

MTL



MICRO ENCODER

Microtech Laboratory Inc. manufactures and supplies various high-quality Rotary Encoders.

MICRO ENCODER

Product Catalog



MTL MICROTECH LABORATORY INC.

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MICROTECH LABORATORY INC.

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MTL MICRO ENCODER



MTL is a specialist manufacturer of rotary encoders.

Our business includes the planning, design, manufacture, and sale of rotary encoders.

We are able to respond to all of the needs of our customers including development of new products and modifications to existing products.

We have a wide range of space-saving products such as extremely small, high resolution, and large caliber hollow shaft encoders.

The characteristics are suitable for use in industrial equipment, measurement equipment, humanoid robots, medical equipment, semiconductor fabrication equipment, and digital broadcasting video equipment.

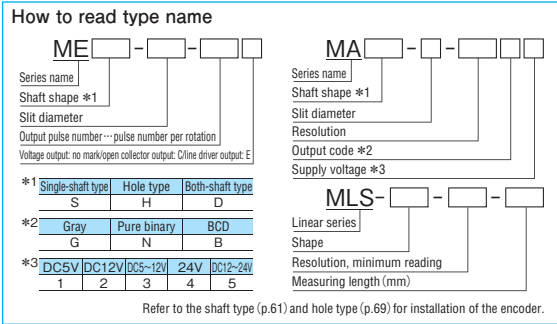
This catalog gives an introduction to our vast lineup of rotary encoders for solving a variety of your needs.



MICRO ENCODER

-Description-

MTL rotary encoders are all based on space-saving design and available in many types from ultra-small types to high-resolution products.



▼Description

Series name	Appearance	Type name	Outside dimensions	Resolution	Features	Page
Incremental ME series		MES-3P MES-3PST	φ5×9.6 □6×8.6	64P/R,100P/R 1024P/R	●The smallest model of ultra-small series. ●A, B, and Z phase output. ●Open collector output.	7 8
		MES-6-□PC MES-6-□PST□C	φ7.5×10.5 φ7.5×10.5	100 500	●A, B, and Z phase output. ●Open collector output.	9 10
		ME□-9-□P□	φ13×20	32 1,024 (16,000)	●Compactness, light weight. ●A, B, and Z phase output. ●Hollow-shaft type convenient for small motors. Option ●With built-in PST ×2, ×4, ×8, ×16 multiplication circuit	11 12
		ME□-12-□P□	φ20×20(S)	60 2,048 (32,000)	●Compactness, light weight. ●A, B, and Z phase output. ●Availability of hollow-shaft type convenient for small motors. Option ●With built-in PST ×2, ×4, ×8, ×16 multiplication circuit	13 14
	NEW	MEH-14-2250 PSTN□E	φ21×16.5	2,250 (72,000)	●Compact high-resolution incremental encoder ●Hollow shaft with 2.6 mm inner diameter. ●PSTN ×2, ×4, ×5, ×8, ×10, ×16, ×20, ×32	15 16
		ME□-17-□P	φ20×15	100 500	●Compactness, light weight. ●A, B, and Z phase output. ●Availability of 3 types of shaft shape, single-shaft types φ2 and φ4 and hollow-shaft type.	17 18
	NEW	MEH-19-3375 PSTN□E	φ30×16.5	3,375 (108,000)	●Compact high-resolution incremental encoder ●Hollow shaft with 5 mm inner diameter. ●PSTN ×2, ×4, ×5, ×8, ×10, ×16, ×20, ×32	19 20
		ME□-20-□P□	φ32×22	40 7,200 (144,000)	●Thin and compact popular type. ●Availability of shaft shape to meet various fitting systems. Option ●With built-in PST ×2, ×4, ×5, ×8, ×10, ×16 ×20 multiplication circuit	21 22
	NEW	MEH-28-6750 PSTN□E	φ40×16.5	6,750 (216,000)	●Compact high-resolution incremental encoder ●Hollow shaft with 8 mm inner diameter. ●PSTN ×2, ×4, ×5, ×8, ×10, ×16, ×20, ×32	23 24
		ME□-30-□P□	φ44×22	40 10,800 (216,000)	●Thin and compact popular type. ●Availability of shaft shape to meet various fitting systems. Option ●With built-in PST ×2, ×4, ×5, ×8, ×10, ×16 ×20 multiplication circuit	25 26
		MEH-30T-□PST□E	φ44×18	20,000 200,000	●Thickness: 18mm ●Diameter hollow shaft: φ10mm ●Output pulse: 200,000P/R ●Maximum response frequency: 1 MHz	27 28
		MES-40-□P□	φ56×36.8	100 15,000 (300,000)	●Robust, general-purpose type. ●Hostile-environment and drip-proof specifications are also available. ●Load-resistance. Option ●With built-in PST ×2, ×4, ×5, ×8, ×10, ×16 ×20 multiplication circuit	29 30
		MES-45-□-□□ (Old model: RK1·RKW1)	φ55×50	360 9,000	●Strong type ●Environment resistance	31 32
		ME□-50-□P□	φ65×30	500 10,800 (216,000)	●Thin and compact popular type. ●Availability of shaft shape to meet various fitting methods. Option ●With built-in PST ×2, ×4, ×5, ×8, ×10, ×16 ×20 multiplication circuit	33 34
		MEH-60-□P□	φ74×30	100 21,600 (432,000)	●High resolution. ●Easy-to-fit thin type. ●Large hollow shaft of 30 in inside diameter. Option ●With built-in PST ×2, ×4, ×5, ×8, ×10, ×16 ×20 multiplication circuit	35 36
		MEH-85-□P□	φ100×26	150 21,600 (432,000)	●High resolution. ●Easy-to-fit thin type. ●Large hollow shaft of 36 in inside diameter. Option ●With built-in PST ×2, ×4, ×5, ×8, ×10, ×16 ×20 multiplication circuit	37 38
		MEH-130-□P□	φ150×50	360 36,000 (720,000)	●High resolution. ●Large hollow shafts of 60 and 75 in inside diameter. Option ●With built-in PST ×2, ×4, ×5, ×8, ×10, ×16 ×20 multiplication circuit	39 40
		MEH-180-□P□	φ200×71	36,000 72,000 (1,440,000)	●High resolution. ●Large hollow shaft of 90 in inside diameter. Option ●With built-in PST ×2, ×4, ×5, ×8, ×10, ×16 ×20 multiplication circuit	41 42
Incremental MGH series		MGH-20-□-E MGH-30-□-E	φ32×22.5 φ44×21	40~1,200 40~2,000	●Light weight, compactness. ●Modular type best suited for small motors. ●With CS signal	43 44
		MG-20-□□ MG-30-□□	Diameter rotating slit φ22 Diameter rotating slit φ31.6	100~1,200 100~2,000	●Kit where the rotating slit and sensor unit are separate pieces. ●Compact and lightweight. Best suited for space-saving designs. ●A, B, and Z phase output.	45 46

Series name	Type name	Page
Fitting Method	Hole Type Encoder	6
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Setting Option/ Coupling	Hole Type	List of dimensions and accessories 67
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	Warranty	70

■For the details of products, see the page of each product.
■You are requested to consult sales personnel of our company because the specifications, etc. may be changed for improvement without prior notice.

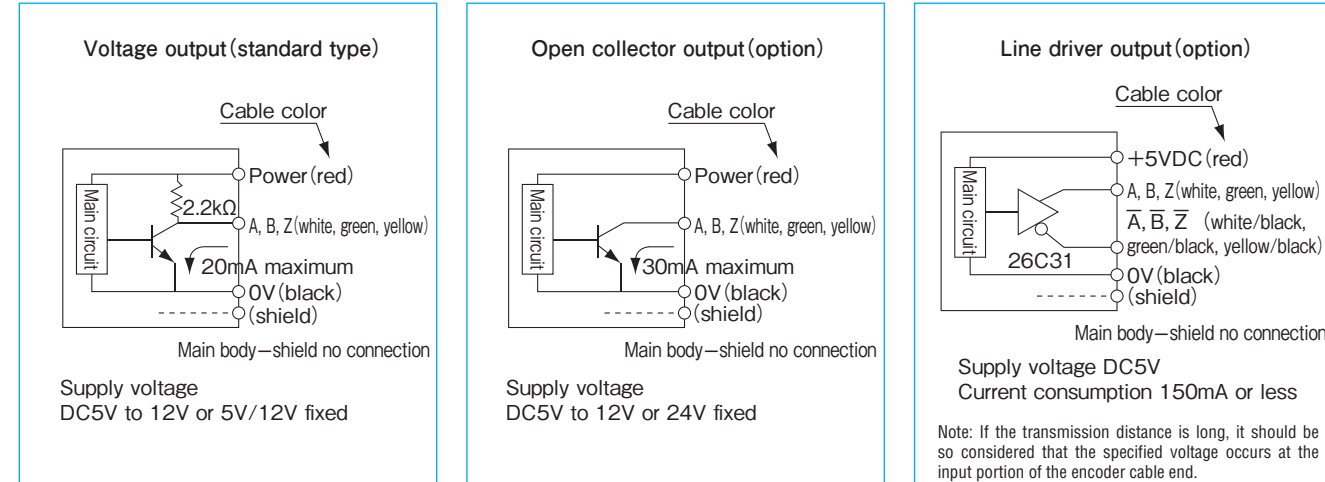
Series name	Appearance	Type name	Outside dimensions	Resolution	Features	Page
Absolute MMS series		MMS-10-□□G1	φ13×17.2	256 1,024	●Outer diameter: φ13mm ●Height: 15.5mm ●Resolution: 1024 divisions ●SSI interface	47
Absolute MA series		MAS-10-256G	φ13×15.5	256	●Ultra compact 8-bit absolute type ●Gray code output without reading error	48
	NEW	MAS-14-□□N1	φ21×16.5	32,768 (16bit) 65,536 (16bit) 131,072 (17bit) 262,144 (18bit)	●18bit small high-resolution absolute encoder ●SSI interface	49
		MA□-17-□□1	φ20×21	256 1,024	●Small absolute type. ●Availability of single-shaft (4 in diameter) and hollow shaft (2 in inside diameter). ●The output codes are gray code, pure binary code, and BCD code.	50
	NEW	MAS-18-□□N1	φ25×15	32,768 (15bit) 65,536 (16bit) 131,072 (17bit) 262,144 (18bit)	●17bit small high-resolution absolute encoder ●SSI interface	51
	NEW	MAH-19-□□N1	φ30×16.5	65,536 (16bit) 131,072 (17bit) 262,144 (18bit) 524,288 (19bit)	●19bit small high-resolution absolute encoder ●Hollow shaft type (5 in inside diameter) ●SSI interface	52
		MA□-20-□-□□1	φ32×24	256 4,096	●Thin and compact 12-bit absolute encoder ●Availability of shaft shape to meet various fitting systems. ●The output codes are gray code, pure binary code, and BCD code.	53
	NEW	MAH-28-□□N1	φ40×16.5	262,144 (18bit) 524,288 (19bit) 1,048,576 (20bit)	●20bit small high-resolution absolute encoder ●Hollow shaft type (8 in inside diameter) ●SSI interface	54
		MA□-36-□□□	φ46×30	256 16,384	●Compact absolute encoder. ●Robust, hostile-environment type. ●Availability of shaft shape to meet various fitting systems.	55
		MA□-42-□□□	φ52×30	256 4,096	●12-bit absolute encoder ●The output codes are gray code, pure binary code, and BCD code.	56
		MA□-42-□□□	φ52×30	256 4,096	●12-bit absolute encoder ●The output codes are gray code, pure binary code, and BCD code.	56
Multiple-rotation absolute encoder MXS series		MXS-36-□-□□C6□□ MXS-42-□-□□□□□-□	φ46×55 φ65×63.5	128~1,024 128~4,096	●Multiple-rotation absolute encoder	57 58
Wire-type linear encoder MLS series		MLS-12-□-□			●Smallest in the series: Outside dimensions 23 x 24 x 25 (H) ●Stroke: 250 mm ●Resolution: Selection from among 0.1mm, 0.04mm ●Lightweight: 60 g	59
		MLS-30-□-□			●Wire draw-out-type linear encoder. Detection of linear position to correspond to the draw-out amount of the wire. ●Minimum reading 0.02mm, 0.2mm *0.005mm, 0.05mm is possible with 4-multiplying circuits. ●Measuring range: 500mm, 1000mm. ●Also available is a set type with indicator.	60
		MLS-50-□-□			●Wire draw-out type linear encoder. Detection of linear position corresponding to the draw-out amount of the wire. ●Minimum reading 0.4mm *0.1mm is possible with 4-multiplying circuits. ●Measuring range: 2000mm, 4000mm. ●Also available is a set type with indicator.	61
Wire draw-out-type linear encoder MLA series		MLA-17-□□1-60			●Wire draw-out-type linear absolute encoder. ●Smallest in the series: Outside dimensions 23 x 24 x 27.4 (H) ●Output 1,024 (G, N) or 1,000 (B) ●Main Applications: Robot Machine, small actuator, manipulator and etc.	62
		MLA-30-□□□-90			●Wire draw-out-type linear absolute encoder. ●Minimum reading 0.08mm, 0.09mm ●Output 1,024 (G, N) or 1,000 (B)	63
		MLA-42-□-□			●Wire pulling linear absolute encoder Detection of absolute position does not need backup. ●Resolution/measuring range: 0.1/400 mm, 0.25/1000 mm, 0.5/2000 mm, 1/4000 mm	64
Roller encoder REH series		REH-30-□R□			●Roller type linear encoder. ●Easy measuring. ●Minimum reading 0.1 to 1mm.	65
Measuring angle/ measuring length DC series		DC-□□□□□□			●Small and robust counter. ●Decimal point moving, dividing/multiplying possible.	66

ME series

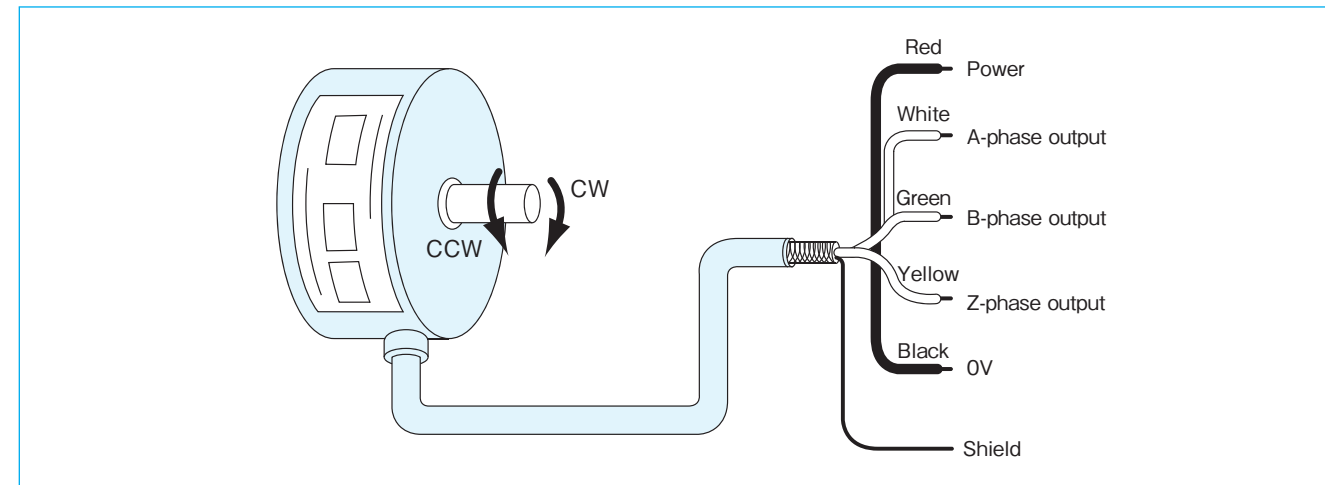
[Square Wave/Incremental]

- Widely available from low pulse to high resolution pulse. A desired division pulse number is easily available because of internal manufacturing.
- Outside diameters are available in series from ultra-small type to large type and selection should be made in accordance with the fitting shaft and division pulse number.
- All products are of thin type, and especially the hole type is an encoder best suited for fitting.
- Investigation is possible under optimum conditions such as noise resistance and reduction in current consumption depending on the purpose of use.

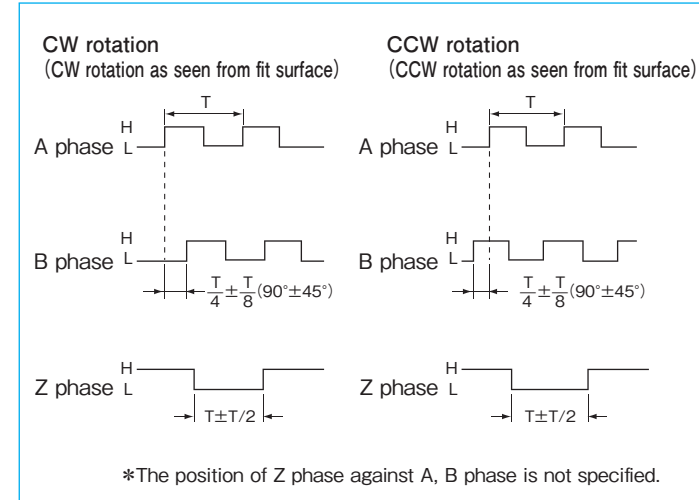
Output circuit diagram



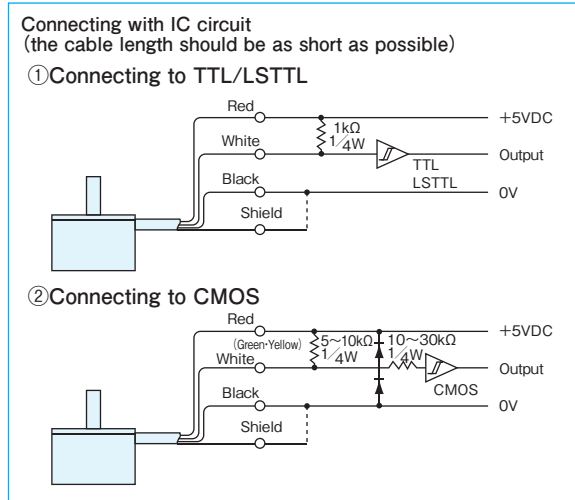
A capacitor (0.1μF) is connected between 0V and FG (frame ground).



Output waveform



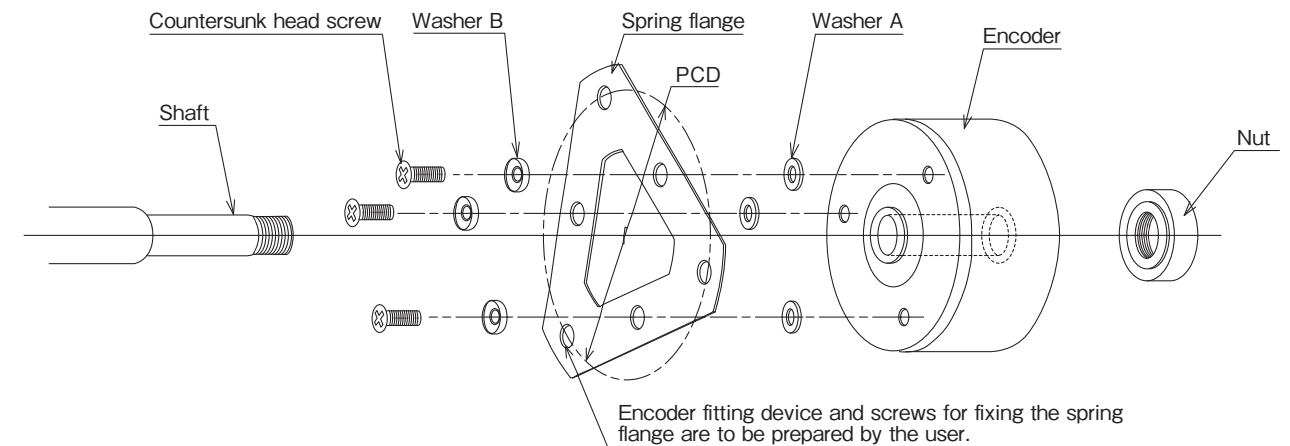
Connecting example



Fitting Method for Hole Type Encoder (MEH/MAH)

Spring flange MEH-20, 30, 50, 60, 85, 130 (material: SUS304-CSPH)

Hole type encoder (MEH) fitting image

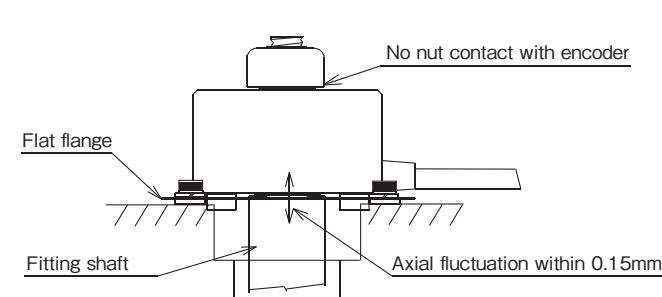


For the spring flange, see Setting Option (P67).

Precautions in assembling the hole-type encoder

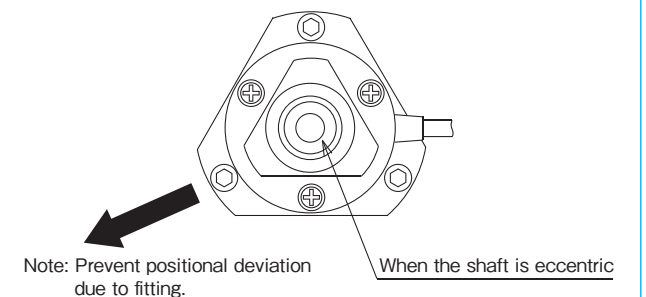
Effect on encoder of thrust load

Absorption of axial fluctuation of flat flange is within 0.15mm



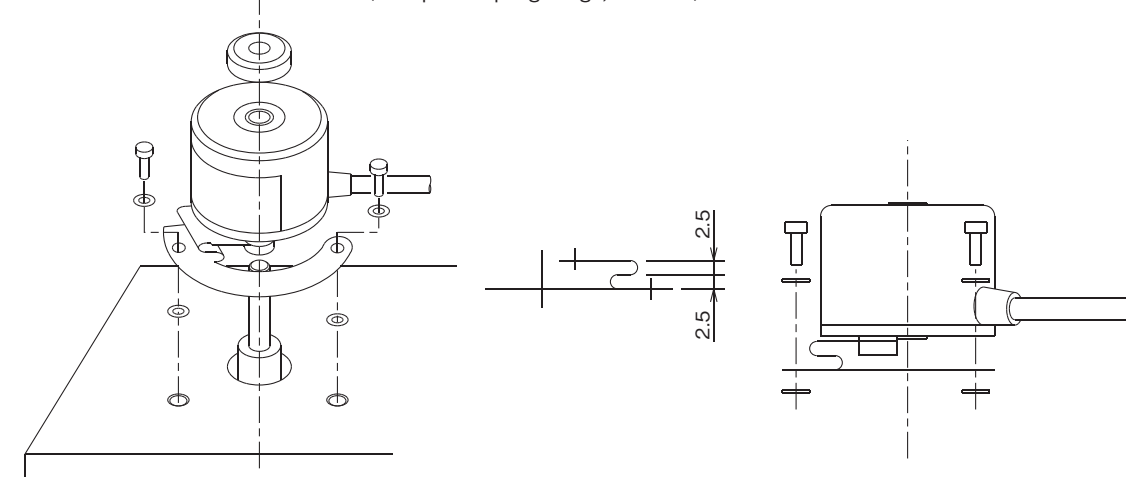
Effect on encoder of radial load

Basically it is difficult to absorb the radial load because of the flat plate.
Radial eccentricity should be less than 20 micron.



When radial fluctuation is large, consider the method shown below.

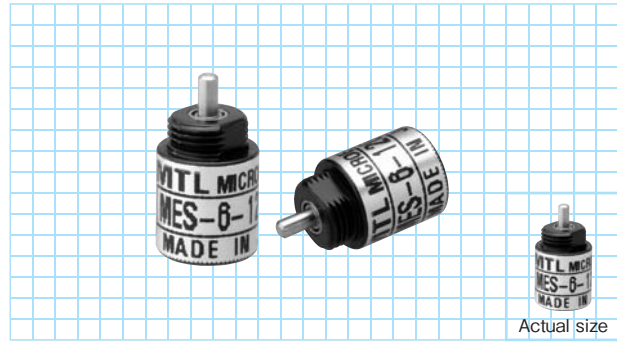
(For special spring flange, see P68)



8

MES-6-P series

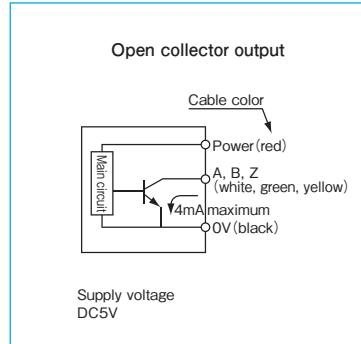
[Square Wave/Incremental]



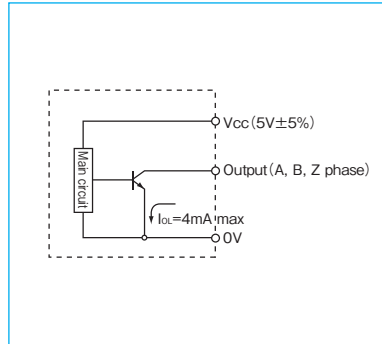
Specifications

Type name		MES-6-□PC
Item		Pulse number
Supply voltage		DC5V ±10%
Current consumption		30mA or less (under no load)
Detection system		Incremental
Output	Output pulse number (Standard)	100 300
	[Pulse number/rotation]	120 360
		200 500
	Output phase	A, B, Z phase
Output	Output form	Square wave, open collector output
	Output capacity	Sink current: 4mA (output voltage resistance 7V) Residual voltage: 0.4V or less
	Maximum response frequency (response pulse number)	100kHz
	Output phase difference	A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)
Waveform	rise/fall time	2μs or less (output cable 300mm or less)
	Allowable load of shaft (electrical)	Radial 1.9N (200gf) Thrust 0.98N (100gf)
Maximum allowable revolutions (mechanical)		6,000r/min
	Working ambient temperature/humidity	0°C~60°C RH35%~90% no dewing
Storing ambient temperature		-20°C~80°C
	Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
	Cable	Vinyl wire (AWG32) Cable length 300mm
Mass		5g

Output circuit diagram (ME-6P)

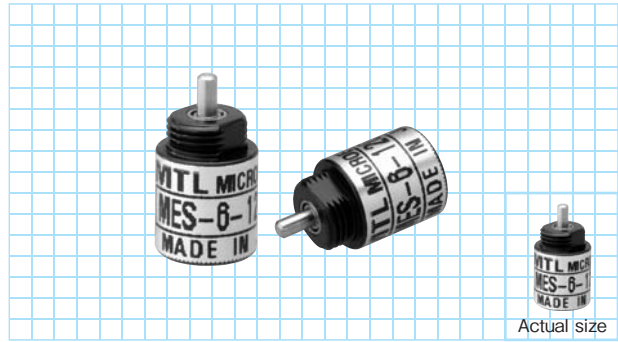


Output circuit diagram (ME-6PST)



MES-6-I25PSTI6C

[Square Wave/Incremental]

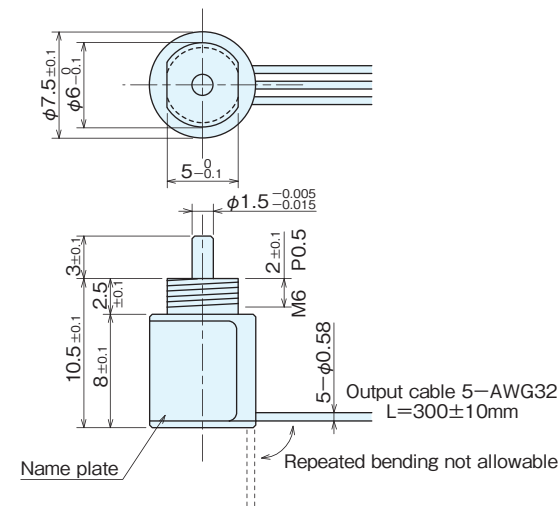


Specifications

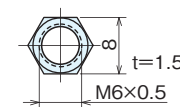
Type name		MES-6-□PST□C
Item		Pulse number Multiplication
Supply voltage		DC5V ±5%
Current consumption		30mA or less
Detection system		Incremental
Output	Output pulse number (Standard)	2,000P/R (125×16), 2048P/R (128×16)
	[Pulse number/rotation]	1,000P/R (125×8), 1,024P/R (128×8)
		500P/R (125×4), 512P/R (128×4)
	Output phase	A, B, Z phase
Output	Output form	Square wave, open collector output
	Output capacity	Output current: 4mA max output voltage resistance : 5.25V or less (power supply voltage or less)
	Maximum response frequency (response pulse number)	100kHz
	Allowable load of shaft (electrical)	Radial 1.9N (200gf) Thrust 0.98N (100gf)
Maximum allowable revolutions (mechanical)		6,000r/min
	Working ambient temperature/humidity	0°C~60°C RH35%~90% no dewing
Storing ambient temperature		-20°C~80°C
	Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
	Cable	Vinyl wire (AWG32) Cable length 300mm
Mass		5g

Outside dimensions

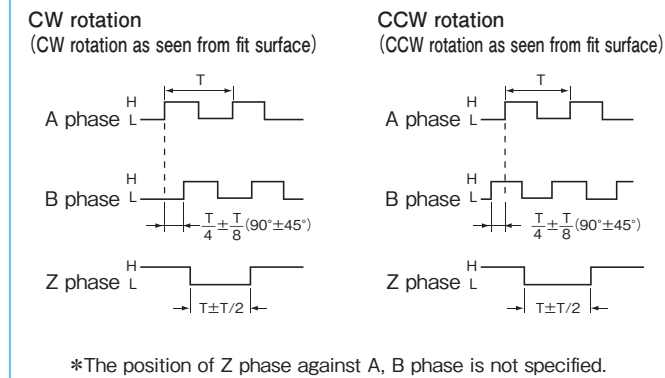
MES-6P. PST



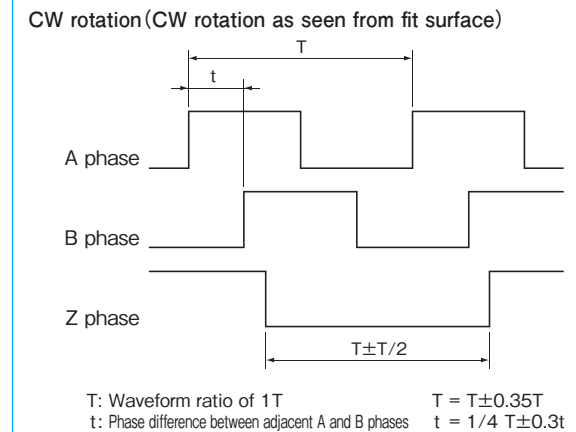
Accessory (lock nut)



Output waveform (ME-6P)

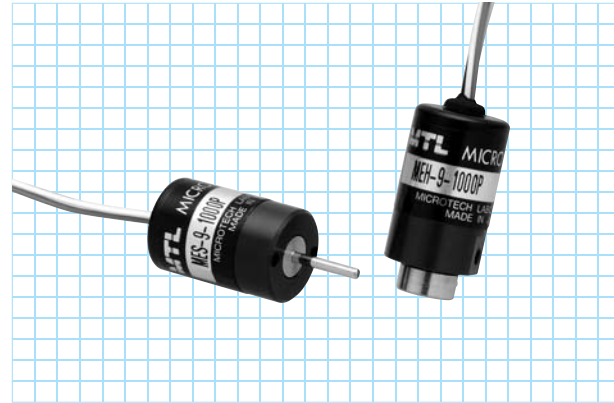


Output waveform (ME-6PST)



ME-9-P series

[Square Wave/Incremental]



Specifications

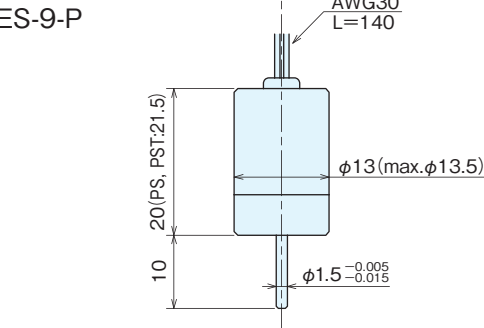
Type name		ME -9- P 	
Item		Shaft shape ●S=single shaft ●H=hollow shaft	
		Pulse number	Output circuit ●Noentry=Voltage output ●C=open collector output ●E=line driver output
		●ST (2·4·8·16)	
		Square wave	
		Built-in multiplication circuit(x2·x4·x8·x16)	
Supply voltage		DC5V ±10%	
Current consumption		40mA or less(under no load)	
Detection system		Incremental	
Output	Output pulse number (Standard) [Pulse number/rotation]	32 100 200 256	300 360 500 900(*) 1,000(*) 1,024
	Output phase	A, B, Z phase (Z="H")	
	Output form	Square wave	
	Output capacity	Sink current:20mA Residual voltage:0.5V or less(at 10mA) Open collector output:Load voltage DC13.2V max	
	Maximum response frequency (response pulse number)	100kHz	
	Output phase difference	A, B phase difference 90°±45°(T/4±T/8) Z phase T±T/2(see Output Waveform)	
	Waveform rise/fall time	2μs or less(output cable 140mm or less)	
	Allowable load of shaft(electrical)	Radial	1.9N(200gf)
	Thrust	1.9N(200gf)	0.98N(100gf)
Maximum allowable revolutions (mechanical)		6,000r/min	
Working ambient temperature/ humidity		0℃~60℃ RH35%~90% no dewing	
Storing ambient temperature		-20℃~80℃	
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable		Voltage-Open collector:Vinyl wire(AWG30) Cable length 140mm Line driver-Vinyl wire(AWG32) Cable length 330	
Mass		10g	

*Handled by built-in multiplier circuit

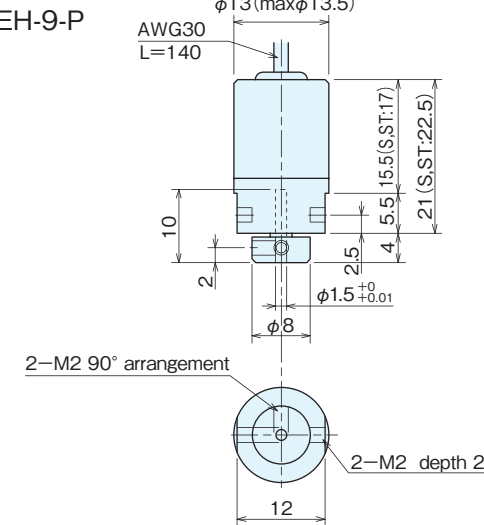
Note: Types with a built-in internal multiplier circuit do not support voltage output

Outside dimensions

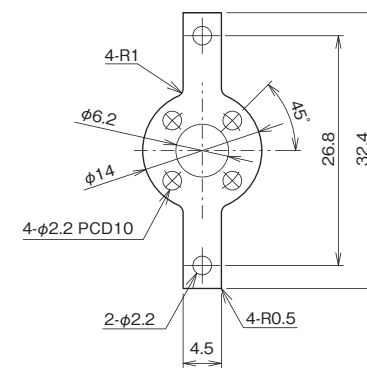
MES-9-P



MEH-9-P

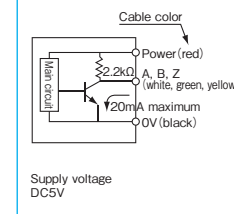


Spring flange MEH-9 (Included)

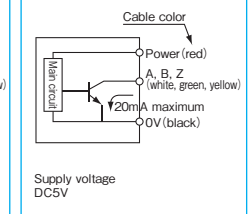


Output circuit diagram (Square wave)

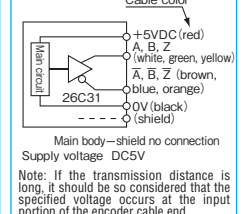
Voltage output (standard type)



Open collector output (option)

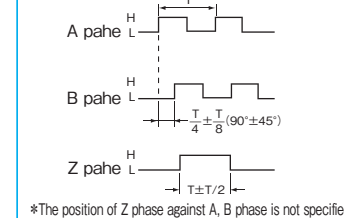


Line driver output (option)



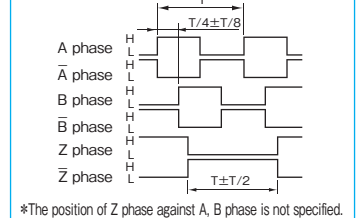
Output waveform (Square wave) Voltage/Open collector

CW rotation (CW rotation as seen from fit surface)

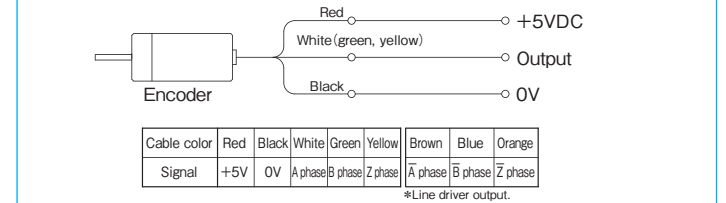


Output waveform (Square wave) Line driver

CW rotation (CW rotation as seen from fit surface)

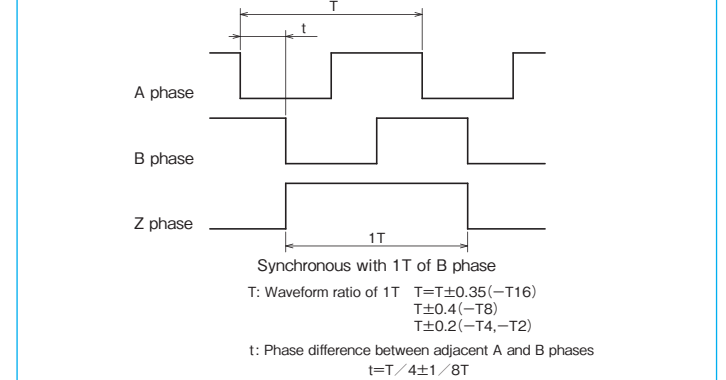


Output connection diagram / Built-in multiplication circuit (x2·x4·x8·x16)



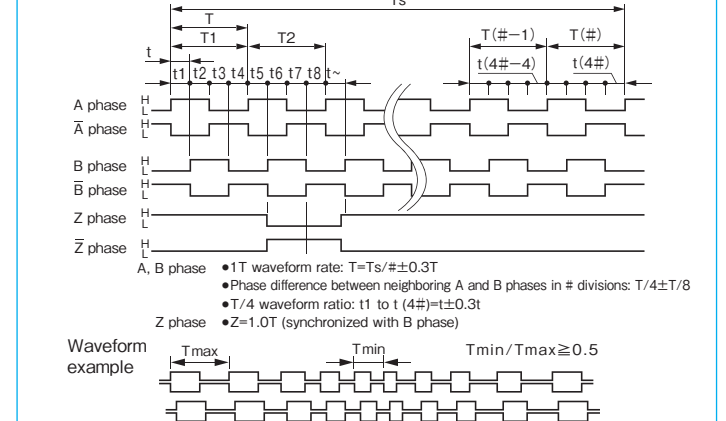
Output waveform Open collector output / Built-in multiplication circuit (x2·x4·x8·x16)

CW rotation (CW rotation as seen from fit surface)



Output waveform Line driver output / Built-in multiplication circuit (x2·x4·x8·x16)

CW rotation (CW rotation as seen from fit surface)



ME-I2-P series

[Square Wave/Incremental]

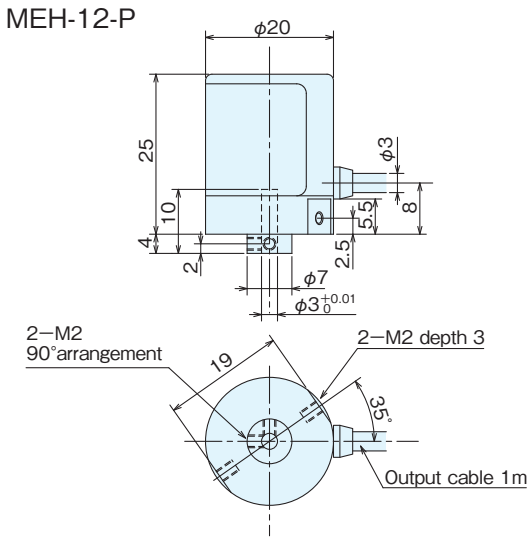
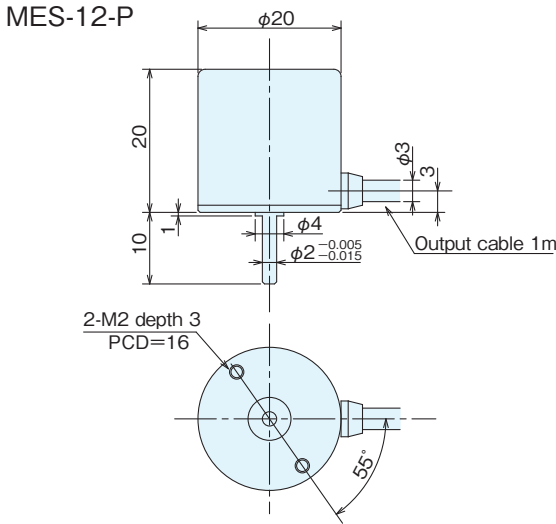


Specifications

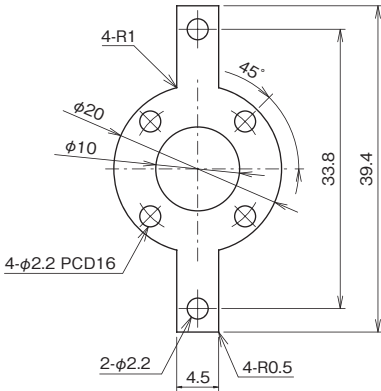
Type name		ME□-12-□P□			
Item		Shaft shape ●S=single shaft ●H=hollow shaft Pulse number Output circuit ●Noentry=Voltage output ●C=open collector output ●E=line driver output ●ST□(2·4·8·16)			
		Square wave		Built-in multiplication circuit (×2·×4·×8·×16)	
Supply voltage		DC5V ±10%		DC5V ±5%	
Current consumption		40mA or less (under no load)		60mA or less (under no load)	
Detection system		Incremental		Incremental	
Output	Output pulse number	60	300	1,000(*)	1,500(*)
	(Standard)	100	360	1,024(*)	1,800(*)
	[Pulse number/rotation]	125(*)	500		2,000(*)
		200	600		2,048(*)
		256(*)	900		
Output phase		A, B, Z phase		A, B, Z phase	
Output form		Square wave		Square wave	
Output capacity		Sink current:20mA Residual voltage:0.5V or less (at 10mA) Open collector output:Load voltage DC13.2V max		Sink current:20mA max. Residual voltage:0.5V or less (at 10mA) Open collector output:Load voltage DC13.2V max	
Maximum response frequency (response pulse number)		100kHz		Line driver output:50kHz× (by multiplication) Voltage output·Open collector output:100kHz	
Output phase difference		A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)		Refer to the figure on the right	
Waveform rise/fall time		2μs or less (output cable 1m or less)		2μs or less (output cable 1m or less)	
Allowable load of shaft (electrical)	Radial	1.9N (200gf)	0.98N (100gf)	0.98N (100gf)	
	Thrust	1.9N (200gf)	0.98N (100gf)	0.98N (100gf)	
Maximum allowable revolutions (mechanical)		6,000r/min		6,000r/min	
Working ambient temperature/humidity		-10°C~70°C RH35%~90% no dewing		-10°C~70°C RH35%~90% no dewing	
Storing ambient temperature		-20°C~80°C		-20°C~80°C	
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable		Outside diameter φ3 5-core vinyl wire Insulated shield cable (length 1m)		Outside diameter φ3 5-core vinyl wire Insulated shield cable (length 1m)	
Mass		40g		40g	

*Handled by built-in multiplier circuit

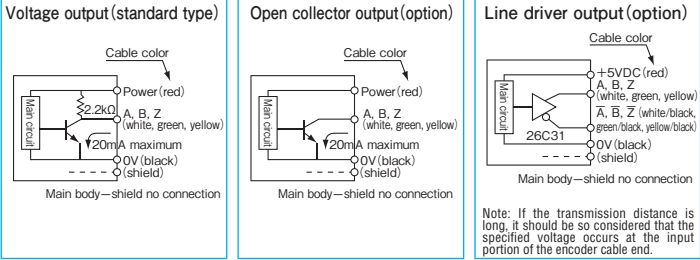
Outside dimensions



Spring flange MEH-12(Included)

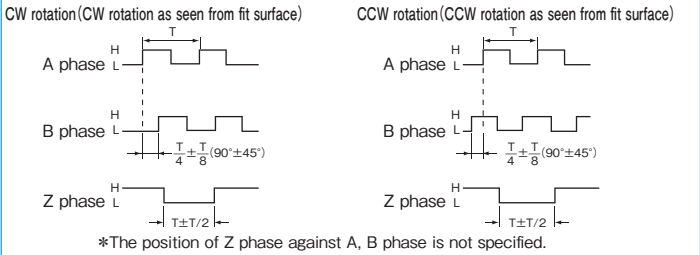


Output circuit diagram

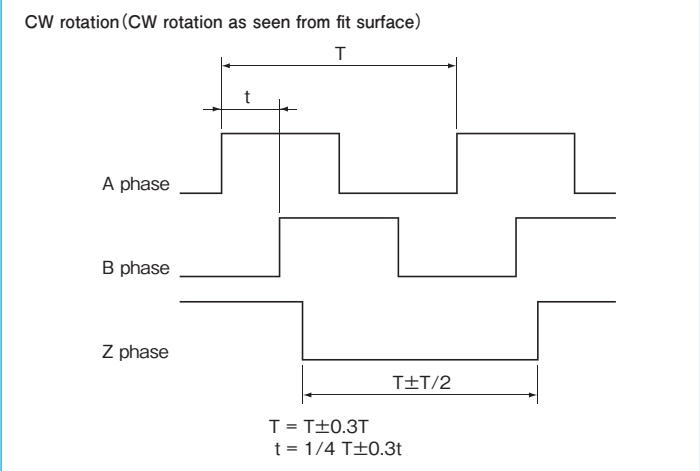


A capacitor (0.1μF) is connected between 0V and FG (frame ground).
Note: This capacitor is not connected to the voltage or open collector output of the built-in multiplier circuit.

Output waveform (Square wave)



Output waveform / Built-in multiplication circuit (×2·×4·×8·×16)



MEH-14 series

[Square Wave/Incremental]

- Outside dimensions $\phi 21 \times 16.5\text{mm}$
- Through Shaft

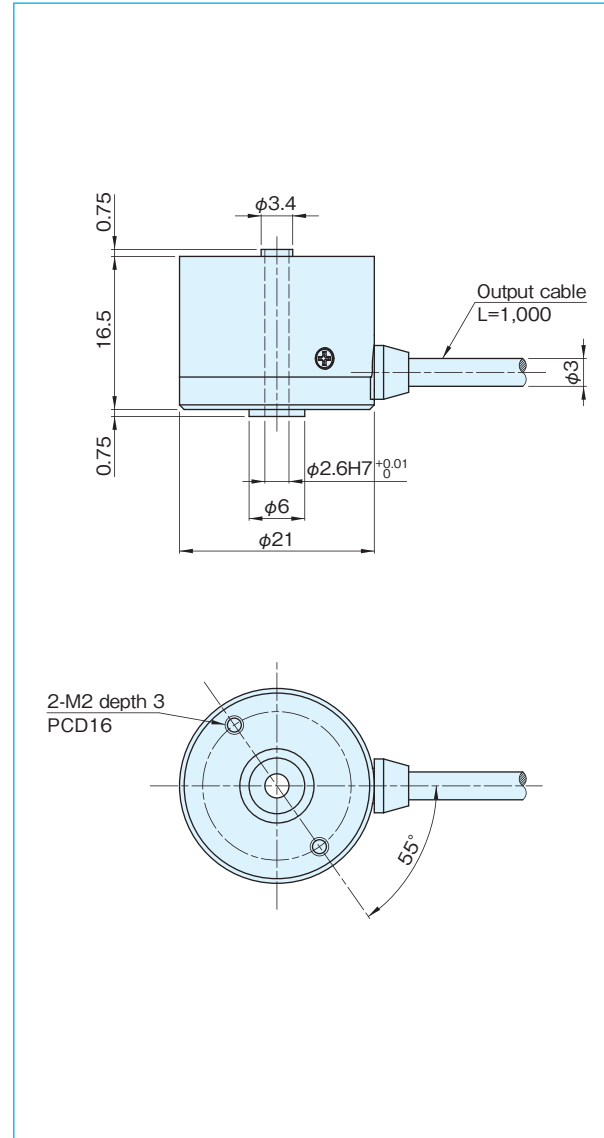


NEW

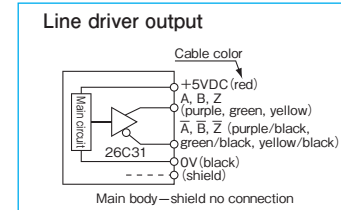
Specifications

Type name	MEH-14-2250 PSTN ☐ E
Item	
Detection system	Incremental
Output phase	A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$ phase CS phase (U, $\bar{U}$, V, $\bar{V}$, W, $\bar{W}$)
Output form	Square, Line driver output
Output pulse number (P/R)	2250, 4500 (2250 $\times$ 2), 9000 (2250 $\times$ 4) 11250 (2250 $\times$ 5), 18000 (2250 $\times$ 8), 22500 (2250 $\times$ 10) 36000 (2250 $\times$ 16), 45000 (2250 $\times$ 20), 72000 (2250 $\times$ 32)
Output	Phase difference between neighboring A/B phases: $T/4 \pm T/8$ Waveform ratio of 1T: $T \pm 0.3t$ Z phase width: $T \pm T/2$ (Synchronized with 1T of B phase)
Supply voltage	DC5V $\pm$ 5%
Current consumption	150mA or less
Maximum response frequency	50kHz $\times$ division ratio (2, 4, 5, 8, 10, 16, 20, 32)
Output capacity	Output current (I_o): $\pm 20\text{mA}_{\text{max}}$. Output voltage Vol: 0.5V $_{\text{max}}$. VoH: 2.5V $_{\text{min}}$.
Maximum allowable revolutions	6000r/min
Working ambient temperature/humidity	$-10^\circ\text{C} \sim +70^\circ\text{C}$ /RH35% $\sim$ 90% no dewing
Storing ambient temperature	$-20^\circ\text{C} \sim +80^\circ\text{C}$
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 50G 3 times each in X, Y, and Z directions
Cable	Outside diameter $\phi 3.0$ 14-cores shield cable (without CS phase: 8-cores)
Mass	35g (excluding cable)

Outside dimensions



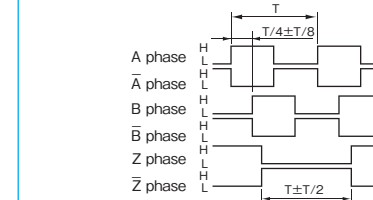
Output circuit diagram



Note: If the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end.

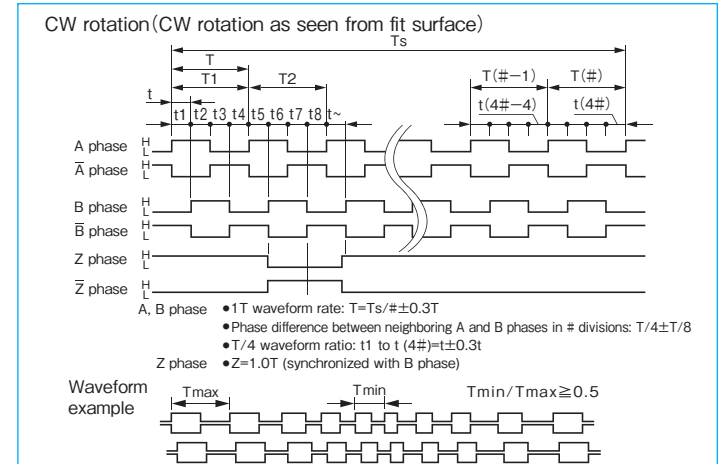
Output waveform [×1]

CW rotation (CW rotation as seen from fit surface)

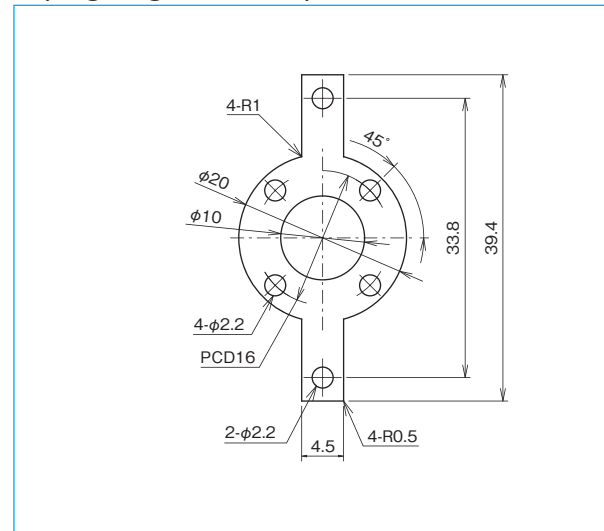


*The position of Z phase against A, B phase is not specified.

Output waveform / Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20·×32)

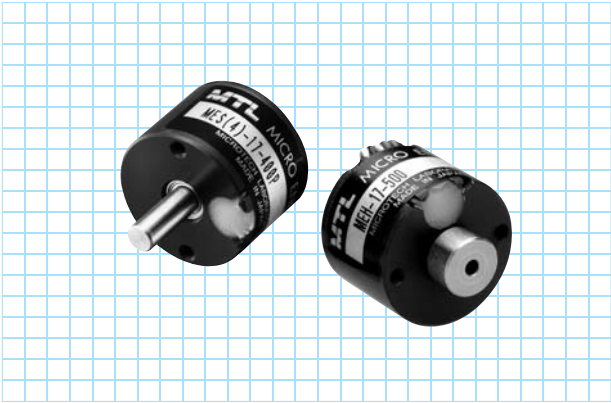


Spring flange MEH-14 (Option)



ME-17-P series

[Square Wave/Incremental]

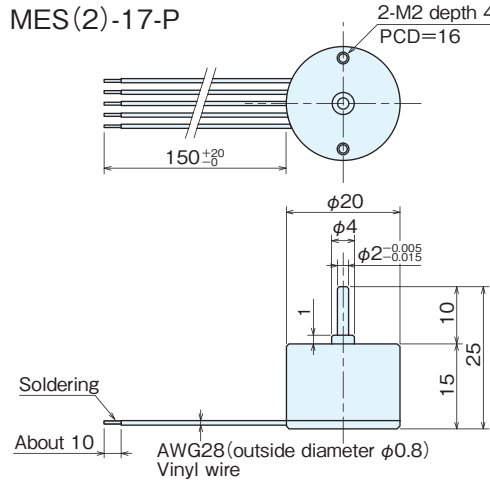


Specifications

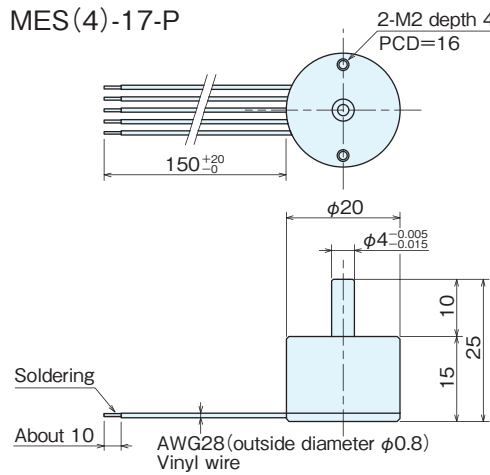
Type name		ME□-17-□P		
		Shaft shape Pulse number ●S(2)=φ2 single shaft ●S(4)=φ4 single shaft ●H=hollow shaft		
Item				
Supply voltage		DC5V ±10%		
Current consumption		30mA or less (under no load)		
Detection system		Incremental		
Output	Output pulse number (Standard)	100	300	500
	[Pulse number/rotation]	200	360	
		256	400	
	Output phase	A, B, Z phase (Z="H")		
	Output form	Square wave, voltage output only Pull-up resistance 10kΩ		
	Output capacity	Sink current:20mA Residual voltage:0.4V or less (at 10mA)		
	Maximum response frequency (response pulse number)	50kHz		
Output phase difference		A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)		
Waveform rise/fall time		2μs or less		
Allowable load of shaft (electrical)	Radial	1.9N (200gf)		
	Thrust	1.9N (200gf)		
Maximum allowable revolutions (mechanical)		6,000r/min		
Working ambient temperature/humidity		0°C~50°C RH35%~90% no dewing		
Storing ambient temperature		-20°C~80°C		
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		
Impact resistance		Durability 500m/s² (about 50G) 3 times each in X, Y, and Z directions		
Cable		Vinyl wire AWG28 150mm		
Mass		20g		

Outside dimensions

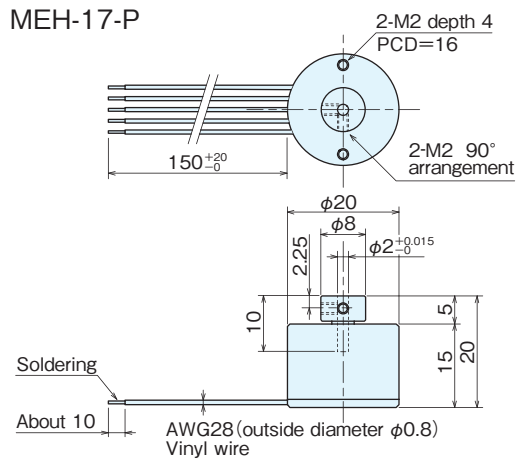
MES(2)-17-P



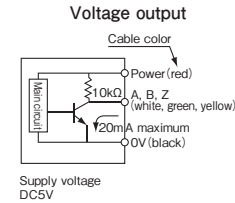
MES(4)-17-P



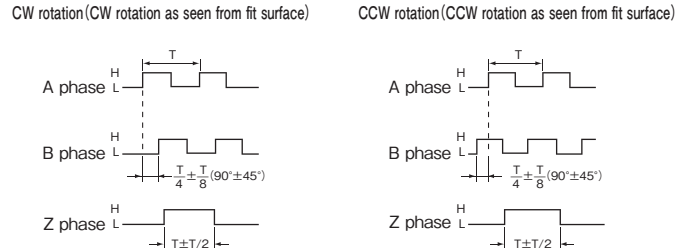
MEH-17-P



Output circuit diagram

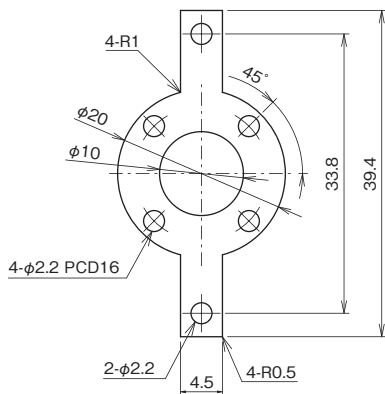


Output waveform



*The position of Z phase against A, B phase is not specified.

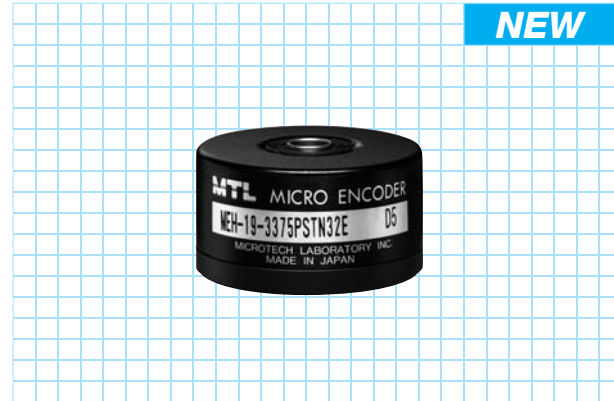
Spring flange MEH-17 (Option)



MEH-19 series

[Square Wave/Incremental]

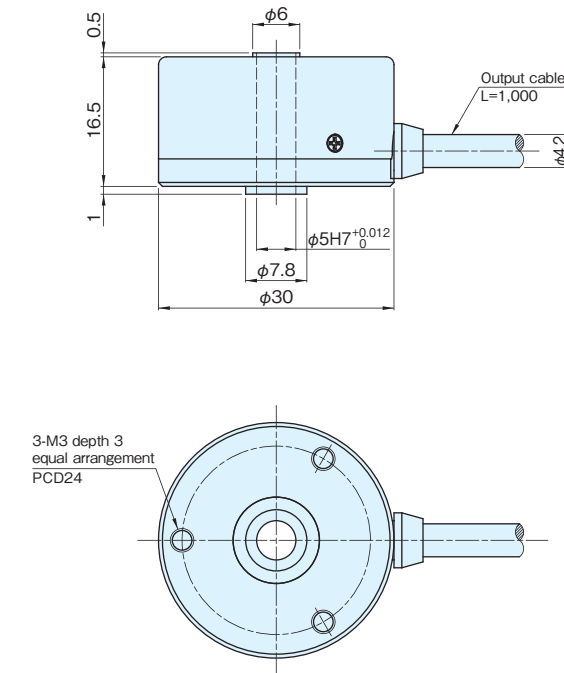
- Outside dimensions $\phi 30 \times 16.5\text{mm}$
- Through Shaft



Specifications

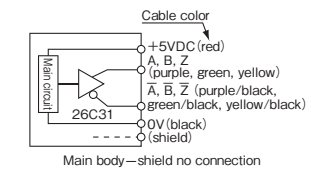
Type name	MEH-19-3375 PSTN□E
Item	
Detection system	Incremental
Output phase	A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$ phase CS phase (U, U, V, $\bar{V}$, W, $\bar{W}$)
Output form	Square, Line driver output
Output pulse number (P/R)	3375, 6750 (3375×2), 13500 (3375×4) 16875 (3375×5), 27000 (3375×8), 33750 (3375×10) 54000 (3375×16), 67500 (3375×20), 108000 (3375×32)
Output	Phase difference between neighboring A/B phases: $T/4 \pm T/8$ Waveform ratio of 1T: $T \pm 0.3t$ Z phase width: $T \pm T/2$ (Synchronized with 1T of B phase)
Supply voltage	DC5V±5%
Current consumption	150mA or less
Maximum response frequency	50kHz×division ratio (2, 4, 5, 8, 10, 16, 20, 32)
Output capacity	Output current (I_o): $\pm 20\text{mAmax.}$ Output voltage Vol: 0.5Vmax. VoH: 2.5Vmin.
Maximum allowable revolutions	6000r/min
Working ambient temperature/humidity	$-10^\circ\text{C} \sim +70^\circ\text{C}/\text{RH}35\% \sim 90\%$ no dewing
Storing ambient temperature	$-20^\circ\text{C} \sim +80^\circ\text{C}$
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 50G 3 times each in X, Y, and Z directions
Cable	Outside diameter $\phi 4.2$ 16-cores shield cable (without CS phase: 8-cores)
Mass	57g (excluding cable)

Outside dimensions



Output circuit diagram

Line driver output (option)

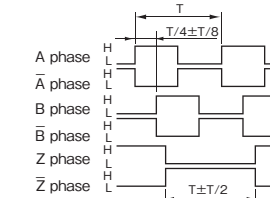


Note: If the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end.

A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Output waveform [×1]

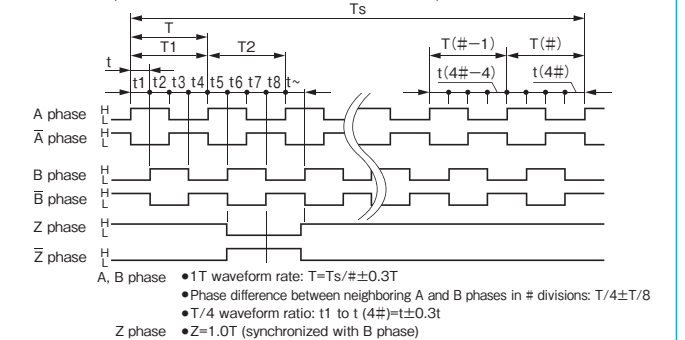
CW rotation (CW rotation as seen from fit surface)



*The position of Z phase against A, B phase is not specified.

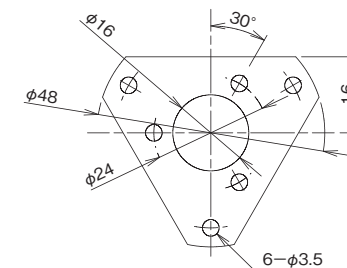
Output waveform / Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20·×32)

CW rotation (CW rotation as seen from fit surface)



Waveform example: T_{max} , T_{min} , $T_{\text{min}}/T_{\text{max}} \geq 0.5$

Spring flange MEH-19 (Option)



ME-20-P series

[Square Wave/Incremental]

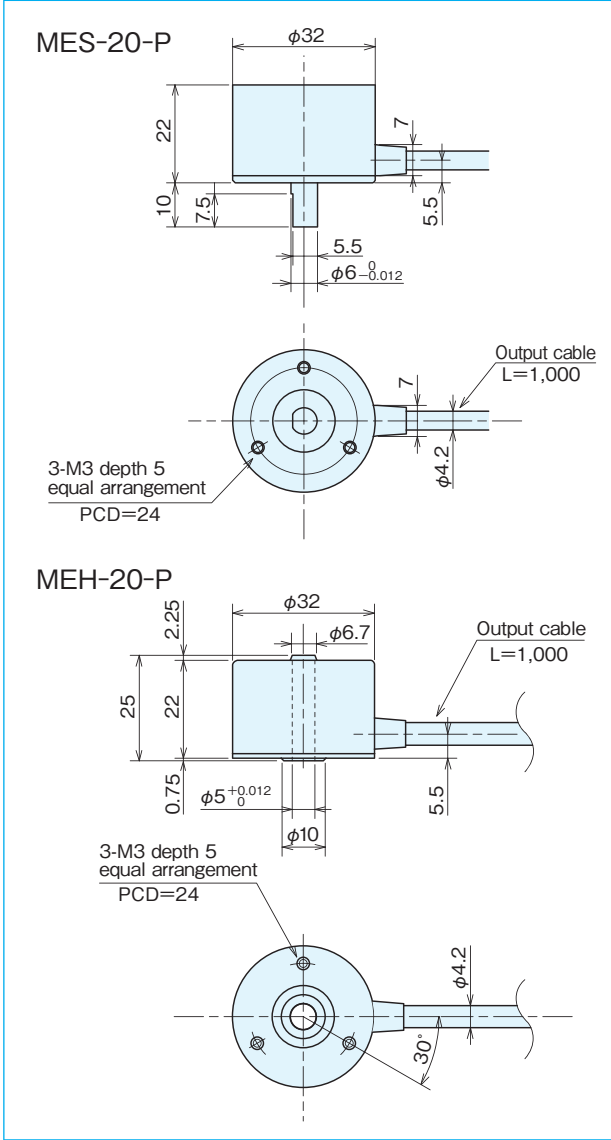


Specifications

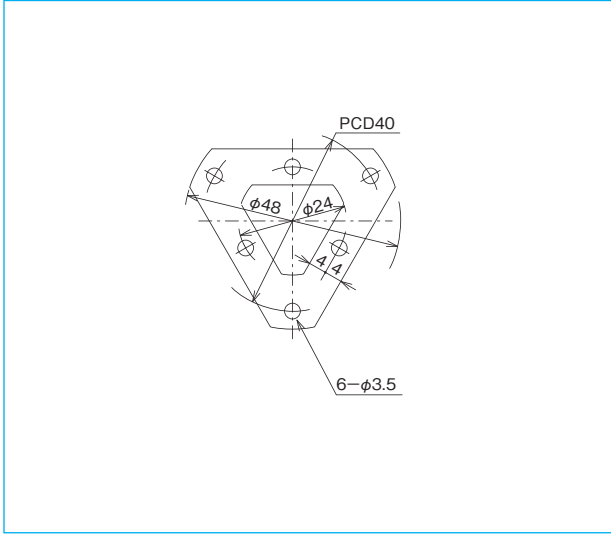
Type name		ME□□-20-□□P□□					
Item		Shaft shape		Pulse number	Output circuit	●E=line driver output ●ST□(2·4·5·8·10·16·20)	
		●S=single shaft ●H=hollow shaft ●D=double shaft			●No entry=voltage output ●C=open collector output ●C4=open collector output DC24V		
		Square wave				Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)	
Supply voltage		Voltage／Open collector:DC5V－5%～12V+10% Open collector C4:DC24V±10% Line driver:DC5V－5%～5V+10%				Voltage／Open collector:DC5V －5%～12V+10% Line driver:DC5V±5%	
Current consumption		70mA or less (under no load)				100mA or less (under no load)	
Detection system		Incremental				Incremental	
Output	Output pulse number (Standard) 〔Pulse number/rotation〕	40	250	512	600	1,800 (＊)	EX 7,200×2 (14,400) 7,200×4 (28,800) 7,200×5 (36,000) 7,200×8 (57,600) 7,200×10 (72,000) 7,200×16 (115,200) 7,200×20 (144,000)
		50	256		800	2,000 (＊)	
		60	300		1,000	2,048 (＊)	
		100	360		1,024	2,500 (＊)	
		125	400		1,200	3,600 (＊)	
		200	500		1,500	5,400 (＊)	
						7,200 (＊)	
	Output phase	A, B, Z phase					A, B, Z phase
	Output form	Square wave					Square wave
	Output capacity		Sink current:20mA Residual voltage:0.5V or less (at 10mA)				Sink current:20mA Residual voltage:0.5V or less (at 10mA) Open collector output: Load voltage DC13.2V max
Maximum response frequency (response pulse number)		100kHz				Line driver output:50kHz× (by multiplication) Voltage·Open collector output:100kHz	
Output phase difference		A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)				Refer to the figure on the right	
Waveform rise/fall time		2μs or less (output cable 1m or less)				—	
Allowable load of shaft (electrical)	Radial	19.6N (2kgf)		14.7N (1.5kgf)		14.7N (1.5kgf)	
	Thrust	9.8N (1kgf)		4.9N (0.5kgf)		4.9N (0.5kgf)	
Maximum allowable revolutions (mechanical)		6,000r/min				6,000r/min	
Working ambient temperature/humidity		－10℃～70℃ RH35%～90% no dewing				－10℃～70℃ RH35%～90% no dewing	
Storing ambient temperature		－20℃～80℃				－20℃～80℃	
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions				Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions				Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable		Outside diameter φ4.2 5-core vinyl wire Insulated shield cable (length 1m)				Outside diameter φ4.2 5-core vinyl wire Insulated shield cable (length 1m)	
Mass		70g				70g	

*Handled by built-in multiplier circuit

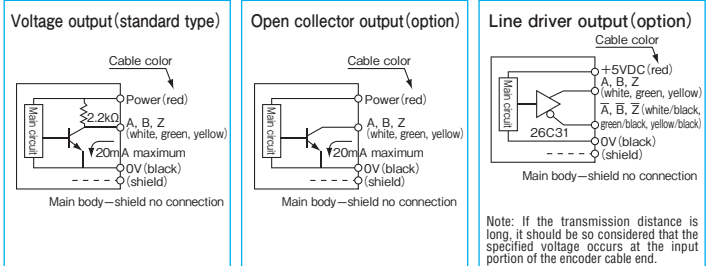
Outside dimensions



Spring flange MEH-20 (Option)

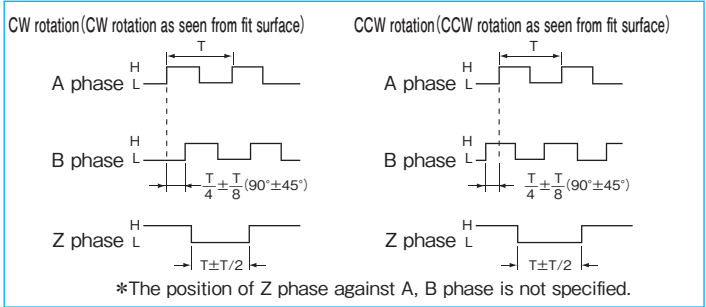


Output circuit diagram

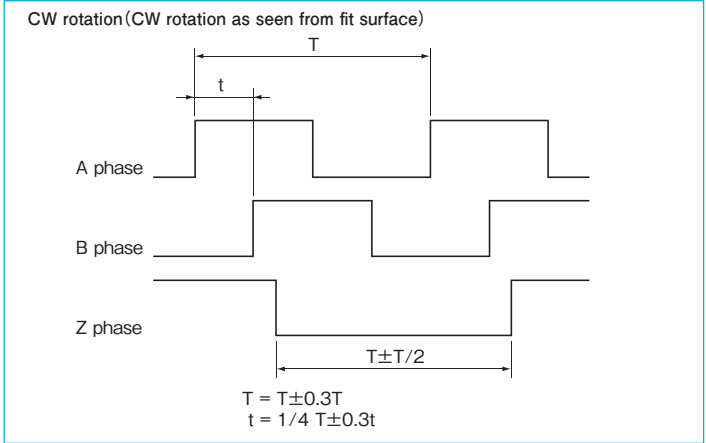


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Output waveform (Square wave)



Output waveform / Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)



MEH-28 series

[Square Wave/Incremental]

- Outside dimensions $\phi 40 \times 16.5\text{mm}$
- Through Shaft

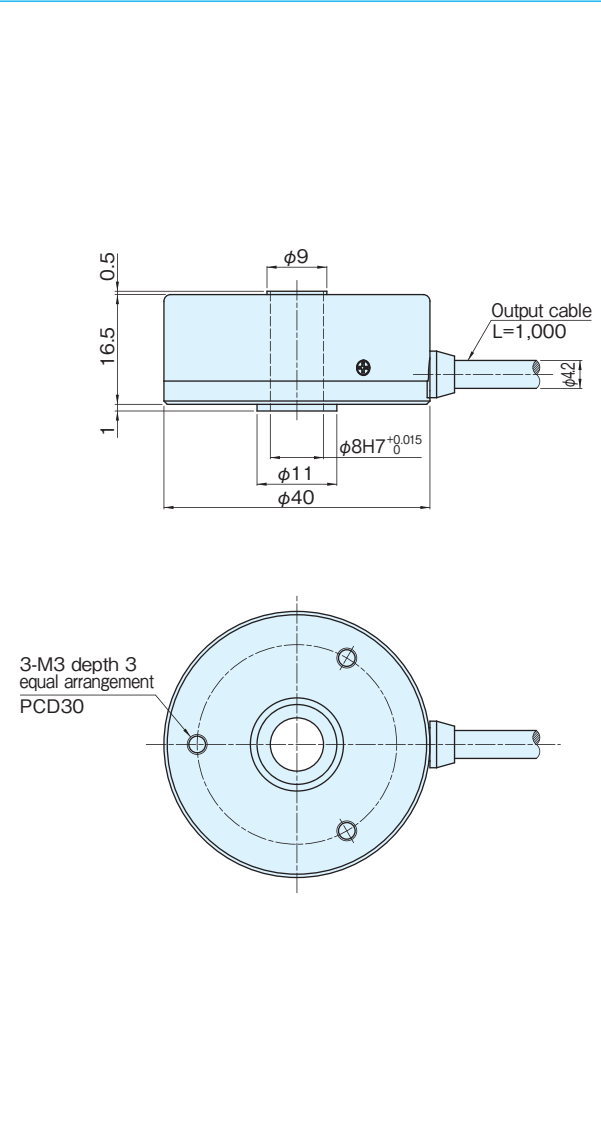
NEW



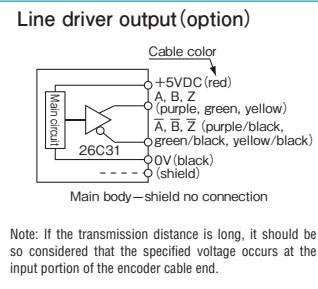
Specifications

Type name	MEH-28-6750 PSTN□E
Item	
Detection system	Incremental
Output phase	A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$ phase CS phase(U, $\bar{U}$, V, $\bar{V}$, W, $\bar{W}$)
Output form	Square, Line driver output
Output pulse number (P/R)	6750, 13500 (6750×2), 27000 (6750×4) 33750 (6750×5), 54000 (6750×8), 67500 (6750×10) 108000 (6750×16), 135000 (6750×20), 216000 (6750×32)
Output	Phase difference between neighboring A/B phases: $T/4 \pm T/8$ Waveform ratio of 1T: $T \pm 0.3t$ Z phase width: $T \pm T/2$ (Synchronized with 1T of B phase)
Supply voltage	DC5V±5%
Current consumption	150mA or less
Maximum response frequency	50kHz×division ratio (2, 4, 5, 8, 10, 16, 20, 32)
Output capacity	Output current (I_o): $\pm 20\text{mA}_{\text{max}}$. Output voltage Vol: 0.5V $_{\text{max}}$. VoH: 2.5V $_{\text{min}}$.
Maximum allowable revolutions	6000r/min
Working ambient temperature/humidity	-10°C~+70°C/RH35%~90% no dewing
Storing ambient temperature	-20°C~+80°C
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 50G 3 times each in X, Y, and Z directions
Cable	Outside diameter $\phi 4.2$ 16-cores shield cable (without CS phase: 8-cores)
Mass	80g (excluding cable)

Outside dimensions

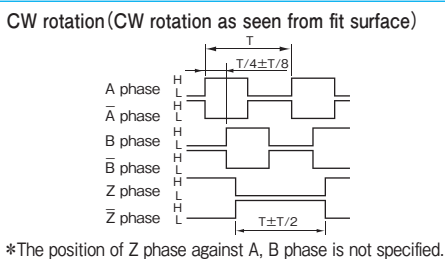


Output circuit diagram

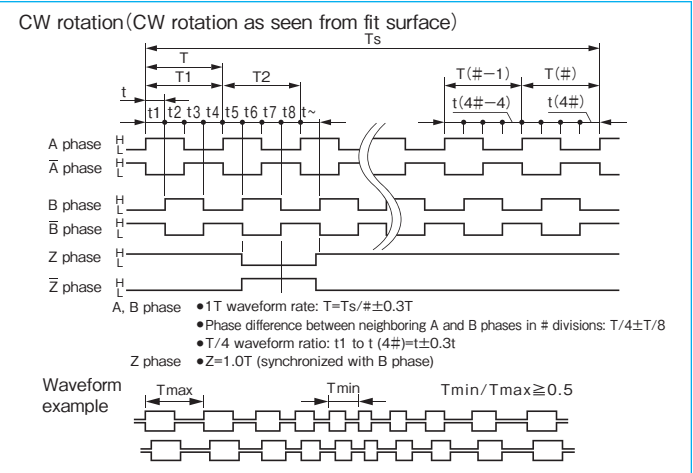


A capacitor (0.1 μF) is connected between 0V and FG (frame ground).

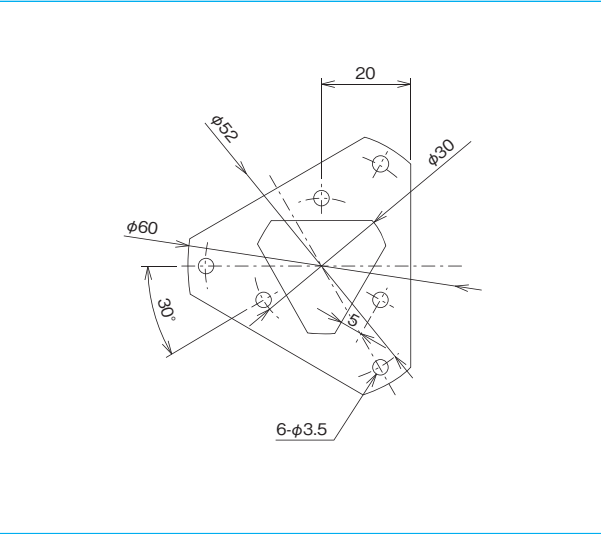
Output waveform [×1]



Output waveform / Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20·×32)

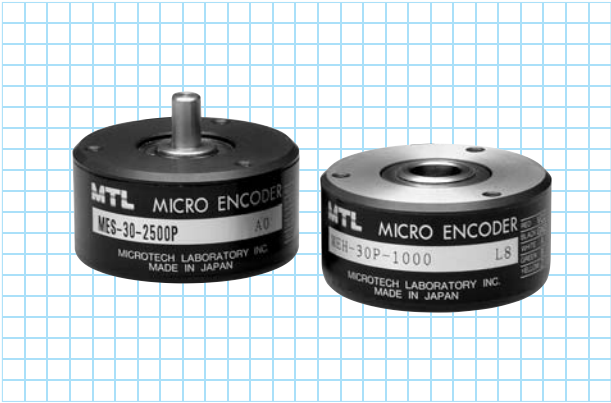


Spring flange MEH-28 (Option)



ME-30-P series

[Square Wave/Incremental]



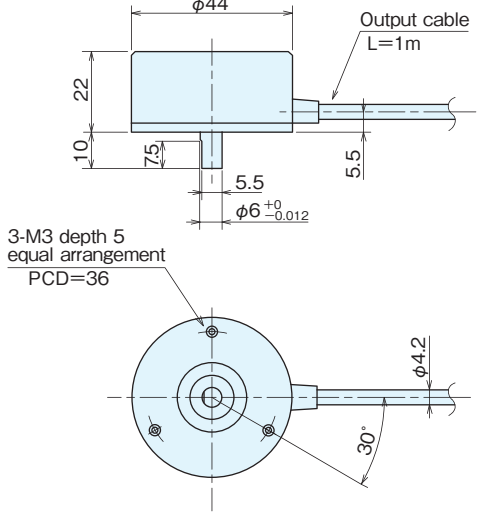
Specifications

Type name		ME□-30-□P□			
		Shaft shape	Pulse number	Output circuit	
		●S=single shaft		●No entry=voltage output	●E=line driver output
		●H=hollow shaft		●C=open collector output	●ST□(2·4·5·8·10·16·20)
		●D=double shaft		●C4=open collector output DC24V	
Item		Square wave		Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20)	
Supply voltage		Voltage/Open collector:DC5V-5%~12V+10% Open collector C4:DC24V±10% Line driver:DC5V±5%		Voltage:DC5V-5%~12V+10% Open collector:DC5V-5%~24V+15% Line driver:DC5V±5%	
Current consumption		70mA or less (under no load)		100mA or less (under no load)	
Detection system		Incremental		Incremental	
Output	Output pulse number (Standard) [Pulse number/rotation]	40 50 60 100 200	250 300 360 400 450	500 512 600 1,000 1,024 1,200 1,500 1,800 2,000 2,048	720 800 900 1,000 1,024 1,200 1,500 1,800 2,000 2,048
	Output phase	A, B, Z phase		A, B, Z phase	
	Output form	Square wave		Square wave	
	Output capacity	Sink current:20mA Residual voltage:0.5V or less (at 10mA)		—	
	Maximum response frequency (response pulse number)	100kHz		Line driver output:50kHz× (by multiplication) Voltage·Open collector output:100kHz	
	Output phase difference	A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)		Refer to the figure on the right	
	Waveform rise/fall time	2μs or less (output cable 1m or less)		—	
	Allowable load of shaft (electrical)	Radial	19.6N (2kgf)	14.7N (1.5kgf)	14.7N (1.5kgf)
		Thrust	9.8N (1kgf)	4.9N (0.5kgf)	4.9N (0.5kgf)
	Maximum allowable revolutions (mechanical)	6,000r/min		6,000r/min	
Working ambient temperature/humidity		-10°C~70°C RH35%~90% no dewing		-10°C~70°C RH35%~90% no dewing	
Storing ambient temperature		-20°C~80°C		-20°C~80°C	
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable		Outside diameter φ4.2 5-core vinyl wire Insulated shield cable (length 1m)		Outside diameter φ4.2 5-core vinyl wire Insulated shield cable (length 1m)	
Mass		140g		140g	

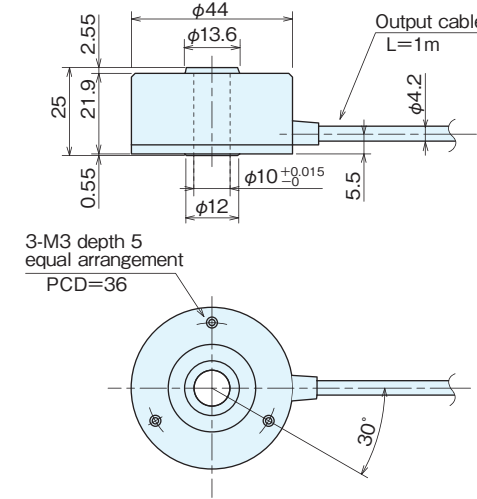
*Handled by built-in multiplier circuit

Outside dimensions

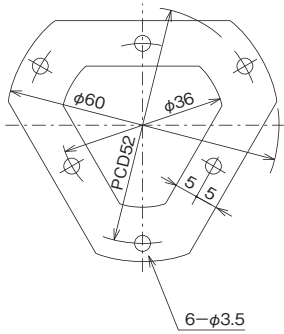
MES-30-P



MEH-30-P

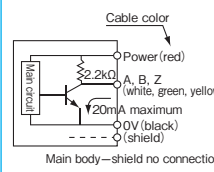


Spring flange MEH-30 (Option)

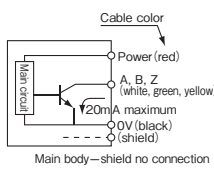


Output circuit diagram

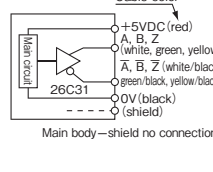
Voltage output (standard type)



Open collector output (option)



Line driver output (option)

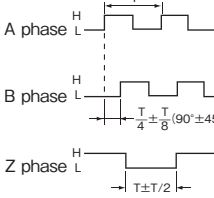


Note: If the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end.

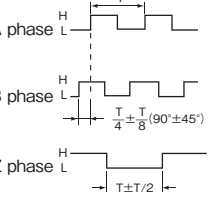
A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Output waveform (Square wave)

CW rotation (CW rotation as seen from fit surface)



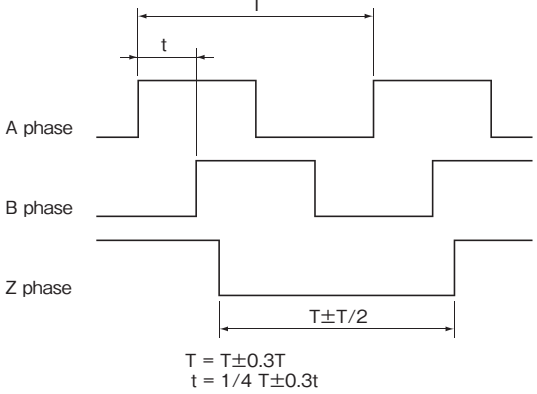
CCW rotation (CCW rotation as seen from fit surface)



*The position of Z phase against A, B phase is not specified.

Output waveform / Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20)

CW rotation (CW rotation as seen from fit surface)

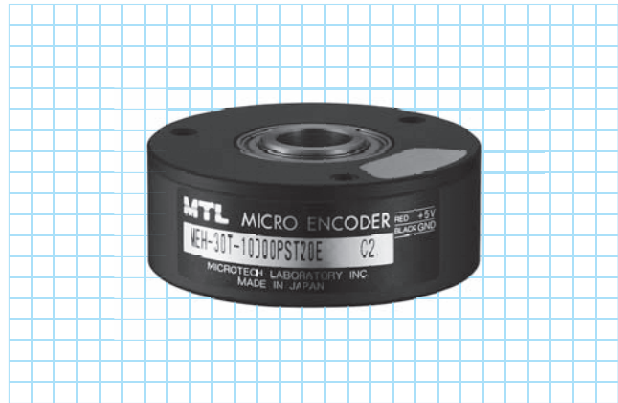


T = T±0.3T
t = 1/4 T±0.3t

MEH-30T series

[Square Wave/Incremental]

- External $\phi 44$
- 18mm-high thin incremental encoder (hollow axle)

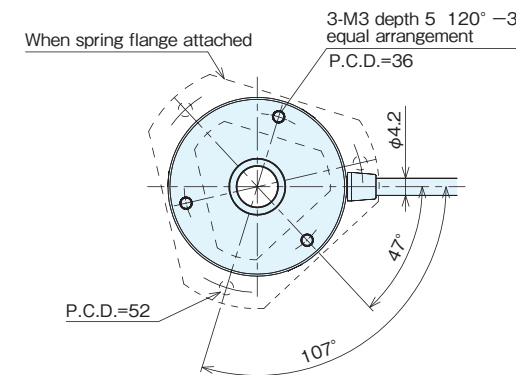
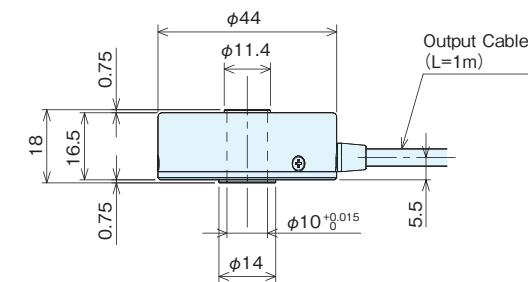


Specifications

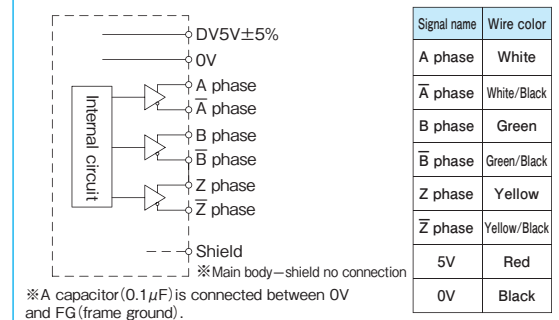
Type name	MEH-30T- Pulse number 10000 By multiplication (×2, 4, 5, 8, 10, 16, 20) PST 20 E
Item	
Detection system	Incremental
Output phase	A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$ phase
Output form	Square, Line driver output
Output pulse number (P/R)*	20000 (10000×2), 40000 (10000×4) 50000 (10000×5), 80000 (10000×8) 100000 (10000×10), 160000 (10000×16) 200000 (10000×20)
Output	Phase difference between neighboring A/B phases: $T/4 \pm T/8$ Waveform ratio of 1T: $T \pm 0.3t$ Z phase width: $T \pm T/2$ (Synchronized with 1T of B phase)
Supply voltage	DC5V±5%
Current consumption	100mA or less
Maximum response frequency	50kHz × division ratio (2, 4, 5, 8, 10, 16, 20)
Output capacity	Output current (I_o): ±20mAmax. Output voltage Vol: 0.5Vmax. VoH: 2.5Vmin.
Maximum allowable revolutions	6000r/min
Working ambient temperature/humidity	−10°C~+70°C RH35%~90% no dewing
Storing ambient temperature	−20~+80°C
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable	Outside diameter $\phi 4.2$ 8-core vinyl wire Insulated shield cable (length 1m)
Mass	140g (excluding cable)

*Output pulse numbers other than 10000P/R are scheduled to be added in the near future.

Outside dimensions

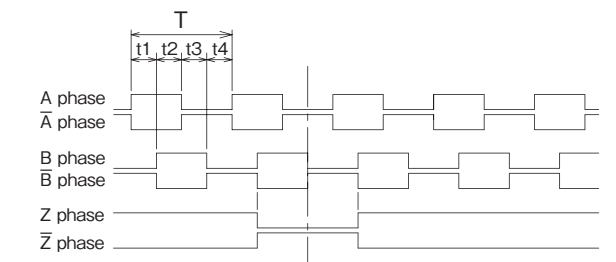


Output circuit diagram and connection diagram

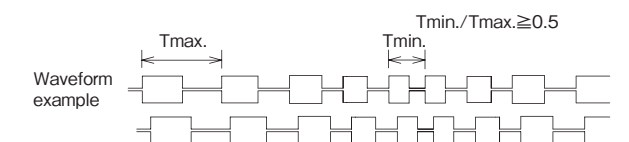


Connection diagram

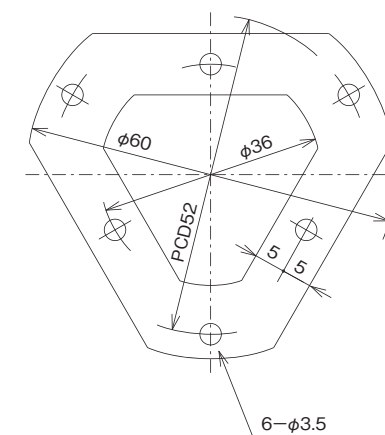
CW rotation (CW rotation as seen from fit surface) →



A/B phase 1T waveform ratio: $T = T \pm 0.03T$
Phase difference between neighboring A/B phases after division: $T/4 \pm T/8$
Z phase $Z = 1T$ Synchronized with B phase

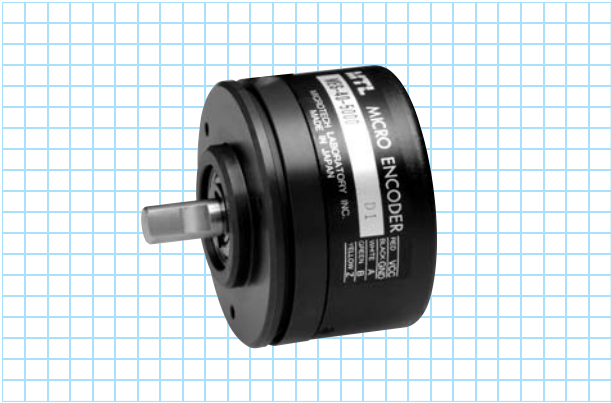


Spring flange MEH-30 (Option)



MES-40-P series

[Square Wave/Incremental]

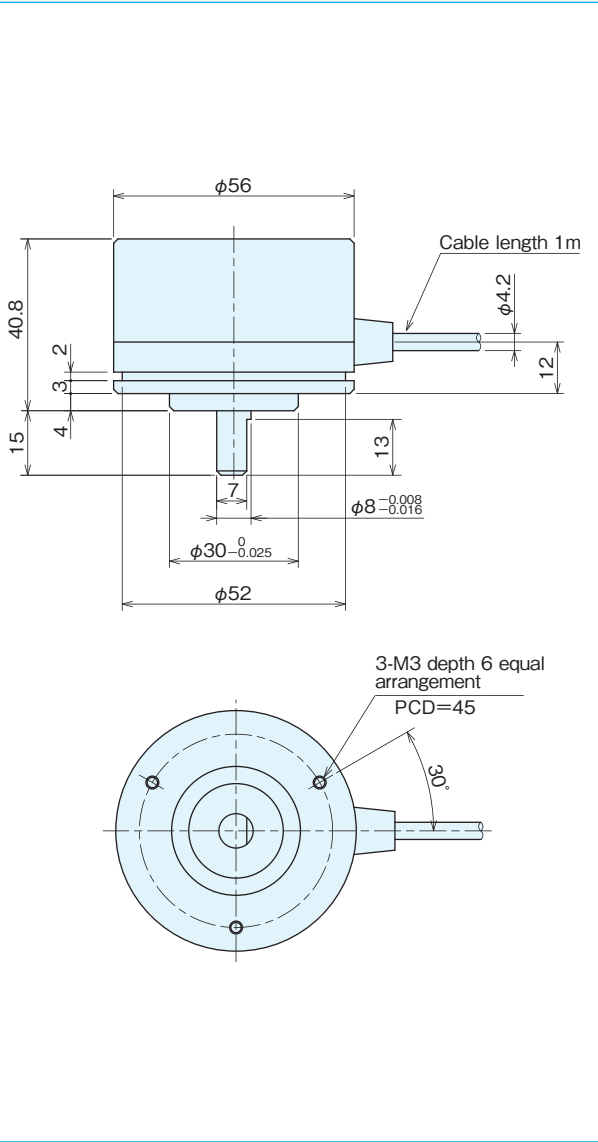


Specifications

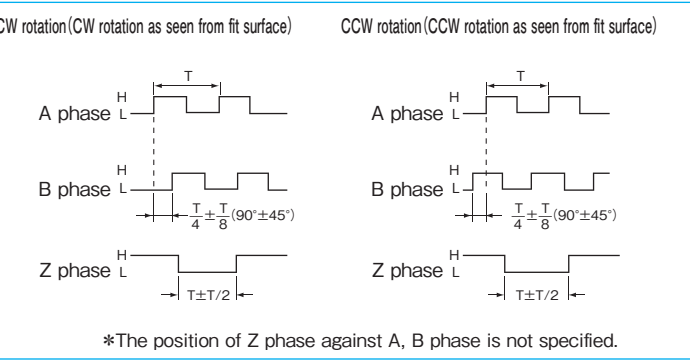
Type name		MES-40- P	
Item		Pulse number Output circuit ●No entry=voltage output ●C=open collector output ●C4=open collector output DC24V	●E=line driver output ●ST (2·4·5·8·10·16·20)
		Square wave	Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)
Supply voltage		Voltage/Open collector:DC5V-5%~12V+10% Open collector DC24V:DC24V±10% Line driver:DC5V±10%	Voltage:DC5V-5%~12V+10% Open collector:DC5V-5%~24V+15% Line driver:DC5V±5%
Current consumption		50mA or less (under no load)	100mA or less (under no load)
Detection system		Incremental	Incremental
Output	Output pulse number (Standard) [Pulse number/rotation]	100 600 2,048 8,192(*) 200 720 2,500 9,000(*) 250 800 3,000 10,000(*) 256 1,000 3,600(*) 300 1,024 4,000(*) 360 1,200 4,096(*) 400 1,500 5,000(*) 500 1,800 5,400(*) 512 2,000(*) 6,000(*)	EX 10,000×2 (20,000) 10,000×4 (40,000) 10,000×5 (50,000) 10,000×8 (80,000) 10,000×10 (100,000) 10,000×16 (160,000) 10,000×20 (200,000)
	Output phase	A, B, Z phase	A, B, Z phase
	Output form	Square wave	Square wave
	Output capacity	Sink current:20mA Residual voltage:0.5V or less (at 10mA)	—
	Maximum response frequency (response pulse number)	100kHz	Line driver output:50kHz× (by multiplication) Open collector output:100kHz
	Output phase difference	A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)	Refer to the figure on the right
	Waveform rise/fall time	2μs or less (output cable 1m or less)	—
	Allowable load of shaft (electrical)	Radial 49N (5kgf) Thrust 29.4N (3kgf)	49N (5kgf) 29.4N (3kgf)
	Maximum allowable revolutions (mechanical)	6,000r/min	6,000r/min
	Working ambient temperature/humidity	-10°C~70°C RH35%~90% no dewing	-10°C~70°C RH35%~90% no dewing
Storing ambient temperature		-20°C~80°C	-20°C~80°C
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter φ4.2 5-core vinyl wire Insulated shield cable (length 1m)	Outside diameter φ4.2 5-core vinyl wire Insulated shield cable (length 1m)
Mass		200g	200g

*Handled by built-in multiplier circuit

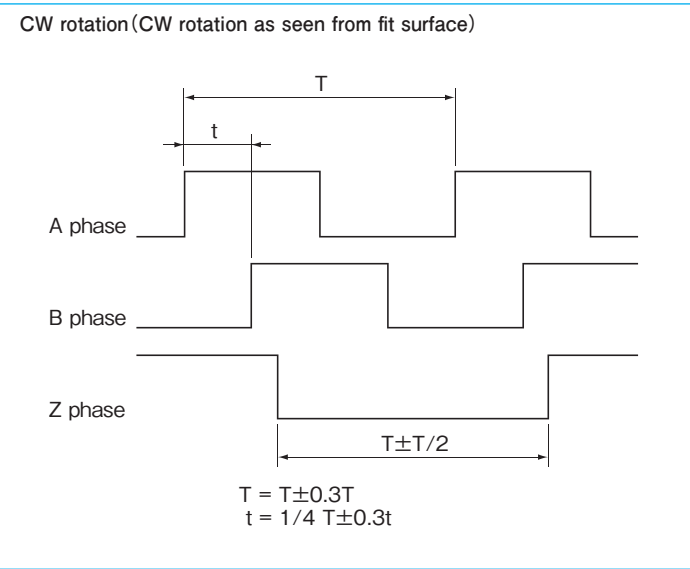
Outside dimensions



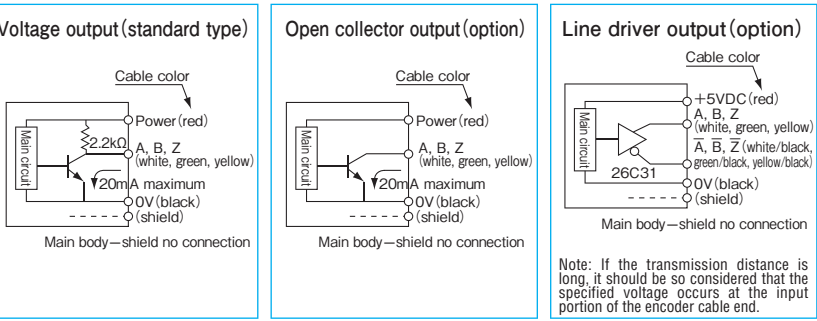
Output waveform (Square wave)



Output waveform/Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)



Output circuit diagram

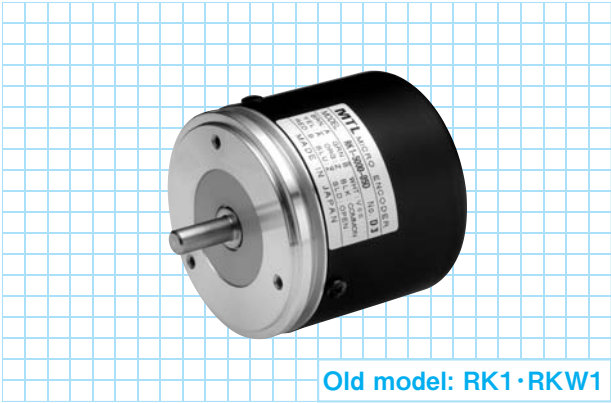


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

MES-45 series

[Square Wave/Incremental]

- Old model: RK1/RKW1
- Strong type
- Environment resistance



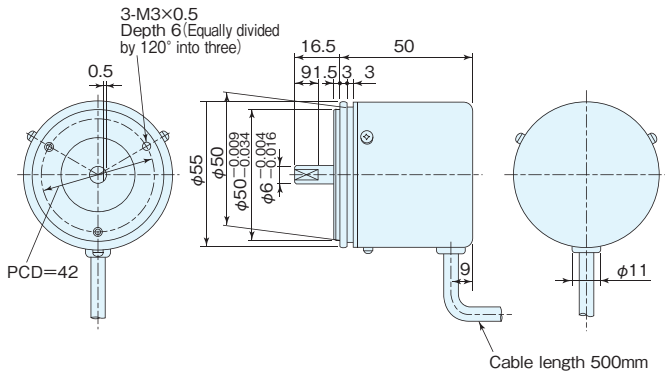
Old model: RK1·RKW1

Specifications

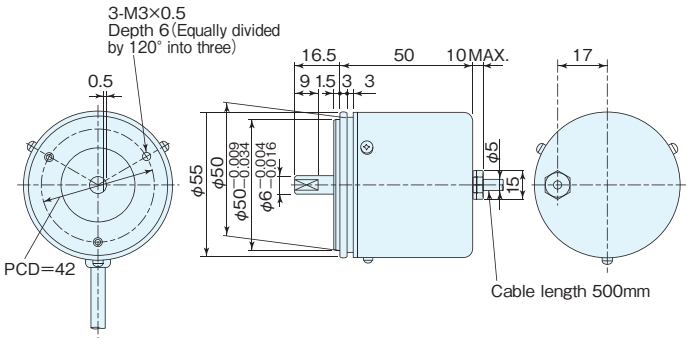
Type name		MES□-45-□□□□-□□C			
Item	●No entry=standard type ●W=drip-proof type Resolution ●05=5V ●12=12V ●24=24V Input voltage ●05=5V ●12=12V ●24=24V Output circuit ●No entry=voltage output ●C=open collector output ●D=differential driver output				
Supply voltage		DC5V -5%~12V+10% (voltage output/differential driver output) DC5V -5%~24V+15% (open collector output)			
Current consumption		120mA max (voltage output) 100mA max (open collector output) 150mA max (differential driver output: driver no load)			
Output pulse number (Standard) [Pulse number/rotation]		360 500 512 600 720 800 1,000	1,024 1,200 1,500 1,800 2,000 2,048 2,500	3,000 3,200 3,600 4,096 5,000 6,000 9,000	
Maximum response frequency		200kHz			
Allowable load of shaft (electrical)	Radial	49.0N (5kgf)			
	Thrust	29.4N (3kgf)			
Maximum allowable revolutions (mechanical)		6,000r/min			
Working ambient temperature/humidity		-10°C~70°C / RH95%max no dewing			
Storing ambient temperature		-30°C~80°C			
Vibration resistance		Durability 0-500Hz, double amplitude 1.52mm 2 hours each in X, Y, and Z directions			
Impact resistance		Durability 490m/s ² (about 50G) 3 times each in X, Y, and Z directions			
Cable		Outside diameter ϕ5 5-core vinyl wire Insulated shield cable (length 500mm)			
Mass		280g			

Outside dimensions

MES-45 (Standard type)

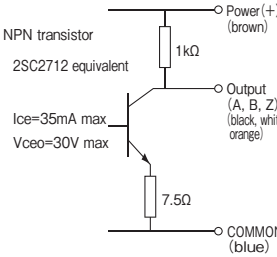


MESW-45 (Option; drip-proof type)

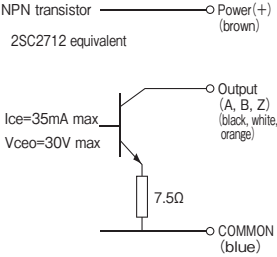


Output circuit diagram

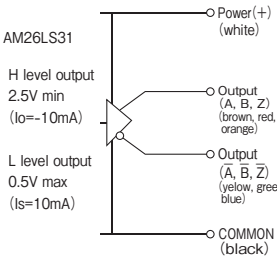
Voltage output (standard type)



Open collector output

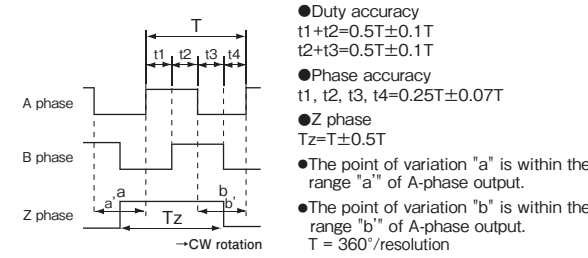


Differential driver output

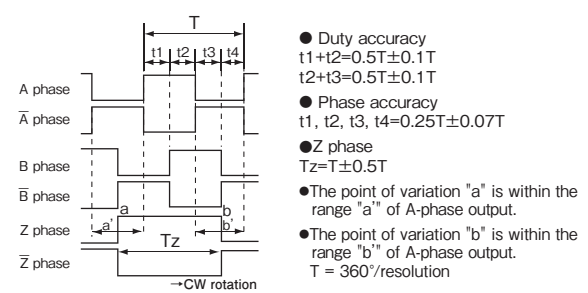


Output waveform

Voltage output/open collector output

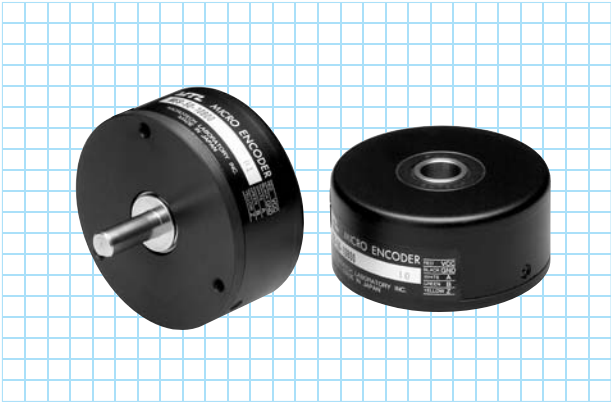


Differential driver output



ME-50-P series

[Square Wave/Incremental]



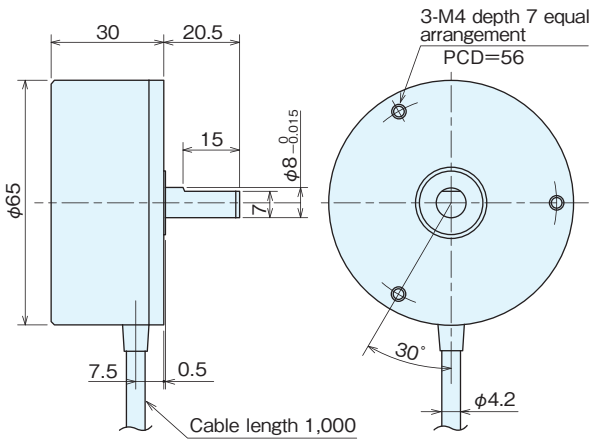
Specifications

Type name				
ME-50-P				
Shaft shape ●S=single shaft ●H=hollow shaft Pulse number ●No entry=voltage output ●C=open collector output ●C4=open collector output DC24V Output circuit ●E=line driver output ●ST(2·4·5·8·10·16·20)				
Item	Square wave		Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)	
Supply voltage	Voltage/Open collector:DC5V-5%~12V+10% Open collector DC24V:DC24V±10% Line driver:DC5V±5%		Voltage:DC5V-5%~12V+10% Open collector:DC5V-5%~24V+10% Line driver:DC5V±5%	
Current consumption	60mA or less (under no load)		100mA or less (under no load)	
Detection system	Incremental		Incremental	
Output	Output pulse number (Standard)	500 900 1,000 1,024	2,000 3,000 3,600 4,096 (*)	5,000 (*) 5,400 (*) 6,000 (*) 9,000 (*) 10,000 (*)
	Output phase	A, B, Z phase		EX 10,000×2 (20,000) 10,000×4 (40,000) 10,000×5 (50,000) 10,000×8 (80,000) 10,000×10 (100,000) 10,000×16 (160,000) 10,000×20 (200,000)
	Output form	Square wave		A, B, Z phase
	Output capacity	Sink current:20mA Residual voltage:0.5V or less (at 10mA)		Square wave
	Maximum response frequency (response pulse number)	100kHz		—
Output phase difference		A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)		Line driver output:50kHz× (by multiplication) Open collector output:100kHz
Waveform rise/fall time		2μs or less (output cable 1m or less)		Refer to the figure on the right
Allowable load of shaft (electrical)	Radial	19.6N (2kgf)	9.8N (1kgf)	9.8N (1kgf)
	Thrust	9.8N (1kgf)	4.9N (0.5kgf)	4.9N (0.5kgf)
Maximum allowable revolutions (mechanical)	6,000r/min		6,000r/min	
Working ambient temperature/humidity	-10°C~70°C RH35%~90% no dewing		-10°C~70°C RH35%~90% no dewing	
Storing ambient temperature	-20°C~80°C		-20°C~80°C	
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable	Outside diameter φ4.2 5-core vinyl wire Insulated shield cable (length 1m)		Outside diameter φ4.2 5-core vinyl wire Insulated shield cable (length 1m)	
Mass	220g		220g	

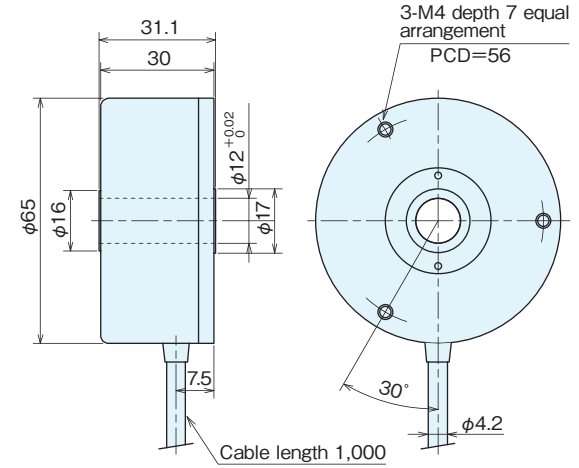
*Handled by built-in multiplier circuit

Outside dimensions

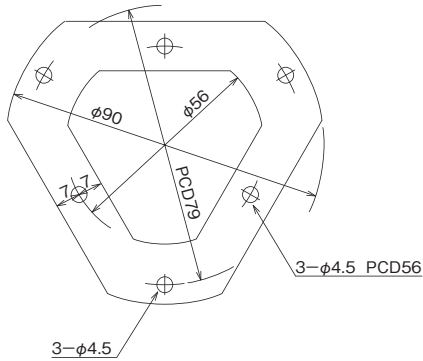
MES-50-P



MEH-50-P

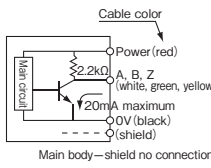


Spring flange MEH-50 (Option)

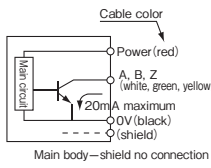


Output circuit diagram

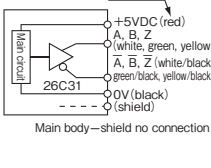
Voltage output (standard type)



Open collector output (option)



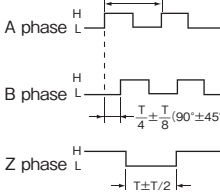
Line driver output (option)



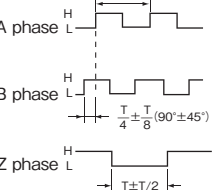
A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Output waveform (Square wave)

CW rotation (CW rotation as seen from fit surface)



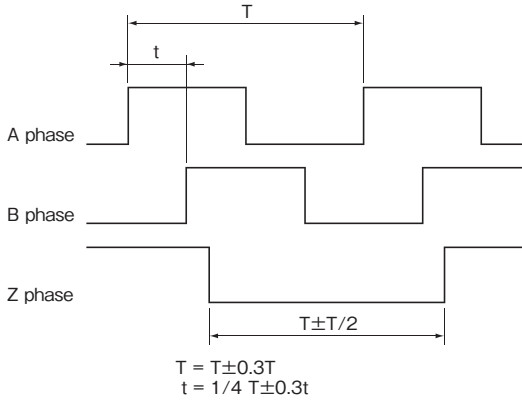
CCW rotation (CCW rotation as seen from fit surface)



*The position of Z phase against A, B phase is not specified.

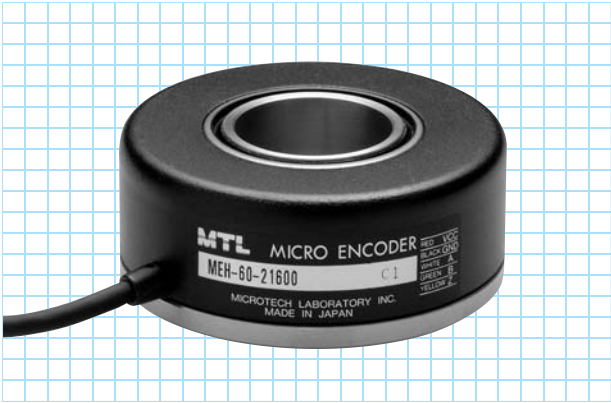
Output waveform / Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)

CW rotation (CW rotation as seen from fit surface)



MEH-60-P series

[Square Wave/Incremental]



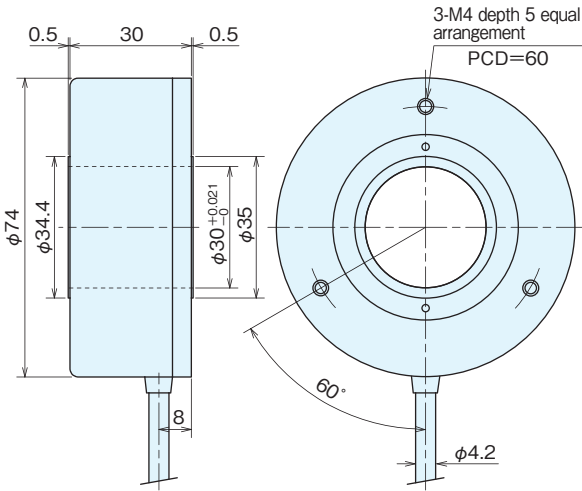
Specifications

Type name		MEH-60- P			
		Pulse number		Output circuit	
				●No entry=voltage output	
				●C=open collector output	
				●C4=open collector output DC24V	
				●E=line driver output	
				●ST (2·4·5·8·10·16·20)	
Item		Square wave		Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20)	
Supply voltage		Voltage / Open collector DC5V-5%~12V+10% Open collector DC24V:DC24V±10% (*) Open collector output:20,250,21,600±DC5V-5%~DC12V+10% Line driver:DC5V±5%		Voltage:DC5V-5%~12V+10% Open collector:DC5V-5%~24V+10% (10,800 pulse or less) (*) Open collector output:20,250,21,600±DC5V-5%~DC12V+10% Line driver:DC5V±5%	
Current consumption		60mA or less *120mA or less (under no load)		100mA or less (under no load)	
Detection system		Incremental		Incremental	
Output	Output pulse number (Standard) [Pulse number/rotation]	100	600	1,024	8,100(*1)
		180	1,000	1,800	9,000(*1)
		200		2,000	10,000(*1)
		360		3,600	10,800(*1)
		400		4,000	20,250(*1, 2)
		500		5,000	21,600(*1, 2)
				5,400(*1)	
	Output phase		A, B, Z phase		A, B, Z phase
	Output form		Square wave		Square wave
	Output capacity		Sink current:20mA Residual voltage:0.5V or less (at 10mA)		—
Maximum response frequency (response pulse number)		100kHz		Line driver output:50kHz×(by multiplication) Open collector output:100kHz	
Output phase difference		A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)		Refer to the figure on the right	
Waveform rise/fall time		2μs or less (output cable 1m or less)		—	
Allowable load of shaft (electrical)	Radial	19.6N (2kgf)		9.8N (1kgf)	
	Thrust	9.8N (1kgf)		4.9N (0.5kgf)	
Maximum allowable revolutions (mechanical)		1,000r/min		1,000r/min	
Working ambient temperature/humidity		0°C~60°C RH35%~90% no dewing		0°C~60°C RH35%~90% no dewing	
Storing ambient temperature		-20°C~80°C		-20°C~80°C	
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable		Outside diameter φ4.2 5-core vinyl wire Insulated shield cable (length 1m)		Outside diameter φ4.2 5-core vinyl wire Insulated shield cable (length 1m)	
Mass		320g 430g(*2)		430g	

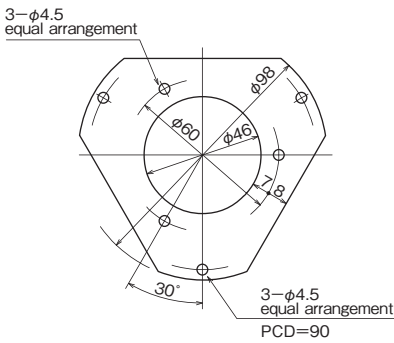
*1: Handled by built-in multiplier circuit

*2: The mass changes

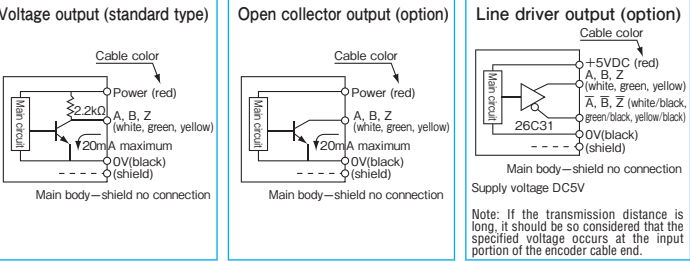
Outside dimensions



Spring flange MEH-60 (Option)

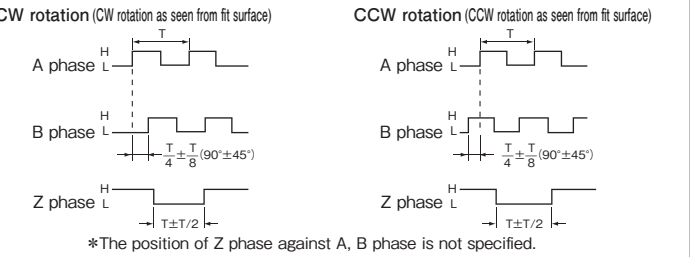


Output circuit diagram

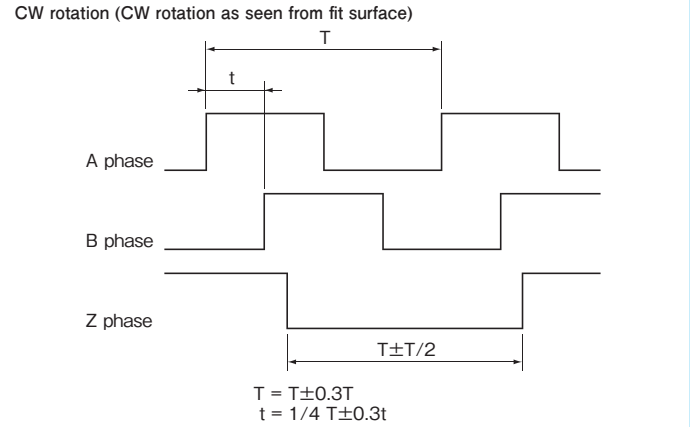


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Output waveform (Square wave)

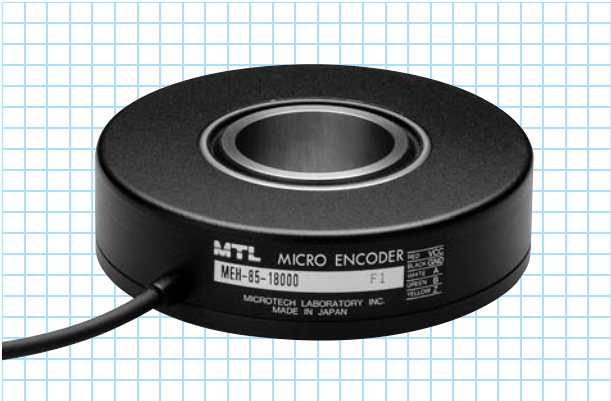


Output waveform / Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20)



MEH-85-P series

[Square Wave/Incremental]

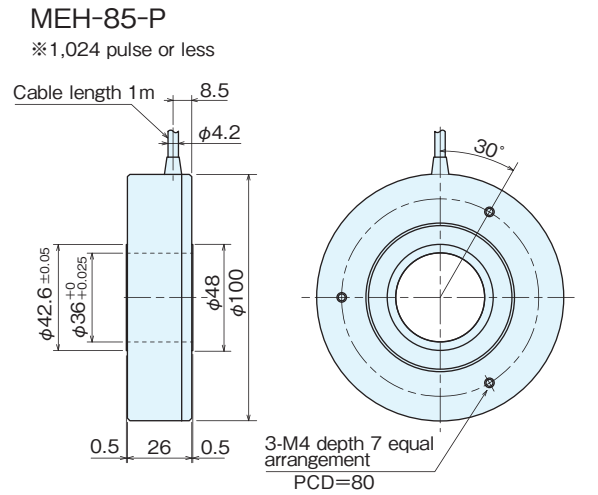


Specifications

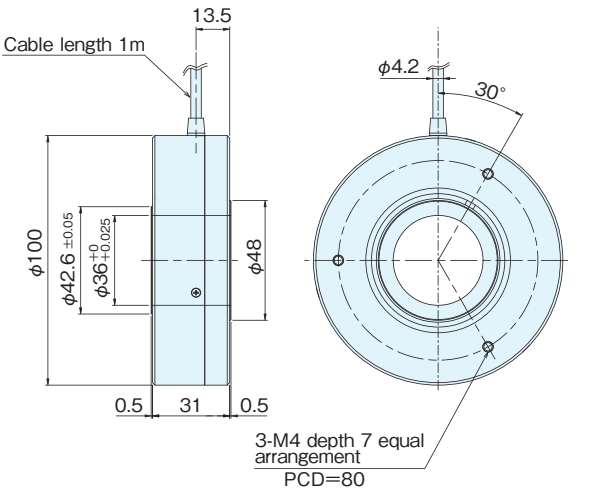
Type name		MEH-85- P Pulse number Output circuit ●No entry=voltage output ●C=open collector output ●C4=open collector output DC24V ●E=line driver output ●ST (2·4·5·8·10·16·20)			
Item		Square wave			Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)
Supply voltage		Voltage／Open collector:DC5V－5%～12V+10% Open collector DC24V:DC24V±10% Line driver:DC5V±5%			Voltage:DC5V－5%～12V+10% Open collector:DC5V－5%～24V+10% Line driver:DC5V±5%
Current consumption		Voltage／Open collector output:60mA or less(under no load) Line driver:140mA or less(under no load)			140mA or less(under no load)
Detection system		Incremental			Incremental
Output	Output pulse number (Standard) 〔Pulse number/rotation〕	150 200 500 1,000 1,024	1,500 3,600 4,500 5,400 5,625 7,200(*) 8,192(*) 10,800(*) 11,250(*) 18,000(*)	20,250(*) 21,600(*)	EX 18,000×2 (36,000) 18,000×4 (72,000) 18,000×5 (90,000) 18,000×8 (144,000) 18,000×10 (180,000) 18,000×16 (288,800) 18,000×20 (360,000)
	Output phase	A, B, Z phase			A, B, Z phase
	Output form	Square wave			Square wave
	Output capacity	Sink current:20mA Residual voltage:0.5V or less(at 10mA)			—
	Maximum response frequency (response pulse number)	100kHz			Voltage／Open collector output:100kHz Line driver output:75kHz× (by multiplication)
	Output phase difference	A, B phase difference 90°±45°(T/4±T/8) Z phase T±T/2(see Output Waveform)			Refer to the figure on the right
	Waveform rise/fall time	2μs or less(output cable 1m or less)			—
Allowable load of shaft(electrical)	Radial	9.8N(1kgf)			9.8N(1kgf)
	Thrust	4.9N(0.5kgf)			4.9N(0.5kgf)
Maximum allowable revolutions (mechanical)		1,000r/min			1,000r/min
Working ambient temperature/ humidity		0°C～60°C RH35%～90% no dewing			0°C～60°C RH35%～90% no dewing
Storing ambient temperature		－20°C～80°C			－20°C～80°C
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions			Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions			Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter ϕ4.2 5-core vinyl wire Insulated shield cable(length 1m)			Outside diameter ϕ4.2 5-core vinyl wire Insulated shield cable(length 1m)
Mass		520g	620g	1,050g	1,050g

*Handled by built-in multiplier circuit

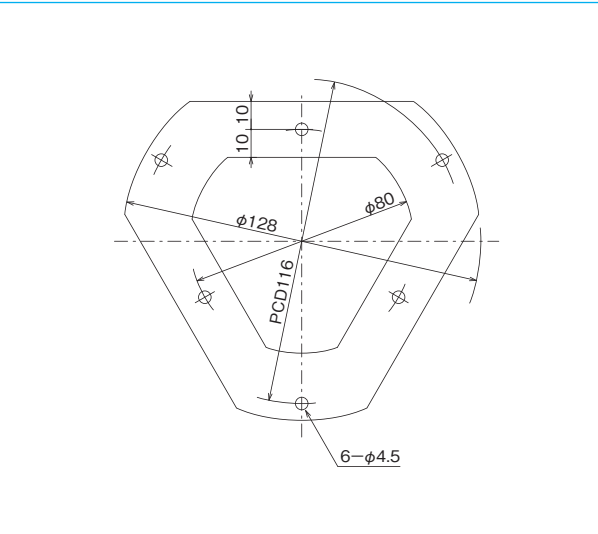
Outside dimensions



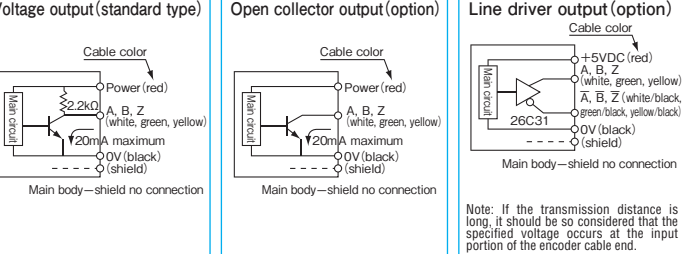
MEH-85-P (1,500 pulse or more),
MEH-85-PS, MEH-85-PST



Spring flange MEH-85 (Option)

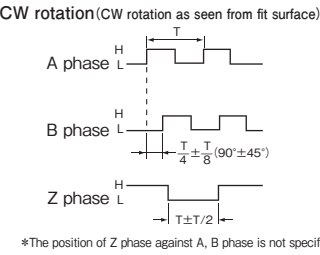


Output circuit diagram

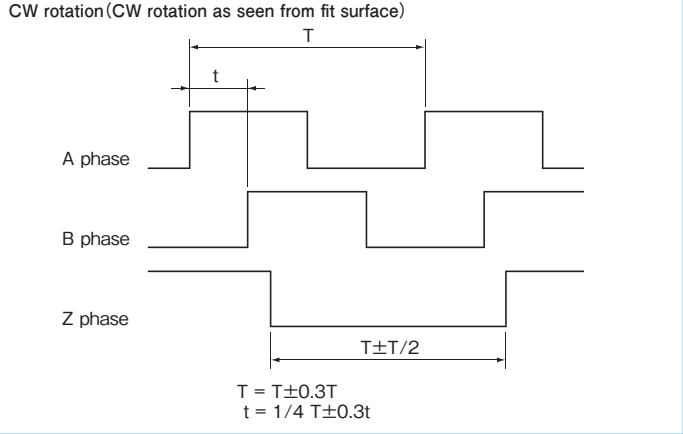


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Output waveform (Square wave)

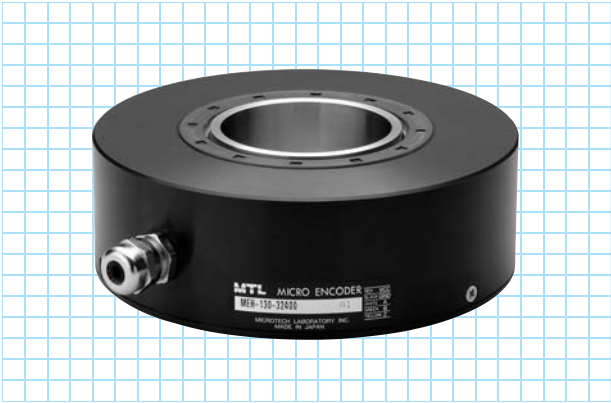


Output waveform/Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)



MEH-130-P series

[Square Wave/Incremental]

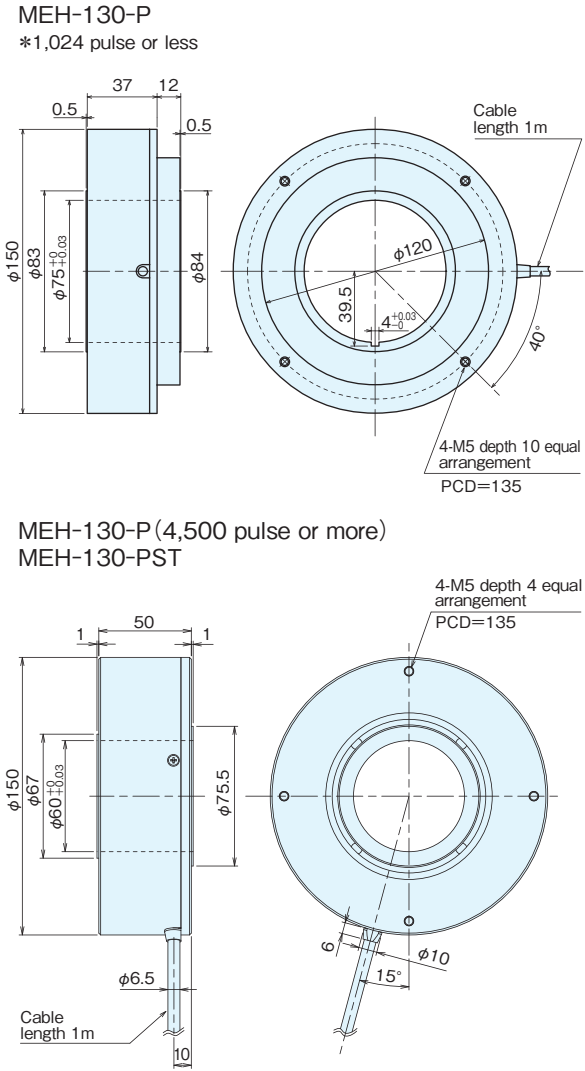


Specifications

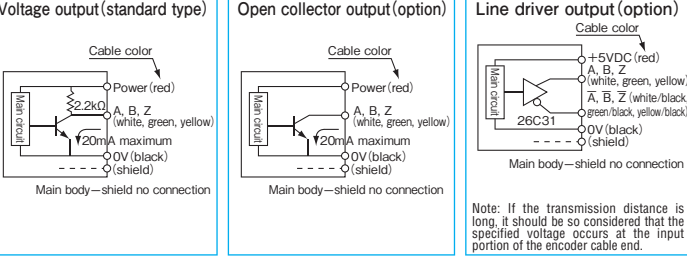
Type name		MEH-130- P P	
		Pulse number ●No entry=voltage output ●C=open collector output	●E=line driver output ●ST

*Handled by built-in multiplier circuit

Outside dimensions

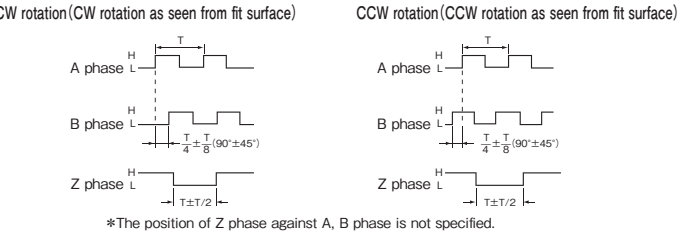


Output circuit diagram

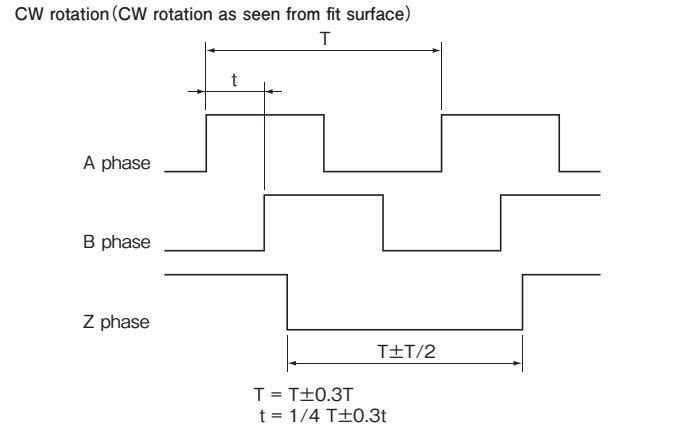


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

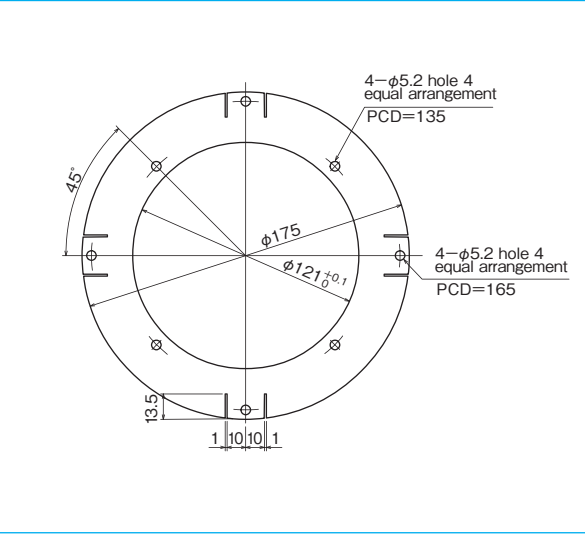
Output waveform (Square wave)



Output waveform/Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20)

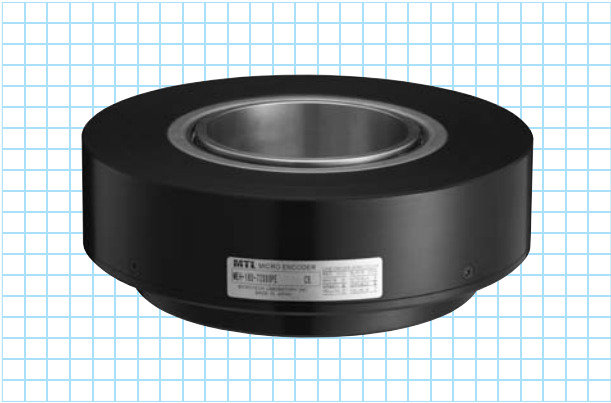


Spring flange MEH-130 (Option)



MEH-180-P series

[Square Wave/Incremental]

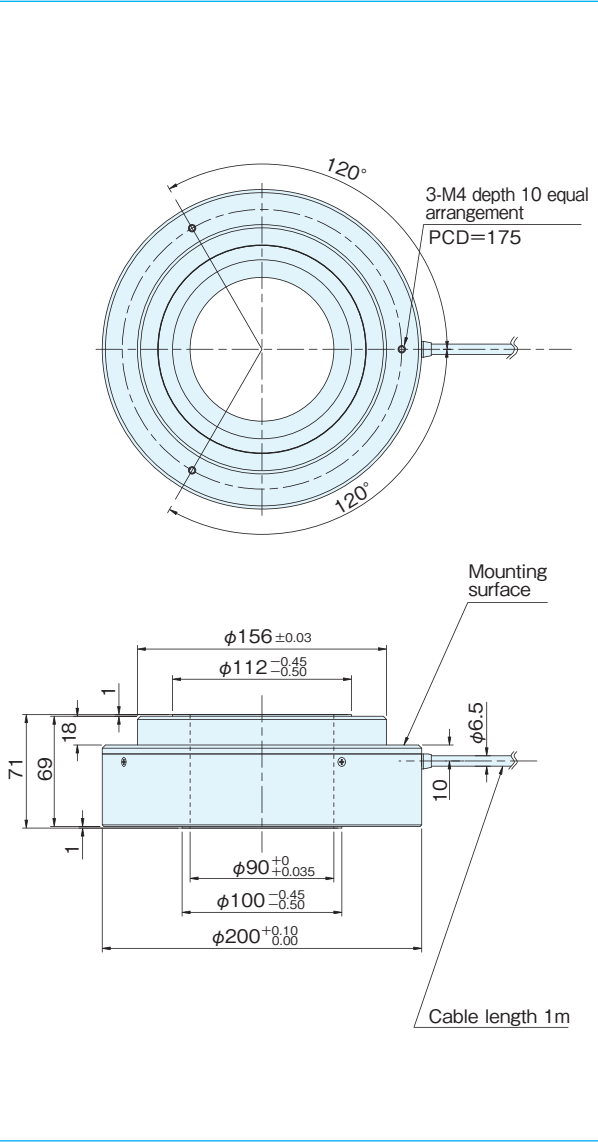


Specifications

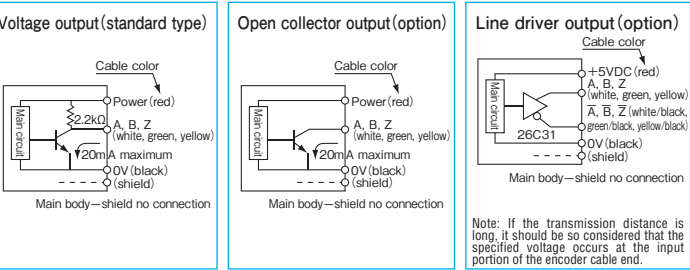
Type name		MEH-180- P	
		Pulse number Output circuit ●No entry=voltage output ●C=open collector output ●E=line driver output ●ST(2-4-5-8-10-16-20)	
Item		Square wave	Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)
Supply voltage		Voltage/Open collector:DC5V-5%~12V+10% Open collector DC24V:DC24V±10% Line driver:DC5V±5%	Voltage:DC5V-5%~12V+10% Open collector:DC5V-5%~24V+10% Line driver:DC5V±5%
Current consumption		Voltage·Open collector output 60mA or less Line driver output 100mA or less	Voltage·Open collector output 100mA or less(under no load) Line driver output 140mA or less(under no load)
Detection system		Incremental	Incremental
Output	Output pulse number (Standard) [Pulse number/rotation]	36,000(*) 54,000(*) 72,000(*)	EX 72,000×2(144,000) 72,000×4(288,000) 72,000×5(360,000) 72,000×8(576,000) 72,000×10(720,000) 72,000×16(1152,000) 72,000×20(1440,000)
	Output phase	A, B, Z phase	A, B, Z phase
	Output form	Square wave	Square wave
	Output capacity	Sink current:20mA Residual voltage:0.5V or less(at 10mA)	—
	Maximum response frequency (response pulse number)	Voltage·Open collector output:100kHz Line driver output:300kHz	Line driver output:100kHz×(by multiplication) Voltage·Open collector output:100kHz
	Output phase difference	A, B phase difference 90°±45°(T/4±T/8) Z phase T±T/2(see Output Waveform)	Refer to the figure on the right
	Waveform rise/fall time	Voltage·Open collector output:2μs or less Line driver output:0.5μs or less (When used with output cable of 1m or less)	Voltage·Open collector output:2μs or less Line driver output:0.5μs or less (When used with output cable of 1m or less)
Allowable load of shaft (electrical)	Radial	29.4N(3kgf)	29.4N(3kgf)
	Thrust	19.6N(2kgf)	19.6N(2kgf)
Maximum allowable revolutions (mechanical)		300r/min	300r/min
Working ambient temperature/humidity		0°C~50°C RH35%~90% no dewing	0°C~50°C RH35%~90% no dewing
Storing ambient temperature		-20°C~80°C	-20°C~80°C
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter φ6.5 14-core Insulated shield cable (length 1m)	Outside diameter φ6.5 14-core vinyl wire Insulated shield cable (length 1m)
Mass		5kg	5kg

*Handled by built-in multiplier circuit

Outside dimensions

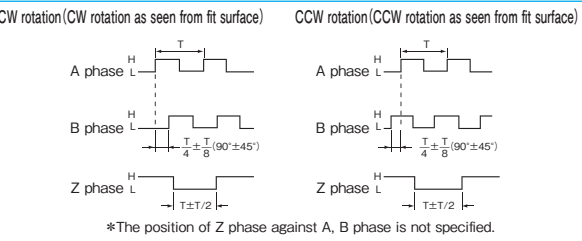


Output circuit diagram

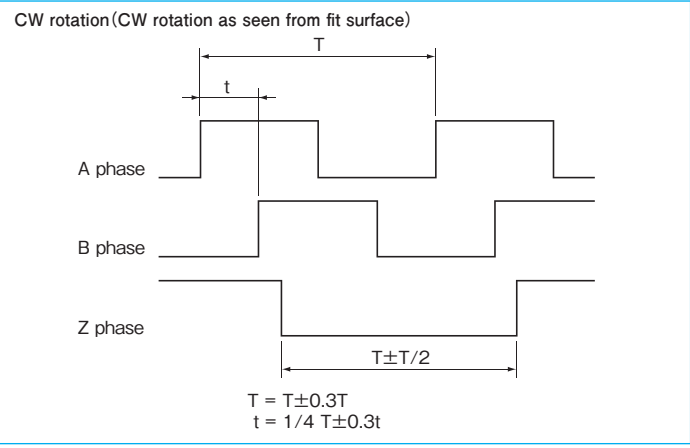


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

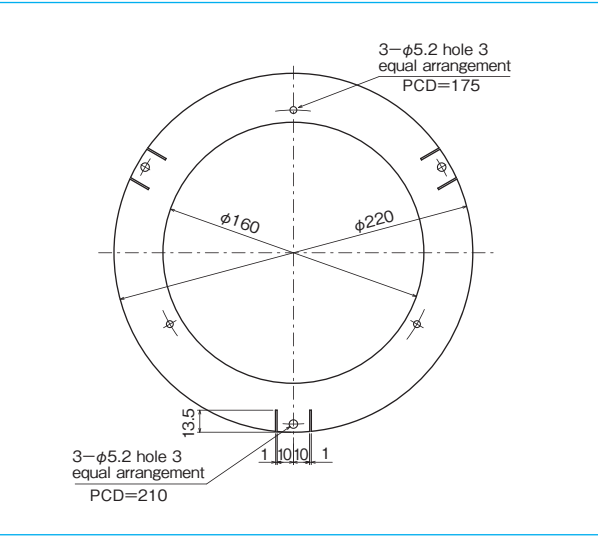
Output waveform (Square wave)



Output waveform/Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)



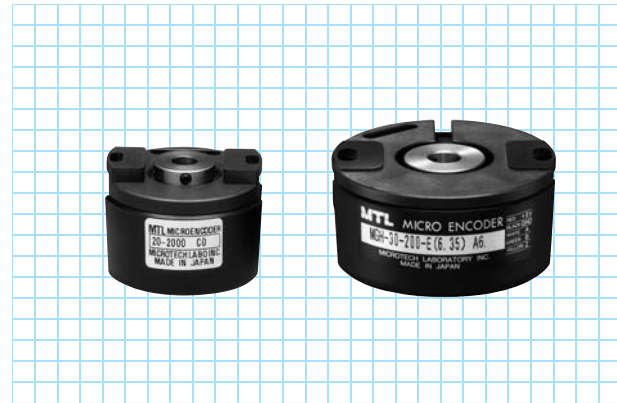
Spring flange MEH-180 (Option)



MGH series

[Square Wave/Incremental]

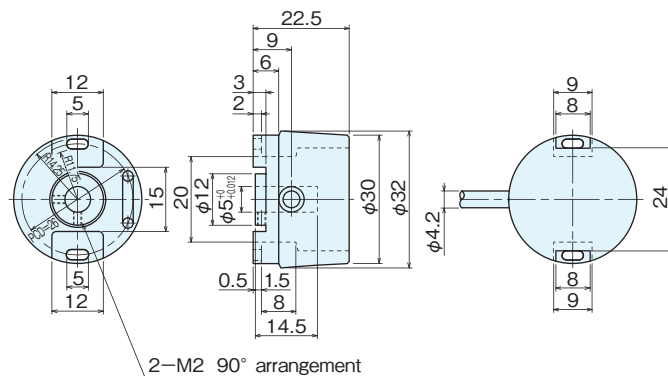
Can be easily attached to DC motors, AC motors, and stepping motors.



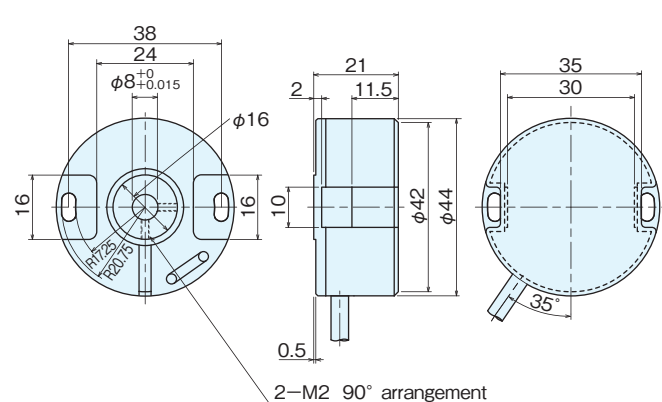
MGH-20, MGH-30

Outside dimensions

MGH-20



MGH-30



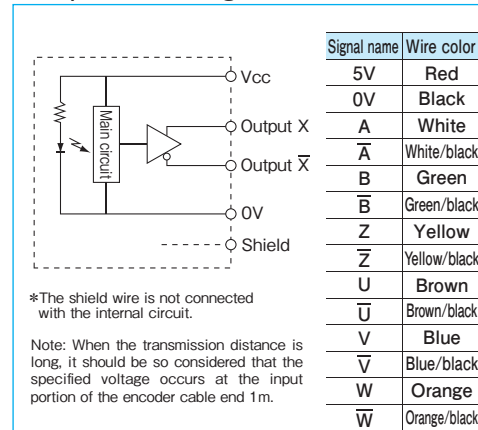
Specifications

Type name	MGH-20-□-E□	MGH-30-□-E□
Item	Pulse number CS signal ●No entry=nil ●CS=available	Pulse number CS signal ●No entry=nil ●CS=available
Supply voltage	DC5V±10%	
Current consumption	60mA or less (under no load)	
Detection system	Incremental	
Output pulse number (Standard) [Pulse number/rotation]	40 300 1,000 50 360 1,024 60 400 1,200 100 500 125 512 200 600 250 800	40 400 1,000 50 450 1,024 60 500 1,200 100 512 1,500 200 600 1,800 250 720 2,000 360 900
Output phase	A, $\bar{A}$, B, $\bar{B}$, Z, $\bar{Z}$ phase*with CS signal U, $\bar{U}$, V, $\bar{V}$, W, $\bar{W}$ phase	
Output form	Square wave Line driver output	
Output capacity	$V_{OL}=0.5V_{max}$ $V_{OH}=2.5V_{min}$ $I_o=\pm 20mA$	
Maximum response frequency (response pulse number)	100kHz	
Output phase difference	A, B phase difference $90^\circ \pm 45^\circ (T/4 \pm T/8)$ Z phase $T \pm T/2$ With CS signal (U, V, W) 4 poles, 60° phase difference 3 signals	
Waveform rise/fall time	1 μs or less (with 0.5m cable)	
Maximum allowable revolutions (mechanical)	6,000r/min	
Working ambient temperature/ humidity	$-10^\circ C \sim 70^\circ C$ RH35%~90% no dewing	
Storing ambient temperature	$-20^\circ C \sim 80^\circ C$	
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable	Outside diameter $\phi 4.2(\phi 6.8)$ 8-core (19-core) vinyl wire Insulated shield cable length 1m (length 0.5m)	
Mass	60g	150g

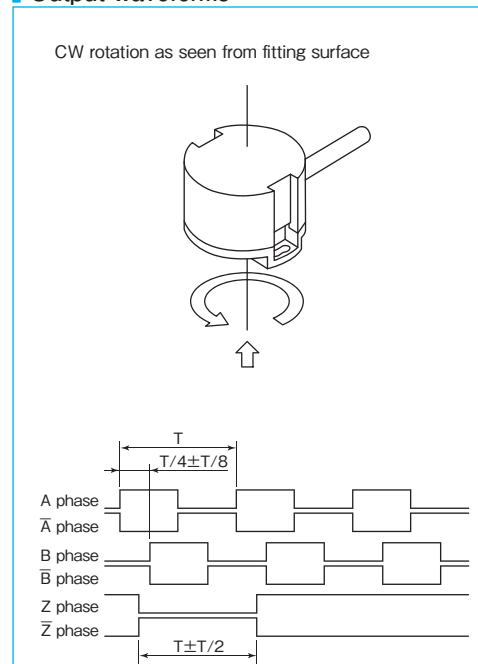
Allowable change amount of fitting shaft

MGH-20	Pulse number	100~200	250~600	800~1,200
MGH-30	Pulse number	100~300	360~1,024	1,200~2,000
Allowable eccentricity	Radial	$\pm 0.02mm$		$\pm 0.01mm$
	Thrust	$\pm 0.1mm$	$\pm 0.05mm$	$\pm 0.02mm$

Output circuit diagram

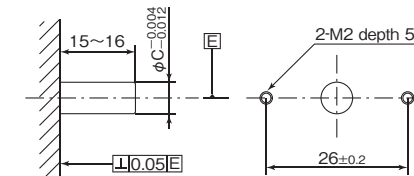


Output waveforms

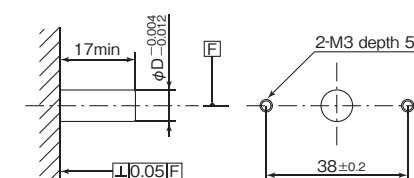


Fitting shaft dimensions

MGH-20



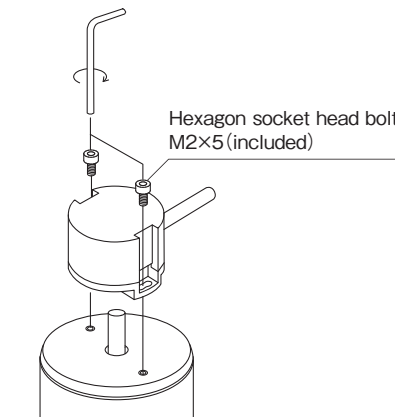
MGH-30



Assembling image of MGH series

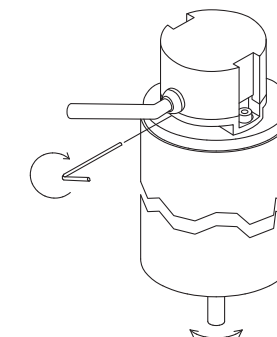
MGH-20, 30

1. Fix the encoder to the base of rotating shaft.

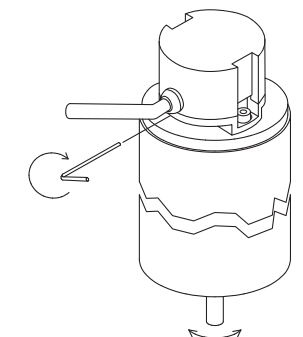


●Tools to be used
0.89mm hexagon wrench (included)
1.5mm hexagon wrench

2. ① Search for a screw by turning the rotating shaft and fix it.



2. ② Turn the shaft 90° right or left and fix the other screw.



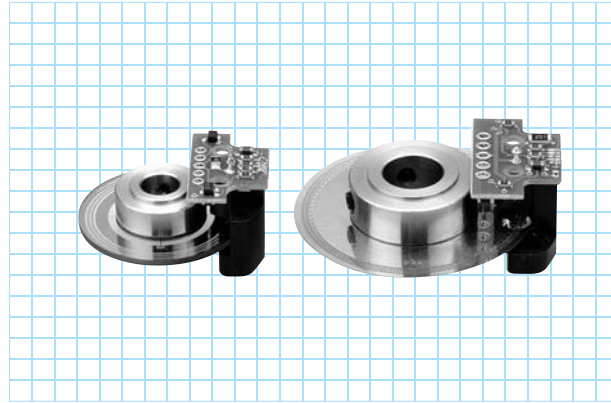
Note: Evenly tighten the screws in 2. ① and 2. ②
Note: Recommended tightening torque: 0.18 N·m

3. Affix encoder to base of rotating axle.

Note: Recommended tightening torque: 0.18 N·m

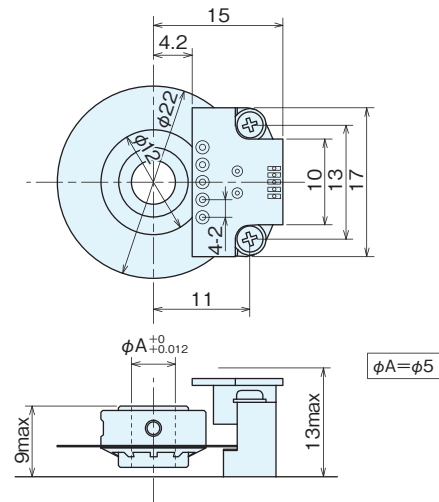
MG series

[Module Kit]

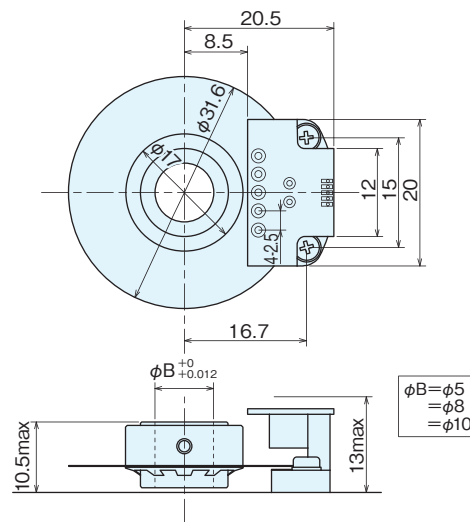


Outside dimensions

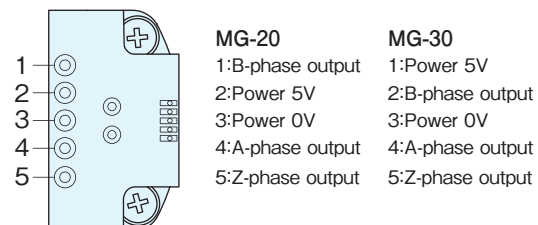
MG-20



MG-30



Output pin position encoder



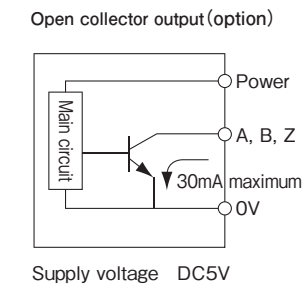
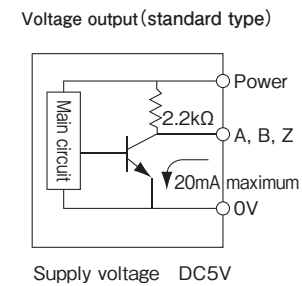
Specifications

Type name		MG-20- 		MG-30- 	
Item		Pulse number Output circuit ●No entry=voltage output ●C=open collector output		Pulse number Output circuit ●No entry=voltage output ●C=open collector output	
Supply voltage		DC5V±10%			
Current consumption		30mA or less (under no load)			
Detection system		Incremental			
Input	Output pulse number (Standard) [Pulse number/rotation]	100	500	100	600 2,000
		200	512	200	800
		250	600	250	1,000
		256	800	300	1,024
		300	1,000	360	1,200
		360	1,024	400	1,500
		400	1,200	500	1,800
	Output phase	A, B, Z phase (Z=H)			
Output form	Square Wave				
Output capacity	Sink current:30mA Residual voltage:0.5V or less(at 10mA)				
Maximum response frequency (response pulse number)	100kHz				
Output phase difference	A, B phase difference 90° (T/4±T/8) Z phase T±T/2				
Waveform rise/fall time	2μs or less				
Maximum allowable revolutions (mechanical)		10,000r/min (such that the maximum response frequency is not exceeded)			
Working ambient temperature/ humidity		-10°C~70°C RH35%~90% no dewing			
Storing ambient temperature		-20°C~80°C			
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions			
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions			
I/O terminals		PCB through hole terminals (refer to outside dimensions diagram)			
Mass		10g or less		20g or less	

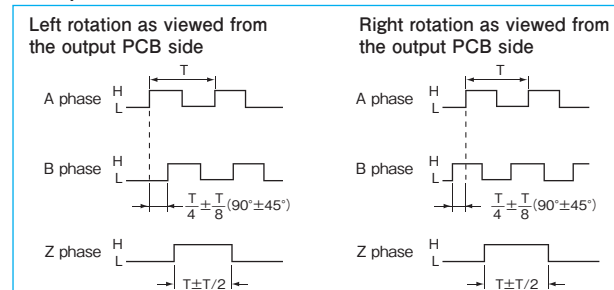
Allowable change amount of fitting shaft

MG-20	Pulse number	100~200	250~600	800~1,200
MG-30	Pulse number	100~300	400~1,024	1,200~2,000
Allowable eccentricity	Radial	±0.05mm		±0.02mm
	Thrust	±0.2mm	±0.1mm	±0.05mm

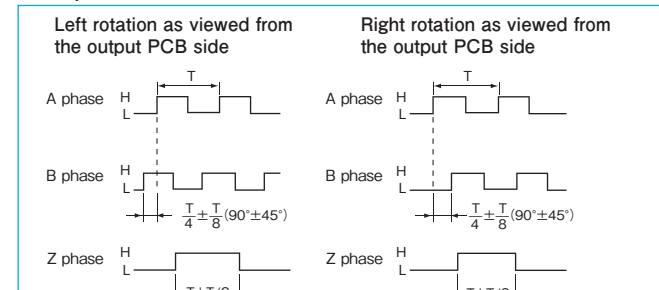
Output circuit diagram



Output waveforms MG-20



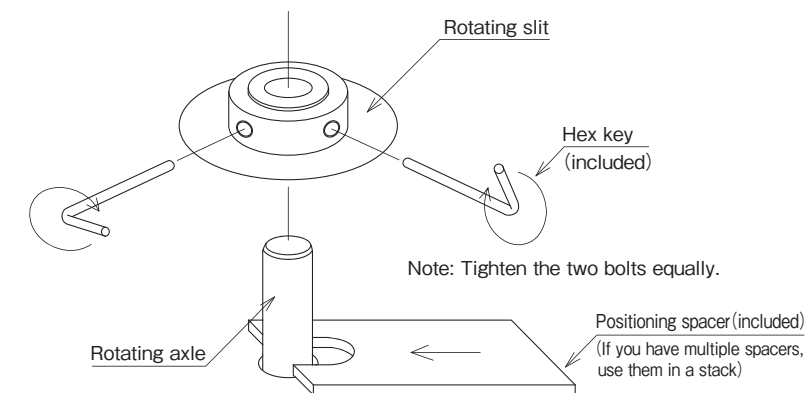
Output waveforms MG-30



Assembling image of MG series

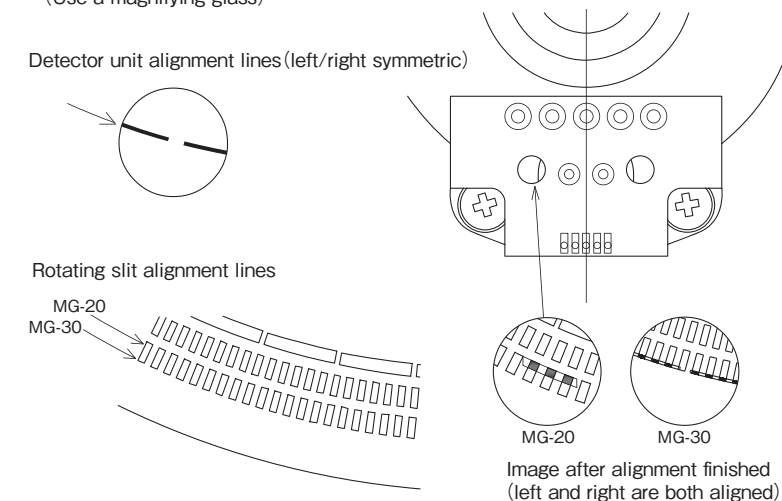
1. Attach the rotating slit

Attach the rotating slit using the positioning spacer.



2. Fit the detector unit

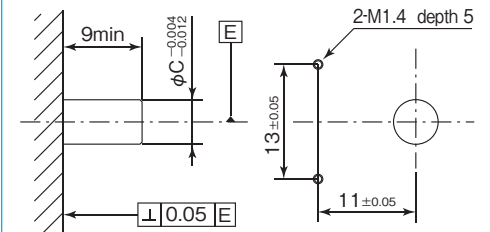
Attach and adjust the position of the detector unit using the included bolts and washers.
(Use a magnifying glass)



Fitting shaft dimensions

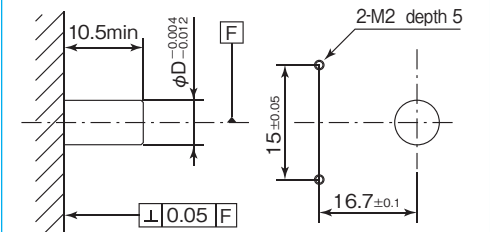
MG-20

Note: Refer also to the axle variation tolerance



MG-30

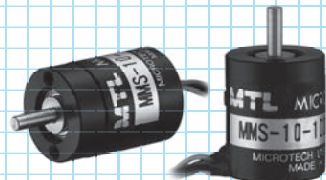
Note: Refer also to the axle variation tolerance



MMS-10 series

[Absolute]

- Magnetic encoder with external dimensions $\phi 13\text{mm} \times \text{height } 15.5\text{mm}$
- Resolution 1024, SSI interface



MAS-10 series

[Absolute]

- Ultra compact absolute encoder
- $\phi 13 \times H15.5$
- Resolution 256 (8-bit)



Actual size

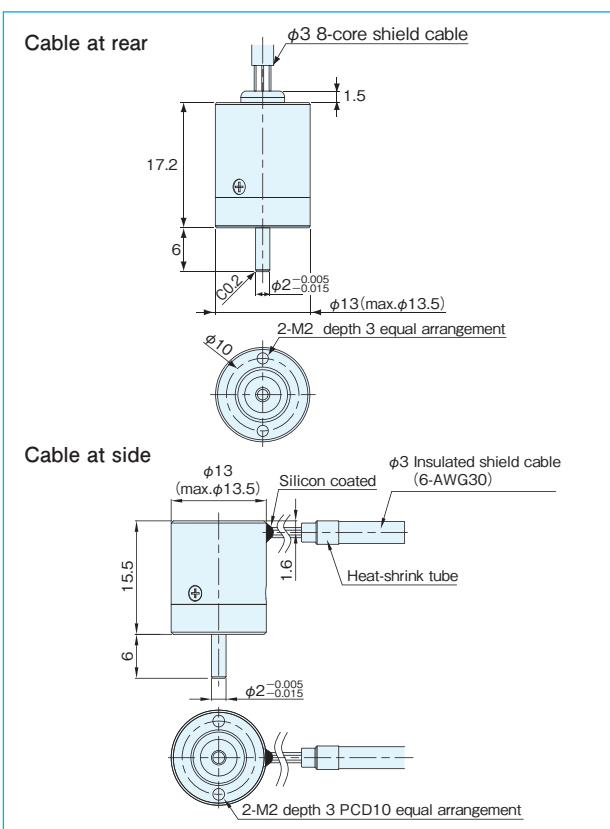
Encoder Specifications

Item	Type name	MMS-10- Pulse number Cable
Supply voltage		DC5V $\pm 5\%$
Current consumption		50mA or less (under no load)
Resolution		256(8bit) 360, 512(9bit) 1,024(10bit)
Allowable revolutions		6000r/min
Allowable load of shaft (electrical)	Radial	1.9N (200gf)
	Thrust	1.9N (200gf)
Working temperature/humidity		$-10^{\circ}\text{C} \sim +70^{\circ}\text{C} / \text{RH}35\% \sim 90\%$
Storage temperature		$-20^{\circ}\text{C} \sim +100^{\circ}\text{C}$
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter $\phi 3$ 6-core Insulated shield cable AWG30 (length 1m)
Mass		40g

Connection

Cable color	Encoder connection	Cable color	Encoder connection
Red	5V $\pm 5\%$	Green	CLOCK
Black	0V (COMMON)	Blue	/CLOCK
White	DATA		
Brown	/DATA		
Shield			

Encoder Outside dimensions



Decoder specifications (37 $\times$ 37 PCB)

Item	Type name	DECODER- $\triangle\triangle$ bit
Supply voltage		DC5V $\pm 5\%$
Current consumption		60mA or less (110mA or less including encoder)
Parallel data update cycle		60 μ s (16.7kHz)
Output circuit		NPN open collector output (when using parallel output)
Output capacity		Sink current 20mA max. Load voltage 35Vmax. Residual voltage 0.4V or less
Logic		Negative logic (H=0, L=1)
Connection		Power supply and parallel signal output by P=2.54 header pins (see diagram below)

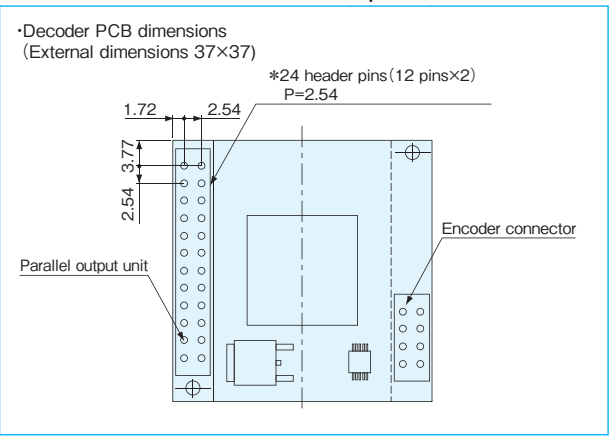
$\triangle\triangle \cdots 8, 9, 10$ (corresponding to the encoder resolution)

Connection diagram

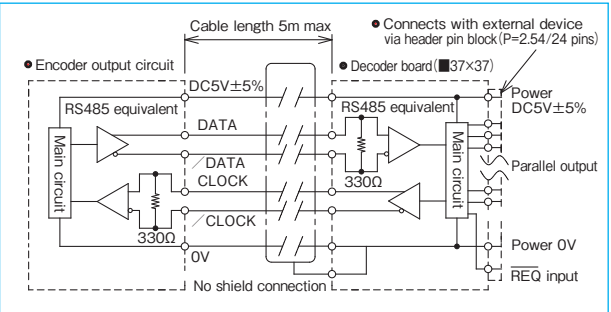
Decoder board TH No.

TH No.	Parallel output / Power	TH No.	Parallel output / Power
1	5V $\pm 5\%$	8	Output 2 ⁴
2	0V (COMMON)	9	Output 2 ³
3	Output 2 ⁹	10	Output 2 ²
4	Output 2 ⁸	11	Output 2 ¹
5	Output 2 ⁷	12	Output 2 ⁰
6	Output 2 ⁶	13~24	NC
7	Output 2 ⁵		

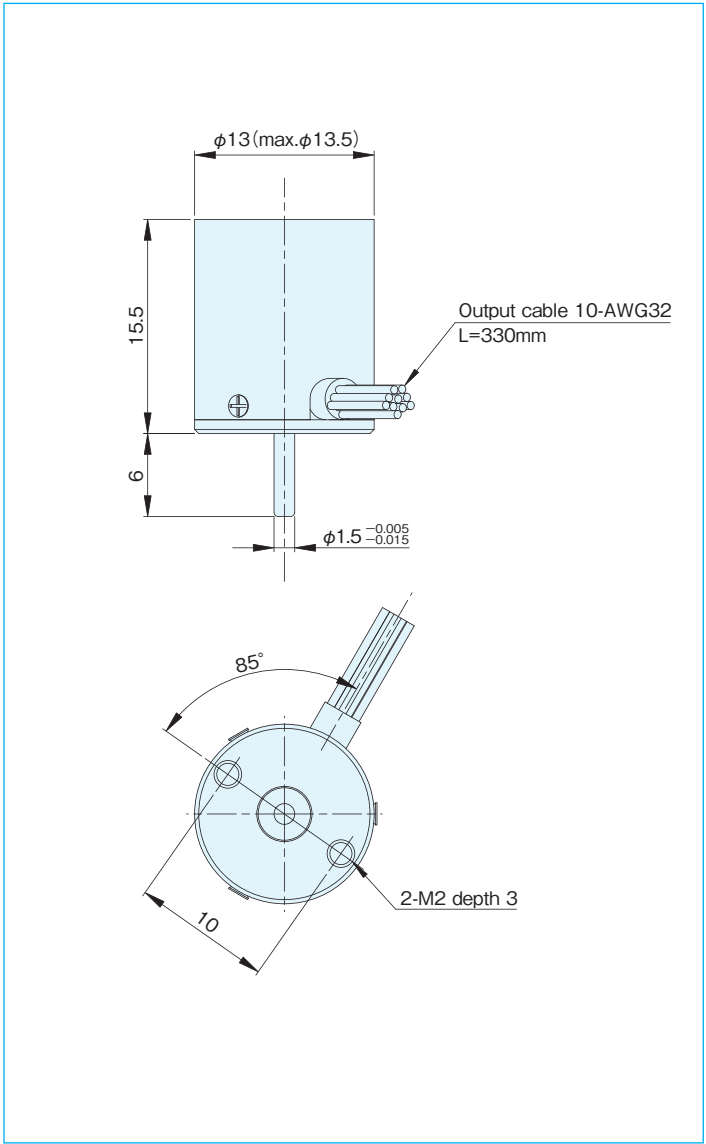
Decoder Outside dimensions (Option)



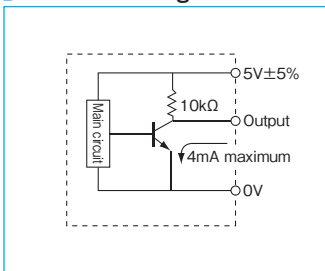
I/O circuit diagram



Outside dimensions



I/O circuit diagram



Specifications

Item	Type name	MAS-10-256G1
Supply voltage		DC5V $\pm 5\%$
Current consumption		40mA or less (under no load)
Output code		G: gray code
Logic		Negative logic (H=0, L=1)
Resolution		256 (8 bits/rotation)
Output circuit		Voltage output
Output capacity		Max. sink current per bit 4mA Residual voltage 0.4V or less
Allowable load of shaft (electrical)	Radial	0.98N (100gf)
	Thrust	0.98N (100gf)
Maximum revolutions (mechanical)		6,000r/min
Maximum response frequency		20kHz
Working temperature/humidity		0 $^{\circ}\text{C} \sim +60^{\circ}\text{C} / \text{RH}35\% \sim 90\%$ no dewing
Storage temperature		$-20^{\circ}\text{C} \sim +80^{\circ}\text{C}$
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Mass		10g

Connection

Cable color	MAS-10-256 G
Black	0V (COMMON)
Red	5V $\pm 5\%$
Brown	Output 2 ⁰
Orange	Output 2 ¹
Yellow	Output 2 ²
Green	Output 2 ³
Blue	Output 2 ⁴
Purple	Output 2 ⁵
Gray	Output 2 ⁶
White	Output 2 ⁷

MAS-14 series

[Absolute]

- Outside dimensions:φ21×16.5mm
- Resolution:18bit, SSI interface



NEW

MA-17 series

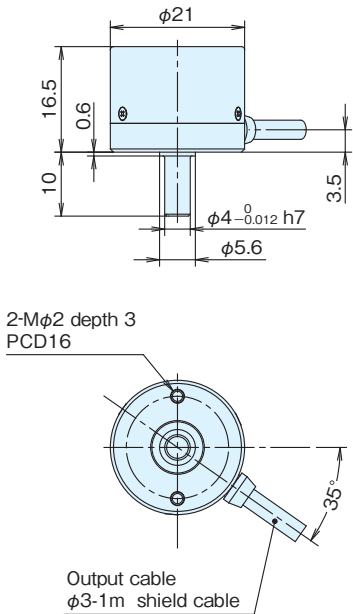
[Absolute]



Specifications

Type name	MAS-14-□□N1
Item	
Supply voltage	DC5V±5%
Current consumption	100mA or less (under no load)
Resolution	32,768 (15bit), 65,536 (16bit), 131,072 (17bit), 262,144 (18bit)
Allowable rotation	6000r/min
Allowable load of shaft (electrical)	Radial 0.98N (100gf) Thrust 1.9N (200gf)
Working temperature/humidity	−10℃~70℃/RH35%~90% no dewing
Storage temperature	−20℃~80℃
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable	Outside diameter φ3 6-core vinyl wire Insulated shield cable AWG28 (length 1m)
Mass	30g (excluding cable)

Outside dimensions

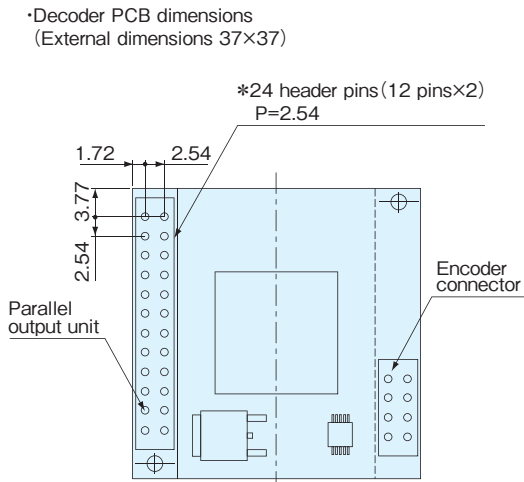


Decoder specifications (37×37 PCB)

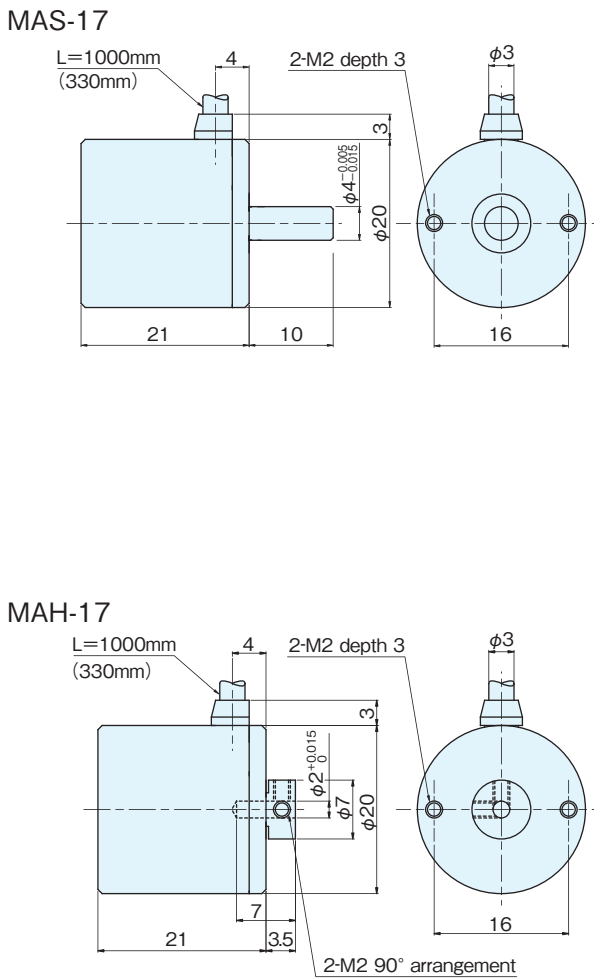
Type name	DECODER-△△bit
Item	
Supply voltage	DC5V ±5%
Current consumption	60mA or less (160mA or less including encoder)
Parallel data update cycle	60μs (16.7kHz)
Output circuit	NPN open collector output (when using parallel output)
Output capacity	Sink current 20mA or less Load voltage 35V or less Residual voltage 0.4V or less
Logic	Negative logic (H=0, L=1)
Connection	Power supply and parallel signal output by P=2.54 header pins (see diagram below)

△△...15, 16, 17, 18 (corresponding to the encoder resolution)

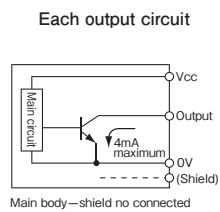
Decoder Outside dimensions (Option)



Outside dimensions



Output circuit diagram



Specifications

Type name	MA□-17-□□□1
Item	Shaft shape S=single shaft H=hollow shaft Pulse number G N B
Supply voltage	DC5V ±5%
Current consumption	80mA or less (under no load)
Output code	G:gray code, N:Pure binary code, B:BBC code
Logic	Negative logic (H=0, L=1)
Resolution	G, N 256(8 bits) 512(9 bits) 1024(10 bits) 1,000
Output circuit	NPN open collector (256 gray codes) CMOS output (256 pure binary and 512 or more divisions)
Output capacity	Sink current per bit 4mA (output withstand voltage 7V) Residual voltage 0.4V or less
Allowable load of shaft (electrical)	Radial 1.9N (200gf) Thrust 1.9N (200gf)
Maximum revolutions	6,000r/min
Maximum response frequency	20kHz
Working temperature/humidity	0℃~60℃/RH35%~90% no dewing
Storage temperature	−20℃~80℃
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable	256:Outside diameter φ3 10-core vinyl wire Insulated shield cable (length 1m) 512:1024:1000:Vinyl wire (AWG30) Cable length 330mm
Mass	40g (excluding cable)

Connection

Type cable color	MA□-17-1024 G1	MA□-17-1024 N1	MA□-17-1000 B1
Black	0V (COMMON)		
Red	5V ±5%		
Brown	Output 2 ⁰		Output 2 ⁰
Brown/black	Output 2 ¹		Output 2 ¹
Orange	Output 2 ²		Output 2 ²
Orange/black	Output 2 ³		Output 2 ³
Yellow	Output 2 ⁴		Output 2 ⁰ ×10
Yellow/black	Output 2 ⁵		Output 2 ¹ ×10
Green	Output 2 ⁶		Output 2 ² ×10
Green/black	Output 2 ⁷		Output 2 ³ ×10
Blue	Output 2 ⁸		Output 2 ⁰ ×10 ²
Blue/black	Output 2 ⁹		Output 2 ¹ ×10 ²
Purple	—		Output 2 ² ×10 ²
Purple/black	—		Output 2 ³ ×10 ²

MAS-18 series

[Absolute]

- Outside dimension: $\phi 25\text{mm} \times 15\text{mm}$
- Resolution: 18bit, SSI interface



NEW

MAH-19 series

[Absolute]

- Outside dimensions: $\phi 30 \times 16.5\text{mm}$
- Through Shaft
- Resolution: 19bit, SSI interface

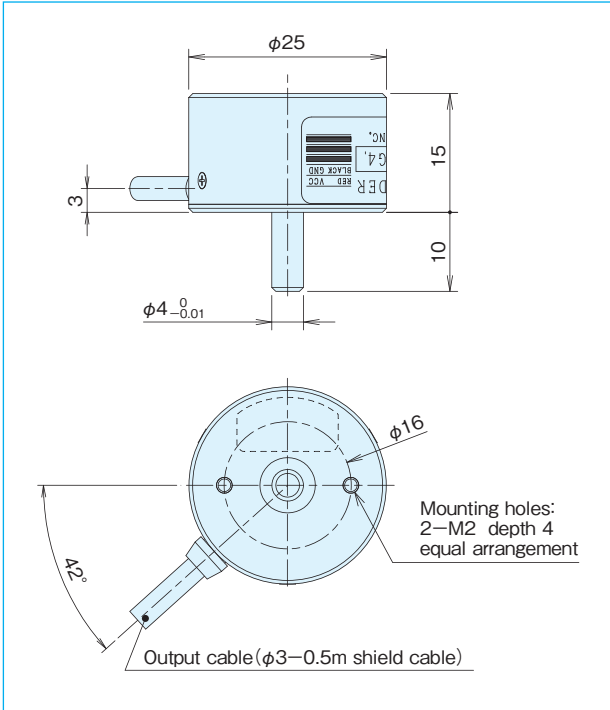


NEW

Encoder specifications

Item	Type name	MAS-18-□□N1
Supply voltage		DC5V $\pm 5\%$
Current consumption		100mA or less (under no load)
Resolution		32,768 (15bit), 65,536 (16bit) 131,072 (17bit), 262,144 (18bit)
Allowable revolutions		6000r/min
Allowable load of shaft (electrical)	Radial	1.9N (200gf)
	Thrust	1.9N (200gf)
Working temperature/humidity		$-10^{\circ}\text{C} \sim +70^{\circ}\text{C}$ / RH35%~90%
Storage temperature		$-20^{\circ}\text{C} \sim +80^{\circ}\text{C}$
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter $\phi 3$ -8-core vinyl wire Insulated shield cable AWG30 (length 0.5m)
Data formats		RS422 SSI Point To Point
Mass		30g

Encoder outside dimensions

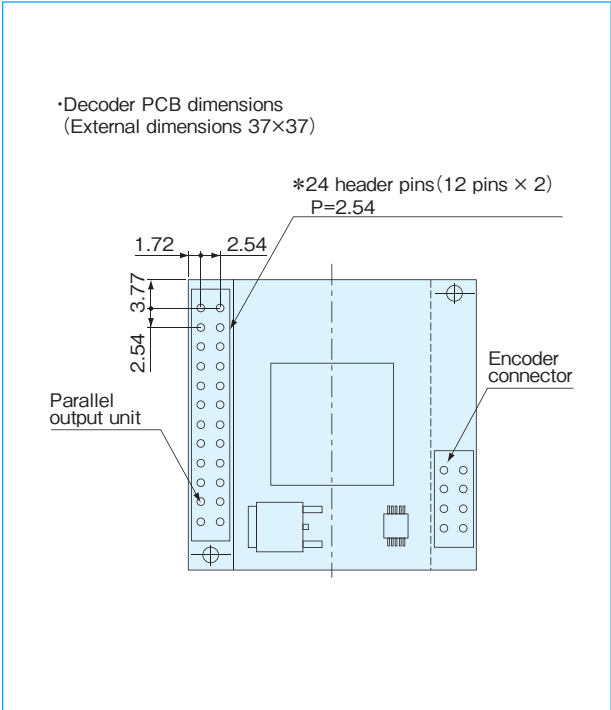


Decoder Specifications (37×37 PCB)

Item	Type name	DECODER-△△bit
Supply voltage		DC5V $\pm 5\%$
Current consumption		60mA or less (160mA or less including encoder)
Parallel data update cycle		60 μ s (16.7kHz)
Output circuit		NPN open collector output (when using parallel output)
Output capacity		Sink current 20mA max. Load voltage 35V max. Residual voltage 0.4V or less
Logic		Negative logic (H=0, L=1)
Connection		Power supply and parallel signal output by P=2.54 header pins (see diagram below)

△△...15, 16, 17, 18 (corresponding to the encoder resolution)

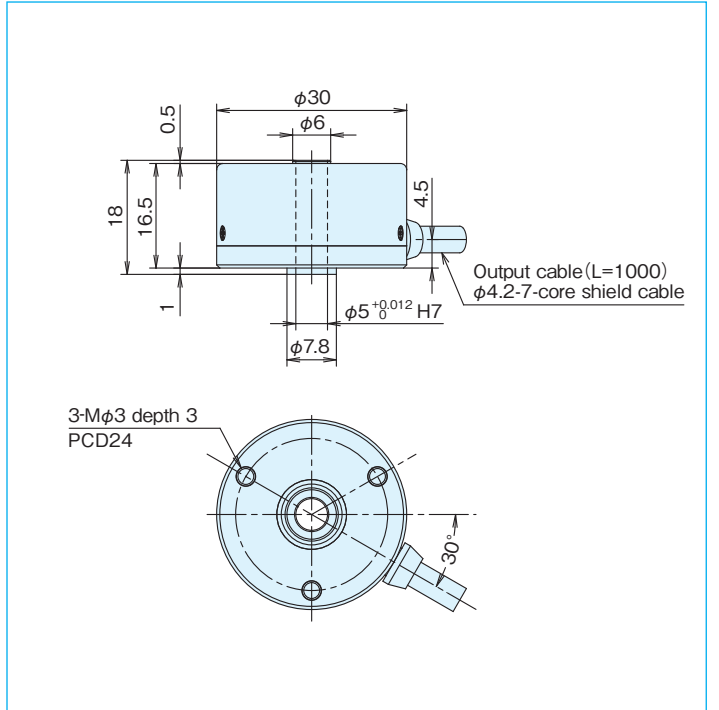
Decoder Outside dimensions (Option)



Specifications

Item	Type name	MAH-19-□□N1
Supply voltage		DC5V $\pm 5\%$
Current consumption		100mA or less (under no load)
Resolution		65,536 (16bit), 131,072 (17bit) 262,144 (18bit), 524,288 (19bit)
Allowable rotation		6000r/min
Allowable load of shaft (electrical)	Radial	9.8N (1kgf)
	Thrust	4.9N (0.5kgf)
Working temperature/humidity		$-10^{\circ}\text{C} \sim +70^{\circ}\text{C}$ / RH35%~90% no dewing
Storage temperature		$-20^{\circ}\text{C} \sim +80^{\circ}\text{C}$
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter $\phi 4.2$ 7-core vinyl wire Insulated shield cable AWG28 (length 1m)
Mass		30g (excluding cable)

Outside dimensions

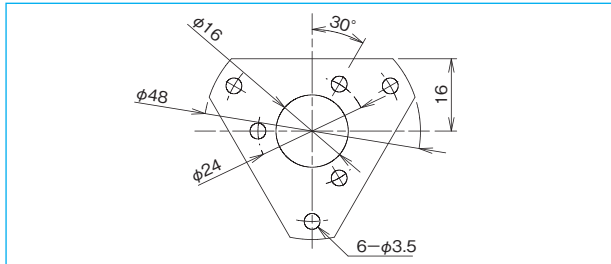


Decoder specifications (37×37 PCB)

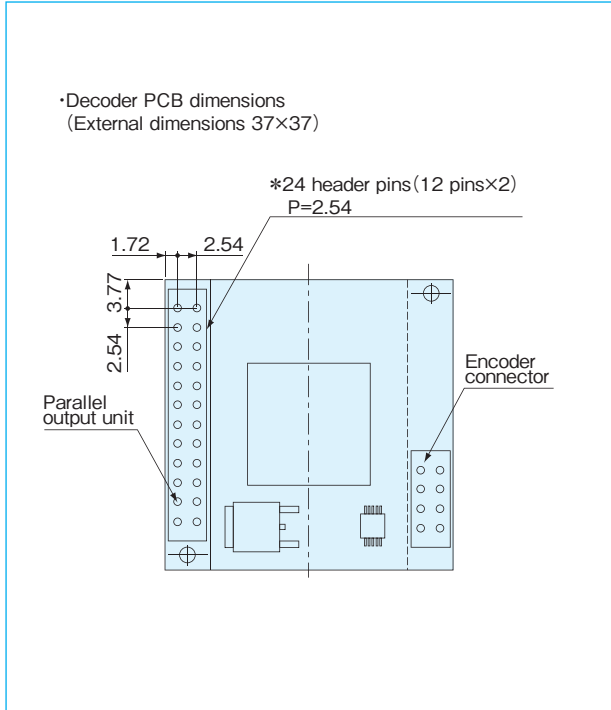
Item	Type name	DECODER-△△bit
Supply voltage		DC5V $\pm 5\%$
Current consumption		60mA or less (160mA or less including encoder)
Parallel data update cycle		60 μ s (16.7kHz)
Output circuit		NPN open collector output (when using parallel output)
Output capacity		Sink current 20mA or less Load voltage 35V or less Residual voltage 0.4V or less
Logic		Negative logic (H=0, L=1)
Connection		Power supply and parallel signal output by P=2.54 header pins (see diagram below)

△△...16, 17, 18, 19 (corresponding to the encoder resolution)

Spring flange MEH-19 (Option)



Decoder Outside dimensions (Option)



MA-20 series

[Absolute]



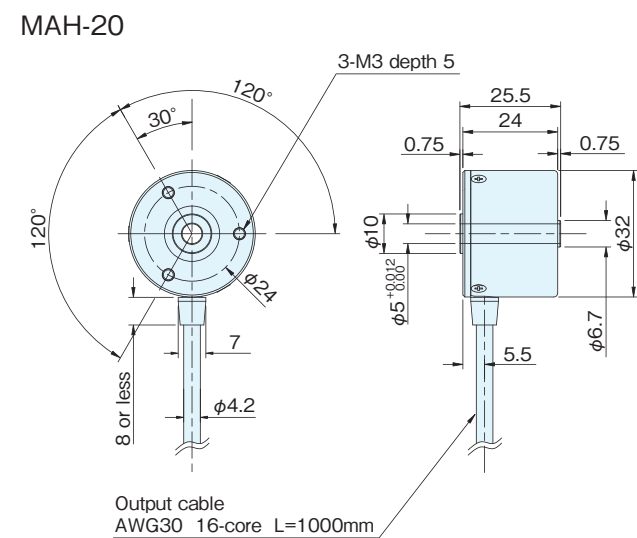
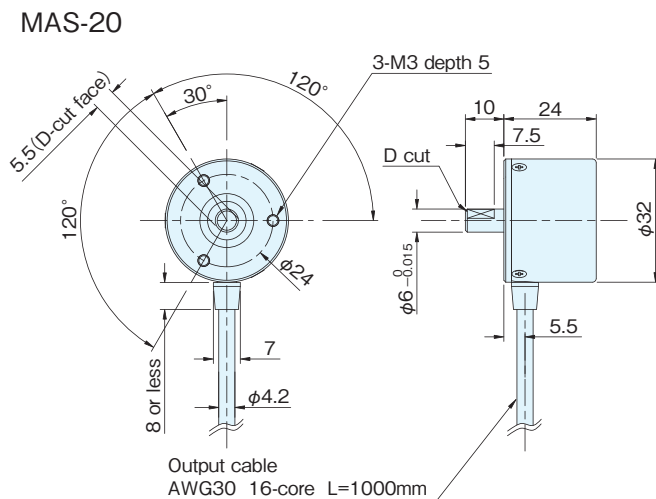
MAH-28

[Absolute]

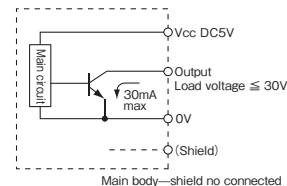
- Outside dimensions: $\phi 40 \times 16.5\text{mm}$
- Through Shaft
- Resolution: 20bit, SSI interface



Outside dimensions



Output circuit diagram



*A capacitor (0.33 μ F) is connected between 0V and FG (frame ground).

Specifications

Type name		MA□□-20-□□1		
Item		Shaft shape □□ ●S=single shaft ●H=hollow shaft		Pulse number □□ ●G=gray code ●N=pure binary code ●B=BCD code
Supply voltage		DC5V±5%		
Current consumption		100mA or less (under no load)		
Output code		G1: gray code N1: pure binary code	B1: BCD code	
Logic		Negative logic (H=0, L=1)		
Resolution		256 1,024 4,096 512 2,048	3,600	
Output circuit		NPN open collector		
Output capacity		Sink current:30mAmax, load voltage:30Vmax, Output residual voltage:0.5V or less (Cable length 1m, Sink current:at 30mA)		
Allowable load of shaft (electrical)	Radial	14.7N (1.5kgf)		
	Thrust	4.9N (0.5kgf)		
Maximum revolutions (mechanical)		6,000r/min		
Maximum response frequency		10kHz		
Working temperature/humidity		-10℃~70℃ / 35%~90%RH no dewing		
Storage temperature		-20℃~80℃		
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions		
Cable		Outside diameter φ4.2 16-core vinyl wire Insulated shield cable (length 1m)		
Mass		150g (excluding cable)		

(*) Output code "B" is selectable only in Shaft shape "S"

Connection

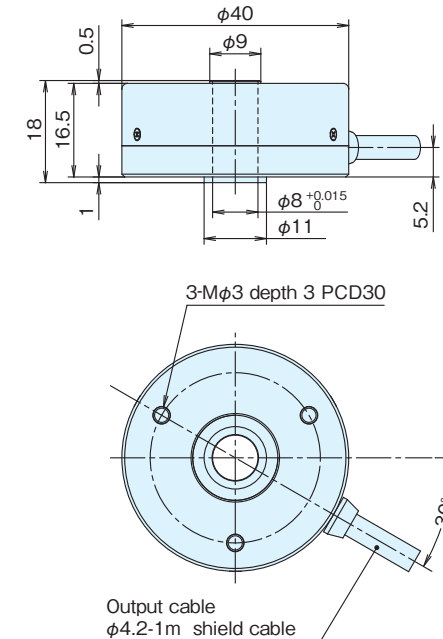
Type	Output signal		
Cable color	MA-20-□G1	MA-20-□N1	MA-20-□B1
Brown	Output 2 ⁰	Output 2 ⁰	Output 2 ⁰
Brown/Black	Output 2 ¹	Output 2 ¹	Output 2 ¹
Orange	Output 2 ²	Output 2 ²	Output 2 ²
Orange/Black	Output 2 ³	Output 2 ³	Output 2 ³
Yellow	Output 2 ⁴	Output 2 ⁰ ×10 ¹	Output 2 ⁰ ×10 ¹
Yellow/Black	Output 2 ⁵	Output 2 ¹ ×10 ¹	Output 2 ¹ ×10 ¹
Green	Output 2 ⁶	Output 2 ² ×10 ¹	Output 2 ² ×10 ¹
Green/Black	Output 2 ⁷	Output 2 ³ ×10 ¹	Output 2 ³ ×10 ¹
Blue	Output 2 ⁸	Output 2 ⁰ ×10 ²	Output 2 ⁰ ×10 ²
Blue/Black	Output 2 ⁹	Output 2 ¹ ×10 ²	Output 2 ¹ ×10 ²
Purple	Output 2 ¹⁰	Output 2 ² ×10 ²	Output 2 ² ×10 ²
Purple/Black	2 ¹¹	Output 2 ³ ×10 ²	Output 2 ³ ×10 ²
Gray	N.C.	Output 2 ⁰ ×10 ³	Output 2 ⁰ ×10 ³
White	N.C.	Output 2 ¹ ×10 ³	Output 2 ¹ ×10 ³
Red	Vcc (DC5V)		
Black	0V		

Note: The shield is in the encoder and not connected. A capacitor (0.1mF) is connected between 0V and FG.

Specifications

Type name	MAH-28-1048576N1	
Item		
Supply voltage	DC5V $\pm$ 5%	
Current consumption	100mA or less (under no load)	
Resolution	262,144 (18bit) 524,288 (19bit) 1,048,576 (20bit)	
Allowable rotation	6000r/min	
Allowable load of shaft (electrical)	Radial	14.7N (1.5kgf)
	Thrust	4.9N (0.5kgf)
Working temperature/humidity	-10°C~70°C / RH35%~90% no dewing	
Storage temperature	-20°C~80°C	
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable	Outside diameter $\phi 4.2$ 7-core vinyl wire Insulated shield cable AWG28 (length 1m)	
Mass	80g (excluding cable)	

Outside dimensions

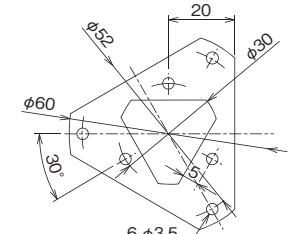


Decoder specifications (37×37 PCB)

Type name	DECODER-△△bit
Item	
Supply voltage	DC5V $\pm$ 5%
Current consumption	60mA or less (160mA or less including encoder)
Parallel data update cycle	60 μ s (16.7kHz)
Output circuit	NPN open collector output (when using parallel output)
Output capacity	Sink current 20mA or less Load voltage 35V or less Residual voltage 0.4V or less
Logic	Negative logic (H=0, L=1)
Connection	Power supply and parallel signal output by P=2.54 header pins (see diagram below)

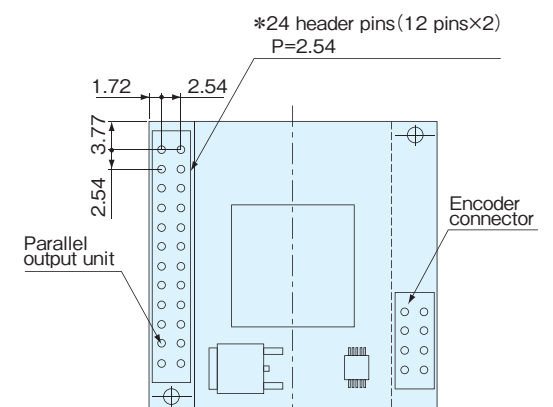
△△...18, 19, 20 (corresponding to the encoder resolution)

Spring flange MEH-28 (Option)



Decoder Outside dimensions (Option)

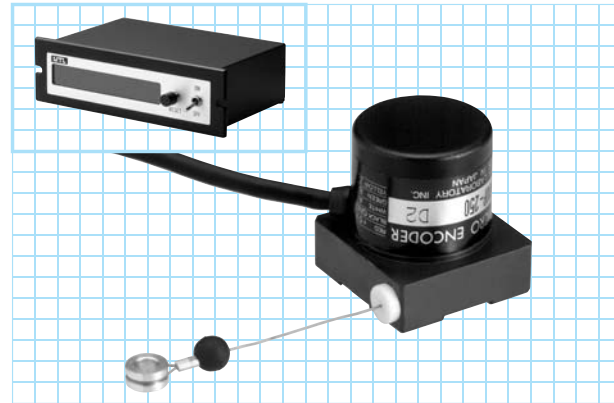
Decoder PCB dimensions (External dimensions 37×37)



MLS-12 series

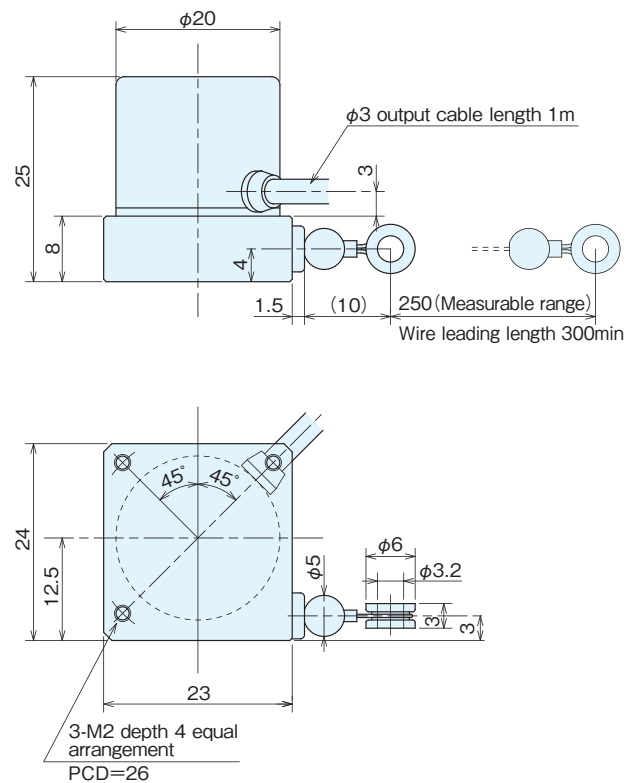
[Wire-Type Linear Scale]

- Smallest in the series: Outside dimensions 23×24×25 (H)
- Stroke: 250 mm
- Resolution: Selection from among 0.1 mm, 0.04 mm
- Lightweight: 60g



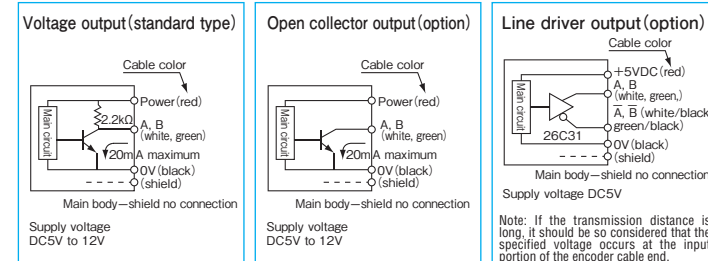
Outside dimensions

MLS-12



Note: Usage warning: The wire may stop midway through retracting.
When this happens, slowly pull out the full length and then slowly retract again before using.

Output circuit diagram



Specifications

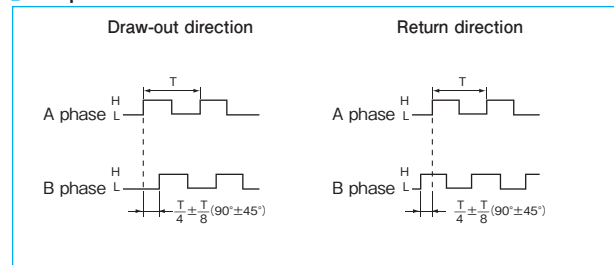
Type name	MLS-12- Pulse number -250
Item	Output circuit ●No entry=voltage output ●C=open collector output ●E=line driver output
Measuring range	250mm
Supply voltage	Voltage/Open collector:DC5V~12V±10%, Line driver:DC5V±5%
Current consumption	40mA or less (under no load)
Detection system	Incremental
Stroke speed mm/sec	250
Wire tensile force	0.29N~0.59N (30~60gf)
Output pulse number [Minimum resolution]	600 [0.1mm] 1,500 [0.04mm]
Output phase	A, B phase
Output form	Square wave
Output capacity	Sink current:20mA Residual voltage:0.5V or less (at 10mA)
Maximum response frequency (response pulse number)	50kHz
Working ambient temperature/humidity	0°C~50°C RH95% no dewing
Storing ambient temperature	-20°C~80°C
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable	Outside diameter $\phi 3$ vinyl wire Insulated shield cable
Mass	60g

Specifications/micro linear scale (detecting portion + indicating portion)

Type name	MLS-12-01-250	MLS-12-001-250
Measuring range mm	10	100
Output pulse/1mm	±1	±1
Counter accuracy pulse	±1	±1
Minimum reading	0.1	0.01
Power	AC100V 50/60Hz 180mA max	
Counter mode	10 Decimal	
Count indication	0~±999999.9	0~±99999.99
Reset	Reset switch provided *External signal resetting possible	
External output	*BCD parallel output	
Mass	700g	
Power cord	2m with plug	

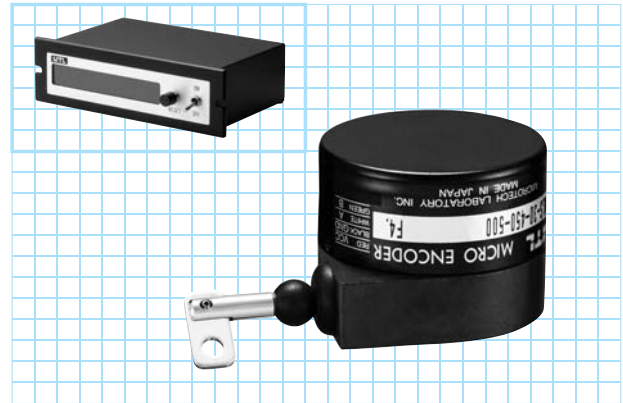
Note: For counter specifications, see DC Series. * indicates option.

Output waveform

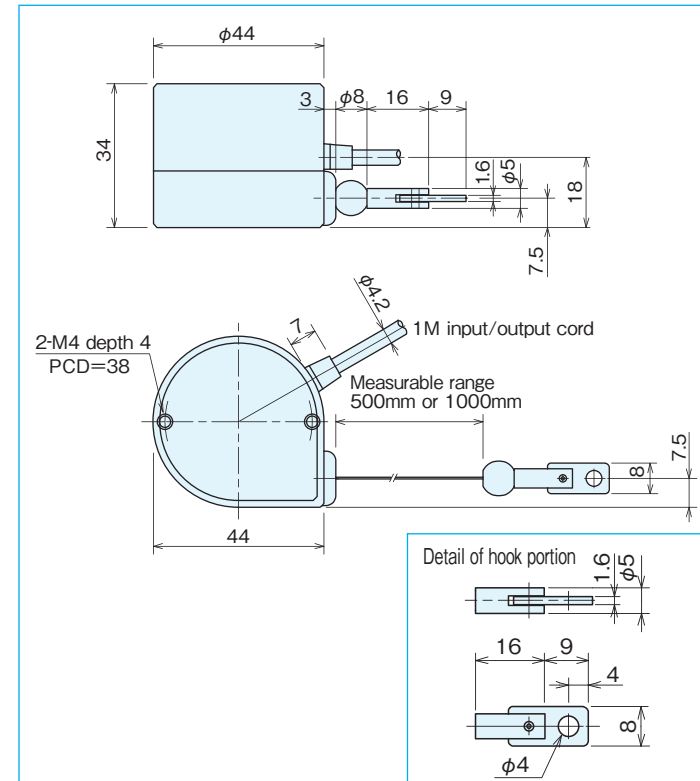


MLS-30 series

[Wire-Type Linear Scale]

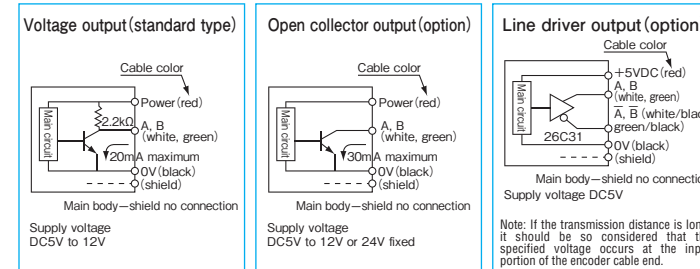


Outside dimensions



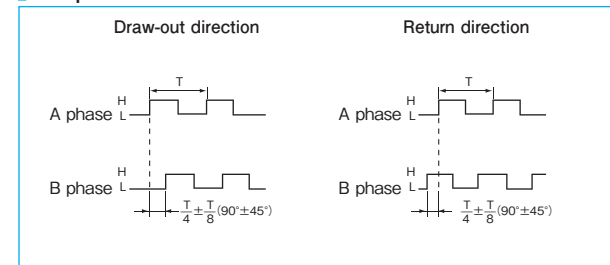
Note: Usage warning: The wire may stop midway through retracting.
When this happens, slowly pull out the full length and then slowly retract again before using.

Output circuit diagram



A capacitor (0.1 μ F) is connected between 0V and FG (frame ground).

Output waveform



Specifications/linear scale encoder (detection portion)

Type name	MLS-30- Pulse number -500-1000
Item	Output circuit ●No entry=voltage output ●C=open collector output ●E=line driver output ●C4=open collector output DC24V
Measuring range mm	500 1,000 500 1,000
Output pulse/1mm	5 5 50 50
Stroke speed mm/sec	1,000 1,000 1,000 1,000
Absolute accuracy mm	±0.25 ±0.5 ±0.25 ±0.5
Minimum resolution mm	0.2 0.2 0.02 0.02
Supply voltage	DC5V~5%~12V±10% DC24V±10% (option) Line driver:DC5V±5%
Current consumption	60mA or less (under no load)
Output phase	A phase, B phase
Output form	Square wave
Output capacity	Sink current 20mA or less, residual voltage 0.5V or less (at 10mA)
Response frequency	100kHz
Output phase	A, B phase difference 90°±45°
Waveform rise/fall time	2 μ sec or less
Wire tensile force	0.98N~2.94N (100gf~300gf)
Working ambient temperature/humidity	0°C~50°C / RH35%~90%
Storage ambient temperature	-20~80°C
Vibration resistance	Endurance 10 to 55Hz Double amplitude 2 hours each in X, Y, and Z directions
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable	Insulated shield wire Outside diameter $\phi 4.2$ vinyl wire
Mass	185g

Note: The output pulse or resolution is possible to 4 multiple with the counter.

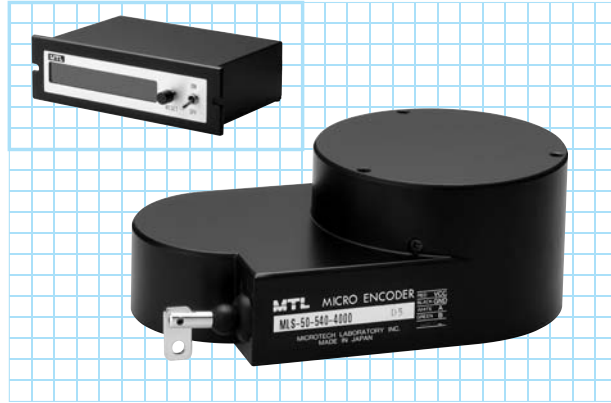
Specifications/micro linear scale (detecting portion + indicating portion)

Type name	MLS-30-01-500	MLS-30-01-1000	MLS-30-001-500	MLS-30-001-1000
Measuring range mm	10	10	100	100
Output pulse/1mm	±1	±1	±1	±1
Counter accuracy pulse	±1	±1	±1	±1
Minimum reading	0.1	0.1	0.01	0.01
Power	AC100V 50/60Hz 180mA max			
Counter mode	10 Decimal			
Count indication	0~±999999.9		0~±999999.99	
Reset	Reset switch provided *External signal resetting possible			
External output	*BCD parallel output			
Mass	700g			
Power cord	2m with plug			

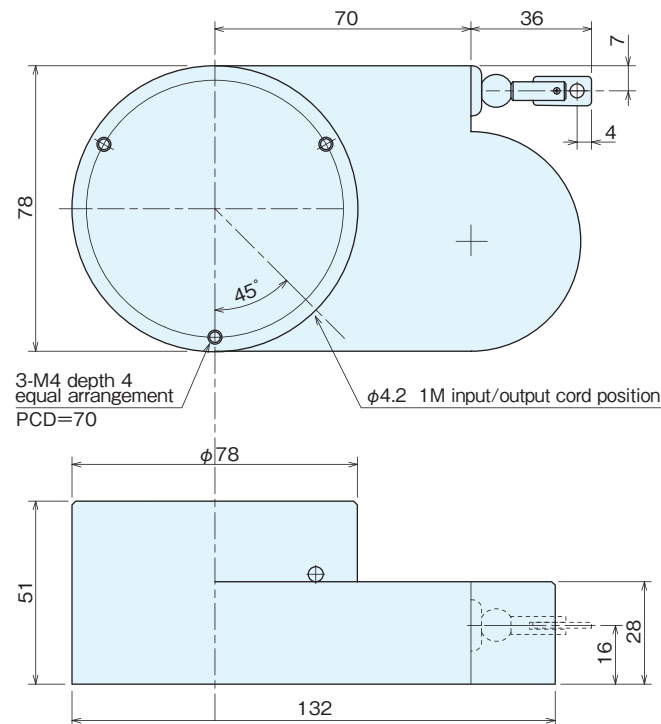
Note: For counter specifications, see DC Series. * indicates option.

MLS-50 series

[Wire-Type Linear Scale]

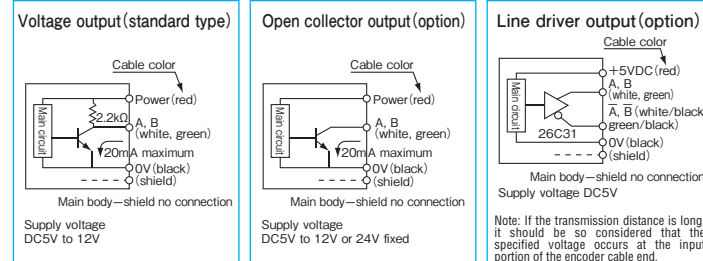


Outside dimensions



Note: Usage warning: The wire may stop midway through retracting. When this happens, slowly pull out the full length and then slowly retract again before using.

Output circuit diagram



A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Specifications/linear scale encoder (detection portion)

Type name	MLS-50-2000	MLS-50-4000
	Pulse number	Output circuit ●No entry=voltage output ●C=open collector output ●E=line driver output ●C4=open collector output DC24V
Item	MLS-50-2000	MLS-50-4000
Measuring range mm	2,000	4,000
Output pulse/1mm	2.5	2.5
Stroke speed mm/sec	1,000	1,000
Absolute accuracy mm	±2	±4
Minimum resolution mm	0.4	0.4
Supply voltage	DC5V-5%~12V+10% DC24V±10% (option) Line driver:DC5V±5%	
Current consumption	60mA or less (under no load)	
Output phase	A phase, B phase	
Output form	Square wave	
Output capacity	Sink current 20mA or less, residual voltage 0.5V or less (at 10mA)	
Response frequency	100kHz	
Output phase	A, B phase difference 90°±45°	
Waveform rise/fall time	2μsec or less	
Wire tensile force	3.9N~6.8N (400~700gf)	
Working ambient temperature/humidity	0°C~50°C / RH35%~90%	
Storage ambient temperature	-20~80°C	
Vibration resistance	Endurance 10 to 55Hz Double amplitude 2 hours each in X, Y, and Z directions	
Impact resistance	50G	
Cable	Insulated shield wire Outside diameter φ4.2 4-core vinyl wire	
Mass	850g	

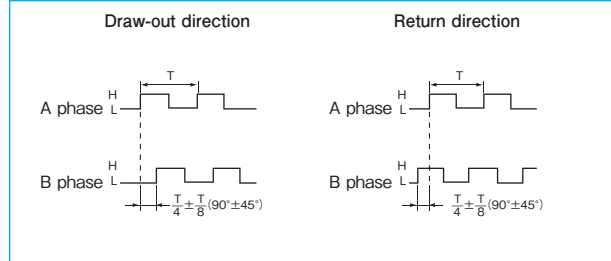
Note: The output pulse or resolution is possible to 4 multiple with the counter.

Specifications/micro linear scale (detecting portion + indicating portion)

Type name	MLS-50-01-2000	MLS-50-01-4000
Measuring range mm	2,000	4,000
Output pulse/1mm	10	10
Counter accuracy pulse	±1	±1
Minimum reading	0.1	0.1
Power	AC100V 50/60Hz 180mA max	
Counter mode	10 Decimal	
Count indication	0~±999999.9	
Reset	Reset switch provided *External signal resetting possible	
External output	*BCD parallel output	
Mass	1,350g	
Power cord	2m with plug	

Note: For counter specifications, see DC Series. * indicates option.

Output waveform



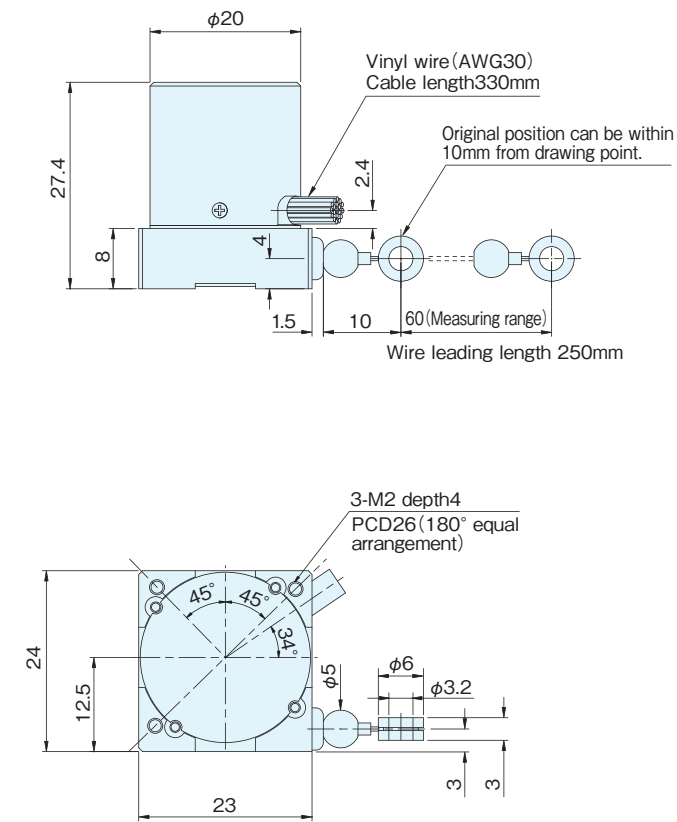
MLA-17 series

[Absolute Linear Scale]

- Smallest in the series: Outside dimensions 23×24×27.4 (H)
- Measuring range: 60mm (*Max. 250mm)
- Main Applications: Robot Machine, small actuator, conductor apparatus, manipulator, Jack-up controller for building industry and etc.

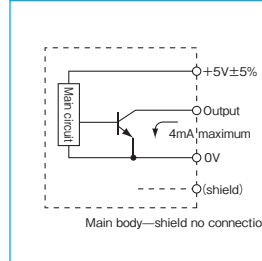


Outside dimensions



Note: Usage warning: The wire may stop midway through retracting. When this happens, slowly pull out the full length and then slowly retract again before using.

I/O circuit diagram



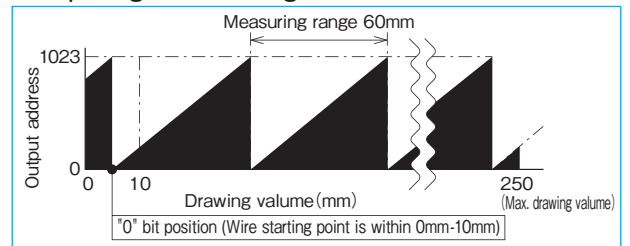
Specifications

Type name	MLA-17-1-60
	Pulse number 1,024 (G, N) or 1,000 (B)
	Output code ●G=Gray code ●N=Pure binary code ●B=BCD code
Item	
Supply voltage	DC5V±5%
Current consumption	80mA or less (under no load)
Output code	G:gray code N:pure binary code B:BCD code
Logic	Negative logic (H=0, L=1)
Output circuit	NPN open collector
Output capacity	Sink current each bit 4mA max
Maximum response frequency	20kHz
Measuring range	60mm (Please refer to the output signal image)
Output pulse number/mm	1,024/60 (G, N), 1,000/60 (B)
Minimum resolution	G (N):0.059mm B:0.06mm
Stroke speed	250mm/sec
Wire tensile force	0.29N~0.59N (30~60gf)
Working ambient temperature/humidity	0°C~+50°C / RH35%~90% (no dewing)
Storage ambient temperature	-20~+80°C
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	50G 3 times each in X, Y, and Z directions
Cable	Vinyl wire (AWG30) Cable length 330mm
Mass	40g

Connection

Type/code color	MLA-17-1024 G1-60	MLA-17-1024 N1-60	MLA-17-1000 B1-60
Black	0V (COMMON)		
Red	5V ±5%		
Brown	Output 2 ⁰	Output 2 ⁰	Output 2 ⁰
Brown / Black	Output 2 ¹	Output 2 ¹	Output 2 ¹
Orange	Output 2 ²	Output 2 ²	Output 2 ²
Orange / Black	Output 2 ³	Output 2 ³	Output 2 ³
Yellow	Output 2 ⁴	Output 2 ⁰ ×10	Output 2 ⁰ ×10
Yellow / Black	Output 2 ⁵	Output 2 ¹ ×10	Output 2 ¹ ×10
Green	Output 2 ⁶	Output 2 ² ×10	Output 2 ² ×10
Green / Black	Output 2 ⁷	Output 2 ³ ×10	Output 2 ³ ×10
Blue	Output 2 ⁸	Output 2 ⁰ ×10 ²	Output 2 ⁰ ×10 ²
Blue / Black	Output 2 ⁹	Output 2 ¹ ×10 ²	Output 2 ¹ ×10 ²
Purple	—	Output 2 ² ×10 ²	Output 2 ² ×10 ²
Purple / Black	—	Output 2 ³ ×10 ²	Output 2 ³ ×10 ²

Output signal is an image form

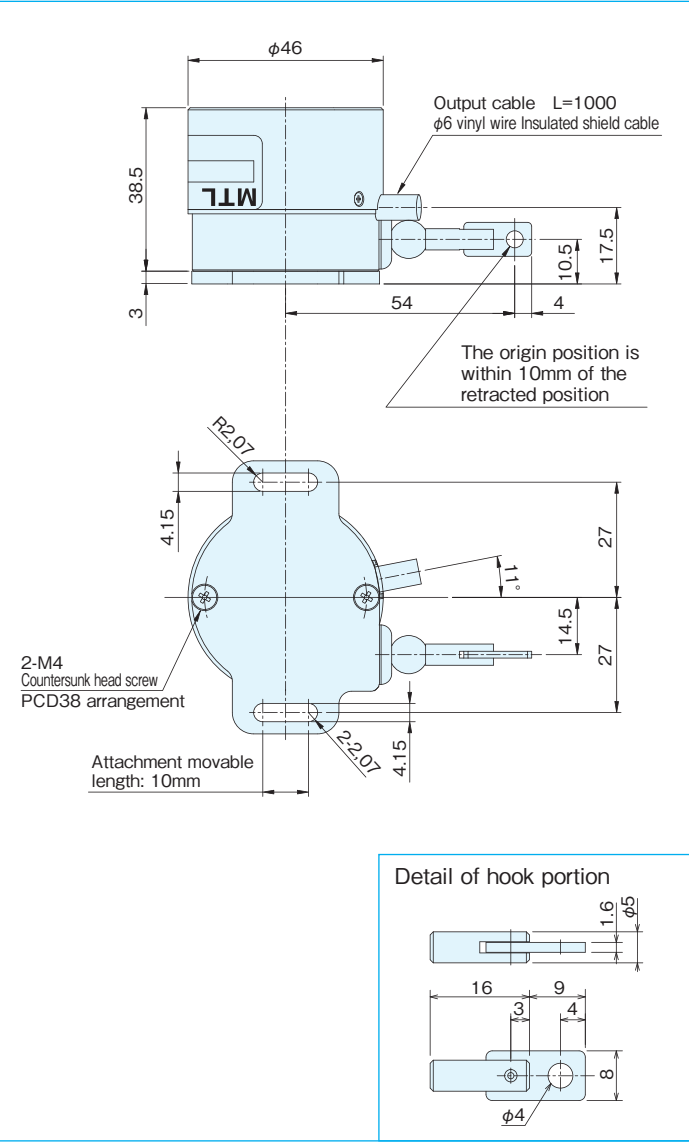


MLA-30 series

[Absolute Linear Scale]

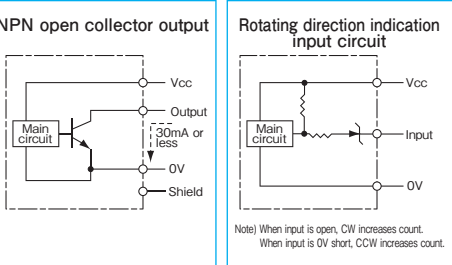


Outside dimensions



Note: Usage warning: The wire may stop midway through retracting.
When this happens, slowly pull out the full length and then slowly retract again before using.

I/O circuit diagram



Specifications

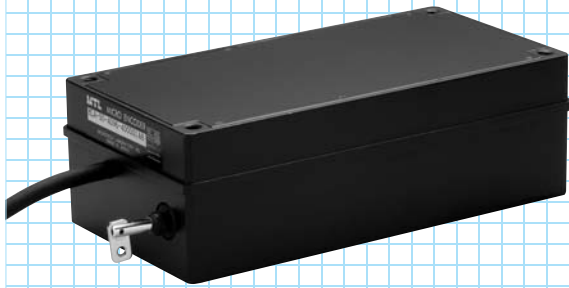
Type name	MLA-30- Pulse number Output code Supply voltage (1, 5) -90
Item	
Supply voltage	1:DC5V±5% 5:DC12V-10%~24V+15%
Current consumption	100mA or less (under no load)
Output code	G:gray code N:pure binary code B:BCD code
Logic	Negative logic (H=0, L=1)
Output circuit	NPN open collector output
Output capacity	Sink current 30mAmax, Residual voltage 0.5V (at 30mA)
Maximum response frequency	10kHz
Measuring range	90mm
Output pulse number/mm	1,024/90 (G, N), 1,000/90 (B)
Minimum resolution	G (N):0.088mm B:0.09mm
Stroke speed	1000mm/sec max
Wire tensile force	0.98N~2.94N (100gf~300gf)
Working ambient temperature/humidity	0°C~+50°C / RH35%~90% (no dewing)
Storage ambient temperature	-20°C~80°C
Vibration resistance	Durability 10~55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	50G 3 times each in X, Y, and Z directions
Cable	Outside dia. φ6 16-core vinyl wire Insulated shield cable (length:1m)
Mass	350g or less (excluding cable)

Connection

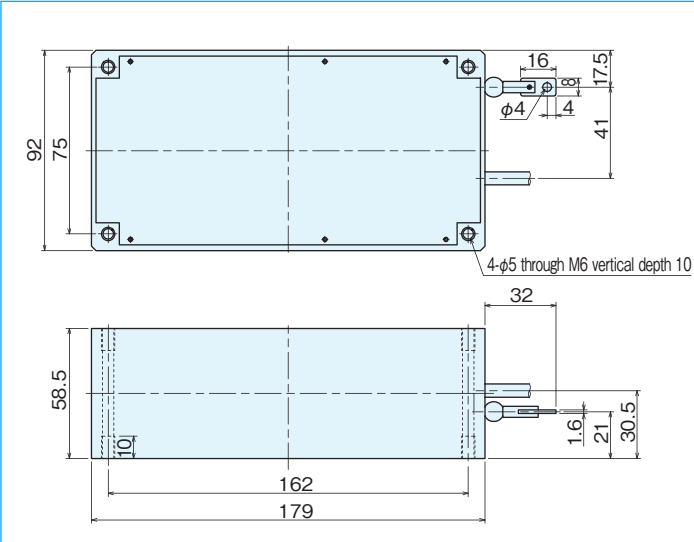
Code color	Output signal			Code color	Output signal		
	G	N	B		G	N	B
Brown		2 ⁰		Blue		2 ⁸	2 ⁰ ×100
Brown/Black		2 ¹		Blue/Black		2 ⁹	2 ¹ ×100
Orange		2 ²		Purple		NC	2 ² ×100
Orange/Black		2 ³		Purple/Black		NC	2 ³ ×100
Yellow	2 ⁴		2 ⁰ ×10	Red/Black		—	*Rotating direction indication input
Yellow/Black	2 ⁵		2 ¹ ×10	Red			Vcc
Green	2 ⁶		2 ² ×10	Black			COMMON
Green/Black	2 ⁷		2 ³ ×10	Black			COMMON

MLA-42 series

[Absolute Linear Scale]



Outside dimensions

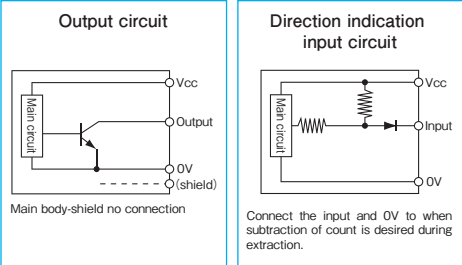


Specifications / Absolute Linear Scale

Type name	MLA-42-4096-216	MLA-42-4096-400	MLA-42-4096-1000	MLA-42-4096-2000	MLA-42-4096-4000
Measuring range mm	216	400	1,000	2,000	4,000
Output pulse/mm	4,096/216	10	4	2	1
Stroke speed mm/sec	500	1,000	1,000	1,000	1,000
Accuracy mm	±0.1/100mm				
Min. resolution mm	0.053	0.1	0.25	0.5	1
Wire dia. mm	0.6	0.9	0.9	0.9	0.8
Wire cutting load kg	7	70	70	70	60
Material of wire	SUS304				
Tensile strength of wire	3.9N~6.8N (400gf~700gf)				
Material of spring	Spring steel				
Origin adjustment	Free				
Material of pulley	SUS303 Auto-return structure				
Outside dimensions	MLS50 As per outside dimension diagram				

Note: Usage warning: The wire may stop midway through retracting.
When this happens, slowly pull out the full length and then slowly retract again before using.

I/O circuit diagram

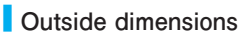


Specifications

Type name	MLA-42-4096- Output code Supply voltage Measuring range
Item	
Supply voltage	1:DC5V±10% 5:DC12V-10%~24V+15%
Current consumption	70mA or less (under no load), 100mA or less (under no load)
Output code	G:gray code N:pure binary code
Logic	Negative logic (H=0, L=1)
Output circuit	NPN open collector
Output capacity	Sink current 20mA or less Residual voltage 0.5V or less (at 10mA)
Maximum response frequency	10kHz
Working temperature	0°C~60°C
Storage temperature	-20°C~80°C
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable	Outside dia. φ6.8 19-core vinyl wire Insulated shield cable (length: 1m)

Connection MLA-42

Type/code color	MLA-42-4096
Black	0V (COMMON)
Red	Supply power
Red/black	Rotating direction indication input (N only)
Brown	Output 2 ⁰
Brown/black	Output 2 ¹
Orange	Output 2 ²
Orange/black	Output 2 ³
Yellow	Output 2 ⁴
Yellow/black	Output 2 ⁵
Green	Output 2 ⁶
Green/black	Output 2 ⁷
Blue	Output 2 ⁸
Blue/black	Output 2 ⁹
Purple	Output 2 ¹⁰
Purple/black	Output 2 ¹¹
Gray	No connection
Gray/black	No connection



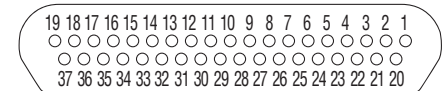
Outside dimensions



※BCD external output and Z reset are optional

Option

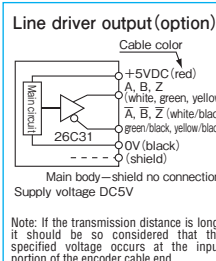
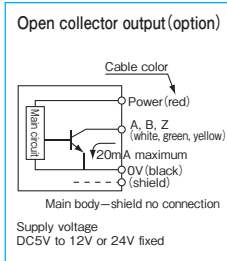
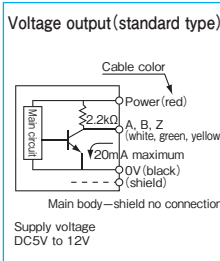
- BCD parallel output (output IC 74HC573)



Terminal No.	Signal name	Terminal No.	Signal name	Terminal No.	Signal name
1	2 ⁰ (A)×10 ⁰	14	2 ² (C)×10 ⁶	27	2 ³ (D)×10 ³
2	2 ² (C)×10 ⁰	15	NC	28	2 ¹ (B)×10 ⁴
3	2 ⁰ (A)×10 ¹	16	NC	29	2 ³ (D)×10 ⁴
4	2 ² (C)×10 ¹	17	External latch input	30	2 ¹ (B)×10 ⁵
5	2 ⁰ (A)×10 ²	18	External reset input	31	2 ³ (D)×10 ⁵
6	2 ² (C)×10 ²	19	GND	32	2 ¹ (B)×10 ⁶
7	2 ⁰ (A)×10 ³	20	2 ¹ (B)×10 ⁰	33	2 ³ (D)×10 ⁶
8	2 ² (C)×10 ³	21	2 ³ (D)×10 ⁰	34	NC
9	2 ⁰ (A)×10 ⁴	22	2 ¹ (B)×10 ¹	35	Take-in prohibiting signal
10	2 ² (C)×10 ⁴	23	2 ³ (D)×10 ¹	36	SIGN
11	2 ⁰ (A)×10 ⁵	24	2 ¹ (B)×10 ²	37	GND
12	2 ² (C)×10 ⁵	25	2 ³ (D)×10 ²		
13	2 ⁰ (A)×10 ⁶	26	2 ¹ (B)×10 ³		

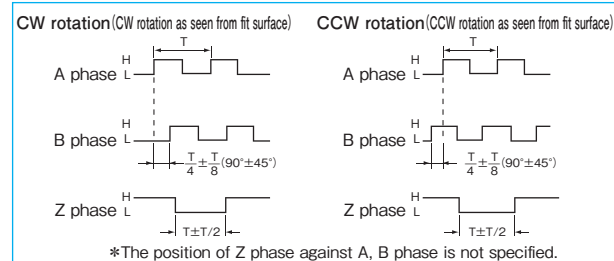
Output signal connector (Japan Aviation Electronics Industry: DC-37SAF-N)
Attached product (Japan Aviation Electronics Industry: DASP-JP37P)

Output circuit diagram

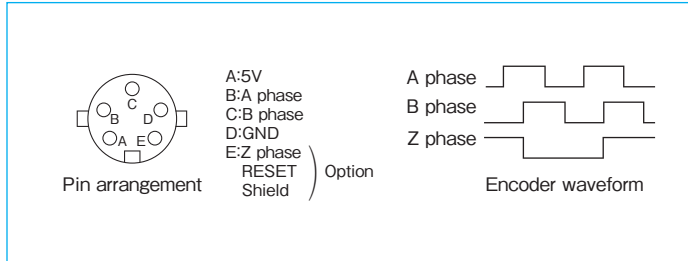


A capacitor ($0.1\mu\text{F}$) is connected between 0V and FG (frame ground).

Output waveform



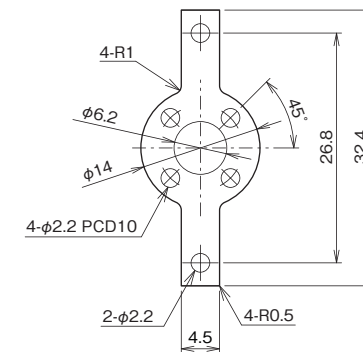
Input signal connector(Tajimi Electronics: R05-R5M) cord side: R05-PB5F



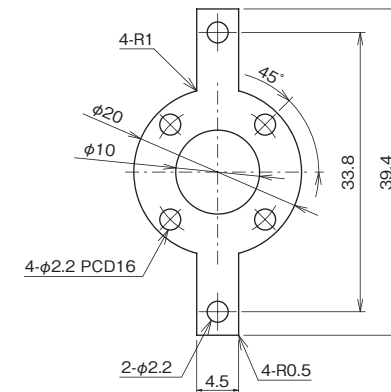
A collection of various mechanical parts, including a large circular flange, several square and triangular plates with holes, and various brackets and connectors, all arranged on a blue grid background.

List of dimensions and accessories

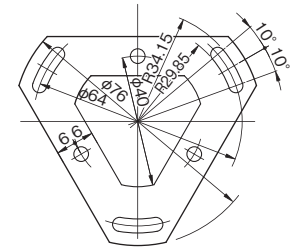
ME-9P, MA-10



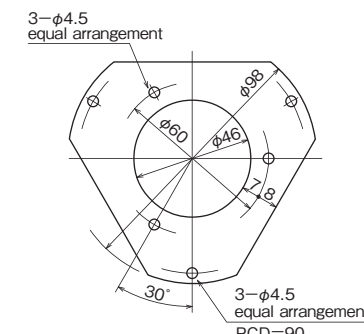
* ME-12P, MA-17, MEH-17, MEH-14



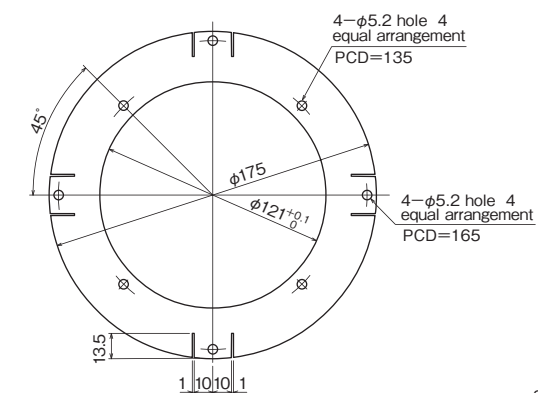
MAH-42



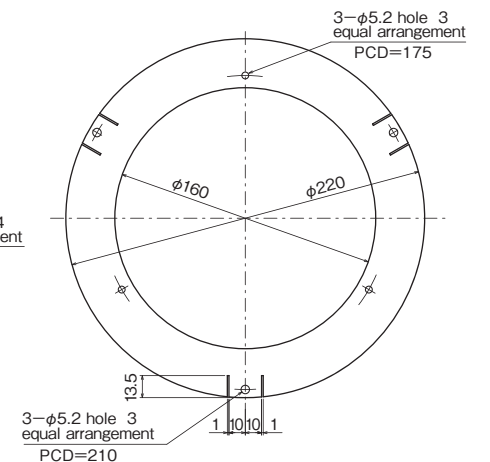
MEH-60



MEH-130

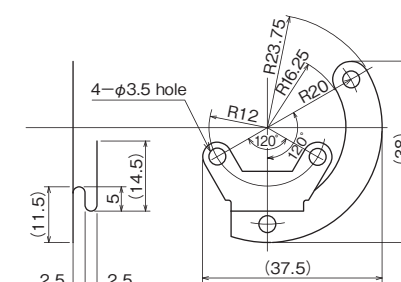


MEH-180

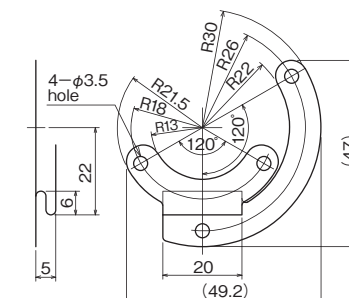


Special spring flange (this type is recommended when fluctuation in radial direction is large)

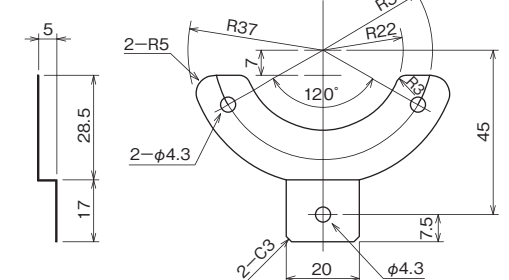
MEH-20SP (plate thickness 0.1t)



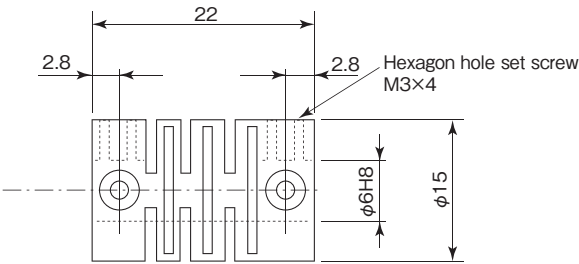
MEH-30SP (plate thickness 0.15t)



MEH-60SP2 (plate thickness 0.3t)



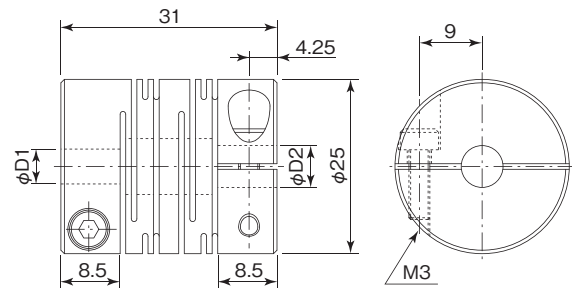
Coupling GJ6x6 (for MES-20, 30)



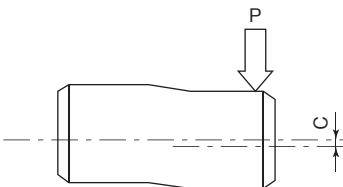
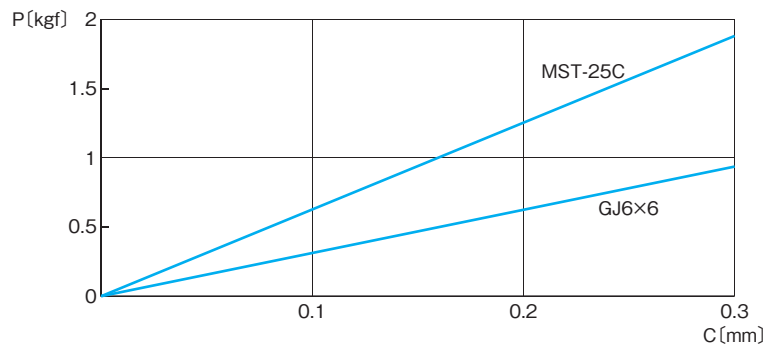
(1) Material: Polyacetal resin containing glass
(2) thers than $\phi 6\text{-}\phi 6$ are available.

Coupling MST-25C-6x6 (for MES-30 high resolution), 8x8 (for MES-50 high resolution)

Clamping type



Eccentric spring characteristics

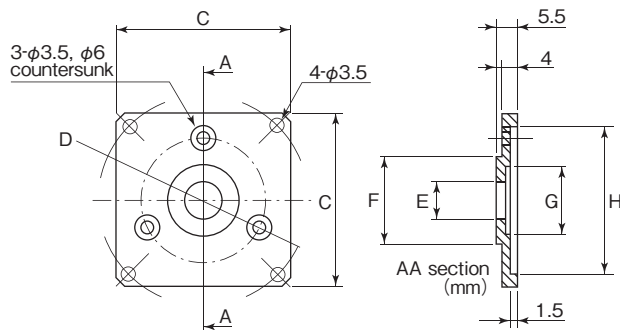


It should be used under optimum conditions to maintain the accuracy of the encoder and also for prolonged use.

Fitting Method for Shaft Type Encoder (MES/MAS)

(Use this method when the base of the main unit of MES-20 or MES-30 with a single-shaft cannot be installed from the shaft side.)

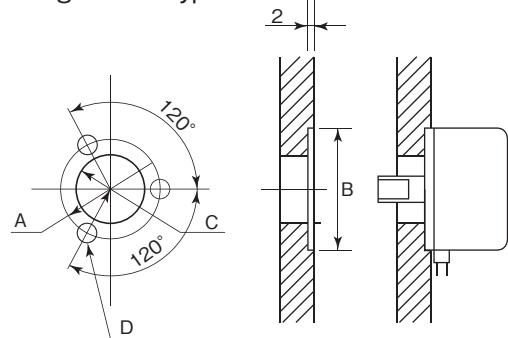
Flange MEF-20 (for MES-20), MEF-30 (for MES-30)



Type name	C	D	E	F	G	H
MEF-20	36	40	$\phi 8$	$\phi 15_{-0.018}^0$	$\phi 13$	$\phi 32_{+0.025}^{+0.009}$
MEF-30	46	52	$\phi 15$	$\phi 20_{-0.021}^0$	$\phi 25$	$\phi 44_{+0.025}^{+0.009}$

Fitting dimensions

MES single-shaft type



Type name	A	B	C	D
MES-20	$\phi 24$	$\phi 32_{+0.025}^{+0.015}$	$\phi 16$	3- $\phi 3.5$
MES-30	$\phi 36$	$\phi 44_{+0.025}^{+0.015}$	$\phi 28$	3- $\phi 3.5$
MES-40	$\phi 45$	$\phi 56_{+0.03}^{+0.025}$	$\phi 30$	3- $\phi 3.5$
MES-50	$\phi 56$	$\phi 65_{+0.03}^{+0.025}$	$\phi 32$	3- $\phi 4.5$

Using our products safely

Limitations on use

These products cannot be used for the following applications.

- Devices for spacecraft • Devices for automobiles • Devices for transporting people
 - Devices and appliances for household use • Devices used in a vacuum • Devices for nuclear power
 - Devices for special environments • Devices applied directly to the human body • Devices for aircraft • Devices for toys
- Consult our company in advance before using our products for any of the above applications.

When these products are used in life support equipment or equipment that could cause serious injuries, implement safety devices to ensure that there are no accidents even if the product fails and the output goes out of control.

Warnings to note when using our encoders

• Meaning of warning notation

Danger	There is a risk of fatality or serious injury to the user if mishandled. There is also a risk of serious physical damage.
Warning	There is a risk of light injury to the user or serious physical damage if mishandled.

• Usage warnings

Always read the instruction manual before using an encoder to ensure that you use the encoder correctly and safely.

Danger	Do not use in locations containing gas or steam. If used in a location containing inflammable or explosive gases or steam, there is a risk of explosion.
Danger	Do not disassemble or dismantle the encoder under any circumstances. Using the encoder while it is disassembled or dismantled may cause accidents such as injuries and electric shocks.
Warning	The encoder is constructed from precision components, and may lose functionality if dropped. Handle with care.
Warning	Running wires parallel to high voltage lines or drive lines may cause malfunctions or damage. Keep wires separated.
Warning	If surges occur in the power supply to be used, connect a surge absorber between the power supply to absorb the surges.

Warranty

The period and scope of the warranty on the products listed in this catalog are as follows.

• Warranty period

Up to one year from beginning of use (Limited to up to 1.5 years from purchase)

• Warranty scope

If a fault occurs within the above warranty period that is attributable to our company, we shall repair or replace the corresponding component free of charge.

This warranty applies only to the individual purchased units. Our company shall not bear liability for the cost of replacement work (labor costs, etc.), liability for damages, etc.