


# HS1C Full Size Solenoid Locking Switches

**Key features:**

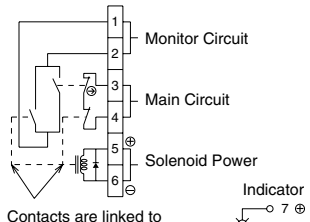
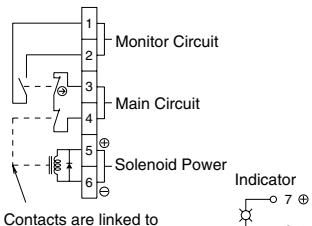
- Rugged aluminum die-cast housing
- 1500N locking retention force
- Flexible Installation: The actuator can be accessed from two directions
- Select from four different circuit configurations
- IP67

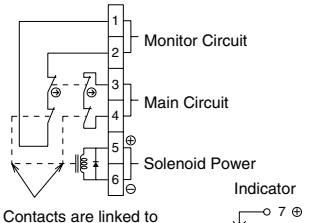
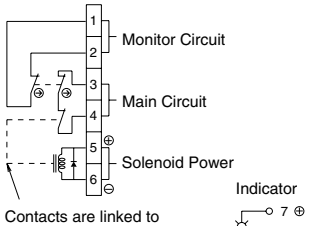
**HS1C Series Functionality**




TORX is a registered trademark of Camcar Textron.

## Part Numbers (Mechanical Spring Lock Only)

| Contact Configuration | Indicator LED | Part Number |
|---|---|---|
|   | Green | **HS1C-R44R-G** |
| | Red | **HS1C-R44R-R** |
|   | Green | HS1C-R144R-G |
| | Red | **HS1C-R144R-R** |

| Contact Configuration | Indicator LED | Part Number |
|---|---|---|
|   | Green | **HS1C-R244R-G** |
| | Red | **HS1C-R244R-R** |
|   | Green | **HS1C-R344R-G** |
| | Red | **HS1C-R344R-R** |

Standard stock items in bold

## Actuator Keys & Accessories

| Appearance | Part Number | Description |
|---|---|---|
| | HS9Z-A1 | Straight Actuator |
| | HS9Z-A2 | Right-angle Actuator |
| | HS9Z-A3 | Adjustable Actuator |

| Appearance | Part Number | Description |
|---|---|---|
| | HS9Z-T1 | Key Wrench (included with switch) |
| | HS9Z-P1 | Conduit Opening Plug (G1/2) |

## Specifications

| | | |
|---|---|---|
| Conforming to Standards | | EN1088, IEC60947-5-1, EN60947-5-1, GS-ET-19, UL508, GB 140485.5 (CCC approval), CSA C22.2 No. 14 |
| Operating Temperature | | –20 to +40°C (no freezing) |
| Storage Temperature | | –40 to +80°C |
| Relative Humidity | | 40 to 85% (no condensation) |
| Altitude | | 2,000m maximum |
| Rated Insulation Voltage ($U_i$) | | 300V (between LED or solenoid and ground: 60V) |
| Impulse Withstand Voltage ($U_{imp}$) | | 4 kV (between LED or solenoid and ground: 2.5 kV) |
| Insulation Resistance | | Between live and dead metal parts: 100 MΩ minimum<br>Between live metal part and ground: 100 MΩ minimum<br>Between live metal parts: 100 MΩ minimum<br>Between terminals of the same pole: 100 MΩ minimum |
| Electric Shock Protection Class | | Class 1 (IEC61140) |
| Pollution Degree | | 3 (IEC60947-5-1) |
| Degree of Protection | | IP67 (IEC60529) |
| Vibration Resistance | Operating Extremes | 10 to 55 Hz, amplitude 0.5 mm |
| | Damage Limits | 60 m/sec$^2$ (approx. 6G) |
| Shock Resistance | | 1,000 m/s$^2$ (approx. 100G) |
| Actuator Retention Force | | 1,500N minimum |
| Actuator Operating Speed | | 0.05 to 1.0m/s |
| Direct Opening Travel | | 11mm minimum |
| Direct Opening Force | | 20N minimum |
| Thermal Current ($I_{th}$) | | Main circuit: 10A, Auxiliary circuit: 3A |
| Contact Opening Distance | | Main circuit: 1.7 mm max., Auxiliary circuit: 1.2 mm min. |
| Operating Frequency | | 900 operations/hour max. |
| Mechanical Life | | 1,000,000 operations |
| Electrical Life | | 100,000 operations (rated load) |
| Conditional Short-circuit Current | | 100A (IEC60947-5-1) |
| Recommended Short Circuit Protection | | 250V, 10A fuse (Type D01 based on IEC60269-1, 60269-2) |

## Specifications, con't

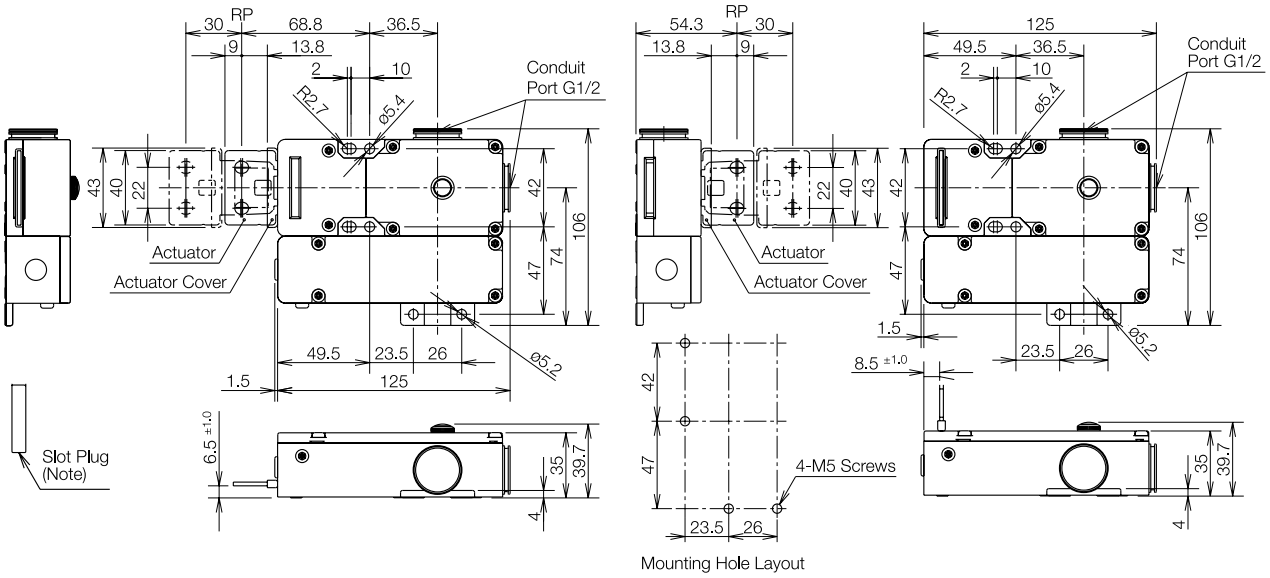
| | | |
|---|---|---|
| Solenoid Unit | Operating Voltage | 24V DC (100% duty cycle) |
| | Current | 415mA (initial value) |
| | Coil Resistance | 58Ω (at 20°C) |
| | Energizing Voltage | Rated voltage x 85% maximum (at 20°C) |
| | De-energizing Voltage | Rated voltage x 10% minimum (at 20°C) |
| | Continuous Applicable Voltage | Rated voltage x 110% |
| | Insulation Class | Class B |
| Indicator | Operating Voltage | 24V DC |
| | Current | 10 mA |
| | Light Source | LED lamp |
| | Lens Color | Red or Green |
| Weight (approx.) | | 660g |

## Contact Ratings

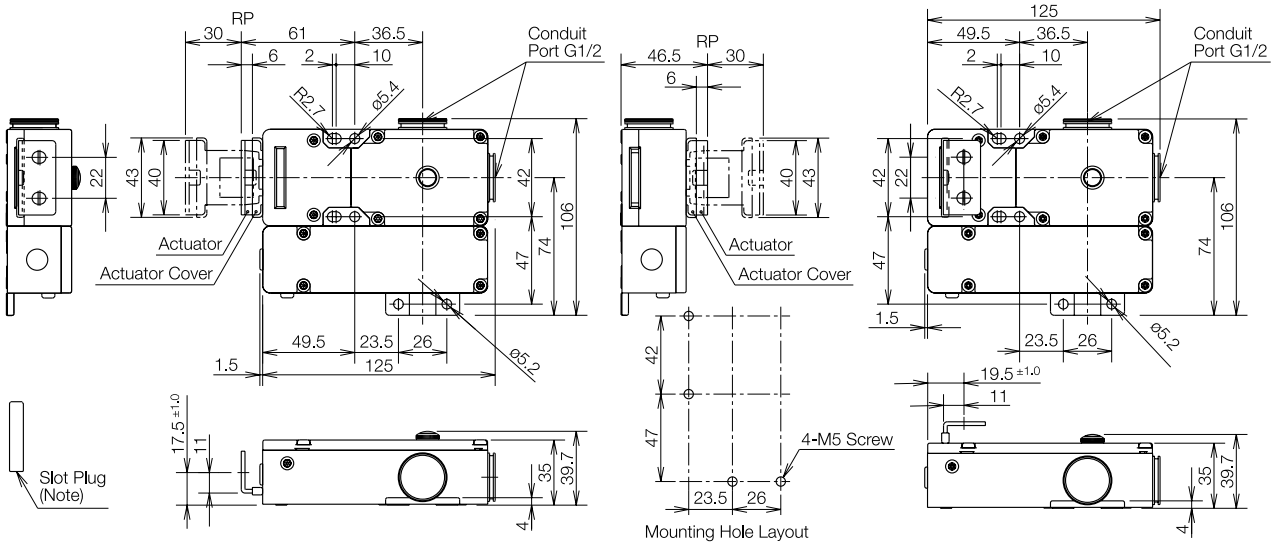
| | | | | | | |
|---|---|---|---|---|---|---|
| Rated Operating Current (Ie) | Operating Voltage (Ue) | | | 30V | 125V | 250V |
| | Main Circuit | AC | Resistive load (AC12) | 10A | 10A | 6A |
| | | | Inductive load (AC15) | 10A | 5A | 3A |
| | | DC | Resistive load (DC12) | 6A | – | – |
| | | | Inductive load (DC13) | 3A | 0.9A | – |
| | Auxiliary Circuit | AC | Resistive load (AC12) | – | 3A | 3A |
| | | | Inductive load (AC15) | – | – | 3A |
| | | DC | Resistive load (DC12) | 3A | – | – |
| | | | Inductive load (DC13) | – | 0.9A | – |

## Dimensions (mm)

### HS1C-R44R-* - using the straight actuator (HS9Z-A1)

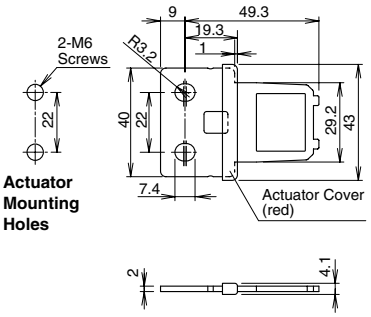



### HS1C-R44R-* - using the Right-angle actuator (HS9Z-A2)



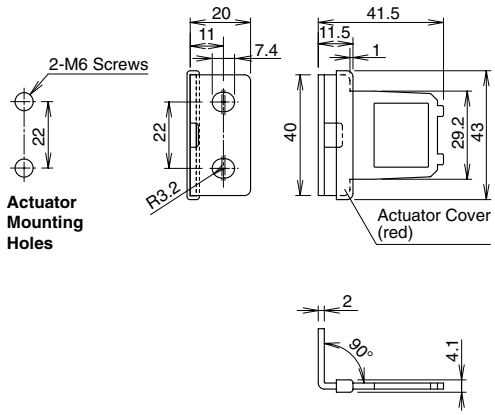
## Accessories

**Straight Actuator (mainly for sliding doors)**
**HS9Z-A1**




**Right-angle Actuator (mainly for hinged doors)**
**HS9Z-A2**

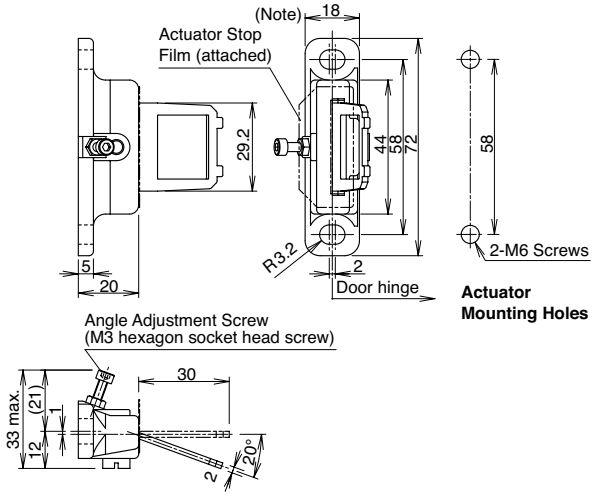
*After installing the actuator, remove the actuator cover.




**Adjustable Actuator**

- The actuator angle is adjustable (0° to 20°) for hinged doors.
- The minimum radius of the door opening can be as small as 100mm.

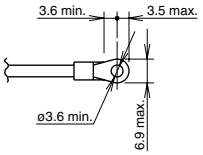
## For HS1/HS2 Series (HS9Z-A3)



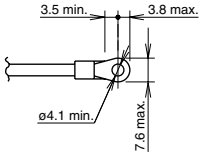

All dimensions in mm.

## Applicable Crimping Terminals

- (Refer to the Crimping Terminal 1 or 2 shown in the drawing below.)
- HS1C
  Terminals No. 1 to 6: Use solid or stranded wires only (crimping terminals not applicable).
  Terminals No. 7 and 8: Crimping Terminal 1
  Ground Terminal: Crimping Terminal 2
- HS1B
  Ground Terminal: Crimping Terminal 2
  Other Terminals: Crimping Terminal 1
  HS2B, HS5B, and HS1E
  Crimping Terminal 1

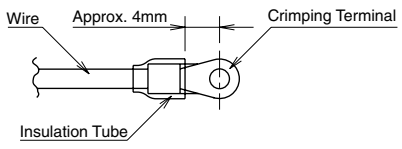



**Crimping Terminal 1**




**Crimping Terminal 2**

Use an insulation tube on the crimping terminal.



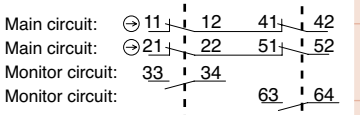
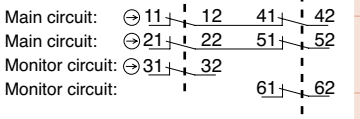
# HS1L Interlock Switches with Solenoid

## Key features:

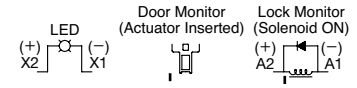
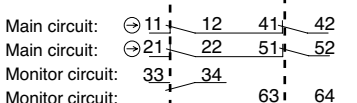
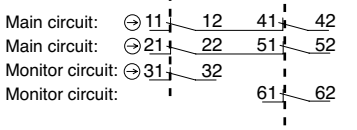
- 3,000N locking retention force
- LED indicator
- Energy-efficient solenoid
- 6 contacts with easy-to-wire terminations
- M3 terminal screws for easy wiring

## Part Numbers

### Mechanical Spring Lock (power solenoid to unlock)

| Contact Configuration | Conduit Size | LED | Part Number |
|---|---|---|---|
| | G1/2 | Red | **HS1L-R44KMSR-R** |
| | | Green | **HS1L-R44KMSR-G** |
| | PG13.5 | Red | **HS1L-R44KMSRP-R** |
| | | Green | HS1L-R44KMSRP-G |
| | M20 | Red | **HS1L-R44KMSRM-R** |
| | | Green | **HS1L-R44KMSRM-G** |
|  | G1/2 | Red | **HS1L-DQ44KMSR-R** |
| | | Green | **HS1L-DQ44KMSR-G** |
| | PG13.5 | Red | **HS1L-DQ44KMSRP-R** |
| | | Green | **HS1L-DQ44KMSRP-G** |
| | M20 | Red | HS1L-DQ44KMSRM-R |
| | | Green | **HS1L-DQ44KMSRM-G** |
|  | G1/2 | Red | **HS1L-DT44KMSR-R** |
| | | Green | **HS1L-DT44KMSR-G** |
| | PG13.5 | Red | **HS1L-DT44KMSRP-R** |
| | | Green | **HS1L-DT44KMSRP-G** |
| | M20 | Red | **HS1L-DT44KMSRM-R** |
| | | Green | **HS1L-DT44KMSRM-G** |

### Solenoid Lock (Remove Power to Unlock)

| Contact Configuration | Conduit Size | LED | Part Number |
|---|---|---|---|
|  | G1/2 | Red | **HS1L-R7Y4KMSR-R** |
| | | Green | **HS1L-R7Y4KMSR-G** |
| | PG13.5 | Red | HS1oh yL-R7Y4KMSRP-R |
| | | Green | HS1L-R7Y4KMSRP-G |
| | M20 | Red | HS1L-R7Y4KMSRM-R |
| | | Green | HS1L-R7Y4KMSRM-G |
|  | G1/2 | Red | **HS1L-DQ7Y4KMSR-R** |
| | | Green | **HS1L-DQ7Y4KMSR-G** |
| | PG13.5 | Red | HS1L-DQ7Y4KMSRP-R |
| | | Green | **HS1L-DQ7Y4KMSRP-G** |
| | M20 | Red | HS1L-DQ7Y4KMSRM-R |
| | | Green | HS1L-DQ7Y4KMSRM-G |
|  | G1/2 | Red | **HS1L-DT7Y4KMSR-R** |
| | | Green | **HS1L-DT7Y4KMSR-G** |
| | PG13.5 | Red | HS1L-DT7Y4KMSRP-R |
| | | Green | **HS1L-DT7Y4KMSRP-G** |
| | M20 | Red | **HS1L-DT7Y4KMSRM-R** |
| | | Green | HS1L-DT7Y4KMSRM-G |

1. Contact configuration shows the contact status when actuator is inserted and solenoid off for spring lock.
2. Contact configuration shows the contact status when actuator is inserted and solenoid on for solenoid lock.
3. Actuator keys are not supplied with the interlock switch and must be ordered separately.
4 Manual unlock key is included with the interlock switch.
5. Standard stock items in bold

## Actuator Keys & Accessories (order separately)

| Appearance | Part Number | Description |
|---|---|---|
| | HS9Z-A1S | Straight Actuator |
| | HS9Z-A2S | L-shaped Actuator |
| | HS9Z-A3S | Angle Adjustable Actuator (vertical operation only) |

| Appearance | Part Number | Description |
|---|---|---|
| | HS9Z-T1 | Key Wrench (included with switch) |
| | HS9Z-P1 | Conduit Opening Plug (G1/2) |

## Specifications

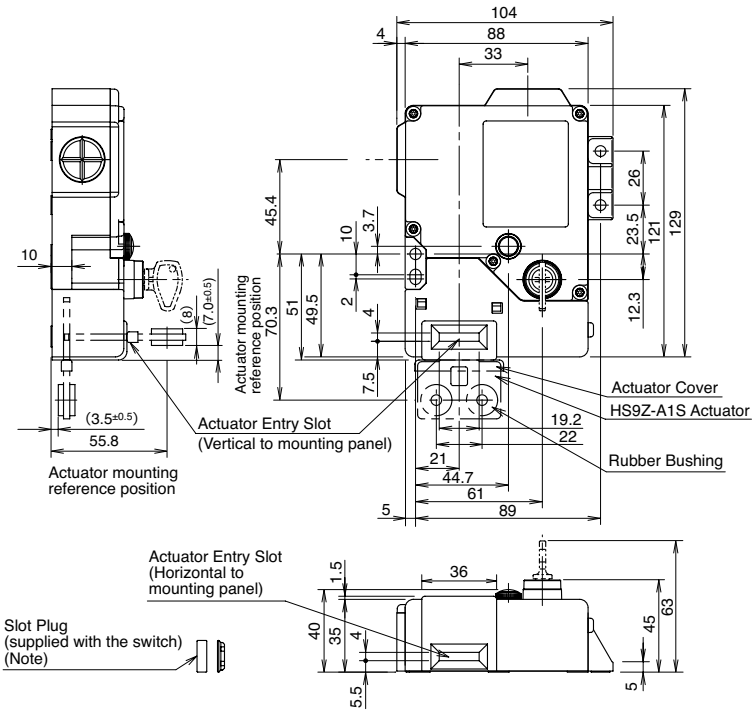
| | | |
|---|---|---|
| Conforming to Standards | | ISO14119, IEC60947-5-1. EN60947-5-1 (TÜV approval), GS-ET-19 (TÜV approval). UL508, CSA C22.2 No. 14<br>IEC60204-1/EN60204-1 (applicable standards for use) |
| Operating Temperature | | –20 to +55°C (no freezing) |
| Storage Temperature | | –40 to +80°C (no freezing) |
| Relative Humidity | | 45 to 85% (no condensation) |
| Rated Insulation Voltage (Ui) | | 300V |
| Overvoltage Category | | III |
| Electric Shock Protection | | Class II (IEC 61140) |
| Degree of Protection | | IP67 (IEC 60529) |
| Shock Resistance | | Damage limits: 1000m/s$^2$ |
| Actuator Retention Force | | 3000N minimum (GS-ET-19) |
| Actuator Operating Speed | | 0.05 to 1.0m/s |
| Direct Opening Travel | | 11mm minimum |
| Direct Opening Force | | 50N minimum |
| Thermal Current (Ith) | | 10A |
| Operating Frequency | | 900 operations per hour |
| Mechanical Life | | 1,000,000 operations minimum (GS-ET-19) |
| Electrical Life | | 100,000 operations minimum (AC-15 3A/250V)<br>1,000,000 operations minimum (24V AC/DC, 100mA)<br>(operating frequency 900 operations per hour) |
| Solenoid Unit | Rated Operating Voltage | 24V DC (100% duty cycle) |
| | Rated Current | 200mA (initial value) |
| Indicator | Rated Operating Voltage | 24V DC |
| | Rated Current | 10mA |
| | Light Source | LED |
| | Illumination Color | Green (G), Red (R) |
| Weight (approx.) | | 450g (HS1L-DQ44) |

## Contact Ratings

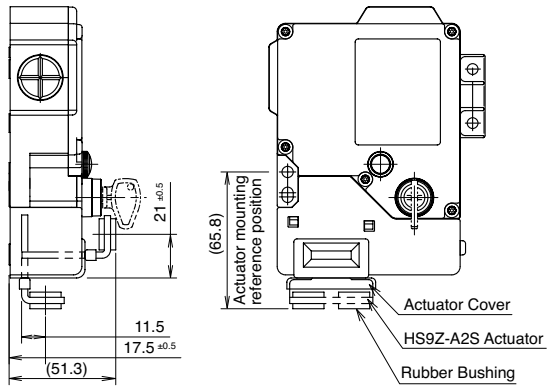
| | | | | | |
|---|---|---|---|---|---|
| Rated Operating Current ($I_e$) | Rated Voltage ($U_e$) | | 30V | 125V | 250V |
| | AC | Resistive load (AC12) | 10A | 10A | 6A |
| | | Inductive load (AC15) | 10A | 5A | 3A |
| | DC | Resistive load (DC12) | 8A | 2.2A | 1.1A |
| | | Inductive load (DC13) | 4A | 0.9A | 0.6A |

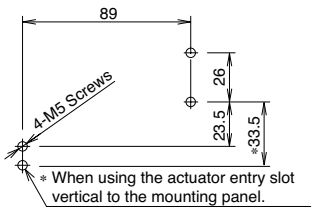
## Dimensions (mm) and Mounting Hole Layouts

### Interlock switch when using straight actuator (HS9Z-A1S)




### Interlock switch when using L-shaped actuator (HS9Z-A2S)

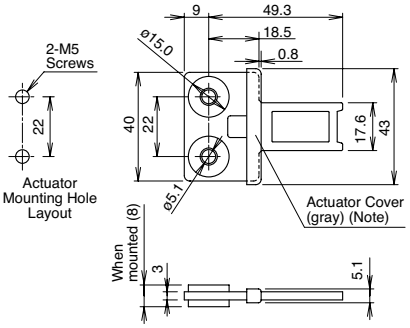


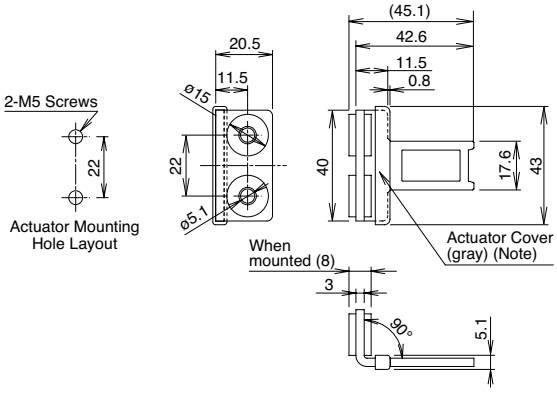

**Interlock Switch Mounting Hole Layout**

Note: Plug the unused actuator entry slot using the slot plug supplied with the interlock switch.
* Install the interlock switch using four mounting screws when using the actuator entry slot vertical to the mounting panel, and three mounting screws when using the actuator entry slot horizontal to the mounting panel.

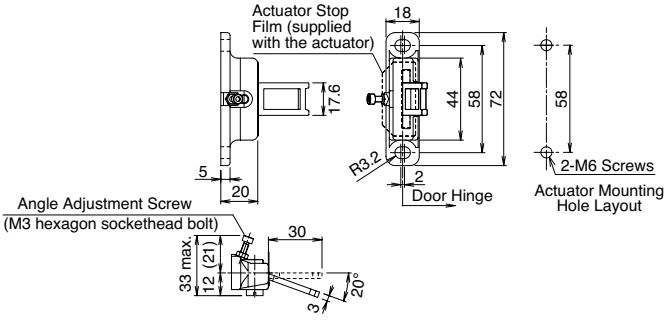
### Straight Actuator (HS9Z-A1S)




### L-shaped Actuator (HS9Z-A2S)




### Angle Adjustable (vertical) Actuator (HS9Z-A3S)




The actuator cover and the actuator stop film are supplied with the actuator and used when adjusting the actuator position. Remove them after the actuator position is determined.

# HS5E-K Key Locking Safety Interlock Switches

**Key features:**

- Head removal detection circuitry.
- High-security pin tumbler key types are used. Sixteen types of key numbers are available, see page 358.
- Available with rear unlocking button for emergency escape.
- Accessory available for aluminum frame mounting.
- Gold-plated contacts.
- The locking strength is 1400N minimum. (GS-ET-19)
- The head orientation can be rotated, allowing 8 different actuator entries.
- Metal actuator entry slot ensures high durability.
- Actuator with rubber bushings alleviates the impact of the actuator entry slot.
- Environmentally-friendly. RoHs directive compliant.
- Double insulation structure. No need for grounding.
- Compact body: 35 × 40 × 146 mm

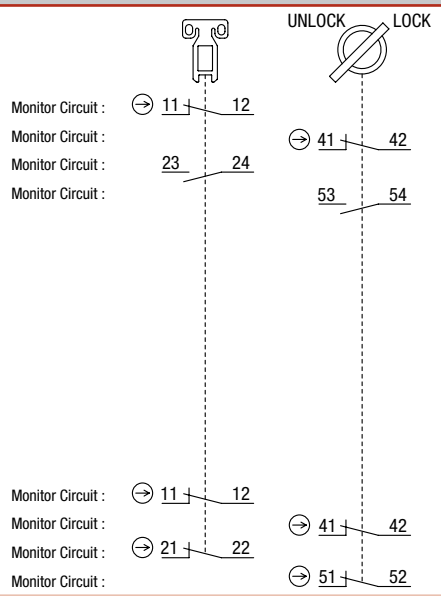
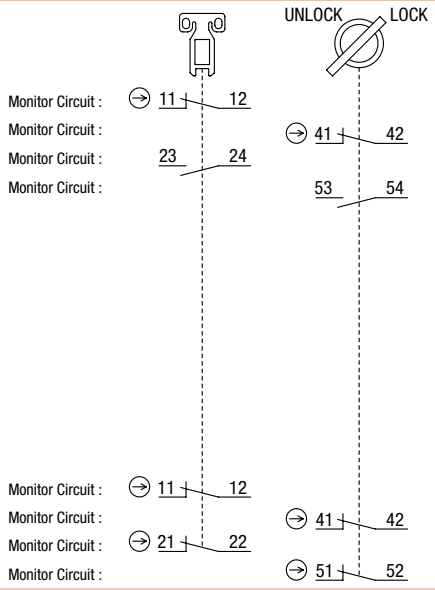
A single key used for interlock switch and selector switch prevents itself from being left in the lock.

Hostage key ensures that the person holding the key is not locked inside the hazardous area.

Hostage key prevents the machine from starting unexpectedly.

HS5E-K key interlock switches use a key to lock and unlock a door of safeguard. When the key is taken into a dangerous area, the interlock switch cannot be locked and the machine does not operate. Therefore, workers can be prevented from being locked in a dangerous area, and the system is prevented from restarting unexpectedly. Furthermore, because the key used for HS5E-K key interlock switches can also be used for HW series key selector switches (pin tumbler type), switching operation modes of systems and door unlocking can be performed using a single key. 16 types of key numbers are available, so that each system can have its own key, and a higher level of safety can be achieved.

## Spring Lock Type (Power Solenoid to VA Lock)

| Circuit Code | Contact Configuration | Key Removal Position | Cable Length | Part Number | |
|---|---|---|---|---|---|
| | | | | Standard | With Rear Unlock Button |
| VA |  | A (removable in all positions) | 3m | HS5E-KVA003-2A | HS5E-KVA0L03-2A |
| | | | 5m | HS5E-KVA005-2A | HS5E-KVA0L05-2A |
| | | B (removal in UNLOCK position) | 3m | HS5E-KVA003-2B | HS5E-KVA0L03-2B |
| | | | 5m | HS5E-KVA005-2B | HS5E-KVA0L05-2B |
| | | C (removable in LOCK position) | 3m | HS5E-KVA003-2C | HS5E-KVA0L03-2C |
| |  | | 5m | HS5E-KVA005-2C | HS5E-KVA0L05-2C |
| VD |  | A (removable in all positions) | 3m | HS5E-KVD003-2A | HS5E-KVD0L03-2A |
| | | | 5m | HS5E-KVD005-2A | HS5E-KVD0L05-2A |
| | | B (removal in UNLOCK position) | 3m | HS5E-KVD003-2B | HS5E-KVD0L03-2B |
| | | | 5m | HS5E-KVD005-2B | HS5E-KVD0L05-2B |
| | | C (removable in LOCK position) | 3m | HS5E-KVD003-2C | HS5E-KVD0L03-2C |
| |  | | 5m | HS5E-KVD005-2C | HS5E-KVD0L05-2C |

The contact configuration shows the status when the actuator is inserted and the switch is locked.
Actuators are not supplied with interlock switches and must be ordered separately.
Key number 500 is supplied as the default key in table above (500 not added to part number).

To order additional key types, specify key number at end of part number (special order).
Example: HS5E-KVA003-2A501
501 to 515
Note: The key number is engraved on the cylinder.

## Actuator Keys & Accessories

| Appearance | Part Number | Description |
|---|---|---|
| | HS9Z-A51 | Straight |
| | HS9Z-A52 | Right-angle |
| | HS9Z-A53 | Angle adjustable vertical operation |

| Appearance | Part Number | Description |
|---|---|---|
| | HS9Z-A55 | Angle adjustable horizontal/vertical operation [1] |
| | HS9Z-A5P | Plug Actuator (allows switch to be used as interlock plug unit) |
| | HS9Z-PH5 | Padlock Hasp (prevents unauthorized insertion of actuator) |

| Appearance | Part Number | Description |
|---|---|---|
| | HS9Z-SP51 | Mounting Plate (allows easy mounting to aluminum frames) |
| | HS9Z-T3 | Manual unlock key (long type - metal) |
| | HS9Z-SH5 | Sliding Actuator |

1. The actuator tensile strength is 500N minimum.
2. Actuators are not included and must be included separately.

### Specifications

| | |
|---|---|
| Applicable Standards | ISO14119, IEC60947-5-1, EN60947-5-1 (TÜV approval), EN1088, GS-ET-19 (TÜV approval), UL508 (UL recognition), CSA C22.2 No. 14 (c-UL recognized) |
| | IEC60204-1/EN60204-1 (applicable standards for use) |
| Operating Temperature | -25 to +70°C (No freezing) |
| Relative Humidity | 45 to 85% (No condensation) |
| Storage Temperature | -40 to +80°C (No freezing) |
| Pollution Degree | 3 |
| Impulse Withstand Voltage | 2.5 kV |
| Insulation Resistance (500V DC megger) | Between live and dead metal parts: 100 MΩ minimum (500V DC megger)<br>Between live metal part and ground: 100 MΩ minimum (500V DC megger)<br>Between live metal parts: 100 MΩ minimum (500V DC megger)<br>Between terminals of the same pole: 100 MΩ minimum |
| Electric Shock Class | Class II (IEC61140) |
| Degree of Protection | IP65 (IEC60529) |
| Shock Resistance | Operating extremes: 100 m/s$^2$<br>Damage limits: 1,000 m/s$^2$ |
| Vibration Resistance | Operating extremes: 10 to 55 Hz, amplitude 0.35 mm<br>Damage limits: 30 Hz, amplitude 1.5 mm |
| Actuator Operating Speed | 0.05 to 1.0 m/s |
| Direct Opening Travel | Actuator HS9Z-A51: 11 mm minimum<br>Actuator HS9Z-A51A/A52/A52A/A53/A55: 12 mm minimum |
| Direct Opening Force | 80N minimum |
| Actuator Retention Force [1] | 1,400N minimum (GS-ET-19) |
| Operating Frequency | 900 operations per hour |
| Rear Unlocking Button Mechanical Durability | 3,000 operations minimum (HS5E-K□L) |
| Mechanical Durability | 1,000,000 operations minimum (GS-ET-19) |
| Electrical Durability | 100,000 operations minimum (AC-12, 250V, 1A)<br>1,000,000 operations minimum (24V AC/DC, 100 mA)<br>(Operating frequency: 900 operations per hour) |
| Performance between 41 and 42 when head is removed | Mechanical durability: 10 operations minimum<br>Insulation resistance: 100 MΩ (initial value)<br>Withstand voltage: 1,000V for 1 minute (initial value) |
| Conditional Short-circuit Current | 50A (250V) [2] |
| Cable | 22 AWG (12-core, 0.3 mm$^2$ or equivalent/core) |
| Cable Diameter | ø7.6 mm |
| Weight (approx.) | 400g (HS5E-KVA003) |

1. See page 358 for actuator retention force.
2. Use 250V/10A fast-blow fuse for short-circuit protection.

### Key Cylinder Specifications

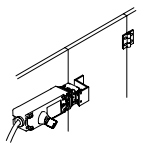
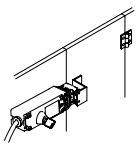
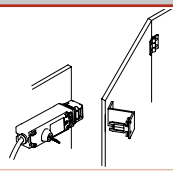
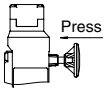
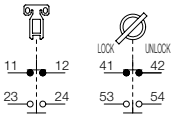
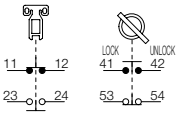
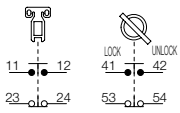
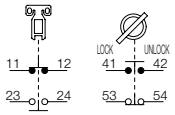
| | |
|---|---|
| Operating Method | 2-position maintained |
| Mechanical Durability | 100,000 operations minimum |
| Insertion/Removal Durability | 10,000 operations minimum |
| Operator Strength | 1.0 N·m minimum |
| Direct Opening Force | 0.6 N·m minimum |
| Direct Opening Angle | 60° minimum |

## Contact Rating

| | | | | | |
|---|---|---|---|---|---|
| **Rated Insulation Voltage ($U_i$)** [1] | | | 250V | | |
| Rated Thermal Current ($I_{th}$) | | | Operating temperature:<br>–25°C to 60°C: 2.5A max.<br>60° to 65°C: 1.5A max.<br>65°C to 70°C: 1.0A max. | | |
| Rated Voltage ($U_e$) | | | 30V | 125V | 250V |
| Rated Current (Ie) [2] | AC | Resistive load (AC12) | — | 2.5A | 1.5A |
| | | Inductive Load (AC15) | — | 1.5A | 0.75A |
| | DC | Resistive load (DC12) | 2.5A | 1.1A | 0.55A |
| | | Inductive Load (DC13) | 2.3A | 0.55A | 0.27A |

Minimum applicable load (reference value) = 3V AC/DC, 5 mA
(Applicable range may vary with operating conditions and load types.)
1: UL rating: 125V
2: TÜV rating: AC-15, 0.5A/250V, DC-13, 0.22A/125V
UL, c-UL rating: Pilot Duty AC 0.5A/125V, Pilot Duty DC 0.22A/125V

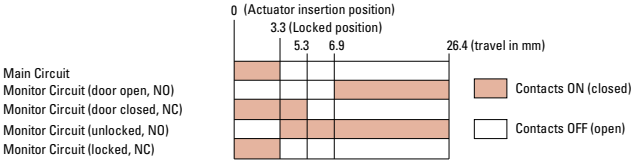
## Standard Type - Solenoid Lock Type

| Interlock Switch Status | Status 1 | Status 2 | Status 3 | Manual Unlock |
|---|---|---|---|---|
| | • Door Closed<br>• Machine ready to operate<br>• Solenoid energized | • Door Closed<br>• Machine cannot be operated<br>• Solenoid de-energized | • Door Open<br>• Machine cannot be operated<br>• Solenoid de-energized | • Door Closed<br>• Machine cannot be operated<br>• Solenoid de-energized energized |
| Door Status |  |  |  |  Press rear unlocking button. (Note) |
| Circuit Diagram (HS5E-KVA) |  |  |  |  |

| Door | | | Closed (locked) | Closed (unlocked) | Open | Closed (unlocked) |
|---|---|---|---|---|---|---|
| Type No. and Contact Configuration | HS5E-KVA | Main Circuit (door closed) 11–12 | ON (closed) | ON (closed) | OFF (open) | ON (closed) |
| | | Monitor Circuit (door open) 23-24 | OFF (open) | OFF (open) | ON (closed) | OFF (open) |
| | | Monitor Circuit (locked) 41-42 | ON (closed) | OFF (open) | OFF (open) | ON (closed) |
| | | Monitor Circuit (unlocked) 53–54 | OFF (open) | ON (closed) | ON (closed) | ON (closed) |
| | HS5E-KVD | Main Circuit (door closed) 11–12 | ON (closed) | ON (closed) | OFF (open) | ON (closed) |
| | | Monitor Circuit (door open) 21-22 | ON (closed) | ON (closed) | OFF (open) | OFF (open) |
| | | Monitor Circuit (locked) 41-42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) |
| | | Monitor Circuit (unlocked) 51–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) |

Note: When the operator is confined in a hazardous area, the actuator can be unlocked manually by pressing the rear unlocking button, which should be accessed easily by the operator.
The above contact configuration shows the status when the actuator is inserted and the switch is locked.
Monitor circuit: Sends monitoring signals of protective door open/closed status or protective door lock/unlock status.

### Operation Characteristics (reference)



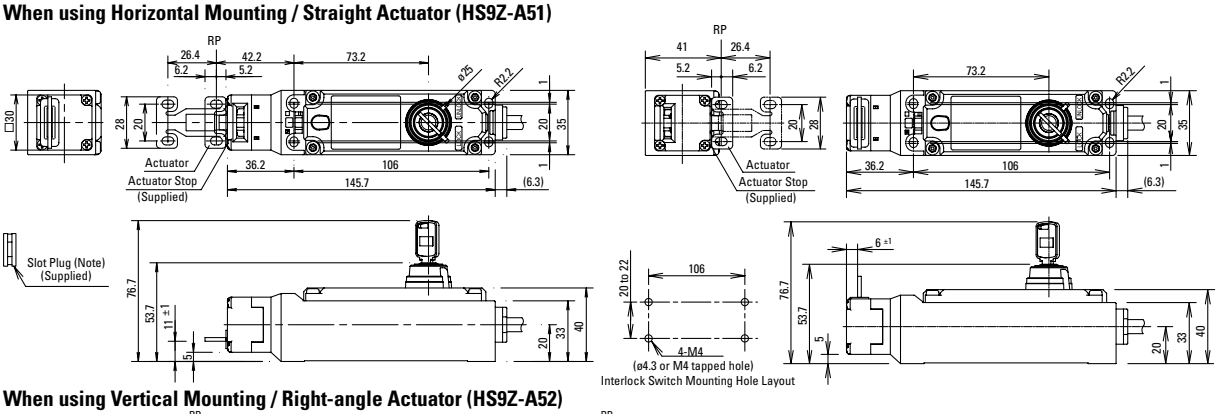

The operation characteristics shown in the chart above are of the HS9Z-A51. For other actuator types, add 1.3 mm.

The operation characteristics show the contact status when the actuator enters the entry slot of an interlock switch.

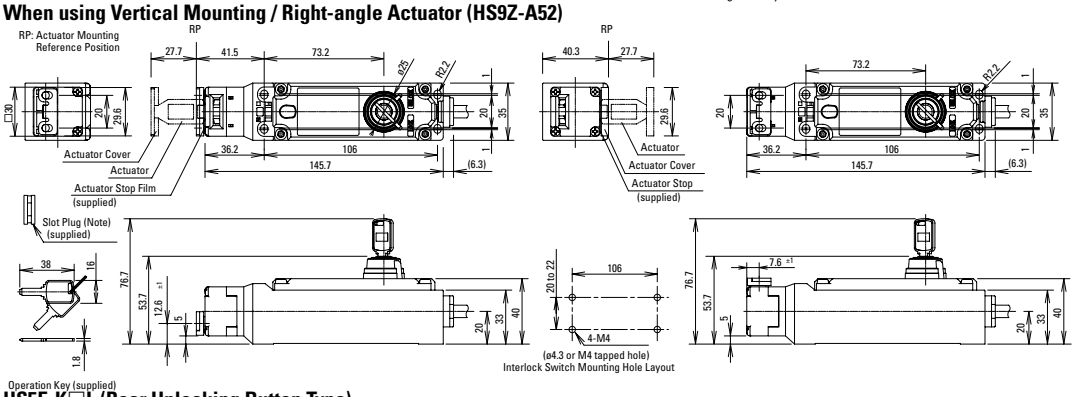
## Dimensions (mm) and Mounting Hole Layouts

**HS5E-K□**

**When using Horizontal Mounting / Straight Actuator (HS9Z-A51)**

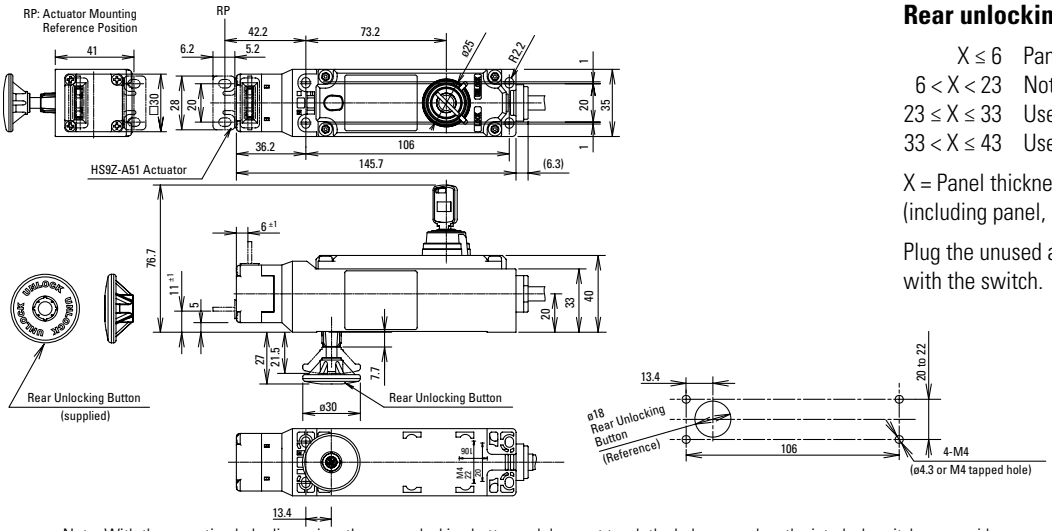



**When using Vertical Mounting / Right-angle Actuator (HS9Z-A52)**




**HS5E-K□L (Rear Unlocking Button Type)**

**When using Horizontal Mounting / Straight Actuator (HS9Z-A51)**




### Rear unlocking button mounting

| | |
|---|---|
| X ≤ 6 | Panel mounting |
| 6 < X < 23 | Not mountable |
| 23 ≤ X ≤ 33 | Use HS9Z-FL53 rear unlocking button kit (Note) |
| 33 < X ≤ 43 | Use HS9Z-FL54 rear unlocking button kit (Note) |

X = Panel thickness
(including panel, mounting frame, and mounting plate)

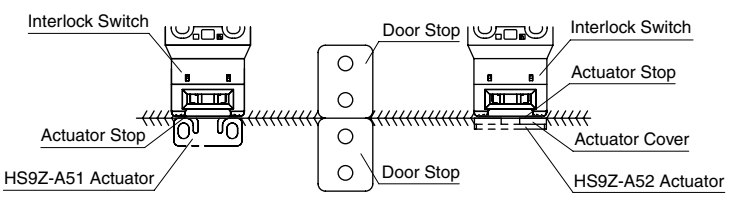
Plug the unused actuator entry slot using the plug supplied with the switch.

Note: With the mounting hole dimension, the rear unlocking button rod does not touch the hole even when the interlock switch moves sideways.

### Actuator Mounting Reference Position

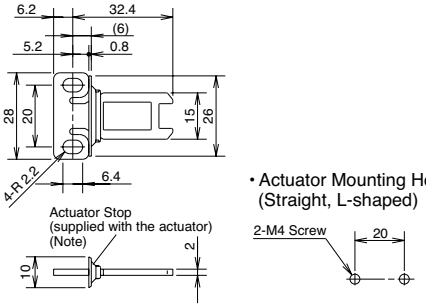
As shown in the figure on the right, the mounting reference position of the actuator when inserted in the interlock switch is where the actuator stop placed on the actuator lightly touches the interlock switch.

Note: After mounting the actuator, remove the actuator stop from the actuator.



## Dimensions and Mounting Hole Layouts, continued

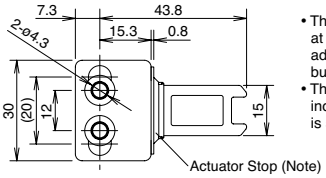
### Straight Actuator (HS9Z-A51)



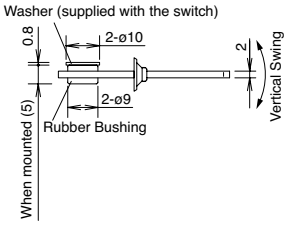

• Actuator Mounting Hole Layout
(Straight, L-shaped)




### Straight Actuator w/Rubber Bushings (HS9Z-A51A)

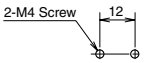



- The mounting center distance is set to 12 mm at factory. When 20-mm distance is required, adjust the distance by moving the rubber bushings.
- The actuator has flexiblity to the direction indicated by the arrows. When 20-mm distance is selected, the actuator swings vertically.



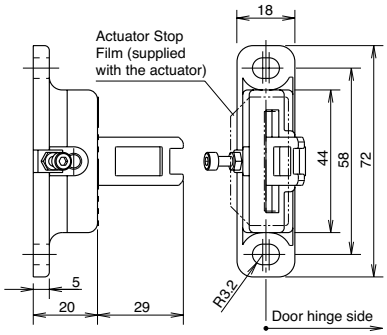

• Actuator Mounting Hole Layout

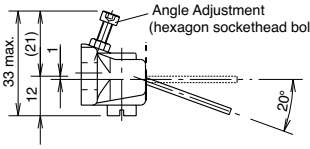
Straight type (with rubber bushings)
Right-angle type (with rubber bushings)



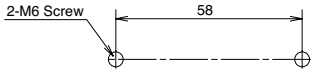

Note: Mounting centers can be widened to 20 mm by moving the rubber bushings.

### Angle Adjustable Actuator (Vertical) (HS9Z-A53)



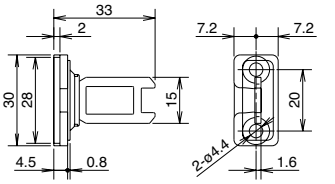

• Actuator Mounting Hole Layout
(vertical swing)

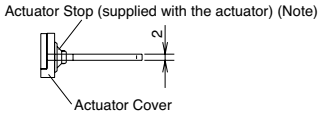



### Actuator Orientation

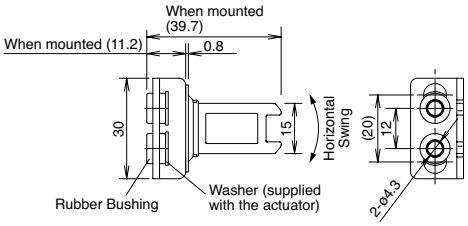
The orientation of actuator swing (horizontal/vertical) can be changed using the orienting insert (white plastic) installed on the back of the actuator. Do not lose the orientating insert, otherwise the actuator will not swing properly.

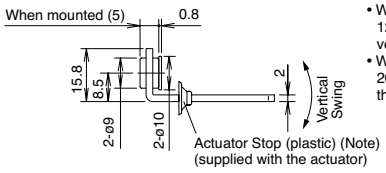
### Right-angle Actuator (HS9Z-A52)



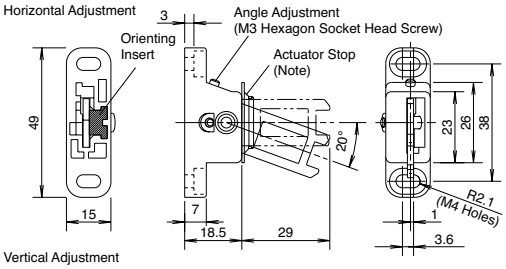

### Right-angle Actuator w/Rubber Bushings (HS9Z-A52A)

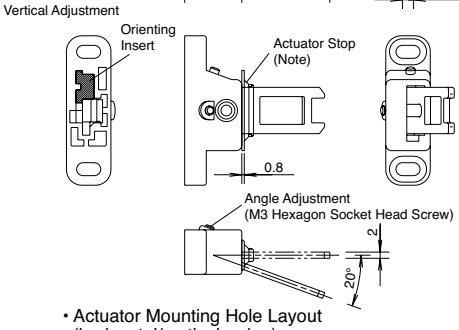


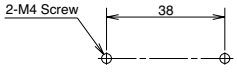

- When the mounting center distance is set to 12 mm, the actuator has flexibility both vertically and horizontally.
- When the mounting center distance is set to 20 mm, the actuator swings vertically. Adjust the distance by moving the rubber bushings.

### Angle Adjustable Actuator (Horizontal/Vertical) (HS9Z-A55)

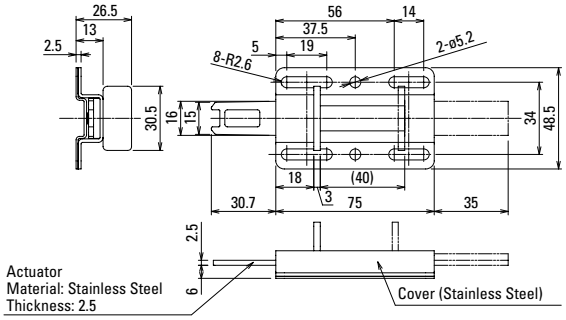


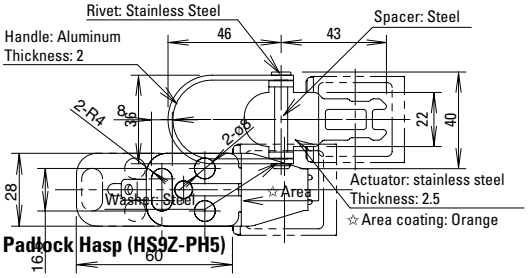

• Actuator Mounting Hole Layout
(horizontal/vertical swing)



### Sliding Actuator (HS9Z-SH5)



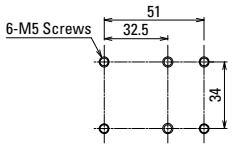

### Plug Actuator (HS9Z-A5P)



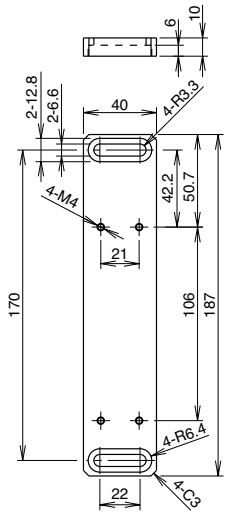

### Padlock Hasp (HS9Z-PH5)



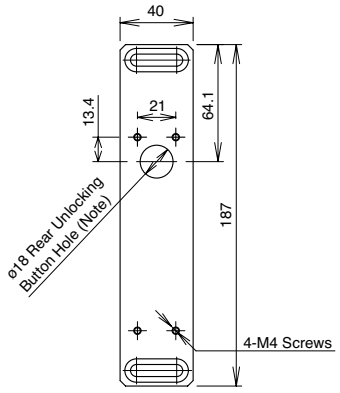

### Panel Cut-out




### Mounting Plate (HS9Z-SP51)

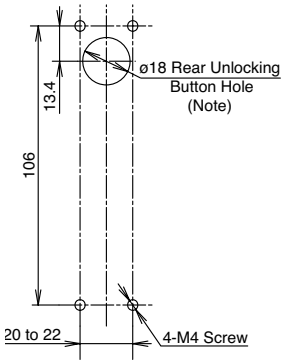



### Drilling Rear Unlocking Button Hole



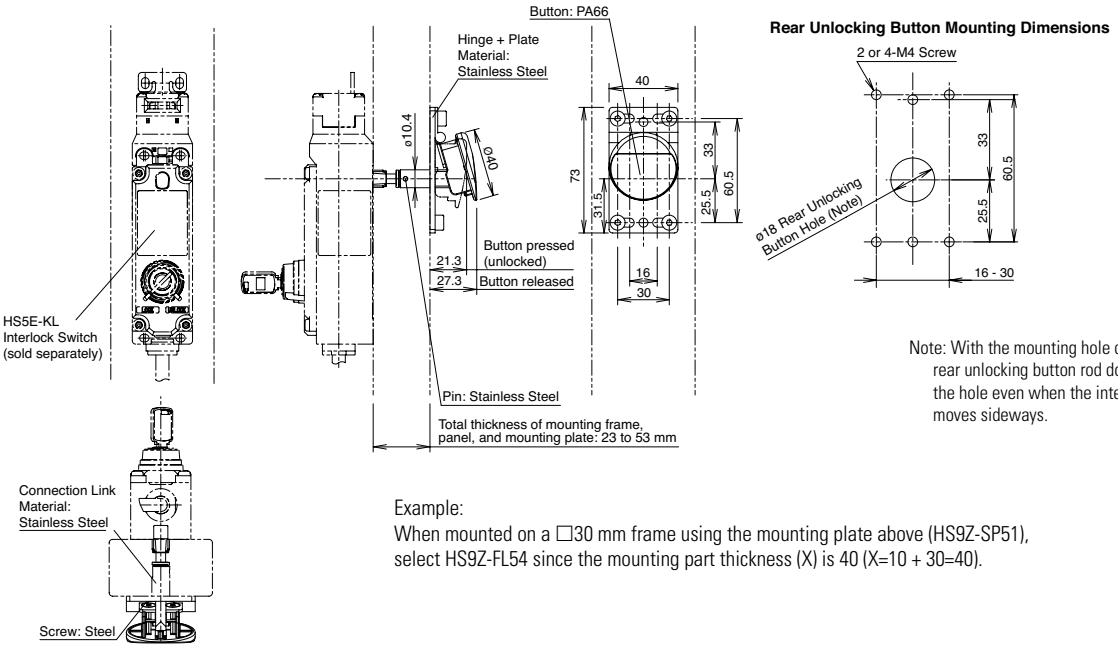

When installing the HS5E-□44L□-G (rear unlocking button type), provide a rear unlocking button hole on the HS9Z-SP51.

### Manual Unlocking Key (Metal) (HS9Z-T3)




Material: Anodized aluminum A6063
Weight: Approx. 180g

### Rear Unlocking Button Kit (HS9Z-FL5□)




### Rear Unlocking Button Mounting Dimensions




Note: With the mounting hole dimension, the rear unlocking button rod does not touch the hole even when the interlock switch moves sideways.

Example:
When mounted on a □30 mm frame using the mounting plate above (HS9Z-SP51), select HS9Z-FL54 since the mounting part thickness (X) is 40 (X=10 + 30=40).

# Operating Instructions

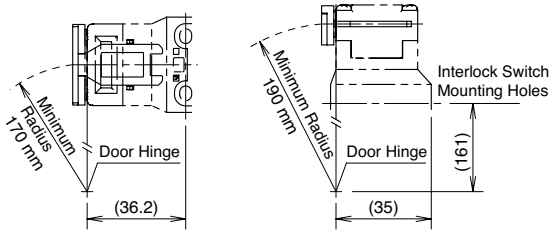
## Minimum Radius of Hinged Door

- When using the interlock switch for a hinged door, refer to the minimum radius of doors shown below. For the doors with small minimum radius, use angle adjustable actuators (HS9Z-A53 or HS9Z-A55).

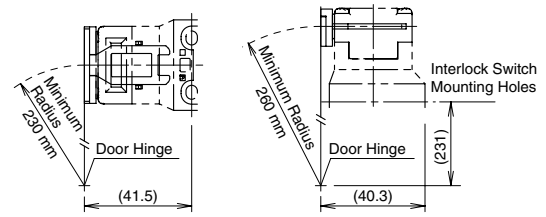
Because deviation or dislocation of hinged door may occur in actual applications, make sure of the correct operation before installation.

## HS9Z-A52 Actuator

When the door hinge is on the extension line of the interlock switch surface:

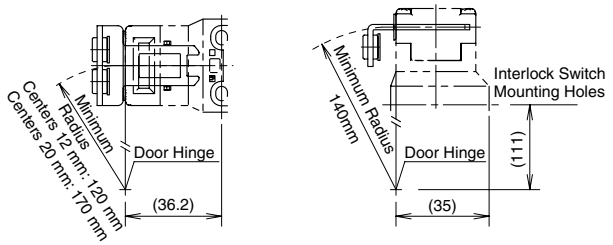



When the door hinge is on the extension line of the actuator mounting surface:

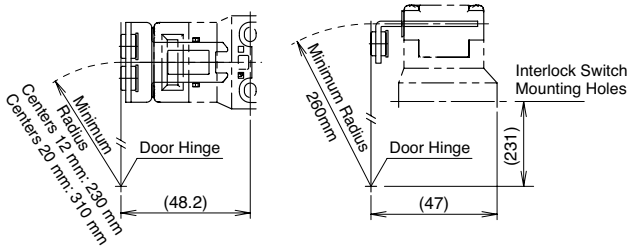



## HS9Z-A52 Actuator (w/rubber bushings)

When the door hinge is on the extension line of the interlock switch surface:




When the door hinge is on the extension line of the actuator mounting surface:



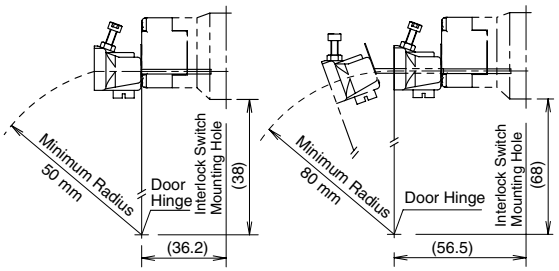

## Actuator Angle Adjustment (vertical/horizontal)

- Using the angle adjustment screw, the actuator angle can be adjusted (refer to the dimensional drawing on page 361).
  Adjustable angle: 0 to 20°
- The larger the adjusted angle of the actuator, the smaller the applicable radius of the door opening.
- After installing the actuator, open the door. Then adjust the actuator so that its edge can be inserted properly into the actuator entry slot of the interlock switch.
- After adjusting the actuator angle, apply Loctite to the adjustment screw so that the screw will not move.

## When using the HS9Z-A53 Angle Adjustable (vertical) Actuator

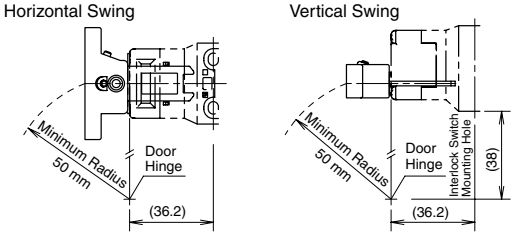
When the door hinge is on the extension line of the interlock switch surface: 50 mm

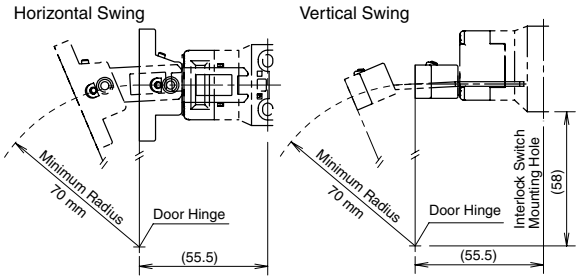
When the door hinge is on the extension line of the actuator mounting surface: 80 mm




## When using the HS9Z-A55 Angle Adjustable (vertical/horizontal) Actuator

When the door hinge is on the extension line of the interlock switch surface: 50 mm

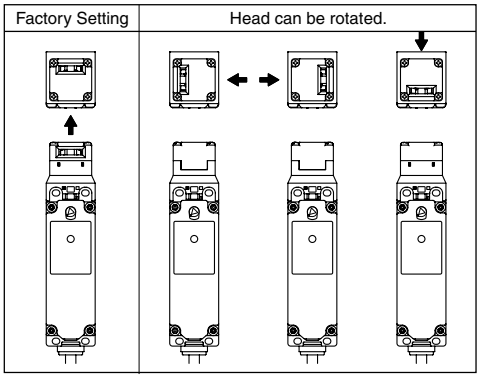



When the door hinge is on the extension line of the actuator mounting surface: 70 mm

## Rotating the Head

The head of the HS5E can be rotated by removing the four screws from the corners of the HS5E head and reinstalling the head in the desired orientation. Before wiring the HS5E, replace the head if necessary. Before replacing the head, turn the manual unlock to the UNLOCK position using the manual unlock key. When reinstalling the head, make sure that no foreign object enters the interlock switch. Tighten the screws tightly, without leaving space between the head and body, otherwise the interlock switch may malfunction.
Recommended tightening torque: 0.9 to 1.1 N·m.



## Instructions, continued

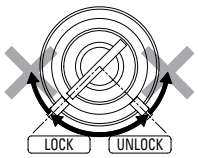
### Head Removal Detection Circuitry

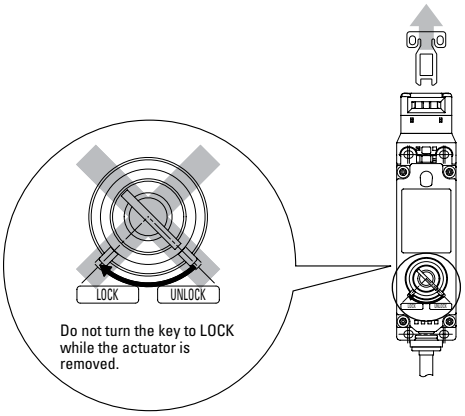
- Only the lock monitor circuit 41-42 turns off (open) when the head is removed, such as when the head is rotated. The other monitor circuit 51-52 turns ON (close). Be sure to connect the lock monitor circuit (41-42) to a safety circuit.
- When connecting the HS5E-K to a safety circuit, connect the door monitor circuits (11-12)⊖ and the lock monitor circuits (41- 42)⊖ in series. (GS-ET-19)
- When rotating the head, make sure that the interlock switch is not wired or that the key position is in the UNLOCK position.

### Key

Follow the instructions below to avoid operating failures and damage.

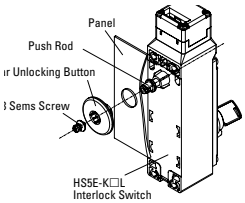
- Insert the key completely.
- Do not remove or insert the key while turning the key.
- Other than the standard key number (500), 15 types of key numbers are available. Use a key with the same number as the number on the cylinder.
- Do not apply excessive force when turning the key. Otherwise operating failures and damage may occur.
- Do not turn the key to the LOCK side while the actuator is removed (door open). Otherwise, operating failures and breakdowns may occur.




### Installing the Rear Unlocking Button (HS5E-K□L)

- After installing the interlock switch on the panel, place the rear unlocking button (supplied with the switch) on the push rod on the back of the interlock switch, and fasten the button using the screw supplied with the switch. Rear unlocking buttons can be installed alone when the total thickness of mounting frame and panel is 6 mm or less. When the total thickness of mounting frame, panel, and mounting plate is 23 to 53 mm, use the rear unlocking button kit (HS9Z-FL53, HS9Z-FL54, or HS9Z-FL55) sold separately.




### Recommended Tightening Torque for Mounting Screws

- HS5E interlock switch: 1.8 to 2.2 N·m (four M4 screws) (Note)
- Rear unlocking button: 0.5 to 0.7 N·m
- Rear unlocking button kit: 4.8 to 5.2 N·m (M5 screw)
- Actuators
  HS9Z-A51: 1.8 to 2.2 N·m (two M4 screws)
  HS9Z-A52: 0.8 to 1.2 N·m (two M4 Phillips screws)
  HS9Z-A51A/A52A: 1.0 to 1.5 N·m (two M4 screws)
  HS9Z-A53: 4.5 to 5.5 N·m (two M6 screws)
  HS9Z-A55: 1.0 to 1.5 N·m (two M4 screws)

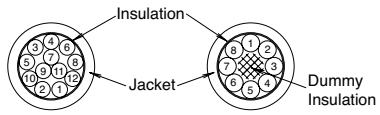
Note: The above recommended tightening torque of the mounting screws are the values with hex socket head bolts. When other screws are used and tightened to a smaller torque, make sure that the screws do not become loose after mounting.

### Wire Identification

Wires can be identified by color and a white line printed on the wire.

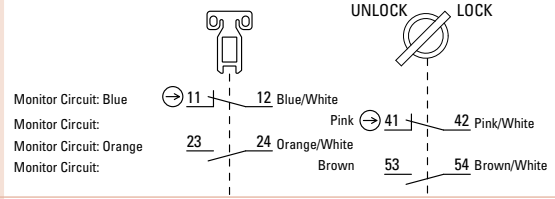
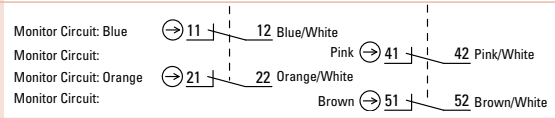
- HS5E-V: Wires of gray and gray/white insulation cannot be used.
- HS5E-DD: Wires of brown and brown/white insulation cannot be used.

| No. | Insulation | No. | Insulation | No. | Insulation | No. | Insulation |
|---|---|---|---|---|---|---|---|
| 1 | White | 4 | Blue | 7 | Blue/White | 10 | Pink/White |
| 2 | Black | 5 | Brown/White | 8 | Orange/White | 11 | Gray |
| 3 | Brown | 6 | Orange | 9 | Pink | 12 | Gray/White |




### Circuit Code Identification

- Circuit codes can be identified by the insulation color in each contact configuration.
- The following table shows the identification of circuit numbers.
- When wiring, cut unnecessary wires such as the dummy insulation (white) and any unused wires.

| Type | Circuit Diagram |
|---|---|
| HS5E-KVA |  |
| HS5E-KVD |  |





The contact configuration shows the status where the actuator is inserted and the switch is locked.

# ø22 HW Key Switch

## Key features:

- Key Selector Switches with Direct Opening Action Mechanism
- High-security Pin Tumbler Key
- The NC contact is opened by direct opening action mechanism ⊖. Mode selection enables easy construction of safety systems.
- The single key enables the hostage control of combining HW series key selector switch (pin tumbler type) and HS5E-K interlock key switch. High-security pin tumbler key is used. Sixteen types of key numbers are available.
- Selection of 2-position and 3-position, maintained, spring-return types and key retained variety is available.
- Degree of Protection: IP65 (IEC60529)

| Applicable Standards | Mark | File No. or Organization |
|---|---|---|
| UL508 | UL LISTED | UL Listing<br>File No. E68961 |
| CSA C22.2 No.14 | SP | CSA166730 (LR92374) |
| EN60947-5-1 | TÜV | TÜV Rheinland R50054316 |
| | CE | Self-declaration<br>Low Voltage Directive of Europe |

## Two-position Key Switch (90°)

| Contact Code | Contact Block | | Standard Logic | | | Inverse Logic | | |
|---|---|---|---|---|---|---|---|---|
| | | | Logic Table | | Maintained 1 2 | Logic Table | | Maintained 2 1 |
| | Mounting Position | Contact | 1 | 2 | | 1 | 2 | |
| 1NO (10) | ① | NO | | ● | HW1K-2PA10 | ● | | HW1K-2JPA10 |
| | ② | – | Dummy Block | | | Dummy Block | | |
| 1NC (01) | ① | NC | ● | | HW1K-2PA01 | | ● | HW1K-2JPA01 |
| | ② | – | Dummy Block | | | Dummy Block | | |
| 2NO (20) | ① | NO | | ● | HW1K-2PA20 | ● | | HW1K-2JPA20 |
| | ② | NO | | ● | | ● | | |
| 2NC (02) | ① | NC | ● | | HW1K-2PA02 | | ● | HW1K-2JPA02 |
| | ② | NC | ● | | | | ● | |
| 1NO-1NC (11) | ① | NO | | ● | HW1K-2PA11 | ● | | HW1K-2JPA11 |
| | ② | NC | ● | | | | ● | |
| 2NO-2NC (22) | ① | NO | | ● | HW1K-2PA22 | ● | | HW1K-2JPA22 |
| | ② | NC | ● | | | | ● | |
| | ③ | NO | | ● | | ● | | |
| | ④ | NC | ● | | | | ● | |

Contact Block Mounting Position

For contact block mounting position, see the figure to the right of the table.
Each key selector switch is supplied with two keys.
Key number 500 is supplied as the default key in table above (500 not added to part number).
To order additional key types, specify key number at end of part number (special order).
Example: HS5E-KVA003-2A501
501 to 515
Note: The key number is engraved on the cylinder.

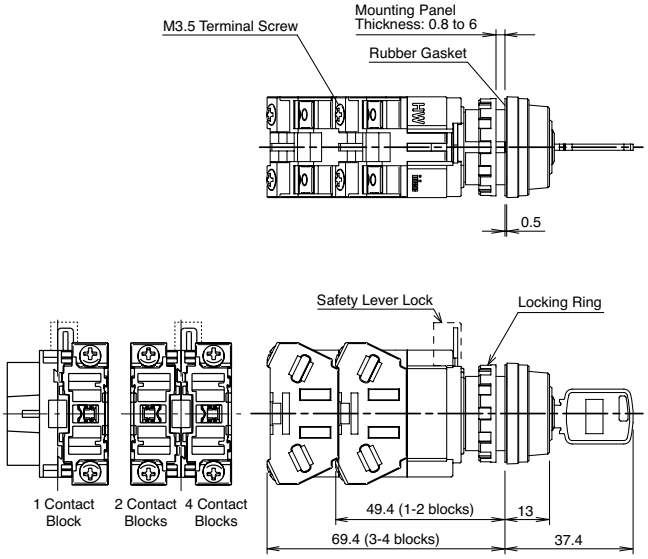
## Three-position Key Switch (45°)

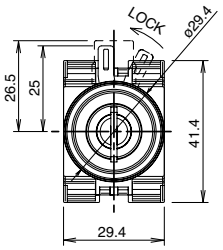
| Contact Code | Contact Block No. | Contact Block Contact | Logic Table 1 | Logic Table 0 | Logic Table 2 | Cam Code | Maintained (1 0 2) |
|---|---|---|---|---|---|---|---|
| 2NC (02) | ① | NC | | ● | | – | HW1K-3PA02 |
| | ② | NC | ● | | | | |
| 2NO-2NC (22N1) | ① | NO | ● | | | – | HW1K-3PA22N1 |
| | ② | NO | | | ● | | |
| | ③ | NC | | ● | | | |
| | ④ | NC | ● | | | | |
| 2NO (02) | ① | NO | ● | | | – | HW1K-3PA20 |
| | ② | NO | | | ● | | |
| 2NO-1NC (21N1) | ① | NO | ● | | | J | HW1K-3JPA21N1 |
| | ② | NO | | | ● | | |
| | ③ | NC | | ● | | | |
| ☆ | ④ | – | Dummy Block | | | | |
| 2NO-2NC (22N9) | ① | NC | | | ● | S | HW1K-3SPA22N9 |
| | ② | NC | ● | | | | |
| | ③ | NO | ● | | | | |
| ☆ | ④ | NO | | | ● | | |
| 4NC (04) | ① | NC | | | ● | S | HW1K-3SPA04 |
| | ② | NC | ● | | | | |
| | ③ | NC | | | ● | | |
| ☆ | ④ | NC | ● | | | | |

Contact Block Mounting Position

On the contact arrangement marked with ☆ in the table above, the rated current (load switching current) is reduced to a half of the rated current of the contact block. The rated insulation voltage and the rated thermal current remain unchanged.
For models with ☆, contacts may overlap when the operator position is changed.
For contact block mounting position, see the figure on the right.
Each key selector switch is supplied with two keys.
15 types of key numbers are available in addition to standard (500) key.
Key number 500 is supplied as the default key in table above (500 not added to part number).
To order additional key types, specify key number at end of part number (special order).
Example: HS5E-KVA003-2A501
501 to 515
Note: The key number is engraved on the cylinder.

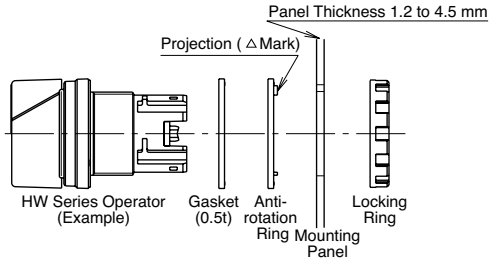
## Dimensions (mm)



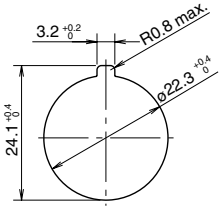




### Anti-rotation Ring and Panel cut-out

Align the TOP marking on the operator and the TOP mark on the anti-rotation ring with the recess in the mounting panel.



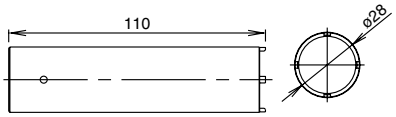
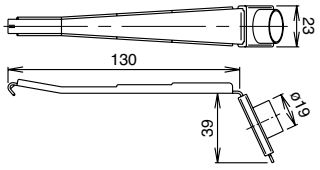
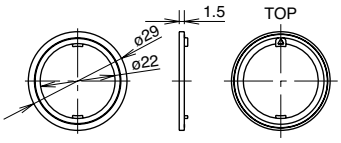

Panel-cut
(Complies with IEC 60947-5-1)

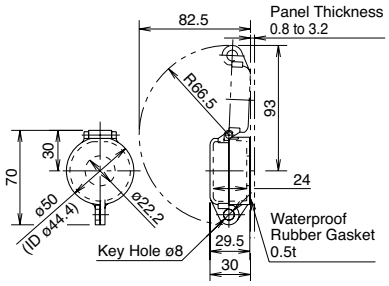
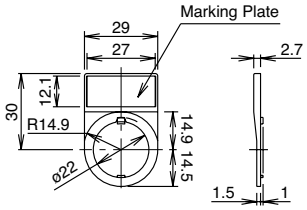
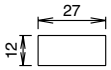


## Replacement Parts

| Item | Material | Part No. | Remarks |
|---|---|---|---|
| Contact Block | 1NO contact | HW-G10 | Housing color: blue<br>Push rod: green |
| | 1NC contact | HW-G01 | Housing color: purple<br>Push rod: red |
| Dummy Block | Nylon | TW-DB | Used when using contact blocks in odd numbers. |
| Spare Key | Metal (nickel-plated brass) | LW9Z-SK-500 | Standard key number |
| | | LW9Z-SK-□ | Key number 501 to 515 |
| Locking Ring | Polyamide | HW9Z-LN | Black |
| Safety Lever Lock | Polyacetal | HW9Z-LS | Yellow<br>One safety lever lock is supplied as standard. |
| Gasket | Polyacetal | HW9Z-WM | Black |

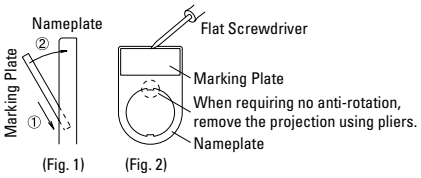
## Accessories

| Item | Material | Part No. | Dimensions |
|---|---|---|---|
| Locking Ring Wrench | Metal (brass)<br>Weight: approx. 150g | MW9Z-T1 | Used to tighten the locking ring when installing the HW switch onto a panel.<br>Tighten the locking ring to a torque of 2.0 N·m.   |
| Contact Block Removal Tool | Metal (copper-zinc plating) / Nitrile Rubber | TW-KC1 | Used to remove the contact block and the transformer, and also to install or remove the pilot light lens. Also used to adjust the panel thickness (1, 1.6, 2, 2.3, 3.2, and 5 mm).   |
| Anti-rotation Ring | Ring: Nylon<br>Gasket: Nitrile Rubber | HW9Z-RL | Used to prevent the operator from turning.   |

| Item | Material | Part No. | Dimensions |
|---|---|---|---|
| Padlock Cover | Body: Polyarylate<br>Gasket: Nitrile Rubber | HW9Z-KL1 |   |
| Nameplate | Plastic (black)<br>1.5 mm thick | HWAM | Order marking plate (HWNP-☐) separately.   |
| Marking Plate | Aluminum (black)<br>1.0 mm thick | HWNP-☐ | White letters on black background   Specify a legend code in place of ☐ in the Type No. |

| Code | Legend |
|---|---|
| 31 | OFF-ON |
| 35 | HAND-AUTO |
| 53 | HAND-OFF-AUTO |

To install the marking plate on a nameplate, see Fig. 1.
To remove the marking plate, insert a flat screwdriver between the marking plate and nameplate as shown in Fig. 2.
When using a nameplate, mounting panel thickness is decreased by 1.5 mm.
When an anti-rotation ring on the nameplate is not required, remove the projection using pliers as shown in Fig. 2.



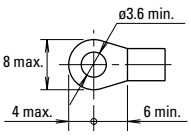

## Operating Instructions

### Applicable Wiring

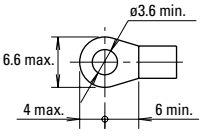
1. The applicable wire size is 14 AWG maximum (Solid wire 16 AWG max.). One or two wires can be connected.

Applicable Crimping Terminal

Crimping Terminal for Ⓐ

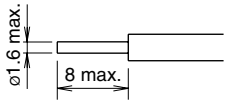



Crimping Terminal for Ⓑ




Be sure to use an insulation tube or cover on the crimping part of the crimping terminal to prevent electrical shocks.

Solid Wire




2. Tighten the M3.5 terminal screw to a recommended tightening torque of 1.0 to 1.3 N·m.

# HS7A-DMC Magnetic Safety Switches

## Key features:

- Compact size and easy positioning.
- Combination with proprietary relay modules achieves safety category 4 (EN954-1).
- Compact size (7 × 16 × 51mm)
- Positioning for installation is easy.
- Up to 36 sets can be connected.
  (safety relay module: HR1S-DME)
- Degree of protection: IP67

## Part Numbers

### HS7A Non-contact Magnetic Interlock Switches

| Contact Configuration | Cable Length | LED | Part Number | Applicable Safety Relay Module |
|---|---|---|---|---|
| 1NO + 1NC | 2m | Without | HS7A-DMC5902 | HR1S-D☐ |
| | | With | HS7A-DMC5912 | |
| | 5m | Without | HS7A-DMC5905 | |
| | | With | HS7A-DMC5915 | |
| | 10m | Without | HS7A-DMC59010 | |
| | | With | HS7A-DMC59110 | |
| 2NO | 2m | Without | HS7A-DMC7902 | HR1S-AF☐ |
| | | With | HS7A-DMC7912 | |
| | 5m | Without | HS7A-DMC7905 | |
| | | With | HS7A-DMC7915 | |
| | 10m | Without | HS7A-DMC79010 | |
| | | With | HS7A-DMC79110 | |

The HS7A-DMC non-contact interlock switch is supplied with an HS9Z-ZC1 actuator.
The contact configuration in the table above shows the contact status when the non-contact interlock switch is not activated.

### HR1S Safety Relay Modules for Non-contact Interlock Switches

| Safety Relay Module | Voltage | Number of Inputs | Max. Number of Connectable Non-contact Interlock Switches |
|---|---|---|---|
| HR1S-DMB☐32 | 24V DC –20 to +20% | 2 | 12 |
| HR1S-DME☐32 | | 6 | 36 |
| HR1S-AF☐30B | 24V AC –15 to +10% 50/60 Hz<br>24V DC –15 to +10% | 1 | 6 |

Safety category 3 can be achieved when connecting two or more non-contact interlock switches per one input.
When connecting multiple non-contact interlock switches (HS7A-DMC790☐), use HR1S-AF51☐.
(HS7A-DMC791☐ cannot be connected in multiple numbers.)

### Accessory

| Name | Part Number |
|---|---|
| Actuator | HS9Z-ZC1 |

One HS9Z-ZC1 is supplied with each HS7A-DMC non-contact interlock switch.

### Maximum Number of Connectable Non-contact Interlock Switches per Input of Safety Relay Module

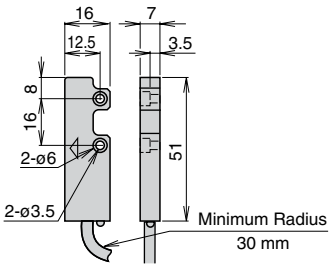
| Non-contact Interlock Switch | HS7A-DMC59☐☐ | | HS7A-DMC79☐☐ | |
|---|---|---|---|---|
| | Without LED | With LED | Without LED | With LED |
| HR1S-D☐ | 6 | 3 | – | – |
| HR1S-AF☐ | – | – | 6 | 1 |

## Specifications

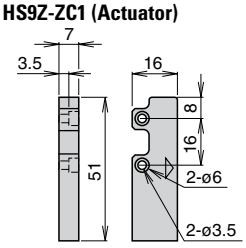
| | | |
|---|---|---|
| Applicable Standards | | IEC/EN 60947-5-1<br>UL508 (UL listed)<br>CSA C22.2, No. 14 |
| Operating Temperature | | –25 to 85°C (no freezing) |
| Relative Humidity | | 30 to 85% RH (no condensation) |
| Storage Temperature | | –40 to +85°C (no freezing) |
| Pollution Degree | | 3 |
| Electric Shock Protection | | Class II (IEC 60536) |
| Degree of Protection | | IP67 (IEC 60529) |
| Shock Resistance | | 300 m/s$^2$ (11 ms) (IEC 60068-2-7) |
| Vibration Resistance | | 100 m/s$^2$ (10 to 150 Hz) (IEC 60068-2-6) |
| Rated Voltage (Ue) | | 24V DC |
| Rated Current (Ie) | | 100 mA |
| Repeat Accuracy | | 10% maximum |
| Maximum Operating Frequency | | 150 Hz |
| Voltage Drop | I = 10 mA | 0.1V (without LED) / 2.4V (with LED) |
| | I = 100 mA | 1V (without LED) / 4.2V (with LED) |
| Housing Material | | PBT |
| Housing Color | | Red |
| Cable | | AWG23 × 4<br>Cable length: 2m, 5m, 10m |
| Weight (approx.) | | HS7A-DMC: 100g (cable length: 2m)<br>HS9Z-ZC1: 9g |

## Dimensions (mm)

**HS7A-DMC**
**(Non-contact Interlock Switch)**



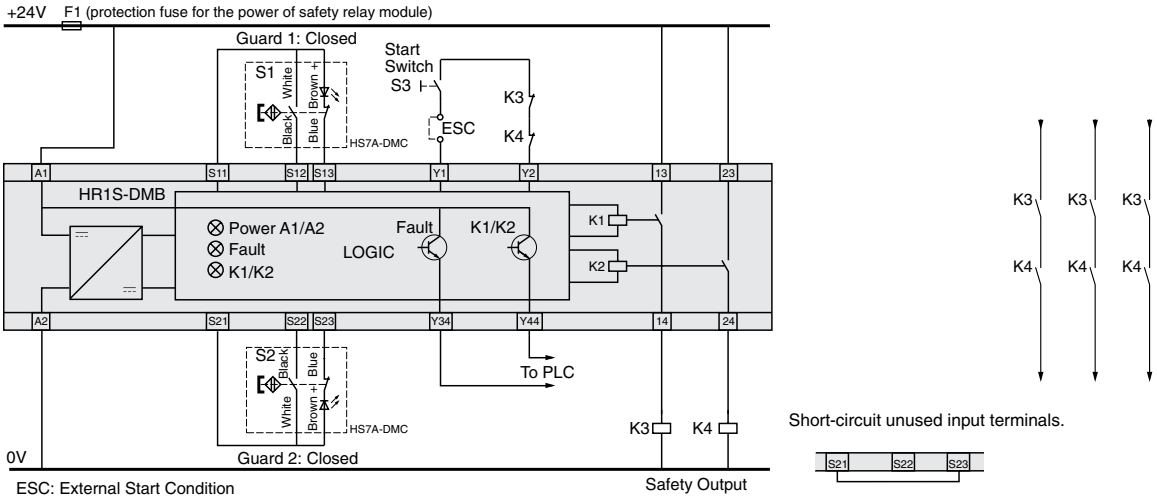

**HS9Z-ZC1 (Actuator)**



## Example Wiring Diagram

The following diagrams show the contact statuses when the non-contact interlock switches are activated by the actuators.

**Example: Safety Category 4 (ISO 13849-1) Circuit, HR1S-DMB + HS7A-DMC591□ (1NO+1NC) + HS9Z-ZC1**



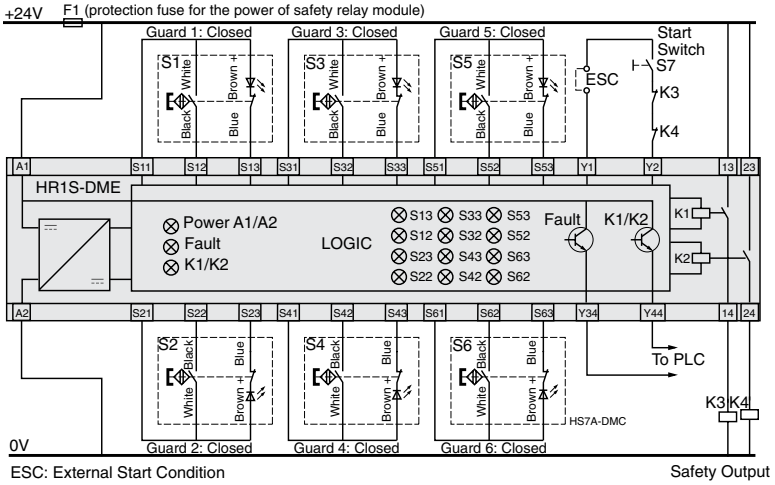


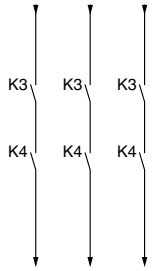


Short-circuit unused input terminals.

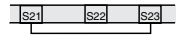



**Example: Safety Category 4 (EN 13849-1) Circuit, HR1S-DME + HS7A-DMC591□ (1NO+1NC) + HS9Z-ZC1**

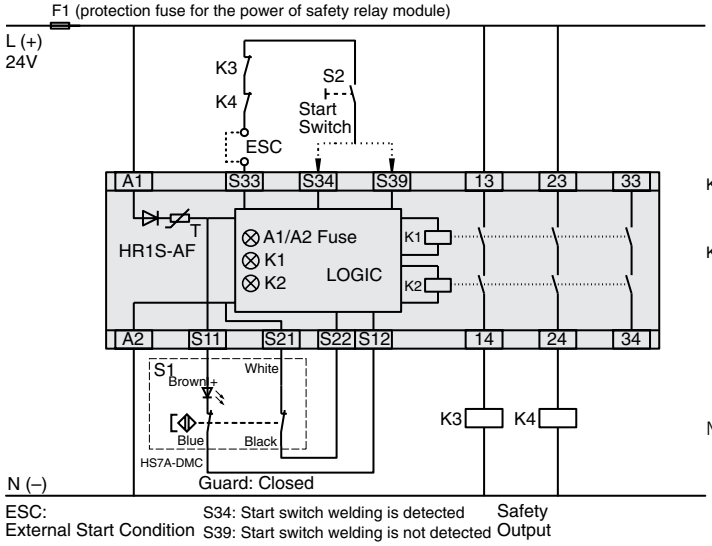


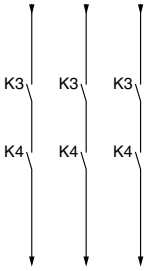




Short-circuit unused input terminals.




**Example: Safety Category 4 (EN 13849-1) Circuit, HR1S-DME + HS7A-DMC591□ (1NO+1NC) + HS9Z-ZC1**

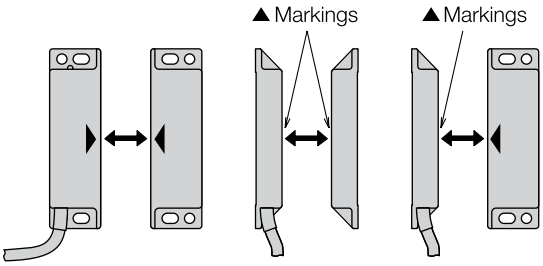



Note: The circuit example shown on the left (HR1S-AF and HS7A-DMC79□□ may not conform to safety category 4 depending on the operating conditions, such as the frequency of safety function check. Perform risk assessment of your system before operation.

## Operating Instructions

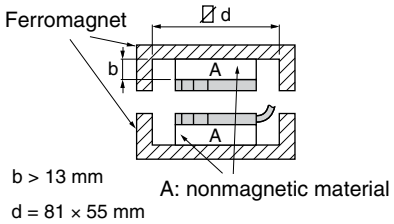
### Operating Direction



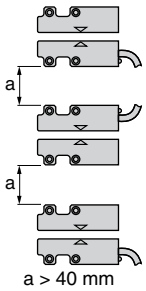

Safety output ON distance (SAO): 3mm.

### Precautions for Installation

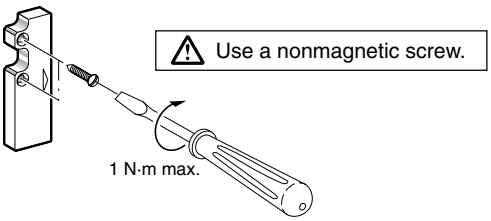
When installing on a ferromagnet




Close mounting

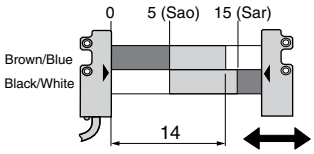



### Tightening Torque

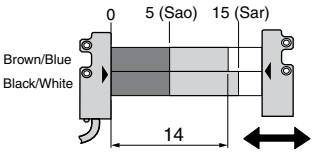



### Operation Chart

**HS7A-DMC59□□(1NO+1NC)**




**HS7A-DMC79□□(2NO)**




Dimensions: mm

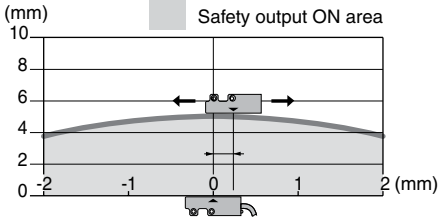
### Contact Status

| | |
|---|---|
| | Contact Closed (1) |
| | Contact Open (0) |
| | Transient State |

Sao: Assured operating distance where the safety output is sure to turn on.
Sar: Assured release distance where the safety output is sure to turn off.

Note: When the transfer time between the actuator's Sao-Sar is 500 ms or longer, the time lag is detected as an error.

### Operation Area



# HS7A-DMP Magnetic Safety Switches



## Key features:

- Three-contact models.
  Auxiliary contacts enable PLCs to monitor the door status.
- Operation signals from auxiliary contacts can be read directly by controllers such as PLCs, allowing for monitoring HS7A-DMP non-contact interlock switches.
- Ideal for installation on guard doors where positioning is difficult.
- Conformable up to safety category 4 (EN ISO 13849-1)
  (Combining with proprietary safety relay module achieves safety category 4.)
- A maximum of 36 sets can be connected (safety relay module: HR1S-DME)
- Degree of protection: IP67

The HS7A-DMP non-contact interlock switches can be used as interlock switches when used in combination with safety relay modules specified by IDEC.

## Part Numbers

### HS7A Non-contact Interlock Switches

| Contact Configuration | Cable Length | LED | Ordering Type No. | Applicable Safety Relay Module |
|---|---|---|---|---|
| 1NO+2NC | 2m | Without | HS7A-DMP5002 | HR1S-D☐ |
| | | With | HS7A-DMP5012 | |
| | 5m | Without | HS7A-DMP5005 | |
| | | With | HS7A-DMP5015 | |
| 2NO+1NC | 2m | Without | HS7A-DMP7002 | HR1S-AF☐ |
| | | With | HS7A-DMP7012 | |
| | 5m | Without | HS7A-DMP7005 | |
| | | With | HS7A-DMP7015 | |

The HS7A-DMP non-contact interlock switch is supplied with an HS9Z-ZP1 actuator.
The contact configuration in the table above shows the contact status when the non-contact interlock switch is not activated.

### HR1S Safety Relay Modules for Non-contact Interlock Switches

| Safety Relay Module | Number of Inputs | Max. Number of Connectable Non-contact Interlock Switches |
|---|---|---|
| HR1S-DMB☐ | 2 | 12 |
| HR1S-DME☐ | 6 | 36 |
| HR1S-AF☐ | 1 | 6 |

When connecting multiple non-contact interlock switches (HS7A-DMP700☐), use HR1S-AF☐.
(HS7A-DMP701☐ cannot be connected in multiple numbers.)

### Accessory

| Name | Part Number |
|---|---|
| Actuator | HS9Z-ZP1 |

One HS9Z-ZP1 is supplied with each HS7A-DMP non-contact interlock switch.

### Maximum Number of Connectable Non-contact Interlock Switches per Input of Safety Relay Module

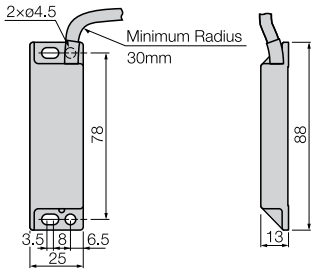
| Non-contact Interlock Switch | HS7A-DMP50☐☐ | | HS7A-DMP70☐☐ | |
|---|---|---|---|---|
| | Without LED | With LED | Without LED | With LED |
| HR1S-DM☐ | 6 | 3 | – | – |
| HR1S-AF☐ | – | – | 6 | 1 |

## Specifications

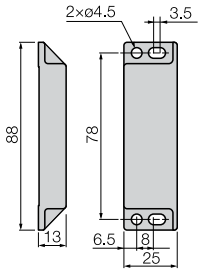
| | | |
|---|---|---|
| Applicable Standards | | IEC/EN 60947-5-1<br>UL508 (UL listed)<br>CSA C22.2, No. 14 |
| Operating Temperature | | –25 to 85°C (no freezing) |
| Relative Humidity | | 35 to 85% RH (no condensation) |
| Storage Temperature | | –40 to +85°C (no freezing) |
| Pollution Degree | | 3 |
| Electric Shock Protection | | Class II (IEC 60536) |
| Degree of Protection | | IP67 (IEC 60529) |
| Shock Resistance | | 300 $m/s^2$ (11 ms) (IEC 60068-2-7) |
| Vibration Resistance | | 100 $m/s^2$ (10 to 150 Hz) (IEC 60068-2-6) |
| Rated Voltage (Ue) | | 24V DC |
| Rated Current (Ie) | | 100 mA |
| Repeat Accuracy | | 10% maximum |
| Maximum Operating Frequency | | 150 Hz |
| Voltage Drop | I = 10 mA | 0.1V (without LED) / 2.4V (with LED) |
| | I = 100 mA | 1V (without LED) / 4.2V (with LED) |
| Electrical Durability | | 1,200,000 operations minimum |
| Housing Material | | PBT |
| Housing Color | | Red |
| Cable | | AWG23 × 6<br>Cable length: 2m, 5m |
| Weight (approx.) | | HS7A-DMP: 180g (cable length: 2 m)<br>HS9Z-ZP1: 50g |

## Dimensions (mm)

**HS7A-DMP□□□□ (Non-contact Interlock Switch)**



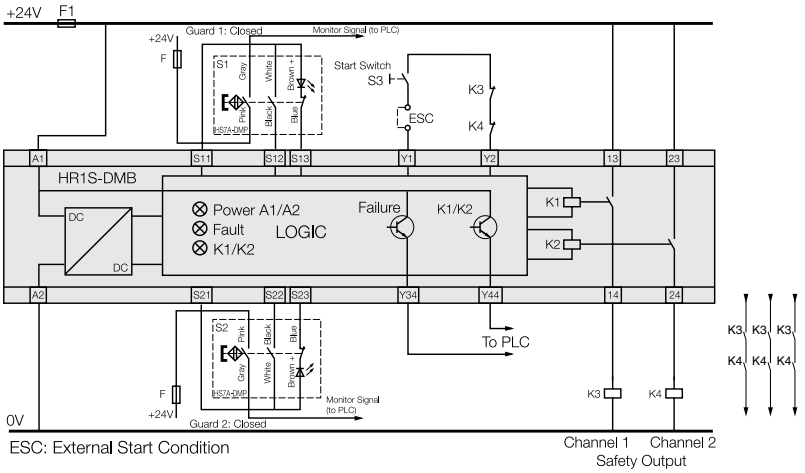

**HS7A-ZP1 (Actuator)**



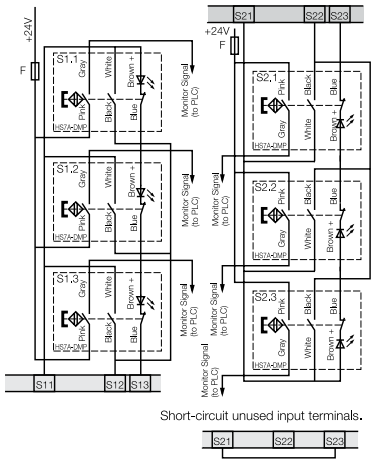
## Example Wiring Diagram

The following diagrams show the contact statuses when the non-contact interlock switches are activated by the actuators.

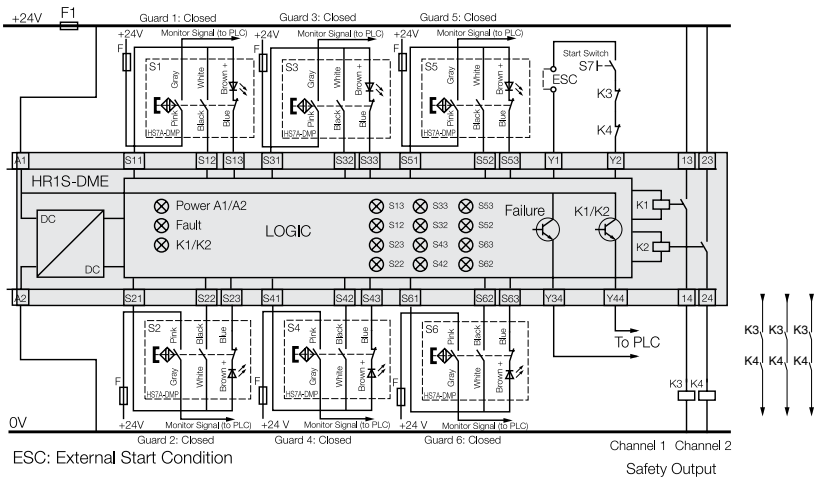
**Example: Safety Category 4 (ISO 13849-1) Circuit**
**HR1S-DMB + HS7A-DMP50□□ (1NO+2NC) + HS9Z-ZP1**



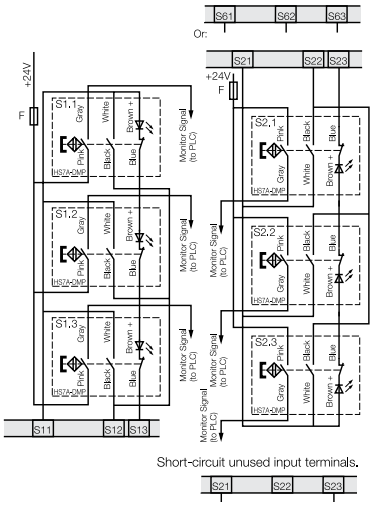

**Example: Safety Category 3 (EN ISO 13849-1) Circuit**
**HR1S-DMB**



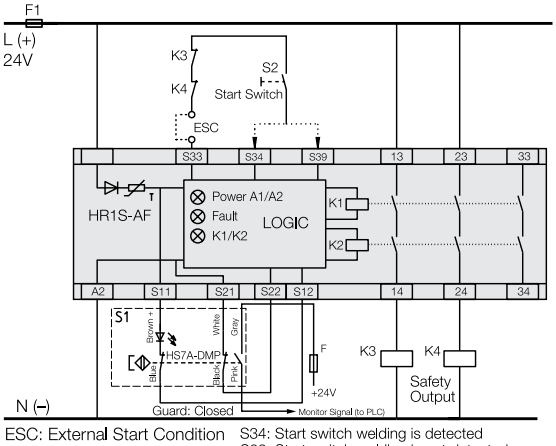

**Example: Safety Category 4 (ISO 13849-1) Circuit**
**HR1S-DME + HS7A-DMP50□□ (1NO+2NC) + HS9Z-ZP1**




**Example: Safety Category 3 (ISO 13849-1) Circuit**
**HR1S-DME**




**Example: Safety Category 4 (ISO 13849-1) Circuit**
**HR1S-AF + HS7A-DMP70□□ (2NO+1NC) + HS9Z-ZP1**



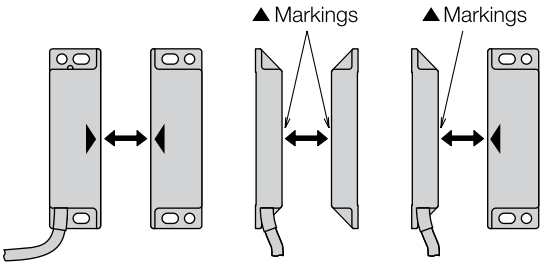

F1: Protection fuse for the power of safety relay module

F: Protection fuse for monitor signal contacts (max. 500mA gG (gL))

Note: The circuit example shown on the left (HR1S-AF and HS7A-DMP70□□) may not conform to safety category 4 depending on the operating conditions, such as the frequency of safety function check. Perform risk assessment of your system before operation.

## Operating Instructions

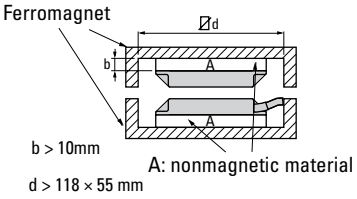
### Operating Direction



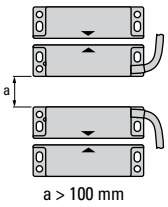

Safety output ON distance (SAO): 3mm.

### Precautions for Installation

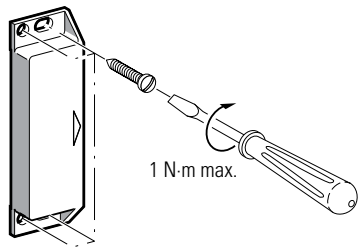
When installing on a ferromagnet




Close mounting



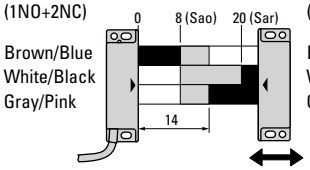

### Tightening Torque



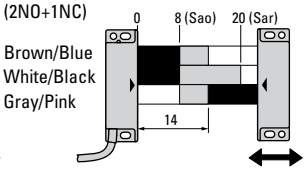

⚠ Use a nonmagnetic screw.

### Operation Chart

HS7A-DMP50□□ (1NO+2NC)




HS7A-DMP70□□ (2NO+1NC)



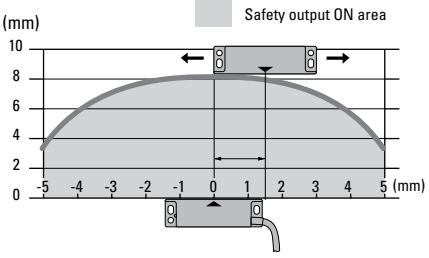

Contact Status

| | |
|---|---|
| ■ | Contact closed (1) |
| | Contact open (0) |
| ▒ | Transient area |

Sao: Assured operating distance where the safety output is sure to turn on.
Sar: Assured release distance when the safety output is sure to turn off.

Note: When the transfer time between the actuator's Sao-Sar is 500 ms or longer, the time lag is detected as an error.

Operation Area



# HS3A Non-contact RFID Safety Switches

## Key features:

- RFID non-contact interlock switch, Category 4 and PLe (EN/ISO 13849-1) compliant.
- The sensor head with built-in safety function (redundant solid state output with internal monitoring) eliminates the need for a designated safety module.
- RFID ensures detection of slow-moving, open, sliding, and rattling doors.
- Multicode and unicode sensor heads are available. Unicode sensor head (one sensor head corresponds to one actuator) prevents tampering with the use of an unassigned spare actuator.
- Sensor head can be installed in 5 directions.
- Degree of protection IP67. Actuator IP67, IP69K (Note)

Note: IP69K is a degree of protection specified by Deutsches Institüt für Normung (DIN), DW 40050 Part 9 for hot and high-pressure water.

Interlock Switch
(Sensor Head)

Actuator

## Part Numbers

### HS3A Non-contact RFID Safety Switches

| Outputs | Type | Part Number |
|---|---|---|
| Safety output: 2<br>Monitor output: 1 | Multicode | HS3A-H21M4 |
| | Unicode | HS3A-H21U4 |

## Accessories

| Name | | | Part Number | Remarks |
|---|---|---|---|---|
| Actuator | | | HS9Z-ZH31 | Actuator for both multicode and unicode sensor heads.<br>Supplied with two M5 × 10 mounting screws (stainless steel) |
| Terminal Plug (For serial connection) | | | HS9Z-H3TP | Used on Y-branch connector when connecting two or more switches in series. |
| Y-branch Connector (For serial connection) | | | HS9Z-H3YD | Used when connecting two or more switches in series.<br>Plug connector: 8-pin (switch side), 5-pin (cable side) |
| M12 Plug Connection Cable | | For connecting two or more switches in series | 5-pin, 5m | HS9Z-H3F505 | Used when connecting two or more switches in series.<br>5-pin plug connector is provided at one end. |
| | | | 5-pin, 10m | HS9Z-H3F510 | |
| | | For connecting a single switch | 8-pin, 5m | HS9Z-H3F805 | Used when connecting a single switch.<br>8-pin plug connector is provided at one end. |
| | | | 8-pin, 10m | HS9Z-H3F810 | |
| M12 Plug Connection Cable (For serial connection) | | | 5-pin, 5m | HS9Z-H3F5M05 | Used when connecting two or more switches in series.<br>5-pin plug connectors are provided at both ends. |
| | | | 5-pin, 10m | HS9Z-H3F5M10 | |

See below for an example of accessories required when connecting N number of HS3A switches in series.

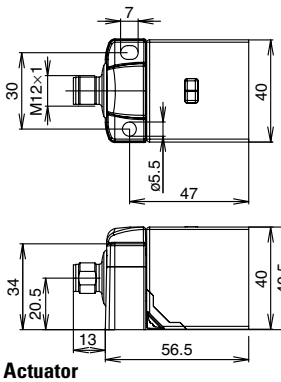
HS3A non-contact interlock switch (HS3Z-H21☐4): N pcs.
Actuator (HS9Z-ZH31): N pcs.
Terminal plug (HS9Z-H3TP): 1 pc.
Y-branch connector (HS9Z-H3YD): N pcs.
M12 plug connection cable, open end (HS9Z-H3F5☐☐): 1 pc.
M12 plug connection cable, plug connectors at both ends (HS9Z-H3F5M☐☐): N–1 pcs.

## Specifications

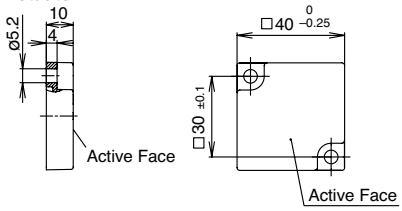
| | | |
|---|---|---|
| Applicable Standards | | EN60947-5-3 (IFA approval)<br>EN954-1<br>EN ISO13849-1<br>EN62061<br>GS-ET-14 (IFA approval)<br>UL508 (UL listed)<br>CSA C22.2 No.14 (c-UL listed) |
| Operating Temperature | | –20 to +55°C (no freezing) |
| Relative Humidity | | 5 to 80% (no condensation) |
| Storage Temperature | | –25 to +70°C |
| Pollution Degree | | 3 |
| Sensor Classification | | PDF-M (EN60947-5-3) |
| Performance Level (PL) | | e (EN ISO 13849-1) |
| Safety Category | | 4 (EN ISO 13849-1) |
| Safety Integrity Level (SIL) | | 3 (EN 62061) |
| Degree of Protection | Interlock Switch (sensor head) | IP67 |
| | Actuator | IP67, IP69K (Note) |
| Rated Voltage (UB) | | 24V DC ±15% |
| Current Consumption | | 80mA (at no load) |
| Dielectric Strength | | 500V AC |
| Output Specifications | Safety Output | Semiconductor output, P-channel<br>Output voltage: Max: UB [V], Min.: UB-1.5 [V]<br>Maximum output current per safety output: 400 mA |
| | Monitor Output | Semiconductor output, P-channel<br>Output voltage: Max: UB [V], Min.: 0.8×UB [V]<br>Maximum output current: 200 mA |
| Operation Distance | Turn-on Distance | 15mm (typ.) |
| | Assured Turn-on Distance (Sao) | 13mm |
| | Maximum Turn-off Distance (Sar) | 58mm |
| Response Time | When using a single switch | 260 ms (actuator removed) |
| | | 150 ms (non-identical input signal at IA/IB) |
| | | 150 ms (non-identical enabling input state at IA/IB) |
| | | 300 ms (short-circuit or cross-circuit at OA/OB, or internal error) |
| | When using two or more switches (max.) | 360 ms (actuator removed) |
| | | 250 ms (non-identical input signal at IA/IB) |
| | | 400 ms (non-identical enabling input state at IA/IB) |
| | | 400 ms (short-circuit or cross-circuit at OA/OB, or internal error) |
| Shock Resistance | | Operating extremes: 300 m/s$^2$ (11 ms) |
| Vibration Resistance | | 10 to 55 Hz, amplitude 0.5 mm |
| Material | | PBT |
| Cable | | M12 plug connection cable, 8-pin |
| Weight (approx.) | | 400g (HS3A-H21☐☐) |
| Attachment | | System Manual (CD-ROM) |

## Dimensions (mm)

### Sensor Head

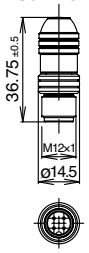



### Actuator

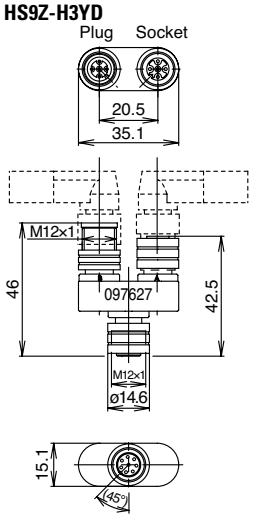



Supplied with two mounting screws (M5 × 10).

### Terminal Plug HS9Z-H3TP

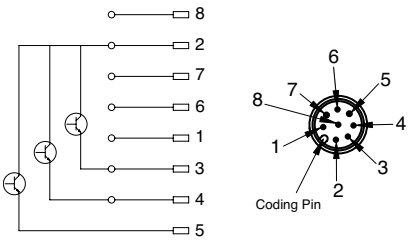



### Y-branch Connector HS9Z-H3YD



## Specifications

### Non-contact Interlock Switch




### Plug Connection Cable

### HS9Z-H3FB

| Pin | Wire | Legend | Description |
|---|---|---|---|
| 1 | White | IB | Enabling input (channel 2) |
| 2 | Brown | UB | Power supply (24V DC) |
| 3 | Green | OA | Safety output (channel 1) |
| 4 | Yellow | OB | Safety output (channel 2) |
| 5 | Gray | OUT | Monitoring output |
| 6 | Pink | IA | Enabling input (channel 1) |
| 7 | Blue | 0V | 0V |
| 8 | Red | RST | Reset input for hardware |

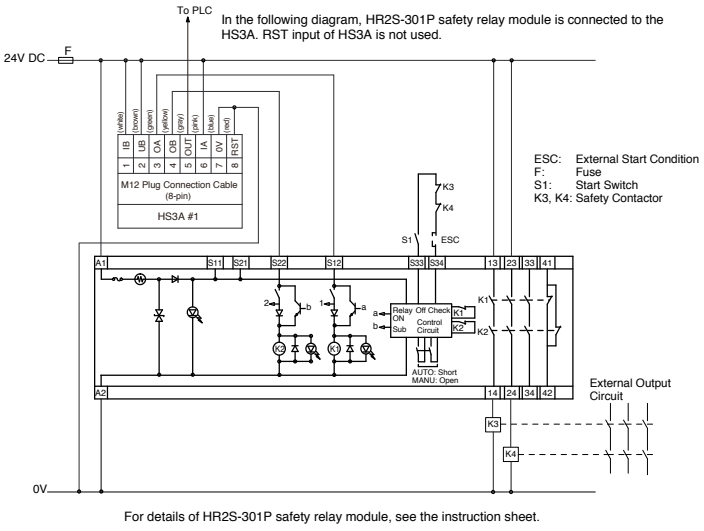
### HS9Z-H3FS

| Pin | Wire | Legend |
|---|---|---|
| 1 | Brown | UB |
| 2 | White | OA |
| 3 | Blue | 0V |
| 4 | Black | OB |
| 5 | Gray | RST |

## Wiring Diagram

### When using a single HS3A

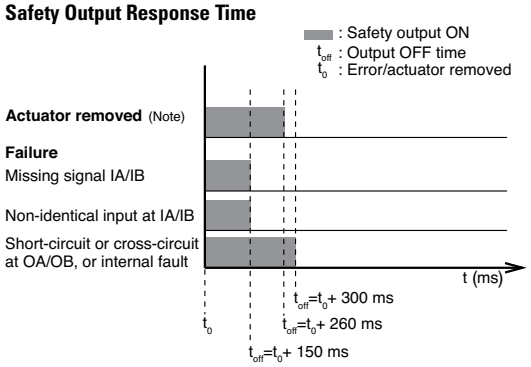
When using a single HS3A, connect as shown in the figure below (Note). The OUT output can be connected to a control system, to a PLC for example, as a monitoring output.
The HS3A can be reset via the RST input. To reset, apply 24V DC for at least 3 seconds. When not using the RST input, connect the RST input to 0V.




For details of HR2S-301P safety relay module, see the instruction sheet.

Note: Safety performance of the actual system is determined by performing a risk assessment on the entire system. Depending on the risk level the system may entail, K1 and K2 need to be monitored to prevent serious accidents.

### Safety Output Response Time




Note: The time required for the safety output to turn off after the actuator moves outside the operating distance of the HS3A switch.

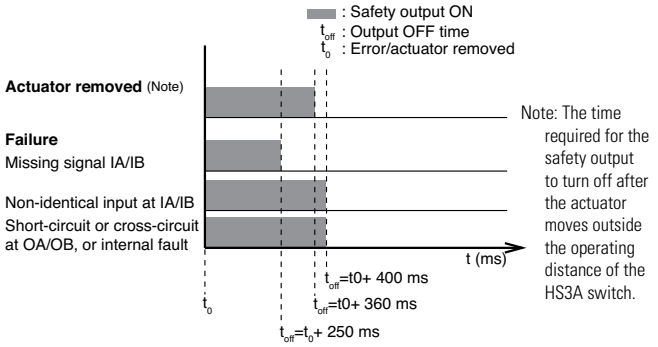
### When using two or more HS3A in series

A maximum of 20 can be connected in series.
Pay attention to the contact resistance at the connection points.

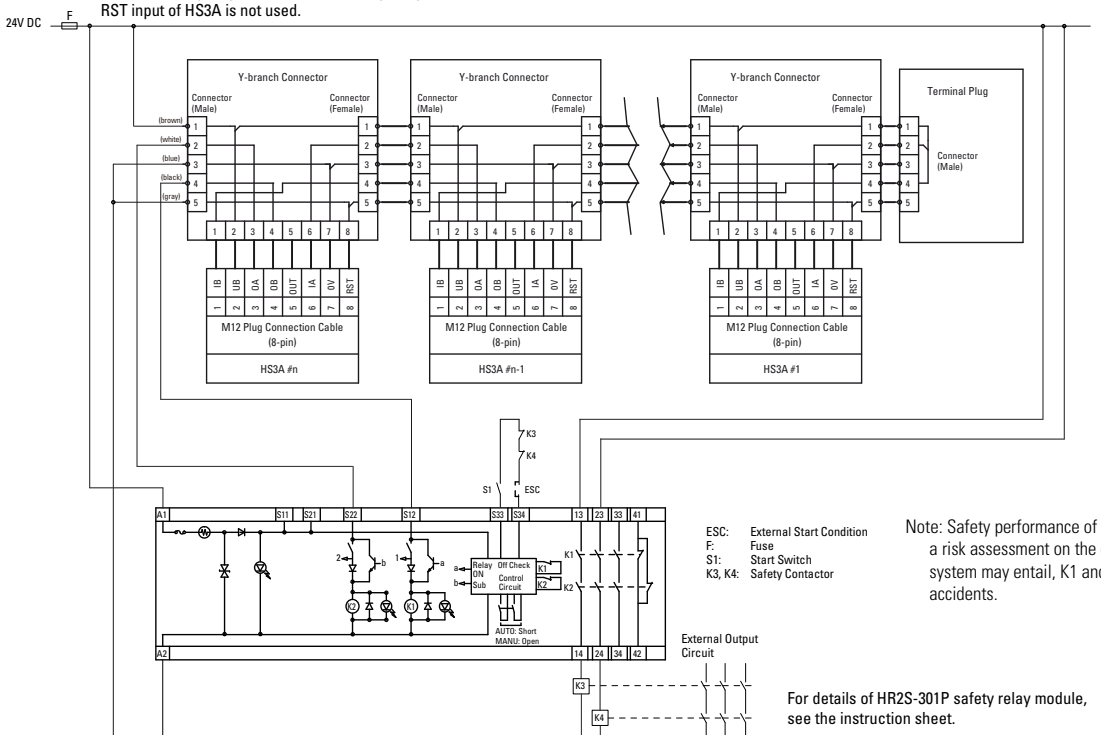
The HS3A switches can be connected in series using plug connection cables and Y-branch connectors as shown in the figure below (Note). When any of the HS3A switches detects that the safety guard is open, or when a failure has occurred on any of the switches, the system tuns off the machine. However, the external control system cannot detect which safety guard is open or where a failure has occurred.

The HS3A can be reset via the RST input. To reset, apply 24V DC for at least 3 seconds. When not using the RST input, connect the RST input to 0V.

### Safety Output Response Time




In the following diagram, HR2S-301P safety relay module is connected to the HS3A.
RST input of HS3A is not used.




ESC: External Start Condition
F: Fuse
S1: Start Switch
K3, K4: Safety Contactor

Note: Safety performance of the actual system is determined by performing a risk assessment on the entire system. Depending on the risk level the system may entail, K1 and K2 need to be monitored to prevent serious accidents.

For details of HR2S-301P safety relay module, see the instruction sheet.

## Operation Distance and Response Time

When installing the HS3A, ensure the safety of the door opening area by paying attention to the operation distance (Table 1) and response time (Table 2) shown below.

### Table 1: Operation Distance [1]

| Distance | Value (mm) | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| Turn-on distance | — | 15 [2] | — |
| Assured turn-on distance Sa0 | 13 | — | — |
| Switching hysteresis | 1.5 | 2.5 | — |
| Assured turn-off distance Sar | — | — | 58 |

1. When the off-center displacement of the interlock switch (sensor head) and actuator is 0 mm.
2. When surface-mounted on aluminum. When using by embedding in metal, pay attention to the operation distance affected by the metal. In non-metallic environment, the typical turn-on distance increases to 30mm.

### Table 2: Response Time

| | | |
|---|---|---|
| Response Time | When connecting a single switch (max.) | 260 ms (actuator removed) |
| | | 150 ms (missing enabling input IA/IB) |
| | | 150 ms (non-identical enabling input state at IA/IB) |
| | | 300 ms (short-circuit or cross-circuit at OA/OB, or internal fault) |
| | When connecting two or more switches (max.) | 360 ms (actuator removed) |
| | | 250 ms (missing signal enabling input IA/IB) |
| | | 400 ms (non-identical enabling input state at IA/IB) |
| | | 400 ms (short-circuit or cross circuit at OA/OB or internal fault) |

Note: To ensure safety, both safety outputs (OA and OB) must always be evaluated. Single-channel use of the safety outputs as shown below leads to a reduction of safety category stipulated in EN954-1.

# HS5B/HS5E Door Handle Actuator

## Key features:

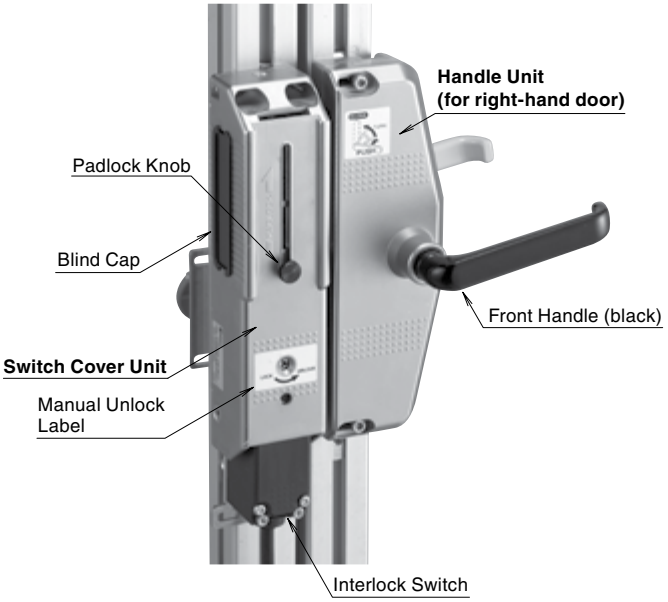
- Easy and secure operation
- Rattling doors can be locked smoothly and securely.
- A door can be locked with an actuator by pushing and turning the handle.
- Padlock tab is provided to ensure operator safety.
- Interlock switch with or without solenoid lock can be installed.
- LED shows solenoid status
  (when using HS5E-☐44L☐☐-G).

## Part Numbers

| Description | | Ordering Type No. | Remarks | |
|---|---|---|---|---|
| Handle Unit | For right-hand door | HS9Z-DH5RH | Choose according to the required opening side. | |
| | For left-hand door | HS9Z-DH5LH | | |
| Switch Cover Unit | | HS9Z-DH5C | Used for installing the interlock switch inside. | |
| HS5B Installation Kit | | HS9Z-DH5B | Contains a mounting plate and two spacers. | |
| Rear Unlocking Button Kit [1] | | HS9Z-FL53 | Contains a button with base plate and a connecting rod | Mounting panel thickness (X): 20 ≤ X ≤ 30mm [2] |
| | | HS9Z-FL54 | | Mounting panel thickness (X): 30 ≤ X ≤ 40mm [2] |

1. Use the kit in combination with the HS5E-☐44L☐☐-G rear unlocking button type interlock switch.
2. Mounting panel is a frame or a panel.

## Parts Description




Front View

Rear View

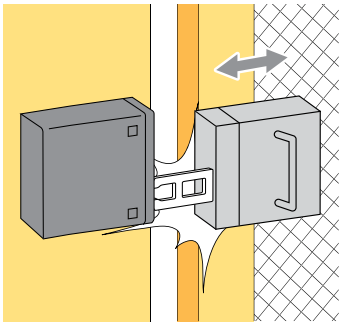
## Specifications

| | |
|---|---|
| Applicable Interlock Switch | HS5B Metal Head Interlock Switch [1]<br>HS5E Rear Unlocking Button Type Interlock Switch with Solenoid [2] |
| Operating Temperature | –25 to +70°C (no freezing) |
| Mechanical Durability | 100,000 operations minimum |
| Applicable Shackle Diameter of Padlock | ø6 to 7.5 mm |
| Withstand Load of Padlock Tab | 30N maximum |
| Handle Operation Angle | 77° (removed position ⟷ inserted position) |
| Insulation Resistance<br>(500V DC megger) | Between live and dead metal parts: 100 MΩ minimum<br>Between terminals of different poles: 100 MΩ minimum. |

1. HS5B-☐☐ZB, HS5B-☐☐ZBM
2. HS5E-☐44L☐☐-G
Interlock switch is not supplied with the actuator and must be ordered separately.
For the specifications of interlock switches, see pages XX, XX, and XX.

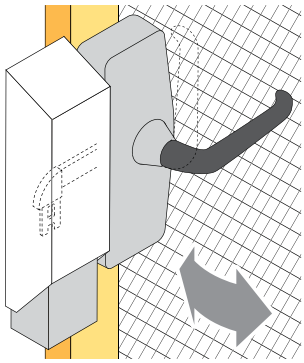
### Rotational handle actuator can be inserted/removed smoothly on rattling doors.

**Conventional Sliding Actuator**



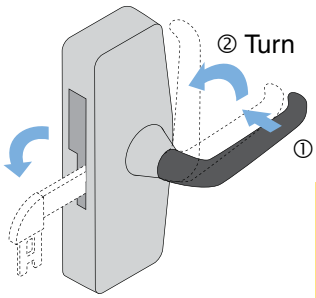
**IDEC's Door Handle Actuator**

Rattling doors can be locked smoothly and securely.

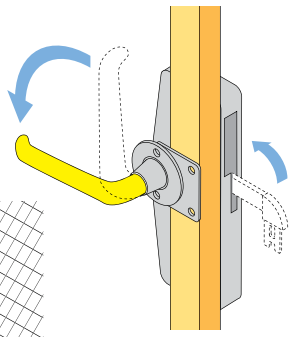


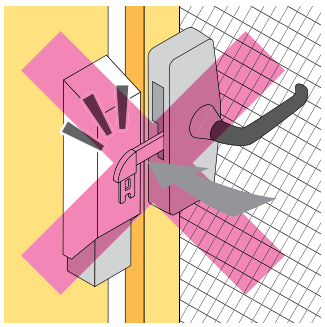
### The door can be locked and unlocked by pushing and turning the handle.

The actuator can be inserted into the interlock switch by pushing and turning the front handle. The actuator can be removed from the interlock switch by turning the front handle.

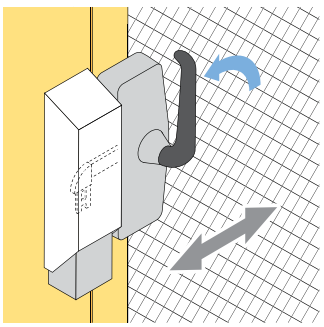



The rear handle can remove the actuator, but cannot insert the actuator.





Because the handle can be turned only while it is pushed, the actuator is prevented from hitting the switch cover unit.

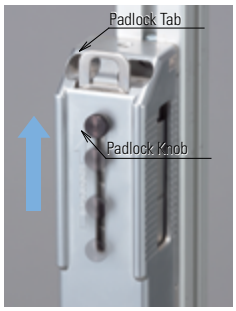


Sliding doors can also be locked securely.

### Padlockable tab ensures operator's safety.

When padlocks are installed on the padlock tab, the machine cannot be started because the actuator entry slot is blocked and the actuator cannot enter the interlock switch. By requiring all operators to have their own padlock and installing them on the door handle actuator before entering the hazardous area, the door will not be closed unless all padlocks are removed—i.e. all operators have left the hazardous area.

Note: Operators must observe rules in the workplace in order to ensure safety. Residual risk such as failure to install padlocks must be taken into consideration.



### Interlock switch with/without solenoid locking can be selected.

HS5E

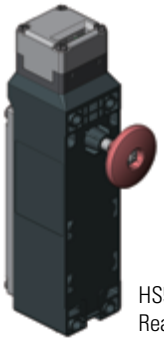
(HS5E-☐44L☐☐-G)

HS5B

(HS5B-☐☐Z)

## Door Handle Actuator Configuration

### Interlock Switches



HS5E-☐44L☐☐-G
Rear Unlocking
Button Type

HS5B-☐☐Z
Metal Head Type

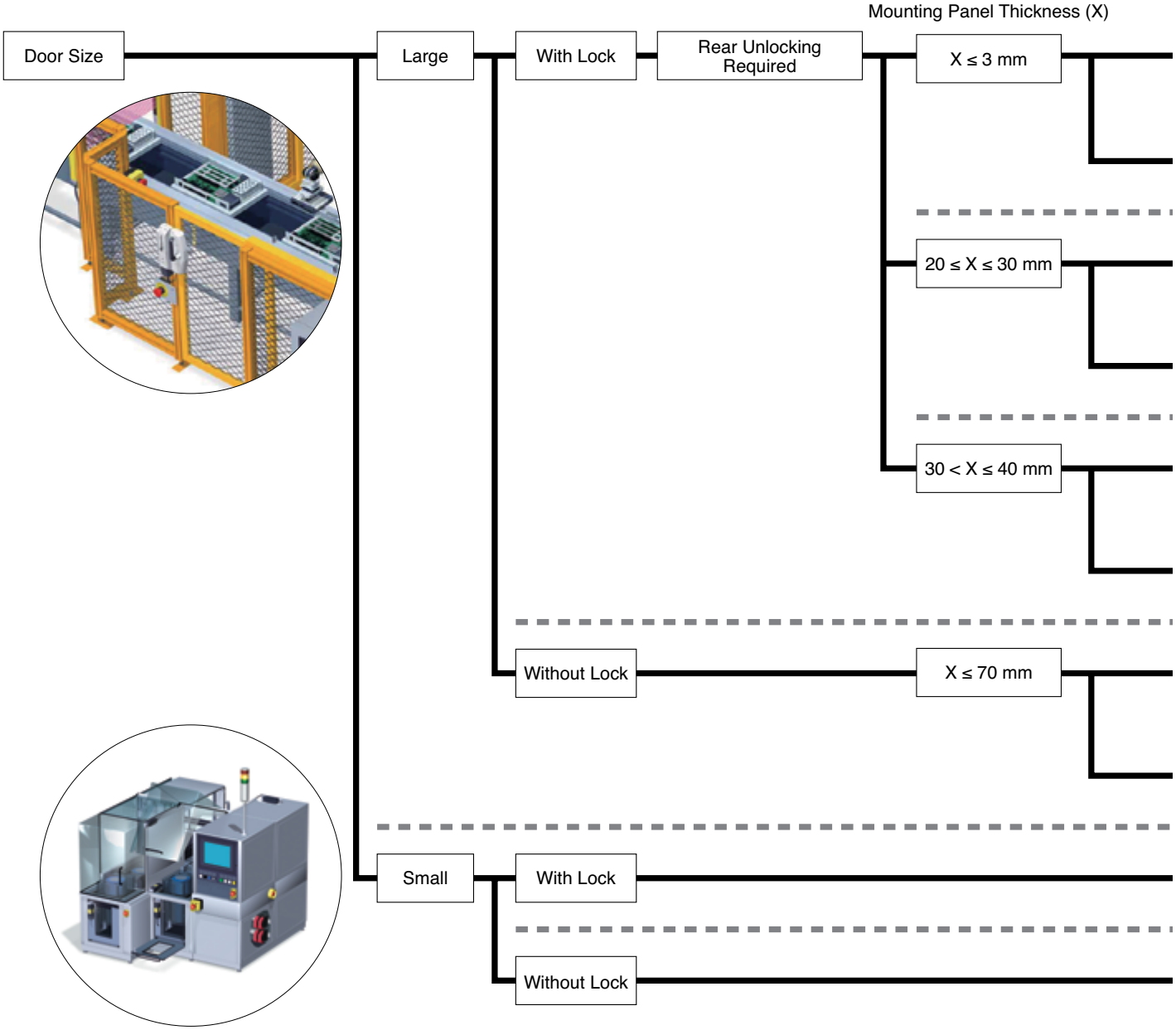
### Switch Cover Unit

HS9Z-DH5C

## Selection Chart

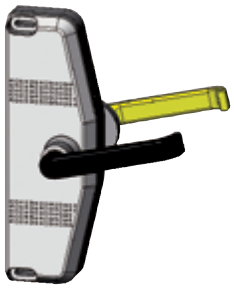






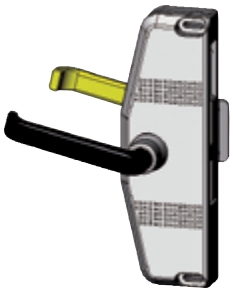
**Handle Unit**

**Right-hand Door**



HS9Z-DH5RH

**Left-hand Door**



HS9Z-DH5LH

**Accessories**

**Rear Unlocking Button Kit**

HS9Z-FL53
HS9Z-FL54

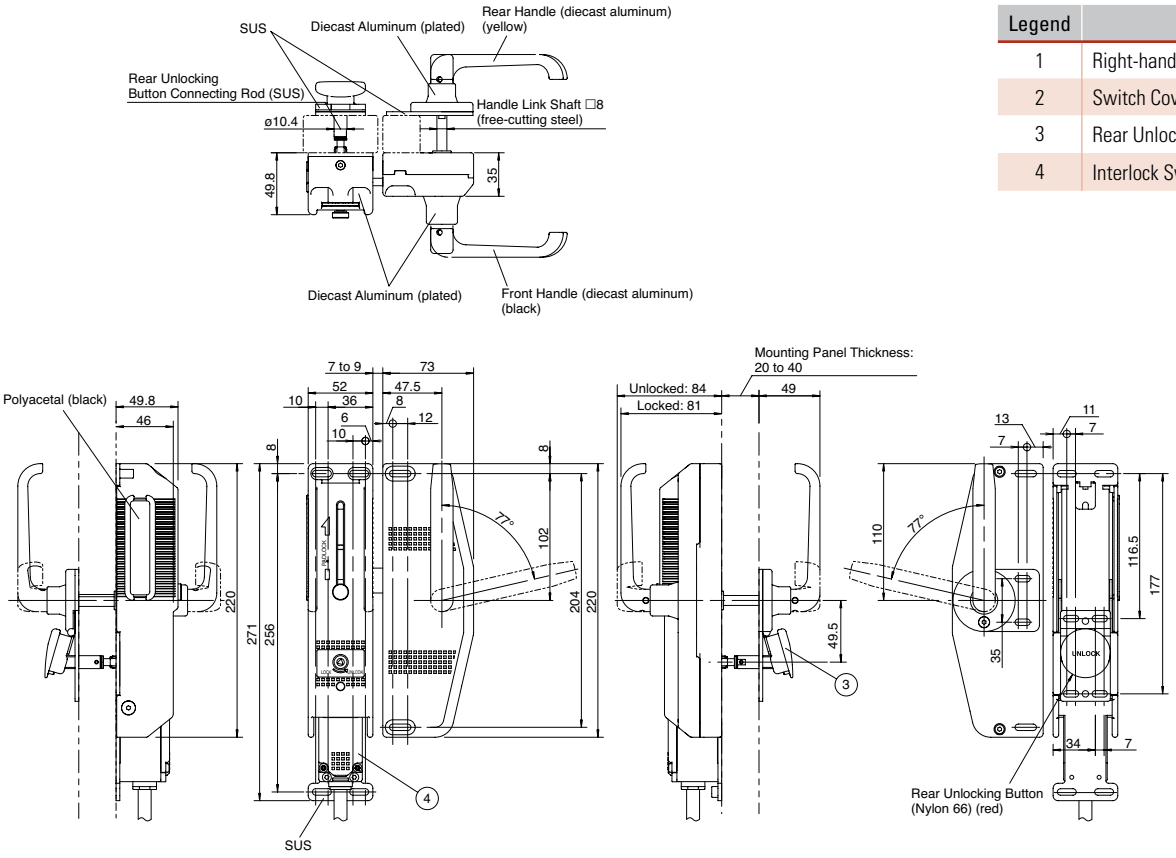
**HS5B Installation Kit**

HS9Z-DH5B

| Handle Unit | | Switch Cover Unit | Accessories | Interlock Switch |
|---|---|---|---|---|
| Right-hand Door | HS9Z-DH5RH | HS9Z-DH5C | | |
| Left-hand Door | HS9Z-DH5LH | | | |
| Right-hand Door | HS9Z-DH5RH | | Rear Unlocking Button Kit HS9Z-FL53 | HS5E-∗44L∗∗-G (Rear Unlocking Button Type) |
| Left-hand Door | HS9Z-DH5LH | | | |
| Right-hand Door | HS9Z-DH5RH | | Rear Unlocking Button Kit HS9Z-FL54 | |
| Left-hand Door | HS9Z-DH5LH | | | |
| Right-hand Door | HS9Z-DH5RH | | HS5B Installation Kit HS9Z-DH5B | HS5B-∗∗Z (Metal Head Type) |
| Left-hand Door | HS9Z-DH5LH | | | |
| Sliding Actuator HS9Z-SH5 | | | | HS5E (All types) |
| | | | | HS5B-∗∗Z (Metal Head Type) |

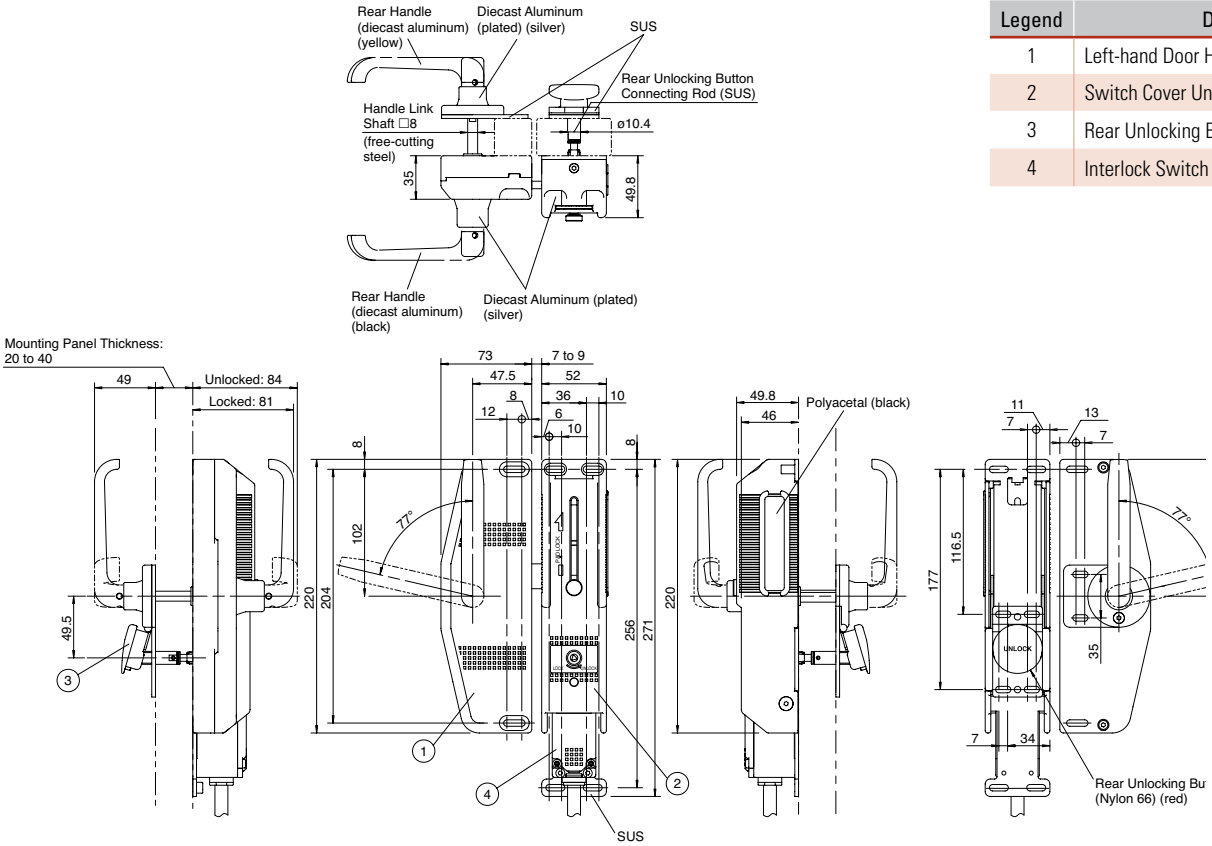
## Dimensions (mm)

### HS9Z-DH5RH (right-hand door) and HS5E-□44L□□-G Interlock Switch with Solenoid



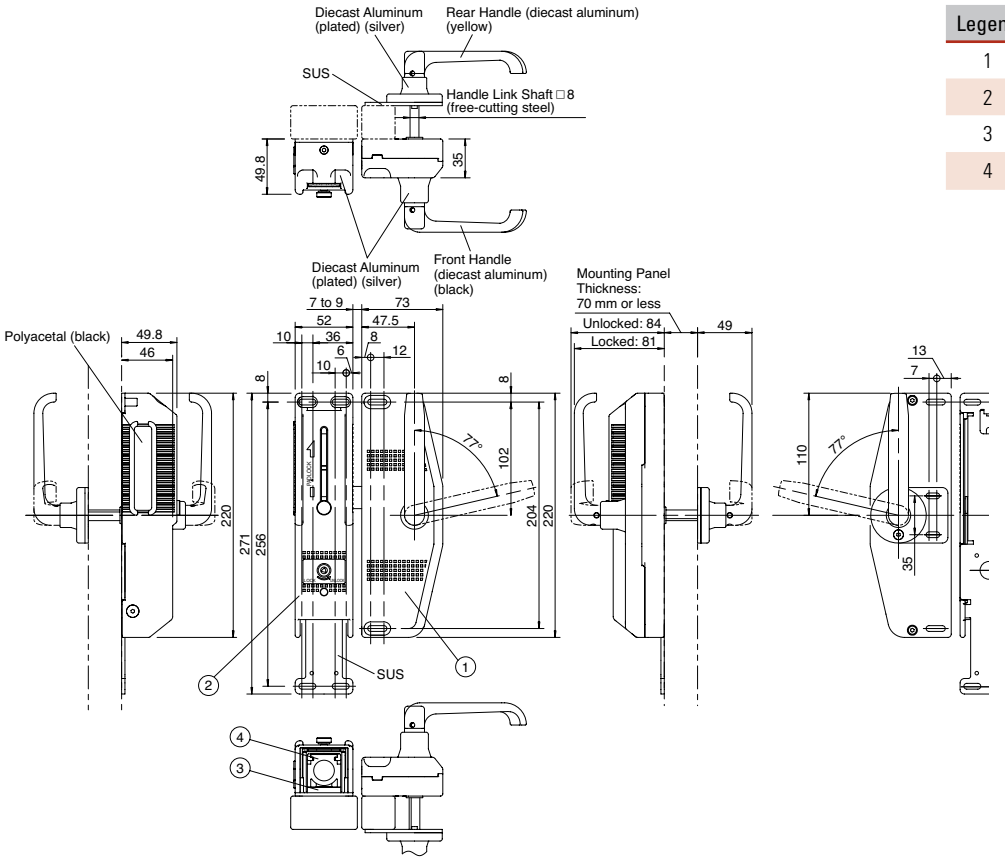

| Legend | Description |
|---|---|
| 1 | Right-hand Door Handle Unit HS9Z-DH5RH |
| 2 | Switch Cover Unit HS9Z-DH5C |
| 3 | Rear Unlocking Button Kit HS9Z-FL5□ |
| 4 | Interlock Switch HS5E-□44L□□-G |

### HS9Z-DH5LH (left-hand door) and HS5E-□44L□□-G Interlock Switch with Solenoid



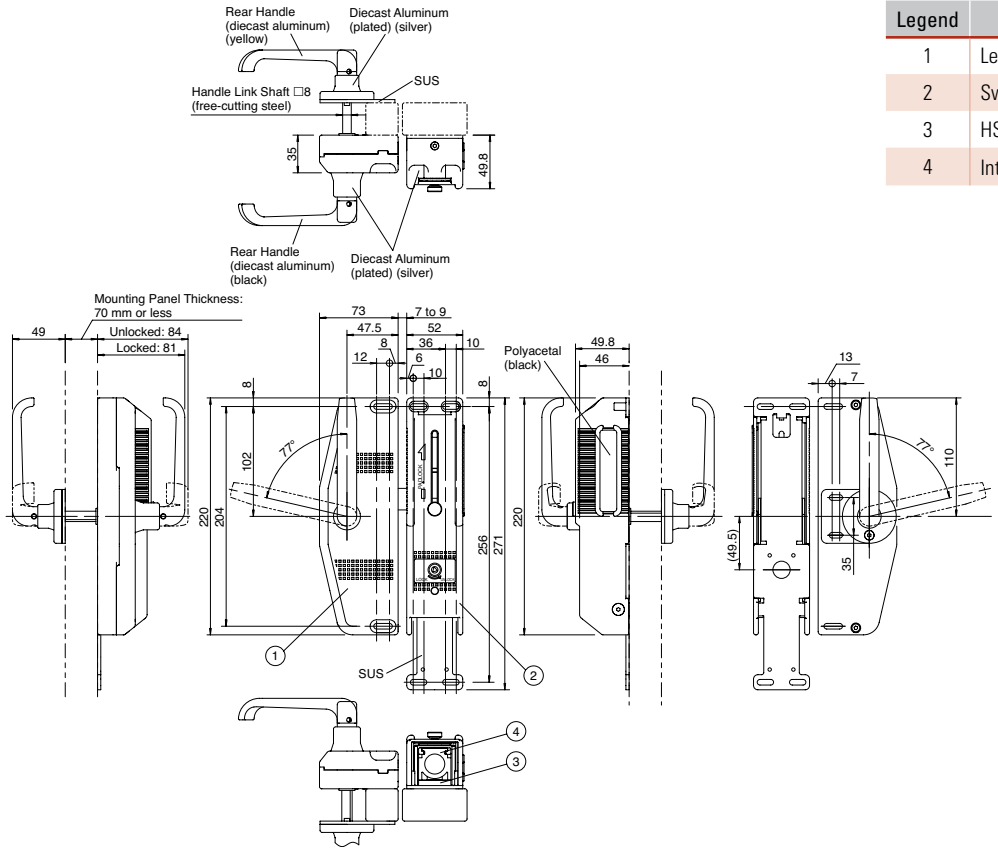

| Legend | Description |
|---|---|
| 1 | Left-hand Door Handle Unit HS9Z-DH5LH |
| 2 | Switch Cover Unit HS9Z-DH5C |
| 3 | Rear Unlocking Button Kit HS9Z-FL5□ |
| 4 | Interlock Switch HS5E-□44L□□-G |

### HS9Z-DH5RH (right-hand door) and HS5B-☐☐Z Interlock Switch




| Legend | Description |
|---|---|
| 1 | Right-hand Door Handle Unit HS9Z-DH5RH |
| 2 | Switch Cover Unit HS9Z-DH5C |
| 3 | HS5B Installation Kit HS9Z-DH5B |
| 4 | Interlock Switch HS5B-☐☐Z |

### HS9Z-DH5LH (left-hand door) and HS5B-☐☐Z Interlock Switch

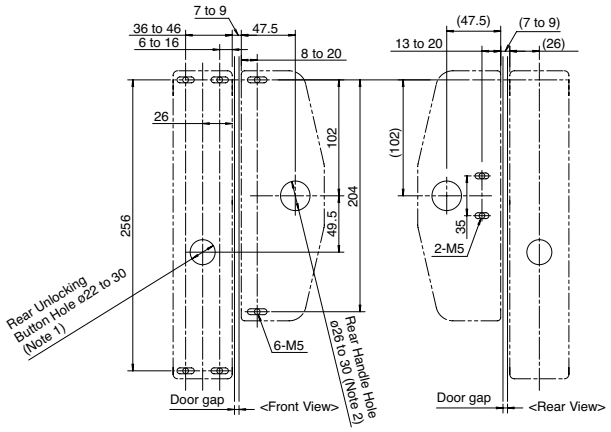



| Legend | Description |
|---|---|
| 1 | Left-hand Door Handle Unit HS9Z-DH5LH |
| 2 | Switch Cover Unit HS9Z-DH5C |
| 3 | HS5B Installation Kit HS9Z-DH5B |
| 4 | Interlock Switch HS5B-☐☐Z |

**Panel Cut-out**
**HS9Z-DH5RH right-hand door handle unit**

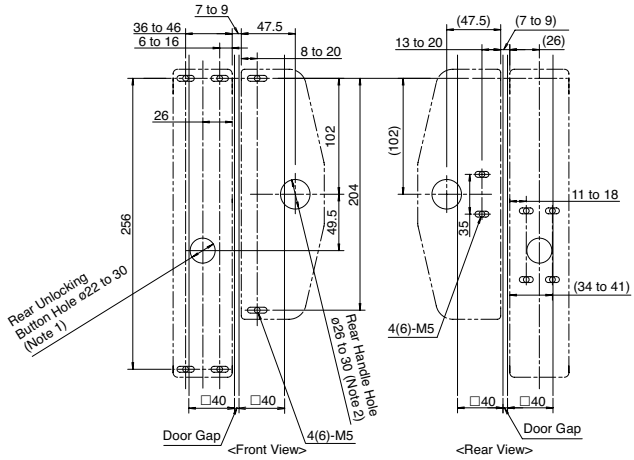
When using the HS5E-☐44L☐☐-G on the mounting panel of 3 mm or less in thickness (use the rear unlocking button).

When using the HS5B-☐Z (mounting panel thickness X ≤70mm).




When using the HS5E-☐44L☐☐-G on the mounting panel of 20 to 40 mm in thickness.

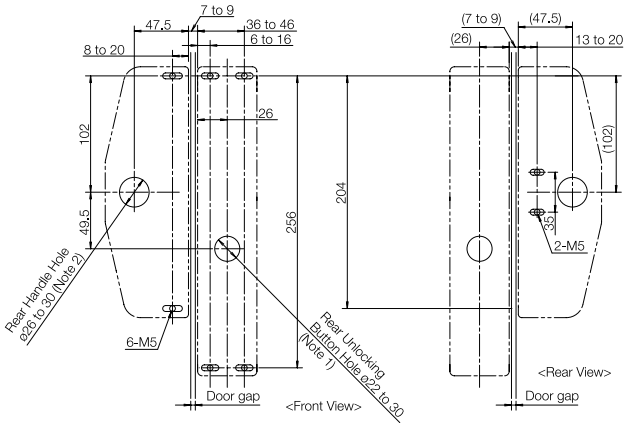
- Use the rear unlocking button kit (HS9Z-FL5☐).
- In the figure shown on the right, ☐40mm frame is used.




**HS9Z-DH5LH left-hand door handle unit**

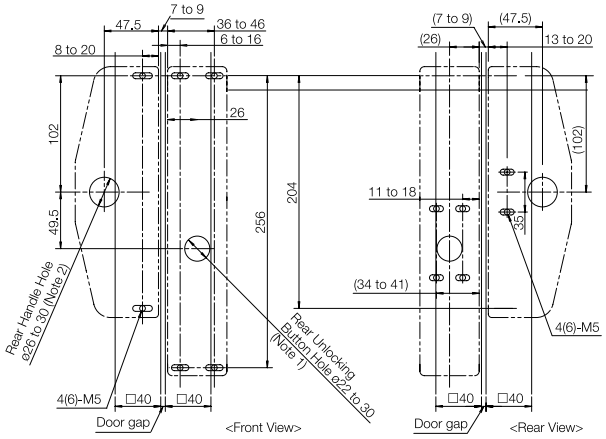
When using the HS5E-☐44L☐☐-G on the mounting panel of 3 mm or less in thickness (use the rear unlocking button).

When using the HS5B-☐Z (mounting panel thickness X ≤ 70mm).

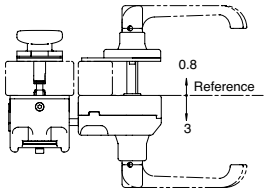


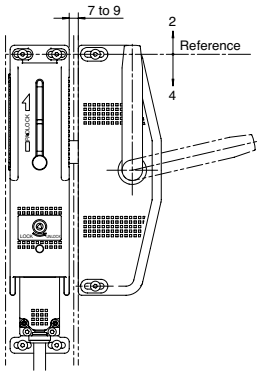

When using the HS5E-☐44L☐☐-G on the mounting panel of 20 to 40 mm in thickness.

- Use the rear unlocking button kit (HS9Z-FL5☐).
- In the figure shown on the right, ☐40mm frame is used.



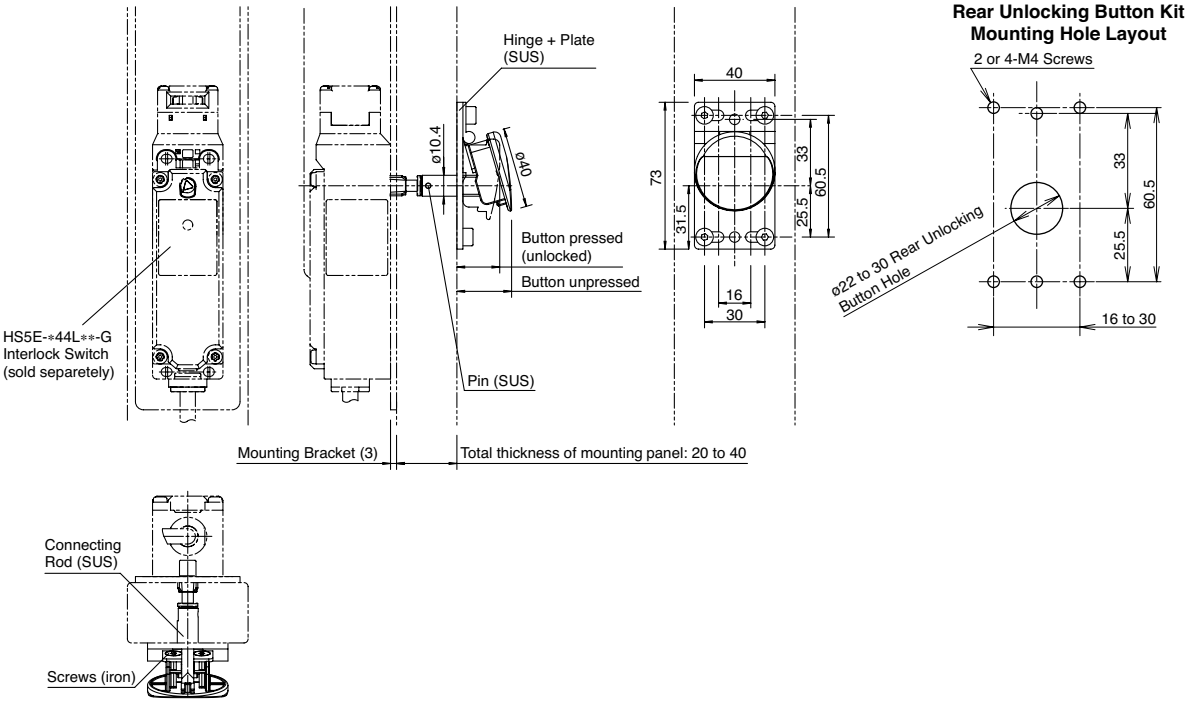

Mounting Position Tolerance




Note 1: Required when using the HS5E-☐44L-☐☐-G.
Not required when using the HS5B-☐☐Z (without locking function).
Note 2: Ensure that the hole in the mounting panel does not interfere with the rear handle shaft.

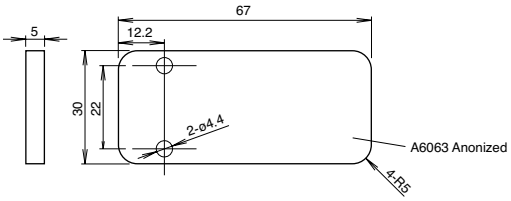
**Rear Unlocking Button Kit**
**(HS9Z-FL53/HS9Z-FL54) (Use with the HS5E-*44L**-G Interlock Switch)**







**HS5B Installation Kit (HS9Z-DH5B)**




Note: The illustration kit contains the aluminum mounting plate shown above and two spacers.

**For more information, download instruction sheet from web.**

Selection Guide ..... 393
Panel Mount Enabling Switches ..... 394
HE1B Series ..... 394
HE2B Series ..... 396
HE3B Series ..... 399
HE5B Series ..... 402
HE6B Series ..... 405
Grip Enabling Switches ..... 408
HE1G Series ..... 408
HE1G-L Series ..... 412
HE2G Series ..... 415
HE5B Housing ..... 419

# Enabling Switches



IDEC

www.IDEC.com/safety

# Enabling "Dead Man" Switches

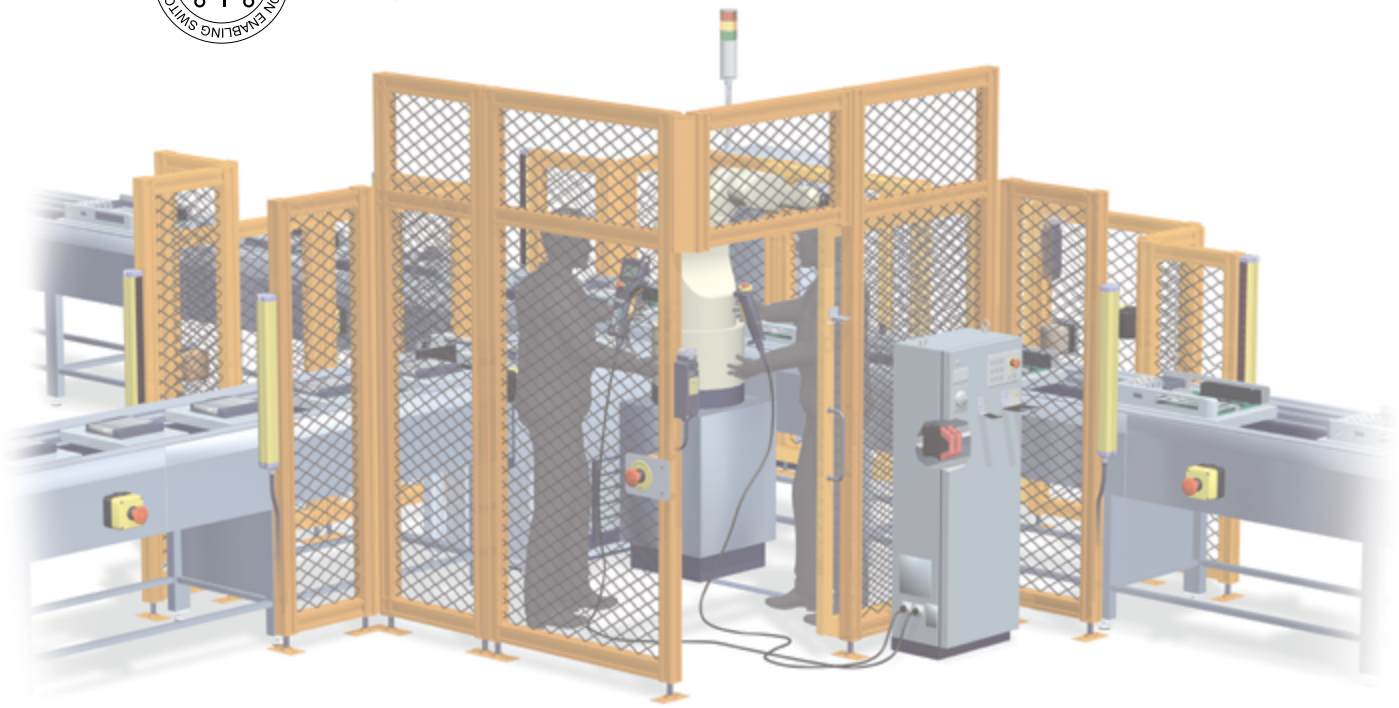
## What is an enabling switch?

An enabling switch is a 3-position (OFF-ON-OFF) switch to allow a machine operation only when the switch is lightly pressed and held in the middle position (position 2). Because it disables machine operation when released (position 1) or further depressed (position 3) by a panicked operator, the safety of operators is ensured.

IDEC was a pioneer in developing these type of switches and championed the additional IEC60947-5-8 requirements for enabling switches to be used in automated manufacturing cells.

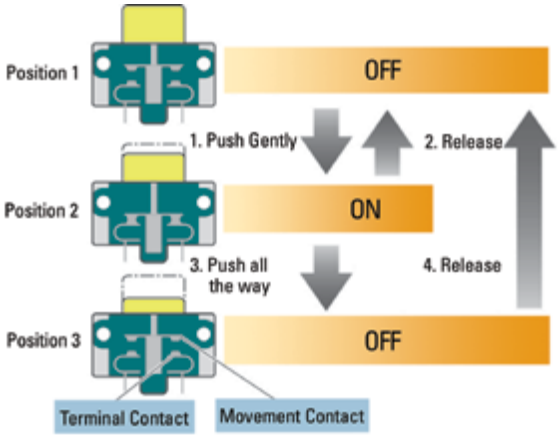
Because operators use pendants in dangerous environments performing teaching, system changeover, and maintenance of robots, they must have protection against unpredictable motion of robots, and therefore teach pendants are equipped with 3-position enabling switches.

IEC symbol designating a 3-position enabling switch as specified in IEC60947-5-8



## HE1B Enabling Switch Movement

3 Position Enabling Switch
Position 1 - Normal position - Contact Open
Position 2 - Push half way - Contact Closed
Position 3 - Push all the way - Contact Open




When releasing switch from position 3 back to position 1, the switch will not enter the ON state.

# Selection Guide

## Enabling Switches

| Series | HE1B | HE2B | HE3B | HE5B | HE6B |
|---|---|---|---|---|---|
| Appearance | | | | | |
| Page | 394 | 396 | 399 | 402 | 405 |
| Description | Basic Switch | Full Size Contacts | 16mm Panel Mount | 16mm Panel Mount | Compact Size |
| Main Contacts | 1NO | DPDT/DPDT, 2NC/DPDT, 4NC | DPDT | DPDT | DPDT |
| Monitor Contacts | – | 2NC, 4NC | – | – | 2NC |

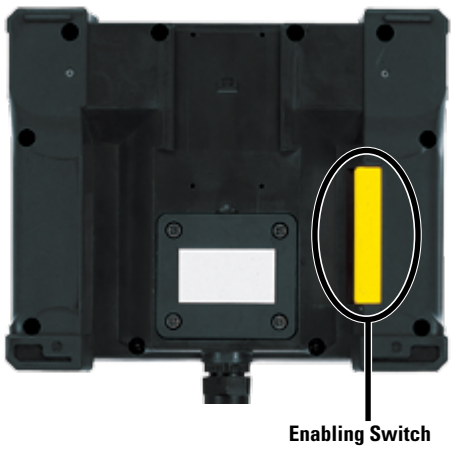
## Grip Switches

| Series | HE1G | HE1G-L | HE2G | HE5B Housing |
|---|---|---|---|---|
| Appearance | | | | |
| Page | 408 | 412 | 415 | 419 |
| Description | Grip Switch | Light Force Grip Switch | Compact, Ergonomic Grip Switch | Grip switch housing for HE5B |
| Maximum Contacts | DPDT, 1NC/DPDT, 2NC | | DPDT | DPDT |
| Options | E Stop or Push Button | E Stop or Push Button | E Stop, Push Button, Key Switch, Pilot Light | – |

## Application Example

**Teaching Pendant**

**Back of Teaching Pendant**



# HE1B Basic Enabling Switch

## Key features:

- 3-position functionality (OFF – ON –OFF) as required for manual robotic control
- Ideally suited for use as enabling (aka "deadman") switch on teach pendants
- Provides a high level of safety based on human behavioral studies that determine personnel may squeeze OR let go when presented with a panic situation
- Positive action contacts "On" (pos. 2) to "Off" (pos. 3) ensure no contact welding (per EN60947-5-1 / IEC60947-5-1)
- Contacts will not close when released from "Off" (pos. 3) to "Off" (pos. 1) (per IEC60204-1; 9.2.5.8)
- Small and lightweight

## Part Numbers

| Item | Installation | Part Number |
|---|---|---|
| | Side | HE1B-M1 |
| | Front | HE1B-M1N |

## Specifications

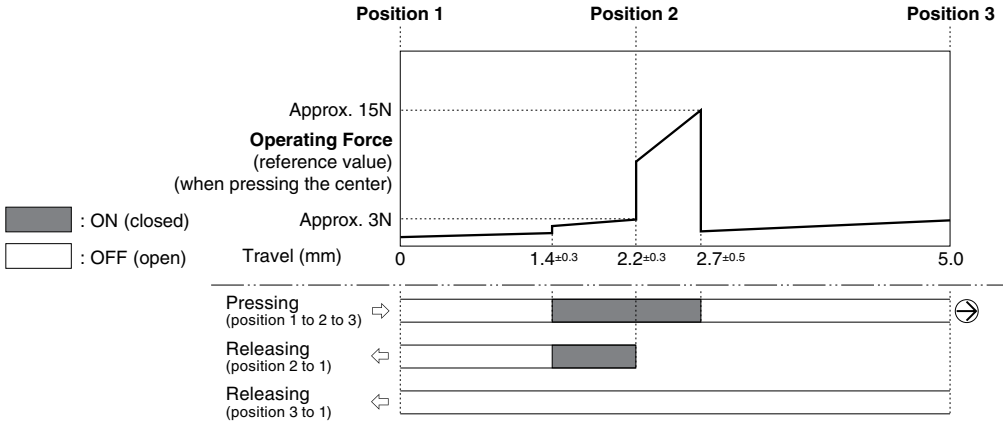
| | | |
|---|---|---|
| Conforming to Standards | | UL508 (UL recognized), CSA C22.2, No. 14 (c-UL recognized), IEC/EN 60947-5-1, IEC/EN 60947-5-8 (TÜV approval) |
| Operating Temperature | | –25 to +60°C (no freezing) |
| Operating Humidity | | 45 to 85% RH (no condensation) |
| Storage Temperature | | –40 to +80°C (no freezing) |
| Pollution Degree | | 2 |
| Initial Contact Resistance | | 50mΩ maximum |
| Insulation Resistance | | 100MΩ minimum |
| Impulse Withstand Voltage | | 2.5kV |
| Operating Frequency | | 1200 operations/hour |
| Mechanical Life | | Position 1→2→1: 1,000,000 operations minimum |
| | | Position 1→2→3→1: 100,000 operations minimum |
| Electrical Life | | 100,000 operations minimum at rated load |
| Shock Resistance | Operating Extremes | 150m/s$^2$ (15G) |
| | Damage Limits | 1000m/s$^2$ (100G) |
| Vibration Resistance | Operating Extremes | 5 to 55Hz, amplitude 0.5mm minimum |
| | Damage Limits | 16.7Hz, amplitude 1.5mm minimum |
| Terminal | | Solder Terminal |
| Recommended Wire Size | | 0.5mm$^2$ maximum / 1 line (20AWG) |
| Solder Heat Resistance | | 260°C / 3 seconds maximum |
| Terminal Pulling Strength | | 20N minimum |
| Recommended Screw Torque | | HE1B-M1: M3 screw / 0.5 to 0.8Nm |
| Degree of Protection | | IP40 (IEC 60529) excluding terminal part |
| Conditional Short-Circuit Current | | 50A (250V) |
| Recommended Short Circuit Protection | | 250V, 10A fast blow fuse (IEC 60127-1) |
| Circuit Opening Force | | 30N minimum (position 2→3) |
| Control Resistance (Operating) | | 250N minimum |
| Weight | | Approx. 6g |

## Current Ratings

| | | | | | |
|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | AC / DC250V | | |
| Thermal Current (Ith) | | | 5A | | |
| Rated Operating Voltage (Ue) | | | 30V | 125V | 250V |
| Rated Operating Current (Ie) | AC 50/60Hz | Resistive Load (AC-12) | – | 3A | 1.5A |
| | | Inductive Load (AC-15) | – | 1.5A | 0.75A |
| | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |
| Contact Configuration | | | SPST-NO three position (OFF-ON-OFF) | | |

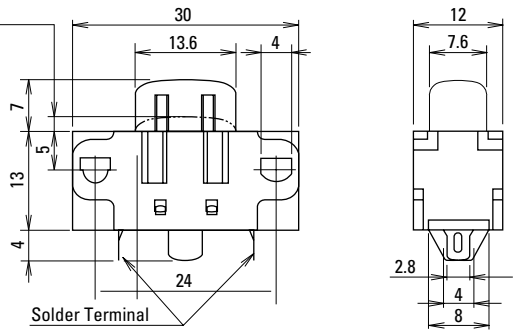
Minimum applicable load: AC/DC3V • 5mA (For reference only).

## Operating Characteristics



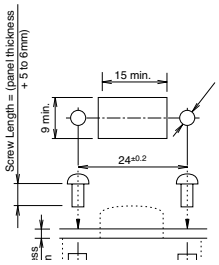

## Dimensions (mm)

When pressed to position 3: 2



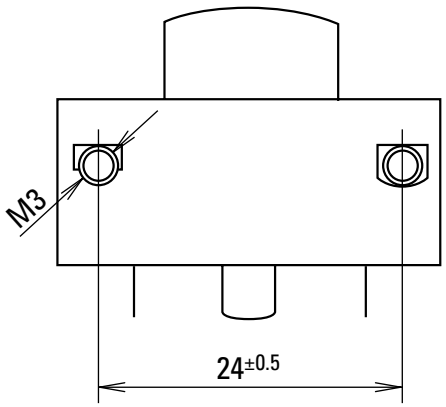

**HE1B-M1 (Side Mounting)**

1. M3 Screw (not provided)
2. Thread built in




**HE1B-M1N (Front Mounting)**

1. M3 Screw (not provided)
2. Locking nut (2 pcs) included




When using a panel thicker than 2mm, the button will be lower than the surface of the panel

# HE2B Redundant (Double) Basic Enabling Switch

## Key features:

- 3-position functionality (OFF – ON –OFF) as required for manual robotic control
- Ideally suited for use as enabling (aka "deadman") switch on teach pendants
- Provides a high level of safety based on human behavioral studies that determine personnel may squeeze OR let go when presented with a panic situation
- Snap acting contacts from Off→On (1→ 2)
- Positive action contacts from On→Off (2→ 3) ensure no contact welding (per EN60947-5-1 / IEC60947-5-1)
- Contacts will not re-close when released from Off→On (3→1) (per IEC60204-1; 9.2.5.8)
- Multiple contacts for enhanced reliability
- Monitoring contacts in addition to main load contacts
- Available with or without rubber cover (cover provides IP65 watertight seal)

(Monitor Switch)

IEC60947-5-8 3-POSITION ENABLING SWITCH INSIDE

## Part Numbers

| Style | | | Number of Contacts | | | Part Number |
|---|---|---|---|---|---|---|
| | | | 3 Position Switch | Push Monitor Switch | Return Monitor Switch | |
| | Without Rubber Cover | | 2 | 0 | 0 | HE2B-M200 |
| | | | 2 | 1 | 1 | HE2B-M211 |
| | | | 2 | 2 | 2 | HE2B-M222 |
| | With Rubber Cover | Yellow | 2 | 0 | 0 | HE2B-M200PY |
| | | | 2 | 1 | 1 | HE2B-M211PY |
| | | | 2 | 2 | 2 | HE2B-M222PY |
| | | Black | 2 | 0 | 0 | HE2B-M200PB |
| | | | 2 | 1 | 1 | HE2B-M211PB |
| | | | 2 | 2 | 2 | HE2B-M222PB |
| | | Gray | 2 | 0 | 0 | HE2B-M200PN1 |
| | | | 2 | 1 | 1 | HE2B-M211PN1 |
| | | | 2 | 2 | 2 | HE2B-M222PN1 |

## Accessories

### Replacement Rubber Cover

| Apperance | Color | Part Number | Material |
|---|---|---|---|
| | Yellow | HE9Z-D2Y | Silicon Rubber |
| | Black | HE9Z-D2B | |
| | Gray | HE9Z-D2N1 | NBR/PVC Polyblend |

## Specifications

| | | |
|---|---|---|
| Conforming to Standards | | UL508 (UL recognized), CSA C22.2, No. 14 (c-UL recognized), IEC/EN 60947-5-1, IEC/EN 60947-5-8 (TÜV approval) |
| Application Standards | | ISO 12100-1, -2, EN 12100-1, 2 / EN 292, IEC 60204-1 / EN 60204-1 ISO11161 / prEN 11161, ISO10218 / EN 775, ANSI / RIA R15.06, ANSI B11.19 |
| Operating Temperature | | –25 to +60°C (no freezing) |
| Operating Humidity | | 45 to 85% RH (no condensation) |
| Storage Temperature | | –40 to +80°C (no freezing) |
| Pollution Degree | | 2 (inside of panel/contact side) |
| | | 3 (outside of panel/operating side) |
| Contact Resistance | | 50mΩ maximum |
| Insulation Resistance | | Between live and dead metal parts: 100MΩ maximum |
| | | Between positive and negative live parts: 100MΩ minimum |
| Impulse Withstand Voltage | | 2.5kV |
| Operating Frequency | | 1200 operations/hour |
| Mechanical Life | | Position 1→2: 1,000,000 operations minimum<br>Position 1→2→3→1: 100,000 operations minimum |
| Electrical Life | | 100,000 (at full rated load) |
| Shock Resistance | Operating Extremes | 150m/s$^2$ (15 G) |
| | Damage Limits | 1000m/s$^2$ (100 G) |
| Vibration Resistance | Operating Extremes | 5 to 55Hz, amplitude 0.5mm minimum |
| | Damage Limits | 16.7Hz, amplitude 1.5mm minimum |
| Terminal | | 0.110" quick connect / solder terminal |
| Recommended Wire Size | | 0.5mm$^2$ maximum / 1 line (20AWG) |
| Solder Heat Resistance | | 310 ~ 350°C / 3 seconds maximum |
| Terminal Pulling Strength | | 20N minimum |
| Recommended Screw Torque | | 0.5 to 0.8Nm |
| Degree of Protection | | with rubber cover: IP65,<br>without rubber cover: IP40 (IEC 60529), |
| Conditional Short-Circuit Current | | 50A (250V) |
| Recommended Short Circuit Protection | | 250V/10A fast blow fuse (IEC 60127-1) |
| Circuit Opening Force | | 60N minimum (button return monitor & button push monitor) |
| Actuating Force (Operating) | | 500N minimum |
| Weight | | Approx. 26g (without cover), 30g (with cover) |

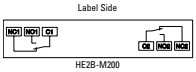
## Contact Ratings

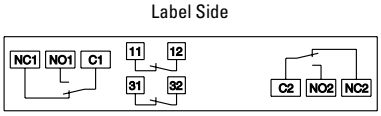
| | | | | | | |
|---|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | | 250V | | |
| Thermal Current (Ith) | | | | 3A | | |
| Rated Operating Voltage (Ue) | | | | 30V | 125V | 250V |
| Rated Operating Current (Ie) | 3 Position Switch | AC | Resistive Load (AC-12) | – | 1A | 0.5A |
| | | | Inductive Load (AC-15) | – | 0.7A | 0.5A |
| | | DC | Resistive Load (DC-12) | 1A | 0.2A | – |
| | | | Inductive Load (DC-13) | 0.7A | 0.1A | – |
| | Push/return Monitor Switch (NC Contacts) | AC | Resistive Load (AC-12) | – | 2.5A | 1.5A |
| | | | Inductive Load (AC-15) | – | 1.5A | 0.75A |
| | | DC | Resistive Load (DC-12) | 2.5A | 1.1A | 0.55A |
| | | | Inductive Load (DC-13) | 2.3A | 0.55A | 0.27A |
| Contact Configuration | 3 Position Switch | | | 2 contacts (DPDT) | | |
| | Return Monitor Switch | | | 0 ~ 2 contacts (NC) | | |
| | Push Monitor Switch | | | 0 ~ 2 contacts (NC) | | |

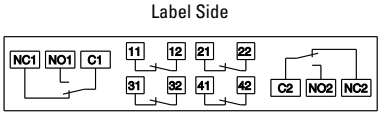
Minimum applicable load (reference) = AC/DC3V • 5mA (for reference only)

## Circuit Diagrams

### Terminal Circuit Diagrams (bottom view)

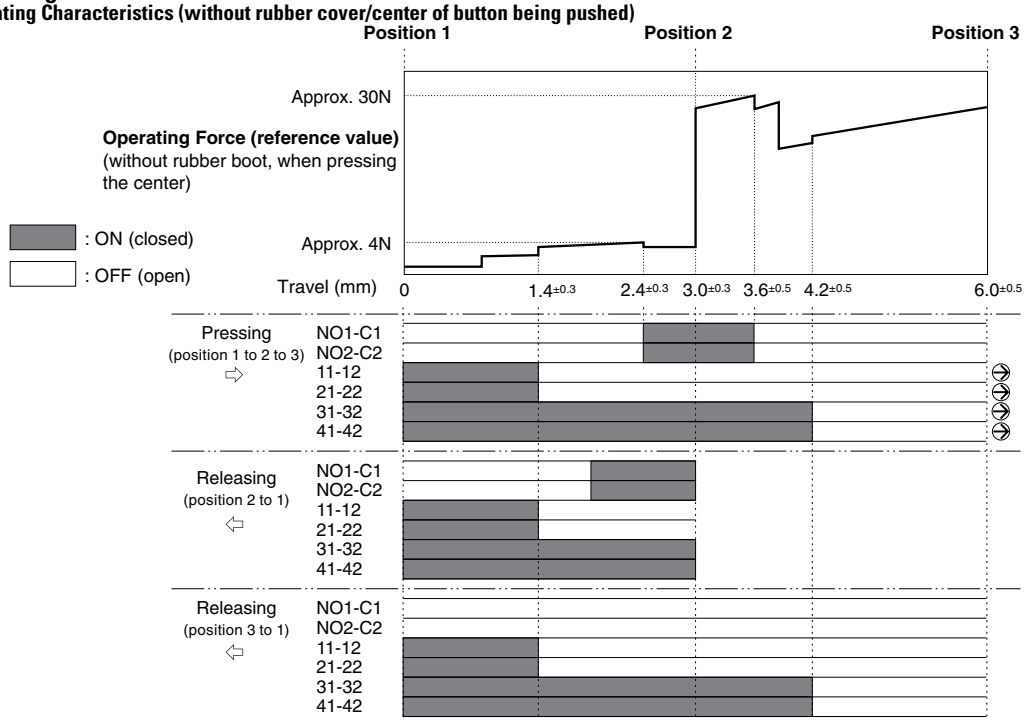



## Operating Characteristics

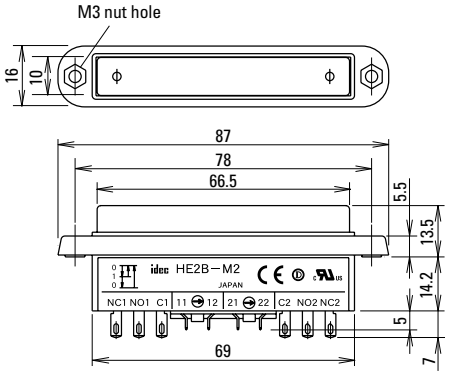
### Operating Characteristics (without rubber cover/center of button being pushed)



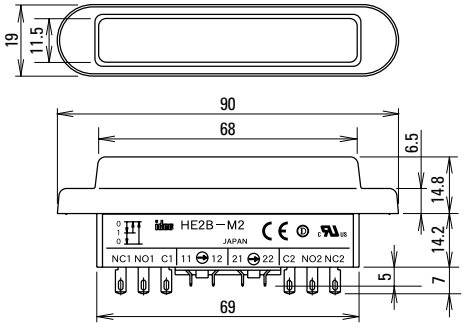

Using rubber boot will change the operating force depending on the operating temperature.

## Dimensions (mm)

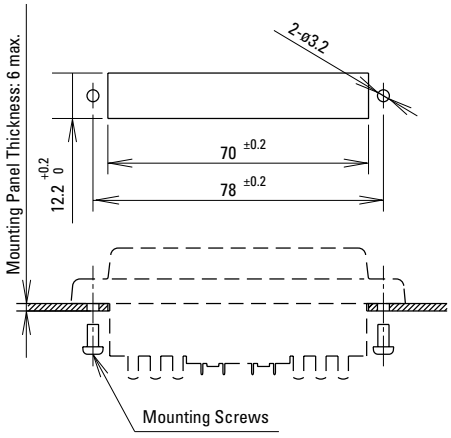
### Without Rubber Cover




### With Rubber Cover



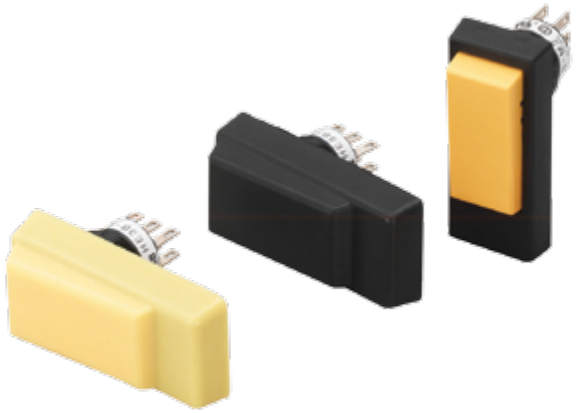

### Mounting Hole Layout



# HE3B ø16mm Redundant Contact Switch

**Key features:**

- 3-position functionality (OFF – ON – OFF) as required for manual robotic control
- Provides a high level of safety based on human behavioral studies that determine personnel may squeeze OR let go when presented with a panic situation
- Contacts will not re-close when released from Off→On (3→1) (per IEC60204-1; 9.2.5.8)
- Multiple contacts for enhanced reliability
- Snap acting contacts from position 1 to 2
- Available with or without rubber cover



## Part Numbers

| Style | | | Part Numbers |
|---|---|---|---|
| | Without Rubber Cover | | HE3B-M2 |
| | With Rubber Cover | Yellow | HE3B-M2PY |
| | | Black | HE3B-M2PB |
| | | Gray | HE3B-M2PN1 |

## Accessories

### Replacement Rubber Cover

| Appearance | Color | Part Number | Material |
|---|---|---|---|
| | Yellow | HE9Z-D3Y | Silicon Rubber |
| | Black | HE9Z-D3B | |
| | Gray | HE9Z-D3N1 | NBR/PVC polyblend |

### Lock Nut Tool

| Appearance | Part Number | Material |
|---|---|---|
| | MT-001 | Metal |

## Specifications

| | |
|---|---|
| Conforming to Standards | UL508 (UL recognized), CSA C22.2, No. 14 (c-UL recognized)<br>IEC/EN 60947-5-1, IEC/EN 60947-5-8 (TÜV approval) |
| Application Standards | ISO 12100-1, -2, EN 12100-1, 2, IEC 60204-1 / EN 60204-1<br>ISO 11161 / prEN 11161, ISO 10218 / EN 775<br>ANSI/RIA R15.06, ANSI B11.19 |
| Operating Temperature | –25 to +60˚C (no freezing) |
| Operating Humidity | 45 to 85% RH maximum (no condensation) |
| Storage Temperature | –40 to +80˚C (no freezing) |
| Pollution Degree | 2 (inside panel, terminal side)<br>3 (outside panel, operator side) |
| Contact Resistance | 50mΩ maximum |
| Insulation Resistance | Between live & dead metal parts:<br>100MΩ maximum |
| | Between positive & negative live parts:<br>100MΩ minimum |
| Impulse Withstand Voltage | 1.5kV |
| Operating Frequency | 1200 operations/hour |
| Mechanical Life | Position 1→2→1: 1,000,000 operations minimum |
| | Position 1→2→3→1: 100,000 operations minimum |

## Specifications con't

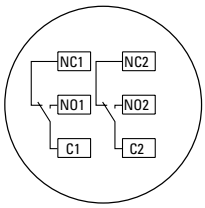
| | | |
|---|---|---|
| Electrical Life | | 100,000 operations minimum at rated load |
| Shock Resistance | Operating Extremes | 150m/s² (15 G) |
| | Damage Limits | 500m/s² (50 G) |
| Vibration Resistance | Operating Extremes | 5 to 55Hz, applitude 0.5mm minimum |
| | Damage Limits | 16.7Hz, applitude 1.5mm minimum |
| Terminal | | 0.110" quick connect / solder terminal |
| Recommended Wire Size | | 0.5mm² maximum / 1 line (20AWG) |
| Solder Heat Resistance | | 310 ~ 350°C / 3 seconds maximum |
| Terminal Pulling Strength | | 20N minimum |
| Recommended Screw Torque | | 0.68 to 0.88Nm |
| Degree of Protection | | with rubber cover: IP65,<br>without rubber cover: IP40 (IEC 60529) |
| Conditional Short-Circuit Current | | 50A (125V) |
| Recommended Short Circuit Protection | | 125V/10A fast blow fuse (IEC 60127-1) |
| Circuit Opening Force | | 500N minimum |
| Weight | | without rubber cover - Approx. 14g<br>with rubber cover - Approx. 18g |

## Contact Ratings

| | | | | |
|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | 125V | |
| Thermal Current (Ith) | | | 3A | |
| Rated Operating Voltage (Ue) | | | 30V | 125V |
| Rated Operating Current (Ie) | AC | Resistive Load (AC-12) | – | 1A |
| | | Inductive Load (AC-15) | – | 0.7A |
| | DC | Resistive Load (DC-12) | 1A | 0.2A |
| | | Inductive Load (DC-13) | 0.7A | 0.1A |
| Contact Configuration | | | 2 contacts (DPDT) | |
| Minimum Applicable Load | | | AC/DC5V 1mA reference | |

## Circuit Diagrams

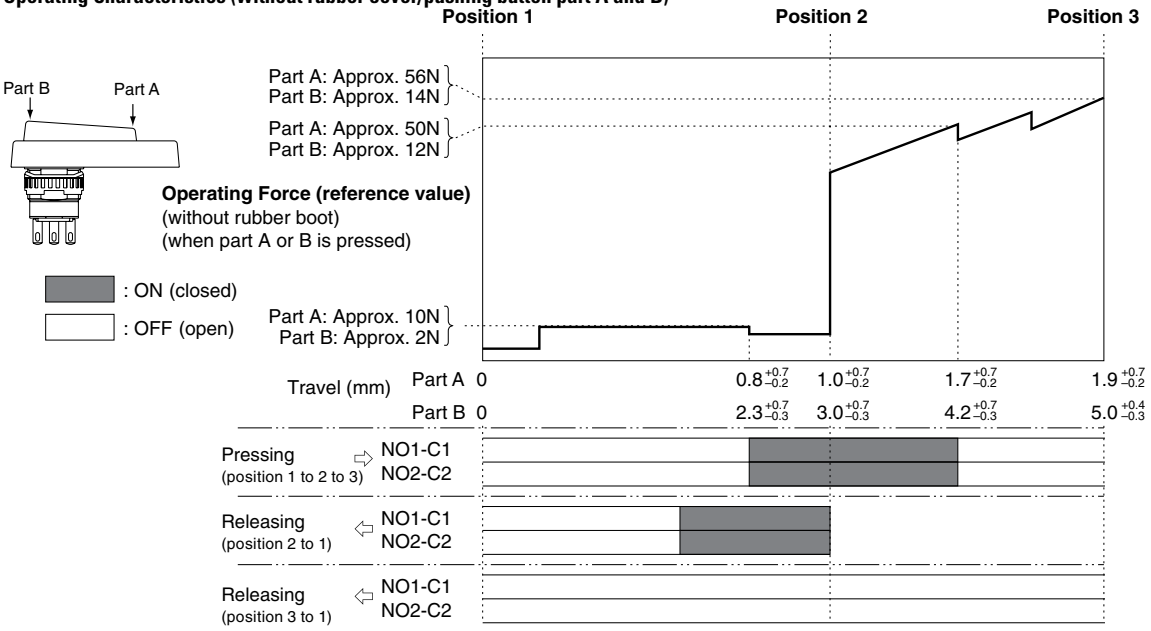
### Terminal Circuit Diagrams (bottom view)




1. 3 position switch: 2 contacts, terminal no. = between NO1-C1, between NO2-C2
2. Use between NO-C for OFF→ On→ OFF 3 position switch (NC is not used).

## Operating Characteristics

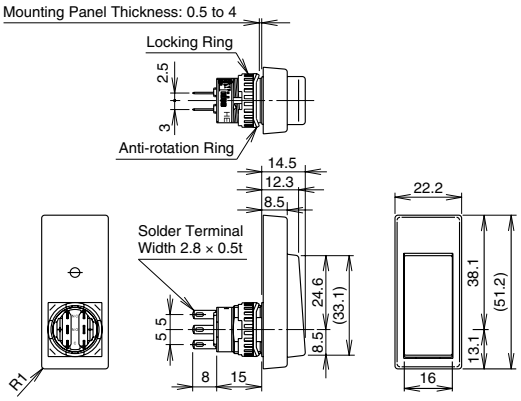
### Operating Characteristics (without rubber cover/pushing button part A and B)



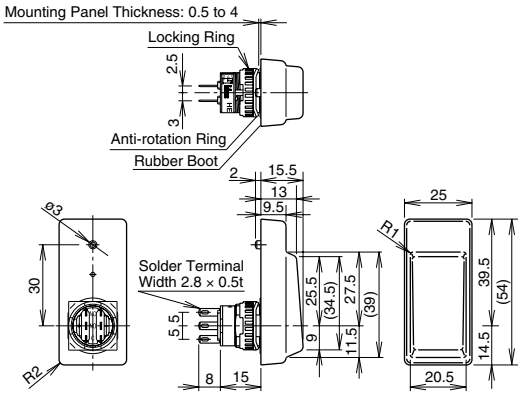

Using rubber boot will change the operating force depending on the operating temperature.

## Dimensions (mm)

### Without Rubber Cover

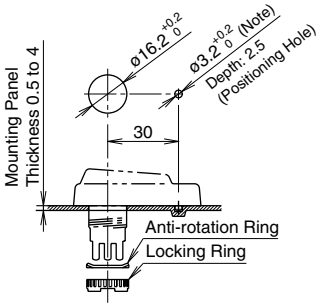



### With Rubber Cover




All dimensions in mm.

### Mounting Hole Layout




1. Recommended Lock Nut Torque: 0.68 to 0.88Nm.
2. Use a lock nut tool to screw on the lock nut (see page 399).
3. To retain the switches waterproof performance, do not penetrate the rubber cover.
4. Remove the rubber cover projection if you do not want a positioning hole. (Do not penetrate the rubber cover).

# HE5B ø16mm Redundant Contact Pushbutton Enabling Switch

## Key features:

- Ergonomically-designed OFF-ON-OFF 3-position operation
- Easy recognition of position 1 → 2 transition, made possible by snap action switch
- Sufficient load difference is provided for shifting from position 2 → 3
- Light force needed to maintain position 2, so that operators can easily use the enabling switch
- The switch does not turn ON when being released from position 3 (OFF when pressed) to position 1 (OFF when released) (IEC60204-1, 9.2.5.8)
- Two contacts are provided for safety
- IP65 (using the waterproof rubber cover)
- Mounts in a 16mm (5/8") round hole

## Part Numbers

| Style | | Color | Part Number |
|---|---|---|---|
| | Silicon Rubber | Yellow | HE5B-M2PY |
| | | Black | HE5B-M2PB |
| | NBR/PVC | Gray | HE5B-M2PN1 |

NBR/PVC cover comes in gray only.

## Accessories
### Replacement Rubber Cover

| Appearance | Part Number | Material | |
|---|---|---|---|
| | Silicon Rubber | Yellow | HE9Z-D5Y |
| | | Black | HE9Z-D5B |
| | NBR/PVC Polyblend | Gray | HE9Z-D5N1 |

### Lock Nut Tool

| Appearance | Part Number | Material |
|---|---|---|
| | MT-001 | Metal |

### Grip Housing

| Appearance | Part Number |
|---|---|
| | HE9Z-GSH51 |

See page 419 for more information.

## Specifications

| | |
|---|---|
| Conforming to Standards | UL508 (UL recognized), CSA C22.2, No. 14 (c-UL recognized)<br>IEC/EN 60947-5-1, IEC/EN 60947-5-8 (TÜV approval) |
| Application Standards | ISO 12100-1, -2, EN 12100-1, 2 / EN292, IEC 60204-1 / EN 60204-1,<br>ISO 11161 / prEN 11161, ISO 10218 / EN 775, ANSI/RIA R15.06, ANSI B11.19 |
| Operating Temperature | Silicon rubber boot: –25 to 60°C (no freezing)<br>NBR/PVC Polyblend rubber boot: –10 to 60°C (no freezing) |
| Relative Humidity | 45 to 85% RH (no condensation) |
| Storage Temperature | –40 to +80°C (no freezing) |
| Operating Environment | Degree of pollution: 2 (panel inside/terminal side)<br>Degree of pollution: 3 (panel outside/operator side) |
| Contact Resistance | 50 mΩ maximum (initial value) |
| Insulation Resistance (DC megger) | Between live and dead metal parts: 100 MΩ minimum<br>Between terminals of different pole: 100 MΩ minimum |
| Impulse Withstand Voltage | 1.5 kV |

## Specifications con't

| | |
|---|---|
| Operating Frequency | 1200 operations per hour |
| Mechanical Life | Position 1→ 2→ 1: 1,000,000 operations minimum<br>Position 1→ 2→ 3→ 1: 100,000 operations minimum |
| Electrical Life | 100,000 operations minimum |
| Shock Resistance | Operating extremes: 150 m/s² (15 G)<br>Damage limits: 500 m/s² (50 G) |
| Vibration Resistance | Operating extremes: 5 to 55 Hz, amplitude 0.5 mm minimum<br>Damage limits: 5 to 55 Hz, amplitude 0.5 mm minimum |
| Terminal Style | Solder Terminal |
| Recommended Wire Size | 0.5 mm² maximum per line (20AWG) |
| Solder Heat Resistance | 310 ~ 350°C, 3 seconds maximum |
| Terminal Pulling Strength | 20 N minimum |
| Recommended Tightening Torque of Locking Ring | 0.29 to 0.49 N·m |
| Degree of Protection | IP65 |
| Conditional Short-circuit Current | 50A (250V) (Use 250V/10A fast acting type fuse for short circuit protection.) |
| Operator Strength | 250N minimum (when pressing the entire surface of the operator) |
| Weight (approx.) | 9 g |

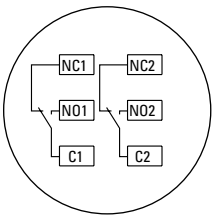
## Current Ratings

| | | | | |
|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | 125V | |
| Thermal Current (Ith) | | | 3A | |
| Rated Operating Voltage (Ue) | | | 30V | 125V |
| Rated Operating Current (Ie) | AC | Resistive Load (AC-12) | – | 0.5A |
| | | Inductive Load (AC-15) | – | 0.3A |
| | DC | Resistive Load (DC-12) | 1A | – |
| | | Inductive Load (DC-13) | 0.7A | – |
| Contact Configuration | | | 2 contacts (DPDT) | |

Minimum applicable load (reference): 5V AC/DC, 5mA.

## Circuit Diagrams

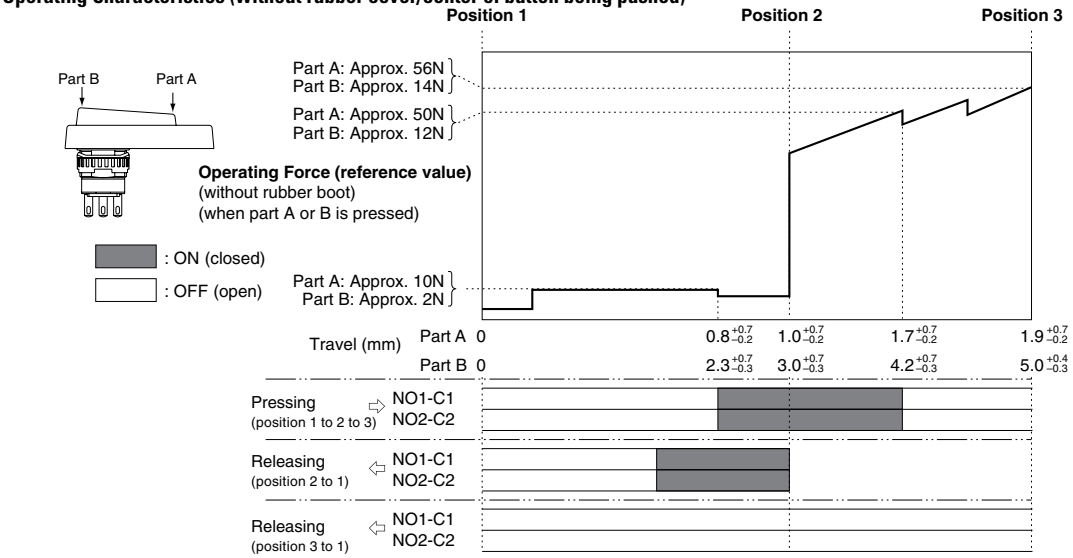
**Terminal Arrangement (Bottom View)**




1. 3 position switch: 2 contacts, terminal no. = between NO1-C1, between NO2-C2
2. Use between NO-C for OFF→ On→ OFF 3 position switch (NC is not used).

## Operating Characteristics

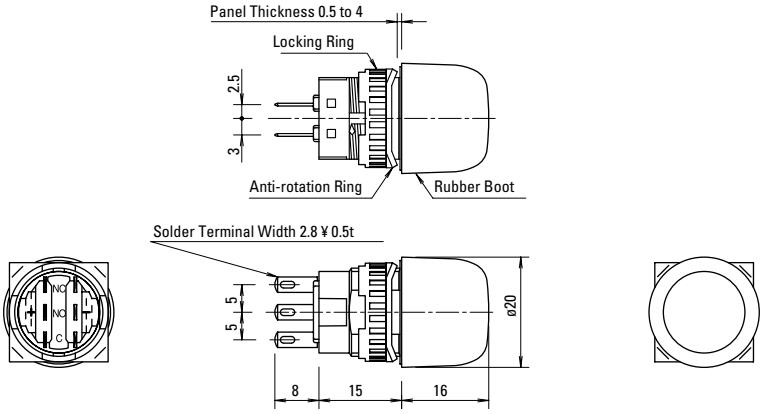
### Operating Characteristics (without rubber cover/center of button being pushed)



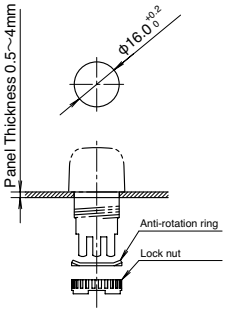

Operating load depends on ambient temperature.

## Dimensions (mm)

### With Rubber Cover




### Mounting Hole Layout




1. Recommended tightening torque for Locking Ring: 0.29 to 0.49 N·mm.
2. Use a lock nut tool to screw on the lock nut (see page 402).

# HE6B Enabling Switch

**Key features:**

- Ergonomically-designed OFF-ON-OFF operation.
- The switch does not turn ON while returning from position 3 (OFF) to position 1 (OFF)
- IEC 60204-1 (2005), 10.9
- IEC 60947-5-8 (2006), 7.1.9*
- Some teach pendants are equipped with two 3-position enabling switches, and when one switch is pressed to position 3 (OFF), the other switch must not enable machine operation even when pressed to position 2. Machine operation can resume after both switches are released. The monitoring switches monitor the OFF status of the 3-position enabling switch, whether the button is returned to position 1 or the button is pressed to position 3 (monitor switches have direct opening action mechanism.)
- Two contacts are provided in a 3-position enabling switch so that even if one contact fails, the other contact will still disable machine operation.
- The waterproof rubber boot provides IP65 protection.

* IEC 60947-5-8 Control circuit devices and switching elements – Three-position enabling switches

(Monitor Switch)

## Part Numbers

| Model | Contact Configuration/No. of Contacts | | | Color | Part Number |
|---|---|---|---|---|---|
| | 3-position Switch | Button Return Monitor Switch ⊖ | Button Depress Monitor Switch ⊖ | | |
| | 2 | 0 | 0 | Yellow | HE6B-M200Y |
| | | | | Black | HE6B-M200B |
| | 2 | 1 | 1 | Yellow | HE6B-M211Y |
| | | | | Black | HE6B-M211B |

## Accessories

### Replacement Rubber Cover

| Appearance | Color | Part Number | Material |
|---|---|---|---|
| | Yellow | HE9Z-D6Y | Silicon Rubber |
| | Black | HE9Z-D6B | |

## Specifications

| | |
|---|---|
| Conforming to Standards | IEC 60947-5-1/EN60947-5-1<br>IEC 60947-5-8/EN60947-5-8 (TÜV approved)<br>GS-ET-22 (TÜV approved)<br>UL508 (UL recognized)<br>CSA C22.2 No.14 (c-UL recognized) |
| Application Standards for Use | ISO 12100/EN ISO 12100,<br>IEC 60204-1/EN 60204-1,<br>ISO 11161/EN ISO 11161,<br>ISO 10218-1/EN ISO 10218-1,<br>ANSI/RIA/ISO 10218-1,<br>ANSI/RIA/R15.06, ANSI B 11.19<br>ISO 13849-1/EN ISO 13849-1 |
| Operating Temperature | –25 to +60°C (no freezing) |
| Relative Humidity | 45 to 85% RH (no condensation) |
| Storage Temperature | –40 to +80°C (no freezing) |
| Pollution Degree | 2 (inside panel, terminal side)<br>3 (outside panel, operator side) |
| Contact Resistance | 50mΩ maximum (initial value) |
| Insulation Resistance | Between live and dead metal parts:<br>100MΩ minimum (500V DC megger)<br>Between terminals of different poles:<br>10 MΩ minimum (500V DC megger) |
| Impulse Withstand Voltage | 1.5kV (3 position switch)<br>2.5kV (monitor switch) |
| Operating Frequency | 1200 operations per hour |
| Mechanical Life | Position 1→2→1: 1,000,000 operations minimum<br>Position 1→2→3→1: 100,000 operations minimum |
| Electrical Life | 100,000 operations minimum (rated load)<br>1,000,000 operations minimum<br>(24V AC/DC, 100 mA) |
| Shock Resistance | Operating extremes: 150m/s$^2$ (15G)<br>Damage limits: 500m/s$^2$ (50G) |
| Vibration Resistance | Operating extremes: 5 to 55 Hz, amplitude 0.5mm<br>Damage limits: 16.7Hz, amplitude 1.5mm |
| Terminal Style | Solder terminal |
| Applicable Wire Size | 1 cable, 0.5mm$^2$ maximum (20AWG wire) |
| Solder Terminal Heat Resistance | 310 to 350°C, 3 seconds maximum |
| Terminal Tensile Strength | 20N minimum |
| Locking Ring Recommended Tightening Torque | 0.5 to 0.8N·m |
| Degree of Protection | IP65 (IEC 60529) |
| Conditional Short-circuit Current | 50A (125V): 3-position switch<br>(Use 120V/10A fast acting type fuse for short circuit protection.) (IEC 60127-1)<br>50A (250V): monitor switch<br>(Use 250V/10A fast acting type fuse for short circuit protection.) (IEC 60127-1) |
| Direct Opening Force | 40N minimum (button release monitor and button depress monitor switches) |
| Direct Opening Stroke (when pressing the entire button surface) | 0.9mm minimum (button return monitor switch)<br>4.0mm minimum (button depress monitor switch) |
| Operator Strength | 250N minimum<br>(when pressing the entire button surface) |
| Weight (approx.) | 17g |

## Current Ratings

| | | | | | | |
|---|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | | 125V (monitor switch: 250V) | | |
| Rated Thermal Current (Ith) | | | | 3A | | |
| Rated Voltage (Ue) | | | | 30V | 125V | 250V |
| Rated Current (Ie) | 3-position switch | AC | Resistive Load (AC-12) | – | 0.5A | – |
| | | | Inductive Load (AC-15) | – | 0.3A | – |
| | | DC | Resistive Load (DC-12) | 1A | – | – |
| | | | Inductive Load (DC-13) | 0.7A | – | – |
| | Button return monitor switch<br>Button depress monitor switch (NC) | AC | Resistive Load (AC-12) | – | 2.5A | 1.5A |
| | | | Inductive Load (AC-15) | – | 1.5A | 0.75A |
| | | DC | Resistive Load (DC-12) | 2.5A | 1.1A | 0.55A |
| | | | Inductive Load (DC-13) | 2.3A | 0.55A | 0.27A |
| Contact Configuration | | 3-position switch | | 2 contacts | | |
| | | Button return monitor switch | | 0 or 1 contact | | |
| | | Button depress monitor switch | | 0 or 1 contact | | |

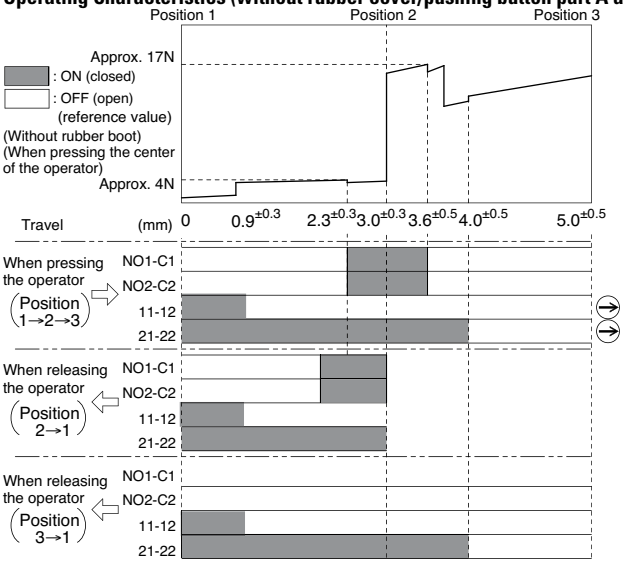
TÜV ratings:
3 position switch:
AC-12 125V/0.5A
DC-12 30V/1A
DC-13 30V/0.7A
Monitor Switch:
AC-15 250V/0.5A
DC-13 125V/0.22A
DC-13 30V/1A

UL ratings:
3-position switch:
125V AC/0.5A (Resistive)
30V DC/1A (Resistive)
Monitor switch:
250V AC/0.5A (General use)
30V DC/1A (General use)

Minimum applicable load (reference value): 3V AC/DC, 5mA (Applicable operation area depends on the operating conditions and load.)

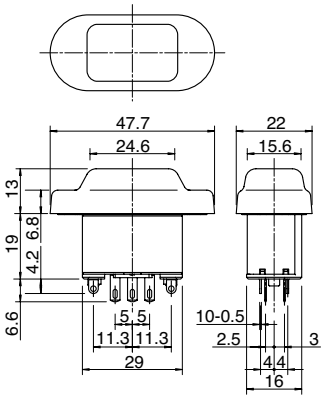
## Operating Characteristics

### Operating Characteristics (without rubber cover/pushing button part A and B)

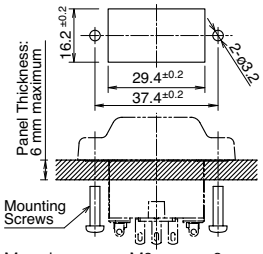



Notes: When a rubber boot is used, the operating force depends on the operating temperature.

## Dimensions (mm)

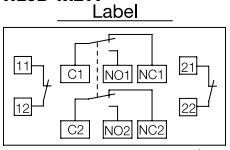



### Mounting Hole Layout




Mounting screws: M3 screw × 2
(not attached and must be supplied by the user)
Mounting screw length: 5 to 6 mm (panel thickness + gasket)

### Terminal Arrangement (bottom view)
### HE6B-M211




3-position switch 2 contacts [1]
Button return monitor switch: 1 contact, terminals 11-12
Button depress monitor switch: 1 contact, terminals 21-22
There are no terminals 11-22 and 21-22 for HE6B-M200 type.
[1]Use NO and C terminals for OFF → ON → OFF 3-position switch
(NC terminal is not used.)

# HE1G Basic Grip Enabling Switch

## Key features:

- 3 position functionality (Off – On – Off) as required for manual robotic control
- Ideally suited for use as an enabling (aka "deadman") switch for robotic cells
- Provides a high level of safety based on human behavioral studies that determine personnel may squeeze OR let go when presented with a panic situation
- Contacts will not re-close when released from Off → On (3 → 1) (per IEC60204-1; 9.2.5.8)
- Optional E-Stop switch built in
- Connection for conduit and cable strain relief built in
- IP66 waterproof sealing
- Meets ANSI RIA 15.06 robotics standards
- Optional momentary pushbutton or E-Stop built in

(HE1B installed)

## Part Numbers

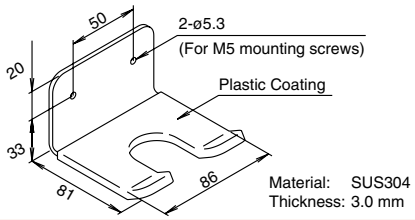
| Contact Configuration | | | Rubber Boot | Part No. |
|---|---|---|---|---|
| 3-position Switch | Monitor Switch | Pushbutton | | |
| 2 contacts | With (1NC) | – | Silicon Rubber / yellow | HE1G-21SM |
| | | | NBR/PVC Polyblend / gray | HE1G-21SM-1N |
| | | Momentary Pushbutton (1NO) (1NO: AB6M-M1PB) | Silicon Rubber / yellow | HE1G-21SMB |
| | | | NBR/PVC Polyblend / gray | HE1G-21SMB-1N |
| | Without | Emergency Stop Switch (2NC) (2NC: HA1E-V2S2R) | Silicon Rubber / yellow | HE1G-20ME |
| | | | NBR/PVC Polyblend / gray | HE1G-20ME-1N |
| | | Momentary Pushbutton (2NO) (2NO: AB6M-M2PB) | Silicon Rubber / yellow | HE1G-20MB |
| | | | NBR/PVC Polyblend / gray | HE1G-20MB-1N |

## Accessories

### Replacement Rubber Cover

| Appearance | Part Number | Material | Color |
|---|---|---|---|
| | HE9Z-GBK1 | Silicon Rubber | Yellow |
| | HE9Z-GBK1-1N | NBR/PVC | Gray |

### Mounting Plate (secures grip switch)

| Appearance | Part Number | Material |
|---|---|---|
|   | HE9Z-GH1 | Metal |

## Specifications

| | |
|---|---|
| Conforming to Standards | UL508 (UL listed), CSA C22.2, No. 14 (c-UL listed), IEC/EN 60947-5-1 (TÜV/BG approval), GS-ET-22 (TÜV/BG approval) |
| Applicable Standards | ISO 12100-1, -2, EN12100-1, -2, IEC 60204-1 / EN 60204-1, ISO11161 / prEN11161, ISO 10218 / EN 775, ANSI/RIA R15.06, ANSI B11.19 |
| Operating Temperature | –25 to +60°C (no freezing) |
| Operating Humidity | 45 to 85% RH maximum (no condensation) |
| Storage Temperature | –40 to +80°C (no freezing) |
| Pollution Degree | 3 |
| Contact Resistance | 100mΩ maximum |
| Insulation Resistance | Between live & dead metal parts: 100MΩ maximum<br>Between positive & negative live parts: 100MΩ minimum |

## Specifications con't

| | | |
|---|---|---|
| Impulse Withstand Voltage | | 2.5kV |
| Operating Frequency | | 1200 operations/hour |
| Mechanical Life | | Position 1→ 2→ 1: 1,000,000 operations minimum |
| | | Position 1→ 2→ 3→ 1: 100,000 operations minimum |
| Electrical Life | | 100,000 minimum at rated load |
| Shock Resistance | Operating Extremes | 150m/s² (15 G) |
| | Damage Limits | 1000m/s² (100 G) |
| Vibration Resistance | Operating Extremes | 5 to 55Hz, amplitude 0.5mm minimum |
| | Damage Limits | 16.7Hz, amplitude 1.5mm minimum |
| Recommend Wire Size | | 0.14 to 1.5mm² (24AWG - 16AWG) |
| Recommend Cable Size | | ø7 to 13mm |
| Conduit Size | | M20 |
| Terminal Pulling Strength | | 20N minimum |
| Terminal Screw Torque | | 0.5 to 0.6Nm |
| Degree of Protection | | HE1G-21SM: IP66, HE1G-20MB: IP65<br>HE1G-20ME: IP65, HE1G-21SMB: IP65 |
| Conditional Short Circuit Current | | 50A (250V) |
| Recommended Short Circuit Protection | | 250V/10A fast blow fuse (IEC 60127-1) |
| Weight (approx.) | | HE1G-21SM: 210g<br>HE1G-20ME: 250g<br>HE1G-20MB/HE1G-21SMB: 220g |

## Contact Ratings

| | | | | | | |
|---|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | | 250V | | |
| Thermal Current (Ith) | | | | 3A | | |
| Rated Operating Voltage (Ue) | | | | 30V | 125V | 250V |
| Rated Operating Current (Ie) | 3 Position Switch (Terminal No.1-2, 3-4) | AC | Resistive Load (AC-12) | – | 3A | 1.5A |
| | | | Inductive Load (AC-15) | – | 1.5A | 0.75A |
| | | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |
| | Monitor Switch (Terminal No. 5-6 of HE1G-21SM) | AC | Resistive Load (AC-12) | – | 2A | 1A |
| | | | Inductive Load (AC-15) | – | 1A | 0.5A |
| | | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |
| | Emergency Stop Pushbutton (Terminal No. 5-6, 7-8 of HE1G-20ME) | AC | Resistive Load (AC-12) | – | – | – |
| | | | Inductive Load (AC-15) | – | – | 0.5A |
| | | DC | Resistive Load (DC-12) | – | – | – |
| | | | Inductive Load (DC-13) | – | – | 0.1A |

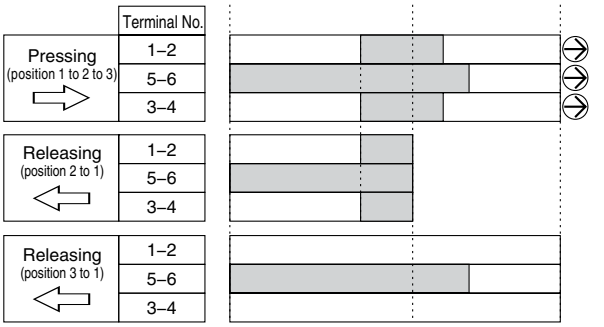
| | | |
|---|---|---|
| Contact Configuration | 3 Position Switch | 2 Contacts |
| | Monitor Switch | 0 or 1 Contact |
| | Emergency Stop Pushbutton | 0 or 2 Contacts |
| | Momentary Pushbutton | 0 to 2 contacts |

The minimum load (reference) = AC/DC3V • 5mA (for reference only.

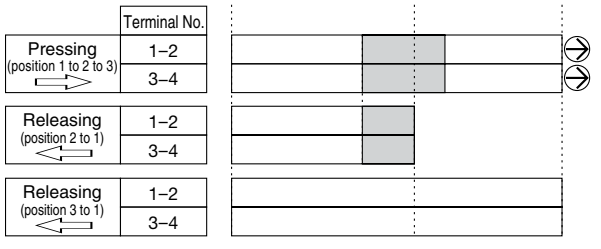
## Operating Characteristics

### Contact Movement

**HE1G-21SM**

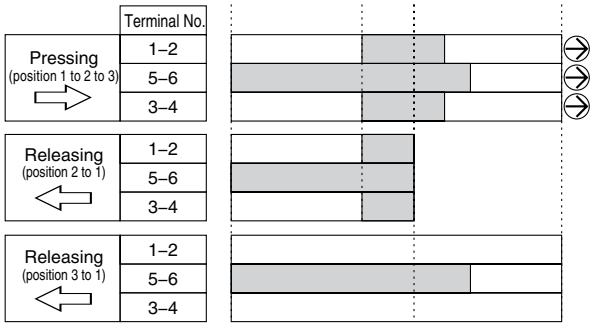



**HE1G-20ME**



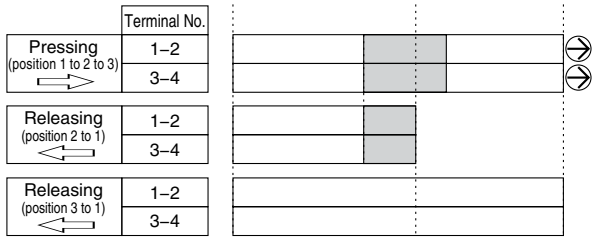

\+
Emergency Stop Switch: 2NC contact (terminal no. 5-6, 7-8)

**HE1G-21SMB**




\+
Momentary Pushbutton: 1NO contact (terminal no. 7-8)

**HE1G-20MB**



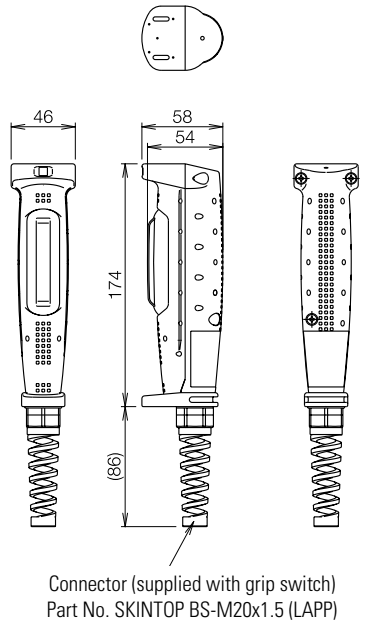

\+
Momentary Pushbutton: 2NO contact (terminal no. 5-6, 7-8)

: contact ON (closed) : contact OFF (open)

Notes:
1. 3-position switches operate with direct opening action ⊖ when shifting from position 2 to position 3.
2. For the output of the enabling device, use terminals 1-2 and 3-4.
3. The above operation characteristics show when the center of the button is pressed. Pressing the edge of a button turns on one contact earlier than the other contact, causing a delay in operation.

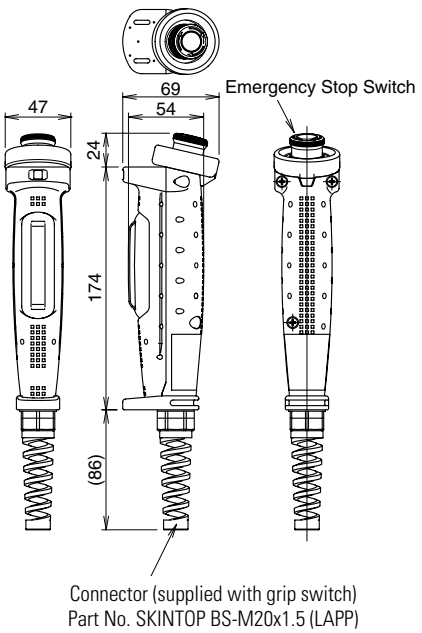
## Dimensions (mm)

**HE1G-21SM**



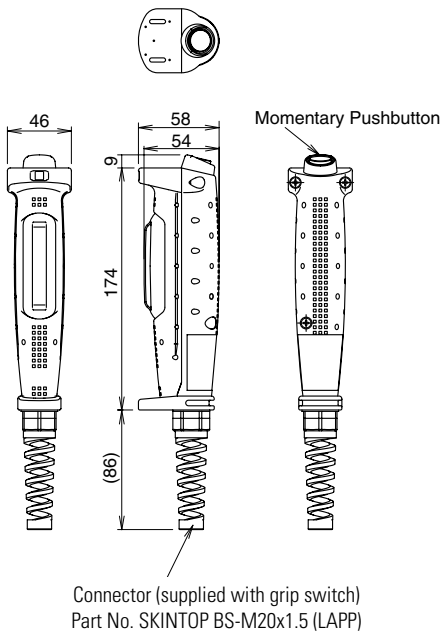

Connector (supplied with grip switch)
Part No. SKINTOP BS-M20x1.5 (LAPP)

**HE1G-20ME**




Connector (supplied with grip switch)
Part No. SKINTOP BS-M20x1.5 (LAPP)

**HE1G-20MB/21SMB**



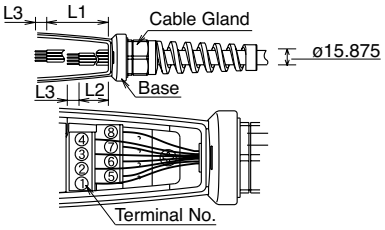

Connector (supplied with grip switch)
Part No. SKINTOP BS-M20x1.5 (LAPP)

## Wiring Precautions

### HE1G

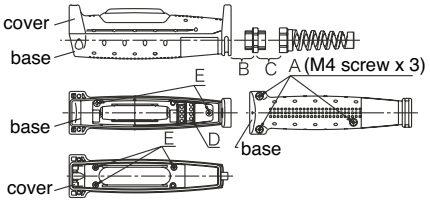
- Wire Stripping Information

| Wire Length | Terminal Number 1-4 | Terminal Number 5-8 |
|---|---|---|
| L1, L2 (mm) | L1=40mm | L2=27mm |
| L3 (mm) | L3=6mm | |




- Applicable Wire Size:0.14 to 1.5mm² (24 - 16AWG, one wire per terminal)

- Recommended Torque




| | See Drawing Above | Recommended Torque |
|---|---|---|
| Rubber Boot & Base | A | 1.2±0.1Nm |
| Connector & Grip Switch | B | 4.0±0.3Nm |
| Connector | C | 4.0±0.3Nm |
| Terminal Screw | D | 0.5±0.6Nm |
| Do Not Remove | E | |

# HE1G-L Light Force Grip Enabling Switch

## Key features:

- 3 position functionality (Off – On – Off) as required for manual robotic control
- Ideally suited for use as an enabling (aka "deadman") switch for robotic cells
- Provides a high level of safety based on human behavioral studies that determine personnel may squeeze OR let go when presented with a panic situation
- Contacts will not re-close when released from Off → On (3 → 1) (per IEC60204-1; 9.2.5.8)
- Optional E-Stop switch built in
- Connection for conduit and cable strain relief built in
- IP66 waterproof sealing
- Meets ANSI RIA 15.06 robotics standards
- Optional momentary pushbutton
- Distinctive tactile feedback when shifting to position 2 (enabling position)
- Lighter operating force to on position

LISTED
(screw terminal)

(Monitor Switch)

## Variation

In addition to a monitoring switch, the HE1G grip switch is also available with an emergency stop switch or a momentary pushbutton. Screw terminal and wire-saving internal connector models can be selected.

## Part Numbers

| Contact Configuration | | | | Rubber Boot | Part Numbers | |
|---|---|---|---|---|---|---|
| 3-position Switch | Monitor Switch | Additional Pushbutton Switch | | | Screw Terminals | Internal Connector |
| 2 contacts | With (1NC) | Without | | Yellow[1] | HE1G-L21SM | HE1G-L21SMC |
| | | | | Gray[2] | HE1G-L21SM-1N | HE1G-L21SMC-1N |
| | | Momentary Pushbutton Switch (1NO: AB6M-M1PB) | | Yellow[1] | HE1G-L21SMB | HE1G-L21SMCB |
| | | | | Gray[2] | HE1G-L21SMB-1N | HE1G-L21SMCB-1N |
| | Without | Emergency Stop Switch (2NC: HA1E-V2S2R) | | Yellow[1] | HE1G-L20ME | HE1G-L20MCE |
| | | | | Gray[2] | HE1G-L20ME-1N | HE1G-L20MCE-1N |
| | | Momentary Pushbutton Switch (2NO: AB6M-M2PB) | | Yellow[1] | HE1G-L20MB | HE1G-L20MCB |
| | | | | Gray[2] | HE1G-L20MB-1N | HE1G-L20MCB-1N |

1: Yellow silicon rubber: Can be used in general factories. Remains flexible at cold temperatures. Suitable to applications in a wide operating temperature range.
2: Gray NBR/PVC polyblend: Oil-proof. Suitable for environments subjected to machine oil and painting robot where silicon rubber cannot be used.

## Specifications

| | |
|---|---|
| Applicable Standards | UL508 (UL listed, screw terminal only)<br>CSA C22.2, No. 14 (c-UL listed, screw terminal only)<br>IEC/EN 60947-5-1 (TÜV/BG approval)<br>GS-ET-22 (TÜV/BG approval) |
| Applicable Standards for Use | ISO 12100-1, -2, IEC 60204-1/EN 60204-1, ISO11161 / prEN11161, ISO 10218 / EN 775, ANSI/RIA R15.06, ANSI B11.19 |
| Operating Temperature | Silicon rubber boot: –25 to 60°C (no freezing)<br>NBR/PVC Polyblend rubber boot: –10 to 60°C (no freezing) |
| Relative Humidity | 45 to 85% (no condensation) |
| Storage Temperature | –40 to +80°C (no freezing) |
| Pollution Degree | 3 |
| Contact Resistance | 100 mΩ maximum (initial value) |
| Insulation Resistance | Between live and dead metal parts: 100 MΩ minimum (500V DC megger)<br>Between terminals of different pole: 100 MΩ minimum (500V DC megger) |
| Impulse Withstand Voltage | Screw terminal: 2.5 kV (momentary pushbuttons: 1.5 kV)<br>Internal connector: 1.5 kV |
| Electric Shock Protection Class | Class II (IEC 61140) |
| Operating Frequency | 1,200 operations per hour |
| Mechanical Life | Position 1→2→1: 1,000,000 operations minimum<br>Position 1→2→3→1: 100,000 operations minimum |
| Electrical Life | 100,000 operations minimum (rated load)<br>1,000,000 operations minimum (24V AC/DC, 100 mA) |
| Shock Resistance | Operating extremes: 150 $m/s^2$<br>Damage limits: 1,000 $m/s^2$ |
| Vibration Resistance | Operating extremes: 5 to 55 Hz, amplitude 0.5 mm minimum<br>Damage limits: 16.7 Hz, amplitude 1.5 mm minimum |
| Applicable Wire Size | Screw terminal: 0.14 to 1.5 mm2 (AWG16 to 24)<br>Internal connector: 0.05 to 0.86 mm2 (AWG18 to 30) |
| Applicable Cable | Outside diameter ø7 to 13 mm |
| Conduit Port Size | M20 (cable gland is supplied with the grip style enabling switch) |
| Terminal Tensile Strength | 20N minimum |
| Terminal Screw Tightening Torque | 0.5 to 0.6 N·m |
| Degree of Protection | HE1G-L21SM: IP66 (IEC 60529)<br>HE1G-L20ME: IP65 (IEC 60529)<br>HE1G-L20MB: IP65 (IEC 60529)<br>HE1G-L21SMB: IP65 (IEC 60529) |
| Conditional Short-circuit Current | 50A (250V) (Use 250V/10A fast-blow fuse for short circuit protection.) |
| Direct Opening Force | 70N minimum (monitor switch) |
| Operator Strength | 500N minimum (when pressing the entire button surface) |
| Weight (approx.) | HE1G-L21SMC: 190g<br>HE1G-L21SM/L21SMCB/L20MCB: 200g<br>HE1G-L21SMB/L20MB: 210g<br>HE1G-L20MCE: 230g<br>HE1G-L20ME: 240g |

See grip switch catalog for complete list of specifications.

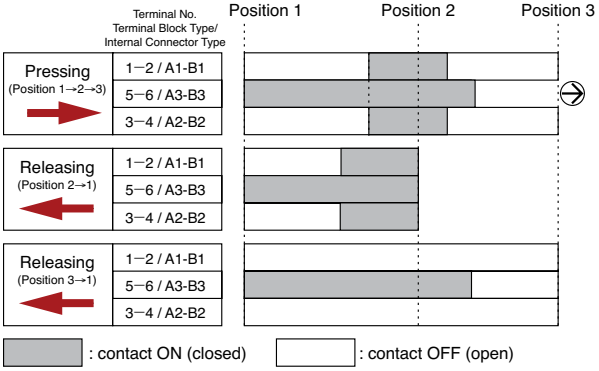
## Contact Ratings

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | | | 250V (momentary pushbutton: 125V) | | |
| Rated Thermal Current (Ith) | | | | | 2.5A (Note) | | |
| Rated Voltage (Ue) | | | | | 30V | 125V | 250V |
| Rated Current (Ie) | Grip Style Enabling Switch | 3-position Switch (Terminal No.1-2/A1-B1,3-4/A2-B2) | AC | Resistive Load (AC-12) | — | 1A | 0.5A |
| | | | | Inductive Load (AC-15) | — | 0.7A | 0.5A |
| | | | DC | Resistive Load (DC-12) | 1A | 0.2A | — |
| | | | | Inductive Load (DC-13) | 0.7A | 0.1A | — |
| | | Monitor Switch (HE1G-L21SM/ HE1G-L21SMB, Terminal No.5-6/A3-B3) | AC | Resistive Load (AC-12) | — | 2A | 1A |
| | | | | Inductive Load (AC-15) | — | 1A | 0.5A |
| | | | DC | Resistive Load (DC-12) | 2.5A | 1.1A | 055A |
| | | | | Inductive Load (DC-13) | 2.3A | 0.55A | 0.27A |
| | Pushbutton | Emergency Sop Switch (HE1G-L20M, Terminal No. 5-6/A3-B3, 7-8/A4-B4) | AC | Resistive Load (AC-12) | — | — | — |
| | | | | Inductive Load (AC-15) | — | — | 0.5A |
| | | | DC | Resistive Load (DC-12) | — | — | — |
| | | | | Inductive Load (DC-13) | — | — | 0.1A |
| | | Momentary Puhsbutton (HE1G-L20M, Terminal No.5-6/A3-B3,7-8/A4-B4) (HE1G-L21SM, Terminal No.7-8/A4-B4) | AC | Resistive Load (AC-12) | — | 0.5A | — |
| | | | | Inductive Load (AC-15) | — | 0.3A | — |
| | | | DC | Resistive Load (DC-12) | 1A | 0.2A | — |
| | | | | Inductive Load (DC-13) | 0.7A | 0.1A | — |

Minimum applicable load (reference value): 3V AC/DC, 5 mA (Applicable range is subject to the operating conditions and load.)
Note: Operating temp. 40 to up to +50°C (not included): 2A (4 circuits) 50 to +60°C: 1.5A (3 or 4 circuits)

## Operating Characteristics

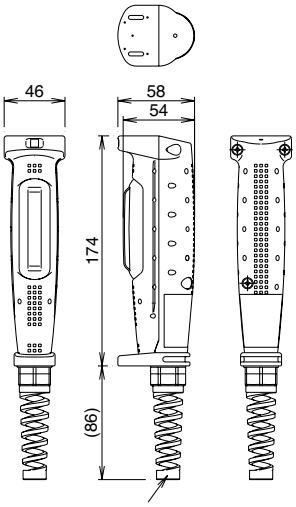
**HE1G-L21SM, HE1G-L21SMC, HE1G-L21SM-1N, HE1G-L21SMC-1N**




Terminals 1-2/A1-B1 and 3-4/A2-B2 are outputs of the 3-position enabling switch.
Terminals 5-6/A3-B3 are outputs of the monitor switch.
The above operation characteristics show when the center of the grip switch button is pressed. Because two contacts are designed to operate independently, pressing the edge of the button turns on one contact earlier than the other contact, causing a delay in operation. To avoid this, always press the center of the button.

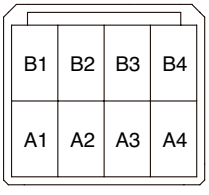
## Dimensions (mm)

**HE1G-L21SM, HE1G-L21SMC, HE1G-L21SM-1N, HE1G-L21SMC-1N**




Cable Gland (supplied with grip switch)
Type No.: SKINTOP BS-M20 × 1.5 (LAPP)

## Internal Connector Terminal No.

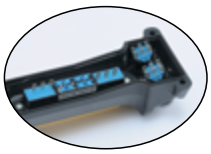


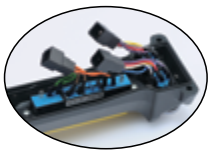

Connector
Tyco Electronics D-1200D series
Receptacle housing: 1-1827864-4
Receptacle contact
1827586-2: AWG28 to 30
(Hand tool: 1762952-1)
1827587-2: AWG22 to 28
(Hand tool: 1762846-1)
1827588-2: AWG22 to 28
(Hand tool: 1762950-1)
1827589-2: AWG18 to 22
(Hand tool: 1762625-1)

# HE2G Compact Grip Enabling Switch

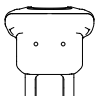
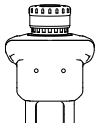
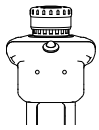
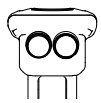
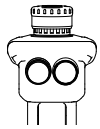
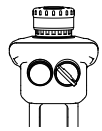
**Key features:**

- New compact, light-weight grip switch provides a comfortable hold
- Compact design fits comfortably in the hand
- Light operating force ensures worry-free operation
- 3-position switch with distinctive tactile feedback
- Dual enabling contacts ensure a high level of safety





## Part Numbers

| Additional Control Units | | Rubber Boot Color | Solder Terminal | Internal Connector |
|---|---|---|---|---|
| None |  | Yellow | HE2G-21SH | HE2G-21SC |
| | | Gray | HE2G-21SH-1N | HE2G-21SC-1N |
| Estop |  | Yellow | HE2G-21SHE | – |
| Estop and Green Pilot Light |  | | HE2G-21SHE-P-0 | |
| Two Momentary Pushbuttons |  | | HE2G-21SH-L-L | |
| E-Stop and Two Momentary Pushbuttons |  | | HE2G-21SHE-L-L | HE2G-21SCE-L-L |
| E-Stop, Momentary Pushbutton and Key Switch |  | | HE2G-21SHE-L-K | HE2G-21SCE-L-K |

1. Additional control units installed on the HE2G are as follows:
   Emergency Stop Switch: XA1E-BV3U02R
   Momentary Pushbutton: AB6M-M2PLW
   Key Selector Switch: AS6M-2KT2PA Pilot Light: UP9P-2498G
2. Silicon rubber: Can be used in general factories. Remains flexible in cold temperatures. Suitable in applications with a wide operating temperature range.
3. NBR/PVC polyblend: Oil-proof. Suitable for environments subjected to machine oil and painting robots where silicon rubber cannot be used.

## Specifications

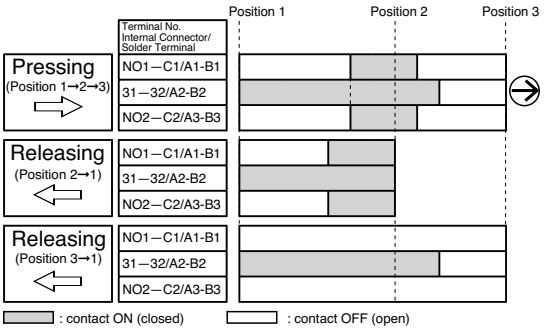
| | |
|---|---|
| Applicable Standards | UL508 (UL recognition)<br>CSA C22.2, No. 14 (c-UL recognition)<br>IEC/EN 60947-5-1 (TÜV)<br>GS-ET-22 (TÜV approval) |
| Applicable Standards for Use | ISO 12100-1, -2<br>IEC 60204-1/EN 60204-1<br>ISO11161 / prEN11161<br>ISO 10218 / EN 775<br>ANSI/RIA R15.06<br>ANSI B11.19 |
| Operating Temperature | Silicon rubber boot: –25 to 60°C (no freezing)<br>NBR/PVC Polyblend rubber boot: –10 to 60°C (no freezing) |
| Relative Humidity | 45 to 85% (no condensation) |
| Storage Temperature | –40 to +80°C (no freezing) |
| Pollution Degree | 3 |
| Contact Resistance | 50 mΩ maximum (initial value) |
| Insulation Resistance | Between live and dead metal parts: 100 MΩ minimum (500V DC megger)<br>Between terminals of different pole: 100 MΩ minimum (500V DC megger) |
| Impulse Withstand Voltage | (Solder terminal)<br>Grip style enabling switch/emergency stop switch: 2.5 kV<br>Momentary pushbutton/key selector switch: 1.5 kV<br>Pilot light: 500V AC, 1 minute (between live and dead parts)<br>(Internal connector)<br>Grip style enabling switch/emergency stop switch/momentary pushbutton/key selector switch: 1.5 kV |
| Electric Shock Protection Class | Class II (IEC 61140) (With pilot light: class III) |
| Operating Frequency | 1,200 operations per hour |
| Mechanical Life | Position 1 → 2 → 1: 1,000,000 operations minimum<br>Position 1 → 2 → 3 → 1: 100,000 operations minimum |
| Electrical Life | 100,000 operations minimum (rated load)<br>1,000,000 operations minimum (24V AC/DC, 100 mA) |
| Shock Resistance | Operating extremes: 150 m/s$^2$ (15G)<br>Damage limits: 1,000 m/s$^2$ (100G) |
| Vibration Resistance | Operating extremes: 5 to 55 Hz, amplitude 0.5 mm minimum<br>Damage limits: 16.7 Hz, amplitude 1.5 mm minimum |
| Applicable Wire | Solder terminal: 0.5 mm$^2$ maximum (20 AWG)<br>Internal connector: 0.05 to 0.86 mm$^2$ (AWG18 to 30) |
| Applicable Wire Size | Solder terminal: 0.5 mm$^2$ (20 AWG)<br>Internal connector: 0.05 to 0.86 mm$^2$ (AWG18 to 30) (AWG22 between switch and connector) |
| Applicable Cable | Outside diameter: ø4.5 to 10 mm |
| Conduit Port Size | M16 (cable gland is supplied) |
| Terminal Tensile Strength | 20N minimum |
| Degree of Protection | With control unit: IP67/IP66 (IEC 60529)<br>Without control unit: IP65 (IEC 60529) |
| Conditional Short-circuit Current | 50A (250V) (Use 250V/10A fast-blow fuse for short circuit protection.) |
| Direct Opening Force | 60N minimum (monitor switch) |
| Operator Strength | 500N minimum (when pressing the entire button surface) |
| Weight (approx.) | HE2G-21SH: 140g<br>HE2G-21SH-P-0/-21SC: 145g<br>HE2G-21SHE/-21SC-P-0: 150g<br>HE2G-21SH-L-L/-21SHE-P-0/-21SCE: 155g<br>HE2G-21SH-L-K/-21SCE-P-0: 160g<br>HE2G-21SHE-L-L/-21SC-L-L: 165g<br>HE2G-21SHE-L-K/-21SC-L-K: 170g<br>HE2G-21SCE-L-L: 175g<br>HE2G-21SCE-L-K: 180g |

## Contact Ratings

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | | | 250V (momentary pushbutton and key selector: 125V) / 30V (with pilot light) | | |
| Rated Thermal Current (Ith) | | | | | 3A (emergency stop switch: 5A) | | |
| Rated Voltage (Ue) | | | | | 30V | 125V | 250V |
| Rated Current | Grip Style Enabling Switch | 3-position switch (Terminal No. NO1-C1/A1-B1, NO2-C2/A3-B3) | AC | Resistive Load (AC-12) | — | 1A | 0.5A |
| | | | | Inductive Load (AC-15) | — | 0.7A | 0.5A |
| | | | DC | Resistive Load (DC-12) | 1A | 0.2A | — |
| | | | | Inductive Load (DC-13) | 0.7A | 0.1A | — |
| | | Monitor Switch (NC contact) (Terminal No. 31-32/A2-B2) | AC | Resistive Load (AC-12) | — | 2.5A | 1.5A |
| | | | | Inductive Load (AC-15) | — | 1.5A | 0.75A |
| | | | DC | Resistive Load (DC-12) | 2.5A | 1.1A | 0.55A |
| | | | | Inductive Load (DC-13) | 2.3A | 0.55A | 0.27A |
| | Control Unit | Emergency Stop Switch XA1E-BV3U02R (Terminal No.1-2/A1-B1, 1-2/A2-B2) | AC | Resistive Load (AC-12) | — | 5A | 3A |
| | | | | Inductive Load (AC-15) | — | 3A | 1.5A |
| | | | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |
| | | Momentary Pushbutton Key Selector Switch AB6M-M2PLW, AS6M-2KT2PA (Terminal No.C1/B1, NO1/B2, NC1/B3, C2/A1, NO2/A2, NC2/A3) | AC | Resistive Load (AC-12) | — | 0.5A | — |
| | | | | Inductive Load (AC-15) | — | 0.3A | — |
| | | | DC | Resistive Load (DC-12) | 1A | 0.2A | — |
| | | | | Inductive Load (DC-13) | 0.7A | 0.1A | — |
| | | UP9 Pilot Light UP9P-2498G (Terminal No. +, –) | | | Rated operating voltage: 24V DC ±10% Rated current: 15mA | | |

Note: Minimum applicable load (reference value): 3V AC/DC, 5 mA
(Applicable range is subject to the operating conditions and load.)
*Operating temperature for internal connectors:
–25°C min., 40°C max. 2.5A (12 to 19 poles), 2A (20 to 22 poles)
40°C min., 50°C max. 2.5A (8 to12 poles), 2A (13 to 22 poles)
50°C min., 60°C max. 2.5A (6, 7 poles), 2A (8 to13 poles), 1.5A (14 to 22 poles)

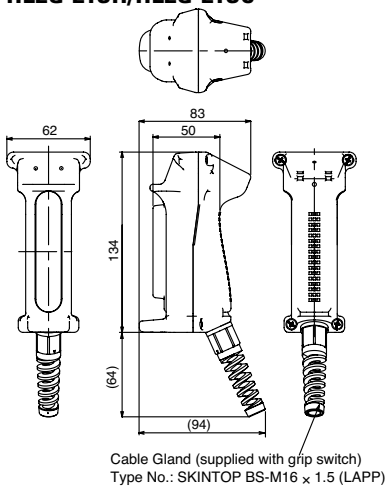
## Operation Characteristics




Terminals NO1-C1/A1-B1, NO2-C2/A3-B3 are outputs of the 3-position enabling switch.
The above operation characteristics show when the center of the grip switch button is pressed. Because two contacts are designed to operate independently, pressing the edge of the button turns on one contact earlier than the other contact, causing a delay in operation To avoid this, always press the center of the button.

## Dimensions (mm)

### HE2G-21SH/HE2G-21SC




All dimensions in mm.

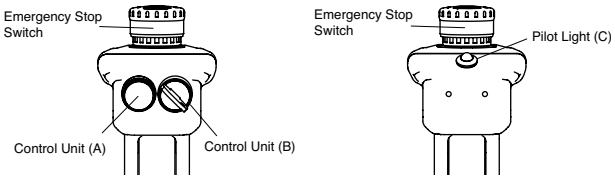
### Internal Connector

Cable side connector:
Tyco Electronics D-1200D Series

- Receptacle: 1-1827864-☐
- Receptacle contact
  1827586-2: AWG28 to 30
  (Hand tool: 1762952-1)
  1827587-2: AWG22 to 28
  (Hand tool: 1762846-1)
  1827588-2: AWG22 to 28
  (Hand tool: 1762950-1)
  1827589-2: AWG18 to 22
  (Hand tool: 1762625-1)

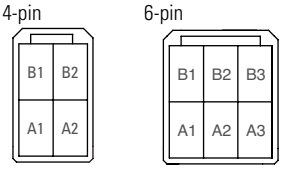
Specify 2 or 3 in place of ☐.
2: 4-pin connector
3: 6-pin connector
The customer needs to purchase the connector separately.

## Additional Control Unit Layout




## Contact Arrangement (Internal Connector)

Internal Connector Pin No.

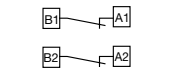



Emergency stop switch

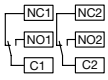
3-position switch
Momentary pushbutton
Key selector switch

3-position switch /control unit side connector:
Tyco Electronics D-1200D Series
Tab housing: 1-1903130-2 (4-pin connector)
1-1903130-3 (6-pin connector)
Tab contact: 19303116-2

## Terminal Arrangement (TOP VIEW)




Emergency stop switch




Momentary pushbutton
Key selector switch

## 6-Pin Connector Allotment Table

| Internal Connector Pin No. | Momentary pushbutton Key selector switch |
|---|---|
| A1 | C2 |
| A2 | NO2 |
| A3 | NC2 |
| B1 | C1 |
| B2 | NO1 |
| B3 | NC1 |

# Grip Switch Housing for HE5B Enabling Switch

## Grip Style Enabling Switch Housing

- HE5B enabling switches can be installed in the HE9Z-GSH51 grip style enabling switch housing to be used as 3-position grip style enabling switches.

Shown with HE5B switch.

## Part Numbers

| Part Number | Description |
|---|---|
| HE9Z-GSH51 | Grip Switch Housing for HE5B Enabling Switch |

## Specifications

| | |
|---|---|
| Applicable Standards | IEC/EN 60529, UL50 |
| Operating Temperature | –25 to 60°C (no freezing) |
| Relative Humidity | 45 to 85% RH (no condensation) |
| Storage Temperature | –40 to 80°C (no freezing) |
| Pollution Degree | 3 |
| Shock Resistance | Damage limits: 500 m/s$^2$ (50G) |
| Vibration Resistance | Damage limits: 5 to 55 Hz, amplitude 0.5 mm |
| Electric Shock Protection Class | Class II (when using HE5B-M2P*) |
| Applicable Cable | Outside diameter ø4.5 to 10 mm |
| Conduit Port Size | M16 (cable gland is supplied with the grip style enabling switch housing) |
| Degree of Protection | IP65 (with HE5B-M2P*)<br>Type 4X (with HE5B-M2P*) |
| Weight (approx.) | 65g (grip style enabling switch housing only) |

The specifications are for the grip style enabilng switch housing only. For enabling switch, see the HE5B specifications on page 402.

The following switches can be installed on the grip style enabling switch housing to be used as hand-held switches.

AB6M pushbuttons (IP65, except for AB6M-V)
AS6M selector switches (IP65)
AS6M key selector switches (IP65)

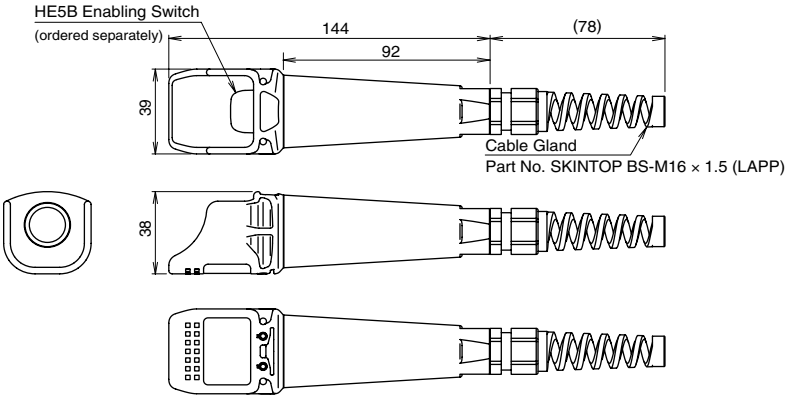
Notes:

The HE9Z-GSH51 grip style enabling switch housing does not include the HE5B enabling switch. The enabling switch must be ordered separately.

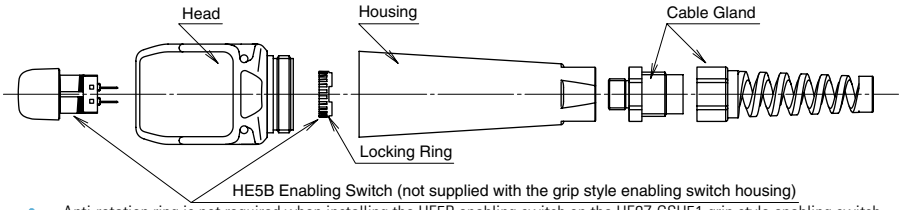
The HE5B enabling switch must be installed and wired to the HE9Z-GSH51 grip style enabling switch housing by the user. For information on wiring, see the instruction sheet supplied with the HE9Z-GSH51.

## Dimensions (mm)

### HE9Z-GSH51

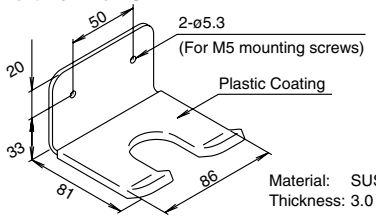



### HE9Z-GSH51 + HE5B Construction




Anti-rotation ring is not required when installing the HE5B enabling switch on the HE9Z-GSH51 grip style enabling switch housing. Use the locking ring only.

### Mounting Bracket
### Part No. HE9Z-GH1




Material: SUS304
Thickness: 3.0 mm

All dimensions in mm.

Selection Guide ..... 422
Safety Relay HR1S-AC ..... 423
Safety Relay HR1S-AF ..... 426
Safety Relay HR1S-DM ..... 429
Safety Relay HR1S-ATE ..... 431
Safety Relay HR2S-301 ..... 434
Safety Relay HR2S-332N ..... 439
FS1A Multi-function Safety Relay ..... 445

# Safety Control

IDEC

**www.IDEC.com/safety**

# Selection Guide

| Series | Single Function Safety Relay | Single Function Safety Relay | Multi-function Safety Relay |
|---|---|---|---|
| | HR1S | HR2S | FS1A |
| Appearance | | | |
| Page | 423 | 434 | 445 |
| Performance Level | PLe | PLe | PLe |
| Safety Category | 3/4 | 3/4 | 4 |
| Contact Configuration | 1NO/1NC, 2NC,<br>2NO/3NO (time delay) | 3NO/1NC,<br>3NO/3NO (time delay) /2NC (Aux.) | 4NO |

# Safety Relay HR1S-AC

## Key features:

- 1NC or 2NC safety input type, such as E-Stops or Interlock Switches
- EN ISO 13849-1 PLe, Safety Cat 3 compliant, and EN 62061 SIL 3
- Fault diagnosis function with dual safety circuits.
- Internal relay operations can be monitored with LED Indicator.
- Finger-safe protection
- 22.5mm wide, 35mm DIN rail mounting
- UL listed, CSA certified, TÜV NORD approved

## Part Numbers

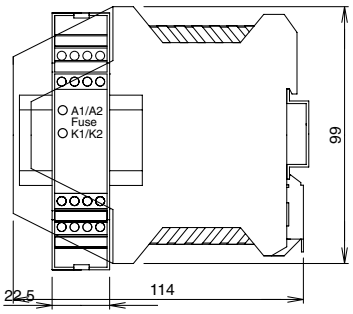
| Part Number | Terminal Style |
|---|---|
| HR1S-AC5121 | Integrated Terminal Block |
| HR1S-AC5121P | Removable Terminal Block |

## Specifications

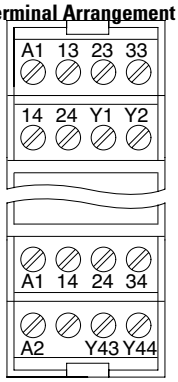
| | | | |
|---|---|---|---|
| Operating Temperature | | | –10 to 55°C (no freezing) |
| Degree of Protection | | | Terminal: IP20, Housing: IP40 |
| Rated Power Voltage | | | 24V AC (–20 to +10%) 50/60 Hz<br>24V DC (±20%) |
| Power Consumption | | | AC: 2.2 VA (24V AC) maximum<br>DC: 1.2W (24V DC) maximum |
| Overcurrent Protection | | | Electronic |
| Control Circuit Voltage | | | 24V |
| Performance Level (PL) | | | e (EN ISO 13849-1) |
| Safety Category | | | 3 (EN 954-1) |
| Safety Integrity Level (SIL) | | | 3 (EN 62061) |
| Response Time | | | 100ms maximum |
| Input Synchronization Time | | | Unlimited |
| Overvoltage Category | | | III |
| Pollution Degree | | | 2 |
| Rated Insulation Voltage | | | 300V |
| Safety Outputs | Instantaneous (Stop Cat 0) | | 3NO |
| | Auxiliary Contact | | 1NO (transistor, PNP) |
| Output Contact Ratings | Safety Circuit | AC-15 | C300: Ue= 240VAC, Ie=0.75A |
| | | DC-13 | Ue=24VDC, Ie=2A |
| | Transistor Circuit | | 24V/20mA |
| | Minimum Applicable Load | | 17V/10mA (initial value) |
| Operation Frequency | | | 1200 operations/h maximum |
| Rated Current | | | Safety circuit output total: 10.5A maximum |
| Wire Size | | | HR1S-AC5121: 1 × 2.5mm², 2 × 0.75mm² maximum<br>HR1S-AC5121P: 1 × 2.5mm², 2 × 1.5mm² maximum |
| Weight | | | 160g |

Use a 4A fuse (Type gL) for power fuse protection.
Use a 4A (Type gL) or a 6A fast blow fuse for output fuse protection

**Dimensions (mm)**

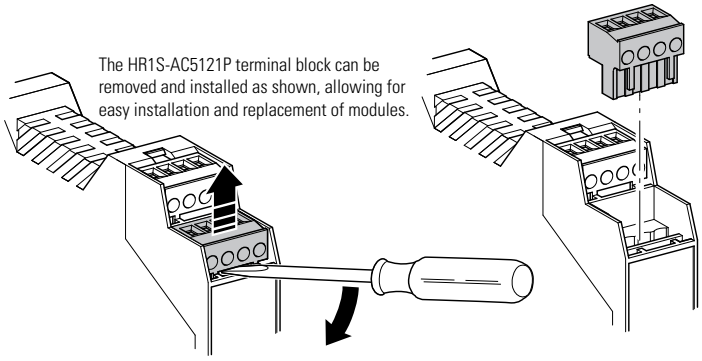



**Terminal Arrangement**



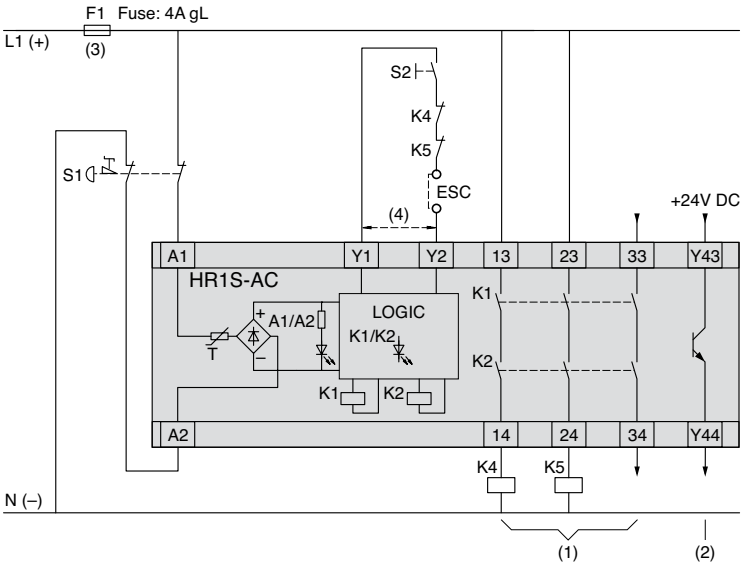

**LED Indicator**

- A1/A2 Fuse:
  Turns on when power circuit is normal.
  Turns off when power is interrupted or the electronic fuse blows.
- K1: Turns on when K1 relay operates.
- K2: Turns on when K2 relay operates.

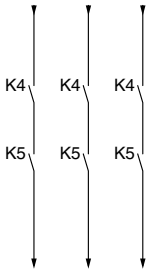


## HR1S-AC Wiring Diagram

### Safety Category 3 Example Circuit (using an emergency stop switch with 2NC contacts)



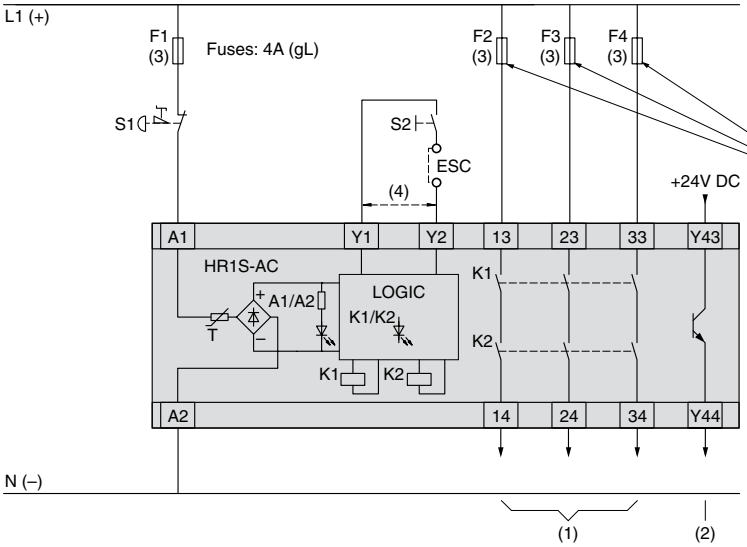

ESC: External Start Condition
S1: Emergency Stop Switch
S2: Start Switch
F1: Protection fuse for the power of safety relay module
K4, 5: Safety contactor




The Safety Category is achieved by the entire control system. Take any connected safety equipment and wiring into consideration.

(1) Three safety outputs
(2) One transistor output
(3) See the specifications for maximum fuse size
(4) Jumper for terminal Y1-Y2 (for automatic start)

### Safety Category 3 Example Circuit (using an emergency stop switch with 2NC contacts)

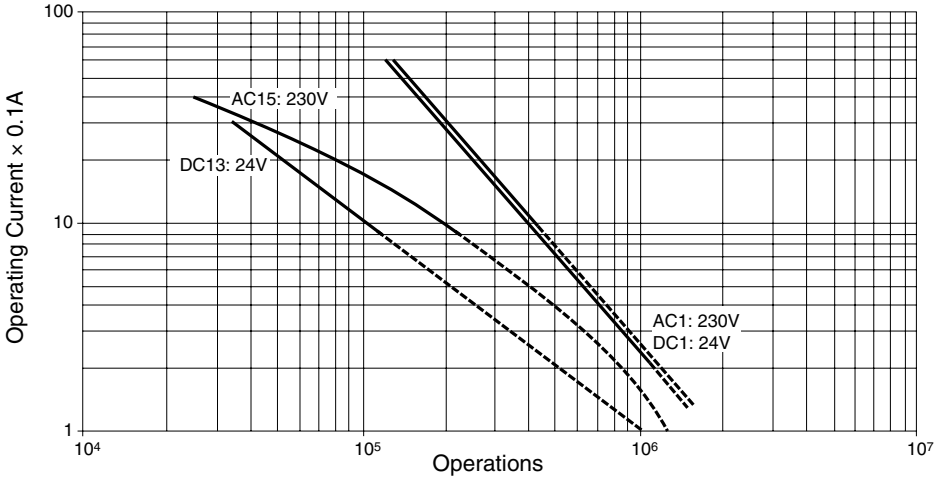



ESC: Exernal Start Condition
S1: Emergency Stop Switch
S2: Start Switch
F1: Protection fuse for the power of safety relay module
F2 to F4: Protection fuse for the output of safety relay module

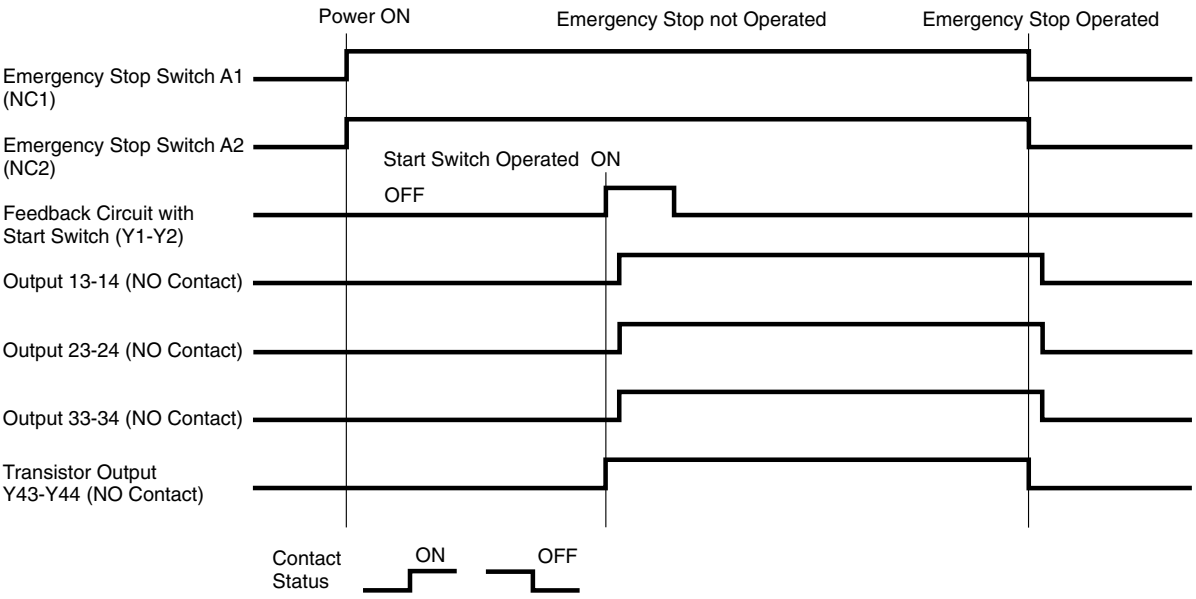
Fuses: 4A (gL) or 6A fast blow type

(1) Three safety outputs
(2) One transistor output
(3) See the specifications for maximum fuse size

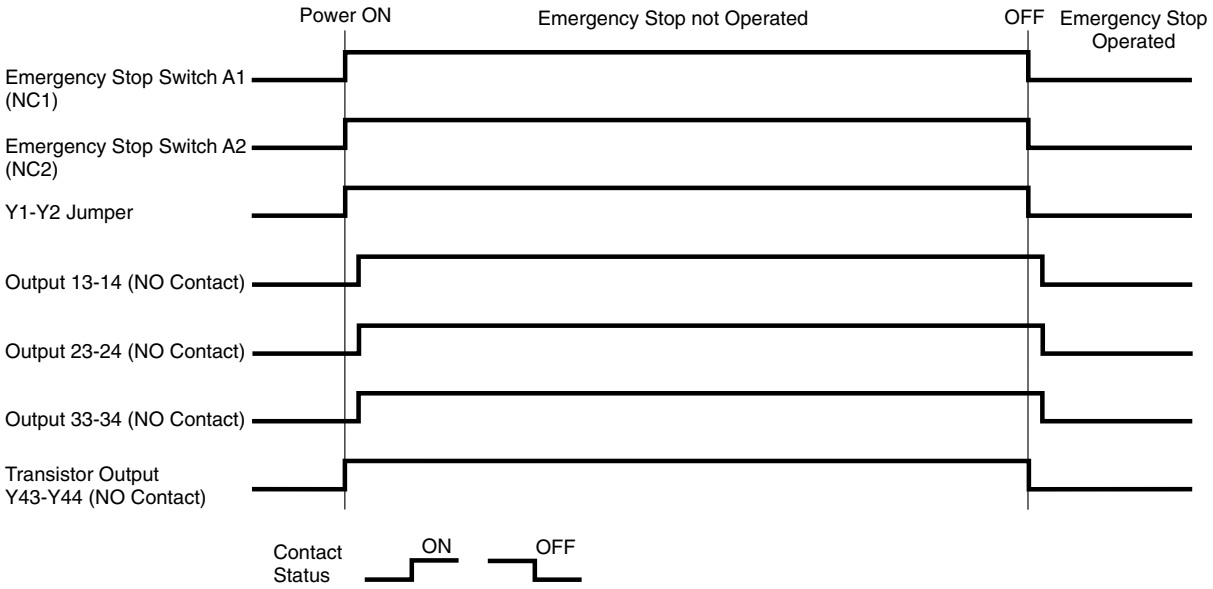
### Output Contact Electrical Life



**HR1S-AC Safety Relay Module Operation Chart**
**When Using a Start Switch**




**When Not Using a Start Switch**



# Safety Relay HR1S-AF

## Key features:

- 2NC safety input type, such as E-Stops or Interlock Switches
- EN ISO 13849-1 PLe, Safety Cat 4 compliant, and EN 62061 SIL 3
- Welding detection of start switch
- Fault diagnosis function with dual safety circuits
- Internal relay operations can be monitored with LED Indicator.
- Finger-safe protection
- 22.5mm wide, 35mm DIN rail mounting
- UL listed, CSA certified, TÜV NORD approved

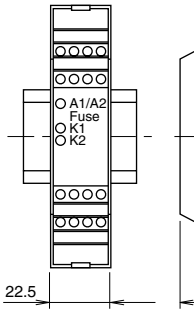
## Part Numbers

| Part Number | Terminal Style |
|---|---|
| HR1S-AF5130B | Integrated Terminal Block |
| HR1S-AF5130PB | Removable Terminal Block |

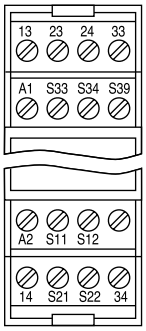
## Specifications

| | | | |
|---|---|---|---|
| Operating Temperature | | | –25 to +55°C (no freezing) |
| Degree of Protection | | | Terminal: IP20, Housing: IP40 |
| Rated Power Voltage | | | 24V AC (–15 to +10%) 50/60 Hz<br>24V DC (–15 to +10%) |
| Power Consumption | | | 5 VA maximum (24V AC)<br>2.5W maximum (24V DC) |
| Overcurrent Protection | | | Electronic (Note) |
| Control Circuit Voltage | | | 24V |
| Performance Level (PL) | | | e (EN ISO 13849-1) |
| Safety Category | | | 4 (EN ISO 13849-1) |
| Safety Integrity Level (SIL) | | | 3 (EN 62061) |
| Response Time | | | When S11-S12, S21-S22 are interrupted:<br>20 ms maximum<br>When power is interrupted: 60 ms maximum |
| Input Synchronization Time | | | Unlimited |
| Overvoltage Category | | | III |
| Pollution Degree | | | 2 |
| Rated Insulation Voltage | | | 300V |
| Safety Outputs | Instantaneous (Stop Cat 0) | | 3NO |
| Output Contact Ratings | Safety Circuit | AC-15 | C300: Ue= 240VAC, Ie=0.75A |
| | | DC-13 | Ue=24VDC, Ie=2A |
| | Minimum Applicable Load | | 17V/10mA (initial value) |
| Operation Frequency | | | 1200 operations/h maximum |
| Rated Current | | | Safety circuit output total: 18A maximum<br>Each safety circuit output: 6A maximum |
| Wire Size | | | HR1S-AF5130B: 1 × 2.5 mm², 2 × 0.75 mm² maximum<br>HR1S-AF5130PB: 1 × 2.5 mm², 2 × 1.5 mm² maximum |
| Weight | | | 250g |

**Dimensions (mm)**

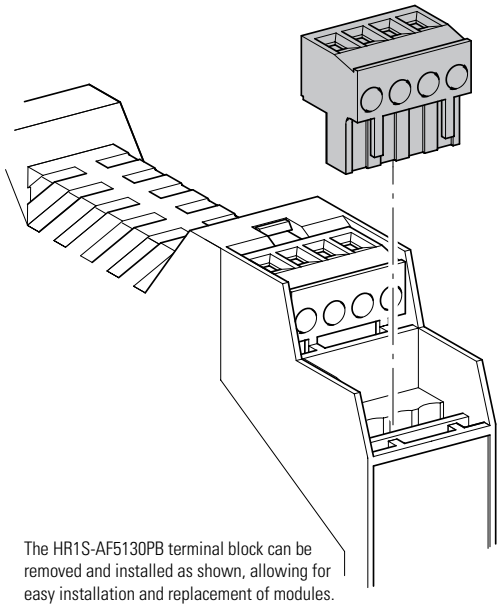



**Terminal Arrangement**




**LED Indicator**

- A1/A2 Fuse:
  Turns on when power circuit is normal.
  Turns off when power is interrupted or the electronic fuse blows.
- K1: Turns on when K1 relay operates.
- K2: Turns on when K2 relay operates.



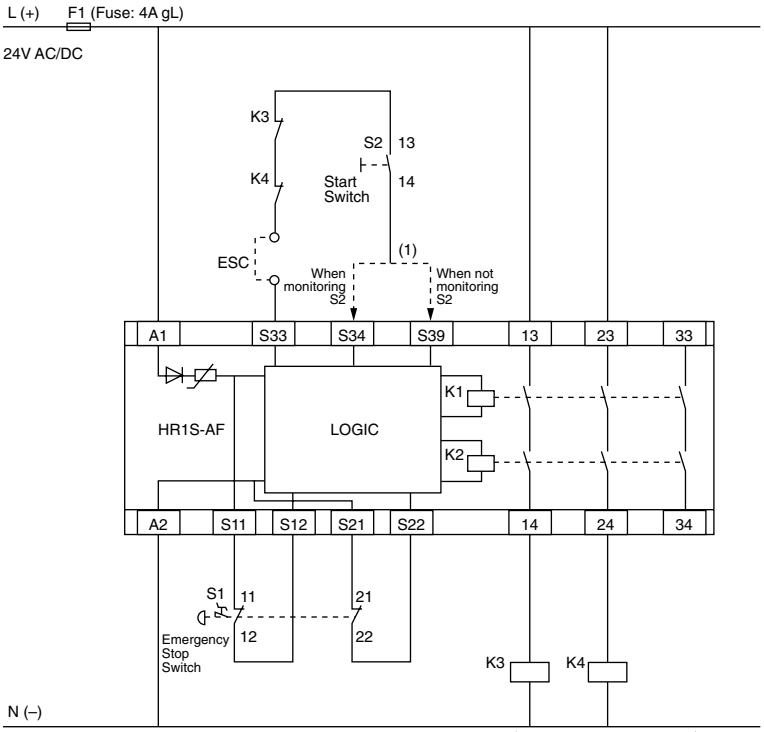
The HR1S-AF5130PB terminal block can be removed and installed as shown, allowing for easy installation and replacement of modules.

Note: Short-circuit of S11 and S21 activates the overcurrent protection circuit, interrupting the power supply. The safety output turns off. Normal status is restored when the short-circuit is removed. Use a 4A fuse (Type gL) for power line protection. Use a 4A fuse (Type gL) or a 6A fast blow fuse for output line protection.

## HR1S-AF Wiring Diagram

### Safety Category 4 Example Circuit (using an emergency stop switch)

The Safety Category is achieved by the entire control system. Take any connected safety equipment and wiring into consideration.

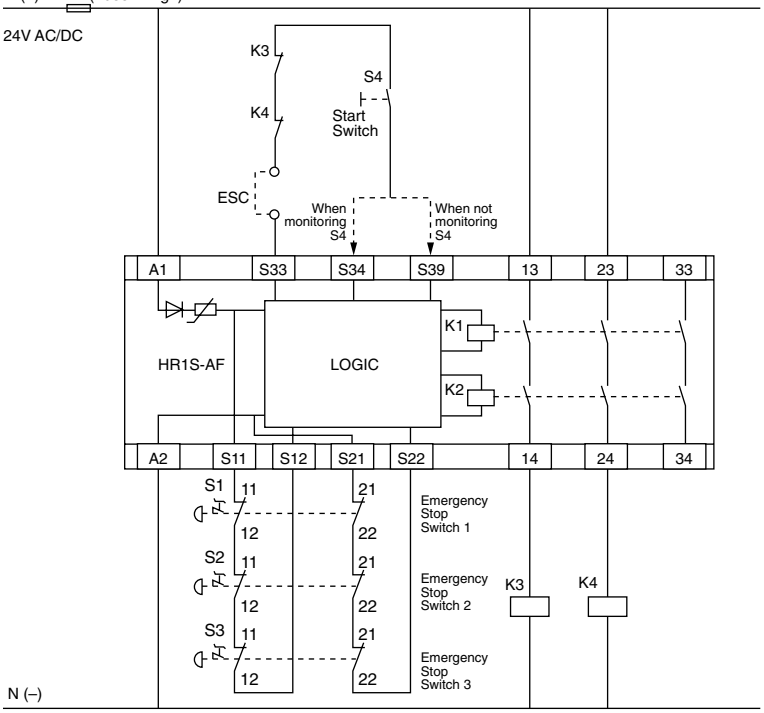



(1) = Start Switch Monitor

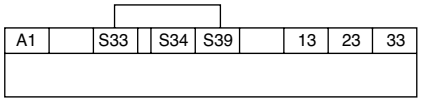
ESC: External Start Condition
F1: Protection fuse for the power of safety relay module
K3, 4: Safety contactor

Safety Output 3 Circuits

### Safety Category 3 Example Circuit (using multiple emergency stop switches)

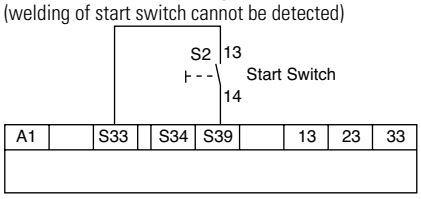



### When not using a start switch (automatic start)



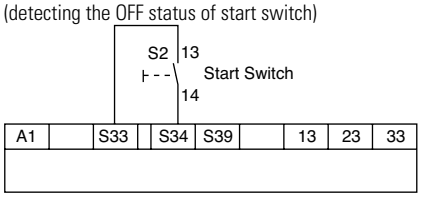

### When not monitoring the start switch

(welding of start switch cannot be detected)



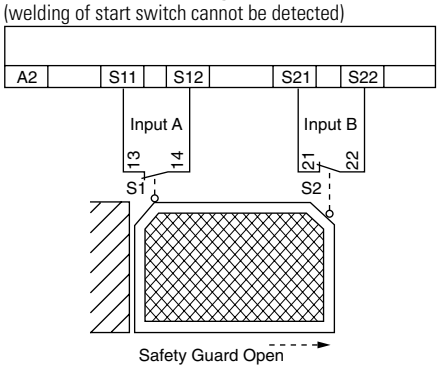

### When monitoring the start switch

(detecting the OFF status of start switch)



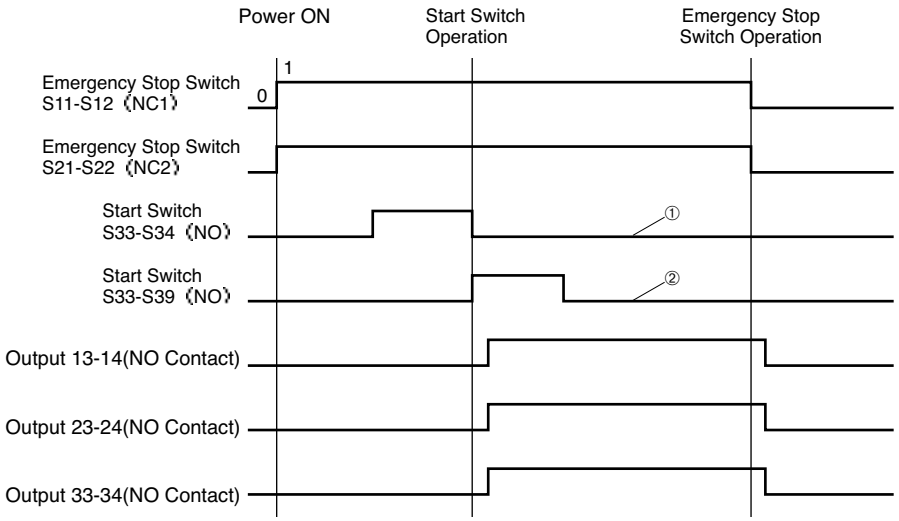

### When not monitoring the start switch

(welding of start switch cannot be detected)



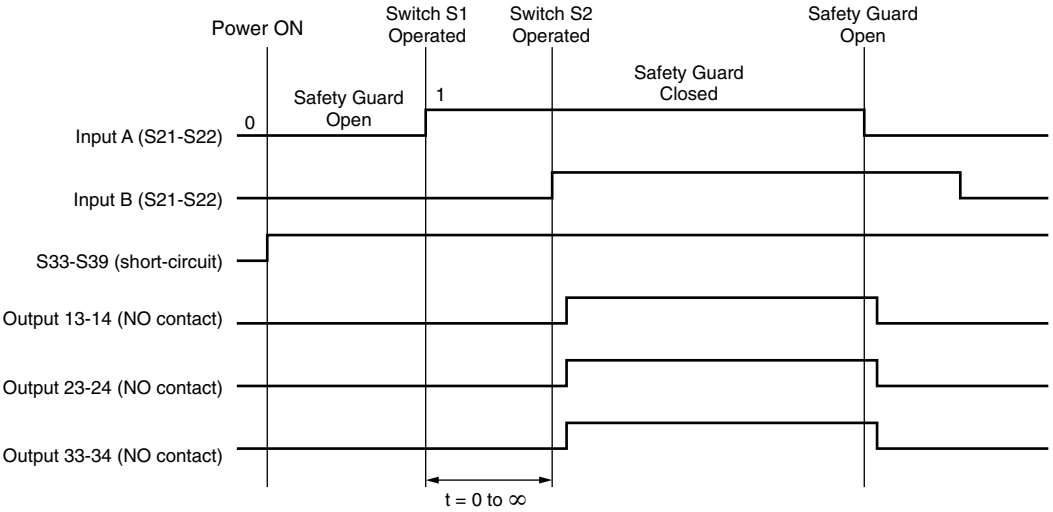

ESC: External Start Condition
F1: Protection fuse for the power of safety relay module
K3, 4: Safety contactor

**HR1S-AF Operation Chart**
**When Using the Emergency Stop Switch**

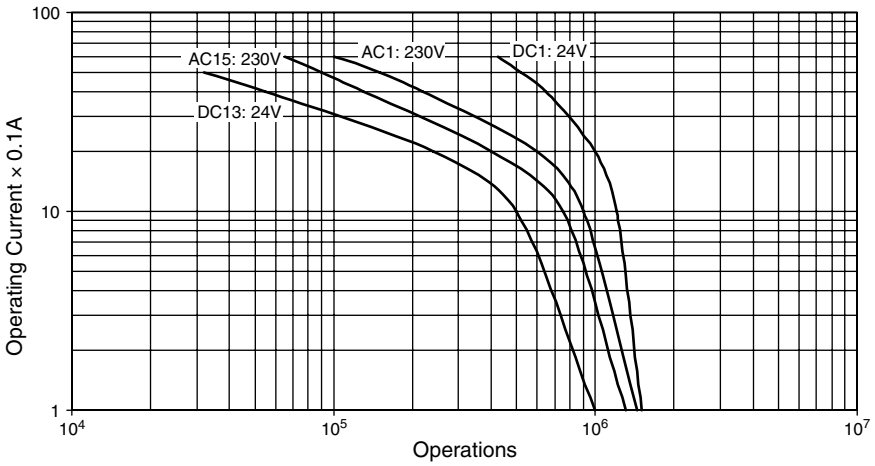



① When monitoring the start switch (detecting the OFF status of start switch)
② When not monitoring the start switch (contact welding of start switch cannot be detected)

**When not Using the Safety Guard (Automatic Start)**




**Output Contact Electrical Life**



# Safety Relay HR1S-DM

**Key features:**

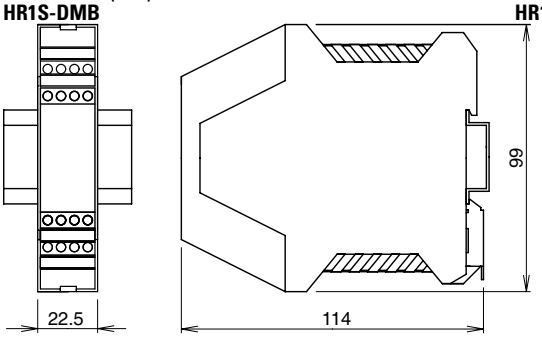
- 1NO-1NC safety input type, such as magnetic coded safety switches
- Fault diagnosis function with dual safety circuits.
- Internal relay operations can be monitored with LED Indicator.
- Finger-safe protection
- 22.5 or 45mm wide, 35mm DIN rail mounting
- EN ISO 13849-1 PLe, Safety Cat 4 compliant, and EN 62061 SIL 3
- UL listed, CSA certified, TÜV NORD approved

HR1S-DMB( )P

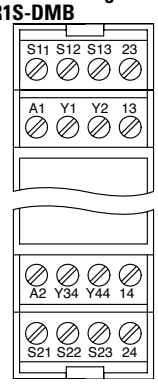
## Part Numbers

| Part Number | Terminal Style | Input |
|---|---|---|
| HR1S-DMB1132 | Integrated Terminal Block | 2 |
| HR1S-DMB1132P | Removable Terminal Block | |
| HR1S-DME1132 | Integrated Terminal Block | 6 |
| HR1S-DME1132P | Removable Terminal Block | |

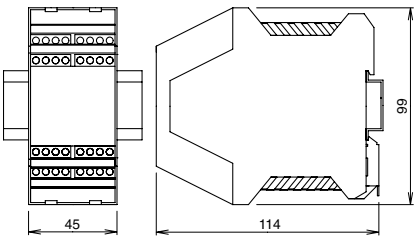
**Dimensions (mm)**
**HR1S-DMB**



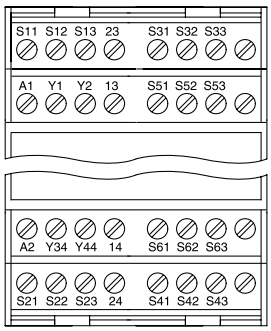

**Terminal Arrangement**
**HR1S-DMB**




**Dimensions (mm)**
**HR1S-DME**




**Terminal Arrangement**
**HR1S-DME**




## Specifications

| | | | |
|---|---|---|---|
| Operating Temperature | | | –10 to 55°C (no freezing) |
| Degree of Protection | | | Terminal: IP20, Housing: IP40 |
| Rated Power Voltage | | | 24V DC (–20 to +20%) |
| Power Consumption | | | HR1S-DMB: 2.5W maximum (24V DC)<br>HR1S-DME: 3.5W maximum (24V DC) |
| Overcurrent Protection | | | Electronic |
| Control Circuit Voltage | | | 24V DC |
| Performance Level (PL) | | | e (EN ISO 13849-1) |
| Safety Category | | | 4 (EN ISO 13849-1) |
| Safety Integrity Level (SIL) | | | 3 (EN 62061) |
| Response Time | | | 20 ms maximum |
| Input Synchronization Time | | | 500ms max |
| Overvoltage Category | | | III |
| Pollution Degree | | | 2 |
| Rated Insulation Voltage | | | 300V |
| Maximum Input Resistance | | | 100Ω (per input point) |
| No. of Outputs | Safety Circuit | | 2NO |
| | Auxilliary Contact | | 2NO (transistor PNP) |
| Output Contact Ratings | Safety Circuit | AC-15 | C300: Ue= 240VAC, Ie=0.75A |
| | | DC-13 | Ue= 24V DC, Ie= 1.5A |
| | Transistor Circuit | | 24V/20 mA |
| | Minimum Applicable Load | | 17V/10 mA (initial value) |
| Operation Frequency | | | 1200 operations/hour maximum |
| Rated Current | | | Output total 12A maximum |
| Wire Size | | | 0.14 to 2.5 $mm^2$ |
| Weight | | | HR1S-DMB: 180g<br>HR1S-DME: 250g |

Use a 4A fuse (Type gL) for power fuse protection.
Use a 4A (Type gL) or a 6A fast blow fuse for output fuse protection.

**LED Indicator**

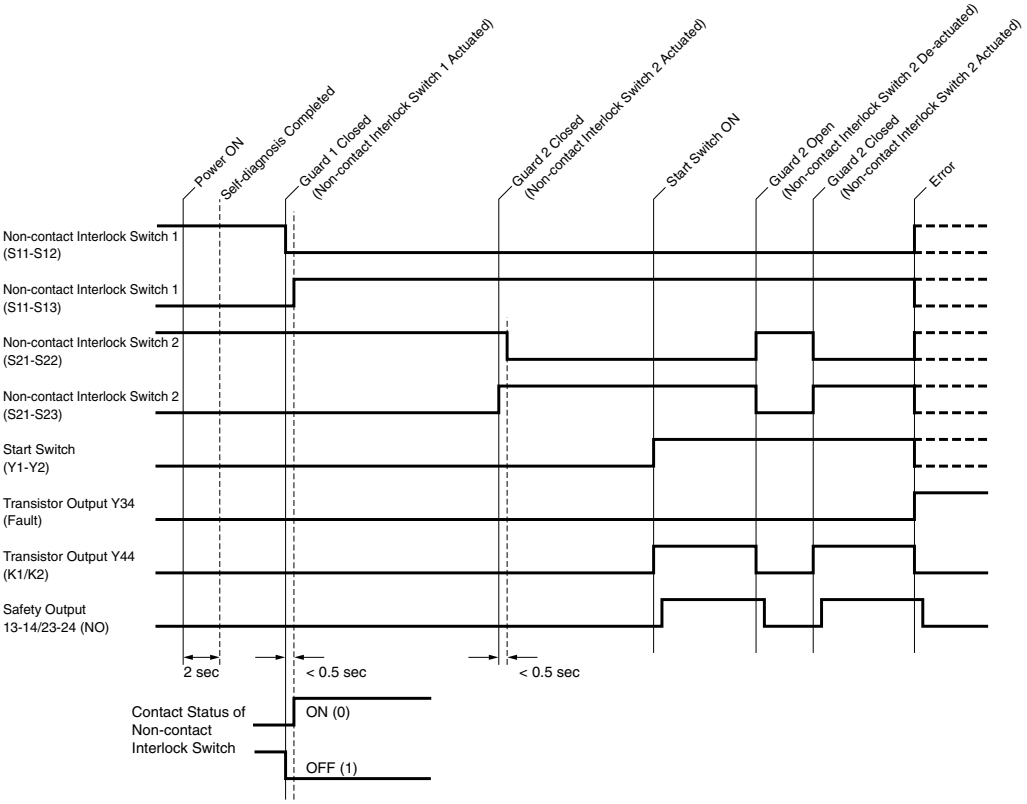
## HR1S-DMB

- Power A1/A2:
  Turns on when power circuit is normal.
  Turns off when power is interrupted or the electronic fuse blows.
- Fault:
  Turns on when the HR1S fails (see failure causes on page 694).
- K1/K2:
  Turns on when K1/K2 relays operate.

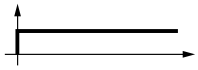
## HR1S-DME

- Power A1/A2:
  Turns on when power circuit is normal.
  Turns off when power is interrupted or the electronic fuse blows.
- Fault:
  Turns on when the HR1S fails (see failure causes on page 694)
- K1/K2:
  Turns on when K1/K2 relays operate.
- S13: NO contact of non-contact interlock switch 1
- S12: NC contact of non-contact interlock switch 1
- S23: NO contact of non-contact interlock switch 2
- S22: NC contact of non-contact interlock switch 2
- S33: NO contact of non-contact interlock switch 3
- S32: NC contact of non-contact interlock switch 3
- S43: NO contact of non-contact interlock switch 4
- S42: NC contact of non-contact interlock switch 4
- S53: NO contact of non-contact interlock switch 5
- S52: NC contact of non-contact interlock switch 5
- S63: NO contact of non-contact interlock switch 6
- S62: NC contact of non-contact interlock switch 6

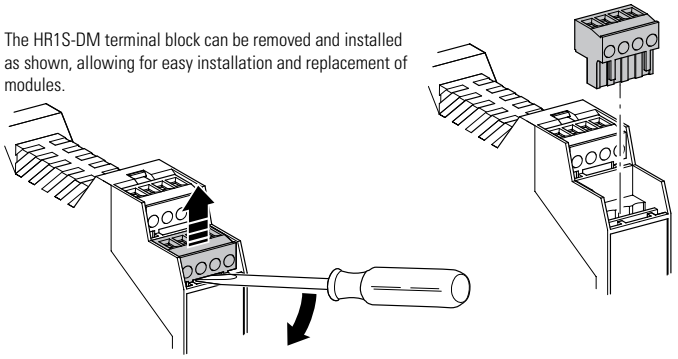
**HR1S-DM Operation Chart**
**When Using the Emergency Stop Switch**




## Causes of Fault LED Indication

| LED2: Fault | Fault Type | Fault Cause | Measures |
|---|---|---|---|
|  | Internal Fault | Fault of the internal circuit | Replace the safety relay module. |
| | External Fault | Short circuit of the +24V power supply and input terminal | Remove the short circuit and reboot. |
| | External Fault | Short-circuit of the non-contact interlock switch wiring | Correct the wiring of the non-contact interlock switch and reboot. |
| | Synchronization time excess of switch contact input | Synchronization for the NO contact and NC contact of the non-contact interlock switch (HS7A) is 0.5 seconds or longer. | Open and close the door again. |
| | | Fault of the non-contact interlock switch (HS7A) | Replace the non-contact interlock switch. |

The HR1S-DM terminal block can be removed and installed as shown, allowing for easy installation and replacement of modules.



# Safety Relay HR1S-ATE

## Key features:

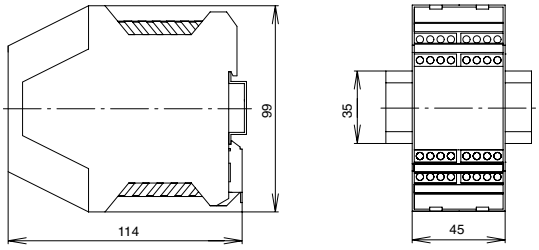
- EN ISO 13849-1 performance level e, safety category 4 compliant, and EN 62061 safety integrity level 3
- Integrated and removable teminal styles available
- Compact design: 45 mm in width
- Time delay outputs: 3NO
- Auxiliary output enables power supply monitoring, inputs (2 channels), and a time delay output
- Environmentally friendly, RoHs directive compliant
- UL Listed, CSA certified, TÜV NORD approved

## Part Numbers

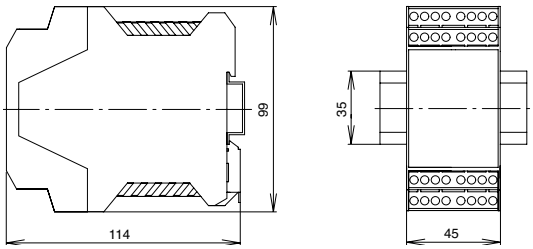
| Part Number | Terminal Style |
|---|---|
| HR1S-ATE5110 | Integrated Terminal Block |
| HR1S-ATE5110P | Removable Terminal Block |

## Dimensions (mm)

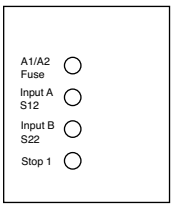
### HR1S-ATE5110 Integrated Terminal Type




### HR1S-ATE5110P Removable Terminal Type




### LED Indicator




A1/A2 Fuse: Turns on when power circuit is normal.
Input A S12: Turns on when S11–S12 is closed.
Input B S22: Turns on when S21–S22 is closed.
Stop1: Turns on when the time-delay output circuits 57-58, 67-68, and 77-78 are closed.

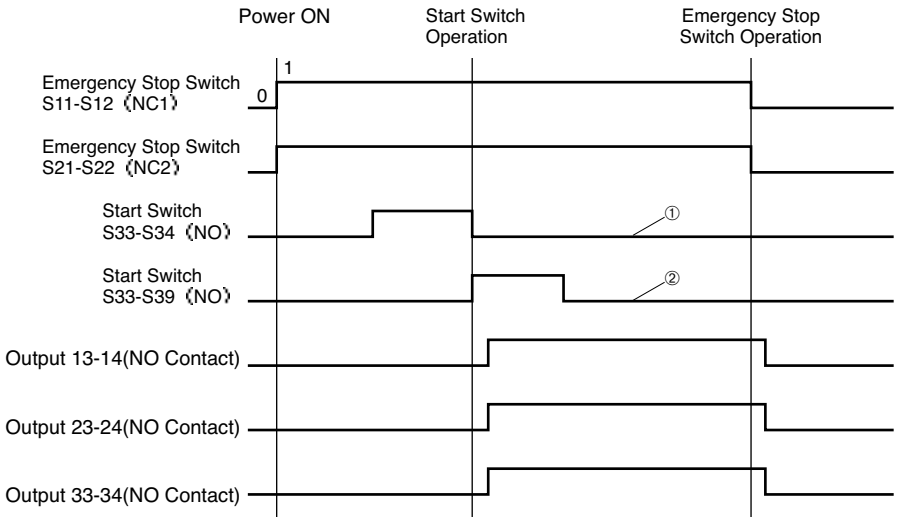
## Specifications

| | | | |
|---|---|---|---|
| Applicable Standards | | | EN 60204-1: 2007, EN 60947-1: 2007, EN 60947-5-1:2004, EN 61000-6-2: 2005 EN 61000-6-4: 2007, EN 62061: 2005 EN ISO 13849-1: 2008, EN ISO 13849-2: 2008 |
| Applicable Standards for Use | | | EN 60204-1: 2006 EN ISO 13850: 2008 |
| Performance level (PL) | | | e (EN ISO 13849-1) |
| Safety Category | | | 4 (EN ISO 13849-1) |
| Safety Integrity Level (SIL) | | | 3 (EN 62061) |
| Stop Category | | | 0, 1 (EN 60204-1) (Note) |
| Operating Temperature | | | –10 to +55°C (no freezing) |
| Relative Humidity | | | 30 to 85% RH (no condensation) |
| Impulse Withstand Voltage | | | 4 kV (IEC 60947-5-1) |
| Shock Resistance | | | 150 m/s², 11m sec, 3 shocks in each 3 axes |
| Vibration Resistance | | | 10 to 60 Hz, amplitude 0.35 mm 60 to 150 Hz, acceleration 50 m/s² |
| Degree of Protection | | | Terminal: IP20 Enclosure: IP40 |
| Rated Voltage | | | 24V AC –20% +10% 24V DC –20% +20% |
| Power Consumption | | | 24V AC: 8 VA max. 24V DC: 4W max. |
| Overcurrent Protection | | | Built-in, electronic |
| Minimal Applicable Load | | | 17V DC / 10 mA (initial value) |
| Response Time | | | ON to OFF: 20 ms max. (instantaneous output) |
| Overvoltage Category | | | III |
| Pollution Degree | | | 2 |
| Rated Insulation Voltage | | | 300V Ac |
| No of Outputs | Safety Circuit | | 2NO |
| | Time-delay Circuit | | 3NO |
| | Auxilliary Circuit | Contact | None |
| | | Transistor | 4 |
| Output Contact Ratings | Safety Circuit | AC15 | C300 (230V AC / Ie=0.75A) |
| | | DC13 | 24V DC / Ie=1A |
| | Time-delay Circuit | AC15 | C300 (230V AC/ Ie=0.75A) |
| | | DC13 | 24V DC / Ie=1A |
| | | Preset Time | 0, 0.5, 1, 2, 4, 6, 8, 10, 15, 20, 25, 30 sec. |
| | Auxilliary Circuit | | 24V DC / 20 mA (PNP) |
| Mechanical Durability | | | 10,000,000 operations |
| Electrical Durability | | | See page XX |
| Rated Current | | | Total output: 8A max. 1 output 4A max. |
| Wire Size | | HR1S-ATE5110 | Single wire: 0.2 to 2.5 mm² max. (24~14 AWG) Multiple wires: 0.14 to 0.75 mm² max. |
| | | HR1S-ATE5110P | Single wire: 0.2 to 2.5 mm² max.(24~14 AWG) Multiple wires: 0.2 to 1.5 mm² max. |
| Weight (approx.) | | | 280g |

Note: Safety output contact — Stop category 0
Time-delay output contact — Stop category 1

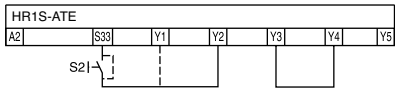
Use a 4A fuse (Type gG) for power protection.Use a 6A fuse (Type gG) for safety output protection.
Use a 4A fuse (Type gG) for time-delay output and auxiliary output protection.

## HR1S-ATE Wiring Diagram
### Safety Category 4 (3) Circuit (using an emergency stop switch) (Note)

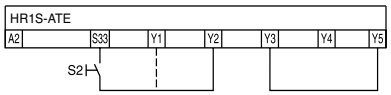



Safety category is achieved by the entire control system. Take the connected safety equipment and wiring into consideration.

**When not monitoring the start switch**
(Y3-Y4 short-circuited)
(automatic start when S33-Y2 is short-circuited)



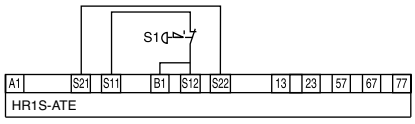

**When monitoring the start switch**
(Y3-Y5 short-circuited)



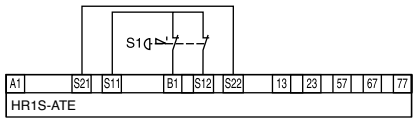

1. When monitoring the start switch, starts when switched off (default setting/recommended)
2. When monitoring the start switch, starts when switched on
3. Outputs must be fused (see the instruction manual for maximum fuse size)
4. To PLC, etc.
Note: When using off-delay output, safety category becomes 3.

S1 = Emergency stop switch with 2 NC contacts (recommended)
S2 = Start switch
ESC = External start conditions
Y1 (S33) – Y2 = Feedback loop

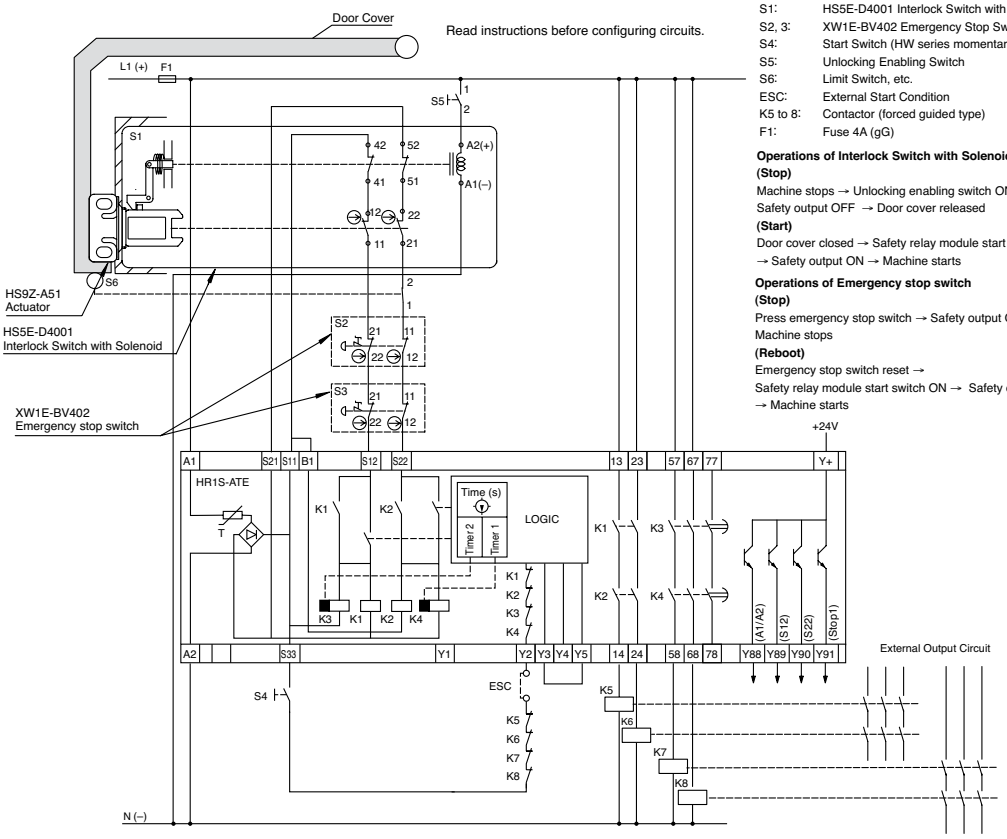
**Emergency stop switch - Input 1 channel**
When not detecting short-circuit (All failures such as short-circuit of emergency stop switch wiring not detected)




**Emergency stop switch - Input 2 channels**
When not detecting short-circuit(B1-S12 short-circuit not detected)




### Safety Category 3 Example Circuit (using multiple emergency stop switches)

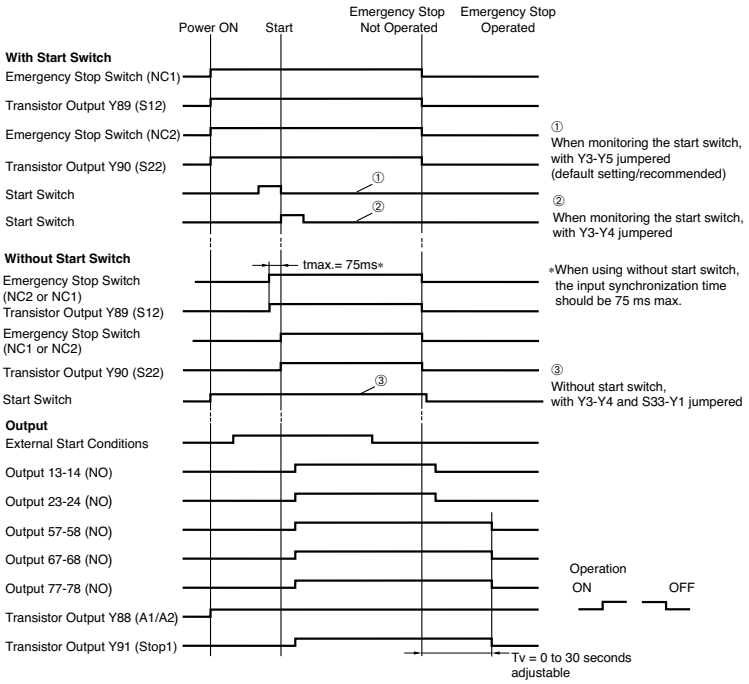



S1: HS5E-D4001 Interlock Switch with Solenoid
S2, 3: XW1E-BV402 Emergency Stop Switch
S4: Start Switch (HW series momentary)
S5: Unlocking Enabling Switch
S6: Limit Switch, etc.
ESC: External Start Condition
K5 to 8: Contactor (forced guided type)
F1: Fuse 4A (gG)

**Operations of Interlock Switch with Solenoid**
**(Stop)**
Machine stops → Unlocking enabling switch ON → Safety output OFF → Door cover released
**(Start)**
Door cover closed → Safety relay module start switch ON → Safety output ON → Machine starts

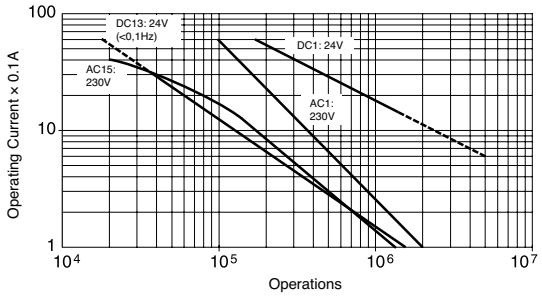
**Operations of Emergency stop switch**
**(Stop)**
Press emergency stop switch → Safety output OFF → Machine stops
**(Reboot)**
Emergency stop switch reset → Safety relay module start switch ON → Safety output ON → Machine starts

### HR1S-ATE Operation Chart




### Output Contact Electrical Life

(Safety Circuit, Time-delay Circuit, Auxilliary Circuit)




### Residual Risk (En ISO/ISO12100-1)

The wiring diagrams on previous page have been tested under actual operating conditions. The HR1S-ATE safety relay module can be used in a safety circuit by connecting to safety equipment compliant to applicable standards. Consider residual risk in the following circumstances:

a) When it is necessary to modify the recommended circuit and if added/modified components are not properly integrated into the control circuit.

b) When applicable standards of machine operation are not observed, or when the machine is not adjusted or maintained properly (adhere to a strict maintenance schedule).

c) When the contacts of relays and contactors for connected with safety outputs are not forced guided (compliant with EN 50205).

# HR2S-301P/HR2S-301N Safety Relay Modules

## Key features:

- Simple wiring procedure
- Removable terminal block enables easy replacement
- Terminal cover detects improper connection
- Operation modes can be changes with a single action
- Compact design enables installation in a narrow space
- Safety Category 4, Performance Level e according to EN ISO 13849-1: 2008
- TÜV SÜD European and North American (NRTL)

## Part Numbers

| Contact Configuration | | Input | Supply Voltage | Part No. |
|---|---|---|---|---|
| Safety Output | Auxiliary Contact | | | |
| 3NO | 1NC | Positive | 24V DC –15% to +10% | HR2S-301P |
| | | Negative | 24V DC –15% to +10% | HR2S-301N |

## Specifications

| | |
|---|---|
| Applicable Standards | EN ISO 13849-1: 2008<br>EN 954-1: 1996<br>EN 50178: 1997<br>EN 55011/A2: 2007<br>EN 61000-6-2: 2005<br>IEC/EN 61496-1: 2006<br>UL508/R2005-07<br>CAN/CSA C22.2 No.14: 2005 |
| Applicable Standards for Use | EN 60204-1: 2006 |
| Performance level (PL) | e (EN ISO 13849-1) |
| Safety Category [1] | 3 or 4 (EN ISO 13849-1) |
| Stop Category | 0 (IEC/EN 60204-1) |
| Operating Temperature | –10 to +55°C (no freezing) |
| Relative Humidity | 30 to 85% (no condensation) |
| Altitude | 0 to 2000m (operating) |
| Insulation Resistance | 100Ω minimum<br>(500V DC megger, same measurement positions as dielectric strength) |
| Dielectric Strength | Between outside housing and internal circuit:<br>3,750V AC,1 minute<br>Between outputs of different poles:<br>2,500V AC, 1 minute<br>Between input and output terminals:<br>2,500V AC, 1 minute<br>Between power supply and output terminals:<br>2,500V AC ,1 minute |
| Shock Resistance | 300 m/s², pulse width 11m sec, 3 shocks in each of 3 axes |
| Bump | 100 m/s², pulse width 16m sec, 1000 times in each of 3 axes |
| Vibration Resistance | 10 to 55 Hz, 1 octave/minute,<br>0.7 mmp-p in each of 3 axes, 20 sweeps,<br>5 to 55 Hz, 30 m/s², for 2 hours in each of 3 axes |
| Degree of Protection | Terminals: IP20 Housing: IP40 |
| Rated Voltage | 24V DC –15% +10% |
| Power Consumption | 2.2W (26.4V DC) |
| Overcurrent Protection | Built-in, electronic (approx. 0.9A) |
| Contact Resistance | 200 mΩ maximum [2] |
| Turn-On Time | 50 ms maximum [3] |

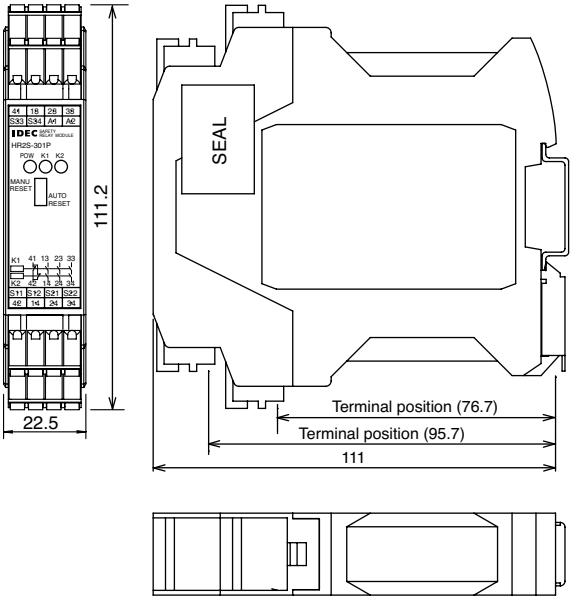
| | | | | |
|---|---|---|---|---|
| Minimum Applicable Load | | | | 24V DC / 5 mA (Reference value) |
| Response Time | | | | 20 ms maximum [3 4] |
| Overvoltage Category | | | | III (IEC60664-1) |
| Pollution Degree | | | | 2 (IEC60664-1) |
| Rated Insulation Voltage (output contact) | | | | 250V (IEC60664-1) |
| Output Contact Ratings | Terminals 13-14 23-24 33-34 | Rated Load [5 6] | | 250V AC / 30V DC (resistive load) [7]<br>Category 3 or lower: 5.0A maximum<br>Category 4 or lower: 3.6A maximum |
| | | Safety Circuit | AC15 | 240V AC / 2A cosø=0.3 |
| | | | DC13 | 24V DC / 1A L/R=48 ms |
| | | No. of Outputs | | 3 (NO contact output) |
| | Terminals 41-42 | Rated Load [6] | | 250V AC / 30V DC (resistive load)<br>Category 3 or lower: 5.0A maximum<br>Category 4 or lower: 3.6A maximum |
| | | Safety Circuit | AC15 | 240V AC / 2A cosø=0.3 |
| | | | DC13 | 24V DC / 1A L/R=48 ms |
| | | No. of Outputs | | 1 (NC contact output) |
| Mechanical Durability | | | | 5,000,000 operations minimum |
| Electrical Durability | | | | 100,000 operations minimum |
| Wire Size | | | | 0.2 mm² to 1.5 mm² (24 to 16 AWG) |
| Weight (approx.) | | | | 200g |

1. HR2S-301N is recommended for use in category 4 safety applications. The requirements of the safety category must be determined according to the safety equipment. We recommend that you consult a third party organization.
   Categories may change depending on the combination of the safety equipment. Categories may also change depending on the output contact ratings.
2. Measured using 5 or 6V DC, 1A voltage drop method.
3. When measured at the rated voltage (at 20°C), excluding contact bounce time.
4. The time from when the safety input turns OFF to when the safety output turns OFF.
5. Leave 5 mm of space between the sides of the module when more than 3A is continuously applied to the relay contact.
6. The module is not suitable for use with a load less than the minimum applicable load. Once a large load is applied, contacts may not operate with a small load.
7. The maximum current of the safety output contact is specified by the approved standard.

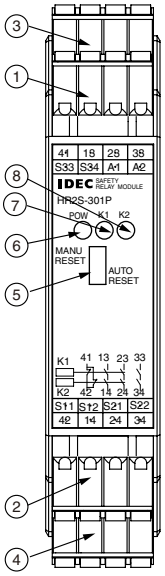
| | | |
|---|---|---|
| Category 4 | HR2S-301N, HR2S-301P + Type 4 OSSD's | 3.6A |
| Category 3 | HR2S-301P | 5.0A |

To prevent the safety output contact from overcurrent, use a fuse. To satisfy Category 4, use a fuse with a maximum current of 3.6A. This fuse is not required if the short circuit current is less than 5A.

### Dimensions (mm)




### Terminal Arrangement




### Part Description

| Part No. | Part Names and Functions |
|---|---|
| 1 | CN1: Power supply input, start/off-check input |
| 2 | CN2: Safety input (dual channel) |
| 3 | CN3: Safety output contact |
| 4 | CN4: Safety output contact |
| 5 | Switch: Select AUTO or MANU mode |
| 6 | POW: Power LED |
| 7 | K1: ON-LED for safety output |
| 8 | K2: ON-LED for safety output |

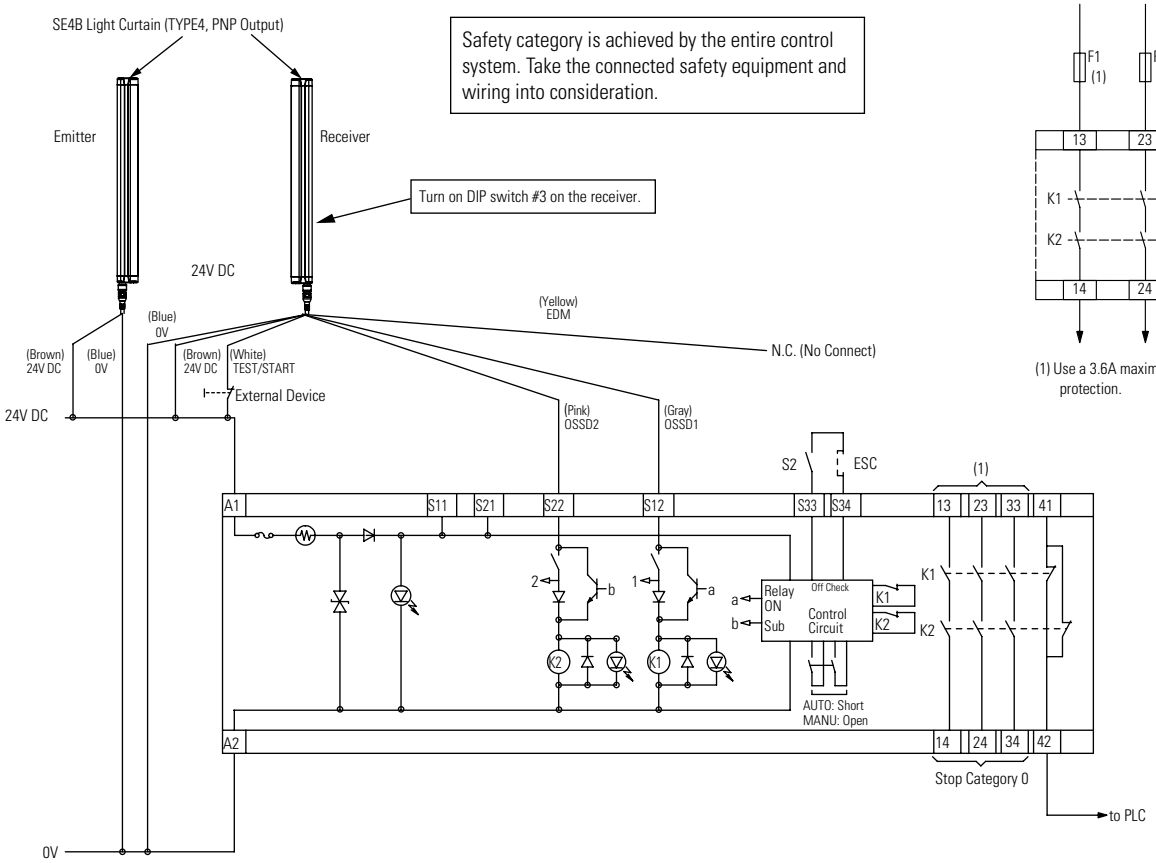
### Terminal Arrangement

| Terminal | Markings | I/O Signals | | Notes |
|---|---|---|---|---|
| CN1 | A1 | Power supply +24V DC input | | |
| | A2 | Power supply 0V input | | |
| | S33 | Start/off-check input | | Use a dry contact. |
| | S34 | | | |
| CN2 | S11 | Safety input 1 | Common | For HR2S-301N, use a dry contact. When connecting TYPE 4 safety light curtain to HR2S-301P, use only S12 (S22). |
| | S12 | | Function | |
| | S21 | Safety input 2 | Common | |
| | S22 | | Function | |
| CN3 CN4 | 41–42 | Monitor contact for safety output (NC) | | Rated load 250V AC / 30V DC, 1A (Resistive load) |
| | 13–14 | Safety output contact (NO) | | Rated load 250V AC / 30V DC (Note) (Resistive load) |
| | 23–24 | | | |
| | 33–34 | | | |

Note: 5.0A max. Category 3 or lower HR2S-301P
3.6A max. Category 4 HR2S-301N, HR2S-301P + Type 4 OSSD's

**HR2S-301P Wiring Diagram**
**Safety Category 4 Circuit Example (using a safety light curtain)**

*EDM function disabled

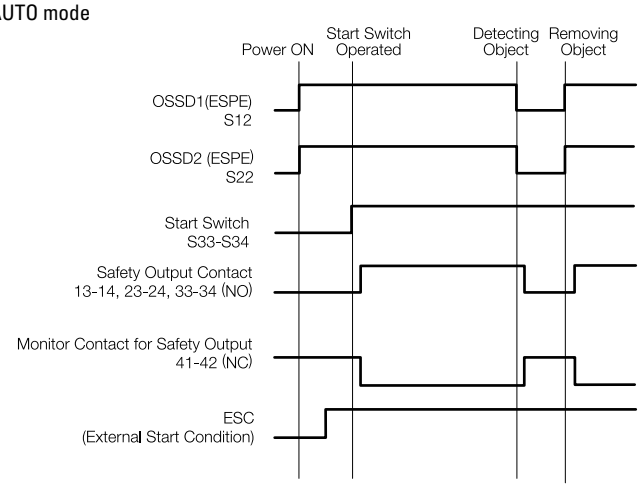



The SE4B light curtains are used in the above system.

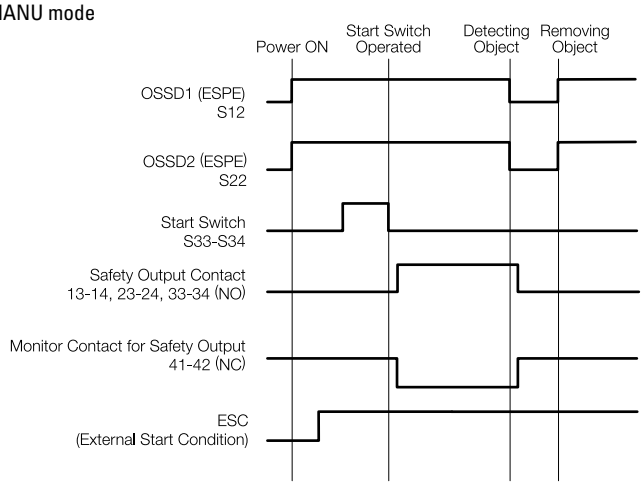
ESC: External Start Condition
F1 to 3: Protective fuse for the output of safety relay module
K1 to 2: Safety Contactor
S2: Start Switch
S33-S34: Feedback loop

**HR2S-301P Operation Chart**
**Using OSSD outputs of a light curtain (EPSE)**

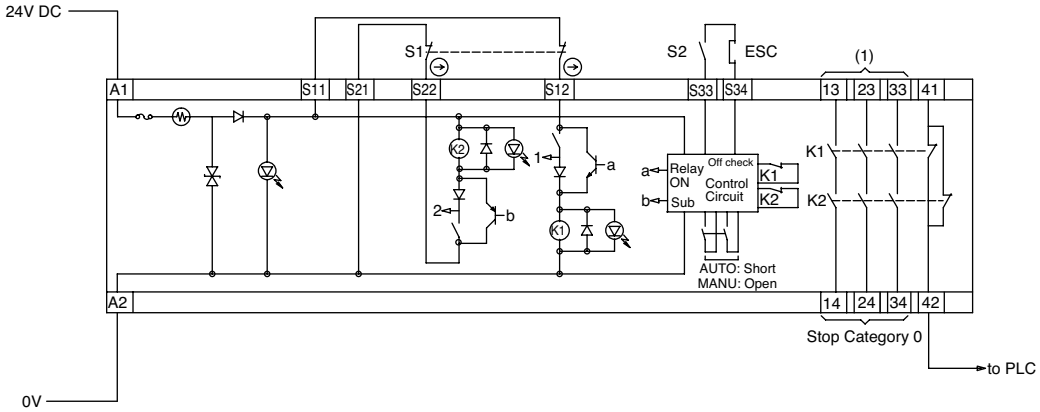
AUTO mode




MANU mode

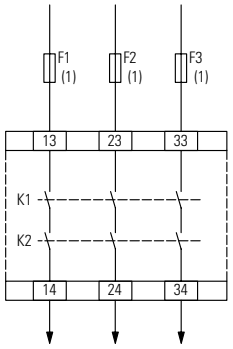



**HR2S-301N Wiring Diagram**
**Safety Category 4 (3) Circuit Example (using an emergency stop switch)**




Safety category is achieved by the entire control system. Take the connected safety equipment and wiring into consideration.

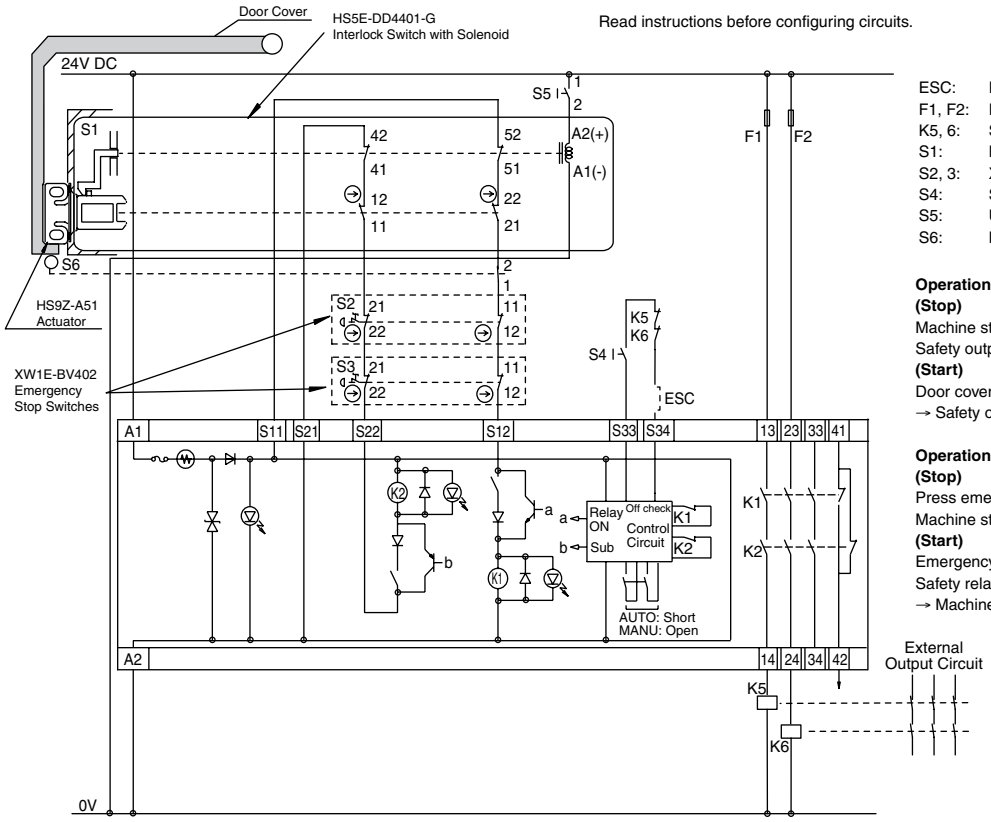
ESC: External start condition
F1 to 3: Protective fuse for the output of safety relay module
S1: Emergency stop switch with 2NC contacts, safety switch (recommended)
S2: Start Switch
S33-S34: Feedback loop




(1) Use a 3.6A maximum fuse for output line protection.

**HR2S-301N Wiring Diagram**
**Safety Category 4 (3) Circuit Example (using an emergency stop switch)**

Safety category is achieved by the entire control system. Take the connected safety equipment and wiring into consideration.



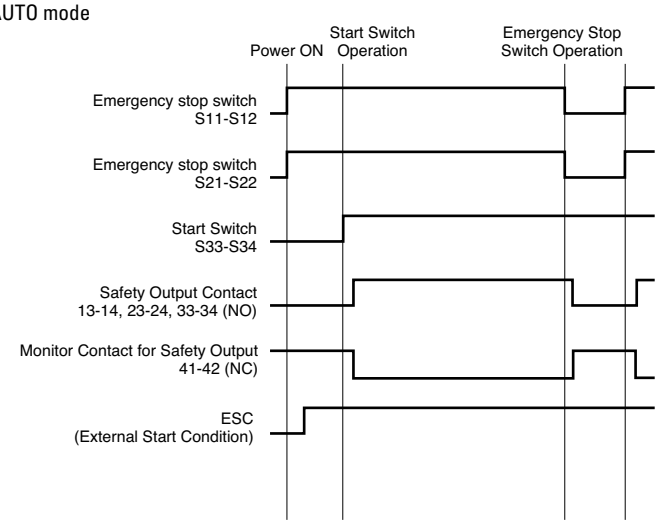

ESC: External Start Condition
F1, F2: Fuse 3.6A
K5, 6: Safety Contactor (force guided)
S1: HS5E-DD4401-G Interlock Switch with Solenoid
S2, 3: XW1E-BV402 Emergency Stop Switches
S4: Start Switch (HW series momentary)
S5: Unlocking Enabling Switch
S6: Limit Switch, etc.

**Operations of Interlock Switch with Solenoid**
**(Stop)**
Machine stops → Unlocking enabling switch ON → Safety output OFF → Door cover released
**(Start)**
Door cover closed → Safety relay module start switch ON → Safety output ON → Machine starts

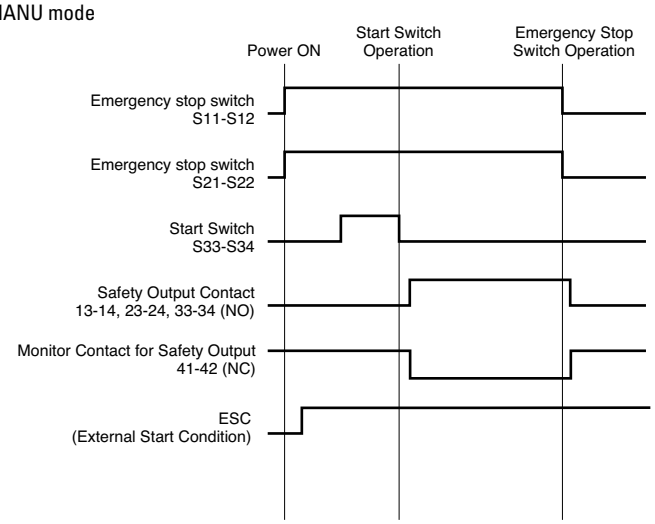
**Operations of Emergency Stop Switch**
**(Stop)**
Press emergency stop switch → Safety output OFF → Machine stops
**(Start)**
Emergency stop switch reset → Safety relay module start switch ON → Safety output ON → Machine starts

## HR2S-301N Operation Chart
## Using an emergency stop switch

AUTO mode




MANU mode



# HR2S-332N-T075/T15/T30 Safety Relay Modules

## Key features:

- Simple wiring procedure
- Removable terminal block enables easy replacement
- Terminal cover detects improper connection
- Operation modes can be changes with a single action
- Compact design enables installation in a narrow space
- Safety Category 4, Performance Level e according to EN ISO 13849-1: 2008
- TÜV SÜD European and North American (NRTL)

## Part Numbers

| Contact Configuration | | | Input | Supply Voltage | Part No. |
|---|---|---|---|---|---|
| Safety Output | Time-delay Safety Output | Auxiliary Contact | | | |
| 3NO | 3NO | 2NC | Negative | 24V DC –15% to +10% | HR2S-332N-T075 |
| | | | | | HR2S-332N-T15 |
| | | | | | HR2S-332N-T30 |

Note: Time-delay duration can be set in 15 steps. 7.5 sec. (0.5, 1.0 … 7.0, 7.5); 15 sec. (1, 2 … 14, 15); 30 sec. (2, 4 … 28, 30)

## Specifcations

| | |
|---|---|
| Applicable Standards | EN ISO 13849-1: 2008<br>EN 954-1: 1996<br>EN 50178: 1997<br>EN 55011/A2: 2007<br>EN 61000-6-2: 2005<br>EN 61496-1: 2004<br>UL508/R2005-07<br>CAN/CSA C22.2 No.14: 2005 |
| Applicable Standards for Use | EN 60204-1: 2006 |
| Performance level (PL) | e (EN ISO13849-1) |
| Safety Category | 4 (EN ISO13849-1) |
| Stop Category | 0, 1 (IEC/EN 60204-1) [1] |
| Operating Temperature | –10 to +55°C (no freezing) |
| Relative Humidity | 30 to 85% (no condensation) |
| Altitude | 0 to 2000m (operating) |
| Insulation Resistance | 100 MΩ minimum<br>(500V DC megger, same measurement positions as dielectric strength) |
| Dielectric Strength | Between outside housing and internal circuit:<br>3,750V AC,1 minute<br>Between outputs of different poles:<br>2,500V AC, 1 minute<br>Between input and output terminals:<br>2,500V AC, 1 minute<br>Between power supply and output terminals:<br>2,500V AC,1 minute |

| | |
|---|---|
| Shock Resistance | 300 m/s$^2$, pulse width 11m sec, 3 times in each of 3 axes |
| Bump | 100 m/s$^2$, pulse width 16m sec, 1000 times in each of 3 axes |
| Vibration Resistance | 10 to 55 Hz, 1 octave/minute,<br>0.7 mmp-p in each of 3 axes, 20 sweeps,<br>5 to 55 Hz, 30 m/s$^2$, for 2 hours in each of 3 axes |
| Degree of Protection | Terminals: IP20 Housing: IP40 |
| Rated Voltage | 24V DC –15% to +10% |
| Power Consumption | 4.6W (26.4V DC) |
| Overcurrent Protection | Built-in, electronic (approx. 0.9A) |
| Contact Resistance | 200 mW maximum (measured using 5 or 6V DC, 1A voltage drop method) |
| Turn-On Time | 50 ms maximum |
| Minimum Applicable Load | 24V DC / 5 mA (reference value) |
| Response Time | 20 ms maximum [2 3] |
| Overvoltage Category | III (IEC60664-1) |
| Pollution Degree | 2 (IEC60664-1) |
| Rated Insulation Voltage (output contact) | 250V (IEC60664-1) |

1. Safety output contact: Stop Category 0
   Time-delay output contact: Stop Category 1
2. When measured at the rated voltage (at 20°C), excluding contact bounce time.
3. The time from when the safety input turns OFF to when the safety output turns OFF.

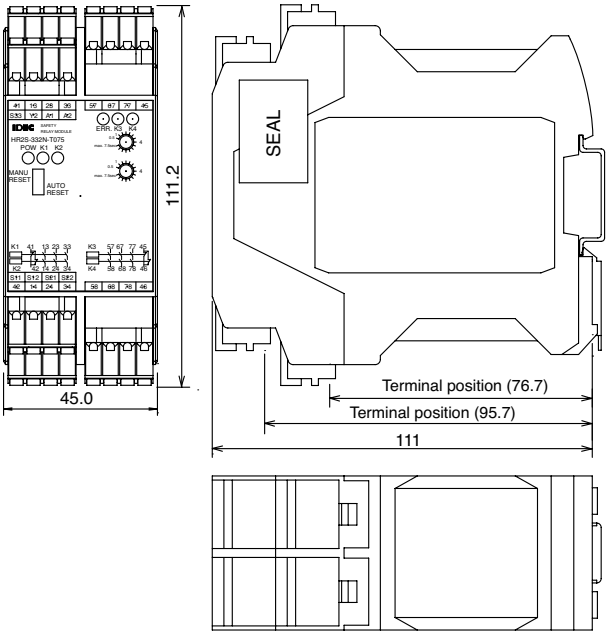
## Specifications, con't

| | | | | |
|---|---|---|---|---|
| Output Contact Ratings | Terminals 13-14 23-24 33-34 | Rated Load [5][6] | | 250V AC / 30V DC (resistive load) [7]<br>Category 3 or lower: 5.0A maximum<br>Category 4 or lower: 3.6A maximum |
| | | Safety Circuit | AC15 | 240V AC / 2A cosø=0.3 |
| | | | DC13 | 24V DC / 1A L/R=48 ms |
| | | No. of Outputs | | 3 (NO contact output) |
| | Terminals 41-42 | Rated Load [6] | | 250V AC / 30V DC (resistive load)<br>Category 3 or lower: 5.0A maximum<br>Category 4 or lower: 3.6A maximum |
| | | Safety Circuit | AC15 | 240V AC / 2A cosø=0.3 |
| | | | DC13 | 24V DC / 1A L/R=48 ms |
| | | No. of Outputs | | 1 (NC contact output) |

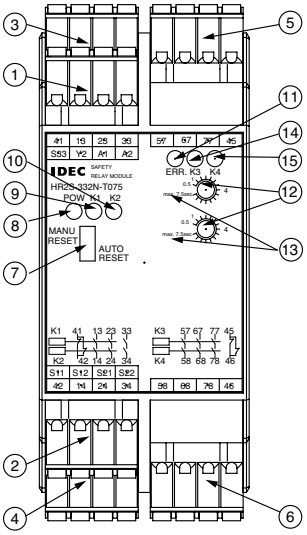
| | | | | |
|---|---|---|---|---|
| Time-delay Output Contact | Terminals 57-58 67-68 77-78 | Rated Load [5][6] | | 250V AC / 30V DC (resistive load) [7]<br>Category 3 or lower: 5.0A maximum<br>Category 4 or lower: 3.6A maximum |
| | | Safety Circuit | AC15 | 240V AC / 2A cosø=0.3 |
| | | | DC13 | 24V DC / 1A L/R=48 ms |
| | | No. of Outputs | | 3 (NO contact output) |
| | Terminals 45-46 | Rated Load [6] | | 250V AC / 30V DC (resistive load)<br>Category 3 or lower: 5.0A maximum<br>Category 4 or lower: 3.6A maximum |
| | | Safety Circuit | AC15 | 240V AC / 2A cosø=0.3 |
| | | | DC13 | 24V DC / 1A L/R=48 ms |
| | | No. of Outputs | | 1 (NC contact output) |
| Mechanical Durability | | | | 5,000,000 operations minimum |
| Electrical Durability | | | | 100,000 operations minimum |
| Wire Size | | | | 0.2 $mm^2$ to 1.5 $mm^2$ (24 to 16 AWG) |
| Weight (approx.) | | | | 320g |

5. Leave 5 mm of space between the sides of the module when more than 3A is continuously applied to the relay contact.
6. The module is not suitable for use with a load less than the minimum applicable load. Once a large load is applied, contacts may not operate with a small load.
7. The maximum current of the safety output contact is specified by the approved standard.
   Category 4: 3.6A Category 3: 5.0A
   To prevent the safety output contact from overcurrent, use a fuse. To satisfy Category 4, use a fuse with a maximum current of 3.6A. This fuse is not required if the short circuit current is less than 5A.

### Dimensions (mm)




### Terminal Arrangement




### Part Description

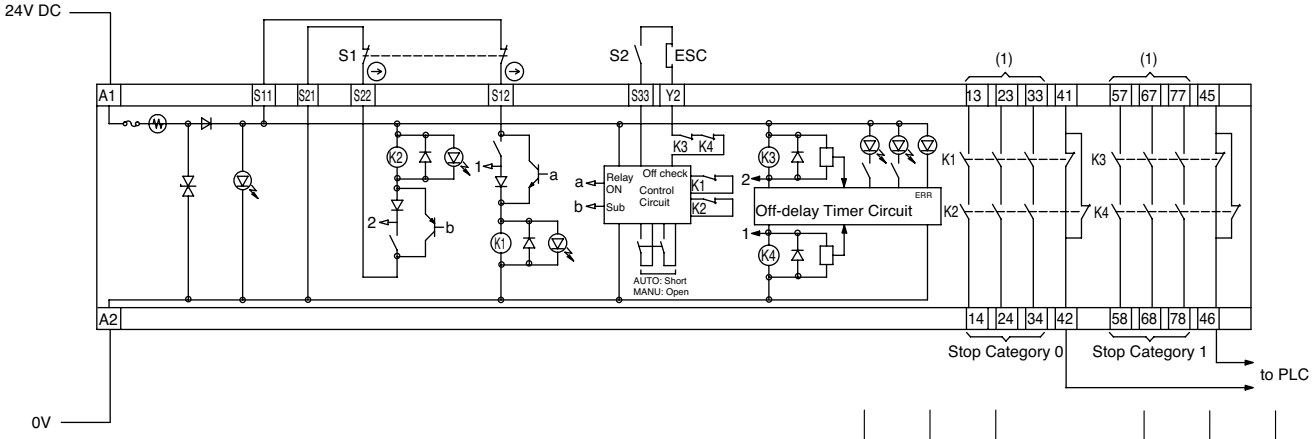
| Part No. | Part Names and Functions |
|---|---|
| 1 | CN1: Power supply input, start/off-check input |
| 2 | CN2: Safety input (dual channel) |
| 3 | CN3: Safety output contact |
| 4 | CN4: Safety output contact |
| 5 | CN5: Time-delay safety output contact |
| 6 | CN6: Time-delay safety output contact |
| 7 | Switch: Select AUTO or MANU mode |
| 8 | POW: Power LED |
| 9 | K1: ON-LED for safety output |
| 10 | K2: ON-LED for safety output |
| 11 | ERR: Error (timer) LED |
| 12 | Switches: Time-delay. The same value should be set for both switches. Otherwise, an error occurs. |
| 13 | Characters: Maximum time-delay duration is displayed. 0.75: 7.5 sec., 15: 15 sec., 30: 30 sec. |
| 14 | K3: ON-LED for safety output |
| 15 | K4: ON-LED for safety output |

### Terminal Arrangement

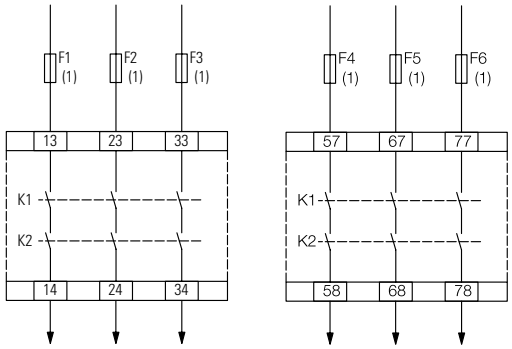
| Terminals | Markings | I/O Signals | | Remarks |
|---|---|---|---|---|
| CN1 | A1 | Power supply +24V DC input | | |
| | A2 | Power supply 0V input | | |
| | S33 | Start/off-check input | | Use a dry contact. |
| | Y2 | | | |
| CN2 | S11 | Safety input 1 | Common | Use a dry contact. |
| | S12 | | Function | |
| | S21 | Safety input 2 | Common | |
| | S22 | | Function | |
| CN3 CN4 | 41–42 | Monitor contact for safety output (NC) | | Rated load 250V AC / 30V DC 1A (Resistive load) |
| | 13–14 | Safety output contact (NO) | | Rated load 250V AC / 30V DC (Note) (Resistive load) |
| | 23–24 | | | |
| | 33–34 | | | |
| CN5 CN6 | 45–46 | Time-delay safety output contact (NC) | | Rated load 250V AC / 30V DC 1A (Resistive load) |
| | 57–58 | Time-delay safety output contact (NO) | | Rated load 250V AC / 30V DC (Note) (Resistive load) |
| | 67–68 | | | |
| | 77–78 | | | |

Note: 5.0A maximum Category 3 or lower
3.6A maximum Category 4

**HR2S-332N-T075/T15/T30 Wiring Diagram**
**Safety Category 4 Circuit Example (using an emergency stop switch)**



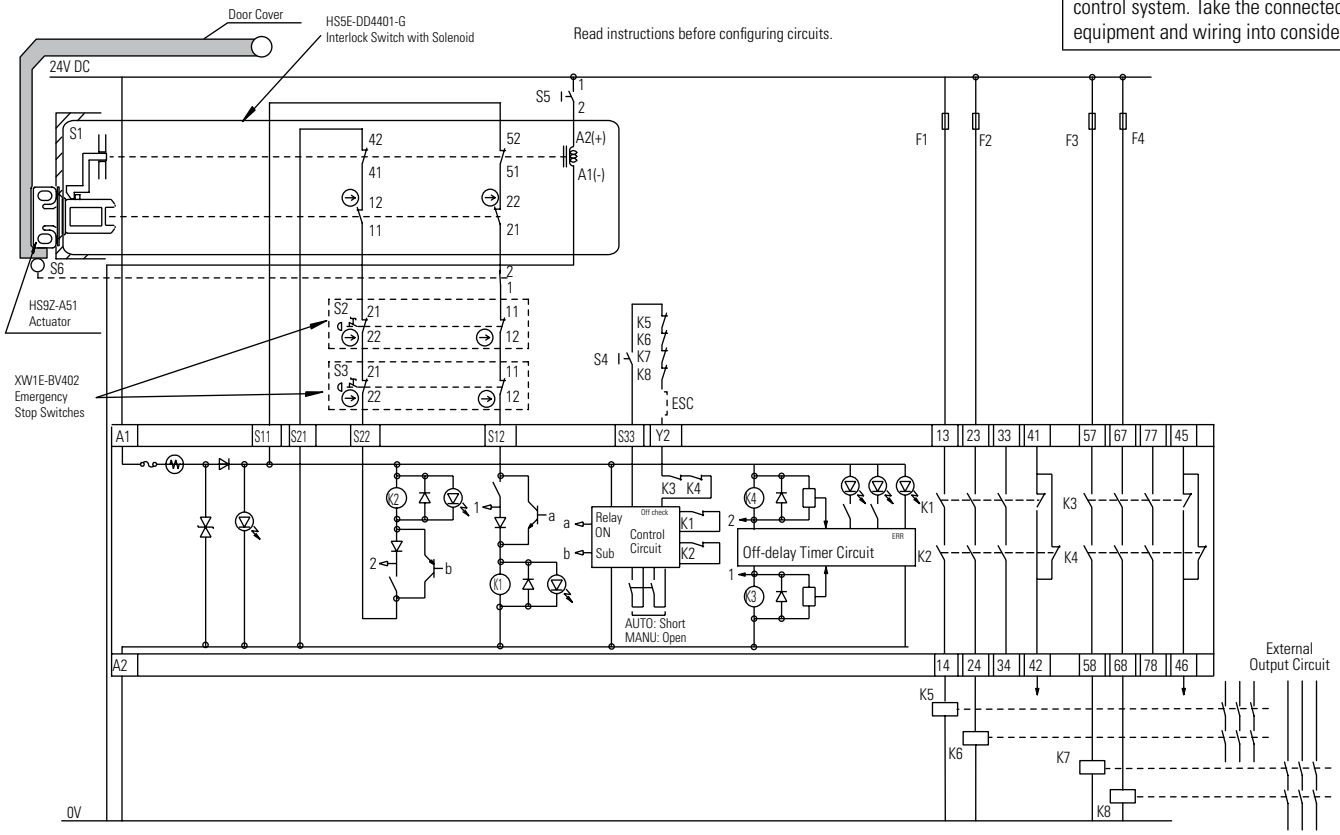

ESC: External Start Condition
F1 to 6: Protective fuse for the output of safety relay module
S1: Emergency stop switch with 2NC contacts, safety switch (recommended)
S2: Start Switch
S33-Y2: Feedback loop




(1) Use a 3.6A maximum fuse for output line protection.

**Safety Category 3 Circuit (using multiple emergency stop switches)**

Safety category is achieved by the entire control system. Take the connected safety equipment and wiring into consideration.



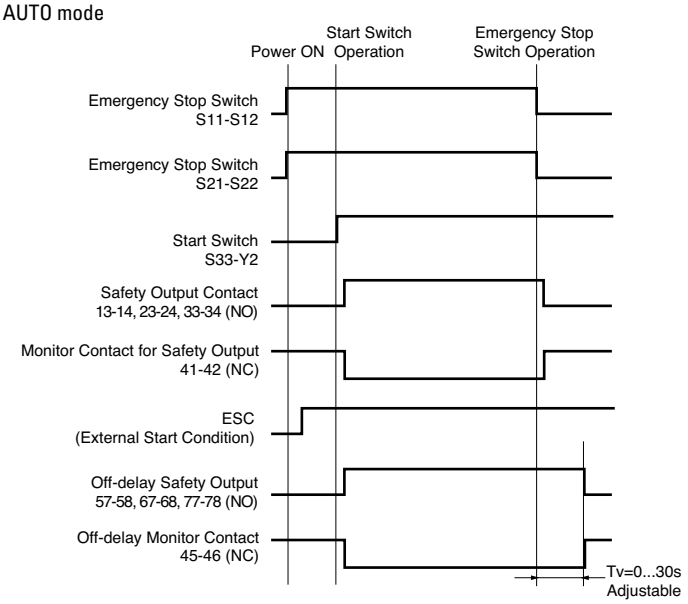

ESC: External Start Condition
F1 to F4: Fuse 3.6A
K5 to 8: Safety Contactor
S1: HS5E-DD4401-G Interlock Switch with Solenoid
S2,3: XW1E-BV402 Emergency Stop Switches
S4: Start Switch (HW series momentary)
S5: Unlocking Enabling Switch
S6: Limit Switch, etc.

Operations of Interlock Switch with Solenoid
(Stop)
Machine stops Unlocking enabling switch ON Safety output OFF Door cover released
(Start)
Door cover closed Safety relay module start switch ON Safety output ON Machine starts

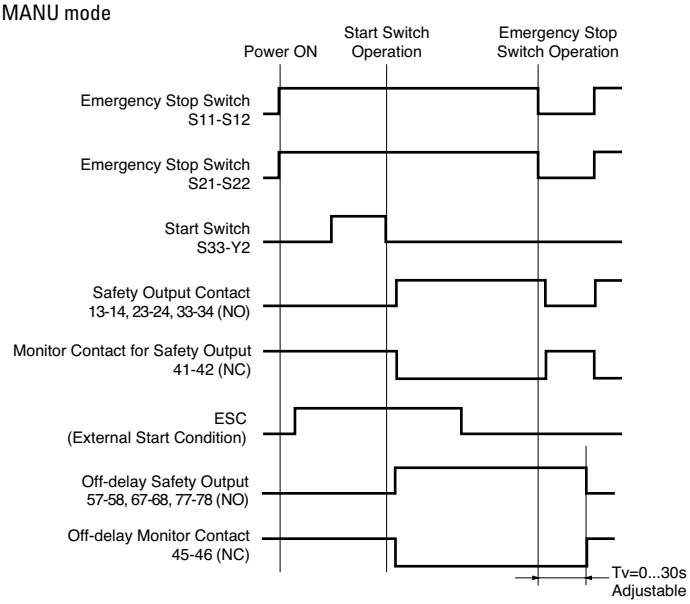
Operations of Emergency Stop Switch
(Stop)
Press emergency stop switch Safety output OFF Machine stops
(Start)
Emergency stop switch reset Safety relay module start switch ON Safety output ON Machine starts

**HR2S-332N-T075/T15/T30 Operation Chart**
**Using emergency stop switches**

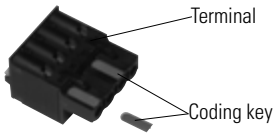
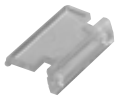
AUTO mode




MANU mode




## Maintenance Parts

| Item | Part Number | Remarks |
|---|---|---|
| Terminal / Coding Key   | HR9Z-PMT1 | Coding keys are used to prevent incorrect insertion of terminals. |
| Terminal Cover  | HR9Z-PMC1 | Used to make sure that the terminals are fully inserted. |
| Protective Tape | HR9Z-PE1 | Used to protect the AUTO/MANU switch on the front of the module. |

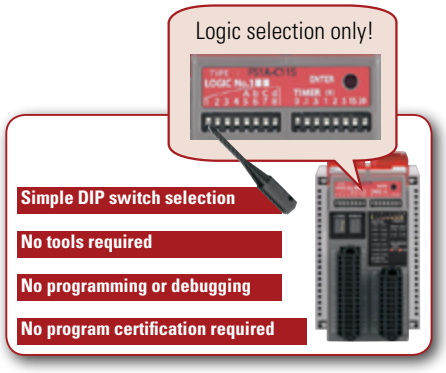
# FS1A Multi-function Safety Relay

**Key features:**

- No programming required. Configuration complete by turning on a logic switch
- A safety circuit can be configured easily just by selecting a logic from eight pre-programmed logics
- Mode selection, partial/entire stop can be achieved just by selecting a logic
- One SafetyOne module can connect with various safety inputs such as emergency stop switches and light curtains
- The status of safety I/Os and the SafetyOne errors can be monitored
- Solenoid drive output is provided, eliminating the need for a PLC
- IEC 61508 safety integrity level 3, ISO 13849-1 performance level e, and EN954-1 control category 4 compliant

## Part Numbers

| No. of Logic | Part Number |
|---|---|
| 8 | FS1A-C01S |
| 24 | FS1A-C11S |




## Optional Parts

| Product | Part Number | Note |
|---|---|---|
| Input Connector | FS9Z-CN01 | |
| Output Connector | FS9Z-CN02 | |
| Connecting Tool | FS9Z-SD01 | |
| Marked Cable Tie | FS9Z-MT01 | Used to lock the protective cover of the FS1A. |
| DIN Rail | BNDN1000 | Aluminum, 1m 35mm wide |
| End Clip | BNL6 | |

## Complies with key safety standards!

International Standards Compliant

ISO13849-1 PLe

The **SafetyOne** satisfies:

| | |
|---|---|
| EN 954-1 | Category 4 |
| IEC 61508 | SIL3 |
| ISO 13849-1 | Performance level e |

ISO IEC EN ANSI/RIA ANSI SEMI NFPA

With 8 (FS1A-C01S) or 24 (FS1A-C11S) pre-programmed safety circuit logics in a compact housing, the FS1A SafetyOne safety controller allows you to build a safety circuit by just sliding a DIP switch. Because the programs are tested and approved for compliance with key safety standards, labor, cost, and time for safety system certification can be reduced greatly.

Note: The eight logic programs of FS1A-C01S are not included in the 24 logic programs of FS1A-C11S.

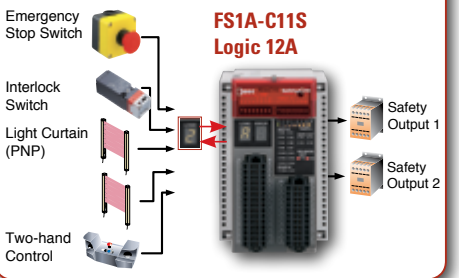
## Large functionality in a compact housing!

Small & Compact

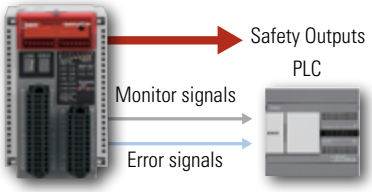
ALL-IN-ONE

**Replaces more than seven safety relay modules**

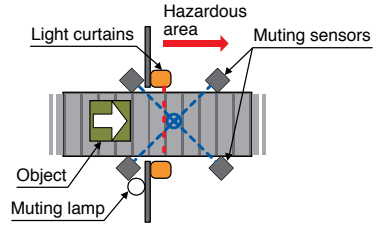
**Two-hand Control**

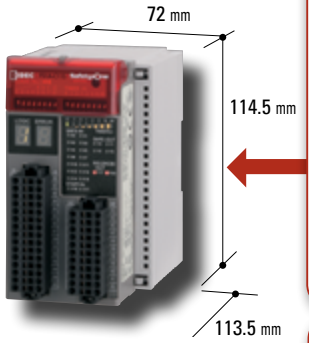



**Monitor Output**

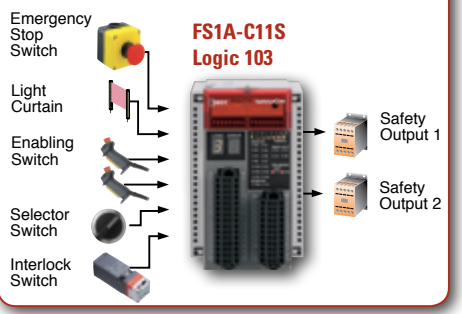



**Muting function of light curtains**

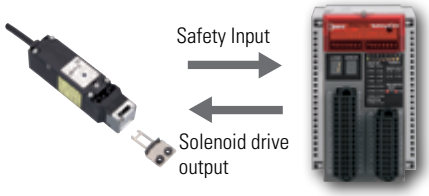


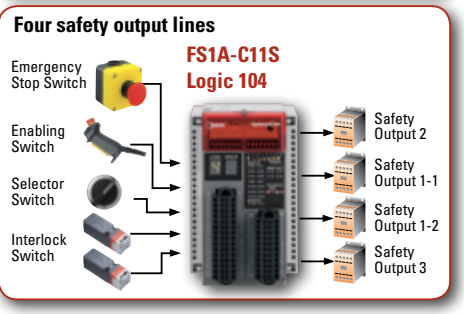

**Mode selection**

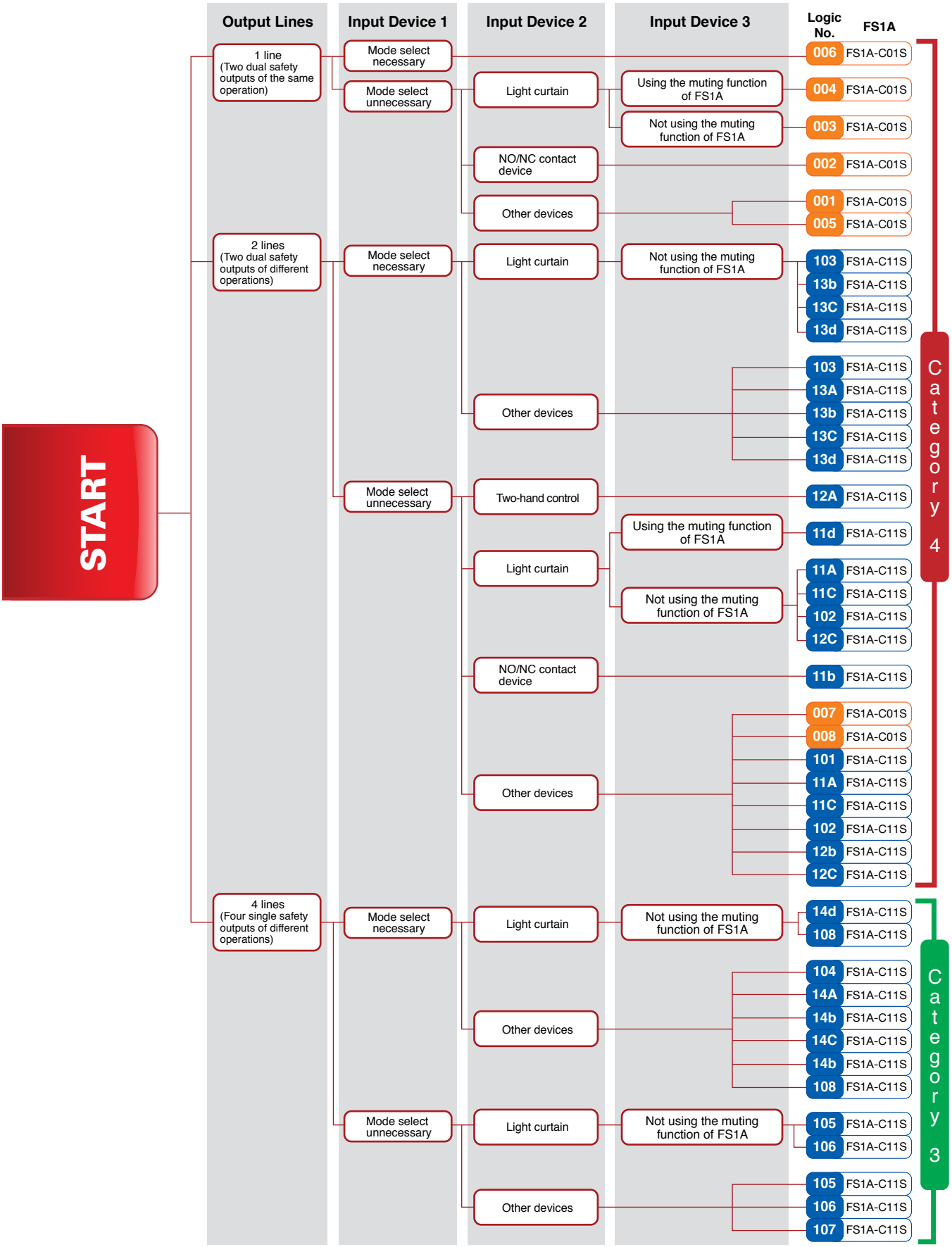



**Solenoid drive output**




**Four safety output lines**




START
Output Lines
Input Device 1
Input Device 2
Input Device 3
Logic No.
FS1A
1 line (Two dual safety outputs of the same operation)
2 lines (Two dual safety outputs of different operations)
4 lines (Four single safety outputs of different operations)
Mode select necessary
Mode select unnecessary
Light curtain
Two-hand control
NO/NC contact device
Other devices
Using the muting function of FS1A
Not using the muting function of FS1A
006 FS1A-C01S
004 FS1A-C01S
003 FS1A-C01S
002 FS1A-C01S
001 FS1A-C01S
005 FS1A-C01S
103 FS1A-C11S
13b FS1A-C11S
13C FS1A-C11S
13d FS1A-C11S
13A FS1A-C11S
12A FS1A-C11S
11d FS1A-C11S
11A FS1A-C11S
11C FS1A-C11S
102 FS1A-C11S
12C FS1A-C11S
11b FS1A-C11S
007 FS1A-C01S
008 FS1A-C01S
101 FS1A-C11S
12b FS1A-C11S
14d FS1A-C11S
108 FS1A-C11S
104 FS1A-C11S
14A FS1A-C11S
14b FS1A-C11S
14C FS1A-C11S
105 FS1A-C11S
106 FS1A-C11S
107 FS1A-C11S
Category 4
Category 3

## Specifications

### Operating Environment

| | |
|---|---|
| Applicable Standards | TÜV approval: IEC/EN 61000-6-2, IEC/EN 61000-6-4, IEC/EN 61496-1, IEC 61508 Part 1-7, IEC/EN 62061, ISO 13849-1, ISO 13851 (FS1A-C11S), EN 954-1<br>UL: UL508, CSA C22.2 No. 142<br>Applicable standards: IEC/EN 60204-1, IEC/EN 61131-2, ISO 10218-1, ANSI/RIA R15.06, ANSI B11.19, SEMI S2-0706, NFPA79<br>EN 954-1, 13849-1, 62061, 61496-1, 60204-1, 61131-2, 61000-6-2, 61000-6-4<br>ANSI/RIA R15.06<br>ANSI B11.19<br>SEMI S2<br>NFPA 79 |
| Safety Circuit | Logic selection |
| Operating Temperature | –10 to +55°C (no freezing) |
| Operating Humidity | 10 to 95% RH (no condensation) |
| Storage Temperature | –40 to +70°C (no freezing) |
| Storage Humidity | 10 to 95% RH (no condensation) |
| Pollution Degree | 2 (IEC/EN60664-1) |
| Degree of Protection | IP20 (IEC/EN60529) |
| Corrosion Immunity | Free from corrosive gases |
| Altitude | Operation: 0 to 2000m, Transport: 0 to 3000m |
| Vibration Resistance | Vibration: 5 to 8.4 Hz, amplitude 3.5 mm<br>8.4 to 150 Hz<br>Acceleration: 9.8 m/s$^2$ (2 hours each on three mutually perpendicular axes) (IEC/EN60028-2-6)<br>Bump: Acceleration 98 m/s$^2$, 16 ms (1000 times each on three mutually perpendicular axes) (IEC/EN60028-2-29) |
| Shock Resistance | 147 m/s$^2$, 11ms (3 shocks each on three mutually perpendicular axes (IEC/EN 60028-2-27) |
| Connector Insertion/ Removal Durability | 50 times maximum |
| Configuration Switch Durability | 100 operations maximum per pole |
| Enter Button Durability | 1000 operations maximum |
| Housing Material | Modified-polyphenyleneether (m-PPE) |
| Weight (approx.) | 330g |

### Electric Characteristics

| | |
|---|---|
| Rated Voltage | 24V DC |
| Allowable Voltage Range | 20.4 to 28.8V DC |
| Maximum Power Consumption | 48W (at the rated power voltage, when all I/Os are ON) (incl. output load) |
| Allowable Momentary Power Interruption | 10 ms minimum (at the rated power voltage) |
| Response Time | ON–OFF: 40 ms maximum [1]<br>100 ms maximum [2]<br>OFF–ON: 100 ms maximum [3] |
| Start-up Time [4] | 6 sec maximum |
| Dielectric Strength | Between live part and FE terminal: 500V AC, 1 minute<br>Between housing and FE terminal: 500V AC, 1 minute |
| Insulation Resistance | Between live part and FE terminal: 10 MΩ minimum (500V DC megger)<br>Between housing and FE terminal: 10 MΩ minimum (500V DC megger) |
| Impulse Noise Immunity (noise simulator) | Power terminal: ±1 kV 50 ns, 1μs (direct connection)<br>I/O terminal: ±2kV 50 ns, 1μs (coupling adapter) |
| Inrush Current | 25A maximum |
| Ground | Ground resistance of 100Ω maximum |
| Effect of Incorrect Wiring | Reverse polarity: No operation, no damage<br>Improper voltage: Permanent damage may occur |

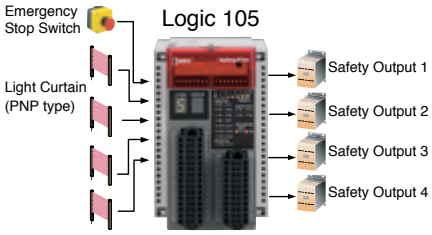
1. The time to shut off safety outputs after inputs are turned off or input monitor error is detected (when off-delay timer is set to 0s)
2. Time to shut off safety outputs after an error (except input monitor error) or a configuration change of logic or timer is detected (not depending on the off-delay timer value)
3. Auto start—Time to turn on safety outputs after safe inputs are turned on
   Manual start—Time to turn on safety outputs after start inputs are turned on
   Control start—Time to turn on safety outputs after the start inputs are turned off-on-off (maintain ON for 0.1 to 5s)
4. Time to change to Run state after power supply is turned on.

## Examples

| FS1A-C11S<br>Logic 105 | Partial stop logic for apparatus with openings | Output Line: 4<br>4 single safety outputs of different operations | Category<br>3 |
|---|---|---|---|

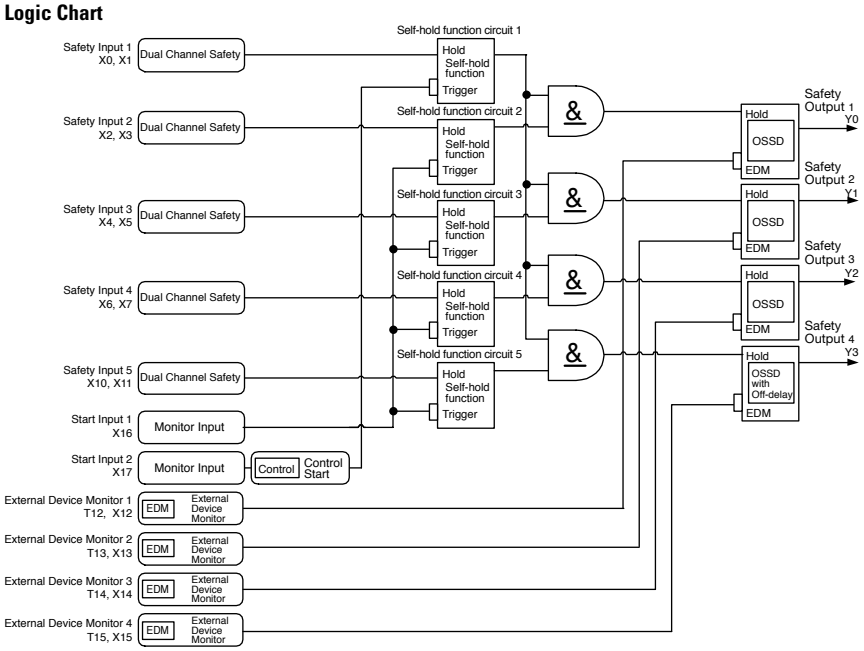
Logic 105 is used for safeguarding measures of machine tools and robots, which use safety equipment such as light curtains with dual solid state outputs. Safety outputs are single output. Five dual channel safety inputs can be connected. Safety output 4 has an off-delay timer.

### Wiring Example




### DIP Switch and LED Display

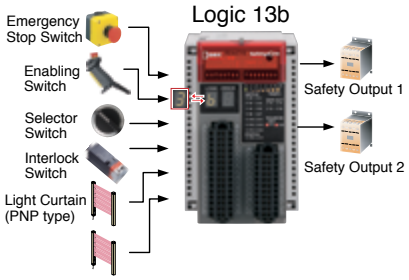
### Logic Chart



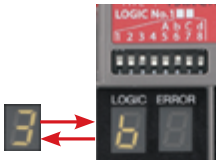

| FS1A-C11S<br>Logic 13b | The logic constructing an OR circuit applicable for selection of active safety input devices | Output Line: 2<br>2 dual safety outputs of different operations | Category<br>4 |
|---|---|---|---|

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 13b is used to configure a system in which teach or auto mode can be selected using a selector switch. Safety outputs are dual channel outputs. OR circuit can be configured in auto mode. Two dual channel direct opening input, one mode select input, one dual channel dependent input, and two dual channel safety inputs can be connected. Safety output 2 has an off-delay timer.

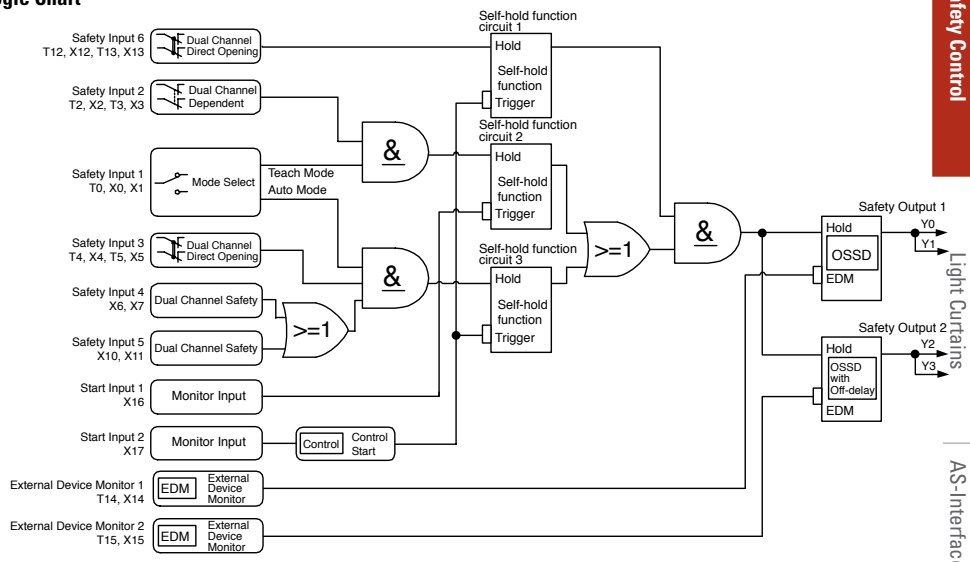
### Wiring Example




### DIP Switch and LED Display



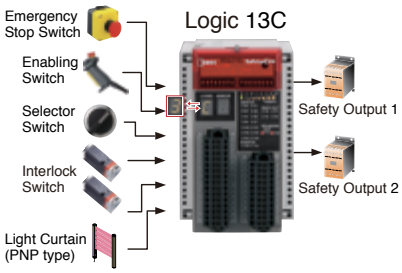
### Logic Chart



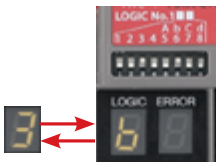
| FS1A-C11S<br>Logic 13C | Partial stop logic applicable for selection of active safety input devices | Output Line: 2<br>2 dual safety outputs of different operations | Category<br>4 |
|---|---|---|---|

In machine tools and robots, a hazard source is isolated by a guard in automatic operation. In human-attended operation such as teaching and maintenance, the operator has to work inside a hazardous area. Logic 13C is used to configure a system in which teach or auto mode can be selected using a selector switch. Safety outputs are dual channel outputs. Three dual channel direct opening inputs, one mode select input, one dual channel dependent input, one dual channel safety input can be connected. Safety output 2 has an off-delay timer.

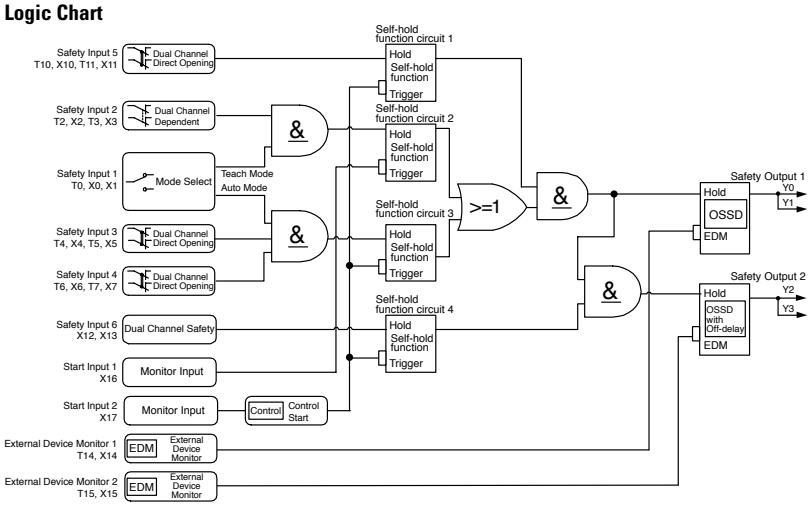
**Wiring Example**




**DIP Switch and LED Display**



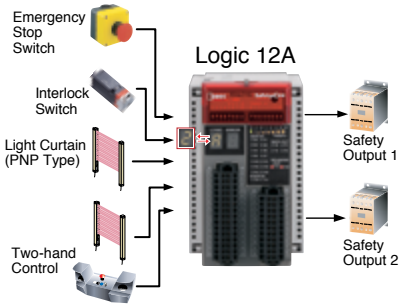

**Logic Chart**



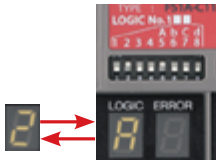

| FS1A-C11S<br>Logic 12A | The logic for apparatus with a two-hand control device | Output Line: 2<br>2 dual safety outputs of different operations | Category<br>4 |
|---|---|---|---|

Logic 12A is used for safeguarding measures of machine tools that use two-hand control. Safety outputs are dual channel outputs. Two dual channel direct opening inputs, one two-hand control input (two safety inputs = one point), and two dual channel safety inputs can be connected. Safety output 2 has an off-delay timer.

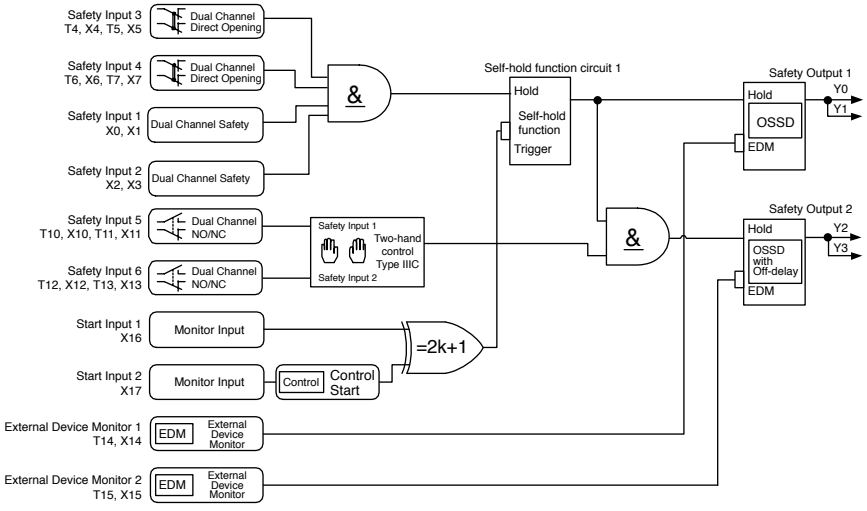
**Wiring Example**




**DIP Switch and LED Display**




**Logic Chart**



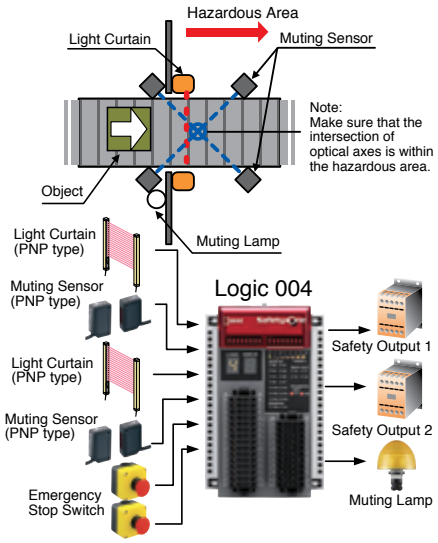
| FS1A-C01S<br>Logic 004 | Muting function logic for apparatus with openings | Output Line: 1<br>2 dual safety outputs of the same operation | Category<br>4 |
|---|---|---|---|

In Logic 004, muting functions are added to the dual solid state output of Logic 003. Dual direct-opening components such as emergency stop switches and interlock switches can be used at the same time.

## Muting Function Improves Productivity

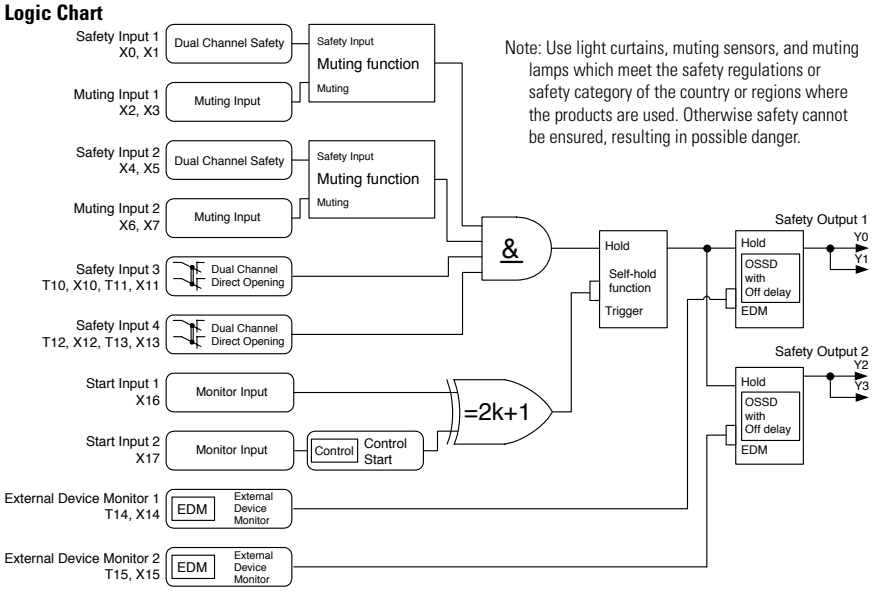
With a muting function, the system stops when detecting a human and temporarily defeats the light curtain while work objects are being supplied. This improves the system's productivity. Muting functions can be used easily by connecting a light curtain, muting sensor, and muting lamp to the SafetyOne (Note). In muting status, the OFF signals of corresponding safety solid state outputs are defeated.

### Wiring Example




### DIP Switch and LED Display

### Logic Chart




Note: Use light curtains, muting sensors, and muting lamps which meet the safety regulations or safety category of the country or regions where the products are used. Otherwise safety cannot be ensured, resulting in possible danger.

Note: When installing light curtain and muting sensor, ensure safety by referring to IEC TS 62046 technical documents.

## Safety Input Specifications

### Drive Terminals

(T0, T1, T2, T3, T4, T5, T6, T7, T10, T11, T12, T13, T14, T15)

| | |
|---|---|
| Rated Drive Voltage | Power supply voltage |
| Minimum Drive Voltage | Power supply voltage – 2.0V |
| Number of Drive Terminals | 14 |
| Maximum Drive Current | 20 mA per terminal (28.8V DC) (Note) |

Note: Drive terminals of safety inputs send safety confirmation signals (pulse signals) for the diagnosis of safety components and input circuits.
Wiring and diagnosis function change depending on the selected logic. See user's manual "Chapter 5 Logic." Basic specifications remain the same.

### Receive Terminals

(X0, X1, X2, X3, X4, X5, X6, X7, X10, X11, X12, X13, X14, X15)

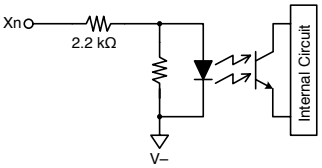
| | |
|---|---|
| Rated Input Voltage | 24V DC |
| Input ON Voltage | 15.0 to 28.8V DC |
| Input OFF Voltage | Open or 0 to 5.0V DC |
| Number of Inputs | 14 |
| Input Current | 10 mA per terminal (at the rated power voltage) |
| Input Signal | Sink input (for PNP output), Type 1 (IEC61131-2) |

### Wire

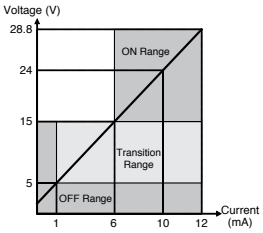
| | |
|---|---|
| Cable Length (Note) | 100m maximum (total wire length per input) |
| Allowable Wire Resistance | 300Ω maximum |

Note: When wiring between the SafetyOne and a component is 30m or more, use shielded cable to ensure electromagnetic immunity.

**• Receive Terminal Internal Circuit**




**• Receive Terminal Operating Range**

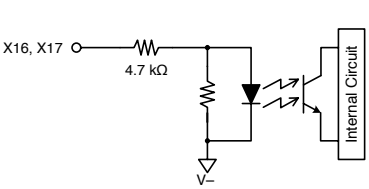



## Start Input Specifications

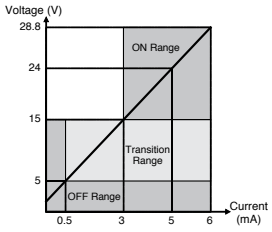
| | |
|---|---|
| Rated Input Voltage | 24V DC |
| Input ON Voltage | 15.0 to 28.8V DC |
| Input OFF Voltage | Open or 0V to 5.0V DC |
| Number of Start Inputs | 2 (X16, X17) |
| Input Current | 5 mA per terminal (at the rated power voltage) |
| Input Signal | Sink input (PNP output), Type 1 (IEC61131-2) |
| Cable Length (Note) | 100m maximum (total wire length per input) |
| Allowable Wire Resistance | 300Ω maximum |

Note: When wiring between the SafetyOne and a component is 30m or more, use shielded cable to ensure electromagnetic immunity.

**• Start Input Internal Circuit**




**• Start Input Operation Range**

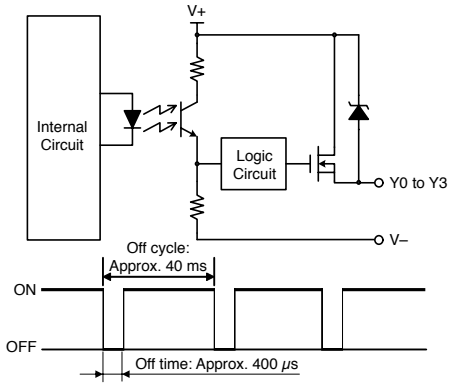



## Safety Output Specifications

| | | |
|---|---|---|
| Output Type | | Source output (N channel MOSFET) |
| Rated Output Voltage | | Power supply voltage |
| Minimum Output Voltage | | Power supply voltage – 2.0V |
| Number of Safety Outputs | | 4 (Y0, Y1, Y2, Y3) |
| Maximum Output Current | 1 output | 500 mA maximum |
| | Total | 1A maximum |
| Leakage Current | | 0.1 mA maximum |
| Allowable Inductive Load [1] | | L/R = 25 ms |
| Allowable Capacitive Load | | 1 µF maximum |
| Cable Length [2] | | 100m maximum (total length per output) |

1. When connecting an inductive load, connect a protection element such as a diode.
2. When wiring between the SafetyOne and a component is 30m or more, use shielded cable to ensure electromagnetic immunity.

**• Safety Output Internal Circuit**



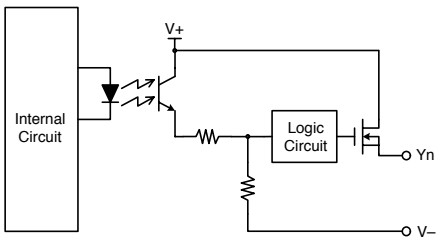

The safety outputs of the SafetyOne are solid state outputs. When the output is on, off-check signals are generated at regular intervals. The operating characteristics of the safety output change depending on the selected logic. For details, see user's manual "Chapter 5 Logic." The basic specifications remain the same.
Note that off-check signals may cause reaction of some safety components depending on their response speed.
Monitor output and solenoid/lamp output do not generate outputs of off-check signals.

## Monitor Output Specifications

| | | |
|---|---|---|
| Output Type | | Source output (N channel MOSFET) |
| Rated Output Voltage | | Power supply voltage |
| Minimum Output Voltage | | Power supply voltage – 2.0V |
| Number of Safety Outputs | | 4 (Y0, Y1, Y2, Y3) |
| Maximum Output Current | 1 output | 500 mA maximum |
| | Total | 1A maximum |
| Leakage Current | | 0.1 mA maximum |
| Allowable Inductive Load [1] | | L/R = 25 ms |
| Allowable Capacitive Load | | 1 µF maximum |
| Cable Length [2] | | 100m maximum (total length per output) |

Note: When wiring between the SafetyOne and a component is 30m or more, use shielded cable to ensure electromagnetic immunity.

**• Monitor Output Internal Circuit**



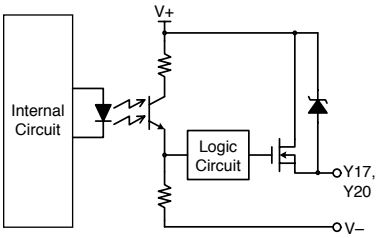

The operating characteristics of the monitor output change depending on the selected logic. For details, see user's manual "Chapter 5 Logic." The basic specifications remain the same.
Do not use monitor output as a safety output, otherwise the system's safety cannot be assured when the SafetyOne or safety components fail.

## Solenoid/Lamp Output Specifications

| | | |
|---|---|---|
| Output Type | | Source output (N channel MOSFET) |
| Rated Output Voltage | | Power supply voltage |
| Minimum Output Voltage | | Power supply voltage – 2.0V |
| No. of Solenoid/Lamp Outputs | | 2 (Y17, Y20) |
| Maximum Output Current | 1 output | 500 mA maximum |
| | Total | 500 mA maximum |
| Leakage Current | | 0.1 mA maximum |
| Allowable Inductive Load [1] | | L/R = 25 ms |
| Cable Length [2] | | 100m maximum (total length per output) |

1. When connecting an inductive load, connect a protection element such as a diode.
2. When wiring between the SafetyOne and a component is 30m or more, use shielded cable to ensure electromagnetic immunity.

## Solenoid/Lamp Output Internal Circuit




The selected operating characteristics of solenoid/lamp output change depending on the selected logic. For details, see user's manual "Chapter 5 Logic." The basic specifications remain the same. Do not use solenoid/lamp output as a safety output, otherwise the system's safety cannot be assured when the SafetyOne or safety components fail.

## Internal States

| State | Description |
|---|---|
| Initial | Initial processing is performed immediately after power is supplied to the SafetyOne. The internal circuits are checked and the LEDs show operation confirmation (blinking) for 6 seconds (approx). |
| Run | The SafetyOne is under normal operation. Logic processing continues without failures or wiring errors. |
| Configuration | A logic or off-delay timer value is being configured. Configuration enables the logic and off-delay timer value. When completed, the SafetyOne changes to the Run state. |
| Protection | An input monitor error has occurred with dual channel input, EDM input, or muting input. When the problem is removed, the SafetyOne changes to Run state. |
| Stop | A failure or error has occurred with an external device or internal circuit. When the problem is removed and the power is turned on, Stop state is cleared. |

## LED and Output States

### When safety outputs are dual channel outputs

| State | Logic LED | Error LED | Timer LED | Safety Output | Solenoid/ Lamp Output | Monitor Output | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Y0 to Y3 | Y17, Y20 | Y4 to Y13 | Y14 | Y15 | Y16 |
| Initial | (Note 1) | (Note 1) | (Note 1) | OFF | OFF | OFF | ON | ON | OFF |
| Run | Logic # | Blank | Selected Value | (Note 2) | (Note 2) | (Note 2) | OFF | OFF | ON |
| Configuration | (Note 3) | C | (Note 3) | OFF | OFF | OFF | OFF | ON | OFF |
| Protection | Logic # | 1 | Selected Value | Off (Note 6) | OFF | (Note 4) | OFF | ON | OFF |
| Stop | Blank | (Note 5) | Blank | OFF | OFF | (Note 4) | ON | ON or OFF | OFF |

### When safety outputs are single channel outputs

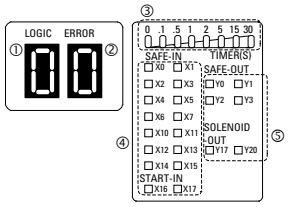
| State | Logic LED | Error LED | Timer LED | Safety Output | Monitor Output | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Y0 to Y3 | Y4 to Y13, Y17, Y20 | Y14 | Y15 | Y16 |
| Initial | (Note 1) | (Note 1) | (Note 1) | OFF | OFF | ON | ON | OFF |
| Run | Logic # | Blank | Selected Value | (Note 2) | (Note 2) | OFF | OFF | ON |
| Configuration | (Note 3) | C | (Note 3) | OFF | OFF | OFF | ON | OFF |
| Protection | Logic # | 1 | Selected Value | Off (Note 6) | (Note 4) | OFF | ON | OFF |
| Stop | Blank | (Note 5) | Blank | OFF | (Note 4) | ON | ON or OFF | OFF |

1. Random display of Initial state.
2. Output and LED display of the selected logic.
3. Blinking LED display of the selected logic number or the selected timer value.
4. Pulsing display of monitor output and output LED corresponding to the input of error. Other LEDs and monitor outputs maintain the display of Run state.
5. Error number is displayed.
6. Safety output with timer is turned OFF after set OFF-delay time.

Caution: Solenoid/lamp outputs (Y17, Y20) turn on for 1 second maximum when the state changes to Run state. Take operation of connected components into consideration.

## LEDs

① Logic LED (green)
② Error LED (red)
③ Timer LED (green)
④ Input LED (orange)
⑤ Output LED (orange)




### Logic LED ①

| Type | LED | Status | Description |
|---|---|---|---|
| FS1A-C01S | 1, 2, 3, 4, 5, 6, 7, 8 | ON | The selected logic is in Run or Protection state |
| | | Blink | The selected logic is in Configuration state |
| FS1A-C11S | 1, 2, 3, 4, 5, 6, 7, 8, A, b, C, d | ON | The selected logic is in Run or Protection state (Ex. Logic 14A: 4→A→4→A→4→...) |
| | | Blink | The selected logic is in Configuration state (Ex. Logic 14A: 4→A→OFF→A→4→OFF...) |
| FS1A-C01S/ C11S | E | Blink | The selected logic has Configuration error (logic not selected, or multiple logics are selected) |
| | Random | ON/Blink | Initializing (Initial state) |
| | OFF | OFF | Error (Stop state) |

**FS1A-C01S setting**
Correct: Selecting one logic from 1 to 8
Wrong: Selecting two or more logics from 1 to 8

**FS1A-C11S setting**
Correct: Selecting one logic from 1 to 8
Selecting one from 1 to 4, and one from A, b, C, or d.
Wrong: Selecting three or more logics from 1 to 8
Selecting two or more logics from 1 to 4
Selecting two or more logics from A (5), b (6), C (7), or d (8)

### Error LED ②

| Type | LED | Status | Description |
|---|---|---|---|
| FS1A-C01S/ FS1A-C11S | 1 | ON | Input monitor error (Protection state) |
| | 2 | ON | Wiring error at safety input or an error in safety input circuits |
| | 3 | ON | Wiring error at start input or an error in start input circuit |
| | 4 | ON | Wiring error at safety output or an error in safety output circuit |
| | 5 | ON | Muting lamp error (disconnection) (FS1A-C01S: logic 4 only) (FS1A-C11S: logic 11d only) |
| | 6 | ON | Power supply error or internal power supply circuit error |
| | 7 | ON | Internal error, power supply error, or internal power supply circuit error |
| | 9 | ON | EMC disturbance |
| | C | ON | Configuration procedure is in progress (Configuration state) |
| | | Blink | Configuration is valid (Note) (Configuration state) |
| | Random | ON/Blink | Initializing (Initial state) |
| | OFF | OFF | Normal operation (Run state) |

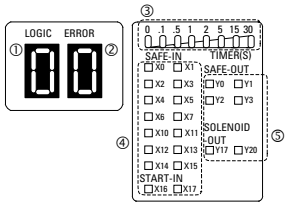
Note: Blinks for 1 to 5 seconds after the enter button is pressed. Releasing the button during blinking activates the setting. The blinking LED becomes ON if the button is pressed for more than 5 seconds, and the setting becomes invalid even after the button is released.

### Timer LED ③

| Type | LED | Status | Description |
|---|---|---|---|
| FS1A-C01S/ FS1A-C11S | 0 | ON | No off-delay (safety outputs shut down immediately) |
| | .1 | ON | Off-delay timer 0.1s |
| | .5 | ON | Off-delay timer 0.5s |
| | 1 | ON | Off-delay timer 1s |
| | 2 | ON | Off-delay timer 2s |
| | 5 | ON | Off-delay timer 5s |
| | 15 | ON | Off-delay timer 15s |
| | 30 | ON | Off-delay timer 30s |
| | Each LED | Blink | Selected timer value (Configuration state) |
| | Random | ON/Blink | Initializing (Initial state) |
| | All LEDs | OFF | Timer value is not selected or the SafetyOne is in Stop state |

## LEDs, con't

① Logic LED (green)
② Error LED (red)
③ Timer LED (green)
④ Input LED (orange)
⑤ Output LED (orange)



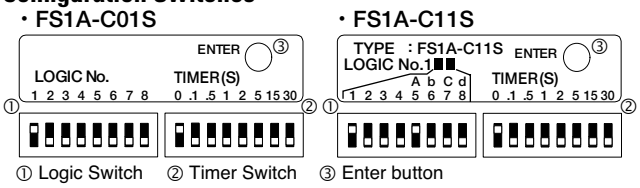

### Input LED ④
### SAFE-IN (X0 to X15), START-IN (X16, X17)

| Type | LED | Status | Description |
|---|---|---|---|
| FS1A-C01S | X0 to X15 | ON | Input ON |
| | | OFF | Input OFF, Stop/Configuration state |
| | | Blink | Input monitor error |
| | X16, X17 | ON | Input ON |
| | | OFF | Input OFF, Stop/Configuration state |
| FS1A-C11S | X0 to X15 | ON | Input ON |
| | | OFF | Input OFF, Stop/Configuration state |
| | | Blink | Input error (error displayed on error LED) |
| | X16, X17 | ON | Input ON |
| | | OFF | Input OFF, Stop/Configuration state |
| | | Blink | Input error (error displayed on error LED) |

### Ourput LED ⑤
### SAFE-OUT (Y0 to Y3), SOLENOID-OUT (Y17, Y20)

| Type | LED | Status | Description |
|---|---|---|---|
| FS1A-C01S | Y0 to Y3 | ON | Output ON |
| | | OFF | Output OFF, Stop/Configuration state |
| | | Blink | Off-delay operating |
| | Y17, Y20 | ON | Output ON |
| | | OFF | Output OFF, Stop/Configuration state |
| FS1A-C11S | Y0 to Y3 | ON | Output ON |
| | | OFF | Output OFF |
| | | Blink | Off-delay operating, or output error (error displayed on error LED) |
| | Y17, Y20 | ON | Output ON |
| | | OFF | Output OFF |
| | | Blink | Off-delay operating, or output error (error displayed on error LED) |

## Configuration Switches




① Logic Switch ② Timer Switch ③ Enter button

### Logic Switch ①

### FS1A-C01S

Eight DIP switches are provided for selecting a logic by moving a switch upward. For details, see user's manual "Chapter 5 Logic." Only one logic switch can be selected.

| DIP Switch | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Logic | 001 | 002 | 003 | 004 | 005 | 006 | 007 | 008 |

### FS1A-C11S

Eight DIP switches are provided for selecting a logic by moving one or two switch(es) upward. For details, see user's manual "Chapter 5 Logic."

| DIP Switch | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Logic | 001 | 002 | 003 | 004 | 005 | 006 | 007 | 008 |

| 1 + A | 1 + b | 1 + C | 1 + d | 2 + A | 2 + b | 2 + C | 2 + d |
|---|---|---|---|---|---|---|---|
| 11A | 11b | 11C | 11d | 12A | 12b | 12C | 12d |

| 3 + A | 3 + b | 3 + C | 3 + d | 4 + A | 4 + b | 4 + C | 4 + d |
|---|---|---|---|---|---|---|---|
| 13A | 13b | 13C | 13d | 14A | 14b | 14C | 14d |

### Timer Switch ②

Eight DIP switches are provided for selecting an off-delay timer value, by moving a switch upward. Only one timer switch can be selected.

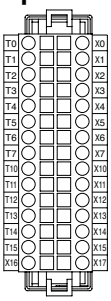
| Switch No. | Timer Value | Description |
|---|---|---|
| 1 | 0 | No off-delay (safety outputs shut down immediately) |
| 2 | .1 | Off-delay timer 0.1s |
| 3 | .5 | Off-delay timer 0.5s |
| 4 | 1 | Off-delay timer 1s |
| 5 | 2 | Off-delay timer 2s |
| 6 | 5 | Off-delay timer 5s |
| 7 | 15 | Off-delay timer 15s |
| 8 | 30 | Off-delay timer 30s |

### Enter Button ③

The enter button is used to activate the configuration of logic and timer switches. Error LED will blink for 1 to 5 seconds after pressing the enter button. Releasing the button during blinking activates the setting. The blinking LED becomes ON if the button is pressed for more than 5 seconds, and the setting becomes invalid even after the button is released. For setting the switches and enter button, use the setting tool supplied with the SafetyOne.

## Connector Specifications

### Input Connector

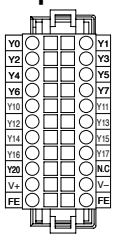



**Applicable connector**
- Spring clamp (30-pin)
  FS9Z-CN01 (IDEC)
  2-1871940-5
  (Tyco Electronics)
- Crimp (30-pin)
  2-1871946-5
  (Tyco Electronics)

| Terminal | No. | Description |
|---|---|---|
| T0 | A1 | Safety input drive terminal 0 |
| T1 | A2 | Safety input drive terminal 1 |
| T2 | A3 | Safety input drive terminal 2 |
| T3 | A4 | Safety input drive terminal 3 |
| T4 | A5 | Safety input drive terminal 4 |
| T5 | A6 | Safety input drive terminal 5 |
| T6 | A7 | Safety input drive terminal 6 |
| T7 | A8 | Safety input drive terminal 7 |
| T10 | A9 | Safety input drive terminal 10 |
| T11 | A10 | Safety input drive terminal 11 |
| T12 | A11 | Safety input drive terminal 12 |
| T13 | A12 | Safety input drive terminal 13 |
| T14 | A13 | Safety input drive terminal 14 |
| T15 | A14 | Safety input drive terminal 15 |
| T16 | A15 | Start input terminal 16 |
| X0 | B1 | Safety input receive terminal 0 |
| X1 | B2 | Safety input receive terminal 1 |
| X2 | B3 | Safety input receive terminal 2 |
| X3 | B4 | Safety input receive terminal 3 |
| X4 | B5 | Safety input receive terminal 4 |
| X5 | B6 | Safety input receive terminal 5 |
| X6 | B7 | Safety input receive terminal 6 |
| X7 | B8 | Safety input receive terminal 7 |
| X10 | B9 | Safety input receive terminal 10 |
| X11 | B10 | Safety input receive terminal 11 |
| X12 | B11 | Safety input receive terminal 12 |
| X13 | B12 | Safety input receive terminal 13 |
| X14 | B13 | Safety input receive terminal 14 |
| X15 | B14 | Safety input receive terminal 15 |
| X17 | B15 | Start input terminal 17 |

Note: For the specifications of crimp connector, contact Tyco Electronics.

### Output Connector




**Applicable connector**
- Spring clamp (22-pin)
  FS9Z-CN02 (IDEC)
  2-1871940-1
  (Tyco Electronics)
- Crimp (22-pin)
  2-1871946-1
  (Tyco Electronics)

| Terminal | No. | Description |
|---|---|---|
| Y0 | A1 | Safety output terminal 0 |
| Y2 | A2 | Safety output terminal 2 |
| Y4 | A3 | Safety output terminal 4 |
| Y6 | A4 | Safety output terminal 6 |
| Y10 | A5 | Safety output terminal 10 |
| Y12 | A6 | Safety output terminal 12 |
| Y14 | A7 | Safety output terminal 14 |
| Y16 | A8 | Safety output terminal 16 |
| Y20 | A9 | Solenoid/lamp output terminal 20 |
| V+ | A10 | 24V DC power terminal |
| FE | A11 | Functional ground terminal |
| Y1 | B1 | Safety output terminal 1 |
| Y3 | B2 | Safety output terminal 3 |
| Y5 | B3 | Safety output terminal 5 |
| Y7 | B4 | Safety output terminal 7 |
| Y11 | B5 | Safety output terminal 11 |
| Y13 | B6 | Safety output terminal 13 |
| Y15 | B7 | Safety output terminal 15 |
| Y17 | B8 | Solenoid/lamp output terminal 17 |
| NC | B9 | Blank terminal |
| V– | B10 | 0V DC power terminal |
| FE | B11 | Functional ground terminal |

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# Light Curtains

IDEC

www.IDEC.com/safety

# Selection Guide

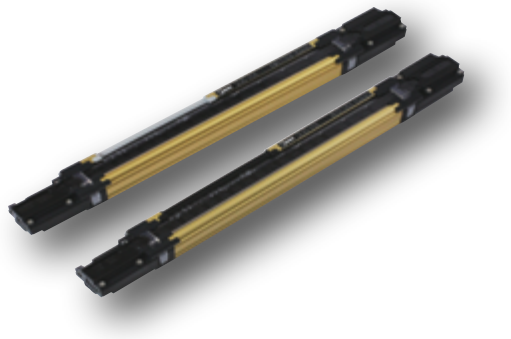
| Series | Type 4 Safety Category | Type 2 Safety Category | | Type 4 Safety Category | |
|---|---|---|---|---|---|
| | SE4D Hand Series | SG2 - Hand Series | SG2 - Presence Series | SG4 - Finger Series | SG4 - Hand Series |
| Appearance | | | | | |
| Page | 461 | 466 | | 470 | |
| Protection Type | Type 4 | Type 2 | | Type 4 | |
| Resolution | 25mm | 30mm | 50mm, 90mm | 14mm | 30mm |
| Material | Aluminum | Painted Aluminum | | | |

# SE4D Series

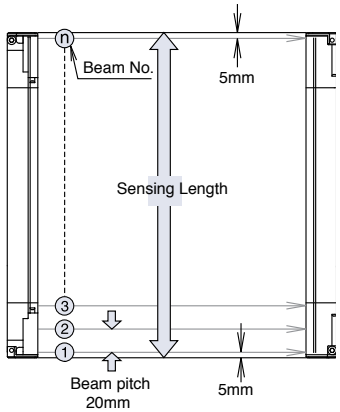
## Key features

The IDEC SE4D Light Curtains are easy to install and use specialized technology to ensure there are no dead zones around the units. Their features increase safety, reduce downtime and improve productivity.

- Cascading with no dead zone
- Built-in muting function
- Built-in EDM function
- Fixed and floating blanking function
- Fast and Unified response time of 14ms
- Supports both PNP and NPN outputs in a single model
- Beam Axis Adjustment function
- Type 4 Hand protection
- Category 4, PLe, SIL3
- IP67 Degree of Protection

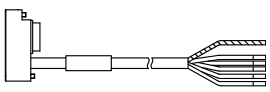
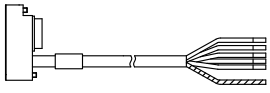
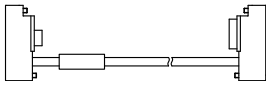


## Part Numbers

| Shape | Minimum Sensing Object | Sensing Distance (Note 2) (Effective Distance) | No. of Beams | Sensing Length (mm) | Part Number (Note 3) |
|---|---|---|---|---|---|
|  | ø25mm | 0.3 to 9m | 12 | 230 | SE4D-H12 |
| | | | 16 | 310 | SE4D-H16 |
| | | | 20 | 390 | SE4D-H20 |
| | | | 24 | 470 | SE4D-H24 |
| | | | 28 | 550 | SE4D-H28 |
| | | | 32 | 630 | SE4D-H32 |
| | | | 36 | 710 | SE4D-H36 |
| | | | 40 | 790 | SE4D-H40 |
| | | | 48 | 950 | SE4D-H48 |
| | | | 56 | 1,110 | SE4D-H56 |
| | | | 64 | 1,270 | SE4D-H64 |
| | | 0.3 to 7m | 72 | 1,430 | SE4D-H72 |
| | | | 80 | 1,590 | SE4D-H80 |
| | | | 88 | 1,750 | SE4D-H88 |
| | | | 96 | 1,910 | SE4D-H96 |

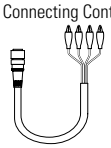
1. Package quantity is 1 set (emitter/received). Mounting brackets and bottom cap cables are not included with the light curtain. Purchase a mounting bracket and bottom cap cable separately.
2. The sensing distance is the possible setting distance between the emitter and the receiver.
3. The light curtain with "E" in the part number (indicated on the nameplate) is the emitter. The light curtain with "D" in the part number (indicated on the nameplate) is the receiver.
Example for SE4D-H12: Emitter = SE4D-H12E, Receiver = SE4D-H12D

## Accessories

| Item | Description | Cable Length | Weight | Part Number | Remarks |
|---|---|---|---|---|---|
|  | 8-pin Bottom Cap Cable | 3m | 370g approx. | SE9Z-CCB3 | Standard cable<br>Cable diameter: ø6mm<br>Cable color: Emitter - Gray, Receiver - Gray with black line<br>Minimum bending diameter: R6 mm |
| | | 7m | 820g approx. | SE9Z-CCB7 | |
| | | 10m | 1,160g approx. | SE9Z-CCB10 | |
| | | 15m | 1,710g approx. | SE9Z-CCB15 | |
|  | 12-pin Bottom Cap Cable | 3m | 420g approx. | SE9Z-CCB3-MU | Used for muting function<br>Cable diameter: ø6mm<br>Cable color: Emitter - Gray, Receiver - Gray with black line<br>Minimum bending diameter: R6 mm |
| | | 7m | 930g approx. | SE9Z-CCB7-MU | |
|  | Cable for Series Connection | 0.5m | 95g approx. | SE9Z-CSL05 | Used for connecting the light curtains in series.<br>Cable color: Gray (for emitter and receiver)<br>Minimum bending diameter: R6 mm |

Each pkg contains 2 cables.

## Controller

| Name and Shape | Part Number |
|---|---|
| Controller (adapter cable, 2 pcs, included) | SE9Z-HC |
| Cable for Connecting Controller  | SE9Z-WNC1 |

The controller is used for setting optional functions.
The cable is used for connecting the controller and the light curtain. Order the cable when purchasing the controlle

## Mounting Brackets

| Item | Part Number | Remarks |
|---|---|---|
| Standard Mounting Bracket | SE9Z-SED-1 | Mounting bracket for easy adjustment of the beam axis.<br>Includes 2 hexagon socket head screws (M5) or 1 hexagon socket head screw (M8).<br>The light curtain can be rotated 360 degrees.<br>Material: Zinc diecast |
| M8 Mounting Bracket | SE9Z-SED-1-T | Mounting bracket for easy adjustment of the beam axis.<br>The light curtain can be rotated 360 degrees.<br>Material: Zinc diecast |
| Dead Space Mounting Bracket | SE9Z-SED-3 | Mounting bracket that eliminates dead space.<br>Material: Zinc diecast |

# Specifications

## General Specifications

| | | |
|---|---|---|
| Applicable standards | | IEC/EN 61496-1 (TÜV), IEC 61496-2 (TÜV), IEC 61508-1 to 4 (TÜV), ISO 13849-1 (TÜV),<br>EN ISO 13849-1 (TÜV), EN 50178 (TÜV), EN 55011 (TÜV), EN 61000-6-2 (TÜV), UL 508 (UL),<br>UL 61496-1/2 (UL), UL 1998 (UL), CSA C22.2 No.14 (c-UL), CSA C22.2 No.0.8 (c-UL) |
| Minimum Sensing Object | | ø25mm (opaque) |
| Effective Aperture Angle | | When detection distance is more than 3m: within ±2.5° maximum (IEC 61496-2, UL 61496-2) |
| Rated Voltage | | 24V DC ±20%  Ripple P-P10% maximum |
| Control output (OSSD1/2) | | PNP open-collector transistor / NPN open-collector transistor (switching type) |
| | | **PNP Output**<br>Maximum source current: 200mA<br>Applied voltage: Same as supply voltage (between control output and +V)<br>Residual voltage: 2.5V max. (source current 200mA, using 15m length cable)<br>Leakage current: 0.1mA max. (includes power off state)<br>Maximum load capacity: 0.22µF (no load to max. output current)<br>Load wiring resistance: 3W max. |
| | | **NPN Output**<br>Maximum sink current: 200mA<br>Applied voltage: Same as supply voltage (between control output and 0V)<br>Residual voltage: 2.5V max. (sink current 200 mA, using 15m length cable)<br>Leakage current: 0.1mA max. (includes power off state)<br>Maximum load capacity: 0.22µF (no load to max. output current)<br>Load wiring resistance: 3W max. |
| | Operation mode (Output operation) | ON when all beams are received, OFF when one or more beams are interrupted (Note 1, 2)<br>(Also turns OFF at sensor or synchronization error) |
| | Protection circuit (Short-circuit) | Built-in |
| | Response Time | OFF response: 14ms max., ON response: 80 to 90ms |
| Auxiliary output (Non-safety output) | | PNP open-collector transistor / NPN open-collector transistor (switching type) |
| | | **PNP Output**<br>Maximum source current: 60mA<br>Applied voltage: Same as supply voltage (between auxiliary output and +V)<br>Residual voltage: 2.5V min. (source current 60mA, using 15m length cable) |
| | | **NPN Output**<br>Maximum sink current: 60mA<br>Applied voltage: Same as supply voltage (between auxiliary output and 0V)<br>Residual voltage: 2.5V min. (sink current 60mA, using 15m length cable) |
| | Operation mode (Output operation) | When OSSDs are ON: OFF, when OSSDs are OFF: ON (factory set)<br>[Operation modes can be changed by using the SE9Z-HC controller (optional).] |
| | Protection circuit (Short-circuit) | Built-in |
| | Response Time | OFF response: 34ms max., ON response: 110ms max. |
| Interference Prevention Function | | Built-in |
| Emission Halt Function | | |
| Interlock Function | | |
| External Device Monitoring Function | | |
| Override Function | | |
| Muting Function | | |
| Optional Functions (Note 4) | | Fixed blanking function, Floating blanking function, Auxiliary output switching function, Interlock setting adjust function, External relay monitoring setting adjust function, Muting setting adjust function, Protect function, Emitted light intensity control function |
| Degree of Protection | | IP65, IP67 (IEC 60529) |
| Operating Conditions | | Operating temperature: –10 to +55°C (no freezing)<br>Relative humidity: 30 to 85%RH (no condensation)<br>Storage temperature: –25 to +70°C (no freezing)<br>Storage humidity: 30 to 95%RH (no condensation)<br>Pollution Degree: 3 |

## General Specifications (con't)

| | |
|---|---|
| Operating Illuminance | Incandescent lamp: 3,500 lux max. at light-receiving surface |
| Dielectric Strength | 1,000V AC, 1 minute between power terminals connected together and enclosure |
| Insulation Resistance | 20MW minimum (500V DC megger) between power terminals connected together and enclosure |
| Vibration Resistance | Damage limits: 10 to 55Hz, amplitude: 0.75mm 2 hours each in 3 axes |
| Shock Resistance | Damage limits: 300m/s² (30G approx.) 3 times each in 3 axes |
| Light Source | Infrared LED (emission wavelength = 870nm) |
| Connection | Connector |
| Material | Enclosure: Aluminum<br>Upper / lower case: Aluminum<br>Sensing surface: PC / Polyester resin<br>Cap: PBT |
| Accessories | SE9Z-SED-2 (intermediate supporting bracket) (Note 3), SE9Z-TR25 (test rod): 1 |

1. Does not turn OFF during muting even when the light beam is interrupted.
2. When the blanking function is enabled, the operation mode changes:

| Floating Blanking Function (Min. Sensing Object) | | | |
|---|---|---|---|
| No setting | Setting | | |
| | 1 beam | 2 beam | 3 beam |
| ø25mm | ø45mm | ø65mm | ø85mm |

3. The number of intermediate supporting brackets that is included differs with each model.
SE4D-H40/H48/H56 = 1 set, SE4D-H64/H72/H80 = 2 sets, SE4D-H88/H96 = 3 sets
4. When using the optional functions, the controller is required.

## Individual Specifications

| Part Number | SE4D-H12 | SE4D-H16 | SE4D-H20 | SE4D-H24 | SE4D-H28 | SE4D-H32 |
|---|---|---|---|---|---|---|
| No. of Beams | 12 | 16 | 20 | 24 | 28 | 32 |
| Sensing Range | 0.3 to 9m | | | | | |
| Beam Width | 20mm | | | | | |
| Protective Height | 230mm | 310mm | 390mm | 470mm | 550mm | 630mm |
| Current Consumption | Emitter: 70mA max., Receiver: 95mA max. | | | Emitter: 80mA max., Receiver: 115mA max. | | |
| PFHd | $2.01\times10^{-9}$ | $2.21\times10^{-9}$ | $2.41\times10^{-9}$ | $2.61\times10^{-9}$ | $2.81\times10^{-9}$ | $3.01\times10^{-9}$ |
| MTTFd | 100 years minimum | | | | | |
| Weight (approx.) | 510g | 660g | 810g | 960g | 1,110g | 1,260g |

| Part Number | SE4D-H36 | SE4D-H40 | SE4D-H48 | SE4D-H56 | SE4D-H64 | SE4D-H72 |
|---|---|---|---|---|---|---|
| No. of Beams | 36 | 40 | 48 | 56 | 64 | 72 |
| Sensing Range | 0.3 to 9m | | | | | 0.3 to 7m |
| Beam Width | 20mm | | | | | |
| Protective Height | 710mm | 790mm | 950mm | 1,110mm | 1,270mm | 1,430mm |
| Current Consumption | Emitter: 80mA max.<br>Receiver: 115mA max. | Emitter: 90mA max.<br>Receiver: 140mA max. | | Emitter: 100mA max.<br>Receiver: 160mA max. | | Emitter: 110mA max.<br>Receiver: 180mA max. |
| PFHd | $3.21\times10^{-9}$ | $3.41\times10^{-9}$ | $3.80\times10^{-9}$ | $4.20\times10^{-9}$ | $4.60\times10^{-9}$ | $5.00\times10^{-9}$ |
| MTTFd | 100 years minimum | | | | | |
| Weight (approx.) | 1,420g | 1,570g | 1,870g | 2,170g | 2,470g | 2,770g |

| Part Number | SE4D-H80 | SE4D-H88 | SE4D-H96 |
|---|---|---|---|
| No. of Beams | 80 | 88 | 96 |
| Sensing Range | 0.3 to 7m | | |
| Beam Width | 20mm | | |
| Protective Height | 1,590mm | 1,750mm | 1,910mm |
| Current Consumption | Emitter: 110mA max.<br>Receiver: 180mA max. | Emitter: 120mA max.<br>Receiver: 200mA max. | |
| PFHd | $5.40\times10^{-9}$ | $5.80\times10^{-9}$ | $6.20\times10^{-9}$ |
| MTTFd | 100 years minimum | | |
| Weight (approx.) | 3,070g | 3,370g | 3,670g |

Note: PFHd (Probability of dangerous failure per hour), MTTFd (Mean time to dangerous failure)
Weight is the (total of emitter and receiver.

## Controller

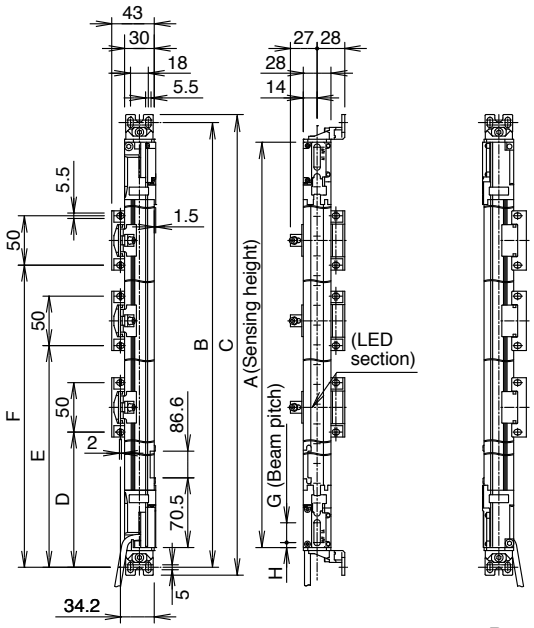
| | |
|---|---|
| Part Number | SE9Z-HC |
| Supply Voltage | 24V DC ±10% Ripple P-P10 % or less (common to light curtain power supply) |
| Current Consumption | 65mA max. |
| Communication Method | RS-485 two-way communications (exclusive procedure) |
| Digital LED | 4-digit red LED display × 2 (selected beams and settings are displayed) |
| Functional LED | Green LED × 9 (lights on when set) |
| Functions | • Fixed blanking function (factory setting: disabled)<br>• Floating blanking function (factory setting: disabled)<br>• Auxiliary output switching function (factory setting: negative logic of OSSD)<br>• Emitted light intensity control function (factory setting: disabled)<br>• Muting setting adjust function (factory setting: all beam channels enabled, A = B (Note 2), Muting lamp diagnosis function enabled, Muting sensor output operation N.O/N.O)<br>• Interlock setting adjust function (factory setting: start /restart)<br>• External device monitoring setting adjust function (factory setting: enabled, 300ms)<br>• Override setting adjust function, Setting detail monitoring function<br>• Protect function (factory setting: disabled) (factory password setting: 0000)<br>• Initialization function<br>• Copy function |
| Operating Conditions | Operating Temperature: –10 to +55°C (no freezing)<br>Operating Humidity: 30 to 85% RH (no condensation)<br>Storage Temperature: –25 to +70°C (no freezing)<br>Storage Humidity: 30 to 85% RH (no condensation) |
| Dielectric Strength | 1,000V AC, 1 minute between power terminals connected together and enclosure |
| Insulation Resistance | 20MΩ min. (500V DC megger) between power terminals connected together and enclosure |
| Cable | 8-core shielded cable, 0.5m 1.640 ft long, with a connector at the end (2 cables) |
| Weight (approx.) | 200g |
| Accessories | Adapter cable: 2 |

1. The operating humidity is +20° for conditions that are not specified.
2. To enable the muting function, A or B input order can be specified. The muting function is enabled, at the factory, whether muting A or B is input first.

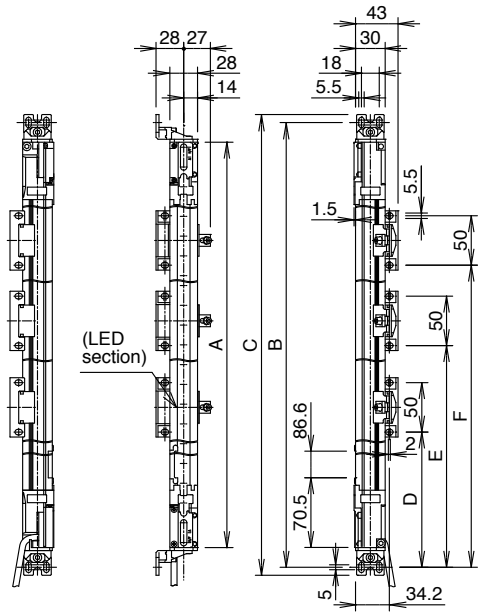
# Dimensions

## Light Curtains with Standard Mounting Bracket (SE9Z-SED-1) & Intermediate Supporting Bracket Side Mounting (Note 1)

Emitter

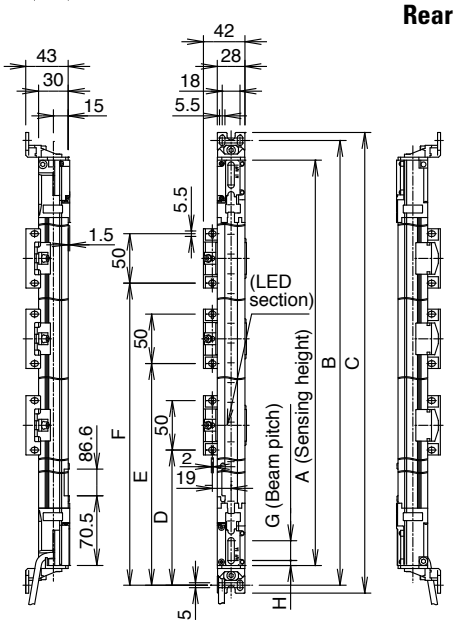



Receiver

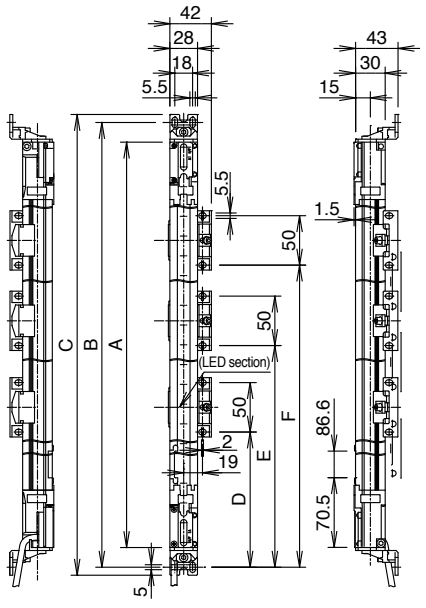



## Rear Mounting

Emitter




Receiver




| Part Number | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| SE4D-H12 | 230 | 270 | 286 | - | - | - | 20 | 5 |
| SE4D-H16 | 310 | 350 | 366 | - | - | - | 20 | 5 |
| SE4D-H20 | 390 | 430 | 446 | - | - | - | 20 | 5 |
| SE4D-H24 | 470 | 510 | 526 | - | - | - | 20 | 5 |
| SE4D-H28 | 550 | 590 | 606 | - | - | - | 20 | 5 |
| SE4D-H32 | 630 | 670 | 686 | - | - | - | 20 | 5 |
| SE4D-H36 | 710 | 750 | 766 | - | - | - | 20 | 5 |
| SE4D-H40 | 790 | 830 | 846 | 390 | - | - | 20 | 5 |
| SE4D-H48 | 950 | 990 | 1,006 | 470 | - | - | 20 | 5 |
| SE4D-H56 | 1,110 | 1,150 | 1,166 | 550 | - | - | 20 | 5 |
| SE4D-H64 | 1,270 | 1,310 | 1,326 | 418 | 842 | - | 20 | 5 |
| SE4D-H72 | 1,430 | 1,470 | 1,486 | 472 | 948 | - | 20 | 5 |
| SE4D-H80 | 1,590 | 1,630 | 1,646 | 525 | 1,055 | - | 20 | 5 |
| SE4D-H88 | 1,750 | 1,790 | 1,806 | 433 | 870 | 1,308 | 20 | 5 |
| SE4D-H96 | 1,910 | 1,950 | 1,966 | 473 | 950 | 1,428 | 20 | 5 |

1. The intermediate supporting bracket (SE9Z-SED-2) is supplied (for SE4D-H40 to H96). The number of brackets supplied varies according to the model: SE4D-H40/H48/H56 = 1 set, SE4D-H64/H72/H80 = 2 sets, SE4D-H88/H96 = 3 sets

# Type 2 SG2 Series (Basic & Extended Models)

**Hand Protection**

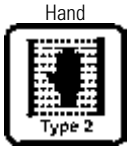
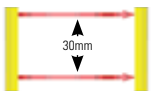
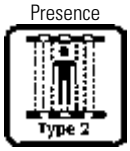
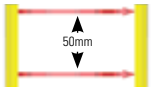
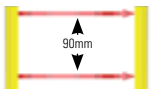
**Presence Protection**

## Type 2 SG2 features:

- Integrated light curtain for Hand or Presence Protection
- Operating distance up to 19m
- Sensing field heights from 150 to 1800mm
- Compact 32 x 37mm profile
- Sturdy profile and rotating brackets
- Test/Restart, Auto/Manual Restart, EDM, Anti-interference
- User interface with display
- Alignment function

The SG2 Type 2 series offers two models, the SG2 basic and the SG2 extended. Available functions include Test/Restart, EDM and Anti-interference. With very fast response times, the SG2 series can be installed right next to a dangerous area, improving productivity. The adjustable mounting brackets make installation and the alignment of emitting and receiving units easy, even at long distances and in applications that use mirrors.

## Part Numbers

| Part Number | Protection Type | Resolution | Features |
|---|---|---|---|
| SG2-30-□-00-X | Hand   |   | Basic Model - Test/Reset |
| SG2-30-□-00-E-C | | | Extended Model - Test/Reset, Auto/Manual Restart, EDM |
| SG2-50-□-00-X | Presence   |   | Basic Model - Test/Reset |
| SG2-50-□-00-E-C | | | Extended Model - Test/Reset, Auto/Manual Restart, EDM |
| SG2-90-□-00-X | |   | Basic Model - Test/Reset |
| SG2-90-□-00-E-C | | | Extended Model - Test/Reset, Auto/Manual Restart, EDM |

In place of □ enter the Height code. See table on the right.

## Sensing Field Height Code

| Sensing Field Height | Code |
|---|---|
| 150mm[1] | 015[1] |
| 300mm | 030 |
| 450mm | 045 |
| 600mm | 060 |
| 750mm | 075 |
| 900mm | 090 |
| 1050mm | 105 |
| 1200mm | 120 |
| 1350mm | 135 |
| 1500mm | 150 |
| 1650mm | 165 |
| 1800mm | 180 |

1. Not applicable to SG2 Presence Series

## Accessories

### M12 Unshielded Axial Connector Cable

| Item | # of Poles | | Used For | Cable Length | Part Number |
|---|---|---|---|---|---|
| | 4 | | SG4 & SG2 Emitters | 3m | CS-A1-02-U-03 |
| | | | | 5m | CS-A1-02-U-05 |
| | | | | 10m | CS-A1-02-U-10 |
| | | | | 15m | CS-A1-02-U-15 |
| | | | | 25m | CS-A1-02-U-25 |
| | 5 | | SG2 Basic Model Receivers | 3m | CS-A1-03-U-03 |
| | | | | 5m | CS-A1-03-U-05 |
| | | | | 10m | CS-A1-03-U-10 |
| | | | | 15m | CS-A1-03-U-15 |
| | | | | 25m | CS-A1-03-U-25 |
| | 8 | | SG4 & SG2 Extended Model Receivers | 3m | CS-A1-06-U-03 |
| | | | | 5m | CS-A1-06-U-05 |
| | | | | 10m | CS-A1-06-U-10 |
| | | | | 15m | CS-A1-06-U-15 |
| | | | | 25m | CS-A1-06-U-25 |

### Mounting Brackets

| Item | Description | Part Number |
|---|---|---|
| | Angled mounting brackets (4 pc kit) | ST-KSTD |
| | Anti-vibration supports (4 pc kit) | ST-K4AV |
| | Anti-vibration supports (6 pc kit) | ST-K6AV |
| | Top-Bottom adjustable mounting brackets (4 pc kit) | ST-K4ROT |

### Laser Pointer

| Item | Description | Part Number |
|---|---|---|
| | Laser pointer used to aid in aligning safety light curtains. | SG-LP |

## Specifications

| | | SG2 - Hand Series | SG2 - Presence Series |
|---|---|---|---|
| | | | |
| Electrical | Power supply (Vdd) | 24V DC ± 20% | |
| | Power (TX) | 2.5W max | |
| | Power (RX) | 3.5W max (without load) | |
| | OSSD outputs | 2 PNP (push-pull) | |
| | Short-circuit protection | 1.4A max | |
| | Output current | 0.5A max on each output | |
| | Output voltage – ON status | Vdd-1V min | |
| | Output voltage – OFF status | 0.2V max | |
| | Leakage current | < 1mA | |
| | Capacitive load | 2.2 uF @ 24V DC max* | |
| | Height | 150 - 1800mm | 300 - 1800mm |
| | Auxiliary functions | Test/Reset, Auto/Manual Restart (extended), EDM (extended) | |
| | Electrical protection | Class I / Class III | |
| | Connections | M12: Emitter 4 pole, Receiver 5 pole (basic), 8 pole (extended) | |
| | Cable length (for powering) | 50m. max * | |
| Optical | Light emission | Infrared LED (950nm) | |
| | Resolution | 30mm | 50mm / 90mm |
| | Operating distance | 0.2m-19m (basic) or selectable 0.2m-9m / 0.2-19m (extended) | |
| | Aperture angle (EAA) | ±5° | |
| | Ambient light rejection | IEC 61496-2 | |
| Mechanical & Environmental | Operating temperature | 0 - 55°C | |
| | Storage temperature | -25 to +70°C | |
| | Temperature class | T6 | |
| | Humidity | 15 - 95% (no condensation) | |
| | Mechanical protection | IP65 (EN 60529) | |
| | Vibration | 0.35mm amplitude, 10 - 55 Hz frequency<br>20 sweep per axis, 1 octave/min (EN 60068-2-6) | |
| | Shock resistance | 16ms (10g) 1.000 shock per axis, (EN 60068-2-29) | |
| | Housing material | Painted aluminium (yellow) | |
| | Protective shield material | PMMA | |

* If a longer cable is needed, please verify that the capacitive load specifications are followed.

### Sensing Field Heights

| Height |
|---|
| 150mm[1] |
| 300mm |
| 450mm |
| 600mm |
| 750mm |
| 900mm |
| 1050mm |
| 1200mm |
| 1350mm |
| 1500mm |
| 1650mm |
| 1800mm |

### Number of Beams

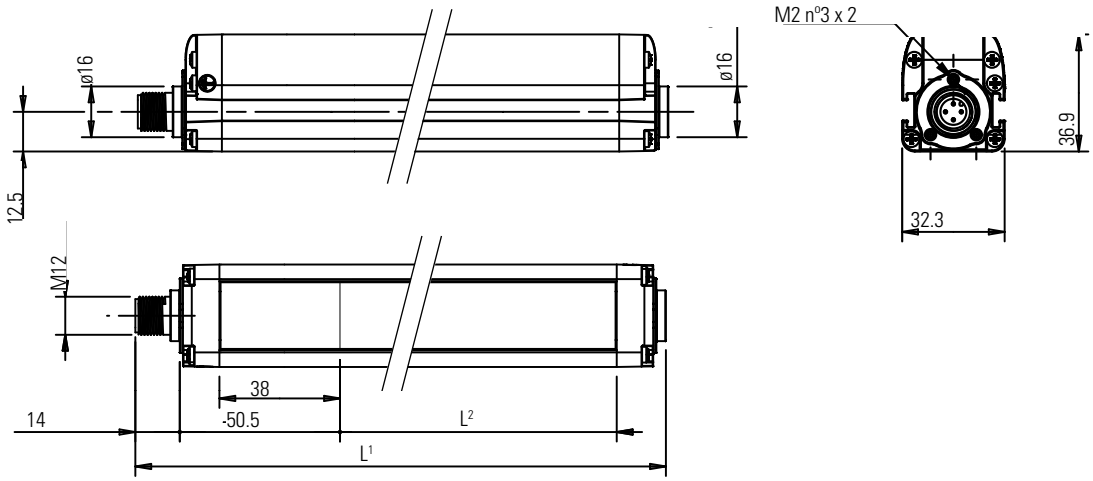
| Height | SG2 Hand | SG2 Presence | |
|---|---|---|---|
| | | 50mm | 90mm |
| 150 | 8 | – | – |
| 300 | 16 | 9 | 5 |
| 450 | 24 | 13 | 7 |
| 600 | 32 | 17 | 9 |
| 750 | 40 | 21 | 11 |
| 900 | 48 | 25 | 13 |
| 1050 | 56 | 29 | 15 |
| 1200 | 64 | 33 | 17 |
| 1350 | 72 | 37 | 19 |
| 1500 | 80 | 41 | 21 |
| 1650 | 88 | 45 | 23 |
| 1800 | 96 | 49 | 25 |

### Response Time (ms)

| Height | SG2 Hand | SG2 Presence | |
|---|---|---|---|
| | | 50mm | 90mm |
| 150 | 8 | – | – |
| 300 | 9 | 9 | 9 |
| 450 | 11 | 10 | 10 |
| 600 | 12 | 11 | 11 |
| 750 | 14 | 12 | 12 |
| 900 | 15 | 14 | 13 |
| 1050 | 17 | 15 | 14 |
| 1200 | 18 | 16 | 15 |
| 1350 | 20 | 17 | 16 |
| 1500 | 21 | 18 | 17 |
| 1650 | 23 | 19 | 18 |
| 1800 | 24 | 20 | 19 |

1. Not applicable to SG2 Presence Series

## Dimensions (mm)




## Dimension Table

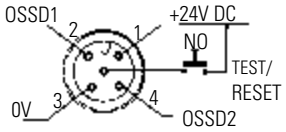
| Model | L1 | L2 |
|---|---|---|
| 150[1] | 233.3 | 153.3 |
| 300 | 383.2 | 303.2 |
| 450 | 533.2 | 453.3 |
| 600 | 683.2 | 603.2 |
| 750 | 833.2 | 753.3 |
| 900 | 983.2 | 903.2 |
| 1050 | 1133.2 | 1053.2 |
| 1200 | 1283.3 | 1203.3 |
| 1350 | 1433.2 | 1353.2 |
| 1500 | 1583.3 | 1503.3 |
| 1650 | 1733.3 | 1653.3 |
| 1800 | 1883.3 | 1803.3 |

1. Not applicable to SG2 Presence Series

## Dimensions (mm)

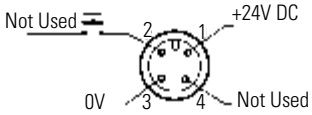
### SG2 Basic Models

#### M12 5-Pole Connector




| Pin | Cable Color | Function |
|---|---|---|
| 1 | brown | +24V DC |
| 2 | white | OSSD1 |
| 3 | blue | 0V |
| 4 | black | OSSD2 |
| 5 | gray | TEST/RESET |

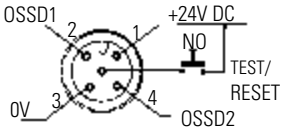
#### M12 4-Pole Connector




| Pin | Cable Color | Function |
|---|---|---|
| 1 | brown | +24V DC |
| 2 | white | Not Used |
| 3 | blue | 0V |
| 4 | black | Not Used |

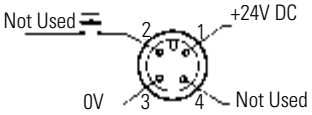
### SG2 Extended Models

#### M12 8-Pole Connector




| Pin | Cable Color | Function |
|---|---|---|
| 1 | white | RESET [1] |
| 2 | brown | +24V DC |
| 3 | green | EDM Activation |
| 4 | yellow | EDM |
| 5 | gray | OSSD1 |
| 6 | pink | OSSD2 |
| 7 | blue | 0V |
| 8 | red | SEL MAN / AUTO RESTART |

#### M12 4-Pole Connector

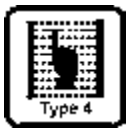



| Pin | Cable Color | Function |
|---|---|---|
| 1 | brown | +24V DC |
| 2 | white | TEST |
| 3 | blue | 0V |
| 4 | black | SG2: SEL operating distance |

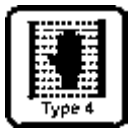
1. Automatic RESTART - RESET function
Manual RESTART - RESET/RESTART function

# Type 4 SG4 Series

**Finger Protection**




**Hand Protection**

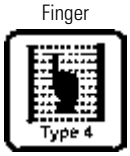
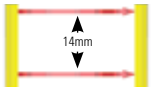
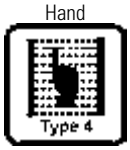
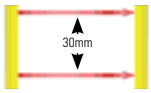


## Type 4 SG4 features:

- Integrated light curtain for Finger Protection or Hand Protection
- Operating distance up to 6m for Finger Protection series and 19m for Hand Protection series
- Sensing field heights from 150 to 1800mm
- Compact 32 x 37mm profile
- Sturdy profile and adjustable brackets
- Test/Restart, Auto/Manual Restart, EDM
- User interface with display
- Alignment function

With mounting brackets that rotate, no connection is necessary between emitter and receiver, and configuration can be accomplished without external control units or supplementary cables. In addition, the light curtains can be aligned using the 7 segment display on either the emitter or receiver.

## Part Numbers

| Part Number | Protection Type | Resolution | Features |
|---|---|---|---|
| SG4-14-□-00-E | Finger   |   | Test/Reset, Auto/Manual Restart, EDM |
| SG4-30-□-00-E | Hand   |   | Test/Reset, Auto/Manual Restart, EDM |

In place of □ enter the Height code. See table on the right.

## Sensing Field Height Code

| Sensing Field Height | Code |
|---|---|
| 150mm[1] | 015[1] |
| 300mm | 030 |
| 450mm | 045 |
| 600mm | 060 |
| 750mm | 075 |
| 900mm | 090 |
| 1050mm | 105 |
| 1200mm | 120 |
| 1350mm | 135 |
| 1500mm | 150 |
| 1650mm | 165 |
| 1800mm | 180 |

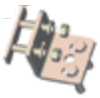
1. Not applicable to SG2 Presence Series

## Accessories

### M12 Unshielded Axial Connector Cable

| Item | # of Poles | | Used For | Cable Length | Part Number |
|---|---|---|---|---|---|
| | 4 | | SG4 & SG2 Emitters | 3m | CS-A1-02-U-03 |
| | | | | 5m | CS-A1-02-U-05 |
| | | | | 10m | CS-A1-02-U-10 |
| | | | | 15m | CS-A1-02-U-15 |
| | | | | 25m | CS-A1-02-U-25 |
| | 8 | | SG4 & SG2 Extended Model Receivers | 3m | CS-A1-06-U-03 |
| | | | | 5m | CS-A1-06-U-05 |
| | | | | 10m | CS-A1-06-U-10 |
| | | | | 15m | CS-A1-06-U-15 |
| | | | | 25m | CS-A1-06-U-25 |

### Mounting Brackets

| Item | Description | Part Number |
|---|---|---|
|  | Angled mounting brackets (4 pc kit) | ST-KSTD |
| | Anti-vibration supports (4 pc kit) | ST-K4AV |
| | Anti-vibration supports (6 pc kit) | ST-K6AV |
| | Top-Bottom adjustable mounting brackets (4 pc kit) | ST-K4ROT |

### Laser Pointer

| Item | Description | Part Number |
|---|---|---|
| | Laser pointer used to aid in aligning safety light curtains. | SG-LP |

## Specifications

| | | SG4 - Finger Protection Type | SG4 - Hand Protection Type |
|---|---|---|---|
| | | | |
| Electrical | Power supply (Vdd) | 24V DC ± 20% | |
| | Power (TX) | 2.5W max | |
| | Power (RX) | 4W max (without load) | |
| | OSSD outputs | 2 PNP (push-pull) | |
| | Short-circuit protection | 1.4A max | |
| | Output current | 0.5A max on each output | |
| | Output voltage – ON status | Vdd-1V | |
| | Output voltage – OFF status | 0.2V max | |
| | Leakage current | < 1mA | |
| | Capacitive load | 2.2 uF @ 24V DC* | |
| | Height | 150 - 1800mm | |
| | Auxiliary functions | Test/Reset, Auto/Manual Restart, EDM | |
| | Electrical protection | Class I / Class III | |
| | Connections | M12: Emitter 4 pole, Receiver 8 pole | |
| | Cable length (for powering) | 50m. max * | |
| Optical | Light emission | Infrared LED (950nm) | |
| | Resolution | 14mm | 30mm |
| | Operating distance | 0.2 - 6m | 0.2 - 19m |
| | Aperture angle (EAA) | ±2.5° | |
| | Ambient light rejection | IEC 61496-2 | |
| Mechanical & Environmental | Operating temperature | 0 - 55°C | |
| | Storage temperature | -25 to +70°C | |
| | Temperature class | T6 | |
| | Humidity | 15 - 95% (no condensation) | |
| | Mechanical protection | IP65 (EN 60529) | |
| | Vibration | 0.35mm amplitude, 10 - 55 Hz frequency<br>20 sweep per axis, 1 octave/min (EN 60068-2-6) | |
| | Shock resistance | 16ms (10g) 1.000 shock per axis, (EN 60068-2-29) | |
| | Housing material | Painted aluminium (yellow) | |
| | Protective shield material | PMMA | |

* If a longer cable is needed, please verify that the capacitive load specifications are followed.

### Sensing Field Heights

| Height |
|---|
| 150mm |
| 300mm |
| 450mm |
| 600mm |
| 750mm |
| 900mm |
| 1050mm |
| 1200mm |
| 1350mm |
| 1500mm |
| 1650mm |
| 1800mm |

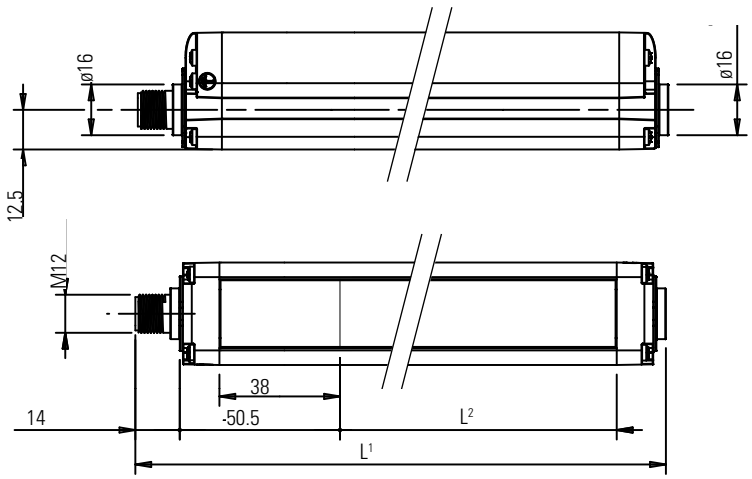
### Number of Beams

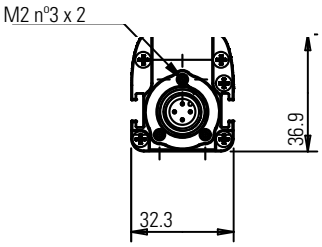
| Height | SG4 Finger | SG4 Hand |
|---|---|---|
| 150 | 16 | 8 |
| 300 | 32 | 16 |
| 450 | 48 | 24 |
| 600 | 64 | 32 |
| 750 | 80 | 40 |
| 900 | 96 | 48 |
| 1050 | 112 | 56 |
| 1200 | 128 | 64 |
| 1350 | 144 | 72 |
| 1500 | 160 | 80 |
| 1650 | 176 | 88 |
| 1800 | 192 | 96 |

### Response Time (ms)

| Height | SG4 Finger | SG4 Hand |
|---|---|---|
| 150 | 11 | 9 |
| 300 | 15 | 11 |
| 450 | 18 | 13 |
| 600 | 22 | 14 |
| 750 | 25 | 16 |
| 900 | 29 | 18 |
| 1050 | 33 | 19 |
| 1200 | 36 | 21 |
| 1350 | 40 | 23 |
| 1500 | 43 | 25 |
| 1650 | 47 | 26 |
| 1800 | 50 | 28 |

## Dimensions (mm)



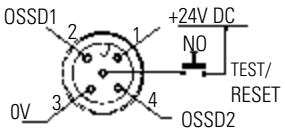




## Dimension Table

| Model | L1 | L2 |
|---|---|---|
| 150[1] | 233.3 | 153.3 |
| 300 | 383.2 | 303.2 |
| 450 | 533.2 | 453.3 |
| 600 | 683.2 | 603.2 |
| 750 | 833.2 | 753.3 |
| 900 | 983.2 | 903.2 |
| 1050 | 1133.2 | 1053.2 |
| 1200 | 1283.3 | 1203.3 |
| 1350 | 1433.2 | 1353.2 |
| 1500 | 1583.3 | 1503.3 |
| 1650 | 1733.3 | 1653.3 |
| 1800 | 1883.3 | 1803.3 |

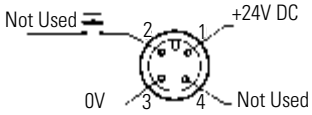
## Dimensions (mm)
## SG4 Models

### M12 8-Pole Connector




| Pin | Cable Color | Function |
|---|---|---|
| 1 | white | RESET [1] |
| 2 | brown | +24V DC |
| 3 | green | EDM Activation |
| 4 | yellow | EDM |
| 5 | gray | 0SSD1 |
| 6 | pink | 0SSD2 |
| 7 | blue | 0V |
| 8 | red | SEL MAN / AUTO RESTART |

### M12 4-Pole Connector



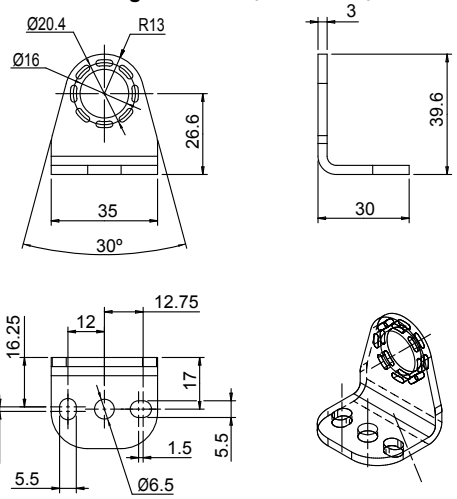

| Pin | Cable Color | Function |
|---|---|---|
| 1 | brown | +24V DC |
| 2 | white | TEST |
| 3 | blue | 0V |
| 4 | black | SG2: SEL operating distance |

1. Automatic RESTART - RESET function
Manual RESTART - RESET/RESTART function

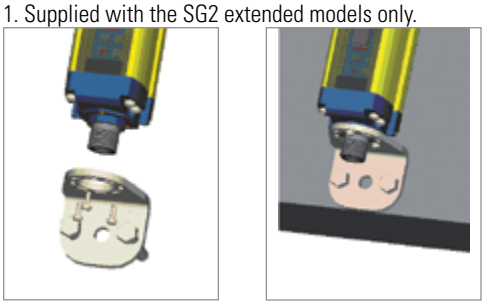
# Mounting Bracket and Accessories

## Mounting Brackets Dimensions (mm)

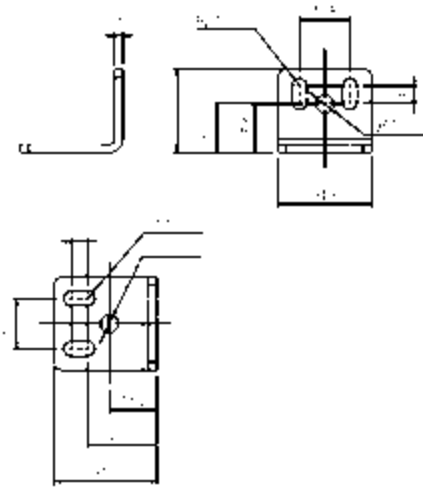
### Adjustable Mounting Bracket [1] (ST-K4ROT)



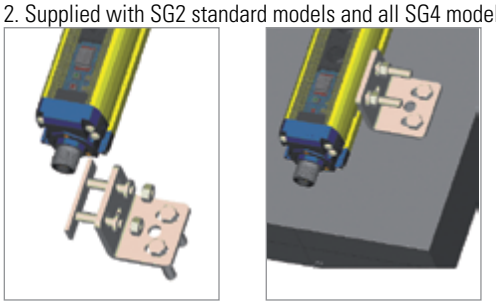

1. Supplied with the SG2 extended models only.



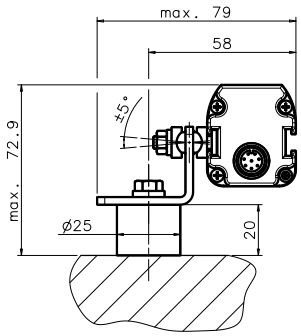
### Angled Mounting Bracket [2] (ST-KSTD)

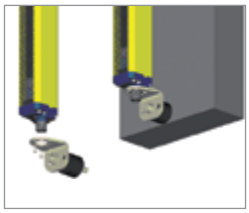


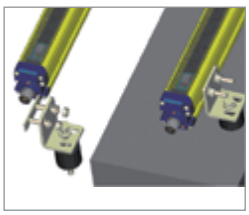
2. Supplied with SG2 standard models and all SG4 models.

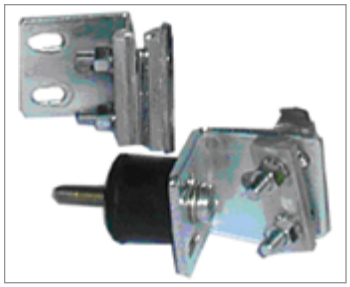


### Anti-vibration Support Brackets (ST-K4AV/ST-K6AV)

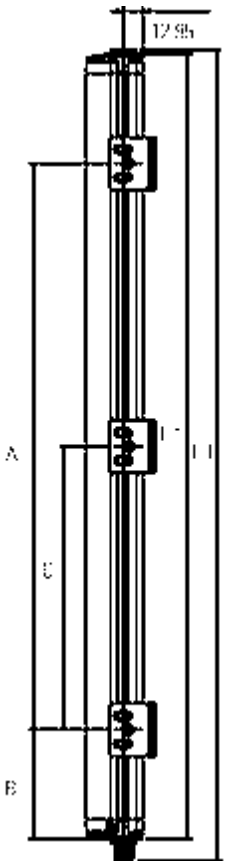






### Mounting Bracket with Light Curtain (mm)



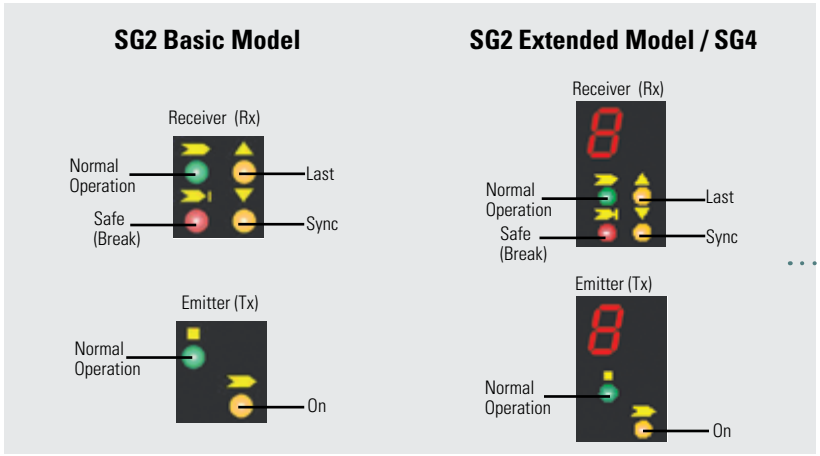

### Mounting Bracket Dimension Table (mm)

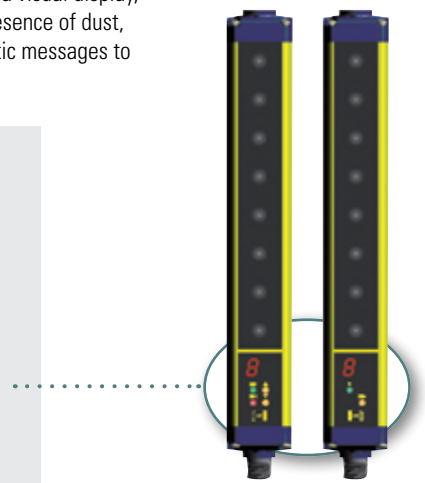
| Height | L | A | B | C |
|---|---|---|---|---|
| 150* | 216.3 | 108 | 54 | - |
| 300 | 366.2 | 216 | 75 | - |
| 450 | 516.3 | 316 | 100 | - |
| 600 | 666.2 | 366 | 150 | - |
| 750 | 816.3 | 466 | 175 | - |
| 900 | 966.2 | 566 | 200 | - |
| 1050 | 1116.2 | 666 | 225 | - |
| 1200 | 1266.3 | 966 | 150 | 483 |
| 1350 | 1416.2 | 1066 | 175 | 533 |
| 1500 | 1566.3 | 1166 | 200 | 583 |
| 1650 | 1716.3 | 1266 | 225 | 633 |
| 1800 | 1866.3 | 1366 | 250 | 683 |

1. Not applicable to SG2 Presence Series

**Indicators & Settings**

SG4 and SG2 light curtains are equipped with an Alignment system that shows alignment status on a visual display, making configuration quick and easy. Alignment level and any change in environment conditions (presence of dust, light disturbance, etc.) are monitored during normal operating mode. The display also gives diagnostic messages to ensure accurate and correct functioning.



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# AS-Interface Safety at Work

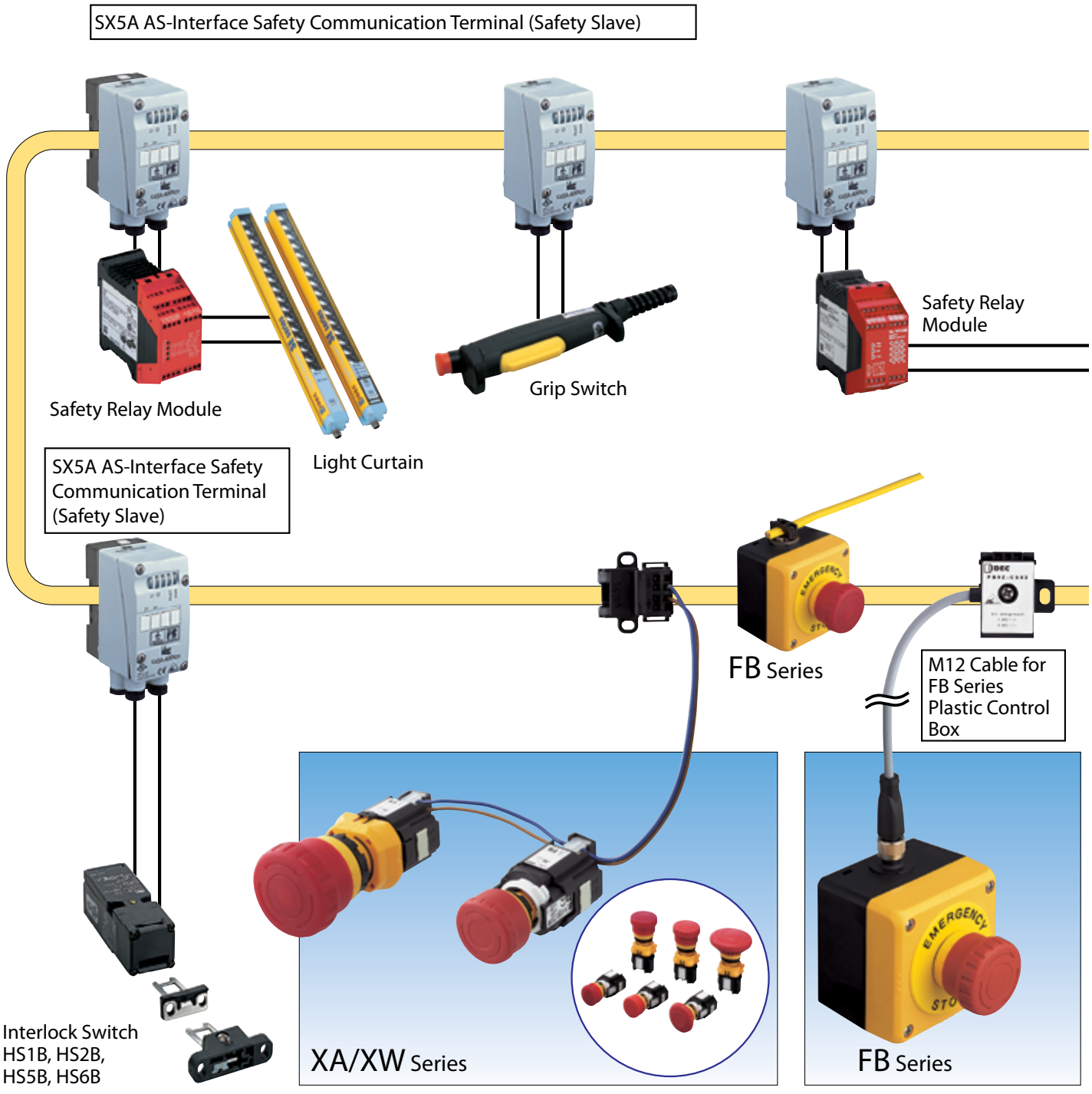
IDEC

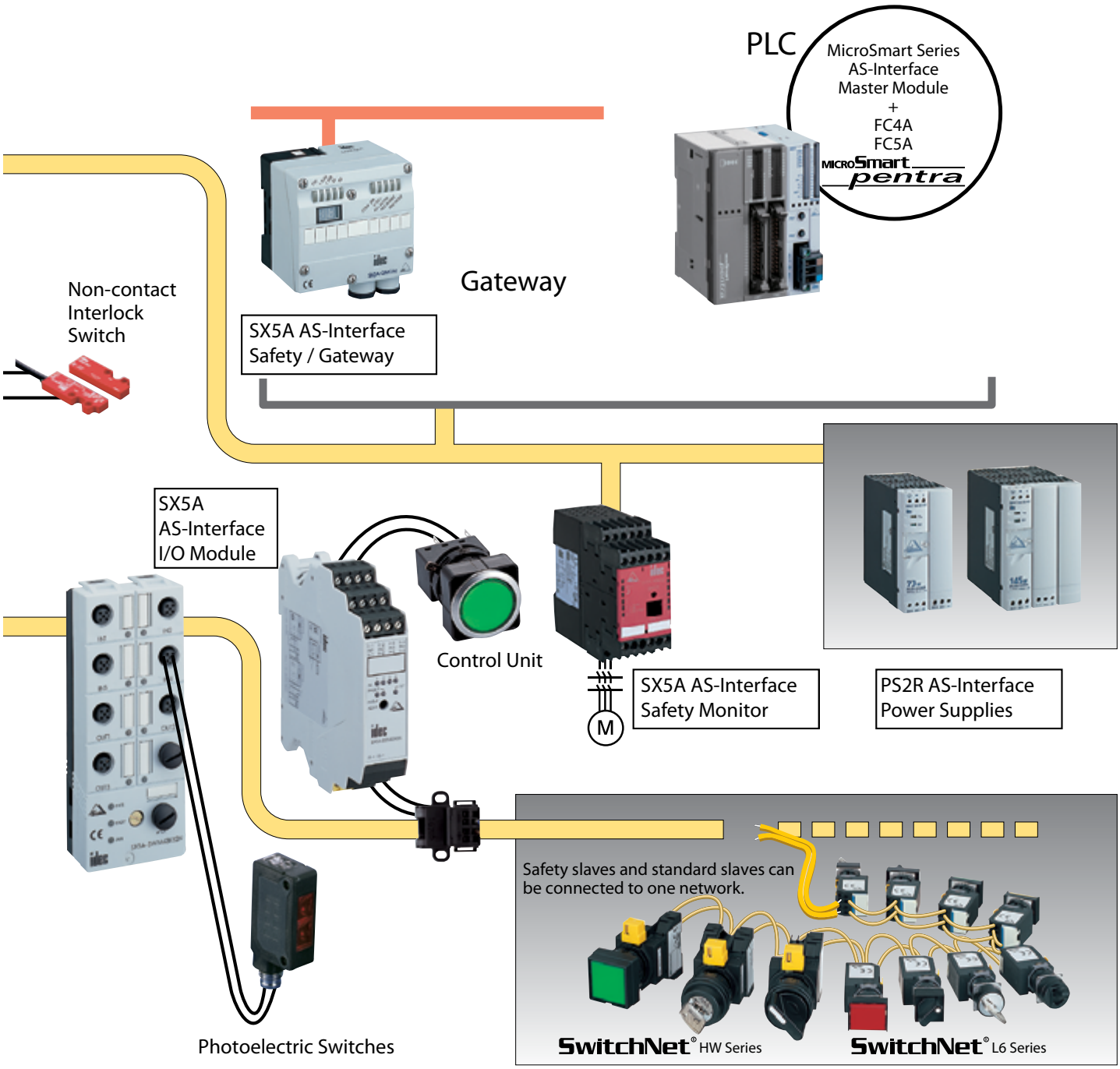
www.IDEC.com/safety

## AS-Interface Safety at Work

AS-Interface safety at work integrates a safety network into one wire-saving system.

- Safety slaves and safety monitors can be simply connected to the existing AS-Interface network to establish the AS-Interface Safety at Work.
- Interlock switches, safety relay modules and other safety components can be connected to the safety network via safety slaves.
- Emergency stop switches can be connected directly to AS-Interface Safety at Work, further reducing wiring.
- Safety components can be connected to other networks through gateways.




PLC
MicroSmart Series
AS-Interface
Master Module
+
FC4A
FC5A
MICROSmart pentra
Gateway
SX5A AS-Interface
Safety / Gateway
Non-contact
Interlock
Switch
SX5A
AS-Interface
I/O Module
Control Unit
SX5A AS-Interface
Safety Monitor
PS2R AS-Interface
Power Supplies
M
Safety slaves and standard slaves can
be connected to one network.
SwitchNet® HW Series
SwitchNet® L6 Series
Photoelectric Switches

# Emergency Stop Switches

## XA Series/XW Series/FB Series (Plastic Enclosures) with Safety Slave Functions for Direct Connection to the AS-Interface Safety at Work

- Emergency stop switches with safety slave functions can be connected to the AS-Interface Safety at Work network.
- Complies with IEC 61508 SIL3 (Functional safety of electrical/electronic/programmable electronic safety-related systems) and EN954-1 safety category 4 (Safety of machinery-Safety related parts of control systems).
- Space, wire, and labor-saving solutions for safety equipment
- Equipped with AS-Interface standard slave functions. Monitored with AS-Interface master devices.
- A wide variety of safety components:
  1) 1-IN (non-illuminated) and 1-IN/1-OUT (illuminated) available.
  2) FB series plastic control stations with ø16mm XA series and ø22mm XW series emergency stop switches available.
  3) XA series available with ø29mm and ø40mm mushroom buttons and XW series available with ø40mm and ø60mm jumbo mushroom buttons.
  4) Terminal connectors are available in insulation displacement, crimping, and M12 connectors which enable effective connection of multiple switches.

## Part Numbers

### ø16mm XA Series

| Button Size | Connector Terminal | I/O Points | Illumination | Part Number | Button/Lens Color |
|---|---|---|---|---|---|
| ø29 | IDC | 1-IN | Non-illuminated | XA1E-BV3Z10C1R | Red |
| | | | | XA1E-BV3Z10C1N | Gray |
| | | 1-IN 1-OUT | Illuminated | XA1E-LV3Z114C1R | Red |
| ø40 | | 1-IN | Non-illuminated | XA1E-BV4Z10C1R | |
| | | 1-IN 1-OUT | Illuminated | XA1E-LV4Z114C1R | |

### ø22mm XW Series

| Button Size | Connector Terminal | I/O Points | Illumination | Part Number | Button/LensColor |
|---|---|---|---|---|---|
| ø40 | IDC | 1-IN | Non-illuminated | XW1E-BV4Z10C1R | Red |
| | Crimping | | | XW1E-BV4Z10C2R | |
| | IDC | 1-IN 1-OUT | Illuminated | XW1E-LV4Z114C1R | |
| | Crimping | | | XW1E-LV4Z114C2R | |
| ø60 | IDC | 1-IN | Non-illuminated | XW1E-BV5Z10C1R | |
| | Crimping | | | XW1E-BV5Z10C2R | |

### E-Stop Enclosure

| Button Size | Connector Terminal | I/O Points | Illumination | Nameplate | Part Number | Button/Lens Color |
|---|---|---|---|---|---|---|
| ø40 | M12 | 1-IN | Non-illuminated | Without | FB1W-XW1E-BV4Z10C2R-Y0-1 | Red |
| | | | | With | FB1W-XW1E-BV4Z10C2R-Y1-1 | |
| | | 1-IN | Illuminated | Without | FB1W-XW1E-LV4Z114C2R-Y0-1 | |
| | | 1-OUT | | With | FB1W-XW1E-LV4Z114C2R-Y1-1 | |
| ø60 | | 1-IN | Non-illuminated | Without | FB1W-XW1E-BV5Z10C2R-Y0-1 | |
| ø40 | AS- Interface Piercing | 1-IN | Non-illuminated | Without | FB1W-XW1E-BV4Z10C2R-Y0-2 | |
| | | | | With | FB1W-XW1E-BV4Z10C2R-Y1-2 | |
| | | 1-IN 1-OUT | Illuminated | Without | FB1W-XW1E-LV4Z114C2R-Y0-2 | |
| | | | | With | FB1W-XW1E-LV4Z114C2R-Y1-2 | |
| ø60 | | 1-IN | Non-illuminated | Without | FB1W-XW1E-BV5Z10C2R-Y0-2 | |

1. Units have been evaluated as emergency stop devices by TÜV.
2. Units with nameplates are engraved "Emergency Stop".

## Accessories

| Name | Specification | Part Number |
|---|---|---|
| XA/XW Series IDC Connector Kit [1] | End connector (with cover) | XW9Z-C100-1 |
| | Through connector (with cover) | XW9Z-C100-2 |
| IDC Connector Termination Tool | Manufactured by ITW Pancon | MMIT-156F |
| Crimping Type Connector Cable | Length 500 mm, with one connector | XW9Z-C205 |
| | Length 1m, with one connector | XW9Z-C210 |
| FB Series Control Station M12 Connector Cable | Length 300 mm, straight | FB9Z-CS03 |
| | Length 1m, straight | FB9Z-CS10 |
| | Length 2m, straight | FB9Z-CS20 |
| | Length 1m, right-angle | FB9Z-CL10 |
| | Length 2m, right-angle | FB9Z-CL20 |
| Hand-held Programming Device | [2] | SX9Z-ADR1N |

1. Minimum order is 5 pieces. IDC connector termination tool MMIT-156F (ITW Pancon) may be required to connect the cable to the connector.
2. *Hand-held programming device accessories:
-Programming device cable (SX9Z-CN1)
-Programming device AC adapter (SX9Z-ADPT)
-SwitchNet addressing port adapter (LA9Z-SNADP)

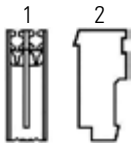
## Specifications

| | | | |
|---|---|---|---|
| General | Operating Voltage | | 26.5 to 31.6V DC (supplied from AS-Interface) |
| | Rated Input Current | | Illuminated type: 35 mA (XA series), 40 mA (XW, FB series)<br>Non-illuminated type: 25 mA |
| | Dielectric Strength | | 500V AC, 1 minute |
| | Insulation Resistance | | 100 MΩ (500V DC megger) |
| | Operating Temperature | | XA, XW series: -25 to +55°C (no freezing)<br>FB series: Illuminated type -25 to +50°C (no freezing)<br>Non-illuminated type -25 to +55°C (no freezing) |
| | Storage Temperature | | -40 to +70°C (no freezing) |
| | Operating Humidity | | 45 to 85% RH (no condensation) |
| | Pollution Degree (IEC60664) | | XA, XW series - Operator unit: 3, Communication unit: 2,<br>FB series: 3 (2 - per UL) |
| | Degree of Protection | | Operator unit: IP65 |
| | IEC60529 | | Terminal unit: IP20 (FB series: IP65) |
| | Corrosion Immunity | | Free from corrosive gases |
| | Vibration Resistance | | Damage limits/Operating extremes: 10 to 500 Hz, amplitude 0.35 mm, acceleration 50 m/s² |
| | Shock Resistance | | Damage limits: 150 m/s², Operating extremes: 1000 m/s² |
| | Weight (approx.) | | XA series ø29: 35g, ø40: 40g<br>XW series ø40: 60g, ø60: 70g<br>FB series M12 connector: 195g (ø40), 205g (ø60)<br>Piercing: 235g (ø40), 245g (ø60) |
| Communication | Communication | | AS-Interface Ver. 3.0 |
| | Slave Type | | Safety slave |
| | Maximum Network Length | | 100m total |
| | Maximum No. of Slaves | | 31 (when only safety slaves are connected) |
| | Profile (I/O, ID, ID2) | | S-7, B, E (illuminated type)<br>S-0, B, E (non-illuminated type) |
| | Data Bit | Input | Emergency stop switch When pressed: DI0 0, DI1 0, DI2 0, DI3 0 |
| | | | Emergency stop switch When not pressed: DI0 X, DI1 X, DI2 X, DI3 X (x:0.1 (unspecified)) |
| | | Output | DO0 = 1 Pilot light: on DO1 to 3: not used<br>DO0 = 0 Pilot light: off |
| | Parameter Bit | | Not used |

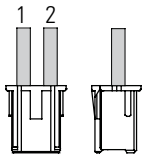
| | | |
|---|---|---|
| Mechanical/Electrical | Operating Force | Pushlock: 10.5N (XA series), 32N (XW, FB series)<br>Pull reset: 10N (XA series), 21N (XW, FB series)<br>Turn reset: 0.16N·m (XA series), 0.27 N·m (XW, FB series) |
| | Minimum Force Required for Direct Opening Action | 60N (XA series), 80N (XW, FB series) |
| | Minimum Operator Stroke Required for Direct Opening Action | 4.0 mm |
| | Maximum Operating Stroke | 4.5 mm |
| | Operating Frequency | 900 operations/hour |
| | Mechanical Life | 250,000 operations minimum |
| | Electrical Life | 250,000 operations minimum |
| | Connectors | IDC connector (XA series)<br>IDC connector, crimping connector (XW series)<br>M12 connector/AS-Interface piercing connector (FB series) |
| | Recommended Tightening Torque for Locking Ring | 0.88 N·m (XA series), 2.0 N·m (XW series) |

## Pin Assignment

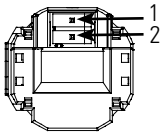
**XA/XW Series**




IDC: XW9Z-C100-1
(End connector)

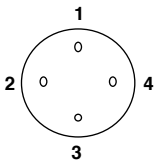



XW9Z-C100-2 (Through connector)

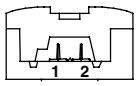



**FB Series**

**(M12 Connector)**



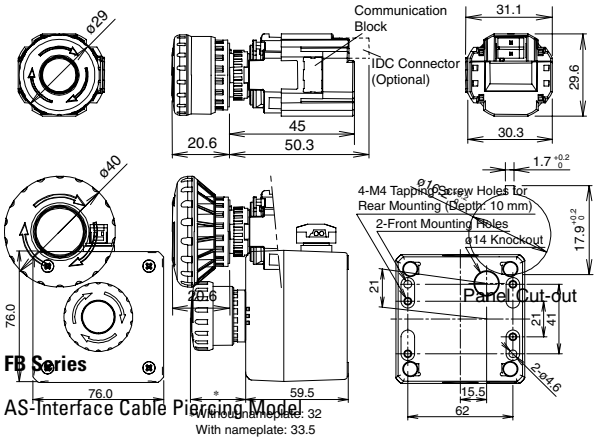

**(AS-Interface Piercing Connector)**




1: AS-i+
2: AS-i-

# Dimensions

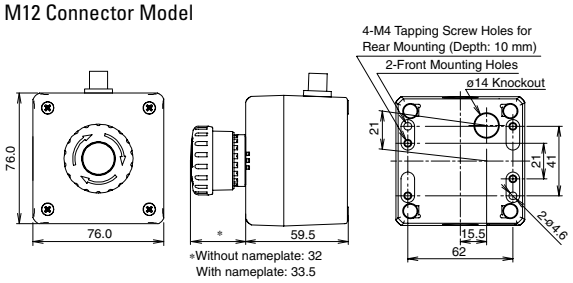
### XA Series



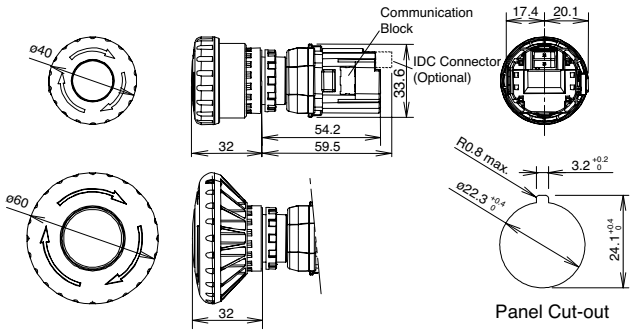

### FB Series

AS-Interface Cable Piercing Model

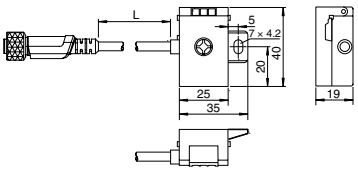
M12 Connector Model




### XW Series




### M12 Connector Cable for FB Series

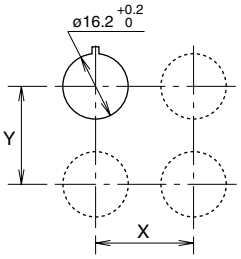



## Mounting Centers

### XA Series

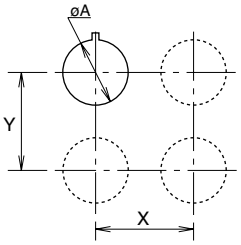
| XA Size | X & Y |
|---|---|
| ø29 | 40mm minimum |
| ø40 | 50mm minimum |
| ø60 | 70mm minimum |

The above values are for installing with ø16mm pushbutton switches. For using with control units of other size and operator shape, determine the mounting centers in consideration of easy operation and wiring.



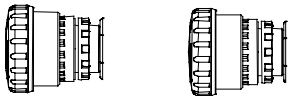

### XW Series

| XW Size | øA | X & Y |
|---|---|---|
| 40mm | $22.3^{+0.4}$ | 70mm min |




## Resetting

These emergency stop switches are push-lock, pull/turn reset types. When pressed, the operator is latched, and reset by pulling or turning.



# Operating Instructions



## AS-Interface Safety Monitor

**Wiring and Installation**

Before wiring the interface cable, discharge static electricity. Tighten the screws to a torque of 0.8 to 1.2 N·m.

The AS-Interface power supply unit must separate the main power (input) and output safely according to IEC 60742. It must also maintain a stable supply in the event of instantaneous power failure.

### Replacing the Safety Slave

Press "Service" button before and after replacing the safety slave. Resetting of safety monitor using the PC is not necessary. After replacement, check whether the new safety slave performs correctly.

### Replacing the Safety Monitor

The settings of the safety monitor can be transferred to the new safety monitor using the download cable sold separately, and the new safety monitor does not require resetting using software. After replacement, check whether the new safety monitor performs correctly.

## AS-Interface Safety Communication Terminal & Base Module

### Wiring

The AS-Interface safety communication terminal will be connected to the AS-Interface network via the base module. When only one AS-i flat cable is used, plug the unused grooves using the gaskets supplied with the base module. Tighten the screws to a torque of 0.7 N·m maximum.

Before wiring, disconnect the safety communication terminal and discharge static electricity with an adequate method. Connect the emergency stop switches and interlock switches in normally-closed status.

The slave has two independent inputs for connecting the products to comply with the required safety category. When complying with safety category 4, limit the cable length between the module and the input device to not longer than 30m. For leading in the cables, use the upper part (1 and 2), and tighten the cable gland to a torque of 0.5 to 0.7 N·m.

## Emergency Stop Switches

### Panel Mounting

The panel thickness should be within the range from 0.8 to 6.0 mm. Remove the locking ring from the operator and check that the rubber gasket is in place. Insert the operator from panel front into the panel hole. Face the side without thread on the operator with TOP marking upward, and tighten the locking ring using ring wrench MW9Z-T1 to a torque of 2.0 N·m maximum. Do not use pliers. Do not tighten with excessive force, otherwise the locking ring will be damaged.

To prevent the XW emergency stop switches from rotating when resetting from the latched position, use of an anti-rotation ring (HW9Z-RL) or a nameplate is recommended.

### Address Setting

The lid of the address setting device on the side of the unit can be removed by prying it out. Take care not to lose the lid, which comes off completely. By removing the lid of the address setting section, you can see the terminals for connecting a programming cable. Connect the programming cable to the terminals.

To set an address while mounting this product on the panel, more than 60mm space is necessary on the left side in terms of the AS-Interface communication unit. Note that adequate space cannot be allocated by the distance specified with minimum mounting centers. If adequate space cannot be allocated, set the address before installing the product on the panel or set the address after removing the AS-Interface communication unit from the operation section.

### Wiring

A maximum of 31 units can be connected to a network. Addresses must be assigned to avoid overlaps.

This product allows connecting safety slaves with safety equipment, and normal slaves without safety equipment at the same time. Do not connect safety related signals to a normal slave.

The AS-Interface slaves are divided into two types: A/B slaves with expanded addresses and standard slaves without expanded addresses. If A/B slaves and standard slaves are connected simultaneously, the maximum number of slaves connectable to a network may exceed 31.

The network length is a maximum of 100 meters, including all wires. However, the maximum possible length of the wires may actually be shorter than 100 meters depending on the type of master and composition of slaves. Consider the lengths of cables and wiring topology so that voltage drops in transmission lines are no higher than 3V.

Use applicable two-wire flat cables for wiring.

Do not operate the switch using solid object such as metal or with excessive force, otherwise the switch may be deformed or damaged, causing malfunction or operation failure.

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A8 Series ø8mm ..... 492
ø16mm Switches & Pilot Devices ..... 497
X6 E-Stops ø16mm ..... 497
XA E-Stops ø16mm ..... 501
LB Series ø16mm ..... 508
A6 Series ø16mm ..... 501
L6 Series ø16mm ..... 508
ø22mm Switches & Pilot Devices ..... 580
XW E-Stops ø22mm ..... 580
AP22M Series ø22mm ..... 586
CW Series ø22mm ..... 589
HW Series ø22mm ..... 611
TW Series ø22mm ..... 673
FB Series Enclosures ..... 714
ø30mm Switches & Pilot Devices ..... 716
XN E-Stops ø30mm ..... 716
TWTD Series ø30mm ..... 722
EU2B Series ø30mm ..... 752
Cam Switches - CS Series ..... 765
Mono-Lever Switches - ARN Switches ..... 772

# Switches & Pilot Devices

IDEC

**www.IDEC.com/switches**

# Selection Guide

| Appearance | Product Series | Mounting Hole | Contact Rating | Contact Mounting | Function | Page |
|---|---|---|---|---|---|---|
| | AP | ø8mm, ø10mm, ø12mm, ø16mm | N/A | N/A | Pilot light | 488 |
| | A8 | ø8mm | 1A | Unibody | Pushbutton, Pilot Light | 492 |
| | X6 | ø16mm | 5A | Unibody | E-Stop | 497 |
| | XA | | 5A | Removable/ Unibody | E-Stop | 501 |
| | A6 | | 1A | Unibody | Pushbutton, Pilot Light, Selector Switch, Key Switch, Stop Switch | www.IDEC.com/switches |
| | LB | | 3A | Removable | Pushbutton, Pilot Light, Selector Switch, Key Switch, Lever Switch, Buzzer | 508 |
| | L6 | | 5A | Removable | Pushbutton, Pilot Light, Selector Switch, Key Switch, Stop Switch, Buzzer | 526 |
| | XW | ø22mm | 5A | Removable | E-Stop | 580 |
| | AP22M | | N/A | Unibody | Pilot Lights | 586 |
| | CW | | 10A | Removable | Pushbutton, Pilot light, selector switch, key selector | 589 |
| | HW | | 10A | Removable | Pushbutton, Pilot Light, Selector Switch, Key Switch, E-Stop, MonoLever | 611 |

## Selection Guide con't

| Appearance | Product Series | Mounting Hole | Contact Rating | Contact Mounting | Function | Page |
|---|---|---|---|---|---|---|
| | TW | ø22mm | 10A | Removable | Pushbutton, Pilot Light, Selector Switch, Key Switch, Stop Switch | 673 |
| | FB | | N/A | N/A | Enclosures | 714 |
| | XN | ø30mm | 5A | Removable | E-Stop | 716 |
| | TWTD | | 10A | Removable | Pushbutton, Pilot Light, Selector Switch, Key Switch, Stop Switch | 722 |
| | CS | | 10A | Unibody | Cam Switch | 765 |
| | ARN | | 10A | Removable | MonoLever | 772 |
| | LW Flush | ø25mm, □ 25 x 25mm | 5A | Removable | Pushbutton, Pilot Light, Selector Switch, Key Switch | www.IDEC.com/switches |

# AP Series — Miniature Pilot Lights

**Key features:**

- Long service life, low maintenance
- Space saving miniature style
- Dome or flat lens models
- Built-in current-limiting resistor
- Five illumination colors: red, green, amber, yellow, and white
- Transformer (120V AC and 240V AC) and DC-DC Converter (110V DC) options on 12mm and 16mm units

UL Recognized
File No. E55996

CSA Certified
File No. LR21451

*AP8/AP1 series only.

## Specifications

| | |
|---|---|
| Lamp | Built-in LED with current limiting resistor |
| Operational Voltage | 5, 6, 12, 24VDC (full voltage),<br>110/120, 220/240VAC, (with transformer)<br>110VDC (with converter) |
| Current Ratings | AP8: 5V DC/9mA, 12V DC/9mA, 24V DC/9mA, 12V AC/15mA, 24V AC/15mA<br>AP1: 5V DC/9mA, 12V DC/9mA, 24V DC/9mA, 12V AC/15mA, 24V AC/15mA<br>AP2: 6V DC/33mA, 12V DC/22mA, 24V DC/11mA<br>AP6: 6V DC/33mA, 12V DC/22mA, 24V DC/11mA |
| Operating Temp. | -20°C to +55°C |
| Operating Humidity | 45 to 85% RH |
| Insul. Resistance | 100MΩ min. (500V DC megger)<br>Between live and dead parts |
| Rev. Withstand Voltage | AP2/AP6: 100V<br>AP1/AP8: 200V |
| Solder Terminal | Soldering 260°C maximum (5 sec.) |
| Degree of Protection | AP8: IP40 (dustproof)<br>Other Series: IP65 (oiltight) |

## Optional Adaptors/Converters

| Model | Transformer | DC-DC Converter |
|---|---|---|
| Applicable Units | AP2 & AP6 (with 6V LED only) | |
| Operating Voltage | 110/120VAC 50/60 Hz<br>220/240VAC 50/60 Hz | 110V DC (90 to 140V DC) |
| Power Consumption | 1.6 VA maximum | 1W maximum |
| Insulation Voltage | 250 V AC | 140V DC |
| Insulation Resistance | 10MΩ min. (500V DC megger) Between live and dead parts | |
| Dielectric Strength | 2,000V AC, 1 minute Between live/dead parts<br>2,000V AC, 1 minute Between terminals | 2,000V AC, 1 minute Between live/dead parts<br>1,500V AC, 1 minute Between terminals |

Available as one piece only (replacement LEDs are not available).

# Miniature Pilot Lights

## AP Miniature Pilot Lights - ø8 & ø10mm

| Style | | Lens Style | Operating Voltage | Part Numbers |
|---|---|---|---|---|
| AP8 Series - Ø8mm | | Dome | 5V DC +/- 5%<br>12V AC/DC +/- 10%<br>24V AC/DC +/- 10% | AP8M255-②<br>AP8M211-②<br>AP8M222-② |
| | | Flat | 5V DC +/- 5%<br>12V AC/DC +/- 10%<br>24V AC/DC +/- 10% | AP8M155-②<br>AP8M111-②<br>AP8M122-② |
| AP1 Series - Ø10mm | | Dome | 5V DC +/- 5%<br>12V AC/DC +/- 10%<br>24V AC/DC +/- 10% | AP1M255-②<br>AP1M211-②<br>AP1M222-② |
| | | Flat | 5V DC +/- 5%<br>12V AC/DC +/- 10%<br>24V AC/DC +/- 10% | AP1M155-②<br>AP1M111-②<br>AP1M122-② |

1. In place of ②, specify the color code.
2. For dimensions, see page 491.
3. For accessories, see page 490.

### ② Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S* |
| Warm White | W |
| Cool White | PW |
| Yellow | Y |

* Available in only the AP8 and AP1 series.

## AP Miniature Pilot Lights - ø12 & ø16mm

| Style | | Lens Style | Operating Voltage | Part Numbers |
|---|---|---|---|---|
| AP2 Series - Ø12mm | | Dome | 6V DC +/- 5%<br>12V DC +/- 10%<br>24V DC +/- 10% | AP2M266-②<br>AP2M211-②<br>AP2M222-② |
| | | Flat | 6V DC +/- 5%<br>12V DC +/- 10%<br>24V DC +/- 10% | AP2M166-②<br>AP2M111-②<br>AP2M122-② |
| AP6 Series - Ø16mm | | Dome | 6V DC +/- 5%<br>12V DC +/- 10%<br>24V DC +/- 10% | AP6M266-②<br>AP6M211-②<br>AP6M222-② |
| | | Flat | 6V DC +/- 5%<br>12V DC +/- 10%<br>24V DC +/- 10% | AP6M166-②<br>AP6M111-②<br>AP6M122-② |

1. In place of ②, specify the color code.
2. For dimensions, see page 491.
3. For accessories, see page 490.

### ② Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Warm White | W |
| Yellow | Y |

## Optional Transformers and DC-DC Converters (for AP2 and AP6 only)

| Style | | Voltage | Part Numbers | |
|---|---|---|---|---|
| | | | Used with AP2 Series | Used with AP6 Series |
| | Transformer | 110/120V AC<br>220/240V AC | AP2-0126D<br>AP2-0246D | AP6-0126D<br>AP6-0246D |
| | DC-DC Converter | 110V DC<br>(90–140V DC) | AP2-016DD | AP6-016DD |

1. Optional Transformers and DC-DC converters snap onto the back of AP2 or AP6 pilot lights.
2. Transformers and DC-DC Converters step down to 6V.
3. For dimensions, see page 491.

## Accessories — AP Series

| Item | Appearance | Description | Used With | Part Number |
|---|---|---|---|---|
| Locking Ring Wrench | | Made of metal. Used for tightening plastic locking ring during installation. Tightening torque should not exceed 3kgf-cm | Ø 16mm units | MT-001 |
| | | | Ø 12mm units | MT-002 |
| | | | Ø 10mm units | MT-003 |
| | | | Ø 8mm units | MT-004 |
| Mounting Hole Plug | | Made of rubber. Fills unused mounting holes to provide IP65 protection | Unused 8mm panel cutouts | AL-B8 |
| | | | Unused 10mm panel cutouts | AL-B1 |
| | | | Unused 12mm panel cutouts | AL-B2 |
| | | | Unused 16mm panel cutouts | AL-B6 |
| Transformer Removal Tool | | A Series Blank/Lens Removal Tool | AP2 and AP6 snap on transformer and DC-DC converter | MT-100 |
| Replacement Lenses | | Lenses (included with all units). | AP1M Flat | AP1M-L1-② |
| | | | AP1M Dome | AP1M-L2-② |
| | | | AP2M Flat | AP2M-L1-② |
| | | | AP2M Dome | AP2M-L2-② |
| | | | AP6M Flat | AP6M-L1-② |
| | | | AP6M Dome | AP6M-L2-② |

1. In place of ②, specify the Lens Color Code.
2. Internal LED is fixed and cannot be removed or replaced.

### ② Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S* |
| White | W |
| Yellow | Y |

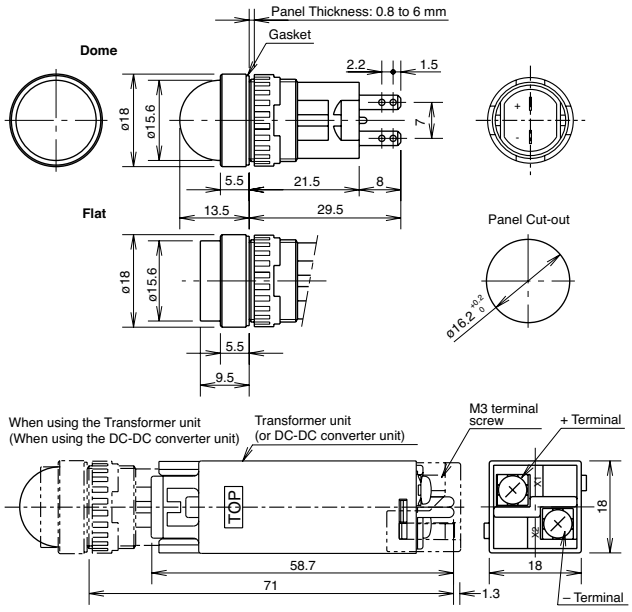
*Blue available in AP8/AP1 series only.

# Dimensions — AP Series

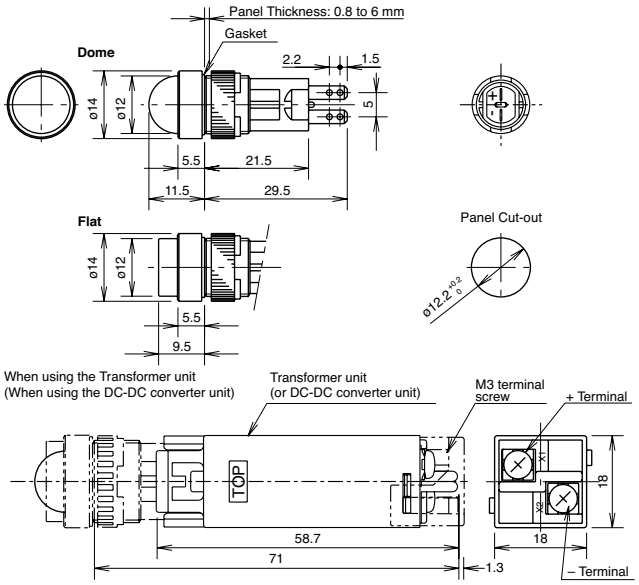
## Pilot Lights (AP Series)

| Style | AP8 | | AP1 | | AP2 | | | AP6 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Flat | Dome | Flat | Dome | Flat | Dome | w/ Adaptor or Converter | Flat | Dome | w/ Adaptor or Converter |
| Panel Cut-out | Ø 0.319" (+0.0118, –0) 8.1mm (+0.3, –0) | | Ø 0.398" (+0.0118, –0) 10.1mm (+0.3, –0) | | Ø 0.480" (+0.0118, –0) 12.2mm (+0.3, –0) | | | Ø 0.638" (+0.0118, –0) 16.2mm (+0.3, –0) | | |
| Outside Dimension | Ø 0.386" (9.8mm) | | Ø 0.472" (12mm) | | Ø 0.551" (14mm) | | ☐ 0.709" (18mm) | Ø 0.709" (18mm) | | ☐ 0.709" (18mm) |

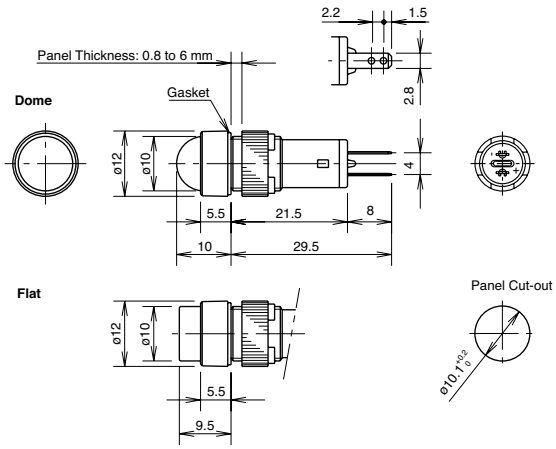
AP6



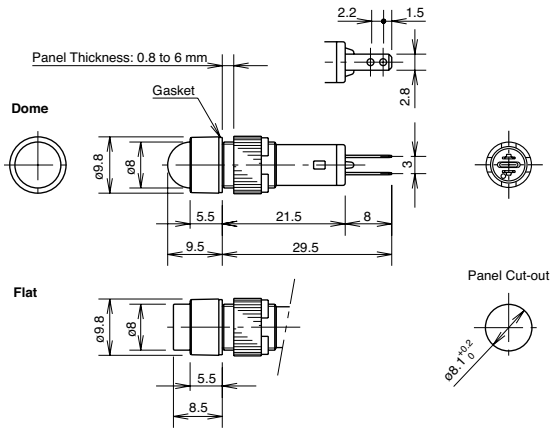

AP2




AP1



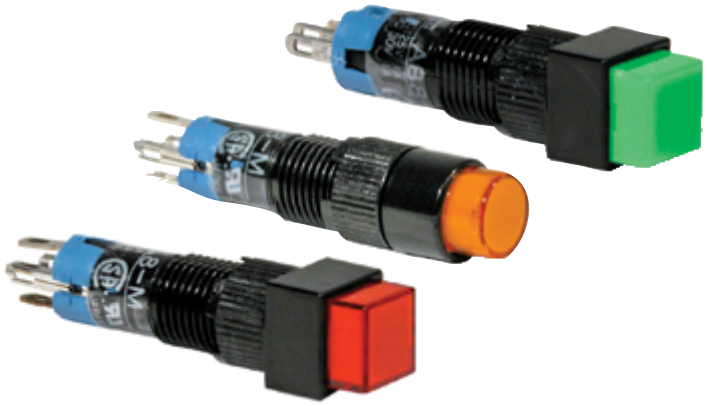

AP8



# A8 Series — Miniature Switches and Pilot Devices: 8mm

## Key features:

- 21/64" (8mm) round mounting hole
- Compact Design Saves Space
- Bright and Vivid Illumination
- Choice of Shapes and Functions
- Gold Clad Silver Contacts for reliable low level switching
- Snap action contacts
- IP40 (Dustproof) Construction



UL Listed
File No. E55996

CSA Certified
File No. LR21451

## Specifications

| | |
|---|---|
| LED Lamp Life | 50,000 hours approximately (reduced to half of original intensity) |
| Contact Configuration | SPDT |
| Maximum Voltage | 250V AC/DC |
| Thermal Current | 3A |
| Contact Material | Gold-clad Silver |
| Terminal Style | Solder Tab Terminal |
| Operating Temperature | –25° to +55°C (no freezing) |
| Operating Humidity | 45 to 85% RH |
| Contact Resistance | 50mΩ maximum (initial value) |
| Insulation Resistance | 100MΩ minimum<br>(500V DC megger) |
| Vibration Resistance | 5 to 55Hz, 0.75mm amplitude |
| Shock Resistance | Damage limits: 500m/sec$^2$ (approx. 50G)<br>Operating extremes: 200m/sec$^2$ (approx. 20G) |
| Electrical Life | 100,000 operations minimum |
| Mechanical Life | Maintained: 100,000 (1200 operations/hour)<br>Momentary: 200,000 minimum |
| Degree of Protection | IP40 Enclosed/Dustproof |
| Soldering Temperature | 20W/5 seconds or 260°C/3 seconds |
| Dielectric Strength | Switch Unit: 2,000V AC, 1 min. between live/dead part and terminals of different poles; 1,000V AC, 1 minute between terminals of the same pole; 1,500V AC, 1 minute between contact and lamp terminals.<br>Illumination Unit: 2,000V AC, 1 min. between live part/ground |

## Contact Ratings

| Operating Voltage | | 24V | 120V | 240V |
|---|---|---|---|---|
| AC 50/60Hz | Resistive | — | 1.0A | 0.5A |
| | Inductive | — | 0.7A | 0.5A |
| DC | Resistive | 1.0A | 0.2A | — |
| | Inductive | 0.7A | 0.1A | — |

1. AC Inductive Load, PF = 0.6 – 0.7; DC Inductive Load, L/R = 7.
2. Minimum applicable load (reference value) is 5V AC/DC 3mA (applicable range is subject to the operating conditions and load).

# AB8 Non-Illuminated Pushbuttons (Assembled)

## Non-Illuminated Pushbuttons

| Style | | Contact | Part Numbers | |
|---|---|---|---|---|
| | | | Momentary | Maintained |
| Round | | SPDT | AB8M-M1-① | AB8M-A1-① |
| Square | | SPDT | AB8Q-M1-① | AB8Q-A1-① |
| Rectangular | | SPDT | AB8H-M1-① | AB8H-A1-① |

1. In place of ①, specify button color code from the table below.
2. For accessories, see page 495.
3. For dimensions, see page 496.

### ① Button Color Codes

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

# AL8 Illuminated Pushbuttons & Pilot Lights (Assembled)

## Illuminated Pushbuttons

| Style | | Contact | Part Numbers | | Pilot Light Part Number |
|---|---|---|---|---|---|
| | | | Momentary | Maintained | |
| Round | | SPDT | AL8M-M11-② | AL8M-A11-② | AL8M-P1-② |
| Square | | SPDT | AL8Q-M11-② | AL8Q-A11-② | AL8Q-P1-② |
| Rectangular | | SPDT | AL8H-M11-② | AL8H-A11-② | AL8H-P1-② |

1. In place of ②, specify lens color code from table on the right.
2. A replaceable LED lamp is included with the operator.
3. Because the LED lamp does not contain an internal current limiting resistor, an external resistor must be added. For recommended values, see table below.
4. For accessories, see page 495.
5. For dimensions, see page 496.

### ② LED/Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| White | W |
| Yellow | Y |

## Replacement LEDs

| Lens Color | LED Lamp | Part Number |
|---|---|---|
| Amber | Amber | LAD-SA |
| Green | Green | LAD-SG |
| Red | Red | LAD-SR |
| White | Yellow* | LAD-SY |
| Yellow | Yellow | LAD-SY |

* White units use a white lens and a yellow LED.

## LED Voltage and Recommended Current Limiting Resistor

| Voltage | External Resistor |
|---|---|
| 5V DC | 150Ω, 1/2W |
| 6V DC | 200Ω, 1/2W |
| 12V DC | 510Ω, 1W |
| 24V DC | 1.1kΩ, 1W |

## LED Lamp Ratings: LED Specifications

| LED Lamp | Forward Current $I_f$ | Forward Voltage (Nominal) $V_f$ | Reverse Voltage $V_r$ | Operating Voltage & External Current Limiting Resistor (Recommended Value) |
|---|---|---|---|---|
| Amber | 20mA | 2.2V | 4V | 5V DC: 150Ω, 1/2W<br>6V DC: 200Ω, 1/2W<br>12V DC: 510Ω, 1W<br>24V DC: 1.1kΩ, 1W |
| Green | 20mA | 2.1V | 4V | |
| Red | 20mA | 1.7V | 4V | |
| Yellow | 20mA | 2.2V | 4V | |

When LED lamps are used at voltages other than those stated above, external resistor value, R, is determined by the following formula: $R = (\text{Operating Voltage} - V_f) / I_f$

## Accessories

| Item | Description | Used With | | Part Number |
|---|---|---|---|---|
| Locking Ring Wrench | Made of metal. Used for tightening plastic locking ring during installation. Tightening torque should not exceed 3kgf-cm | All units | | MT-004 |
| Lens Removal Tool | Made of metal. Used for removing lens or button from the housing | Illuminated pushbuttons and pilot lights | | MT-101 |
| Lamp Holder Tool | Made of rubber. Used for removing and replacing LED lamps in illuminated units | Illuminated pushbuttons and pilot lights | | OR-66 |
| Switch Guard | Used to avoid operating the pushbutton inadvertently. Cover flips open 90˚. Provides IP40 protection | Round & square units | | AL-K8 |
| | | Rectangular units | | AL-KH8 |
| Terminal Cover | Made of translucent nylon. Fits over and shields the terminals | All units | | AL-V8 |
| Adaptor Socket AL-C8 AL-C8V shown attached | Plug-on adaptor with solder terminals, allows easy control unit replacement. | All units | | AL-C8 |
| | Plug-on adaptor with PCB terminals, allows easy control unit replacement. | | | AL-C8V |
| Mounting Hole Plug | Made of rubber. Fills unused mounting holes to provide IP65 protection | Extra panel cutouts | | AL-B8 |
| Replacements LEDs | LED lamp is included in every illuminated control unit. Replacement lamp is ordered separately. External current limiting resistor required. | Illuminated units and pilot lights | | LAD-SR (red) |
| | | | | LAD-SG (green) |
| | | | | LAD-SA (amber) |
| | | | | LAD-SY (yellow) |
| Replacement Lenses | | Illuminated pushbuttons and pilot lights | Round | AL8M-LK1-② |
| | | | Square | AL8Q-LK1-② |
| | | | Rectangular | AL8H-LK1-② |
| Replacement Buttons | | Non-Illuminated buttons | Round | AB8M-BK1-① |
| | | | Square | AB8Q-BK1-① |
| | | | Rectangular | AB8H-BK1-① |

1. In place of ①, specify Button Color Code from the table.
2. In place of ②, specify Lens Color Code from table.

### ① Button Color Codes

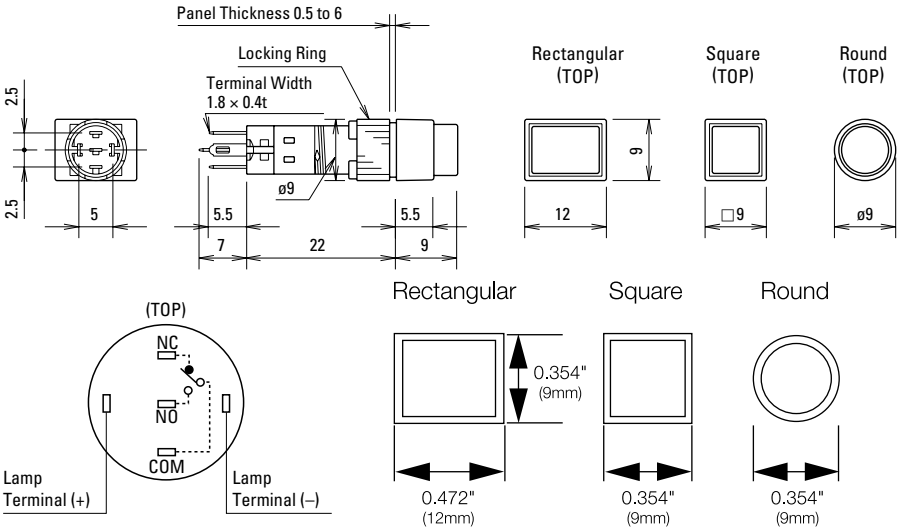
| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

### ② LED/Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| White | W |
| Yellow | Y |

# Dimensions

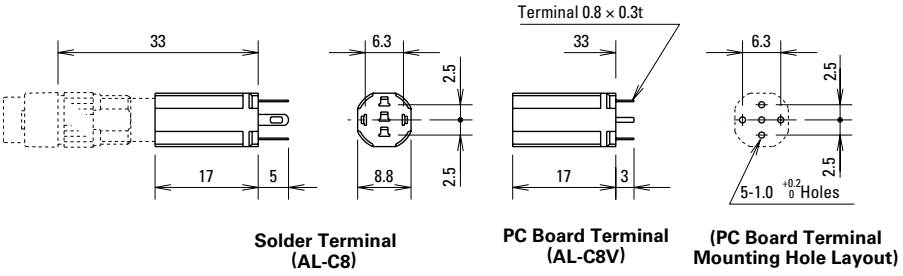
## AΔ8







## Terminal Sockets

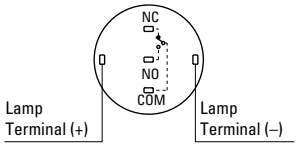



**Solder Terminal (AL-C8)**

**PC Board Terminal (AL-C8V)**

**(PC Board Terminal Mounting Hole Layout)**

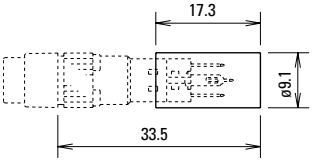
**Terminal Arrangement**
(TOP)




**(Bottom View)**

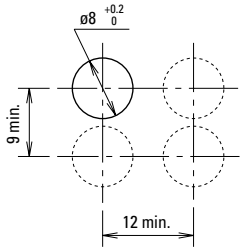
## Terminal Cover

AL-V8, Ø 21/64" (8mm)

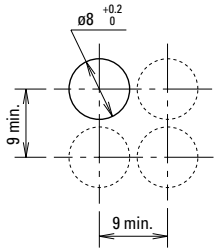



## Panel Cut-Out (not drawn to scale)

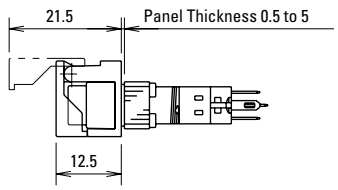
Rectangular



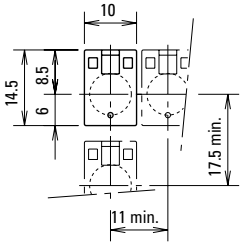

Round/Square



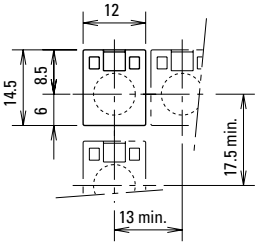

Switch Guard, Ø 21/64" (8mm)




**For Round/Square Units (AL-K8)**




**For Rectangular Units (AL-KH8)**



# 16mm X6 E-Stops

**Key features:**

- Two button sizes—ø30mm and ø40mm
- Two button colors—red for emergency stop and yellow for stop switch
- Two ways of resetting —pulling and turning
- Solder/tab terminal #110 makes for easy connections
- UL, c-UL recognized, EN compliant
- Safety lock mechanism (IEC 60947-5-5; 6.2)
- Direct opening action (IEC 60947-5-5; 5.2, IEC 60947-5-1, Annex K)

UL File No. E68961

CCC No. 2010010305411586

## Specifications

| | |
|---|---|
| Applicable Standards | IEC 60947-5-1, EN 60947-5-1<br>IEC 60947-5-5 (Note), EN 60947-5-5 (Note)<br>JIS C8201-5-1, JIS C8201-5-5, UL508<br>CSA C22.2 No.14, GB14048.5 |
| Operating Temperature | –25 to +60°C (no freezing) |
| Operating Humidity | 45 to 85% RH (no condensation) |
| Storage Temperature | –45 to +80°C (no freezing) |
| Operating Force | Push to lock: 10.5N, Pull to reset: 8.8N, Turn to reset: 0.17 N·m |
| Minimum Force Required for Direct Opening Action | 40N |
| Minimum Operator Stroke Required for Direct Opening Action | 4.5mm |
| Maximum Operator Stroke | 4.5mm |
| Contact Resistance | 50mΩ maximum (initial value) |
| Insulation Resistance | 100MΩ minimum (500V DC megger) |
| Overvoltage Category | II |
| Impulse Withstand Voltage | 2.5kV |
| Pollution Degree | 3 |
| Operation Frequency | 900 operations/hour |
| Shock Resistance | Operation extremes: 150 m/s2, Damage limits: 1000 m/s2 |
| Vibration Resistance | Operation extremes: 10 to 500 Hz<br>amplitude 0.35 mm, acceleration 50 m/s2<br>Damage limits: 10 to 500 Hz,<br>amplitude 0.35 mm, acceleration 50 m/s2 |
| Mechanical Life | 100,000 operations minimum |
| Electrical Life | 100,000 operations minimum |
| Degree of Protection | IP65 (IEC 60529) |
| Short-circuit Protection | 250V/10A fuse (Type aM IEC 60269-1/IEC 60269-2) |
| Conditional Short-circuit Current | 1000A |
| Terminal Style | Solder/tab terminal #110 |
| Recommended Tightening Torque for Locking Ring | 0.88N·m |
| Applicable Wire Size | 1.25mm2 maximum (AWG16 maximum) |
| Terminal Soldering Condition | 310 to 350°C, within 3 seconds |
| Weight (approx.) | ø30mm button: 13g, ø40mm button: 16g |

Except for stop switch (yellow button)

## Contact Ratings

| | | | | | |
|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | | 250V | |
| Rated Thermal Current (Ith) | | | | 5A | |
| Rated Operating Voltage (Ue) | | | | 30V | 125V | 250V |
| Rated Operating Current (Note) | Main Contacts | AC 50/60 Hz | Resistive Load (AC-12) | – | 5A | 3A |
| | | | Inductive Load (AC-15) | – | 1.5A | 0.75A |
| | | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |

- Minimum applicable load: 5V AC/DC, 1mA (reference value) (May vary depending on the operating conditions and load)
- Operational current represents the classification by making and breaking currents (IEC 60947-5-1)
- TÜV rating: AC-15 0.75A/250V, DC-13 1A/30V
  UL rating: Standard Duty AC 0.75A/250V
  Standard Duty DC 1A/30V

# Part Numbers

## Pushlock Pull/Turn Reset Switch (Unmarked)

| Shape | Main Contact (NC) | Part Number Solder/tab Terminal #110 |
|---|---|---|
| ø30mm Mushroom | 1NC | AB6E-3BV01PTRH |
| | 2NC | AB6E-3BV02PTRH |
| ø40mm Mushroom | 1NC | AB6E-4BV01PTRH |
| | 2NC | AB6E-4BV02PTRH |

## Pushlock Pull/Turn Reset Switch (Marked with Arrow)

| Shape | Main Contact (NC) | Part Number Solder/tab Terminal #110 |
|---|---|---|
| ø30mm Mushroom | 1NC | AB6E-3BV01PTRM |
| | 2NC | AB6E-3BV02PTRM |
| ø40mm Mushroom | 1NC | AB6E-4BV01PTRM |
| | 2NC | AB6E-4BV02PTRM |

## Yellow Button, Pushlock Pull/Turn Reset Switch (Unmarked)

| Shape | Operator | Main Contact (NC) | Part Number Solder/tab Terminal #110 |
|---|---|---|---|
| ø30mm Mushroom | ø30mm button | 1NC | AB6E-3BV01PTY |
| | | 2NC | AB6E-3BV02PTY |
| | ø40mm button | 1NC | AB6E-4BV01PTY |
| | | 2NC | AB6E-4BV02PTY |

1. Pushlock pull/turn reset switches are locked when pressed, and reset when pulled or turned clockwise.
2. Do not use the stop switch as an emergency stop switch.

## Accessories

| Shape | Material | Part Number | Remarks |
|---|---|---|---|
| Locking Ring Wrench | Metal (nickel-plated brass) | MT-001 | Used to tighten the locking ring when installing the X6 switch onto a panel. Recommended tightening torque: 0.88 N·m maximum |
| Locking Ring | Plastic | XA9Z-LNPN10 | Black |
| SEMI S2 Compliant Switch Guard | Polyamide (PA6) | XA9Z-KG1 | IP65 degree of protection Color: yellow (Munsell 2.5Y8/10 or equivalent) Cannot be used with nameplate. |

## Part Number Key

**AB6E - 3 BV 01 PT RH**

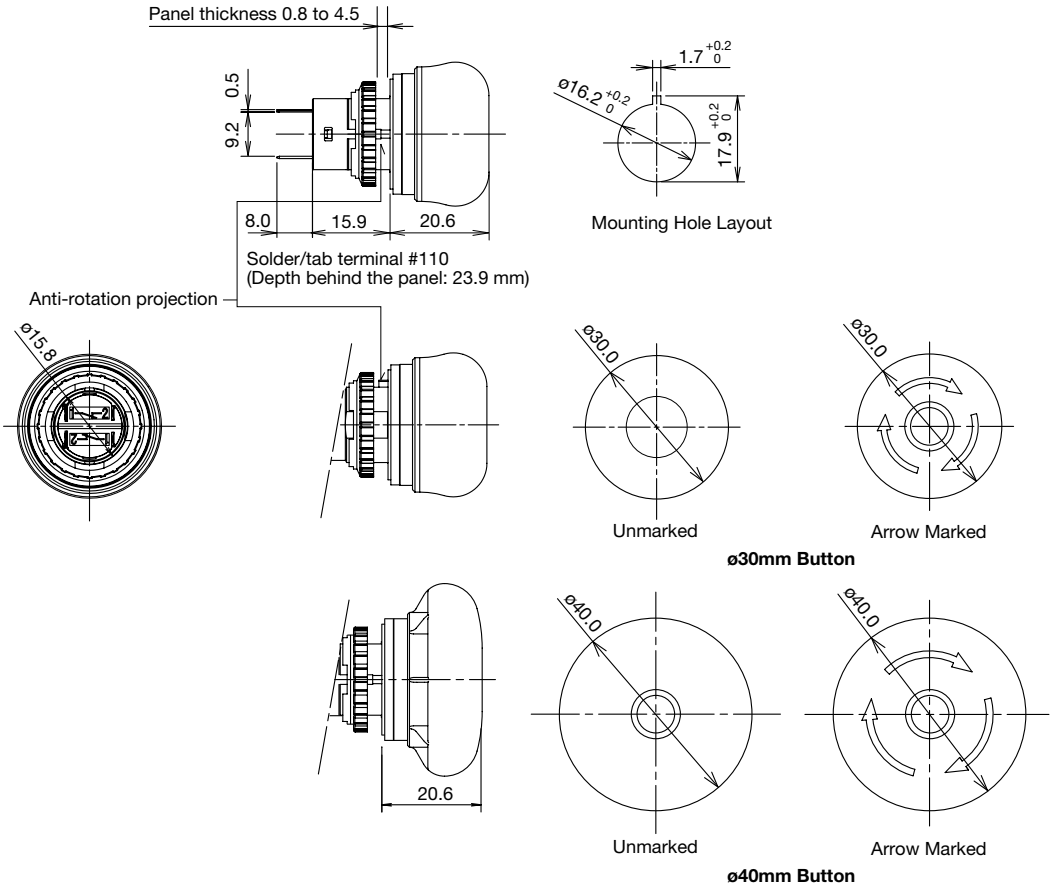
- Mushroom Size: 3: ø29mm; 4: ø40mm
- Contact Configuration: 01: 1NC; 02: 2NC
- Color/Marking: RH: Red (unmarked); RM: Red (marked with arrow); Y: Yellow (unmarked)

## Nameplates

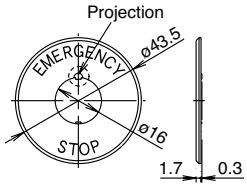
| Use With | Description | Legend | Part Number | Material | Background Color | Legend Color |
|---|---|---|---|---|---|---|
| E-Stops | For ø30mm Button | Blank | HAAV-0 | Polyamide | Yellow | Black |
| | | EMERGENCY STOP | HAAV-27 | | | |
| | For ø40mm Button | Blank | HAAV4-0 | | | |
| | | EMERGENCY STOP | HAAV4-27 | | | |
| Stop Switch | For ø30mm Button | Blank | HAAV-0-W | | White (Munsell N9.5) | |
| | For ø40mm Button | | HAAV4-0-W | | | |

Cannot be used with switch guard.

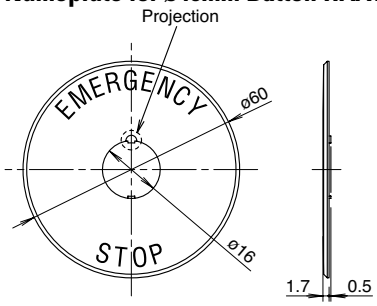
## Dimensions (mm)



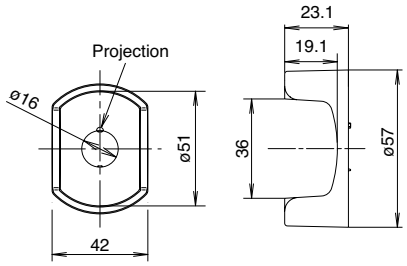

### Nameplate for ø30mm Button HAAV-*



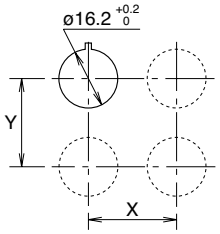

### Nameplate for ø40mm Button HAAV4-*




### Switch Guard XA9Z-KG1



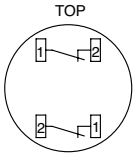

### Mounting Hole Layout




The values shown on the left are the minimum dimensions for mounting with other ø16 mm pushbuttons. For other control units of different sizes and styles, determine the values according to dimensions, operation, and wiring.

| | X | Y |
|---|---|---|
| ø30 mm Button | 40 mm min. | 40mm min. |
| ø40 mm Button | 50 mm min. | 50mm min. |

### Terminal Arrangement (Bottom View)




1NC type: Terminals located near the TOP marking

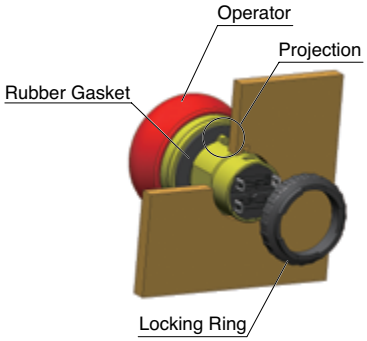
## Safety Precautions

- Turn off power to the X6 series units before installation, removal, wiring, maintenance, and inspection. Failure to turn power off may cause electrical shocks or fire hazard.
- For wiring, use wires of proper size to meet the voltage and current requirements and solder properly. Improper soldering may cause overheating and create fire hazards.

## Instructions

### Panel Mounting

Remove the locking ring from the operator and check that the rubber gasket is in place. Insert the operator from panel front into the panel hole. Face the side with the projection upward, and tighten the locking ring using the locking ring wrench MT-001.




#### Notes for Panel Mounting

Using the locking ring wrench MT-001, tighten the locking ring to a torque of 0.88 N·m. Do not use pliers. Do not apply excessive force, otherwise the locking ring will become damaged.

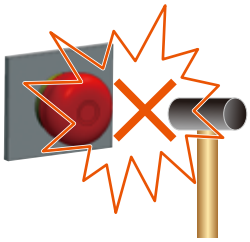
### Contact Bounce

When the button is reset by pulling or turning, the NC contacts will bounce. When designing a control circuit, take the contact bounce time into consideration (reference value: 20ms).

Do not apply any external shock to the emergency stop switches, otherwise the contact will bounce.

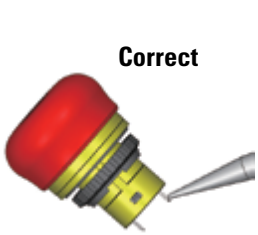
### Handling

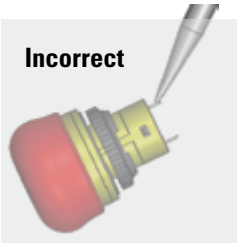
Do not expose the switch to excessive shock and vibrations, otherwise the switch may be deformed or damaged, causing malfunction or operation failure.



### Wiring

1. Applicable wire size is 1.25mm$^2$ (16 AWG) maximum.
2. Solder the terminals using a soldering iron at 310 to 350°C for 3 seconds maximum. Do not use flow or dip soldering. SnAgCu type lead-free solder is recommended. Make sure that the soldering iron touches the terminals only, not any plastic parts. Do not apply external force (bending the terminals or applying tensile force on the wires).
3. Use a non-corrosive rosin flux. To prevent the flux from entering the switch while soldering, angle the terminals downward.




4. Because the terminal spacing is narrow, use protective tubes or heat shrinkable tubes to avoid burning the wire sheath or causing a short circuit.
5. Apply force on the terminals in the vertical direction to the panel only, otherwise the terminals will be damaged.
6. When using tab connectors, specify quick connect #110 and 0.5mm tab thickness.

# 16mm XA E-Stops

**Key features:**

- Two button sizes: ø29 and ø40mm
- Lead-free, RoHS compliant, (EU directive 2002/95/EC)
- Depth behind the panel:
  Standard - only 27.9mm for 1 to 4 contacts
  Unibody - only 23.9mm for 1NC or 2NC
- IDEC's original "Safe break action" ensures that the NC contacts open when the contact block is detached from the operator.
- Push-to-lock, Pull or Turn-to-reset operator
- Direct opening action mechanism (IEC60947-5-5, 5.2, IEC60947-5-1, Annex K)
- Safety lock mechanism (IEC60947-5-5, 6.2)
- Degree of protection:
  Standard - IP65 (IEC60529)
  Unibody - IP65 and IP40 (IEC 60529)
- UL, c-UL recognized. EN compliant
- UL NISD2 category emergency stop button (File# E305148)

UL File No. E68691

CCC No. 2005010305150899

## Specifications

| Model | Standard | Unibody |
|---|---|---|
| Applicable Standards | IEC60947-5-1, EN60947-5-1, IEC60947-5-5, EN60947-5-5, UL508, UL991, CSA C22.2 No. 14 | UL508, CSA C22.2 No.14, IEC 60947-5-1, EN 60947-5-1 IEC 60947-5-5 Note, EN 60947-5-5 Note, JIS C8201-5-1 |
| Operating Temperature | Non-illuminated: –25 to +60°C (no freezing), Illuminated: –25 to +55°C (no freezing) | –25 to +60°C (no freezing) |
| Operating Humidity | 45 to 85% RH (no condensation) | |
| Storage Temperature | –45 to +80°C | |
| Operating Force | Push-to-lock: 10.5N Pull-to-reset: 10N Turn-to-reset: 0.16N·m | |
| Minimum Force Required for Direct Opening Action | 60N | 40N |
| Min Operator Stroke Required for Direct Opening Action | 4mm | |
| Maximum Operator Stroke | 4.5mm | |
| Contact Resistance | 50mΩ maximum (initial value) | |
| Contact Material | Gold plated silver | |
| Insulation Resistance | 100MΩ minimum (500V DC megger) | |
| Impulse Withstand Voltage | 2.5kV | |
| Pollution Degree | 3 (inside LED unit: 2) | 3 |
| Operation Frequency | 900 operations/hour | |
| Shock Resistance | Operating extremes: 150 $m/s^2$, Damage limits: 1000 $m/s^2$ | |
| Vibration Resistance | Operating extremes: 10 to 500Hz, amplitude 0.35mm acceleration 50$m/s^2$, Damage limits: 10 to 500Hz, amplitude 0.35mm acceleration 50$m/s^2$ | |
| Mechanical Life | 250,000 operations minimum | |
| Electrical Life | 100,000 operations minimum, (250,000 operations minimum @ 24V AC/DC, 100mA) | |
| Degree of Protection | IP65 (IEC60529) | IP65, IP40 (IEC 60529) |
| Terminal Style | Solder terminal, PC board terminal | Solder/tab #110 terminal |
| Recommended Tightening Torque for Locking Ring | 0.88N·m | |
| Wire Size | 16 AWG max | |
| Soldering Conditions | 310 to 350°C, 3 seconds maximum | |
| Weight | ø29mm: 23g<br>ø40mm: 28g | ø29mm mushroom: 14g<br>ø40mm mushroom: 17g |

Note: Except for stop switches (operator color: yellow and gray)

# Part Numbers

## Non-Illuminated XA E-Stop

| Style | Termination | Monitor Contacts | Main Contacts | Part Number |
|---|---|---|---|---|
| 29mm Mushroom | PCB Terminal | 1NO | 1NC | XA1E-BV311V-R |
| | | – | 2NC | XA1E-BV302V-R |
| | | 1NO | 3NC | XA1E-BV313V-R |
| | | – | 4NC | XA1E-BV304V-R |
| | Solder Terminal | 1NO | 1NC | XA1E-BV311-R |
| | | – | 2NC | XA1E-BV302-R |
| | | 1NO | 3NC | XA1E-BV313-R |
| | | – | 4NC | XA1E-BV304-R |
| 40mm Mushroom | PCB Terminal | 1NO | 1NC | XA1E-BV411V-R |
| | | – | 2NC | XA1E-BV402V-R |
| | | 1NO | 3NC | XA1E-BV413V-R |
| | | – | 4NC | XA1E-BV404V-R |
| | Solder Terminal | 1NO | 1NC | XA1E-BV411-R |
| | | – | 2NC | XA1E-BV402-R |
| | | 1NO | 3NC | XA1E-BV413-R |
| | | – | 4NC | XA1E-BV404-R |

## Illuminated XA E-Stop

| Style | Termination | Monitor Contacts | Main Contacts | Part Number |
|---|---|---|---|---|
| 29mm Mushroom | PCB Terminal | 1NO | 1NC | XA1E-LV311Q4V-R |
| | | – | 2NC | XA1E-LV302Q4V-R |
| | | 1NO | 3NC | XA1E-LV313Q4V-R |
| | | – | 4NC | XA1E-LV304Q4V-R |
| | Solder Terminal | 1NO | 1NC | XA1E-LV311Q4-R |
| | | – | 2NC | XA1E-LV302Q4-R |
| | | 1NO | 3NC | XA1E-LV313Q4-R |
| | | – | 4NC | XA1E-LV304Q4-R |
| 40mm Mushroom | PCB Terminal | 1NO | 1NC | XA1E-LV411Q4V-R |
| | | – | 2NC | XA1E-LV402Q4V-R |
| | | 1NO | 3NC | XA1E-LV413Q4V-R |
| | | – | 4NC | XA1E-LV404Q4V-R |
| | Solder Terminal | 1NO | 1NC | XA1E-LV411Q4-R |
| | | – | 2NC | XA1E-LV402Q4-R |
| | | 1NO | 3NC | XA1E-LV413Q4-R |
| | | – | 4NC | XA1E-LV404Q4-R |

All illuminated XA E-Stops come with a replaceable 24V AC/DC LED.

## Part Number Key

**XA1E - L V 3 11 Q4 V - R**

**Illumination**
B: Non-Illuminated
L: Illuminated

**Mushroom Size**
3: ø29mm
4: ø40mm

**Contact Configuration**
11: 1NO - 1NC
02: 2NC
13: 1NO - 3NC
04: 4NC

**Terminal**
Blank: solder tab
V: PCB

**Voltage Code**
Blank: Non-illuminated
Q4: Illuminated 24V AC/DC

## Unibody XA E-Stop

| Style | Contact | Part Number | |
|---|---|---|---|
| | | IP40 (black housing) | IP65 (yellow housing) |
| 29mm Mushroom | 1NC | XA1E-BV3U01KT-R | XA1E-BV3U01T-R |
| | 2NC | XA1E-BV3U02KT-R | XA1E-BV3U02T-R |
| 40mm Mushroom | 1NC | XA1E-BV4U01KT-R | XA1E-BV4U01T-R |
| | 2NC | XA1E-BV4U02KT-R | XA1E-BV4U02T-R |

## Unibody XA Stop Switch

| Style | Operator Type | Contact | ① Color Code | Part Number | |
|---|---|---|---|---|---|
| | | | | IP40 (black housing) | IP65 (yellow housing) |
| | 29mm Mushroom | 1NC | Y: yellow N: gray | XA1E-BV3U01KT-① | XA1E-BV3U01T-① |
| | | 2NC | | XA1E-BV3U02KT-① | XA1E-BV3U02T-① |
| | 40mm Mushroom | 1NC | | XA1E-BV4U01KT-① | XA1E-BV4U01T-① |
| | | 2NC | | XA1E-BV4U02KT-① | XA1E-BV4U02T-① |

## EMO XA E-Stop

| Style | NC Main Contact | NO Monitor Contact | Part Number |
|---|---|---|---|
| 40mm Mushroom | 1NC | - | XA1E-BV401-RH-EMO |
| | 2NC | - | XA1E-BV402-RH-EMO |
| | 3NC | - | XA1E-BV403-RH-EMO |
| | 4NC | - | XA1E-BV404-RH-EMO |
| | 1NC | 1NO | XA1E-BV411-RH-EMO |
| | 2NC | 1NO | XA1E-BV412-RH-EMO |
| | 3NC | 1NO | XA1E-BV413-RH-EMO |

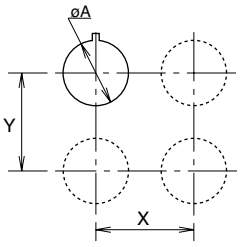
## Contact Ratings

| Standard | | | | | | |
|---|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | | 300V (illuminated part: 60V) | | |
| Rated Current (Ith) | | | | 5A | | |
| Rated Operating Voltage (Ue) | | | | 30V | 125V | 250V |
| Rated Operating Current | Main Contacts (NC) | AC 50/60Hz | Resistive Load (AC-12) | – | 3A | 3A |
| | | | Inductive Load (AC-15) | – | 1.5A | 1.5A |
| | | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |
| | Monitor Contacts (NO) | AC 50/60Hz | Resistive Load (AC-12) | – | 1.2A | 0.6A |
| | | | Inductive Load (AC-14) | – | 0.6A | 0.3A |
| | | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |

| Unibody | | | | | |
|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | 250V | | |
| Thermal Current (Ith) | | | 5A | | |
| Rated Operating Voltage (Ue) | | | 30V | 125V | 250V |
| Rated Operating Current | AC 50/60Hz | Resistive Load (AC-12) | – | 5A | 3A |
| | | Inductive Load (AC-15) | – | 3A | 1.5A |
| | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |

Minimum applicable load: 5V AC/DC, 1mA (reference value).
The rated operating currents are measured at resistive/inductive load types specified in IEC 60947-5-1.

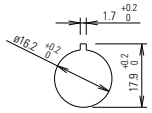
## Mounting Hole Layout




Measurements

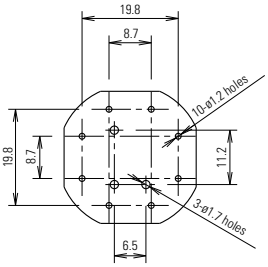
| Model | øA | X & Y |
|---|---|---|
| ø29mm | $16.2^{+0.2}$ | 40mm min |
| ø40mm | | 50mm min |

## Panel Cutout

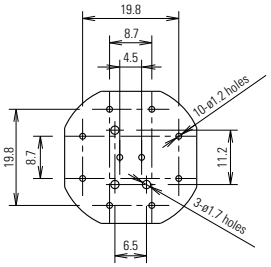



## PC Board Layout - Bottom View

Non-Illuminated




Illuminated




## Illuminated Unit LED Ratings

| Operating Voltage | Current |
|---|---|
| 24V AC/DC ±10% | 11mA |

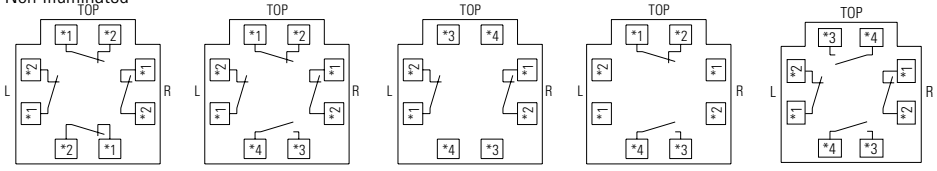
## Depth Behind the Panel

| Depth (mm) | Description |
|---|---|
| 27.9 (Standard) | 1 - 4 contacts, both illuminated and non-illuminated |
| 23.9 (Unibody) | 1NC or 2NC |

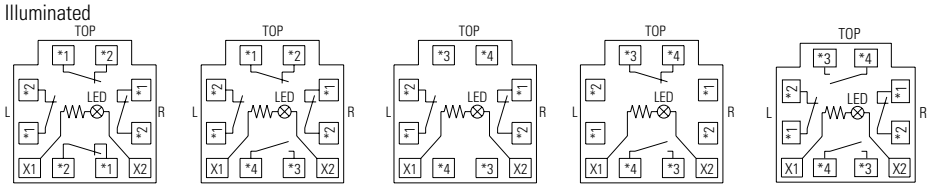
## Terminal Arrangements (Bottom View)

4NC | 1NO-3NC | 2NC | 1NO-1NC

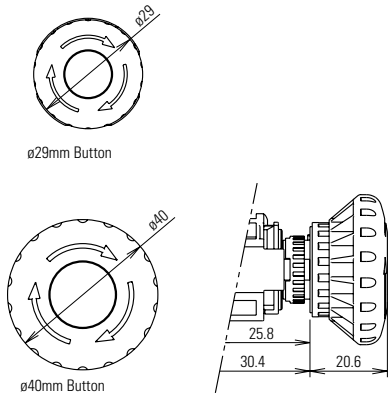
Non-Illuminated



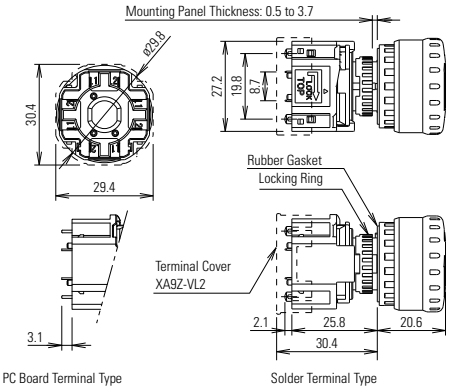

Illuminated



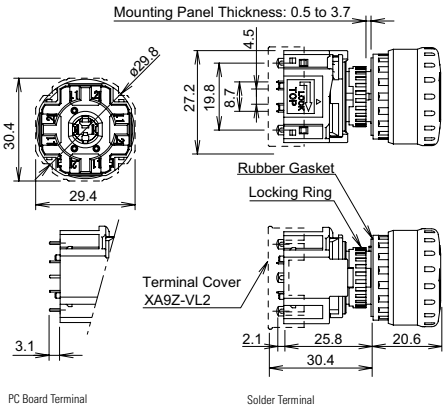
## Dimensions (mm)



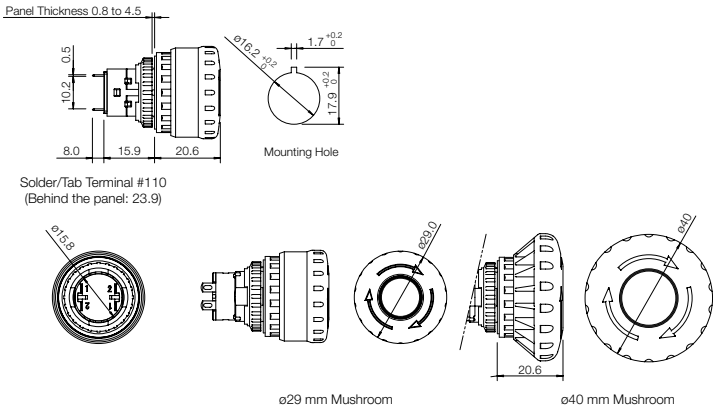

### Non-Illuminated



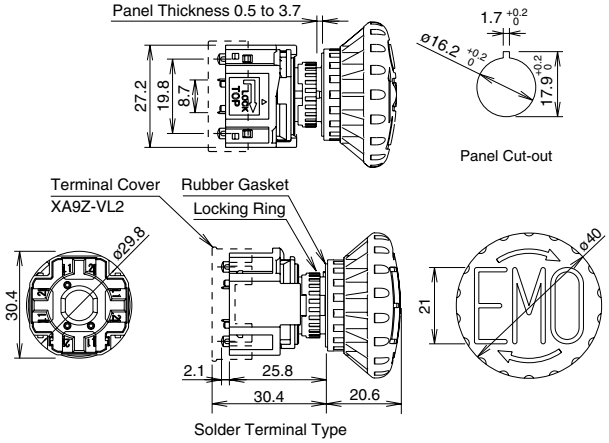

### Illuminated




### Unibody




### EMO




## Accessories

| Description | Part Numbers |
|---|---|
| Replacement LED Unit: Solder Terminal | XA9Z-LED2R |
| Replacement LED Unit: PCB Terminal | XA9Z-LED2VR |
| Terminal Cover for contact block (solder terminal only) | XA9Z-VL2 |

## Accessories: Shroud

| Appearance | Part Number | Applicable Standards |
|---|---|---|
| | XA9Z-KG1 | SEMI S2 Compliant (Approved by TUV) |

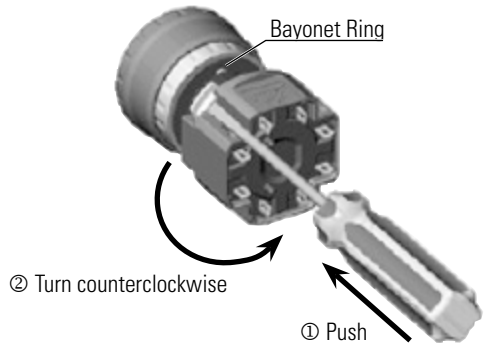
## Accessories: Nameplates

| Appearance | Legend | Part Number | Inner Ø | Outer Ø | Applicable Mushroom Size |
|---|---|---|---|---|---|
| | (blank) | HAAV-0 | 16mm | 43mm | 29mm |
| | "Emergency Stop" | HAAV-27 | 16mm | 43mm | |
| | (blank) | HAAV4-0 | 16mm | 60mm | 40mm |
| | "Emergency Stop" | HAAV4-27 | 16mm | 60mm | |

# Operating Instructions

## Removing the Contact Block

First unlock the operator button. While pushing up the white bayonet ring, using a small screwdriver (width: 2.5 to 3 mm) if necessary, turn the contact block counterclockwise and pull out. **Do not exert excessive force when using a screwdriver, otherwise the bayonet ring may be damaged.**

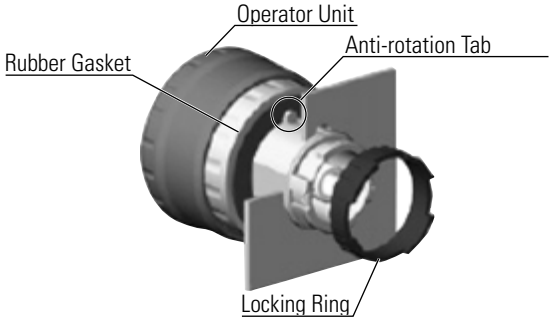



### Notes for Removing the Contact Block

1. When the contact block is removed, the monitor contact (NO contact) is closed.
2. While removing the contact block, do not exert excessive force, otherwise the switch may be damaged.

## Panel Mounting

Remove the locking ring from the operator and check that the rubber gasket is in place. Insert the operator from panel front into the panel hole. Face the side with the anti-rotation tab on the operator upward, and tighten the locking ring.

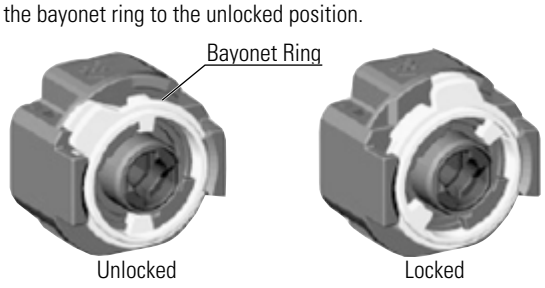



### Notes for Panel Mounting

To mount XA emergency stop switches onto a panel, tighten the locking ring to a tightening torque of 0.88 N·m maximum using ring wrench MT-001. Do not use pliers. Do not exert excessive force, otherwise the locking ring may be damaged.

## Installing the Contact Block

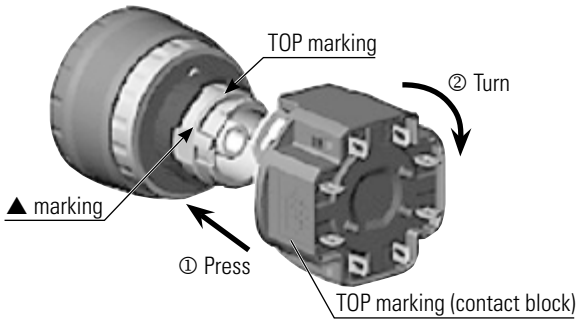
First turn the bayonet ring to the unlocked position.




Align the small ▲ marking on the edge of the operator base with the TOP marking on the contact block. Press the contact block onto the operator and turn the contact block clockwise until the bayonet ring clicks.

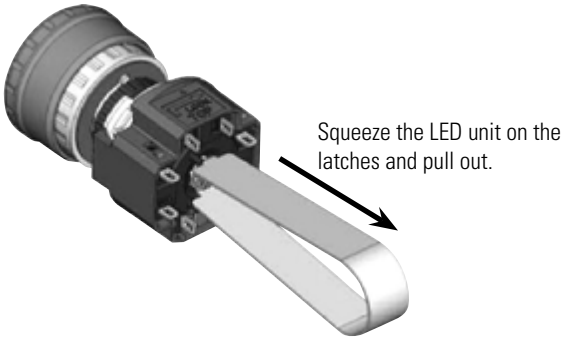
### Notes for Installing the Contact Block

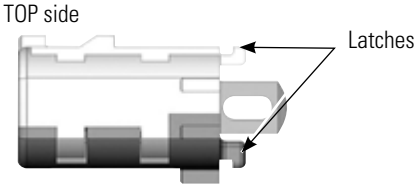
Check that the contact block is securely installed on the operator. When the emergency stop switch is properly assembled, the bayonet ring is in place as shown below.




## Removing the LED Unit

Pull out the LED unit while squeezing the latches on the LED unit using the LED unit removal tool (MT-101).




## Installing the LED Unit

Align the top of the LED unit with the TOP marking on the contact block. Push the LED unit into the contact block.

## Operating Instructions, continued

### Wiring

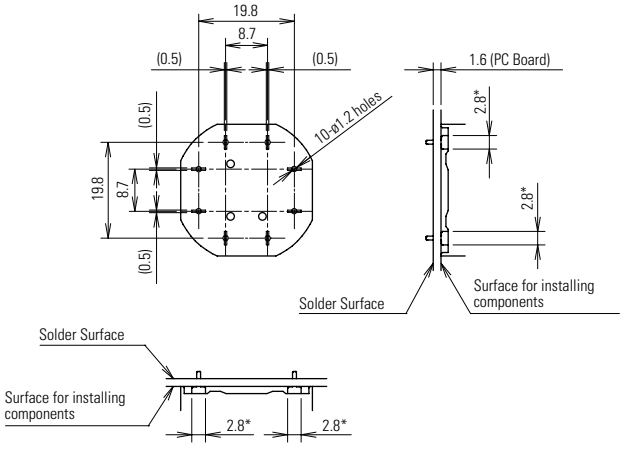
1. The applicable wire size is 16 AWG maximum.
2. Solder the terminal at a temperature of 310 to 350°C within 3 seconds using a soldering iron. Sn-Ag-Cu solder is recommended. When soldering, do not touch the switch with the soldering iron. Also ensure that no tensile force is applied to the terminals. Do not bend the terminals or apply excessive force to the terminals.
3. Use a non-corrosive rosin flux.
4. Because the terminal spacing is narrow, use protective tubes or heat shrinkable tubes to avoid burning of wire coating or short circuit.

#### PC Board Terminal Type

1. When mounting a contact block on a PC board, provide sufficient rotating space for the PC board when installing and removing the contact block.
2. When mounting an XA emergency stop switch on a PC board, make sure that the operator is securely installed.

#### About PC Board and Circuit Design

1. Use PC boards made of glass epoxy copper-clad laminated sheets of 1.6 mm in thickness, with double-sided through holes.
2. PC boards and circuits must withstand rated voltage and current, including instantaneous current and voltage at switching.
3. The minimum applicable load is 5V AC/DC, 1 mA.
4. Within the 2.8* mm areas shown in the figure below, terminals touch the PC board, resulting in possible short circuit on the printed circuit. When designing a PC board pattern, take this possibility into consideration.

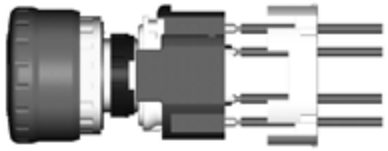



All dimensions in mm.

#### Installing Insulation Terminal Cover

To install the terminal cover (XA9Z-VL2), align the TOP marking on the terminal cover with TOP marking on the contact block, and press the terminal cover toward the contact block.

Note: For wiring, insert the wires into the holes in the terminal cover before soldering.



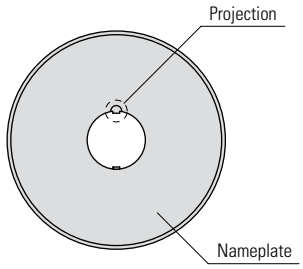
### Contact Bounce

When the button is reset by pulling or turning, the NC main contacts will bounce. When pressing the button, the NO monitor contacts will bounce.

When designing a control circuit, take the contact bounce time into consideration (reference value: 20 ms).

### Nameplate

When anti-rotation is not required, remove the projection from the nameplate using pliers.




### Handling

Do not expose the switch to excessive shock and vibration, otherwise the switch may be deformed or damaged, causing malfunction or operation failure.

### Safety Precautions

- Turn off power to the XA series emergency stop switch before starting installation, removal, wiring, maintenance, and inspection of the relays. Failure to turn power off may cause electrical shock or fire hazard.
- Use the LED unit removal tool when replacing the LED unit to avoid burning your hands.
- Use wires of the proper size to meet the voltage and current requirements, and solder the wires correctly. If soldering is incomplete, the wire may heat during operation, causing a fire hazard.

# LB Flush Mount & 16mm Miniature Switches & Pilot Lights

**Flush bezel projects only 2mm from front of panel. Standard bezel has a depth of only 27.9mm! Removable contact blocks are ideal for single board mounting.**

## Key Features

- Pushbuttons, lever switches, selector switches, and key selector switches with up to 3PDT contacts.
- Key selectors with keys that are difficult to duplicate. Seven different key numbers to choose from.
- Pilot lights with flat or dome lenses.
- Buzzers with 80dB steady sound.
- Black or metallic flush bezels available.
- Bright and clear LED illuminated face.
- Choice of either gold-clad or silver contacts.
- Degree of protection: IP65 (from the front of the panel).

| Applicable Standards | Mark | File No. or Organization |
|---|---|---|
| UL508 | | UL Recognition No.E55996 |
| CSA 22.2 No.14 | | CSA File No. LR 21451 |
| EN60947-5-1 | | TÜV Rheinland |
| | CE | EU Low Voltage Directive |
| GB14048.5 | | |

## Specifications

| | | |
|---|---|---|
| Operating Temperature | | –25 to +60°C (no freezing), Illuminated units: –25 to +55°C |
| Storage Temperature | | –30 to +80°C (no freezing) |
| Operating Humidity | | 45 to 85% RH (no condensation) |
| Contact Resistance | | 50 mW maximum (initial value) |
| Insulation Resistance | | 100 MW minimum (500V DC megger) |
| Dielectric Strength | Switch | Between live part and ground: 2,000V AC, 1 min.<br>Between terminals of different poles: 2,000V AC, 1 min.<br>Between terminals of the same poles: 1,000V AC, 1 min. |
| | Illumination | Between live part and ground: 2,000V AC, 1 min. |
| Vibration Resistance | | Operating extremes/Damage limits:<br>5 to 55 Hz, amplitude 0.5mm |
| Shock Resistance | | Operating extremes: 100 $m/s^2$<br>Damage limits: 1,000 $m/s^2$ |
| Mechanical Life (minimum operations) | | Momentary: 2,000,000<br>Maintained: 250,000<br>Selector switches: 250,000<br>Key selector switches: 250,000 |
| Electrical Life (minimum operations) | | Momentary: 50,000 / 100,000 [1]<br>Maintained: 50,000 / 100,000 [2]<br>Selector switches: 50,000 / 100,000 [2]<br>Key selector switches: 50,000 / 100,000 [2] |
| Degree of Protection | | IP65 (IEC 60529) |
| Terminal Style | | Solder/tab terminal #110, PC board terminal |
| Bezel | | Black plastic or metallic |
| Weight (approx.) | | 11g (lever switch)<br>13g (pilot light, pushbutton)<br>14g (illuminated pushbutton, pushbutton with guard, buzzer)<br>15g (selector switch, illuminated pushbutton with guard)<br>27g (key selector switch) |

1. Switching frequency 1,800 operations/h.
2. Switching frequency 1,200 operations/h.

## Contact Ratings

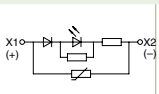
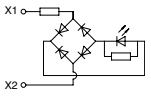
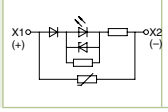
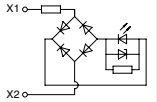
| Gold Contact (switch base color: blue) | | | | |
|---|---|---|---|---|
| Rated Insulation Voltage | | | 250V | |
| Rated Thermal Current | | | 3A | |
| Rated Operating Voltage | | | 30V DC | 125V AC |
| Rated Operating Current (resistive load) | | | 0.1A | 0.1A |
| Contact Material | | | Gold-clad silver | |

Minimum applicable load (reference value): 5V AC/DC, 1 mA

| Silver Contact (switch base color: gray) | | | | | |
|---|---|---|---|---|---|
| Rated Insulation Voltage | | | 250V | | |
| Rated Operating Voltage | | | 30V | 125V | 250V |
| Rated Operating Current | AC 50/60Hz | Resistive load | — | 5A | 5A |
| | | Inductive load | — | 3A | 1.5A |
| | DC | Resistive load | 5A | 1.1A | — |
| | | Inductive load | 2.5A | 0.55A | — |
| | AC 50/60Hz | Resistive load | — | 5A | 3A |
| | | Inductive load | — | 3A | 1.5A |
| | DC | Resistive load | 3A | 0.6A | — |
| | | Inductive load | 1A | 0.22A | — |
| Rated Thermal Current | | | 5A | | |
| Contact Material | | | Silver | | |

AC inductive load: PF=0.6 to 0.7 DC inductive load: L/R=7 ms max.

### LED Ratings

| | | | |
|---|---|---|---|
| Rated Voltage | 5V DC | 12V AC/DC | 24V AC/DC |
| Voltage Range | 5V DC±5% | 12V AC/DC±10% | 24V AC/DC ±10% |
| LED Part No. | LB9Z-LED5② | LB9Z-LED1② | LB9Z-LED2② |
| Rated Current | A, R: 22 mA G, PW, S: 16 mA | | |
| Voltage Rating | Marked on the side of the LED unit | | |
| LED Life (reference value) | Approx. 30,000 hours (until the brightness reduces to 50% of the initial value) | | |
| Internal Circuit | A, PW, R | A, PW, R | |
| |  |  | |
| | G, S | G, S | |
| |  |   | |

1. For ② (color code): A (amber), G (green), PW (white), R (red), S (blue)
2. Use the white LED for yellow illumination.
3. LED lamp contains a current-limiting resistor.

## Illuminated Pushbuttons (Assembled)

| Style | Operation | Operating Voltage | Contact | Standard Bezel | | Flush Bezel | | ② Color Code |
|---|---|---|---|---|---|---|---|---|
| | | | | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) | |
| Standard Bezel (black)<br> | Momentary | 5V DC | SPDT | LB①L-M1T51② | LB①L-M1T11V② | LB③④L-M1T51② | LB③④L-M1T11V② | Specify the color code in place of ② in the Part Number:<br>A: amber<br>G: green<br>R: red<br>S: blue<br>PW: white<br>Y: yellow |
| | | | DPDT | LB①L-M1T61② | LB①L-M1T21V② | LB③④L-M1T61② | LB③④L-M1T21V② | |
| | | 12V AC/DC | SPDT | LB①L-M1T53② | LB①L-M1T13V② | LB③④L-M1T53② | LB③④L-M1T13V② | |
| | | | DPDT | LB①L-M1T63② | LB①L-M1T23V② | LB③④L-M1T63② | LB③④L-M1T23V② | |
| | | 24V AC/DC | SPDT | LB①L-M1T54② | LB①L-M1T14V② | LB③④L-M1T54② | LB③④L-M1T14V② | |
| Flush Bezel (metallic or black)<br> | | | DPDT | LB①L-M1T64② | LB①L-M1T24V② | LB③④L-M1T64② | LB③④L-M1T24V② | |
| | Maintained | 5V DC | SPDT | LB①L-A1T51② | LB①L-A1T11V② | LB③④L-A1T51② | LB③④L-A1T11V② | |
| | | | DPDT | LB①L-A1T61② | LB①L-A1T21V② | LB③④L-A1T61② | LB③④L-A1T21V② | |
| | | 12V AC/DC | SPDT | LB①L-A1T53② | LB①L-A1T13V② | LB③④L-A1T53② | LB③④L-A1T13V② | |
| | | | DPDT | LB①L-A1T63② | LB①L-A1T23V② | LB③④L-A1T63② | LB③④L-A1T23V② | |
| Black Bezel with Guard<br> | | 24V AC/DC | SPDT | LB①L-A1T54② | LB①L-A1T14V② | LB③④L-A1T54② | LB③④L-A1T14V② | |
| | | | DPDT | LB①L-A1T64② | LB①L-A1T24V② | LB③④L-A1T64② | LB③④L-A1T24V② | |

1. For Standard Bezel part numbers specify:
   - Bezel shape in place of ①. 1 (round), 2 (square), 3 (rectangular)
   - Lens/LED color in place of ②. A (amber), G (green), PW (white), R (red), S (blue), Y (yellow)
2. For Flush Bezel part numbers specify:
   - Lens/LED in place of ②. A (amber), G (green), PW (white), R (red), S (blue), Y (yellow)
   - Bezel shape in place of ③. 6 (round), 7 (square), 8 (rectangular)
   - Bezel material in place of ④. M (metallic), Blank (black), G (black with guard)
3. Solder/Tab terminals have silver contacts and PC Board Terminals have gold contacts.
4. Illuminated pushbuttons contain an LED unit.
5. See page page 526 for dimensions.
6. See page page 541 for replacement LED units.
7. Illuminated pushbuttons can be used with legend markings. Engraving can be done on a marking plate which is placed in the lens, or a clear film can be printed and placed in the lens. See page page 541 for details on the marking plate and film.

## Illuminated Pushbuttons (Sub-assembled)

| Contact Block | Operator | LED Module | Lens | Completed Unit |
|---|---|---|---|---|

### Contact Block

| Terminal Style | | Material | Contact | Part Number |
|---|---|---|---|---|
| | Solder/Tab | Silver | SPDT | LB-T50 |
| | | | DPDT | LB-T60 |
| | PCB | Gold | SPDT | LB-T10V |
| | | | DPDT | LB-T20V |

### LED Module

| Style | Color | Voltage | Part Number |
|---|---|---|---|
| | Amber | 5V | LB9Z-LED5A |
| | | 12V | LB9Z-LED1A |
| | | 24V | LB9Z-LED2A |
| | Green | 5V | LB9Z-LED5G |
| | | 12V | LB9Z-LED1G |
| | | 24V | LB9Z-LED2G |
| | Red | 5V | LB9Z-LED5R |
| | | 12V | LB9Z-LED1R |
| | | 24V | LB9Z-LED2R |
| | Blue | 5V | LB9Z-LED5S |
| | | 12V | LB9Z-LED1S |
| | | 24V | LB9Z-LED2S |
| | White | 5V | LB9Z-LED5PW |
| | | 12V | LB9Z-LED1PW |
| | | 24V | LB9Z-LED2PW |
| | Yellow | 5V | LB9Z-LED5PW |
| | | 12V | LB9Z-LED1PW |
| | | 24V | LB9Z-LED2PW |

### Operator

| Style | Mounting Style | Shape | Monmontary | Maintained |
|---|---|---|---|---|
| | Standard (Plastic) | Round | LB1L-M0 | LB1L-A0 |
| | | Square | LB2L-M0 | LB2L-A0 |
| | | Rectangular | LB3L-M0 | LB3L-A0 |
| | Flush Mount (Plastic) | Round | LB6L-M0 | LB6L-A0 |
| | | Square | LB7L-M0 | LB7L-A0 |
| | | Rectangular | LB8L-M0 | LB8L-A0 |
| | Flush Mount (Metallic) | Round | LB6ML-M0 | LB6ML-A0 |
| | | Square | LB7ML-M0 | LB7ML-A0 |
| | | Rectangular | LB8ML-M0 | LB8ML-A0 |
| | Flush Mount (Built-in switch guard) | Round | LB6GL-M0 | LB6GL-A0 |
| | | Square | LB7GL-M0 | LB7GL-A0 |
| | | Rectangular | LB8GL-M0 | LB8GL-A0 |

### Lens

| Shape | Color | Part Number |
|---|---|---|
| Round | Amber | LB1A-L1A |
| | Green | LB1A-L1G |
| | Red | LB1A-L1R |
| | Blue | LB1A-L1S |
| | White | LB1A-L1W |
| | Yellow | LB1A-L1Y |
| Square | Amber | LB2A-L1A |
| | Green | LB2A-L1G |
| | Red | LB2A-L1R |
| | Blue | LB2A-L1S |
| | White | LB2A-L1W |
| | Yellow | LB2A-L1Y |
| Rectangular | Amber | LB3A-L1A |
| | Green | LB3A-L1G |
| | Red | LB3A-L1R |
| | Blue | LB3A-L1S |
| | White | LB3A-L1W |
| | Yellow | LB3A-L1Y |

## Pilot Lights (Assembled)

| Style | Operating Voltage | Standard Bezel | | Flush Bezel | | ② Color Code |
|---|---|---|---|---|---|---|
| | | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) | |
| Standard Bezel (black)<br> | 5V DC | LB①P-⑤T01② | LB①P-⑤T01V② | LB③④P-⑤T01② | LB③④P-⑤T01V② | Specify the color code in place of ② in the Part Number.:<br><br>A: amber<br>G: green<br>PW: white<br>R: red<br>S: blue<br>Y: yellow |
| Flush Bezel (metallic or black)<br> | 12V AC/DC | LB①P-⑤T03② | LB①P-⑤T03V② | LB③④P-⑤T03② | LB③④P-⑤T03V② | |
|  | 24V AC/DC | LB①P-⑤T04② | LB①P-⑤T04V② | LB③④P-⑤T04② | LB③④P-⑤T04V② | |

1. For Standard Bezel part numbers specify:
   - bezel shape in place of ①. 1 (round), 2 (square), 3 (rectangular)
   - lens/LED color in place of ②. A (amber), G (green), PW (white), R (red), S (blue), Y (yellow)
   - lens type code in place of ⑤. 1 (flat), 2 (dome with round lens)
2. For Flush Bezel part numbers specify:
   - lens/LED in place of ②. A (amber), G (green), PW (white), R (red), S (blue), Y (yellow)
   - bezel shape in place of ③. 6 (round), 7 (square), 8 (rectangular)
   - bezel material in place of ④. M (metallic), Blank (black)
   - lens type code in place of ⑤. 1 (flat), 2 (dome with round lens)
3. Pilot lights contain an LED unit.
4. See page page 526 for dimensions.
5. See page page 541 for replacement LED unit.

## Pilot Lights (Sub-assembled)

| Contact Block | Operator | LED Module | Lens | Completed Unit |
|---|---|---|---|---|

### Contact Block

| Terminal Style | | Part Number |
|---|---|---|
| | Solder Tab | LB-T00 |
| | PCB | LB-T00V |

### LED Module

| Style | Color | Voltage | Part Number |
|---|---|---|---|
| | Amber | 5V | LB9Z-LED5A |
| | | 12V | LB9Z-LED1A |
| | | 24V | LB9Z-LED2A |
| | Green | 5V | LB9Z-LED5G |
| | | 12V | LB9Z-LED1G |
| | | 24V | LB9Z-LED2G |
| | Red | 5V | LB9Z-LED5R |
| | | 12V | LB9Z-LED1R |
| | | 24V | LB9Z-LED2R |
| | Blue | 5V | LB9Z-LED5S |
| | | 12V | LB9Z-LED1S |
| | | 24V | LB9Z-LED2S |
| | White | 5V | LB9Z-LED5PW |
| | | 12V | LB9Z-LED1PW |
| | | 24V | LB9Z-LED2PW |
| | Yellow | 5V | LB9Z-LED5PW |
| | | 12V | LB9Z-LED1PW |
| | | 24V | LB9Z-LED2PW |

### Operator

| Style | Mounting Style | Shape | Part Number |
|---|---|---|---|
| | Standard (Plastic) | Round | LB1P-0 |
| | | Square | LB2P-0 |
| | | Rectangular | LB3P-0 |
| | Flush Mount (Plastic) | Round | LB6P-0 |
| | | Square | LB7P-0 |
| | | Rectangular | LB8P-0 |
| | Flush Mount (Metallic) | Round | LB6MP-0 |
| | | Square | LB7MP-0 |
| | | Rectangular | LB8MP-0 |

### Lens

| Shape | Color | Part Number |
|---|---|---|
| Round | Amber | LB1A-P1A |
| | Green | LB1A-P1G |
| | Red | LB1A-P1R |
| | Blue | LB1A-P1S |
| | White | LB1A-P1W |
| | Yellow | LB1A-P1Y |
| Dome | Amber | LB1A-P2A |
| | Green | LB1A-P2G |
| | Red | LB1A-P2R |
| | Blue | LB1A-P2S |
| | White | LB1A-P2W |
| | Yellow | LB1A-P2Y |
| Square | Amber | LB2A-P1A |
| | Green | LB2A-P1G |
| | Red | LB2A-P1R |
| | Blue | LB2A-P1S |
| | White | LB2A-P1W |
| | Yellow | LB2A-P1Y |
| Rectangular | Amber | LB3A-P1A |
| | Green | LB3A-P1G |
| | Red | LB3A-P1R |
| | Blue | LB3A-P1S |
| | White | LB3A-P1W |
| | Yellow | LB3A-P1Y |

## Non-Illuminated Pushbuttons (Assembled)

| Style | Operation | Contact | Standard Bezel | | Flush Bezel | | ② Color Code |
|---|---|---|---|---|---|---|---|
| | | | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) | |
| Standard Bezel (black)<br> <br> <br> <br>Flush Bezel (metallic or black)<br> <br> <br> <br>Black Bezel with Guard<br> | Momentary | SPDT | LB①B-M1T5② | LB①B-M1T1V② | LB③④B-M1T5② | LB③④B-M1T1V② | Specify the color code in place of ② in the Part Number:<br><br>B: black<br>G: green<br>R: red<br>S: blue<br>W: white<br>Y: yellow |
| | | DPDT | LB①B-M1T6② | LB①B-M1T2V② | LB③④B-M1T6② | LB③④B-M1T2V② | |
| | | 3PDT | LB①B-M1T7② | LB①B-M1T3V② | LB③④B-M1T7② | LB③④B-M1T3V② | |
| | Maintained | SPDT | LB①B-A1T5② | LB①B-A1T1V② | LB③④B-A1T5② | LB③④B-A1T1V② | |
| | | DPDT | LB①B-A1T6② | LB①B-A1T2V② | LB③④B-A1T6② | LB③④B-A1T2V② | |
| | | 3PDT | LB①B-A1T7② | LB①B-A1T3V② | LB③④B-A1T7② | LB③④B-A1T3V② | |

1. For Standard Bezel part numbers specify:
   - bezel shape in place of ①. 1 (round), 2 (square), 3 (rectangular)
   - lens/LED in place of ②. B (black), G (green), R (red), S (blue), W (white), Y (yellow)
2. For Flush Bezel part numbers specify:
   - lens/LED in place of ②. B (black), G (green), R (red), S (blue), W (white), Y (yellow)
   - bezel shape in place of ③. 6 (round), 7 (square), 8 (rectangular)
   - bezel material in place of ④. M (metallic), Blank (black)
3. See page page 528 for dimensions.
4. Lens can be used with legend markings. Engraving can be done on a marking plate which is placed into the lens, or a clear film can be printed and placed under the lens. For details on the marking plate and film, see page page 541.

## Non-Illuminated Pushbuttons (Sub-assembled)

| Contact Block | Operator | Button | Completed Unit |
|---|---|---|---|

### Contact Block

| Terminal Style | | Material | Contact | Part Number |
|---|---|---|---|---|
| | Solder/Tab | Silver | SPDT | LB-T5 |
| | | | DPDT | LB-T6 |
| | | | 3PDT | LB-T7 |
| | PCB | Gold | SPDT | LB-T1V |
| | | | DPDT | LB-T2V |
| | | | 3PDT | LB-T3V |

### Button

| Style | | Color | Part Number |
|---|---|---|---|
| | Round | Black | LB1A-B1B |
| | | Green | LB1A-B1G |
| | | Red | LB1A-B1R |
| | | Blue | LB1A-B1S |
| | | White | LB1A-B1W |
| | | Yellow | LB1A-B1Y |
| | Square | Black | LB2A-B1B |
| | | Green | LB2A-B1G |
| | | Red | LB2A-B1R |
| | | Blue | LB2A-B1S |
| | | White | LB2A-B1W |
| | | Yellow | LB2A-B1Y |
| | Rectangular | Black | LB3A-B1B |
| | | Green | LB3A-B1G |
| | | Red | LB3A-B1R |
| | | Blue | LB3A-B1S |
| | | White | LB3A-B1W |
| | | Yellow | LB3A-B1Y |

### Operator

| Style | Mounting style | Shape | Momentary | Maintained |
|---|---|---|---|---|
| | Standard (Plastic) | Round | LB1L-M0 | LB1L-A0 |
| | | Square | LB2L-M0 | LB2L-A0 |
| | | Rectangular | LB3L-M0 | LB3L-A0 |
| | Flush Mount (Plastic) | Round | LB6L-M0 | LB6L-A0 |
| | | Square | LB7L-M0 | LB7L-A0 |
| | | Rectangular | LB8L-M0 | LB8L-A0 |
| | Flush Mount (Metallic) | Round | LB6ML-M0 | LB6ML-A0 |
| | | Square | LB7ML-M0 | LB7ML-A0 |
| | | Rectangular | LB8ML-M0 | LB8ML-A0 |
| | Flush Mount (Built-in switch guard) | Round | LB6GL-M0 | LB6GL-A0 |
| | | Square | LB7GL-M0 | LB7GL-A0 |
| | | Rectangular | LB8GL-M0 | LB8GL-A0 |

## Selector Switches (Assembled)

| Style | Operator Position | | Contact | Standard Bezel | | Flush Bezel | |
|---|---|---|---|---|---|---|---|
| | | | | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) |
| Standard Bezel (black) lever shown | 90° 2-position | Maintained L R | SPDT | LB①S-2⑤T5 | LB①S-2⑤T1V | LB③④S-2⑤T5 | LB③④S-2⑤T1V |
| | | | DPDT | LB①S-2⑤T6 | LB①S-2⑤T2V | LB③④S-2⑤T6 | LB③④S-2⑤T2V |
| | | | 3PDT | LB①S-2⑤T7 | LB①S-2⑤T3V | LB③④S-2⑤T7 | LB③④S-2⑤T3V |
| | | Spring return from right L R | SPDT | LB①S-21⑤T5 | LB①S-21⑤T1V | LB③④S-21⑤T5 | LB③④S-21⑤T1V |
| | | | DPDT | LB①S-21⑤T6 | LB①S-21⑤T2V | LB③④S-21⑤T6 | LB③④S-21⑤T2V |
| | | | 3PDT | LB①S-21⑤T7 | LB①S-21⑤T3V | LB③④S-21⑤T7 | LB③④S-21⑤T3V |
| Flush Bezel (metallic or black) lever shown | 45° 3-position | Maintained L C R | DPDT | LB①S-3⑤T6 | LB①S-3⑤T2V | LB③④S-3⑤T6 | LB③④S-3⑤T2V |
| | | | 3PDT | LB①S-3⑤T7 | LB①S-3⑤T3V | LB③④S-3⑤T7 | LB③④S-3⑤T3V |
| | | Spring return from right L C R | DPDT | LB①S-31⑤T6 | LB①S-31⑤T2V | LB③④S-31⑤T6 | LB③④S-31⑤T2V |
| | | | 3PDT | LB①S-31⑤T7 | LB①S-31⑤T3V | LB③④S-31⑤T7 | LB③④S-31⑤T3V |
| | | Spring return from left L C R | DPDT | LB①S-32⑤T6 | LB①S-32⑤T2V | LB③④S-32⑤T6 | LB③④S-32⑤T2V |
| | | | 3PDT | LB①S-32⑤T7 | LB①S-32⑤T3V | LB③④S-32⑤T7 | LB③④S-32⑤T3V |
| | | Spring return two-way L C R | DPDT | LB①S-33⑤T6 | LB①S-33⑤T2V | LB③④S-33⑤T6 | LB③④S-33⑤T2V |
| | | | 3PDT | LB①S-33⑤T7 | LB①S-33⑤T3V | LB③④S-33⑤T7 | LB③④S-33⑤T3V |

Knob models shown above unless otherwise indicated.

5. For Standard Bezel part numbers specify:
   - bezel shape in place of ①. 1 (round), 2 (square), 3 (rectangular)
   - operator shape in place of ⑤. blank (knob), L (lever).
6. For Flush Bezel part numbers specify:
   - bezel shape in place of ③. 6 (round), 7 (square), 8 (rectangular)
   - bezel material in place of ④. M (metallic), Blank (black)
   - operator shape in place of ⑤. blank (knob), L (lever).
7. See page page 524 for contact operation .
8. See page page 530 for dimensions.

## Selector Switches (Sub-assembled)

| Contact Block | | Operator | | Completed Unit |
|---|---|---|---|---|

### Contact Block

| Terminal Style | | Material | Contact | Part Number |
|---|---|---|---|---|
| | Solder/Tab | Silver | SPDT | LB-T5 |
| | | | DPDT | LB-T6 |
| | | | 3PDT | LB-T7 |
| | PCB | Gold | SPDT | LB-T1V |
| | | | DPDT | LB-T2V |
| | | | 3PDT | LB-T3V |

SPDT contacts applicable for 2-position switches only.

### Operator

| Style | Shape | Position | Function | Part Number | |
|---|---|---|---|---|---|
| | | | | Knob | Lever |
| Standard (Plastic) Round | Round | 2 | Maintained | LB1S-2Y | LB1S-2L |
| | | | Spring from right | LB1S-21Y | LB1S-21L |
| | | 3 | Maintained | LB1S-3Y | LB1S-3L |
| | | | Spring from right | LB1S-31Y | LB1S-31L |
| | | | Spring from left | LB1S-32Y | LB1S-32L |
| | | | Spring from both | LB1S-33Y | LB1S-33L |
| Rectangular | Square | 2 | Maintained | LB2S-2Y | LB2S-2L |
| | | | Spring from right | LB2S-21Y | LB2S-21L |
| | | 3 | Maintained | LB2S-3Y | LB2S-3L |
| | | | Spring from right | LB2S-31Y | LB2S-31L |
| | | | Spring from left | LB2S-32Y | LB2S-32L |
| | | | Spring from both | LB2S-33Y | LB2S-33L |
| | Rectangular | 2 | Maintained | LB3S-2Y | LB3S-2L |
| | | | Spring from right | LB3S-21Y | LB3S-21L |
| | | 3 | Maintained | LB3S-3Y | LB3S-3L |
| | | | Spring from right | LB3S-31Y | LB3S-31L |
| | | | Spring from left | LB3S-32Y | LB3S-32L |
| | | | Spring from both | LB3S-33Y | LB3S-33L |

| Style | Shape | Position | Function | Part Number | |
|---|---|---|---|---|---|
| | | | | Knob | Lever |
| Flush Mount (Plastic) Round | Round | 2 | Maintained | LB6S-2Y | LB6S-2L |
| | | | Spring from right | LB6S-21Y | LB6S-21L |
| | | 3 | Maintained | LB6S-3Y | LB6S-3L |
| | | | Spring from right | LB6S-31Y | LB6S-31L |
| | | | Spring from left | LB6S-32Y | LB6S-32L |
| | | | Spring from both | LB6S-33Y | LB6S-33L |
| Square | Square | 2 | Maintained | LB7S-2Y | LB7S-2L |
| | | | Spring from right | LB7S-21Y | LB7S-21L |
| | | 3 | Maintained | LB7S-3Y | LB7S-3L |
| | | | Spring from right | LB7S-31Y | LB7S-31L |
| | | | Spring from left | LB7S-32Y | LB7S-32L |
| | | | Spring from both | LB7S-33Y | LB7S-33L |
| | Rectangular | 2 | Maintained | LB8S-2Y | LB8S-2L |
| | | | Spring from right | LB8S-21Y | LB8S-21L |
| | | 3 | Maintained | LB8S-3Y | LB8S-3L |
| | | | Spring from right | LB8S-31Y | LB8S-31L |
| | | | Spring from left | LB8S-32Y | LB8S-32L |
| | | | Spring from both | LB8S-33Y | LB8S-33L |
| Flush Mount (Metallic) Round | Round | 2 | Maintained | LB6MS-2Y | LB6MS-2L |
| | | | Spring from right | LB6MS-21Y | LB6MS-21L |
| | | 3 | Maintained | LB6MS-3Y | LB6MS-3L |
| | | | Spring from right | LB6MS-31Y | LB6MS-31L |
| | | | Spring from left | LB6MS-32Y | LB6MS-32L |
| | | | Spring from both | LB6MS-33Y | LB6MS-33L |
| Square | Square | 2 | Maintained | LB7MS-2Y | LB7MS-2L |
| | | | Spring from right | LB7MS-21Y | LB7MS-21L |
| | | 3 | Maintained | LB7MS-3Y | LB7MS-3L |
| | | | Spring from right | LB7MS-31Y | LB7MS-31L |
| | | | Spring from left | LB7MS-32Y | LB7MS-32L |
| | | | Spring from both | LB7MS-33Y | LB7MS-33L |
| | Rectangular | 2 | Maintained | LB8MS-2Y | LB8MS-2L |
| | | | Spring from right | LB8MS-21Y | LB8MS-21L |
| | | 3 | Maintained | LB8MS-3Y | LB8MS-3L |
| | | | Spring from right | LB8MS-31Y | LB8MS-31L |
| | | | Spring from left | LB8MS-32Y | LB8MS-32L |
| | | | Spring from both | LB8MS-33Y | LB8MS-33L |

## Illuminated Selector Switches (Assembled)

| Style | Operating Voltage | Operator Position | | Contact | Standard Bezel | | Flush Bezel | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) |
| Standard Bezel (black) Flush Bezel (metallic or black) | 5V DC | 90° 2-position | Maintained L R | SPDT | LB①F-2T51② | LB①F-2T11V② | LB6③F-2T51② | LB6③F-2T11V② |
| | | | | DPDT | LB①F-2T61② | LB①F-2T21V② | LB6③F-2T61② | LB6③F-2T21V② |
| | | 45° 3-position | Maintained L C R | DPDT | LB①F-3T61② | LB①F-3T21V② | LB6③F-3T61② | LB6③F-3T21V② |
| | 12V AC/DC | 90° 2-position | Maintained L R | SPDT | LB①F-2T53② | LB①F-2T13V② | LB6③F-2T53② | LB6③F-2T13V② |
| | | | | DPDT | LB①F-2T63② | LB①F-2T23V② | LB6③F-2T63② | LB6③F-2T23V② |
| | | 45° 3-position | Maintained L C R | DPDT | LB①F-3T63② | LB①F-3T23V② | LB6③F-3T63② | LB6③F-3T23V② |
| | 24V AC/DC | 90° 2-position | Maintained L R | SPDT | LB①F-2T54② | LB①F-2T14V② | LB6③F-2T54② | LB6③F-2T14V② |
| | | | | DPDT | LB①F-2T64② | LB①F-2T24V② | LB6③F-2T64② | LB6③F-2T24V② |
| | | 45° 3-position | Maintained L C R | DPDT | LB①F-3T64② | LB①F-3T24V② | LB6③F-3T64② | LB6③F-3T24V② |

Flush bezel only available with round operator.

9. For Standard Bezel part numbers specify:
   - bezel shape in place of ①. 1 (round), 2 (square), 3 (rectangular)
   - color code in place of ②. A (amber), G (green), R (red), S (blue), PW (white), Y (yellow)
10. For Flush Bezel part numbers specify:
   - color code in place of ②. A (amber), G (green), R (red), S (blue), PW (white), Y (yellow)
   - bezel material in place of ③. M (metallic), Blank (black)
11. See page page 524 for contact operation.
12. See page page 532 for dimensions.

## Illuminated Selector Switches (Sub-assembled)

| Contact Block | | Operator | | LED Module | | Lens Handle | | Completed Unit |
|---|---|---|---|---|---|---|---|---|
| | + | | + | | + | | = | |

### Contact Block

| Terminal Style | | Material | Contact | Part Number |
|---|---|---|---|---|
| | Solder/Tab | Silver | SPDT | LB-T50 |
| | | | DPDT | LB-T60 |
| | | Gold | SPDT | LB-T10 |
| | | | DPDT | LB-T20 |
| | PCB | Gold | SPDT | LB-T10V |
| | | | DPDT | LB-T20V |

SPDT contacts applicable for 2-position switches only.

### Operator

| Style | Shape | Position | Function | Part Number |
|---|---|---|---|---|
| Standard (Plastic) | Round | 2 | Maintained | LB1F-2 |
| | | 3 | Maintained | LB1F-3 |
| | Square | 2 | Maintained | LB2F-2 |
| | | 3 | Maintained | LB2F-3 |
| | Rectangular | 2 | Maintained | LB3F-2 |
| | | 3 | Maintained | LB3F-3 |
| Flush Mount (Plastic) | Round | 2 | Maintained | LB6F-2 |
| | | 3 | Maintained | LB6F-3 |
| Flush Mount (Metallic) | Round | 2 | Maintained | LB6MF-2 |
| | | 3 | Maintained | LB6MF-3 |

### LED Module

| Style | Color | Voltage | Part Number |
|---|---|---|---|
| | Amber | 5V | LB9Z-LED5A |
| | | 12V | LB9Z-LED1A |
| | | 24V | LB9Z-LED2A |
| | Green | 5V | LB9Z-LED5G |
| | | 12V | LB9Z-LED1G |
| | | 24V | LB9Z-LED2G |
| | Red | 5V | LB9Z-LED5R |
| | | 12V | LB9Z-LED1R |
| | | 24V | LB9Z-LED2R |
| | Blue | 5V | LB9Z-LED5S |
| | | 12V | LB9Z-LED1S |
| | | 24V | LB9Z-LED2S |
| | White | 5V | LB9Z-LED5PW |
| | | 12V | LB9Z-LED1PW |
| | | 24V | LB9Z-LED2PW |
| | Yellow | 5V | LB9Z-LED5PW |
| | | 12V | LB9Z-LED1PW |
| | | 24V | LB9Z-LED2PW |

### Lens Handle

| Style | Color | Part Number |
|---|---|---|
| | Amber | LA1A-FA |
| | Green | LA1A-FG |
| | Red | LA1A-FR |
| | Blue | LA1A-FS |
| | White | LA1A-FW |
| | Yellow | LA1A-FY |

## Key Selector Switches (Assembled)

| Style | Operator Position | | Key retained at ● | | Contact | Standard Bezel | | Flush Bezel | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) |
| Standard Bezel (black) | 90° 2-position | Maintained | A | | SPDT | LB①K-2T5A | LB①K-2T1VA | LB③④K-2T5A | LB③④K-2T1VA |
| | | | | | DPDT | LB①K-2T6A | LB①K-2T2VA | LB③④K-2T6A | LB③④K-2T2VA |
| | | | | | 3PDT | LB①K-2T7A | LB①K-2T3VA | LB③④K-2T7A | LB③④K-2T3VA |
| | | | B | | SPDT | LB①K-2T5B | LB①K-2T1VB | LB③④K-2T5B | LB③④K-2T1VB |
| | | | | | DPDT | LB①K-2T6B | LB①K-2T2VB | LB③④K-2T6B | LB③④K-2T2VB |
| | | | | | 3PDT | LB①K-2T7B | LB①K-2T3VB | LB③④K-2T7B | LB③④K-2T3VB |
| | | | C | | SPDT | LB①K-2T5C | LB①K-2T1VC | LB③④K-2T5C | LB③④K-2T1VC |
| | | | | | DPDT | LB①K-2T6C | LB①K-2T2VC | LB③④K-2T6C | LB③④K-2T2VC |
| | | | | | 3PDT | LB①K-2T7C | LB①K-2T3VC | LB③④K-2T7C | LB③④K-2T3VC |
| | | Spring return from right | B | | SPDT | LB①K-21T5B | LB①K-21T1VB | LB③④K-21T5B | LB③④K-21T1VB |
| | | | | | DPDT | LB①K-21T6B | LB①K-21T2VB | LB③④K-21T6B | LB③④K-21T2VB |
| | | | | | 3PDT | LB①K-21T7B | LB①K-21T3VB | LB③④K-21T7B | LB③④K-21T3VB |
| Flush Bezel (metallic or black) | 45° 3-position | Maintained | A | | DPDT | LB①K-3T6A | LB①K-3T2VA | LB③④K-3T6A | LB③④K-3T2VA |
| | | | | | 3PDT | LB①K-3T7A | LB①K-3T3VA | LB③④K-3T7A | LB③④K-3T3VA |
| | | | B | | DPDT | LB①K-3T6B | LB①K-3T2VB | LB③④K-3T6B | LB③④K-3T2VB |
| | | | | | 3PDT | LB①K-3T7B | LB①K-3T3VB | LB③④K-3T7B | LB③④K-3T3VB |
| | | | C | | DPDT | LB①K-3T6C | LB①K-3T2VC | LB③④K-3T6C | LB③④K-3T2VC |
| | | | | | 3PDT | LB①K-3T7C | LB①K-3T3VC | LB③④K-3T7C | LB③④K-3T3VC |
| | | | D | | DPDT | LB①K-3T6D | LB①K-3T2VD | LB③④K-3T6D | LB③④K-3T2VD |
| | | | | | 3PDT | LB①K-3T7D | LB①K-3T3VD | LB③④K-3T7D | LB③④K-3T3VD |
| | | | E | | DPDT | LB①K-3T6E | LB①K-3T2VE | LB③④K-3T6E | LB③④K-3T2VE |
| | | | | | 3PDT | LB①K-3T7E | LB①K-3T3VE | LB③④K-3T7E | LB③④K-3T3VE |
| | | | G | | DPDT | LB①K-3T6G | LB①K-3T2VG | LB③④K-3T6G | LB③④K-3T2VG |
| | | | | | 3PDT | LB①K-3T7G | LB①K-3T3VG | LB③④K-3T7G | LB③④K-3T3VG |
| | | | H | | DPDT | LB①K-3T6H | LB①K-3T2VH | LB③④K-3T6H | LB③④K-3T2VH |
| | | | | | 3PDT | LB①K-3T7H | LB①K-3T3VH | LB③④K-3T7H | LB③④K-3T3VH |

Assembled Key Selector Switches con't on next page.

## Assembled Key Selector Switches con't on next page.

| Style | Operator Position | | Key retained at ● | | Contact | Standard Bezel | | Flush Bezel | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) |
| Standard Bezel (black) | 45° 3-position | Spring return from right | B | Ⓛ Ⓒ Ⓡ | DPDT | LB①K-31T6B | LB①K-31T2VB | LB③④K-31T6B | LB③④K-31T2VB |
| | | | | | 3PDT | LB①K-31T7B | LB①K-31T3VB | LB③④K-31T7B | LB③④K-31T3VB |
| | | | D | Ⓛ Ⓒ Ⓡ | DPDT | LB①K-31T6D | LB①K-31T2VD | LB③④K-31T6D | LB③④K-31T2VD |
| | | | | | 3PDT | LB①K-31T7D | LB①K-31T3VD | LB③④K-31T7D | LB③④K-31T3VD |
| | | | G | Ⓛ Ⓒ Ⓡ | DPDT | LB①K-31T6G | LB①K-31T2VG | LB③④K-31T6G | LB③④K-31T2VG |
| | | | | | 3PDT | LB①K-31T7G | LB①K-31T3VG | LB③④K-31T7G | LB③④K-31T3VG |
| Flush Bezel (metallic or black) | | Spring return from left | C | Ⓛ Ⓒ Ⓡ | DPDT | LB①K-32T6C | LB①K-32T2VC | LB③④K-32T6C | LB③④K-32T2VC |
| | | | | | 3PDT | LB①K-32T7C | LB①K-32T3VC | LB③④K-32T7C | LB③④K-32T3VC |
| | | | D | Ⓛ Ⓒ Ⓡ | DPDT | LB①K-32T6D | LB①K-32T2VD | LB③④K-32T6D | LB③④K-32T2VD |
| | | | | | 3PDT | LB①K-32T7D | LB①K-32T3VD | LB③④K-32T7D | LB③④K-32T3VD |
| | | | H | Ⓛ Ⓒ Ⓡ | DPDT | LB①K-32T6H | LB①K-32T2VH | LB③④K-32T6H | LB③④K-32T2VH |
| | | | | | 3PDT | LB①K-32T7H | LB①K-32T3VH | LB③④K-32T7H | LB③④K-32T3VH |
| | | Spring return two-way | D | Ⓛ Ⓒ Ⓡ | DPDT | LB①K-33T6D | LB①K-33T2VD | LB③④K-33T6D | LB③④K-33T2VD |
| | | | | | 3PDT | LB①K-33T7D | LB①K-33T3VD | LB③④K-33T7D | LB③④K-33T3VD |

13. Key is retained at ● and removable at ○ positions.
14. Two keys are supplied.
15. For Standard Bezel part numbers specify bezel shape in place of ①. 1 (round), 2 (square), 3 (rectangular)
16. For Flush Bezel part numbers specify:
    -bezel shape in place of ③. 6 (round), 7 (square), 8 (rectangular)
    - bezel material in place of ④. M (metallic), Blank (black)
17. See page page 524 for contact operation.
18. See page page 533 for dimensions.
19. For additional security, wave keys also available.
    Add the letter "S" before the "T" in the part no. Example: LB1K-31ST1A
    Besides the standard wave key (key number 0H), six other keys are available.
    To order other keys, specify the key number as shown below:
    Example: LB1K-31ST2B-1H (Key number is indicated on the key cylinder. Standard keys do not have a key number indication.)
    (blank): Standard wave key (0H)
    1H to 2H: Reversible wave key
    3H to 6H: Non-reversible wave key
20. If ordering standard wave key (0H), subcomponents are available, see next page.
21. If ordering other than standard wave key (for example, key number 6H), only completed switches are available.

## Key Selector Switches (Sub-assembled)

| Contact Block | Operator | Completed Unit |
|---|---|---|

### Contact Block

| Terminal Style | | Material | Contact | Part Number |
|---|---|---|---|---|
| | Solder/Tab | Silver | SPDT | LB-T5 |
| | | | DPDT | LB-T6 |
| | | | 3PDT | LB-T7 |
| | PCB | Gold | SPDT | LB-T1V |
| | | | DPDT | LB-T2V |
| | | | 3PDT | LB-T3V |

### Operator

| Style | Shape | Position | Function | Part number |
|---|---|---|---|---|
| Standard (plastic) | Round | 2 | Maintained | LB1K-2⑤ |
| | | | Spring from right | LB1K-21B |
| | | 3 | Maintained | LB1K-3⑤ |
| | | | Spring from right | LB1K-31⑤ |
| | | | Spring from left | LB1K-32⑤ |
| | | | Spring from both | LB1K-33D |
| | Square | 2 | Maintained | LB2K-2⑤ |
| | | | Spring from right | LB2K-21B |
| | | 3 | Maintained | LB2K-3⑤ |
| | | | Spring from right | LB2K-31⑤ |
| | | | Spring from left | LB2K-32⑤ |
| | | | Spring from both | LB2K-33D |
| | Rectangular | 2 | Maintained | LB3K-2⑤ |
| | | | Spring from right | LB3K-21B |
| | | 3 | Maintained | LB3K-3⑤ |
| | | | Spring from right | LB3K-31⑤ |
| | | | Spring from left | LB3K-32⑤ |
| | | | Spring from both | LB3K-33D |

| Style | Shape | Position | Function | Part number |
|---|---|---|---|---|
| Flush Mount (plastic) | Round | 2 | Maintained | LB6K-2⑤ |
| | | | Spring from right | LB6K-21B |
| | | 3 | Maintained | LB6K-3⑤ |
| | | | Spring from right | LB6K-31⑤ |
| | | | Spring from left | LB6K-32⑤ |
| | | | Spring from both | LB6K-33D |
| | Square | 2 | Maintained | LB7K-2⑤ |
| | | | Spring from right | LB7K-21B |
| | | 3 | Maintained | LB7K-3⑤ |
| | | | Spring from right | LB7K-31⑤ |
| | | | Spring from left | LB7K-32⑤ |
| | | | Spring from both | LB7K-33D |
| | Rectangular | 2 | Maintained | LB8K-2⑤ |
| | | | Spring from right | LB8K-21B |
| | | 3 | Maintained | LB8K-3⑤ |
| | | | Spring from right | LB8K-31⑤ |
| | | | Spring from left | LB8K-32⑤ |
| | | | Spring from both | LB8K-33D |
| Flush Mount (metallic) | Round | 2 | Maintained | LB6MK-2⑤ |
| | | | Spring from right | LB6MK-21B |
| | | 3 | Maintained | LB6MK-3⑤ |
| | | | Spring from right | LB6MK-31⑤ |
| | | | Spring from left | LB6MK-32⑤ |
| | | | Spring from both | LB6MK-33D |
| | Square | 2 | Maintained | LB7MK-2⑤ |
| | | | Spring from right | LB7MK-21B |
| | | 3 | Maintained | LB7MK-3⑤ |
| | | | Spring from right | LB7MK-31⑤ |
| | | | Spring from left | LB7MK-32⑤ |
| | | | Spring from both | LB7MK-33D |
| | Rectangular | 2 | Maintained | LB8MK-2⑤ |
| | | | Spring from right | LB8MK-21B |
| | | 3 | Maintained | LB8MK-3⑤ |
| | | | Spring from right | LB8MK-31⑤ |
| | | | Spring from left | LB8MK-32⑤ |
| | | | Spring from both | LB8MK-33D |

22. In place of ⑤ specify retention option code from table below.
23. For standard wave key operators, add "S" to part number before the key retention code from table below. (For example, LB6K-2B with wave key would be LB6K-2SB.)

⑤ Retention Option Code

| Code | Description |
|---|---|
| A | Key not retained in any position (removable in all positions) |
| B | Key retained in right position only |
| C | Key retained in left position only |
| D | Key retained in left and right (3-position only) |

| Code | Description |
|---|---|
| E | Key retained in center only (3-position only) |
| G | Key retained in right and center (3-position only) |
| H | Key retained in left and center (3-position only) |

## Lever Switches (Assembled)

| Style | Operator Position | | Contact | Solder/Tab Terminal (silver contacts) | PC Board Terminal (gold contacts) |
|---|---|---|---|---|---|
| Standard Bezel (black) | 2-position | Maintained | SPDT | LB①T-2T5 | LB①T-2T1V |
| | | | DPDT | LB①T-2T6 | LB①T-2T2V |
| | | | 3PDT | LB①T-2T7 | LB①T-2T3V |
| Flush Bezel (black) | 3-position | Maintained | DPDT | LB①T-3T2 | LB①T-3T6V |
| | | | 3PDT | LB①T-3T3 | LB①T-3T7V |
| | | Spring return from top/bottom | DPDT | LB①T-33T2 | LB①T-33T6V |
| | | | 3PDT | LB①T-33T3 | LB①T-33T7V |

24. For all part numbers, specify bezel in place of ①. 1 (standard bezel), 6 (flush bezel).
25. See page page 524 for contact operation,.
26. See page page 535 for dimensions.

## Lever Switches (Sub-assembled)

| Contact Block | | Operator | | Completed Unit |
|---|---|---|---|---|
| | + | | = | |

### Contact Block

| Terminal Style | | Material | Contact | Part Number |
|---|---|---|---|---|
| | Solder/Tab | Silver | SPDT | LB-T5 |
| | | | DPDT | LB-T6 |
| | | | 3PDT | LB-T7 |
| | | Gold | SPDT | LB-T1 |
| | | | DPDT | LB-T2 |
| | | | 3PDT | LB-T3 |
| | PCB | Gold | SPDT | LB-T1V |
| | | | DPDT | LB-T2V |
| | | | 3PDT | LB-T3V |

### Operator

| Style | Position | Function | Part Number |
|---|---|---|---|
| Round Standard (Plastic) | 2 | Maintained | LB1T-2 |
| | 3 | Maintained | LB1T-3 |
| | | Spring rerturn from both | LB1T-33 |
| Round Flush Mount (Plastic) | 2 | Maintained | LB6T-2 |
| | 3 | Maintained | LB6T-3 |
| | | Spring return from both | LB6T-33 |

## Buzzers (Assembled)

| Style | Shape | Voltage | Standard Bezel | | Flush Bezel | |
|---|---|---|---|---|---|---|
| | | | Solder/Tab Terminal | PC Board Terminal | Solder/Tab Terminal | PC Board Terminal |
| Black Bezel | Round | 12V DC | – | – | LB6Z-1T03 | LB6Z-1T03V |
| | | 24V DC | – | – | LB6Z-1T04 | LB6Z-1T04V |
| | Rectangular | 12V DC | LB3Z-1T03 | LB3Z-1T03V | LB8Z-1T03 | LB8Z-1T03V |
| | | 24V DC | LB3Z-1T04 | LB3Z-1T04V | LB8Z-1T04 | LB8Z-1T04V |
| Metallic Bezel | Round | 12V DC | – | – | LB6MZ-1T03 | LB6MZ-1T03V |
| | | 24V DC | – | – | LB6MZ-1T04 | LB6MZ-1T04V |
| | Rectangular | 12V DC | – | – | LB8MZ-1T03 | LB8MZ-1T03V |
| | | 24V DC | – | – | LB8MZ-1T04 | LB8MZ-1T04V |

27. IP54 Rated.
28. For IP40 rating, use part number LB3Z-104K.
29. See page page 536 for dimensions.

## Buzzers (Sub-assembled)

| Contact Block | | Operator | | Completed Unit |
|---|---|---|---|---|
| | + | | = | |

### Contact Block

| Terminal Style | | Part Number |
|---|---|---|
| | Solder/Tab | LB-T00 |
| | PCB | LB-T00V |

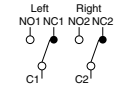
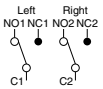
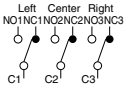
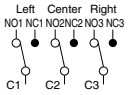
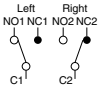
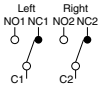
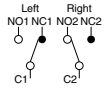
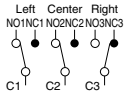
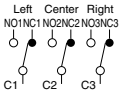
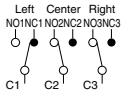
### Operator

| Style | Mounting Style | Shape | Voltage | |
|---|---|---|---|---|
| | | | 12V DC | 24V DC |
| | Standard (Plastic) | Rectangular | LB3Z-103 | LB3Z-104 |
| | Flush Mount (Plastic) | Round | LB6Z-103 | LB6Z-104 |
| | | Rectangular | LB8Z-103 | LB8Z-104 |
| | Flush Mount (Metallic) | Round | LB6MZ-103 | LB6MZ-104 |
| | | Rectangular | LB8MZ-103 | LB8MZ-104 |

# Contact Operation

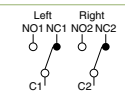
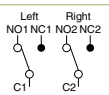
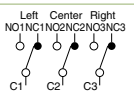
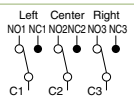
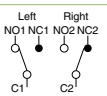
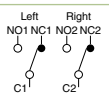
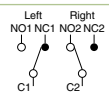
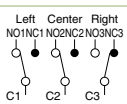
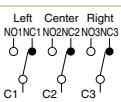
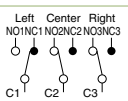
## Selector Switch, Illuminated Selector Switch, Key Selector Switch

Operator Position & Contact Operation (Top View)

| Position | | | | | Contact | Left | Center | Right |
|---|---|---|---|---|---|---|---|---|
| 90° 2-position | L R Maintained | | L R Spring return from right | | SPDT | | | |
| | | | | | DPDT |  | |  |
| | | | | | 3PDT |  | |  |
| 45° 3-position | L C R Maintained | L C R Spring return from right | L C R Spring return from left | L C R Spring return two-way | DPDT |  |  |  |
| | | | | | 3PDT |  |  |  |

## Lever Switch

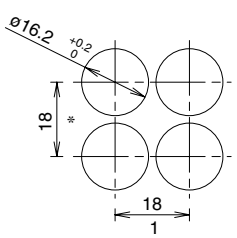
Lever Position & Contact Operation (Top View)

| Position | | | Contact | Down | Center | Up |
|---|---|---|---|---|---|---|
| 90° 2-position | U D Maintained | | SPDT | | | |
| | | | DPDT |  | |  |
| | | | 3PDT |  | |  |
| 45° 3-position | U C D Maintained | U C D Spring return two-way | DPDT |  |  |  |
| | | | 3PDT |  |  |  |

# Mounting Hole Layout (mm)

Standard Bezels

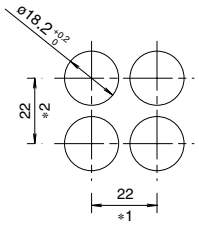
LB1/LB2/LB3



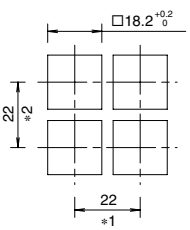

*1. Rectangular: 24mm
3PDT: 23.2mm
*2. 3PDT: 21mm

Flush Bezels

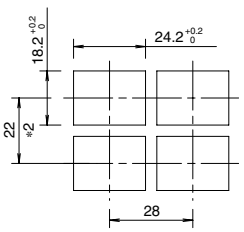
Round




Square




Rectangular




*1. 3PDT: 23.2mm
*2. Switches with Guard: 45mm

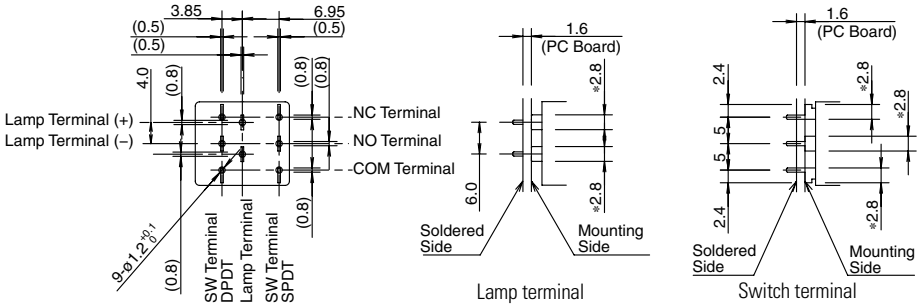
When using the LB series with a rubber boot or terminal cover, make sure to note the dimensions on pages page 539 and page 540.

# PC Board Drilling Layout (mm)

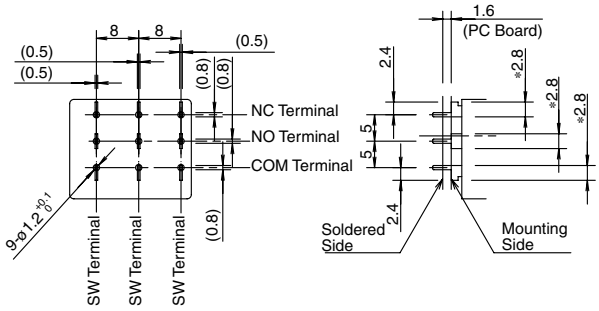
## Notes for Designing PC Board and Circuit

1. Use 1.6mm-thick glass epoxy PC board with drilled holes.
2. Design a circuit so that the LB series can operate within the rated voltage and current range. Make sure that inrush current and voltage do not exceed the rating.
3. Minimum applicable load is 5V AC/DC, 1mA on gold contacts.
4. Since the *2.8mm-wide terminal touches the PC board as shown below , short circuit may occur with pattern lines. Design a circuit that prevents short circuits.

### SPDT/DPDT Contacts

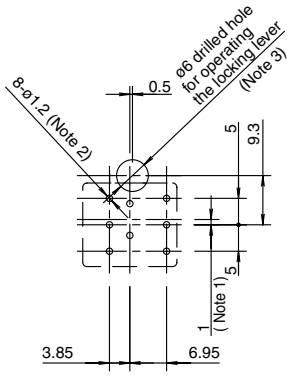



### 3PDT Contacts

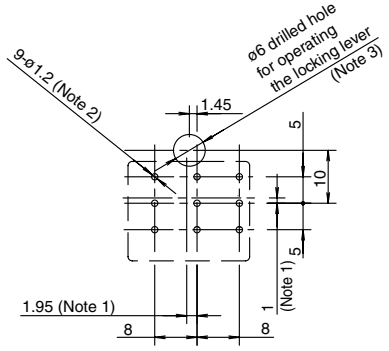



## PC Board Drilling Layout (Bottom View)

### SPDT/DPDT Contacts




### 3PDT Contacts

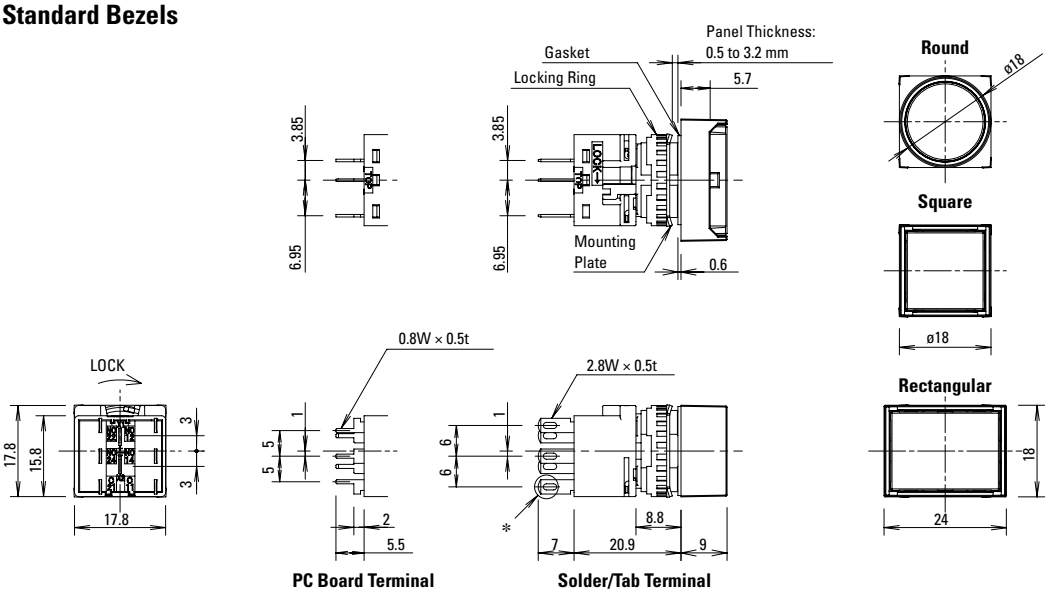



5. When designing, note the alignment of the center lines of the contact blocks and operators.
6. The diameter of the terminal hole is ø1.2.
7. Hole diameter may vary to meet installation requirements. Determine the location and the size of the hole so that the locking lever can be operated.

# Dimensions (mm)

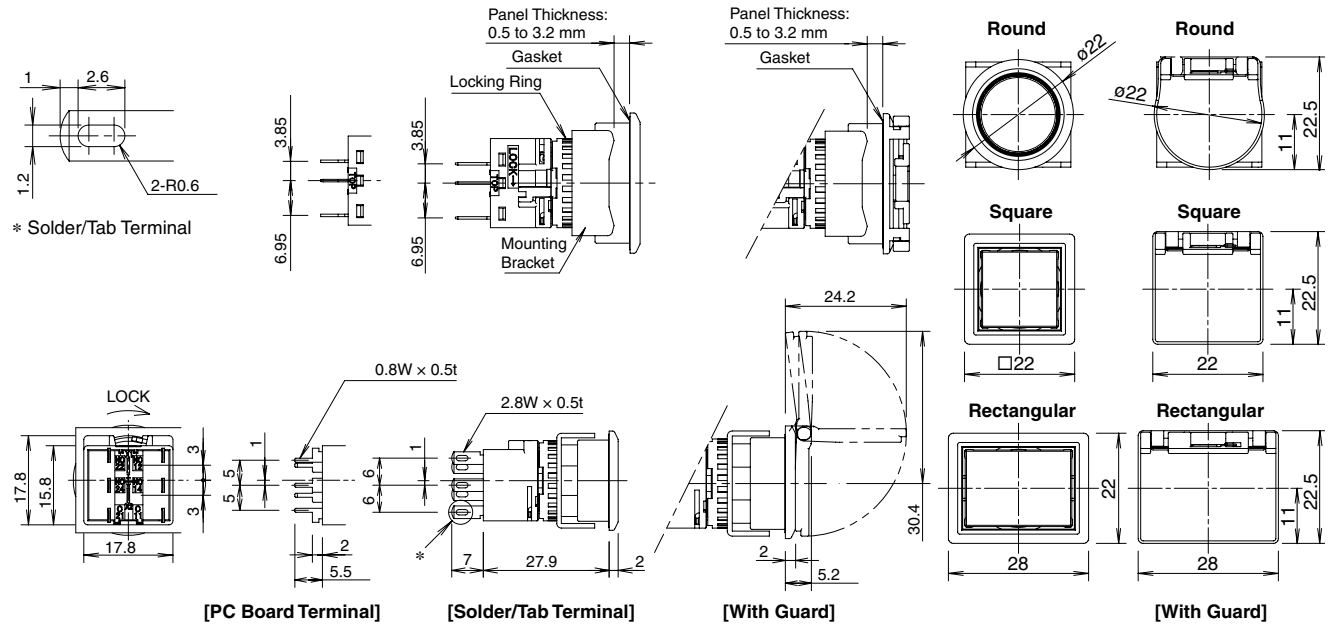
## Illuminated Pushbuttons

### Standard Bezels



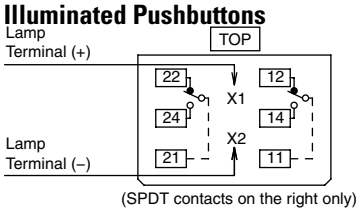

### Flush Bezels

**SPDT/DPDT Contacts**



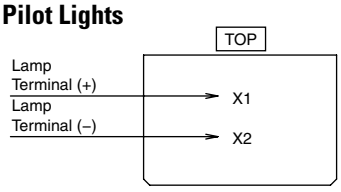

## Terminal Arrangement (Bottom View)

### Illuminated Pushbuttons



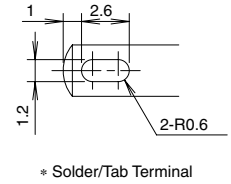

(SPDT contacts on the right only)

### Pilot Lights

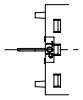


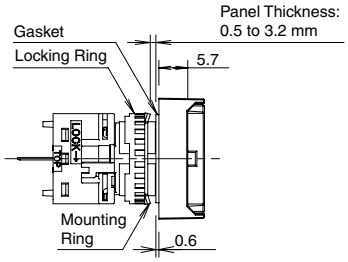

## Pilot Lights

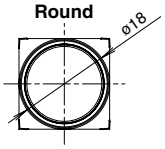
## Standard Bezels

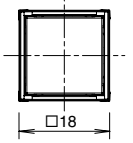


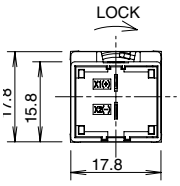

* Solder/Tab Terminal

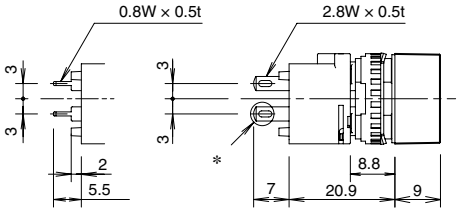




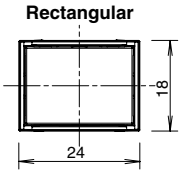



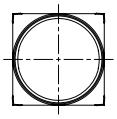



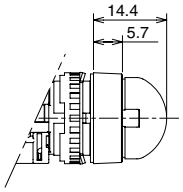

[PC Board Terminal] [Solder/Tab Terminal]




[Flush]

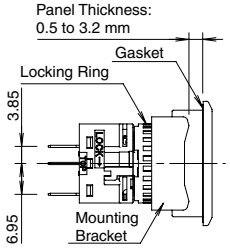


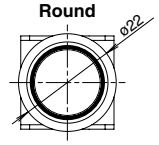
[Dome]

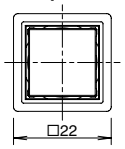


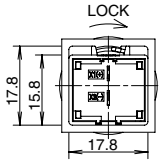

[Dome]

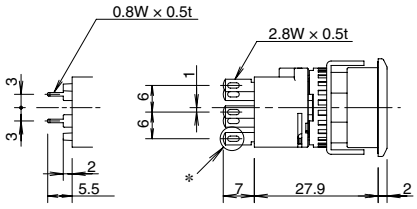
## Flush Bezels



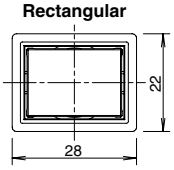



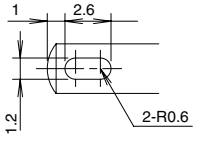




PC Board Terminal Solder/Tab Terminal

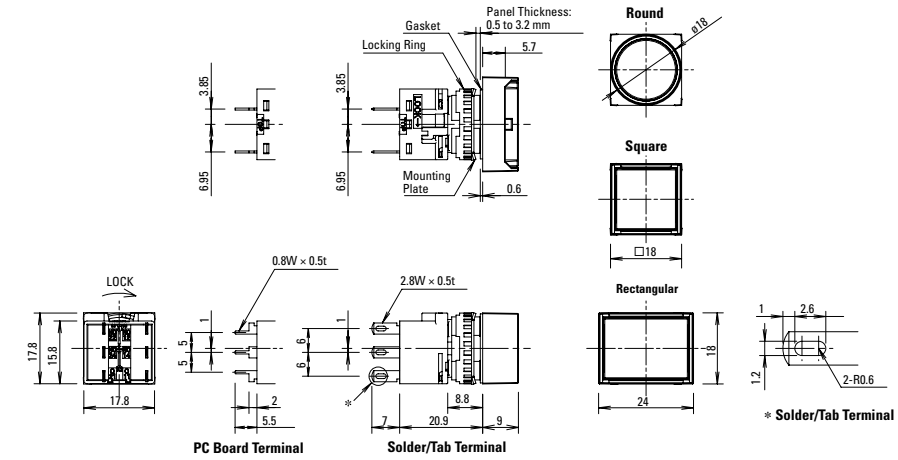


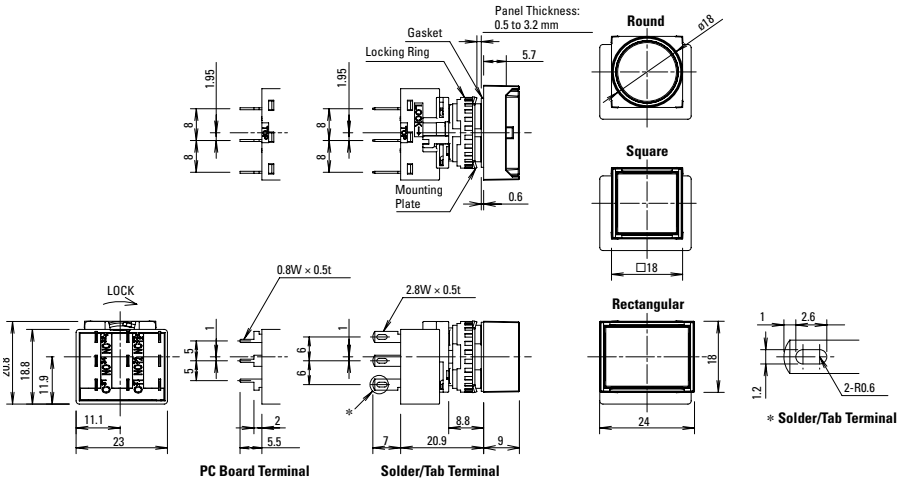




* Solder/Tab Terminal

## Non-Illuminated Pushbuttons

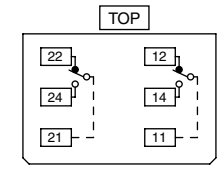
### Standard Bezels



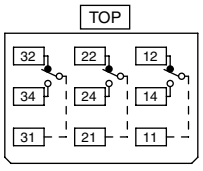

## Terminal Arrangement (Bottom View)

### SPDT/DPDT Contacts



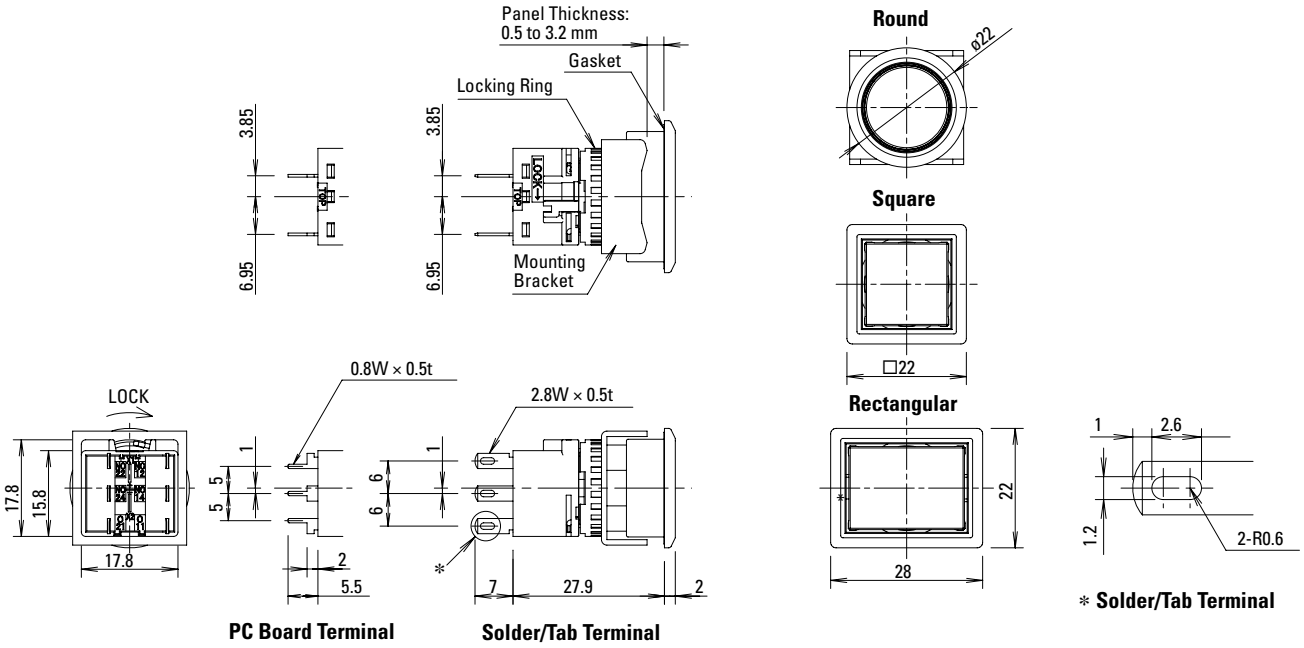

(SPDT contacts on the right only)

### 3PDT Contacts



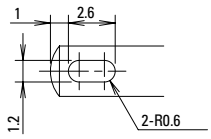
## Non-Illuminated Pushbuttons

### Flush Bezels

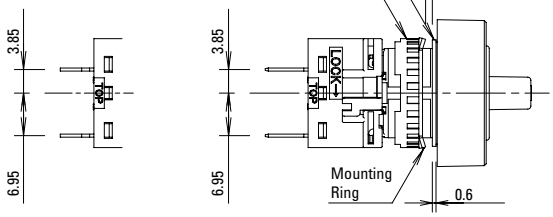


# Selector Switches

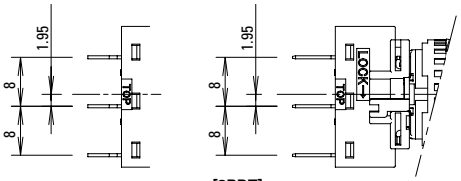
## Standard Bezels



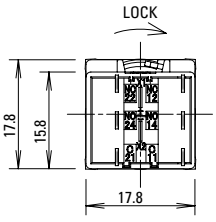

* Solder/Tab Terminal



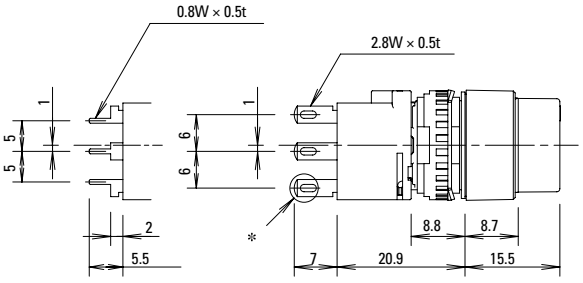

[SPDT/DPDT]



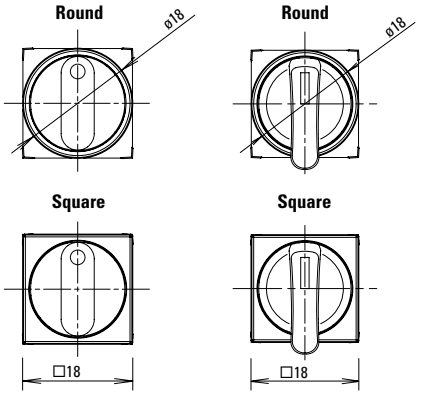

[3PDT]



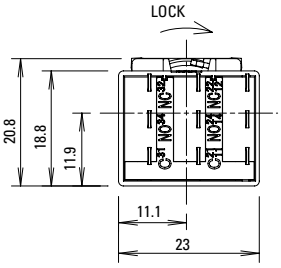

[SPDT/DPDT]



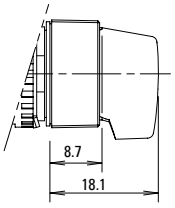

[PC Board Terminal] [Knob Operator PC Board Terminal]




[Knob Operator] [Lever Operator]



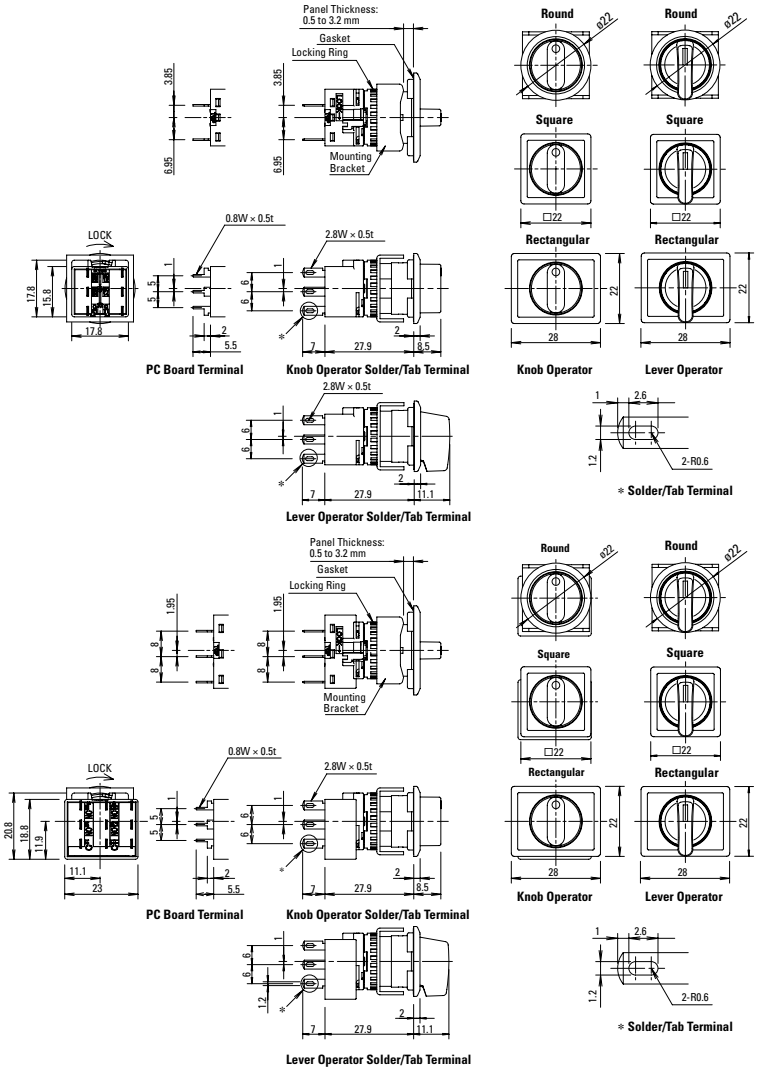

[3PDT]




[Lever Operator]

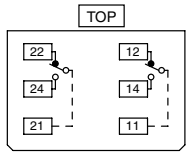
## Selector Switches

### Flush Bezels



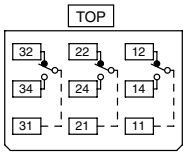

## Terminal Arrangement (Bottom View)

### SPDT/DPDT Contacts



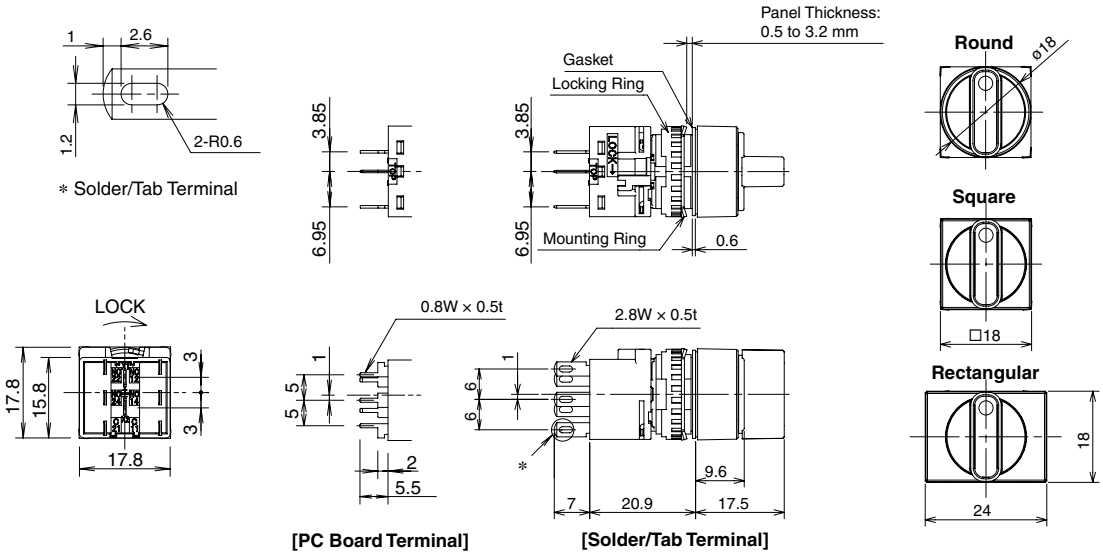

(SPDT contacts on the right only)

### 3PDT Contacts

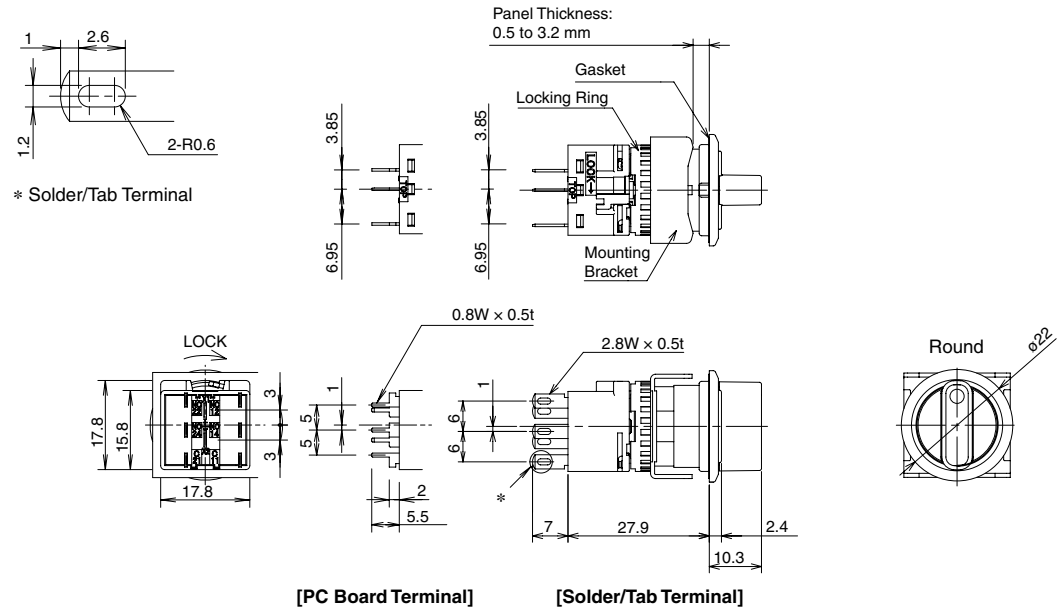


# Illuminated Selector Switches

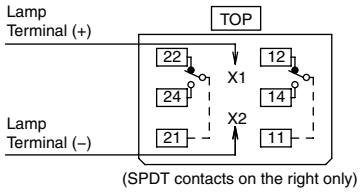
### Standard Bezels




### Flush Bezels



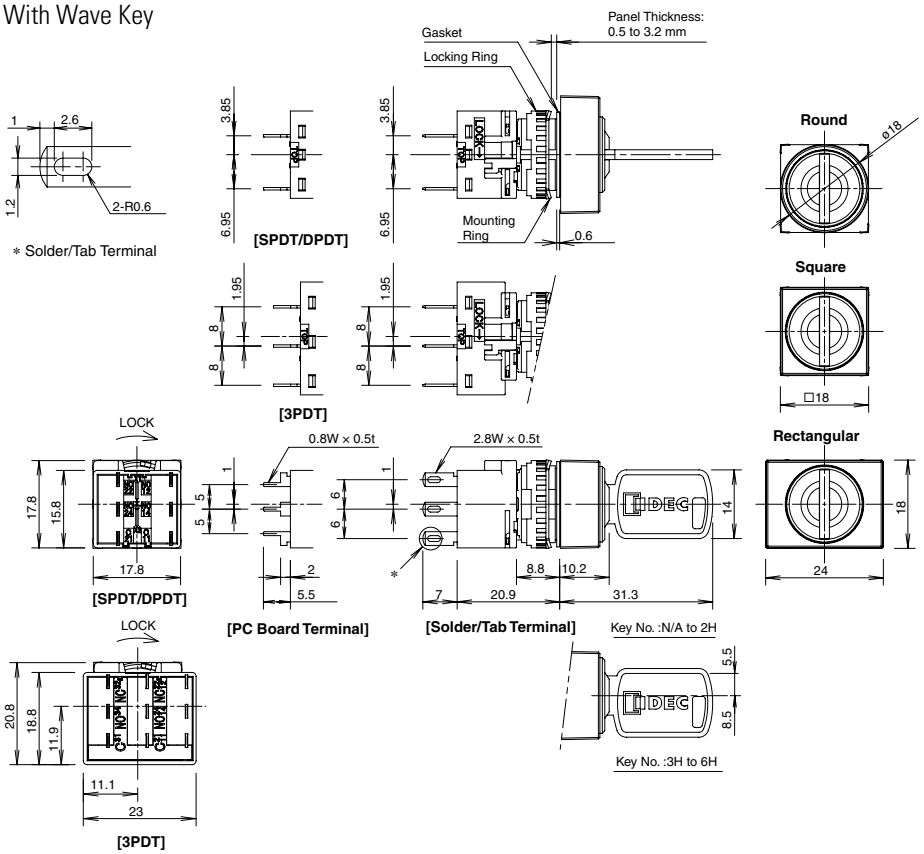

## Terminal Arrangement (Bottom View)



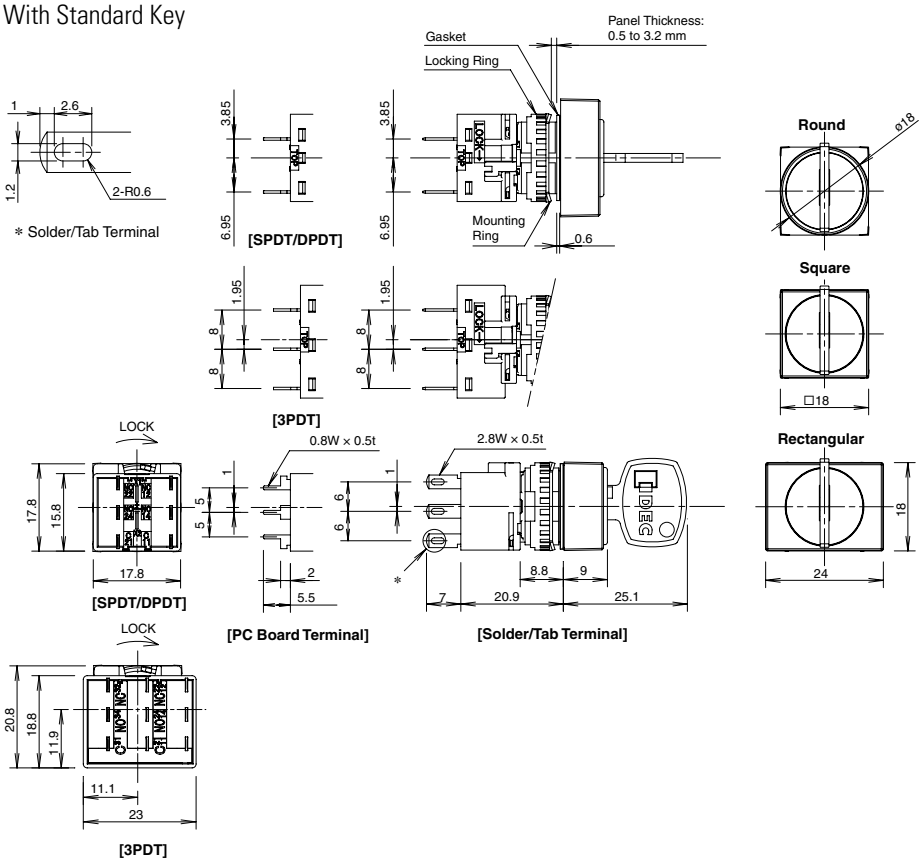
# Key Selector Switches

## Standard Bezels

### With Wave Key

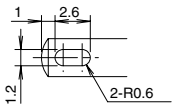



### With Standard Key

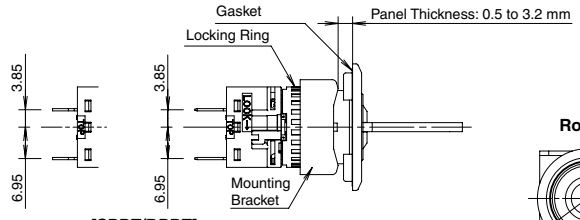


## Flush Bezels

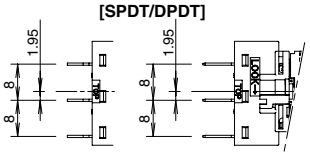
### With Wave Key



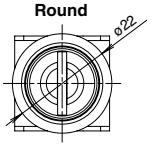

* Solder/Tab Terminal

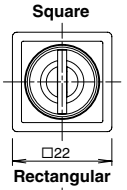


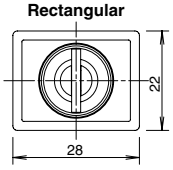

[SPDT/DPDT]

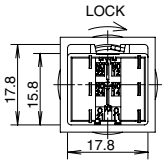



[3PDT]

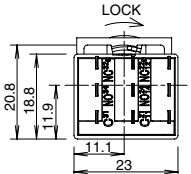



[SPDT/DPDT]

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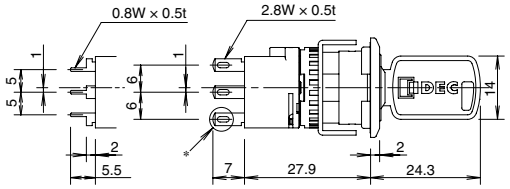
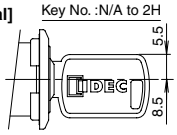
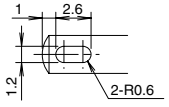


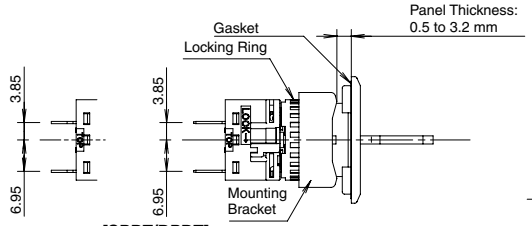

[PC Board Terminal] [Solder/Tab Terminal]



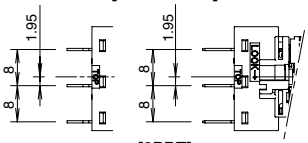

### With Standard Key



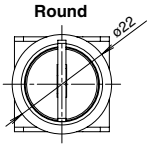

* Solder/Tab Terminal

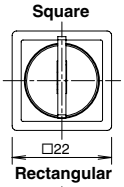


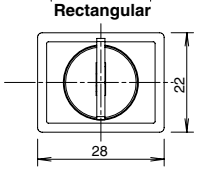

[SPDT/DPDT]

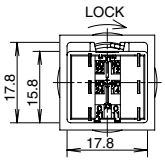



[3PDT]

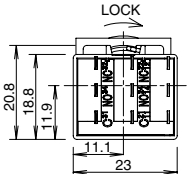


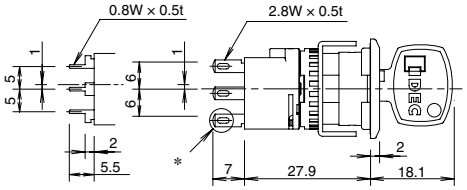




[SPDT/DPDT]



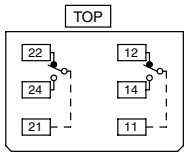

[3PDT]




[PC Board Terminal] [Solder/Tab Terminal]

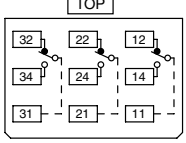
## Terminal Arrangement (Bottom View)

### SPDT/DPDT Contacts



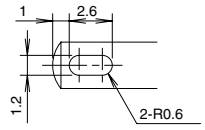

(SPDT contacts on the right only)

### 3PDT Contacts

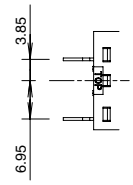


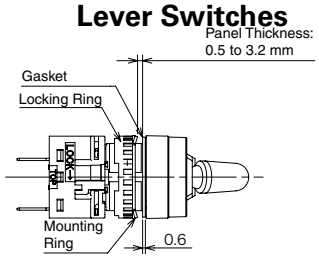
# Lever Switches

## Standard Bezels

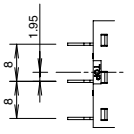


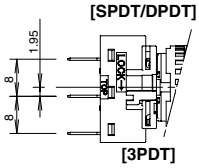

* Solder/Tab Terminal



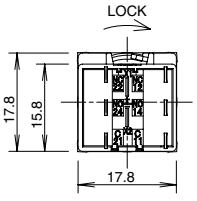




[SPDT/DPDT]

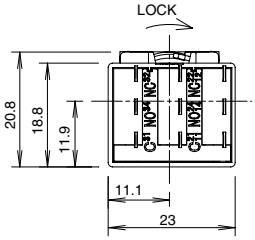


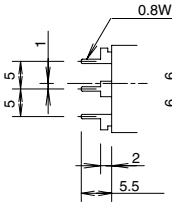

[3PDT]



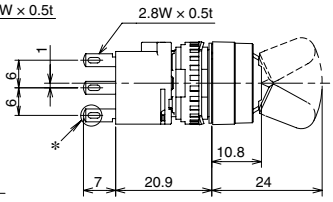

[SPDT/DPDT]



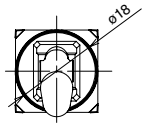

[3PDT]



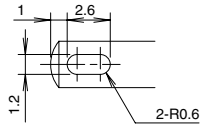

[PC Board Terminal]



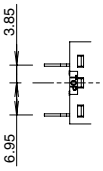

[Solder/Tab Terminal]

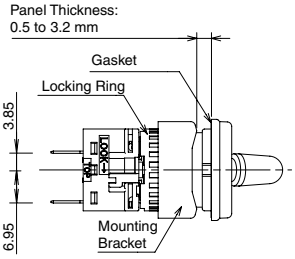



## Flush Bezels

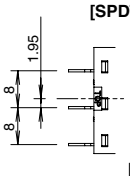


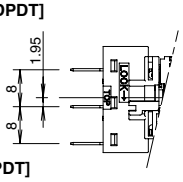

* Solder/Tab Terminal



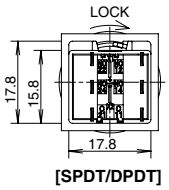




[SPDT/DPDT]

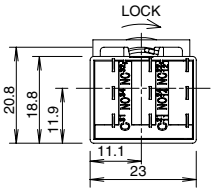


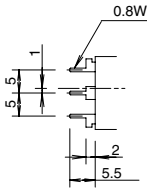

[3PDT]



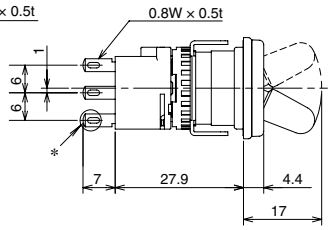

[SPDT/DPDT]



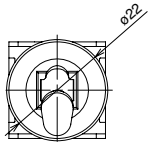

[3PDT]




[PC Board Terminal]

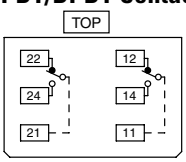



[Solder/Tab Terminal]



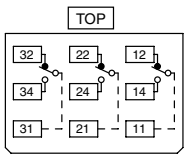

# Terminal Arrangement (Bottom View)

## SPDT/DPDT Contacts




(SPDT contacts on the right only)

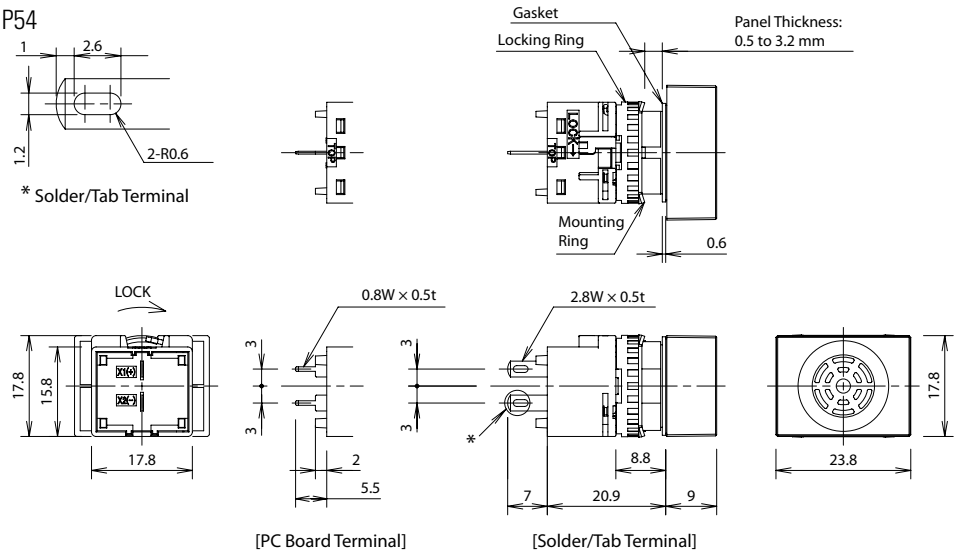
## 3PDT Contacts



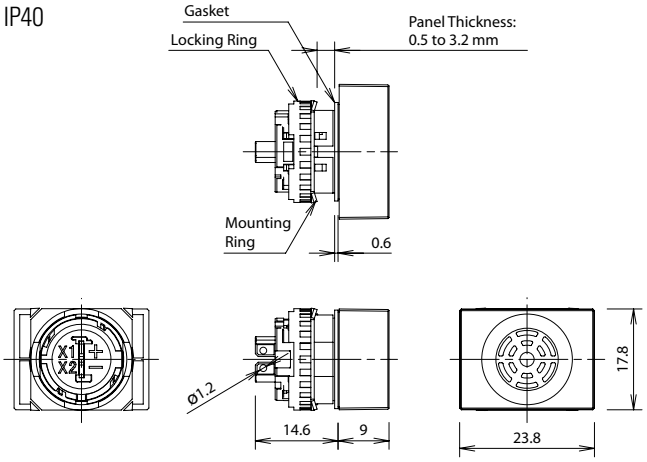
# Buzzers

## Standard Bezels

IP54

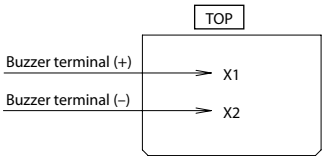



IP40

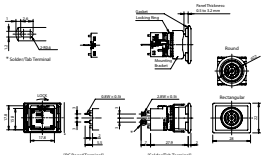



## Terminal Arrangement (Bottom View)

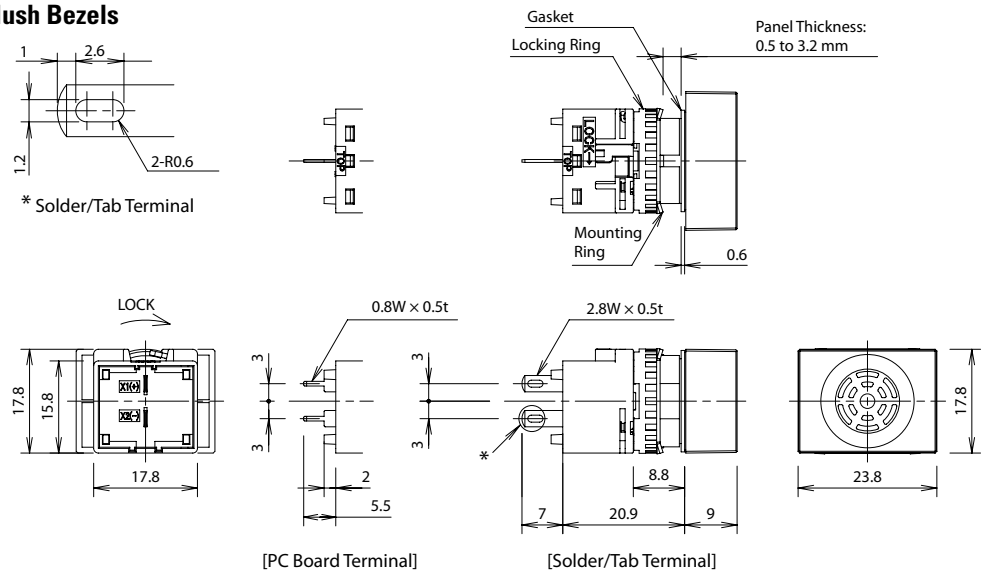
### Flush & Standard IP54



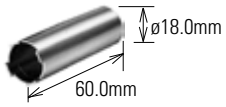
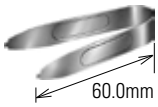
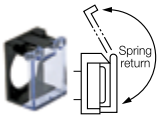

### IP40



## Flush Bezels



## Accessories

| Item | | | Material | Part Number | Remarks |
|---|---|---|---|---|---|
| Locking Ring Wrench   | | | Metal: Nickel-plated brass | MT-001 | Used to tighten the locking ring when installing the units on to the panel. |
| Lens Removal Tool   | | | Stainless Steel | MT-101 | Used to remove the lens or button. |
| For Standard Bezels | Switch Guard (180° Spring return)   | For round / square standard units | Guard: Polyacetal<br>Base: Polyarylate | AL-K6SP | Degree of protection: IP65<br>Used to protect standard pushbuttons and illuminated pushbuttons from inadvertent operation.<br>See page page 540 for dimensions.<br>With the gasket mounted on the switch, attach the switch guard and mount on the panel.<br><br>Note: not applicable for flush mounted units. Select operator with built-in switch guard. |
| | | For rectangular standard units | | AL-KH6SP | |
| | Switch Guard for Single Board Mounting | For rectangular units | Guard: Polyacetal<br>Base: Polyarylate | LA9Z-K3 | Degree of protection: IP65<br>With the gasket mounted on the switch, attach the switch guard and mount on the panel.<br>See page page 540 for dimensions. |
| | Rubber Boot for Standard Bezels<br>1 | 1. For round units | Silicon Rubber | LB9Z-D1 | Degree of protection: IP65<br>See page page 539 for dimensions.<br>See page page 542 for mounting. |
| | 2 | 2. For square units | | LB9Z-D2 | |
| | 3 | 3. For rectangular units | | LB9Z-D3 | |
| | Mounting Hole Plug | Metal | Plug: Metal (Zinc diecast)<br>Locking nut: Polyacetal<br>Gasket: Nitrile rubber | AL-BM6 | Degree of protection: IP65<br>Tightening torque: 0.1 to 0.29 N•m<br>See page page 539 for dimensions. |
| | Mounting Hole Plug | Rubber | Nitrile rubber (black) | AL-B6 | Degree of protection: IP65<br>See page page 539 for dimensions. |

## Accessories con't

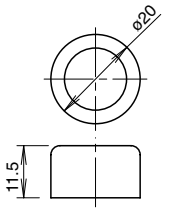
| Item | | | Material | Part Number | Remarks |
|---|---|---|---|---|---|
| For Flush Bezels | Rubber Boot for Flush Bezels<br>1 | 1. For round units | Silicon Rubber | LB9Z-D6 | Degree of protection: IP65<br>See page page 539 for dimensions.<br>See page page 542 for mounting. |
| | 2 | 2. For square units | | LB9Z-D7 | |
| | 3 | 3. For rectangular units | | LB9Z-D8 | |
| | Mounting Hole Plug<br>1 | 1. For round units | Plug: Polyamide (Black)<br>Gasket: Nitrile rubber<br>Mounting Plate: Stainless Steel | LB9Z-BS6 | Degree of protection: IP65<br>Panel thickness: 0.5 to 3.2mm<br>See page page 539 for dimensions. |
| | 2 | 2. For square units | | LB9Z-BS7 | |
| | 3 | 3. For rectangular units | | LB9Z-BS8 | |
| | Terminal Cover<br>1 2 | 1. For SPDT/DPDT contacts | | LB9Z-VL2 | See page page 540 for dimensions. |
| | | 2. For 3PDT contacts | | LB9Z-VL3 | |

# Accessory Dimensions (mm)

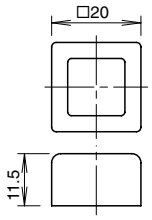
## Rubber Boot

### Standard Bezel

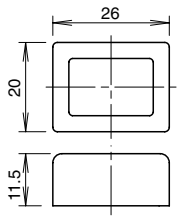
For round units (LB9Z-D1)




For square units (LB9Z-D2)

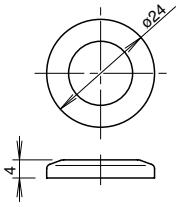



For rectangular units (LB9Z-D3)

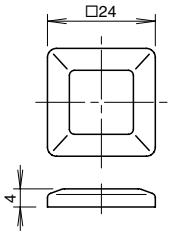



### Flush Bezel

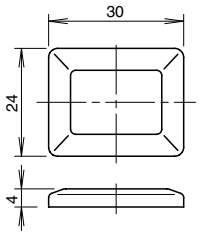
For round units (LB9Z-D6)




For square units (LB9Z-D7)



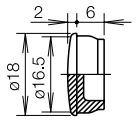

For rectangular units (LB9Z-D8)

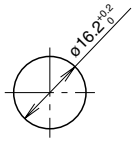



## Mounting Hole Plug

### Standard Bezels

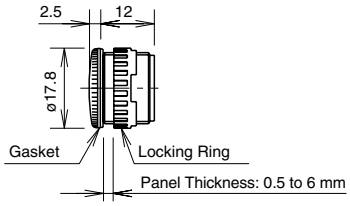
AL-B6

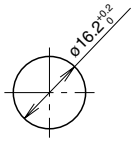



Mounting Hole Layout

AL-BM6

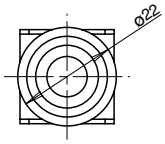


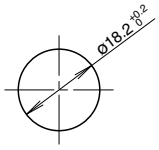

Mounting Hole Layout

### Flush Bezels

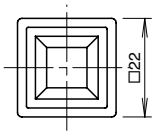
For round units (LB9Z-BS6)



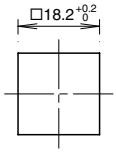

Mounting Hole Layout



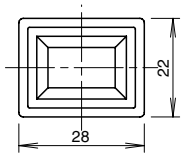

For square units (LB9Z-BS7)



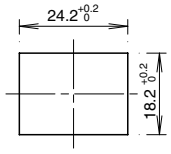

Mounting Hole Layout

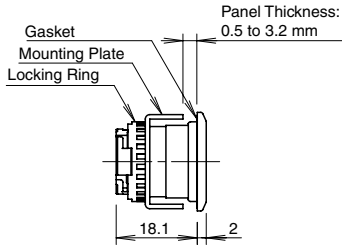



For rectangular units (LB9Z-BS8)




Mounting Hole Layout



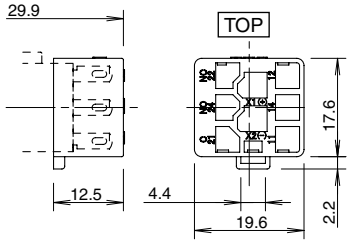



## Accessory Dimensions (mm) con't

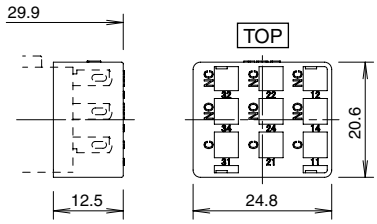
### Terminal Cover

Standard Bezel

For SPDT/DPDT contacts (LB9Z-VL2)

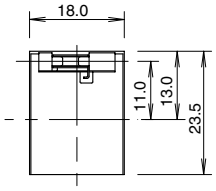



For 3PDT contacts (LB9Z-VL3)

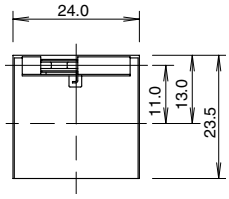


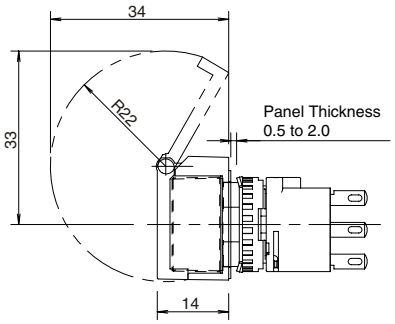

### Switch Guard for Standard Bezel Models

For round / square units (AL-K6SP)

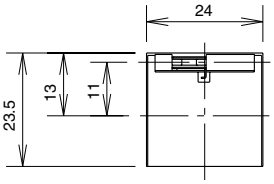


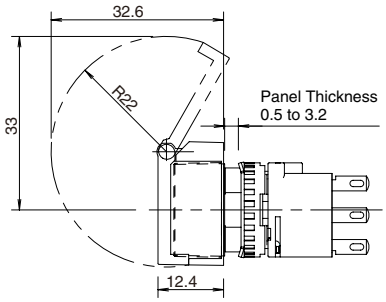

For rectangular units (AL-KH6SP )



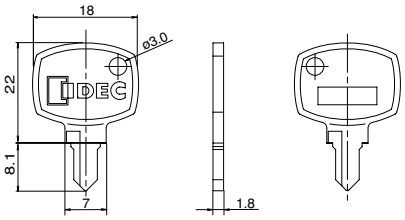

For Single Board Mounting (LA9Z-K3)



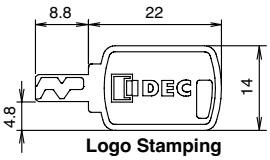

Note: The panel depth is the same for switches with or without switch guards. Both models can be installed on the same PC board.

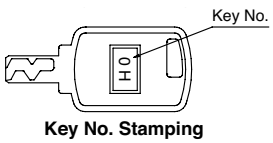
### Standard Key



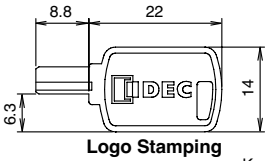

### Wave Key

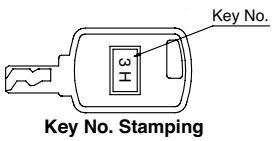
Reversible Wave Key




Non-reversible Wave Key



## Replacement Parts

| Item | | Material | Part Number | Remarks |
|---|---|---|---|---|
| Lens | For round units | Polyarylate ø15.4 H4mm | AL6M-L② | Specify the color code in place of ② in the part number. A: Amber, C: Clear, G: Green, R: Red, S: Blue, Y: Yellow<br>Note: Use a clear lens for or white (PW) illumination. |
| | For square units | Polyarylate □15.4, H4mm | AL6Q-L② | |
| | For rectangular units | Polyarylate W21.4 x H4 x D15.4mm | AL6H-L② | |
| Button | For round units | Polyarylate □15.4, H4mm | AB6M-B② | Specify the color code in place of ② in the part number. B: Black, G: Green, R: Red, S: Blue W: White, Y: Yellow |
| | For square units | Polyarylate □15.4, H4mm | AB6Q-B② | |
| | For rectangular units | Polyarylate W21.4 x H4 x D15.4 | AB6H-B② | |
| Marking Plate | For round units | Acrylic ø13.7 H0.8 | AL6M-② | Specify the color code in place of ② in the part number. B: Black, W: White |
| | For square units | Acrylic □13.7, H0.8mm | AL6Q-② | |
| | For rectangular units | Acrylic W19.7 x H0.8 (0.4) x D13.7mm | AL6H-② | |
| Locking Ring | For all units | Polyamide ø17.9, H3.9mm | LB9Z-LNP | |
| Anti-rotation Ring | For standard bezel | Metal (Stainless steel) □17.9, t0.6mm | LB9Z-LP1 | |
| Anti-rotation Ring | For flush bezel | Metal (Stainless steel) W21 x H8.2 x D20.6 t0.8mm | LB9Z-LP6 | |
| Spare Standard Key | For key selector switches | Nickel-plated Brass | AS6-SK | See page page 540 for dimensions. |
| Spare Wave key<br>Non-reversible Wave Key <br>Reversible Wave Key | For Wave key selector switches | Diecast zinc alloy (nickel plated) W14 x H2 x D30.8mm | LA9Z-SK-⑤ | Specify Wave key number in place of ⑤ in the part number.<br>0H: Standard wave key (reversible)<br>1H to 2H: Reversible wave key<br>3H to 6H: Non-reversible wave key<br>See page page 540 for dimensions. |

### LB Series Replacement LED Unit

| Item | Rated Operating Voltage | Part Number | ②Color Code | |
|---|---|---|---|---|
| LED Unit | DC5V | LB9Z-LED5② | A<br>G<br>PW<br>R<br>S | 8. Specify color code in place of the ② in the part number. R: Red, G: Green, A: Amber, S: Blue, PW: White<br>9. All illuminated LB series contain an LED unit.<br>10. Use a white (PW) LED unit for yellow (Y) illumination. |
| | AC/DC12V | LB9Z-LED1② | | |
| | AC/DC24V | LB9Z-LED2② | | |

## Precautions & Instructions ⚠ Safety Precautions

- Turn off the power to the LB series control units before installation, removal, wiring, maintenance, and inspection. Failure to turn power off may cause electrical shocks or fire hazard.
- To avoid burning your hand, use the lamp holder tool when replacing the lamps.
- For wiring, use wires of a proper size to meet voltage and current requirements. Solder correctly according to the instructions in "Wiring" and "Notes on Terminal Cover." Improper soldering may cause overheating and create a fire hazard. Also, when using tab terminals, use receptacles of appropriate size.

## Instructions

### Wiring

1. Solder the terminals at 350°C within 3 seconds using a 60W soldering iron. Sn-Ag-Cu type is recommended. When soldering, do not touch the LB series with the soldering iron. Also ensure that no tensile force is applied to the terminals. Do not bend the terminal or apply excessive force to the terminal.
2. Use non-corrosive liquid flux.

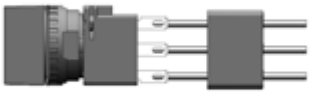
### Terminal Cover

Solder/tab terminal

Insert the terminal cover into the contact block with the TOP markings on the contact block and the terminal cover in the same direction.

Note: When wiring, insert the lead wires into the terminal cover holes before soldering. After wiring, terminal covers cannot be installed.

Standard Bezel



Flush Bezel

### Operating Environment

- Do not use the LB series where corrosive gases exist or under an environment exceeding the operating temperature and humidity ranges. Otherwise, damage such as contact failure or change of the surface color may occur.
- Major parts of the switch are plastic. Scratches or damage may occur when scraped with a sharp object or if excessive load or shock is applied. Note that this may cause operation and appearance failure of the operator and bezel.
- Application of detergent, cutting oil, or special chemicals to the switch may result in operation and/or appearance failure such as a change in surface color.

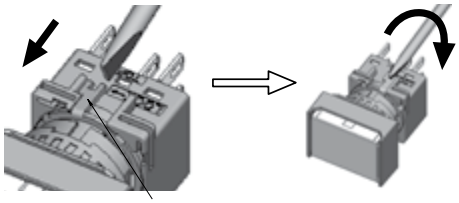
### Handling

Contacts (micro switch)

When using NC (normally closed) and NO (normally open) contacts of the same microswitch, avoid connections of different voltages, or connections of different types of power supplies. Failure to observe this instruction may cause a short-circuit.

### Removing and Installing the Contact Block

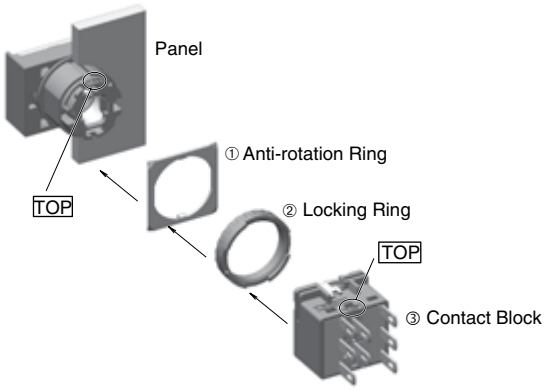
3. Turn the locking lever on the contact block in the direction opposite to the arrow on the housing. Then the contact block can be removed.
4. Insert the contact block with the TOP markings on the contact block and the operator placed in the same direction. Then lock the units, turning the locking lever in the direction of the arrow.



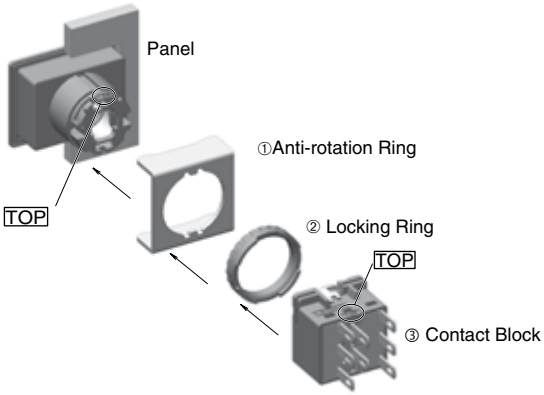

### Panel Mounting

Remove the contact block from the operator. Insert the operator into the panel cut-out from the front, then install the contact block to the operator.

Standard Bezel




Flush Bezel




### Notes on Mounting

Use the optional ring wrench (MT-001) to mount the operator onto the panel. Tightening torque should not exceed 0.7 N·m. Do not use pliers. Excessive tightening will damage the locking ring.

# A6 Series — Miniature Switches and Pilot Devices: 16mm

**Key features:**

- 16mm (5/8") mounting hole
- LED illumination
- Compact design saves space
- Momentary, Maintained, Selectors, and E-Stops
- Gold-clad Silver contacts for reliable low level switching
- Snap action contacts
- IP40 (dustproof) or IP65 (oiltight) versions

UL Recognized File No.E55996

CSA Certified File No. LR21451

| | | | | | | |
|---|---|---|---|---|---|---|
| Specifications | Degree of Protection | | IP40: Dustproof<br>IP65 Watertight/Oiltight | | | |
| | Contact Configuration | | SPDT, DPDT | | | |
| | Maximum Voltage | | 250V AC/DC | | | |
| | Thermal Current | | 3A | | | |
| | Minimum Applicable Load | | 5V AC/DC, 1mA | | | |
| | Contact Material | | Gold-clad silver | | | |
| | Terminal Style | | .110" Solder/ Quick Connect | | | |
| | Operating Temperature | | -25° to +55°C (no freezing) | | | |
| | Operating Humidity | | 45 to 85% RH | | | |
| | Contact Resistance | | 50mΩ maximum (initial value) | | | |
| | Insulation Resistance | | 100MΩ minimum (500V DC megger) | | | |
| | Vibration Resistance | | 10 to 55Hz, amplitude 1.5mm p-p | | | |
| | Shock Resistance | | Damage limits: 500m/sec² (approx. 50G) Operating extremes: 200m/sec² (approx. 20G) | | | |
| | Electrical Life | | 100,000 operations minimum (at full rated load) | | | |
| | Mechanical Life | | Maintained: 100,000 operations minimum<br>Momentary: 1,000,000 operations minimum<br>Selector/Keylock: 250,000 operations minimum | | | |
| | Dielectric Strength | | Switch Unit: 2,000V AC, 1 min. between live/dead part and terminals of different poles;<br>1,000V AC, 1 minute between terminals of the same pole;<br>1,500V AC, 1 minute between contact and lamp terminals.<br>Illumination Unit: 2,000V AC, 1 min. between live part/ground | | | |
| | Soldering Temperature | | 20W/5 seconds or 260°C/3 seconds | | | |
| Contact Ratings | Operating Voltage | | 24V | 120V | 240V | |
| | AC (50/60Hz) | Resistive | — | 1.0A | 0.5A | |
| | | Inductive | — | 0.7A | 0.5A | |
| | DC | Resistive | 1.0A | 0.2A | — | |
| | | Inductive | 0.7A | 0.1A | — | |

| | | | | | |
|---|---|---|---|---|---|
| LED Lamp Ratings | Rated Voltage/Current | 5V DC ±5% | 6V AC/DC (±10%) | 12V AC/DC (±10%) | 24V AC/DC (±10%) |
| | | 8mA | AC: A, R, W, Y: 8mA<br>G, S: 7mA<br>DC: A, R, W, Y: 6mA<br>G, S: 5mA | AC: 9mA<br>DC: 8mA | AC: 9mA<br>DC: 8mA |

1. AC Inductive Load, PF = 0.6 – 0.7; DC Inductive Load, L/R = 7ms.
2. LED lamp contains a built-in current limiting resistor and a protection diode.
3. LED's don't "burn out." Luminance is reduced to 50% of initial intensity after being lit for 50,000 hours continuously.

# AB6 Non-Illuminated Pushbuttons (Assembled)

## Non-Illuminated Pushbuttons

| | Style | Contact | Part Number | | | |
|---|---|---|---|---|---|---|
| | | | Momentary | | Maintained (Latching) | |
| | | | Dustproof (IP40) | Oiltight (IP65) | Dustproof (IP40) | Oiltight (IP65) |
| Standard Button | Round 18mm | SPDT<br>DPDT | AB6M-M1-①<br>AB6M-M2-① | AB6M-M1P-①<br>AB6M-M2P-① | AB6M-A1-①<br>AB6M-A2-① | AB6M-A1P-①<br>AB6M-A2P-① |
| | Square 18mm | SPDT<br>DPDT | AB6Q-M1-①<br>AB6Q-M2-① | AB6Q-M1P-①<br>AB6Q-M2P-① | AB6Q-A1-①<br>AB6Q-A2-① | AB6Q-A1P-①<br>AB6Q-A2P-① |
| | Rectangular 18mm x 24mm | SPDT<br>DPDT | AB6H-M1-①<br>AB6H-M2-① | AB6H-M1P-①<br>AB6H-M2P-① | AB6H-A1-j<br>AB6H-A2-j | AB6H-A1P-①<br>AB6H-A2P-① |
| Oversize Button | Round 23.5mm | SPDT<br>DPDT | – | AB6M-M1P-M②<br>AB6M-M2P-M② | – | AB6M-A1P-M①<br>AB6M-A2P-M① |
| | Square 23.5mm | SPDT<br>DPDT | – | AB6Q-M1P-Q①<br>AB6Q-M2P-Q① | – | AB6Q-A1P-Q①<br>AB6Q-A2P-Q① |
| | Rectangular 17.5 X 23.5mm | SPDT<br>DPDT | – | AB6Q-M1P-H①<br>AB6Q-M2P-H① | – | AB6Q-A1P-H①<br>AB6Q-A2P-H① |

### ①Button Color Code

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

1. In place of ① specify Button Color Code from the table at right.
2. To order as sub-assembled, see page 459.
3. For accessories, see page 466.
4. For dimensions, see page 468.

## AB6 Non-Illuminated Pushbuttons (Sub-Assembled)

| Operator | + | Button | = | Completed Unit |
|---|---|---|---|---|
| | | | | |

### Operators

| Style | Contact | Operator | Part Number | | |
|---|---|---|---|---|---|
| | | | Round | Square | Rectangular |
| Non-Illuminated Pushbuttons | SPDT | Momentary | AB6M-M100 | AB6Q-M100 | AB6H-M100 |
| | | Maintained | AB6M-A100 | AB6Q-A100 | AB6H-A100 |
| | DPDT | Momentary | AB6M-M200 | AB6Q-M200 | AB6H-M200 |
| | | Maintained | AB6M-A200 | AB6Q-A200 | AB6H-A200 |

Oversize rectangular button uses square operator.

### Buttons

| Description | Part Number | |
|---|---|---|
| | Button | |
| | Dustproof (IP40) | Oiltight (IP65) |
| Round | AB6M-BK1-j | AB6M-BK2-j |
| Square | AB6Q-BK1-j | AB6Q-BK2-j |
| Rectangular | AB6H-BK1-j | AB6H-BK2-j |
| Round Oversize | – | AB6M-BK2-Mj |
| Square Oversize | – | AB6Q-BK2-Qj |
| Rectangular Oversize | – | AB6Q-BK2-Hj |

1. In place of j, specify Button Color Code from table.
2. Buttons which are rated IP65 include a waterproof rubber gasket.
3. For accessories, see page 466.

### ①Button Color Code

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

# AL6 Illuminated Pushbuttons (Assembled)

## LED Illuminated Pushbuttons

| Description | Style | Contact | Part Numbers | | | |
|---|---|---|---|---|---|---|
| | | | Momentary | | Maintained (Latching) | |
| | | | Dustproof (IP40) | Oiltight (IP65) | Dustproof (IP40) | Oiltight (IP65) |
| Standard Lens | Round (18mm lens) | SPDT<br>DPDT | AL6M-M1③-②<br>AL6M-M2③-② | AL6M-M1③P-②<br>AL6M-M2③P-② | AL6M-A1③-②<br>AL6M-A2③-② | AL6M-A1③P-②<br>AL6M-A2③P-② |
| | Square (18mm lens) | SPDT<br>DPDT | AL6Q-M1③-②<br>AL6Q-M2③-② | AL6Q-M1③P-②<br>AL6Q-M2③P-② | AL6Q-A1③-②<br>AL6Q-A2③-② | AL6Q-A1③P-②<br>AL6Q-A2③P-② |
| | Rectangular (18mm x 24mm lens) | SPDT<br>DPDT | AL6H-M1I-②<br>AL6H-M2I-② | AL6H-M1IP-②<br>AL6H-M2IP-② | AL6H-A1I-②<br>AL6H-A2I-② | AL6H-A1IP-②<br>AL6H-A2IP-② |
| Oversize Lens | Round (24mm lens) | SPDT<br>DPDT | – | AL6M-M1③P-M②<br>AL6M-M2③P-M② | – | AL6M-A1③P-M②<br>AL6M-A2③P-M② |
| | Square (24mm lens) | SPDT<br>DPDT | – | AL6Q-M1③P-Q②<br>AL6Q-M2③P-Q② | – | AL6Q-A1③P-Q②<br>AL6Q-A2③P-Q② |
| | Rectangular (18mm x 24mm lens) | SPDT<br>DPDT | – | AL6Q-M1③P-H②<br>AL6Q-M2③P-H② | – | AL6Q-A1③P-H②<br>AL6Q-A2③P-H② |

1. In place of ②, specify Lens/LED Color Code from table below.
2. In place of ③, specify Voltage Code from table below.
3. Lamps also available in 5V DC, 6V AC/DC or 12 V AC/DC, change "4" using voltage/lamp codes (ie AL6M-M13-k uses 12V AC/DC LED).
4. LED lamp is included in unit and contains a current-limiting resistor and a protection diode. (External resistor not required.)
5. To order as sub-assembled, see page.
6. For accessories, see page.
7. For dimensions, see page.
8. Light independent of switch position.

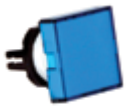
### ②Lens/LED Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| Warm White | W |
| Cool White | JW |
| Yellow | Y |

### ③Voltage Code

| Voltage | Code |
|---|---|
| 5V DC | 1 |
| 6V AC/DC | 2 |
| 12V AC/DC | 3 |
| 24V AC/DC | 4 |

# AL6 Illuminated Pushbuttons (Sub-Assembled)

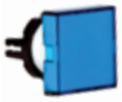
| Operator | + | LED Lamp | + | Lens | = | Completed Unit |
|---|---|---|---|---|---|---|
| | | | |  | | |

## Operators

| Style | Contact | Operator | Part Number | | |
|---|---|---|---|---|---|
| | | | Round | Square | Rectangular |
| AL6 Illuminated Pushbuttons | SPDT | Momentary | AL6M-M100 | AL6Q-M100 | AL6H-M100 |
| | | Maintained | AL6M-A100 | AL6Q-A100 | AL6H-A100 |
| | DPDT | Momentary | AL6M-M200 | AL6Q-M200 | AL6H-M200 |
| | | Maintained | AL6M-A200 | AL6Q-A200 | AL6H-A200 |

Oversize rectangular button uses square operator.

## Lenses

| Unit | Part Number | | |
|---|---|---|---|
| Degree of Protection | Dustproof (IP40) | Oiltight (IP65) | |
| Size | Standard | Standard | Oversize |
| Round | AL6M-LK1-k | AL6M-LK2-② | AL6M-LK2-M k |
| Square | AL6Q-LK1-k  | AL6Q-LK2-k | AL6Q-LK2-Q k |
| Rectangular | AL6H-LK1-k | AL6H-LK2-k | AL6Q-LK2-H k |

1. In place of ②, specify Lens Color Code from table below.
2. Lenses which are rated IP65 include a waterproof rubber gasket.
3. For accessories, see page.

## ②Lens/LED Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| Warm White | W |
| Cool White | JW |
| Yellow | Y |

## LED Lamps

| Appearance | Rated Voltage | Part Number |
|---|---|---|
| | 5V DC | LATD-5 ② |
| | 6V AC/DC | LATD-6 ② |
| | 12V AC/DC | LATD-1 ② |
| | 24V AC/DC | LATD-2 ② |

1. In place of ②, specify LED Color Code from table at left.

# AL6 Pilot Lights (Assembled)

## LED Pilot Lights

| Description | Part Number | |
|---|---|---|
| | Dustproof (IP40) | Oiltight (IP65) |
| Round (18mm Lens) | AL6M-P③-② | AL6M-P③P-② |
| Square (18mm Lens) | AL6Q-P③-② | AL6Q-P③P-② |
| Rectangular (18mm x 24mm Lens) | AL6H-P③-② | AL6H-P③P-② |

1. In place of ②, specify Lens Color Code from table below.
2. In place of ③, specify Voltage Code from table below.
3. LEDs also available in 5V DC, 6V AC/DC or 12 V AC/DC, change "4" using voltage codes (ie AL6M-P3-② uses 12V AC/DC LED).
4. LED is included and contains built-in current limiting resistor and reverse polarity protection diode. (no external resistor required)
5. To order sub-assembled, see page.
6. For accessories, see page.
7. For dimensions, see page.
8. For one piece pilot lights and/or dome lens pilot lights, see AP series miniature pilot lights.

### ②Lens/LED Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| Warm White | W |
| Cool White | JW |
| Yellow | Y |

### ③Voltage Code

| Voltage | Code |
|---|---|
| 5V DC | 1 |
| 6V AC/DC | 2 |
| 12V AC/DC | 3 |
| 24V AC/DC | 4 |

## AL6 Pilot Lights (Sub-Assembled)

| Operator | + | LED Lamp | + | Lens | = | Completed Unit |
|---|---|---|---|---|---|---|
| | | | | | | |

### Operators

| Style | Part Number | | |
|---|---|---|---|
| | Round | Square | Rectangular |
| AL6 Pilot Lights | AL6M-P00 | AL6Q-P00 | AL6H-P00 |

### Lenses

| Degree of Protection | Part Number | |
|---|---|---|
| | Dustproof IP40 | Oiltight IP65 |
| Round | AL6M-LK1-② | AL6M-LK3-② |
| Square | AL6Q-LK1-② | AL6Q-LK3-② |
| Rectangular | AL6H-LK1-② | AL6H-LK3-② |

1. In place of ②, specify Lens Color Code from table below.
2. Lenses which are rated IP65 include a waterproof rubber gasket.
3. For accessories, see page.

### kLens/LED Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| Warm White | W |
| Cool White | JW |
| Yellow | Y |

### LED Lamps

| Appearance | Rated Voltage | Part Number |
|---|---|---|
| | 5V DC | LATD-5 ② |
| | 6V AC/DC | LATD-6 ② |
| | 12V AC/DC | LATD-1 ② |
| | 24V AC/DC | LATD-2 ② |

1. In place of ②, specify LED Color Code from table at left.

## AS6 Selector and Keylock Switches

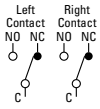
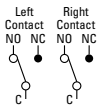
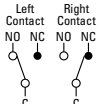
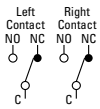
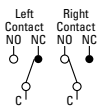
### AS6 Selector Switches and Keylock Switches (2 & 3 Position)

| Style | | Function | | Knob | Key |
|---|---|---|---|---|---|
| Round Selector | 2-Position 90° | Maintained | | AS6M-2Y2P | AS6M-2KT2P① |
| | | Spring Return Right | | AS6M-21Y2P | AS6M-21KT2PB |
| Round Keylock | 3-Position 45° | Maintained | | AS6M-3Y2P | AS6M-3KT2P① |
| | | Spring Return Right →Center | | AS6M-31Y2P | AS6M-31KT2P① |
| | | Spring Return Left →Center | | AS6M-32Y2P | AS6M-32KT2P① |
| | | 2-Way Return→Center | | AS6M-33Y2P | AS6M-33KT2PD |
| Square Selector | 2-Position 90° | Maintained | | AS6Q-2Y2P | AS6Q-2KT2P① |
| | | Spring Return to Right | | AS6Q-21Y2P | AS6Q-21KT2PB |
| Square Keylock | 3-Position 45° | Maintained | | AS6Q-3Y2P | AS6Q-3KT2P① |
| | | Spring Return Right→Center | | AS6Q-31Y2P | AS6Q-31KT2P① |
| | | Spring Return Left →Center | | AS6Q-32Y2P | AS6Q-32KT2P① |
| | | 2-Way Return→Center | | AS6Q-33Y2P | AS6Q-33KT2PD |
| Rectangular Selector | 2-Position 90° | Maintained | | AS6H-2Y2P | AS6H-2KT2P① |
| | | Spring Return Right | | AS6H-21Y2P | AS6H-21KT2PB |
| Rectangular Keylock | 3-Position 45° | Maintained | | AS6H-3Y2P | AS6H-3KT2P① |
| | | Spring Return Right →Center | | AS6H-31Y2P | AS6H-31KT2P① |
| | | Spring Return Left→Center | | AS6H-32Y2P | AS6H-32KT2P① |
| | | 2-Way Return→Center | | AS6H-33Y2P | AS6H-33KT2PD |

1. **All models are IP65 and DPDT.**
2. In place of ①, specify Key Retention Code. See table on right.
3. Available as assembled units only.
4. For accessories, see page 466.
5. For dimensions, see page 468.

### Contact Operations

(for all selectors)

| Contents | Operator Position & Contact Operation | |
|---|---|---|
| 2-pos. (DPDT) | Left |  |
| | Right |  |
| 3-pos. (DPDT) | Left |  |
| | Center |  |
| | Right |  |

### Key Retention Codes

| Code | Description |
|---|---|
| A | Key not retained in any position (removable in all positions) |
| B | Key retained in right position only |
| C | Key retained in left position only |
| D | Key retained in left and right (3 position only) |
| E | Key retained in center only (3 position only) |
| G | Key retained right and center (3 position only) |
| H | Key retained left and center (3 position only) |

Key cannot be removed in a spring return position.

## Switch Engraving Order Form – A6 Series

Copy this order form and use it to specify Letter Height, Maximum Number of Lines and Text to be engraved.

To insure engraving accuracy, fax it to your IDEC representative or Distributor.

Your Company: _____ Telephone: _____

Name: _____ Fax: _____

Address: _____ Email: _____

PO: _____ Part Number to be Engraved: _____

Please check one of the boxes below to indicate your choice of engraving options:

Rectangular Switch

| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 5/32 | 6 |
| ☐ | 2 | 5/32 | 6 |
| ☐ | | 1/8 | 6 |
| ☐ | 3 | 1/8 | 6 |
| ☐ | 4 | N/A | |

Square Switch

| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 5/32 | 5 |
| ☐ | 2 | 5/32 | 5 |
| ☐ | | 1/8 | 6 |
| ☐ | 3 | 1/8 | 6 |
| ☐ | 4 | N/A | |

Round Switch

| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 5/32 | 3 |
| ☐ | | 1/8 | 3 |
| ☐ | 2 | 5/32 | Custom* |
| ☐ | 3 | 1/8 | Custom* |
| ☐ | 4 | 3/32 | Custom* |

*Engraving is possible, but character size will be smaller than standard sizes.

1. Engraving is done on the button itself for non-Illuminated pushbuttons and on marking plate for illuminated pushbuttons and pilot lights.
2. Please enter text exactly how you want it engraved, take care to emphasize capital or small letters.

Enter text to be engraved :

Line 1: _____

Line 2: _____

Line 3: _____

Line 4: _____

**Sample Letter Sizes**

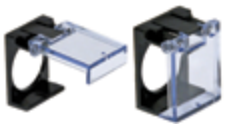
1/8 Letters: OPEN

5/32 Letters: OPEN

For IDEC Internal Use Only:

Work Order #: _____

## Accessories

| Appearance | | Description | Used With | Part Number |
|---|---|---|---|---|
| Locking Ring Wrench | | Made of metal. Used for tightening plastic locking ring during installation. Tightening torque should not exceed 3kgf-cm | Ø 5/8" (16mm) units | MT-001 |
| | | | Ø 31/64" (12mm) AP2M units | MT-002 |
| | | | Ø 13/32" (10mm) AP1M units | MT-003 |
| Lens Removal Tool | | Made of metal. Used for removing lens or button from the housing | All pushbuttons and pilot lights | MT-101 |
| Lamp Holder Tool | | Made of rubber. Used for removing and replacing LED lamps in illuminated units | All illuminated pushbuttons and pilot lights | OR-77 |
| Switch Guard |  | Prevents inadvertent switch operation. IP40 dust-tight. 90 degrees opening maintained | Round/Square | AL-K6 |
| | | | Rectangular | AL-KH6 |
| | | Prevents inadvertent switch operation. IP65 oiltight 180 degrees opening, spring return | Round/Square | AL-K6SP |
| | | | Rectangular | AL-KH6SP |
| Terminal Cover | | Made of translucent nylon. Fits over and shields the terminals | All 5/8" (16mm) units | AL-V6 |
| Dust Cover | | Fits over the lens or button to provide extra protection from dust (not applicable for oversize lenses or buttons). | All round units | AL-D6 |
| | | | All square units | AL-DQ6 |
| | | | All rectangular units | AL-DH6 |
| Adaptor Socket | | Plug-on terminal adaptor with solder terminals | All 5/8" (16mm) units | AL-C6 |
| | | Plug-on terminal adaptor with PCB terminals | | AL-C6V |
| Mounting Hole Plug | | Fills unused panel cutouts. Made of nitrile rubber. Push-in installation from front of panel. IP65 (oiltight). | Rubber | AL-B6 |
| | | Fills unused panel cutouts. Made of aluminum. Screw-on locking ring from inside of panel. IP65 (oiltight). | Aluminum | AL-BM6 |
| | | Round Mounting Hole Plug | Plastic (Applicable for flush mount switches only) | LA9Z-BS6 |
| | | Square Mounting Hole Plug | | LA9Z-BS7 |
| | | Rectangular Mounting Hole Plug | | LA9Z-BS8 |
| Replacement LED Lamps | | LED with built in current limiting resistor (with all illuminated assemblies). | 5V DC | LATD-5 ② |
| | | | 6V AC/DC | LATD-6 ② |
| | | | 12V AC/DC | LATD-1 ② |
| | | | 24V AC/DC | LATD-2 ② |
| Replacement Locking Ring | | Fastens operators to panel (included with all operators). | All switches & pilot lights | HA9Z-LN |
| Anti-Rotation Ring | | Prevents rotation of switches in panel (included with all operators). | All switches & pilot lights | AL6-LP |
| Replacement Engraving Inserts |  | Engraving plates to allow legends underneath translucent lenses (included with all lenses). | Round standard | AL6M-W |
| | | | Square standard | AL6Q-W |
| | | | Rectangular standard | AL6H-W |
| | | | Round oversize | AL6M-MW |
| | | | Square/rectangular oversize | AL6Q-QW |
| Replacement Keys | | Pair of keys (#132). All key switches use same standard key. | All key selectors | AS6-SK |

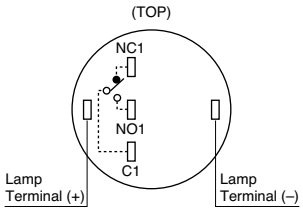
1. In place of ② specify color code. A=Amber, G=Green, Y=Yellow, R=Red, S=Blue, W=Warm White, JW=Cool White.
2. LEDs include built-in current limiting resistor and reverse polarity protection diode.

| Appearance | | Description | Used With | Part Number |
|---|---|---|---|---|
| Flush Bezel | | ø24mm round, metal (aluminum color), panel cut-out ø20.2mm | Pushbuttons, pilot lights, illuminated pushbutton, selector switches, key selector switches and illuminated selector switches. | LA9Z-SM61 |
| | | ø24mm round, plastic (black), square panel cut-out ø20.2mm | A6 Switch + Flush Bezel = Flush Switch | LA9Z-S61B |
| | | 24mm square, plastic (black), panel cut-out 20.2 x 20.2mm | | LA9Z-S71B |
| | | 24 x 30mm rectangular, plastic (black), rectangular panel cut-out ø20.2 x 26.2mm | | LA9Z-S81B |
| Switch Guard w/ Flush Bezel (spring return) | | Rectangular, plastic (black) | | LA9Z-KS8 |

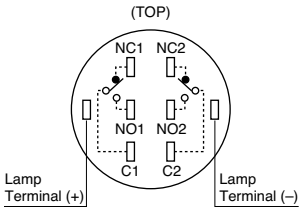
## Schematics — A Series: 5/8" (16mm)

### Terminal Arrangement (Top View)

**Illuminated Pushbuttons**

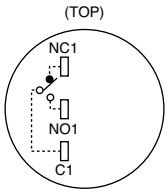



SPDT Contact
(Single-pole/Double Throw)

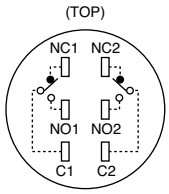



DPDT Contact
(Double-pole/Double Throw)

**Non-illuminated Pushbuttons and Selector Switches**

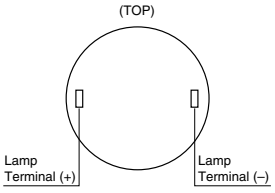



SPDT Contact
(Single-pole/Double Throw)



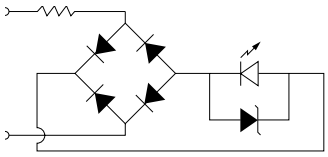

DPDT Contact
(Double-pole/Double Throw)

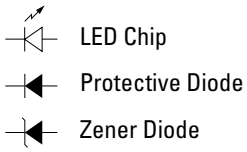
**Pilot Lights**




### IDEC's Superbright LED Internal Circuits

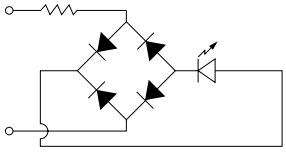
LATD-1,-2,-6 (GS)



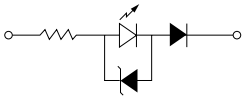



LATD-5 (ARWY)

LATD-1,-2,-6 (ARWY)

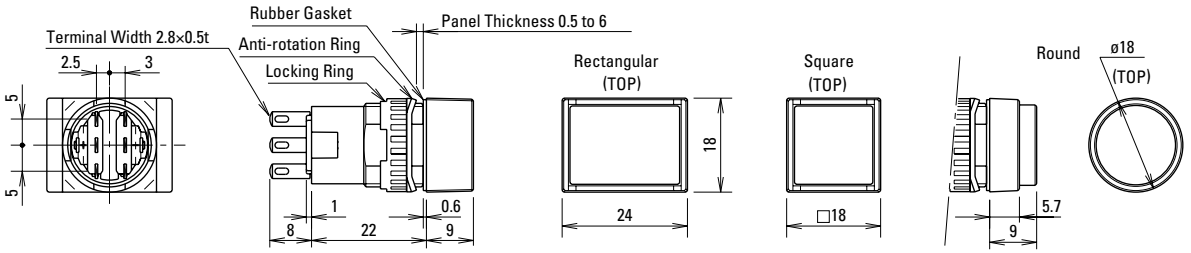


LATD-5 (GS)

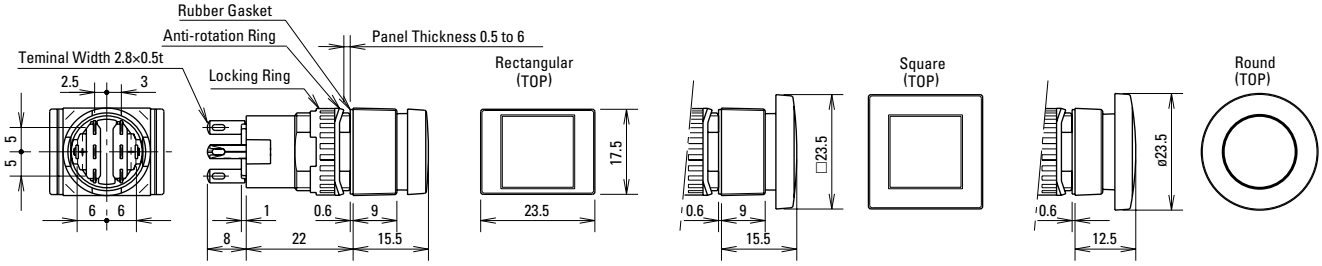


# Dimensions (mm)

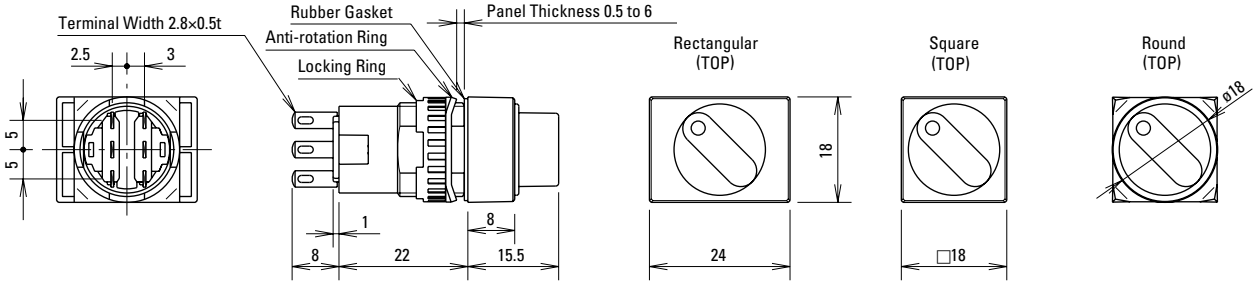
**Pushbuttons, Ø 5/8" (16mm)**



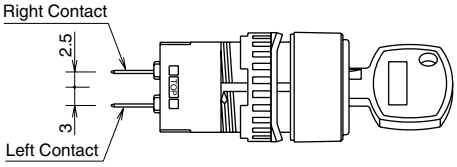

**Oversize Lens**

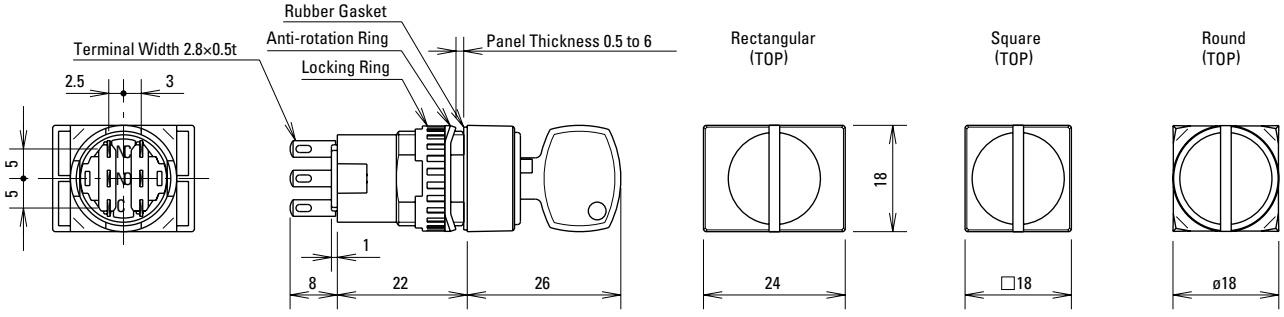



**Selector Switches, Ø 5/8" (16mm)**



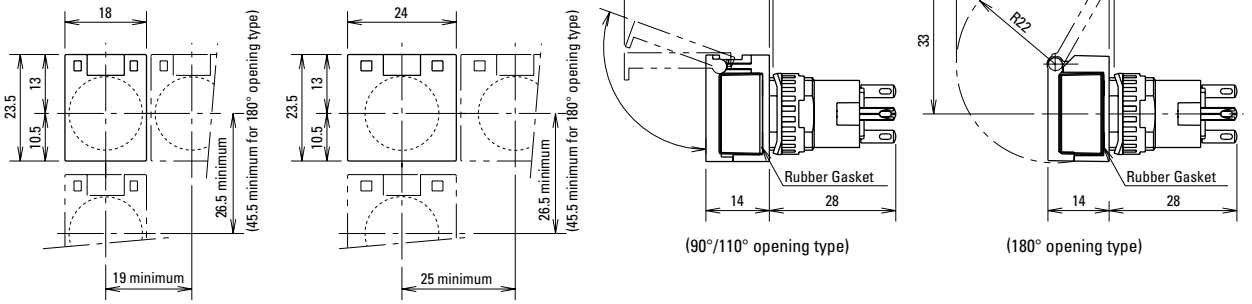

**Key Selector Switches, Ø 5/8" (16mm)**

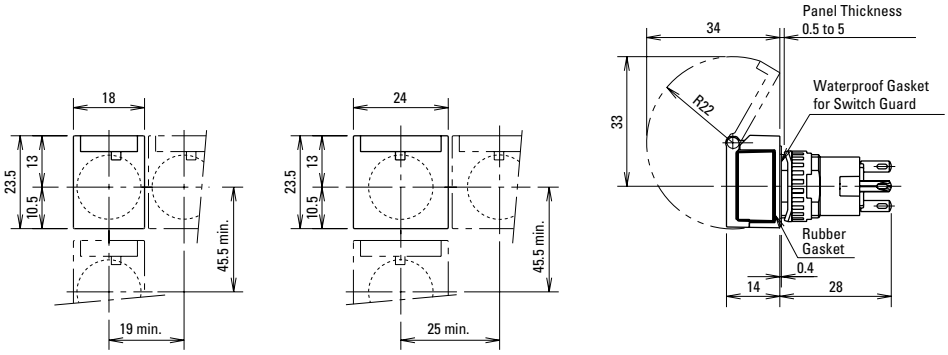


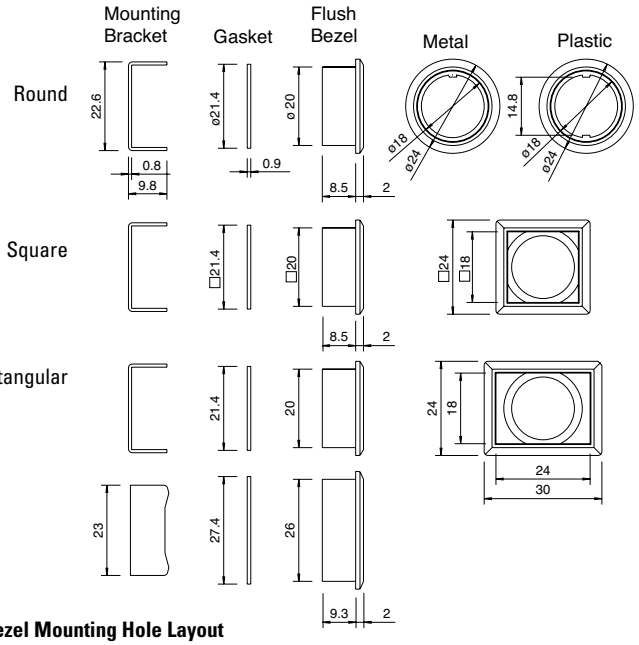

All dimensions are in mm.

## Switch Guard, Ø 5/8" (16mm)

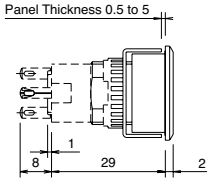



## Flush Bezel

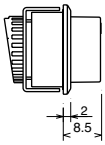



## Flush Bezel with Switch

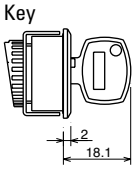



## Selector Switches

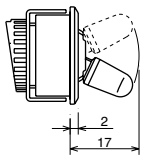
Illuminated &
Non-illuminated




Key

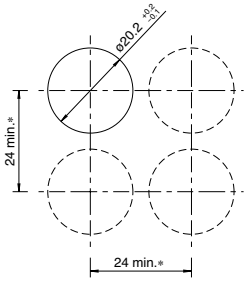



Lever

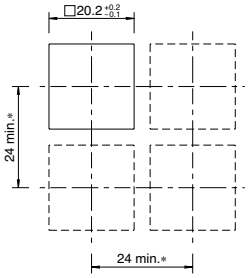



## Flush Bezel Mounting Hole Layout

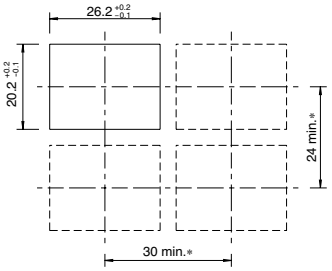
### Round

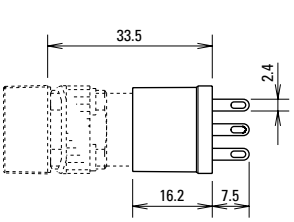



### Square

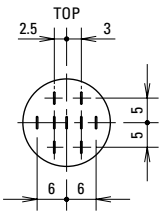


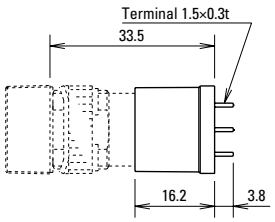

### Rectangular



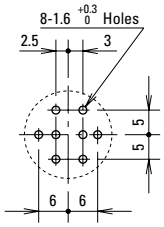



Solder Terminal Type
(AL-C6)

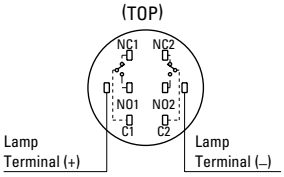



PC Board Terminal Type
(AL-C6V)



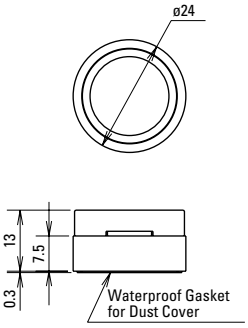

PC Board
Mounting Hole Layout
(Bottom View)



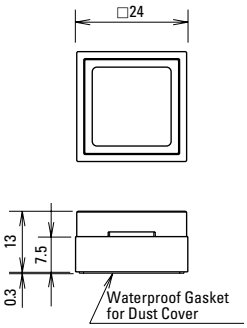

Terminal Arrangement
(Bottom View)

**Terminal Sockets**
**Dust Covers**

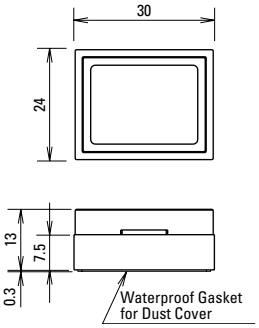
AL-D6, Round




AL-DQ6, Square

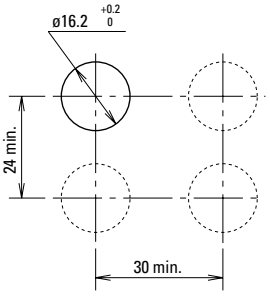



AL-DH6, Rectangular

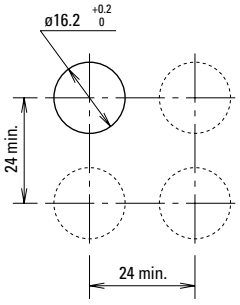



**Panel Cut-Outs For Units w/Dust Cover**

Round/Square

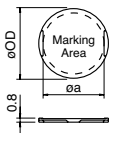
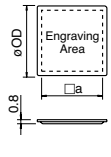
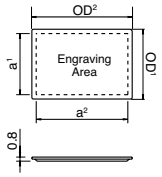



Rectangular



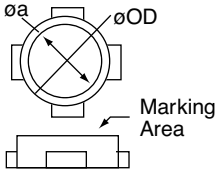
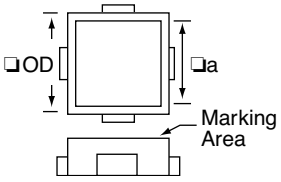

**Marking Plates**

## Pushbuttons with Standard Size Lens

| Style | Round—AL6M-W | Square—AL6Q-W | Rectangular—AL6H-W |
|---|---|---|---|
| Dimensions |   |   |   |
| | Ø 5/8" (16mm) | | |
| Outside (OD) | (13.8mm) | (13.8mm) | (OD¹ x OD²) 13.8 x 19.8mm |
| Marking Area (a) | (12mm) | (12mm) | (a¹xa²) 12 x 18mm |

Engraving must be made on the engraving area within 0.02" (0.5mm) deep.

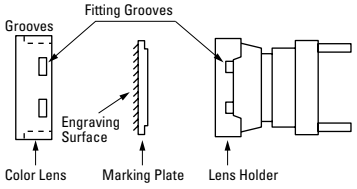
## Pushbuttons with Oversize Lens

| Style | Round—AL6M-MW | Square/Rectangular—AL6Q-QW |
|---|---|---|
| Dimensions |   |   |
| Outside (OD) | Ø 0.491" (12.6mm) | 0.491" (12.6mm) |
| Marking Area (a) | Ø 0.429" (11mm) | 0.429" (11mm) |

## Replacing and Marking Plate

### Removal

Remove the lens holder assembly (lens, marking plate and holder) from the operator by holding the color lens recesses with the lens removal tool (Part No.MT-101) and pulling out. Remove marking plate by pushing the color lens from the rear to disengage the latches. Marking plate must be engraved on the side as shown in the figure on the right.
Ø 5/8" (16mm)




### Installation

For illuminated pushbuttons:
1. Insert marking plate inside lens in correct direction
2. Press color lens on to lens holder to engage latches.
3. Insert lens holder into housing in correct direction.

Do not loosen spring on illuminated pushbutton units (except on pilot light units). The marking plate must be engraved on the front side as shown above.

## L6 (Oversize) Series — Miniature Switches and Pilot Devices

**Key features:**

- 5/8" (16mm) mounting holes
- Locking lever removable contact blocks
- Solder terminal or PCB terminal options
- Available assembled or as sub-components
- Worldwide approvals
- Incandescent or LED illumination
- Snap action contacts

UL Recognized
File No. E55996

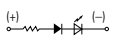
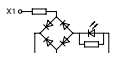
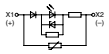
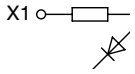
CSA Certified
File No. LR21451

TÜV Rheinland

Registration No. R9551089 (E-stops)
Registration No. J9551458 (all other switches)
Registration No. R95650511 (Pilot Lights)

| | | |
|---|---|---|
| Contact Ratings | Conforming to Standards | EN60947-1, EN60947-5-1, VDE0660-200, UL508, CSA C22-2 N0.14 |
| | Operating Temperature | Operation: –25 to +55°C (without freezing), 45 to 85% RH<br>Storage: -30 to +80°C (without freezing) |
| | Vibration Resistance | 5 to 55Hz, 1.0 peak-peak amplitude max |
| | Shock Resistance | Operating limit: 100 m/sec$^2$ (approximately 10G)<br>Damage limit: 1000 m/sec$^2$ (approximately 100G) |
| | Mechanical Life | Momentary pushbuttons 2,000,000 operations minimum<br>All others: 250,000 operations minimum |
| | Degree of Protection | IP65 (conforming to IEC 60529) |
| | Dielectric Strength | Switch unit: between live and ground: 2500 volt AC, 1 minute<br>between terminals of different poles: 2500 volt AC, 1 minute<br>between terminals of same pole: 1000 volt AC, 1 minute<br>Illumination unit: between live part and ground: 2500 volt AC, 1 minute |
| | Insulation Resistance | 100MΩ minimum (using 500V DC megger) |
| | Rated Insulation Voltage | 250V AC/DC |
| | Rated Thermal Current | Gold Contacts (pcb): 3A<br>Silver Contacts (solder): 5A |
| | Contact Resistance | 50Ω maximum initial value |
| | Rated Operating Current | **Silver Contacts (Solder Terminals)**<br>30V / 125V / 250V<br>AC resistive — / 5A / 2A<br>AC inductive — / 2A / 1.5A<br>DC resistive 3A / 0.4A / —<br>DC inductive 1A / 0.2A / —<br>**Gold Clad Contacts (PCB terminals)**<br>30V / 125V<br>AC inductive - / 0.1A<br>DC resistive 0.1A / — |
| | Minimum Recommended Load (reference value for silver contacts) | 5V AC/DC, 1mA |
| | Terminal Style | 0.110" Solder Tab /PCB |
| | Contact Form | Snap Action, Double Throw |
| | Contact Material | Solder Tab: Pure Silver /PCB: Gold Plated Silver |
| | Electrical Life (at full load) | Momentary pushbuttons: 100,000 operations minimum (1800 operations / hour)<br>All others: 100,000 operations minimum (1200 operations / hour) |
| Lamp Ratings | Lamp Current Draw | 5V DC LED: 8mA<br>6V AC/DC LED: 7mA<br>12V AC/DC LED: 8mA<br>24V AC/DC LED: 8mA<br>120V AC = 8mA<br>6V AC/DC incandescent: 100 mA<br>12V AC/DC incandescent: 50 mA<br>24V AC/DC incandescent: 25 mA |
| | Lamp Life | Incandescent: 2000 hours./LED 50,000 hours. (on pure DC, half-life intensity) |

## Built-in LED Lamp Ratings

| Model | | LFTD-5② | LFTD-1② | LFTD-2② | LFTD-H2② |
|---|---|---|---|---|---|
| Lamp Base | | SX6S/8x5.4 | | | |
| Rated Voltage | | 5V DC | 12V AC/DC | 24V AC/DC | 120V AC |
| Operating Voltage | | 5V DC ±5% | 12V AC/DC ±10% | 24V AC/DC ±10% | 120V AC ±5% |
| Current Draw | AC | — | 9mA | 9mA | 8mA |
| | DC | 8mA | 8mA | 8mA | — |
| Color Code ② | | Specify a color code in place of ② in the Part No: A (amber), G (green), R (red), S (blue), W (white), Y (yellow) | | | |
| Lamp Base Color | | Same as illumination color | | | |
| Voltage Marking | | Stamped on the lamp base | | | |
| Life (reference value) | | Approx. 50,000 hours | | | |
| Internal Circuit | | A, R, W, Y  G, S  | A, R, W, Y  G, S  | | |

## Non-Illuminated Pushbuttons (Assembled)

### Non-Illuminated Pushbuttons

| Style | Operation | Contact | Terminal Style | |
|---|---|---|---|---|
| | | | Solder Tab | PCB |
| Oversize Round Extended | Momentary | SPDT | HA1B-M2C5-① | HA1B-M2C1V-① |
| | | DPDT | HA1B-M2C6-① | HA1B-M2C2V-① |
| | Maintained | SPDT | HA1B-A2C5-① | HA1B-A2C1V-① |
| | | DPDT | HA1B-A2C6-① | HA1B-A2C2V-① |
| Oversize Square Flush | Momentary | SPDT | HA2B-M1C5-① | HA2B-M1C1V-① |
| | | DPDT | HA2B-M1C6-① | HA2B-M1C2V-① |
| | Maintained | SPDT | HA2B-A1C5-① | HA2B-A1C1V-① |
| | | DPDT | HA2B-A1C6-① | HA2B-A1C2V-① |
| Oversize Square Extended | Momentary | SPDT | HA2B-M2C5-① | HA2B-M2C1V-① |
| | | DPDT | HA2B-M2C6-① | HA2B-M2C2V-① |
| | Maintained | SPDT | HA2B-A2C5-① | HA2B-A2C1V-① |
| | | DPDT | HA2B-A2C6-① | HA2B-A2C2V-① |
| Mushroom | Momentary | SPDT | HA1B-M3C5-① | HA1B-M3C1V-① |
| | | DPDT | HA1B-M3C6-① | HA1B-M3C2V-① |
| | Maintained | SPDT | HA1B-A3C5-① | HA1B-A3C1V-① |
| | | DPDT | HA1B-A3C6-① | HA1B-A3C2V-① |

### ①Button Color Codes

| Color | Code | Color | Code |
|---|---|---|---|
| Black | B | Blue | S |
| Green | G | White | W |
| Red | R | Yellow | Y |

1. In place of ① specify Button Color Code from table.
2. Illuminated (translucent) style lenses also available, specify as such: instead of LA1B-M1C5-① use LA1B-M1C5L-② in place of ② (specify Lens Color Code from next page.)
3. PCB terminal models also available with silver contacts (change "1" or "2" to "5" or "6" respectively, ie LA1B-M1C1V-① becomes LA1B-M1C5V-①).

## Non-Illuminated Pushbuttons (Sub-Assembled)

| Contact | + | Safety Lever Lock | + | Operator | + | Button | = | Complete Part |
|---|---|---|---|---|---|---|---|---|

### Operators

| Style | Momentary | Maintained |
|---|---|---|
| Oversize Round | HA1B-M0 | HA1B-A0 |
| Oversize Square | HA2B-M0 | HA2B-A0 |
| Mushroom | HA1B-M0L | HA1B-A0L |

1. In place of ① specify Button Color Code from table on right.
2. In place of ② specify Lens Color Code from table on right.
3. *requires HA1L-M0 or HA1L-A0 operator instead of HA1B-M0 or HA1B-A0.
4. **requires HA2L-M0 or HA2L-A0 instead of HA2B-M0 or HA2B-A0.

### Buttons/Lenses

| Style | Button | Lens |
|---|---|---|
| Oversize Round Flush | HA1A-B1-① | HA1A-L1-②* |
| Oversize Round Extended | HA1A-B2-① | – |
| Oversize Square Flush | HA2A-B1-① | HA2A-L1-②** |
| Oversize Square Extended | HA2A-B2-① | – |
| Mushroom | HA1A-B3-① | HA1A-L3-② |

### Contacts

| Style | | Contacts | Terminal Style | |
|---|---|---|---|---|
| | | | Solder Tab | PCB |
| | Gold | SPDT<br>DPDT | HA-C1<br>HA-C2 | HA-C1V<br>HA-C2V |
| | Silver | SPDT<br>DPDT | HA-C5<br>HA-C6 | HA-C5V<br>HA-C6V |

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HA9Z-LS |

### ① Button Color Code

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

### ② Lens Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| Yellow | Y |
| White | W |

# HA1B/HA1E Stop Switch

## Key features:

- PCB or Solder Terminals
- Locking Lever Removable Contact Blocks
- Positive Action Contacts
- 1 or 2 form B (SPST-NC) Contacts
- IP65 Protection
- 16mm Mounting Hole
- Tamper Proof Construction

File No. DK95-00138

CSA
File No. LR21451

UL Recognized
File No. E55996

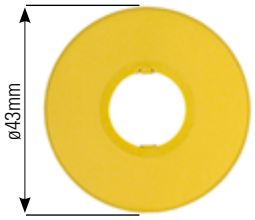
Direct
Opening
Action

## Specifications

| | | |
|---|---|---|
| Contact Form | | 1 or 2 form B (SPST-NC) |
| Termination | | PCB or Solder Terminal |
| Contact Material | | Silver |
| Applicable Standards | | EN60947-5-1, UL508, CSA 22.2. No. 14 |
| Rated Insulation Voltage | | 250V AC/DC |
| Degree of Protection | | IP65 |
| Conditional Short-Circuit Current and Short-Circuit Protective Device | | 50 A (at 250V) 10A 250V Fuse, operation class M according to IEC269-1 and IEC269-2 |
| Positive Opening Operation | Positive opening travel | 3.4mm |
| | Minimum force required to achieve positive opening operation of all break contacts. | 10.3 N (2 form B contacts) |
| | Maximum travel including travel beyond the minimum travel position | 5.5mm |
| | Maximum frequency of actuation | 1,200 operations/hour |
| Pollution Degree | | 3 |

## Nameplates

HAAV–Yellow Plastic




| Marking | Part Number |
|---|---|
| Blank | HAAV-0 |

## Positive Action Stop Switch

| Style | | Operation | Contact | | Terminal Style: Solder Tab | Terminal Style: PCB |
|---|---|---|---|---|---|---|
| Stop Switch | | Pushlock/ Turn Reset | DPST(NC) (2 form B) | | HA1B-V2E2R | HA1B-V2E2VR |
| | | | Short Body | SPST-NC (1 form B) DPST-NC (2 form B) | HA1E-V2S1R HA1E-V2S2R | — |

1. Button is non-removable, available in red and as complete assembled unit only.
2. Stop Switch does not come with safety lever lock.

## Accessories: Shroud

| Style | Part Number | Applicable Standards |
|---|---|---|
| | XA9Z-KG1 | SEMI S2 Compliant (Approved by TUV) |

## Buzzers (IP40)

| Style | | Operating Voltage | Terminal Style: Solder/ Tab | Terminal Style: PCB |
|---|---|---|---|---|
| Buzzer-Rectangular | | 6V AC/DC ± 10% | LA3Z-1X2 | LA3Z-1X2V |
| | | 12V to 24 AC/DC ± 10% | LA3Z-1X4 | LA3Z-1X4V |

## Buzzer Ratings

| | |
|---|---|
| Frequency | 2 khz ± 500 HZ |
| Amplitude | 80db @ 0.1m (at rated voltage) |
| Operating Voltage | 6V AC/DC or 12 - 24V AC/DC ± 10% |
| Adjustable Cycle | 55 to 600 cycles per minute |
| Current Draw | DC: 7mA<br>AC: 20mA |
| Life | 1000 hrs. minimum |
| Insulation Voltage | 60V AC/DC |
| Operating Temperature | -20 to 55°C (no freezing), 45 to 85% RH |
| Degree of Protection | IP40 |

# Pilot Lights (Assembled)

## Pilot Lights

| Style | Terminal Style | |
|---|---|---|
| | Solder Tab | PCB |
| Oversize Round | HA1P-1C0③-② | HA1P-1C0③V-② |
| Oversize Square | HA2P-1C0③-② | HA2P-1C0③V-② |
| Oversize Round Unibody | HA1P-1③-② | — |
| Oversize Square Unibody | HA2P-1③-② | — |

1. In place of ② specify Lens/LED Color Code from table.
2. In place of ③ specify Voltage Code from table.

## ②Lens/LED Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

## ③Voltage/Lamp Code

| Voltage | Code |
|---|---|
| 5V DC LED | 1 |
| 6V AC/DC LED | 2 |
| 12V AC/DC LED | 3 |
| 24V AC/DC LED | 4 |
| 120V AC LED | 8 |
| 6V AC/DC Incandescent | 5 |
| 12V AC/DC Incandescent | 6 |
| 24V AC/DC Incandescent | 7 |

## Pilot Lights (Sub-Assembled)

| Terminals | + | Safety Lever Lock | + | Lamp Holder | + | Lamp | + | Operator | + | Lens | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

### Operators

| Style | Part Number |
|---|---|
| Oversize Round | HA1P-0 |
| Oversize Square | HA2P-0 |
| Oversize Round Unibody | HA1P-00 |
| Oversize Square Unibody | HA2P-00 |

### Lenses

| Style | Part Number |
|---|---|
| Oversize Round | HA1A-P1-② |
| Oversize Square | HA2A-P1-② |

In place of ② specify lens color code.

### Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 5V DC<br>6V AC/DC<br>12V AC/DC<br>24V AC/DC<br>120 V AC | LFTD-5②<br>LFTD-6②<br>LFTD-1②<br>LFTD-2②<br>LFTD-H2② |
| Incandescent | 6V AC/DC<br>12V AC/DC<br>24V AC/DC | LH-06<br>LH-14<br>LH-28 |

In place of ② specify LED color code from table below.

### Terminals

| Style | Solder Tab | PCB |
|---|---|---|
| | HA-C00 | HA-C00V |

Not required for unibody operators.

### Lamp Holder

| Style | Part Number |
|---|---|
| | HA9Z-AH |

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HA9Z-LS |

### ② Lens/LED Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| Yellow | Y |
| White | W |

# Illuminated Pushbuttons (Assembled)

## Illuminated Pushbuttons

| Style | Operation | Contact | Terminal Style | |
|---|---|---|---|---|
| | | | Solder Tab | PCB |
| Oversize Round | Momentary | SPDT<br>DPDT | HA1L-M1C5③-②<br>HA1L-M1C6③-② | HA1L-M1C1③V-②<br>HA1L-M1C2③V-② |
| | Maintained | SPDT<br>DPDT | HA1L-A1C5③-②<br>HA1L-A1C6③-② | HA1L-A1C1③V-②<br>HA1L-A1C2③V-② |
| Oversize Square | Momentary | SPDT<br>DPDT | HA2L-M1C5③-②<br>HA2L-M1C6③-② | HA2L-M1C1③V-②<br>HA2L-M1C2③V-② |
| | Maintained | SPDT<br>DPDT | HA2L-A1C5③-②<br>HA2L-A1C6③-② | HA2L-A1C1③V-②<br>HA2L-A1C2③V-② |
| Mushroom | Momentary | SPDT<br>DPDT | HA1L-M3C5③-②<br>HA1L-M3C6③-② | HA1L-M3C1③V-②<br>HA1L-M3C2③V-② |
| | Maintained | SPDT<br>DPDT | HA1L-A3C5③-②<br>HA1L-A3C6③-② | HA1L-A3C1③V-②<br>HA1L-A3C2③V-② |

1. In place of ② specify Lens Color Code from table.
2. In place of ③ specify Voltage Code from table.
3. PCB terminal models also available with silver contacts change "1" or "2" to "5" or "6" respectively, (ie LA1L-M1C14V-① becomes LA1L-M1C54V-①).
4. Light independent of switch position.

## ②Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| Yellow | Y |
| White | W |

## ③Voltage/Lamp Code

| Voltage | Code |
|---|---|
| 5V DC LED | 1 |
| 6V AC/DC LED | 2 |
| 12V AC/DC LED | 3 |
| 24V AC/DC LED | 4 |
| 120 V AC LED | 8 |
| 6V AC/DC Incandescent | 5 |
| 12V AC/DC Incandescent | 6 |
| 24V AC/DC Incandescent | 7 |

## Illuminated Pushbuttons (Sub-Assembled)

| Terminals | + | Safety Lever Lock | + | Lamp Holder | + | Lamp | + | Operator | + | Lens | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |

### Operators

| Style | Momentary | Maintained |
|---|---|---|
| Oversize Round | HA1L-M0 | HA1L-A0 |
| Oversize Square | HA2L-M0 | HA2L-A0 |
| Mushroom | HA1B-M0L | HA1B-A0L |

### ② Lens/LED Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| Yellow | Y |
| White | W |

### Lenses

| Style | Part Number |
|---|---|
| Oversize Round | HA1A-L1-② |
| Oversize Square | HA2A-L1-② |
| Mushroom | HA1A-L3-② |

In place of ② specify lens color code.

### Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 5V DC<br>6V AC/DC<br>12V AC/DC<br>24V AC/DC<br>120 V AC | LFTD-5②<br>LFTD-6②<br>LFTD-1②<br>LFTD-2②<br>LFTD-H2② |
| Incandescent | 6V AC/DC<br>12V AC/DC<br>24V AC/DC | LH-06<br>LH-14<br>LH-28 |

### Contacts

| Style | | Contacts | Terminal Style | |
|---|---|---|---|---|
| | | | Solder Tab | PCB |
| | Gold | SPDT<br>DPDT | HA-C10<br>HA-C20 | HA-C10V<br>HA-C20V |
| | Silver | SPDT<br>DPDT | HA-C50<br>HA-C60 | HA-C50V<br>HA-C60V |

### Lamp Holder

| Style | Part Number |
|---|---|
| | HA9Z-AH |

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HA9Z-LS |

# Selector Switches (Assembled)

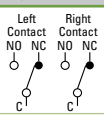
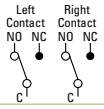
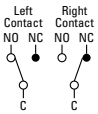
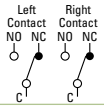
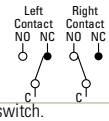
## Selector Switches

| Style | | Position | | Contact | Terminal Style | |
|---|---|---|---|---|---|---|
| | | | | | Solder Tab | PCB |
| Oversize Round | 90° 2 -Position | Maintained | L R | DPDT | HA1S-2C6 | HA1S-2C2V |
| | | Spring return from right | L R | DPDT | HA1S-21C6 | HA1S-21C2V |
| | 45° 3-Position | Maintained | C L R | DPDT | HA1S-3C6 | HA1S-3C2V |
| | | Spring return from right | C L R | DPDT | HA1S-31C6 | HA1S-31C2V |
| | | Spring return from left | C L R | DPDT | HA1S-32C6 | HA1S-32C2V |
| | | 2-Way spring return | C L R | DPDT | HA1S-33C6 | HA1S-33C2V |

1. All assembled selector switches use DPDT contacts.
2. For SPDT contacts see sub-components on next page.
3. PCB terminal models also available with silver contacts change "1" or "2" to "5" or "6" respectively, (ie LA1S-21C2V becomes LA1S-21C6V).

## Contact Operations

(for all selectors)

| Contacts | Operator Position and Contact Operation | |
|---|---|---|
| 2-pos. (DPDT) | Left |   |
| | Right |   |
| 3-pos. (DPDT) | Left |   |
| | Center |   |
| | Right |   |

As viewed from front of switch.

## Selector Switches (Sub-Assembled)

| Contact | + | Safety Lever Lock | + | Operator | = | Complete Part |
|---|---|---|---|---|---|---|

### Operators

| Style | Position | Function | Part Number |
|---|---|---|---|
| Oversize Round | 2 | Maintained<br>Spring from right | HA1S-2Y<br>HA1S-21Y |
| | 3 | Maintained<br>Spring from right<br>Spring from left<br>Spring from both | HA1S-3Y<br>HA1S-31Y<br>HA1S-32Y<br>HA1S-33Y |

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HA9Z-LS |

### Contacts

| Style | | Contacts | Terminal Style | |
|---|---|---|---|---|
| | | | Solder Tab | PCB |
| | Gold | SPDT<br>DPDT | HA-C1<br>HA-C2 | HA-C1V<br>HA-C2V |
| | Silver | SPDT<br>DPDT | HA-C5<br>HA-C6 | HA-C5V<br>HA-C6V |

1. All assembled switches listed on previous page use DPDT contacts.
2. SPDT Contacts for use on 2 position selector switch only

# Key Switches (Assembled)

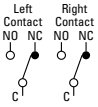
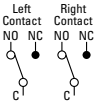
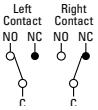
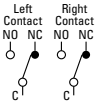
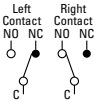
## Key Switches

| Style | | Position | | Contact | Terminal Style | |
|---|---|---|---|---|---|---|
| | | | | | Solder Tab | PCB |
| Oversize Round | 90° 2-Position | Maintained | L R | DPDT | HA1K-2C6③ | HA1K-2C2V③ |
| | | Spring return from right | L C R | DPDT | HA1K-21C6B | HA1K-21C2VB |
| | 45° 3-Position | Maintained | L C R | DPDT | HA1K-3C6③ | HA1K-3C2V③ |
| | | Spring return from right | L C R | DPDT | HA1K-31C6③ | HA1K-31C2V③ |
| | | Spring return from left | L C R | DPDT | HA1K-32C6③ | HA1K-32C2V③ |
| | | 2-Way spring return | L C R | DPDT | HA1K-33C6D | HA1K-33C2VD |

1. In place of ③ specify Key Retention Code from next page.
2. All assembled key switches have DPDT contacts. For SPDT see sub-assembled on next page.
3. PCB terminal models also available with silver contacts change "1" or "2" to "5" or "6" respectively, (ie LA1K-2C2V③ becomes LA1K-2C6V③).

## Contact Operations

(for all selectors)

| Contacts | Operator Position and Contact Operation | |
|---|---|---|
| 2-pos. (DPDT) | Left |  |
| | Right |  |
| 3-pos. (DPDT) | Left |  |
| | Center |  |
| | Right |  |



As viewed from front of switch.

## ③ Key Retention Option Codes

| Code | Description |
|---|---|
| A | Key not retained in any position (removable in all positions) |
| B | Key retained in right position only |
| C | Key retained in left position only |
| D | Key retained in left and right (3 position only) |
| E | Key retained in center only (3 position only) |
| G | Key retained right and center (3 position only) |
| H | Key retained left and center (3 position only) |

Key cannot be removed from a spring-return position.

## Selector Switches (Sub-Assembled)

| Contact | + | Safety Lever Lock | + | Operator | = | Complete Part |
|---|---|---|---|---|---|---|

### Operators

| Style | Position | Function | Part Number |
|---|---|---|---|
| Oversize Round | 2 | Maintained<br>Spring from right | HA1K-2③<br>HA1K-21B |
| | 3 | Maintained<br>Spring from right<br>Spring from left<br>Spring from both | HA1K-3③<br>HA1K-31③<br>HA1K-32③<br>HA1K-33D |

1. In place of ③ specify key removable code from table on right.
2. Operator includes two keys.

### Contacts

| Style | | Contacts | Terminal Style | |
|---|---|---|---|---|
| | | | Solder Tab | PCB |
| | Gold | SPDT<br>DPDT | HA-C1<br>HA-C2 | HA-C1V<br>HA-C2V |
| | Silver | SPDT<br>DPDT | HA-C5<br>HA-C6 | HA-C5V<br>HA-C6V |

1. All assembled switches listed on previous page use DPDT contacts.
2. SPDT Contacts for use on 2 position selector switch only

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HA9Z-LS |

### ③ Key Retention Option Codes

| Code | Description |
|---|---|
| A | Key not retained in any position (removable in all positions) |
| B | Key retained in right position only |
| C | Key retained in left position only |
| D | Key retained in left and right (3 position only) |
| E | Key retained in center only (3 position only) |
| G | Key retained right and center (3 position only) |
| H | Key retained left and center (3 position only) |

Key cannot be removed from a spring-return position.

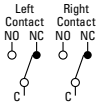
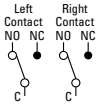
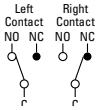
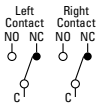
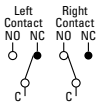
# Illuminated Selector Switches (Assembled)

## Illuminated Selector Switches

| Style | | Position | Contact | Terminal Style | |
|---|---|---|---|---|---|
| | | | | Solder Tab | PCB |
| Round | 90˚ 2 -Position | Maintained | DPDT | LA1F-2C6③-② | LA1F-2C2③V-② |
| | | Spring return from right | DPDT | LA1F-21C6③-② | LA1F-21C2③V-② |
| | 45˚ 3-Position | Maintained | DPDT | LA1F-3C6③-② | LA1F-3C2③V-② |
| | | Spring return from right | DPDT | LA1F-31C6③-② | LA1F-31C2③V-② |
| | | Spring return from left | DPDT | LA1F-32C6③-② | LA1F-32C2③V-② |
| | | 2-Way spring return | DPDT | LA1F-33C6③-② | LA1F-33C2③V-② |
| Square | 90˚ 2 -Position | Maintained | DPDT | LA2F-2C6③-② | LA2F-2C2③V-② |
| | | Spring return from right | DPDT | LA2F-21C6③-② | LA2F-21C2③V-② |
| | 45˚ 3-Position | Maintained | DPDT | LA2F-3C6③-② | LA2F-3C2③V-② |
| | | Spring return from right | DPDT | LA2F-31C6③-② | LA2F-31C2③V-② |
| | | Spring return from left | DPDT | LA2F-32C6③-② | LA2F-32C2③V-② |
| | | 2-Way spring return | DPDT | LA2F-33C6③-② | LA2F-33C2③V-② |
| Rectangular | 90˚ 2 -Position | Maintained | DPDT | LA3F-2C6③-② | LA3F-2C2③V-② |
| | | Spring return from right | DPDT | LA3F-21C6③-② | LA3F-21C2③V-② |
| | 45˚ 3-Position | Maintained | DPDT | LA3F-3C6③-② | LA3F-3C2③V-② |
| | | Spring return from right | DPDT | LA3F-31C6③-② | LA3F-31C2③V-② |
| | | Spring return from left | DPDT | LA3F-32C6③-② | LA3F-32C2③V-② |
| | | 2-Way spring return | DPDT | LA3F-33C6③-② | LA3F-33C2③V-② |
| Oversize Round | 90˚ 2 -Position | Maintained | DPDT | HA1F-2C6③-② | HA1F-2C2③V-② |
| | | Spring return from right | DPDT | HA1F-21C6③-② | HA1F-21C2③V-② |
| | 45˚ 3-Position | Maintained | DPDT | HA1F-3C6③-② | HA1F-3C2③V-② |
| | | Spring return from right | DPDT | HA1F-31C6③-② | HA1F-31C2③V-② |
| | | Spring return from left | DPDT | HA1F-32C6③-② | HA1F-32C2③V-② |
| | | 2-Way spring return | DPDT | HA1F-33C6③-② | HA1F-33C2③V-② |

## Contact Operations

(for all selectors)

| Contacts | Operator Position and Contact Operation | |
|---|---|---|
| 2-pos. (DPDT) | Left |  |
| | Right |  |
| 3-pos. (DPDT) | Left |  |
| | Center |  |
| | Right |  |



As viewed from front of switch.

## ② Lens/LED Color Codes

| Color | Code | Color | Code |
|---|---|---|---|
| Amber | A | Blue | S |
| Green | G | Yellow | Y |
| Red | R | White | W |

## ③ Voltage/Lamp Code

| Voltage | Code |
|---|---|
| 5V DC LED | 1 |
| 6V AC/DC LED | 2 |
| 12V AC/DC LED | 3 |
| 24V AC/DC LED | 4 |
| 120V AC LED | 8 |
| 6V AC/DC Incandescent | 5 |
| 12V AC/DC Incandescent | 6 |
| 24V AC/DC Incandescent | 7 |

1. In place of ② specify Lens/LED Color Code from table above.
2. In place of ③ specify Voltage Code from table above.
3. All switches listed have DPDT contacts. For SPDT see sub-assembled on next page.
4. PCB terminal models also available with silver contacts change "1" or "2" to "5" or "6" respectively, (ie LA1F-2C24V-② becomes LA1F-2C64V-②).
5. Light independent of switch position.

# Illuminated Selector Switches (Sub-Assembled)

| Contacts | + | Safety Lever Lock | + | Lamp Holder | + | Lamp | + | Operator | + | Lens/Handle | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |

## Operators

| Style | | Position | Function | Part Number |
|---|---|---|---|---|
| Round | | 2 | Maintained<br>Spring from right | LA1F-20<br>LA1F-210 |
| | | 3 | Maintained<br>Spring from right<br>Spring from left<br>Spring from both | LA1F-30<br>LA1F-310<br>LA1F-320<br>LA1F-330 |
| Square | | 2 | Maintained<br>Spring from right | LA2F-20<br>LA2F-210 |
| | | 3 | Maintained<br>Spring from right<br>Spring from left<br>Spring from both | LA2F-30<br>LA2F-310<br>LA2F-320<br>LA2F-330 |
| Rectangular | | 2 | Maintained<br>Spring from right | LA3F-20<br>LA3F-210 |
| | | 3 | Maintained<br>Spring from right<br>Spring from left<br>Spring from both | LA3F-30<br>LA3F-310<br>LA3F-320<br>LA3F-330 |
| Oversize Round | | 2 | Maintained<br>Spring from right | HA1F-20<br>HA1F-210 |
| | | 3 | Maintained<br>Spring from right<br>Spring from left<br>Spring from both | HA1F-30<br>HA1F-310<br>HA1F-320<br>HA1F-330 |

## Safety Lever Lock

| Style | Part Number |
|---|---|
| | HA9Z-LS |

## Lamp Holder

| Style | Part Number |
|---|---|
| | HA9Z-AH |

## Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 5V DC<br>6V AC/DC<br>12V AC/DC<br>24V AC/DC<br>120V AC | LFTD-5②<br>LFTD-6②<br>LFTD-1②<br>LFTD-2②<br>LFTD-H2② |
| Incandescent | 6V AC/DC<br>12V AC/DC<br>24V AC/DC | LH-06<br>LH-14<br>LH-28 |

In place of ② specify LED color code from table below.

## Contacts

| Style | | Contacts | Terminal Style | |
|---|---|---|---|---|
| | | | Solder Tab | PCB |
| | Gold | SPDT<br>DPDT | HA-C10<br>HA-C20 | HA-C10V<br>HA-C20V |
| | Silver | SPDT<br>DPDT | HA-C50<br>HA-C60 | HA-C50V<br>HA-C60V |

All assembled selectors on previous pages use DPDT contacts. SPDT contacts are for use only on two position selectors.

## Lenses/Handles

| Style | Part Number |
|---|---|
| Standard | LA1A-F-② |
| Oversize | HA1A-F-② |

In place of ② specify lens color code from table.

## ② Lens/LED Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| Yellow | Y |
| White | W |

# Pushbutton Selectors (Assembled)

## Pushbutton Selectors

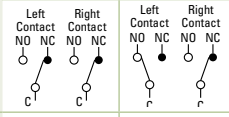
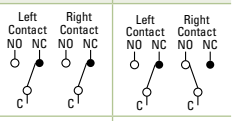
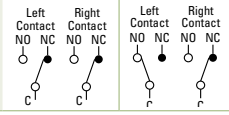
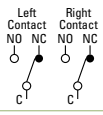
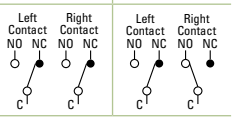
| Style | | Terminal Style | |
|---|---|---|---|
| | | Solder Tab | PCB |
| | 2 Position | HA1R-2C6-① | HA1R-2C2V-① |
| | 3 Position | HA1R-3C6-① | HA1R-3C2V-① |

1. In place of ① specify Button Color Code.
2. PCB terminal models also available with silver contacts (change "1" or "2" to "5" or "6" respectively, ie HA1R-2C2V-① becomes HA1R-2C6V-①).
3. Pushed position, momentary only.

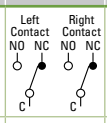
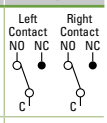
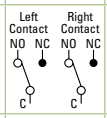
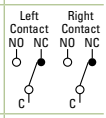
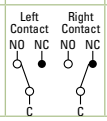
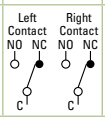
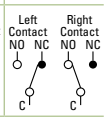
## ① Button Color Codes

| Color | Code | Color | Code |
|---|---|---|---|
| Amber | A | Blue | S |
| Green | G | Yellow | Y |
| Red | R | White | W |

## Contact Operation

| Style | Operator Position | | | | | |
|---|---|---|---|---|---|---|
| | Left | | Center | | Right | |
| | Normal | Pushed | Normal | Pushed | Normal | Pushed |
| 2 Position |  |  | — | — |  |  |
| 3 Position |  |  |  | Blocked |  |  |

## Contact Operation

| Contacts | Operator Position and Contact Information | | | |
|---|---|---|---|---|
| | | Down | Center | Up |
| 2-pos. (DPDT) | Maintained Spring from Top |  | |  |
| 2-pos. (DPDT) | Spring Return from Bottom |  | |  |
| 3-pos. (DPDT) | All models |  |  |  |

As viewed from front of switch.

## Lever Switches

| Style | | Operation | | Contacts | Terminal Type | |
|---|---|---|---|---|---|---|
| | | | | | Solder Tab | PCB |
| | 2 -Position | Maintained | | DPDT | LA1T-2C6 | LA1T-2C2V |
| | | Spring return from top | | DPDT | LA1T-21C6 | LA1T-21C2V |
| | | Spring return from bottom | | DPDT | LA1T-22C6 | LA1T-22C2V |
| | 3-Position | Maintained | | DPDT | LA1T-3C6 | LA1T-3C2V |
| | | Spring return from top | | DPDT | LA1T-31C6 | LA1T-31C2V |
| | | Spring return from bottom | | DPDT | LA1T-32C6 | LA1T-32C2V |
| | | Spring return from both | | DPDT | LA1T-33C6 | LA1T-33C2V |

1. PCB terminal models also available with silver contacts (change "1" or "2" to "5" or "6" respectively, ie LA1T-2C2V becomes LA1T-2C6V).
2. Terminology: U = up, D = down, C = center.

## Switch Engraving Order Form – L6 Series

Copy this order form and use it to specify Letter Height, Maximum Number of Lines and Text to be engraved.

To insure engraving accuracy, fax it to your IDEC representative or Distributor.

Your Company: _____ Telephone: _____

Name: _____ Fax: _____

Address: _____ Email: _____

PO: _____ Part Number to be Engraved: _____

Please check one of the boxes below to indicate your choice of engraving options:

Rectangular Switch

| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 5/32 | 6 |
| ☐ | 2 | 5/32 | 6 |
| ☐ | | 1/8 | 6 |
| ☐ | 3 | 1/8 | 6 |
| ☐ | 4 | N/A | |

Square Switch

| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 5/32 | 5 |
| ☐ | 2 | 5/32 | 5 |
| ☐ | | 1/8 | 6 |
| ☐ | 3 | 1/8 | 6 |
| ☐ | 4 | N/A | |

Round Switch

| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 5/32 | 3 |
| ☐ | | 1/8 | 3 |
| ☐ | 2 | Custom* | |
| ☐ | 3 | Custom* | |
| ☐ | 4 | N/A | |

*Engraving is possible, but character size will be smaller than standard sizes.

1. Above mentioned specifications hold true for standard size pushbuttons (round, square and rectangular).
2. Oversize pushbuttons and pilot lights allow you to engrave 1 additional character.
3. Engraving is done on the button itself for non-illluminated push buttons and on marking plate for illuminated pushbuttons and pilot lights.
4. Please enter text exactly how you want it engraved, take care to emphasize capital or small letters.

Enter text to be engraved:

Line 1: _____

Line 2: _____

Line 3: _____

Line 4: _____

**Sample Letter Sizes**

1/8 Letters: OPEN

5/32 Letters: OPEN

For IDEC Internal Use Only:

Work Order #: _____

## Accessories

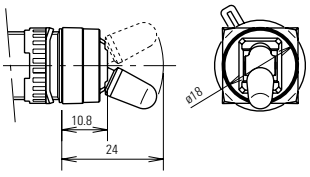
| Item | Appearance | Specifications | | Part Number | Notes |
|---|---|---|---|---|---|
| Ring Wrench | | Made of metal | | MT-001 | Used for tightening the plastic locking ring when installing the L6 series unit on a panel. Tightening torque should not exceed 9kgf cm when tightening the locking ring. |
| Lamp Holder Tool (Made of Rubber) | | Made of rubber. Used for removing and replacing LED and incandescent lamps in illuminated units. | | OR-44 | Rubber tool used for replacing LED and incandescent lamps. |
| Lens Removal Tool | | For Illuminated pushbuttons and pilot lights. | | MT-101 | Used for removing the lens or button from the housing. |
| LED Lamp | | 5V DC<br>6V AC/DC<br>12V AC/DC<br>24V AC/DC<br>120V AC | | LFTD-5②<br>LFTD-6②<br>LFTD-1②<br>LFTD-2②<br>LFTD-H2② | T 1-3/4 miniature flange base. In place of ① specify LED Color Code (A, G, R, S, W, Y). |
| Incandescent Lamp | | 6V AC/DC<br>12V AC/DC<br>24V AC/DC | | LH-06<br>LH-14<br>LH-28 | 0.5W, T 1-3/4 miniature flange base |
| Switch Guard | | 180 degrees opening, spring return | Oversize Round/Sq | HA9Z-K1 | Prevents inadvertent switch operation. IP65 oiltight rated. |
| Terminal Cover | | Made of white nylon | All removable contacts | H6-VL2 | Covers terminals to prevent possible electric shock. |
| | | | Unibody Pilot Lights | H6-PVL | |
| Mounting Hole Plug | | Rubber | | AL-B6 | Fills unused panel cutouts. Made of nitrile rubber. Push-in installation from front of panel. IP65 (oiltight) rated. |
| | | Aluminum | | AL-BM6 | Fills unused panel cutouts. Made of aluminum. Screw-on locking ring from inside of panel. IP65 (oiltight) rated. |
| Replacement Keys | | for HA1K (#231) – oversize | | KG9Z-SK | Pair of keys. |
| Replacement Engraving Inserts |  | | Oversize Round<br>Oversize Square<br>Mushroom | HA9Z-P1-W<br>HA9Z-P2-W<br>HA9Z-P13-W | |
| Replacement Locking Ring | | All models | | HA9Z-LN | |
| Replacement Anti-Rotation Ring | | | L6 oversize | HA9Z-LP | Prevents rotation of switches in panel. (included with all assembled switches) |
| Replacement Selector Inserts | | | | HA9Z-HC1-① | Applicable to round oversize selectors only<br>① = (G, R, S, W, Y) |
| Replacement Safety Lever Lock | | | | HA9Z-LS | |

| Item | Appearance | Description | Used With | Part Number |
|---|---|---|---|---|
| Flush Bezel | | ø24mm round, metal (aluminum color), panel cut-out ø20.2mm | Illuminated selector switches.<br> <br>L6 Switch<br>+<br> <br>Flush Bezel<br>=<br> <br>Flush Switch | LA9Z-SM61 |
| | | ø24mm round, plastic (black), panel cut-out ø20.2mm | | LA9Z-S61B |
| | | □24mm square, plastic (black), panel cut-out □20.2mm | | LA9Z-S71B |
| | | 24 x 30mm rectangular, plastic (black), panel cut-out ø20.2 x 26.2mm | | LA9Z-S81B |
| Switch Guard w/ Flush Bezel (spring return) | | Rectangular, plastic (black) | | LA9Z-KS8 |

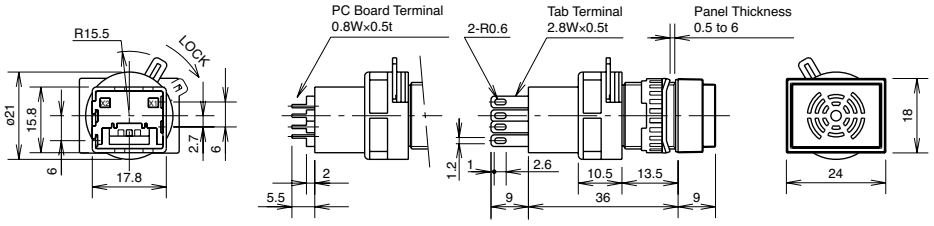
Flush bezels not applicable for oversize units.

## Dimensions (mm)

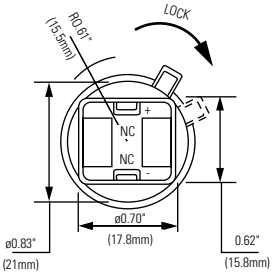
### Lever Switches (LA1T)

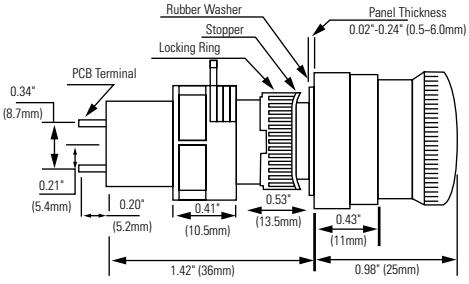


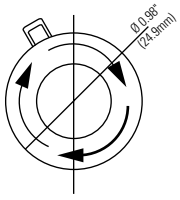

### Buzzer (LA3Z)



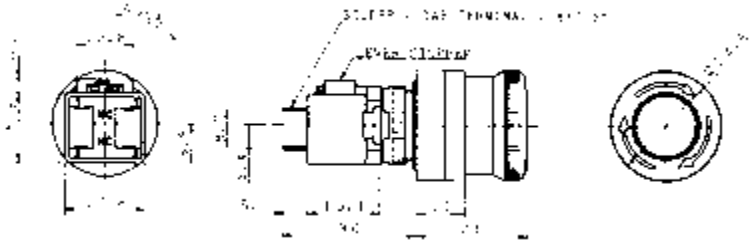

### Emergency Stop Switch (HA1B)



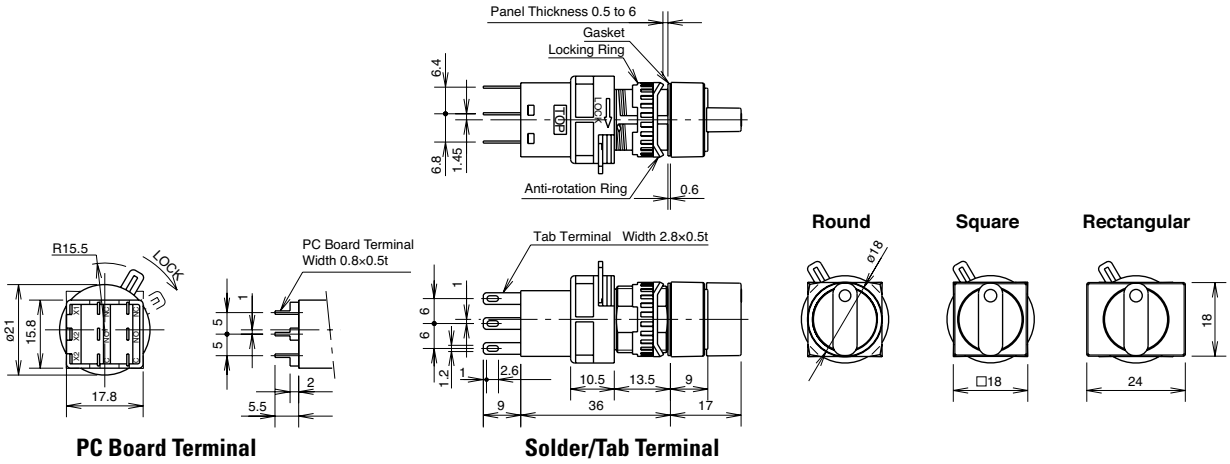




### Emergency Stop Switch (HA1E) - Short Body Style



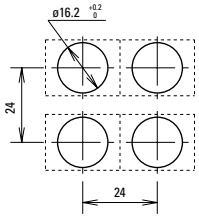
## Illuminated Selector Switches (LA*F)



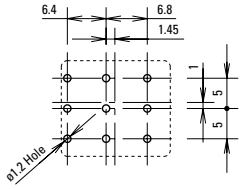

**PC Board Terminal** **Solder/Tab Terminal**

## PC Board Drilling Layout (Bottom View)

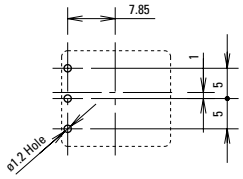
### Panel Cut-Out



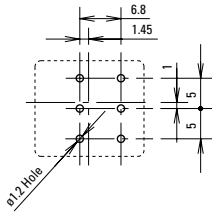

### Illuminated Pushbuttons, Illuminated Selector Switches




### Pilot Lights, Selector Switches, Key Selector Switches

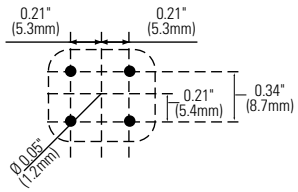



### Pushbutton Lever Switches

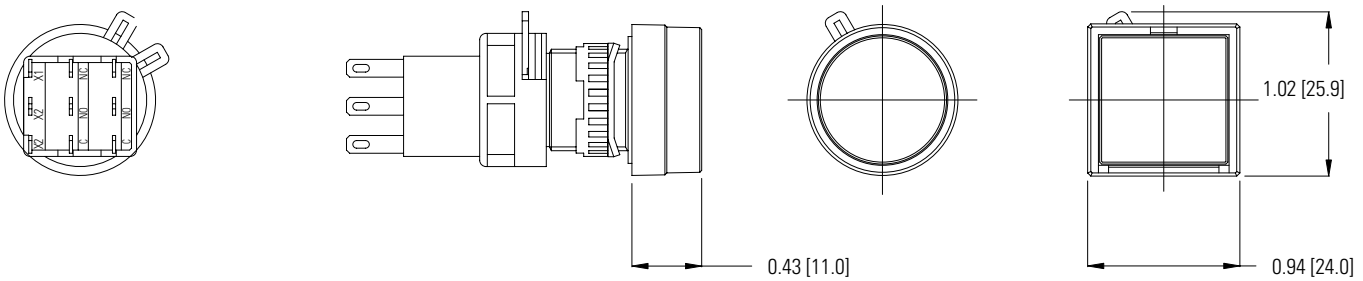



### HA1B E-Stop

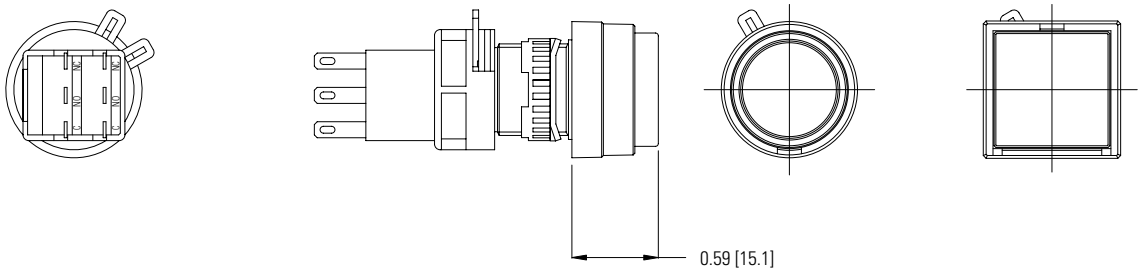
PCB Mounting Pattern



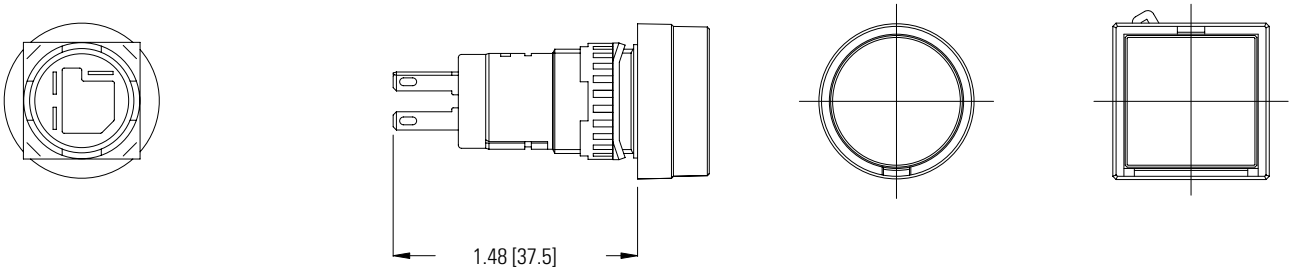

## Oversize Flush Pushbutton and Pilot Lights



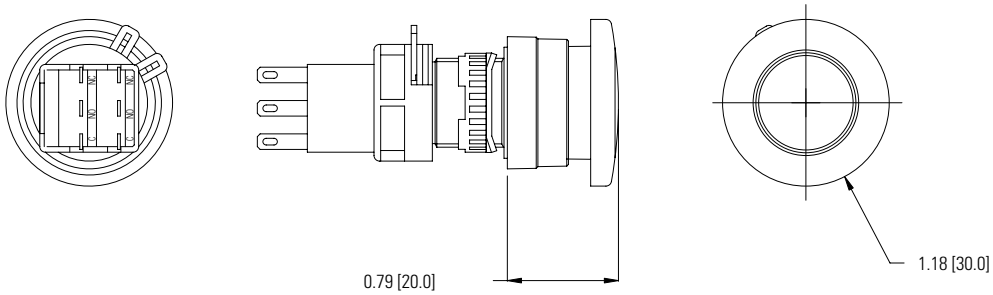
**Oversize Extended Non-Illuminated Pushbutton**



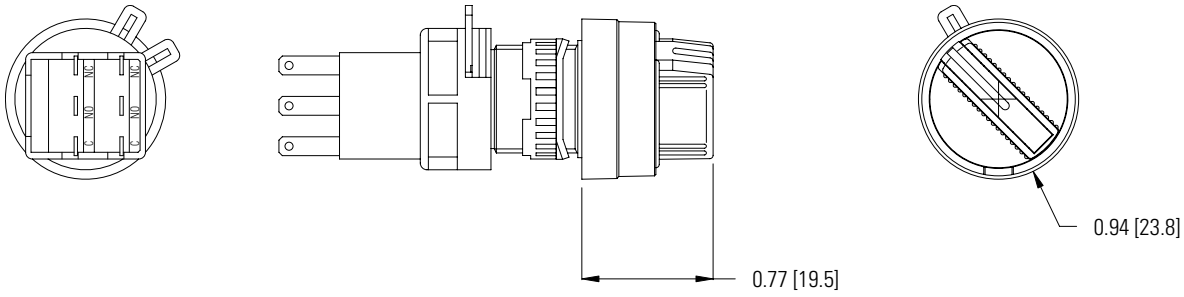

**Oversize Unibody Pilot Lights**



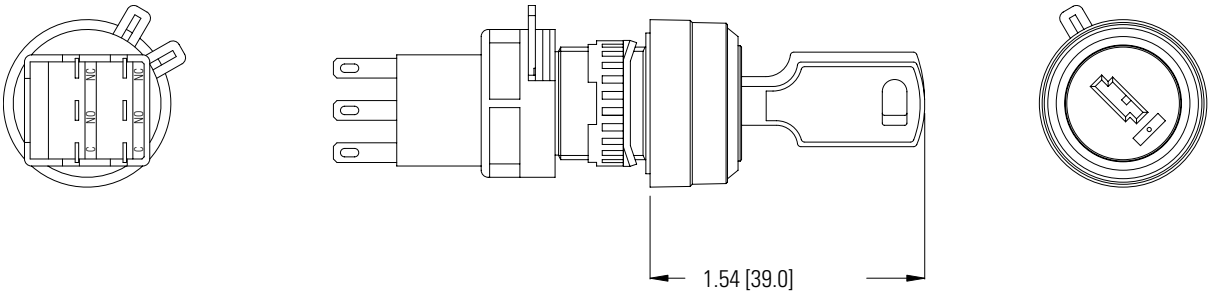

**Mushroom Pushbuttons**



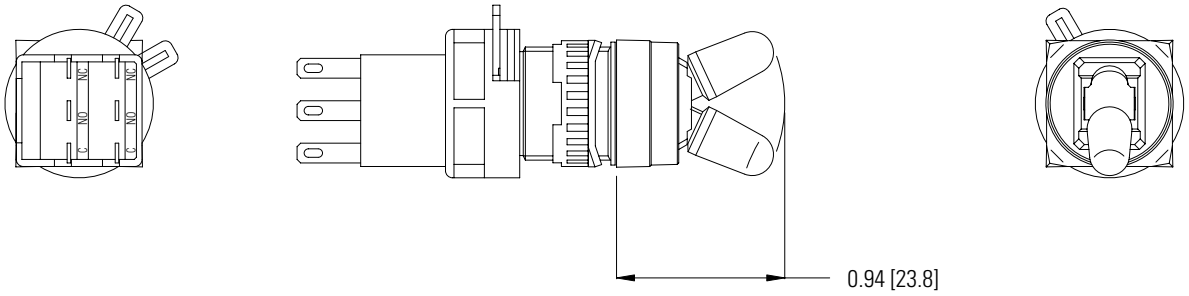

**Oversize Selector Switch**



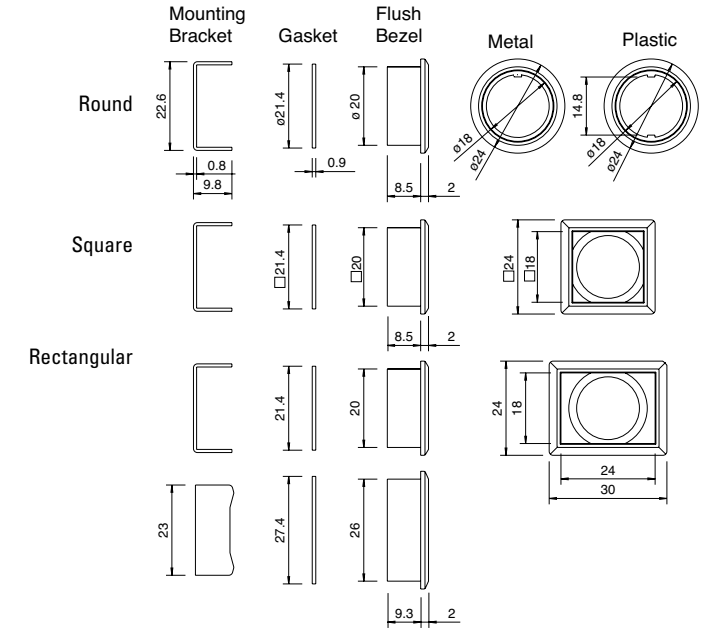
### Oversize Key Switch



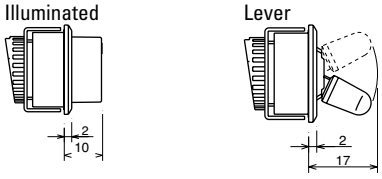

### Lever Switch




### Flush Bezel

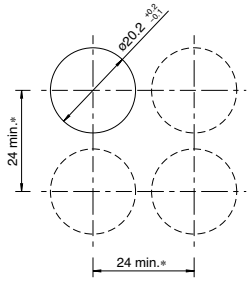



### Selector Switches

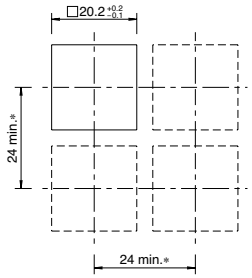



### Flush Bezel Mounting Hole Layout

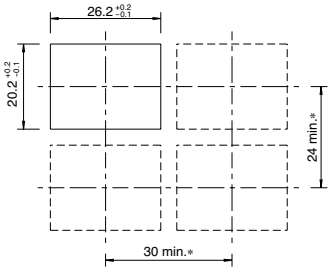
#### Round




#### Square

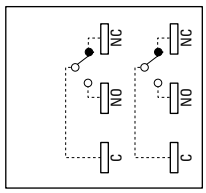



#### Rectangular

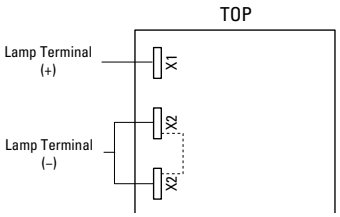


**Terminal Configurations**

**Non Illuminated Pushbutton**

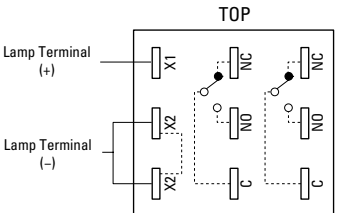



**Pilot Lights**

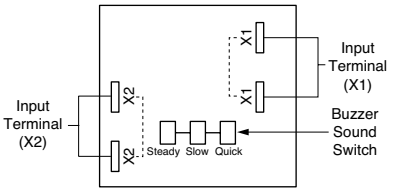



**AL-K6SP**

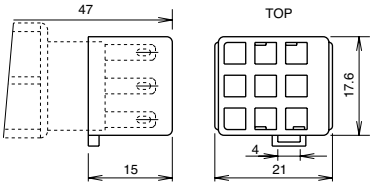
**Illuminated Pushbuttons**



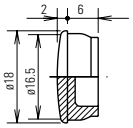

**Buzzer**



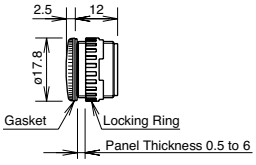

**H6-VL2**



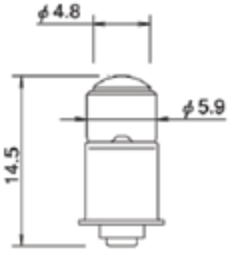

**AL-B6**

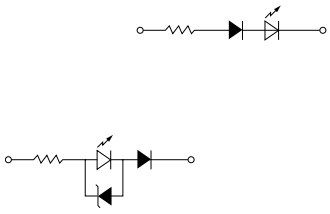



**AL-BM6**

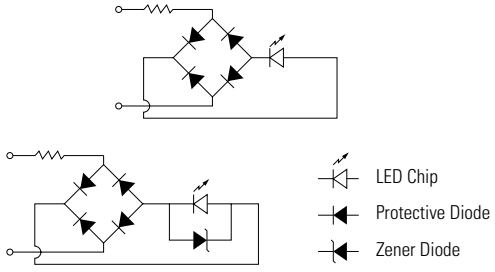



**LFTD**

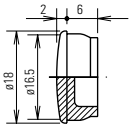


**LED Lamp**
**Internal Circuit**




**AL-B6**



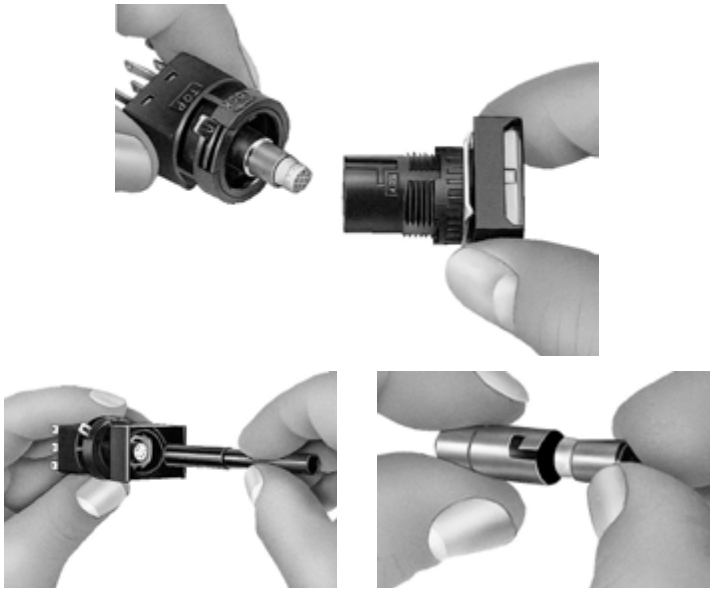
## General Instructions

### Pushbutton Assembly

### Lamp Installation

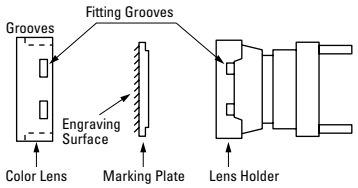
Lamps can be replaced in two ways:

1. If contacts are accessible (or pushbutton not installed in a panel) then it is easiest to first remove the contacts from the operator. This will allow easy access to the lamp/lamp-holder assembly. Grab lamp, depress slightly, and turn counter clockwise. Lamp can then be removed by pushing it back through the lamp holder.
2. If contacts are not accessible, then the lamp can be replaced by first removing the lens from the operator. Just pull lens straight out either with a fingernail or optional lens removal tool (MT-101). Lamp/lamp-holder assembly can then be removed with lamp removal tool (OR-44). Insert lamp removal tool through operator, depress slightly, turn counter clockwise, then pull lamp/lamp-holder assembly out. Lamp can then be removed by pushing it back through the lamp holder.



### Engraving Lenses

All buttons and lenses can be engraved directly on the outside surface. Illuminated lenses also allow for engraving on a plate that is underneath the colored section of the lens. Remove the colored section of the lens by pulling on the edge while simultaneously unhooking it from the latches on the lens holder. The marking plate will then be accessible. It can then be engraved or a thin marked insert (such as mylar or paper) can be sandwiched between the marking plate and colored section of the lens.

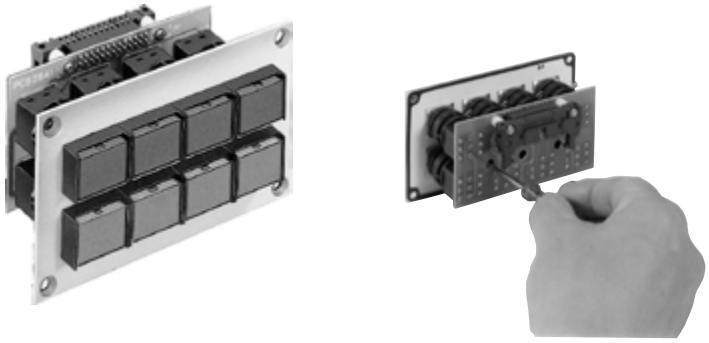



### Panel Mounting

Before any unit can be mounted into a panel, the contact block must be removed. Slide metal locking lever and pull contact off. Loosen and remove the locking ring and square anti-rotation ring from the operator and insert operator through panel cutout from the front of the panel. Slide on anti-rotation ring and tighten locking ring, using locking ring wrench (MT-001). Slide contact block onto operator, observing TOP marking on both parts. Slide metal locking lever in direction indicated by LOCK. The yellow plastic safety lever lock can then be snapped onto the locking lever; this will prevent vibration or maintenance actions from releasing the contact from the operator.

### PCB Mounting

Being able to separate the contacts from the operator allows for assembly of the front panel components (operator and lens) to be performed in tandem with the PC board assembly and soldering. For applications where multiple rows of push-buttons are mounted closely together, or where other components may obstruct access to the contact locking lever, be sure to include access holes in the PC board (refer to PC board layout dimensions for location). Also be sure to allow for space above and to the side of contact to ensure that no components block the contact block locking lever. PC board pins are designed to rest on the PCB, take this into consideration to ensure that pins do not short closely spaced traces.



# 22mm XW E-Stops

**Key features:**

- The depth behind the panel can be as little as 46.4 mm for 1 to 4 contacts (with terminal cover) for illuminated and non-illuminated units.
- IDEC's original "Safe break action" ensures that the NC contacts open when the contact block is detached from the operator.
- 1 to 4NC main contacts and 1 or 2NO monitor contacts
- Push-to-lock, Pull or Turn-to-reset operator
- Models with mechanical indicator on the operator body show the normal/latched status (green: normal).
- Safety lock mechanism (IEC60947-5-5, 6.2)
- Degree of protection IP65 (IEC60529)
- Fingersafe (IP20) terminals
- Three button sizes: ø38, ø40 and ø60 mm
- Push-ON illumination type available (40mm mushroom head)
- Direct opening action mechanism (IEC60947-5-5, 5.2, IEC60947-5-1, Annex K)
- RoHS compliant (EU directive 2002/95/EC).
- UL c-UL listed. EN compliant
- UL NISD category emergency stop device (File# E305148)

UL File #E68961

CCC No. 2005010305150897

## Specifications

| | |
|---|---|
| Applicable Standards | IEC60947-5-5, EN60947-5-5, JIS C8201-5-1, UL508, UL991, NFPA79, CSA C22.2 No. 14, GB14048.5 |
| Operating Temperature | Non-illuminated: –25 to +60°C (no freezing), Illuminated: –25 to +55°C (no freezing) |
| Operating Humidity | 45 to 85% RH (no condensation) |
| Storage Temperature | –45 to +80°C |
| Operating Force | Push-to-lock: 32N<br>Pull-to-reset: 21N<br>Turn-to-reset: 0.27N·m |
| Minimum Force Required for Direct Opening Action | 80N |
| Min Operator Stroke Required for Direct Opening Action | 4mm |
| Maximum Operator Stroke | 4.5mm |
| Contact Resistance | 50mΩ maximum (initial value) |
| Contact Material | Gold plated silver |
| Insulation Resistance | 100MΩ minimum (500V DC megger) |
| Impulse Withstand Voltage | 2.5kV |
| Pollution Degree | 3 |
| Operation Frequency | 900 operations/hour |
| Shock Resistance | Operating extremes: 150m/s$^2$ (15G), Damage limits: 1000m/s$^2$ (100G) |
| Vibration Resistance | Operating extremes: 10 to 500Hz, amplitude 0.35mm acceleration 50m/s$^2$<br>Damage limits: 10 to 500Hz, amplitude 0.35mm acceleration 50m/s$^2$ |
| Mechanical Life | 250,000 operations minimum |
| Electrical Life | 100,000 operations minimum, (250,000 operations minimum @ 24V AC/DC, 100mA) |
| Degree of Protection | Operator: IP65 (IEC60529)<br>Terminal: IP20 (when XW9Z-VL2MF is installed) |
| Terminal Style | M3.0 screw terminal |
| Recommended Tightening Torque for Locking Ring | 2.0N·m |
| Wire Size | 16 AWG max |
| Weight | ø40mm: 72g<br>ø60mm: 81g |

# Part Numbers

## Standard Button Without Mechanical Indicator

| Style | Operator Type | Monitor Contact | Main Contact | Part Number |
|---|---|---|---|---|
| Non-Illuminated | 40mm Mushroom | 1NO | 1NC | XW1E-BV411M-R |
| | | – | 2NC | XW1E-BV402M-R |
| | | 2NO | 2NC | XW1E-BV422M-R |
| | | 1NO | 3NC | XW1E-BV413M-R |
| | | – | 4NC | XW1E-BV404M-R |
| | 60mm Mushroom | 1NO | 1NC | XW1E-BV511M-R |
| | | – | 2NC | XW1E-BV502M-R |
| | | 2NO | 2NC | XW1E-BV522M-R |
| | | 1NO | 3NC | XW1E-BV513M-R |
| | | – | 4NC | XW1E-BV504M-R |
| Illuminated [1] | 40mm Mushroom with built-in 24V AC/DC LED | 1NO | 1NC | XW1E-LV411Q4M-R |
| | | – | 2NC | XW1E-LV402Q4M-R |
| | | 2NO | 2NC | XW1E-LV422Q4M-R |
| | | 1NO | 3NC | XW1E-LV413Q4M-R |
| | | – | 4NC | XW1E-LV404Q4M-R |
| | 40mm Mushroom Push-ON LED [2] | 1NO | 2NC | XW1E-TV412Q4M-R |

1. The light is independent of the position of the switch, except for push-on LED type.
2. The light only operates when the switch is pressed as it is internally wired.

## Smooth Button With Mechanical Indicator

| Style | Operator Type | Monitor Contact | Main Contact | Part Number |
|---|---|---|---|---|
| Non-Illuminated | 38mm Mushroom | – | 1NC | XW1E-BV4TG01MR |
| | | – | 2NC | XW1E-BV4TG02MR |
| | | – | 3NC | XW1E-BV4TG03MR |
| | | – | 4NC | XW1E-BV4TG04MR |
| | | 1NO | 1NC | XW1E-BV4TG11MR |
| | | 1NO | 2NC | XW1E-BV4TG12MR |
| | | 1NO | 3NC | XW1E-BV4TG13MR |
| | | 2NO | 4NC | XW1E-BV4TG22MR |
| Illuminated | 38mm Mushroom with built-in 24V AC/DC LED [1] | – | 1NC | XW1E-LV4TG01Q4MR |
| | | – | 2NC | XW1E-LV4TG02Q4MR |
| | | – | 3NC | XW1E-LV4TG03Q4MR |
| | | – | 4NC | XW1E-LV4TG04Q4MR |
| | | 1NO | 1NC | XW1E-LV4TG11Q4MR |
| | | 1NO | 2NC | XW1E-LV4TG12Q4MR |
| | | 1NO | 3NC | XW1E-LV4TG13Q4MR |
| | | 2NO | 2NC | XW1E-LV4TG22Q4MR |

Note: Pushlock pull/turn reset switches are locked when pressed, and reset when pulled or turned clockwise.
1. LED lamp is not removable.

## XW Series EMO Switches

| Style | NC Main Contact | NO Monitor Contact | Part Number |
|---|---|---|---|
| 40mm Mushroom | 1NC | - | XW1E-BV401M-RH-EMO |
| | 2NC | - | XW1E-BV402M-RH-EMO |
| | 3NC | - | XW1E-BV403M-RH-EMO |
| | 4NC | - | XW1E-BV404M-RH-EMO |
| | 1NC | 1NO | XW1E-BV411M-RH-EMO |
| | 2NC | 1NO | XW1E-BV412M-RH-EMO |
| | 3NC | 1NO | XW1E-BV413M-RH-EMO |
| | 2NC | 2NO | XW1E-BV422M-RH-EMO |

## FB Enclosures with XW E-Stops

| Style | Style | NC Contact | NO Contact | Part Number |
|---|---|---|---|---|
| | 40mm Push-lock Turn/Pull Reset Non-Illuminated | 2NC | – | FB1W-XW1E-BV402MR |
| | | 1NC | 1NO | FB1W-XW1E-BV411MR |
| | | 2NC | 2NO | FB1W-XW1E-BV422MR |
| | | 3NC | 1NO | FB1W-XW1E-BV413MR |
| | | 4NC | – | FB1W-XW1E-BV404MR |
| | 40mm Push-lock Turn/Pull Reset Illuminated* | 2NC | – | FB1W-XW1E-LV402MR |
| | | 1NC | 1NO | FB1W-XW1E-LV411MR |
| | | 2NC | 2NO | FB1W-XW1E-LV422MR |
| | | 3NC | 1NO | FB1W-XW1E-LV413MR |
| | | 4NC | – | FB1W-XW1E-LV404MR |
| | 60mm Push-lock Turn/Pull Reset Non-Illuminated | 2NC | – | FB1W-XW1E-BV502MR |
| | | 1NC | 1NO | FB1W-XW1E-BV511MR |
| | | 2NC | 2NO | FB1W-XW1E-BV522MR |
| | | 3NC | 1NO | FB1W-XW1E-BV513MR |
| | | 4NC | – | FB1W-XW1E-BV504MR |

For added safety, Switch Guards and Nameplates can be used with E-Stop Enclosures

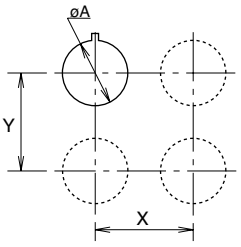
*LED illumination voltage: 24V AC/DC

## Contact Ratings

| | | | | | |
|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | 250V | | |
| Rated Current (Ith) | | | 5A | | |
| Rated Operating Voltage (Ue) | | | 30V | 125V | 250V |
| Rated Operating Current | Main Contacts (NC) | AC 50/60Hz | Resistive Load (AC-12) | – | 5A | 3A |
| | | | Inductive Load (AC-15) | – | 3A | 1.5A |
| | | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |
| | Monitor Contacts (NO) | AC 50/60Hz | Resistive Load (AC-12) | – | 1.2A | 0.6A |
| | | | Inductive Load (AC-14) | – | 0.6A | 0.3A |
| | | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |

Minimum applicable load: 5V AC/DC, 1mA (reference value).
The rated operating currents are measured at resistive/inductive load types specified in IEC 60947-5-1.

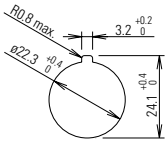
## Mounting Hole Layout




Measurements

| Size | øA | X & Y |
|---|---|---|
| 40mm | $22.3^{+0.4}$ | 70mm min |

## Panel Cutout




## Illuminated Unit LED Ratings

| Operating Voltage | Current |
|---|---|
| 24V AC/DC ±10% | 15mA |

## Depth Behind the Panel

| Depth (mm) | Description |
|---|---|
| 46.4 | with indicator, 1 - 4 contacts, both illuminated and non-illuminated |
| 48.7 | w/o indicator, 1 - 4 contacts, both illuminated and non-illuminated |

## Part Number Key

**XW1E- L V 4 TG 11 Q4MR**

Illumination
B: Non-Illuminated
L: Illuminated LED
T: Illuminated Push-ON LED

Mushroom Size
4: ø40mm
5: ø60mm (non-illuminated only)

Indicator
TG: w/green mechanical indicator
blank: w/o indicator

Contact Configuration
11: 1NO - 1NC
02: 2NC
13: 1NO - 3NC
04: 4NC
22: 2NO-2NC
12: 1NO-2NC (Push-ON LED only)
01: 1NC (EMO switch only)
03: 3NC (EMO switch only)

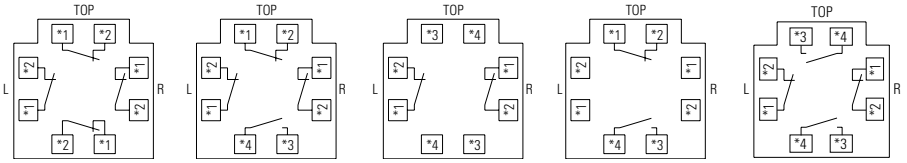
Color
R: red with indicator
-R: red w/o indicator
-RH-EMO: red w/o indicator with EMO engraving

Voltage Code
Blank: Non-illuminated
Q4: Illuminated 24V AC/DC

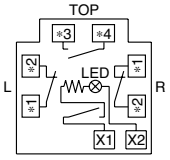
## Terminal Arrangements (Bottom View)

**4NC** **1NO-3NC** **2NC** **1NO-1NC** **2NO-2NC** **1NO-2NC**

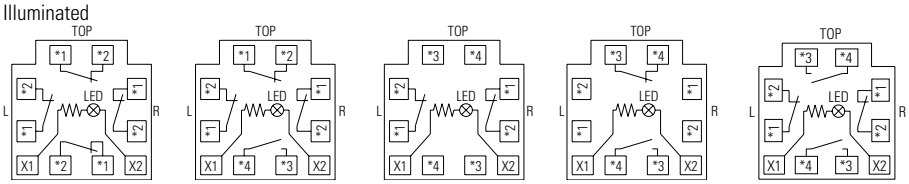
Non-Illuminated




Push-ON

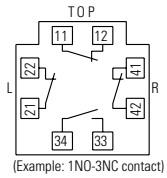



Illuminated




Terminal Marking Description

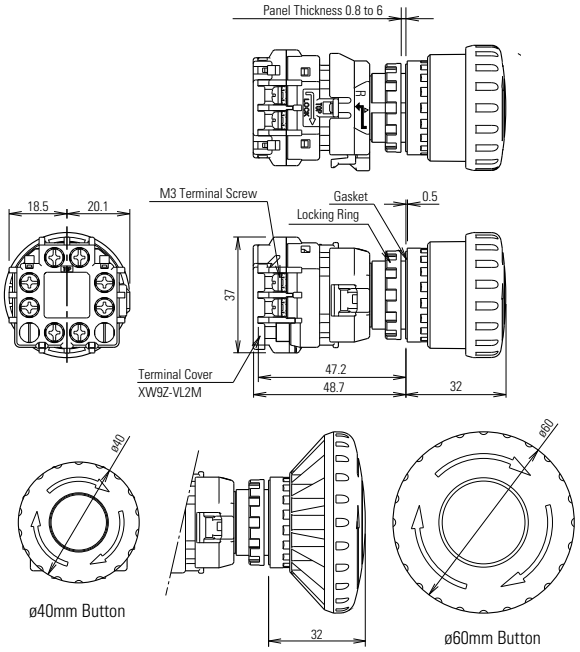
* □
- Contact Type
  1-2: NC main contact
  3-4: NO monitor contact
- Contact Number (1-4)
  Starting with the contact on TOP in a counterclockwise direction.
  Note:
  1: contact on the TOP
  2: contact on the Left
  3: contact on the Bottom
  4: contact on the Right



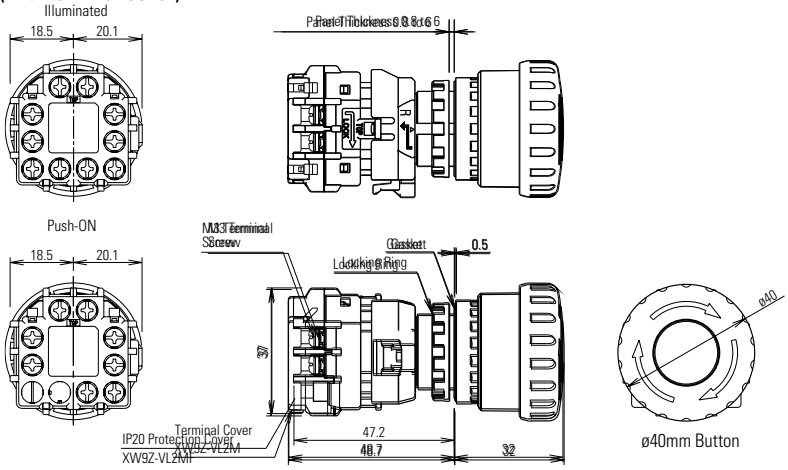

(Example: 1NO-3NC contact)

# Dimensions (mm)

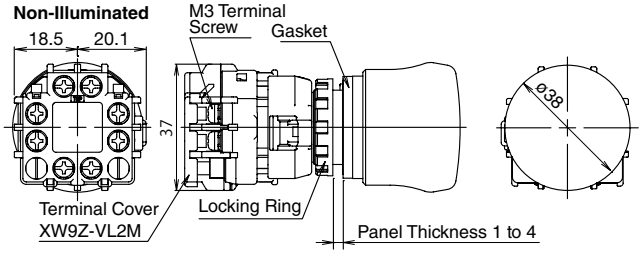
### XW Standard Button Non-Illuminated Without Indicator (with terminal cover)



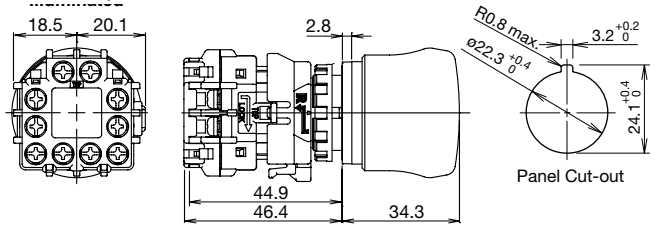

### XW Standard Button LED Illuminated/Push-ON Without Indicator (with terminal cover)



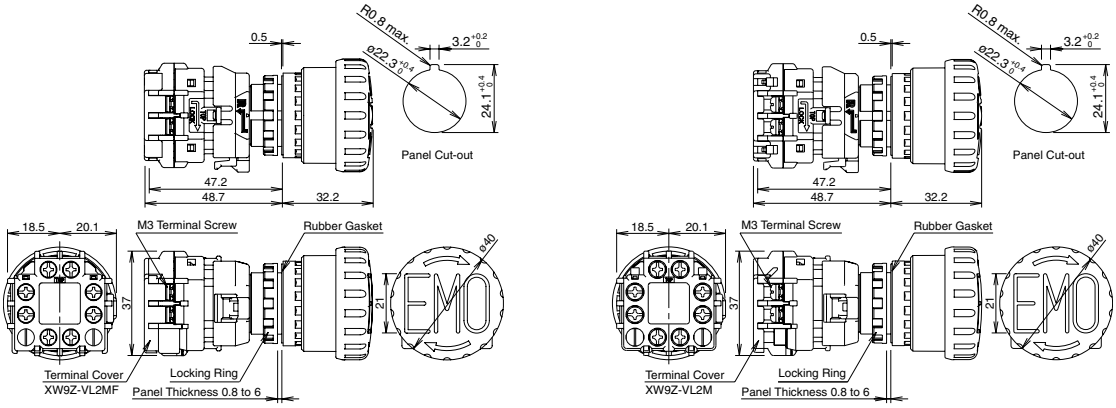

### XW Smooth Button Non-Illuminated With Indicator (with terminal cover)




### XW Smooth Button LED Illuminated/Push-ON With Indicator (with terminal cover)




### EMO



### Accessories: Terminal Covers

| Appearance | Description | Part Numbers |
|---|---|---|
| | Terminal Cover for contact block | XW9Z-VL2M |
| | IP20 Fingersafe Cover | XW9Z-VL2MF |

### Accessories: Nameplates

| Appearance | Legend | Part Number | Inner Ø | Outer Ø |
|---|---|---|---|---|
| | (blank) | HWAV-0 | 22mm | 60mm |
| | "Emergency Stop" | HWAV-27 | 22mm | 60mm |
| | (blank) | HWAV5-0 | 22mm | 80mm |
| | "Emergency Stop" | HWAV5-27 | 22mm | 80mm |

Use 60mm nameplates for 38mm and 40mm mushroom buttons and 80mm nameplates for 60mm mushroom buttons.

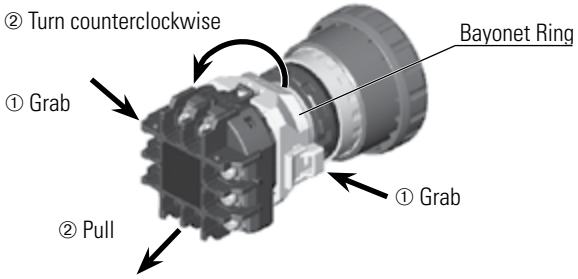
### Accessories: Shrouds

| Appearance | Part Numbers | E-Stop Types | Applicable Standards |
|---|---|---|---|
| | HW9Z-KG1 | 38mm, 40mm Mushroom Head | SEMI S2-0703, 12.5.1 Compliant |
| | HW9Z-KG2 | 38mm, 40mm, and 60mm Mushroom Head | SEMI S2-0703, 12.5.1 & SEMATECH Compliant |
| | HW9Z-KG3 | 38mm, 40mm Mushroom Head | SEMI S2 Compliant (Approved by TUV) |
| | HW9Z-KG4 | 38mm, 40mm Mushroom Head | SEMI S2 Compliant (Approved by TUV) & SEMATECH |

## Operating Instructions

### Removing the Contact Block

First unlock the operator button. Grab the bayonet ring ① and pull back the bayonet ring until the latch pin clicks ②, then turn the contact block counterclockwise and pull out ③.

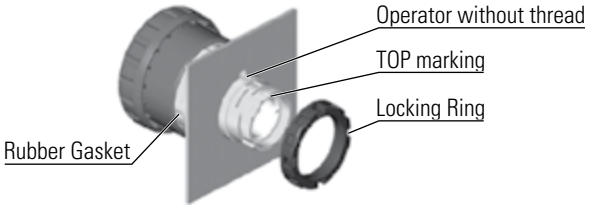



#### Notes for removing the contact block

1. When the contact block is removed, the monitor contact (NO contact) is closed.
2. While removing the contact block, do not exert excessive force, otherwise the switch may be damaged.
3. An LED lamp is built into the contact block for illuminated pushbuttons. When removing the contact block, pull the contact block straight to prevent damage to the LED lamp. If excessive force is exerted, the LED lamp may be damaged and fail to light.

### Panel Mounting

Remove the locking ring from the operator and check that the rubber gasket is in place. Insert the operator from panel front into the panel hole. Face the side without thread on the operator with TOP marking upward, and tighten the locking ring using ring wrench MW9Z-T1 to a torque of 2.0 N·m maximum.

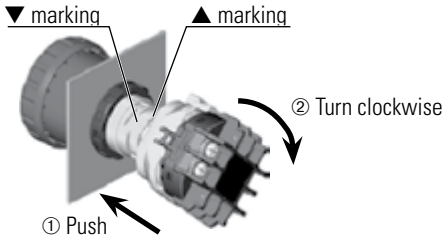



#### Notes for Panel Mounting

To prevent the XW emergency stop switch from rotating when resetting from the latched position, use of an anti-rotation ring (HW9Z-RL) or a nameplate is recommended.

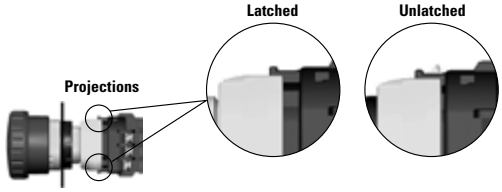
### Installing the Contact Block

First unlock the operator button. Align the small ▲ marking on the edge of the operator with the small ▼ marking on the yellow bayonet ring. Hold the contact block, not the bayonet ring. Press the contact block onto the operator and turn the contact block clockwise until the bayonet ring clicks.



### Notes for installing the contact block

Make sure that the bayonet ring is in the locked position. Check that the two projections on the bayonet ring are securely in place.




## Wiring

The applicable wire size is 16 AWG maximum.

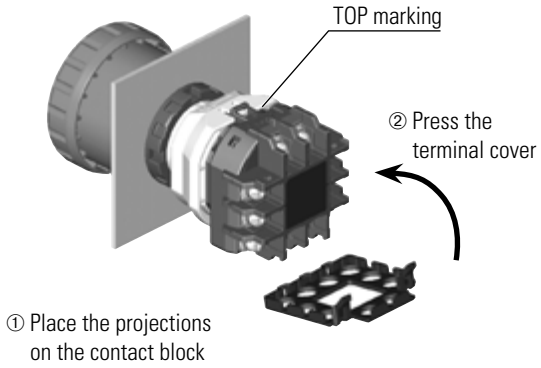
### Screw Terminal

1. Wire thickness: AWG18 to 16
2. Tighten the M3 terminal screw to a tightening torque of 0.6 to 1.0 N·m.

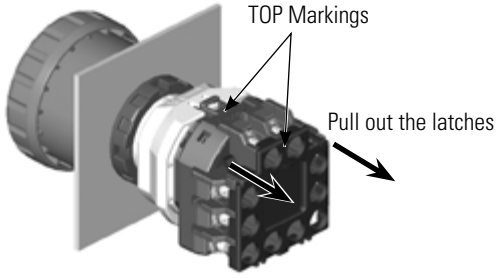
## Installing and Removing Terminal Covers

### XW9Z-VL2M

To install the terminal cover, align the TOP marking on the terminal cover with the TOP marking on the contact block. Place the two projections on the bottom side of the contact block into the slots in the terminal cover. Press the terminal cover toward the contact block.

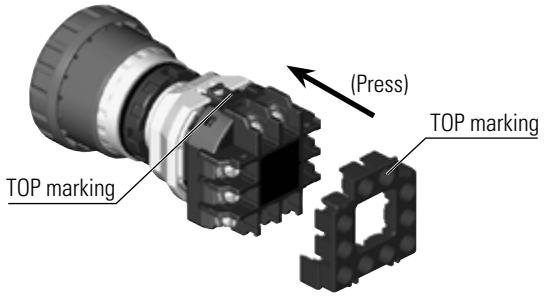



To remove the terminal cover, pull out the two latches on the top side of the terminal cover. Do not exert excessive force to the latches, otherwise the latches may break.




## IP20 Protection Terminal Cover XW9Z-VL2MF

To install the IP20 protection cover, align the TOP marking on the cover with the TOP marking on the contact block, and press the cover toward the contact block.




1. Once installed, the XW9Z-VL2MF cannot be removed.
2. The XW9Z-VL2MF cannot be installed after wiring.
3. With the XW9Z-VL2MF installed, crimping terminals cannot be used.
4. Make sure that the XW9Z-VL2MF is securely installed. IP20 protection cannot be achieved when installed loosely, and electric shocks may occur.

## Contact Bounce

When the button is reset by pulling or turning, the NC main contacts will bounce. When pressing the button, the NO monitor contacts will bounce.

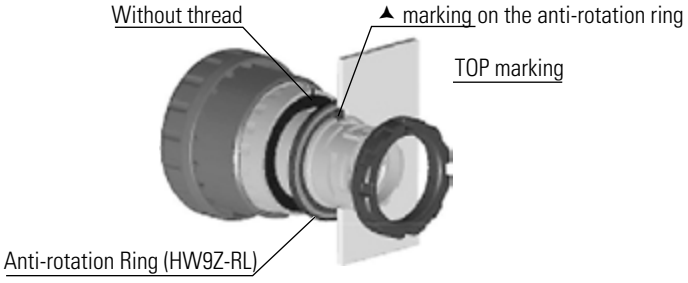
When designing a control circuit, take the contact bounce time into consideration (reference value: 20 ms).

## LED Illuminated Switches

LED lamp is built into the contact block and cannot be replaced.

## Installing the Anti-rotation Ring HW9Z-RL

Align the side without thread on the operator with TOP marking, the small s marking on the anti-rotation ring, and the recess on the mounting panel.



# AP22M Series

## Key Features

- Viewable in direct sunlight.
- Visible from all directions.
- The use of an ultra-bright LED that is not susceptible to external scattered light ensures high visibility and provides for more accurate recognition.
- Integrated terminal cover is IP20 protected (finger protection), preventing electrical shocks.
- UL and c-UL listed, EN standard compliant.
- Colored and clear lenses are offered. Clear lens (except for PW) provides for higher contrast.
- UL Type 4X

c UL us LISTED

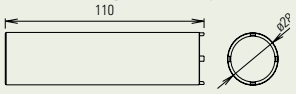
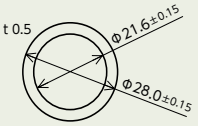
## Part Numbers

### Pilot Lights

| Appearance | Lens | Rated Voltage | Part Number | Lamp Color |
|---|---|---|---|---|
| | Color | 12V DC<br>24V AC/DC<br>120V AC | AP22M-2Q②① | R<br>G<br>Y<br>A<br>S<br>PW |
| | Clear | | AP22M-2Q②C① | R<br>G<br>Y<br>A<br>S |

1. In place of ① insert LED color. Red (R), Green (G), Yellow (Y), Amber (A), Blue (S), and White (PW).
2. Clear lenses are standard (except for white). White (PW) only available as colored lens.
3. In place of ② insert voltage code. For 12V DC use (3), for 24V AC/DC use (4), for 120V AC use (H).
4. LED cannot be removed or replaced.

### Accessories

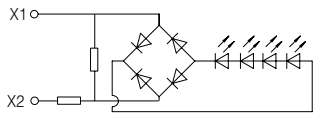
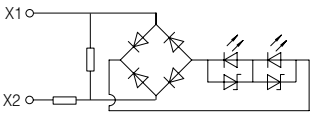
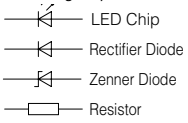
| Appearance | Material | Part Number | Notes |
|---|---|---|---|
| Locking Ring Wrench | Metal (brass) | MW9Z-T1 | Used for mounting unit into a panel.   |
| Lens | Resin | YW9Z-PL12① | Dimension: ø29.8 H14.5<br>In place of ① insert color: R (Red), G (geen), Y (Yellow), A (Amber), S (Blue), C (Clear*) |
| Rubber Gasket | Nitrile rubber | HW9Z-WM |   |

1. Nameplates: HWAM, HWAS-0, and CWAM. Go to www.IDEC.com and review HW Series and CW Series catalogs for detailed information.
2. *Use a clear lens (C) for a PW (White) lamp.

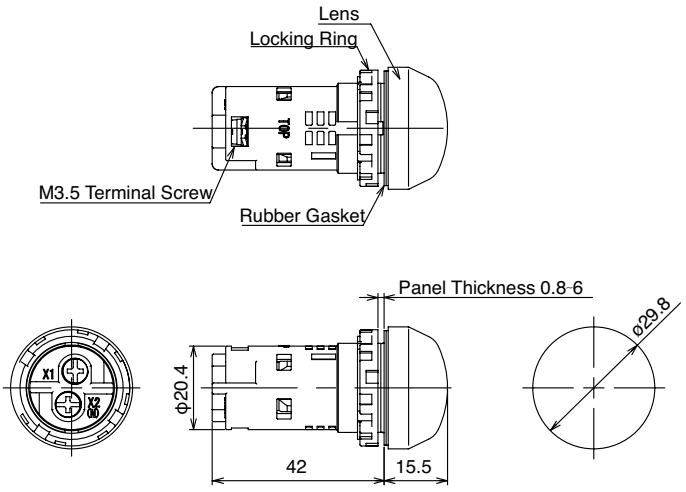
## Specifications

| | | |
|---|---|---|
| Environment | | Operating Temperature: –25 to +55°C (no freezing)<br>Storage Temperature: –45 to +80°C (no freezing)<br>Operating Humidity: 45-85%RH (no condensation) |
| Insulation Resistance | | 100MΩ (DC500V megger) |
| Over Voltage Category | | II (IEC60664-1) |
| Impulse Dielectric Strength | | 2.5kV (IEC60664-1, IEC60947-5-1) |
| Degree of pollution | | 3 (IEC60947-5-1) |
| Dielectric Strength | | between terminals of different poles: 2,000V AC, 1 min<br>between live and non-live parts: 2,000V AC, 1 min |
| Vibration Resistance | Operation limit | 5-55Hz half amp: 0.5mm |
| | Damage limit | 30Hz half amp: 1.5mm |
| Shock Resistance | Operation limit | 100m/s$^2$ (10G) |
| | Damage limit | 1000m/s$^2$ (100G) |
| Degree of Protection | | Panel front: IP66 (IEC 60529), UL Type 4X<br>Terminals: IP20 |
| Terminal Size | | M3.5 screw |
| Tightening torque for terminal screw | | 1.0N•m |
| Tighten'g torque for Locking Ring | | 2.0N•m |
| Wire Size | | AWG16 ~ AWG14, 2 wires max. |
| Weight (approx.) | | 18g |

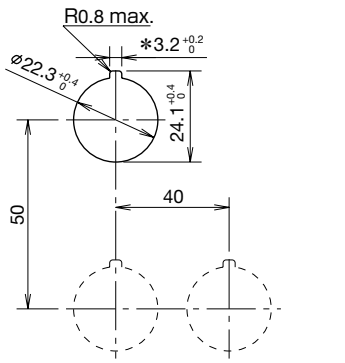
## Lamp Ratings

| | |
|---|---|
| Rated Voltage | 12V DC, 24V AC/DC, 120V AC |
| Voltage Range | 12V DC ±5%, 24V AC/DC ±10%, 120V AC ±10% |
| LED Illumination Color | Red (R), Green (G), Yellow (Y), Amber (A), Blue (S), and White (PW) |
| Rated Current | 12V DC: R, A, Y - 21mA; G, S, PW - 22mA<br>24V AC/DC, 120V AC: 24mA (all colors) |
| LED Life (Ref.) | Approx. 30,000 Hrs. at rated DC voltage at 25°C in specified environmental conditions (The brightness reduces to 50% of initial value.) |
| Equivalent Circuit | Colors R, A, and Y<br>  <br>Colors G, S, & PW<br>  <br>Drawing Key<br>  |

## Dimensions (mm)




## Panel cut-out (mm)




A 3.2mm $^{+0.2}_{0}$ opening (notch) is used to stop rotation.
(Not necessary if a nameplate is not used.)

## Safety Instructions

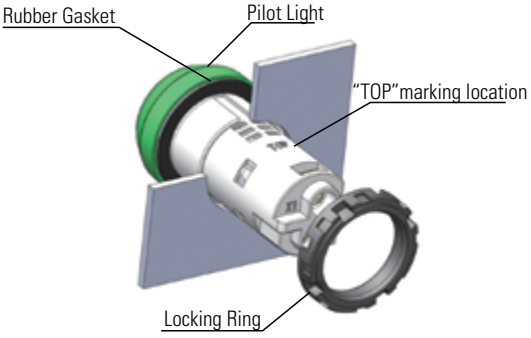
Turn off the power before installation, removal, wiring, maintenance and inspection. Failure to turn off power may cause electrical shocks or fire hazard.

When wiring, use proper size (AWG16 - AWG14) wires to meet voltage and current requirements. Tighten the terminal screws to a recommended tightening torque (1.0N•m). Operating with loose terminal screws may cause overheating and fire.

## Installation Instructions

### Panel Mounting

Remove the locking ring and check if the rubber gasket is properly aligned. Then insert the AP22M unit, aligning the "TOP" marking with the recess into the panel cut-out, and tighten the locking ring.




When installing the pilot light into a panel cut-out, use locking ring wrench (part number MW9Z-T1) to tighten the locking ring to a recommended torque of 2.0N•m. Do not use pliers and do not tighten excessively, otherwise the unit may become damaged.

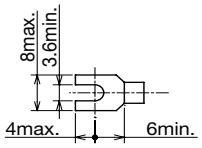
### Mounting Notes

#### Applicable Wires

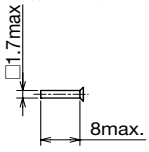
The applicable wire sizes are from AWG14 to AWG16 with 2 wires max. A ring-tongue crimp style terminal cannot be used.

#### Applicable Terminal

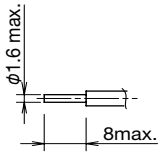
Fork Crimp Terminal




Bar Type Crimp Terminal

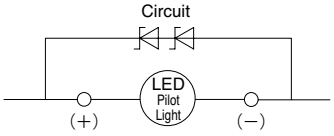



Single Wire

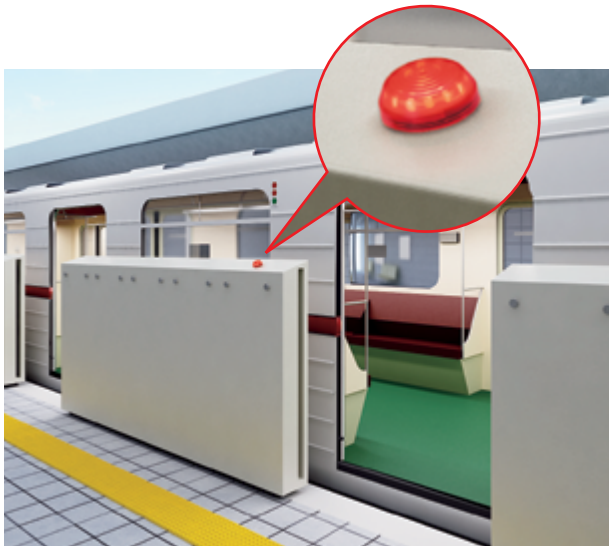



#### Noise

External noise may cause LED chips to deteriorate, leading to a reduction in brightness, a change in color, or malfunction. We recommend the following solution if this problem exists. However, please note that this solution will vary depending on the operating environment and the application.




Zener Diode Reference Value
Zener Voltage: 15V (1W)



Great Visibility - even from inside a train (automatic safety fence on a train station platform)

Compact Size - Perfect for mounting on small or narrow surfaces.

# ø22 Flush Mount CW Switches & Pilot Devices

**Flush bezel projects only 2.5mm from front of panel and as little as 39.9mm behind the panel!**

**Key features:**

- ø22.3mm mounting hole compliant with IEC 60947-5-1
- 3.5-mm operator travel for pushbuttons ensures comfortable and reliable operation
- Up to 6 contacts per switch are possible with use of dual contact blocks
- Black and metallic bezels available
- Illuminated pushbuttons, pushbuttons, pilot lights, selector switches and key selector switches are available
- Direct opening NC contact
- Seven different keys can be chosen for key selector switches
- 10A contact rating; up to three contact blocks for non-illuminated and two contact blocks for illuminated models can be connected
- Contact blocks can be removed by locking lever
- IP20 finger-safe screw terminals
- UL Type 4X rating

| Applicable Standards | Mark | File No. or Organization |
|---|---|---|
| UL508<br>CSA C22.2 No.14 | | UL/c-UL File No. E68961 |
| EN60947-5-1 | | TÜV SÜD |
| | CE | EC Low Voltage Directive |

## Specifications

| | |
|---|---|
| Operating Temperature | Non-illuminated: –25 to +60°C (no freezing)<br>LED illuminated: –25 to +55°C (no freezing) |
| Operating Humidity | 45 to 85% RH (no condensation) |
| Storage Temperature | –40 to +80°C |
| Contact Resistance | 50 mΩ maximum (initial value) |
| Insulation Resistance | 100 MΩ minimum (500V DC megger) |
| Overvoltage Category | II (IEC 60664-1) |
| Impulse Withstand Voltage | 2.5 kV (IEC60664-1/60947-5-1) |
| Pollution Degree | 3 (IEC60947-5-1) |
| Vibration Resistance | Operating extremes: 5 to 55Hz, amplitude 0.5mm |
| Shock Resistance | Operating extremes: 100m/s$^2$<br>Damage limits: 1000m/s$^2$ |
| Mechanical Life<br>(minimum operations) | Pushbutton, illuminated pushbutton: 2,000,000<br>Selector switch: 250,000<br>Key selector switch: 250,000 |
| Electrical Life<br>(minimum operations) | 50,000 (see Contact Ratings)<br>100,000 (see Contact Ratings)<br>(switching frequency 1800 operations/h) |
| Degree of Protection (IEC60529) | Panel front: IP65 Type 4X<br>Terminals: IP20 |
| Short-circuit Protection | 250V/10A fuse, (Type aM IEC60269-1, IEC602069-2) |
| Electrical Shock Protection | Class II (IEC61140) |
| Terminal Style | Screw terminal (M3.5 slotted Phillips screw) |
| Bezel Material | Polyamide |
| Applicable Wire Size | Up to 2 wires of 2mm$^2$ (solid wire ø1.6) maximum (AWG14 to 16)<br>(Ring terminal cannot be used) |
| Recommended Tightening Torque | Terminal: 1.0 to 1.3N·m<br>Locking ring: 1.2N·m |

## Contact Ratings

| | | | | 24V | 120V | 240V |
|---|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | | 300V | | |
| Rated Thermal Current (Ith) | | | | 10A | | |
| Rated Operating Voltage (Ue) | | | | | | |
| Rated Operating Current (Ie) | Electrical Life 50,000 operations | AC 50/60Hz | Resistive Load (AC-12) | 10A | 10A | 6A |
| | | | Inductive Load (AC-15) | 10A | 6A | 3A |
| | | DC | Resistive Load (DC-12) | 8A | 2.2A | 1.1A |
| | | | Inductive Load (DC-13) | 4A | 1.1A | 0.55A |
| | Electrical Life 100,000 operations | AC 50/60Hz | Resistive Load (AC-12) | 5A | 5A | 3A |
| | | | Inductive Load (AC-15) | 5A | 3A | 1.5A |
| | | DC | Resistive Load (DC-12) | 4A | 1.1A | 0.55A |
| | | | Inductive Load (DC-13) | 2A | 0.55A | 0.27A |
| Contact Material | | | | Silver | | |

1. Minimum applicable load (reference value): 3V AC/DC, 5mA (Applicable range is subject to the operating conditions and load.)
2. The operational current represents the classification by making and breaking currents (IEC 60947-5-1).
3. UL, c-UL rating: A300

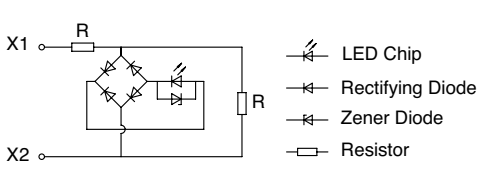
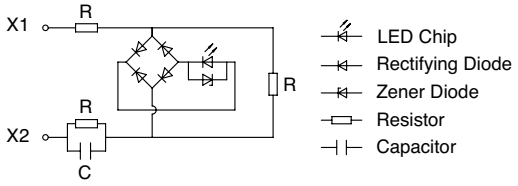
## Direct Opening of Key Selector Switch

| | 2-position (3NC) | 3-position (2NC) |
|---|---|---|
| Operator Angle for Direct Opening Action | 90° | 45° |
| Minimum Operator Torque for Direct Opening Action | 0.2N·m | 0.3N·m |
| Maximum Operator Angle | 90° | 45° |

## Weights

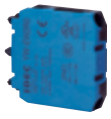
| | |
|---|---|
| Illuminated Pushbutton | 46g (CW1L-M1E02QH, 2 contacts)<br>62g (CW1L-M1E22QH, 4 contacts) |
| Pushbutton | 45g (CW1B-M1E03, 3 contacts)<br>52g (CW1B-M1E22, 4 contacts) |
| Pilot Light | 27g (CW1P-1EQH) |
| Selector Switch | 48g (CW1S-2E03, 3 contacts)<br>55g (CW1S-2E22, 4 contacts) |
| Key Selector Switch | 61g (CW1K-2AE03, 3 contacts)<br>68g (CW1K-2AE22, 4 contacts) |

## LED Module

| | | | | | |
|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | 250V | | | | |
| Rated Operating Voltage (Ue) | 6V AC/DC | 12V AC/DC | 24V AC/DC | 100/120V AC | 230/240V AC |
| Operating Voltage Range | 6V AC/DC±10% | 12V AC/DC±10% | 24V AC/DC±10% | 100/120V AC±10% | 230/240V AC±10% |
| Illumination Color Code ② | A (amber), G (green), PW (white), R (red), S (blue) | | | | |
| LED Module Part Number | CW-EAQ2② | CW-EAQ3② | CW-EAQ4② | CW-EAQH② | CW-EAQM4② |
| Current Draw | 15mA | 15mA | 16.5mA | 18mA | 18mA |
| Life (reference value) | Approx. 30,000 hours | | | | |
| Internal Circuit |  | |  | | |

1. Specify an illumination color code in place of ② in the part number.
2. Use the white (PW) LED module for yellow illumination.

## Contact Blocks

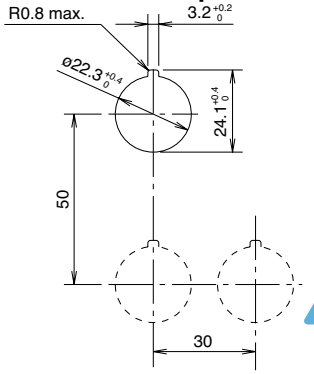
| Contact Block | Single Contact Block | | Double Contact Block | | |
|---|---|---|---|---|---|
| Contact | 1NO | 1NC | 2NO | 2NC | 1NO-1NC |
| Part No. | YW-E10R | YW-E01 | YW-EW2R0 | YW-EW02 | YW-EW1R1 |
| Shape | | |  | | |
| Housing Color | Blue/Black | Reddish Purple | Blue/Black | Reddish Purple | Reddish Purple/Blue |
| Push Rod Color | Black | Red | Black | Red | Gray |
| Terminal No. | 3-4 | 1-2 | 1st tier: 13-14<br>2nd tier: 23-24 | 1st tier: 11-12<br>2nd tier: 21-22 | 1st tier: (NO) 13-14<br>2nd tier: (NC) 21-22 |
| Weight (approx.) | 11g | | 19g | | |

## Degree of Protection

| Rating | IP65 | IP66 | IP67 | UL Type 4X |
|---|---|---|---|---|
| Illuminated Pushbutton | Yes | Yes * | Yes * | Yes * |
| Pilot Light | Yes | Yes | No | Yes |
| Pushbutton | Yes | Yes * | Yes * | Yes * |
| Selector Switch | Yes | Yes | Yes | Yes |
| Key Selector Switch | Yes | Yes | No | Yes |

*When used with rubber boot (CW9Z-D11, -D12)

## Mounting Hole Layout
## IEC 60947-5-1 compliant




Note: Determine mounting centers to ensure proper spacing.

## Illuminated Pushbuttons (Assembled)

| Style | Operating Voltage | Contact Configuration | Black Bezel | Metallic Bezel | Illumination Color Code ② |
|---|---|---|---|---|---|
| Round Flush<br>CW□L-□1<br> <br>(black bezel)<br> <br>(metallic bezel) | 6V AC/DC | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC<br>2NO-2NC | CW1L-③1E10Q2②<br>CW1L-③1E01Q2②<br>CW1L-③1E11Q2②<br>CW1L-③1E20Q2②<br>CW1L-③1E02Q2②<br>CW1L-③1E22Q2② | CW4L-③1E10Q2②<br>CW4L-③1E01Q2②<br>CW4L-③1E11Q2②<br>CW4L-③1E20Q2②<br>CW4L-③1E02Q3②<br>CW4L-③1E22Q2② | A: amber<br>G: green<br>PW: white<br>R: red<br>S: blue<br>Y: yellow |
| | 12V AC/DC | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC<br>2NO-2NC | CW1L-③1E10Q3②<br>CW1L-③1E01Q3②<br>CW1L-③1E11Q3②<br>CW1L-③1E20Q3②<br>CW1L-③1E02Q3② | CW4L-③1E10Q3②<br>CW4L-③1E01Q3②<br>CW4L-③1E11Q3②<br>CW4L-③1E20Q3②<br>CW4L-③1E02Q3② | |
| | 24V AC/DC | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC<br>2NO-2NC | CW1L-③1E10Q4②<br>CW1L-③1E01Q4②<br>CW1L-③1E11Q4②<br>CW1L-③1E20Q4②<br>CW1L-③1E02Q4②<br>CW1L-③1E22Q4② | CW4L-③1E10Q4②<br>CW4L-③1E01Q4②<br>CW4L-③1E11Q4②<br>CW4L-③1E20Q4②<br>CW4L-③1E02Q4②<br>CW4L-③1E22Q4② | |
| | 100/120V AC | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC<br>2NO-2NC | CW1L-③1E10QH②<br>CW1L-③1E01QH②<br>CW1L-③1E11QH②<br>CW1L-③1E20QH②<br>CW1L-③1E02QH②<br>CW1L-③1E22QH② | CW4L-③1E10QH②<br>CW4L-③1E01QH②<br>CW4L-③1E11QH②<br>CW4L-③1E20QH②<br>CW4L-③1E02QH②<br>CW4L-③1E22QH② | |
| | 230/240V AC | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC<br>2NO-2NC | CW1L-③1E10QM4②<br>CW1L-③1E01QM4②<br>CW1L-③1E11QM4②<br>CW1L-③1E20QM4②<br>CW1L-③1E02QM4②<br>CW4L-③1E22QM4② | CW4L-③1E10QM4②<br>CW4L-③1E01QM4②<br>CW4L-③1E11QM4②<br>CW4L-③1E20QM4②<br>CW4L-③1E02QM4②<br>CW4L-③1E22QM4② | |
| Round Extended<br>CW□L-□2<br> <br>(black bezel)<br> <br>(metallic bezel) | 6V AC/DC | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC<br>2NO-2NC | CW1L-③2E10Q2②<br>CW1L-③2E01Q2②<br>CW1L-③2E11Q2②<br>CW1L-③2E20Q2②<br>CW1L-③2E02Q2②<br>CW1L-③2E22Q2② | CW4L-③2E10Q2②<br>CW4L-③2E01Q2②<br>CW4L-③2E11Q2②<br>CW4L-③2E20Q2②<br>CW4L-③2E02Q2②<br>CW4L-③2E22Q2② | |
| | 12V AC/DC | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC<br>2NO-2NC | CW1L-③2E10Q3②<br>CW1L-③2E01Q3②<br>CW1L-③2E11Q3②<br>CW1L-③2E20Q3②<br>CW1L-③2E02Q3②<br>CW1L-③2E22Q3② | CW4L-③2E10Q3②<br>CW4L-③2E01Q3②<br>CW4L-③2E11Q3②<br>CW4L-③2E20Q3②<br>CW4L-③2E02Q3②<br>CW4L-③2E22Q3② | |
| | 24V AC/DC | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC<br>2NO-2NC | CW1L-③2E10Q4②<br>CW1L-③2E01Q4②<br>CW1L-③2E11Q4②<br>CW1L-③2E20Q4②<br>CW1L-③2E02Q4②<br>CW1L-③2E22Q4② | CW4L-③2E10Q4②<br>CW4L-③2E01Q4②<br>CW4L-③2E11Q4②<br>CW4L-③2E20Q4②<br>CW4L-③2E02Q4②<br>CW4L-③2E22Q4② | |
| | 100/120V AC | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC<br>2NO-2NC | CW1L-③2E10QH②<br>CW1L-③2E01QH②<br>CW1L-③2E11QH②<br>CW1L-③2E20QH②<br>CW1L-③2E02QH②<br>CW1L-③2E22QH② | CW4L-③2E10QH②<br>CW4L-③2E01QH②<br>CW4L-③2E11QH②<br>CW4L-③2E20QH②<br>CW4L-③2E02QH②<br>CW4L-③2E22QH② | |
| | 230/240V AC | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC<br>2NO-2NC | CW1L-③2E10QM4②<br>CW1L-③2E01QM4②<br>CW1L-③2E11QM4②<br>CW1L-③2E20QM4②<br>CW1L-③2E02QM4②<br>CW1L-③2E22QM4② | CW4L-③2E10QM4②<br>CW4L-③2E01QM4②<br>CW4L-③2E11QM4②<br>CW4L-③2E20QM4②<br>CW4L-③2E02QM4②<br>CW4L-③2E22QM4② | |

1. Specify an illumination color code in place of ② in the Part Number.
2. Specify function code in place of ③ in the Part Number. M: momentary, A: maintained
3. See page 605 for dimensions.
4. See next page for replacement LED modules.
5. A dummy block is installed when one contact block is used.
6. Additional contact configurations available, contact IDEC for more details

# Illuminated Pushbuttons (Sub-assembled)

| Contact Blocks | + | LED Module | + | Mounting Adapter | + | Operator | + | Lens | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

## Contact Blocks

| Style | Contacts | Contact Block | Contact Configuration | Part Number |
|---|---|---|---|---|
| | Finger-safe screw terminal | Single | 1NO | YW-E10R |
| | | | 1NC | YW-E01 |
| | | Double | 2NO | YW-EW2R0 |
| | | | 2NC | YW-EW02 |
| | | | 1N0-1NC | YW-EW1R1 |
| | Dummy block | | | CW-DB |

## LED Module

| Style | Part Number |
|---|---|
| | CW-EAQ ②① |

1. In place of ①, specify the Lens/LED Color Code from table.
2. In place of ②, specify the Voltage Code from table.
3. Use PW LED for yellow lens.

## Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | CW-CN |

## Operators

| Style | | | Black Bezel | Metallic Bezel |
|---|---|---|---|---|
| | Momentary | Round Flush | CW1L-M10 | CW4L-M10 |
| | | Round Extended | CW1L-M20 | CW4L-M20 |
| | Maintained | Round Flush | CW1L-A10 | CW4L-A10 |
| | | Round Extended | CW1L-A20 | CW4L-A20 |

## Lens

| Style | | Part Number |
|---|---|---|
| | Round Flush | CW9Z-L11① |
| | Round Extended | CW9Z-L12① |

1. In place of ①, specify the Lens/LED Color Code from table.

## ① Lens/LED Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White* | PW or C |
| Yellow | Y |

*Use PW for LED module, use C for lens.

## ② Voltage Code

| Voltage | Code |
|---|---|
| 6V AC/DC | 2 |
| 12V AC/DC | 3 |
| 24V AC/DC | 4 |
| 100/120V AC | H |
| 230/240V AC | M4 |

## Non-Illuminated Pushbuttons (Assembled)

| Style | Contact Configuration | Black Bezel | Metallic Bezel | Button Color Code ① |
|---|---|---|---|---|
| Round Flush CW□B-□1 (black bezel) | 1NO | CW1B-③1E10① | CW4B-③1E10① | B: black<br>G: green<br>R: red<br>S: blue<br>W: white<br>Y: yellow |
| | 1NC | CW1B-③1E01① | CW4B-③1E01① | |
| | 1NO-1NC | CW1B-③1E11① | CW4B-③1E11① | |
| | 2NO | CW1B-③1E20① | CW4B-③1E20① | |
| | 2NC | CW1B-③1E02① | CW4B-③1E02① | |
| | 2NO-1NC* | CW1B-M1E21① | CW4B-M1E21① | |
| | 1NO-2NC* | CW1B-M1E12① | CW4B-M1E12① | |
| | 3NO* | CW1B-M1E30① | CW4B-M1E30① | |
| | 3NC* | CW1B-M1E03① | CW4B-M1E03① | |
| | 2NO-2NC | CW1B-③1E22j | CW4B-③1E22j | |
| Round Extended CW□B-□2 (metallic bezel) | 1NO | CW1B-③2E10① | CW4B-③2E10① | |
| | 1NC | CW1B-③2E01① | CW4B-③2E01① | |
| | 1NO-1NC | CW1B-③2E11① | CW4B-③2E11① | |
| | 2NO | CW1B-③2E20① | CW4B-③2E20① | |
| | 2NC | CW1B-③2E02① | CW4B-③2E02① | |
| | 2NO-1NC* | CW1B-M2E21① | CW4B-M2E21① | |
| | 1NO-2NC* | CW1B-M2E12① | CW4B-M2E12① | |
| | 3NO* | CW1B-M2E30① | CW4B-M2E30① | |
| | 3NC* | CW1B-M2E03① | CW4B-M2E03① | |
| | 2NO-2NC | CW1B-M2E22① | CW4B-③2E22① | |

1. Specify a button color code in place of ① in the part number.
2. Specify function code in place of ③ in the Part Number. M: momentary, A: maintained
3. See page 606 for dimensions.
4. Two dummy blocks are installed when one contact is used and one dummy block in installed when two contact blocks are used.
5. *These contact configurations are not available in maintained action
6. Additional contact configurations available; contact IDEC for more details.

## Non-Illuminated Pushbuttons (Sub-assembled)

| Contact Blocks | + | Mounting Adaptor | + | Operator | = | Completed Unit |
|---|---|---|---|---|---|---|

### Contact Blocks

| Style | Contacts | Contact Block | Contact Configuration | Part Number |
|---|---|---|---|---|
| | Finger-safe screw terminal | Single | 1NO | YW-E10R |
| | | | 1NC | YW-E01 |
| | | Double | 2NO | YW-EW2R0 |
| | | | 2NC | YW-EW02 |
| | | | 1N0-1NC | YW-EW1R1 |
| | Dummy block | | | CW-DB |

### Operators*

| Style | | | Black Bezel | Metallic Bezel |
|---|---|---|---|---|
| | Momentary | Round Flush | CW1B-M1① | CW4B-M1① |
| | | Round Extended | CW1B-M2① | CW4B-M2① |
| | Maintained | Round Flush | CW1B-A1① | CW4B-A1① |
| | | Round Extended | CW1B-A2① | CW4B-A2① |

1. Specify a button color code in place of ①.
2. *Operator button is not removable from operator.

### ① Button Color Code

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | CW-CN |

## Pilot Lights (Assembled)

| Style | Operating Voltage | Black Bezel | Metallic Bezel | Illumination Color Code ② |
|---|---|---|---|---|
| Round Flush Lens CW□P-1 (black bezel) | 6V AC/DC | CW1P-1EQ2② | CW4P-1EQ2② | A: amber<br>G: green<br>R: red<br>S: blue<br>PW: white<br>Y: yellow |
| | 12V AC/DC | CW1P-1EQ3② | CW4P-1EQ3② | |
| | 24V AC/DC | CW1P-1EQ4② | CW4P-1EQ4② | |
| | 100/120V AC | CW1P-1EQH② | CW4P-1EQH② | |
| | 230/240V AC | CW1P-1EQM4② | CW4P-1EQM4② | |
| Round Dome Lens CW□P-2 (metallic bezel) | 6V AC/DC | CW1P-2EQ2② | CW4P-2EQ2② | |
| | 12V AC/DC | CW1P-2EQ3② | CW4P-2EQ3② | |
| | 24V AC/DC | CW1P-2EQ4② | CW4P-2EQ4② | |
| | 100/120V AC | CW1P-2EQH② | CW4P-2EQH② | |
| | 230/240V AC | CW1P-2EQM4② | CW4P-2EQM4② | |

1. Specify an illumination color code in place of ② in the Part Number
2. See page 606 for dimensions.
3. See page 604 for replacement LED modules.
4. Two dummy blocks are installed.

## Pilot Lights (Sub-assembled)

| Contact Blocks* | + | LED Module | + | Mounting Adapter | + | Operator | + | Lens | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

* 2 dummy blocks are required for each completed pilot light.

### Contact Block

| Style | Contacts | Part Number |
|---|---|---|
| | Dummy Block | CW-DB |

### LED Module

| Style | Part Number |
|---|---|
| | CW-EAQ ②① |

1. In place of ①, specify the Lens/LED Color Code from table.
2. In place of ②, specify the Voltage Code from table.
3. Use PW LED for yellow lens.

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | CW-CN |

### Operators

| Style | Black Bezel | Metallic Bezel |
|---|---|---|
| | CW1P-00 | CW4P-00 |

### Lens

| Style | | Part Number |
|---|---|---|
| | Round Flush | CW9Z-L11① |
| | Round Dome | CW9Z-L15① |

1. In place of ①, specify the Lens/LED Color Code from table.

### ① Lens/LED Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White* | PW or C |
| Yellow | Y |

*Use PW for LED module, use C for lens.

### ② Voltage Code

| Voltage | Code |
|---|---|
| 6V AC/DC | 2 |
| 12V AC/DC | 3 |
| 24V AC/DC | 4 |
| 100/120V AC | H |
| 230/240V AC | M4 |

## Selector Switches (Assembled)

| Shape | CW□S (Knob Operator) | (black bezel) | (metallic bezel) | | |
|---|---|---|---|---|---|

| No. of Positions | Contact Configuration | Contact Block: Mounting Position | Contact Block: Type | Operator Position: L | Operator Position: R | L R Maintained | L R Spring return from right |
|---|---|---|---|---|---|---|---|
| 90° 2-position | 1NO (10) | 1 | NO | | ● | CW□S-2E10 | CW□S-21E10 |
| | | 2 | — | Dummy | | | |
| | | 3 | — | Dummy | | | |
| | 1NC (01) | 1 | — | Dummy | | CW□S-2E01 | CW□S-21E01 |
| | | 2 | — | Dummy | | | |
| | | 3 | NC | ● | | | |
| | 1NO-1NC (11) | 1 | NO | | ● | CW□S-2E11 | CW□S-21E11 |
| | | 2 | — | Dummy | | | |
| | | 3 | NC | ● | | | |
| | 2NO (20) | 1 | NO | | ● | CW□S-2E20 | CW□S-21E20 |
| | | 2 | — | Dummy | | | |
| | | 3 | NO | | ● | | |
| | 2NC (02) | 1 | NC | ● | | CW□S-2E02 | CW□S-21E02 |
| | | 2 | — | Dummy | | | |
| | | 3 | NC | ● | | | |
| | 2NO-1NC (21) | 1 | NO | | ● | CW□S-2E21 | CW□S-21E21 |
| | | 2 | NO | | ● | | |
| | | 3 | NC | ● | | | |
| | 1NO-2NC (12) | 1 | NO | | ● | CW□S-2E12 | CW□S-21E12 |
| | | 2 | NC | ● | | | |
| | | 3 | NC | ● | | | |
| | 3NO (30) | 1 | NO | | ● | CW□S-2E30 | CW□S-21E30 |
| | | 2 | NO | | ● | | |
| | | 3 | NO | | ● | | |
| | 3NC (03) | 1 | NC | ● | | CW□S-2E03 | CW□S-21E03 |
| | | 2 | NC | ● | | | |
| | | 3 | NC | ● | | | |
| | 2NO-2NC (22) | 1 | NO/NC: NC | | ● | CW□S-2E22 | CW□S-21E22 |
| | | | NO/NC: NC | ● | | | |
| | | 2 | — | Dummy | | | |
| | | | NO/NC: NO | | ● | | |
| | | 3 | NO/NC: NC | ● | | | |
| | 4NO (40) | 1 | 2NO: NO | | ● | CW□S-2E40 | CW□S-2E40 |
| | | | 2NO: NO | | ● | | |
| | | 2 | — | Dummy | | | |
| | | 3 | 2NO: NO | | ● | | |
| | | | 2NO: NO | | ● | | |

## Selector Switches (Assembled) con't

| No. of Positions | Contact Configuration | Contact Block: Mounting Position | Contact Block: Type | Operator Position: L | Operator Position: C | Operator Position: R | L C R Maintained | L C R Spring return from right | L C R Spring return from left | L C R Spring return two-way |
|---|---|---|---|---|---|---|---|---|---|---|
| 45° 3-position | 1NO-1NC (11) | 1 | NO | ● | | | CW□S-3E11 | CW□S-31E11 | CW□S-32E11 | CW□S-33E11 |
| | | 2 | — | Dummy | | | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 1NO-1NC (11N1) | 1 | NC | | ▬ | | CW□S-3E11N1 | CW□S-31E11N1 | CW□S-32E11N1 | CW□S-33E11N1 |
| | | 2 | — | Dummy | | | | | | |
| | | 3 | NO | | | ● | | | | |
| | 1NO-1NC (11N2) | 1 | NO | ● | | | CW□S-3E11N2 | CW□S-31E11N2 | CW□S-32E11N2 | CW□S-33E11N2 |
| | | 2 | NC | | ● | | | | | |
| | | 3 | — | Dummy | | | | | | |
| | 1NO-1NC (11N3) | 1 | — | Dummy | | | CW□S-3E11N3 | CW□S-31E11N3 | CW□S-32E11N3 | CW□S-33E11N3 |
| | | 2 | NC | | ● | | | | | |
| | | 3 | NO | | | ● | | | | |
| | 1NO-1NC (11N4) | 1 | — | Dummy | | | CW□S-3E11N4 | CW□S-31E11N4 | CW□S-32E11N4 | CW□S-33E11N4 |
| | | 2 | NO | ● | | ● | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 2NO (20) | 1 | NO | ● | | | CW□S-3E20 | CW□S-31E20 | CW□S-32E20 | CW□S-33E20 |
| | | 2 | — | Dummy | | | | | | |
| | | 3 | NO | | | ● | | | | |
| | 2NO (20N1) | 1 | — | Dummy | | | CW□S-3E20N1 | CW□S-31E20N1 | CW□S-32E20N1 | CW□S-33E20N1 |
| | | 2 | NO | ● | | ● | | | | |
| | | 3 | NO | | | ● | | | | |
| | 2NC (02) | 1 | NC | | ▬ | | CW□S-3E02 | CW□S-31E02 | CW□S-32E02 | CW□S-33E02 |
| | | 2 | — | Dummy | | | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 2NC (02N1) | 1 | — | Dummy | | | CW□S-3E02N1 | CW□S-31E02N1 | CW□S-32E02N1 | CW□S-33E02N1 |
| | | 2 | NC | | ● | | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 2NO-1NC (21) | 1 | NO | ● | | | CW□S-3E21 | CW□S-31E21 | CW□S-32E21 | CW□S-33E21 |
| | | 2 | NO | ● | | ● | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 2NO-1NC (21N1) | 1 | NO | ● | | | CW□S-3E21N1 | CW□S-31E21N1 | CW□S-32E21N1 | CW□S-33E21N1 |
| | | 2 | NC | | ● | | | | | |
| | | 3 | NO | | | ● | | | | |
| | 1NO-2NC (12) | 1 | NO | ● | | | CW□S-3E12 | CW□S-31E12 | CW0S-32E12 | CW□S-33E12 |
| | | 2 | NC | | ● | | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 1NO-2NC (12N1) | 1 | NC | | ▬ | | CW□S-3E12N1 | CW□S-31E12N1 | CW□S-32E12N1 | CW□S-33E12N1 |
| | | 2 | NO | ● | | ● | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 3NO (30) | 1 | NO | ● | | | CW□S-3E30 | CW□S-31E30 | CW□S-32E30 | CW□S-33E30 |
| | | 2 | NO | ● | | ● | | | | |
| | | 3 | NO | | | ● | | | | |
| | 3NC (03) | 1 | NC | | ▬ | | CW□S-3E03 | CW□S-31E03 | CW□S-32E03 | CW□S-33E03 |
| | | 2 | NC | | ● | | | | | |
| | | 3 | NC | ▬ | | | | | | |

## Selector Switches (Assembled) con't

| No. of Positions | Contact Configuration | Contact Block: Mounting Position | Contact Block: Type | Operator Position: L | Operator Position: C | Operator Position: R | Maintained | Spring return from right | Spring return from left | Spring return two-way |
|---|---|---|---|---|---|---|---|---|---|---|
| 45° 3-position | 2NO-2NC (22) | 1 | NO/NC NO | ● | | ▬ | CW□S-3E22 | CW□S-31E22 | CW□S-32E22 | CW□S-33E22 |
| | | 2 | — | | Dummy | | | | | |
| | | 3 | NO/NC NC | ▬ | | ● | | | | |
| | 4NO (40) | 1 | 2NO NO | ● | | | CW□S-3E40 | CW□S-31E40 | CW□S-32E40 | CW□S-33E40 |
| | | 2 | — | | Dummy | | | | | |
| | | 3 | 2NO NO | | | ● | | | | |
| | 2NO-2NC (22N2) | 1 | 2NC NC | | ▬ | | CW□S-3E22N2 | CW□S-31E22N2 | CW□S-32E22N2 | CW□S-33E22N2 |
| | | 2 | — | | Dummy | | | | | |
| | | 3 | 2NC NC | | | ● | | | | |

1. Specify a bezel color code in place of □ in the Part Number, 1 (black bezel), 4 (metallic bezel)
2. For the contact block mounting position, see below.
3. Lever operator is also available. For dimensions, see page 607.
4. To order a lever operator selector switch, insert L before E in the knob operator part number. Example: Knob Operator part number CW1S-3E11 becomes CW1S-3LE11 for Lever Operator.

**Lever Operator**

CW1S-□L
(black bezel)

CW4S-□L
(metallic bezel)

**Contact Block Mounting Position**

| | | Left (L) | Center (C) | Right (R) |
|---|---|---|---|---|
| 1 | NO | ● | | |
| 2 | NC | | ● | |
| 3 | NC | ▬ | | |

Operator Position

## Selector Switches (Sub-assembled)

| Contact Block | + | Mounting Adaptor | + | Operator | = | Completed Unit |
|---|---|---|---|---|---|---|

### Contact Blocks

| Style | Contacts | Contact Block | Contact Configuration | Part Number |
|---|---|---|---|---|
| | Finger-safe screw terminal | Single | 1NO | YW-E10R |
| | | | 1NC | YW-E01 |
| | | Double | 2NO | YW-EW2R0 |
| | | | 2NC | YW-EW02 |
| | | | 1N0-1NC | YW-EW1R1 |
| | Dummy block | | | CW-DB |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | CW-CN |

### Operators

| Style | Position | Handle | Description | Black Bezel | Metallic Bezel |
|---|---|---|---|---|---|
| (knob operator shown) | 2-position | Knob | Maintained | CW1S-2 | CW4S-2 |
| | | | Spring return from right | CW1S-21 | CW4S-21 |
| | | Lever | Maintained | CW1S-2L | CW4S-2L |
| | | | Spring return from right | CW1S-21L | CW4S-21L |
| | 3-position | Knob | Maintained | CW1S-3 | CW4S-3 |
| | | | Spring return from right | CW1S-31 | CW4S-31 |
| | | | Spring return from left | CW1S-32 | CW4S-32 |
| | | | Spring return two-way | CW1S-33 | CW4S-33 |
| | | Lever | Maintained | CW1S-3L | CW4S-3L |
| | | | Spring return from right | CW1S-31L | CW4S-31L |
| | | | Spring return from left | CW1S-32L | CW4S-32L |
| | | | Spring return two-way | CW1S-33L | CW4S-33L |

Lever or knob is supplied with operator.

## Key Selector Switches (Assembled)

Shape: CW□K

(black bezel)

(metallic bezel)

| No. of Positions | Contact Configuration | Contact Block: Mounting Position | Contact Block: Type | Operator Position: L | Operator Position: R | Maintained | Spring return from right |
|---|---|---|---|---|---|---|---|
| 90° 2-position | 1NO (10) | 1 | NO | | ● | CW□K-2AE10 | CW□K-21BE10 |
| | | 2 | — | Dummy | | | |
| | | 3 | — | Dummy | | | |
| | 1NC (01) | 1 | — | Dummy | | CW□K-2AE01 | CW□K-21BE01 |
| | | 2 | — | Dummy | | | |
| | | 3 | NC | ● | | | |
| | 1NO-1NC (11) | 1 | NO | | ● | CW□K-2AE11 | CW□K-21BE11 |
| | | 2 | — | Dummy | | | |
| | | 3 | NC | ● | | | |
| | 2NO (20) | 1 | NO | | ● | CW□K-2AE20 | CW□K-21BE20 |
| | | 2 | — | Dummy | | | |
| | | 3 | NO | | ● | | |
| | 2NC (02) | 1 | NC | ● | | CW□K-2AE02 | CW□K-21BE02 |
| | | 2 | — | Dummy | | | |
| | | 3 | NC | ● | | | |
| | 2NO-1NC (21) | 1 | NO | | ● | CW□K-2AE21 | CW□K-21BE21 |
| | | 2 | NO | | ● | | |
| | | 3 | NC | ● | | | |
| | 1NO-2NC (12) | 1 | NO | | ● | CW□K-2AE12 | CW□K-21BE12 |
| | | 2 | NC | ● | | | |
| | | 3 | NC | ● | | | |
| | 3NO (30) | 1 | NO | | ● | CW□K-2AE30 | CW□K-21BE30 |
| | | 2 | NO | | ● | | |
| | | 3 | NO | | ● | | |
| | 3NC (03) | 1 | NC | ● | | CW□K-2AE03 | CW□K-21BE03 |
| | | 2 | NC | ● | | | |
| | | 3 | NC | ● | | | |
| | 2NO-2NC (22) | 1 | NO/NC | NO: ● | NC: ● | CW□K-2AE22 | CW□K-21BE22 |
| | | 2 | — | | Dummy | | |
| | | 3 | NO/NC | NO: ● | NC: ● | | |
| | 4NO (40) | 1 | 2NO | NO: ● | NO: ● | CW□K-2AE40 | CW□K-21BE40 |
| | | 2 | — | | Dummy | | |
| | | 3 | 2NO | NO: ● | NO: ● | | |

## Key Selector Switches (Assembled) con't

| No. of Positions | Contact Configuration | Contact Block | | Operator Position | | | L C R Maintained | L C R Spring return from right | L C R Spring return from left | L C R Spring return two-way |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Mounting Position | Type | L | C | R | | | | |
| 45° 3-position | 1NO-1NC (11) | 1 | NO | ● | | | CW□K-3AE11 | CW□K-31BE11 | CW□K-32CE11 | CW□K-33DE11 |
| | | 2 | — | Dummy | | | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 1NO-1NC (11N1) | 1 | NC | | ▬ | | CW□K-3AE11N1 | CW□K-31BE11N1 | CW□K-32CE11N1 | CW□K-33DE11N1 |
| | | 2 | — | Dummy | | | | | | |
| | | 3 | NO | | | ● | | | | |
| | 1NO-1NC (11N2) | 1 | NO | ● | | | CW□K-3AE11N2 | CW□K-31BE11N2 | CW□K-32CE11N2 | CW□K-33DE11N2 |
| | | 2 | NC | | ● | | | | | |
| | | 3 | — | Dummy | | | | | | |
| | 1NO-1NC (11N3) | 1 | — | Dummy | | | CW□K-3AE11N3 | CW□K-31BE11N3 | CW□K-32CE11N3 | CW□K-33DE11N3 |
| | | 2 | NC | | ● | | | | | |
| | | 3 | NO | | | ● | | | | |
| | 1NO-1NC (11N4) | 1 | — | Dummy | | | CW□K-3AE11N4 | CW□K-31BE11N4 | CW□K-32CE11N4 | CW□K-33DE11N4 |
| | | 2 | NO | ● | | ● | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 2NO (20) | 1 | NO | ● | | | CW□K-3AE20 | CW□K-31BE20 | CW□K-32CE20 | CW□K-33DE20 |
| | | 2 | — | Dummy | | | | | | |
| | | 3 | NO | | | ● | | | | |
| | 2NO (20N1) | 1 | — | Dummy | | | CW□K-3AE20N1 | CW□K-31BE20N1 | CW□K-32CE20N1 | CW□K-33DE20N1 |
| | | 2 | NO | ● | | ● | | | | |
| | | 3 | NO | | | ● | | | | |
| | 2NC (02) | 1 | NC | | ▬ | | CW□K-3AE02 | CW□K-31BE02 | CW□K-32CE02 | CW□K-33DE02 |
| | | 2 | — | Dummy | | | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 2NC (02N1) | 1 | — | Dummy | | | CW□K-3AE02N1 | CW□K-31BE02N1 | CW□K-32CE02N1 | CW□K-33DE02N1 |
| | | 2 | NC | | ● | | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 2NO-1NC (21) | 1 | NO | ● | | | CW□K-3AE21 | CW□K-31BE21 | CW□K-32CE21 | CW□K-33DE21 |
| | | 2 | NO | ● | | ● | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 2NO-1NC (21N1) | 1 | NO | ● | | | CW□K-3AE21N1 | CW□K-31BE21N1 | CW□K-32CE21N1 | CW□K-33DE21N1 |
| | | 2 | NC | | ● | | | | | |
| | | 3 | NO | | | ● | | | | |
| | 1NO-2NC (12) | 1 | NO | ● | | | CW□K-3AE12 | CW□K-31BE12 | CW□K-32CE12 | CW□K-33DE12 |
| | | 2 | NC | | ● | | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 1NO-2NC (12N1) | 1 | NC | | ▬ | | CW□K-3AE12N1 | CW□K-31BE12N1 | CW□K-32CE12N1 | CW□K-33DE12N1 |
| | | 2 | NO | ● | | ● | | | | |
| | | 3 | NC | ▬ | | | | | | |
| | 3NO (30) | 1 | NO | ● | | | CW□K-3AE30 | CW□K-31BE30 | CW□K-32CE30 | CW□K-33DE30 |
| | | 2 | NO | ● | | ● | | | | |
| | | 3 | NO | | | ● | | | | |
| | 3NC (03) | 1 | NC | | ▬ | | CW□K-3AE03 | CW□K-31BE03 | CW□K-32CE03 | CW□K-33DE03 |
| | | 2 | NC | | ● | | | | | |
| | | 3 | NC | ▬ | | | | | | |

## Key Selector Switches (Assembled) con't

| No. of Positions | Contact Configuration | Contact Block: Mounting Position | Contact Block: Type | | Operator Position: L | C | R | Maintained (L C R) | Spring return from right | Spring return from left | Spring return two-way |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 90° 2-position | 2NO-2NC (22) | 1 | NO/NC | NO | ● | | | CW□K-3AE22 | CW□K-31BE22 | CW□K-32CE22 | CW□K-33DE22 |
| | | | | NC | | ▬ | | | | | |
| | | 2 | — | | Dummy | | | | | | |
| | | 3 | NO/NC | NO | | | ● | | | | |
| | | | | NC | ▬ | | | | | | |
| | 4NO (40) | 1 | 2NO | NO | ● | | | CW□K-3AE40 | CW□K-31BE40 | CW□K-32CE40 | CW□K-33DE40 |
| | | | | NO | ● | | | | | | |
| | | 2 | — | | Dummy | | | | | | |
| | | 3 | 2NO | NO | | | ● | | | | |
| | | | | NO | | | ● | | | | |
| | 2NO-2NC (22N2) | 1 | 2NC | NC | | ▬ | | CW□K-3AE22N2 | CW□K-31BE22N2 | CW□K-32CE22N2 | CW□K-33DE22N2 |
| | | | | NC | | ▬ | | | | | |
| | | 2 | — | | Dummy | | | | | | |
| | | 3 | 2NC | NC | | | ● | | | | |
| | | | | NC | | | ● | | | | |

1. Specify a bezel color code in place of □ in the Part Number: 1 (black bezel), 4 (metallic bezel).
2. On the spring-returned models, the key can be released only from the maintained position. On the maintained models, the key can be released from any position. Key retained positions are also available. See below.
3. Two keys are supplied.
4. Key cylinder material: Metal
5. Besides the standard key (key number 0H), six other keys are also available. See below.
6. For the contact block mounting position, see right.
7. For dimensions, see page 608.
8. When ordering an optional key or optional key-retained positions, specify designation codes as shown below:

Example: CW1K-2AE10-1H

- blank: Standard key (0H, reversible)
- 1H to 2H: Reversible key
- 3H to 6H: Non-reversible key

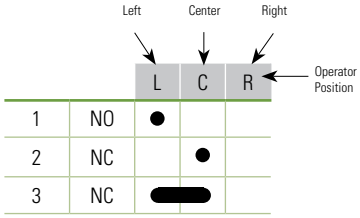
Key removal position code

2-position
- A: Removable in all positions
- B: Removable in left only
- C: Removable in right only

3-position
- A: Removable in all positions
- B: Removable in left and center
- C: Removable in right and center
- D: Removable in center only
- E: Removable in right and left
- G: Removable in left only
- H: Removable in right only

Note: Key is retained in all spring-returned positions.

**Contact Block Mounting Position**




Note:
Key number is indicated on the key cylinder.
Standard keys do not have a key number indication.

## Key Selector Switches (Sub-assembled)

| Contact Block | + | Mounting Adaptor | + | Operator | = | Completed Unit |
|---|---|---|---|---|---|---|

### Contact Blocks

| Style | Contacts | Contact Block | Contact Configuration | Part Number |
|---|---|---|---|---|
| | Finger-safe screw terminal | Single | 1NO | YW-E10R |
| | | | 1NC | YW-E01 |
| | | Double | 2NO | YW-EW2R0 |
| | | | 2NC | YW-EW02 |
| | | | 1NO-1NC | YW-EW1R1 |
| | Dummy block | | | CW-DB |

### Contact Block Mounting Adaptor

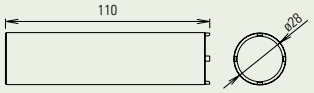
| Style | Part Number |
|---|---|
| | CW-CN |

### Operator

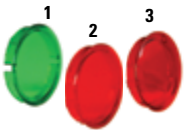
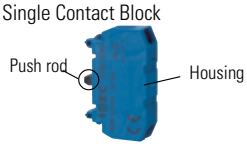
| Style | Position | Description | Black Bezel | Metallic Bezel |
|---|---|---|---|---|
| | 2-position | Maintained, key removable all positions | CW1K-2A | CW4K-2A |
| | | Maintained, key removable left position only | CW1K-2B | CW4K-2B |
| | | Maintained, key removable right position only | CW1K-2C | CW4K-2C |
| | | Spring return from right | CW1K-21B | CW4K-21B |
| | 3-position | Maintained, key removable all positions | CW1K-3A | CW1K-3A |
| | | Maintained, key removable left and center positions only | CW1K-3B | CW4K-3B |
| | | Maintained, key removable right and center positions only | CW1K-3C | CW4K-3C |
| | | Maintained, key removable center position only | CW1K-3D | CW4K-3D |
| | | Maintained, key removable left and right positions only | CW1K-3E | CW4K-3E |
| | | Maintained, key removable left position only | CW1K-3G | CW4K-3G |
| | | Maintained, key removable right position only | CW1K-3H | CW4K-3H |
| | | Spring return from right, key removable left and center positions only | CW1K-31B | CW4K-31B |
| | | Spring return from right, key removable center position only | CW1K-31D | CW4K-31D |
| | | Spring return from right, key removable left position only | CW1K-31G | CW4K-31G |
| | | Spring return from left, key removable right and center positions only | CW1K-32C | CW4K-32C |
| | | Spring return from left, key removable center position only | CW1K-32D | CW4K-32D |
| | | Spring return from left, key removable right position only | CW1K-32H | CW4K-32H |
| | | Spring return two-way, key removable center position only | CW1K-33D | CW4K-33D |

Two keys supplied with operator.

## Accessories

| Item | Appearance | Material | Part Number | Remarks |
|---|---|---|---|---|
| Locking Ring Wrench | | Brass | MW9Z-T1 | • Used to tighten the locking ring when installing the CW series control unit in a panel cut-out<br>• Weight: Approx 150g<br>  |
| Mounting Hole Plug | | Polyamide (black) | LW9Z-BP1 | • Used to plug an unnecessary ø22.3mm hole in the panel<br>• Degree of protection: IP65<br>• Panel thickness: 0.8 to 6.0mm |

## Replacement Parts

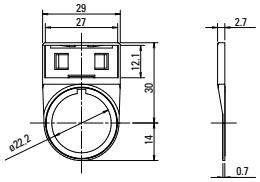
| Shape | Material | Part Number | Remarks |
|---|---|---|---|
| Lens  1 Round Flush | Polyalylate | CW9Z-L11② | Color code ②: A (amber), C (clear), G (green), R (red), S (blue), Y (yellow)<br>Use a clear (C) lens for white (PW) illumination.<br>1: For illuminated pushbutton, pilot light<br>2: For illuminated pushbutton<br>3: For pilot light |
| 2 Round Extended | Polyalylate | CW9Z-L12② | |
| 3 Round Dome | Polyalylate | CW9Z-L15② | |
| Single Contact Block  | 1NO | YW-E10R | Push rod color: Black<br>Housing color: Blue/black<br>Terminal No.: 3-4 |
| | 1NC | YW-E01 | Push rod color: Red<br>Housing color: Reddish purple<br>Terminal No.: 1-2 |
| Double Contact Block | 2NO | YW-EW2R0 | Push rod color: black<br>Housing color: blue and black<br>Terminal No. 1st tier: 13-14, 2nd tier: 23-24 |
| | 2NC | YW-EW02 | Push rod color: red<br>Housing color: reddish purple<br>Terminal No. 1st tier: 11-12, 2nd tier: 21-22 |
| | 1NO, 1NC | YW-EW1R1 | Push rod color: gray<br>Housing color: reddish purple/blue<br>Terminal No. 1st tier: 13-14, 2nd tier: 21-22 |
| Rubber Boot (clear) | | CW9Z-D11 | |
| | | CW9Z-D12 | |
| Dummy Block | Polyamide (black) | CW-DB | |
| Locking Ring | Polyamide (black) | CW9Z-LN | |
| Gasket | Nitrile rubber | CW9Z-WM | Waterproof gasket between CW control unit bezel and the mounting panel. |
| Nameplate | Plastic | CWAM-OB | |
| Spare Key | Zinc (nickel-plated) | LA9Z-SK-□ | Specify a key No. in place of □.<br>0H: Standard key (reversible)<br>1H to 2H: Reversible key<br>3H to 6H: Non-reversible key<br>For dimensions, see page 608. |

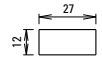
## LED Modules

| Shape | Operating Voltage Range | Current Draw | Part Number | Illumination Color Code ② |
|---|---|---|---|---|
| | 6V AC/DC±10% | 15mA | CW-EAQ2② | Specify an illumination color code in place of ② in the Part Number<br>A: amber<br>G: green<br>PW: white<br>R: red<br>S: blue |
| | 12V AC/DC±10% | 15mA | CW-EAQ3② | |
| | 24V AC/DC±10% | 16.5mA | CW-EAQ4② | |
| | 100/120V AC±10% | 18mA | CW-EAQH② | |
| | 230/240V AC±10% | 18mA | CW-EAQM4② | |

## Nameplate

CWAM–Black Plastic




| | | |
|---|---|---|
| Nameplate (blank engraving plate included) | CWAM-OB | |
| Nameplate (engraved) | CWAM-① | |
| Additional Insert (blank) | HWNP-O | HWNP Dimensions   |
| Additional Insert (engraved) | HWNP-① | |

1. In place of ①, insert either the standard legend code from table below or custom engraving delimited by " ".
2. Standard engravings are available at no charge.

## Standard Legend Codes

| Pushbuttons | | | | Pushbuttons/Selector Switches | | | | Selector Switches | |
|---|---|---|---|---|---|---|---|---|---|
| Legend | Code | Legend | Code | Legend | Code | Legend | Code | Legend | Code |
| AUTO | 101 | OPEN | 116 | AUTO-MAN | 201 | REV-FOR | 216 | AUTO-MAN-OFF | 301 |
| CLOSE | 102 | OUT | 117 | CLOSE-OPEN | 202 | RUN-JOG | 217 | AUTO-OFF-MAN | 302 |
| DOWN | 103 | RAISE | 118 | DOWN-UP | 203 | RUN-SAFE | 218 | CLOSE-OFF-OPEN | 303 |
| EMERG. | 104 | RESET | 119 | FAST-SLOW | 204 | SAFE-RUN | 219 | DOWN-OFF-SLOW | 304 |
| STOP | 105 | REVERSE | 120 | FOR-REV | 205 | SLOW-FAST | 220 | FAST-OFF-SLOW | 305 |
| FAST | 106 | RUN | 121 | HAND-AUTO | 206 | START-STOP | 221 | FOR-OFF-REV | 306 |
| FORWARD | 107 | SLOW | 122 | HIGH-LOW | 207 | STOP-START | 222 | LEFT-OFF-RIGHT | 307 |
| HAND | 108 | START | 123 | JOG-RUN | 208 | UP-DOWN | 223 | LOWER-OFF-RAISE | 308 |
| HIGH | 109 | STOP | 125 | LEFT-RIGHT | 209 | OI (Int'l OFF | 250 | OFF-MAN-AUTO | 309 |
| IN | 110 | TEST | 126 | LOWER-RAISE | 210 | ON) | | OFF-SLOW-FAST | 310 |
| INCH | 111 | UP | 127 | MAN-AUTO | 211 | | | OFF-1-2 | 311 |
| JOG | 112 | I (Int'l On) | 150 | OFF-ON | 212 | | | OPEN-OFF-CLOSE | 312 |
| LOW | 113 | O (Int'l | 151 | ON-OFF | 213 | | | SLOW-OFF-FAST | 313 |
| LOWER | 114 | Off) | 152 | OPEN-CLOSE | 214 | | | SUMMER-OFF-WINTER | 314 |
| OFF | 115 | EMO | | RAISE-LOWER | 215 | | | UP-OFF-DOWN | 315 |
| ON | | | | | | | | 1-OFF-2 | 316 |
| | | | | | | | | HAND-OFF-AUTO | 317 |

1. To order engraved nameplates, add legend code to nameplate part number.
2. Character height based on the number of characters and size of nameplate. Standard character size is 3/16".
3. Nameplates with standard legends are the same list price as blank nameplates.

## Nameplates Order Form — CW Series

Copy this order form and use it to specify Letter Height, Custom Engravings, Location of Engraving on Nameplate, and Quantity Desired.

To ensure engraving accuracy, fax it to your IDEC representative or Distributor.

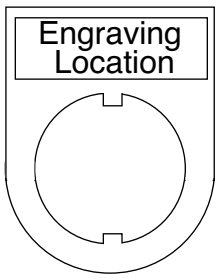
Your Company: _____ IDEC Rep/Distributor Contact: _____

Name: _____ PO number (if known): _____

Telephone: _____ IDEC Rep/Distributor Phone: _____

Fax & Email: _____ IDEC Rep/Distributor Fax & Email: _____

### CWAM Nameplate




**Step 1.**
**Choose Letter Size - 7/64" or 1/8".**
Check the box for the letter size you want. Then write your lettering in box below the check boxes. Note: 1/8" size letters cannot exceed 9 characters.

**Step 2.**
**Specify Quantity.**
Enter the number of nameplates desired in the box on the right.

Qty

7/64" Letter Size ☐ 11 characters maximum (for 7/64" size letters)

1/8" Letter Size ☐ 9 characters maximum (for 7/8" size letters)

1 2 3 4 5 6 7 8 9 10 11

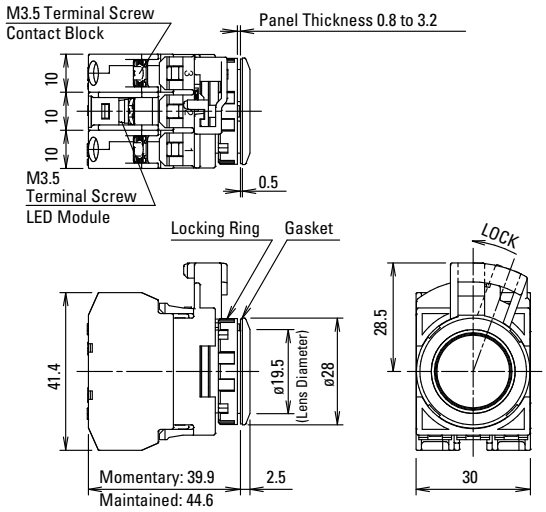
Sample Letter Sizes
7/64" Letters: A B C D
1/8" Letters: A B C D

# Dimensions (mm)

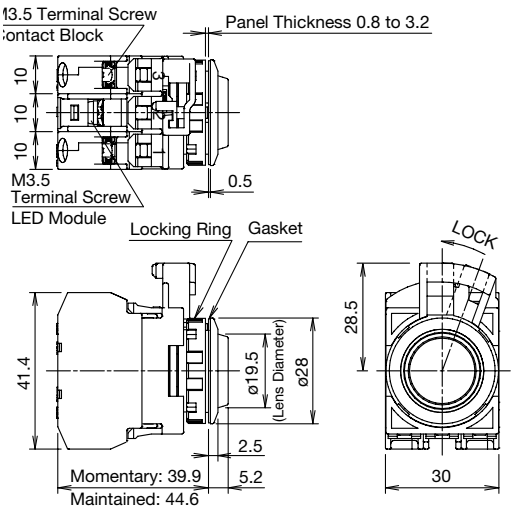
## Illuminated Pushbuttons

### 1 to 3 Contacts

#### Round Flush

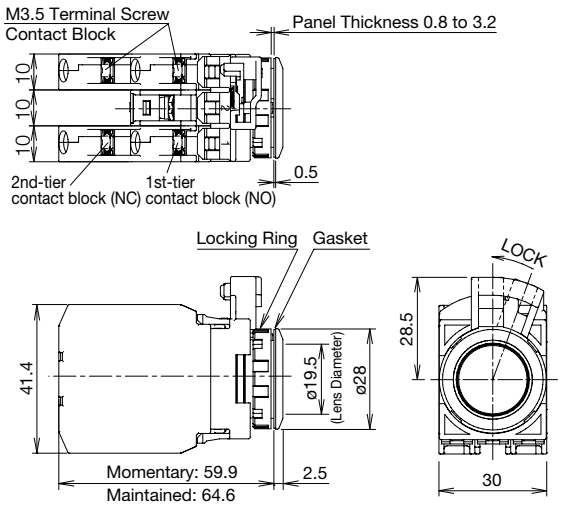



#### Round Extended

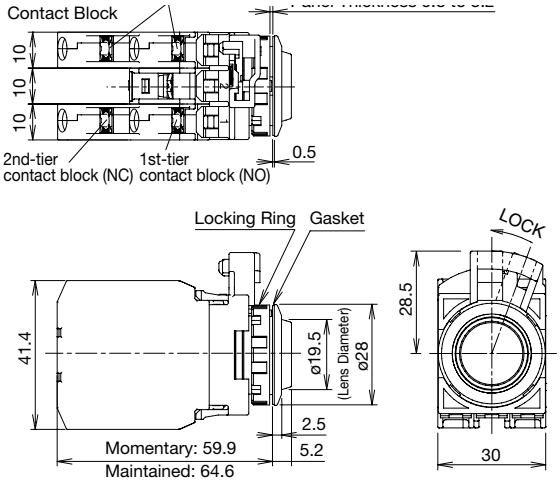



### 4 to 6 Contacts

#### Round Flush



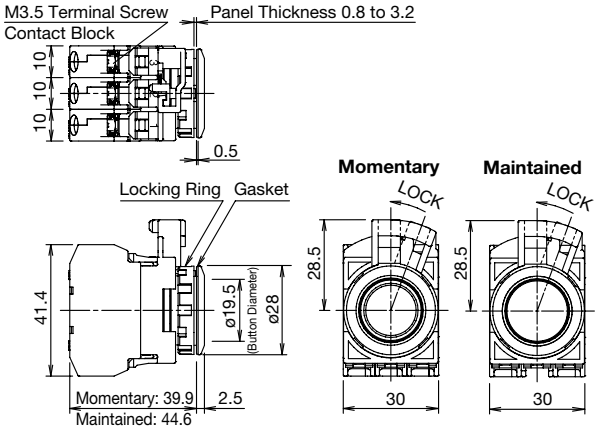

#### Round Extended



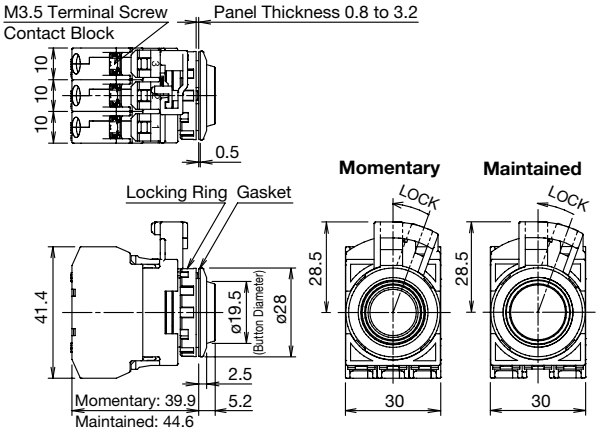
# Pushbuttons

## 1 to 3 Contacts

### Round Flush

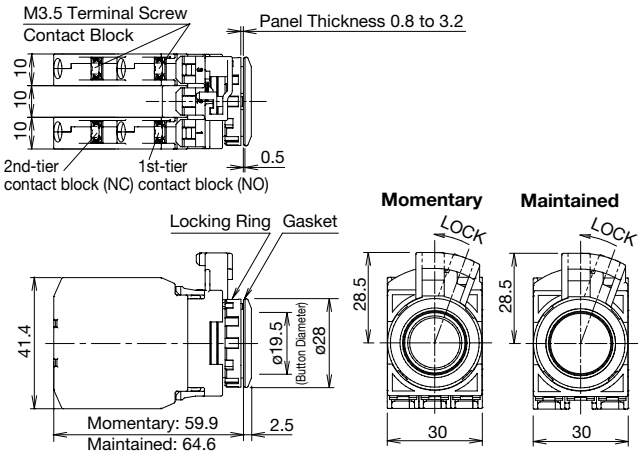



### Round Extended

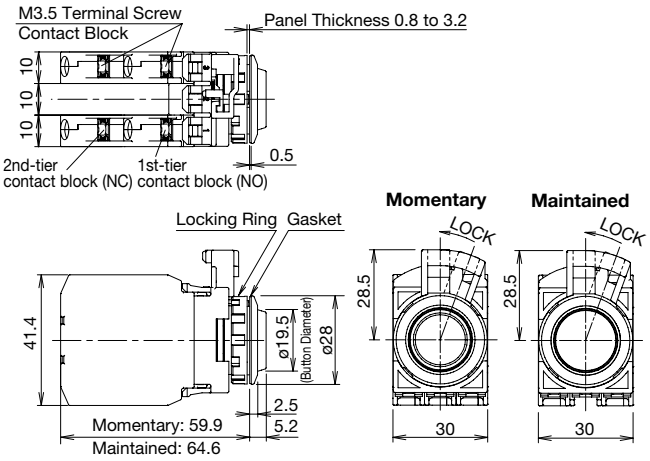



## 4 to 6 Contacts

### Round Flush

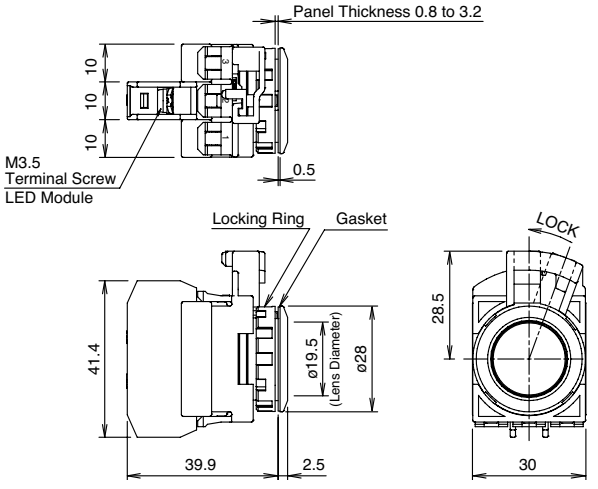



### Round Extended

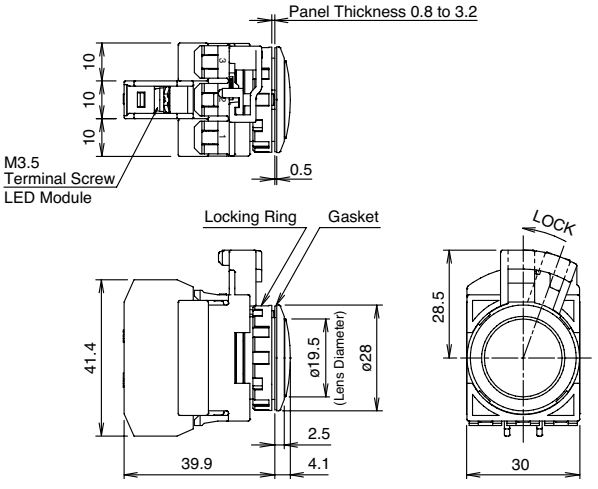



# Pilot Lights

### Round Flush



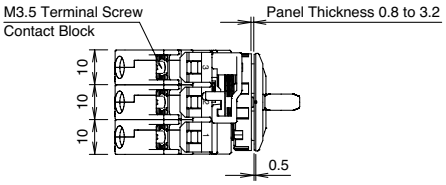

### Round Dome

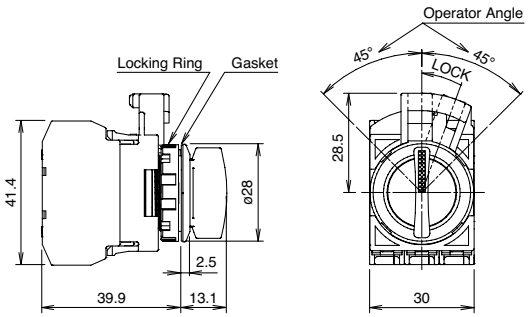


# Selector Switches

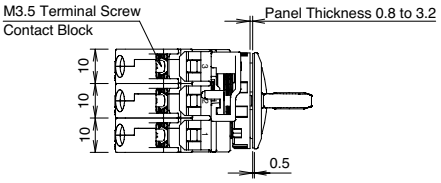
## 1 to 3 Contacts

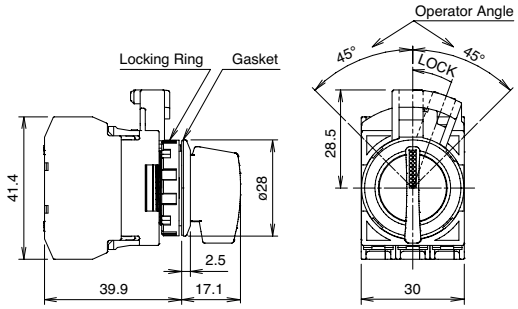
### Knob Operator



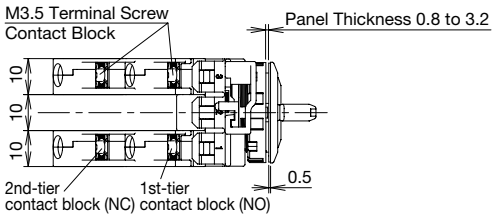

### Lever Operator

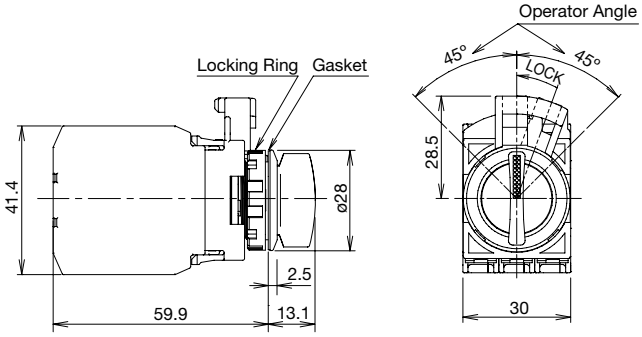


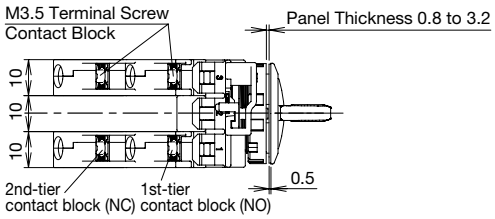

## 4 to 6 Contacts

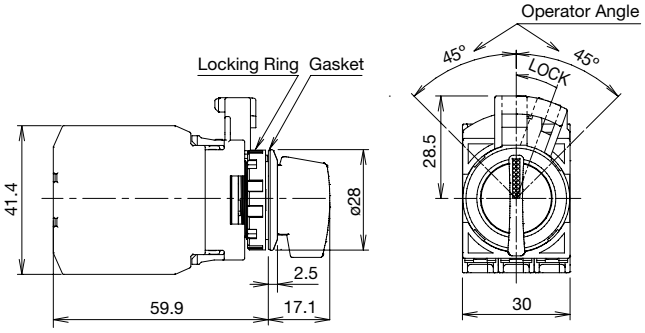
### Knob Operator



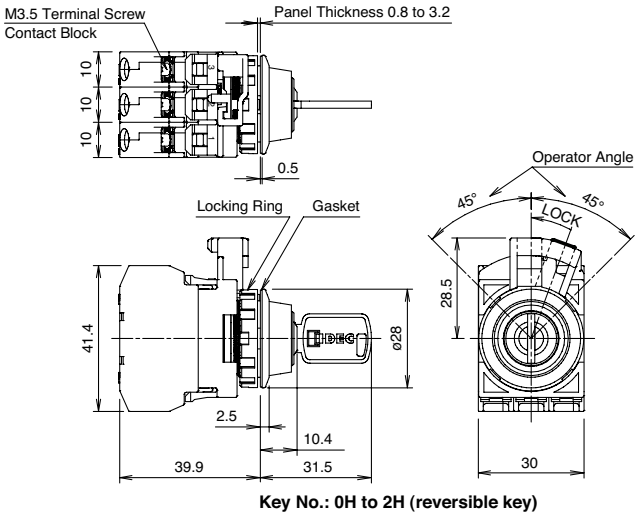

### Lever Operator



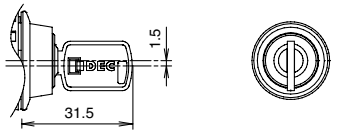



# Key Selector Switches

### 1 to 3 Contacts



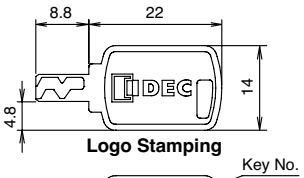

Key No.: 0H to 2H (reversible key)



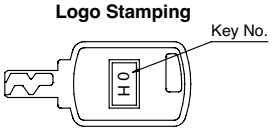

Key No.: 3H to 6H (non-reversible key)

### Keys

Reversible Key

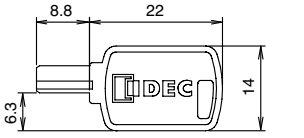



Logo Stamping

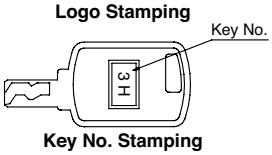



Key No. Stamping

Non-reversible Key

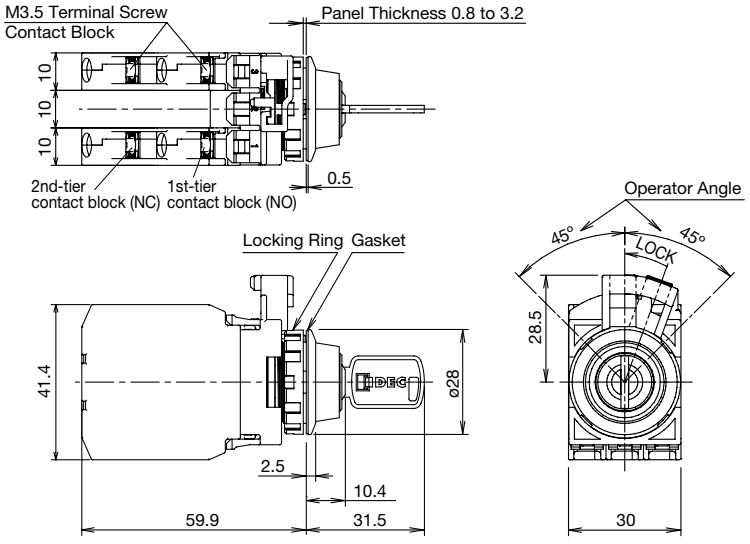



Logo Stamping




Key No. Stamping

### 4 to 6 Contacts



## Safety Precautions

Turn off the power to CW series switches before installation, removal, wiring and maintenance. Failure to turn power off may cause electrical shocks or fire hazard.

When wiring, use wires of a proper size to meet the voltage and current requirements. Tighten the M3.5 terminal screws to a tightening torque of 1.0 to 1.3 N·m. Failure to tighten the terminal screws may cause overheating and fire.

## Operating Instructions

### Notes for Operation

When using the CW series switches in a safety-related circuit of a control system, observe safety rules and regulations of each country concerning particular applications of the actual machines and facilities. Perform risk assessment before operation to ensure safety.

### Operating Conditions

In corrosive gas or high-temperature, high-humidity environments, contact failure due to corrosion or color change or breakage of the housing may occur.

Main parts of the CW series switches are made of plastic. Do not scratch the surface with a sharp object or apply excessive electric shock or load, otherwise the switches may be damaged. In particular, keep the button, lens and bezel from such damage, otherwise appearance and function may be impaired.

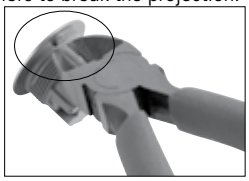
Do not apply detergents, cutting oils, or chemicals which may impair the function and appearance of the CW series switches.

### Panel Mounting

First remove the contact block and then the locking ring from the operator. Insert the operator into the panel cut-out from the front, tighten the locking ring from the back, then install the contact block to the operator.

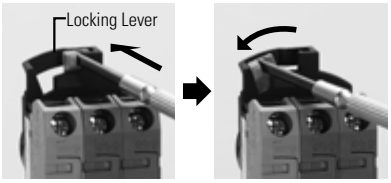
#### Mounting Hole

1. Mounting hole dimensions are in compliance with IEC60947-5-1.
2. If the anti-rotation projection is removed from the bezel, CW series switches can be mounted in ø22.3mm mounting holes. To remove the anti-rotation projection, remove the gasket and use cutting pliers to break the projection.



#### Removing and Installing the Contact Unit

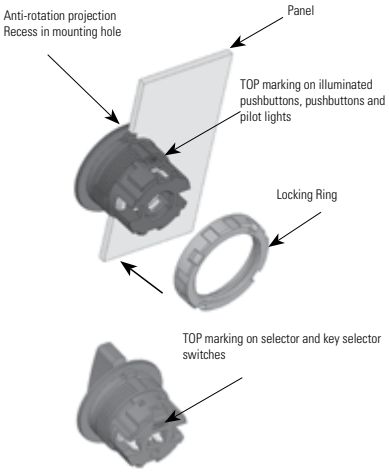
1. To remove the contact block from the operator, push the yellow locking lever and turn it to the left.




2. To install, align the TOP marking on the operator with the TOP marking on the contact block mounting adaptor, and turn the locking lever to the right.

#### Installation in Panel Cut-out

Remove the locking ring from the operator. With the anti-rotation projection on the operator aligned with the recess in the mounting hole, insert the operator into the mounting hole. Tighten the locking ring from the rear of the panel.




#### Note for Panel Mounting

When installing the operator in a panel cut-out, use the optional locking ring wrench (MW9Z-T1) to tighten the locking ring to a recommended tightening torque of 1.2 N·m. Do not use pliers and do not tighten excessively, otherwise the operator may be damaged.

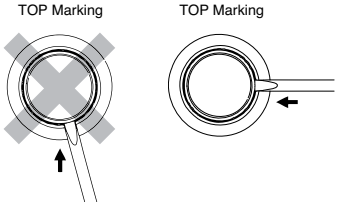
### Illuminated Pushbuttons and Pilot Lights

#### Removing the Lens

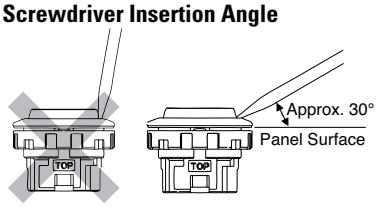
To remove the lens from an illuminated pushbutton or pilot light, insert a flat screwdriver under the flange of the lens at 90° from the TOP marking and twist the screwdriver.

Do not insert the screwdriver too far and do not apply excessive force to the lens, otherwise the bezel surface may be damaged.

#### Screwdriver Insertion Direction

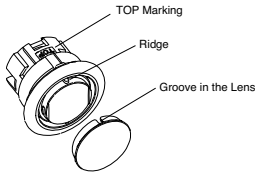



#### Screwdriver Insertion Angle




#### Installing the Lens

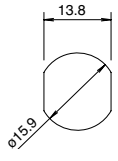
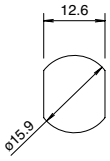
Turn the groove in the lens to the TOP marking on the operator housing. With the groove aligned with the ridge, press the lens in.




#### Marking

Marking film can be applied for inscriptions or identification.

#### Applicable Marking Film Size

| Illuminated Pushbutton (Round Flush) Pilot Light (Round Flush, Round Extended) | Illuminated Pushbutton (Round Extended) |
|---|---|
|  |  |



Thickness: 0.2mm maximum
Film material: Polyester (recommended)
Note: Film is not supplied and must be provided by the user.

## Operating Instructions, con't

### Pushbuttons

Pushbutton caps cannot be removed. Do not tamper with the cap using a screwdriver or pliers, otherwise it may be damaged.

### Selector Switches

Turn the selector operator or key to the detent positions.

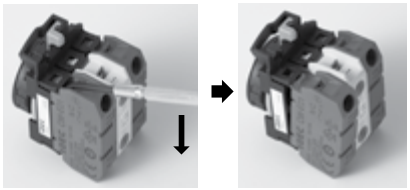
### Key Selector Switches

To prevent malfunction and damage, take the following precautions.

- Completely insert the key before turning.
- Do not remove the key while turning.
- Besides the standard key (0H), six other keys are available. Use only a key with a number that matches the number on the switches' key cylinder. (The standard key does not have a key number.)
- Keys are available in two shapes.
  -0H (standard), 1H, 2H: reversible keys
  -3H, 4H, 5H, 6H: non-reversible keys
  Make sure of correct insertion direction.

### Contact Blocks and LED Modules

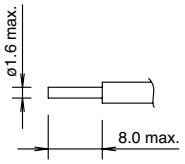
To remove the contact block from the operator, insert a flat screwdriver under the latch and push the screwdriver down as shown below. Before removing the LED module, first remove all contact blocks, and then remove the LED module in the same manner.



### Wiring

#### Applicable Wires

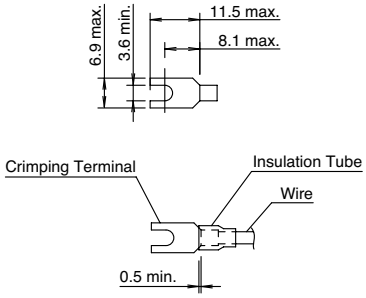
Stranded wire: 2.0 mm2 maximum (14AWG)
Solid wire: ø1.6 mm maximum



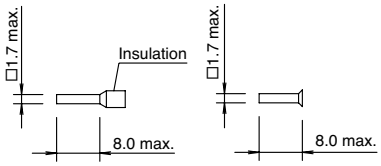

One or two wires can be connected to the terminal.

#### Applicable Crimping Terminals

Spade terminal
When using crimping terminals, be sure to use insulating tubes or insulated crimping terminals.




Ferrule
When connecting two ferrules to one terminal, use ferrules without insulation.




When using spade terminals or ferrules, ensure that they are inserted completely.
Ring terminals cannot be used.

#### Screw Tightening Torque

Tighten the M3.5 terminal screws to a recommended torque of 1.0 to 1.3N·m.

# HW Series — 22mm IEC Style Global Pushbuttons

**Key features:**

- Locking lever removable contact blocks
- Finger-safe IP20 contacts as standard, other terminal styles available
- Tamperproof construction
- All E-stops meet EN418 and are compliant with SEMI S2 standards
- Worldwide approvals
- Easy to assemble
- Choice of black plastic or metallic front bezels
- Incandescent or LED illumination
- Transformer or full voltage
- Slow make double break self cleaning contacts

## HW: The Best Engineered Switch in the World

IDEC's HW switches are "The best engineered switch in the world" for a reason. Carrying the CE mark, UL, CSA, CCC (Chinese), and TUV approvals, these switches are designed for use in almost any part of the world.

Complete with finger-safe contact blocks offering IP20 protection, these 7/8" (22mm) switches include illuminated and non-illuminated pushbuttons, pilot lights, selector switches, and emergency stop switches.

All switches also incorporate mechanically keyed safety locking levers, ensuring correct installation and maintaining safety in high-vibration applications.

File No. E68961

File No. LR92374

Registration No. R9551089 (E-stops)
Registration No. R50054316 (Dual Pushbuttons)
Registration No. J9650511 (Pilot Lights)
Registration No. J9551458 (all other switches)

TÜV Rheinland
Certificate No.
2005010305145656

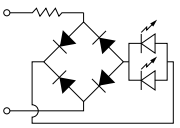
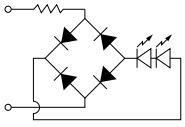
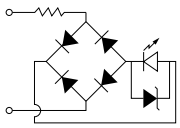
## Specifications

| | | |
|---|---|---|
| Electrical | Rated Operational Characteristics | AC-15: A600 or Ue = 250V, Ie = 3A (NO, NC, NO-EM, NC-LB)<br>DC-13: P600 or Ue = 125V, Ie = 1.1A (NO, NC)<br>DC-13: Q600 or Ue = 125V, Ie = 0.9A (NO-EM, NC-LB) |
| | Maximum Inrush Current | 40 A (40 ms) |
| | Rated Insulation Voltage | 600V |
| | Rated Switching Over-Voltage | Less than 4kV, conforming to IEC60947-1 |
| | Rated Impulse Withstanding Voltage | 4kV for contact circuit, 2.5kV for lamp circuit |
| | Rated Thermal Current | 10 Amp |
| | Minimum Switching Capacity | 5 mA at 3V AC/DC |
| | Electrical Reliability | MTBF < 1 fault for 10 million operation cycles (3V DC, 5mA) |
| | Lamp Ratings | Incandescent: 1 W<br>LEDs: 6V/17mA max, 12V & 24V/11mA max, 120 & 240V/10mA max |
| Mechanical | Contact Operation | Slow break NC or NO, self-cleaning |
| | Positive Action Operation<br>(Emergency Stops with NC contacts) | 5.5mm to 10mm travel to latch, 45N minimum force to latch<br>10mm maximum travel, 1,800 operations per hour maximum for a Pushlock Turn Reset<br>900 operations per hour maximum for a Push-Pull |
| | Operating Force | Flush and extended pushbuttons—with 1NO or 1NC contact: 6.2±2N (momentary), 7.0±2N (maintained)<br>Additional contacts—1NO or 1NC: +3.2N (momentary), + 3.3N (maintained) |
| | Recommended Terminal Torque | 0.8 N m (7.1 in lb.) |
| | Applicable Wire Size | Minimum 1 x 22 AWG, max. 2 x 14 AWG or 1 x 12 AWG |
| | Contact Resistance | Initial contact resistance of 50mΩ or less |
| | Contact Gap | 4mm (NO and NC), 2mm (NO-EM and NC-LB) |
| | Horsepower Rating | Reference Value: 1/4 HP @ 120V (1ø non-reversing), 1HP @ 240V (3ø non-reversing) |
| | Contact Material | Silver (gold plated contacts available - contact IDEC) |
| | Operating Temperature | Operation: –25 to +50°C (without freezing), Storage: –40 to +70°C (without freezing) |
| | Vibration Resistance | 10 to 55Hz, 98m/sec$^2$ (10G) conforming to IEC6068-2-6 |
| | Shock Resistance | 980m/sec$^2$ (100G) conforming to IEC6068-2-7 |
| | Mechanical Life | Momentary pushbuttons: 5,000,000 (900 operations per hour), All other switches: 500,000 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Standards & Approvals | Conforming to Standards | | | EN60947-1, EN60947-5-1, VDE0660-200, UL508, CSA C22-2 No.14 | | | | |
| | Approvals | | | CSA: pushbuttons and selector switches: A600<br>pilot lights and illuminated pushbuttons, direct supply pilot lights and illuminated pushbuttons with integral transformer (100/110, 115, 120, 200/220, 230, 240, 380, 400/440, 480V)<br>UL: pushbuttons and selector switches: A600<br>pilot lights and illuminated pushbuttons, direct supply pilot lights and illuminated pushbuttons with integral transformer (100/110, 115, 120, 200/220, 230, 240, 380, 400/440, 480V)<br>TÜV: pushbuttons and selector switches: A600=P600 (NO, NC)/Q600 (NO-EM, NC-LB)<br>pilot lights and illuminated pushbuttons, direct supply pilot lights and illuminated pushbuttons with integral transformer (100/110, 115, 120, 200/220, 230, 240, 380, 400/440, 480V) | | | | |
| | Electric Shock Protection | | | Class 0 conforming to IEC60536 | | | | |
| | Degree of Protection (conforming to IEC60529 and UL50) | | | UL Type 1, 4X, 12, 13 [1]<br>IP65 (from front of the panel) IP20 (Type HW-F contact block) | | | | |
| | Pollution Degree (conforming to IEC60947-1) | | | 3 for switches not using a transformer, 2 for switches using a transformer | | | | |
| | External Short-Circuit Protection | | | 10A 250V fuse conforming to IEC60269-1 | | | | |
| | Terminal Referencing | | | Conforming to CENELEC EN50005 | | | | |
| Contact Ratings | Pushbuttons<br>Illuminated Pushbuttons<br>Selector Switches<br>Illuminated Selector Switches<br>Pushbutton Selectors | | | Contact Block | | Type HW-C/HW-F /HW-G | | |
| | | | | Rated Insulation Voltage | | 600V | | |
| | | | | Rated Continuous Current | | 10A | | |
| | | | | Contact Ratings by Utilization Category IEC 60947-5-1 | | AC-15 (A600)<br>DC-13 (P600) | | |
| Characteristics | Operational Voltage | | | 24V | 48V | 50V | 110V | 220V | 440V |
| | Operational Current | AC 50/60 Hz | AC-12 Control of resistive loads & solid state loads | 10A | — | 10A | 10A | 6A | 2A |
| | | | AC-15 Control of electromagnetic loads (> 72VA) | 10A | — | 7A | 5A | 3A | 1A |
| | | DC | DC-12 Control of resistive loads & solid state loads | 8A | 5A | — | 2.2A | 1.1A | — |
| | | | DC-13 Control of electromagnets | 5A | 2A | — | 1.1A | 0.6A | — |

For dimensions, see page 662.
Note 1. Except for HW[]F and HW2B

## LED Lamp Ratings (LSTD Type)

| Model | | | LSTD-6② | LSTD-1② | LSTD-2② | LSTD-H2② | LSTD-M4② |
|---|---|---|---|---|---|---|---|
| Lamp Base | | | BA9S/13 | | | | |
| Rated Voltage | | | 6V AC/DC | 12V AC/DC | 24V AC/DC | 120V AC | 240V AC |
| Voltage Range | | | 6V AC/DC ±10% | 12V AC/DC ±10% | 24V AC/DC ±10% | 120V AC ±5% | 240V AC ±5% |
| Current Draw | AC | A, R, W:<br>G, S: | 17mA<br>8mA | 11mA | 11mA | 10mA | 10mA |
| | DC | A, R, W:<br>G, S: | 14mA<br>5.5mA | 10mA | 10mA | – | – |
| Color Code | | | A (amber), G (green), R (red), S (blue), W (white) | | | | |
| Lamp Base Color | | | Same as illumination color | | | | |
| Voltage Marking | | | Die stamped on the base | | | | |
| Life (reference value) | | | Approx. 50,000 hours (The luminance reduces to 50% the initial intensity when used on complete DC.) | | | | |
| Internal Circuit | | | A, R, W | A, R, W | | | |
| | | |  |  | | | |
| | | | G, S | | | | |
| | | |  | LED Chip<br>Protection Diode<br>Zener Diode | | | |

In place of ②, specify the Lens/LED Color Code.

## Non-Illuminated Round Pushbuttons (Assembled)

| | | Round Flush | | Round Extended | |
|---|---|---|---|---|---|
| Function | Contacts | Plastic Bezel | Metal Bezel | Plastic Bezel | Metal Bezel |
| Momentary | *Operator Only* | *HW1B-M1-①* | *HW4B-M1-①* | *HW1B-M2-①* | *HW4B-M2-①* |
| | 1NO | HW1B-M1F10-① | HW4B-M1F10-① | HW1B-M2F10-① | HW4B-M2F10-① |
| | 1NC | HW1B-M1F01-① | HW4B-M1F01-① | HW1B-M2F01-① | HW4B-M2F01-① |
| | 1NO-1NC | HW1B-M1F11-① | HW4B-M1F11-① | HW1B-M2F11-① | HW4B-M2F11-① |
| | 2NO | HW1B-M1F20-① | HW4B-M1F20-① | HW1B-M2F20-① | HW4B-M2F20-① |
| | 2NC | HW1B-M1F02-① | HW4B-M1F02-① | HW1B-M2F02-① | HW4B-M2F02-① |
| | 2NO-2NC | HW1B-M1F22-① | HW4B-M1F22-① | HW1B-M2F22-① | HW4B-M2F22-① |
| Maintained | *Operator Only* | *HW1B-A1-①* | *HW4B-A1-①* | *HW1B-A2-①* | *HW4B-A2-①* |
| | 1NO | HW1B-A1F10-① | HW4B-A1F10-① | HW1B-A2F10-① | HW4B-A2F10-① |
| | 1NC | HW1B-A1F01-① | HW4B-A1F01-① | HW1B-A2F01-① | HW4B-A2F01-① |
| | 1NO-1NC | HW1B-A1F11-① | HW4B-A1F11-① | HW1B-A2F11-① | HW4B-A2F11-① |
| | 2NO | HW1B-A1F20-① | HW4B-A1F20-① | HW1B-A2F20-① | HW4B-A2F20-① |
| | 2NC | HW1B-A1F02-① | HW4B-A1F02-① | HW1B-A2F02-① | HW4B-A2F02-① |
| | 2NO-2NC | HW1B-A1F22-① | HW4B-A1F22-① | HW1B-A2F22-① | HW4B-A2F22-① |

### ① Button Color Code

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

1. In place of ①, specify the Button Color Code from table below.
2. For nameplates and accessories, see page 657 and 660.
3. For dimensions, see page 662.
4. For contact assembly part numbers, see page 661.
5. All assembled part numbers in catalog include standard, fingersafe (HW-F...) contacts.
6. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
7. Operator only models include operator plus button.
8. Additional contact configurations available (up to 6 total contacts).

## Part Number Structure

H W 1 B - M 1 F 10 – R

**Bezel**
1: Plastic Bezel
4: Metal Bezel

**Function**
M: Momentary Action
A: Maintained Action

**Operator**
1: Flush
2: Extended

**Terminals**
F: Fingersafe Contacts
C: Exposed Screw Terminals
blank: Spring-up Terminals

**Contact Arrangement**
10: 1NO
01: 1NC
11: 1NO-NC
20: 2NO
02: 2NC
22: 2NO-2NC

**Button Colors**
B: Black
G: Green
R: Red
S: Blue
W: White
Y: Yellow

## Non-Illuminated Round Pushbuttons (Replacement Parts)

| Contact Blocks | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | + | Button | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator.
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Anti-Rotation Ring

| Style | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Operators

| Style | | Plastic Bezel | Metal Bezel |
|---|---|---|---|
| Round Flush/ Extended | Momentary | HW1B-M0 | HW4B-M0 |
| | Maintained | HW1B-A0 | HW4B-A0 |

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Buttons

| Style | Part Number |
|---|---|
| Round Flush | HW1A-B1-① |
| Round Extended | HW1A-B2-① |

1. In place of ①, specify the Button Color Code from table.

### ① Button Color Code

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

## Non-Illuminated Mushroom Head Pushbuttons (Assembled)

| | | ø29mm Mushroom Head | | ø40mm Mushroom Head | |
|---|---|---|---|---|---|
| Function | Contacts | Plastic Bezel | Metal Bezel | Plastic Bezel | Metal Bezel |
| Momentary | *Operator Only* | *HW1B-M3-①* | *HW4B-M3-①* | *HW1B-M4-①* | *HW4B-M4-①* |
| | 1NO | HW1B-M3F10-① | HW4B-M3F10-① | HW1B-M4F10-① | HW4B-M4F10-① |
| | 1NC | HW1B-M3F01-① | HW4B-M3F01-① | HW1B-M4F01-① | HW4B-M4F01-① |
| | 1NO-1NC | HW1B-M3F11-① | HW4B-M3F11-① | HW1B-M4F11-① | HW4B-M4F11-① |
| | 2NO | HW1B-M3F20-① | HW4B-M3F20-① | HW1B-M4F20-① | HW4B-M4F20-① |
| | 2NC | HW1B-M3F02-① | HW4B-M3F02-① | HW1B-M4F02-① | HW4B-M4F02-① |
| | 2NO-2NC | HW1B-M3F22-① | HW4B-M3F22-① | HW1B-M4F22-① | HW4B-M4F22-① |
| Maintained | *Operator Only* | *HW1B-A3-①* | *HW4B-A3-①* | *HW1B-A4-①* | *HW4B-A4-①* |
| | 1NO | HW1B-A3F10-① | HW4B-A3F10-① | HW1B-A4F10-① | HW4B-A4F10-① |
| | 1NC | HW1B-A3F01-① | HW4B-A3F01-① | HW1B-A4F01-① | HW4B-A4F01-① |
| | 1NO-1NC | HW1B-A3F11-① | HW4B-A3F11-① | HW1B-A4F11-① | HW4B-A4F11-① |
| | 2NO | HW1B-A3F20-① | HW4B-A3F20-① | HW1B-A4F20-① | HW4B-A4F20-① |
| | 2NC | HW1B-A3F02-① | HW4B-A3F02-① | HW1B-A4F02-① | HW4B-A4F02-① |
| | 2NO-2NC | HW1B-A3F22-① | HW4B-A3F22-① | HW1B-A4F22-① | HW4B-A4F22-① |

| | | ø60mm Mushroom Head |
|---|---|---|
| Function | Contacts | Plastic Bezel |
| Momentary | *Operator Only* | *HW1B-M5-①** |
| | 1NO | HW1B-M5F10-①* |
| | 1NC | HW1B-M5F01-①* |
| | 1NO-1NC | HW1B-M5F11-①* |
| | 2NO | HW1B-M5F20-①* |
| | 2NC | HW1B-M5F02-①* |
| | 2NO-2NC | HW1B-M5F22-①* |

### ① Button Color Code

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

1. In place of ①, specify the Button Color Code from table.
2. *60mm mushroom available only in red, green, black, and yellow.
3. For nameplates and accessories, see page 657 and 660.
4. For dimensions, see page 662.
5. For contact assembly part numbers, see page 661.
6. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
7. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
8. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
9. Operator only models include operator plus button.
10. Additional contact configurations available (up to 6 total contacts).

## Part Number Structure

H W 1 B - M 3 F 10 – R

**Bezel**
1: Plastic Bezel
4: Metal Bezel
(Not available for 60mm mushroom)

**Function**
M: Momentary Action
A: Maintained Action
(Not available for 60mm jumbo mushroom pushbutton.)

**Operator**
3: ø29mm Mushroom
4: ø40mm Mushroom
5: ø60mm Mushroom

**Terminals**
F: Fingersafe Contacts
C: Exposed Screw Terminals
blank: Spring-up Terminals

**Contact Arrangement**
10: 1NO
01: 1NC
11: 1NO-NC
20: 2NO
02: 2NC
22: 2NO-2NC

**Button Colors**
B: Black
G: Green
R: Red
S: Blue
W: White
Y: Yellow

## Non-Illuminated Mushroom Head Pushbuttons (Replacement Parts)

| Contact Blocks | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | + | Button | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator.
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Anti-Rotation Ring

| Appearance | Part Number |
|---|---|
| | HW9Z-RL |

### Operators

| Style | | Plastic Bezel | Metal Bezel |
|---|---|---|---|
| ø29mm Mushroom ø40mm Mushroom | Momentary | HW1B-M0L | HW4B-M0L |
| | Maintained | HW1B-A0L | HW4B-A0L |
| Ø60mm Jumbo Mushroom | Momentary | HW1B-M5-①* | – |

1. *60mm mushroom operator includes non-removable button (available in red, black, green and yellow only).
2. For nameplates and accessories, see page 657 and 660.
3. For dimensions, see page 662.

### Buttons

| Style | Part Number |
|---|---|
| ø29mm Mushroom Cap | HW1A-B3-① |
| ø40mm Mushroom Cap | HW1A-B4-① |

1. In place of ①, specify the Button Color Code from table.

### ① Button Color Code

| Color | Code | Color | Code |
|---|---|---|---|
| Black | B | Blue | S |
| Green | G | White | W |
| Red | R | Yellow | Y |

HW1B-M5 available only in black, red, green and yellow.

## Non-Illuminated Square Pushbuttons (Assembled)

| Function | Contacts | Square Flush Plastic Bezel | Square Extended Plastic Bezel |
|---|---|---|---|
| Momentary | *Operator Only* | *HW2B-M1-①* | *HW2B-M2-①* |
| | 1NO | HW2B-M1F10-① | HW2B-M2F10-① |
| | 1NC | HW2B-M1F01-① | HW2B-M2F01-① |
| | 1NO-1NC | HW2B-M1F11-① | HW2B-M2F11-① |
| | 2NO | HW2B-M1F20-① | HW2B-M2F20-① |
| | 2NC | HW2B-M1F02-① | HW2B-M2F02-① |
| | 2NO-2NC | HW2B-M1F22-① | HW2B-M2F22-① |
| Maintained | *Operator Only* | *HW2B-A1-①* | *HW2B-A2-①* |
| | 1NO | HW2B-A1F10-① | HW2B-A2F10-① |
| | 1NC | HW2B-A1F01-① | HW2B-A2F01-① |
| | 1NO-1NC | HW2B-A1F11-① | HW2B-A2F11-① |
| | 2NO | HW2B-A1F20-① | HW2B-A2F20-① |
| | 2NC | HW2B-A1F02-① | HW2B-A2F02-① |
| | 2NO-2NC | HW2B-A1F22-① | HW2B-A2F22-① |

### ① Button Color Code

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

1. In place of ①, specify the Button Color Code from table.
2. For nameplates and accessories, see page 657 and 660.
3. For dimensions, see page 662.
4. For contact assembly part numbers, see page 661.
5. Square pushbuttons available in plastic bezel only.
6. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
7. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW2B-M1F11-R becomes HW1B-M111-R).
8. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
9. Operator only model includes operator and button.
10. Additional contact configurations available (up to 6 total contacts).

## Part Number Structure

H W 2 B - M 1 F 10 – R

**Function**
M: Momentary Action
A: Maintained Action

**Operator**
1: Flush
2: Extended

**Terminals**
F: Fingersafe Contacts
C: Exposed Screw Terminals
blank: Spring-up Terminals

**Contact Arrangement**
10: 1NO
01: 1NC
11: 1NO-NC
20: 2NO
02: 2NC
22: 2NO-2NC

**Button Colors**
B: Black
G: Green
R: Red
S: Blue
W: White
Y: Yellow

## Non-Illuminated Square Pushbuttons (Replacement Parts)

| Contact Blocks | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | + | Button | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator.
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Anti-Rotation Ring

| Appearance | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Operators

| Style | | Plastic Bezel |
|---|---|---|
| Square Flush Extended | Momentary | HW2B-M0 |
| | Maintained | HW2B-A0 |

2. For nameplates and accessories, see pages 657 and 660.
3. For dimensions, see page 662.

### Buttons

| Style | Part Number |
|---|---|
| Square Flush | HW2A-B1-① |
| Square Extended | HW2A-B2-① |

1. In place of ①, specify the Button Color Code from table.

### ① Button Color Code

| Color | Code | Color | Code |
|---|---|---|---|
| Black | B | Blue | S |
| Green | G | White | W |
| Red | R | Yellow | Y |

## Non-Illuminated E-Stop Pushbuttons (Assembled)

| | Ø29mm Head Pushlock Turn Reset | | Ø40mm Head Pushlock Turn Reset | |
|---|---|---|---|---|
| Contacts | Plastic Bezel | Metal Bezel | Plastic Bezel | Metal Bezel |
| *Operator Only* | *HW1B-V3①†* | *HW4B-V3①†* | *HW1B-V4①†* | *HW4B-V4①†* |
| 1NO | HW1B-V3F10-①† | HW4B-V3F10-①† | HW1B-V4F10-①† | HW4B-V4F10-①† |
| 1NC | HW1B-V3F01-①† | HW4B-V3F01-①† | HW1B-V4F01-①† | HW4B-V4F01-①† |
| 1NO-1NC | HW1B-V3F11-①† | HW4B-V3F11-①† | HW1B-V4F11-①† | HW4B-V4F11-①† |
| 2NO | HW1B-V3F20-①† | HW4B-V3F20-①† | HW1B-V4F20-①† | HW4B-V4F20-①† |
| 2NC | HW1B-V3F02-①† | HW4B-V3F02-①† | HW1B-V4F02-①† | HW4B-V4F02-①† |

| | Ø40mm Head EMO Pushlock Turn Reset | | Ø40mm Head Pushlock Key Reset | |
|---|---|---|---|---|
| Contacts | Plastic Bezel | Metal Bezel | Plastic Bezel | Metal Bezel |
| *Operator Only* | *HW1B-V4R-EMO-2** | *HW4B-V4R-EMO-2** | *HW1B-X4R** | *HW4B-X4R** |
| 1NO | HW1B-V4F10-R-EMO-2* | HW4B-V4F10-R-EMO-2* | HW1B-X4F10-R* | HW4B-X4F10-R* |
| 1NC | HW1B-V4F01-R-EMO-2* | HW4B-V4F01-R-EMO-2* | HW1B-X4F01-R* | HW4B-X4F01-R* |
| 1NO-1NC | HW1B-V4F11-R-EMO-2* | HW4B-V4F11-R-EMO-2* | HW1B-X4F11-R* | HW4B-X4F11-R* |
| 2NO | HW1B-V4F20-R-EMO-2* | HW4B-V4F20-R-EMO-2* | HW1B-X4F20-R* | HW4B-X4F20-R* |
| 2NC | HW1B-V4F02-R-EMO-2* | HW4B-V4F02-R-EMO-2* | HW1B-X4F02-R* | HW4B-X4F02-R* |

| | ø60mm Head Pushlock Turn Reset |
|---|---|
| Contacts | Plastic Bezel |
| *Operator Only* | *HW1B-V5R** |
| 1NO | HW1B-V5F10-R* |
| 1NC | HW1B-V5F01-R* |
| 1NO-1NC | HW1B-V5F11-R* |
| 2NO | HW1B-V5F20-R* |
| 2NC | HW1B-V5F02-R* |

1. * Available in Red only.
2. † Available in red or yellow. Insert color code in place of ① (R: Red, Y: Yellow).
2. For accessories, see page 660.
3. For dimensions, see page 662.
5. For nameplates and shrouds, see page 661.
4. For contact assembly part numbers, see page 661.
7. All HW series E-stops comply with EN60947-5-5, the IEC "E-Stop Addendum to the Low Voltage Directive," this includes "tamper proof" operation whereby a change of contact state is not possible by "teasing" or "floating" the operator.
8. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
9. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
10. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
11. Operator only models include operator and button.
12. Additional contact configurations available (up to 6 total contacts).

## Part Number Structure

H W 1 B – V 3 F 10 – R – EMO-2

**Bezel**
1: Plastic Bezel
4: Metal Bezel
(not available for 60mm jumbo mushroom)

**Function**
V: Pushlock Turn Reset
X: Pushlock Key Reset

**Operator**
3: ø29mm Head
4: ø40mm Head
5: ø60mm Head

**Terminals**
F: Fingersafe
C: Exposed Screw
blank: Springup

**Contact Arrangement**
10: 1NO
01: 1NC
11: 1NO-NC
20: 2NO
02: 2NC
22: 2NO-2NC

**Button Colors**
R: Red
Y: Yellow
Note: some switches only available in red.

**Engraved Button***
EMO-2: EMO switch
*Option available for red EMO E-Stop only

## Non-Illuminated E-Stop Pushbuttons (Replacement Parts)

| Contact Blocks | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator.
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Anti-Rotation Ring

| Appearance | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Operators

| Style | Plastic | | Metal |
|---|---|---|---|
| ø29mm Head Pushlock Turn Reset | red | HW1B-V3R | HW4B-V3R |
| | yellow | HW1B-V3Y | HW4B-V3Y |
| ø40mm Head Pushlock Turn Reset | red | HW1B-V4R | HW4B-V4R |
| | yellow | HW1B-V4Y | HW4B-V4Y |
| ø40mm Head EMO Pushlock Turn Reset* | HW1B-V4R-EMO-2 | | HW4B-V4R-EMO-2 |
| ø40mm Head Pushlock Key Reset* | HW1B-X4R | | HW4B-X4R |
| ø60mm Head Pushlock Turn Reset* | HW1B-V5R | | – |

1. *Available in red only.
2. All E-Stop buttons are not removable from the operator.

Note: Determine mounting centers to ensure proper spacing.

# Push Pull & Unibody E-Stop Pushbuttons (Assembled)

| | ø40mm Head Push–Pull | |
|---|---|---|
| Contacts | Plastic Bezel | Metal Bezel |
| *Operator Only (Red)* | *HW1B-Y2R* | *HW4B-Y2R* |
| *Operator Only (Yellow)* | *HW1B-Y2Y* | *HW4B-Y2Y* |
| 1NO | HW1B-Y2F10-①† | HW4B-Y2F10-①† |
| 1NC | HW1B-Y2F01-①† | HW4B-Y2F01-①† |
| 1NO-1NC | HW1B-Y2F11-①† | HW4B-Y2F11-①† |
| 2NC | HW1B-Y2F02-①† | HW4B-Y2F02-①† |
| 2NO | HW1B-Y2F20-①† | HW4B-Y2F20-①† |

| | ø40mm Unibody Pushlock Turn Reset* |
|---|---|
| Contacts | Plastic Bezel |
| 1NO-1NC | HW1E-BV4F11-R |
| 2NC | HW1E-BV4F02-R |
| 1NO-2NC | HW1E-BV412R-TK2093-1 |

| | Unibody Illuminated E-Stops* | |
|---|---|---|
| Contacts | LED | Incandescent |
| 1NO-1NC | HW1E-LV4F11QD-R-③ | HW1E-LV4F11Q-R-③ |
| 2NC | HW1E-LV4F02QD-R-③ | HW1E-LV4F02Q-R-③ |
| 2NC (with push-on illumination) | HW1E-TV4F02QD-R-③ | HW1E-TV4F11Q-R-③ |
| 1NO-1NC (with push-on illumination ) | HW1E-TV4F11QD-R-③ | HW1E-TV4F02Q-R-③ |

## ③ Full Voltage Code

| Voltage | Code |
|---|---|
| 6VAC/DC | 6V |
| 12VAC/DC | 12V |
| 24VAC/DC | 24V |
| 120V AC* | 120V |
| 240V AC* | 240V |

*LED only.

## Terminal Numbering

(Unibody only)

| Models | Terminal Number |
|---|---|
| 1NO-1NC | NO = 13/14, NC = 11/12 |
| 2NC | NC = 11/12, NC = 21/22 |
| HW1E-L HW1E-T | Lamp + = X2, Lamp - = X1 |

1. * Available in Red only.
2. † Available in red or yellow. Insert color code in place of ① (R: Red, Y: Yellow).
3. In place of ③, specify Full Voltage Code.
4. With single unit construction, the positive action contacts are integrated in the body of the switch. This provides an extra degree of safety and reliability for critical emergency stop functions.
5. In the illuminated version, the light is independent of the switch action (except push-on LED model).
6. For accessories, see page 660.
7. For dimensions, see page 662.
8. For nameplates and shrouds, see page 660.
9. For contact assembly part numbers, see page 660.
10. All HW Series E-Stop operators include non-removable color caps.
11. All HW series E-Stops comply with EN60947-5-5, the IEC "E-Stop Addendum to the Low Voltage Directive," this includes "tamper proof" operation whereby a change of contact state is not possible by "teasing" or "floating" the operator.
12. All HW series E-Stop switches comply with SEMI S2 standards.
13. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
14. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
15. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
16. Additional contact configurations available (up to 6 total contacts).

## Part Number Structure

H W 1 E – LV4 F 11 – Q D R – 24V

**Bezel**
1: Plastic Bezel
4: Metal Bezel*
(*not available for HW1E unibody)

**Function**
B: Push Pull
E: Pushlock Turn Reset

**Illumination**
BV4: Non-illuminated (unibody style)
LV4: Illuminated
TV4: Illuminated Push On
Y2: Non-illuminated Push Pull E-Stop

**Contacts**
11: 1NO-1NC
02: 2NC
10: 1NO
20: 2NO

**Illumination Circuit**
blank: 40mm Push Pull & Non-illuminated Unibody E-Stop
Q: Illuminated Unibody E-Stop

**Lamp Code**
D: LED
blank: Incandescent

**Button Colors**
R: Red
Y: Yellow*
(*only available in 40mm Push Pull E-Stop)

**Full Voltage Code**
(Illuminated E-Stop)
6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120VC AC*
240V: 240V AC*
*LED only

## Illuminated & Non-Illuminated E-Stop Pushbuttons (Replacement Parts)

| Contact Blocks | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

1. There are no replacement parts for the HW1E unibody E-Stop.
2. For illuminated unibody E-Stop, see page 661 for replacement lens.

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator.
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Anti-Rotation Ring

| Appearance | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Operators

| Style | | | Part Number |
|---|---|---|---|
| ø40mm Head Push-Pull | Plastic | red | HW1B-Y2R |
| | Metal | red | HW4B-Y2R |
| | Plastic | yellow | HW1B-Y2Y |
| | Metal | yellow | HW4B-Y2Y |

All E- Stop Buttons are not removable from the operator.

## E-Stop Stations

| | 29mm Pushlock Turn Reset | | 40mm Pushlock Turn Reset | |
|---|---|---|---|---|
| Contacts | Plastic Bezel | Metal Bezel | Plastic Bezel | Metal Bezel |
| 1NO-1NC | FB1W-HW1B-V311R | FB1W-HW4B-V311R | FB1W-HW1B-V411R | FB1W-HW4B-V411R |
| 2NC | FB1W-HW1B-V302R | FB1W-HW4B-V302R | FB1W-HW1B-V402R | FB1W-HW4B-V402R |

| | 40mm Push-Pull Reset | | 40mm Pushlock Key Reset | |
|---|---|---|---|---|
| Contacts | Plastic Bezel | Metal Bezel | Plastic Bezel | Metal Bezel |
| 1NO-1NC | FB1W-HW1B-Y211R | FB1W-HW4B-Y211R | FB1W-HW1B-X411R | FB1W-HW4B-X411R |
| 2NC | FB1W-HW1B-Y202R | FB1W-HW4B-Y202R | FB1W-HW1B-X402R | FB1W-HW4B-X402R |

| | 40mm EMO Pushlock Turn Reset | |
|---|---|---|
| Contacts | Plastic Bezel | Metal Bezel |
| 1NO-1NC | FB1W-HW1B-V411R-EMO-2 | FB1W-HW4B-V411R-EMO-2 |
| 2NC | FB1W-HW1B-V402R-EMO-2 | FB1W-HW4B-V402R-EMO-2 |

1. Maximum of two contact blocks.
2. Box is supplied with yellow top and black bottom only.

# Jumbo Dome Pilot Lights (Assembled)

| | | | Plastic Bezel |
|---|---|---|---|
| Jumbo Dome | LED | *Operator Only* | *HW1P-5Q0* |
| | | Full Voltage 24V AC/DC | HW1P-5Q4-② |
| | Incandescent | *Operator Only* | *HW1P-5Q7** |
| | | Full Voltage 24V AC/DC | HW1P-5Q7-② |

1. In place of ②, specify the Lens/LED Color Code.
2. *Incandescent operator comes with bulb.
3. Available with spring-up terminals in 24V only.
4. For nameplates and accessories, see page 657 and 660.
5. For dimensions, see page 662.

Actual Size

## ② Lens/LED Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | PW |
| Yellow | Y |

## Jumbo Dome Replacement Parts

| Item | Appearance | Description | Part Number |
|---|---|---|---|
| Lens | | Polycarbonate Lens | HW1A-P5② |
| LED Diffusing Lens* | | | HW9Z-PP5C |
| LED Lamps | | LED Lamp | LSTDB-2② |

1. In place of ②, specify the Lens/LED Color Code.
2. *Diffusing lens for LED models only.
3. Use white LED for yellow lens.

## Lamp Ratings

| | Part Number | Operating Voltage | Rated Current | Power Consumption |
|---|---|---|---|---|
| LED | LSTDB-2 | 24V AC/DC ±10% | 15mA | 0.36W |
| Incandescent | LSB-2 | | 150mA | 3.6W |

*Use PW for LED module, use C for lens.

## Pilot Lights (Assembled)

| | | Round Flush | | Dome | |
|---|---|---|---|---|---|
| | | Plastic Bezel | Metal Bezel | Plastic Bezel | Metal Bezel |
| *Operator Only* | | *HW1P-1FQ0-②* | *HW4P-1FQ0-②* | *HW1P-2FQ0-②* | *HW4P-2FQ0-②* |
| Full Voltage | | HW1P-1FQ④-②-③ | HW4P-1FQ④-②-③ | HW1P-2FQ④-②-③ | HW4P-2FQ④-②-③ |
| Transformer | 120V AC | HW1P-1FH2④-② | HW4P-1FH2④-② | HW1P-2FH2④-② | HW4P-2FH2④-② |
| | 240V AC | HW1P-1FM4④-② | HW4P-1FM4④-② | HW1P-2FM4④-② | HW4P-2FM4④-② |
| | 480V AC | HW1P-1FT8④-② | HW4P-1FT8④-② | HW1P-2FT8④-② | HW4P-2FT8④-② |
| DC-DC Converter* | 110V DC | HW1P-1D2D-② | – | HW1P-2D2D-② | – |

| | | Square Flush |
|---|---|---|
| | | Plastic Bezel |
| *Operator Only* | | *HW2P-1FQ0-②* |
| Full Voltage | | HW2P-1FQ④-②-③ |
| Transformer | 120V AC | HW2P-1FH2④-② |
| | 240V AC | HW2P-1FM4④-② |
| | 480V AC | HW2P-1FT8④-② |
| DC-DC Converter* | 110V DC | HW2P-1D2D-② |

### ② Lens/LED Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

### ③ Full Voltage Code

| Voltage | Code |
|---|---|
| 6VAC/DC | 6V |
| 12VAC/DC | 12V |
| 24VAC/DC | 24V |
| 120V AC (LED only) | 120V |
| 240V AC (LED only) | 240V |

### ④ Lamp Type Code

| Lamp | Code |
|---|---|
| Incandescent | Blank |
| LED | D |

1. In place of ②, specify the Lens/LED Color Code from table below.
2. In place of ③specify the Full Voltage Code from table below.
3. In place of ④ specify Lamp Type Code from table below.
4. *DC-DC convertor voltage input from 90-140V DC, comes with spring-up terminals only.
5. DC-DC converter models with LED lamps only.
6. For nameplates and accessories, see page 657 and 660.
7. For dimensions, see page 662.
8. **Pilot lights do not come with anti-rotation ring.**
9. Operator models come with operator and lens.
10. **Yellow pilot light comes with white LED.**

## Part Number Structure

H W 1 P – 2 F Q D – R – 12V

**Bezel**
1: Round Plastic
2: Square Plastic
4: Round Metal

**Operator**
1: Flush
2: Dome

**Illumination Circuit**
Q: Full Voltage
H2: 120V AC Transformer
M4: 240V AC Transformer
T8: 480V AC Transformer
D2: DC-DC Converter

**Lamp Type Code**
D: LED
Blank: Incandescent

**Lens/LED Colors**
A: Amber
G: Green
R: Red
S: Blue
W: White
Y: Yellow

**Lamp Voltage**
(full voltage units only)
6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120V AC*
240V: 240V AC*
*LED only

## Pilot Lights (Replacement Parts)

| Transformer* | + | Lamp | + | Operator | + | Lens | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|

(not applicable for full voltage units)

### Transformer Units

| Style | Voltage | Part Number |
|---|---|---|
| LED/Incandescent (6V secondary voltage) | 120V AC | HW-FH20<br>HW-MH20* |
| | 240V AC | HW-FM40<br>HW-MM40* |
| | 480V AC | HW-FT80<br>HW-RT80* |
| | 110V DC** | HW-RD0* |

1. *With spring-up terminals - to use spring-up terminal type, must use transformer type operator designed for spring-up transformer.
2. ** DC-DC converter voltage input from 90-140V DC.

### Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 6V AC/DC | LSTD-6② |
| | 12V AC/DC | LSTD-1② |
| | 24V AC/DC | LSTD-2② |
| | 120V AC | LSTD-H2② |
| | 240V AC | LSTD-M4② |
| Incandescent | 6V AC/DC | IS-6 |
| | 12V AC/DC | IS-12 |
| | 24V AC/DC | IS-24 |

1. In place of ②, specify the LED Color Code.
2. The LED contains a current-limiting resistor and reverse polarity protection diodes.

### ② LED Color Code

| Color | Code | Color | Code |
|---|---|---|---|
| Amber | A | Blue | S |
| Green | G | White | W |
| Red | R | | |

For yellow lens use white LED.

### Operators

| Style | | Type | Plastic Bezel | Metal Bezel |
|---|---|---|---|---|
| Round Flush | Full Voltage | Standard | HW1P-1FQ0 | HW4P-1FQ0 |
| | | Spring-up Terminals | HW1P-1Q0 | HW4P-1Q0 |
| | Transformer | Standard | HW1P-10 | HW4P-10 |
| | | Spring-up Terminals | HW1P-100 | – |
| Dome | Full Voltage | Standard | HW1P-2FQ0 | HW4P-2FQ0 |
| | | Spring-up Terminals | HW1P-2Q0 | HW4P-2Q0 |
| | Transformer | Standard | HW1P-20 | HW4P-20 |
| | | Spring-up Terminals | HW1P-200 | – |
| Square Flush | Full Voltage | Standard | HW2P-1FQ0 | – |
| | | Spring-up Terminals | HW2P-1Q0 | |
| | Transformer | Standard | HW2P-10 | – |
| | | Spring-up Terminals | HW2P-100 | – |

1. Transformer type requires separate transformer & lamp. Must select correct transformer bases on standard or spring up terminal type. Use 6V lamps or LEDs.
2. Full voltage type only requires lamp.

### Lenses

| Style | | Part Number |
|---|---|---|
| Round/ Flush | | HW1A-P1-③ |
| Dome | | HW1A-P2-③ |
| Square/ Flush | | HW2A-P1-③ |

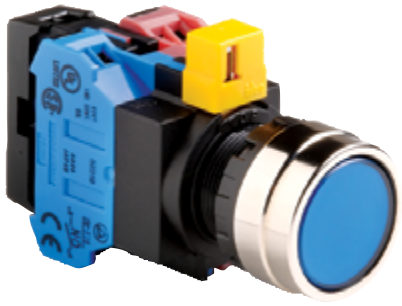
In place of ③, specify the Lens Color Code.

### ③ Lens Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

For yellow lens use white LED.

# Illuminated Round Pushbuttons (Assembled)



## Illuminated Full Voltage Pushbuttons

| | Contacts | Flush | | Extended | | Extended w/ Full Shroud | |
|---|---|---|---|---|---|---|---|
| | | Plastic Bezel | Metal Bezel | Plastic Bezel | Metal Bezel | Plastic Bezel | Metal Bezel |
| Momentary | *Operator Only* | *HW1L-M1-②* | *HW4L-M1-②* | *HW1L-M2-②* | *HW4L-M2-②* | *HW1L-MF2-②* | *HW4L-MF2-②* |
| | 1NO | HW1L-M1F10Q④-②-③ | HW4L-M1F10Q④-②-③ | HW1L-M2F10Q④-②-③ | HW4L-M2F10Q④-②-③ | HW1L-MF2F10Q④-②-③ | HW4L-MF2F10Q④-②-③ |
| | 1NC | HW1L-M1F01Q④-②-③ | HW4L-M1F01Q④-②-③ | HW1L-M2F01Q④-②-③ | HW4L-M2F01Q④-②-③ | HW1L-MF2F01Q④-②-③ | HW4L-MF2F01Q④-②-③ |
| | 1NO-1NC | HW1L-M1F11Q④-②-③ | HW4L-M1F11Q④-②-③ | HW1L-M2F11Q④-②-③ | HW4L-M2F11Q④-②-③ | HW1L-MF2F11Q④-②-③ | HW4L-MF2F11Q④-②-③ |
| | 2NO | HW1L-M1F20Q④-②-③ | HW4L-M1F20Q④-②-③ | HW1L-M2F20Q④-②-③ | HW4L-M2F20Q④-②-③ | HW1L-MF2F20Q④-②-③ | HW4L-MF2F20Q④-②-③ |
| Maintained | *Operator Only* | *HW1L-A1-②* | *HW4L-A1-②* | *HW1L-A2-②* | *HW4L-A2-②* | *HW1L-AF2-②* | *HW4L-AF2-②* |
| | 1NO | HW1L-A1F10Q④-②-③ | HW4L-A1F10Q④-②-③ | HW1L-A2F10Q④-②-③ | HW4L-A2F10Q④-②-③ | HW1L-AF2F10Q④-②-③ | HW4L-AF2F10Q④-②-③ |
| | 1NC | HW1L-A1F01Q④-②-③ | HW4L-A1F01Q④-②-③ | HW1L-A2F01Q④-②-③ | HW4L-A2F01Q④-②-③ | HW1L-AF2F01Q④-②-③ | HW4L-AF2F01Q④-②-③ |
| | 1NO-1NC | HW1L-A1F11Q④-②-③ | HW4L-A1F11Q④-②-③ | HW1L-A2F11Q④-②-③ | HW4L-A2F11Q④-②-③ | HW1L-AF2F11Q④-②-③ | HW4L-AF2F11Q④-②-③ |
| | 2NO | HW1L-A1F20Q④-②-③ | HW4L-A1F20Q④-②-③ | HW1L-A2F20Q④-②-③ | HW4L-A2F20Q④-②-③ | HW1L-AF2F20Q④-②-③ | HW4L-AF2F20Q④-②-③ |

## Illuminated Transformer Pushbuttons

| | Contacts | Flush | | Extended | | Extended w/ Full Shroud | |
|---|---|---|---|---|---|---|---|
| | | Plastic Bezel | Metal Bezel | Plastic Bezel | Metal Bezel | Plastic Bezel | Metal Bezel |
| Momentary | *Operator Only* | *HW1L-M1-②* | *HW4L-M1-②* | *HW1L-M2-②* | *HW4L-M2-②* | *HW1L-MF2-②* | *HW4L-MF2-②* |
| | 1NO-1NC | HW1L-M1F11③④-② | HW4L-M1F11③④-② | HW1L-M2F11③④-② | HW4L-M2F11③④-② | HW1L-MF2F11③④-② | HW4L-MF2F11③④-② |
| | 2NO | HW1L-M1F20③④-② | HW4L-M1F20③④-② | HW1L-M2F20③④-② | HW4L-M2F20③④-② | HW1L-MF2F20③④-② | HW4L-MF2F20③④-② |
| Maintained | *Operator Only* | *HW1L-A1-②* | *HW4L-A1-②* | *HW1L-A2-②* | *HW4L-A2-②* | *HW1L-AF2-②* | *HW4L-AF2-②* |
| | 1NO-1NC | HW1L-A1F11③④-② | HW4L-A1F11③④-② | HW1L-A2F11③④-② | HW4L-A2F11③④-② | HW1L-AF2F11③④-② | HW4L-AF2F11③④-② |
| | 2NO | HW1L-A1F20③④-② | HW4L-A1F20③④-② | HW1L-A2F20③④-② | HW4L-A2F20③④-② | HW1L-AF2F20③④-② | HW4L-AF2F20③④-② |

1. In place of ②, specify Lens/LED Color Code from table.
2. In place of ③specify Voltage Code from table.
3. In place of ④ specify Lamp Code from table.
4. Light independent of switch position.
5. For replacement part numbers, see page 628.
6. For nameplates and accessories, see page 657. and 660.
7. For dimensions, see page 662.
8. For contact assembly part numbers, see page 661.
9. Full voltage and transformer models use the same operator.
10. Additional contact configurations available (up to 6 total contacts).
11. **Yellow pushbutton comes with white LED.**

### ② Lens/LED Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

Yellow LED not available. Use white LED for yellow lens.

### ③ Voltage Code

| Full Voltage Models | |
|---|---|
| Voltage | Code |
| 6V AC/DC | 6V |
| 12V AC/DC | 12V |
| 24V AC/DC | 24V |
| 120V AC (LED only) | 120V |
| 240V AC (LED only) | 240V |

| Transformer Models | |
|---|---|
| Voltage | Code |
| 120V AC | H2 |
| 240V AC | M4 |
| 480V AC | T8 |

### ④ Lamp Code

| Lamp | Code |
|---|---|
| Incandescent | Blank |
| LED | D |

## Part Number Structure

H W 1 L – M 1F 10 Q D – G – 12V

**Bezel**
1: Plastic
4: Metal

**Function**
M: Momentary
A: Maintained

**Operator**
1F: Flush
2F: Extended
F2F: Extended w/ shroud

**Contact Arrangement**
10: 1NO
01: 1NC
11: 1NO-1NC
20: 2NO

**Illumination Circuit**
Q: Full Voltage
H2: Transformer 120V AC
M4: Transformer 240V AC
T8: Transformer 480V AC

**Lamp Code**
D: LED
Blank: Incandescent

**Lens Color**
A: Amber S: Blue
G: Green W: White
R: Red Y: Yellow

**Lamp Voltage**
(full voltage units only)
6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120VC AC*
240V: 240V AC*
*LED only

## Illuminated Round Pushbuttons (Replacement Parts)

| Transformer* | + | Contact Blocks | + | Lead Holder | + | Mounting Adaptor | + | Safety Lever Lock | + | Lamp | + | Anti-Rotation Ring | + | Operator | + | Lens | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |  | | | | | | |

*Transformer not needed with full voltage models.

### Lamp Circuit Components

| Style | Description | Terminals | Part Number |
|---|---|---|---|
| Lead Holder | For use with HW-CBL on all illuminated pushbutton units. One required for each deck (pair) of contacts. | | HW-LH3 |
| Dummy Block with Full Voltage Adaptor | For use with odd number of contacts. | Fingersafe | HW-DA1FB |
| | | Exposed | HW-DA1B |
| | | Spring Up | HW-GA1 |
| Full Voltage Adaptor | For use with even number of contacts. | Fingersafe | TW-DA1FB |
| | | Exposed | TW-DA1B |
| Transformer Unit (6V secondary voltage) | 120VAC<br>240VAC<br>480VAC | Fingersafe | TW-F126B<br>TW-F246B<br>TW-F486B |
| | 120V<br>240V<br>480V | Spring Up | HW-T126<br>HW-T246<br>HW-L486 |
| | 120V<br>240V<br>480V | Exposed | TW-T126B<br>TW-T246B<br>TW-T486B |
| DC-DC Converter | 110VDC | | HW-L16D |

HW-GA1 "Dummy Block with full voltage adaptor" does not require the use of HW-LH3.

### Operators

| Style | | | Plastic Bezel | Metal Bezel |
|---|---|---|---|---|
| Round Flush/ Extended | | Momentary | HW1L-M0 | HW4L-M0 |
| | | Maintained | HW1L-A0 | HW4L-A0 |
| Extended with Full Shroud | | Momentary | HW1L-MF0 | HW4L-MF0 |
| | | Maintained | HW1L-AF0 | HW4L-AF0 |

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10<br>HW-F10R (early make) | HW-F01<br>HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10<br>HW-G10R (early make) | HW-G01<br>HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10<br>HW-C10R (early make) | HW-C01<br>HW-C01R (late break) |

1. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
2. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
3. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CBL |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Anti-Rotation Ring

| Appearance | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Lenses

| Style | Part Number |
|---|---|
| Round Flush | HW1A-L1-② |
| Round Extended | HW1A-L2-② |

In place of ②, specify the Lens Color Code from previous page.

### Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 6V AC/DC | LSTD-6② |
| | 12V AC/DC | LSTD-1② |
| | 24V AC/DC | LSTD-2② |
| | 120V AC | LSTD-H2② |
| | 240V AC | LSTD-M4② |
| Incandescent | 6V AC/DC | IS-6 |
| | 12V AC/DC | IS-12 |
| | 24V AC/DC | IS-24 |

1. In place of ②, specify the LED Color Code.
2. The LED contains a current-limiting resistor and reverse polarity protection diodes.
3. Yellow LED not available, use white LED when using yellow lens.

## Illuminated Mushroom & Square Pushbuttons (Assembled)

| | | | 40mm Mushroom Head | | Square Flush |
|---|---|---|---|---|---|
| | | Contacts | Plastic Bezel | Metal Bezel | Plastic Bezel |
| Full Voltage | Momentary | *Operator Only*[†] | *HW1L-M4-②* | *HW4L-M4-②* | *HW2L-M1-②* |
| | | 1NO | HW1L-M4F10Q④-②-③ | HW4L-M4F10Q④-②-③ | HW2L-M1F10Q④-②-③ |
| | | 1NC | HW1L-M4F01Q④-②-③ | HW4L-M4F01Q④-②-③ | HW2L-M1F01Q④-②-③ |
| | | 1NO-1NC | HW1L-M4F11Q④-②-③ | HW4L-M4F11Q④-②-③ | HW2L-M1F11Q④-②-③ |
| | | 2NO | HW1L-M4F20Q④-②-③ | HW4L-M4F20Q④-②-③ | HW2L-M1F20Q④-②-③ |
| | Maintained | *Operator Only*[†] | *HW1L-A4-②* | *HW4L-A4-②* | *HW2L-A1-②* |
| | | 1NO | HW1L-A4F10Q④-②-③ | HW4L-A4F10Q④-②-③ | HW2L-A1F10Q④-②-③ |
| | | 1NC | HW1L-A4F01Q④-②-③ | HW4L-A4F01Q④-②-③ | HW2L-A1F01Q④-②-③ |
| | | 1NO-1NC | HW1L-A4F11Q④-②-③ | HW4L-A4F11Q④-②-③ | HW2L-A1F11Q④-②-③ |
| | | 2NO | HW1L-A4F20Q④-②-③ | HW4L-A4F20Q④-②-③ | HW2L-A1F20Q④-②-③ |
| Transformer | Momentary | 1NO-1NC | HW1L-M4F11③④-② | HW4L-M4F11③④-② | HW2L-M1F11③④-② |
| | | 2NO | HW1L-M4F20③④-② | HW4L-M4F20③④-② | HW2L-M1F20③④-② |
| | Maintained | 1NO-1NC | HW1L-A4F11③④-② | HW4L-A4F11③④-② | HW2L-A1F11③④-② |
| | | 2NO | HW1L-A4F20③④-② | HW4L-A4F20③④-② | HW2L-A1F20③④-② |

1. [†] Full voltage and transformer units use the same operator.
2. In place of ②, specify the Lens/LED Color Code from table.
3. In place of ③specify the Voltage Code from table.
4. In place of ④ specify Lamp Type Code from table.
5. Light independent of switch position
6. For nameplates and accessories, see page 657. and 660.
7. For dimensions, see page 662.
8. For contact assembly part numbers, see page 661.
9. Additional contact configurations available (up to 6 total contacts).
10. **Yellow pushbutton comes with white LED.**

### ② Lens/LED Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y* |

1. *40mm mushroom lenses not available in yellow.
2. Yellow LED not available. Use white LED for yellow lens.

### ③ Voltage Code

| Full Voltage Models | | Transformer Models | |
|---|---|---|---|
| Voltage | Code | Voltage | Code |
| 6V AC/DC | 6V | 120V AC | H2 |
| 12V AC/DC | 12V | 240V AC | M4 |
| 24V AC/DC | 24V | 480V AC | T8 |
| 120V AC (LED only) | 120V | | |
| 240V AC (LED only) | 240V | | |

### ④ Lamp Code

| Lamp | Code |
|---|---|
| Incandescent | Blank |
| LED | D |

## Part Number Structure

H W 1 L – M 1 F 10 Q D – G – 12V

**Bezel**
1: Round Plastic
2: Square Plastic
4: Round Metal

**Function**
M: Momentary
A: Maintained

**Operator**
1: Square Flush
4: Mushroom

**Contact Arrangement**
10: 1NO
01: 1NC
11: 1NO-1NC
20: 2NO

**Illumination Circuit**
Q: Full Voltage
H2: Transformer 120V AC
M4: Transformer 240V AC
T8: Transformer 480V AC

**Lamp Code**
D: LED
Blank: Incandescent

**Lens Color**
A: Amber S: Blue
G: Green W: White
R: Red Y: Yellow

**Lamp Voltage**
(full voltage units only)
6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120VC AC*
240V: 240V AC*
*LED only

## Illuminated Mushroom & Square Pushbuttons (Replacement Parts)

| Transformer* | + | Contact Blocks | + | Lead Holder | + | Adaptor† | + | Safety Lever Lock | + | Lamp | + | Anti-Rotation Ring | + | Operator | + | Lens | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | |

*Transformer not needed with full voltage models.

## Lamp Circuit Components

| Style | Description | Terminals | Part Number |
|---|---|---|---|
| Lead Holder | For use with HW-CBL on all illuminated pushbutton units. One required for each deck (pair) of contacts. | | HW-LH3 |
| Dummy Block with Full Voltage Adaptor | For use with odd number of contacts. | Fingersafe | HW-DA1FB |
| | | Exposed | HW-DA1B |
| | | Spring Up | HW-GA1 |
| Full Voltage Adaptor | For use with even number of contacts. | Fingersafe | TW-DA1FB |
| | | Exposed | TW-DA1B |
| Transformer Unit (6V secondary voltage) | 120VAC<br>240VAC<br>480VAC | Fingersafe | TW-F126B<br>TW-F246B<br>TW-F486B |
| | 120V<br>240V<br>480V | Spring Up | HW-T126<br>HW-T246<br>HW-L486 |
| | 120V<br>240V<br>480V | Exposed | TW-T126B<br>TW-T246B<br>TW-T486B |
| DC-DC Converter | 110VDC | | HW-L16D |

HW-GA1 "Dummy Block with full voltage adaptor" does not require the use of HW-LH3.

## Operators

| Style | | | Plastic Bezel | Metal Bezel |
|---|---|---|---|---|
| ø40mm Mushroom | | Momentary | HW1L-M0L | HW4L-M0L |
| | | Maintained | HW1L-A0L | HW4L-A0L |
| Square | | Momentary | HW2L-M0 | – |
| | | Maintained | HW2L-A0 | |

## Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10<br>HW-F10R (early make) | HW-F01<br>HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10<br>HW-G10R (early make) | HW-G01<br>HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10<br>HW-C10R (early make) | HW-C01<br>HW-C01R (late break) |

1. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
2. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
3. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.

## Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CBL |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

## Anti-Rotation Ring

| Appearance | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

## Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

## Lenses

| Style | Part Number |
|---|---|
| ø40mm Mushroom Lens | ALW4BLU-②* |
| Square Flush | HW2A-L1-② |

1. In place of ②, specify the Lens Color Code.
2. *Mushroom lens not available in yellow.

## Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 6V AC/DC | LSTD-6② |
| | 12V AC/DC | LSTD-1② |
| | 24V AC/DC | LSTD-2② |
| | 120V AC | LSTD-H2② |
| | 240V AC | LSTD-M4② |
| Incandescent | 6V AC/DC | IS-6 |
| | 12V AC/DC | IS-12 |
| | 24V AC/DC | IS-24 |

1. In place of ②, specify the LED Color Code.
2. The LED contains a current-limiting resistor and reverse polarity protection diodes.
3. Yellow LED not available, use white LED when using yellow lens.

## Selector Switches 2-Position (Assembled)

### 2-Position Selector Switches

| Contact | Mounting | Operator Position L | Operator Position R | Handle | Maintained | Spring Return from Right |
|---|---|---|---|---|---|---|
| *Operator Only* | | | | *Knob*<br>*Lever* | *HW⑤S-2T*<br>*HW⑤S-2L* | *HW⑤S-21T*<br>*HW⑤S-21L* |
| 1NO | 1 | 0 | X | Knob<br>Lever | HW⑤S-2TF10<br>HW⑤S-2LF10 | HW⑤S-21TF10<br>HW⑤S-21LF10 |
| 1NO-<br>1NC | 1<br>2 | 0<br>X | X<br>0 | Knob<br>Lever | HW⑤S-2TF11<br>HW⑤S-2LF11 | HW⑤S-21TF11<br>HW⑤S-21LF11 |
| 2NO | 1<br>2 | 0<br>0 | X<br>X | Knob<br>Lever | HW⑤S-2TF20<br>HW⑤S-2LF20 | HW⑤S-21TF20<br>HW⑤S-21LF20 |
| 2NO-<br>2NC | 1<br>2<br>3<br>4 | X<br>0<br>X<br>0 | 0<br>X<br>0<br>X | Knob<br>Lever | HW⑤S-2TF22<br>HW⑤S-2LF22 | HW⑤S-21TF22<br>HW⑤S-21LF22 |

1. In place of ⑤ enter 1 for plastic bezel or 4 for metal bezel.
2. For nameplates, see page 657.
3. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
4. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
5. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
6. Standard color for knob and lever is black.
7. Optional colors available for lever type. Must order in components. See next page for part numbers.
8. Additional contact configurations available (up to 6 total contacts).
9. For Truth Tables see page 670.

### ⑤ Bezel Type

| Type | Code |
|---|---|
| Plastic | 1 |
| Metal | 4 |

## Part Number Structure

H W 1 S - 2 1 T F 10

**Bezel**
1: Plastic
4: Metal

**# of Positions**
2: 2-Position

**Operator**
blank: Maintained
1: Spring Return from Right

**Handle**
T: Knob
L: Lever

**Contact Arrangement**
10: 1NO
11: 1NO-1NC
20: 2NO

## Selector Switches 2-Position (Replacement Parts)

| Contact Blocks | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Anti-Rotation Ring

| Style | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Operators

| Style | Description | Handle | Plastic Bezel | Metal Bezel |
|---|---|---|---|---|
| | Maintained | Knob | HW1S-2T | HW4S-2T |
| | | Lever | HW1S-2 | HW4S-2 |
| | Spring Return from Right | Knob | HW1S-21T | HW4S-21T |
| | | Lever | HW1S-21 | HW4S-21 |

1. Knob operator comes with black handle.
2. To order lever type, lever and inserts must be ordered separately, along with lever operator. See part numbers below.

### Levers & Inserts

| Style | | Part Number |
|---|---|---|
| | Lever | ASWHHL-① |
| | Lever Color Insert | TW-HC1-① |

Standard lever color is black. Standard insert color is white.

### ① Handle/Insert Color Code

| Color | Code |
|---|---|
| Black* | B |
| Blue | S |
| Green | G |
| Red | R |
| Yellow | Y |
| White† | W |

1. * Lever color inserts not available in black.
2. †Lever not available in white.

## Selector Switches 3-Position (Assembled)

### 3–Position Selector Switches

| Contact | Mounting | Operator Position L | Operator Position C | Operator Position R | Handle | Maintained | Spring Return from Right | Spring Return from Left | Spring Return Two-Way |
|---|---|---|---|---|---|---|---|---|---|
| *Operator Only* | | | | | *Knob*<br>*Lever* | *HW⑤S-3T**<br>*HW⑤S-3L* | *HW⑤S-31T*<br>*HW⑤S-31L* | *HW⑤S-32T*<br>*HW⑤S-32L* | *HW⑤S-33T*<br>*HW⑤S-33L* |
| 1NO-1NC | 1<br>2 | 0<br>0 | X—X<br>0 | X<br>X | Knob<br>Lever | HW⑤S-3TF11<br>HW⑤S-3LF11 | HW⑤S-31TF11<br>HW⑤S-31LF11 | HW⑤S-32TF11<br>HW⑤S-32LF11 | HW⑤S-33TF11<br>HW⑤S-33LF11 |
| 2NO | 1<br>2 | X<br>0 | 0<br>0 | 0<br>X | Knob<br>Lever | HW⑤S-3TF20<br>HW⑤S-3LF20 | HW⑤S-31TF20<br>HW⑤S-31LF20 | HW⑤S-32TF20<br>HW⑤S-32LF20 | HW⑤S-33TF20<br>HW⑤S-33LF20 |
| 2NC | 1<br>2 | 0<br>X—X | X—X | X<br>0 | Knob<br>Lever | HW⑤S-3TF02<br>HW⑤S-3LF02 | HW⑤S-31TF02<br>HW⑤S-31LF02 | HW⑤S-32TF02<br>HW⑤S-32LF02 | HW⑤S-33TF02<br>HW⑤S-33LF02 |
| 2NO-1NC | 1<br>2<br>3 | X<br>0<br>0 | 0<br>0<br>X | 0<br>X<br>0 | Knob | HW⑤S-3JTF21N1 | – | – | – |
| 2NO-2NC | 1<br>2<br>3<br>4 | X<br>0<br>0<br>X—X | 0<br>0<br>X—X | 0<br>X<br>X<br>0 | Knob | HW⑤S-3TF22 | HW⑤S-31TF22 | HW⑤S-32TF22 | HW⑤S-33TF22 |
| 2NO-2NC | 1<br>2<br>3<br>4 | 0<br>X<br>X—X<br>0 | 0<br>0<br>X—X<br>0 | X<br>0<br>0<br>X | Knob | HW⑤S-3STF22N9 | – | – | – |
| 4NO | 1<br>2<br>3<br>4 | X<br>0<br>X<br>0 | 0<br>0<br>0<br>0 | 0<br>X<br>0<br>X | Knob | HW⑤S-3TF40 | HW⑤S-31TF40 | HW⑤S-32TF40 | HW⑤S-33TF40 |
| 4NO | 1<br>2<br>3<br>4 | X<br>0<br>X<br>0 | 0<br>X—X<br>0<br>0 | 0<br>X<br>0<br>X | Knob | HW⑤S-3STF40N2 | – | – | – |
| 4NC | 1<br>2<br>3<br>4 | 0<br>X—X<br>0<br>X—X | X—X<br>X<br>X—X<br>0 | X<br>0<br>X<br>0 | Knob | HW⑤S-3TF04 | HW⑤S-31TF04 | HW⑤S-32TF04 | HW⑤S-33TF04 |

### ⑤ Bezel Type

| Type | Code |
|---|---|
| Plastic | 1 |
| Metal | 4 |

1. In place of ⑤ enter 1 for plastic bezel or 4 for metal bezel.
2. Knob operator includes black knob/lever operator includes black lever.
3. * Three position operator is available with three different cams.
   HW⑤S-3T: Maintained (standard cam)
   HW⑤S-3ST: Maintained (S cam)
   HW⑤S-3JT: Maintained (J cam)
4. Operator cams are color coded (white=standard cam, red=S cam, black =J cam).
5. For nameplates, see page 657.
6. For contact assembly part numbers, see page 661
7. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
8. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
9. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
10. Standard color for knob and lever is black.
11. Optional colors available for lever type. Must order in components. See next page for part numbers.
12. Additional contact configurations available (up to 6 total contacts).
13. For Truth Tables see page 670.

## Part Number Structure

H W 1 S - 3 1 T F 20

**Bezel**
1: Plastic
4: Metal

**# of Positions**
3: 3-Position

**Operator**
blank: Maintained
1: Spring Return from Right
2: Spring Return from Left
3: Spring Return Two Way

**Handle**
T: Knob
L: Lever

**Contact Arrangement**
11: 1NO-1NC
20: 2NO
21: 2NO-1NC
22: 2NO-2NC
40: 4NO
04: 4NC

## Selector Switches 3-Position (Replacement Parts)

| Contact Blocks | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Anti-Rotation Ring

| Style | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Operators

| Style | Description | Handle | Plastic Bezel | Metal Bezel |
|---|---|---|---|---|
| | Maintained (standard cam) | Knob | HW1S-3T | HW4S-3T |
| | | Lever | HW1S-3 | HW4S-3 |
| | Maintained (S cam) | Knob | HW1S-3ST | HW4S-3ST |
| | Maintained (J cam) | Knob | HW1S-3JT | HW4S-3JT |
| | Spring Return from Right (standard cam) | Knob | HW1S-31T | HW4S-31T |
| | | Lever | HW1S-31 | HW4S-31 |
| | Spring Return from Left (standard cam) | Knob | HW1S-32T | HW4S-32T |
| | | Lever | HW1S-32 | HW4S-32 |
| | 2-Way Spring Return (standard cam) | Knob | HW1S-33T | HW4S-33T |
| | | Lever | HW1S-33 | HW4S-33 |

1. Knob operator comes with black handle.
2. Three position knob operator is available with three different cams.
3. Operator cams are color coded (white=standard cam, red=S cam, black =J cam).
4. To order lever type, lever and inserts must be ordered separately, along with lever operator. See part numbers below.

### Levers & Inserts

| Style | | Part Number |
|---|---|---|
| | Lever | ASWHHL-① |
| | Lever Color Insert | TW-HC1-① |

Standard lever color is black. Standard insert color is white.

### ① Handle/Insert Color Code

| Color | Code | Color | Code |
|---|---|---|---|
| Black* | B | Red | R |
| Blue | S | Yellow | Y |
| Green | G | White† | W |

1. * Lever color inserts not available in black.
2. †Lever not available in white.

# Selector Switches 4- & 5-Position (Assembled)

## 4-Position Selector Switches

| Contact | Mounting | Operator Position 1 | 2 | 3 | 4 | Handle | Maintained |
|---|---|---|---|---|---|---|---|
| *Operator Only* | | | | | | *Knob Lever* | *HW⑤S-4T HW⑤S-4L* |
| 1NO-2NC | 1<br>2<br>3<br>4 | X<br>0<br>0<br>0 | 0<br>X<br>0<br>0 | 0<br>0<br>X<br>0 | 0<br>0<br>0<br>0 | Knob Lever | HW⑤S-4TF12<br>HW⑤S-4LF12 |
| 1NO-3NC | 1<br>2<br>3<br>4 | 0<br>0<br>0<br>0 | X<br>X<br>0<br>0 | X<br>0<br>X<br>0 | X<br>0<br>0<br>X | Knob Lever | HW⑤S-4TF13N6<br>HW⑤S-4LF13N6 |
| 2NO-2NC | 1<br>2<br>3<br>4 | X<br>0<br>0<br>0 | 0<br>X<br>0<br>0 | 0<br>0<br>X<br>0 | 0<br>0<br>0<br>X | Knob Lever | HW⑤S-4TF22N3<br>HW⑤S-4LF22N3 |

## 5-Position Selector Switch

| Contact | Mounting | Operator Position 1 | 2 | 3 | 4 | 5 | Handle | Maintained |
|---|---|---|---|---|---|---|---|---|
| *Operator Only* | | | | | | | *Knob Lever* | *HW⑤S-5T HW⑤S-5L* |
| 2NO-2NC | 1<br>2<br>3<br>4 | X<br>0<br>0<br>0 | 0<br>X<br>0<br>0 | 0<br>0<br>0<br>0 | 0<br>0<br>X<br>0 | 0<br>0<br>0<br>X | Knob Lever | HW⑤S-5TF22N3<br>HW⑤S-5LF22N3 |

1. In place of ⑤ enter 1 for plastic bezel or 4 for metal bezel.
2. Knob operator includes black knob/lever operator includes black lever.
3. For nameplates, see page 657.
4. For contact assembly part numbers, see page 661.
5. Five position circuit cannot be made to make five independent contact closures.
6. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
7. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
8. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
9. Standard color for knob and lever is black.
10. Optional colors available for lever type. Must order in components. See next page for part numbers.
11. Additional contact configurations available (up to 6 total contacts).
12. For Truth Tables see page 670.

### ⑤ Bezel Type

| Type | Code |
|---|---|
| Plastic | 1 |
| Metal | 4 |

## Part Number Structure

H W 1 S - 4 T F 13N6

**Bezel**
1: Plastic
4: Metal

**# of Positions**
4: 4-Position
5: 5-Position

**Handle**
T: Knob
L: Lever

**Contact Arrangement**
(based on desired truth table)
12: 1NO-2NC
13N6: 1NO-3NC
22N3: 2NO-2NC

## Selector Switches 4- & 5-Position (Replacement Parts)

| Contact Blocks | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Anti-Rotation Ring

| Style | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Operators

| Style | Position | Description | Handle | Plastic Bezel | Metal Bezel |
|---|---|---|---|---|---|
| | 4 | Maintained | Knob | HW1S-4T | HW4S-4T |
| | | | Lever | HW1S-4 | HW4S-4 |
| | 5 | Maintained | Knob | HW1S-5T | HW4S-5T |
| | | | Lever | HW1S-5 | HW4S-5 |

1. Knob operator comes with black handle.
2. To order lever type, lever and inserts must be ordered separately, along with lever operator. See part numbers below.

### Levers & Inserts

| Style | | Part Number |
|---|---|---|
| | Lever | ASWHHL-① |
| | Lever Color Insert | TW-HC1-① |

Standard lever color is black. Standard insert color is white.

### ① Handle/Insert Color Code

| Color | Code |
|---|---|
| Black* | B |
| Blue | S |
| Green | G |
| Red | R |
| Yellow | Y |
| White† | W |

1. * Lever color inserts not available in black.
2. †Lever not available in white.

## Key Switches 2-Position (Assembled)

### 2-Position Key Switches

| Contact | Mounting | Operator Position L | Operator Position R | Maintained | Spring Return from Right |
|---|---|---|---|---|---|
| *Operator Only* | | | | *HW⑤K-2A* | *HW⑤K-21B* |
| 1NO | 1 | 0 | X | HW⑤K-2AF10 | HW⑤K-21BF10 |
| 1NO-1NC | 1<br>2 | 0<br>X | X<br>0 | HW⑤K-2AF11 | HW⑤K-21BF11 |
| 2NO | 1<br>2 | 0<br>0 | X<br>X | HW⑤K-2AF20 | HW⑤K-21BF20 |
| 2NO-2NC | 1<br>2<br>3<br>4 | 0<br>X<br>0<br>X | X<br>0<br>X<br>0 | HW⑤K-2AF22 | HW⑤K-21BF22 |

1. In place of ⑤ enter 1 for plastic bezel or 4 for metal bezel.
2. Key is removable in all maintained positions. Other key removable options available.
3. Two keys are supplied with all switches.
4. All standard operators are keyed alike.
5. Other key removable options available. See table below
6. For nameplates, see page 657.
7. For contact assembly part numbers, see page 661.
8. Key is retained in "Spring Return" position.
9. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
10. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
11. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
12. Additional contact configurations available (up to 6 total contacts).
13. For Truth Tables see page 661.

### ⑤ Bezel Type

| Type | Code |
|---|---|
| Plastic | 1 |
| Metal | 4 |

### Key Removable Option Codes

| Code | Description |
|---|---|
| A | Key not retained in any position (removable in all positions) |
| B | Key retained in right position only |
| C | Key retained in left position only |

## Part Number Structure

H W 1 K - 2 1 B F 10

**Bezel**
1: Plastic
4: Metal

**# of Positions**
2: 2-Position

**Operator**
blank: Maintained
1: Spring Return from Right

**Key Retained Position**
A: Key not retained in any position (removable in all positions)
B: Key retained in right position only
C: Key retained in left position only

**Contact Arrangement**
10: 1NO 20: 2NO
11: 1NO-1NC 22: 2NO-2NC

## Key Switches 2-Position (Replacement Parts)

| Contact Assembly | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Anti-Rotation Ring

| Style | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Operators

| Style | Description | Plastic Bezel | Metal Bezel |
|---|---|---|---|
| | Maintained | HW1K-2A | HW4K-2A |
| | Maintained, key removed left only | HW1K-2B | HW4K-2B |
| | Spring Return from Right | HW1K-21B | HW4K-21B |
| | Maintained, key removed right only | HW1K-2C | HW4K-2C |

1. Operator includes two keys.
2. All standard operators are keyed alike.

## Key Switches 3-Position (Assembled)

3-Position Key Switches

| Contact | Mounting | Operator Position L | Operator Position C | Operator Position R | Maintained | Spring Return from Right | Spring Return from Left | Spring Return Two Way |
|---|---|---|---|---|---|---|---|---|
| *Operator Only* | | | | | *HW⑤K-3A** | *HW⑤K-31B* | *HW⑤K-32C* | *HW⑤K-33D* |
| 1NO-1NC | 1<br>2 | 0<br>0 | X—X<br>0 | X<br>X | HW⑤K-3AF11 | HW⑤K-31BF11 | HW⑤K-32CF11 | HW⑤K-33DF11 |
| 2NO | 1<br>2 | X<br>0 | 0<br>0 | 0<br>X | HW⑤K-3AF20 | HW⑤K-31BF20 | HW⑤K-32CF20 | HW⑤K-33DF20 |
| 2NC | 1<br>2 | 0<br>X—X | X—X | X<br>0 | HW⑤K-3AF02 | HW⑤K-31BF02 | HW⑤K-32CF02 | HW⑤K-33DF02 |
| 2NO-1NC | 1<br>2<br>3 | X<br>0<br>0 | 0<br>0<br>X | 0<br>X<br>0 | HW⑤K-3JAF21N1 | – | – | – |
| 2NO-2NC | 1<br>2<br>3<br>4 | X<br>0<br>0<br>X—X | 0<br>0<br>X—X | 0<br>X<br>0 | HW⑤K-3AF22 | HW⑤K-31BF22 | HW⑤K-32CF22 | HW⑤K-33DF22 |
| 2NO-2NC | 1<br>2<br>3<br>4 | 0<br>X<br>X—X<br>0 | 0<br>0<br>0<br>0 | X<br>0<br>0<br>X | HW⑤K-3SAF22N9 | – | – | – |
| 4NO | 1<br>2<br>3<br>4 | X<br>0<br>X<br>0 | 0<br>0<br>0<br>0 | 0<br>X<br>0<br>X | HW⑤K-3AF40 | HW⑤K-31BF40 | HW⑤K-32CF40 | HW⑤K-33DF40 |
| 4NO | 1<br>2<br>3<br>4 | X<br>0<br>X<br>0 | 0<br>X—X<br>0<br>0 | 0<br>X<br>0<br>X | HW⑤K-3SAF40N2 | – | – | – |
| 4NC | 1<br>2<br>3<br>4 | 0<br>X—X<br>0<br>X—X | X—X<br>X<br>X—X<br>0 | X<br>0<br>X<br>0 | HW⑤K-3AF04 | HW⑤K-31BF04 | HW⑤K-32CF04 | HW⑤K-33DF04 |

### ⑤ Bezel Type

| Type | Code |
|---|---|
| Plastic | 1 |
| Metal | 4 |

1. In place of ⑤ enter 1 for plastic bezel or 4 for metal bezel.
2. Key is removable in all maintained positions. Other key removable options available.
3. Two keys are supplied with all switches.
4. All standard operators are keyed alike.
5. Other key removable options available. See table to the right.
6. * Operator is available with three different cams.
   HW⑤K-3A: Maintained (standard cam)
   HW⑤K-3SA: Maintained (Cam S)
   HW⑤K-3JA: Maintained (Cam J)
7. For nameplates, see page 657.
8. For contact assembly part numbers, see page 661.
9. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
10. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
11. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
12. Additional contact configurations available (up to 6 total contacts).
13. For Truth Tables see page 670.

### Key Removable Option Codes

| Code | Description |
|---|---|
| A | Key not retained in any position (removable in all positions) |
| B | Key retained in right position only |
| C | Key retained in left position only |
| D | Key retained in left and right (3 position only) |
| E | Key retained in center only (3 position only) |
| G | Key retained right and center (3 position only) |
| H | Key retained left and center (3 position only) |

## Part Number Structure

H W 1 K - 3 1 B F 11

**Bezel**
1: Plastic
4: Metal

**# of Positions**
3: 3-Position

**Operator**
blank: Maintained
1: Spring Return from Right
2: Spring Return from Left
3: Spring Return Two Way

**Key Removable Option Code**
(see chart on previous page)

**Contact Arrangement**
11: 1NO-1NC 40: 4NO
20: 2NO 04: 4NC
22: 2NO-2NC

## Key Switches 3-Position (Replacement Parts)

| Contact Assembly | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Anti-Rotation Ring

| Style | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Operators

| Style | Description | Plastic Bezel | Metal Bezel |
|---|---|---|---|
| | Maintained (standard cam) | HW1K-3A | HW4K-3A |
| | Maintained (S cam) | HW1K-3SA | HW4K-3SA |
| | Maintained (J cam) | HW1K-3JA | HW4K-3JA |
| | Spring Return from Right (standard cam) | HW1K-31B | HW4K-31B |
| | Spring Return from Left (standard cam) | HW1K-32C | HW4K-32C |
| | 2-Way Spring Return (standard cam) | HW1K-33D | HW4K-33D |

1. Operator includes two keys.
2. All standard operators are keyed alike.
3. Other key removable options available. See table on previous page.
4. Key not removable from spring-returned position

# Illuminated Selector Switches 2-Position (Assembled)

## 2-Position Illuminated Selector Switches

| Style | | | | | | Part Number | |
|---|---|---|---|---|---|---|---|
| Contact | Mounting | Operator Position L | Operator Position R | Type | | Maintained | Spring Return from Right |
| | | ↖ | ↗ | | | L R | L R |
| *Operator Only* | | | | | | *HW⑤F-2②* | *HW⑤F-21②* |
| 1NO-1NC | 1<br>2 | 0<br>X | X<br>0 | Full Voltage | | HW⑤F-2F11Q④-②-③ | HW⑤F-21F11Q④-②-③ |
| | | | | Transformer | 120V<br>240V<br>480V | HW⑤F-2F11H2④-②<br>HW⑤F-2F11M4④-②<br>HW⑤F-2F11T8④-② | HW⑤F-21F11H2④-②<br>HW⑤F-21F11M4④-②<br>HW⑤F-21F11T8④-② |
| 2NO | 1<br>2 | X<br>0 | 0<br>X | Full Voltage | | HW⑤F-2F20Q④-②-③ | HW⑤F-21F20Q④-②-③ |
| | | | | Transformer | 120V<br>240V<br>480V | HW⑤F-2F20H2④-②<br>HW⑤F-2F20M4④-②<br>HW⑤F-2F20T8④-② | HW⑤F-21F20H2④-②<br>HW⑤F-21F20M4④-②<br>HW⑤F-21F20T8④-② |
| 2NO-2NC | 1<br>2<br>3<br>4 | 0<br>X<br>0<br>X | X<br>0<br>X<br>0 | Full Voltage | | HW⑤F-2F22Q④-②-③ | HW⑤F-21F22Q④-②-③ |
| | | | | Transformer | 120V<br>240V<br>480V | HW⑤F-2F22H2④-②<br>HW⑤F-2F22M4④-②<br>HW⑤F-2F22T8④-② | HW⑤F-21F22H2④-②<br>HW⑤F-21F22M4④-②<br>HW⑤F-21F22T8④-② |

1. In place of ② specify Lens/LED color code.
2. In place of ③ specify Full Voltage code.
3. In place of ④ specify Lamp code.
4. In place of ⑤ enter 1 for plastic bezel or 4 for metal bezel.
5. For nameplates, see page 657.
6. For contact assembly part numbers, see page 661.
7. Light is independent of switch position.
8. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
9. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
10. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
11. **Yellow selector switch comes with white LED.**
12. Additional contact configurations available (up to 6 total contacts).
13. For Truth Tables see page 670.

### ② Lens/LED Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

### ③ Full Voltage Code

| Full Voltage Models | |
|---|---|
| Voltage | Code |
| 6VAC/DC | 6V |
| 12VAC/DC | 12V |
| 24VAC/DC | 24V |
| 120V AC (LED only) | 120V |
| 240V AC (LED only) | 240V |

### ④ Lamp Code

| Lamp | Code |
|---|---|
| Incandescent | Blank |
| LED | D |

### ⑤ Bezel Code

| Type | Code |
|---|---|
| Plastic | 1 |
| Metal | 4 |

## Part Number Structure

H W 1 F – 21 F 20 Q D – G – 24V

**Bezel**
1: Plastic
4: Metal

**Position**
2: Maintained
21: Spring Return from Right

**Contact Arrangement**
11: 1NO-1NC
20: 2NO
22: 2NO-2NC

**Illumination Circuit**
Q: Full Voltage
H2: Transformer 120V AC
M4: Transformer 240V AC
T8: Tranformer 480V AC

**Lamp Code**
D: LED
Blank: Incandescent

**Lens Color**
A: Amber S: Blue
G: Green W: White
R: Red Y: Yellow

**Lamp Voltage**
(Full voltage units only)
6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120V AC*
240V: 240V AC*
*LED only

## Illuminated Selector Switches 2-Position (Replacement Parts)

| Transformer* | + | Contact Blocks | + | Lead Holder | + | Mounting Adaptor | + | Safety Lever Lock | + | Lamp | + | Anti-Rotation Ring | + | Operator | + | Lens | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | |

*Transformer not needed with full voltage models.

### Lamp Circuit Components

| Style | Description | Terminals | Part Number |
|---|---|---|---|
| Lead Holder | For use with HW-CBL on all illuminated pushbutton units. One required for each deck (pair) of contacts. | | HW-LH3 |
| Dummy Block with Full Voltage Adaptor | For use with odd number of contacts. | Fingersafe | HW-DA1FB |
| | | Exposed | HW-DA1B |
| | | Spring Up | HW-GA1 |
| Full Voltage Adaptor | For use with even number of contacts. | Fingersafe | TW-DA1FB |
| | | Exposed | TW-DA1B |
| Transformer Unit (6V secondary voltage) | 120VAC<br>240VAC<br>480VAC | Fingersafe | TW-F126B<br>TW-F246B<br>TW-F486B |
| | 120V<br>240V<br>480V | Spring Up | HW-T126<br>HW-T246<br>HW-L486 |
| | 120V<br>240V<br>480V | Exposed | TW-T126B<br>TW-T246B<br>TW-T486B |
| DC-DC Converter | 110VDC | | HW-L16D |

1. HW-GA1 "Dummy Block with full voltage adaptor" does not require the use of HW-LH3.
2. DC-DC convertor features spring-up terminals.
3. DC-DC convertor applicable voltage range 90-140V DC.

### Operators

| Style | Description | Plastic Bezel | Metal Bezel |
|---|---|---|---|
| | Maintained | HW1F-2 | HW4F-2 |
| | Spring return from right | HW1F-21 | HW4F-21 |

Illuminated knobs must be ordered separately.

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10<br>HW-F10R (early make) | HW-F01<br>HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10<br>HW-G10R (early make) | HW-G01<br>HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10<br>HW-C10R (early make) | HW-C01<br>HW-C01R (late break) |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CBL |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Illuminated Knob

| Appearance | Part Number |
|---|---|
| | HW9Z-FDY-② |

In place of ②, specify the Color Code.

### ② Lens/LED Color Code

| Color | Code | Color | Code |
|---|---|---|---|
| Amber | A | Blue | S |
| Green | G | White | W |
| Red | R | Yellow | Y |

### Anti-Rotation Ring

| Style | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 6V AC/DC | LSTD-6② |
| | 12V AC/DC | LSTD-1② |
| | 24V AC/DC | LSTD-2② |
| | 120V AC | LSTD-H2② |
| | 240V AC | LSTD-M4② |
| Incandescent | 6V AC/DC | IS-6 |
| | 12V AC/DC | IS-12 |
| | 24V AC/DC | IS-24 |

1. In place of ②, specify the LED Color Code.
2. The LED contains a current-limiting resistor and reverse polarity protection diodes.
3. Use white LED for yellow lens. Yellow LED not available.

## Illuminated Selector Switches 3-Position (Assembled)

### 3-Position Illuminated Selector Switches

| Style | | | | | | | Part Number | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Contact | Mounting | Operator Position L | Operator Position C | Operator Position R | Type | | Maintained | Spring Return from Right | Spring Return from Left | Spring Return Two-Way |
| | | L C R | L C R | L C R | | | L C R | L C R | L C R | L C R |
| *Operator Only* | | | | | | | *HW⑤F-3②* | *HW⑤F-31②* | *HW⑤F-32②* | *HW⑤F-33②* |
| 1NO-1NC | 1 2 | 0 0 | X 0 | X X | Full Voltage | | HW⑤F-3F11Q④-②-③ | HW⑤F-31F11Q④-②-③ | HW⑤F-32F11Q④-②-③ | HW⑤F-33F11Q④-②-③ |
| | | | | | Transformer | 120V<br>240V<br>480V | HW⑤F-3F11H2④-②<br>HW⑤F-3F11M4④-②<br>HW⑤F-3F11T8④-② | HW⑤F-31F11H2④-②<br>HW⑤F-31F11M4④-②<br>HW⑤F-31F11T8④-② | HW⑤F-32F11H2④-②<br>HW⑤F-32F11M4④-②<br>HW⑤F-32F11T8④-② | HW⑤F-33F11H2④-②<br>HW⑤F-33F11M4④-②<br>HW⑤F-33F11T8④-② |
| 2NO | 1 2 | X 0 | 0 0 | 0 X | Full Voltage | | HW⑤F-3F20Q④-②-③ | HW⑤F-31F20Q④-②-③ | HW⑤F-32F20Q④-②-③ | HW⑤F-33F20Q④-②-③ |
| | | | | | Transformer | 120V<br>240V<br>480V | HW⑤F-3F20H2④-②<br>HW⑤F-3F20M4④-②<br>HW⑤F-3F20T8④-② | HW⑤F-31F20H2④-②<br>HW⑤F-31F20M4④-②<br>HW⑤F-31F20T8④-② | HW⑤F-32F20H2④-②<br>HW⑤F-32F20M4④-②<br>HW⑤F-32F20T8④-② | HW⑤F-33F20H2④-②<br>HW⑤F-33F20M4④-②<br>HW⑤F-33F20T8④-② |
| 2NC | 1 2 | 0 X | X X | X 0 | Full Voltage | | HW⑤F-3F02Q④-②-③ | HW⑤F-31F02Q④-②-③ | HW⑤F-32F02Q④-②-③ | HW⑤F-33F02Q④-②-③ |
| | | | | | Transformer | 120V<br>240V<br>480V | HW⑤F-3F02H2④-②<br>HW⑤F-3F02M4④-②<br>HW⑤F-3F02T8④-② | HW⑤F-31F02H2④-②<br>HW⑤F-31F02M4④-②<br>HW⑤F-31F02T8④-② | HW⑤F-32F02H2④-②<br>HW⑤F-32F02M4④-②<br>HW⑤F-32F02T8④-② | HW⑤F-33F02H2④-②<br>HW⑤F-33F02M4④-②<br>HW⑤F-33F02T8④-② |
| 2NO-2NC | 1 2 3 4 | X 0 0 X | 0 0 X X | 0 X X 0 | Full Voltage | | HW⑤F-3F22Q④-②-③ | HW⑤F-31F22Q④-②-③ | HW⑤F-32F22Q④-②-③ | HW⑤F-33F22Q④-②-③ |
| | | | | | Transformer | 120V<br>240V<br>480V | HW⑤F-3F22H2④-②<br>HW⑤F-3F22M4④-②<br>HW⑤F-3F22T8④-② | HW⑤F-31F22H2④-②<br>HW⑤F-31F22M4④-②<br>HW⑤F-31F22T8④-② | HW⑤F-32F22H2④-②<br>HW⑤F-32F22M4④-②<br>HW⑤F-32F22T8④-② | HW⑤F-33F22H2④-②<br>HW⑤F-33F22M4④-②<br>HW⑤F-33F22T8④-② |
| 4NO | 1 2 3 4 | X 0 X 0 | 0 0 0 0 | 0 X 0 X | Full Voltage | | HW⑤F-3F40Q④-②-③ | HW⑤F-31F40Q④-②-③ | HW⑤F-32F40Q④-②-③ | HW⑤F-33F40Q④-②-③ |
| | | | | | Transformer | 120V<br>240V<br>480V | HW⑤F-3F40H2④-②<br>HW⑤F-3F40M4④-②<br>HW⑤F-3F40T8④-② | HW⑤F-31F40H2④-②<br>HW⑤F-31F40M4④-②<br>HW⑤F-31F40T8④-② | HW⑤F-32F40H2④-②<br>HW⑤F-32F40M4④-②<br>HW⑤F-32F40T8④-② | HW⑤F-33F40H2④-②<br>HW⑤F-33F40M4④-②<br>HW⑤F-33F40T8④-② |
| 4NC | 1 2 3 4 | 0 X 0 X | X X X X | X 0 X 0 | Full Voltage | | HW⑤F-3F04Q④-②-③ | HW⑤F-31F04Q④-②-③ | HW⑤F-32F04Q④-②-③ | HW⑤F-33F04Q④-②-③ |
| | | | | | Transformer | 120V<br>240V<br>480V | HW⑤F-3F04H2④-②<br>HW⑤F-3F04M4④-②<br>HW⑤F-3F04T8④-② | HW⑤F-31F04H2④-②<br>HW⑤F-31F04M4④-②<br>HW⑤F-31F04T8④-② | HW⑤F-32F04H2④-②<br>HW⑤F-32F04M4④-②<br>HW⑤F-32F04T8④-② | HW⑤F-33F04H2④-②<br>HW⑤F-33F04M4④-②<br>HW⑤F-33F04T8④-② |

1. In place of ② specify Lens/LED color code.
2. In place of ③ specify Full Voltage code.
3. In place of ④ specify Lamp code.
4. In place of ⑤ enter 1 for plastic bezel or 4 for metal bezel.
5. For nameplates, see page 657.
6. For contact assembly part numbers, see page 661.
7. Light is independent of switch position.
8. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
9. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
10. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
11. **Yellow selector switch comes with white LED.**
12. Additional contact configurations available (up to 6 total contacts).
13. For Truth Tables see page 670.

#### ② Lens/LED Color

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

#### ③ Full Voltage Code

| Full Voltage Models | |
|---|---|
| Voltage | Code |
| 6VAC/DC | 6V |
| 12VAC/DC | 12V |
| 24VAC/DC | 24V |
| 120V AC (LED only) | 120V |
| 240V AC (LED only) | 240V |

#### ④ Lamp Code

| Lamp | Code |
|---|---|
| Incandescent | Blank |
| LED | D |

#### ⑤ Bezel Code

| Type | Code |
|---|---|
| Plastic | 1 |
| Metal | 4 |

## Part Number Structure

H W 1 F – 31 F 20 Q D – G – 24V

**Bezel**
1: Plastic
4: Metal

**Position**
3: Maintained
31: Spring Return from Right
32: Spring Return from Left
33: Spring Return 2-Way

**Contact Arrangement**
11: 1NO-1NC
20: 2NO
02: 2NC
22: 2NO-2NC
40: 4NO
04: 4NC

**Illumination Circuit**
Q: Full Voltage
H2: Transformer 120V AC
M4: Transformer 240V AC
T8: Tranformer 480V AC

**Lamp Code**
D: LED
Blank: Incandescent

**Lens Color**
A: Amber
G: Green
R: Red
S: Blue
W: White
Y: Yellow

**Full Voltage Code**
6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120V AC*
240V: 240V AC*
*LED only

## Illuminated Selector Switches 3-Position (Replacement Parts)

| Transformer* | + | Contact Blocks | + | Lead Holder | + | Mounting Adaptor | + | Safety Lever Lock | + | Lamp | + | Anti-Rotation Ring | + | Operator | + | Lens | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | |

*Transformer not needed with full voltage models.

### Lamp Circuit Components

| Style | Description | Terminals | Part Number |
|---|---|---|---|
| Lead Holder | For use with HW-CBL on all illuminated pushbutton units. One required for each deck (pair) of contacts. | | HW-LH3 |
| Dummy Block with Full Voltage Adaptor | For use with odd number of contacts. | Fingersafe | HW-DA1FB |
| | | Exposed | HW-DA1B |
| | | Spring Up | HW-GA1 |
| Full Voltage Adaptor | For use with even number of contacts. | Fingersafe | TW-DA1FB |
| | | Exposed | TW-DA1B |
| Transformer Unit (6V secondary voltage) | 120VAC<br>240VAC<br>480VAC | Fingersafe | TW-F126B<br>TW-F246B<br>TW-F486B |
| | 120V<br>240V<br>480V | Spring Up | HW-T126<br>HW-T246<br>HW-L486 |
| | 120V<br>240V<br>480V | Exposed | TW-T126B<br>TW-T246B<br>TW-T486B |
| DC-DC Converter | 110VDC | | HW-L16D |

1. HW-GA1 "Dummy Block with full voltage adaptor" does not require the use of HW-LH3.
2. DC-DC convertor features spring-up terminals.
3. DC-DC convertor applicable voltage range 90-140V DC.

### Operators

| Style | Description | Plastic Bezel | Metal Bezel |
|---|---|---|---|
| | Maintained | HW1F-3 | HW4F-3 |
| | Spring return from right | HW1F-31 | HW4F-31 |
| | Spring return from left | HW1F-32 | HW4F-32 |
| | 2-Way spring return | HW1F-33 | HW4F-33 |

Illuminated knobs must be ordered separately.

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10<br>HW-F10R (early make) | HW-F01<br>HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10<br>HW-G10R (early make) | HW-G01<br>HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10<br>HW-C10R (early make) | HW-C01<br>HW-C01R (late break) |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CBL |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Illuminated Knob

| Appearance | Part Number |
|---|---|
| | HW9Z-FDY-② |

In place of ②, specify the Color Code.

### ② Lens/LED Color Code

| Color | Code | Color | Code |
|---|---|---|---|
| Amber | A | Blue | S |
| Green | G | White | W |
| Red | R | Yellow | Y |

### Anti-Rotation Ring

| Style | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 6V AC/DC | LSTD-6② |
| | 12V AC/DC | LSTD-1② |
| | 24V AC/DC | LSTD-2② |
| | 120V AC | LSTD-H2② |
| | 240V AC | LSTD-M4② |
| Incandescent | 6V AC/DC | IS-6 |
| | 12V AC/DC | IS-12 |
| | 24V AC/DC | IS-24 |

1. In place of ②, specify the LED Color Code.
2. The LED contains a current-limiting resistor and reverse polarity protection diodes.
3. Use white LED for yellow lens. Yellow LED not available.

# Mono Lever Switches 2-Position (Assembled)

## 2-Position Mono Lever Switches

| Style | Part Number | Description |
|---|---|---|
| HW1M Standard Lever | HW1M-F1010-20 | Maintained up and down |
| | HW1M-F2020-20 | Spring return up and down |
| | HW1M-F1010-40 | Maintained up and down |
| | HW1M-F2020-40 | Spring return up and down |
| | HW1M-F0101-20 | Maintained right and left |
| | HW1M-F0202-20 | Spring return right and left |
| | HW1M-F0101-40 | Maintained right and left |
| | HW1M-F0202-40 | Spring return right and left |
| HW1M-L Interlocking Lever | HW1M-LF1010-20 | Maintained up and down |
| | HW1M-LF2020-20 | Spring return up and down |
| | HW1M-LF1010-40 | Maintained up and down |
| | HW1M-LF2020-40 | Spring return up and down |
| | HW1M-LF0101-20 | Maintained right and left |
| | HW1M-LF0202-20 | Spring return right and left |
| | HW1M-LF0101-40 | Maintained right and left |
| | HW1M-LF0202-40 | Spring return right and left |

1. All assembled part numbers in catalog include standard (HW-F...) contacts.
2. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
3. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
4. Additional contact configurations available (up to 6 total contacts).

## Circuit Diagrams

### 2 Position Left/Right

| Circuit Number | Contact Mounting | | Position | | |
|---|---|---|---|---|---|
| | No. | | Left | Center | Right |
| 20 | 1 | HW-F10 | X | 0 | 0 |
| | 2 | HW-F10 | 0 | 0 | X |
| 40 | 1 | HW-F10 | X | 0 | 0 |
| | 2 | HW-F10 | 0 | 0 | X |
| | 3 | HW-F10 | X | 0 | 0 |
| | 4 | HW-F10 | 0 | 0 | X |

### 2 Position Up/Down

| Circuit Number | Contact Mounting | | Position | | |
|---|---|---|---|---|---|
| | No. | | Down | Center | Up |
| 20 | 1 | HW-F10 | X | 0 | 0 |
| | 2 | HW-F10 | 0 | 0 | X |
| 40 | 1 | HW-F10 | X | 0 | 0 |
| | 2 | HW-F10 | 0 | 0 | X |
| | 3 | HW-F10 | X | 0 | 0 |
| | 4 | HW-F10 | 0 | 0 | X |

## Part Number Structure

H W 1 M - L F 0 1 0 1 20

- **Type**: blank: Standard; L: Interlocking
- **Lever Action** (up right down left): 1: Maintained; 2: Spring; 0: Blocked
- **Circuit Number**: 20 or 40 (see contact arrangement on previous page)

## Mono Lever Switches 2-Position (Sub-assembled) Part Numbers

| Contact Assembly | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock (included) to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Anti-Rotation Ring

| Style | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Operators

| Style | Description | Part Number |
|---|---|---|
| Standard | Maintained Up/Down | HW1M-1010 |
| | Spring return Up/Down | HW1M-2020 |
| | Maintained Left/Right | HW1M-0101 |
| | Spring return Left/Right | HW1M-0202 |
| Interlocking | Maintained Up/Down | HW1M-L1010 |
| | Spring return Up/Down | HW1M-L2020 |
| | Maintained Left/Right | HW1M-L0101 |
| | Spring return Left/Right | HW1M-L0202 |

### Replacement Parts

| Item | Part Number |
|---|---|
| Black Cap | HW9Z-CPM |
| Boot | HW9Z-BLM (fits standard operator only) |

# Mono Lever Switches 3- & 4-Position (Assembled)

## 3-Position

| Style | Part Number | Description |
|---|---|---|
| HW1M Standard Lever | HW1M-F0121-12N3 | Maintained right and left, spring return down |
| | HW1M-F0222-12N3 | Spring return right, down, left |
| HW1M-L Interlocking Lever | HW1M-LF0121-12N3 | Maintained right and left, spring return down |
| | HW1M-LF0222-12N3 | Spring return right, down, left |

Circuit Diagram

| Circuit Number | Contact Mounting | | Position | | | | |
|---|---|---|---|---|---|---|---|
| | No. | | Down | Left | Center | Up | Right |
| 12N3 | 1 | HW-F01 | 0 | 0 | 0 | 0 | X |
| | 2 | HW-F01 | X | 0 | 0 | 0 | 0 |
| | 3 | HW-F10 | 0 | X | 0 | 0 | 0 |

## 4-Position

| Style | Part Number | Description |
|---|---|---|
| HW1M Standard Lever | HW1M-F1111-22N9 | Maintained all positions |
| | HW1M-F1212-22N9 | Maintained up and down, spring left and right |
| | HW1M-2121-22N9 | Spring up and down, maintained left and right |
| | HW1M-2222-22N9 | Spring return all positions |
| HW1M-L Interlocking Lever | HW1M-LF1111-22N9 | Maintained all positions |
| | HW1M-LF1212-22N9 | Maintained up and down, spring left and right |
| | HW1M-LF2121-22N9 | Spring up and down, maintained left and right |
| | HW1M-LF2222-22N9 | Spring return all positions |

Circuit Diagram

| Circuit Number | Contact Mounting | | Position | | | | |
|---|---|---|---|---|---|---|---|
| | No. | | Down | Left | Center | Up | Right |
| 22N9 | 1 | HW-F01 | 0 | 0 | 0 | 0 | X |
| | 2 | HW-F01 | X | 0 | 0 | 0 | 0 |
| | 3 | HW-F10 | 0 | X | 0 | 0 | 0 |
| | 4 | HW-F10 | 0 | 0 | 0 | X | 0 |

1. All assembled part numbers in catalog include standard (HW-F...) contacts.
2. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
3. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
4. Additional contact configurations available (up to 6 total contacts).

## Part Number Structure

H W 1 M - L F 0 1 2 1 12N3

**Type**
blank: Standard
L: Interlocking

**Lever Action** (up right down left)
1: Maintained
2: Spring
0: Blocked

**Circuit Number**
3 Position: 12N3
4 Position: 22N9

## Mono Lever Switches 3 & 4-Position (Sub-assembled) Part Numbers

| Contact Assembly | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

### Contact Block Mounting Adaptor

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock (included) to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Anti-Rotation Ring

| Style | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Operators

| Style | Description | Part Number |
|---|---|---|
| Standard | Combination, 3 position | HW1M-0121 |
| | Spring return, 3 position | HW1M-0222 |
| | Maintained, 4 position | HW1M-1111 |
| | Combination, 4 position | HW1M-1212 |
| | Combination, 4 position | HW1M-2121 |
| | Spring return, 4 position | HW1M-2222 |
| Interlocking | Combination, 3 position | HW1M-L0121 |
| | Spring return, 3 position | HW1M-L0222 |
| | Maintained, 4 position | HW1M-L1111 |
| | Combination, 4 position | HW1M-L1212 |
| | Combination, 4 position | HW1M-L2121 |
| | Spring return, 4 position | HW1M-L2222 |

### Replacement Parts

| Item | Part Number |
|---|---|
| Black Cap | HW9Z-CPM |
| Boot | HW9Z-BLM (fits standard operator only) |

## Pushbutton Selectors (Assembled)

### 2-Position Pushbutton Selectors

| | | | | Operator Position | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Left | | Right | | |
| Cam | Contacts | Mounting | | Normal | Push | Normal | Push | Part Number |
| A | *Operator Only* | | | | | | | *HW1R-2A-①* |
| | 1NO-1NC | 1<br>2 | HW-F10<br>HW-F01 | 0<br>X | X<br>0 | 0<br>0 | X<br>0 | HW1R-2AF11-① |
| | 2NO | 1<br>2 | HW-F10<br>HW-F10 | 0<br>0 | X<br>X | 0<br>X | X<br>X | HW1R-2AF20-① |
| | 2NO-2NC | 1<br>2<br>3<br>4 | HW-F10<br>HW-F01<br>HW-F10<br>HW-F01 | 0<br>X<br>0<br>X | X<br>0<br>X<br>0 | 0<br>0<br>0<br>0 | X<br>0<br>X<br>0 | HW1R-2AF22-① |
| D | *Operator Only* | | | | | | | *HW1R-2D-①* |
| | 2NO | 1<br>2 | HW-F10<br>HW-F10 | 0<br>0 | X<br>0 | 0<br>0 | 0<br>X | HW1R-2DF20-① |
| | 2NO-2NC | 1<br>2<br>3<br>4 | HW-F10<br>HW-F10<br>HW-F01<br>HW-F01 | 0<br>0<br>X<br>X | X<br>0<br>0<br>X | 0<br>0<br>X<br>X | 0<br>X<br>X<br>0 | HW1R-2DF22N1-① |
| E | *Operator Only* | | | | | | | *HW1R-2E-①* |
| | 2NO-2NC | 1<br>2<br>3<br>4 | HW-F10<br>HW-F10<br>HW-F01<br>HW-F01 | 0<br>0<br>0<br>X | X<br>0<br>0<br>X | 0<br>0<br>X<br>0 | 0<br>X<br>X<br>0 | HW1R-2EF22N1-① |
| F | *Operator Only* | | | | | | | *HW1R-2F-①* |
| | 2NO-2NC | 1<br>2<br>3<br>4 | HW-F10<br>HW-F10<br>HW-F01<br>HW-F01 | 0<br>0<br>0<br>X | 0<br>X<br>0<br>0 | 0<br>0<br>X<br>0 | X<br>0<br>0<br>0 | HW1R-2FF22N1-① |
| N | *Operator Only* | | | | | | | *HW1R-2N-①* |
| | 2NO-2NC | 1<br>2<br>3<br>4 | HW-F01<br>HW-F10<br>HW-F01<br>HW-F10 | 0<br>0<br>0<br>0 | 0<br>X<br>0<br>X | X<br>0<br>X<br>0 | 0<br>X<br>0<br>X | HW1R-2NF22N2-① |
| T | *Operator Only* | | | | | | | *HW1R-2T-①* |
| | 2NO-2NC | 1<br>2<br>3<br>4 | HW-F10<br>HW-F10<br>HW-F01<br>HW-F01 | 0<br>0<br>X<br>X | X<br>X<br>0<br>0 | X<br>X<br>0<br>0 | Blocked | HW1R-2TF22N1-① |

1. All assembled part numbers in catalog include standard (HW-F...) contacts.
2. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
3. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
4. Operator only models come with operator and button.
5. Additional contact configurations available (up to 6 total contacts).

### ① Button Color Code

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |

| Color | Code |
|---|---|
| White | W |
| Yellow | Y |
| Gray | N |

## Part Number Structure

H W 1 R - 2 D F 22N1 – R

**Operator**
A: Cam A
D: Cam D
E: Cam E
F: Cam F
N: Cam N
T: Cam T

**Contact Arrangement Code**
11: 1NO-1NC
20: 2NO
(For additional contact codes see previous page)

**Button Colors**
B: Black
G: Green
R: Red
S: Blue
W: White
Y: Yellow
N: Gray

## Pushbutton Selectors (Sub-assembled)

| Contact Blocks | + | Mounting Adaptor | + | Safety Lever Lock | + | Anti-Rotation Ring | + | Operator | + | Button | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |

### Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10 | HW-F01 |
| | | HW-F10R (early make) | HW-F01R (late break) |
| | Spring-Up Terminal | HW-G10 | HW-G01 |
| | | HW-G10R (early make) | HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10 | HW-C01 |
| | | HW-C10R (early make) | HW-C01R (late break) |
| | Dummy Block | TW-DB | |

### Contact Block Mounting Adaptor
(safety lever lock included)

| Style | Part Number |
|---|---|
| | HW-CB2C |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock (included) to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

### Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

### Anti-Rotation Ring

| Style | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### Operators

| Style | Description | Part Number |
|---|---|---|
| | Cam A | HW1R-2A |
| | Cam D | HW1R-2D |
| | Cam E | HW1R-2E |
| | Cam F | HW1R-2F |
| | Cam N | HW1R-2N |
| | Cam T | HW1R-2T |

### Buttons

| Style | Part Number |
|---|---|
| Round Flush | HW1A-B1-① |

In place of ①, specify the Button Color Code from table below.

### ① Button Color Code

| Color | Code | Color | Code |
|---|---|---|---|
| Black | B | White | W |
| Green | G | Yellow | Y |
| Red | R | Gray | N |
| Blue | S | | |

# Dual Pushbutton Switches

## Key features:

- Two pushbuttons and a pilot light are integrated into one space-saving ø22 mm control unit.
- Momentary and interlock types are available for pushbuttons. Interlock type prevents both buttons from being pressed at the same time.
- Pilot lights are available in full voltage and transformer with LED or incandescent lamps.
- IP40 protection, IP65 when using silicon cover.
- UL Listed, CSA approved, and EN compliant

## Applications:

- Ideal for use as power switches and start/stop switches (available with I/ON and O/OFF markings on the buttons and a pilot light in the center).
- Interlock type prevents two pushbuttons from being pressed at the same time.

## Dual Pushbutton Switches (Assembled) Part Numbers

### Without Center Pilot Light

| Operation Type | Button Style | | Contact Arrangement | | Part Number | ④Button Color Code | ⑤Legend Code |
|---|---|---|---|---|---|---|---|
| | | | Top Button | Bottom Button | | | |
| Momentary | Flush (top) Flush (bottom) | | 1NO | 1NC | HW7D-B11F1001-④⑤ | GR: Green (top) Red (bottom) WB: White (top) Black (bottom) | Blank: Without legend 1: I/ON (top) O/OFF (bottom) |
| | | | 1NO | 1NO | HW7D-B11F1010-④⑤ | | |
| | | | 1NO-1NC | 1NO-1NC | HW7D-B11F1111-④⑤ | | |
| | | | 2NO | 2NC | HW7D-B11F2002-④⑤ | | |
| | | | 2NO | 2NO | HW7D-B11F2020-④⑤ | | |
| | Flush (top) Extended (bottom) | | 1NO | 1NC | HW7D-B12F1001-④⑤ | | |
| | | | 1NO | 1NO | HW7D-B12F1010-④⑤ | | |
| | | | 1NO-1NC | 1NO-1NC | HW7D-B12F1111-④⑤ | | |
| | | | 2NO | 2NC | HW7D-B12F2002-④⑤ | | |
| | | | 2NO | 2NO | HW7D-B12F2020-④⑤ | | |
| Interlock* | Flush (top) Flush (bottom) | | 1NO | 1NC | HW7D-B21F1001-④⑤ | | |
| | | | 1NO | 1NO | HW7D-B21F1010-④⑤ | | |
| | | | 1NO-1NC | 1NO-1NC | HW7D-B21F1111-④⑤ | | |
| | | | 2NO | 2NC | HW7D-B21F2002-④⑤ | | |
| | | | 2NO | 2NO | HW7D-B21F2020-④⑤ | | |
| | Flush (top) Extended (bottom) | | 1NO | 1NC | HW7D-B22F1001-④⑤ | | |
| | | | 1NO | 1NO | HW7D-B22F1010-④⑤ | | |
| | | | 1NO-1NC | 1NO-1NC | HW7D-B22F1111-④⑤ | | |
| | | | 2NO | 2NC | HW7D-B22F2002-④⑤ | | |
| | | | 2NO | 2NO | HW7D-B22F2020-④⑤ | | |

1. *Interlock type prevents both top and bottom buttons from being pressed simultaneously.
2. Clear silicon rubber cover part number HW9Z-D7D.
3. Additional contact configurations available (up to 6 total contacts).

## With Center Pilot Light

| Operation Type | Button Style | | Top Button | Bottom Button | Part Number |
|---|---|---|---|---|---|
| Momentary | Flush (Top)<br>Flush (Bottom) | Flush (top)<br>Flush (bottom)<br> | 1NO | 1NC | HW7D-L11F1001②③-④⑤ |
| | | | 1NO | 1NO | HW7D-L11F1010②③-④⑤ |
| | | | 1NO-1NC | 1NO-1NC | HW7D-L11F1111②③-④⑤ |
| | | | 2NO | 2NC | HW7D-L11F2002②③-④⑤ |
| | | | 2NO | 2NO | HW7D-L11F2020②③-④⑤ |
| | Flush (Top)<br>Extended (Bottom) | | 1NO | 1NC | HW7D-L12F1001②③-④⑤ |
| | | | 1NO | 1NO | HW7D-L12F1010②③-④⑤ |
| | | | 1NO-1NC | 1NO-1NC | HW7D-L12F1111②③-④⑤ |
| | | | 2NO | 2NC | HW7D-L12F2002②③-④⑤ |
| | | | 2NO | 2NO | HW7D-L12F2020②③-④⑤ |
| Interlock* | Flush (Top)<br>Flush (Bottom) | Flush (top)<br>Extended (bottom)<br> | 1NO | 1NC | HW7D-L21F1001②③-④⑤ |
| | | | 1NO | 1NO | HW7D-L21F1010②③-④⑤ |
| | | | 1NO-1NC | 1NO-1NC | HW7D-L21F1111②③-④⑤ |
| | | | 2NO | 2NC | HW7D-L21F2002②③-④⑤ |
| | | | 2NO | 2NO | HW7D-L21F2020②③-④⑤ |
| | Flush (Top)<br>Extended (Bottom) | | 1NO | 1NC | HW7D-L22F1001②③-④⑤ |
| | | | 1NO | 1NO | HW7D-L22F1010②③-④⑤ |
| | | | 1NO-1NC | 1NO-1NC | HW7D-L22F1111②③-④⑤ |
| | | | 2NO | 2NC | HW7D-L22F2002②③-④⑤ |
| | | | 2NO | 2NO | HW7D-L22F2020②③-④⑤ |

1. *Interlock type prevents both top and bottom buttons from being pressed simultaneously.
2. Clear silicon rubber cover part number HW9Z-D7D.
3. All assembled part numbers in catalog include standard (HW-F...) contacts.
4. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
5. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.

### ②Pilot Light Illumination & Voltage Code

| Full Voltage | |
|---|---|
| **Voltage** | **Code** |
| 6V AC/DC, LED | Q2 |
| 12V AC/DC, LED | Q3 |
| 24V AC/DC, LED | Q4 |
| 120V AC, LED | Q8 |
| 6V AC/DC, Incandescent | Q5* |
| 12V AC/DC, Incandescent | Q6* |
| 24V AC/DC, Incandescent | Q7* |
| **Step-Down Transformer (6V Secondary Lamp Voltage)** | |
| **Voltage** | **Code** |
| 120V AC, LED | H22 |
| 240V AC, LED | M42 |
| 480V AC, LED | T82 |
| 120V AC, Incandescent | H25* |
| 240V AC, Incandescent | M45* |
| 480V AC, Incandescent | T85* |

*Only available for White Lens Pilot Lamp.

### ③ Pilot Lamp Color Code

| Color | Code |
|---|---|
| Amber | A* |
| Green | G* |
| Red | R* |
| Blue | S* |
| White | W |

*Only available in LED illumination.

### ④Pushbutton Color Code

| Color | | Code |
|---|---|---|
| Top | Green | GR |
| Bottom | Red | |
| Top | White | WB |
| Bottom | Black | |

### ⑤Engraving Codes

| Engraving | | Code |
|---|---|---|
| No Engraving | | Blank |
| I/ON | Top | 1 |
| O/OFF | Bottom | |

## Part Number Structure

H W 7 D – L 21 F 20 20 H22 R – GR 1

**Pilot Light**
B: Without Center Pilot Light
L: With Center Pilot Light

**Button Arrangement**
11: Momentary (Flush/Flush)
12: Momentary (Flush/Extended)
21: Interlock (Flush/Flush)
22: Interlock (Flush/Extended)

**Contact Arrangement**
**Top Button**
01: 1NC 02: 2NC
10: 1NO 20: 2NO
**Bottom Button**
01: 1NC 02: 2NC
10: 1NO 20: 2NO

**Voltage Code**
blank: without center pilot light
**Full Voltage***
Q2: 6V LED
**Transformer***
H22: 120V AC LED
*For additional voltage codes, please see previous page

**Pilot Lamp Color**
A: Amber* Y: Yellow*
G: Green* blank: without center pilot light
R: Red*
S: Blue*
W: White
*Only available in LED illumination.

**Engraving Code**
blank: No Engraving
1: Top: I/ON Bottom: O/OFF

**Pushbutton Color**
GR: Top: Green Bottom: Red
WB: Top: White Bottom: Black

## Dual Pushbutton Switches (Sub-assembled) Part Numbers

| Contact Blocks | + | Mounting Adaptor | + | Safety Lever Lock | + | Operator | + | Lens | = | Completed Unit |
|---|---|---|---|---|---|---|---|---|---|---|

## Lamp Circuit Components with Fingersafe Terminals

| Style | | Description | Part Number |
|---|---|---|---|
| Lead Holder | | For use with HW-CBL on all illuminated pushbutton units. One required for each deck (pair) of contacts. | HW-LH3 |
| Dummy Block with Full Voltage Adaptor | | For use with odd number of contacts. | HW-DA1FB |
| Full Voltage Adaptor | | For use with even number of contacts. | TW-DA1FB |
| Transformer Unit (6V secondary voltage) | | 120VAC<br>240VAC<br>480VAC | TW-F126B<br>TW-F246B<br>TW-F486B |

Exposed and spring up terminals also available.

## Operators

| Style | | Button | Part Number |
|---|---|---|---|
| Momentary | | Flush (top) | HW7D-*11④-⑤ |
| | | Flush (bottom) | |
| | | Flush (top) | HW7D-*12④-⑤ |
| | | Extended (bottom) | |
| Interlock | | Flush (top) | HW7D-*21④-⑤ |
| | | Flush (bottom) | |
| | | Flush (top) | HW7D-*22④-⑤ |
| | | Extended (bottom) | |

Instead of * insert:
B: Non-illuminated
L: Illuminated

### ④Pushbutton Color Code

| Color | | Code | Color | | Code |
|---|---|---|---|---|---|
| Top | Green | GR | Top | White | WB |
| Bottom | Red | | Bottom | Black | |

## Contact Blocks

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Standard Fingersafe (IP20) | HW-F10<br>HW-F10R (early make) | HW-F01<br>HW-F01R (late break) |
| | Dummy Block | TW-DB | |

| Style | Contacts | 1NO | 1NC |
|---|---|---|---|
| | Spring-Up Terminal | HW-G10<br>HW-G10R (early make) | HW-G01<br>HW-G01R (late break) |
| | Exposed Screw Terminal | HW-C10<br>HW-C10R (early make) | HW-C01<br>HW-C01R (late break) |

## Contact Block Mounting Adaptor

| Style | | Part Number |
|---|---|---|
| | Non-illuminated | HW-CB2C |
| | Illuminated (with Pilot Light) | HW-CBL |

1. Used to mount contact blocks to operator (first pair only).
2. IDEC strongly recommends using the safety lever lock (included) to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

## Safety Lever Lock

| Style | Part Number |
|---|---|
| | HW9Z-LS |

## Anti-Rotation Ring

| Appearance | Part Number |
|---|---|
| | HW9Z-RL |

Use with notched panel cutout to prevent unit rotation.

### ⑤Engraving Codes

| Engraving | | Code |
|---|---|---|
| No Engraving | | Blank |
| I/ON | Top | 1 |
| O/OFF | Bottom | |

## Lamps/Lens

| Style | | Voltage | Part Number |
|---|---|---|---|
| | LED | 6V AC/DC | LSTD-6② |
| | | 12V AC/DC | LSTD-1② |
| | | 24V AC/DC | LSTD-2② |
| | | 120V AC | LSTD-H2② |
| | | 240V AC | LSTD-M4② |
| | Incandescent | 6V AC/DC | IS-6 |
| | | 12V AC/DC | IS-12 |
| | | 24V AC/DC | IS-24 |
| Non-illuminated | | | HW9Z-B7B |
| Illuminated | | | HW9Z-L7W |

1. In place of ②, specify the LED Color Code.
2. The LED contains a current-limiting resistor and reverse polarity protection diodes.

### ②LED Color Code

| Color | Code | Color | Code |
|---|---|---|---|
| Amber | A* | Blue | S* |
| Green | G* | White | W |
| Red | R* | | |

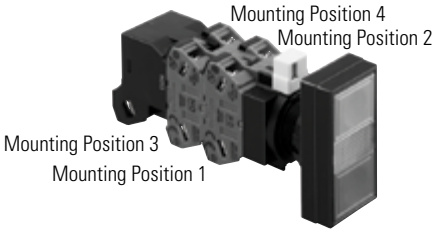
Only for LED illumination.

## Contact Arrangement Chart

| Contact Arrangement | | | Contact Block | | Top Button | | Bottom Button | |
|---|---|---|---|---|---|---|---|---|
| Top Button | Bottom Button | Contact Code | Mounting Position | Type | Normal | Push | Normal | Push |
| 1NO | 1NO | 1010 | 1 | NO | | X | | |
| | | | 2 | NO | | | | X |
| 1NO | 1NC | 1001 | 1 | NO | | X | | |
| | | | 2 | NC | | | X | |
| 1NC | 1NO | 0110 | 1 | NC | X | | | |
| | | | 2 | NO | | | | X |
| 1NC | 1NC | 0101 | 1 | NC | X | | | |
| | | | 2 | NC | | | X | |
| 1NO | 2NO | 1020 | 1 | NO | | X | | |
| | | | 2 | NO | | | | X |
| | | | 3 | Dummy | | | | |
| | | | 4 | NO | | | | X |
| 1NO | 1NO-1NC | 1011 | 1 | NO | | X | | |
| | | | 2 | NO | | | | X |
| | | | 3 | Dummy | | | | |
| | | | 4 | NC | | | X | |
| 1NO | 2NC | 1002 | 1 | NO | | X | | |
| | | | 2 | NC | | | X | |
| | | | 3 | Dummy | | | | |
| | | | 4 | NC | | | X | |
| 1NC | 2NO | 0120 | 1 | NC | X | | | |
| | | | 2 | NO | | | | X |
| | | | 3 | Dummy | | | | |
| | | | 4 | NO | | | | X |
| 1NC | 1NO-1NC | 0111 | 1 | NC | X | | | |
| | | | 2 | NO | | | | X |
| | | | 3 | Dummy | | | | |
| | | | 4 | NC | | | X | |
| 1NC | 2NC | 0102 | 1 | NC | X | | | |
| | | | 2 | NC | | | X | |
| | | | 3 | Dummy | | | | |
| | | | 4 | NC | | | X | |
| 2NO | 1NO | 2010 | 1 | NO | | X | | |
| | | | 2 | NO | | | | X |
| | | | 3 | NO | | X | | |
| | | | 4 | Dummy | | | | |
| 2NO | 1NC | 2001 | 1 | NO | | X | | |
| | | | 2 | NC | | | X | |
| | | | 3 | NO | | X | | |
| | | | 4 | Dummy | | | | |
| 1NO-1NC | 1NO | 1110 | 1 | NO | | X | | |
| | | | 2 | NO | | | | X |
| | | | 3 | NC | X | | | |
| | | | 4 | Dummy | | | | |
| 1NO-1NC | 1NC | 1101 | 1 | NO | | X | | |
| | | | 2 | NC | | | X | |
| | | | 3 | NC | X | | | |
| | | | 4 | Dummy | | | | |

1. Transformers can have two or four contact blocks only.
2. Contact blocks 1 and 3 are actuated by the top button. Contact blocks 2 and 4 are actuated by the bottom button.

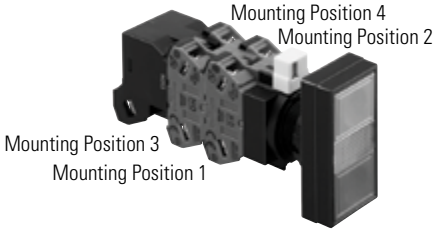
## Contact Block Mounting Position Example



## Contact Arrangement Chart (con't)

| Contact Arrangement | | | Contact Block | | Top Button | | Bottom Button | |
|---|---|---|---|---|---|---|---|---|
| Top Button | Bottom Button | Contact Code | Mounting Position | Type | Normal | Push | Normal | Push |
| 2NC | 1NO | 0210 | 1 | NC | X | | | |
| | | | 2 | NO | | | | X |
| | | | 3 | NC | X | | | |
| | | | 4 | Dummy | | | | |
| 2NC | 1NC | 0201 | 1 | NC | X | | | |
| | | | 2 | NC | | | X | |
| | | | 3 | NC | X | | | |
| | | | 4 | Dummy | | | | |
| 2NO | 2NO | 2020 | 1 | NO | | X | | |
| | | | 2 | NO | | | | X |
| | | | 3 | NO | | X | | |
| | | | 4 | NO | | | | X |
| 2NO | 1NO-1NC | 2011 | 1 | NO | | X | | |
| | | | 2 | NO | | | | X |
| | | | 3 | NO | | X | | |
| | | | 4 | NC | | | X | |
| 2NO | 2NC | 2002 | 1 | NO | | X | | |
| | | | 2 | NC | | | X | |
| | | | 3 | NO | | X | | |
| | | | 4 | NC | | | X | |
| 1NO-1NC | 2NO | 1120 | 1 | NO | | X | | |
| | | | 2 | NO | | | | X |
| | | | 3 | NC | X | | | |
| | | | 4 | NO | | | | X |
| 1NO-1NC | 1NO-1NC | 1111 | 1 | NO | | X | | |
| | | | 2 | NO | | | | X |
| | | | 3 | NC | X | | | |
| | | | 4 | NC | | | X | |
| 1NO-1NC | 2NC | 1102 | 1 | NO | | X | | |
| | | | 2 | NC | | | X | |
| | | | 3 | NC | X | | | |
| | | | 4 | NC | | | X | |
| 2NC | 2NO | 0220 | 1 | NC | X | | | |
| | | | 2 | NO | | | | X |
| | | | 3 | NC | X | | | |
| | | | 4 | NO | | | | X |
| 2NC | 1NO-1NC | 0211 | 1 | NC | X | | | |
| | | | 2 | NO | | | | X |
| | | | 3 | NC | X | | | |
| | | | 4 | NC | | | X | |
| 2NC | 2NC | 0202 | 1 | NC | X | | | |
| | | | 2 | NC | | | X | |
| | | | 3 | NC | X | | | |
| | | | 4 | NC | | | X | |

## Contact Block Mounting Position Example



# Contactor Reset Button

## Reset Buttons (Assembled)

| | Plastic Bezel | Metal Bezel |
|---|---|---|
| (Blank) | HW1B-M1RS-①T | HW4B-M1RS-①T |
| Engraved "R" | HW1B-M1RS-①T-ENG-R | HW4B-M1RS-①T-ENG-R |

1. In place of ① specify Button Color Code.
2. 130mm (5.1") overall length.
3. 16mm flat base for easy alignment

### ① Button Color Code

| Color | Code | Color | Code |
|---|---|---|---|
| Black | B | White | W |
| Green | G | Yellow | Y |
| Red | R | Gray | N |
| Blue | S | | |

## Contactor Reset Button (Sub-assembled)

| Rod | + | Operator | + | Button | = | Completed Unit |
|---|---|---|---|---|---|---|
| | | | | | | |

## Rod

| Style | Part Number |
|---|---|
| | HW9Z-RS-TK2141 |

## Operator

| Style | Plastic | Metal |
|---|---|---|
| | HW1B-MO | HW4B-MO |

## Button

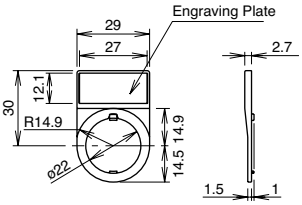
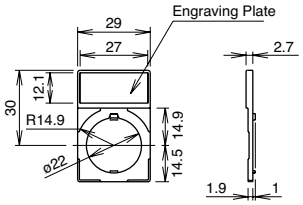
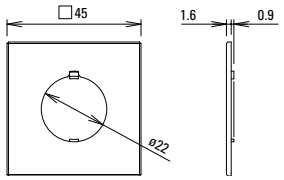
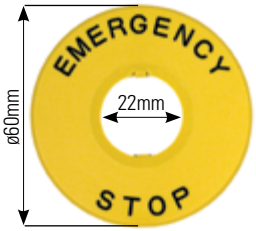
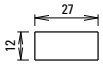
| Style | Part Number |
|---|---|
| | HW1A-B1-① |

In place of ①, specify the Button Color Code from table.

### ① Button Color Code

| Color | Code | Color | Code |
|---|---|---|---|
| Black | B | White | W |
| Green | G | Yellow | Y |
| Red | R | Gray | N |
| Blue | S | | |

## Nameplates - HW Series

| | HWAM–Black Plastic | HWAQ–Black Plastic | HWAS–Black Plastic | HWAV–Yellow Plastic |
|---|---|---|---|---|
| |  |  |  |  |
| Nameplate (blank engraving plate included) | HWAM-0B | HWAQ-0B | HWAS-0B | HWAV-0<br>HWAV5-0† |
| Nameplate (engraved) | HWAM-① | HWAQ-① | HWAS-① | HWAV-27*<br>HWAV5-27† |
| Additional Insert (blank) | HWNP-0 | HWNP-0 | HWNP Dimensions  | |
| Additional Insert (engraved) | HWNP-① | HWNP-① | | |

1. In place of ①, insert either the standard legend code from table below or custom engraving delimited by " ".
2. Standard engravings are available at no charge.
3. * HWAV-27 comes engraved "Emergency Stop" as shown in drawing.
4. † HWAV5-27 and HWAV5-0 for 60mm diameter E-Stops (80mm diameter nameplate).

### Standard Legend Codes

| Pushbuttons | | | | Pushbuttons/Selector Switches | | | | Selector Switches | |
|---|---|---|---|---|---|---|---|---|---|
| Legend | Code | Legend | Code | Legend | Code | Legend | Code | Legend | Code |
| AUTO | 101 | OPEN | 116 | AUTO-MAN | 201 | REV-FOR | 216 | AUTO-MAN-OFF | 301 |
| CLOSE | 102 | OUT | 117 | CLOSE-OPEN | 202 | RUN-JOG | 217 | AUTO-OFF-MAN | 302 |
| DOWN | 103 | RAISE | 118 | DOWN-UP | 203 | RUN-SAFE | 218 | CLOSE-OFF-OPEN | 303 |
| EMERG.STOP | 104 | RESET | 119 | FAST-SLOW | 204 | SAFE-RUN | 219 | DOWN-OFF-SLOW | 304 |
| FAST | 105 | REVERSE | 120 | FOR-REV | 205 | SLOW-FAST | 220 | FAST-OFF-SLOW | 305 |
| FORWARD | 106 | RUN | 121 | HAND-AUTO | 206 | START-STOP | 221 | FOR-OFF-REV | 306 |
| HAND | 107 | SLOW | 122 | HIGH-LOW | 207 | STOP-START | 222 | LEFT-OFF-RIGHT | 307 |
| HIGH | 108 | START | 123 | JOG-RUN | 208 | UP-DOWN | 223 | LOWER-OFF-RAISE | 308 |
| IN | 109 | STOP | 125 | LEFT-RIGHT | 209 | OI (Int'l OFF ON) | 250 | OFF-MAN-AUTO | 309 |
| INCH | 110 | TEST | 126 | LOWER-RAISE | 210 | | | OFF-SLOW-FAST | 310 |
| JOG | 111 | UP | 127 | MAN-AUTO | 211 | | | OFF-1-2 | 311 |
| LOW | 112 | I (Int'l On) | 150 | OFF-ON | 212 | | | OPEN-OFF-CLOSE | 312 |
| LOWER | 113 | O (Int'l Off) | 151 | ON-OFF | 213 | | | SLOW-OFF-FAST | 313 |
| OFF | 114 | EMO | 152 | OPEN-CLOSE | 214 | | | SUMMER-OFF-WINTER | 314 |
| ON | 115 | | | RAISE-LOWER | 215 | | | UP-OFF-DOWN | 315 |
| | | | | | | | | 1-OFF-2 | 316 |
| | | | | | | | | HAND-OFF-AUTO | 317 |

1. To order engraved nameplates, add legend code to nameplate part number.
2. Character height based on the number of characters and size of nameplate. Standard character size is 3/16".
3. Nameplates with standard legends are the same list price as blank nameplates.
4. Nameplates have built-in anti-rotation feature for use with notched panel cut-outs. Additional anti-rotation ring (HW9Z-RL) is not necessary.

# Nameplates Order Form — HW Series

Copy this order form and use it to specify Letter Height, Custom Engravings, Location of Engraving on Nameplate, and Quantity Desired.

To ensure engraving accuracy, fax it to your IDEC representative or Distributor.

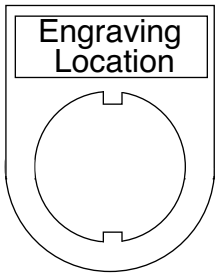
Your Company: _____ IDEC Rep/Distributor Contact: _____

Name: _____ PO number (if known): _____

Telephone: _____ IDEC Rep/Distributor Phone: _____

Fax & Email: _____ IDEC Rep/Distributor Fax & Email: _____

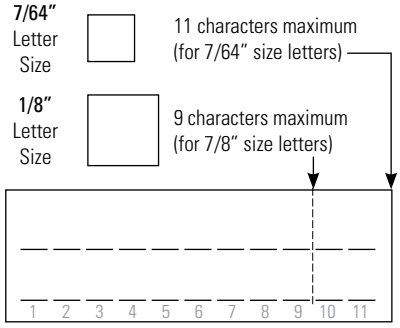
## HWAM Nameplate




**Step 1.**
**Choose Letter Size - 7/64" or 1/8".**
Check the box for the letter size you want. Then write your lettering in box below the check boxes. Note: 1/8" size letters cannot exceed 9 characters.

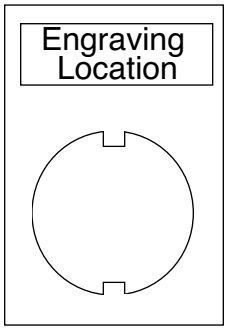
**Step 2.**
**Specify Quantity.**
Enter the number of nameplates desired in the box on the right.

Qty




Sample Letter Sizes
7/64" Letters: A B C D
1/8" Letters: A B C D

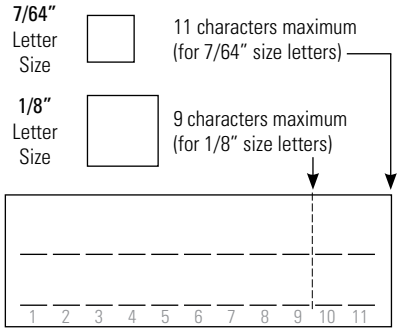
## HWAQ Nameplate




**Step 1.**
**Choose Letter Size - 7/64" or 1/8".**
Check the box for the letter size you want. Then write your lettering in box below the check boxes. Note: 1/8" size letters cannot exceed 9 characters.

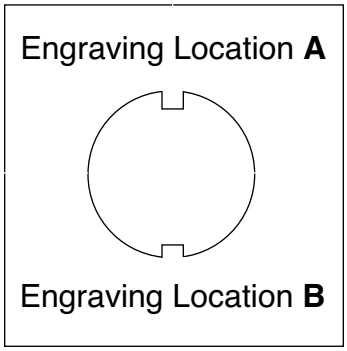
**Step 2.**
**Specify Quantity.**
Enter the number of nameplates desired in the box on the right.

Qty




Sample Letter Sizes
7/64" Letters: A B C D
1/8" Letters: A B C D

## HWAS Nameplate



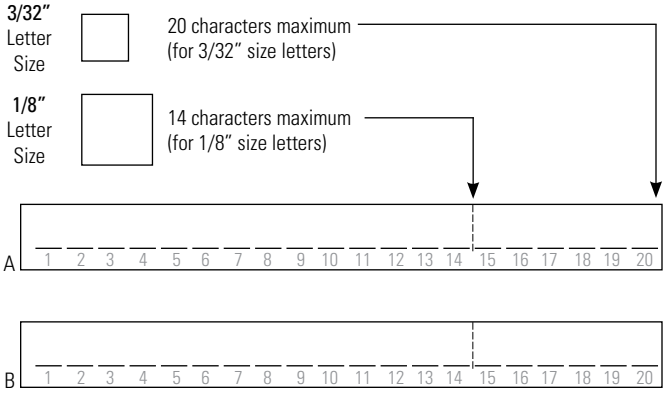

**Step 1.**
**Choose Letter Size - 3/32" or 1/8".**
Check the box for the letter size you want. Then write your lettering in box below the check boxes. Note: 1/8" size letters cannot exceed 14 characters.

**Step 2.**
**Specify Quantity.**
Enter the number of nameplates desired in the box on the right.

Qty

**Step 3.**
**Specify Location.**
Enter the location of engraving (A or B or Both), in box on the right.

Location




Sample Letter Sizes
3/32" Letters: A B C D
1/8" Letters: A B C D

## Switch Engraving Order Form – HW Series

Copy this order form and use it to specify Letter Height, Maximum Number of Lines and Text to be engraved.

To ensure engraving accuracy, fax it to your IDEC representative or Distributor.

Your Company: _____ Telephone: _____

Name: _____ Fax: _____

Address: _____ Email: _____

PO: _____ Part Number to be Engraved: _____

Please check one of the boxes below to indicate your choice of engraving options:

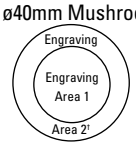
Square Switch

| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 5/32 | 5 |
| ☐ | | 1/8 | 6 |
| ☐ | 2 | 5/32 | 5 |
| ☐ | | 1/8 | 6 |
| ☐ | 3 | 1/8 | 6 |
| ☐ | 4 | 3/32 | 5 |

Round Switch

| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 5/32 | 5 |
| ☐ | | 1/8 | 5 |
| ☐ | 2 | 5/32 | 5 |
| ☐ | | 1/8 | 6 |
| ☐ | 3 | 1/8 | 5 |
| ☐ | 4 | 3/32 | 5 |

ø29mm, ø40mm Mushroom Head




| | | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|---|
| ☐ | Engraving Area 1 | 1 | 5/32 | 5 |
| ☐ | | | 1/8 | 5 |
| ☐ | Engraving Area 2 | 1 | 5/32 | 7 |
| ☐ | | | 1/8 | 7 |

1. Above mentioned specifications hold true for standard size pushbuttons (round and square).
2. †Engraving Area 2 can be engraved for 40mm mushroom Head non-Illuminated push button only.
3. Engraving is done on the button itself for non-Illuminated push buttons and on marking plate for illuminated push buttons and pilot lights.
4. Please enter text exactly how you want it engraved, take care to emphasize capital or small letters.

Enter text to be engraved:

Line 1: _____

Line 2: _____

Line 3: _____

Line 4: _____

**Sample Letter Sizes**

1/8 Letters: OPEN

5/32 Letters: OPEN

For IDEC Internal Use Only:

Work Order #: _____

## Accessories

| Item | Appearance | Description/Usage | Part Number | |
|---|---|---|---|---|
| Locking Ring Wrench | | Metallic tool used to tighten the plastic locking ring when installing the HW series in a panel | MW9Z-T1 | |
| Lamp/LED Removal Tool | | Rubber tool makes lamp/LED removal easier. | OR-55 | |
| Anti-Rotation Ring | | Prevents rotation of switches in panel. (included with all assembled switches except pilot lights) | for notched panel cutout (standard) | HW9Z-RL |
| | | | for round panel cutout | LW9Z-L |
| Rubber Mounting Hole Plug | | Black rubber plug fills unused 7/8" mounting holes in panel. | OB-31 | |
| Metallic Mounting Hole Plug | | For plugging unused 7/8" mounting holes in the panel. Tighten the attached locking ring to a torque of 12 kfg-cm maximum<br>Degree of protection: IP66 | LW9Z-BM | |
| Barrier | | To prevent contact between adjacent lead wires when buttons or switches are tightly mounted close together. | HW-VL1 | |
| Pushbutton Clear Boot | | Used to cover and protect pushbuttons<br>Operating temperature: –50 to +60°C | Flush Pushbuttons | OC-31 |
| | | | Extended Pushbuttons | OC-32 |
| Padlock Cover | | Plastic hinged padlockable cover to protect pushbuttons or selector switches. (Not intended for E-Stops)<br>Degree of protection: IP65 | HW9Z-KL1 | |
| Tab Terminal Adapter | | Tab #250 (6.35 x 0.8mm): Single tab | TW-FA1 | |
| Mounting Adaptor | | Used to mount round HW series (except Jumbo Mushroom, unibody, and square units) into a larger panel cut-out. (includes both pieces) 22 to 30mm | HW9Z-A30 | |
| | | 22 to 25mm | HW9Z-A25 | |
| Replacement Safety Lever Lock | | Used to prevent contact mounting lever from moving due to heavy vibration or panel maintenance. | HW9Z-LS | |
| Reset Rod for Contactors Overload | | 5" rod used with HW1B-M0. | HW9Z-RS-TK2141 | |
| Replacement Operator Washer | | Provided with operator. Insert between bezel and locking ring. | HWM-WASHER | |
| Replacement Locking Ring | | Plastic locking nut comes with all HW operators & assemblies. | Standard (plastic) | HW9Z-LN |
| | | | Optional (metal) | HW9Z-LNM |
| Switch Cover (Square) | | Used only with round or square flush pushbuttons. | HW9Z-K1 (spring return)<br>HW9Z-K11 (maintained cover) | |
| Replacement Keys | | Pair of Keys (#231) | HW9Z-SKP | |

| Item | Appearance | Description/Usage | Part Number |
|---|---|---|---|
| Replacement Lens | | HW Illuminated Unibody Replacement Lens | HWLV-LENSR |
| Replacement Jumbo Dome Lens | | Polycarbonate Replacement Lens<br>(If using yellow lens, use white LED.) | HW1A-P5①<br>① = (A, G, R, S, W, Y)) |
| Replacement Jumbo LED Diffusing Lens | | | HW9Z-PP5C |
| Replacement LED Lamps for HW Jumbo Dome | | Replacement LED Lamp - applicable for jumbo pilot lights only | LSTDB-2①<br>① = (A, G, R, S, W) |
| Rubber Cover for Dual Pushbuttons | | Clear Silicon rubber cover | HW9Z-D7D |
| Barrier for Dual Pushbuttons | | Plastic barrier. Used when mounting the HW7 units on 30mm horizontal centers, to prevent possible interconnections between adjoining terminals. | HW-VG1 |
| EMO Sticker | | Emergency stop nameplate sticker | HW9Z-EMO-NP-TK2120 |

## E-Stop Shrouds

| Style | Part Numbers | E-Stop Types | Applicable Standards |
|---|---|---|---|
| | HW9Z-KG1 | 40mm<br>Mushroom Head | SEMI S2-0703,<br>12.5.1 Compliant |
| | HW9Z-KG2 | 40mm,<br>and 60mm<br>Mushroom Head | SEMI S2-0703, 12.5.1 &<br>SEMATECH Compliant |

| Style | Part Numbers | E-Stop Types | Applicable Standards |
|---|---|---|---|
| | HW9Z-KG3 | 40mm<br>Mushroom Head | SEMI S2 Compliant<br>(Approved by TUV) |
| | HW9Z-KG4 | 40mm<br>Mushroom Head | SEMI S2 Compliant<br>(Approved by TUV)<br>& SEMATECH |

## Contact Assemblies

### Standard Contact Assemblies

For use with Non-Illuminated Pushbuttons & E-Stops

| Style | Contacts | Part Number |
|---|---|---|
| Standard Fingersafe Contacts<br> | 1NO | HW-CBF10 |
| | 1NC | HW-CBF01 |
| | 1NO/1NC | HW-CBF11 |
| | 2NO | HW-CBF20 |
| | 2NC | HW-CBF02 |
| | 2NO/2NC | HW-CBF22 |
| Spring Up Terminal Contacts<br> | 1NO | HW-CB10 |
| | 1NC | HW-CB01 |
| | 1NO/1NC | HW-CB11 |
| | 2NO | HW-CB20 |
| | 2NC | HW-CB02 |
| | 2NO/2NC | HW-CB22 |

Gold contact option is available for spring-up terminals. Add suffix "MAU" to end of part number. For example, HW-CB20 becomes HW-CB20-MAU.

### Full Voltage Contact Assemblies

For use with Illuminated Pushbuttons.

| Style | Contacts | Part Number |
|---|---|---|
| | 1NO | HW-FL10Q0 |
| | 2NO | HW-FL20Q0 |
| | 1NO/1NC | HW-FL11Q0 |
| | 1NC | HW-FL01Q0 |
| | 2NC | HW-FL02Q0 |

Order lamp separately.

## Transfomer Contact Assemblies

For use with Illuminated Pushbuttons.

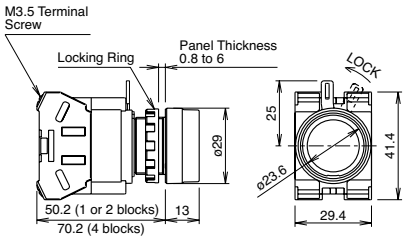
| Style | | Contacts | Part Number |
|---|---|---|---|
| | 120V AC with LED | 1NO | HW-FL10H2-② |
| | | 2NO | HW-FL20H2-② |
| | | 1NC | HW-FL01H2-② |
| | | 1NO/1NC | HW-FL11H2-② |
| | 240V AC with LED | 1NO | HW-FL10M4-② |
| | | 2NO | HW-FL20M4-② |
| | | 1NC | HW-FL01M4-② |
| | | 1NO/1NC | HW-FL11M4-② |
| | 480V AC with LED | 1NO | HW-FL10T8-② |
| | | 2NO | HW-FL20T8-② |
| | | 1NC | HW-FL01T8-② |
| | | 1NO/1NC | HW-FL11T8-② |
| | 120V AC with Incandescent | 1NO | HW-FL10H2 |
| | | 2NO | HW-FL20H2 |
| | | 1NC | HW-FL01H2 |
| | | 1NO/1NC | HW-FL11H2 |
| | 240V AC with Incandescent | 1NO | HW-FL10M4 |
| | | 2NO | HW-FL20M4 |
| | | 1NC | HW-FL01M4 |
| | | 1NO/1NC | HW-FL11M4 |

1. In place of ②, specify the LED Color Code.
   ② = A, G, R, S, or W
2. 6V LED or incandescent lamp included.

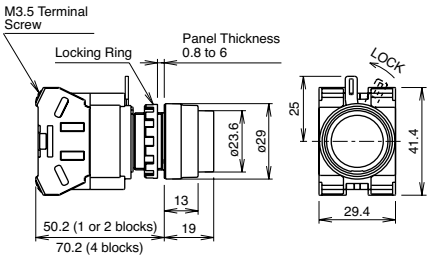
## Dimensions (mm)

### Non-Illuminated Pushbuttons

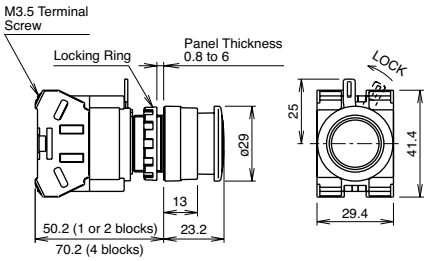
Flush (HW1B-M1, -A1)



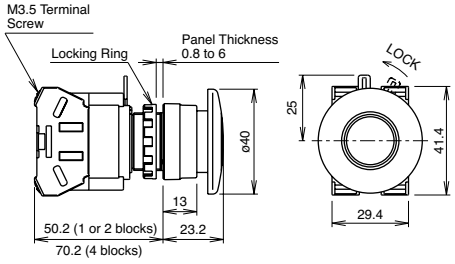

Extended (HW1B-M2, -A2)



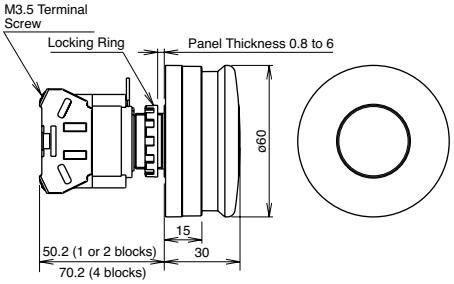

ø29mm Mushroom (HW1B-M3 -A3)



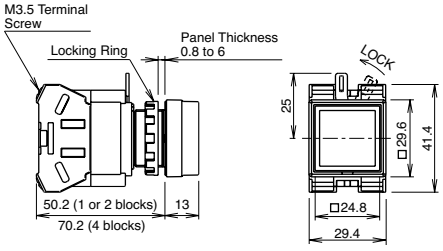

ø40mm Mushroom (HW1B-M4, -A4)



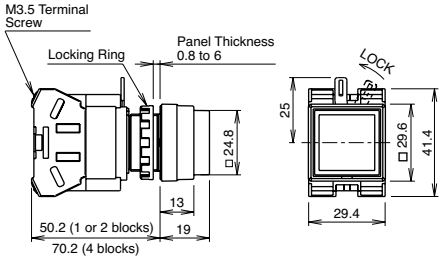

ø60mm Mushroom (HW1B-M5)



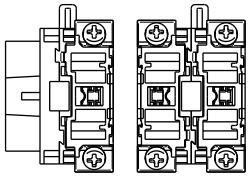

Square Flush (HW2B-M1, -A1)




Square Extended (HW2B-M2, -A2)

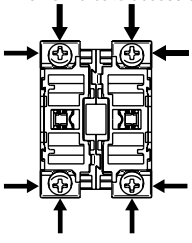



Contact Block (Bottom View)




Terminal Wiring

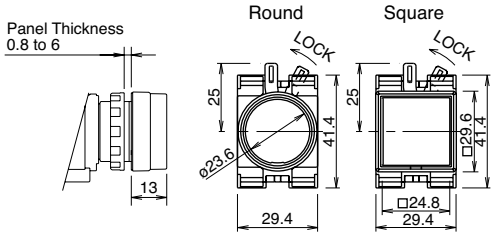
Arrows indicate access directions for wiring



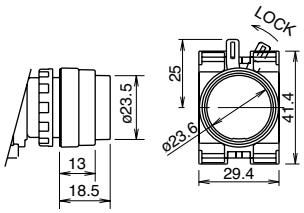
## Operators

Dimensions (mm)

### Flush (Round & Square)

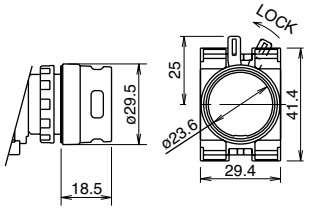



### Extended

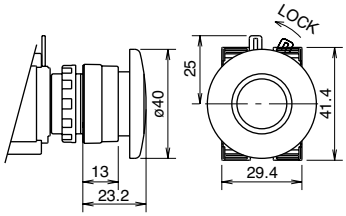



Extended

### Extended with Full Shroud



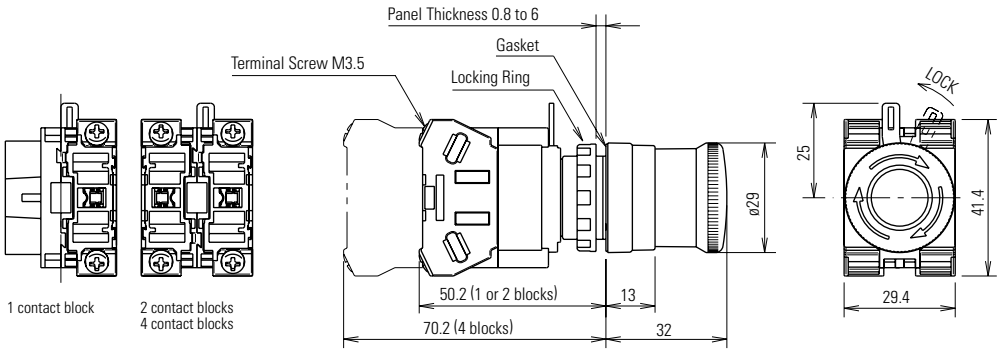

### ø40mm Mushroom



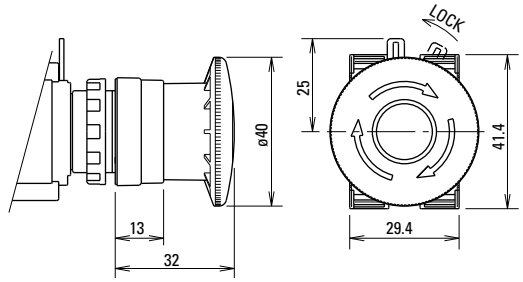

## Emergency Stop Pushbuttons

Dimensions (mm)

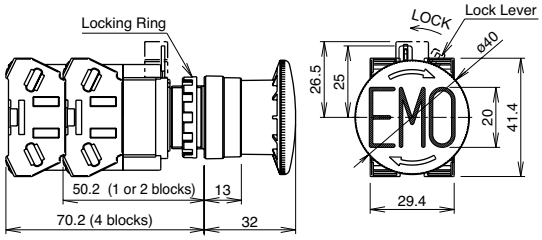
### ø29mm Head Pushlock Turn Reset (HW1B-V3)



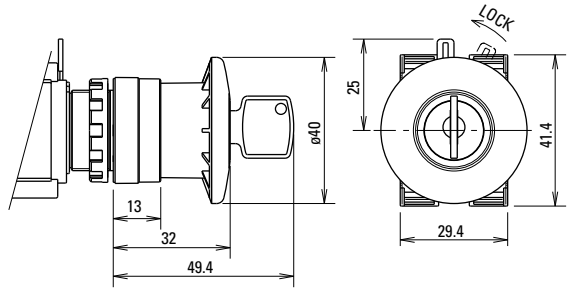

### ø40mm Head Pushlock Turn Reset (HW1B-V4)



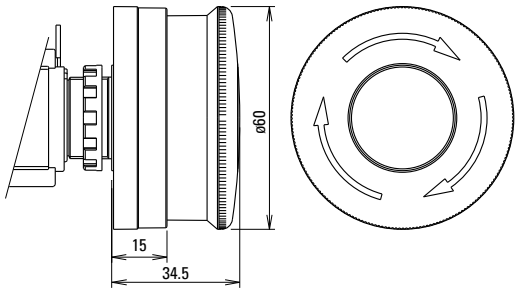

### ø40mm Head EMO Pushlock Turn Reset (HW1B-V4)



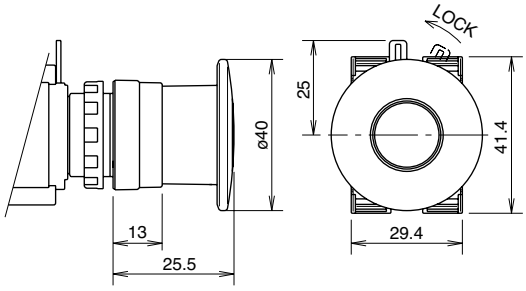

### ø40mm Head Pushlock Key Reset (HW1B-X4)



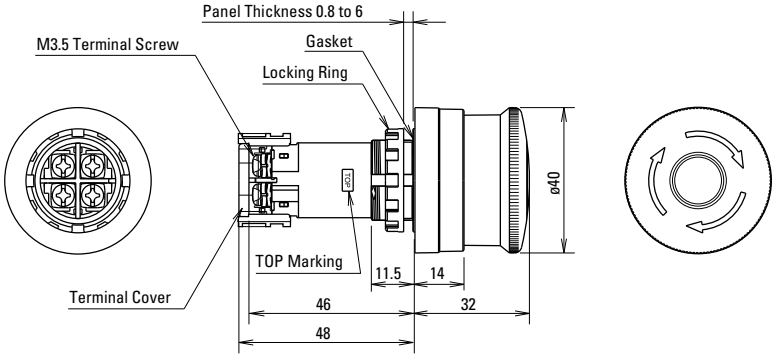

### ø60mm Head Pushlock Turn Reset (HW1B-V5)



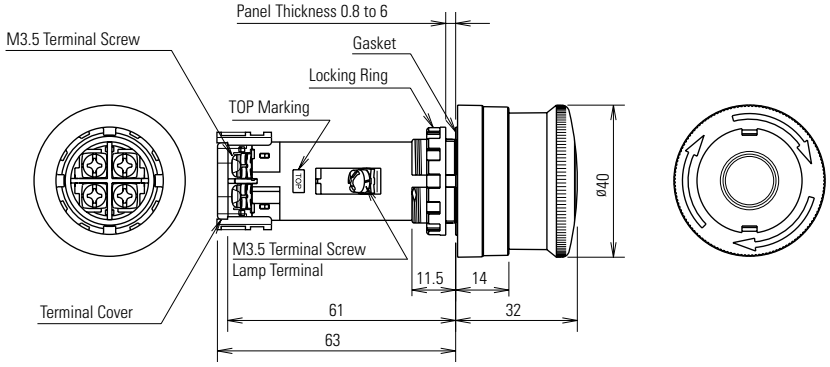
ø40mm Head Push-Pull (HW1B-Y2)



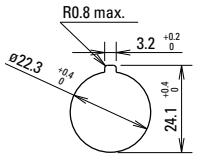

ø40mm Head Unibody Pushlock Turn Reset (HW1B-BV4)




Illuminated E-Stop Pushbuttons (HW1E-LV4)




Mounting Hole

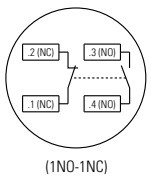



The minimum mounting centers shown below are applicable to E-Stop switches with one layer of contact blocks (two contact blocks). When two layers of contact blocks are mounted, determine the minimum mounting centers for ease of wiring.

| Unit | Vertical Spacing | Horizontal Spacing |
|---|---|---|
| HW1B-V3<br>HW1B-V4<br>HW1B-X4<br>HW1B-Y2 | 50 mm | 50 mm |
| HW1B-V5 | 60 mm | 60 mm |

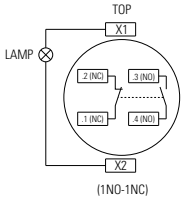
Terminal Arrangement (Bottom View)

HW1E-BV4




(1NO-1NC)

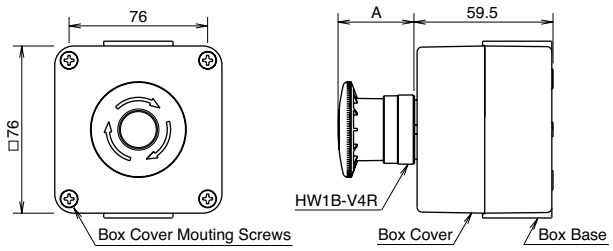
HW1E-LV4




(1NO-1NC)

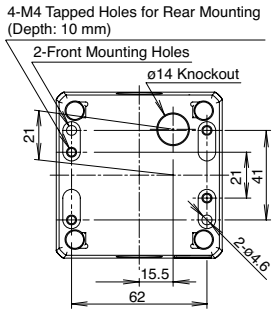
**Emergency Stop Stations**

Dimensions (mm)




| Operator | Dimension A (mm) |
|---|---|
| Pushlock Turn Reset | 32 |
| Pushlock Key Reset | 32 (Key inserted: 49.4) |
| Push Pull | 25.5 |

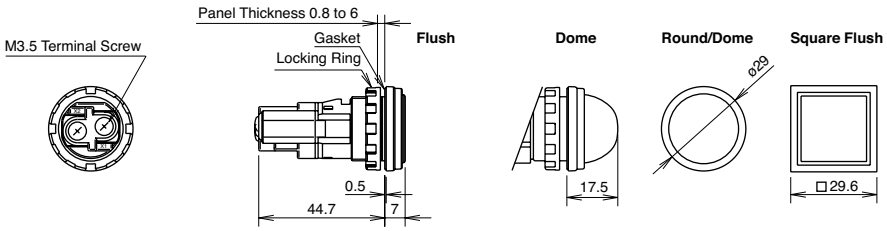
Mounting Hole Layout



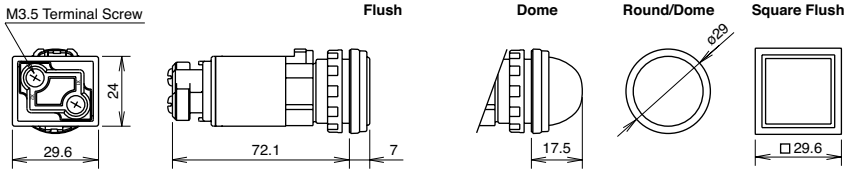

## Pilot Lights

Dimensions (mm)

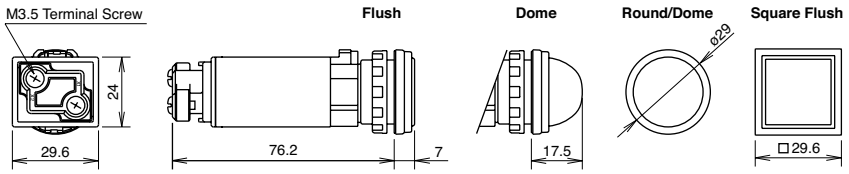
Full Voltage




Transformer

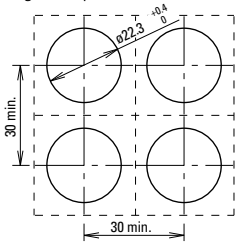



DC-DC Converter



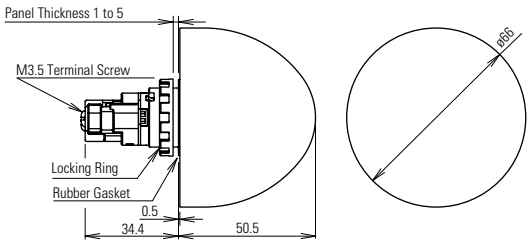

Mounting Hole Layout

Close mounting on 30mm centers
Degree of protection: IP65

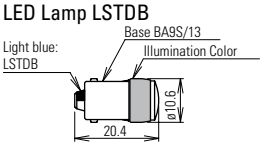



When mounting transformer or DC-DC converter type units on 30mm centers vertically and horizontally, keep the ambient temperature below 40°C.

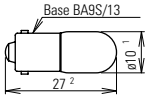
## Jumbo Dome Pilot Lights



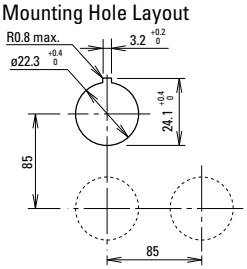

LED Lamp LSTDB




Incandescent Lamp LSB




Mounting Hole Layout



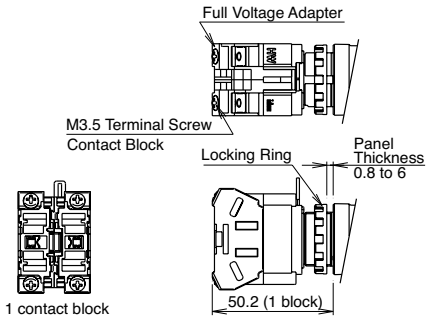

## Illuminated Pushbuttons

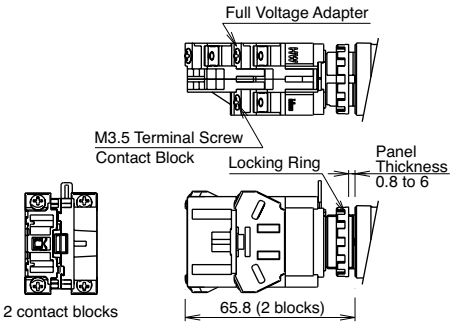
Full Voltage Models

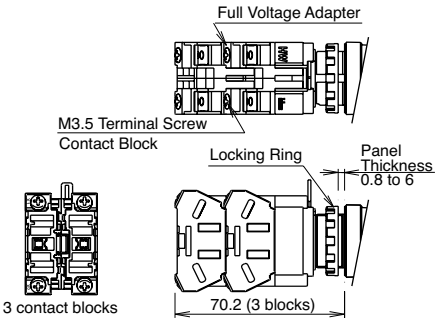
1 Contact Block

2 Contact Blocks

3 Contact Blocks



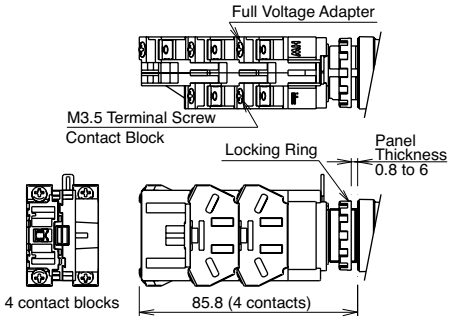




**Illuminated Pushbuttons con't**

Dimensions (mm)

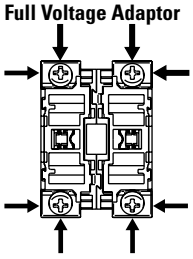
4 Contact Blocks



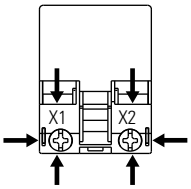

Terminal Wiring

Arrows indicate access directions for wiring.

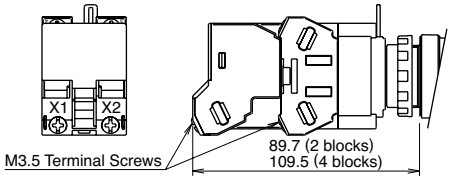
**Contact Block**
**Full Voltage Adaptor**



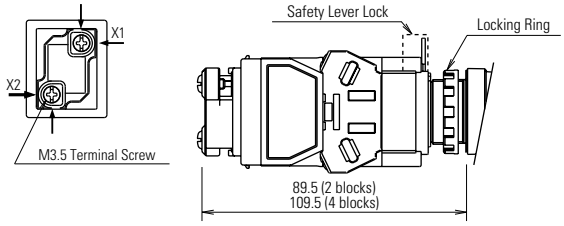
**Transformer**




Transformer Models




DC-DC Converter Models

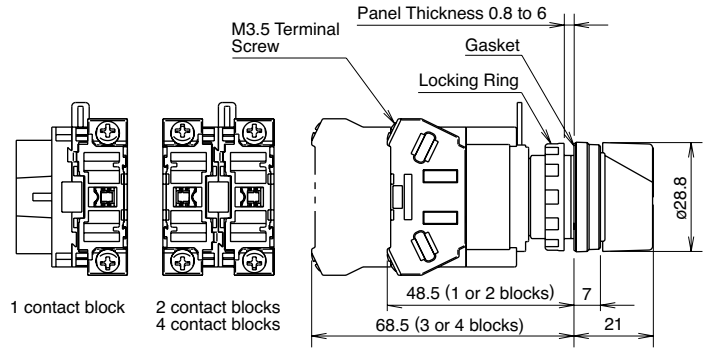



**Non-Illuminated Selector & Key Switches**

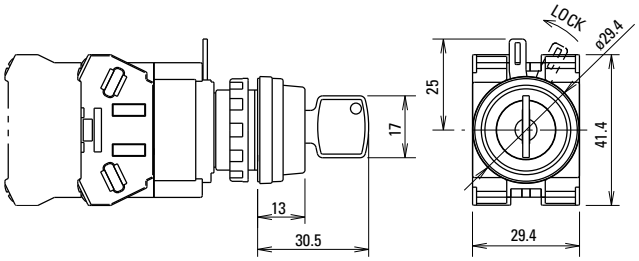
Dimensions (mm)

Knob Operator

Terminal Wiring

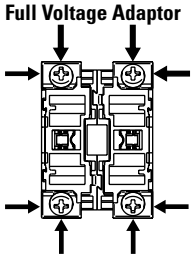



Key Operator

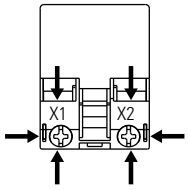



Arrows indicate access directions for wiring.

**Contact Block**
**Full Voltage Adaptor**

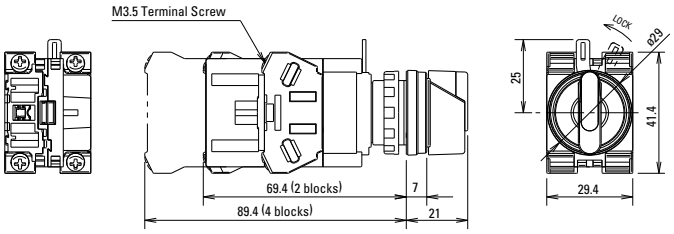


**Tranformer**

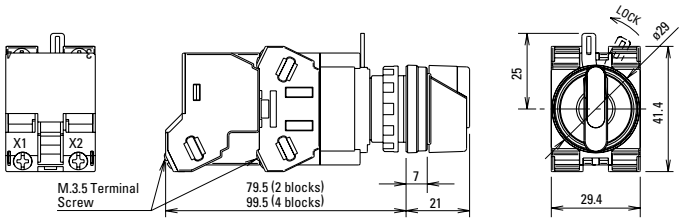



**Illuminated Selector Switches**

Full Voltage Model




Transformer Model

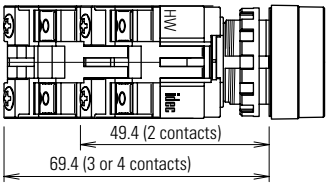


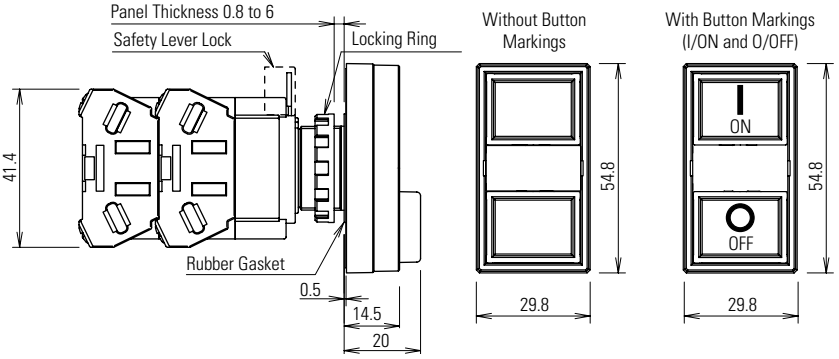

**Dual Pushbutton**

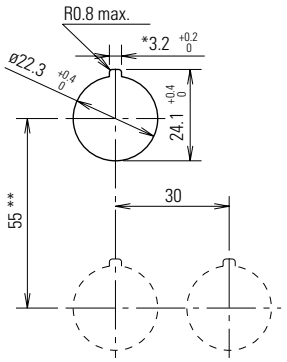
Without Pilot Light

Dimensions (mm)

Mounting Hole Layout



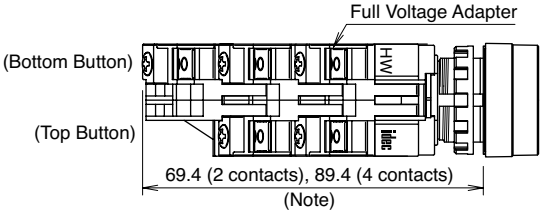




-The 3.2 mm recess is for preventing rotation and is not necessary when a nameplate or anti-rotation ring is not used.
-When using the safety lever lock, determine the vertical spacing in consideration of convenience for installing and removing the safety lever lock.
-Recommended vertical spacing: 100 mm
-The minimum mounting centers are applicable to switches with one layer of contact blocks (two contact blocks). When two layers of contact blocks are mounted, determine the minimum mounting centers for ease of wiring.

### With Pilot Light

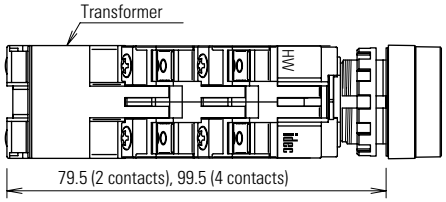
#### Full Voltage



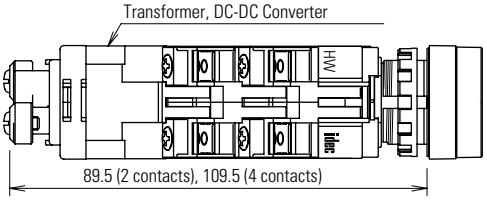

The depth of a 3-contact model depends on the combination of contact blocks at top and bottom pushbuttons.

| | | |
|---|---|---|
| Top Button | 1 contact block | 2 contact blocks |
| Bottom Button | 2 contact blocks | 1 contact block |
| Depth | 89.4 mm | 69.4 mm |

#### Transfomer (240V minimum)

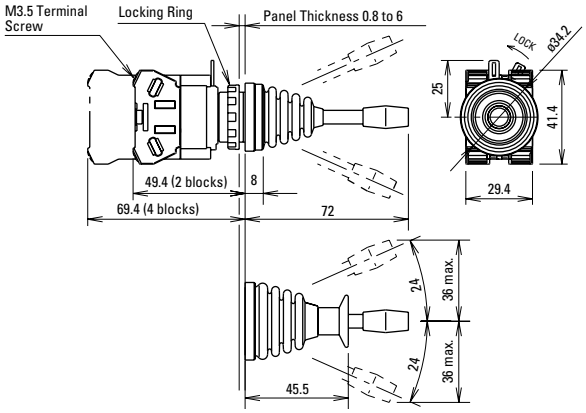



#### Transformer (480V)



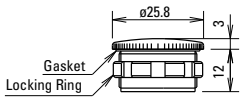

### Monolever

Dimensions (mm)

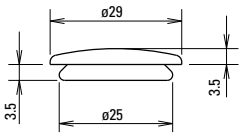


## Accessory Dimensions

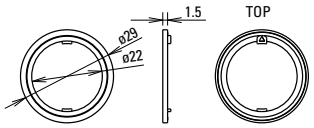
**LW9Z-BM**
Metallic Mounting Hole Plug



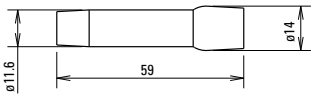

**OB-31**
Rubber Mounting Hole Plug



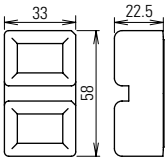

**HW9Z-RL**
Anti-Rotation Ring



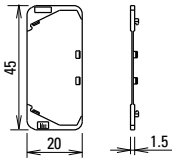

**OR-55**
Lamp/LED Removal Tool



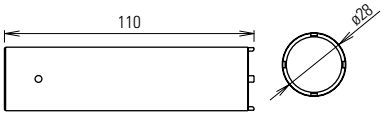

**HW9Z-D7D**
Dual Pushbutton Rubber Cover



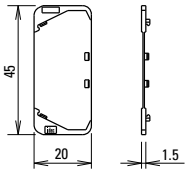

**HW-VG1**
Dual Pushbutton Barrier



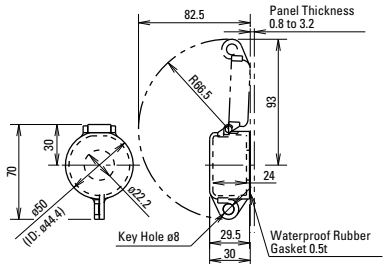

**MW9Z-T1**
Locking Ring Wrench



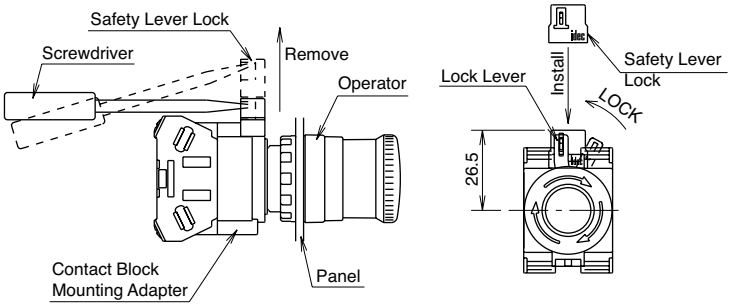

**HW-VL1**
Barrier



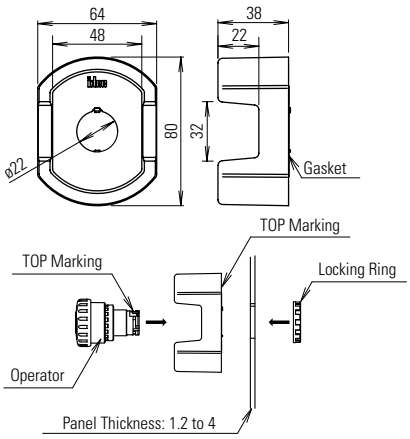

**HW9Z-KL1**
Padlock Cover



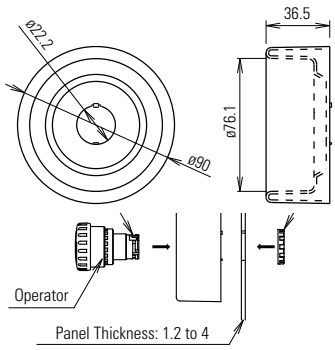

**HWLS-TK1971**
Safety Lever Lock



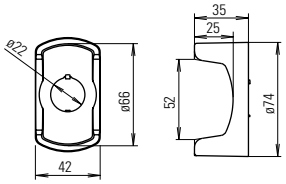

**HW9Z-KG1**



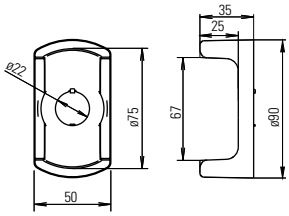

**HW9Z-KG2**



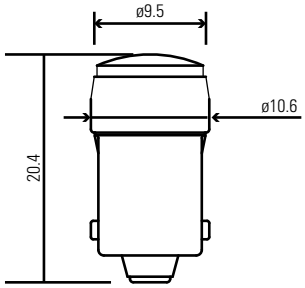

**HW9Z-KG3**



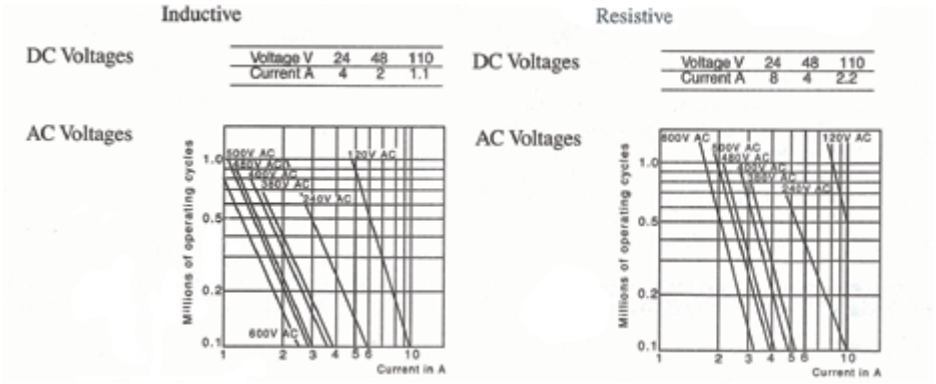

**HW9Z-KG4**




**LSTD**



## Specification Charts




Conforming to IED 947-5-1 Appendix C.
Utilization categories AC-15 and DC-13.
Operation rate: 1,800 op. hour
Load factor:
Inductive 0.4 ±0.05
Resistive 0.9 ±0.05

## Operator Truth Tables

### 2 Position Selector Switches

| | Contact | Mounting Position | Operator Position | |
|---|---|---|---|---|
| | | | Left | Right |
| HW1S-2T<br>HW1K-2*<br>HW1F-2 | HW-F10 (NO) | L | 0 | X |
| | | R | 0 | X |
| | HW-F01 (NC) | L | X | 0 |
| | | R | X | 0 |
| | HW-F10R (NO-EM) | L | 0 | ~~X~~ |
| | | R | 0 | ~~X~~ |
| | HW-F01R (NC-LB) | L | ~~X~~ | 0 |
| | | R | ~~X~~ | 0 |

### 3 Position Selector Switches

| | Contact | Mounting Position | Operator Position | | |
|---|---|---|---|---|---|
| | | | Left | Center | Right |
| HW1S-3T<br>HW1K-3*<br>HW1F-3 | HW-F10 (NO) | L | X | 0 | 0 |
| | | R | 0 | 0 | X |
| | HW-F01 (NC) | L | 0 | ~~X~~ | ~~X~~ |
| | | R | ~~X~~ | ~~X~~ | 0 |
| | HW-F10R (NO-EM) | L | ~~X~~ | 0 | 0 |
| | | R | 0 | 0 | ~~X~~ |
| | HW-F01R (NC-LB) | L | 0 | ~~X~~ | ~~X~~ |
| | | R | ~~X~~ | ~~X~~ | 0 |

| | Contact | Mounting Position | Operator Position | | |
|---|---|---|---|---|---|
| | | | Left | Center | Right |
| HW1S-3ST<br>HW1K-3S* | HW-F10 (NO) | L | X | 0 | 0 |
| | | R | 0 | 0 | X |
| | HW-F01 (NC) | L | 0 | 0 | X |
| | | R | X | 0 | 0 |
| | HW-F10R (NO-EM) | L | ~~X~~ | ~~X~~ | 0 |
| | | R | 0 | ~~X~~ | ~~X~~ |
| | HW-F01R (NC-LB) | L | 0 | ~~X~~ | ~~X~~ |
| | | R | ~~X~~ | ~~X~~ | 0 |

### 3 Position Selector Switches con't

| | Contact | Mounting Position | Operator Position | | |
|---|---|---|---|---|---|
| | | | Left | Center | Right |
| HW1S-3JT<br>HW1K-3J* | HW-F10 (NO) | L | X | 0 | 0 |
| | | R | 0 | 0 | X |
| | HW-F01 (NC) | L | 0 | X | 0 |
| | | R | 0 | X | 0 |
| | HW-FC10R (NO-EM) | L | X | 0 | X |
| | | R | ~~X~~ | 0 | ~~X~~ |
| | HW-F01R (NC-LB) | L | 0 | ~~X~~ | ~~X~~ |
| | | R | ~~X~~ | ~~X~~ | 0 |

### 4 Position Selector Switches

| | Contact | Mounting Position | Operator Position | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| HW1S-4T | HW-F10 (NO) | L | X | 0 | 0 | 0 |
| | | R | 0 | 0 | 0 | X |
| | HW-F01 (NC) | L | 0 | 0 | X | 0 |
| | | R | 0 | X | 0 | 0 |
| | HW-F10R (NO-EM) | L | ~~X~~ | X | 0 | X |
| | | R | X | 0 | ~~X~~ | X |
| | HW-F01R (NC-LB) | L | 0 | ~~X~~ | ~~X~~ | X |
| | | R | ~~X~~ | ~~X~~ | X | 0 |

### 5 Position Selector Switches

| | Contact | Mounting Position | Operator Position | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 |
| HW1S-5T | HW-F10 (NO) | L | X | 0 | 0 | 0 | 0 |
| | | R | 0 | 0 | 0 | 0 | X |
| | HW-F01 (NC) | L | 0 | 0 | 0 | X | 0 |
| | | R | 0 | X | 0 | 0 | 0 |
| | HW-F10R (NO-EM) | L | ~~X~~ | ~~X~~ | X | 0 | X |
| | | R | X | 0 | ~~X~~ | ~~X~~ | X |
| | HW-F01R (NC-LB) | L | 0 | ~~X~~ | ~~X~~ | ~~X~~ | X |
| | | R | ~~X~~ | ~~X~~ | ~~X~~ | X | 0 |

1. Mounting position indicates which side of operator each contact should be mounted (as viewed from the front of the panel).
2. *For key removable code see page 640.
3. HW1S-3T is identified by white plungers on the operator.
4. HW1S-3ST is identified by red plungers on the operator.
5. HW1S-3JT is identified by black plungers on the operator.

## HW Safety Precautions

Turn off power to HW series control units before starting installation, removal, wiring, maintenance, and inspection of the products. Failure to turn power off may cause electrical shocks or fire hazard.

To avoid the possibility of burning yourself, use the lamp holder tool when replacing lamps.

For wiring, use wires of a proper size to meet voltage and current requirements. Tighten the M3.5 terminal screws to a tightening torque of 1.0 to 1.3 N·m. Failure to tighten terminal screws may cause overheating and fire.

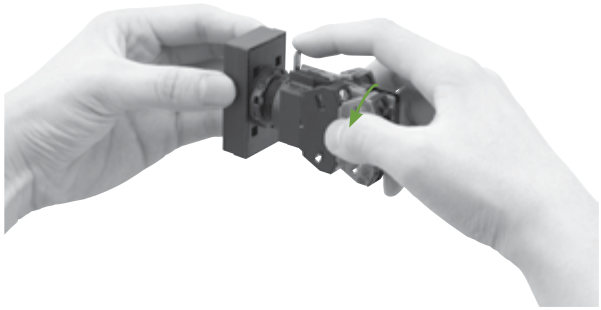
## HW General Instructions

### Panel Mounting

Remove the contact block assembly from the operator (for transformer type pilot lights, remove the transformer from the illumination unit). Remove the locking ring from the operator. Insert the operator into the panel cut-out from the front, tighten the locking ring from the back, then install the contact block assembly to the operator.

### Removing and Installing the Contact Block Assembly

1. To remove the operator from the contact block, turn the locking lever in the direction of the arrow shown below. The operator can now be removed.
2. To reinstall, place the TOP markings on the operator and the contact block mounting adapter in the same direction, and insert the operator into the contact block mounting adapter. Then turn the locking lever in the opposite direction.



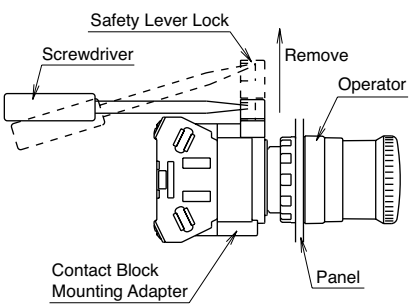
### Notes for Panel Mounting

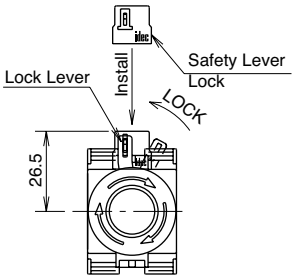
1. When mounting the operator onto a panel, use the optional locking ring wrench (MW9Z-T1) to tighten the locking ring. Tightening torque must not exceed 2.0 N·m. Do not use pliers. Excessive tightening will damage the locking ring.
2. For the contact blocks and transformers housing LED and incandescent lamps, make sure not to press the lamps too hard, otherwise the lamp socket may be damaged.

### Safety Lever Lock

IDEC strongly recommends using the safety lever lock (HW9Z-LS, yellow) to prevent heavy vibration or maintenance personnel from unlocking the contact assembly.

1. HW series can be mounted vertically with a minimum spacing of 55 mm but spacing should be determined to ensure easy operation (recommended minimum spacing: 100 mm).
2. Mount the control unit onto the panel, lock the lever, and push in the safety lever lock to install.
3. When the spacing is narrower than the recommended value, with the lever unlocked, mount the safety lever lock and insert the contact unit to the operator. Then, lock the lever and strongly push in the safety lever lock to install.
4. To remove the safety lever lock, insert a flat screwdriver into the safety lever and push upwards.




## Dual Pushbutton Instructions

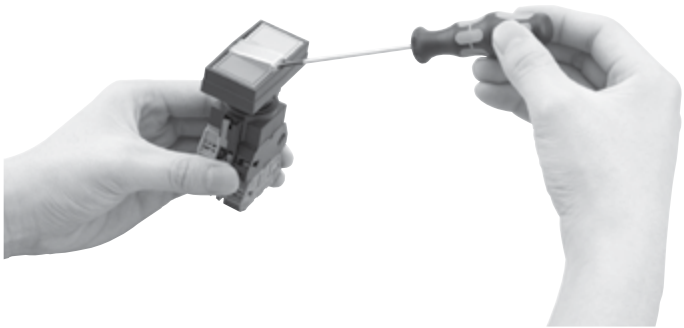
### Replacement of Lens

### Removing

Remove the lens by inserting a screwdriver into the recess of the lens through the bezel.

### Installing

Install the lens in the recess between the buttons by pressing against the bezel.



# Dual Pushbuttons Instructions con't

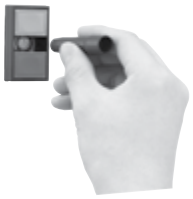
## Replacement of Lamps

Lamps can be replaced by using the lamp holder tool (OR-55) from the front of the panel, or by removing the contact block assembly from the operator unit.

## Removing the Lamps from the Front of the Panel

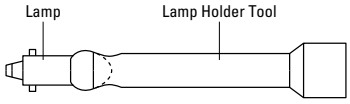
### Removal

1. To remove, slip the lamp holder tool onto the lamp head lightly. Then push slightly, and turn the lamp holder tool counterclockwise.

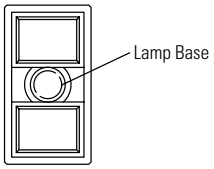


### Installation

1. To install, insert the lamp head into the lamp holder tool, and hold the lamp as shown in the figure below.



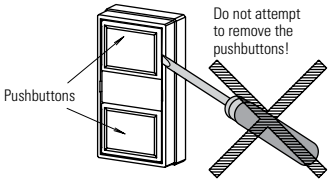

2. Place the pins on the lamp base to the grooves in the lamp socket. Insert the lamp and turn it clockwise.




## About Pushbutton Switches

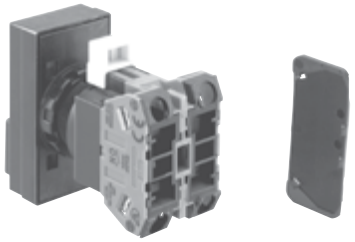
The pushbuttons cannot be removed or replaced!

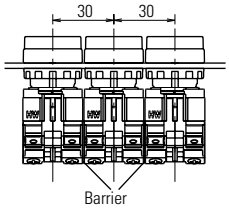
Do not attempt to remove using a flat screwdriver or pincers, otherwise the pushbuttons may be damaged.



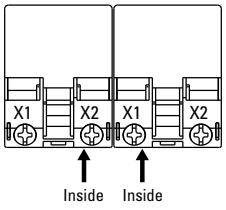

## Narrow Mounting

When mounting the units closely in a horizontal row on 30mm centers, use optional barriers to prevent interconnection between adjoining terminals. The barriers can be attached simply by pressing them onto the sides of contact blocks.






When mounting transformer type illuminated units closely in a horizontal row on 30-mm centers, insert solid wires or stranded wires into inside of the terminal screw on the transformer (see figure on the right) to prevent short circuit between adjoining terminals.




## Tightening Torque for Terminal Screws

Tighten the M3.5 terminal screws to a torque of 1.0 to 1.3 N·m.

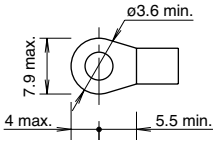
## Installation of LED Illuminated Units

When using full voltage type LED illuminated units, provide protection against electrical noise, if necessary.

## Applicable Wiring

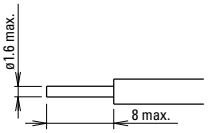
The applicable wire size is 2 $mm^2$ maximum. (solid wire ø1.6$mm^2$ maximum) One or two wires can be connected.

## Applicable Crimping Terminal

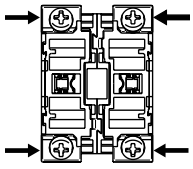


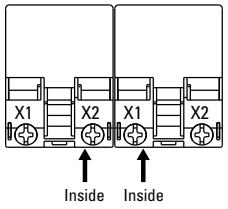

Be sure to use an insulation tube or cover on the crimping part of the crimping terminal to prevent electrical shocks.

## Solid Wire




Note: When connecting wires to contact blocks or transformers in the direction shown below, keep the insulation stripping length 6.6 mm at the maximum.





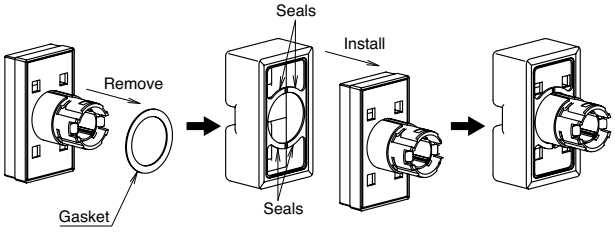

## Installing the Rubber Cover

When using the HW7D pushbuttons in places where the pushbuttons are subjected to water splash or an excessive amount of dust, make sure to use the HW9Z-D7D rubber boot (IP65) which is ordered separately.

## Notes for Installing the Rubber Cover

Remove the gasket from the operator, and install the rubber boot on the operator. Pull out the seals of the rubber boot and place them around the operator sleeve as shown. Make sure that the seals are not twisted or tucked inside and that the gasket does not remain, otherwise the normal waterproof and dustproof characteristics are not ensured.

1. Remove the gasket.
2. Install the rubber boot on the pushbuttons.
3. Rubber boot is installed.



# TW Series — 22mm NEMA Style Pushbuttons

**Key features:**

- TW NEMA Style Switches with snap-on contacts
- Corrosion resistant octagonal chrome plated locking bezel
- Snap-on 10A contact blocks
- Incandescent or LED illumination
- Slow make, double break, self cleaning contacts
- Modular construction for maximum flexibility
- NEMA 4X and IP65 watertight/oiltight panel
- Available assembled or as sub-components
- Large M3.5 screw terminals with captive sems plate

IDEC has your 22mm switching needs covered.

Button styles include flush, extended, mushroom, or square and all bodies are crafted from fracture-resistant nylon.

All illuminated units feature two lens styles, one that maximizes light dispersion, the other accommodates direct lens engraving.

Self cleaning contact mechanisms allow for a wide current rating, 5mA to 10A, which reduces the need for various contact materials.

When looking for a 22mm switch that is durable, easy to use, and versatile, then IDEC's TW series is your solution.

UL Listed
File No. E68961

TÜV Rheinland

CSA Approved
File No. LR21451

File No. DK95-01696

## Specifications

| | |
|---|---|
| Conforming to Standards | EN60947-1, EN60947-5-1, VDE0660-200, UL508, CSA C22-2 No.14 |
| Approvals<br>File No. E68961<br>File No. LR21451<br>Certificate No. 2030010305027380<br>TÜV Rheinland<br>Registration No: J9551802 (E-Stops)<br>Registration No: J9551803 (All other switches)<br>Registration No: J9551804 (Pilot Lights) | **CSA:** pushbuttons and selector switches: A600 pilot lights and illuminated pushbuttons, direct supply pilot lights and illuminated pushbuttons with integral transformer (100/110, 115, 120, 200/220, 230, 240, 380, 400/440, 480V)<br>**UL:** pushbuttons and selector switches: A600 pilot lights and illuminated pushbuttons, direct supply pilot lights and illuminated pushbuttons with integral transformer (100/110, 115, 120, 200/220, 230, 240, 380, 400/440, 480V)<br>**TÜV:** pushbuttons and selector switches: A600=P600 (NO, NC)/Q600 (NO-EM, NC-LB) pilot lights and illuminated pushbuttons, direct supply pilot lights and illuminated pushbuttons with integral transformer (100/110, 115, 120, 200/220, 230, 240, 380, 400/440, 480V) |
| Operating Temperature | Operation: –25 to +50°C (without freezing), Storage: –40 to +80°C (without freezing) |
| Vibration Resistance | 5 to 55Hz, 100m/sec$^2$ (10g) conforming to IEC6068-2-6 |
| Shock Resistance | 1000m/sec$^2$ (100g) conforming to IEC6068-2-7 |
| Electric Shock Protection | Class 0 conforming to IEC60536 |
| Degree of Protection<br>(conforming to IEC60529)<br>(conforming to NEMA ICS6-110) | IP65 from front of the panel; (IP54 for key switches)<br>IP20 (Type HW-F contact block)<br>Type 1, 2, 3, 3R, 3S, 4, 4X, 5, 12, 13 (Type 1, 2, 3R, 5, 12, 13 for key switches) |
| Mechanical Life | Momentary pushbuttons: 5,000,000 (900 operations per hour)<br>All other switches: 500,000 |
| Pollution Degree (conforming to IEC60947-1) | 3 for switches not using a transformer, 2 for switches using a transformer |
| Rated Operational Characteristics | AC-15: A600 or Ue = 250V, Ie = 3A (NO, NC, NO-EM, NC-LB)<br>DC-13: P600 or Ue = 125V, Ie = 1.1A (NO, NC)<br>DC-13: Q600 or Ue = 125V, Ie = 0.9A (NO-EM, NC-LB) |
| Rated Insulation Voltage | 600V |
| Rated Switching Over-Voltage | Less than 4kV, conforming to IEC60947-1 |
| Rated Impulse Withstanding Voltage | 4kV for contact circuit, 2.5kV for lamp circuit |
| Rated Thermal Current | 10 Amp |
| Minimum Switching Capacity | 5 mA at 3V AC/DC |
| Contact Operation | Slow break NC or slow make NO, self-cleaning |
| Recommended Terminal Torque | 0.8 N m (7.1 in lb.) |
| External Short-Circuit Protection | 10A 250V fuse conforming to IEC60269-1 |
| Applicable Wire Size | Minimum 1 x 22 AWG, max. 2 x 14 AWG or 1 x 12 AWG |
| Contact Resistance | Initial contact resistance of 50mΩ or less |
| Contact Gap | 4mm (NO and NC), 2mm (NO-EM and NC-LB) |
| Electrical Reliability | MTBF < 1 fault for 10 million operation cycles (3V DC, 5mA) |
| Lamp Ratings | Incandescent: 1 W<br>LEDs: 6V: 17mA max, 12/24V: 11mA max, 120/240V: 10mA max |
| Horsepower Rating | 1/4 HP @ 120V (single-phase, non-reversing motor); 1 HP @ 240V (3 phase, non-reversing motor) |
| Maximum Inrush Current | 40 A (40 ms) |
| Contact Material | Silver |

## Contact Ratings

Pushbuttons
Illuminated Pushbuttons
Selector Switches
Illuminated Selector Switches
Pushbutton Selectors

| | |
|---|---|
| Contact Block | Type HW-C/HW-F |
| Rated Insulation Voltage | 600V |
| Rated Continuous Current | 10A |
| Contact Ratings by Utilization Category<br>IEC 60947-5-1 | AC-15 (A600)<br>DC-13 (P600) |

## Characteristics

**Contact Ratings by Utilization Category**

| Operational Voltage | | | 24V | 48V | 50V | 110V | 220V | 440V |
|---|---|---|---|---|---|---|---|---|
| Operational Current | AC50/60Hz | AC-12 Control of resistive loads and solid state loads | 10A | — | 10A | 10A | 6A | 2A |
| | | AC-15 Control of electromagnetic loads (> 72VA) | 10A | — | 7A | 5A | 3A | 1A |
| | DC | DC-12 Control of resistive loads and solid state loads | 8A | 5A | — | 2.2A | 1.1A | — |
| | | DC-13 Control of electromagnets | 5A | 2A | — | 1.1A | 0.6A | — |

## Non-Illuminated Pushbuttons (Assembled)

### Assembled Pushbuttons

**A B ( ) W 1 10 ( ) – B**

**Function**

B: Momentary
O: Maintained
K: Key On/Off Lock

**Bezel Shape**

Blank: Octagonal
F: Full Shroud
G: Mushroom Shroud
Q: Square

**Button Color**

B: Black G: Green W: White
R: Red S: Blue Y: Yellow

**Terminal Style**

Blank: Standard
N: Fingersafe (IP20)

**Contact Arrangement**

10: 1NO 01: 1NC
20: 2NO 02: 2NC
11: 1NO-1NC 22: 2NO-2NC

**Button Shape**

1: Flush
2: Extended
3: Mushroom Head Ø 29mm
4: Mushroom Head Ø 40mm

**Series Designation**

W: TW Series

To be used for interpreting part numbers only, not for part number development.

## Non-Illuminated Pushbuttons (Assembled) continued

### Non-Illuminated Pushbuttons

| Style | | Contacts | Momentary Action | Maintained Action |
|---|---|---|---|---|
| Flush | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABW110-①<br>ABW101-①<br>ABW111-①<br>ABW120-①<br>ABW102-① | AOW110-①<br>AOW101-①<br>AOW111-①<br>AOW120-①<br>AOW102-① |
| Extended | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABW210-①<br>ABW201-①<br>ABW211-①<br>ABW220-①<br>ABW202-① | AOW210-①<br>AOW201-①<br>AOW211-①<br>AOW220-①<br>AOW202-① |
| Recessed | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABFW110-①<br>ABFW101-①<br>ABFW111-①<br>ABFW120-①<br>ABFW102-① | AOFW110-①<br>AOFW101-①<br>AOFW111-①<br>AOFW120-①<br>AOFW102-① |
| Extended with Full Shroud | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABFW210-①<br>ABFW201-①<br>ABFW211-①<br>ABFW220-①<br>ABFW202-① | AOFW210-①<br>AOFW201-①<br>AOFW211-①<br>AOFW220-①<br>AOFW202-① |
| Ø 29mm Mushroom Head | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABW310-①<br>ABW301-①<br>ABW311-①<br>ABW320-①<br>ABW302-① | AOW310-①<br>AOW301-①<br>AOW311-①<br>AOW320-①<br>AOW302-① |
| Ø 40mm Mushroom Head | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABW410-①<br>ABW401-①<br>ABW411-①<br>ABW420-①<br>ABW402-① | AOW410-①<br>AOW401-①<br>AOW411-①<br>AOW420-①<br>AOW402-① |
| Ø 40mm Mushroom Head with Full Shroud | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABGW410-①<br>ABGW401-①<br>ABGW411-①<br>ABGW420-①<br>ABGW402-① | AOGW410-①<br>AOGW401-①<br>AOGW411-①<br>AOGW420-①<br>AOGW402-① |
| Square Flush | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABQW110-①<br>ABQW101-①<br>ABQW111-①<br>ABQW120-①<br>ABQW102-① | AOQW110-①<br>AOQW101-①<br>AOQW111-①<br>AOQW120-①<br>AOQW102-① |
| Square Extended | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABQW210-①<br>ABQW201-①<br>ABQW211-①<br>ABQW220-①<br>ABQW202-① | AOQW210-①<br>AOQW201-①<br>AOQW211-①<br>AOQW220-①<br>AOQW202-① |
| Keylock Push On/ Off | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | AKW210<br>AKW201<br>AKW211<br>AKW220<br>AKW202 | – |

### ① Button Color Codes

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| Yellow | Y |
| White | W |

1. In place of ①, specify the Button Color Code from table.
2. For sub-assembled part numbers, see next page.
3. For accessories, see page 705.
4. For dimensions, see page 707.
5. Keyed switches are supplied with two keys. All units are keyed alike.

## Non-Illuminated Pushbuttons (Sub-Assembled)

| Contact Blocks | + | Operator | + | Button | = | Complete Part |
|---|---|---|---|---|---|---|

### Operators

| Style | Part Number | |
|---|---|---|
| | Momentary | Maintained |
| Round Flush/Extended | ABW-100 | AOW-100 |
| Round with Full Shroud/ Recessed | ABFW-200 | AOFW-200 |
| Ø 40mm, Ø 29mm Mushroom Head | ABW-300 | AOW-300 |
| Ø 40mm Mushroom Head with Full Shroud | ABGW-400 | AOGW-400 |
| Square Flush/Extended | ABQW-100 | AOQW-100 |
| Keylock Push On/Off | — | AKW-200 |

### Buttons

| Style | Part Number |
|---|---|
| Round Flush | ABW1B-① |
| Round Extended | ABW2B-① |
| Ø 29mm Mushroom | ABW3B-① |
| Ø 40mm Mushroom | ABW4B-① |
| Square Flush | ABQW1B-① |
| Square Extended | ABQW2B-① |

In place of ① specify the button color code from table

### Contact Blocks

| Style | Part Number | |
|---|---|---|
| | 1NO | 1NC |
| Standard Exposed Screw | HW-C10<br>HW-C10R (early make) | HW-C01<br>HW-C01R (late break) |
| Fingersafe (IP20), CE marked | HW-F10<br>HW-F10R (early make) | HW-F01<br>HW-F01R (late break) |
| Dummy Block | TW-DB | |

1. Dummy blocks (no contacts) are used with an odd number of contact blocks.
2. Use of early and late break contacts creates a make before break function

### ① Button Color Codes

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| Yellow | Y |
| White | W |

## Stop Switches (Assembled)

To be used for interpreting part numbers only, not for part number development.

### Assembled Stop Switches

**A V (L) W 4 (B) (99) 11 (D) (N) – R – (24V)**

**Function**

V: Pushlock Turn Reset
Y: Push-Pull
X: Pushlock Key Reset

**Illumination**

Blank: None
L: Illuminated

**Series Designation**

W: TW Series

**Button/Lens Size**

3: 29mm Mushroom
4: 40mm Mushroom

**Lens Type**
(illuminated units only)

Blank: Standard (ribbed)
B: Engravable (smooth with insert)

**Illuminated Circuit**
(illuminated unit only)

99: Full Voltage (lamp determines voltage)
126: 120V AC Step Down Transformer
246: 240V AC Step Down Transformer
486: 480V AC Step Down Transformer

**Lamp Voltage**
(full voltage illuminated units only)

6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120V AC (LED only)
240V: 240V AC (LED only)

**Button/Lens Color**

A: Amber R: Red W: White
G: Green S: Blue Y: Yellow
B: Black

**Contact Terminal Style**

Blank: Standard
N: Fingersafe (IP20)

**Lamp Type**
(illuminated units only)

Blank: Incandescent
D: LED

**Contact Arrangement**

10: 1NO 01: 1NC
20: 2NO 02: 2NC
11: 1NO/1NC 22: 2NO/2NC

# Stop Switches (Assembled), continued

## Non-Illuminated Stop Switches

| Style | | Contacts | Part Number |
|---|---|---|---|
| Ø 40mm Pushlock Turn Reset* | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | AVW410-R*<br>AVW401-R*<br>AVW411-R*<br>AVW420-R*<br>AVW402-R* |
| Ø 29mm Pushlock Turn Reset* | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | AVW310-R*<br>AVW301-R*<br>AVW311-R*<br>AVW320-R*<br>AVW302-R* |
| Ø 40mm Push-Pull | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | AYW410-①<br>AYW401-①<br>AYW411-①<br>AYW420-①<br>AYW402-① |
| Ø 40mm Pushlock Key Reset * | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | AXW410- R*<br>AXW401- R*<br>AXW411- R*<br>AXW420- R*<br>AXW402- R* |

1. *Available in Red only.
2. In place of ①, specify the Button Color Code from table.
3. For sub-assembled part numbers, see next page.
4. For accessories, see page 705.
5. For dimensions, see page 707.

## Illuminated Stop Switches

| Style | | Type | Contacts | Part Number |
|---|---|---|---|---|
| Ø 40mm Pushlock Turn Reset Type | | Transformer | 1NO-1NC<br>2NO<br>2NC | AVLW4 ④ 11⑤-R*<br>AVLW4 ④ 20⑤-R*<br>AVLW4 ④ 02⑤-R* |
| | | Full Voltage | 1NO-1NC<br>2NO<br>2NC | AVLW49911⑤-R*-③<br>AVLW49920⑤-R*-③<br>AVLW49902⑤-R*-③ |
| Ø 29mm Pushlock Turn Reset | | Transformer | 1NO-1NC<br>2NO<br>2NC | AVLW3④11⑤-R*<br>AVLW3④20⑤-R*<br>AVLW3④02⑤-R* |
| | | Full Voltage | 1NO-1NC<br>2NO<br>2NC | AVLW39911⑤-R*-③<br>AVLW39920⑤-R*-③<br>AVLW39902⑤-R*-③ |
| Ø 40mm Push-Pull | | Transformer | 1NO-1NC<br>2NO<br>2NC | AYLW4 ④ 11⑤-②<br>AYLW4 ④ 20⑤-②<br>AYLW4 ④ 02⑤-② |
| | | Full Voltage | 1NO-1NC<br>2NO<br>2NC | AYLW49911⑤-②-③<br>AYLW49920⑤-②-③<br>AYLW49902⑤-②-③ |

1. *Available in red only.
2. In place of ②, specify the Lens Color Code (see table above).
3. In place of ③, specify the Full Voltage Code (lamp voltage) (see table above).
4. In place of ④, specify the Transformer Voltage Code (see table above).
5. In place of ⑤, specify the Lamp Type Code from table above.
6. For sub-assembly part numbers, see next page.
7. For accessories, see page 705.
8. For dimensions, see page 707.

### ① Button Color Codes

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

### ② LED/Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |

### ③ Full Voltage Codes

| Voltage | Code |
|---|---|
| 6V AC/DC | 6V |
| 12V AC/DC | 12V |
| 24V AC/DC | 24V |
| 120V AC | 120V (LED only) |
| 240V AC | 240V (LED only) |

### ④ Transformer Voltage Codes

| Voltage | Code |
|---|---|
| 120VAC | 126 |
| 240VAC | 246 |
| 480VAC | 486 |

Transformers step down to 6V.

### ⑤ Lamp Type Codes

| Lamp | Code |
|---|---|
| Incandescent | Blank |
| LED | D |

## Stop Switches (Sub-Assembled)

| Transformer/ Adaptor* | + | Contacts | + | Lamp Holder | + | Operator | + | Lamp | + | Button or Lens | = | Complete Part |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

*Not applicable for full voltage units

### Operators

| Style | Part Number | |
|---|---|---|
| | Non-Illuminated | Illuminated |
| Ø 29/Ø 40mm Pushlock Turn Reset | AVW-300 | AVLW3-0600 |
| Ø 40mm Push-Pull | AYW-400 | AYLW4-0600 |
| Ø 40mm Pushlock Key Reset | AXW-300 | — |

### Buttons

| Style | Part Number |
|---|---|
| Ø 40mm Pushlock Turn Reset | AVW4B-R* |
| Ø 29mm Pushlock Turn Reset | AVW3B-R* |
| Ø 40mm Push-Pull | AYW4B-① |
| Ø 40mm Pushlock Key Reset | AXW4B-R* |

1. *Available in Red only
2. In place of ①, specify the button color code from table.

### Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 6V AC/DC | LSTD-6② |
| | 12V AC/DC | LSTD-1② |
| | 24V AC/DC | LSTD-2② |
| | 120V AC | LSTD-H2② |
| | 240V AC | LSTD-M4② |
| Incandescent | 6V AC/DC | IS-6 |
| | 12V AC/DC | IS-12 |
| | 24V AC/DC | IS-24 |

1. In place of ②, specify the LED color code.
2. The LED contains a current-limiting resistor and a protection diode.

### ① Button Color Codes

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

### ② LED/Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |

## Illuminated Stop Switches (Sub-Assembled) continued

### Lenses

| Style | Part Number | |
|---|---|---|
| | Standard | Engravable |
| Ø 29mm Head Pushlock Turn Reset | AVLW3LU-R* | AVLW3BLU-R* |
| Ø 40mm Head Pushlock Turn Reset | AVLW4LU-R* | AVLW4BLU-R* |
| Ø 40mm Head Push Pull | AYLW4LU-② | AYLW4BLU-② |

1. In place of ②, specify the lens color code from table on previous page.
2. *Available only in red
3. Standard lenses have ribbed pattern, Engravable lenses are smooth and include an engravable insert.

### Lamp Circuit Components

| Style | Application | Part Number |
|---|---|---|
| Short Lamp Holder | **Used with** a Half-size Transformer and one contact block | TW-LH1 |
| Long Lamp Holder | **Used with** Full-size Transformer and two contact blocks<br>**Used with** Half-size Transformer and three contact blocks<br>**Used with** Full Voltage Adaptor and two contact blocks | TW-LH2 |
| Lead Holder | **Used with** TW-LH2 holder when using four contact blocks | HW-LH3 |

### Transformers/Full Voltage Modules

| Style | Description | | Part Number |
|---|---|---|---|
| Full Size Transformer | Standard | 120V AC | TW-T126B |
| | | 240V AC | TW-T246B |
| | | 480V AC | TW-T486B |
| | Fingersafe | 120V AC | TW-F126B |
| | | 240V AC | TW-F246B |
| | | 480V AC | TW-F486B |
| Half Size Transformer | 120V AC | | TW-T126SB |
| | 240V AC | | TW-T246SB |
| Full voltage model (use with even number of contacts) | Standard | | TW-DA1B |
| | Fingersafe | | TW-DA1FB |
| Full voltage model (use with odd number of contacts) | Standard | | HW-DA1B |
| | Fingersafe | | HW-DA1FB |

All Transformers step down to 6V (use 6V lamp).

### Contact Blocks

| Style | Part Number | |
|---|---|---|
| | 1NO | 1NC |
| Standard Exposed Screw | HW-C10<br>HW-C10R (early make) | HW-C01<br>HW-C01R (late break) |
| Fingersafe (IP20), CE marked | HW-F10<br>HW-F10R (early make) | HW-F01<br>HW-F01R (late break) |
| Dummy Block | TW-DB | |

1. Dummy blocks (no contacts) are used with an odd number of contact blocks.
2. Use of early and late break contacts creates a make before break function

## Pilot Lights (Assembled)

### Assembled Pilot Lights

**A P (Q) W 1 (B) (99) (D) – R – (24V)**

**Function**
P: Pilot Light

**Bezel Shape**
Blank: Octagonal (round lenses)
Q: Square

**Series Designation**
W: TW Series

**Lens Shape**
1: Flat
2: Dome

**Lens Type**
Blank: Standard (ribbed)
B: Engravable (smooth with insert included)

**Illumination Circuit**
99: Full Voltage (lamp determines voltage)
126: 120V AC Step Down Transformer
246: 240V AC Step Down Transformer
486: 480V AC Step Down Transformer

**Lamp Type**
Blank: Incandescent
D: LED

**Lens Color Code**
A: Amber
G: Green
R: Red
S: Blue
W: White
Y: Yellow

**Lamp Voltage**
(Full Voltage Units Only)
6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120V AC (LED only)
240V: 240V AC (LED only)

1. Use only when interpreting part numbers. Do not use for developing part numbers.
2. All transformers step down to 6V.

## Pilot Lights (Assembled) continued

### Assembled Pilot Lights

| Style | | Type | Voltage | Part Number |
|---|---|---|---|---|
| Round Flat | | Transformer | 120VAC<br>240VAC<br>480VAC | APW1126④-②<br>APW1246④-②<br>APW1486④-② |
| | | Full Voltage | — | APW199④-②-③ |
| Dome | | Transformer | 120VAC<br>240VAC<br>480VAC | APW2126④-②<br>APW2246④-②<br>APW2486④-② |
| | | Full Voltage | — | APW299④-②-③ |
| Square Flat | | Transformer | 120VAC<br>240VAC<br>480VAC | APQW1B126④-②<br>APQW1B246④-②<br>APQW1B486④-② |
| | | Full Voltage | — | APQW1B99④-②-③ |

1. In place of ②, specify the Lens Color Code from table below.
2. In place of ③, specify the Full Voltage Code from table below.
3. In place of ④, specify the Lamp Type Code from table below.
4. For accessories, see page 705.
5. For dimensions, see page 707.
6. For sub-assembly part numbers, see next page.
7. Yellow pilot light comes with white LED.

### ② Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

### ③ Full Voltage Codes

| Voltage | Code |
|---|---|
| 6V AC/DC | 6V |
| 12V AC/DC | 12V |
| 24V AC/DC | 24V |
| 120V AC | 120V (LED only) |
| 240V AC | 240V (LED only) |

### ④ Lamp Type Codes

| Lamp | Code |
|---|---|
| Incandescent | Blank |
| LED | D |

## Pilot Lights (Sub-Assembled)

| Transformer | + | Operator | + | Lamp | + | Lens | = | Complete Part |
|---|---|---|---|---|---|---|---|---|

* Transformer not required for full voltage units.

### Operators

| Style | Part Number |
|---|---|
| Round Dome/Flat | APW-199 |
| Square | UPQW-199 |

Same operator is used for full voltage as for transformer completed units.

### Lenses

| Style | Part Number | |
|---|---|---|
| | Standard | Engravable |
| Dome | APW2LU-② | — |
| Round Flat | APW1LU-② | APW1BLU-② |
| Square Flat | — | APQW1BLU-② |

1. In place of ②, specify the Lens Color Code from table.
2. Standard lenses have a ribbed lens to enhance light dispersion. Marking lenses are smooth and include an engravable insert.

### Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 6V AC/DC | LSTD-6② |
| | 12V AC/DC | LSTD-1② |
| | 24V AC/DC | LSTD-2② |
| | 120V AC | LSTD-H2② |
| | 240V AC | LSTD-M4② |
| Incandescent | 6V AC/DC | IS-6 |
| | 12V AC/DC | IS-12 |
| | 24V AC/DC | IS-24 |

1. In place of ②, specify the LED color code.
2. The LED contains a current-limiting resistor and a protection diode.
3. Yellow LED not available. Use white LED.

### ② LED/Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

If clear lens is desired, use white marking lens and remove engraving insert

### Transformers

| Style | Description | | Part Number |
|---|---|---|---|
| | Standard | 120V AC | TW-T126B |
| | | 240V AC | TW-T246B |
| | | 480V AC | TW-T486B |
| | Fingersafe | 120V AC | TW-F126B |
| | | 240V AC | TW-F246B |
| | | 480V AC | TW-F486B |

All Transformers step down to 6V (use 6V lamp).

## Illuminated Pushbuttons (Assembled)

### Assembled Illuminated Pushbuttons

**A L (F) W 2 (B) 99 11 (D) (N) – R – (24V)**

**Function**

L:Momentary Action
OL:Maintained Action

**Bezel Shape**

Blank: Octagonal (round lenses)
F: Full Shroud (round lenses)
Q: Square

**Series Designation**

W: TW series

**Lens Shape/Size**

2: Standard Extended (round or square)
3: 29mm Mushroom
4: 40mm Mushroom

**Lens Type**

Blank: Standard (ribbed)
B: Engravable (smooth with insert)

**Illumination Circuit**

99: Full Voltage (lamp determines voltage)
126: 120V AC Step Down Transformer
246: 240V AC Step Down Transformer
486: 480V AC Step Down Transformer

**Lamp Voltage**
(Full Voltage Units Only)

6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120V AC (LED only)
240V: 240V AC (LED only)

**Lens Code**

A: Amber
G: Green
R: Red
S: Blue
W: White
Y: Yellow

**Contact Terminal Style**

Blank: Standard
N: Fingersafe

**Lamp Type**

Blank: Incandescent Lamp
D: LED Lamp

**Contact Arrangement**

10: 1NO
20: 2NO
11: 1NO-1NC
01: 1NC
02: 2NC
22: 2NO-2NC

1. Use only when interpreting part numbers. Do not use for developing part numbers.
2. Transformers step down to 6V.

# Illuminated Pushbuttons (Assembled)

## Illuminated Pushbuttons

| Style | | Contacts | Part Number | |
|---|---|---|---|---|
| | | | Momentary | Maintained |
| Extended Lens | Transformer | 1NO-1NC<br>2NO<br>2NC | ALW2 ④ 11⑤-②<br>ALW2 ④ 20⑤-②<br>ALW2 ④ 02⑤-② | AOLW2 ④ 11⑤-②<br>AOLW2 ④ 20⑤-②<br>AOLW2 ④ 02⑤-② |
| | Full Voltage | 1NO-1NC<br>2NO<br>2NC | ALW29911⑤-②-③<br>ALW29920⑤-②-③<br>ALW29902⑤-②-③ | AOLW29911⑤-②-③<br>AOLW29920⑤-②-③<br>AOLW29902⑤-②-③ |
| Extended Lens with Full Shroud | Transformer | 1NO-1NC<br>2NO<br>2NC | ALFW2 ④ 11⑤-②<br>ALFW2 ④ 20⑤-②<br>ALFW2 ④ 02⑤-② | AOLFW2 ④ 11⑤-②<br>AOLFW2 ④ 20⑤-②<br>AOLFW2 ④ 02⑤-② |
| | Full Voltage | 1NO-1NC<br>2NO<br>2NC | ALFW29911⑤-②-③<br>ALFW29920⑤-②-③<br>ALFW29902⑤-②-③ | AOLFW29911⑤-②-③<br>AOLFW29920⑤-②-③<br>AOLFW29902⑤-②-③ |
| ø29mm Mushroom Lens | Transformer | 1NO-1NC<br>2NO<br>2NC | ALW3 ④ 11⑤-②<br>ALW3 ④ 20⑤-②<br>ALW3 ④ 02⑤-② | AOLW3 ④11⑤-②<br>AOLW3 ④20⑤-②<br>AOLW3 ④ 02⑤-② |
| | Full Voltage | 1NO-1NC<br>2NO<br>2NC | ALW39911⑤-②-③<br>ALW39920⑤-②-③<br>ALW39902⑤-②-③ | AOLW39911⑤-②-③<br>AOLW39920⑤-②-③<br>AOLW39902⑤-②-③ |
| ø40mm Mushroom Lens | Transformer | 1NO-1NC<br>2NO<br>2NC | ALW4 ④ 11⑤-②<br>ALW4 ④ 20⑤-②<br>ALW4 ④ 02⑤-② | AOLW4 ④11⑤-②<br>AOLW4 ④20⑤-②<br>AOLW4 ④ 02⑤-② |
| | Full Voltage | 1NO-1NC<br>2NO<br>2NC | ALW49911⑤-②-③<br>ALW49920⑤-②-③<br>ALW49902⑤-②-③ | AOLW49911⑤-②-③<br>AOLW49920⑤-②-③<br>AOLW49902⑤-②-③ |
| Square Extended | Transformer | 1NO-1NC<br>2NO<br>2NC | ALQW2B ④11⑤-②<br>ALQW2B ④20⑤-②<br>ALQW2B ④02⑤-② | AOLQW2B ④11⑤-②<br>AOLQW2B ④20⑤-②<br>AOLQW2B ④02⑤-② |
| | Full Voltage | 1NO-1NC<br>2NO<br>2NC | ALQW2B9911⑤-②-③<br>ALQW2B9920⑤-②-③<br>ALQW2B9902⑤-②-③ | AOLQW2B9911⑤-②-③<br>AOLQW2B9920⑤-②-③<br>AOLQW2B9902⑤-②-③ |

1. In place of ②, specify the Lens Color Code (see table). Mushroom lenses not available in yellow.
2. In place of ③, specify the Full Voltage Code (lamp voltage) (see table).
3. In place of ④, specify the Transformer Voltage Code (see table).
4. In place of ⑤, specify the Lamp Type Code from table.
5. For sub-assembly part numbers, see next page.
6. For accessories, see page 705.
7. For dimensions, see page 707.
8. Light is independent of switch position.
9. Yellow pushbutton comes with white LED.

### ② LED/Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

1. Mushroom lenses not available in yellow.
2. Yellow pushbutton comes with white LED.

### ③ Full Voltage Codes

| Voltage | Code |
|---|---|
| 6V AC/DC | 6V |
| 12V AC/DC | 12V |
| 24V AC/DC | 24V |
| 120V AC | 120V (LED only) |
| 240V AC | 240V (LED only) |

### ④ Transformer Voltage Codes

| Voltage | Code |
|---|---|
| 120VAC | 126 |
| 240VAC | 246 |
| 480VAC | 486 |

Transformers step down to 6V (use 6V lamp).

### ⑤ Lamp Type Codes

| Lamp | Code |
|---|---|
| Incandescent | Blank |
| LED | D |

## Illuminated Pushbuttons (Sub-Assembled)

| Transformer/ Adaptor* | + | Contacts | + | Lamp Holder | + | Operator | + | Lamp | + | Lens | = | Complete Part |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

*Not applicable for full voltage units

### Operators

| Style | | Part Number | |
|---|---|---|---|
| | | Momentary | Maintained |
| Extended | | ALW-0600 | AOLW-0600 |
| Extended with Full Shroud | | ALFW-0600 | AOLFW-0600 |
| ø29mm/ø40mm Mushroom | | ALW3-0600 | AOLW3-0600 |
| Square/Extended | | ALQW-2B0600 | AOLQW-2B0600 |

### Lenses

| Style | | Part Number | |
|---|---|---|---|
| | | Standard | Engravable |
| Round Extended | | ALW2LU-② | ALW2BLU-② |
| ø 29mm Mushroom Head* | | ALW3LU-② | ALW3BLU-② |
| ø 40mm Mushroom Head* | | ALW4LU-② | ALW4BLU-② |
| Square Extended | | — | ALQW2BLU-② |

1. In place of ②, specify the lens color code from table on the bottom right.
2. *Mushroom lens not available in yellow.
3. Standard lenses have ribbed pattern, Engravable lenses are smooth and include an engravable insert.

### Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 6V AC/DC | LSTD-6② |
| | 12V AC/DC | LSTD-1② |
| | 24V AC/DC | LSTD-2② |
| | 120V AC | LSTD-H2② |
| | 240V AC | LSTD-M4② |
| Incandescent | 6V AC/DC | IS-6 |
| | 12V AC/DC | IS-12 |
| | 24V AC/DC | IS-24 |

1. In place of ②, specify the LED color code.
2. The LED contains a current-limiting resistor and a protection diode.

### Lamp Circuit Components

| Style | Application | Part Number |
|---|---|---|
| Short Lamp Holder | **Used with** a Half-size Transformer and one contact block | TW-LH1 |
| Long Lamp Holder | **Used with** Full-size Transformer and two contact blocks<br>**Used with** Half-size Transformer and three contact blocks<br>**Used with** Full Voltage Adaptor and two contact blocks | TW-LH2 |
| Lead Holder | **Used with** TW-LH2 holder when using four contact blocks | HW-LH3 |

### ② LED/Lens Color Codes

| Color | Code | Color | Code |
|---|---|---|---|
| Amber | A | Blue | S |
| Green | G | White | W |
| Red | R | Yellow | Y |

Yellow LED not available. Use white LED.

## Illuminated Pushbuttons (Sub-Assembled) continued

### Contact Blocks

| Style | Part Number | |
|---|---|---|
| | 1NO | 1NC |
| Standard Exposed Screw | HW-C10<br>HW-C10R (early make) | HW-C01<br>HW-C01R (late break) |
| Fingersafe (IP20), CE marked | HW-F10<br>HW-F10R (early make) | HW-F01<br>HW-F01R (late break) |
| Dummy Block | TW-DB | |

1. Dummy blocks (no contacts) are used with an odd number of contact blocks.
2. Use of early and late break contacts creates a make before break function

### Transformers/Full Voltage Modules

| Style | Description | | Part Number |
|---|---|---|---|
| Full Size Transformer | Standard | 120V AC | TW-T126B |
| | | 240V AC | TW-T246B |
| | | 480V AC | TW-T486B |
| | Fingersafe | 120V AC | TW-F126B |
| | | 240V AC | TW-F246B |
| | | 480V AC | TW-F486B |
| Half Size Transformer | 120V AC | | TW-T126SB |
| | 240V AC | | TW-T246SB |
| Full voltage model (use with even number of contacts) | Standard | | TW-DA1B |
| | Fingersafe | | TW-DA1FB |
| Full voltage model (use with odd number of contacts) | Standard | | HW-DA1B |
| | Fingersafe | | HW-DA1FB |

All Transformers step down to 6V (use 6V lamp).

## Non-Illuminated Selector Switches (Assembled)

### Assembled Selector Switches

**A S W 3 (1) (L) 20 (N) – 304**

**Function**

S: Selector Switch

**Series Designation**

W: TW Series

**Number of Positions**

2: 2-Position
3: 3-Position
4: 4-Position
5: 5-Position

**Spring Return Action**

Blank: Maintained
1: Spring return from Right (2 or 3 position)
2: Spring return from Left (2 or 3 position)
3: 2-Way spring return from Left and Right (3 position only)

**Circuit Number**

(Standard circuits shown on following pages and 697.)

**Contacts Terminal Style**

Blank: standard
N: Fingersafe (IP20)

**Contact Arrangement Code**

| | |
|---|---|
| 10: 1NO | 01: 1NC |
| 20: 2NO | 02: 2NC |
| 40: 4NO | 04: 4NC |
| 11: 1NO-1NC | 22: 2NO-2NC |

**Operator Style Code**

Blank: Knob Operator
L: Lever Operator
K: Key Operator

1. Use only when interpreting part numbers. Do not use for developing part numbers.
2. Custom contact configurations available.
3. Custom key removable codes available.
4. Portions of part number inside ( ) are optional.

## Non-Illuminated Selector Switches (Assembled) continued

### 2-Position Selector Switches

| Style | | | | | Part Number | | |
|---|---|---|---|---|---|---|---|
| Contact | Mounting | Operator Position L | Operator Position R | | Maintained | Spring Return from Right | Spring Return from Left |
| | | ↖ | ↗ | | L R | L R | L R |
| 1NO | 1<br>2 | O<br>O | X<br>O | Knob<br>Lever<br>Key | ASW210<br>ASW2L10<br>ASW2K10 | ASW2110<br>ASW21L10<br>ASW21K10 | ASW2210<br>ASW22L10<br>ASW22K10 |
| 1NC | 1<br>2 | X<br>O | O<br>O | Knob<br>Lever<br>Key | ASW201-116<br>ASW2L01-116<br>ASW2K01-116 | ASW2101-116<br>ASW21L01-116<br>ASW21K01-116 | ASW2201-116<br>ASW22L01-116<br>ASW22K01-116 |
| 1NO<br>1NC | 1<br>2 | X<br>O | O<br>X | Knob<br>Lever<br>Key | ASW211<br>ASW2L11<br>ASW2K11 | ASW2111<br>ASW21L11<br>ASW21K11 | ASW2211<br>ASW22L11<br>ASW22K11 |
| 2NO | 1<br>2 | O<br>O | X<br>X | Knob<br>Lever<br>Key | ASW220<br>ASW2L20<br>ASW2K20 | ASW2120<br>ASW21L20<br>ASW21K20 | ASW2220<br>ASW22L20<br>ASW22K20 |
| 2NC | 1<br>2 | X<br>X | O<br>O | Knob<br>Lever<br>Key | ASW202-104<br>ASW2L02-104<br>ASW2K02-104 | ASW2102-104<br>ASW21L02-104<br>ASW21K02-104 | ASW2202-104<br>ASW22L02-104<br>ASW22K02-104 |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | O<br>X<br>O<br>X | X<br>O<br>X<br>O | Knob<br>Lever<br>Key | ASW222<br>ASW2L22<br>ASW2K22 | ASW2122<br>ASW21L22<br>ASW21K22 | ASW2222<br>ASW22L22<br>ASW22K22 |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | O<br>O<br>X<br>X | X<br>X<br>O<br>O | Knob<br>Lever<br>Key | ASW222-111<br>ASW2L22-111<br>ASW2K22-111 | ASW2122-111<br>ASW21L22-111<br>ASW21K22-111 | ASW2222-111<br>ASW22L22-111<br>ASW22K22-111 |

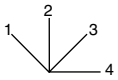
## Non-Illuminated Selector Switches (Assembled) continued

### 3-Position Selector Switches

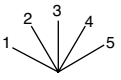
| Style | | | | | | Part Number | | | |
|---|---|---|---|---|---|---|---|---|---|
| Contact | Mounting | Operator Position L | Operator Position C | Operator Position R | | Maintained | Spring Return from Right | Spring Return from Left | Spring Return Two-Way |
| | | | | | | | | | |
| 2NO | 1<br>2 | X<br>0 | 0<br>0 | 0<br>X | Knob<br>Lever<br>Key | ASW320<br>ASW3L20<br>ASW3K20 | ASW3120<br>ASW31L20<br>ASW31K20 | ASW3220<br>ASW32L20<br>ASW32K20 | ASW3320<br>ASW33L20<br>ASW33K20 |
| 2NC | 1<br>2 | 0<br>X—X | X—X | X<br>0 | Knob<br>Lever<br>Key | ASW302<br>ASW3L02<br>ASW3K02 | ASW3102<br>ASW31L02<br>ASW31K02 | ASW3202<br>ASW32L02<br>ASW32K02 | ASW3302<br>ASW33L02<br>ASW33K02 |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | X<br>0<br>0<br>X—X | 0<br>0<br>X—X | 0<br>X<br>X<br>0 | Knob<br>Lever<br>Key | ASW322<br>ASW3L22<br>ASW3K22 | ASW3122<br>ASW31L22<br>ASW31K22 | ASW3222<br>ASW32L22<br>ASW32K22 | ASW3322<br>ASW33L22<br>ASW33K22 |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | X<br>X—X<br>0<br>0 | 0<br>X<br>X<br>0 | X<br>0<br>0<br>X | Knob<br>Lever<br>Key | ASW322-309<br>ASW3L22-309<br>ASW3K22-309 | ASW3122-309<br>ASW31L22-309<br>ASW31K22-309 | ASW3222-309<br>ASW32L22-309<br>ASW32K22-309 | ASW3322-309<br>ASW33L22-309<br>ASW33K22-309 |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | 0<br>0<br>0<br>0 | X<br>0<br>X<br>0 | 0<br>X<br>0<br>X | Knob<br>Lever<br>Key | ASW322-310<br>ASW3L22-310<br>ASW3K22-310 | ASW3122-310<br>ASW31L22-310<br>ASW31K22-310 | ASW3222-310<br>ASW32L22-310<br>ASW32K22-310 | ASW3322-310<br>ASW33L22-310<br>ASW33K22-310 |
| 4NO | 1<br>2<br>3<br>4 | X<br>0<br>X<br>0 | 0<br>0<br>0<br>0 | 0<br>X<br>0<br>X | Knob<br>Lever<br>Key | ASW340<br>ASW3L40<br>ASW3K40 | ASW3140<br>ASW31L40<br>ASW31K40 | ASW3240<br>ASW32L40<br>ASW32K40 | ASW3340<br>ASW33L40<br>ASW33K40 |
| 4NC | 1<br>2<br>3<br>4 | 0<br>X—X<br>0<br>X—X | X—X<br>X—X<br>X—X | X<br>0<br>X<br>0 | Knob<br>Lever<br>Key | ASW304<br>ASW3L04<br>ASW3K04 | ASW3104<br>ASW31L04<br>ASW31K04 | ASW3204<br>ASW32L04<br>ASW32K04 | ASW3304<br>ASW33L04<br>ASW33K04 |

1. The truth table indicates the operating position of contact block when the operator is switched to that position.
   X = On (closed contacts)
   0 = Off (open contacts)
   X—X = Overlapping Contacts: Remain on (closed contacts) when switch is moved between these two positions.
2. All knob and lever selector switches come in black. Other colors are available by ordering the knob or lever separately.
3. Every key selector switch uses an identical key. The key is removable in any maintained position.
4. Custom contact configurations are available, see page 697.

### 4-Position Selector Switch

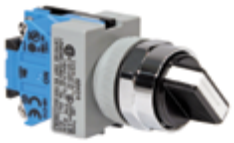
| Style | | | | | | | Maintained |
|---|---|---|---|---|---|---|---|
| Contact | Mounting | Operator Position 1 | Operator Position 2 | Operator Position 3 | Operator Position 4 | | Part Number |
| | | | | | | |  |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | X<br>0<br>0<br>0 | 0<br>X<br>0<br>0 | 0<br>0<br>X<br>0 | 0<br>0<br>0<br>X | Knob<br>Lever | ASW422-411<br>ASW4L22-411 |

### 5-Position Selector Switch

| Style | | | | | | | | Maintained |
|---|---|---|---|---|---|---|---|---|
| Contact | Mounting | Operator Position 1 | Operator Position 2 | Operator Position 3 | Operator Position 4 | Operator Position 5 | | Part Number |
| | | | | | | | |  |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | X<br>0<br>0<br>0 | 0<br>X<br>0<br>0 | 0<br>0<br>0<br>0 | 0<br>0<br>X<br>0 | 0<br>0<br>0<br>X | Knob<br>Lever | ASW522-501<br>ASW5L22-501 |

## Non-Illuminated Selector Switches (Sub-Assembled)

| Contact Blocks | + | Operator | + | Knob or Lever* | + | Color Insert* | = | Complete Part† |
|---|---|---|---|---|---|---|---|---|



1. *Not needed with key type switches.
2. †Knob type shown.

### Operators

| Style | Positions | Description | Part Number |
|---|---|---|---|
| Knob/Lever | 2 | Maintained | ASW200 |
| | | Spring return from right | ASW2100 |
| | | Spring return from left | ASW2200 |
| | 3 | Maintained, Cam 1<br>Maintained, Cam 2<br>Maintained, Cam 3 | ASW300-1<br>ASW300-2<br>ASW300-3 |
| | | Spring return from right, Cam 1<br>Spring return from right, Cam 2 | ASW3100-1<br>ASW3100-2 |
| | | Spring return from left, Cam 1<br>Spring return from left, Cam 2 | ASW3200-1<br>ASW3200-2 |
| | | Spring return from left/right, Cam 1<br>Spring return from left/right, Cam 2 | ASW3300-1<br>ASW3300-2 |
| | 4 | Maintained, Standard Cam<br>Maintained, Cam 1 | ASW400<br>ASW400-1 |
| | 5 | Maintained, Standard cam<br>Maintained, Cam 1 | ASW500<br>ASW500-1 |
| Key | 2 | Maintained | ASW2K00 |
| | | Spring return from right | ASW21K00 |
| | | Spring return from left | ASW22K00 |
| | 3 | Maintained, Cam 1<br>Maintained, Cam 2<br>Maintained, Cam 3 | ASW3K00-1<br>ASW3K00-2<br>ASW3K00-3 |
| | | Spring return from right, Cam 1<br>Spring return from right, Cam 2 | ASW31K00-1<br>ASW31K00-2 |
| | | Spring return from left, Cam 1<br>Spring return from left, Cam 2 | ASW32K00-1<br>ASW32K00-2 |
| | | Spring return from left/right, Cam 1<br>Spring return from left/right, Cam 2 | ASW33K00-1<br>ASW33K00-2 |

1. Two keys are supplied with every key switch, all are keyed alike, and removable from any maintained position.
2. Locking rings are included with all operators. Order knobs, levers, and color inserts separately.
3. Different cams produce different contact actions. For details, see page 697.
4. Key switch operator supplied with black sleeve.

### ① Handle/Insert Color Codes

| Color | Code |
|---|---|
| Black* | B |
| Blue | S |
| Green | G |
| Red | R |
| Yellow | Y |
| White† | W |

*Color inserts not available in black.
†Knob and lever not available in white.

### Replacement Parts

| | |
|---|---|
| Key Switch Black Sleeve | AKW2B-B |

### Handles and Inserts

| Style | | Part Number |
|---|---|---|
| Knob | | ASWHHY-① |
| Lever | | ASWHHL-① |
| Color Insert | | TW-HC1-① |

### Contact Blocks

| Style | Part Number | |
|---|---|---|
| | 1NO | 1NC |
| Standard Exposed Screw | HW-C10<br>HW-C10R (early make) | HW-C01<br>HW-C01R (late break) |
| Fingersafe (IP20), CE marked | HW-F10<br>HW-F10R (early make) | HW-F01<br>HW-F01R (late break) |
| Dummy Block | TW-DB | |

1. Push rod color code:
   Green = NO contact block
   Red = NC contact block.
2. Dummy blocks (no contacts) are used with an odd number of contact blocks.

## Illuminated Selector Switches (Assembled)

### Assembled Illuminated Selector Switches

**A SL W 2 (2) 99 11 (D) (N) – (103) – R – (24V)**

**Function**

SL:Illuminated Selector Switch

**Series Designation**

W: TW series

**Number of Positions**

2: 2-Position
3: 3-Position

**Spring Return Action**

Blank: Maintained
1: Spring return from Right
2: Spring return from Left
3: Two-Way spring return from Left and Right

**Illumination Circuit**

99: Full Voltage (lamp determines voltage)
126: 120V AC Step Down Transformer
246: 240V AC Step Down Transformer
486: 480V AC Step Down Transformer

**Lamp Voltage**

(Full Voltage Units Only)

6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120V AC (LED only)
240V: 240V AC (LED only)

**Lens Color Code**

A: Amber
G: Green
R: Red
S: Blue
W: White
Y: Yellow

**Contact Circuit Number**

Standard circuits are listed on the following pages and 697.

**Contact Terminal Style**

Blank: Standard
N: Fingersafe

**Lamp Type**

Blank: Incandescent Lamp
D: LED Lamp

**Contact Arrangement**

| | |
|---|---|
| 10: 1NO | 01: 1NC |
| 20: 2NO | 02: 2NC |
| 40: 4NO | 04: 4NC |
| 11: 1NO-1NC | 22: 2NO-2NC |

1. Use only when interpreting part numbers. Do not use for developing part numbers.
2. All transformers step down to 6V (use 6V lamp).

# Illuminated Selector Switches(Assembled) continued

## Illuminated 2-Position Selector Switches

| Style | | | | | Part Number | | |
|---|---|---|---|---|---|---|---|
| Contact | Mounting | Operator Position L | Operator Position R | Lamp Circuit Type | Maintained | Spring Return from Right | Spring Return from Left |
| | | | | | L R | L R | L R |
| 1NO<br>1NC | 1<br>2 | 0<br>X | X<br>0 | Transformer<br>Full Voltage | ASLW2 ① 11④-②<br>ASLW29911④-②-③ | ASLW21 ① 11④-②<br>ASLW219911④-②-③ | ASLW22 ① 11④-②<br>ASLW229911④-②-③ |
| 2NO | 1<br>2 | 0<br>0 | X<br>X | Transformer<br>Full Voltage | ASLW2 ① 20④-②<br>ASLW29920④-②-③ | ASLW21 ① 20④-②<br>ASLW219920④-②-③ | ASLW22 ① 20④-②<br>ASLW229920④-②-③ |
| 2NC | 1<br>2 | X<br>X | 0<br>0 | Transformer<br>Full Voltage | ASLW2 ① 02④-104-②<br>ASLW29902④-104-②-③ | ASLW21 ① 02④-104-②<br>ASLW219902④-104-②-③ | ASLW22 ① 02④-104-②<br>ASLW229902④-104-②-③ |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | 0<br>X<br>0<br>X | X<br>0<br>X<br>0 | Transformer<br>Full Voltage | ASLW2 ① 22④-②<br>ASLW29922④-②-③ | ASLW21 ① 22④-②<br>ASLW219922④-②-③ | ASLW22 ① 22④-②<br>ASLW229922④-②-③ |

### ① Transformer Voltage Codes

| Voltage | Code |
|---|---|
| 120VAC | 126 |
| 240VAC | 246 |
| 480VAC | 486 |

Transformers step down to 6V (use 6V lamp).

### ② LED/Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

## Illuminated 3-Position Selector Switches, Maintained and Spring Return from Right

| Style | | | | | | Part Number | | | |
|---|---|---|---|---|---|---|---|---|---|
| Contact | Mounting | Operator Position L | Operator Position C | Operator Position R | Lamp Circuit Type | Maintained | Spring Return From Right | Spring Return from Left | Spring Return Two-Way |
| | | | | | | L C R | L C R | L C R | L C R |
| 2NO | 1<br>2 | X<br>0 | 0<br>0 | 0<br>X | Transformer<br>Full Voltage | ASLW3 ① 20④-②<br>ASLW39920④-②-③ | ASLW31 ① 20④-②<br>ASLW319920④-②-③ | ASLW32 ① 20④-②<br>ASLW329920④-②-③ | ASLW33 ① 20④-②<br>ASLW339920④-②-③ |
| 2NC | 1<br>2 | 0<br>X | X<br>X | X<br>0 | Transformer<br>Full Voltage | ASLW3 ① 02④-②<br>ASLW39902④-②-③ | ASLW31 ① 02④-②<br>ASLW319902④-②-③ | ASLW32 ① 02④-②<br>ASLW329902④-②-③ | ASLW33 ① 02④-②<br>ASLW339902④-②-③ |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | X<br>0<br>0<br>X | 0<br>0<br>X<br>X | 0<br>X<br>X<br>0 | Transformer<br>Full Voltage | ASLW3 ① 22④-②<br>ASLW39922④-②-③ | ASLW31 ① 22④-②<br>ASLW319922④-②-③ | ASLW32 ① 22④-②<br>ASLW329922④-②-③ | ASLW33 ① 22④-②<br>ASLW339922④-②-③ |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | X<br>X<br>0<br>0 | 0<br>X<br>X<br>0 | X<br>0<br>0<br>X | Transformer<br>Full Voltage | ASLW3 ① 22④-309-②<br>ASLW39922④-309-②-③ | ASLW31 ① 22④-309-②<br>ASLW319922④-309-②-③ | ASLW32 ① 22④-309-②<br>ASLW329922④-309-②-③ | ASLW33 ① 22④-309-②<br>ASLW339922④-309-②-③ |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | 0<br>0<br>0<br>0 | X<br>0<br>X<br>0 | 0<br>X<br>0<br>X | Transformer<br>Full Voltage | ASLW3 ① 22④-310-②<br>ASLW39922④-310-②-③ | ASLW31 ① 22④-310-②<br>ASLW319922④-310-②-③ | ASLW32 ① 22④-310- ②<br>ASLW329922④-310- ② -③ | ASLW33 ① 22④-310-②<br>ASLW339922④-310-②-③ |
| 4NO | 1<br>2<br>3<br>4 | X<br>0<br>X<br>0 | 0<br>0<br>0<br>0 | 0<br>X<br>0<br>X | Transformer<br>Full Voltage | ASLW3 ① 40④-②<br>ASLW39940④-②-③ | ASLW31 ① 40④-②<br>ASLW319940④-②-③ | ASLW32 ① 40④-②<br>ASLW329940④-②-③ | ASLW33 ① 40④-②<br>ASLW339940④-②-③ |
| 4NC | 1<br>2<br>3<br>4 | 0<br>X<br>0<br>X | X<br>X<br>X<br>X | X<br>0<br>X<br>0 | Transformer<br>Full Voltage | ASLW3 ① 04④-②<br>ASLW39904④-②-③ | ASLW31 ① 04④-②<br>ASLW319904④-②-③ | ASLW32 ① 04④-②<br>ASLW329904④-②-③ | ASLW33 ① 04④-②<br>ASLW339904④-②-③ |

1. In place of ①, specify the Transformer Voltage Code.
2. In place of ②, specify the Lens/LED Color Code.
3. In place of ③, specify the Full Voltage Code.
4. In place of ④ specify Lamp Type Code
5. For custom contact configurations, see page 697.
6. Light is independent of switch position.
7. Yellow selector switch comes with white LED.

### ③ Full Voltage Codes

| Voltage | Code |
|---|---|
| 6V AC/DC | 6V |
| 12V AC/DC | 12V |
| 24V AC/DC | 24V |
| 120V AC | 120V (LED only) |
| 240V AC | 240V (LED only) |

### ④ Lamp Type Codes

| Lamp | Code |
|---|---|
| Incandescent | Blank |
| LED | D |

## Illuminated Selector Switches (Sub-Assembled)

| Transformer* | + | Contact Block | + | Operator | + | Lamp/Lead Holder† | + | Lamp | + | Lens | = | Complete Part |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

*Full voltage units use a full voltage adaptor (TW-DA1B) instead of a transformer.
†Lamp holder is not included with operators, order separately.
Lead holder is used when using 3 or more contact blocks. Order separately.

### Operators

| Style | Positions | Description | Part Number |
|---|---|---|---|
| | 2 | Maintained | ASLW200 |
| | | Spring return from right | ASLW2100 |
| | | Spring return from left | ASLW2200 |
| | 3 | Maintained, cam 1<br>Maintained, cam 2<br>Maintained, cam 3 | ASLW300-1 |
| | | | ASLW300-2 |
| | | | ASLW300-3 |
| | | Spring return from right, cam 1<br>Spring return from right, cam 2 | ASLW3100-1 |
| | | | ASLW3100-2 |
| | | Spring return from left, cam 1<br>Spring return from left, cam 2 | ASLW3200-1 |
| | | | ASLW3200-2 |
| | | Spring return from left/right, cam 1<br>Spring return from left/right, cam 2 | ASLW3300-1 |
| | | | ASLW3300-2 |

Different cams produce different contact action. For details, see Contact Arrangements on page 697.

### Lenses (Knobs)

| Style | | Part Number |
|---|---|---|
| Knob | | ASLWLU-② |

In place of ②, specify the lens color code from table.

### Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 6V AC/DC | LSTD-6② |
| | 12V AC/DC | LSTD-1② |
| | 24V AC/DC | LSTD-2② |
| | 120V AC | LSTD-H2② |
| | 240V AC | LSTD-M4② |
| Incandescent | 6V AC/DC | IS-6 |
| | 12V AC/DC | IS-12 |
| | 24V AC/DC | IS-24 |

1. In place of ②, specify the LED color code.
2. The LED contains a current-limiting resistor and a protection diode.

### ② LED/Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

Yellow LED not available. Use white LED

# Illuminated Selector Switches (Sub-Assembled) continued

## Contact Blocks

| Style | Part Number | |
|---|---|---|
| | 1NO | 1NC |
| Standard Exposed Screw | HW-C10<br>HW-C10R (early make) | HW-C01<br>HW-C01R (late break) |
| Fingersafe (IP20), CE marked | HW-F10<br>HW-F10R (early make) | HW-F01<br>HW-F01R (late break) |
| Dummy Block | TW-DB | |

1. Dummy blocks (no contacts) are used with an odd number of contact blocks.
2. Use of early and late break contacts creates a make before break function

## Lamp Circuit Components

| Style | Application | Part Number |
|---|---|---|
| Short Lamp Holder | **Used with** a Half-size Transformer and one contact block | TW-LH1 |
| Long Lamp Holder | **Used with** Full-size Transformer and two contact blocks<br>**Used with** Half-size Transformer and three contact blocks<br>**Used with** Full Voltage Adaptor and two contact blocks | TW-LH2 |
| Lead Holder | **Used with** TW-LH2 holder when using four contact blocks | HW-LH3 |

## Transformers/Full Voltage Modules

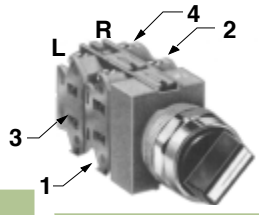
| Style | Description | | Part Number |
|---|---|---|---|
| Full Size Transformer | Standard | 120V AC | TW-T126B |
| | | 240V AC | TW-T246B |
| | | 480V AC | TW-T486B |
| | Fingersafe | 120V AC | TW-F126B |
| | | 240V AC | TW-F246B |
| | | 480V AC | TW-F486B |
| Half Size Transformer | 120V AC | | TW-T126SB |
| | 240V AC | | TW-T246SB |
| Full voltage model (use with even number of contacts) | Standard | | TW-DA1B |
| | Fingersafe | | TW-DA1FB |
| Full voltage model (use with odd number of contacts) | Standard | | HW-DA1B |
| | Fingersafe | | HW-DA1FB |

All Transformers step down to 6V (use 6V lamp).

## Contact Arrangement Charts

**How to Read Contact Arrangement Charts**

To determine contact block mounting position, first make sure the selector switch is oriented as shown on the right




**Contact Arrangement**
Type and quantity of switch contacts

**Circuit Number**
* N/D = No designation required

**Contact Block Mounting Position**
Position or mounting contact blocks on operator

**Operator Position**
Truth table indicates the operating position of contact block when operator is switched to that position.

**Contact Block Part Number**
Part number to use when ordering sub-assembly contact blocks, as required for use with corresponding mounting position

### Contact Arrangement Chart: 2-Position Selector Switches

| Style | | Mounting Position | Operator Position | | Contact Block Part Number | Description | Operator Part Number | | |
|---|---|---|---|---|---|---|---|---|---|
| Contact | Circuit Number | | L | R | | | Maintained | Spring Ret. from Rt. | Spring Ret. from Lt. |
| | | | | | | | | | |
| 1NO | N/D | 1 | O | X | HW-C10 | Knob/Lever Key Illuminated Knob | ASW200 ASW2K00 ASLW200 | ASW2100 ASW21K00 ASLW2100 | ASW2200 ASW22K00 ASLW2200 |
| | | 2 | O | O | TW-DB | | | | |
| 1NC | 116 | 1 | X | O | HW-C01 | Knob/Lever Key Illuminated Knob | ASW200 ASW2K00 ASLW200 | ASW2100 ASW21K00 ASLW2100 | ASW2200 ASW22K00 ASLW2200 |
| | | 2 | O | O | TW-DB | | | | |
| 1NO 1NC | N/D | 1 | O | X | HW-C10 | Knob/Lever Key Illuminated Knob | ASW200 ASW2K00 ASLW200 | ASW2100 ASW21K00 ASLW2100 | ASW2200 ASW22K00 ASLW2200 |
| | | 2 | X | O | HW-C01 | | | | |
| | 103 | 1 | X | O | HW-C01 | Knob/Lever Key Illuminated Knob | ASW200 ASW2K00 ASLW200 | ASW2100 ASW21K00 ASLW2100 | ASW2200 ASW22K00 ASLW2200 |
| | | 2 | O | X | HW-C10 | | | | |
| 1NO-EM 1NC-LB | 600 | 1 | O | X | HW-C10R | Knob/Lever Key Illuminated Knob | ASW200 ASW2K00 ASLW200 | ASW2100 ASW21K00 ASLW2100 | ASW2200 ASW22K00 ASLW2200 |
| | | 2 | X | O | HW-C01R | | | | |
| | 601 | 1 | X | O | HW-C01R | Knob/Lever Key Illuminated Knob | ASW200 ASW2K00 ASLW200 | ASW2100 ASW21K00 ASLW2100 | ASW2200 ASW22K00 ASLW2200 |
| | | 2 | O | X | HW-C10R | | | | |
| 2NO | N/D | 1 | O | X | HW-C10 | Knob/Lever Key Illuminated Knob | ASW200 ASW2K00 ASLW200 | ASW2100 ASW21K00 ASLW2100 | ASW2200 ASW22K00 ASLW2200 |
| | | 2 | O | X | HW-C10 | | | | |
| 2NC | 104 | 1 | X | O | HW-C01 | Knob/Lever Key Illuminated Knob | ASW200 ASW2K00 ASLW200 | ASW2100 ASW21K00 ASLW2100 | ASW2200 ASW22K00 ASLW2200 |
| | | 2 | X | O | HW-C01 | | | | |
| 2NO 2NC | N/D | 1 | O | X | HW-C10 | Knob/Lever Key Illuminated Knob | ASW200 ASW2K00 ASLW200 | ASW2100 ASW21K00 ASLW2100 | ASW2200 ASW22K00 ASLW2200 |
| | | 2 | X | O | HW-C01 | | | | |
| | | 3 | O | X | HW-C10 | | | | |
| | | 4 | X | O | HW-C01 | | | | |
| | 111 | 1 | O | X | HW-C10 | Knob/Lever Key Illuminated Knob | ASW200 ASW2K00 ASLW200 | ASW2100 ASW21K00 ASLW2100 | ASW2200 ASW22K00 ASLW2200 |
| | | 2 | O | X | HW-C10 | | | | |
| | | 3 | X | O | HW-C01 | | | | |
| | | 4 | X | O | HW-C01 | | | | |

1. NO-EM, NC-LB = Early Make, Late Break.
   N/D = No circuit number designation required in assembled selector switch part number.
2. X = On (closed contacts) O = Off (Open contacts)

## Contact Arrangement Chart: 3-Position Selector Switches

| Style | | Mounting Position | Operator Position | | | Contact Block Part Number | Description | Operator Part Number | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Contact | Circuit Number | | L | C | R | | | Maintained | Spring Return from Right | Spring Return from Left | Two-Way |
| 1NO 1NC | 202 | 1 | X | 0 | 0 | HW-C10 | Knob/Lever Key Illuminated Knob | ASW300-1 ASW3K00-1 ASLW300-1 | ASW3100-1 ASW31K00-1 ASLW3100-1 | ASW3200-1 ASW32K00-1 ASLW3200-1 | ASW3300-1 ASW33K00-1 ASLW3300-1 |
| | | 2 | X—X | | 0 | HW-C01 | | | | | |
| | 203 | 1 | 0 | X—X | | HW-C01 | | | | | |
| | | 2 | 0 | 0 | X | HW-C10 | | | | | |
| | 302 | 1 | X | 0 | X | HW-C10 | Knob/Lever Key Illuminated Knob | ASW300-2 ASW3K00-2 ASLW300-2 | ASW3100-2 ASW31K00-2 ASLW3100-2 | ASW3200-2 ASW32K00-2 ASLW3200-2 | ASW3300-2 ASW33K00-2 ASLW3300-2 |
| | | 2 | X—X | | 0 | HW-C01 | | | | | |
| | 303 | 1 | 0 | X | 0 | HW-C01 | | | | | |
| | | 2 | 0 | 0 | X | HW-C10 | | | | | |
| 2NO | N/D | 1 | X | 0 | 0 | HW-C10 | Knob/Lever Key Illuminated Knob | ASW300-1 ASW3K00-1 ASLW300-1 | ASW3100-1 ASW31K00-1 ASLW3100-1 | ASW3200-1 ASW32K00-1 ASLW3200-1 | ASW3300-1 ASW33K00-1 ASLW3300-1 |
| | | 2 | 0 | 0 | X | HW-C10 | | | | | |
| | 301 | 1 | X | 0 | X | HW-C10 | Knob/Lever Key Illuminated Knob | ASW300-2 ASW3K00-2 ASLW300-2 | ASW3100-2 ASW31K00-2 ASLW3100-2 | ASW3200-2 ASW32K00-2 ASLW3200-2 | ASW3300-2 ASW33K00-2 ASLW3300-2 |
| | | 2 | 0 | 0 | X | HW-C10 | | | | | |
| 2NC | 304 | 1 | 0 | X | 0 | HW-C01 | Knob/Lever Key Illuminated Knob | ASW300-2 ASW3K00-2 ASLW300-2 | ASW3100-2 ASW31K00-2 ASLW3100-2 | ASW3200-2 ASW32K00-2 ASLW3200-2 | ASW3300-2 ASW33K00-2 ASLW3300-2 |
| | | 2 | X—X | | 0 | HW-C01 | | | | | |
| | N/D | 1 | 0 | X—X | | HW-C01 | Knob/Lever Key Illuminated Knob | ASW300-1 ASW3K00-1 ASLW300-1 | ASW3100-1 ASW31K00-1 ASLW3100-1 | ASW3200-1 ASW32K00-1 ASLW3200-1 | ASW3300-1 ASW33K00-1 ASLW3300-1 |
| | | 2 | X—X | | 0 | HW-C01 | | | | | |
| 2NO 2NC | N/D | 1 | X | 0 | 0 | HW-C10 | Knob/Lever Key Illuminated Knob | ASW300-1 ASW3K00-1 ASLW300-1 | ASW3100-1 ASW31K00-1 ASLW3100-1 | ASW3200-1 ASW32K00-1 ASLW3200-1 | ASW3300-1 ASW33K00-1 ASLW3300-1 |
| | | 2 | 0 | 0 | X | HW-C10 | | | | | |
| | | 3 | 0 | X—X | | HW-C01 | | | | | |
| | | 4 | X—X | | 0 | HW-C01 | | | | | |
| | 210 | 1 | 0 | X | X | HW-C01 | Knob/Lever Key Illuminated Knob | ASW300-1 ASW3K00-1 ASLW300-1 | ASW3100-1 ASW31K00-1 ASLW3100-1 | ASW3200-1 ASW32K00-1 ASLW3200-1 | ASW3300-1 ASW33K00-1 ASLW3300-1 |
| | | 2 | 0 | 0—X | | HW-C10 | | | | | |
| | | 3 | 0 | X—X | | HW-C01 | | | | | |
| | | 4 | 0 | 0 | X | HW-C10 | | | | | |
| | 308 | 1 | X | 0 | X | HW-C10 | Knob/Lever Key Illuminated Knob | ASW300-2 ASW3K00-2 ASLW300-2 | ASW3100-2 ASW31K00-2 ASLW3100-2 | ASW3200-2 ASW32K00-2 ASLW3200-2 | ASW3300-2 ASW33K00-2 ASLW3300-2 |
| | | 2 | X—X | | 0 | HW-C01 | | | | | |
| | | 3 | X | 0 | X | HW-C10 | | | | | |
| | | 4 | X—X | | 0 | HW-C01 | | | | | |
| | 309 | 1 | X | 0 | X | HW-C10 | Knob/Lever Key Illuminated Knob | ASW300-2 ASW3K00-2 ASLW300-2 | ASW3100-2 ASW31K00-2 ASLW3100-2 | ASW3200-2 ASW32K00-2 ASLW3200-2 | ASW3300-2 ASW33K00-2 ASLW3300-2 |
| | | 2 | X—X | | 0 | HW-C01 | | | | | |
| | | 3 | 0 | X | 0 | HW-C01 | | | | | |
| | | 4 | 0 | 0 | X | HW-C10 | | | | | |
| | 310 | 1 | 0 | X | 0 | HW-C01 | Knob/Lever Key Illuminated Knob | ASW300-2 ASW3K00-2 ASLW300-2 | ASW3100-2 ASW31K00-2 ASLW3100-2 | ASW3200-2 ASW32K00-2 ASLW3200-2 | ASW3300-2 ASW33K00-2 ASLW3300-2 |
| | | 2 | 0 | 0 | X | HW-C10 | | | | | |
| | | 3 | 0 | X | 0 | HW-C01 | | | | | |
| | | 4 | 0 | 0 | X | HW-C10 | | | | | |

1. Each operator sub-assembly is available as a "-1" and a "-2" for 3-position selector switches. The internal cam of a "-1" is different from that of a "-2". This results in designated combinations of open and closed contacts in the various operator positions.
2. N/D = No circuit number designation required in assembled part number.
3. X = On (closed contacts) 0 = Off (open contacts). X X Overlapping contacts remain on (closed) when switch is moved between these two positions.

## Contact Arrangement Chart: 3-Position Selector Switches

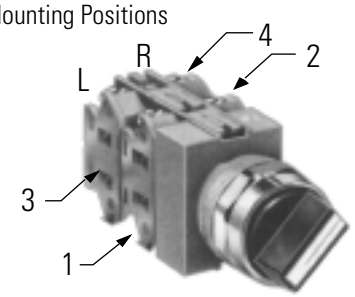
| Style | | Mounting Position | Operator Position | | | Contact Block Part Number | Description | Operator Part Number | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Contact | Circuit Number | | L | C | R | | | Maintained | Spring Return from Right | Spring Return from Left | Two-Way |
| 4NO | N/D | 1 | X | 0 | 0 | HW-C10 | Knob/Lever<br>Key<br>Illuminated Knob | ASW300-1<br>ASW3K00-1<br>ASLW300-1 | ASW3100-1<br>ASW31K00-1<br>ASLW3100-1 | ASW3200-1<br>ASW32K00-1<br>ASLW3200-1 | ASW3300-1<br>ASW33K00-1<br>ASLW3300-1 |
| | | 2 | 0 | 0 | X | HW-C10 | | | | | |
| | | 3 | X | 0 | 0 | HW-C10 | | | | | |
| | | 4 | 0 | 0 | X | HW-C10 | | | | | |
| | 305 | 1 | X | 0 | X | HW-C10 | Knob/Lever<br>Key<br>Illuminated Knob | ASW300-2<br>ASW3K00-2<br>ASLW300-2 | ASW3100-2<br>ASW31K00-2<br>ASLW3100-2 | ASW3200-2<br>ASW32K00-2<br>ASLW3200-2 | ASW3300-2<br>ASW33K00-2<br>ASLW3300-2 |
| | | 2 | 0 | 0 | X | HW-C10 | | | | | |
| | | 3 | X | 0 | X | HW-C10 | | | | | |
| | | 4 | 0 | 0 | X | HW-C10 | | | | | |
| 4NC | N/D | 1 | 0 | X—X | | HW-C01 | Knob/Lever<br>Key<br>Illuminated Knob | ASW300-1<br>ASW3K00-1<br>ASLW300-1 | ASW3100-1<br>ASW31K00-1<br>ASLW3100-1 | ASW3200-1<br>ASW32K00-1<br>ASLW3200-1 | ASW3300-1<br>ASW33K00-1<br>ASLW3300-1 |
| | | 2 | X—X | | 0 | HW-C01 | | | | | |
| | | 3 | 0 | X—X | | HW-C01 | | | | | |
| | | 4 | X—X | | 0 | HW-C01 | | | | | |
| | 314 | 1 | 0 | X | 0 | HW-C01 | Knob/Lever<br>Key<br>Illuminated Knob | ASW300-2<br>ASW3K00-2<br>ASLW300-2 | ASW3100-2<br>ASW31K00-2<br>ASLW3100-2 | ASW3200-2<br>ASW32K00-2<br>ASLW3200-2 | ASW3300-2<br>ASW33K00-2<br>ASLW3300-2 |
| | | 2 | X—X | | 0 | HW-C01 | | | | | |
| | | 3 | 0 | X | 0 | HW-C01 | | | | | |
| | | 4 | X—X | | 0 | HW-C01 | | | | | |

1. Each operator sub-assembly is available as a "-1" and a "-2" for 3-position selector switches. The internal cam of a "-1" is different from that of a "-2". This results in designated combinations of open and closed contacts in the various operator positions.
2. N/D = No circuit number designation required in assembled part number.
3. X = On (closed contacts) O = Off (open contacts). X X Overlapping contacts remain on (closed) when switch is moved between these two positions.

## Custom Selector Switch Building Guide

To build a custom selector switch, follow these steps.

Mounting Positions




### Step 1

How many positions of the switch are needed?

# of positions
(2, 3, 4, 5)

### Step 2

How many contacts should there be?

# of isolated contacts
(maximum 6)

### Step 3

Fill in the Truth Table

(X = closed, 0 = open)

| | | Knob Position | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| Contacts | 1 | | | | | |
| | 2 | | | | | |
| | 3 | | | | | |
| | 4 | | | | | |
| | 5 | | | | | |
| | 6 | | | | | |

### Step 4

If building a 2 position selector, skip this step. (2 position selectors have only one cam)

If building a 3, 4, or 5 position selector, determine appropriate cam as follows:

- Look at Row 1 from above table and locate an identical row in the operator truth tables (See next page).
- Repeat for all rows. The user must find one operator that contains all rows from above table.
- Record the operator cam version.

### Step 5

Build by placing appropriate contact in appropriate mounting position for each desired row on operator cam truth table. “L” and “R” refer to mounting on left or right side of operator as viewed from the front of the panel.

### Step 6

Develop an assembly part number (if necessary) as follows: follow standard numbering nomenclature for selector switches (see pages 689 or 693. In place of the “Circuit Number” indicate the cam number and contact arrangement as such ASW322-3-OELCSS, where “3” is the cam number, and contact arrangement “OELCXX” calls out individual contact mounting locations in order (see diagram above). O=NO, C=NC, E=NO-EM, L=NC-LB, X= no contact. Part number must designate all 6 possible mounting locations.

Caution: Before putting any custom selector switch into use, the user should use an ohmmeter to test for desired performance.
1. For Operator Truth Tables, see next page.

# Operator Truth Tables

Use the following tables to build custom selector switches.

## 2 Position Selector Switches

| | Contact | Mounting Position | Operator Position | |
|---|---|---|---|---|
| | | | Left | Right |
| ASW200<br>ASLW200<br>ASW2K00 | HW-C10 (NO) | L | 0 | X |
| | | R | 0 | X |
| | HW-C01 (NC) | L | X | 0 |
| | | R | X | 0 |
| | HW-C10R (NO-EM) | L | 0 | X |
| | | R | 0 | X |
| | HW-C01R (NC-LB) | L | X | 0 |
| | | R | X | 0 |

## 3 Position Selector Switches

| | Contact | Mounting Position | Operator Position | | |
|---|---|---|---|---|---|
| | | | Left | Center | Right |
| ASW300-1<br>ASW3K00-1<br>ASLW300-1 | HW-C10 (NO) | L | X | 0 | 0 |
| | | R | 0 | 0 | X |
| | HW-C01 (NC) | L | 0 | X | X |
| | | R | X | X | 0 |
| | HW-C10R (NO-EM) | L | X | 0 | 0 |
| | | R | 0 | 0 | X |
| | HW-C01R (NC-LB) | L | 0 | X | X |
| | | R | X | X | 0 |

| | Contact | Mounting Position | Operator Position | | |
|---|---|---|---|---|---|
| | | | Left | Center | Right |
| ASW300-2<br>ASW3K00-2<br>ASLW300-2 | HW-C10 (NO) | L | X | 0 | X |
| | | R | 0 | 0 | X |
| | HW-C01 (NC) | L | 0 | X | 0 |
| | | R | X | X | 0 |
| | HW-C10R (NO-EM) | L | X | 0 | X |
| | | R | 0 | 0 | X |
| | HW-C01R (NC-LB) | L | 0 | X | 0 |
| | | R | X | X | 0 |

| | Contact | Mounting Position | Operator Position | | |
|---|---|---|---|---|---|
| | | | Left | Center | Right |
| ASW300-3<br>ASW3K00-3<br>ASLW300-3 | HW-C10 (NO) | L | X | 0 | 0 |
| | | R | 0 | 0 | X |
| | HW-C01 (NC) | L | 0 | X | 0 |
| | | R | 0 | X | 0 |
| | HW-C10R (NO-EM) | L | X | 0 | X |
| | | R | X | 0 | X |
| | HW-C01R (NC-LB) | L | 0 | X | X |
| | | R | X | X | 0 |

## 4 Position Selector Switches

| | Contact | Mounting Position | Operator Position | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| ASW400 | HW-C10 (NO) | L | X | 0 | 0 | 0 |
| | | R | 0 | X | 0 | 0 |
| | HW-C01 (NC) | L | 0 | X | X | X |
| | | R | X | 0 | X | X |
| | HW-C10R (NO-EM) | L | X | 0 | 0 | 0 |
| | | R | 0 | X | 0 | 0 |
| | HW-C01R (NC-LB) | L | 0 | X | X | X |
| | | R | X | 0 | X | X |

| | Contact | Mounting Position | Operator Position | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| ASW400-1 | HW-C10 (NO) | L | X | 0 | 0 | 0 |
| | | R | 0 | 0 | 0 | X |
| | HW-C01 (NC) | L | 0 | 0 | X | 0 |
| | | R | 0 | X | 0 | 0 |
| | HW-C10R (NO-EM) | L | X | X | 0 | X |
| | | R | X | 0 | X | X |
| | HW-C01R (NC-LB) | L | 0 | X | X | X |
| | | R | X | X | X | 0 |

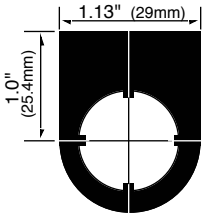
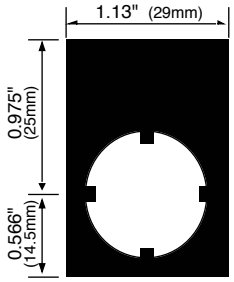
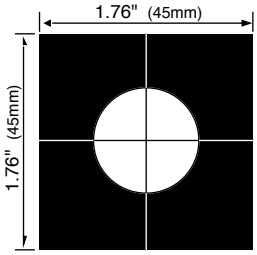
## 5 Position Selector Switches

| | Contact | Mounting Position | Operator Position | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 |
| ASW500 | HW-C10 (NO) | L | X | 0 | 0 | 0 | 0 |
| | | R | 0 | X | 0 | 0 | 0 |
| | HW-C01 (NC) | L | 0 | 0 | X | X | X |
| | | R | 0 | 0 | 0 | X | X |
| | HW-C10R (NO-EM) | L | X | 0 | 0 | 0 | 0 |
| | | R | 0 | X | 0 | 0 | 0 |
| | HW-C01R (NC-LB) | L | 0 | X | X | X | X |
| | | R | X | 0 | X | X | X |

| | Contact | Mounting Position | Operator Position | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 |
| ASW500-1 | HW-C10 (NO) | L | X | 0 | 0 | 0 | 0 |
| | | R | 0 | 0 | 0 | 0 | X |
| | HW-C01 (NC) | L | 0 | 0 | 0 | X | 0 |
| | | R | 0 | X | 0 | 0 | 0 |
| | HW-C10R (NO-EM) | L | X | X | X | 0 | X |
| | | R | X | 0 | X | X | X |
| | HW-C01R (NC-LB) | L | 0 | X | X | X | X |
| | | R | X | X | X | X | 0 |

# Nameplates — TW Series

## Faceplates

| | NWAL | NWAQL | NWAS | EMERGENCY STOP |
|---|---|---|---|---|
| |  |  |  | |
| | Part Number | | | |
| Nameplate (blank) | NWAL-0B (black)<br>NWAL-0R (red) | NWAQL-0B (black)<br>NWAQL-0R (red) | NWAS-0B | NWAR-0 |
| Nameplate (engraved) | NWAL-① | NWAQL-① | NWAS-① | NWAR-27† |

1. In place of ①, insert either the Standard Legend Code from table below or custom engraving delimited by " ".
2. Standard engravings are available at no charge.
3 NWAR-27 comes marked "Emergency Stop" as shown in drawing.

## Standard Legend Codes

| Pushbuttons | | | | Pushbuttons/Selector Switches | | | | Selector Switches | |
|---|---|---|---|---|---|---|---|---|---|
| Legend | Code | Legend | Code | Legend | Code | Legend | Code | Legend | Code |
| AUTO | 101 | OPEN | 116 | AUTO-MAN | 201 | REV-FOR | 216 | AUTO-MAN-OFF | 301 |
| CLOSE | 102 | OUT | 117 | CLOSE-OPEN | 202 | RUN-JOG | 217 | AUTO-OFF-MAN | 302 |
| DOWN | 103 | RAISE | 118 | DOWN-UP | 203 | RUN-SAFE | 218 | CLOSE-OFF-OPEN | 303 |
| EMERG.STOP | 104 | RESET | 119 | FAST-SLOW | 204 | SAFE-RUN | 219 | DOWN-OFF-SLOW | 304 |
| FAST | 105 | REVERSE | 120 | FOR-REV | 205 | SLOW-FAST | 220 | FAST-OFF-SLOW | 305 |
| FORWARD | 106 | RUN | 121 | HAND-AUTO | 206 | START-STOP | 221 | FOR-OFF-REV | 306 |
| HAND | 107 | SLOW | 122 | HIGH-LOW | 207 | STOP-START | 222 | LEFT-OFF-RIGHT | 307 |
| HIGH | 108 | START | 123 | JOG-RUN | 208 | UP-DOWN | 223 | LOWER-OFF-RAISE | 308 |
| IN | 109 | STOP | 124 | LEFT-RIGHT | 209 | | | OFF-MAN-AUTO | 309 |
| INCH | 110 | STOP | 125 | LOWER-RAISE | 210 | | | OFF-SLOW-FAST | 310 |
| JOG | 111 | TEST | 126 | MAN-AUTO | 211 | | | OFF-1-2 | 311 |
| LOW | 112 | UP | 127 | OFF-ON | 212 | | | OPEN-OFF-CLOSE | 312 |
| LOWER | 113 | I (Int'l On) | 150 | ON-OFF | 213 | | | SLOW-OFF-FAST | 313 |
| OFF | 114 | O (Int'l Off) | 151 | OPEN-CLOSE | 214 | | | SUMMER-OFF-WINTER | 314 |
| ON | 115 | EMO | 152 | RAISE-LOWER | 215 | | | UP-OFF-DOWN | 315 |
| | | | | | | | | 1-OFF-2 | 316 |
| | | | | | | | | HAND-OFF-AUTO | 317 |

1. To order engraved nameplates, add legend code to nameplate part number.
Character height based on the number of characters and size of nameplate. Standard character size is 3/16".
2. Nameplates with standard legends are the same list price as blank nameplates.

**Nameplate Order Form on next page.**

# Custom Engraved Nameplates Order Form — TW Series

Copy this order form and use it to specify Letter Height, Custom Engravings, Location of Engraving on Nameplate, and Quantity Desired.
To ensure engraving accuracy, fax it to your IDEC representative. or Distributor.

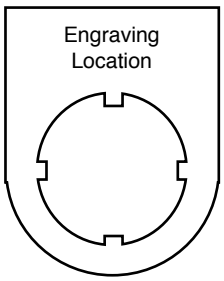
Your Company Name: _____ IDEC Rep/Distributor Contact: _____

Your Name: _____ PO number (if known): _____

Telephone: _____ IDEC Rep/Distributor Phone: _____

Fax & Email: _____ IDEC Rep/Distributor Fax & Email: _____

## NWAL




**Step 1.**
Choose Letter Size - 7/64" or 1/8".

Check the box for the letter size you want. Then write your lettering in box below checkboxes. Note: 1/8" size letters cannot exceed 9 characters.

**Step 2.**
Specify Quantity.

Enter the number of nameplates desired in the box on the right.

**Qty**

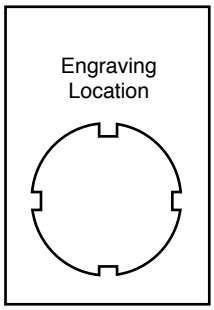
**7/64"** Letter Size ☐ 11 characters max (for 7/64" size letters)

**1/8"** Letter Size ☐ 9 characters max (for 1/8" size letters)

1 2 3 4 5 6 7 8 9 10 11

**Sample Letter Sizes**
7/64" Letters: A B C D
1/8" Letters: A B C D

## NWAQL




**Step 1.**
Choose Letter Size - 7/64" or 1/8".

Check the box for the letter size you want. Then write your lettering in box below checkboxes. Note: 1/8" size letters cannot exceed 9 characters.

**Step 2.**
Specify Quantity.

Enter the number of nameplates desired in the box on the right.

**Qty**

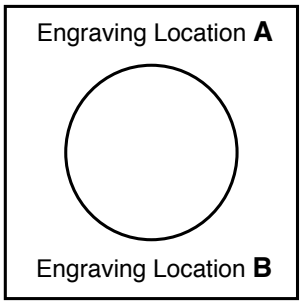
**7/64"** Letter Size ☐ 11 characters max (for 7/64" size letters)

**1/8"** Letter Size ☐ 9 characters max (for 1/8" size letters)

1 2 3 4 5 6 7 8 9 10 11

**Sample Letter Sizes**
7/64" Letters: A B C D
1/8" Letters: A B C D

## NWAS




**Step 1.**
Choose Letter Size - 1/8" or 3/32".

Check the box for the letter size you want. Then write your lettering in box below checkboxes. Note: 1/8" size letters cannot exceed 14 characters.

**3/32"** Letter Size ☐ 20 characters max (for 3/32" size letters)

**1/8"** Letter Size ☐ 14 characters max (for 1/8" size letters)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

**Step 2.**
Specify Quantity.

Enter the number of nameplates desired in the box on the right.

**Qty**

**Step 3.**
Specify Location.

Enter the location of engraving (A or B), in the box on the right.

**Location**

**Sample Letter Sizes**
3/32" Letters: A B C D
1/8" Letters: A B C D

## Switch Engraving Order Form – TW Series

Copy this order form and use it to specify Letter Height, Maximum Number of Lines and Text to be engraved.

To ensure engraving accuracy, fax it to your IDEC representative or Distributor.

Your Company: _____ Telephone: _____

Name: _____ Fax: _____

Address: _____ Email: _____

PO: _____ Part Number to be Engraved: _____

Please check one of the boxes below to indicate your choice of engraving options:

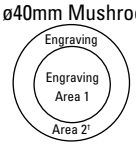
Square Switch

| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 5/32 | 6 |
| ☐ | | 1/8 | 6 |
| ☐ | 2 | 5/32 | 6 |
| ☐ | | 1/8 | 5 |
| ☐ | 3 | 1/8 | 6 |
| ☐ | 4 | 3/32 | 5 |

Round Switch

| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 5/32 | 5 |
| ☐ | | 1/8 | 6 |
| ☐ | 2 | 5/32 | 5 |
| ☐ | | 1/8 | 6 |
| ☐ | 3 | 1/8 | 5 |
| ☐ | 4 | 3/32 | 5 |

ø29mm, ø40mm Mushroom Head




| | | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|---|
| ☐ | Engraving Area 1 | 1 | 5/32 | 5 |
| ☐ | | | 1/8 | 5 |
| ☐ | Engraving Area 2 | 1 | 5/32 | 7 |
| ☐ | | | 1/8 | 7 |

1. Above mentioned specifications hold true for standard size pushbuttons (round and square).
2. †Engraving Area 2 can be engraved for 40mm mushroom Head non-Illuminated push button only.
3. Engraving is done on the button itself for non-Illuminated push buttons and on marking plate for illuminated push buttons and pilot lights.
4. Please enter text exactly how you want it engraved, take care to emphasize capital or small letters.

Enter text to be engraved:

Line 1: _____

Line 2: _____

Line 3: _____

Line 4: _____

**Sample Letter Sizes**

1/8 Letters: OPEN

5/32 Letters: OPEN

For IDEC Internal Use Only:

Work Order #: _____

# Accessories

## TW Series Accessories

| Item | Appearance | Description/Usage | | Part Number |
|---|---|---|---|---|
| Lamp Removal Tool | | Rubber tool used to install or remove LED's and incandescent lamps | | OR-55 |
| Contact Block Remover | | Used to remove contact blocks, transformers, lenses, and adaptors. Can also be used to determine panel thickness adjustment. | | TW-KC1 |
| Nut Locking Wrench | | Used in OR-14 locking wrench to tighten locking nuts inside square bezel | | TW-KQ2 |
| Metal Bezel | | Chrome plated bezels tighten onto operator (replacement for damaged bezels) | Standard octagonal units (chrome-pl.) | AW-R8 |
| | | | Full shroud octagonal units (chrome-pl.) | AW-RF8 |
| | | | Full shroud mushroom head units Ø 40mm | AW-G4 |
| Plastic Bezel | | Black plastic bezels for square buttons (replacement for damaged bezels) | Round flush units (black plastic) | AW-RP1B |
| | | | Round extended units (black plastic) | AW-FP1B |
| | | | Square units (black plastic) | AW-Q1B |
| | | | Square units with full shroud (black plastic) | AW-QF1B |
| Boot/Cover | | Used to cover and protect pushbuttons | Waterproof lens cover for square pilot lights | APW00LN |
| | | | Waterproof lens cover for square illuminated buttons | APW00L |
| | | | Clear boot for round flush units | OC-31 |
| | | | Clear boot for round extended units | OC-32 |
| | | | *In place of asterisk, specify **Rubber Boot** color: **B** (black), **G** (green), **R** (red), **Y** (yellow) - (nitril rubber) | OCW-11* |
| Anti-Rotation Ring | | Ring to prevent operator base from rotating in the mounting hole. Used when nameplate is not used | | OGL-31 |
| Mounting Hole Plug | | Black rubber plug fills unused mounting holes in panel. | | OB-31 |
| Metallic Mounting Hole Plug | | For plugging unused mounting holes in the panel. Tighten the attached locking ring to a torque of 12 kfg-cm maximum<br>Degree of protection: IP66 | | LW9Z-BM |
| Replacement Keys | | Pair of keys (#0) | | TW-SK |
| Replacement Black Sleeve for Keyswitch | | | | AKW2B-B |
| Metal Button Guard | | Used on flush buttons to prevent inadvertent actuation | | OLW-C |

| Item | Appearance | Description/Usage | | Part Number |
|---|---|---|---|---|
| Terminal Tab Adaptor | | Quick- connect terminals | #250 (17/64" x 3/64") single tab | TW-FA1 |
| Lock-out Adaptor | | Used to provide lock-out protection for pushbuttons and knob selector switches:<br>• Up to Ø 40mm mushroom head size<br>(Padlock not included.)<br>Not applicable for e-stops. | | HW9Z-KL1 |
| TW to TWTD Adaptor | | Used to mount TW series control unit (except square units) Ø 7/8" (22mm) into a Ø 1-13/64" (30mm) panel cut-out. | | TWN-A1R8 |
| Replacement Marking Plates |  | White plastic engraving plate for use on all illuminated units (included in each lens). May be used to capture printed mylar insert (not supplied by IDEC) under lens face. | Round Pushbutton (Ø14mm) | ALW2B |
| | | | Round Pilot Light (Ø 14mm) | APW2B |
| | | | Mushroom Pushbutton (Ø 14mm) | ALW3B |
| | | | Square Pilot Light (q 21mm) | APQW1B |
| | | | Square Pushbutton (q 21mm) | ALQW2B |

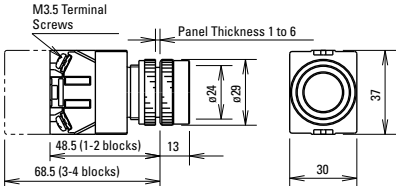
## Fingersafe Covers for TW Series

| Appearance | Description | Used with | Part Number |
|---|---|---|---|
| | Fingersafe terminal cover, adds 6mm to overall depth | APW and UPQW full voltage pilot lights | APS-PVL |
| | Fingersafe terminal cover, adds 3.5mm to overall depth. One required for each contact, only for rear-most terminals | Non-illuminated pushbuttons and selectors | HW-VL2 |
| | Fingersafe terminal cover, adds 3mm to overall depth | APW and UPQW transformer pilot lights, and illuminated pushbuttons and illuminated selectors | HW-VL3 |
| | Fingersafe terminal cover for contacts. | Full voltage illuminated pushbuttons and selectors | HW-VL4 |
| | Fingersafe terminal cover for full voltage adaptor, adds 3 mm to depth | Full voltage illuminated pushbuttons and selectors | HW-VL5 |
| | Fingersafe terminal cover for half size transformer adaptor, adds 3 mm to depth | Illuminated pushbuttons and selectors | HW-VL6 |

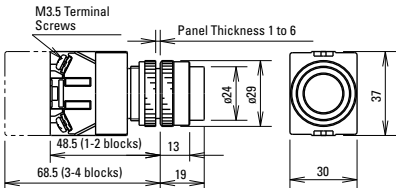
# Dimensions

## Pushbuttons

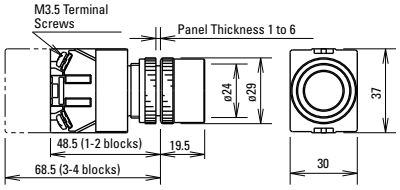
### Flush



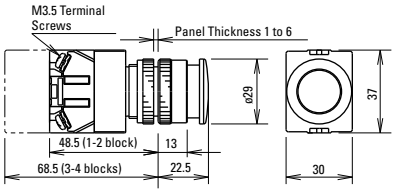

### Extended



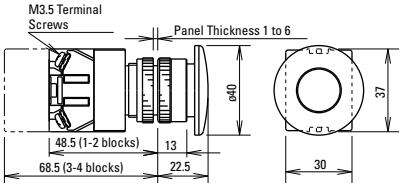

### Extended with Full Shroud



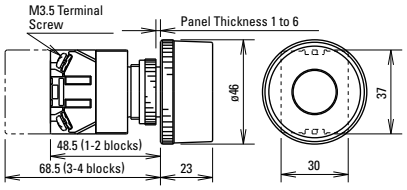

### 29mm Mushroom



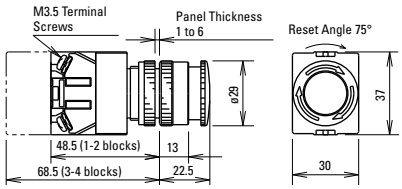

### 40mm Mushroom



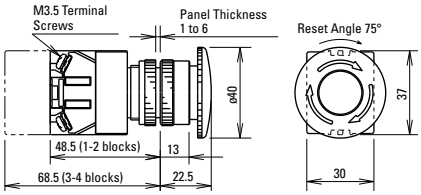

### Mushroom with Full Shroud



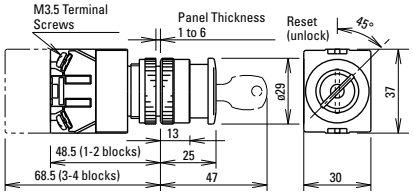

### 29mm Push-Lock-Turn-Reset



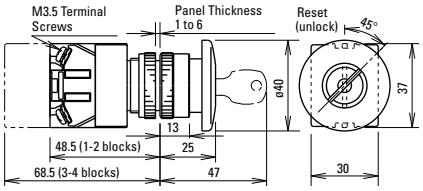

### 40mm Push-Lock-Turn-Reset



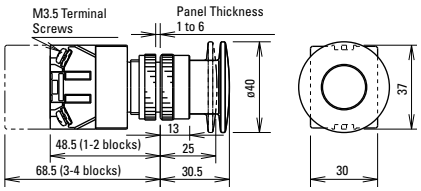

### Keylock Push On/Off



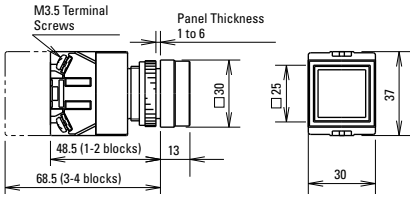

### 40mm Pushlock Key reset



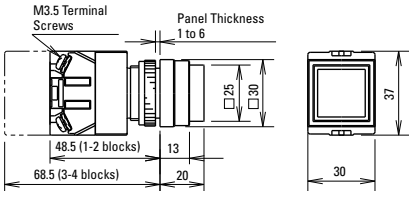

### 40mm Push-Pull



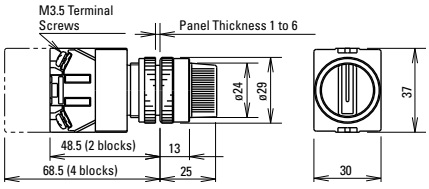

### Square Flush

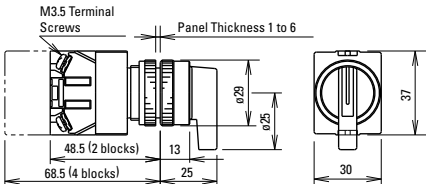


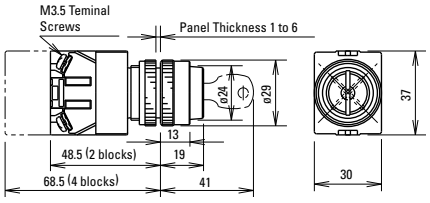

### Square Extended




## Selector Switches



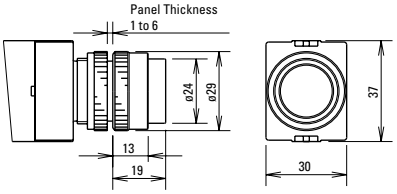



# Dimensions continued

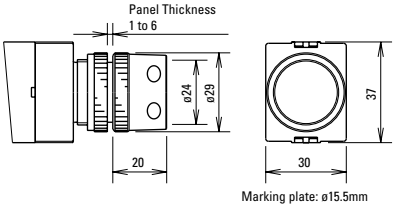
## Illuminated Pushbuttons

### Extended



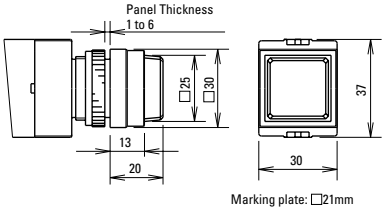

Marking plate: ø15.5mm

### Extended with Full Shroud



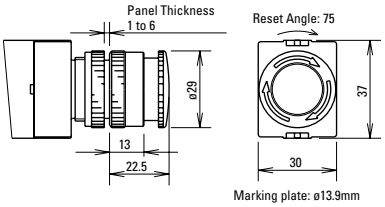

Marking plate: ø15.5mm

### Square Extended



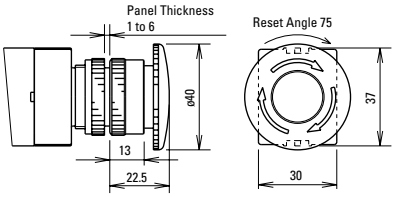

Marking plate: □21mm

### 29mm Push-Turn-Reset



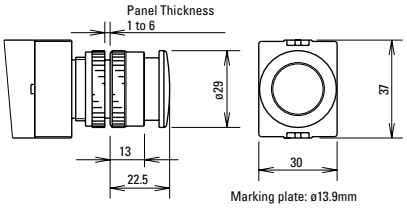

Marking plate: ø13.9mm

### 40mm Push-Turn-Reset



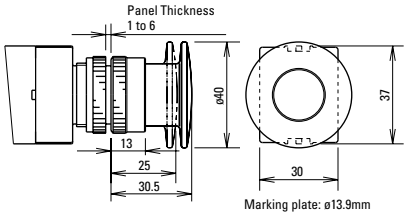

Marking plate: ø13.9mm

### Mushroom




Marking plate: ø13.9mm

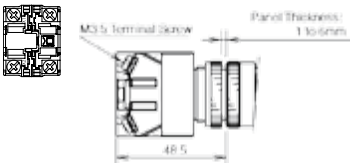
### Push-Pull



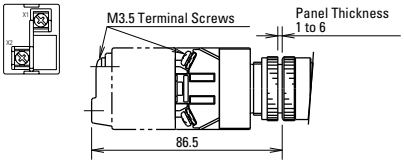

Marking plate: ø13.9mm

## Illuminated Selector Switches

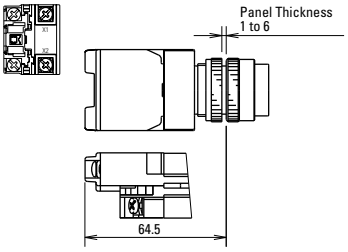
### 1 Contact Block with Full Voltage Adaptor



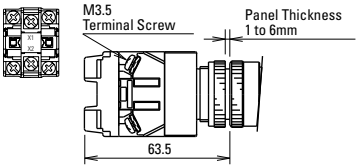
### Transformer (2 blocks)



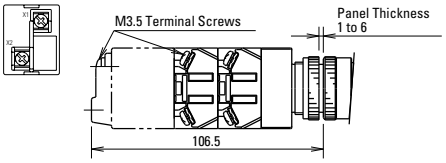

### 1 Contact Block with Half Size Transformer



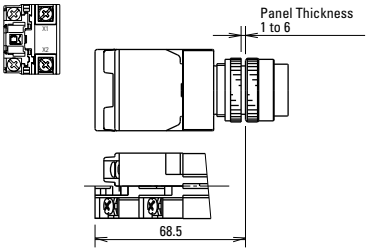

### 2 Contact Blocks with Full Voltage Adaptor



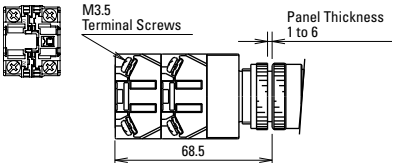

### Transformer (4 blocks)



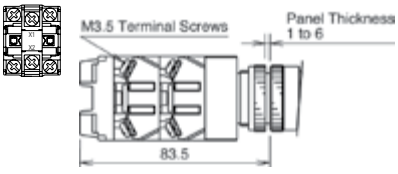

### 2 Contact Blocks with Half Size Transformer



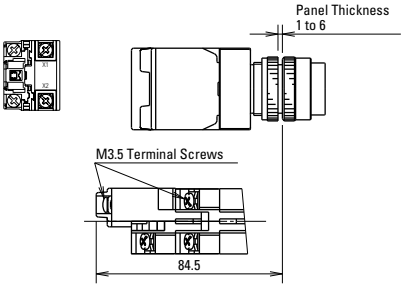

### 3 Contact Blocks with Full Voltage Adaptor




### 4 Contact Blocks with Full Voltage Adaptor



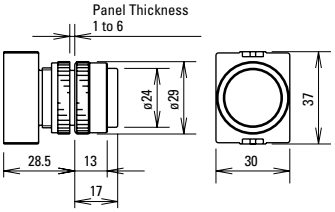

### 3 Contact Blocks with Half Size Transformer



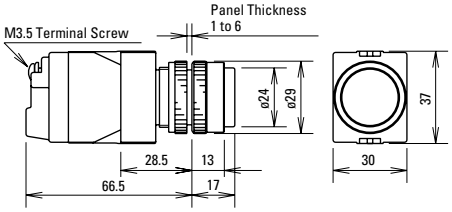
## Dimensions continued

### Pilot Lights

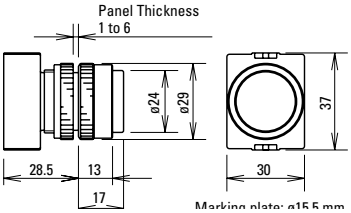
#### Round Flush APW1 Full Voltage



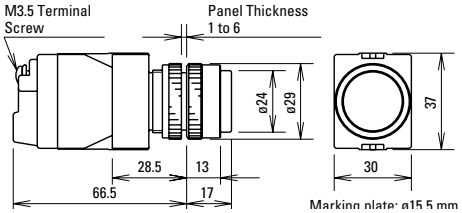

#### Round Flush APW1 Transformer



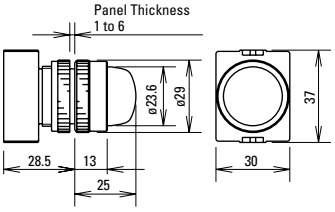

#### Round Flush Marking Type APW1B Full Voltage



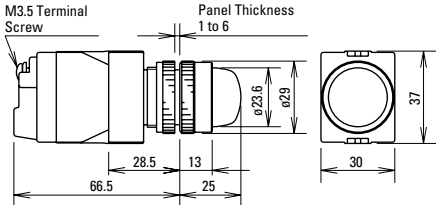

#### Round Flush Marking Type APW1B Transformer



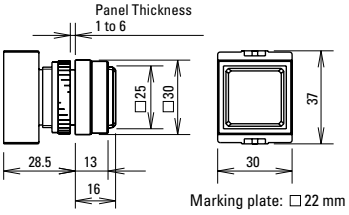

#### Dome APW2 Full Voltage



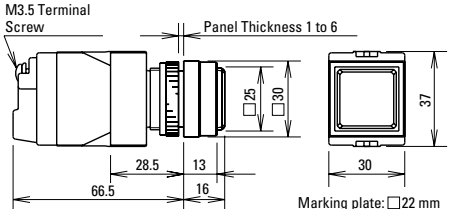

#### Dome APW2 Transformer



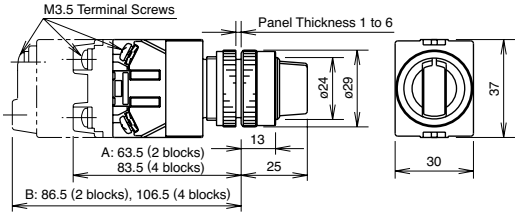

#### Square Flush Marking Type APQW1B Full Voltage




#### Square Flush Marking Type APQW1B Transformer

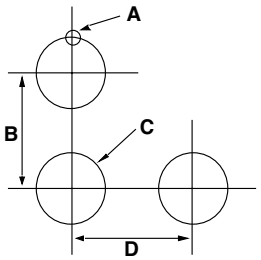



### Illuminated Selector Switches



# Dimensions continued

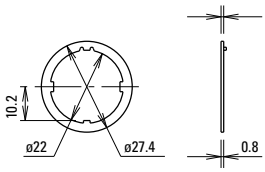
## Panel Cut-Out

| Diagram | Part | Dimension | | | |
|---|---|---|---|---|---|
| | | A | B | C | D |
|   | Pushbuttons | Ø 0.137" (3.5mm) | 1.95" (50mm); 1.76" (45mm) minimum | Ø 0.878" (22.3mm) | 1.17" (30mm) Std. Octagonal<br>> 1.56" (40mm) Large Mushroom |
| | Pilot Light | | | | |
| | Illuminated Pushbuttons | | | | |
| | Selector Switches | | | | 1.17" (30mm) *See note. |
| | Illuminated Selector Switches | | | | |

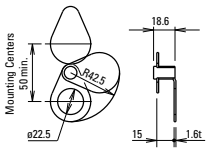
1.The Ø 0.137" (Ø 3.5mm) recess is necessary when either the nameplate or anti-rotation ring is used.
2. *>1.404" (36mm) for 2- or 3-position.
>1.95" (50mm) for 4- or 5-position.

## Accessory Dimensions

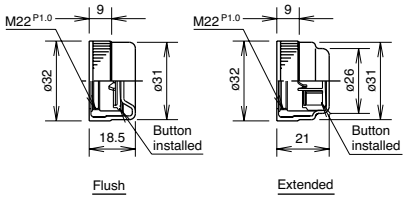
**OGL-31**
**Anti-Rotation Ring**



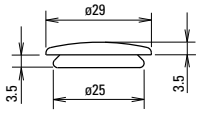

**OLW-C**
**Metal Button Guard**



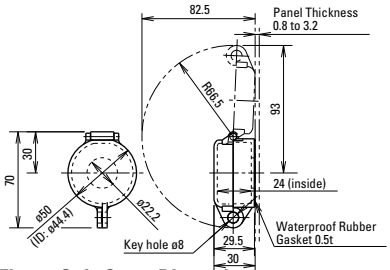

**OCW-11**
**Pushbutton Rubber Boot**




**OB-31**
**Mounting Hole Rubber Plug**



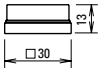

**HW9Z-KL1**
**Lock-out Adaptor**




**AW-RP1B**
**Round Plastic Bezel**

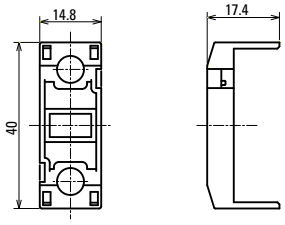
**AW-FP1B**
**Round Plastic w/Full Shroud**

**AW-QF1B**
**Square Full Shroud**

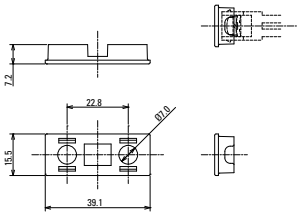



**Finger-Safe Cover Dimensions**

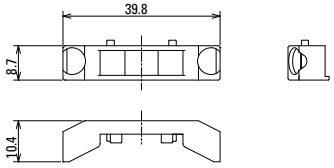
**HW-VL6**



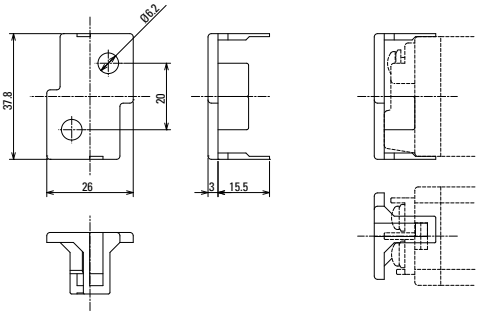

**HW-VL5**



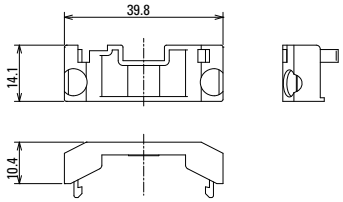

**HW-VL4**



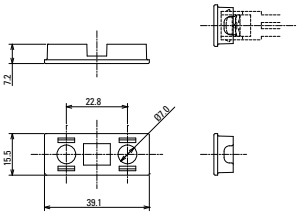

**HW-VL3**



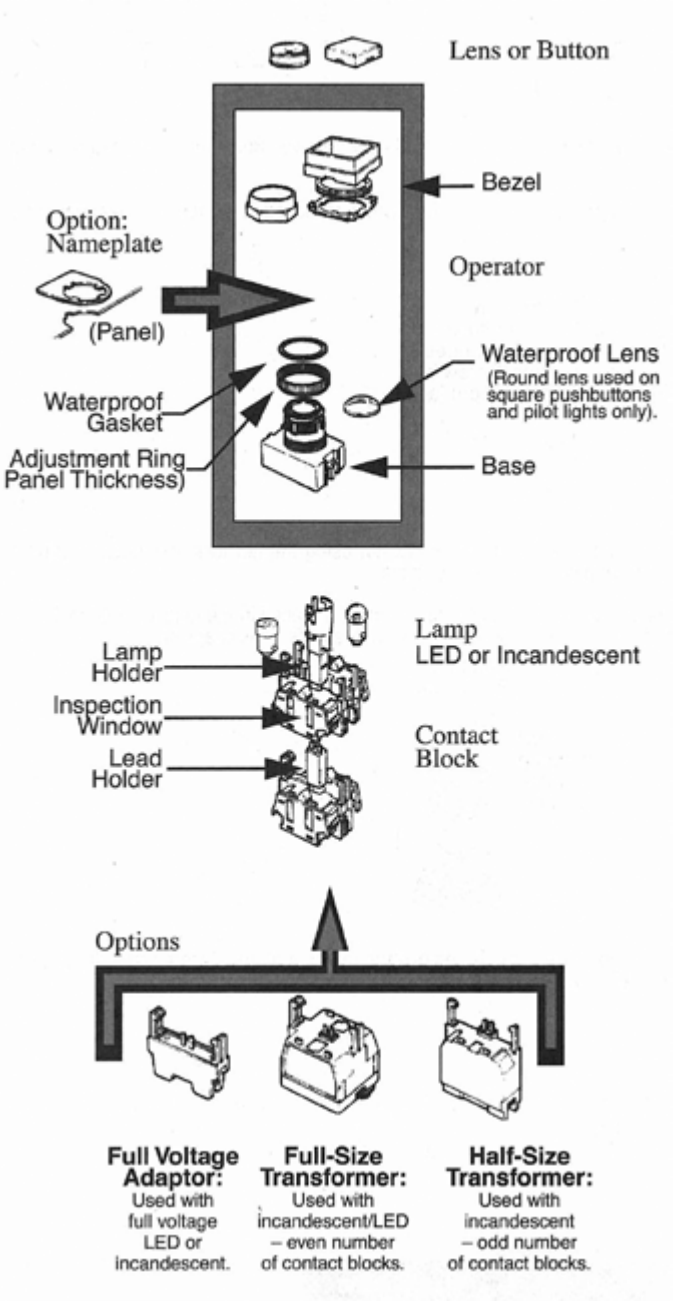

**HW-VL2**




**APS-PVL**



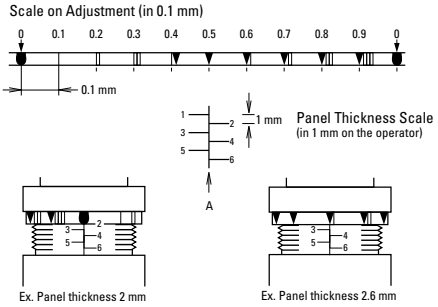
## Component Construction and General Instructions — TW Series




### Instructions for Switches and Pilot Devices

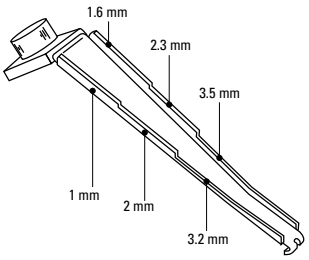
TW Series: Adjustment for Panel Thickness

The panel thickness ring provides adjustment from 0.04" to 0.24" (1 to 6mm) in 0.004" (0.1mm) increments. Rotate the ring until the markings around the periphery are aligned for the desired thickness, as shown below.




**Note:** When a nameplate or an anti-rotation ring is used, add 0.03" (0.8mm) to the panel thickness dimension.

An adjustment for panel thicknesses shown below can be made quickly by using the contact block remover tool.




**Tool TW-KC1**

## Instructions continued

### Pilot Lights and Pushbuttons

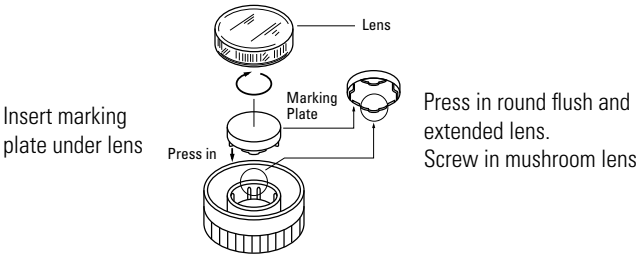
IMPORTANT: Install the body of the TW control unit with the panel thickness scale facing up.

### Octagonal and Round Bezels

Octagonal and round bezels screw into the operator. Use a locking ring wrench (optional) for secure tightening and easy removal. Round flush and extended buttons snap onto the operator base. Mushroom buttons screw onto the operator base.

Every round lens can be used with or without legend markings. Engraving can be done on a white translucent plate which is placed in the lens, or clear mylar can be printed and placed in the lens.

**Round Marking Unit**

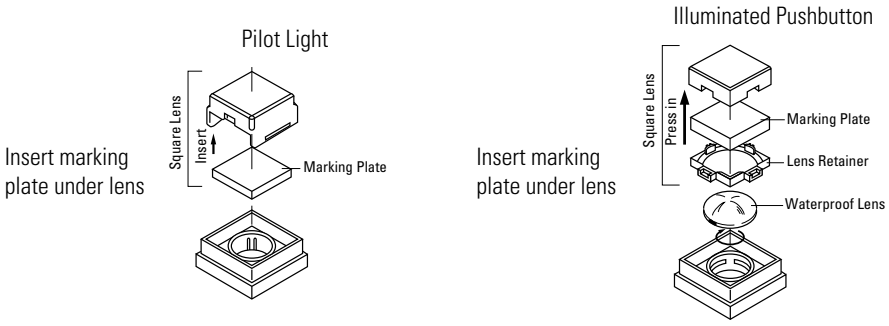



### Square Bezels

Square bezels are installed in a 3-step procedure. First install the base plate from the front. Then install the lock nut using the nut locking wrench (optional). Finally, install the square bezel, which snap-fits onto the base plate. Square buttons also snap onto the operator base.

Every square lens can be used with or without legend markings. Engraving can be done on a white translucent plate which is placed in the lens, or clear mylar can be printed and placed in the lens. Square units include a round waterproof lens which screws into the operator. The square outer lens snaps on.

**Square Marking Units**




To remove square lens from operator, place a screwdriver under the indentation on the side of the lens. To remove the marking plate, place a screwdriver under the indentation and lift out the plate. The lens retainer can be removed by pressing a 3/16" screwdriver into one of the recesses.

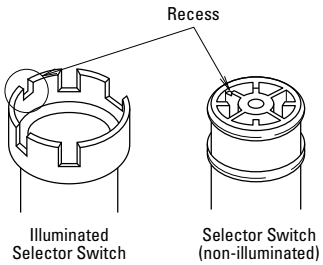
### Marking Plate Engraving Area

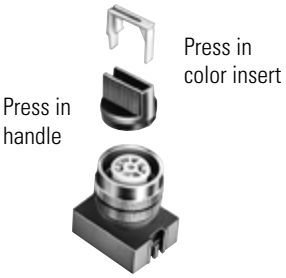
| Shape | Engraving Area | Used With | Part Number |
|---|---|---|---|
| Round | Ø 0.55" (14mm) | Illuminated pushbuttons | ALW2B |
| | Ø 0.55" (14mm) | Pilot lights | APW2B |
| Mushroom | Ø 0.55" (14mm) | Illuminated mushroom | ALW3B |
| Square | ❑ 0.83" (21mm) | Square pilot lights | APQW1B |
| Square | ❑ 0.83" (21mm) | Square illuminated pushbuttons | ALQW2B |

## Instructions, continued

### Selector Switches

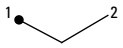
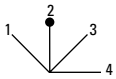
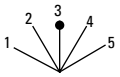
The operator shaft of each unit has a recess to identify in which direction to install the handle. Align the handle with the recess. Press color insert (TW-HC1) into the handle and then press handle into the operator, as shown below.



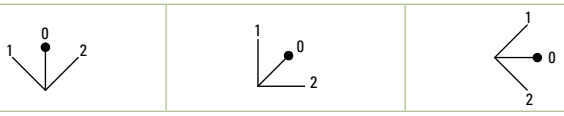

Remove color insert before pulling out the handle.

### Standard Operating Positions

| 2-Postion, 90° | 3-Postion, 45° | 4-Postion, 45° | 5-Postion, 30° |
|---|---|---|---|
|  | |  |  |

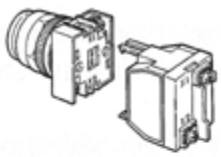


### Positions: Non-Illuminated 3-Position Operators



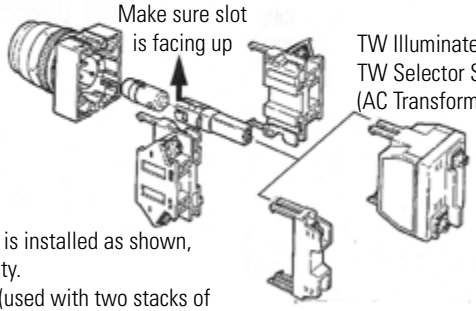

### Installation

**TW Pilot Lights**



Terminal X1 = Positive
Terminal X2 = Negative

Make sure slot is facing up

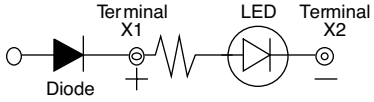


TW Illuminated Pushbuttons,
TW Selector Switches
(AC Transformer or Full Voltage)

Lamp holder is installed as shown, due to polarity.
Lead holder (used with two stacks of contact blocks ) does not have polarity.

### Installation of LED Illuminated Units

AC transformers are recommended for use in areas subjected to inductive noise. When using full voltage types, install a protection diode as shown below. (Diode with DC power supply to protect against surges and noise.)




Make sure that LED illuminated units are installed with correct polarity, as indicated at the terminals.

# Enclosures for XW, HW & TW 22mm Switches and Pilot Devices

## Key features:

- Three compact sizes (mm): 76 x 76, 140 x 76 and 200 x 76
- Available in 1, 2, 3, 4 or 5 mounting hole configurations
- Easy installation: panel, wall or frame mountable
- Polycarbonate enclosure cover and base, stainless steel screws
- UL Listed, RoHS Compliant
- IP65 and Type 4X rated (when installed with IP65 or Nema Type 4X unit)
- Class II electric shock protection (when installed with applicable unit)
- Ideal for high temperatures (-25 to +60°C) and corrosive environments

## Specifications

| | | |
|---|---|---|
| Operating Conditions | Ambient temperature | –25 to +60°C (no freezing) |
| | Relative humidity | 45 to 85%RH (no condensation) |
| | Storage temperature | –40 to +80°C (no freezing) |
| | Degree of pollution | 3 |
| Degree of Protection | IP65 (when IP65 switches and pilot devices are installed)<br>Type 4X Indoor Use Only (when Type 4X switches and pilot devices are installed) | |
| Electric Shock Protection | Class II (when class II switches and pilot devices are installed) | |
| Material | Cover and base | Polycarbonate |
| | Cover mounting screws | Stainless steel |
| Applicable Switches and Pilot Devices | HW, TW and XW series switches, pilot devices and accessories (see note below) | |
| Weight (approx.) | 76mm type: 125g (FB1W-111Z)<br>140mm type: 184g (FB2W-211Z)<br>200mm type: 243g (FB3W-311Z) | |

Choose switches, pilot devices and accessories that match the mounting hole centers, effective depth behind the cover, and the thickness of the cover where switches and pilot devices are installed (3 mm). Enclosures with 30 or 36mm mounting hole centers may limit the knob orientation of selector switches because the contact blocks can be mounted in one direction only on these mounting centers.

## Enclosure Part Numbers

| Size (mm) | Description | Part Number | Distance Between Hole Centers (mm) |
|---|---|---|---|
| 76 x 76 x 59.5 | Enclosure 1 hole, Yellow | FB1W-111Y | – |
| | Enclosure 1 hole, Beige | FB1W-111Z | – |
| 140 x 76 x 59.5 | Enclosure 2 hole, Beige | FB2W-211Z | 50 |
| | Enclosure 3 hole, Beige | FB2W-312Z | 30 |
| 200 x 76 x 59.5 | Enclosure 3 hole, Beige | FB3W-311Z | 50 |
| | Enclosure 4 hole, Beige | FB3W-413Z | 36 |
| | Enclosure 5 hole, Beige | FB3W-512Z | 30 |

## Accessories

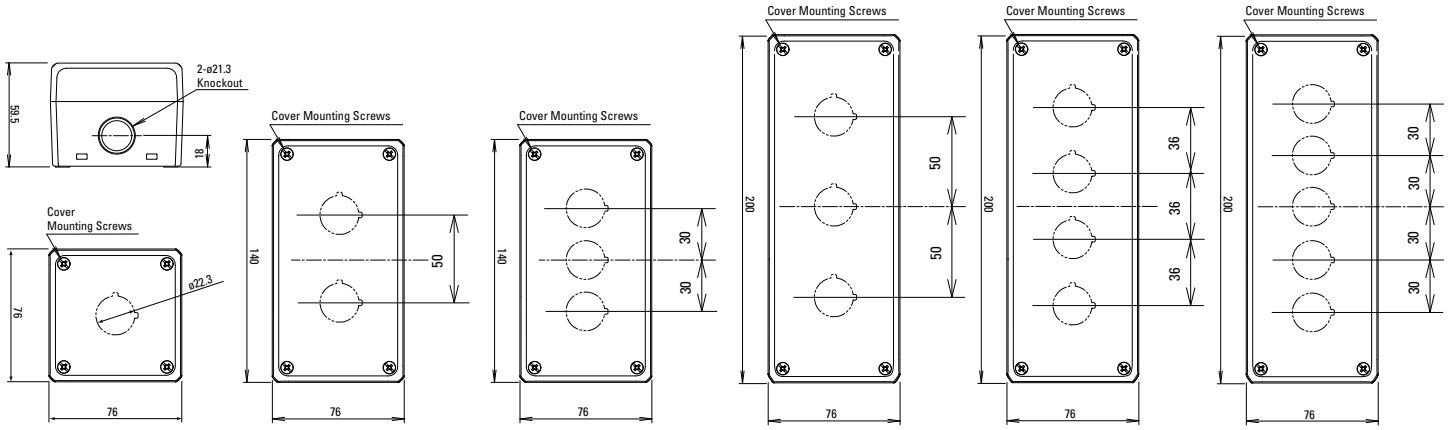
| Description | Part Number |
|---|---|
| Plug Adaptor 13.5mm | HW9Z-PG135 |
| Mounting Bracket | FB9Z-PK1 |

Connectors and nuts are not supplied with accessories.

## Switch and Pilot Device Accessories

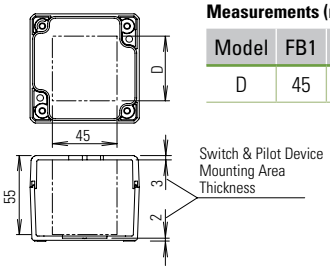
| Series | Description | Part Number |
|---|---|---|
| HW Series | Nameplate | HWAM, HWAQ, HWAS, HWAV |
| | Marking plate for nameplate | HWNP |
| | Anti-rotation ring | HW9Z-RL |
| | EMO switch guard | HW9Z-KG1, HW9Z-KG2, HW9Z-KG3, HW9Z-KG4 |
| | Switch cover | HW9Z-K1, HW9Z-K11 |
| | Pushbutton clear boot | OC-31, OC-32 |
| | Padlock cover | HW9Z-KL1 |
| XW Series E-Stops | Nameplate | HWAV |
| | EMO switch guard | HW9Z-KG1, HW9Z-KG2, HW9Z-KG3, HW9Z-KG4 |
| | Anti-rotation ring | HW9Z-RL |
| TW Series | Nameplate | NWA, NWAQ, NWAS-0, NWAL-0, NWAQL-0, NWAV |
| | Anti-rotation ring | OGL-31 |
| | Metal button guard | OLW-C |
| | Pushbutton clear boot | OC-31, OC-32 |
| | Button cover | OCW-11 |
| | Padlock cover | HW9Z-KL1 |

## External Dimensions (mm)




FB1W-111Y/Z FB2W-211Z FB2W-312Z FB3W-311Z FB3W-413Z FB3W-512Z

### Internal Dimensions (mm)

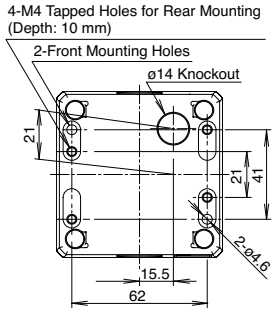



**Measurements (mm)**

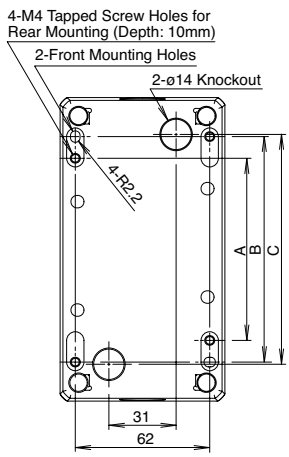
| Model | FB1 | FB2 | FB3 |
|---|---|---|---|
| D | 45 | 92 | 150 |

### External Back Dimensions (mm)

76mm (FB1)




140 and 200mm (FB2/FB3)

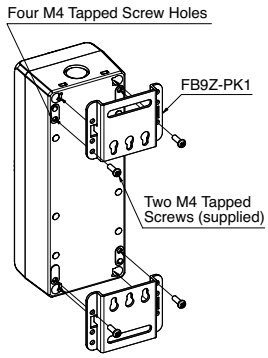


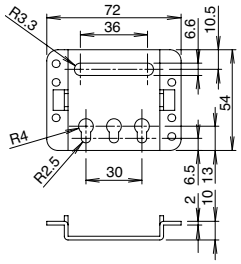

**Measurements (mm)**

| Model | FB2 | FB3 |
|---|---|---|
| A | 84 | 144 |
| B | 104 | 164 |
| C | 106 | 166 |

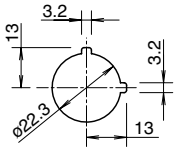
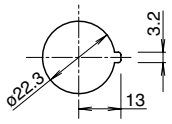
### Mounting

FB9Z-PK1 Frame Mounting Adapter




### Mounting Hole Dimensions

| Model | FB1 | FB2 | FB3 | FB2/FB3 |
|---|---|---|---|---|
| | | 50mm Mounting Centers | 36/50mm Mounting Centers | 30mm Mounting Centers |
| Shape | |  | |  |

# 30mm XN E-Stops

## Key features:

- Plastic bezel, metallic padlock and flush bezel available
- Install up to 20 padlocks (XN4E)
- ø40, ø44 or ø60mm Mushroom heads available
- IDEC's original "safe break action" ensures that the contacts stay open when the contact block is detached from the operator.
- Safety-lock mechanism (IEC60947-5-5, 6.2)
- 2-in-1: Push-to-lock, Pull/Turn-to-Reset
- Push-ON LED model allows E-Stops to be illuminated only when latched
- Direct Opening Action mechanism (IEC60947-5-5, 5.2, IEC60947-5-1, Annex K)
- Very short panel depth
- Degree of protection IP65 (IEC60529)
- RoHS compliant (EU directive 2002/95/EC).
- XN4E series complies with OSHA and ISO 12100-2:2003 standards
- UL, c-UL listed, EN compliant
- UL NISD category emergency type device (File# E305148)

File No. E68961

## Specifications

| | | |
|---|---|---|
| Applicable Standards | IEC60947-5-1, EN60947-5-1, IEC60947-5-5, EN60947-5-5, UL508, UL991, CSA C22.2 No. 14 | |
| Operating Temperature | Non-illuminated: –25 to +60°C (no freezing), Illuminated: –25 to +55°C (no freezing) | |
| Operating Humidity | 45 to 85% RH (no condensation) | |
| Storage Temperature | –45 to +80°C | |
| Operating Force | **XN1E, XN5E**<br>Push-to-lock: 32N<br>Pull-to-reset: 21N<br>Turn-to-reset: 0.27 N·m | **XN4E**<br>Push-to-lock: 32N<br>Pull-to-reset: N/A<br>Turn-to-reset: 0.4 N·m |
| Minimum Force Required for Direct Opening Action | 80N | |
| Min Operator Stroke Required for Direct Opening Action | 4mm | |
| Maximum Operator Stroke | 4.5mm | |
| Contact Resistance | 50mΩ maximum (initial value) | |
| Contact Material | Gold plated silver | |
| Insulation Resistance | 100MΩ minimum (500V DC megger) | |
| Impulse Withstand Voltage | 2.5kV | |
| Pollution Degree | 3 | |
| Operation Frequency | 900 operations/hour | |
| Shock Resistance | Operating extremes: 150m/s$^2$ (15G), Damage limits: 1000m/s$^2$ (100G) | |
| Vibration Resistance | Operating extremes: 10 to 500Hz, amplitude 0.35mm acceleration 50m/s$^2$<br>Damage limits: 10 to 500Hz, amplitude 0.35mm acceleration 50m/s$^2$ | |
| Mechanical Life | 250,000 operations minimum | |
| Electrical Life | 100,000 operations minimum, (250,000 operations minimum @ 24V AC/DC, 100mA) | |
| Degree of Protection | Operator: IP65 (IEC60529)<br>Terminal: IP20 (when XW9Z-VL2MF is installed) | |
| Terminal Style | M3.0 screw terminal | |
| Recommended Tightening Torque for Locking Ring | 2.5N·m | |
| Wire Size | 16 AWG max | |
| Weight | XN1E: Plastic bezel: 83g (ø40 mm), 93g (ø60 mm)<br>XN5E: Flush bezel: 89g<br>XN4E: Padlock type: 20g | |

## Part Numbers

### XN1E Plastic Bezel Type E-Stops (push-pull/twist reset)

| Style | Operator Type | Main Contact | Monitor Contact | Part Number |
|---|---|---|---|---|
| Non-Illuminated | 40mm Mushroom | 1NC | 1NO | XN1E-BV411MR |
| | | 2NC | – | XN1E-BV402MR |
| | | 2NC | 2NO | XN1E-BV422MR |
| | | 3NC | 1NO | XN1E-BV413MR |
| | | 4NC | – | XN1E-BV404MR |
| | 60mm Mushroom | 1NC | 1NO | XN1E-BV511MR |
| | | 2NC | – | XN1E-BV502MR |
| | | 2NC | 2NO | XN1E-BV522MR |
| | | 3NC | 1NO | XN1E-BV513MR |
| | | 4NC | – | XN1E-BV504MR |
| Illuminated | 40mm Mushroom LED (24V AC/DC) | 1NC | 1NO | XN1E-LV411Q4MR |
| | | 2NC | – | XN1E-LV402Q4MR |
| | | 2NC | 2NO | XN1E-LV422Q4MR |
| | | 3NC | 1NO | XN1E-LV413Q4MR |
| | | 4NC | – | XN1E-LV404Q4MR |
| | 40mm Mushroom Push-ON LED (24V AC/DC) | 2NC | 1NO | XN1E-TV412Q4MR |

### XN4E Padlock Type E-Stops (push twist reset only)

| Style | Operator Type | Main Contact | Monitor Contact | Part Number |
|---|---|---|---|---|
| Non-Illuminated | 44mm Mushroom | 1NC | 1NO | XN4E-BL411MR |
| | | 2NC | - | XN4E-BL402MR |
| | | 2NC | 2NO | XN4E-BL422MR |
| | | 3NC | 1NO | XN4E-BL413MR |
| | | 4NC | - | XN4E-BL404MR |
| Illuminated | 44mm Mushroom LED (24V AC/DC) | 1NC | 1NO | XN4E-LL411Q4MR |
| | | 2NC | - | XN4E-LL402Q4MR |
| | | 2NC | 2NO | XN4E-LL422Q4MR |
| | | 3NC | 1NO | XN4E-LL413Q4MR |
| | | 4NC | - | XN4E-LL404Q4MR |
| | 44mm Mushroom Push-ON LED (24V AC/DC) | 2NC | 1NO | XN4E-TL412Q4MR |

### XN5E Flush Bezel Type E-Stops (push-pull/twist reset)

| Style | Operator Type | Main Contact | Monitor Contact | Part Number |
|---|---|---|---|---|
| Non-Illuminated | 40mm Mushroom | 1NC | 1NO | XN5E-BV411MR |
| | | 2NC | - | XN5E-BV402MR |
| | | 2NC | 2NO | XN5E-BV422MR |
| | | 3NC | 1NO | XN5E-BV413MR |
| | | 4NC | - | XN5E-BV404MR |
| Illuminated | 40mm Mushroom LED (24V AC/DC) | 1NC | 1NO | XN5E-LV411Q4MR |
| | | 2NC | - | XN5E-LV402Q4MR |
| | | 2NC | 2NO | XN5E-LV422Q4MR |
| | | 3NC | 1NO | XN5E-LV413Q4MR |
| | | 4NC | - | XN5E-LV404Q4MR |
| | 40mm Mushroom Push-ON LED (24V AC/DC) | 2NC | 1NO | XN5E-TV412Q4MR |

## Contact Ratings

| | | | | | |
|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | 250V | | |
| Rated Current (Ith) | | | 5A | | |
| Rated Operating Voltage (Ue) | | | 30V | 125V | 250V |
| Rated Operating Current | Main Contacts (NC) | AC 50/60Hz | Resistive Load (AC-12) | – | 5A | 3A |
| | | | Inductive Load (AC-15) | – | 3A | 1.5A |
| | | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |
| | Monitor Contacts (NO) | AC 50/60Hz | Resistive Load (AC-12) | – | 1.2A | 0.6A |
| | | | Inductive Load (AC-14) | – | 0.6A | 0.3A |
| | | DC | Resistive Load (DC-12) | 2A | 0.4A | 0.2A |
| | | | Inductive Load (DC-13) | 1A | 0.22A | 0.1A |

1. Minimum applicable load: 5V AC/DC, 1mA (reference value).
2. The rated operating currents are measured at resistive/inductive load types specified in IEC 60947-5-1.

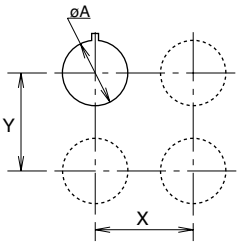
## Illuminated Unit LED Ratings

| Model | Operating Voltage | Current |
|---|---|---|
| XN | 24V AC/DC ±10% | 15mA |

## Depth Behind the Panel

| Model | Depth (mm) | Description |
|---|---|---|
| XN1E | 47.7 | 1 - 4 contacts, plastic bezel |
| XN5E | 60.4 | 1 - 4 contacts, flush bezel |
| XN4E | 61.4 | 1 - 4 contacts, padlock |

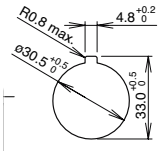
## Mounting Hole Layout




### Measurements

| Size | øA | X & Y |
|---|---|---|
| XN1E, XN5E | $30.5^{+0.5}$ | 70mm min |
| XN4E | 30.5 | For XN4E, determine the values according to the size and number of padlocks and hasp. |

## Panel Cutout




## Part Numbers

**XN1E - LV 4 02 Q4 MR**

**Bezel**
1: Plastic Bezel
4: Padlock
5: Flush Bezel

**Illumination**
XN1E, XN5E
BV: Non-Illuminated
LV: Illuminated LED
TV: Illuminated Push-ON LED
XN4E
BL: Non-Illuminated
LL: Illuminated LED
TL: Illuminated Push-ON LED

**Mushroom Size**
4: ø40mm: XN1E, XN5E
ø44mm: XN4E
5: ø60mm
(XN1E non-illuminated only)

**Contact Configuration***
11: 1NO - 1NC
02: 2NC
13: 1NO - 3NC
22: 2NO - 2NC
04: 4NC
12: 1NO-2NC (Push-ON LED only)

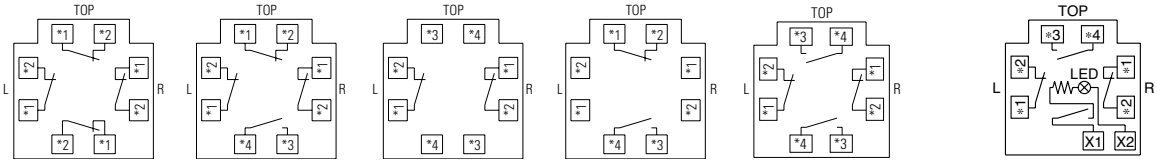
**Voltage Code**
Blank: Non-Illuminated
Q4: 24V AC/DC (Illuminated & Push-ON LED type)

*Contact IDEC for additional configurations.

## Terminal Arrangements (Bottom View)

4NC | 1NO-3NC | 2NC | 1NO-1NC | 2NO-2NC | 1NO-2NC

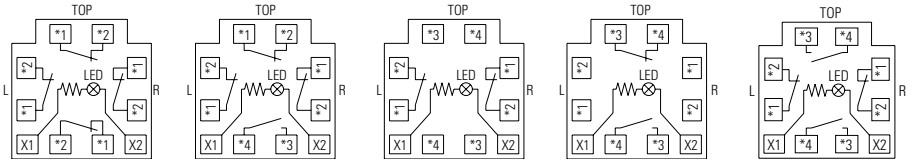
Non-Illuminated



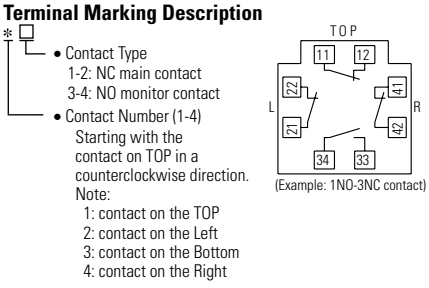

Push-ON




Illuminated

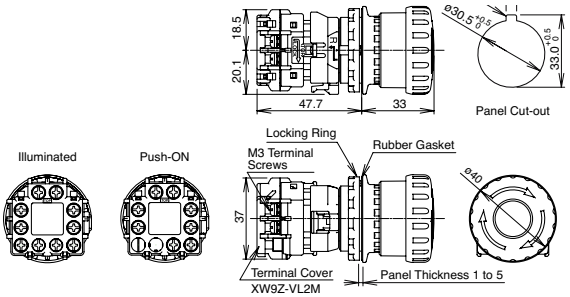



### Terminal Marking Description

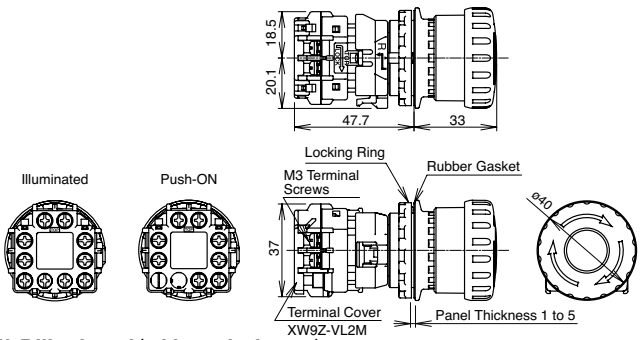


# Dimensions (mm)

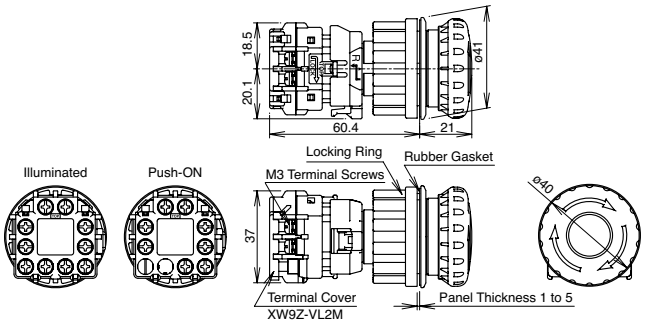
### XN1E Non-Illuminated (with terminal cover)



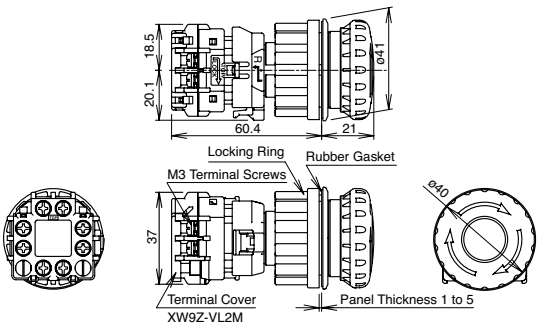

### XN1E Illuminated/Push-ON (with terminal cover)



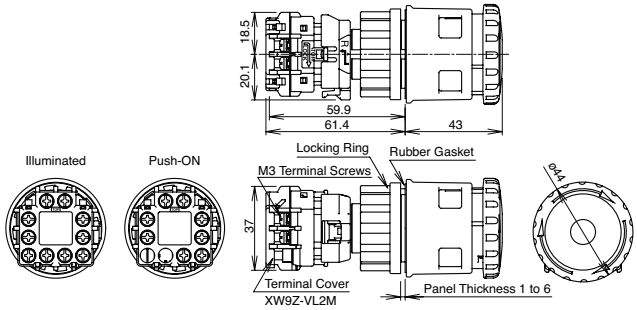

### XN5E Illuminated (with terminal cover)



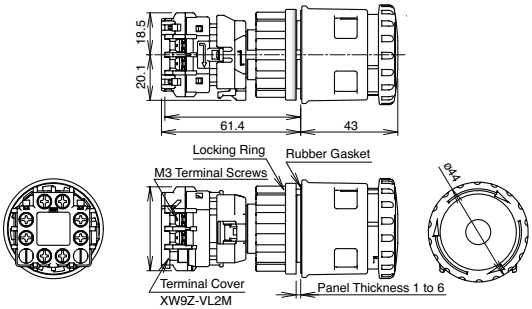

### XN5E Non-Illuminated (with terminal cover)



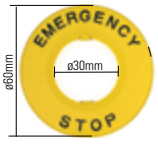

### XN4E Illuminated (with terminal cover)




### XN4E Non-Illuminated (with terminal cover)




### Nameplates

| Item | Part No. | Legend | Mounting Panel Thickness |
|---|---|---|---|
|   | HNAV-0 | (blank) | XN4E: 1.0 to 4.5 mm |
| | HNAV-27 | EMERGENCY STOP | XN1E, XN5E: 1.0 to 3.5 mm |

## Accessories

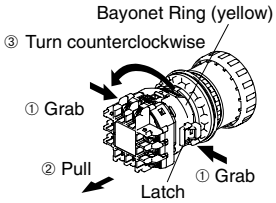
| Item | Description | Part Number |
|---|---|---|
| | Locking Ring Wrench | XN9Z-T1 |
| | Locking Ring Twist Wrench | TWST-T1 |
| | Lockout Hasp | XN9Z-HASP421 |

| Item | Description | Part Number |
|---|---|---|
| | Terminal Cover for Contact Block | XW9Z-VL2M |
| | IP20 Fingersafe Cover | XW9Z-VL2MF |

# Operating Instructions

## Removing the Contact Block

First unlock the operator button. Grab the yellow bayonet ring ① and pull back the bayonet ring until the latch pin clicks ②, then turn the contact block counterclockwise and pull out ③.

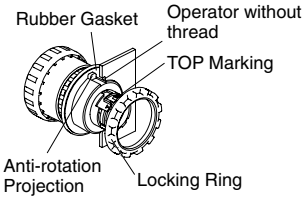



### Notes for removing the contact block

1. Do not attempt to remove the contact block while the operator is latched, otherwise the switch may be damaged.
2. When the contact block is removed, the monitor contact (NO contact) is closed.
3. While removing the contact block, do not use excessive force, otherwise the switch may be damaged.
4. An LED lamp is built into the contact block for illuminated pushbuttons. When removing the contact block, pull the contact block straight to prevent damage to the LED lamp. If excessive force is used, the LED lamp may be damaged and fail to light.

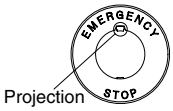
## Panel Mounting

Remove the locking ring from the operator and check that the rubber gasket is in place. Insert the operator from panel front into the panel hole. Face the side without thread on the operator with TOP marking upward, and tighten the locking ring using ring wrench XN9Z-T1 or TWST-T1 to a torque of 2.5 N·m maximum.



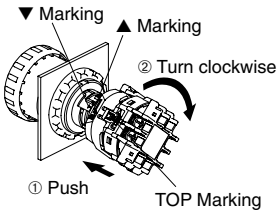

### When using a nameplate

When using a nameplate HNAV-□, break the projection from the nameplate using pliers.




## Installing the Contact Block

First unlock the operator button. Align the small ▼ marking on the edge of the operator with the small ▲ marking on the yellow bayonet ring. Hold the contact block, not the bayonet ring. Press the contact block onto the operator and turn the contact block clockwise until the bayonet ring clicks.



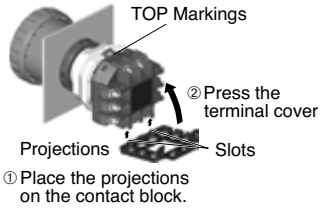

### Notes for installing the contact block

1. Do not attempt to install the contact block when the operator is latched, otherwise the switch may be damaged.
2. Make sure that the bayonet ring is in the locked position.

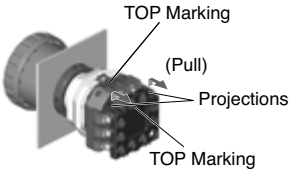
## Installing & Removing Terminal Covers

### XW9Z-VL2M

To install the terminal cover, align the TOP marking on the terminal cover with the TOP marking on the contact block. Place the two projections on the bottom side of the contact block into the slots in the terminal cover. Press the terminal cover toward the contact block.

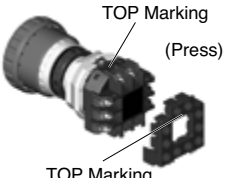



To remove the terminal cover, pull out the two latches on the top side of the terminal cover. Do not exert excessive force to the latches, otherwise the latches may break.




### IP20 Fingersafe Terminal Cover XW9Z-VL2MF

To install the IP20 fingersafe terminal cover, align the TOP marking on the cover with the TOP marking on the contact block, and press the cover toward the contact block.




1. Once installed, the XW9Z-VL2MF cannot be removed.
2. With the XW9Z-VL2MF installed, crimping terminals cannot be used.
3. The XW9Z-VL2MF cannot be installed after wiring.
4. Make sure that the XW9Z-VL2MF is securely installed. IP20 cannot be achieved when installed loosely, and electric shock may occur.

## Notes for Operation

When using the XN emergency stop switches in safety-related part of a control system, observe safety standards and regulations of the relevant country or region. Also be sure to perform a risk assessment before operation.

### Wiring

Tighten the M3 terminal screws to a torque of 0.6 to 1.0 N·m.

### Contact Bounce

When the button is reset by pulling or turning, the NC main contacts will bounce. When pressing the button, the NO monitor contacts will bounce.

When designing a control circuit, take the contact bounce time into consideration (reference value: 20 ms).

### LED Illuminated Switches

LED lamp is built into the contact block and cannot be replaced.

### Handling

Do not expose the switch to excessive shocks and vibrations, for example by operating the switch with tools. Otherwise the switch may be deformed or damaged, causing malfunction or operation failure.

### Screw Terminal Type

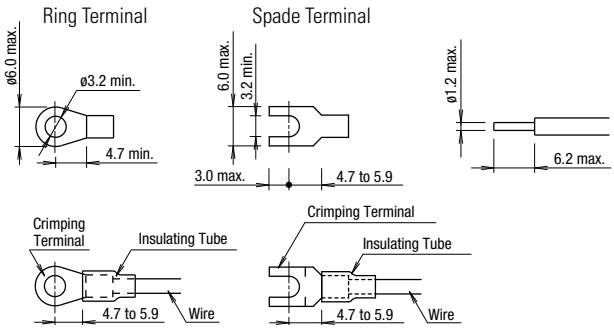
1. AWG18 to 16
2. Tighten the M3 terminal screw to a tightening torque of 0.6 to 1.0 N·m.

## Operating Instructions, continued

### Screw Terminal Type

1. Wire thickness: 0.75 to 1.25 mm² (AWG18 to 16)

**Applicable Crimping Terminals** **Solid Wire**




**Be sure to install an insulating tube on the crimping terminal.**

2. Tighten the M3 terminal screw to a tightening torque of 0.6 to 1.0 N·m.

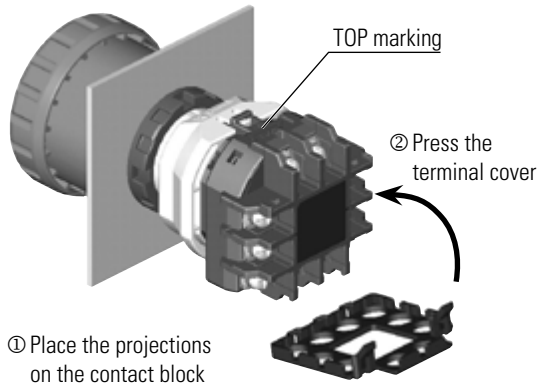
### Connector Type

1. Connector shape
   Tyco Electronics, D-2000 series
   Part No. 1376009-1 (tab header, board mount)
2. Applicable connectors (to be supplied by user)
   Tyco Electronics, D-2000 series
   Part No. 1-1318119-4 (receptacle housing)
   Tyco Electronics, D-2000 series
   Part No. 1318107-1 (receptacle contact)
3. To prepare correct receptacles for the connector type, read the instruction sheet and catalog of Tyco Electronics and understand the installation and wiring method.
4. Fasten the cable so that the connector is not pulled.
   Otherwise the switch may be deformed and damaged, causing malfunction or operation failure.

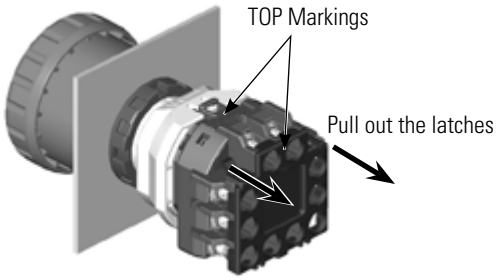
### Installing and Removing Terminal Covers

#### XW9Z-VL2M

To install the terminal cover, align the TOP marking on the terminal cover with the TOP marking on the contact block. Place the two projections on the bottom side of the contact block into the slots in the terminal cover. Press the terminal cover toward the contact block.

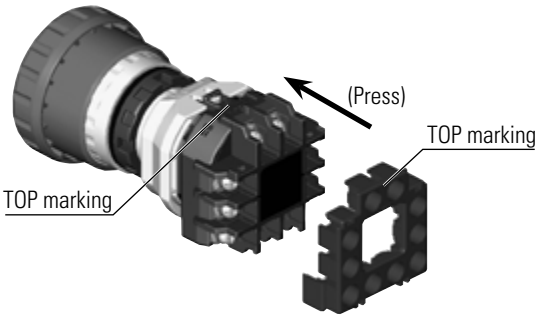



To remove the terminal cover, pull out the two latches on the top side of the terminal cover. Do not exert excessive force to the latches, otherwise the latches may break.




### IP20 Protection Terminal Cover XW9Z-VL2MF

To install the IP20 protection cover, align the TOP marking on the cover with the TOP marking on the contact block, and press the cover toward the contact block.




1. Once installed, the XW9Z-VL2MF cannot be removed.
2. The XW9Z-VL2MF cannot be installed after wiring.
3. With the XW9Z-VL2MF installed, crimping terminals cannot be used. Use solid wires.
4. Make sure that the XW9Z-VL2MF is securely installed. IP20 cannot be achieved when installed loosely, and electric shocks may occur.

### Contact Bounce

When the button is reset by pulling or turning, the NC main contacts will bounce. When pressing the button, the NO monitor contacts will bounce.

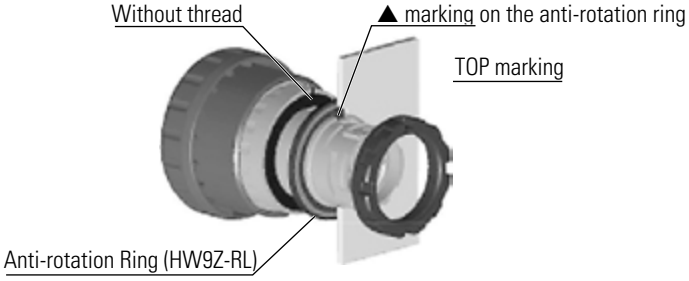
When designing a control circuit, take the contact bounce time into consideration (reference value: 20 ms).

### LED Illuminated Switches

An LED lamp is built into the contact block and cannot be replaced.

### Installing the Anti-rotation Ring HW9Z-RL

Align the side without thread on the operator with TOP marking, the small s marking on the anti-rotation ring, and the recess on the mounting panel.



# TWTD Series — Full Size NEMA Pushbuttons

**TWTD Series: Heavy duty switches built to last**

**Key features:**

- Variety of button sizes up to 2 9/16" (65mm)
- Rugged construction includes chrome plated zinc locking ring die cast zinc mounting threads, screw mounted contact blocks
- LED or incandescent illumination
- Transformer or full voltage
- Transparent contact windows
- Slow make, double break self-cleaning contacts
- Modular construction for maximum flexibility
- Double nickel plated terminal screws
- Available assembled or as sub-components
- Type 4x and IP65 watertight/oiltight panel
- Large M3.5 screw terminals with captive sems plate

The rugged series of TWTD switches offers both variety and durability in an attractive design.

With button sizes up to 2 9/16" (65mm), chrome plated zinc locking rings, die cast zinc mounting threads, steel anti-rotation rings, and self cleaning contacts, the TWTDs are here to stay.

The TWTD series also offers either LED or incandescent illumination in full voltage and transformer models.

Transparent contact windows allow the viewing of IDEC's self cleaning slow-make/slow-break contacts.

Regardless of your switching needs, the TWTD series provides the kind of long lasting, industrial strength quality you've come to expect from IDEC.

UL Listed
File No. E68961

File No. LR21451

Ref No. 117617MC

Certificate No.
2005010305145658

## Specifications

| | |
|---|---|
| Conforming to Standards | EN60947-1, EN60947-5-1, VDE0660-200, UL508, CSA C22-2 No.14 |
| Approvals | **CSA:** pushbuttons and selector switches: A600 pilot lights and illuminated pushbuttons, direct supply pilot lights and illuminated pushbuttons with integral transformer (100/110, 115, 120, 200/220, 230, 240, 380, 400/440, 480V)<br>**UL:** pushbuttons and selector switches: A600 pilot lights and illuminated pushbuttons, direct supply pilot lights and illuminated pushbuttons with integral transformer (100/110, 115, 120, 200/220, 230, 240, 380, 400/440, 480V)<br>**TÜV:** pushbuttons and selector switches: A600=P600 (NO, NC)/Q600 (NO-EM, NC-LB) pilot lights and illuminated pushbuttons, direct supply pilot lights and illuminated pushbuttons with integral transformer (100/110, 115, 120, 200/220, 230, 240, 380, 400/440, 480V) |
| Operating Temperature | Operation: –25 to +50°C (without freezing)<br>Storage: –40 to +70°C (without freezing) |
| Vibration Resistance | 10 to 55Hz, 98m/sec$^2$ (10g) conforming to IEC6068-2-6 |
| Shock Resistance | 980m/sec$^2$ (100g) conforming to IEC6068-2-7 |
| Electric Shock Protection | Class 0 conforming to IEC60536 |
| Degree of Protection | IP65 (from front of the panel) (conforming to IEC60529)<br>IP54 (key switches)<br>Type 1, 2, 3, 3R, 3S, 4, 4X, 5, 12, 13 (conforming to NEMA ICS6-110) |
| Mechanical Life | Momentary pushbuttons: 5,000,000 (900 operations per hour)<br>All other switches: 500,000 |
| Pollution Degree (conforming to IEC60947-1) | 3 for switches not using a transformer<br>2 for switches using a transformer |

## Mechanical-Electrical Specifications

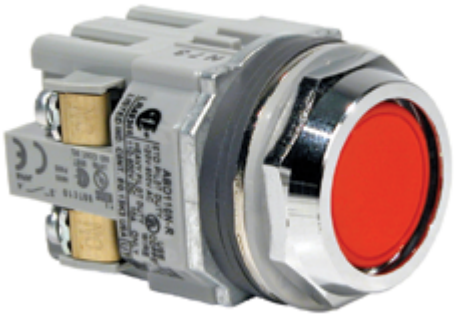
| | |
|---|---|
| Rated Operational Characteristics | AC-15: A600 or Ue = 250V, Ie = 3A (NO, NC, NO-EM, NC-LB)<br>DC-13: P600 or Ue = 125V, Ie = 1.1A (NO, NC)<br>DC-13: Q600 or Ue = 125V, Ie = 0.9A (NO-EM, NC-LB) |
| | |
| Rated Insulation Voltage | 600V |
| Rated Switching Overvoltage | Less than 4kV, conforming to IEC60947-1 |
| Rated Impulse Withstanding Voltage | 4kV for contact circuit<br>2.5kV for lamp circuit |
| Rated Thermal Current | 10 Amp |
| Minimum Switching Capacity | 5 mA at 3V AC/DC |
| Contact Operation | Slow break NC or NO, self-cleaning |
| Operating Force | Flush and extended pushbuttons—with 1NO or 1NC contact: 6.2±2N (momentary), 7.0±2N (maintained)<br>Additional contacts—1NO or 1NC: +3.2N (momentary), + 3.3N (maintained) |
| Terminal Referencing | Conforming to CENELEC EN50005 |
| Recommended Terminal Torque | 0.8 N m (7.1 in lb.) |
| External Short-Circuit Protection | 10A 250V fuse conforming to IEC60269-1 |
| Applicable Wire Size | Minimum 1 x 22 AWG, max. 2 x 14 AWG or 1 x 12 AWG |
| Contact Resistance | Initial contact resistance of 50mΩ or less |
| Contact Gap | 4mm (NO and NC)<br>2mm (NO-EM and NC-LB) |
| Lamp Ratings | Incandescent: 1 W<br>LEDs: 6V: 17mA, 12V: 11mA, 24V: 11mA, / 120, 240V: 10mA |
| Maximum Inrush Current | 40 A (40 msec) |
| Contact Material | Silver |

## Contact Ratings

| | |
|---|---|
| Contact Ratings by Utilization Category IEC 60947-5-1 | AC-15 (A600) |
| | DC-13 (P600) |

| Contact Ratings by Utilization Category | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Operational Voltage | | | 24V | 48V | 50V | 110V | 220V | 440V |
| Operation Current | AC 50/60 Hz | AC-12 Control of resistive loads & solid state loads | 10A | — | 10A | 10A | 6A | 2A |
| | | AC-15 Control of electromagnetic loads (> 72VA) | 10A | — | 7A | 5A | 3A | 1A |
| | DC | DC-12 Control of resistive loads & solid state loads | 8A | 5A | — | 2.2A | 1.1A | — |
| | | DC-13 Control of electromagnets | 5A | 2A | — | 1.1A | 0.6A | — |

## Non-Illuminated Pushbuttons (Assembled)



### Assembled Pushbuttons

A B ( ) D 1 10 N – R

**Function**

B: Momentary
O: Maintained
V: Pushlock Turn Reset
Y: Push-Pull

**Bezel Shape**

Blank: Octagonal
F: Full Shroud
G: Mushroom Shroud
P: Neoprene Boot

**Series Designation**

D: TWTD Series

**Button Color**

B: Black G: Green W: White
R: Red S: Blue Y: Yellow

**Contact Arrangement**

10: 1NO 01: 1NC
20: 2NO 02: 2NC
11: 1NO-1NC 22: 2NO-2NC

**Button Shape**

1: Flush
2: Extended
3: Mushroom ø 40mm
4: Jumbo Mushroom ø 65mm

1. Use only when interpreting part numbers. Do not use for developing part numbers.
2. Custom contact configurations available, contact IDEC for details.

# Non-Illuminated Pushbuttons (Assembled)

## Non-Illuminated Pushbuttons

| Style | | Contacts | Momentary | Maintained |
|---|---|---|---|---|
| Flush | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABD110N-①<br>ABD101N-①<br>ABD111N-①<br>ABD120N-①<br>ABD102N-① | AOD110N-①<br>AOD101N-①<br>AOD111N-①<br>AOD120N-①<br>AOD102N-① |
| Extended | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABD210N-①<br>ABD201N-①<br>ABD211N-①<br>ABD220N-①<br>ABD202N-① | AOD210N-①<br>AOD201N-①<br>AOD211N-①<br>AOD220N-①<br>AOD202N-① |
| Extended with Neoprene Boot† | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABPD210N-①<br>ABPD201N-①<br>ABPD211N-①<br>ABPD220N-①<br>ABPD202N-① | AOPD210N-①<br>AOPD201N-①<br>AOPD211N-①<br>AOPD220N-①<br>AOPD202N-① |
| Recessed | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABFD110N-①<br>ABFD101N-①<br>ABFD111N-①<br>ABFD120N-①<br>ABFD102N-① | AOFD110N-①<br>AOFD101N-①<br>AOFD111N-①<br>AOFD120N-①<br>AOFD102N-① |
| Extended with Full Shroud | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABFD210N-①<br>ABFD201N-①<br>ABFD211N-①<br>ABFD220N-①<br>ABFD202N-① | AOFD210N-①<br>AOFD201N-①<br>AOFD211N-①<br>AOFD220N-①<br>AOFD202N-① |
| ø 40mm Mushroom Head | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABD310N-①<br>ABD301N-①<br>ABD311N-①<br>ABD320N-①<br>ABD302N-① | AOD310N-①<br>AOD301N-①<br>AOD311N-①<br>AOD320N-①<br>AOD302N-① |
| ø 40mm Mushroom Head with Full Shroud | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABGD310N-①<br>ABGD301N-①<br>ABGD311N-①<br>ABGD320N-①<br>ABGD302N-① | AOGD310N-①<br>AOGD301N-①<br>AOGD311N-①<br>AOGD320N-①<br>AOGD302N-① |
| ø 65mm Jumbo Mushroom Head | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABD410N-①<br>ABD401N-①<br>ABD411N-①<br>ABD420N-①<br>ABD402N-① | AOD410N-①<br>AOD401N-①<br>AOD411N-①<br>AOD420N-①<br>AOD402N-① |
| ø 65mm Jumbo Mushroom Head with Shallow Shroud | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABGD410N-①<br>ABGD401N-①<br>ABGD411N-①<br>ABGD420N-①<br>ABGD402N-① | AOGD410N-①<br>AOGD401N-①<br>AOGD411N-①<br>AOGD420N-①<br>AOGD402N-① |
| ø 65mm Jumbo Mushroom Head With Deep Shroud | | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | ABFD410N-①<br>ABFD401N-①<br>ABFD411N-①<br>ABFD420N-①<br>ABFD402N-① | AOFD410N-①<br>AOFD401N-①<br>AOFD411N-①<br>AOFD420N-①<br>AOFD402N-① |

1. In place of ①, specify the Button Color Code.
2. For sub-assembly part numbers, see next page.
3. For accessories, see page 744.
4. †Neoprene boot available only in Black (B), Green (G), Red (R) and Yellow (Y).

## ① Button Color Codes

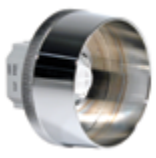
| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| Yellow | Y |
| White | W |

1. 65mm Jumbo mushroom not available in white.
2. Neoprene boot is not available in blue or white.

## Non-Illuminated Pushbuttons (Sub-Assembled)

| Contact Block | + | Operator | + | Button | = | Complete Part |
|---|---|---|---|---|---|---|

### Operators

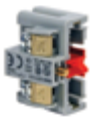
| Style | | Part Number | |
|---|---|---|---|
| | | Momentary | Maintained |
| Flush/Extended | | ABD-100 | AOD-100 |
| Extended with Full Shroud | | ABFD-200 | AOFD-200 |
| ø 40mm Mushroom/ø 65mm Jumbo Mushroom | | ABD-300 | AOD-300 |
| ø 40mm Mushroom with Full Shroud | | ABGD-300 | AOGD-300 |
| ø 65mm Jumbo Mushroom with Shallow Shroud | | ABGD-400 | AOGD-400 |
| ø 65mm Jumbo Mushroom with Deep Shroud |  | ABFD-400 | AOFD-400 |

### Buttons and Lenses

| Style | | Part Number |
|---|---|---|
| Flush | | ABD1BN-① |
| Extended | | ABD2BN-① |
| ø 40mm Mushroom | | ABD3BN-① |
| ø 65mm Jumbo Mushroom | | ABD4BN-① |

In place of ①, specify the Button Color Code. (See table previous page)

### Contact Blocks

| Style | | Part Number | |
|---|---|---|---|
| | | 1NO | 1NC |
| All Control Units |  | BST-010<br>BST-010S (early make) | BST-001<br>BST-001S (late break) |
| Dummy Block | | BST-D | |

1. Dummy blocks (no contacts) are used with an odd number of contact blocks.
2. Combining BST-010S and BST-001S result in overlapping contacts (remain on, or closed, when switch is moved between two positions).

## Stop Switches (Assembled)

### Assembled Stop Switches

**A V (L) D 3 (99) 11 (D) N – R – (24V)**

**Function**

V:Pushlock Turn Reset
Y:Push-Pull

**Illumination**

Blank: None
L: Illuminated

**Series Designation**

D: TWTD Series

**Button/Lens Size**

3: 40mm Mushroom

**Illumination Circuit**

99: Full Voltage (lamp determines voltage)
126: 120V AC Step Down Transformer
246: 240V AC Step Down Transformer
486: 480V AC Step Down Transformer

**Lamp Voltage**
(full voltage illuminated units only)

6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120V AC (LED only)
240V: 240V AC (LED only)

**Button/Lens Color Code**

A: Amber
G: Green
R: Red
S: Blue
W: White
Y: Yellow

**Lamp Type**
(illuminated units only)

Blank: Incandescent
D: LED

**Contact Arrangement**

10: 1NO
20: 2NO
11: 1NO-1NC
01: 1NC
02: 2NC
22: 2NO-2NC

1. Use only when interpreting part numbers. Do not use for developing part numbers.
2. Custom contact configurations available, contact IDEC for details.

# Stop Switches (Assembled)

## Stop Switches

| Style | | Contacts | Part Number |
|---|---|---|---|
| ø 40mm Pushlock Turn Reset | Non-Illuminated | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | AVD310N-R*<br>AVD301N-R*<br>AVD311N-R*<br>AVD320N-R*<br>AVD302N-R* |
| ø 40mm Illuminated Pushlock Turn Reset | Full Voltage | 1NO-1NC<br>2NO<br>2NC | AVLD39911⑤N-R-③*<br>AVLD39920⑤N-R-③*<br>AVLD39902⑤N-R-③* |
| | Transformer | 1NO-1NC<br>2NO<br>2NC | AVLD3 ④ 11⑤N-R*<br>AVLD3 ④ 20⑤N-R*<br>AVLD3 ④ 02⑤N-R* |
| ø 40mm Push-Pull | Non-Illuminated | 1NO<br>1NC<br>1NO-1NC<br>2NO<br>2NC | AYD310N-①<br>AYD301N-①<br>AYD311N-①<br>AYD320N-①<br>AYD302N-① |
| ø 40mm Push-Pull | Full Voltage | 1NO-1NC<br>2NO<br>2NC | AYLD39911⑤N-②-③ **<br>AYLD39920⑤N-②-③ **<br>AYLD39902⑤N-②-③ ** |
| | Transformer | 1NO-1NC<br>2NO<br>2NC | AYLD3 ④ 11⑤N-② **<br>AYLD3 ④ 20⑤N-② **<br>AYLD3 ④ 02⑤N-②** |
| ø 40mm Momentary Push-Pull (3-position) | Full Voltage | 1NO-1NC<br>1NC-1LB† | AYLD229911⑤N-②-③ -TK962<br>AYLD229902S⑤N-②-③-TK962 |
| | Transformer | 1NO-1NC<br>1NC-1LB† | AYLD22 ④ 11⑤N-②-TK962<br>AYLD22 ④ 02S⑤N-②-TK962 |

## Unibody E-Stops

| Style | | Contacts | Part Number |
|---|---|---|---|
| ø 40mm Pushlock Turn Reset (available in Red only) | | 1NO-1NC<br>2NC | HN1E-BV4F11-R*<br>HN1E-BV4F02-R* |
| Illuminated ø 40mm Pushlock Turn Reset (available in Red only) | | 1NO-1NC<br>2NC | HN1E-LV4F11Q⑤-R-③<br>HN1E-LV4F02Q⑤-R-③ |

1. In place of ①, specify the button color code
2. In place of ②, specify the lens color code.
3. In place of ③, specify the Full Voltage (lamp voltage) Code.
4. In place of ④, specify the transformer voltage code.
5. In place of ⑤, specify the Lamp Type code.
6. With single unit construction, the positive action contacts are integrated in the body of the switch. This provides an extra degree of safety and reliability for critical emergency stop functions.
7. HN1E series E-stops comply with the IEC "E-Stop Addendum to the Low Voltage Directive," this includes "tamper proof" operation whereby a change of contact state is not possible by "teasing" or "floating" the operator.
8. 3 position push-pull available in spring return to center only.
9. *Available in red only.
10. **Not available in blue.
11. †The most common configuration for motor starting applications.
12. For sub-assembly part numbers, see next page.
13. For nameplates and accessories, see page 746 and page 744.
14. For dimensions, see page 749.

## 3 Position Push-Pull†

| Contact | Push | Center | Pull |
|---|---|---|---|
| NC (BST-001) | 0 | 0 | X |
| NC-LB (BST-001S) | 0 | X | X |
| NO (BST-010) | X | 0 | 0 |
| NO-EM (BST-010S) | X | X | 0 |

## ① Button Color Codes

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| Yellow | Y |

## ② LED/Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |

## ③ Full Voltage Codes

| Voltage | Code |
|---|---|
| 6V AC/DC | 6V |
| 12V AC/DC | 12V |
| 24V AC/DC | 24V |
| 120V AC | 120V |
| 240V AC | 240V (LED only) |

## ④ Transformer Voltage Codes

| Voltage | Code |
|---|---|
| 120VAC | 126 |
| 240VAC | 246 |
| 480VAC | 486 |

Transformers step down to 6V.

## ⑤ Lamp Type Codes

| Lamp | Code |
|---|---|
| Incandescent | Blank |
| LED | D |

## Stop Switches (Sub-Assembled)

| Transformer* | + | Operator | + | Lamp | + | Button/Lens | = | Complete Part |
|---|---|---|---|---|---|---|---|---|

* Not required for full voltage units (full voltage clips used instead).

### Operators

| Style | | | Part Number |
|---|---|---|---|
| ø40mm Pushlock Turn Reset | | | AVD-300 |
| Illuminated ø40mm Pushlock Turn Reset | | | AVLD3-0600N |
| ø40mm Push-Pull | | | AYD-3100 |
| Illuminated ø 40mm Push-Pull | | 2 pos | AYLD-0600 |
| | | 3 pos | AYLD22TK962-0B01 |

### Buttons and Lenses

| Style | | | Part Number |
|---|---|---|---|
| Button for Pushlock Turn Reset Stop Switches (ø40mm, red only) | | | AVN3B-R |
| Lens for Illuminated Pushlock Turn Reset Stop Switches (ø40mm, red only) | | | AVLN3LU-R |
| Button for Push-Pull Stop Switches (ø40mm) | | | AYD3BN-① |
| Lens for Illuminated Push-Pull Stop Switches (ø40mm) | | 2 pos* | AYLD3L-② |
| | | 3 pos | AYLD2L-② |

1. In place of ①, specify the Button Color Code. (See table below)
2. In place of ②, specify the LED Color Code.
3. *Not available in blue.

### Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 6V AC/DC | LSTD-6② |
| | 12V AC/DC | LSTD-1② |
| | 24V AC/DC | LSTD-2② |
| | 120V AC | LSTD-H2② |
| | 240V AC | LSTD-M4② |
| Incandescent | 6V AC/DC | IS-6 |
| | 12V AC/DC | IS-12 |
| | 24V AC/DC | IS-24 |
| | 120V AC | L-120L |

1. In place of ②, specify the LED color code.
2. The LED contains a current-limiting resistor and a protection diode.

### ① Button Color Codes

| Color | Code |
|---|---|
| Black | B |
| Green | G |
| Red | R |
| Blue | S |
| Yellow | Y |

### ② LED Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |

### Contact Blocks

| Style | | Part Number 1NO | Part Number 1NC |
|---|---|---|---|
| All Control Units | | BST-010<br>BST-010S (early make) | BST-001<br>BST-001S (late break) |
| Dummy Block | | BST-D | |

1. Dummy blocks (no contacts) are used with an odd number of contact blocks.
2. Combining BST-010S and BST-001S result in overlapping contacts.

### Full Voltage Clips

| Primary Voltage (50/60Hz) | | Part Number |
|---|---|---|
| Full Voltage Clips (2 required for each unit) | | APD-F |

### Transformers

| Style | Primary Voltage (50/60Hz) | Part Number |
|---|---|---|
| | 120V AC | TWD-0126 |
| | 240V AC | TWD-0246 |
| | 480V AC | TWD-0486 |

6V secondary voltage (uses 6V lamp).

## Pilot Lights (Assembled)

### Assembled Pilot Lights

**A P D 1 126 D N – R – ( )**

**Function**
P: Pilot Light

**Series Designation**
D: TWTD Series

**Lens Shape**
1: Dome

**Rated Operational Voltage (Primary)**

| Transformer Type | Full Voltage Type |
|---|---|
| 126: 120V AC | 99: Full Voltage |
| 246: 240V AC | |
| 486: 480V AC | |

**Lamp Voltage**
(full voltage illuminated units only)

| | |
|---|---|
| 6V: | 6V AC/DC |
| 12V: | 12V AC/DC |
| 24V: | 24V AC/DC |
| 120V: | 120V AC (LED only) |
| 240V: | 240V AC (LED only) |

**Lens Color Code**

| | |
|---|---|
| A: | Amber |
| G: | Green |
| R: | Red |
| S: | Blue |
| W: | White |
| Y: | Yellow |

**Lamp Type**
Blank: Incandescent
D: LED

Use only when interpreting part numbers. Do not use for developing part numbers.

### LED and Incandescent Pilot Lights

| Style | Operating Voltage | Part Number | |
|---|---|---|---|
| | | LED | Incandescent |
| Transformer Dome | 120V AC<br>240V AC<br>480V AC | APD1126DN-②<br>APD1246DN-②<br>APD1486DN-② | APD1126N-②<br>APD1246N-②<br>APD1486N-② |
| Full Voltage Dome | — | APD199DN-②-③ | APD199N-②-③ |

1. In place of ②, specify the Lens/LED Color Code.
2. In place of ③, specify the Full Voltage Code (lamp voltage).
3. Yellow pilot light comes with white LED.

### ② Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

### ③ Full Voltage Codes

| Voltage | Code |
|---|---|
| 6V AC/DC | 6V |
| 12V AC/DC | 12V |
| 24V AC/DC | 24V |
| 120V AC | 120V |
| 240V AC | 240V (LED only) |

## Pilot Lights (Sub-Assembled)

| Transformer* | + | Operator | + | Lamp | + | Lens | = | Complete Part |
|---|---|---|---|---|---|---|---|---|

* Not required for full voltage units (full voltage clips used instead).

| One Each from Left Column | plus | One Selection from Right Column |
|---|---|---|

### Operators

| Style | | Part Number |
|---|---|---|
| Transformer | | APD-006 |
| Full Voltage | | APD-199 |

Full voltage operator comes with full voltage clips.

### Lenses

| Style | | Part Number |
|---|---|---|
| Dome Lens | | APN106LN-② |

1. In place of ②, specify the Lens Color Code.
2. LED and incandescent lenses differ in shade only. Some colors have only one shade.

### Lamps

| Style | | Voltage | Part Number |
|---|---|---|---|
| LED | | 6V AC/DC | LSTD-6② |
| | | 12V AC/DC | LSTD-1② |
| | | 24V AC/DC | LSTD-2② |
| | | 120V AC | LSTD-H2② |
| | | 240V AC | LSTD-M4② |
| Incandescent | | 6V AC/DC | IS-6 |
| | | 12V AC/DC | IS-12 |
| | | 24V AC/DC | IS-24 |
| | | 120V AC | L-120L |

1. In place of ②, specify the LED color code.
2. The LED contains a current-limiting resistor and a protection diode.

### Full Voltage Clips

| Primary Voltage (50/60Hz) | | Part Number |
|---|---|---|
| | | APD-F |

Required for all full voltage models. Two pieces each.

### Transformers

| Style | Primary Voltage (50/60Hz) | | Part Number |
|---|---|---|---|
| LED | | 120V AC | TWD-0126 |
| | | 240V AC | TWD-0246 |
| | | 480V AC | TWD-0486 |

6V secondary voltage (use 6V lamp).

### ② LED/Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

Yellow lens only. Yellow LED not available, use white LED.

## Illuminated Pushbuttons (Assembled)

### Assembled Illuminated Pushbuttons

**A L ( ) D 2 126 11 (D) N – R – ( )**

**Function**

L: Momentary Action
OL: Maintained Action

**Bezel Shape**

Blank: Octagonal
F: Full Shroud

**Series Designation**

D: TWTD Series

**Lens Shape**

2: Extended
3: Mushroom ø 40mm

**Rated Operational Voltage (Primary)**

Transformer Type
126: 120V AC
246: 240V AC
486: 480V AC

Full Voltage Type
99: Full Voltage

**Lamp Voltage**
(full voltage only)

6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120V AC
240V: 240V AC (LED only)

**Lens Color Code**

A: Amber
G: Green
R: Red
S: Blue
W: White
Y: Yellow

**Lamp Type**

Blank: Incandescent
D: LED

**Contact Arrangement**

20: 2NO
02: 2NC
11: 1NO-1NC

1. Use only when interpreting part numbers. Do not use for developing part numbers.
2. All transformers step down to 6V.

# Illuminated Pushbuttons (Assembled)

## Illuminated Pushbuttons

| Style | | Contacts | Part Number | |
|---|---|---|---|---|
| | | | Momentary | Maintained |
| Extended Lens | Full Voltage | 1NO-1NC<br>2NO<br>2NC | ALD29911⑤N-②-③<br>ALD29920⑤N-②-③<br>ALD29902⑤N-②-③ | AOLD29911⑤N-②-③<br>AOLD29920⑤N-②-③<br>AOLD29902⑤N-②-③ |
| | Transformer | 1NO-1NC<br>2NO<br>2NC | ALD2 ④ 11⑤N-②<br>ALD2 ④ 20⑤N-②<br>ALD2 ④ 02⑤N-② | AOLD2 ④ 11⑤N-②<br>AOLD2 ④ 20⑤N-②<br>AOLD2 ④ 02⑤N-② |
| Extended Lens with Full Shroud | Full Voltage | 1NO-1NC<br>2NO<br>2NC | ALFD29911⑤N-②-③<br>ALFD29920⑤N-②-③<br>ALFD29902⑤N-②-③ | AOLFD29911⑤N-②-③<br>AOLFD29920⑤N-② ③<br>AOLFD29902⑤N-②-③ |
| | Transformer | 1NO-1NC<br>2NO<br>2NC | ALFD2 ④ 11⑤N-②<br>ALFD2 ④ 20⑤N-②<br>ALFD2 ④ 02⑤N-② | AOLFD2 ④ 11⑤N-②<br>AOLFD2 ④ 20⑤N-②<br>AOLFD2 ④ 02⑤N-② |
| ø 40mm Mushroom Lens | Full Voltage | 1NO-1NC<br>2NO<br>2NC | ALD39911⑤N-②-③<br>ALD39920⑤N-②-③<br>ALD39902⑤N-②-③ | AOLD39911⑤N-②-③<br>AOLD39920⑤N-②-③<br>AOLD39902⑤N-②-③ |
| | Transformer | 1NO-1NC<br>2NO<br>2NC | ALD3 ④ 11⑤N-②<br>ALD3 ④ 20⑤N-②<br>ALD3 ④ 02⑤N-② | AOLD3 ④ 11⑤N-②<br>AOLD3 ④ 20⑤N-②<br>AOLD3 ④ 02⑤N-② |

1. In place of ②, specify the Lens Color Code.
2. In place of ③, specify the Full Voltage Code (lamp voltage).
3. In place of ④, specify the Transformer Voltage Code.
4. In place of ⑤, specify the Lamp Type Code.
5. Light is independent of switch position.
6. Yellow pushbutton comes with white LED only.

### ② Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

### ③ Full Voltage Codes

| Voltage | Code |
|---|---|
| 6V AC/DC | 6V |
| 12V AC/DC | 12V |
| 24V AC/DC | 24V |
| 120V AC | 120V |
| 240V AC | 240V (LED only) |

### ④ Transformer Voltage Codes

| Voltage | Code |
|---|---|
| 120VAC | 126 |
| 240VAC | 246 |
| 480VAC | 486 |

6V secondary voltage (uses 6V lamp).

### ⑤ Lamp Type Codes

| Lamp | Code |
|---|---|
| Incandescent | Blank |
| LED | D |

# Illuminated Pushbuttons (Sub-Assembled)

| Transformer* | + | Contact Block | + | Operator | + | Lamp | + | Lens | = | Complete Part |
|---|---|---|---|---|---|---|---|---|---|---|

*Not required for full voltage types (full voltage types use APD-F full voltage clips).

## Operators

| Style | | Part Number | |
|---|---|---|---|
| | | Momentary | Maintained |
| Extended | | ALD-0600 | AOLD-0600 |
| Extended with Full Shroud | | ALFD-0600 | AOLFD-0600 |
| 40mm Mushroom | | ALD-0600 | AOLD-0600 |

## Lenses

| Style | | Part Number |
|---|---|---|
| Extended | | ALN06LU-② |
| ø 40mm Mushroom | | ALN3LU-② |

In place of ②, specify the Lens Color Code.

## Full Voltage Clips

| Style | | Part Number |
|---|---|---|
| Full Voltage Clips (2 required for each unit) | | APD-F |

Required for all full voltage models.

## Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 6V AC/DC | LSTD-6② |
| | 12V AC/DC | LSTD-1② |
| | 24V AC/DC | LSTD-2② |
| | 120V AC | LSTD-H2② |
| | 240V AC | LSTD-M4② |
| Incandescent | 6V AC/DC | IS-6 |
| | 12V AC/DC | IS-12 |
| | 24V AC/DC | IS-24 |
| | 120V AC | L-120L |

1. In place of ②, specify the LED color code.
2. The LED contains a current-limiting resistor and a protection diode.

## ② LED/Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

Yellow lens only. Yellow LED not available, use white LED.

## Contact Blocks

| Style | | Part Number | |
|---|---|---|---|
| | | 1NO | 1NC |
| All Control Units | | BST-010<br>BST-010S (early make) | BST-001<br>BST-001S (late break) |
| Dummy Block | | BST-D | |

1. Dummy blocks (no contacts) are used with an odd number of contact blocks.
2. Combining BST-010S and BST-001S result in overlapping contacts (remain on, or closed, when switch is moved between two positions).

## Transformers

| Style | | Primary Voltage (50/60Hz) | Part Number |
|---|---|---|---|
| Transformers | | 120V AC | TWD-0126 |
| | | 240V AC | TWD-0246 |
| | | 480V AC | TWD-0486 |

6V secondary voltage (use 6V lamp).

## Non-Illuminated Selector Switches (Assembled)

### Assembled Selector Switches

**A S D 2 ( ) ( ) 11 N – ( )**

**Function**

S: Selector Switch

**Series Designation**

D: TWTD Series

**Number of Positions**

2: 2-Position
3: 3-Position

**Spring Return Action**

Blank: Maintained
1: Spring return from Right
2: Spring return from Left
3: 2-Way spring return from Left and Right

**Circuit Number**

(See Circuit # column of Selector Switch Contact Arrangement Chart on beginning on page 741.)

**Contact Arrangement Code**

| | |
|---|---|
| 10: 1NO | 01: 1NC |
| 20: 2NO | 02: 2NC |
| 40: 4NO | 04: 4NC |
| 11: 1NO-1NC | 22: 2NO-2NC |

**Operator Style Code**

Blank: Knob Operator
L: Lever Operator
K: Key Operator

1. Use only when interpreting part numbers. Do not use for developing part numbers.
2. Custom key removal codes available. Please contact IDEC for details.

# Non-Illuminated Selector Switches (Assembled)

## Non-Illuminated 2-Position Selector Switches

| Style | | | | | Part Number | | |
|---|---|---|---|---|---|---|---|
| Contact | Mounting | Operator Position L | Operator Position R | | Maintained | Spring Return from Right | Spring Return from Left |
| | | | | | | | |
| 1NO | 1<br>2 | 0<br>0 | X<br>0 | Knob<br>Lever<br>Key | ASD210N<br>ASD2L10N<br>ASD2K10N | ASD2110N<br>ASD21L10N<br>ASD21K10N | ASD2210N<br>ASD22L10N<br>ASD22K10N |
| 1NC | 1<br>2 | X<br>0 | 0<br>0 | Knob<br>Lever<br>Key | ASD201N-116<br>ASD2L01N-116<br>ASD2K01N-116 | ASD2101N-116<br>ASD21L01N-116<br>ASD21K01N-116 | ASD2201N-116<br>ASD22L01N-116<br>ASD22K01N-116 |
| 1NO<br>1NC | 1<br>2 | 0<br>X | X<br>0 | Knob<br>Lever<br>Key | ASD211N<br>ASD2L11N<br>ASD2K11N | ASD2111N<br>ASD21L11N<br>ASD21K11N | ASD2211N<br>ASD22L11N<br>ASD22K11N |
| 2NO | 1<br>2 | 0<br>0 | X<br>X | Knob<br>Lever<br>Key | ASD220N<br>ASD2L20N<br>ASD2K20N | ASD2120N<br>ASD21L20N<br>ASD21K20N | ASD2220N<br>ASD22L20N<br>ASD22K20N |
| 2NC | 1<br>2 | X<br>X | 0<br>0 | Knob<br>Lever<br>Key | ASD202N-104<br>ASD2L02N-104<br>ASD2K02N-104 | ASD2102N-104<br>ASD21L02N-104<br>ASD21K02N-104 | ASD2202N-104<br>ASD22L02N-104<br>ASD22K02N-104 |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | 0<br>X<br>0<br>X | X<br>0<br>X<br>0 | Knob<br>Lever<br>Key | ASD222N<br>ASD2L22N<br>ASD2K22N | ASD2122N<br>ASD21L22N<br>ASD21K22N | ASD2222N<br>ASD22L22N<br>ASD22K22N |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | 0<br>0<br>X<br>X | X<br>X<br>0<br>0 | Knob<br>Lever<br>Key | ASD222N-111<br>ASD2L22N-111<br>ASD2K22N-111 | ASD2122N-111<br>ASD21L22N-111<br>ASD21K22N-111 | ASD2222N-111<br>ASD22L22N-111<br>ASD22K22N-111 |

1. The truth table indicates the operating position of contact block when the operator is switched to that position.
   X = On (closed contacts) 0 = Off (open contacts)
   X⟷X = Overlapping Contacts: Remain on (closed contacts) when switch is moved between these two positions.
2. All knob and lever selector switches come in black. Other colors are available by ordering the knob or lever separately.
3. Custom contact arrangements available, see page 741.

## Non-Illuminated 3-Position Selector Switches

| Style | | | | | | Part Number | | | |
|---|---|---|---|---|---|---|---|---|---|
| Contact | Mounting | Operator Position L | Operator Position C | Operator Position R | | Maintained | Spring Return from Right | Spring Return from Left | Spring Return Two-Way |
| | | |  | | | | | | |
| 2NO | 1<br>2 | X<br>0 | 0<br>0 | 0<br>X | Knob<br>Lever<br>Key | ASD320N<br>ASD3L20N<br>ASD3K20N | ASD3120N<br>ASD31L20N<br>ASD31K20N | ASD3220N<br>ASD32L20N<br>ASD32K20N | ASD3320N<br>ASD33L20N<br>ASD33K20N |
| 2NC | 1<br>2 | 0<br>X | X⟷X | X<br>0 | Knob<br>Lever<br>Key | ASD302N<br>ASD3L02N<br>ASD3K02N | ASD3102N<br>ASD31L02N<br>ASD31K02N | ASD3202N<br>ASD32L02N<br>ASD32K02N | ASD3302N<br>ASD33L02N<br>ASD33K02N |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | X<br>0<br>0<br>X⟷X | 0<br>0<br>X⟷X<br>0 | 0<br>X<br>X<br>0 | Knob<br>Lever<br>Key | ASD322N<br>ASD3L22N<br>ASD3K22N | ASD3122N<br>ASD31L22N<br>ASD31K22N | ASD3222N<br>ASD32L22N<br>ASD32K22N | ASD3322N<br>ASD33L22N<br>ASD33K22N |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | X<br>X⟷X<br>0<br>0 | 0<br>X<br>X<br>0 | X<br>0<br>0<br>X | Knob<br>Lever<br>Key | ASD322N-309<br>ASD3L22N-309<br>ASD3K22N-309 | ASD3122N-309<br>ASD31L22N-309<br>ASD31K22N-309 | ASD3222N-309<br>ASD32L22N-309<br>ASD32K22N-309 | ASD3322N-309<br>ASD33L22N-309<br>ASD33K22N-309 |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | 0<br>0<br>0<br>0 | X<br>0<br>X<br>0 | 0<br>X<br>0<br>X | Knob<br>Lever<br>Key | ASD322N-310<br>ASD3L22N-310<br>ASD3K22N-310 | ASD3122N-310<br>ASD31L22N-310<br>ASD31K22N-310 | ASD3222N-310<br>ASD32L22N-310<br>ASD32K22N-310 | ASD3322N-310<br>ASD33L22N-310<br>ASD33K22N-310 |
| 4NO | 1<br>2<br>3<br>4 | X<br>0<br>X<br>0 | 0<br>0<br>0<br>0 | 0<br>X<br>0<br>X | Knob<br>Lever<br>Key | ASD340N<br>ASD3L40N<br>ASD3K40N | ASD3140N<br>ASD31L40N<br>ASD31K40N | ASD3240N<br>ASD32L40N<br>ASD32K40N | ASD3340N<br>ASD33L40N<br>ASD33K40N |
| 4NC | 1<br>2<br>3<br>4 | 0<br>X⟷X<br>0<br>X⟷X | X⟷X<br>X⟷X<br>X⟷X<br>X⟷X | X<br>0<br>X<br>0 | Knob<br>Lever<br>Key | ASD304N<br>ASD3L04N<br>ASD3K04N | ASD3104N<br>ASD31L04N<br>ASD31K04N | ASD3204N<br>ASD32L04N<br>ASD32K04N | ASD3304N<br>ASD33L04N<br>ASD33K04N |

## Non-Illuminated Selector Switches (Sub-Assembled)

| Contact Blocks | + | Operator | + | Knob or Lever* | + | Color Insert* | = | Complete Part† |
|---|---|---|---|---|---|---|---|---|

1. *Not needed with key type switches.
2. †Knob type shown.

### Operators

| Style | Position | Description | Part Number |
|---|---|---|---|
| Knob/Lever | 2 | Maintained | ASD200 |
| | | Spring return from right | ASD2100 |
| | | Spring return from left | ASD2200 |
| | 3 | Maintained, Cam 1<br>Maintained, Cam 2 | ASD300-1<br>ASD300-2 |
| | | Spring return from right, Cam 1<br>Spring return from right, Cam 2 | ASD3100-1<br>ASD3100-2 |
| | | Spring return from left, Cam 1<br>Spring return from left, Cam 2 | ASD3200-1<br>ASD3200-2 |
| | | Spring return from left/right, Cam 1<br>Spring return from left/right, Cam 2 | ASD3300-1<br>ASD3300-2 |
| Key | 2 | Maintained | ASD2K00-RA |
| | | Spring return from right | ASD21K00-RL |
| | | Spring return from left | ASD22K00 |
| | 3 | Maintained, Cam 1<br>Maintained, Cam 2 | ASD3K00-1<br>ASD3K00-2 |
| | | Spring return from right, Cam 1<br>Spring return from right, Cam 2 | ASD31K00-1-RLC<br>ASD31K00-2-RLC |
| | | Spring return from left, Cam 1<br>Spring return from left, Cam 2 | ASD32K00-1-RRC<br>ASD32K00-2-RRC |
| | | Spring return from left/right, Cam 1<br>Spring return from left/right, Cam 2 | ASD33K00-1-RC<br>ASD33K00-2-RC |

1. Order knobs, levers, color inserts separately (see below).
2. For key switches, keys are removable in all maintained positions. Other options available, contact IDEC for details.
3. See page 743 "Operator Truth Tables" for details of difference between cams.

### ① Color Codes

| Knob/Lever Color | Code |
|---|---|
| Black | B |
| Blue | S |
| Green | G |
| Red | R |
| Yellow | Y |
| White | W |

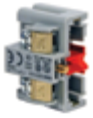
1. Knob/Lever not available in white.
2. Color inserts not available in Black.
3. Lever not available in yellow.

### Handles and Inserts

| Style | | Part Number |
|---|---|---|
| Knob | | ASDHHY-① |
| Lever | | ASDHHL-①* |
| Color Insert | | TW-HC1-① |

1. In place of ①, specify the Color Code.
*Not available in yellow.

### Contact Blocks

| Style | | Part Number 1NO | Part Number 1NC |
|---|---|---|---|
| All Control Units |  | BST-010<br>BST-010S (early make) | BST-001<br>BST-001S (late break) |
| Dummy Block | | BST-D | |

1. Dummy blocks (no contacts) are used with an odd number of contact blocks.
2. Combining BST-010S and BST-001S result in overlapping contacts (remain on, or closed, when switch is moved between two positions).

## Illuminated Selector Switches (Assembled)

### Assembled Illuminated Selector Switches

**A SL D 2 (2) 99 11 D N – 111 – R – 24**

**Function**

SL:Illuminated Selector Switch

**Series Designation**

D: TWTD series

**Number of Positions**

2: 2-Position
3: 3-Position

**Spring Return Action**

Blank: Maintained
1: Spring return from Right
2: Spring return from Left
3: Two-Way spring return from Left and Right

**Rated Operational Voltage (Primary)**

| Transformer Type | Full Voltage Type |
|---|---|
| 126: 120V AC | 99: Full Voltage |
| 246: 240V AC | |
| 486: 480V AC | |

**Contact Arrangement Code**

| | |
|---|---|
| 20: 2NO | 02: 2NC |
| 40: 4NO | 04: 4NC |
| 11: 1NO-1NC | 22: 2NO-2NC |

**Lamp Voltage**
(Full Voltage Units Only)

6V: 6V AC/DC
12V: 12V AC/DC
24V: 24V AC/DC
120V: 120V AC
240V: 240V AC (LED only)

**Lens Color Code**

A: Amber
G: Green
R: Red
S: Blue
W: White
Y: Yellow

**Circuit Code Number**

See Circuit # column of Selector Switch Contact Arrangement Charts on page 741.

**Lamp Type**

Blank: Incandescent Lamp
D: LED Lamp

Use only when interpreting part numbers. Do not use for developing part numbers.

# Illuminated Selector Switches (Assembled)

## Illuminated 2-Position Selector Switches

| Style | | | | | Part Number | | |
|---|---|---|---|---|---|---|---|
| Contact | Mounting | Operator Position L | Operator Position R | Lamp Circuit Type | Maintained | Spring Return from Right | Spring Return from Left |
| 1NO<br>1NC | 1<br>2 | 0<br>X | X<br>0 | Transformer<br>Full Voltage | ASLD2 ④11⑤N-②<br>ASLD29911⑤N-②-③ | ASLD21 ④11⑤N-②<br>ASLD219911⑤N-②-③ | ASLD22 ④11⑤N-②<br>ASLD229911⑤N-②-③ |
| 2NO | 1<br>2 | 0<br>0 | X<br>X | Transformer<br>Full Voltage | ASLD2 ④20⑤N-②<br>ASLD29920⑤N-②-③ | ASLD21 ④20⑤N-②<br>ASLD219920⑤N-②-③ | ASLD22 ④20⑤N-②<br>ASLD229920⑤N-②-③ |
| 2NC | 1<br>2 | X<br>X | 0<br>0 | Transformer<br>Full Voltage | ASLD2 ④02⑤N-104-②<br>ASLD29902⑤N-104-②-③ | ASLD21 ④02⑤N-104-②<br>ASLD219902⑤N-104-②-③ | ASLD22 ④02⑤N-104-②<br>ASLD229902⑤N-104-②-③ |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | 0<br>X<br>0<br>X | X<br>0<br>X<br>0 | Transformer<br>Full Voltage | ASLD2 ④22⑤N-②<br>ASLD29922⑤N-②- ③ | ASLD21 ④22⑤N-②<br>ASLD219922⑤N-②-③ | ASLD22 ④22⑤N-②<br>ASLD229922⑤N-②-③ |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | 0<br>0<br>X<br>X | X<br>X<br>0<br>0 | Transformer<br>Full Voltage | ASLD2 ④22⑤N-111-②<br>ASLD29922⑤N-111-②-③ | ASLD21 ④22⑤N-111-②<br>ASLD219922⑤N-111-②-③ | ASLD22 ④22⑤N-111-②<br>ASLD229922⑤N-111-②-③ |

### ② LED/Lens Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

### ③ Full Voltage Codes

| Voltage | Code |
|---|---|
| 6V AC/DC | 6V |
| 12V AC/DC | 12V |
| 24V AC/DC | 24V |
| 120V AC | 120V |
| 240V AC | 240V (LED only) |

## Illuminated 3-Position Selector Switches, Maintained and Spring Return

| Style | | | | | | Part Number | | | |
|---|---|---|---|---|---|---|---|---|---|
| Contact | Mounting | Operator Position L | Operator Position C | Operator Position R | Lamp Circuit Type | Maintained | Spring Return From Right | Spring Return from Left | Spring Return Two-Way |
| 2NO | 1<br>2 | X<br>0 | 0<br>0 | 0<br>X | Transformer<br>Full Voltage | ASLD3 ④ 20⑤N-②<br>ASLD39920⑤N-②-③ | ASLD31 ④ 20⑤N-②<br>ASLD319920⑤N-②- ③ | ASLD32 ④ 20⑤N-②<br>ASLD329920⑤N-②-③ | ASLD33 ④ 20⑤N-②<br>ASLD339920⑤N-②-③ |
| 2NC | 1<br>2 | 0<br>X | X<br>X | X<br>0 | Transformer<br>Full Voltage | ASLD3 ④ 02⑤N-②<br>ASLD39902⑤N-②-③ | ASLD31 ④ 02⑤N-②<br>ASLD319902⑤N-②-③ | ASLD32 ④ 02⑤N-②<br>ASLD329902⑤N-②-③ | ASLD33 ④ 02⑤N-②<br>ASLD339902⑤N-②-③ |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | X<br>0<br>0<br>X | 0<br>0<br>X<br>X | 0<br>X<br>X<br>0 | Transformer<br>Full Voltage | ASLD3 ④ 22⑤N-②<br>ASLD39922⑤N-②-③ | ASLD31 ④ 22⑤N-②<br>ASLD319922⑤N-②-③ | ASLD32 ④ 22⑤N-②<br>ASLD329922⑤N-②-③ | ASLD33 ④ 22⑤N-②<br>ASLD339922⑤N-②-③ |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | X<br>X<br>0<br>0 | 0<br>X<br>X<br>0 | X<br>0<br>0<br>X | Transformer<br>Full Voltage | ASLD3 ④ 22⑤N-309-②<br>ASLD39922⑤N-309-②-③ | ASLD31 ④ 22⑤N-309-②<br>ASLD319922⑤N-309-②-③ | ASLD32 ④ 22⑤N-309-②<br>ASLD329922⑤N-309-②-③ | ASLD33 ④ 22⑤N-309-②<br>ASLD339922⑤N-309-②-③ |
| 2NO<br>2NC | 1<br>2<br>3<br>4 | 0<br>0<br>0<br>0 | X<br>0<br>X<br>0 | 0<br>X<br>0<br>X | Transformer<br>Full Voltage | ASLD3 ④ 22⑤N-310-②<br>ASLD39922⑤N-310-②-③ | ASLD31 ④ 22⑤N-310-②<br>ASLD319922⑤N-310-②-③ | ASLD32 ④ 22⑤N-310-②<br>ASLD329922⑤N-310-②-③ | ASLD33 ④ 22⑤N-310-②<br>ASLD339922⑤N-310-②-③ |
| 4NO | 1<br>2<br>3<br>4 | X<br>0<br>X<br>0 | 0<br>0<br>0<br>0 | 0<br>X<br>0<br>X | Transformer<br>Full Voltage | ASLD3 ④ 40⑤N-②<br>ASLD39940⑤N-②-③ | ASLD31 ④ 40⑤N-②<br>ASLD319940⑤N-②-③ | ASLD32 ④ 40⑤N-②<br>ASLD329940⑤N-②-③ | ASLD33 ④ 40⑤N-②<br>ASLD339940⑤N-②-③ |
| 4NC | 1<br>2<br>3<br>4 | 0<br>X<br>0<br>X | X<br>X<br>X<br>X | X<br>0<br>X<br>0 | Transformer<br>Full Voltage | ASLD3 ④ 04⑤N-②<br>ASLD39904⑤N-②-③ | ASLD31 ④ 04⑤N-②<br>ASLD319904⑤N-②-③ | ASLD32 ④ 04⑤N-②<br>ASLD329904⑤N-②-③ | ASLD33 ④ 04⑤N-②<br>ASLD339904⑤N-②-③ |

1. In place of ②, specify the Lens/LED Color Code, in place of ③, specify the Full Voltage (lamp voltage) Code, in place of ④, specify the Transformer Voltage Code and in place of ⑤ specify the Lamp Type Code.
2. The truth table indicates the operating position of contact block when the operator is switched to that position.
   X = On (Closed Contacts) O = Off (Open Contacts)
   X⟷X = Overlapping Contacts: Remain on (closed contacts) when switch is moved between these positions
3. Yellow selector switch comes with white LED.

### ④ Transformer Voltage Codes

| Voltage | Code |
|---|---|
| 120VAC | 126 |
| 240VAC | 246 |
| 480VAC | 486 |

Transformers step down to 6V (use 6V lamp).

### ⑤ Lamp Type Codes

| Lamp | Code |
|---|---|
| Incandescent | Blank |
| LED | D |

Light is independent of switch position.

# Illuminated Selector Switches (Sub-Assembled)

| Transformer* | + | Contact Block | + | Operator | + | Lamp | + | Lens | = | Complete Part |
|---|---|---|---|---|---|---|---|---|---|---|

*Not required for full voltage units (use APD-F full voltage clips instead).

## Operators

| Style | Position | Description | Part Number |
|---|---|---|---|
| Operator | 2 | Maintained | ASLD200 |
| | 3 | Maintained, Cam 1<br>Maintained, Cam 2 | ASLD300-1<br>ASLD300-2 |
| | 2 | Spring return from right | ASLD2100 |
| | | Spring return from left | ASLD2200 |
| | 3 | Spring return from right, Cam 1<br>Spring return from right, Cam 2 | ASLD3100-1<br>ASLD3100-2 |
| | | Spring return from left, Cam 1<br>Spring return from left, Cam 2 | ASLD3200-1<br>ASLD3200-2 |
| | | Spring return from left/right, Cam 1<br>Spring return from left/right, Cam 2 | ASLD3300-1<br>ASLD3300-2 |

## Lenses

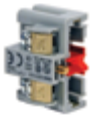
| Style | | Part Number |
|---|---|---|
| Knob | | ASLNHU-① |

## Lamps

| Style | Voltage | Part Number |
|---|---|---|
| LED | 6V AC/DC | LSTD-6② |
| | 12V AC/DC | LSTD-1② |
| | 24V AC/DC | LSTD-2② |
| | 120V AC | LSTD-H2② |
| | 240V AC | LSTD-M4② |
| Incandescent | 6V AC/DC | IS-6 |
| | 12V AC/DC | IS-12 |
| | 24V AC/DC | IS-24 |
| | 120V AC | L-120L |

1. In place of ②, specify the LED color code.
2. The LED contains a current-limiting resistor and a protection diode.

## Contact Blocks

| Style | | Part Number 1NO | Part Number 1NC |
|---|---|---|---|
| All Control Units |  | BST-010<br>BST-010S (early make) | BST-001<br>BST-001S (late break) |
| Dummy Block | | BST-D | |

1. Dummy blocks (no contacts) are used with an odd number of contact blocks.
2. Combining BST-010S and BST-001S result in overlapping contacts (remain on, or closed, when switch is moved between two positions).

## Full Voltage Clips

| Style | | Part Number |
|---|---|---|
| Full Voltage Clips (2 required for each unit) | | APD-F |

Required for all full voltage models.

## Transformers

| Style | | Primary Voltage (50/60Hz) | Part Number |
|---|---|---|---|
| Transformers | | 120V AC | TWD-0126 |
| | | 240V AC | TWD-0246 |
| | | 480V AC | TWD-0486 |

6V secondary voltage.

## ② LED/Lens Color Codes

| Color | Code | Color | Code |
|---|---|---|---|
| Amber | A | Blue | S |
| Green | G | White | W |
| Red | R | Yellow | Y |

Yellow lens only. Yellow LED not available, use white LED.

# Contact Arrangement Charts

## How to Read Contact Arrangement Charts

To determine contact block mounting position, first make sure the selector switch is oriented as shown on the right

**Contact Arrangement**
Type and quantity of switch contacts

**Circuit Number**
* N/D = No designation

**Contact Block Mounting Position**
Position or mounting contact blocks on operator

**Operator Position**
Truth table indicates the operating position of contact block when operator is switched to that position.

X = On (Closed Contacts)
O = Off (Open Contacts)
X—X = Overlapping Contacts: Remain on (closed) when switch is moved between these two positions

**Contact Block Part Number**
Part number to use when ordering sub-assembly contact blocks, as required for use with corresponding mounting position

## Contact Arrangement Chart: 2-Position Selector Switches

| Style | | Mounting Position | Operator Position | | Contact Block Part Number | Description | Operator Part Number | | |
|---|---|---|---|---|---|---|---|---|---|
| Contact | Circuit Number | | L | R | | | Maintained | Spring Return from Right | Spring Return from Left |
| | | | | | | | | | |
| 1NO | N/D | 1 | O | X | BST-010 | Knob/Lever<br>Key<br>Illuminated Knob | ASD200<br>ASD2K00<br>ASLD200 | ASD2100<br>ASD21K00<br>ASLD2100 | ASD2200<br>ASD22K00<br>ASLD2200 |
| | | 2 | O | O | BST-D | | | | |
| 1NC | 116 | 1 | X | O | BST-001 | Knob/Lever<br>Key<br>Illuminated Knob | ASD200<br>ASD2K00<br>ASLD200 | ASD2100<br>ASD21K00<br>ASLD2100 | ASD2200<br>ASD22K00<br>ASLD2200 |
| | | 2 | O | O | BST-D | | | | |
| 1NO<br>1NC | N/D | 1 | O | X | BST-010 | Knob/Lever<br>Key<br>Illuminated Knob | ASD200<br>ASD2K00<br>ASLD200 | ASD2100<br>ASD21K00<br>ASLD2100 | ASD2200<br>ASD22K00<br>ASLD2200 |
| | | 2 | X | O | BST-001 | | | | |
| | 103 | 1 | X | O | BST-001 | Knob/Lever<br>Key<br>Illuminated Knob | ASD200<br>ASD2K00<br>ASLD200 | ASD2100<br>ASD21K00<br>ASLD2100 | ASD2200<br>ASD22K00<br>ASLD2200 |
| | | 2 | O | X | BST-010 | | | | |
| 1NO-EM<br>1NC-LB | 600 | 1 | O | X | BST-010S | Knob/Lever<br>Key<br>Illuminated Knob | ASD200<br>ASD2K00<br>ASLD200 | ASD2100<br>ASD21K00<br>ASLD2100 | ASD2200<br>ASD22K00<br>ASLD2200 |
| | | 2 | X | O | BST-001S | | | | |
| | 601 | 1 | X | O | BST-001S | Knob/Lever<br>Key<br>Illuminated Knob | ASD200<br>ASD2K00<br>ASLD200 | ASD2100<br>ASD21K00<br>ASLD2100 | ASD2200<br>ASD22K00<br>ASLD2200 |
| | | 2 | O | X | BST-010S | | | | |
| 2NO | N/D | 1 | O | X | BST-010 | Knob/Lever<br>Key<br>Illuminated Knob | ASD200<br>ASD2K00<br>ASLD200 | ASD2100<br>ASD21K00<br>ASLD2100 | ASD2200<br>ASD22K00<br>ASLD2200 |
| | | 2 | O | X | BST-010 | | | | |
| 2NC | 104 | 1 | X | O | BST-001 | Knob/Lever<br>Key<br>Illuminated Knob | ASD200<br>ASD2K00<br>ASLD200 | ASD2100<br>ASD21K00<br>ASLD2100 | ASD2200<br>ASD22K00<br>ASLD2200 |
| | | 2 | X | O | BST-001 | | | | |
| 2NO<br>2NC | N/D | 1 | O | X | BST-010 | Knob/Lever<br>Key<br>Illuminated Knob | ASD200<br>ASD2K00<br>ASLD200 | ASD2100<br>ASD21K00<br>ASLD2100 | ASD2200<br>ASD22K00<br>ASLD2200 |
| | | 2 | X | O | BST-001 | | | | |
| | | 3 | O | X | BST-010 | | | | |
| | | 4 | X | O | BST-001 | | | | |
| | 110 | 1 | X | O | BST-001 | Knob/Lever<br>Key<br>Illuminated Knob | ASD200<br>ASD2K00<br>ASLD200 | ASD2100<br>ASD21K00<br>ASLD2100 | ASD2200<br>ASD22K00<br>ASLD2200 |
| | | 2 | O | X | BST-010 | | | | |
| | | 3 | X | O | BST-001 | | | | |
| | | 4 | O | X | BST-010 | | | | |
| | 111 | 1 | O | X | BST-010 | Knob/Lever<br>Key<br>Illuminated Knob | ASD200<br>ASD2K00<br>ASLD200 | ASD2100<br>ASD21K00<br>ASLD2100 | ASD2200<br>ASD22K00<br>ASLD2200 |
| | | 2 | O | X | BST-010 | | | | |
| | | 3 | X | O | BST-001 | | | | |
| | | 4 | X | O | BST-001 | | | | |
| 4NO | N/D | 1 | O | X | BST-010 | Knob/Lever<br>Key<br>Illuminated Knob | ASD200<br>ASD2K00<br>ASLD200 | ASD2100<br>ASD21K00<br>ASLD2100 | ASD2200<br>ASD22K00<br>ASLD2200 |
| | | 2 | O | X | BST-010 | | | | |
| | | 3 | O | X | BST-010 | | | | |
| | | 4 | O | X | BST-010 | | | | |

## Contact Arrangement Chart: 3-Position Selector Switches

| Style | | Mounting Position | Operator Position | | | Contact Block Part Number | Description | Operator Part Number | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Contact | Circuit Number | | L | C | R | | | Maintained | Spring Return from Right | Spring Return from Left | Two-Way |
| 1NO 1NC | 202 | 1 | X | 0 | 0 | BST-010 | Knob/Lever Key Illuminated Knob | ASD300-1 ASD3K00-1 ASLD300-1 | ASD3100-1 ASD31K00-1 ASLD3100-1 | ASD3200-1 ASD32K00-1 ASLD3200-1 | ASD3300-1 ASD33K00-1 ASLD3300-1 |
| | | 2 | X—X | | 0 | BST-001 | | | | | |
| | 203 | 1 | 0 | X—X | | BST-001 | | | | | |
| | | 2 | 0 | 0 | X | BST-010 | | | | | |
| | 302 | 1 | X | 0 | X | BST-010 | Knob/Lever Key Illuminated Knob | ASD300-2 ASD3K00-2 ASLD300-2 | ASD3100-2 ASD31K00-2 ASLD3100-2 | ASD3200-2 ASD32K00-2 ASLD3200-2 | ASD3300-2 ASD33K00-2 ASLD3300-2 |
| | | 2 | X—X | | 0 | BST-001 | | | | | |
| | 303 | 1 | 0 | X | 0 | BST-001 | | | | | |
| | | 2 | 0 | 0 | X | BST-010 | | | | | |
| 2NO | N/D | 1 | X | 0 | 0 | BST-010 | Knob/Lever Key Illuminated Knob | ASD300-1 ASD3K00-1 ASLD300-1 | ASD3100-1 ASD31K00-1 ASLD3100-1 | ASD3200-1 ASD32K00-1 ASLD3200-1 | ASD3300-1 ASD33K00-1 ASLD3300-1 |
| | | 2 | 0 | 0 | X | BST-010 | | | | | |
| | 301 | 1 | X | 0 | X | BST-010 | Knob/Lever Key Illuminated Knob | ASD300-2 ASD3K00-2 ASLD300-2 | ASD3100-2 ASD31K00-2 ASLD3100-2 | ASD3200-2 ASD32K00-2 ASLD3200-2 | ASD3300-2 ASD33K00-2 ASLD3300-2 |
| | | 2 | 0 | 0 | X | BST-010 | | | | | |
| 2NC | 304 | 1 | 0 | X | 0 | BST-001 | Knob/Lever Key Illuminated Knob | ASD300-2 ASD3K00-2 ASLD300-2 | ASD3100-2 ASD31K00-2 ASLD3100-2 | ASD3200-2 ASD32K00-2 ASLD3200-2 | ASD3300-2 ASD33K00-2 ASLD3300-2 |
| | | 2 | X—X | | 0 | BST-001 | | | | | |
| | N/D | 1 | 0 | X—X | | BST-001 | Knob/Lever Key Illuminated Knob | ASD300-1 ASD3K00-1 ASLD300-1 | ASD3100-1 ASD31K00-1 ASLD3100-1 | ASD3200-1 ASD32K00-1 ASLD3200-1 | ASD3300-1 ASD33K00-1 ASLD3300-1 |
| | | 2 | X—X | | 0 | BST-001 | | | | | |
| 2NO 2NC | N/D | 1 | X | 0 | 0 | BST-010 | Knob/Lever Key Illuminated Knob | ASD300-1 ASD3K00-1 ASLD300-1 | ASD3100-1 ASD31K00-1 ASLD3100-1 | ASD3200-1 ASD32K00-1 ASLD3200-1 | ASD3300-1 ASD33K00-1 ASLD3300-1 |
| | | 2 | 0 | 0 | X | BST-010 | | | | | |
| | | 3 | 0 | X—X | | BST-001 | | | | | |
| | | 4 | X—X | | 0 | BST-001 | | | | | |
| | 210 | 1 | 0 | X—X | | BST-001 | Knob/Lever Key Illuminated Knob | ASD300-1 ASD3K00-1 ASLD300-1 | ASD3100-1 ASD31K00-1 ASLD3100-1 | ASD3200-1 ASD32K00-1 ASLD3200-1 | ASD3300-1 ASD33K00-1 ASLD3300-1 |
| | | 2 | 0 | 0 | X | BST-010 | | | | | |
| | | 3 | 0 | X—X | | BST-001 | | | | | |
| | | 4 | 0 | 0 | X | BST-010 | | | | | |
| | 308 | 1 | X | 0 | X | BST-010 | Knob/Lever Key Illuminated Knob | ASD300-2 ASD3K00-2 ASLD300-2 | ASD3100-2 ASD31K00-2 ASLD3100-2 | ASD3200-2 ASD32K00-2 ASLD3200-2 | ASD3300-2 ASD33K00-2 ASLD3300-2 |
| | | 2 | X—X | | 0 | BST-001 | | | | | |
| | | 3 | X | 0 | X | BST-010 | | | | | |
| | | 4 | X—X | | 0 | BST-001 | | | | | |
| | 309 | 1 | X | 0 | X | BST-010 | Knob/Lever Key Illuminated Knob | ASD300-2 ASD3K00-2 ASLD300-2 | ASD3100-2 ASD31K00-2 ASLD3100-2 | ASD3200-2 ASD32K00-2 ASLD3200-2 | ASD3300-2 ASD33K00-2 ASLD3300-2 |
| | | 2 | X—X | | 0 | BST-001 | | | | | |
| | | 3 | 0 | X | 0 | BST-001 | | | | | |
| | | 4 | 0 | 0 | X | BST-010 | | | | | |
| | 310 | 1 | 0 | X | 0 | BST-001 | Knob/Lever Key Illuminated Knob | ASD300-2 ASD3K00-2 ASLD300-2 | ASD3100-2 ASD31K00-2 ASLD3100-2 | ASD3200-2 ASD32K00-2 ASLD3200-2 | ASD3300-2 ASD33K00-2 ASLD3300-2 |
| | | 2 | 0 | 0 | X | BST-010 | | | | | |
| | | 3 | 0 | X | 0 | BST-001 | | | | | |
| | | 4 | 0 | 0 | X | BST-010 | | | | | |

1. Each operator sub-assembly is available as a "-1" and a "-2" for 3-position selector switches. The internal cam of a "-1" is different from that of a "-2". This results in designated combinations of open and closed contacts in the various operator positions.
2. N/D = No circuit number designation required in assembled part number.
3. X = On (closed contacts) 0 = Off (open contacts). X—X Overlapping contacts remain on (closed) when switch is moved between these two positions.

## Contact Arrangement Chart: 3-Position Selector Switches

| Style | | Mounting Position | Operator Position | | | Contact Block Part Number | Description | Operator Part Number | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Contact | Circuit Number | | L | C | R | | | Maintained | Spring Return from Right | Spring Return from Left | Two-Way |
| | | | | | | | | | | | |
| 4NO | N/D | 1 | X | 0 | 0 | BST-010 | Knob/Lever<br>Key<br>Illuminated Knob | ASD300-1<br>ASD3K00-1<br>ASLD300-1 | ASD3100-1<br>ASD31K00-1<br>ASLD3100-1 | ASD3200-1<br>ASD32K00-1<br>ASLD3200-1 | ASD3300-1<br>ASD33K00-1<br>ASLD3300-1 |
| | | 2 | 0 | 0 | X | BST-010 | | | | | |
| | | 3 | X | 0 | 0 | BST-010 | | | | | |
| | | 4 | 0 | 0 | X | BST-010 | | | | | |
| | 305 | 1 | X | 0 | X | BST-010 | Knob/Lever<br>Key<br>Illuminated Knob | ASD300-2<br>ASD3K00-2<br>ASLD300-2 | ASD3100-2<br>ASD31K00-2<br>ASLD3100-2 | ASD3200-2<br>ASD32K00-2<br>ASLD3200-2 | ASD3300-2<br>ASD33K00-2<br>ASLD3300-2 |
| | | 2 | 0 | 0 | X | BST-010 | | | | | |
| | | 3 | X | 0 | X | BST-010 | | | | | |
| | | 4 | 0 | 0 | X | BST-010 | | | | | |
| 4NC | N/D | 1 | 0 | X—X | | BST-001 | Knob/Lever<br>Key<br>Illuminated Knob | ASD300-1<br>ASD3K00-1<br>ASLD300-1 | ASD3100-1<br>ASD31K00-1<br>ASLD3100-1 | ASD3200-1<br>ASD32K00-1<br>ASLD3200-1 | ASD3300-1<br>ASD33K00-1<br>ASLD3300-1 |
| | | 2 | X—X | | 0 | BST-001 | | | | | |
| | | 3 | 0 | X—X | | BST-001 | | | | | |
| | | 4 | X—X | | 0 | BST-001 | | | | | |
| | 314 | 1 | 0 | X | 0 | BST-001 | Knob/Lever<br>Key<br>Illuminated Knob | ASD300-2<br>ASD3K00-2<br>ASLD300-2 | ASD3100-2<br>ASD31K00-2<br>ASLD3100-2 | ASD3200-2<br>ASD32K00-2<br>ASLD3200-2 | ASD3300-2<br>ASD33K00-2<br>ASLD3300-2 |
| | | 2 | X—X | | 0 | BST-001 | | | | | |
| | | 3 | 0 | X | 0 | BST-001 | | | | | |
| | | 4 | X—X | | 0 | BST-001 | | | | | |

1. Each operator sub-assembly is available as a "-1" and a "-2" for 3-position selector switches. The internal cam of a "-1" is different from that of a "-2". This results in designated combinations of open and closed contacts in the various operator positions.
2. N/D = No circuit number designation required in assembled part number.
3. X = On (closed contacts) 0 = Off (open contacts). X—X Overlapping contacts remain on (closed) when switch is moved between these two positions.

## Operator Truth Tables

Use the following tables to build custom selector switches.

### 2 Position Selector Switches

| | Contact | Mounting Position | Operator Position | |
|---|---|---|---|---|
| | | | Left | Right |
| ASD200 | BST-010 (NO) | L | 0 | X |
| | | R | 0 | X |
| | BST-001 (NC) | L | X | 0 |
| | | R | X | 0 |
| | BST-010S (NO-EM) | L | 0 | —X— |
| | | R | 0 | —X— |
| | BST-001S (NC-LB) | L | —X— | 0 |
| | | R | —X— | 0 |

### 3 Position Push/Pull Switches

| | Contact | Operator Position | | |
|---|---|---|---|---|
| | | Pull | Normal | Push |
| AYLD22 | BST-010 (NO) | 0 | 0 | X |
| | BST-001 (NC) | X | 0 | 0 |
| | BST-010S (NO-EM) | 0 | X | X |
| | BST-001S (NC-LB) | X | X | 0 |

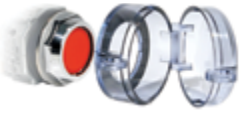
### 3 Position Selector Switches

| | Contact | Mounting Position | Operator Position | | |
|---|---|---|---|---|---|
| | | | Left | Center | Right |
| ASD300-1<br>ASLD300-1<br>ASD3K00-1 | BST-010 (NO) | L | X | 0 | 0 |
| | | R | 0 | 0 | X |
| | BST-001 (NC) | L | 0 | X—X | |
| | | R | X—X | | 0 |
| | BST-010S (NO-EM) | L | X— | 0 | 0 |
| | | R | 0 | 0 | X |
| | BST-001S (NC-LB) | L | 0 | X—X | |
| | | R | X—X | | 0 |

| | Contact | Mounting Position | Operator Position | | |
|---|---|---|---|---|---|
| | | | Left | Center | Right |
| ASD300-2<br>ASLD300-2<br>ASD3K00-2 | BST-010 (NO) | L | X | 0 | X |
| | | R | 0 | 0 | X |
| | BST-001 (NC) | L | 0 | X | 0 |
| | | R | X—X | | 0 |
| | BST-010S (NO-EM) | L | X— | 0 | —X |
| | | R | 0 | 0 | X |
| | BST-001S (NC-LB) | L | 0 | X— | 0 |
| | | R | X— | —X | 0 |

# Accessories — TWTD Series

## TWTD Series Accessories

| Item | Appearance | Description/Usage | | Part Number |
|---|---|---|---|---|
| Lamp Removal Tool | | Rubber tool used to install or remove LED's and incandescent lamps | | OR-55 |
| Metal Bezel | | Replacement locking ring/ bezel | Standard octagonal units (chrome-pl.). | OG-81 |
| | | | Extended, non-illuminated (chrome-pl.). | OG-82 |
| | | | Extended, illuminated (chrome-pl.). | OG-83L |
| | | | Jumbo Mushroom Shallow Shroud | ABN4G |
| | | | Jumbo Mushroom Deep Shroud | ABN4F |
| Plastic Bezel | | Black plastic locking ring/bezel | | OGP11B |
| Boot/Cover |  | Used to cover and protect pushbuttons | In place of ①, specify **Neoprene Rubber Boot** color: **B** (black), **G** (green), **R** (red), **Y** (yellow) | OC-11 ① |
| | | | Flush units (clear plastic -40˚ to +60˚C). | OC-121 |
| | | | Extended units (clear plastic -40˚ to +60˚C). | OC-122 |
| Anti-Rotation Ring |  | Plastic washer<br>For nameplates or panels that should not be scratched. | | OGL-D1T |
| | | Thrust washer/Anti-rotation ring for use with notched panel cutout. | | OGL-D1S |
| Mounting Hole Plug | | Plugs used to fill unused 30mm panel cutouts. | Plastic with locking nut attached. | OBP-11 |
| | | | Metal with locking nut attached | OB-11 |
| | | | Grey rubber (-5˚ to +60˚C) | OB-13 |
| Terminal Tab Adaptor | | Tab #250 17/64" x 3/64" (6.35mm x 0.8mm): Single tab | | TW-FA1 |
| Full Voltage Adaptor | | Used on all full voltage illuminated units.<br>Two required per unit. (M3.5 screw and saddle) | | APD-F |
| Lock Out Adaptor |  | Used to provide lockout protection for TWTD pushbuttons and knob selectors.<br>ø 1-13/64" (30mm) | | OL-KL1 |
| Replacement Keys | | Pair of keys (#0) | | TW-SK |

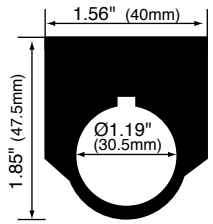
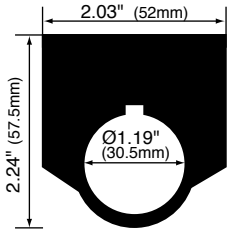
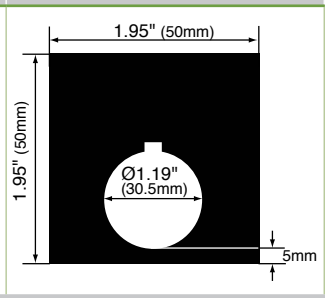
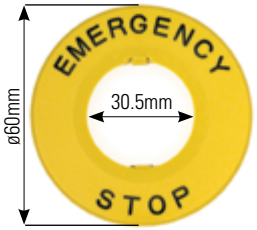
## Fingersafe Covers for TWTD Series

| Item | Description | Used with | Part Number |
|---|---|---|---|
| | Fingersafe terminal cover, for full voltage pilot lights, adds 3mm to overall depth | APD199... full voltage pilot lights | APD-PVL |
| | Fingersafe terminal cover, for contact blocks, adds 3mm to overall depth | Non-Illuminated pushbuttons ABD..., and AOD... | N-VL2 |
| | Fingersafe terminal cover, adds 1.5mm to overall depth | Transformer pilot lights and illuminated units | N-VL3 |
| | Fingersafe terminal cover, adds 4 mm to depth | Full voltage illuminated pushbuttons | N-VL4 |

Dimensions on page 749.

# Nameplates — TWTD Series

## Faceplates

| | NALD | NAKD | NAQD | HNAV |
|---|---|---|---|---|
| Dimensions |  |  |  |  |
| Description | Part Number | | | |
| Nameplate (blank) | NALD-B (black)<br>NALD-R (red) | NAKD-B (black)<br>NAKD-R (red) | NAQD-B (black)<br>NAQD-R (red) | HNAV-0 |
| Nameplate (engraved) | NALD-① | NAKD-① | NAQD-① | HNAV-27 "Emergency Stop" |

1. Nameplates are made of 0.031" aluminum. Lettering is white letters engraved on black background.
2. In place of ①, insert either the standard legend code from table below or custom engraving delimited by " ".
3. HNAV available in yellow only.

## Standard Legend Codes

| Pushbuttons | | | | Pushbuttons/Selector Switches | | | | Selector Switches | |
|---|---|---|---|---|---|---|---|---|---|
| Legend | Code | Legend | Code | Legend | Code | Legend | Code | Legend | Code |
| AUTO | 101 | OPEN | 116 | AUTO-MAN | 201 | REV-FOR | 216 | AUTO-MAN-OFF | 301 |
| CLOSE | 102 | OUT | 117 | CLOSE-OPEN | 202 | RUN-JOG | 217 | AUTO-OFF-MAN | 302 |
| DOWN | 103 | RAISE | 118 | DOWN-UP | 203 | RUN-SAFE | 218 | CLOSE-OFF-OPEN | 303 |
| EMERG.STOP* | 104 | RESET | 119 | FAST-SLOW | 204 | SAFE-RUN | 219 | DOWN-OFF-SLOW | 304 |
| FAST | 105 | REVERSE | 120 | FOR-REV | 205 | SLOW-FAST | 220 | FAST-OFF-SLOW | 305 |
| FORWARD | 106 | RUN | 121 | HAND-AUTO | 206 | START-STOP | 221 | FOR-OFF-REV | 306 |
| HAND | 107 | SLOW | 122 | HIGH-LOW | 207 | STOP-START | 222 | LEFT-OFF-RIGHT | 307 |
| HIGH | 108 | START | 123 | JOG-RUN | 208 | UP-DOWN | 223 | LOWER-OFF-RAISE | 308 |
| IN | 109 | STOP* | 124 | LEFT-RIGHT | 209 | | | OFF-MAN-AUTO | 309 |
| INCH | 110 | STOP | 125 | LOWER-RAISE | 210 | | | OFF-SLOW-FAST | 310 |
| JOG | 111 | TEST | 126 | MAN-AUTO | 211 | | | OFF-1-2 | 311 |
| LOW | 112 | UP | 127 | OFF-ON | 212 | | | OPEN-OFF-CLOSE | 312 |
| LOWER | 113 | I (Int'l On) | 150 | ON-OFF | 213 | | | SLOW-OFF-FAST | 313 |
| OFF | 114 | O (Int'l Off) | 151 | OPEN-CLOSE | 214 | | | SUMMER-OFF-WINTER | 314 |
| ON | 115 | EMO | 152 | RAISE-LOWER | 215 | | | UP-OFF-DOWN | 315 |
| | | | | | | | | 1-OFF-2 | 316 |
| | | | | | | | | HAND-OFF-AUTO | 317 |

1. *Available in Red as standard legend code 104 and 124. To order engraved nameplate and codes, add legend code to nameplate part number. Character height based on the number of characters, space and size of nameplate. Standard character size is 3/16".
2. Nameplates with standard legends are the same list price as blank nameplates. Special engravings, additional cost.

**To specify engraving instructions, use the Nameplate order form on next page.**

# Custom engraved Nameplates Order Form — TWTD Series

Copy this order form and use it to specify Letter Height, Custom Engravings, Location of Engraving on Nameplate, and Quantity Desired.
To ensure engraving accuracy, fax it to your IDEC representative. or Distributor.

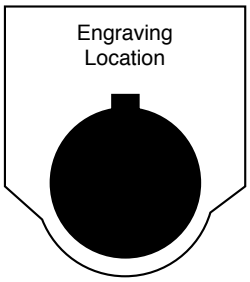
Your Company Name: _____ IDEC Rep/Distributor Contact: _____

Your Name: _____ PO number (if known): _____

Telephone: _____ IDEC Rep/Distributor Phone: _____

Fax & Email: _____ IDEC Rep/Distributor Fax & Email: _____

**NALD Nameplate**




**Step 1.**
Choose Letter Size - 7/64" or 1/8".

Check the box for the letter size you want. Then write your lettering in box below checkboxes. Note: 1/8" size letters cannot exceed 13 characters.

**Step 2.**
Specify Quantity.

Enter the number of nameplates desired in the box on the right.

Qty

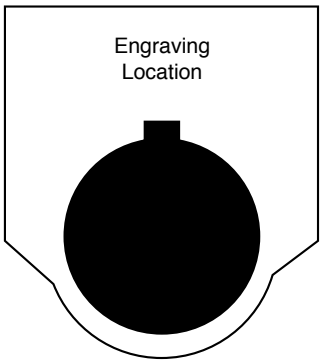
**Sample Letter Sizes**
7/64" Letters: A B C D
1/8" Letters: A B C D

**7/64"** Letter Size ☐ 16 characters max (for 7/64" size letters)

**1/8"** Letter Size ☐ 13 characters max (for 1/8" size letters)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

**NAKD Nameplate**




**Step 1.**
Choose Letter Size - 7/64" or 1/8".

Check the box for the letter size you want. Then write your lettering in box below checkboxes. Note: 1/8" size letters cannot exceed 9 characters.

**Step 2.**
Specify Quantity.

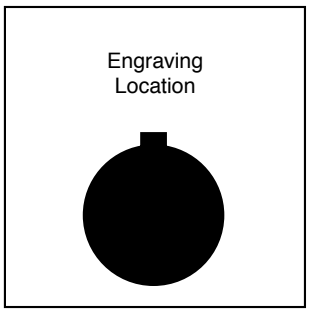
Enter the number of nameplates desired in the box on the right.

Qty

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

**Sample Letter Sizes**
1/8" Letters: A B C D

**NAQD Nameplate**




**Step 1.**
Choose Letter Size - 7/64" or 1/8".

Check the box for the letter size you want. Then write your lettering in box below checkboxes.
Note: 1/8" size letters c
16 characters.

**7/64"** Letter Size ☐ 20 characters max (for 7/64" size letters)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

**Step 2.**
Specify Quantity.

Enter the number of nameplates desired in the box on the right.

Qty

**Sample Letter Sizes**
3/32" Letters: A B C D
1/8" Letters: A B C D

# Switch Engraving Order Form – TWTD Series

Copy this order form and use it to specify Letter Height, Maximum Number of Lines and Text to be engraved.

To insure engraving accuracy, fax it to your IDEC representative or Distributor.

Your Company: _____ Telephone: _____

Name: _____ Fax: _____

Address: _____ Email: _____

PO: _____ Part Number to be Engraved: _____

Please check one of the boxes below to indicate your choice of engraving options:

Square Switch

| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 5/32 | 7 |
| ☐ | | 1/8 | 8 |
| ☐ | 2 | 5/32 | 7 |
| ☐ | | 1/8 | 8 |
| ☐ | 3 | 1/8 | 8 |
| ☐ | 4 | Custom* | |

*Engraving is possible, but character size will be smaller than standard sizes.

Round Switch

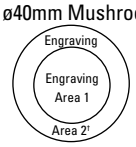
| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 5/32 | 7 |
| ☐ | | 1/8 | 8 |
| ☐ | 2 | 5/32 | 7 |
| ☐ | | 1/8 | 8 |
| ☐ | 3 | 1/8 | 8 |
| ☐ | 4 | Custom* | |

*Engraving is possible, but character size will be smaller than standard sizes.

65mm Jumbo Mushroom

| | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|
| ☐ | 1 | 3/4 | 4 |
| ☐ | | 5/16 | 5 |
| ☐ | 2 | 5/16 | 5 |
| ☐ | | 1/4 | 6 |
| ☐ | | 5/32 | 8 |
| ☐ | 3 | 5/32 | 8 |
| ☐ | | 1/8 | 9 |
| ☐ | 4 | 1/8 | 9 |

ø29mm, ø40mm Mushroom Head




| | | # of Lines | Letter Height | Max. Characters Per Line |
|---|---|---|---|---|
| ☐ | Engraving Area 1 | 1 | 5/32 | 5 |
| ☐ | | | 1/8 | 5 |
| ☐ | Engraving Area 2 | 1 | 5/32 | 7 |
| ☐ | | | 1/8 | 7 |

1. Above mentioned specifications hold true for standard size pushbuttons (round and square).
2. †Engraving Area 2 can be engraved for 40mm mushroom head non-Illuminated pushbutton only.
3. Engraving is done on the button itself for non-Illuminated push buttons and on marking plate for illuminated push buttons and pilot lights.
4. Please enter text exactly how you want it engraved, take care to emphasize capital or small letters.

Enter text to be engraved:

Line 1: _____

Line 2: _____

Line 3: _____

Line 4: _____

**Sample Letter Sizes**

1/8 Letters: OPEN

5/32 Letters: OPEN

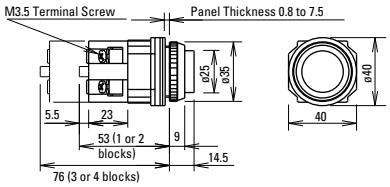
All engraving is 5/8mm wide.

For IDEC Internal Use Only:

Work Order #: _____

# Dimensions (mm)

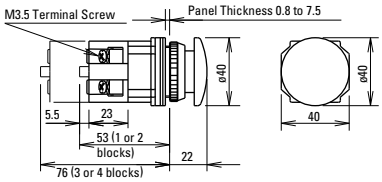
## Pushbutton




| Pushbuttons | Dimension A | Dimension B |
|---|---|---|
| Flush<br>Extended<br>Extended w/Full Shroud | 0.351" (9mm)<br>0.566" (14.5mm)<br>0.663" (17mm) | ø 0.975" (25mm)<br>ø 0.975"(25mm)<br>ø 1.11" (28.5mm) |
| Mushroom<br>Mushroom w/Full Shroud<br>Jumbo Mushroom<br>ø 1.56" (40mm) | 0.858" (22mm)<br>0.936" (24mm)<br>1.13" (29mm) | ø 1.56" (40mm)<br>ø 1.87" (48mm)<br>ø 2.54" (65mm) |
| Mushroom, Pushlock Turn Reset and Push-Pull<br>ø 1.56" (40mm) | *0.975" (25mm)<br>**0.975" (25mm) | ø 1.56" (40mm)<br>ø 1.56" (40mm) |

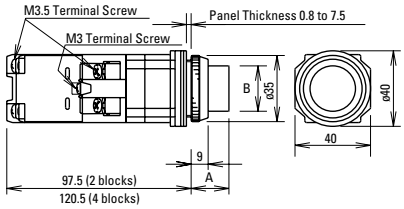
*Dimension when operator is in reset position.
**Dimension when operator is in pull position.

## Mushroom Pushbutton w/Full Shroud




## Illuminated Pushbuttons

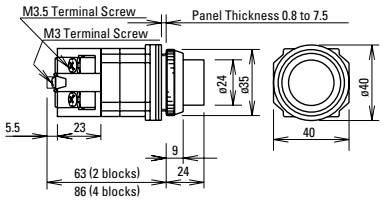
w/Transformer



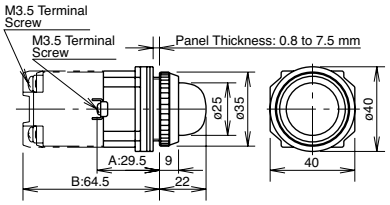

| Illuminated Pushbuttons | Dimension A | Dimension B |
|---|---|---|
| Flush w/Full Shroud | 0.975" (25mm)<br>0.995" (25.5mm) | ø 0.936" (24mm)<br>ø 0.936" (24mm) |
| Extended w/Full Shroud | 0.741" (19mm)<br>0.761" (19.5mm) | ø 0.936" (24mm)<br>ø 0.936" (24mm) |
| ø 1.56" (40mm) Mushroom Pushlock Turn Reset, Push-Pull | *0.975" (25mm)<br>**0.975" (25mm) | ø 1.56" (40mm)<br>ø 1.56" (40mm) |

*Dimension when operator is in reset position.
**Dimension when operator is in pull position.

Full Voltage

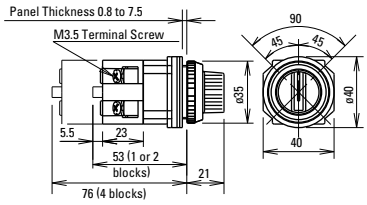



### Pilot Lights

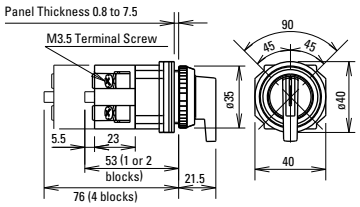



## Selector Switches

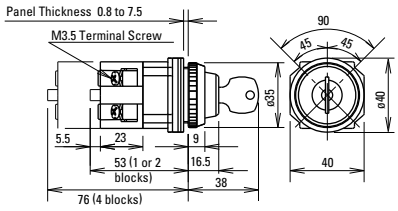
### Knob



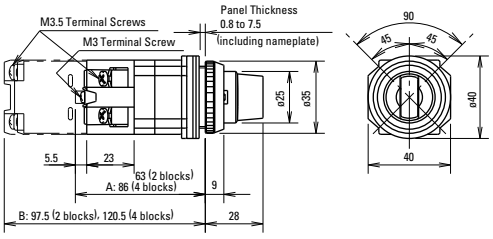

### Lever



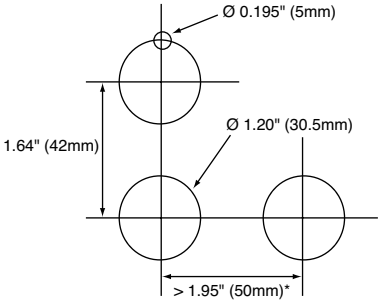

### Key




### Illuminated Knob



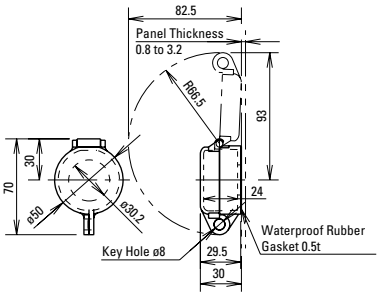
## Selector Switches Panel Cut-Out



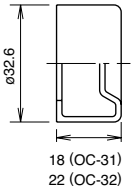

1. *Jumbo Mushroom < 2.61" (66mm)
2. Minimum mounting centers are applicable to switches with one stack of contact blocks. When mounting two stacks of contact blocks, minimum centers should allow for access to wiring.
3. The ø 0.195" (ø 5mm) recess is necessary when either the nameplate or anti-rotation ring is used.

## IlluminatedSelector Switches

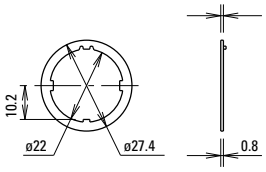
**OL-KL1**
Lock-Out Adaptor



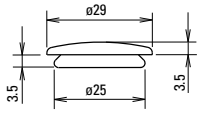

**OC-31**
Pushbutton Clear Boot




**OGL-31**
Anti-Rotation Ring

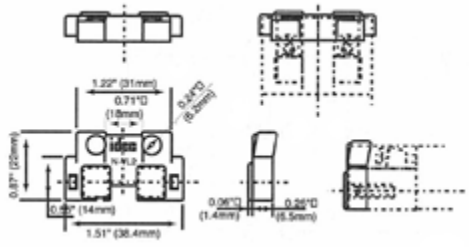



**OB-31**
Mounting Hole Rubber Plug

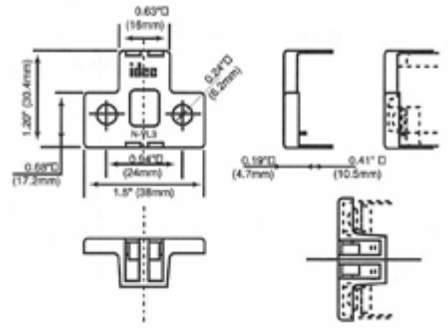



## Finger-Safe Cover

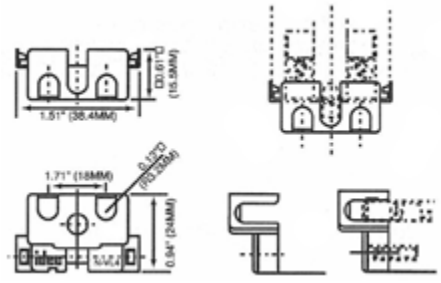
**N-VL2**



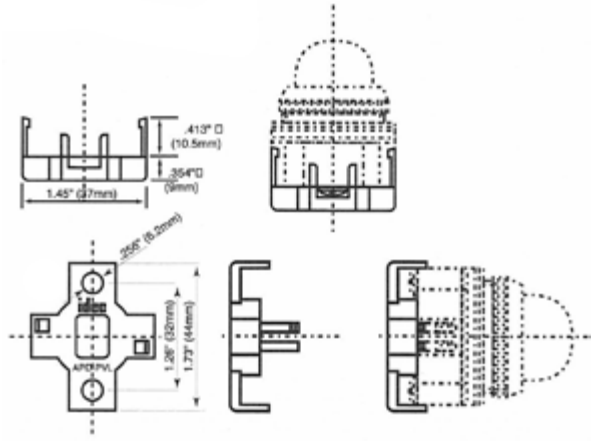
**N-VL3**



**N-VL4**



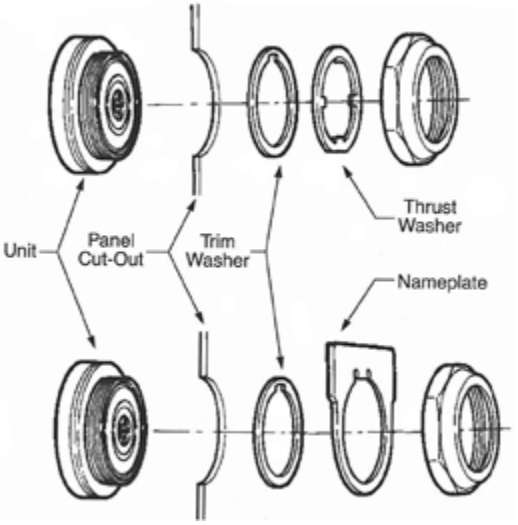
**APD-PVL**



# Operating Instructions

## Adjustment for Panel Thickness

Each unit is shipped with several waterproof gaskets which are 0.06" (1.5mm) and 0.12" (3mm) thick. Combine the gaskets for a dimension approximately equal to panel thickness and install between the bezel and the body of the unit.

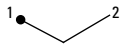
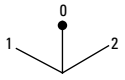



A trim washer must be used with a thrust washer or a nameplate to prevent the control unit from rotating in the mounting hole. When using anti-rotation rings (trim washer with thrust washer or nameplate), install as shown below.

## Selector Switches

The operator shaft of each unit has a recess to identify in which direction to install the handle. Align the handle with the recess. Press color insert (TW-HC1) into the Standard Operating Positions.

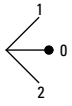
## Standard Operation Positions

| 2-Position, 90° | 3-Position, 45° |
|---|---|
|  |  |



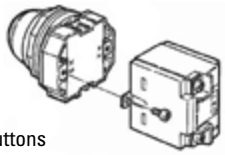


## Non-Illuminated 3-Position Operators

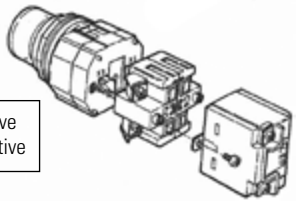



**Installation of TWTD Series Units**

**TWTD Pilot Lights**



TWTD Illuminated Pushbuttons
TWTD Selector Switches
(Transformer or Full Voltage)



Terminal X1 = Positive
Terminal X2 = Negative

## Installation of LED Illuminated Units

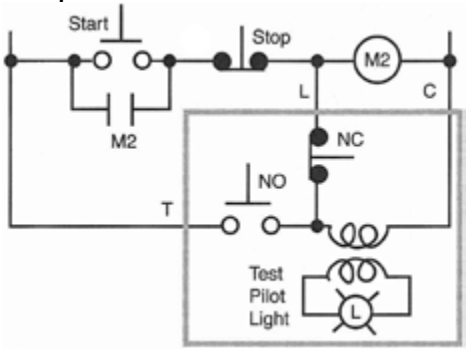
Transformer units are recommended for use in areas subjected to inductive noise. When using full voltage types, install a protection diode as shown below. Use diode with DC power supply to protect against surges and noise.

Make sure that LED illuminated units are installed with correct polarity, as indicated at the terminals.

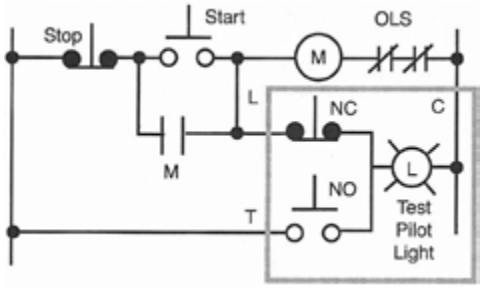
## Application Example For Push-To-Test Pilot Light

A typical application of illuminated pushbuttons is a push-to-test pilot light which can be used to check the lamp/LED circuit.

**Transformer/AC-Adapter Circuit**




**Full Voltage Circuit**



# 30mm Hazardous Location Switches

**Key features:**

- Class I, Zone 1/Division 2
- Applicable in explosive gas atmospheres (AEx de IIC T6 Gb)
- UL Type 4X rated
- Up to 3 contact blocks
- Selector switches available with lever or key
- Selector switches available with overlapping contacts
- Exposed and finger-safe (IP20) screw terminals available

IECEx is pending approval

## Specifications

### Standards Compliance

| | Switches | Pilot Lights | Meters |
|---|---|---|---|
| UL | Class I, Zone 1, AEx de IIC T6 Gb<br>Class I, Div 2, Groups A, B, C and D | Class I, Zone 1, AEx de IIC T6 Gb<br>Class I, Div 2, Groups A, B, C and D | Class I, Zone 1, AEx de IIC T6 Gb<br>Class I, Div 2, Groups A, B, C and D |
| c-UL | Class I, Zone 1, Ex de IIC T6 Gb<br>Class I, Div 2, Groups A, B, C and D | Class I, Zone 1, Ex de IIB T6 Gb<br>Class I, Div 2, Groups C and D | Class I, Zone 1, Ex de IIC T6 Gb<br>Class I, Div 2, Groups A, B, C and D |
| ATEX | Ⓔx II2G Ex de IIC<br>Ⓔx II2D tD A21 IP65 | | Ⓔx II2G Ex de IIC Gb<br>Ⓔx II2D Ex tb IIIC Db IP65 |

### Certificate Numbers

| | |
|---|---|
| UL/cUL | E347230 |
| ATEX | PTB 08 ATEX 1053 U<br>PTB 08 ATEX 1003 U |

### Applicable Standards

| Products | Applicable Standards | Mark | Certifications |
|---|---|---|---|
| Pushbuttons<br>Selector Switches<br>Key Selector Switches<br>Pilot Lights | EN60947-5-1 | CE | EU Low Voltage Directive |
| Emergency Stop Switches | EN60947-5-5 | TÜV | TÜV SÜD |
| | | CE | EU Low Voltage Directive |

## General Specifications

| | | |
|---|---|---|
| Degree of Protection | IP65 (IEC60529), Type 4X | |
| Insulation Resistance | 100 MΩ minimum (500V DC megger) | |
| Operating Temperature | –20 to +50°C (no freezing) | |
| Operating Humidity | 45 to 85% (no condensation) | |
| Altitude | 2,000m Maximum | |
| Pollution Degree | 3 | |
| Shock Resistance | Operating Extremes | 100-m/s²<br>Emergency Stop Switch:<br>150-m/s² (without Meter) |
| | Damage Limits | 1000-m/s² |
| Vibration Resistance | Operating Extremes | 5 to 55-Hz, amplitude 0.5 mm<br>Emergency Stop Switch:<br>5 to 500-Hz, amplitude 0.35-mm,<br>acceleration 50-m/s² (without Meter) |
| | Damage Limits | 30Hz, amplitude 1.5-mm<br>Emergency Stop Switch:<br>5 to 500-Hz, amplitude 0.35-mm,<br>acceleration 50-m/s² |

## Switch Specifications

| | | |
|---|---|---|
| Rated Insulation Voltage | | 600V |
| Contact Resistance | | 50mΩ maximum (initial value) |
| Impulse Withstand Voltage (Uimp) | | 6kV |
| Insulation Resistance | | 100MΩ minimum (500V DC megger) |
| Short-Circuit Protection | | 250V/10A fuse<br>(Type aM IEC60269-1/IEC60269-2) |
| Conditional Short-Circuit Current | | 1,000A |
| Mechanical Life | Pushbutton | 1,000,000 operations minimum |
| | Selector Switch | 500,000 operations minimum |
| | Key Selector Switch | 500,000 operations minimum |
| | Emergency Stop Switch | 50,000 operations minimum |
| Electrical Life | Pushbutton | 250,000 (switching frequency 1800 operations/h) |
| | Selector Switch | 250,000 (switching frequency 900 operations/h) |
| | Key Selector Switch | 250,000 (switching frequency 900 operations/h) |
| | Emergency Stop Switch | 50,000 (switching frequency 900 operations/h) |
| Minimum Operator Stroke Required for Direct Opening Action | Emergency Stop Switch | 7.0mm |
| Maximum Operator Stroke | Emergency Stop Switch | 9.0mm |

Note: Contacts will bounce during operation of pushbuttons and selector switches (reference value: 20-ms). Be sure to take contact bounce time into consideration when designing a control circuit.

## Contact Rating (Switches)

| | | | | | | |
|---|---|---|---|---|---|---|
| Rated Insulation Voltage (Ui) | | | 600V | | | |
| Rated Thermal Current (Ith) | | | 10A* | | | |
| Rated Operating Voltage (Ue) | | | 24V | 120V | 240V | 500V |
| Rated Operating Current (Ie) | AC 50/60Hz | Resistive Load (AC12) | 10A* | 10A* | 6A | 2.8A |
| | | Inductive Load (AC15) | 10A* | 6A | 3A | 1.4A |
| | DC | Resistive Load (DC12) | 8A | 2.2A | 1.1A | — |
| | | Inductive Load (DC13) | 4A | 1.1A | 0.55A | — |

Note: Up to 2 contacts (per control unit): 10A
3 contacts (per control unit): 9A
Minimum applicable load: 3V AC/DC, 5mA
Applicable operating locations may vary according to operating conditions and load types.

| Contact Rating Code Designation | Thermal Continuous Test Current Amperes | Maximum current, Amperes | | | | | | | | Maximum Volt-Amperes | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 120 Volt | | 240 Volt | | 480 Volt | | 600 Volt | | 600 Volt | |
| | | Make | Break | Make | Break | Make | Break | Make | Break | Make | Break |
| A600 | 10 | 60 | 6.00 | 30 | 3.00 | 15 | 1.5 | 12 | 1.2 | 7200 | 720 |

## Pilot Lights

| | | |
|---|---|---|
| Rated Insulation Voltage (Ui) | | 500V |
| Rated Operating Voltage (Ue) | Voltage | 6V, 12V, 24V AC/DC |
| | Transformer | 120V, 230V, 240V, 380V, 480V AC |
| Impulse Withstand Voltage (Uimp) | | 4kV |
| Insulation Resistance | | 100 MΩ minimum (500V DC) |
| Frequency | | 50/60Hz |
| Power Consumption (approx.) | Full Voltage | 0.3W |
| | Transformer | 1.5VA |
| Life (reference value) | | Approx. 40,000 hours |

Note: Because the built-in LED lamp is a high-brightness version, the lamp may light dimly due to induction even when power is off.

## Meters

| | | |
|---|---|---|
| Accuracy Class | | 2.5 |
| Insulation Resistance | | 100 MΩ minimum<br>(500V DC megger) |
| AC ammeter | Rated Insulation Voltage (Ui) | 300V |
| | Operation | Moving core |
| | Impulse Withstand Voltage (Uimp) | 4kV |
| | Power Consumption | 1VA |
| | Measurement | 5A, 10A, 30A, 50A, etc |
| | Input (CT Ratio) | 1A, 5A |
| | Extended Memory | 3 times, etc |
| DC ammeter | Rated Insulation Voltage (Ui) | 150V |
| | Operation | Moving coil |
| | Impulse Withstand Voltage (Uimp) | 2.5kV |
| | Input | 0 to10V DC, 4 to 20mA, etc. |
| | Power Consumption | 0.15W |
| | Consumption Current | 1mA |

Note: Use a commercially available CT (current transformer) for all AC ammeters, and install the CT in a non-hazardous location.

# Part Numbers

## Pushbuttons

**Part Number Structure**

**EU2B - YB1 11 F S D**

**Operator (style / function)**
B1 : Flush pushbutton / Momentary
B2 : Extended pushbutton / Momentary
B3 : Mushroom pushbutton / Momentary

**Contact arrangement**
10 : 1NO
20 : 2NO
30 : 3NO
11 : 1NO-1NC
21 : 2NO-1NC
01 : 1NC
02 : 2NC
03 : 3NC
12 : 1NO-2NC

**Button color**
Blank: Red, Green, Black, and White included
Y : Yellow S : Blue

**Terminals**
F : Finger-safe terminal (IP20)
C : Exposed screw terminal

Note: Use only when interpreting part numbers. Do not use for developing part numbers.

| Part Number | Style and Function | Contact Arrange-ment | Weight (Ap-prox.) | ① Button Color |
|---|---|---|---|---|
| EU2B-YB110④①–D | Flush Momentary | 1NO | 68g | ① Blank - supplied with red, green, black, and white buttons<br>For yellow or blue buttons, specify Y (yellow) or S (blue). |
| EU2B-YB101④①–D | | 1NC | | |
| EU2B-YB111④①–D | | 1NO-1NC | 92g | |
| EU2B-YB120④①–D | | 2NO | | |
| EU2B-YB102④①–D | | 2NC | | |
| EU2B-YB121④①–D | | 2NO-1NC | 116g | |
| EU2B-YB112④①–D | | 1NO-2NC | | |
| EU2B-YB130④①–D | | 3NO | | |
| EU2B-YB103④①–D | | 3NC | | |
| EU2B-YB210④①–D | Extended Momentary | 1NO | 70g | Specify a button color code in place of ① in the part number<br>B : black<br>G : green<br>R : red<br>S : blue<br>W : white<br>Y : yellow |
| EU2B-YB201④①–D | | 1NC | | |
| EU2B-YB211④①–D | | 1NO-1NC | 94g | |
| EU2B-YB220④①–D | | 2NO | | |
| EU2B-YB202④①–D | | 2NC | | |
| EU2B-YB221④①–D | | 2NO-1NC | 118g | |
| EU2B-YB212④①–D | | 1NO-2NC | | |
| EU2B-YB230④①–D | | 3NO | | |
| EU2B-YB203④①–D | | 3NC | | |
| EU2B-YB310④①–D | Mushroom Momentary | 1NO | 76g | |
| EU2B-YB301④①–D | | 1NC | | |
| EU2B-YB311④①–D | | 1NO-1NC | 101g | |
| EU2B-YB320④①–D | | 2NO | | |
| EU2B-YB302④①–D | | 2NC | | |
| EU2B-YB321④①–D | | 2NO-1NC | 125g | |
| EU2B-YB312④①–D | | 1NO-2NC | | |
| EU2B-YB330④①–D | | 3NO | | |
| EU2B-YB303④①–D | | 3NC | | |

Note: ① Button Color.

Specify a contact terminal style in place of ④ in the part number: F (Finger-safe terminal), C (Exposed screw terminal)

## Emergency Stop Switches

**Part Number Structure**

**EU2B - YBV3 11 F R**

**Operator (style / function)**
BV3 : 40mm mushroom/push, pull or twist release

**Contact arrangement**
01 : 1NC
11 : 1NO-1NC
02 : 2NC
03 : 3NC
12 : 1NO-2NC

**Button color**
R : Red

**Terminals**
F : Finger-safe terminal (IP20)
C : Exposed screw terminal

Note: Use only when interpreting part numbers. Do not use for developing part numbers.

| Part Number | Operator | Contact Arrangement | Weight (Approx.) | Button Color |
|---|---|---|---|---|
| EU2B-YBV301④R | ø40 Mushroom | 1NC | 96g | R : Red |
| EU2B-YBV311④R | | 1NO-1NC | 120g | |
| EU2B-YBV302④R | | 2NC | | |
| EU2B-YBV312④R | | 1NO-2NC | 144g | |
| EU2B-YBV303④R | | 3NC | | |

Specify a terminal style in place of ④ in the part number: F (Finger-safe terminal), C (Exposed screw terminal)

## Pilot Lights

**Part Number Structure**

**EU2B - YL1 22 F D R**

**Operator (style / function)**
L1 : Pilot Light / dome

**Operating voltage**
126 : AC 120V (Transformer type)
246 : AC 240V (Transformer type)
386 : AC 380V (Transformer type)
486 : AC 480V (Transformer type)
66 : AC/DC 6V (Full voltage type)
11 : AC/DC 12V (Full voltage type)
22 : AC/DC 24V (Full voltage type)

**Lens/LED Colors**
R : Red G : Green A : Amber
Y : Yellow PW : White S : Blue

**Terminals**
F : Finger-safe terminal (IP20)
C : Exposed screw terminal

Note: Use only when interpreting part numbers. Do not use for developing part numbers.

| Part Number | Type | Operating Voltage | Weight (Approx.) | ① Illumination Color Code |
|---|---|---|---|---|
| EU2B-YL1126④D① | Transformer | 120V AC | 150g | R : red<br>G : green<br>A : amber<br>Y : yellow<br>PW : white<br>S : blue |
| EU2B-YL1236④D① | | 230V AC | | |
| EU2B-YL1246④D① | | 240V AC | | |
| EU2B-YL1386④D① | | 380V AC | | |
| EU2B-YL1486④D① | | 480V AC | | |
| EU2B-YL166④D① | Full Voltage | 6V AC/DC | 108g | |
| EU2B-YL111④D① | | 12V AC/DC | | |
| EU2B-YL122④D① | | 24V AC/DC | | |

Note: ① Illumination Color.

Specify a contact terminal style in place of ④ in the part number: F (Finger-safe terminal), C (Exposed screw terminal)

## Selector Switches

### Part Number Structure

**EU2B - YS 2 11 N1 F**

**Operator (style / function)**
S : Selector (Knob operator)

**Number of Positions / Spring Return Action**
2 : 2-position / Maintained
2R : 2-position / Maintained (Overlap)
2J : 2-position / Maintained (Special function)
21 : 2-position / Spring return from right
3 : 3-position / Maintained
31 : 3-position / Spring return from right
32 : 3-position / Spring return from left
33 : 3-position / Spring return two-way

**Contact arrangement**
10 : 1NO
11 : 1NO-1NC
01 : 1NC
30 : 3NO
20 : 2NO
03 : 3NC
02 : 2NC
21 : 2NO-1NC
12 : 1NO-2NC

**Terminals**
F : Finger-safe terminal (IP20)
C : Exposed screw terminal

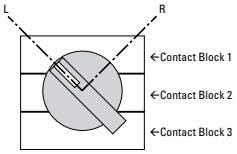
**Circuit Number**
Blank : No Designation
N* : See charts

Note: Use only when interpreting part numbers. Do not use for developing part numbers.

### 2-Position Selector Switches

| Contact | Mounting | Operator Position L | Operator Position R | Maintained L R | Spring Return from Right L R | Weight (approx) |
|---|---|---|---|---|---|---|
| NO | 1 | | ● | EU2B-YS210④ | EU2B-YS2110④ | 74g |
| | | | | | | |
| | | | | | | |
| | | | | EU2B-YS201④ | EU2B-YS2101④ | |
| NC | 3 | ● | | | | |
| NO | 1 | | ● | EU2B-YS220④ | EU2B-YS2120④ | 98g |
| | | | | | | |
| NO | 3 | | ● | | | |
| NC | 1 | ● | | EU2B-YS202④ | EU2B-YS2102④ | |
| | | | | | | |
| NC | 3 | ● | | | | |
| NO | 1 | | ● | EU2B-YS211④ | EU2B-YS2111④ | |
| | | | | | | |
| NC | 3 | ● | | | | |
| NO | 1 | | ● | EU2B-YS230④ | EU2B-YS2130④ | 122g |
| NO | 2 | | ● | | | |
| NO | 3 | | ● | | | |
| NC | 1 | ● | | EU2B-YS203④ | EU2B-YS2103④ | |
| NC | 2 | ● | | | | |
| NC | 3 | ● | | | | |
| NO | 1 | | ● | EU2B-YS221④ | EU2B-YS2121④ | |
| NO | 2 | | ● | | | |
| NC | 3 | ● | | | | |
| NO | 1 | | ● | EU2B-YS212④ | EU2B-YS2112④ | |
| NC | 2 | ● | | | | |
| NC | 3 | ● | | | | |
| NO | 1 | ▬ | | EU2B-YS2R11④ | N/A | 98g |
| | | | | | | |
| NC | 2 | ▬ | | | | |

Specify a terminal style in place of ④ in the part number: F (Finger-safe terminal), C (Exposed screw terminal)



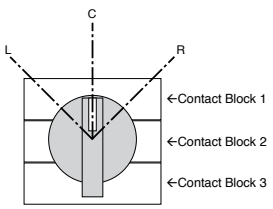

### 2-Position Selector Switches (Inverse Cam)

| Contact | Mounting | Operator Position L | Operator Position R | Maintained L R | Weight (approx) |
|---|---|---|---|---|---|
| NO | 1 | ● | | EU2B-YS2J10④ | 74g |
| | | | | | |
| | | | | | |
| | | | | EU2B-YS2J01④ | |
| NC | 3 | | ● | | |
| NO | 1 | ● | | EU2B-YS2J20④ | 98g |
| | | | | | |
| NO | 3 | ● | | | |
| NC | 1 | | ● | EU2B-YS2J02④ | |
| | | | | | |
| NC | 3 | | ● | | |
| NO | 1 | ● | | EU2B-YS2J11④ | |
| | | | | | |
| NC | 3 | | ● | | |
| NO | 1 | ● | | EU2B-YS2J30④ | 122g |
| NO | 2 | ● | | | |
| NO | 3 | ● | | | |
| NC | 1 | | ● | EU2B-YS2J03④ | |
| NC | 2 | | ● | | |
| NC | 3 | | ● | | |
| NO | 1 | ● | | EU2B-YS2J21④ | |
| NO | 2 | ● | | | |
| NC | 3 | | ● | | |
| NO | 1 | ● | | EU2B-YS2J12④ | |
| NC | 2 | | ● | | |
| NC | 3 | | ● | | |

## 3-Position Selector Switches

| Contact | Mounting | Operator Position L | Operator Position C | Operator Position R | Maintained | Spring Return from Right | Spring Return from Left | Spring Return Two Way | Weight (approx) |
|---|---|---|---|---|---|---|---|---|---|
| NO | 1 | ● | | | EU2B-YS320④ | EU2B-YS3120④ | EU2B-YS3220④ | EU2B-YS3320④ | 98g |
| | | | | | | | | | |
| NO | 3 | | | ● | | | | | |
| | | | | | | | | | |
| NO | 2 | ● | | ● | EU2B-YS320N1④ | EU2B-YS3120N1④ | EU2B-YS3220N1④ | EU2B-YS3320N1④ | |
| NO | 3 | | | ● | | | | | |
| NC | 1 | | ▬ | | EU2B-YS302④ | EU2B-YS302④ | EU2B-YS3202④ | EU2B-YS3302④ | |
| | | | | | | | | | |
| NC | 3 | ▬ | | | | | | | |
| | | | | | | | | | |
| NC | 2 | | ● | | EU2B-YS302N1④ | EU2B-YS3102N1④③ | EU2B-YS3202N1④③ | EU2B-YS3302N1④ | |
| NC | 3 | ▬ | | | | | | | |
| NO | 1 | ● | | | EU2B-YS311④ | EU2B-YS311④ | EU2B-YS3211④ | EU2B-YS3311④ | |
| | | | | | | | | | |
| NC | 3 | ▬ | | | | | | | |
| NC | 1 | | ▬ | | EU2B-YS311N1④ | EU2B-YS3111N1④ | EU2B-YS3211N1④ | EU2B-YS3311N1④ | |
| | | | | | | | | | |
| NO | 3 | | | ● | | | | | |
| NO | 1 | ● | | | EU2B-YS311N2④ | EU2B-YS3111N2④ | EU2B-YS3211N2④ | EU2B-YS3311N2④ | |
| NC | 2 | | ● | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| NC | 2 | | ● | | EU2B-YS311N3④ | EU2B-YS3111N3① | EU2B-YS3211N3① | EU2B-YS3311N3① | |
| NO | 3 | | | ● | | | | | |
| | | | | | | | | | |
| NO | 2 | ● | | ● | EU2B-YS311N4④ | EU2B-YS3111N4④ | EU2B-YS3211N4④ | EU2B-YS3311N4④ | |
| NC | 3 | ▬ | | | | | | | |
| NO | 1 | ● | | | EU2B-YS330④ | EU2B-YS3130④ | EU2B-YS3230④ | EU2B-YS3330④ | 122g |
| NO | 2 | ● | | ● | | | | | |
| NO | 3 | | | ● | | | | | |
| NC | 1 | | ▬ | | EU2B-YS303④ | EU2B-YS3103④ | EU2B-YS3203④ | EU2B-YS3303④ | |
| NC | 2 | | ● | | | | | | |
| NC | 3 | ▬ | | | | | | | |
| NO | 1 | ● | | | EU2B-YS3 21N1④ | EU2B-YS3121N1④ | EU2B-YS3221N1④ | EU2B-YS3321N1④ | |
| NC | 2 | | ● | | | | | | |
| NO | 3 | | | ● | | | | | |
| NC | 1 | | ▬ | | EU2B-YS3 12N1④ | EU2B-YS3112N1④ | EU2B-YS3212N1④ | EU2B-YS3312N1④ | |
| NO | 2 | ● | | ● | | | | | |
| NC | 3 | ▬ | | | | | | | |

Specify a terminal style in place of ④ in the part number: F (Finger-safe terminal), C (Exposed screw terminal)



## Key Selector Switches

### Part Number Structure

**EU2B - YSK 2 11 N1 F A**

**Operator (style / function)**
SK: Key selector (Key operator)

**Number of Positions / Spring Return Action**
2 : 2-position / Maintained
2R : 2-position / Maintained (Overlap)
2J : 2-position / Maintained (Special function)
21 : 2-position / Spring return from right
3: 3 -position / Maintained
31 : 3-position / Spring return from right
32 : 3-position / Spring return from left
33 : 3-position / Spring return two-way

**Contact arrangement**
10 : 1NO
11 : 1NO-1NC
01 : 1NC
30 : 3NO
20 : 2NO
03 : 3NC
02 : 2NC
21 : 2NO-1NC
12 : 1NO-2NC

**Key Removable Position**
See Key removable option codes below

**Terminals**
F : Finger-safe terminal (IP20)
C : Exposed screw terminal

**Circuit Number**
Blank : No Designation
N* : See the following charts

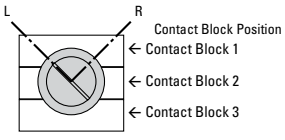
Note: Use only when interpreting part numbers. Do not use for developing part numbers.

### 2-Position Key Selector Switches

| Contact | Mounting | Operator Position L | Operator Position R | Maintained L R | Spring Return from Right L R | Weight (approx) |
|---|---|---|---|---|---|---|
| NO | 1 | | ● | EU2B-YSK210④③ | EU2B-YSK2110④③ | 96g |
| | | | | | | |
| | | | | | | |
| | | | | EU2B-YSK201④③ | EU2B-YSK2101④③ | |
| | | | | | | |
| NC | 3 | ● | | | | |
| NO | 1 | | ● | EU2B-YSK220④③ | EU2B-YSK2120④③ | 120g |
| | | | | | | |
| NO | 3 | | ● | | | |
| NC | 1 | ● | | EU2B-YSK202④③ | EU2B-YSK2102④③ | |
| | | | | | | |
| NC | 3 | ● | | | | |
| NO | 1 | | ● | EU2B-YSK211④③ | EU2B-YSK2111④③ | |
| | | | | | | |
| NC | 3 | ● | | | | |
| NO | 1 | | ● | EU2B-YSK230④③ | EU2B-YSK2130④③ | 144g |
| NO | 2 | | ● | | | |
| NO | 3 | | ● | | | |
| NC | 1 | ● | | EU2B-YSK203④③ | EU2B-YSK2103④③ | |
| NC | 2 | ● | | | | |
| NC | 3 | ● | | | | |
| NO | 1 | | ● | EU2B-YSK221④③ | EU2B-YSK2121④③ | |
| NO | 2 | | ● | | | |
| NC | 3 | ● | | | | |
| NO | 1 | | ● | EU2B-YSK212④③ | EU2B-YSK2112④③ | |
| NC | 2 | ● | | | | |
| NC | 3 | ● | | | | |
| NO | 1 | | ▬ | EU2B-YSK2R11④③ | N/A | 120g |
| | | | | | | |
| NC | 2 | ▬ | | | | |

Key is removable in all maintained positions. Specify key removal position in place of ③ in the part number. See table.

Specify a terminal style in place of ④ in the part number: F (Finger-safe terminal), C (Exposed screw terminal).




### 2-Position Key Selector Switches (Inverse Cam)

| Contact | Mounting | Operator Position L | Operator Position R | Maintained L R | Weight (approx) |
|---|---|---|---|---|---|
| NO | 1 | ● | | EU2B-YSK2J10④③ | 96g |
| | | | | | |
| | | | | | |
| | | | | EU2B-YSK2J01④③ | |
| | | | | | |
| NC | 3 | | ● | | |
| NO | 1 | ● | | EU2B-YSK2J20④③ | |
| | | | | | |
| NO | 3 | ● | | | |
| NC | 1 | | ● | EU2B-YSK2J02④③ | 120g |
| | | | | | |
| NC | 3 | | ● | | |
| NO | 1 | ● | | EU2B-YSK2J11④③ | |
| | | | | | |
| NC | 3 | | ● | | |
| NO | 1 | ● | | EU2B-YSK2J30④③ | 144g |
| NO | 2 | ● | | | |
| NO | 3 | ● | | | |
| NC | 1 | | ● | EU2B-YSK2J03④③ | |
| NC | 2 | | ● | | |
| NC | 3 | | ● | | |
| NO | 1 | ● | | EU2B-YSK2J21④③ | |
| NO | 2 | ● | | | |
| NC | 3 | | ● | | |
| NO | 1 | ● | | EU2B-YSK2J12④③ | |
| NC | 2 | | ● | | |
| NC | 3 | | ● | | |

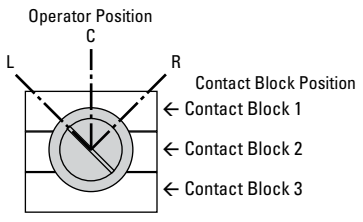
### ③ Key Removable Option Codes (2-position)

| Code | Description |
|---|---|
| A | Key removable in any position |
| B | Key removable in left position |
| C | Key removable in right position |

## 3-Position Key Selector Switches

| Contact | Mount-ing | Operator Position L | Operator Position C | Operator Position R | Maintaineds (L C R) | Spring Return from Right (L C R) | Spring Return from Left (L C R) | Spring Return Two Way (L C R) | Weight (approx) |
|---|---|---|---|---|---|---|---|---|---|
| NO | 1 | ● | | | EU2B-YSK320④③ | EU2B-YSK3120④③ | EU2B-YSK3220④③ | EU2B-YSK3320④③ | |
| | | | | | | | | | |
| NO | 3 | | | ● | | | | | |
| | | | | | | | | | |
| NO | 2 | ● | | ● | EU2B-YSK320N1④③ | EU2B-YSK3120N1④③ | EU2B-YSK3220N1④③ | EU2B-YSK3320N1④③ | |
| NO | 3 | | | ● | | | | | |
| NC | 1 | | ▬ | | EU2B-YSK302④③ | EU2B-YSK302④③ | EU2B-YSK3202④③ | EU2B-YSK3302④③ | |
| | | | | | | | | | |
| NC | 3 | ▬ | | | | | | | |
| | | | | | | | | | |
| NC | 2 | | ● | | EU2B-YSK302N1④③ | EU2B-YSK3102N1④③ | EU2B-YSK3202N1④③ | EU2B-YSK3302N1④③ | |
| NC | 3 | ▬ | | | | | | | |
| NO | 1 | ● | | | EU2B-YSK311④③ | EU2B-YSK311④③ | EU2B-YSK3211④③ | EU2B-YSK3311④③ | 120g |
| | | | | | | | | | |
| NC | 3 | ▬ | | | | | | | |
| NC | 1 | | ▬ | | EU2B-YSK311N1④③ | EU2B-YSK3111N1④③ | EU2B-YSK3211N1④③ | EU2B-YSK3311N1④③ | |
| | | | | | | | | | |
| NO | 3 | | | ● | | | | | |
| NO | 1 | ● | | | EU2B-YSK311N2④③ | EU2B-YSK3111N2④③ | EU2B-YSK3211N2④③ | EU2B-YSK3311N2④③ | |
| NC | 2 | | ● | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| NC | 2 | | ● | | EU2B-YSK311N3④③ | EU2B-YSK3111N3④③ | EU2B-YSK3211N3④③ | EU2B-YSK3311N3④③ | |
| NO | 3 | | | ● | | | | | |
| | | | | | | | | | |
| NO | 2 | ● | | ● | EU2B-YSK311N4④③ | EU2B-YSK3111N4④③ | EU2B-YSK3211N4④③ | EU2B-YSK3311N4④③ | |
| NC | 3 | ▬ | | | | | | | |
| NO | 1 | ● | | | EU2B-YSK330④③ | EU2B-YSK3130④③ | EU2B-YSK3230④③ | EU2B-YSK3330④③ | 144g |
| NO | 2 | ● | | ● | | | | | |
| NO | 3 | | | ● | | | | | |
| NC | 1 | | ▬ | | EU2B-YSK303④③ | EU2B-YSK3103④③ | EU2B-YSK3203④③ | EU2B-YSK3303④③ | |
| NC | 2 | | ● | | | | | | |
| NC | 3 | ▬ | | | | | | | |
| NO | 1 | ● | | | EU2B-YSK321N1④③ | EU2B-YSK3121N1④③ | EU2B-YSK3221N1④③ | EU2B-YSK3321N1④③ | |
| NC | 2 | | ● | | | | | | |
| NO | 3 | | | ● | | | | | |
| NC | 1 | | ▬ | | EU2B-YSK312N1④③ | EU2B-YSK3112N1④③ | EU2B-YSK3212N1④③ | EU2B-YSK3312N1④③ | |
| NO | 2 | ● | | ● | | | | | |
| NC | 3 | ▬ | | | | | | | |

Key is removable in all maintained positions. Specify key removal position in place of ③ in the part number. See table. Specify a terminal style in place of ④ in the part number: F (Finger-safe terminal), C (Exposed screw terminal).




### ③ Key Removable Option Codes (3-Position)

| Code | Description |
|---|---|
| A | Key removable in any position |
| B | Key removable in left and center positions |
| C | Key removable in center and right positions |
| D | Key removable in center position |
| E | Key removable in left and right positions |
| G | Key removable in left position |
| H | Key removable in right position) |

## Meters

### Part Number Structure - AC Ammeter

EU2B - YM 5 3 A 10 F R

**Function**
M : Meter
**Input current**
1 : 1A 5 : 5A
**Specification of overload scale**
3: 3 times 2 : 2 times 5 : 5 times N:Non
**Type of meter**
A : AC ammeter
**Measuring range**
Direct measuring 1 : 1A 5 : 5A
For current transformers: 10 : 10A 15 : 15A 20 : 20A 30:30A 50:50A
60 : 60A 75 : 75A 100:100A 150:150A
**Set pointer**
blank : non -R : with set pointer
**Terminals**
F : Finger-safe terminal (IP20)
C : Exposed screw terminal

Note: Use only when interpreting part numbers. Do not use for developing part numbers.

### Part Number Structure - DC Ammeter or Voltmeter

EU2B - YM 010 VD F-PER-R

**Function**
M : Meter
**Input voltage or current**
010 : 0-10V
001 : 0-1mA
420 : 4-20mA etc.
**Type of meter**
VD : DC voltmeter
MD : DC ammeter
**Terminals**
F : Finger-safe terminal (IP20)
C : Exposed screw terminal
**Set pointer**
blank : non -R : with set pointer
**Specification of scale**
-PER : 0~100%
-60HZ : 0~60Hz
-80HZ : 0~80Hz

Note: Use only when interpreting part numbers. Do not use for developing part numbers.

| Input | Part Number | Description | | Weight (approx.) |
|---|---|---|---|---|
| AC input meter (ammeter) | EU2B-YM53A5④ | Capacity: 5A | Expansion scale: x3 | 270g |
| | EU2B-YM53A10④ | Capacity:10/5A | Expansion scale: x3 | |
| | EU2B-YM13A10④ | Capacity:10/1A | Expansion scale: x3 | |
| | EU2B-YM53A15④ | Capacity:15/5A | Expansion scale: x3 | |
| | EU2B-YM13A15④ | Capacity:15/1A | Expansion scale: x3 | |
| | EU2B-YM13A20④ | Capacity:20/1A | Expansion scale: x3 | |
| | EU2B-YM53A30④ | Capacity:30/5A | Expansion scale: x3 | |
| | EU2B-YM13A30④ | Capacity:30/1A | Expansion scale: x3 | |
| | EU2B-YM53A50④ | Capacity:50/5A | Expansion scale: x3 | |
| | EU2B-YM53A60④ | Capacity:60/5A | Expansion scale: x3 | |
| | EU2B-YM53A75④ | Capacity:75/5A | Expansion scale: x3 | |
| | EU2B-YM53A100④ | Capacity:100/5A | Expansion scale: x3 | |
| | EU2B-YM53A150④ | Capacity:150/5A | Expansion scale: x3 | |
| DC input meter | EU2B-YM010VD④-PER | 0-10V DC Input | Scale: 0 to 100% | |
| | EU2B-YM010VD④-60HZ | 0-10V DC Input | Scale: 0 to 60Hz | |
| | EU2B-YM001MD④-PER | 0-1mA DC Input | Scale: 0 to 100% | |
| | EU2B-YM001MD④-60HZ | 0-1mA DC Input | Scale: 0 to 60Hz | |
| | EU2B-YM001MD④-80HZ | 0-1mA DC Input | Scale: 0 to 80Hz | |
| | EU2B-YM420MD④-PER | 4-20mA DC Input | Scale: 0 to 100% | |
| | EU2B-YM420MD④-60HZ | 4-20mA DC Input | Scale: 0 to 60Hz | |

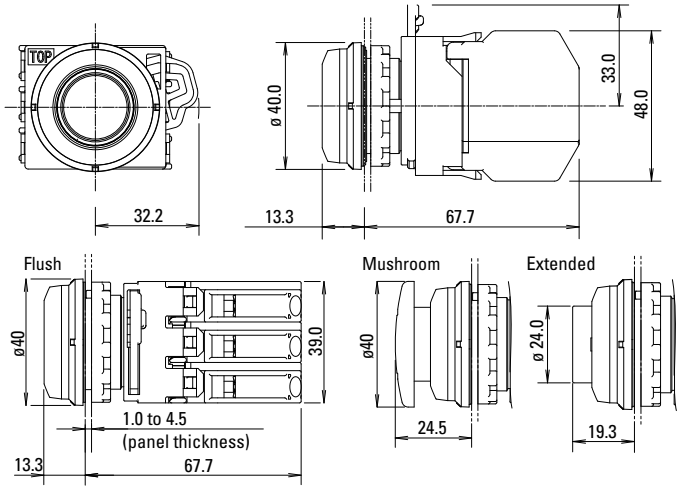
Specify a terminal style in place of ④ in the part number: F (Finger-safe terminal), C (Exposed screw terminal)

# Dimensions

All dimensions in mm

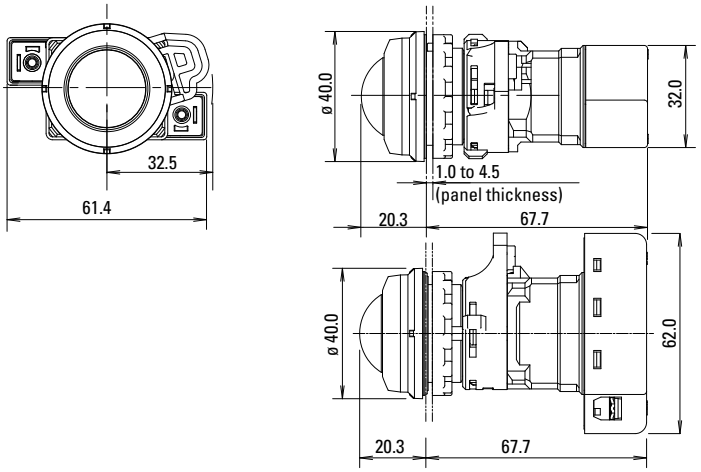
## Pushbuttons

Shown with finger-safe contacts



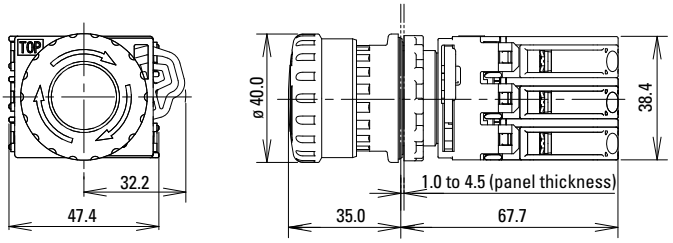

## Pilot Lights

Shown with finger-safe contacts



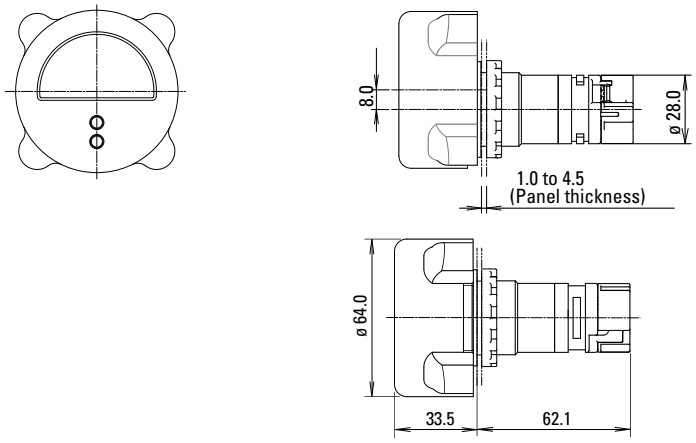

## Emergency Stop Switches

Shown with finger-safe contacts



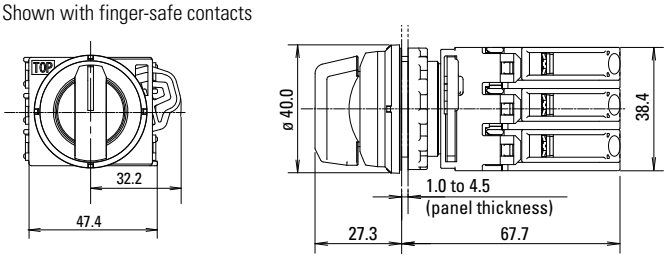

## Meters

Shown with finger-safe contacts




## Selector Switches

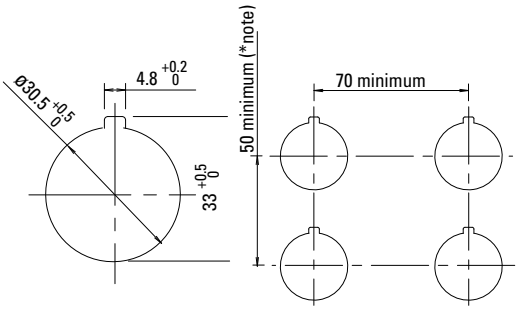
Shown with finger-safe contacts




## Mounting Hole Dimensions

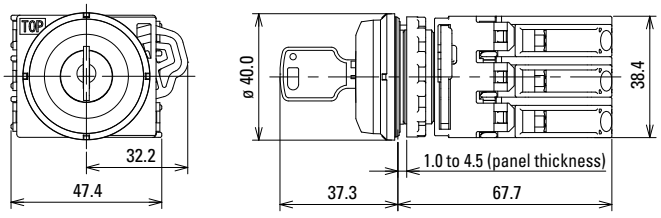
Panel thickness: 1.0 to 4.5 mm.

*Note: The meter can be mounted on the top mounting holes of a standard 50mm mounting centers. The meter can be mounted on any mounting hole with a 70mm or larger mounting center.




## Key Selector Switch

Shown with finger-safe contacts

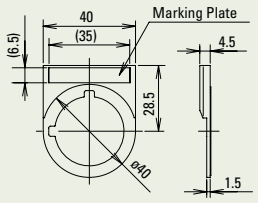


# Accessories

All dimensions in mm

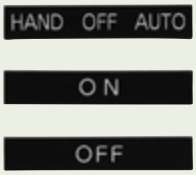
## Nameplates

Used for pilot light, pushbutton, selector switch, and key selector switch.

| Appearance | Part Number | Dimensions |
|---|---|---|
| | EU9Z-NM |  |



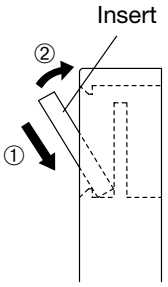
## Nameplate Inserts

| Appearance | Legend | Part Number |
|---|---|---|
|  | Blank | EU9Z-NP0 |
| | ON | EU9Z-NP1 |
| | OFF | EU9Z-NP2 |
| | START | EU9Z-NP3 |
| | STOP | EU9Z-NP4 |
| | OFF-ON | EU9Z-NP31 |
| | HAND-AUTO | EU9Z-NP35 |
| | HAND-OFF-AUTO | EU9Z-NP53 |



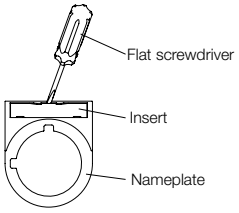
Material: Aluminum

Installing the Insert to the Nameplate





Removing the Insert from the Nameplate



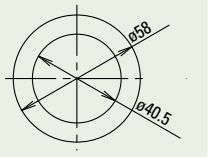
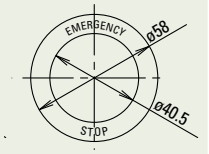


To remove the Insert, insert a flat screwdriver between the Insert and Nameplate.

## Rubber Boots

| Appearance | Description/Usage | Part Number |
|---|---|---|
| For Flush Pushbuttons | Not for use with name plate | EU9Z-DB1 |
| For Flush Pushbuttons | For use with name plate | EU9Z-DB1N |
| For Extended Pushbuttons | Not for use with name plate | EU9Z-DB2 |
| For Extended Pushbuttons | For use with name plate | EU9Z-DB2N |

## Emergency Stop Switch Nameplate Stickers

| Appearance | Legend | Part Number | Dimensions |
|---|---|---|---|
| | Blank | EU9Z-NVS0 |  |
| | Emergency Stop | EU9Z-NVS27 |  |

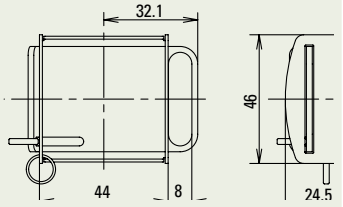


Material: yellow vinyl Legend: black

## Padlock Cover

EU2B-YB2 extended pushbutton: to maintain latched status

EU2B-YB1 flush pushbutton/EU2B-YSK key selector switch: to prevent operation

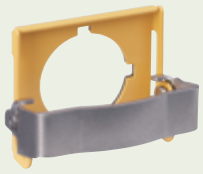
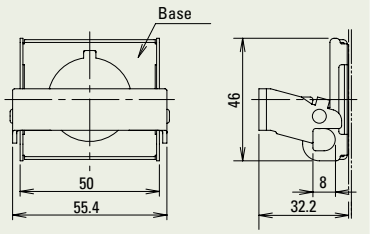
| Appearance | Part Number | Dimensions |
|---|---|---|
| | EU9Z-PC |  |



Material: Stainless Steel

## Emergency Stop Switch Padlock Cover

Used with EU2B-YBV emergency stop switch to maintain the switch in the latched status.

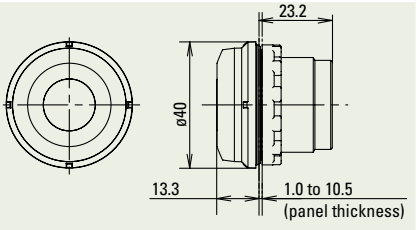
| Appearance | Part Number | Dimensions |
|---|---|---|
|  | EU9Z-PCE |  |



Coating: yellow Material: Stainless Steel

## Mounting Hole Plug

Used to plug unused mounting holes (ø30.5) on the mounting panel.

| Appearance | Part Number | Dimensions / Usage |
|---|---|---|
| | EU9Z-BP |  |

### Buttons

| Appearance | Style | Part Number | Button Color Code |
|---|---|---|---|
| | Flush | HW1A-B1① | Specify a color code in place of ① in the Ordering Number.<br>R : red<br>G : green<br>B : black<br>Y : yellow<br>W : white<br>S : blue |
| | Extended | HW1A-B2① | |
| | ø40 Mushroom | HW1A-B4① | |

Material: Polyacetal

### Lenses

| Appearance | Lens Color | Part Number |
|---|---|---|
| | Red | EU9Z-LR |
| | Green | EU9Z-LG |
| | Amber | EU9Z-LA |
| | Yellow | EU9Z-LY |
| | White | EU9Z-LW |
| | Blue | EU9Z-LS |

Material: AS resin (gasket supplied)

### LED Lamps

| Operating Voltage | Current Draw AC | Current Draw DC | Part Number | Illumination Color Code | Base |
|---|---|---|---|---|---|
| 6V AC/DC±10% | 8mA | 7mA (A, R, W)<br>5.5mA (G, PW, S) | LSTD-6① | Specify a color code in place of ① in the part number<br>R : red<br>G : green<br>A : amber<br>PW : white<br>S : blue<br>Use a white (PW) LED with yellow (Y) lens. | BA9S/13 |
| 12V AC/DC±10% | 11mA | 10mA | LSTD-1① | | |
| 24V AC/DC±10% | 11mA | 10mA | LSTD-2① | | |

## Operating Instructions

### Wiring

### Applicable Wires

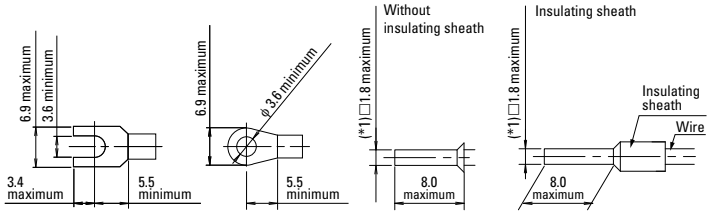
Stranded wire: 1.5 to 2.5 mm², solid wire: ø1.2 to ø1.6 mm (AWG16 to 14)

Note: Do not connect more than 2 wires to the same terminal.

### Applicable crimping terminal

Ring and spade terminals cannot be used with IP20 finger-safe terminal blocks.

When connecting 2 ferrules to the EU2B control unit, use ferrules without insulating sheath.




Recommended crimping terminal (WAGO)

Ferrule with insulating sheath: 216-204

Ferrule without insulating sheath: 216-104

Crimping plier: 206-204

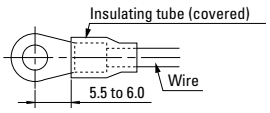
### Recommended Tightening Torque

EU2B control units (M3.5): 1.0 to 1.3 N·m

### Warning

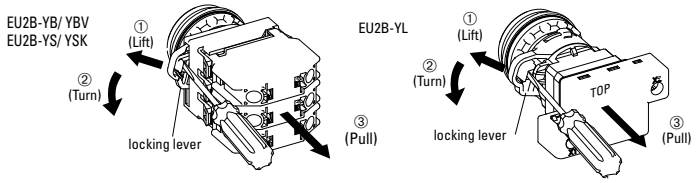
Incorrect wiring may cause fire hazard. Observe the following conditions.

- Be sure to install an insulating sheath on the crimping terminal or the crimping terminal with insulation.
- When connecting solid wires or stranded wires directly, strip the insulation, mentioned below, and insert the wire all the way in.
  EU2B Control units: 8.6 mm maximum
  Crimping terminal: 8 to 9 mm
- When using stranded wires, make sure that there are no wire whiskers.
- Make sure that the spade crimping terminals and ferrules are inserted all the way in.



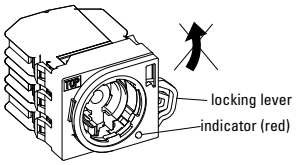
### Removing and Installing the Contact Unit / Lamp Unit

To remove the contact unit or the lamp unit from the operator, pull the protruding yellow part of the locking lever outwards as shown in the figure below using a screwdriver, and turn it to the left. The contact unit or lamp unit can be removed.




When the contact unit is removed from the emergency stop switch operator, the NO contact closes and the NC contact opens.

Do not turn the locking lever when the contact unit is removed from the operator (the red indicator is protruding out. See the figure below) or the switch can be damaged.




### Panel mounting for the operator, lens unit and meter

Remove the locking ring from the operator and check that the rubber gasket is in place. Insert the operator from the panel front into the panel hole. Place the projection on the operator with TOP marking upward and the recess on the mounting panel in the same direction. (The meter has no projection.)

Tighten the locking ring using ring wrench XN9Z-T1 to a torque of 2.5 Nm. When using a nameplate or padlocking cover, install it between the operator and panel. Make sure that the groove of the namplate or padlocking cover and the projection on the TOP marking of the operator are in the same direction.

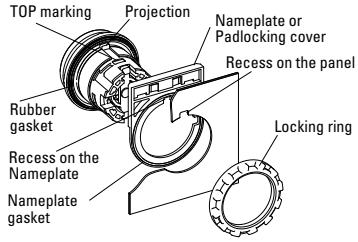
Note: The locking ring for emergency stop switches and meter is metallic. The meter can't mount the nameplate or podlocking cover.

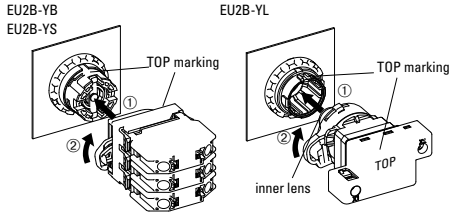
### Installing the contact unit and lamp unit

To install the contact unit, place the TOP marking on the operator and the TOP marking on the contact block adapter in the same direction, and then attach the contact unit to the operator. Then turn the locking lever to the right. Follow the same procedure when installing the lamp unit.

When installing the lamp unit, check that the inner lens is not loose.

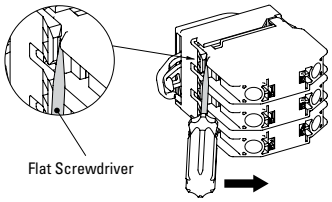
The contact block adapters for emergency stop switches cannot be used for the pushbutton, selector and key selector switches.




### Removing the Contact Block

To remove the contact block, insert a flat screwdriver under the latch of the contact block adaptor and disengage the latch as shown in the figure below.




### Installing the Contact block

When installing the contact block after maintenance or wiring, make sure that the contact configuration is correct. Installing the contact block in the incorrect position or incomplete installation may cause malfunction of the switch.

Remove the contact block from the operator before installing the contact block to the contact block adaptor. Also make sure that the contact block is correctly installed to the contact block adaptor before attaching the operator. Do not install the contact block adaptor with the operator attached. Otherwise, malfunction may result.

### Accessories

### Padlock Cover

The following padlocks and hasps can be used.

| (Padlock Size) | a | b | c |
|---|---|---|---|
| Flush/extended pushbutton/ key selector switch | ø3.5 to 7.0 mm | 15 mm min. | 70 mm max. |
| Emergency Stop Switch | ø5.5 to 7.0 mm | — | — |

### Recommended Hasp

| Manufacturer | Part No. |
|---|---|
| Panduit | PSL-1, PSL-1A, PSL-1.5, PSL-1.5A, PSL-HD1 |
| Master Lock | 420, 421 |

Padlock and hasp are available in various shapes and sizes. Make sure that they do not interfere with the control units. Note: Not supplied by IDEC.

Keep the total weight of padlock and hasp under 1500g max, otherwise the switch may malfunction or result in failure. No vibration should be applied when padlock or hasp are installed. When padlock or hasp are disfigured, stop usage immediately.

Ensure that no shock or electric sparks are generated.

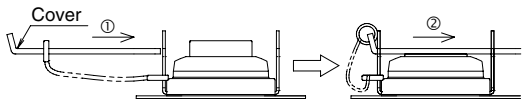
When using the plate lock padlock cover with the extended pushbutton, the switch contact may turn on/off when the cover is being installed. Ensure to provide functional safety measure to prevent unexpected startup.

When using the padlock cover on the safety-related part of the control system, observe safety standards and regulations of the relevant country or region. Also be sure to perform risk assessment before operation.

### Installing EU9Z-PC Padlock Cover

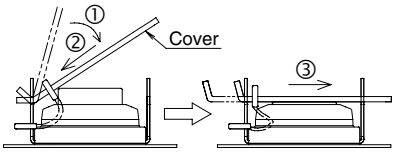
(Flush/extended pushbtton/key selector switch) EU9Z-PC can be installed in the following two ways. Remove the cover in the reverse step of installing the cover. Do not install or remove the cover forcefully, or it will cause failure.

[Installation A]



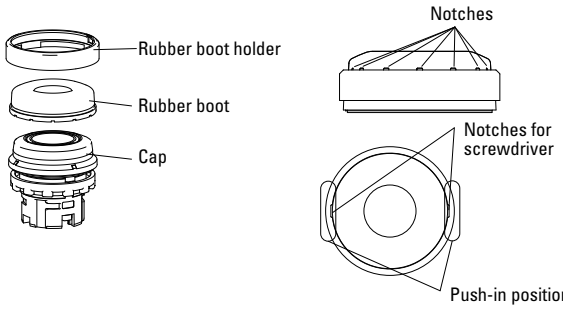

[Installation B]

This method is effective when the neighboring control unit interferes when installing in method A.




### Installing EU9Z-DB Rubber Boots

To install the rubber boot on flush and extended pushbuttons, place the rubber boot on the cap and push the rubber boot holder straight. The notches around the rubber boot must show evenly.

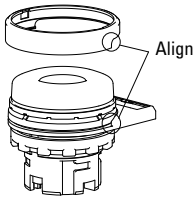



Push the rubber boot holder further around on the two notches on the holder so that the holder fits the button completely

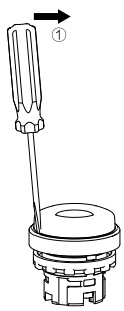
Make sure that the rubber boot and rubber boot holder are installed straight.

On Nameplate Types, the EU2B and the rubber boot holder must be aligned so that when installed, the anti-rotation projection on the EU2B comes to the center of the groove on the holder.

Make sure that the rubber boot is installed completely, otherwise water droplets might enter the rubber boot, but no water will enter the control box.




To remove the rubber boot from the flush and extended pushbuttons, gently insert the slotted screwdriver (0.5t x 4w or below) inside a notch on the rubber boot holder and tilt to the direction shown by the arrow ①. To prevent damage, do not apply excessive force to the EU2B when removing the rubber boot.




### Maintenance and Inspection

EU2B switches should be installed in an appropriate control box.

**Maintenance and Inspection Method**

Perform daily or periodical maintenance and inspection for items such as damage and temperature rise of the EU2B switches listed in the Maintenance and Inspection table below.

**Maintenance and Inspection**

| Inspection Items | Inspection Method | Inspections | Measures |
|---|---|---|---|
| Enclosure base | Visual | No rusting<br>No damages | Cleaning<br>Rust-resistant treatment |
| Tightening bolt, screws | Visual, tactile | No loosening<br>No rusting | Tightening<br>Cleaning |
| Packings | Visual | No cracks<br>No apparent deformation | Replacement |
| Connecting parts | Visual, tactile | No loosening of screws<br>No dirt on insulation materials | Tightening<br>Cleaning |
| Temperature rise | Thermometer, tactile | Surface temperature 80°C max. | Investigate the cause |

### Disposal

Observe laws and regulations set by each country concerning refuse disposal.

### Safety Precautions

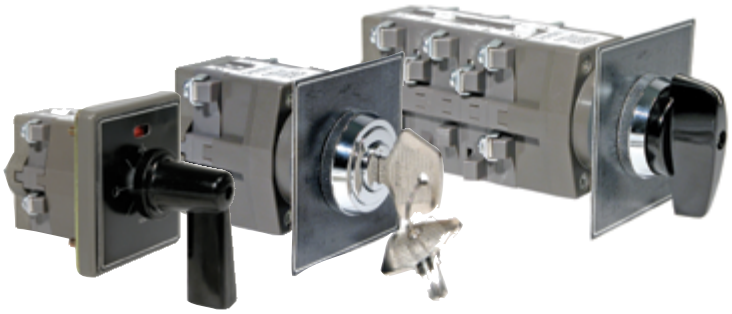
Use EU2B switches that are applicable for use in hazardous areas (potentially explosive atmosphere where explosive gas or vapor may exist), otherwise explosion or fire hazard may result.

- EU2B switches can be installed only in zones 1 and 2. Do not use in zone 0.
- Turn power off to the EU2B switches before installation, removal, wiring, or maintenance, otherwise explosion, fire hazard, or electric shock may result.
- Do not disassemble, repair, or modify, otherwise damage or accident may result.
- Do not use damaged EU2B switches, otherwise damage or accident may result.
- When connecting external devices, make sure that each cable is connected to the correct terminal, otherwise electric shock, fire hazard, or explosion may result.
- Use wires of a proper size to meet voltage and current requirements. Incorrect wiring may cause abnormal temperature rise and lead to fire hazard and explosion.
- Connect the grounding terminal to a proper ground, otherwise electric shock, fire hazard, or explosion may result.
- Operate the EU2B switches at the rated current and voltage specified in this catalog, otherwise short-circuiting, fire hazard, or explosion may result.
- Stop operation immediately if abnormal operation occurs. Otherwise, a secondary accident may occur.

# CS Series — Heavy Duty Cam Switches

**Key features:**

- Wide variety of heavy-duty oiltight cam switches
- Operators available up to 12 positions
- Switches made with a double circuit contact block
- Contact blocks rated 600V, 10A
- Ideal for ammeter/voltmeter applications
- Built to order — not available in subcomponents
- UL listed and CSA certified
- Type 4, 13



UL Listed
File No. E68961

CSA Certified
File No. LR48366

## Contact Ratings

| | | | | | | |
|---|---|---|---|---|---|---|
| Rated Thermal Current | | | 10A | | | |
| AC | Break Current | | 120V/5A | 240V/3A | 480V/2A | 600V/1A |
| DC | Resistive | Break Current | 24V/8A | 110V/3A | 220V/1A | 440V/0.45A |
| | Inductive | Break Current | 24V/5A | 110V/1.2A | 220V/0.45A | 440V/0.20A |
| | | Make Current (A) | Rated amperage x 1.1 | | | |
| Electrical Life | | | 500,000 operations minimum (at full rated load) | | | |
| Mechanical Life | | | 5,000,000 (at no load) | | | |

## CS Series

| | | Operator | | | |
|---|---|---|---|---|---|
| Series | Style | Cam Angle | Position | Maximum Contacts To Be Mounted | Handle Styles |
| ACSNO | | 30° | Up to 12 | 1 to 10 decks; Up to 20 contacts | YB, SB, PB, FB |
| | | 45° | Up to 8 | | |
| | | 60° | Up to 6 | | |
| | | 90° | Up to 4 | | |
| ACSNK | | 30° | Up to 12 | 1 to 10 decks; Up to 20 contacts | HB or standard key |
| | | 45° | Up to 8 | | |
| | | 60° | Up to 6 | | |
| | | 90° | Up to 4 | | |
| UCSQO | | 30° | Up to 12 | 1 to 10 decks; Up to 20 contacts | YB, SB, PB, FB |
| | | 45° | Up to 8 | | |
| | | 60° | Up to 6 | | |
| | | 90° | Up to 4 | | |
| UCSQM | | 45° Spring return | Only 3 | 1 to 3 decks; Up to 6 contacts | YB, SB, PB, FB |

1. Do not use spring return (SR) for more than six contacts.
2. Two identical keys come with ACSNK unit. Specify "H" for handle key option.
3. For handle styles, see page 770.

## Selector Switches (Assembled)

### Assembled Selector Switches

**ACSNO – 3 6 6 – ( ) SB – C3013**

**Series**

ACSNO = Standard Cam Switch (30mm)
ACSNK = Key Cam Switch (30mm)
UCSQO = Cam Switch (5 hole mounting)
UCSQM = 3 Position Spring Return Cam Switch (5 hole mounting)

**Number of Levels (Decks)**

1 through 10
Note: One level contains two independent contacts.*

**Number of Positions**

2 through 12

**Angle**

**3** = 30° (12 position max)
**4** = 45° (8 position max)
**6** = 60° (6 position max)
**9** = 90° (4 position max)

**Contact Arrangement**

1. For standard contact arrangements, use designations on page 642.
2. For custom contact arrangements, omit contact arrangement designation and complete the blank order form on page 769.

**Handle**

**YB** = Knob, Small
**SB** = Lever, Small
**PB** = Lever, Large
**FB** = Knob, Large
**HB** = Handle Key (ACSNK only)
**Blank** = Standard Key (ACSNK only)

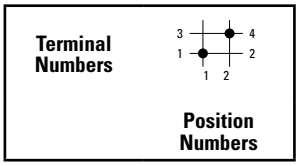
**Spring Return Action**

**Blank:** Maintained
**RO =** Spring return from left (3 or 4position, 45° only)
**OR =** Spring return from right (3 or 4 position, 45° only)
**RR =** Return from right and left (3 pos, 45° only)

1. *Contact blocks may contain two independent contacts, (a four position switch with four independent contacts only requires two contact blocks).
2. *Caution: switches with 180° or more of rotation may require separate blocks for each contact due to cam overlapping.
3. Key retainable in every 45° position (45, 90, 180, 225, 270, 315, 360).

# Contact Arrangements

**Standard Arrangements**

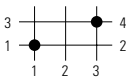



**C-1001**

**C-1002**

**C-1014**

**C-1005**



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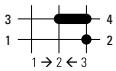
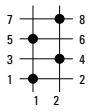


**C-2001**



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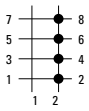
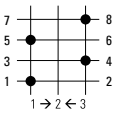
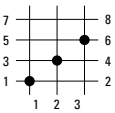


**C-2006**



**C-2004**



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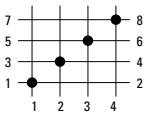
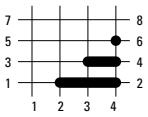
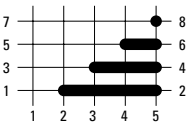


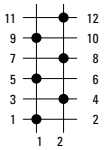
**C-2009**



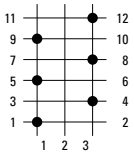
**C-2027**



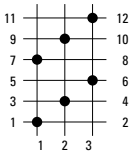
**C-3001**



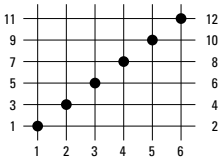
**C-3002**



**C-3005**



**C-3013**



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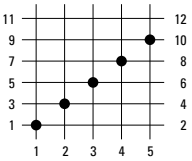

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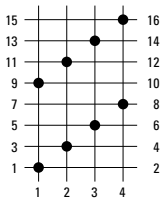
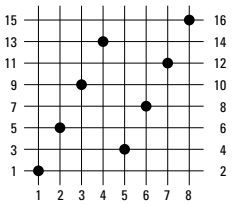
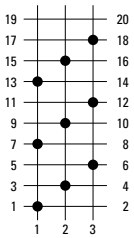


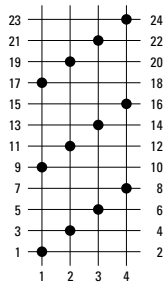
**C-4002**



**C-5001**



**C-6001**



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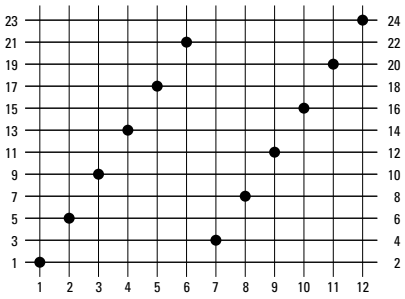
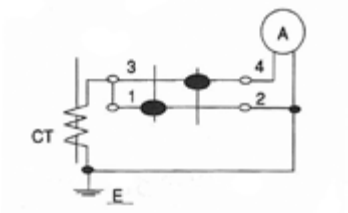


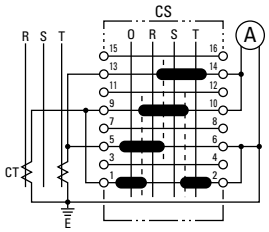
## Contact Arrangements continued

### Ammeter Switching

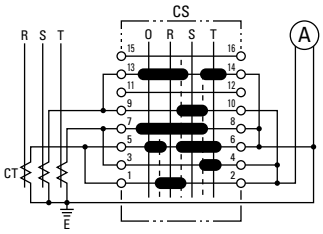
**C-1012**



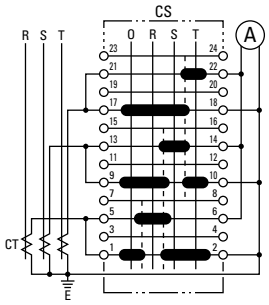

**C-4007**




**C-4003**

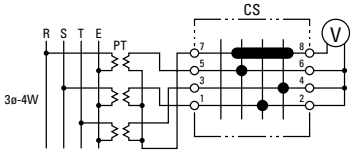



**C-6003**

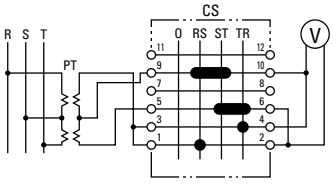



### Voltmeter Switching

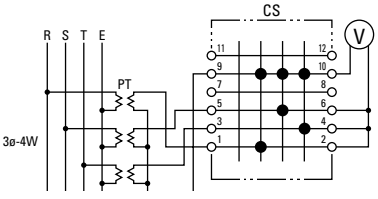
**C-2022**



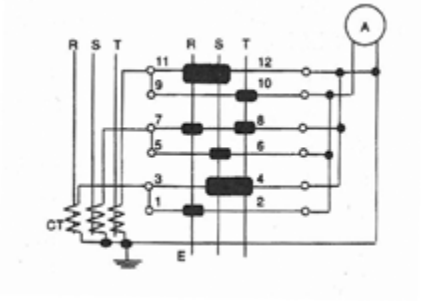

**C-3008**




**C-3009**




**C-3007**



# Order Form (Custom Contact Arrangement)

**Series**

ACSNO
ACSNK
UCSQO
UCSQM

***Number of Decks**

Specify Qty = 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10

*Note: One Deck can drive two independent contacts.

**Handle**

**ACSNO, UCSQO, UCSQM:**

**YB** = Knob, Small
**SB** = Lever, Small
**PB** = Lever, Large
**FB** = Knob, Large

**ACSNK:**

**HB** = Handle Key (option)
**Blank** = Standard Key

For handle styles, see page 770.

**Number of Positions**

| Unit | Angle | Positions |
|---|---|---|
| ACSNO<br>ACSNK*<br>UCSQO | 30° only | 9, 10, 11, 12 |
| | 30° or 45° only | 7 or 8 |
| | 30°, 45° or 60° | 5 or 6 |
| | 30°, 45°, 60°, 90° | 2, 3, or 4 |
| UCSQM | 45° only | 3 only |

* ACSNK keys only remove at 45°.

**Angle**

**3** = 30°
**4** = 45°
**6** = 60°
**9** = 90°

**Spring Return**

Blank = Maintained
**RO** = Spring return from left (3 or 4 position, 45°)
**OR** = Spring return from right (3 or 4 position, 45°)
**RR** = Return from right and left (3 position, 45°)

**UCSQM is available in spring-return version only.**

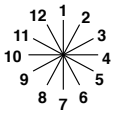
## Contact Arrangement Table

| Cams | Terminal Numbers | Position 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Deck 1 | 1 and 2 | | | | | | | | | | | | |
| | 3 and 4 | | | | | | | | | | | | |
| Deck 2 | 5 and 6 | | | | | | | | | | | | |
| | 7 and 8 | | | | | | | | | | | | |
| Deck 3 | 9 and 10 | | | | | | | | | | | | |
| | 11 and 12 | | | | | | | | | | | | |
| Deck 4 | 13 and 14 | | | | | | | | | | | | |
| | 15 and 16 | | | | | | | | | | | | |
| Deck 5 | 17 and 18 | | | | | | | | | | | | |
| | 19 and 20 | | | | | | | | | | | | |
| Deck 6 | 21 and 22 | | | | | | | | | | | | |
| | 23 and 24 | | | | | | | | | | | | |
| Deck 7 | 25 and 26 | | | | | | | | | | | | |
| | 27 and 28 | | | | | | | | | | | | |
| Deck 8 | 29 and 30 | | | | | | | | | | | | |
| | 31 and 32 | | | | | | | | | | | | |
| Deck 9 | 33 and 34 | | | | | | | | | | | | |
| | 35 and 36 | | | | | | | | | | | | |
| Deck 10 | 37 and 38 | | | | | | | | | | | | |
| | 39 and 40 | | | | | | | | | | | | |

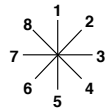
To specify non-standard arrangements (designation not on preceding pages), fill in this table using the following symbols.
**X** = Closed contact (break before make) **O** = Open contact **X–X** = Overlapping contact (remain on when switch is moved between two positions)

**Specifying Nameplate (Optional)**

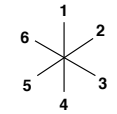
**30°**



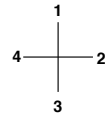

**45°**




**60°**




**90°**




**Specifying Legends**
Position

1 _____
2 _____
3 _____
4 _____
5 _____
6 _____

If no engraving information is provided, a blank nameplate will be supplied.

1 _____
2 _____
3 _____
4 _____
5 _____
6

# Accessories — CS Series

## Replacement Handles

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| Part Number | CSH-YB | CSH-SB | CSH-PB | CSH-FB | CSH-H2B |
| Dimensions | 0.79"D x 1.61"H | 0.79"D x 1.97"H | 1.58"D x 1.97"H | 1.58"D x Ø 1.97" | 0.95"D x 2.28"H |
| Applicable Models | ACSNO, UCSQO, UCSQM | | | | ACSNK |

## Replacement Nameplates

| Size & Shape<br>❑ 2.52" (64mm)<br>Black Aluminum | | | |
|---|---|---|---|
| Part Number | CQ | CQM | CQN |
| Applicable Models | UCSQO | UCSQM | ACSNO, ACSNK |

1. Extra cost for engraving, 3/16" min. letter height, Legends maximum ten characters.
2. Blank nameplates are supplied with all cam switches (they need not be ordered separately).

## Wiring Clips

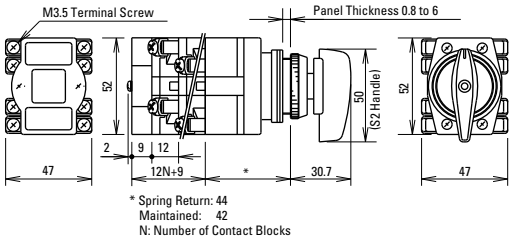
| Part Number | Contact Block Jumpers |
|---|---|
| CJ-1<br> | Between decks |
| CJ-2<br> | Same deck |

## Replacement Keys

| Part Number | Description |
|---|---|
| K301<br> | Pair of keys (#301) |

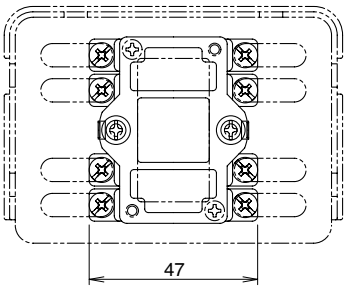
## Dimensions/Terminal Arrangements/Mounting Holes

**ACSNO**

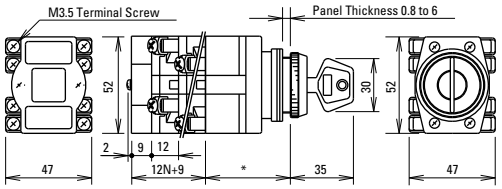



* Spring Return: 44
Maintained: 42
N: Number of Contact Blocks

**Terminal Arrangement**

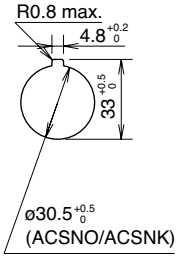



**ACSNK**

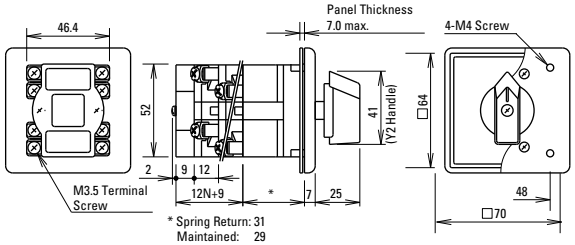



* Spring Return: 44
Maintained: 42
N: Number of Contact Blocks

**Mounting Holes**

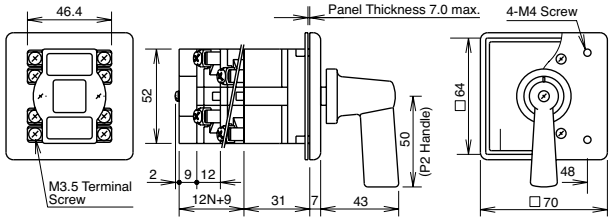



**UCSQO**



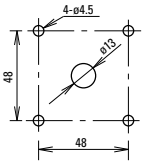

* Spring Return: 31
Maintained: 29
N: Number of Contact Blocks

**UCSQM**




N: Number of Contact Blocks

**UCSQO**
**UCSQM**



# ARN Series — Mono-Lever Switches

**Key features:**

- Mono-Lever Switches Ø 1-13/64" (30mm)
- Contact Blocks Rated for 600V, 10A
- Available in 2–, 3–, and 4–positions.
- Maintained and spring-return modes available.
- Models available with interlock mechanism to prevent inadvertent actuation.

UL Listed
File No. E68961

CSA Certified
File No. LR48366

## Specifications

| | | |
|---|---|---|
| Operating Temperature | | -25˚to 50˚C (without freezing) |
| Insulation Resistance | | 100MΩ |
| Contact Rating | Rated Voltage: Current | 110VDC: 3A<br>24V AC/DC: 10A<br>120VAC: 10A<br>240VAC: 6A<br>480VAC: 2A<br>600VAC: 1A |
| | Insulation Voltage | 600V AC/DC |
| | Rated Thermal Current | 10A |
| | Electrical Life | Over 500,000 operations |

## Part Numbering Guide (Assembled)

| ARN | 4 | – | 1012 | – | 10.00.02.11 |
|---|---|---|---|---|---|
| ① Style | ② Number of Contact Blocks | | ③ Lever Action | | ④ Contact Arrangement |

| Description | | Code | Remarks |
|---|---|---|---|
| ① Style | Standard Lever | ARN | Interlocking lever prevents inadvertent operation. |
| | Short Lever | ARNS | |
| | Interlocking Lever | ARNL | |
| ② No. of Contact Blocks | — | 1 | Each contact block contains two independent contacts. |
| | | 2 | |
| | | 3 | |
| | | 4 | |
| ③ Lever Action | Blocked | 0 | Specify in this order:<br>Up.Right.Down.Left |
| | Maintained | 1 | |
| | Spring Return | 2 | |
| ④ Contact Arrangement | No contacts | 00 | Specify the number of contacts to be activated in all active (non-blocked) positions:<br>Up.Right.Down.Left<br>For blocked positions use code: 00 |
| | 1 NO contact | 10 | |
| | 1 NC contact | 01 | |
| | 1 NO and 1 NC contact | 11 | |
| | 2 NO contacts | 20 | |

## Mono-Lever Switches (Sub-Assembled)

| Contact Blocks | + | Operator | = | Complete Part |
|---|---|---|---|---|

### Standard Mono-Lever Operators

| Style | | Lever Operation Mode | Part Number |
|---|---|---|---|
| Standard Lever | | 2-Position manual return<br>3-Position manual return<br>4-Position manual return | ARN0-1010-B<br>ARN0-1110-B<br>ARN0-1111-B |
| | | 2-Position spring return<br>3-Position spring return<br>4-Position spring return | ARN0-2020-B<br>ARN0-2220-B<br>ARN0-2222-B |
| Short Lever | | 2-Position manual return<br>3-Position manual return<br>4-Position manual return | ARNS0-1010-B<br>ARNS0-1110-B<br>ARNS0-1111-B |
| | | 2-Position spring return<br>3-Position spring return<br>4-Position spring return | ARNS0-2020-B<br>ARNS0-2220-B<br>ARNS0-2222-B |
| Interlocking Lever | | 2-Position manual return<br>3-Position manual return<br>4-Position manual return | ARNL0-1010-B<br>ARNL0-1110-B<br>ARNL0-1111-B |
| | | 2-Position spring return<br>3-Position spring return<br>4-Position spring return | ARNL0-2020-B<br>ARNL0-2220-B<br>ARNL0-2222-B |

### Contact Blocks

| Style | Contact Arrangement | Part Number |
|---|---|---|
| | 2NO contacts<br>1NO & 1NC contact<br>2NC contacts<br>1NO early make contact | BR-1E<br>BR-2E<br>BR-3E<br>BR-1EM |

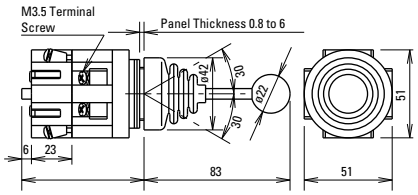
To calculate the number of contact blocks required, add the number of NO and NC contacts on each pair of adjoining positions (up + right, right + down, down + left, and left + up). The largest of the four sums is the number of contact blocks required. Up to four contact blocks can be mounted.

### Replacement Parts

| Style | | | Part Number |
|---|---|---|---|
| Bellows | | ARN0, ARNS0<br>(standard & short lever) | ARN-BL |
| | | ARNL0<br>(Interlocking) | ARNL-BL<br>(comes in 2 pieces) |
| Knob (ball) | | All Models Knob (ball) | ARNB-B |

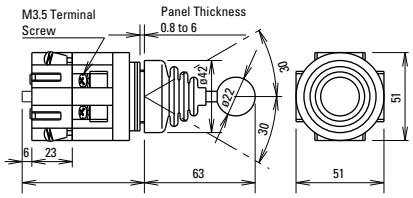
## Dimensions — ARN Series

**ARNO**



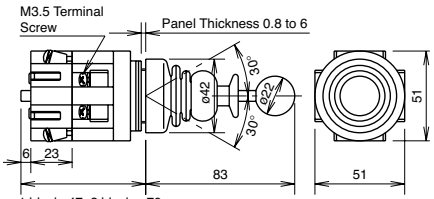

1 block: 47, 2 blocks: 70
3 blocks: 93, 4 blocks: 116

**ARNSO**



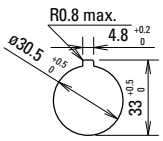

1 block: 47, 2 blocks: 70
3 blocks: 93, 4 blocks: 116

**ARNLO**




1 block: 47, 2 blocks: 70
3 blocks: 93, 4 blocks: 116

**ARNO**
**ARNSO**
**ARNLO**



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Jumbo Dome Pilot Lights ..... 795
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30mm SLC30-IPS Series ..... 804
40mm SLC40 Series ..... 812

# Signaling Lights

IDEC

**www.IDEC.com/signalinglights**

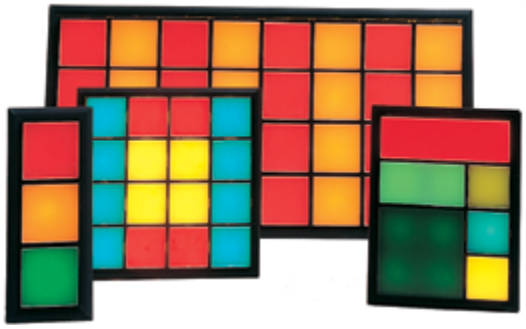
# Selection Guide

| Series | SignaLight Towers | | Surface Mount Indicators | |
|---|---|---|---|---|
| | LD6A | LT7 | LH1D | Jumbo Dome Pilot Lights |
| Appearance | | | | |
| Page | 778 | 787 | 790 | 795 |
| Description | LED<br>Steady or Flashing Light with Buzzer | LED<br>Steady or Flashing Light with Buzzer | LED<br>One-color, Two-color, or Three-color Alternate Illumination | Incandescent or LED |
| Features | • Unique oval lens shape provides clear distinction between LED colors<br>• Color coded wires | • Ultra bright LEDs<br>• Fast and easy assembly<br>• Optional adjustable alarm<br>• Color-coded wiring terminals<br>• LED strobe modules | • Flat lens, dome, or jumbo dome lenses | • Large dome lens |
| Nominal Voltage | 24V AC/DC | 24V DC, 90-250V AC | 24V AC/DC | 24V AC/DC |
| Lamp Style | Lens LED Modules | Lens LED modules | LED | LED or Incandescent |
| Lens Colors | Red, Yellow, Blue, Green, White | Red, Amber, Green, Blue, White, Lemon Yellow | Cool White, Blue, Green, Yellow, Warm White, Amber, Red | Amber, Green, Red, Blue, White, Yellow |
| Degree of Protection | IP65, IP54, IP23 | IP65, Type 4, 4X, 13 | IP67, Type 4X | IP65 |
| Mounting | Frame mount<br>Wall mount<br>Direct mount<br>Pole mount with base<br>Pole mount with L-shaped bracket | Base-mounting with stud<br>L-angle bracket with pole<br>Base-mount with pole<br>Wall mount bracket | Direct mount<br>Surface mount | 22mm panel cut-out |
| Lens Shape/Size | Oval / 40mm x 60mm | Round / 70mm (2.75") | Dome / ø37mm<br>Flat / 35mm x 34mm<br>Jumbo Dome / ø66mm | Dome / ø66mm |
| Ratings/Approvals | | | | Certificate No. 20050103051456 56<br>TÜV Rheinland |

## SLC Series — Panel Mount Annunciators

| Series | SLC30 1.18" (30mm) | SLC30-IPS 1.18" (30mm) | SLC40 1.57" (40mm) |
|---|---|---|---|
| Appearance | Full Voltage Transformer | Available with integrated control unit pushbuttons and key switches | Full Voltage Transformer |
| Page | 796 | 804 | 812 |
| Features | • Custom-built, multiple combination windows<br>• Custom illumination color combinations<br>• Optional legend engraving | | |
| Illumination Face Size | Style F: 1.181" x 1.181" (30 x 30mm)<br>Style H: 1.181" x 2.362" (30 x 60mm)<br>Style L: 1.181" x 3.543" (30 x 90mm)<br>Style V: 2.362" x 1.181" (60 x 30mm)<br>Style G: 2.362" x 2.362" (60 x 60mm) | | Style F: 1.575" x 1.575" (40 x 40mm)<br>Style H: 1.575" x 3.150" (40 x 80mm)<br>Style L: 1.575" x 4.724" (40 x 120mm)<br>Style V: 3.150" x 1.575" (80 x 40mm)<br>Style G: 3.150" x 3.150" (80 x 80mm) |
| Light Source | LED cluster or<br>bayonet base incandescent (1W) | | LED cluster or<br>screw base incandescent (2W) |
| Illumination Colors | LED: Amber, Blue, Green, Red, Yellow, White, Red/Green 2-color alternate*<br>Incandescent: Amber, Blue, Green, Red, Yellow, White | | |
| Input Type/Voltage | **LED** — Full voltage | 6, 12, 24V DC | |
| | **LED** — Transformer | 120V, 240V AC | |
| | **LED** — DC-DC converter | 110V DC | |
| | **Incandescent** — Full voltage | 6.3, 18, 24, 30V DC | |
| | **Incandescent** — Transformer | 120V, 240V AC (50/60Hz) | |
| Terminations | M3.5 screw with captive sems plate<br>(M3 screw check terminals on applicable units)<br>LED models feature M3.5 spring-up terminals | | |
| Approvals | TÜV Cert No. B970213332375 | cULus UL Recognized File No. E68961 | CE, CSA Certified File No. LR48366, ABS American Bureau of Shipping |

*Red/Green 2-color alternate available in 24V LED only.



# LD6A LED SignaLight Towers

## Unique Striped Design Improves Visibility

Key features of the LD6A LED SignaLight Towers include:

- The striped design with non-illuminated area between the lenses makes the illuminated color very visible.
- Unique oval lens shape provides high-visibility from different directions.
- Five different mounting styles available: frame mount, wall mount, direct mount and pole mount (round or L-shaped bracket).
- Clear lens models available to clearly distinguish between illuminated and non-illuminated lenses.
- Custom configuration is possible.
- Flashing cycle: 1.75Hz (approx. 105 flashes per minute) conforms to international standard IEC 60073.
- Alarm (3.3kHz, 2 different styles) can be heard in 360° degrees. Adjustable volume (70 to 90dB).
- Degree of protection: IP65 Steady units and IP54 Flashing units (using frame, wall, direct and pole mount with round base), IP23 Steady and Flashing units using pole mount with L-shaped bracket.

## Assembled Products

| Mounting Style | Tiers | LED Color Code | Steady | | Steady/Flashing/Alarm | |
|---|---|---|---|---|---|---|
| | | | Part Number | Weight (approx.) | Part Number | Weight (approx.) |
| G: Frame Mount | 1 | R, Y, S, G, W | LD6A-1GQ*-□ | 220g | LD6A-1GZQ*-□ | 310g |
| | 2 | RY, RG | LD6A-2GQ*-□□ | 260g | LD6A-2GZQ*-□□ | 350g |
| | 3 | RYS, RYG | LD6A-3GQ*-□□□ | 300g | LD6A-3GZQ*-□□□ | 390g |
| | 4 | RYSG | LD6A-4GQ*-□□□□ | 340g | LD6A-4GZQ*-□□□□ | 430g |
| | 5 | RYSGW | LD6A-5GQ*-□□□□□ | 380g | LD6A-5GZQ*-□□□□□ | 470g |
| W: Wall Mount | 1 | R, Y, S, G, W | LD6A-1WQ*-□ | 225g | LD6A-1WZQ*-□ | 315g |
| | 2 | RY, RG | LD6A-2WQ*-□□ | 265g | LD6A-2WZQ*-□□ | 355g |
| | 3 | RYS, RYG | LD6A-3WQ*-□□□ | 305g | LD6A-3WZQ*-□□□ | 395g |
| | 4 | RYSG | LD6A-4WQ*-□□□□ | 345g | LD6A-4WZQ*-□□□□ | 435g |
| | 5 | RYSGW | LD6A-5WQ*-□□□□□ | 385g | LD6A-5WZQ*-□□□□□ | 475g |
| D: Direct Mount | 1 | R, Y, S, G, W | LD6A-1DQ*-□ | 185g | LD6A-1DZQ*-□ | 275g |
| | 2 | RY, RG | LD6A-2DQ*-□□ | 225g | LD6A-2DZQ*-□□ | 315g |
| | 3 | RYS, RYG | LD6A-3DQ*-□□□ | 265g | LD6A-3DZQ*-□□□ | 355g |
| | 4 | RYSG | LD6A-4DQ*-□□□□ | 305g | LD6A-4DZQ*-□□□□ | 395g |
| | 5 | RYSGW | LD6A-5DQ*-□□□□□ | 345g | LD6A-5DZQ*-□□□□□ | 435g |
| P: Pole Mount (with base) | 1 | R, Y, S, G, W | LD6A-1PQ*-□ | 645g | LD6A-1PZQ*-□ | 735g |
| | 2 | RY, RG | LD6A-2PQ*-□□ | 685g | LD6A-2PZQ*-□□ | 775g |
| | 3 | RYS, RYG | LD6A-3PQ*-□□□ | 725g | LD6A-3PZQ*-□□□ | 815g |
| | 4 | RYSG | LD6A-4PQ*-□□□□ | 765g | LD6A-4PZQ*-□□□□ | 855g |
| | 5 | RYSGW | LD6A-5PQ*-□□□□□ | 805g | LD6A-5PZQ*-□□□□□ | 895g |
| K: Pole Mount (with L-shaped bracket) | 1 | R, Y, S, G, W | LD6A-1KQ*-□ | 640g | LD6A-1KZQ*-□ | 730g |
| | 2 | RY, RG | LD6A-2KQ*-□□ | 680g | LD6A-2KZQ*-□□ | 770g |
| | 3 | RYS, RYG | LD6A-3KQ*-□□□ | 720g | LD6A-3KZQ*-□□□ | 810g |
| | 4 | RYSG | LD6A-4KQ*-□□□□ | 760g | LD6A-4KZQ*-□□□□ | 850g |
| | 5 | RYSGW | LD6A-5KQ*-□□□□□ | 800g | LD6A-5KZQ*-□□□□□ | 890g |

Specify housing color code in place of *: B (black), W (light gray)
Specify illumination color in place of □ starting with the top tier. State the LED color code from the left.
R (red), Y (yellow), S (blue), G (green), W (pure white)
Example: When the LED color is RYGSW => **LD6A-5GQW-RYGSW**
Clear lens type also available. Specify "C" after the LED color code.
Example:
**LD6A-5GQW-RYSGW** => **LD6A-5GQW-RYSGWC**

## Combination of LED Color and Lens Color

| LED Color | Color Lens Type | Clear Lens Type |
|---|---|---|
| R: Red | Red lens | Clear lens |
| Y: Yellow | Yellow lens | Clear lens |
| S: Blue | Blue lens | Clear lens |
| G: Green | Green lens | Clear lens |
| W: White | Clear lens | |

For white (W) LED, a clear lens is used in both color and clear lens configurations.

## Mounting Parts Included

| Mounting Style | Supplied Parts |
|---|---|
| G: Frame mount | M4 screw (4 pcs)*, M4 spring washer (4 pcs)*, M4 plain washer (4 pcs)*, M5 screw (2 pcs), M5 spring washer (2 pcs), M5 plain washer (2 pcs), bracket (1 pc) |
| W: Wall mount | M4 screw (20 mm) (4 pcs), M4 screw (8 mm) (4 pcs)*, M4 spring washer (8 pcs)* M4 plain washer (8 pcs)*, M4 nut (4 pcs), bracket (1 pc), gasket (1 pc) |
| D: Direct mount | M5 screw (4 pcs)*, M5 spring washer (4 pcs)*, M5 plain washer (4 pcs)*, M5 nut (4 pcs)*, O-ring (4 pcs), gasket (1 pc) |
| P: Pole mount (with base) | M5 screw (4 pcs), M5 spring washer (4 pcs), M5 plain washer (4 pcs), M5 nut (4 pcs), O-ring (4 pcs), gasket (1 pc) |
| K: Pole mount (with L-shaped bracket) | M22 plain washer 2 (pcs), M22 nut (2 pcs), bracket (1 pc) |

*For black housing, black screws and washers are supplied. For light gray housing, silver screws and washers are supplied.

## Base Module

| Style | Mounting Style | Part Number | | Notes |
|---|---|---|---|---|
| | | Steady | Steady/Flashing/Alarm | |
| | Frame Mount | LD6A-0GQ* | LD6A-0GZQ* | A top cap is supplied. |
| | Wall Mount | LD6A-0WQ* | LD6A-0WZQ* | |
| | Direct Mount | LD6A-0DQ* | LD6A-0DZQ* | |
| | Pole Mount (with base) | LD6A-0PQ* | LD6A-0PZQ* | |
| | Pole Mount (with L-shaped bracket) | LD6A-0KQ* | LD6A-0KZQ* | |

Specify a housing color code in place of *: B (black), W (light gray)
Do not supply power to the base module without connecting LED modules.

## LED Module

| Style | | Lens | Part Number | LED Color Code |
|---|---|---|---|---|
| | Black | Color lens | LD9Z-6ALB-☐ | R, Y, S, G, W |
| | | Clear lens | LD9Z-6ALB-☐C | R, Y, S, G |
| | Light gray | Color lens | LD9Z-6ALW-☐ | R, Y, S, G, W |
| | | Clear lens | LD9Z-6ALW-☐C | R, Y, S, G |

Specify an LED color code in place of ☐: R (red), Y (yellow), S (blue), G (green), W (white)
When using white (W) with a clear lens, order LD9Z-6ALB-W (black housing) or LD9Z-6ALW-W (light gray housing).

## Center Set Screw

| Item | | Part Number | Notes |
|---|---|---|---|
| | 1 tier | LD9Z-6AC1 | A plain washer and spring washer are supplied. |
| | 2 tiers | LD9Z-6AC2 | |
| | 3 tiers | LD9Z-6AC3 | |
| | 4 tiers | LD9Z-6AC4 | |
| | 5 tiers | LD9Z-6AC5 | |

## Ordering Examples

[Ex. 1] When ordering LD6A-3PQW-RYG as sub-component parts, specify the following:

Pole mount (with base), steady, light gray housing, 3 tiers, color lens LED modules with Red, Yellow, and Green LED

| | | |
|---|---|---|
| Base module (pole mount with base, steady, light gray housing) | LD6A-0PQW | 1 piece |
| LED module (red LED with color lens, light gray housing) | LD9Z-6ALW-R | 1 piece |
| LED module (yellow LED with color lens, light gray housing) | LD9Z-6ALW-Y | 1 piece |
| LED module (green LED with color lens, light gray housing) | LD9Z-6ALW-G | 1 piece |
| Center screw set (3 tiers) | LD9Z-6AC3 | 1 piece |

[Ex. 2] When ordering LD6A-5WZQB-RYSGWC as sub-component parts, specify the following:

Wall mount, steady/flashing/alarm, black housing, 5 tiers, clear lens LED modules with Red, Yellow, Blue, Green, and Pure white LED

| | | |
|---|---|---|
| Base module (wall mount, steady/flashing/alarm, black housing) | LD6A-0WZQB | 1 piece |
| LED module (red LED with clear lens, black housing) | LD9Z-6ALB-RC | 1 piece |
| LED module (yellow LED with clear lens, black housing) | LD9Z-6ALB-YC | 1 piece |
| LED module (blue LED with clear lens, black housing) | LD9Z-6ALB-SC | 1 piece |
| LED module (green LED with clear lens, black housing) | LD9Z-6ALB-GC | 1 piece |
| LED module (pure white LED with clear lens, black housing) | LD9Z-6ALB-W | 1 piece |
| Center screw set (5 tiers) | LD9Z-6AC5 | 1 piece |

## Replacement Parts

| Item | Description | | Part Number | Notes |
|---|---|---|---|---|
| | Top Cap | Black | LD9Z-6ATB | A top cap is supplied with a base module. |
| | | Light gray | LD9Z-6ATW | |
| | L-shaped Bracket | Metal (chrome-plated) | LD9Z-6AK | Two plain washers and two nuts are supplied. |

# Specifications

## Specifications

| | | | |
|---|---|---|---|
| Safety Standards | IEC60947-5-1, EN60947-5-1, UL508, CSA C22.2 No.14 | | |
| Operating Temperature | –25 to +55°C (no freezing) | | |
| Operating Humidity | 45 to 85% RH (no condensation) | | |
| Storage Temperature | –40 to +75°C (no freezing) | | |
| Overvoltage Category | III (IEC60664-1) | | |
| Impulse Withstand Voltage | 800V (IEC60947-1) | | |
| Insulation Resistance | 100 MΩ minimum (500V DC megger) | | |
| Dielectric Strength | Between live and dead parts: 1000V AC, 1 minute | | |
| Pollution Degree | 3 | | |
| Corrosion Immunity | Atmosphere free from corrosive gases | | |
| Vibration Resistance | Operating extremes: 10 to 55Hz, amplitude 0.5 mm | | |
| Shock Resistance | Operating extremes: 147 m/s², 6 shocks each in 6 axes | | |
| Degree of Protection (IEC60529) | Steady | frame mount, wall mount, direct mount, pole mount with base | IP65 |
| | Steady | pole mount with L-shaped bracket | IP23 |
| | Flashing/ Alarm | frame mount, wall mount, direct mount, pole mount with base | IP54 |
| | Flashing/ Alarm | pole mount with L-shaped bracket | IP23 |
| Housing Color | Black, Light gray | | |
| Material | Housing: ABS resin<br>Lens: AS resin<br>Pole: Steel (nickel-chrome plated)<br>Pole base: Diecast aluminum | | |
| Wire | 22AWG | | |

## Functional Specifications

| | | | | |
|---|---|---|---|---|
| Rated Insulation Voltage | | 60V | | |
| Operating Voltage | | 24V AC/DC ±10% | | |
| Rated Voltage (Ue) | | 24V AC/DC | | |
| LED Color Code | | R (red), Y (yellow), S (blue), G (green), W (white) | | |
| LED | Illumination Color | R, Y | S, G | W |
| | Rated Current (per tier) | 25mA | 30mA | 20mA |
| | Power Consumption (per tier) | 0.6W | 0.75W | 0.5W |
| LED Life (Note) | | Approx. 30,000 hours (until brightness is reduced to 50% of the initial value in a 25°C operating environment) | | |
| Flashing Cycle (IEC60073) | | Approx. 105 flashes per minute (1.75 Hz) | | |
| Alarm | Alarm Cycle | Alarm 1: approx. 700 times per minute<br>Alarm 2: approx. 35 times per minute | | |
| | Current Draw | 110mA max. | | |
| | Inrush Current | AC: 400mA max. DC: 250mA max. | | |
| | Alarm Volume | 70 to 90dB, at 1m (volume adjustable) | | |
| | Acoustic Frequency | Approx. 3.3kHz | | |

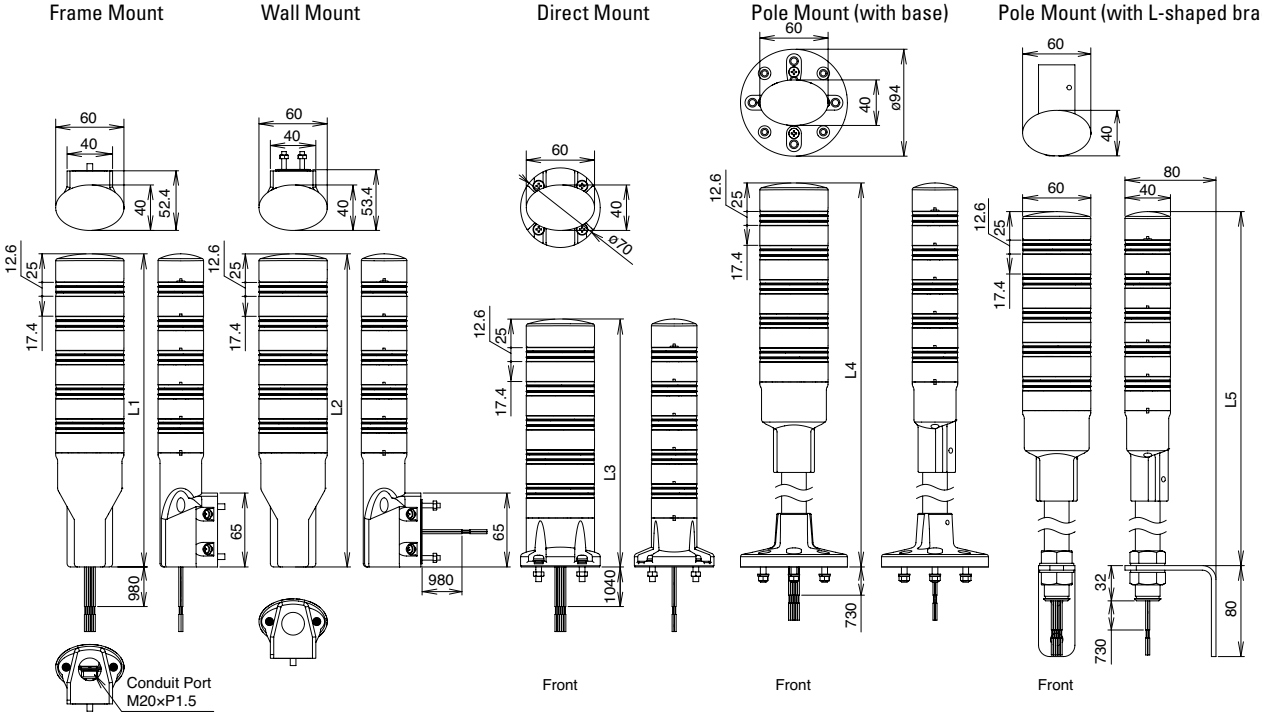
Note: Life of the LED varies according to operating conditions and environment.

## External Contact Ratings

| | | | |
|---|---|---|---|
| LED | AC Contact Capacity (per tier) | Current Capacity | 100mA min. |
| | | Dielectric Strength | 35V AC min. |
| | DC Contact Capacity, Transistor Capacity (per tier) | Current Capacity | 100mA min. |
| | | Dielectric Strength | 35V min. |
| | | Leakage Current | 0.1mA max. |
| Alarm | AC Contact Capacity (per alarm) | Current Capacity | 400mA min. |
| | | Dielectric Strength | 35V AC min. |
| | DC Contact Capacity, Transistor Capacity (per alarm) | Current Capacity | 300mA min. |
| | | Dielectric Strength | 35V min. |
| | | Leakage Current | 0.1mA max. |

## Dimensions (Steady Light)

Frame Mount | Wall Mount | Direct Mount | Pole Mount (with base) | Pole Mount (with L-shaped bracket)

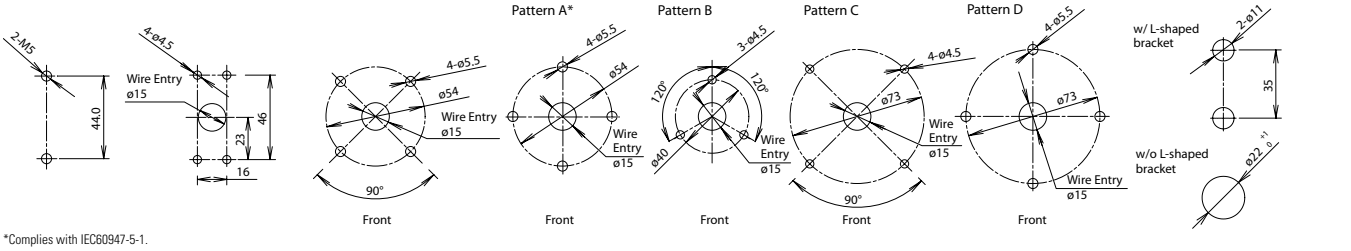



## Dimension Table

| Tiers | Frame Mount (L1) | Wall Mount (L2) | Direct Mount (L3) | Pole Mount | |
|---|---|---|---|---|---|
| | | | | w/ base (L4) | w/ L-shaped bracket (L5) |
| 1 | 156 | 156 | 98 | 408 | 372 |
| 2 | 186 | 186 | 128 | 438 | 402 |
| 3 | 216 | 216 | 158 | 468 | 432 |
| 4 | 246 | 246 | 188 | 498 | 462 |
| 5 | 276 | 276 | 218 | 528 | 492 |

## Panel Cut-Out

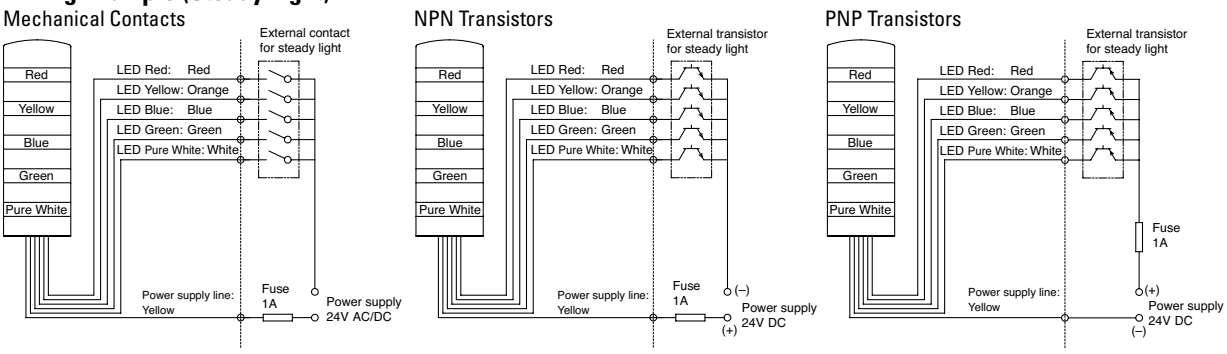
Frame Mount | Wall Mount | Direct Mount* | Pole Mount (with base) | Pole Mount (with L-shaped bracket)




*Complies with IEC60947-5-1.

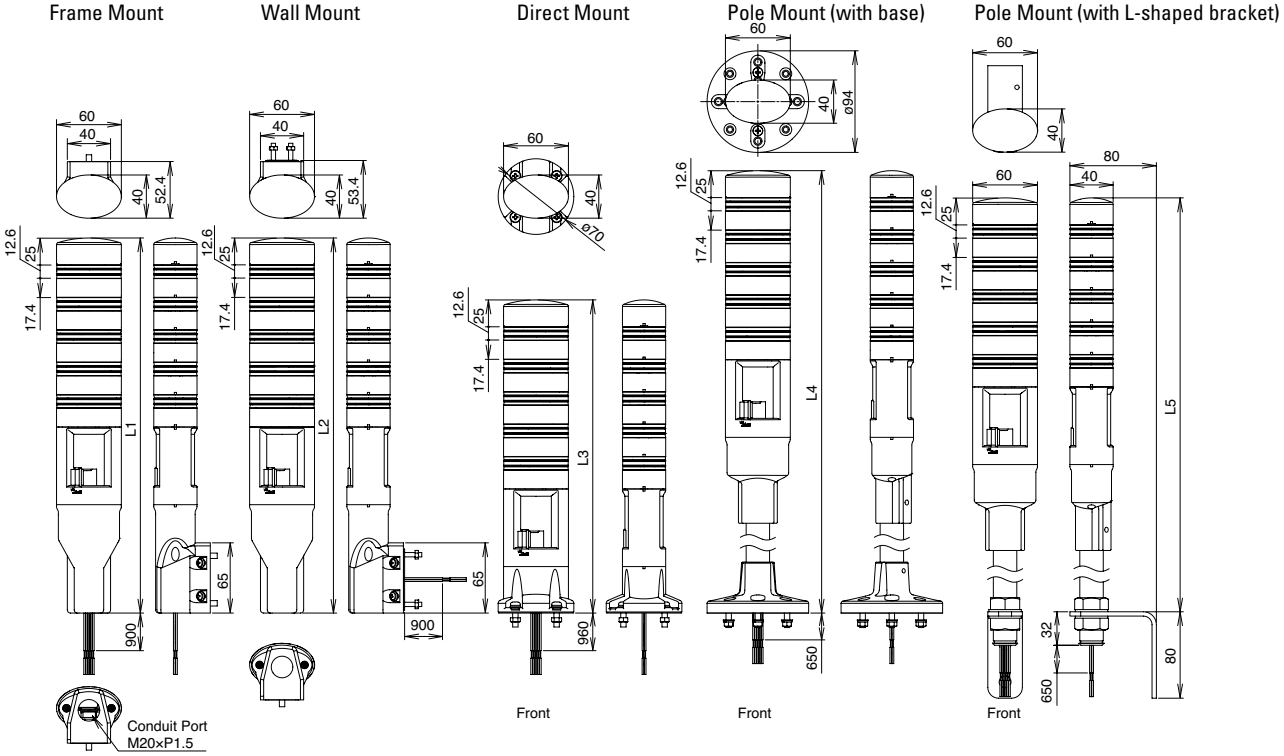
## Wiring Example (Steady Light)

Mechanical Contacts | NPN Transistors | PNP Transistors



## Dimensions (Steady/Flashing/Alarm)

Frame Mount | Wall Mount | Direct Mount | Pole Mount (with base) | Pole Mount (with L-shaped bracket)

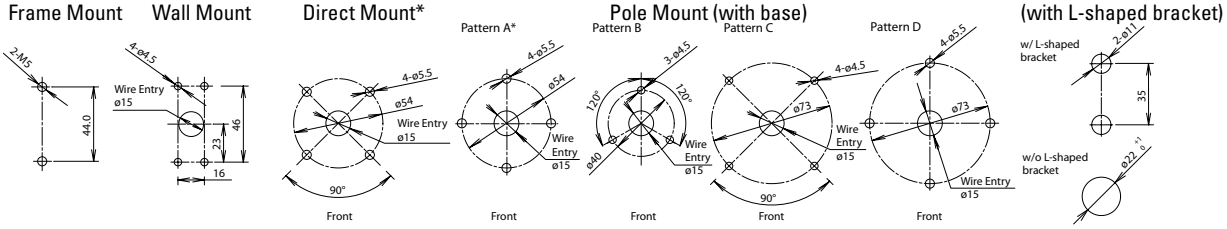



## Dimension Table

| Tiers | Frame Mount (L1) | Wall Mount (L2) | Direct Mount (L3) | Pole Mount | |
|---|---|---|---|---|---|
| | | | | w/ base (L4) | w/ L-shaped bracket (L5) |
| 1 | 228 | 228 | 170 | 480 | 444 |
| 2 | 258 | 258 | 200 | 510 | 474 |
| 3 | 288 | 288 | 230 | 540 | 504 |
| 4 | 318 | 318 | 260 | 570 | 534 |
| 5 | 348 | 348 | 290 | 600 | 564 |

## Panel Cut-Out

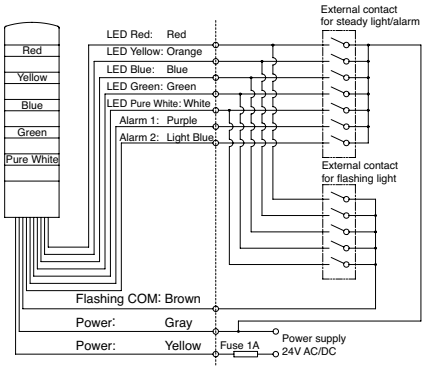
Frame Mount | Wall Mount | Direct Mount* | Pole Mount (with base) | Pole Mount (with L-shaped bracket)



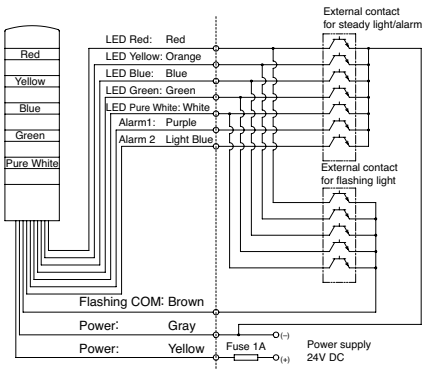

*Complies with IEC60947-5-1.

## Wiring Example (Flashing Light and Alarm)

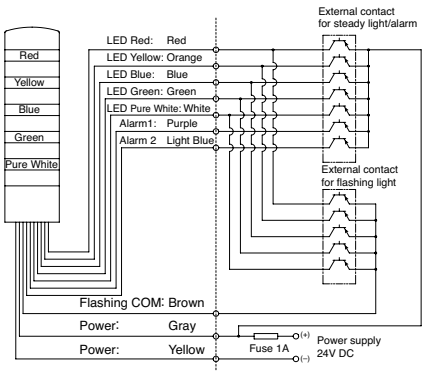
Mechanical Contacts




NPN Transistors

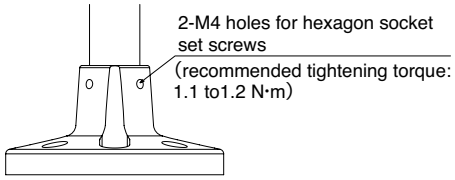



PNP Transistors




## Safety Precautions

- Turn off the power to the LD6A before mounting, removing, wiring or assembling the LED module. Make sure the wiring is done correctly otherwise electrical shock or fire may result.
- Mount the LD6A on a solid surface not subject to vibrations.
- Do not mount the LD6A upside-down or horizontally.
- Do not leave the LD6A without a cap or unassembled.
- Install the supplied gasket, otherwise the waterproof seal will be compromised.
- Do not apply any chemicals that may corrode the plastic materials.
- If the LD6A is subjected to strong vibrations, the hexagon socket screw may become loose. Take measures to prevent loosening. (See the figure below.)




- Do not loosen any screws if the tightening torque is not specified.

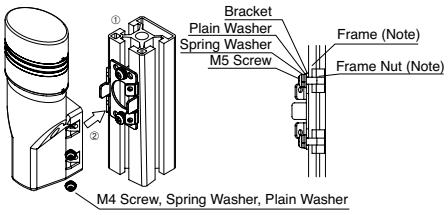
# Instructions

## Mounting

- See drawing below regarding the mounting of the LD6A.
- For panel cut-out dimensions, see pages 9 and 10.
- Postion the LD6A to make sure the alarm sound is the loudest. (Steady/flashing/alarm type)

## Frame Mounting

1. Insert two nuts in the frame, and attach the bracket using two M5 screws. Recommended tightening torque: 2.6 to 2.7 N·m
2. Mount the LD6A to the bracket using four M4 screws. Recommended tightening torque: 1.6 to 1.7 N·m




Note: See table below for typical examples of frames and nuts. Consult the manufacturer of the frame for the installation method of the frame nut.

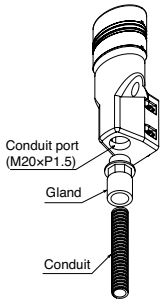
## Examples of recommended frames and frame nuts

| Frame Size | Frame | Frame Nut | Manufacturer |
|---|---|---|---|
| ☐30 mm* | SFF-302 | SFB-001<br>SFB-4B5<br>SFB-101 | SUS Corporation (Japan) |
| ☐40 mm | SFF-402 | SFB-008<br>SFB-4A5<br>SFB-108 | |

*The mounting bracket for the housing is 40 mm.

When using a frame mount type, be sure to use flexible conduit, otherwise the waterproof seal will be compromised.

Refer to the "Example of Flexible Conduit" shown on the right.

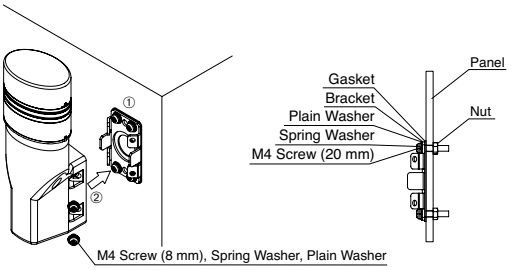



## Example of Flexible Conduit

| | |
|---|---|
| Conduit Port Size | M20 |
| Gland | AL16/M20/A/BL |
| Conduit | PAFS16BL |
| Manufacturer | Adaptaflex |

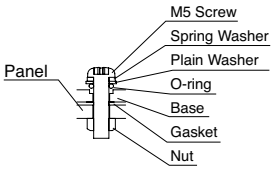
## Wall Mounting

1. Make four tapped holes in the mounting panel and mount the bracket and gasket using four screws (M4 x 20).
   Recommended tightening torque: 1.6 to 1.7 N·m
2. Mount the LD6A to the bracket using four screws (M4 x 8).
   Recommended tightening torque: 1.6 to 1.7 N·m




## Direct Mounting

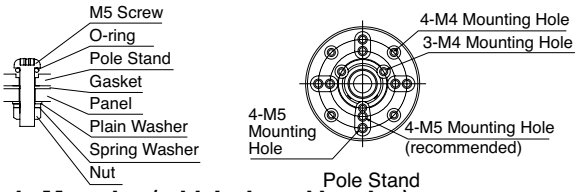
Recommended tightening torque: 2.6 to 2.7 N·m




## Pole Mounting (with base)

The pole mount type can be installed in four ways. The recommended mounting method (pattern A from page 9 or 10) is described below.

Recommended tightening torque: 2.6 to 2.7 N·m (M5 screw)

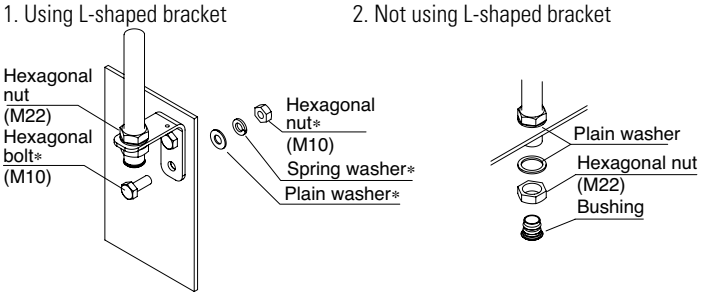



## Pole Mounting (with L-shaped bracket)

**1. Using L-shaped bracket**
Recommended tightening torque: 10 to 11 N·m (M10)
Recommended tightening torque: 25 to 26 N·m (M22)

**2. Not using L-shaped bracket**
Remove the bushing, hexagonal nut (M22), plain washer, and L-shaped bracket from the LD6A and install in the following order: plain washer, hexagonal nut (M22), and bushing.
Recommended tightening torque: 25 to 26 N·m (M22)

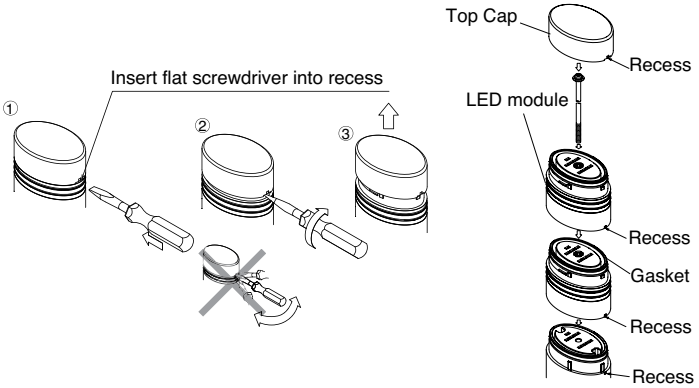
1. Using L-shaped bracket 2. Not using L-shaped bracket




The parts marked with * are not supplied and should be provided by the user.

## Replacement and Addition of LED Modules

- Make sure to turn power off.
- Insert a flat screwdriver into the cap recess as shown below, lift up the cap, and remove with your hands. Use a flat screwdriver with maximum 1-mm thick and 7-mm wide tip.
- Remove the center screw before reassembling the LED modules.
- When assembling the LED modules, make sure to align the recess of the cap with the recess of the LED module. Otherwise, damage may result.
  Recommended tightening torque: 0.4 to 0.5 N·m.




- Note the correct orientation when assembling the LED modules.
- Tighten the screws to the recommended tightening torque. The LED module may be damaged if the screw is loose during operation.
- Do not touch the metal plug on the LED module. Otherwise, LED elements maybe damaged due to static electricity.
- Use a maximum of 5 tiers.
- Select the correct screw length depending on the number of tiers.
- Do not remove the gasket from the LED module. Otherwise, the waterproof seal will be compromised.

## Wiring

- For wiring, see the wiring diagrams on pages 782 and 784.
- Incorrect wiring may damage the internal circuit.
- Be sure to insulate unused wires.
- Connect a 1A fuse to the power line as shown in the Wiring Examples on pages 782 and 784.
- Use a UL listed external fuse holder.
- Use a class 2 power supply only.
- When using LED modules of the same color for two or more tiers, determine contact capacity in referencet to the LED current, because only one wire is used to light all tiers of the same color.
- Do not apply voltage to flashing (brown) lines.
- Do not connect flashing (brown) line to the power lines. The internal circuit may be damaged.
- Do not turn on steady and flashing circuits simultaneously.
- Do not turn on alarms 1 and 2 simultaneously.

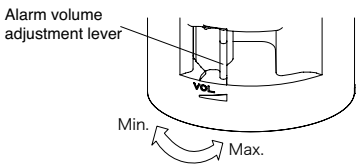
## Wire Color

| Wire Color | Steady | Steady, Flashing, Alarm |
|---|---|---|
| Red | LED Module – Red | LED Module – Red |
| Orange | LED Module – Yellow | LED Module – Yellow |
| Blue | LED Module – Blue | LED Module – Blue |
| Green | LED Module – Green | LED Module – Green |
| White | LED Module – White | LED Module – White |
| Purple | — | Alarm 1 |
| Light Blue | — | Alarm 2 |
| Brown | — | Flashing COM |
| Gray | — | Power Line |
| Yellow | Power Line | Power Line |

For information on external contacts, see "External Contact Ratings" on page 781.

## Alarm Volume Adjustment

- Move the volume adjustment to the right or left to change the volume.
- When the adjustment lever is all the way to the right the volume is at its maximum.
- The adjustment lever may be damaged if forced open or closed.




## High Temperature Limitations

The external temperature cannot exceed 50°C when all tiers are lit at the same time in the following combinations:

1. Three tiers
   Two or more tiers of blue and green (example: Red-Green-Blue, Green-Green-Red)
2. Four or five tiers (example: Red-Yellow-Green-White, Red-Yellow-Blue-Green-White)

# LT7 Series Light Towers

## Easily build or modify the combination that works for you!

The LT7 light tower combines innovative LED technology with modular style assembly. This enables the towers to meet the extensive requirements seen in most status indicating applications. The simple design uses only 9 modular components to make a five color tower complete with alarm and flashing functions.

Using the latest and brightest LEDs, the LT7 product range provides brilliant illumination for all the lens colors. The unique prism cut design enhances the brightness and ensures outstanding levels of visibility from any direction and distance.

Key features of the LT7 series light towers include:

- 70mm diameter
- Ultra bright LEDs
- LED strobe modules
- Unique interlocking construction
- Fast and easy assembly
- Optional adjustable alarm
- Lead-free design, RoHS compliant
- IP65 environment protection, NEMA 4, 4X, 13
- Color-coded wiring terminals
- Only nine modular components with 5 lens colors & 4 base units
- UL/c-UL Listed, CE marked

File #E245027

## Part Numbers

### Part Numbers: Base Units

| Voltage | Steady | Flashing/Buzzer |
|---|---|---|
| 24V DC | LT7B-D24 | LT7B-D24FB |
| | LT7B-D24SB* | |
| 90-250V AC | LT7B-A250 | LT7B-A250FB |

1. Base unit comes with top cap.
2. *Short body, black base type.

### Part Numbers: Lens/LED Units

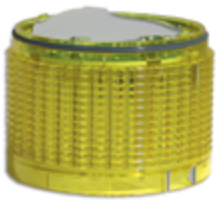
| Color | Part Number |
|---|---|
| Red | LT7A-R |
| Amber Yellow | LT7A-Y |
| Green | LT7A-G |
| Blue | LT7A-S |
| White | LT7A-C |
| Lemon Yellow | LT7A-LY* |

*Maximum 5 LED color variations per base. Lemon yellow LED module and amber yellow LED module share same signal and both will light if stacked together.

### Part Numbers: LED-Strobe Units

| Color | Part Number |
|---|---|
| Red | LT7A-XE-R |
| Amber Yellow | LT7A-XE-Y |
| Green | LT7A-XE-G |
| Blue | LT7A-XE-S |
| White | LT7A-XE-C |

(for 24V DC base only)



Lemon Yellow LED module

Short body type

## LT7 Specifications

| Base Units | | | LT7B-D24<br>LT7B-D24SB | LT7B-D24FB | | LT7B-A250 | LT7B-A250FB | |
|---|---|---|---|---|---|---|---|---|
| Specifications | Operation/Function | | Steady | Flashing/Steady | | Steady | Flashing/Steady | |
| | Rated Voltage | | 24V DC | | | 90~250V AC (50/60Hz) | | |
| | Operating Voltage | | 24V ±10% (21.6~26.4V) | | | 90~250V AC (50/60Hz) | | |
| | Alarm | | – | Alarm 1* | Alarm 2** | – | Alarm 1* | Alarm 2** |
| | Current Consumption | | – | 50mA±10mA | 24mA±10mA | – | 50mA±10mA | 24mA±10mA |
| | Power Consumption | | – | 1.2W±0.25W | 0.58W±0.25W | – | 1.8W±0.25W | 1.3W±0.25W |
| | Alarm Sound Level | Max | – | 90dB±5 (at 1m) | | – | 90dB±5 (at 1m) | |
| | | Min | – | 70dB or less (at 1m) | | – | 70dB or less (at 1m) | |
| | Flashing Cycle | | – | 60 flashes per minute | | – | 60 flashes per minute | |
| | Operating Temperature Range | | -30°C~+60°C | | | -25°C~+55°C | | |
| | Mounting | | Upright, indoor only | | | Upright, indoor only | | |
| | Protection | | IP65, Type 4, 4X, 13 | | | IP65, Type 4, 4X, 13 | | |
| | Weight | | 250g | 280g | | 310g | 340g | |
| | Open Collector | | PNP/NPN | | | NPN | | |

*Alarm 1: continuous sound
*Alarm 2: intermittent sound

**Ultra-bright LEDs**

**Color Coded Wiring Terminals**

| Lens/LED and LED-Strobe Units* | | LT7A-R | LT7A-Y | LT7A-G | LT7A-S | LT7A-C | LT7A-LY | LT7A-XE-R | LT7A-XE-Y | LT7A-XE-G | LT7A-XE-S | LT7A-XE-C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Specifications | LED Unit Type | Steady/Flashing | | | | | | Strobe | | | | |
| | LED Unit Color | Red | Amber Yellow | Green | Blue | White | Lemon Yellow | Red | Amber Yellow | Green | Blue | White |
| | Current/Power | 52mA/1.25W | | 42mA/1.0W | | | | 280mA/6.96W | | 130mA/3.36W | 260mA/6.48W | 270mA/6.72W |
| | Operating Temperature Range | -30°C~+60°C | | | | | | -10°C~+60°C | | | | |
| | Weight | 60g | | | | | | 70g | | | | |

*Operate with all voltage base units listed on previous page.
1. Strobe units pulse 77 times per minute
2. Strobe units suitable only for BASE unit [LT7B-D24(FB)]. Units do NOT work with BASE unit [LT7B-A250(FB)].
3. Strobe units should be operated in 'Continuous light' mode. If it is operated in flashing mode, it will NOT operate correctly.
4. Do not substitute parts of units from other products.
5. This product can be used only indoors. Do not use outdoors.
6. Do not use without LED unit or top cover installed.

## Accessories & Replacement Parts

LT9Z-7T

mounting pole with base mount

LT9Z-7L

mounting pole with L-angle bracket

LT9Z-SZ007

90 degree angle mounting bracket

LT9Z-SZ020*

wall mounting bracket (pole required)

LT9Z-SZ018

wall mounting bracket (direct mount)

LT9Z-SZ50NPT

1/2" NPT aluminum mounting adapter



LT9Z-HCLT7

replacement top cap (1 piece)

LT9Z-M4NUTSLT7

Replacement M4 mounting nuts (1 piece)

LT9Z-ORINGLT7

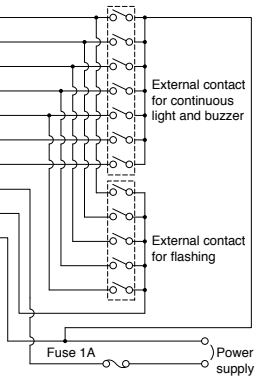
Replacement O-ring gasket (1 piece)

Must use LT9Z-7L pole mount with LT9Z-SZ020 wall mount bracket.

## Wiring Examples

### LT7B-D24FB

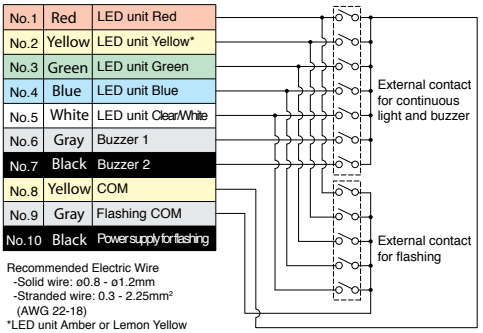
| | | |
|---|---|---|
| No.1 | Red | LED unit Red |
| No.2 | Yellow | LED unit Yellow* |
| No.3 | Green | LED unit Green |
| No.4 | Blue | LED unit Blue |
| No.5 | White | LED unit Clear/White |
| No.6 | Gray | Buzzer 1 |
| No.7 | Black | Buzzer 2 |
| No.8 | Yellow | COM |
| No.9 | Gray | Flashing COM |
| No.10 | Black | Power supply for flashing |




Recommended Electric Wire
-Solid wire: ø0.8 - ø1.2mm
-Stranded wire: 0.3 - 2.25mm²
(AWG 22-18)
*LED unit Amber or Lemon Yellow

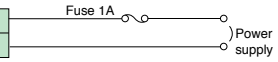
### LT7B-A250FB

| | | |
|---|---|---|
| No.1 | Red | LED unit Red |
| No.2 | Yellow | LED unit Yellow* |
| No.3 | Green | LED unit Green |
| No.4 | Blue | LED unit Blue |
| No.5 | White | LED unit Clear/White |
| No.6 | Gray | Buzzer 1 |
| No.7 | Black | Buzzer 2 |
| No.8 | Yellow | COM |
| No.9 | Gray | Flashing COM |
| No.10 | Black | Power supply for flashing |



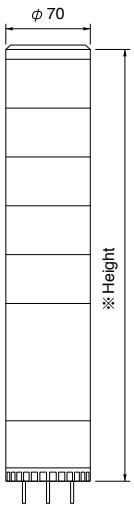

Recommended Electric Wire
-Solid wire: ø0.8 - ø1.2mm
-Stranded wire: 0.3 - 2.25mm²
(AWG 22-18)
*LED unit Amber or Lemon Yellow

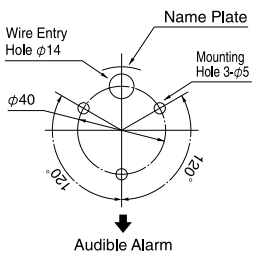
| | |
|---|---|
| P1 | AC in (L) |
| P2 | AC in (N) |




## LT7 Dimensions

### LT7 Base Unit







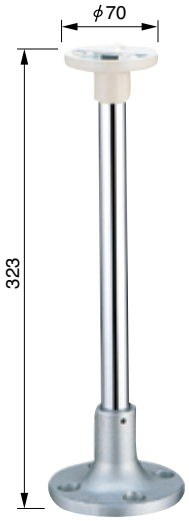
Height (mm)

| # of Lights | Base Type | |
|---|---|---|
| | Standard | Short Body |
| 1 | 211 | 119 |
| 2 | 252 | 160 |
| 3 | 293 | 201 |
| 4 | 334 | 242 |
| 5 | 375 | 283 |

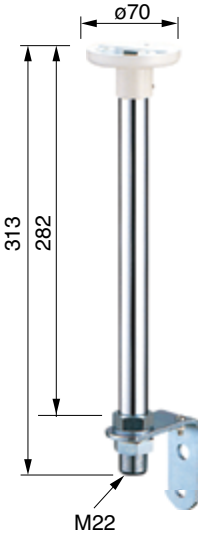
## LT7 Dimensions con't

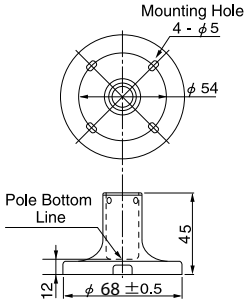
### LT7 Mounting Brackets

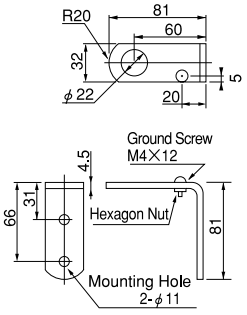
LT9Z-7T



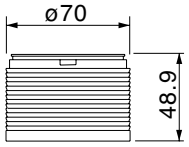

LT9Z-7L



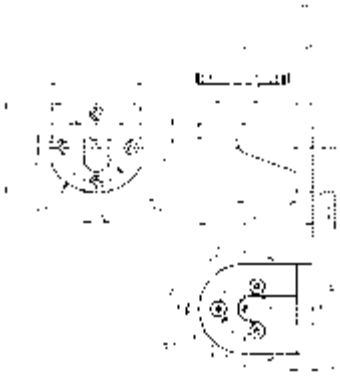



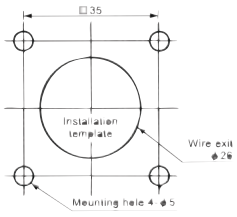

### LT7 LED Unit

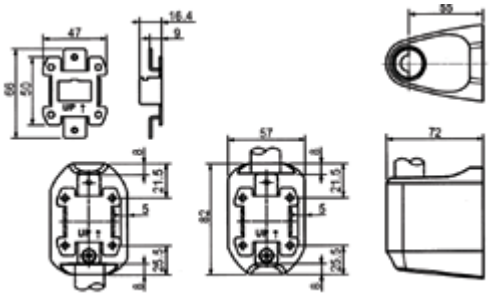



LT9Z-SZ018

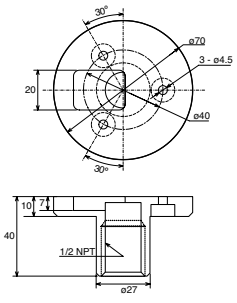


LT9Z-SZ020

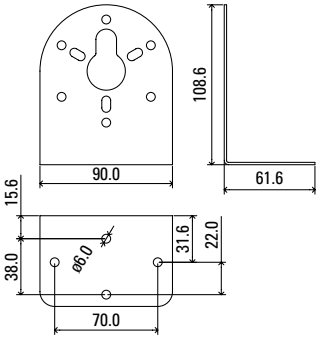



LT9Z-SZ50NPT




LT9Z-SZ007



# LH Series Surface Mount Indicators

**Innovative indicators in a slim & stylish design.**
**Reduces installation space.**

Key features of the LH series include:

- Direct mounting on surfaces such as panels, aluminum frames, and walls.
- Surface mount style does not affect the placement of other components. Requires only a small space behind the mounting surface for screws and nuts.
- Slim design well suited for installation in small spaces.
- Direct cable wiring style ensures waterproof characteristics. 1m, 3m, and 5m cables available.
- IP67, Type 4X
- Excellent visibility from the front and from the side.
- Legends and symbols can be printed on marking film to customize flat type.
- Red/Green two-color alternate illumination available.
- Three-color alternate illumination available with jumbo-dome models.
- Jumbo dome models available with connector.

## Part Numbers

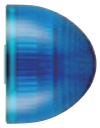
| Style | Cable | Part No. |
|---|---|---|
| Dome ø37 One Color | 1m | LH1D-D2HQ4C10-① |
| | 3m | LH1D-D2HQ4C30-① |
| | 5m | LH1D-D2HQ4C50-① |
| Dome ø37 Red/Green 2-color Alternate | 1m | LH1D-D2HQ4C10-RG |
| | 3m | LH1D-D2HQ4C30-RG |
| | 5m | LH1D-D2HQ4C50-RG |
| Flat One Color Full | 1m | LH1D-H2HQ4C10-① |
| | 3m | LH1D-H2HQ4C30-① |
| | 5m | LH1D-H2HQ4C50-① |
| Flat Red/Green 2-color Alternate | 1m | LH1D-H2HQ4C10-RG |
| | 3m | LH1D-H2HQ4C30-RG |
| | 5m | LH1D-H2HQ4C50-RG |

| Style | Connections | | Part No. |
|---|---|---|---|
| Jumbo Dome (one color) | Cable | 1m | LH1D-D3HQ4C10-② |
| | | 3m | LH1D-D3HQ4C30-② |
| | | 5m | LH1D-D3HQ4C50-② |
| | Connector | | LH1D-D3HQ4CN1-② |
| Jumbo Dome (two color) | Cable | 1m | LH1D-D3HQ4C10-③ |
| | | 3m | LH1D-D3HQ4C30-③ |
| | | 5m | LH1D-D3HQ4C50-③ |
| | Connector | | LH1D-D3HQ4CN1-③ |
| Jumbo Dome (three color) | Cable | 1m | LH1D-D3HQ4C10-④ |
| | | 3m | LH1D-D3HQ4C30-④ |
| | | 5m | LH1D-D3HQ4C50-④ |
| | Connector | | LH1D-D3HQ4CN1-④ |

1. Specify a color code in place of ① in the Part No.: **A**: amber, **G**: green, **PW**: cool white, **R**: red, **S**: blue, **W**: warm white, **Y**: yellow
2. Specify a color code in place of ② in the Part No.: **A**: amber, **G**: green, **R**: red, **S**: blue, **W**: warm white, **Y**: yellow
3. Specify a color code in place of ③ in the Part No.: **AG**: amber/green, **AW**: amber/warm white, **APW**: amber/cool white, **RG**: red/green, **RW**: red/warm white, **RPW**: red/cool white, **GW**: green/warm white, **GPW**: green/cool white
4. Specify a color code in place of ④ in the Part No.: **RGW**: red/green/warm white, **RGPW**: red/green/cool white
5. **RG**: R (red) / G (green) 2-color alternate illumination

Note: Dual- and tri-color units use a white lens.

## Replacement Parts

| Style | Material | Part Number | ② Lens Color |
|---|---|---|---|
| Lens (flat) | Polyarylate | LH9Z-1DLH2-① | For flat lens.<br>Specify a color code in place of ① in the Part No.<br>A: amber<br>G: green<br>C: clear<br>R: red<br>S: blue<br>Y: yellow<br>Note: Use C (clear) lens for R/G (red/green alternate), W (warm white), or PW (cool white) illumination. |
| Lens (jumbo dome)  | Polycarbonate | HW1A-P5② | For jumbo dome lens.<br>Specify a color code in place of ② in the Part No.<br>A: amber<br>G: green<br>R: red<br>S: blue<br>W: white<br>Y: yellow<br>Note: Dual- and tri-color units use a white lens. |

## LH Specifications

| | |
|---|---|
| Applicable Standards | IEC 60947-1, IEC 60947-5-1,<br>EN 60598-2-1, EN 60947-5-1<br>UL508, CSA C22.2 No.14 |
| Operating Temperature | –20 to +55°C (no freezing) |
| Operating Humidity | 45 to 85% RH (no condensation) |
| Storage Temperature | –30 to +80°C (no freezing) |
| Impulse Withstand Voltage (illuminating part) | 800V |
| Insulation Resistance | Between live and dead parts:<br>100 MΩ minimum |
| Dielectric Strength | Between live and dead parts:<br>2000V, 50/60Hz , 1 minute |
| Pollution Degree | 3 |
| Vibration Resistance | 60m/s$^2$, 5 to 55 Hz, amplitude 0.5 mm |
| Shock Resistance | 1000m/s$^2$ |
| Cable Tensile Strength | 90N minimum |
| Degree of Protection | IP67, Type 4X |
| Housing Color | Black |
| Cable | 24 AWG<br>2-core (one-color)<br>3-core (2-color alternate)<br>4-core (3-color alternate) |
| Cable Outside Diameter | ø4.1mm |
| Allowable Cable Bending Radius | 24.6mm minimum |
| Weight (1m cable) | 50g (dome type, flat type)<br>140g (jumbo dome type) |

### Standards

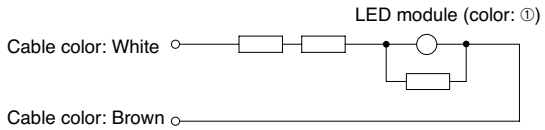
| Standards | Marks | File No. or Organization |
|---|---|---|
| EN 60598-2-1 | TÜV | TÜV SÜD |
| EN 60598-2-1<br>EN 60947-5-1 | CE | EC Low Voltage Directive |
| UL508 | c UL us | UL, cUL |

LH series surface mount indicators are approved by TÜV as class III lighting fixtures.

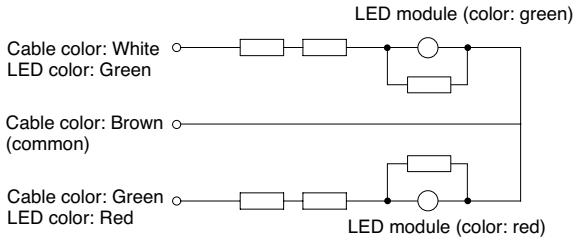
### Specifications

| | |
|---|---|
| Rated Insulation Voltage (Ui) | 32V |
| Rated Voltage | 24V AC/DC |
| Operating Voltage Range | 24V AC/DC ±10% |
| Rated Current | 17 mA |
| Maximum Power/Current | 0.6W (25 mA) |
| Illumination Color | A (amber), G (green), PW (cool white),<br>R (red), S (blue), W (warm white), Y (yellow)<br>R (red) /G (green) alternate |
| LED Lamp Life | Approx. 50,000 hours<br>(When used on complete DC at 25°C, brightness reduces to 50% of the initial intensity.) |

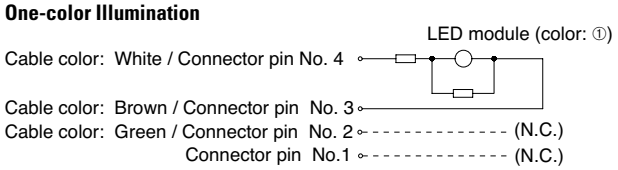
**Internal Circuit**
**One-color Illumination (Dome)**



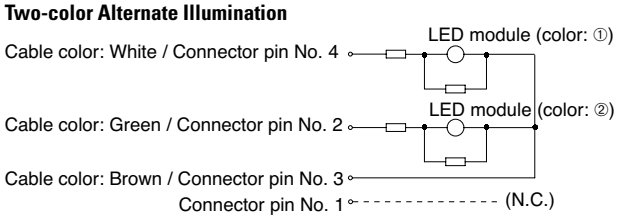

**Two-color**
**(Dome)**



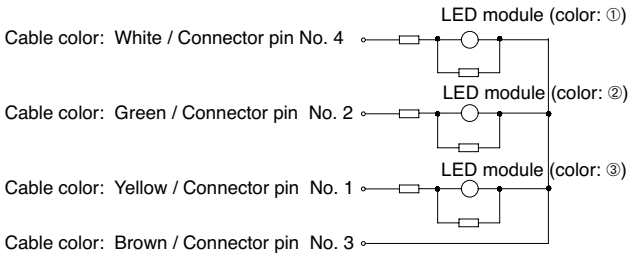

**Internal Circuit**
**One-color Illumination**




**Two-color Alternate Illumination**

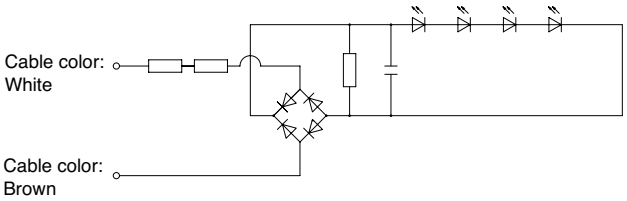



**Three-color Alternate Illumination**

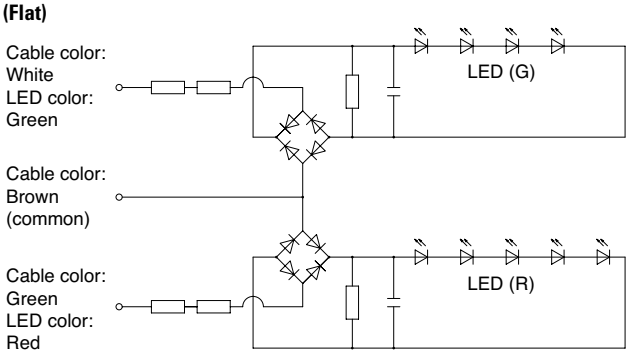



Note: For the schematic of the LED module, see "LED Module Internal Circuit" on the right.
N.C. means No connection

**One-color Illumination (Flat)**

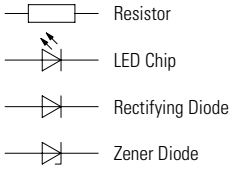



**(Flat)**




## Lens Colors

| | Illumination Type | Illumination Color | White Lens Color |
|---|---|---|---|
| Dome/Flat | One Color | Amber | Amber |
| | | Blue | Blue |
| | | Green | Green |
| | | Cool White | Clear (Note) |
| | | Red | Red |
| | | Warm White | Clear (Note) |
| | | Yellow | Yellow |
| | Two-color Alternate | Red/Green | Clear (Note) |
| Jumbo Dome | One Color | Amber | Amber |
| | | Green | Green |
| | | Red | Red |
| | | Blue | Blue |
| | | White | White |
| | | Yellow | Yellow |
| | Two-color Alternate | Red/Green | White |
| | | Green/White | White |
| | | Red/White | White |
| | | Amber/Green | White |
| | | Amber/White | White |
| | | Red/Pure White | White |
| | | Green/Pure White | White |
| | | Amber/Pure White | White |
| | Three-color Alternate | Red/Green/White | White |
| | | Red/Green/Pure White | White |

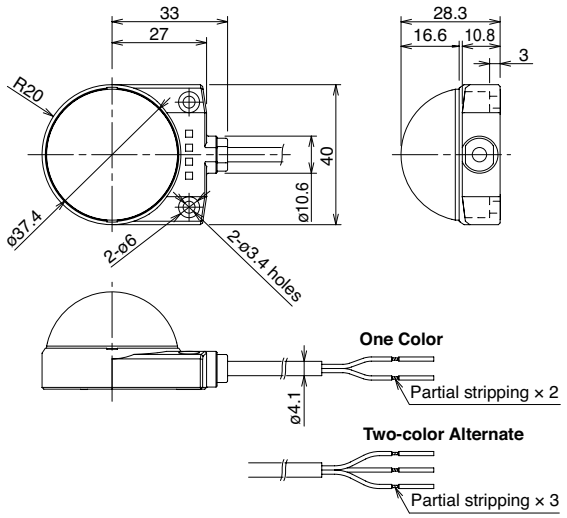



Note: Because lenses have a white diffusion cover inside, cool white, warm white, and red/green types look white when the light is off.

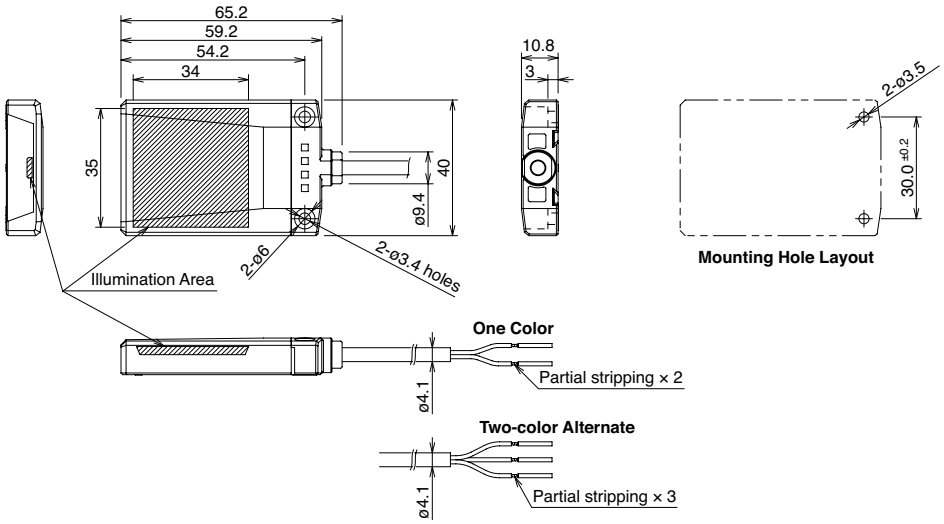
# Dimensions (mm)

Not to scale.

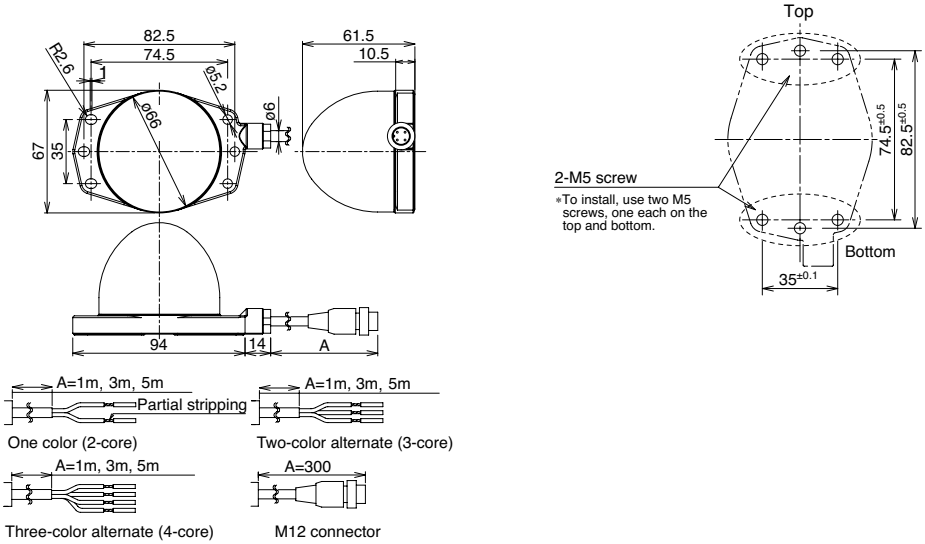
## Dome




## Flat



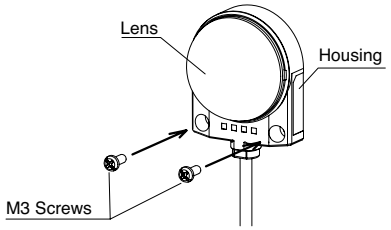

## Jumbo Dome



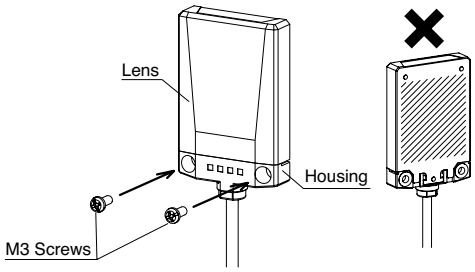
# Instructions

## Panel Mounting

Using two M3 screws, install the LH indicator to a mounting surface. Tighten the screws to a torque of 0.6 N·m maximum.
Mounting screws are not provided and must be supplied by the user.



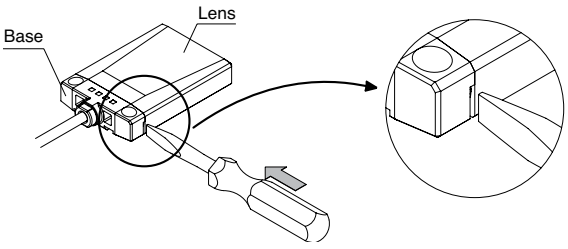

Note: The standard dome lens is not removable. Do not attempt to remove or damage may occur. However, the jumbo dome lens is removable and replaceable.



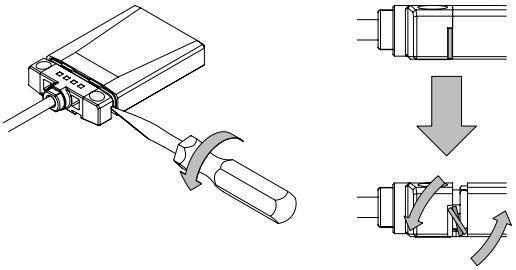

Note 1: Do not install the LH indicator by attaching the lens only, such as by taping down on the lens as the internal components may come loose.
Note 2: Make sure that the back of the indicator is securely attached to the mounting surface so that the lens cannot be easily removed.

## Inserting Marking Film into Flat Type Lens

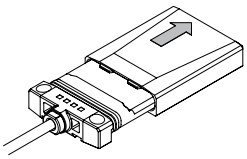
1. Insert a flat screwdriver into the groove between the base and lens.



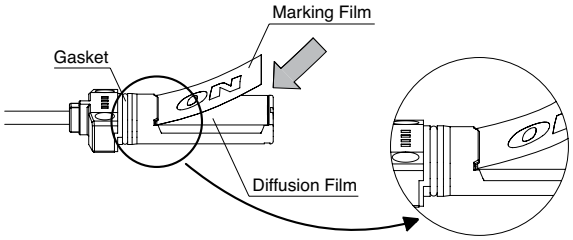

2. Twist the screwdriver and disengage the lens from the base.



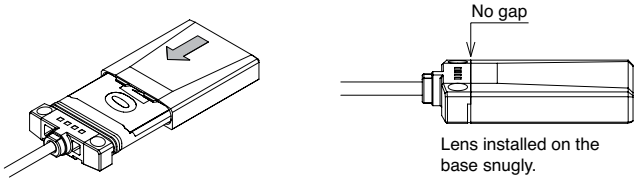
3. Remove the lens from the base.



4. Insert the edge of a marking film into the gap between the base and the diffusion plate, and place the marking film on top of the diffusion plate.




5. Replace the lens. Ensure that the lens is installed snugly.



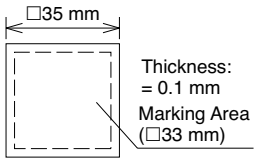

Note 1: Do not touch the gasket, as this may affect its waterproof characteristics.
Note 2: Do not touch the diffusion plate.

## Markings

Legends and symbols can be printed on marking film that can be used with the flat lens. One 0.1mm-thick film can be inserted.

Marking films are not inlcuded and must be supplied by the user.

Recommended marking film: Polyester



# Jumbo Dome Pilot Lights

| | | | Plastic Bezel |
|---|---|---|---|
| Jumbo Dome | LED | *Operator Only* | *HW1P-5Q0* |
| | | Full Voltage 24V AC/DC | HW1P-5Q4-② |
| | Incandescent | *Operator Only* | *HW1P-5Q7** |
| | | Full Voltage 24V AC/DC | HW1P-5Q7-② |

1. In place of ②, specify the Lens/LED Color Code.
2. *Incandescent operator comes with bulb.
3. Available with spring-up terminals and 24V only.
4. For nameplates and accessories, see page 546 and 549.
5. For dimensions, see page 551.

Actual Size

## ② Lens/LED Color Code

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | PW |
| Yellow | Y |

## Jumbo Dome Replacement Parts

| Item | Appearance | Description | Part Number |
|---|---|---|---|
| Lens | | Polycarbonate Lens | HW1A-P5② |
| LED Diffusing Lens* | | | HW9Z-PP5C |
| LED Lamps | | LED Lamp | LSTDB-2② |

1. In place of ②, specify the Lens/LED Color Code.
2. *Diffusing lens for LED models only.
3. Use white LED for yellow lens.

## Lamp Ratings

| | Part Number | Operating Voltage | Rated Current | Power Consumption |
|---|---|---|---|---|
| LED | LSTDB-2 | 24V AC/DC ±10% | 15mA | 0.36W |
| Incandescent | LSB-2 | | 150mA | 3.6W |

# SLC30 Series — Panel Mounted Annunciators

## SLC Series Panel Mounted Annunciators — an Ideal Alternative to Mounting Multiple Pilot Devices

**Cluster mounting simplifies panel cutouts and offers a variety of window combination sizes!**

Available with incandescent or Superbright LED illumination.

Key features of the SLC30 series include:

- Custom configurations with up to 200 windows
- Five window sizes based on a 30mm grid
- Non-reflective clear lenses
- Incandescent or Superbright LED illumination
- Wide variety of input voltages
- Two color alternate illumination in Red/Green LED

UL Recogized
File No. E68961

CSA Certified
File No.
LR48366

Cert No.
B970213332375

ABS
American Bureau of Shipping

**Style F (30mm x 30mm)**

**Style H (30mm x 60mm)**

**Style L (30mm x 90mm)**

**Style V (60mm x 30mm)**

**Style G (60mm x 60mm)**

**Staggered Terminals:** increased safety and serviceability

## Specifications

| Light Source | | LED | Incandescent |
|---|---|---|---|
| Nominal Voltages | Full Voltage | 6, 12, 24V AC/DC | 6, 12, 18, 24, 30V AC/DC |
| | Transformer | 120, 240V AC | 120, 240V AC |
| | DC-DC Conv. | 110V DC | 110V DC |
| Colors | | Amber, Green, Red, Yellow, Blue (24V only), White, dual color Red/Green (24V only) | Amber, Green, Red, Yellow, Blue, White |
| Lamp Type | | Surface (Chip type) LED cluster | BA9S/13 (T3-1/4) bayonet base (1W) |
| Current Consumption | 6V DC | Red (R), Green (G), Yellow (Y), Amber (A), White (W): 80mA | |
| | 12V DC | Red (R), Green (G), Yellow (Y), Amber (A), White (W): 40mA | |
| | 24V DC | Red (R), Green (G), Yellow (Y), Amber (A), White (W), Blue (S): 20mA | |
| Available Window Sizes | | "F" 30x30mm, "H" 30x60mm, "L" 30x90mm, "V" 60x30mm, "G" 60x60mm | |
| Insulation Resistance | | More than 100 MΩ by a 500V DC megger | |
| Degree of Protection | | IP20 (for indoor use only) | |
| Dielectric Strength | | 2,000V AC direct (2,500V AC transformer, 1 minute) | |
| Operating Temperature | | – 20˚ to +40˚C; 15–90% relative humidity (– 10˚ to +40˚C DC-DC converter) | |
| Material of Marking Plate and Color Screen | | Polycarbonate | |
| Termination | | M3.5 screw with captive sems plate<br>(Check terminals: M3 screw with captive sems plate on applicable units) | |
| Maximum Size | | Full voltage 10 rows, 20 columns (200 windows)<br>Transformer and DC/DC converter (50 windows) | |
| Recommended Wire Size | | 22-14 AWG x2 ($2mm^2$ x 2) | |
| Approvals | | TÜV Cert. No. B970213332375; UL Recognized File No. E68961; ABS American Bureau of Shipping; CSA Certified File No. LR48366 | |

## Part Numbers (assembled)

### Part Number Guide

**SLC30N** ① **01** Number of Rows ② **03** Number of Columns – ③ **DD** Type ④ **2** Voltage ⑤ **F** Style **B** – ⑥ **A(3)** Color and Number of Windows

| Description | | | Code | Remark |
|---|---|---|---|---|
| ①Number of Rows | | | 01, 02, 03, 04, 05, 06, 07, 08, 09, 10 | 10 row maximum (always expressed in terms of "F" size windows) |
| ② Number of Columns | | | 01, 02, 03, 04, 05, 06, 07, 08, 09, 10 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 | 20 column maximum (always expressed in terms of "F" size windows) |
| ③ Type | LED | Full voltage | DD | 6V, 12V, 24V |
| | | Full voltage with check terminal | DHM | 24V only |
| | | Full voltage 2 color (Red/Green) | DW | 24V only |
| | | Transformer | TD | 120V, 240V AC |
| | | DC-DC converter | CD | 110V DC only |
| | Incandescent | Full voltage | DS | 6V, 12V, 18V, 24V, 30V |
| | | Transformer | TS | 120V, 240V |
| ④ Voltage | 6V AC/DC | | 6 | Type DD or DS |
| | 12V AC/DC | | 1 | With Type DD or DS |
| | 18V AC/DC | | 8 | Type DS only |
| | 24V AC/DC | | 2 | Type DD, DW, DS or DHM |
| | 30V AC/DC | | 3 | Type DS only |
| | 120V AC | | 12 | Type TD or TS |
| | 240V AC | | 24 | Type TD or TS |
| | 110V DC | | 1 | With Type CD |
| | No lamp | | 99 | Type DS only |
| ⑤ Style | Square | | F | 30x30mm |
| | Horizontal rectangle | | H | 30x60mm |
| | Horizontal rectangle with barrier | | H2 | |
| | Large horizontal rectangle | | L | 30x90mm |
| | Vertical rectangle | | V | 60x30mm |
| | Large square | | G | 60x60mm |
| | Combination | | M | Fill out order form on next page |
| ⑥ Color (number of windows) | Amber | | A | After each color, specify the number of windows Example... A(3), G(2), R(1) |
| | Green | | G | |
| | Red | | R | |
| | Blue | | S (LED version: 24V only) | |
| | White | | W | |
| | Yellow | | Y | |

1. Secondary voltage on transformers and DC-DC converters is 24V.
2. To specify arrangement of varying window sizes and colors, use the order form on the next page.
3. Drawing required for any units ordered with engraving.
4. Incandescent models use color screen and marking plate, LED models use 2 marking plates (no color screen).

**Purchase Order No.** _____ **Date** _____ **Sheet** ☐ **of** ☐

Contact _____

Company _____

Phone # _____

Ship to _____

_____

City/State/Zip _____

**Fill in Part Number Below:**

**SLC30N** – ☐☐ ☐☐ – ☐ ☐ ☐ **B–** *Black Frame*

*Number of Rows* | *Number of Columns* | *Type Code* | *Operating Voltage* | *Style Code*

***Note:*** *Convert all window styles to the style F (basic unit size).*

***F*** *= One Window*
***H*** *= Two Windows Wide*
***L*** *= Three Windows Wide*
***V*** *= Two Windows High*
***G*** *= Two x Two*
***M*** *= Multiple Combination*

| | | |
|---|---|---|
| **A** | ☐ | *Number of Amber* |
| **G** | ☐ | *Number of Green* |
| **R** | ☐ | *Number of Red* |
| **S** | ☐ | *Number of Blue* |
| **W** | ☐ | *Number of White* |
| **Y** | ☐ | *Number of Yellow* |

**Remarks:**

*First Window (upper, left-hand corner of panel)*

**THIS SIDE UP**

*Basic Unit Size (style F)*

**COLUMNS**

**ROWS**

**Quantity** _____

**Note:** All units ordered with one order form must be identical

**For engraving information, see page 715.**

**Order Form**

For information on how to complete the order form or to view examples, see the following page.

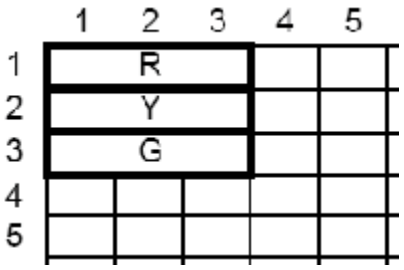
1. For part number development, see the previous page.
2. Panel cutout dimensions are on page 697.
3. Additional ordering information is on page 696.

**THIS SIDE UP**

## How to complete SLC30N Series annunciator order form:

1. Draw the SLC30N layout in the Order Form as per customer requirements. Define the boundaries of each window (F, V, H, L or G Style) and of complete annunciator panel by heavy border lines. Specify each window color with appropriate designation (eg: G for Green, R for Red, etc). See Example 1 below:

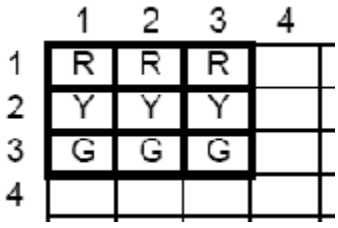
**Example 1**




2. Count number of rows and columns. eg: Example 1, Rows: 03 and Columns: 03
   **SLC30N-0303**
3. Determine the type of illumination required. eg: "DD" for LED full voltage type illumination.
   **SLC30N-0303-DD**
4. Determine the voltage code. eg: "2" for 24V AC/DC.
   **SLC30N-0303-DD2**
5. Determine window style. eg: "L" style windows as shown in Example 1.
   **SLC30N-0303-DD2LB***
   *B denotes black frame
6. Count the number of different colored windows in the annunciator. Example 1 has 1 Red L-style (30x90mm) window, 1 Yellow L-style window and 1 Green L-style window.
   **SLC30N-0303-DD2LB-R(1)Y(1)G(1)**
7. Now your part number is complete, please fill out contact information and fax or email the form to IDEC Customer Service for order processing. If you would like to get annunciator windows engraved, please see the information on page 820 and send us your engraving information. If you have any questions, please contact IDEC Technical Support or for additional information, view examples 2 and 3:

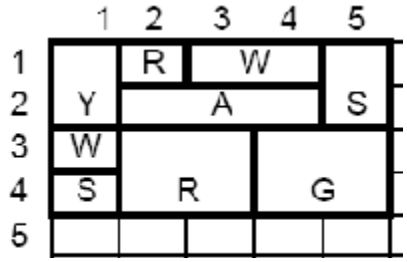
**Example 2**

Rows=03; Columns= 03; F Style Windows (30x30mm); LED Full Voltage 24V AC/DC Illumination. Part number **SLC30N-0303-DD2FB-R(3)Y(3)G(3)**.




**Example 3**:

Rows = 04; Columns = 05; M = combination of various window styles(F, H, L V and G Style) ; LED Full Voltage 24V AC/DC Illumination.
Part number **SLC30N-0405-DD2MB-A(1)R(2)Y(1)G(1)W(2)S(2)**.



# Dimensions

## Panel Cut-Out Dimensions

| No. of Rows | No. of Columns | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Overall Panel Width Dimension → | | | 1.654" (42mm) | 2.853" (72mm) | 4.016" (102mm) | 5.197" (132mm) | 6.378" (162mm) | 7.559" (192mm) | 8.740" (222mm) | 9.921" (252mm) | 11.102" (282mm) | 12.283" (312mm) | 13.465" (342mm) | 14.646" (372mm) | 15.827" (402mm) | 17.008" (432mm) | 18.189" (462mm) | 19.370" (492mm) | 20.551" (522mm) | 21.732" (552mm) | 22.913" (582mm) | 24.094" (612mm) |
| | Overall Height ↓ | Cut-out Ht ↓ | Cut-out Wd → | 1.378" (35mm) | 2.559" (65mm) | 3.740" (95mm) | 4.921" (125mm) | 6.102" (155mm) | 7.283" (185mm) | 8.465" (215mm) | 9.646" (245mm) | 10.827" (275mm) | 12.008" (305mm) | 13.189" (335mm) | 14.370" (365mm) | 15.551" (395mm) | 16.732" (425mm) | 17.913" (455mm) | 19.094" (485mm) | 20.276" (515mm) | 21.457" (545mm) | 22.638" (575mm) | 23.819" (605mm) |
| 1 | 1.654" (42mm) | 1.378" (35mm) | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 2 | 2.853" (72mm) | 2.559" (65mm) | | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 |
| 3 | 4.016" (102mm) | 3.740" (95mm) | | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 | 39 | 42 | 45 | 48 | 51 | 54 | 57 | 60 |
| 4 | 5.197" (132mm) | 4.921" (125mm) | | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 52 | 56 | 60 | 64 | 68 | 72 | 76 | 80 |
| 5 | 6.378" (162mm) | 6.102" (155mm) | | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 |
| 6 | 7.559" (192mm) | 7.283" (185mm) | | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 | 78 | 84 | 90 | 96 | 102 | 108 | 114 | 120 |
| 7 | 8.740" (222mm) | 8.465" (215mm) | | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 | 91 | 98 | 105 | 112 | 119 | 126 | 133 | 140 |
| 8 | 9.921" (252mm) | 9.646" (245mm) | | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 |
| 9 | 11.102" (282mm) | 10.827" (275mm) | | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 | 99 | 108 | 117 | 126 | 135 | 144 | 153 | 162 | 171 | 180 |
| 10 | 12.283" (312mm) | 12.008" (305mm) | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 |
| | | | | **Total Number of Windows** (equivalent to style F—basic unit size) | | | | | | | | | | | | | | | | | | | |

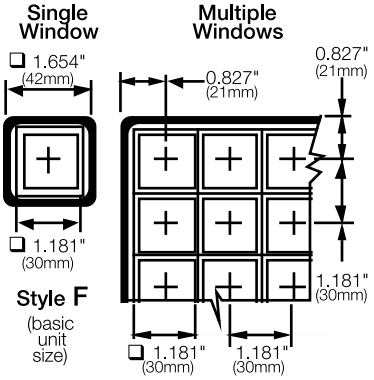
1. The number of rows and columns refers to styles equivalent to style F (basic unit size).
   For styles H, L, V, and G, convert into style F (basic unit size) equivalents.
   - Style H: 1 window high (1 row) x 2 windows wide (2 columns)
   - Style V: 2 windows high (2 rows) x 1 window wide (1 column)
   - Style L: 1 window high (1 row) x 3 windows wide (3 columns)
   - Style G: 2 windows high (2 rows) x 2 windows wide (2 columns)

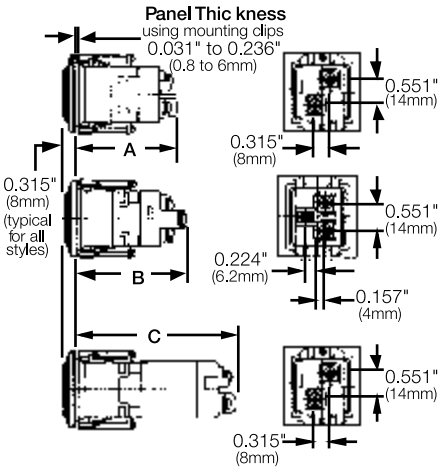
   Example: 18 windows = 3 windows high (3 rows) x 6 windows wide (6 columns)
   Overall dimension (H x W): 4.016" x 7.559" (102 x 192mm)
   Panel cut-out (H x W): 3.740" x 7.283" (95 x 185mm)
   Tolerance: +0.039" (1mm), –0
2. For part numbering information, see page 798.

## Window Dimensions

| Window Style | | Style F | Style H | Style L | Style V | Style G |
|---|---|---|---|---|---|---|
| Appearance | | | | | | |
| Window Size | Illumination Face (H x W) | 1.181" x 1.181" (30 x 30mm) | 1.181" x 2.362" (30 x 60mm) | 1.181" x 3.543" (30 x 90mm) | 2.362" x 1.181" (60 x 30mm) | 2.362" x 2.362" (60 x 60mm) |
| | Lens (H x W) | 1.102" x 1.102" (28 x 28mm) | 1.102" x 2.283" (28 x 58mm) | 1.102" x 3.432" (28 x 88mm) | 2.283" x 1.102" (58 x 28mm) | 2.283" x 2.283" (58 x 58mm) |
| | Marking Plate (H x W x t) | 1.062" x 1.062" x 0.04" (27 x 27 x 1.0mm) | 1.062" x 2.244" x 0.04" (27 x 57 x 1.0mm) | 1.062" x 3.425" x 0.04" (27 x 87 x 1.0mm) | 2.244" x 1.062" x 0.04" (57 x 27 x 1.0mm) | 2.244" x 2.244" x 0.04" (57 x 57 x 1.0mm) |
| | Color Screen (H x W x t) | 1.062" x 1.062" x 0.04" (27 x 27 x 1.0mm) | 1.062" x 2.244" x 0.04" (27 x 57 x 1.0mm) | 1.062" x 3.425" x 0.04" (27 x 87 x 1.0mm) | 2.244" x 1.062" x 0.04" (57 x 27 x 1.0mm) | 2.244" x 2.244" x 0.04" (57 x 57 x 1.0mm) |
| | Engraving Area | 0.984" x 0.984" (25 x 25mm) | 0.984" x 2.165" (25 x 55mm) | 0.984" x 3.346" (25 x 85mm) | 2.165" x 0.984" (55 x 25mm) | 2.165" x 2.165" (55 x 55mm) |

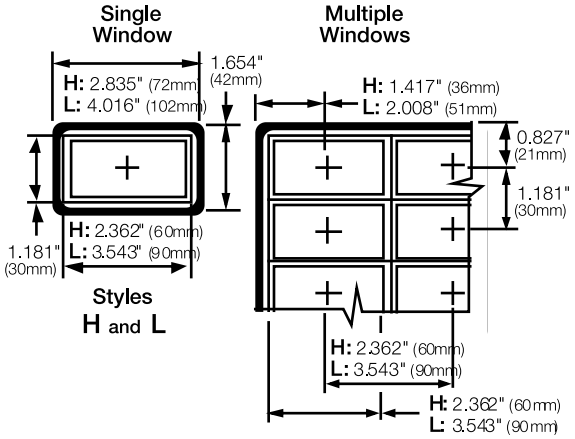
## Dimensions, continued

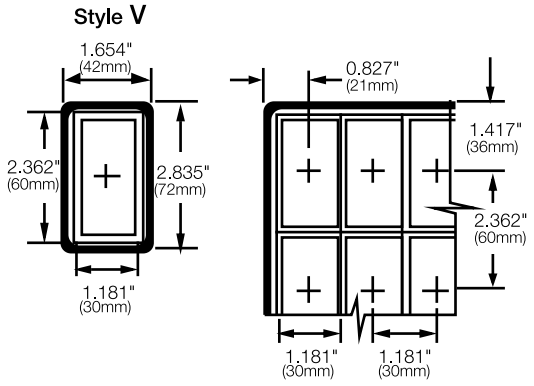


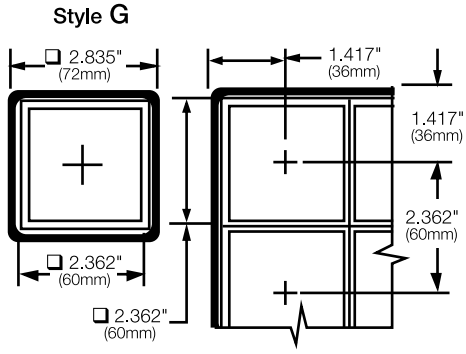



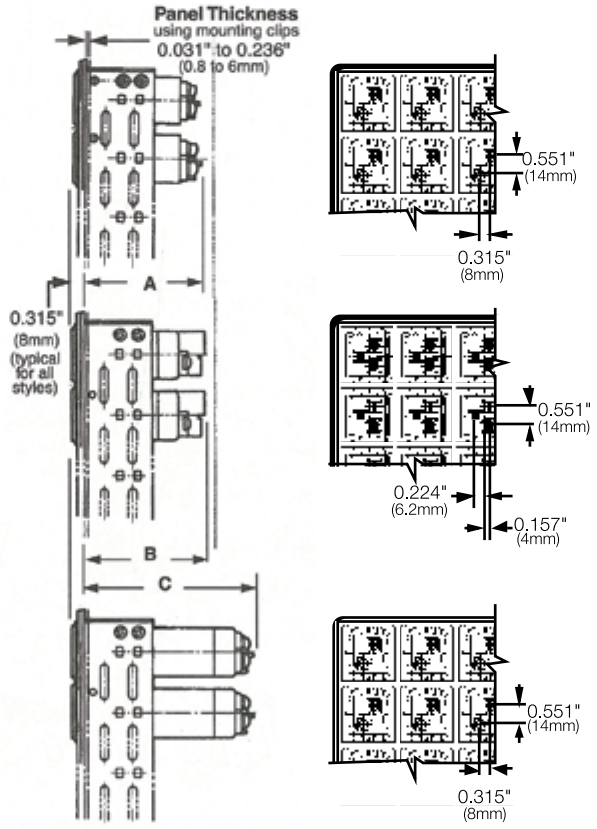

**Styles F, H, L, V, G:**
**Single Window (right)**
**Multiple Windows (below)**

| | Description | LED | Incandescent |
|---|---|---|---|
| A | Full voltage | 2.146" (54.5mm) | 2.264" (57.5mm) |
| B | Full voltage LED 2-color alternate | 2.343" (59.5mm) | — |
| C | Transformer | 3.228" (82mm) | — |
| | DC-DC converter | 3.228" (82mm) | — |
| | Transformer | — | 3.228" (82mm) |
| Terminals (X1, X2) | | M3.5 screw | |
| Check terminal (C) | | M3 screw | |
| Same terminals, adjacent windows | | 1.181" (30mm) centers | |

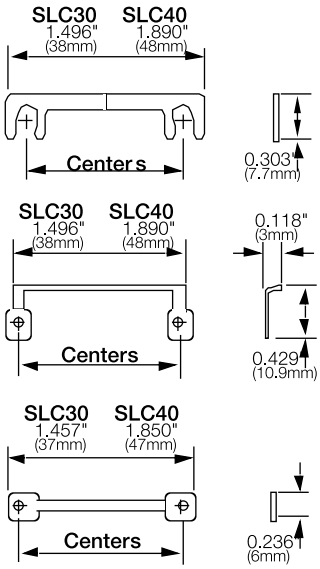


## Dimensions, continued




## Instructions

### Estimating Weights

**A x** [**Rows + Columns**] **+** **B x** [**Rows x Columns**] **+** **C x** [**Rows x Columns**] **=** **Total Weight of Display Panel**

1. Make sure that the panel thickness is sufficient to support the total weight of the display panel(s).

| | | Full Voltage | **Transformer** (incandescent/LED) | **DC-DC Converter** (LED only) |
|---|---|---|---|---|
| A<br>Frame Weight | B<br>Housing Weight | C<br>**Lamp/LED Weight** (includes lamp/LED) | | |
| 0.68oz (22g) | 0.53oz (17g) | 0.65oz (21g) | 2.36oz (76g) | 1.77oz (52g) |

2. Weights are approximate.

Example:
SLC30N-0304-DD2FB
Total weight = A (rows + columns) + B (rows x columns) + C (rows x columns)
Total weight = 0.68 (3+4) + 0.53 (3x4) + 0.65 (3x4) = 19.92 oz

# SLC30-IPS Series — Panel Mounted Annunciators

## SLC Series Panel Mounted Annunciators — an Ideal Alternative to Mounting Multiple Pilot Devices

**SLC30-IPS combination display lights with control units combine display lights with control units such as pushbuttons, illuminated pushbuttons, selector switches and keylock selector switches.**
This results in savings of both space and installation time, since mounting separate switches becomes unnecessary. SLC30-IPS combination display lights can be custom built to meet your specifications.

Key features of the SLC30-IPS series include:

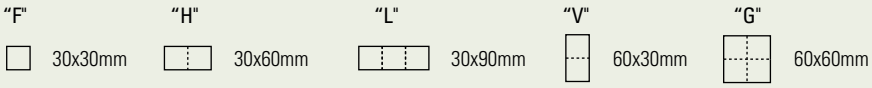
- Switches are integrated into an assembled SLC matrix, requiring only one panel cutout
- Illuminated, non-illuminated, selector, and key-switches are available
- Five window sizes based on a 30mm grid
- Non-reflective clear lenses
- Incandescent or Superbright LED illumination
- Momentary pushbuttons only

UL Recogized
File No. E68961

CSA Certified
File No.
LR48366

Cert No.
B970213332375

## Specifications

| Light Source | | LED | Incandescent |
|---|---|---|---|
| Nominal Voltages | Full Voltage | 6, 12, 24V AC/DC | 6, 12, 18, 24, 30V AC/DC |
| | Transformer | 120, 240V AC | 120, 240V AC |
| | DC-DC Conv. | 110V DC | 110V DC |
| Maximum Voltage | | 250V AC/DC | |
| Contact Thermal Current | | 3A (gold contact), 5A (silver contact) | |
| Contact Operating Current | | Gold contact: 125V AC/0.1A, 30V DC/0.1A (resistive load)<br>Silver contact: 125V AC/3A, 250V AC/2.0A (resisitive load), 30V DC/2A, 125V DC/0.4A (resistive load) | |
| Control Unit Types | | Pushbuttons: Square or round, illuminated or non-illuminated (momentary only) | |
| | | Selector switches: 2-position or 3-position, maintained | |
| | | Keylock switches: 2-position or 3-position, maintained | |
| Colors | | Amber, Green, Red, Yellow, Blue (24V only), White,<br>dual color Red/Green (24V only) | Amber, Green, Red, Yellow, Blue, White |
| Lamp Type | | Surface (Chip type) LED cluster | BA9S/13 (T3-1/4) bayonet base (1W) |
| Available Window Sizes | |  | |
| Insulation Resistance | | More than 100 MΩ by a 500V DC megger | |
| Degree of Protection | | IP20 (for indoor use only), Type 1 | |
| Dielectric Strength | | 2,000V AC direct (2,500V AC transformer, 1 minute) | |
| Operating Temperature | | – 20˚ to +40˚C; 15–90% relative humidity (– 10˚ to +40˚C DC-DC converter) | |
| Material of Marking Plate and Color Screen | | Polycarbonate | |
| Termination | | M3.5 screw with captive sems plate<br>(Check terminals: M3 screw with captive sems plate on applicable units) | |
| Maximum Size | | Full voltage: 10 rows, 20 columns (200 windows)<br>Transformer and DC/DC converter: 50 windows | |
| Recommended Wire Size | | 22-14 AWG x2 ($2mm^2$ x 2) | |
| Approvals | | TÜV Cert. No. B970213332375<br>UL Recognized File No. E68961<br>CSA Certified File No. LR48366 | |

## Part Numbers (assembled)

### Part Number Guide

**SLC30N–** ① **01** ② **03** **–** ③ **DD** ④ **2** **MLB**

① Number of Rows
② Number of Columns
③ Type
④ Voltage

| Description | | | | Code | Remark |
|---|---|---|---|---|---|
| ①Number of Rows | | | | 01, 02, 03, 04, 05, 06, 07, 08, 09, 10 | 10 row maximum<br>(number of base unit (F-style) windows) |
| ② Number of Columns | | | | 01, 02, 03, 04, 05, 06, 07, 08, 09, 10<br>11, 12, 13, 14, 15, 16, 17, 18, 19, 20 | 20 column maximum<br>(number of base unit (F-style) windows) |
| ③ Type | LED | Full voltage | Standard | DD | 6V, 12V, 24V |
| | | | With check terminal | DHM | 24V only |
| | | | 2 color (Red/Green) | DW | 24V only |
| | | Transformer | | TD | 120V, 240V AC |
| | | DC-DC converter | | CD | 110V DC only |
| | Incandescent | Full voltage | | DS | 6V, 12V, 18V, 24V, 30V |
| | | Transformer | | TS | 120V, 240V |

| Description | | Code | Remark |
|---|---|---|---|
| ④ Voltage | 6V AC/DC | 6 | Type DD or DS |
| | 12V AC/DC | 1 | With Type DD, DHM or DS |
| | 18V AC/DC | 8 | Type DS only |
| | 24V AC/DC | 2 | Type DD, DHM, DW, or DS |
| | 30V AC/DC | 3 | Type DS only |
| | 120V AC | 12 | Type TD or TS |
| | 240V AC | 24 | Type TD or TS |
| | 110V DC | 1 | With Type CD |
| | No lamp | 99 | Type DS only |

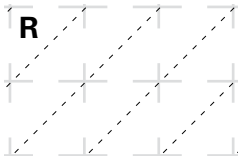
1. Secondary voltage on transformers and DC-DC converters is 24V.
2. To specify arrangement of varying window sizes and colors, use the order form on the next page.
3. Drawing required.

## SLC30-IPS Order Form Instructions

### How to order a SLC30-IPS display light:

### Example 1: Specifying a window color

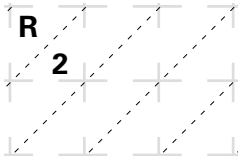
Enter the lens illumination color code in each square. Use the table below for color codes.




This example would place a Red window in this location

### Example 2: Specifying a control unit

Enter the lens illumination color code in each square. Use the table below for color codes.




This example would place a Red, square, illuminated pushbutton with silver contacts in this location

For assistance with developing part numbers or completing the order form on the next page, contact IDEC technical support.

### Color Codes

| Color | Code |
|---|---|
| Amber | A |
| Green | G |
| Red | R |
| Blue | S |
| White | W |
| Yellow | Y |

### Control Unit Codes

| | Contact Type | |
|---|---|---|
| Type | Gold | Silver |
| Square illuminated pushbutton (DPDT) | **1** | **2** |
| Round illuminated pushbutton (DPDT) | **3** | **4** |
| Square pushbutton (DPDT) | **5** | **6** |
| Round pushbutton (DPDT) | **7** | **8** |
| Selector switch (2-position) | **9** | **10** |
| Selector switch (3-position) | **11** | **12** |
| Keylock selector switch (2-position) | **13** | **14** |
| Keylock selector switch (3-position) | **15** | **16** |

**Purchase Order No.** _____ **Date** _____ **Sheet** ☐ **of** ☐

Contact _____

Company _____

Phone # _____

Ship to _____

_____

City/State/Zip _____

**Fill in Part Number Below:**

| | Number of Rows | Number of Columns | Type Code | Lamp Voltage | |
|---|---|---|---|---|---|
| **SLC30N** | – ☐☐ | ☐☐ | – ☐ | ☐ | **MLB** *Black Frame* |

***Note:*** *Convert all window styles to the style F (basic unit size).*

**Remarks:**

*First Window (upper, left-hand corner of panel)*

**THIS SIDE UP**

*Basic Unit Size (style F)*

**COLUMNS**

**ROWS**

**Quantity** _____

**Note:** All units ordered with one order form must be identical

**For engraving information, see page 715.**

**THIS SIDE UP**

1. For SLC30-IPS ordering form instruction, see previous page.
2. See engraving information page 715.
3. See panel cutout dimensions on page 705.
4. Additional ordering information is on page 702 and 704.

**Order Form**

For information on how to complete the order form or to view examples, see the following page.

## How to complete SLC30N-IPS Series annunciator order form:

1. Determine the type of switches you would like to include in the annunciator panel. For this example, we will include the following 3 types of switches:
   i. Red Square illuminated pushbutton DPDT with silver contacts.
   ii. Yellow round non-illuminated push button DPDT with silver contacts.
   iii. 2 Position keylock selector switch with silver contacts.

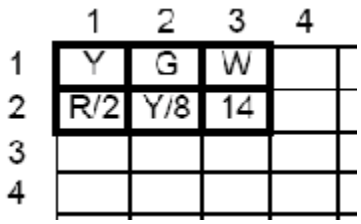
2. From chart shown on page 806,

| CODE | DESCRIPTION |
|---|---|
| **R/2** | Red Square Illuminated Push Button DPDT with Silver Contacts. |
| **Y/8** | Yellow Round Non-illuminated Push Button DPDT with Silver contacts |
| **14** | 2 Position Keylock Selector Switch with Silver contacts. |

Enter the above mentioned CODE designation in the layout window (on the previous page), where you would like the respective switch to be installed.

3. Determine the type of 30x30mm illuminated windows you would like to include. For the current example, we will assume 3 F-Style (30x30mm) windows in Yellow, Green and White color. Specify each window color in the Order Form with appropriate designation: "Y" for Yellow, "G" for Green and "W" for White.

4. Define the boundaries of each window (F, V, H, L or G Style) and of complete annunciator panel by heavy border lines, as shown below.




5. Count the number of rows and columns in the SLC30N diagram. eg: For the current example, we have, Rows: 02 and Columns: 03.
   **SLC30N-0203**

6. Determine the type of illumination for SLC30N annunciator. eg: For the current example, we use, "DD" for LED Full Voltage type illumination.
   **SLC30N-0203-DD**

7. Determine the voltage code; for the current example, we will use 24V AC/DC for all illuminated windows and illuminated switches. This is designated by using the number "2".
   **SLC30N-0203-DD2**

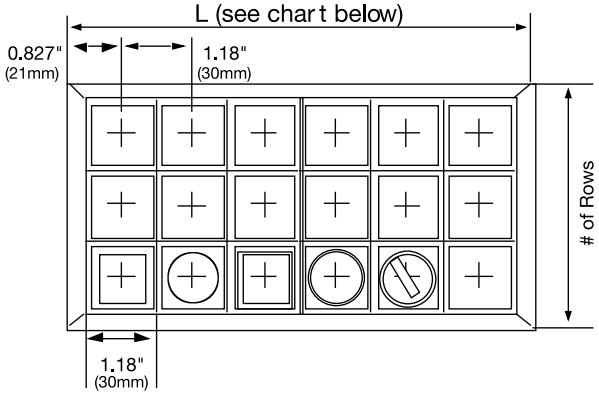
8. The complete part number would be:
   **SLC30N-0203-DD2MLB**

9. **A drawing must be provided for each of these parts ordered.**

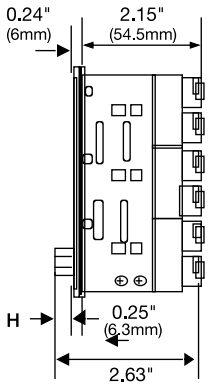
Note: Buttons and switches are only available in 'F' (30 x 30mm) window sizes.

## Dimensions

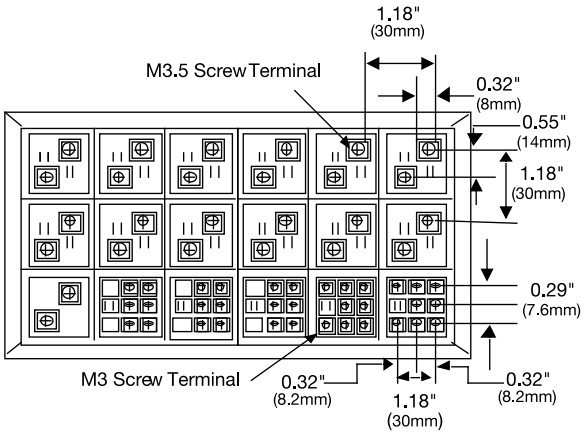
### Front View




### Side View

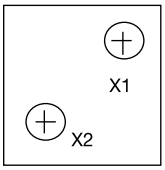



### Back View

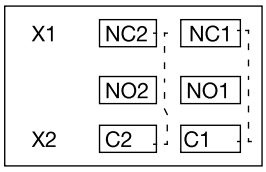



### Bottom View

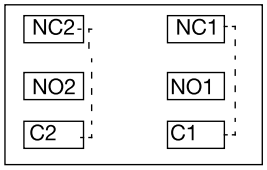
SLC30




Illuminated Pushbuttons

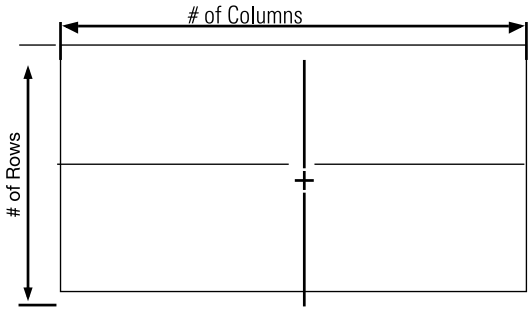



Non-Illuminated Pushbuttons and Selector Switches




X1 = Positive Terminal, X2 = Negative Terminal

### Panel Cut-Out Size

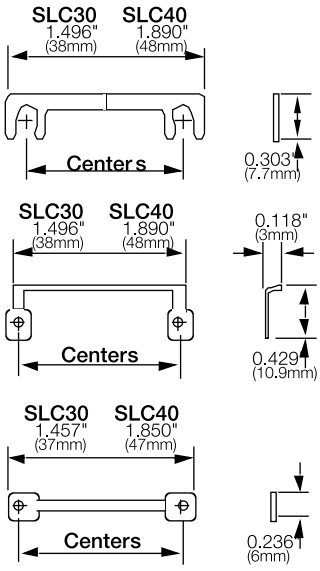



## Panel Cut-Out Dimensions

| No. of Rows | No. of Columns | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Overall Panel Width Dimension → | | 1.654" (42mm) | 2.853" (72mm) | 4.016" (102mm) | 5.197" (132mm) | 6.378" (162mm) | 7.559" (192mm) | 8.740" (222mm) | 9.921" (252mm) | 11.102" (282mm) | 12.283" (312mm) | 13.465" (342mm) | 14.646" (372mm) | 15.827" (402mm) | 17.008" (432mm) | 18.189" (462mm) | 19.370" (492mm) | 20.551" (522mm) | 21.732" (552mm) | 22.913" (582mm) | 24.094" (612mm) |
| | Overall Height ↓ | Cut-out Ht ↓ / Cut-out Wd → | 1.378" (35mm) | 2.559" (65mm) | 3.740" (95mm) | 4.921" (125mm) | 6.102" (155mm) | 7.283" (185mm) | 8.465" (215mm) | 9.646" (245mm) | 10.827" (275mm) | 12.008" (305mm) | 13.189" (335mm) | 14.370" (365mm) | 15.551" (395mm) | 16.732" (425mm) | 17.913" (455mm) | 19.094" (485mm) | 20.276" (515mm) | 21.457" (545mm) | 22.638" (575mm) | 23.819" (605mm) |
| 1 | 1.654" (42mm) | 1.378" (35mm) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 2 | 2.853" (72mm) | 2.559" (65mm) | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 |
| 3 | 4.016" (102mm) | 3.740" (95mm) | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 | 39 | 42 | 45 | 48 | 51 | 54 | 57 | 60 |
| 4 | 5.197" (132mm) | 4.921" (125mm) | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 52 | 56 | 60 | 64 | 68 | 72 | 76 | 80 |
| 5 | 6.378" (162mm) | 6.102" (155mm) | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 |
| 6 | 7.559" (192mm) | 7.283" (185mm) | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 | 78 | 84 | 90 | 96 | 102 | 108 | 114 | 120 |
| 7 | 8.740" (222mm) | 8.465" (215mm) | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 | 91 | 98 | 105 | 112 | 119 | 126 | 133 | 140 |
| 8 | 9.921" (252mm) | 9.646" (245mm) | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | 128 | 136 | 144 | 152 | 160 |
| 9 | 11.102" (282mm) | 10.827" (275mm) | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 | 99 | 108 | 117 | 126 | 135 | 144 | 153 | 162 | 171 | 180 |
| 10 | 12.283" (312mm) | 12.008" (305mm) | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 |

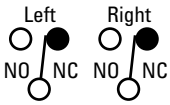
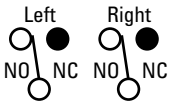
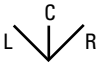
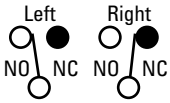
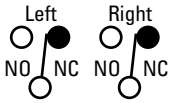
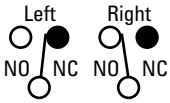
**Total Number of Windows** (equivalent to style F—basic unit size)

## Dimensions, continued




## Contact Operations

### Selector Switches and Keylock Selector Switches

| | | | Operator Position and Contact Operation (top view) | | |
|---|---|---|---|---|---|
| | Position | Contacts | Left | Center | Right |
| Contact Operation | 90° 2-position maintained | DPDT 2-position |   | — |   |
| | 45° 3-position maintained   | DPDT 3-position |   |   |   |

# SLC40 Series — Panel Mounted Annunciators

## SLC 40 Series Annunciators

**SLC series panel mounted annunciators are an ideal alternative to mounting multiple pilot devices.**
Cluster mounting simplifies panel cutouts and offers a variety of window combination sizes.
Available with incandescent or Superbright LED illumination.

Key features of the SLC40 series include:

- Custom configurations with up to 105 windows
- Four window sizes based on a 40mm grid
- Non-reflective clear lenses that can be extended (angled) for better visibility when mounted in higher locations
- Incandescent or Superbright LED illumination
- Wide variety of input voltages

Cert No.
B970213332375

UL Recogized
File No. E68961

CSA Certified
File No.
LR48366

**Extended Windows**

**Style F**
(40mm x 40mm)

**Style G**
(80mm x 80mm)

**Style H**
(40mm x 80mm)

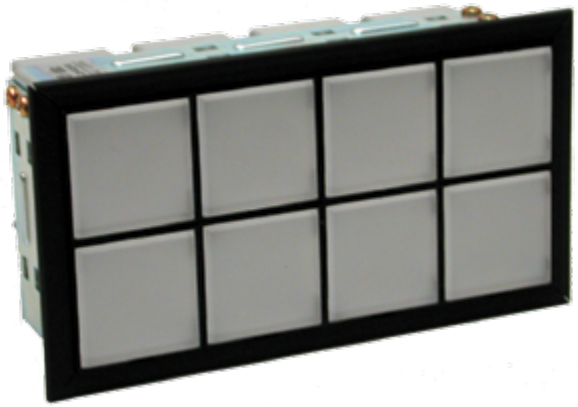
**Style L**
(40mm x 120mm)

**Style V**
(80mm x 40mm)

**Staggered Terminals:**
increased safety
and serviceability

## Specifications

| Light Source | | LED | Incandescent |
|---|---|---|---|
| Nominal Voltages | Full Voltage | 6, 12, 24V AC/DC | 6, 12, 18, 24, 30V AC/DC |
| | Transformer | 120, 240V AC | 120, 240V AC |
| | DC-DC Conv. | 110V DC | — |
| Colors | | Full voltage:<br>Amber, Green, Red, Yellow, Blue (24V only), White,<br>dual color Red/Green (24V only) | Amber, Green, Red, Yellow, Blue, White |
| Lamp Type | | Surface (Chip type) LED cluster | E12/15 Screw terminal base (2W) |
| Current Consumption | 24V AC/DC | 40mA | 80mA |
| | 12V AC/DC | 80mA | 160mA |
| | 6V AC/DC | 160mA | 330mA |
| Available Window Sizes | | "F" 40x40mm "H" 40x80mm "L" 40x120mm "V" 80x40mm "G" 80x80mm | |
| Insulation Resistance | | 100MW minimum (with 500V DC megger), between live and dead parts | |
| Degree of Protection | | IP20 (for indoor use only), Type 1 | |
| Dielectric Strength | | Full voltage: 2,000V AC direct<br>Adaptor/transformer 2,500V AC (1 minute) | |
| Operating Temperature | | – 20˚ to +40˚C; (45-85% relative humidity) | |
| Material of Marking Plate and Color Screen | | Polycarbonate | |
| Termination | | X1 and X2 terminals: M3.5 screw with a captive wire clamp washer<br>(Check terminal: M3 screw on applicable models) | |
| Maximum Size | | Full voltage: 7 rows, 15 columns (105 windows)<br>Others: 50 windows maximum | |
| Recommended Wire Size | | 22-14 AWG x2 ($2mm^2$ x 2) | |
| Approvals | | TÜV Cert. No. B970213332375<br>UL Recognized File No. E68961<br>ABS American Bureau of Shipping<br>CSA Certified File No. LR48366 | |



# Part Numbers (assembled)

## Part Number Guide

| | ① | ② | | ③ | ④ | ⑤ | | | ⑥ |
|---|---|---|---|---|---|---|---|---|---|
| SLC40N | 01 | 03 | – | DD | 2 | F | B | – | A(3) |
| | Number of Rows | Number of Columns | | Type | Voltage | Style | | | Color and Number of Windows |

## Part Numbers: Assembled Parts

| Description | | | Code | Remark |
|---|---|---|---|---|
| ①Number of Rows | | | 01, 02, 03, 04, 05, 06, 07 | 7 row maximum (always expressed in terms of "F" size windows) |
| ② Number of Columns | | | 01, 02, 03, 04, 05, 06, 07, 08, 09, 10 11, 12, 13, 14, 15 | 15 column maximum (always expressed in terms of "F" size windows) |
| ③ Type | LED | Full voltage | DD | 6V, 12V, 24V |
| | | Full voltage with check terminal | DHM | 24V only |
| | | Full voltage 2 color (Red/Green) | DW | 24V only |
| | | Transformer | TD | 120V, 240V AC |
| | | DC-DC converter | CD | 110V DC only |
| | Incandescent | Full voltage | DE | 6V, 12V, 18V, 24V, 30V |
| | | Full voltage with check terminal | DEM | 6V, 12V, 18V, 24V, 30V |
| | | Transformer | TE | 120V, 240V |
| ④ Voltage | 6V AC/DC | | 6 | Type DD, DE, or DEM |
| | 12V AC/DC | | 1 | Type DD, DE or DEM |
| | 18V AC/DC | | 8 | Type DE or DEM |
| | 24V AC/DC | | 2 | Type DD, DHM, DW, DE, or DEM |
| | 30V AC/DC | | 3 | Type DE or DEM |
| | 120V AC | | 12 | Type TD or TE |
| | 240V AC | | 24 | Type TD or TE |
| | 110V DC | | 1 | Type CD |
| | No lamp | | 99 | Type DE or DEM |
| ⑤ Style | Square | | F | 40x40mm |
| | Horizontal rectangle | | H | 40x80mm |
| | Large horizontal rectangle | | L | 40x120mm |
| | Vertical rectangle | | V | 80x40mm |
| | Large square | | G | 80x80mm |
| | Combination | | M | Fill out order form on next page |
| ⑥ Color (number of windows) | Amber | | A | After each color, specify the number of windows Example... A(3), G(2), R(1) |
| | Green | | G | |
| | Red | | R | |
| | Blue | | S (LED version: 24V only) | |
| | White | | W | |
| | Yellow | | Y | |

1. Secondary voltage on transformers and DC-DC converters is 24V.
2. To specify the arrangement of varying window sizes and colors, use the order form on the next page.
3. Drawing required for any units ordered with engraving.
4. Incandescent models use color screen and marking plate, LED models use 2 marking plates (no color screen).

**Purchase Order No.** _____ **Date** _____ **Sheet** ☐ **of** ☐

Contact _____

Company _____

Phone # _____

Ship to _____

_____

City/State/Zip _____

**Fill in Part Number Below:**

**SLC40N** – [Number of Rows] [Number of Columns] – [Type Code] [Operating Voltage] [Style Code] **B–** *Black Frame*

***Note:*** *Convert all window styles to the style F (basic unit size).*

***F*** *= One Window*
***H*** *= Two Windows Wide*
***L*** *= Three Windows Wide*
***V*** *= Two Windows High*
***G*** *= Two x Two*
***M*** *= Multiple Combination*

| | |
|---|---|
| **A** ☐ | *Number of Amber* |
| **G** ☐ | *Number of Green* |
| **R** ☐ | *Number of Red* |
| **S** ☐ | *Number of Blue* |
| **W** ☐ | *Number of White* |
| **Y** ☐ | *Number of Yellow* |

*First Window (upper, left-hand corner of panel)*

**THIS SIDE UP**

**COLUMNS**

**ROWS**

*Basic Unit Size (style F)*

**Remarks:**

**Quantity** _____

**Note:** All units ordered with one order form must be identical

**For engraving information, see page 715.**

For information on how to complete the order form or to view examples, see the following page.

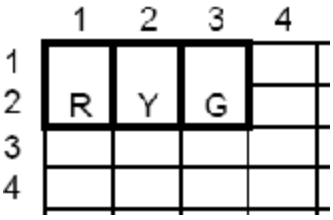
1. The part number guide is on the previous page.
2. Panel cutout dimensions are on page 712.

**THIS SIDE UP**

## How to complete SLC40N Series annunciator order form:

1. Draw the layout of SLC40N annunciator in the Order Form as per customer requirements. Define the boundaries of each window (F, V, H or L Style) and of complete annunciator panel by heavy border lines. Specify each window color with appropriate designation: eg: G for Green, R for Red, etc.

**Example 1**

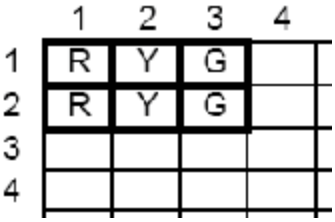



2. Count number of rows and columns. Eg: Example 1 has 02 rows and 03 columns.
   **SLC40N-0203**
3. Determine the type of illumination required. Eg: "DD" for LED full voltage type illumination.
   **SLC40N-0203-DD**
4. Determine the voltage code. Eg: "2" for 24V AC/DC, as in Example 1.
   **SLC40N-0203-DD2**
5. Determine window style. Eg: "V" style windows as shown in Example 1.
   **SLC40N-0203-DD2VB***
   ***B** denotes black frame.
6. Count the number of different colored windows. Eg: Example 1 has 1 Red V-style (80mmx40mm) window, 1 Yellow V-style window and 1 Green V-style window. Therefore to complete the part number for example 1, you would illustrate this by: R(1)Y(1)G(1)
   **SLC40N-0203-DD2VB-R(1)Y(1)G(1)**
7. Now your part number is complete, please fill out contact information and fax or email the form to IDEC Customer Service for order processing. If you would like to get annunciator windows engraved, please see the examples on page 820 and send us your engraving information. If you have any questions please contact IDEC Technical Support.

Here are two more examples of your order form and the subsequent SLC40N layout you will receive.

**Example 2**

Rows=02; Columns= 03; F Style Windows (40x40mm); LED Full Voltage 24V AC/DC Illumination. Part number **SLC40N-0203-DD2FB-R(2)Y(2)G(2)**.




**Example 3**

Rows=3; Columns= 4; M = combination of various window styles (F, H, L and V Style); LED Full Voltage 24V AC/DC Illumination.
Part number **SLC40N-0304-DD2MB-R(1)Y(1)G(1)W(1)S(1)**.

# Dimensions

## Panel Cut-Out Dimensions

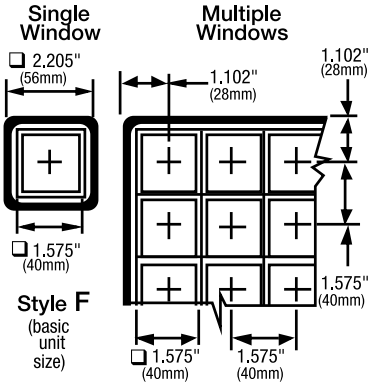
| No. of Rows | No. of Columns | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Overall Panel Width Dimension → | | | 2.205" (56mm) | 3.780" (96mm) | 5.354" (136mm) | 6.929" (176mm) | 8.504" (216mm) | 10.079" (256mm) | 11.654" (296mm) | 13.228" (336mm) | 14.804" (376mm) | 16.378" (416mm) | 17.953" (456mm) | 19.528" (496mm) | 21.102" (536mm) | 22.677" (576mm) | 24.252" (616mm) |
| | Overall Height ↓ | Cut-out Ht ↓ | Cut-out Wd → | 1.772" (45mm) | 3.346" (85mm) | 4.921" (125mm) | 6.496" (165mm) | 8.071" (205mm) | 9.646" (245mm) | 11.220" (285mm) | 12.795" (325mm) | 14.370" (365mm) | 15.945" (405mm) | 17.520" (445mm) | 19.094" (485mm) | 20.669" (525mm) | 22.244" (565mm) | 23.819" (605mm) |
| 1 | 2.205" (56mm) | 1.772" (45mm) | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 2 | 3.780" (96mm) | 3.346" (85mm) | | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 |
| 3 | 5.354" (136mm) | 4.921" (125mm) | | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 | 39 | 42 | 45 |
| 4 | 6.929" (176mm) | 6.496" (165mm) | | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 52 | 56 | 60 |
| 5 | 8.504" (216mm) | 8.071" (205mm) | | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 |
| 6 | 10.079" (256mm) | 9.646" (245mm) | | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 | 78 | 84 | 90 |
| 7 | 11.654" (296mm) | 11.220" (285mm) | | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 | 91 | 98 | 105 |
| | | | | **Total Number of Windows** (equivalent to style F—basic unit size) | | | | | | | | | | | | | | |

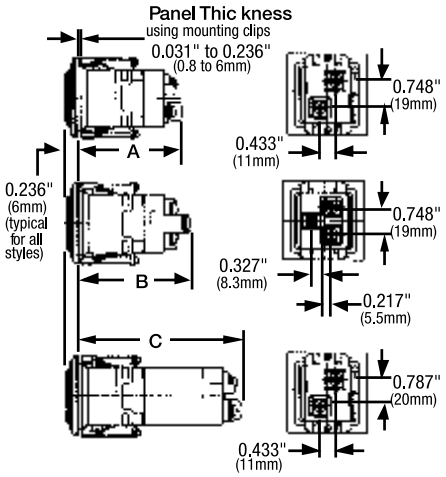
1. The number of rows and columns refers to styles equivalent to style F (basic unit size).
   For styles H, L, V, and G, convert into style F (basic unit size) equivalents.
   Style H: 1 window high (1 row) x 2 windows wide (2 columns)
   Style V: 2 windows high (2 rows) x 1 window wide (1 column)
   Style L: 1 window high (1 row) x 3 windows wide (3 columns)
   Style G: 2 windows high (2 rows) x 2 windows wide (2 columns)
   Example: 18 windows = 3 windows high (3 rows) x 6 windows wide (6 columns)
   Overall dimension (H x W): 5.354" x 10.079" (136 x 256mm)
   Panel cut-out (H x W): 4.921" x 9.646" (125 x 245mm)
   Tolerance: +0.039" (1mm), –0
2. See page 814 for part numbering information.

## Window Dimensions

| Window Style | | Style F | Style H | Style L | Style V |
|---|---|---|---|---|---|
| Appearance | | | | | |
| Window Size | Illumination Face (H x W) | 1.575" x 1.575" (40 x 40mm) | 1.575" x 3.150" (40 x 80mm) | 1.575" x 4.724" (40 x 120mm) | 3.150" x 1.575" (80 x 40mm) |
| | Lens (H x W) | 1.457" x 1.457" (37 x 37mm) | 1.457" x 3.031" (37 x 77mm) | 1.457" x 4.606" (37 x 117mm) | 3.031" x 1.457" (77 x 37mm) |
| | Marking Plate (H x W x t) | 1.409" x 1.409" x 0.04" (35.8 x 35.8 x 1.0mm) | 1.409" x 2.984" x 0.04" (35.8 x 75.8 x 1.0mm) | 1.409" x 4.559" x 0.04" (35.8 x 115.8 x 1.0mm) | 2.984" x 1.409" x 0.04" (75.8 x 35.8 x 1.0mm) |
| | Color Screen (H x W x t) | 1.409" x 1.409" x 0.04" (35.8 x 35.8 x 1.0mm) | 1.409" x 2.984" x 0.04" (35.8 x 75.8 x 1.0mm) | 1.409" x 4.559" x 0.04" (35.8 x 115.8 x 1.0mm) | 2.984" x 1.409" x 0.04" (75.8 x 35.8 x 1.0mm) |
| | Engraving Area | 1.339" x 1.339" (34 x 34mm) | 1.339" x 2.913" (34 x 55mm) | 1.339" x 4.488" (34 x 85mm) | 2.913" x 1.339" (55 x 34mm) |

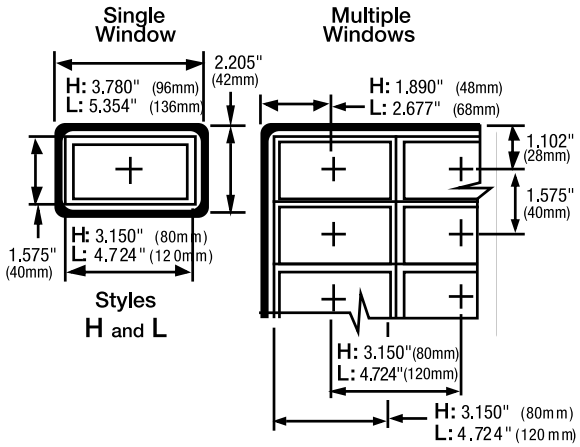
## Dimensions, continued

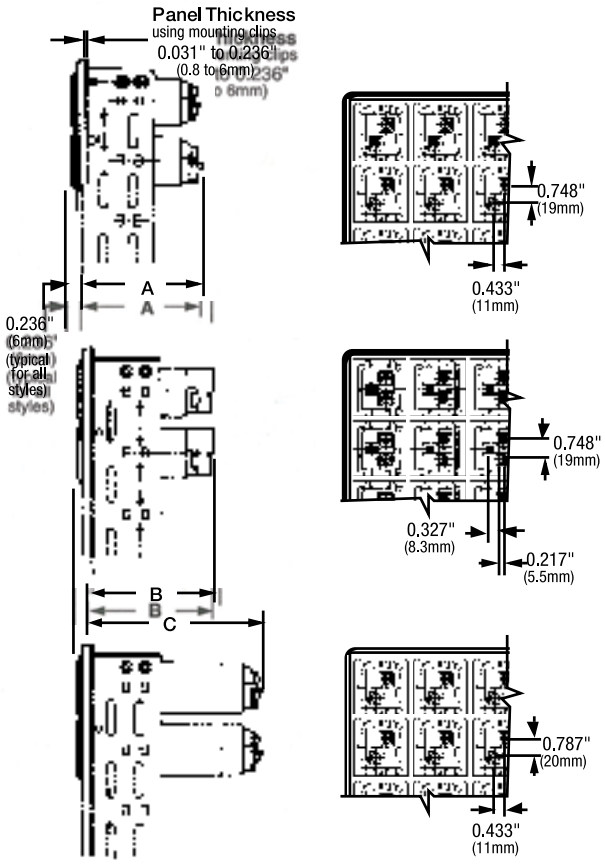


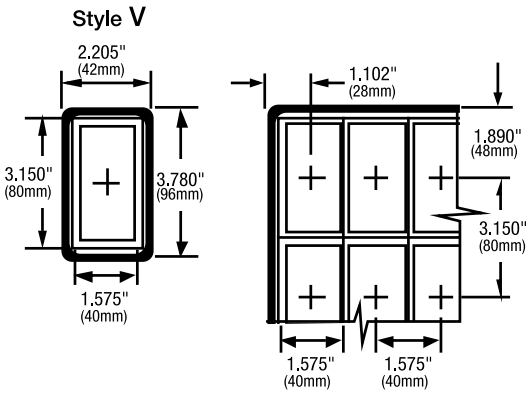




### Styles F, H, L, V, G:
### Single Window (right)
### Multiple Windows (below)

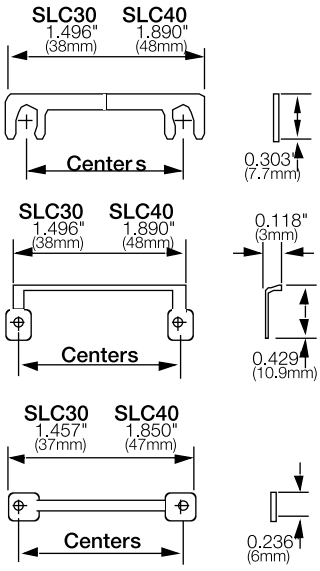
| | Description | LED | Incandescent |
|---|---|---|---|
| A | Full voltage | 2.618" (66.5mm) | 2.539" (64.5mm) |
| B | Full voltage LED 2-color alternate | 2.874" (73mm) | — |
| C | Transformer | 3.327" (84.5mm) | — |
| | DC-DC converter | 3.327" (84.5mm) | — |
| | Transformer | — | 2.854" (72.5mm) |
| Terminals (X1, X2) | | M3.5 screw | |
| Check terminal (C) | | M3 screw | |
| Same terminals, adjacent windows | | 1.575" (40mm) centers | |



## Dimensions, continued




## Instructions

### Estimating Weights

**A x** [**Rows + Columns**] **+** **B x** [**Rows x Columns**] **+** **C x** [**Rows x Columns**] **=** **Total Weight of Display Panel**

1. Make sure that the panel thickness is sufficient to support the total weight of the display panel(s).

| | | Full Voltage | **Transformer** (incandescent) **AC Adapter** (LED) | **DC-DC Converter** (LED only) |
|---|---|---|---|---|
| A<br>Frame Weight | B<br>Housing Weight | C<br>**Lamp/LED Weight** (includes lamp/LED) | | |
| 0.93oz (30g) | 0.93oz (30g) | 0.93oz (30g) | 2.98oz (96g) | 1.92oz (62g) |

2. Weights are approximate.

Example:
SLC40N-0304-DD2FB
Total weight = A (rows + columns) + B (rows x columns) + C (rows x columns)
Total weight = 0.93 (3+4) + 0.93 (3x4) + 0.93 (3x4) = 28.83 oz

## Engraving Information

### Part Numbers: SLC30 Engraving Plates

| Window Type | Part No. | Character Size | Maximum Characters per Line | Maximum Lines |
|---|---|---|---|---|
| F 30x30mm | SLC-3PF | 7/32 | 9 | 4 |
| | | 3/16 | 10 | 4 |
| | | 5/32 | 11 | 5 |
| | | 9/64 | 12 | 6 |
| | | 1/8 | 13 | 7 |
| H 30x60mm | SLC-3PH | 5/16 | 10 | 3 |
| | | 7/32 | 15 | 4 |
| | | 5/32 | 19 | 6 |
| L 30x90mm | SLC-3PL | 5/16 | 16 | 3 |
| | | 7/32 | 22 | 4 |
| | | 5/32 | 28 | 6 |
| V 60x30mm | SLC-3PV | 5/16 | 6 | 7 |
| | | 7/32 | 8 | 9 |
| | | 5/32 | 10 | 13 |
| G 60x60mm | SLC-3PG | 5/16 | 12 | 7 |
| | | 7/32 | 15 | 10 |
| | | 5/32 | 18 | 14 |

**Engraving Size Samples**

**5/16" size**

**7/32" size**

**3/16" size**

**5/32" size**

**9/64" size**

**1/8" size**

### Part Numbers SLC40 Engraving Plates

| | | | | |
|---|---|---|---|---|
| F 40x40mm | SLC-4PF | 5/16 | 8 | 4 |
| | | 7/32 | 11 | 6 |
| | | 5/32 | 14 | 8 |
| H 40x80mm | SLC-4PH | 5/16 | 17 | 4 |
| | | 7/32 | 20 | 6 |
| | | 5/32 | 24 | 8 |
| L 40x120mm | SLC-4PL | 5/16 | 22 | 4 |
| | | 7/32 | 30 | 6 |
| | | 5/32 | 34 | 8 |
| V 80x40mm | SLC-4PV | 5/16 | 7 | 8 |
| | | 7/32 | 10 | 9 |
| | | 5/32 | 12 | 14 |
| G 80x80mm | SLC-4PG | 5/16 | 12 | 7 |
| | | 7/32 | 15 | 10 |
| | | 5/32 | 18 | 14 |

**Engraving Size Samples**

**5/16" size**

**7/32" size**

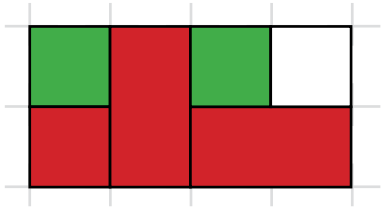
**5/32" size**

## Engraving Example

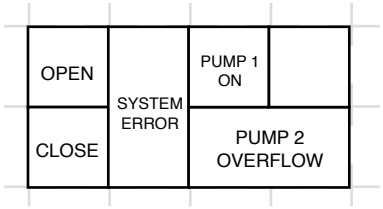
Engraving information can be provided in two ways:

### Method 1

If you have created your own SLC annunciator layout and there is enough space to write engraving information, please print out a copy of the layout and write what you would like to be engraved in respective window. Attach this with the Order Form and send it to IDEC Customer Service for processing.



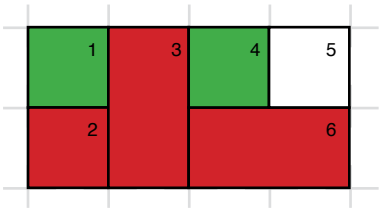
**Engraving Layout**




**SLC Annunciator Layout**

### Method 2

If you are using the Order Form from the IDEC Automation Catalog and do not have enough space to list engraving information, you can number the top right corner of the window you would like to be engraved.

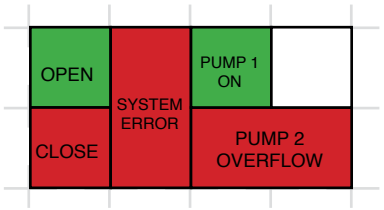



Keeping engraving window type, character size, maximum character per line and maximum number of lines in perspective, create a table (see Engraving Table Example shown below). Please attach the Table along with SLC annunciator layout and send it to IDEC Customer Service for processing.

Engraving Table Example

| Window | Font Size | Engrave |
|---|---|---|
| 1 | 7/32" | "OPEN" |
| 2 | 7/32" | "CLOSE" |
| 3 | 7/32" | "SYSTEM" "ERROR " |
| 4 | 3/16" | "PUMP 1" "ON" |
| 5 | | NO ENGRAVING |
| 6 | 5/32" | "PUMP 2" "OVERFLOW" |

Using method 1 or 2, the final engraved panel will look as below:




**Final Engraved Panel**

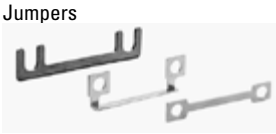
## Accessories

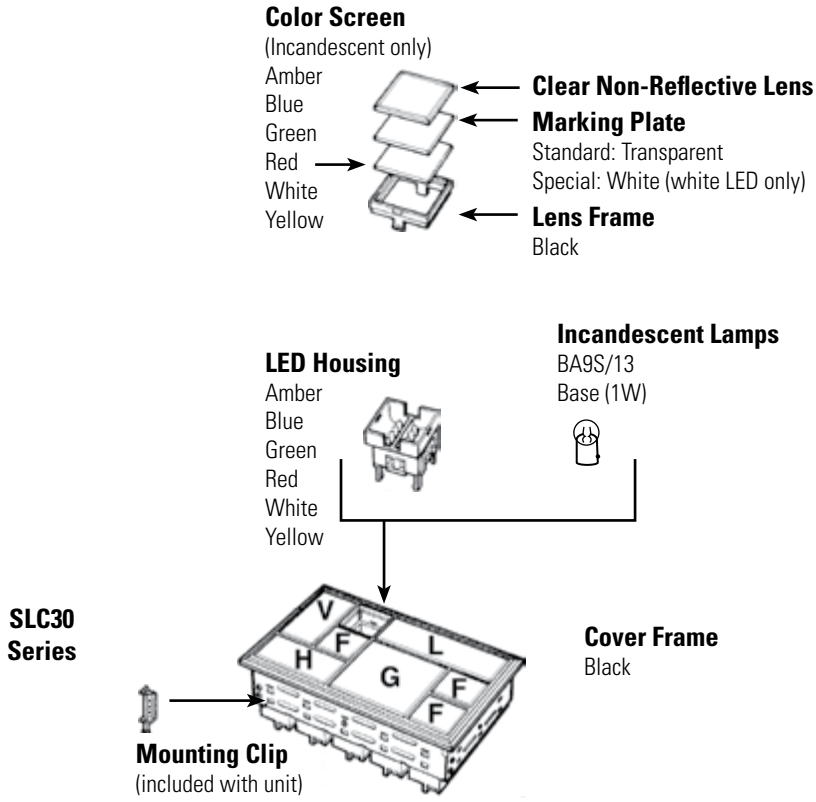
| Description | | Application | | Part No. | Remarks | |
|---|---|---|---|---|---|---|
| Lenses | | SLC30 incandescent, LED | F | SLC-3LF-(UL) | A lens is included with each window on assembled units | |
| | | | H and V | SLC-3LH-(UL) | | |
| | | | L | SLC-3LL-(UL) | | |
| | | | G | SLC-3LG-(UL) | | |
| | | SLC40 incandescent, LED | F | SLC-4LF-(UL) | | |
| | | | H and V | SLC-42H-(UL) | | |
| | | | L | SLC-4LL-(UL) | | |
| | | | G | SLC-4LG | | |
| Color Screens | | SLC30 incandescent | F | SLC-3PF-*-(UL) | Specify color code in place of asterisk ( * ):<br>A = Amber<br>C = Transparent<br>G = Green (incandescent)<br>R = Red<br>S = Blue<br>W = White<br>Y = Yellow | A color screen and marking plate are included with each window of assembled incandescent units<br><br>Two marking plates are included with each window of assembled LED units; LED units do not use color screens |
| | | | H and V | SLC-3PH-*-(UL) | | |
| | | | L | SLC-3PL-*-(UL) | | |
| | | | G | SLC-3PG-* | | |
| | | SLC40 incandescent | F | SLC-4PF-*-(UL) | | |
| | | | H and V | SLC-4PH-* | | |
| | | | L | SLC-4PL-*-(UL) | | |
| | | | G | SLC-4PG | | |
| Marking Plates | | SLC30 incandescent, LED | F | SLC-3PF-□-(UL) | Specify color code in place of square ( □ ):<br>C = Transparent (LED)<br>W = White (incandescent)<br>WL = White (LED) | |
| | | | H and V | SLC-3PH-□-(UL) | | |
| | | | L | SLC-3PL-□-(UL) | | |
| | | | G | SLC-3PG-□-(UL) | | |
| | | SLC40 incandescent, LED | F | SLC-4PF-□-(UL) | | |
| | | | H and V | SLC-4PH-□-(UL) | | |
| | | | L | SLC-4PL-□-(UL) | | |
| | | | G | SLC-4PG | | |
| Lens Frames | | SLC30 incandescent only | F | SLC-3WF-B | A lens frame is included with each window on assembled units<br>Lens frame for LED modules has the inner walls painted white, while the incandescent frame is completely black. | |
| | | | H | SLC-3WH-B | | |
| | | | V | SLC-3WV-B | | |
| | | | L | SLC-3WL-B | | |
| | | | G | SLC-3WG-B | | |
| | | SLC30 LED only | F | SLC-3WF-BL | | |
| | | | H | SLC-3WH-BL | | |
| | | | V | SLC-3WV-BL | | |
| | | | L | SLC-3WL-BL | | |
| | | | G | SLC-3WG-BL | | |
| | | SLC40 incandescent only | F | SLC-4WF-B | | |
| | | | H | SLC-4WH-B | | |
| | | | V | SLC-4WV-B | | |
| | | | L | SLC-4WL-B | | |
| | | | G | SLC-4WG-B | | |
| | | SLC40 LED only | F | SLC-4WF-BL | | |
| | | | V | SLC-4WV-BL | | |
| | | | L | SLC-4WL-BL | | |
| | | | G | SLC-4WG-BL | | |

| Description | | Application | | Part No. | Remarks | |
|---|---|---|---|---|---|---|
| Incandescent Lamps | BA9S/13 (1W) | SLC30 incandescent only | BA9S/13 lamp base | IS-6 | 6.3V, 1W; operating voltage: 5 to 6V AC/DC | Unless "no lamp" (99) is specified, a lamp is included with each style F window equivalent<br><br>One part number is specified for one replacement bulb |
| | | | | IS-12 | 12V, 1W; operating voltage: 9 to 12V AC/DC | |
| | | | | IS-24 | 24V, 1W; operating voltage: 18 to 24V AC/DC | |
| | | | | IS-30 | 30V, 1W; operating voltage: 24 to 30V AC /DC | |
| | E12/15 (2W) | SLC40 incandescent only | E12/15 lamp base | LE-6 | 6.3V, 2W; operating voltage: 5 to 6V AC/DC | |
| | | | | LE-8 | 18V, 2W; operating voltage: 12 to 18V AC/DC | |
| | | | | LE-2 | 24V, 2W; operating voltage: 18 to 24V AC/DC | |
| | | | | LE-3 | 30V, 2W; operating voltage: 24 to 30V AC/DC | |
| LED Lamps | | SLC30 LED only 1-color | 6V AC/DC | SLDN-36F-* | Specify color code in place of asterisk (*):<br>A = Amber<br>G = Green<br>R = Red<br>S = Blue (available in 24V version only)<br>W = White<br>Y = Yellow | |
| | | | 12V AC/DC | SLDN-31F-* | | |
| | | | 24V AC/DC | SLDN-32F-* | | |
| | | SLC30 LED only 2-color: Red/Green | 24V AC/DC | SLDN-32FW-RG | | |
| | | SLC40 LED only 1-color | 6V AC/DC | SLC-6EP* | | |
| | | | 12V AC/DC | SLCN-1ET-* | | |
| | | | 24V AC/DC | SLCN-2ET-* | | |
| | | SLC40 LED only 2-color: Red/Green | 24V AC/DC | SLCN-2ETW-RG | | |

## Replacement Parts

| Full Voltage Models | | Description | Type | Part Number |
|---|---|---|---|---|
| SLC30 | Incandescent | Incandescent | DS | SLC-3DS |
| | LED | Standard LED | DD | SLDN-3DH |
| | | LED w/ Check Terminal | DHM | SLD-3DHM |
| | | Dual Color LED | DW | SLD-3DW |
| SLC 40 | Incandescent | Incandescent | DE | SLC-4DE |
| | | Incandescent w/ Check Terminal | DEM | SLC-4DEM |
| | LED | Standard LED | DD | SLDN-4DH |
| | | LED w/ Check Terminal | DHM | SLD-4DHM |
| | | Dual Color LED | DW | SLD-4DW |
| **Step Down Models** | | **Description** | **Type** | **Part Number** |
| SLC30 | Incandescent | Incandescent xfrmr, 120V AC | TS12 | SLC-3TS120 |
| | | Incandescent xfrmr, 240V AC | TS24 | SLC-3TS240 |
| | LED | LED xfrmr, 120V AC | TD12 | SLDN-3TH12 |
| | | LED xfrmr, 240V AC | TD24 | SLDN-3TH24 |
| | | LED DC-DC converter, 110V DC | CD1 | SLDN-3CH1 |
| SLC40 | Incandescent | Incandescent xfrmr, 120V AC | TE12 | SLC-4TE12 |
| | | Incandescent xfrmr, 240V AC | TE24 | SLC-4TE240 |
| | LED | LED xfrmr, 120V AC | TD12 | SLDN-4TH120 |
| | | LED xfrmr, 240V AC | TD24 | SLDN-4TH240 |
| | | LED DC-DC converter, 110V DC | CD1 | SLDN-4CH1 |

| Description | Application | | Part No. | Remarks |
|---|---|---|---|---|
| Lamp Holder Tool | SLC30 and SLC40 incandescent | | OR-55 | Rubber tool eases the removal of incandescent lamps |
| Tab Terminal Adaptors | Used for wiring quick-connect terminals | | TW-FA1 | #250 tab terminal (W x H): 0.250" x 0.031" (6.35 x 0.8mm) single tab |
| Jumpers  | SLC30 | X1 terminal (spade) | SLC-JP30 | Total number of jumpers equals total number of style F window equivalents |
| | | X2 terminal (ring) | SLCN-JP34 | |
| | | C terminal (ring) | SLC-JP32 | |
| | SLC40 | X1 terminal (spade) | SLC-JP40 | |
| | | X2 terminal (ring) | SLCN-JP44 | |
| | | C terminal (ring) | SLC-JP42 | |
| Mounting Clip | All SLCs | | SLC-3K1 | Mounting clips are included with the panel (see page 827 for details about quantity and placement). |
| Finger-Safe Terminal Covers | Use with SLC30 types DD, TD, CD, DS and TS | | SLC30-VL3 | |
| | Use with all SLC30 types DHM and DW | | SLC30-VL6 | |
| | Use with SLC40 types DD, TD, CD, DE and TE | | HW-VL3 | |
| | Use with SLC40 types DHM, DW, and DEM | | SLC40-VL6 | |



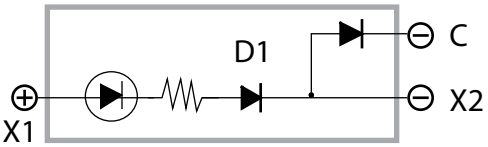
# SLC Series Installation Instructions

## Installation Notes

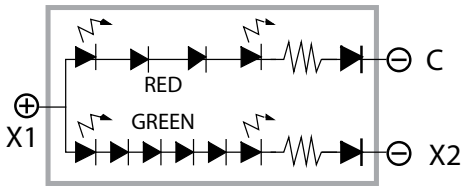
1. Since lamps generate heat, it is recommended that ventilation be provided for cooling when more than ten lamps are lit continuously.
2. A lower number of windows is specified for multiple transformer and DC-DC converter units (50 maximum, instead of 200 as for full voltage only). This is done to avoid damage which may result from excessive heat generation when all lamps are lit simultaneously.
3. When multiple units are panel mounted, determine panel thickness so that the combined weight of all units and connecting wires can be supported.
4. Multiple units are not designed for continuous, simultaneous lighting of all lamps. However, it is possible to conduct a lamp test with all lamps lit simultaneously for a period of up to 40 minutes.
5. Before removing the LED unit, turn the power supply off.
6. DC-rated voltages for LED units are complete direct current voltages. Make sure to check the measuring instruments and compensate for any error in the measured, full-wave rectified or pulsating voltages.
7. To ensure brightness and long life of LED units, keep the DC power voltage within the operating voltage range.
   **LED Operating Voltage Range: 24V AC/DC ± 10%**

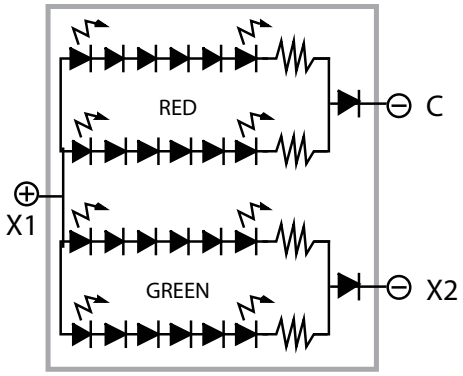
## Terminal Arrangements (LED units)

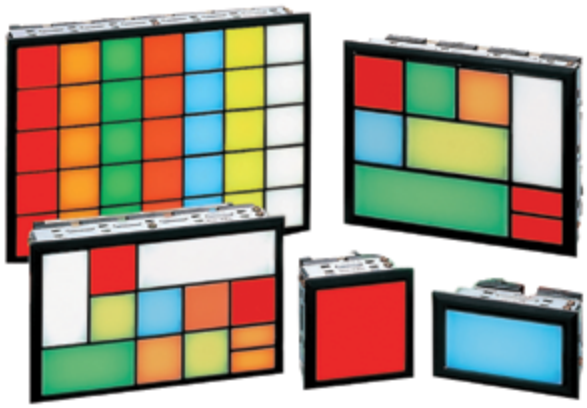
For full voltage (1- and 2-color) and DC-DC converter LED units, terminal X1 is positive and terminal X2 is negative. Make sure to observe polarity when wiring.



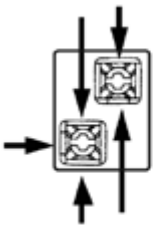

For 2-color alternate units, terminal X1 is positive, and terminals X2 and C (check terminal) are negative.



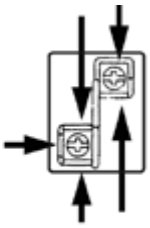



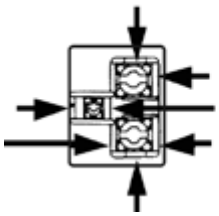
**SLC30/SLC40**
**Full Voltage**
**DC-DC Converter**



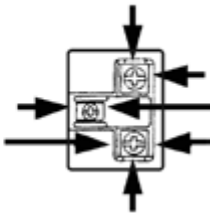
**SLC30/SLC40**
**Transformer**



**SLC30/SLC40**
**Full Voltage**
**with Check Terminal**



**SLC30/40**
**2-color LED**
**(alternating)**



**SLC30**

**SLC40**

## Installation Instructions, continued

### Removing Windows

**SLC30:** To remove a window, insert the tip of a small screwdriver into the slot under the lens frame and gently press down on the screwdriver.

**SLC40:** To remove an extended window, pull on the top as if to extend the unit; then continue pulling until the unit comes out of the housing. All units are shipped with windows retracted. When transporting units, make sure windows are pushed in fully. After windows are installed, they can be extended as shown in Figure 1.

### Removing Lens, Color Screen, and Marking Plate

The lens has two retaining projections on the right and two on the left. To remove the lens, color screen, and marking plate from the lens frame, push open the lens frame with both hands as shown in Figure 2.

The lens can also be removed by inserting a screwdriver into one of the sides with recesses. Since the lens has an orientation, be sure to insert the screwdriver in the direction shown in Figures 3 and 4.

**Figure 3: SLC30**

**Figure 4: SLC40**

### Installing Lens, Color Screen, and Marking Plate

First, install the marking plate and color screen into the lens frame. To install the lens, insert its retaining projections into the recesses inside the lens frame, and press the lens into the lens frame as shown in Figure 5.

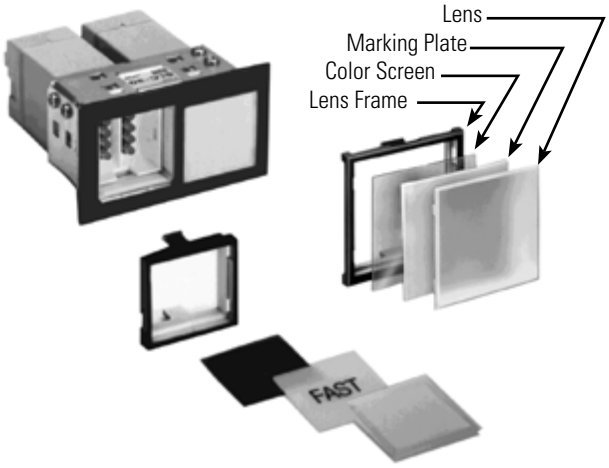



**Figure 5: SLC30 and SLC40**

### Replacing the LED Unit

**To remove:** Insert the tip of a screwdriver into one of the two slots inside the LED unit. Pull the LED unit straight out without pressing on the LED terminals, as shown in Figure 6.

**To install:** Make sure that the junction inside the LED unit is aligned in the same direction as the junction of the LED housing. Push the LED unit into the LED housing as shown in Figure 7.

**Figure 6: Remove LED**

**Figure 7: Install LED**

### Installing Units into a Panel

**Single units:** With leaf springs installed, push the SLC housing from the front of the panel. Secure the SLC housing with two mounting clips. Tighten the mounting clip screws to a torque of 4 to 5 kgf-cm as shown in Figure 8.

**Figure 8: SLC40**

**Multiple combination units:** Insert the units into the panel cut-out from the front. Install the attached mounting clips into the openings on the frame, and tighten the screws as shown in Figure 9. After tightening, use Loctite to prevent loosening. The number of mounting clips included with each multiple unit varies with the number of windows as shown in the table below.

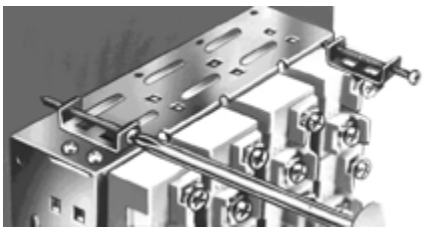


**Figure 9: Multiple Combination**

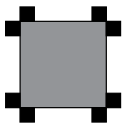
## SLC Series Installation Instructions, continued

### Number of Mounting Clips Included

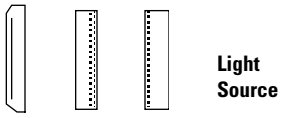
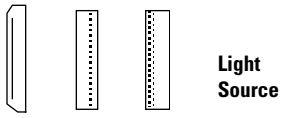
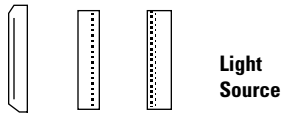
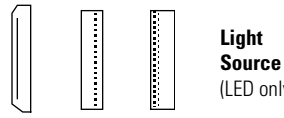
| Columns | 1 or 2 | | 3 to 8 | | 9 to 15 | 16 to 20 * |
|---|---|---|---|---|---|---|
| Rows | Full Voltage | Others | Full Voltage | Others | All Types | All Types |
| 1 or 2 | 2 | | 4 | | 6 | 8 |
| 3 to 6 | 4 | 6 | 6 | 8 | 8 | 10 |
| 7 to 10 (SLC30 only) | 6 | 8 | 8 | | 10 | 12 |

* SLC30 series only

### Recommended Mounting Clip Positions

| Columns | 1 or 2 | | 3 to 8 | | 9 to 15 | 16 to 20* |
|---|---|---|---|---|---|---|
| Rows | Full Voltage | Others | Full Voltage | Others | All Types | All Types |
| 1 or 2 | 2 Clips | | 4 Clips | | 6 Clips | 8 Clips |
| | | | | | | |
| 3 to 6 | 4 Clips | 6 Clips | 6 Clips | 8 Clips | 8 Clips | 10 Clips |
| | | | | | | |
| 7 to 10 (SLC30 only) | 6 Clips | 8 Clips | 8 Clips | | 10 Clips | 12 Clips |
| | | |  | | | |

### Assembly Order for Lamp On/Lamp Off Colors

| Lamp On: Amber, Blue Green, Red, Yellow | | Lamp On: White | Lamp On: Red/Green |
|---|---|---|---|
| Lamp Off: Desired Color | Lamp Off: White | Lamp Off: White | Lamp Off: White |
| **Matte Surface** (non-shiny) | **Matte Surface** (non-shiny) | **Matte Surface** (non-shiny) | **Matte Surface** (non-shiny) |
|  |  |  |  |
| **Light Source** | **Light Source** | **Light Source** | **Light Source** (LED only) |
| Lens<br>Color Screen: Any Color<br>Marking Plate: White | Lens<br>Marking Plate: White<br>Color Screen: Any Color | Lens<br>Marking Plate: White<br>Color Screen: White | Lens<br>Marking Plate: White<br>Color Screen: White |

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General Purpose Relays ..... 832
- RV8H Series 6mm Interface Relays ..... 832
- RV8S Series 6mm Interface Relays ..... 834
- RV8H Series 14mm Interface Relays ..... 838
- RJ Series Slim Power Relays ..... 843
- RL Series Power Relays ..... 853
- RQ Series PCB Relays ..... 859
- RH Series Compact Power Relays ..... 863
- RR Series Power Relays ..... 873
- RU Series Universal Relays ..... 879
- RY/RM Series Miniature Relays ..... 888
- RF1V Force Guided Relays ..... 899
- RF2V Force Guided Relays ..... 907

Solid State Relays ..... 915
- RSC Series Solid State Relays ..... 915
- RSS Series Panel Mount Solid State Relays ..... 918

# Relays

IDEC

**www.IDEC.com/relays**

# Selection Guide

## General Purpose Relays

| Series | RV8 6mm Series | RV8H 14mm Series | RJ Series | RQ Series | RH Series | RL Series |
|---|---|---|---|---|---|---|
| Appearance | | | | | | |
| Page | 832 | 838 | 843 | 858 | 863 | 852 |
| Contact Configuration | 1 form C (SPDT) | 1-pole : 1C (SPDT)<br>2-pole: 2C (DPDT) | SPDT, SPST, DPDT, DPST | SPDT, DPDT | SPDT, DPDT, 3PDT, 4PDT | RL1: 1X (SPST, Double Make)<br>RL2: 2X (DPST, Double Make) |
| Terminal | Screw, Spring-clamp | Screw, Spring Clamp | Blade or PCB | PCB | Blade or PCB | QuicK Connect/Screw |
| Contact Rating (resistive) | 6A 30V DC/250V AC | 1-pole screw: 16A<br>1-pole spring: 12A<br>2-pole screw: 8A<br>2-pole spring: 6A | SPDT: 12A/16A, 30V DC/250V AC<br>DPDT: 8A, 30V DC/250V AC | SPDT: 12A, 16A<br>DPDT: 8A | 10A, 30V DC/240V AC<br>1/3HP, 240V AC<br>1/6HP, 120V AC | 1-pole: 250V AC 30A<br>2-pole: 250V AC 25A |
| Contact Material | Silver-Nickel with gold plating | 1-pole: Silver-Nickel<br>2-pole: Silver-Nickel with gold plating | Silver-Nickel alloy | Silver-Nickel alloy | Silver-Cadmium Oxide | Ag Alloy |
| Approvals | CE<br>c UL us<br>Class I Division 2 Hazardous Locations | CE<br>c UL us<br>(when using combination of RV relay and SV socket) | c UL us SA<br>VDE Reg.-Nr. B312<br>CE | c UL us<br>CE<br>TÜV Rheinland | c UL us<br>TÜV SA<br>CE | c UL us<br>CE<br>VDE Reg.-Nr. B312 |

| Series | RR Series | RU Series | | RY/RM Series | | RF1V Series |
|---|---|---|---|---|---|---|
| Appearance | | | | | | |
| Page | 873 | 879 | | 888 | | 899 |
| Contact Configuration | SPDT, DPDT, 3PDT | DPDT, 4PDT | | DPDT, 4PDT | DPDT | 4PDT or 6PDT |
| Terminal | Pin or Blade | Blade or PCB | | Blade or PCB | | |
| Contact Rating (resistive) | 10A, 30V DC/ 240V AC<br>1/3HP, 240V AC<br>1/4HP, 120V AC | DPDT: 10A, 30V DC/250V AC<br>4PDT: 6A, 30V DC/250V AC<br>1/10 HP, 240V AC | | RY: DPDT: 3A, 30V DC/240V AC<br>4PDT: 5A, 30V DC/240V AC | 5A, 30V DC/240V AC | 6A, 250V AC<br>6A 250V DC |
| Contact Material | Silver | DPDT | Silver Tin Oxide Indium | Gold plated silver | Silver | Silver alloy |
| | | 4PDT | Gold-Silver Alloy on Silver | | | |
| Approvals | c UL us<br>TÜV SA<br>CE | c UL us<br>TÜV SA<br>CE | | c UL us SA<br>TÜV CE | | c UL us<br>TÜV SA<br>CE*<br>*with socket |

## Selection Guide con't

### Bifurcated Contacts Relays

| Series | RJ22 Series | RU42 Series |
|---|---|---|
| Appearance | | |
| Page | 843 | 879 |
| Contact Configuration | DPDT | 4PDT |
| Terminal | Blade or PCB | Blade or PCB |
| Contact Rating (resistive) | 1A 250V AC/30V DC | 3A 250V AC/30V DC |
| Contact Material | Gold clad | Gold Silver Alloy on Silver |
| Approvals | cULus, CSA, VDE Reg.-Nr. B312, CE | cULus, TÜV, CSA, CE |

### Latching Relays

| Series | RR2KP Series | RY2KS Series |
|---|---|---|
| Appearance | | |
| Page | visit www.IDEC.com/relays | |
| Contact Configuration | DPDT | DPDT |
| Terminal | Pin | Blade |
| Contact Rating (resistive) | 10A, 30V DC<br>10A, 240V AC | 3A, 30V DC<br>3A, 240V AC |
| Contact Material | Silver | Silver, gold-plated |
| Approvals | cULus, CSA | cULus, CSA |

### Solid State Relays

| Series | RV8S Series | RSC Series | RSS Series |
|---|---|---|---|
| Appearance | | | |
| Page | 834 | 915 | 918 |
| Output Configuration | 1 Form A (SPST-NO) | 1 Form A (SPST-NO) | 1 Form A (SPST-NO) |
| Output Rating | 24V: 3.5A, 48V DC: 100mA, 280 V AC: 2A | 20A, 30A, 45A<br>48 - 600V AC | 10A, 25A, 50A, 75A, 90A<br>48 - 660V AC |
| Output | 24V - MOSFET, 48V DC Photo-transistor, 280V AC: Triac | Dual SCR (zero crossing) | |
| Approvals | CE, cULus LISTED (when using combination of RV relay and SV socket) | cULus, CSA, TÜV Rheinland, CE | cULus, CE |

# RV8 Series 6mm Interface Relays

**Key features:**

- Class I, Division 2 and Class I, Zone 2 Hazardous Location options (electromechanical relays only)
- Solid State relay versions available
- Only 70mm in height from DIN rail
- Gold-plated contacts (electrical mechanical relays only)
- Pre-assembled relay and DIN mount socket
- Universal screw terminals (flat and phillips) or spring clamp terminals
- Universal AC/DC socket with built-in surge suppression and green LED
- 6A contact rating (electromechanical relays only)
- Lever for easy locking and removal of relay
- Operating temperature of -40°C ~ +70°C (-20°C ~ +60°C for SSR)
- RoHS compliant

CE

c UL us LISTED
(when using combination of RV relay and SV socket)

Electromechanical C1D2 (screw terminal)

Top view with marking plate

Solid State (spring clamp)

Top view with marking plate

## RV8H Electromechanical Part Numbers

**Electromechanical General Purpose and Hazardous Location (Class I, Division 2) Relays**

Screw Terminals

Complete Unit

Relay Only

Spring Clamp Terminals

Complete Unit

Relay Only

| Coil Voltage | | General Purpose | | Hazardous Location (C1D2) | | General Purpose | | Hazardous Location (C1D2) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Complete Part Number | Replacement (Relay Only) | Complete Part Number | Replacement (Relay Only) | Complete Part Number | Replacement (Relay Only) | Complete Part Number | Replacement (Relay Only) |
| DC | 6V | RV8H-L-D6 | RV1H-G-D5 | RV8H-L-D6-C1D2 | RV1H-G-D5-C1D2 | RV8H-S-D6 | RV1H-G-D5 | RV8H-S-D6-C1D2 | RV1H-G-D5-C1D2 |
| | 9V | RV8H-L-D9 | RV1H-G-D9 | RV8H-L-D9-C1D2 | RV1H-G-D9-C1D2 | RV8H-S-D9 | RV1H-G-D9 | RV8H-S-D9-C1D2 | RV1H-G-D9-C1D2 |
| | 12V | RV8H-L-D12 | RV1H-G-D12 | RV8H-L-D12-C1D2 | RV1H-G-D12-C1D2 | RV8H-S-D12 | RV1H-G-D12 | RV8H-S-D12-C1D2 | RV1H-G-D12-C1D2 |
| | 18V | RV8H-L-D18 | RV1H-G-D18 | RV8H-L-D18-C1D2 | RV1H-G-D18-C1D2 | RV8H-S-D18 | RV1H-G-D18 | RV8H-S-D18-C1D2 | RV1H-G-D18-C1D2 |
| | 24V | RV8H-L-D24 | RV1H-G-D24 | RV8H-L-D24-C1D2 | RV1H-G-D24-C1D2 | RV8H-S-D24 | RV1H-G-D24 | RV8H-S-D24-C1D2 | RV1H-G-D24-C1D2 |
| AC/DC | 12V | RV8H-L-AD12 | RV1H-G-D12 | RV8H-L-AD12-C1D2 | RV1H-G-D12-C1D2 | RV8H-S-AD12 | RV1H-G-D12 | RV8H-S-AD12-C1D2 | RV1H-G-D12-C1D2 |
| | 18V | RV8H-L-AD18 | RV1H-G-D18 | RV8H-L-AD18-C1D2 | RV1H-G-D18-C1D2 | RV8H-S-AD18 | RV1H-G-D18 | RV8H-S-AD18-C1D2 | RV1H-G-D18-C1D2 |
| | 24V | RV8H-L-AD24 | RV1H-G-D24 | RV8H-L-AD24-C1D2 | RV1H-G-D24-C1D2 | RV8H-S-AD24 | RV1H-G-D24 | RV8H-S-AD24-C1D2 | RV1H-G-D24-C1D2 |
| | 48V | RV8H-L-AD48 | RV1H-G-D48 | RV8H-L-AD48-C1D2 | RV1H-G-D48-C1D2 | RV8H-S-AD48 | RV1H-G-D48 | RV8H-S-AD48-C1D2 | RV1H-G-D48-C1D2 |
| | 60V | RV8H-L-AD60 | RV1H-G-D60 | RV8H-L-AD60-C1D2 | RV1H-G-D60-C1D2 | RV8H-S-AD60 | RV1H-G-D60 | RV8H-S-AD60-C1D2 | RV1H-G-D60-C1D2 |
| | 110V - 125V | RV8H-L-AD110 | RV1H-G-D60 | RV8H-L-AD110-C1D2 | RV1H-G-D60-C1D2 | RV8H-S-AD110 | RV1H-G-D60 | RV8H-S-AD110-C1D2 | RV1H-G-D60-C1D2 |
| | 220V - 240V | RV8H-L-AD220 | RV1H-G-D60 | RV8H-L-AD220-C1D2 | RV1H-G-D60-C1D2 | RV8H-S-AD220 | RV1H-G-D60 | RV8H-S-AD220-C1D2 | RV1H-G-D60-C1D2 |

## Electromechanical Coil Ratings

| Rated Voltage | | Rated Current ±15% (mA)* | Circuit AC Resistance ±15% (Ω)* | Circuit DC Resistance ±15% (Ω)* | Operating Characteristics | | | Power Consumption |
|---|---|---|---|---|---|---|---|---|
| | | | | | Pickup Voltage | Dropout Voltage | Maximum Allowable Voltage | |
| DC | 6V | 35 | - | 170 | 90% max | 7% min | 110% | 0.21W |
| | 9V | 18.6 | - | 485 | | | | 0.2W |
| | 12V | 14.6 | - | 820 | | | | 0.2W |
| | 18V | 11.6 | - | 1550 | | | | 0.2W |
| | 24V | 10.6 | - | 2270 | | | | 0.25W |
| AC/DC | 12V | 15.5 | 755 | 800 | 90% max | 7% min | 110% | 0.2W |
| | 18V | 13.3 | 1365 | 1345 | | | | 0.25W |
| | 24V | 13.7 | 1730 | 1790 | | | | 0.33W |
| | 48V | 4 | 11880 | 12230 | | | | 0.2W |
| | 60V | 3.4 | 17600 | 17910 | | | | 0.2W |
| | 110V - 125V | 3.4 - 3.9 | 31790 - 31890 | 32450 - 32900 | | | | 0.5W |
| | 220V - 240V | 3.3 - 3.6 | 65670 - 66070 | 65940 - 68570 | | | | 0.85W |

*±10% for 6V, 9V and 12V

## Electromechanical Contact Ratings

| | | |
|---|---|---|
| Allowable Contact Power | Resistive Load | 1500VA, 180W DC |
| Rated Load | Resistive Load | 250V AC 6A, 30V DC 6A |
| Allowable Switching Current | | 6A |
| Allowable Switching Voltage | | 400V AC, 125V DC |
| Allowable Switching Power | | 1500VA, 180W DC |
| Minimum Applicable Load | | 6V DC/10mA |

## RV8S Solid State Relay Part Numbers

| | | | Screw Terminals | Spring Clamp Terminals |
|---|---|---|---|---|
| | | | | |

| Input Voltage | | Output Voltage | Complete Part Number | Complete Part Number |
|---|---|---|---|---|
| DC | 6V | 24V DC, 3.5A | RV8S-L-D24-D6 | RV8S-S-D24-D6 |
| | | 48V DC, 0.1A | RV8S-L-D48-D6 | RV8S-S-D48-D6 |
| | | 240V AC, 2A zero cross | RV8S-L-A240Z-D6 | RV8S-S-A240Z-D6 |
| | | 240V AC, 2A random | RV8S-L-A240-D6 | RV8S-S-A240-D6 |
| | 24V | 24V DC, 3.5A | RV8S-L-D24-D24 | RV8S-S-D24-D24 |
| | | 48V DC, 0.1A | RV8S-L-D48-D24 | RV8S-S-D48-D24 |
| | | 240V AC, 2A zero cross | RV8S-L-A240Z-D24 | RV8S-S-A240Z-D24 |
| | | 240V AC, 2A random | RV8S-L-A240-D24 | RV8S-S-A240-D24 |
| AC | 120V | 24V DC, 3.5A | RV8S-L-D24-A120 | RV8S-S-D24-A120 |
| | | 48V DC, 0.1A | RV8S-L-D48-A120 | RV8S-S-D48-A120 |
| | | 240V AC, 2A zero cross | RV8S-L-A240Z-A120 | RV8S-S-A240Z-A120 |
| | | 240V AC, 2A random | RV8S-L-A240-A120 | RV8S-S-A240-A120 |
| | 240V | 24V DC, 3.5A | RV8S-L-D24-A240 | RV8S-S-D24-A240 |
| | | 48V DC, 0.1A | RV8S-L-D48-A240 | RV8S-S-D48-A240 |
| | | 240V AC, 2A zero cross | RV8S-L-A240Z-A240 | RV8S-S-A240Z-A240 |
| | | 240V AC, 2A random | RV8S-L-A240-A240 | RV8S-S-A240-A240 |

### Solid State Output Ratings

| Typical Input Voltage | 24V DC | 48V DC | 240V AC |
|---|---|---|---|
| Output Device | MOSFET | Photo-transistor | Triac |
| Operating Voltage Range | 0-24V DC | 0-48V DC | 24-280V AC (47-63Hz) |
| Maximum Load Current | 3.5A | 100mA | 2A |
| Minimum Load Current | 1mA | 1mA | 70mA |
| Maximum Blocking Voltage | 30V DC | 60V DC | 600V AC |
| Maximum Surge Current | 9A (10ms) | 300mA (10ms) | 120A pk (16.6ms) |
| Maximum I2t for Fusing | – | – | 60A² sec |
| Typical On-State Leakage Current | 0.4V | 1V | 1.1V (peak) |
| Maximum Off-State Leakage Current | 0.001mA | 0.001mA | 4mA |
| Switching Configuration | Normally Open | Normally Open | Normally Open |

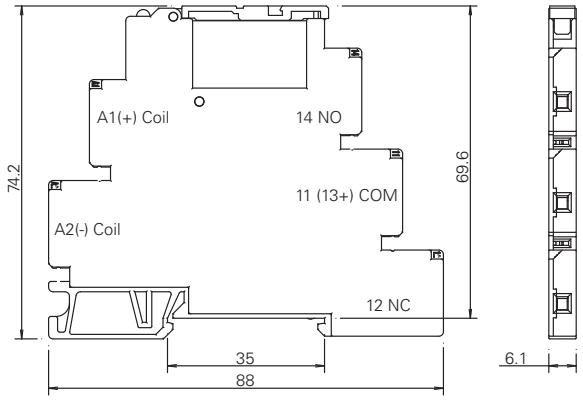
### Solid State Input Ratings

| Type | Control Voltage Range | Output / Input Voltage | Pickup Voltage | Dropout Voltage | Input Current | Maximum Operation Time | Maximum Release Time |
|---|---|---|---|---|---|---|---|
| | 4.5-12V DC | 24V DC / 6V DC | 4.5V DC | 1.5V DC | 10mA±10%(±6VDC) | 120µs | 200µs |
| | 19.6-30V DC | 24V DC / 24V DC | 19.6V DC | 5V DC | 9mA±10%(±24VDC) | 350µs | 200µs |
| | 96-132V AC | 24V DC / 120V AC | 96V AC | 12V AC | 10mA±10%(±120VAC) | 11ms | 14ms |
| | 192-264V AC | 24V DC / 240V AC | 192V AC | 24V AC | 10mA±10%(±240VAC) | 11ms | 14ms |
| | 4.5-12V DC | 48V DC / 6V DC | 4.5V DC | 1.5V DC | 6mA±10%(±6VDC) | 40µs | 300µs |
| | 19.6-30V DC | 48V DC / 24V DC | 19.6V DC | 5V DC | 7mA±10%(±24VDC) | 40µs | 300µs |
| | 96-132V AC | 48V DC / 120V AC | 96V AC | 12V AC | 10mA±10%(±120VAC) | 8ms | 14ms |
| | 192-264V AC | 48V DC / 240V AC | 192V AC | 24V AC | 10mA±10%(±240VAC) | 8ms | 14ms |
| Zero Crossing | 4.5-12V DC | 240V AC / 6V DC | 4.5V DC | 2V DC | 15mA±10%(±6VDC) | 10ms | 10ms |
| | 19.6-30V DC | 240V AC / 24V DC | 19.6V DC | 5V DC | 7mA±10%(±24VDC) | 10ms | 10ms |
| | 96-132V AC | 240V AC / 120V AC | 96V AC | 12V AC | 10mA±10%(±120VAC) | 16ms | 20ms |
| | 192-264V AC | 240V AC / 240V AC | 192V AC | 24V AC | 10mA±10%(±240VAC) | 16ms | 20ms |
| Random Crossing | 4.5-12V DC | 240V AC / 6V DC | 4.5V DC | 2V DC | 15mA±10%(±6VDC) | 300µs | 10ms |
| | 19.6-30V DC | 240V AC / 24V DC | 19.6V DC | 5V DC | 7mA±10%(±24VDC) | 300µs | 10ms |
| | 96-132V AC | 240V AC / 120V AC | 96V AC | 12V AC | 10mA±10%(±120VAC) | 8ms | 20ms |
| | 192-264V AC | 240V AC / 240V AC | 192V AC | 24V AC | 10mA±10%(±240VAC) | 8ms | 20ms |

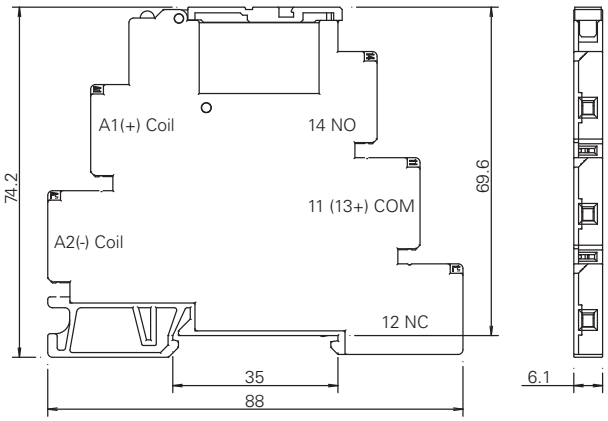
## Dimensions

### Electromechanical Relays

RV8H-L Screw Terminal (mm)

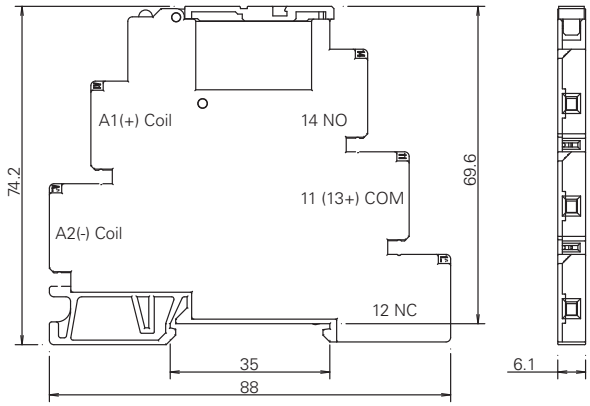



RV8H-S Spring Clamp Terminal (mm)

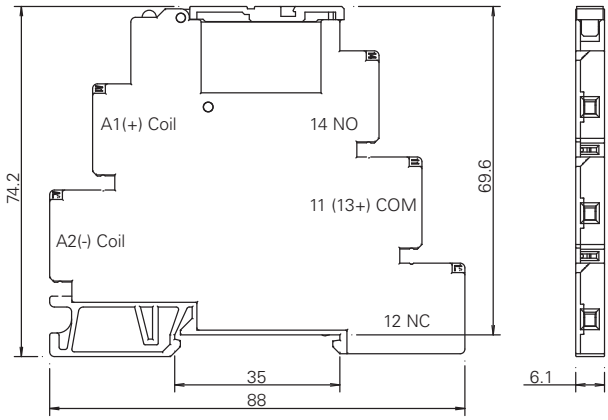



### Solid State Relays

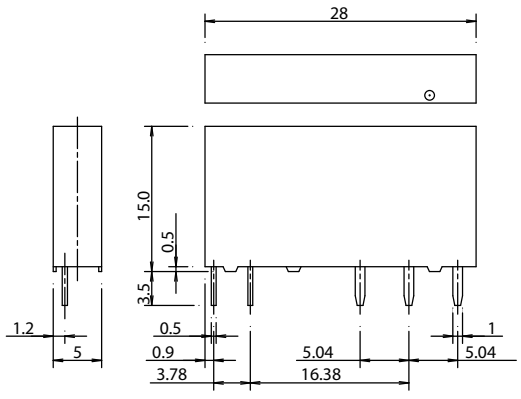
RV8S-L Screw Terminal (mm)



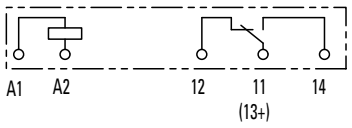

RV8S-S Spring Clamp Terminal (mm)




### RV1H Replacement Electromechanical Relay (mm)

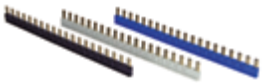



Internal Connection bottom view (mm)



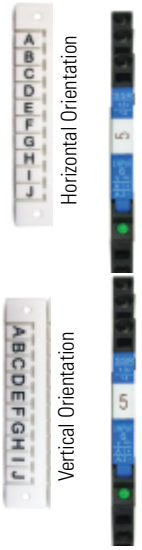
## Accessories

### Jumpers, Spacer, and Screwdriver

| Item | Color | Part Number |
|---|---|---|
| Jumper (20 combs) Note 1, 2, 4 | Black | SV9Z-J20B |
|  | Gray | SV9Z-J20W |
| | Blue | SV9Z-J20S |
| Spacer (circuit separator) Note 3, 4 | - | SV9Z-SA2W |
| Screwdriver | - | BC1S-SD0 |

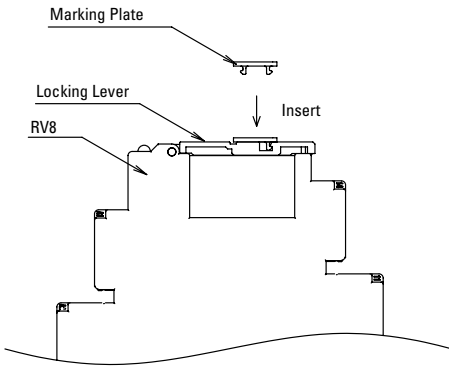
1. Jumper combs come with 20 points, if shorter lengths are needed simply cut off the excess points.
2. Ensure that the total current to the jumper does not exceed the overall rated current (Rated current: 6A).
3. Width of spacer: 2mm
4. When using a cut jumper, please use a spacer on the cut side. For additional information see instruction sheet.

### Marking Plates (Blank and Pre-marked)

| Item | Part Number | Engraving |
|---|---|---|
|   | SV9Z-PW10 | blank |
| | SV9Z-PW10-①1-10 | 1-10 |
| | SV9Z-PW10-①11-20 | 11-20 |
| | SV9Z-PW10-①21-30 | 21-30 |
| | SV9Z-PW10-①31-40 | 31-40 |
| | SV9Z-PW10-①41-50 | 41-50 |
| | SV9Z-PW10-①51-60 | 51-60 |
| | SV9Z-PW10-①61-70 | 61-70 |
| | SV9Z-PW10-①71-80 | 71-80 |
| | SV9Z-PW10-①81-90 | 81-90 |
| | SV9Z-PW10-①91-100 | 91-100 |
| | SV9Z-PW10-①A-J | A-J |
| | SV9Z-PW10-①K-T | K-T |
| | SV9Z-PW10-①U-Z | U-Z |
| | SV9Z-PW10-①GROUND | ⏚ |
| | SV9Z-PW10-①AC | ∿ |

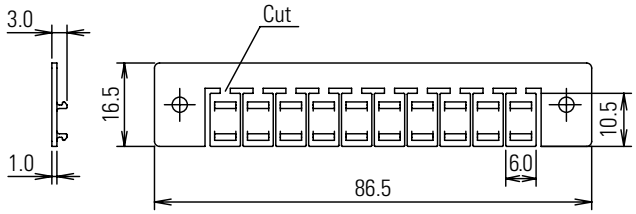
1. In place of ① insert orientation code: V=Vertical, H=Horizontal
2. Each unit has 10 pieces (marking plates).

### Marking Plate Placement



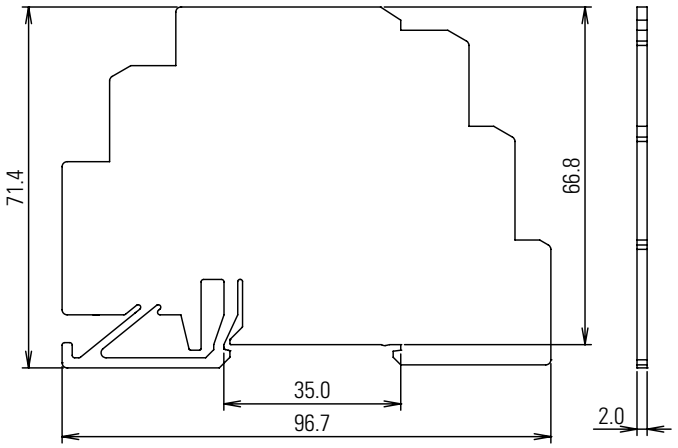

## Dimensions (mm)

### SV9Z-PW10* Marking Plate

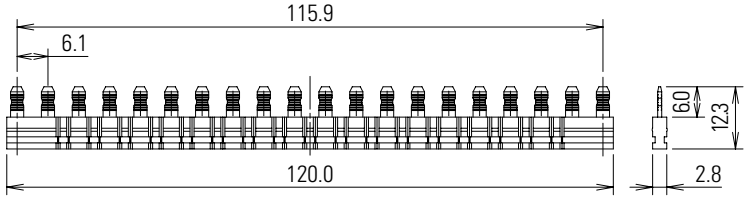



*Available blank or pre-marked.

### SV9Z-SA2W Spacer




### SV9Z-J20* Jumper

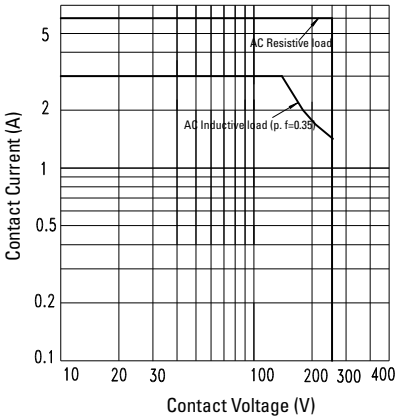



*Available in black, gray and blue.

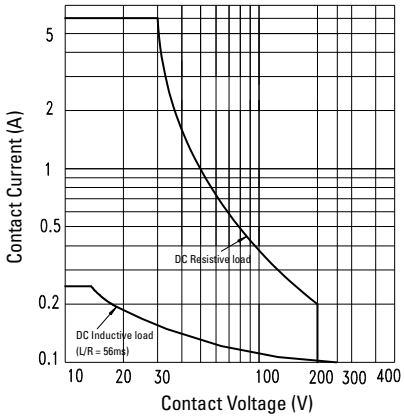
## Characteristics

### RV1H Replacement Electromechanical Relay

Maximum Switching Power AC

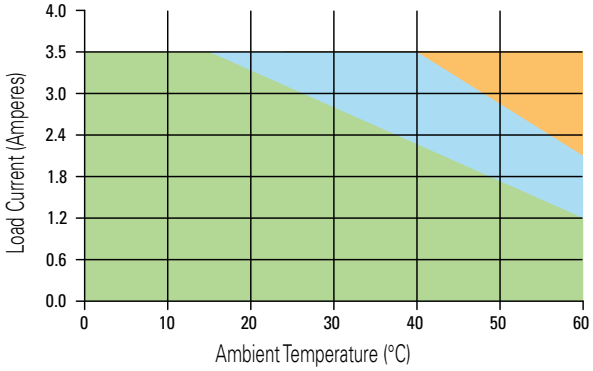



Maximum Switching Power DC

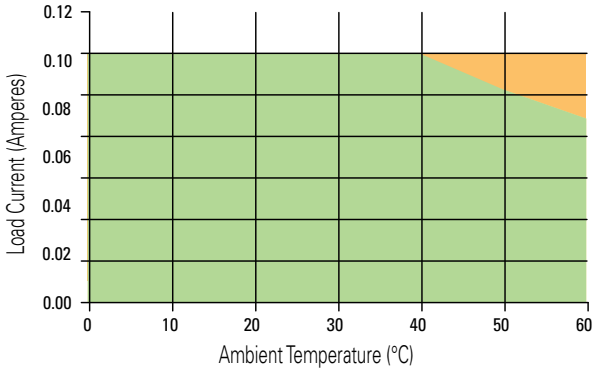



### Solid State Continuous Load Current vs. Ambient Temperature Curves

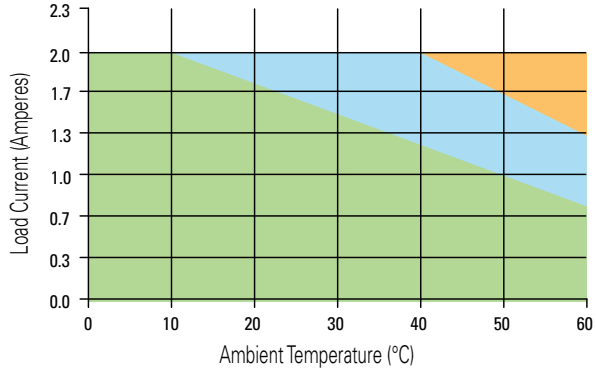
**24V DC**



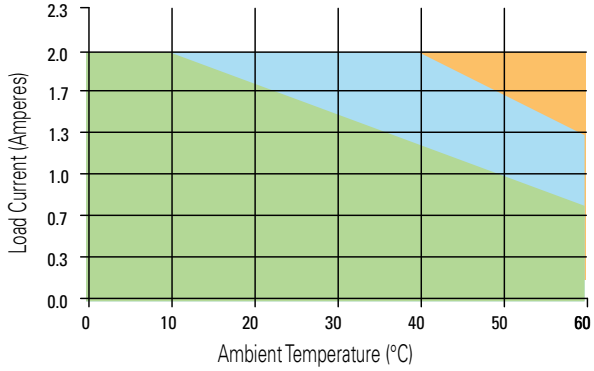

**48V DC**




**240V AC Zero Cross**




**240V AC Random Cross**




**Legend**

No spacing required between units.

Spacing of 6.2mm minimum required between units

Not Recommended

# RV8 Series 14mm Interface Relays

Top View with Marking Plate

Screw Terminal

Only 70mm in height from DIN rail

Spring Clamp Terminal

Only 70mm in height from DIN rail

(when using combination of RV relay and SV socket)

With the addition of a 14mm version, IDEC offers a complete line of RV8 interface relays. Ideal for panels with limited room, these low-profile relays provide up to a 40% reduction in DIN rail space when compared with standard plug-ins. RV8 relays are good for higher load switching applications, panels with high I/O content and commercial HVAC panels. UL listed when paired with a corresponding socket, it's easy to save space with new RV8 models.

## Key Features

- Space-saving 14mm width.
- Universal AC/DC socket with built-in surge suppression and green LED Indicator
- Gold plated contacts (2-pole model only)
- Pre-assembled relay and DIN mount socket
- Universal screw terminals (flat and Philips) or spring clamp terminals
- Only 70 mm in height from DIN rail
- Release lever for easy locking and removal of relay
- Wide input voltage range: 6 to 240V
- High dielectric strength and impulse withstand voltages.
- Reverse polarity protected
- RoHS compliant

## Specifications

| Number of Poles | | 1-pole | 2-pole |
|---|---|---|---|
| Contact Configuration | | 1C (SPDT) | 2C (DPDT) |
| Contact Material | | AgNi | AgNi (Au-plated) |
| Degree of Protection | | IP20 | IP20 |
| Dielectric strength | Between contact and coil | 5,000V AC for 1 minute | 5,000V AC for 1 minute |
| | Between contacts of the same pole | 1,000V AC for 1 minute | 1,000V AC for 1 minute |
| | Between contact sets | - | 2,500V AC for 1 minute |
| Vibration Resistance | Operating extremes | 10 to 55Hz, amplitude 0.75mm (NO contact), 0.175mm (NC contact) | 10 to 55Hz, amplitude 0.75mm (NO contact), 0.1mm (NC contact) |
| | Damage limits | 10 to 55Hz, amplitude 0.75mm (NO contact), 0.175mm (NC contact) | 10 to 55Hz, amplitude 0.75mm (NO contact), 0.1mm (NC contact) |
| Shock Resistance | Operating extremes | 98m/s² (NO) | 98m/s² (NO) |
| | Damage limits | 980m/s² | 980m/s² |
| Electrical Life - Screw terminal | | AC load:30,000 operations minimum (250V AC, 16A resistive load, operation frequency 360 operation per hour) | AC load:100,000 operations minimum (250V AC, 8A resistive load, operation frequency 360 operation per hour) |
| Electrical Life - Spring Clamp terminal | | AC load:30,000 operations minimum (250V AC, 12A resistive load, operation frequency 360 operation per hour) | AC load:100,000 operations minimum (250V AC, 6A resistive load, operation frequency 360 operation per hour) |
| Mechanical Life (no load) | | 10,000,000 operations minimum (Operation frequency 18,000 operations per hour) | 10,000,000 operations minimum (Operation frequency 18,000 operations per hour) |
| Operating Temperature | | RV8H-1L1-D6, D9, D12, D18, D24, AD12, AD18, AD24, AD48, AD60, AD110 : -40 to +70°C (Contact current 12A max, 6A per terminal) no freezing : -40 to +55°C (Contact current 16A max, 8A per terminal) no freezing | RV8H-2L-D6, D9, D12, D18, D24, AD12, AD18, AD24, AD48, AD60, AD110 : -40 to +70°C (Contact current 6A max) no freezing : -40 to +55°C (Contact current 8A max) no freezing |
| | | RV8H-1L1- AD220 : -40 to +55°C (Contact current 16A max, 8A per terminal) no freezing | RV8H-2L- AD220 : -40 to +55°C (Contact current 8A max) no freezing |
| | | RV8H-1S1-D6, D9, D12, D18, D24, AD12, AD18, AD24, AD48, AD60, AD110 : -40 to +70°C (Contact current 12A max, 6A per terminal) no freezing | RV8H-2S-D6, D9, D12, D18, D24, AD12, AD18, AD24, AD48, AD60, AD110 : -40 to +70°C (Contact current 6A max) no freezing |
| | | RV8H-1S1- AD220 : -40 to +55°C (Contact current 12A max, 6A per terminal) no freezing | RV8H-2S- AD220 : -40 to +55°C (Contact current 6A max) no freezing |
| Operating Humidity | | 5 to 85% (no condensation) | 5 to 85% (no condensation) |
| Weight | | Screw Terminal: Approx.52g Spring Clamp Terminal: Approx. 49g | Screw Terminal: Approx. 52g Spring Clamp Terminal: Approx. 49g |

## Part Numbers

| Input voltage | | Screw Terminals | | | | Spring Clamp Terminals | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1-pole | | 2-pole | | 1-pole | | 2-pole | |
| | | Complete Part Number | Replacement (Relay Only) | Complete Part Number | Replacement (Relay Only) | Complete Part Number | Replacement (Relay Only) | Complete Part Number | Replacement (Relay Only) |
| DC | 6V | RV8H-1L1-D6 | RV2H-1HG1-D5 | RV8H-2L-D6 | RV2H-2G-D5 | RV8H-1S1-D6 | RV2H-1HG1-D5 | RV8H-2S-D6 | RV2H-2G-D5 |
| | 9V | RV8H-1L1-D9 | RV2H-1HG1-D9 | RV8H-2L-D9 | RV2H-2G-D9 | RV8H-1S1-D9 | RV2H-1HG1-D9 | RV8H-2S-D9 | RV2H-2G-D9 |
| | 12V | RV8H-1L1-D12 | RV2H-1HG1-D12 | RV8H-2L-D12 | RV2H-2G-D12 | RV8H-1S1-D12 | RV2H-1HG1-D12 | RV8H-2S-D12 | RV2H-2G-D12 |
| | 18V | RV8H-1L1-D18 | RV2H-1HG1-D18 | RV8H-2L-D18 | RV2H-2G-D18 | RV8H-1S1-D18 | RV2H-1HG1-D18 | RV8H-2S-D18 | RV2H-2G-D18 |
| | 24V | RV8H-1L1-D24 | RV2H-1HG1-D24 | RV8H-2L-D24 | RV2H-2G-D24 | RV8H-1S1-D24 | RV2H-1HG1-D24 | RV8H-2S-D24 | RV2H-2G-D24 |
| AC/DC | 12V | RV8H-1L1-AD12 | RV2H-1HG1-D12 | RV8H-2L-AD12 | RV2H-2G-D12 | RV8H-1S1-AD12 | RV2H-1HG1-D12 | RV8H-2S-AD12 | RV2H-2G-D12 |
| | 18V | RV8H-1L1-AD18 | RV2H-1HG1-D18 | RV8H-2L-AD18 | RV2H-2G-D18 | RV8H-1S1-AD18 | RV2H-1HG1-D18 | RV8H-2S-AD18 | RV2H-2G-D18 |
| | 24V | RV8H-1L1-AD24 | RV2H-1HG1-D24 | RV8H-2L-AD24 | RV2H-2G-D24 | RV8H-1S1-AD24 | RV2H-1HG1-D24 | RV8H-2S-AD24 | RV2H-2G-D24 |
| | 48V | RV8H-1L1-AD48 | RV2H-1HG1-D48 | RV8H-2L-AD48 | RV2H-2G-D48 | RV8H-1S1-AD48 | RV2H-1HG1-D48 | RV8H-2S-AD48 | RV2H-2G-D48 |
| | 60V | RV8H-1L1-AD60 | RV2H-1HG1-D60 | RV8H-2L-AD60 | RV2H-2G-D60 | RV8H-1S1-AD60 | RV2H-1HG1-D60 | RV8H-2S-AD60 | RV2H-2G-D60 |
| | 110V - 125V | RV8H-1L1-AD110 | RV2H-1HG1-D110 | RV8H-2L-AD110 | RV2H-2G-D110 | RV8H-1S1-AD110 | RV2H-1HG1-D110 | RV8H-2S-AD110 | RV2H-2G-D110 |
| | 220V - 240V | RV8H-1L1-AD220 | RV2H-1HG1-D110 | RV8H-2L-AD220 | RV2H-2G-D110 | RV8H-1S1-AD220 | RV2H-1HG1-D110 | RV8H-2S-AD220 | RV2H-2G-D110 |

## Ratings

### Coil Ratings

| Rated Voltage | | Operating Characteristics (Against Rated Voltage) | | | | | | Power Consumption (W) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Minimum Pickup Voltage (at 23°C) | Dropout Voltage (at 23°C) | Maximum Allowable Voltage (at 23°C) | Maximum Continuous Applied Voltage (Note 1) | Operation time | Release time | DC | AC (50Hz) | AC (60Hz) |
| DC | 6V | 80% max | 7% min | 120% | 110% (Note 2) | 15ms max | 15ms max | 0.45 | - | - |
| | 9V | | | | | | | 0.40 | - | - |
| | 12V | | | | | | | 0.38 | - | - |
| | 18V | | | | | | | 0.43 | - | - |
| | 24V | | | | | | | 0.48 | - | - |
| AC/DC | 12V | | | 110% | | | | 0.38 | 0.35 | 0.35 |
| | 18V | | | | | | | 0.43 | 0.43 | 0.43 |
| | 24V | | | | | | | 0.48 | 0.50 | 0.50 |
| | 48V | | | | | | | 0.36 | 0.43 | 0.43 |
| | 60V | | | | | | | 0.46 | 0.54 | 0.54 |
| | 110V - 125V | | | | | | | 0.64 | 0.73 | 0.73 |
| | 220V - 240V | | | | | | | 1.10 | 1.25 | 1.32 |

Note 1: At rated operating temperature
Note 2: Rated Voltage AC/DC 240V : 106%

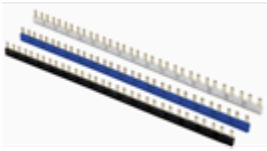
### Contact Ratings

| | | Screw Terminal | Spring Clamp Terminal |
|---|---|---|---|
| Allowable contact power | Resistive load | 1-pole 4,000VA | 1-pole 3,000VA |
| | | 2-pole 2,000VA | 2-pole 1,500VA |
| | Inductive load | B300 (pilot duty) | B300 (pilot duty) |
| Rated Load | Resitive load | 1-pole 250V AC, 16A (8A per terminal) at 55°C, 12A (6A per terminal) at 70°C | 1-pole 250V AC, 12A (6A per terminal) at 70°C |
| | | 2-pole 250V AC, 8A at 55°C, 6A at 70°C | 2-pole 250V AC, 6A at 70°C |
| | Inductive load | B300 (pilot duty) | B300 (pilot duty) |
| Allowable Switching Current | | 1-pole 16A (8A per terminal) at 55°C, 12A (6A per terminal) at 70°C | 1-pole 12A (6A per terminal) at 70°C |
| | | 2-pole 8A at 55°C, 6A at 70°C | 2-pole 6A at 70°C |
| Allowable Switching Power | | 1-pole 4,000VA | 1-pole 3,000VA |
| | | 2-pole 2,000VA | 2-pole 1,500VA |
| Minimum Applicable Load (reference value) | | 1-pole 6VDC 100mA | 1-pole 6VDC 100mA |
| | | 2-pole 5VDC 10mA | 2-pole 5VDC 10mA |

### UL Ratings

| | | Screw Terminal | | Spring Clamp Terminal | |
|---|---|---|---|---|---|
| | Voltage | 1-Pole | 2-Pole | 1-Pole | 2-Pole |
| Resistive | 250V AC | 16A (8A per terminal) at 55°C | 8A at 55°C | - | - |
| | | 12A (6A per terminal) at 70°C | 6A at 70°C | 12A (6A per terminal) at 70°C | 6A at 70°C |

## Accessories

| Item | Color | Part Number |
|---|---|---|
| Jumper (32 combs, with 2-combs per relays, or 16 discrete relays.) Note 1, 2, 4 | Black | SV9Z-J232B |
| | Gray | SV9Z-J232W |
|  | Blue | SV9Z-J232S |
| Spacer (circuit separator) Note 3, 4 | Light Grey | SV9Z-SA2W |
| | | |
| Screwdriver | - | BC1S-SD0 |
| | | |

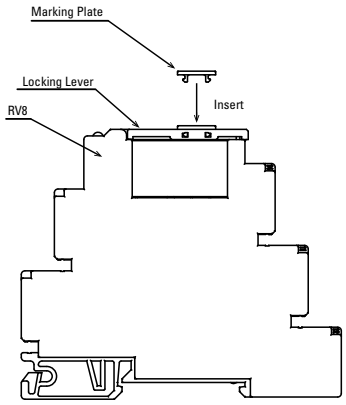
1. Jumper combs come with 16 pairs of combs, if shorter lengths are needed simply cut off the excess points.
2. Ensure that the total current to the jumper does not exceed the overall rated current (Rated current: 6A for spring-clamp terminals and 8A for screw type terminations).
3. Width of spacer: 2mm
4. When using a cut jumper, please use a spacer on the cut side. For additional information see instruction sheet.

Marking Plates (Blank and Pre-marked)

| Item | Part Number | Engraving |
|---|---|---|
| | SV9Z-PW10 | blank |
| | SV9Z-PW10-①1-10 | 1-10 |
| | SV9Z-PW10-①11-20 | 11-20 |
| | SV9Z-PW10-①21-30 | 21-30 |
| | SV9Z-PW10-①31-40 | 31-40 |
| | SV9Z-PW10-①41-50 | 41-50 |
| | SV9Z-PW10-①51-60 | 51-60 |
| | SV9Z-PW10-①61-70 | 61-70 |
| | SV9Z-PW10-①71-80 | 71-80 |
| | SV9Z-PW10-①81-90 | 81-90 |
| | SV9Z-PW10-①91-100 | 91-100 |
| | SV9Z-PW10-①A-J | A-J |
| | SV9Z-PW10-①K-T | K-T |
| | SV9Z-PW10-①U-Z | U-Z |
| | SV9Z-PW10-①GROUND | ⏚ |
| | SV9Z-PW10-①AC | ∿ |

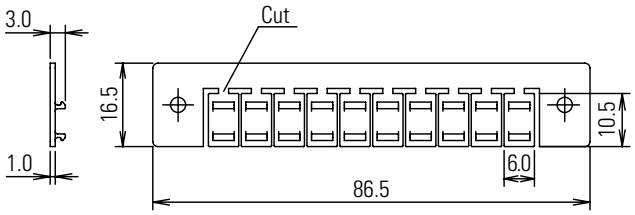
1. In place of ① insert orientation code: V=Vertical, H=Horizontal
2. Each unit has 10 pieces (marking plates).

Marking Plate Placement



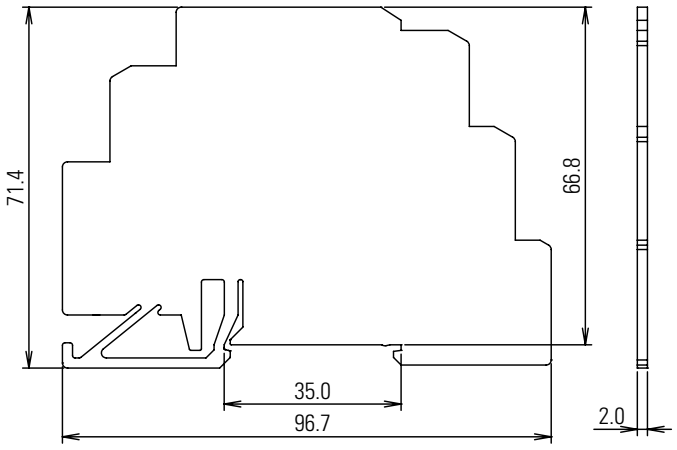

### Dimensions (mm)

SV9Z-PW10* Marking Plate

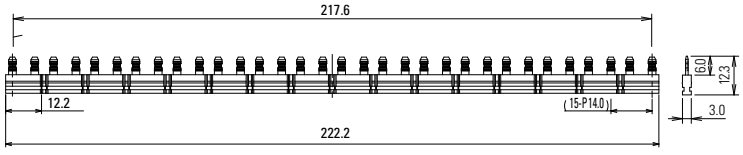



*Available blank or pre-marked.

SV9Z-SA2W Spacer



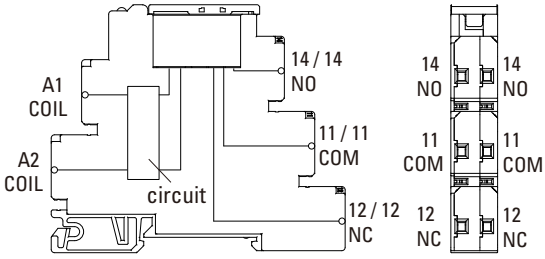

SV9Z-J232* Jumper



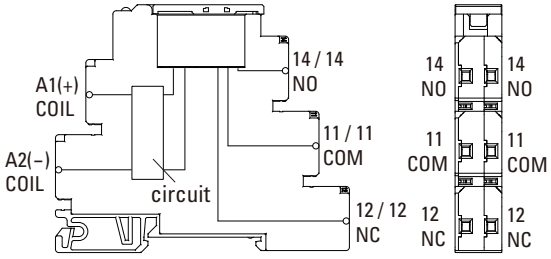

*Available in black, gray and blue.

## Internal Connections

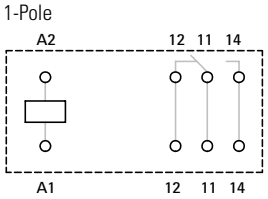
### AC/DC Type (1-Pole)



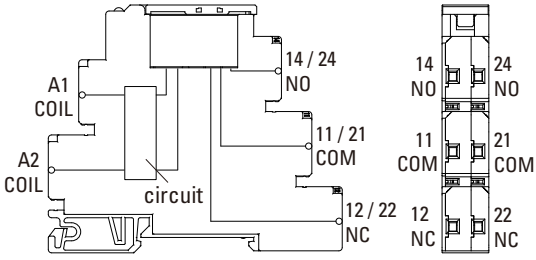

### DC Type (1-Pole)



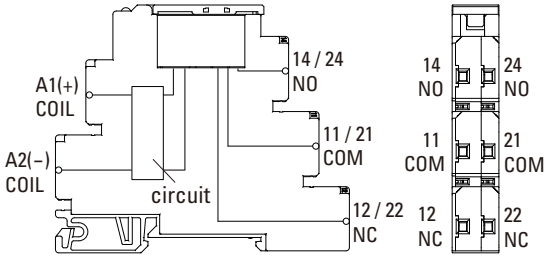

### RV2H Replacement Relay



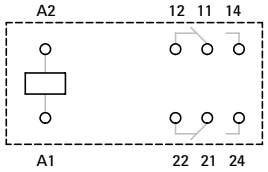

### AC/DC Type (2-Pole)




### DC Type (2-Pole)

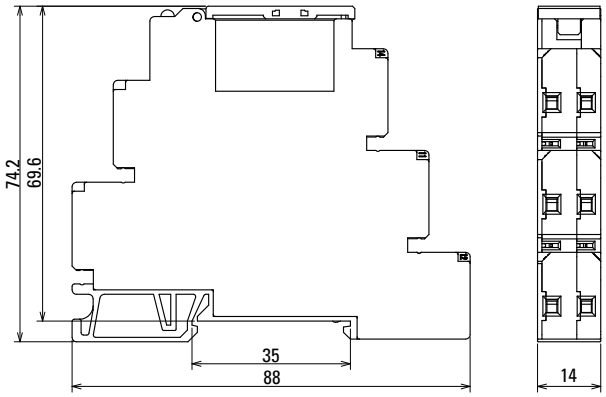



2-Pole

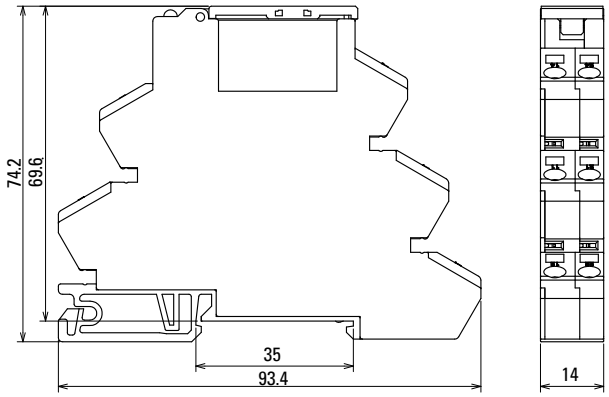



## Dimensions (mm)

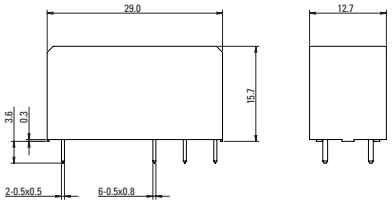
### Screw Terminals




### Spring Clamp Terminals

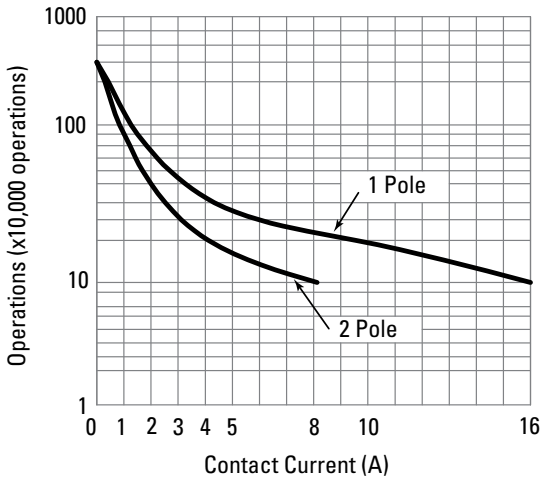



### RV2H Replacement Relay (mm)



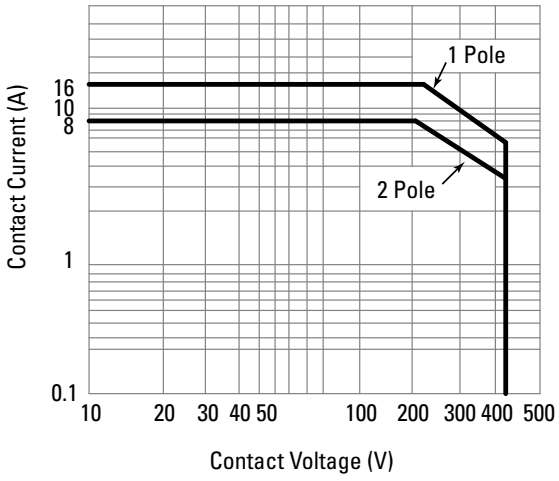
## Characteristics

### Electrical Life Curve (AC Load)

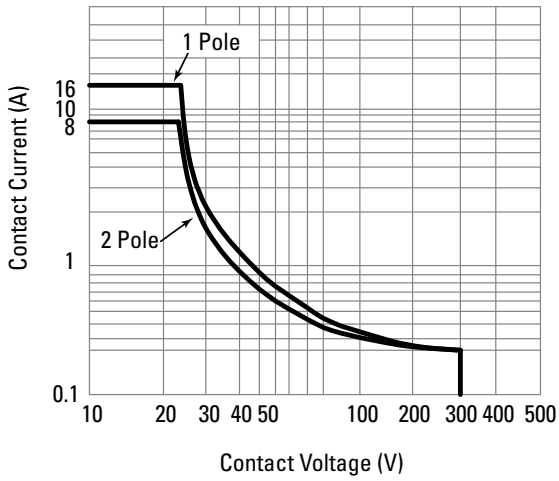



### Contact Rating

**AC**




**DC**



# RJ Series Slim Power Relays

**Key features:**

- Compact and rugged power relays. Large switching capacity
- Compact housing only 12.7-mm wide.
  Large contact rating
  RJ1 (1-pole): 16A (UL general use rating @250V AC)
  RJ2 (2-pole): 8A
- Non-polarized LED indicator available on blade type. IDEC's unique light guide structure enables high visibility of coil status from any direction.
- The smallest width for 2-pole/bifurcated contact relay
- Excellent electrical and mechanical life.
  Electrical life: 200,000 operations (AC load)
  Mechanical life: 30 million operations (AC coil)
- RoHS directive compliant (EU directive 2002/95/EC). Contains no lead, cadmium, mercury, hexavalent chromium, PBB or PBDE.
- Diode model:
  Diode reverse withstand voltage: 1000V
- UL recognized, CSA certified, EN compliant.

UL508
UL File No. E55996

CSA C22.2 No. 14
1608322
CSA File No. LR35144

VDE
Reg.-Nr. B312
EN61810-1
VDE (REG.-Nr B312)

EN61810-1
EC Low Voltage Directive

## Part Number Selection

| Style | Terminal | Contact | Model | Part Number | Coil Voltage Code (Standard Stock in bold) |
|---|---|---|---|---|---|
| | Blade | SPDT | Standard | RJ1S-C-☐ | **A24**, A110, **A120**, A220, **A240**, D12, **D24**, D48, D100 |
| | | | with LED | RJ1S-CL-☐ | |
| | | | with Surge Suppresion Diode | RJ1S-CD-☐ | D12, **D24**, D48, D100 |
| | | | with LED & Surge Suppresion Diode | RJ1S-CLD-☐ | |
| | | DPDT | Standard | RJ2S-C-☐ | **A24**, A110, **A120**, A220, **A240**, D12, **D24**, D48, D100 |
| | | | with LED | RJ2S-CL-☐ | |
| | | | with Surge Suppresion Diode | RJ2S-CD-☐ | D12, **D24**, D48, D100 |
| | | | with LED & Surge Suppresion Diode | RJ2S-CLD-☐ | |
| | | | Standard Bifurcated contacts (without LED indicator) | RJ22S-C-☐ | A12, **A24**, **A120**, **A240**, D5, D12, **D24**, D100 |
| | | | Bifurated contacts (with LED indicator) | RJ22S-CL-☐ | |
| | | | Bifurcated contacts diode (without LED indicator) | RJ22S-CD-☐ | D5, D12, **D24**, D48, D100 |
| | | | Bifurcated contacts diode (with LED indicator) | RJ22S-CLD-☐ | |
| | PCB | SPDT | Standard | RJ1V-C-☐ | **A24**, A110, **A120**, A220, **A240**, D5, D6, D12, **D24**, D48, D100 |
| | | | High Capacity | RJ1V-CH-☐ | |
| | | SPST-NO | Standard | RJ1V-A-☐ | |
| | | | High Capacity | RJ1V-AH-☐ | |
| | | DPDT | Standard | RJ2V-C-☐ | |
| | | DPST-NO | Standard | RJ2V-A-☐ | |
| | | DPDT | Bifurcated contacts | RJ22V-C-☐ | A12, **A24**, **A120**, **A240**, D5, D12, **D24**, D48, D100 |
| | | DPST-NO | Bifurcated contacts | RJ22V-A-☐ | |

**Ordering Information**
When ordering, specify the Part No. and coil voltage code:
(example) **RJ1S-C-** **A120**
Part No. — Coil Voltage Code

## Coil Voltage Table

| Coil Voltage Code | A12 | A24 | A110 | A120 | A220 | A240 | D5 | D6 | D12 | D24 | D48 | D100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coil Rating | 12V AC | 24V AC | 110V AC | 120V AC | 220V AC | 240V AC | 5V DC | 6V DC | 12V DC | 24V DC | 48V DC | 100-110V DCV DC |

## Sockets

| | Relays | Standard DIN Rail Mount | Finger-safe DIN Rail Mount | PCB Mount |
|---|---|---|---|---|
| Blade Models | RJ1S (Std) | SJ1S-05BW | SJ1S-07LW | SJ1S-61 |
| | RJ2S (Std)/RJ22S | SJ2S-05BW | SJ2S-07LW | SJ2S-61 |
| PCB Models | RJ1V (Std) | — | SQ1V-07B* | SQ1V-63* |
| | RJ1V (HC) RJ2V/RJ22V | — | SQ2V-07B* | SQ2V-63* |
| | | Shown with optional marking plate. | | |

*Hold-down clip or spring must be removed to use with RJ PCB relays.

## Replacement Hold Down Springs

| Part Number | Used With Socket |
|---|---|
| SJ9Z-CM | SJ1S-05BW, SJ1S-07LW, SJ2S-05BW, SJ2S-07LW |
| SQ9Z-C | SQ1V-07B, SQ2V-07B |
| SQ9Z-C63 | SQ1V-63, SQ2V-63 |

## Jumpers for SJ Sockets

| Poles | Part Number | Quantity |
|---|---|---|
| 2 | SJ9Z-JF2 | Must purchase in quantities of 10. |
| 5 | SJ9Z-JF5 | |
| 8 | SJ9Z-JF8 | |
| 10 | SJ9Z-JF10 | |

## Accessories

| Item | Appearance | Use with | Part No. | Remarks |
|---|---|---|---|---|
| Aluminum DIN Rail (1 meter length) | | All DIN rail sockets | BNDN1000 | The BNDN1000 is designed to accommodate DIN mount sockets. Made of durable extruded aluminum, the BNDN1000 measures 0.413 (10.5mm) in height and 1.37 (35mm) in width (DIN standard). Standard length is 39" (1,000mm). |
| DIN Rail End Stop | | DIN rail | BNL5 | 9.1 mm wide. |
| Marking Plate |  | Finger safe sockets (ONLY) | SJ9Z-PWPN10 | 10 pieces per pack |

## Specifications

| Model | | RJ1 | RJ2 | RJ22S | RJ22V |
|---|---|---|---|---|---|
| Number of Poles | | 1-pole | 2-pole | | |
| Contact Configuration | | SPDT | DPDT | DPDT bifurcated contacts | DPDT (bifurcated), DPST-NO (bifurcated) |
| Contact Material | | Silver-nickel alloy | | AgNi (gold clad) | |
| Degree of Protection | | IP40 | | | Flux-tight structure |
| Contact Resistance (initial value) [1] | | 50 mΩ maximum | | | |
| Operating Time [2] | | 15ms maximum (with diode: 20 ms maximum) | | | |
| Release Time [2] | | 10 ms maximum (with diode: 20 ms maximum) | | | |
| Dielectric Strength | Between contact and coil | 5000V AC, 1 minute | | | |
| | Between contacts of the same pole | 1000V AC, 1 minute | | | |
| | Between contacts of different poles | — | 3000V AC, 1 minute | | |
| Vibration Resistance | Operating extremes | 10 to 55 Hz, amplitude 0.75 mm | | | |
| | Damage limits | 10 to 55 Hz, amplitude 0.75 mm | | | |
| Shock Resistance | Operating extremes | NO contact: 200 $m/s^2$, NC contact: 100 $m/s^2$ | | | |
| | Damage limits | 1000 $m/s^2$ | | | |
| Electrical Life (rated load) | | AC load: 200,000 operations minimum (operation frequency 1800 operations per hour)<br>DC load: 100,000 operations minimum (operation frequency 1800 operations per hour) | | AC load: 100,000 operations minimum (operation frequency 1,800 per hour)<br>DC load: 200,000 operations minimum (operation frequency 1,800 per hour) | |
| Mechanical Life (no load) | | AC coil: 30,000,000 operations minimum (operation frequency 18,000 operations per hour)<br>DC coil: 50,000,000 operations minimum (operation frequency 18,000 operations per hour) | | AC load: 10 million operations minimum (operating frequency 18,000 operations per hour)<br>DC load: 20 million operations minimum (operating frequency 18,000 operations per hour) | |
| Operating Temperature [3] | | –40 to +70°C (no freezing) | | | |
| Operating Humidity | | 5 to 85% RH (no condensation) | | | |
| Weight (approx.) | | 19g (blade type), 17g (PCB form C type), 16g (PCB form A type) | | 19g | DPDT: 17g, DPST-NO: 16g |

Note: Above values are initial values.
1. Measured using 5V DC, 1A voltage drop method.
2. Measured at the rated voltage (at 20°C), excluding contact bounce time.
3. 100% rated voltage.

## Coil Ratings

| Rated Voltage | | | Coil Voltage Code | Rated Current (mA) ±15% (at 20°C) | | | | Coil Resistance (ohms)±10% (at 20°C) | Operating Characteristics[2] | | | Power Consumption |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Without LED[1] | | With LED[1] | | | Pickup Voltage | Dropout Voltage | Maximum Allowable Voltage[3] | |
| | | | | 50Hz | 60Hz | 50Hz | 60Hz | | | | | |
| AC | Blade & PCB Models | 24V | A24 | 43.9 | 37.5 | 47.5 | 41.1 | 243 | 80% max | 30% min | 140% | 0.9VA (60Hz) |
| | | 120V | A120 | 8.8 | 7.5 | 8.7 | 7.4 | 6,400 | | | | |
| | | 240V | A240 | 4.3 | 3.7 | 4.3 | 3.7 | 25,570 | | | | |
| | Bifurcated Models | 12V | A12 | 87.3 | 75.0 | 91.1 | 78.8 | 62.5 | | | | Approx. 1.1VA (50Hz) 0.9 to 1.2VA (60Hz) |
| | | 24V | A24 | 43.9 | 37.5 | 47.5 | 41.1 | 243 | | | | |
| | | 120V | A120 | 8.8 | 7.5 | 8.7 | 7.4 | 6,400 | | | | |
| | | 240V | A240 | 4.3 | 3.7 | 4.3 | 3.7 | 25,570 | | | | |

| Rated Voltage | | | Coil Voltage Code | Rated Current (mA) ±15% (at 20°C) | | Coil Resistance (ohms)±10% (at 20°C) | Operating Characteristics[2] | | | Power Consumption |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Without LED[1] | With LED[1] | | Pickup Voltage | Dropout Voltage | Maximum Allowable Voltage[3] | |
| DC | Blade Models | 12V | D12 | 44.2 | 48.0 | 271 | 70% max | 10% min | 170% | 0.53W |
| | | 24V | D24 | 22.1 | 25.7 | 1,080 | | | | |
| | | 48V | D48 | 11.0 | 10.7 | 4,340 | | | | |
| | | 100-110V | D100 | 5.3 - 5.8 | 5.2 - 5.7 | 18,870 | | | 160% | |
| | PCB Models | 5V | D5 | 106 | – | 47.2 | 70% max | 10% min | 170% | 0.53-0.64W |
| | | 6V | D6 | 88.3 | – | 67.9 | | | | |
| | | 12V | D12 | 44.2 | – | 271 | | | | |
| | | 24V | D24 | 22.1 | – | 1,080 | | | | |
| | | 48V | D48 | 11.0 | – | 4,340 | | | | |
| | | 100-110V | D100 | 5.3 - 5.8 | – | 18,870 | | | 160% | |
| | Bifurcated Models | 5V | D5 | 106 | 110 | 47.2 | 70% max | 10% min | 170% | Approx. 0.53 to 0.64W |
| | | 12V | D12 | 44.2 | 48.0 | 271 | | | | |
| | | 24V | D24 | 22.1 | 25.7 | 1,080 | | | | |
| | | 48V | D48 | 11 | 10.7 | 4,340 | | | | |
| | | 100-110V | D100 | 5.3-5.8 | 5.2-5.7 | 18,870 | | | 160% | |

1. LED Indicator is only available on Blade or Bifurcated relays.
2. Operating characteristics are at 20°C.
3. The maximum allowable voltage is the maximum value which can be applied to the relay coils.

## Contact Ratings

| Model | | | Contact | Allowable Contact Power | | Rated Load | | | Allowable Switching Current | Allowable Switching Voltage | Minimum Applicable Load |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Resistive Load | Inductive Load | Voltage | Resistive Load | Inductive Load cosø=0.3 L/R=7ms | | | |
| Blade Models | 1 pole | | NO | 3000VA | 1875VA | 250V AC | 12A | 7.5A | 16A | AC250V DC30V | DC5V 100mA |
| | | | NC | 3000VA | 1875VA | 250V AC | 12A | 7.5A | 6A | | |
| | 2 poles | | NO | 2000VA | 1000VA | 250V AC | 8A | 4A | 4A | AC250V DC30V | DC5V 10mA |
| | | | NC | 2000VA | 1000VA | 250V AC | 8A | 4A | 4A | | |
| | 2 poles (bifurcated contacts) | | NO | 250VA AC 30W DC | 100VA AC 15W DC | 250V AC | 1A | 0.4A | 1A | 250V AC 125V DC | 1V DC 100µA |
| | | | NC | | | 30V DC | 1A | 0.5A | | | |
| PCB Models | 1 pole | Standard Type | NO | 3000VA | 1875VA | 250V AC | 12A | 7.5A | 12A | AC250V DC125V | DC5V 100mA |
| | | | | 360W | 180W | 30V DC | 12A | 6A | | | |
| | | | NC | 3000VA | 1875VA | 250V AC | 12A | 7.5A | 6A | | |
| | | | | 180W | 90W | 30V DC | 6A | 3A | | | |
| | | High Capacity Type | NO | 4000VA | 2000VA | 250V AC | 16A | 8A | 16A | AC250V DC125V | DC5V 100mA |
| | | | | 480W | 240W | 30V DC | 16A | 8A | | | |
| | | | NC | 4000VA | 2000VA | 250V AC | 16A | 8A | 8A | | |
| | | | | 240W | 120W | 30V DC | 8A | 4A | | | |
| | 2 poles | | NO | 2000VA | 1000VA | 250V AC | 8A | 4A | 8A | AC250V DC125V | DC5V 10mA |
| | | | | 240W | 120W | 30V DC | 8A | 4A | | | |
| | | | NC | 2000VA | 1000VA | 250V AC | 8A | 4A | 4A | | |
| | | | | 120W | 60W | 30V DC | 4A | 2A | | | |
| | 2 poles (bifurcated contacts) | | NO | 250VA AC 30W DC | 100VA AC 15W DC | 250V AC | 1A | 0.4A | 1A | 250V AC 125V DC | 1V DC 100µA |
| | | | NC | | | 30V DC | 1A | 0.5A | | | |

## Agency Ratings

| Voltage | UL | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | General Use | | | | | | Resistive | |
| | RJ1 | | RJ2 | | RJ22 | | RJ22 | |
| | NO | NC | NO | NC | NO | NC | NO | NC |
| 250V AC | 16A | 6A | 8A | 4A | 1A | 1A | – | – |
| 30V DC | 12A | 6A | 8A | 4A | – | – | 1A | 1A |

| Voltage | CSA | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | General Use | | Resistive | | | | | | Inductive | | | | | |
| | RJ22 | | RJ1 | | RJ2 | | RJ22 | | RJ1 | | RJ2 | | RJ22 | |
| | NO | NC | NO | NC | NO | NC | NO | NC | NO | NC | NO | NC | NO | NC |
| 250V AC | 1A | 1A | 12A | 12A | 8A | 8A | – | – | 7.5A | 7.5A | 4A | 4A | – | – |
| 30V DC | – | – | 12A | 6A | 8A | 4A | 1A | 1A | 6A | 3A | 4A | 2A | 1A | 1A |

| Voltage | VDE | | | | | |
|---|---|---|---|---|---|---|
| | Resistive | | | | AC-15, DC-13* | |
| | RJ1 | RJ2 | RJ22 | | RJ1 | RJ2 |
| | NO | NO | NO | NC | NO | NO |
| 250V AC | 12A | 8A | 1A | 1A | 6A | 3A |
| 30V DC | 12A | 8A | 1A | 1A | 2.5A | 2A |

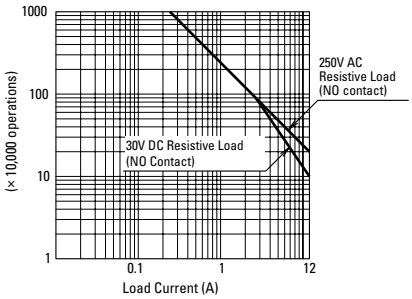
*According to the utilization categories of IEC60947-5-1

## Socket Specifications

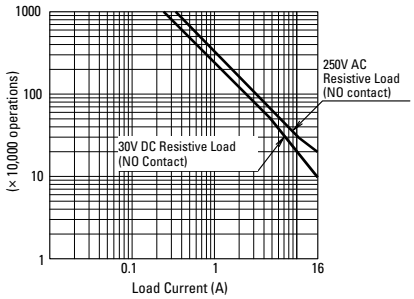
| | Socket | Terminal | Electrical Rating | Wire Size | Torque |
|---|---|---|---|---|---|
| DIN Rail/ Panel Mount | SJ1S-05BW | M3 screw with captive wire clamp | 250V, 12A | Maximum up to 2 - #14 AWG | 0.6 - 1.0N•m (Maximum 1.2N•m) |
| | SJ2S-05BW | M3 screw with captive wire clamp | 250V, 8A | Maximum up to 2 - #14 AWG | 0.6 - 1.0N•m (Maximum 1.2N•m) |
| Finger-safe DIN Rail/Panel Mount | SJ1S-07LW | M3 screw with captive wire clamp, fingersafe | 250V, 12A | Maximum up to 2 - #14 AWG | 0.6 - 1.0N•m (Maximum 1.2N•m) |
| | SJ2S-07LW | M3 screw with captive wire clamp, fingersafe | 250V, 8A | Maximum up to 2 - #14 AWG | 0.6 - 1.0N•m (Maximum 1.2N•m) |
| | SQ1V-07B | M3 screw with box clamp, fingersafe | 300V, 12A | Maximum up to 2 - #14 AWG | 1.0N•m Maximum |
| | SQ2V-07B | M3 screw with box clamp, fingersafe | 300V, 10A | Maximum up to 2 - #14 AWG | 1.0N•m Maximum |
| PCB Mount | SJ1S-61 | PCB mount | 250V, 12A | — | — |
| | SJ2S-61 | PCB mount | 250V, 8A | — | — |
| | SQ1V-63 | PCB mount | 300V, 12A | — | — |
| | SQ2V-63 | PCB mount | 300V, 12A | — | — |

## Electrical Life Curve (Resistive Load)

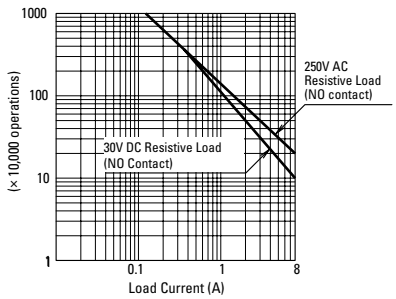
### RJ1




### RJ1 High Capacity

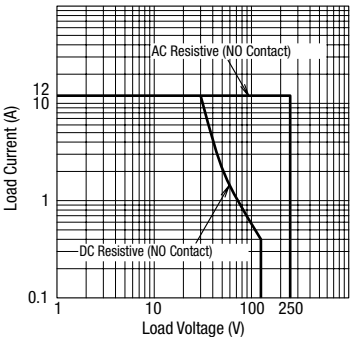



### RJ2

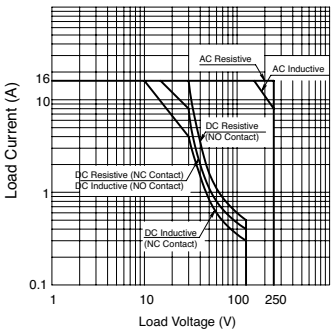



## Maximum Switching Capacity (Resistive Load)

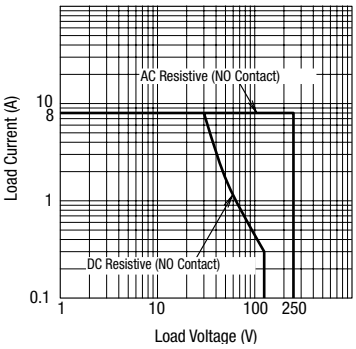
### RJ1




### RJ1 High Capacity

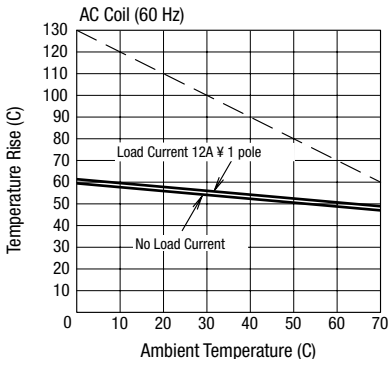



### RJ2

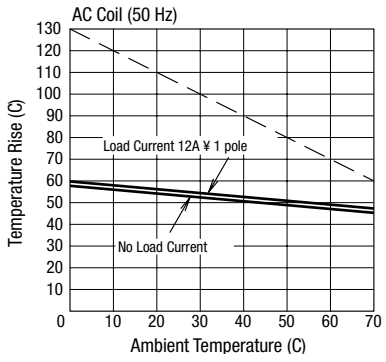



## Operating Temperature and Coil Temperature Rise

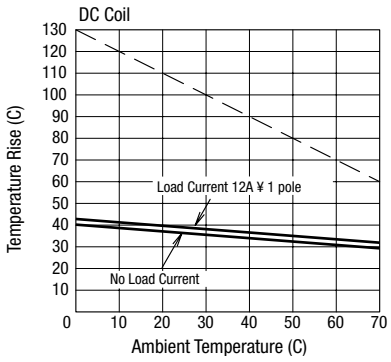
### RJ1 (AC Coil, 60 Hz)



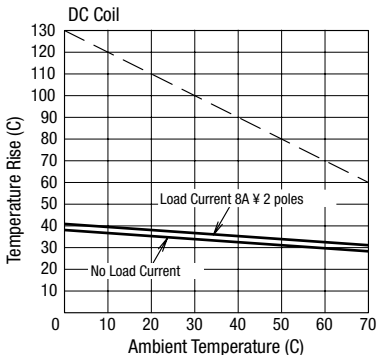

### RJ1 (AC Coil, 50 Hz)



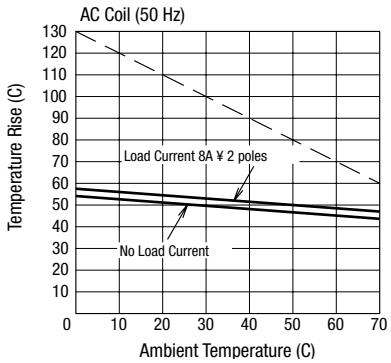

### RJ1 (DC Coil)



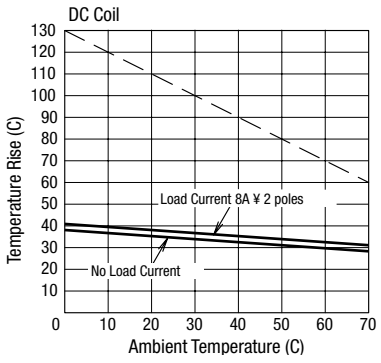

### RJ2 (AC Coil, 60 Hz)



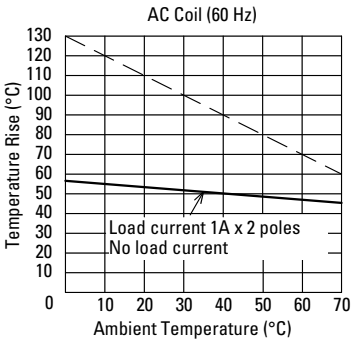

### RJ2 (AC Coil, 50 Hz)



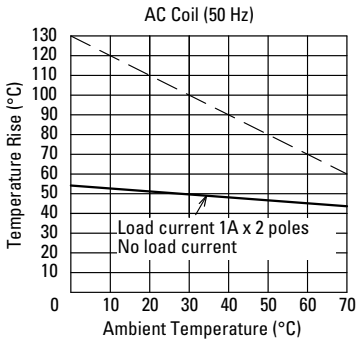

### RJ2 (DC Coil)



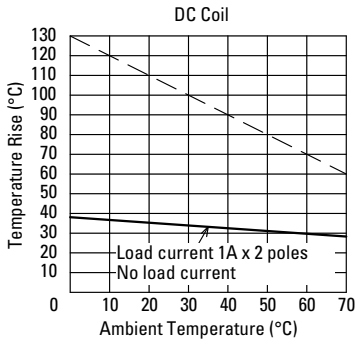
**RJ22 (AC Coil, 60 Hz)**




**RJ22 (AC Coil, 50 Hz)**



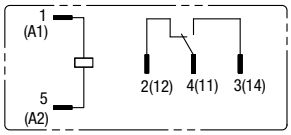

**RJ22 (DC Coil)**



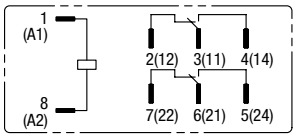

The above temperature rise curves show characteristics when 100% the rated coil voltage is applied.
The slanted dashed line indicates allowable temperature rise for the coil at different ambient temperatures.

## Internal Connection (View from Bottom)

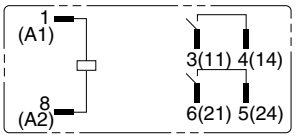
**RJ1-C-* Standard**



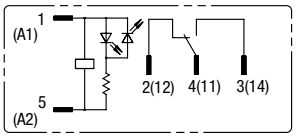

**RJ2-C/RJ22-C-* Standard**



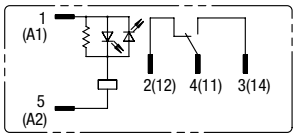

**RJ22V-A-***




**RJ1-CL-* With LED Indicator**

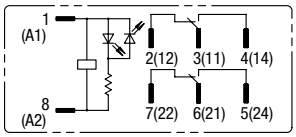



Coil voltage 24V AC/DC and below

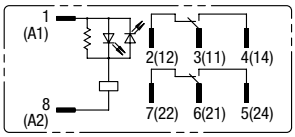



Coil voltage greater than 24V AC/DC

**RJ2-CL/RJ22-CL-* With LED Indicator**

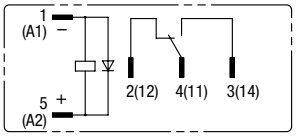



Coil voltage 24V AC/DC and below

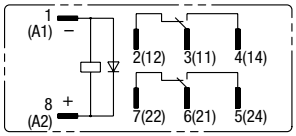



Coil voltage greater than 24V AC/DC

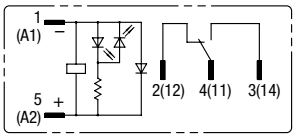
**RJ1-CD-* With Diode**



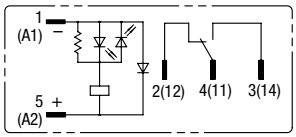

**RJ2-CD-/ RJ22-CD-* With Diode**




**RJ1-CLD-* With LED Indicator and Diode**

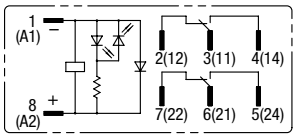



Coil voltage 24V DC and below

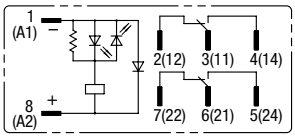



Coil voltage greater than 24V DC

**RJ2-CLD/ RJ22-CLD-* With LED Indicator and Diode**




Coil voltage 24V DC and below

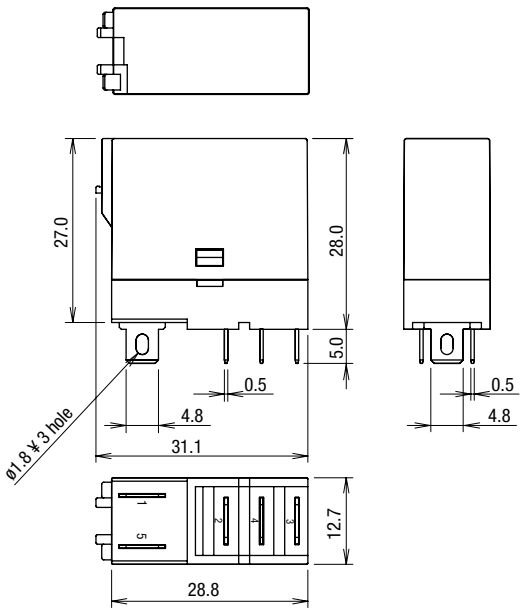



Coil voltage greater than 24V DC

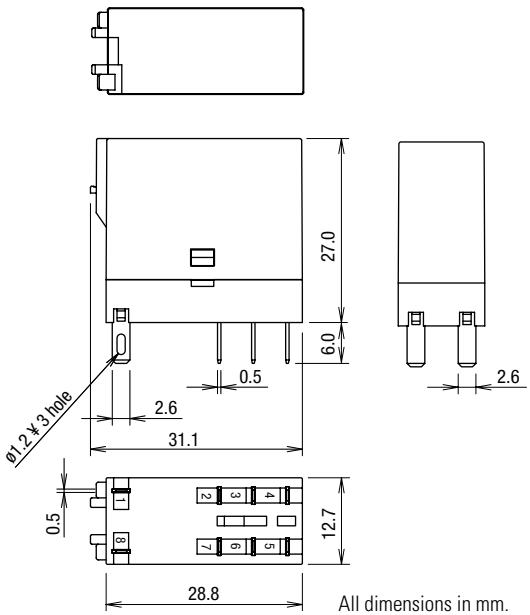
# Dimensions (mm)

## Blade Relay (mm)

### RJ1S



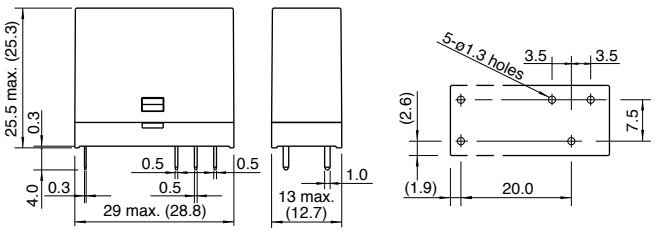

### RJ2S/RJ22S



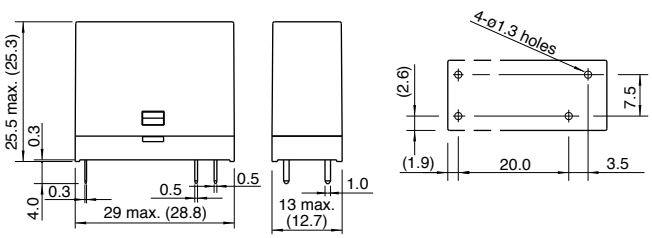

All dimensions in mm.

## PCB Relay (mm)

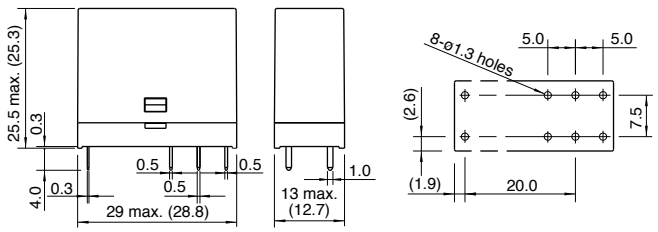
### RJ1V-C-*



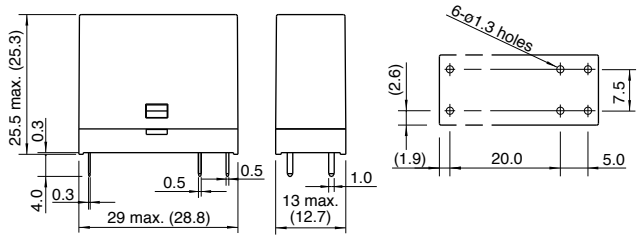

### RJ1V-A-*



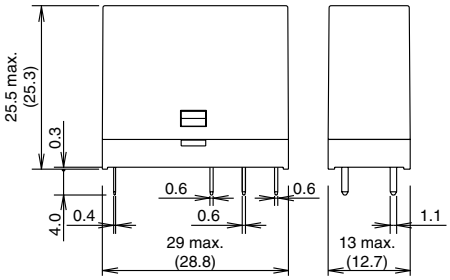

### RJ1V-CH-*/RJ2V-C-*



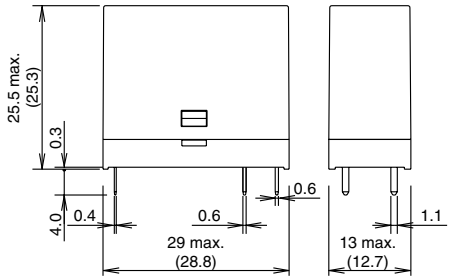

### RJ1V-AH-*/RJ2V-A-*




### RJ22V-C-*



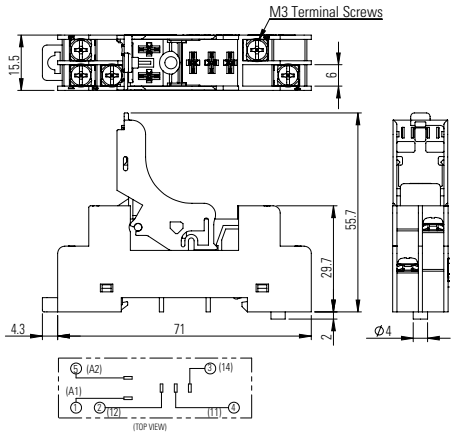

### RJ22V-A-*



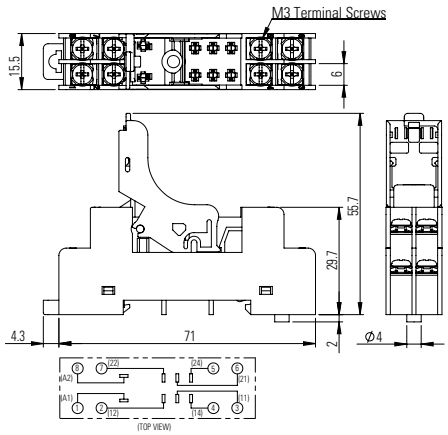
## Dimensions con't (mm)

### Standard DIN Rail Mount Sockets

**SJ1S-05BW**

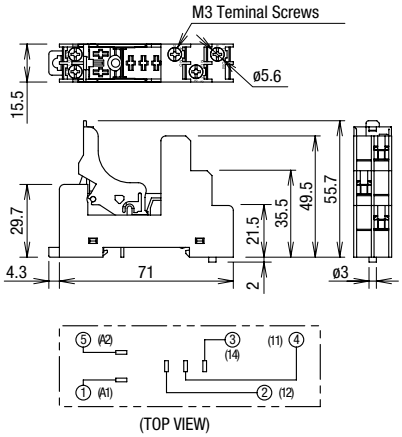



**SJ2S-05BW**

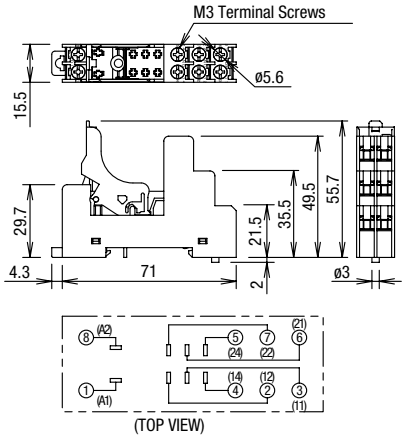



### Finger-safe DIN Rail Mount Sockets

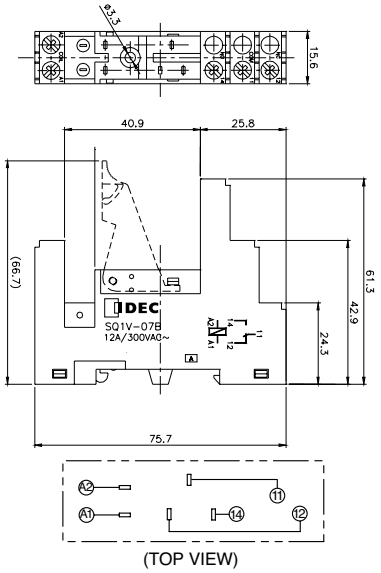
**SJ1S-07LW**



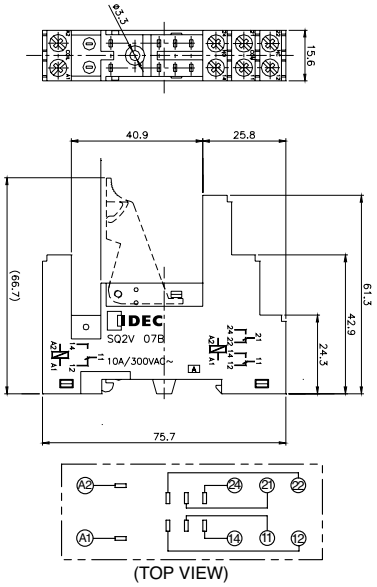

**SJ2S-07LW**




**SQ1V-07B**



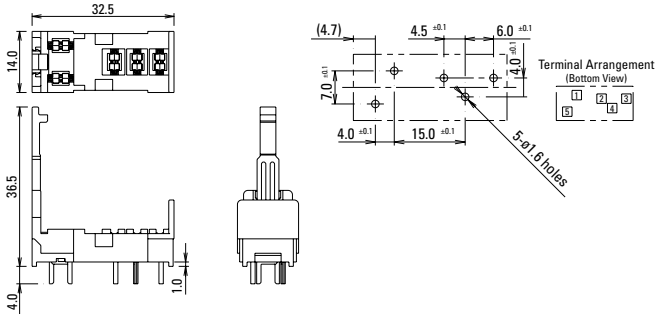

**SQ2V-07B**



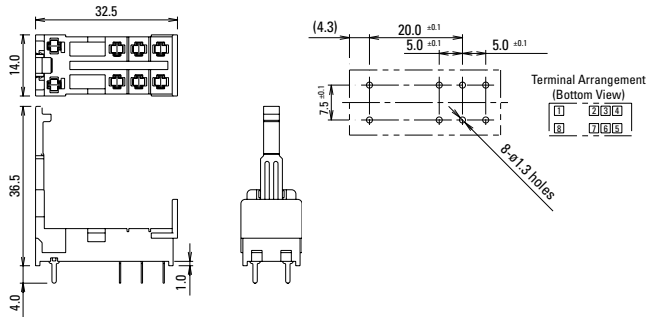
## Dimensions con't (mm)

### PC Mount Sockets

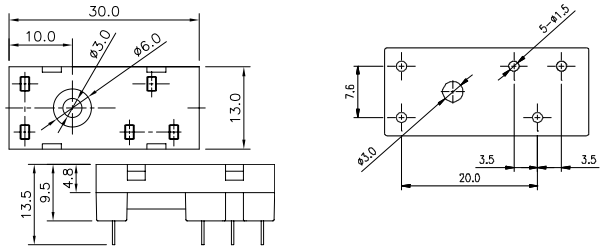
#### SJ1S-61



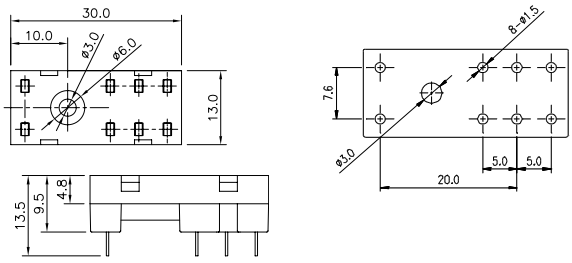

#### SJ2S-61




#### SQ1V-63




#### SQ2V-63



# RL Series Power Relays

Quick Connect
Flange Mount

Screw Terminal
DIN Rail Mount

Designed with a 1- and 2-pole 3HP/277V AC rating in an economical and compact package, 30A RL power relays are the superior choice for HVAC panels, energy management and applications requiring higher voltage loads and inductive kick-back. Choose from panel or DIN rail mounting.

Unlike the competition, when DIN rail mounted, RL relays don't require a socket or adaptor. Quick Connect terminals allow faster installation on commercial applications, while screw terminations are ideal for industrial applications.

## Key Features

- 3HP at 277VAC, 1.5HP at 120VAC
- Single pole rated at 30A, double pole at 25A
- Double Make contacts
- Flange mount or DIN-rail mount with panel mount tabs
- #250 quick-connect or screw terminations
- AC or DC Coil Inputs
- Designed for Motor, Lighting, and Heater Loads
- Up to 7500 VA maximum switching power
- RoHS compliant

## Specifications

| | | RL1 | RL2 |
|---|---|---|---|
| Number of poles | | 1 pole | 2 poles |
| Contact Configuration | | 1X (SPST, double make) | 2X (DPST, double make) |
| Contact material | | Ag Alloy | Ag Alloy |
| Operating Time and Release Time | | 30ms max | 30ms max |
| Degree of Protection | | IP40 | IP40 |
| Dielectric strength | Between contact and coil | 4,000V AC for 1 minute | 4,000V AC for 1 minute |
| | Between pole | 2,000V AC for 1 minute | 2,000V AC for 1 minute |
| | Between contact sets | - | 2,000V AC for 1 minute |
| Vibration Resistance | Operating extremes | Frequency 10 to 55 Hz, Amplitude 0.75mm | Frequency 10 to 55 Hz, Amplitude 0.75mm |
| | Damage limits | Frequency 10 to 55 Hz, Amplitude 0.75mm | Frequency 10 to 55 Hz, Amplitude 0.75mm |
| Shock Resistance | Operating extremes | 100 m/s² (10G) | 100 m/s² (10G) |
| | Damage limits | 1,000 m/s² (100G) | 1,000 m/s² (100G) |
| Electrical Life (rated load). Operation frequency (1800 operations per hour) | AC resistive load | 200,000 operations min | 200,000 operations min |
| | Inductive load | 100,000 operations min | 100,000 operations min |
| Mechanical Life (without load) | | 1,000,000 operations min | 1,000,000 operations min |
| Operating Temperature | | -25 to +55°C | -25 to +55°C |
| Operating Humidity | | 5 to 85% (without condensation) | 5 to 85% (without condensation) |
| Weight | | Between 90 and 135 grams, depending on model | Between 90 and 135 grams, depending on model |

## Standards Compliance

| Agency ratings | RL1 | RL2 |
|---|---|---|
| Standard current ratings | 30 A, 277 Vac, General Use, 100,000 Cycles | 25 A, 277 Vac, General Use, 100,000 cycles |
| HP ratings | 1.5 HP, 120 Vac, 10,000 Cycles | 1.5 HP, 120 Vac, 10,000 Cycles |
| | 3 HP, 277 Vac, 30,000 Cycles | 3 HP, 277 Vac, 30,000 Cycles |
| FLA and LRA ratings | 20 FLA, 120 LRA, 120 Vac, 50/60 Hz, 30,000 Cycles | 20 FLA, 120 LRA, 120 Vac, 50/60 Hz, 30,000 Cycles |
| | 17 FLA, 102 LRA, 277 Vac, 50/60 Hz, 30,000 Cycles | 17 FLA, 102 LRA, 277 Vac, 50/60 Hz, 30,000 Cycles |

## Coil Ratings

| Rated Voltage | | Coil Voltage Code | Rated Current (mA) ±10% | Coil Resistance (Ω) | Operating Characteristics at 20°C | | | Power Consumption |
|---|---|---|---|---|---|---|---|---|
| | | | | | Pickup Voltage | Dropout Voltage | Maximum Allowable Voltage | |
| DC | 12V | D12 | 160 | 75 | 80% max | 15% min | 110% | 1.9W |
| | 24V | D24 | 79.0 | 303 | | | | 1.9W |

| Rated Voltage | | Coil Voltage Code | Rated Current (mA) +15% -25% | | Coil Resistance (Ω) | Operating Characteristics at 20°C | | | Power Consumption |
|---|---|---|---|---|---|---|---|---|---|
| | | | 50Hz | 60Hz | | Pickup Voltage | Dropout Voltage | Maximum Allowable Voltage | |
| AC (50-60Hz) | 24V | A24 | 71.0 | 69.5 | - | 80% max | 10% min | 110% | 1.7-2.5VA |
| | 100V - 120V | A100 | 17.0 | 16.6 | - | | | | 1.7-2.5VA |
| | 200V - 240V | A200 | 8.5 | 8.1 | - | | | | 1.7-2.5VA |

## Contact Ratings

| | | RL1 | RL2 |
|---|---|---|---|
| Allowable Contact Power | Resistive load | 7500VA | 6250VA |
| Rated Load | Resitive load | 250VAC 30A, 30VDC 30A | 250VAC 25A, 30VDC 25A |
| Allowable Switching Current | | 30A | 25A |
| Allowable Switching Voltage | | 277VAC | |

## Part Numbers

### Flange Mount

| Coil voltage | | Screw Terminal 1 Pole Flange Mount | Screw Terminal 2 Pole Flange Mount | Quick Connect Terminal 1 Pole Flange Mount | Quick Connect Terminal 2 Pole Flange Mount |
|---|---|---|---|---|---|
| DC | 12V | RL1N-T-D12 | RL2N-T-D12 | RL1B-T-D12 | RL2B-T-D12 |
| | 24V | RL1N-T-D24 | RL2N-T-D24 | RL1B-T-D24 | RL2B-T-D24 |
| AC | 24V | RL1N-T-A24 | RL2N-T-A24 | RL1B-T-A24 | RL2B-T-A24 |
| | 100V - 120V | RL1N-T-A100 | RL2N-T-A100 | RL1B-T-A100 | RL2B-T-A100 |
| | 200V - 240V | RL1N-T-A200 | RL2N-T-A200 | RL1B-T-A200 | RL2B-T-A200 |

### DIN Rail Mount with Panel Mount Tabs

| Coil voltage | | Screw Terminal 1 Pole DIN Rail | Screw Terminal 2 Pole DIN Rail | Quick Connect Terminal 1 pole DIN Rail | Quick Connect Terminal 2 Pole DIN Rail |
|---|---|---|---|---|---|
| DC | 12V | RL1N-D-D12 | RL2N-D-D12 | RL1B-D-D12 | RL2B-D-D12 |
| | 24V | RL1N-D-D24 | RL2N-D-D24 | RL1B-D-D24 | RL2B-D-D24 |
| AC | 24V | RL1N-D-A24 | RL2N-D-A24 | RL1B-D-A24 | RL2B-D-A24 |
| | 100V - 120V | RL1N-D-A100 | RL2N-D-A100 | RL1B-D-A100 | RL2B-D-A100 |
| | 200V - 240V | RL1N-D-A200 | RL2N-D-A200 | RL1B-D-A200 | RL2B-D-A200 |

### Part Number Structure

**RL 1 B - T-A 100**

**Series Name**

**Contact Arrangement**
1 : 1 Form X
2 : 2 Form X

**Terminal Construction**
B : Quick Connect Terminal
N : Screw Terminal

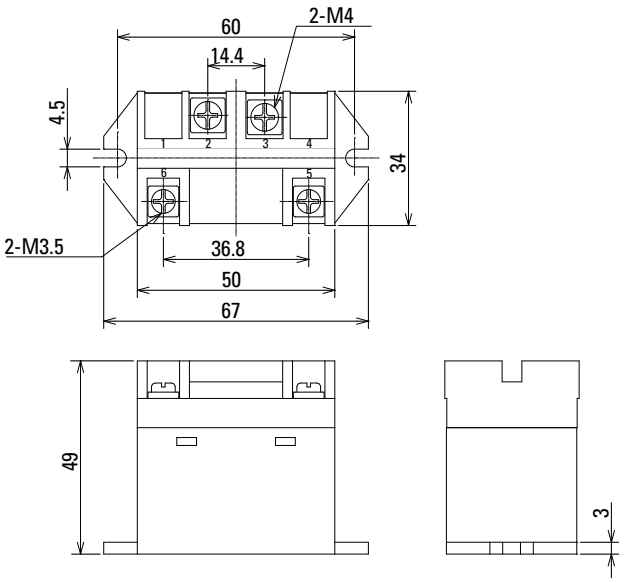
**Mounting**
T : Flange Mount
D: DIN Rail Mount with panel mount tabs

**Voltage**
D : DC (Voltage: 12, 24V)
A : AC 50/60Hz (Voltage: 24, 100-120, 200-240V)

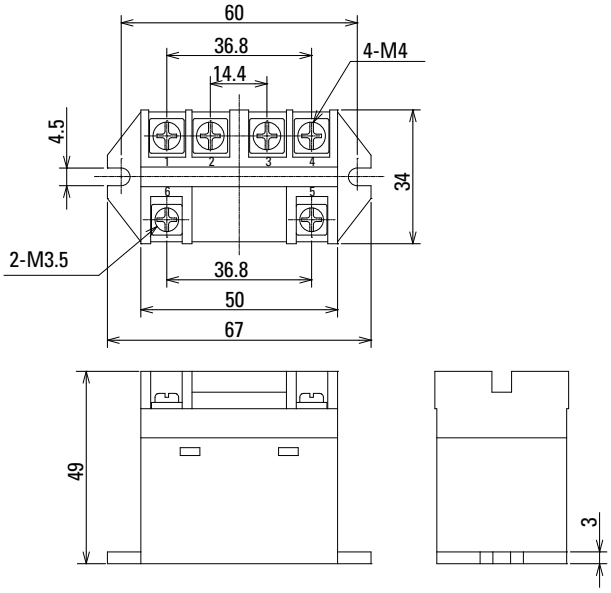
**Input Voltage**
12 : 12V
24 : 24V
100 : 100-120V
200 : 200-240V

# Dimensions

### RL1N-T Screw Terminal 1 Pole Flange Mount

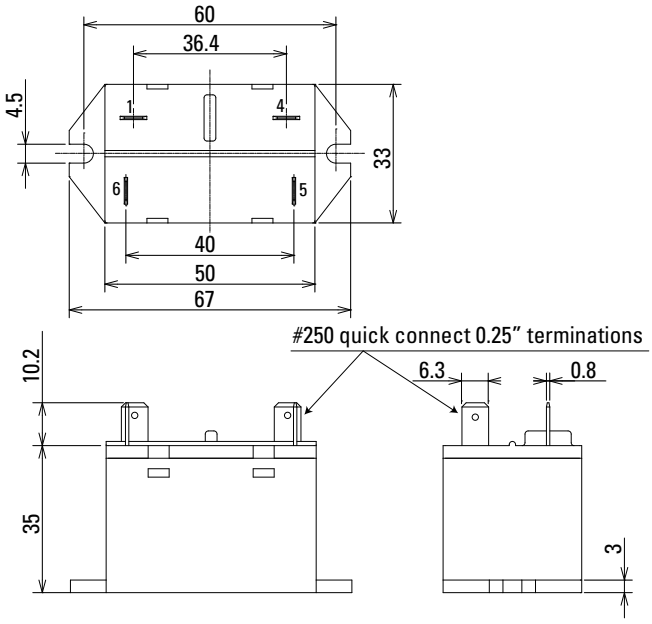



### RL2N-T Screw Terminal 2 Pole Flange Mount

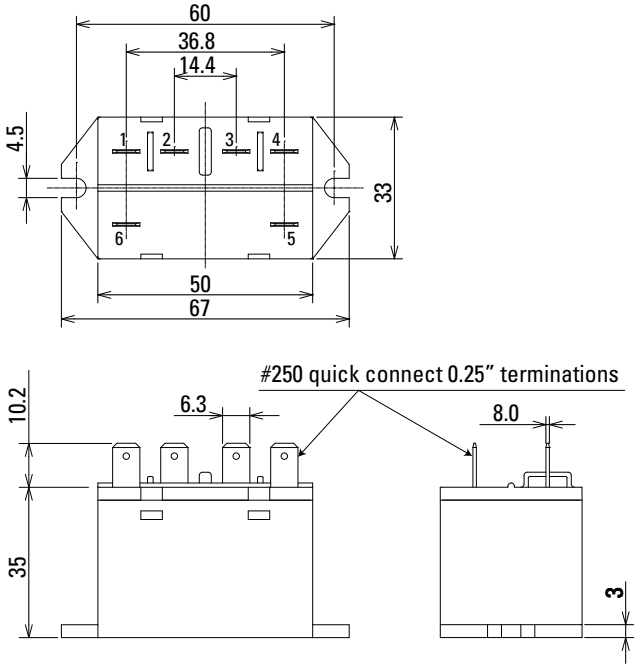



Recommended tightening torque: Coil terminals (M3.5): 0.7 - 0.9 N·m, Contact terminals (M4): 1.0 - 1.4 N·m

### RL1B-T Quick Connect Terminal 1 Pole Flange Mount

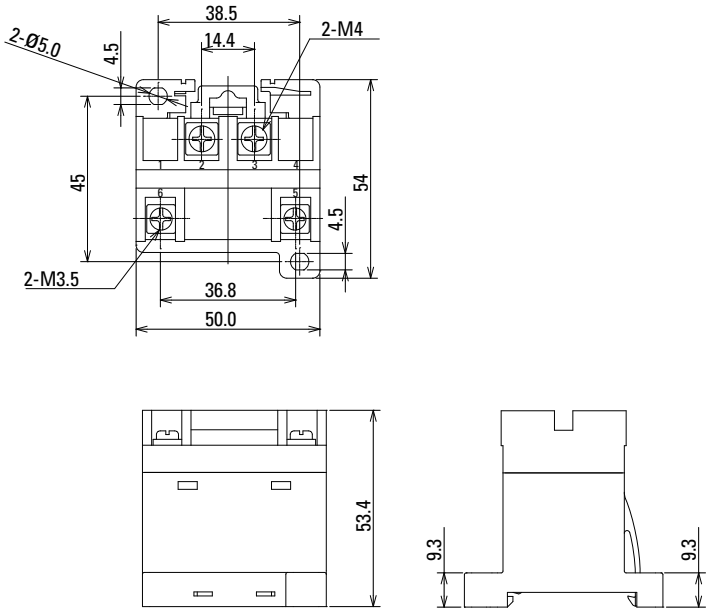



### RL2B-T Quick Connect Terminal 2 Pole Flange Mount

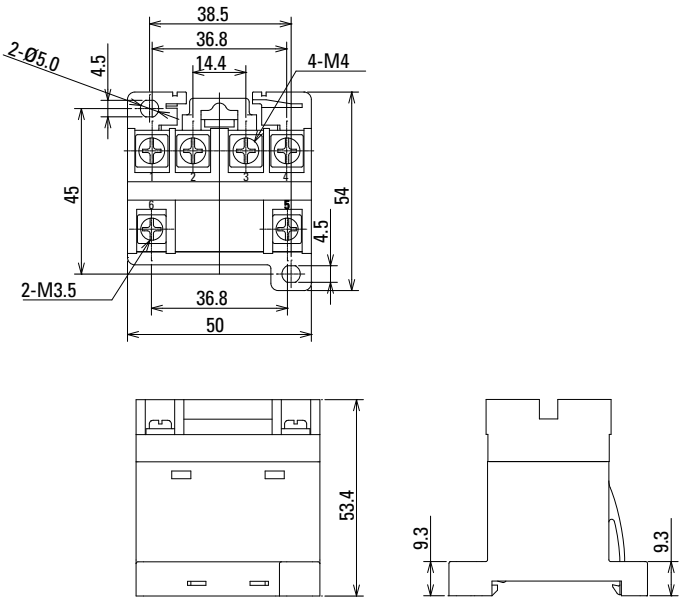



**(All dimensions in mm, except where noted.)**

### RL1N-D Screw Terminal 1 Pole DIN Rail Mount

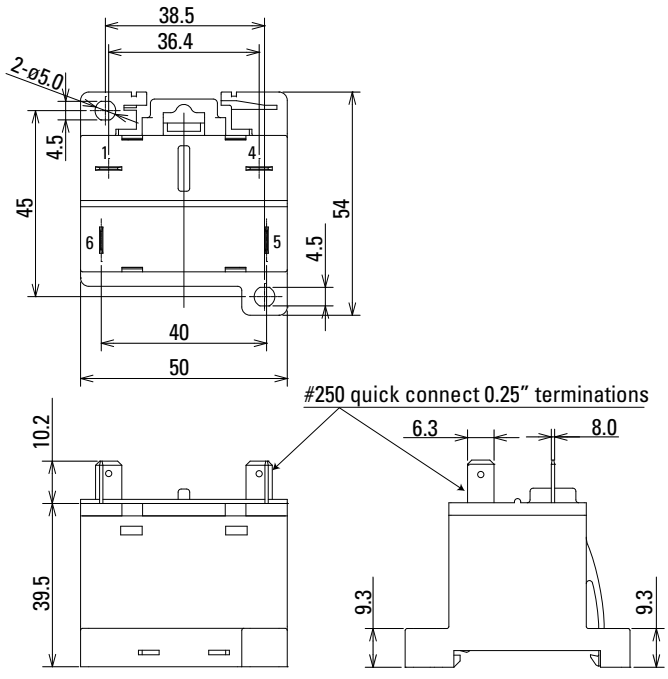



### RL2N-D Screw Terminal 2 Pole DIN Rail Mount

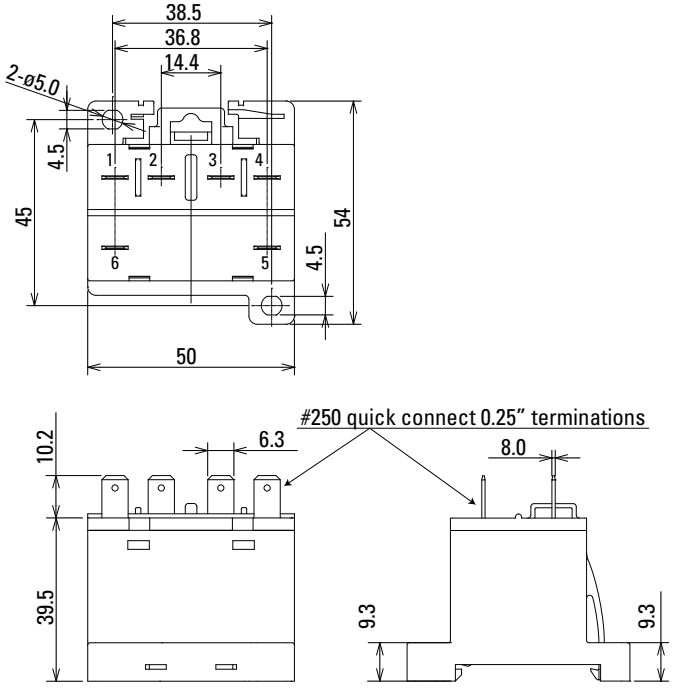



Recommended tightening torque: Coil terminals (M3.5): 0.7 - 0.9 N·m, Contact terminals (M4): 1.0 - 1.4 N·m

### RL1B-D Quick Connect Terminal 1 Pole DIN Rail Mount




### RL2B-D Quick Connect Terminal 2 Pole DIN Rail Mount



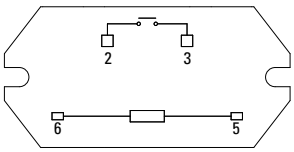
## Accessories

| Description | Color | Part Number |
|---|---|---|
| Finger-safe terminal cover | Clear | RL9Z-C |

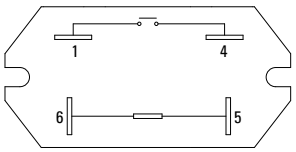
Applicable for screw terminal models only

## Terminal Arrangements (Top View)

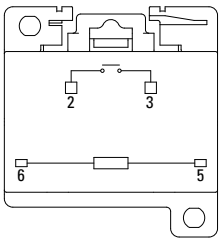
**Screw Terminal 1 Pole Flange Mount**



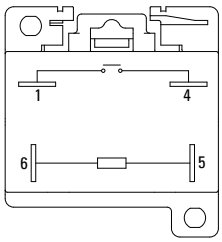

**Quick Connect Terminal 1 Pole Flange Mount**



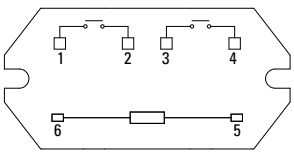

**Screw Terminal 1 Pole DIN Rail Mount**



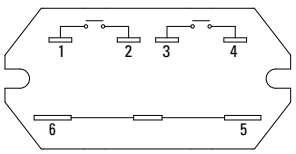

**Quick Connect Terminal 1 Pole DIN Rail Mount**



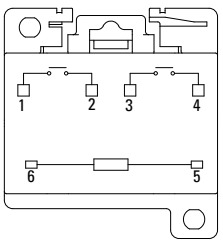

**Screw Terminal 2 Pole Flange Mount**



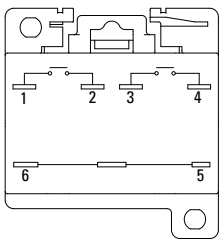

**Quick Connect Terminal 2 Pole Flange Mount**




**Screw Terminal 2 Pole DIN Rail Mount**

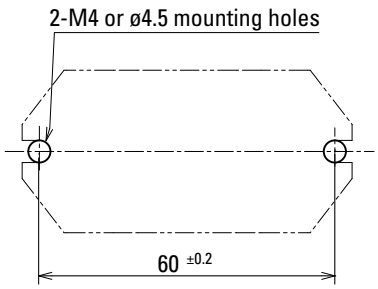



**Quick Connect Terminal 2 Pole DIN Rail Mount**

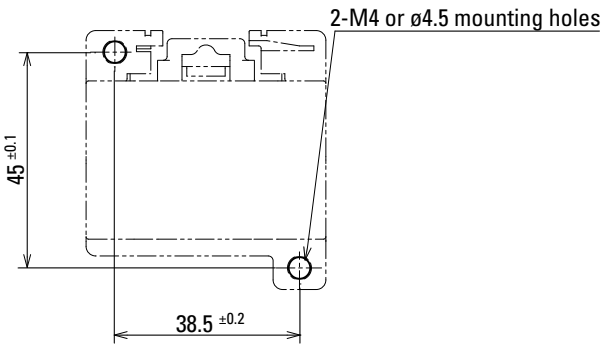



## Mounting Hole Dimensions

**Flange Mount**



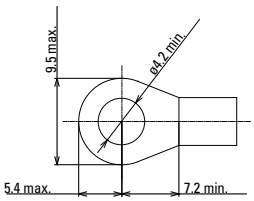

**DIN Rail Mount with Panel Mount Tabs**

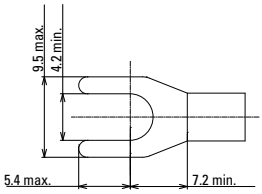



Recommended tightening torque: 0.6 - 0.9 N·m

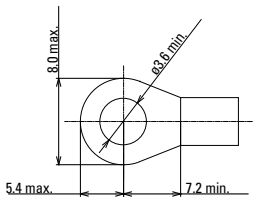
## Recommended ring or fork terminations for screw terminals.

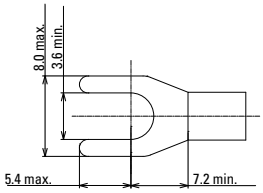
### Contact Terminals




### Coil Terminals

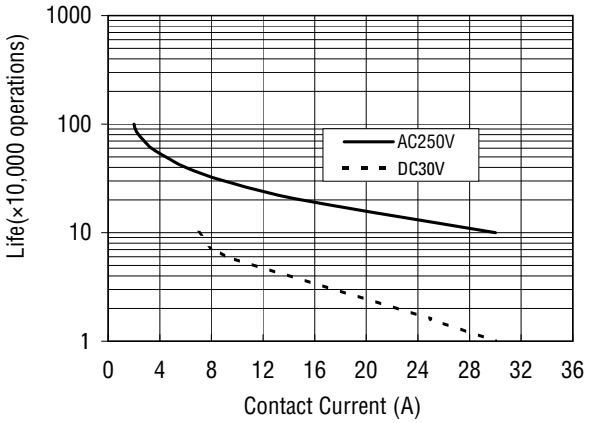



## Electrical Life Curves

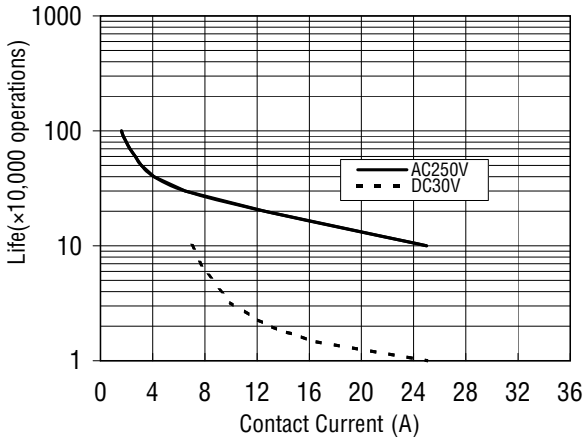
### RL1

**1 pole**




### RL2

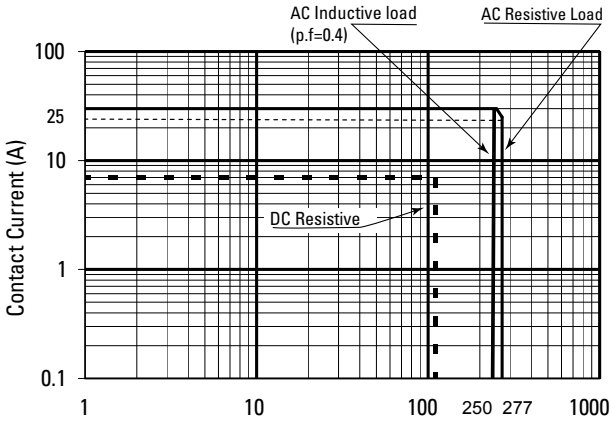
**2 poles**




## Maximum Switching Capacity

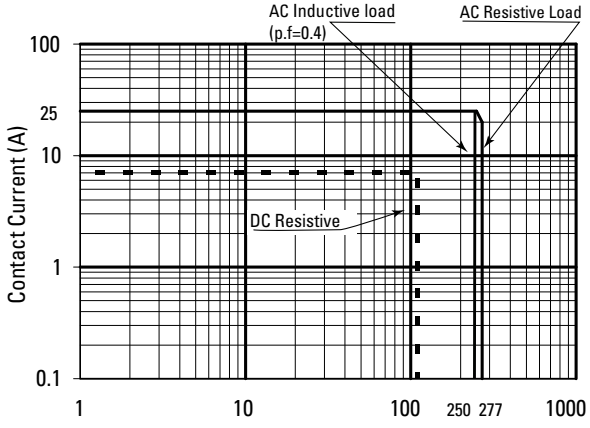
### RL1

**1 pole**




### RL2

**2 poles**



## RQ Series PCB Relays

IDEC RQ relays are low-profile, PCB relays in a compact package. Size equals value. RQ relays are small, yet maintain high contact ratings and long operational life. For larger power needs, a 16A model is also available.

**Key features:**

- Low profile:
  29 x 12.7 x 15 mm
- Contact rating:
  8A (DPDT) and 12A (SPDT)
- High capacity model with 16A (SPDT) contact rating
- Operational life:
  100K cycles at full resistive load
  10 million cycles, no load
- LED/Diode Plug-in modules available with DIN rail socket

c UL us® UL Recognized File No. E59804

TÜV Rheinland R500562600001

CE

## Part Number Selection

| Contact | Model | Part Number Pin Terminal | Coil Voltage Code |
|---|---|---|---|
| SPDT 12A | Basic | RQ1V-CM-☐ | A24, A115, A230, D12, D24 |
| SPDT 16A | HIgh Capacity (HC) | RQ1V-CH-☐ | A24, A115, A230, D12, D24, D110 |
| DPDT 8A | Basic | RQ2V-CN-☐ | A24, A115, A230, D12, D24, D110 |

**Ordering Information**
When ordering, specify the Part No. and coil voltage code:

(example) **RQ1V-CM** **A115**
Part No. — Coil Voltage Code

## Coil Voltage Table

| Coil Voltage Code | A24 | A115 | A230 | D12 | D24 | D110 |
|---|---|---|---|---|---|---|
| Coil Rating | 24V AC | 110-120V AC | 220-240V AC | 12V DC | 24V DC | 110V DC |

## Sockets

| Relays | Finger-safe DIN Rail Mount | PCB Mount |
|---|---|---|
| RQ1 | SQ1V-07B† | SQ1V-63* |
| RQ2<br>RQ1 HC | SQ2V-07B† | SQ2V-63* |
| | | |

1. *Comes with hold down spring
2. †Comes with retaining clip and marking plate.

## Replacement Parts & Accessories

| Part Number | Description |
|---|---|
| SQ9Z-C | Replacement retaining clip |
| SQ9Z-C63 | Replacement hold-down spring for SQ PCB sockets |
| SQ9Z-J8 | 8 pt jumper for DIN socket |

| Part Number | Description |
|---|---|
| SQ9Z-LD | Diode plug in modules for DIN socket |
| SQ9Z-LR | RC plug-in module (110-230V AC) for DIN socket |
| SQ9Z-P | Replacement marking plate |

## Accessories

| Item | Appearance | Use with | Part No. | Remarks |
|---|---|---|---|---|
| Aluminum DIN Rail (1 meter length) | | All DIN rail sockets | BNDN1000 | IDEC offers a low-profile DIN rail (BNDN1000). The BNDN1000 is designed to accommodate DIN mount sockets. Made of durable extruded aluminum, the BNDN1000 measures 0.413 (10.5mm) in height and 1.37 (35mm) in width (DIN standard). Standard length is 39" (1,000mm). |
| DIN Rail End Stop | | DIN rail | BNL5 | 9.1 mm wide. |

## Specifications

| Model (Contact) | | RQ1 | RQ1 HC | RQ2 |
|---|---|---|---|---|
| No. of poles | | 1 | 1 | 2 |
| Contact Configuration | | SPDT | SPDT | DPDT |
| Contact Rating | | 12A | 16A | 8A |
| Contact Material | | Silver-Nickel alloy | | |
| Contact Resistance | | 100mΩ max | | |
| Operating Time | | 12 ms | | |
| Release Time | | 8 ms | | |
| Dielectric Strength | Between contact & coil<br>Between contacts | 5,000VAC, 1 minute<br>1,000VAC, 1 minute | | |
| Vibration Resistance | Damage limits<br>Operating extremes | 10-55 Hz, amplitude 1.5mm<br>10-55 Hz, amplitude 1.5mm | | |
| Shock Resistance | Damage limits<br>Operating extremes | 100m/s$^2$ min (10G)<br>1,000m/s$^2$ min (100G) | | |
| Mechanical Life | | 10,000,000 operations | | |
| Electrical Life @ Full Rated Load | | 100,000 operations | | |
| Operating Temperature | | -40 to 85° C | | |
| Operating Humidity | | 45 to 85% RH | | |
| Dimensions (H x W x D mm) | | 29 x 12.7 x 15 | | |
| Weight (Approx.) | | 15g | | |

## Coil Ratings

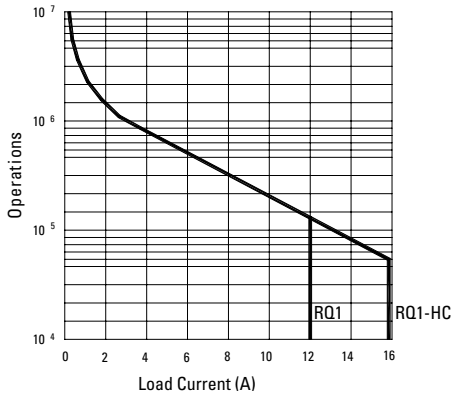
| Rated Voltage | | Nominal Current 50HZ | Nominal Current 60HZ | Coil Resistance | Power Consumption 50HZ | Power Consumption 60HZ | Pickup Voltage | Dropout Voltage | Max Allowable Voltage |
|---|---|---|---|---|---|---|---|---|---|
| DC | 12V | 33.3mA | | 360Ω | 0.40W | | 80% Max | 5% Min | 130% |
| | 24V | 16.7mA | | 1,440Ω | | | | | |
| | 110V | 4.1mA | | 26,530Ω | | | | | |
| AC | 24V | 29.75mA | 25.35mA | 350Ω | 0.71W | 0.61W | 80% Max | 30% Min | 130% |
| | 115V | 7.65mA | 6.3mA | 8,100Ω | 0.88W | 0.73W | | | |
| | 230V | 3.42mA | 2.72mA | 32,500Ω | 0.79W | 0.63W | | | |

## Socket Specifications

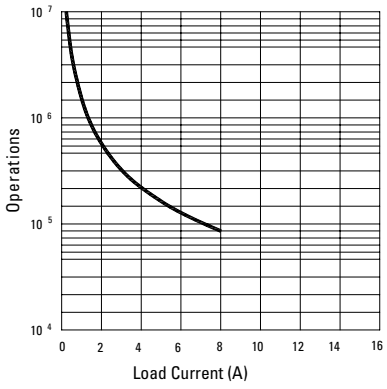
| | Relays | Terminal | Electrical Rating | Wire Size | Torque |
|---|---|---|---|---|---|
| DIN Rail Sockets | SQ1V-07B | M3 screw with box clamp | 300V, 12A | Maximum up to 2 - #14 AWG | 1.0N•m Maximum |
| | SQ2V-07B | M3 screw with box clamp | 300V, 8A | Maximum up to 2 - #14 AWG | 1.0N•m Maximum |
| PCB Mount Socket | SQ1V-63 | PCB mount | 300V, 12A | — | — |
| | SQ2V-63 | PCB mount | 300V, 12A | — | — |

## Electrical Life Curves

### RQ1 & RQ1 High Capacity

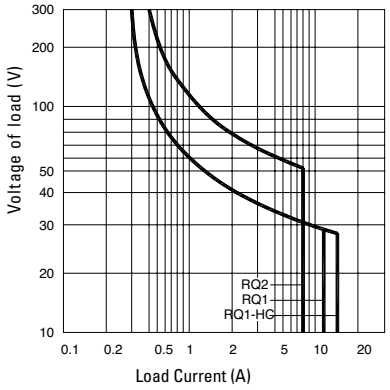



### RQ2



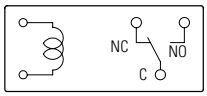

## Maximum Switching Capacity

### RQ1, RQ1 High Capacity & RQ2

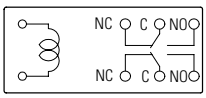



## Internal Connection (View from Bottom)

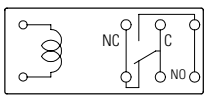
RQ1




RQ2

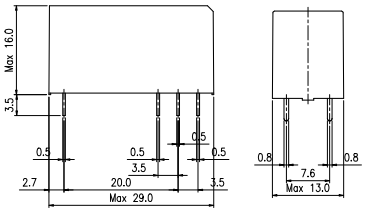


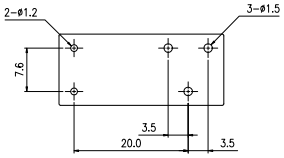

RQ1 HC



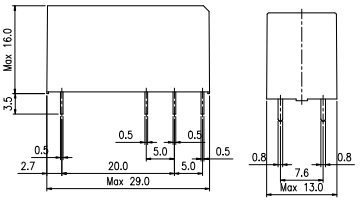
## Dimensions (mm)

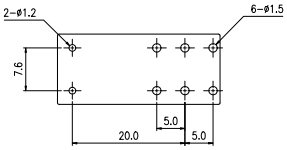
### RQ1



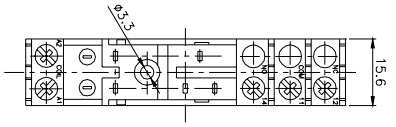

### RQ2/RQ1 HC

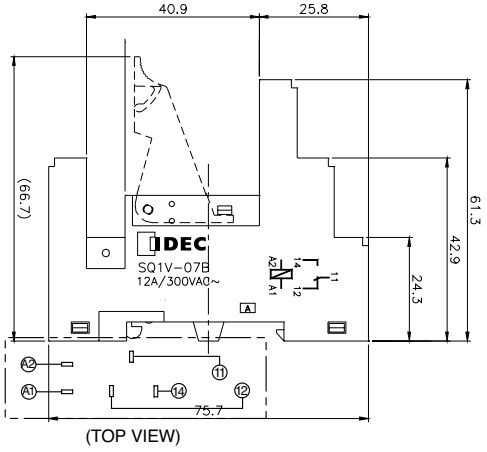



## SQ Socket Domensions

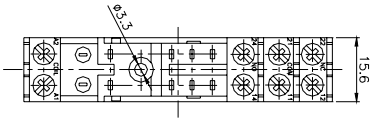
### SQ1V-07B

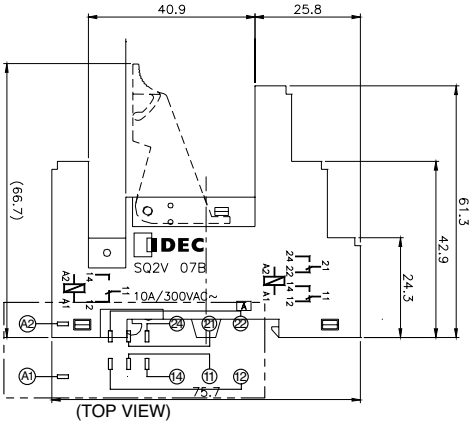



(TOP VIEW)

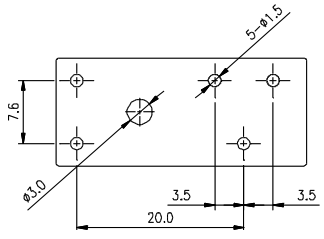
### SQ2V-07B



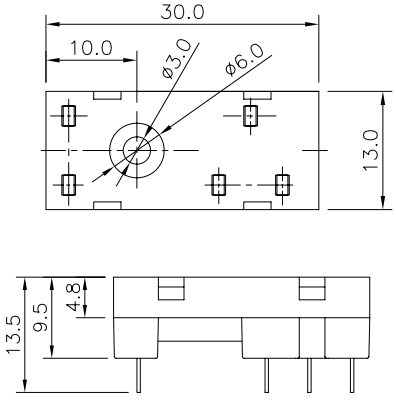




(TOP VIEW)

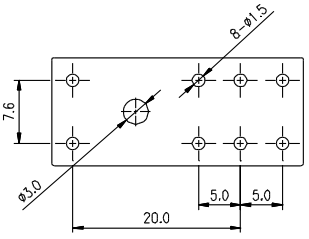
### SQ1V-63 PCB Pin Layout




### SQ1V-63




### SQ2V-63 PCB Pin Layout

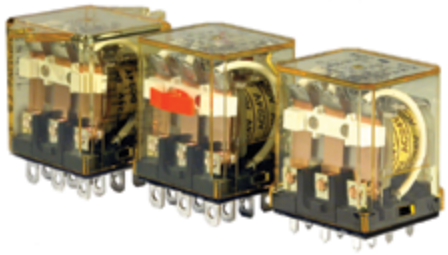



### SQ2V-63

# RH Series Compact Power Relays

## Key features

- SPDT through 4PDT, 10A contacts
- Compact power type relays
- Miniature power relays with a large capacity
- 10A contact capacity
- Compact size saves space



## Part Number Selection

| Contact | Model | Part Number: Blade Terminal | Part Number: PCB Terminal | Coil Voltage Code (Standard Stock in bold) |
|---|---|---|---|---|
| SPDT | Standard | RH1B-U ☐ | RH1V2-U ☐ | AC6V, AC12V, **AC24V**, AC110V, **AC120V**, AC220V, **AC240V** DC6V, **DC12V**, **DC24V**, DC48V, DC110V |
| | With Indicator | RH1B-UL ☐ | — | |
| | With Check Button | RH1B-UC ☐ | — | |
| | With Indicator and Check Button | RH1B-ULC ☐ | — | |
| | Top Bracket Mounting | RH1B-UT ☐ | — | |
| | With Diode (DC coil only) | RH1B-UD ☐ | RH1V2-UD ☐ | DC6V, **DC12V**, **DC24V**, DC48V, DC110V |
| | With Indicator and Diode (DC coil only) | RH1B-ULD ☐ | — | **DC12V**, **DC24V**, DC48V, DC110V |
| DPDT | Standard | RH2B-U ☐ | RH2V2-U ☐ | AC6V, AC12V, **AC24V**, **AC110-120V**, **AC220-240V** DC6V, **DC12V**, **DC24V**, DC48V, DC100-110V |
| | With Indicator | RH2B-UL ☐ | RH2V2-UL ☐ | |
| | With Check Button | RH2B-UC ☐ | — | |
| | With Indicator and Check Button | RH2B-ULC ☐ | — | |
| | Top Bracket Mounting | RH2B-UT ☐ | — | |
| | With Diode (DC coil only) | RH2B-UD ☐ | RH2V2-UD ☐ | DC6V, **DC12V**, **DC24V**, DC48V, DC100-110V |
| | With Indicator and Diode (DC coil only) | RH2B-ULD ☐ | RH2V2-ULD ☐ | |
| 3PDT | Standard | RH3B-U ☐ | RH3V2-U ☐ | AC6V, AC12V, **AC24V**, AC110V, **AC120V**, AC220V, **AC240V** DC6V, **DC12V**, **DC24V**, DC48V, DC110V |
| | With Indicator | RH3B-UL ☐ | RH3V2-UL ☐ | |
| | With Check Button | RH3B-UC ☐ | — | |
| | With Indicator and Check Button | RH3B-ULC ☐ | — | |
| | Top Bracket Mounting | RH3B-UT ☐ | — | |
| | With Diode (DC coil only) | RH3B-UD ☐ | — | DC6V, DC12V, DC24V, DC48V, DC110V |
| | With Indicator and Diode (DC coil only) | RH3B-ULD ☐ | — | |
| 4PDT | Standard | RH4B-U ☐ | RH4V2-U ☐ | AC6V, AC12V, **AC24V**, AC110V, **AC120V**, AC220V, **AC240V** DC6V, **DC12V**, **DC24V**, DC48V, DC110V |
| | With Indicator | RH4B-UL ☐ | RH4V2-UL ☐ | |
| | With Check Button | RH4B-UC ☐ | — | |
| | With Indicator and Check Button | RH4B-ULC ☐ | — | |
| | Top Bracket Mounting | RH4B-UT ☐ | — | |
| | With Diode (DC coil only) | RH4B-UD ☐ | RH4V2-UD ☐ | DC6V, DC12V, DC24V, DC48V, DC110V |
| | With Indicator and Diode (DC coil only) | RH4B-ULD ☐ | — | |

PCB terminal relays are designed to mount directly to a circuit board without any socket.

**Ordering Information**
When ordering, specify the Part No. and coil voltage code:

(example) **RH3B-U** (Part No.) **AC120V** (Coil Voltage Code)

## Sockets (for Blade Terminal Models)

| Relays | Standard DIN Rail Mount [1] | Finger-safe DIN Rail Mount [1] | Through Panel Mount | PCB Mount |
|---|---|---|---|---|
| RH1B | SH1B-05 | SH1B-05C | SH1B-51 | SH1B-62 |
| RH2B | SH2B-05 | SH2B-05C | SH2B-51 | SH2B-62 |
| RH3B | SH3B-05 | SH3B-05C | SH3B-51 | SH3B-62 |
| RH4B | SH4B-05 | SH4B-05C | SH4B-51 | SH4B-62 |

1. DIN Rail mount socket comes with two horseshoe clips. Do not use unless you plan to insert pullover wire spring. Replacement horseshoe clip part number is Y778-011.

## Hold Down Springs & Clips

| Appearance | Item | Relay | For DIN Mount Socket | For Through Panel & PCB Mount Socket |
|---|---|---|---|---|
| | Pullover Wire Spring | RH1B | SY2S-02F1 [2] | SY4S-51F1 |
| | | RH2B | SY4S-02F1 [2] | |
| | | RH3B | SH3B-05F1 [2] | |
| | | RH4B | SH4B-02F1 [2] | |
| | Leaf Spring (side latch) | RH1B, RH2B, RH3B, RH4B | SFA-202 [3] | SFA-302 [3] |
| | Leaf Spring (top latch) | RH1B, RH2B, RH3B, RH4B | SFA-101 [3] | SFA-301 [3] |

2. Must use horseshoe clip when mounting in DIN mount socket. Replacement horseshoe clip part number is Y778-011.
3. Two required per relay.

## AC Coil Ratings

| Voltage (V) | Rated Current (mA) ±15% at 20°C | | | | | | | | Coil Resistance (Ω) ±10% at 20°C | | | | Operation Characteristics (against rated values at 20°C) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AC 50Hz | | | | AC 60Hz | | | | | | | | | | |
| | SPDT | DPDT | 3PDT | 4PDT | SPDT | DPDT | 3PDT | 4PDT | SPDT | DPDT | 3PDT | 4PDT | Max. Continuous Applied Voltage | Pickup Voltage | Dropout Voltage |
| 6 | 170 | 240 | 330 | 387 | 150 | 200 | 280 | 330 | 330 | 9.4 | 6.4 | 5.4 | 110% | 80% maximum | 30% minimum |
| 12 | 86 | 121 | 165 | 196 | 75 | 100 | 140 | 165 | 165 | 39.3 | 25.3 | 21.2 | | | |
| **24** | 42 | 60.5 | 81 | 98 | 37 | 50 | 70 | 83 | 83 | 153 | 103 | 84.5 | | | |
| 110 | 9.6 | — | 18.1 | 21.6 | 8.4 | — | 15.5 | 18.2 | 18.2 | — | 2,200 | 1,800 | | | |
| **110-120** | — | 9.4-10.8 | — | — | — | 8.0-9.2 | — | — | — | — | — | — | | | |
| **120** | 8.6 | — | 16.4 | 19.5 | 7.5 | — | 14.2 | 16.5 | 16.5 | — | 10,800 | 7,360 | | | |
| 220 | 4.7 | — | 8.8 | 10.7 | 4.1 | — | 7.7 | 9.1 | 9.1 | — | 10,800 | 7,360 | | | |
| **220-240** | — | 4.7-5.4 | — | — | — | 4.0-4.6 | — | | — | 18,820 | — | — | | | |
| **240** | 4.9 | — | 8.2 | 9.8 | 4.3 | — | 7.1 | 8.3 | 8.3 | — | 12,100 | 9,120 | | | |

## DC Coil Ratings

| Voltage (V) | Rated Current (mA) ±15% at 20°C | | | | Coil Resistance (Ω) ±10% at 20°C | | | | Operation Characteristics (against rated values at 20°C) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPDT | DPDT | 3PDT | 4PDT | SPDT | DPDT | 3PDT | 4PDT | Max. Continuous Applied Voltage | Pickup Voltage | Dropout Voltage |
| 6 | 128 | 150 | 240 | 250 | 47 | 40 | 25 | 24 | 110% | 80% maximum | 10% minimum |
| 12 | 64 | 75 | 120 | 125 | 188 | 160 | 100 | 96 | | | |
| **24** | 32 | 36.9 | 60 | 62 | 750 | 650 | 400 | 388 | | | |
| 48 | 18 | 18.5 | 30 | 31 | 2,660 | 2,600 | 1,600 | 1,550 | | | |
| 100-110 | — | 8.2-9.0 | — | — | — | 12,250 | — | — | | | |
| 110 | 8 | — | 12.8 | 15 | 13,800 | — | 8,600 | 7,340 | | | |

Standard coil voltages are in **BOLD**.

## Contact Ratings

| Model | Continuous Current | Maximum Contact Capacity: Allowable Contact Power: Resistive Load | Allowable Contact Power: Inductive Load | Rated Load: Voltage (V) | Rated Load: Res. Load | Rated Load: Ind. Load |
|---|---|---|---|---|---|---|
| SPDT | 10A | 1540VA 300W | 990VA 210W | 110 AC | 10A | 7A |
| | | | | 220 AC | 7A | 4.5A |
| | | | | 30 DC | 10A | 7A |
| DPDT 3PDT 4PDT | 10A | 1650VA 300W | 1100VA 225W | 110 AC | 10A | 7.5A |
| | | | | 220 AC | 7.5A | 5A |
| | | | | 30 DC | 10A | 7.5A |

Note: Inductive load for the rated load — cos ø = 0.3, L/R = 7 ms

## TÜV Ratings

| Voltage | RH1 | RH2 | RH3 | RH4 |
|---|---|---|---|---|
| 240V AC | 10A | 10A | 7.5A | 7.5A |
| 30V DC | 10A | 10A | 10A | 10A |

AC: cos ø = 1.0, DC: L/R = 0 ms

## UL Ratings

| Voltage | Resistive | | | General Use | | | Horsepower Rating | | |
|---|---|---|---|---|---|---|---|---|---|
| | RH1 RH2 | RH3 | RH4 | RH1 RH2 | RH3 | RH4 | RH1 RH2 | RH3 | RH4 |
| 240V AC | 10A | 7.5A | 7.5A | 7A | 6.5A | 5A | 1/3 HP | 1/3 HP | — |
| 120V AC | — | 10A | 10A | — | 7.5A | 7.5A | 1/6 HP | 1/6 HP | — |
| 30V DC | 10A | 10A | — | 7A | — | — | — | — | — |
| 28V DC | — | — | 10A | — | — | — | — | — | — |

## CSA Ratings

| Voltage | Resistive | | | | General Use | | | | Horse-power Rating |
|---|---|---|---|---|---|---|---|---|---|
| | RH1 | RH2 | RH3 | RH4 | RH1 | RH2 | RH3 | RH4 | RH1, 2, 3 |
| 240V AC | 10A | 10A | — | 7.5A | 7A | 7A | 7A | 5A | 1/3 HP |
| 120V AC | 10A | 10A | 10A | 10A | 7.5A | 7.5A | — | 7.5A | 1/6 HP |
| 30V DC | 10A | 10A | 10A | 10A | 7A | 7.5A | — | — | — |

## Socket Specifications

| | Sockets | Terminal | Electrical Rating | Wire Size | Torque |
|---|---|---|---|---|---|
| DIN Rail Mount Sockets | SH1B-05 | (Coil) M3 screws (contact) M3.5 screws with captive wire clamp | 250V, 10A | Maximum up to 2–#12AWG | 5.5 - 9 in•lbs 9 - 11.5 in•lbs |
| | SH2B-05 SH3B-05 SH4B-05 | M3.5 screws with captive wire clamp | 300V, 10A | Maximum up to 2–#12AWG | 9 - 11.5 in•lbs |
| Finger-safe DIN Rail Mount | SH1B-05C | (coil) M3 screws (contact) M3.5 screws with captive wire clamp, fingersafe | 250V, 10A | Maximum up to 2–#12AWG | 5.5 - 9 in•lbs 9 - 11.5 in•lbs |
| | SH2B-05C SH3B-05C SH4B-05C | M3.5 screws with captive wire clamp, fingersafe | 300V, 10A | Maximum up to 2–#12AWG | 9 - 11.5 in•lbs |
| Through Panel Mount Socket | SH1B-51 SH2B-51 SH3B-51 SH4B-51 | Solder | 300V, 10A | — | — |
| PCB Mount Socket | SH1B-62 | PCB mount | 250V, 10A | — | — |
| | SH2B-62 SH3B-62 SH4B-62 | PCB mount | 300V, 10A | — | — |

## Accessories

| Item | Appearance | Use with | Part No. | Remarks |
|---|---|---|---|---|
| Aluminum DIN Rail (1 meter length) | | All DIN rail sockets | BNDN1000 | The BNDN1000 is designed to accommodate DIN mount sockets. Made of durable extruded aluminum, the BNDN1000 measures 0.413 (10.5mm) in height and 1.37 (35mm) in width (DIN standard). Standard length is 39" (1,000mm). |
| DIN Rail End Stop | | DIN rail | BNL5 | 9.1 mm wide. |
| Replacement Hold-Down Spring Anchor | | DIN mount sockets and hold down springs. | Y778-011 | For use on DIN rail mount socket when using pullover wire hold down spring. 2 pieces included with each socket. |

## Specifications

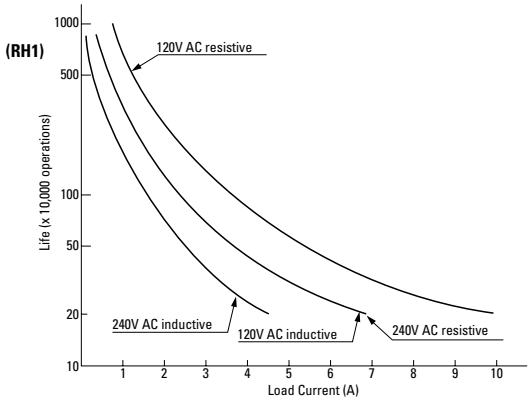
| | | | |
|---|---|---|---|
| Contact Material | | Silver cadmium oxide | |
| Contact Resistance [1] | | 50mΩ maximum | |
| Minimum Applicable Load | | 24V DC, 30 mA; 5V DC, 100 mA (reference value) | |
| Operating Time [2] | SPDT<br>DPDT | 20ms maximum | |
| | 3PDT<br>4PDT | 25ms maximum | |
| Release Time [2] | SPDT<br>DPDT | 20ms maximum | |
| | 3PDT<br>4PDT | 25ms maximum | |
| Power Consumption (approx.) | SPDT | AC: 1.1VA (50Hz), 1VA (60Hz) | DC: 0.8W |
| | DPDT | AC: 1.4VA (50Hz), 1.2VA (60Hz) | DC: 0.9W |
| | 3PDT | AC: 2VA (50Hz), 1.7VA (60Hz) | DC: 1.5W |
| | 4PDT | AC: 2.5VA (50Hz), 2VA (60Hz) | DC: 1.5W |
| Insulation Resistance | | 100MΩ minimum (500V DC megger) | |
| Dielectric Strength [3] | SPDT | Between live and dead parts:<br>Between contact and coil:<br>Between contacts of the same pole: | 2,000V AC, 1 minute<br>2,000V AC, 1 minute<br>1,000V AC, 1 minute |
| | DPDT<br>3PDT<br>4PDT | Between live and dead parts:<br>Between contact and coil:<br>Between contacts of different poles:<br>Between contacts of the same pole: | 2,000V AC, 1 minute<br>2,000V AC, 1 minute<br>2,000V AC, 1 minute<br>1,000V AC, 1 minute |
| Operating Frequency | | Electrical:<br>Mechanical: | 1,800 operations/hour maximum<br>18,000 operations/hour maximum |
| Vibration Resistance | | Damage limits:<br>Operating extremes: | 10 to 55Hz, amplitude 0.5 mm<br>10 to 55Hz, amplitude 0.5 mm |
| Shock Resistance | | Damage limits:<br>Operating extremes: | 1,000m/s$^2$ (100G)<br>200m/s$^2$ (20G - SPDT, DPDT)<br>100m/s$^2$ (10G - 3PDT, 4PDT) |
| Mechanical Life | | 50,000,000 operations minimum | |
| Electrical Life | DPDT | 500,000 operations minimum (120V AC, 10A) | |
| | SPDT<br>3PDT<br>4PDT | 200,000 operations minimum (120V AC, 10A) | |
| Operating Temperature [4] | SPDT<br>DPDT<br>3PDT<br>4PDT | –25 to +70°C (no freezing) | |
| Operating Humidity | | 45 to 85% RH (no condensation) | |
| Weight (approx.) | | SPDT: 24g, DPDT: 37g, 3PDT: 50g, 4PDT: 74g | |

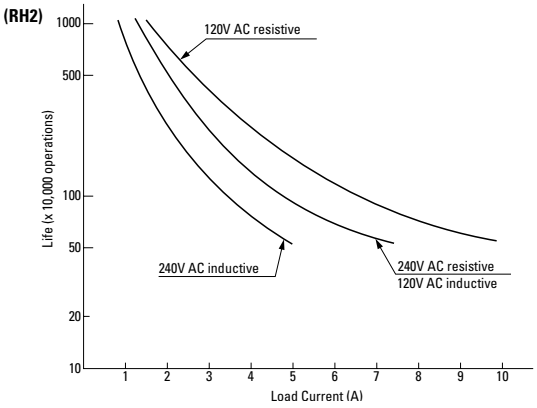
Note: Above values are initial values.
1. Measured using 5V DC, 1A voltage drop method
2. Measured at the rated voltage (at 20°C), excluding contact bouncing
   Release time of relays with diode: 40 ms maximum
3. Relays with indicator or diode: 1000V AC, 1 minute
4. For use under different temperature conditions, refer to Continuous Load Current vs. Operating Temperature Curve. The operating temperature range of relays with indicator or diode is –25 to +40°C.

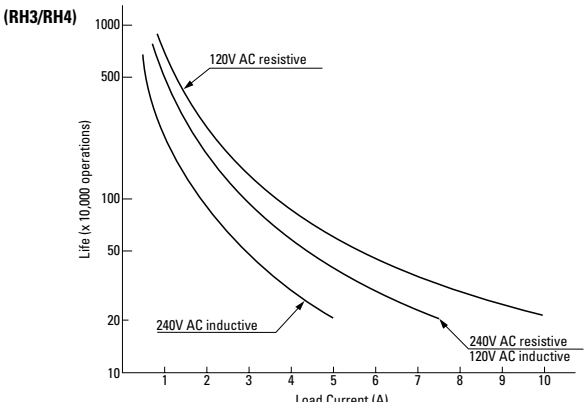
## Characteristics (Reference Data)

### Electrical Life Curves

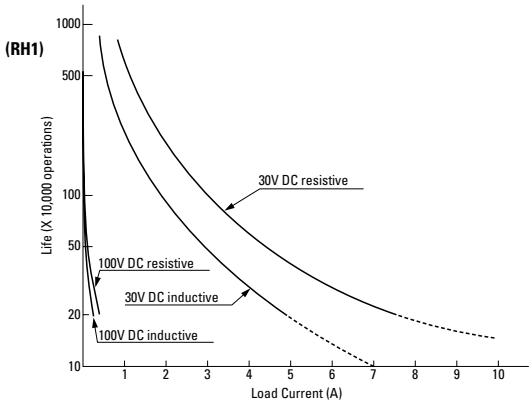
AC Load

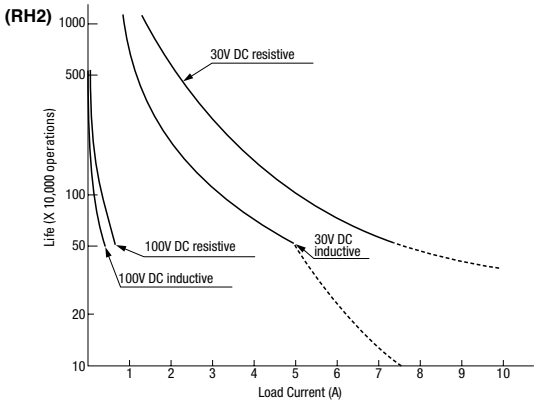


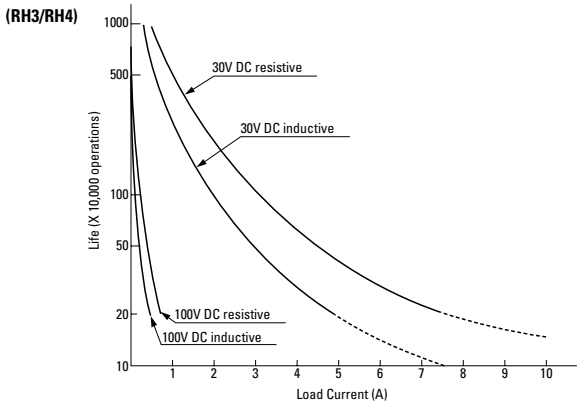




DC Load

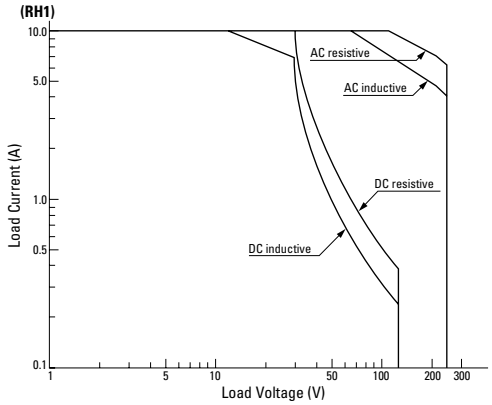


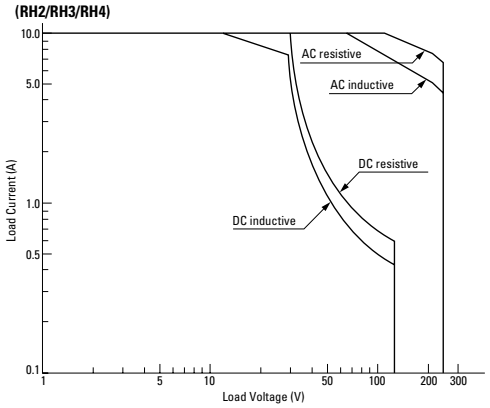



## Maximum Switching Capacity

(RH1)

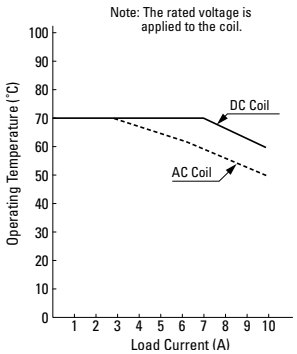



(RH2/RH3/RH4)

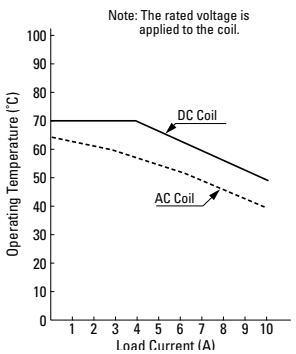



## Continuous Load Current vs. Operating Temperature Curve (Basic Type, With Check Button, and Top Bracket Mounting Type)

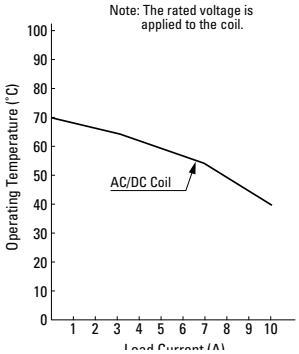
(RH1)




(RH2)



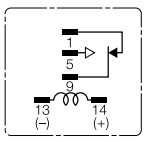

(RH3/RH4)



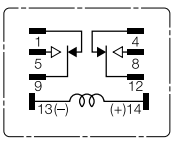

## Internal Connection (View from Bottom)

Basic Type

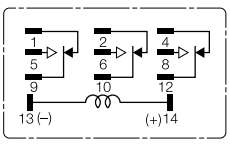
SPDT



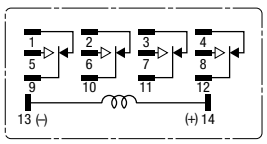

DPDT



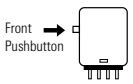

3PDT




4PDT




With Check Button

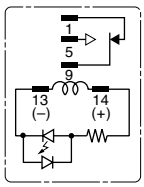



Contacts can be operated by pressing the check button.

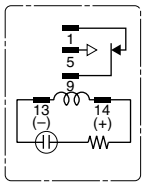
## With Indicator (-L type)

SPDT

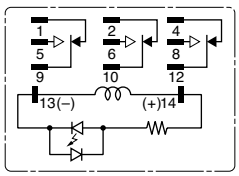
Below 100V AC/DC

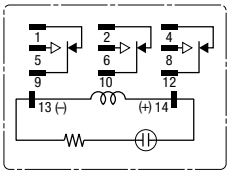



100V AC/DC and over

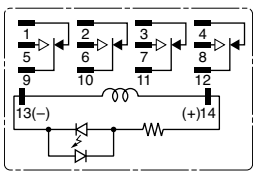


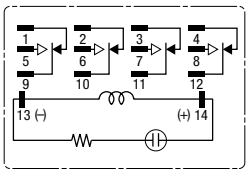

3PDT



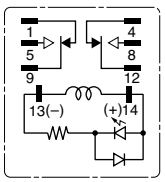

4PDT



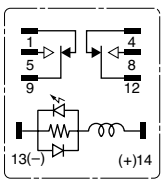




DPDT

Below 24V AC/DC




24V AC/DC and over

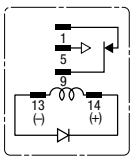



When the relay is energized, the indicator goes on.

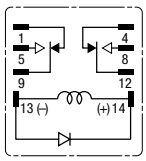
- Relay coils less than 100V DC do not contain a protection diode (except DPDT).
- Relay coils below 100V use LED indicator, coils above 100V use neon lamp indicator.
- LED color of DPDT model is green

## With Diode (-D type)

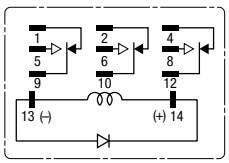
SPDT



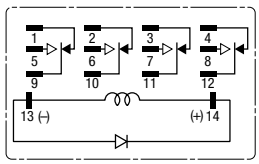

DPDT




3PDT



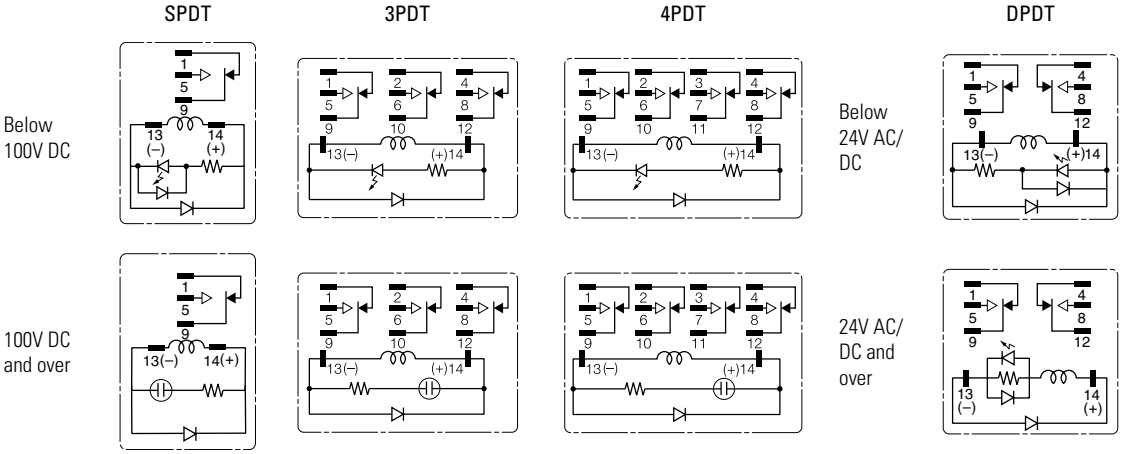

4PDT




Contains a diode to absorb the back emf generated when the coil is de-energized. The release time is slightly longer. Available for DC coil only.

- Diode Characteristics
  Reverse withstand voltage: 1,000V
  Forward current: 1A

## With Indicator LED & Diode (-LD type)

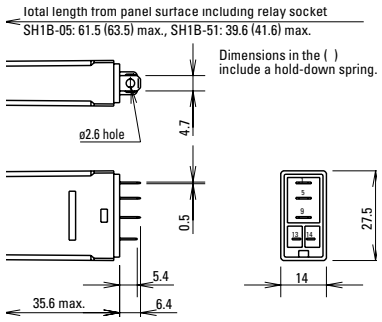



Contains an LED indicator and a surge absorber, and has the same height as the basic type.

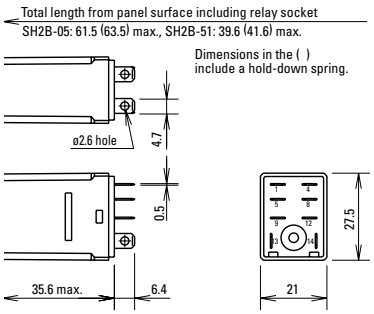
LED color of DPDT model is green.

## Dimensions (mm)

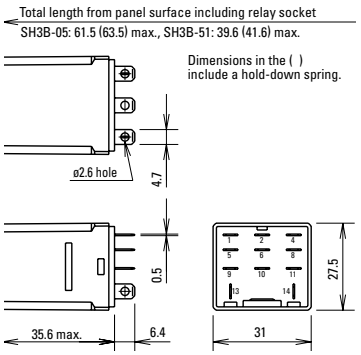
### RH1B-U/RH1B-UL/RH1B-UD/RH1B-ULD



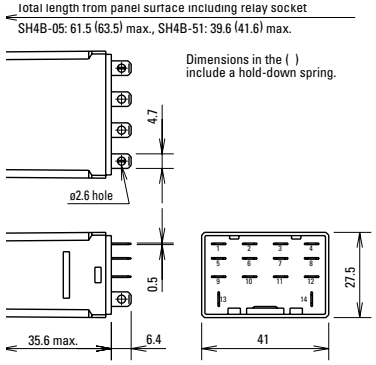

### RH2B-U/RH2B-UL/RH2B-UD/RH2B-ULD



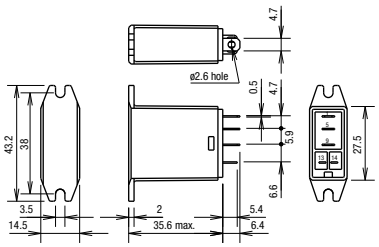

### RH3B-U/RH3B-UL/RH3B-UD/RH3B-ULD



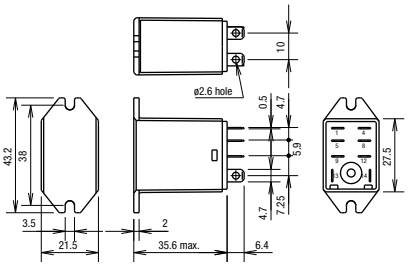

### RH4B-U/RH4B-UL/RH4B-UD/RH4B-ULD



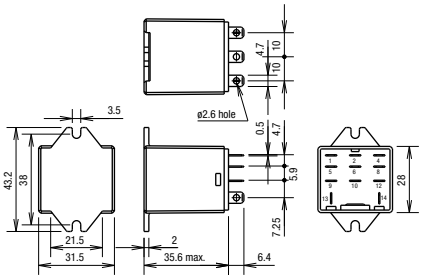

### RH1B-UT



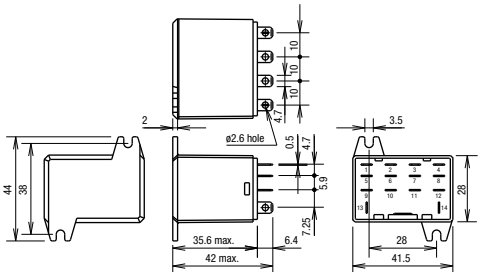

### RH2B-UT




### RH3B-UT

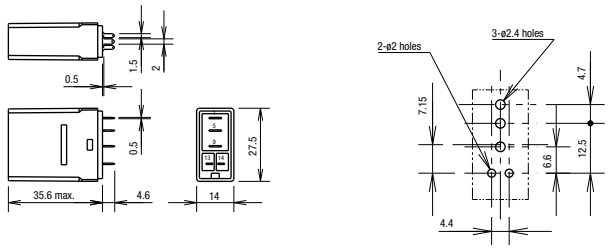



### RH4B-UT

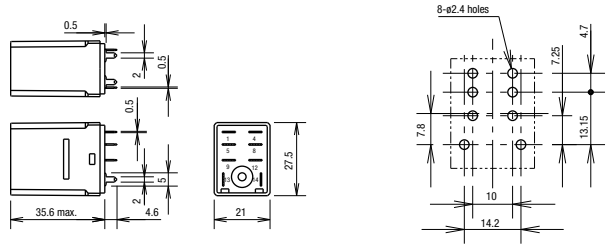


## Dimensions con't (mm)

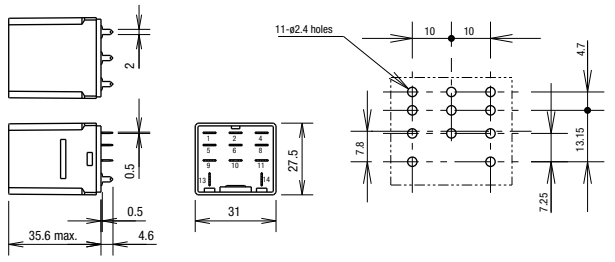
### RH1V2-U/RH1V2-UD



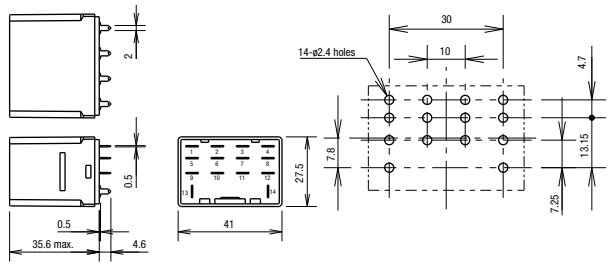

### RH2V2-U/RH2V2-UL/RH2V2-UD




### RH3V2-U/RH3V2-UL/RH3V2-D

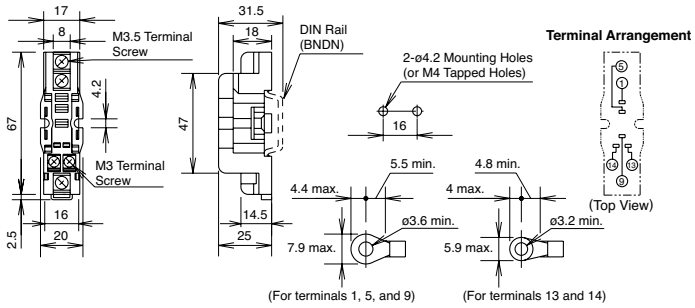



### RH4V2-U/RH4V2-UL/RH4V2-UD

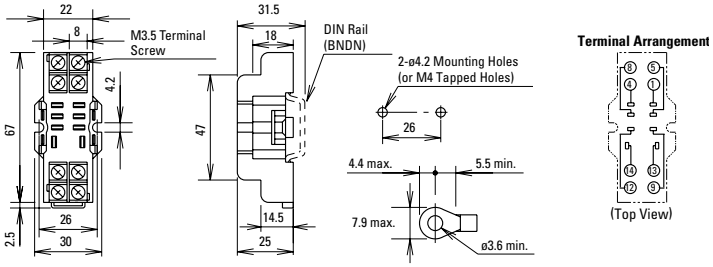



## Standard DIN Rail Mount Sockets

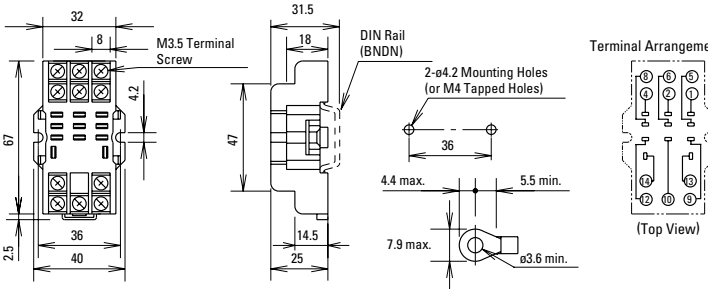
### SH1B-05



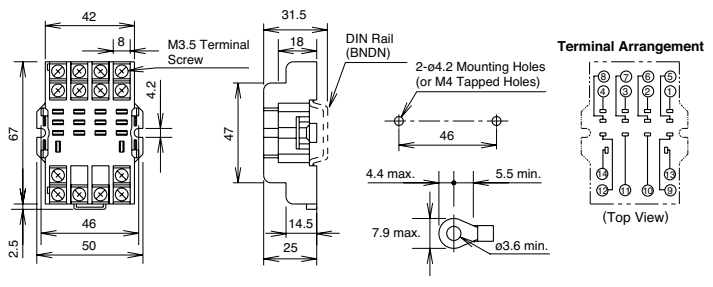

### SH2B-05




### SH3B-05



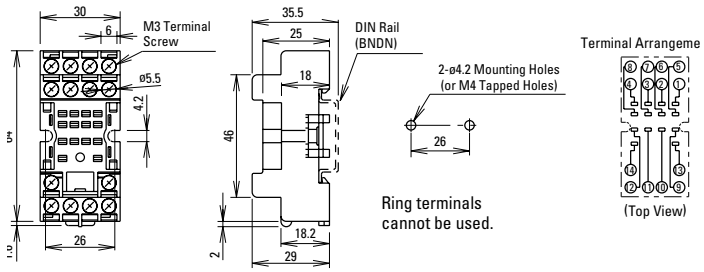

### SH4B-05



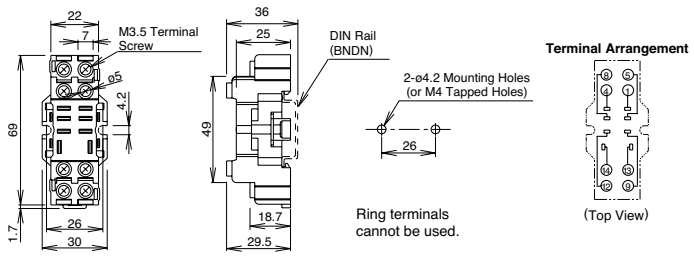
# Dimensions con't (mm)

## Finger-safe DIN Rail Mount Sockets

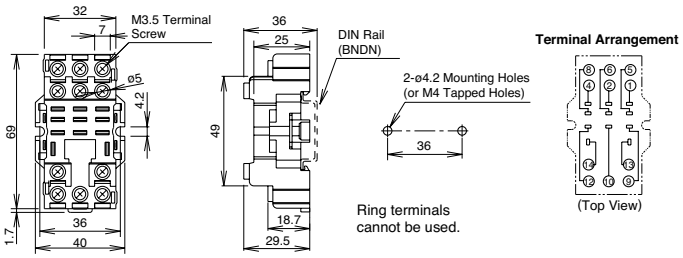
### SH1B-05C



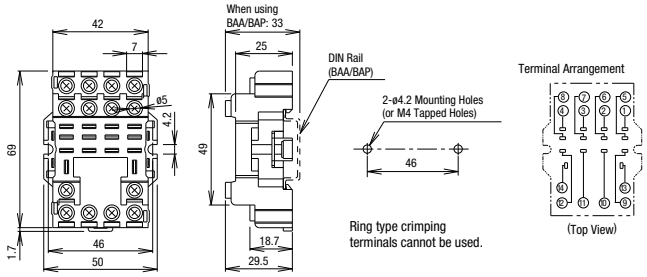

### SH2B-05C




### SH3B-05C

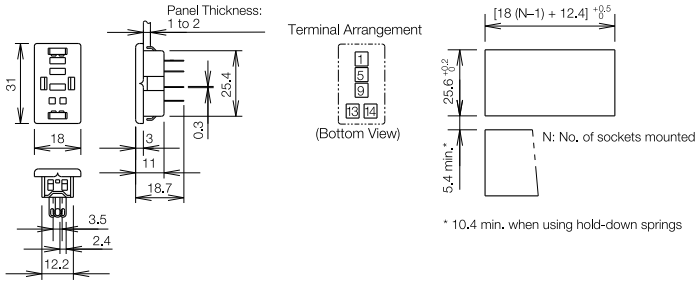



### SH4B-05C

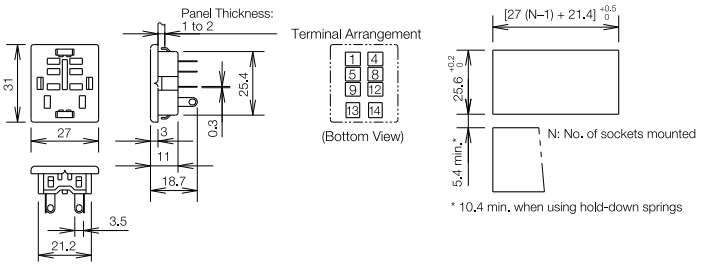



## Through Panel Mount Socket

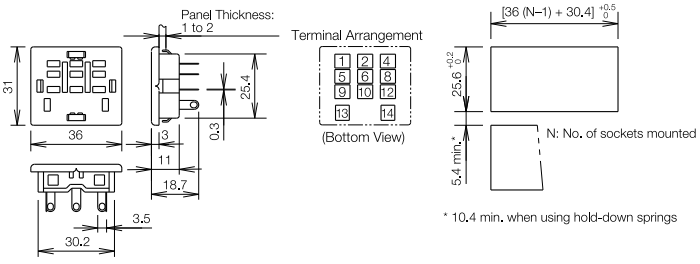
### SH1B-51



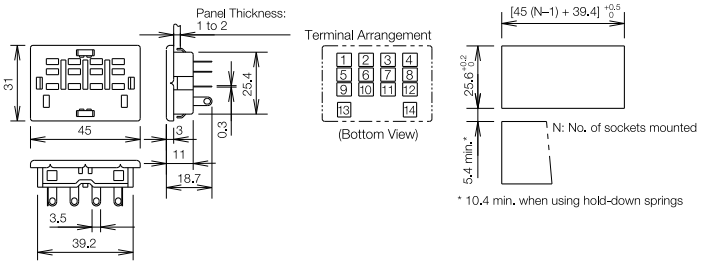

### SH2B-51




### SH3B-51



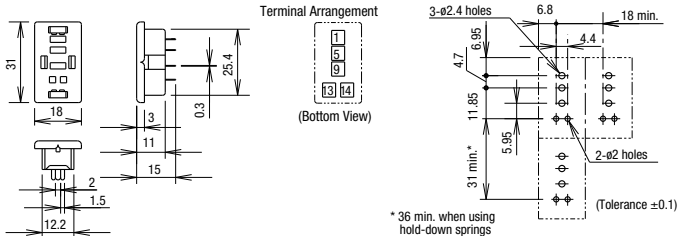

### SH4B-51



## Dimensions con't (mm)

### PCB Mount Sockets

#### SH1B-62

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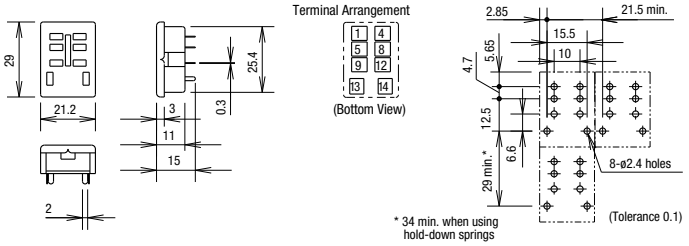
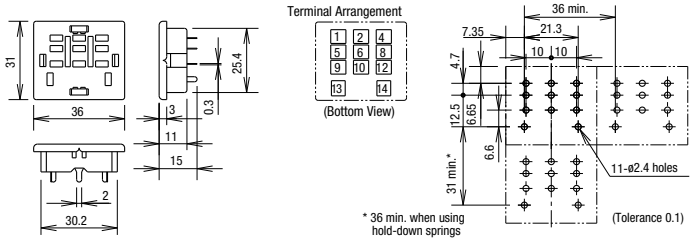
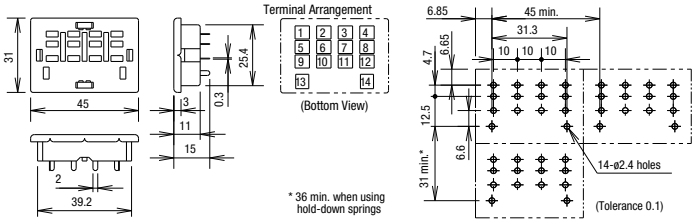



#### SH3B-62




#### SH4B-62



# RR Series Power Relays

**Key features:**

- SPDT through 3PDT, 10A contacts
- Midget power type relays
- Available in pin and blade terminal styles.
- Options include an indicator, check button for test operations and side flange.
- DIN rail, surface and panel mount sockets are available for a wide a variety of mounting applications.

## Part Number Selection

| Contact | Model | Part Number: Pin Terminal | Part Number: Blade Terminal* | Coil Voltage Code (Standard Stock Items in Bold) |
|---|---|---|---|---|
| SPDT | Standard | — | RR1BA-U ☐ | AC6V, AC12V, AC24V, AC110V, **AC120V**, AC240V, DC6V, DC12V, **DC24V**, DC48V, DC110V |
| | With Indicator | | RR1BA-UL ☐ | |
| | With Check Button | | RR1BA-UC ☐ | |
| | With Indicator and Check Button | | RR1BA-ULC ☐ | |
| | Side Flange Model | | RR1BA-US ☐ | |
| DPDT | Standard | RR2P-U ☐ | RR2BA-U ☐ | |
| | With Indicator | RR2P-UL ☐ | RR2BA-UL ☐ | |
| | With Check Button | RR2P-UC ☐ | RR2BA-UC ☐ | |
| | With Indicator and Check Button | RR2P-ULC ☐ | RR2BA-ULC ☐ | |
| | Side Flange Model | — | RR2BA-US ☐ | |
| 3PDT | Standard | RR3PA-U ☐ | RR3B-U ☐ | |
| | With Indicator | RR3PA-UL ☐ | RR3B-UL ☐ | |
| | With Check Button | RR3PA-UC ☐ | RR3B-UC ☐ | |
| | With Indicator and Check Button | RR3PA-ULC ☐ | RR3B-ULC ☐ | |
| | Side Flange Model | — | RR3B-US ☐ | |

*Blade type not TUV tested or CE marked.
Side flange model mounts directly to panel with no socket required.

**Ordering Information**
When ordering, specify the Part No. and coil voltage code:
(example) **RR3B-U** **AC120V**
Part No. | Coil Voltage Code

## Sockets

| Relays | Standard DIN Rail Mount | Finger-safe DIN Rail Mount | Through Panel Mount |
|---|---|---|---|
| RR2P | SR2P-05<br>SR2P-06 | SR2P-05C | SR2P-51 |
| RR3PA | SR3P-05<br>SR3P-06 | SR3P-05C | SR3P-51 |
| RR1BA<br>RR2BA<br>RR3B | SR3B-05 | — | SR3B-51 |
| | | | |

All DIN rail mount sockets shown above can be mounted using DIN rail BNDN1000.

## Hold Down Springs & Clips

| Appearance | Description | Relay | For DIN Mount Socket | For Through Panel & PCB Mount Socket |
|---|---|---|---|---|
| | Pullover Wire Spring | RR2P | SR2B-02F1 | SR3P-01F1 |
| | | RR3PA | SR3B-02F1 | |
| | | RR1BA, RR2BA, RR3B | SR3B-02F1 | SR3B-02F1 |
| | Leaf Spring (side latch) | RR2P, RR3PA | SFA-203 | – |

## Accessories

| Item | Appearance | Use with | Part No. | Remarks |
|---|---|---|---|---|
| Aluminum DIN Rail (1 meter length) | | All DIN rail sockets | BNDN1000 | The BNDN1000 is designed to accommodate DIN mount sockets. Made of durable extruded aluminum, the BNDN1000 measures 0.413 (10.5mm) in height and 1.37 (35mm) in width (DIN standard). Standard length is 39" (1,000mm). |
| DIN Rail End Stop | | DIN rail | BNL5 | 9.1 mm wide. |
| Replacement Hold-Down Spring Anchor | | Horseshoe clip for sockets SR3B-05, SR2P-06, SR3P-06 | Y778-011 | For use on DIN rail mount socket when using pullover wire hold down spring. 2 pieces included with each socket. |
| | | Chair clip for sockets SR2P-05(C), SR3P-05(C) | Y703-102 | |

## Specifications

| | | | |
|---|---|---|---|
| Contact Material | | Silver | |
| Contact Resistance [1] | | 30 mΩ maximum | |
| Minimum Applicable Load | | 1V DC, 10 mA | |
| Operating Time [2] | | 25 ms maximum | |
| Release Time [2] | | 25 ms maximum | |
| Power Consumption (approx.) | | AC: 3 VA (50 Hz), 2.5 VA (60 Hz)<br>DC: 1.5W | |
| Insulation Resistance | | 100 MΩ minimum (500V DC megger) | |
| Dielectric Strength | Pin Terminal | Between live and dead parts: | 1500V AC, 1 minute |
| | | Between contact and coil: | 1500V AC, 1 minute |
| | | Between contacts of different poles: | 1500V AC, 1 minute |
| | | Between contacts of the same pole: | 1000V AC, 1 minute |
| | Blade Terminal | Between live and dead parts: | 2000V AC, 1 minute |
| | | Between contact and coil: | 2000V AC, 1 minute |
| | | Between contacts of different poles: | 2000V AC, 1 minute |
| | | Between contacts of the same pole: | 1000V AC, 1 minute |
| Operating Frequency | | Electrical: | 1800 operations/h maximum |
| | | Mechanical: | 18,000 operations/h maximum |
| Vibration Resistance | | Damage limits: | 10 to 55 Hz, amplitude 0.5 mm |
| | | Operating extremes: | 10 to 55 Hz, amplitude 0.5 mm |
| Shock Resistance | | Damage limits: | 1000 m/s² (100g) |
| | | Operating extremes: | 100 m/s² (10G) |
| Mechanical Life | | 10,000,000 operations | |
| Electrical Life | | 200,000 operations (220V AC, 5A) | |
| Operating Temperature [3] | | –25 to +40°C (no freezing) | |
| Operating Humidity | | 5 to 85% RH (no condensation) | |
| Weight (approx.) (Standard type) | | RR2P: 90g, RR3PA: 96g, RR1BA/RR2BA/RR3B: 82g | |

1. Measured using 5V DC, 1A voltage drop method
2. Measured at the rated voltage (at 20°C), excluding contact bouncing
3. For use under different temperature conditions, refer to Continuous Load Current vs. Operating Temperature Curve.

## Coil Ratings

| Rated Voltage (V) | | Rated Current (mA) ±15% (at 20°C) | | Coil Resistance (Ω) ±10% (at 20°C) | Operating Characteristics (values at 20°C) | | |
|---|---|---|---|---|---|---|---|
| | | 50 Hz | 60 Hz | | Maximum Continuous Applied Voltage | Pickup Voltage | Dropout Voltage |
| AC (50/60 Hz) | 6 | 490 | 420 | 4.9 | 110% | 80% maximum | 30% minimum |
| | 12 | 245 | 210 | 18 | | | |
| | 24 | 121 | 105 | 79 | | | |
| | 110 | 27 | 23 | 1,680 | | | |
| | 120 | 24 | 20.5 | 2,100 | | | |
| | 240 | 12.1 | 10.5 | 8,330 | | | |
| DC | 6 | 240 | | 25 | 110% | 80% maximum | 10% minimum |
| | 12 | 120 | | 100 | | | |
| | 24 | 60 | | 400 | | | |
| | 48 | 30 | | 1,600 | | | |
| | 110 | 13 | | 8,460 | | | |

## Contact Ratings

| Maximum Contact Capacity | | | | | |
|---|---|---|---|---|---|
| Continuous Current | Allowable Contact Power | | Rated Load | | |
| | Resistive Load | Inductive Load | Voltage (V) | Res. Load | Ind. Load |
| 10A | 1650VA AC 300W DC | 1100VA AC 150W DC | 110 AC | 10A | 7.5A |
| | | | 220 AC | 7.5A | 5A |
| | | | 30 DC | 10A | 5A |

Note: Inductive load for the rated load — cos ø = 0.3, L/R = 7 ms

## TÜV Ratings

| Voltage | |
|---|---|
| 240V AC | 10A |
| 30V DC | 10A |

AC: cos ø = 1.0, DC: L/R = 0 ms

## UL Ratings

| Voltage | Resistive | General use | Horse Power Rating |
|---|---|---|---|
| 240V AC | 10A | 7A | 1/3 HP |
| 120V AC | 10A | 7.5A | 1/4 HP |
| 30V DC | 10A | 7A | — |

## CSA Ratings

| Voltage | Resistive | General use |
|---|---|---|
| 240V AC | 10A | 7A |
| 120V AC | 10A | 7.5A |
| 100V DC | — | 0.5A |
| 30V DC | 10A | 7.5A |

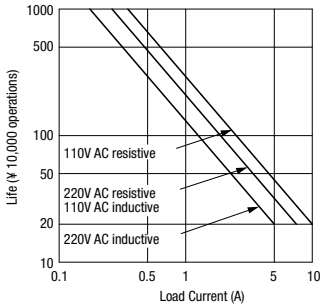
## Socket Specifications

| | Relays | Terminal | Electrical Rating | Wire Size | Torque |
|---|---|---|---|---|---|
| DIN Rail Sockets | SR2P-05 | M3 screw with captive wire clamp | 300V, 10A | Maximum 2 - #12 AWG | 9 - 11.5in•lbs |
| | SR2P-05C | M3 screw with captive wire clamp, fingersafe | 300V, 10A | Maximum 2 - #12 AWG | 9 - 11.5in•lbs |
| | SR2P-06 | M3 screw with captive wire clamp | 300V, 10A | Maximum 2 - #12 AWG | 9 - 11.5in•lbs |
| | SR3P-05 | M3 screw with captive wire clamp | 300V, 10A | Maximum 2 - #12 AWG | 9 - 11.5in•lbs |
| | SR3P-05C | M3 screw with captive wire clamp, fingersafe | 300V, 10A | Maximum 2 - #12 AWG | 9 - 11.5in•lbs |
| | SR3P-06 | M3 screw with captive wire clamp | 300V, 10A | Maximum 2 - #12 AWG | 9 - 11.5in•lbs |
| | SR3B-05 | M3 screw with captive wire clamp | 300V, 15A (10A)* (*CSA rating) | Maximum 2 - #12 AWG | 9 - 11.5in•lbs |
| Through Panel Mount Sockets | SR2P-51 | Solder | 300V, 10A | — | — |
| | SR3P-51 | Solder | 300V, 10A | — | — |
| | SR3B-51 | Solder | 300V, 10A | — | — |

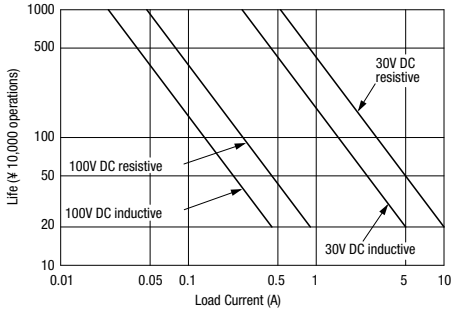
# Characteristics (Reference Data)

Electrical Life Curves

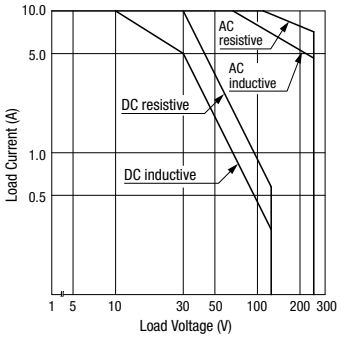
AC Load



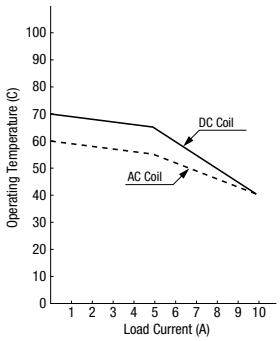

DC Load




## Maximum Switching Capacity



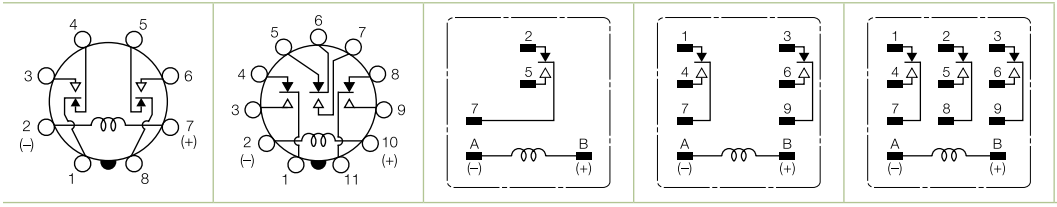

## Continuous Load Current vs. Operating Temperature Curve (Standard Type, With Check Button, and Side Flange Type)



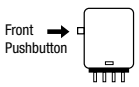

## Internal Connection (View from Bottom)

### Standard Type

RR2P-U | RR3PA-U | RR1BA-U | RR2BA-U | RR3B-U

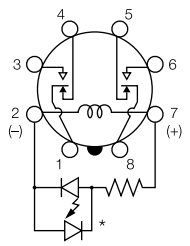
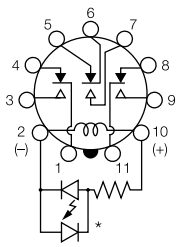
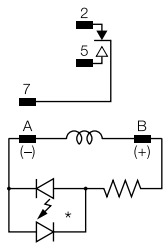
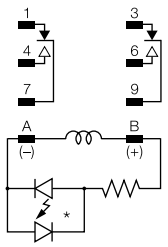
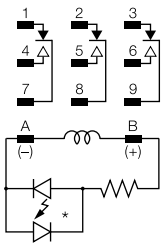
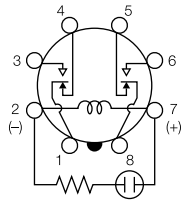
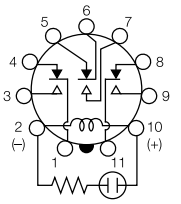
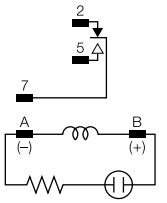
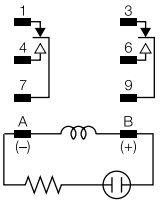
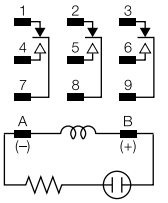



With Check Button




Contacts can be operated by pressing the check button.

## With Indicator (-UL type)

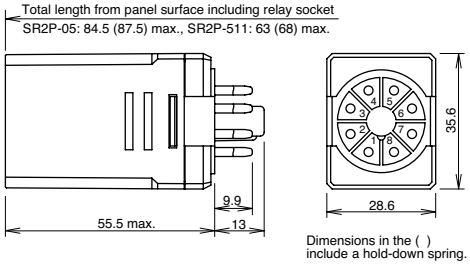
| | RR2P | RR3PA | RR1BA | RR2BA | RR3B |
|---|---|---|---|---|---|
| Coil Below 100V AC/DC |  |  |  |  |  |
| Coil 100V AC/DC and over |  |  |  |  |  |

When the relay is energized, the indicator goes on.

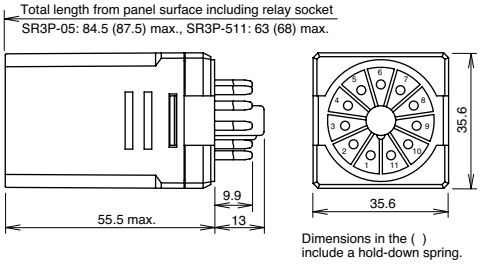
- An LED protection diode is not contained in relay coils below 100V DC.
- Coils below 100V use LED indicator while coils above 100V use neon lamp indicator.

# Dimensions (mm)

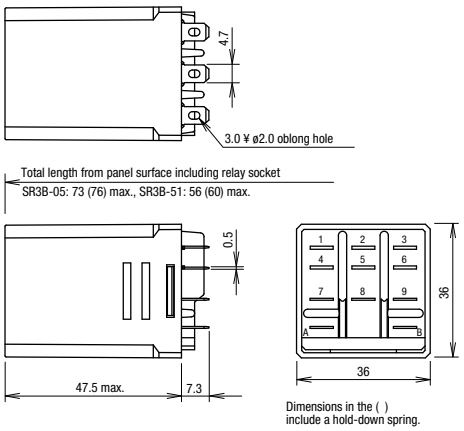
### RR2P-U/RR2P-UL



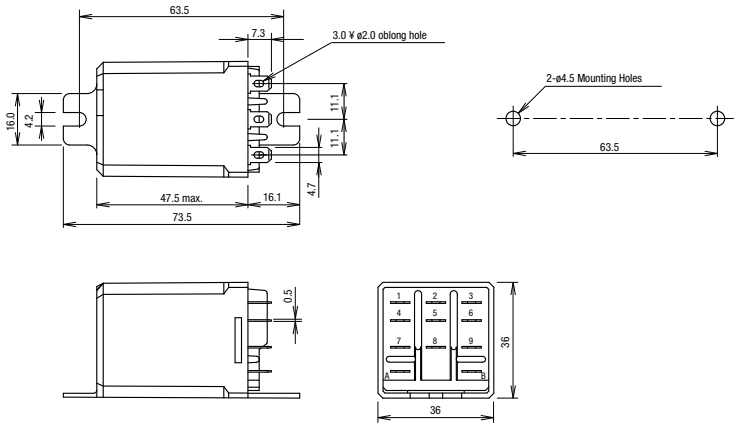

### RR3PA-U/RR3PA-UL




### RR1BA-U/RR2BA-UL/RR2BA-U
### RR2BA-UL/RR3B-U/RR3B-UL

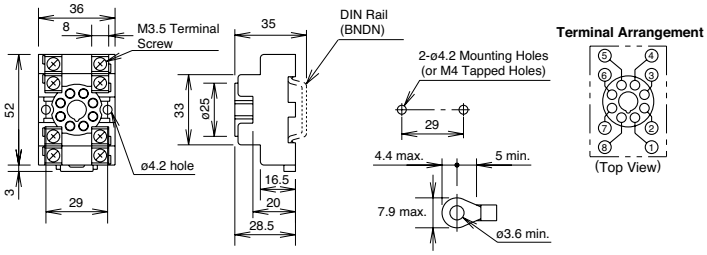



### RR1BA-US/RR2BA-US/RR3B-US

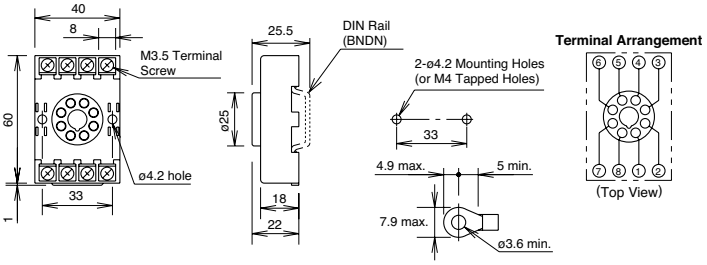



## Standard DIN Rail Mount Sockets

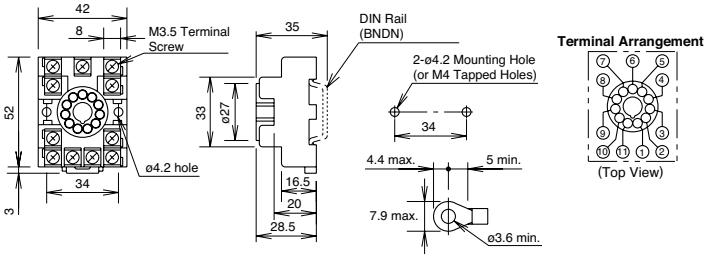
### SR2P-05



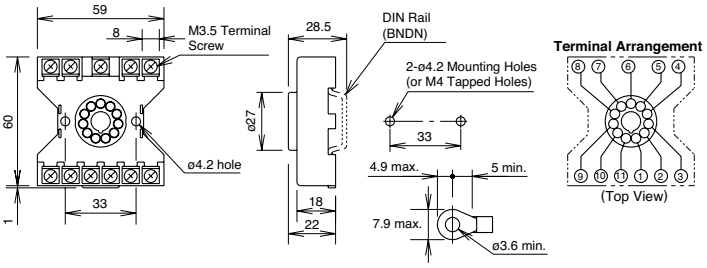

### SR2P-06




### SR3P-05

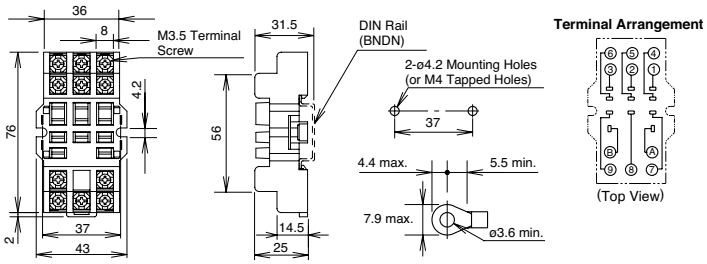



### SR3P-06



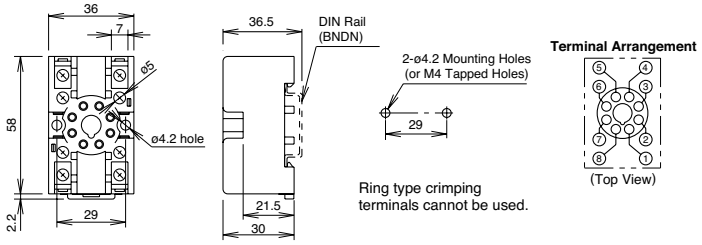
## Standard DIN Rail Mount Sockets

### SR3B-05

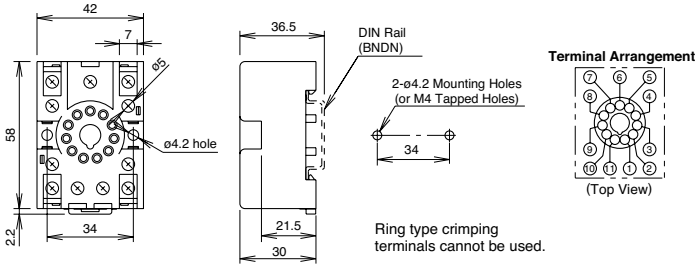



## Finger-safe DIN Rail Mount Sockets

### SR2P-05C

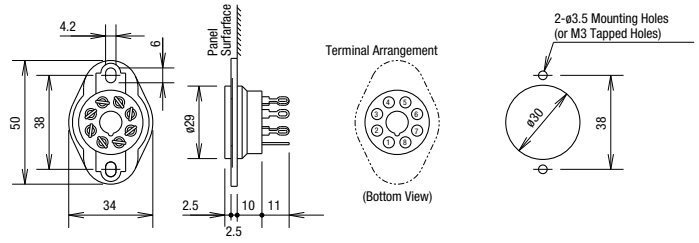



### SR3P-05C

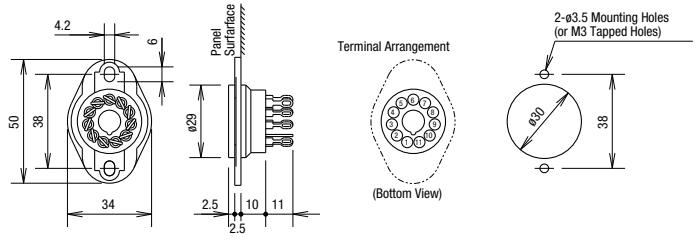



## Through Panel Mount Socket

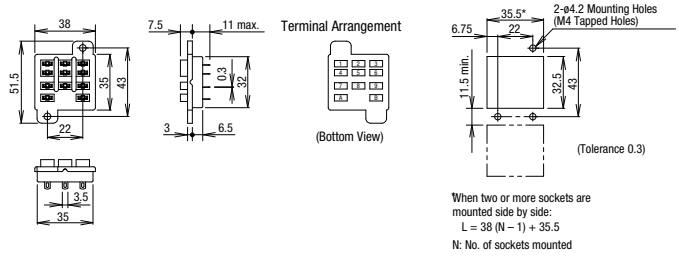
### SR2P-51




### SR3P-51




### SR3B-51



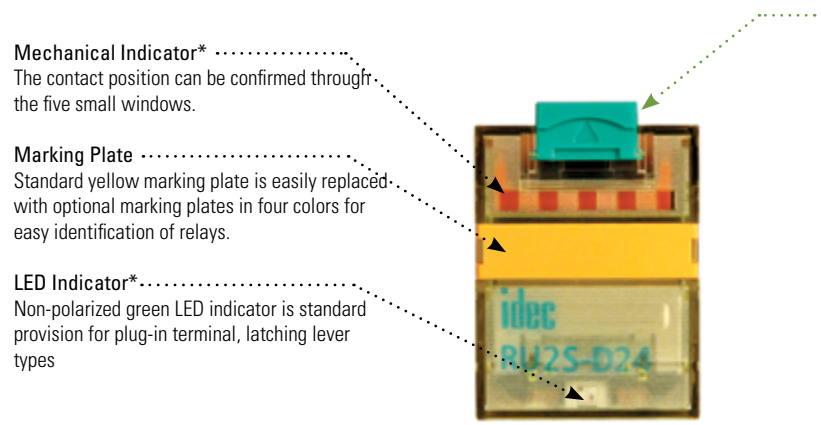
# RU Series Universal Relays

**Key features:**

- Full featured universal miniature relays
- Designed with environment taken into consideration
- Two terminal styles: plug-in and PCB mount
- Non-polarized LED indicator
- No internal wires, lead-free construction
- Cadmium-free contacts
- Mechanical flag indicator
- Manual latching lever with color coding for AC or DC coil
- Snap-on yellow marking plate; optional marking plates are available in four other colors
- Maximum contact ratings: 10A (RU2), 6A (RU4), 3A (RU42)
- UL Recognized, CSA Certified, EN Compliant

EN61810-1

## With Latching or Momentary Lever

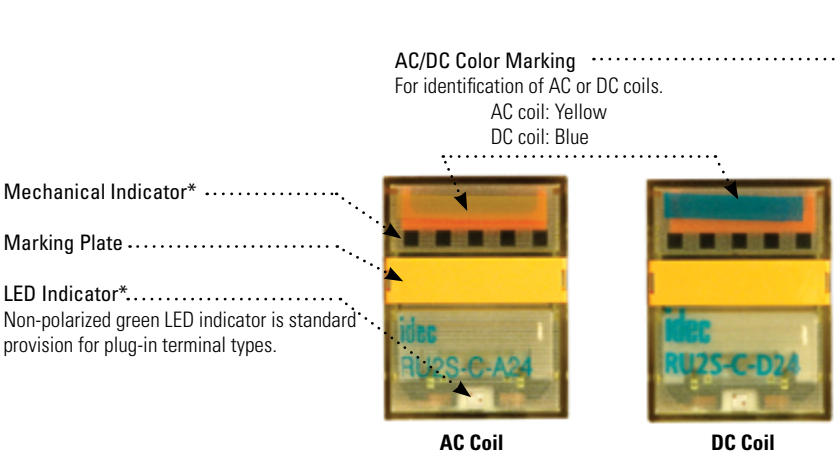


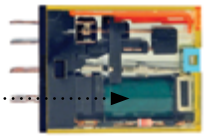

| | Latching | Momentary |
|---|---|---|
| AC coil: | Orange | Red |
| DC coil: | Green | Blue |

**In Normal Operation**

Note: Turn off the power to the relay coil when using the latching lever. After checking the operation, return the latching lever in the normal position.

## Standard (without lever)



| Coil Voltage | Tape Color |
|---|---|
| 24V AC | White |
| 100 to 110V AC | Clear |
| 110 to 120V AC | Blue |
| 200 to 220V AC | Black |
| 220 to 240V AC | Red |
| 24V DC | Green |
| 6V DC | Voltage marking on yellow tape |
| 12V DC | |
| 48V DC | |
| 110V DC | |

*Not available on PCB type.

## Part Number Selection

| Contact | Model | Part Number: Standard | Part Number: With Latching Lever | Part Number: With Momentary Lever | Coil Voltage Code (Standard Stock in bold) |
|---|---|---|---|---|---|
| DPDT (10A) | Standard | RU2S-C-□ | RU2S-□ | RU2S-M-□ | A24, **A110**, **A220** D6, D12, **D24**, D48, D110 |
| | With RC (AC coil only) | RU2S-CR-□ | RU2S-R-□ | RU2S-MR-□ | A110, A220 |
| | With diode (DC coil only) | RU2S-CD-□ | RU2S-D-□ | RU2S-MD-□ | D6, D12, **D24**, D48, D110 |
| | PCB | RU2V-NF-□ | — | — | A24, A110, A220 D6, D12, **D24**, D48, D110 |
| 4PDT (6A) | Standard | RU4S-C-□ | RU4S-□ | RU4S-M-□ | A24, **A110**, **A220** D6, D12, **D24**, D48, D110 |
| | With RC (AC coil only) | RU4S-CR-□ | RU4S-R-□ | RU4S-MR-□ | A110, A220 |
| | With diode (DC coil only) | RU4S-CD-□ | RU4S-D-□ | RU4S-MD-□ | D6, D12, D24, D48, D110 |
| | PCB | RU4V-NF-□ | — | — | A24, **A110**, A220 D6, D12, **D24**, D48, D110 |
| 4PDT Bifurcated (3A) | Standard | RU42S-C-□ | RU42S-□ | RU42S-M-□ | A24, A110, A220 D6, D12, **D24**, D48, D110 |
| | With RC (AC coil only) | RU42S-CR-□ | RU42S-R-□ | RU42S-MR-□ | A110, A220 |
| | With diode (DC coil only) | RU42S-CD-□ | RU42S-D-□ | RU42S-MD-□ | D6, D12, D24, D48, D110 |
| | PCB | RU42V-NF-□ | — | — | A24, A110, A220 D6, D12, **D24**, D48, D110 |

1. Plug-in terminal models have an LED indicator and a mechanical indicator as standard.
2. PCB models do not have an LED indicator or a mechanical indicator.

**Ordering Information**
When ordering, specify the Part No. and coil voltage code:
(example) **RU2S-C** **A110**
Part No. / Coil Voltage Code

### Coil Voltage Table

| Coil Voltage Code | A24 | A110 | A220 | D6 | D12 | D24 | D48 | D110 |
|---|---|---|---|---|---|---|---|---|
| Coil Rating | 24V AC | 110-120V AC | 220-240V AC | 6V DC | 12V DC | 24V DC | 48V DC | 110V DC |

### Sockets

| Relays | Spring Clamp DIN Rail Mount | Standard DIN Rail Mount | Finger-safe DIN Rail Mount | Panel Mount | PCB Mount |
|---|---|---|---|---|---|
| RU2S (DPDT) | SU2S-11L | SM2S-05 | SM2S-05C | SY4S-51 | SM2S-61 SM2S-62 |
| RU4S (4PDT) RU42S (4PDT) | SU4S-11L | SY4S-05 | SY4S-05C | | SY4S-61 SY4S-62 |
| | | | | | |

## Hold Down Springs & Clips

| Appearance | Item | Relay | For DIN Mount Socket | For Through Panel & PCB Mount Socket |
|---|---|---|---|---|
| | Pullover Wire Spring | RU2S/RU4S/ RU42S | SY4S-02F1 | SY4S-51F1 |
| | Leaf Spring (side latch) | RU2S/RU4S/ RU42S | SFA-202* | SFA-302* |
| | Leaf Spring (top latch) | RU2S/RU4S/ RU42S | SFA-101* | SFA-301* |

Note: Order 2 pieces for each relay

## Accessories

| Name | Part Number | Color Code * |
|---|---|---|
| Marking Plate | RU9Z-P* | A (orange), G (green), S (blue), W (white), Y (yellow) |

Specify a color code when ordering. The marking plate can be removed from the relay by inserting a flat screwdriver under the marking plate.

## Specifications

| Model (Contact) | RU2 (DPDT) | RU4 (4PDT) | RU42 (4PDT-bifurcated) |
|---|---|---|---|
| Contact Material | Silver alloy | Silver (gold clad) | Silver-nickel (gold clad) |
| Contact Resistance [1] | 50 mΩ maximum | | |
| Minimum Applicable Load [2] | 24V DC, 5 mA (reference value) | 1V DC, 1 mA | 1V DC, 0.1 mA |
| Operating Time [3] | 20 ms maximum | | |
| Release Time [3] | 20 ms maximum | | |
| Power Consumption | AC: 1.1 to 1.4VA (50 Hz), 0.9 to 1.2VA (60 Hz) DC: 0.9 to 1.0W | | |
| Insulation Resistance | 100MΩ minimum (500V DC megger) | | |
| Dielectric Strength | Between contact and coil: 2500V AC, 1 minute | | |
| | Between contacts of different poles: | | |
| | 2500V AC, 1 minute | 2000V AC, 1 minute | |
| | Between contacts of the same pole: 1000V AC, 1 minute | | |
| Operating Frequency | Electrical: 1800 operations/h maximum<br>Mechanical: 18,000 operations/h maximum | | |
| Vibration Resistance | Damage limits: 10 to 55 Hz, amplitude 0.5 mm<br>Operating extremes: 10 to 55 Hz, amplitude 0.5 mm | | |
| Shock Resistance | Damage limits: 1000 m/s$^2$ (100G)<br>Operating extremes: 150 m/s$^2$ (15G) | | |
| Mechanical Life | AC: 50,000,000 operations<br>DC: 100,000,000 operations | | 50,000,000 operations |
| Electrical Life [4] | See table on page 883 | | |
| Operating Temperature [5] | PCB model: –55 to +70°C (no freezing)<br>Blade model: –55 to +60°C (no freezing) | | |
| Operating Humidity | 5 to 85% RH (no condensation) | | |
| Weight | Approx. 35g | | |

1. Measured using 5V DC, 1A voltage drop method
2. Measured at operating frequency of 120 operations/min (failure rate level P, reference value)
3. Measured at the rated voltage (at 20°C), excluding contact bouncing;
   Release time of AC relays with RC: 25 ms maximum
   Release time of DC relays with diode: 40 ms maximum
4. Contact Load and Electrical Life (at ambient temperature 20°C)
5. Measured at the rated voltage.

## Accessories

| Item | Appearance | Use with | Part No. | Remarks |
|---|---|---|---|---|
| Aluminum DIN Rail (1 meter length) | | All DIN rail sockets | BNDN1000 | The BNDN1000 is designed to accommodate DIN mount sockets. Made of durable extruded aluminum, the BNDN1000 measures 0.413 (10.5mm) in height and 1.37 (35mm) in width (DIN standard). Standard length is 39" (1,000mm). |
| DIN Rail End Stop | | DIN rail | BNL5 | 9.1 mm wide. |
| Replacement Hold-Down Spring Anchor | | Horseshoe clip for DIN rail sockets | Y778-011 | For use on DIN rail mount socket when using pullover wire hold down spring. 2 pieces included with each socket. |

## Coil Ratings

| Rated Voltage (V) | | Coil Voltage Code | Rated Current (mA) ±15% (at 20°C) | | Coil Resistance (Ω) ±10% (at 20°C) | Operating Characteristics (values at 20°C) | | |
|---|---|---|---|---|---|---|---|---|
| | | | 50 Hz | 60 Hz | | Maximum Continuous Applied Voltage | Pickup Voltage | Dropout Voltage |
| AC (50/60 Hz) | 24 | A24 | 49.3 | 42.5 | 164 | 110% | 80% maximum | 30% minimum |
| | 110-120 | A110 | 8.4-10.0 | 7.1-8.2 | 4,550 | | | |
| | 220-240 | A220 | 4.2-5.0 | 3.6-4.2 | 18,230 | | | |
| DC | 6 | D6 | 155 | | 40 | 110% | 80% maximum | 10% minimum |
| | 12 | D12 | 80 | | 160 | | | |
| | 24 | D24 | 44.7 | | 605 | | | |
| | 48 | D48 | 18 | | 2,560 | | | |
| | 110 | D110 | 8.9 | | 12,100 | | | |

1. The rated current includes the current of the LED indicator.

## Surge Suppressor Ratings

| Model | | Ratings |
|---|---|---|
| AC Coil | With RC | RC series circuit<br>R: 20 kΩ, C: 0.033 µF |
| DC Coil | With Diode | Diode reverse voltage: 1000V<br>Diode forward current: 1A |

## Contact Ratings

| Maximum Contact Capacity | | | | | | |
|---|---|---|---|---|---|---|
| Contact | Continuous Current | Allowable Contact Power | | Voltage (V) | Rated Load | |
| | | Resistive Load | Inductive Load | | Res. Load | Ind. Load |
| DPDT | 10A | 2500VA AC | 1250VA AC | 250 AC | 10A | 5A |
| | | 300W DC | 150W DC | 30 DC | 10A | 5A |
| 4PDT | 6A | 1500VA AC | 600VA AC | 250 AC | 6A | 0.8A |
| | | 180W DC | 90W DC | 30 DC | 6A | 1.5A |
| 4PDT bifurcated | 3A | 750VA AC | 200VA AC | 250 AC | 3A | 0.8A |
| | | 90W DC | 45W DC | 30 DC | 3A | 1.5A |

1. On 4PDT relays, the maximum allowable total current of neighboring two poles is 6A. At the rated load, make sure that the total current of neighboring two poles does not exceed 6A (3A + 3A = 6A).
2. Inductive load for the rated load — cos ø = 0.3, L/R = 7 ms

## UL and c-UL Ratings

| Voltage | Resistive | | | General Use | | | Horse Power Rating | | |
|---|---|---|---|---|---|---|---|---|---|
| | RU2 | RU4 | RU42 | RU2 | RU4 | RU42 | RU2 | RU4 | RU42 |
| 250V AC | 10A | — | 3A | — | 6A | — | — | 1/10HP | — |
| 30V DC | 10A | 6A | 3A | — | — | — | — | — | — |

## CSA Ratings

| Voltage | Resistive |
|---|---|
| | RU42 |
| 250V AC | 3A |
| 30V DC | 3A |

## TÜV Ratings

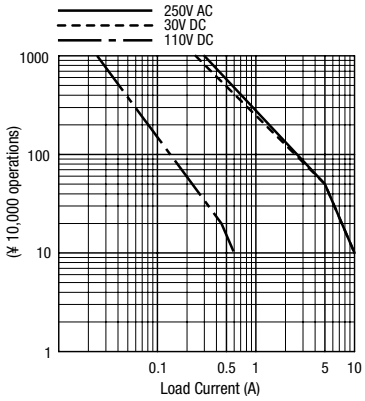
| Voltage | Resistive | | | Inductive | | |
|---|---|---|---|---|---|---|
| | RU2 | RU4 | RU42 | RU2 | RU4 | RU42 |
| 250V AC | 10A | 6A | 3A | 5A | 0.8A | 0.8A |
| 30V DC | 10A | 6A | 3A | 5A | 1.5A | 1.5A |

## Socket Specifications

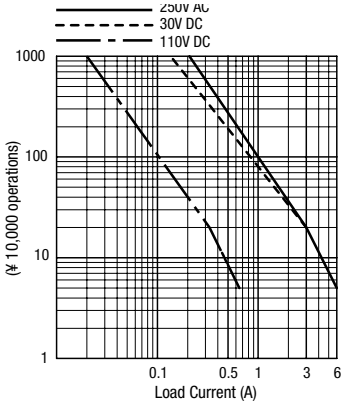
| | Sockets | Terminal | Electrical Rating | Wire Size | Torque |
|---|---|---|---|---|---|
| DIN Rail Mount Sockets | SU2S-11L | Spring clamp terminals | 250V/10A | 24-16 AWG | — |
| | SU4S-11L | Spring clamp terminals | 250V/6A (using RU4), 10A (using RU2) | 24-16 AWG | — |
| | SM2S-05 | M3 screw with captive wire clamp | 300V, 10A | Maximum up to 2–#14AWG | 5.5 - 9in•lbs |
| | SM2S-05C | M3 screw with captive wire clamp, fingersafe | 300V, 10A | Maximum up to 2–#14AWG | 5.5 - 9in•lbs |
| | SY4S-05 | M3 screw with captive wire clamp | 300V, 7A (using RU4), 10A (using RU2) | Maximum up to 2–#14AWG | 5.5 - 9in•lbs |
| | SY4S-05C | M3 screw with captive wire clamp, fingersafe | 300V, 7A (using RU4), 10A (using RU2) | Maximum up to 2–#14AWG | 5.5 - 9in•lbs |
| Through Panel Mount Socket | SY4S-51 | Solder | 300V, 7A | — | — |
| PCB Mount Socket | SY4S-61 | PCB mount | 300V, 7A | — | — |
| | SY4S-62 | PCB mount | 250V, 7A | — | — |

## Electrical Life Curves

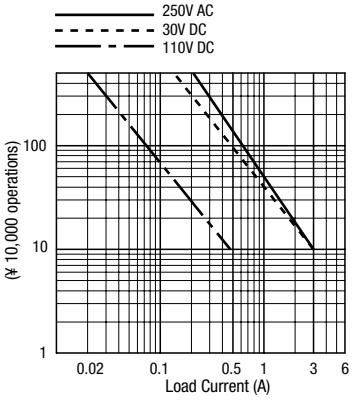
### RU2 (Resistive Load)



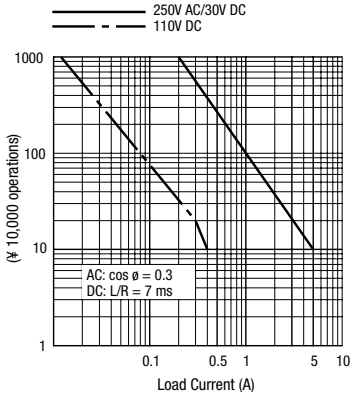

### RU4 (Resistive Load)



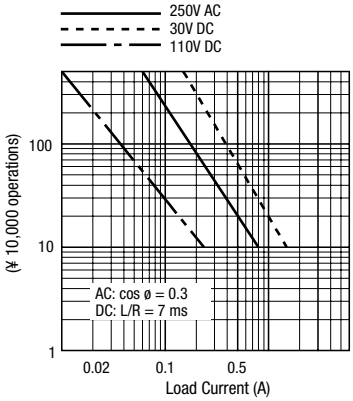

### RU42 (Resistive Load)



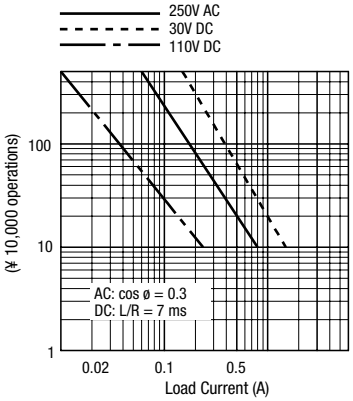

### RU2 (Inductive Load)




### RU4 (Inductive Load)

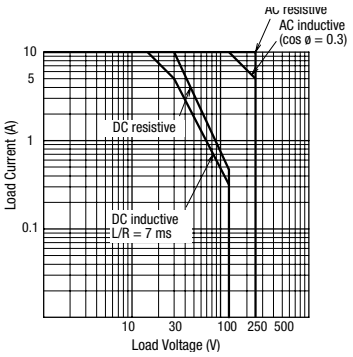



### RU42 (Inductive Load)

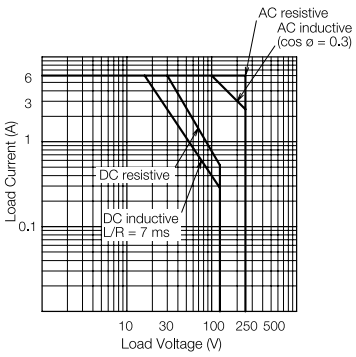



## Maximum Switching Current

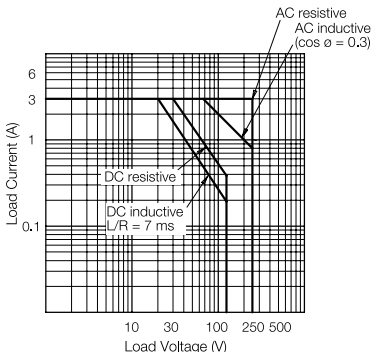
### RU2




### RU4

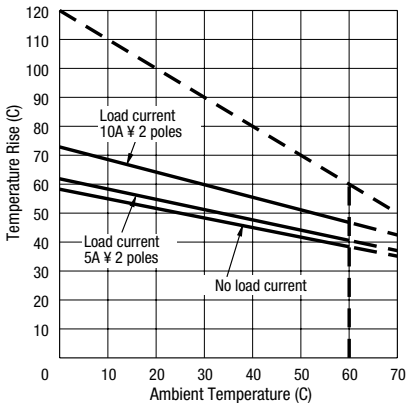



### RU42 (Bifurcated)

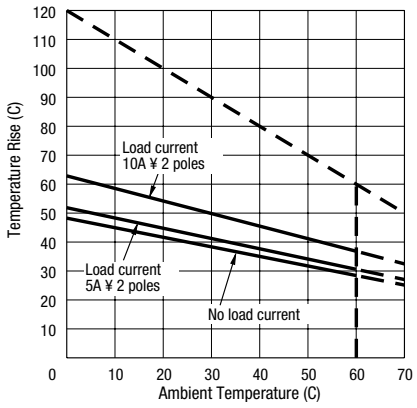


## Ambient Temperature vs. Temperature Rise Curves

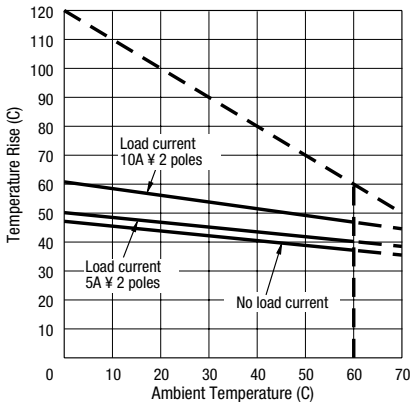
### RU2 (AC Coil, 50 Hz)



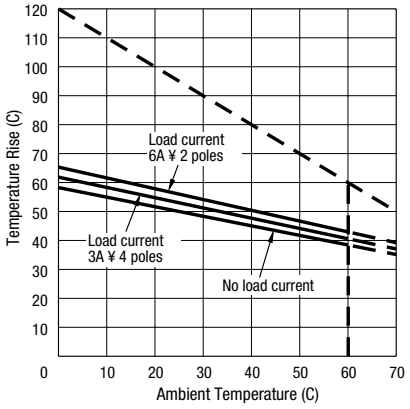

### RU2 (AC Coil, 60 Hz)



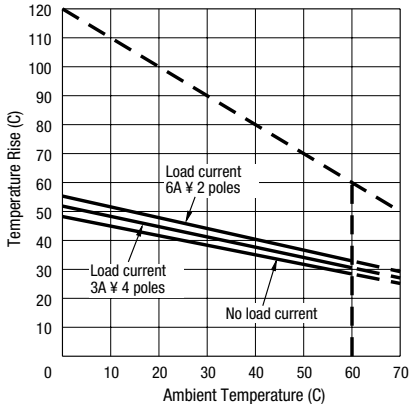

### RU2 (DC Coil)



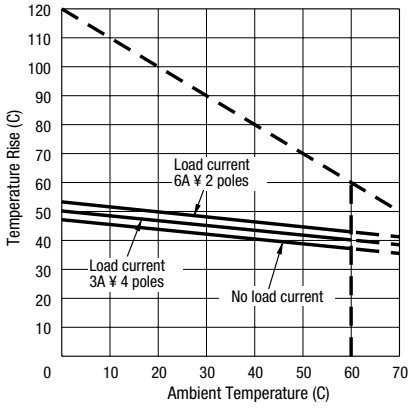

### RU4/RU42 (AC Coil, 50 Hz)




### RU4/RU42 (AC Coil, 60 Hz)



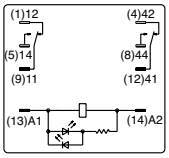

### RU4/RU42 (DC Coil)



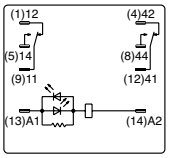

The above temperature rise curves show the characteristics when 100% the rated coil voltage is applied.
The heat resistance of the coil is 120°C. The slant dashed line indicates the allowable temperature rise for the coil at different ambient temperatures.
Load current 6A x 2 poles is for the RU4 models only.

## Internal Connection (View from Bottom)

**RU2S-* Standard**

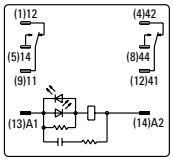



24V AC/DC coil or less

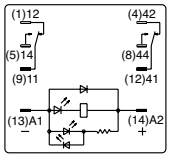



Over 24V AC/DC coil

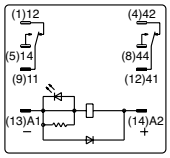
**RU2S-*R with RC**




**RU2S-*D With Diode**

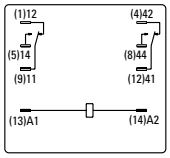



24V DC coil or less

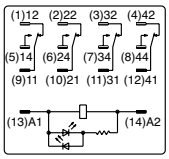



Over 24V DC coil

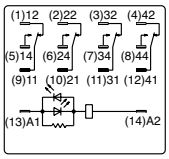
**RU2V-NF-***




**RU4S-*/RU42S-* Standard**

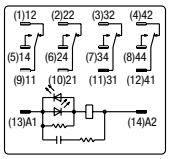



24V AC/DC coil or less

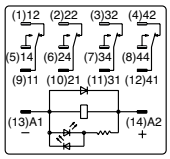



Over 24V AC/DC coil

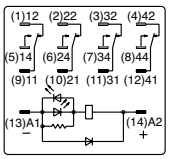
**RU4S-*R/RU42S-*R With RC**




**RU4S-*D/RU42S-*D With Diode**

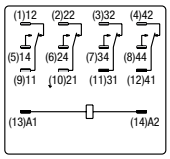



24V DC coil or less



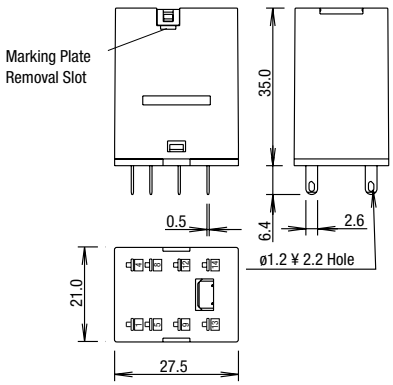

Over 24V DC coil

**RU4V-NF-*/RU42V-NF-***



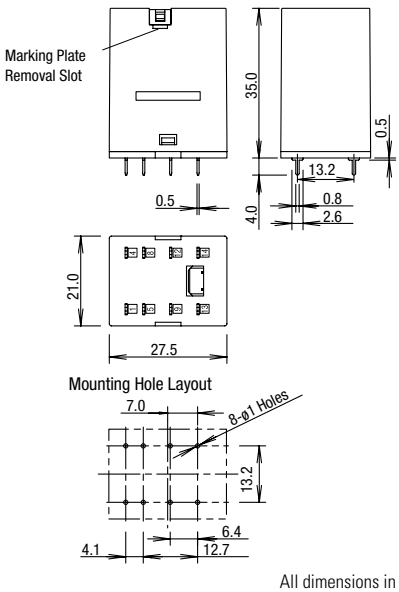

## Dimensions (mm)

**RU2S**




Marking plate removal slot is provided only on one side. Insert a flat screwdriver into the slot to remove the marking plate.

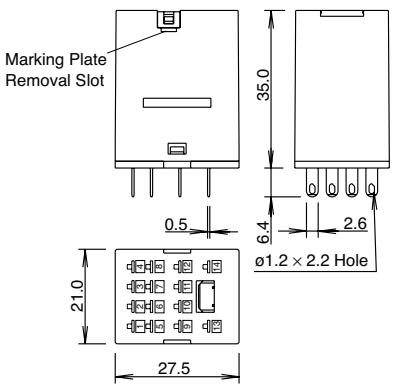
**RU2V**




All dimensions in mm.

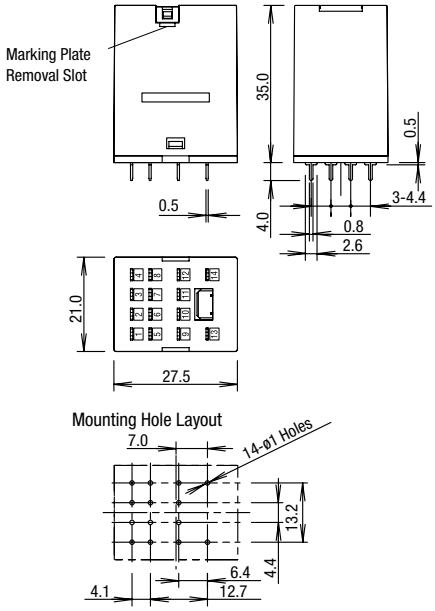
## Dimensions con't (mm)

**RU4S/RU42S**




Marking plate removal slot is provided only on one side. Insert a flat screwdriver into the slot to remove the marking plate.

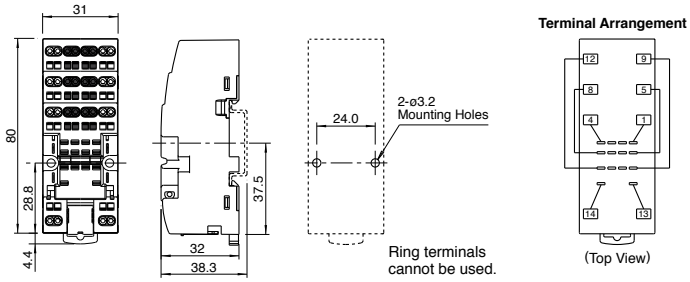
**RU4V/RU42V**



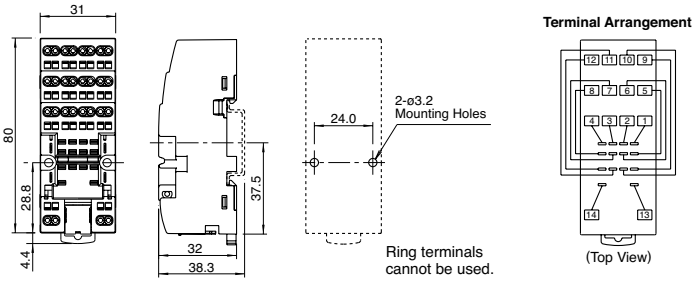

All dimensions in mm.

## Spring Clamp DIN Rail Mount Sockets

**SU2S-11L**

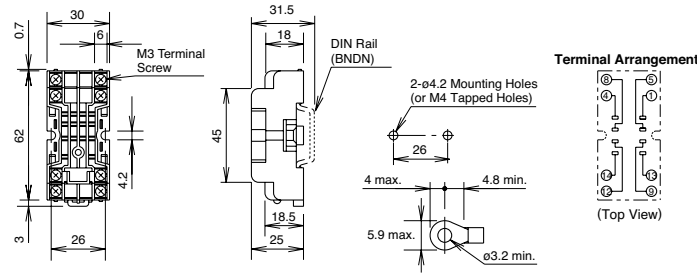



**SU4S-11L**

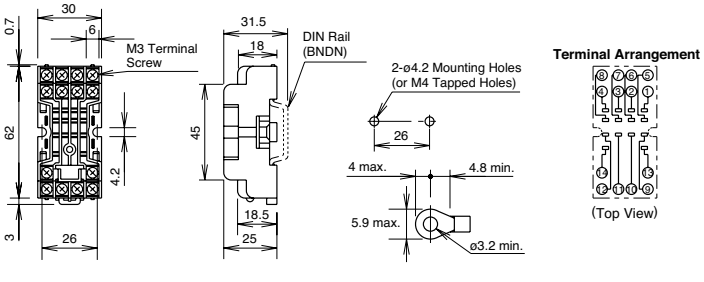



## Standard DIN Rail Mount Sockets

**SM2S-05**



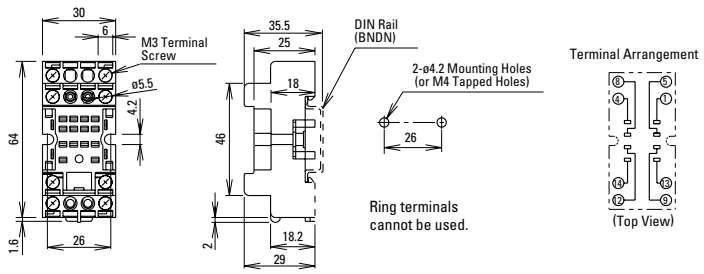

**SY4S-05**



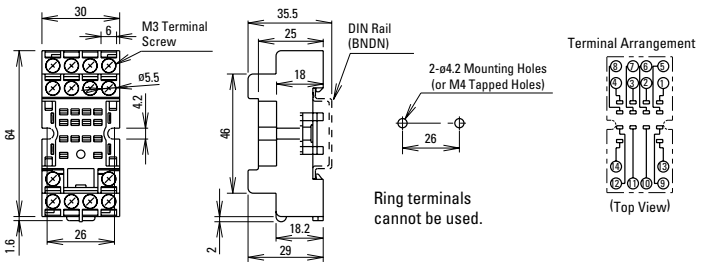
# Dimensions con't (mm)

## Finger-safe DIN Rail Mount Sockets

### SM2S-05C

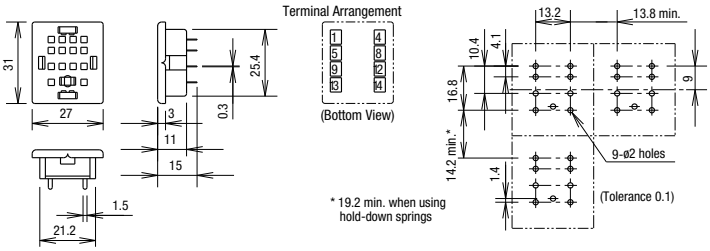



### SY4S-05C

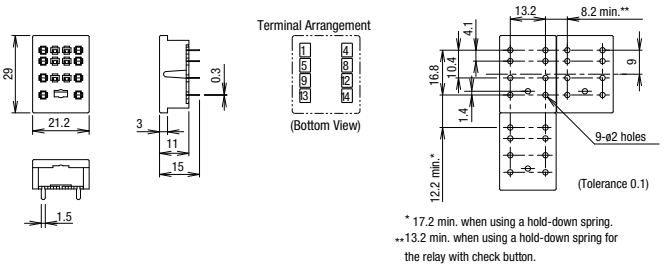



## PCB Mount Sockets

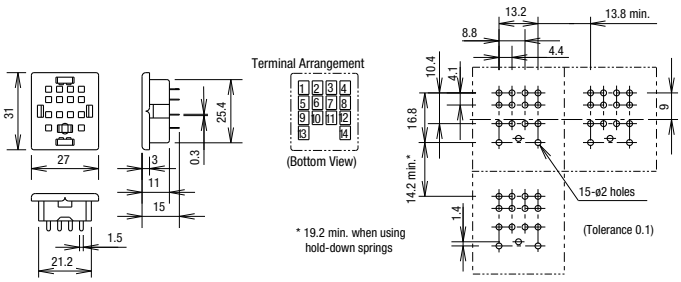
### SM2S-61



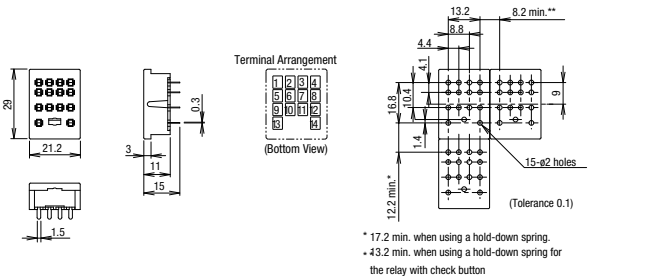

### SM2S-62




### SY4S-61

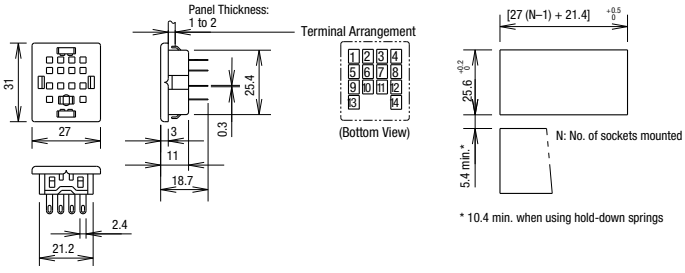



### SY4S-62




## Through Panel Mount Socket

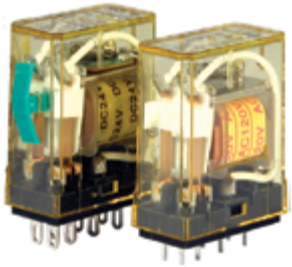
### SY4S-51



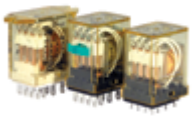
# RY/RM Series Miniature Relays

**Key features:**

- RY2 (3A), RY4 (5A), RM2 (5A)
- General purpose miniature relays
- 3A or 5A contact capacity
- Wide variety of terminal styles and coil voltages meet a wide range of applications
- All 4PDT types have arc barriers.



## Part Number Selection

| Contact | Model | Part Number: Plug-in Terminal | Part Number: PC Board Terminal | Coil Voltage Code |
|---|---|---|---|---|
| DPDT (Slim) 3A | Standard | RY2S-U ☐ | RY2V-U ☐ | AC6V, AC12V, AC24V, AC110V, AC120V, AC220V, AC240V DC6V, DC12V, DC24V, DC48V, DC110V |
| | With Indicator | RY2S-UL ☐ | RY2V-UL ☐ | |
| | With Check Button | RY2S-UC ☐ | — | |
| | With Indicator and Check Button | RY2S-ULC ☐ | | |
| | Top Bracket Mounting | RY2S-UT ☐ | | |
| | With Diode (DC coil only) | RY2S-UD ☐ | RY2V-UD ☐ | DC6V, DC12V, DC24V, DC48V, DC110V |
| DPDT (Wide) 5A | Standard | RM2S-U ☐ | RM2V-U ☐ | RYAC6V, AC12V, AC24V, AC110-120V, AC220-240V DC6V, DC12V, DC24V, DC48V, DC100-110V |
| | With Indicator | RM2S-UL ☐ | RM2V-UL ☐ | |
| | With Check Button | RM2S-UC ☐ | — | |
| | With Indicator and Check Button | RM2S-ULC ☐ | | |
| | Top Bracket Mounting | RM2S-UT ☐ | | |
| | With Diode (DC coil only) | RM2S-UD ☐ | | DC6V, DC12V, DC24V, DC48V, DC100-110V |
| | With Indicator and Diode (DC coil only) | RM2S-ULD ☐ | | |
| 4PDT 5A  | Standard | RY4S-U ☐ | RY4V-U ☐ | AC6V, AC12V, AC24V, AC110-120V, AC220-240V DC6V, DC12V, DC24V, DC48V, DC100-110V |
| | With Indicator | RY4S-UL ☐ | RY4V-UL ☐ | |
| | With Check Button | RY4S-UC ☐ | — | |
| | With Indicator and Check Button | RY4S-ULC ☐ | | |
| | Top Bracket Mounting | RY4S-UT ☐ | | |
| | With Diode (DC coil only) | RY4S-UD ☐ | | DC6V, DC12V, DC24V, DC48V, DC100-110V |
| | With Indicator and Diode (DC coil only) | RY4S-ULD ☐ | | |

Top mount models are designed to mount directly to a panel and do not require a socket.

**Ordering Information**
When ordering, specify the Part No. and coil voltage code:

(example) **RY4S-U** **AC110-120V**
Part No. — Coil Voltage Code

## Sockets

| Relays | Standard DIN Rail Mount | Finger-safe DIN Rail Mount | Through Panel Mount | PCB Mount |
|---|---|---|---|---|
| RY2S | SY2S-05 | SY2S-05C | SY2S-51 | SY2S-61 |
| RM2 | SM2S-05 | SM2S-05C | SM2S-51 | SY4S-61<br>SY4S-62 |
| RY4S | SY4S-05 | SY4S-05C | SY4S-51 | |
| | | | | |

## Hold Down Springs & Clips

| Appearance | Item | Relay | For DIN Mount Socket | For Through Panel & PCB Mount Socket |
|---|---|---|---|---|
| | Pullover Wire Spring | RY2S | SY2S-02F1 | SY4S-51F1 |
| | | RM2 | SY4S-51F1 | SY4S-51F1 |
| | | RY4S | | |
| | Leaf Spring [1] (side latch) | RY2S | SFA-202 [2] | SFA-302 |
| | | RM2, RY4S | | |
| | Leaf Spring [1] (top latch) | RY2S | SFA-101 [2] | SFA-301 |
| | | RM2 | | |
| | | RY4S | | |

1. Not available for PCB mount socket SY4S-62.
2. Order 2 pieces per relay.

## Accessories

| Item | Appearance | Use with | Part No. | Remarks |
|---|---|---|---|---|
| Aluminum DIN Rail (1 meter length) | | All DIN rail sockets | BNDN1000 | The BNDN1000 is designed to accommodate DIN mount sockets. Made of durable extruded aluminum, the BNDN1000 measures 0.413 (10.5mm) in height and 1.37 (35mm) in width (DIN standard). Standard length is 39" (1,000mm). |
| DIN Rail End Stop | | DIN rail | BNL5 | 9.1 mm wide. |
| Replacement Hold-Down Spring Anchor | | Horseshoe clip for all DIN rail sockets | Y778-011 | For use on DIN rail mount socket when using pullover wire hold down spring. 2 pieces included with each socket. |

## Specifications

| Contact Model | Standard Contact | | |
|---|---|---|---|
| | RY2 - DPDT Slim | RM2 - DPDT Wide | RY4 - 4PDT |
| Contact Material | Gold-plated silver | Silver | Gold-plated silver |
| Contact Resistance [1] | 50 mΩ maximum | 30 mΩ maximum | 50 mΩ maximum |
| Minimum Applicable Load | 24V DC, 5 mA; 5V DC, 10 mA (reference value) | 24V DC, 10 mA; 5V DC, 20 mA (reference value) | 24V DC, 5 mA; 5V DC, 10 mA (reference value) |
| Operating Time [2] | 20 ms maximum | | |
| Release Time [2] | 20 ms maximum | | |
| Power Consumption (approx.) | AC: 1.1 VA (50 Hz), 1 VA (60 Hz)<br>DC: 0.8W | AC: 1.4 VA (50 Hz), 1.2 VA (60 Hz)<br>DC: 0.9W | AC: 1.4 VA (50 Hz), 1.2 VA (60 Hz)<br>DC: 0.9W |
| Insulation Resistance | 100 MΩ minimum (500V DC megger) | | |
| Dielectric Strength | Between live and dead parts: | | |
| | 1500V AC, 1 minute | 2000V AC, 1 minute | 2000V AC, 1 minute |
| | Between contact and coil: | | |
| | 1500V AC, 1 minute | 2000V AC, 1 minute | 2000V AC, 1 minute |
| | Between contacts of different poles: | | |
| | 1500V AC, 1 minute | 2000V AC, 1 minute | 2000V AC, 1 minute |
| | Between contacts of the same pole: | | |
| | 1000V AC, 1 minute | 1000V AC, 1 minute | 1000V AC, 1 minute |
| Operating Frequency | Electrical: 1800 operations/h maximum<br>Mechanical: 18,000 operations/h maximum | | |
| Vibration Resistance | Damage limits: 10 to 55 Hz, amplitude 0.5 mm<br>Operating extremes: 10 to 55 Hz, amplitude 0.5 mm | | |
| Shock Resistance | Damage limits: 1000 m/s$^2$<br>Operating extremes: 100 m/s$^2$ (DPDT Slim), 200 m/s$^2$ (4PDT, DPDT Wide) | | |
| Mechanical Life | 50,000,000 operations | | |
| Electrical Life | 200,000 operations (220V AC, 3A) | 500,000 operations (220V AC, 5A) | 100,000 operations (220V AC, 5A)<br>200,000 operations (220V AC, 3A) |
| Operating Temperature [3] | –25 to +55°C (no freezing) | –25 to +45°C (no freezing) | –25 to +55°C (no freezing) [4] |
| Operating Humidity | 45 to 85% RH (no condensation) | | |
| Weight (approx.) | 23g | 35g | 34g |

Note: Above values are initial values.

1. Measured using 5V DC, 1A voltage drop method
2. Measured at the rated voltage (at 20°C), excluding contact bouncing
   Release time of relays with diode: 40 ms maximum
3. For use under different temperature conditions, refer to Continuous Load Current vs. Operating Temperature Curve. The operating temperature range of relays with indicator or diode is –25 to +40°C.
4. When the total current of 4 contacts is less than 15A, the operating temperature range is –25 to +70°C.

## AC Coil Ratings

| Voltage (V) | Rated Current (mA) ±15% at 20°C | | | | Coil Resistance (Ω) ±10% at 20°C | | Operation Characteristics (against rated values at 20°C) | | |
|---|---|---|---|---|---|---|---|---|---|
| | AC 50Hz | | AC 60Hz | | | | | | |
| | DPDT Slim | DPDT Wide & 4PDT | DPDT Slim | DPDT Wide & 4PDT | DPDT Slim | DPDT Wide & 4PDT | Max. Continuous Applied Voltage | Pickup Voltage | Dropout Voltage |
| 6 | 170 | 240 | 150 | 200 | 18.8 | 9.4 | 110% | 80% maximum | 30% minimum |
| 12 | 86 | 121 | 75 | 100 | 76.8 | 39.3 | | | |
| 24 | 42 | 60.5 | 37 | 50 | 300 | 153 | | | |
| 110 | 9.6 | — | 8.4 | — | 6,950 | — | | | |
| 110-120 | — | 9.4-10.8 | — | 8.0-9.2 | — | 4,290 | | | |
| 120 | 8.6 | — | 7.5 | — | 8,100 | — | | | |
| 220 | 4.7 | — | 4.1 | — | 25,892 | — | | | |
| 220-240 | — | 4.7-5.4 | — | 4.0-4.6 | — | 18,820 | | | |
| 240 | 4.9 | — | 4.3 | — | 26,710 | — | | | |

## DC Coil Ratings

| Voltage (V) | Rated Current (mA) ±15% at 20°C | | Coil Resistance (Ω) ±10% at 20°C | | Operation Characteristics (against rated values at 20°C) | | |
|---|---|---|---|---|---|---|---|
| | DPDT Slim | DPDT Wide & 4PDT | DPDT Slim | DPDT Wide & 4PDT | Max. Continuous Applied Voltage | Pickup Voltage | Dropout Voltage |
| 6 | 128 | 150 | 47 | 40 | 110% | 80% maximum | 10% minimum |
| 12 | 64 | 75 | 188 | 160 | | | |
| 24 | 32 | 36.9 | 750 | 650 | | | |
| 48 | 18 | 18.5 | 2,660 | 2,600 | | | |
| 100-110 | — | 8.2-9.0 | — | 12,250 | | | |
| 110 | 8 | — | 13,800 | — | | | |

## Contact Ratings

| Maximum Contact Capacity | | | | | | |
|---|---|---|---|---|---|---|
| Contact | Continuous Current | Allowable Contact Power | | Rated Load | | |
| | | Resistive Load | Inductive Load | Voltage (V) | Res. Load | Ind. Load |
| DPDT Slim (RY2) | 3A | 660 VA AC 90W DC | 176 VA AC 45W DC | 110V AC | 3A | 1.5A |
| | | | | 220V AC | 3A | 0.8A |
| | | | | 30V DC | 3A | 1.5A |
| DPDT Wide (RM2) | 5A | 1100VA AC 150W DC | 440VA AC 75W DC | 110V AC | 5A | 2.5A |
| | | | | 220V AC | 5A | 2A |
| | | | | 30V DC | 5A | 2.5A |
| 4PDT (RY4) | 5A | 1200 VA AC 150W DC | 288 VA AC 60W DC | 240V AC | 5A | 1.2A |
| | | | | 30V DC | 5A | 2A |

Note: Inductive load for the rated load — cos ø = 0.3, L/R = 7 ms

## TÜV Ratings

| Voltage | DPDT Slim | DPDT Wide | 4PDT |
|---|---|---|---|
| 240V AC | 3A | 5A | 5A |
| 30V DC | 3A | 5A | 5A |

AC: cos ø = 1.0, DC: L/R = 0 ms

## UL Ratings

| Voltage | Resistive | | | General use | | |
|---|---|---|---|---|---|---|
| | DPDT Slim | DPDT Wide | 4PDT | DPDT Slim | DPDT Wide | 4PDT |
| 240V AC | 3A | 5A | 5A | 0.8A | 2A | 5A |
| 120V AC | — | — | — | 1.5A | 2.5A | — |
| 100V DC | 0.2A | 0.4A | 0.2A | 0.2A | — | 0.2A |
| 30V DC | 3A | 5A | 5A | 3A | — | 5A |

## CSA Ratings

| Voltage | Resistive | | | General use | | |
|---|---|---|---|---|---|---|
| | DPDT Slim | DPDT Wide | 4PDT | DPDT Slim | DPDT Wide | 4PDT |
| 240V AC | 3A | 5A | 5A | 0.8A | 2A | 5A |
| 120V AC | 3A | 5A | — | 1.5A | 2.5A | — |
| 100V DC | — | — | — | 0.2A | 0.4A | 0.2A |
| 30V DC | 3A | 5A | 5A | 1.5A | 2.5A | 1.5A |

## Socket Specifications

| | Sockets | Terminal | Electrical Rating | Wire Size | Torque |
|---|---|---|---|---|---|
| DIN Rail Mount Sockets | SY2S-05 | M3 screws with captive wire clamp | 300V, 7A | Maximum up to 2–#14AWG | 5.5 - 9 in•lbs |
| | SM2S-05 | M3 screw with captive wire clamp | 300V, 10A | Maximum up to 2–#14AWG | 5.5 - 9 in•lbs |
| | SY4S-05 | M3 screw with captive wire clamp | 300V, 7A* | Maximum up to 2–#14AWG | 5.5 - 9 in•lbs |
| Finger-safe DIN Rail Mount | SY2S-05C | M3 screws with captive wire clamp, fingersafe | 300V, 7A | Maximum up to 2–#14AWG | 5.5 - 9 in•lbs |
| | SM2S-05C | M3 screw with captive wire clamp, fingersafe | 300V, 10A | Maximum up to 2–#14AWG | 5.5 - 9 in•lbs |
| | SY4S-05C | M3 screw with captive wire clamp, fingersafe | 300V, 7A* | Maximum up to 2–#14AWG | 5.5 - 9 in•lbs |
| Through Panel Mount Socket | SY2S-51 | Solder | 250V, 7A | — | — |
| | SM2S-51 | Solder | 250V, 10A | — | — |
| | SY4S-51 | Solder | 250V, 7A* | — | — |
| PCB Mount Socket | SY2S-61 | PCB Mount | 300V, 7A | — | — |
| | SY4S-61 | PCB Mount | 300V, 7A | — | — |
| | SY4S-62 | PCB Mount | 250V, 7A | — | — |

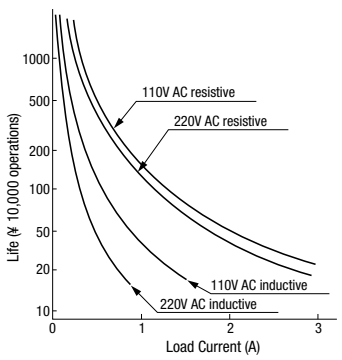
* When using only 2 poles of the 4-poles, the UL recognized current is 10A.

## Characteristics (Reference Data)

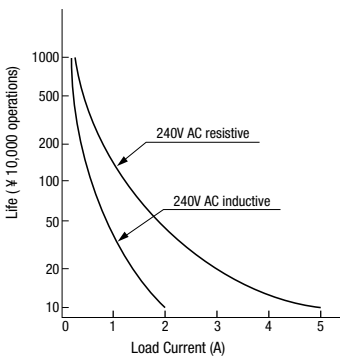
### Electrical Life Curves

AC Load

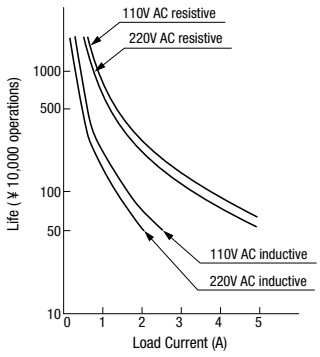
(RY2)




(RY4)

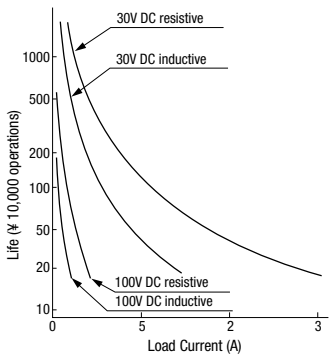



(RM2)

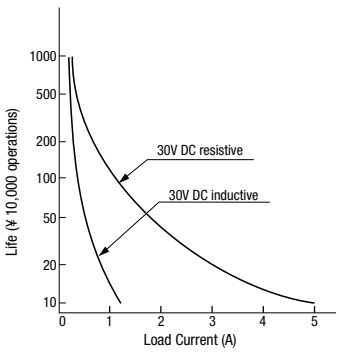



DC Load

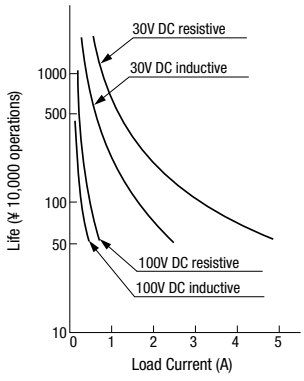
(RY2)




(RY4)

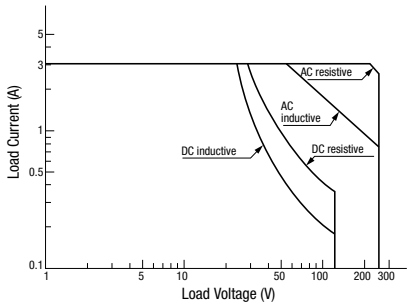



(RM2)

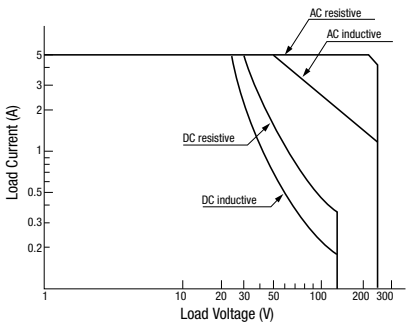


## Maximum Switching Capacity

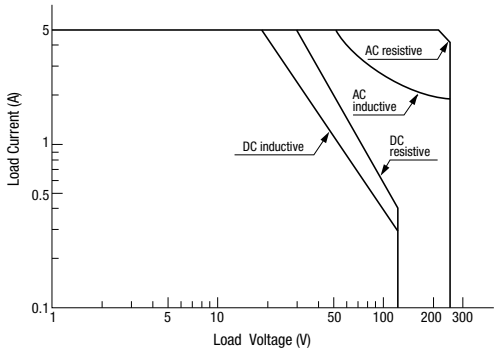
(RY2)




(RY4)

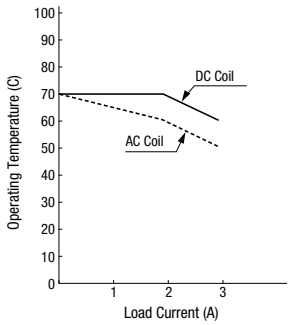



(RM2)

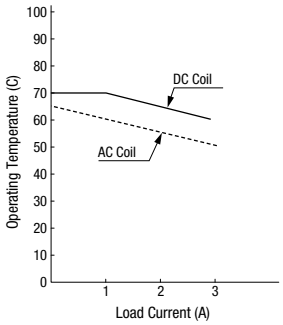



## Continuous Load Current vs. Operating Temperature Curve (Standard Type, With Check Button, and Top Bracket Mounting Type)

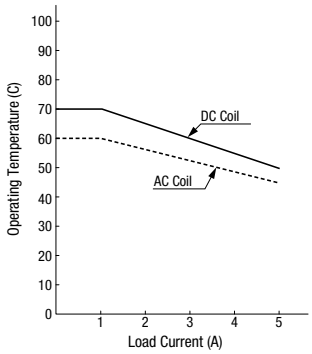
(RY2)




(RY4)



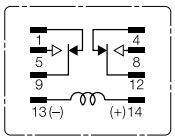

(RM2)



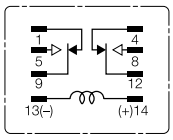
## Internal Connection (View from Bottom)

### Standard Type

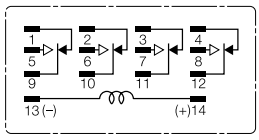
DPDT Slim (RY2)



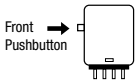

DPDT Wide (RM2)




4PDT (RY4)

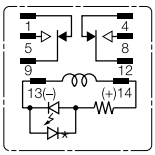
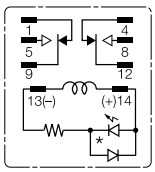
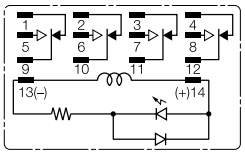
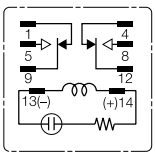
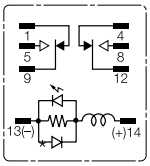
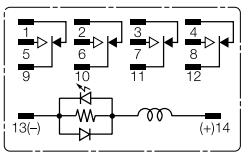



With Check Button



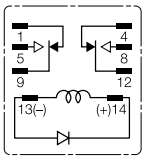

Contacts can be operated by pressing the check button.

### With Indicator (-L type)

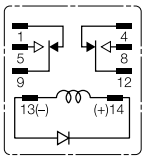
| | DPDT Slim (RY2) | | DPDT Wide (RM2) | 4PDT (RY4) | |
|---|---|---|---|---|---|
| Coil Below 100V AC/DC |  | Coil Below 24V AC/ DC |  |  | When the relay is energized, the indicator goes on.<br>• An LED protection diode is not contained in DPDT relays for coils below 100V DC.<br>• If coil polarity is reversed LED will not light. |
| Coil 100V AC/DC and over |  | Coil 24V AC/DC and over |  |  | |

### With Diode (-D type)

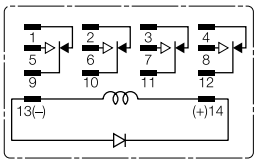
DPDT Slim (RY2)




DPDT Wide (RM2)

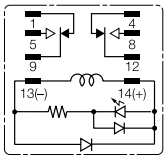
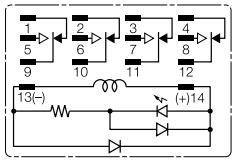
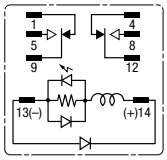
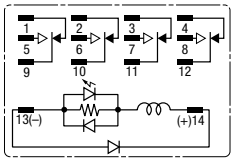



4PDT (RY4)



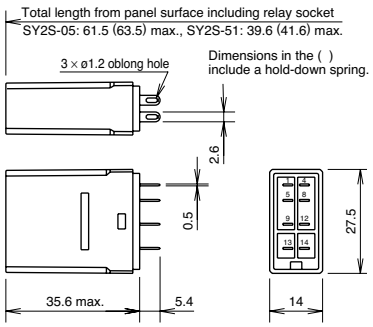

Contains a diode to absorb the back emf generated when the coil is de-energized. The release time is slightly longer.
- Diode Characteristics
  Reverse withstand voltage: 1,000V
  Forward current: 1A

### With Indicator and Diode (-LD type)

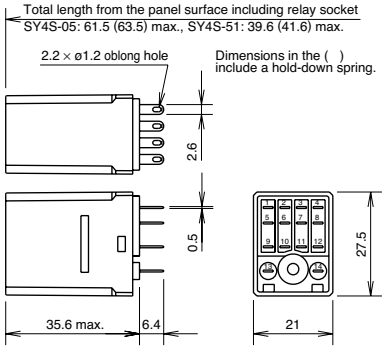
| | DPDT Wide (RM2) | 4PDT (RY4) | | DPDT Wide (RM2) | 4PDT (RY4) | |
|---|---|---|---|---|---|---|
| Coil Below 24V DC |  |  | Coil 24V DC and over |  |  | Contains an LED indicator and a surge absorber. |

# Dimensions (mm)

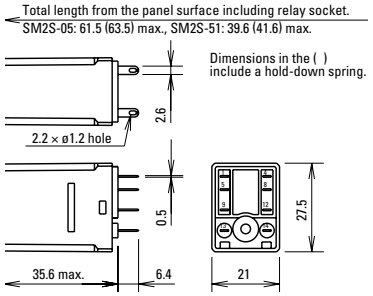
## RY2S



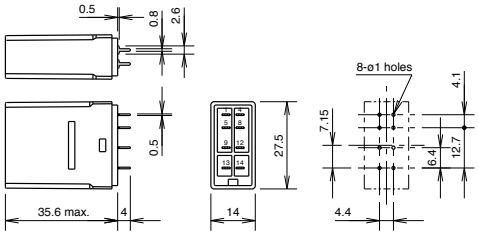

## RY4S



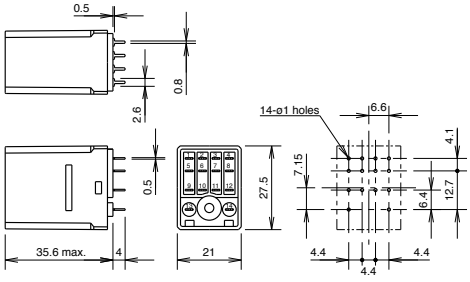

## RM2S



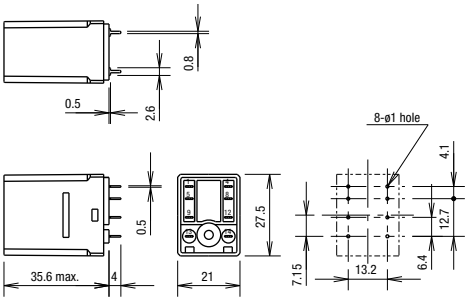

## RY2V



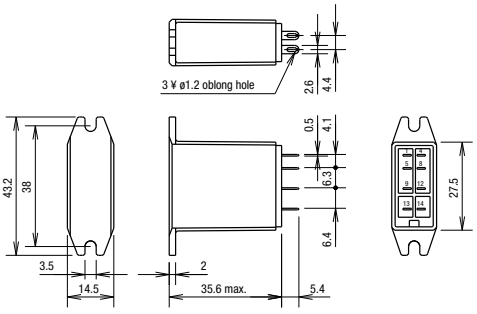

## RY4V



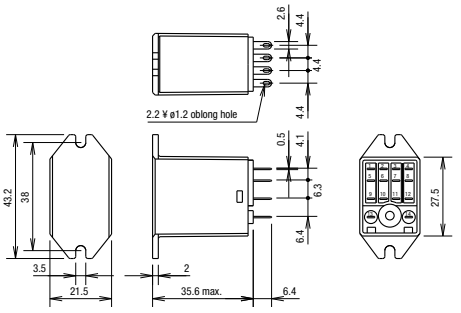

## RM2V



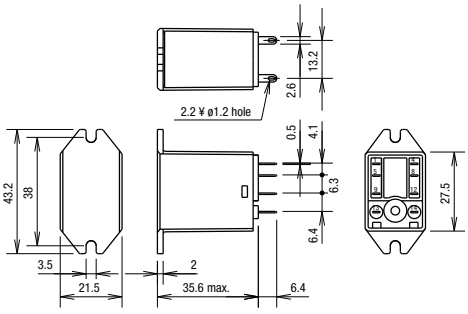

## RY2S-UT




## RY4S-UT



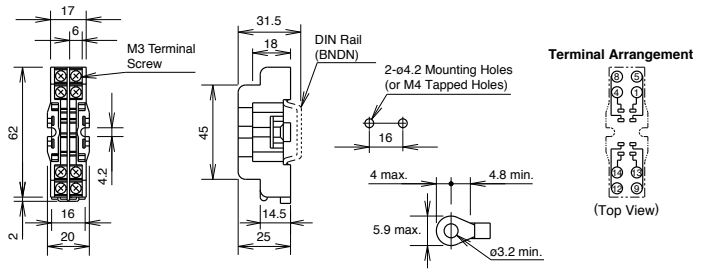

## RM2S-UT



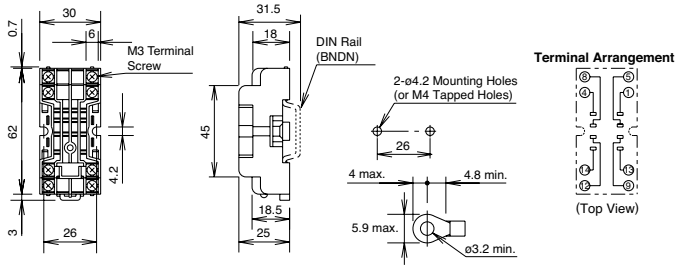
# Dimensions

## Standard DIN Rail Mount Sockets

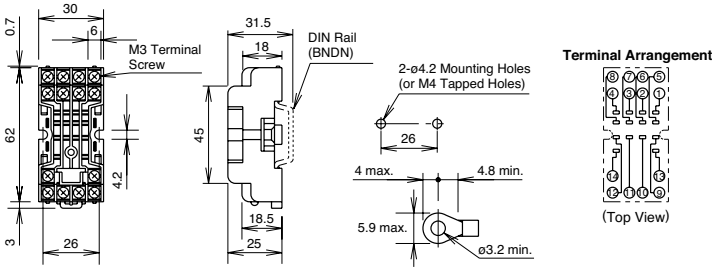
### SY2S-05




### SM2S-05

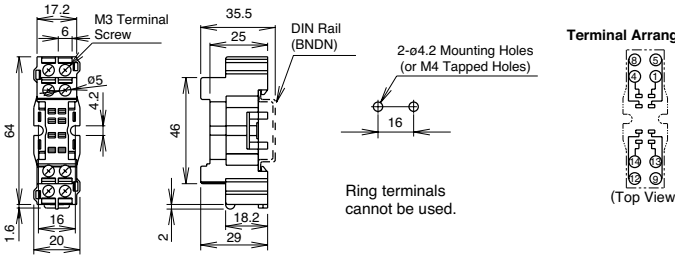



### SY4S-05

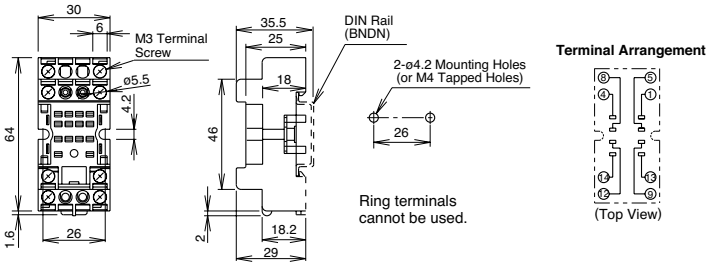



## Finger-safe DIN Rail Mount Sockets

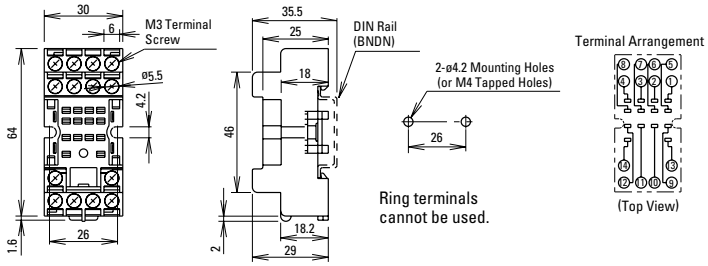
### SY2S-05C




### SM2S-05C

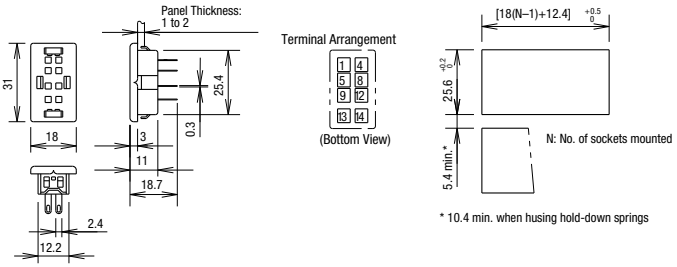



### SY4S-05C

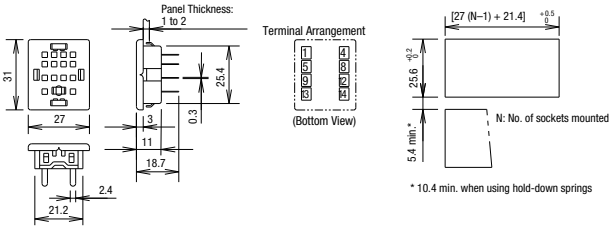


## Through Panel Mount Socket

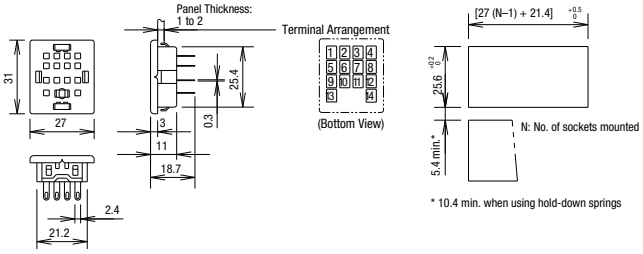
### SY2S-51




### SM2S-51

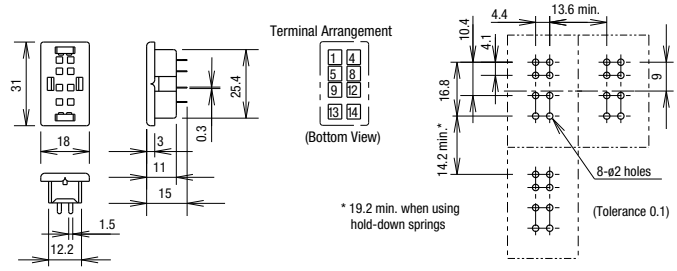



### SY4S-51

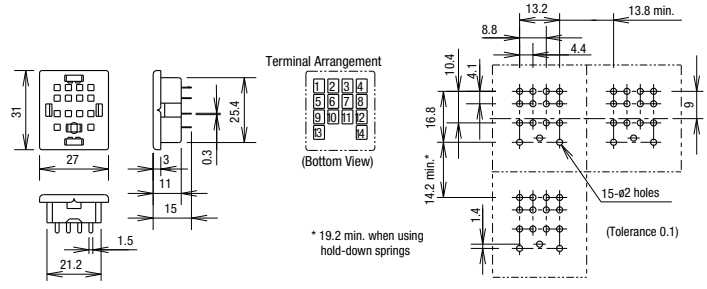



## PCB Mount Sockets

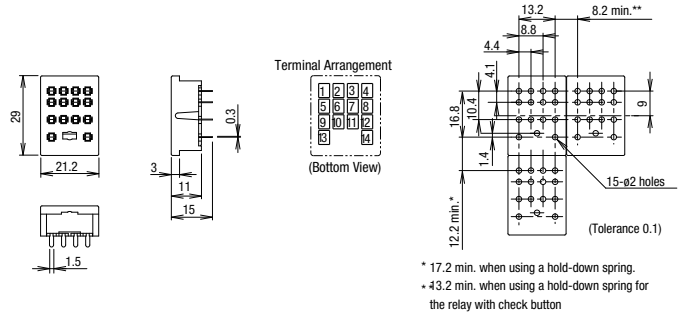
### SY2S-61




### SY4S-61



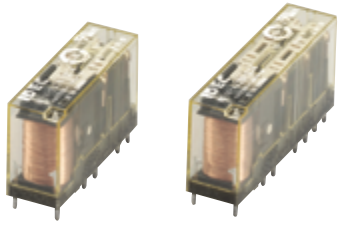

### SY4S-62



# RF1V Force Guided Relays/SF1V Relay Sockets

**Key features:**

- Compact and EN compliant RF1V force guided relays
- Force guided contact mechanism
  (EN50205 Type A TÜV approved)
- Contact configuration
  4-pole (2NO-2NC, 3NO-1NC)
  6-pole (4NO-2NC, 5NO-1NC, 3NO-3NC)
- Built-in LED indicator available.
- Fast response time (8 ms maximum).
- High shock resistance (200 m/s$^2$ minimum)
- Finger-safe DIN rail mount socket and PC board mount socket.



| Applicable Standard | Marking | Certification Organization/ File Number |
|---|---|---|
| UL508<br>CSA C22.2 No.14 | | UL/c-UL File No. E55996 |
| EN50205<br>EN61810-1 | | TÜV SÜD |

## Part Number Selection

| Contact | | Part Number | | Rated Coil Voltage |
|---|---|---|---|---|
| | | Without LED Indicator | With LED Indicator | |
| 4-pole | 2NO-2NC | RF1V-2A2B-D12 | RF1V-2A2BL-D12 | 12V DC |
| | | RF1V-2A2B-D24 | RF1V-2A2BL-D24 | 24V DC |
| | | RF1V-2A2B-D48 | RF1V-2A2BL-D48 | 48V DC |
| | 3NO-1NC | RF1V-3A1B-D12 | RF1V-3A1BL-D12 | 12V DC |
| | | RF1V-3A1B-D24 | RF1V-3A1BL-D24 | 24V DC |
| | | RF1V-3A1B-D48 | RF1V-3A1BL-D48 | 48V DC |
| 6-pole | 4NO-2NC | RF1V-4A2B-D12 | RF1V-4A2BL-D12 | 12V DC |
| | | RF1V-4A2B-D24 | RF1V-4A2BL-D24 | 24V DC |
| | | RF1V-4A2B-D48 | RF1V-4A2BL-D48 | 48V DC |
| | 5NO-1NC | RF1V-5A1B-D12 | RF1V-5A1BL-D12 | 12V DC |
| | | RF1V-5A1B-D24 | RF1V-5A1BL-D24 | 24V DC |
| | | RF1V-5A1B-D48 | RF1V-5A1BL-D48 | 48V DC |
| | 3NO-3NC | RF1V-3A3B-D12 | RF1V-3A3BL-D12 | 12V DC |
| | | RF1V-3A3B-D24 | RF1V-3A3BL-D24 | 24V DC |
| | | RF1V-3A3B-D48 | RF1V-3A3BL-D48 | 48V DC |

## Sockets

| Style | | No. of Poles | Ordering Type No. |
|---|---|---|---|
| | DIN Rail Mount Sockets | 4 | SF1V-4-07L |
| | | 6 | SF1V-6-07L |
| | PC Board Mount Sockets | 4 | SF1V-4-61 |
| | | 6 | SF1V-6-61 |

## Certification for Sockets

| Applicable Standard | Marking | Certification Organization/ File Number |
|---|---|---|
| UL508<br>CSA C22.2 No.14 | | UL/c-UL File No. E62437 |
| EN147000<br>EN147100 | | TÜV SÜD |
| | | EC Low Voltage Directive (DIN rail mount sockets only) |

## Coil Ratings

| Contact | | Rated Coil Voltage (V) | Rated Current (mA) ±10% (at 20°C) [1] | Coil Resistance (Ω) ±10% (at 20°C) | Operating Characteristics (at 20°C) | | | Power Consumption |
|---|---|---|---|---|---|---|---|---|
| | | | | | Pickup Voltage | Dropout Voltage | Maximum Continuous Applied Voltage [2] | |
| 4-pole | 2NO-2NC | 12V DC | 30 | 400 | 75% maximum | 10% minimum | 110% | Approx. 0.36W |
| | | 24V DC | 15 | 1600 | | | | |
| | | 48V DC | 7.5 | 6400 | | | | |
| | 3NO-1NC | 12V DC | 30 | 400 | | | | |
| | | 24V DC | 15 | 1600 | | | | |
| | | 48V DC | 7.5 | 6400 | | | | |
| 6-pole | 4NO-2NC | 12V DC | 41.7 | 288 | | | | Approx. 0.5W |
| | | 24V DC | 20.8 | 1152 | | | | |
| | | 48V DC | 10.4 | 4608 | | | | |
| | 5NO-1NC | 12V DC | 41.7 | 288 | | | | |
| | | 24V DC | 20.8 | 1152 | | | | |
| | | 48V DC | 10.4 | 4608 | | | | |
| | 3NO-3NC | 12V DC | 41.7 | 288 | | | | |
| | | 24V DC | 20.8 | 1152 | | | | |
| | | 48V DC | 10.4 | 4608 | | | | |

1. For relays with LED indicator, the rated current increases by approx. 2 mA.
2. Maximum continuous applied voltage is the maximum voltage that can be applied to relay coils.

## Accessories

| Item | Appearance | Specifications | Type No. | Remarks |
|---|---|---|---|---|
| DIN Rail | | Aluminum<br>Weight: Approx. 250g | BNDN1000 | Length: 1m<br>Width: 35 mm |
| End Clip | | Metal (zinc plated steel)<br>Weight: Approx. 15g | BNL5 | — |
| | | | BNL6 | |

## Specifications

| | | | | | | |
|---|---|---|---|---|---|---|
| Number of Poles | | 4-pole | | 6-pole | | |
| Contact Configuration | | 2NO-2NC | 3NO-1NC | 4NO-2NC | 5NO-1NC | 3NO-3NC |
| Contact Resistance (initial value) [1] | | 100 mΩ maximum | | | | |
| Contact Material | | $AgSnO_2$ (Au flashed) | | | | |
| Rated Load (resistive load) | | 6A 250V AC, 6A 30V DC | | | | |
| Allowable Switching Power (resistive load) | | 1500 VA, 180W | | | | |
| Allowable Switching Voltage | | 250V AC, 30V DC | | | | |
| Allowable Switching Current | | 6A | | | | |
| Minimum Applicable Load [2] | | 5V DC, 1 mA (reference value) | | | | |
| Power Consumption (approx.) | | 0.36W | | 0.5W | | |
| Insulation Resistance | | 1000 MΩ minimum (500V DC megger, same measurement positions as the dielectric strength) | | | | |
| Dielectric Strength | Between contact and coil | 4000V AC, 1 minute | | | | |
| | Between contacts of different poles | 2500V AC, 1 minute<br>Between contacts 7-8 and 9-10 | | 2500V AC, 1 minute<br>Between contacts 7-8 and 11-12<br>Between contacts 9-10 and 13-14<br>Between contacts 11-12 and 13-14 | | |
| | | 4000V AC, 1 min.<br>Between contacts 3-4 and 5-6<br>Between contacts 3-4 and 7-8<br>Between contacts 5-6 and 9-10 | | 4000V AC, 1 min.<br>Between contacts 3-4 and 5-6<br>Between contacts 3-4 and 7-8<br>Between contacts 5-6 and 9-10<br>Between contacts 7-8 and 9-10 | | |
| | Between contacts of the same pole | 1500V AC, 1 minute | | | | |
| Operating Time (at 20°C) | | 20 ms maximum (at the rated coil voltage, excluding contact bounce time) | | | | |
| Response Time (at 20°C) [3] | | 8 ms maximum (at the rated coil voltage, excluding contact bounce time) | | | | |
| Release Time (at 20°C) | | 20 ms maximum (at the rated coil voltage, excluding contact bounce time) | | | | |
| Vibration Resistance | Operating Extremes | 10 to 55 Hz, amplitude 0.75 mm | | | | |
| | Damage Limits | 10 to 55 Hz, amplitude 0.75 mm | | | | |
| Shock Resistance | Operating Extremes (half sine-wave pulse: 11 ms) | 200 $m/s^2$, when mounted on DIN rail mount socket: 150 $m/s^2$ | | | | |
| | Damage Limits (half sine-wave pulse: 6 ms) | 1000 $m/s^2$ | | | | |
| Electrical Life | | 250V AC 6A resistive load: 100,000 operations minimum (operating frequency 1200 per hour)<br>30V DC 6A resistive load: 100,000 operations minimum (operating frequency 1200 per hour)<br>250V AC 1A resistive load: 500,000 operations minimum (operating frequency 1800 per hour)<br>30V DC 1A resistive load: 500,000 operations minimum (operating frequency 1800 per hour)<br>[AC 15] 240V AC 2A inductive load: 100,000 operations minimum (operating frequency 1200 per hour, cos ø = 0.3)<br>[DC 13] 24V DC 1A inductive load: 100,000 operations minimum (operating frequency 1200 per hour, L/R = 48 ms) | | | | |
| Mechanical Life | | 10 million operations minimum (operating frequency 10,800 operations per hour) | | | | |
| Operating Temperature [4] | | –40 to +85°C (no freezing) | | | | |
| Operating Humidity | | 5 to 85%RH (no condensation) | | | | |
| Storage Temperature | | –40 to +85°C | | | | |
| Operating Frequency (rated load) | | 1200 operations per hour | | | | |
| Weight (approx.) | | 20g | | 23g | | |

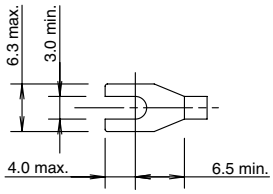
1. Measured using 6V DC,1A voltage drop method.
2. Failure rate level P (reference value)
3. Response time is the time until NO contact opens, after the coil voltage is turned off.
4. When using at 70 to 85°C, reduce the switching current by 0.1A/°C.

## Socket Specifications

| Part Number | SF1V-4-07L | SF1V-6-07L | SF1V-4-61 | SF1V-6-61 |
|---|---|---|---|---|
| Rated Current | 6A | | | |
| Rated Voltage | 250V AC/DC | | | |
| Insulation Resistance | 1000 MΩ minimum (500V DC megger, between terminals) | | | |
| Dielectric Strength | 2500V AC, 1 minute (between terminals) | | | |
| Screw Terminal Style | M3 slotted Phillips screw | | — | |
| Applicable Wire | 0.7 to 1.65 mm² (18 AWG to 14 AWG) | | — | |
| Recommended Screw Tightening Torque | 0.5 to 0.8 N·m | | — | |
| Terminal Strength | Wire tensile strength: 50N min. | | — | |
| Vibration Resistance | Damage limits: 10 to 55 Hz, amplitude 0.75 mm<br>Resonance: 10 to 55 Hz, amplitude 0.75 mm | | | |
| Shock Resistance | 1000 m/s² | | | |
| Operating Temperature [1] | –40 to +85°C (no freezing) | | | |
| Operating Humidity | 5 to 85% RH (no condensation) | | | |
| Storage Humidity | –40 to +85°C | | | |
| Degree of Protection | IP20 (finger-safe screw terminals) | | — | |
| Weight (approx.) | 40g | 55g | 9g | 10g |

1. When using at 70 to 85°C, reduce the switching current by 0.1A/°C.

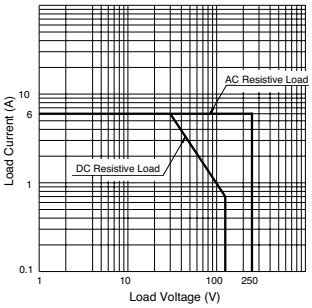
## Applicable Crimping Terminals Specifications



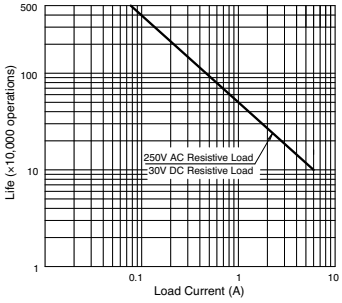

Note: Ring tongue terminals cannot be used.

## Characteristics

### Maximum Switching Capacity

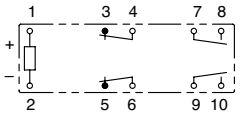



### Electrical Life Curve




### Notes on Contact Gaps except Welded Contacts

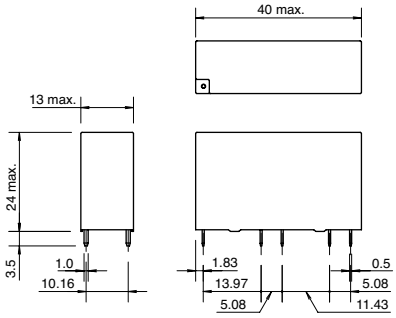
Example: RF1V-2A2B-D24



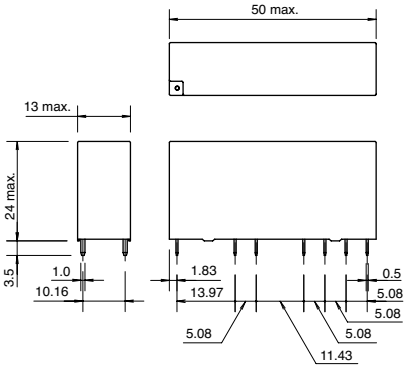

- If the NO contact (7-8 or 9-10) welds, the NC contact (3-4 or 5-6) remains open even when the relay coil is de-energized, maintaining a gap of 0.5 mm. The remaining unwelded NO contact (9-10 or 7-8) is either open or closed.
- If the NC contact (3-4 or 5-6) welds, the NO contact (7-8 or 9-10) remains open even when the relay coil is energized, maintaining a gap of 0.5 mm. The remaining unwelded NC contact (5-6 or 3-4) is either open or closed.

# RF1V Dimensions (mm)

**RF1V (4-pole)**

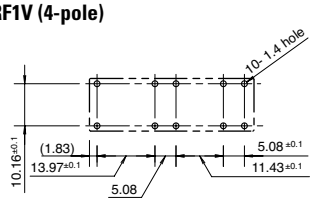



**RF1V (6-pole)**

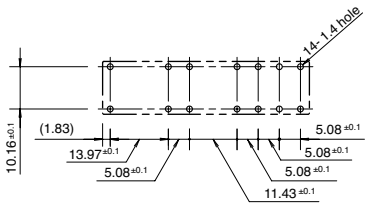



**PC Board Terminal type Mounting Hole Layout (Bottom View)**

**RF1V (4-pole)**



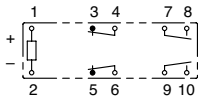

**RF1V (6-pole)**



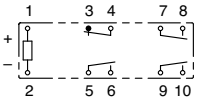

## Internal Connection (View from Bottom) With Indicator and Diode (-LD type)

**RF1V (4-pole)**

Without LED Indicator

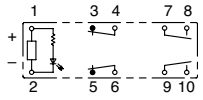



2NO-2NC Contact

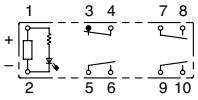



3NO-1NC Contact

With LED Indicator



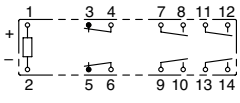

2NO-2NC Contact



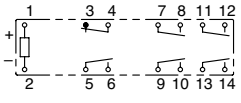

3NO1NC Contact

**RF1V (6-pole)**

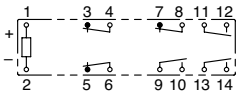
Without LED Indicator




4NO-2NC Contact

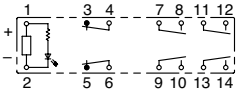



5NO-1NC Contact

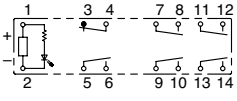



3NO-3NC Contact

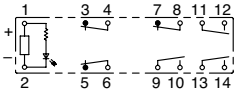
With LED Indicator




4NO-2NC Contact




5NO-1NC Contact

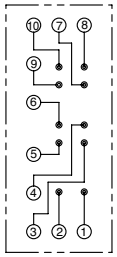



3NO-3NC Contact

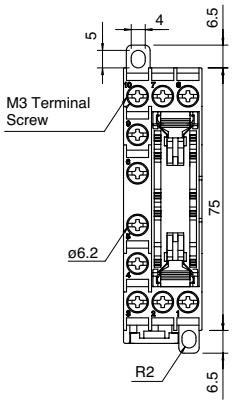
# SF1V DIN Rail Mount Socket Dimensions (mm)

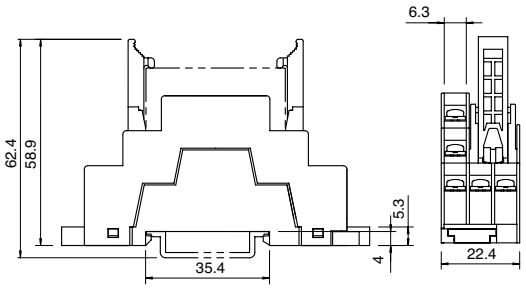
**SF1V-4-07L (4-pole)**

(Internal Connection)

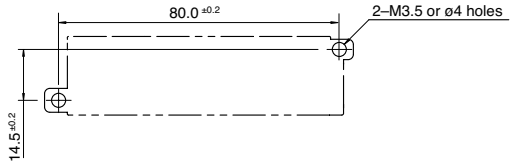


(Top View)



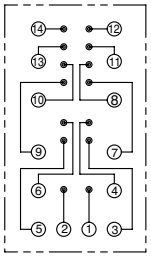

(Panel Mounting Hole Layout)



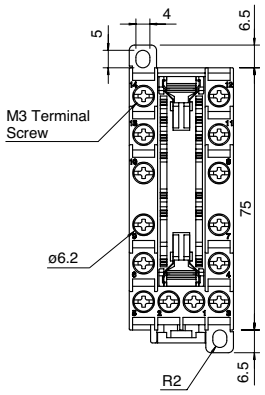

(Top View)

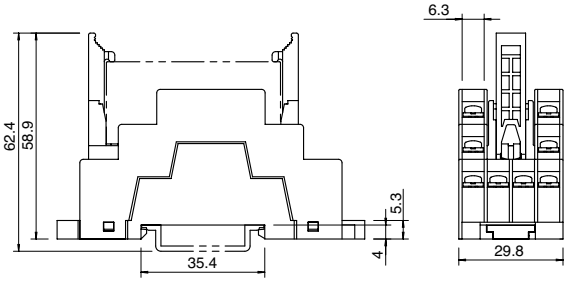
**SF1V-6-07L (6-pole)**

(Internal Connection)

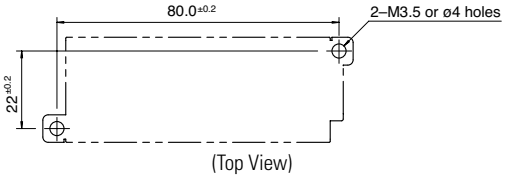


(Top View)



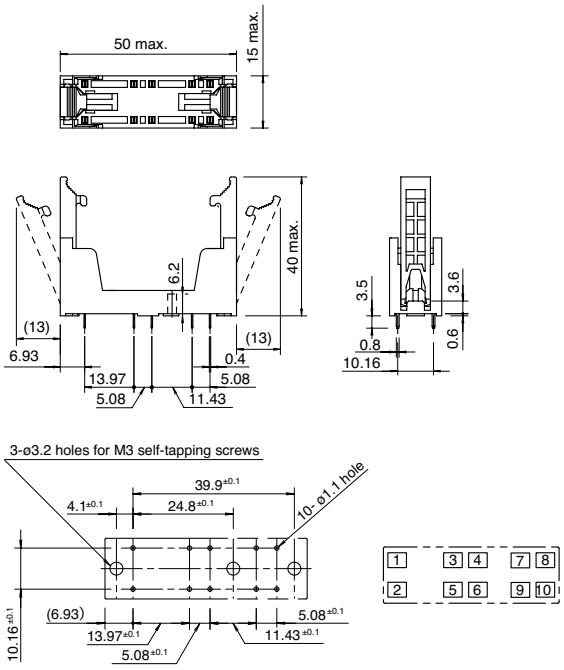

(Panel Mounting Hole Layout)



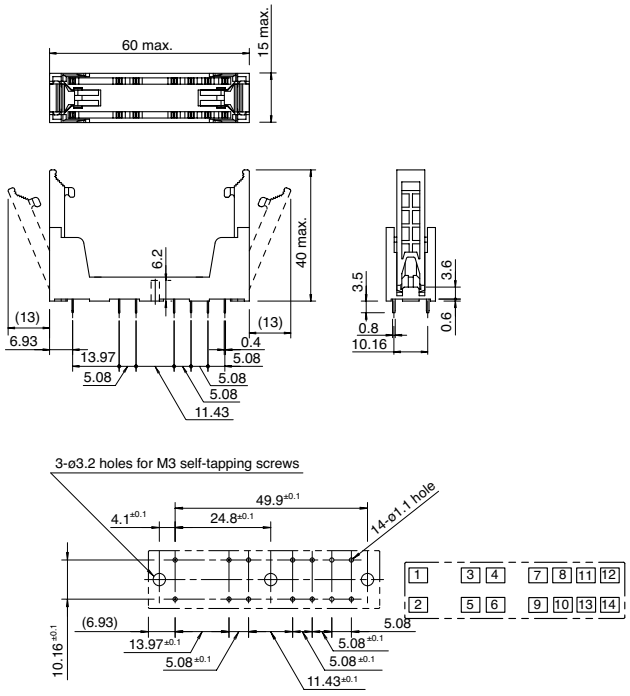

(Top View)

# SF1V PC Board Mount Sockets

**SF1V-4-07L (4-pole)**



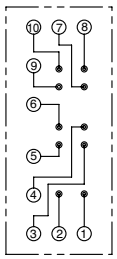

**SF1V-6-07L (6-pole)**



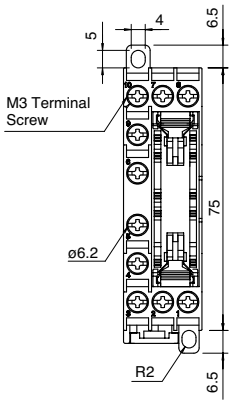
## SF1V DIN Rail Mount Socket Dimensions (mm)

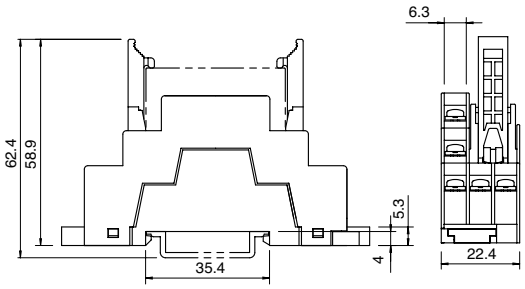
### SF1V-4-07L (4-pole)

(Internal Connection)

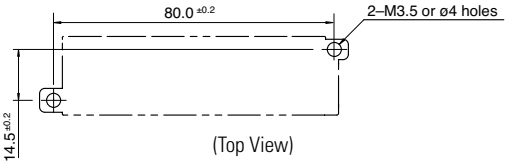


(Top View)



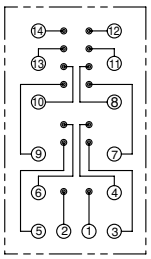

(Panel Mounting Hole Layout)



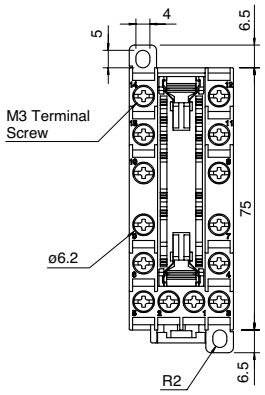

(Top View)

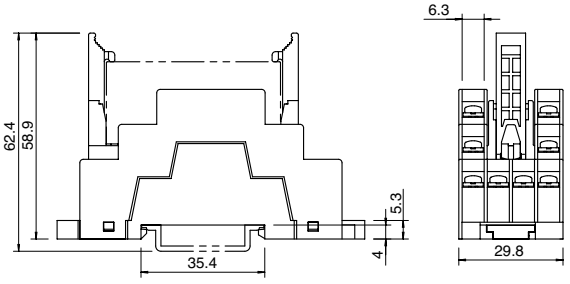
### SF1V-6-07L (6-pole)

(Internal Connection)

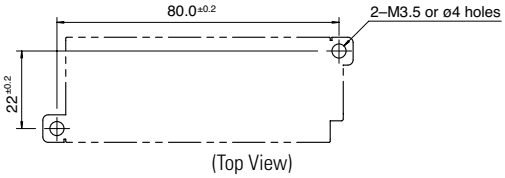


(Top View)



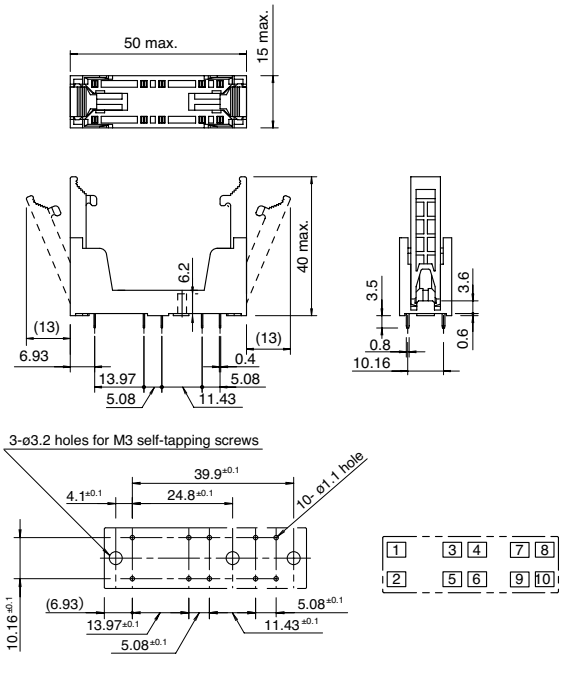

(Panel Mounting Hole Layout)



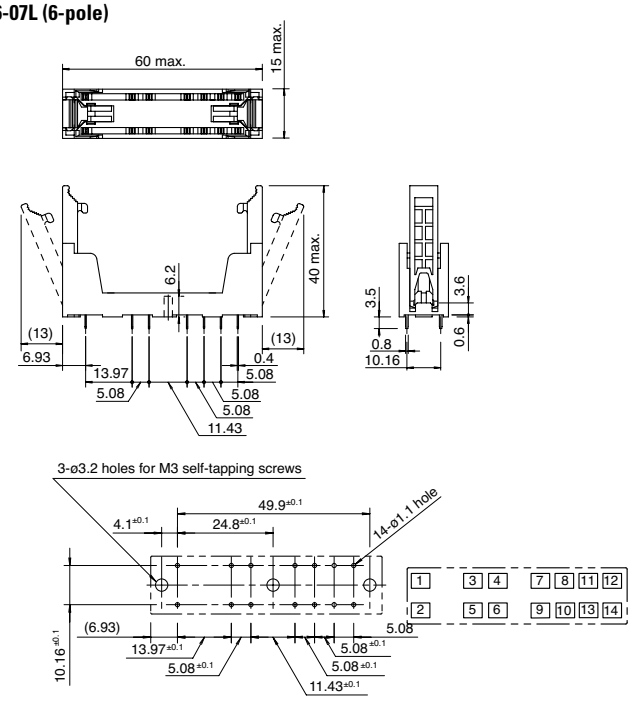

(Top View)

## SF1V PC Board Mount Sockets

### SF1V-4-07L (4-pole)



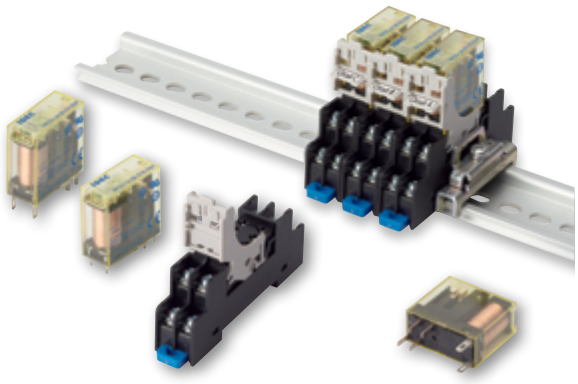

### SF1V-6-07L (6-pole)



## RF2V 2-Pole Force Guided Relays/SJ Series Relay Sockets

**Key features:**

- 2-pole force guided relay to reduce cost and installation space.
- Force guided contact mechanism (EN50205 Type A TÜV approved).
- Reinforced insulation between coil and contact and contacts of different poles.
- Mechanical indicator shows contact status.
- Two terminal styles - socket mounting and PC board mounting.
- RTIII degree of protection, LED, diode models available.
- Can be used with SJ series relay socket.
- Applicable Standards Mark Certification



| Applicable Standard | Marking | Certification Organization/ File Number |
|---|---|---|
| UL508<br>CSA C22.2 No.14 | c UL us, CSA | UL/c-UL File No. E55996 |
| EN50205<br>EN61810-1 | TÜV | TÜV SÜD |

### Part Numbers

| Contact Configuration | | Terminal Style | LED Indicator | w/Diode | Degree of Protection (Note) | | Rated Coil Voltage | Part No. |
|---|---|---|---|---|---|---|---|---|
| | | | | | Flux-tight (RTII) | Sealed (RTIII) | | |
| 2-pole | SPST-NO + SPST-NC | Plug-in | With | √ | √ | | 12V DC | RF2S-1A1BLD1-D12 |
| | | | Without | — | √ | | 24V DC | RF2S-1A1B-D24 |
| | | | | √ | √ | | | RF2S-1A1BD1-D24 |
| | | | With | √ | √ | | | RF2S-1A1BLD1-D24 |
| | | | | √ | | √ | | RF2S-1A1BLD1K-D24 |
| | | | Without | — | √ | | 48V DC | RF2S-1A1B-D48 |
| | | | With | √ | √ | | | RF2S-1A1BLD1-D48 |
| | | | | √ | | √ | | RF2S-1A1BLD1K-D48 |
| | | PC Board | Without | — | √ | | 12V DC | RF2V-1A1B-D12 |
| | | | | — | √ | | 24V DC | RF2V-1A1B-D24 |
| | | | | — | | √ | | RF2V-1A1BK-D24 |
| | | | | √ | √ | | | RF2V-1A1BD1-D24 |
| | | | | √ | | √ | | RF2V-1A1BD1K-D24 |
| | | | With | √ | | √ | | RF2V-1A1BLD1K-D24 |
| | | | Without | — | √ | | 48V DC | RF2V-1A1B-D48 |
| | DPDT | | Without | — | √ | | 24V DC | RF2V-2C-D24 |

### Part Number Structure

**RF 2 S - 1A1B - LD1-K D24**

**Series Name**

**No of poles**
2 : 2-pole

**Terminal Construction**
S : Plug-in
V : PC Board

**Contact Arrangement**
1 A 1 B : 1 Form X
2 C : DPDT

**Rated Coil Voltage**
D12 : 12V DC
D24 : 24V DC
D48 : 48V DC

**Options**
Blank : Standard
L : With LED
D : With diode (Note 1)
D1 : With diode of reverse polarity coil (Note 2)
LD : With LED indicator & diode (Note 1)
LD1 : With LED indicator & diode of reverse polarity coil (Note 2)

**Degree of Protection**
Blank : RTII
K : RTIII

Note 1: With diode: terminal 1 –, terminal 8 +
Note 2: With diode of reverse polarity coil: terminal 1 +, terminal 8 –
Note 3: Used interpreting part numbers. Not all variations are possible.

## Coil Ratings

| Rated Voltage (V) | Rated Current (mA) ±15% (at 20°C) | | Coil Resistance ±10% (at 20°C) | | Operating Characteristics (against rated values at 20°C) | | | Power Consumption |
|---|---|---|---|---|---|---|---|---|
| | Without LED | With LED | Without LED | With LED | Minimum Pickup Voltage | Dropout Voltage | Maximum Continuous Applied Voltage | |
| 12V DC | 58 | 63 | 205 | 205 | 75% maximum | 10% minimum | 110% | Approx. 0.7W |
| 24V DC | 29 | 33 | 820 | 820 | | | | |
| 48V DC | 14.6 | 18 | 3300 | 3300 | | | | |

Note: Maximum continuous applied voltage is the maximum voltage that can be applied to relay coils.

## Standards Ratings

| Voltage | UL Rating Resistive | | CSA Rating Resistive | |
|---|---|---|---|---|
| | NO | NC | NO | NC |
| 277V AC | 6A | 3A | 6A | 3A |
| 30V DC | 6A | 3A | 6A | 3A |

| Voltage | TÜV Rating Resistive | |
|---|---|---|
| | NO | NC |
| 240VAC | 6A | 3A |
| 24V DC | 6A | 3A |

## Sockets

| Style | | No. of Poles | Part Number |
|---|---|---|---|
| | Standard Screw Terminal | 2 | SJ2S-05BW |
| | Fingersafe Screw Terminal | 2 | SJ2S-07LW |
| | PC Board Mount Sockets | 2 | SJ2S-61 |

## Certification for Sockets

| Applicable Standard | Marking | Certification Organization/ File Number |
|---|---|---|
| UL508<br>CSA C22.2 No.14 | | UL/c-UL File No. E62437 |
| EN147000<br>EN147100 | | TÜV SÜD |
| | | EC Low Voltage Directive (DIN rail mount sockets only) |

## Specifications

| Model | | RF2S (Plug-in Terminal) 2-pole | RF2V (PC board terminal) 2-pole |
|---|---|---|---|
| Contact Configuration | | SPST-NO + SPST-NC, DPDT | |
| Contact Resistance (initial value) [1] | | 100 mΩ maximum | |
| Contact Material | | AgNi+Au-Clad | |
| Rated Load (resistive load) | | NO contact: 240V AC, 6A/24V DC, 6A<br>NC contact: 240V AC, 3A/24V DC, 3A | |
| Allowable Switching Power (resistive load) | | NO contact: 1440VA/144W, NC contact: 720VA/72W | |
| Allowable Switching Voltage | | 250V AC, 125V DC | |
| Allowable Switching Current | | 6A | |
| Minimum Applicable Load [2] | | 1V DC, 1mA | |
| Power Consumption (approx.) | | Approx. 0.7W | |
| Insulation Resistance | | 1000 MΩ minimum (500V DC megger, same measurement positions as the dielectric strength) | |
| Dielectric Strength | Between contact and coil | 5000V AC, 1 minute | |
| | Between contacts of the same pole | 4000V AC | |
| | Between contacts of different poles | 1500V AC, 1 minute | |
| Operating Time (at 20°C) | | 15 ms maximum (at the rated coil voltage, excluding contact bounce time) | |
| Response Time (at 20°C) [3] | | 5ms max. (at the rated coil voltage, without diode)<br>20ms max. (at the rated coil voltage, with diode) | |
| Release Time (at 20°C) | | 10ms max. (at the rated coil voltage, excluding contact bounce time, without diode)<br>25ms max. (at the rated coil voltage, excluding contact bounce time, with diode) | |
| Vibration Resistance | Operating Extremes | NO contact: 10 to 55Hz, amplitude 0.75mm<br>NC contact:10 to 55Hz, amplitude 0.2mm | |
| | Damage Limits | 10 to 55Hz, amplitude 0.75mm | |
| Shock Resistance | Operating Extremes | No Contact 100 $m/s^2$, NC contact: 50 $m/s^2$ | |
| | Damage Limits | 1000 $m/s^2$ | |
| Electrical Life | | NO contact:<br>100,000 operations minimum (operating frequency 1,800 per hour) at 240V 6A resistive load or 2A inductive load (power factor 0.4)<br>100,000 operations minimum (operating frequency 1,800 per hour) at 24V 6A resistive load or 1A inductive load (time constant 48ms)<br>NC contact:<br>100,000 operations minimum (operating frequency 1,800 per hour) at 240V AC, 3A resistive load or 2A inductive load (power factor 0.4)<br>100,000 operations minimum (operating frequency 1,800 per hour) at 24V DC, 3A resistive load or 1A inductive load (time constant 48ms) | |
| Mechanical Life | | 10 million operations minimum (operating frequency 10,800 operations per hour) | |
| Operating Temperature | | Single mounting: –40 to +70°C (no freezing)<br>Collective mounting: –40 to +55°C (no freezing) | –40 to +70°C (no freezing)=== |
| Operating Humidity | | 5 to 85%RH (no condensation) | |
| Storage Temperature | | –40 to +85°C (no freezing) | |
| Operating Frequency (rated load) | | 1200 operations per hour | |
| Weight (approx.) | | 18g (without LED/diode), 20g (with LED/with diode/with LED & diode) | |

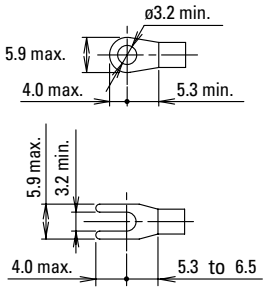
1. Measured using 5V DC,1A voltage drop method.
2. Failure rate level P (reference value)
3. Response time is the time until NO contact opens, after the coil voltage is turned off.

## Socket Specifications

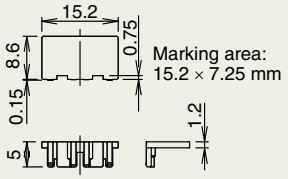
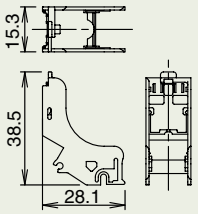
| Part Number | | SJ2S-05B/-07L | SJ2S-61 |
|---|---|---|---|
| Mounting | | DIN Rail | PC Board |
| Rated Current | | 8A | |
| Rated Insulation Voltage | | 250V AC/DC | |
| Dielectric Strength | Between contact and coil | 4000V AC, 1 minute | 5000V AC, 1 minute |
| | Between contacts of the same pole | 1000V AC, 1 minute | |
| | Between contacts of the different pole | 3000V AC, 1 minute | |
| Screw Terminal Style | | M3 slotted Phillips screw | - |
| Applicable Wire | | 2mm$^2$ | - |
| Recommended Screw Tightening Torque | | 0.6 to 1.0 N·m | - |
| Terminal Strength | | Wire tensile strength: 50N min. | - |
| Vibration Resistance | | Damage limits: 90 m/s2<br>Resonance: 10 to 55 Hz, amplitude 0.75 mm | |
| Shock Resistance | | 1000 m/s$^2$ | |
| Operating Temperature [1] | | –40 to +70°C (no freezing) | |
| Operating Humidity | | 5 to 85% RH (no condensation) | |
| Storage Temperature | | –55 to +85°C (no freezing) | |
| Storage Humidity | | 5 to 85% RH (no condensation) | |
| Degree of Protection (Scre Terminal) | | SJ2S-07L: IP20 (IEC 60529) | |
| Weight (approx.) | | 4034g | 4.5g |

1. When using at 70 to 85°C, reduce the switching current by 0.1A/°C.

## Applicable Crimping Terminals Specifications

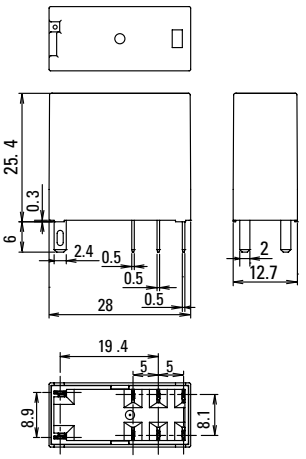



Note: Ring tongue terminals cannot be used on SJ2S-0L.

| Description/Shape | | Material | Part No. | Ordering No. | Package Quantity | Remarks |
|---|---|---|---|---|---|---|
| Removable Marking Plate  | | Plastic (white) | SJ9Z-PW | SJ9Z-PWPN10 | 10 |   Marking area: 15.2 × 7.25 mm |
| Jumper | For 2 sockets | Nickel-coated brass with polypropylene coating | SJ9Z-JF2 | SJ9Z-JF2PN10 | | Terminal centers: 15.5mm<br>Rated current: 12A<br>Ensure that the total current to the jumper does not exceed the maximum current. |
| | For 5 sockets | | SJ9Z-JF5 | SJ9Z-JF5PN10 | | |
| | For 8 sockets | | SJ9Z-JF8 | SJ9Z-JF8PN10 | | |
| | For 10 sockets | | SJ9Z-JF10 | SJ9Z-JF10PN10 | | |
| Replacement Release Lever (with integrated marking plate) | | Plastic (gray) | SJ9Z-CM | SJ9Z-CMPN05 | 5 |   When not using marking plate |

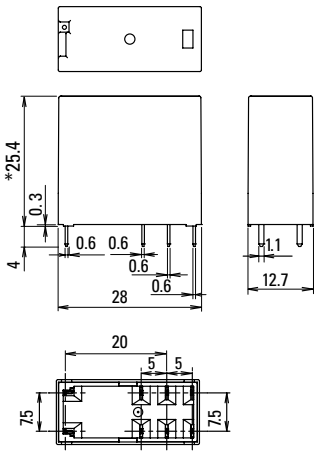
## RF2V Dimensions (mm)

**RF2S (plug-in terminal)**
**Standard (without LED/diode)**




With LED/diode: 28.4

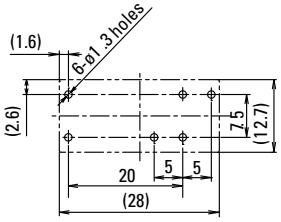
**RF2V (PC board terminal)**
**Standard (without LED/diode)**



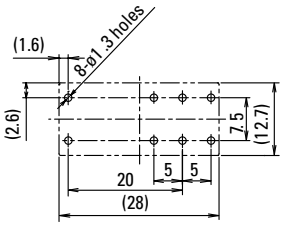

With LED/diode: 28.4

**PC Board Terminal type Mounting Hole Layout (Bottom View)**

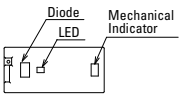
**RF2V (SPST-NO + SPST-NC)**



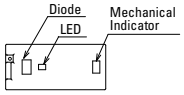

**RF2V (DPDT)**




With LED/diode

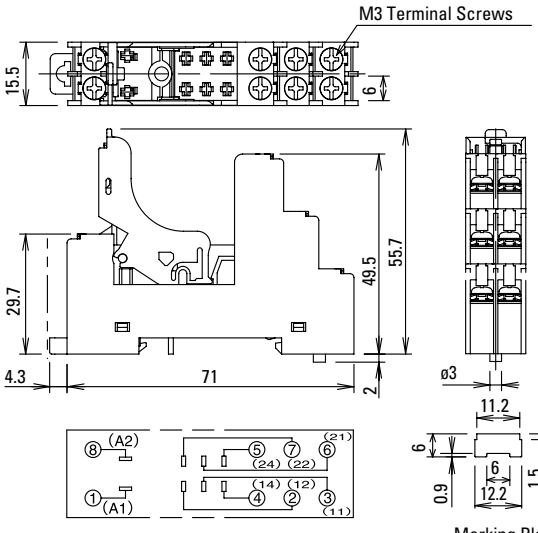



With LED/diode




## Socket Dimensions

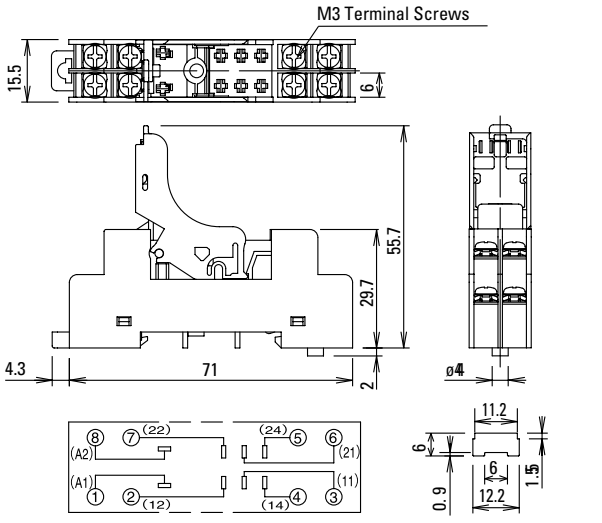
**SJ2S-07L**




(Top View)

Marking Plate
(integrated with release lever)

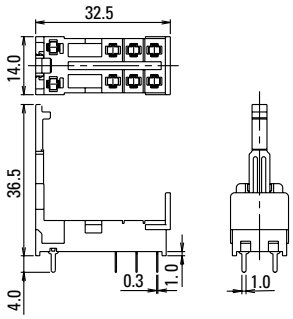
**SJ2S-05B**




(Top View)

Marking Plate
(integrated with release lever)

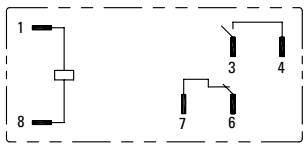
**SJ2S-61**



## Internal Connection (View from Bottom)

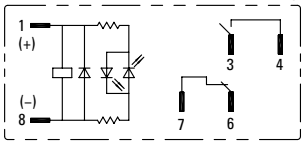
**RF2 -1A1B-☐**

Standard



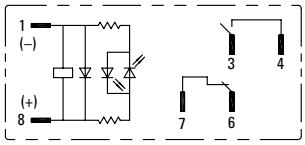

**RF2* -1A1BLD1-☐**

With LED indicator + diode of reverse polarity coil



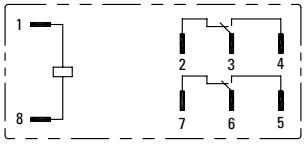

**RF2 -1A1BLD-☐**

With LED indicator + diode



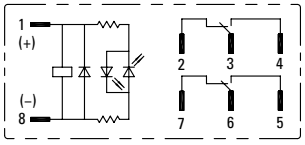

**RF2 *-2C-☐**

Standard



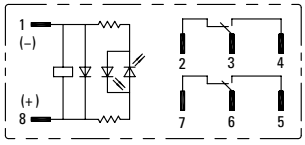

**RF2 -2CLD1-☐**

With LED indicator + diode of reverse polarity coil



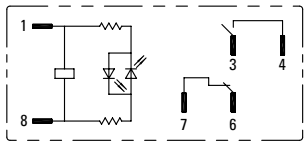

**RF2* -2CLD-☐**

With LED indicator + diode



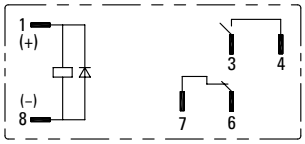

**RF2* -1A1BL-☐**

With LED indicator



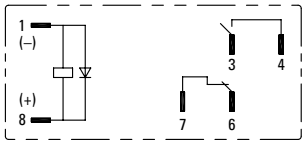

**RF2* -1A1BD1-☐**

With diode of reverse polarity coil



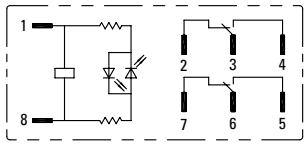

**RF2* -1A1BD-☐**

With diode



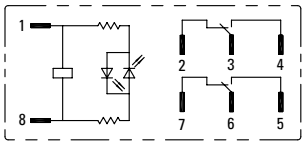

**RF2* -2CL-☐**

With LED indicatorl



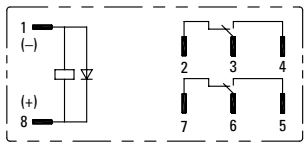

**RF2* -2CD1-☐**

With diode of reverse polarity coil




**RF2* -2CD-☐**

With diode

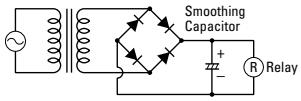


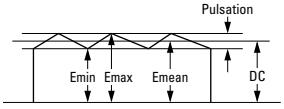

Relays with diode have polarity. Take polarity into consideration when wiring.
When using DPDT model as a force guided relay, use in SPST-NO + SPST-NC wiring (EN50205).

# Operating Instructions

## Driving Circuit for Relays

1. To ensure correct relay operation, apply rated voltage to the relay coil.
2. Input voltage for the DC coil:
   A complete DC voltage is best for the coil power to make sure of stable relay operation. When using a power supply containing a ripple voltage, suppress the ripple factor within 5%. When power is supplied through a rectification circuit, the relay operating characteristics, such as pickup voltage and dropout voltage, depend on the ripple factor. Connect a smoothing capacitor for better operating characteristics as shown below.



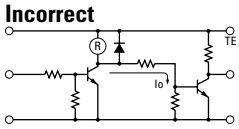




$$\text{Ripple Factor (\%)} \quad \frac{\text{Emax} - \text{Emin}}{\text{Emean}} \times 100\%$$

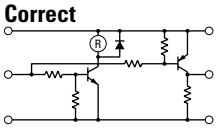
Emax = Maximum of pulsating current
Emin = Minimum of pulsating current
Emean = DC mean value

3. Leakage current while relay is off:
   When driving an element at the same time as the relay operation, special consideration is needed for the circuit design. As shown in the incorrect circuit below, leakage current (Io) flows through the relay coil while the relay is off. Leakage current causes coil release failure or adversely affects the vibration resistance and shock resistance. Design a circuit as shown in the correct example.

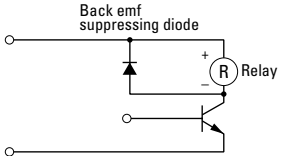
**Incorrect**




**Correct**

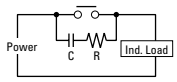
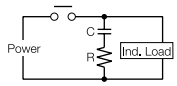
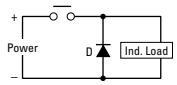
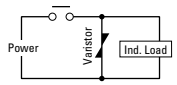



4. Surge suppression for transistor driving circuits:
   When the relay coil is turned off, a high-voltage pulse is generated, causing a transistor to deteriorate and sometimes to break. Be sure to connect a diode to suppress the back electromotive force. Then, the coil release time becomes slightly longer. To shorten the coil release time, connect a Zener diode between the collector and emitter of the transistor. Select a Zener diode with a Zener voltage slightly higher than the power voltage.

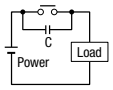
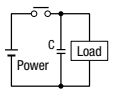



## Protection for Relay Contacts

1. The contact ratings show maximum values. Make sure that these values are not exceeded. When an inrush current flows through the load, the contact may become welded. If this is the case, connect a contact protection circuit, such as a current limiting resistor.
2. Contact protection circuit:
   When switching an inductive load, arcing causes carbides to form on the contacts, resulting in increased contact resistance. In consideration of contact reliability, contact life, and noise suppression, use of a surge absorbing circuit is recommended. Note that the release time of the load becomes slightly longer. Check the operation using the actual load. Incorrect use of a contact protection circuit will adversely affect switching characteristics. Four typical examples of contact protection circuits are shown in the following table:

| | | |
|---|---|---|
| RC |  | This protection circuit can be used when the load impedance is smaller than the RC impedance in an AC load power circuit.<br>• R: Resistor of approximately the same resistance value as the load<br>• C:0.1 to 1 µF |
| |  | This protection circuit can be used for both AC and DC load power circuits.<br>R: Resistor of approximately the same resistance value as the load<br>C: 0.1 to 1 µF |
| Diode |  | This protection circuit can be used for DC load power circuits. Use a diode with the following ratings.<br>Reverse withstand voltage: Power voltage of the load circuit x 10<br>Forward current: More than the load current |
| Varistor |  | This protection circuit can be used for both AC and DC load power circuits.<br>For a best result, when using a power voltage of 24 to 48V AC/DC, connect a varistor across the load.<br>When using a power voltage of 100 to 240V AC/DC, connect a varistor across the contacts. |

3. Do not use a contact protection circuit as shown below:

| | |
|---|---|
|  | This protection circuit is very effective in arc suppression when opening the contacts. But, the capacitor is charged while the contacts are opened. When the contacts are closed, the capacitor is discharged through the contacts, increasing the possibility of contact welding. |
|  | This protection circuit is very effective in arc suppression when opening the contacts. But, when the contacts are closed, a current flows to charge the capacitor, causing contact welding. |

Generally, switching a DC inductive load is more difficult than switching a DC resistive load. Using an appropriate arc suppressor, however, will improve the switching characteristics of a DC inductive load.

## Soldering

1. When soldering the relay terminals, use a soldering iron of 30 to 60W, and quickly complete soldering (within approximately 3 seconds).
2. Use a non-corrosive rosin flux.

## Operating Instructions con't

### Other Precautions

1. General notice:
   To maintain the initial characteristics, do not drop or shock the relay.

   The relay cover cannot be removed from the base during normal operation. To maintain the initial characteristics, do not remove the relay cover.

   Use the relay in environments free from condensation, dust, sulfur dioxide ($SO_2$), and hydrogen sulfide ($H_2S$).

   Make sure that the coil voltage does not exceed applicable coil voltage range.
2. UL and CSA ratings may differ from product rated values determined by IDEC.
3. Do not use relays in the vicinity of strong magnetic field, as this may affect relay operation.

## Safety Precautions

- Turn off the power to the relay before starting installation, removal, wiring, maintenance, and inspection of the relays. Failure to turn power off may cause electrical shock or fire hazard.
- Observe specifications and rated values, otherwise electrical shock or fire hazard may be caused.
- Use wires of the proper size to meet voltage and current requirements. Tighten the terminal screws on the relay socket to the proper tightening torque.
- Surge absorbing elements on AC relays with RC or DC relays with diode are provided to absorb the back electromotive force generated by the coil. When the relay is subject to an excessive external surge voltage, the surge absorbing element may be damaged. Add another surge absorbing provision to the relay to prevent damage.

### Precautions for the RU Relays

- Before operating the latching lever of the RU relay, turn off the power to the RU relay. After checking the circuit, return the latching lever to the original position.
- Do not use the latching lever as a switch. The durability of the latching lever is a minimum of 100 operations.
- When using DC loads on 4PDT relays, apply a positive voltage to terminals of neighboring poles and a negative voltage to the other terminals of neighboring poles to prevent the possibility of short circuits.
- DC relays with a diode have a polarity in the coil terminals. Apply the DC voltage to the correct terminals.

# RSC Series Solid State Relays

**Key features:**

- Slim design allows for DIN rail or panel mounting
- Built-in heat sink maximizes current output capability
- Epoxy-free design
- Choice of 20A, 30A and 45A models
- LED indicator
- Finger-safe terminals
- Zero voltage switching
- Back-to-back SCR output
- Direct Bond Copper (DBC) substrate construction
- Built-in transient protection (TVS)
- 100k-cycle UL508 endurance rating
- UL Recognized, TUV Approved, CE Marked
- Lead free and RoHS compliant
- EMC (Level 3) & IEC 62314 compliant

UL Recognized
File No. E194577

## Part Number Selection

| Input Control Voltage | Output Current Rating | Part Number |
|---|---|---|
| 4-32V DC | 20A | RSCDN-20A |
| | 30A | RSCDN-30A |
| | 45A | RSCDN-45A |
| 90-140V AC | 20A | RSCA1N-20A |
| | 30A | RSCA1N-30A |
| | 45A | RSCA1N-45A |
| 180-280V AC | 20A | RSCA2N-20A |
| | 30A | RSCA2N-30A |
| | 45A | RSCA2N-45A* |

*Input control voltage is 180-260V AC.

## Specifications

| | Model | 20A | 30A | 45A |
|---|---|---|---|---|
| General Characteristics | Operating temperature (°C) | -20 to +80<br>-20 to +60 (90-140 V AC input models) | | |
| | Storage temperature (°C) | -40 to +100 | | |
| | Input-to-Output isolation voltage (Vrms) | 4200 | | |
| | Input/Output to ground isolation voltage (Vrms) | 4000 | | |
| | Operating frequency (Hz) | 47 to 63 | | |
| | Housing material | UL94-V0 Self-extinguishing polycarbonate | | |
| | Heat sink material | Anodized aluminum black | | |
| | Protection (IEC 60529) - Casing | IP20 | | |
| | Input terminal wire size (stranded and solid) | 16 AWG to 24 AWG | | |
| | Input terminal tightening torque (Nm) | 0.5 | | |
| | Output terminal wire size (stranded) | 8 AWG to 16 AWG | | |
| | Output terminal wire size (solid) | 10 AWG to 16 AWG | | |
| | Output terminal tightening torque (Nm) | 1.3 | | |
| | Weight (g) | 225 | | 400 |

## Specifications con't

| | Model | 20A | 30A | 45A |
|---|---|---|---|---|
| Safety Standards | Conformity to standards | IEC 62314<br>IEC 60947-4-2 (AC 53a)<br>TUV certified per EN 60950<br>UL recognized per UL 508 | IEC 60947-4-3 (AC 51)<br>CE compliant with LVD 73/23/EEC<br>c-UR per C22.2.no. 14-95 | |
| | Vibrations according to IEC/EN60068-2-6 | 35 mm / 10-55 Hz | | |
| | Shock test IEC 60068-2-27 | 15 G / 11 ms | | |
| | Immunity to electrostatic discharges IEC/EN 61000-4-2 | Level 3 | | |
| | Immunity to electrostatic fields ENV 50140/204 (IEC 1000-4-3) | Level 3 | | |
| | Immunity to rapid transient bursts to IEC 1000-4-4 | Level 3 | | |
| | Immunity to shock waves according to IEC/EN 61000-4-5 | Level 3 | | |
| | Immunity to radio frequency in common mode acc. to ENV (CEI 1000-4-6) | Level 3 | | |
| | Conducted and radiated noise for industrial environments per CISPR 11 | Class A | | |
| | Pollution | Degree 2 | | |
| | Overvoltage | Category III | | |

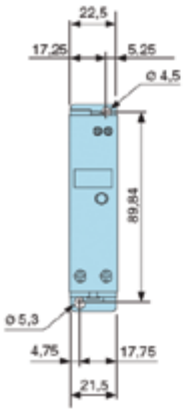
| | Model | 20A, 30A, 45A | | |
|---|---|---|---|---|
| Input Specifications | Input voltage (V) | 4-32V DC | 90-140V AC | 180-280V AC* |
| | Turn-off voltage (V) | 1 | 10 | 10 |
| | Max. controlled current (mA) | 20 | 6 | 8 |
| | Min. input current (mA) | 16 | 5 | 6 |
| | Turn-on time (ms) | 8.33 (60Hz) / 10 (50Hz) | 30 | 30 |
| | Max. turn-off time (ms) | 8.33 (60Hz) / 10 (50Hz) | 30 | 30 |

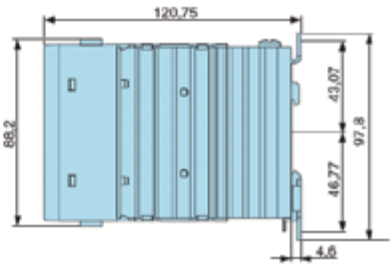
1. LED is not an absolute indicator of power being present.
2. *45A model is 180-260V AC

| | Model | 20A | 30A | 45A |
|---|---|---|---|---|
| Output Specifications | Voltage range (Vrms max) | 48-600 | 48-600 | 48-600 |
| | Non-rep. peak voltage (Vpeak) | 1100 | 1100 | 1100 |
| | Maximum off-state leakage at Vmax and T = 25 °C (µA) | 120 | 120 | 120 |
| | Current max @ 40°C (A) | 20 | 30 | 45 |
| | Minimum current (mA) | 100 | 100 | 100 |
| | On-state voltage drop at I max (Vpeak) | 1.2 | 1.2 | 1.35 |
| | $I^2t$ (t = 10 ms) ($A^2s$) (50/60 Hz) | 1225/1020 | 2850/2350 | 3200/2600 |
| | Static (off-state) dv/dt (V/µs) | 500 | 500 | 500 |
| | HP ratings at 120V | 1/2 | 3/4 | 1.5 |
| | HP ratings at 240V | 1 | 2 | 3 |
| | HP ratings at 480V | – | – | 5 |
| | Utilization category AC-51 (A) | 20 | 30 | 45 |
| | Utilization Category AC-53 (A) | 6 | 9 | 10 |
| | Max. non-rep. 1 s surge (T=25°C) (A) | 100 | 150 | 160 |
| | Max. non-rep.1-cycle surge (T=25°C) (A) | 495 | 750 | 800 |

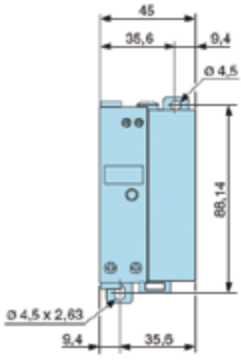
## Dimensions (mm)

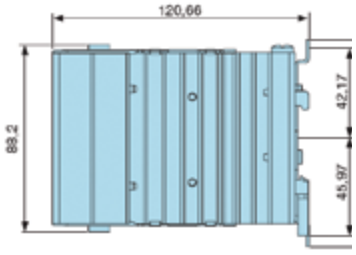
### 20A/30A Models




### 45A Model



# RSS Series Panel Mount Solid State Relays

**Key features:**

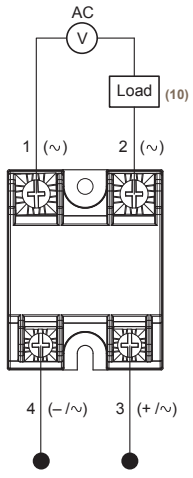
- Input status LED Indicator
- Dual SCR output with epoxy free design
- Direct bond copper substrate with direct output lead frame termination
- Internal transient protection – built-in snubber
- EMC compliant (level 3)
- 1200 Volt blocking voltage
- 4000 Volt optical isolation
- Zero crossing voltage turn-on
- High surge capability
- Optional fingersafe cover (RSS-CVR)

UL Recognized
File No. E194577

## Part Number Selection

| Input | Continuous Output Current | Part Number |
|---|---|---|
| AC Input 90-280V AC | 10A | RSSAN-10A |
| | 25A | RSSAN-25A |
| | 50A | RSSAN-50A |
| | 75A | RSSAN-75A |
| | 90A | RSSAN-90A |
| DC Input 3-32V DC | 10A | RSSDN-10A |
| | 25A | RSSDN-25A |
| | 50A | RSSDN-50A |
| | 75A | RSSDN-75A |
| | 90A | RSSDN-90A |

**Wiring Diagram**




## Specifications

| | Series | RSSDN | | RSSAN | | |
|---|---|---|---|---|---|---|
| Input Specifications | Voltage Range | 3 to 32V DC | | 90 to 280V AC | | |
| | Input Current | current regulated (10mA) | | | | |
| | Pick Up Voltage | 3V DC | | 90V AC | | |
| | Drop Out Voltage | 1V DC | | 10V AC | | |
| | Dielectric Strength (Input-Output-Base) | 4000 RMS (min) | | 4000 RMS (min) | | |
| | Capacitance (Input to Output) | 8pF | | 8pF | | |
| | Rev. Voltage Protection | Yes (–32V DC) | | N/A | | |
| Output Specifications | Current (continuous) | 10A | 25A | 50A | 75A | 90A |
| | 1-Cycle Surge Current | 150A | 300A | 750A | 1000A | 1200A |
| | 1-Second Surge Current at 25°C | 50A | 85A | 150A | 225A | 300A |
| | Minimum Holding Current | 50mA | 50mA | 100mA | 100mA | 100mA |
| | Voltage Drop at Rated Current | 1.35V (maximum) | | | | |
| | Voltage Range | 48 - 660V AC | | | | |
| | Output | Dual SCR (N.O.) | | | | |
| | Over Voltage Rating | 1200 PIV | | | | |
| | Frequency Range | 47 to 440Hz | | | | |
| | Off-State Leakage at Rated Voltage | 25mA (maximum) | | | | |
| | Turn-On Time | 1/2 cycle @ 60Hz for zero-cross versions, 20ms for other versions | | | | |
| | Turn-Off Time | 1/2 cycle @ 60Hz for zero-cross versions, 30ms for other versions | | | | |
| | Zero Voltage Switching | Yes | | | | |
| | Static DV/DT | 200V/µsec | | | | |
| | Commutating DV/DT | Snubbed for 0.5 power factor at rated load | | | | |
| | Ambient operating temperature range | -20 to 80°C | | | | |
| | Weight | 82g | | | | |

# Recommended Loads

## Transformer Loads

Transformer loads sometimes result in severe inrush current when the transformer saturates during the first cycle. Use a relay rated for this surge, which has a 1/2 cycle surge current greater than the maximum applied line voltage; the transformer's primary resistance (approximately 10x rated current).

### Recommended Loads

| SSR Rating | at 120V AC | at 240V AC |
|---|---|---|
| 10A | 500VA | 1KVA |
| 25A | 1KVA | 2KVA |
| 50A | 2KVA | 4KVA |

## Heater Loads

When using solid state relays for driving heaters where the load is switched on and off rapidly and continuously, severe thermal stress will result. In such cases, use an SSR relay at no more than 75% of the rating.

### Recommended Loads

| SSR Rating | at 120V AC | at 240V AC |
|---|---|---|
| 10A | 1KW | 2KW |
| 25A | 2KW | 4KW |
| 50A | 3KW | 6KW |

## Solenoid Valves and Contactors

RSS relays use high-noise immunity circuitry with a built-in snubber to handle the electrical noise generated by inductive loads.

### Recommended Loads

| SSR Rating | at 120V AC | at 240V AC |
|---|---|---|
| 10A | 900W | 1,800W |
| 25A | 2,100W | 4,200W |
| 50A | 3,800W | 7,500W |

RSS series relays provide a highly reliable means of switching AC loads when applied properly. Read the technical notes on the following page prior to installing solid state relays.

## UL Motor Load Ratings (HP Ratings)

| Part Number | 120V | 240V | 480V |
|---|---|---|---|
| 10A | 1/2 | 3/4 | 3/4 |
| 25A | 1/2 | 3/4 | 3/4 |
| 50A | 3/4 | 1 1/2 | 1 1/2 |
| 75A | 3/4 | 5 | 5 |
| 90A | 3/4 | 5 | 5 |

## Lamp Loads

Zero voltage switching is ideal for driving incandescent lamps, since the cold filament will not be subjected to a large inrush current. Using a zero-switched SSR will reduce inrush current and prolong lamp life.

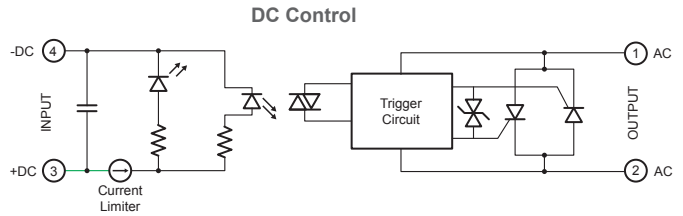
## Recommended Loads

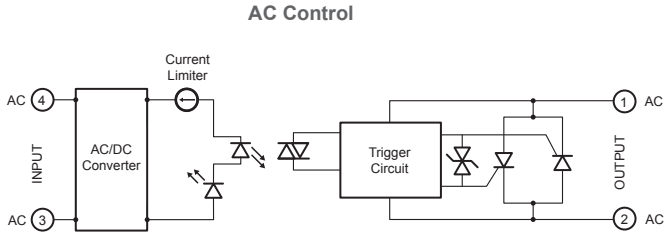
| SSR Rating | at 120V AC | at 240V AC |
|---|---|---|
| 10A | 1KW | 2KW |
| 25A | 2KW | 4KW |
| 50A | 3KW | 6KW |

## Recommended Wire Sizes

| Terminals | Wire Size (Solid/ Stranded) | Wire Pull-Out Strength (lbs) (N) |
|---|---|---|
| Input | 24 AWG (0.2 mm²) / 0.2 (min) | 10 (44.5) |
| | 2 x 12 AWG (3.3 mm²) / 3.3 (max) | 90 (400) |
| Output | 20 AWG (0.5 mm²) / 0.518 (min) | 3 (133) |
| | 2 x 10 AWG (5.4 mm²) / 5.4 | 110 (490) |
| | 2 x 8 AWG (8.4 mm²) / 8.4 (max) | 90 (400) |

### Internal Circuit Block Diagram



## Technical Notes

### Environment

Do not install SSRs near sources of excessive heat. Make sure applications are dry and well ventilated.

If SSRs must be installed in an environment subject to high temperatures or poor ventilation, or if SSRs are mounted collectively, reduce the load current so that it does **not** approach the ambient temperature-load current recommendation. (See the Temperature Derating Curves on the following page.)

When SSRs are used with inductive loads, suppress the inrush current to half of the peak surge current.

### Heat Sinks

Heat sinks are recommended for all solid state relays depending on ambient temperature and mounting position. The recommended heat sink dimensions and material are shown in the table:

| Output Rating | Dimensions | Material |
|---|---|---|
| 10A | 12″ x 12″ x 1/8″ | Aluminum (black anodized) |
| 25A | 12″ x 12″ x 1/8″ (DC/AC) | Aluminum (black anodized) |
| 25A | 15″ x 15″ x 1/8″ (AC/AC) | Aluminum (black anodized) |
| 50A | 15″ x 15″ x 1/8″ | Aluminum (black anodized) |
| 75A | 17″ x 17″ x 1/8″ | Aluminum (black anodized) |
| 90A | 17″ x 17″ x 1/8″ | Aluminum (black anodized) |

Using a thermal compound between the base of the SSR and the heat sink for heat dissipation is recommended.

### Wiring

Locate SSRs as far from motor leads as possible to prevent malfunction from induced current.

Use shielded wires for input leads when they are exposed to a source of induced current.

### Mounting

Provide sufficient ventilation.

Use #6 – 32 screws, flat washers, and lock washers to secure mounting on heat sinks.

Vertical mounting is recommended to allow air to flow unimpeded. Horizontal or inverted mounting is possible, but the SSR must be derated according to the derating curves on the following page.

### Additional Information

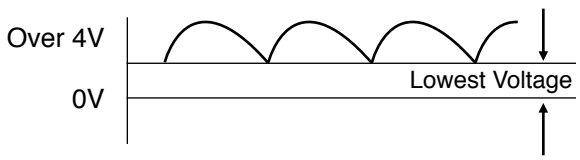
Do not exceed the load voltage and current specifications.

A small-capacity load may not turn off due to the leakage current present after the SSR has turned off. If this is the case, use a resistor in parallel with the load to shunt the leakage current.

Observe the polarity of input terminals. Failure to do so may cause damage to the SSR.

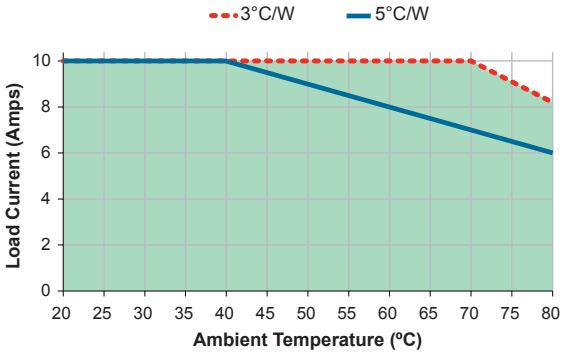
When the SSR output is subjected to a higher than rated voltage, a varistor or other element should be connected to the output terminals to absorb the over-voltage.

When the input signal contains a ripple voltage, the lowest ripple amplitude should exceed the minimum pick-up voltage of 4V.

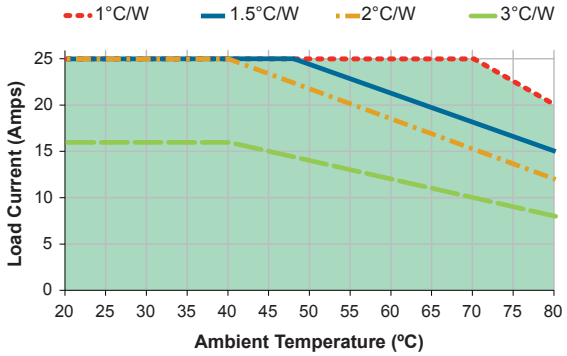


## Temperature Derating Curves: RSS Series - Dependent upon heat-sink heat dissipation

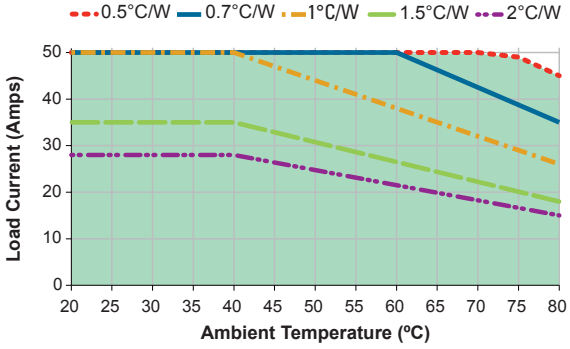
### 10 AMP SCR OUTPUT



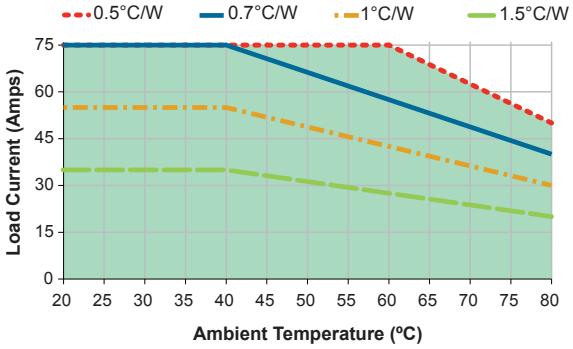

### 25 AMP SCR OUTPUT



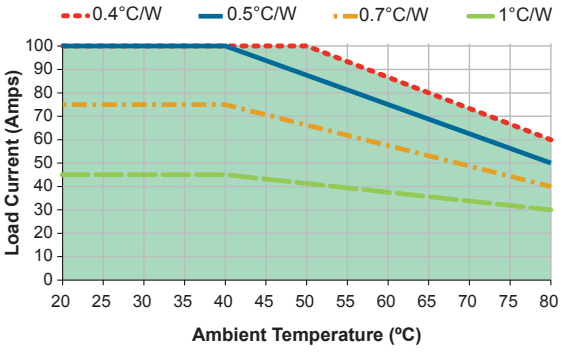

### 50 AMP SCR OUTPUT




### 75 AMP SCR OUTPUT

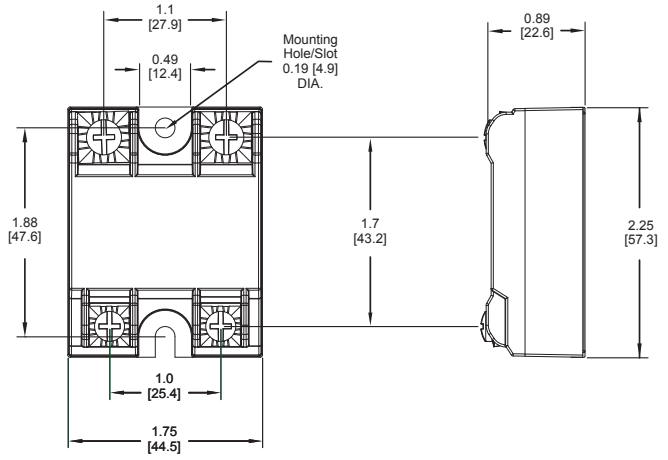



### 90 AMP SCR OUTPUT

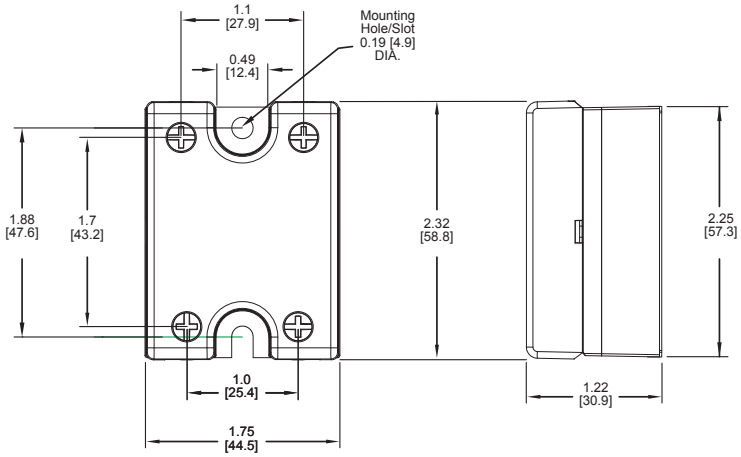


# Dimensions (mm)

### Relay Dimensions




### Finger-safe Cover Dimensions




Tolerances: ±0.02 in / 0.5 mm
All dimensions are in: inches [millimeters]

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# Timers

IDEC

**www.IDEC.com/timers**

# Selection Guide

| Series | RTE | GT3A | GT3F |
|---|---|---|---|
| Page | 932 | 939 | 947 |
| Appearance | | | |
| Modes of Operation | ON-delay<br>Interval<br>OFF-delay<br>One-shot<br>Cycle (ON first)<br>Cycle (OFF first)<br>Signal OFF delay<br>Signal ON/OFF delay | ON-delay<br>Interval<br>OFF-delay<br>One-shot<br>Cycle (off first)<br>Cycle (on first)<br>Signal OFF delay<br>Signal ON/OFF delay | True Power OFF-delay |
| Time Range | 0.1 second to 600 hrs | 0.1 second to 180 hrs | 0.1 to 600 seconds |
| Contact Configuration | DPDT | SPDT, DPDT | SPDT, DPDT |
| Repeat Accuracy | ±0.25% maximum | ±0.2% maximum | ±0.4% maximum |
| Contact Load Rating (resistive) | 10A, 240V AC | SPDT: 3A, 250V AC<br>DPDT: 5A, 240V AC | 5A, 250V AC |
| Available Operating Voltage | 100-240V AC<br>12V DC<br>24V AC/DC | 100 to 240V AC<br>12V DC<br>24V AC/DC | 100 to 240V AC<br>24V AC/DC |
| Approvals | UL Listed<br>c-uL Listed<br>TUV<br>CE | UL Listed<br>c-uL Listed<br>CE | UL Listed<br>c-uL Listed<br>CE |

1. For Timing Diagrams Overview, see page 928.
2. For all series specific instructions, accessories, and dimensions, see the individual series section.

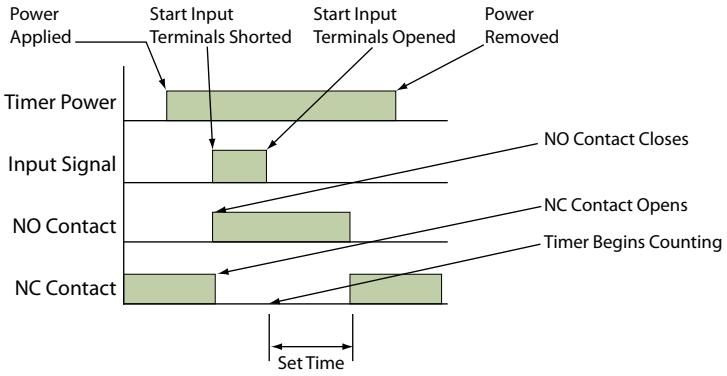
## Selection Guide

| Series | GT3W | GE1A | GT5P | GT5Y |
|---|---|---|---|---|
| Page | 951 | 961 | 965 | 970 |
| Appearance | | | | |
| Modes of Operation | Sequential start<br>ON-delay<br>Recycler and instantaneous<br>Recycler OFF start<br>Recycler ON start<br>Interval<br>Interval ON delay<br>Sequential interval | ON-delay | ON-delay | ON-delay |
| Time Range | 0.1s to 300 hrs | 0.1s to 10 hrs | 0.1s to 10 minutes | 0.1s to 1 hour |
| Contact Configuration | DPDT | SPDT, DPDT | SPDT | DPDT, 4PDT |
| Repeat Accuracy | ±0.2% maximum | ±0.2% maximum | ±0.2% maximum | ±0.2% maximum |
| Contact Load Rating (resistive) | 3A, 250V AC<br>5A, 120V AC/30V DC | 5A, 240V AC | 5A, 250V AC | 5A, DPDT: 250V AC<br>3A, 4PDT: 250V AC |
| Available Operating Voltage | 100 to 240V AC<br>12V DC<br>24V AC/DC | 24V AC/DC<br>110 to 120V AC<br>220 to 240V AC | 100 to 120V AC<br>200 to 240V AC<br>12V DC<br>24V DC | 100 to 120V AC<br>200 to 240V AC<br>12V DC<br>24V DC<br>24V AC |
| Approvals | UL Listed<br>c-uL Listed<br>CE | UL Listed<br>c-uL Listed<br>TUV<br>CE | UL recognized<br>TUV<br>CSA<br>CE | UL Listed<br>c-uL Listed<br>CE |

1. For Timing Diagrams Overview, see page 928.
2. For all series specific instructions, accessories, and dimensions, see the individual series section.

# Timing Diagrams Overview

## Guide to Reading Timing Function Diagrams

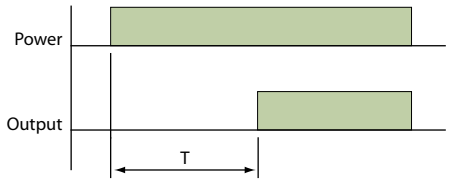



1. If power is disconnected during actual timing, most electronic timers reset to the preset time, ready for the re-application of supply voltage (except for GT3F "true power OFF Delay").
2. NO = Normally open.
3. NC = Normally closed.

## Timing Function Diagrams Overview

### ON-Delay 1 (power start)

When voltage is applied to the coil, the relay contacts remain in the **off state** and the set time begins. When the set time has elapsed, the relay contacts transfer to the **on state**. The contacts remain in the on state until the timer is reset. The timer is reset by removing the coil voltage. Applicable models: RTE-P(B)1, GT3A-1, -2, -3, GE1A, GT5Y and GT5P.

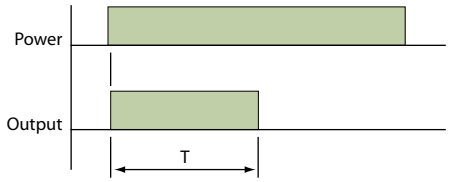



| Type No. | GT3A-1, -2, -3 | RTE-*1 |
|---|---|---|
| Mode | A | A |
| See Page | 939 | 932 |

| Type No. | GE1A | GT5Y/GT5P |
|---|---|---|
| See Page | 961 | 970/965 |

### Interval 1 (power start)

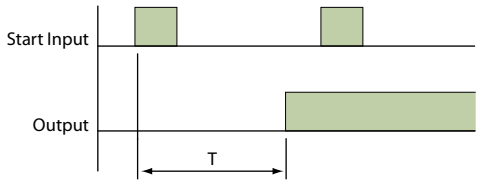
When voltage is applied to the coil, the relay contacts transfer immediately to the **on state** and the set time begins. When the set time has elapsed, the relay contacts transfer to the **off state**. The contacts remain in the **off state** until the timer is reset. The timer is reset by removing the coil voltage. Applicable models: RTE-P(B)1, GT3A-1, -2, -3.




| Type No. | GT3A-1, -2, -3 | RTE-*1 |
|---|---|---|
| Mode | B | B |
| See Page | 939 | 932 |

### ON-Delay 2 (signal start)

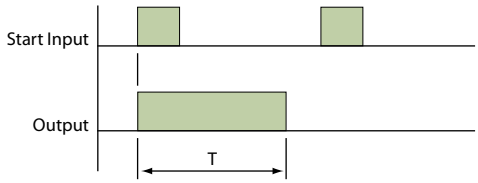
Voltage is applied to the coil at all times. When a start input is supplied, the relay contacts remain in the **off state** and the set time begins. When the set time has elapsed, the relay contacts transfer to the **on state**. The contacts remain in the **on state** until the timer is reset. The timer is reset by applying a reset input or by removing the coil voltage. Applicable models: GT3A-4 and RTE-P(B) 2.




| Type No. | GT3A-4 | RTE-*2 |
|---|---|---|
| Mode | A | A |
| See Page | 939 | 932 |

### Interval 2 (signal start)

Voltage is applied to the coil at all times. When a start signal is supplied, the relay contacts transfer immediately to the **on state** and the set time begins. When the set time has elapsed, the relay contacts transfer to the **off state**. The contacts remain in the **off state** until the timer is reset. The timer is reset by applying a reset input or by removing the coil voltage. Applicable model: GT3A-5.

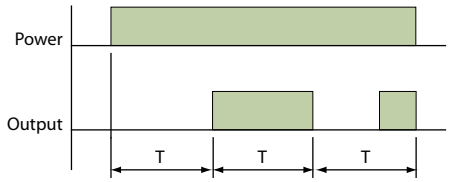



| Type No. | GT3A-5 |
|---|---|
| Mode | A |
| See Page | 939 |

1. T = set time, T' = shorter than set time, Ts = one shot output time
2. For more detailed timing diagrams, see specifications for individual timer models.

### Cycle 1 (power start, OFF first)

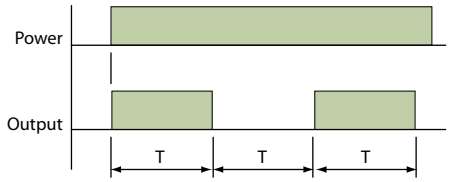
When voltage is applied to the coil, the contacts remain in the **off state** and the set time begins. At the end of the set time, the contacts transfer to the **on state** and remain in the **on state** until the set time elapses. The timer cycles between the two states until power is removed from the coil. Removing the coil voltage resets the timer. The set time for both the **on state** and the **off state** is the same. Applicable models: GT3A-1, -2, -3 and RTE-P(B)1.




| Type No. | GT3A-1, -2, -3 | RTE-*1 |
|---|---|---|
| Mode | C | C |
| See Page | 939 | 932 |

### Cycle 3 (power start, ON first)

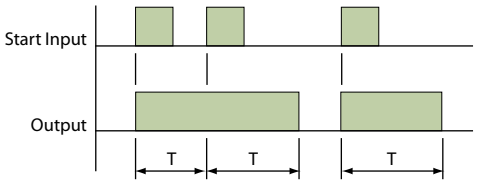
When voltage is applied to the coil, the contacts immediately transfer to the **on state** and the set time begins. At the end of the set time, the contacts transfer to the **off state** and remain in the **off state** until the set time elapses. The timer cycles between the two states until power is removed from the coil. Removing the coil voltage resets the timer. The set time for both the **off state** and the **on state** is the same. Applicable models: GT3A-1, -2, -3 and RTE-P(B)1.




| Type No. | GT3A-1, -2, -3 | RTE-*1 |
|---|---|---|
| Mode | D | D |
| See Page | 939 | 932 |

### One Shot 1 (signal start, retriggerable)

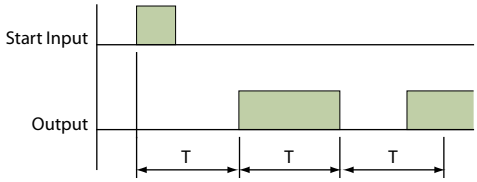
Voltage is applied to the coil at all times. When a start signal is supplied, the contacts immediately transfer to the **on state** and the set time begins. If another start signal is supplied **(before set time has elapsed)** the set time restarts, as the contacts remain in the **on state**. Successive pulses at a frequency greater than the set time will cause the contacts to remain in the "**On state**" indefinitely. When the set time has elapsed the contacts transfer back to the **off state**. The contacts remain in the **off state** until the next start signal is supplied (no reset is necessary). The timer can be reset by application of a reset input or by removing coil voltage. Applicable model: GT3A-6.




| Type No. | GT3A-6 |
|---|---|
| Mode | A |
| See Page | 939 |

### Cycle 2 (signal start, OFF first)

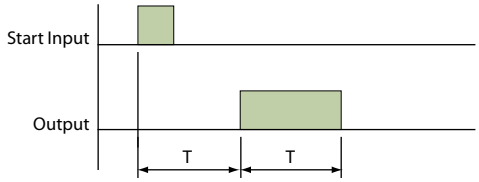
Voltage is applied to the coil at all times. When a start signal is supplied, the relay contacts remain in the **off state** and the set time begins. At the end of the set time, the contacts transfer to the **on state** and remain in the **on state** until the set time elapses. The timer cycles between the two states until the timer is reset. The set time for both the **on state** and the **off state** are the same. The timer is reset by application of a reset input or by removing coil voltage. Applicable models: GT3A-4 and RTE-P(B) 2.




| Type No. | GT3A-4 | RTE-*2 |
|---|---|---|
| Mode | B | B |
| See Page | 939 | 932 |

### One Shot Cycle (signal start)

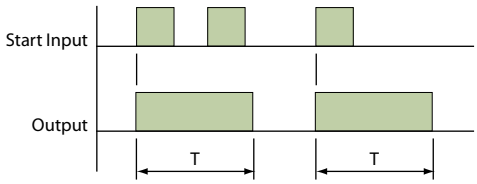
Voltage is applied to the coil at all times. When a start signal is supplied, the contacts remain in the **off state** and the set time begins. At the end of the set time, the contacts transfer to the **on state** and remain in the **on state** for the set time. After the set time has elapsed, the contacts return to the **off state**. The contacts remain in the **off state** until the timer is reset. The timer is reset by application of a reset input or by removing coil voltage. Applicable model: GT3A-5.




| Type No. | GT3A-5 |
|---|---|
| Mode | B |
| See Page | 939 |

### One Shot 2 (signal start)

Voltage is applied to the coil at all times. When a start signal is supplied, the contacts immediately transfer to the **on state** and the set time begins. If another start signal is supplied **(before set time has elapsed)**, the set time will not be affected. When the set time has elapsed, the contacts transfer back to the **off state**. The contacts remain in the **off state** until the next start signal is supplied (no reset is necessary). The timer can be reset by application of a reset input or by removing coil voltage. Applicable models: GT3A-6 and RTE-P(B)2.

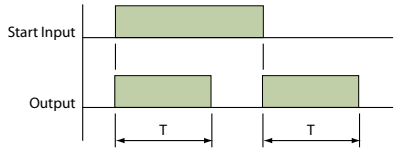



| Type No. | GT3A-6 | RTE-*2 |
|---|---|---|
| Mode | C | F |
| See Page | 939 | 932 |

1. T = set time, T' = shorter than set time, Ts = one shot output time
2. For more detailed timing diagrams, see specifications for individual timer models.

## Signal ON/OFF-Delay 1

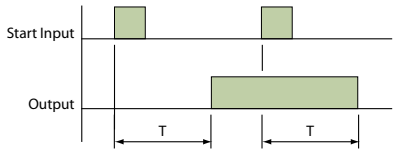
Voltage is supplied to the coil at all times. When a maintained start signal is supplied, the contacts immediately transfer to the **on state** and the set time begins. When the set time has elapsed, the contacts transfer to the **off state**. The contacts remain in the **off state** until the start signal is removed. The contacts transfer back to the **on state** and remain in the **on state** for the set time. When the set time has elapsed, the contacts transfer to the **off state** and remain in the **off state** until the start signal is supplied again (no reset is necessary). The timer is reset by application of a reset input or by removing coil voltage. Applicable models: GT3A-4 and RTE-R(B)2.




| Type No. | GT3A-4 | RTE-*2 |
|---|---|---|
| Mode | C | D |
| See Page | 939 | 932 |

## Signal ON/OFF-Delay 3

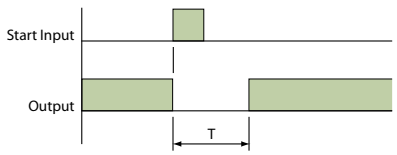
Voltage is supplied to the coil at all times. When a momentary start signal is supplied, the contacts remain in the **off state** and the set time begins. When the set time has elapsed, the contacts transfer to the **on state**. The contacts remain in the **on state** until another momentary input is supplied. The contacts then remain in the **on state** for the set time. When the set time has elapsed, the contacts transfer to the **off state** and remain in the **off state** until the start signal is supplied again (no reset is necessary). The timer is reset by application of a reset input or by removing coil voltage. Applicable model: GT3A-6.




| Type No. | GT3A-6 |
|---|---|
| Mode | D |
| See Page | 939 |

## One Shot ON-Delay (signal start)

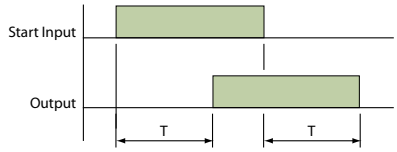
When voltage is applied to the coil, the preset time is initiated and the contacts remain in the **off state** for the preset time. Following the preset time, the contacts transfer to the **on state**, and remain in the **on state** until the start input is supplied. Following the start input, the contacts transfer to the **off state** for the preset time. After the preset time has elapsed, the contacts transfer back to the **on state** and remain there until either the next start input is supplied or the timer is reset. The timer can be reset by either a reset input or removal of the coil voltage. Applicable model: GT3A-6.




| Type No. | GT3A-6 |
|---|---|
| Mode | B |
| See Page | 939 |

## Signal ON/OFF-Delay 2

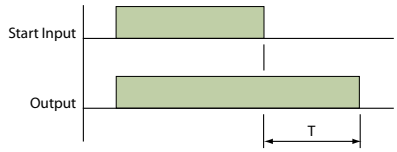
Voltage is supplied to the coil at all times. When a maintained start signal is supplied, the contacts remain in the **off state** and the set time begins. When the set time has elapsed, the contacts transfer to the **on state**. The contacts remain in the **on state** until the start signal is removed. Once the start signal is removed, the contacts remain in the **on state** and the set time begins again. Once the set time has elapsed, the contacts transfer back to the **off state**. The timer is ready for the next start signal. The timer is reset by the application of a reset signal or removal of power. Applicable model: GT3A-5.




| Type No. | GT3A-5 |
|---|---|
| Mode | C |
| See Page | 939 |

## Signal OFF-Delay 1

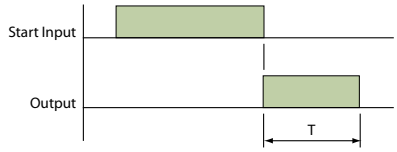
Voltage is applied to the coil at all times. When a start signal is supplied, the contacts immediately transfer to the **on state**. The set time begins **when the start signal is removed**. When the set time has elapsed, the contacts transfer to the **off state**. The contacts remain in the **off state** until the next start signal is supplied (no reset is necessary). The timer can be reset by application of a reset input or by removing coil voltage. Applicable models: RTE-P(B)2 and GT3A-4.




| Type No. | GT3A-4 | RTE-*2 |
|---|---|---|
| Mode | D | E |
| See Page | 939 | 932 |

## Signal OFF-Delay 2

Voltage is applied to the coil at all times. When a maintained start signal is supplied, the contacts remain in the **off state**. When the "start signal is removed", the contacts transfer to the "**On state**" and the set time begins. When the set time has elapsed, the contacts transfer back to the **off state**. They remain in the **off state** until the next start signal is supplied (no reset is necessary. The timer can be reset by application of a reset input or by removing coil voltage. Applicable model: GT3A-5.

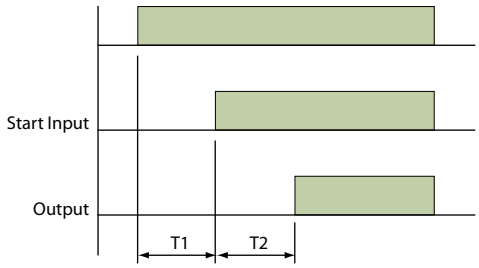



| Type No. | GT3A-5 |
|---|---|
| Mode | D |
| See Page | 939 |

1. T = set time, T' = shorter than set time, Ts = one shot output time
2. For more detailed timing diagrams, see specifications for individual timer models.

### Sequential Start (power start)

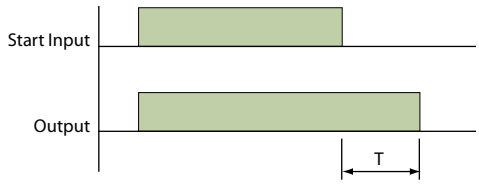
When voltage is applied to the coil, both contacts remain in the OFF state and the set time, T1, begins. When T1 has elapsed, output 1 comes on and T2 begins. When T2 has elapsed, output 2 comes on. Both outputs remain on until power is removed from the coil. Applicable model: GT3W-A.




| Type No. | GT3W-A |
|---|---|
| Mode | A |
| See Page | 951 |

### True Power-OFF Delay

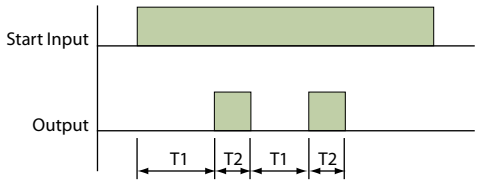
When voltage is applied, output comes on immediately; when voltage is removed from the coil, the timer begins timing (internal capacitors power the timing circuit). When time has expired, contacts transfer back to the OFF state. If power is reapplied before the elapsed time has expired, the timing function will reset back to the starting point. Applicable models: GT3F-1, 2.




| Type No. | GT3F-1, 2 |
|---|---|
| Mode | Power OFF-Delay |
| See Page | 947 |

### Recycler Outputs (power start)

When voltage is applied to the coil, both contacts remain in the off state and time T1 begins. When T1 has elapsed, both contacts transfer to the ON state and T2 begins. When T2 has elapsed, both contacts transfer back to the OFF state and T1 begins again. The cycle continues until power is removed, at which time both contacts transfer back to the OFF state. Applicable model: GT3W-A.




| Type No. | GT3W-A |
|---|---|
| Mode | D |
| See Page | 951 |

1. T = set time, T' = shorter than set time, Ts = one shot output time
2. For more detailed timing diagrams, see specifications for individual timer models.

# RTE Series — Analog Timers

## Key features:

- 20 time ranges and 10 timing functions
- Time delays up to 600 hours
- Space-saving package
- High repeat accuracy of ± 0.2%
- ON and timing OUT LED indicators
- Standard 8- or 11-pin and 11-blade termination
- 2 form C delayed output contacts
- 10A Contact Rating

TÜV Cert. No. E9950913332316 (EMC, RTE)
Cert. No. BL960813332355 (LVD, RTE)

c UL us UL Listed
File No. E66043

CE

## General Specifications

| | | | | | |
|---|---|---|---|---|---|
| Operation System | | | Solid state CMOS Circuit | | |
| Operation Type | | | Multi-Mode | | |
| Time Range | | | 0.1sec to 600 hours | | |
| Pollution Degree | | | 2 (IE60664-1) | | |
| Over voltage category | | | III (IE60664-1) | | |
| Rated Operational Voltage | | AF20 | 100-240V AC(50/60Hz) | | |
| | | AD24 | 24V AC(50/60Hz)/24V DC | | |
| | | D12 | 12V DC | | |
| Voltage Tolerance | | AF20 | 85-264V AC(50/60Hz) | | |
| | | AD24 | 20.4-26.4V AC(50/60Hz)/21.6-26.4V DC | | |
| | | D12 | 10.8-13.2V DC | | |
| Input off Voltage | | | Rated Voltage x10% minimum | | |
| Ambient Operating Temperature | | | -20 to +65°C (without freezing) | | |
| Ambient Storage and Transport Temperature | | | -30 to +75°C (without freezing) | | |
| Relative Humidity | | | 35 to 85%RH (without condensation) | | |
| Atmospheric Pressure | | | 80kPa to 110kPa (Operating), 70kPa to 110kPa (Transport) | | |
| Reset Time | | | 100msec maximum | | |
| Repeat Error | | | ±0.2%, ±20msec* | | |
| Voltage Error | | | ±0.2%, ±20msec* | | |
| Temperature Error | | | ±0.5%, ±20msec* | | |
| Setting Error | | | ±10% maximum | | |
| Insulation Resistance | | | 100MΩ minimum (500V DC) | | |
| Dielectric Strength | | | Between power and output terminals: 2000V AC, 1 minute | | |
| | | | Between contacts of different poles: 2000V AC, 1 minute | | |
| | | | Between contacts of the same pole:1000V AC, 1 minute | | |
| Vibration Resistance | | | 10 to 55Hz amplitude 0.5mm² hours in each of 3 axes | | |
| Shock Resistance | | | Operating extremes: 98m/sec² (10G) | | |
| | | | Damage limits: 490m/sec² (50G) | | |
| | | | 3 times in each of 3 axes | | |
| Degree of Protection | | | IP40 (enclosure) (IEC60529) | | |
| Power Consumption (Approx.) | TYPE | | RTE-P1, -B1 | | RTE-P2, -B2 |
| | AF20 | 120V AC/60Hz | 6.5VA | | 6.6VA |
| | | 240V AC/60Hz | 11.6VA | | 11.6VA |
| | 24V AC 60Hz/DC | | 3.4VA/1.7W | | 3.5VA/1.7W |
| | D12 | | 1.6W | | 1.6W |
| Mounting Position | | | Free | | |
| Dimensions | | RTE-P1, P2 | 40Hx 36W x 77.9D mm | | |
| | | RTE-B1, B2 | 40Hx 36W x 74.9D mm | | |
| Weight (Approx.) | | | RTE-P1 | RTE-P2 | RTE-B1, -B2 |
| | | | 87g | 89g | 85g |

## Contact Ratings

| | | |
|---|---|---|
| Contact Configuration | | 2 Form C, DPDT (Delay output) |
| Allowable Voltage / Allowable Current | | 240V AC, 30V DC / 10A |
| Maximum Permissible Operating Frequency | | 1800 cycles per hour |
| Rated Load | Resistive | 10A 240V AC, 30V DC |
| | Inductive | 7A 240V AC, 30V DC |
| | Horse Power Rating | 1/6 HP 120V AC, 1/3 HP 240V AC |
| Life | Electrical | 500,000 op. minimum (Resistive) |
| | Mechanical | 50,000,000 op. minimum |

*For the value of the error against a preset time, whichever the largest, applies.

## Part Numbering Guide

RTE series part numbers are composed of 4 part number codes. When ordering a RTE series part, select one code from each category.
Example: **RTE-P1AF20**

| RTE | — | P | 1 | AF20 |
|---|---|---|---|---|
| ① Series | | ② Terminal Style | ③ Function Group | ④ Input Voltage |

### Part Numbers: RTE Series

| | Description | Part Number Code | Remarks |
|---|---|---|---|
| ① Series | RTE series | RTE | For internal circuits, see next page. |
| ② Terminal Style | Pin | P | Select one only. |
| | Blade | B | |
| ③ Function Group | ON-delay, interval, cycle OFF, cycle ON | 1 | Each function group has different timing functions. |
| | ON-delay, cycle OFF, cycle ON, signal ON/ OFF delay, OFF-delay, one-shot | 2 | See page 928. |
| ④ Input Voltage | 100 to 240V AC(50/60Hz) | AF20 | |
| | 24V AC(50/60Hz)/24V DC | AD24 | |
| | 12V DC | D12 | |

### Part Numbers

| Voltage | Power Triggered | | Start Input Triggered | |
|---|---|---|---|---|
| | 8-Pin | Blade | 11-Pin | Blade |
| 12V DC | RTE-P1D12 | RTE-B1D12 | RTE-P2D12 | RTE-B2D12 |
| 24V AC/DC | RTE-P1AD24 | RTE-B1AD24 | RTE-P2AD24 | RTE-B2AD24 |
| 100-240V AC | RTE-P1AF20 | RTE-B1AF20 | RTE-P2AF20 | RTE-B2AF20 |

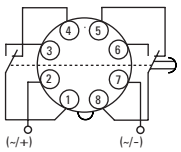
### Time Range Determined by Time Range Selector and Dial Selector

| | Dial | 0 - 1 | 0 - 3 | 0 - 10 | 0 - 30 | 0 - 60 |
|---|---|---|---|---|---|---|
| Range | Second | 0.1 sec - 1 sec | 0.1 sec - 3 sec | 0.2 sec - 10 sec | 0.6 sec - 30 sec | 1.2 sec - 60 sec |
| | Minute | 1.2 sec - 1 min | 3.6 sec - 3 min | 12 sec - 10 min | 36 sec - 30 min | 1.2 min - 60 min |
| | Hour | 1.2 min - 1 hr | 3.6 min - 3 hr | 12 min - 10 hr | 36 min - 30 hr | 1.2 hr - 60 hr |
| | 10 Hours | 12 min - 10 hr | 36 min - 30 hr | 2 hr - 100 hr | 6 hr - 300 hr | 12 hr - 600 hr |

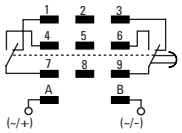
## Timing Diagrams

**RTE-P1, -B1**

RTE-P1




RTE-B1




1. RTE-B1: Do not apply voltage to terminals #2, #5 & #8.
2. IDEC sockets are as follows: RTE-P1: SR2P-06* pin type socket, RTE-B1: SR3B-05* blade type socket, (*-may be followed by suffix letter A,B,C or U).

A: ON-Delay 1 (power start)
Set timer for desired delay, apply power to coil. Contacts transfer after preset time has elapsed, and remain in transferred position until timer is reset. Reset occurs with removal of power.

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | (1) 2 - 7<br>(2) A - B | | |
| Delayed Contact | (1) 1 - 4, 5 - 8<br>(2) 1 - 7, 3 - 9 | (NC) | |
| | (1) 1 - 3, 6 - 8<br>(2) 4 - 7, 6 - 9 | (NO) | |
| Indicator | PWR | | |
| | OUT | | |
| Set Time | | | T |

B: Interval (power start)
Set timer for desired delay, apply power to coil. Contacts transfer immediately, and return to original position after preset time has elapsed. Reset occurs with removal of power.

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | (1) 2 - 7<br>(2) A - B | | |
| Delayed Contact | (1) 1 - 4, 5 - 8<br>(2) 1 - 7, 3 - 9 | (NC) | |
| | (1) 1 - 3, 6 - 8<br>(2) 4 - 7, 6 - 9 | (NO) | |
| Indicator | PWR | | |
| | OUT | | |
| Set Time | | | T |

C: Cycle 1 (power start, OFF first)
Set timer for desired delay, apply power to coil. First transfer of contacts occurs after preset delay has elapsed, after the next elapse of preset delay contacts return to original position. The timer now cycles between on and off as long as power is applied (duty ratio 1:1).

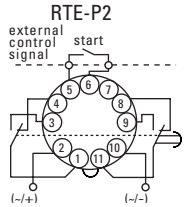
| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | (1) 2 - 7<br>(2) A - B | | |
| Delayed Contact | (1) 1 - 4, 5 - 8<br>(2) 1 - 7, 3 - 9 | (NC) | |
| | (1) 1 - 3, 6 - 8<br>(2) 4 - 7, 6 - 9 | (NO) | |
| Indicator | PWR | | |
| | OUT | | |
| Set Time | | | T T |

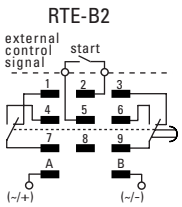
D: Cycle 3 (power start, ON first)
Functions in same manner as Mode C, with the exception that first transfer of contacts occurs as soon as power is applies. The ratio is 1:1. Time On = Time Off

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | (1) 2 - 7<br>(2) A - B | | |
| Delayed Contact | (1) 1 - 4, 5 - 8<br>(2) 1 - 7, 3 - 9 | (NC) | |
| | (1) 1 - 3, 6 - 8<br>(2) 4 - 7, 6 - 9 | (NO) | |
| Indicator | PWR | | |
| | OUT | | |
| Set Time | | | T T |

# Timing Diagrams con't

**RTE-P2, -B2**




1. RTE-P2: Do not apply voltage to terminals #5, #6 & #7.
2. RTE-B2: Do not apply voltage to terminals #2, #5 & #8.
3. IDEC sockets are as follows: RTE-P2: SR3P-05* pin type socket, RTE-B2: SR3B-05* blade type socket, (*-may be followed by suffix letter A,B,C or U).

A: ON-Delay 2 (signal start)
When a preset time has elapsed after the start input turned on while power is on, the NO output contact goes on.

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | (A) 2 - 10<br>(B) A - B | | |
| Start | (A) 5 - 6<br>(B) 2 - 5 | | |
| Delayed Contact | (A) 1 - 4, 8 - 11<br>(B) 1 - 7, 3 - 9 | (NC) | |
| | (A) 1 - 3, 9 - 11<br>(B) 4 - 7, 6 - 9 | (NO) | |
| Indicator | PWR | | |
| | OUT | | |
| Set Time | | | T |

B: Cycle 2 (signal start, OFF first)
When the start input turns on while power is on, the output oscillates at a preset cycle (duty ratio 1:1), starting while the NO contact off.

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | (A) 2 - 10<br>(B) A - B | | |
| Start | (A) 5 - 6<br>(B) 2 - 5 | | |
| Delayed Contact | (A) 1 - 4, 8 - 11<br>(B) 1 - 7, 3 - 9 | (NC) | |
| | (A) 1 - 3, 9 - 11<br>(B) 4 - 7, 6 - 9 | (NO) | |
| Indicator | PWR | | |
| | OUT | | |
| Set Time | | | T T T T T T T T T Ta |

C: Cycle 4 (signal start, ON first)
When the start input turns on while power is on, the NO contact goes on. The output oscillates at a preset cycle (duty ratio 1:1).

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | (A) 2 - 10<br>(B) A - B | | |
| Start | (A) 5 - 6<br>(B) 2 - 5 | | |
| Delayed Contact | (A) 1 - 4, 8 - 11<br>(B) 1 - 7, 3 - 9 | (NC) | |
| | (A) 1 - 3, 9 - 11<br>(B) 4 - 7, 6 - 9 | (NO) | |
| Indicator | PWR | | |
| | OUT | | |
| Set Time | | | T T T T T T T T Ta |

D: Signal ON/OFF-Delay
When the start input turns on while power is on, the NO output contact goes on. When a preset time has elapsed while the start input remains on, the output contact goes off. When the start input turns off, the NO contact goes on again. When a preset time has elapsed after the start input turned off, the NO contact goes off.

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | (A) 2 - 10<br>(B) A - B | | |
| Start | (A) 5 - 6<br>(B) 2 - 5 | | |
| Delayed Contact | (A) 1 - 4, 8 - 11<br>(B) 1 - 7, 3 - 9 | (NC) | |
| | (A) 1 - 3, 9 - 11<br>(B) 4 - 7, 6 - 9 | (NO) | |
| Indicator | PWR | | |
| | OUT | | |
| Set Time | | | T T Ta T T Ta |

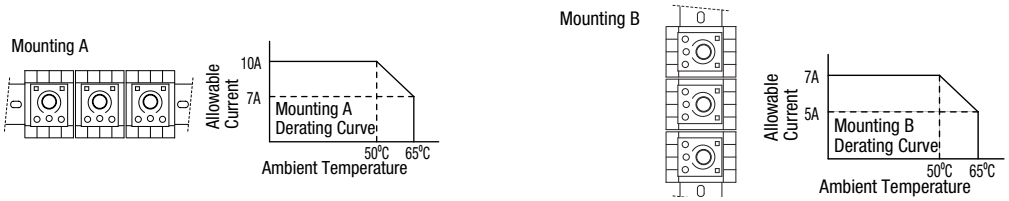
E: Signal OFF-Delay
When power is turned on while the start input is on, the NO output contact goes on. When a preset time has elapsed after the start input turned off, the NO output contact goes off.

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | (A) 2 - 10<br>(B) A - B | | |
| Start | (A) 5 - 6<br>(B) 2 - 5 | | |
| Delayed Contact | (A) 1 - 4, 8 - 11<br>(B) 1 - 7, 3 - 9 | (NC) | |
| | (A) 1 - 3, 9 - 11<br>(B) 4 - 7, 6 - 9 | (NO) | |
| Indicator | PWR | | |
| | OUT | | |
| Set Time | | | T Ta T Ta |

F: One-Shot (signal start)
When the start input turns on while power is on, the NO output contact goes on. When a preset time has elapsed, the NO output contact goes off.

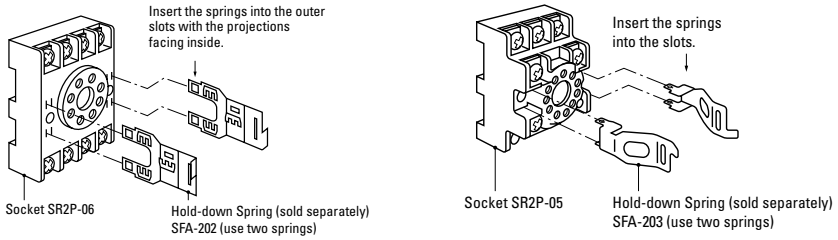
| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | (A) 2 - 10<br>(B) A - B | | |
| Start | (A) 5 - 6<br>(B) 2 - 5 | | |
| Delayed Contact | (A) 1 - 4, 8 - 11<br>(B) 1 - 7, 3 - 9 | (NC) | |
| | (A) 1 - 3, 9 - 11<br>(B) 4 - 7, 6 - 9 | (NO) | |
| Indicator | PWR | | |
| | OUT | | |
| Set Time | | | |

## Temperature Derating Curves




## Instructions

**Installation of Hold-Down Springs**
**DIN Rail Mount Socket**




**Switch Settings**

①Operator Mode Selector
②Scale Selector
③Time Range Selector

1. Turn the selectors securely using a flat screwdriver 4mm wide (maximum).
   Note that incorrect setting may cause malfunction. Do not turn the selectors beyond their limits.
2. Since changing the setting during timer operation may cause malfunction, turn power off before changing.

## Safety Precautions

Special expertise is required to use Electronic Timers.

- All Electronic Timers are manufactured under IDEC's rigorous quality control system, but users must add a backup or fail safe provision to the control system when using the Electronic Timer in applications where heavy damage or personal injury may occur should the Electronic Timer fail.
- Install the Electronic Timer according to instructions described in this catalog.
- Make sure that the operating conditions are as described in the specifications. If you are uncertain about the specifications, contact IDEC in advance.
- In these directions, safety precautions are categorized in order of importance under Warning and Caution.

### Warnings

Warning notices are used to emphasize that improper operation may cause severe personal injury or death.

- Turn power off to the Electronic timer before starting installation, removal, wiring, maintenance, and inspection on the Electronic Timer.
- Failure to turn power off may cause electrical shocks or fire hazard.
- Do not use the Electronic Timer for an **emergency stop circuit** or **interlocking circuit**. If the Electronic Timer should fail, a machine malfunction, breakdown, or accident may occur.

### Caution

Caution notices are used where inattention might cause personal injury or damage to equipment.

- The Electronic Timer is designed for installation in equipment. Do not install the Electronic Timer outside equipment.
- Install the Electronic Timer in environments described in the specifications. If the Electronic Timer is used in places where it will be subjected to high-temperature, high-humidity, condensation, corrosive gases, excessive vibrations, or excessive shocks, then electrical shocks, fire hazard, or malfunction could result.
- Use an IEC60127-approved fuse and circuit breaker on the power and output line outside the Electronic Timer.
- Do not disassemble, repair, or modify the Electronic Timer.
- When disposing of the Electronic Timer, do so as industrial waste.

# Accessories

### DIN Rail Mounting Accessories

## DIN Rail/Surface Mount Sockets and Hold-Down Springs

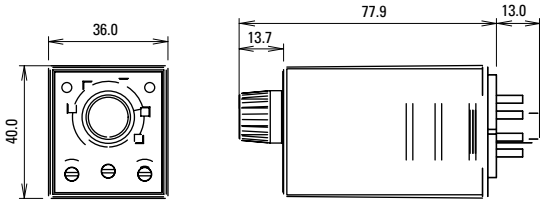
| DIN Rail Mount Socket | | | | Applicable Hold-Down Springs | |
|---|---|---|---|---|---|
| Style | Appearance | Use with Timers | Part Number | Appearance | Part Number |
| 11-Pin Screw Terminal (dual tier) | | RTE-P2 | SR3P-05 | | SFA-203 |
| 11-Pin FingerSafe Socket | | RTE-P2 | SR3P-05C | | |
| 8-Pin Screw Terminal | | RTE-P1 | SR2P-06 | | SFA-202 |
| 8-Pin Fingersafe Socket | | | SR2P-05C | | |
| 11-Blade Screw Terminal | | RTE-B1<br>RTE-B2 | SR3B-05 | | |
| DIN Mounting Rail Length 1000mm | | — | BNDN1000 | | |

### Panel Mounting Accessories

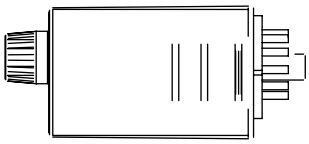
## Flush Panel Mount Adapter and Sockets that use an Adapter

| Accessory | Description | Appearance | Use with | Part No. |
|---|---|---|---|---|
| Panel Mount Adapter | Adaptor for flush panel mounting RTE timers | | All RTE timers | RTB-G01 |
| Sockets for use with Panel Mount Adapter | 8-pin screw terminal | (Shown: SR6P-M08G Wiring Socket Adapter) | RTE-P1 | SR6P-M08G |
| | 11-pin screw terminal | | RTE-P2 | SR6P-M11G |
| | 8-pin solder terminal | | RTE-P1 | SR6P-S08 |
| | 11-pin solder terminal | | RTE-P2 | SR6P-S11 |

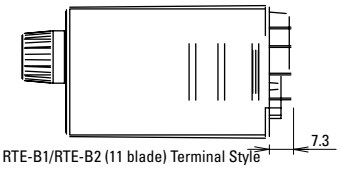
## Dimensions




RTE-P1 (8 pin) Terminal Style



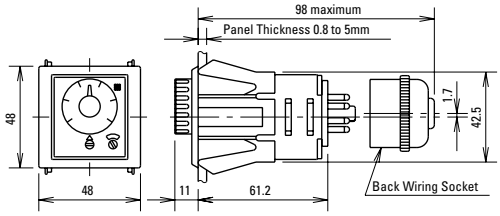
RTE-P2 (11 pin)Terminal Style



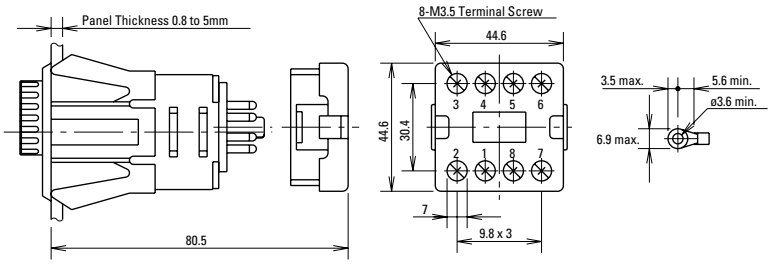

RTE-B1/RTE-B2 (11 blade) Terminal Style

**Panel Mount Adapter**

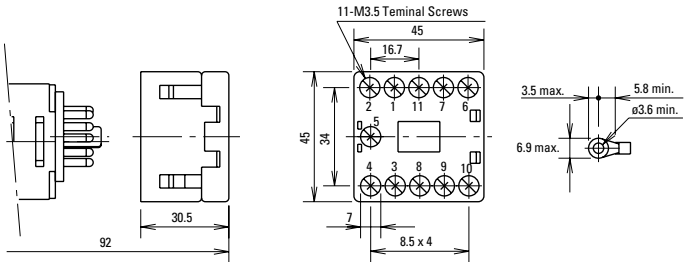
RTE Timer, 8-Pin and 11-Pin with SR6P-S08 or SR6P-S11




RTE Timer, 8-Pin with SR6P-M08G




RTE Timer, 11-Pin with SR6P-M11G



# GT3A Series — Analog Timers

**Key features:**

- 4 selectable operation modes on each model
- External start, reset, and gate inputs
- Panel mount or socket mount
- Large variety of timing functions
- Power and output status indicating LEDs

UL, c-UL Listed
File No. E55996

## Specifications

| | GT3A-1 | GT3A-2 | GT3A-3 | GT3A-4,-5,-6 |
|---|---|---|---|---|
| Operation | Multi-mode | | | Multi-mode with inputs (11 pins) |
| Time Range | 0.1s to 180 hours | | | |
| Rated Voltage | 100 to 240V AC, 50/60Hz<br>12V DC<br>24V AC, 50/60Hz / 24V DC | | | |
| Contact Ratings | 125V AC/250V AC, 3A;<br>30V DC, 1A (resistive load) | | 125V AC/250V AC, 5A;<br>30V DC, 5A (resistive load) | |
| Minimum Applicable Load | 5V, 10mA (reference value) | | | |
| Voltage Tolerance | AF20 (100V AC): 85 to 264V AC<br>AD24: 20.4 to 26.4V AC/21.6 to 26.4V DC<br>D12: 10.8 to 13.2V DC | | | |
| Error | ±0.2%, ±10 msec (repeat, voltage, temperature) | | | |
| Setting Error | ±10% maximum | | | |
| Reset Time | 60msec maximum | | | |
| Insulation Resistance | 100MW minimum | | | |
| Dielectric Strength | Between power and output terminals: 2,000V AC, 1 minute<br>Between contacts of different poles: 2,000V AC, 1 minute<br>Between contacts of the same pole: 750V AC, 1 minute | | | |
| Power Consumption (approximate) | Delayed SPDT | Delayed SPDT + instantaneous SPDT | Delayed DPDT | Delayed DPDT |
| | 10.8VA<br>(200V AC, 60Hz) | 13.5VA<br>(200V AC, 60Hz) | 14.4VA<br>(200V AC, 60Hz) | 4.7VA (100V AC, 60Hz),<br>14.4VA (200V AC, 60Hz) |
| | — | 12VDC/1W<br>24VDC/0.7W<br>24VAC/1.2VA | 12VDC/1.1W<br>24VDC/0.6W<br>24VAC/1.3VA | 12VDC/0.8W<br>24VDC/0.6W<br>24VAC/1.3VA |
| Mechanical Life | 10,000,000 operations minimum | | 5,000,000 operations minimum | |
| Electrical LIfe | 50,000 operations minimum (rated load) | | 100,000 operations minimum (rated load) | |
| Weight (approximate) | 63g | 73g | 79g | 80g |
| Vibration Resistance | 100m/sec$^2$ (approximate 10G) | | | |
| Shock Resistance | Operating extremes: 100m/sec$^2$ (approximate 10G)<br>Damage limits: 500m/sec$^2$ (approximate 50G) | | | |
| Operating Temperature | –10 to +50°C | | | |
| Operating Humidity | 45 to 85% RH | | | |
| Storage Temperature | –30 to +80°C | | | |
| Housing Color | Gray | | | |

## Part Numbers

### GT3A-1, -2, -3

| Mode Of Operation | Rated Voltage Code | Time Range | Output | Contact | Complete Part No. | |
|---|---|---|---|---|---|---|
| | | | | | 8-Pin | 11-Pin |
| A: ON-delay 1<br>B: Interval 1<br>C: Cycle 1<br>D: Cycle 3 | AF20: 100 to 240V AC (50/60Hz) | 0.1 seconds to 180 hours | 250V AC, 3A, 30V DC, 1A (resistive load) | Delayed SPDT | GT3A-1AF20 | GT3A-1EAF20 |
| | AF20: 100 to 240V AC (50/60Hz)<br>D12: 12V DC<br>AD24: 24V AC (50/60Hz)/24V DC | | | Delayed SPDT + Instantaneous SPDT | GT3A-2AF20 | GT3A-2EAF20 |
| | | | | | GT3A-2D12 | GT3A-2ED12 |
| | | | | | GT3A-2AD24 | GT3A-2EAD24 |
| | | | 240V AC, 5A, 24V DC, 5A (resistive load) | Delayed DPDT | GT3A-3AF20 | GT3A-3EAF20 |
| | | | | | GT3A-3D12 | GT3A-3ED12 |
| | | | | | GT3A-3AD24 | GT3A-3EAD24 |

1. For wiring schematics and timing diagrams for GT3A-1, -2, -3, see pages page 928 and page 929 respectively.
2. For more details about time ranges, see instructions on page page 928.
3. For socket and accessory part numbers, see page 946.

### GT3A-4, -5, -6

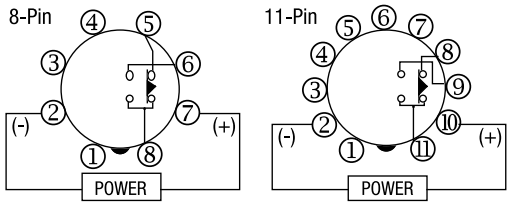
| Mode of Operation | Rated Voltage Code | Time Range | Output | Contact | Input | Complete Part No. | |
|---|---|---|---|---|---|---|---|
| | | | | | | A (11-pin) | B (11-pin) |
| A: ON-Delay 2<br>B: Cycle 2<br>C: Signal ON/OFF-Delay 1<br>D: Signal OFF-Delay 1 | AF20: 100 to 240V AC (50/60Hz)<br>D12: 12V DC<br>AD24: 24V AC (50/60Hz)/24V DC | 0.1 seconds to 180 hours | 250V AC, 5A, 24V DC, 5A (resistive load) | Delayed DPDT | Start<br>Reset<br>Gate | GT3A-4AF20 | GT3A-4EAF20 |
| | | | | | | GT3A-4D12 | GT3A-4ED12 |
| | | | | | | GT3A-4AD24 | GT3A-4EAD24 |
| A: Interval 2<br>B: One-Shot Cycle<br>C: Signal ON/OFF-Delay 2<br>D: Signal OFF-Delay 2 | AF20: 100 to 240V AC (50/60Hz)<br>AD24: 24V AC (50/60Hz)/24V DC | | | | | GT3A-5AF20 | GT3A-5EAF20 |
| | | | | | | GT3A-5AD24 | GT3A-5EAD24 |
| A: One-Shot<br>B: One-Shot ON-Delay<br>C: One-Shot 2<br>D: Signal ON/OFF-Delay 3 | | | | | | GT3A-6AF20 | GT3A-6EAF20 |
| | | | | | | GT3A-6AD24 | GT3A-6EAD24 |

4. For wiring schematics and timing diagrams GT3A-4,-5,-6, see pages 928, 929, and 929 respectively.
5. For more details about time ranges, see instructions on page 928.
6. A (11-pin) and B (11-pin) differ in the way inputs are wired.
7. For socket and accessory part numbers, see page 946.
8. For the timing diagrams overview, see page 928.

## Timing Diagrams/Schematics

### GT3A-1 Timing Diagrams
### Delayed SPDT

Operation Mode Selection




ON-Delay 1

MODE **A**

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | T |
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Delayed Contact | 5 - 8 (8p)<br>8 - 11 (11p) | (NC) | |
| | 6 - 8 (8p)<br>9 - 11 (11p) | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

Interval 1

MODE **B**

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | T |
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Delayed Contact | 5 - 8 (8p)<br>8 - 11 (11p) | (NC) | |
| | 6 - 8 (8p)<br>9 - 11 (11p) | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

Cycle 1
(OFF first)

MODE **C**

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | T T |
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Delayed Contact | 5 - 8 (8p)<br>8 - 11 (11p) | (NC) | |
| | 6 - 8 (8p)<br>9 - 11 (11p) | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

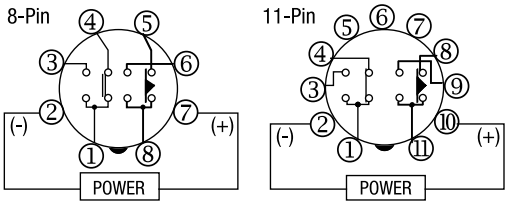
Cycle 3
(ON first)

MODE **D**

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | T T |
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Delayed Contact | 5 - 8 (8p)<br>8 - 11 (11p) | (NC) | |
| | 6 - 8 (8p)<br>9 - 11 (11p) | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

## GT3A-2 Timing Diagrams
## Delayed SPDT + Instantaneous SPDT

Operation Mode Selection




### ON-Delay 1

MODE **A**

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | T |
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Delayed Contact | 5 - 8 (8p)<br>8 - 11 (11p) | (NC) | |
| | 6 - 8 (8p)<br>9 - 11 (11p) | (NO) | |
| Instantaneous Contact | 1 - 4 | (NC) | |
| | 1 - 3 | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

### Interval 1

MODE **B**

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | T |
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Delayed Contact | 5 - 8 (8p)<br>8 - 11 (11p) | (NC) | |
| | 6 - 8 (8p)<br>9 - 11 (11p) | (NO) | |
| Instantaneous Contact | 1 - 4 | (NC) | |
| | 1 - 3 | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

### Cycle 1 (OFF first)

MODE **C**

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | T T |
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Delayed Contact | 5 - 8 (8p)<br>8 - 11 (11p) | (NC) | |
| | 6 - 8 (8p)<br>9 - 11 (11p) | (NO) | |
| Instantaneous Contact | 1 - 4 | (NC) | |
| | 1 - 3 | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

### Cycle 3 (ON first)

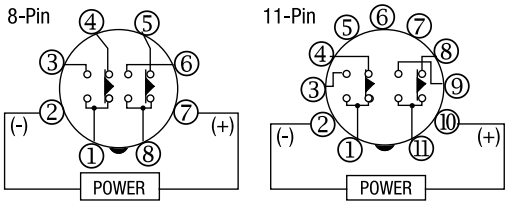
MODE **D**

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | T T |
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Delayed Contact | 5 - 8 (8p)<br>8 - 11 (11p) | (NC) | |
| | 6 - 8 (8p)<br>9 - 11 (11p) | (NO) | |
| Instantaneous Contact | 1 - 4 | (NC) | |
| | 1 - 3 | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

Note: Pins 1, 3, and 4 are the instantaneous contacts.

## GT3A-3 Timing Diagrams
## Delayed DPDT

Operation Mode Selection




### ON-Delay 1

MODE **A**

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | T |
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Delayed Contact | 1 -4, 5 - 8 (8p)<br>1 -4, 8 - 11 (11p) | (NC) | |
| | 1 -3, 6 - 8 (8p)<br>1 -3, 9 - 11 (11p) | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

### Interval 1

MODE **B**

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | T |
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Delayed Contact | 1 -4, 5 - 8 (8p)<br>1 -4, 8 - 11 (11p) | (NC) | |
| | 1 -3, 6 - 8 (8p)<br>1 -3, 9 - 11 (11p) | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

### Cycle 1 (OFF first)

MODE **C**

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | T T |
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Delayed Contact | 1 -4, 5 - 8 (8p)<br>1 -4, 8 - 11 (11p) | (NC) | |
| | 1 -3, 6 - 8 (8p)<br>1 -3, 9 - 11 (11p) | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

### Cycle 3 (ON first)

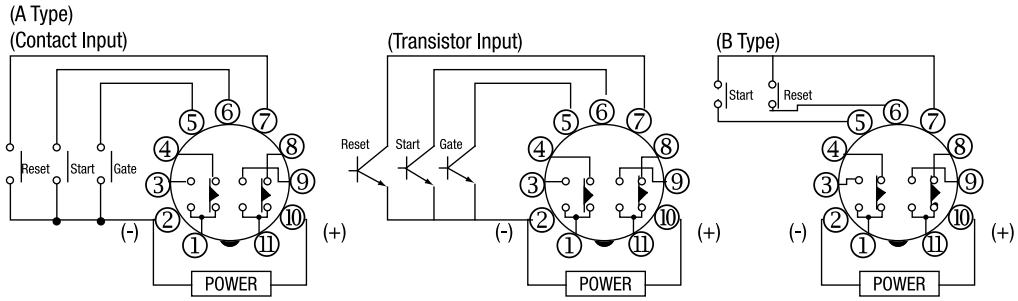
MODE **D**



| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | T T |
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Delayed Contact | 1 -4, 5 - 8 (8p)<br>1 -4, 8 - 11 (11p) | (NC) | |
| | 1 -3, 6 - 8 (8p)<br>1 -3, 9 - 11 (11p) | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

## GT3A-4 Timing Diagrams
## Delayed DPDT

Operation
Mode Selection




### ON-Delay 2

MODE **A**

| Item | Terminal Number | | | Operation |
|---|---|---|---|---|
| Power | 2 - 10 POWER | | | |
| Input | Start | 2 - 6 (A) 5 - 7 (B) | ON or L | |
| | Reset | 2 - 7 (A) 6 - 7 (B) | ON or L | |
| | Gate | 2 - 5 (A) | ON or L | |
| Delayed Contact | 1 - 4 8 - 11 | | (NC) | |
| | 1 - 3 9 - 11 | | (NO) | |
| Indicator | POWER | | | |
| | OUT | | | |
| Set Time | | | | T Ta T' T" |

### Cycle 2

MODE **B**

| Item | Terminal Number | | | Operation |
|---|---|---|---|---|
| Power | 2 - 10 POWER | | | |
| Input | Start | 2 - 6 (A) 5 - 7 (B) | ON or L | |
| | Reset | 2 - 7 (A) 6 - 7 (B) | ON or L | |
| | Gate | 2 - 5 (A) | ON or L | |
| Delayed Contact | 1 - 4 8 - 11 | | (NC) | |
| | 1 - 3 9 - 11 | | (NO) | |
| Indicator | POWER | | | |
| | OUT | | | |
| Set Time | | | | T T T T T T T Ta T T T T" T" T T T T T |

### Signal ON/OFF-Delay 1

MODE **C**

| Item | Terminal Number | | | Operation |
|---|---|---|---|---|
| Power | 2 - 10 POWER | | | |
| Input | Start | 2 - 6 (A) 5 - 7 (B) | ON or L | |
| | Reset | 2 - 7 (A) 6 - 7 (B) | ON or L | |
| | Gate | 2 - 5 (A) | ON or L | |
| Delayed Contact | 1 - 4 8 - 11 | | (NC) | |
| | 1 - 3 9 - 11 | | (NO) | |
| Indicator | POWER | | | |
| | OUT | | | |
| Set Time | | | | T T Ta T Ta T T T T" Ta |

### Signal OFF-Delay 1

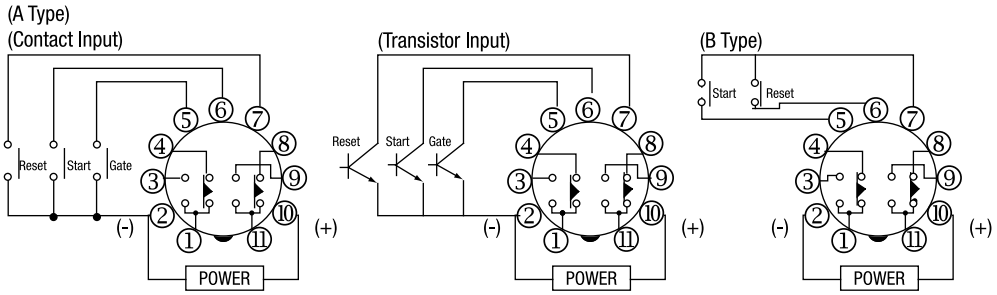
MODE **D**

| Item | Terminal Number | | | Operation |
|---|---|---|---|---|
| Power | 2 - 10 POWER | | | |
| Input | Start | 2 - 6 (A) 5 - 7 (B) | ON or L | |
| | Reset | 2 - 7 (A) 6 - 7 (B) | ON or L | |
| | Gate | 2 - 5 (A) | ON or L | |
| Delayed Contact | 1 - 4 8 - 11 | | (NC) | |
| | 1 - 3 9 - 11 | | (NO) | |
| Indicator | POWER | | | |
| | OUT | | | |
| Set Time | | | | T Ta Ta T T T |

T = Set time Ta = Shorter than set time
T = T' + T"

## GT3A-5 Timing Diagrams
## Delayed DPDT

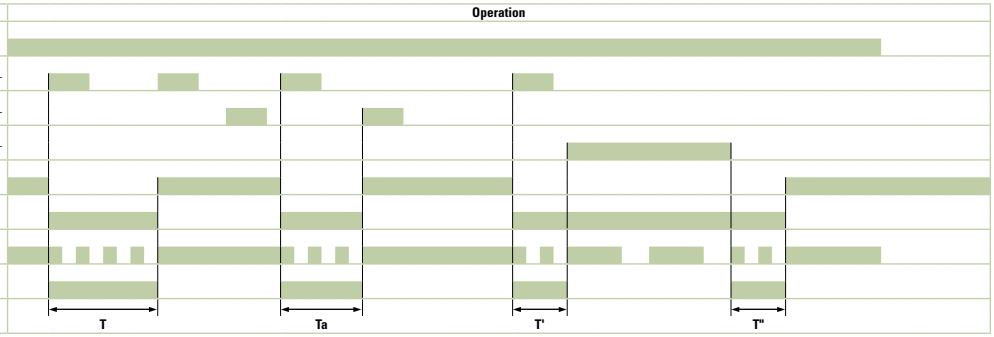
Operation
Mode Selection




### Interval 2

MODE **A**

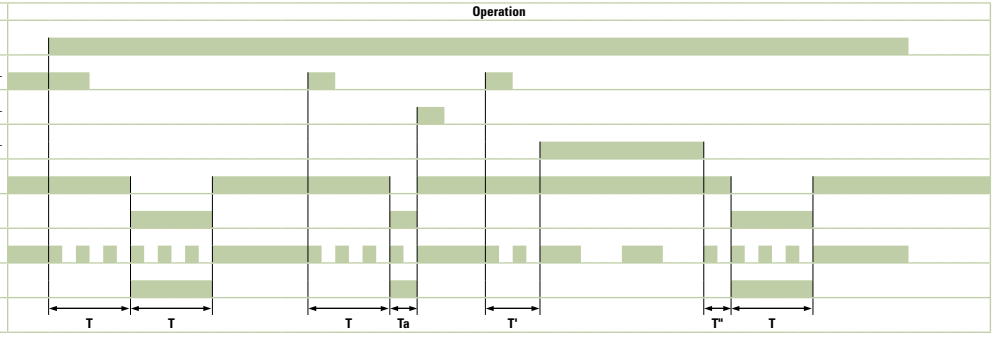
| Item | Terminal Number | | |
|---|---|---|---|
| Power | 2 - 10 POWER | | |
| Input | Start | 2 - 6 (A)<br>5 - 7 (B) | ON or L |
| | Reset | 2 - 7 (A)<br>6 - 7 (B) | ON or L |
| | Gate | 2 - 5 (A) | ON or L |
| Delayed Contact | 1 - 4<br>8 - 11 | | (NC) |
| | 1 - 3<br>9 - 11 | | (NO) |
| Indicator | POWER | | |
| | OUT | | |
| Set Time | | | |




### One-Shot Cycle

MODE **B**

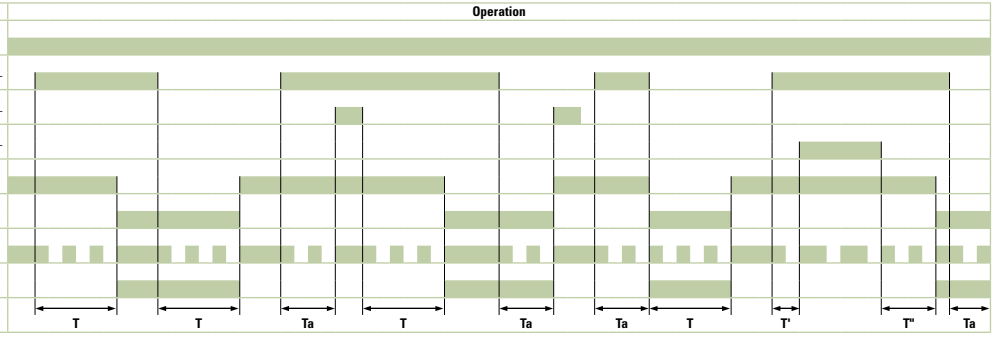
| Item | Terminal Number | | |
|---|---|---|---|
| Power | 2 - 10 POWER | | |
| Input | Start | 2 - 6 (A)<br>5 - 7 (B) | ON or L |
| | Reset | 2 - 7 (A)<br>6 - 7 (B) | ON or L |
| | Gate | 2 - 5 (A) | ON or L |
| Delayed Contact | 1 - 4<br>8 - 11 | | (NC) |
| | 1 - 3<br>9 - 11 | | (NO) |
| Indicator | POWER | | |
| | OUT | | |
| Set Time | | | |




### Signal ON/OFF-Delay 2

MODE **C**

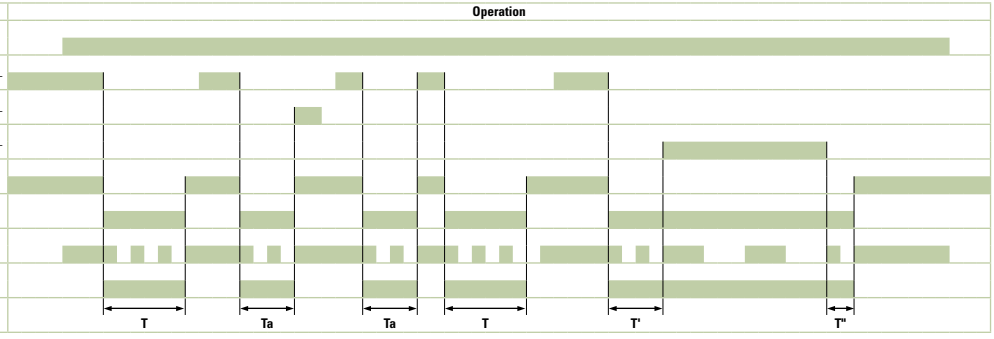
| Item | Terminal Number | | |
|---|---|---|---|
| Power | 2 - 10 POWER | | |
| Input | Start | 2 - 6 (A)<br>5 - 7 (B) | ON or L |
| | Reset | 2 - 7 (A)<br>6 - 7 (B) | ON or L |
| | Gate | 2 - 5 (A) | ON or L |
| Delayed Contact | 1 - 4<br>8 - 11 | | (NC) |
| | 1 - 3<br>9 - 11 | | (NO) |
| Indicator | POWER | | |
| | OUT | | |
| Set Time | | | |




### Signal OFF-Delay 2

MODE **D**

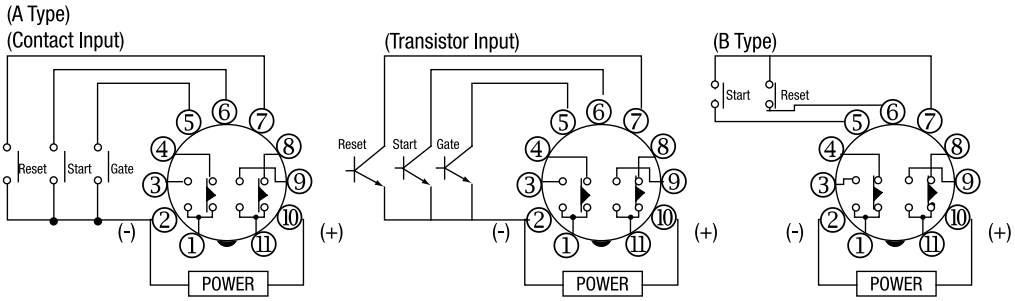
| Item | Terminal Number | | |
|---|---|---|---|
| Power | 2 - 10 POWER | | |
| Input | Start | 2 - 6 (A)<br>5 - 7 (B) | ON or L |
| | Reset | 2 - 7 (A)<br>6 - 7 (B) | ON or L |
| | Gate | 2 - 5 (A) | ON or L |
| Delayed Contact | 1 - 4<br>8 - 11 | | (NC) |
| | 1 - 3<br>9 - 11 | | (NO) |
| Indicator | POWER | | |
| | OUT | | |
| Set Time | | | |




T = Set time  Ta = Shorter than set time
T = T' + T"

## GT3A-6 Timing Diagrams
## Delayed DPDT

Operation
Mode Selection

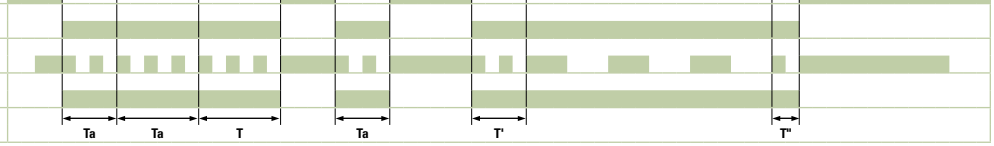



### One-Shot 1

MODE **A**

| Item | Terminal Number | | |
|---|---|---|---|
| Power | 2 - 10 POWER | | |
| Input | Start | 2 - 6 (A) 5 - 7 (B) | ON or L |
| | Reset | 2 - 7 (A) 6 - 7 (B) | ON or L |
| | Gate | 2 - 5 (A) | ON or L |
| Delayed Contact | 1 - 4 8 - 11 | | (NC) |
| | 1 - 3 9 - 11 | | (NO) |
| Indicator | POWER | | |
| | OUT | | |
| Set Time | | | |

Operation

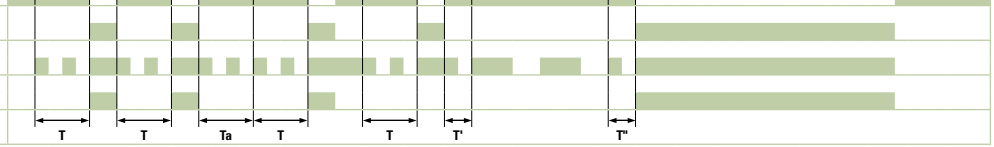



### One-Shot ON-Delay

MODE **B**

| Item | Terminal Number | | |
|---|---|---|---|
| Power | 2 - 10 POWER | | |
| Input | Start | 2 - 6 (A) 5 - 7 (B) | ON or L |
| | Reset | 2 - 7 (A) 6 - 7 (B) | ON or L |
| | Gate | 2 - 5 (A) | ON or L |
| Delayed Contact | 1 - 4 8 - 11 | | (NC) |
| | 1 - 3 9 - 11 | | (NO) |
| Indicator | POWER | | |
| | OUT | | |
| Set Time | | | |

Operation

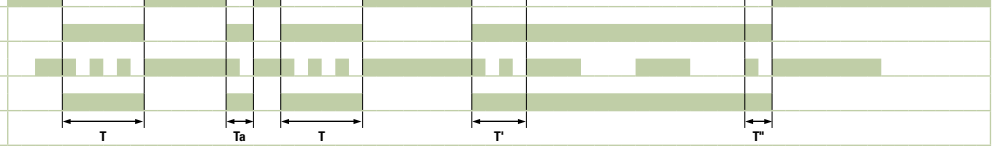



### One-Shot 2

MODE **C**

| Item | Terminal Number | | |
|---|---|---|---|
| Power | 2 - 10 POWER | | |
| Input | Start | 2 - 6 (A) 5 - 7 (B) | ON or L |
| | Reset | 2 - 7 (A) 6 - 7 (B) | ON or L |
| | Gate | 2 - 5 (A) | ON or L |
| Delayed Contact | 1 - 4 8 - 11 | | (NC) |
| | 1 - 3 9 - 11 | | (NO) |
| Indicator | POWER | | |
| | OUT | | |
| Set Time | | | |

Operation




### Signal ON/OFF-Delay 3

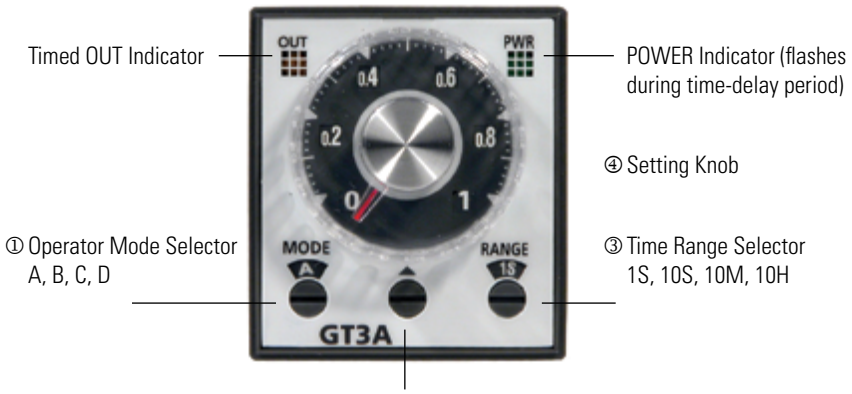
MODE **D**

| Item | Terminal Number | | |
|---|---|---|---|
| Power | 2 - 10 POWER | | |
| Input | Start | 2 - 6 (A) 5 - 7 (B) | ON or L |
| | Reset | 2 - 7 (A) 6 - 7 (B) | ON or L |
| | Gate | 2 - 5 (A) | ON or L |
| Delayed Contact | 1 - 4 8 - 11 | | (NC) |
| | 1 - 3 9 - 11 | | (NO) |
| Indicator | POWER | | |
| | OUT | | |
| Set Time | | | |

Operation

T = Set time Ta = Shorter than set time
T = T' + T"

## Instructions: Setting GT3A Series Timers




| Step 1. | Desired Mode of Operation | | Selection | Remarks |
|---|---|---|---|---|
| | **For Timers** | **Mode of Operation** | **① Operation Mode Selector** | |
| Select the desired mode of operation. | GT3A-1 GT3A-2 GT3A-3 | ON-delay 1 | A | The desired operation mode can be selected from the A, B, C, and D modes using the Operation Mode Selector. Change the operation mode from A to B, C, and D in turn by turning the operation mode selector clockwise using a flat screwdriver which is a maximum of 0.156" (4mm) wide. The selected mode is displayed in the window. |
| | | Interval 1 | B | |
| | | Cycle 1 | C | |
| | | Cycle 3 | D | |
| | GT3A-4 | ON-delay 2 | A | |
| | | Cycle 2 | B | |
| | | Signal ON/OFF-delay 1 | C | |
| | | Signal OFF-delay 1 | D | |
| | GT3A-5 | Interval 2 | A | |
| | | One-shot cycle | B | |
| | | Signal ON/OFF-delay 2 | C | |
| | | Signal OFF-delay 2 | D | |
| | GT3A-6 | One-shot 1 | A | |
| | | One-shot ON-delay | B | |
| | | One-shot 2 | C | |
| | | Signal ON/OFF-delay 3 | D | |

| Step 2. | Desired Time Range | Selection | | Remarks |
|---|---|---|---|---|
| | **Time Ranges** | **② Dial Selector** | **③ Time Range Selector** | |
| Select the time range that contains the desired time period. | 0.1 seconds to 1 second | 0-1 | 1S | The desired time range is selected by setting both ② Dial Selector and ③ Time Range Selector. |
| | 0.1 seconds to 3 seconds | 0-3 | | |
| | 0.1 seconds to 6 seconds | 0-6 | | |
| | 0.15 seconds to 18 seconds | 0-18 | | |
| | 0.1 seconds to 10 seconds | 0-1 | 10S | |
| | 0.3 seconds to 30 seconds | 0-3 | | |
| | 0.6 seconds to 60 seconds | 0-6 | | |
| | 1.8 seconds to 180 seconds | 0-18 | | |
| | 6 seconds to 10 minutes | 0-1 | 10M | |
| | 18 seconds to 30 minutes | 0-3 | | |
| | 36 seconds to 60 minutes | 0-6 | | |
| | 108 seconds to 180 minutes | 0-18 | | |
| | 6 minutes to 10 hours | 0-1 | 10H | |
| | 18 minutes to 30 hours | 0-3 | | |
| | 36 minutes to 60 hours | 0-6 | | |
| | 108 minutes to 180 hours | 0-18 | | |

| Step 3. | Selection |
|---|---|
| Set the precise period of time desired by using the ④ Setting Knob. | |

# GT3F Series — True Power OFF Delay Timers

**Key features:**

- "True" power OFF-delay up to 10 minutes
- No external control switch necessary
- Available with reset inputs
- Mountable in sockets or flush panel

UL, c-UL Listed
File No. E55996

## Specifications

| | GT3F-1 | GT3F-2 |
|---|---|---|
| Operation | True power OFF-delay | |
| Time Range | 0.1 seconds to 600 seconds | |
| Rated Voltage | 100 to 240V AC, 50/60Hz<br>24V AC/DC | |
| Contact Rating | 250V AC/24V DC, 5A<br>(resistive load) | 250V AC/24V DC, 3A<br>(resistive load) |
| Contact Form | SPDT | DPDT |
| Minimum Power Application Time | 1 second | |
| Voltage Tolerance | AF20: 100 to 240V AC<br>AD24: 21.6 to 26.4VDC, 20.4 to 26.4VAC | |
| Repeat Error | ±0.2%, ±10 msec | |
| Voltage Error | ±0.2%, ±10 msec | |
| Temperature Error | ±0.2%, ±10 msec | |
| Setting Error | ±10% maximum | |
| Insulation Resistance | 100MW minimum | |
| Dielectric Strength | Between power and output terminals:<br>2,000V AC, 1 minute (SPDT)<br>1,500V AC, 1 minute (DPDT)<br>Between contacts on different poles:<br>1,000V AC, 1 minute (DPDT)<br>Between contacts of the same pole:<br>750V AC, 1 minute | |
| Power Consumption | AF20: 3.7VA (200V AC, 60Hz)<br>AD24: 0.8W (DC), 1.2VA (AC) | |
| Mechanical Life | 3,000,000 operations minimum | |
| Electrical Life | 100,000 operations minimum | |
| Vibration Resistance | 100m/sec$^2$ (approximate 10G) | |
| Shock Resistance | Operating extremes:<br>100 m/sec$^2$ (approximate 10G)<br>Damage limits: 500 m/sec$^2$ (approximate 50G) | |
| Operating Temperature | –10 to +50°C | |
| Storage Temperature | –30 to +80°C | |
| Operating Humidity | 45 to 85% RH | |
| Weight (approximate) | 77g | 79g |

1. An inrush current flows during the minimum power application time. AF20: approximate 0.4A, AD24: approximate 1.2A
2. GT3F does not read the preset time range shown on the knob after power is turned off. Note that minimizing the preset time, by turning the knob to zero, does not shorten the delay time after power is removed.

## Part Numbering List

### GT3F

| Mode of Operation | Rated Voltage Code | Time Range | Output | Contact | Optional Input | Complete Part Number | |
|---|---|---|---|---|---|---|---|
| | | | | | | 8-Pin | 11-Pin |
| True-Power OFF-delay | AF20: 100 to 240VAC (50/60Hz) | 0.1 seconds to 600 seconds | 250V AC, 5A, 30V DC, 5A (resistive load) | Delayed SPDT | Reset | GT3F-1AF20 | GT3F-1EAF20 |
| | | | | | | GT3F-1AD24 | GT3F-1EAD24 |
| | AD24: 24V AC/DC | | 250V AC, 3A, 30V DC, 3A (resistive load) | Delayed DPDT | None (8p) Reset (11p) | GT3F-2AF20 | GT3F-2EAF20 |
| | | | | | | GT3F-2AD24 | GT3F-2EAD24 |

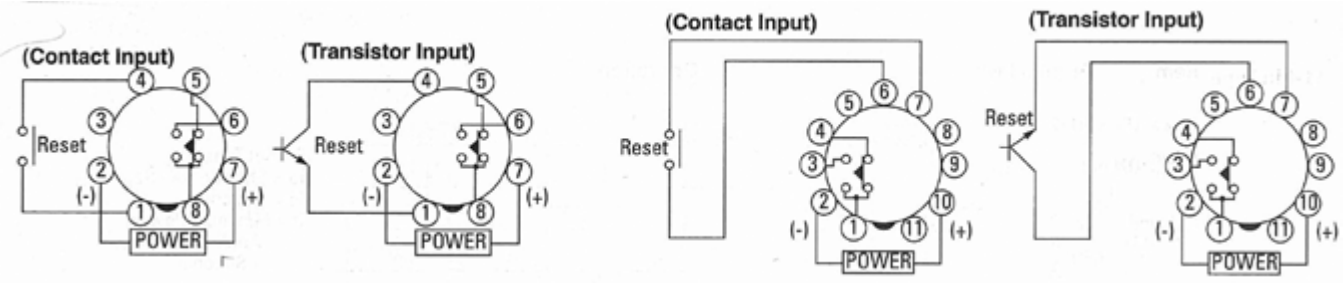
Optional reset input resets the contact to the OFF state before time out.

## Timing Diagrams/Schematics

### GT3F-1 Timing Diagrams

| GT3F-1 (8-pin) | GT3F-1E (11-pin) |
|---|---|

Delayed SPDT Output, with Reset Input




| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | 2 - 7 (8p)<br>2 - 10 (11p) | | |
| Reset Input | 1 - 4 (8p)<br>6 - 7 (11p) | ON or L | |
| Delayed Contact | 5 - 8 (8p)<br>1 - 4 (11p) | (NC) | |
| | 6 - 8 (8p)<br>1 - 3 (11p) | (NO) | |
| Indicator | POWER | | |
| Set Time | | | Tr T Ta Ts T |

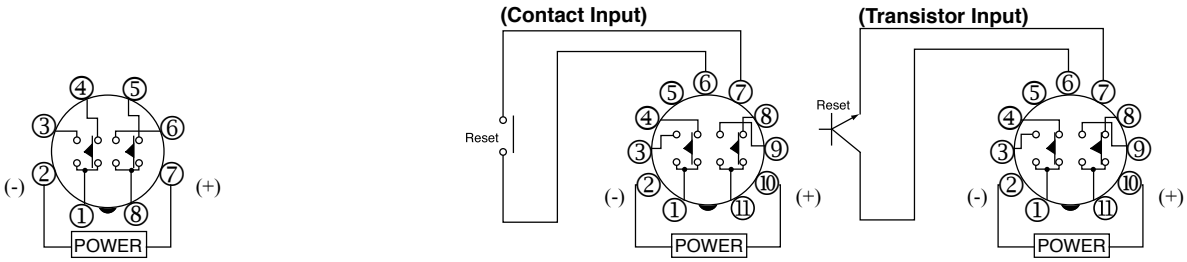
T = Set time
Ta = Shorter than set time
Ts = 1 Second
Tr = Minimum Power Application Time
GT3F-1: 1 Second

1. For time ranges, see page page 929.
2. For sockets and accessory part numbers, see page page 955.
3. When power is applied, the NO output contact closes. When power is removed, the timing period begins. When time has elapsed, the NO contact opens.
4. For the timing diagram overview, see page page 928.

## GT3F-2 Timing Diagrams

| GT3F-2 (8-pin) | GT3F-2E (11-pin) |
|---|---|

Delayed DPDT Output




### 8-Pin Type

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | 2 - 7 | | |
| Delayed Contact | 1 - 4<br>5 - 8 | (NC) | |
| | 1 - 3<br>6 - 8 | (NO) | |
| Indicator | POWER | | |
| Set Time | | | T, Tr, T |

### 11-Pin Type

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | 2 - 10 | | |
| Reset Input | 6 - 7 (11p) | ON or L | |
| Delayed Contact | 1 - 4<br>8 - 11 | (NC) | |
| | 1 - 3<br>9 - 11 | (NO) | |
| Indicator | POWER | | |
| Set Time | | | Tr, T, Ta, Ts, T |

When power is applied, the NO contact closes. When power is removed, the timing period begins. When time has elapsed, the NO contact opens. Optional reset input will return contacts to original state before time elapses.

T = Set time
Ta = Shorter than set time
Ts = 1 Second
Tr = Minimum Power Application Time
GT3F-1: 1 Second

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Power | 2 - 10 | | |
| Reset Input | 6 - 7 (11p) | ON or L | |
| Delayed Contact | 1 - 4<br>8 - 11 | (NC) | |
| | 1 - 3<br>9 - 11 | (NO) | |
| Indicator | POWER | | |
| Set Time | | | Tr, T, Ta, Ts, T |

## Instructions: Setting GT3F Series Timers

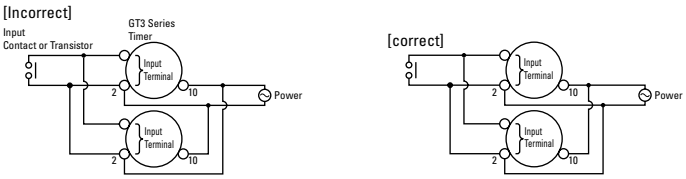
| Step 1 | Desired Operation | Selection | | Remarks |
|---|---|---|---|---|
| | Base Time Ranges | ① Dial Selector | ② Time Range Selector | |
| Select a time range that contains the desired period of time. | 0.1s to 1s | 0 to 1 | 1s | Time range can be selected from 1S and 10S using a flat screwdriver and five different dials of 0 to 1, 0 to 3, 0 to 6, 0 to 18, and 0 to 60 are displayed in the six windows by turning the Dial Selector, allowing for selecting the best suited scale. Note that the switch does not turn infinitely. |
| | 0.1s to 3s | 0 to 3 | | |
| | 0.1s to 6s | 0 to 6 | | |
| | 0.1s to 10s | 0 to 1 | 10s | |
| | 0.3s to 30 | 0 to 3 | | |
| | 0.6s to 60 | 0 to 6 | | |
| | 1.8s to 180s | 0 to 18 | | |
| | 6s to 600s | 0 to 60 | | |

| Step 2 | Remarks |
|---|---|
| The set time is selected by turning the ③ Setting Knob. | Setting Examples:<br><br>1. When the Setting Knob ③ is set at 2.5, with Dial Selector ① 0 to 3 and Time Range Selector ② 1S selected, then the set time is 2.5 seconds.<br><br>2. When the Setting Knob ③ is set at 5.0, with Dial Selector ① 0 to 60 and Time Range Selector ② 10S selected, then the set time is 500 seconds. |

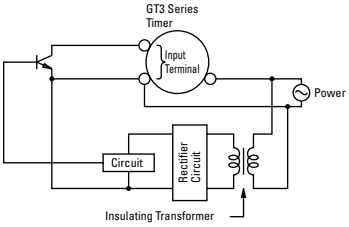
## Instructions: Wiring Inputs

### Inputs of GT3F

To avoid electric shock, do not touch the input signal terminal during power voltage application. Never apply the input signals to two or more GT3F timers using the same contact or transistor.




In a transistor circuit for controlling input signals, with its primary and secondary power circuits isolated, do not ground the secondary circuit.




On the GT3F timers, connect the input signals to terminal No.1 and 4 only on the 8-pin type; connect the input signals to terminal No. 6 and 7 only on the 11-pin type. Never apply voltage to other terminals; otherwise, the internal circuit may be damaged. Input signal lines must be made as short as possible and installed away from power cables and power lines. Use shielded wires or a separate conduit for input wiring. The GT3F, consisting of a high-impedance circuit, may not be reset due to the influence of an inductive voltage or residual voltage caused by a leakage current. If not reset, connect an RC filter or bleeder resistor between power terminals so that the voltage between power terminals can be reduced to less than 15% of the rated voltage.

# GT3W Series — Dual Time Range Timers

**Key features:**

- Sequential start, sequential interval, on-delay, recycler, and interval ON timing functions
- 2 time settings in one timer
- 8 selectable operation modes on each model
- Mountable in sockets or flush panel
- Power and output status indicating LEDs
- Time ranges up to 300 hours

UL, c-UL Listed
File No. E55996

## General Specifications

| | | | |
|---|---|---|---|
| Operation System | | | Solid state CMOS Circuit |
| Operation Type | | | Multi-Mode |
| Time Range | | | 1: 0.1sec to 6 hours, 3: 0.1sec to 300 hours |
| Pollution Degree | | | 2 (IE60664-1) |
| Over Voltage Category | | | III (IE60664-1) |
| Rated Operational Voltage | | AF20 | 100-240V AC(50/60Hz) |
| | | AD24 | 24V AC(50/60Hz)/24V DC |
| | | D12 | 12V DC |
| Voltage Tolerance | | AF20 | 85-264V AC(50/60Hz) |
| | | AD24 | 20.4-26.4V AC(50/60Hz)/21.6-26.4V DC |
| | | D12 | 10.8-13.2V DC |
| Disengaging Value of Input Voltage | | | Rated Voltage x10% minimum |
| Range of Ambient Operating Temperature | | | -10 to +50°C (without freezing) |
| Range of Ambient Storage and Transport Temperature | | | -30 to +75°C (without freezing) |
| Range of Relative Humidity | | | 35 to 85%RH (without condensation) |
| Atmospheric Pressure | | | 80kPa to 110kPa (Operating), 70kPa to 110kPa (Transport) |
| Reset Time | | | 60msec maximum |
| Repeat Error | | | ±0.2%, ±10msec* |
| Voltage Error | | | ±0.2%, ±10msec* |
| Temperature Error | | | ±0.6%, ±10msec* |
| Setting Error | | | ±10% maximum |
| Insulation Resistance | | | 100MΩ minimum (500V DC) |
| Dielectric Strength | | | Between power and output terminals: 2000V AC, 1 minute<br>Between contacts of different poles: 2000V AC, 1 minute<br>Between contacts of the same pole:750V AC, 1 minute |
| Vibration Resistance | | | 10 to 55Hz amplitude 0.75mm² hours in each of 3 axes |
| Shock Resistance | | | Operating extremes: 98m/sec² (approx.10G)<br>Damage limits: 490m/sec² (approx. 50G)<br>3 times in each of 3 axes |
| Degree of Protection | | | IP40 (enclosure), IP20 (socket) (IEC60529) |
| Power Consumption (Approx.) | AF20 | 100V AC/60Hz | 2.3VA |
| | | 200V AC/60Hz | 4.6VA |
| | AD24 (AC/DC) | | 1.8VA/0.9W |
| Mounting Position | | | Free |
| Dimensions | | | 40Hx 36W x 70 mm |
| Weight (Approx.) | | | 72g |

* For the value of the error against a preset time, whichever the largest applies.

## Contact Ratings

| | | |
|---|---|---|
| Allowable Contact Power | | 960VA/120W |
| Allowable Voltage | | 250V AC/150V DC |
| Allowable Current | | 5A |
| Maximum permissible operating frequency | | 1800 cycles per hour |
| Rated Load | | 1/8HP, 240V AC |
| | | 3A, 240V AC (Resistive) |
| | | 5A, 120V AC/30V DC (Resistive) |
| Conditional Short Circuit | | Fuse 5A, 250V |
| Life | Electrical | 100,000 op. minimum (Resistive) |
| | Mechanical | 20,000,000 op. minimum |

## Part Number List

### Part Numbers

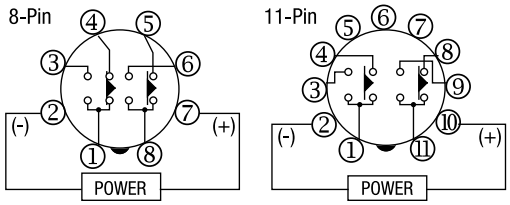
| Mode of Operation | Output | Contact | Time Range* | Rated Voltage | Pin Configuration | New Part Numbers |
|---|---|---|---|---|---|---|
| A: Sequential Start<br>B: On-delay with course and fine<br>C: Recycler and instaneous<br>D: Recycler outputs (OFF Start)<br>E: Recycler outputs (ON Start)<br>F: Interval ON<br>G: Interval ON Delay<br>H: Sequential Interval | 3A, 240V AC<br>5A, 120V AC/30V DC (Resistive Load) | Delayed SPDT + Delayed SPDT | 1: 0.1sec - 6 hours *(See Time Range Settings for details.) | 100 to 240V AC (50/60Hz) | 8 pin | GT3W-A11AF20N |
| | | | | | 11 pin | GT3W-A11EAF20N |
| | | | | 24V AC/DC | 8 pin | GT3W-A11AD24N |
| | | | | | 11 pin | GT3W-A11EAD24N |
| | | | | 12V DC | 8 pin | GT3W-A11D12N |
| | | | | | 11 pin | GT3W-A11ED12N |
| | | | 3: 0.1sec - 300 hours | 100 to 240V AC (50/60Hz) | 8 pin | GT3W-A33AF20N |
| | | | | 24V AC/DC | | GT3W-A33AD24N |

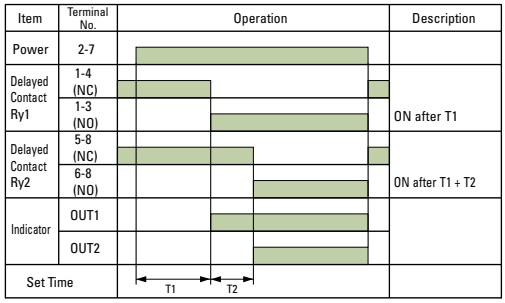
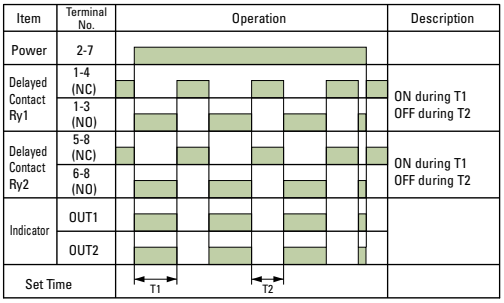
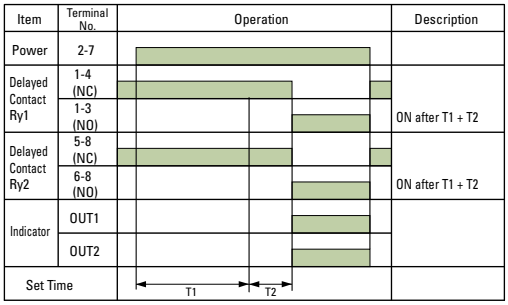
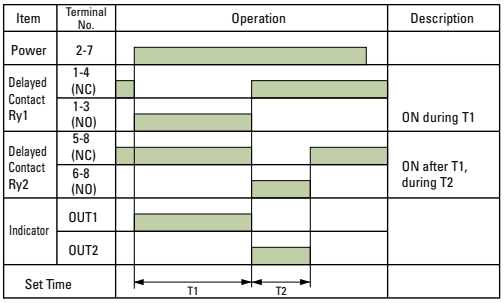
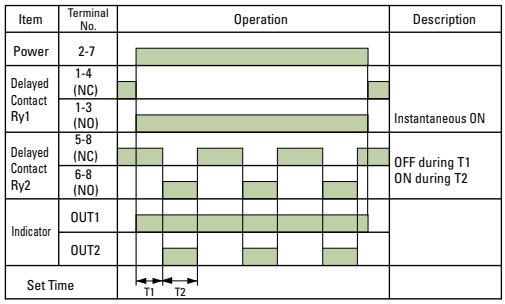
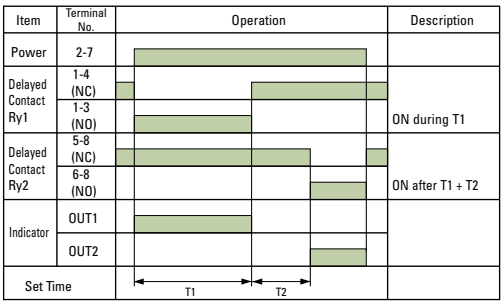
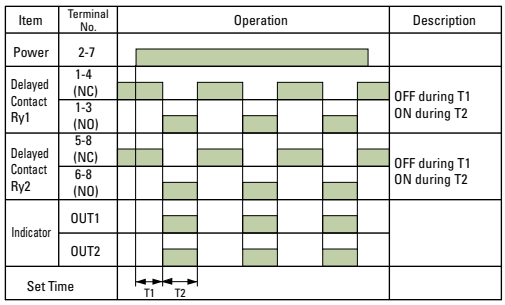
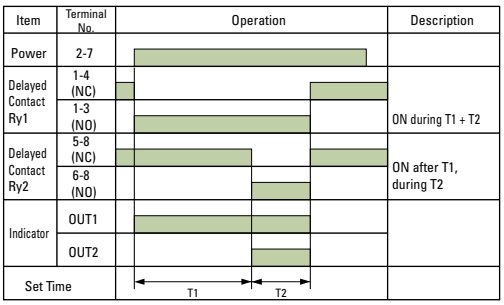
1. For timing diagrams and schematics, see page 928.
2. For socket and accessory part number information, see page 947.
3. 8- and 11-pin models differ only in the number of pins (extra pins are not used).
4. For the timing diagram overview, see page 928.
5. *For details on setting time ranges, see the instructions on page 929.

### Time Range Table

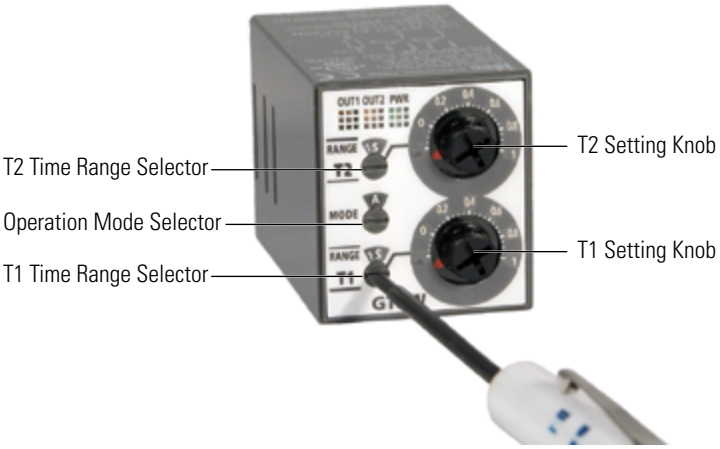
| Time Range Code: 1 | | | Time Range Code: 3 | | |
|---|---|---|---|---|---|
| Time Range Selector | Scale | Time Range | Time Range Selector | Scale | Time Range |
| 1S | 0-1 | 0.1 sec - 1 sec | 1S | 0 - 3 | 0.1 sec - 3 sec |
| 10S | | 0.3 sec - 10 sec | 1M | | 3 sec - 3 min |
| 10M | | 15 sec - 10 min | 1H | | 3 min - 3 hours |
| 1S | 0 - 6 | 0.1 sec - 6 sec | 1S | 0 - 30 | 0.6 sec - 30 sec |
| 10S | | 1 sec - 60 sec | 1M | | 36 sec - 30 min |
| 1M | | 6 sec - 6 min | 1H | | 36min - 30 hours |
| 10M | | 1 min - 60 min | 10H | | 6 hours - 300 hours |
| 1H | | 6 min - 6 hours | | | |

## Timing Diagrams/Schematics




| Mode | Operation Chart | Mode | Operation Chart |
|---|---|---|---|
| A: Sequential Start |  | E: Recycler outputs (ON Start) |  |
| B: On-delay with course and fine |  | F: Interval ON |  |
| C: Recycler and instantaneous |  | G: Interval ON Delay |  |
| D: Recycler outputs (OFF Start) |  | H: Sequential Interval |  |

## Instructions: Setting GT3W Timer




1. The switches should be securely turned using a flat screwdriver 4mm wide (maximum). Note that incorrect setting may cause malfunction. The switches, which do not turn infinitely, should not be turned beyond their limits.
2. Since changing the setting during timer operation my cause malfunction, turn power off before changing.

## Safety Precautions

Special expertise is required to use Electronic Timers.

- All Electronic Timer modules are manufactured under IDEC's rigorous quality control system, but users must add a backup or fail safe provision to the control system when using the Electronic Timer in applications where heavy damage or personal injury may occur should the Electronic Timer fail.
- Install the Electronic Timer according to instructions described in this catalog.
- Make sure that the operating conditions are as described in the specifications. If you are uncertain about the specifications, contact IDEC in advance.
- In these directions, safety precautions are categorized in order of importance to Warning and Caution.

### Warning

Warning notices are used to emphasize that improper operation may cause sever personal injury or death.

- Turn power off to the Electronic timer before starting installation, removal, Wiring, maintenance, and inspection on the Electronic Timer.
- Failure to turn power off may cause electrical shocks or fire hazard.
- Emergency stop and interlocking circuits must be configured outside the Electronic timer. If such a circuit is configured inside the Electronic Timer, failure of the Electronic timer may cause malfunction of the control system, or an accident.

### Caution

Caution notices are used where inattention might cause personal injury or damage to equipment.

- The Electronic Timer is designed for installation in equipment. Do not install the Electronic Timer outside equipment.
- Install the Electronic Timer in environments described in the specifications. If the Electronic Timer is used in places where it will be subjected to high-temperature, high-humidity, condensation, corrosive gases, excessive vibrations, or excessive shocks, then electrical shocks, fire hazard, or malfunction could result.
- Use an IEC60127-approved fuse and circuit breaker on the power and output line outside the Electronic Timer.
- Do not disassemble, repair, or modify the Electronic Timer.
- When disposing of the Electronic Timer, do so as industrial waste.

# GT3 Series

## Accessories

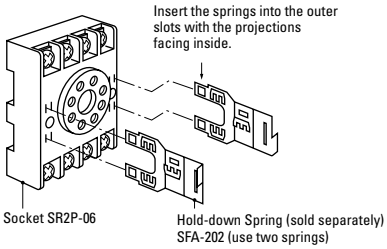
### DIN Rail Mounting Accessories

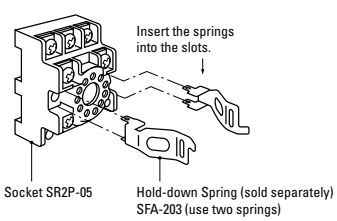
### DIN Rail/Surface Mount Sockets and Hold-Down Springs

| DIN Rail Mount Socket | | | | Applicable Hold-Down Springs | |
|---|---|---|---|---|---|
| Style | Appearance | Use with Timers | Part No. | Appearance | Part No. |
| 8-Pin Screw Terminal (dual tier) | | GT3A-1, 2, 3 (8-pin)<br>GT3F-1, 2 (8-pin)<br>GT3W (8-pin) | SR2P-05 | | SFA-203 |
| 11-Pin Screw Terminal (dual tier) | | GT3A-1, 2, 3 (11-pin)<br>GT3A-4, 5, 6<br>GT3F-1, 2 (11-pin)<br>GT3W (11-pin) | SR3P-05 | | |
| 8-Pin Fingersafe Socket | | GT3A-1, 2, 3 (8-pin)<br>GT3F-1, 2 (8-pin)<br>GT3W (8-pin) | SR2P-05C | | |
| 11-Pin Fingersafe Socket | | GT3A-1, 2, 3 (11-pin)<br>GT3A-4, 5, 6<br>GT3F-1, 2 (11-pin)<br>GT3W (11-pin) | SR3P-05C | | |
| 8-Pin Screw Terminal | | GT3A-1, 2, 3 (8-pin)<br>GT3F-1, 2 (8-pin)<br>GT3W (8-pin) | SR2P-06 | | SFA-202 |
| 11-Pin Screw Terminal | | GT3A-1, 2, 3 (11-pin)<br>GT3A-4, 5, 6<br>GT3F-1, 2 (11-pin)<br>GT3W (11-pin) | SR3P-06 | | |
| DIN Mounting Rail Length 1000mm | | — | BNDN1000 | | |

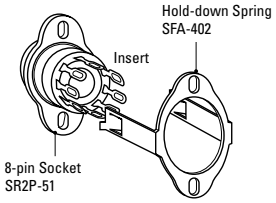
**Installation of Hold-Down Springs**

DIN Rail Mount Socket




Panel Mount Socket



# Panel Mounting Accessories

## Panel Mount Sockets and Hold-Down Springs

| Panel Mount Socket | | | | Applicable HD Springs | |
|---|---|---|---|---|---|
| Style | Appearance | Use with Timers | Part No. | Appearance | Part No. |
| 8-Pin Solder Terminal | | GT3A- (8-pin)<br>GT3W- (8-pin)<br>GT3F- (8-pin) | SR2P-51 | | SFA-402 |
| 11-Pin Solder Terminal | | GT3A- (11-pin)<br>GT3W- (11-pin)<br>GT3F- (11-pin) | SR3P-51 | | |

For information on installing the hold-down springs, see page 955.

## Flush Panel Mount Adapter and Sockets that use an Adapter

| Accessory | Description | Appearance | Use with Timers | Part No. |
|---|---|---|---|---|
| Panel Mount Adapter | Adaptor for flush panel mounting GT3 timers | | All GT3 timers | RTB-G01 |
| Sockets for use with Panel Mount Adapter | 8-pin screw terminal | <br>(Shown: SR6P-M08G for Wiring Socket Adapter) | All 8-pin timers | SR6P-M08G |
| | 11-pin screw terminal | | All 11-pin timers | SR6P-M11G |
| | 8-pin solder terminal | | All 8-pin timers | SR6P-S08 |
| | 11-pin solder terminal | | All 11-pin timers | SR6P-S11 |

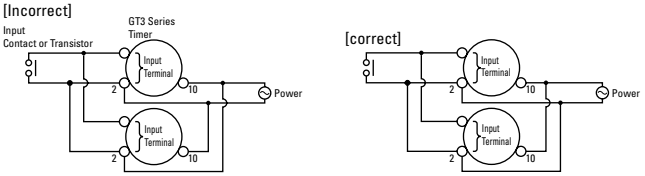
No hold down springs are available for flush panel mounting.

# Instructions: Wiring Inputs for GT3 Series

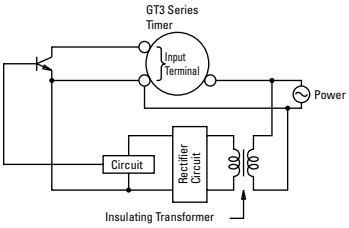
## Inputs

To avoid electric shock, do not touch the input signal terminal during power voltage application.

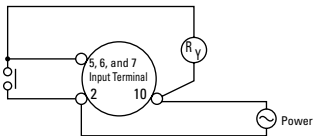
When connecting the input signal terminals of two or more GT3A timers to the same contact or transistor, the input terminals of the same number should be connected. (Connect Terminals No.2 in common.)




In a transistor circuit for controlling input signals, with its primary and secondary power circuits isolated, do not ground the secondary circuit.



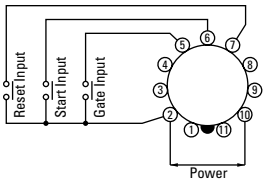

Connect the input signal terminals of the GT3A timers to Terminal No.2 only. Never apply voltage to other terminals; otherwise, the internal circuit may be damaged.



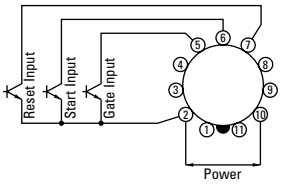

Input signal lines must be made as short as possible and installed away from power cables and power lines. Use shielded wires or a separate conduit for input wiring.

## Inputs Instructions, continued

For contact input, use gold-plated contacts to make sure that the residual voltage is less than 1V when the contacts are closed.

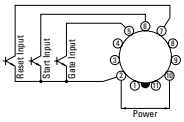



For transistor input, use transistors with the following specifications; VCE = 40V, VCES = 1V or less, IC = 50 mA or more, and ICBO = 50µA or less. The resistance should be less than 1kΩ when the transistor is on. When the output transistor switches on, a signal is input to the timer.




### Inputs: GT3A-1, -2, -3

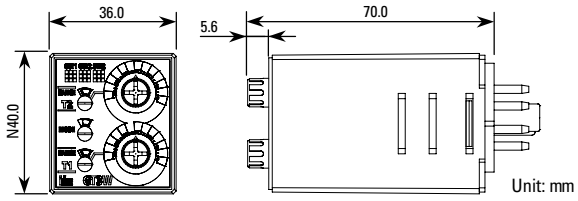
Transistor output equipment such as proximity switches and photoelectric switches can input signals if they are voltage/current output type, with power voltage ranges from 18 to 30V and have1V. When the signal voltage switches from H to L, a signal is input to the timer




### Inputs: GT3A-4, -5, -6

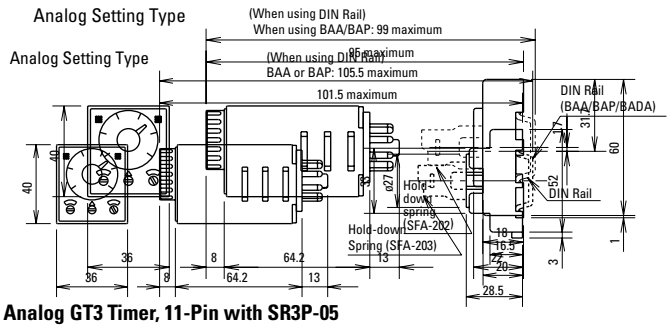
| | | |
|---|---|---|
| Start Input | The start input initiates a time-delay operation and controls output status. | No-voltage contact inputs and NPN open collector transistor inputs are applicable. |
| Reset Input | When the reset input is activated, the time is reset, and contacts return to original state. | 24V DC, 1mA maximum |
| Gate Input | The time-delay operation is suspended while the gate input is on (pause). | Input response time: 50msec maximum |

## Dimensions

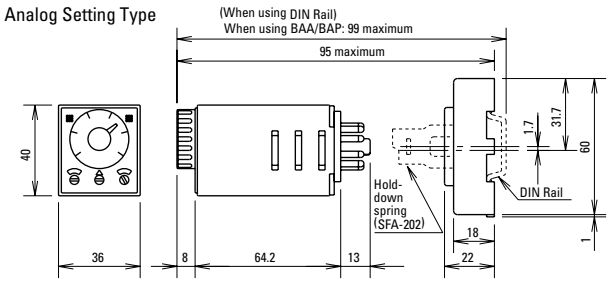



NOTE: GT3W series are UL Listed when used in combination with following IDEC's sockets:
GT3W-A11, A33: SR2P-06* pin type socket.
GT3W-A11E: SR3P-05* pin type socket.
(*-May be followed by A,B,C or U)
The socket to be used with these timers are rated:
-Conductor Temperature Rating 60°C min.
-Use 14AWG max.(2mm²max.) Copper conductors only
-Terminal Torque 1.0 to 1.3 N-m

**Analog GT3 Timer, 8-Pin with SR2P-06**



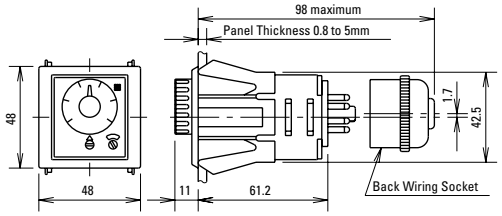

**Analog GT3 Timer, 11-Pin with SR3P-06**



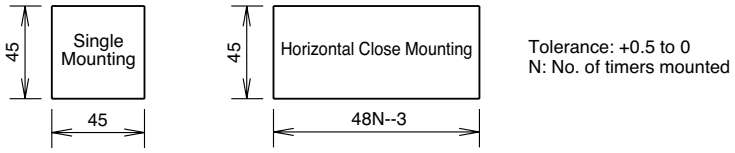

**Analog GT3 Timer, 11-Pin with SR3P-05**

## Panel Mount Adapter

**Analog GT3 Timer, 8-Pin and 11-Pin with SR6P-S08 or SR6P-S11**

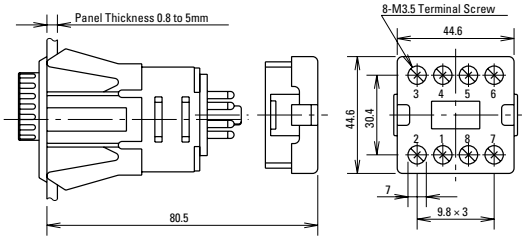


## Mounting Hole Layout

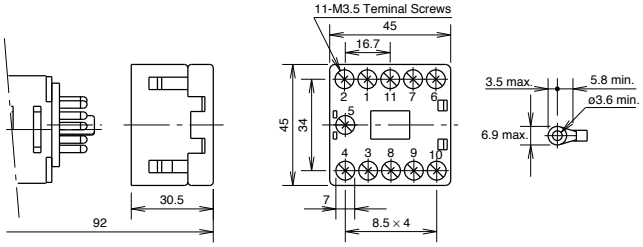



Tolerance: +0.5 to 0
N: No. of timers mounted

### GT3 Timer, 8-Pin with SR6P-M08G




### GT3 Timer, 11-Pin with SR6P-M11G



# GE1A Series — ON Delay Timers

## Single Function

**Key features:**

- DPDT or SPDT + instantaneous SPDT
- 8-pin, octal base
- Repeat error ±0.2% maximum
- Large, clear knob for easy setting
- Instant monitoring of operational status by LED indicators

UL, c-UL Listed
File No. E55996

TÜV Rheinland

### Specifications

| | | |
|---|---|---|
| Rated Operating Voltage | | 24V AC/DC<br>100 to 120V AC<br>220 to 240V AC |
| Voltage Tolerance | | AC: 85 to 110%<br>DC: 90 to 110% |
| Contact Rating | | 240V AC/5A<br>24V DC/5A |
| Contact Form | | DPDT or SPDT+ instantaneous SPDT |
| Repeat Error | | ±0.2% ±10msec maximum |
| Voltage Error | | ±0.5% ±10msec maximum |
| Temperature Error | | ±3% maximum |
| Setting Error | | ±10% maximum |
| Reset Time | | 0.1 sec maximum |
| Insulation Resistance | | 100MΩ minimum (500V DC megger) |
| Dielectric Strength | | Between power and output terminals: 2,000V AC, 1 minute<br>Between contact circuits: 750V AC, 1 minute |
| Vibration Resistance | | Damage limits: Amplitude 0.75mm, 10 to 55 Hz<br>Operating extremes: Amplitude 0.5mm, 10 to 55 Hz |
| Shock Resistance | | Damage limits: 500m/s$^2$ (Approx. 50G) |
| Power Consumption | GE1A-B | 24V AC type: 1.6 VA |
| | | 24V DC type: 1.0W |
| | | 110V AC type: 3.8 VA |
| | | 220V AC type: 7.7 VA |
| | GE1A-C | 24V AC type: 2.0 VA |
| | | 24V DC type: 0.8W |
| | | 110V AC type: 3.5 VA |
| | | 220V AC type: 8.0 VA |
| Electrical Life | | 100,000 operations minimum (at full rated load) |
| Mechanical Life | | B type: 10,000,000 operations minimum, C type: 5,000,0000 operations minimum |
| Operating Temperature | | –10 to +55°C (without freezing) |
| Operating Humidity | | 35 to 85% RH (without freezing) |

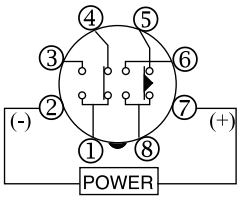
## Part Numbering List

| Mode of Operation | Contact | Output | Rated Voltage | Time Range | Complete Part Number |
|---|---|---|---|---|---|
| ON-Delay | Delayed SPDT + Instantaneous SPDT | 24V DC/120V AC, 5A 240V AC, 5A | 220-240V AC | 0.1s - 10h | GE1A-B10HA220 |
| | | | 110-120V AC | | GE1A-B10HA110 |
| | | | 24V AC/DC | | GE1A-B10HAD24 |
| | | | 220-240V AC | 0.3s - 30h | GE1A-B30HA220 |
| | | | 110-120V AC | | GE1A-B30HA110 |
| | | | 24V AC/DC | | GE1A-B30HAD24 |
| | Delayed DPDT | | 220-240V AC | 0.1s - 10h | GE1A-C10HA220 |
| | | | 110-120V AC | | GE1A-C10HA110 |
| | | | 24V AC/DC | | GE1A-C10HAD24 |
| | | | 220-240V AC | 0.3s - 30h | GE1A-C30HA220 |
| | | | 110-120V AC | | GE1A-C30HA110 |
| | | | 24V AC/DC | | GE1A-C30HAD24 |

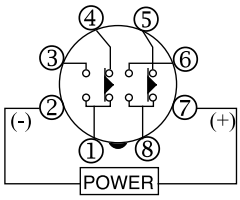
## Timing Diagrams/Schematics

Operation Mode Selection

GE1A-B
Delayed SPDT + Instantaneous SPDT




GE1A-C
Delayed DPDT




ON-Delay 1

MODE
A

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | |
| Power | 2 - 7 (8p) | | |
| Delayed Contact | 5 - 8 (8p) | (NC) | |
| | 6 - 8 (8p) | (NO) | |
| Instantaneous Contact | 1 - 4 | (NC) | |
| | 1 - 3 | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

| Item | Terminal Number | | Operation |
|---|---|---|---|
| Set Time | | | |
| Power | 2 - 7 (8p) | | |
| Delayed Contact | 5 - 8 (8p) | (NC) | |
| | 6 - 8 (8p) | (NO) | |
| Indicator | POWER | | |
| | OUT | | |

Note: Terminals 1, 3, and 4 are for the instantaneous contact

# Accessories

## Mounting Accessories & Sockets

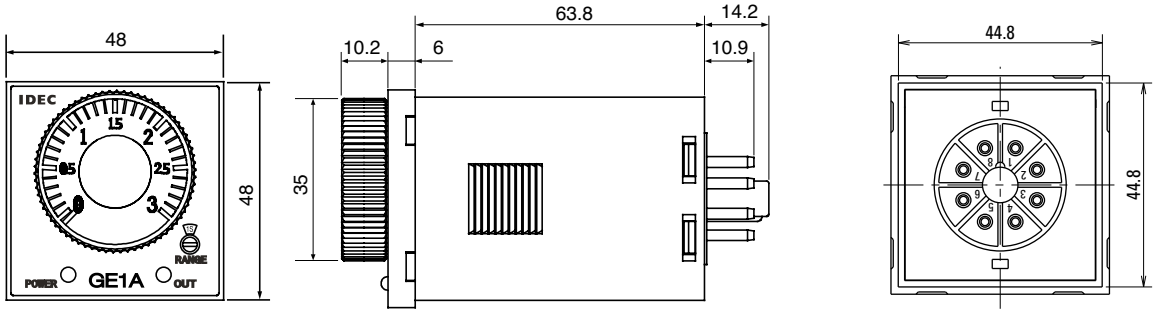
| | Item | Appearance | Part No. |
|---|---|---|---|
| DIN Rail/Surface Mounting Accessories | 8-Pin Screw Terminal (dual tier) | | SR2P-05 |
| | 8-Pin Fingersafe Socket | | SR2P-05C |
| | 8-Pin Screw Terminal | | SR2P-06 |
| | DIN Mounting Rail Length 1000mm | | BNDN1000 |
| Panel Mounting Accessories | 8-Pin Solder Terminal | | SR2P-51 |
| | Screw Terminal Socket | | SR6P-M08G |
| | Panel Mount Adapter | | GE9Z-AD |

## Other Accessories

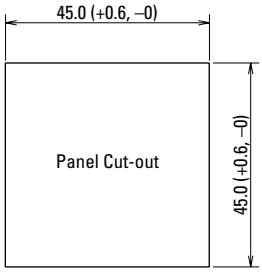
| Item | Appearance | Part No. |
|---|---|---|
| Dust Cover | | GE9Z-C48 |

## Dimensions

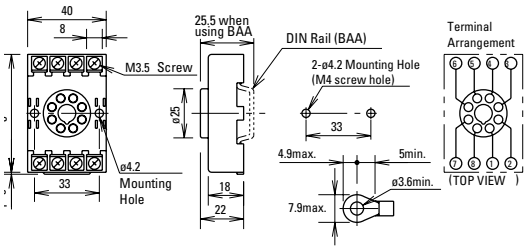
### GE1A Timer



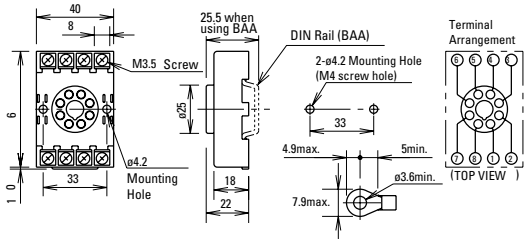

### GE1A Timer Panel Cutout




### 8-Pin SR2P-05




### 8-Pin SR2P-06



# GT5P Series — ON Delay Timers

**Key features:**

- SPDT, 5A contacts
- 8-pin, octal base
- 9 time ranges
- Repeat error ±0.2% maximum
- Control settings by hand or screwdriver
- Power ON and timing out LED indicators
- Uses the same sockets and hold down clips as IDEC's RR2P 8-pin relays

UL Recognized
File No. E55996

CSA Certified
File No. LR66809

## Specifications

| | | |
|---|---|---|
| Rated Operating Voltage | | 100 to 120V AC (50/60Hz)<br>200 to 240V AC (50/60Hz)<br>24V AC/DC<br>12V DC |
| Voltage Tolerance | | AC type: ±15%<br>DC type: ±10%<br>(ripple 10% maximum) |
| Contact Rating | Resistive load | 120V AC/24V DC, 5A<br>240V AC, 3A |
| | Inductive load | 240V AC, 0.8A<br>120V AC, 1.4A<br>24V DC, 1.7A |
| Allowable Contact Power (resistive load) | | 960VA AC<br>120W DC |
| Contact Form | | SPDT |
| Voltage | | 250V AC, 150V DC |
| Repeat Error | | ±0.2% ±10msec |
| Voltage Error | | ±0.5% ±10msec |
| Temperature Error | | ±3% maximum (over –10 to 50°C, reference temperature 20°C) |
| Setting Error | | ±10% maximum |
| Reset Time | | When turning power off after time up:<br>0.1 sec maximum<br>When turning power off before time up:<br>1 sec maximum |
| Insulation Resistance | | 100MΩ minimum |
| Dielectric Strength | | 2000V AC, 1 minute (except between contacts of the same pole) |
| Vibration Resistance | | 100N (approximate 10G) |
| Shock Resistance | | Operating extremes:<br>100N (approximate 10G)<br>Damage limits: 500N (approximate 50G) |
| Power Consumption | | 100V AC type: 1.5VA (at 50Hz)<br>200V AC type: 1.6VA (at 50Hz)<br>24V DC type: 0.9W |
| Electrical Life | | 100,000 operations minimum (at rated load) |
| Mechanical Life | | 20,000,000 operations minimum |
| Operating Temperature | | –10 to +50°C |
| Operating Humidity | | 45 to 85% RH |

1. Inductive load (reference), cos ø =0.3 to 0.4 or L/R=15msec.
2. Minimum applicable load: 5VDC/10mA (reference).

## Part Numbering List

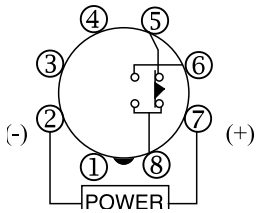
| Mode of Operation | Contact | Output | Rated Voltage | Time Range | Complete Part No. |
|---|---|---|---|---|---|
| ON-Delay | SPDT | 24V DC/120V AC, 5A 240V AC, 3A | 100 to 120V AC | 1S | — |
| | | | | 3S | GT5P-N3SA100 |
| | | | | 6S | — |
| | | | | 10S | GT5P-N10SA100 |
| | | | | 30S | GT5P-N30SA100 |
| | | | | 60S | GT5P-N60SA100 |
| | | | | 3M | GT5P-N3MA100 |
| | | | | 6M | GT5P-N6MA100 |
| | | | | 10M | GT5P-N10MA100 |
| | | | 200 to 240V AC | 1S | GT5P-N1SA200 |
| | | | | 3S | — |
| | | | | 6S | GT5P-N6SA200 |
| | | | | 10S | GT5P-N10SA200 |
| | | | | 30S | GT5P-N30SA200 |
| | | | | 60S | GT5P-N60SA200 |
| | | | | 3M | GT5P-N3MA200 |
| | | | | 6M | GT5P-N6MA200 |
| | | | | 10M | GT5P-N10MA200 |
| | | | 24V AC/DC | 1S | GT5P-N1SAD24 |
| | | | | 3S | — |
| | | | | 6S | GT5P-N6SAD24 |
| | | | | 10S | GT5P-N10SAD24 |
| | | | | 30S | — |
| | | | | 60S | GT5P-N60SAD24 |
| | | | | 3M | — |
| | | | | 6M | GT5P-N6MAD24 |
| | | | | 10M | GT5P-N10MAD24 |
| | | | 12V DC | 1S | — |
| | | | | 3S | — |
| | | | | 6S | — |
| | | | | 10S | GT5P-N10SD12 |
| | | | | 30S | GT5P-N30SD12 |
| | | | | 60S | GT5P-N60SD12 |
| | | | | 3M | — |
| | | | | 6M | — |
| | | | | 10M | GT5P-N10MD12 |

For sockets and accessories, see page 929.

## Timing Diagram/Schematic/Electrical Life Curves

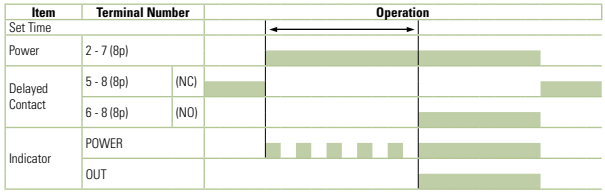
SPDT

Operation Mode

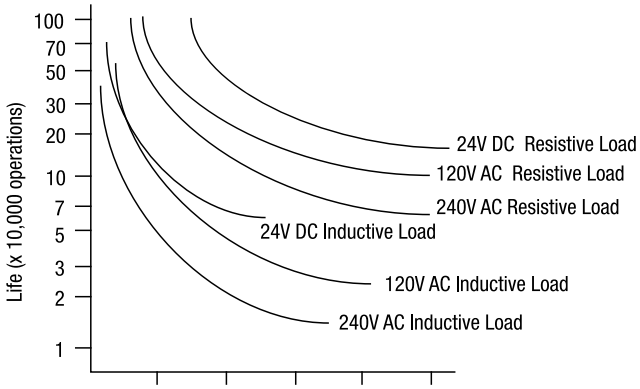



Do not apply voltage to terminals 1, 3, and 4.

ON-Delay




Electrical Life Curves



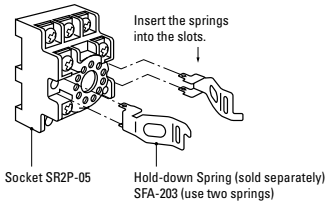
# Accessories

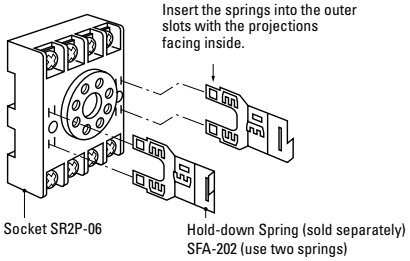
## Mounting

| | Mounting Accessories and Sockets | | | | Applicable Hold-Down Springs | |
|---|---|---|---|---|---|---|
| | Style | Appearance | Use with Timers | Part No. | Appearance | Part No. |
| DIN Rail/ Surface Mounting Accessories | 8-Pin Screw Terminal (dual tier) | | GT5P | SR2P-05 | | SFA-203 |
| | 8-Pin Fingersafe Socket | | GT5P | SR2P-05C | | |
| | 8-Pin Screw Terminal | | GT5P | SR2P-06 | | SFA-202 |
| | DIN Mounting Rail Length 1000mm | | — | BNDN1000 | | |
| | Part Numbers: Mounting Accessories and Sockets | | | | Applicable Hold-Down Springs | |
| Mounting Accessories | 8-Pin Solder Terminal | | | SR2P-51 | | SFA-402 |

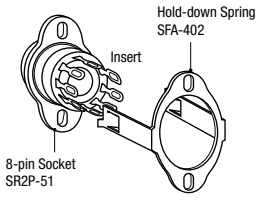
**Installation of Hold-Down Springs**

**DIN Rail Mount Socket**



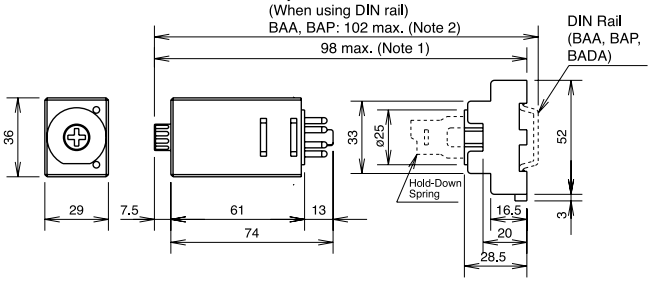

**Panel Mount Socket**



## Dimensions

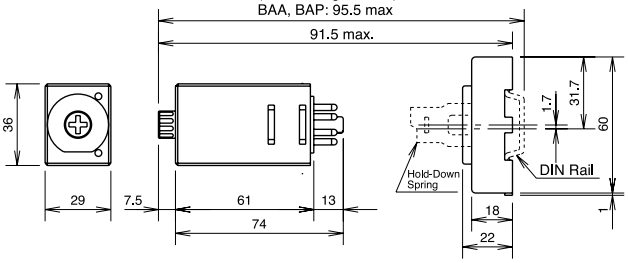
**GT5P Timer, 8-Pin with SR2P-05**

(When using DIN rail)
BAA, BAP: 102 max. (Note 2)
98 max. (Note 1)




**GT5P Timer, 8-Pin with SR2P-06**

(When using DIN rail)
BAA, BAP: 95.5 max
91.5 max.



# GT5Y Series — ON Delay Timers

**Key features:**

- 4PDT, 3A or DPDT, 5A contacts
- 4 time ranges
- Repeat error ±0.2% maximum
- Control settings by hand or screwdriver
- Power ON and timing out LED indicators
- Uses the same sockets and hold-down clips as IDEC's RY4S and RU series relays

CE

c UL us UL, c-UL Listed
File No. E55996

## Specifications

| | | GT5Y-2 | GT5Y-4 |
|---|---|---|---|
| Rated Operating Voltage | | 100 to 120V AC (50/60Hz)<br>200 to 240V AC (50/60Hz)<br>24V DC<br>24V AC<br>12V DC | |
| Contact Form | | DPDT | 4PDT |
| Rated Load | Resistive Load | 220V AC, 5A<br>30V DC, 5A | 220V AC, 3A<br>30V DC, 3A |
| | Inductive Load | 220V AC, 2A<br>30V DC, 2.5A | 220V AC, 0.8A<br>30V DC, 1.5A |
| Allowable Contact Power | Resistive Load | 1100VA AC<br>150W DC | 660VA AC<br>90W DC |
| | Inductive Load<br>Cos ø = 0.3<br>L/R = 7msec | 440VA AC<br>75W DC | 176VA AC<br>45W DC |
| Allowable Voltage | | 250V AC, 125V DC | |
| Allowable Current | | 5A | 3A |
| Temperature Error | | ±3% maximum (over –10 to 50°C, reference temperature 20°C) | |
| Setting Error | | ±10% maximum | |
| Reset Time | | When turning power off after time up: 0.1 second maximum<br>When turning power off before time up: 1 second maximum | |
| Insulation Resistance | | 100MΩ minimum | |
| Dielectric Strength | | 2,000V AC, 1 minute (except between contacts of the same pole) | |
| Vibration Resistance | | 100N (approximate 10G) | |
| Shock Resistance | | Operating extremes: 100N (approximate 10G)<br>Damage limits: 500N (approximate 50G) | |
| Power Consumption | | 100V AC type: 1.5VA (at 50Hz)<br>200V AC type: 1.6VA (at 50Hz)<br>24V DC type: 0.9W | |
| Electrical Life | | 500,000 operations minimum<br>(220V AC, 5A) | 200,000 operations minimum<br>(110V AC, 3A) |
| Mechanical Life | | 50,000,000 operations minimum | |
| Operating Temperature | | –10 to +50°C | |
| Operating Humidity | | 45 to 85% RH | |

1. Minimum applicable load: GT5Y-2: 5V DC, 20mA (reference value); GT5Y-4: 5V DC, 10mA (reference value).
2. Inductive load: cos ø =0.3, L/R=7msec.

## Part Numbering List

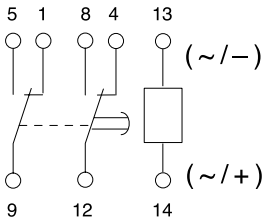
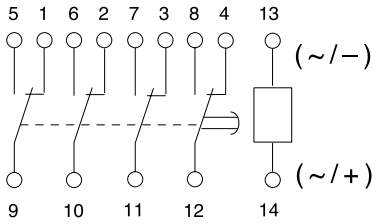
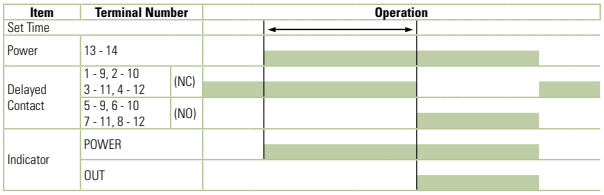
| Mode of Operation | Contact | Output | Rated Voltage | Time Range | Complete Part No. |
|---|---|---|---|---|---|
| ON-Delay | DPDT | 220V AC/ 30V DC, 5A | 100 to 120V AC | 1S/10S/1M/10M | GT5Y-2SN1A100 |
| | | | | 3S/30S/3M/30M | GT5Y-2SN3A100 |
| | | | | 6S/60S/6M/60M | GT5Y-2SN6A100 |
| | | | 200 to 240V AC | 1S/10S/1M/10M | GT5Y-2SN1A200 |
| | | | | 3S/30S/3M/30M | GT5Y-2SN3A200 |
| | | | | 6S/60S/6M/60M | GT5Y-2SN6A200 |
| | | | 12V DC | 1S/10S/1M/10M | GT5Y-2SN1D12 |
| | | | | 3S/30S/3M/30M | GT5Y-2SN3D12 |
| | | | | 6S/60S/6M/60M | GT5Y-2SN6D12 |
| | | | 24V DC | 1S/10S/1M/10M | GT5Y-2SN1D24 |
| | | | | 3S/30S/3M/30M | GT5Y-2SN3D24 |
| | | | | 6S/60S/6M/60M | GT5Y-2SN6D24 |
| | | | 24V AC | 1S/10S/1M/10M | GT5Y-2SN1A24 |
| | | | | 3S/30S/3M/30M | GT5Y-2SN3A24 |
| | | | | 6S/60S/6M/60M | GT5Y-2SN6A24 |
| | 4PDT | 220V AC/30V DC, 3A | 100 to 120V AC | 1S/10S/1M/10M | GT5Y-4SN1A100 |
| | | | | 3S/30S/3M/30M | GT5Y-4SN3A100 |
| | | | | 6S/60S/6M/60M | GT5Y-4SN6A100 |
| | | | 200 to 240V AC | 1S/10S/1M/10M | GT5Y-4SN1A200 |
| | | | | 3S/30S/3M/30M | GT5Y-4SN3A200 |
| | | | | 6S/60S/6M/60M | GT5Y-4SN6A200 |
| | | | 12V DC | 1S/10S/1M/10M | — |
| | | | | 3S/30S/3M/30M | GT5Y-4SN3D12 |
| | | | | 6S/60S/6M/60M | — |
| | | | 24V DC | 1S/10S/1M/10M | GT5Y-4SN1D24 |
| | | | | 3S/30S/3M/30M | GT5Y-4SN3D24 |
| | | | | 6S/60S/6M/60M | GT5Y-4SN6D24 |
| | | | 24V AC | 1S/10S/1M/10M | GT5Y-4SN1A24 |
| | | | | 3S/30S/3M/30M | GT5Y-4SN3A24 |
| | | | | 6S/60S/6M/60M | GT5Y-4SN6A24 |

For sockets and accessories, see page 929.

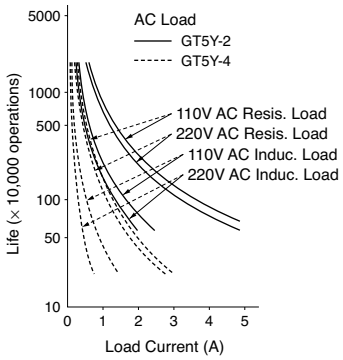
### Timing Ranges

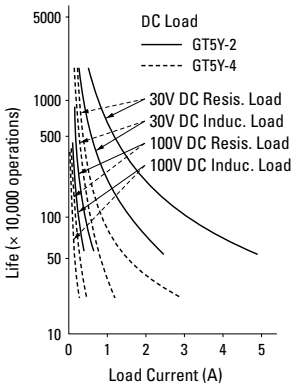
| Code | Scale | Time Range Indication | | Time Range |
|---|---|---|---|---|
| 1S | 0 to 10 | x 0.1 | S | 0.1 second to 1 second |
| 10S | | x 1 | S | 0.2 second to 10 seconds |
| 1M | | x 0.1 | M | 1.2 seconds to 1 minute |
| 10M | | x 1 | M | 12 seconds to 10 minutes |
| 3S | 0 to 3 | x 1 | S | 0.1 second to 3 seconds |
| 30S | | x 10 | S | 0.5 second to 30 seconds |
| 3M | | x 1 | M | 3 seconds to 3 minutes |
| 30M | | x 10 | M | 30 seconds to 30 minutes |
| 6S | 0 to 6 | x 1 | S | 0.1 second to 6 seconds |
| 60S | | x 10 | S | 1 second to 60 seconds |
| 6M | | x 1 | M | 6 seconds to 6 minutes |
| 60M | | x 10 | M | 1 minute to 60 minutes |

## Timing Diagram/Schematics/Electrical Life Curves

| | GT5Y-2 | GT5Y-4 |
|---|---|---|
| | DPDT | 4PDT |
| Internal Connections (bottom view) |   |   |
| Operation Mode: ON-Delay |   For an explanation of timing modes, see page page 928. | |

## Electrical Life Curves



# Accessories

## DIN Rail Mounting Accessories

### DIN Rail/Surface Mount Sockets and Hold-Down Springs

| DIN Rail Mount Socket | | | Applicable Hold-Down Springs | |
|---|---|---|---|---|
| Style | Appearance | Part No. | Appearance | Part No. |
| 14-Blade Screw Terminal | | SY4S-05 | | SFA-202 |
| 14-Blade Screw Terminal (fingersafe) | | SY4S-05C | | |
| DIN Mounting Rail Length 1000mm | | BNDN1000 | | |

## Panel Mounting Accessories

### Part Numbers: Panel Mount Socket and Hold-Down Springs

| Panel Mount Socket | | | Applicable Hold-Down Springs | |
|---|---|---|---|---|
| Style | Appearance | Part No. | Appearance | Part No. |
| 14-Blade Solder Terminal | | SY4S-51 | | SFA-302 |

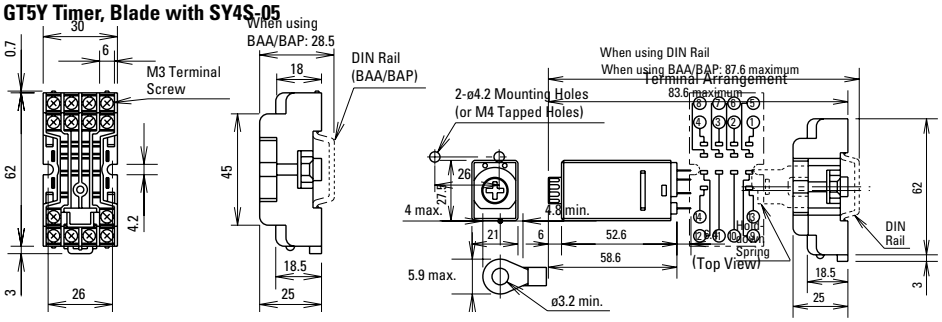
## PCB Mounting Accessories

### Part Numbers: PCB Mount Sockets with Applicable Hold-Down Springs

| PCB Mount Socket | | | Applicable Hold-Down Springs | |
|---|---|---|---|---|
| Style | Appearance | Part No. | Appearance | Part No. |
| 14 Blade, PCB Terminal | | SY4S-61 | | SFA-302 |
| 14 Blade, PCB Terminal | | SY4S-62 | | SY4S-02F1 |

## Dimensions

**GT5Y Timer, Blade with SY4S-05**




# General Instructions for All Timer Series

### Load Current

With inductive, capacitive, and incandescent lamp loads, inrush current more than 10 times the rated current may cause welded contacts and other undesired effects. The inrush current and steady-state current must be taken into consideration when specifying a timer.

### Contact Protection

Switching an inductive load generates a counter-electromotive force (back EMF) in the coil. The back EMF will cause arcing, which may shorten the contact life and cause imperfect contact. Application of a protection circuit is recommended to safeguard the contacts.

### Temperature and Humidity

Use the timer within the operating temperature and operating humidity ranges and prevent freezing or condensation. After the timer has been stored below its operating temperature, leave the timer at room temperature for a sufficient period of time to allow it to return to operating temperatures before use.

### Environment

Avoid contact between the timer and sulfurous or ammonia gases, organic solvents (alcohol, benzine, thinner, etc.), strong alkaline substances, or strong acids. Do not use the timer in an environment where such substances are prevalent. Do not allow water to run or splash on the timer.

### Vibration and Shock

Excessive vibration or shocks can cause the output contacts to bounce, the timer should be used only within the operating extremes for vibration and shock resistance. In applications with significant vibration or shock, use of hold down springs or clips is recommended to secure a timer to its socket.

### Time Setting

The time range is calibrated at its maximum time scale; so it is desirable to use the timer at a setting as close to its maximum time scale as possible. For a more accurate time delay, adjust the control knob by measuring the operating time with a watch before application.

### Input Contacts

Use mechanical contact switch or relay to supply power to the timer. When driving the timer with a solid-state output device (such as a two-wire proximity switch, photoelectric switch, or solid-state relay), malfunction may be caused by leakage current from the solid-state device. Since AC types comprise a capacitive load, the SSR dielectric strength should be two or more times the power voltage when switching the timer power using an SSR.

Generally, it is desirable to use mechanical contacts whenever possible to apply power to a timer or its signal inputs. When using solid state devices, be cautious of inrushes and back-EMF that may exceed the ratings on such devices. Some timers are specially designed so that signal inputs switch at a lower voltage than is used to power the timer (models designated as "B" type).

### Timing Accuracy Formulas

Timing accuracies are calculated from the following formulas:

**Repeat Error**

$$= \pm \frac{1 \times \text{Maximum Measured Value} - \text{Minimum Measured Value} \times 100\%}{2 \text{ Maximum Scale Value}}$$

**Voltage Error**

$$= \pm \frac{Tv - Tr \times 100\%}{Tr}$$

Tv: Average of measured values at voltage V
Tr: Average of measured values at the rated voltage

**Temperature Error**

$$= \pm \frac{Tt - T20 \times 100\%}{T20}$$

Tt: Average of measured values at °C
T20: Average of measured values at 20°C

**Setting Error**

$$= \pm \frac{\text{Average of Measured Values} - \text{Set Value} \times 100\%}{\text{Maximum Scale Value}}$$

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# Contactors

IDEC

**www.IDEC.com/contactor**

# Selection Guide

## Selection by Horsepower Rating (AC Coil)

| Series | YC1N(K) Mini series | YC1U AC Series | YC1N AC Series |
|---|---|---|---|
| | | | |
| Coil Voltage | AC or DC | AC | AC |
| Amp Range (AC3) | 9A & below | 9A - 80A | 80A - 300A |
| RoHS Compliance | Yes | Yes | Yes |
| Page | 977 | 981 | 988 |

# YC1N(K) Mini Contactors

**Part Number Key**

YC1 | N | – | 5 | B | A120

**Coil Voltage Code**
N: AC Coil
K: DC Coil

**Contactor Size***
(5, 6)

*See selection table for details.

**Coil Voltage**
A24: 24V AC, 50/60Hz
A120: 120V AC, 50/6-Hz
A240: 240V AC, 50/60Hz
A480: 480V AC, 50/60Hz
D24: 24V DC
D110: 110V DC

**Auxiliary Contact Arrangement**
Blank: 1NO
B: 1NC

## Part Numbers

### Selection by Horsepower Rating (AC Coil)

| | Rated Power (Hp) per AC3 IEC 60947-4-1 | | | | | | | Rated Power (Hp) per UL508 CSA C22.2 | | | | | | Auxilary Contact | Part Numbers | | Coil Voltage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1-Phase | | 3-Phase | | | | | 1-Phase | | 3-Phase | | | | | | | |
| | 110V | 220V | 220/240V | 380/400V | 415/440V | 500V | 660/690V | 110/120V | 220/240V | 200/208V | 230/240V | 440/480V | 575V | | | | |
| | 0.5 | 1 | 2 | 4 | 4 | 4 | 4 | – | – | 2 | 2 | 3 | 3 | 1NO | YC1N-5 | + | A24: 24V AC<br>A120: 120V AC<br>A240: 240V AC<br>A480: 480V AC |
| | | | | | | | | | | | | | | 1NC | YC1N-5B | | |
| | 0.75 | 1.5 | 3 | 5.5 | 5.5 | 5.5 | 5.5 | – | – | 3 | 3 | 5 | 5 | 1NO | YC1N-6 | | |
| | | | | | | | | | | | | | | 1NC | YC1N-6B | | |

## Selection by Horsepower Rating (DC Coil)

| | Rated Power (Hp) per AC3 IEC 60947-4-1 | | | | | | | Rated Power (Hp) per UL508 CSA C22.2 | | | | | | Auxilary Contact | Part Numbers | | Coil Voltage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1-Phase | | 3-Phase | | | | | 1-Phase | | 3-Phase | | | | | | | |
| | 110V | 220V | 220/ 240V | 380/ 400V | 415/ 440V | 500V | 660/ 690V | 110/ 120V | 220/ 240V | 200/ 208V | 230/ 240V | 440/ 480V | 575V | | | | |
| | 0.5 | 1 | 2 | 4 | 4 | 4 | 4 | – | – | 2 | 2 | 3 | 3 | 1NO | YC1K-5 | + | D24: 24V DC<br>D110: 110V DC |
| | | | | | | | | | | | | | | 1NC | YC1K-5B | | |
| | 0.75 | 1.5 | 3 | 5.5 | 5.5 | 5.5 | 5.5 | – | – | 3 | 3 | 5 | 5 | 1NO | YC1K-6 | | |
| | | | | | | | | | | | | | | 1NC | YC1K-6B | | |

## Selection by Amp Rating (AC Coil)

| Rated Power (A) per AC3 IEC 60947-4-1 | | | | | | | Rated Power (A) per UL508 CSA C22.2 | | | | | | Auxilary Contact | Part Numbers | | Coil Voltage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-Phase | | 3-Phase | | | | | 1-Phase | | 3-Phase | | | | | | | |
| 110V | 220V | 220/ 240V | 380/ 400V | 415/ 440V | 500V | 660/ 690V | 110/ 120V | 220/ 240V | 200/ 208V | 230/ 240V | 440/ 480V | 575V | | | | |
| 8 | 7 | 7.5 | 7 | 6.5/6 | 5 | 4 | – | – | 7.5 | 6.8 | 4.8 | 3.9 | 1NO | YC1N-5 | + | A24: 24V AC<br>A120: 120V AC<br>A240: 240V AC<br>A480: 480V AC |
| | | | | | | | | | | | | | 1NC | YC1N-5B | | |
| 10.5 | 10 | 10.1 | 9 | 8.5/8 | 6.5 | 5 | – | – | 11 | 9.6 | 7.6 | 6.1 | 1NO | YC1N-6 | | |
| | | | | | | | | | | | | | 1NC | YC1N-6B | | |

## Selection by Amp Rating (DC Coil)

| Rated Power (A) per AC3 IEC 60947-4-1 | | | | | | | Rated Power (A) per UL508 CSA C22.2 | | | | | | Auxilary Contact | Part Numbers | | Coil Voltage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-Phase | | 3-Phase | | | | | 1-Phase | | 3-Phase | | | | | | | |
| 110V | 220V | 220/ 240V | 380/ 400V | 415/ 440V | 500V | 660/ 690V | 110/ 120V | 220/ 240V | 200/ 208V | 230 240V | 440/ 480V | 575V | | | | |
| 8 | 7 | 7.5 | 7 | 6.5/ 6 | 5 | 4 | – | – | 7.5 | 6.8 | 4.8 | 3.9 | 1NO | YC1K-5 | + | D24: 24V DC<br>D110: 110V DC |
| | | | | | | | | | | | | | 1NC | YC1K-5B | | |
| 10.5 | 10 | 10.1 | 9 | 8.5/8 | 6.5 | 5 | – | – | 11 | 9.6 | 7.6 | 6.1 | 1NO | YC1K-6 | | |
| | | | | | | | | | | | | | 1NC | YC1K-6B | | |

## Selection by Kilowatt Rating (AC Coil)

| Rated Power (kW) per AC3 IEC 60947-4-1 | | | | | | | Auxilary Contact | Part Numbers | | Coil Voltage |
|---|---|---|---|---|---|---|---|---|---|---|
| 1-Phase | | 3-Phase | | | | | | | | |
| 110V | 220V | 220/240V | 380/400V | 415/440V | 500V | 660/690V | | | | |
| 0.37 | 0.75 | 1.5 | 3 | 3 | 3 | 3 | 1NO | YC1N-5 | + | A24: 24V AC<br>A120: 120V AC<br>A240: 240V AC<br>A480: 480V AC |
| | | | | | | | 1NC | YC1N-5B | | |
| 0.55 | 1.1 | 2.2 | 4 | 4 | 4 | 4 | 1NO | YC1N-6 | | |
| | | | | | | | 1NC | YC1N-6B | | |

## Selection by Kilowatt Rating (DC Coil)

| Rated Power (kW) per AC3 IEC 60947-4-1 | | | | | | | Auxilary Contact | Part Numbers | | Coil Voltage |
|---|---|---|---|---|---|---|---|---|---|---|
| 1-Phase | | 3-Phase | | | | | | | | |
| 110V | 220V | 220/240V | 380/400V | 415/440V | 500V | 660/690V | | | | |
| 0.37 | 0.75 | 1.5 | 3 | 3 | 3 | 3 | 1NO | YC1K-5 | + | D24: 24V DC<br>D110: 110V DC |
| | | | | | | | 1NC | YC1K-5B | | |
| 0.55 | 1.1 | 2.2 | 4 | 4 | 4 | 4 | 1NO | YC1K-6 | | |
| | | | | | | | 1NC | YC1K-6B | | |

## Accessories

| Description | Current Range | Part Number |
|---|---|---|
| Overload Relay | 0.1-0.16A | YC9Z-RHU5AP16 |
| | 0.16-0.25A | YC9Z-RHU5AP25 |
| | 0.25-0.4A | YC9Z-RHU5AP4 |
| | 0.35-0.5A | YC9Z-RHU5AP5 |
| | 0.45-0.63A | YC9Z-RHU5AP63 |
| | 0.55-0.8A | YC9Z-RHU5AP8 |
| | 0.75-1A | YC9Z-RHU5A1P0 |
| | 0.9-1.3A | YC9Z-RHU5A1P3 |
| | 1.1-1.6A | YC9Z-RHU5A1P6 |
| | 1.4-2A | YC9Z-RHU5A2P0 |
| | 1.8-2.5A | YC9Z-RHU5A2P5 |
| | 2.3-3.2A | YC9Z-RHU5A3P2 |
| | 2.9-4A | YC9Z-RHU5A4P0 |
| | 3.5-4.8A | YC9Z-RHU5A4P8 |
| | 4.5-6.3A | YC9Z-RHU5A6P3 |
| | 5.5-7.5A | YC9Z-RHU5A7P5 |
| | 7.2-10A | YC9Z-RHU5A10P |
| | 9-12.5A | YC9Z-RHU5A12P |

| Description | Form A (NO) | Form B (NC) | Part Number |
|---|---|---|---|
| Top Mount Auxiliary Contact | – | 2 NC | YC9Z-CNA202M |
| | – | 4 NC | YC9Z-CNA404M |
| | 1 NO | 1 NC | YC9Z-CNA211M |
| | 1 NO | 3 NC | YC9Z-CNA413M |
| | 2 NO | – | YC9Z-CNA220M |
| | 2 NO | 2 NC | YC9Z-CNA422M |
| | 3 NO | 1 NC | YC9Z-CNA431M |
| | 4 NO | – | YC9Z-CNA440M |
| Mechanical Interlock | | | YC9Z-CI6 |
| Surge Suppressor Unit | 120V AC | RC | YC9Z-SS1ES |
| | | VARISTOR | YC9Z-SS2ES |
| | 240V AC | RC | YC9Z-SS1HS |
| | | VARISTOR | YC9Z-SS2HS |

## Specifications

### General Specifications

| | YC1N-5/6 | YC1K-5/6 |
|---|---|---|
| Contact Configuration | 3A1a or 3A1b | |
| Making Capacity (A) | 10xIe | |
| Breaking Capacity (A) | 8xIe | |
| Switching Frequency (Operations/Hr) | 1,200 | |
| Electrical Life (Operations) | 1,000,000 | |
| Mechanical Life (Operations) | 5,000,000 | |
| Operating Temperature | -20°C ~ 55°C | |
| Storage Temperature | -40°C ~ 70°C | |
| Weight (Kg) | 0.18 | 0.23 |

Note: Ie = rated operational current

### Main Pole Contact Specifications

| | YC1N-5/6 | YC1K-5/6 |
|---|---|---|
| Insulation Voltage, Ui (V) | IEC: 690 | UL: 600 |
| Operational Voltage, Ue (V) | IEC: 690 | UL: 600 |
| Thermal Current, $I_{th}$ (A) | IEC /UL: 20 | |
| Short Circuit Current Rating (KA) | 5 | |
| NEMA Size Equivalent (approx.) | 00+ | |

### Auxilary Contacts Specifications

| | | | YC1N-5/6 | YC1K-5/6 |
|---|---|---|---|---|
| Insulation Voltage, Ui (V) | | | IEC /UL: 600/600 | |
| Operational Voltage, Ue (V) | | | IEC /UL: 600/600 | |
| Thermal Current, $I_{th}$ (A) | | | AC: 10 | DC: 2.5 |
| Operational Current (A) IEC 60947-5-1 UL 508 | AC-15 A600 | 120V | 6 | |
| | | 240V | 3 | |
| | | 380V | 1.9 | |
| | | 480V | 1.5 | |
| | | 500V | 1.4 | |
| | | 600V | 1.2 | |
| | DC-13 Q300 | 125V | 0.55 | |
| | | 250V | 0.27 | |

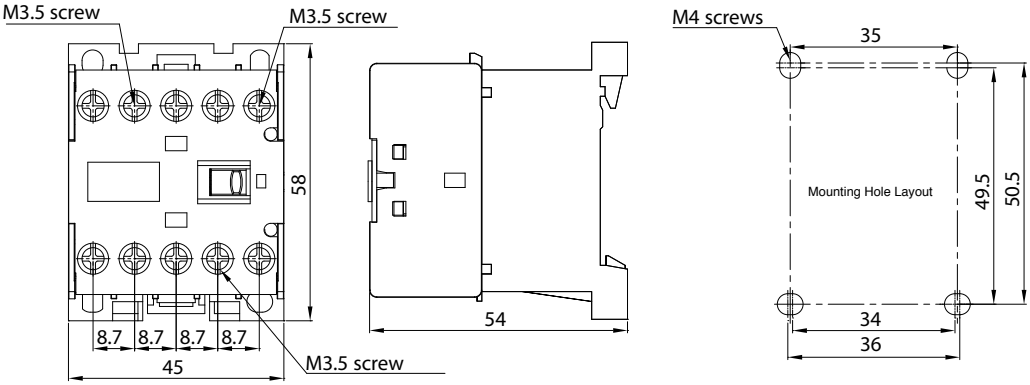
### Coil Specifications

| | | YC1N-5/6 | YC1K-5/6 |
|---|---|---|---|
| Pick-up Voltage | 50/60Hz | 75% | 75% |
| Power Consumption, max. (VA) | Inrush | 27 | – |
| | Sealed | 5 | 3 |
| Power Dissipation max. (W) | | 2 | 3 |

## Dimensions (mm)

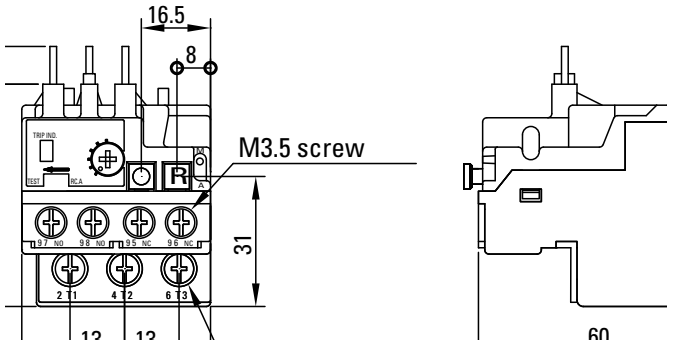
### Contactor

#### YC1N-5/6, YC1K-5/6

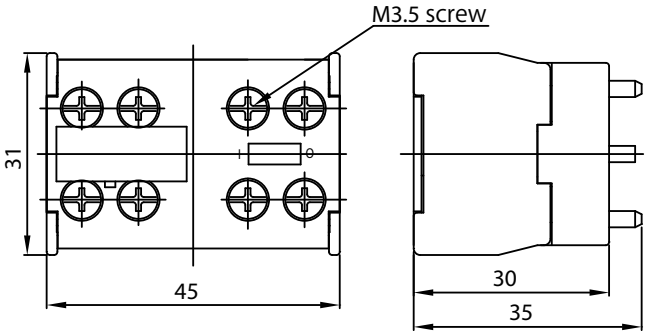



### Accessories

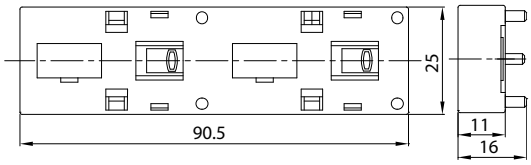
#### Overload Relay YC9Z-RHU5




#### Top Mounting Auxiliary Contact YC9Z-CNA

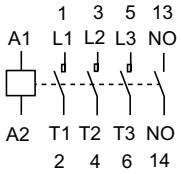



#### Mechanical Interlock YC9Z-CI6

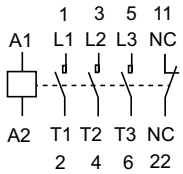



## Electrical Diagrams

#### YC1N-5/6, YC1K-5/6 (1NO Aux.)




#### YC1N-5/6, YC1K-5/6 (1NC Aux.)



# YC1U Series Contactor (AC Coil)

**Part Number Key**

YC1U – [9] [B] [A120]

**Contactor Size***
9, 11, 16, 18, 27, 32, 38, 50, 65, 80

*see selection table for details

**Coil Voltage**
A24: 24V AC, 50/60Hz
A120: 120V AC, 50/60Hz
A240: 240V AC, 50/60Hz
A480: 480V AC, 50/60Hz

**Auxilary Contact Arrangement**
Blank: 1NO (size 9 - 16)
1NO-1NC (size 18 - 38)
2NO-2NC (size 50 - 80)
B: 1NC (size 9 - 16 only)

## Part Numbers

### Selection by Horsepower Rating

| | Rated Power (Hp) per AC3 IEC 60947-4-1 | | | | | | | Rated Power (Hp) per UL508 CSA C22.2 | | | | | | Auxilary Contact | Part Numbers | Coil Voltage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1-Phase | | 3-Phase | | | | | 1-Phase | | 3-Phase | | | | | | |
| | 110V | 220V | 220/240V | 380/400V | 415/440V | 500V | 660/690V | 110/120V | 220/240V | 200/208V | 230/240V | 440/480V | 575V | | | |
| | 0.75 | 1.5 | 3.5 | 5.5 | 5.5 | 5.5 | 5.5 | 0.75 | 2 | 3 | 3 | 5 | 7.5 | 1NO | YC1U-9 | A24: 24V AC<br>A120: 120V AC<br>A240: 240V AC<br>A480: 480V AC |
| | | | | | | | | | | | | | | 1NC | YC1U-9B | |
| | 0.75 | 1.5 | 4 | 7.5 | 7.5 | 7.5 | 7.5 | 1 | 2 | 5 | 5 | 7.5 | 10 | 1NO | YC1U-11 | |
| | | | | | | | | | | | | | | 1NC | YC1U-11B | |
| | 1 | 2 | 5.5 | 10 | 10 | 10 | 10 | 1.5 | 3 | 5 | 5 | 10 | 10 | 1NO | YC1U-16 | |
| | | | | | | | | | | | | | | 1NC | YC1U-16B | |
| | 1.5 | 3 | 7.5 | 15 | 15 | 15 | 15 | 2 | 3 | 7.5 | 7.5 | 15 | 15 | 1NO-1NC | YC1U-18 | |
| | 2 | 4 | 10 | 20 | 20 | 20 | 20 | 2 | 5 | 7.5 | 10 | 20 | 20 | 1NO-1NC | YC1U-27 | |
| | 2 | 5 | 12 | 20 | 20 | 25 | 25 | 3 | 5 | 10 | 15 | 25 | 30 | 1NO-1NC | YC1U-32 | |
| | 3 | 7 | 15 | 25 | 30 | 30 | 30 | 3 | 7.5 | 10 | 15 | 30 | 30 | 1NO-1NC | YC1U-38 | |
| | 4 | 8 | 20 | 35 | 35/40 | 40 | 40 | 5 | 10 | 15 | 20 | 40 | 50 | 2NO-2NC | YC1U-50 | |
| | 4 | 8 | 25 | 40 | 45/50 | 50 | 50 | 5 | 15 | 20 | 25 | 50 | 60 | 2NO-2NC | YC1U-65 | |
| | 5.5 | 10 | 30 | 50 | 54 | 60 | 60 | 7.5 | 15 | 25 | 30 | 60 | 60 | 2NO-2NC | YC1U-80 | |

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## Selection by Amp Rating

| Rated Power (A) per AC3 IEC 60947-4-1 | | | | | | | Rated Power (A) per UL508 CSA C22.2 | | | | | | Auxilary Contact | Part Numbers |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-Phase | | 3-Phase | | | | | 1-Phase | | 3-Phase | | | | | |
| 110V | 220V | 220/ 240V | 380/ 400V | 415/ 440V | 500V | 660/ 690V | 110/ 120V | 220/ 240V | 200/ 208V | 230/ 240V | 440/ 480V | 575V | | |
| 10.5 | 10.5 | 11.5 | 11 | 10/9 | 8 | 6 | 13.8 | 12 | 12 | 9.6 | 7.6 | 9 | 1NO | YC1U-9 |
| | | | | | | | | | | | | | 1NC | YC1U-9B |
| 10.5 | 10.5 | 12 | 12 | 11 | 9 | 7 | 16 | 12 | 18 | 15.2 | 11 | 11 | 1NO | YC1U-11 |
| | | | | | | | | | | | | | 1NC | YC1U-11B |
| 13.5 | 14 | 16 | 16 | 15 | 13 | 10 | 20 | 17 | 18 | 15.2 | 14 | 11 | 1NO | YC1U-16 |
| | | | | | | | | | | | | | 1NC | YC1U-16B |
| 19.5 | 20.5 | 23 | 22 | 21 | 19 | 14 | 24 | 17 | 26 | 22 | 21 | 17 | 1NO-1NC | YC1U-18 |
| 30 | 30 | 30 | 30 | 28/27 | 26 | 21/20 | 24 | 28 | 25.3 | 28 | 27 | 22 | 1NO-1NC | YC1U-27 |
| 35 | 35 | 35 | 32 | 32 | 30 | 23/22 | 34 | 28 | 32.2 | 42 | 34 | 32 | 1NO-1NC | YC1U-32 |
| 39 | 39 | 39 | 38 | 38 | 33 | 25.2/24.2 | 34 | 40 | 32.2 | 42 | 40 | 32 | 1NO-1NC | YC1U-38 |
| 48 | 48 | 55 | 55 | 52 | 45 | 35 | 56 | 50 | 49 | 54 | 52 | 52 | 2NO-2NC | YC1U-50 |
| 50 | 50 | 65 | 64 | 64 | 55 | 45 | 56 | 68 | 63 | 68 | 65 | 62 | 2NO-2NC | YC1U-65 |
| 60 | 60 | 75 | 72 | 72/70 | 65 | 60 | 80 | 68 | 79 | 80 | 77 | 62 | 2NO-2NC | YC1U-80 |

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| Coil Voltage |
|---|
| A24: 24V AC<br>A120: 120V AC<br>A240: 240V AC<br>A480: 480V AC |

## Selection by Kilowatt Rating

| Rated Power (kW) per AC3 IEC 60947-4-1 | | | | | | | Auxilary Contact | Part Numbers |
|---|---|---|---|---|---|---|---|---|
| 1-Phase | | 3-Phase | | | | | | |
| 110V | 220V | 220/ 240V | 380/ 400V | 415/ 440V | 500V | 660/ 690V | | |
| 0.55 | 1.1 | 2.5 | 4 | 4 | 4 | 4 | 1NO | YC1U-9 |
| | | | | | | | 1NC | YC1U-9B |
| 0.55 | 1.1 | 3 | 5.5 | 5.5 | 5.5 | 5.5 | 1NO | YC1U-11 |
| | | | | | | | 1NC | YC1U-11B |
| 0.75 | 1.5 | 4 | 7.5 | 7.5 | 7.5 | 7.5 | 1NO | YC1U-16 |
| | | | | | | | 1NC | YC1U-16B |
| 1.1 | 2.2 | 5.5 | 11 | 11 | 11 | 11 | 1NO-1NC | YC1U-18 |
| 1.5 | 3 | 7.5 | 15 | 15 | 15 | 15 | 1NO-1NC | YC1U-27 |
| 1.5 | 3.7 | 9 | 15 | 15 | 18.5 | 18.5 | 1NO-1NC | YC1U-32 |
| 2.2 | 5 | 11 | 18.5 | 22 | 22 | 22 | 1NO-1NC | YC1U-38 |
| 3 | 6 | 15 | 25 | 25/30 | 30 | 30 | 2NO-2NC | YC1U-50 |
| 3 | 6 | 18.5 | 30 | 33/37 | 37 | 37 | 2NO-2NC | YC1U-65 |
| 4 | 7.5 | 22 | 37 | 40 | 45 | 45 | 2NO-2NC | YC1U-80 |

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| Coil Voltage |
|---|
| A24: 24V AC<br>A120: 120V AC<br>A240: 240V AC<br>A480: 480V AC |

## Accessories

| Item | Contactor Size | Current Range | Part Number |
|---|---|---|---|
| Overload Relay | 9~27 | 0.1-0.16 | YC9Z-RHU10AP16 |
| | | 0.16-0.25 | YC9Z-RHU10AP25 |
| | | 0.25-0.4A | YC9Z-RHU10AP40 |
| | | 0.35-0.5A | YC9Z-RHU10AP5 |
| | | 0.45-0.63A | YC9Z-RHU10AP63 |
| | | 0.55-0.8A | YC9Z-RHU10AP8 |
| | | 0.75-1A | YC9Z-RHU10A1P0 |
| | | 0.9-1.3A | YC9Z-RHU10A1P3 |
| | | 1.1-1.6A | YC9Z-RHU10A1P6 |
| | | 1.4-2A | YC9Z-RHU10A2P0 |
| | | 1.8-2.5A | YC9Z-RHU10A2P5 |
| | | 2.3-3.2A | YC9Z-RHU10A3P2 |
| | | 2.9-4A | YC9Z-RHU10A4P0 |
| | | 3.5-4.8A | YC9Z-RHU10A4P8 |
| | | 4.5-6.3A | YC9Z-RHU10A6P3 |
| | | 5.5-7.5A | YC9Z-RHU10A7P5 |
| | | 7.2-10A | YC9Z-RHU10A10P |
| | | 9-12.5A | YC9Z-RHU10A12P |
| | | 11.3-16A | YC9Z-RHU10A16P |
| | | 15-20A | YC9Z-RHU10A20P |
| | | 21-25A | YC9Z-RHU10A25P |
| | | 24.5-30A | YC9Z-RHU10A30P |
| | 27~38 | 15-20A | YC9Z-RHU10A220 |
| | | 17.5-21.5A | YC9Z-RHU10A21P |
| | | 21-25A | YC9Z-RHU10A225 |
| | | 24.5-30A | YC9Z-RHU10A230 |
| | | 29-36A | YC9Z-RHU10A36P |
| | | 24.5-36A | YC9Z-RHU80A436 |
| | | 35-47A | YC9Z-RHU80A447 |
| | 50~80 | 17-25A | YC9Z-RHU80A325 |
| | | 24.5-36A | YC9Z-RHU80A336 |
| | | 35-47A | YC9Z-RHU80A347 |
| | | 45-60A | YC9Z-RHU80A360 |
| | | 58-75A | YC9Z-RHU80A75P |
| | | 72-90A | YC9Z-RHU80A90P |

| Item | | Part Number |
|---|---|---|
| Mechanical Interlock | for YC1U-9,11, 16, 18, 27, 32, 38 | YC9Z-CI18 |
| | for YC1U-50, 65, 80 | YC9Z-CI35 |

| Item | | | Part Number |
|---|---|---|---|
| Side Mount Auxiliary Contact | for YC1U-9 thru 38 1NO-1NC (1a1b) | | YC9Z-CNA111SR |
| Surge Suppressor Unit | 120V AC | RC | YC9Z-SS1E |
| | | VARISTOR | YC9Z-SS2E |
| | 240V AC | RC | YC9Z-SS1H |
| | | VARISTOR | YC9Z-SS2H |

| Item | Form A (NO) | Form B (NC) | Part Number |
|---|---|---|---|
| Top Mount Auxiliary Contact | – | 2NC | YC9Z-CUA202 |
| | 1NO | 1NC | YC9Z-CUA211 |
| | 2NO | – | YC9Z-CUA220 |
| | 2NO | 2NC | YC9Z-CUA422 |
| | 3NO | 1NC | YC9Z-CUA431 |
| | 4NO | – | YC9Z-CUA440 |

| Item | Size | Coil Voltage | Part Number |
|---|---|---|---|
| Replacement Coils | 9~27 | 24V AC | YC9Z-LCU22A24* |
| | | 110V AC | YC9Z-LCU22A110 |
| | | 120V AC | YC9Z-LCU22A120* |
| | | 208V AC | YC9Z-LCU22A208 |
| | | 220V AC | YC9Z-LCU22A220 |
| | | 240V AC | YC9Z-LCU22A240* |
| | | 480V AC | YC9Z-LCU22A480* |
| | 27~38 | 24V AC | YC9Z-LCU38A24* |
| | | 110V AC | YC9Z-LCU38A110 |
| | | 120V AC | YC9Z-LCU38A120* |
| | | 208V AC | YC9Z-LCU38A208 |
| | | 220V AC | YC9Z-LCU38A220 |
| | | 240V AC | YC9Z-LCU38A240* |
| | | 480V AC | YC9Z-LCU38A480* |
| | 50~80 | 24V AC | YC9Z-LCU80A24* |
| | | 110V AC | YC9Z-LCU80A110 |
| | | 120V AC | YC9Z-LCU80A120* |
| | | 208V AC | YC9Z-LCU80A208 |
| | | 220V AC | YC9Z-LCU80A220 |
| | | 240V AC | YC9Z-LCU80A240* |
| | | 480V AC | YC9Z-LCU80A480* |

* Standard stock coil voltages.

# Specifications

## General Specifications

| | YC1U-9 | YC1U-11 | YC1U-16 | YC1U-18 | YC1U-27 | YC1U-32 | YC1U-38 | YC1U-50 | YC1U-65 | YC1U-80 |
|---|---|---|---|---|---|---|---|---|---|---|
| Contact Configuration | 3A1a , 3A1b | | | 3A1a1b | 3A1a1b | | | 3A2a2b | | |
| Making Capacity (A) | 10xIe | | | 10xIe | 10xIe | | | 10xIe | | |
| Breaking Capacity (A) | 8xIe | | | 8xIe | 8xIe | | | 8xIe | | |
| Switching Frequency (Operations/ Hr) | 1200 | | | 1200 | 1200 | | | 1200 | | |
| Electrical Life (Operations) | 1,000,000 | | | 1,000,000 | 1,000,000 | | | 500,000 | 1,000,000 | 1,000,000 |
| Mechanical Life (Operations) | 5,000,000 | | | 5,000,000 | 5,000,000 | | | 5,000,000 | | |
| Operating Temperature | -20°C ~ 55°C | | | | | | | | | |
| Storage Temperature | -40°C ~ 70°C | | | | | | | | | |
| Weight (Kg) | 0.3 | | | 0.4 | 0.7 | | | 1.3 | | |

Note: Ie = rated operational current

## Main Pole Contact Specifications

| | YC1U-9 | YC1U-11 | YC1U-16 | YC1U-18 | YC1U-27 | YC1U-32 | YC1U-38 | YC1U-50 | YC1U-65 | YC1U-80 |
|---|---|---|---|---|---|---|---|---|---|---|
| Insulation Voltage, Ui (V) | IEC: 660 UL: 600 | | | IEC: 660 UL: 600 | IEC: 1000 UL: 600 | | | IEC: 660 UL: 600 | | |
| Operational Voltage, Ue (V) | IEC: 660 UL: 600 | | | IEC: 660 UL: 600 | IEC: 690 UL: 600 | | | IEC: 660 UL: 600 | | |
| Thermal Current, $I_{th}$ (A) | IEC: 25<br>UL: 24 | | | IEC: 32<br>UL: 35 | IEC: 50<br>UL: 45 | IEC: 60<br>UL: 50 | IEC: 60<br>UL: 55 | IEC: 70<br>UL: 72 | IEC: 80/100<br>UL: 85 | IEC: 100<br>UL: 104 |
| Short Circuit Current Rating (KA) | 5 | | | 5 | 5 | | | 10 | | |
| NEMA Size Equivalent (approx.) | 0 | 0+ | 0+ | 1+ | 1 | 2 | 2 | 2+ | 2+ | 3+ |

## Auxilary Contacts Specifications

| | | | YC1U-9 | YC1U-11 | YC1U-16 | YC1U-18 | YC1U-27 | YC1U-32 | YC1U-38 | YC1U-50 | YC1U-65 | YC1U-80 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Contact Configuration | | | 1a or 1b | | | 1a1b | 1a1b | | | 1a1b | | |
| Insulation Voltage, Ui (V) | | | IEC: 600 UL: 600 | | | IEC: 660 UL: 600 | IEC: 690 UL: 600 | | | IEC: 660 UL: 600 | | |
| Operational Voltage, Ue (V) | | | IEC: 600 UL: 600 | | | IEC: 600 UL: 600 | IEC: 690 UL: 600 | | | IEC: 660 UL: 600 | | |
| Thermal Current, $I_{th}$ (A) | | | AC: 10 DC: 2.5 | | | | | | | | | |
| Contact Rating Code Designatior UL | | | A600 Q300 | | | | | | | | | |
| Operational Current (A) IEC 60947-5-1 UL 508 | AC-15 A600 | 120V | 6 | | | | | | | | | |
| | | 240V | 3 | | | | | | | | | |
| | | 380V | 1.9 | | | | | | | | | |
| | | 480V | 1.5 | | | | | | | | | |
| | | 500V | 1.4 | | | | | | | | | |
| | | 600V | 1.2 | | | | | | | | | |
| | DC-13 Q300 | 125V | 0.55 | | | | | | | | | |
| | | 250V | 0.27 | | | | | | | | | |

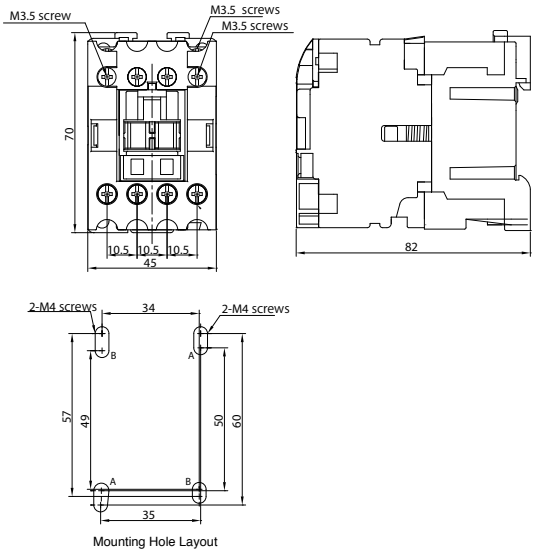
## Coil Specifications

| | | YC1U-9 | YC1U-11 | YC1U-16 | YC1U-18 | YC1U-27 | YC1U-32 | YC1U-38 | YC1U-50 | YC1U-65 | YC1U-80 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pick-up Voltage | 50-60Hz | 70% | | | 75% | 75% | | | 75% | | |
| Power Consumption, max. (VA) | Inrush | 70 | | | 70 | 150 (cos ø = 0.7) | | | 280 | | |
| | Sealed | 12 | | | 12 | 15 (cos ø = 0.3) | | | 32 | | |
| Power Dissipation max. (W) | | 2-4 | | | 2-4 | 5 | | | 6-7.5 | | |

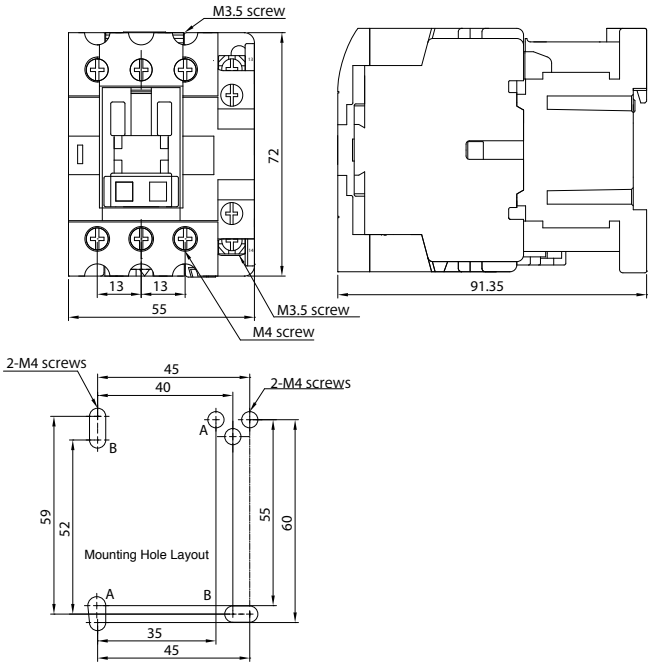
## Dimensions (mm)

### Contactors

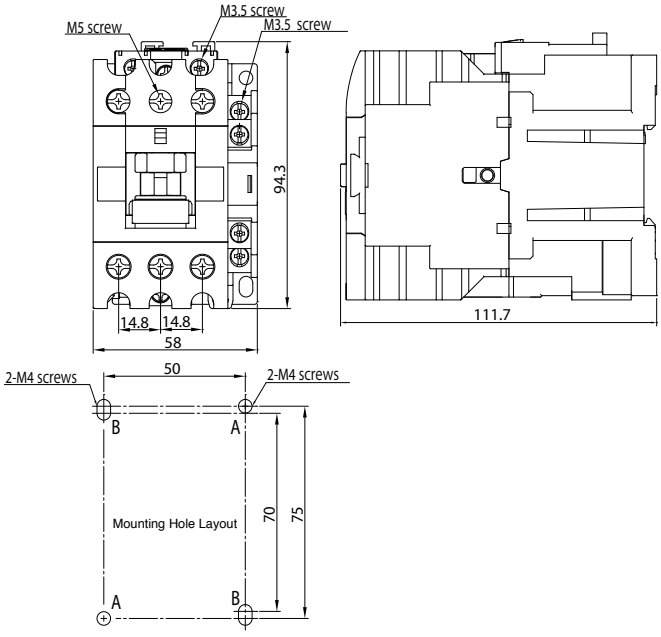
#### YC1U-9, YC1U-11, YC1U-16



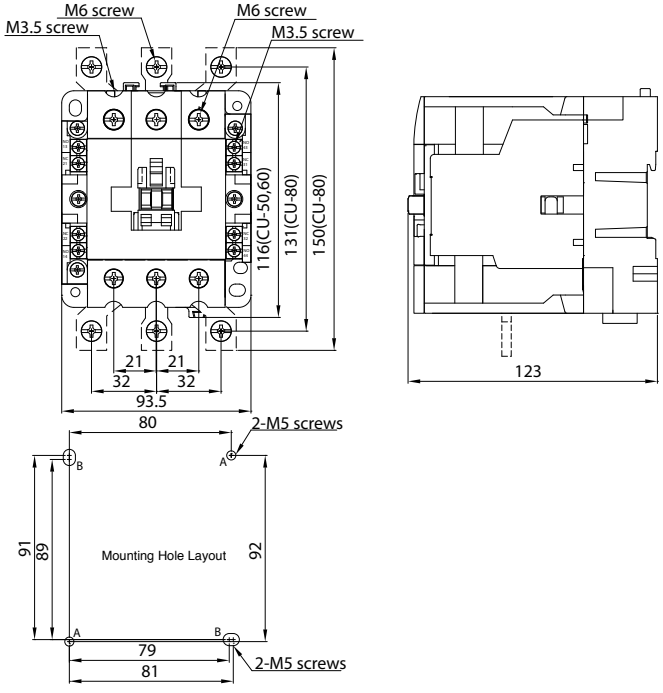

#### YC1U-18




#### YC1U-27, YC1U-32, YC1U-38



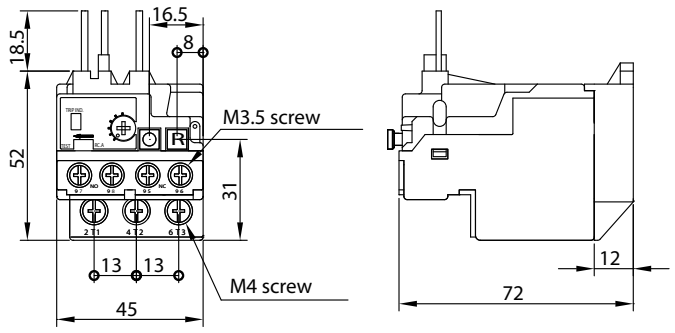

#### YC1U-50, YC1U-65, YC1U-80



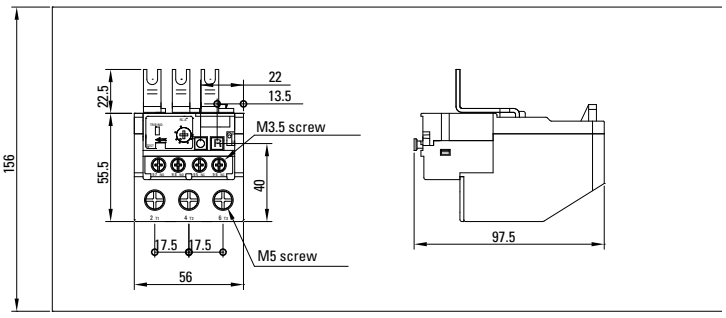
## Dimensions (mm)

### Overload Relays

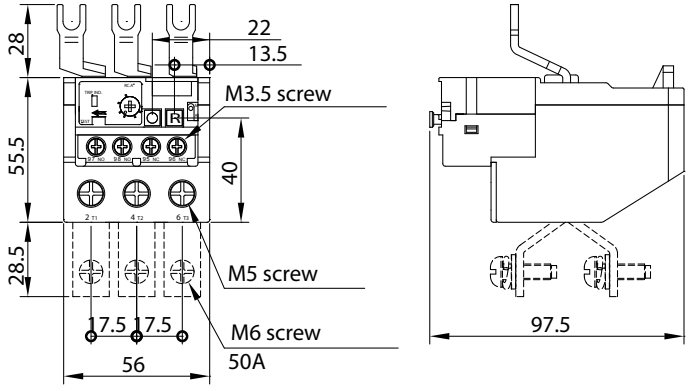
#### YC9Z-RHU10 (for YC1U-9, 11, 16, 18)




#### YC9Z-RHU10 (for YC1U-27, 32, 38, 40)

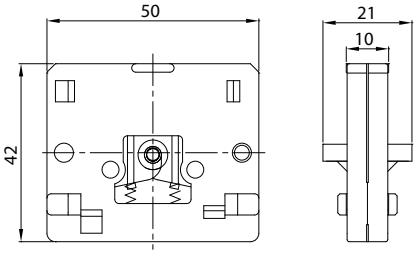



#### YC9Z-RHU80 (for YC1U-50, 65, 80)

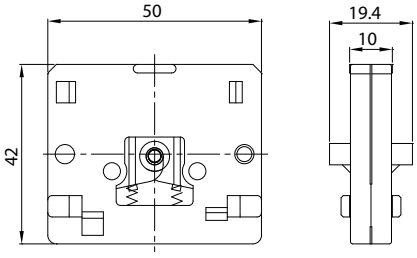



### Mechanical Interlocks

#### YC9Z-CI18 (for YC1U-9, 11, 16, 27, 32, 38)

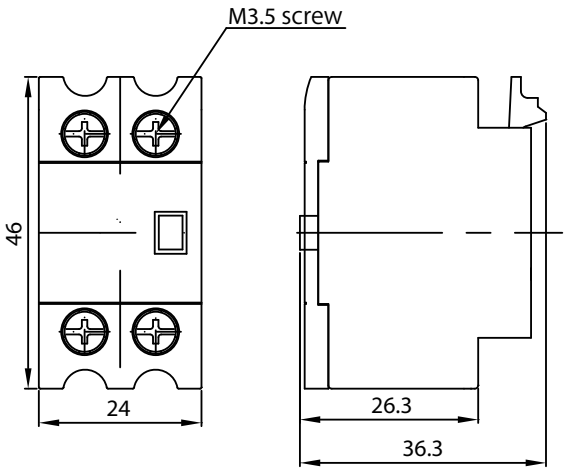



#### YC9Z-CI135 (for YC1U-50, 65, 80)

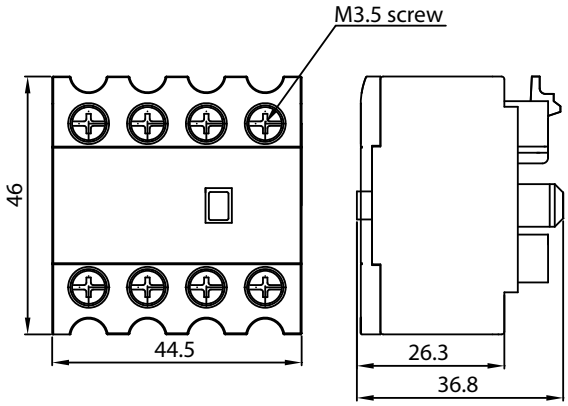


### Top Mounting Auxiliary Contacts

**YC9Z-CUA2**

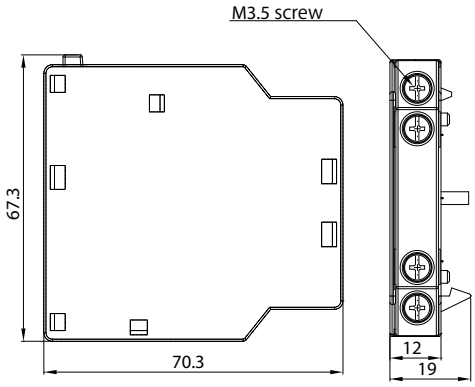



**YC9Z-CUA4**



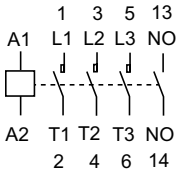

### Side Mounting Auxiliary Contact

**YC9Z-CNA111SR (1a1b for YC1U-9 to YC1U-38)**

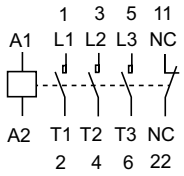



## Electrical Diagrams

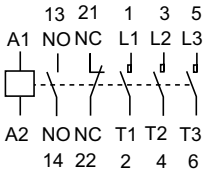
**YC1U-9/11/16 (1NO Aux.)**




**YC1U-9/11/16 (1NC Aux.)**




**YC1U-18 to YC1U-38 (1NO-1NC Aux.)**



# YC1N Series Contactors (AC Coil)

**Part Number Key**

YC1N – 125 A120

**Contactor Size***
100, 125, 150, 180, ~~220, 300~~

**Coil Voltage**
A24: 24V AC, 50/60Hz
A120: 120V AC, 50/6-Hz
A240: 240V AC, 50/60Hz
A480: 480V AC, 50/60Hz

*see selection table for details

## Part Numbers

### Selection by Horsepower Rating

| | Rated Power (Hp) per AC3 IEC 60947-4-1 | | | | | Rated Power (Hp) per UL508 CSA C22.2 | | | | | | Auxilary Contact | Part Numbers | | Coil Voltage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3-Phase | | | | | 1-Phase | | 3-Phase | | | | | | | |
| | 220/ 240V | 380/ 400V | 415/ 440V | 500V | 660/ 690V | 110/ 120V | 220/ 240V | 200/ 208V | 230/ 240V | 440/ 480V | 575V | | | | |
| | 40 | 80 | 80 | 85 | 85 | 10 | 15 | 30 | 40 | 75 | 100 | 2NO-2NC | YC1N-100 | + | A24: 24V AC<br>A120: 120V AC<br>A240: 240V AC<br>A480: 480V AC |
| | 54 | 100 | 100 | 100 | 100 | – | – | 40 | 50 | 100 | 100 | | YC1N-125 | | |
| | 60 | 110 | 110 | 125 | 136 | – | – | 50 | 75 | 125 | 125 | | YC1N-150 | | |
| | 75 | 125 | 136 | 150 | 150 | – | – | 60 | 75 | 150 | 150 | | YC1N-180 | | |
| | 85 | 160 | 170 | 180 | 180 | – | – | 75 | 100 | 200 | 200 | | YC1N-220 | | |
| | 120 | 220 | 220 | 220 | 270 | – | – | 100 | 125 | 250 | 250 | | YC1N-300 | | |

## Selection by Amp Rating

| Rated Power (A) per AC3 IEC 60947-4-1 | | | | | Rated Power (A) per UL508 CSA C22.2 | | | | | | Auxilary Contact | Part Numbers | Coil Voltage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-Phase | | | | | 1-Phase | | 3-Phase | | | | | | |
| 220/240V | 380/400V | 415/440V | 500V | 660/690V | 110/120V | 220/240V | 200/208V | 230/240V | 440/480V | 575V | | | |
| 115 | 115 | 105 | 93 | 75 | 100 | 68 | 92 | 104 | 96 | 99 | 2NO-2NC | YC1N-100 | A24: 24V AC<br>A120: 120V AC<br>A240: 240V AC<br>A480: 480V AC |
| 138 | 138 | 138 | 105 | 85 | – | – | 120 | 130 | 124 | 99 | | YC1N-125 | |
| 150 | 147 | 138 | 129 | 107 | – | – | 150 | 154 | 156 | 125 | | YC1N-150 | |
| 182 | 179 | 182 | 156 | 118 | – | – | 177 | 192 | 180 | 144 | | YC1N-180 | |
| 225 | 225 | 220 | 190 | 140 | – | – | 221 | 248 | 240 | 192 | | YC1N-220 | |
| 300 | 300 | 300 | 250 | 220 | – | – | 285 | 312 | 302 | 242 | | YC1N-300 | |

+

## Selection by Kilowatt Rating

| Rated Power (kW) per AC3 IEC 60947-4-1 | | | | | Auxilary Contact | Part Numbers | Coil Voltage |
|---|---|---|---|---|---|---|---|
| 3-Phase | | | | | | | |
| 220/240V | 380/400V | 415/440V | 500V | 660/690V | | | |
| 30 | 60 | 60 | 65 | 65 | 2NO-2NC | YC1N-100 | A24: 24V AC<br>A120: 120V AC<br>A240: 240V AC<br>A480: 480V AC |
| 40 | 75 | 75 | 75 | 75 | | YC1N-125 | |
| 45 | 80 | 80 | 90 | 100 | | YC1N-150 | |
| 55 | 95 | 100 | 110 | 110 | | YC1N-180 | |
| 65 | 120 | 132 | 132 | 132 | | YC1N-220 | |
| 90 | 160 | 160 | 160 | 220 | | YC1N-300 | |

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## Accessories

| Item | Size | Current Range | Part Number |
|---|---|---|---|
| Overload Relay | 100, 125 | 65~95A | YC9Z-RHN100A95P |
| | | 85~125A | YC9Z-RHN100A125 |
| | | 110~160A | YC9Z-RHN100A160 |
| | 150 | 65~95A | YC9Z-RHN150A95P |
| | | 85~125A | YC9Z-RHN150A125 |
| | | 110~160A | YC9Z-RHN150A160 |
| | 180 | 110~160A | YC9Z-RHN180A160 |
| | | 125~185A | YC9Z-RHN180A185 |
| | 220, 300 | 110~160A | YC9Z-RHN220A160 |
| | | 125~185A | YC9Z-RHN220A185 |

| Item | | | Part Number |
|---|---|---|---|
| Mechanical Interlock | | | YC9Z-CI100 |
| Side Mount Auxiliary Contact | 1a1b | | YC9Z-CNA111BC |
| Surge Suppressor Unit | 120V AC | RC | YC9Z-SS1E |
| | | VARISTOR | YC9Z-SS2E |
| | 240V AC | RC | YC9Z-SS2H |
| | | VARISTOR | YC9Z-SS1H |

| Item | Contactor Size | Coil Voltage | Part Number |
|---|---|---|---|
| Replacement Coils | 100, 125 | 24VAC | YC9Z-LCN125A24* |
| | | 110VAC | YC9Z-LCN125A110 |
| | | 120VAC | YC9Z-LCN125A120* |
| | | 208VAC | YC9Z-LCN125A208 |
| | | 220VAC | YC9Z-LCN125A220 |
| | | 240VAC | YC9Z-LCN125A240* |
| | | 480VAC | YC9Z-LCN125A480* |
| | 150, 180 | 24VAC | YC9Z-LCN180A24* |
| | | 110VAC | YC9Z-LCN180A110 |
| | | 120VAC | YC9Z-LCN180A120* |
| | | 208VAC | YC9Z-LCN180A208 |
| | | 220VAC | YC9Z-LCN180A220 |
| | | 240VAC | YC9Z-LCN180A240* |
| | | 480VAC | YC9Z-LCN180A480* |
| | 220, 300 | 24VAC | YC9Z-LCN300A24* |
| | | 110VAC | YC9Z-LCN300A110 |
| | | 120VAC | YC9Z-LCN300A120* |
| | | 208VAC | YC9Z-LCN300A208 |
| | | 220VAC | YC9Z-LCN300A220 |
| | | 240VAC | YC9Z-LCN300A240* |
| | | 480VAC | YC9Z-LCN300A480* |

* Standard stock coil voltages.

# Specifications

## General Specifications

| | YC1N-100 | YC1N-125 | YC1N-150 | YC1N-180 | YC1N-220 | YC1N-300 |
|---|---|---|---|---|---|---|
| Contact Configuration | 3A2a2b | | | | | |
| Making Capacity (A) | 10xIe | | | | | |
| Breaking Capacity (A) | 8xIe | | | | | |
| Switching Frequency (Operations/ Hr) | 1,200 | | | | | |
| Electrical Life (Operations) | 1,000,000 | | | | | |
| Mechanical Life (Operations) | 5,000,000 | | | | | |
| Operating Temperature | -20°C ~ 55°C | | | | | |
| Storage Temperature | -40°C ~ 70°C | | | | | |
| Weight (Kg) | 2.2 | | 4.1 | | 6.7 | |

Note: Ie = rated operational current

## Main Pole Contact Specifications

| | YC1N-100 | YC1N-125 | YC1N-150 | YC1N-180 | YC1N-220 | YC1N-300 |
|---|---|---|---|---|---|---|
| Insulation Voltage, Ui (V) | IEC: 1000 UL: 600 | | IEC: 1000 UL:600 | | IEC: 1000 UL:600 | |
| Operational Voltage, Ue (V) | IEC: 690 UL:600 | | IEC: 690 UL:600 | | IEC: 690 UL:600 | |
| Thermal Current, $I_{th}$ (A) | IEC: 135 UL: 130 | IEC/UL: 150 | IEC/UL: 200 | IEC/UL: 240 | IEC/UL: 260 | IEC/UL: 350 |
| Short Circuit Current Rating (KA) | 10 | | 10 | | 18 | |
| NEMA Size Equivalent (approx.) | 3 | 4 | 4 | 4 | 4 | 5 |

## Auxiliary Contacts Specifications

| | | | YC1N-100 | YC1N-125 | YC1N-150 | YC1N-180 | YC1N-220 | YC1N-300 |
|---|---|---|---|---|---|---|---|---|
| Insulation Voltage, Ui (V) | | | IEC: 690 UL:600 | | | | | |
| Operational Voltage, Ue (V) | | | IEC: 690 UL: 600 | | | | | |
| Thermal Current, $I_{th}$ (A) | | | AC: 10 DC: 2.5 | | | | | |
| Contact Rating Code Designatior UL | | | A600 Q300 | | | | | |
| Operational Current (A) IEC 60947-5-1 UL 508 | AC-15 A600 | 120V | 6 | | | | | |
| | | 240V | 3 | | | | | |
| | | 380V | 1.9 | | | | | |
| | | 480V | 1.5 | | | | | |
| | | 500V | 1.4 | | | | | |
| | | 600V | 1.2 | | | | | |
| | DC-13 Q300 | 125V | 0.55 | | | | | |
| | | 250V | 0.27 | | | | | |

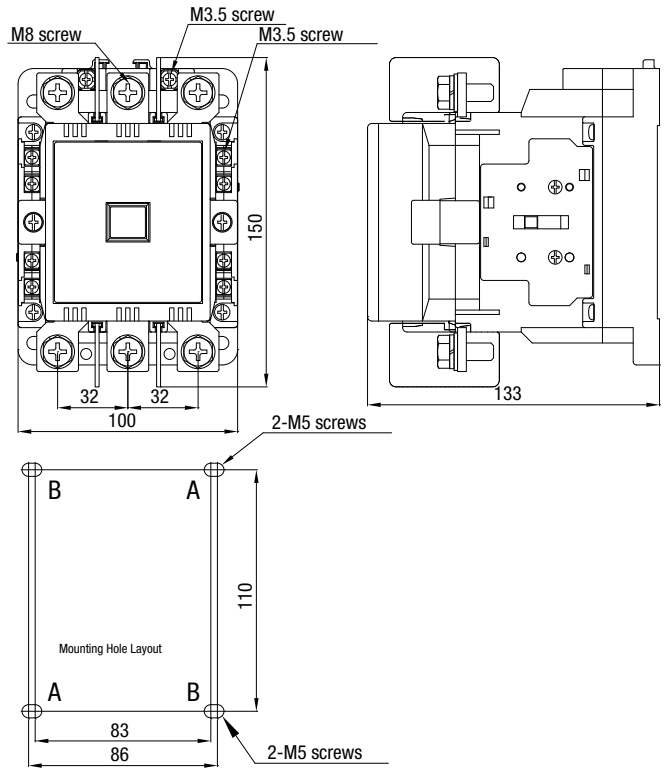
## Coil Specifications

| | | YC1N-100/YC1N-125 | YC1N-150/YC1N-180 | YC1N-220/YC1N-300 |
|---|---|---|---|---|
| Pick-up Voltage | 50/60Hz | 75% | 75% | 75% |
| Drop-out Voltage | | 60% | 45% | 45% |
| Power Consumption, max. (VA) | Inrush | 560 | 700 | 300 |
| | Sealed | 63 | 88 | 63 |
| Power Dissipation max. (W) | | 6-11.6 | 25-35 | 9-15 |

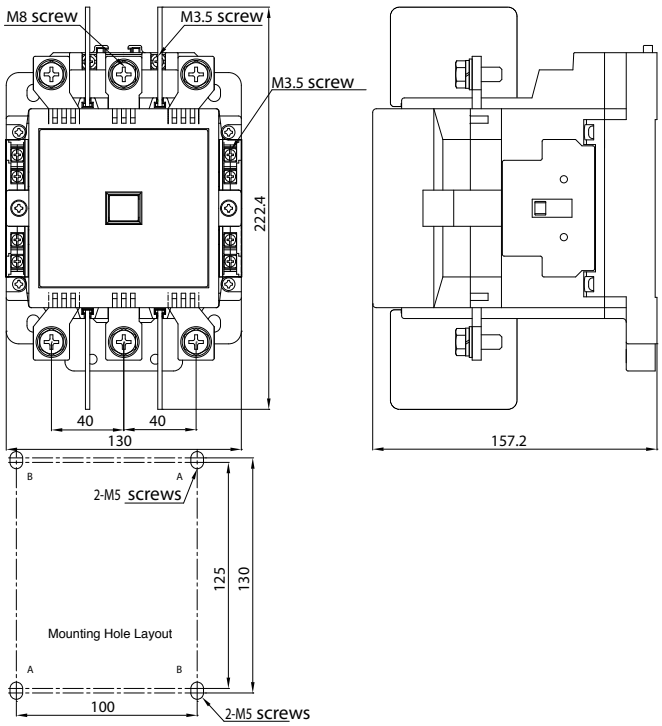
## Dimensions (mm)

### Contactors

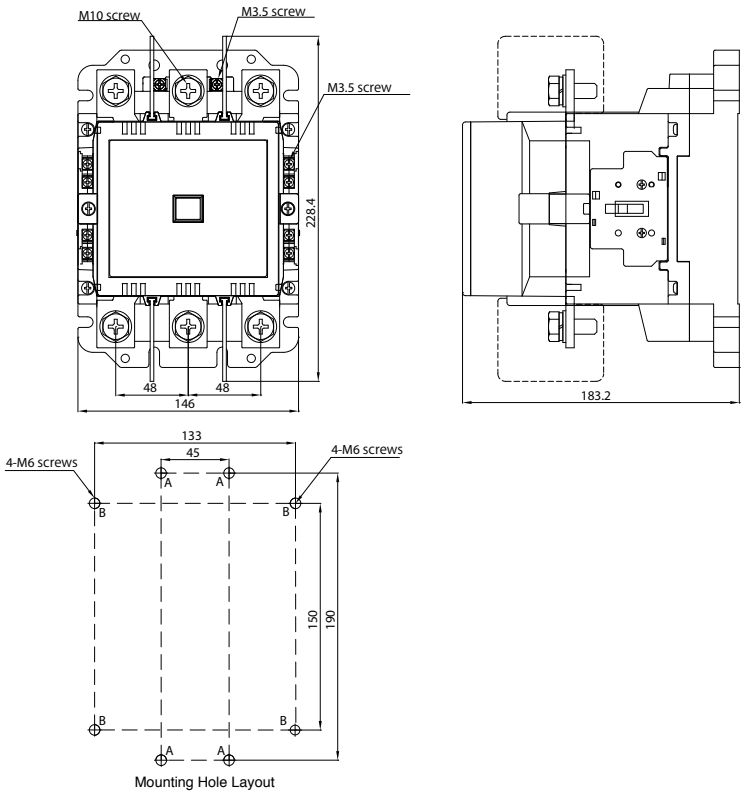
#### YC1N-100, YC1N-125




#### YC1N-150, YC1N-180



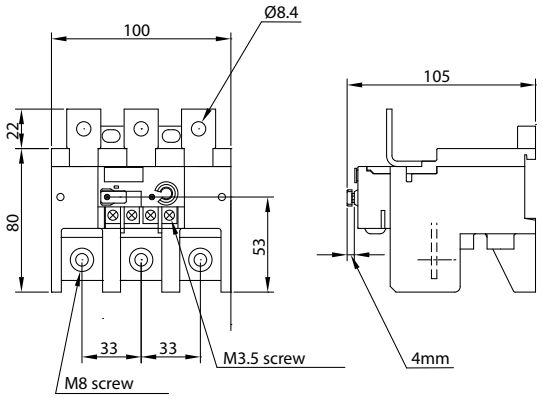

#### YC1N-220, YC1N-300



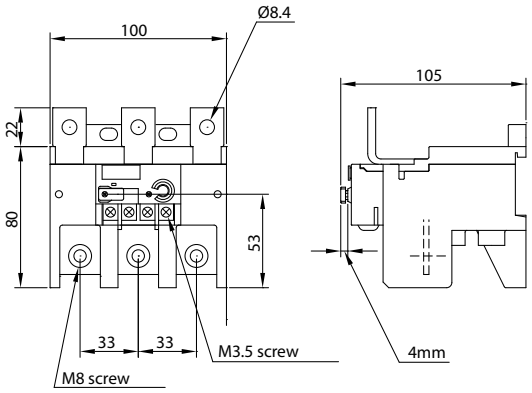
## Dimensions (mm)

### Overload Relay

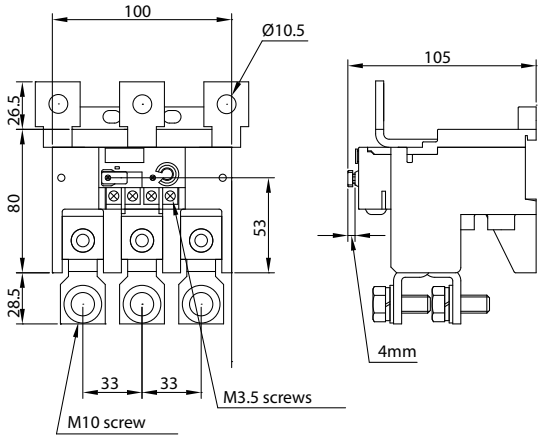
#### YC9Z-RHN100



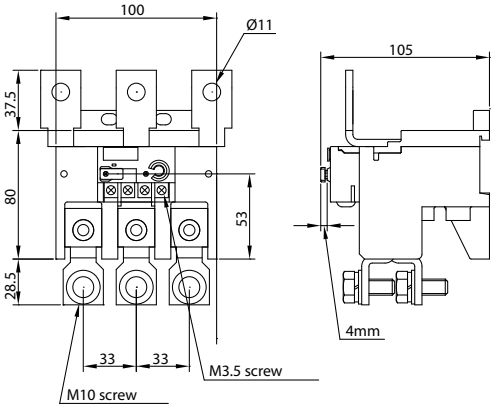

#### YC9Z-RHN150



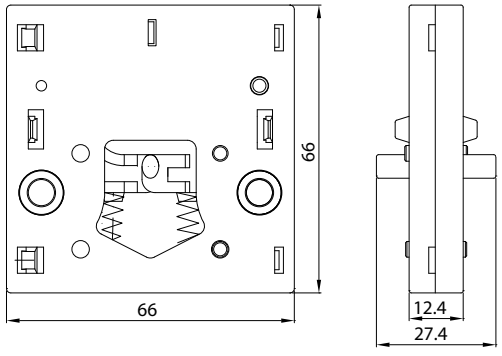

#### YC9Z-RHN180



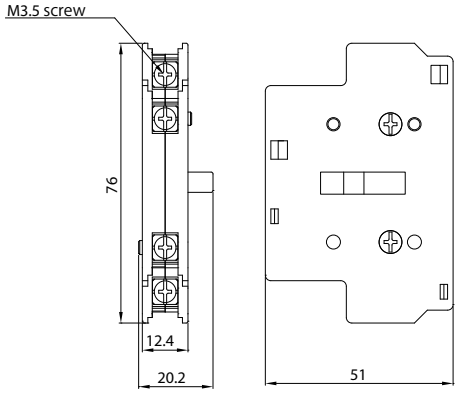

#### YC9Z-RHN220




### Mechanical Interlock YC9Z-CI100




### Side Mounting Auxilary Contact YC9Z-CNA111BC (1a1b)




## Electrical Diagram

#### YC1N-100 to YC1N-300

Selection Guides ..... 994
General Purpose Terminal Blocks ..... 995
BN/BNH Modular Terminal & Fuse Blocks ... 995
BN High Current Power Blocks ..... 999
BA One Piece Terminal/Fuse Blocks & Small Current Power Blocks ..... 1001
BX Break-Out Modules..... 1011

# Terminal Blocks

IDEC

**www.IDEC.com/terminalblocks**

# Selection Guide

| Description | Appearance | Page | Current |
|---|---|---|---|
| Modular DIN Rail Terminal Blocks | | 995 | 10A to 150A |
| Modular DIN Rail Fuse Holders | | 997 | 10A maximum |
| One-Piece Power Blocks (DIN rail and surface mount) | | 999 | 200A to 350A |
| One-Piece DIN Rail Terminal Blocks | | 1001 | 15A to 40A |
| One-Piece DIN Rail Fuse Holders | | 1002 | 10A maximum |
| DIN Rail Break-Out Modules | | 1011 | 1A maximum |

**Key features of IDEC terminal blocks include:**

- Molded from UL94-V0 material with excellent flame- and shock-resistance
- Mounts on a standard 35mm DIN rail
- Marking strips and dust covers are available
- Control circuit, power circuits, and fuse blocks, are available
- Sectional or one-piece construction

| | | |
|---|---|---|
| Specifications | Insulation Voltage | 600V |
| | Dielectric Strength | 2,500V AC, 1 minute |
| | Insulation Resistance | 100MΩ minimum |
| | Operating Temperature | –25 to +55°C |
| | Operating Humidity | 45 to 85% RH |

## BNH/BN Series

**Key features:**

- Touch-down terminals with spring-loaded captive screws
- Jumpers available up to 50A model
- Fuse block with or without blown-fuse indicator in neon or LED
- Mounts on 35mm standard DIN rail

UL Recognized
File No. E78117

CSA Certified
File No. LR64803

TÜV Rheinland
File No. R9551701
J9551516 (power blocks)
R9650688 (dual-deck blocks)

## Specifications

| Model | | BNH10W | BNH15MW | BNH15LW | BNH30W |
|---|---|---|---|---|---|
| Appearance | | | | | |
| Width | | 0.275" (7mm) | 0.315" (8mm) | 0.413" (10.5mm) | 0.472" (12mm) |
| Approvals | | UL, CSA, TUV | UL, CSA, TUV | UL, CSA, TUV | UL, CSA, TUV |
| No. of Poles | | 1 | 1 | 1 | 1 |
| Wire Sizes | | 22 to 16 AWG | 22 to 14 AWG | 22 to 14 AWG | 18 to 10 AWG |
| Voltage/Current | | 600V / 10A | 600V / 10A | 600V / 15A | 600V / 30A |
| Terminals | Size | M3 | M3 | M3.5 | M4 |
| | Type | Touch-down | Touch-down | Touch-down | Touch-down |
| Mounting | | 35mm DIN rail | 35mm DIN rail | 35mm DIN rail | 35mm DIN rail |
| Terminal Torque | (N-m) | 0.6 - 1.0 | 0.6 - 1.0 | 1.0 - 1.3 | 1.4 - 2.0 |
| | (in-lbs.) | 5.3 - 8.9 | 5.3 - 8.9 | 8.9 - 11.5 | 12.4 - 17.8 |
| End Plate | | BNE15W | BNE15W | BNE15W | BNE30W |
| DIN Rail Stop | | BNL-5 | BNL-5 | BNL-5 | BNL-5 |
| Dust Cover | | BNC230 | BNC230 | BNC230 | BNC230 |
| Marking Strip | PVC | BNM7 | BNM7 | BNM7 | BNM7 |
| | Fiberglass | BNM9 | BNM9 | BNM9 | BNM9 |
| | End clip | BNM3 | BNM3 | BNM3 | BNM3 |
| Ring Terminal Jumpers | | BNJ16 | BNJ26W | BNJ46 | BNJ56 |
| Fork Terminal Jumpers | | BNJ16F | BNJ26FW | BNJ46F | BNJ56F |

1. BNDN1000 aluminum DIN rails are available in 1 meter lengths.
2. Marking strips are sold in 1 meter lengths.
3. Most jumpers are provided with 6 poles (except for BNH50W jumper that is 2-poles only).
4. Remove the "H" in the terminal block part number for standard screw type (ex. BNH10W becomes BN10W).

## Specifications, continued

| Model | | BNH50W | BN75W | BN150W | BNDH15W |
|---|---|---|---|---|---|
| Appearance | | | | | |
| Width | | 0.610" (15.5mm) | 0.787" (20mm) | 1.024" (26mm) | 0.315" (8mm) |
| Approvals | | UL, CSA, TUV | UL, CSA, TUV | UL, CSA, TUV | UL, CSA, TUV |
| No. of Poles | | 1 | 1 | 1 | 2 |
| Wire Sizes | | 16 to 6 AWG | 16 to 4 AWG | 16 to 0 AWG | 22 to 14 AWG |
| Voltage/Current | | 600V / 50A | 600V / 75A | 600V / 150A | 600V / 10A |
| Terminals | Size | M5 | M6 | M8 | M3 |
| | Type | Touch-down | Hex bolt | Hex bolt | Touch-down |
| Mounting | | 35mm DIN rail | 35mm DIN rail | 35mm DIN rail | 35mm DIN rail, surface |
| Terminal Torque | (N-m) | 2.6 - 3.7 | 3.9 - 5.4 | 10 - 13.5 | 0.6 - 1.0 |
| | (in-lbs.) | 23.1 - 32.8 | 34.6 - 47.9 | 88.8 - 119.8 | 5.3 - 8.9 |
| End Plate | | BNE50W | BNE75W | BNE150W | BNDE15W |
| DIN Rail Stop | | BNL-5 | BNL-6 | BNL-6 | BNL-8 |
| Dust Cover | | BNC320 | BNC420 | BNC520 | BNC230 (top level)<br>BNC240 (bottom Level) |
| Marking Strip | PVC | BNM7 | BNM7 | BNM7 | BNM7 |
| | Fiberglass | BNM9 | BNM9 | BNM9 | BNM9 |
| | End clip | BNM3 | BNM3 | BNM3 | BNM3 |
| Connecting Rods | | — | — | — | BNR1 10.34" (265mm)<br>BNR2 19.69" (500mm) |
| Connecting Nuts | | — | — | — | BNN1 (2 pieces) |
| Base Mount Brackets | | — | — | — | BNDL2 |
| Ring Terminal Jumpers | | BNJ62 (2 pole) | — | — | BNJ26 |
| Fork Terminal Jumpers | | — | — | — | BNJ26FW |

1. BNDN1000 aluminum DIN rails are available in 1 meter lengths.
2. Marking strips are available in 1 meter lengths.
3. Most jumpers are six poles (except for BNJ62 which is 2 poles only).
4. Remove the "H" in the terminal block part number for standard screw type (ex. BNH50W becomes BN50W).

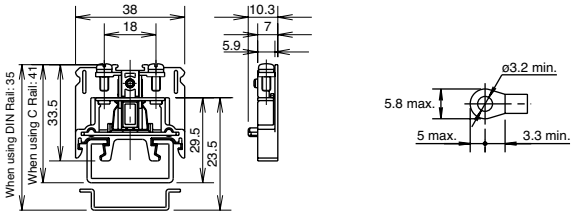
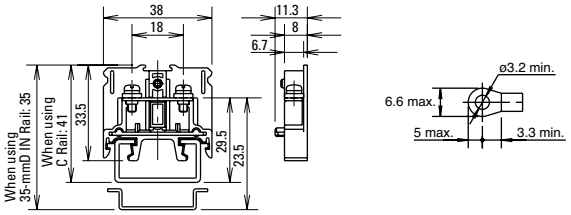
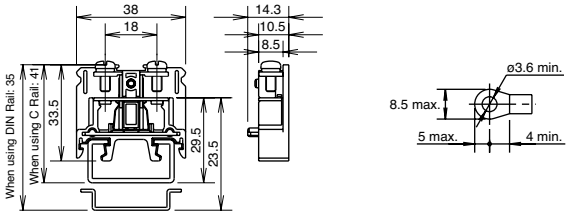
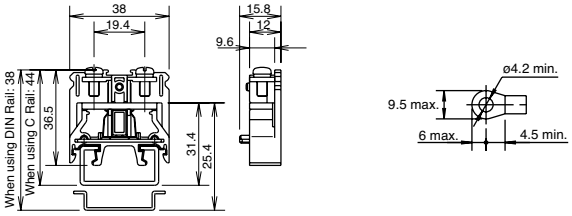
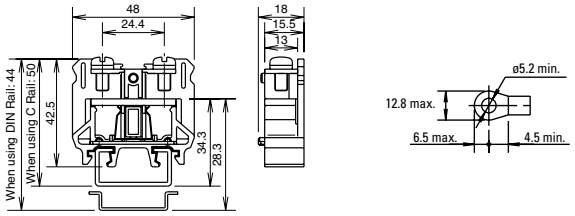
## Specifications, continued

| Model | | BNF10SW | BNF10NW | BNF10DW |
|---|---|---|---|---|
| Appearance | | | | |
| Width | | 0.591" (15mm) | 0.591" (15mm) | 0.591" (15mm) |
| Blown Fuse Indicator | | None | Neon (100–300VAC) | LED (24V DC) |
| Approvals | | UL, CSA | UL, CSA | UL, CSA |
| No. of Poles | | 1 | 1 | 1 |
| Wire Sizes | | 18 to 10 AWG | 18 to 10 AWG | 18 to 10 AWG |
| Voltage/Current | | 600V/10A maximum | 600V/10A maximum | 600V/10A maximum |
| Terminals | Size | M4 | M4 | M4 |
| | Type | Standard screw | Standard screw | Standard screw |
| Mounting | | 35mm DIN rail | 35mm DIN rail | 35mm DIN rail |
| Terminal Torque | (N-m) | 1.4 - 2.0 | 1.4 - 2.0 | 1.4 - 2.0 |
| | (in-lbs.) | 12.4 - 17.8 | 12.4 - 17.8 | 12.4 - 17.8 |
| End Plate | | BNE20 | BNE20 | BNE20 |
| DIN Rail Stop | | BNL-5 | BNL-5 | BNL-5 |
| Dust Cover | | — | — | — |
| Marking Strip | | BNM7 | BNM7 | BNM7 |
| Applicable Fuse Size | | 1/4" x 1-1/4" (6.35 x 31.8mm) | 1/4" x 1-1/4" (6.35 x 31.8mm) | 1/4" x 1-1/4" (6.35 x 31.8mm) |

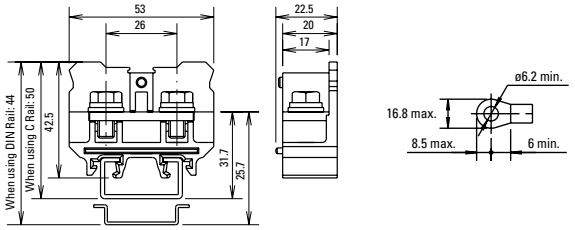
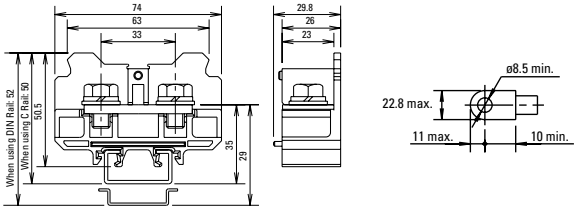
1. BNDN1000 aluminum DIN rails are available in 1 meter lengths.
2. Fuses not included.

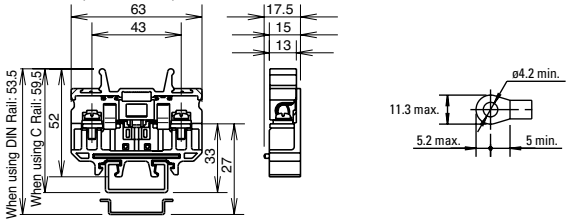
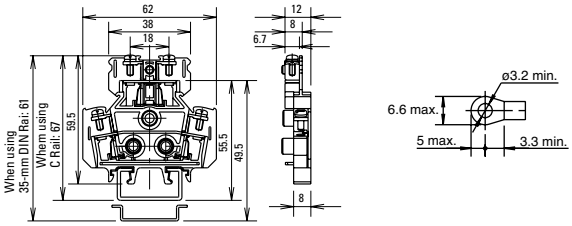
# Dimensions

## BNH Series

| Part No. | Diagrams |
|---|---|
| BNH10W<br>BNH15MW | BNH10W<br>  <br>BNH15MW<br>  |
| BNH15LW<br>BNH30W | BNH15LW<br>  <br>BNH30W<br>  |
| BNH50W | BNH50W<br>  |

## BN Series

| Part No. | Diagrams |
|---|---|
| BN75W<br>BN150W | BN75W<br>  <br>BN150W<br>  |

| Part No. | Diagrams |
|---|---|
| BNF10SW<br>BNF10NW<br>BNW10DW | BNF10SW/BNF10NW/BNF10DW<br>  |
| BNDH15W | BND15W<br>  |

## BN Power Block Series

**Key features:**

- Up to 350A are available for DIN rail or direct mounting on panel surfaces
- 2, 3, 4 pole models available

UL Recognized
File No. E78117

CSA Certified
File No. LR64803

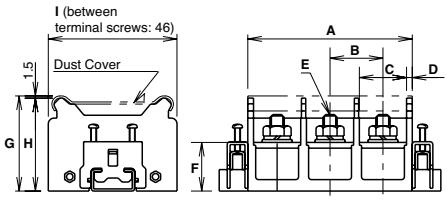
TÜV Rheinland
File No. J9551516

## Specifications

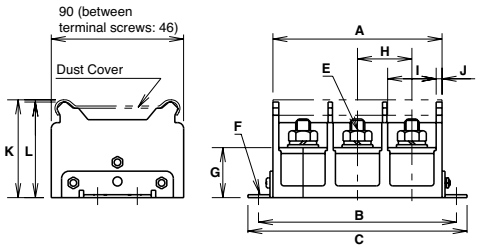
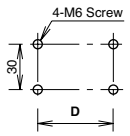
| Model | | BN200NW# (replace # with the number of poles) | BN400NW# (replace # with the number of poles) | BN200NW#K (replace # with the number of poles) | BN400NW#K (replace # with the number of poles) |
|---|---|---|---|---|---|
| Appearance | | | | | |
| Width | | See dimension table on page 1000 | See dimension table on page 1000 | See dimension table on page 1000 | See dimension table on page 1000 |
| Approvals | | UL, CSA, TUV | UL, CSA, TUV | UL, CSA, TUV | UL, CSA, TUV |
| No. of Poles | | 2, 3, 4 | 2, 3, 4 | 2, 3, 4 | 2, 3, 4 |
| Wire Sizes | | 0000 AWG | 400 mcm | 0000 AWG | 400 mcm |
| Voltage/Current | | 600V / 200A | 600V / 350A | 600V / 200A | 600V / 350A |
| Terminals | Size | M10 stud | M12 stud | M10 stud | M12 stud |
| | Type | 17mm hex | 19mm hex | 17mm hex | 19mm hex |
| Mounting | | 35mm DIN rail | 35mm DIN rail | Surface | Surface |
| Terminal Torque | (N-m) | 21 - 28 | 38 - 49 | 21 - 28 | 38 - 49 |
| | (in-lbs.) | 186 - 249 | 337 - 435 | 186 - 249 | 337 - 435 |
| DIN Rail Stop | | BNL-8 | BNL-8 | — | — |
| Dust Cover | | Included | Included | Included | Included |
| Marking Strip | | Included | Included | Included | Included |

1. BNDN1000 aluminum DIN rails are available in 1 meter lengths.

## Dimensions

| Part No. | Diagram |
|---|---|
| BN200NW<br>BN400NW |  |

| Part No. | No. of poles | Dim A | Dim B | Dim C | Dim D | Dim E | Dim F | Dim G | Dim H | Dim I |
|---|---|---|---|---|---|---|---|---|---|---|
| BN200NW | 2-Pole | 3.04″ (78mm) | 1.44″ (37mm) | 1.29″ (33mm) | 0.156″ (4mm) | Terminal stud M10 | 1.33″ (34mm) | 2.59″ (66.5mm) | 2.56″ (65mm) | 3.51″ (90mm) |
| | 3-Pole | 4.49″ (115mm) | 1.44″ (37mm) | 1.29″ (33mm) | 0.156″ (4mm) | Terminal stud M10 | 1.33″ (34mm) | 2.59″ (66.5mm) | 2.56″ (65mm) | 3.51″ (90mm) |
| | 4-Pole | 5.93″ (152mm) | 1.44″ (37mm) | 1.29″ (33mm) | 0.156″ (4mm) | Terminal stud M10 | 1.33″ (34mm) | 2.59″ (66.5mm) | 2.56″ (65mm) | 3.51″ (90mm) |
| BN400NW | 2-Pole | 4.41″ (113mm) | 2.22″ (57mm) | 2.03″ (52mm) | 0.195″ (5mm) | Terminal stud M12 | 1.48″ (38mm) | 3.18″ (81.5mm) | 3.12″ (80mm) | 4.68″ (120mm) |
| | 3-Pole | 6.86″ (176mm) | 2.22″ (57mm) | 2.03″ (52mm) | 0.195″ (5mm) | Terminal stud M10 | 1.48″ (38mm) | 3.18″ (81.5mm) | 3.12″ (80mm) | 4.68″ (120mm) |
| | 4-Pole | 9.09″ (233mm) | 2.22″ (57mm) | 2.03″ (52mm) | 0.195″ (5mm) | Terminal stud M10 | 1.48″ (38mm) | 3.18″ (81.5mm) | 3.12″ (80mm) | 4.68″ (120mm) |

| Part No. | Diagram | Mounting Hole Dimension |
|---|---|---|
| BN200NW#K<br>BN400NW#K |  |  |

| Part No. | No. of poles | Dim A | Dim B | Dim C | Dim D | Dim E | Dim F | Dim G | Dim H | Dim I | Dim J | Dim K | Dim L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BN200NW#K | 2-Pole | 3.04″ (78mm) | 3.9″ (100mm) | 4.52″ (116mm) | 3.9″ (100mm) | Terminal stud M10 | Ø 0.312″ (8mm) 3 holes | 1.33″ (34mm) | 1.44″ (37mm) | 1.29″ (33mm) | 0.156″ (4mm) | 2.59″ (66.5mm) | 2.54″ (65mm) |
| | 3-Pole | 4.49″ (115mm) | 5.34″ (137mm) | 5.97″ (153mm) | 5.34″ (137mm) | | | | | | | | |
| | 4-Pole | 5.93″ (152mm) | 6.79″ (174mm) | 7.41″ (190mm) | 6.79″ (174mm) | | | | | | | | |
| BN400NW#K | 2-Pole | 4.41″ (113mm) | 5.54″ (142mm) | 6.16″ (158mm) | 5.54″ (142mm) | Terminal stud M10 | Ø 0.312″ (8mm) 3 holes | 1.48″ (38mm) | 2.22″ (57mm) | 2.03″ (52mm) | 0.195″ (5mm) | 3.21″ (81.5mm) | 3.12″ (80mm) |
| | 3-Pole | 6.86″ (176mm) | 7.76″ (199mm) | 8.39″ (215mm) | 7.76″ (199mm) | | | | | | | | |
| | 4-Pole | 9.09″ (233mm) | 9.98″ (256mm) | 10.61″ (272mm) | 9.98″ (256mm) | | | | | | | | |

## BA Series

**Key features:**

- Self-contained: end plates are not required
- Rugged heavy-duty construction
- Current capacities up to 40A
- 3-pole units available as 1 piece (no endplates are needed)
- Fuse blocks with blown fuse indicators

UL Recognized
File No. E78117

CSA Certified
File No. LR64803

## Specifications

### Power Blocks

| Model | | BA111T | BA211T | BA311T | BA411S |
|---|---|---|---|---|---|
| Appearance | | | | | |
| Width | | 0.984" (25mm) | 1.201" (30.5mm) | 1.358" (34.5mm) | 0.630" (16mm) |
| Approvals | | UL, CSA | UL, CSA | UL, CSA | UL, CSA |
| No. of Poles | | 3 | 3 | 3 | 1 |
| Wire Sizes | | 22 to 14 AWG | 22 to 12 AWG | 18 to 10 AWG | 16 to 6 AWG |
| Voltage/ Current | UL/CSA | 300V / 15A | 300V / 20A | 150V / 30A | 600V / 40A |
| | JIS | 600V / 16A | 600V / 21A | 600V / 40A | 600V / 70A |
| Terminals | Size | M3 | M3.5 | M4 | M5 |
| | Type | Standard screw | Standard screw | Standard screw | Standard screw |
| Mounting | | 35mm DIN rail | 35mm DIN rail | 35mm DIN rail | 35mm DIN rail |
| Terminal Torque | (N-m) | 0.6 - 1.0 | 1.0 - 1.3 | 1.4 - 2.0 | 2.6 - 3.7 |
| | (in-lbs.) | 5.3 - 8.9 | 8.9 - 11.5 | 12.4 - 17.8 | 23.1 - 32.8 |
| DIN Rail Stop | | BNL-5 | BNL-5 | BNL-5 | BNL-5 |
| Dust Cover | | BNC220 | BNC220 | BNC230 | BNC320 |
| Marking Strip | PVC | BNM7 | BNM7 | BNM7 | BNM7 |
| | Fiberglass | BNM9 | BNM9 | BNM9 | BNM9 |
| | End clip | BNM3 | BNM3 | BNM3 | BNM3 |

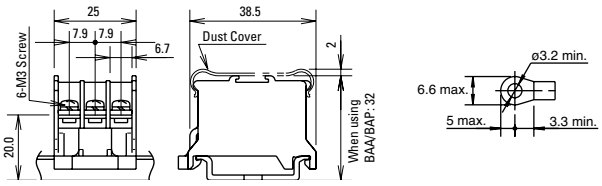
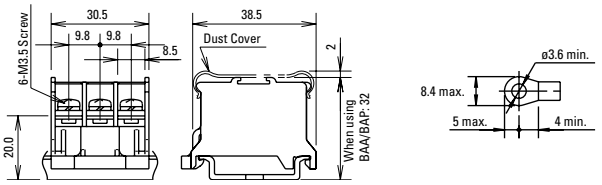
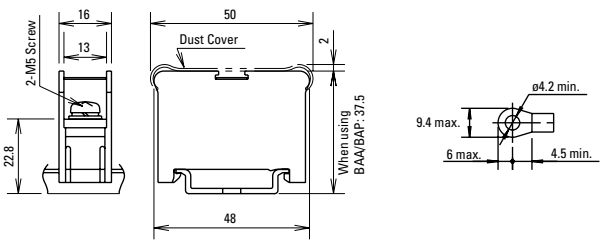
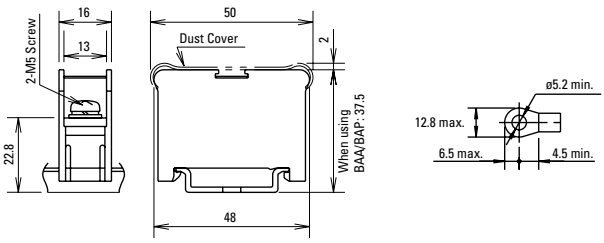
1. BNDN1000 aluminum DIN rails are available in 1 meter lengths.
2. Marking strips are available in 1 meter lengths.

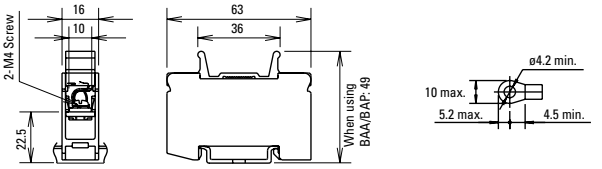
## Specifications, continued

### Fuse Blocks

| Model | | BAF111SU | BAF111SNU | BAF111SDU |
|---|---|---|---|---|
| Appearance | | | | |
| Width | | 0.630" (16mm) | 0.630" (16mm) | 0.630" (16mm) |
| Blown Fuse Indicator | | None | Neon (100 to 300V AC) | LED (24V DC) |
| Approvals | | UL, CSA | UL, CSA | UL, CSA |
| No. of Poles | | 1 | 1 | 1 |
| Wire Sizes | | 18 to 10 AWG | 18 to 10 AWG | 18 to 10 AWG |
| Current | | 10A maximum | 10A maximum | 10A maximum |
| Terminals | Size | M4 | M4 | M4 |
| | Type | Standard screw | Standard screw | Standard screw |
| Mounting | | 35mm DIN rail | 35mm DIN rail | 35mm DIN rail |
| Terminal Torque | (N-m) | 1.4 - 2.0 | 1.4 - 2.0 | 1.4 - 2.0 |
| | (in-lbs.) | 12.4 - 17.8 | 12.4 - 17.8 | 12.4 - 17.8 |
| DIN Rail Stop | | BNL-5 | BNL-5 | BNL-5 |
| Dust Cover | | — | — | — |
| Marking Strip | | BNM7 | BNM7 | BNM7 |
| Applicable Fuse Size | | 1/4" x 1-1/4" (6.35 x 31.8mm) | 1/4" x 1-1/4" (6.35 x 31.8mm) | 1/4" x 1-1/4" (6.35 x 31.8mm) |

## Dimensions

| Part No. | Diagrams |
|---|---|
| BA111T |   |
| BA211T |   |
| BA311T |   |
| BA411S |   |

| Part No. | Diagrams |
|---|---|
| BAF111 |   |

## Accessories

### Part Numbers: End Plates, DIN Rail Stops, Stand-Offs, DIN Rail and Dust Covers

| Item | Appearance | Use with | Part No. | Remarks |
|---|---|---|---|---|
| End Plates | | BNH10W | BNE15W | |
| | | BNH15MW | | |
| | | BNH15LW | | |
| | | BNH30W | BNE30W | |
| | | BNF10SW | BNE20 | |
| | | BNF10NW | | |
| | | BNF10DW | | |
| | | BNH50W | BNE50W | |
| | | BN75W | BNE75W | |
| | | BN150W | BNE150W | |
| | | BNDH15W | BNDE15W | |
| DIN Rail Stops | | BNH10W | BNL5 (small) | 1. DIN rail stops prevent side-to-side movement.<br>2. The BNL-5 width is 0.375" (9mm). |
| | | BNH15MW | | |
| | | BNH15LW | | |
| | | BNH30W | | |
| | | BNH50W | | |
| | | BNF10SW | | |
| | | BNF10NW | | |
| | | BNF10DW | | |
| | | BA111T | | |
| | | BA211T | | |
| | | BA311T | | |
| | | BA411S | | |
| | | BAF111SU | | |
| | | BAF111SDU | | |
| | | BN75W<br>BN150W | BNL6 (medium) | 1. DIN rail stops prevent side-to-side movement.<br>2. The BNL-6 width is 0.375" (9mm).<br>3. To firmly stabilize these higher profile terminal blocks, the BNL-6 has a higher profile than the BNL-5. |
| | | BNDH15W<br>BN200NW#<br>BN400NW# | BNL8 (large) | 1. DIN rail stops prevent side-to-side movement.<br>2. The BNL-8 width is 0.571" (14.5mm).<br>3. # = number of poles. |
| DIN Rail Stand-Offs | | All series | BNS3 | 1.46" (37mm) height |
| | | | BNS4 | 3.03" (77mm) height |
| DIN Rail | | All series | BNDN1000 (length 39.37" (1mm) | 1. For calculating the rail lengths required, see the instructions on page 876.<br>2. The DIN rail material is aluminum. |
| Surface Mount Bracket | | BNDH15W (dual-deck) | BNDL2 | Used to surface mount dual-deck terminal blocks. (BNDL2). |

## Accessories, continued

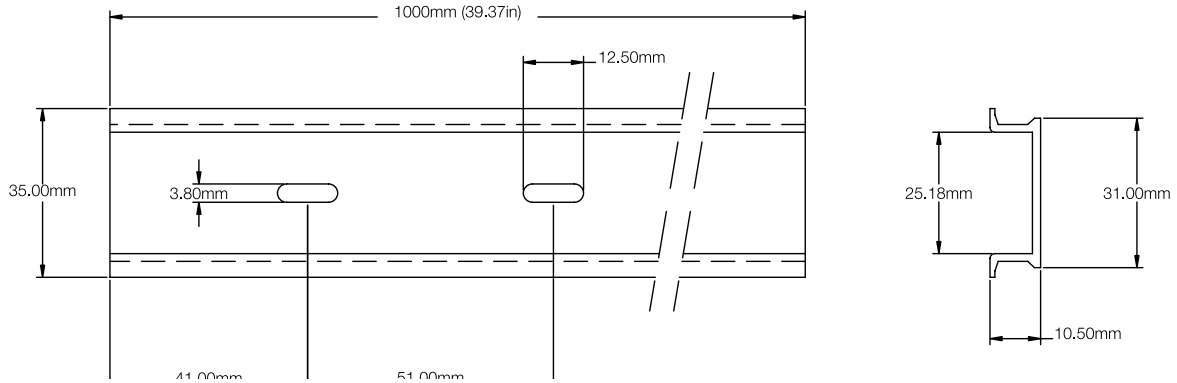
### Part Numbers: Rods, Nuts, Marking Strips, Dust Covers, and Jumpers

| Item | Appearance | Use with | Part No. | Remarks |
|---|---|---|---|---|
| Dust Covers | | BNDH15W | BNC230 | The overall length is 39.37" (1,000mm).<br>The material is polycarbonate (UL94-V2). |
| | | BNH10W | | |
| | | BNH15MW | | |
| | | BNH15LW | | |
| | | BNH30W | | |
| | | BNH50W | BNC320 | |
| | | BN75W | BNC420 | |
| | | BN150W | BNC520 | |
| | | BN200 | BAC820 | |
| | | BN400 | BNC1000 | |
| Marking Strips | | All series | BNM7 | Material: polyvinyl chloride (PVC)<br>Strip dimensions are 0.37"x39" (9.5 x 1,000mm). |
| | | | BNM9 | Material: fiberglass<br>Strip dimensions are 0.37"x39" (9.5 x 1,000mm). |
| Marking Strip Fastener | | All series | BNM3 | Used to prevent marking strips from sliding off terminal block. |
| Ring Terminal Jumpers | | BNH10W | BNJ16 | Jumpers come standard with 6 points (except BNJ62).<br><br>Note: insulated jumpers available - add "B" to end of part number. For example, BNJ26WB. |
| | | BNH15MW | BNJ26W | |
| | | BNH15LW | BNJ46 | |
| | | BNH30W | BNJ56 | |
| | | BNDH15W | BNJ26W | |
| | | BNH50W | BNJ62 | |
| Fork Terminal Jumpers | | BNH10W | BNJ16F | |
| | | BNH15MW | BNJ26FW | |
| | | BNH15LW | BNJ46F | |
| | | BNH30W | BNJ56F | |
| | | BNDH15W | BNJ26FW | |
| M4 Thread Rod | | BNDH15W | BNR1 (265mm) | 1. Rod and connecting nuts are used to mount dual-decks collectively.<br>2. Each connecting nut set includes 1 hex connecting nut and 1 round connecting nut.<br>3. The BNR1 rod dimensions are 0.027 "x 10.43" (0.7 x 265mm).<br>4. The BNR2 rod dimen-sions are 0.027" x 19.69" (0.7 x 500mm). |
| | | | BNR2 (500mm) | |
| Connecting Nuts | | BNR1<br>BNR2 | BNN1 | |
| Terminal Block Removal Tool | | | BND2 | |

For accessory dimensions, see page 1006.

# Dimensions

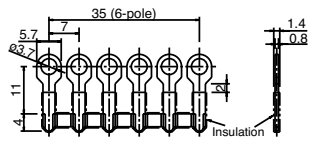
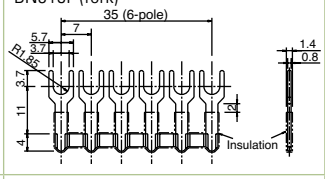
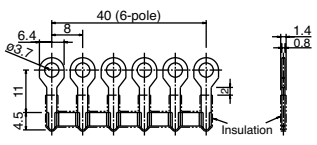
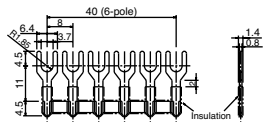
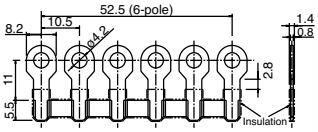
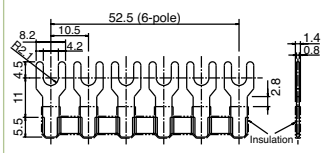
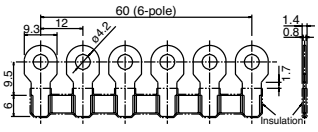
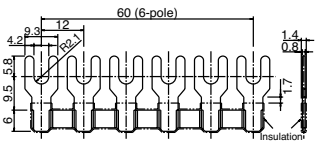
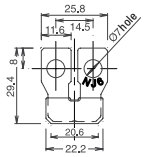
## Dimensions: DIN Rail

| Part No. | Diagrams |
|---|---|
| BNDN1000 |  |



## Dimensions: Jumpers

### BNH Series

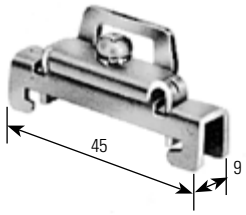
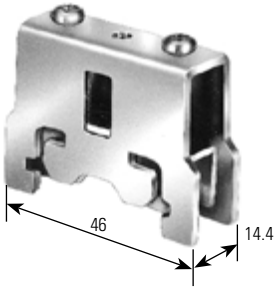
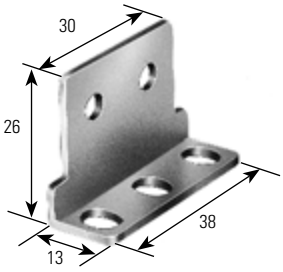
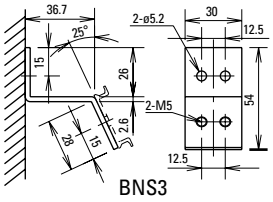
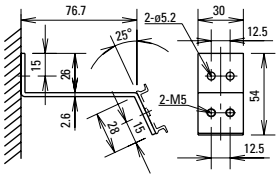
| Part No. | Diagrams | | | |
|---|---|---|---|---|
| BNJ16<br>BNJ16F (fork)<br>BNJ26W<br>BNJ26FW (fork) | BNJ16<br>  | BNJ16F (fork)<br>  | BNJ26W<br>  | BNJ26FW (fork)<br>  |
| BNJ46<br>BNJ46F (fork)<br>BNJ56<br>BNJ56F (fork) | BNJ46<br>  | BNJ46F (fork)<br>  | BNJ56<br>  | BNJ56W (fork)<br>  |
| BNJ62 | BNJ62<br>  | | | |



Thickness + 0.8mm (0.0315")

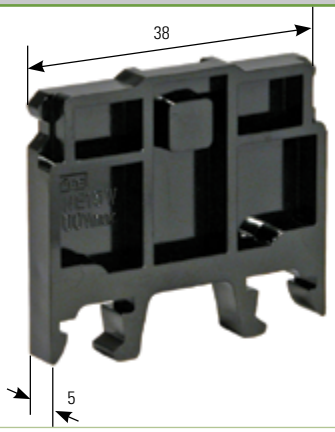
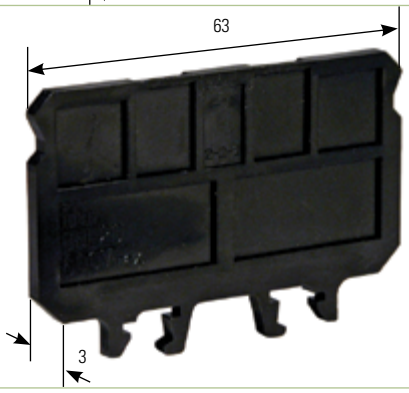
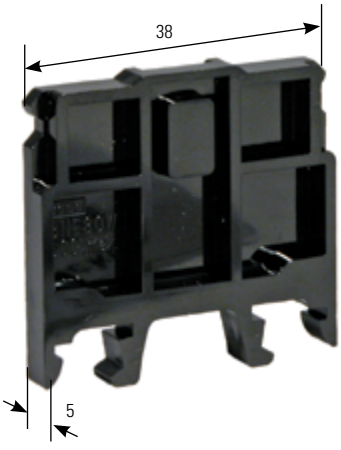
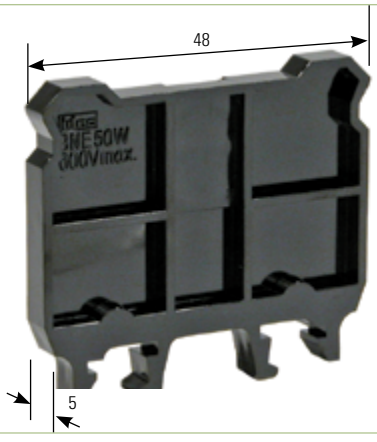
## Dimensions, continued

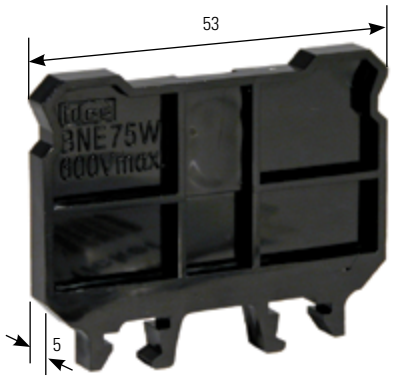
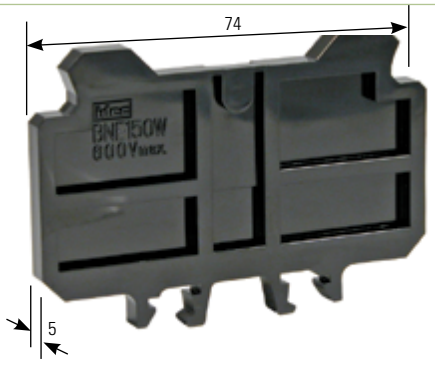
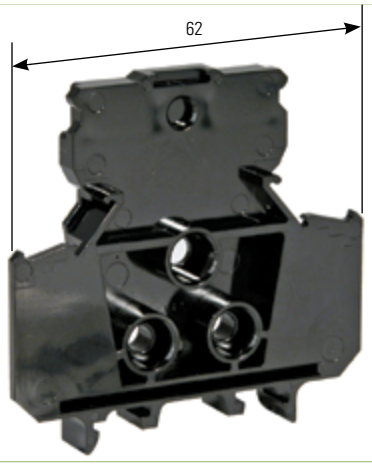
### Dimensions, DIN Rail Stops and Stand-offs

| Part No. | Dimensions |
|---|---|
| BNL-6 |  BNL-6 shown, BNL-5 same except without back crossbar |
| BNL-8 |  |
| BNDL2 |  |
| BNS3 |  BNS3 |
| BNS4 |  BNS4 |

## Dimensions, continued

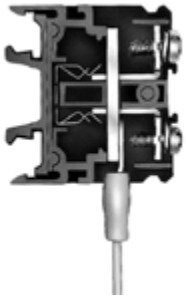
### Dimensions: End Plates

| Part No. | Dimensions |
|---|---|
| BNE15W |  |
| BNE20 |  |
| BNE30W |  |
| BNE50W |  |

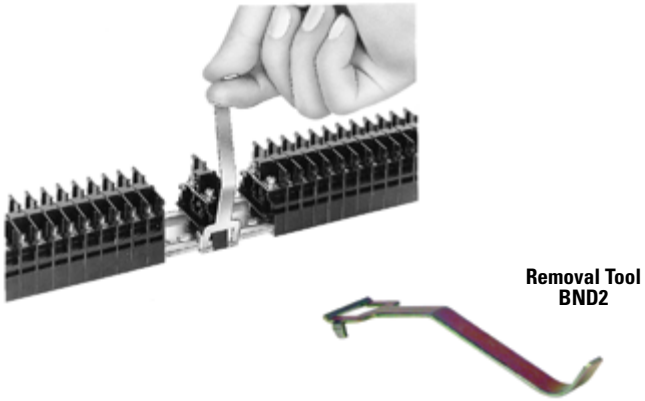
| Part No. | Dimensions |
|---|---|
| BNE75W |  |
| BNE150W |  |
| BNDE15W |  |

# Instructions

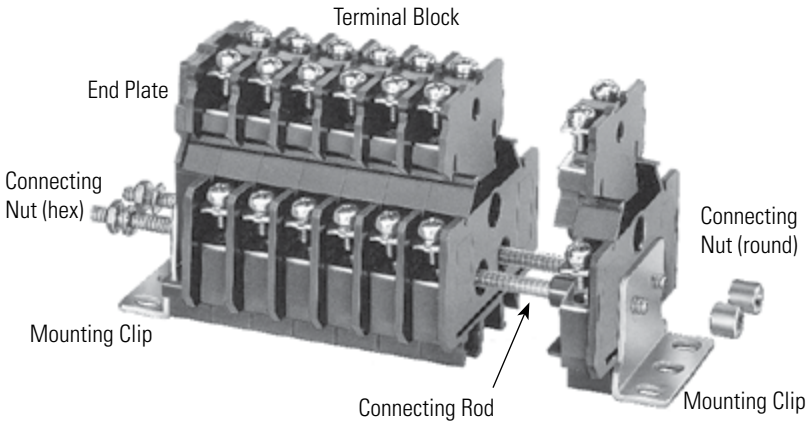
## Wiring Touch-Down Terminal Blocks: BNH Series

| Instructions | Step 1 | Step 2 | Step 3 | Step 4 |
|---|---|---|---|---|
| Step 1. Insert the wire (or crimping terminal) into the terminal block with the terminal screws in the open position. (Use of crimping terminals is optional.)<br>Step 2. Push the terminal screw down to hold the wire in place.<br>Step 3. Hold the terminal screw down, and tighten with a screwdriver.<br>Step 4. To remove the wire, loosen the terminal screw and pull up until wire is released. | | | |  |

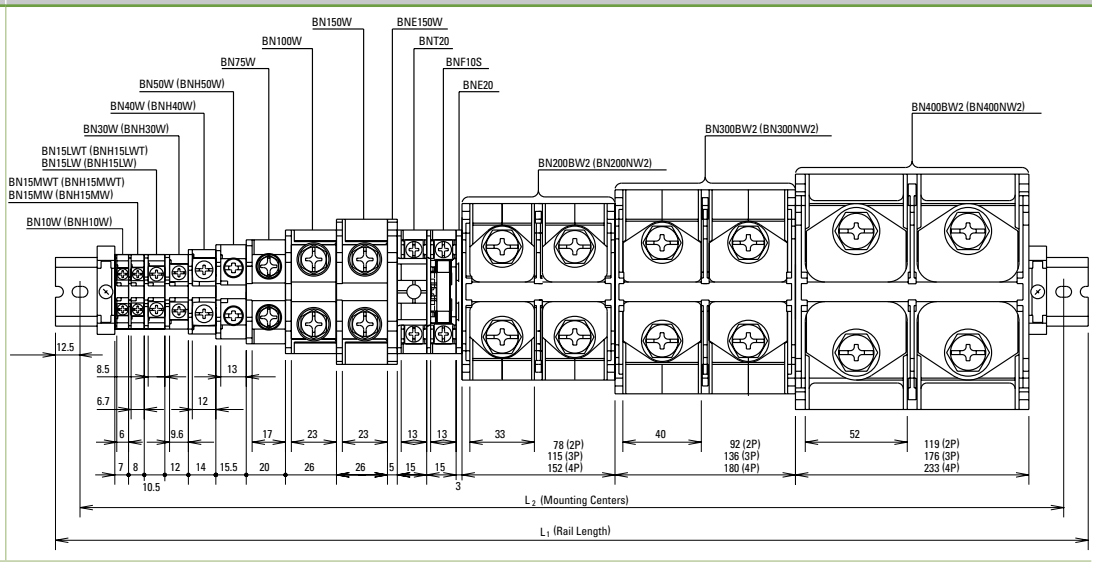
## Installation and Removal of Terminal Blocks

| Instructions | Appearance |
|---|---|
| Step 1. Slide the terminal blocks onto the DIN rail from one end.<br>Step 2. Use BNL5 or BNL6 end clips to secure the terminal block row and to prevent side-to-side movement. BNH10W, BNH15MW, BNH15LW, and BNH30W can be installed from the middle of a DIN rail.<br>Step 3. To install, place the terminal block on top of the DIN rail and push down until both edges of the terminal block snap onto the DIN rail.<br>Step 4. To remove the terminal block, use the BND2 removal tool as shown on the right. |  |

## Mounting Double-Deck Terminal Blocks

| Instructions | Appearance |
|---|---|
| DIN Rail Mount:<br>Step 1. First install the end plate. Then mount the terminal blocks onto the DIN rail.<br>Step 2. To prevent side-to-side movement on the DIN rail, use the BNL-8 mounting clip at both ends of the rail.<br><br>Panel Mount:<br>Step 1. Assemble a row of terminal blocks with end plates on exposed end(s).<br>Step 2. Use BNDL2 mounting clips at both ends of a row.<br>Step 3. With the two holes of the mounting clip aligned with the terminal block holes, insert a connecting rod through each hole.<br>Step 4. Secure the ends of the connecting rods with the connecting nuts, as shown below. |  |

## Calculating DIN Rail Lengths

| Instructions | Appearance |
|---|---|
| Step 1. Add widths of all terminal blocks (reference pages 864 through 869).<br>Step 2. Add the endplate thickness (usually only one).<br>Step 3. Add the DIN rail stop widths (usually two are used).<br>Step 4. Round to the nearest 2" (50mm) increment to allow for DIN rail hole spacing.<br>Step 5. Add 1" (25mm) to ensure 0.5" (12.5mm) of clearance at each end of the DIN rail. |  |

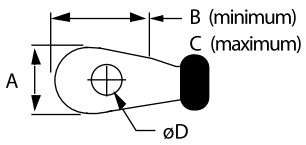


## DIN Rail Stop Dimensions

| Part No. | Width |
|---|---|
| BNL-5 | .374" (9mm) |
| BNL-6 | .374" (9mm) |
| BNL-8 | .571" (14.5mm) |

## Torque Specifications and Applicable Connector Sizes

| Screw Size | | M3 | M3.5 | M4 | M5 | M6 | M8 | M10 | M12 | Diagram |
|---|---|---|---|---|---|---|---|---|---|---|
| Torque | (N-m) | 0.6 to 1.0 | 1.0 to 1.3 | 1.4 to 2.0 | 2.6 to 3.7 | 3.9 to 5.4 | 10 to 13.5 | 21 to 28 | 38 to 49 | |
| | (kgf-cm) | 6.1 to 10.2 | 10.2 to 13.3 | 14.3 to 20.4 | 26.5 to 37.7 | 39.8 to 55.1 | 102 to 138 | 214 to 286 | 388 to 500 | |
| Dimension A | | 0.257" (6.6mm) | 0.332" (8.5mm) | 0.371" (9.5mm) | 0.499" (12.8mm) | 0.655" (16.8mm) | 0.890" (22.8mm) | 1.279" (32.8mm) | 1.981" (50.8mm) | |
| Dimension B | | 0.129" (3.3mm) | 0.156" (4mm) | 0.176" (4.5mm) | 0.176" (4.5mm) | 0.234" (6mm) | 0.312" (8mm) | 0.429" (11mm) | 0.546" (14mm) | |
| Dimension C | | 0.195" (5mm) | 0.195" (5mm) | 0.234" (6mm) | 0.254" (6.5mm) | 0.332" (8.5mm) | 0.429" (11mm) | 0.624" (16mm) | 1.014" (26mm) | |
| Dimension D | | Ø 0.125" (3.2mm) | Ø 0.140" (3.6mm) | Ø 0.164" (4.2mm) | Ø 0.203" (5.2mm) | Ø 0.242" (6.2mm) | Ø 0.332" (8.5mm) | Ø 0.410" (10.5mm) | Ø 0.488" (12.5mm) | |



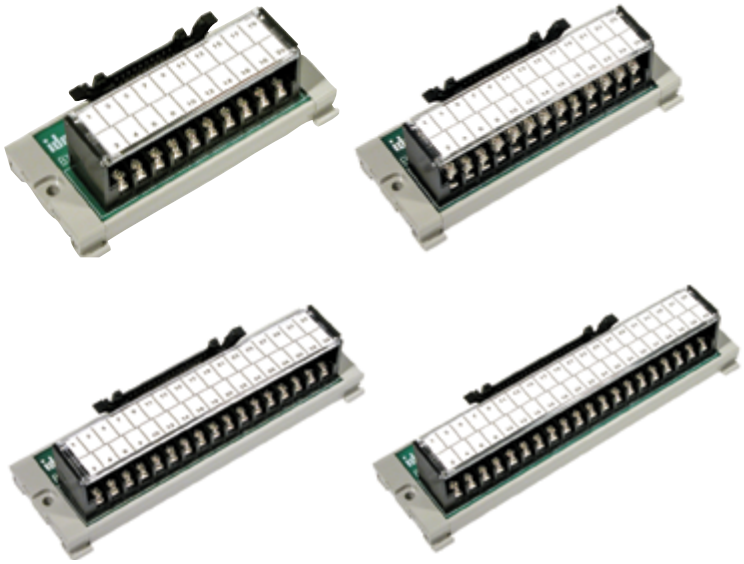

## Rated Current

| Applicable Wire | Rated at 60°C |
|---|---|
| 22 AWG (0.3mm²) | 3A |
| 20 AWG (0.5mm²) | 5A |
| 18 AWG (0.75mm²) | 7A |
| 16 AWG (1.25mm²) | 10A |
| 14 AWG (2mm²) | 15A |
| 12 (3.5mm²) | 20A |
| 10 (5.5mm²) | 30A |

| Applicable Wire | Rated at 60°C |
|---|---|
| 6 (14mm²) | 50A |
| 4 (22mm²) | 75A |
| 0 (38mm²) | 100A |
| 00 (60mm²) | 150A |
| 0000 (100mm²) | 200A |
| 300mcm (150mm²) | 300A |
| 400mcm (200mm²) | 350A |

UL/CSA ratings are specified. The current carrying capacity depends on the rating of the wire used, as shown.

# BX Series



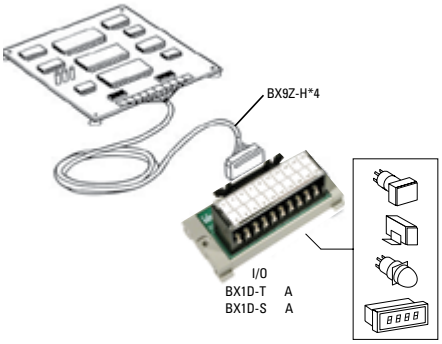
## Key features:

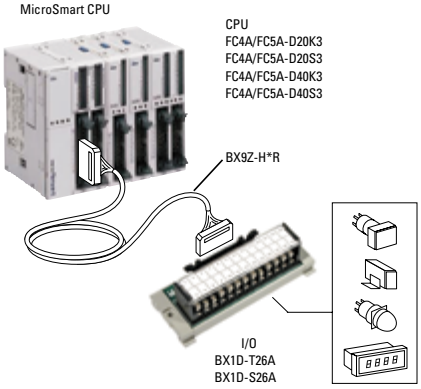
- Unique touch-down terminals
- All units are molded from UL94-V0 material with excellent flame- and shock-resistance
- Mount on DIN rail or flat surface
- Current capacity: 1A
- Available with 16, 20, 26, 34, 40, and 50 pins
- UL and CSA
- Hinged covers with built-in marking strips

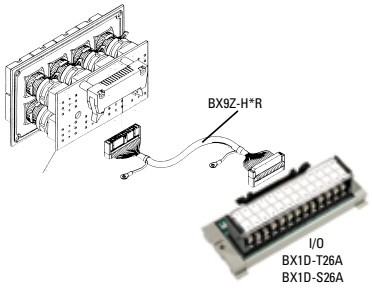
## Specifications

| | |
|---|---|
| Terminal Width | 7.62mm (M3 screw) |
| Rated Voltage | 125V |
| Rated Current | 1A |
| Rated Wire Size | 22-14 AWG (2mm$^2$) |
| Insulation Resistance | 100MΩ minimum (500V DC) |
| Dielectric Strength | 500V AC, 1 minute |
| Operating Temperature | –10 to 65°C |
| Humidity Range | 45 to 85% RH |
| Housing Material | PPE resin (UL94-V0) |
| Terminals/Connector | PBT resin (UL94-V0) |

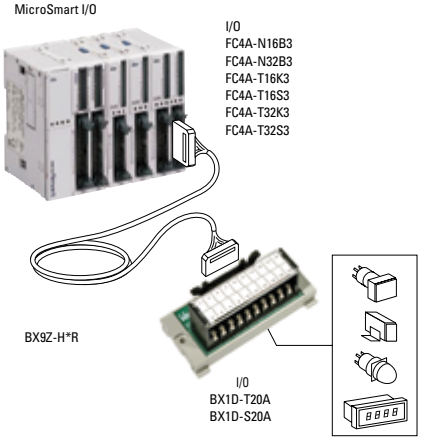
## BX Series Application Examples




*See cable selection table next page.



# Part Numbers

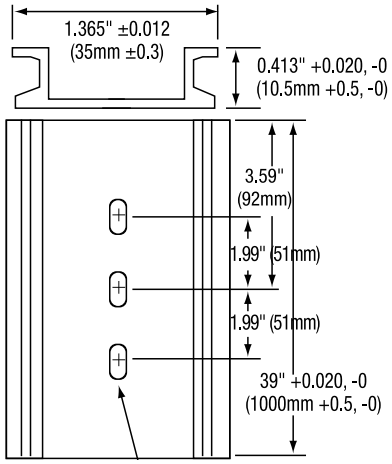
## Part Numbers: Break-Out Modules and Cables

### Accessories

| | Pins | Terminal Style | Module Part Number | Cable Part Number | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | MIL to Single Connectors | MIL to MIL Shielded | MIL to MIL Non-shielded | |
| Standard MIL Connector Modules | 16 | Touch-down | BX1D-T16A | BX9Z-H#D4 | – | – | |
| | | Screw | BX1D-S16A | | | | |
| | 20 | Touch-down | BX1D-T20A | BX9Z-H#E4 | FC9Z-H#A20 | FC9Z-H#B20 | FC4A/FC5A 16 & 32 point I/O modules |
| | | Screw | BX1D-S20A | | | | |
| | 26 | Touch-down | BX1D-T26A | FC9Z-H100C26A | FC9Z-H#A26 | FC9Z-H#B26 | FC4A/FC5A 20 & 40 point I/O slim CPUs |
| | | Screw | BX1D-S26A | | | | |
| | 34 | Touch-down | BX1D-T34A | BX9Z-H#F4 | – | – | |
| | | Screw | BX1D-S34A | | | | |
| | 40 | Touch-down | BX1D-T40A | BX9Z-H#G4 | – | – | |
| | | Screw | BX1D-S40A | | | | |
| | 50 | Touch-down | BX1D-T50A | BX9Z-H#H4 | – | – | |
| | | Screw | BX1D-S50A | | | | |

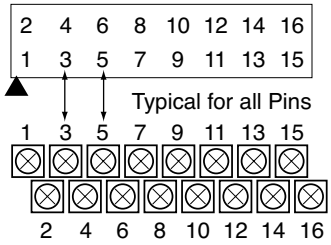
1. For BX terminal arrangements, see page 879.
2. # = length codes:
   100 = 39.4" (1 meter)
   200 = 78.7" (2 meter)
   300 = 118.1" (3 meter)

## Part Numbers: DIN Rail and DIN Rail Stops

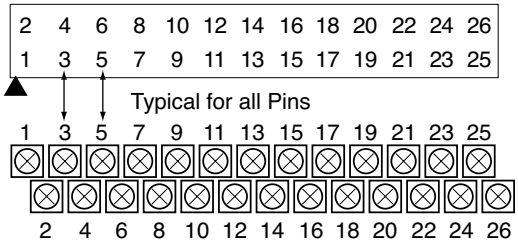
| Description | Use with | Diagram | Part No. | Remarks |
|---|---|---|---|---|
| DIN Rail | All BX series |  | BNDN1000 | 1. The length is 39.37" (1,000mm).<br>2. For calculating the rail lengths required, see the instructions on page 876.<br>3. DIN rail material is aluminum. |
| DIN Rail Stop | All BX series | | BNL6 | 1. Rail stops prevent side-to-side movement.<br>2. Use rail stops on BNDN1000 DIN rails. |

## Terminal Arrangements: BX Series

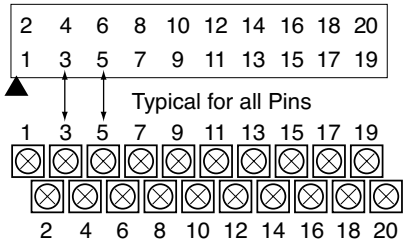
16-Pin



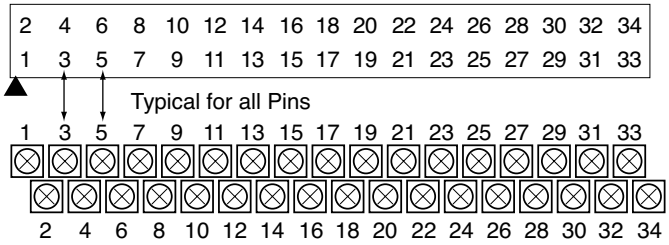

26-Pin



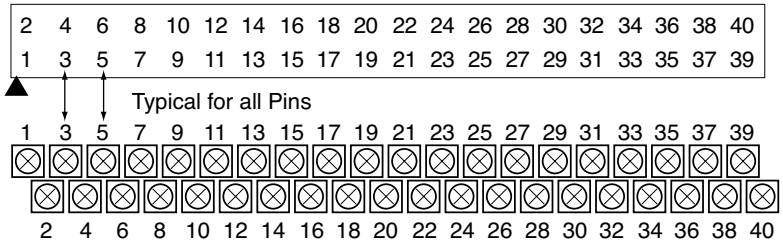

20-Pin



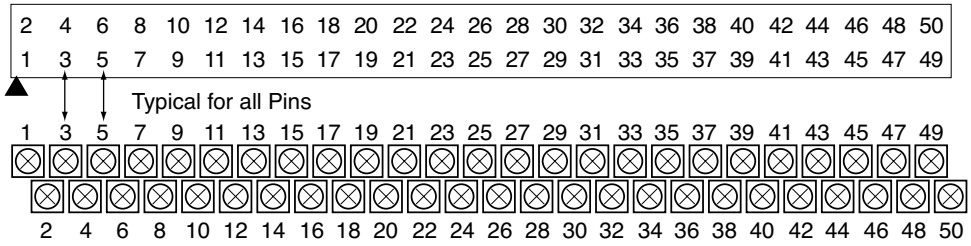

34-pin




40-Pin

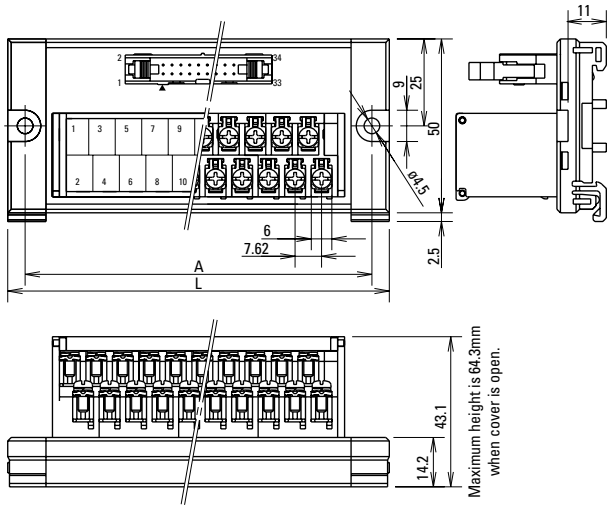



50-Pin



# Dimensions: BX Series

## Dimensions

| Part No. | Pins | Dimensions L | Dimensions A | Diagram |
|---|---|---|---|---|
| BX1D-T16A | 16 | 3.66″ (94mm) | 3.27″ (84mm) |  |
| BX1D-S16A | | | | |
| BX1D-T20A | 20 | 4.29″ (113mm) | 3.89″ (103mm) | |
| BX1D-S20A | | | | |
| BS1D-T26A | 26 | 5.20″ (132mm) | 4.80″ (122mm) | |
| BX1D-S26A | | | | |
| BX1D-T34A | 34 | 6.38″ (162mm) | 5.98″ (152mm) | |
| BX1D-S34A | | | | |
| BX1D-T40A | 40 | 7.28″ (185mm) | 6.89″ (175mm) | |
| BX1D-S40A | | | | |
| BX1D-T50A | 50 | 8.78″ (223mm) | 8.39″ (213mm) | |
| BX1D-S50A | | | | |

Selection Guide ..... 1016
NC1V Series ..... 1017
Dimensions ..... 1023

# Circuit Breakers

IDEC

www.IDEC.com/circuitbreaker

# Selection Guide

| Series | NC1V | | NRA | NRBM |
|---|---|---|---|---|
| Appearance | | | | |
| Page | 1017 | | **Visit www.IDEC.com/circuitbreaker** | |
| Actuator Style | Lever | | Lever and Rocker (non-illuminated and illuminated) | Lever |
| Number of Poles | 1, 2, 3 | | Lever: 1, 2, 3<br>Rocker: 1 | 1, 2, 3 |
| Protection Method | Hydraulic magnetic | | Electromagnetic trip | |
| Internal Circuits | Series current trip<br>Relay voltage trip | | Series current trip | |
| Auxiliary Contact | Optional 125V AC 3A (resistive load), 30V DC 2A (resistive load) | | Optional (250V AC, 5A; 50V DC, 1A) | Optional (250V AC, 5A; 50V DC, 1A) |
| Alarm Contact | Optional 125V AC 3A (resistive load). 30V DC 2A (resistive load) | | Optional (250V AC, 5A; 50V DC, 1A) | Optional (250V AC, 5A; 50V DC, 1A) |
| Inertial Delay | Optional (for resistance to high inrush currents) | | Optional (for resistance to high inrush) | Optional (for resistance to high inrush) |
| Time Delay Curves | 3 types (AC or DC) | | 2 types for DC; 3 types for AC | 2 types for DC; 3 types for AC |
| Rated Voltage | 1-pole | 250V AC 50/60Hz, 65V DC | 250V AC, 50/60Hz, 65V DC | |
| | 2-pole | 250V AC 50/60Hz, 125V DC | | |
| | 3-pole | 250V AC, 50/60Hz | | |
| Rated Tripping Currents | 0.1A, 0.3A, 0.5A, 1A, 2A, 3A, 5A, 7A, 10A, 15A, 20A, 25A, 30A | | 0.3A, 0.5A, 0.75A, 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 25A, 30A | 1A, 2A, 3A, 5A, 7.5A, 10A, 15A, 20A, 25A, 30A, 40A, 50A |
| Rated Interruption Capacity | 2,500A | | 1,000A, 250V AC (50/60Hz), 65V DC | 1,000A, 250V AC (50/60Hz), 65V DC |
| Approvals | UL, CSA, CE, TUV, CCC | | Lever: UL, CSA, VDE<br>Rocker: UL | UL, c-UL, VDE |

1. For dimensions, see end of each section.
2. UL recognized, applicable standard: UL1077, "Supplementary Protectors."
3. Not suitable for branch circuit protection.

c UL us UL Recognized File No. E68029

File No. LR83454 NRC Series

CE*

CCC*

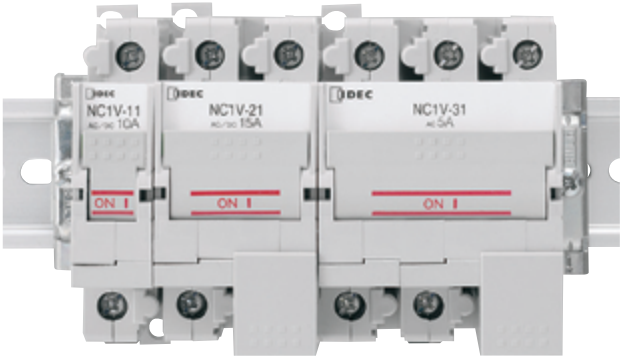
TÜV* File No. B07 09 13332 063

*CE, TUV, and CCC apply to NC1V.

# NC1V Circuit Breakers

**Key features:**

- Superior protection for a wide range of devices from sensitive electronic equipment to electrical control circuits. Applications include semi-conductor manufacturing equipment, electronic controllers, computers, microprocessors, communications equipment, power supplies, machine tools, motors, and more.
- Excellent tripping time curve performance
- Flat retractable lever for safety operations
- Slim housing design
- Spring-up terminals allow for use of ring terminals
- Fingersafe main circuit terminals
- Color (red/green) contact position indicator
- DIN rail or direct panel mounting (through-panel mounting brackets available)
- Optional built-in auxiliary / alarm contacts



| Applicable Standards | Certification Mark | File Number |
|---|---|---|
| UL1077 | UL | E68029 |
| CSA C22.2 No. 235 | SP | LR83454 |
| EN60934 | TÜV | B07 09 13332 063 |
| | CE | European Commission's Low Voltage Directive |
| GB17701-1999 | CCC | No. 2008010307265840 |
| Electrical Applicance and Material Safety Law Technical Standard | Series Trip: PS E | Jet |
| | Relay Trip: PS E | |

## Part Number Structure

**NC1V – 2 1 00 F – 30A A DC24V**

**Type**
NC1V: Lever style
DIN rail and panel mountng

**No. of Poles**
1: 1-pole
2: 2-pole
3: 3-pole

**Internal Circuit**
1: Series trip (current trip)
5: Relay trip (voltage trip)

**Auxiliary/Alarm Contacts**
00: None
11: With one auxiliary contact
12: With two auxiliary contacts
13: With three auxiliary contacts
21: With one alarm contact
31: With one auxiliary contact and one alarm contact
32: With two auxiliary contacts and one alarm contact

**Inertial Delay**
Blank: Without
F: With
* Inertial delay is for AC voltage only.
* Available with medium and slow trip curves (not applicable with relay trip).

**Rated Current**
0.1A, 0.3A, 0.5A, 1A, 2A, 3A, 5A, 7A, 10A 15A, 20A, 25A, 30A
*Specified for series trip only.

**Time Delay Curve**
M: Slow
A: Medium
S: Instantaneous
*Specified for series trip only.

**Voltage Trip Coil Voltage**
DC24V: 24-48V DC
*Specified for relay trip only.

# Specifications

| | | | | |
|---|---|---|---|---|
| Operator Style | | Retractable lever | | |
| Internal Circuit | | Series trip (current trip), Relay trip (voltage trip) | | |
| Protection Method | | Hydraulic magnetic tripping system, Magnetic tripping system (voltage trip) | | |
| No. of Poles | | 1-pole | 2-pole | 3-pole |
| Rated Voltage (AC/DC)[1] | | 250V AC 50/60Hz, 65V DC | 250V AC 50/60Hz, 125V DC | 250V AC, 50/60Hz |
| Series Trip (Current Trip) | Rated Short-circuit Capacity | 250V AC, 2500A<br>65V DC, 2500A | 250V AC, 2500A<br>125V DC, 2500A | 250V AC, 2500A |
| | Rated Current | 0.1A, 0.3A, 0.5A, 1A, 2A, 3A, 5A, 7A, 10A, 15A, 20A, 25A, 30A | | |
| | Operation Characteristics[2] | Time delay curve curve M (slow), curve A (medium), S (instantaneous)<br>Only curves M and A are also available with inertial delay option. | | |
| Relay Trip (Voltage Trip)[3] | Rated Current | 30A | | |
| | Trip Voltage | 24 to 48V DC (at 25°C)<br>Voltage application duration 10 sec maximum, tripping time 0.1 sec maximum (at rated voltage) | | |
| Auxiliary Contact/Alarm Contact | Contact Rating | 125V AC 3A (resistive load), 30V DC 2A (resistive load) | | |
| | Minimum Applicable Load | 24V DC 1mA (resistive load, reference value) | | |
| Insulation Resistance | | 100MΩ minimum (500V DC megger) | | |
| Dielectric Strength | | 2,000V AC, 1 minute (between terminals when main contacts are open, between live parts of different poles, between live and dead parts)<br>600V AC (between terminals when auxiliary circuits are open) | | |
| Vibration Resistance (with rated current applied) | | Damage limits: 147 m/s$^2$ (10 to 55 Hz) (1-pole, 2-pole), 78 m/s$^2$ (3-pole)<br>Operating extremes: 98 m/s$^2$ (1-pole, 2-pole), 78 m/s$^2$ (3-pole) | | |
| Shock Resistance (S time delay curve: 80% rated current, A, M time delay curve: 100% rated current) | | Damage limits: 490 m/s$^2$ (1-pole, 2-pole), 297 m/s$^2$ (3-pole)<br>Operating extremes: 196 m/s$^2$ (S, A, M curves) | | |
| Electrical Life | | 10,000 cyles minimum (at rated curent), 10 operations per minute | | |
| Reference Temperature | | 40°C | | |
| Operating Temperature | | –10 to +60°C (no freezing)<br>Rated current is based on an ambient temperature of 40°C. When the operating temperature exceeds 40°C, derate the rated current by using the factors shown below. | | |
| Operating Humidity | | 45 ~ 85% RH (no condensation) | | |
| Terminal Style | Main Circuit Terminal | Spring-up, fingersafe terminal: M4 screw (up to 20A), M5 screw (25A and 30A) | | |
| | Auxiliary/Alarm Contacts, Voltage Coil Terminal | M3.5 screw | | |
| Weight (approx.) | | 1-pole: 90g, 2-pole: 170g, 3-pole: 260g | | |

[1]3-pole model is for AC voltage only.
[2]For S (instantaneous) tripping curve, a humming sound may occur when used in an AC sinusoidal-wave current circuit around 80% of the rated current, however, the performance of the circuit breaker will not be affected.
To avoid unnecessary tripping, do not use in circuits where inrush currents may be present.
[3]Relay trip (voltage trip) type is not equipped with an overcurrent trip function.
Do not use the NC1V circuit breakers in environments where they are exposed to extreme temperature, humidity, dust, corrosive gases, vibration, shock, or in a circuit where inrush current may be present, otherwise unnecessary operation and damage may occur.

| Operating Temp. | Derating Factor |
|---|---|
| 50°C | 0.9 |
| 55°C | 0.8 |
| 60°C | 0.7 |

# Models

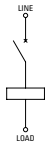
Specify rated current, time delay curve, or voltage trip coil voltage in place of 6 7 8 when ordering.

| Internal Circuit | No. of Poles | Inertial Delay | Auxiliary Contact Alarm Contact | Part No | Code | | |
|---|---|---|---|---|---|---|---|
| | | | | | 6 Rated Current | 7 Time Delay Curve | 8 Voltage Trip Coil Voltage |
| Series Trip (Current Trip) | 1-pole | — | — | NC1V-1100-6 7 | 0.1A<br>0.3A<br>0.5A<br>1A<br>2A<br>3A<br>5A<br>7A<br>10A<br>15A<br>20A<br>25A<br>30A | M (slow)<br>A (medium)<br>S (instantaneous) | — |
| | | | One Auxiliary Contact | NC1V-1111-6 7 | | | |
| | | | One Alarm Contact | NC1V-1121 6 7 | | | |
| | | With | — | NC1V-1100F-6 7 | | | |
| | | | One Auxiliary Contact | NC1V-1111F-6 7 | | | |
| | | | One Alarm Contact | NC1V-1121F-6 7 | | | |
| | 2-pole | — | — | NC1V-2100-6 7 | | | |
| | | | One Auxiliary Contact | NC1V-2111-6 7 | | | |
| | | | Two Auxiliary Contacts | NC1V-2112-6 7 | | | |
| | | | One Alarm Contact | NC1V-2121-6 7 | | | |
| | | | One Auxiliary Contact and One Alarm Contact | NC1V-2131-6 7 | | | |
| | | With | — | NC1V-2100F-6 7 | | | |
| | | | One Auxiliary Contact | NC1V-2111F-6 7 | | | |
| | | | Two Auxiliary Contacts | NC1V-2112F-6 7 | | | |
| | | | One Alarm Contact | NC1V-2121F-6 7 | | | |
| | | | One Auxiliary Contact and One Alarm Contact | NC1V-2131F-6 7 | | | |
| | 3-pole | — | — | NC1V-3100-6 7 | | | |
| | | | One Auxiliary Contact | NC1V-3111-6 7 | | | |
| | | | Two Auxiliary Contacts | NC1V-3112-6 7 | | | |
| | | | Three Auxiliary Contacts | NC1V-3113-6 7 | | | |
| | | | One Alarm Contact | NC1V-3121-6 7 | | | |
| | | | One Auxiliary Contact and One Alarm Contact | NC1V-3131-6 7 | | | |
| | | | Two Auxiliary Contacts and One Alarm Contact | NC1V-3132-6 7 | | | |
| | | With | — | NC1V-3100F-6 7 | | | |
| | | | One Auxiliary Contact | NC1V-3111F-6 7 | | | |
| | | | Two Auxiliary Contacts | NC1V-3112F-6 7 | | | |
| | | | Three Auxiliary Contacts | NC1V-3113F-6 7 | | | |
| | | | One Alarm Contact | NC1V-3121F-6 7 | | | |
| | | | One Auxiliary Contact and One Alarm Contact | NC1V-3131F-6 7 | | | |
| | | | Two Auxiliary Contacts and One Alarm Contact | NC1V-3132F-6 7 | | | |
| Relay Trip (Voltage Trip) | 1-pole | — | — | NC1V-1500-8 | — | — | DC24V |
| | 2-pole | | | NC1V-2500-8 | | | |
| | 3-pole | | | NC1V-3500-8 | | | |

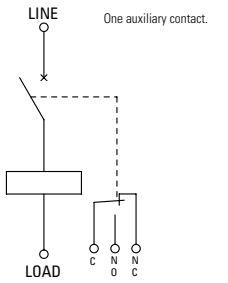
## Internal Circuits

### 1-pole

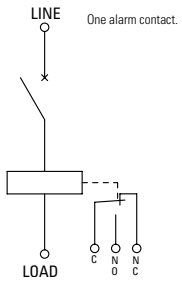
NC1V-1100
(Without auxiliary/alarm contacts)



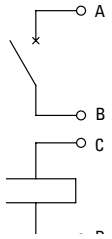

NC1V-1111
(With auxiliary contact)




NC1V-1121
(With alarm contact)

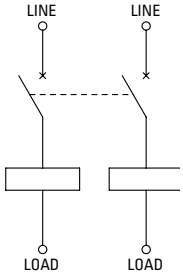



NC1V-1500
(Relay Trip)

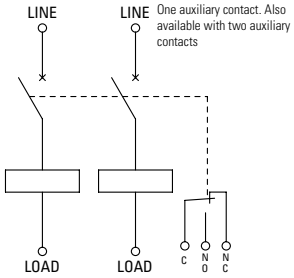



### 2-pole

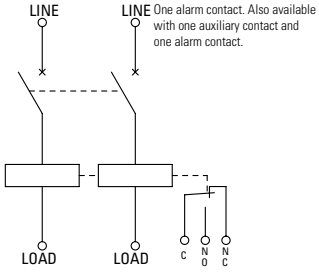
NC1V-2100
(Without auxiliary/alarm contacts)



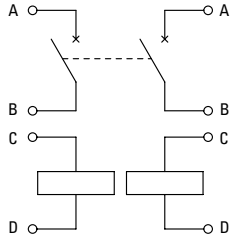

NC1V-2111
(With auxiliary contact)




NC1V-2121
(With alarm contact)

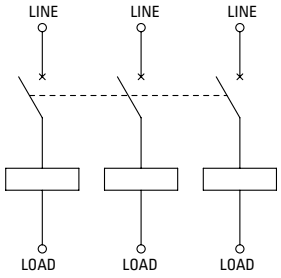



NC1V-2500
(Relay Trip)

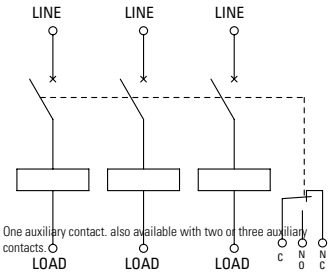



### 3-pole

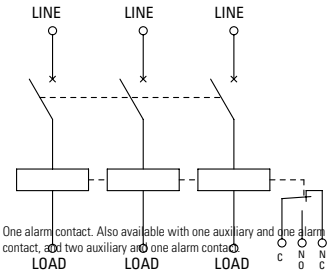
NC1V-3100
(Without auxiliary/alarm contacts)



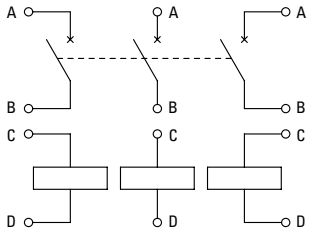

NC1V-3111
(With auxiliary contact)




NC1V-3121
(With alarm contact)




NC1V-3500
(Relay Trip)

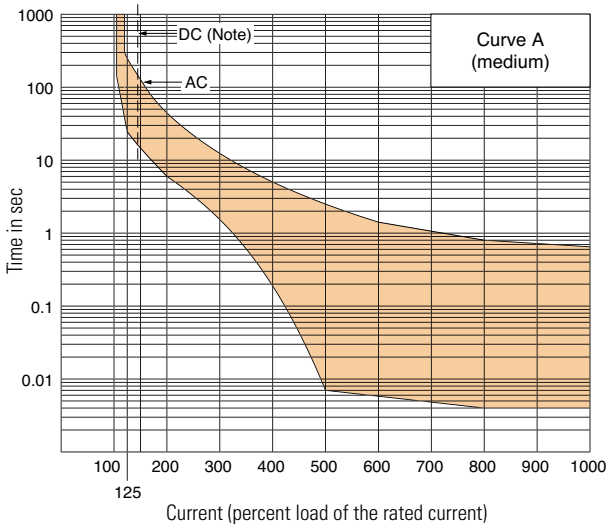


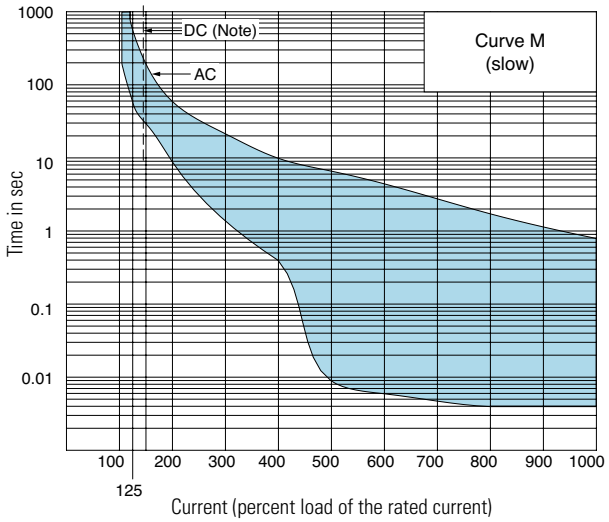

### Overcurrent-Time Delay Characteristics (seconds @ 40 deg C) [vertical mounting]

| Item | Time Delay Curve | Percent of Rated Current | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 100% | 125% | 150% | 175% | 200% | 400% | 600% | 800% | 1000% |
| AC (50/60Hz)/DC | S (instantaneous) | NO TRIP | — | *0.005 to 0.1 | 0.003 to 0.06 | 0.0027 to 0.05 | 0.002 to 0.03 | 0.002 to 0.028 | 0.002 to 0.025 | 0.002 to 0.022 |
| | A (medium) | NO TRIP | *25 to 240 | 16 to 140 | — | 6 to 32 | 0.4 to 4 | 0.0055 to 1.5 | 0.004 to 0.8 | 0.004 to 0.65 |
| | M (slow) | NO TRIP | *60 to 600 | 30 to 200 | — | 9 to 60 | 0.4 to 10 | 0.006 to 4.5 | 0.004 to 1.8 | 0.004 to 0.8 |
| AC (50/60Hz) | With Inertial Delay A (medium) | NO TRIP | 25 to 240 | — | — | 6 to 32 | 0.8 to 6 | 0.09 to 3.5 | 0.02 to 1.8 | 0.01 to 1.0 |
| | With Inertial Delay M (slow) | NO TRIP | 60 to 600 | — | — | 10 to 60 | 0.8 to 10 | 0.06 to 4.5 | 0.02 to 3 | 0.01 to 1.75 |

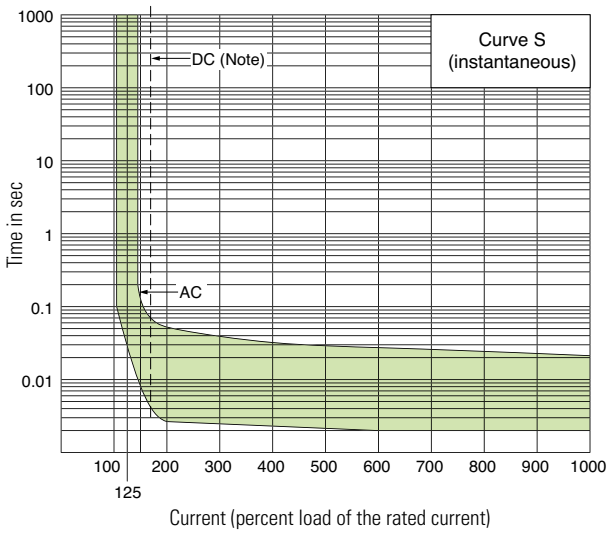
*: MAY TRIP on DC

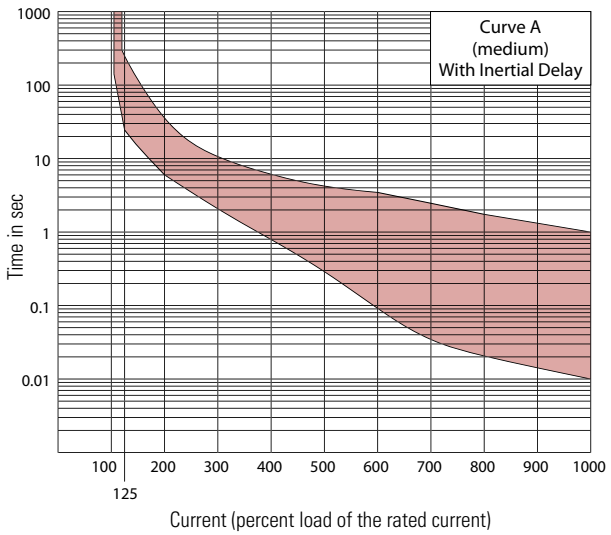
## Time Delay Curves at 40°C

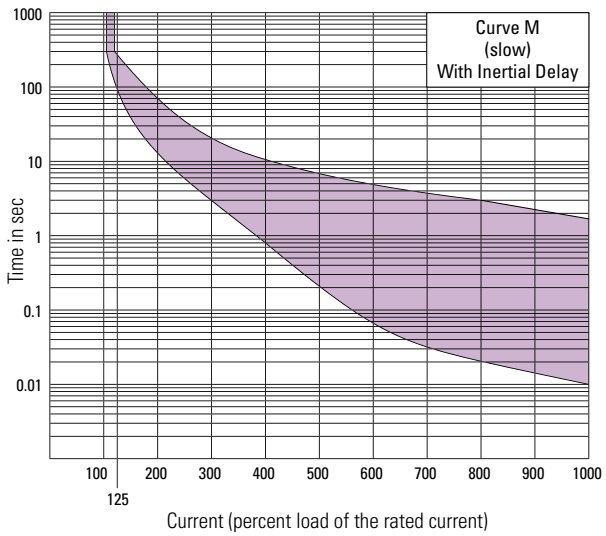



Note: The entire shaded area applies to AC. For DC, the shaded area on the right of the dashed line applies.



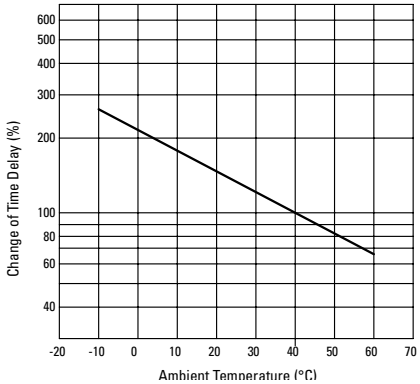

Note: Inertial Delay option not available with S (instantaneous) curve.

## Time Delay Curve and Ambient Temperature

NC1V circuit breakers employ a hydraulic magnetic tripping system, where the rated current (trip current) is not affected by ambient temperatures. But the time delay may vary with the oil viscosity in the oil dash pot. Lower oil viscosity at higher temperatures results in a shorter delay, whereas at lower temperatures the delay will be longer.

## Temperature Correction Curve

The time delay curves on the preceding page are measured at 40°C. With reference to the following curves, time delays can be corrected according to ambient temperature.




The time delay is based on an ambient temperature of 40°C. Time delays at other temperatures are corrected according to the temperature correction curve. The time delay of the instantaneous time delay curve (S) is not affected by ambient temperature.

When operating temperature exceeds 40°C, derate the rated current by multiplying the derating factor shown on the right.

| Operating Temp | Derating Factor |
|---|---|
| 50°C | 0.9 |
| 55°C | 0.8 |
| 60°C | 0.7 |

## Impedance and Coil Resistance Series Trip (Current Trip) at 25°C

| Rated Current | For AC 50/60 Hz Impedance (Ω) | | For DC Resistance (Ω) | |
|---|---|---|---|---|
| | Curve S | Curves A, M | Curve S | Curves A, M |
| 0.1A | 66.0 | 116.0 | 43.0 | 106.0 |
| 0.3A | 6.6 | 11.0 | 4.1 | 10.0 |
| 0.5A | 1.92 | 3.65 | 0.86 | 3.40 |
| 1A | 0.50 | 0.93 | 0.25 | 0.90 |
| 2A | 0.16 | 0.27 | 0.11 | 0.25 |
| 3A | 0.07 | 0.12 | 0.050 | 0.11 |
| 5A | 0.025 | 0.050 | 0.015 | 0.045 |
| 7A | 0.014 | 0.027 | 0.011 | 0.025 |
| 10A | 0.007 | 0.021 | 0.005 | 0.020 |
| 15A | 0.006 | 0.010 | 0.005 | 0.009 |
| 20A | 0.005 | 0.006 | 0.004 | 0.005 |
| 25A | 0.004 | 0.005 | 0.004 | 0.005 |
| 30A | 0.003 | 0.004 | 0.003 | 0.004 |

Tolerance: ±25% (up to 20A), ±50% (25A and 30A)

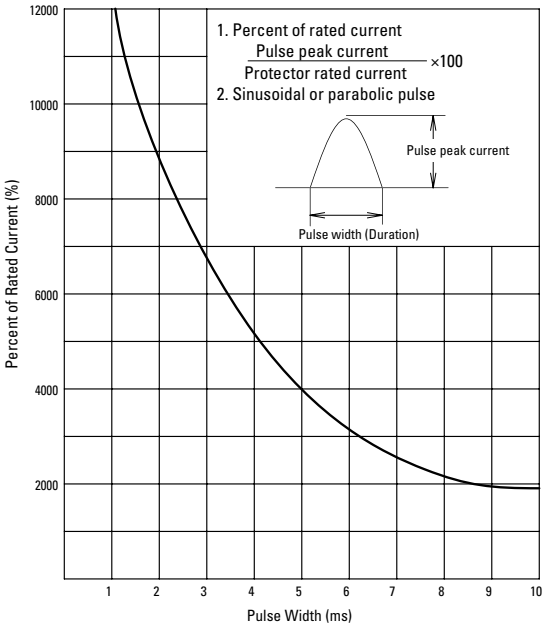
## Relay Trip (Voltage Trip) at 25°C

| Tripping Voltage | For DC Resistance (Ω) |
|---|---|
| 24-48V | 100.0 |

Tolerance: ±25%

## Inertial Delay

Inertial delay is designed not to trip on a non-repeating single pulse of 20 times the rated current (peak value) for a duration of 8ms. In addition, circuit breakers equipped with inertial delay do not respond to high inrush currents caused by transformer or lamp loads, but perform the specified interruption on subsequent overcurrents. Inertial delay is not available with the series trip curve S (instantaneous).



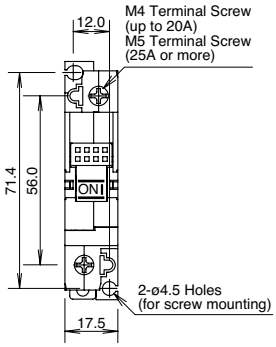

## Voltage Drop Due to Coil Resistance or Impedance

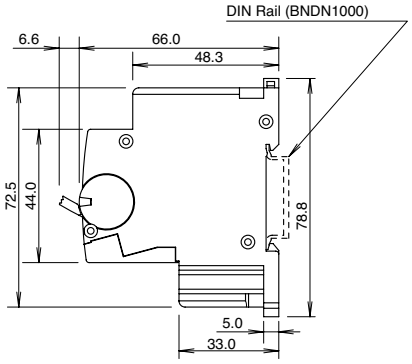
The internal resistance or impedance of a circuit breaker tends to be larger for a smaller rated current. Therefore, when circuit breakers with a small rated current are used, voltage drop should be taken into consideration. Internal resistance also varies with time delay curves, which should also be considered during installation.

## Dimensions (mm)

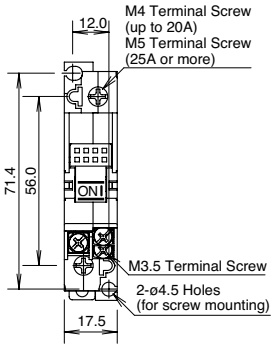
### 1-pole

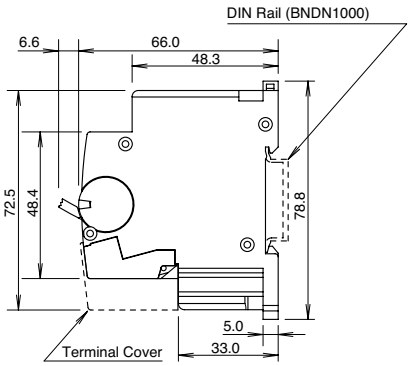
NC1V-1100



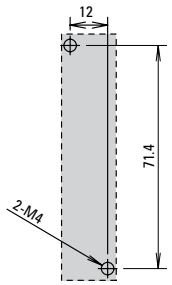




NC1V-1111
(Auxiliary Contact)
NC1V-1121
(Alarm Contact)

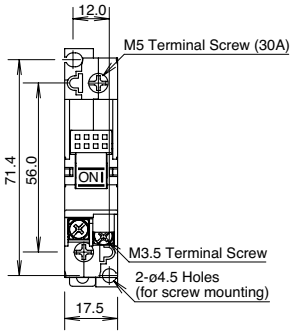


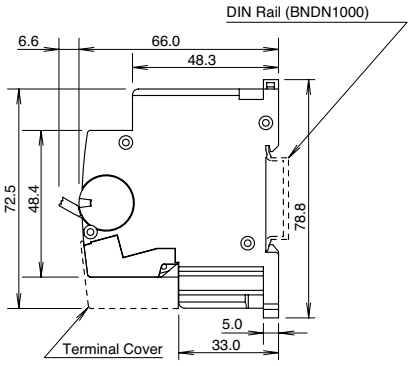




Mounting Hole Layout
(M4 Mounting Screws)



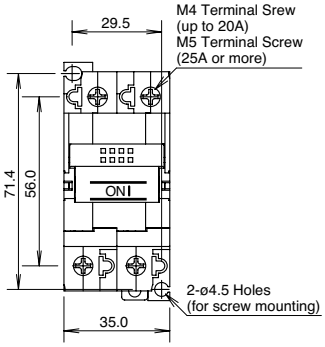

NC1V-1500
(Relay Trip)

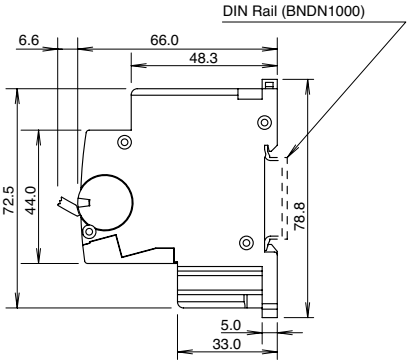


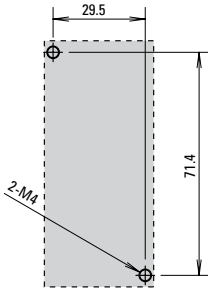

### 2-pole

NC1V-2100



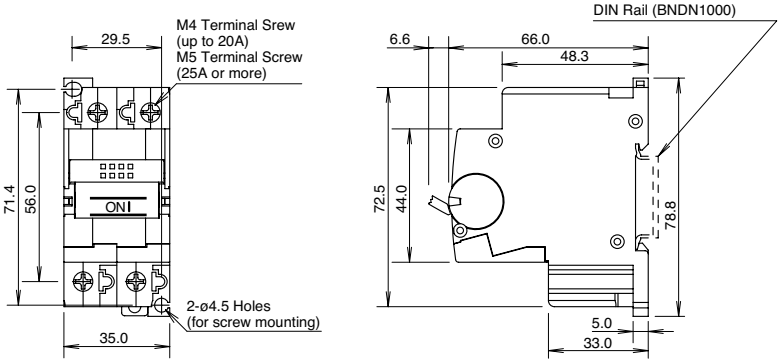




Mounting Hole Layout
(M4 Mounting Screws)



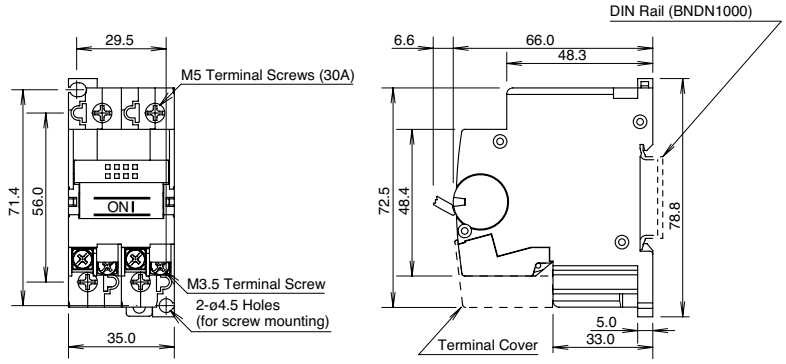
## 2-pole

NC1V-2111
(one auxiliary contact)
NC1V-2112
(two auxiliary contacts)
NC1V-2121
(one alarm contact)
NC1V-2131
(one auxiliary contact and one alarm contact)

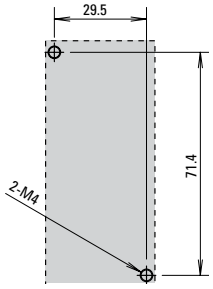



Dimensions shown are for NC1V-2111 and NC1V-2121.

NC1V-2500
(Relay Trip)

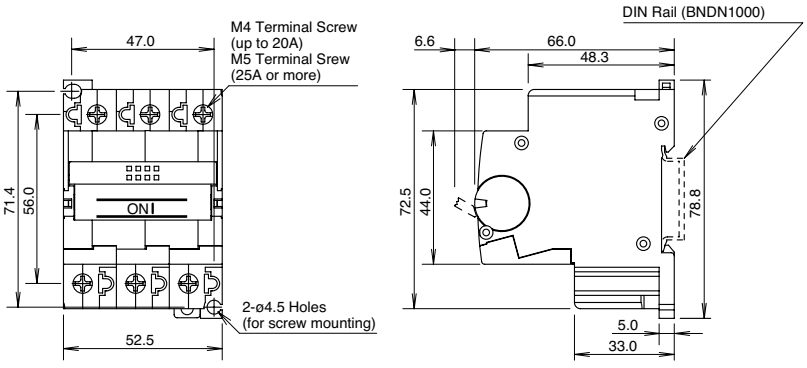



Mounting Hole Layout
(M4 Mounting Screws)

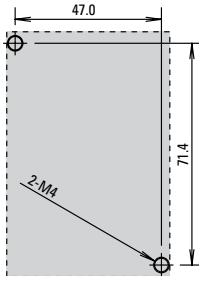



## 3-pole

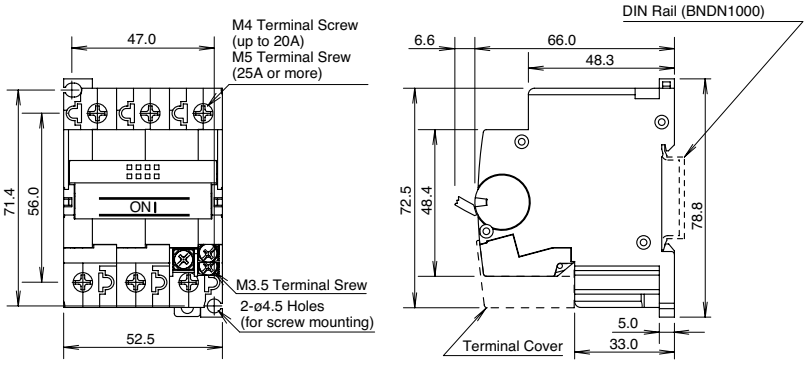
NC1V-3100




Mounting Hole Layout
(M4 Mounting Screws)



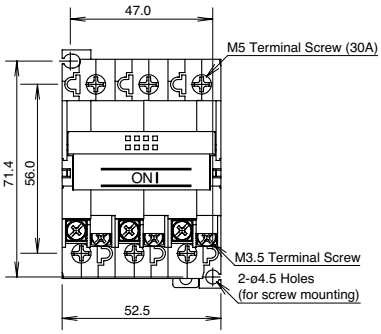

NC1V-3111
(one auxiliary contact)
NC1V-3112
(two auxiliary contacts)
NC1V-3113
(three auxiliary contacts)
NC1V-3121
(one alarm Contact)
NC1V-3131
(one auxiliary contact and one alarm contact)
NC1V-3132
(two auxiliary contacts and one alarm contact)

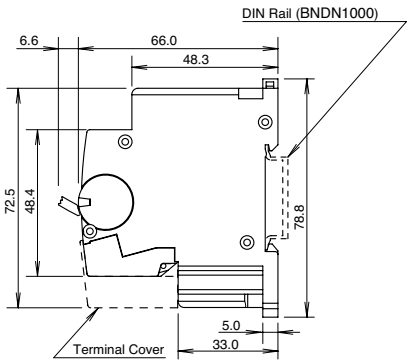



Dimensions shown are for NC1V-3111 and NC1V-3121.

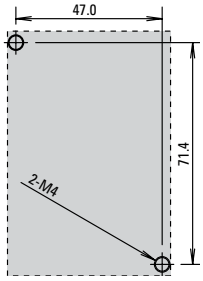
### 3-pole

NC1V-3500
(Relay Trip)



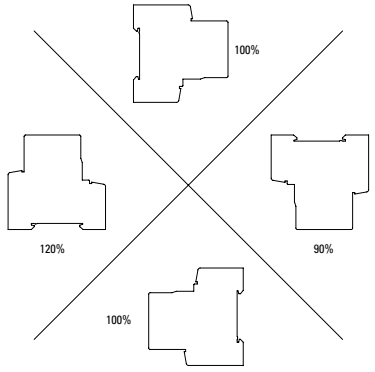

Mounting Hole Layout
(M4 Mounting Screws)




## Instructions

### Installation Angle

Tripping method is hydraulic magnetic. Minimum operating current varies with installation angle. Operating currents are influenced by the weight of the movable iron core. With reference to the following figures, correct the rated current.




Minimum operating current is calculated from the following formula:

(Minimum operating current) = (Rated current) × (Correction factor by installation angle) × (Reference minimum tripping current rate)

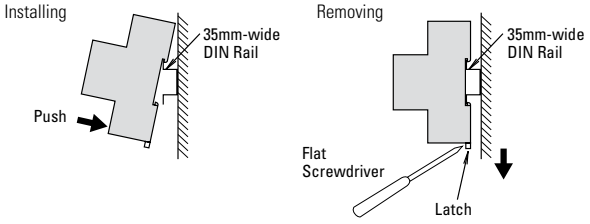
### DIN Rails

Installation on DIN Rail

1. Fasten the DIN rail securely.
2. With the latch facing downward, install the NC1V circuit breaker on the DIN rail as shown below.

Removal from DIN Rail

Using a flat screwdriver, pull the latch on the circuit breaker to remove from the DIN rail.




### Panel Mounting Screws (not supplied)

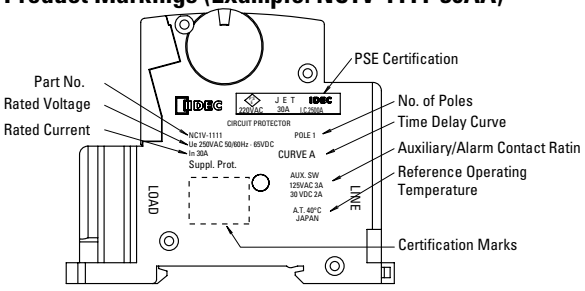
| Screw Type | Tightening Torque | Shape |
|---|---|---|
| M4 | 0.8 to 1.0 N·m | Spring Washer, Plain Washer |

### Applicable wire and Crimp Terminals

| Terminal | Terminal Screw | Connectable Wire Size (mm²) | Applicable Crimping Terminal | Tightening Torque (N·m) |
|---|---|---|---|---|
| Main Circuit Terminals | Spring-up, fingersafe, slotted Phillips screw with square washer (up to 20A) | 0.25 to 1.65 | R1.25-4 | 1 to 1.4 |
| | | 1.04 to 2.63 | R2-4 | |
| | | 2.63 to 6.64 | R5.5-4 | |
| | Spring-up fingersafe terminal (25A and 30A) | 0.25 to 1.65 | R1.25-5 | 1.8 to 2.2 |
| | | 1.04 to 2.63 | R2-5 | |
| | | 2.63 to 6.64 | R5.5-5 | |
| Auxiliary Contact<br>Alarm Contact<br>Voltage Coil Terminals | Slotted Phillips screw with square washer | 0.25 to 1.65 | R1.25-3.5 | 0.7 to 0.9 |
| | | 1.04 to 2.63 | R2-3.5 | |

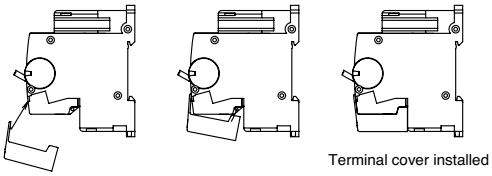
- For wiring the main circuit terminal, use applicable crimp terminals and tighten to the recommended torque.
- When using the a NC1V circuit breaker as a CSA-certified product, use with CSA-certified crimp terminals.
- When using the NC1V circuit breaker as UL-recognized product, use with UL-recognized crimp terminals.

### Product Markings (Example: NC1V-1111-30AA)



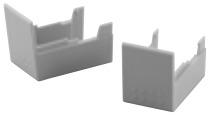

### Installation of Auxiliary/Alarm Terminal Cover

After wiring the terminals, install the terminal cover by aligning with the circuit breaker as shown below.



## Accessories

| Appearance | Part No. | Description |
|---|---|---|
| | NC9Z-MA11 | Panel Cut-Out Mounting bracket for 1-pole model |
| | NC9Z-MA21 | Panel Cut-Out Mounting bracket for 2-pole model |
| | NC9Z-MA31 | Panel Cut-Out Mounting bracket for 3-pole model |
| | NC9Z-TA1 | Replacement Wiring Clip when using panel mount brackets |

| Appearance | Part No. | Description |
|---|---|---|
| | NC9Z-PW1 | Marking Plate Holder* |
| | NC9Z-LK1 | Padlock attachment** |
|  | NC1V-AUX-CV | Replacement Auxiliary/ Alarm Terminal Cover (Nylon - PA66) |

*Marking plate not supplied.
** Padlock not supplied.

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| LED Lighting | EF1A | | UL/c-UL, ATEX, IECEx<br>Class I, Zone 1 AEx d IIB T4 Gb<br>IEC60079-0:Ed 6 (2011), IEC60079-1:Ed 6 (2007), IEC60079-31: Ed 1 (2008)<br>EN60079-0 2012, EN60079-1 2007, EN60079-31 2009<br>ANSI/UL 60079-0.Ed. 5 (2009), ANSI/UL 60079-1. Ed.6 (2009)<br>CSA C22.2 60079-0:2011, CSA C22.2 60079-1:2011 | 18 |
| OI Touchscreens – High Performance Series | 5.7"<br>HG2G-5FT,<br>8.4" & 10.4"<br>HG3G,<br>12.1"<br>HG4G | | UL/c-UL<br>Class I, Division 2 Groups A, B, C, D<br>ANSI/ISA 12.12.01<br>IP66, UL508, ABS, LR, NK, DNV<br>Type 4X & 13 | 28 |
| OI Touchscreens – HG2G-5T Series | 5.7"<br>HG2G-5TT | | UL/c-UL<br>Class I, Division 2 Groups A, B, C, D<br>ANSI/ISA 12.12.01<br>IP66, UL508<br>Type 4X & 13 | 33 |
| OI Touchscreens – HG2G-5T Series | 5.7"<br>HG2G-S5TN | | UL/c-UL<br>Class I, Division 2 Groups A, B, C, D<br>ANSI/ISA 12.12.01<br>IP66, UL508<br>Type 13 | |
| OI Touchscreens – 4.6" | 4.6"<br>HG1F | | UL/c-UL<br>Class I, Division 2 Groups A, B, C, D<br>ANSI/ISA 12.12.01<br>IP65, UL508<br>Type 13 | |
| PLCs | FC5A | | UL/c-UL<br>Class I, Division 2 Groups A, B, C, D,<br>ANSI/ISA 12.12.01-2010 | 73 |
| PLCs | FC4A | | UL<br>Class 1 Division 2 Groups A, B, C, D<br>ANSI/ISA 12.12.01-2010 | 80 |
| PLCs | FT1A | | UL/c-UL<br>Class I, Division 2 Groups A, B, C, D<br>ANSI/ISA 12.12.01-2013 | 108 |

| Family | Series | | Hazardous Location Rating | Page |
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| PLCs | FL1F | | UL/c-UL<br>Class I, Division 2 Groups A, B, C, D<br>ANSI/ISA 12.12.01-2007<br>FM<br>Class I, Division 2 Groups A, B, C, D Class I, Zone 2 Ex nC IIC | 118 |
| Power Supplies | PS6R | | UL/c-UL<br>Class I and II, Division 2 and Class III, Divisions 1 and 2<br>ANSI/ISA 12.12.01-2013<br>ABS and GL Marine certifications (pending) | 149 |
| | PS5R-S | | UL/c-UL<br>Class I, Division 2 Groups A, B, C, D<br>ANSI/ISA 12.12.01-2007 | 155 |
| Barriers | EB3C | | UL, FM, CSA, ATEX<br>Class I, II, III, Divivion 1 Groups A, B, C, D, E, F, G<br>Class I, Zone 0 [AExia] II C<br>UL913, UL60079-0, UL60079-11, UL61010-1 | 246 |
| | EB3N | | UL, FM, CSA, ATEX, IECEx<br>Class I, II, III, Division 1 Groups A, B, C, D, E, F, G<br>Class I, Zone 0 [AExia] II C<br>UL913, UL60079-0, UL60079-11, UL61010-1 | 253 |
| | EB3L | | UL, FM, CSA, ATEX<br>Class I, II, III, Division 1 Groups A, B, C, D, E, F, G<br>Class I, Zone 0 [AExia] II C<br>UL913, UL60079-0, UL60079-11, UL61010-1 | 261 |
| Relays | RV8H | | UL/c-UL<br>Class I, Division 2 Groups A, B, C, D T4A<br>Class I, Zone 2 AEx nA nC IIC T4<br>Class I, Zone 2 Ex nA nC IIC T4 X Gc | 832 |
| Switches | EU2B | | UL: Class I, Zone 1, AEx de IIC T6 Gb Class I, Div 2, Groups A, B, C and D<br>c-UL: Class I, Zone 1, Ex de IIC T6 Gb Class I, Div 2, Groups A, B, C and D<br>ATEX: II2G Ex de IIC II2D tD A21 IP65 | 752 |

# Approvals & Standards

| Approval | Explanation |
|---|---|
| | **UL Listing Mark**<br>This is one of the most common UL marks. If a product carries this mark, it means UL found that samples of this product met UL's safety requirements. These requirements are primarily based on UL's own published Standards for Safety. |
| | **C-UL / US Listing Mark**<br>UL introduced this new listing mark in early 1998. It indicates compliance with both Canadian and U.S. requirements. |
| | **Recognized Component Mark for Canada and the United States**<br>These are marks consumers rarely see because they are specifically used on component parts that are part of a larger product or system. These components may have restrictions on their performance or may be incomplete in construction. Products that bear this mark comply with the safety standards of Canada and the U.S. |

### UL Listing vs. UL Recognition What's the difference?

A product is UL Listed if the UL Listing Mark is on the product, accompanied by the manufacturer's name, trade name, trademark or other authorized identification.

A UL Listing Mark on a product is composed of four elements: the "UL in a circle Mark", the word "LISTED" in capital letters, an alpha-numeric control number, and the product name. Sometimes the UL file number is used as company identification. The UL Listing Mark on a product is the manufacturer's representation that samples of that complete product have been tested by UL to nationally recognized Safety Standards; found to be free from reasonably foreseeable risk of fire, electric shock and related hazards; and that the product was manufactured under UL's Follow-Up Services program.

If you do not find a UL Listing Mark on the product, you may find, on closer examination, that some of the individual components have the UL Recognized Component Mark. The UL Recognized Component Mark means that the component alone meets the requirements for limited, specified use. UL's Component Recognition Service covers the testing and evaluation of component products that are incomplete or restricted in performance capabilities. These components will later be used in complete end products or systems listed by UL.

UL's Component Recognition Service covers millions of components, such as plastics, wire and printed wiring boards, that may be used in either very specific, or a broad spectrum of end-products, or even components such as motors or power supplies. These components are not intended for separate installation in the field. They are intended for use as components of complete equipment submitted for investigation to UL. Component/end-product compatibility is the critical link between certification of a component and certification of the end product in which the component is used.

| Approval | Explanation |
|---|---|
| | The CSA mark may appear alone or with indicators. If it appears alone, it means that the product is certified for the Canadian market, to the applicable Canadian standards. |
| | Many products seeking entry into the European Union must comply with the European Directives and bear the CE Marking. The CE Marking is the manufacturers self-declaration, showing compliance with all applicable directives. |
| | DEMKO's D-Mark represents electrical product safety for a great majority of consumers. The D-Mark is recognized throughout the EU as a reputable European third-party mark of electrical product safety. |
| | **International "emc-Mark"**<br>The International "emc-Mark" appears on products meeting the electromagnetic compatibility requirements of Europe, the United States, Japan, Australia, or any combination of the four. In the United States, some types of products can't be sold without proof of compliance to U.S. electromagnetic compatibility requirements. |

| Approval | Explanation |
|---|---|
| | **C-tick Mark**<br>Applying the C-tick mark to a product indicates compliance with Australian EMC regulations. |
| | **TÜV Product Service**<br>The TÜV Product Service mark demonstrates that you meet European Health and Safety Requirements of safety directives. Both the older and newer marks are shown to the left, as IDEC products bear one or the other. |
| | **TÜV Rheinland**<br>The TÜV Rheinland mark demonstrates compliance with European safety requirements. |
| | **VDE Mark**<br>The VDE Mark indicates conformity with the VDE standards or European or internationally harmonized standards and confirms compliance with protective requirements of the applicable EC Directive(s). |
| | The BIA is a test and certification body affiliated with the testing and certification system BG-PRÜFZERT of German institutions for statutory accident insurance and prevention (BG means Berufsgenossenschaft). The BIA has received accreditation from the central office of safety technology of the Länder (ZLS).<br>The BIA acts as a test and certification body for products under the terms of the EC Directive for personal protective equipment. |
| | The CCC Mark is a labeling requirement for select products entering China. Essentially, the CCC Mark verifies to customs officials that a product complies with safety and quality requirements set by the Chinese government. Compliance is demonstrated by the manufacturer affixing the CCC Mark to their products. |
| | Factory Mutual is a test and certification body specializing in approvals for Hazardous Locations products. |

### Hazardous Location Definitions

| | |
|---|---|
| Class I:<br>An area with flammable gases, vapors or liquids | Division 1:<br>Where ignitable concentrations of flammable gases, vapors, or liquids can exist all of the time under normal operating conditions.<br>Division 2:<br>Where ignitable concentrations of flammable gases, vapors, or liquids are not likely to exist under normal operating conditions. |
| Class II:<br>An area with combustible dusts | Division 1:<br>Where ignitable concentrations of combustible dusts can exist all of the time or some of the time under normal operating conditions.<br>Division 2:<br>Where ignitable concentrations of combustible dusts are not likely to exist under normal operating conditions. |
| Class III:<br>An area with ignitable fibers and flyings | Division 1:<br>Where easily ignitable fibers or materials producing combustible flyings are handled, manufactured, or used.<br>Division 2:<br>Where easily ignitable fibers are stored or handled. |

# Mature Product List

| Device | Product | Discontinued | Available but not in stock | Replaced by |
|---|---|---|---|---|
| Pilot Lights | UP | | √ | None |
| Switches and Pilot Devices | S Series | √ | | TWS |
| | MCM Series | √ | | MC Series |
| Relays | RY2L Series | √ | | None |
| | RH2L | √ | | None |
| | RHN Series | √ | | RH1B |
| | RN Series | √ | | None |
| | RCN Series | √ | | None |
| | LCN Series | √ | | None |
| | RG Series | √ | | None |
| | RP Series | √ | | None |
| | RE Series | √ | | None |
| | RW Series | √ | | None |
| | RSE Series | √ | | None |
| | RA Series | √ | | None |
| | RB Series | √ | | None |
| | RD Series | √ | | None |
| | RV3N | √ | | None |
| | RY22 | √ | | RJ22 (different socket needed) |
| | RY42 | √ | | RU42 |
| Timers | RTB Series | √ | | GT3A or RTE |
| | RTA Series | √ | | GT3A or GT3F |
| | RTM Series | √ | | GT3A |
| | RTP Series | √ | | GT5P |
| | RTY Series | √ | | GT5Y |
| | GT3P Series | √ | | GT3W |
| | GT3D series | √ | | None |
| | GT3S series | | √ | |
| | GT3W-B | √ | | GT3W-A (some functions) |
| | GT3W-C<br>GT3W-D<br>GT3W-E<br>GT3W-F | √ | | None |
| | RTE-PN1<br>RTE-PI1<br>RTE-P11<br>RTE-PN2<br>RTE-PI2<br>RTE-P12 | √ | | RTE-P1 |
| | RTE-PF1<br>RTE-PS1<br>RTE-P21<br>RTE-PF2<br>RTE-PS2<br>RTE-P22 | √ | | RTE-P2 |
| | RTE-BN1<br>RTE-BI1<br>RTE-B11<br>RTE-BN2<br>RTE-BI2<br>RTE-B12 | √ | | RTE-B1 |
| | RTE-BF1<br>RTE-BS1<br>RTE-B21<br>RTE-BF2<br>RTE-BS2<br>RTE-B22 | √ | | RTE-B2 |

| Device | Product | Discontinued | Available but not in stock | Replaced by |
|---|---|---|---|---|
| Display Lights | SLD Series | | √ | SLCs |
| Photoelectric Sensors | SA1A, SA1B | | √ | |
| | SA1C | √ | | SA1E |
| | ISA | √ | | SA1E |
| | ISF | √ | | SA1U/SA2U |
| | SA1L | √ | | None |
| Full Color Recognition Sensors | SA1K | √ | | May use SA1J |
| | SA1K-C2 | √ | | May use SA1J |
| | SA1K-FA | √ | | May use SA1J |
| Laser Sensors | SA1M | √ | | None |
| | MX1A/MX1B/MX1C | √ | | None |
| Ultrasonic Analog Sensors | SA6A | | √ | |
| Intrinsically safe control units | YC contact blocks | √ | | None |
| Monolevers | ARW | √ | | HW1M |
| Contacts | TW-C**L,<br>TW-C**M<br>TW-C**T | √ | | New cammed operators in TW and HW series |
| Thumbwheel switches | DK, DL, DE, DF | | √ | None |
| Power Supplies | PSR-S<br>PSR-H | √ | | PS3L |
| | PSR-AD | √ | | PS5R-A |
| | PS3E | √ | | PS3X |
| | PS3L | | √ | |
| Incandescent bulb for miniature pushbutton | LAY | √ | | LATD (LED) |
| Circuit breakers | NRA*2,<br>NRA*3<br>NRA*4<br>NRA*5<br>NRBM*2<br>NRBM*3<br>NRBM*4<br>NRBM*5 | √ | | None |
| | NRA/NRB-BD, CD, DD, SD, ED, CA, SA, EA delay curves | √ | | None |
| PLCs | FA1 | √ | | FC4A or FC5A (MicroSmart) |
| | FA1J | √ | | |
| | FC1A (Micro1) | √ | | |
| | FC2A (Micro3) | √ | | |
| | FC2A (Micro3C) | √ | | |
| | FC3A (ONC) | | √ | |
| | FA-2J | √ | | |
| | FA-3S | √ | | |
| LED Lamps | LAPD | √ | | LATD |
| | LFPD | √ | | LFTD |
| | LSPD | √ | | LSTD |
| | LF1E | √ | | LF2B, LF1B-N |
| IDEC SmartRelay | FL1A, FL1B, FL1C, FL1D, FL1E | √ | | FL1F |
| Operator Interfaces | HG2A, HG2F | √ | | HG2G |
| | HG3F, HG4F | | | HG3G, HG4G |
| | HG1B, HG1A | √ | | HG1F |
| Contactors | YS series | | | YC series |

# General Terms & Conditions

**1. Responsibility And Title:**
All orders are acknowledged, either in writing or by actual shipment, after final acceptance by IDEC. Risk of loss shall pass to Buyer upon delivery to carrier at IDEC's F.O.B. point. The products are security for full payment of the purchase price. If payment is not made on a timely basis, the title to the products shall revert to IDEC.

**2. Shipments:**
F.O.B. Sunnyvale, California, seller's dock.

**3. Delivery Schedule:**
IDEC shall not be liable for delays in delivery or failure to perform due to causes beyond reasonable control of IDEC. IDEC reserves the right to bill for merchandise and charges for warehousing, insurance, trucking and other associated expenses, if and when shipment should be held beyond scheduled date at the request of Buyer.

**4. Cancellations:**
No order accepted by IDEC may be altered or modified by Buyer unless agreed to in writing signed by an authorized official of IDEC, and no such order may be canceled or terminated except upon payment of IDEC's loss, damage and expense arising from such cancellation or termination.

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**12. Taxes:**
Unless Buyer provides IDEC with tax exemption certificates acceptable to the taxing authorities, Buyer shall pay any sales, use, excise or similar tax attributable to the sale of merchandise covered hereby.

**13. Governing Law:**
This agreement and performance by the parties hereunder shall be construed in accordance with the law of the state of California.

**14. Specifications, Dimensions & Pricing:**
Subject to change without notice.

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