# VARISPEED-616P1Y

# INSTRUCTION MANUAL

MULTI-AXIS INVERTER (VS-616P1Y)

MODEL: CIMR-P1Y

---

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

---

YASKAWA

MANUAL NO. TOEZ-S616-13B

# Preface

This manual is designed to ensure correct and suitable application of the multi-axis inverter VA-RISPEED-616P1Y series. Read this manual before attempting to install, operate, maintain, or inspect an Inverter and keep it in a safe, convenient location for future reference. Before you understand all precautions and safety information before attempting application.

## Safety Information

The following conventions are used to indicate precautions in this manual. Failure to heed precautions provided in this manual can result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

⚠**WARNING** Indicates precautions that, if not heeded, could possibly result in loss of life or serious injury.

⚠**CAUTION** Indicates precautions that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

Even items described in CAUTION may result in a vital accident in some situations. In either case, follow these important notes.

# General Precautions

- The diagrams in this manual may be indicated without covers or safety shields to show details. Be sure to restore covers or shields before operating the Units and run the Units according to the instructions described in this manual.
- Any illustrations, photographs, or examples used in this manual are provided as examples only and may not apply to all products to which this manual is applicable.
- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual.
- When ordering a new copy of the manual due to damage or loss, contact your Yaskawa representatives or the nearest Yaskawa sales office and provide the manual number shown on the front cover.
- If nameplates become warn or damaged, order new ones from your Yaskawa representatives or the nearest Yaskawa sales office.

# Safety Precautions

## ■ Confirmations upon Delivery

### ⚠ CAUTION

| | Page |
|---|---|
| • Never install an Inverter that is damaged or missing components.<br>Doing so can result in injury. | 1 - 2 |

## ■ Installation

### ⚠ CAUTION

| | Page |
|---|---|
| • Always hold the case when carrying the Inverter.<br>If the Inverter is held by the front cover, the main body of the Inverter may fall, possibly resulting in injury. | 2 - 2 |
| • Attach the Inverter to a metal or other noncombustible material.<br>Fire can result if the Inverter is attached to a combustible material. | 2 - 2 |
| • Install a cooling fan or other cooling device when installing more than one Inverter in the same enclosure so that the temperature of the air entering the Inverters is below 45°C.<br>Overheating can result in fires or other accidents. | 2 - 2 |

## ■ Wiring

### ⚠ WARNING

| | Page |
|---|---|
| • Always turn OFF the input power supply before wiring terminals.<br>Otherwise, an electric shock or fire can occur. | 3 - 2 |
| • Wiring must be performed by an authorized person qualified in electrical work.<br>Otherwise, an electric shock or fire can occur. | 3 - 2 |
| • Be sure to ground the ground terminal.<br>(200 V class: Ground to 100 Ω or less)<br>Otherwise, an electric shock or fire can occur. | |
| • Always check the operation of any emergency stop circuits after they are wired.<br>Otherwise, there is the possibility of injury. (Wiring is the responsibility of the user.) | 3 - 2 |

### ⚠ CAUTION

| | Page |
|---|---|
| • Check to be sure that the voltage of the main AC power supply satisfies the rated voltage of the Inverter.<br>Injury or fire can occur if the voltage is not correct. | 3 - 2 |
| • Do not perform voltage withstand tests on the Inverter.<br>Otherwise, semiconductor elements and other devices can be damaged. | 3 - 2 |
| • Tighten all terminal screws to the specified tightening torque.<br>Otherwise, a fire may occur. | 3 - 2 |
| • Never connect the AC main circuit power supply to output terminals U, V, and W.<br>The inverter can be damaged. | |

## ■ Operation

### ⚠ WARNING

| | Page |
|---|---|
| • Check to be sure that the front cover is attached before turning ON the power supply. Do not remove the front cover during operation.<br>An electric shock may occur. | 5-2 |
| • Reset alarms only after confirming that the RUN signal is OFF. If an alarm is reset with the RUN signal turned ON, the machine may suddenly start.<br>Injury may occur. | 5-2 |

### ⚠ CAUTION

| | Page |
|---|---|
| • Don't touch the radiation fins (heat sink), braking resistor, or Braking Resistor Unit. These can become very hot.<br>Otherwise, a burn injury may occur. | 5-2 |
| • Be sure that the motor and machine is within the applicable ranges before starting operation.<br>Otherwise, an injury may occur. | 5-2 |
| • Provide a separate holding brake if necessary.<br>Otherwise, an injury may occur. | 5-2 |
| • Don't check signals while the Inverter is running.<br>Otherwise, the equipment may be damaged. | 5-2 |
| • Be careful when changing Inverter settings. The Inverter is factory set to suitable settings. | 5-2 |

## ■ Maintenance and Inspection

### ⚠ WARNING

- Do not touch the Inverter terminals. Some of the terminals carry high voltages and are extremely dangerous.

  Doing so can result in electric shock.
- Always have the protective cover in place when power is being supplied to the Inverter. When attaching the cover, always turn OFF power to the Inverter through the MCCB.

  Doing so can result in electric shock.
- After turning OFF the main circuit power supply, wait until the CHARGE indicator light goes out before performance maintenance or inspections.

  The capacitor will remain charged and is dangerous.
- Maintenance, inspection, and replacement of parts must be performed only by authorized personnel.

  Remove all metal objects, such as watches and rings, before starting work. Always use grounded tools.

  Failure to heed these warning can result in electric shock.

### ⚠ CAUTION

- A CMOS IC is used in the control board. Handle the control board and CMOS IC carefully. The CMOS IC can be destroyed by static electricity if touched directly.

  The CMOS IC can be destroyed by static electricity if touched directly.
- Do not change the wiring, or remove connectors or the Digital Operator, during operation.

  Doing so can result in personal injury.

## ■ Others

### ⚠ WARNING

- Do not attempt to modify or alter the Inverter.

  Doing so can result in electrical shock or injury.

# Warning Label Contents and Position

There is a warning label on the Inverter in the position shown in the following illustration. Always heed the warnings given on this label.

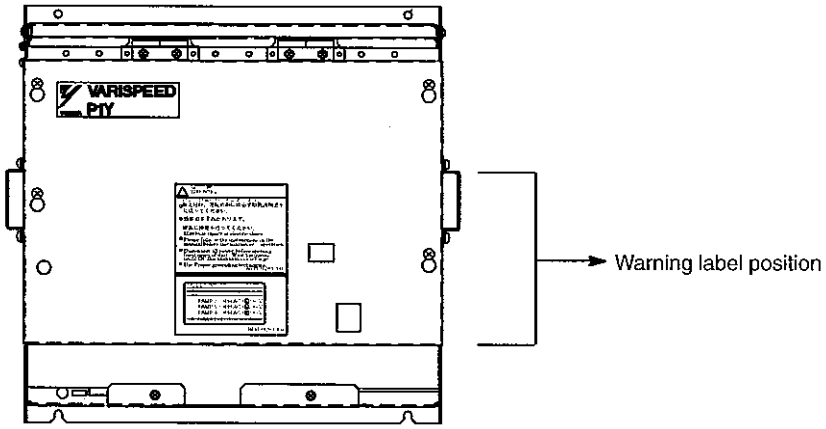



Illustration shows the CIMR-P1Y

Warning Label Contents

# Table of Contents

# 6 TROUBLESHOOTING

# 1

# CONFIRMATIONS UPON DELIVERY

This chapter describes the checks required upon receiving a VS-616P1Y Inverter.

# 1.1 CONFIRMATIONS UPON DELIVERY

> **⚠ CAUTION**
>
> - Never install an Inverter that is damaged or missing components.
>
> Doing so can result in injury.

Check the following items as soon as the Inverter is delivered.

Table 1.1 Checks

| Item | Method |
|---|---|
| Has the correct model of Inverter been delivered? | Check the model number on the nameplate on the side of the Inverter (See 1.1.1). |
| Is the Inverter damaged in any way? | Inspect the entire exterior of the Inverter to see if there are any scratches or other damage resulting from shipping. |
| Are any screws or other components loose? | Use a screwdriver or other tools to check for tightness. |

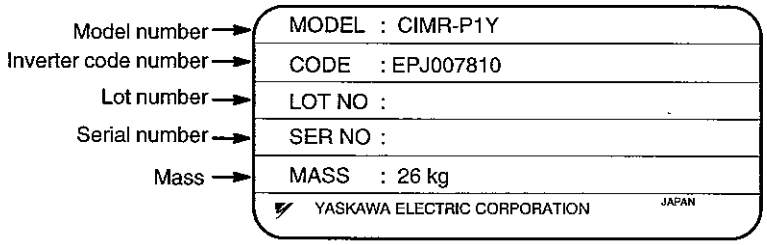
If you find any irregularities in the above items, contact the agency from which you purchased the Inverter or your Yaskawa representative immediately.

## 1.1.1 Nameplate Information

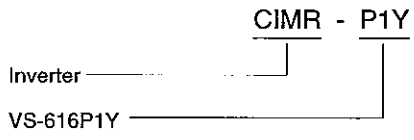
### ■ Inverter Code No.

The code No. of inverter (5-axis) for winder of the new spinning system is: EPJ007810

### ■ Example Nameplate




### ■ Inverter Model Numbers



## 1.1.2 Standard Specifications

Table 1.2 VS-616P1Y Specifications

| Item | | | 200V Class | | | | 400V Class | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Output ratings | Max. appicable motor | kVA | 0.2 | 0.75 | 3.7 | 7.5 | 0.4 | 0.75 | 3.7 | 7.5 | 15 |
| | Max. output capacity | kVA | 0.6 | 2.3 | 6.7 | 13 | 1.4 | 2.6 | 6.1 | 14 | 26 |
| | Rated output current | A | 1.5 | 6 | 17.5 | 33 | 1.8 | 3.4 | 8 | 18 | 34 |
| | Max. output frequency | | 500 Hz | | | | 500 Hz | | | | |
| | Max. output voltage | | 3-phase 200/208/220/230 V (Proportional to input voltage) | | | | 3-phase 380/400/415/440/460 V (Proportional to input voltage) | | | | |
| Power supply | DC input voltage | | 270 to 330 V | | | | 540 to 660 V | | | | |
| | AC input voltage | | 200/208/220 V 50Hz<br>200/208/220/230 V 60 Hz | | | | 380/400/415/440/460 V 50/60 Hz | | | | |
| Number of axis and Inverter output capacity | | 3-axis | 9 kW | | | | 9 kW | | | | |
| | | 5-axis | 20 kW, 30 kW | | | | 20 kW, 30 kW | | | | |
| | | 8-axis | 20 kW, 30 kW | | | | 20 kW, 30 kW | | | | |
| Control characteristics | Control method | | Sine wave PWM | | | | | | | | |
| | Carrier frequency | | 2.5 kHz | | | | | | | | |
| | Output frequency range | | 0.1 to 500 Hz | | | | | | | | |
| | Frequency setting resolution | | Digital references: 1/60000, Analog references 1/16384 (with AI-14U) | | | | | | | | |
| | Output frequency resolution | | 1/60000 | | | | | | | | |
| | Accel/decel time | | 0.1 to 6000 s | | | | | | | | |
| | Overload capacity | | 150% of rated current for one minute | | | | | | | | |
| Protective functions | Motor protection | | Protection by electronic thermal overload relaly | | | | | | | | |
| | Instantaneous overcurrent protection | | Stops at approx. 200% of rated output current | | | | | | | | |
| | Fuse blown protection | | Stops for fuse blown | | | | | | | | |
| | Overload protection | | Stops in one minute at approx. 150% of rated output current | | | | | | | | |
| | Overvolage protection | | Stops when main-circuit DC voltage is approx. 400 V | | | | Stops when main-circuit DC voltage is approx. 800 V | | | | |
| | Undervoltage protection | | Stops when main-circuit DC voltage is approx. 190 V | | | | Stops when main-circuit DC voltage is approx. 380 V | | | | |
| | Momentary power loss ridethru | | Stops for 15 ms or more. By selecting the momentary power loss mode, operation can be continued if power is restored within 2s. | | | | | | | | |
| | Stall prevention | | Stall prevention during acceleration, deceleration, or running | | | | | | | | |
| | Cooling fin overheating | | Protection by themistor | | | | | | | | |
| Environment | Application site | | Indoor (no corrosive gas, dust, etc.) | | | | | | | | |
| | Ambient operating temperature | | 0 to 45℃ | | | | | | | | |
| | Storage temperature | | −10 to 60℃ | | | | | | | | |
| | Ambient operating humidity | | 90% RH max. (non-condensing) | | | | | | | | |
| | Vibration | | 19 Hz or less: 9.8 $m/s^2$ (1 G), 20 to 50 Hz: 2 $m/s^2$ (0.2 G) | | | | | | | | |

Note Cooling air should be 2 m/s at the heatsink for effective cooling.

# 2

# INSTALLATION

This chapter describes the installation procedure of a VS-616P1Y Inverter.

# 2.1 INSTALLATION

| ⚠ CAUTION |
| --- |
| • Always hold the case when carrying the Inverter.<br>If the Inverter is held by the front cover, the main body of the Inverter may fall, possibly resulting in injury.<br>• Attach the Inverter to a metal or other noncombustible material.<br>Fire can result if the Inverter is attached to a combustible material.<br>• Install a cooling fan or other cooling device when installing more than one Inverter in the same enclosure so that the temperature of the air entering the Inverters is below 45°C.<br>Overheating can result in fires or other accidents. |

Install the VS-616P1Y in the installation site described below and maintain optimum conditions.

## 2.1.1 Installation Site

Do not install the Inverter under the following conditions.

- Extreme cold and heat.
  Use only within ambient temperature range: –10℃ to +40℃
- Rain, moisture. (For enclosed wall-mounted type)
- Oil sprays, splashes.
- Salt spray.
- Direct sunlight. (Avoid using outdoors.)
- Corrosive gases or liquids.
- Dust or metallic particles in the air. (For enclosed wall-mounted type)
- Physical shock, vibration.
- Magnetic noise. (Example: welding machines, power devices, etc.)
- High humidity.
- Radioactive materials.
- Combustibles: thinners, solvents, etc.

# 3

# WIRING

This chapter describes wiring terminals, main circuit terminal connections, main circuit terminal wiring specifications, and other wiring specifications of a VS-616P1Y Inverter.

## 3.1 WIRING

### ⚠ WARNING

- Always turn OFF the input power supply before wiring terminals.

  Otherwise, an electric shock or fire can occur.
- Wiring must be performed by an authorized person qualified in electrical work.

  Otherwise, an electric shock or fire can occur.
- Always check the operation of any emergency stop circuits after they are wired.

  Otherwise, there is the possibility of injury. (Wiring is the responsibility of the user.)

### ⚠ CAUTION

- Check to be sure that the voltage of the main AC power supply satisfies the rated voltage of the Inverter.

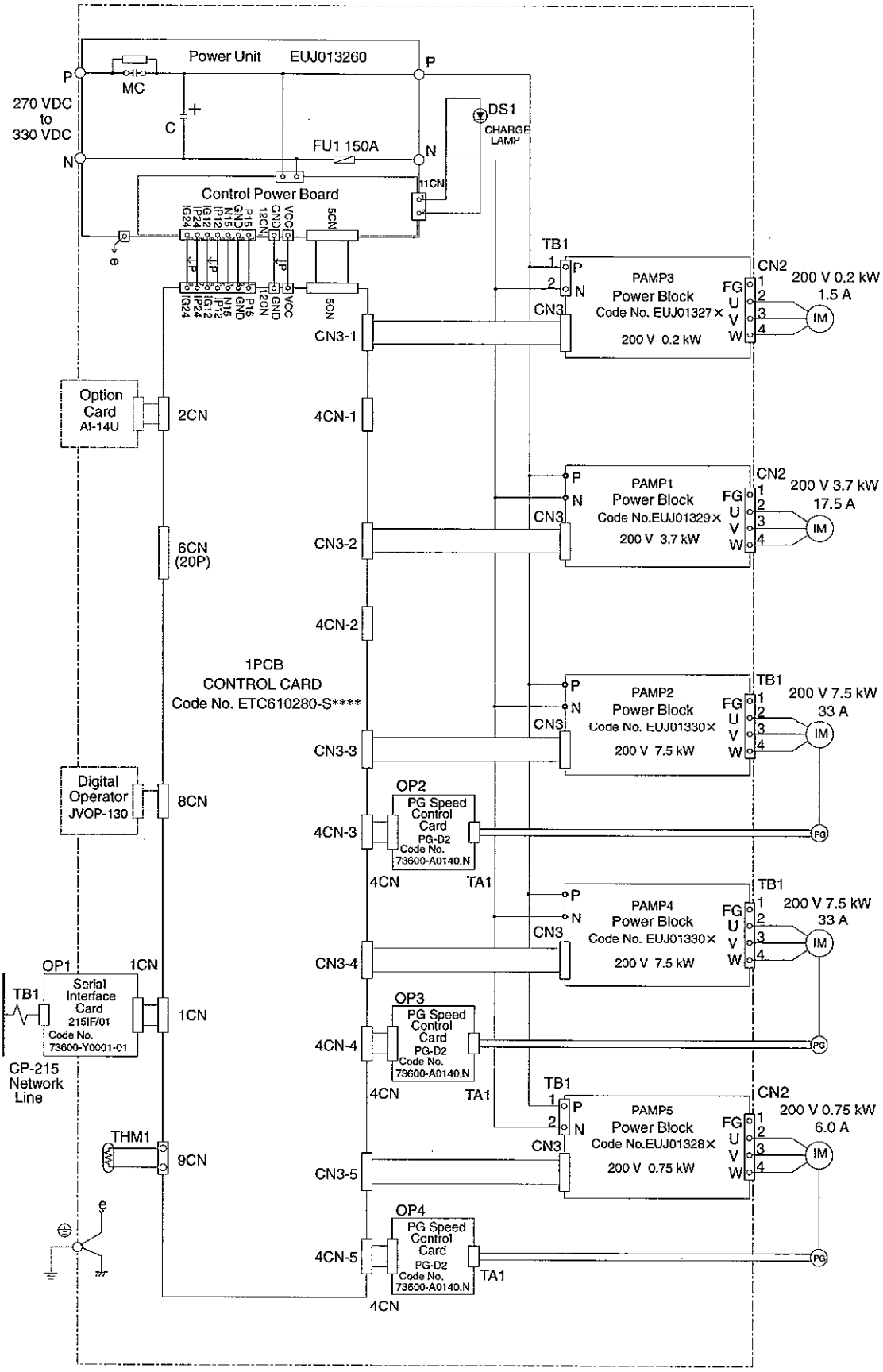
  Injury or fire can occur if the voltage is not correct.
- Do not perform voltage withstand tests on the Inverter.

  Otherwise, semiconductor elements and other devices can be damaged.
- Tighten all terminal screws to the specified tightening torque.

  Otherwise, a fire may occur.

## 3.1.1 Main Circuit Connection Diagram

The figure below shows an example of connecting the main circuit for a 200 V class motor (DC input).



### 3.1.2 Main Circuit Terminals

*Table 3.1* and *3.2* show the main circuit terminals and their functions, screw size, tightening torque, and recommended cable size.

Table 3.1 200 V Class Main Circuit Terminals

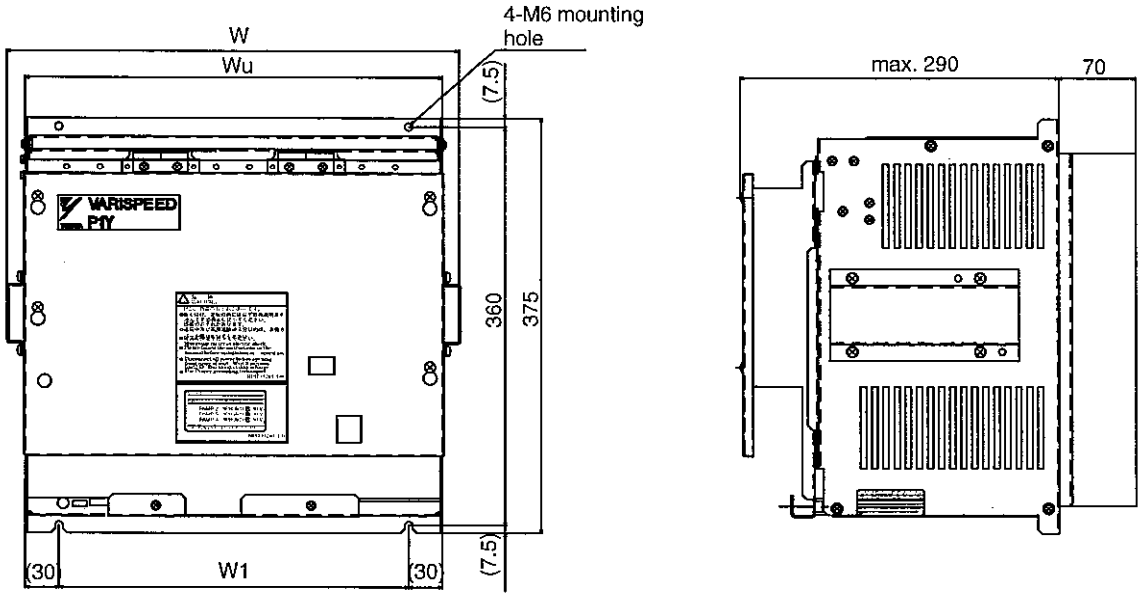
| Part | Capacity | Terminal | Function | Screw Size | Tightening Torque N·m | Recommended Cable Size mm² |
|---|---|---|---|---|---|---|
| Power Supply | Total 9 kW | P, N | DC input terminal | M8 | 8.2 to 9.8 | 22 |
| | Total 20 kW | P, N | DC input terminal | M8 | 8.2 to 9.8 | 22 |
| | — | — | Unit ground terminal | M6 | 3.6 to 4.9 | 22 |
| Power Block | 0.2 kW | U, V, W | Output terminal | Connector connection<br>Receptable housing type : 1-178128-4<br>Contact type : 353717-5<br>(Manufactured by AMP (JAPAN) LTD.) | — | 2 |
| | | PE | Power amplifier ground terminal | | | |
| | 0.75 kW | U, V, W | Output terminal | Connector connection<br>Receptable housing type : 1-178128-4<br>Contact type : 353717-5<br>(Manufactured by AMP (JAPAN) LTD.) | — | 2 |
| | | PE | Power amplifier ground terminal | | | |
| | 3.7 kW | U, V, W | Output terminal | Connector connection<br>Receptable housing type : 1-177958-4<br>Contact type : 316041-2<br>(Manufactured by AMP (JAPAN) LTD.) | — | 5.5 |
| | | PE | Power amplifier ground terminal | | | |
| | 7.5 kW | U, V, W | Output terminal | M5 | 2.0 to 2.4 | 14 |
| | | PE | Power amplifier ground terminal | | | |

Table 3.2 400 V Class Main Circuit Terminals

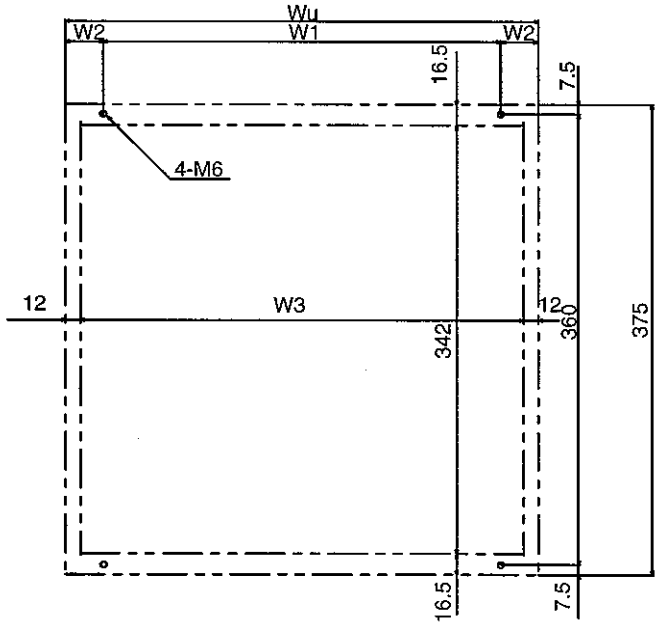
| Part | Capacity | Terminal | Function | Screw Size | Tightening Torque N·m | Recommended Cable Size mm² |
|---|---|---|---|---|---|---|
| Power | Total 9 kW | P, N | DC input terminal | M6 | 3.6 to 4.9 | 14 |
| | Total 20 kW | P, N | DC input terminal | M6 | 3.6 to 4.9 | 22 |
| | — | — | Unit ground terminal | M6 | 3.6 to 4.9 | 22 |
| Power Block | 0.4 kW | U, V, W | Output terminal | Connector connection<br>Receptable housing type : 1-178129-6<br>Contact type : 1-917511-5<br>(Manufactured by AMP (JAPAN) LTD.) | — | 2 |
| | | PE | Power amplifier ground terminal | | | |
| | 0.75 kW | U, V, W | Output terminal | Connector connection<br>Receptable housing type : 1-178129-6<br>Contact type : 1-917511-5<br>(Manufactured by AMP (JAPAN) LTD.) | — | 2 |
| | | PE | Power amplifier ground terminal | | | |
| | 3.7 kW | U, V, W | Output terminal | Connector connection<br>Receptable housing type : 1-177958-4<br>Contact type : 316041-2<br>(Manufactured by AMP (JAPAN) LTD.) | — | 5.5 |
| | | PE | Power amplifier ground terminal | | | |
| | 7.5 kW | U, V, W | Output terminal | Connector connection<br>Receptable housing type : 1-177958-4<br>Contact type : 316041-2<br>(Manufactured by AMP (JAPAN) LTD.) | — | 5.5 |
| | | PE | Power amplifier ground terminal | | | |
| | 15 kW | U, V, W | Output terminal | M5 | 2.0 to 2.4 | 14 |
| | | PE | Power amplifier ground terminal | | | |

### 3.1.3 Dimensions in mm

#### ■ Exterior Dimensions



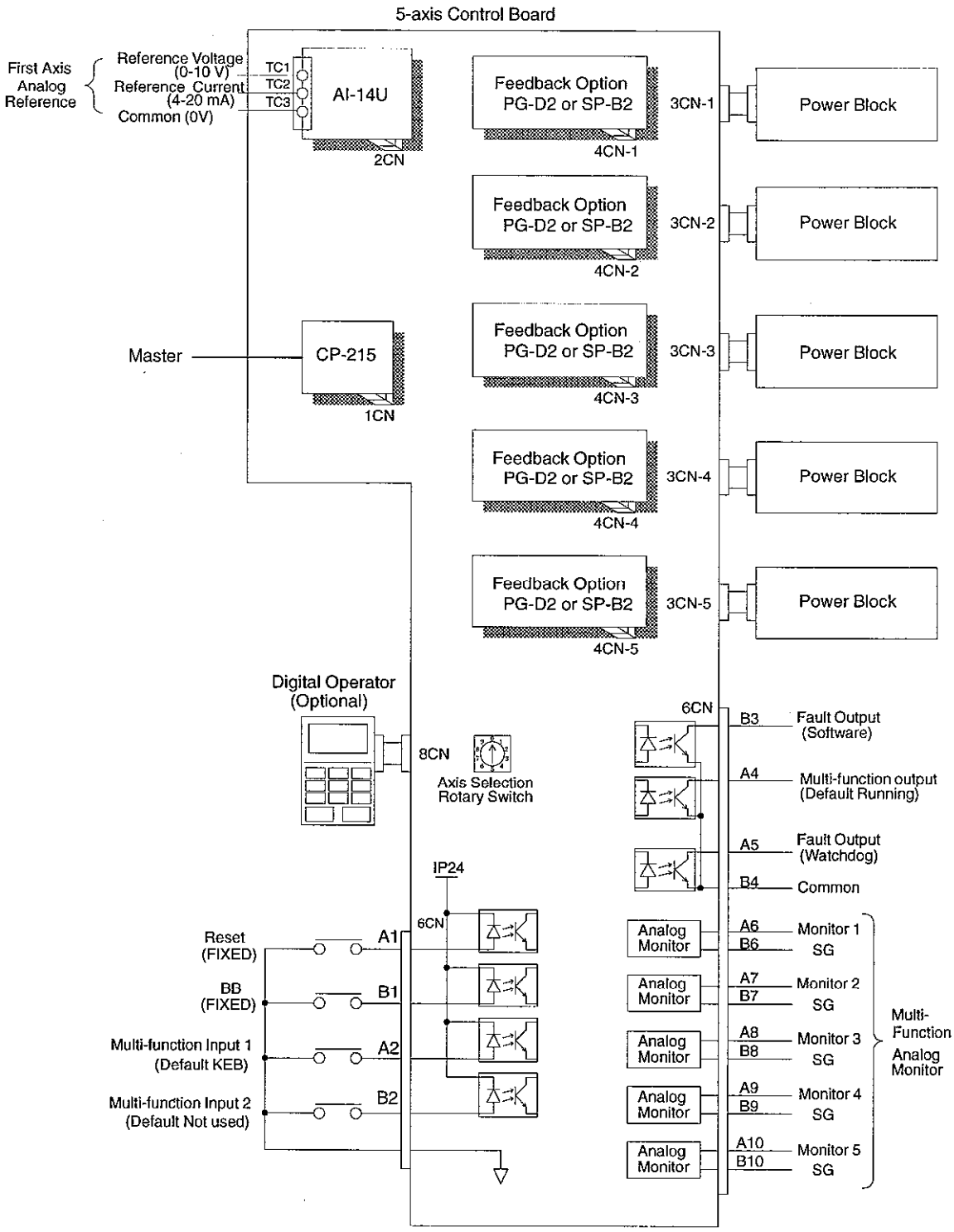

#### ■ Panel Cut Out Dimensions




| Voltage | Unit | W | Wu | W1 | W2 | W3 |
|---|---|---|---|---|---|---|
| 200 V | 3-axis | 340 | 305 | 250 | 27.5 | 226 |
| | 5-axis | 415 | 380 | 325 | 27.5 | 356 |
| | 8-axis | 565 | 530 | 475 | 27.5 | 506 |
| 400 V | 3-axis | 365 | 330 | 250 | 40 | 306 |
| | 5-axis | 455 | 420 | 350 | 35 | 396 |
| | 8-axis | 565 | 530 | 475 | 27.5 | 506 |

## 3.1.4 Connection Diagram of Control PC Board

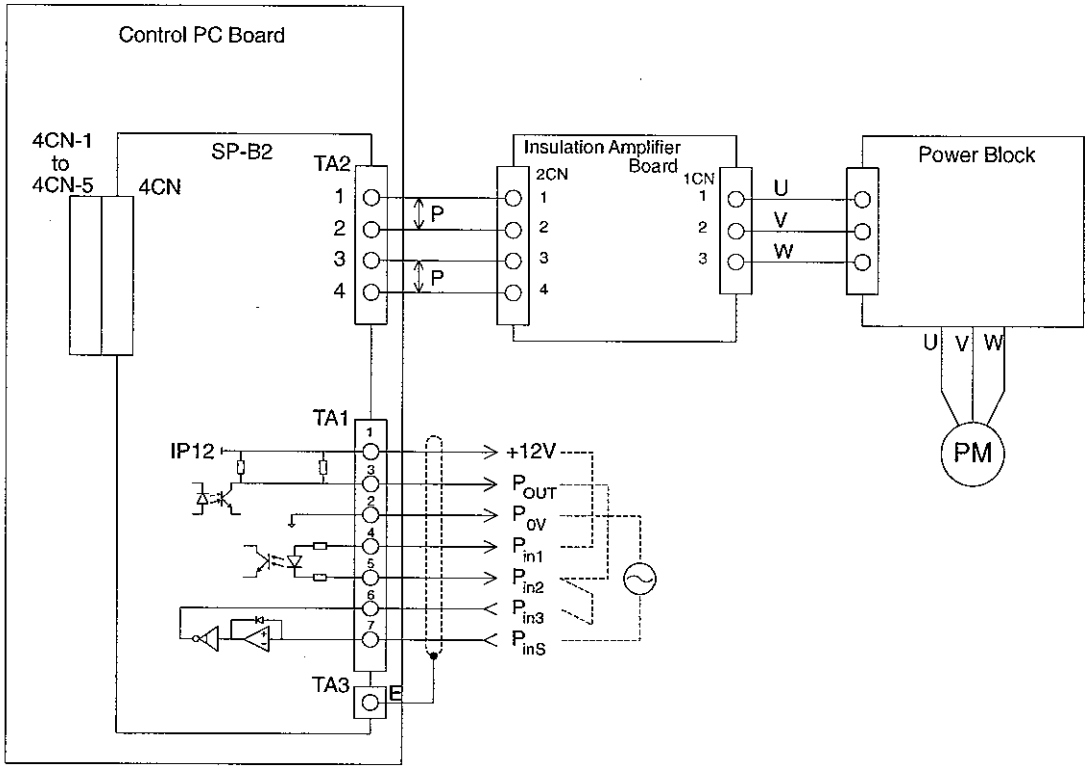
The figure below shows an example of the 5-axis unit control board.



## ■ Connector

| Connector No. | Name | Description | Application for the unit | | |
|---|---|---|---|---|---|
| | | | 3-axis | 5-axis | 8-axis |
| 1CN | 8832E-050FSD-Z | CP-215 Interface | ○ | ○ | ○ |
| 2CN | 8830-060-170SD | C option Interface (For AI-14U) | ○ | ○ | ○ |
| CN3-1 | 8830-032-170SD | First axis gate driver interface | ○ | ○ | ○ |
| CN3-2 | 8830-032-170SD | Second axis gate driver interface | ○ | ○ | ○ |
| CN3-3 | 8830-032-170SD | Third axis gate driver interface | ○ | ○ | ○ |
| CN3-4 | 8830-032-170SD | Fourth axis gate driver interface | | ○ | ○ |
| CN3-5 | 8830-032-170SD | Fifth axis gate driver interface | | ○ | ○ |
| CN3-6 | 8830-032-170SD | Sixth axis gate driver interface | | | ○ |
| CN3-7 | 8830-032-170SD | Seventh axis gate driver interface | | | ○ |
| CN3-8 | 8830-032-170SD | Eighth axis gate driver interface | | | ○ |
| 4CN-1 | 8812-050-170SD | First axis A option interface (SP-A2, PG-D2) | ○ | ○ | ○ |
| 4CN-2 | 8812-050-170SD | Second axis A option interface (SP-A2, PG-D2) | ○ | ○ | ○ |
| 4CN-3 | 8812-050-170SD | Third axis A option interface (SP-A2, PG-D2) | ○ | ○ | ○ |
| 4CN-4 | 8812-050-170SD | Fourth axis A option interface (SP-A2, PG-D2) | | ○ | ○ |
| 4CN-5 | 8812-050-170SD | Fifth axis A option interface (SP-A2, PG-D2) | | ○ | ○ |
| 4CN-6 | 8812-050-170SD | Sixth axis A option interface (SP-A2, PG-D2) | | | ○ |
| 4CN-7 | 8812-050-170SD | Seventh axis A option interface (SP-A2, PG-D2) | | | ○ |
| 4CN-8 | 8812-050-170SD | Eighth axis A option interface (SP-A2, PG-D2) | | | ○ |
| 5CN | HIF3BA-14PA-2 | Control power supply board interface (signal) | ○ | ○ | ○ |
| 6CN | HIF3CA-20PA-2 | External I/O interface | ○ | ○ | ○ |
| 8CN | DFI1-12DP-2 (20) | Digital operator interface | ○ | ○ | ○ |
| 9CN | B02B-XASK-1 | Thermistor interface | ○ | ○ | ○ |
| 12CN | B08B-XASK-1 | Control power supply board interface (power) | ○ | ○ | ○ |
| 31CN | FX2B-40P-1 | Extended 3-axis board interface 1 | | | ○ |
| 32CN | FX2B-40P-1 | Extended 3-axis board interface 2 | | | ○ |
| 33CN | B06-XASK-1 | Extended 3-axis board interface 3 (power) | | | ○ |
| TB1 (GND) | 1P Terminal Block | Control power supply board interface (signal ground) | ○ | ○ | ○ |
| TB1 (VCC) | 1P Terminal Block | Control power supply board interface (+5 V) | ○ | ○ | ○ |

### 3.1.5 SP-B2 Connection Diagram



### 3.1.6 Connection to the Digital Operator

Connect the digital operator to the 8CN of the inverter.

To connect the digital operator (JVOP-130), an exclusive extention cable (type: 72616-W5001 or 72616-W5003) must be prepared.

### 3.1.7 Setting Axis Selection Rotary Switch

Use the rotary switch to select the axis.

Table 3.3 Rotary Switch Setting

| Setting | Content |
|---|---|
|  | Connect the digital operator to the first axis inverter. |
|  | Connect the digital operator to the second axis inverter. |
|  | Connect the digital operator to the third axis inverter. |
|  | Connect the digital operator to the fourth axis inverter. |
|  | Connect the digital operator to the fifth axis inverter. |
|  | Connect the digital operater to the sixth axis inverter (extended 3-axis side). |
|  | Connect the digital operater to the seventh axis inverter (extended 3-axis side). |
|  | Connect the digital operater to the eighth axis inverter (extended 3-axis side). |
|  | Connect the digital operater to the first axis inverter. |
|  | Connect the digital operater to the second axis inverter. |

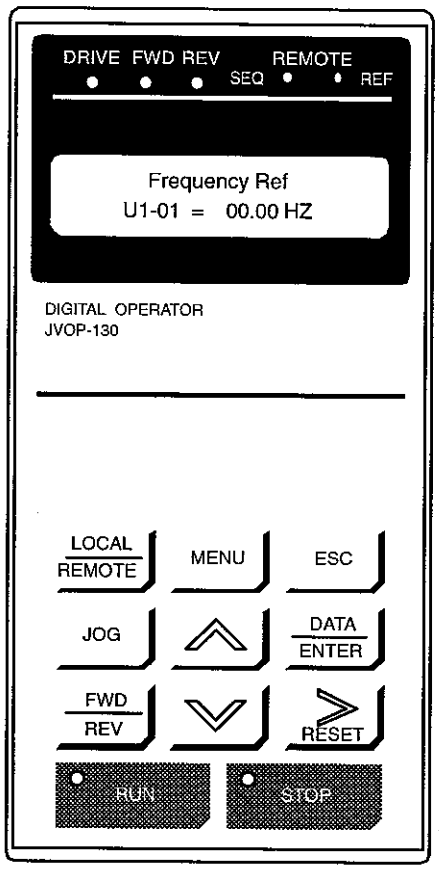
# 4

# Setting Operation Conditions

This chapter describes user constants and operation modes of a VS-616P1Y Inverter.

# 4.1 USING THE DIGITAL OPERATOR

This section describes the component names and functions of the Digital Operator. The component names and functions are shown in *Figure 4.1* and Key functions are described in *Table 4.1*.




### Operation Mode Indicators

DRIVE: Lit when in operation mode.
FWD: Lit when there is a forward run command input.
REV: Lit when there is a reverse run command input.
SEQ: Lit when the run command from the CP-215 is enabled.
REF: Lit when the frequency reference from CP-215 is enabled.

### Data Display

Two-line LCD that displays data for monitoring, user constants, and set values with 16 characters per line.

### Keys

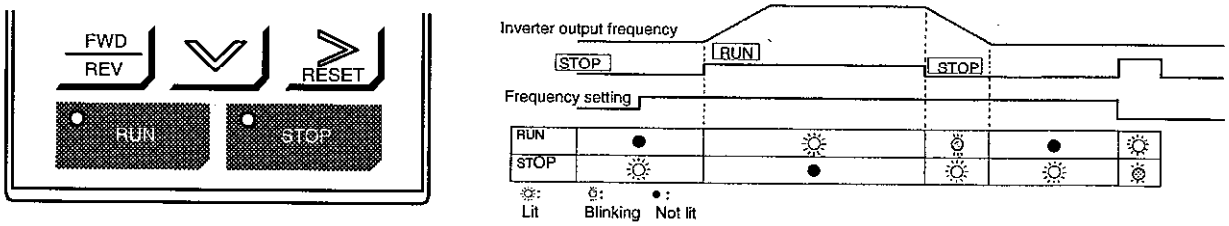
Execute operations such as setting user constants, monitoring, JOG, and autotuning.

Fig 4.1 Digital Operator Component Names and Functions

Table 4.1 Key Functions

| Key | Name | Function |
|---|---|---|
| LOCAL / REMOTE | LOCAL/REMOTE Key | Switches between operation (LOCAL) via the Digital Operator and CP-215 (REMOTE) operation.<br>This Key can be enabled or disabled by setting a user constant (o2-01). |
| MENU | MENU Key | Displays menus. |
| ESC | ESC Key | Returns to the status before the DATA/ENTER Key was pressed. |
| JOG | JOG Key | Enables jog operation when the VS-616P1Y is being operated from the Digital Operator. |
| FWD / REV | FWD/REV Key | Selects the rotation direction of the motor when the VS-616P1Y is being operated from the Digital Operator. |
| RESET | RESET Key | Sets the number of digits for user constant settings.<br>Also acts as the reset Key when a fault has occurred. |
| ∧ | Increment Key | Selects menu items, groups, functions, and user constant names, and increments set values. |
| ∨ | Decrement Key | Selects menu items, groups, functions, and user constant names, and decrements set values. |
| DATA / ENTER | DATA/ENTER Key | Enters menu items, functions, constants, and set values after they are set. |
| RUN | RUN Key | Starts the VS-616P1Y operation when the VS-616P1Y is in operation with the Digital Operator. |
| STOP | STOP Key | Stops VS-616P1Y operation.<br>This Key can be enabled or disabled by setting a user constant (o2-02) when operating from the control circuit terminal. |

Note Except in diagrams, Keys are referred to using the Key names listed in the above table.




The RUN and STOP indicators light and blink to indicate operating status.
During DB (initial excitation), RUN blinks and STOP is turned ON.

Fig 4.2 RUN and STOP Indicators

# 4.2 MODES

This section describes the VS-616P1Y's monitor modes, switching between modes, and accessing/setting user constants.

## 4.2.1 Inverter Modes

The VS-616P1Y Inverter's user constants and monitoring functions have been organized in groups called modes that make it easier to read and set user constants.

The VS-616P1Y is equipped with 3 modes, as shown in the *Table 4.2*.

Table 4.2 Modes

| Mode | Primary function(s) |
|---|---|
| Operation mode | The Inverter can be run in this mode.<br>Use this mode when monitoring values such as frequency references or output current, displaying fault information, or displaying the fault history. |
| Initialize mode | Use this mode when selecting the language displayed on the Digital Operator, selecting the access level for reading/setting user constants, selecting the control mode, or initializing the user constants. |
| Programming mode | Use this mode when reading/setting the user constants required for operation.<br>The program-mode functions are subdivided into the following groups:<br>• Application: Operation mode selection, DC control, speed search, etc.<br>• Tuning: Acceleration/deceleration times, S-curve characteristics, carrier frequencies, etc.<br>• Reference: Settings related to frequency control<br>• Motor: V/f characteristics and motor constants<br>• Option: Settings for Optional Cards<br>• Terminal: Settings for sequential I/O and analog I/O<br>• Protection: Settings for the motor and inverter protection functions<br>• Operator: Selects the Digital Operator's display and Key functions |

## 4.2.2 Switching Modes

Once the Inverter has been put into operation mode by pressing the Menu Key, the Increment and Decrement Keys can be pressed to switch to other modes. Press the DATA/ENTER Key to read/set the user constants in each mode.

Press the ESC Key to return to the mode display from the user constant display.

Press the DATA/ENTER Key twice to write a constant and then press the ESC Key to return to the mode display. This is the most Basic operation, so you should remember it.

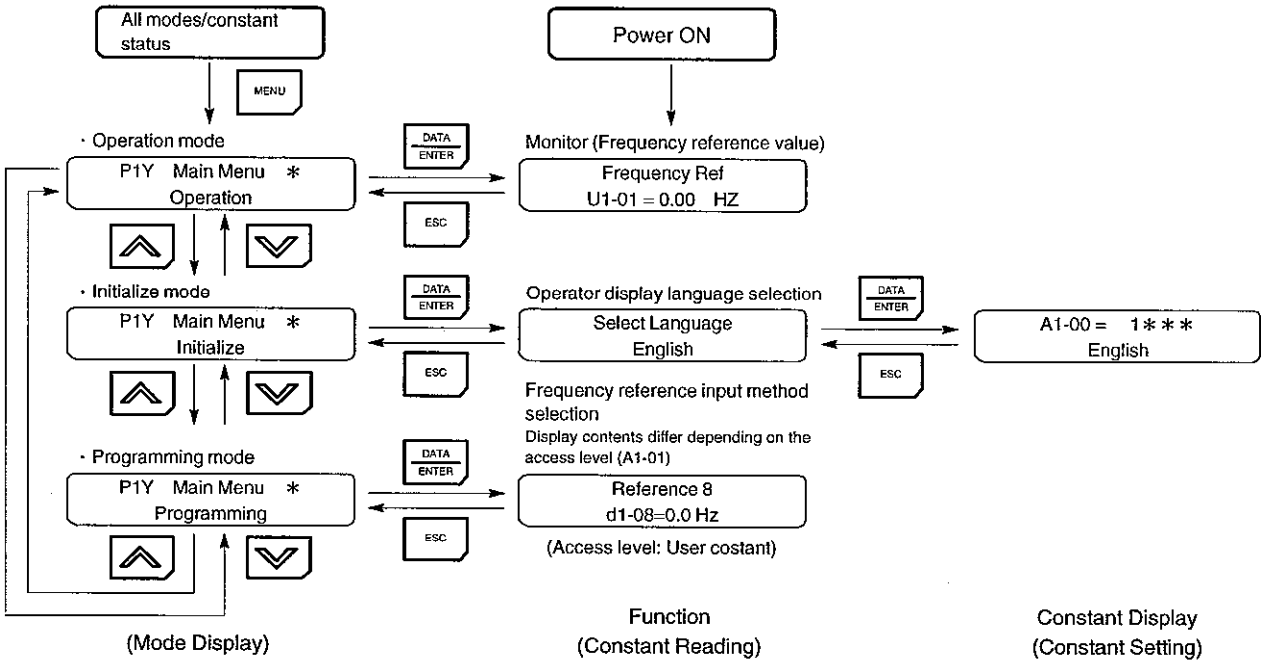



Fig 4.3 Mode Transitions

### 4.2.3 Operation Mode

Operation mode is the mode in which the Inverter can be operated.

Many user constants can't be changed when the Inverter is operating. Refer to *User Constant List* for details.

The following monitor displays are possible in operation mode: The frequency reference, output frequency, output current, and output voltage, as well as fault information and the fault history.

**IMPORTANT**

When running the Inverter after using digital operator, press the MENU Key to enter the operation mode and then press the DATA/ENTER Key from the operation mode display to bring up the monitor display.Run commands can't be received from any other display. (Monitor display in the operation mode appears when the power is turned ON.)

The structure of the operation mode is shown in *Figure 4.4.*

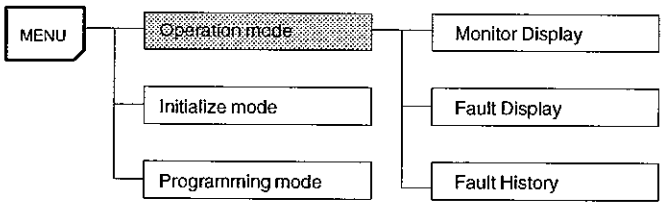



Fig 4.4 Structure of the Operation Mode User Constants

## ■ Operations in Operation Mode

Key operations in operation mode are shown in *Figure 4.5*.

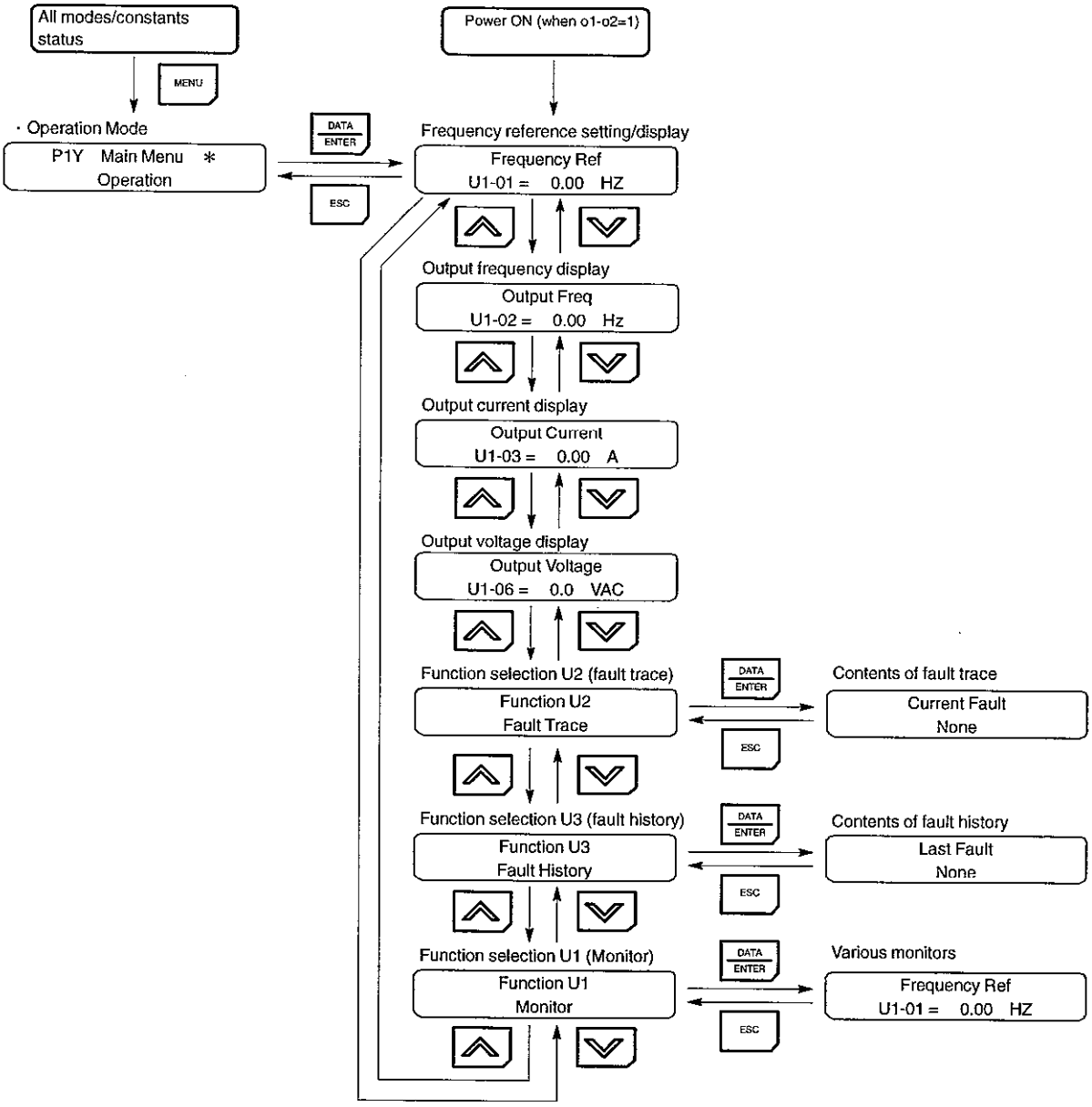



Fig 4.5 Operations in Operation Mode

## ■ Conditions for Monitoring

*Table 4.3* shows the items that can bc monitored in operation mode.

The "Valid access levels" column in the table indicates whether an item can be monitored in a particular access level and control method. The codes in this column have the following meanings.

| | |
|---|---|
| Q | Items that can be monitored in all access levels. (Quick-start, Basic, and Advanced) |
| B | Items that can be monitored in the Advanced and Basic access levels. |
| A | Items that can be monitored only in the Advanced access level. |
| × | Items that cannot be monitored in the control mode shown. |

The output signal levels for multi-function analog outputs shown in the table are for a gain of 100.0 and a bias of 0.00.

Table 4.3 Constants Monitored in Operation Mode

| Function | Constant No. | Name: Digital Operator Display | Function | Output Signal Levels for Multi-function Analog Outputs | Min. Unit | Valid Access Levels: V/f | V/f w/ PG | Open-loop Vector | Flux Vector |
|---|---|---|---|---|---|---|---|---|---|
| Status Monitor | U1-01 | Frequency reference<br>Frequency Ref | Monitors/sets the frequency reference value.<br>The display units can be set with user constant o1-03. | 10 V: Max. frequency | 0.01 Hz | Q | Q | Q | Q |
| | U1-02 | Output frequency<br>Output Freq | Monitors the output frequency.<br>The display units can be set with user constant o1-03. | 10 V: Max. frequency | 0.01 Hz | Q | Q | Q | Q |
| | U1-03 | Output current<br>Output Current | Monitors the output current. | 10 V: Rated current | 0.1 A | Q | Q | Q | Q |
| | U1-04 | Control method<br>Control Method | Shows which control mode is set. | 0: V/f control *<br>1: V/f with PG<br>2: Open-loop vector<br>3: Flux vector | – | Q | Q | Q | Q |
| | U1-05 | Motor speed<br>Motor Speed | Monitors the motor speed.<br>The display unit setting can be changed using o1-03. | 10 V: Max. output frequency | 0.01 Hz | × | Q | Q | Q |
| | U1-06 | Output voltage<br>Output Voltage | Monitors the Inverter's internal output voltage reference value. | 10 V: 200 (400) VAC | 0.1 V | Q | Q | Q | Q |
| | U1-07 | DC bus voltage<br>DC Bus Voltage | Monitors the DC voltage of the Inverter. | 10 V: 400 (800) VDC | 1 V | Q | Q | Q | Q |
| | U1-08 | Output power<br>Output kWatts | Monitors the output power. (This is an internally detected value.) | 10 V: Inverter capacity | 0.1 kW | Q | Q | Q | Q |
| | U1-09 | Torque reference<br>Torque Reference | Monitors the internal torque reference value when vector control is used. | 10 V: Rated torque<br>(0 to ±10 V possible) | 0.1 % | × | × | Q | Q |
| | U1-10 | Input terminal status<br>Input Term Sts | Shows input ON/OFF status.<br>U1-10 = 00000000<br>1: Fault reset<br>1: External baseblock (NC contact)<br>1: Function selected by H1-01<br>1: Function selected by H1-02<br>1: Function selected by H1-03<br>1: Function selected by H1-04<br>1: Function selected by H1-05<br>1: Function selected by H1-06 | – | – | Q | Q | Q | Q |
| | U1-11 | Output terminal status<br>Output Term Sts | Shows output ON/OFF status.<br>U1-11 = 00000000<br>1: Green LED ON (RUN)<br>1: Function selected by H2-02<br>Not used.<br>1: Red LED ON (fault) | – | – | Q | Q | Q | Q |

* Select 0 when using a PM drive.

Table 4.3 Constants Monitored in Operation Mode (continued)

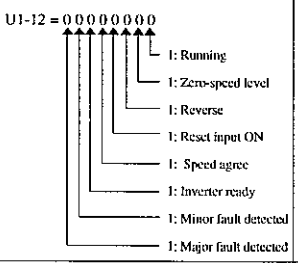
| Function | Constant No. | Name: Digital Operator Display | Function | Output Signal Levels for Multi-function Analog Outputs | Min. Unit | Valid Access Levels: V/f | V/f w/ PG | Open-loop Vector | Flux Vector |
|---|---|---|---|---|---|---|---|---|---|
| Status Monitor | U1-12 | Operation status<br>Int Ctl Sts 1 | Inverter operating status.<br>  | – | – | Q | Q | Q | Q |
| | U1-13 | Cumulative operation time<br>Elapsed Time | Monitors the Inverter's elapsed operating time.<br>The initial value and running/power-on time selection can be set with user constants o2-07 and o2-08. | – | 1 hr | Q | Q | Q | Q |
| | U1-14 | Software No.<br>FLASH ID | | – | – | Q | Q | Q | Q |
| | U1-18 | Motor secondary current (Iq)<br>Mot SEC Current | Monitors the calculated value of the motor's secondary current (Iq).<br>The motor's rated secondary current corresponds to 100%. | 10 V: Rated primary current<br>(0 to +10 V output) | 0.1 % | B | B | B | B |
| | U1-19 | Motor exciting current (Id)<br>Mot EXC Current | Monitors the calculated value of the motor's excitation current (Id).<br>The motor's rated secondary current corresponds to 100%. | 10 V: Rated primary current<br>(0 to +10 V output) | 0.1 % | × | × | B | B |
| | U1-20 | Output frequency after soft-start<br>SFS Output | Monitors the output frequency after a soft start.<br>The display shows the frequency without the correction from compensation functions such as slip compensation. | 10 V: Max. output frequency | 0.01 Hz | A | A | A | A |
| | U1-21 | ASR input<br>ASR Input | Monitors the input to the speed control loop.<br>The max. frequency corresponds to 100%. | 10 V: Max. output frequency | 0.01 % | × | A | × | A |
| | U1-22 | ASR output<br>ASR Output | Monitors the output from the speed control loop.<br>The motor's rated secondary current corresponds to 100%. | 10 V: Rated primary current | 0.01 % | × | A | × | A |
| | U1-23 | Speed deviation<br>Speed Deviation | Monitors the speed deviation within the speed control loop.<br>The max. frequency corresponds to 100%. | 10 V: Max. output frequency | 0.01 % | × | A | × | A |
| | U1-24 | PID feedback value<br>PID Feedback | Monitors the feedback value when PID control is used.<br>The input for the max. frequency corresponds to 100%. | 10 V: Max. output frequency | 0.01 % | A | A | A | A |
| | U1-25 | DI-16H input status<br>DI-16 Reference | Monitors the reference value from a VS-616P1Y DI16H Digital Reference Card.<br>The value will be displayed in binary or BCD depending on user constant F3-01. | – | – | A | A | A | A |
| | U1-26 | Output voltage reference (Vq)<br>Voltage Ref (Vq) | Monitors the Inverter's internal voltage reference value for the motor's secondary current control. | 10 V: 200 (400) VAC | 0.1 V | × | × | A | A |

Table 4.3 Constants Monitored in Operation Mode (continued)

| Function | Constant No. | Name<br>Digital Operator Display | Function | Output Signal Levels for Multi-function Analog Outputs | Min. Unit | Valid Access Levels | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | V/f | V/f w/ PG | Open-loop Vector | Flux Vector |
| Status Monitor | U1-27 | Output voltage reference (Vd)<br>Voltage Ref (Vd) | Monitors the Inverter's internal voltage reference value for the motor's excitation current control. | 10 V: 200 (400) VAC | 0.1 V | × | × | A | A |
| | U1-28 | Software No. (CPU)<br>CPU ID | | – | – | A | A | A | A |
| | U1-32 | ACR output of q axis<br>ACR (q) Output | Monitors current control output value for motor's secondary current. | – | 0.1 % | × | × | A | A |
| | U1-33 | ACR output of d axis<br>ACR (d) Output | Monitors current control output value for motor's excitation current. | – | 0.1 % | × | × | A | A |
| | U1-34 | OPE fault constant<br>OPE Detected | Shows the first constant number where an OPE fault is detected. | – | – | A | A | A | A |
| | U1-35 | Zero servo movement pulses | Shows the number of PG pulses for the movement range at the stop point for a zero servo times 4. | – | 1 | × | × | × | A |
| | U1-36 | Gate driver ID | | – | – | A | A | A | A |
| | U1-37 | Carrier frequency monitor<br>Carrier Freq | Monitors the carrier frequency. | – | 0.1 kHz | A | A | A | A |
| | U1-38 | Feedback voltage monitor<br>Feedback votage | Monitors the feedback voltage. | – | 0.1 V | A | × | × | × |

Table 4.3 Constants Monitored in Operation Mode (continued)

| Function | Constant No. | Name: Digital Operator Display | Function | Output Signal Levels for Multi-function Analog Outputs | Min. Units | Valid Access Levels: V/f | V/f w/ PG | Open-loop Vector | Flux Vector |
|---|---|---|---|---|---|---|---|---|---|
| Fault trace | U2-01 | Current fault / Current Fault | Information on the current fault | – | – | Q | Q | Q | Q |
| | U2-02 | Last fault / Last Fault | Information on the last fault | – | – | Q | Q | Q | Q |
| | U2-03 | Frequency reference at fault / Frequency Ref | Frequency reference value when the "last fault" occurred. | – | 0.01 Hz | Q | Q | Q | Q |
| | U2-04 | Output frequency at fault / Output Freq | Output frequency when the "last fault" occurred. | – | 0.01 Hz | Q | Q | Q | Q |
| | U2-05 | Output current at fault / Output Current | Output current when the "last fault" occurred. | – | 0.1 A | Q | Q | Q | Q |
| | U2-06 | Motor speed at fault / Motor Speed | Motor speed when the "last fault" occurred. | – | 0.01 Hz | × | Q | Q | Q |
| | U2-07 | Output voltage reference at fault / Output Voltage | Output voltage when the "last fault" occurred. | – | 0.1 V | Q | Q | Q | Q |
| | U2-08 | DC bus voltage at fault / DC Bus Voltage | The main circuit DC voltage when the "last fault" occurred. | – | 1 V | Q | Q | Q | Q |
| | U2-09 | Output power at fault / Output kWatts | Output power when the "last fault" occurred. | – | 0.1 kW | Q | Q | Q | Q |
| | U2-10 | Torque reference at fault / Torque Reference | Torque reference when the "last fault" occurred. (The rated torque = 100%.) | – | 0.1 % | × | × | Q | Q |
| | U2-11 | Input terminal status at fault / Input Term Sts | Input terminal status when the "last fault" occurred. (Same format as U1-10.) | – | – | Q | Q | Q | Q |
| | U2-12 | Output terminal status at fault / Output Term Sts | Output terminal status when the "last fault" occurred. (Same format as U1-11.) | – | – | Q | Q | Q | Q |
| | U2-13 | Operation status at fault / Inverter status | Inverter operating status when the "last fault" occurred. (Same format as U1-12.) | – | – | Q | Q | Q | Q |
| | U2-14 | Cumulative operation time at fault / Elapsed time | Elapsed operating or power-on time when the "last fault" occurred. | – | 1 hr | Q | Q | Q | Q |

Table 4.3 Constants Monitored in Operation Mode (continued)

| Function | Constant No. | Name: Digital Operator Display | Function | Output Signal Levels for Multi-function Analog Outputs | Min. Units | Valid Access Levels: V/f | V/f w/ PG | Open-loop Vector | Flux Vector |
|---|---|---|---|---|---|---|---|---|---|
| Fault history | U3-01 | Most recent fault / Last Fault | Information on the last fault. | – | – | Q | Q | Q | Q |
| | U3-02 | Second most recent fault / Fault Message 2 | Information on the 2nd to last fault. | – | – | Q | Q | Q | Q |
| | U3-03 | Third most recent fault / Fault Message 3 | Information on the 3rd to last fault. | – | – | Q | Q | Q | Q |
| | U3-04 | Fourth/oldest fault / Fault Message 4 | Information on the 4th to last fault. | – | – | Q | Q | Q | Q |
| | U3-05 | Cumulative operation time at fault / Elapsed Time 1 | Elapsed running or power-on time when the last fault occurred. | – | 1 hr | Q | Q | Q | Q |
| | U3-06 | Accumulated time of second fault / Elapsed Time 2 | Elapsed running or power-on time when the 2nd to last fault occurred. | – | 1 hr | Q | Q | Q | Q |
| | U3-07 | Accumulated time of third fault / Elapsed Time 3 | Elapsed running or power-on time when the 3rd to last fault occurred. | – | 1 hr | Q | Q | Q | Q |
| | U3-08 | Accumulated time of fourth/oldest fault / Elapsed Time 4 | Elapsed running or power-on time when the 4th to last fault occurred. | – | 1 hr | Q | Q | Q | Q |

## 4.2.4 Initialize Mode

The initialize mode is used to select the language displayed by the Unit, the access level, and the control method; it is also used to initialize the Unit's user constants. The structure of the initialize mode is shown in *Figure 4.6*.

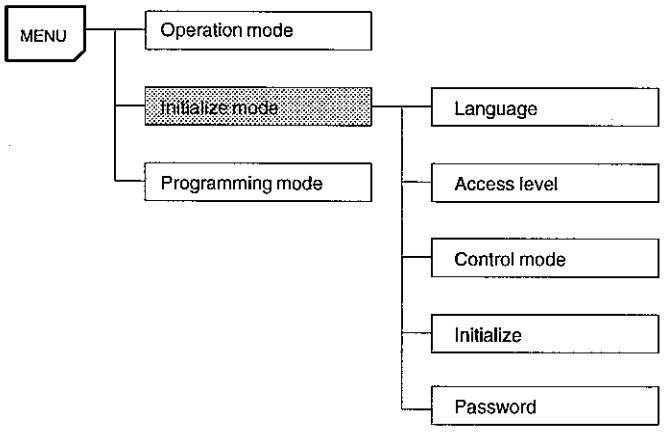



Fig 4.6 Structure of Initialize Mode User Constants

## ■ Selecting the Display Language: A1-00

- Use constant A1-00 to select the language displayed by the Inverter. A value of 0 sets English and a value of 1 sets Japanese.
- This user constant is not returned to the factory setting when constants are initialized. It must be manually reset to the factory setting.

| User Constant Number | Name | Change during Operation | Setting Range | Unit | Factory Setting | Valid Access Levels | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | V/f Control | V/f with PG | Open Loop Vector | Flux Vector |
| A1-00 | Language selection for Digital Operator display | ○ | 0 (English)<br>1 (Japanese) | – | 1<br>(Japanese) | Q | Q | Q | Q |

◀EXAMPLE▶ **Changing the Language to English**

Use the following procedure to change the display language from Japanese to English.

| Step | Key Sequence | Digital Operator Display | Remarks |
|---|---|---|---|
| 1 | MENU | P1Y モードセンタク ＊<br>ドライブモード | |
| 2 | ∧ | P1Y モードセンタク ＊<br>カンキョウセッテイ | |
| 3 | DATA ENTER | ゲンゴ (Language)<br>ニホンゴ (Japanese) | |
| 4 | DATA ENTER | A1-00 = 1＊＊＊<br>ニホンゴ (Japanese) | Changed to constant setting level. |
| 5 | ∨ | A1-00 = 0<br>English | |
| 6 | DATA ENTER | Entry Accepted | Writes-in the new setting. |
| | | Select Language<br>English | After a few seconds, the Operator display is as shown on the left. |

The display language has been set to English.

## ■ Setting the Access Level: A1-01

- Use constant A1-01 to select the user constant access level. This level determines which user constants can be changed and displayed.
- The user constants that can be displayed and changed also depend upon the control method being used.

| User Constant Number | Name | Change during Operation | Setting Range | Unit | Factory Setting | Valid Access Levels | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | V/f Control | V/f with PG | Open Loop Vector | Flux Vector |
| A1-01 | Constant access level | ○ | 0 to 4 | – | 1 (Q) | Q | Q | Q | Q |

Access Level Settings

| Setting | Function | |
|---|---|---|
| 0 | Operation Only | This setting allows the operation mode and initialize mode to be changed or displayed.<br>Use this setting to prevent user constant settings from being changed. |
| 1 | User Program | This setting allows only the user-selected constants (up to 32) to be changed or displayed.<br>Select the desired user constants in A2-01 through A2-32. |
| 2 | Quick-start | This setting allows the user constants required to start the Inverter (about 25) to be changed or displayed. |
| 3 | Basic | This setting allows the commonly used user constants to be changed or displayed. |
| 4 | Advanced | This setting allows all user constants to be changed or displayed. |

## ■ Setting the Control Method: A1-02

- Use constant A1-02 to select one of the four control methods.
- This user constant is not returned to the factory setting when constants are initialized. It must be manually reset to the factory setting.

| User Constant Number | Name | Change during Operation | Setting Range | Unit | Factory Setting | Valid Access Levels | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | V/f Control | V/f with PG | Open Loop Vector | Flux Vector |
| A1-02 | Control method selection | × | 0 to 3 | — | 0 (V/f control without PG) | Q | Q | Q | Q |

Control Method Settings

| Setting | Function |
|---|---|
| 0 | V/f control without pulse generator (normal V/f control; select 0 when using a PM drive). |
| 1 | V/f control with PG feedback (V/f control using a PG Speed Control Card). |
| 2 | Open-loop vector control<br>(Vector control using the Inverter internal speed information). |
| 3 | Flux vector control<br>(Vector control using a PG Speed Control Card). |

Note Do not use settings 2 and 3 since they do not correspond to the control.

## ■ Initializing User Constants: A1-03

- Use constant A1-03 to initialize the user constants.
- When initialized, the user constants will return to their factory-preset values. You should normally record the setting of any constants that are changed from the factory presets.

| User Constant Number | Name | Change during Operation | Setting Range | Unit | Factory Setting | Valid Access Levels | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | V/f Control | V/f with PG | Open Loop Vector | Flux Vector |
| A1-03 | Initialize | × | 0, 1110, 2220, 3330 | — | 0 | Q | Q | Q | Q |

Settings to Initialize User Constants

| Setting | Function |
|---|---|
| 0 | Returns to the Initialize Display without initializing any user constants. |
| 1110 | Initializes the user constants to the user settings. |
| 2220 | 2-wire sequential initialization (Initializes the user constants to the factory settings.) |
| 3330 | 3-wire sequential initialization |

### Initializing to User Settings

This function initializes the user constants to values that have been recorded as user settings.

To record the user settings, change the user constants to the desired values and then set user constant o2-03 (User constant initial value) to 1. Once user settings are recorded, the o2-03 value will be automatically reset to 0. (The 1110 function will be disabled when user constant o2-03 is set to 0.)

◀EXAMPLE▶ **Initializing for 2-wire Sequential Operation**

Use the following procedure to initialize user constants to the factory settings.

| Step | Key Sequence | Digital Operator Display | Remarks |
|---|---|---|---|
| 1 | MENU | P1Y Main Menu ∗<br>Operation | |
| 2 | ^ | P1Y Main Menu ∗<br>Initialize | |
| 3 | DATA ENTER | Select Language<br>English | |
| 4 | ^<br>Press 3 times. | Init Parameters<br>No Initialize | |
| 5 | DATA ENTER | A1-03 = 0∗∗∗<br>No Initialize | |
| 6 | ^ | A1-03 = 2220<br>2-wire Initial | |
| 7 | DATA ENTER | Entry Accepted | Writes-in the new setting. |
| | | Init Parameters<br>No Initialize | After a few seconds, the Operator display is as shown on the left. |

The initialization has been completed for a 2-wire sequence.

## ■ Passwords: A1-04, A1-05

- Use constants A1-04 and A1-05 to write-protect the initialize-mode user constants.
- User constants A1-01 through A1-03 and A2-01 through A2-32 can be displayed but not changed if the contents of A1-04 and A1-05 are not the same.
- To write-protect the initialize-mode user constants, set the password in A1-05 after inputting the desired values in A1-01 through A1-03 and A2-01 through A2-32. User constant A1-05 can be displayed by displaying A1-04 and pressing the Menu Key while pressing the Reset Key. (A1-05 can't be displayed with the usual Key sequences.)
- It will be possible to change the initialize-mode user constants again when the same password is written to A1-04 and A1-05.

| User Constant Number | Name | Change during Operation | Setting Range | Unit | Factory Setting | Valid Access Levels | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | V/f Control | V/f with PG | Open Loop Vector | Flux Vector |
| A1-04 | Password 1 | × | 0 to 9999 | — | 0 | Q | Q | Q | Q |
| A1-05 | Password 2 | × | 0 to 9999 | — | 0 | Q | Q | Q | Q |

## 4.2.5 Programming Mode

The Inverter user constants can be set in programming mode. The user constants which can be changed and displayed depend on the access level and control method that are being used. Refer to the following table to determine if a user constant can be changed.

The groups of constants in programming mode is shown in *Figure 4.7*.

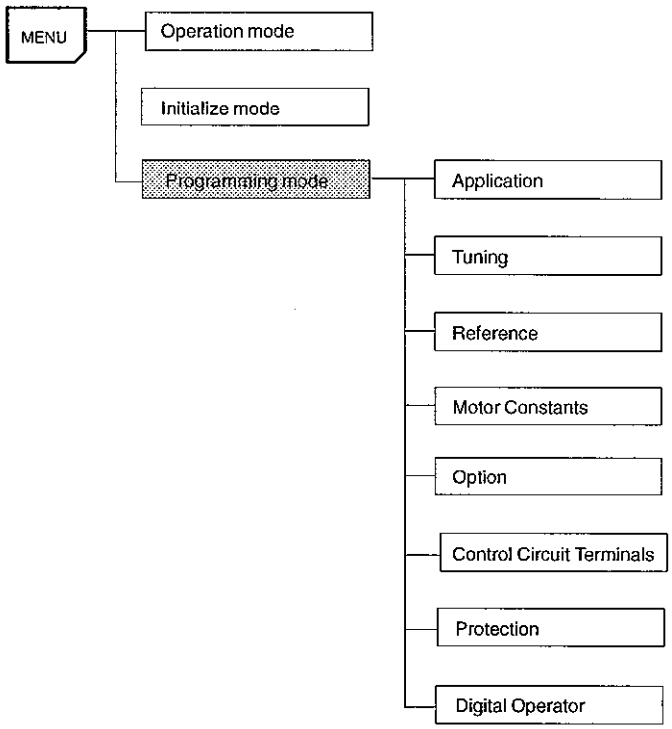



Fig 4.7 Operations in Operation Mode

### ■ Operations in Programming Mode

Key operations in operation mode are shown in *Figure 4.8*.

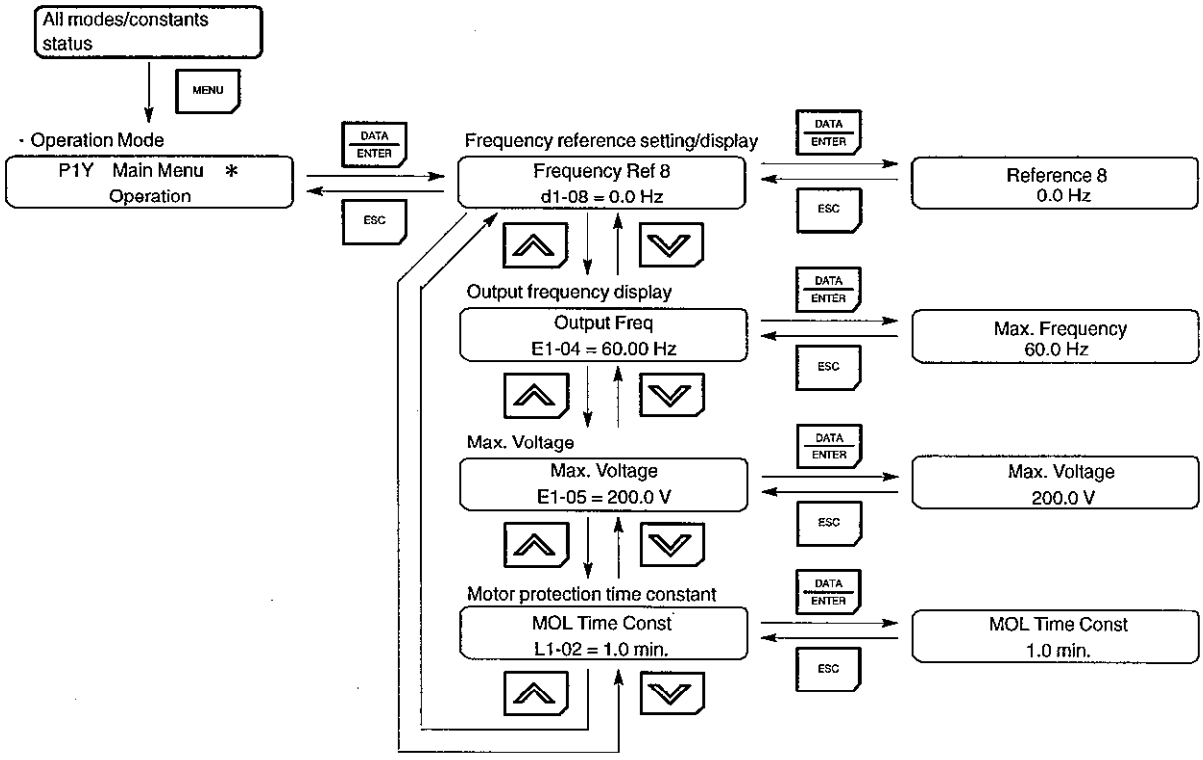
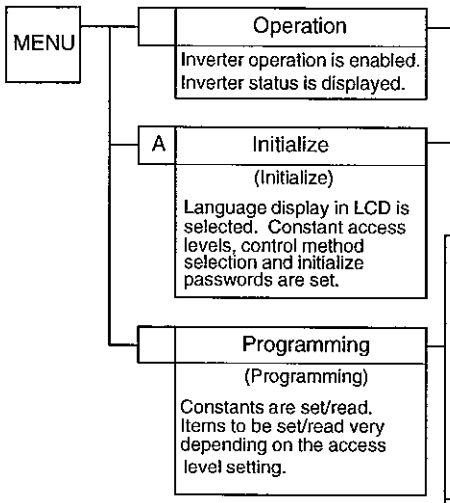



Fig 4.8 Operations in Operation Mode

# 4.3 CONSTANTS ARRAY OF DIGITAL OPERATOR DISPLAY FUNCTIONS




| Group | Function | Display | Access Level |
|---|---|---|---|
| U | Monitoring Items | Monitor | |
| U1 | Status monitoring | Monitor | Q,B,A |
| U2 | Fault trace | Fault Trace | Q |
| U3 | Fault history | Fault History | Q |
| A | Initialize | | |
| A1 | Initialization | Initialize | Q |
| A2 | User setting constant | User Constants | A |
| B | Application | Application | |
| B1 | Operation method selection | Sequence | Q,B,A |
| B2 | DC injection braking | DC Braking | B |
| B3 | Speed search | Speed search | A |
| B4 | Timer function | Delay Timers | A |
| B6 | DWELL function | Reference Hold | A |
| B7 | DROOP function | Droop Control | A |
| B8 | Energy-saving control | Energy saving | A |
| B9 | Zero servo | Zero servo | A |
| C | Tuning | Tuning | |
| C1 | Accel/decel time | Accel/Decel | Q,B,A |
| C2 | S-curve characteristics | S-Curve Acc/Dec | A |
| C3 | Slip compensation | Motor-Slip Comp | B,A |
| C4 | Torque compensation | Torque Comp | B,A |
| C5 | ASR | ASR Tuning | B,A |
| C6 | Carrier frequency | Carrier Freq | B,A |
| C7 | Hunting prevention | Hunting Prev | A |
| C8 | Factory-tuning constant | Factory Tuning | A |
| D | Reference | Reference | |
| D1 | Frequency referance value | Preset Referance | Q,B,A |
| D2 | Upper/lower limits | Reference Limits | B,A |
| D3 | Jump frequency | Jump Frequencies | B,A |
| D4 | Sequence | Sequence | A |
| D5 | Torque reference | Torque Control | A |
| E | Motor Constants | Motor | |
| E1 | V/f pattern | V/F Pattern | Q |
| E2 | Motor constants | Motor Setup | Q,A |
| F | Option | Option | |
| F1 | PG speed control card | PG Option Setup | Q,B,A |
| F2 | Analog reference card | AI-14 Setup | B,A |
| F3 | Digital input card | DI-08, 16 Setup | B,A |
| F9 | DDS-B/SI-B card | DDS/SI-B | B |
| H | Control Circuit Terminals | Terminal | |
| H1 | Sequence input | Digital Inputss | B |
| H2 | Sequence output | Digital Outputs | B |
| H4 | Analog output | Analog Outputs | B |
| H5 | MODBUS communication (RS-485) | Serial Com Setup | A |
| L | Protection | Protection | |
| L1 | Motor electronic thermal overload relay | Motor Overload | B |
| L2 | Momentary power loss ride-through | PwrLoss Ridethru | B,A |
| L3 | Stall prevention | Stall Prevention | B,A |
| L4 | Frequency detection | Ref Detection | B,A |
| L5 | Fault retry | Fault Restart | B |
| L6 | Overtorque detection | Torque Detection | B,A |
| L7 | Torque limit | Torque Limit | B |
| L8 | Hardware protection | Hdwe Protection | B,A |
| O | Digital Operator | Operator | |
| O1 | Display selection | Monitor Select | B,A |
| O2 | Key selection | Key Selections | B,A |

# 4.4 VS-616P1Y CONSTANT LIST

Table 4.4 VS-616P1Y Constant List

| Function | | Constant No. | Name (Digital Operator Display) | Setting Range | Setting Unit | Factory Setting | Remarks | Change During Operation (○ : Enabled ×:Disabled) | Constant Access Level*3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | V/f | V/f with PG | Open Loop Vector | Flux Vector |
| Initialize | Initialize | A1-00 | Language selection for digital operation display (Select Language) | 0.1 | 1 | 1 *1 | 0: English<br>1: Japanese | ○ | Q | Q | Q | Q |
| | | A1-01 | Constant access level (Access Level) | 0 to 4 | 1 | 2 | 0: Exclusive for monitor<br>1: User program<br>2: Quick-start (Q)<br>3: Basic (B)<br>4: Advanced (A) | ○ | Q | Q | Q | Q |
| | | A1-02 | Control method selection (Control Method) | 0 to 3 | 1 | 0 *1 | 0: V/f Control<br>1: V/f with PG<br>2: Open loop vector<br>3: Flux vector | × | Q | Q | Q | Q |
| | | A1-03 | Initialize (Init Parameters) | 0000 to 3330 | 1 | 0000 | 1110: User Initialize<br>2220: 2-Wire Initialize<br>3330: 3-Wire Initialize | × | Q | Q | Q | Q |
| | | A1-04 | Password 1 (Enter Password) | 0000 to 9999 | 1 | 0000 | | × | Q | Q | Q | Q |
| | | A1-05 | Password 2 *3 (Select Password) | 0000 to 9999 | 1 | 0000 | | × | Q | Q | Q | Q |
| | User Constants | A2-01 to A2-32 | User setting constant (User Param 1 to 32) | — | — | — | | × | A | A | A | A |
| Application | Sequence | b1-01 | Reference selection (Reference Source) | 0 to 3 | 1 | 1 | 0: Digital operator<br>1: DP-RAM<br>2: Control circuit terminal<br>3: DP-RAM | × | Q | Q | Q | Q |
| | | b1-02 | Operation method selection (Run Source) | 0 to 3 | 1 | 1 | 0: Digital operator<br>1: DP-RAM<br>2: Control circuit terminal<br>3: DP-RAM | × | Q | Q | Q | Q |
| | | b1-03 | Stopping method selection (Stopping Method) | 0 to 3 *2 | 1 | 0 | 0: Decelerate to stop<br>1: Coast to stop<br>2: DC injection to stop<br>3: Coast with timer | × | Q | Q | Q | Q |
| | | b1-04 | Prohibition of reverse operation (Reverse Oper) | 0, 1 | 1 | 0 | 0: Reverse enabled<br>1: Reverse disabled | × | B | B | B | B |
| | | b1-05 | Operation selection for setting of E1-09 or less (Zero-Speed Oper) | 0 to 3 | 1 | 0 | 0: Run at reference less thanE1-09<br>1: STOP<br>2: Run at setting of E1-09<br>3: Run at zero speed | × | × | × | × | A |
| | | b1-06 | Read sequence input twice (Cntl Input Scan) | 0, 1 | 1 | 1 | 0: 5 ms — 1 scan<br>1: 5 ms — 2 scans | × | A | A | A | A |
| | | b1-07 | Operation after switching to remote mode (LOC/REM RUN Sel) | 0, 1 | 1 | 1 | 0: Disabled<br>1: Enabled | × | A | A | A | A |
| | DC Braking | b2-01 | Zero speed level (DC injection braking starting frequency) (DC Inj Start Freq) | 0.0 to 10.0 | 0.1 Hz | 0.5 | | × | B | B | B | B |
| | | b2-02 | DC injection braking current (DCInj Current) | 0 to 100 | 1% | 50 | | × | B | B | B | × |
| | | b2-03 | DC injection braking time at start (DCInj Time at Start) | 0.00 to 10.00 | 0.01 sec | 0.00 | | × | B | B | B | B |
| | | b2-04 | DC injection braking time at stop (DCInj Time at Stop) | 0.00 to 10.00 | 0.01 sec | 0.50 | | × | B | B | B | B |

*1 Not initialized. (Domestic standard specifications : A1-01=1, A1-02=2)

*2 Setting range is only 0 and 1 when the control method is set to flux vector control (A1-03=3)

*3 A1-05 will appear by pressing > and MENU keys while A1-04 is displayed.
Constant access levels
Setting / reading enabled at Q : Quick-start (A1-01=2) , B : Basic (A1-01=3) , A : Advanced (A1-01=4).

Table 4.4 VS-616P1Y Constant List (continued)

| Function | | Constant No. | Name (Digital Operator Display) | Setting Range | Setting Unit | Factory Setting | Remarks | Change During Operation (O : Enabled X : Disabled) | Constant Access Level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | V/f | V/f with PG | Open Loop Vector | Flux Vector |
| Applica-tion | Speed Search | b3-01 | Speed search selection at start (SpdSrch at Start) | 0,1 | 1 | 0 * | 0: Disabled 1: Enabled * Changing the control method (A1-02) changesthe set value automatically. | X | A | A | A | A |
| | | b3-02 | Speed search operating current (SpdSrch Current) | 0 to 200 | 1% | 150 | Set to 150 when A1-02 is 0, 100 when A1-02 is 2. | X | A | X | A | X |
| | | b3-03 | Speed search deceleration time (SpdSrch Dec Time) | 0.1 to 10.0 | 0.1 sec | 2.0 | | X | A | X | A | X |
| | Delay Timers | b4-01 | Timer function ON-delay time (Delay-ON Timer) | 0.0 to 300.0 | 0.1 sec | 0.0 | | X | A | A | A | A |
| | | b4-02 | Timer function OFF-delay time (Delay-OFF Timer) | 0.0 to 300.0 | 0.1 sec | 0.0 | | X | A | A | A | A |
| | Refer-ence Hold | b6-01 | Dwell frequency at start (Dwell Ref at Start) | 0.0 to 400.0 | 0.1 Hz | 0.0 | | X | A | A | A | A |
| | | b6-02 | Dwell time at start (Dwell time at Start) | 0.0 to 10.0 | 0.1 sec | 0.0 | | X | A | A | A | A |
| | | b6-03 | Dwell frequency at stop (Dwell Ref at Stop) | 0.0 to 400.0 | 0.1 Hz | 0.0 | | X | A | A | A | A |
| | | b6-04 | Dwell time at stop (Dwell time at Stop) | 0.0 to 10.0 | 0.1 sec | 0.0 | | X | A | A | A | A |
| | Droop Control | b7-01 | Droop control gain (Droop gain) | 0.00 to 100.0 | 0.1% | 0.0 | | O | X | X | X | A |
| | | b7-02 | Droop control delay time (Droop Delay Time) | 0.00 to 2.00 | 0.01 sec | 0.05 | | O | X | X | X | A |
| | Energy Saving | b8-01 | Energy-saving gain (Energy Save Gain) | 0 to 100 | 1% | 80 | | X | A | A | X | X |
| | | b8-02 | Energy-saving frequency (Energy Save Freq) | 0.0 to 400.0 | 0.1 Hz | 0.0 | | X | A | A | X | X |
| | Zero Servo | b9-01 | Zero-servo gain (Zero Servo Gain) | 0 to 100 | 1 | 5 | | X | X | X | X | A |
| | | b9-02 | Zero-servo completion width (Zero Servo Count) | 0 to 16383 | 1 | 10 | | X | X | X | X | A |
| Tuning | Accel/ Decel | C1-01 | Acceleration time 1 (Accel Time 1) | Depend-ing on C1-10 | Depend-ing on C1-10 | 10.0 | | O | Q | Q | Q | Q |
| | | C1-02 | Deceleration time 1 (Decel Time 1) | | | 10.0 | | O | Q | Q | Q | Q |
| | | C1-03 | Acceleration time 2 (Accel Time 2) | | | 10.0 | | O | B | B | B | B |
| | | C1-04 | Deceleration time 2 (Decel Time 2) | 0.00 to 800.00 or 0.0 to 6000.0 | 0.01 sec or 0.1 sec | 10.0 | | O | B | B | B | B |
| | | C1-05 | Acceleration time 3 (Accel Time 3) | | | 10.0 | | X | A | A | A | A |
| | | C1-06 | Deceleration time 3 (Decel Time 3) | | | 10.0 | | X | A | A | A | A |
| | | C1-07 | Acceleration time 4 (Accel Time 4) | | | 10.0 | | X | A | A | A | A |
| | | C1-08 | Deceleration time 4 (Decel Time 4) | | | 10.0 | | X | A | A | A | A |
| | | C1-09 | Emergency stop time (Fast Stop Time) | | | 10.0 | | X | B | B | B | B |
| | | C1-10 | Accel/decel time setting unit (Acc/Dec Unit) | 0,1 | 1 | 1 | 0: 0.01 Seconds 1: 0.1 Seconds | X | A | A | A | A |
| | | C1-11 | Accel/decel time switching frequency (Acc/Dec SW Freq) | 0.0 to 400.0 | 0.1 Hz | 0.00 | | X | A | A | A | A |

Table 4.4 VS-616P1Y Constant List (continued)

| Function | | Constant No. | Name (Digital Operator Display) | Setting Range | Setting Unit | Factory Setting | Remarks | Change During Operation (○ : Enabled × : Disabled) | Constant Access Level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | V/f | V/f with PG | Open Loop Vector | Flux Vector |
| Tuning | S-Curve Acc/Dec | C2-01 | S-curve characteristic time at acceleration start (SCrv Acc at Start) | 0.00 to 2.50 | 0.01 sec | 0.20 | | × | A | A | A | A |
| | | C2-02 | S-curve characteristic time at acceleration end (SCrv Acc at End) | 0.00 to 2.50 | 0.01 sec | 0.20 | | × | A | A | A | A |
| | | C2-03 | S-curve characteristic time at deceleration start (SCrv Dec at Start) | 0.00 to 2.50 | 0.01 sec | 0.20 | | × | A | A | A | A |
| | | C2-04 | S-curve characteristic time at deceleration end (SCrv Dec at End) | 0.00 to 2.50 | 0.01 sec | 0.00 | | × | A | A | A | A |
| | Motor-Slip Compensation | C3-01 | Slip compensation gain (Slip Comp Gain) | 0.0 to 2.5 | 0.1 | 1.0 * | * Changing the control method (A1-02) changes the set value automatically. | ○ | B | × | B | B |
| | | C3-02 | Slip compensation primary delay time (Slip Comp Time) | 0 to 10000 | 1 ms | 200 * | * Changing the control method (A1-02) changes the set value automatically. | × | A | × | A | × |
| | | C3-03 | Slip compensation limit (Slip Comp Limit) | 0 to 250 | 1% | 200 | | × | A | × | A | × |
| | | C3-04 | Slip compensation selection during regeneration (Slip Comp Regen) | 0,1 | 1 | 0 | 0: Disabled 1: Enabled | × | A | × | A | × |
| | | C3-05 | Flux calculation method (Flux Select) | 0,1 | 1 | 0 | 0: Slip included 1: Slip excluded | × | × | × | A | × |
| | Torque Compensation | C4-01 | Torque compensation gain (Torq comp Gain) | 0.00 to 2.50 | 0.01 | 0.00 | | ○ | B | B | B | × |
| | | C4-02 | Torque compensation time constant (Torq Comp Time) | 0 to 10000 | 1 ms | 20 * | * Changing the control method (A1-02) changes the set value automatically. | × | A | A | A | × |
| | ASR | C5-01 | ASR proportional (P) gain 1 (ASR P Gain 1) | 0.00 to 300.00 | 0.01 | 20.00 * | * Changing the control method (A1-02) changes the set value automatically. | ○ | × | B | × | B |
| | | C5-02 | ASR integral (I) time 1 (ASR I Time 1) | 0.000 to 10.000 | 0.001 sec | 0.500 * | * Changing the control method (A1-02) changes the set value automatically. | ○ | × | B | × | B |
| | | C5-03 | ASR proportional (P) gain 2 (ASR P Gain 2) | 0.00 to 300.00 | 0.01 | 20.00 * | * Changing the control method (A1-02) changes the set value automatically. | ○ | × | B | × | B |
| | | C5-04 | ASR integral (I) time 2 (ASR I time 2) | 0.000 to 10.000 | 0.001 sec | 0.500 * | * Changing the control method (A1-02) changes the set value automatically. | ○ | × | B | × | B |
| | | C5-05 | ASR limit (ASR Limit) | 0.0 to 20.0 | 0.1% | 5.0 | | × | × | A | × | × |
| | | C5-06 | ASR primary delay time (ASR Delay Time) | 0.000 to 0.500 | 0.001 sec | 0.004 | | × | × | × | × | A |
| | | C5-07 | ASR switching frequency (ASR Gain SW Freq) | 0.0 to 400.0 | 0.1 Hz | 0.0 | | × | × | × | × | A |
| | | C5-08 | ASR integral (I) limit (ASR I Limit) | 0 to 400 | 1 | 400% | | × | × | × | × | A |

Table 4.4 VS-616P1Y Constant List (continued)

| Function | | Constant No. | Name (Digital Operator Display) | Setting Range | Setting Unit | Factory Setting | Remarks | Change During Operation (O : Enabled × : Disabled) | Constant Access Level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | V/f | V/f with PG | Open Loop Vector | Flux Vector |
| Tuning | Carrier Frequency | C6-01 | Carrier frequency upper limit (Carrier Freq Max) | 0.4 to 15.0* * | 0.1 kHz | 15.0 ** 5.0 *** | When vector control (A1-02=2 or 3) is selected, the setting range of C6-01 and 02 is 2.0 to 15.0<br>** Setting range and factory setting deffer depending on the inverter capacity.<br>*** When PM motor is selected in V/f mode, setting range of C6-01 and C6-02 is 0.4 to 15.0. | × | B | B | B | B |
| | | C6-02 | Carrier frequency lower limit (Carrier Freq Min) | 0.4 to 15.0* * | 0.1 kHz | 15.0 ** 1.0 *** | | × | A | A | × | × |
| | | C6-03 | Carrier frequency proportional gain (Carrier Freq Gain) | 00 to 99** | 1 | 00 ** | | × | A | A | × | × |
| | Hunting Prevention | C7-01 | Hunting prevention selection (Hunt Prev Select) | 0.1 | 1 | 0 | 0: Disabled<br>1: Enabled | × | A | A | × | × |
| | | C7-02 | Hunting prevention gain (Hunt Prev Gain) | 0.00 to 2.50 | 0.01 | 1.00 | | × | A | A | × | × |
| | Factory Tuning | C8-08 | AFR gain (AFR Gain) | 0.00 to 10.00 | 0.01 | 1.00 | | × | × | × | A | × |
| | | C8-09 | Speed feedback detection control (AFR) time (AFR Time) | 0 to 2000 | 1 msec | 50 | | × | × | × | A | × |
| | | C8-30 | Carrier frequency selection during autotuning (Carrier in tune) | 0 to 2 | 1 | 0 | 0: Carreir frequency is set to 2.0 kHz.<br>1: Carreir frequency is set to a value as set in C6-01.<br>2: Carreir frequency is set to 5 kHz. | × | × | × | A | A |
| | | C8-31 | Carrier frequency threshold level (FC Threshold Lvl) | 0.4 to 5.0 | 0.1 kHz | 3.0 kHz | | × | A | A | A | A |
| | | C8-32 | Carrier frequency accel/decel time (FC Acc/Dec Gain) | 1.00 to 10.00 | 0.01 | 2.00 | | × | A | A | A | A |
| | | C8-33 | Synchronous phase electrical angle offset (Phase Offset) | 0.0 to 360.0 | 0.1 | 15.0 | | × | A | A | A | A |
| | | C8-34 | AVR gain (SPA) (AVR Gain (SPA)) | 0.00 to 9.99 | 0.01 | 0.00 | | O | A | A | A | A |
| | | C8-35 | AVR time constant (SPA) (AVR I time (SPA)) | 0.0 to 20.0 | 0.1 sec | 2.0 | | × | A | A | A | A |
| | | C8-36 | AVR limitter (SPA) (AVR limit (SPA)) | 0.0 to 20.0 | 0.1% | 20.0 | | × | A | A | A | A |
| | | C8-37 | SP-B2 pulse monitor output selection (SP-B2 Pulse Sel) | 0.1 | 1 | 0 | 0: 1F<br>1: 6F | × | A | A | A | A |
| | | C8-39 | Carreir frequency during DWELL (During DWELL) | 0.4 to 5.0 | 0.1 kHz | 0.4 | Enabled only in PM motor mode. | × | A | A | × | × |
| | | C8-40 | Feedback voltage gain (Feedback V Gain) | 0.900 to 1.100 | 0.001 | 1.000 | Enabled only in PM motor mode. | O | A | × | × | × |

Table 4.4 VS-616P1Y Constant List (continued)

| Function | | Constant No. | Name (Digital Operator Display) | Setting Range | Setting Unit | Factory Setting | Remarks | Change During Operation (○ : Enabled × : Disabled) | Constant Access Level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | V/f | V/f with PG | Open Loop Vector | Flux Vector |
| Reference | Preset Reference | d1-01 | Frequency reference 1 (Reference 1) | 0.0 to 500.0 | 0.01 Hz | 0.00 | | ○ | Q | Q | Q | Q |
| | | d1-02 | Frequency reference 2 (Reference 2) | 0.0 to 500.0 | 0.01 Hz | 0.00 | | ○ | Q | Q | Q | Q |
| | | d1-03 | Frequency reference 3 (Reference 3) | 0.0 to 500.0 | 0.01 Hz | 0.00 | | ○ | Q | Q | Q | Q |
| | | d1-04 | Frequency reference 4 (Reference 4) | 0.0 to 500.0 | 0.01 Hz | 0.00 | | ○ | Q | Q | Q | Q |
| | | d1-05 | Frequency reference 5 (Reference 5) | 0.0 to 500.0 | 0.01 Hz | 0.00 | | ○ | B | B | B | B |
| | | d1-06 | Frequency reference 6 (Reference 6) | 0.0 to 500.0 | 0.01 Hz | 0.00 | | ○ | B | B | B | B |
| | | d1-07 | Frequency reference 7 (Reference 7) | 0.0 to 500.0 | 0.01 Hz | 0.00 | | ○ | B | B | B | B |
| | | d1-08 | Frequency reference 8 (Reference 8) | 0.0 to 500.0 | 0.01 Hz | 0.00 | | ○ | B | B | B | B |
| | | d1-09 | Jog frequency reference (Jog Reference) | 0.0 to 500.0 | 0.01 Hz | 6.00 | | ○ | Q | Q | Q | Q |
| | Reference Limit | d2-01 | Frequency reference upper limit (Ref Upper Limit) | 0.0 to 110.0 | 0.1% | 100.0 | | × | B | B | B | B |
| | | d2-02 | Frequency reference lower limit (Ref Lower Limit) | 0.0 to 109.0 | 0.1% | 0.0 | | × | B | B | B | B |
| | Jump Frequencies | d3-01 | Jump frequency 1 (Jump freq 1) | 0.0 to 500.0 | 0.1 Hz | 0.0 | | × | B | B | B | B |
| | | d3-02 | Jump frequency 2 (Jump freq 2) | 0.0 to 500.0 | 0.1 Hz | 0.0 | | × | B | B | B | B |
| | | d3-03 | Jump frequency 3 (Jump freq 3) | 0.0 to 500.0 | 0.1 Hz | 0.0 | | × | B | B | B | B |
| | | d3-04 | Jump frequency width (Jump Bandwidth) | 0.0 to 20.0 | 0.1 Hz | 1.0 | | × | B | B | B | B |
| | Sequence | d4-01 | Frequency reference hold function selection (MOP Ref Memory) | 0,1 | 1 | 0 | 0: Disabled 1: Enabled | × | A | A | A | A |
| | | d4-02 | + − Speed limits (Trim Control Lvl) | 0 to 100 | 1% | 25 | | × | A | A | A | A |
| | Torque Control | d5-01 | Torque control selection (Torq Control Sel) | 0,1 | 1 | 0 | 0: Speed control 1: Torque control | × | × | × | × | A |
| | | d5-02 | Torque reference delay time (Torque Ref Filter) | 0 to 1000 | 1 msec | 0 | | × | × | × | × | A |
| | | d5-03 | Speed limit selection (Speed Limit sel) | 1,2 | 1 | 1 | 1: Analog input (terminals 13, 14) 2: Program setting | × | × | × | × | A |
| | | d5-04 | Speed limit (Speed Lmt Value) | −120 to +120 | 1% | 0 | | × | × | × | × | A |
| | | d5-05 | Speed limit bias (Speed Lmt Bias) | 0 to 120 | 1% | 10 | | × | × | × | × | A |
| | | d5-06 | Speed / torque control switching timer (Ref Hold Time) | 0 to 1000 | 1 msec | 0 | | × | × | × | × | A |

## Table 4.4 VS-616P1Y Constant List (continued)

| Function | | Constant No. | Name (Digital Operator Display) | Setting Range | Setting Unit | Factory Setting | Remarks | Change During Operation (O : Enabled × : Disabled) | Constant Access Level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | V/f | V/f with PG | Open Loop Vector | Flux Vector |
| Motor | V/f Pattern | E1-01 | Input voltage setting (Input Voltage) | 155 to 255 *1 | 1 V | 200 *1 | | × | Q | Q | Q | Q |
| | | E1-02 | Motor selection (Motor Selection) | 0 to 2 | 1 | 0 | 0: Standard motor<br>1: Inverter motor<br>2: PM motor | × | Q | Q | Q | Q |
| | | E1-03 | V/f pattern selection (V/f Selection) | 00 to 0F | 1 | 0F | 00 to 0E: 15 preset V/f pattens<br>0F: Custom V/f patterns | × | Q | Q | Q | Q |
| | | E1-04 | Max. output frequency (Max. frequency) | 40.0 to 500.0 | 0.1 Hz | 60.0 | * Changing the control method (A1-02) changes the set value autmatically. | × | Q | Q | Q | Q |
| | | E1-05 | Max. voltage (Max Voltage) | 0.0 to 255.0 *1 | 0.1 V | 200.0 *1 * | * Changing the control method (A1-02) changes the set value autmatically. | × | Q | Q | Q | Q |
| | | E1-06 | Max. voltage frequency (Base Frequency) | 0.0 to 500.0 | 0.1 Hz | 60.0 | * Changing the control method (A1-02) changesthe set value autmatically. | × | Q | Q | Q | Q |
| | | E1-07 | Mid. output frequency (Mid Frequency A) | 0.0 to 500.0 | 0.1 Hz | 3.0 * | * Changing the control method (A1-02) changes the set value autmatically. | × | Q | Q | A | × |
| | | E1-08 | Mid. output frequency voltage (Mid. voltage A) | 0.0 to 255.0 *1 | 0.1 V | 11.0 *1 * | * Changing the control method (A1-02) changes the set value autmatically. | × | Q | Q | A | × |
| | | E1-09 | Min. output frequency (Min. Frequency) | 0.0 to 500.0 | 0.1 Hz | 0.5 * | * Changing the control method (A1-02) changes the set value autmatically. | × | Q | Q | Q | A |
| | | E1-10 | Min. output frequency voltage (Min. Voltage) | 0.0 to 255.0 *1 | 0.1 V | 2.0 *1 * | * Changing the control method (A1-02) changes the set value autmatically. | × | Q | Q | A | × |
| | | E1-11 | Mid. output frequency 2 (Mid Frequency B) | 0.0 to 500.0 | 0.1 Hz | 0.0 | | × | A | A | A | A |
| | | E1-12 | Mid. output frequency voltage 2 (Mid Voltage B) | 0.0 to 255.0 *1 | 0.1 V | 0.0 | | × | A | A | A | A |
| | | E1-13 | Base Voltage (Base Voltage) | 0.0 to 255.0 *1 | 0.1 V | 200.0 | | × | A | A | Q | Q |
| Motor | Motor setup | E2-01 | Motor rated current (Motor Rated FLA) | 0.01 to 1500.0 | 0.1 A *2 | 1.9 ** | ** : Factory setting differs depending on inverter capacity | × | Q | Q | Q | Q |
| | | E2-02 | Motor rated slip (Motor Rated slip) | 0.00 to 20.00 | 0.01 Hz | 2.90 ** | | × | A | A | Q | Q |
| | | E2-03 | Motor no-load current (No-Load Current) | 0.00 to 1500.0 | 0.01 A | 1.20 ** | | × | A | A | Q | Q |
| | | E2-04 | Number of motor poles (Number of Poles) | 2 to 48 | 1 pole | 4 | | × | × | Q | × | Q |
| | | E2-05 | Motor line-to-line resistance (Term Resistance) | 0.000 to 65.000 | 0.001 Ω | 9.842 ** | | × | A | A | A | A |
| | | E2-06 | Motor leak inductance (Leak Inductance) | 0.0 to 30.0 | 0.1% | 18.2 ** | | × | × | × | A | A |
| | | E2-07 | Motor iron-core saturation coefficient 2 (Saturation comp 1) | 0.00 to 0.50 | 0.01 | 0.50 | | × | × | × | A | A |
| | | E2-08 | Motor iron-core saturation coefficient 2 (Saturation comp 2) | 0.00 to 0.75 | 0.01 | 0.75 | | × | × | × | A | A |
| | | E2-09 | Motor mechanical loss (Mechanical Loss) | 0.0 to 10.0 | 0.1% | 0.0 | | × | × | × | × | A |

*1 Set value for 200 V class. For 400 V class, the value is twice as that of 200 V class.

*2 Setting unit is 0.01A for mode of 7.5kW or below.

Table 4.4 VS-616P1Y Constant List (continued)

| Function | | Constant No. | Name (Digital Operator Display) | Setting Range | Setting Unit | Factory Setting | Remarks | Change During Operation (○ : Enabled × : Disabled) | Constant Access Level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | V/f | V/f with PG | Open Loop Vector | Flux Vector |
| Options | PG Option setup PG Option setup | F1-01 | PG constant (PG Pulses/Rev) | 0 to 60000 | 1 | 600 | | × | × | Q | × | Q |
| | | F1-02 | Operation selection at PG open circuit (PG Fdbk Loss Sel) | 0 to 3 | 1 | 1 | 0: Ramp to stop<br>1: Coast to stop<br>2: Fast-stop<br>3: Alarm only | × | × | B | × | B |
| | | F1-03 | Operation selection at overspeed (PG Overspeed Sel) | 0 to 3 | 1 | 1 | 0: Ramp to stop<br>1: Coast to stop<br>2: Fast-stop<br>3: Alarm only | × | × | B | × | B |
| | | F1-04 | Operation selection at deviation (PG Deviation Sel) | 0 to 3 | 1 | 3 | 0: Ramp to stop<br>1: Coast to stop<br>2: Fast-stop<br>3: Alarm only | × | × | B | × | B |
| | | F1-05 | PG rotation (PG Rotation Sel) | 0, 1 | 1 | 0 | 0: Counter-clockwise<br>1: Clockwise | × | × | B | × | B |
| | | F1-06 | PG division rate (PG pulse monitor) (PG Ouput Ratio) | 1 to 132 | 1 | 1 | Effective only with control circuit board PG-B2 | × | × | B | × | B |
| | | F1-07 | Integral value during accel/decel enable/disable (PG Ramp PI/ I Sel) | 0, 1 | 1 | 0 | 0: Disabled<br>1: Enabled | × | × | B | × | × |
| | | F1-08 | Overspeed detection level (PG Overspd Level) | 0 to 120 | 1% | 115 | | × | × | A | × | A |
| | | F1-09 | Overspeed detection delay time (PG Overspd Time) | 0.0 to 2.0 | 0.1 sec | 0.0 * | * Changing the control method (A1-02) changes the set value automatically. | × | × | A | × | A |
| | | F1-10 | Excessive speed deviation detection level (PG Deviate Level) | 0 to 50 | 1% | 10 | | × | × | A | × | A |
| | | F1-11 | Excessive speed deviation detection delay time (PG Deviate Time) | 0.0 to 10.0 | 0.1 sec | 0.5 | | × | × | A | × | A |
| | | F1-12 | Number of PG gear teeth 1 (PG Gear Teeth 1) | 0 to 1000 | 1 | 0 | | × | × | A | × | × |
| | | F1-13 | Number of PG gear teeth 2 (PG Gear Teeth 2) | 0 to 1000 | 1 | 0 | | × | × | A | × | × |
| | | F1-14 | PG open-circuit detection time (PGO Time) | 0 to 10.0 | 0.1 sec | 2.0 | | × | × | A | × | A |
| | | F1-15 | Speed detection filter time average sampling number (Spd Dtct Filter) | 0 to 16 | 1 | 0 | 0,1: Disabled<br>2 to 16: Sampling number | × | × | Q | × | × |
| | AI | F2-01 | Bi-polar or uni-polar input selection (AI-14 Input Sel) | 0, 1 | 1 | 0 | 0: 3-channel individual<br>1: 3-channel addition | × | B | B | B | B |
| | DI | F3-01 | Digital input option (DI Input) | 0 to 7 | 1 | 0 | 0: BCD 1%<br>1: BCD 0.1%<br>2: BCD 0.01%<br>3: BCD 1 Hz<br>4: BCD 0.1 Hz<br>5: BCD 0.01 Hz<br>6: Binary 255/100%<br>7: Binary | × | B | B | B | B |
| | DDS, SI-B | F9-01 | External fault input level from option (EF0 Selection) | 0, 1 | 1 | 0 | 0: EF0 when 1<br>1: EF0 when 0 | × | B | B | B | B |
| | | F9-02 | External fault detection from transmission option (EF0 Detection) | 0, 1 | 1 | 0 | 0: Always detect<br>1: Detect during operation | × | B | B | B | B |
| | | F9-03 | Action for external fault from transmission option (EF0 Fault Action) | 0 to 3 | 1 | 1 | 0: Ramp to stop<br>1: Coast to stop<br>2: Emergency stop<br>3: Continue operation | × | B | B | B | B |
| | | F9-04 | Transmission option trace sampling option (Trace Sample Tim) | 0 to 60000 | 1 | 0 | | × | B | B | B | B |
| | | F9-05 | Torque command/torque limit selection from DP-RAM transmission (Torq Ref/Limt Sel) | 0, 1 | 1 | 1 | 0: Disabled<br>1: Enabled | × | × | × | × | B |

## Table 4.4 VS-616P1Y Constant List (continued)

| Function | | Constant No. | Name (Digital Operator Display) | Setting Range | Setting Unit | Factory Setting | Remarks | Change During Operation (O : Enabled × : Disabled) | Constant Access Level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | V/f | V/f with PG | Open Loop Vector | Flux Vector |
| Options | DDS, SI-B | F9-06 | Operation selection for DP-RAM transmission error (BUS Fault Sel) | 0 to 3 | 1 | 1 | 0: Decelerate to stop<br>1: Coast to stop<br>2: Emergency stop<br>3: Continue operation | × | B | B | B | B |
| | | F9-07 | Transmission date frequency unit selection (Fref Set Scaling) | 0 to 2 | 1 | 0 | 0: Set according to the value of o1-03.<br>1: 30000/100%<br>2: 60000/100% | × | B | B | B | B |
| Terminal | Digital Inputs | H1-01 | Multi-function input (terminal 3) (Terminal 3 Sel) | 00 to 77 | 1 | 24 | | × | B | B | B | B |
| | | H1-02 | Multi-function input (terminal 4) (Terminal 4 Sel) | 00 to 77 | 1 | 14 | | × | B | B | B | B |
| | | H1-03 | Run command bit 4 (Terminal 5 Sel) | 00 to 77 | 1 | 3 (0) *1 | | × | B | B | B | B |
| | | H1-04 | Run command bit 5 (Terminal 6 Sel) | 0 to 77 | 1 | 4 (3) *1 | | × | B | B | B | B |
| | | H1-05 | Run command bit 6 (Terminal 7 Sel) | 00 to 77 | 1 | 6 (4) *1 | | × | B | B | B | B |
| | | H1-06 | Run command bit 7 (Terminal 8 Sel) | 00 to 77 | 1 | 8 (6) *1 | | × | B | B | B | B |
| | Sequence outputs | H2-02 | PHC function selection | 00 to 37 | 1 | 1 | | × | B | B | B | B |
| | Analog Outputs | H4-01 | Monitor selection (terminal 21) (Terminal 21 Sel) | 1 to 43 | 1 | 2 | | × | B | B | B | B |
| | | H4-02 | Gain (terminal 21) (Terminal 21 Gain) | 0.00 to 2.50 | 0.01 | 1.00 | | ○ | B | B | B | B |
| | | H4-03 | Bias (terminal 21) (Terminal 21 Bias) | −10.0 to +10.0 | 0.0% | 0.0 | | ○ | B | B | B | B |
| | | H4-07 | Analog output signal level selection (AO Level Select) | 0, 1 | 1 | 0 | 0: 0 to 10 VDC<br>1: −10 to +10 VDC | × | B | B | B | B |
| Protection | Motor Over load | L1-01 | Motor protection selection (MOL Fault select) | 0.1 | 1 | 1 | 0: Disabled<br>1: Enabled | × | B | B | B | B |
| | | L1-02 | Motor protection time constant (MOL Time Const) | 0.1 to 5.0 | 0.1min | 1.0 | | × | B | B | B | B |
| | Power Loss Ridethru | L2-01 | Momentary power loss detection (PwrL Selection ) | 0 to 2 | 1 | 0 | 0: Disabled<br>1: Power loss ridethru<br>2: CPU power active | × | B | B | B | B |
| | | L2-02 | Momentary power loss ridethru time (PwrL Ridethru t) | 0.0 to 2.0 | 0.1 sec | 0.7 ** | ** Factory setting differs depending on inverter capacity | × | B | B | B | B |
| | | L2-03 | Min. baseblock time (PwrL Baseblock t) | 0.0 to 5.0 | 0.1 sec | 0.5 ** | ** Factory setting differs depending on inverter capacity | × | B | B | B | B |
| | | L2-04 | Voltage recovery time (PwrL V/F Ramp t) | 0.0 to 5.0 | 0.1 sec | 0.3 | | × | A | A | A | A |
| | | L2-05 | Undervoltage detection level (PUV Det Level) | 150 to 210 | 1 V | 190 *2 | *2 | × | A | A | A | A |
| | | L2-06 | KEB deceleration rate (KEB Frequency) | 0.0 to 100.0 | 0.1% | 0.0 | | × | A | A | A | A |
| | Stall Prevention | L3-01 | Stall prevention selection during accel (StallP Accel Sel) | 0 to 2 | 1 | 1 | 0: Disabled<br>1: Intelligent<br>2: General-purpose | × | B | B | B | × |
| | | L3-02 | Stall prevention level during accel (StallP Accel Lvl) | 0 to 200 | 1% | 150 | | × | B | B | B | × |
| | | L3-03 | Stall prevention limit during accel (StallP CHP Lvl) | 0 to 100 | 1% | 50 | | × | A | A | A | × |

*1 The value in parenthesis indicate initial values when initialized in 3-wire sequence.

*2 Set value for 200 V class. For 400 V class, the value is twice as that of 200 V class.

Table 4.4 VS-616P1Y Constant List (continued)

| Function | | Constant No. | Name (Digital Operator Display) | Setting Range | Setting Unit | Factory Setting | Remarks | Change During Operation (O : Enabled × : Disabled) | Constant Access Level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | V/f | V/f with PG | Open Loop Vector | Flux Vector |
| Protection | Stall Prevention | L3-04 | Stall prevention selection during dccel (StallP Decel Sel) | 0 to 2 | 1 | 1 | 0: Disabled<br>1: General-purpose<br>2: Intelligent | × | B | B | B | B |
| | | L3-05 | Stall prevention selection during running (StallP Run Sel) | 0 to 2 | 1 | 1 | 0: Disabled<br>1: Decel time 1<br>2: Decel time 2 | × | B | B | × | × |
| | | L3-06 | Stall prevention level during running (StallP Run Level) | 30 to 200 | 1% | 160 | | × | B | B | × | × |
| | Frequency Detection | L4-01 | Frequency detection level (Spd Agree Level) | 0.0 to 400.0 | 0.1 Hz | 0.0 | | × | B | B | B | B |
| | | L4-02 | Frequency detection width (Spd Agree Width) | 0.0 to 20.0 | 0.1 Hz | 2.0 | | × | B | B | B | B |
| | | L4-03 | Frequency detection level (+/–) (Spd Agree Lvl +–) | 0.0 to ±400.0 | 0.1 Hz | 0.0 | | × | A | A | A | A |
| | | L4-04 | Frequency detection width (+/–) (Spd Agree Wdth +–) | 0.0 to 20.0 | 0.1 Hz | 2.0 | | × | A | A | A | A |
| | | L4-05 | Oparation when frequency reference is missing (Ref Loss Sel) | 0, 1 | 1 | 0 | 0: Disabled<br>1: Enabled | × | A | A | A | A |
| | Fault Restart | L5-01 | Number of auto restart attempts (Num of Restarts) | 0 to 10 | 1 time | 0 | | × | B | B | B | B |
| | | L5-02 | Auto restart operation selection (Restart Sel) | 0, 1 | 1 | 0 | 0: No fault retry<br>1: Fault retry active | × | B | B | B | B |
| | Torque Detection | L6-01 | Torque detection selection 1 (Torq Det 1 Sel) | 0 to 4 | 1 | 0 | 0: Disabled<br>1: Detected during speed agree, and operation continues after detection<br>2: Detected during running, and operation continues after detection<br>3: Detected during speed agree, and inverter outputis shut OFF<br>4: Detected during running, and inverter output is shut OFF | × | B | B | B | B |
| | | L6-02 | Torque detection level 1 (Torq Det 1 Lvl) | 0 to 300 | 1% | 150 | | × | B | B | B | B |
| | | L6-03 | Torque detection time 1 (Torq Det 1 Time) | 0.0 to 10.0 | 0.1scc | 0.1 | | × | B | B | B | B |
| | | L6-04 | Torque detection selection 2 (Torq Det 2 Sel) | 0 to 4 | 1 | 0 | 0: Disabled<br>1: Detected during speed agree, and operation continues after detection<br>2: Detected during running, and operation continues after detection<br>3: Detected during speed agree, and inverter output is shut OFF<br>4: Detected during running, andi nverter output is shut OFF | × | A | A | A | A |
| | | L6-05 | Torque detection level 2 (Torq Det 2 Lvl) | 0 to 300 | 1% | 150 | | × | A | A | A | A |
| | | L6-06 | Torque detection selection 2 (Torq Det 2 Time) | 0.0 to 10.0 | 0.1 sec | 0.1 | | × | A | A | A | A |

## Table 4.4 VS-616P1Y User Constant List (continued)

| Function | | Constant No. | Name (Digital Operator Display) | Setting Range | Setting Unit | Factory Setting | Remarks | Change During Operation (O : Enabled × : Disabled) | Constant Access Level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | V/f | V/f with PG | Open Loop Vector | Flux Vector |
| Protection | Torque Limit | L7-01 | Forward torque limit (Torq Limit Fwd) | 0 to 300 | 1% | 200 | | × | × | × | B | B |
| | | L7-02 | Reverse torque limit (Torq Limit Rev) | 0 to 300 | 1% | 200 | | × | × | × | B | B |
| | | L7-03 | Forward regenerative torque limit (Torq Lmt Fwd Rgn) | 0 to 300 | 1% | 200 | | × | × | × | B | B |
| | | L7-04 | Reverse regenerative torque limit (Torq Lmt Rev Rgn) | 0 to 300 | 1% | 200 | | × | × | × | B | B |
| | Hardware Protection | L8-02 | Over Heat pre-alarm level (OH Pre-Alarm Lvl) | 50 to 110 | 1 deg | 95 | | × | A | A | A | A |
| | | L8-03 | Operation selection after OH pre-alam (OH Pre-Alarm Sel) | 0 to 3 | 1 | 3 | 0: Decelerate to stop<br>1: Coast to stop<br>2: Fast-stop<br>3: Alarm only | × | A | A | A | A |
| | | L8-05 | Input open-phase protection selection (Ph Loss In Sel) | 0, 1 | 1 | 0 | 0: Disabled<br>1: Enabled | × | A | A | A | A |
| | | L8-07 | Output open-phase protection selection (Ph Loss Out Sel) | 0, 1 | 1 | 0 | 0: Disabled<br>1: Enabled | × | A | A | A | A |
| | | L8-10 | Grounding protection selection (Ground Fault Sel) | 0, 1 | 0 | 1 | 0: Disabled<br>1: Enabled | × | A | A | A | A |
| Operator | Monitor select | o1-01 | Monitor selection (Monitor Select) | 4 to 43 | 1 | 6 | | ○ | B | B | B | B |
| | | o1-02 | Monitor selection after power up (Power-On Monitor) | 1 to 4 | 1 | 1 | 1: Frequency reference<br>2: Output frequency<br>3: Output current<br>4: Selected monitor | ○ | B | B | B | B |
| | | o1-03 | Frequency units of reference setting and monitor (Display Scaling) | 0 to 39999 | 1 | 0 | | × | B | B | B | B |
| | | o1-04 | Frequency units of constant setting (Display Units) | 0, 1 | 1 | 0 | 0: Hz<br>1: r/min | × | × | × | × | B |
| | | o1-05 | Constant No. display selection (Address Display) | 0, 1 | 1 | 0 | 0: Constant number<br>1: MODBUS address | × | A | A | A | A |

Table 4.4 VS-616P1Y User Constant List (continued)

| Function | | Constant No. | Name (Digital Operator Display) | Setting Range | Setting Unit | Factory Setting | Remarks | Change During Operation (O : Enabled × : Disabled) | Constant Access Level | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | V/f | V/f with PG | Open Loop Vector | Flux Vector |
| Operator | Key Select | o2-01 | LOCAL/REMOTE key enable/disable (Local/Remote Key) | 0, 1 | 1 | 1 | 0: Disabled<br>1: Enabled | × | B | B | B | B |
| | | o2-02 | STOP key during control circuit terminal operation (Oper STOP Key) | 0, 1 | 1 | 1 | 0: Enabled when run command is issued from the operator.<br>1: Enabled | × | B | B | B | B |
| | | o2-03 | User constant initial value (User Defaults) | 0 to 2 | 1 | 0 | 1: Set default<br>2: Clear all | × | B | B | B | B |
| | | o2-04 | kVA selection (Inverter Model #) | 0 to FF | 1 | –<br>* | * Not initialized. Factory setting differs depending on the inverter capacity. | × | B | B | B | B |
| | | o2-05 | Frequency reference setting method selection (Operator M. O. P.) | 0, 1 | 1 | 0 | 0: Disabled<br>1: Enabled | × | A | A | A | A |
| | | o2-06 | Operation selection when digital operator is disconnected (Oper Detection) | 0, 1 | 1 | 0 | 0: Disabled<br>1: Enabled | × | A | A | A | A |
| | | o2-07 | Cumulative operation time setting (Elapsed Time Set) | 0 to 65535 | 1 hour | – | | × | A | A | A | A |
| | | o2-08 | Cumulative operation time selection (Elapsed Time Run) | 0, 1 | 1 | 0 | 0: Power-on time<br>1: Running time | × | A | A | A | A |

# 4.5 MULTI-FUNCTION I/O TERMINAL SETTING LIST

Table 4.5 Multi-function I/O Terminal Setting

| Set Value | Multi-function Input Terminal Function (H1-01, 02, 03, 04, 05, 06) | Multi-function Output Terminal Function (H2-01, 02, 03) |
|---|---|---|
| 00 | Not used | During run |
| 01 | LOCAL/REMOTE selection | Zero-speed |
| 02 | Opiton/inverter selection | Frequency agree 1 |
| 03 | Multi-step speed referance 1 | Desired frequency agree 1 |
| 04 | Multi-step speed referance 2 | Frequency detection 1 |
| 05 | Multi-step speed referance 3 | Frequency detection 2 |
| 06 | Jog reference selection | Inverter operation ready |
| 07 | Accel/decel time selection 1 | During undervoltage detection |
| 08 | External baseblock (NO contact) | During baseblock |
| 09 | External baseblock (NC contact) | Frequency reference mode |
| 0A | Accel/decel prohibit (hold) | Operation reference mode |
| 0B | Inverter overheat alarm (OH2) | During overtorque detection 1 (NO contact output) |
| 0C | Not used | Not used |
| 0D | Speed control cancel | Braking resistor fault |
| 0E | Speed control integral reset | Fault |
| 0F | Not used | Not used |
| 10 | UP command | Alarm |
| 11 | DOWN command | During fault reset |
| 12 | FJOG command | Timer output |
| 13 | RJOG command | Frequency agree 2 |
| 14 | Fault reset | Desired frequency agree 2 |
| 15 | Emergency stop | Frequency detection 3 |
| 16 | Not used | Frequency detection 4 |
| 17 | Not used | During overtorque detection 1 (NC contact) |
| 18 | Timer Input | During overtorque detection 2 (NO contact) |
| 19 | Not used | During overtorque detection 2 (NC contact) |
| 1A | Accel/decel time selection 2 | During reverse run |
| 1B | Constant write-in prohibit | During baseblock |
| 1C | Not used | Not used |
| 1D | | Motoring/regenerating mode |
| 1E | | During retry |
| 1F | | OL1 pre-alarm |
| 20 | External fault | OH pre-alarm |
| 21-2F | | Not used |
| 30 | Not used | During current/torque limiting |
| 31 | | During speed limit |
| 32 | | Not used |
| 33 | | Zero-servo completed |
| 37 | | During run 2 |
| 34-5F | | Not used |
| 60 | DC injection braking command | |
| 61 | External search command 1 | |
| 62 | External search command 2 | |
| 63 | Energy-saving operation | |
| 64 | External search cammand 3 | |
| 65 | KEB (deceleration at momentary power loss) command (NC contact) | |
| 66 | KEB (deceleration at momentary power loss) command (NO contact) | |
| 67-70 | Not used | |
| 71 | Speed/torque control selection | |
| 72 | Zero-servo command | |
| 73-76 | Not used | |
| 77 | Speed control proportional gain selection | |
| 78-FF | Not used | |

Table 4.6 Constants that can be changed by Inverter Capacity (200 V class)

| Constant No. | Name | Unit | Inverter Capacity (kW) | | | |
|---|---|---|---|---|---|---|
| | | | 0.2 | 0.75 | 3.7 | 7.5 |
| U1-36 | Gate driver ID (ID5 to ID1) | — | 00010 | 00011 | 00110 | 00111 |
| o2-04 | kVA selection | — | A0 | A1 | A2 | A3 |
| C6-01 | Carrier frequency upper limit | kHz | 5.0 | 5.0 | 5.0 | 5.0 |
| — | Carrier frequency upper range | kHz | 5.0 | 5.0 | 5.0 | 5.0 |
| C6-02 | Carrier frequency lower limit | kHz | 5.0 | 5.0 | 5.0 | 5.0 |
| C6-03 | Carrier frequency proportional gain | 1 | 0 | 0 | 0 | 0 |
| E2-01 | Motor rated current | A | 1.1 | 3.3 | 14.0 | 26.6 |
| E2-02 | Motor rated slip | Hz | 2.60 | 2.50 | 2.73 | 1.30 |
| E2-03 | Motor no-load current | A | 0.8 | 1.8 | 4.5 | 8.0 |
| E2-05 | Motor line-to line resistance | Ω | 20.563 | 5.156 | 0.771 | 0.288 |
| E2-06 | Motor leak inductance | % | 14.0 | 13.8 | 19.6 | 15.5 |
| L2-02 | Momentary power loss ridethru time | sec | 2.0 | 2.0 | 2.0 | 2.0 |
| L2-03 | Min. baseblock time | sec | 0.5 | 0.5 | 0.5 | 0.7 |

Table 4.7 Constants that can be changed by Inverter Capacity (400 V class)

| Constant No. | Name | Unit | Inverter Capacity (kW) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 0.4 | 0.75 | 3.7 | 7.5 | 15 |
| U1-36 | Gate driver ID (ID5 to ID1) | — | 10001 | 10010 | 10101 | 10110 | 11000 |
| o2-04 | kVA selection | — | B0 | B1 | B2 | B3 | B5 |
| C6-01 | Carrier frequency upper limit | kHz | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| — | Carrier frequency upper range | kHz | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| C6-02 | Carrier frequency lower limit | kHz | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| C6-03 | Carrier frequency proportional gain | 1 | 0 | 0 | 0 | 0 | 0 |
| E2-01 | Motor rated current | A | 1.1 | 1.6 | 7.0 | 13.3 | 26.5 |
| E2-02 | Motor rated slip | Hz | 2.90 | 2.60 | 2.70 | 1.30 | 1.60 |
| E2-03 | Motor no-load current | A | 0.6 | 0.8 | 2.3 | 4.0 | 7.6 |
| E2-05 | Motor line-to line resistance | Ω | 38.198 | 22.459 | 3.333 | 1.152 | 0.550 |
| E2-06 | Motor leak inductance | % | 18.2 | 14.3 | 19.3 | 15.5 | 17.2 |
| L2-02 | Momentary power loss ridethru time | sec | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| L2-03 | Min. baseblock time | sec | 0.5 | 0.5 | 0.5 | 0.7 | 0.7 |

# 5

# OPERATION

This chapter explains the basic settings required to operate and stop the VS-616P1Y.

# 5.1 OPERATION MODE SELECTION

## ⚠ WARNING

- Check to be sure that the front cover is attached before turning ON the power supply. Do not remove the front cover during operation.

  An electric shock may occur.
- Reset alarms only after confirming that the RUN signal is OFF. If an alarm is reset with the RUN signal turned ON, the machine may suddenly start.

  Injury may occur.

## ⚠ CAUTION

- Don't touch the radiation fins (heat sink), braking resistor, or Braking Resistor Unit. These can become very hot.

  Otherwise, a burn injury may occur.
- Be sure that the motor and machine is within the applicable ranges before starting operation.

  Otherwise, an injury may occur.
- Provide a separate holding brake if necessary.

  Otherwise, an injury may occur.
- Don't check signals while the Inverter is running.

  Otherwise, the equipment may be damaged.
- Be careful when changing Inverter settings. The Inverter is factory set to suitable settings.

The VS-616P1Y has two operation modes, LOCAL and REMOTE, as described below. These two modes can be selected by the digital operator "LOCAL/REMOTE" key only while the operation is stopped. The selected operation mode can be verified by observing the digital operator SEQ and REF LEDs as shown below.

- LOCAL: Both frequency reference and run command are set by the digital operator. SEQ and REF LEDs go OFF.
- REMOTE: Master frequency reference and run command can be selected as described below.

Table 5.1 Reference Selection in REMOTE Mode

| Constant No. | Digital Operator Display | Name | Remarks |
|---|---|---|---|
| b1-01 | Reference Source | Reference selection | 0 : Master frequency reference from operator (d1-01) (Operator REF LED is OFF.)<br>1 : Master frequency reference from control circuit (Operator REF LED is ON.)<br>2 : Master frequency reference set by CP-215 (Operator REF LED blinks.)<br>3 : Master frequency reference set by AI-14U (Operator REF LED blinks.) |
| b1-02 | Run Source | Operation method selection | 0 : Master frequency reference from operator (d1-01) (Operator SEQ LED is OFF.)<br>1 : Master frequency reference from control circuit (Operator SEQ LED is ON.)<br>2 : Master frequency reference set byCP-215 (Operator REF LED blinks.)<br>3 : Master frequency reference set by option (Operator SEQ LED blinks.) |

# 5.2 TEST RUN CHECKPOINTS

To assure safety, prior to initial operation, disconnect the machine coupling so that the motor is isolated from the machine. If initial operation must be performed while the motor is still coupled to the machine, use great care to avoid potentially hazardous conditions. Check the following items before the test run.

- Wiring and terminal connections are correct.
- No short circuit caused by wire clippings.
- Screw-type terminals are securely tightened.
- Motor is securely mounted.
- All items are correctly earthed (grounded).

# 5.3 TEST RUN

## 5.3.1 Digital Operator Display at Power-up

When the system is ready for operation, turn ON the power supply. Verify that the inverter powers up properly. If any problems are found, turn OFF the power supply immediately. The digital operator display illuminates as shown below when turning the power supply ON.

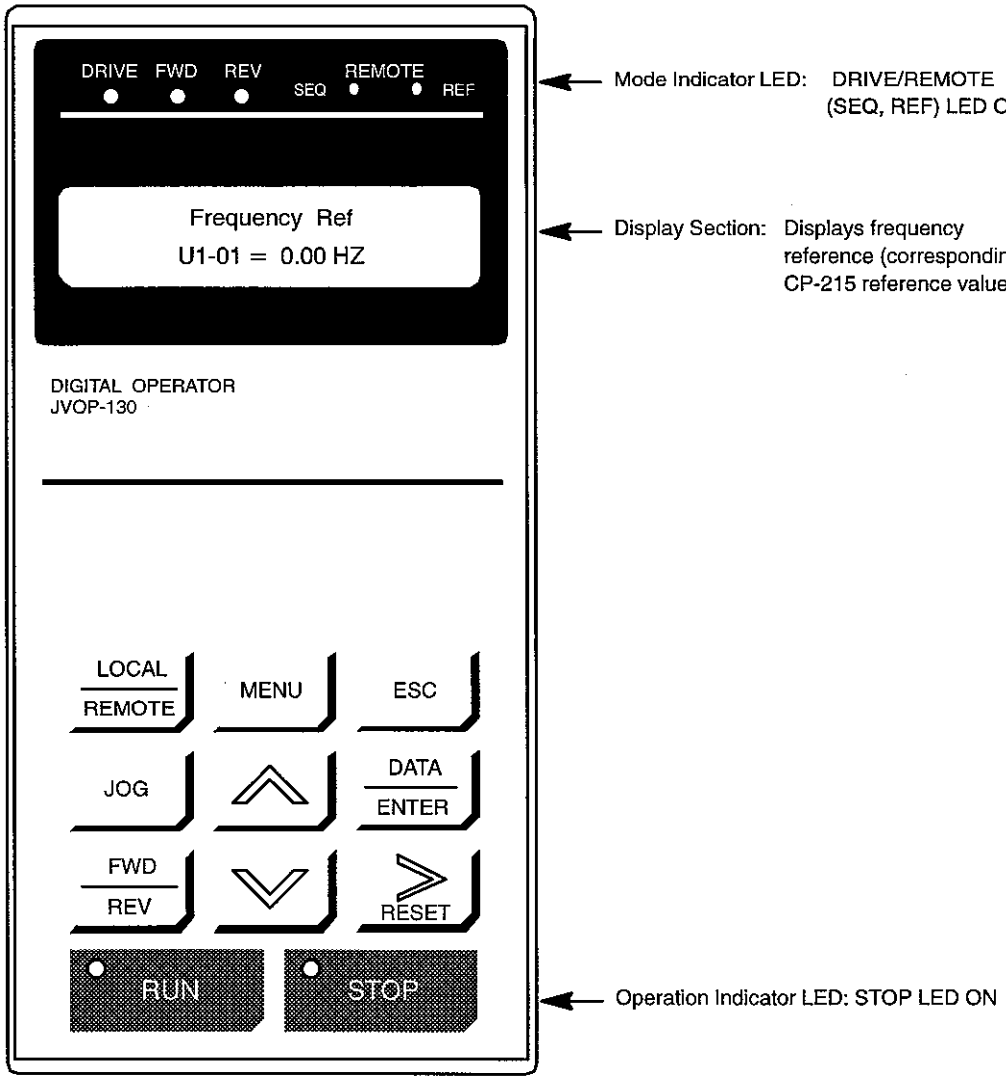



Fig 5.1 Digital Operator Display at Power-up

### 5.3.2 Operation Check Points

Check the following items during operation.

- Motor rotates smoothly.
- Motor rotates in the correct direction.
- Motor does not have abnormal vibration or noise.
- Acceleration and deceleration are smooth.
- Current matches the load flow.
- Status indicator LEDs and digital operator display are correct.

### 5.3.3 Example of Basic Operation

#### ■ Operation by Digital Operator

The diagram below shows a typical operation pattern using the digital operator.

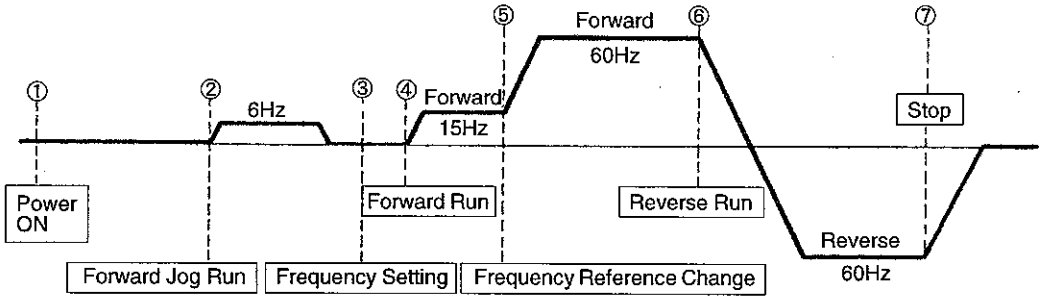
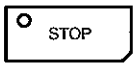
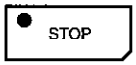



Fig 5.2 Operation Sequence by Digital Operator

Table 5.2 Typical Operation by Digital Operator

| Description | Key Sequence | Digital Operator Display |
|---|---|---|
| ① Power ON<br>· Displays frequency reference value. | | Frequency Ref<br>U1-01 = 0.00 HZ |
| Operation Condition Setting<br>· Select LOCAL mode. | LOCAL/REMOTE | REMOTE LED OFF<br>(SEQ, REF) |
| ② Forward Jog Run<br>(6 Hz)<br>· JOG run procedure<br>(Runs while depressing JOG key.) | JOG | |
| ③ Frequency Setting<br>· Change reference value. | DATA/ENTER | Frequency Ref<br>000.00 HZ<br>Digit to be changed blinks. |
| | Change the value by pressing<br>▽ △ RESET | Frequency Ref<br>015.00 HZ |
| | DATA/ENTER | Entry Accepted |
| · Write-in set value. | | Frequency Ref<br>015.00 HZ |
| · Select output frequency monitor display. | ESC | Frequency Ref<br>U1-01 = 15.00 HZ |
| | △ | Output Freq<br>U1-02 = 0.00 HZ |
| ④ Forward Run<br>· Forward run (15 Hz) | RUN | Output Freq<br>U1-02 = 15.00 HZ<br>RUN LED lights. FWD LED lights. |
| | | RUN |

| Description | Key Sequence | Digital Operator Display |
|---|---|---|
| ⑤ Frequency Reference Value Change<br>(15 Hz to 60 Hz)<br>· Select frequency reference value display. |  | Frequency Ref<br>U1-01 = 015.00 HZ |
| |  | Frequency Ref<br>015.00 HZ |
| · Change set value. | Change the value by pressing<br>  | Frequency Ref<br>060.00 HZ |
| · Write-in set value. |  | Entry Accepted |
| | | Frequency Ref<br>060.00 HZ |
| · Select output frequency monitor display. |  | Frequency Ref<br>U1-01 = 60.00 HZ |
| |  | Output Freq<br>U1-02 = 60.00 HZ |
| ⑥ Reverse Run<br>· Switch to reverse run. |  | Output Freq<br>U1-02 = –60.00 HZ |
| | | REV LED lights. |
| ⑦ Stop<br>· Decelerates to a stop. |  | Output Freq<br>U1-02 = 0.00 HZ |
| | | STOP LED lights.<br>(RUN LED blinks during deceleration.) |
| | |  |

# 6

# TROUBLESHOOTING

This chapter describes the fault displays and countermeasure for the VS-616P1Y and motor problems and countermeasures.

# 6.1 FAULT DISPLAY

This chapter describes the inverter fault display and the fault contents caused by motor/machine malfunctions and the corrective actions to be taken.

At the occurance of failure in the VS-616P1Y, the indicator LED (red) on the IPCP control card is lit. A failure occurs in the axis whose indicator LED is lit.

## 6.1.1 Fault Diagnosis and Corrective Actions

When the VS-616P1Y detects a fault, the fault is displayed on the digital operator and activates the fault contact output and the motor coasts to a stop. Check the cause in the table below and take the corrective actions.

If the inspections or corrective actions described cannot solve the problem, contact your YASKAWA representative immediately.

Table 6.1 Fault Diagnosis and Corrective Actions

| Fault Display | Description | Details | Corrective Action |
|---|---|---|---|
| PUF<br>DC Bus Fuse Open | Fuse blown (FU) | · The direct current circuit fuse is blown.<br>· The output transistors were damaged. | Check for damaged transistor, load side short circuit, grounding, etc. |
| UV1<br>DC Bus Undervolt | Main circuit undervoltage (PUV) | Undervoltage in the direct current main circuit during running. | · Check the power supply wiring.<br>· Correct the line voltage. |
| UV2<br>CTL PS Undervolt | Control circuit undervoltage (CUV) | Undervoltage in the control circuit during running. | |
| GF<br>Ground Fault | Grounding (GF) (Earth fault) | Inverter output grounding current exceeded 50% of inverter rated current. | · Check that motor insulation has not deteriorated.<br>· Check that connection between inverter and motor is not damaged. |
| OC<br>Overcurrent | Overcurrent (OC) | The inverter output current exceeded the OC level. | · Check the motor coil resistance.<br>· Extend the accel/decel time.<br>· Check the motor insulation.<br>· Multi-meter check |
| OV<br>DC Bus Overvolt | Overvoltage (OV) | The main circuit direct current voltage exceeded the OV level. | Extend the deceleration time, add braking circuit. |
| OH<br>Heatsnk Overtemp | Heatsink overheat (OH) | The transistor heatsink temperature exceeded the setting of L8-02. | |
| OH1<br>Heatsnk MAX tmp | Heatsink overheat (OH1) | The transistor heatsink temperature exceeded the setting of L8-04. | Check the fan and ambient temperature. |
| OL1<br>Motor Overloaded | Motor overload (OL1) | Inverter output exceeded the motor overload level. | Reduce the load. |
| OL2<br>Inv Overloaded | Inverter overload (OL2) | Inverter output exceeded the inverter overload level. | Reduce the load, extend the acceleration time. |
| OL3<br>Overtorque Det 1 | Overtorque detection 1 | Inverter output current (in V/f control) or inverter torque reference (in vector control) exceeded torque detection level 1 (L6-02). | — |
| OL4<br>Overtorque Det 2 | Overtorque detection 2 | Inverter output current (in V/f control) or inverter torque reference (in vector control) exceeded torque detection level 2 (L6-04) . | — |
| RR<br>Dyn Brk Transistr | Braking transistor failure | The braking transistor has failed. | Replace the inverter. |
| RH<br>Dyn Brk Resistor | Braking resistor unit overheat | The braking resistor unit temperature has exceeded the allowable value. | Reduce the regenerative load. |
| EF3<br>External Fault 3 | External fault at terminal 3 | Fault occurred in the external control circuit. | Check the condition of the input terminal.<br>If the fault is displayed when terminal is not connected, replace the inverter. |
| EF4<br>External Fault 4 | External fault at terminal 4 | | |
| EF5<br>External Fault 5 | External fault at terminal 5 | | |
| EF6<br>External Fault 6 | External fault at terminal 6 | | |
| EF7<br>External Fault 7 | External fault at terminal 7 | | |
| EF8<br>External Fault 8 | External fault at terminal 8 | | |

Table 6.1 Fault Diagnosis and Corrective Actions (continued)

| Fault Display | Description | Details | Corrective Action |
|---|---|---|---|
| OS<br>Overspeed Det | Overspeed (OS) | The motor speed exceeded the overspeed level. | – |
| DEV<br>Speed Deviation | Speed deviation (DEV) | The deviation of the speed reference and speed feedback exceeded the regulation level. | Check the load. |
| PGO<br>PG open | PG open circuit (PGO) | The PG line is broken. | · Check the PG line.<br>· Check the condition of the motor lock or the load. |
| PF<br>Input Pha Loss | Input open-phase | · Inverter input power supply has open-phase.<br>· Large unbalance in input voltage. | · Check the line voltage.<br>· Re-tighten the input terminal screws. |
| LF<br>Output Pha Loss | Output open-phase | Inverter output has open-phase. | · Check the output wiring.<br>· Check the motor impedance.<br>· Re-tighten the output terminal screws. |
| OPR<br>Oper Disconnect | Digital operator connection fault | The digital operator was disconnected during operation by run command from the digital operator. | Check the operator connection. |
| ERR<br>EEPROM R/W Err | EEPROM writing fault (ERR) | EEPROM internal data did not match when initializing the constant. | Replace the control card. |
| CF<br>Out of Control | Control fault | In open loop vector control, it took 3 seconds or more for torque limit during deceleration to stop. | Check the motor-related constants. |
| SVE<br>Zero Servo Fault | Zero-servo fault | The rotation position deviated by 10000 r/min or more during zero-servo operation. | · Check that the torque limit value is not too low.<br>· Check that the load torque is not excessive.<br>· Check the noise of PG signals. |
| BUS<br>Option Com Err | SI-B transmission error | A communications error occured in a mode where the command or a frequency reference is set from the Transmission Option Card. | · Check the communication devices and signals.<br>· Replace the transmission option card. |
| EF0<br>Opt External Flt | DDS/SI-B option external error detected | An "external fault" was input from DDS/SI-B option. | Remove the cause of the external fault. |
| IPMFLT<br>IPM Fault | IPM fault | An alarm (OC, SC, OH, UV, etc.) was detected. | · Check the output signal of the alarm.<br>· Check the wiring of the power block. |
| IPMRDY<br>IPM Not Ready | IPM Ready fault | An alarm (UV) output from the power supply board was detected. | · Check the wiring of the power block.<br>· Replace the power block. |

Table 6.2 CPF Fault Display and Corrective Actions

| Fault Display | Meaning | Probable Causes | Corrective Actions |
|---|---|---|---|
| CPF00<br>COM-ERR (OP&INV) | Operator Communications Error 1<br>Communications with the Operator were not established within 5 seconds after the power was turned on. | The Degital Operator's connector isn't connected properly. | Disconnect the Digital Operator and then connect it again. |
| | | The Inverter's control circuits are faulty. | Replace the Inverter. |
| CPF01<br>COM-ERR (OP&INV) | Operator Communications Error 2<br>After communications were established, there was a transmission error with the Digital Operator for more than 2 seconds. | The Digital Operator isn't connected properly. | Disconnect the Digital Operator and then connect it again. |
| | | The Inverter's control circuits are faulty. | Replace the Inverter. |
| CPF02<br>BB Circuit Err | Baseblock circuit error | --- | Try turning the power supply off and on again. |
| | | The control circuit is damaged. | Replace the Inverter. |
| CPF03<br>EEPROM Error | EEPROM error | --- | Try turning the power supply off and on again. |
| | | The control circuit is damaged. | Replace the Inverter. |
| CPF04<br>Internal A/D Err | CPU internal A/D converter error | --- | Try turning the power supply off and on again. |
| | | The control circuit is damaged. | Replace the Inverter. |
| CPF06<br>Option Error | Option Card connection error | The Option Card is not connected properly. | Turn off the power and insert the Card again. |
| | | The Inverter or Option Card is faulty. | Replace the faulty component. |
| CPF20<br>Option A/D Error | Option Card A/D converter error | The Option Card is not connected properly. | Turn off the power and insert the Card again. |
| | | The Option Card's A/D converter is faulty. | Replace the Option Card. |
| CPF21<br>Option CPU down | Transmission Option Card self diagnostic error | Option Card fault. | Replace the Option Card. |
| CPF22<br>Option Type Err | Transmission Option Card model code error | | |
| CPF23<br>Option DPRAM Err | Transmission Option Card DPRAM error | | |

Table 6.3 Operation Errors

| Display | Meaning | Incorrect settings |
|---|---|---|
| OPE01<br>kVA Selection | Incorrect Inverter capacity setting | The Inverter capacity setting doesn't match the Unit. (Contact your Yaskawa representative.) |
| OPE02<br>Limit | Constant setting range error | The constant setting is outside of the valid setting range. |
| OPE03<br>Terminal | Multi-function input selection error | One of the following errors has been made in the multi-function input (H1-01 to H1-06) settings:<br>• The same setting has been selected for two or more multi-function inputs.<br>• An up or down command was selected independently. (They must be used together.)<br>• The up/down commands (10 and 11) and Accel/Decel Ramp Hold (A) were selected at the same time.<br>• Speed Search 1 (61, maximum output frequency) and Speed Search 2 (62. set frequency) were selected at the same time.<br>• External Baseblock NO (8) and External Baseblock NC (9) were selected at the same time.<br>• The up/down commands (10 and 11) were selected while PID control (b5-01) was enabled.<br>• The Terminal 13/14 Switch (1F) was selected, but the terminal 14 function selector (H3-09) wasn't set to frequency reference (1F).<br>• Positive and negative speed commands have not been set at the same time.<br>• The emergency stop command NO and NC have been set at the same time. |
| OPE05<br>Sequence Select | Option Card selection error | The Option Card was selected as the frequency reference source by setting b1-01 to 3, but an Option Card isn't connected. |
| OPE06<br>PG Opt Missing | Control method selection error | • V/f control with PG feedback was selected by setting A1-02 to 1, but a PG Speed Control Card isn't connected.<br>• Flux vector control was selected by setting A1-02 to 3, but a PG Speed Control Card isn't connected. |
| OPE08<br>Elevator Table | Constant selection error | A setting has been made that is not required in the current control method.<br>Ex.: A function used only with flux vector control was selected for open-loop vector control. |
| OPE10<br>V/f Ptrn Setting | V/f data setting error | Constants E1-04, E1-06, E1-07, and E1-09 do not satisfy the following conditions:<br>• E1-04 (FMAX) ≧ E1-06 (FA) > E1-07 (FB) ≧ E1-09 (FMIN) |
| OPE11<br>CarrFrg/On-Delay | Constant setting error | One of the following constant setting errors exists.<br>• The carrier frequency upper limit (C6-01) > 5 kHz and the carrier frequency lower limit (C6-02) ≦ 5 kHz.<br>• The carrier frequency gain (C6-03) > 6 and (C6-01) > (C6-02).<br>• Upper/lower limit error in C6-01 to 03 or C8-15. |
| OPE12 | Constant setting error | Constant setting error would occur when the following conditions are satified.<br>• E2-02=2 and C9-01≠0<br>• C8-37=1 and $\frac{\text{C6-01}}{12}$ >E1-04×D2-01 |

Table 6.4 Minor Fault Displays and Processing

| Minor Fault Display | Meaning | Probable Causes | Corrective Actions |
|---|---|---|---|
| UV (blinking)<br>DC Bus Undervolt | Main Circuit Undervoltage<br>The following conditions occurred when there was no Run signal.<br>• The main circuit DC voltage was below the undervoltage detection level (L2-05).<br>• The surge current limiting contactor opened.<br>• The control power supply voltage when below the CUV level. | See causes for UV1, UV2, and UV3 faults. | See corrective actions for UV1, UV2, and UV3 faults. |
| OV (blinking)<br>DC Bus Overvolt | Main Circuit Overvoltage<br>The main circuit DC voltage exceeded the overvoltage detection level. | The power supply voltage is too high. | Decrease the voltage so it's within specifications. |
| OH (blinking)<br>Heatsink Over tmp | Cooling Fin Overheating<br>The temperature of the Inverter's cooling fins exceeded the setting in L8-02. | The ambient temperature is too high. | Install a cooling unit. |
| | | There is a heat source nearby. | Remove the heat source. |
| | | The Inverter cooling fan has stopped. | Replace the cooling fan. (Contact your Yaskawa representative.) |
| OH2 (blinking)<br>Over Heat 2 | Inverter Overheating Pre-alarm<br>An OH2 alarm signal (Inverter overheating alarm signal) was input from a multi-function input. | — | Clear the multi-function input's overheating alarm input. |
| OL3 (blinking)<br>Overtorque Det 1 | Overtorque 1<br>There has been a current greater than the setting in L6-02 for longer than the setting in L6-03. | — | • Make sure that the settings in L6-02 and L6-03 are appropriate.<br>• Check the mechanical system and correct the cause of the overtorque. |
| OL4 (blinking)<br>Overtorque Det 2 | Overtorque 2<br>There has been a current greater than the setting in L6-05 for longer than the setting in L6-06. | — | • Make sure that the current setting in L6-05 and time setting in L6-06 are appropriate.<br>• Check the mechanical system and correct the cause of the overtorque. |
| EF (blinking)<br>External Fault | Forward/Reverse Run Commands Input Together<br>Both the forward and reverse run commands have been ON for more than 0.5 s. | — | Check the sequence of the forward and reverse run commands.<br>※Since the rotational direction is unknown, the motor will be decelerated to a stop when this minor fault occurs. |
| EF3 (blinking)<br>External Fault 3 | External fault (Input terminal 3) | An "external fault" was input from a multi-function input.<br>(Operation continues.) | • Reset external fault inputs to the multi-function inputs.<br>• Remove the cause of the external fault. |
| EF4 (blinking)<br>External Fault 4 | External fault (Input terminal 4) | | |
| EF5 (blinking)<br>External Fault 5 | External fault (Input terminal 5) | | |
| EF6 (blinking)<br>External Fault 6 | External fault (Input terminal 6) | | |
| EF7 (blinking)<br>External Fault 7 | External fault (Input terminal 7) | | |
| EF8 (blinking)<br>External Fault 8 | External fault (Input terminal 8) | | |
| OS (blinking)<br>Overspeed Det | Overspeed<br>The speed has been greater than the setting in F1-08 for longer than the setting in F1-09. | Overshooting/undershooting are occurring. | Adjust the gain again. |
| | | The reference speed is too high. | Check the reference circuit and reference gain. |
| | | The settings in F1-08 and F1-09 aren't appropriate. | Check the settings in F1-08 and F1-09. |

Table 6.4 Minor Fault Displays and Processing (continued)

| Minor Fault Display | Meaning | Probable Causes | Corrective Actions |
|---|---|---|---|
| DEV (blinking)<br>Speed Deviation | Excessive Speed Deviation<br>The speed deviation has been greater than the setting in F1-10 for longer than the setting in F1-11. | The load is too large. | Reduce the load. |
| | | The acceleration time and deceleration time are too short. | Lengthen the acceleration time and deceleration time. |
| | | The load is locked. | Check the mechanical system. |
| | | The settings in F1-10 and F1-11 aren't appropriate. | Check the settings in F1-10 and F1-11. |
| PGO (blinking)<br>PG open | The PG is disconnected.<br>The Inverter is outputting a frequency, but PG pulses aren't being input. | There is a break in the PG wiring. | Fix the broken/disconnected wiring. |
| | | The PG is wired incorrectly. | Fix the wiring. |
| | | Power isn't being supplied to the PG. | Supply power to the PG properly. |
| BUS<br>SI-B Com Err | SI-B Transmission Error<br>A communications error occurred in a mode where the run command or a frequency reference is set from the Transmission Option Card. | — | Check the Transmission Card and signals. |
| CALL<br>SI-F/G Com Call | SI-F/G Communications Error<br>Control data was not normally received when power was turned ON. | — | Check the communications devices and signals. |

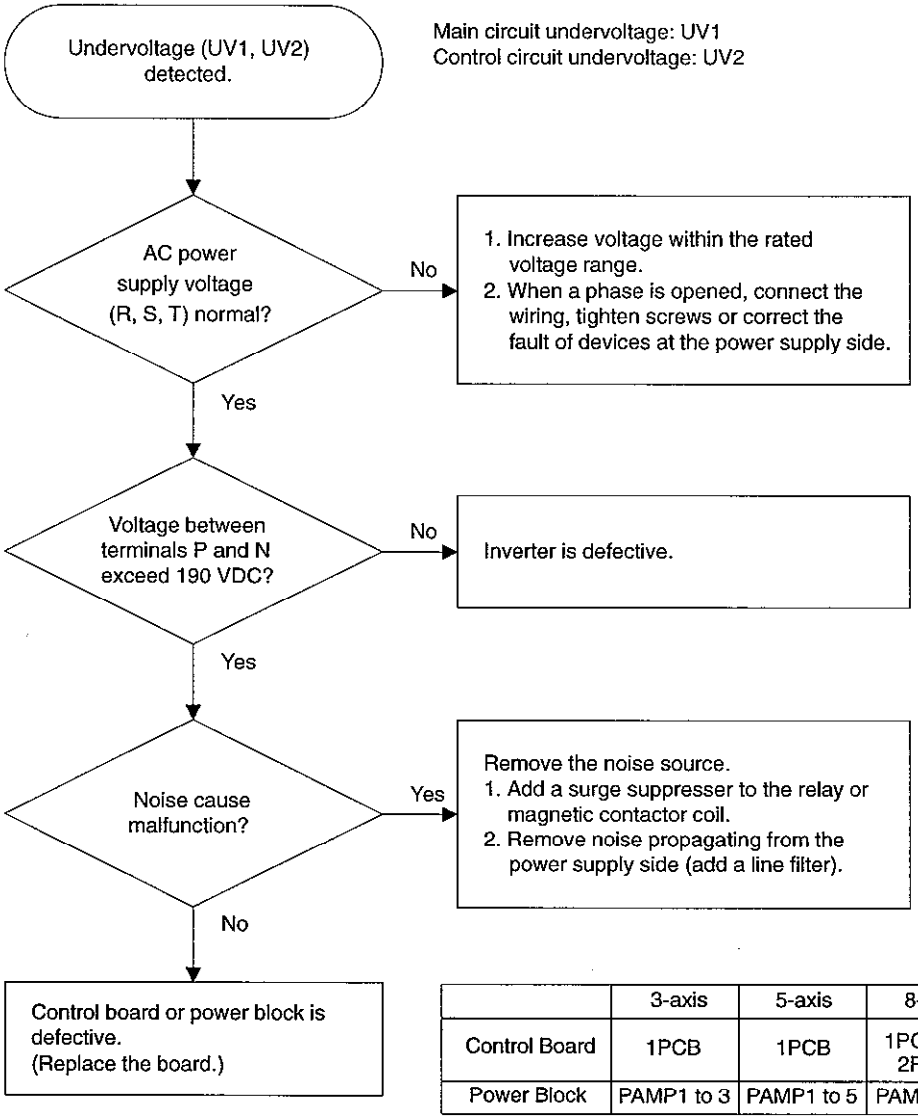
Table 6.5 Troubleshooting Autotuning Faults

| Display Message | Fault | Description | Countermeasure |
|---|---|---|---|
| Auto-Tuning<br>Data invalid | Motor data fault | Motor data error for autotuning. | • Check the input data.<br>• Check the Inverter and motor capacities. |
| Tune Aborted<br>Minor Fault: □□□ | Minor fault | A minor Inverter fault occurred. | Check the minor fault indicated in the boxes in the display shown at the left. |
| Tune Aborted<br>STOP key | Overvoltage (0V) at stop | Auto tuning was interrpted. | Check and adjust if necessary. |
| Tune Aborted<br>Resistance | Line resistance fault | Autotuning was not completed within a set time. | • Check the input data.<br>• Check the motor wiring. |
| Tune Aborted<br>No-load current | No-load current fault | | |
| Tune Aborted<br>Saturation -1 | Saturated core coefficient 1 fault | | |
| Tune Aborted<br>Saturation -2 | Saturated core coefficient 2 fault | | |
| Tune Aborted<br>Rated Slip | Rated slip fault | | |
| Tune Aborted<br>Accelerate | Acceleration fault | The motor did not accelerate within a set time. | • Increase the acceleration time (C1-01).<br>• Increase the torque limits (L7-01, -02) if these have been decreased.<br>• Disconnect the motor from the machine if it has been connected. |
| Tune Aborted<br>PG Direction | Motor directccelerion fault | There is a contact fault between the Inverter, PG (phase A and B), and motor (phases U, V, and W) | • Check the PG wiring.<br>• Check the motor wiring.<br>• Check the PG direction and constant F1-05. |
| Tune Aborted<br>Motor speed | Motor speed fault | The torque reference was too large (100%) during autotuning. | • Disconnect the motor from the machine if it has been connected.<br>• Increase the acceleration time (C1-01).<br>• Check the input data (particularly the number of PG pulses). |
| Tune Aborted<br>V/f Over Setting | V/f setting exceeded | The torque command exceeded 100%, and the no-load current exceeded 70% of the motor's rated current. | • Check and adjust settings if necessary.<br>• Remove the load from the motor. |

# 6.2 Corrective Actions

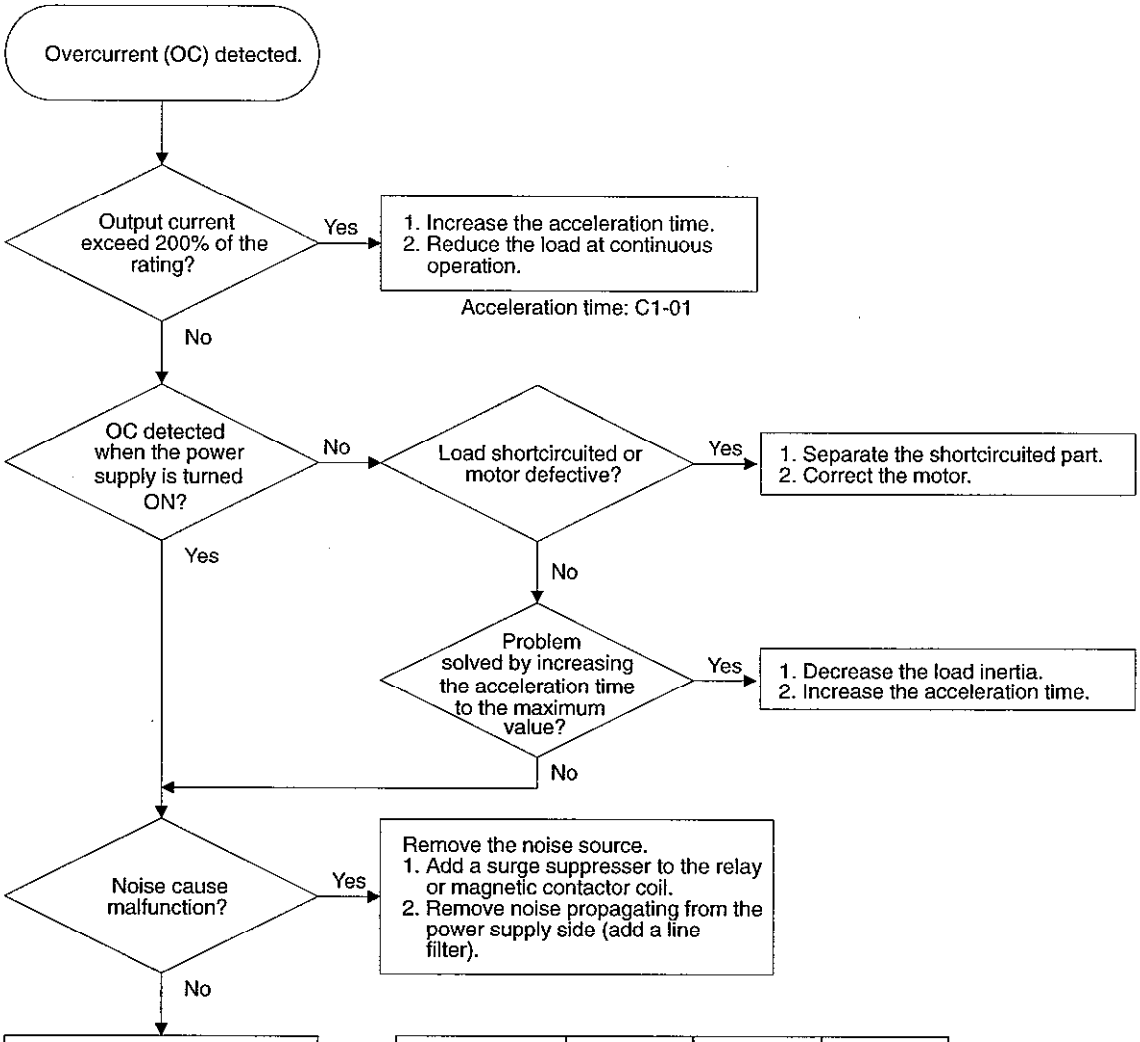
Following flow charts describe the fault contents and corrective actions to be taken.

Undervoltage



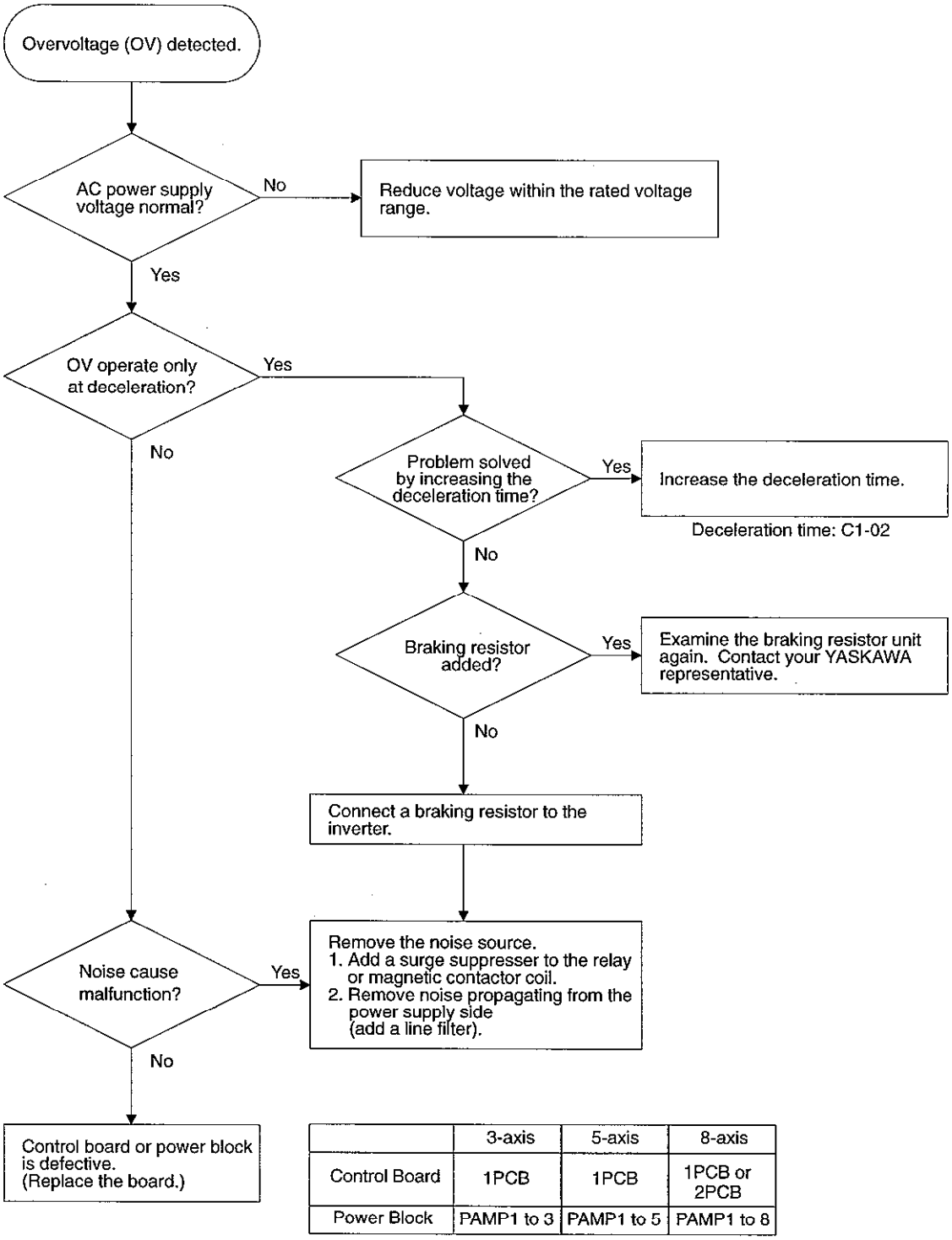

| | 3-axis | 5-axis | 8-axis |
|---|---|---|---|
| Control Board | 1PCB | 1PCB | 1PCB or 2PCB |
| Power Block | PAMP1 to 3 | PAMP1 to 5 | PAMP1 to 8 |

## Overcurrent



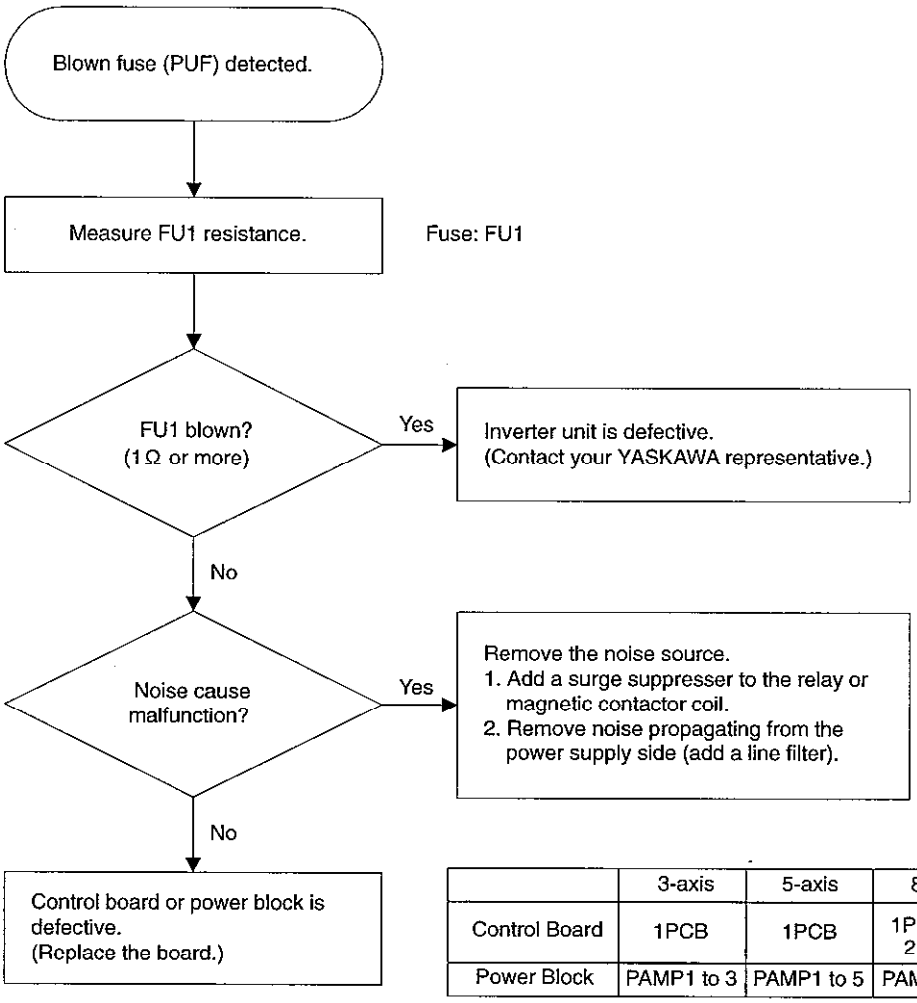

| | 3-axis | 5-axis | 8-axis |
|---|---|---|---|
| Control Board | 1PCB | 1PCB | 1PCB or 2PCB |
| Power Block | PAMP1 to 3 | PAMP1 to 5 | PAMP1 to 8 |

## Overvoltage



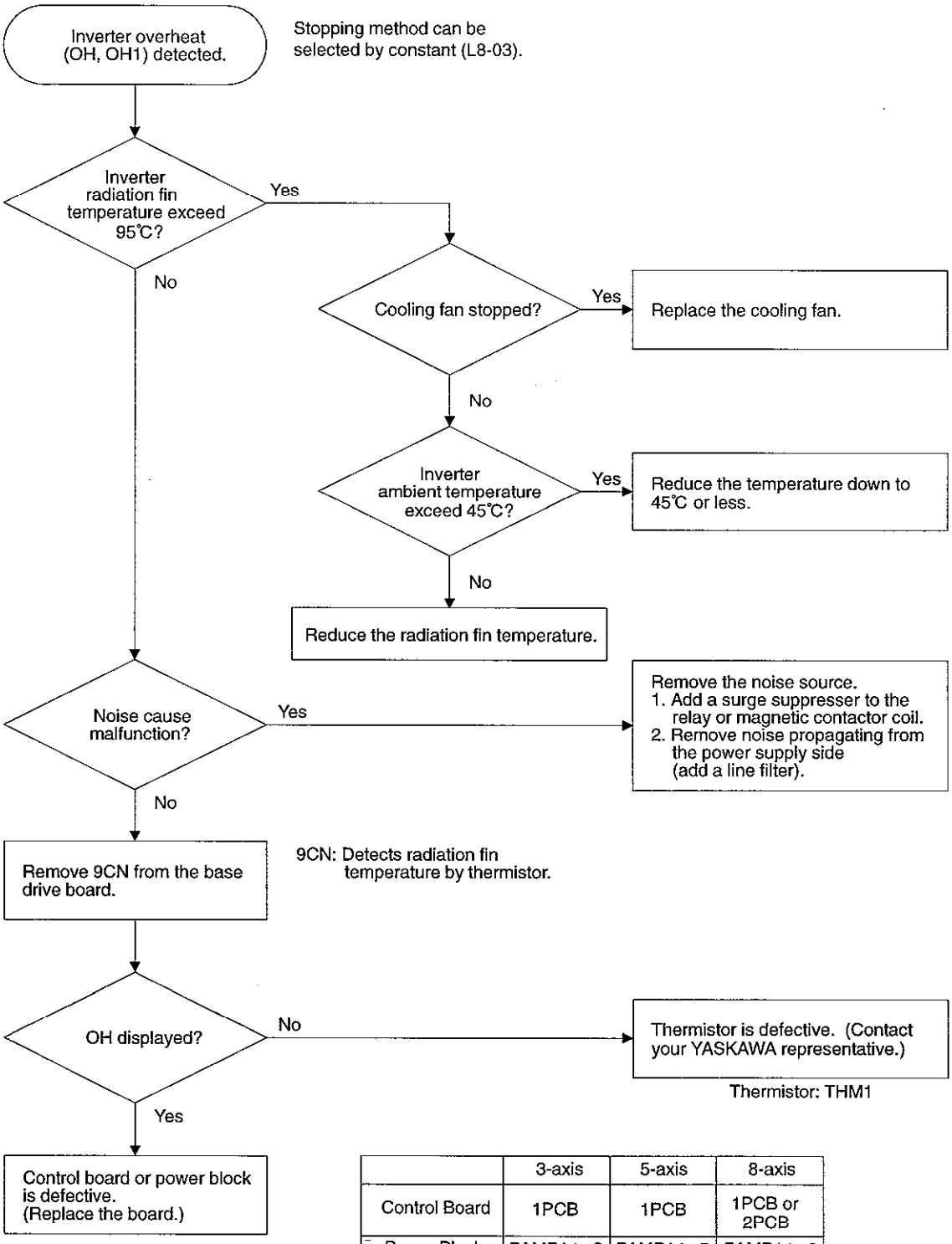

| | 3-axis | 5-axis | 8-axis |
|---|---|---|---|
| Control Board | 1PCB | 1PCB | 1PCB or 2PCB |
| Power Block | PAMP1 to 3 | PAMP1 to 5 | PAMP1 to 8 |

## Blown Fuse



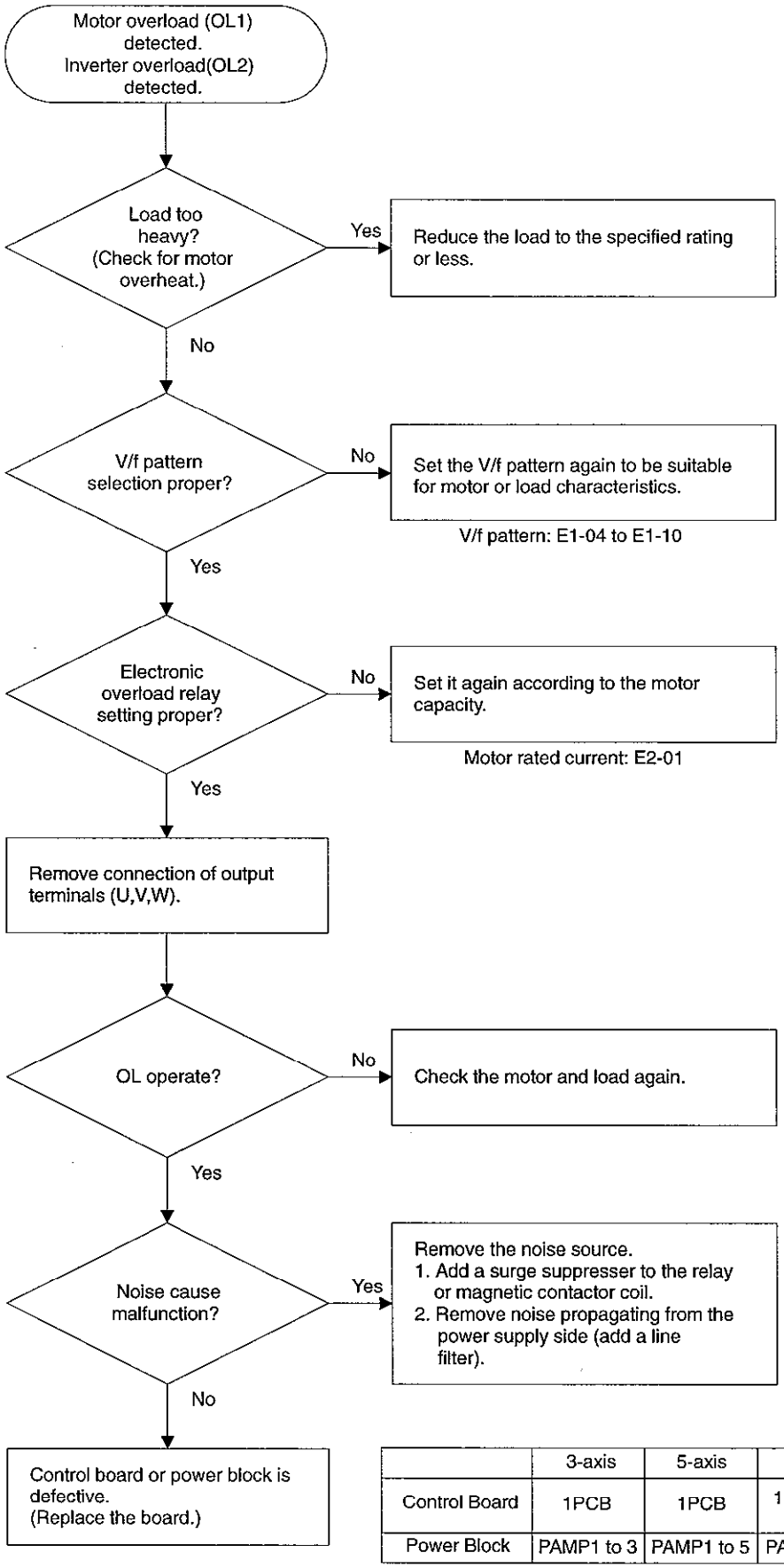

| | 3-axis | 5-axis | 8-axis |
|---|---|---|---|
| Control Board | 1PCB | 1PCB | 1PCB or 2PCB |
| Power Block | PAMP1 to 3 | PAMP1 to 5 | PAMP1 to 8 |

## Inverter Overheat



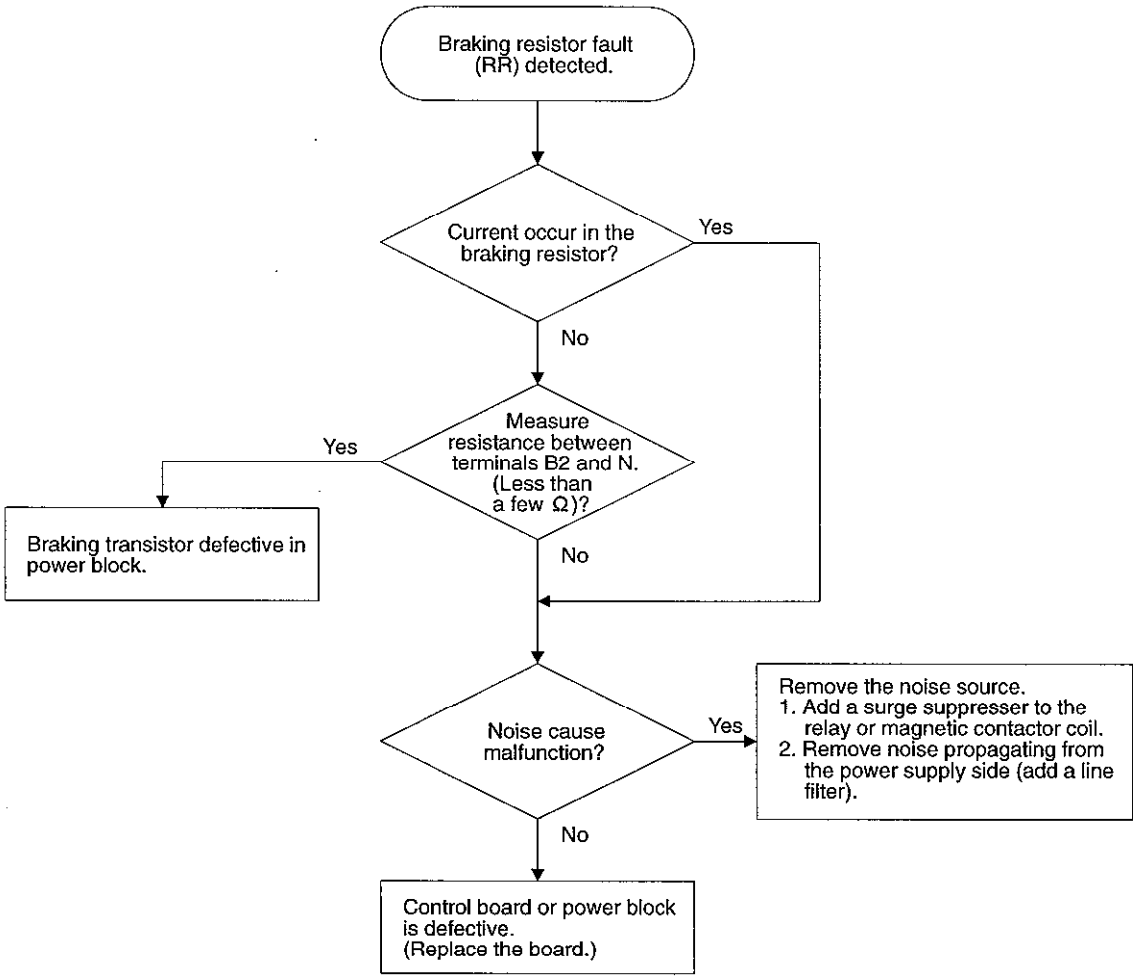

| | 3-axis | 5-axis | 8-axis |
|---|---|---|---|
| Control Board | 1PCB | 1PCB | 1PCB or 2PCB |
| Power Block | PAMP1 to 3 | PAMP1 to 5 | PAMP1 to 8 |

## Motor overload: Inverter overload



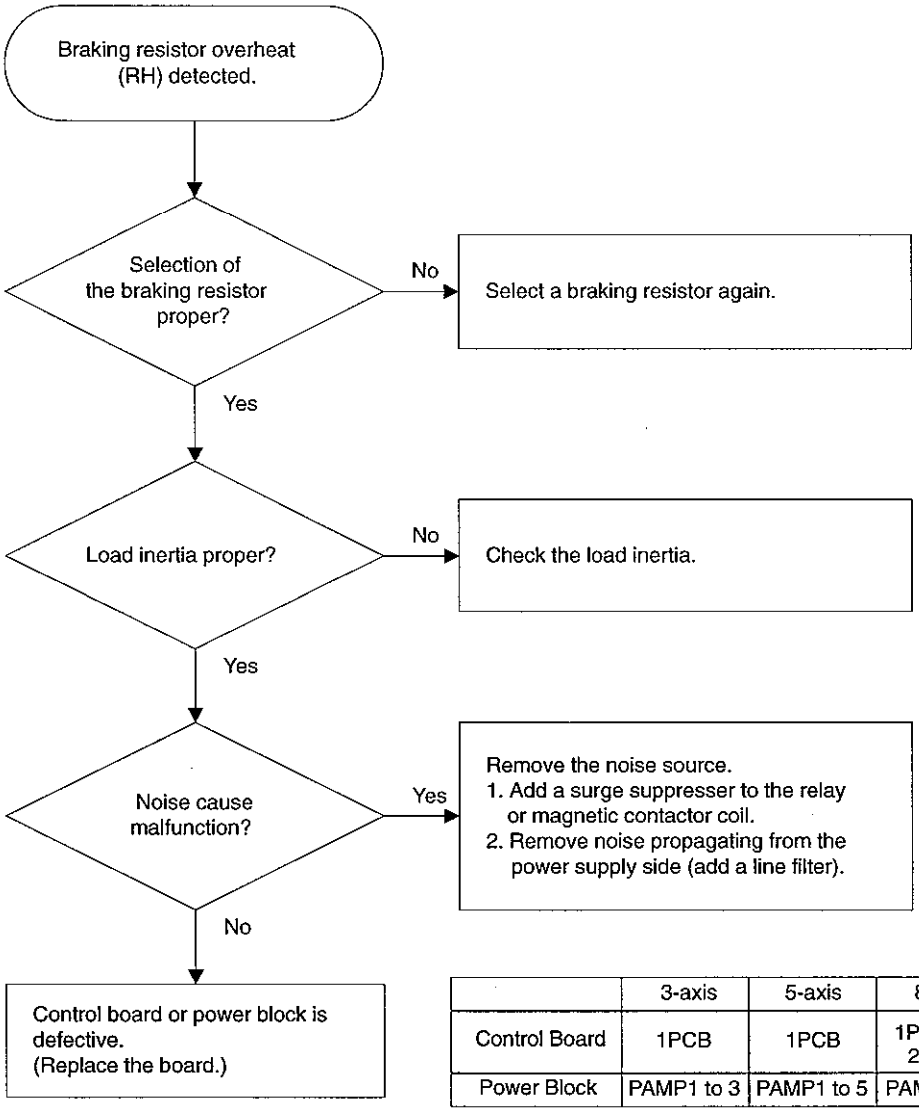

| | 3-axis | 5-axis | 8-axis |
|---|---|---|---|
| Control Board | 1PCB | 1PCB | 1PCB or 2PCB |
| Power Block | PAMP1 to 3 | PAMP1 to 5 | PAMP1 to 8 |

Braking transistor fault



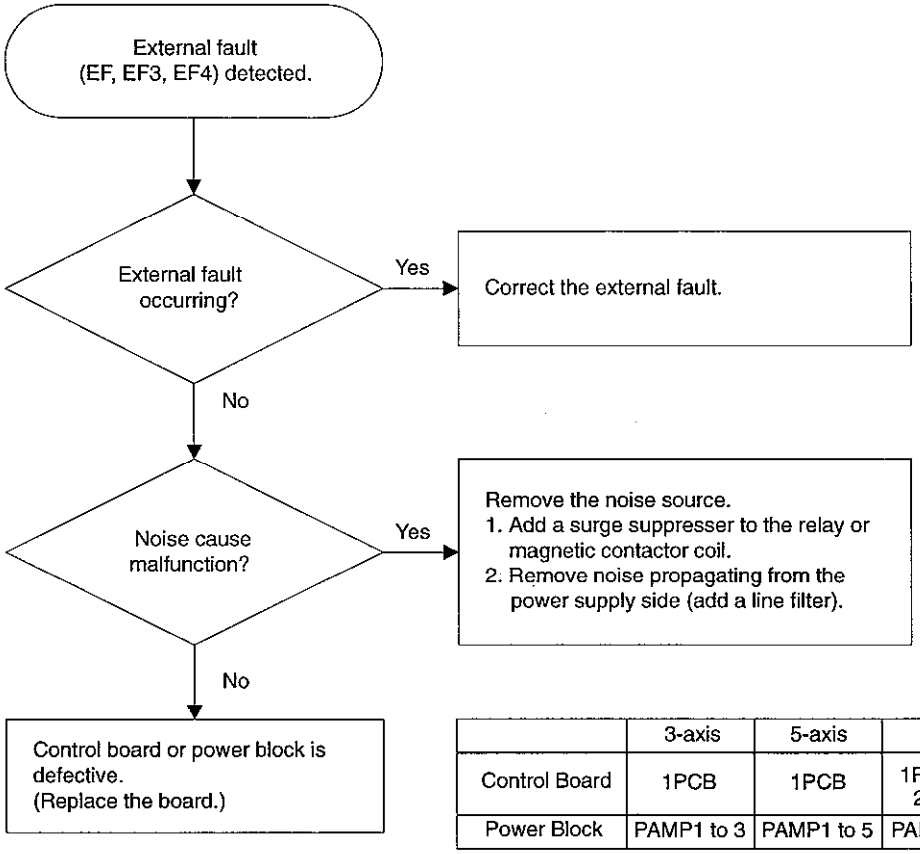

| | 3-axis | 5-axis | 8-axis |
|---|---|---|---|
| Control Board | 1PCB | 1PCB | 1PCB or 2PCB |
| Power Block | PAMP1 to 3 | PAMP1 to 5 | PAMP1 to 8 |

## Braking resistor overheat



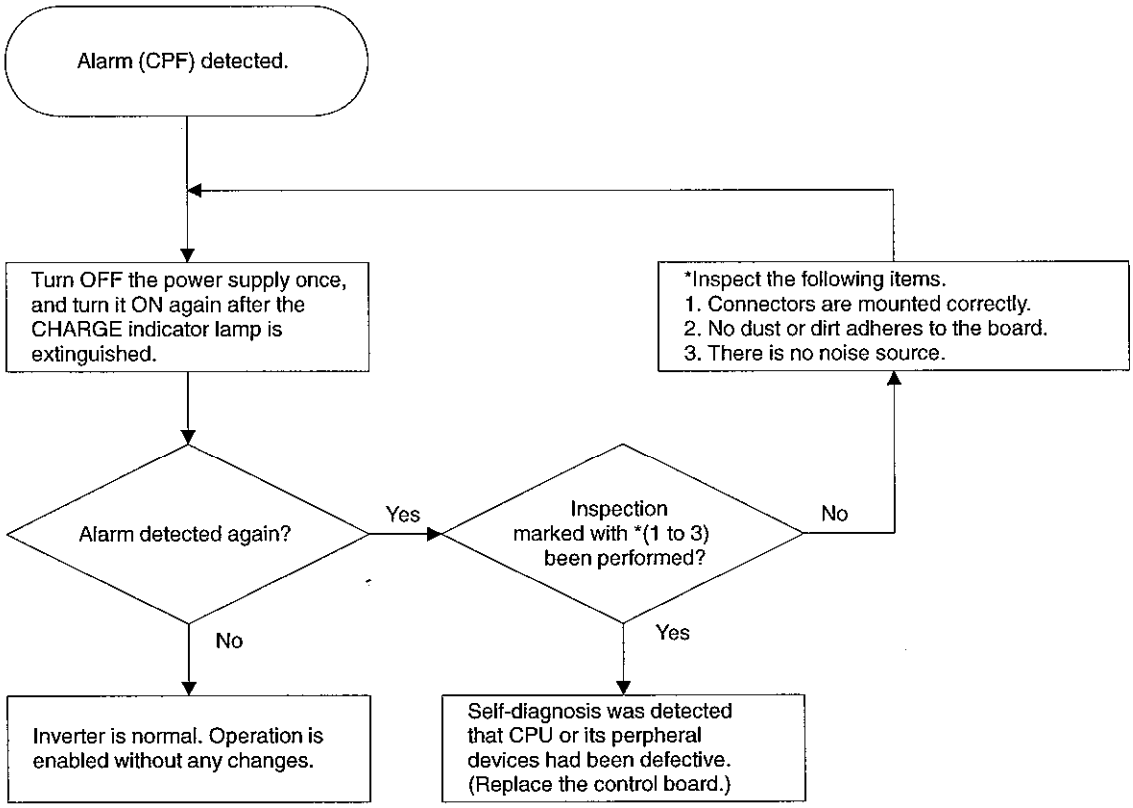

| | 3-axis | 5-axis | 8-axis |
|---|---|---|---|
| Control Board | 1PCB | 1PCB | 1PCB or 2PCB |
| Power Block | PAMP1 to 3 | PAMP1 to 5 | PAMP1 to 8 |

External fault




| | 3-axis | 5-axis | 8-axis |
|---|---|---|---|
| Control Board | 1PCB | 1PCB | 1PCB or 2PCB |
| Power Block | PAMP1 to 3 | PAMP1 to 5 | PAMP1 to 8 |

CPFXX


Alarm (CPF) detected.
Turn OFF the power supply once, and turn it ON again after the CHARGE indicator lamp is extinguished.
*Inspect the following items.
1. Connectors are mounted correctly.
2. No dust or dirt adheres to the board.
3. There is no noise source.
Alarm detected again?
Yes
Inspection marked with *(1 to 3) been performed?
No
No
Yes
Inverter is normal. Operation is enabled without any changes.
Self-diagnosis was detected that CPU or its perpheral devices had been defective. (Replace the control board.)

# VARISPEED-616P1Y
# INSTRUCTION MANUAL


**TOKYO OFFICE**
New Pier Takeshiba South Tower, 1-16-1, Kaigan, Minatoku, Tokyo 105-6891 Japan
Phone 81-3-5402-4511 Fax 81-3-5402-4580

**YASKAWA ELECTRIC AMERICA, INC.**
2121 Norman Drive South, Waukegan, IL 60085, U.S.A.
Phone 1-847-887-7000 Fax 1-847-887-7370

**MOTOMAN INC. HEADQUARTERS**
805 Liberty Lane West Carrollton, OH 45449, U.S.A.
Phone 1-937-847-6200 Fax 1-937-847-6277

**YASKAWA ELÉTRICO DO BRASIL COMÉRCIO LTDA.**
Avenida Fagundes Filho, 620 Bairro Saude-Sao Päulo-SP, Brazil CEP: 04304-000
Phone 55-11-5071-2552 Fax 55-11-5581-8795

**YASKAWA ELECTRIC EUROPE GmbH**
Am Kronberger Hang 2, 65824 Schwalbach, Germany
Phone 49-6196-569-300 Fax 49-6196-888-301

**Motoman Robotics Europe AB**
Box 504 S38525 Torsås, Sweden
Phone 46-486-48800 Fax 46-486-41410

**Motoman Robotec GmbH**
Kammerfeldstraße 1, 85391 Allershausen, Germany
Phone 49-8166-900 Fax 49-8166-9039

**YASKAWA ELECTRIC UK LTD.**
1 Hunt Hill Orchardton Woods Cumbernauld, G68 9LF, United Kingdom
Phone 44-1236-735000 Fax 44-1236-458182

**YASKAWA ELECTRIC KOREA CORPORATION**
Kfpa Bldg #1201, 35-4 Youido-dong, Yeongdungpo-Ku, Seoul 150-010, Korea
Phone 82-2-784-7844 Fax 82-2-784-8495

**YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.**
151 Lorong Chuan, #04-01, New Tech Park Singapore 556741, Singapore
Phone 65-282-3003 Fax 65-289-3003

**YASKAWA ELECTRIC (SHANGHAI) CO., LTD.**
4F No.18 Aona Road, Waigaoqiao Free Trade Zone, Pudong New Area, Shanghai 200131, China
Phone 86-21-5866-3470 Fax 86-21-5866-3869

**YATEC ENGINEERING CORPORATION**
Shen Hsiang Tang Sung Chiang Building 10F 146 Sung Chiang Road, Taipei, Taiwan
Phone 886-2-2563-0010 Fax 886-2-2567-4677

**YASKAWA ELECTRIC (HK) COMPANY LIMITED**
Rm. 2909-10, Hong Kong Plaza, 186-191 Connaught Road West, Hong Kong
Phone 852-2803-2385 Fax 852-2547-5773

**BEIJING OFFICE**
Room No. 301 Office Building of Beijing International Club, 21
Jianguomenwai Avenue, Beijing 100020, China
Phone 86-10-6532-1850 Fax 86-10-6532-1851

**TAIPEI OFFICE**
Shen Hsiang Tang Sung Chiang Building 10F 146 Sung Chiang Road, Taipei, Taiwan
Phone 886-2-2563-0010 Fax 886-2-2567-4677

**SHANGHAI YASKAWA-TONGJI M & E CO., LTD.**
27 Hui He Road Shanghai China 200437
Phone 86-21-6531-4242 Fax 86-21-6553-6060

**BEIJING YASKAWA BEIKE AUTOMATION ENGINEERING CO., LTD.**
30 Xue Yuan Road, Haidian, Beijing P.R. China Post Code: 100083
Phone 86-10-6233-2782 Fax 86-10-6232-1536

**SHOUGANG MOTOMAN ROBOT CO., LTD.**
7, Yongchang-North Street, Beijing Economic Technological Investment & Development Area,
Beijing 100076, P.R. China
Phone 86-10-6788-0551 Fax 86-10-6788-2878


YASKAWA ELECTRIC CORPORATION

YASKAWA


MANUAL NO. TOEZ-S616-13B