

MICRO ENCODER

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

MTL MICROTECH LABORATORY INC.

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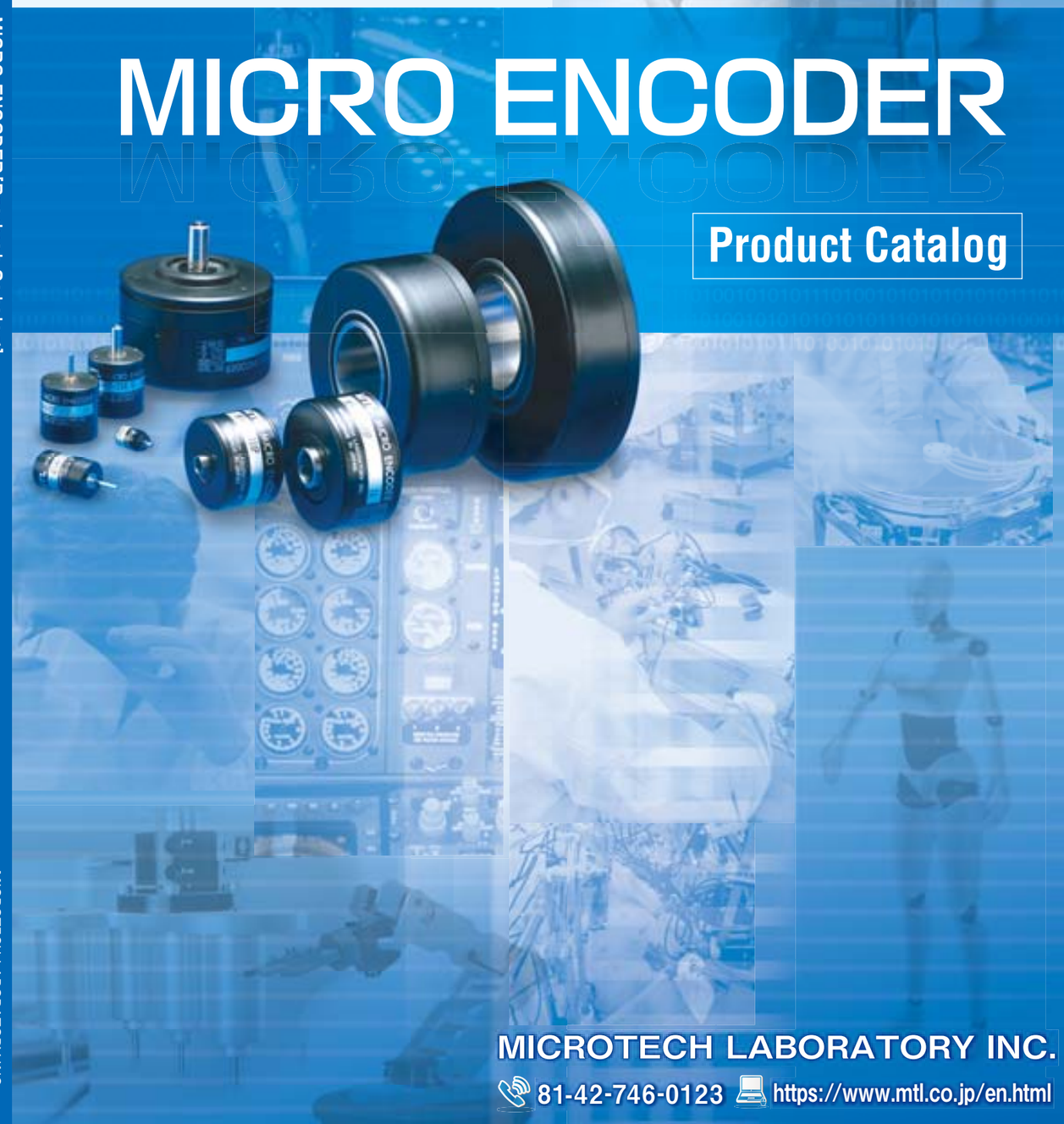
MICRO ENCODER [Product Catalog]

MTL

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Product Catalog



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81-42-746-0123 https://www.mtl.co.jp/en.html

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.



ISO 9001 certification
JQA-1035

ISO 14001 certification
JQA-EM5019

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.

Incremental

Series name	Appearance	Type name	Outside dimensions	Resolution	Features	Page
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
		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
		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
		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
	NEW 	MEH-59-12960PSTG50E	ϕ70×16.5	2097152、1048576、524288	●Thin and high resolution incremental encoder ●Hollow shaft of 25 in inside diameter. ●PSTN ×2・×4・×5・×8・×10・×16・×20・×32 ●PSTG ×25・×50・×100	35 - 36
		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	37 - 38
		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	39 - 40
		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	41 - 42
		MEH-180-□P□	ϕ200×71	36,000 ～ 72,000 (1440,000)	●High resolution. ●Large hollow shaft of 90 in inside diameter. Option ●With built-in PST ×2, ×4, ×5, ×8, ×10, ×16 ×20 multiplication circuit	43 - 44
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	45 - 46
MG series		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.	47 - 48

How to read type name

ME□-□-□□
- Series name
- Shaft shape ※1
- Slit diameter
- Output pulse number…pulse number per rotation
- Voltage output: no mark/open collector output: C/line driver output: E

MA□-□-□□
- Series name
- Shaft shape ※1
- Slit diameter
- Resolution
- Output code ※2
- Supply voltage ※3

MLS-□-□-□
- Linear series
- Shape
- Resolution, minimum reading
- Measuring length (mm)

※1

Single-shaft type	Hole type	Both-shaft type
S	H	D

※2

Gray	Pure binary	BCD
G	N	B

※3

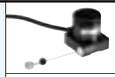
DC5V	DC12V	DC5～12V	24V	DC12～24V
1	2	3	4	5

Refer to the shaft type (p.86) and hole type (p.83) for installation of the encoder.

Absolute

Series name	Appearance	Type name	Outside dimensions	Resolution	Features	Page
Single turn type	NEW 	MAS-3-4096N1	ϕ6×8.6	4096 2048 1024	●12bit, super-compact, smallest model in its series ●SSI interface	50
		MMS-10-□G1	ϕ13×17.2	256(8bit) ～ 1,024(10bit)	●Outer diameter：ϕ13mm ●Height：15.5mm ●Resolution: 1024 divisions ●SSI interface	51
		MAS-10-256G	ϕ13×15.5	256(8bit)	●Ultra compact 8-bit absolute type ●Gray code output without reading error	52
		MAS-14-□N1	ϕ21×16.5	32,768(15bit) 65,536(16bit) 131,072(17bit) 262,144(18bit)	●18bit small high-resolution absolute encoder ●SSI interface	53
		MA□-17-□□1	ϕ20×21	256(8bit) ～ 1,024(10bit)	●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.	54
		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	55
		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	56
		MA□-20-□-□□1	ϕ32×24	256(8bit) ～ 4,096(12bit)	●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.	57
		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	58
	NEW 	MA△-36-※※※N1	ϕ46×30	1048576 524288 262144	●Compact 20-bit absolute encoder ●SSI interface ●Availability of shaft shape to meet various fitting systems.	59
		MA□-36-□□□	ϕ46×30	256(8bit) ～ 16,384(14bit)	●Compact absolute encoder. ●Robust, hostile-environment type. ●Availability of shaft shape to meet various fitting systems.	60
		MA□-42-□□□	ϕ52×30	256(8bit) ～ 4,096(12bit)	●12bit absolute encoder ●The output codes are gray code, pure binary code, and BCD code.	61
	NEW 	MAH-59-2097152N1	ϕ70×18	2097152 1048576 524288	●21bit thin high-resolution absolute encoder. ●Hollow shaft of 25 in inside diameter. ●SSI interface	62
	NEW 	MAH-85-2097152N1	ϕ100×32	2097152 1048576 524288 262144	●21bit high-resolution absolute encoder. ●Large hollow shaft of 36 in inside diameter. ●SSI interface	63
Muiti turn type (Multiple-rotation)	NEW 	MAS-36-1000MT-S	ϕ46×30	1000×256	●Electronic multi-revolution absolute encoder. ●Single-revolution: 1,000 divisions, multi-revolution: -128 to 127 rotations. ●Binary output at decoder.	64
	NEW 	MXH-36-256-1024GC5N	ϕ46×37	1024×256	●Mechanical multi-revolution absolute encoder, no battery backup required. ●ϕ8mm fully hollow shaft.	65
		MXS-36-□-□□C6□□	ϕ46×55	128～1,024(10bit)	●Multiple-rotation absolute encoder	66
		MXS-42-□-□□□□□□-□	ϕ65×63.5	128～4,096(12bit)	●Multiple-rotation absolute encoder	67

Wire-type linear scale

Series name	Appearance	Type name	Features	Page
Incremental formula		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	69
		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.	70
	NEW 	MLS-37-1024※◎-1500	●Wire draw-out-type linear encoder. Detection of linear position to correspond to the draw-out amount of the wire. ●Minimum reading 0.01mm ∗0.025mm is possible with 4-multiplying circuits. ●Measuring range: 1500mm.	71
	NEW 	MLS-45-540※-4000	●Compact and slim version of the MLS-50 ●Minimum reading 0.4mm ∗0.1mm is possible with 4-multiplying circuits. ●Measuring range: 4000mm.	72
		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.	73
Absolute formula		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.	74
		MLA-30-□□□-90	●Wire draw-out-type linear absolute encoder. ●Minimum reading 0,088mm, 0,09mm ●Output 1,024 (G, N) or 1,000 (B)	75
	NEW 	MLA-37-1024GC5NV-1500	●Wire draw-out-type linear absolute encoder. ●Reading 0.1mm ●Measuring range: 1500mm.	76
		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	77

Roller encoder／Counter

Roller encoder ***REH series***		REH-30-□R□	●Roller type linear encoder. ●Easy measuring. ●Minimum reading 0.1 to 1mm.	79
Measuring angle/ measuring length ***DC series***		DC-□□□□□□	●Small and robust counter. ●Decimal point moving, dividing/multiplying possible.	80

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		Special spring flange	85
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	Purchase method (Contact)		
	Troubleshooting		
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	Warranty		

■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.

Incremental

Abundant lineup, covering outer diameter Φ6 - Φ200mm, resolution 40P/R - 1,440,000P/R, and hollow diameter Φ5 - Φ90mm.
Choose from single-shaft type, double-shaft type, tubular-shaft type, and hollow-shaft type.
These attributes can be combined to suit diverse applications.

MES-3P/MES-3PST


MES-6P/MES-6-125PST16C


ME-9-P


ME-12-P


MEH14


ME-17-P


MEH-19


ME-20-P


MEH-28


ME-30-P


MEH-30T


MES-40-P


MES-45


ME-50-P


MEH-59


MEH-60-P


MEH-85-P

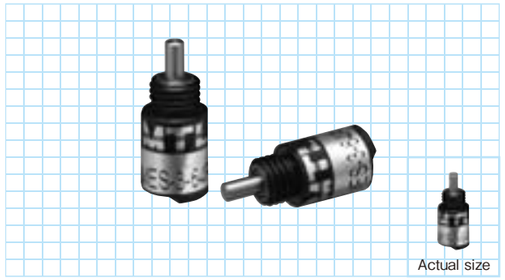

MEH-130-P


MEH-180-P


MGH


MG-20/30

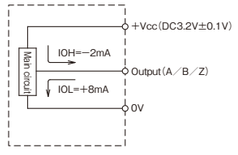

MES-3P series
[Square Wave/Incremental]



Specifications

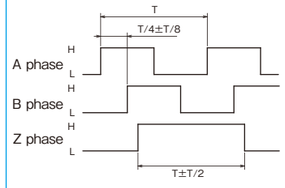
Item		Type name: MES-3-64P
Supply voltage		DC3.2±0.1V
Current consumption		15mA or less
Detection system		Incremental
Output	Output pulse number (Standard) 〔Pulse number/rotation〕	64P／R, 100P／R
	Output phase	A, B, Z phase
	Output form	Square wave, Voltage(C-MOS)output
	Output capacity	CMOS output: Output current IOL=+8mA, IOH=−2mA Output voltage: VOL≦0.3V(when IOL=+1mA) VOH≧Vcc−0.3V(when IOH =−1mA) Output withstand voltage:3.3V or less (power supply voltage or less)
	Maximum response frequency (response pulse number)	100kHz
	Output phase difference	A, B phase difference :T/4±T/8 Z phase T±0.5T
	Waveform rise/fall time	2μs or less (When 150mm flexible cable extended using 300mm AWG30 cable)
Allowable load of shaft(electrical)	Radial	0.98N(100gf)
	Thrust	0.98N(100gf)
Maximum allowable revolutions (mechanical)		6,000r/min
Working ambient temperature/ humidity		0℃～60℃ 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		Flexible cable: Length approx. 150mm
Mass		5g(including flexible cable)

Output circuit diagram(ME-3P、ME-3PST)



Output waveform(ME-3P)

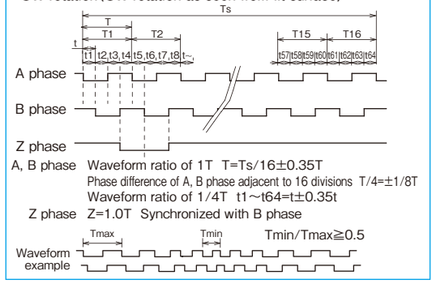
CW rotation(CW rotation as seen from fit surface)



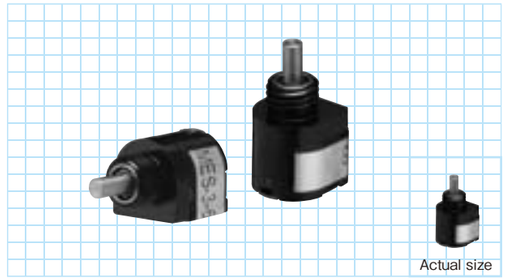
*The position of Z phase against A, B phase is not specified.

Output waveform(ME-3PST)

CW rotation(CW rotation as seen from fit surface)



MES-3PST series
[Square Wave/Incremental]

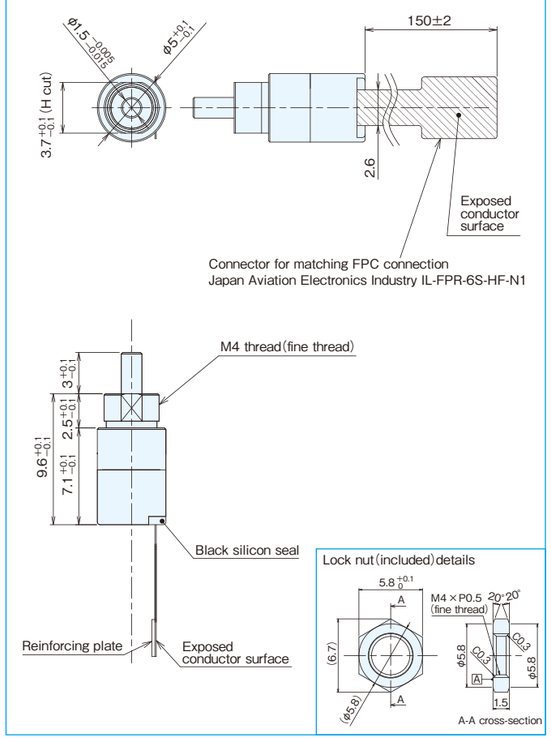


Specifications

Item		Type name: MES-3-64PST16
Supply voltage		DC3.2±0.1V
Current consumption		20mA or less
Detection system		Incremental
Output	Output pulse number (Standard) 〔Pulse number/rotation〕	1,024 pulse/rotation (64 pulses/rotation multiplied ×16 electrically)
	Output phase	A, B, Z phase
	Output form	Square wave, Voltage(C-MOS)output
	Output capacity	CMOS output: Output current IOL=+8mA, IOH=−2mA Output voltage: VOL≦0.3V(when IOL=+1mA) VOH≧Vcc −0.3V(when IOH =−1mA) Output withstand voltage:3.3V or less (power supply voltage or less)
	Maximum response frequency (response pulse number)	100kHz
	Output phase difference	Phase difference between neighboring A/B phases: T/4 ± T/8 Waveform ratio of 1T: T ± 0.35T Z phase width: 1T(Synchronized with 1T of B phase)
	Waveform rise/fall time	2μs or less (When 150mm flexible cable extended using 300mm AWG30 cable)
Allowable load of shaft(electrical)	Radial	0.98N(100gf)
	Thrust	0.98N(100gf)
Maximum allowable revolutions (mechanical)		6,000r/min
Working ambient temperature/ humidity		0℃～60℃ 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		Flexible cable: Length approx. 150mm
Mass		5g(including flexible cable)

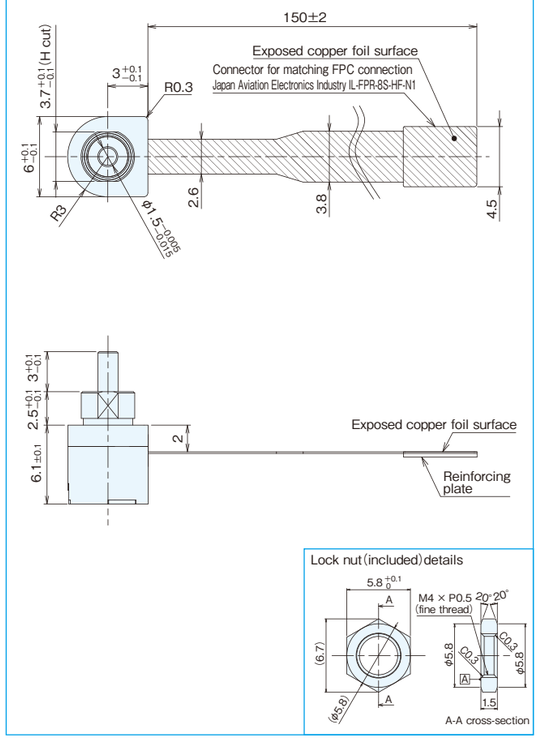
Outside dimensions

MES-3P

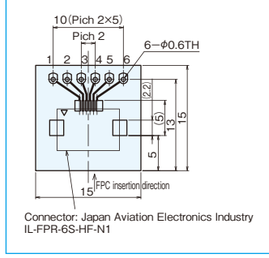


Outside dimensions

MES-3PST



Terminal board(included)details

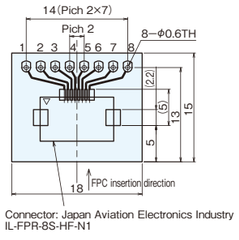


Connector: Japan Aviation Electronics Industry IL-FPR-6S-HF-N1

Wiring chart

TH No.	Signal name
1	Vcc(DC3.2V±0.1V)
2	Z phase output
3	0V
4	A phase output
5	B phase output
6	0V

Terminal board(included)details



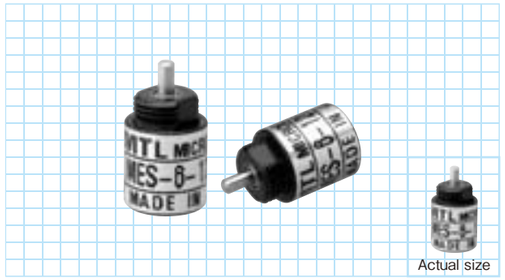
Connector: Japan Aviation Electronics Industry IL-FPR-8S-HF-N1

Wiring chart

TH No.	Signal name
1	Vcc(DC3.2V±0.1V)
2	N.C.(Not connected)
3	N.C.(Not connected)
4	Vcc(DC3.2V±0.1V)
5	Z phase output
6	B phase output
7	A phase output
8	0V

MES-6-P series

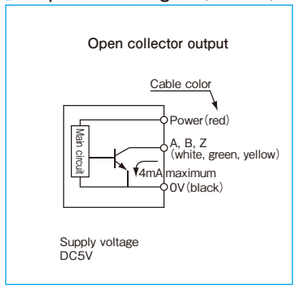
[Square Wave/Incremental]



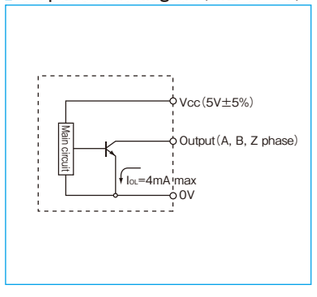
Specifications

Item		Type name: MES-6-□PC (□: Pulse number)
Supply voltage		DC5V ±10%
Current consumption		30mA or less (under no load)
Detection system		Incremental
Output	Output pulse number (Standard) [Pulse number/rotation]	100 300 120 360 200 500
Output	Output phase	A, B, Z phase
Output	Output form	Square wave, open collector output
Output	Output capacity	Sink current:4mA (output voltage resistance 7V) Residual voltage:0.4V or less
Output	Maximum response frequency (response pulse number)	100kHz
Output	Output phase difference	A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)
Output	Waveform rise/fall time	2μs or less (output cable 300mm or less)
Allowable load of shaft (electrical)	Radial	1.9N (200gf)
Allowable load of shaft (electrical)	Thrust	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/s² (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)

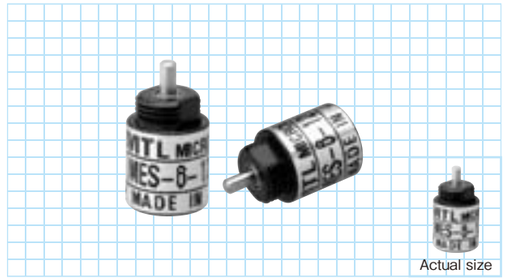


Output circuit diagram (ME-6PST)



MES-6-I25PSTI6C

[Square Wave/Incremental]

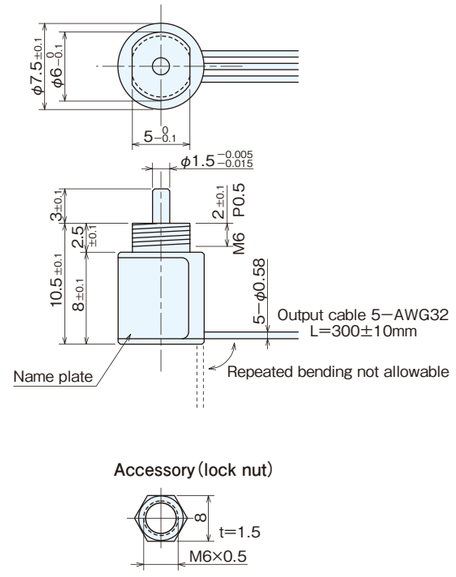


Specifications

Item		Type name: MES-6-□PST□C (□: Pulse number, Multiplication)
Supply voltage		DC5V ±5%
Current consumption		30mA or less
Detection system		Incremental
Output	Output pulse number (Standard) [Pulse number/rotation]	2,000P/R (125×16), 2048P/R (128×16) 1,000P/R (125×8), 1,024P/R (128×8) 500P/R (125×4), 512P/R (128×4)
Output	Output phase	A, B, Z phase
Output	Output form	Square wave, open collector output
Output	Output capacity	Output current:4mA max output voltage resistance :5.25V or less (power supply voltage or less)
Output	Maximum response frequency (response pulse number)	100kHz
Allowable load of shaft (electrical)	Radial	1.9N (200gf)
Allowable load of shaft (electrical)	Thrust	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/s² (about 50G) 3 times each in X, Y, and Z directions
Cable		Vinyl wire (AWG32) Cable length 300mm
Mass		5g

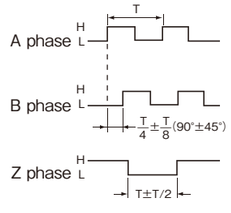
Outside dimensions

MES-6P. PST

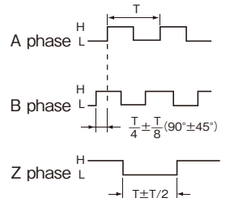


Output waveform (ME-6P)

CW rotation
(CW rotation as seen from fit surface)



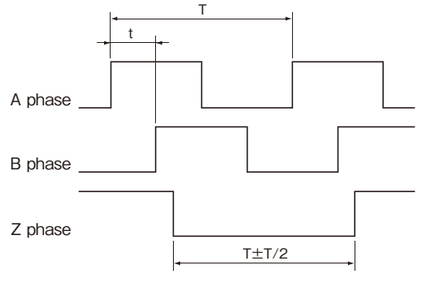
CCW rotation
(CCW rotation as seen from fit surface)



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

Output waveform (ME-6PST)

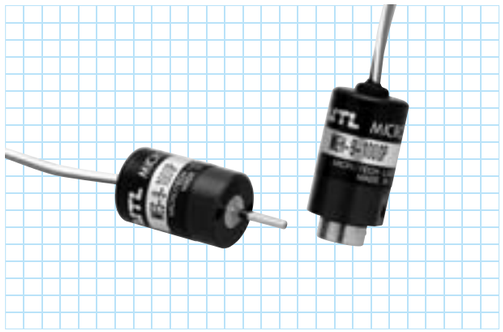
CW rotation (CW rotation as seen from fit surface)



T: Waveform ratio of 1T — T = T±0.35T
t: Phase difference between adjacent A and B phases — t = 1/4 T±0.3t

ME-9-P series

[Square Wave/Incremental]



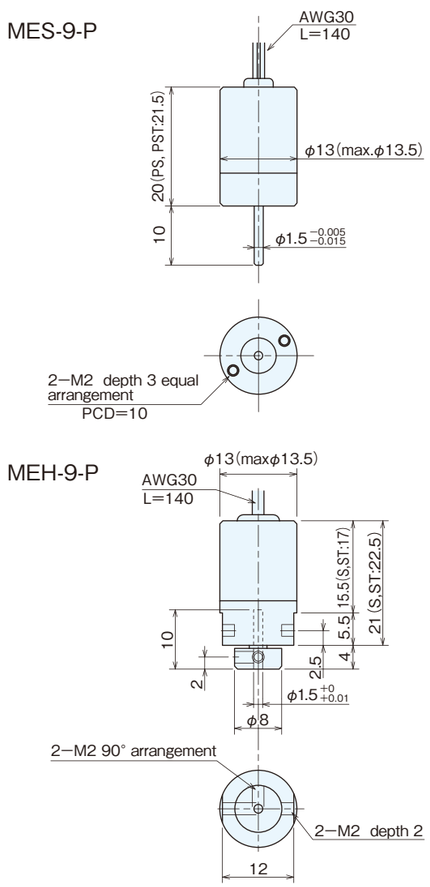
Specifications

Item				
Type name	ME□-9-□P□ Shaft shape ●S=single shaft ●H=hollow shaft Pulse number Output circuit ●Noentry=Voltage putput ●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)			50mA or less(under no load)
Detection system	Incremental			Incremental
Output: Output pulse number (Standard) [Pulse number/rotation]	32 100 200 256	300 360 500	900(*) 1,000(*) 1,024	EX 1,000×2(2,000) 1,000×4(4,000) 1,000×8(8,000) 1,000×16(16,000)
Output: Output phase	A, B, Z phase (Z="H")			A, B, Z phase
Output: Output form	Square wave			Square wave
Output: 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
Output: Maximum response frequency (response pulse number)	100kHz			Open collector output:100kHz Line driver output:50kHz×(by multiplication)
Output: 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
Output: Waveform rise/fall time	2μs or less(output cable 140mm or less)			1μs or less(output cable 140mm or less)
Allowable load of shaft(electrical) Radial	1.9N(200gf)		0.98N(100gf)	0.98N(100gf)
Allowable load of shaft(electrical) Thrust	1.9N(200gf)		0.98N(100gf)	0.98N(100gf)
Maximum allowable revolutions (mechanical)	6,000r/min			6,000r/min
Working ambient temperature/ humidity	0℃~60℃ RH35%~90% no dewing			0℃~60℃ 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/s²(about 50G) 3 times each in X, Y, and Z directions			Durability 500m/s²(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			Open collector:Vinyl wire(AWG30) Cable length 140mm Line driver·Vinyl wire(AWG32) Cable length 330
Mass	10g			20g

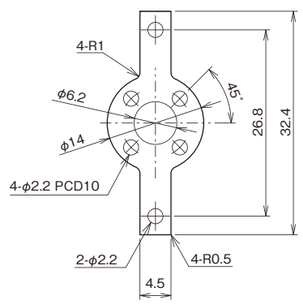
*Handled by built-in multiplier circuit

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

Outside dimensions

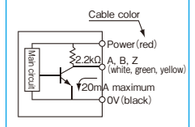


Spring flange MEH-9(Included)

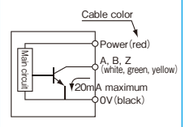


Output circuit diagram(Square wave)

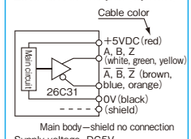
Voltage output(standard type)



Open collector output(option)



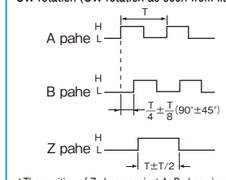
Line driver output(option)



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.

Output waveform(Square wave)Voltage/Open collector

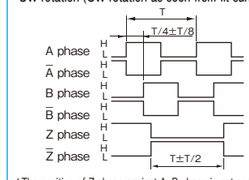
CW rotation (CW rotation as seen from fit surface)



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

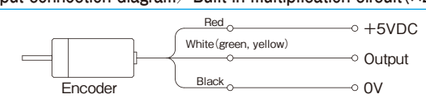
Output waveform(Square wave)Line driver

CW rotation (CW rotation as seen from fit surface)



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

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

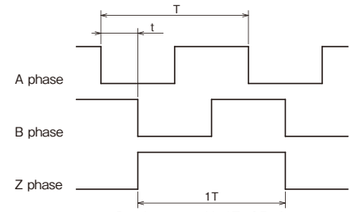


Cable color	Red	Black	White	Green	Yellow	Brown	Blue	Orange
Signal	+5V	0V	A phase	B phase	Z phase	Ā phase	B̄ phase	Z̄ phase

*Line driver output.

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

CW rotation(CW rotation as seen from fit surface)



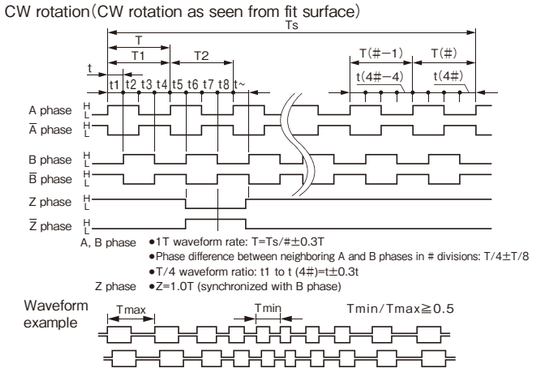
Synchronous with 1T of B phase

T: Waveform ratio of 1T T=T±0.35(−T16)
T±0.4(−T8)
T±0.2(−T4,−T2)

t: Phase difference between adjacent A and B phases
t=T／4±1／8T

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

CW rotation(CW rotation as seen from fit surface)



ME-12-P series

[Square Wave/Incremental]



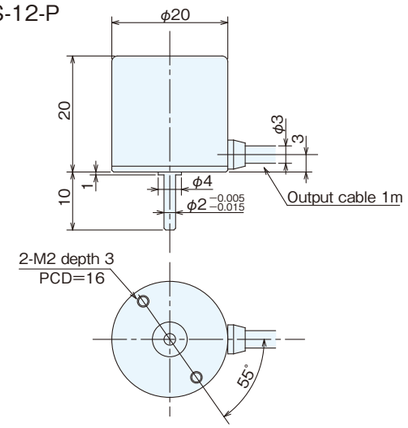
Specifications

Item					
Type name	ME□-12-□P□ Shaft shape ●S=single shaft ●H=hollow shaft Pulse number Output circuit ●Noentry=Voltage putput ●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 pulse number (Standard) [Pulse number/rotation]	60 100 125(*) 200 256(*)	300 360 500 600 900	1,000(*) 1,024(*)	1,500(*) 1,800(*) 2,000(*) 2,048(*)	EX 2,000×2(4,000) 2,000×4(8,000) 2,000×8(16,000) 2,000×16(32,000)
Output: Output phase	A, B, Z phase				A, B, Z phase
Output: Output form	Square wave				Square wave
Output: 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
Output: Maximum response frequency (response pulse number)	100kHz				Line driver output:50kHz×(by multiplication) Voltage output·Open collector output:100kHz
Output: 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
Output: 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)
Allowable load of shaft (electrical) 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℃~70℃ RH35%~90% no dewing				−10℃~70℃ 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/s²(about 50G) 3 times each in X, Y, and Z directions				Durability 500m/s²(about 50G) 3 times each in X, Y, and Z directions
Cable	Outside diameter φ3 5-core vinyl wire AWG28 Insulated shield cable(length 1m)				Outside diameter φ3 5-core vinyl wire AWG28 Insulated shield cable(length 1m)
Mass	40g				40g

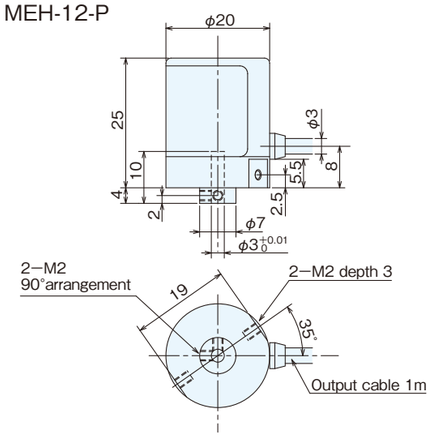
*Handled by built-in multiplier circuit

Outside dimensions

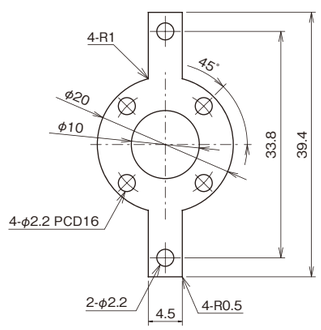
MES-12-P



MEH-12-P

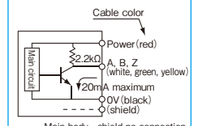


Spring flange MEH-12(Included)

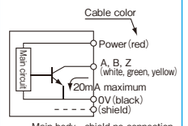


Output circuit diagram

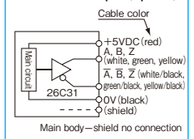
Voltage output(standard type)



Open collector output(option)



Line driver output(option)

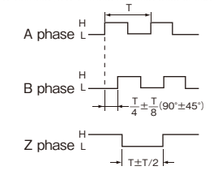


Note: If the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end.

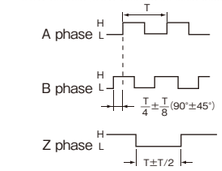
A capacitor(0.1μF)is connected between 0V and FG(frame ground).
Note: This capacitor is not connected to the voltage or open collector output of the built-in multiplier circuit.

Output waveform(Square wave)

CW rotation(CW rotation as seen from fit surface)



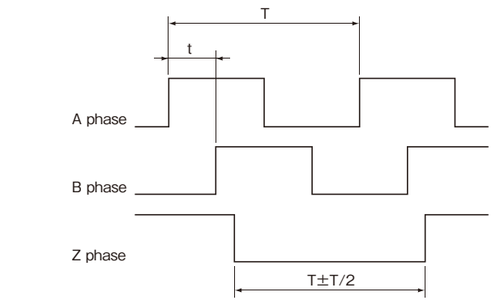
CCW rotation(CCW rotation as seen from fit surface)



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

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

CW rotation(CW rotation as seen from fit surface)



T = T±0.3T
t = 1/4 T±0.3t

MEH-14 series

[Square Wave/Incremental]

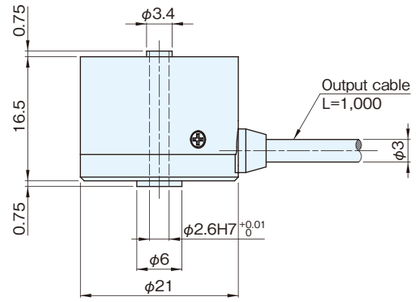
- Outside dimensions φ21×16.5mm
- Through Shaft

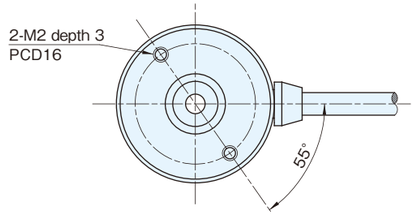


Specifications

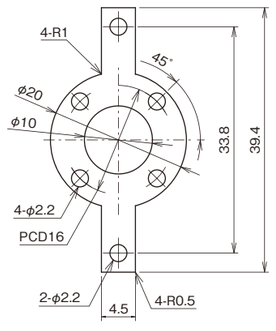
Type name / Item	MEH-14-2250 PSTN□E
Detection system	Incremental
Output phase	A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$ phase CS phase(U, $\overline{U}$, V, $\overline{V}$, W, $\overline{W}$)
Output form	Square, Line driver output
Output pulse number(P/R)	2250, 4500(2250×2), 9000(2250×4) 11250(2250×5), 18000(2250×8), 22500(2250×10) 36000(2250×16), 45000(2250×20), 72000(2250×32)
Output	Phase difference between neighboring A/B phases: T/4 ± T/8 Waveform ratio of 1T: T ± 0.3t Z phase width: T ± 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(Io): ±20mAmax. Output voltage Vol: 0.5Vmax. VoH: 2.5Vmin.
Maximum allowable revolutions	6000r/min
Working ambient temperature/humidity	−10℃~+70℃/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 50G 3 times each in X, Y, and Z directions
Cable	Outside diameter φ3.0 8-cores shield cable(without CS phase: 14-cores)AWG30
Mass	35g(excluding cable)

Outside dimensions



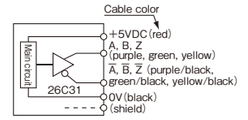


Spring flange MEH-14(Option)



Output circuit diagram

Line driver output

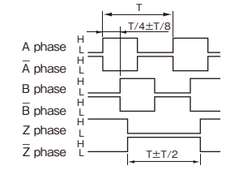


Main body—shield no connection

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]

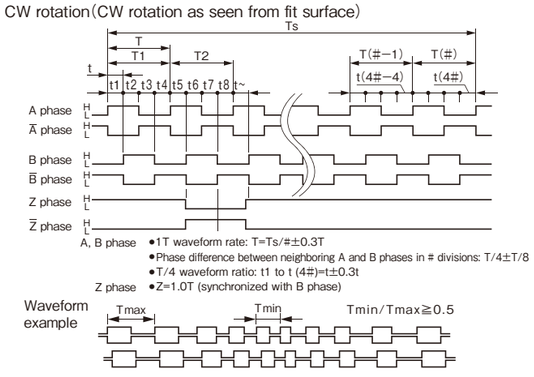
CW rotation(CW rotation as seen from fit surface)



*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)

CW rotation(CW rotation as seen from fit surface)



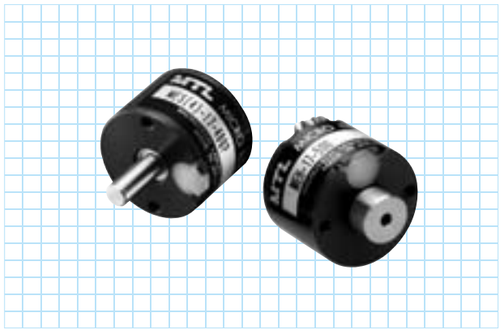
A, B phase
- 1T waveform rate: T=Ts/#±0.3T
- Phase difference between neighboring A and B phases in # divisions: T/4±T/8
- T/4 waveform ratio: t1 to t (4#)=t±0.3t

Z phase
- Z=1.0T (synchronized with B phase)

Waveform example

ME-I7-P series

[Square Wave/Incremental]

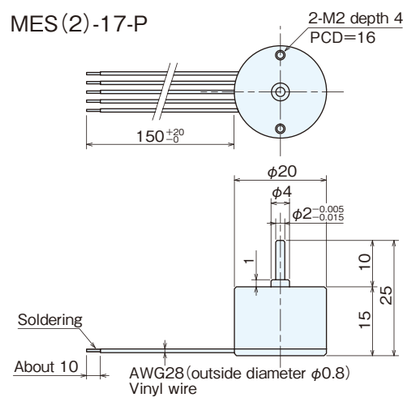


Specifications

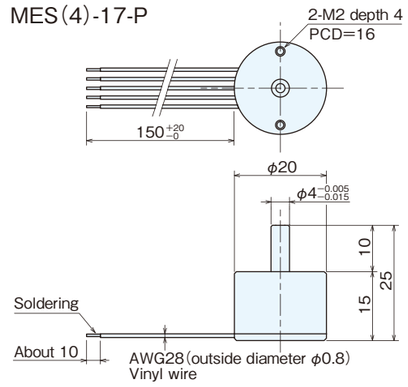
Item		Type name: ME□-17-□P (Shaft shape: ●S(2)=φ2 single shaft, ●S(4)=φ4 single shaft, ●H=hollow shaft; Pulse number)
Supply voltage		DC5V ±10%
Current consumption		30mA or less (under no load)
Detection system		Incremental
Output	Output pulse number (Standard) (Pulse number/rotation)	100 300 500 200 360 256 400
Output	Output phase	A, B, Z phase (Z="H")
Output	Output form	Square wave, voltage output only Pull-up resistance 10kΩ
Output	Output capacity	Sink current:20mA Residual voltage:0.4V or less (at 10mA)
Output	Maximum response frequency (response pulse number)	50kHz
Output	Output phase difference	A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)
Output	Waveform rise/fall time	2μs or less
Allowable load of shaft (electrical)	Radial	1.9N (200gf)
Allowable load of shaft (electrical)	Thrust	1.9N (200gf)
Maximum allowable revolutions (mechanical)		6,000r/min
Working ambient temperature/ humidity		0℃~50℃ 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

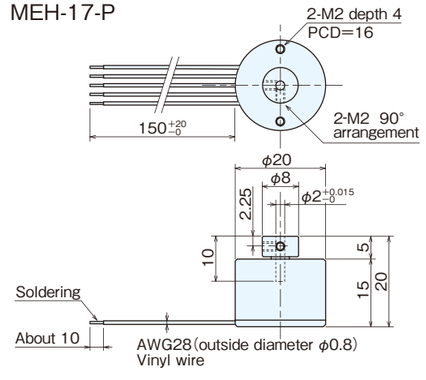
MES(2)-17-P



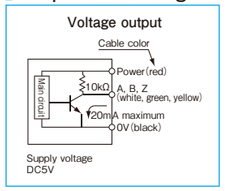
MES(4)-17-P



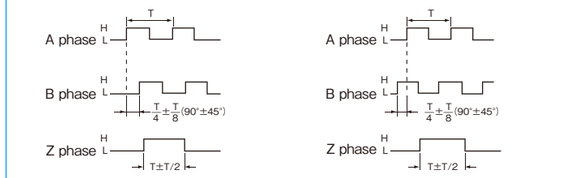
MEH-17-P



Output circuit diagram

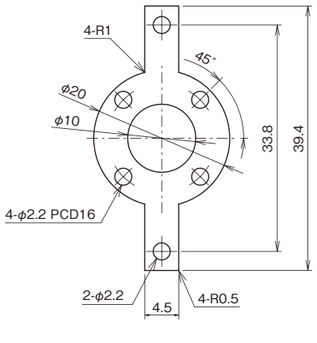


Output waveform



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

Spring flange MEH-17 (Option)



MEH-19 series

[Square Wave/Incremental]

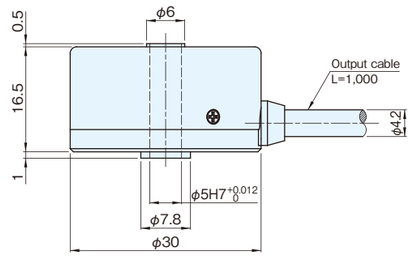
- Outside dimensions ϕ30×16.5mm
- Through Shaft

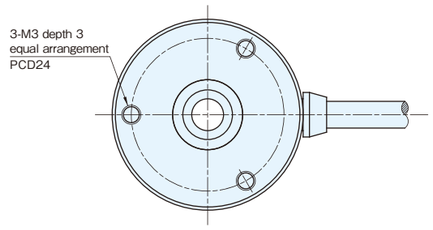


Specifications

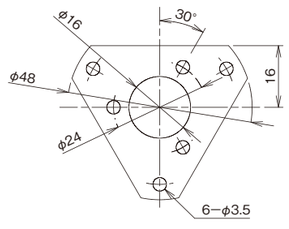
Type name / Item	MEH-19-3375 PSTN□E
Detection system	Incremental
Output phase	A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$ phase CS phase(U, U, V, $\overline{V}$, W, $\overline{W}$)
Output form	Square, Line driver output
Output pulse number(P/R)	3375, 6750(3375×2), 13500(3375×4) 16875(3375×5), 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 ± T/8 Waveform ratio of 1T: T ± 0.3t Z phase width: T ± 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(Io): ±20mAmax. Output voltage Vol: 0.5Vmax. VoH: 2.5Vmin.
Maximum allowable revolutions	6000r/min
Working ambient temperature/ humidity	−10℃~+70℃/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 50G 3 times each in X, Y, and Z directions
Cable	Outside diameter ϕ4.2 8-cores shield cable(without CS phase: 14-cores)AWG30
Mass	57g(excluding cable)

Outside dimensions



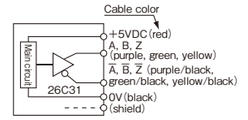


Spring flange MEH-19(Option)



Output circuit diagram

Line driver output(option)

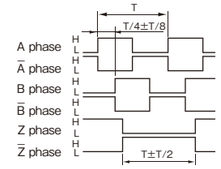


Note: If the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end.

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

Output waveform[×1]

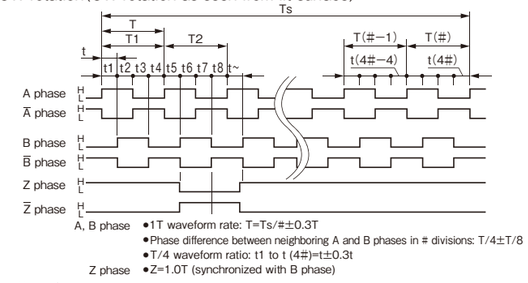
CW rotation(CW rotation as seen from fit surface)



*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)

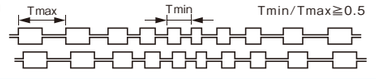
CW rotation(CW rotation as seen from fit surface)



A, B phase
- 1T waveform rate: T=Ts/#±0.3T
- Phase difference between neighboring A and B phases in # divisions: T/4±T/8
- T/4 waveform ratio: t1 to t (4#)=t±0.3t

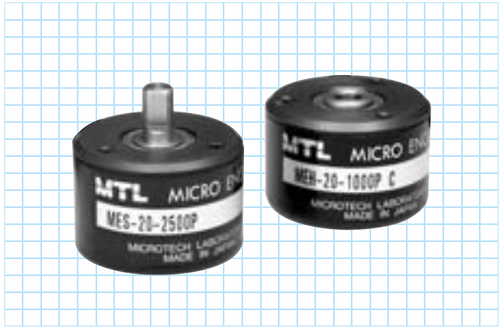
Z phase
- Z=1.0T (synchronized with B phase)

Waveform example



ME-20-P series

[Square Wave/Incremental]



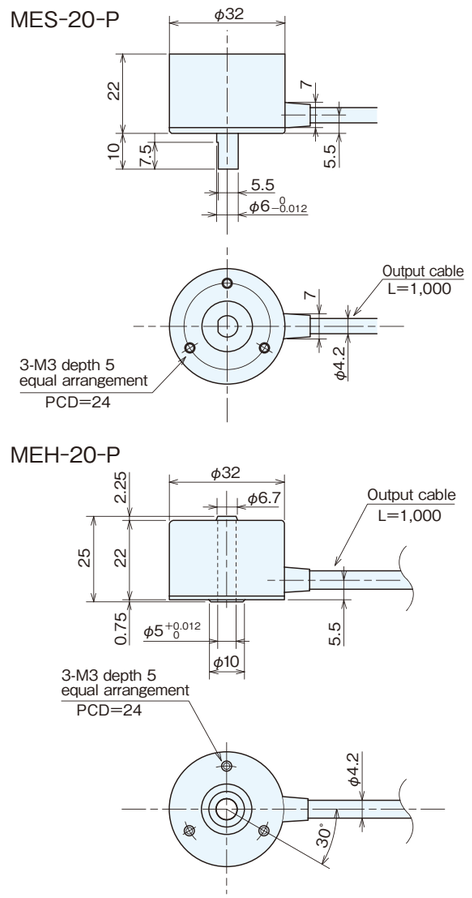
Specifications

Item				
Type name	ME□-20-□P□ Shaft shape ●S=single shaft ●H=hollow shaft ●D=double shaft 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(×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%～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 pulse number (Standard) (Pulse number/rotation)	40 250 512 50 256 60 300 100 360 125 400 200 500	600 1,800(*) 800 2,000(*) 1,000 2,048(*) 1,024 2,500(*) 1,200 3,600(*) 1,500 5,400(*) 7,200(*)		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)
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)
Allowable load of shaft(electrical) 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°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/s²(about 50G) 3 times each in X, Y, and Z directions			Durability 500m/s²(about 50G) 3 times each in X, Y, and Z directions
Cable	Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable(length 1m)			Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable(length 1m)
Mass	70g			70g

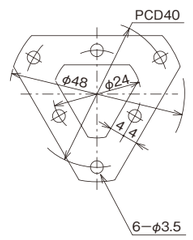
Output

*Handled by built-in multiplier circuit

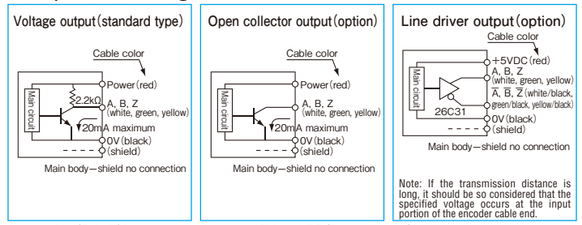
Outside dimensions



Spring flange MEH-20(Option)

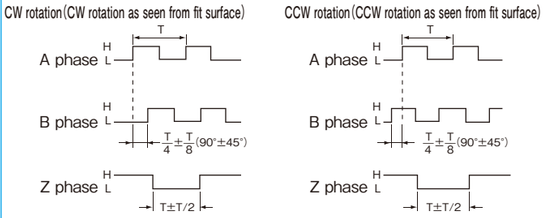


Output circuit diagram



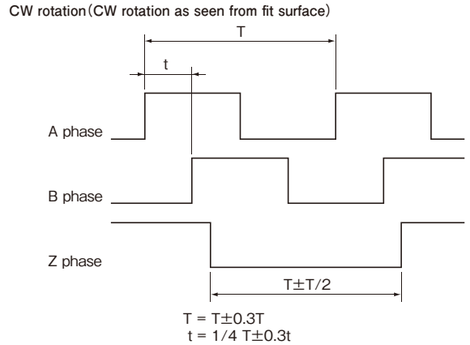
A capacitor(0.1μF)is connected between 0V and FG(frame ground).

Output waveform(Square wave)



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

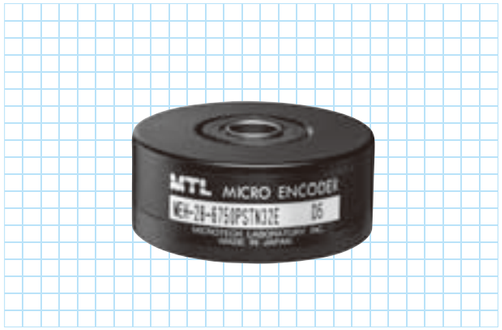
Output waveform／Built-in multiplication circuit(×2·×4·×5·×8·×10·×16·×20)



MEH-28 series

[Square Wave/Incremental]

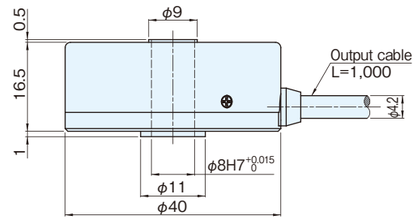
- Outside dimensions ϕ40×16.5mm
- Through Shaft

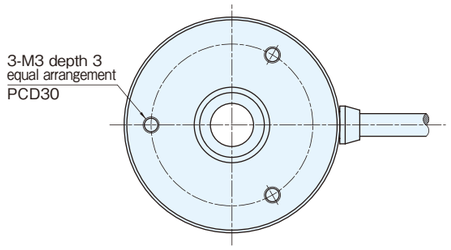


Specifications

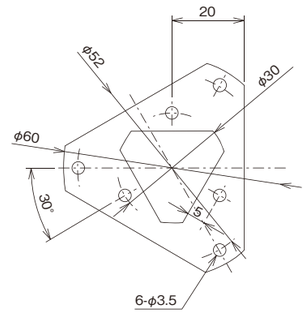
Type name / Item	MEH-28-6750 PSTN□E
Detection system	Incremental
Output phase	A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$ phase CS phase(U, $\overline{U}$, V, $\overline{V}$, W, $\overline{W}$)
Output form	Square, Line driver output
Output pulse number(P/R)	6750, 13500(6750×2), 27000(6750×4) 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 ± T/8 Waveform ratio of 1T: T ± 0.3t Z phase width: T ± 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(Io): ±20mAmax. Output voltage Vol: 0.5Vmax. VoH: 2.5Vmin.
Maximum allowable revolutions	6000r/min
Working ambient temperature/humidity	−10℃~+70℃/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 50G 3 times each in X, Y, and Z directions
Cable	Outside diameter ϕ4.2 8cores shield cable(without CS phase: 14-cores) AWG30
Mass	80g(excluding cable)

Outside dimensions



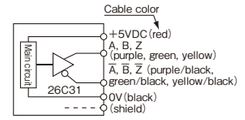


Spring flange MEH-28(Option)



Output circuit diagram

Line driver output(option)

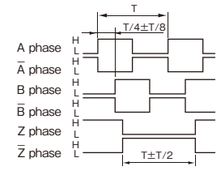


Note: If the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end.

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

Output waveform[×1]

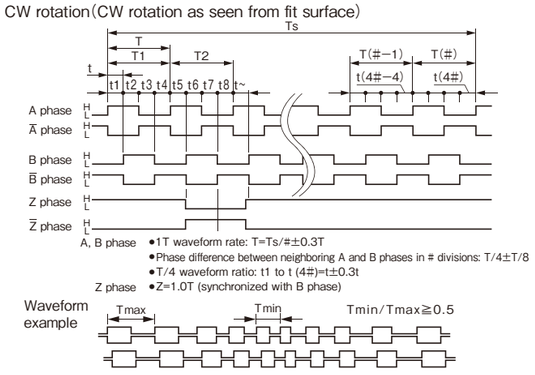
CW rotation(CW rotation as seen from fit surface)



*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)

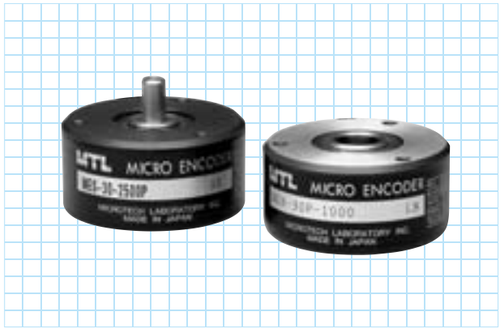
CW rotation(CW rotation as seen from fit surface)



- 1T waveform rate: T=Ts/#±0.3T
- Phase difference between neighboring A and B phases in # divisions: T/4±T/8
- T/4 waveform ratio: t1 to t (4#)=t±0.3t
- Z=1.0T (synchronized with B phase)

ME-30-P series

[Square Wave/Incremental]



Specifications

Type name: ME□-30-□P□

Item

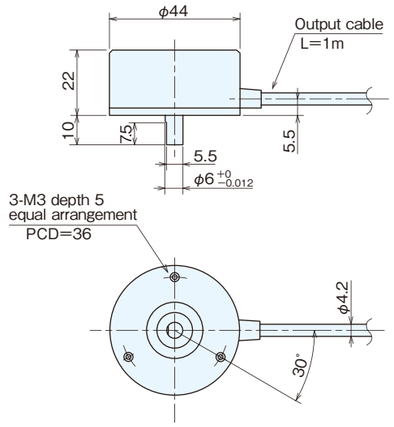
- Shape: ●S=single shaft ●H=hollow shaft ●D=double shaft
- Pulse number
- Output circuit: ●No entry=voltage output ●C=open collector output ●C4=open collector output DC24V ●E=line driver output ●ST□(2·4·5·8·10·16·20)

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 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]	40 250 500 50 300 512 60 360 600 100 400 200 450	720 2,500(*) 800 3,600(*) 900 4,096(*) 1,000 4,500(*) 1,024 5,000(*) 1,200 6,000(*) 1,500 8,192(*) 1,800 9,000(*) 2,000 10,000(*) 2,048 10,800(*)	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) 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°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/s²(about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s²(about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter ϕ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)		Outside diameter ϕ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)
Mass		140g		140g

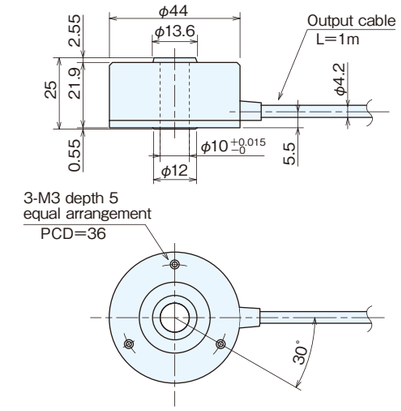
*Handled by built-in multiplier circuit

Outside dimensions

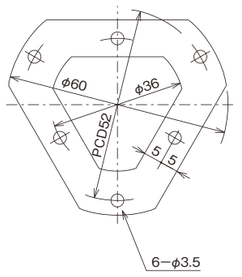
MES-30-P



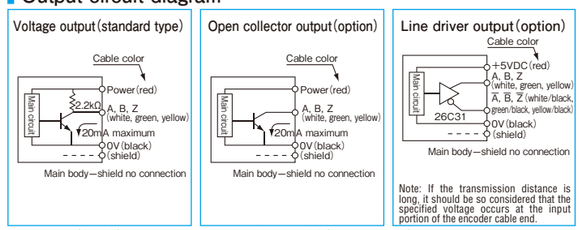
MEH-30-P



Spring flange MEH-30 (Option)

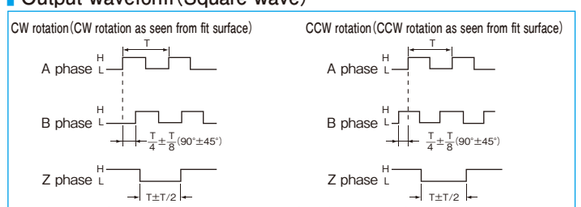


Output circuit diagram



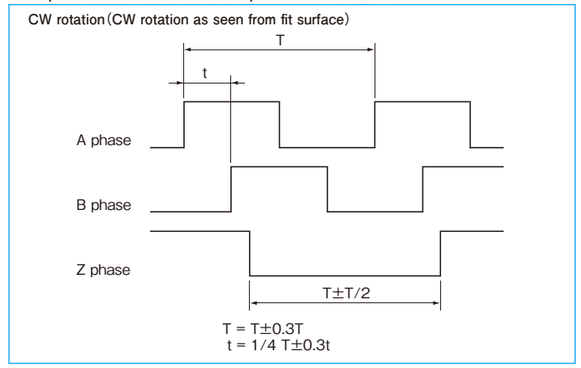
A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Output waveform (Square wave)



*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)



MEH-30T series

[Square Wave/Incremental]

- External ϕ44
- 18mm-high thin incremental encoder (hollow axle)

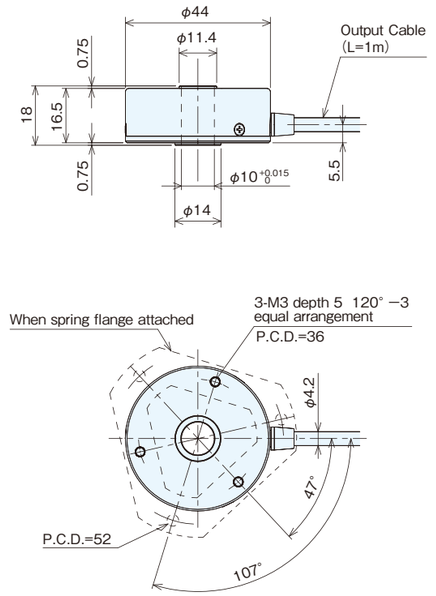


Specifications

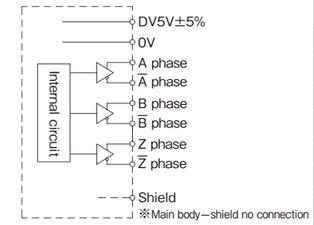
Item \ Type name	MEH-30T-10000 PST20 E Pulse number / By multiplication (×2, 4, 5, 8, 10, 16, 20)
Detection system	Incremental
Output phase	A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$ phase
Output form	Square, Line driver output
Output pulse number (P/R)※	20000 (10000×2), 40000 (10000×4) 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 ± T/8 Waveform ratio of 1T: T ± 0.3t Z phase width: T ± 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 (Io): ±20mAmax. Output voltage Vol:0.5Vmax. VoH:2.5Vmin.
Maximum allowable revolutions	6000r/min
Working ambient temperature/ humidity	−10℃～+70℃ 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	Outside diameter ϕ4.2 8-core vinyl wire AWG28 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

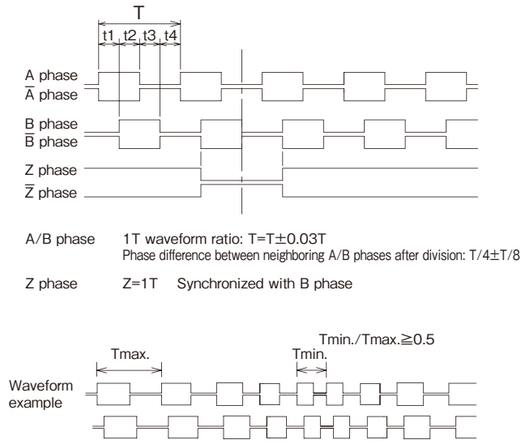


Signal name	Wire color
A phase	White
Ā phase	White/Black
B phase	Green
B̄ phase	Green/Black
Z phase	Yellow
Z̄ phase	Yellow/Black
5V	Red
0V	Black

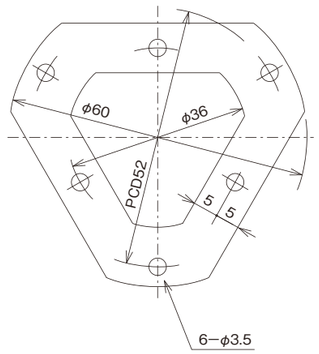
※A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Connection diagram

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

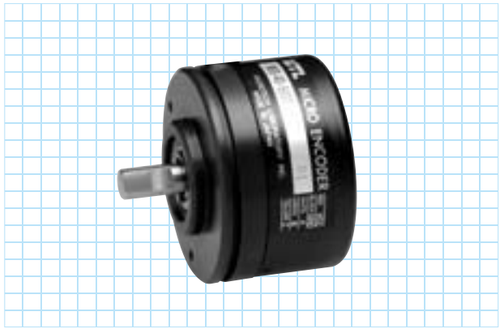


Spring flange MEH-30 (Option)



MES-40-P series

[Square Wave/Incremental]

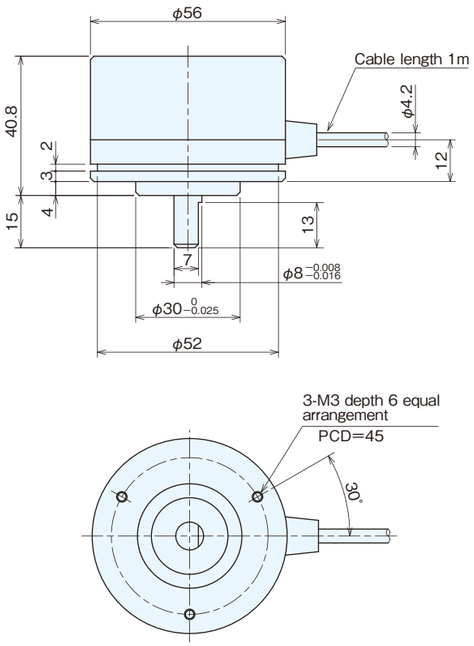


Specifications

Item			Square wave	Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20)
Type name			MES-40-□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))	
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(*) 10,800(*) 300 1,024 4,000(*) 11,250(*) 360 1,200 4,096(*) 15,000(*) 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)	49N (5kgf)
		Thrust	29.4N (3kgf)	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/s²(about 50G) 3 times each in X, Y, and Z directions	Durability 500m/s²(about 50G) 3 times each in X, Y, and Z directions
Cable			Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)	Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)
Mass			200g	200g

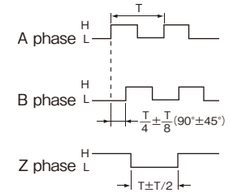
*Handled by built-in multiplier circuit

Outside dimensions

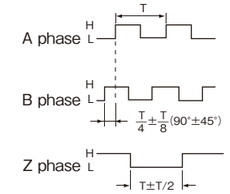


Output waveform (Square wave)

CW rotation (CW rotation as seen from fit surface)



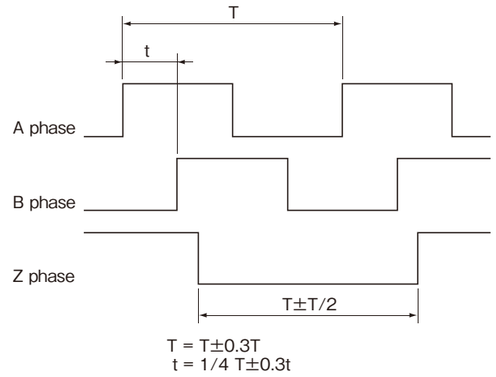
CCW rotation (CCW rotation as seen from fit surface)



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

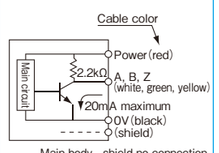
Output waveform/Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20)

CW rotation (CW rotation as seen from fit surface)

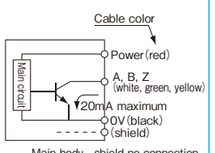


Output circuit diagram

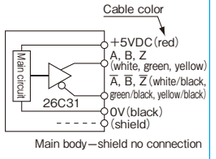
Voltage output (standard type)



Open collector output (option)



Line driver output (option)



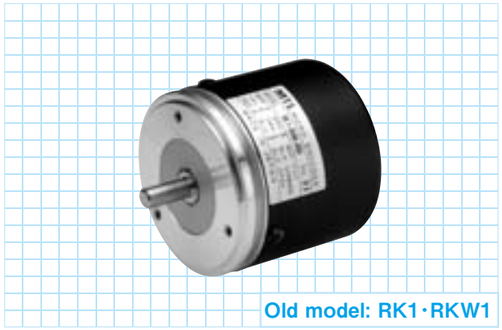
Note: If the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end.

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

MES-45 series

[Square Wave/Incremental]

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



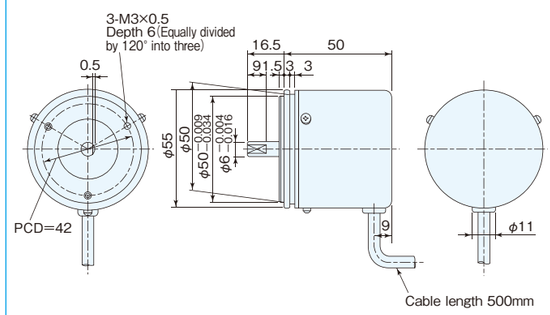
Old model: RK1・RKW1

Specifications

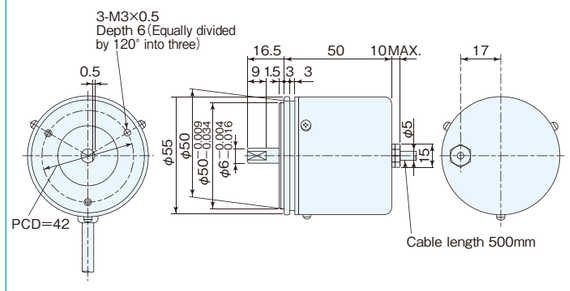
Item	Type name: MES□-45-1000-05 C ●No entry= standard type ●W=drip-proof type Resolution Input voltage ●05=5V ●12=12V ●24=24V Output circuit ●No entry=voltage output ●C=open collector output ●D=differential driver output
Supply voltage	DC5V −5%～12V+10% (voltage output/differential driver output) DC5V −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 1,024 3,000 500 1,200 3,200 512 1,500 3,600 600 1,800 4,096 720 2,000 5,000 800 2,048 6,000 1,000 2,500 9,000
Maximum response frequency	200kHz
Allowable load of shaft(electrical) Radial	49.0N(5kgf)
Allowable load of shaft(electrical) Thrust	29.4N(3kgf)
Maximum allowable revolutions (mechanical)	6,000r/min
Working ambient temperature/ humidity	−10℃～70℃／ RH95% max no dewing
Storing ambient temperature	−30°C～80°C
Vibration resistance	Durablility 0-500Hz, double amplitude 1.52mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 490m/s²(about 50G) 3 times each in X, Y, and Z directions
Cable	Outside diameter ϕ5 5-core vinyl wire AWG28 Insulated shield cable(length 500mm)
Mass	280g

Outside dimensions

MES-45(Standard type)

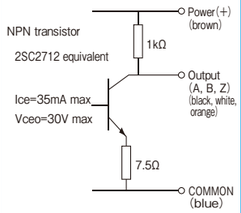


MESW-45(Option; drip-proof type)

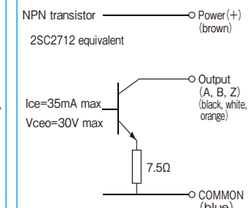


Output circuit diagram

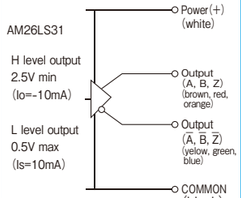
Voltage output(standard type)



Open collector output

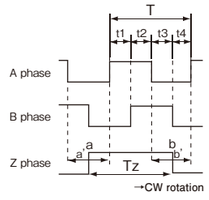


Differential driver output



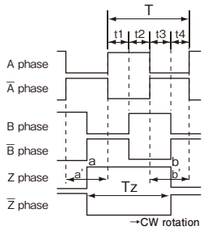
Output waveform

Voltage output/open collector output



- ●Duty accuracy
  t1+t2=0.5T±0.1T
  t2+t3=0.5T±0.1T
- ●Phase accuracy
  t1, t2, t3, t4=0.25T±0.07T
- ●Z phase
  Tz=T±0.5T
- ●The point of variation "a" is within the range "a'" of A-phase output.
- ●The point of variation "b" is within the range "b'" of A-phase output.
  T = 360°/resolution

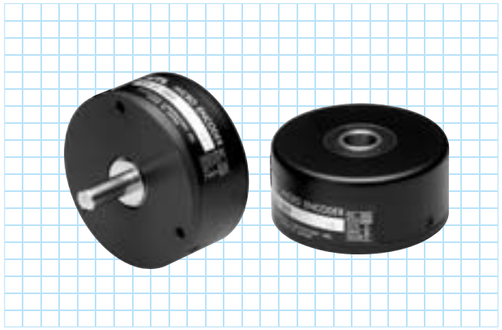
Differential driver output



- ● Duty accuracy
  t1+t2=0.5T±0.1T
  t2+t3=0.5T±0.1T
- ● Phase accuracy
  t1, t2, t3, t4=0.25T±0.07T
- ●Z phase
  Tz=T±0.5T
- ●The point of variation "a" is within the range "a'" of A-phase output.
- ●The point of variation "b" is within the range "b'" of A-phase output.
  T = 360°/resolution

ME-50-P series

[Square Wave/Incremental]



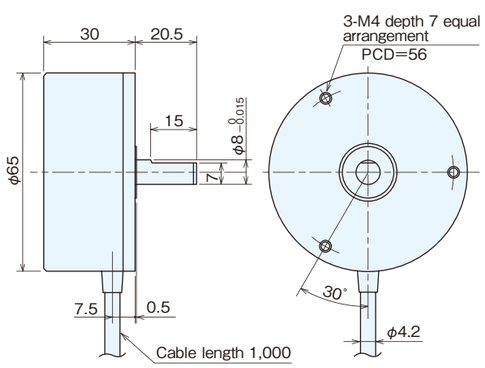
Specifications

Item			Square wave		Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20)
Type name			ME□-50-□P□ Shaft shape ●S=single shaft ●H=hollow shaft; 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)		
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) [Pulse number/rotation]		500 2,000 5,000(*) 10,800(*) 900 3,000 5,400(*) 1,000 3,600 6,000(*) 1,024 4,096(*) 9,000(*) 10,000(*)		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	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℃～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/s²(about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s²(about 50G) 3 times each in X, Y, and Z directions
Cable			Outside diameter ϕ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)		Outside diameter ϕ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)
Mass			220g		220g

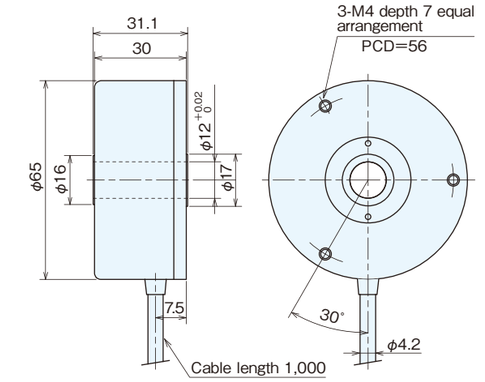
*Handled by built-in multiplier circuit

Outside dimensions

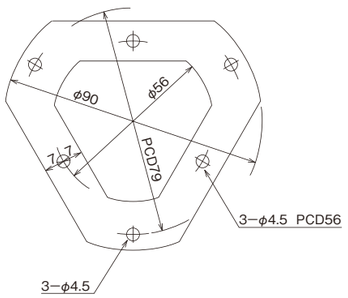
MES-50-P



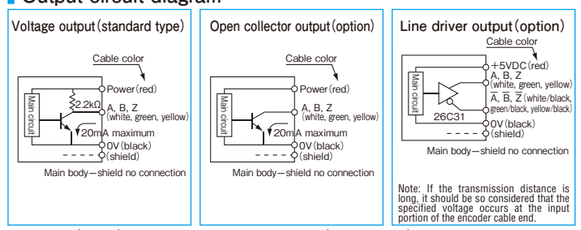
MEH-50-P



Spring flange MEH-50 (Option)



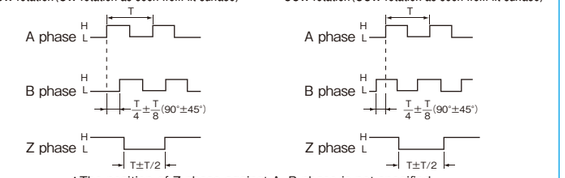
Output circuit diagram



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.

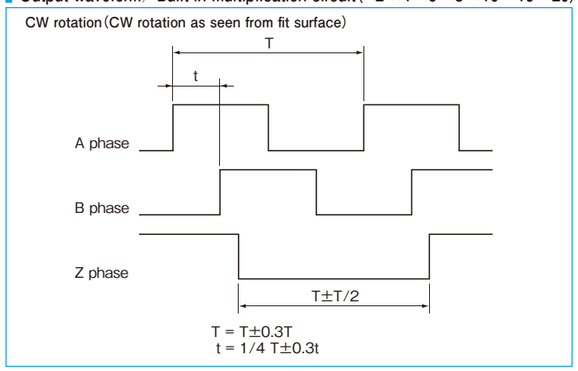
A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Output waveform (Square wave)



*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)



MEH-59 series

[Square Wave/Incremental]

- Outside dimensions ϕ70×16.5mm　Incremental encoder
- Resolution 648000(12960×50)、中空軸ϕ25

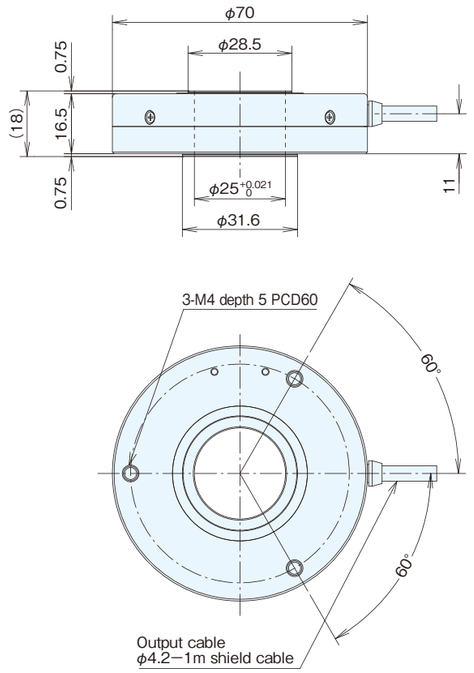
NEW



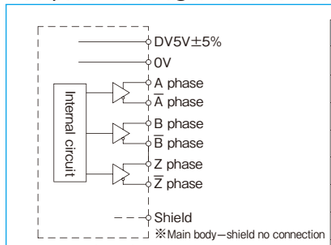
Specifications

Type name / Item		MEH-59-12960PSTG50E
Detection system		Incremental
Output phase		A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$ phase CS phase(U,$\overline{U}$,V,$\overline{V}$,W,$\overline{W}$)
Output form		Square, Line driver output
Resolution		648000(12960×50)
Supply voltage		DC5V±5%
Current consumption		150mA or less(under no load)
Maximum response frequency		5MHz
Maximum allowable revolutions		1000rpm(electrical)
Allowable load of shaft(electrical)	Radial	9.8N(1.0kg)
	Thrust	4.9N(0.5kg)
Working ambient temperature/ humidity		−10℃～+70℃／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 50G 3 times each in X, Y, and Z directions
Cable		Outside diameter ϕ4.2 8-cores shield cable AWG30(length 1m)＊without CS phase: 14-cores
Mass		200g

Outside dimensions



Output circuit diagram and connection diagram

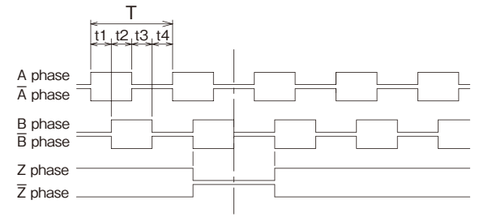


Signal name	Wire color
A phase	White
$\overline{A}$ phase	White/Black
B phase	Green
$\overline{B}$ phase	Green/Black
Z phase	Yellow
$\overline{Z}$ phase	Yellow/Black
5V	Red
0V	Black

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

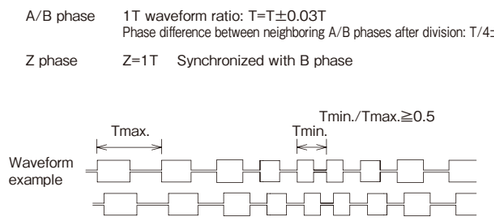
Connection diagram

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

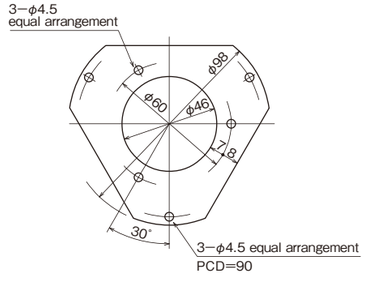


A/B phase　1T waveform ratio: T=T±0.03T
Phase difference between neighboring A/B phases after division: T/4±T/8

Z phase　Z=1T　Synchronized with B phase

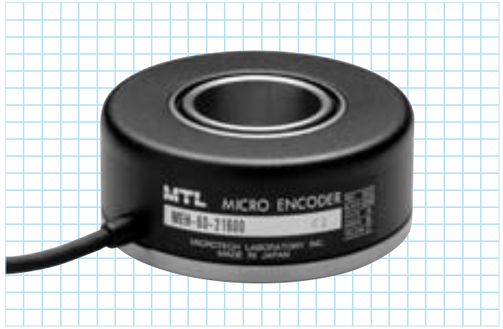


Spring flange MEH-60(Option)



MEH-60-P series

[Square Wave/Incremental]

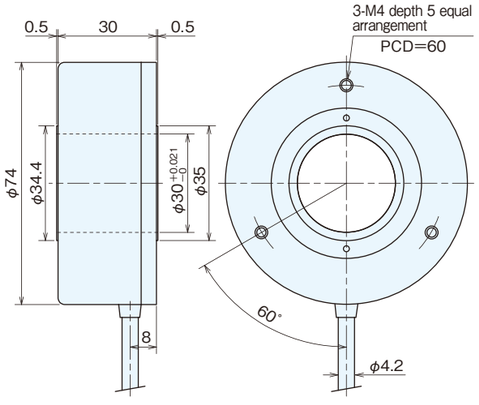


Specifications

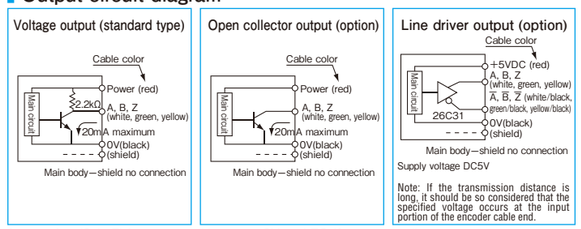
Item				
Type name		MEH-60-□P□ Pulse number / Output circuit ●No entry=voltage output ●C=open collector output ●C4=open collector output DC24V ●E=line driver output ●ST□(2·4·5·8·10·16·20)		
		Square wave		Built-in multiplication circuit(×2·×4·×5·×8·×10·×16·×20)
Supply voltage		Voltage／Open collector DC5V−5%～12V+10% Open collector DC24V:DC24V±10% (*)Open collector output:20,250,21,600は 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は 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]	100 600 180 1,000 200 360 400 500	1,024 8,100(*1) 1,800 9,000(*1) 2,000 10,000(*1) 3,600 10,800(*1) 4,000 20,250(*1, 2) 5,000 21,600,(*1, 2) 5,400(*1)	EX 21,600×2(43,200) 21,600×4(86,400) 21,600×5(108,000) 21,600×8(172,800) 21,600×10(216,000) 21,600×16(345,600) 21,600×20(432,000)
	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	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)		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℃～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/s²(about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s²(about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter ϕ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)		Outside diameter ϕ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)
Mass		320g 430g(*2)		430g

*1: Handled by built-in multiplier circuit
*2: The mass changes

Outside dimensions

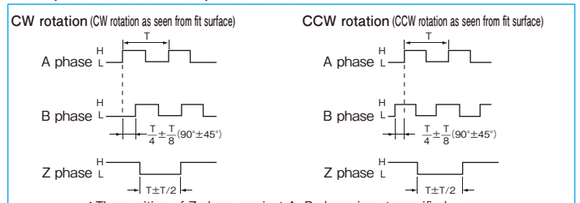


Output circuit diagram



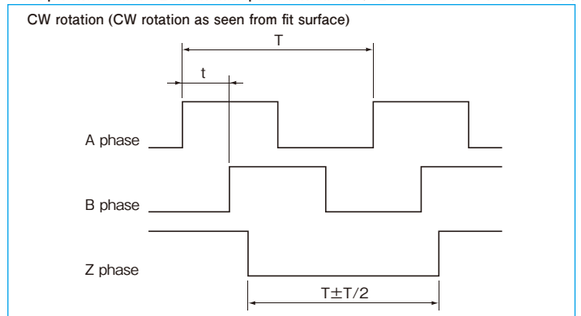
A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Output waveform (Square wave)



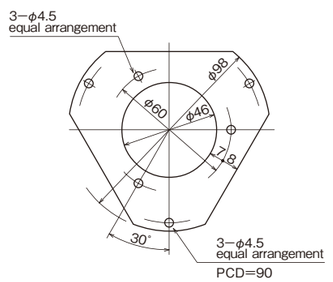
＊The position of Z phase against A, B phase is not specified.

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



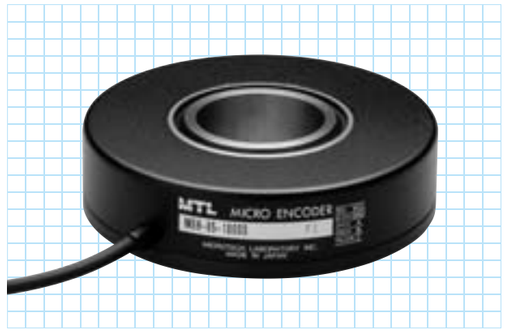
T = T±0.3T
t = 1/4 T±0.3t

Spring flange MEH-60(Option)



MEH-85-P series

[Square Wave/Incremental]



Specifications

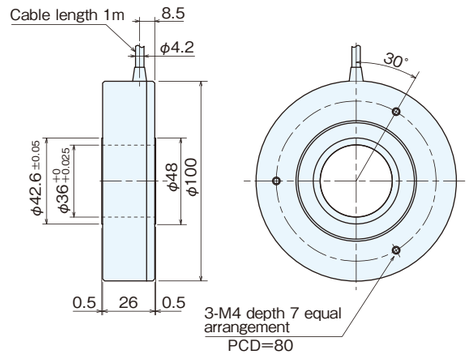
Item					
Type name	MEH-85-□P□ (Pulse number; Output circuit: ●No entry=voltage output ●C=open collector output ●C4=open collector output DC24V ●E=line driver output ●ST□(2·4·5·8·10·16·20))				
	Square wave			Built-in multiplication circuit(×2·×4·×5·×8·×10·×16·×20)	
Supply voltage	Voltage／Open collector:DC5V−5%～12V+10% Open collector DC24V:DC24V±10% 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: Output phase	A, B, Z phase			A, B, Z phase	
Output: Output form	Square wave			Square wave	
Output: Output capacity	Sink current:20mA Residual voltage:0.5V or less(at 10mA)			—	
Output: Maximum response frequency (response pulse number)	100kHz			Voltage／Open collector output:100kHz Line driver output:75kHz×(by multiplication)	
Output: 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	
Output: Waveform rise/fall time	2μs or less(output cable 1m or less)			—	
Allowable load of shaft(electrical): Radial	9.8N(1kgf)			9.8N(1kgf)	
Allowable load of shaft(electrical): 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℃～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/s²(about 50G) 3 times each in X, Y, and Z directions			Durability 500m/s²(about 50G) 3 times each in X, Y, and Z directions	
Cable	Outside diameter ϕ4.2 5-core vinyl wire AWG28 Insulated shield cable(length 1m)			Outside diameter ϕ4.2 5-core vinyl wire AWG28 Insulated shield cable(length 1m)	
Mass	520g	620g	1,050g	1,050g	

*Handled by built-in multiplier circuit

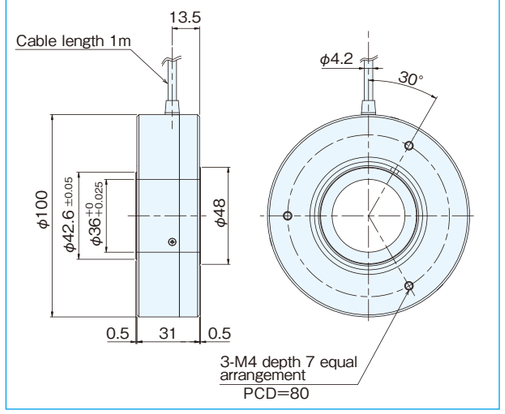
Outside dimensions

MEH-85-P

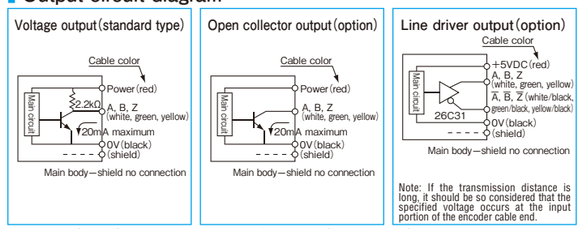
※1,024 pulse or less



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

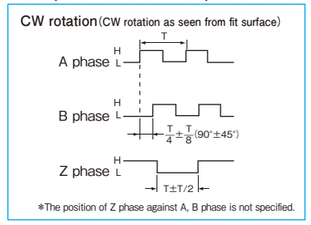


Output circuit diagram

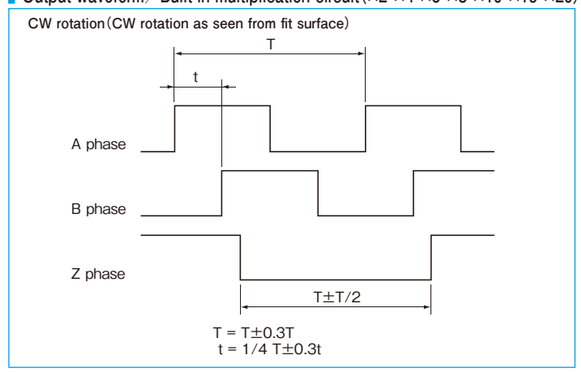


A capacitor(0.1μF)is connected between 0V and FG(frame ground).

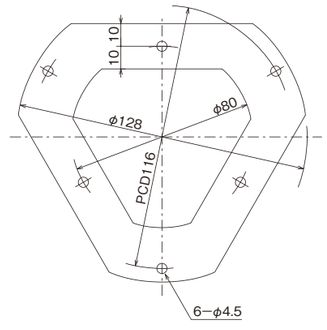
Output waveform(Square wave)



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

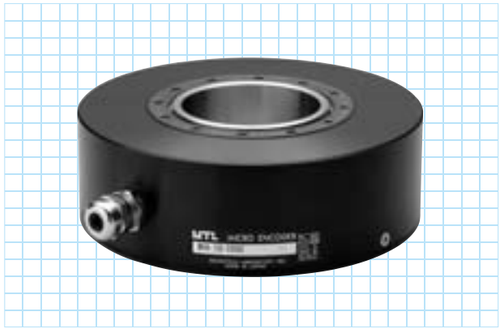


Spring flange MEH-85(Option)



MEH-130-P series

[Square Wave/Incremental]



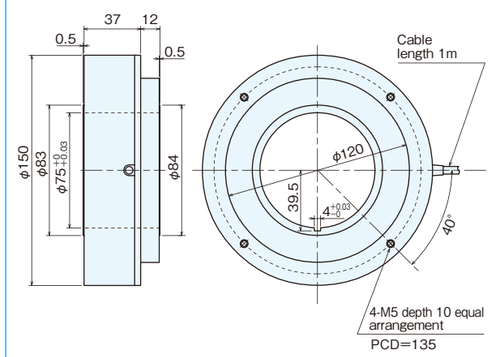
Specifications

Item				Square wave	Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20)
Type name				MEH-130-□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))	
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				1,024 pulse or less 60mA or less 4,500 pulse or more 100mA or less(under no load)	150mA or less(under no load)
Detection system				Incremental	Incremental
Output	Output pulse number (Standard) 〔Pulse number/rotation〕			360 5,000 28,125(*) 512 9,000 32,400(*) 600 11,250(*) 36,000(*) 1,024 20,250(*) 4,500 25,000(*)	EX 32,400×2(64,800) 32,400×4(129,600) 32,400×5(162,000) 32,400×8(259,200) 32,400×10(324,000) 32,400×16(518,400) 32,400×20(648,000)
	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:75kHz×(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)	19.6N(2kgf)
		Thrust		9.8N(1kgf)	9.8N(1kgf)
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℃～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/s²(about 50G) 3 times each in X, Y, and Z directions	Durability 500m/s²(about 50G) 3 times each in X, Y, and Z directions
Cable				Outside diameter φ4.2 vinyl wire AWG28(1024P/R or less) Outside diameter φ6.5(14-core)vinyl wire(4500P/R or more) Insulated shield cable (length 1m)	Outside diameter φ6.5 14-core vinyl wire AWG28 Insulated shield cable(length 1m)
Mass				3kg	3kg

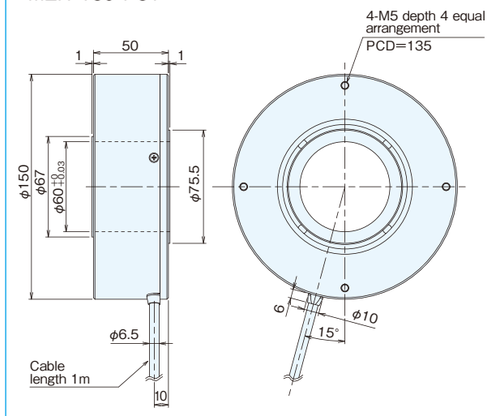
*Handled by built-in multiplier circuit

Outside dimensions

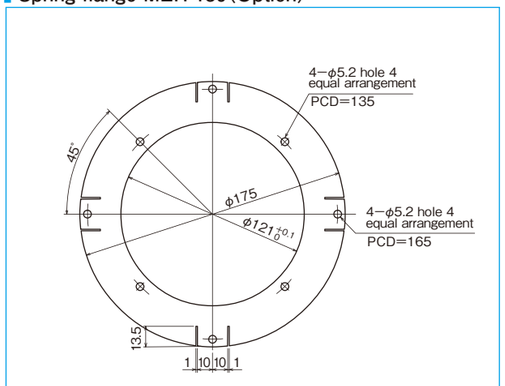
MEH-130-P
*1,024 pulse or less



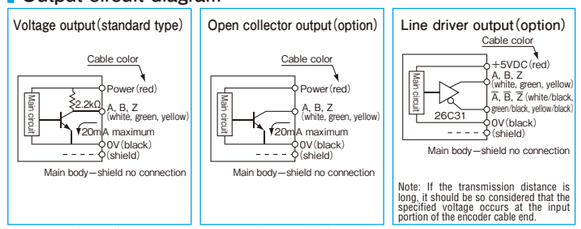
MEH-130-P(4,500 pulse or more)
MEH-130-PST



Spring flange MEH-130(Option)

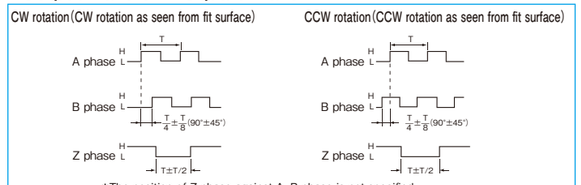


Output circuit diagram



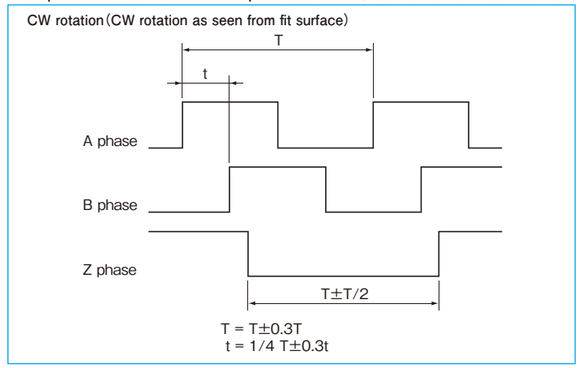
A capacitor(0.1μF)is connected between 0V and FG(frame ground).

Output waveform(Square wave)



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

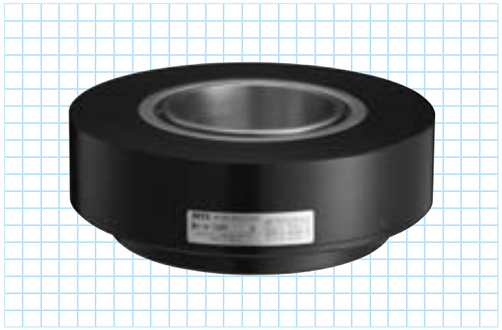
Output waveform／Built-in multiplication circuit(×2·×4·×5·×8·×10·×16·×20)



T = T±0.3T
t = 1/4 T±0.3t

MEH-180-P series

[Square Wave/Incremental]

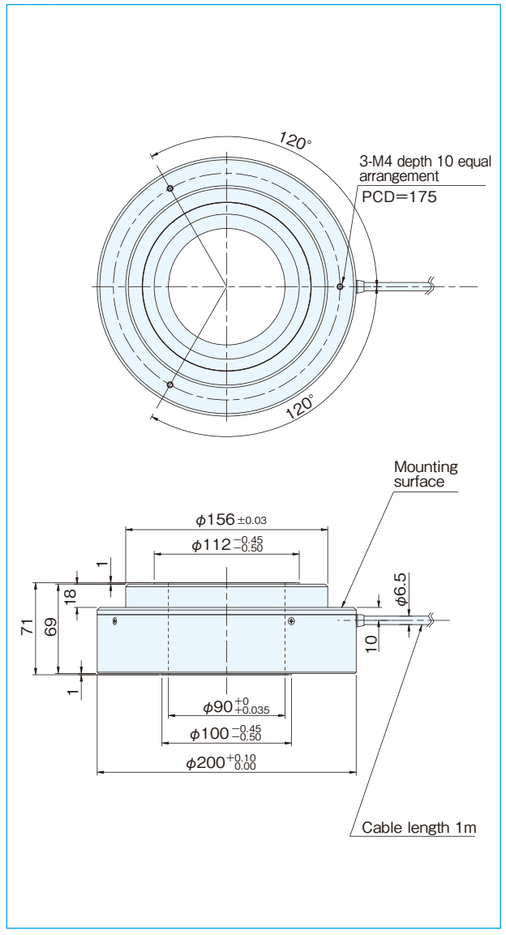


Specifications

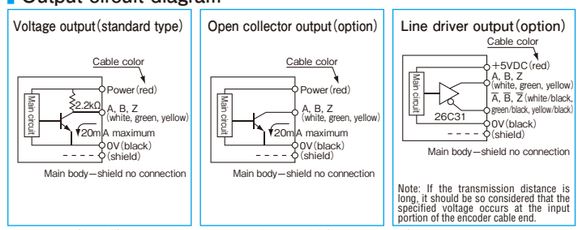
Item		Type name: MEH-180-□P□ (Pulse number / Output circuit: ●No entry=voltage output ●C=open collector output ●E=line driver output ●ST□(2·4·5·8·10·16·20))	
		Square wave	Built-in multiplication circuit(×2·×4·×5·×8·×10·×16·×20)
Supply voltage		Voltage／Open collector:DC5V−5%～12V+10% Open collector DC24V:DC24V±10% 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/s²(about 50G) 3 times each in X, Y, and Z directions	Durability 500m/s²(about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter φ6.5 14-core AWG28 Insulated shield cable (length 1m)	Outside diameter φ6.5 14-core vinyl wire AWG28 Insulated shield cable (length 1m)
Mass		5kg	5kg

*Handled by built-in multiplier circuit

Outside dimensions

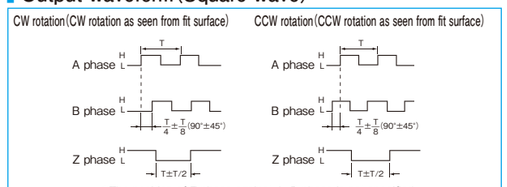


Output circuit diagram



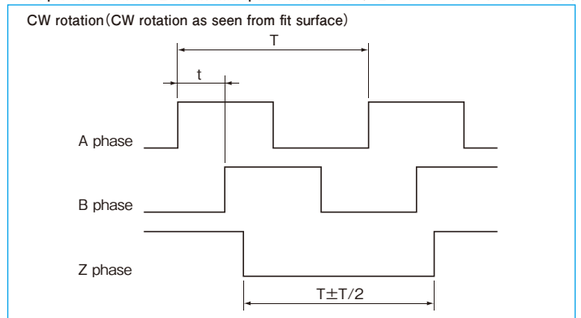
A capacitor(0.1μF)is connected between 0V and FG(frame ground).

Output waveform(Square wave)



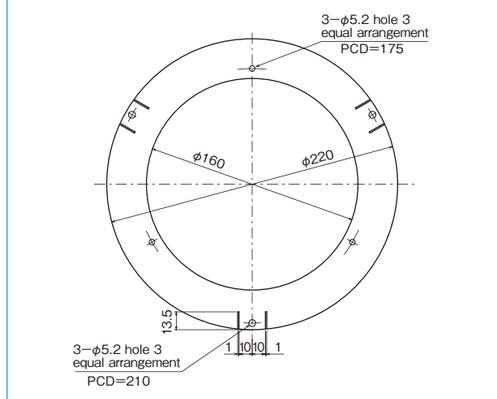
*The position of Z phase against A, B phase is not specified.

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



T = T±0.3T
t = 1/4 T±0.3t

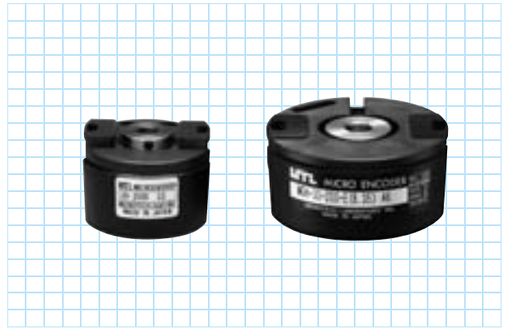
Spring flange MEH-180(Option)



MGH series

[Square Wave/Incremental]

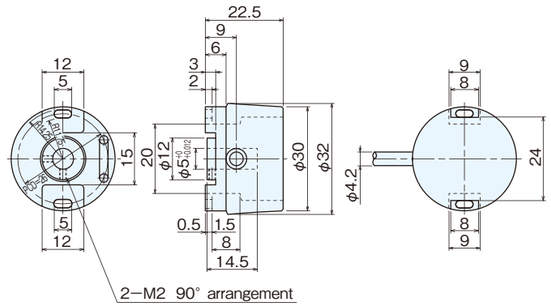
Can be easily attached to DC motors, AC motors, and stepping motors.



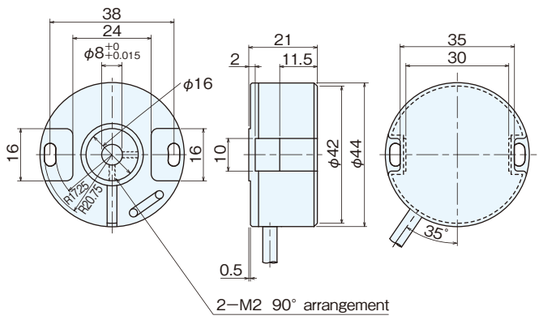
MGH-20, MGH-30

Outside dimensions

MGH-20



MGH-30



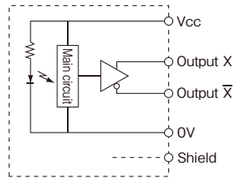
Specifications

Item		MGH-20-□-E□ (Pulse number; CS signal ●No entry=nil ●CS=available)	MGH-30-□-E□ (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	Output pulse number (Standard) (Pulse number/rotation)	40 50 60 100 125 200 250 / 300 360 400 500 512 600 800 / 1,000 1,024 1,200	40 50 60 100 200 250 300 360 / 400 450 500 512 600 720 800 900 / 1,000 1,024 1,200 1,500 1,800 2,000
	Output phase	A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$ phase*with CS signal U, $\overline{U}$, V, $\overline{V}$, W, $\overline{W}$ phase	
	Output form	Square wave Line driver output	
	Output capacity	V_{OL}=0.5Vmax V_{OH}=2.5Vmin I_O=±20mA	
	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 With CS signal(U, V, W) 4 poles, 60° phase difference 3 signals	
	Waveform rise/fall time	1μs or less(with 0.5m cable)	
Maximum allowable revolutions (mechanical)		6,000r/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 500m/s²(about 50G) 3 times each in X, Y, and Z directions	
Cable		Outside diameter φ4.2(φ6,8) 8-core(19-core)vinyl wire AWG 28 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	±0.02mm		±0.01mm
	Thrust	±0.1mm	±0.05mm	±0.02mm

Output circuit diagram



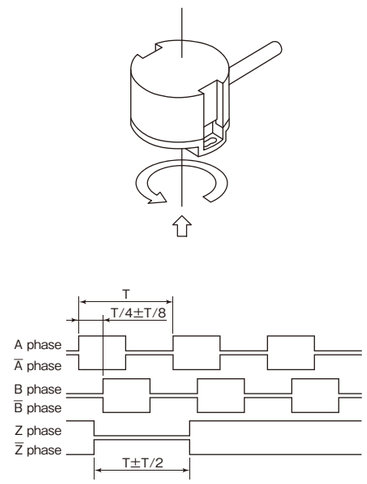
*The shield wire is not connected with the internal circuit.

Note: When the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end 1m.

Signal name	Wire color
5V	Red
0V	Black
A	White
$\overline{A}$	White/black
B	Green
$\overline{B}$	Green/black
Z	Yellow
$\overline{Z}$	Yellow/black
U	Brown
$\overline{U}$	Brown/black
V	Blue
$\overline{V}$	Blue/black
W	Orange
$\overline{W}$	Orange/black

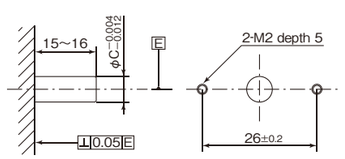
Output waveforms

CW rotation as seen from fitting surface

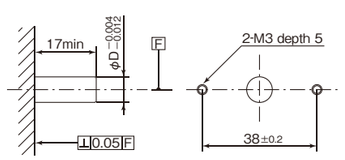


Fitting shaft dimensions

MGH-20



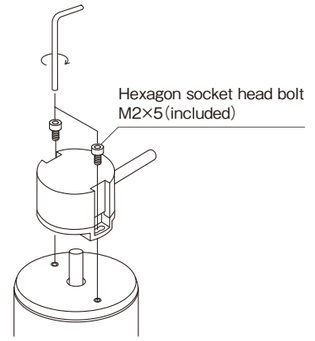
MGH-30



Assembling image of MGH series

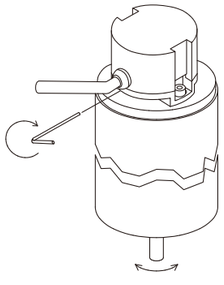
MGH-20, 30

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

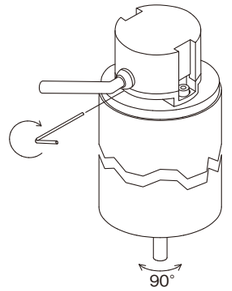


●Tools to be used
0.89mm hexagon wrench(included)
1.5mm hexagon wrench

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



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

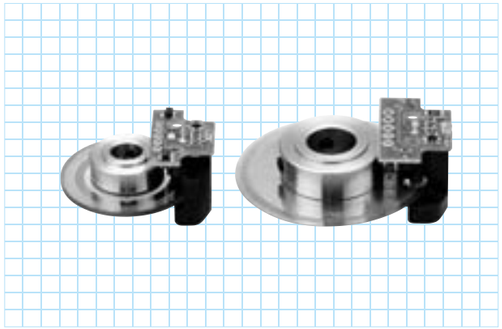


Note: Evenly tighten the screws in 2. ① and 2. ②
Note: Recommended tightening torque: 0.18 N·m

3. Affix encoder to base of rotating axle.
Note: Recommended tightening torque: 0.18 N·m

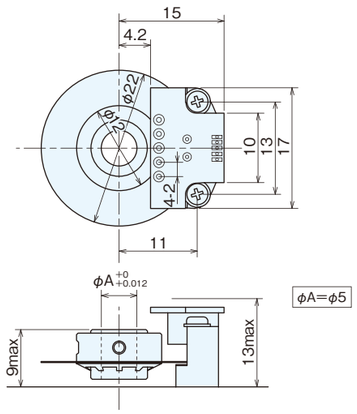
MG series

[Module Kit]

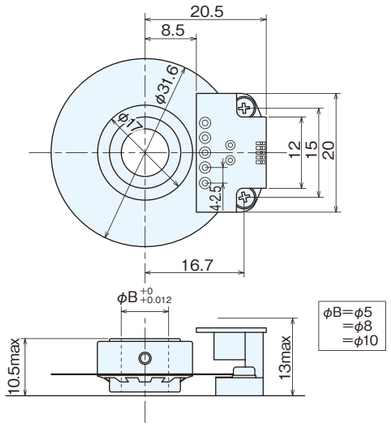


Outside dimensions

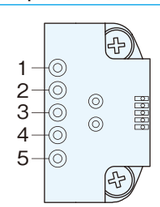
MG-20



MG-30



Output pin position encoder



	MG-20	MG-30
1	1:B-phase output	1:Power 5V
2	2:Power 5V	2:B-phase output
3	3:Power 0V	3:Power 0V
4	4:A-phase output	4:A-phase output
5	5:Z-phase output	5:Z-phase output

Specifications

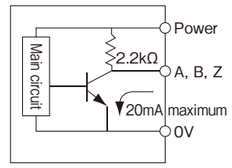
Item		MG-20-□□ Pulse number / Output circuit (●No entry=voltage output ●C=open collector output)	MG-30-□□ Pulse number / Output circuit (●No entry=voltage output ●C=open collector output)
Supply voltage		DC5V±10%	
Current consumption		30mA or less (under no load)	
Detection system		Incremental	
Output	Output pulse number (Standard) [Pulse number/rotation]	100 500 200 512 250 600 256 800 300 1,000 360 1,024 400 1,200	100 600 2,000 200 800 250 1,000 300 1,024 360 1,200 400 1,500 500 1,800
Output	Output phase	A, B, Z phase (Z=H)	
Output	Output form	Square Wave	
Output	Output capacity	Sink current:30mA Residual voltage:0.5V or less (at 10mA)	
Output	Maximum response frequency (response pulse number)	100kHz	
Output	Output phase difference	A, B phase difference 90°(T/4±T/8) Z phase T±T/2	
Output	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/s²(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

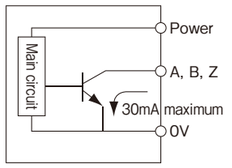
Output circuit diagram

Voltage output (standard type)



Supply voltage DC5V

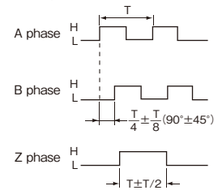
Open collector output (option)



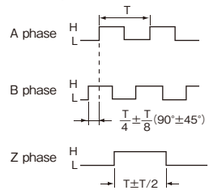
Supply voltage DC5V

Output waveforms MG-20

Left rotation as viewed from the output PCB side

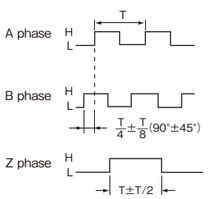


Right rotation as viewed from the output PCB side

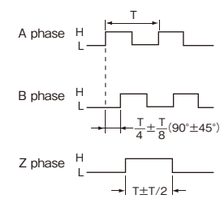


Output waveforms MG-30

Left rotation as viewed from the output PCB side



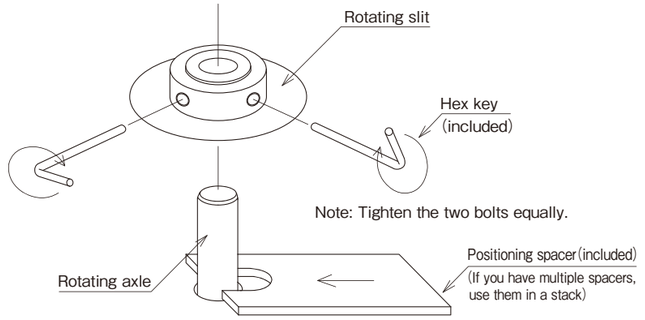
Right rotation as viewed from the output PCB side



Assembling image of MG series

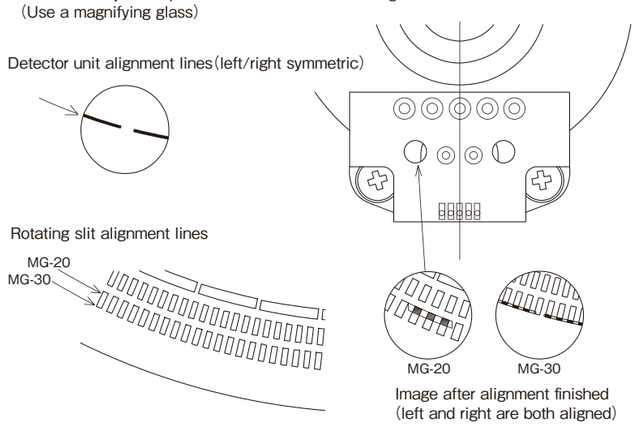
1.Attach the rotating slit

Attach the rotating slit using the positioning spacer.



2.Fit the detector unit

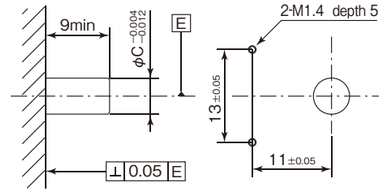
Attach and adjust the position of the detector unit using the included bolts and washers.
(Use a magnifying glass)



Fitting shaft dimensions

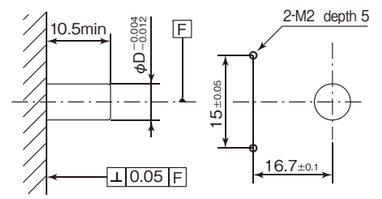
MG-20

Note: Refer also to the axle variation tolerance



MG-30

Note: Refer also to the axle variation tolerance



Absolute

Choose from outer diameter Φ6 - Φ100mm, resolution 256 - 2,097,152 pulses, single-shaft type, tubular-shaft type, and hollow-shaft type.
These attributes can be combined to suit diverse applications.

Single turn type

MAS-3-4096N1



MMS-10



MAS-10



MAS-14



MA-17



MAS-18



MAH-19



MA-20



MAH-28



MA-36-20bit



MA-36



MA-42



MAH-59



MAH-85



Multi turn type

MAS-36-1000MT-S



MXH-36



MXS-36



MXS-42



MAS-3 series

[Absolute]

- Outside dimensions φ6×8.6mm　12bit Absolute encoder
- Resolution 4096, SSI interface

NEW





Actual size

Encoder Specifications

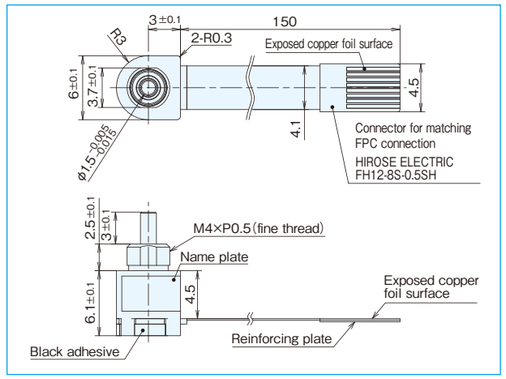
Item \ Type name		MAS-3-4096N1
Supply voltage		DC5V ±5%
Current consumption		40mA or less (under no load)
Resolution		4096, 2048, 1024
Allowable revolutions		6000r/min
Allowable load of shaft(electrical)	Radial	0.98N(100g)
	Thrust	0.98N(100g)
Working temperature/humidity		0°C～+60°C／RH35%～90%
Storage temperature		−20°C～+100°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		Flexible cable(lengh 150mm)
Mass		5g (not including I/F box)

Receiver specifications(37×37 PCB)

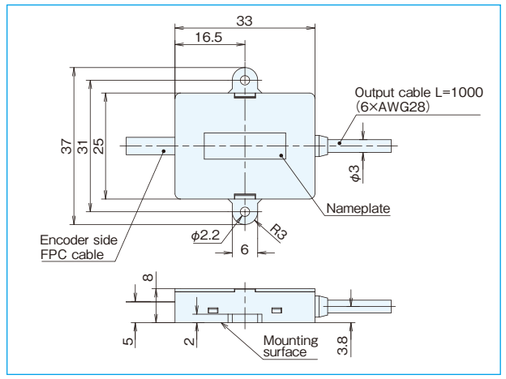
Item \ Type name	DECODER-△△bit
Supply voltage	DC5V ±5%
Current consumption	60mA or less (110mA or less including encoder)
Parallel data update cycle	60μs(16.7kHz)
Output circuit	NPN open collector output (when using parallel output)
Output capacity	Sink current 20mA or less. Load voltage 35V or less. 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)

△△…10, 11, 12 (corresponding to the encoder resolution)

Encoder Outside dimensions

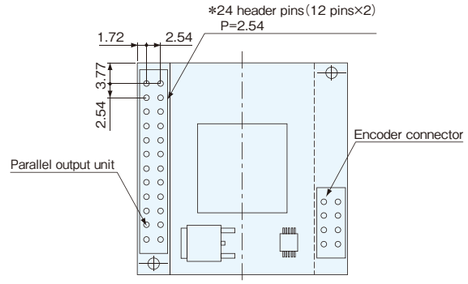


Outside dimensions of the I/F box



Receiver Outside dimensions(Option)

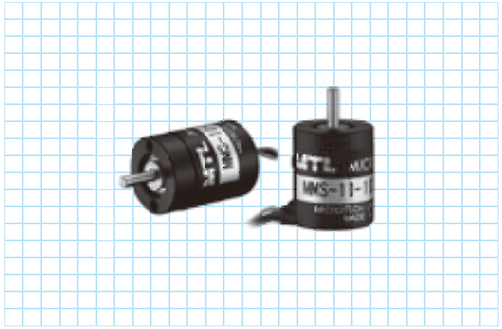
・Decoder PCB dimensions
(External dimensions 37×37)



MMS-10 series

[Absolute]

- Magnetic encoder with external dimensions Φ13mm × height 15.5mm
- Resolution 1024, SSI interface



Encoder Specifications

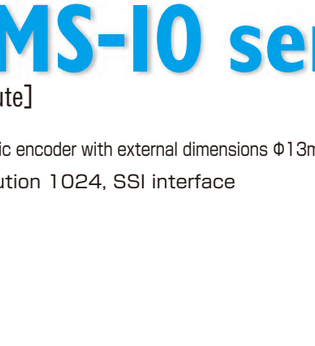
Item \ Type name	MMS−10− □ G1□ (Pulse number / Cable)
Supply voltage	DC5V ±5%
Current consumption	50mA or less (under no load)
Resolution	256(8bit) 360, 512(9bit) 1,024(10bit)
Allowable revolutions	6000r/min
Allowable load of shaft(electrical) Radial	1.9N(200gf)
Allowable load of shaft(electrical) Thrust	1.9N(200gf)
Working temperature/humidity	−10℃～+70℃／RH35%～90%
Storage temperature	−20℃～+100℃
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 Insulated shield cable AWG30(length 1m)
Mass	40g

Connection

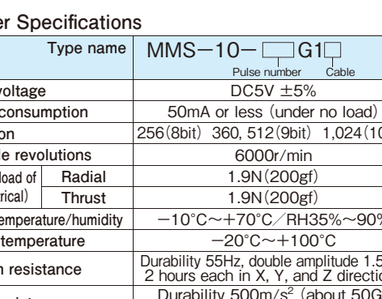
Cable color	Encoder connection	Cable color	Encoder connection
Red	5V±5%	Green	CLOCK
Black	0V(COMMON)	Blue	/CLOCK
White	DATA		
Brown	/DATA		
Shield			

Encoder Outside dimensions

Cable at rear



Cable at side (B)



Decoder specifications(37×37 PCB)

Item \ Type name	DECODER−△△bit
Supply voltage	DC5V ±5%
Current consumption	60mA or less (110mA 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 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)

△△…8, 9, 10 (corresponding to the encoder resolution)

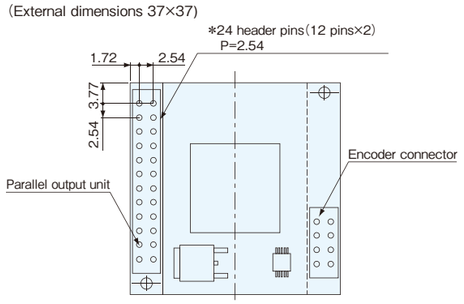
Connection diagram

Decoder board TH No.

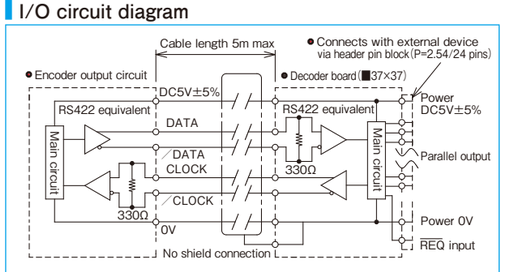
TH No.	Parallel output／Power	TH No.	Parallel output／Power
1	5V±5%	8	Output 2^4
2	0V(COMMON)	9	Output 2^3
3	Output 2^9	10	Output 2^2
4	Output 2^8	11	Output 2^1
5	Output 2^7	12	Output 2^0
6	Output 2^6	13～24	NC
7	Output 2^5		

Decoder Outside dimensions(Option)

・Decoder PCB dimensions
(External dimensions 37×37)



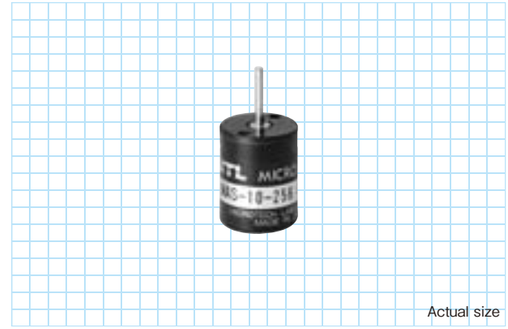
I/O circuit diagram



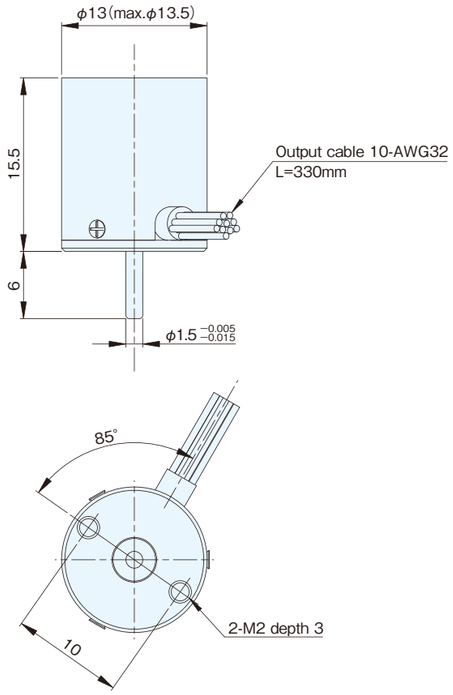
MAS-10 series

[Absolute]

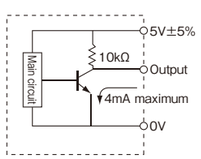
- Ultra compact absolute encoder
- φ13×H15.5
- Resolution 256 (8-bit)



Outside dimensions



I/O circuit diagram



Specifications

Item \ Type name	MAS-10-256G1
Supply voltage	DC5V ±5%
Current consumption	40mA or less(under no load)
Output code	G: gray code
Logic	Nagative 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)
Allowable load of shaft(electrical) Thrust	0.98N(100gf)
Maximum revolutions (mechanical)	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
Mass	10g

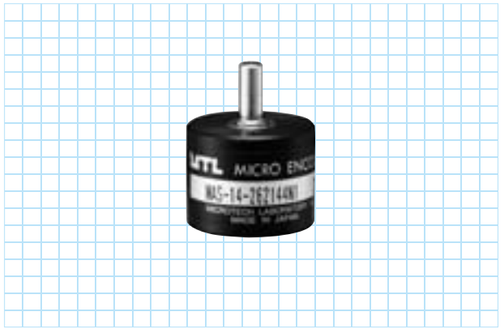
Connection

Cable color	MAS-10-256 G
Black	0V(COMMON)
Red	5V±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



Specifications

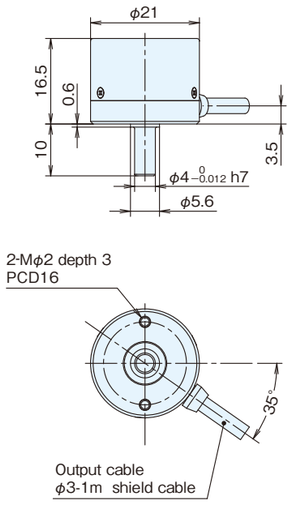
Item	Type name: MAS-14-□N1
Supply voltage	DC5V±5%
Current consumption	100mA or less(under no load)
Resolution	32,768(15bit), 65,536(16bit), 131,072(17bit), 262,144(18bit)
Allowable rotation	6000r/min
Allowable load of shaft(electrical) Radial	0.98N(100gf)
Allowable load of shaft(electrical) Thrust	1.9N(200gf)
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/s²(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)

Decoder specifications(37×37 PCB)

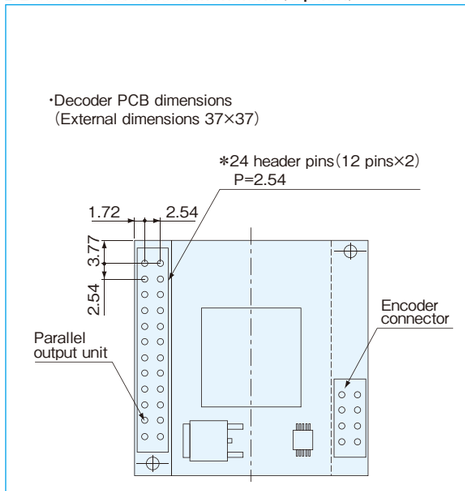
Item	Type name: DECODER−△△bit
Supply voltage	DC5V ±5%
Current consumption	60mA or less(160mA or less including encoder)
Parallel data update cycle	60μs(16.7kHz)
Output circuit	NPN open collector output (when using parallel output)
Output capacity	Sink current 20mA or less Load voltage 35V or less Residual 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)

Outside dimensions



Decoder Outside dimensions(Option)

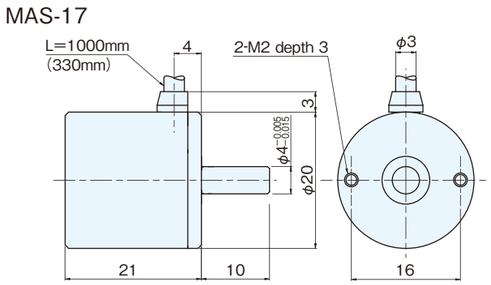


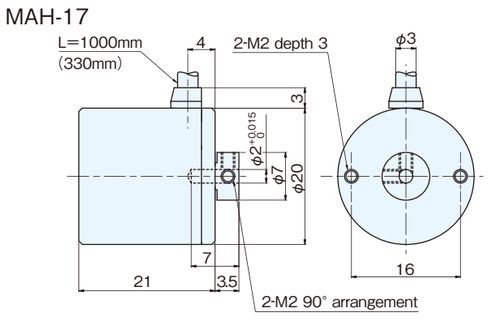
MA-17 series

[Absolute]



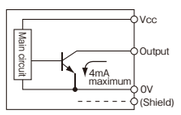
Outside dimensions





Output circuit diagram

Each output circuit



Main body−shield no connected

Specifications

Item	Type name: MA□-17-□□1 (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	B
	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)	
Allowable load of shaft (electrical) 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/s²(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)	

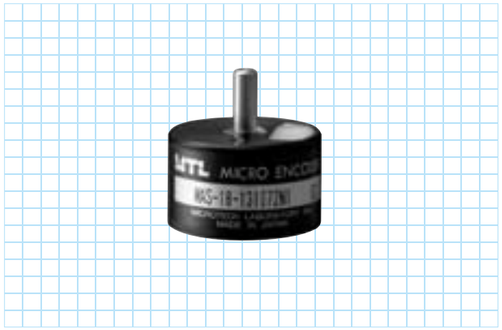
Connection

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 $2^0\times10$
Yellow/black	Output 2^5		Output $2^1\times10$
Green	Output 2^6		Output $2^2\times10$
Green/black	Output 2^7		Output $2^3\times10$
Blue	Output 2^8		Output $2^0\times10^2$
Blue/black	Output 2^9		Output $2^1\times10^2$
Purple	—		Output $2^2\times10^2$
Purple/black	—		Output $2^3\times10^2$

MAS-18 series

[Absolute]

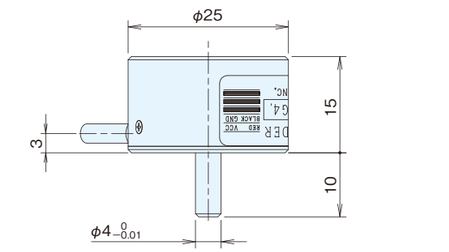
- Outside dimension: ϕ25mm×15mm
- Resolution:18bit, SSI interface



Encoder specifications

Item \ Type name		MAS-18-□N1
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 revolutions		6000r/min
Allowable load of shaft(electrical)	Radial	1.9N(200gf)
	Thrust	1.9N(200gf)
Working temperature/humidity		−10°C～+70°C／RH35%～90%
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 ϕ3−8-core vinyl wire Insulated shield cable AWG30(length 0.5m)
Data formats		RS422 SSI Point To Point
Mass		30g

Encoder outside dimensions

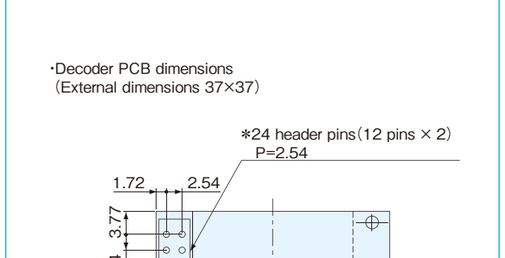


Decoder Specifications(■37×37 PCB)

Item \ Type name	DECODER−△△bit
Supply voltage	DC5V ±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 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)

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

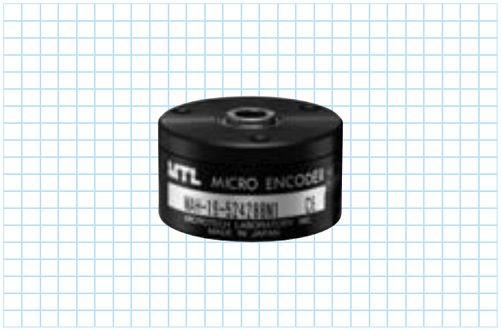
Decoder Outside dimensions(Option)



MAH-19 series

[Absolute]

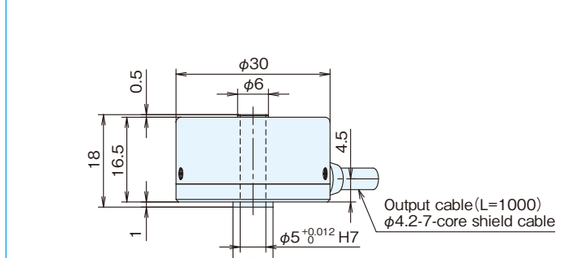
- Outside dimensions:ϕ30×16.5mm
- Through Shaft
- Resolution:19bit, SSI interface



Specifications

Item \ Type name		MAH-19-□N1
Supply voltage		DC5V±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℃～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 ϕ4.2 7-core vinyl wire Insulated shield cable AWG28(length 1m)
Mass		30g(excluding cable)

Outside dimensions

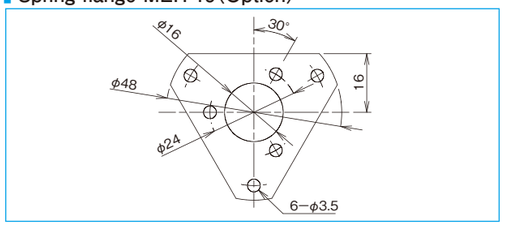


Decoder specifications (37×37 PCB)

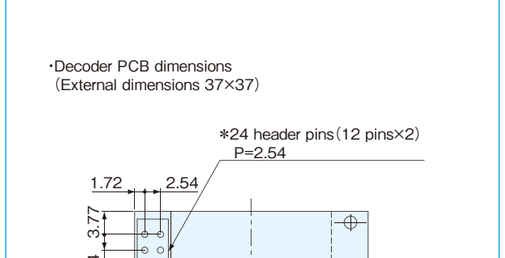
Item \ Type name	DECODER−△△bit
Supply voltage	DC5V ±5%
Current consumption	60mA or less(160mA or less including encoder)
Parallel data update cycle	60μs(16.7kHz)
Output circuit	NPN open collector output (when using parallel output)
Output capacity	Sink current 20mA or less Load voltage 35V or less Residual 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)

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

Spring flange MEH-19(Option)

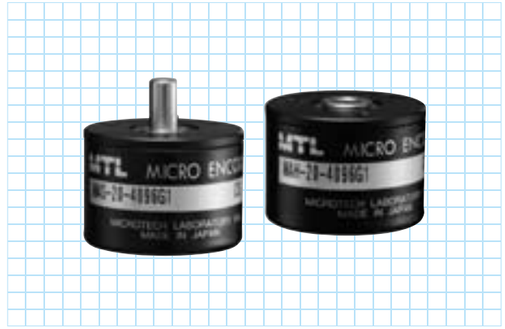


Decoder Outside dimensions(Option)



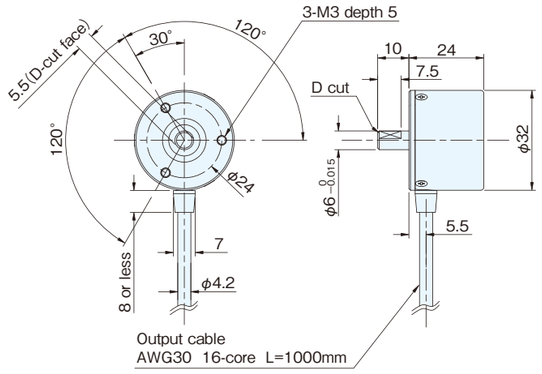
MA-20 series

[Absolute]

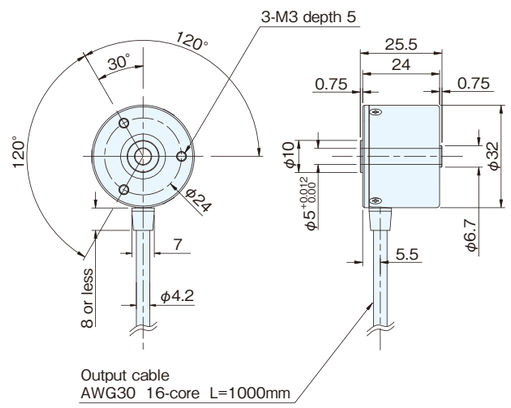


Outside dimensions

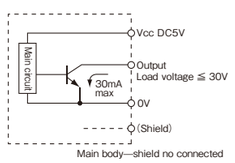
MAS-20



MAH-20



Output circuit diagram



※A capacitor(0.33μF) is connected between 0V and FG(frame ground).

Specifications

Item \ Type name	MA□-20-□ □1 (Shaft shape ●S=single shaft ●H=hollow shaft; Pulse number; Output code※ ●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)	
Allowable load of shaft(electrical) 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/s²(about 50G) 3 times each in X, Y, and Z directions	
Cable	Outside diameter φ4.2 16-core vinyl wire AWG30 Insulated shield cable(length 1m)	
Mass	150g(excluding cable)	

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

Connection

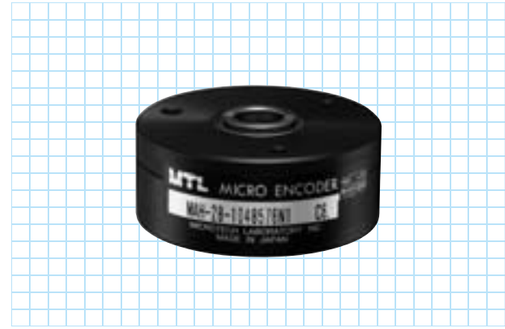
Cable color \ Type	Output signal MA-20-□G1	MA-20-□N1	MA-20-□B1
Brown	Output 2^0		Output 2^0
Brown/Black	Output 2^1		Output 2^1
Orange	Output 2^2		Output 2^2
Orange/Black	Output 2^3		Output 2^3
Yellow	Output 2^4		Output $2^0\times10^1$
Yellow/Black	Output 2^5		Output $2^1\times10^1$
Green	Output 2^6		Output $2^2\times10^1$
Green/Black	Output 2^7		Output $2^3\times10^1$
Blue	Output 2^8		Output $2^0\times10^2$
Blue/Black	Output 2^9		Output $2^1\times10^2$
Purple	Output 2^{10}		Output $2^2\times10^2$
Purple/Black	2^{11}		Output $2^3\times10^2$
Gray	N.C.		Output $2^0\times10^3$
White	N.C.		Output $2^1\times10^3$
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.

MAH-28

[Absolute]

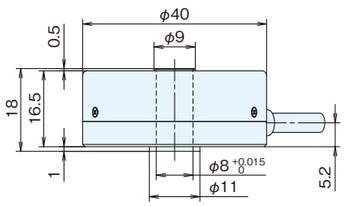
- Outside dimensions:φ40×16.5mm
- Through Shaft
- Resolution:20bit, SSI interface

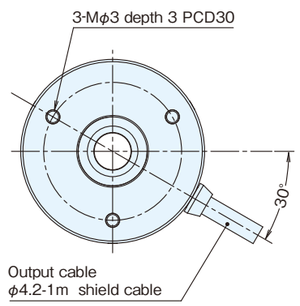


Specifications

Item \ Type name	MAH-28-□N1
Supply voltage	DC5V±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)
Allowable load of shaft(electrical) Thrust	4.9N(0.5kgf)
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/s²(about 50G) 3 times each in X, Y, and Z directions
Cable	Outside diameter φ4.2 7-core vinyl wire Insulated shield cable AWG28(length 1m)
Mass	80g(excluding cable)

Outside dimensions



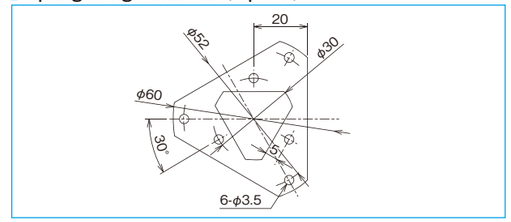


Decoder specifications (37×37 PCB)

Item \ Type name	DECODER−△△bit
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)

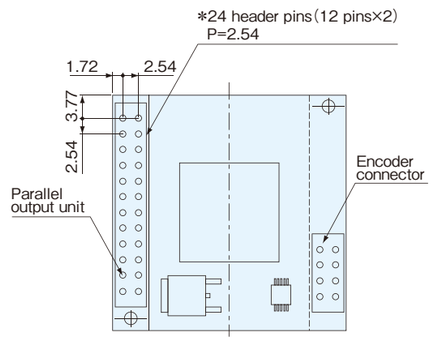
△△…18, 19, 20 (corresponding to the encoder resolution)

Spring flange MEH-28(Option)



Decoder Outside dimensions(Option)

・Decoder PCB dimensions
(External dimensions 37×37)



MA-36-20bit

[Absolute]

- Single-revolution absolute encoder with outside dimensions ϕ46×30
- Compliant with RS422 serial communications (SSI Format)

NEW

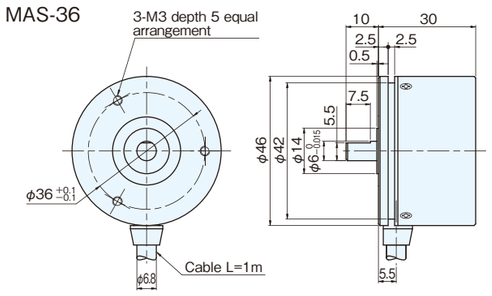


Specifications

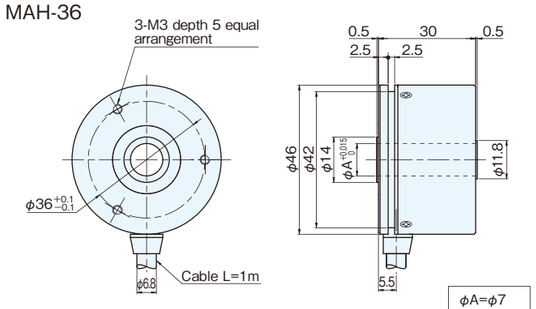
Item \ Type name	MA△-36-□N1	
Supply voltage	DC5V±5%(at end of encoder cable)	
Current consumption	100mA or less(under no load)	
Resolution	1,048,576(20bit)、524,288(19bit)、262,144(18bit)	
Allowable rotation	6000r/min	
Allowable load of shaft(electrical)	Radial	19.6N(2kgf)
	Thrust	9.8N(1kgf)
Working temperature/ humidity	−10℃~70℃／RH90% or less (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 ϕ6.8 7-core vinyl wire Insulated shield cable AWG28(length 1m)	
Mass	300g(excluding cable)	

Outside dimensions

MAS-36



MAH-36

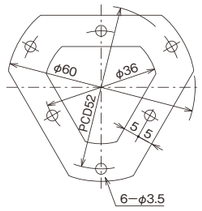


Decoder specifications (37×37 PCB)

Item \ Type name	DECODER−△△bit
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 capacity	Sink current 20mA or less Load voltage 35V or less Residual voltage 0.4V or less (sink current 10mA)
Logic	Negative logic(H=0、L=1)

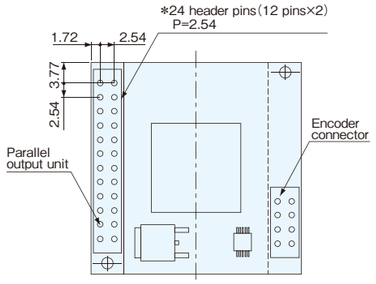
△△…18, 19, 20 (corresponding to the encoder resolution)

Spring flange MEH-30(Option)



Decoder Outside dimensions(Option)

・Decoder PCB dimensions
(External dimensions 37×37)



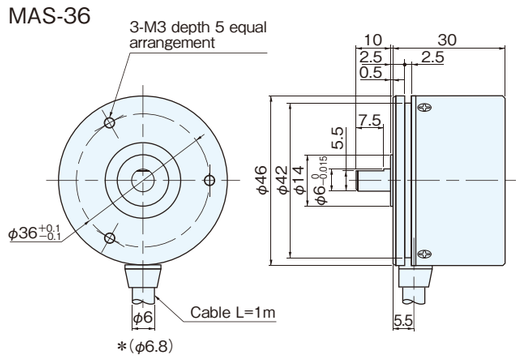
MA-36 series

[Absolute]

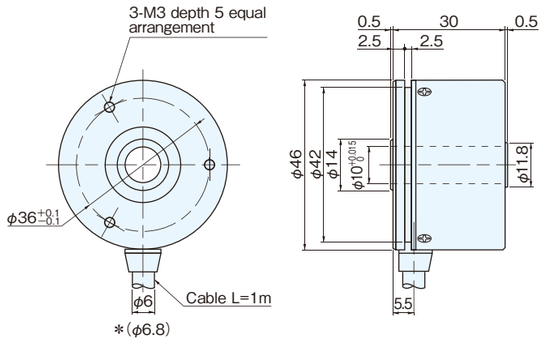


Outside dimensions

MAS-36



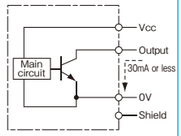
MAH-36



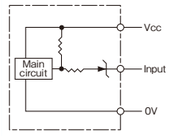
∗Specifications for 2,048 or more pulses

Output circuit diagram

NPN open collector output



Rotating direction indication input circuit



Note) When input is open, CW increases count.
When input is 0V short, CCW increases count.

Specifications

Item \ Type name	MA□-36-□ □ □ (Shaft shape: ●S=single shaft ●H=hollow shaft; Pulse number; Output code: ●G=gray code ●N=pure binary code ●B=BCD code; Supply voltage: ●1=DC5V ●5=DC12V−24V)	
Supply voltage	1:DC5V±5% 5:DC12V-10%~24V+15%	
Current consumption	1024P or less:100mA or less(under no load) 2048P or more:150mA or less(under no load)	
Output code	G: gray code N: pure binary code	B: BCD code
Logic	Nagative logic(H=0, L=1)	
Resolution	256 720 4,096 360 1,024 8,192 512 2,048 16,384	1,000
Output circuit	NPN open collector	
Output capacity	Sink current each bit 30mA max, Output residual voltage:0.5V or less (Cable length 1m, Sink current: at 30mA)	
Allowable load of shaft (electrical)	Radial	19.6N(2kgf)
	Thrust	9.8N(1kgf)
Maximum revolutions (mechanical)	6,000r/min	
Maximum response frequency	10kHz(1,024 or less) 15kHz(2,048 pulse) 30kHz(4,096 pulse)	60kHz(8,192 pulse) 120kHz(16,384 pulse)
Working temperature/ humidity	−10℃~70℃／RH95% or less no dewing	
Storage temperature	−25℃~85℃ ∗−20℃~85℃	
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 ϕ6.0 16-core vinyl wire AWG28 Insulated shield cable(length 1m)	
Mass	300g or less(excluding cable)	

∗Specifications for 2,048 or more pulses

Connection(1,024 pulse or less)

Cable color \ Type	Output signal		
	MA36-G	MA36-N	MA36-B
Brown	2^0	2^0	2^0
Brown／Black	2^1	2^1	2^1
Orange	2^2	2^2	2^2
Orange／Black	2^3	2^3	2^3
Yellow	2^4	2^4	2^0×10
Yellow／Black	2^5	2^5	2^1×10
Green	2^6	2^6	2^2×10
Green／Black	2^7	2^7	2^3×10
Blue	2^8	2^8	2^0×100
Blue／Black	2^9	2^9	2^1×100
Purple	NC	NC	2^2×100
Purple／Black	NC	NC	2^3×100
Red／Black	NC	Rotating direction indication input	
Red	Supply power		
Black	0V(COMMON)		
Black	0V(COMMON)		

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

Connection(2,048 pulse or more)

Cable color \ Type	Output signal	
	MA36-□G1	MA36-□N1
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	Output 2^{12}	
Gray／Black	Output 2^{13}	
Red	Vcc	
Red／Black	N.C. (∗)Latch input(LE)	N.C
Black	0V	

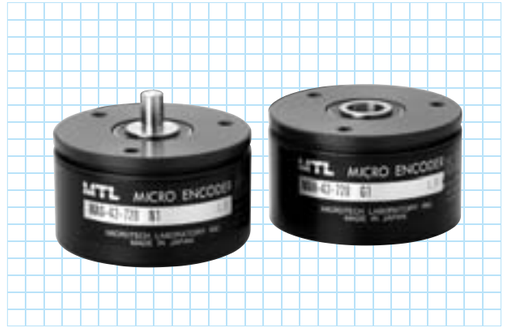
Resolution and code No.

Resolution	Code No.
256	0~255
360	76~435
512	0~511
720	152~871
1,000	0~999
1,024	0~1,023

Resolution	Code No.
2,048	0~2,047
4,096	0~4,095
8,192	0~8,191
16,384	0~16,383

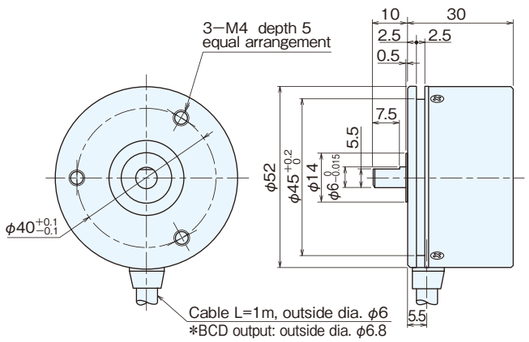
MA-42 series

[Absolute]

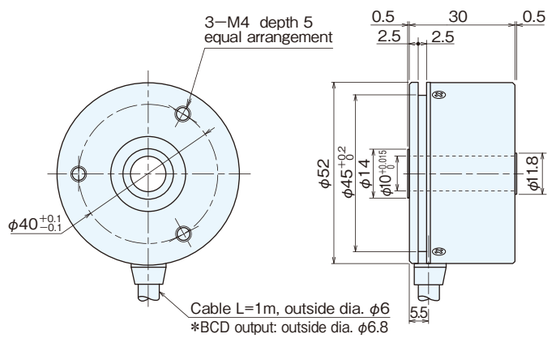


Outside dimensions

MAS-42

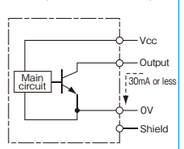


MAH-42

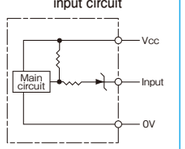


I/O circuit diagram

NPN open collector output



Rotating direction indication input circuit



Note) When input is open, CW increases count.
When input is 0V short, CCW increases count.

Specifications

Item \ Type name	MA□-42-□ □ □ (Shaft shape: ●S=single shaft ●H=hollow shaft; Pulse number; Output code: ●G=gray code ●N=pure binary code ●B=BCD code; Supply voltage: ●1=DC5V ●5=DC12V–24V)	
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	Nagative logic(H=0, L=1)	
Resolution	256 512 1,024 4,096 360 720 2,048	1,000 3,600
Output circuit	NPN open collector	
Output capacity	Sink current each bit 30mA, Residual voltage:0.4V or less(Sink current: at 30mA)	
Allowable load of shaft(electrical) Radial	19.6N(2kgf)	
Allowable load of shaft(electrical) Thrust	9.8N(1kgf)	
Maximum revolutions (mechanical)	6,000r/min	
Maximum response frequency	10kHz	
Working temperature/ humidity	−10℃～70℃／RH95%or less no dewing	
Storage temperature	−25℃～85℃	
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	Outside diameter(G, N: φ6, 16 cores/B: φ6.8, 19 cores) vinyl wire AWG28 Insulated shield cable(length 1m)	
Mass	300g or less(excluding cable)	

Connection

Cable color \ Type	Output signal MA42-G	MA42-N	MA42-B
Brown	2^0	2^0	2^0
Brown/black	2^1	2^1	2^1
Orange	2^2	2^2	2^2
Orange/black	2^3	2^3	2^3
Yellow	2^4	2^4	2^0×10
Yellow/black	2^5	2^5	2^1×10
Green	2^6	2^6	2^2×10
Green/black	2^7	2^7	2^3×10
Blue	2^8	2^8	2^0×100
Blue/black	2^9	2^9	2^1×100
Purple	2^{10}	2^{10}	2^2×100
Purple/black	2^{11}	2^{11}	2^3×100
Gray	—	—	2^0×1000
Gray/black	—	—	2^1×1000
White	—	—	Not connected
White/black	—	—	Not connected
Red/black	Not connected	Rotating direction indication input	
Red	Supply power		
Black	0V(COMMON)		
Black	0V(COMMON)		—

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

Resolution and code No.

Resolution	Code No.
256	0～255
360	76～435
512	0～511
720	152～871
1,000	0～999

Resolution	Code No.
1,024	0～1,023
2,048	0～2,047
3,600	0～3,599
4,096	0～4,095

MAH-59 series

[Absolute]

- Outside dimensions φ70×16.5mm
  21bit absolute encoder
- Resolution:2097152, SSI interface, Hollow shaft φ25

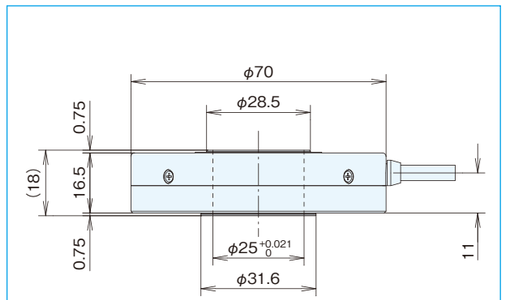
NEW

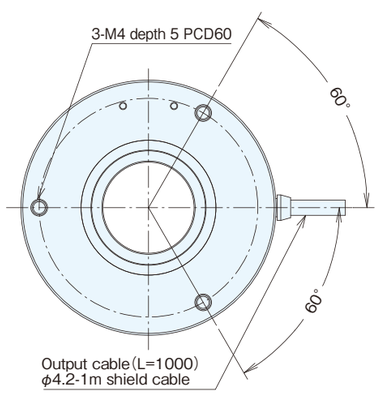


Specifications

Item \ Type name	MAH−59−□N1	
Supply voltage	DC5V ±5%	
Current consumption	100mA or less(under no load)	
Resolution	2,097,152(21bit), 1,048,576(20bit), 524,288(19bit)	
Allowable rotation	1000rpm	
Allowable load of shaft(electrical)	Radial	9.8N(1.0kg)
	Thrust	4.9N(0.5kg)
Working temperature/ humidity	−10°C～+70°C／RH35%～90%	
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/s²(about 50G) 3 times each in X, Y, and Z directions	
Cable	Outside diameter φ4.2 7-core vinyl wire Insulated shield cable AWG28(length 1m)	
Mass	200g	

Outside dimensions





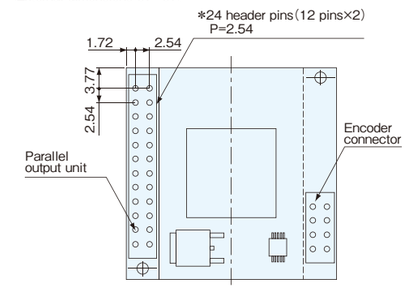
Decoder specifications (37×37 PCB)

Item \ Type name	DECODER−△△bit
Supply voltage	DC5V ±5%
Current consumption	60mA or less (110mA 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)

△△…19, 20, 21 (corresponding to the encoder resolution)

Decoder Outside dimensions(Option)

・Decoder PCB dimensions
(External dimensions 37×37)



MAH-85 series

[Absolute]

- Outside dimensions ϕ100×31mm
  21bit absolute encoder
- Resolution:2097152, SSI interface, Hollow shaft ϕ36

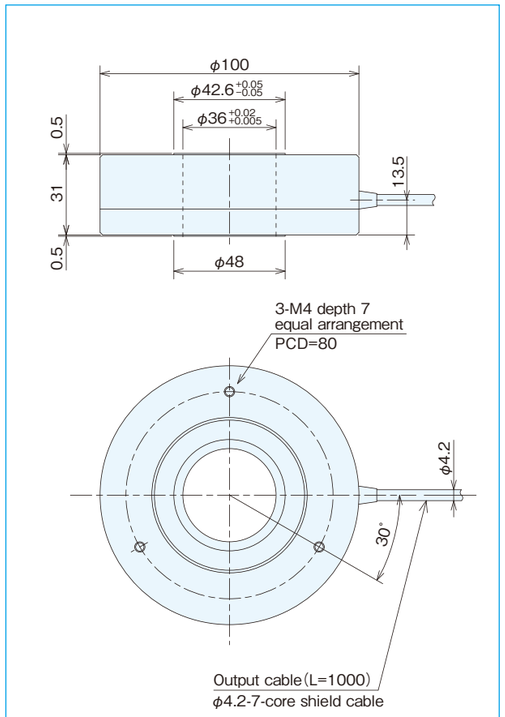
NEW



Specifications

Item \ Type name		MAH-85-2097152N1
Supply voltage		DC5V ±5%
Current consumption		250mA or less (under no load)
Resolution		2097152, 1048576, 524288, 262144
Allowable rotation		1000r/min
Allowable load of shaft (electrical)	Radial	4.9N (0.5kg)
	Thrust	4.9N (0.5kg)
Working temperature/ humidity		0°C～+60°C／RH35%～90%
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 ϕ4.2 7-core vinyl wire Insulated shield cable AWG28 (length 1m)
Mass		700g

Outside dimensions



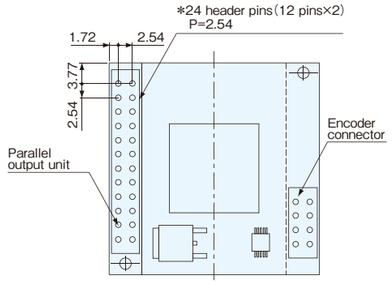
Decoder specifications (37×37 PCB)

Item \ Type name	DECODER-△△bit
Supply voltage	DC5V ±5%
Current consumption	60mA or less (310mA 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 (sink current 10mA)
Logic	Negative logic (H=0, L=1)
Connection	Power supply and parallel signal output by P=2.54 header pins (see diagram below)

△△…8, 9, 10 (corresponding to the encoder resolution)

Decoder Outside dimensions (Option)

・Decoder PCB dimensions
(External dimensions 37×37)



MAS-36-MT series

[Electronic multi-revolution absolute encoder]

- Outside dimensions ϕ46×30mm
- Resolution:1000×256

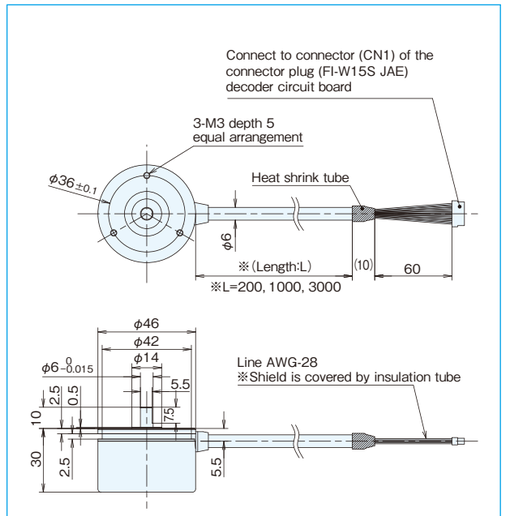
NEW



Specifications

Item \ Type name		MAS-36-1000MT-S
Supply voltage		DC5V ±5%, ripple (p-p) 5% or less
Current consumption		100mA or less (under no load)
Resolution		Single-revolution part 1,000 divisions/ Multi-revolution part -128 to 127 revolutions Allowable shaft rotation angle when power supply is cut off ±80°
Alarm output		Counter overflow output
Output		Serial output (pure binary code, Positive logic)
Output circuit		Line driver output (RS485 compliant)
Response speed		25kHz (1500rpm)
Allowable load of shaft (electrical)	Radial	19.6N (2kg)
	Thrust	9.8N (1kg)
Working temperature/ humidity		−10°C～+70°C／RH35%～90%
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 ϕ6 16-core conector Insulated shield cable AWG28 (length 200mm)
Mass		300g or less

Outside dimensions

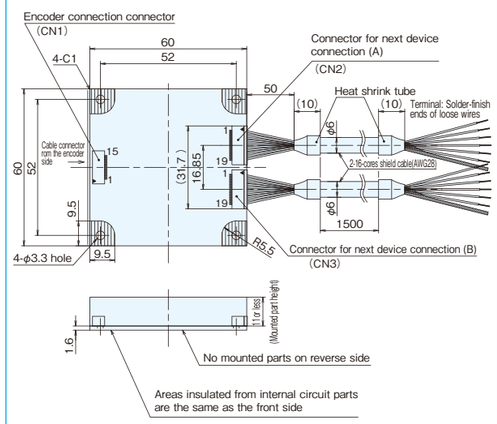


Decoder specifications (60×60 PCB)

Item \ Type name	MA-36-MT-DECODER
Supply voltage	DC12V −10%～24V +15%
Current consumption	150mA or less (including encoder, stepless output load)
Output	Single-revolution absolute parallel data (ABS 0-9) Multi-revolution absolute parallel data (TKN 0-7) Counter overflow alarm (COF)
Absolute data output code	Pure binary code, Negative logic (H=0, L=1)
Input	Single-revolution absolute data reset input (ARST) Multi-revolution absolute data reset input (TRST) (100ms or less, 1mA or less)
Absolute signal update cycle	3μs typ. (333kHz)
Output circuit	NPN open collector output
Output capacity	Sink current 20mA or less Load voltage 30V or less Residual voltage 0.4V or less
Connection	Outside diameter ϕ6 16-core vinyl wire Insulated shield cable (length 1.5m)

Decoder Outside dimensions (Option)

・Decoder PCB dimensions
(External dimensions 60×60)



MXH-36 series

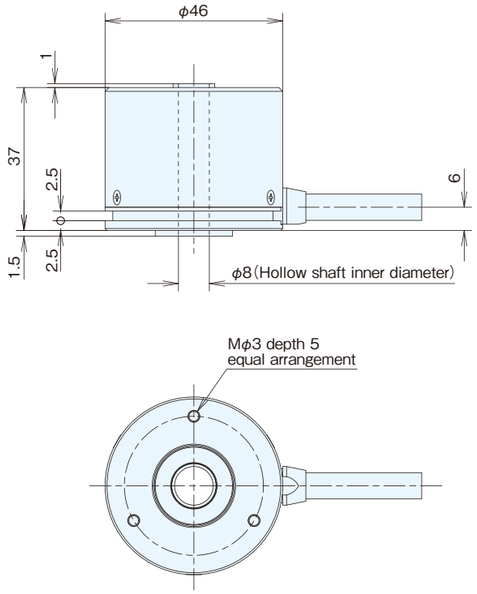
[Slim multi-revolution absolute encoder]

- Outside dimensions ϕ46×37mm
- Resolution 1,024x256, mechanical multi-revolution, no battery backup required

NEW



Outside dimensions

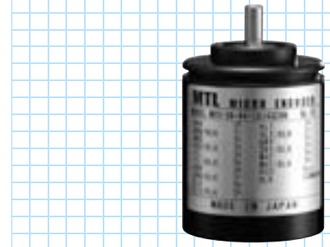


Specifications

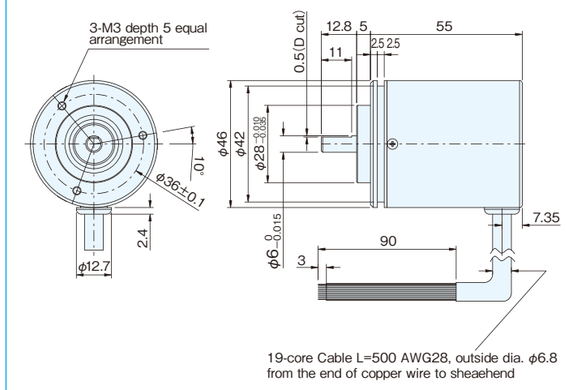
Item \ Type name	MXH-36-256-1024GC5N
Supply voltage	1:DC5V±5% 2:DC12V−10%～24V+15%
Current consumption	150mA or less(under no load)
Resolution	Single-revolution part: 1,024 divisions/ Multi-revolution part: 256 revolutions
Output	Parallel output (Gray code or pure binary code)
Output circuit	NPN open collector output
Output logic	Standard: Negative logic (※Positive logic selection is available)
Allowable rotation (mechanical)	5000r/min⁻¹(instantaneous)
Maximum response frequency	40kHz(10kHz at guaranteed accuracy)
Shaft allowable load(electrical) Radial	19.6N(2kgf)
Shaft allowable load(electrical) Thrust	9.8N(1kgf)
Working temperature/ humidity	−10°C～60°C/RH35%～90%
Storage temperature	−20°C～80°C
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Vibration resistance	Durability 11msec (about 50G) 3 times each in X, Y, and Z directions
Cable	Outside diameter ϕ6.8 0-core vinyl wire Insulated shield cable(length 500mm)
Mass	150g or less(excluding cable)

MXS 36-series

[High-resolution Multiple-rotation
(64 rotations max) Absolute Type Encoder]



Outside dimensions



Specifications

Item \ Type name	MXS-36-○○-□□□□△C6-①②
	Number of turns / One rotation resolution / Output signal code ●G ●N / Option N: Negative logic / Option V: Increment on reverse rotation(V indicates values increases in CCW direction)
Supply voltage	DC5V-5%～24V+15%
Current consumption	150mA or less(under no load)
Output code	G: gray code N: pure binary code
Output circuit	NPN open collector
Output logic	No mark: positive logic; N: negative logic
Output pulse number (Standard) [Pulse number/rotation]	128 1,024 256 512
Rotation number	2·4·8·16·32·64
Maximum response frequency	40kHz(10kHz at guaranteed accuracy)
Shaft allowable load(electrical) Radial	19.6N(2kgf)
Shaft allowable load(electrical) Thrust	9.8N(1kgf)
Working temperature/ humidity	−10°C～70°C/RH95% or less(no dewing)
Storage temperature	−20°C～80°C
Vibration resistance	Durability 0-500Hz, double amplitude 1.52mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 11msec (about 50G) 3 times each in X, Y, and Z directions
Mass	170g or less(excluding cable)

Connection

Cable color	Output signal	Cable color	Output signal
Brown	2^0	Purple	2^{10}
Brown／Black	2^1	Purple／Black	2^{11}
Orange	2^2	Gray	2^{12}
Orange／Black	2^3	Gray／Black	2^{13}
Yellow	2^4	White	2^{14}
Yellow／Black	2^5	White／Black	2^{15}
Green	2^6	Red	Vcc
Green／Black	2^7	Black	COMMON
Blue	2^8	Shield(*)	Cable shield
Blue／Black	2^9	—	—

(*)shielding cable is non-connected in encoder.

MXS-42 series

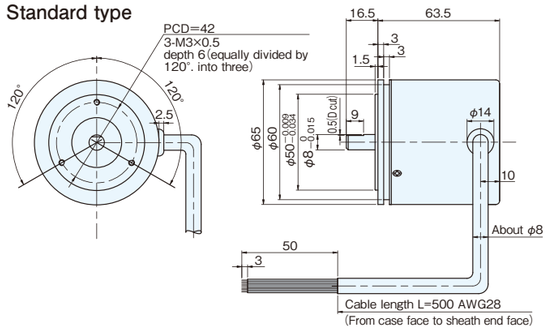
[High-resolution Multiple-rotation
(100 rotations max) Absolute Type Encoder]



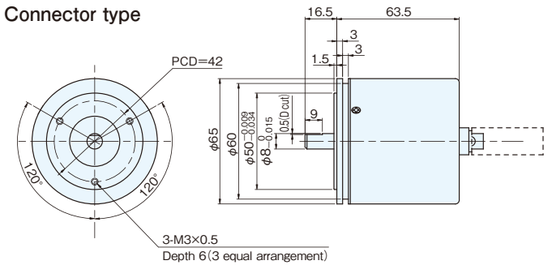
- High-reliability operation without internal battery is possible. (Batteryless)
- Permitting a total count of 2^{18} max. high-resolution
- O.D. ϕ65×63.5
- Multiple-rotation (100 rotations max.) absolute output
- Selection of gray code output without reading error or pure binary code
- Selection of side-cable, rear-cable, or connector type
- IP64 drip-proof option possible (rear-cable type)

Outside dimensions

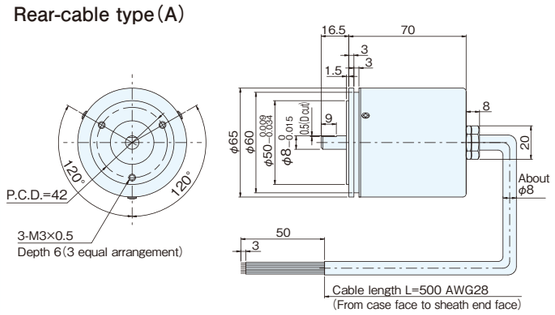
Standard type



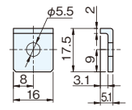
Connector type



Rear-cable type (A)



Detailed servo mount clamp



Specifications

Item		Type name: MXS■-42-○○○-□□□□△①②③◆
		■: Protective structure: W: Waterproof
		○○○: Number of multi-turn revolutions
		□: Single turn resolution
		□: Output signal coding: G, N Note: For 100 multi-rotation, N only
		□: Output format: Unmarked, C
		□: Power supply voltage: 3, 6 Note: For 100 multi-rotation, 1.5
		□: Option V: Increment on reverse rotation (V indicates values increases in CCW direction) Option N: Negative logic Note: For 100 multi-rotation, N only
		△: Cable placement: B: side attached (standard), A: rear attached (waterproof type W only), unmarked: Connector attached
Supply voltage		Voltage output:3 DC5V-5%~12V+10% Open collector output:6 DC5V-5%~24V+15% For 100 rotations: Open collector output:1 DC5V±5% Open collector output:5 DC12V-10%~DC24V+15%
Current consumption		Voltage output:3 450mA or less Open collector output:6 240mA or less
Output code		G:gray code N:pure binary code
Output logic		No mark: positive logic; N: negative logic
Output pulse number (Standard) [Pulse number/rotation]		128 1,024 256 2,048 512 4,096
Rotation number		2·4·8·16·32·64·100 (DC5V, N code only)
Maximum response frequency		40kHz (10kHz during guaranteed precision)
Shaft allowable load (electrical)	Radial	49N (5kgf)
	Thrust	29.4N (3kgf)
Working temperature/ humidity		−10℃~70℃/RH95% or less (no dewing)
Storage temperature		−20℃~80℃
Vibration resistance		Durability 0-500Hz, double amplitude 1.52mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 11msec (about 50G) 3 times each in X, Y, and Z directions
Mass		600g or less (excluding cable)

Connection

a) Cable

Cable color	Output signal	Cable color	Output signal
Brown	2^0	Brown / White	2^{10}
Red	2^1	Red / White	2^{11}
Orange	2^2	Orange / White	2^{12}
Yellow	2^3	Yellow / White	2^{13}
Green	2^4	Green / White	2^{14}
Blue	2^5	Blue / White	2^{15}
Purple	2^6	Purple / White	2^{16}
Gray	2^7	Gray / White	2^{17}
White	2^8	Yellow / Black	Vcc
Black	2^9	White / Black	COMMON
		Shield	Cable shield

b) Connector

Pin No.	Output signal	Pin No.	Output signal
1	2^0	13	2^{12}
2	2^1	14	2^{13}
3	2^2	15	2^{14}
4	2^3	16	2^{15}
5	2^4	17	2^{16}
6	2^5	18	2^{17}
7	2^6	19	Vcc
8	2^7	20	Vcc
9	2^8	21	COMMON
10	2^9	22	COMMON
11	2^{10}	23	NC
12	2^{11}	24	Frame ground
		25	NC

Note:
1) Shielding cable is non-connected in encoder.
2) Those cable which are inneccessary for signals are to be cut.
3) The form bellow indicate 64 multy-turn and 4096P/R. When resolution is not enough, it becomes NC.

Wire-type linear scale

No linear scale guide rail etc. is required, usable for stroke length measurement of hydraulic cylinders etc.
Mounting is simple, with only 2 points to fasten: The encoder body and the wire hook end.
Provides digital display when combined with a display unit (DC Series).

MLS-12



MLS-30



MLS-37



MLS-45



MLS-50



MLA-17



MLA-30



MLA-37



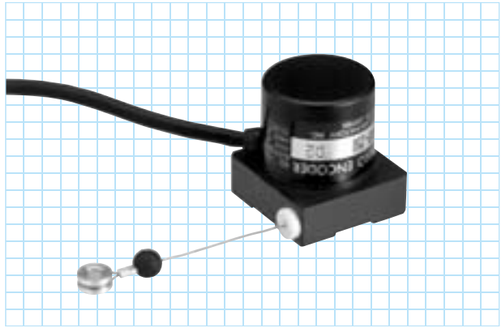
MLA-42



MLS-12 series

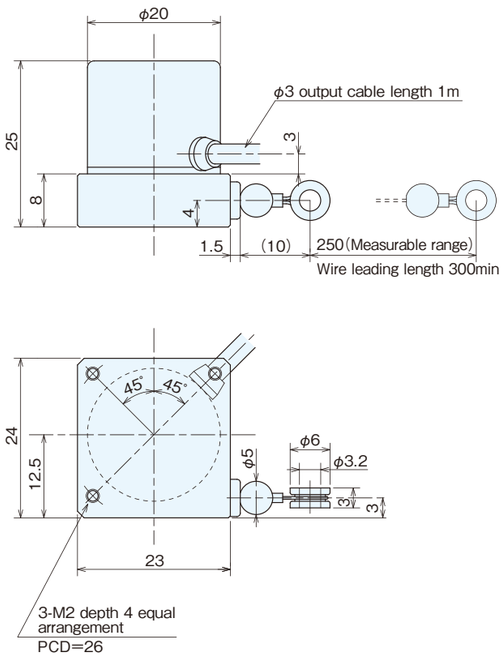
[Wire-Type Linear Scale]

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



Outside dimensions

MLS-12

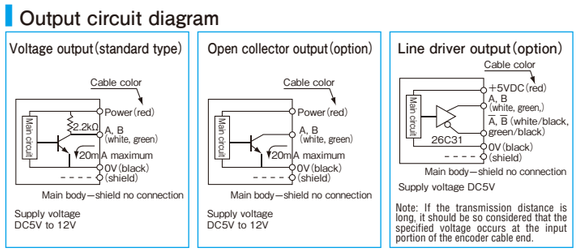


Note: Usage warning: The wire may stop midway through retracting.
When this happens, slowly pull out the full length and then slowly retract again before using.

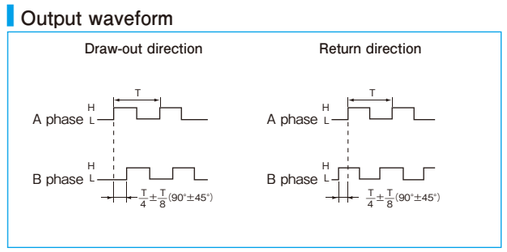
Specifications

Item		Type name: MLS-12-□□-250 (Pulse number; 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	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℃～50℃ RH95% 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/s²(about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter ϕ3 vinyl wire Insulated shield cable
Mass		60g

Output circuit diagram



Output waveform

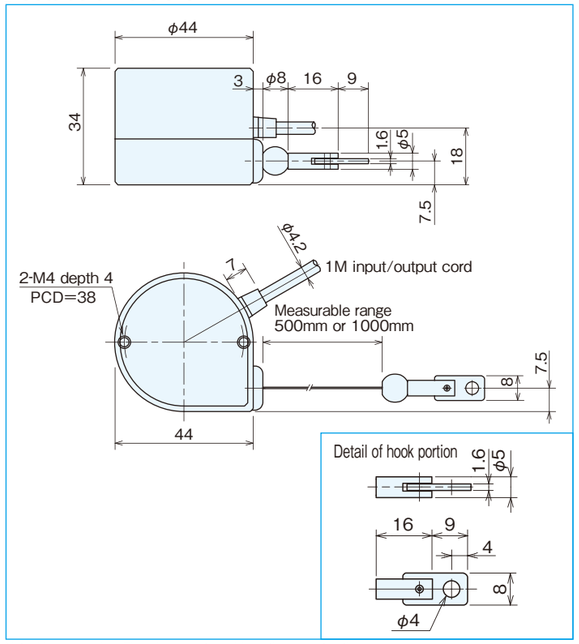


MLS-30 series

[Wire-Type Linear Scale]

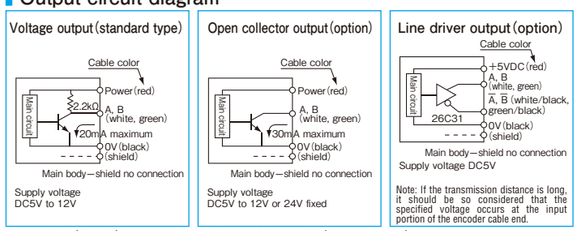


Outside dimensions



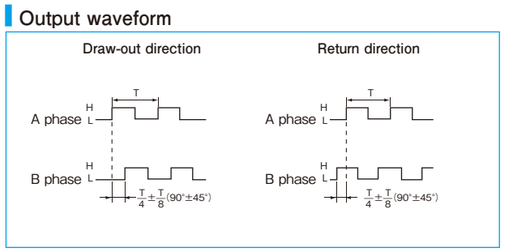
Note: Usage warning: The wire may stop midway through retracting.
When this happens, slowly pull out the full length and then slowly retract again before using.

Output circuit diagram



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

Output waveform



Specifications/linear scale encoder (detection portion)

Item	Type name: MLS-30-□□-500 -1000 (Pulse number; Output circuit: ●No entry=voltage output ●C=open collector output ●E=line driver output ●C4=open collector output DC24V)			
	MLS-30-450-500	MLS-30-450-1000	MLS-30-4500-500	MLS-30-4500-1000
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%		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	0.98N～2.94N (100gf～300gf)			
Working ambient temperature/humidity	0℃～50℃／RH35%～90%			
Storage ambient temperature	−20～80℃			
Vibration resistance	Endurance 10 to 55Hz Double amplitude 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	Insulated shield wire Outside diameter ϕ4.2 vinyl wire			
Mass	185g			

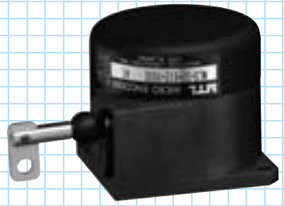
Note: The output pulse or resolution is possible to 4 multiple with the counter.

MLS-37 series

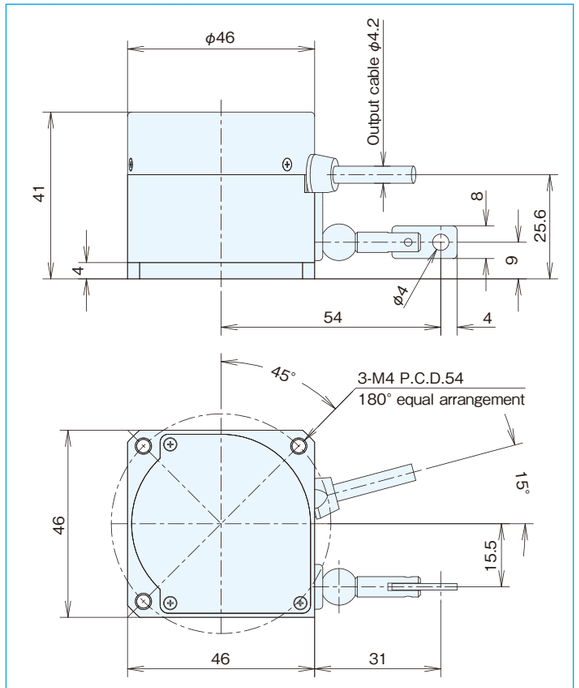
[Wire-Type Linear Scale]

- Outside dimensions ■46×41mm
- Length measurement resolution: 0.1mm,
  Length measurement distance: 1,500mm

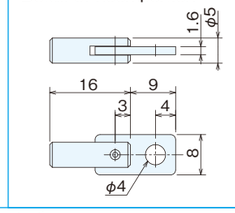
NEW



Outside dimensions



Detail of hook portion



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.

Specifications

Item \ Type name	MLS-37-1027※◎-1500
Measuring range	1500mm
Supply voltage	1:DC5V±5% (note 1) 3:DC5V−5%～12V+10% 5:DC12V−10%～24V+15%(note 1)
Current consumption	70mA or less(under no load)
Length measurement resolution	0.1mm (note 2)
Stroke speed	500mm／sec
Wire tensile force	0.98N～3.92N(100gf～400gf)
Absolute accuracy	±0.1%FS (note 3)
Output circuit(※)	Voltage output(Blank), open collector output(C), Line drive output(E) (note 1)
Output phase	A phase, B phase
Output form	Square wave
Output capacity	Sink current 20mA or less, residual voltage 0.5V or less
Maximum response frequency (Number of response pulses)	100kHz
Output phase	A, B phase difference 90°±45°
Working ambient temperature/humidity	0°C～50°C／RH35%～90%
Storage 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	Outside diameter ϕ4.2 4-core(8-core) vinyl wire Insulated shield cable AWG 28(length 1000mm)
Mass	250g or less(excluding cable)

※Refer to the DC Series for the counter specification.

(Note 1) The line driver specification is DC5V power supply voltage only.
DC12-24V is only available for open collector output.

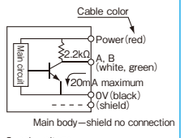
(Note 2) There are 4 types of length measurement resolution: 0.2mm, 0.1mm, 0.02mm, 0.01mm.

(Note 3) Customers needing products with absolute accuracy of ±0.05FS should contact our Sales Department separately.

(Note 4) 3-M4 PCD54 can also be used as a Φ3.5 hole for M3 mounting.

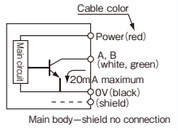
Output circuit diagram

Voltage output(standard type)



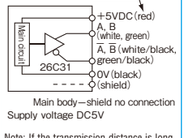
Supply voltage
DC5V to 12V

Open collector output(option)



Supply voltage
DC5V to 12V

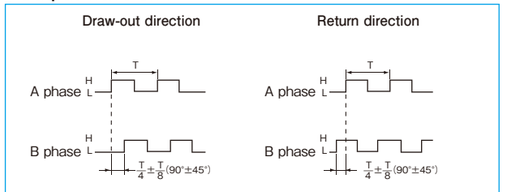
Line driver output(option)



Supply voltage DC5V

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



MLS-45 series

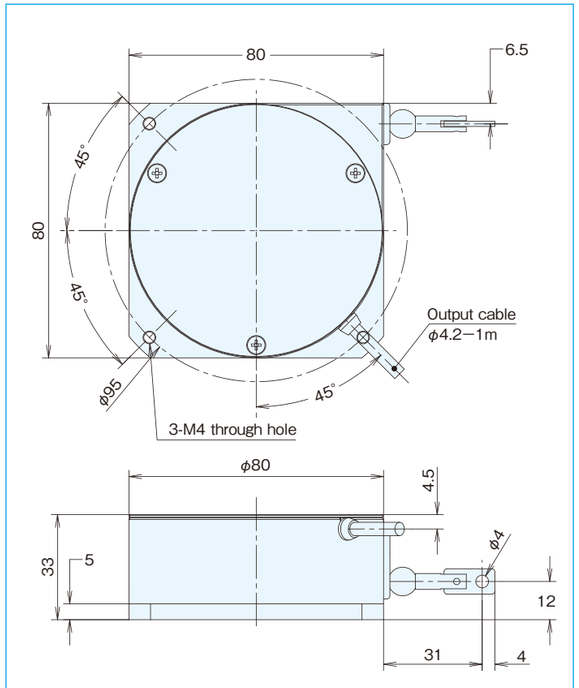
[Wire-Type Linear Scale]

- Outside dimensions ■80×33mm
- Length measurement resolution: 0.4mm/ 0.04mm,
  Length measurement distance: 2,000mm/ 4,000mm

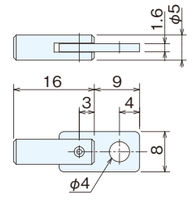
NEW



Outside dimensions



Detail of hook portion



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.

Specifications

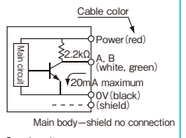
Item \ Type name	MLS-45-540※-4000
Measuring range	2000mm 、4000mm
Supply voltage	DC5V−5%～12V+10% DC24V±10%(option) Line driver:DC5V±5%
Current consumption	70mA or less(under no load)
Length measurement resolution (output pulse count)	0.4mm(540P/R)、 0.04mm(5400P/R)
Stroke speed	500mm／sec
Wire tensile force	2.94N～7.84N(300gf～800gf)
Absolute accuracy	±0.1%FS
Output circuit(※)	Voltage output(Blank), open collector output(C), Line drive output(E) (note 1) open collector output DC24V(C4)
Output phase	A phase, B phase
Output form	Square wave
Output capacity	Sink current 20mA or less, residual voltage 0.5V or less
Maximum response frequency (Number of response pulses)	100kHz
Output phase	A, B phase difference 90°±45°
Working ambient temperature/humidity	0°C～50°C／RH35%～90%
Storage 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	Outside diameter ϕ4.2 4-core(8-core) vinyl wire Insulated shield cable(length 1000mm)
Mass	700g or less(excluding cable)

※Refer to the DC Series for the counter specification.

(Note 1) 3-M4 PCD95 can also be used as a Φ3.5 hole for M3 mounting.

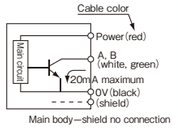
Output circuit diagram

Voltage output(standard type)



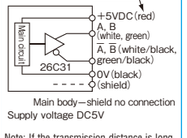
Supply voltage
DC5V to 12V

Open collector output(option)



Supply voltage
DC5V to 12V

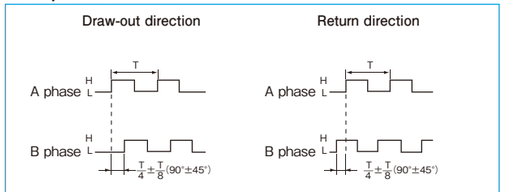
Line driver output(option)



Supply voltage DC5V

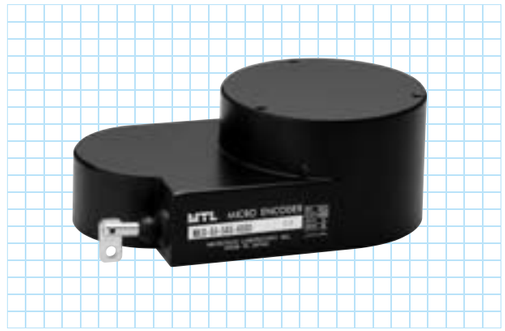
Note: If the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end.

Output waveform

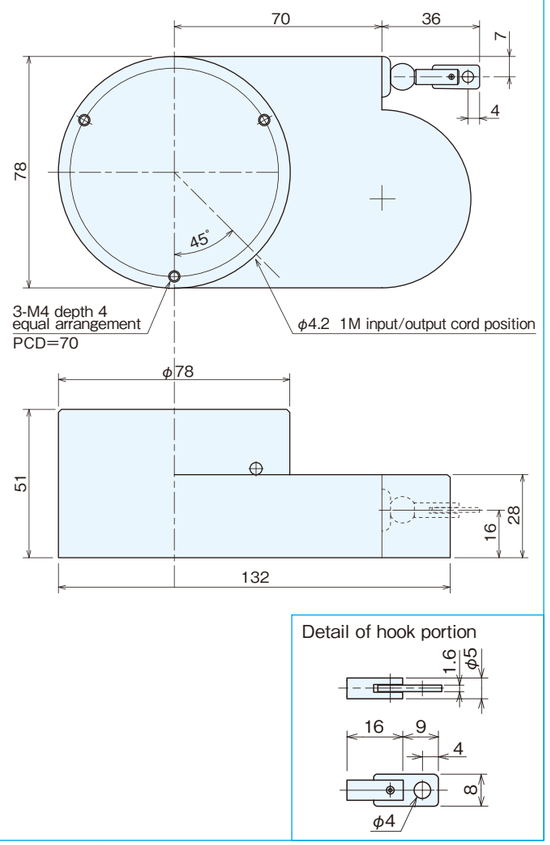


MLS-50 series

[Wire-Type Linear Scale]



Outside dimensions



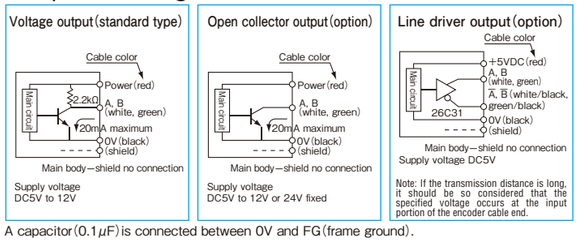
Note: Usage warning: The wire may stop midway through retracting.
When this happens, slowly pull out the full length and then slowly retract again before using.

Specifications/linear scale encoder (detection portion)

Type name	MLS-50-□ □ -2000 -4000 Pulse number Output circuit ●No entry=voltage output ●C=open collector output ●E=line driver output ●C4=open collector output DC24V	
Item	MLS-50-540-2000	MLS-50-540-4000
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℃～50℃／RH35%～90%	
Storage ambient temperature	−20～80℃	
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	

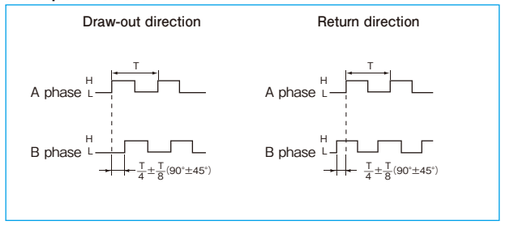
Note: The output pulse or resolution is possible to 4 multiple with the counter.

Output circuit diagram



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

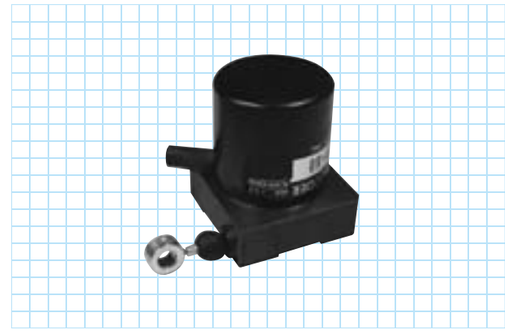
Output waveform



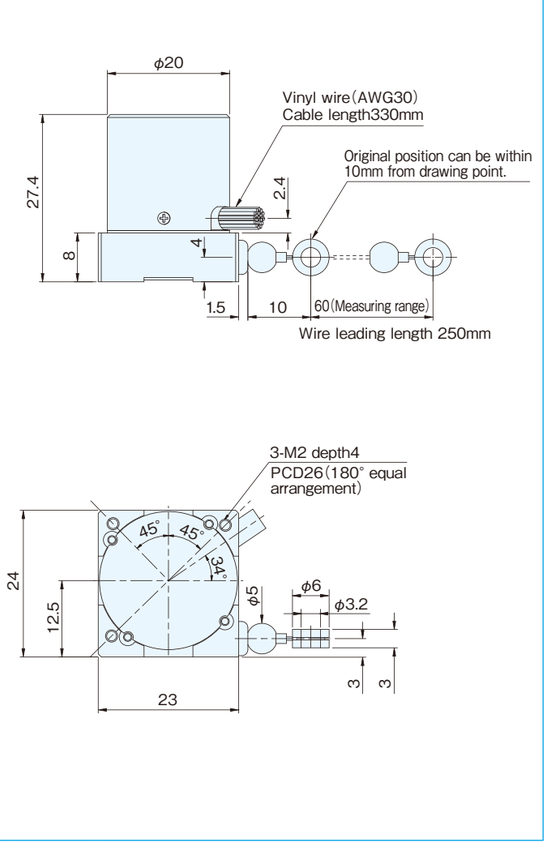
MLA-17 series

[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.

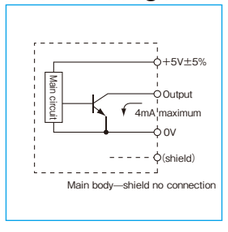
Specifications

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	Nagative 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℃～+50℃／RH35%～90% (no dewing)
Storage ambient temperature	−20～+80℃
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

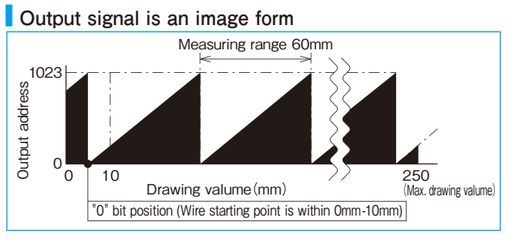
Connection

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
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 $2^0 \times 10$
Yellow／Black	Output 2^5		Output $2^1 \times 10$
Green	Output 2^6		Output $2^2 \times 10$
Green／Black	Output 2^7		Output $2^3 \times 10$
Blue	Output 2^8		Output $2^0 \times 10^2$
Blue／Black	Output 2^9		Output $2^1 \times 10^2$
Purple	—		Output $2^2 \times 10^2$
Purple／Black	—		Output $2^3 \times 10^2$

I/O circuit diagram



Output signal is an image form

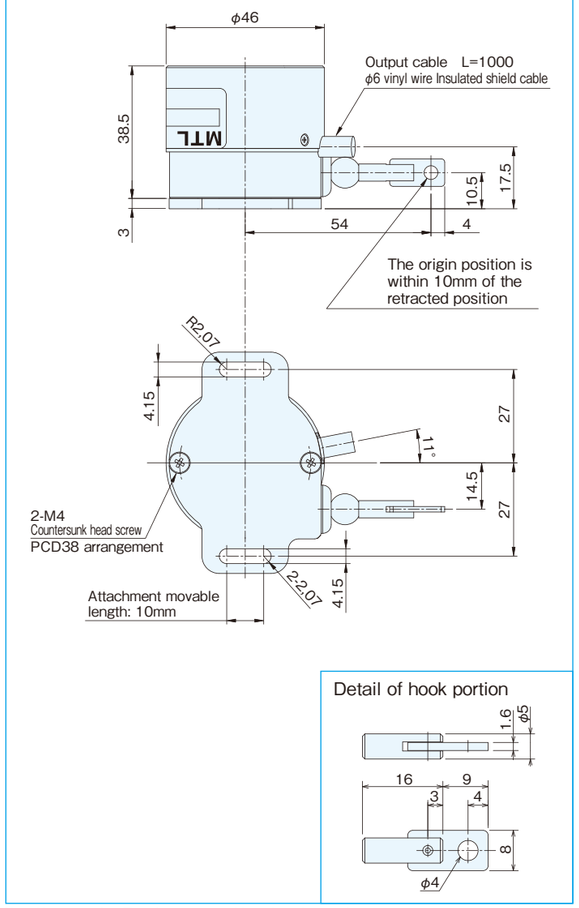


MLA-30 series

[Absolute Linear Scale]



Outside dimensions



Detail of hook portion

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.

Specifications

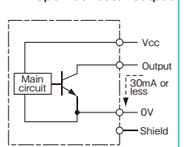
Item \ Type name	MLA-30-□□□-90 (Pulse number / Output code: ●G=Gray code ●N=Pure binary code ●B=BCD code / Supply voltage(1, 5))
Supply voltage	1:DC5V±5% 5:DC12V−10%～24V+15%
Current consumption	100mA or less(under no load)
Output code	G:gray code N:pure binary code B:BCD code
Logic	Nagative logic(H=0, 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℃～+50℃／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

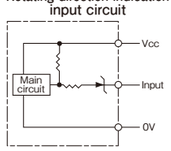
Code color	Output signal G	N	B	Code color	Output signal G	N	B
Brown	2^0			Blue	2^8		2^0×100
Brown／Black	2^1			Blue／Black	2^9		2^1×100
Orange	2^2			Purple	NC		2^2×100
Orange／Black	2^3			Purple／Black	NC		2^3×100
Yellow	2^4		2^0×10	Red／Black	—	※Rotating direction indication input	
Yellow／Black	2^5		2^1×10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

I/O circuit diagram

NPN open collector output



Rotating direction indication input circuit



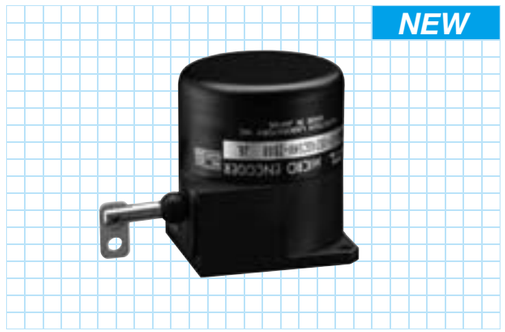
Note) When input is open, CW increases count.
When input is 0V short, CCW increases count.

MLA-37 series

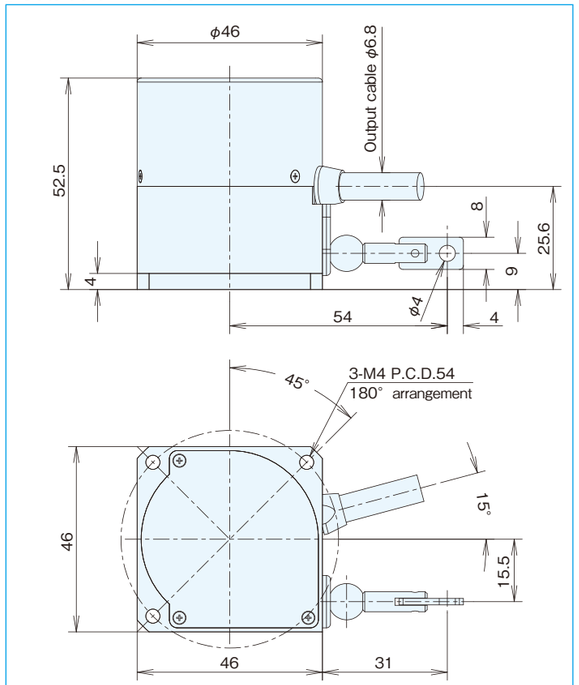
[Absolute Linear Scale]

- Outside dimensions ■46×52.5mm
- Length measurement resolution: 0.1mm,
  Length measurement distance: 1,500mm

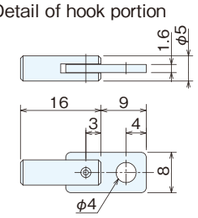
NEW



Outside dimensions



Detail of hook portion



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.

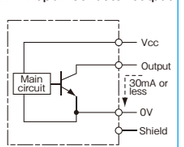
Specifications

Item \ Type name	MLA-37-1024GC5NV-1500
Supply voltage	1:DC5V±5% 5:DC12V−10%～24V+15%
Current consumption	150mA or less(under no load)
Output	Parallel output(Gray code or pure binary code)
Output logic	Standard:Negative logic (※Positive logic selectable)
Output circuit	NPN open collector output
Maximum response frequency	10kHz
Measuring range	1500mm
Minimum resolution	0.1mm
Stroke speed	500mm／sec
Absolute accuracy	±0.1%FS
Wire tensile force	0.98N～3.92N(100gf～400gf)
Working ambient temperature/humidity	0℃～+50℃／RH35%～90%
Storage 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	50G 3 times each in X, Y, and Z directions
Cable	Outside dia. ϕ6.8 20-core vinyl wire Insulated shield cable AWG28(length 500mm)
Mass	350g or less(excluding cable)

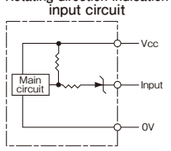
※Output origin position (address 0) within 10mm of the extension start point.
(Note 1) 3-M4 PCD54 can also be used as a Φ3.5 hole for M3 mounting.

I/O circuit diagram

NPN open collector output



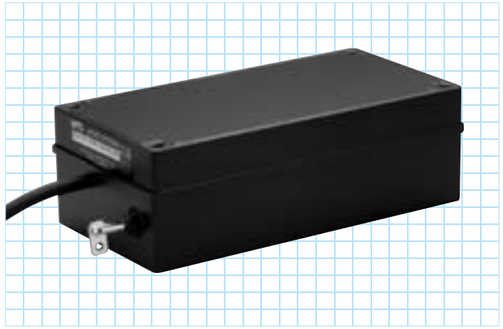
Rotating direction indication input circuit



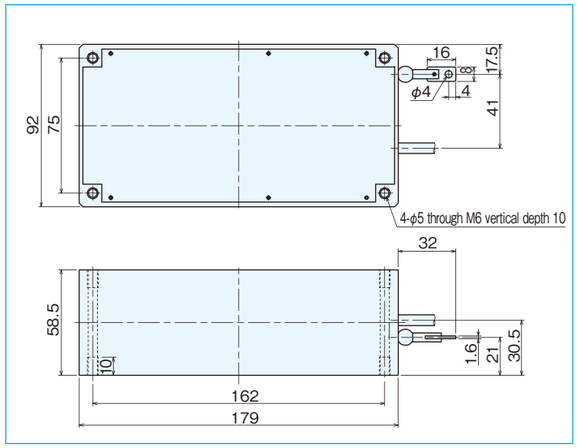
Note) When input is open, CW increases count.
When input is 0V short, CCW increases count.

MLA-42 series

[Absolute Linear Scale]



Outside dimensions



Specifications

Item \ Type name	MLA-42-4096□□-□ (Output code / Supply voltage / Measuring range)
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℃~60℃
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 dia. φ6.8 19-core vinyl wire Insulated shield cable(length: 1m)

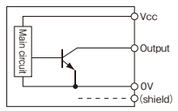
Specifications／Absolute Linear Scale

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.

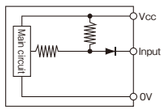
I/O circuit diagram

Output circuit



Main body-shield no connection

Direction indication input circuit



Connect the input and 0V to when subtraction of count is desired during extraction.

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

Roller encoder/Counter

Roller encoder: Length measurement with resolution 1mm - 0.1mm is available with a roller of 200mm circumference.

Counter: Display unit and setting options

REH-30R

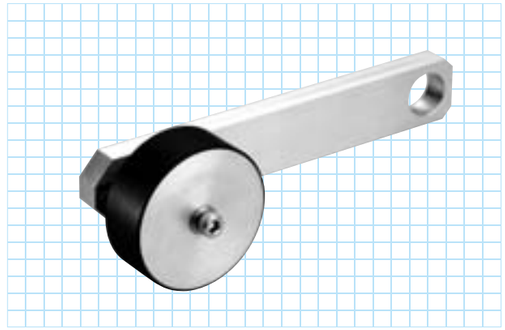


DC

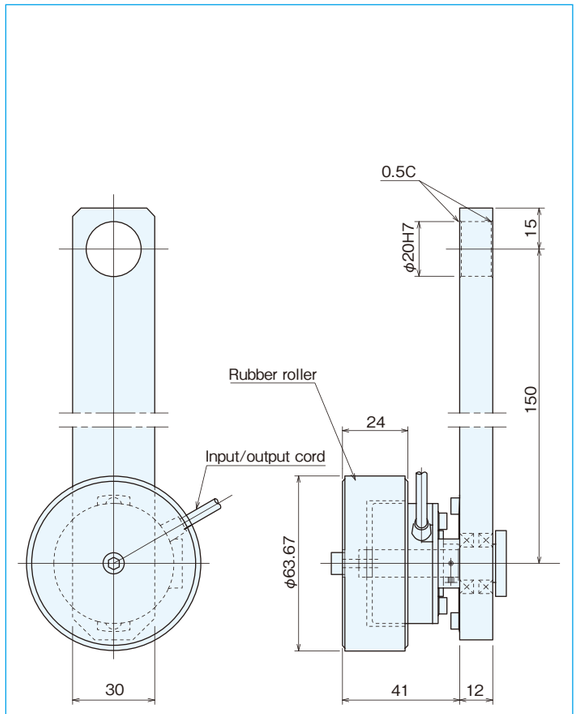


REH-30R series

[Roller Encoder]



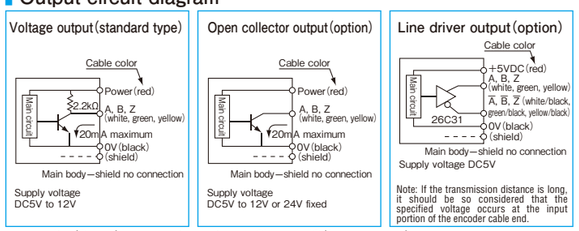
Outside dimensions



Specifications

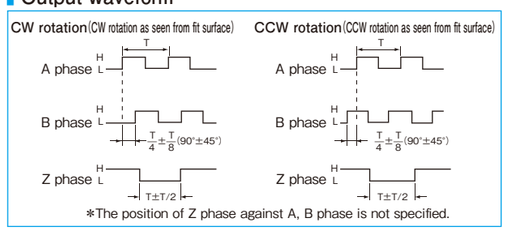
Item						
Type name	REH-30-□R□ Pulse number / Output circuit ●No entry=voltage output ●C=open collector output ●C4=open collector output DC24V ●E=line driver output					
Supply voltage	Voltage/Open collector:DC5V−5%～12V+10% DC24V±10%(open collector output only) Line driver:DC5V±5%					
Current consumption	60mA or less(under no load)					
Detection system	Incremental					
Output	Output pulse number	200	400	500	1,000	2,000
	Output pulse/1mm	1	2	2.5	5	10
	Minimum resolution mm	1	0.5	0.4	0.2	0.1
	Output phase	A, B, Z phase				
	Output form	Square wave				
	Output capacity	Sink current: 20mA Residual voltage: 0.5V or less(at 10mA)				
	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 1m or less)				
Allowable load of shaft(electrical)	Radial	19.6N(2kgf)			14.7N(1.5kgf)	
	Thrust	9.8N(1kgf)			4.9N(0.5kgf)	
Maximum allowable revolutions (mechanical)	6,000r/min					
Roller	Outside diameter: φ63.67±0.01 Material: aluminum roll hard urethane rubber baked					
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/s²(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)					
Mass	400g					

Output circuit diagram



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

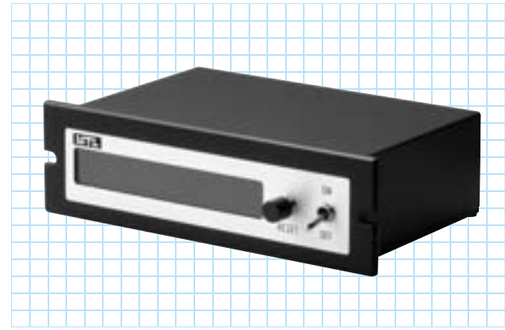
Output waveform



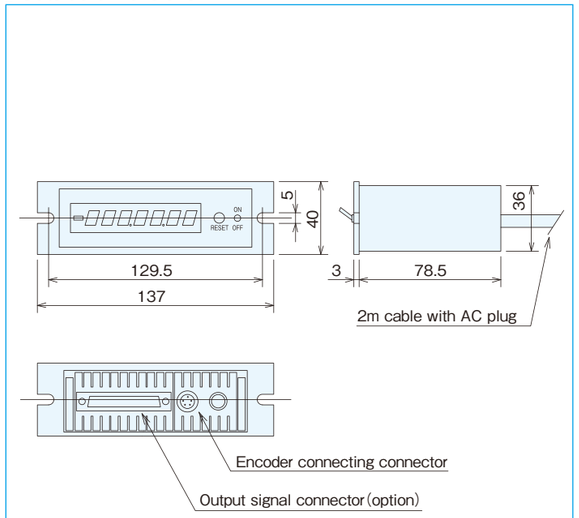
*The position of Z phase against A, B phase is not specified.

DC series

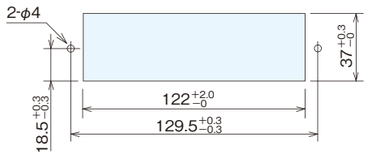
[Measuring Angle/Measuring Length Counter]



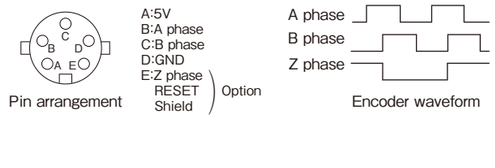
Outside dimensions



Mounting hole processing dimensions



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



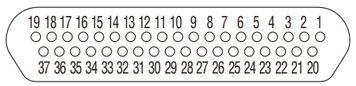
Counter specifications

Item	Type name: DC-※ ×× ** ○ △ □□ (①Count mode ②Divider/multiplier ③Display Units ④BCD output ⑤Z Reset ⑥No. decimal places)	
Count mode(※)	7:Angle	6:Decimal
Indicating function	With(−)indication, reversible	
Indicating range	−359.59.59～0 ～359.59.59	−9999.999～0 ～9999.999
Display Units(**)	S1:1sec, S10:10sec, S15:15sec, S30:30sec, M1:1min, M5:5min, M10:10min, D1:1°	
Display unit	7 segment red LED(7.6mm high)	
Counter input signal	2 square wave inputs with 90° phase difference from encoder Input signal H: 4.0V to 5.0V, L: 0 to 0.5V	
Response frequency	500kHz or less(BCD output response speed 1kHz)	
Frequency divider/multiplier(××)	×Q:1/4, ×H:1/2, ×1:1, ×2:2, ×4:4	
Power supply	AC 100V±10V 50／60Hz	
Encoder supply	DC5V 100mA/DC12V 150mA(option)	
Working ambient temperature/ humidity	0℃～+60℃ 95%RH or less no dewing	
Cable	2m cable with AC plug	
Mass	500g or less(excluding cable)	

※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)

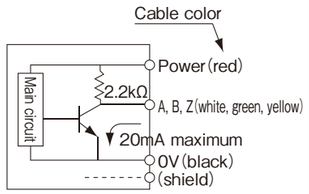
Technical data

Incremental encoder

- 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.

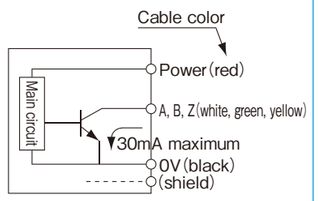
Output circuit diagram

Voltage output (standard type)



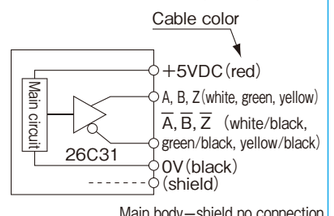
Supply voltage
DC5V to 12V or 5V/12V fixed

Open collector output (option)



Supply voltage
DC5V to 12V or 24V fixed

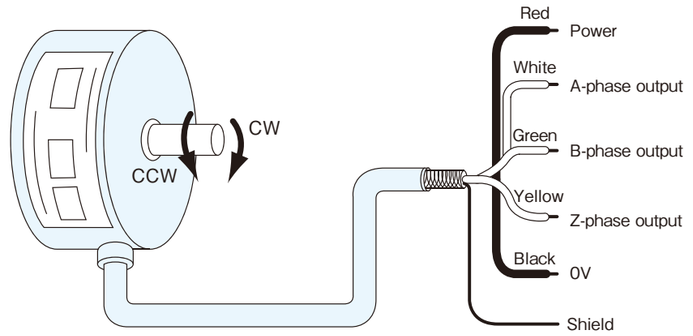
Line driver output (option)



Supply voltage DC5V
Current consumption 150mA or less

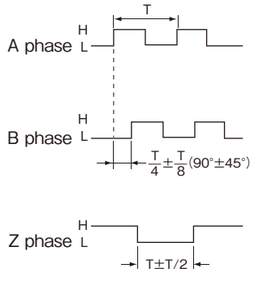
Note: If the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end.

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

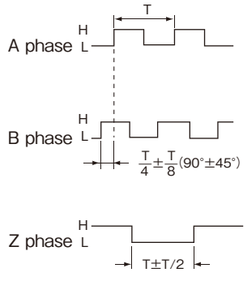


Output waveform

CW rotation
(CW rotation as seen from fit surface)



CCW rotation
(CCW rotation as seen from fit surface)

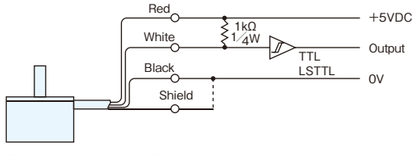


*The position of Z phase against A, B phase is not specified.

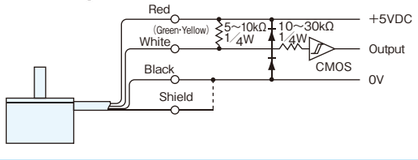
Connecting example

Connecting with IC circuit
(the cable length should be as short as possible)

①Connecting to TTL/LSTTL



②Connecting to CMOS



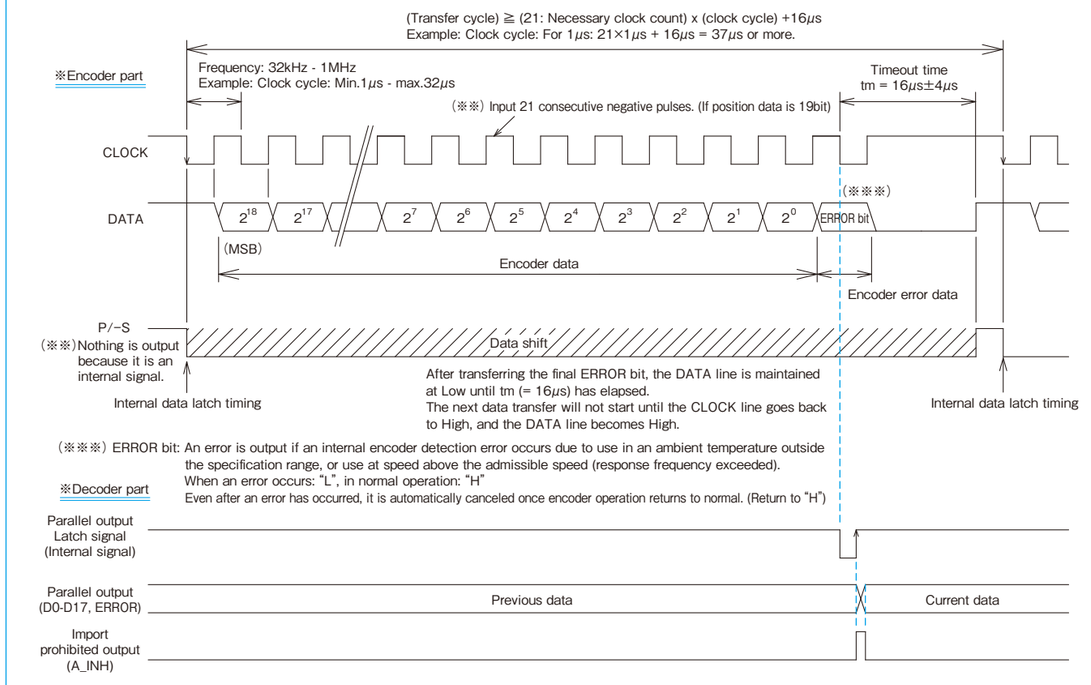
Absolute encoder

Timing Chart for Serial Communications

Refer to the timing chart below for serial communications (SSI format) used by our absolute encoders.

I/O timing chart *For 19bit output data

(※) This chart omits /CLOCK and /DATA.



If an optional decoder circuit board is used

Connection ※If 19bit (524,288)

Decoder board TH No. (24pin)

TH No.	Parallel output / Power	TH No.	Parallel output / Power
1	DC5V±5%	13	Output 2^{8}(D8)
2	0V(COMMON)	14	Output 2^{7}(D7)
3	Output 2^{18}(D18)	15	Output 2^{6}(D6)
4	Output 2^{17}(D17)	16	Output 2^{5}(D5)
5	Output 2^{16}(D16)	17	Output 2^{4}(D4)
6	Output 2^{15}(D15)	18	Output 2^{3}(D3)
7	Output 2^{14}(D14)	19	Output 2^{2}(D2)
8	Output 2^{13}(D13)	20	Output 2^{1}(D1)
9	Output 2^{12}(D12)	21	Output 2^{0}(D0)
10	Output 2^{11}(D11)	22	ERROR bit
11	Output 2^{10}(D10)	23	Import prohibited output(A_INH)
12	Output 2^{9}(D9)	24	N.C.

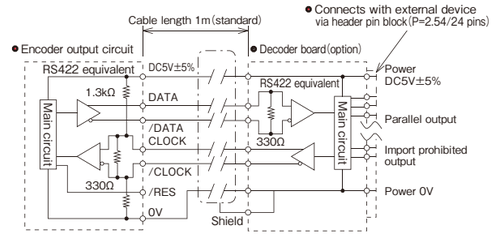
※1: When resolution is 18bit, connect the top bit to TH No.3, then fill in other wiring in sequence.
(Example) When using 18bit: Connect Output 217(D17) to TH No.3, 216(D16) to TH No.4,... output 20(D0) to TH No.20, and ERROR bit to TH No.21.
TH No.22 and 24 are N.C.
※2: The maximum parallel output from this decoder circuit board is 20 bits (including the ERROR bit).
Note that it is not possible to output parallel data of 21 bits or more.

Decoder board TH No. (8pin)

TH No.	Cable color	Encoder connection
1	Red	DC5V±5%
2, 4	Black	0V(COMMON)
3	—	N.C.
5	White	DATA
6	White/Black	/DATA
7	Green	CLOCK
8	Green/Black	/CLOCK

※2: 3pin is N.C.
※3: Reset can be enabled for the yellow line with /RESET (reset input "L", connected to 0V).
Input power supply: 1mA or less
※ "Open" or "5V" in normal use

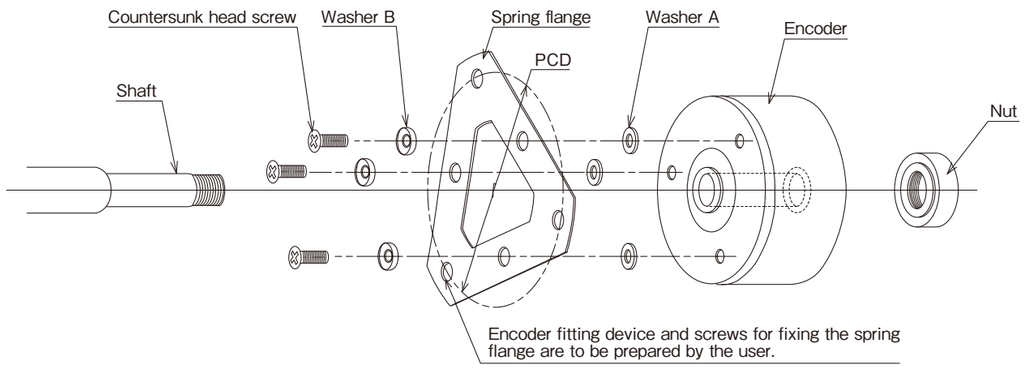
Output circuit diagram



Hall type encoder (MEH/MAH) Mounting method

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

Hole type encoder (MEH) fitting image

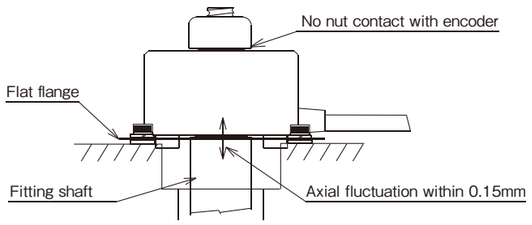


For the spring flange, see Setting Option (P84).

Precautions in assembling the hole-type encoder

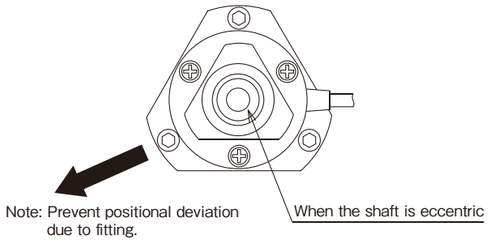
Effect on encoder of thrust load

Absorption of axial fluctuation of flat flange is within 0.15mm



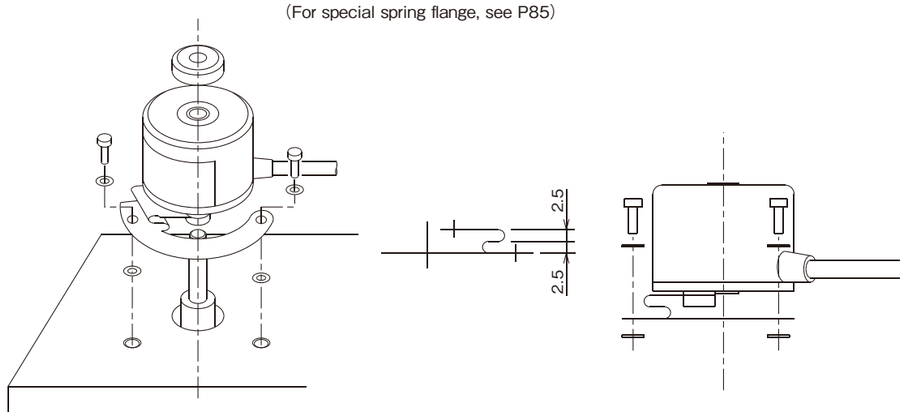
Effect on encoder of radial load

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

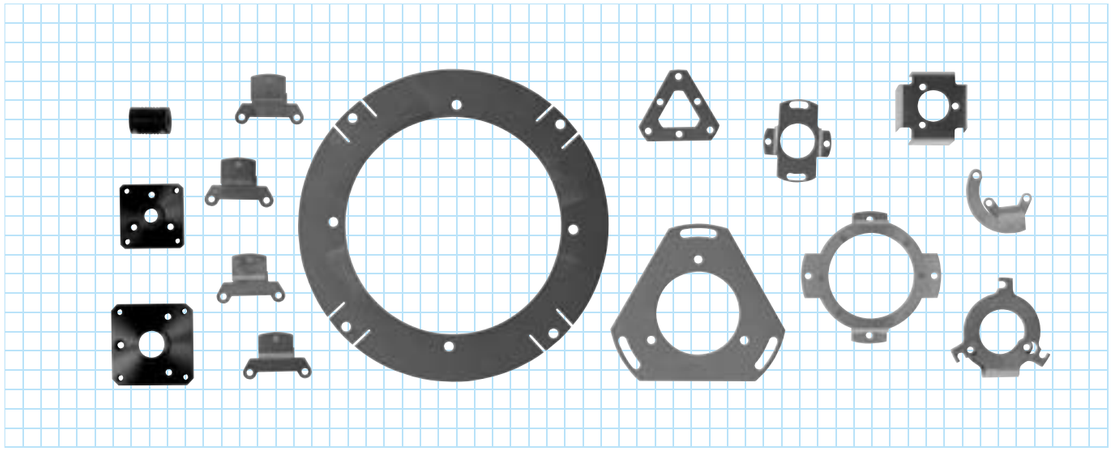


When radial fluctuation is large, consider the method shown below.

(For special spring flange, see P85)

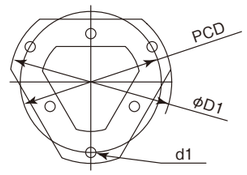
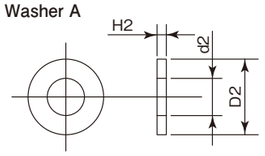
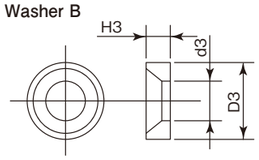
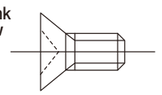
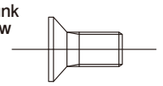


Setting Option/Coupling



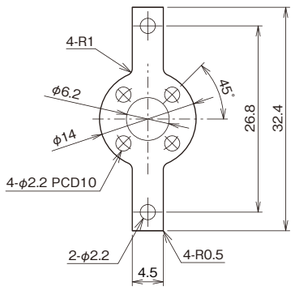
Spring flange (Use with a hollow shaft type encoder)

List of dimensions and accessories

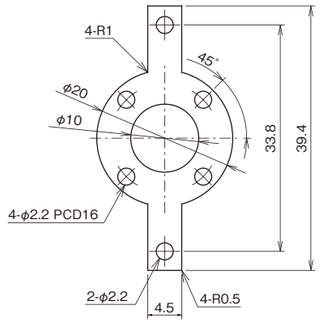
Type name (encoder series)	MEH-	20	30	50	60	85	130	180	MAH-36	MAH-42
Spring flange 	PCD	40	52	79	90	116	165	210	52	64
	D1	48	60	90	98	128	175	220	60	76
	d1	3.5	3.5	4.5	4.5	4.5	5.2 (4 equal arrangement)	5.2 (3 equal arrangement)	3.5	4.5
	H1 (plate thickness)	0.1	0.1	0.1	0.2	0.2	0.5	0.5	0.1	0.1
Washer A 	D2	7	7	14	14	14	—	—	7	14
	d2	3.5	3.5	5	5	5	—	—	3.5	5
	H2	1	1	1	1	1	—	—	1	1
Washer B 	D3	7	7	14	14	14	—	—	7	14
	d3	3.5	3.5	4.5	4.5	4.5	—	—	3.5	4.5
	H3	2.3	2.3	2.5	2.5	2.5	—	—	2.3	2.5
Countersunk head screw 		M3×6	M3×6	M4×8	M4×8	M4×8	—	—	—	M4×8
Countersunk head screw 		—	—	—	—	—	—	—	M3×6	—

"*" indicates standard attachment.
Others are options.

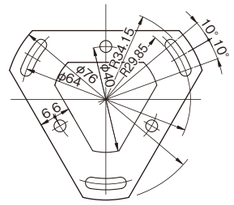
* ME-9P, * MA-10



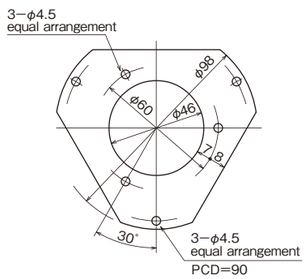
* ME-12P, * MA-17, MEH-17, MEH-14



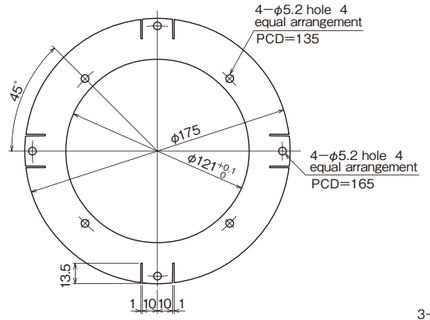
MAH-42



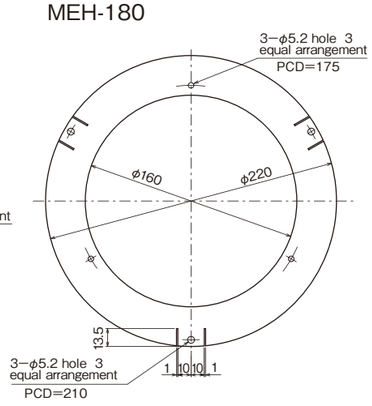
MEH-60



MEH-130

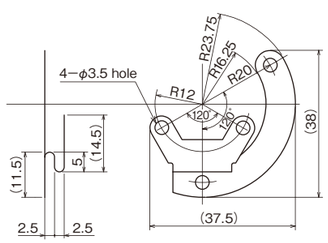


MEH-180

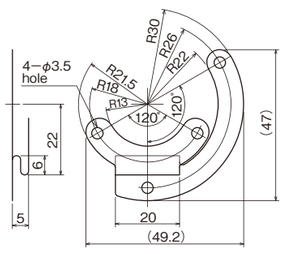


Special spring flange (this type is recommended when fluctuation in radial direction is large)

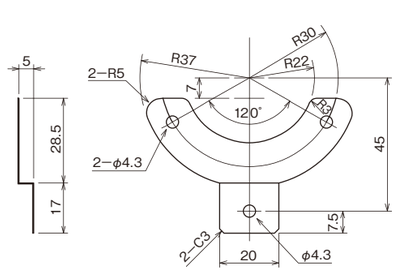
MEH-20SP (plate thickness 0.1t)



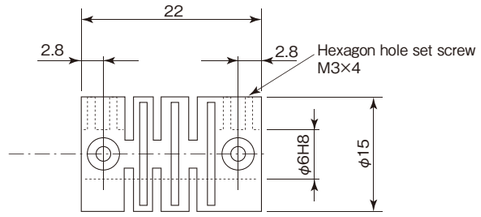
MEH-30SP (plate thickness 0.15t)



MEH-60SP2 (plate thickness 0.3t)



Coupling GJ6x6 (for MES-20, 30)

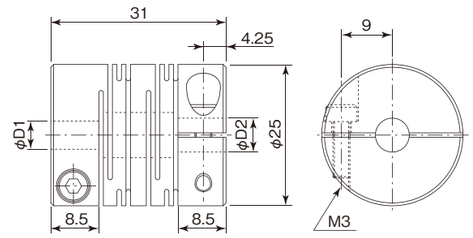


(1) Material: Polyacetal resin containing glass
(2) thers than φ6-φ6 are available.

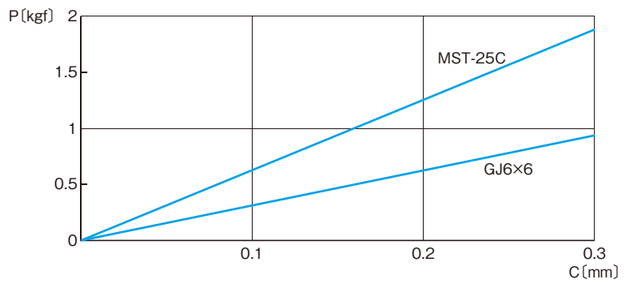
Coupling MST-25C-6x6 (※※※) (for MES-30 high resolution), 8x8 (※※※) (for MES-50 high resolution)

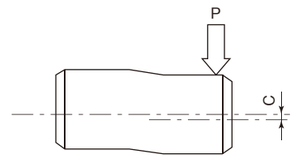
※:φD1
※※:φD2

Clamping type



Eccentric spring characteristics



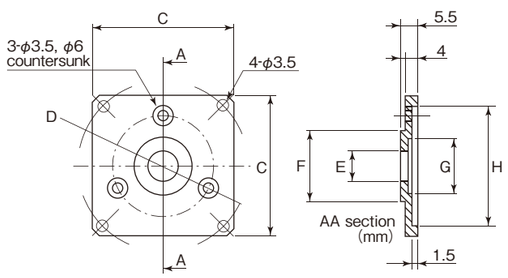


It should be used under optimum conditions to maintain the accuracy of the encoder and also for prolonged use.

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.)

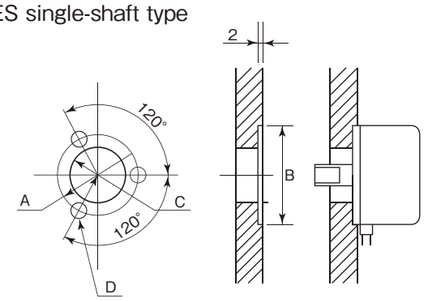
Flange MEF-20 (for MES-20), MEF-30 (for MES-30)



Type name	C	D	E	F	G	H
MEF-20	36	40	φ8	$\phi15^{0}_{-0.018}$	φ13	$\phi32^{+0.025}_{+0.009}$
MEF-30	46	52	φ15	$\phi20^{0}_{-0.021}$	φ25	$\phi44^{+0.025}_{+0.009}$

Fitting dimensions

MES single-shaft type



Type name	A	B	C	D
MES-20	φ24	$\phi32^{+0.2}_{+0.15}$	φ16	3-φ3.5
MES-30	φ36	$\phi44^{+0.2}_{+0.15}$	φ28	3-φ3.5
MES-40	φ45	$\phi56^{+0.3}_{+0.25}$	φ30	3-φ3.5
MES-50	φ56	$\phi65^{+0.3}_{+0.25}$	φ32	3-φ4.5

Frequently Asked Questions

Issuance of Certificate of Non-applicability

Provide the following three items when exporting.

(1) End user name

(2) Export destination country name

(3) Purpose of use

※Please note that we may not be able to sell our products in some cases.

Shipping charges

If the total value of your purchase is JPY10,000 or less (exclusive of tax),
we will charge a packing and shipping fee of JPY1,000 (exclusive of tax).

Purchase method (Contact)

Use e-mail or fax to request an estimate or to place an order.

E-mail:mtl@mtl.co.jp　　FAX:81−42−746−0960

Troubleshooting

Send the encoder to our Sales Department.

Please note that it will take us 1-2 weeks to investigate.

Also, please consult our Sales Department about possible investigation fees.

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.