



MICRO ENCODER

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

MTL MICROTECH LABORATORY INC.

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MTL



MICRO ENCODER

Product Catalog



MICRO ENCODER [Product Catalog]

MICROTECH LABORATORY INC.

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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.

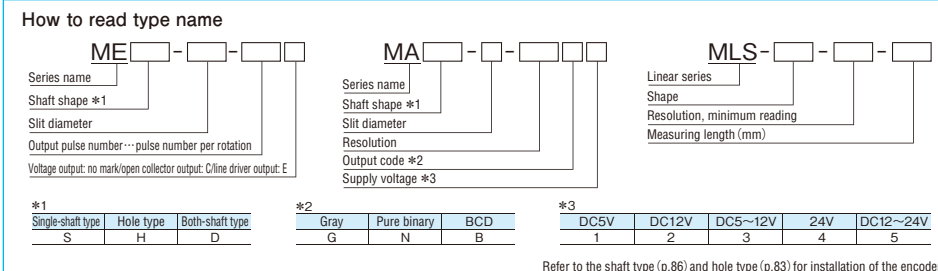
This catalog gives an introduction to our vast lineup of rotary encoders for solving a variety of your needs.

KONLEE
豐立自動控制器材有限公司
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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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> A, B, and Z phase output. Open collector output. 	9 10
		ME□-9-□P□	φ13×20	32 1,024 (16,000)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Strong type Environment resistance 	31 32
		ME□-50-□P□	φ65×30	500 10,800 (216,000)	<ul style="list-style-type: none"> Thin and compact popular type. Availability of shaft shape to meet various fitting methods. Option With built-in PST ×2, ×4, ×5, ×8, ×10, ×16 ×20 multiplication circuit 	33 34
		MEH-59-12960PSTG50E	φ70×16.5	2097152, 1048576, 524288	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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 (1,440,000)	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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.



Absolute

Series name	Appearance	Type name	Outside dimensions	Resolution	Features	Page	
Single turn type		MAS-3-4096N1	φ6×8.6	4096 2048 1024	<ul style="list-style-type: none"> 12bit, super-compact, smallest model in its series SSI interface 	50	
		MMS-10-□G1	φ13×17.2	256(8bit) 1,024(10bit)	<ul style="list-style-type: none"> Outer diameter: φ13mm ●Height: 15.5mm Resolution: 1024 divisions SSI interface 	51	
		MAS-10-256G	φ13×15.5	256(8bit)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 18bit small high-resolution absolute encoder SSI interface 	53	
		MA□-17-□□1	φ20×21	256(8bit) 1,024(10bit)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 20bit small high-resolution absolute encoder Hollow shaft type (8 in inside diameter) SSI interface 	58	
		MA△-36-※※※N1	φ46×30	1048576 524288 262144	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 12bit absolute encoder The output codes are gray code, pure binary code, and BCD code. 	61	
		MAH-59-2097152N1	φ70×18	2097152 1048576 524288	<ul style="list-style-type: none"> 21bit thin high-resolution absolute encoder. Hollow shaft of 25 in inside diameter. SSI interface 	62	
		MAH-85-2097152N1	φ100×32	2097152 1048576 524288 262144	<ul style="list-style-type: none"> 21bit high-resolution absolute encoder. Large hollow shaft of 36 in inside diameter. SSI interface 	63	
	Muti turn type (Multiple-rotation)		MAS-36-1000MT-S	φ46×30	1000×256	<ul style="list-style-type: none"> Electronic multi-revolution absolute encoder. Single-revolution: 1,000 divisions, multi-revolution: -128 to 127 rotations. Binary output at decoder. 	64
			MXH-36-256-1024GC5N	φ46×37	1024×256	<ul style="list-style-type: none"> Mechanical multi-revolution absolute encoder, no battery backup required. φ8mm fully hollow shaft. 	65
			MXS-36-□-□□□□□□	φ46×55	128~1,024(10bit)	<ul style="list-style-type: none"> Multiple-rotation absolute encoder 	66
			MXS-42-□-□□□□□□-□	φ65×63.5	128~4,096(12bit)	<ul style="list-style-type: none"> Multiple-rotation absolute encoder 	67

Wire-type linear scale

Series name	Appearance	Type name	Features	Page
Incremental formula		MLS-12-□-□	<ul style="list-style-type: none"> 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-□-□	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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-□-□	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Wire draw-out-type linear absolute encoder. Reading 0.1mm Measuring range: 1500mm. 	76
		MLA-42-□-□	<ul style="list-style-type: none"> 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□	<ul style="list-style-type: none"> Roller type linear encoder. Easy measuring. Minimum reading 0.1 to 1mm. 	79
Measuring angle/ measuring length DC series		DC-□□□□□	<ul style="list-style-type: none"> Small and robust counter. Decimal point moving, dividing/multiplying possible. 	80

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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.

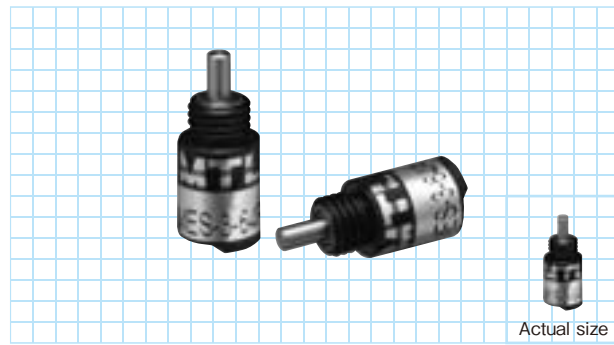
Incremental

Abundant lineup, covering outer diameter $\Phi 6$ - $\Phi 200$ mm, resolution 40P/R - 1,440,000P/R, and hollow diameter $\Phi 5$ - $\Phi 90$ mm.
 Choose from single-shaft type, double-shaft type, tubular-shaft type, and hollow-shaft type. These attributes can be combined to suit diverse applications.



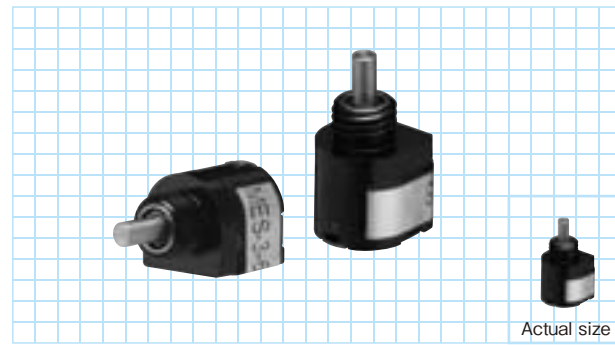
MES-3P series

[Square Wave/Incremental]



MES-3PST series

[Square Wave/Incremental]



Specifications

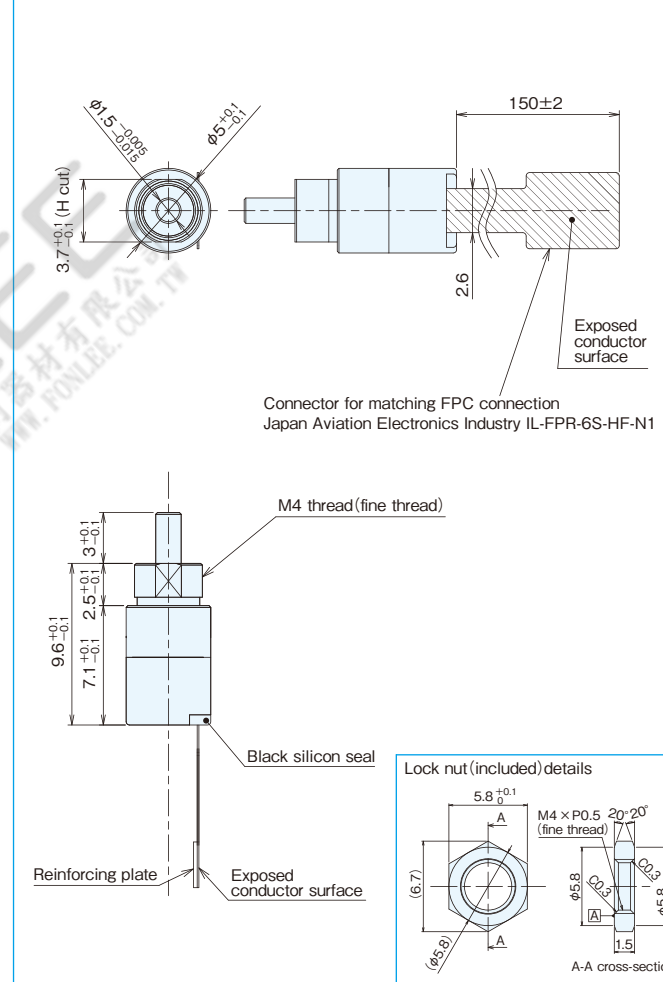
Item	Type name	MES-3-64P
Supply voltage		DC3.2±0.1V
Current consumption		15mA or less
Detection system		Incremental
Output pulse number (Standard) [Pulse number/rotation]		64P/R, 100P/R
Output phase		A, B, Z phase
Output form		Square wave, Voltage (C-MOS) output
Output capacity		CMOS output: Output current 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°C~60°C RH35%~90% no dewing
Storing ambient temperature		-20°C~80°C
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Flexible cable: Length approx. 150mm
Mass		5g (including flexible cable)

Specifications

Item	Type name	MES-3-64PST16
Supply voltage		DC3.2±0.1V
Current consumption		20mA or less
Detection system		Incremental
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°C~60°C RH35%~90% no dewing
Storing ambient temperature		-20°C~80°C
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Flexible cable: Length approx. 150mm
Mass		5g (including flexible cable)

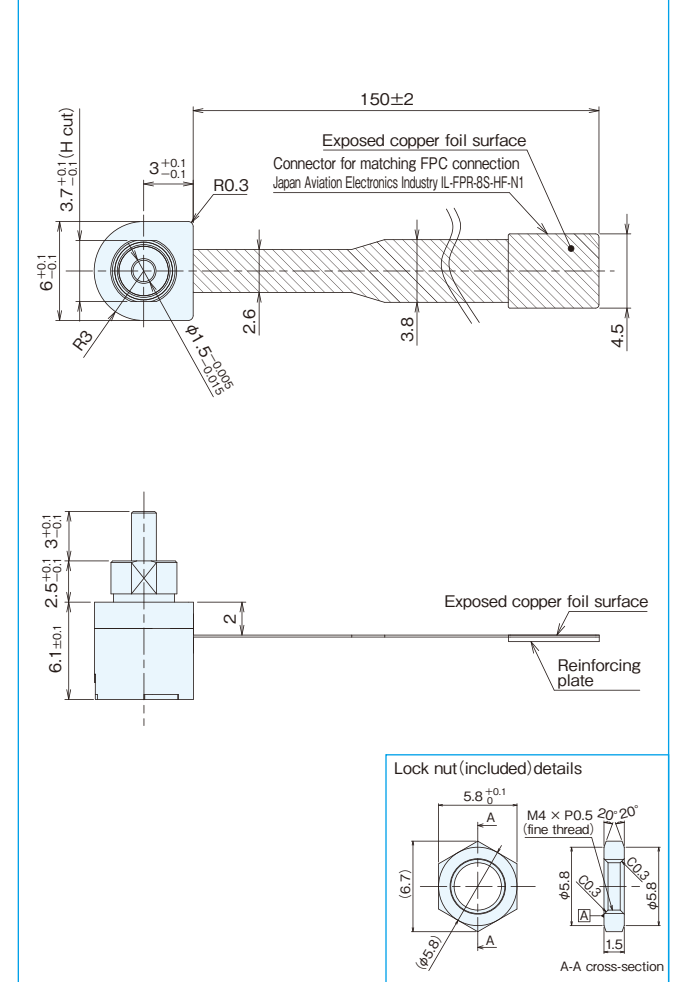
Outside dimensions

MES-3P

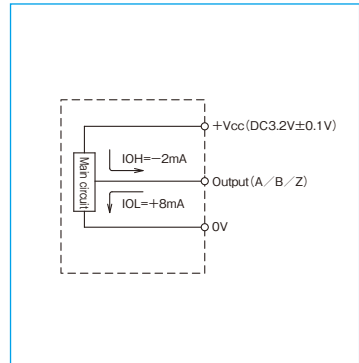


Outside dimensions

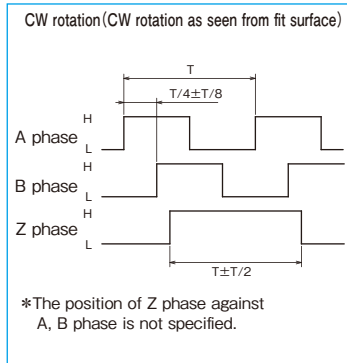
MES-3PST



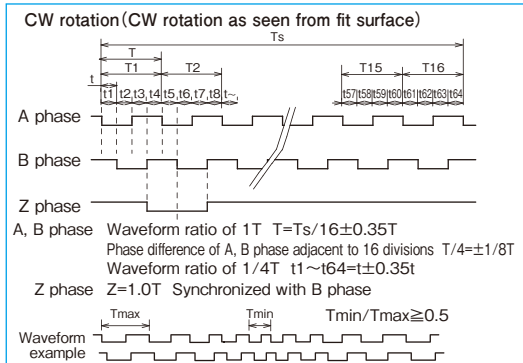
Output circuit diagram (ME-3P, ME-3PST)



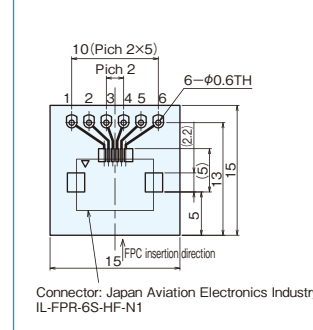
Output waveform (ME-3P)



Output waveform (ME-3PST)

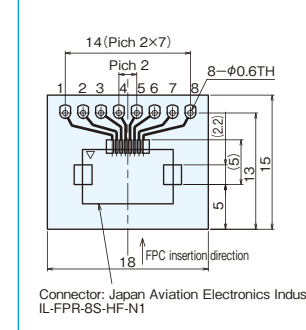


Terminal board (included) details



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

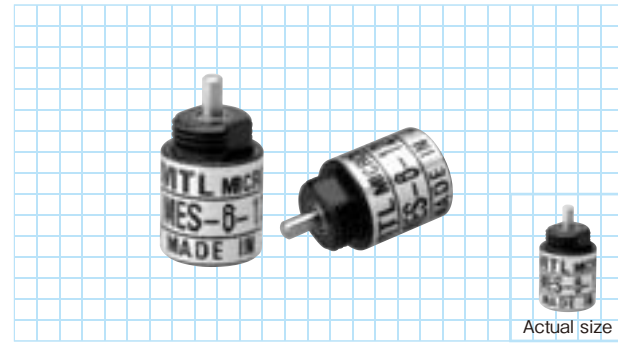
Terminal board (included) details



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

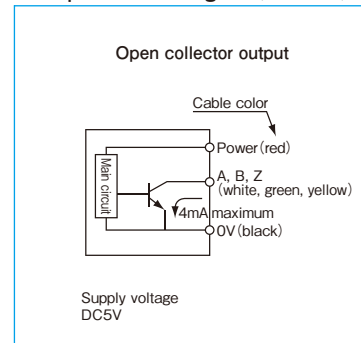
[Square Wave/Incremental]



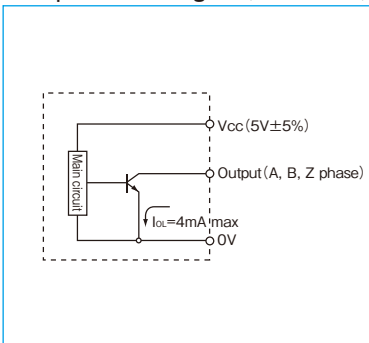
Specifications

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

Output circuit diagram (ME-6P)

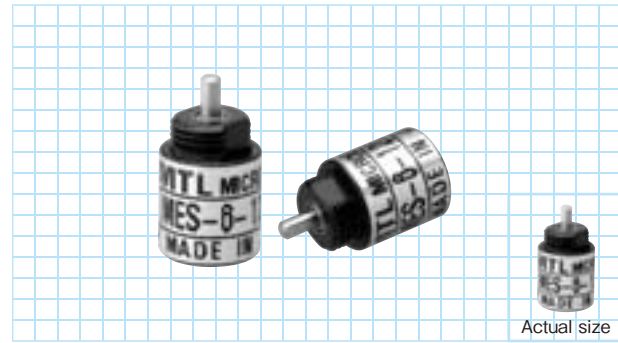


Output circuit diagram (ME-6PST)



MES-6-I25PSTI6C

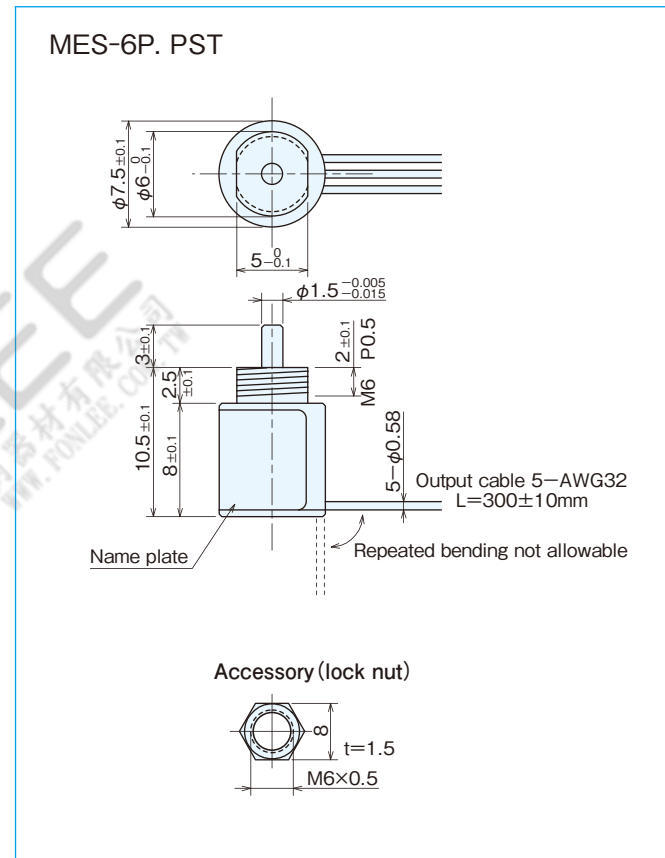
[Square Wave/Incremental]



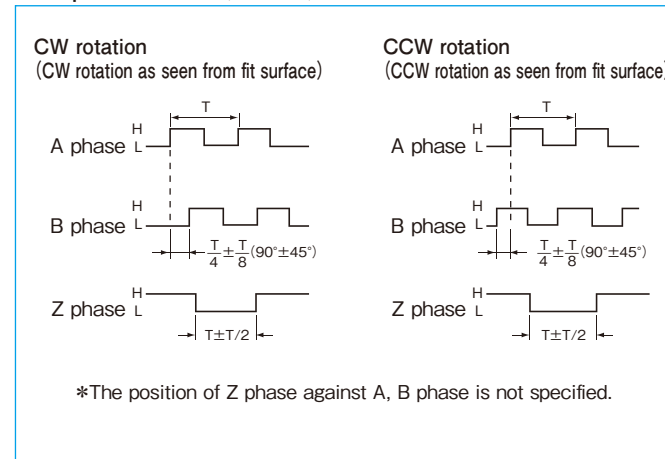
Specifications

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

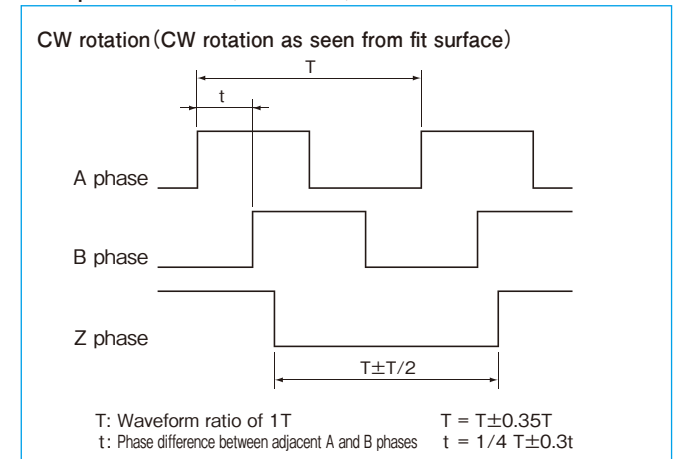
Outside dimensions



Output waveform (ME-6P)

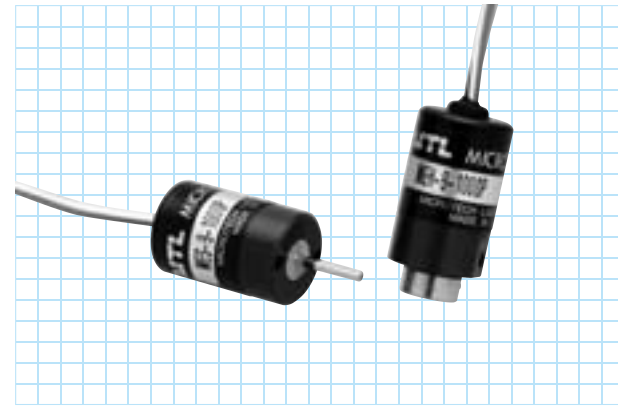


Output waveform (ME-6PST)



ME-9-P series

[Square Wave/Incremental]



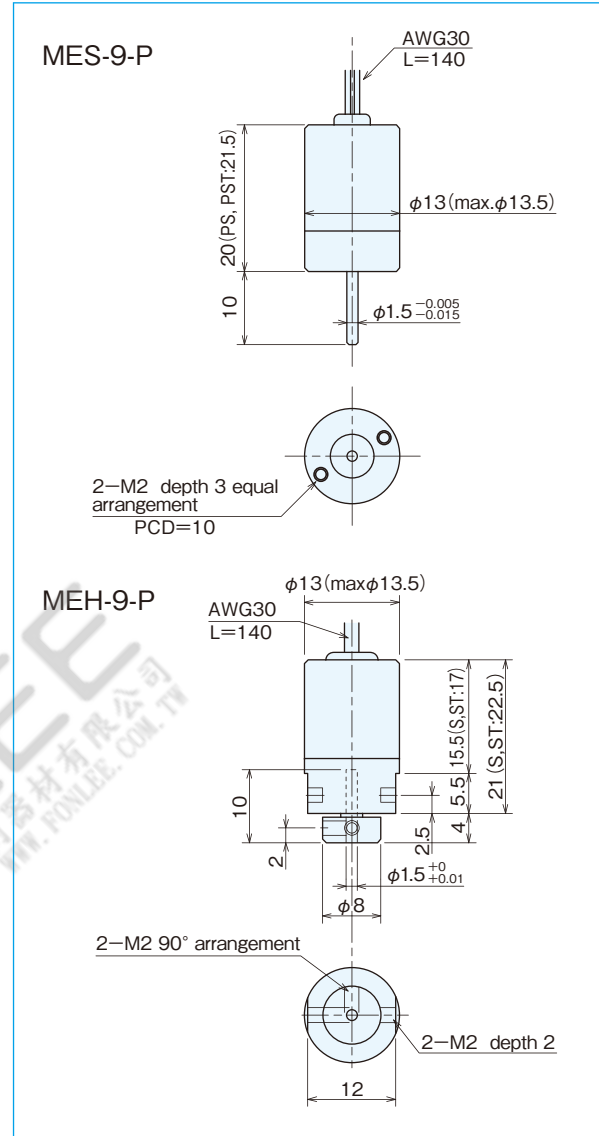
Specifications

Item	Type name		
	ME <input type="checkbox"/> -9- <input type="checkbox"/> P <input type="checkbox"/>		
	Shaft shape ●S=single shaft ●H=hollow shaft	Pulse number ●Noentry=Voltage output ●C=open collector output ●E=line driver output	
	Output circuit ●ST <input type="checkbox"/> (2-4-8-16)		
	Square wave	Built-in multiplication circuit (x2·x4·x8·x16)	
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 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 phase	A, B, Z phase (Z="H")	A, B, Z phase	
Output form	Square wave	Square wave	
Output capacity	Sink current:20mA Residual voltage:0.5V or less (at 10mA) Open collector output:Load voltage DC13.2V max	Sink current:20mA max. Residual voltage:0.5V or less (at 10mA) Open collector output:Load voltage DC13.2V max	
Maximum response frequency (response pulse number)	100kHz	Open collector output:100kHz Line driver output:50kHz×(by multiplication)	
Output phase difference	A, B phase difference 90°±45°(T/4±T/8) Z phase T±T/2(see Output Waveform)	Refer to the figure on the right	
Waveform rise/fall time	2μs or less (output cable 140mm or less)	1μs or less (output cable 140mm or less)	
Allowable load of shaft (electrical)	Radial	1.9N (200gf)	0.98N (100gf)
	Thrust	1.9N (200gf)	0.98N (100gf)
Maximum allowable revolutions (mechanical)	6,000r/min	6,000r/min	
Working ambient temperature/humidity	0°C~60°C RH35%~90% no dewing	0°C~60°C RH35%~90% no dewing	
Storing ambient temperature	-20°C~80°C	-20°C~80°C	
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable	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	

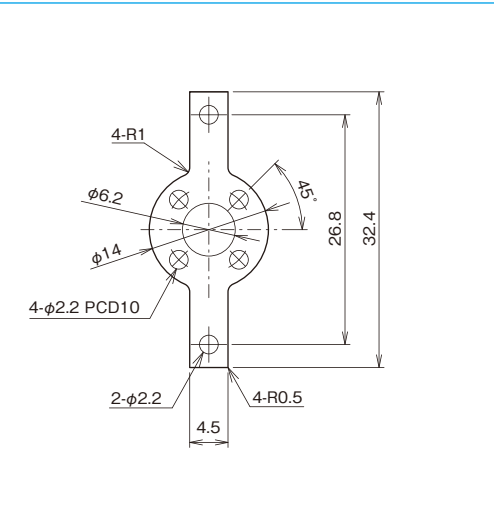
*Handled by built-in multiplier circuit

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

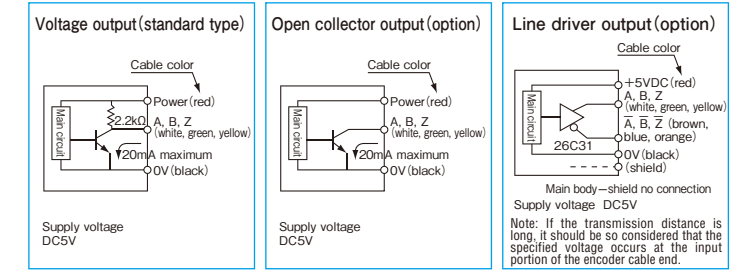
Outside dimensions



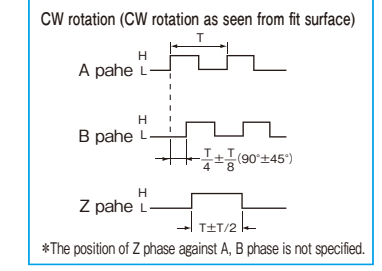
Spring flange MEH-9 (Included)



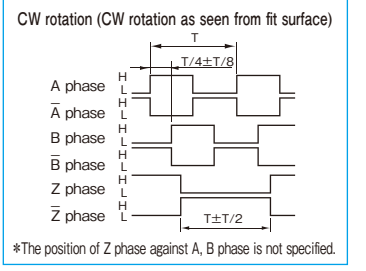
Output circuit diagram (Square wave)



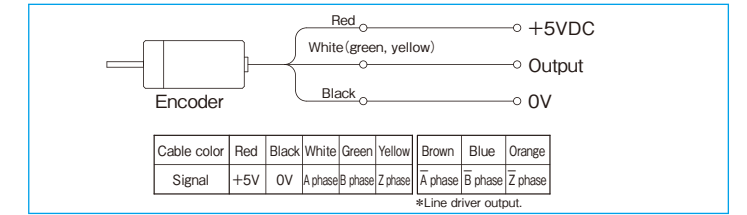
Output waveform (Square wave) Voltage/Open collector



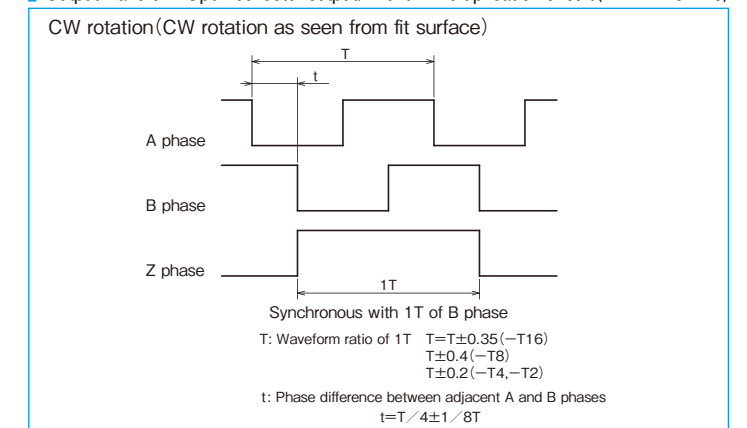
Output waveform (Square wave) Line driver



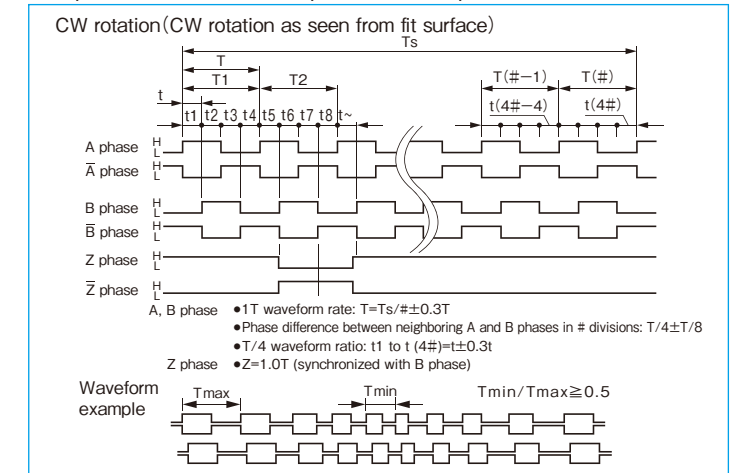
Output connection diagram / Built-in multiplication circuit (x2·x4·x8·x16)



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



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



ME-12-P series

[Square Wave/Incremental]

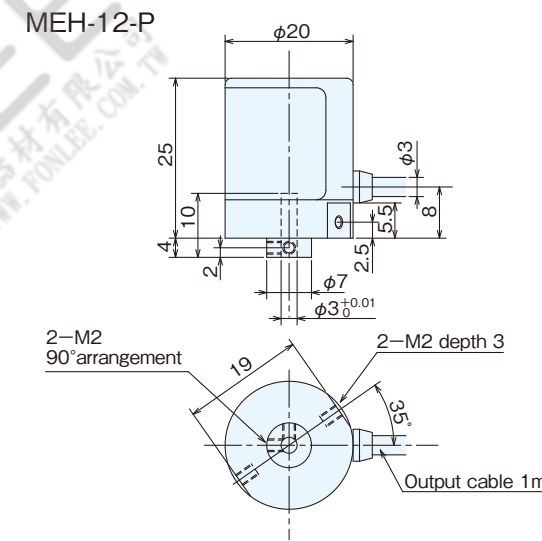
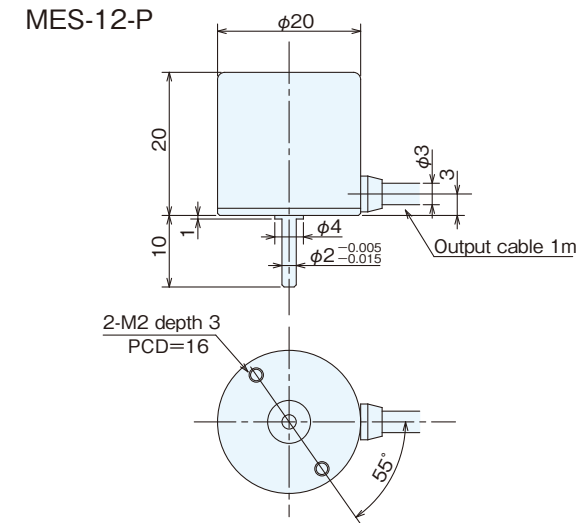


Specifications

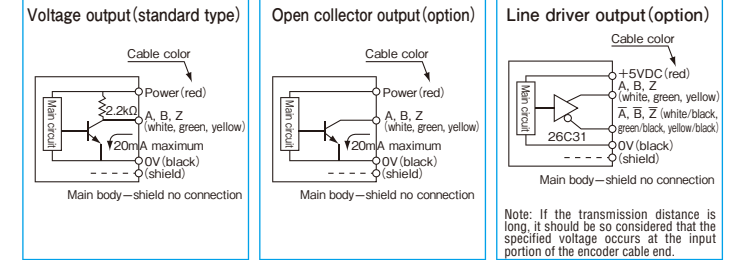
Type name		ME□-12-□P□			
Item	Shaft shape	Pulse number	Output circuit	Built-in multiplication circuit (×2·×4·×8·×16)	
	●S=single shaft ●H=hollow shaft		●Noentry=Voltage output ●C=open collector output ●E=line driver output	●ST□(2·4·8·16)	
Supply voltage	DC5V ±10%		DC5V ±5%		
Current consumption	40mA or less (under no load)		60mA or less (under no load)		
Detection system	Incremental		Incremental		
Output pulse number (Standard) [Pulse number/rotation]	60	300	1,000(*)	1,500(*)	EX 2,000×2(4,000) 2,000×4(8,000) 2,000×8(16,000) 2,000×16(32,000)
	100	360	1,024(*)	1,800(*)	
	125(*)	500		2,000(*)	
	200	600		2,048(*)	
Output phase	A, B, Z phase		A, B, Z phase		
Output form	Square wave		Square wave		
Output capacity	Sink current:20mA Residual voltage:0.5V or less (at 10mA) Open collector output:Load voltage DC13.2V max		Sink current:20mA max. Residual voltage:0.5V or less (at 10mA) Open collector output:Load voltage DC13.2V max		
Maximum response frequency (response pulse number)	100kHz		Line driver output:50kHz× (by multiplication) Voltage output·Open collector output:100kHz		
Output phase difference	A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)		Refer to the figure on the right		
Waveform rise/fall time	2μs or less (output cable 1m or less)		2μs or less (output cable 1m or less)		
Allowable load of shaft (electrical)	Radial	1.9N (200gf)	0.98N (100gf)	0.98N (100gf)	
	Thrust	1.9N (200gf)	0.98N (100gf)	0.98N (100gf)	
Maximum allowable revolutions (mechanical)	6,000r/min		6,000r/min		
Working ambient temperature/humidity	-10°C~70°C RH35%~90% no dewing		-10°C~70°C RH35%~90% no dewing		
Storing ambient temperature	-20°C~80°C		-20°C~80°C		
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions		
Cable	Outside diameter φ3 5-core vinyl wire 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

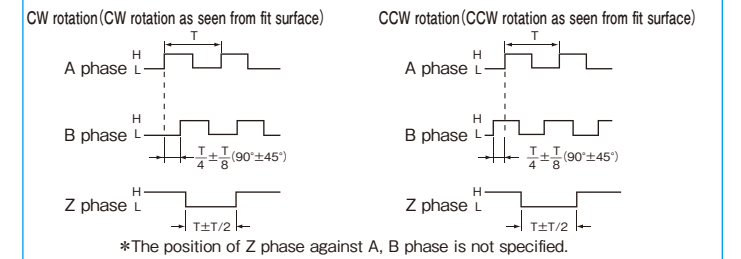


Output circuit diagram

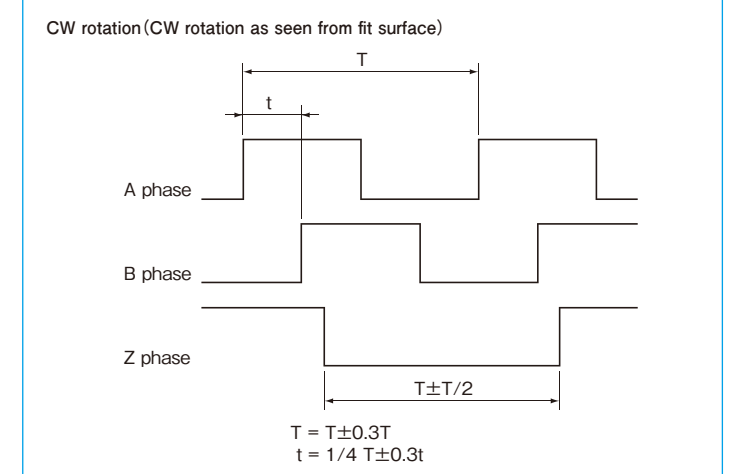


A capacitor (0.1μF) is connected between 0V and FG (frame ground).
Note: This capacitor is not connected to the voltage or open collector output of the built-in multiplier circuit.

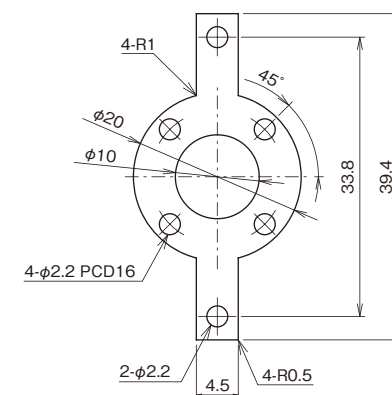
Output waveform (Square wave)



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



Spring flange MEH-12 (Included)



MEH-14 series

[Square Wave/Incremental]

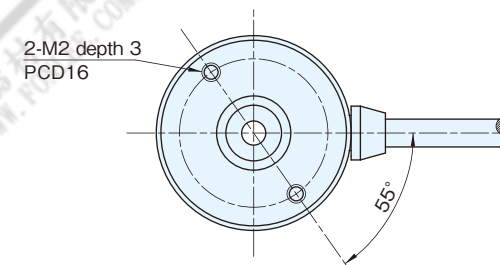
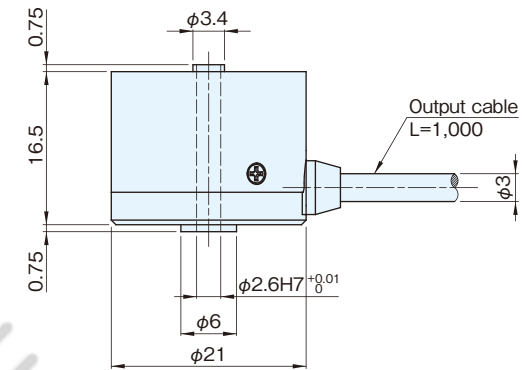
- Outside dimensions $\phi 21 \times 16.5\text{mm}$
- Through Shaft



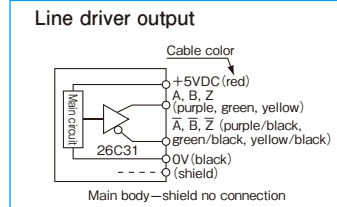
Specifications

Type name	MEH-14-2250 PSTN □ E
Item	
Detection system	Incremental
Output phase	A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase CS phase (U, \bar{U} , V, \bar{V} , W, \bar{W})
Output form	Square, Line driver output
Output pulse number (P/R)	2250, 4500 (2250×2), 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: $T/4 \pm T/8$ Waveform ratio of 1T: $T \pm 0.3t$ Z phase width: $T \pm T/2$ (Synchronized with 1T of B phase)
Supply voltage	DC5V±5%
Current consumption	150mA or less
Maximum response frequency	50kHz×division ratio (2, 4, 5, 8, 10, 16, 20, 32)
Output capacity	Output current (Io): $\pm 20\text{mA}_{\text{max}}$ Output voltage Vol: 0.5V _{max} , VoH: 2.5V _{min} .
Maximum allowable revolutions	6000r/min
Working ambient temperature/humidity	-10°C~+70°C/RH35%~90% no dewing
Storing ambient temperature	-20°C~+80°C
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 50G 3 times each in X, Y, and Z directions
Cable	Outside diameter $\phi 3.0$ 8-cores shield cable (without CS phase: 14-cores) AWG30
Mass	35g (excluding cable)

Outside dimensions



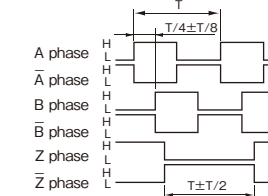
Output circuit diagram



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

Output waveform [×1]

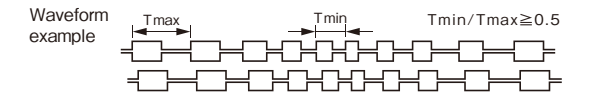
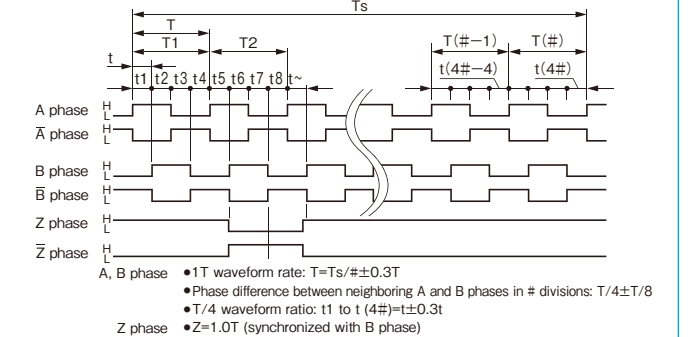
CW rotation (CW rotation as seen from fit surface)



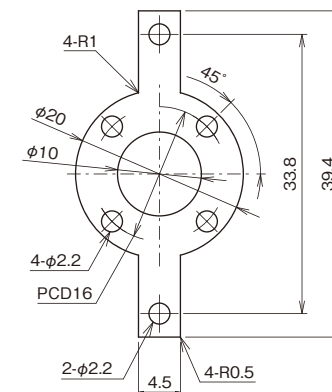
*The position of Z phase against A, B phase is not specified.

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

CW rotation (CW rotation as seen from fit surface)

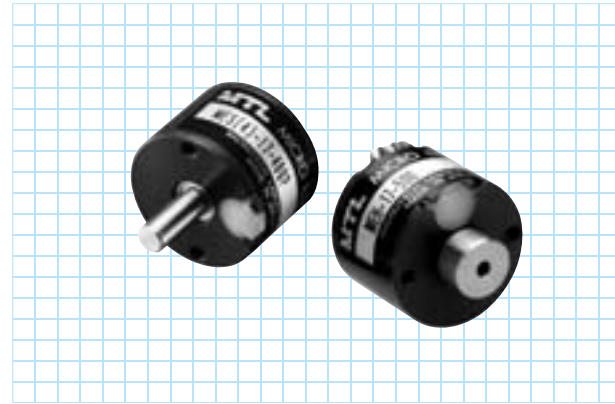


Spring flange MEH-14 (Option)



ME-17-P series

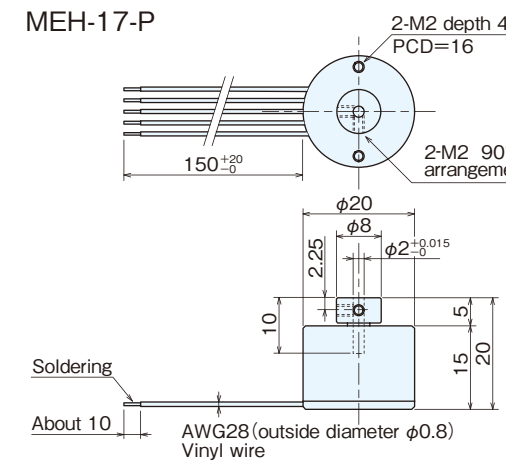
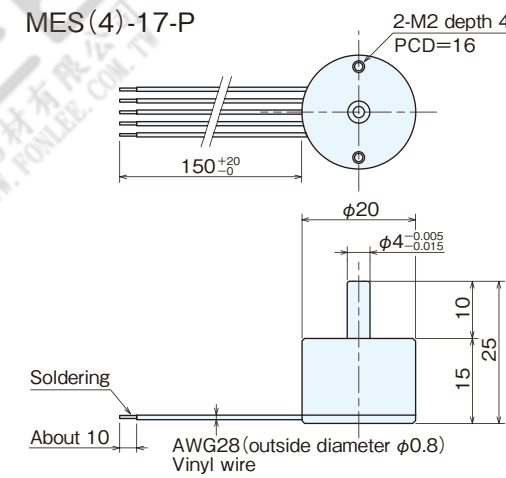
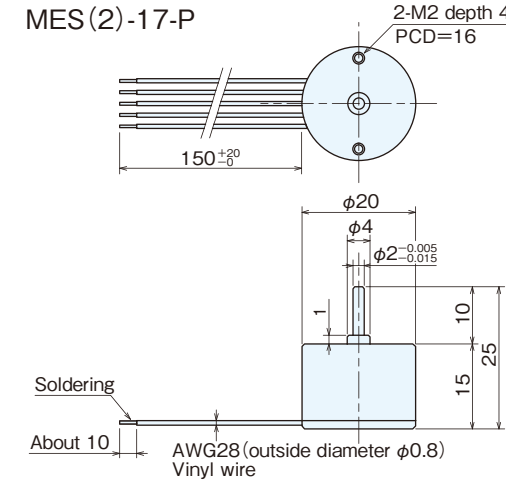
[Square Wave/Incremental]



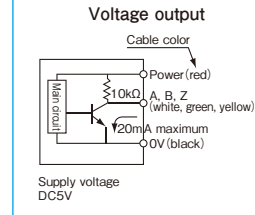
Specifications

Type name		ME <input type="checkbox"/> -17- <input type="checkbox"/> P	
Item		Shaft shape	Pulse number
		<ul style="list-style-type: none"> ●S(2)=φ2 single shaft ●S(4)=φ4 single shaft ●H=hollow shaft 	
Supply voltage	DC5V ±10%		
Current consumption	30mA or less (under no load)		
Detection system	Incremental		
Output pulse number (Standard)	100	300	500
	[Pulse number/rotation]		
Output phase	A, B, Z phase (Z="H")		
Output form	Square wave, voltage output only Pull-up resistance 10kΩ		
Output capacity	Sink current: 20mA Residual voltage: 0.4V or less (at 10mA)		
Maximum response frequency (response pulse number)	50kHz		
Output phase difference	A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)		
Waveform rise/fall time	2μs or less		
Allowable load of shaft (electrical)	Radial	1.9N (200gf)	
	Thrust	1.9N (200gf)	
Maximum allowable revolutions (mechanical)	6,000r/min		
Working ambient temperature/humidity	0°C~50°C RH35%~90% no dewing		
Storing ambient temperature	-20°C~80°C		
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions		
Cable	Vinyl wire AWG28 150mm		
Mass	20g		

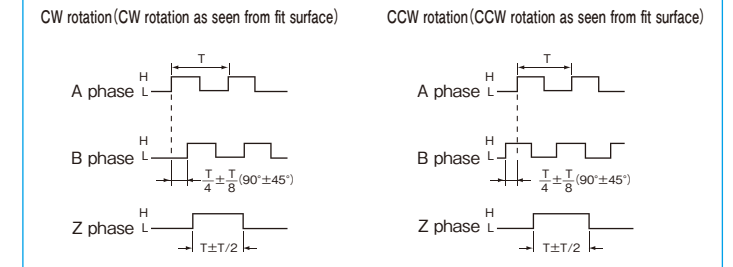
Outside dimensions



Output circuit diagram

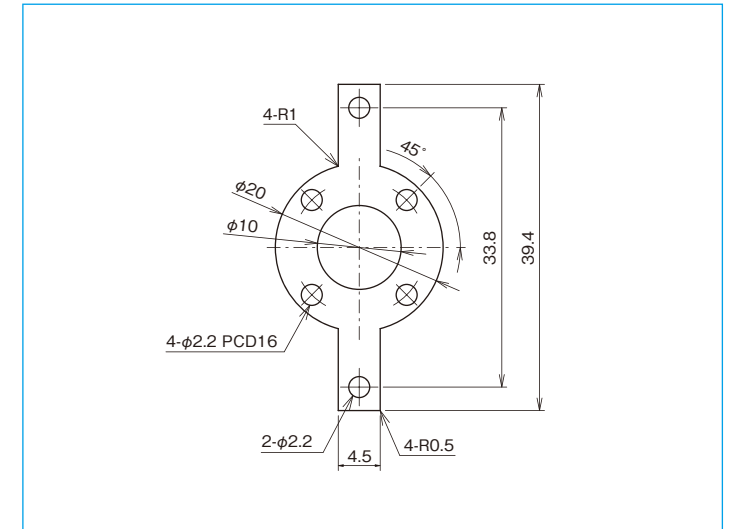


Output waveform



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

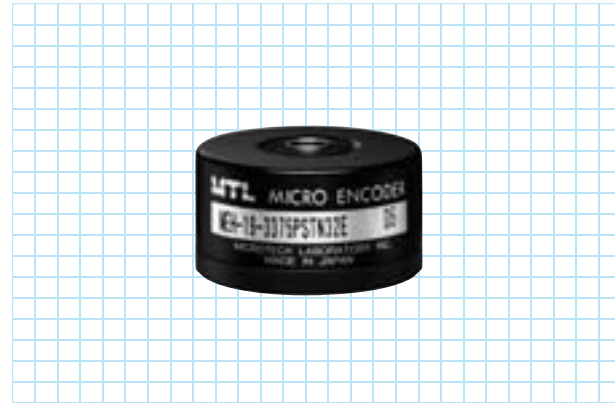
Spring flange MEH-17 (Option)



MEH-19 series

[Square Wave/Incremental]

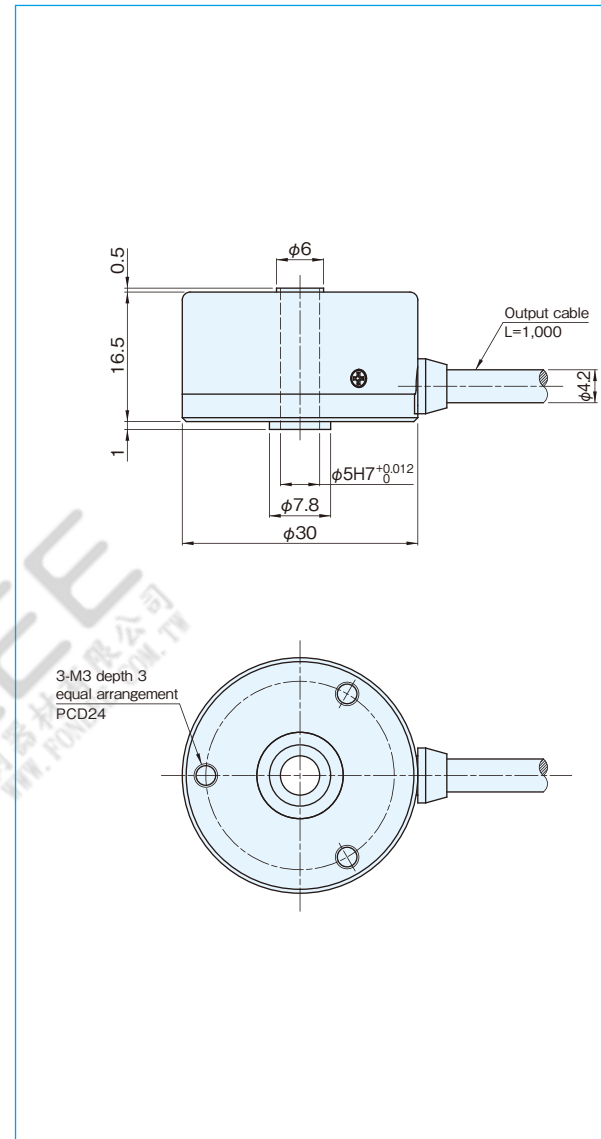
- Outside dimensions $\phi 30 \times 16.5\text{mm}$
- Through Shaft



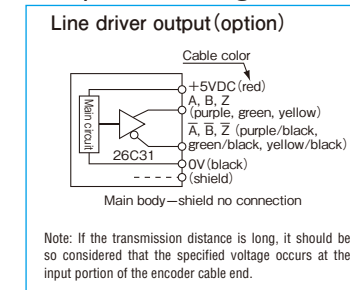
Specifications

Type name	MEH-19-3375 PSTN□E
Item	
Detection system	Incremental
Output phase	A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase CS phase (U, U, V, \bar{V} , W, \bar{W})
Output form	Square, Line driver output
Output pulse number (P/R)	3375, 6750 (3375×2), 13500 (3375×4) 16875 (3375×5), 27000 (3375×8), 33750 (3375×10) 54000 (3375×16), 67500 (3375×20), 108000 (3375×32)
Output	Phase difference between neighboring A/B phases: $T/4 \pm T/8$ Waveform ratio of 1T: $T \pm 0.3t$ Z phase width: $T \pm T/2$ (Synchronized with 1T of B phase)
Supply voltage	DC5V±5%
Current consumption	150mA or less
Maximum response frequency	50kHz×division ratio (2, 4, 5, 8, 10, 16, 20, 32)
Output capacity	Output current (Io): $\pm 20\text{mAmax.}$ Output voltage Vol: 0.5Vmax. VoH: 2.5Vmin.
Maximum allowable revolutions	6000r/min
Working ambient temperature/humidity	-10°C~+70°C/RH35%~90% no dewing
Storing ambient temperature	-20°C~+80°C
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 50G 3 times each in X, Y, and Z directions
Cable	Outside diameter $\phi 4.2$ 8-cores shield cable (without CS phase: 14-cores) AWG30
Mass	57g (excluding cable)

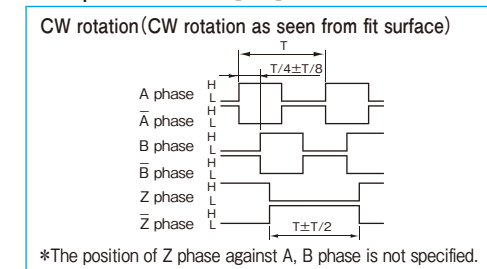
Outside dimensions



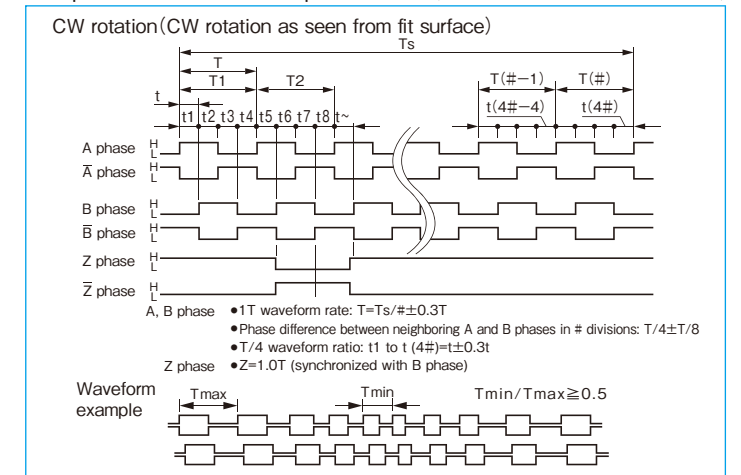
Output circuit diagram



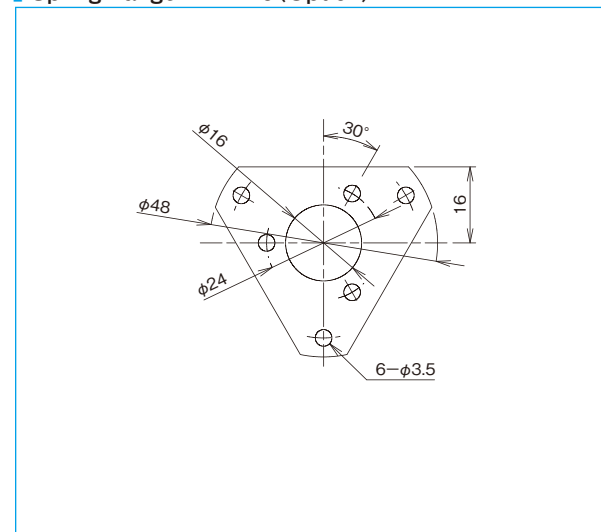
Output waveform [×1]



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



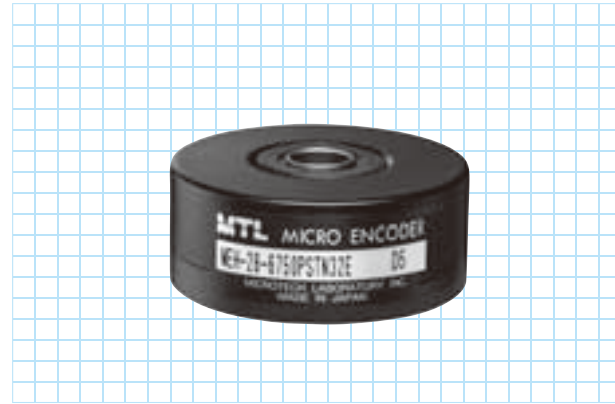
Spring flange MEH-19 (Option)



MEH-28 series

[Square Wave/Incremental]

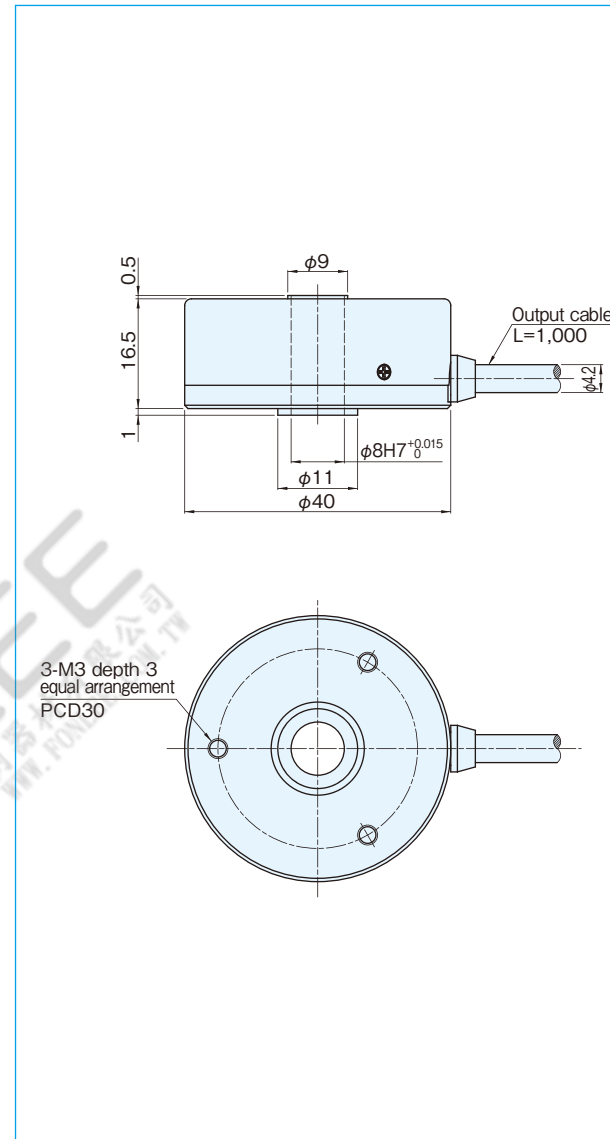
- Outside dimensions $\phi 40 \times 16.5\text{mm}$
- Through Shaft



Specifications

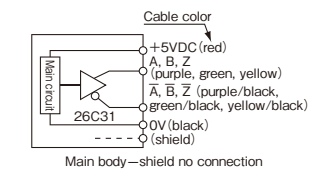
Type name	MEH-28-6750 PSTN□E
Item	
Detection system	Incremental
Output phase	A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase CS phase (U, \bar{U} , V, \bar{V} , W, \bar{W})
Output form	Square, Line driver output
Output pulse number (P/R)	6750, 13500 (6750×2), 27000 (6750×4) 33750 (6750×5), 54000 (6750×8), 67500 (6750×10) 108000 (6750×16), 135000 (6750×20), 216000 (6750×32)
Output	Phase difference between neighboring A/B phases: $T/4 \pm T/8$ Waveform ratio of 1T: $T \pm 0.3t$ Z phase width: $T \pm T/2$ (Synchronized with 1T of B phase)
Supply voltage	DC5V±5%
Current consumption	150mA or less
Maximum response frequency	50kHz×division ratio (2, 4, 5, 8, 10, 16, 20, 32)
Output capacity	Output current (Io): $\pm 20\text{mA}_{\text{max}}$ Output voltage Vol: 0.5V _{max} VoH: 2.5V _{min} .
Maximum allowable revolutions	6000r/min
Working ambient temperature/humidity	-10°C~+70°C/RH35%~90% no dewing
Storing ambient temperature	-20°C~+80°C
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 50G 3 times each in X, Y, and Z directions
Cable	Outside diameter $\phi 4.2$ 8cores shield cable (without CS phase: 14-cores) AWG30
Mass	80g (excluding cable)

Outside dimensions



Output circuit diagram

Line driver output (option)

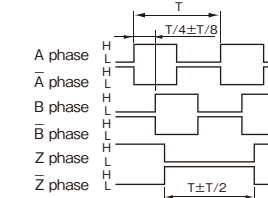


Note: If the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end.

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

Output waveform [×1]

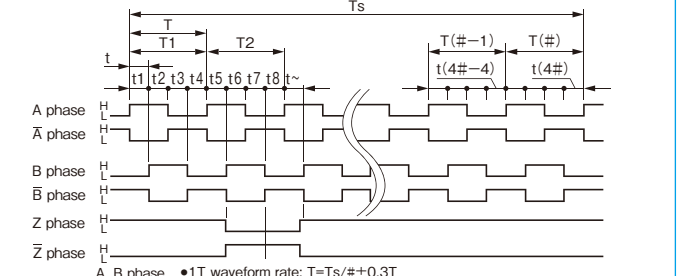
CW rotation (CW rotation as seen from fit surface)



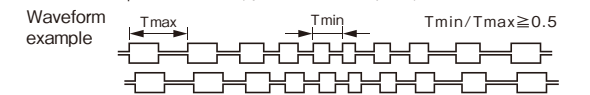
*The position of Z phase against A, B phase is not specified.

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

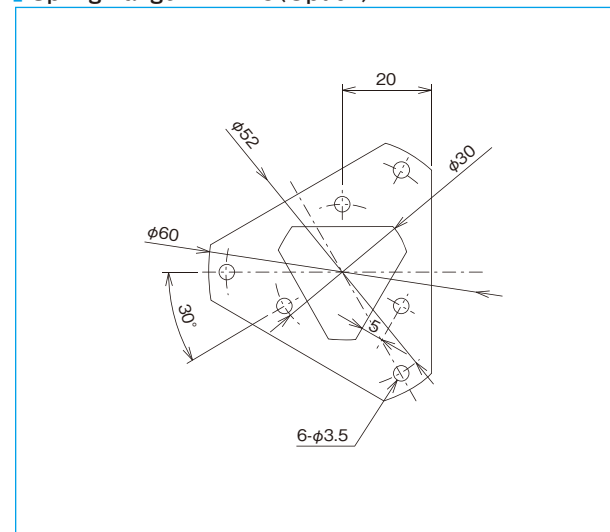
CW rotation (CW rotation as seen from fit surface)



- 1T waveform rate: $T = T_s / \# \pm 0.3T$
- Phase difference between neighboring A and B phases in # divisions: $T/4 \pm T/8$
- T/4 waveform ratio: t_1 to t_4 (4#) = $t \pm 0.3t$
- Z = 1.0T (synchronized with B phase)

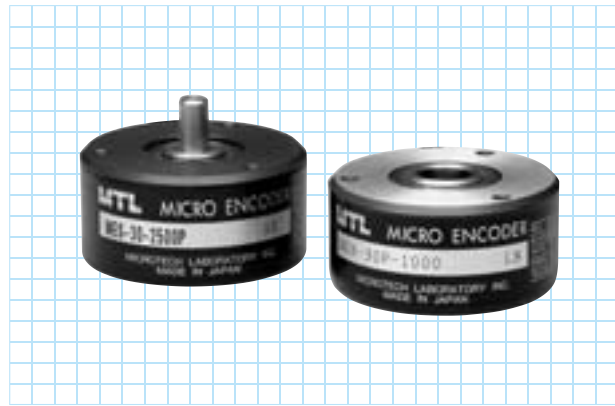


Spring flange MEH-28 (Option)



ME-30-P series

[Square Wave/Incremental]

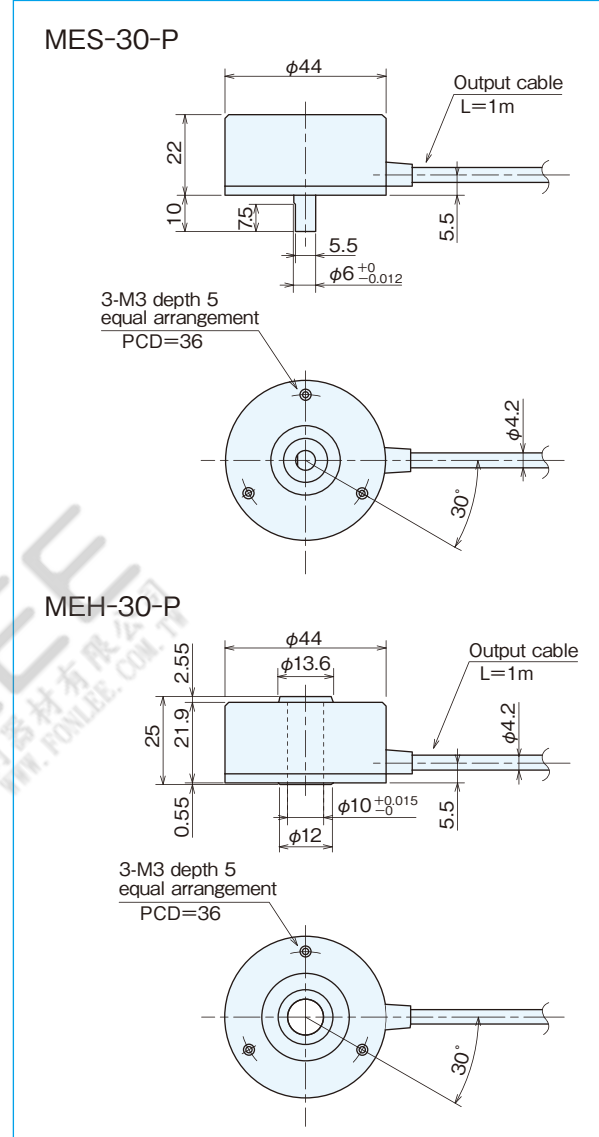


Specifications

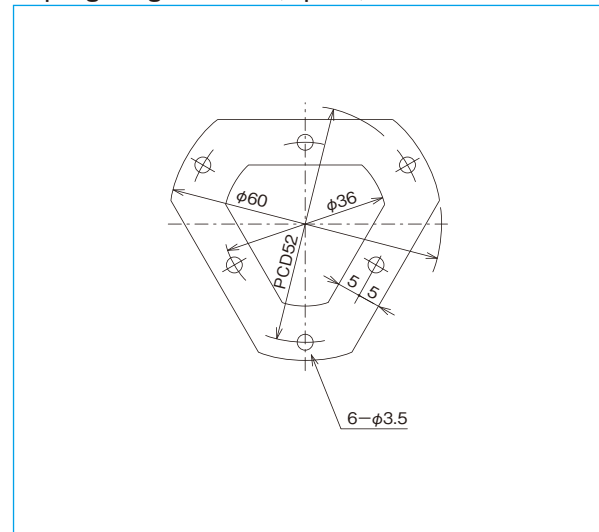
Type name		ME□-30-□P□	
Item		Shaft shape: S=single shaft, H=hollow shaft, D=double shaft Pulse number: No entry=voltage output, C=open collector output, C4=open collector output DC24V Output circuit: No entry=voltage output, C=open collector output, C4=open collector output DC24V E=line driver output, ST□(2-4-5-8-10-16-20)	
		Square wave	Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)
Supply voltage		Voltage/Open collector:DC5V-5%~12V+10% Open collector 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 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)
	Thrust	9.8N (1kgf)	4.9N (0.5kgf)
Maximum allowable revolutions (mechanical)		6,000r/min	6,000r/min
Working ambient temperature/humidity		-10°C~70°C RH35%~90% no dewing	-10°C~70°C RH35%~90% no dewing
Storing ambient temperature		-20°C~80°C	-20°C~80°C
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter φ4.2 5-core vinyl wire 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

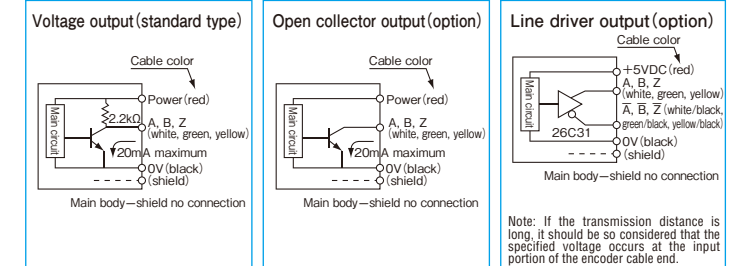
Outside dimensions



Spring flange MEH-30 (Option)

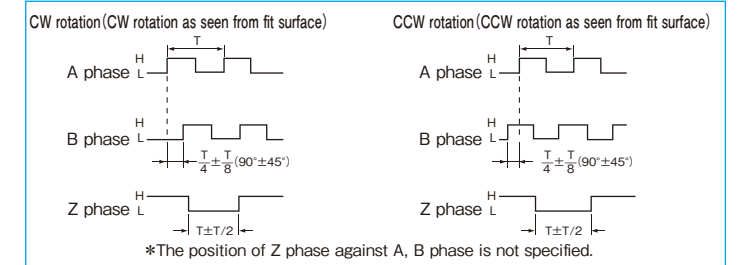


Output circuit diagram

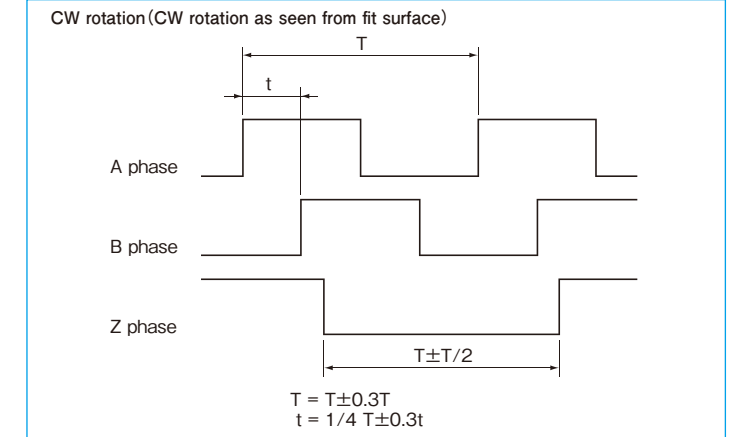


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Output waveform (Square wave)



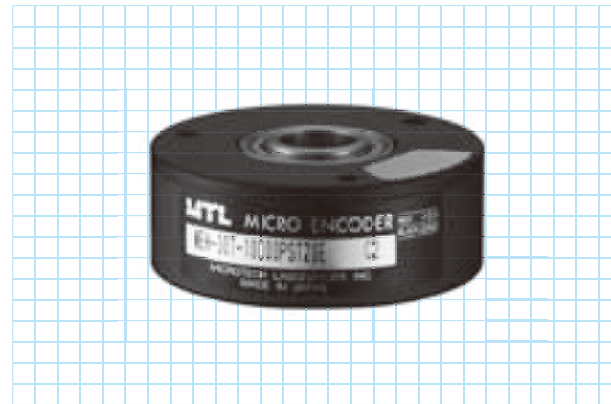
Output waveform / Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)



MEH-30T series

[Square Wave/Incremental]

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

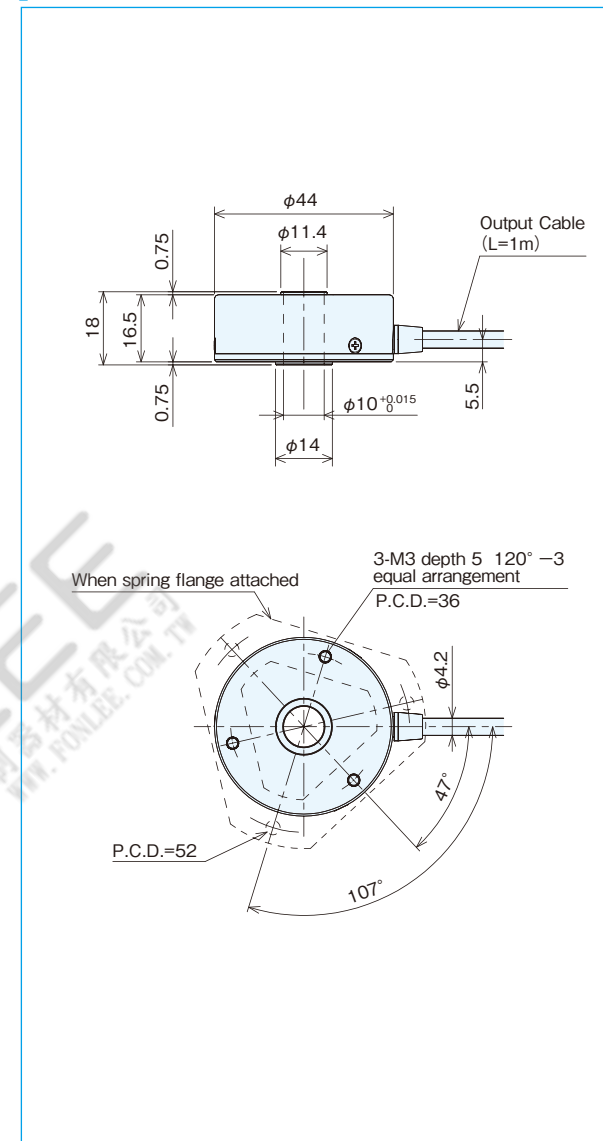


Specifications

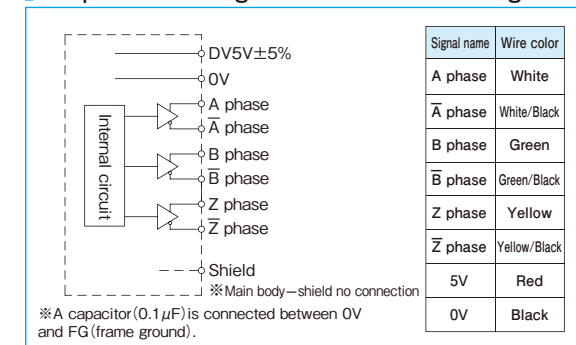
Type name	MEH-30T- 10000 PST 20 E
Item	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <small>Pulse number</small> 10000 </div> <div style="text-align: center;"> <small>By multiplication ($\times 2, 4, 5, 8, 10, 16, 20$)</small> 20 </div> </div>
Detection system	Incremental
Output phase	A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase
Output form	Square, Line driver output
Output pulse number (P/R)*	20000 (10000 $\times 2$), 40000 (10000 $\times 4$) 50000 (10000 $\times 5$), 80000 (10000 $\times 8$) 100000 (10000 $\times 10$), 160000 (10000 $\times 16$) 200000 (10000 $\times 20$)
Output	Phase difference between neighboring A/B phases: $T/4 \pm T/8$ Waveform ratio of 1T: $T \pm 0.3t$ Z phase width: $T \pm T/2$ (Synchronized with 1T of B phase)
Supply voltage	DC5V $\pm 5\%$
Current consumption	100mA or less
Maximum response frequency	50kHz \times division ratio (2, 4, 5, 8, 10, 16, 20)
Output capacity	Output current (I_o): $\pm 20\text{mA}_{\text{max}}$. Output voltage V_o : 0.5V_{max} . V_o : 2.5V_{min} .
Maximum allowable revolutions	6000r/min
Working ambient temperature/humidity	$-10^\circ\text{C} \sim +70^\circ\text{C}$ RH35% \sim 90% no dewing
Storing ambient temperature	$-20 \sim +80^\circ\text{C}$
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable	Outside diameter $\phi 4.2$ 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.

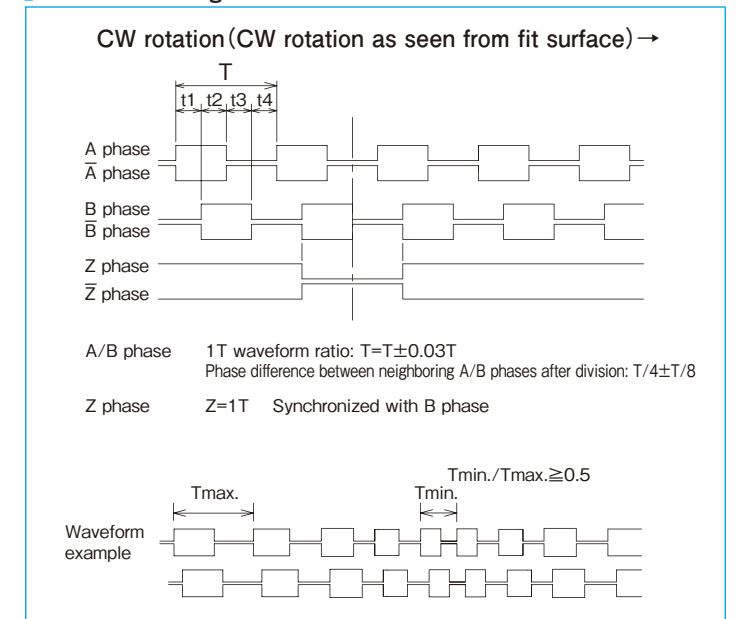
Outside dimensions



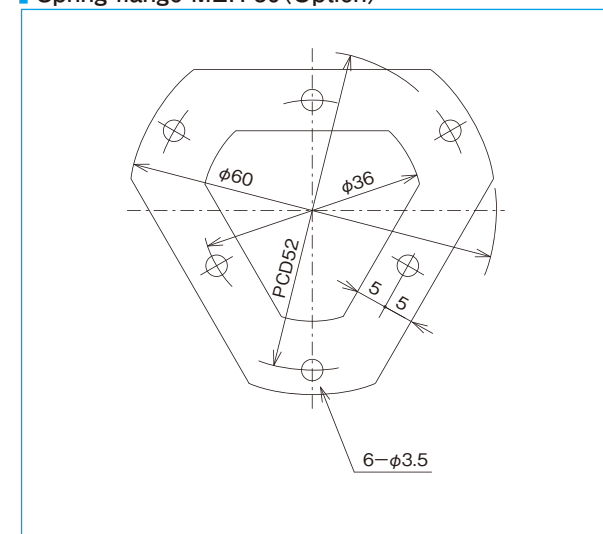
Output circuit diagram and connection diagram



Connection diagram

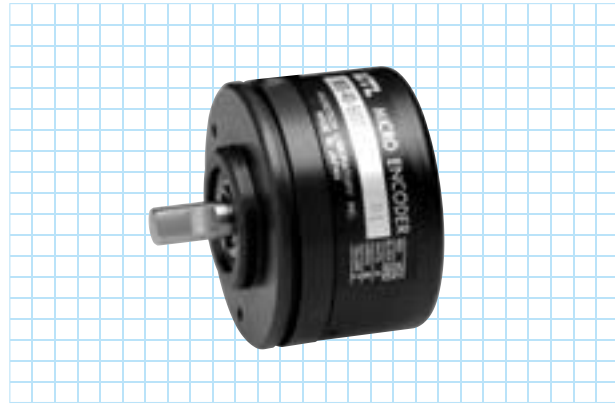


Spring flange MEH-30 (Option)



MES-40-P series

[Square Wave/Incremental]

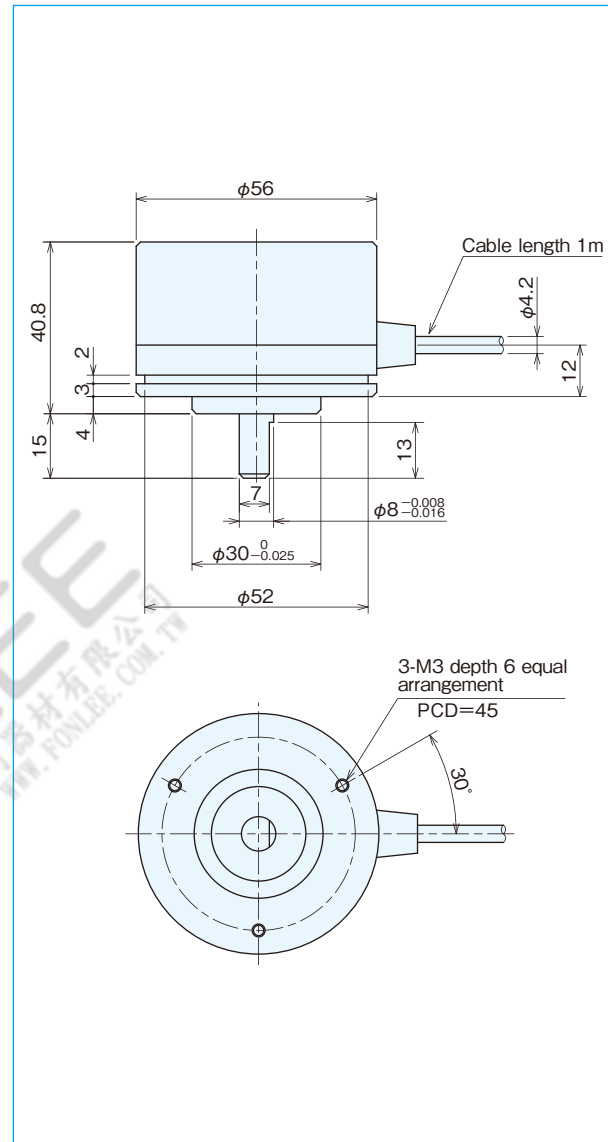


Specifications

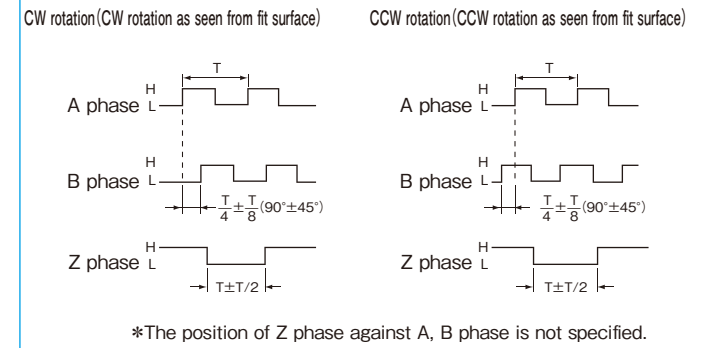
Item	Type name			
	MES-40-□P□	Pulse number Output circuit ●No entry=voltage output ●C=open collector output ●C4=open collector output DC24V ●E=line driver output ●ST□(2·4·5·8·10·16·20)		
	Square wave	Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)		
Supply voltage	Voltage/Open collector:DC5V-5%~12V+10%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

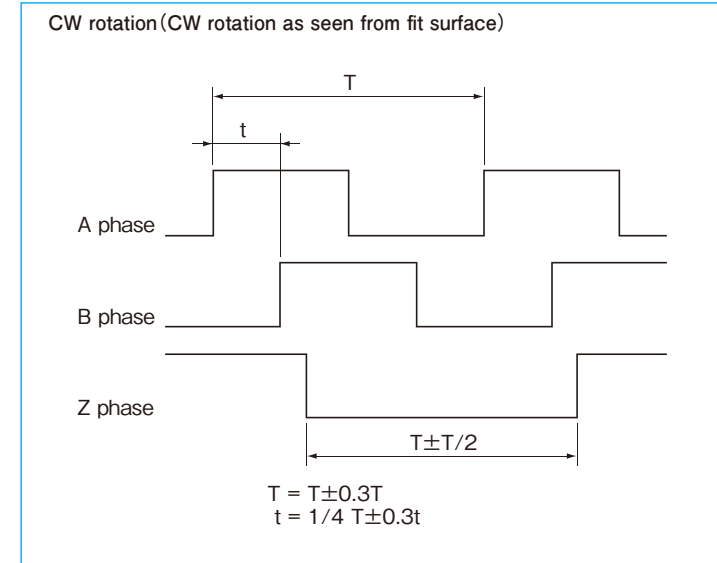
Outside dimensions



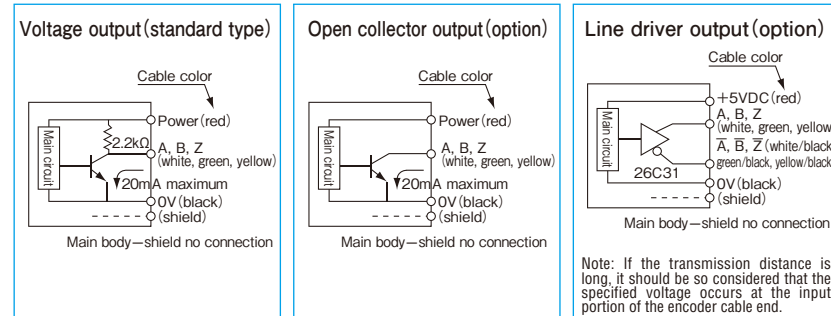
Output waveform (Square wave)



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



Output circuit diagram

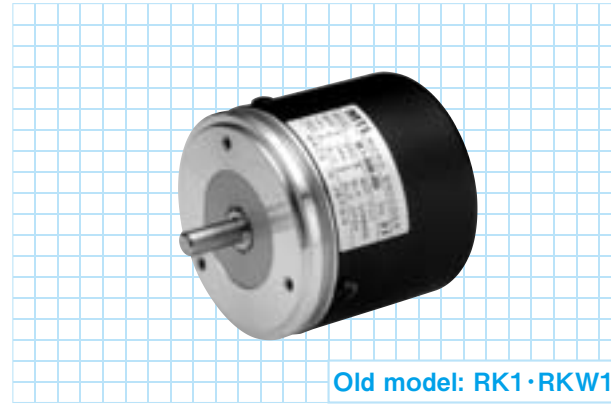


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

MES-45 series

[Square Wave/Incremental]

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

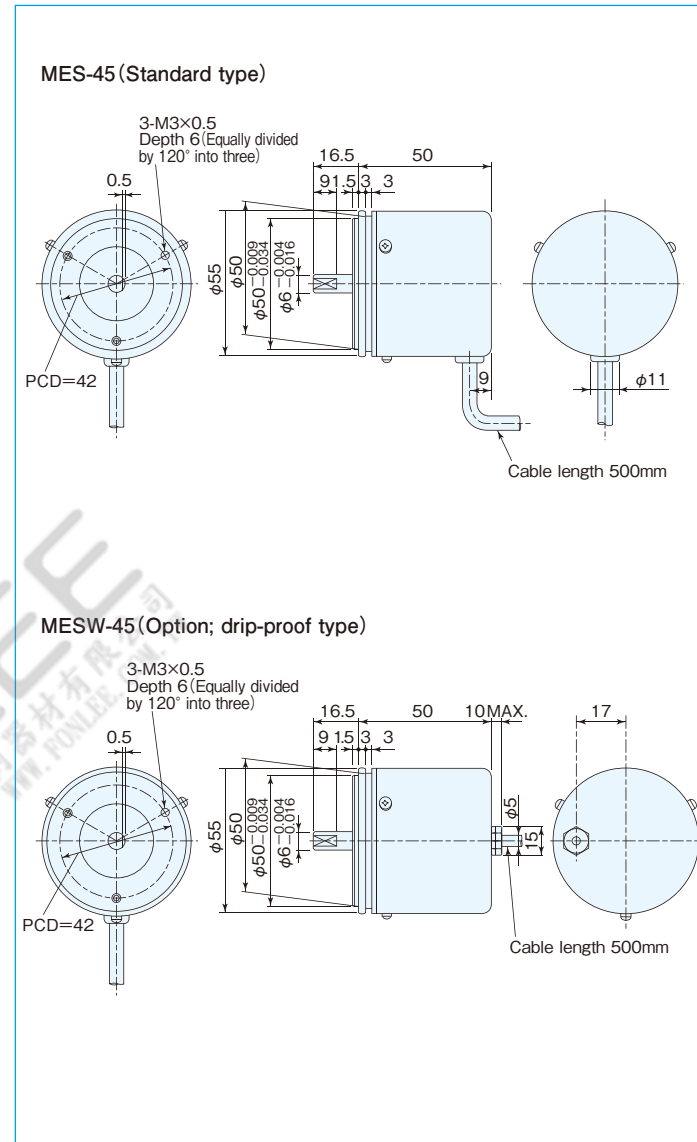


Old model: RK1·RKW1

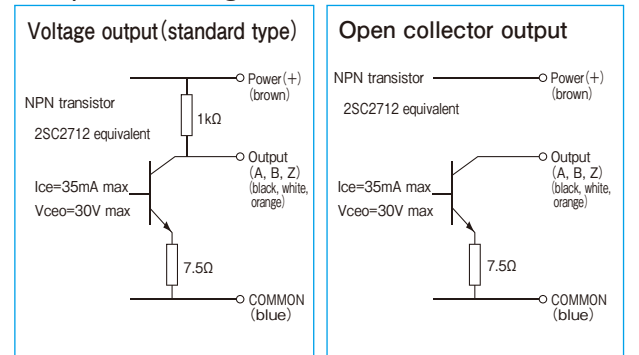
Specifications

Type name	MES-45-1000-05C		
Item	<ul style="list-style-type: none"> No entry=standard type W=drip-proof type 	<ul style="list-style-type: none"> Resolution 05=5V 12=12V 24=24V 	<ul style="list-style-type: none"> 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)	
	Thrust	29.4N (3kgf)	
Maximum allowable revolutions (mechanical)	6,000r/min		
Working ambient temperature/humidity	-10°C~70°C/ RH95% max no dewing		
Storing ambient temperature	-30°C~80°C		
Vibration resistance	Durability 0-500Hz, double amplitude 1.52mm 2 hours each in X, Y, and Z directions		
Impact resistance	Durability 490m/s ² (about 50G) 3 times each in X, Y, and Z directions		
Cable	Outside diameter φ5 5-core vinyl wire AWG28 Insulated shield cable (length 500mm)		
Mass	280g		

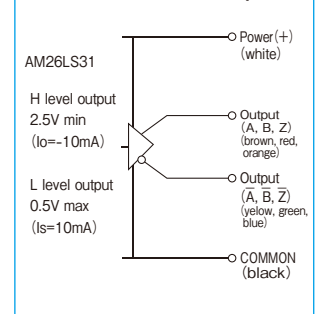
Outside dimensions



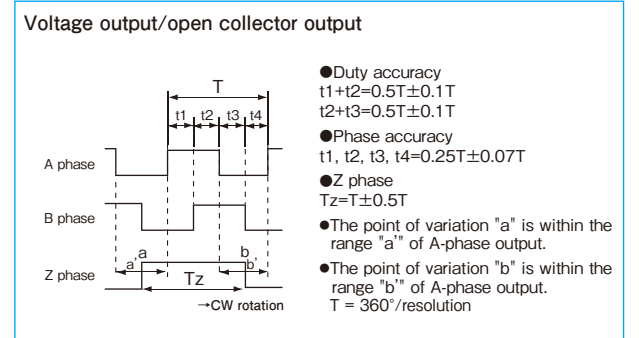
Output circuit diagram



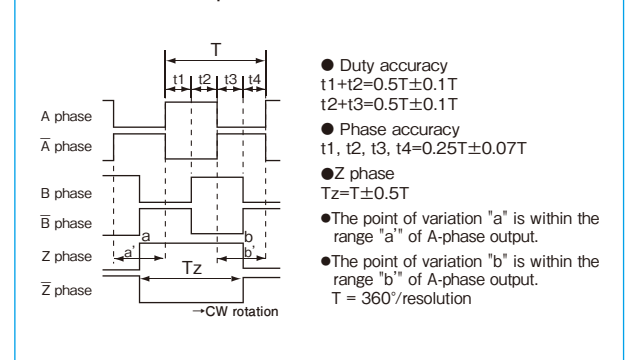
Differential driver output



Output waveform



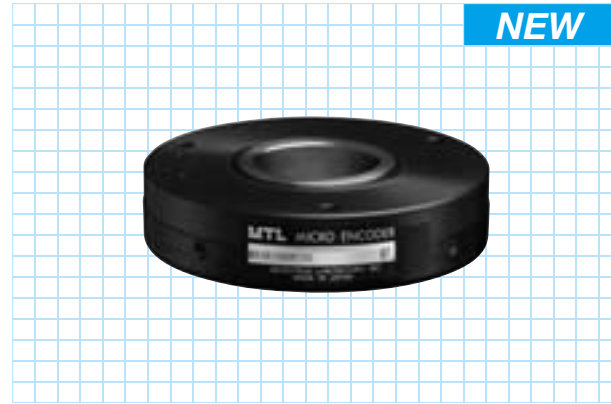
Differential driver output



MEH-59 series

[Square Wave/Incremental]

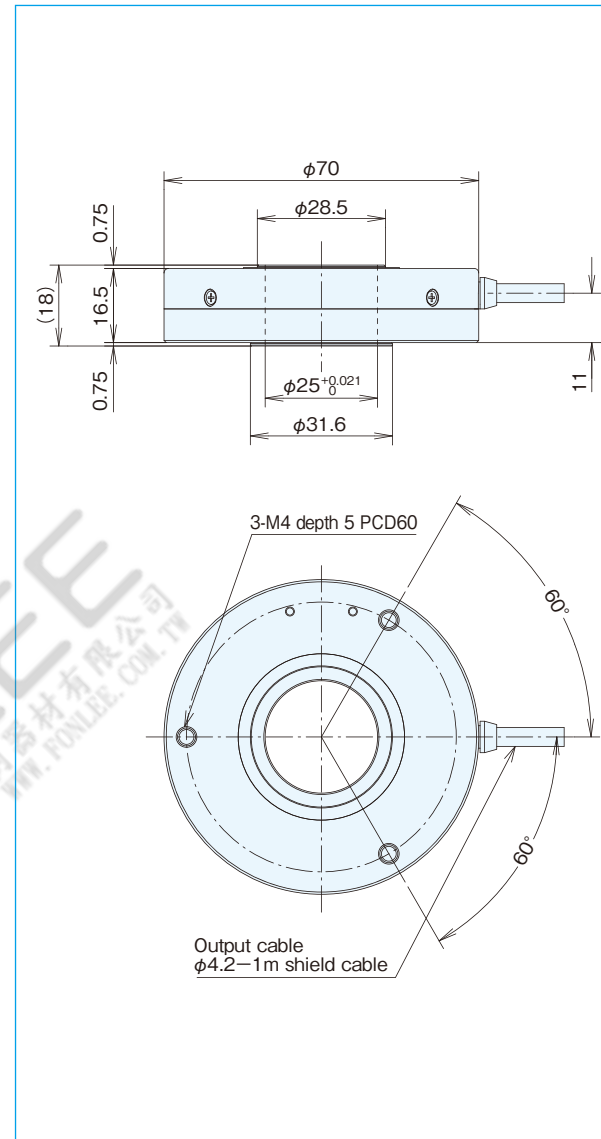
- Outside dimensions $\phi 70 \times 16.5\text{mm}$ Incremental encoder
- Resolution 648000 (12960 \times 50)、中空軸 $\phi 25$



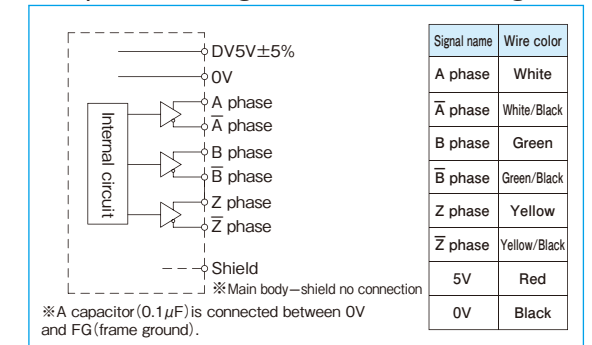
Specifications

Type name	MEH-59-12960PSTG50E	
Item		
Detection system	Incremental	
Output phase	A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase CS phase (U, \bar{U} , V, \bar{V} , W, \bar{W})	
Output form	Square, Line driver output	
Resolution	648000 (12960 \times 50)	
Supply voltage	DC5V \pm 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 $^{\circ}$ C \sim +70 $^{\circ}$ C / RH35% \sim 90% (no dewing)	
Storing ambient temperature	-20 $^{\circ}$ C \sim +80 $^{\circ}$ C	
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance	Durability 50G 3 times each in X, Y, and Z directions	
Cable	Outside diameter $\phi 4.2$ 8-cores shield cable AWG30 (length 1m) *without CS phase: 14-cores	
Mass	200g	

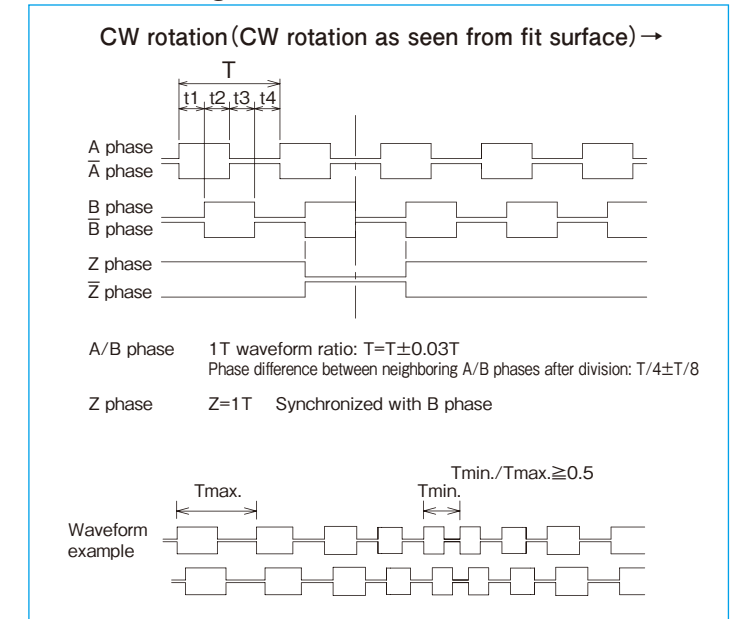
Outside dimensions



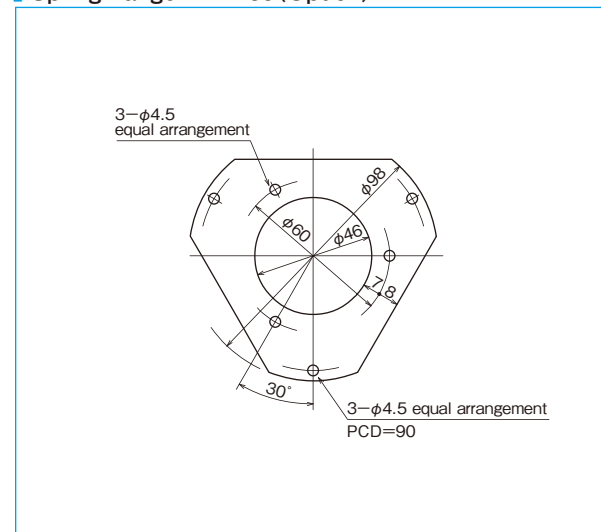
Output circuit diagram and connection diagram



Connection diagram

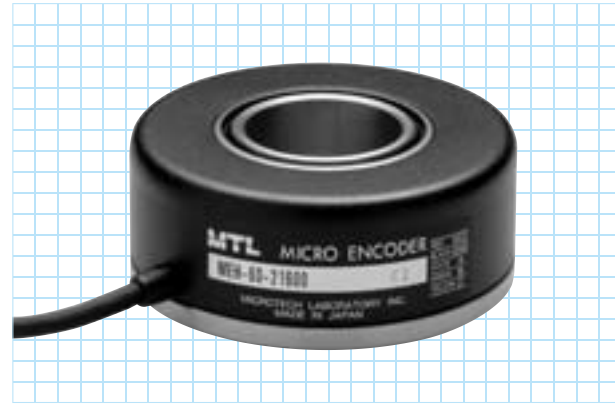


Spring flange MEH-60 (Option)



MEH-60-P series

[Square Wave/Incremental]

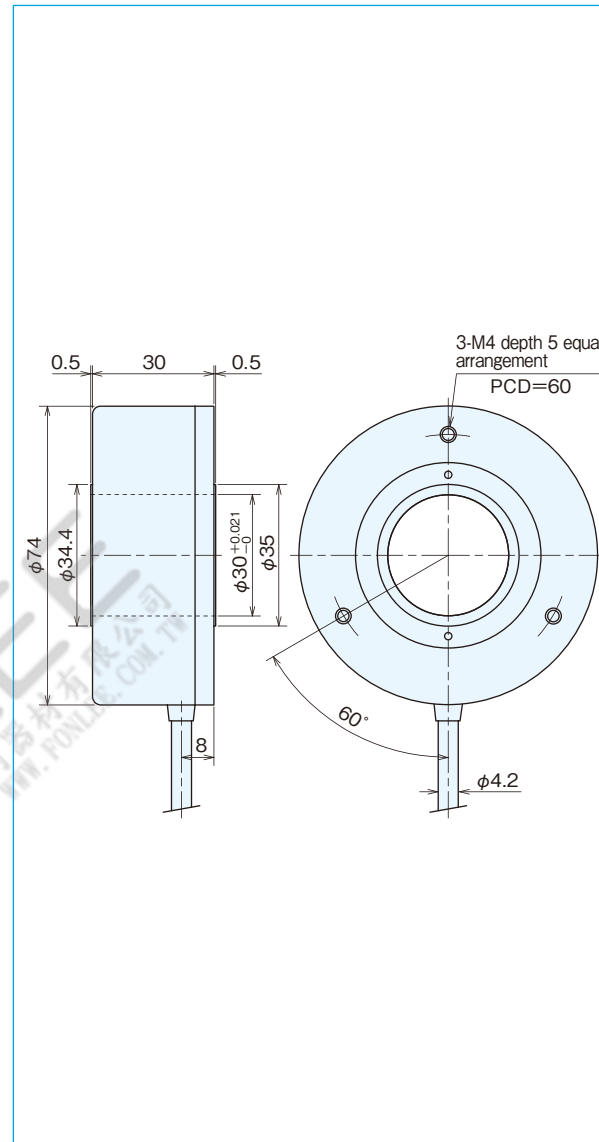


Specifications

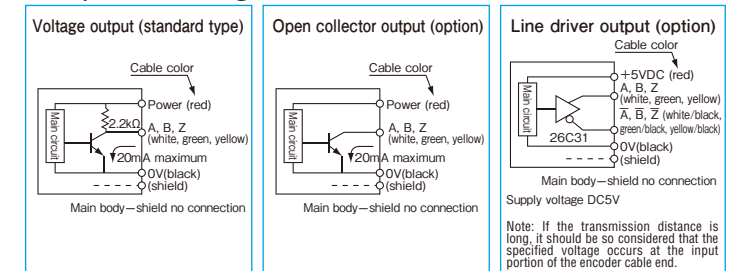
Item	Type name	MEH-60- <input type="checkbox"/> P <input type="checkbox"/>
		Pulse number: <input type="checkbox"/> Output circuit: ●No entry=voltage output ●C=open collector output ●C4=open collector output DC24V ●E=line driver output ●ST <input type="checkbox"/> (2·4·5·8·10·16·20)
		Square wave Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20) Voltage/Open collector: DC5V-5%~12V+10% Open collector: DC24V:DC24V±10% (*1) Open collector output: 20,250, 21,600±DC5V-5%~DC12V+10% Line driver: DC5V±5% Voltage: DC5V-5%~12V+10% Open collector: DC5V-5%~24V+10% (10,800 pulse or less) (*1) Open collector output: 20,250, 21,600±DC5V-5%~DC12V+10% Line driver: DC5V±5%
Supply voltage		60mA or less *120mA or less (under no load) 100mA or less (under no load)
Current consumption		Incremental Incremental
Detection system		Incremental
Output pulse number (Standard) [Pulse number/rotation]		100 600 1,024 8,100(*1) 180 1,000 1,800 9,000(*1) 200 2,000 2,000 10,000(*1) 360 3,600 3,600 10,800(*1) 400 4,000 4,000 20,250(*1, 2) 500 5,000 5,000 21,600(*1, 2) 5,400(*1)
		EX 21,600x2 (43,200) 21,600x4 (86,400) 21,600x5 (108,000) 21,600x8 (172,800) 21,600x10 (216,000) 21,600x16 (345,600) 21,600x20 (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°C~80°C -20°C~80°C
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter φ4.2 5-core vinyl wire 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

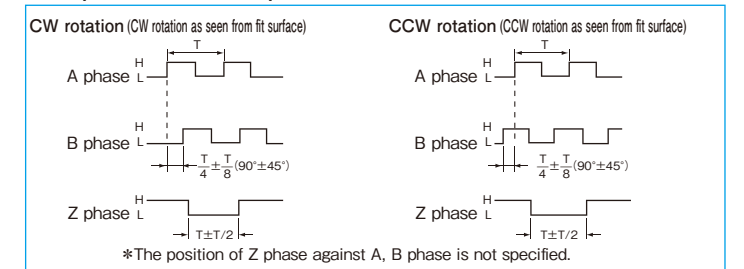


Output circuit diagram

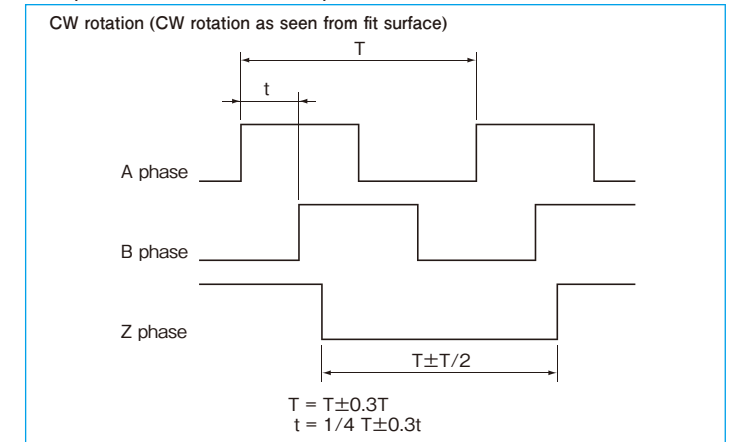


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

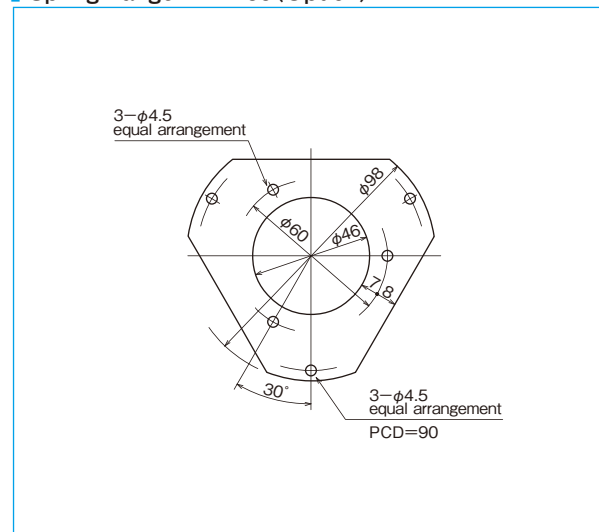
Output waveform (Square wave)



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



Spring flange MEH-60 (Option)



MEH-85-P series

[Square Wave/Incremental]

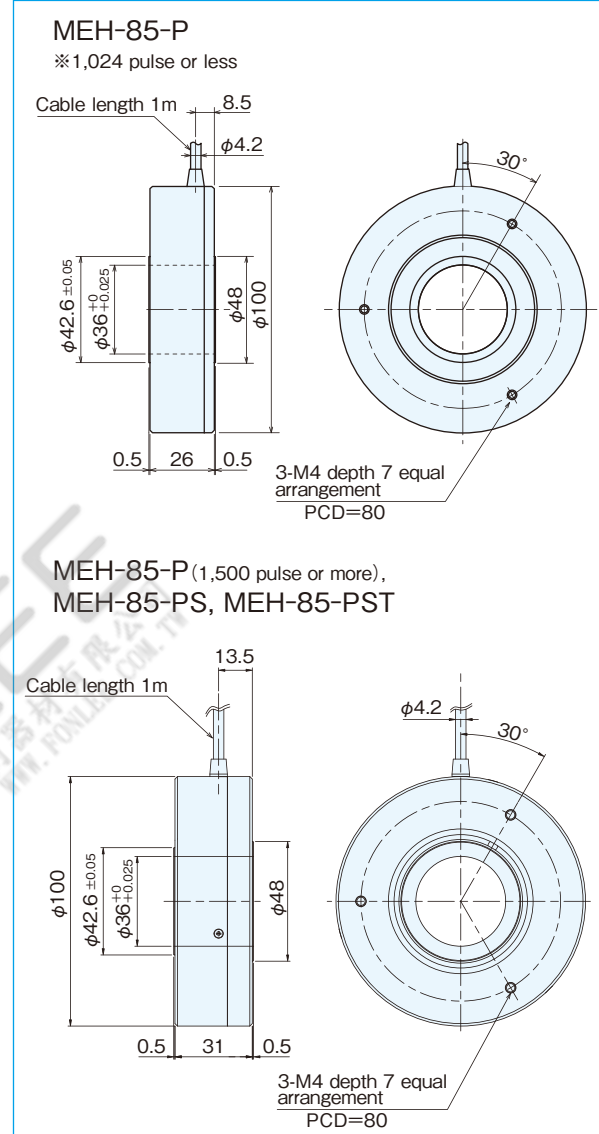


Specifications

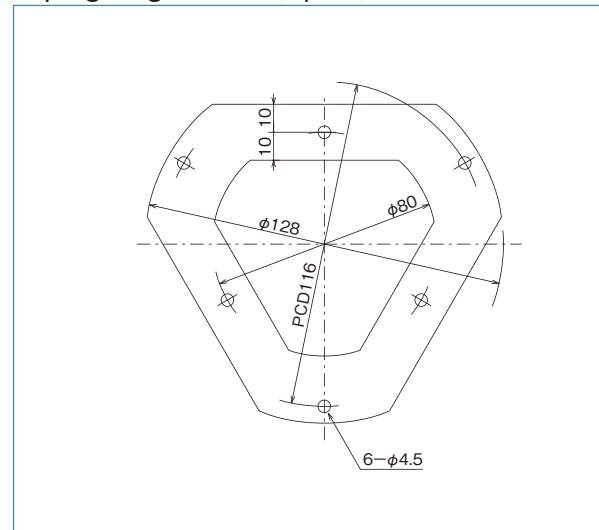
Item	Type name	MEH-85- <input type="checkbox"/> P <input type="checkbox"/>	
		Pulse number: <input type="checkbox"/> Output circuit: ●No entry=voltage output ●C=open collector output ●C4=open collector output DC24V ●E=line driver output ●ST <input type="checkbox"/> (2·4·5·8·10·16·20)	
		Square wave Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)	
Supply voltage	Voltage / Open collector: DC5V-5%~12V+10% Open collector DC24V: DC24V±10% Line driver: DC5V±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 pulse number (Standard) [Pulse number/rotation]	150	1,500	20,250 (*)
	200	3,600	21,600 (*)
Output phase	500	4,500	
	1,000	5,400	
	1,024	5,625	
		7,200 (*)	
		8,192 (*)	
		10,800 (*)	
		11,250 (*)	
		18,000 (*)	
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	9.8N (1kgf)	9.8N (1kgf)
	Thrust	4.9N (0.5kgf)	4.9N (0.5kgf)
Maximum allowable revolutions (mechanical)	1,000r/min		
Working ambient temperature/humidity	0°C~60°C RH35%~90% no dewing		
Storing ambient temperature	-20°C~80°C		
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions		
Cable	Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)		
Mass	520g	620g	1,050g

*Handled by built-in multiplier circuit

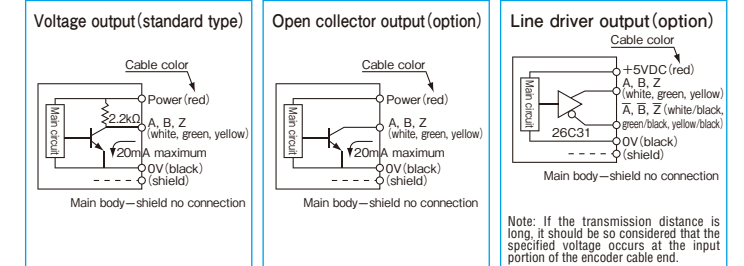
Outside dimensions



Spring flange MEH-85 (Option)

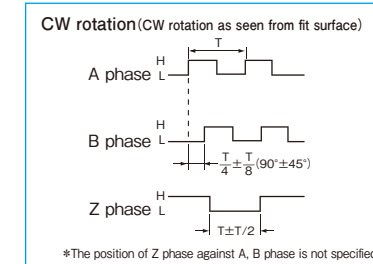


Output circuit diagram

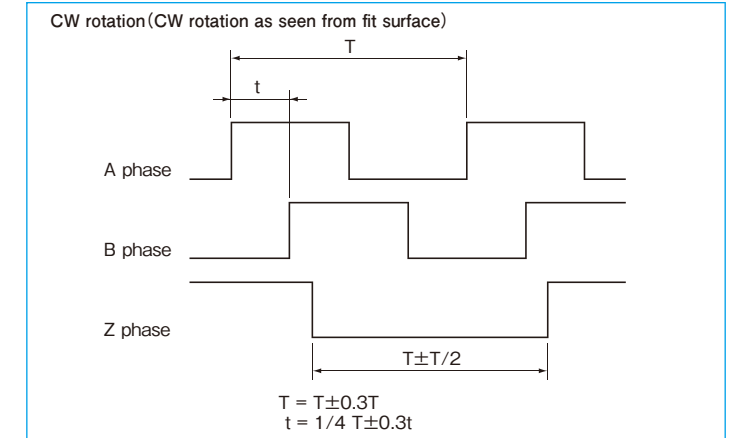


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

Output waveform (Square wave)

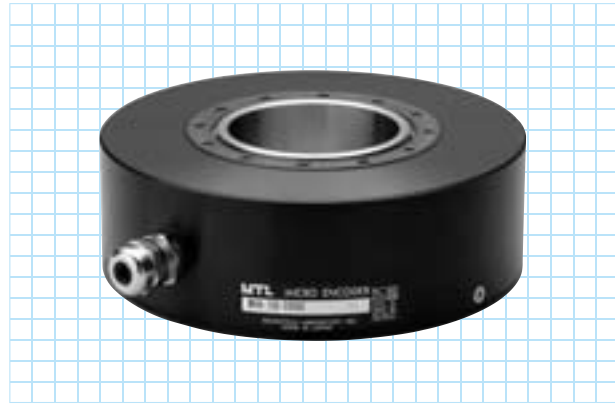


Output waveform / Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)



MEH-130-P series

[Square Wave/Incremental]

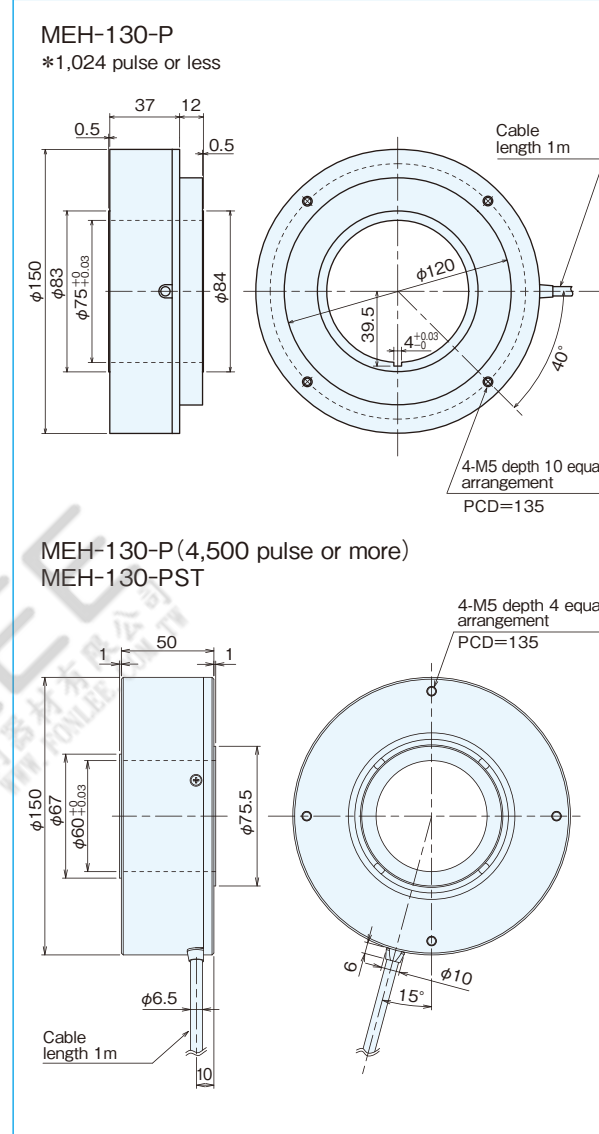


Specifications

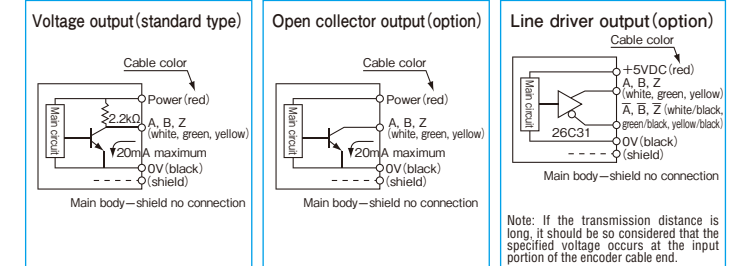
Item	Type name	MEH-130- <input type="checkbox"/> P <input type="checkbox"/>	
		Pulse number: <input type="checkbox"/> No entry=voltage output <input type="checkbox"/> C=open collector output Output circuit: <input type="checkbox"/> E=line driver output <input type="checkbox"/> ST(2-4-5-8-10-16-20)	
		Square wave Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)	
Supply voltage	Voltage / Open collector: DC5V-5%~12V+10% Open collector DC24V: DC24V±10% Line driver: DC5V±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 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 (*)	
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°C~80°C	-20°C~80°C	
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable	Outside diameter φ4.2 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

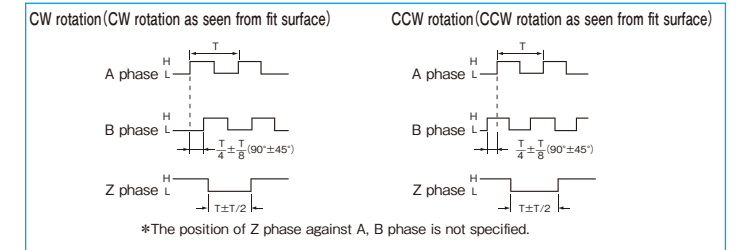


Output circuit diagram

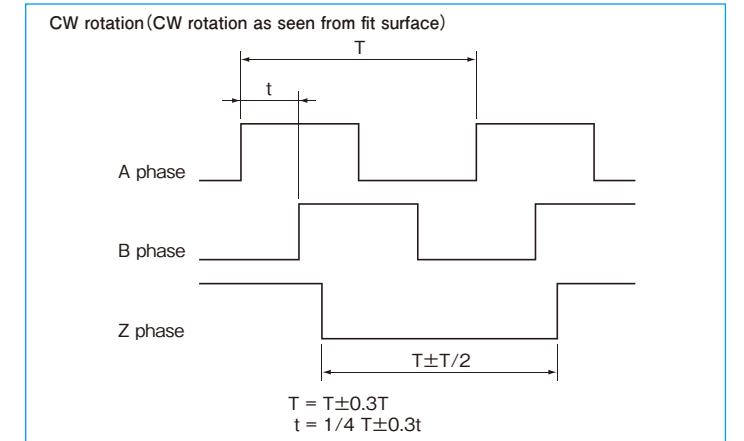


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

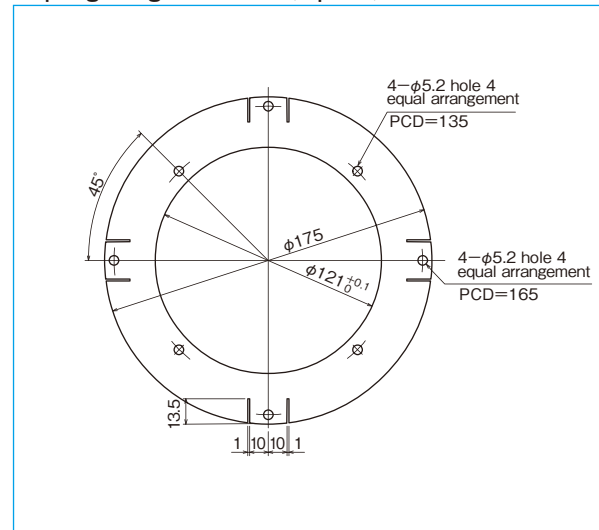
Output waveform (Square wave)



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

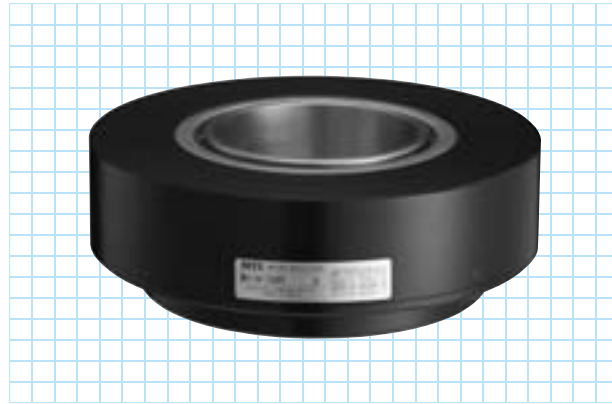


Spring flange MEH-130 (Option)



MEH-180-P series

[Square Wave/Incremental]

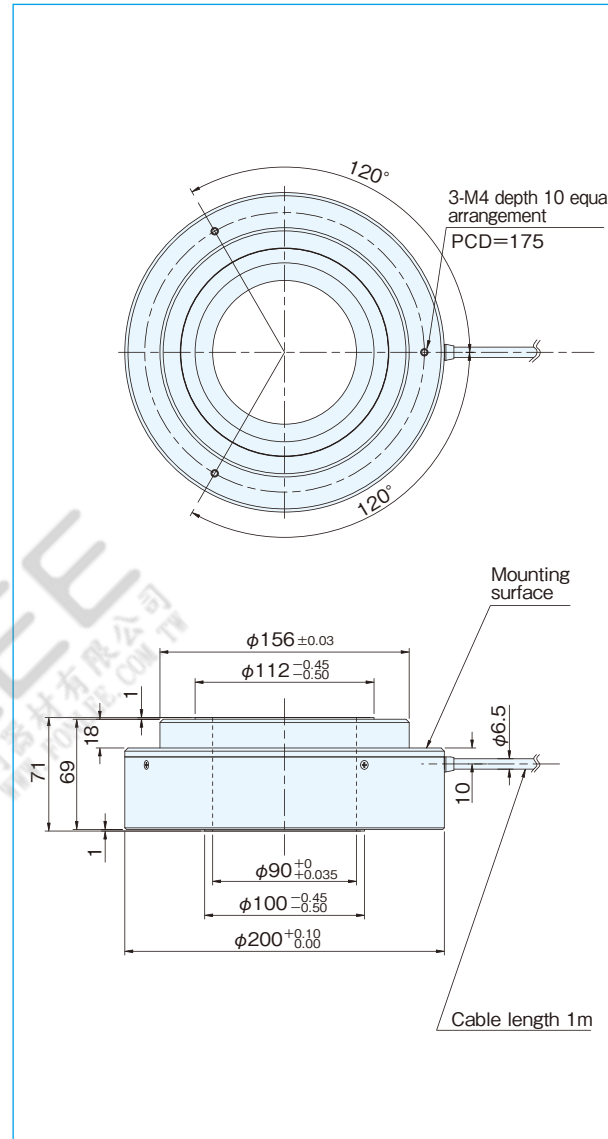


Specifications

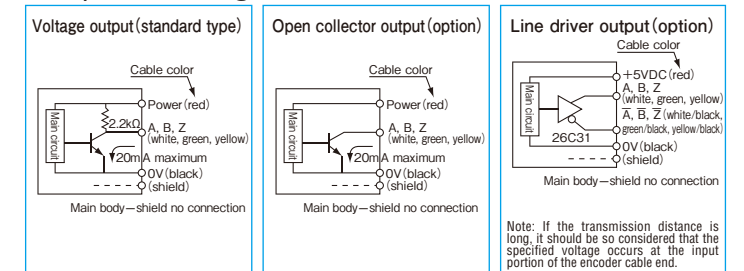
Type name		MEH-180- <input type="checkbox"/> P <input type="checkbox"/>		
Item		Pulse number: <input type="checkbox"/> Output circuit: ●No entry=voltage output ●C=open collector output ●E=line driver output ●ST <input type="checkbox"/> (2·4·5·8·10·16·20)		
		Square wave	Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)	
Supply voltage		Voltage/Open collector:DC5V-5%~12V+10% Open collector DC24V:DC24V±10% Line driver:DC5V±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 (1,152,000) 72,000×20 (1,440,000)	
	Output phase	A, B, Z phase	A, B, Z phase	
	Output form	Square wave	Square wave	
	Output capacity	Sink current:20mA Residual voltage:0.5V or less (at 10mA)	-	
	Maximum response frequency (response pulse number)	Voltage·Open collector output:100kHz Line driver output:300kHz	Line driver output:100kHz×(by multiplication) Voltage·Open collector output:100kHz	
	Output phase difference	A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)	Refer to the figure on the right	
	Waveform rise/fall time	Voltage·Open collector output:2μs or less Line driver output:0.5μs or less (When used with output cable of 1m or less)	Voltage·Open collector output:2μs or less Line driver output:0.5μs or less (When used with output cable of 1m or less)	
	Allowable load of shaft (electrical)	Radial	29.4N (3kgf)	29.4N (3kgf)
		Thrust	19.6N (2kgf)	19.6N (2kgf)
	Maximum allowable revolutions (mechanical)		300r/min	300r/min
Working ambient temperature/humidity		0°C~50°C RH35%~90% no dewing	0°C~50°C RH35%~90% no dewing	
Storing ambient temperature		-20°C~80°C	-20°C~80°C	
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable		Outside diameter φ6.5 14-core 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

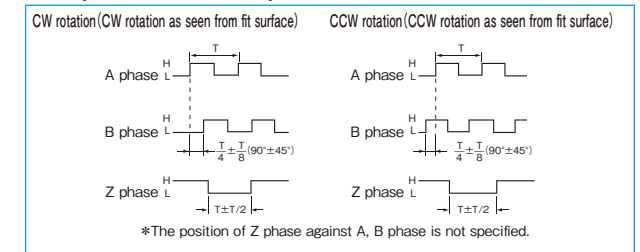


Output circuit diagram

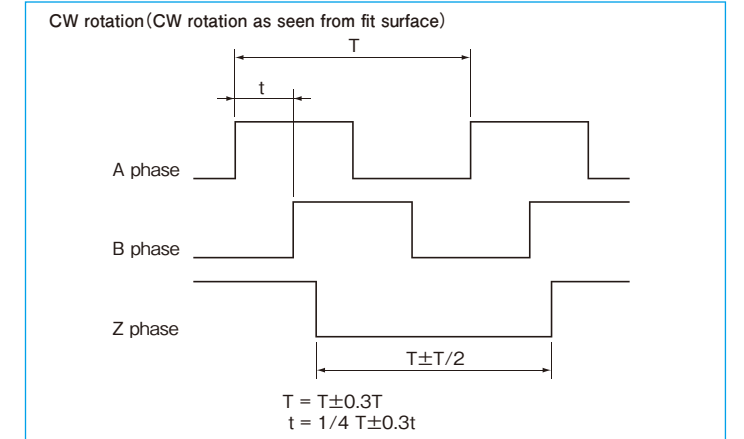


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

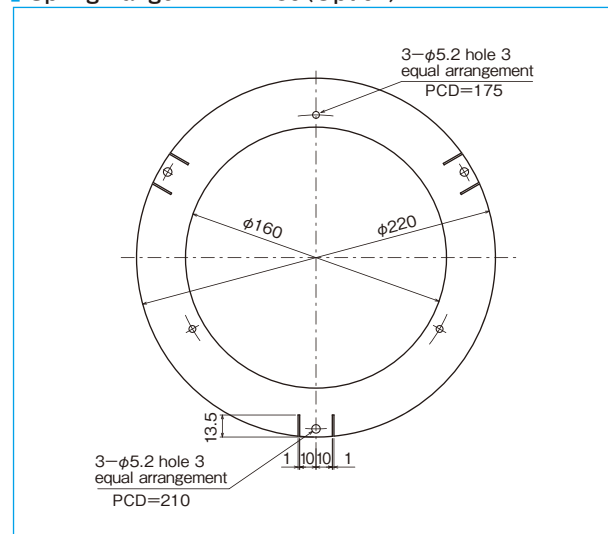
Output waveform (Square wave)



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



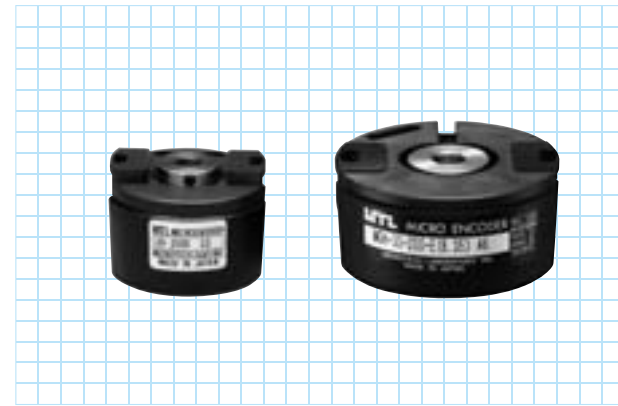
Spring flange MEH-180 (Option)



MGH series

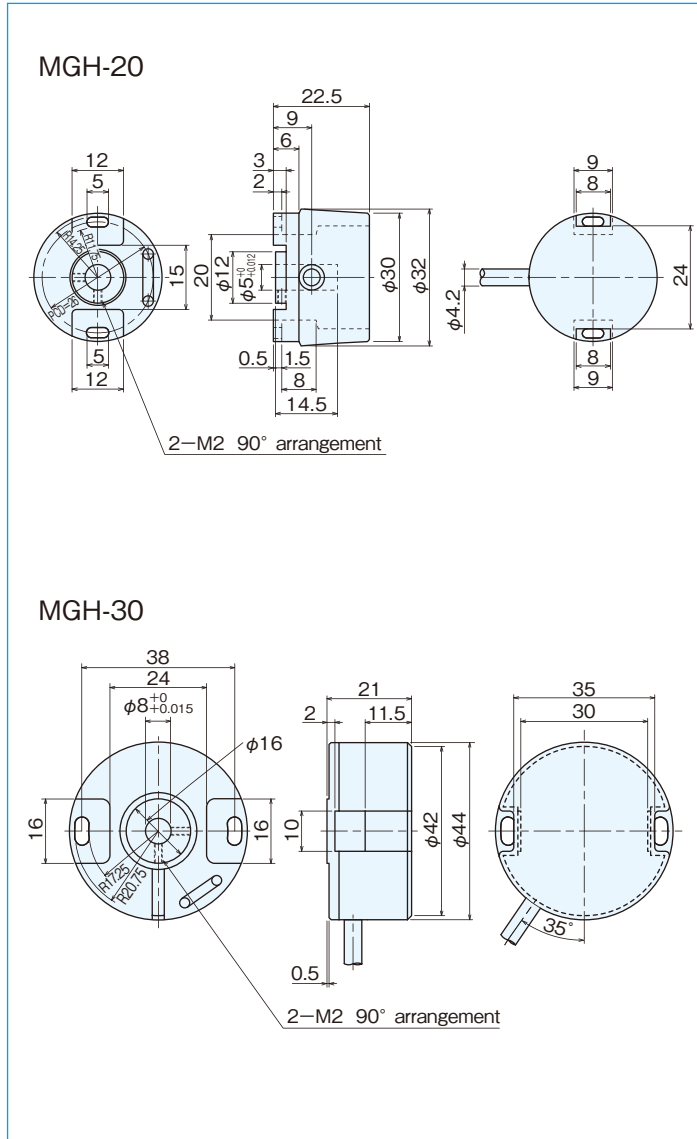
[Square Wave/Incremental]

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



MGH-20, MGH-30

Outside dimensions



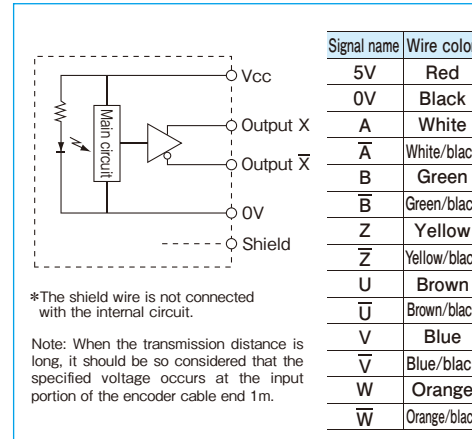
Specifications

Item	MGH-20-□-E□			MGH-30-□-E□		
	Pulse number	CS signal	CS entry	Pulse number	CS signal	CS entry
Supply voltage	DC5V±10%					
Current consumption	60mA or less (under no load)					
Detection system	Incremental					
Output pulse number (Standard) (Pulse number/rotation)	40	300	1,000	40	400	1,000
	50	360	1,024	50	450	1,024
	60	400	1,200	60	500	1,200
	100	500		100	512	1,500
	125	512		200	600	1,800
	200	600		250	720	2,000
250	800		300	800		
360	900		360	900		
Output phase	A, \bar{A} , B, \bar{B} , Z, \bar{Z} phase*with CS signal U, \bar{U} , V, \bar{V} , W, \bar{W} phase					
Output form	Square wave Line driver output					
Output capacity	$V_{OL}=0.5V_{max}$ $V_{OH}=2.5V_{min}$ $I_o=\pm 20mA$					
Maximum response frequency (response pulse number)	100kHz					
Output phase difference	A, B phase difference $90^\circ \pm 45^\circ (T/4 \pm T/8)$ Z phase $T \pm T/2$ With CS signal (U, V, W) 4 poles, 60° phase difference 3 signals					
Waveform rise/fall time	1 μs or less (with 0.5m cable)					
Maximum allowable revolutions (mechanical)	6,000r/min					
Working ambient temperature/ humidity	$-10^\circ C \sim 70^\circ C$ RH35%~90% no dewing					
Storing ambient temperature	$-20^\circ C \sim 80^\circ C$					
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions					
Impact resistance	Durability $500m/s^2$ (about 50G) 3 times each in X, Y, and Z directions					
Cable	Outside diameter $\phi 4.2$ ($\phi 6.8$) 8-core (19-core) vinyl wire AWG 28 Insulated shield cable length 1m (length 0.5m)					
Mass	60g			150g		

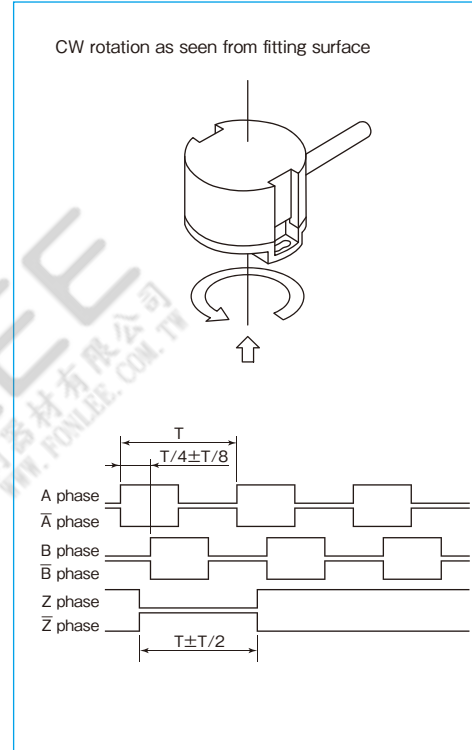
Allowable change amount of fitting shaft

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

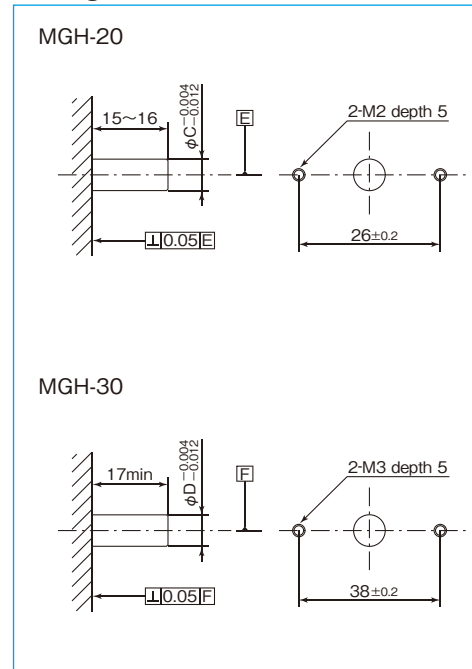
Output circuit diagram



Output waveforms



Fitting shaft dimensions



Assembling image of MGH series

MGH-20, 30

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

Hexagon socket head bolt M2x5 (included)

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

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

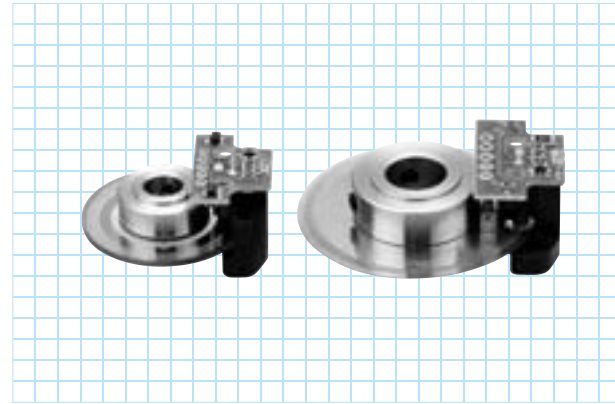
2. ② Turn the shaft 90° right or left and fix the other screw.

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

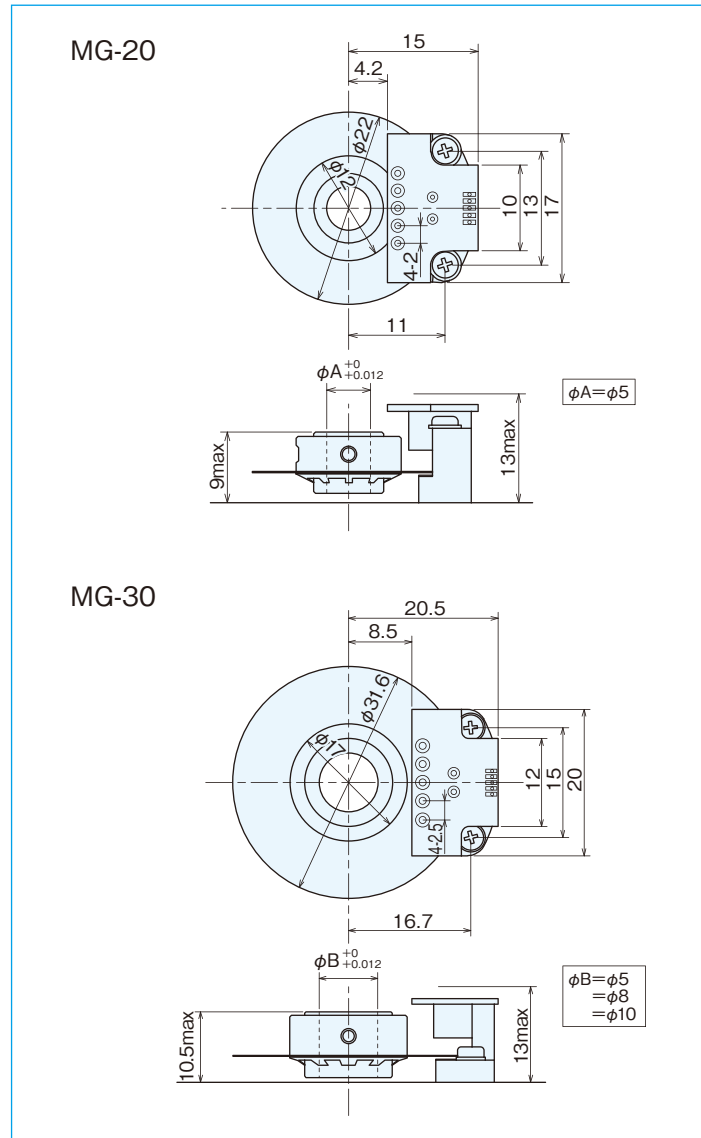
3. Affix encoder to base of rotating axle.
Note: Recommended tightening torque: 0.18 N·m

MG series

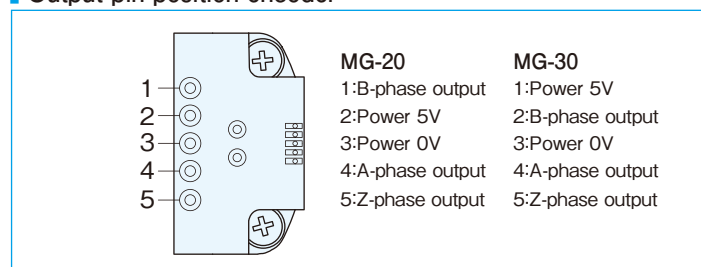
[Module Kit]



Outside dimensions



Output pin position encoder



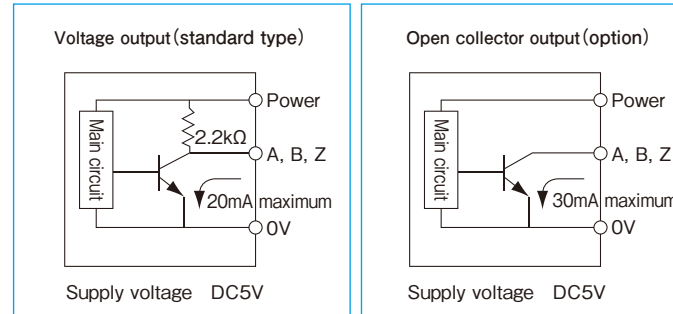
Specifications

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

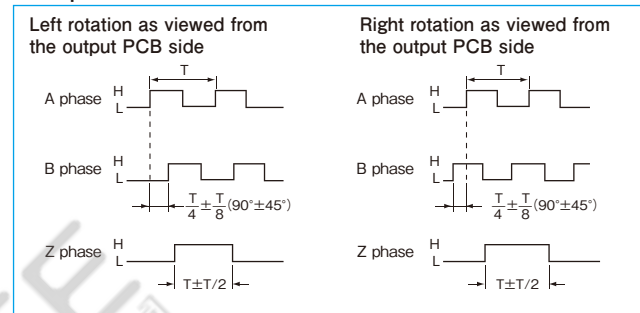
Allowable change amount of fitting shaft

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

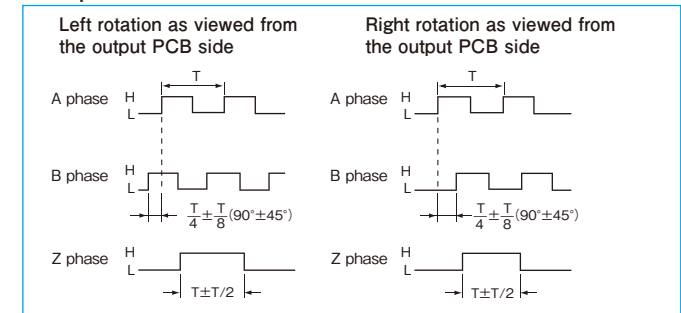
Output circuit diagram



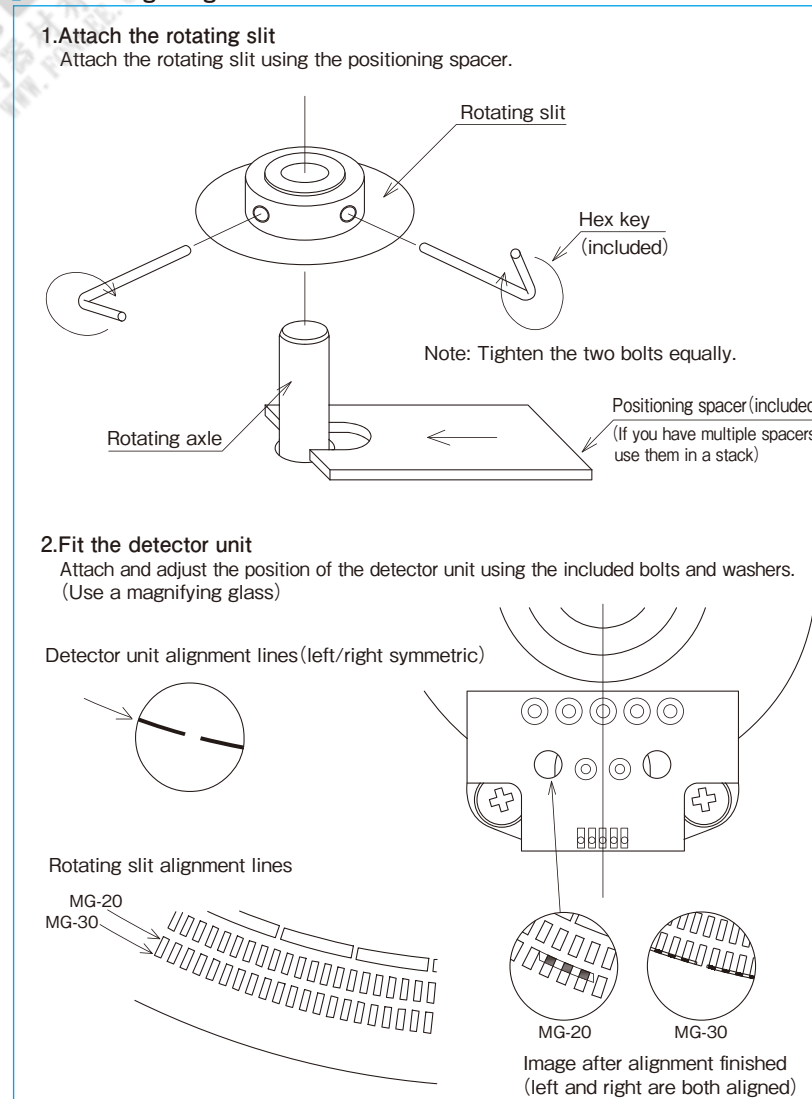
Output waveforms MG-20



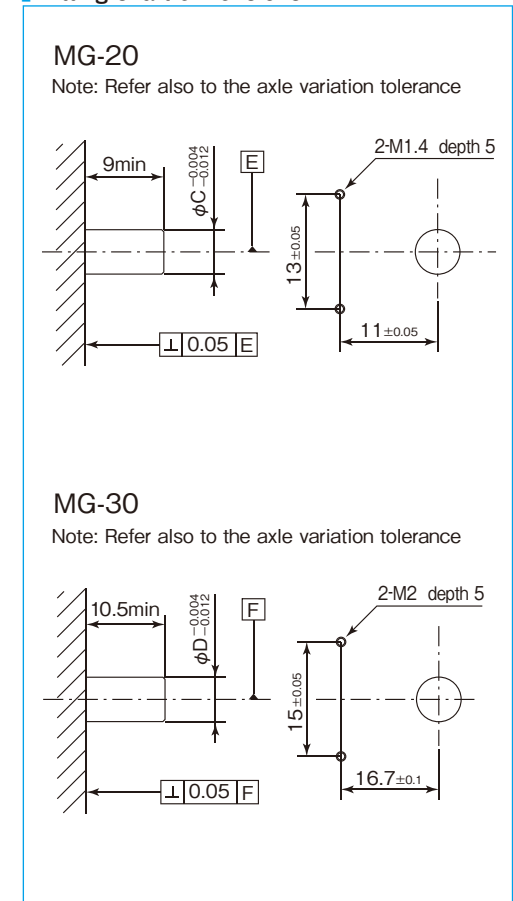
Output waveforms MG-30



Assembling image of MG series



Fitting shaft dimensions



Absolute

Choose from outer diameter $\Phi 6 - \Phi 100\text{mm}$, 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



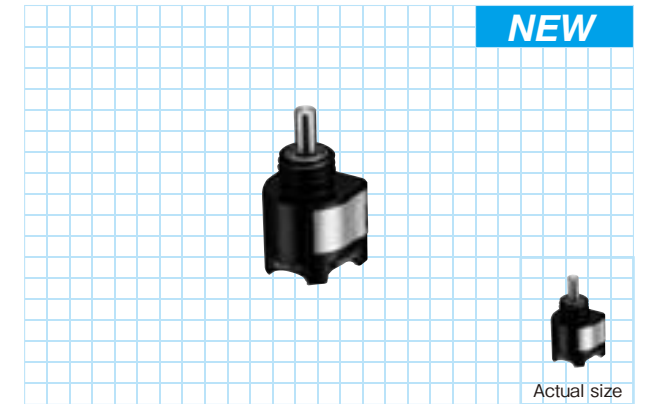
Multi turn type



MAS-3 series

[Absolute]

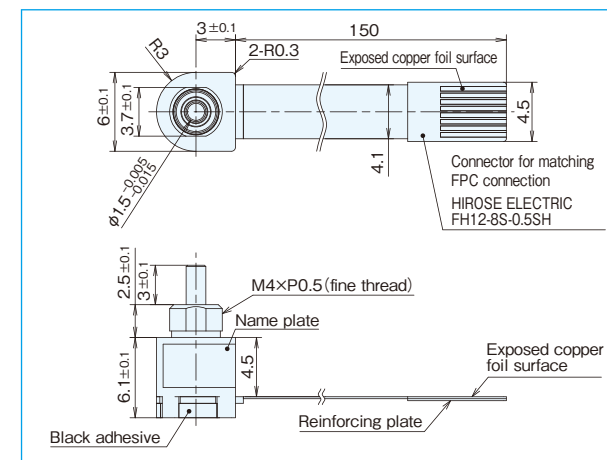
- Outside dimensions $\phi 6 \times 8.6\text{mm}$ 12bit Absolute encoder
- Resolution 4096, SSI interface



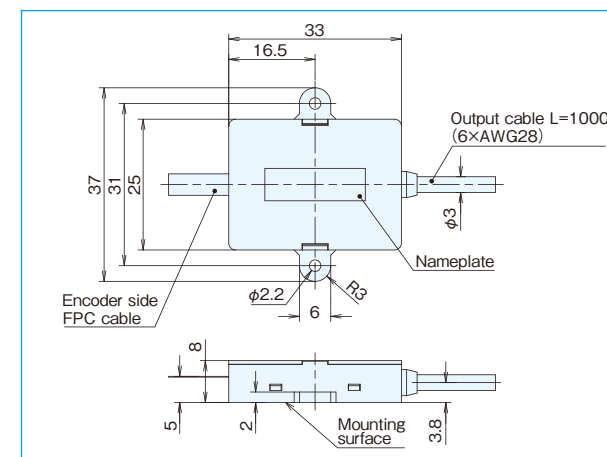
Encoder Specifications

Item	Type name	MAS-3-4096N1
Supply voltage		DC5V $\pm 5\%$
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/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Flexible cable (length 150mm)
Mass		5g (not including I/F box)

Encoder Outside dimensions



Outside dimensions of the I/F box

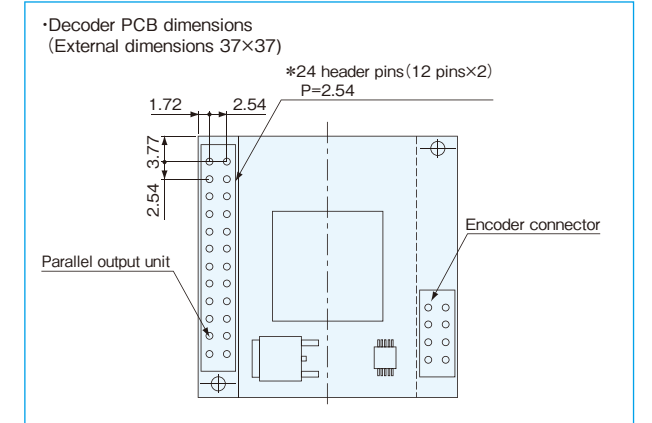


Receiver specifications (37×37 PCB)

Item	Type name	DECODER- $\triangle\triangle$ bit
Supply voltage		DC5V $\pm 5\%$
Current consumption		60mA or less (110mA or less including encoder)
Parallel data update cycle		60 μ s(16.7kHz)
Output circuit		NPN open collector output (when using parallel output)
Output capacity		Sink current 20mA 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)

$\triangle\triangle$...10, 11, 12 (corresponding to the encoder resolution)

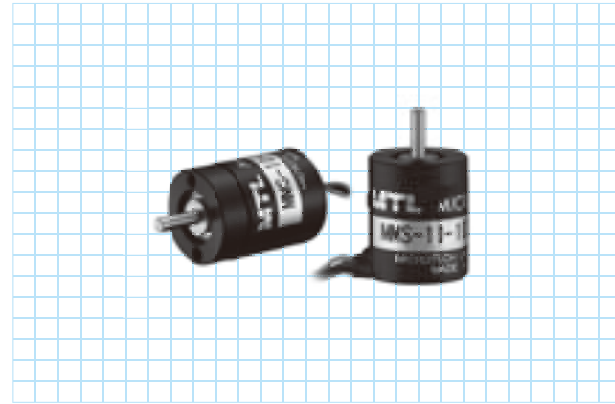
Receiver Outside dimensions (Option)



MMS-10 series

[Absolute]

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



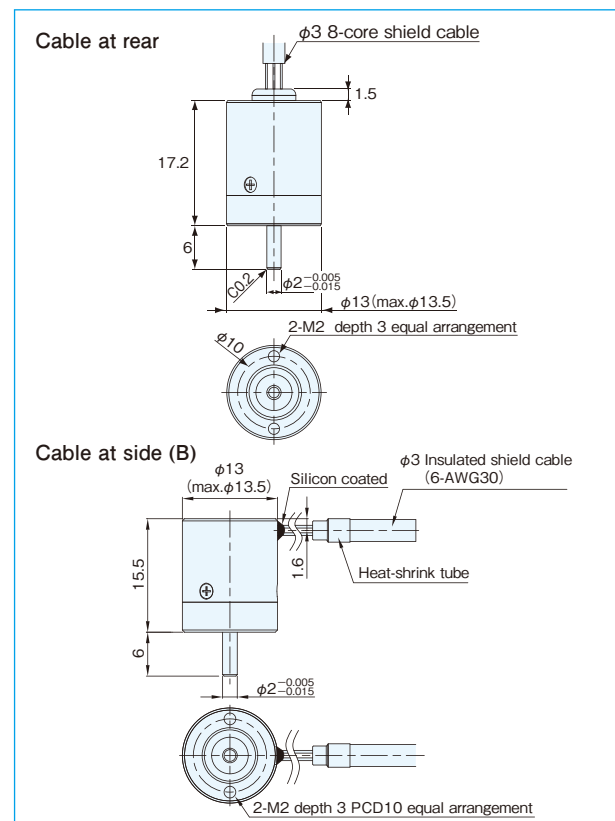
Encoder Specifications

Item	Type name	MMS-10- <input type="checkbox"/> G1 <input type="checkbox"/>
Supply voltage		DC5V $\pm 5\%$
Current consumption		50mA or less (under no load)
Resolution		256(8bit) 360, 512(9bit) 1,024(10bit)
Allowable revolutions		6000r/min
Allowable load of shaft (electrical)	Radial	1.9N(200gf)
	Thrust	1.9N(200gf)
Working temperature/humidity		$-10^{\circ}\text{C} \sim +70^{\circ}\text{C} / \text{RH}35\% \sim 90\%$
Storage temperature		$-20^{\circ}\text{C} \sim +100^{\circ}\text{C}$
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter $\phi 3$ 6-core Insulated shield cable AWG30 (length 1m)
Mass		40g

Connection

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

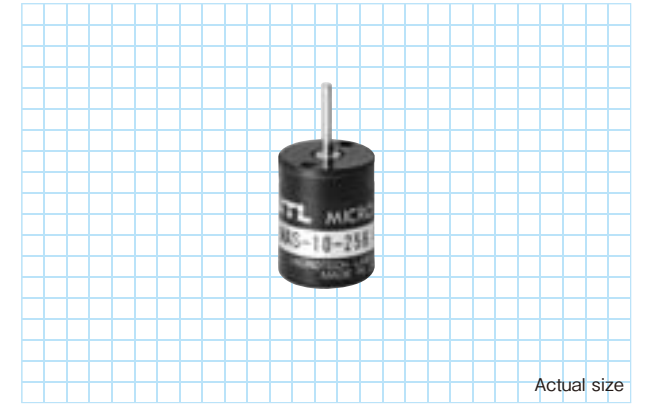
Encoder Outside dimensions



MAS-10 series

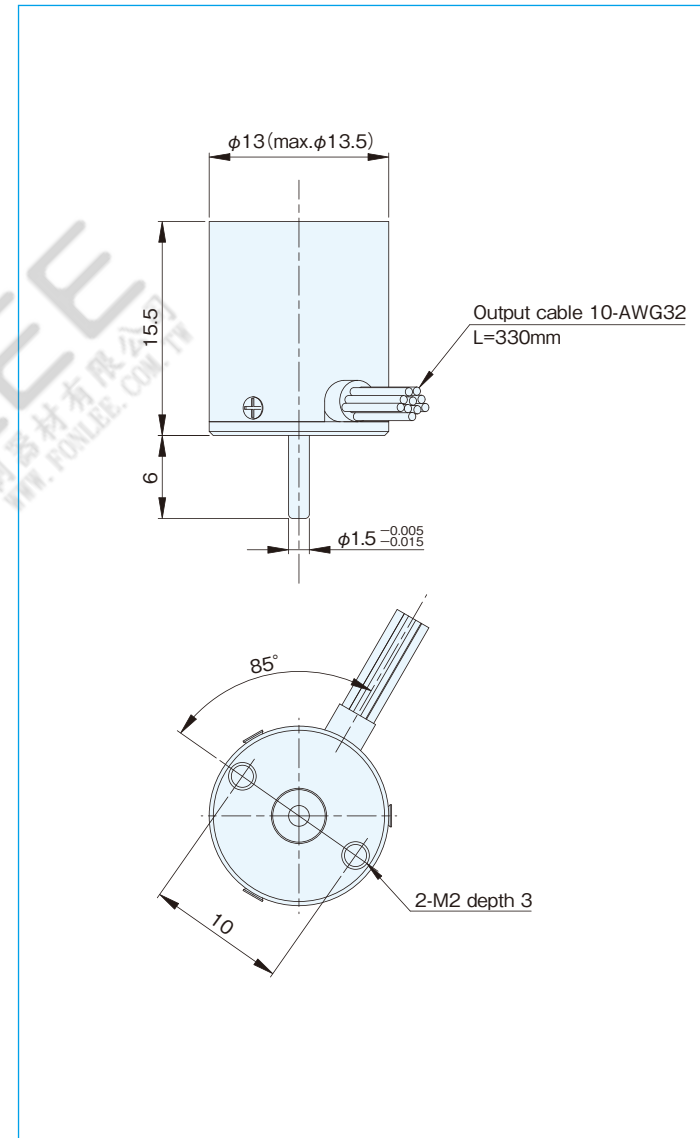
[Absolute]

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



Actual size

Outside dimensions



Specifications

Item	Type name	MAS-10-256G1
Supply voltage		DC5V $\pm 5\%$
Current consumption		40mA or less (under no load)
Output code		G: gray code
Logic		Negative logic (H=0, L=1)
Resolution		256 (8 bits/rotation)
Output circuit		Voltage output
Output capacity		Max. sink current per bit 4mA Residual voltage 0.4V or less
Allowable load of shaft (electrical)	Radial	0.98N (100gf)
	Thrust	0.98N (100gf)
Maximum revolutions (mechanical)		6,000r/min
Maximum response frequency		20kHz
Working temperature/humidity		0°C \sim +60°C / RH35% \sim 90% no dewing
Storage temperature		$-20^{\circ}\text{C} \sim +80^{\circ}\text{C}$
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions
Mass		10g

Connection

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

Decoder specifications (37x37 PCB)

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

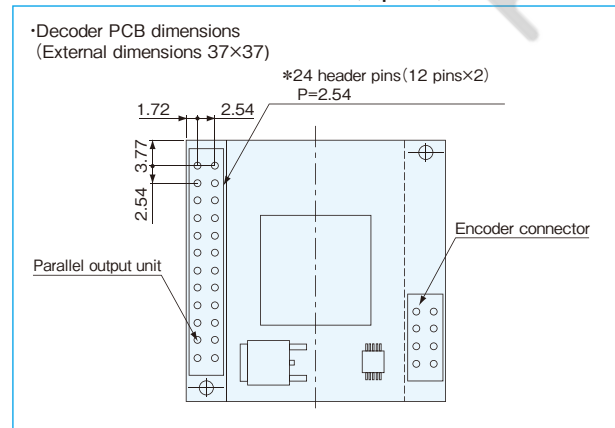
$\triangle\triangle$: 8, 9, 10 (corresponding to the encoder resolution)

Connection diagram

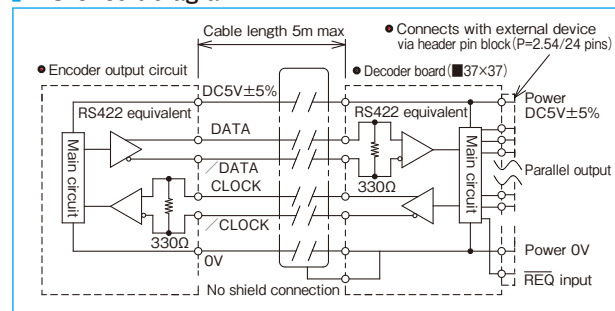
Decoder board TH No.

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

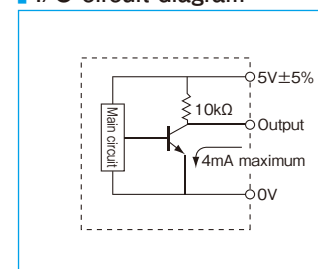
Decoder Outside dimensions (Option)



I/O circuit diagram



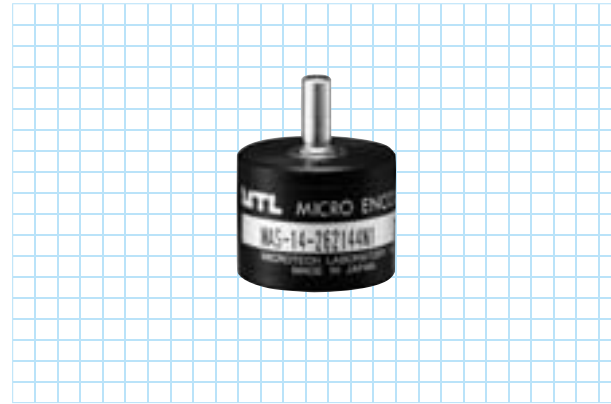
I/O circuit diagram



MAS-14 series

[Absolute]

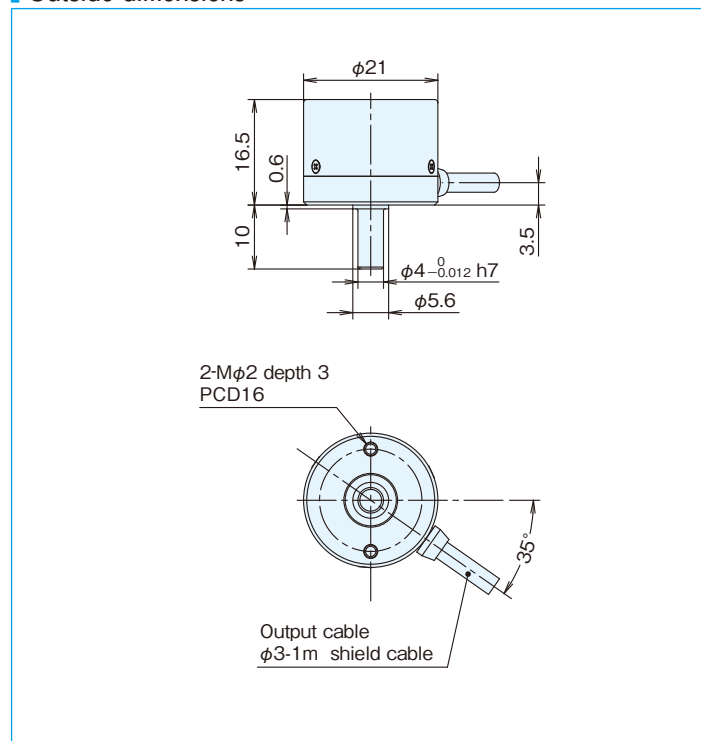
- Outside dimensions: $\phi 21 \times 16.5\text{mm}$
- Resolution: 18bit, SSI interface



Specifications

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

Outside dimensions

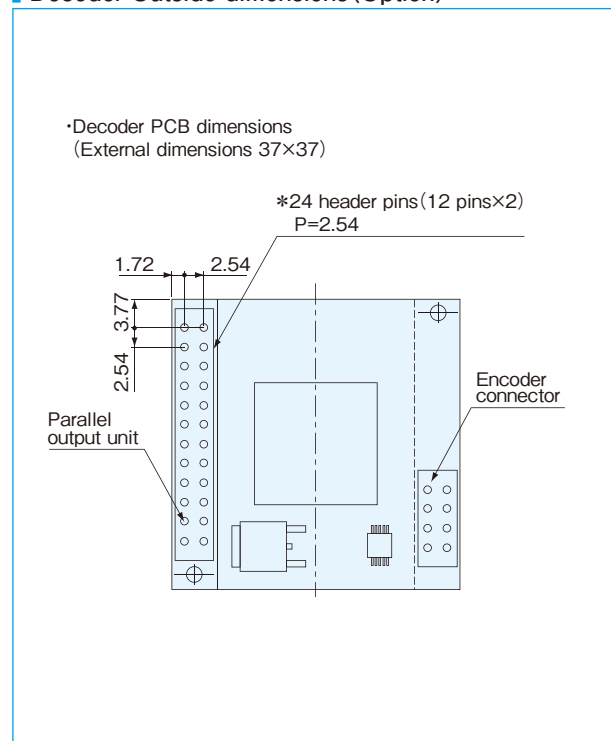


Decoder specifications (37x37 PCB)

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

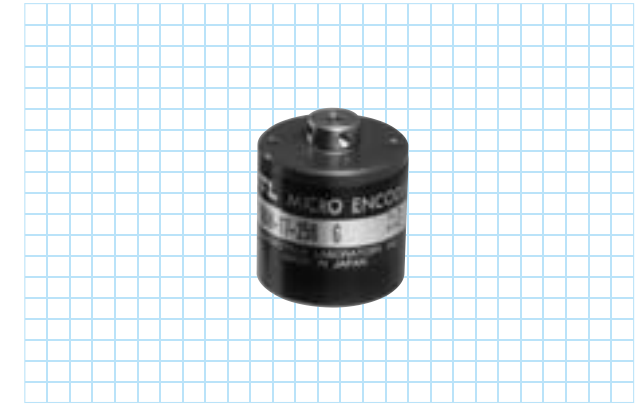
△△...15, 16, 17, 18 (corresponding to the encoder resolution)

Decoder Outside dimensions (Option)

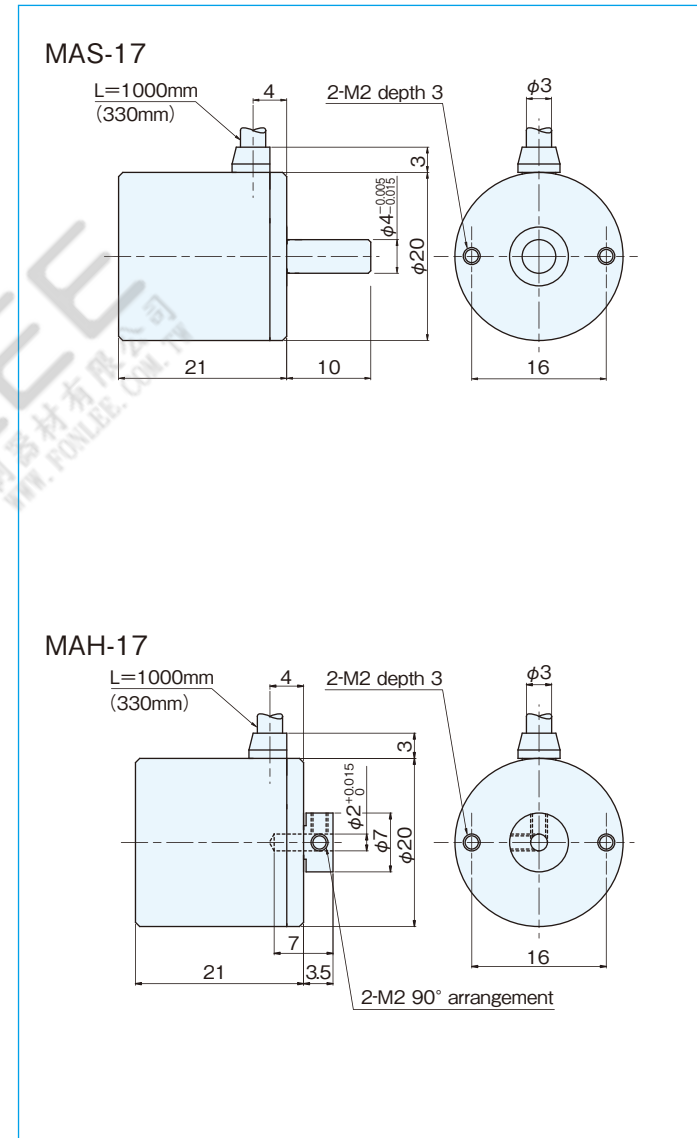


MA-17 series

[Absolute]



Outside dimensions



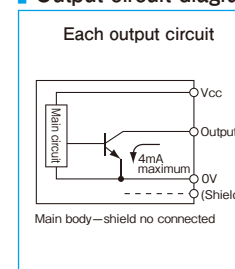
Specifications

Type name	MA□-17-□□□1	
Item	Shaft shape ●S=single shaft ●H=hollow shaft Pulse number G N B G N B	
Supply voltage	DC5V \pm 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)	
	Thrust 1.9N (200gf)	
Maximum revolutions	6,000r/min	
Maximum response frequency	20kHz	
Working temperature/humidity	0°C~60°C / RH35%~90% no dewing	
Storage temperature	-20°C~80°C	
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable	256:Outside diameter $\phi 3$ 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 \pm 5%		
Brown	Output 2 ⁰		Output 2 ⁰
Brown/black	Output 2 ¹		Output 2 ¹
Orange	Output 2 ²		Output 2 ²
Orange/black	Output 2 ³		Output 2 ³
Yellow	Output 2 ⁴		Output 2 ⁰ ×10
Yellow/black	Output 2 ⁵		Output 2 ¹ ×10
Green	Output 2 ⁶		Output 2 ² ×10
Green/black	Output 2 ⁷		Output 2 ³ ×10
Blue	Output 2 ⁸		Output 2 ⁰ ×10 ²
Blue/black	Output 2 ⁹		Output 2 ¹ ×10 ²
Purple	—		Output 2 ² ×10 ²
Purple/black	—		Output 2 ³ ×10 ²

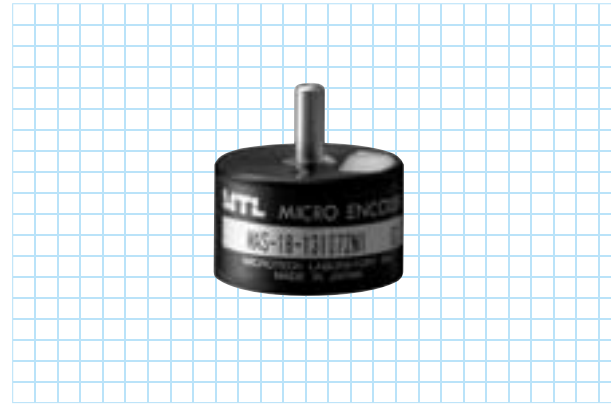
Output circuit diagram



MAS-18 series

[Absolute]

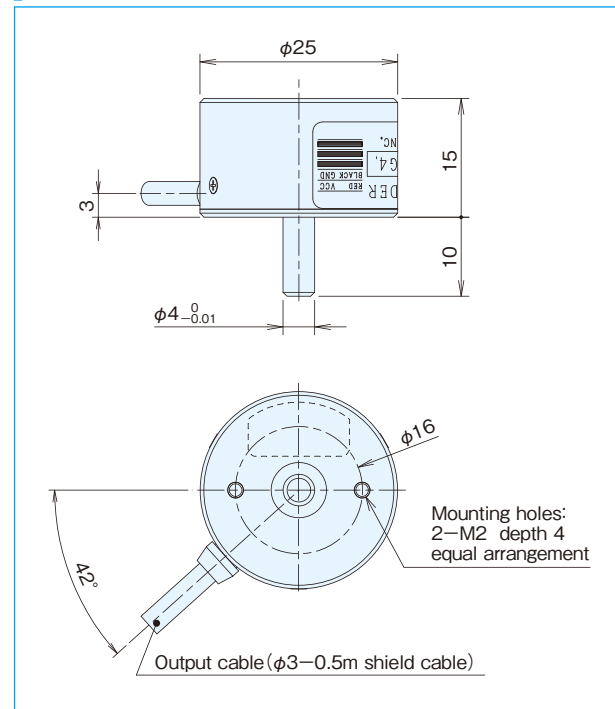
- Outside dimension: $\phi 25\text{mm} \times 15\text{mm}$
- Resolution: 18bit, SSI interface



Encoder specifications

Item	Type name	MAS-18- <input type="checkbox"/> N1
Supply voltage		DC5V $\pm 5\%$
Current consumption		100mA or less (under no load)
Resolution		32,768 (15bit), 65,536 (16bit) 131,072 (17bit), 262,144 (18bit)
Allowable revolutions		6000r/min
Allowable load of shaft (electrical)	Radial	1.9N (200gf)
	Thrust	1.9N (200gf)
Working temperature/humidity		$-10^{\circ}\text{C} \sim +70^{\circ}\text{C} / \text{RH}35\% \sim 90\%$
Storage temperature		$-20^{\circ}\text{C} \sim +80^{\circ}\text{C}$
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s^2 (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter $\phi 3$ -8-core vinyl wire Insulated shield cable AWG30 (length 0.5m)
Data formats		RS422 SSI Point To Point
Mass		30g

Encoder outside dimensions

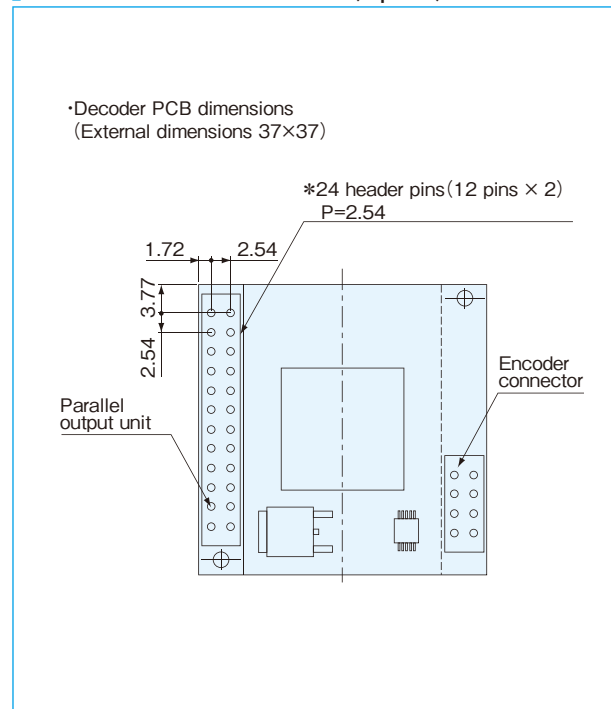


Decoder Specifications (37x37 PCB)

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

$\triangle\triangle$...15, 16, 17, 18 (corresponding to the encoder resolution)

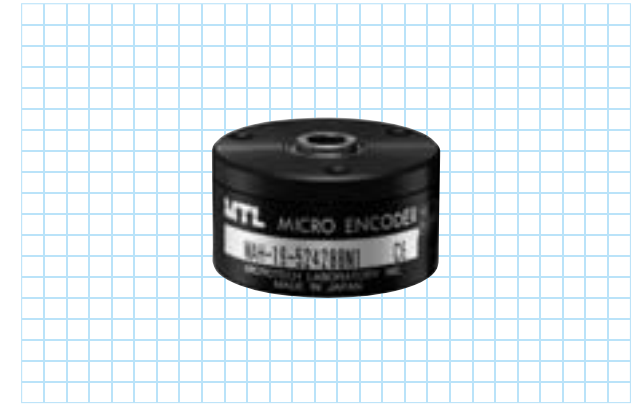
Decoder Outside dimensions (Option)



MAH-19 series

[Absolute]

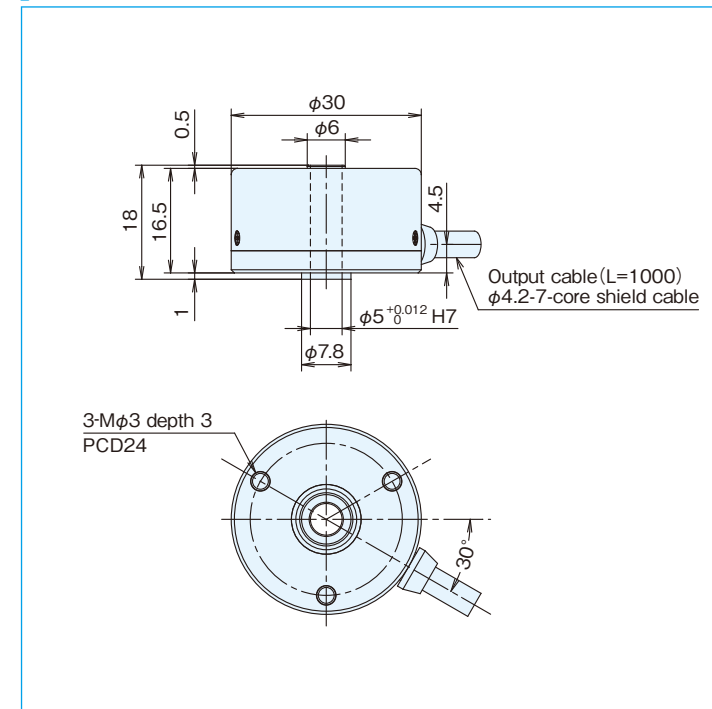
- Outside dimensions: $\phi 30 \times 16.5\text{mm}$
- Through Shaft
- Resolution: 19bit, SSI interface



Specifications

Item	Type name	MAH-19- <input type="checkbox"/> N1
Supply voltage		DC5V $\pm 5\%$
Current consumption		100mA or less (under no load)
Resolution		65,536 (16bit), 131,072 (17bit) 262,144 (18bit), 524,288 (19bit)
Allowable rotation		6000r/min
Allowable load of shaft (electrical)	Radial	9.8N (1kgf)
	Thrust	4.9N (0.5kgf)
Working temperature/humidity		$-10^{\circ}\text{C} \sim +70^{\circ}\text{C} / \text{RH}35\% \sim 90\%$ no dewing
Storage temperature		$-20^{\circ}\text{C} \sim +80^{\circ}\text{C}$
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s^2 (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter $\phi 4.2$ -7-core vinyl wire Insulated shield cable AWG28 (length 1m)
Mass		30g (excluding cable)

Outside dimensions

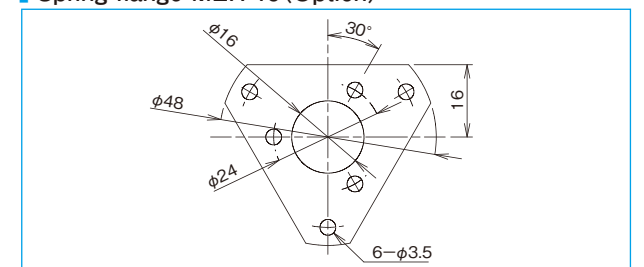


Decoder specifications (37x37 PCB)

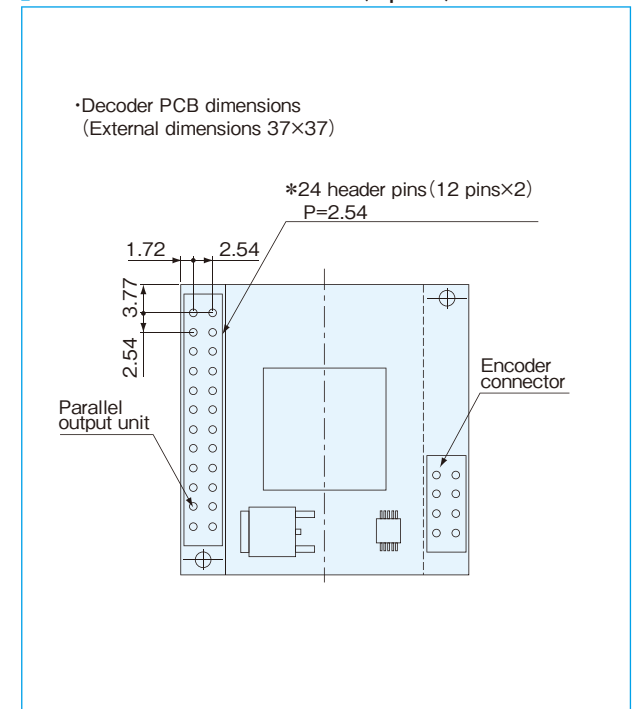
Item	Type name	DECODER- $\triangle\triangle$ bit
Supply voltage		DC5V $\pm 5\%$
Current consumption		60mA or less (160mA or less including encoder)
Parallel data update cycle		60 μs (16.7kHz)
Output circuit		NPN open collector output (when using parallel output)
Output capacity		Sink current 20mA or 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)

$\triangle\triangle$...16, 17, 18, 19 (corresponding to the encoder resolution)

Spring flange MEH-19 (Option)



Decoder Outside dimensions (Option)



MA-20 series

[Absolute]



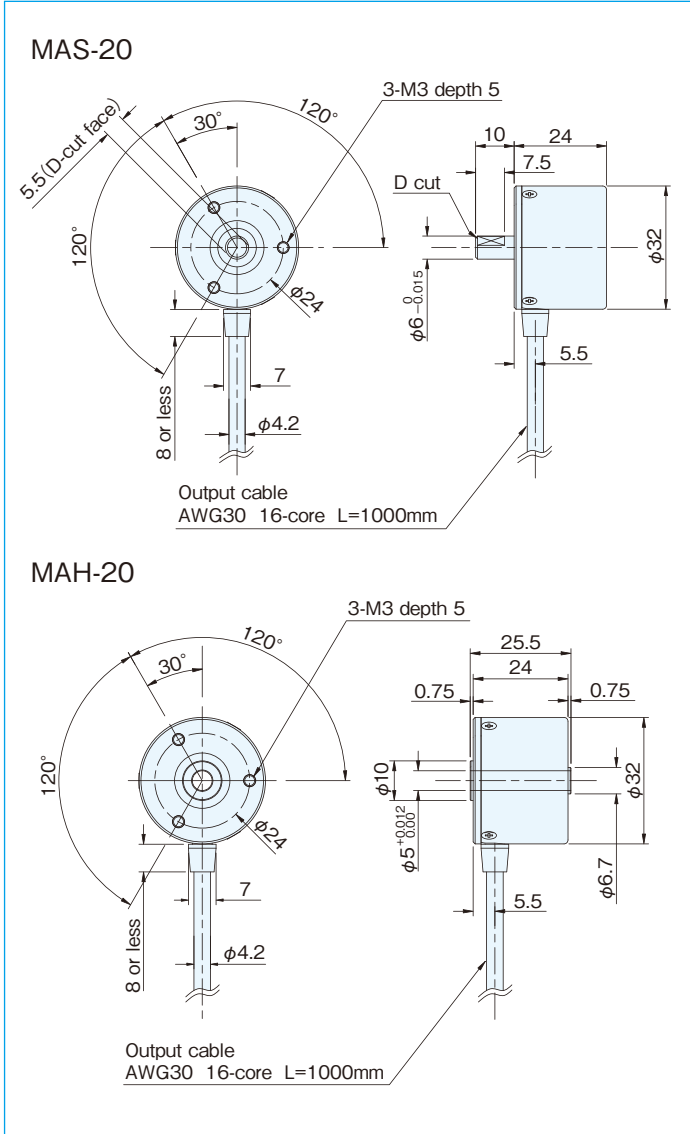
MAH-28

[Absolute]

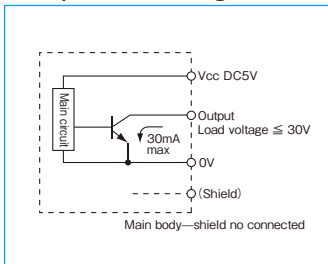
- Outside dimensions: $\phi 40 \times 16.5\text{mm}$
- Through Shaft
- Resolution: 20bit, SSI interface



Outside dimensions



Output circuit diagram



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

Specifications

Item	Type name	MA- <input type="text"/> -20- <input type="text"/> - <input type="text"/> 1
Supply voltage	DC5V \pm 5%	
Current consumption	100mA or less (under no load)	
Output code	G1: gray code N1: pure binary code	B1: BCD code
Logic	Negative logic (H=0, L=1)	
Resolution	256 1,024 4,096 512 2,048	3,600
Output circuit	NPN open collector	
Output capacity	Sink current:30mAmax, load voltage:30Vmax, Output residual voltage:0.5V or less (Cable length 1m, Sink current: at 30mA)	
Allowable load of shaft (electrical)	Radial	14.7N (1.5kgf)
	Thrust	4.9N (0.5kgf)
Maximum revolutions (mechanical)	6,000r/min	
Maximum response frequency	10kHz	
Working temperature/humidity	-10°C~70°C / 35%~90%RH no dewing	
Storage temperature	-20°C~80°C	
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions	
Cable	Outside diameter $\phi 4.2$ 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

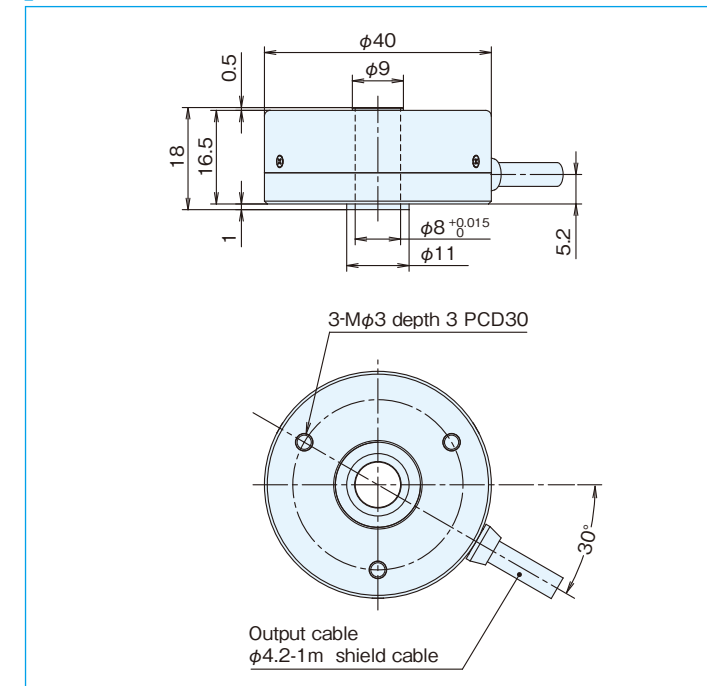
Cable color	Type	Output signal	
		MA-20- <input type="text"/> G1	MA-20- <input type="text"/> N1
Brown		Output 2 ⁰	Output 2 ⁰
Brown/Black		Output 2 ¹	Output 2 ¹
Orange		Output 2 ²	Output 2 ²
Orange/Black		Output 2 ³	Output 2 ³
Yellow		Output 2 ⁴	Output 2 ⁰ \times 10 ¹
Yellow/Black		Output 2 ⁵	Output 2 ¹ \times 10 ¹
Green		Output 2 ⁶	Output 2 ² \times 10 ¹
Green/Black		Output 2 ⁷	Output 2 ³ \times 10 ¹
Blue		Output 2 ⁸	Output 2 ⁰ \times 10 ²
Blue/Black		Output 2 ⁹	Output 2 ¹ \times 10 ²
Purple		Output 2 ¹⁰	Output 2 ² \times 10 ²
Purple/Black		2 ¹¹	Output 2 ³ \times 10 ²
Gray		N.C.	Output 2 ⁰ \times 10 ³
White		N.C.	Output 2 ¹ \times 10 ³
Red		Vcc (DC5V)	
Black		0V	

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

Specifications

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

Outside dimensions

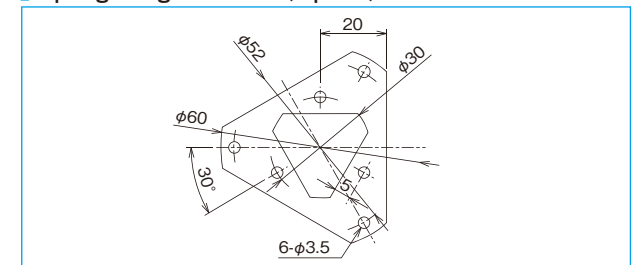


Decoder specifications (37 \times 37 PCB)

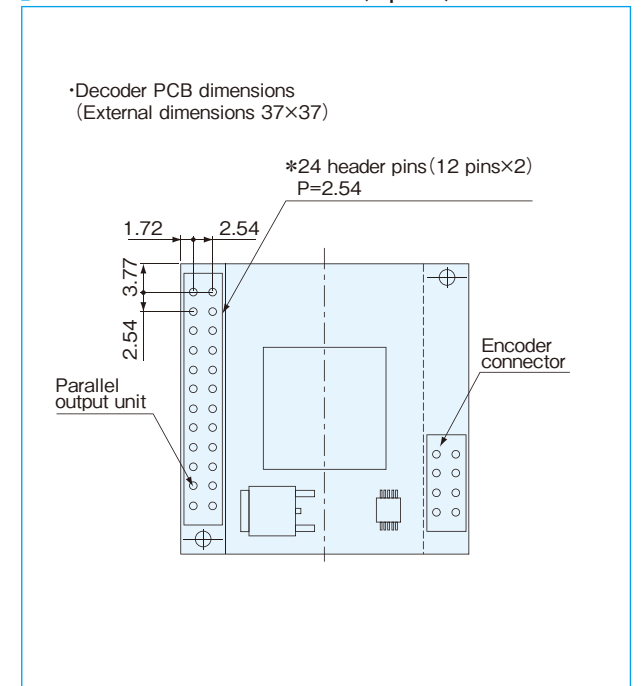
Item	Type name	DECODER- $\Delta\Delta$ bit
Supply voltage	DC5V \pm 5%	
Current consumption	60mA or less (160mA or less including encoder)	
Parallel data update cycle	60 μ s (16.7kHz)	
Output circuit	NPN open collector output (when using parallel output)	
Output capacity	Sink current 20mA or less Load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

$\Delta\Delta$...18, 19, 20 (corresponding to the encoder resolution)

Spring flange MEH-28 (Option)



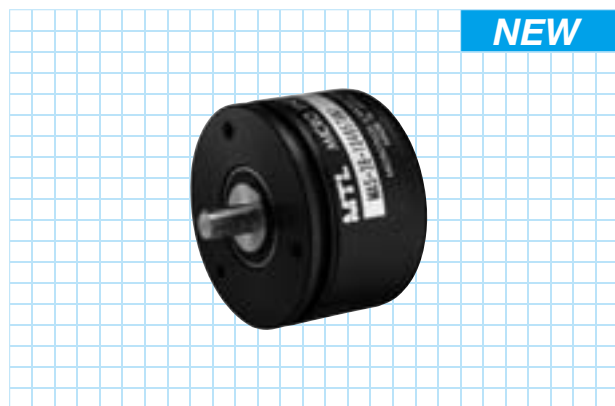
Decoder Outside dimensions (Option)



MA-36-20bit

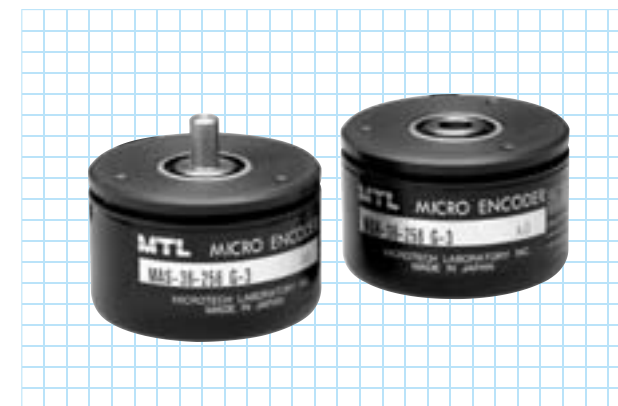
[Absolute]

- Single-revolution absolute encoder with outside dimensions $\phi 46 \times 30$
- Compliant with RS422 serial communications (SSI Format)



MA-36 series

[Absolute]



Specifications

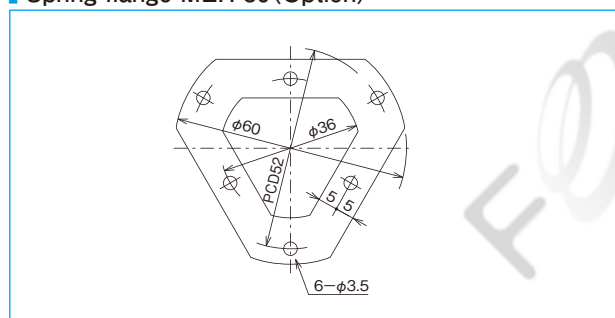
Type name	MA Δ -36-□□N1	
Item		
Supply voltage	DC5V \pm 5% (at end of encoder cable)	
Current consumption	100mA or less (under no load)	
Resolution	1,048,576 (20bit), 524,288 (19bit), 262,144 (18bit)	
Allowable rotation	6000r/min	
Allowable load of shaft (electrical)	Radial	19.6N (2kgf)
	Thrust	9.8N (1kgf)
Working temperature/humidity	-10 $^{\circ}$ C \sim 70 $^{\circ}$ C / RH90% or less (no dewing)	
Storage temperature	-20 $^{\circ}$ C \sim 80 $^{\circ}$ C	
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance	Durability 500m/s 2 (about 50G) 3 times each in X, Y, and Z directions	
Cable	Outside diameter $\phi 6.8$ 7-core vinyl wire Insulated shield cable AWG28 (length 1m)	
Mass	300g (excluding cable)	

Decoder specifications (37 \times 37 PCB)

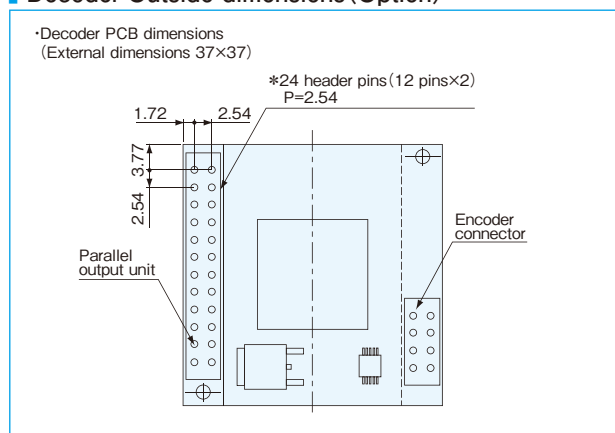
Type name	DECODER- $\Delta\Delta$ bit	
Item		
Supply voltage	DC5V \pm 5%	
Current consumption	60mA or less (160mA or less including encoder)	
Parallel data update cycle	60 μ s (16.7kHz)	
Output circuit	NPN open collector	
Output capacity	Sink current 20mA or less	
	Load voltage 35V or less	
	Residual voltage 0.4V or less (sink current 10mA)	
Logic	Negative logic (H=0, L=1)	

$\Delta\Delta$: 18, 19, 20 (corresponding to the encoder resolution)

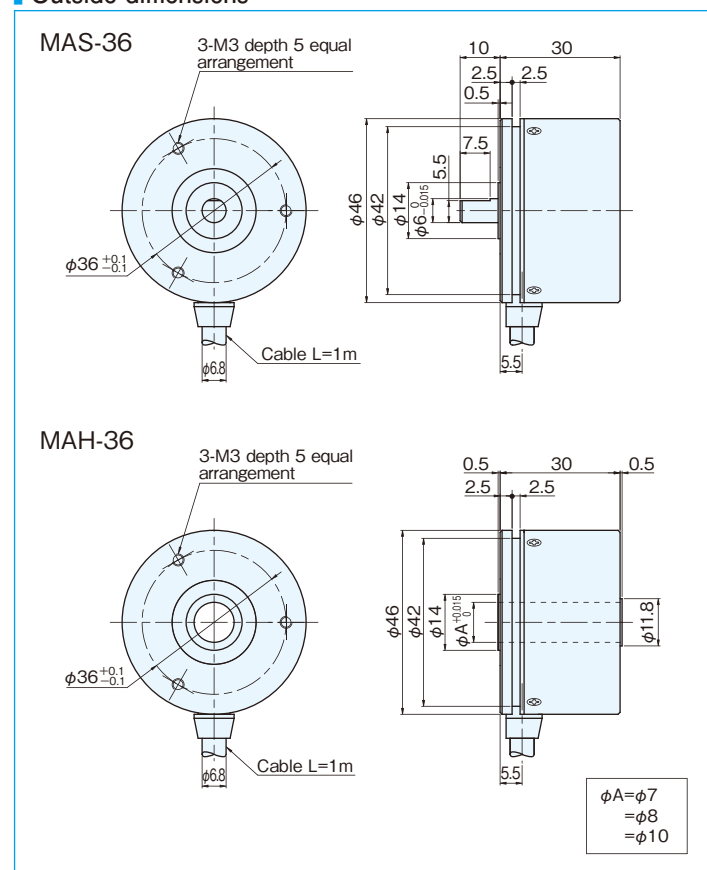
Spring flange MEH-30 (Option)



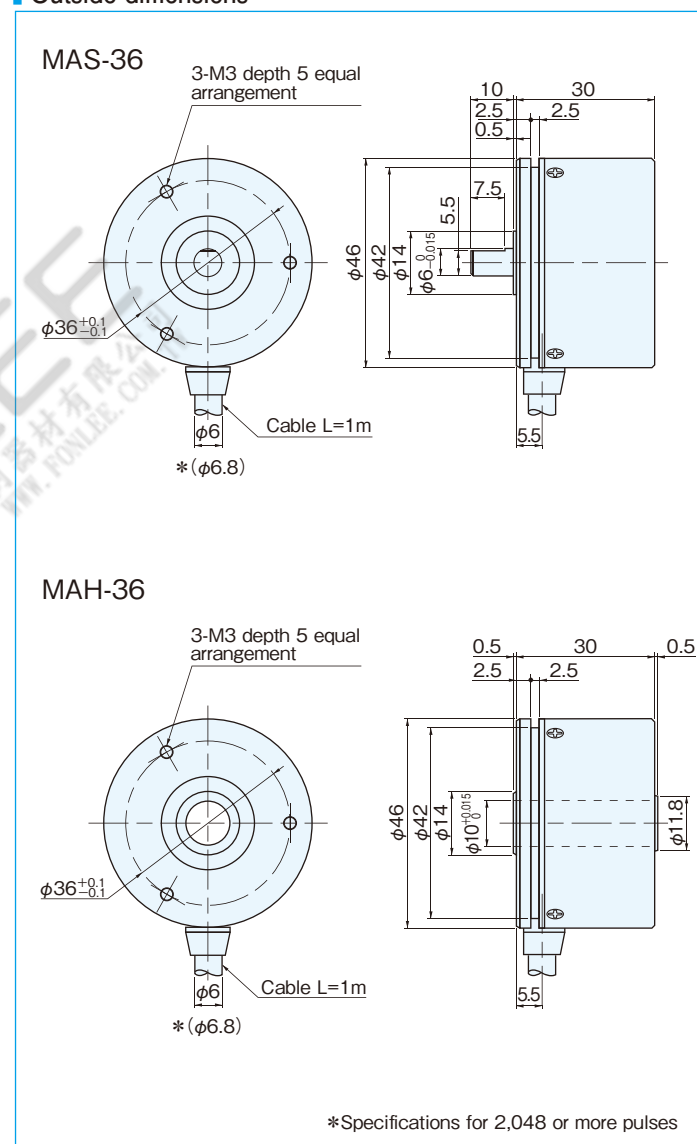
Decoder Outside dimensions (Option)



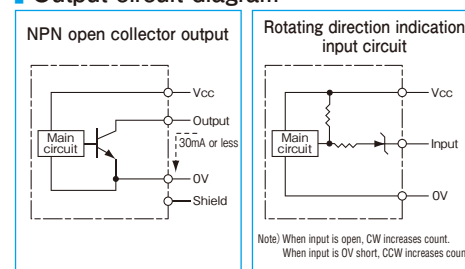
Outside dimensions



Outside dimensions



Output circuit diagram



Specifications

Type name	MA□-36-□□□□	
Item		
Supply voltage	1:DC5V \pm 5% 5:DC12V-10% \sim 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	Negative logic (H=0, L=1)	
Resolution	256 720 4,096	1,000
	360 1,024 8,192	
512 2,048 16,384		
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)	60kHz (8,192 pulse)
	15kHz (2,048 pulse)	120kHz (16,384 pulse)
	30kHz (4,096 pulse)	
Working temperature/humidity	-10 $^{\circ}$ C \sim 70 $^{\circ}$ C / RH95% or less no dewing	
Storage temperature	-25 $^{\circ}$ C \sim 85 $^{\circ}$ C * -20 $^{\circ}$ C \sim 85 $^{\circ}$ C	
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance	Durability 500m/s 2 (about 50G) 3 times each in X, Y, and Z directions	
Cable	Outside diameter $\phi 6.0$ 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)

Type	Output signal		
Cable color	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 $^4 \times 10$
Yellow / Black	2 5	2 5	2 $^5 \times 10$
Green	2 6	2 6	2 $^6 \times 10$
Green / Black	2 7	2 7	2 $^7 \times 10$
Blue	2 8	2 8	2 $^8 \times 100$
Blue / Black	2 9	2 9	2 $^9 \times 100$
Purple	NC	NC	2 $^8 \times 100$
Purple / Black	NC	NC	2 $^8 \times 100$
Red / Black	NC	NC	2 $^8 \times 100$

Connection (2,048 pulse or more)

Type	Output signal	
Cable color	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	
Red / Black	Output 2 13	
Red	Vcc	
Black	N.C.	N.C.
Black (*)	(*) Latch input (LE)	
Black	OV	

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

Resolution and code No.

Resolution	Code No.	Resolution	Code No.
256	0 \sim 255	2,048	0 \sim 2,047
360	76 \sim 435	4,096	0 \sim 4,095
512	0 \sim 511	8,192	0 \sim 8,191
720	152 \sim 871	16,384	0 \sim 16,383
1,000	0 \sim 999		
1,024	0 \sim 1,023		

MA-42 series

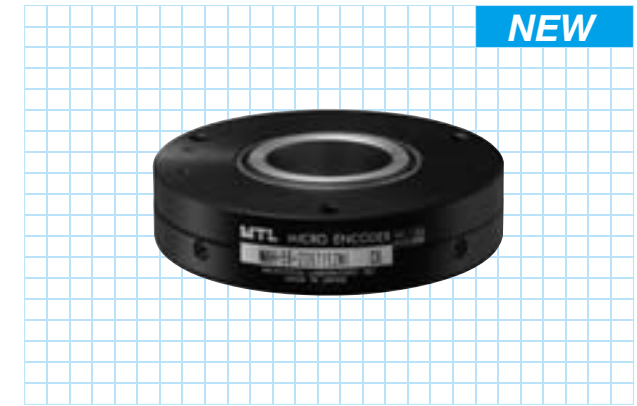
[Absolute]



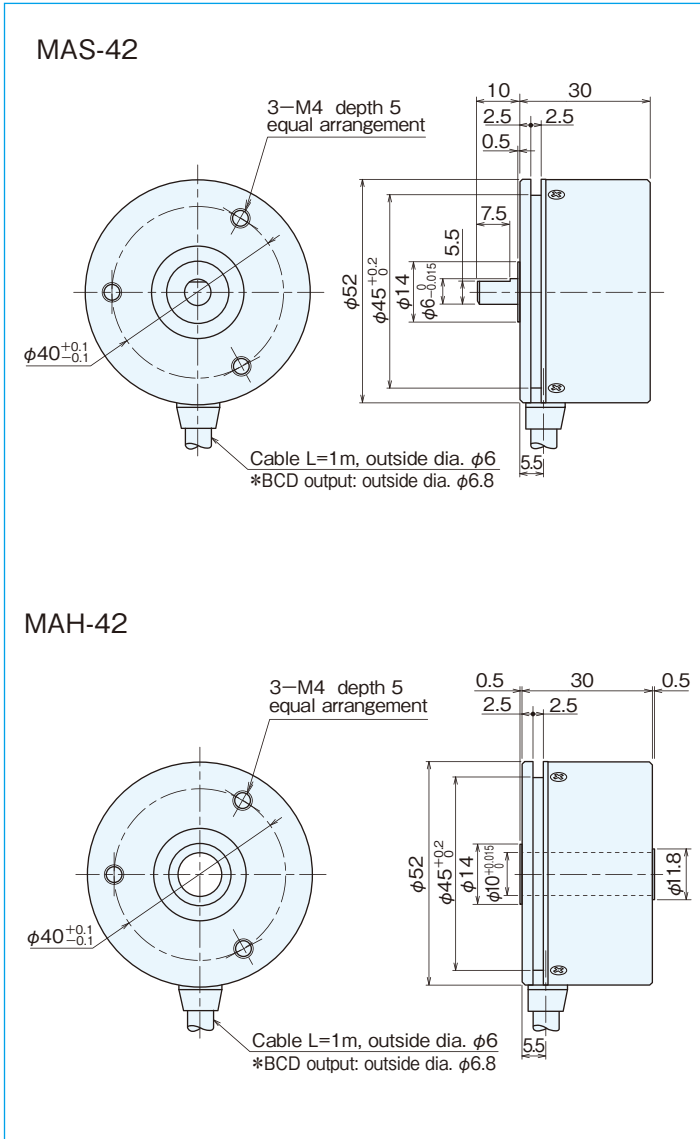
MAH-59 series

[Absolute]

- Outside dimensions $\phi 70 \times 16.5\text{mm}$
21bit absolute encoder
- Resolution: 2097152, SSI interface, Hollow shaft $\phi 25$



Outside dimensions



Specifications

Item	Type name	MA-42- S H	42- G N	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		Negative logic (H=0, L=1)			
Resolution		256 360	512 720	1,024 2,048	4,096 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)			
	Thrust	9.8N (1kgf)			
Maximum revolutions (mechanical)		6,000r/min			
Maximum response frequency		10kHz			
Working temperature/humidity		-10°C~70°C / RH95% or less no dewing			
Storage temperature		-25°C~85°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 (G, N: $\phi 6$, 16 cores/B: $\phi 6.8$, 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.

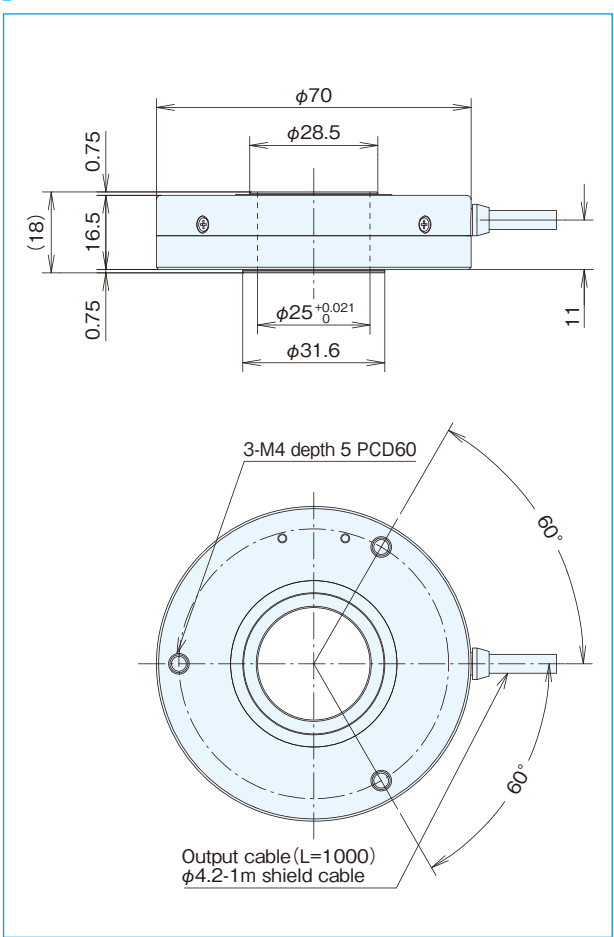
Resolution and code No.

Resolution	Code No.	Resolution	Code No.
256	0~255	1,024	0~1,023
360	76~435	2,048	0~2,047
512	0~511	3,600	0~3,599
720	152~871	4,096	0~4,095
1,000	0~999		

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/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter $\phi 4.2$ 7-core vinyl wire Insulated shield cable AWG28 (length 1m)
Mass		200g

Outside dimensions

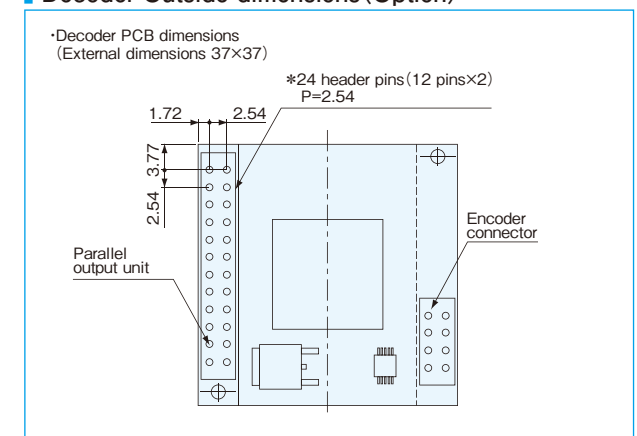


Decoder specifications (37×37 PCB)

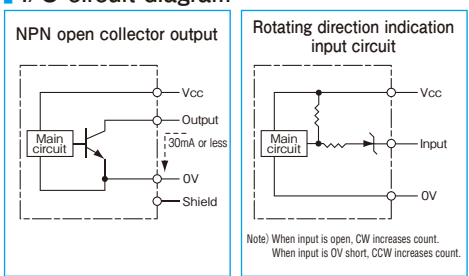
Item	Type name	DECODER-△△bit
Supply voltage		DC5V ±5%
Current consumption		60mA or less (110mA or less including encoder)
Parallel data update cycle		60μs (16.7kHz)
Output circuit		NPN open collector output (when using parallel output)
Output capacity		Sink current 20mA or less Load voltage 35V or less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



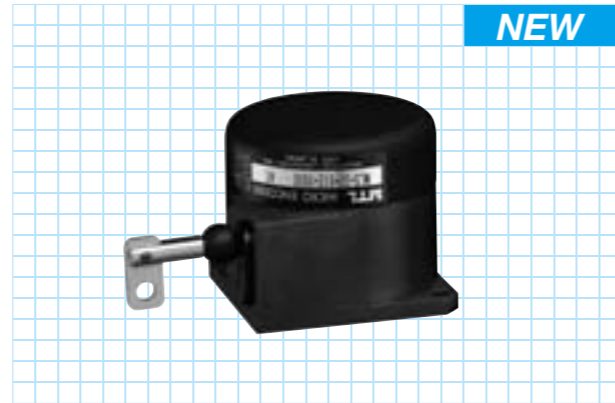
I/O circuit diagram



MLS-37 series

[Wire-Type Linear Scale]

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

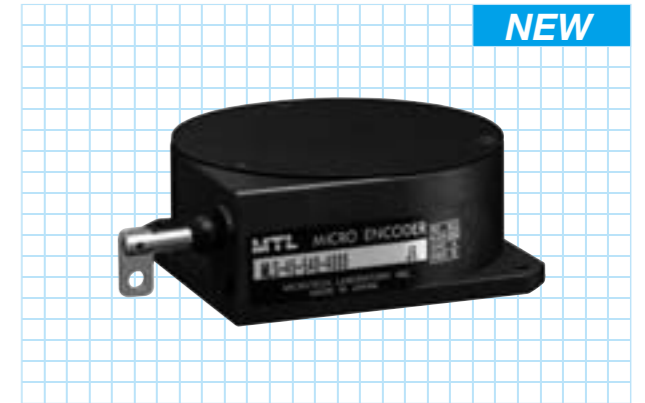


NEW

MLS-45 series

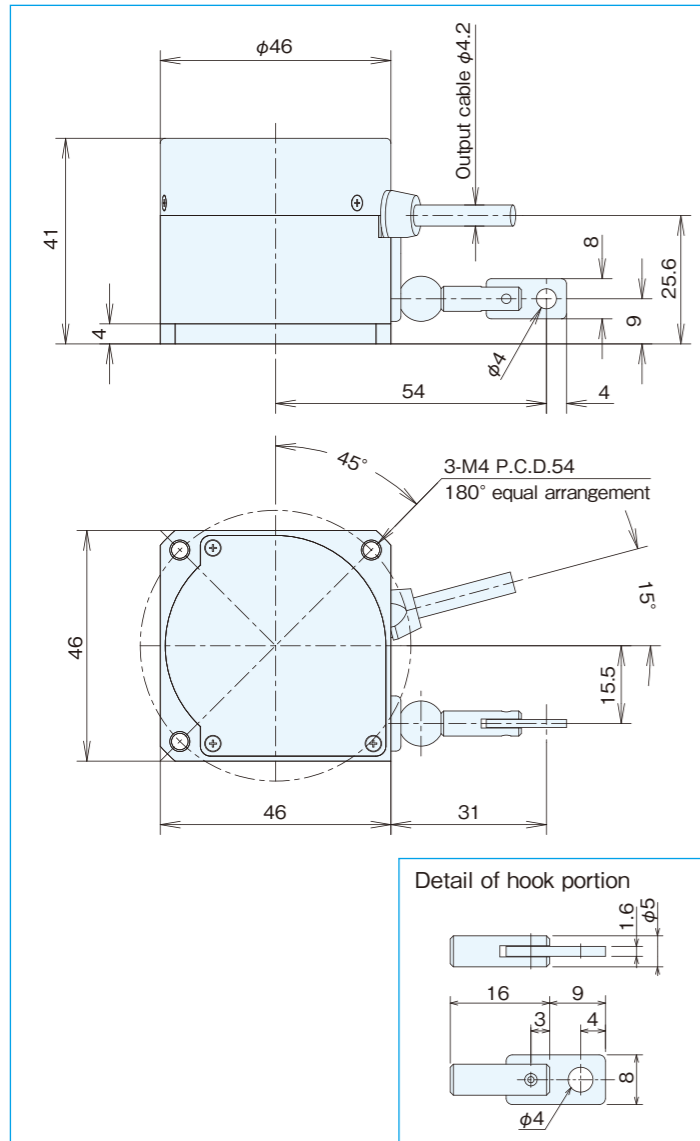
[Wire-Type Linear Scale]

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



NEW

Outside dimensions



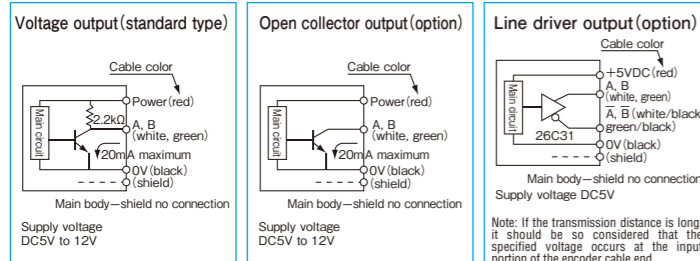
Note: Usage warning: The wire may stop midway through retracting. When this happens, slowly pull out the full length and then slowly retract again before using.

Specifications

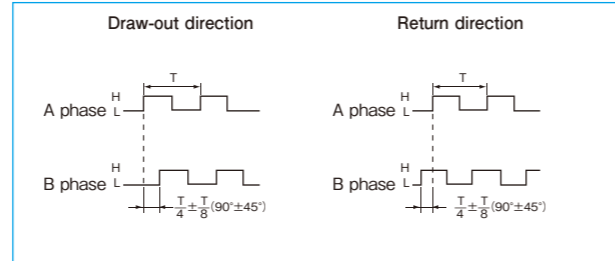
Item	Type name	MLS-37-1027※◎-1500
Measuring range		1500mm
Supply voltage		1:DC5V±5% (note 1) 3:DC5V-5%~12V+10% 5:DC12V-10%~24V+15% (note 1)
Current consumption		70mA or less (under no load)
Length measurement resolution		0.1mm (note 2)
Stroke speed		500mm/sec
Wire tensile force		0.98N~3.92N(100gf~400gf)
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/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter $\phi 4.2$ 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 $\phi 3.5$ hole for M3 mounting.

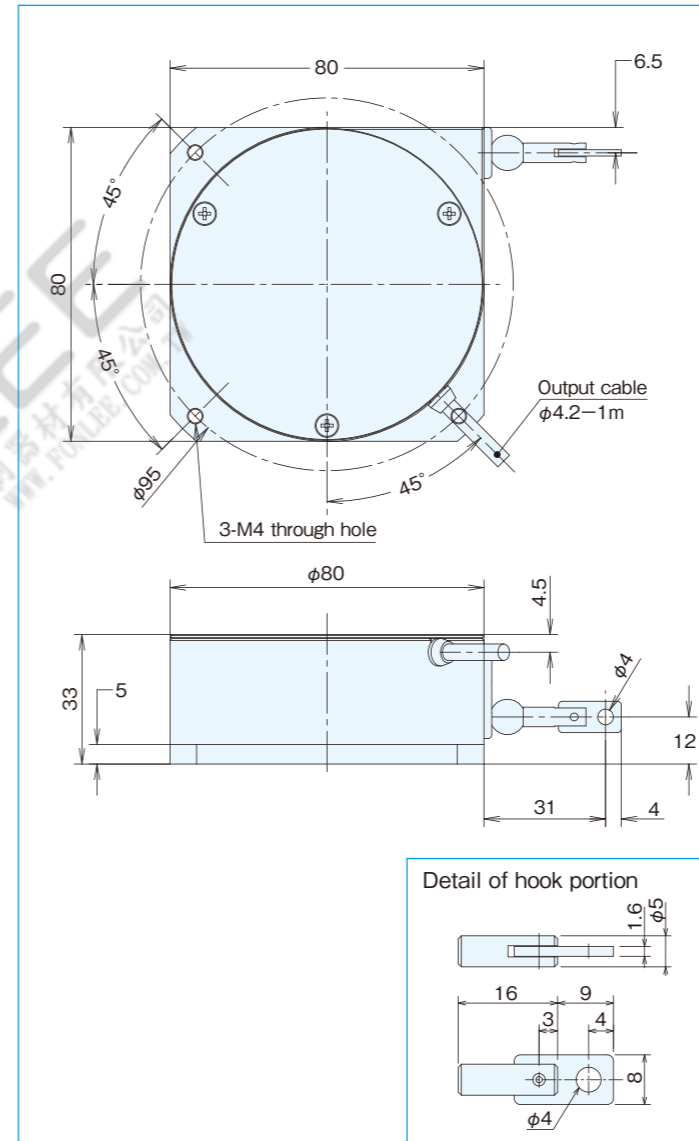
Output circuit diagram



Output waveform



Outside dimensions



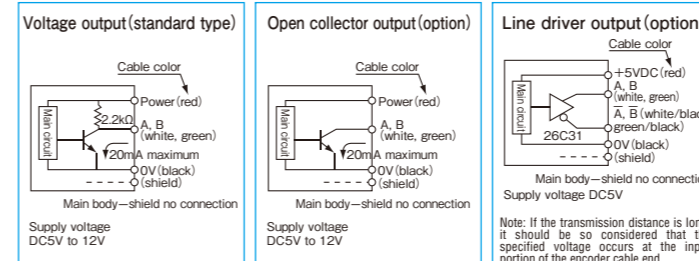
Note: Usage warning: The wire may stop midway through retracting. When this happens, slowly pull out the full length and then slowly retract again before using.

Specifications

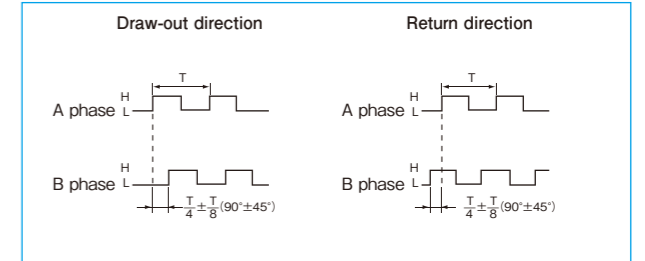
Item	Type name	MLS-45-540※-4000
Measuring range		2000mm, 4000mm
Supply voltage		DC5V-5%~12V+10% DC24V±10% (option) Line driver:DC5V±5%
Current consumption		70mA or less (under no load)
Length measurement resolution (output pulse count)		0.4mm (540P/R), 0.04mm (5400P/R)
Stroke speed		500mm/sec
Wire tensile 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/s ² (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter $\phi 4.2$ 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 $\phi 3.5$ hole for M3 mounting.

Output circuit diagram

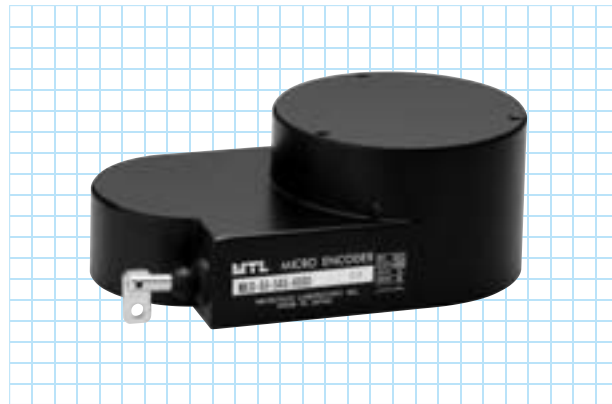


Output waveform

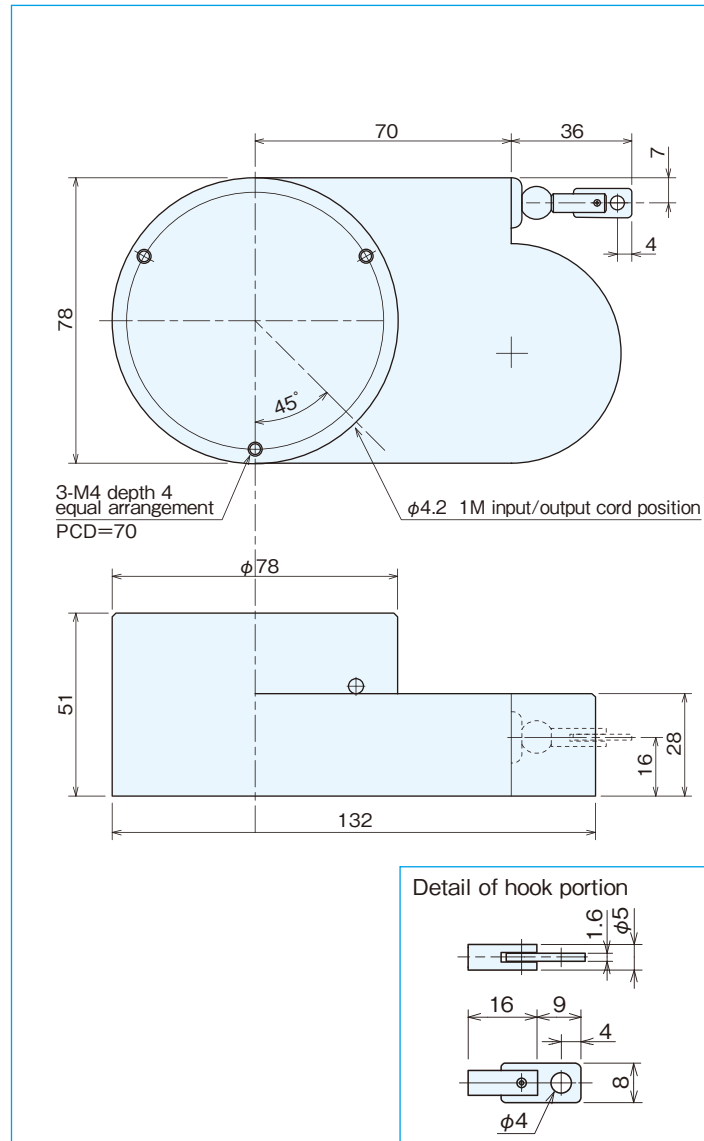


MLS-50 series

[Wire-Type Linear Scale]

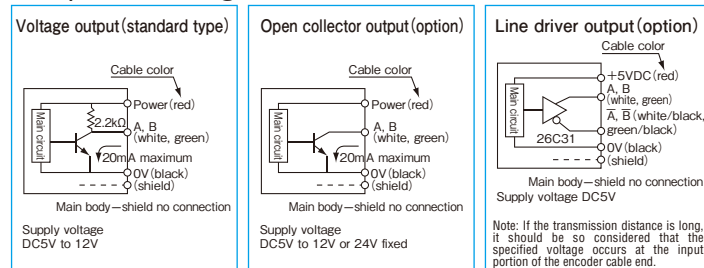


Outside dimensions



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.

Output circuit diagram

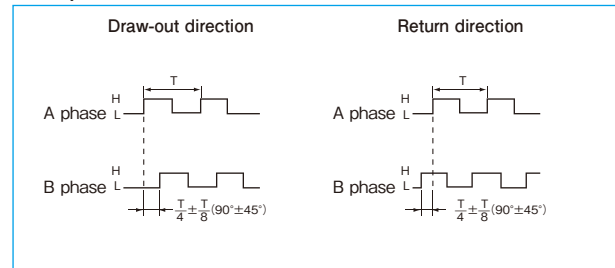


Specifications/linear scale encoder (detection portion)

Type name	MLS-50- <input type="text"/> - <input type="text"/> -2000-4000	
	Pulse number: <input type="text"/> Output circuit: <input type="text"/>	
	●No entry=voltage output ●O=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°C~50°C / RH35%~90%	
Storage ambient temperature	-20~80°C	
Vibration resistance	Endurance 10 to 55Hz Double amplitude 2 hours each in X, Y, and Z directions	
Impact resistance	50G	
Cable	Insulated shield wire Outside diameter φ4.2 4-core vinyl wire	
Mass	850g	

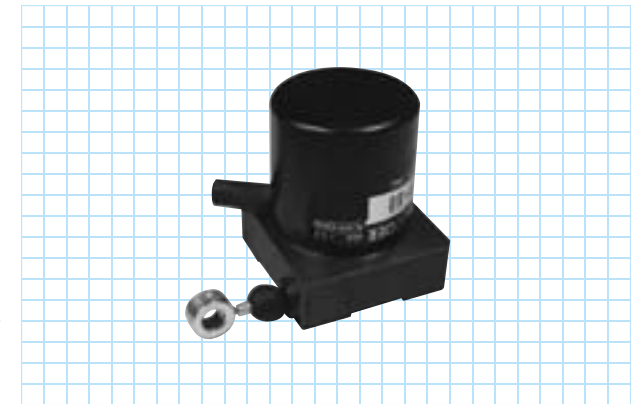
Note: The output pulse or resolution is possible to 4 multiple with the counter.

Output waveform



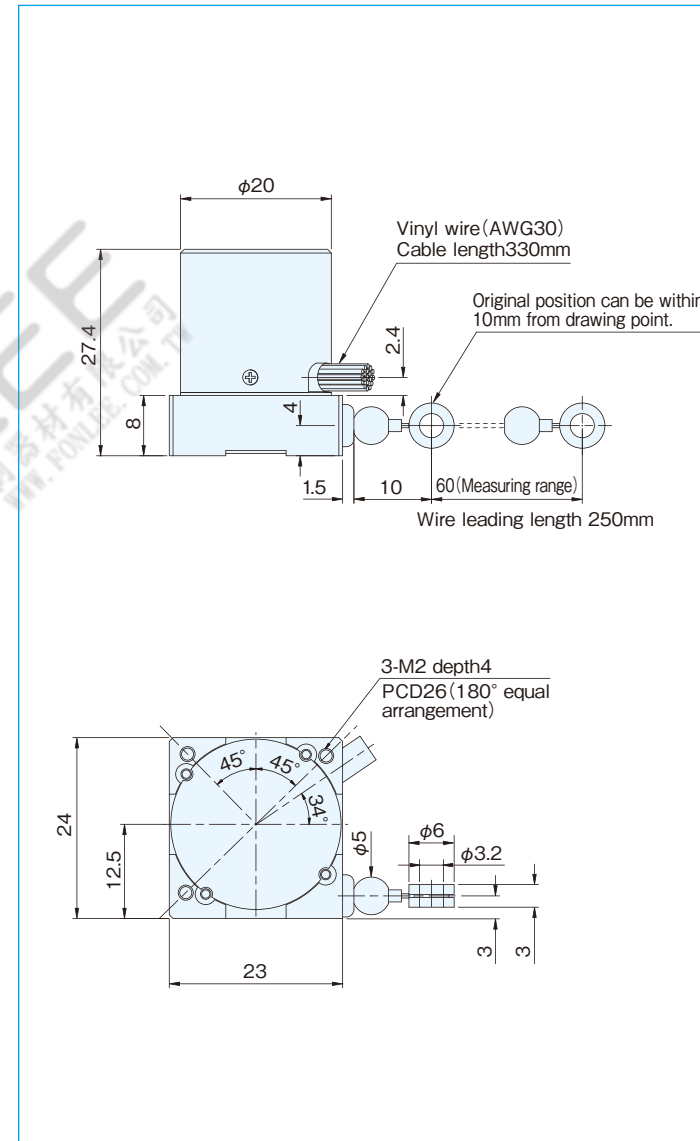
MLA-17 series

[Absolute Linear Scale]



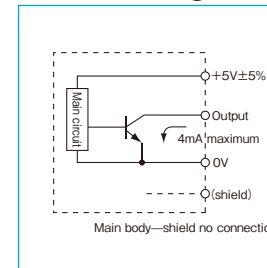
- Smallest in the series: Outside dimensions 23×24×27.4 (H)
- Measuring range: 60mm (*Max. 250mm)
- Main Applications: Robot Machine, small actuator, conductor apparatus, manipulator, Jack-up controller for building industry and etc.

Outside dimensions



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

I/O circuit diagram



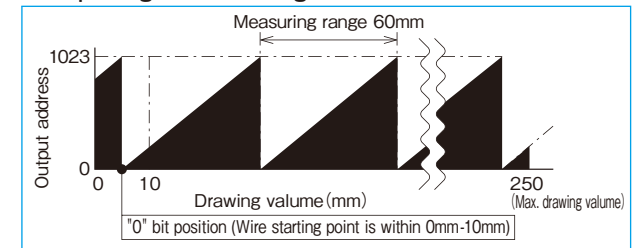
Specifications

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

Connection

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

Output signal is an image form

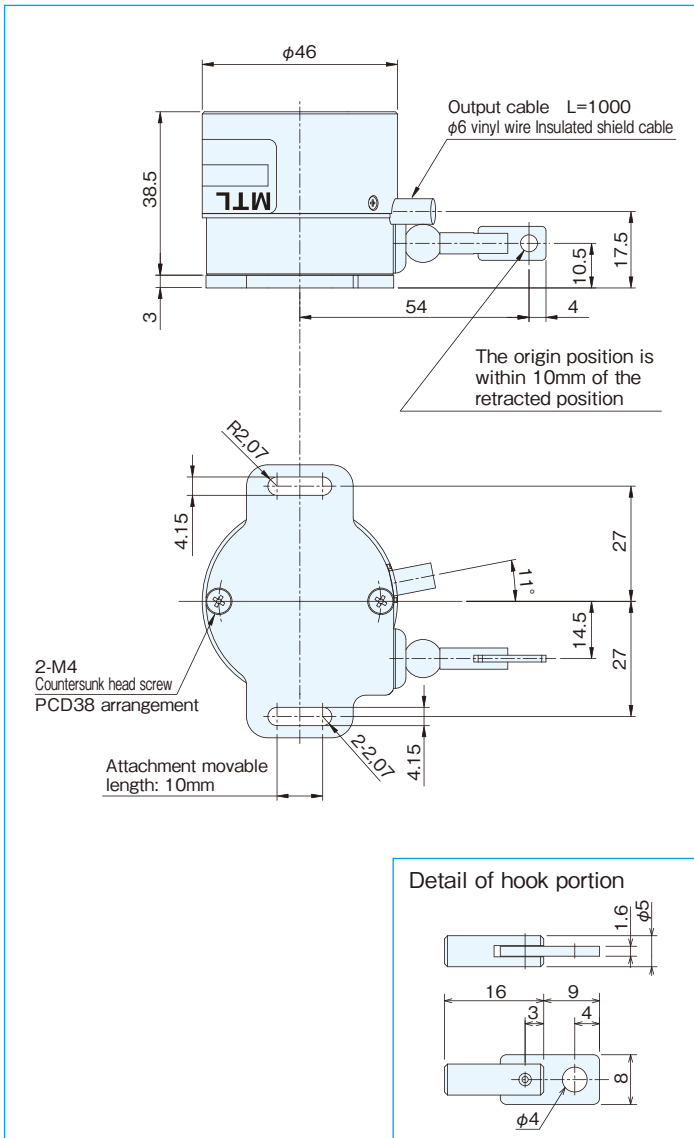


MLA-30 series

[Absolute Linear Scale]

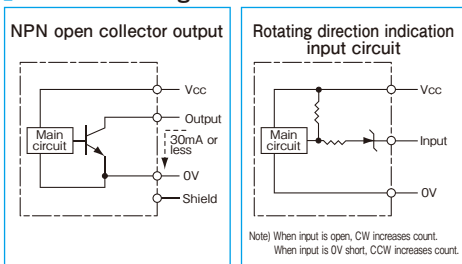


Outside dimensions



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

I/O circuit diagram



Specifications

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

Connection

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

MLA-37 series

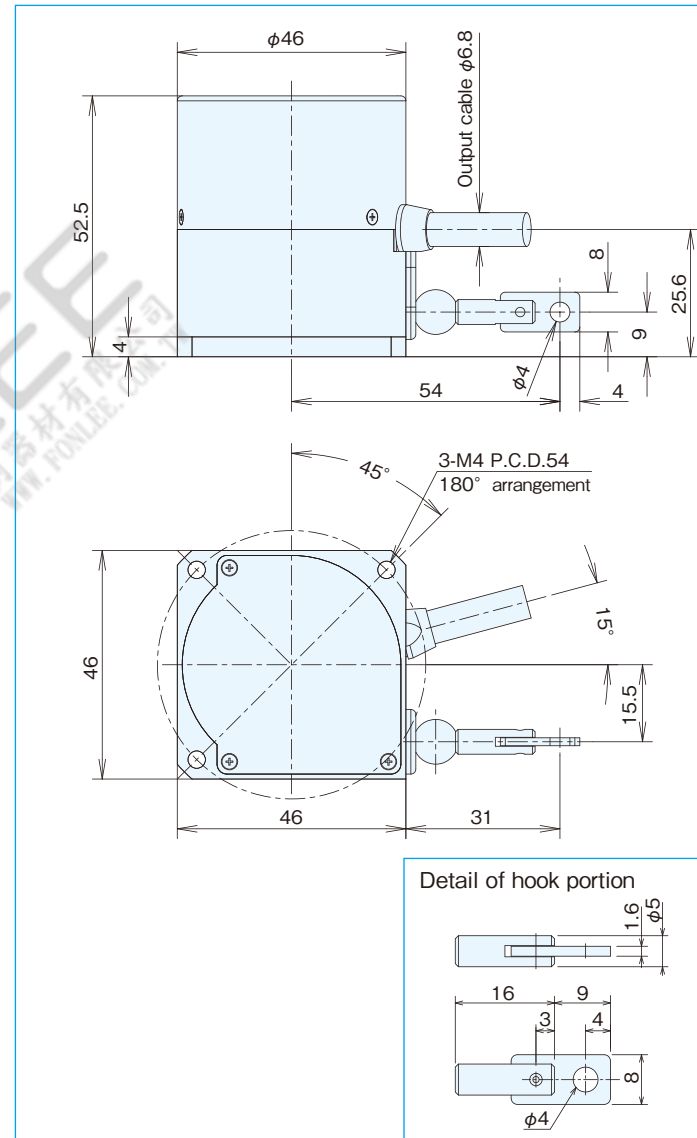
[Absolute Linear Scale]

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



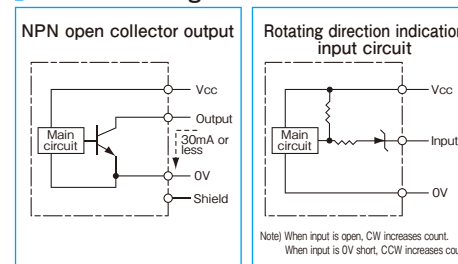
NEW

Outside dimensions



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

I/O circuit diagram



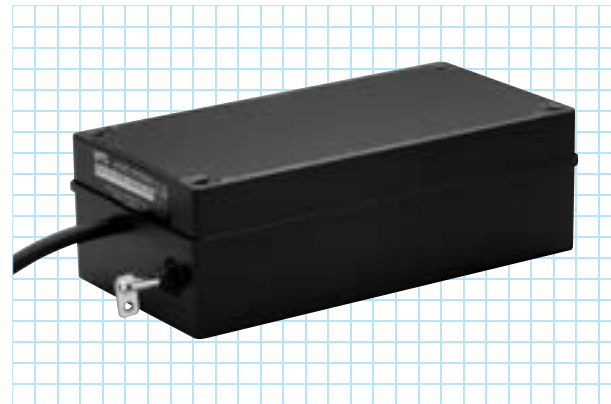
Specifications

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°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	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.

MLA-42 series

[Absolute Linear Scale]

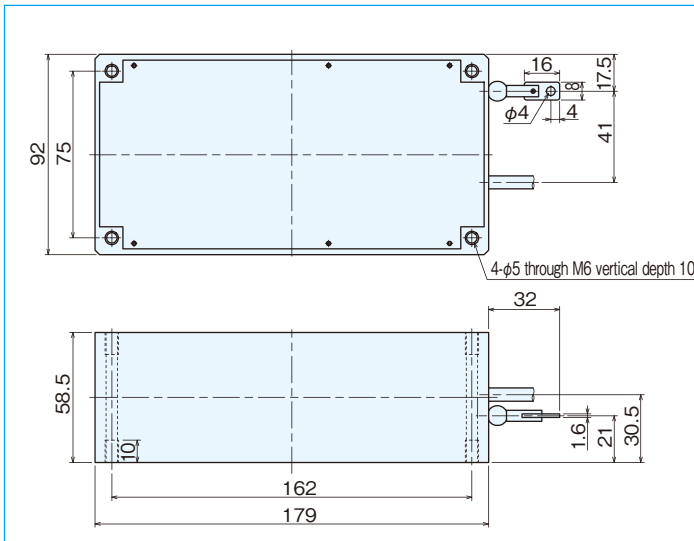


Roller encoder/Counter

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

Counter: Display unit and setting options

Outside dimensions



Specifications

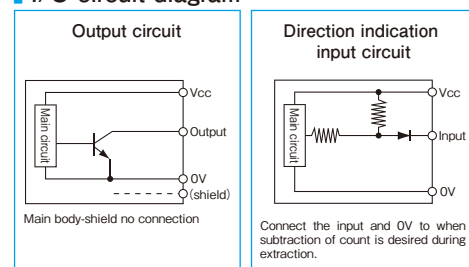
Item	Type name	MLA-42-4096
		Output code - Supply voltage - Measuring range
Supply voltage		1:DC5V±10% 5:DC12V-10%~24V+15%
Current consumption		70mA or less (under no load), 100mA or less (under no load)
Output code		G: gray code N: pure binary code
Logic		Negative logic (H=0, L=1)
Output circuit		NPN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

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			

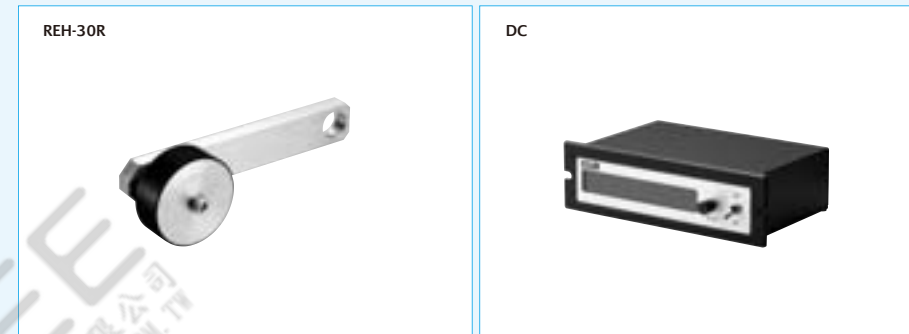
Note: Usage warning: The wire may stop midway through retracting.
When this happens, slowly pull out the full length and then slowly retract again before using.

I/O circuit diagram



Connection MLA-42

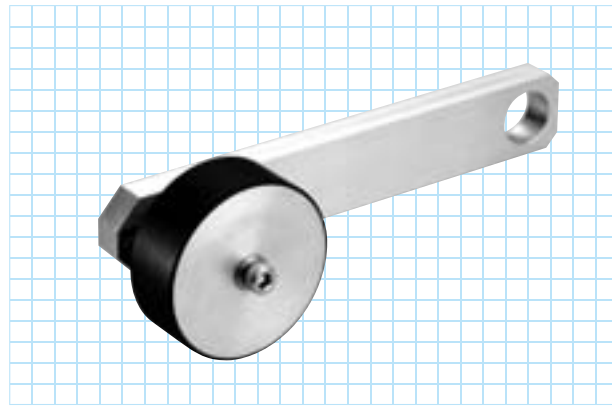
Type/code color	MLA-42-4096
Black	0V (COMMON)
Red	Supply power
Red/black	Rotating direction indication input (N only)
Brown	Output 2 ⁰
Brown/black	Output 2 ¹
Orange	Output 2 ²
Orange/black	Output 2 ³
Yellow	Output 2 ⁴
Yellow/black	Output 2 ⁵
Green	Output 2 ⁶
Green/black	Output 2 ⁷
Blue	Output 2 ⁸
Blue/black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



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www.fonlee.com.tw

REH-30R series

[Roller Encoder]

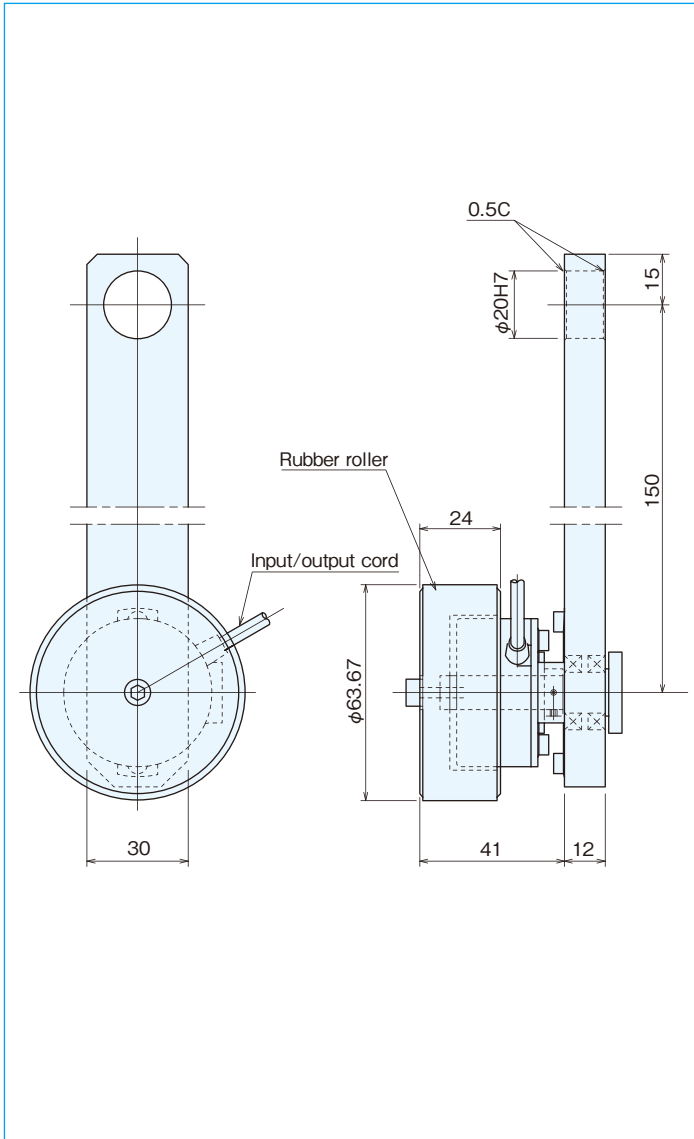


DC series

[Measuring Angle/Measuring Length Counter]



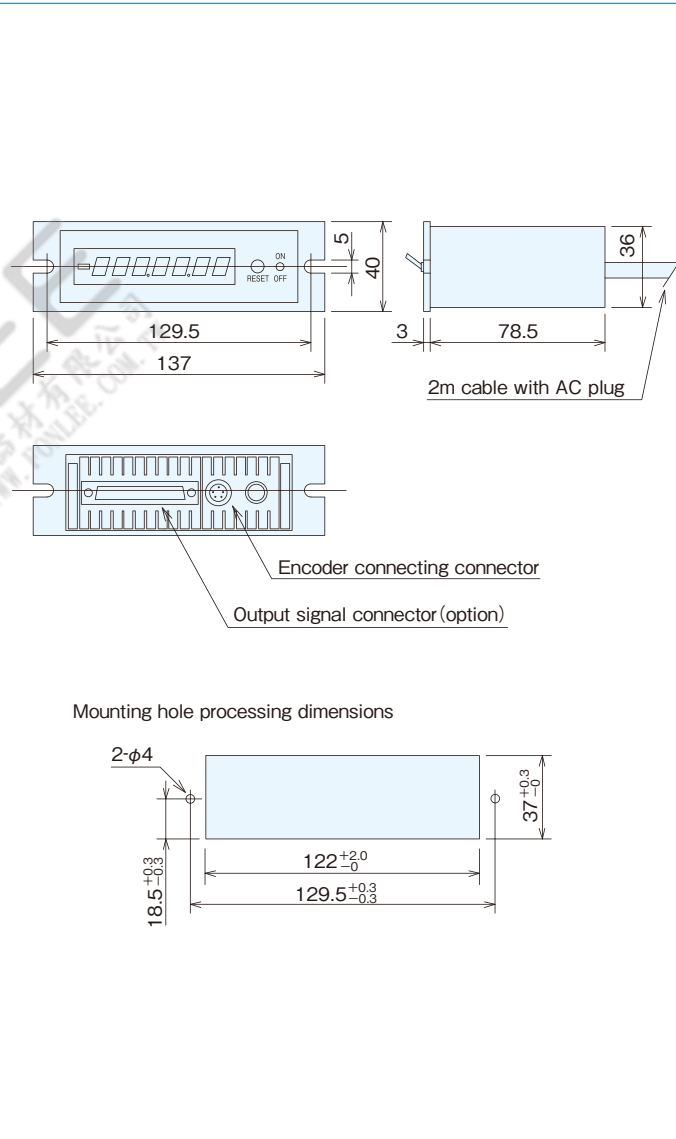
Outside dimensions



Specifications

Type name	REH-30- <input type="text"/> R <input type="text"/>				
Item	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 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°C~60°C RH35%~90% no dewing				
Storing ambient temperature	-20°C~80°C				
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions				
Impact resistance	Durability 500m/s ² (about 50G) 3 times each in X, Y, and Z directions				
Cable	Outside diameter φ4.2 5-core vinyl wire Insulated shield cable (length 1m)				
Mass	400g				

Outside dimensions

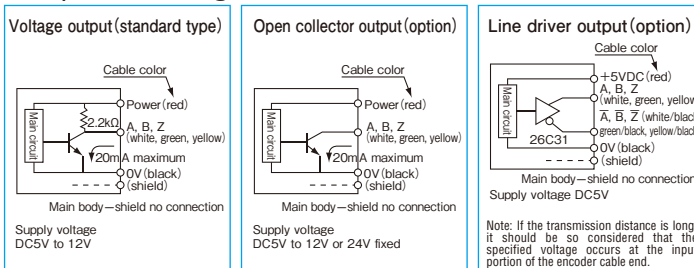


Counter specifications

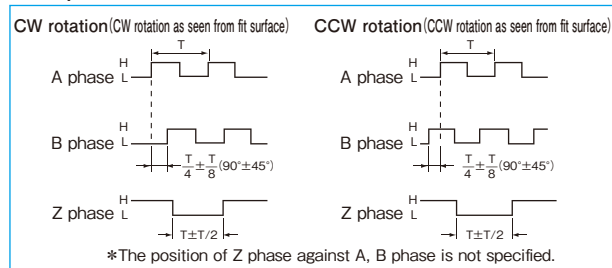
Type name	DC-※XX** <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	
Item	①Count mode ④BCD output ②Divider/multiplier ⑤Z Reset ③Display Units ⑥No. decimal places	
Count mode (※)	7:Angle	6:Decimal
Indicating function	With(-) indication, reversible	
Indicating range	-359.59.59~0 ~359.59.59	-9999.999~0 ~9999.999
Display Units (**)	S1:1sec, S10:10sec, S15:15sec, S30:30sec, M1:1min, M5:5min, M10:10min, D1:1h	
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 (xx)	×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°C~+60°C 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

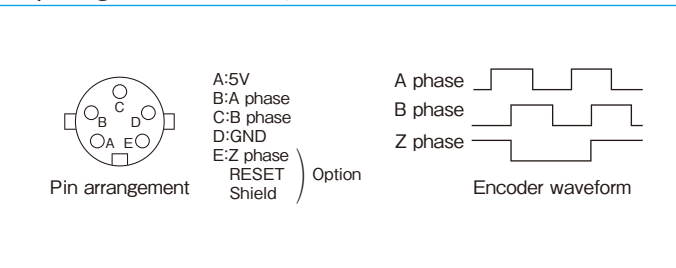
Output circuit diagram



Output waveform



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



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		

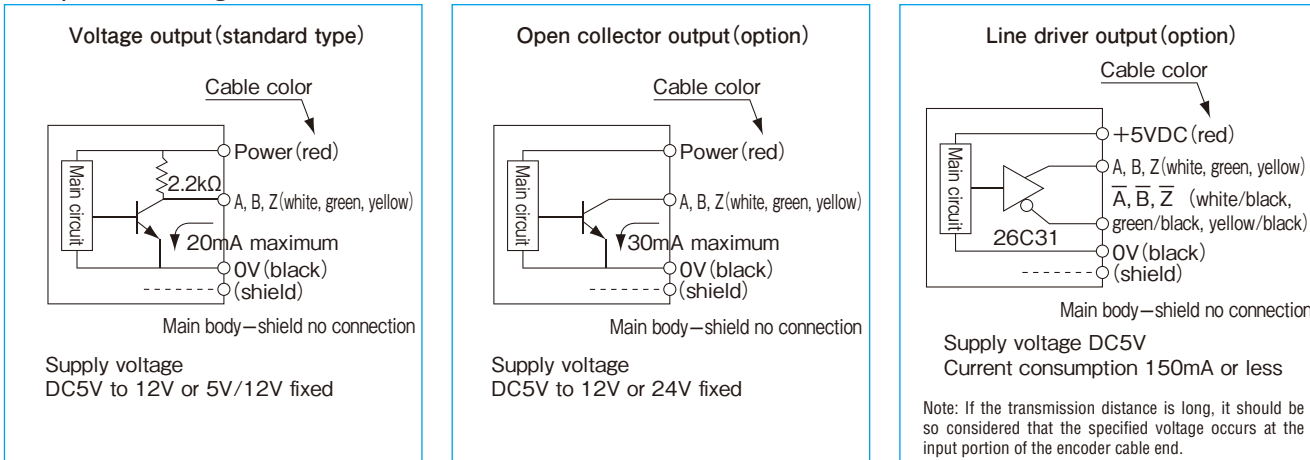
Output signal connector (Japan Aviation Electronics Industry: DC-37SAF-N)
Attached product (Japan Aviation Electronics Industry: DASP-JP37P)

Technical data

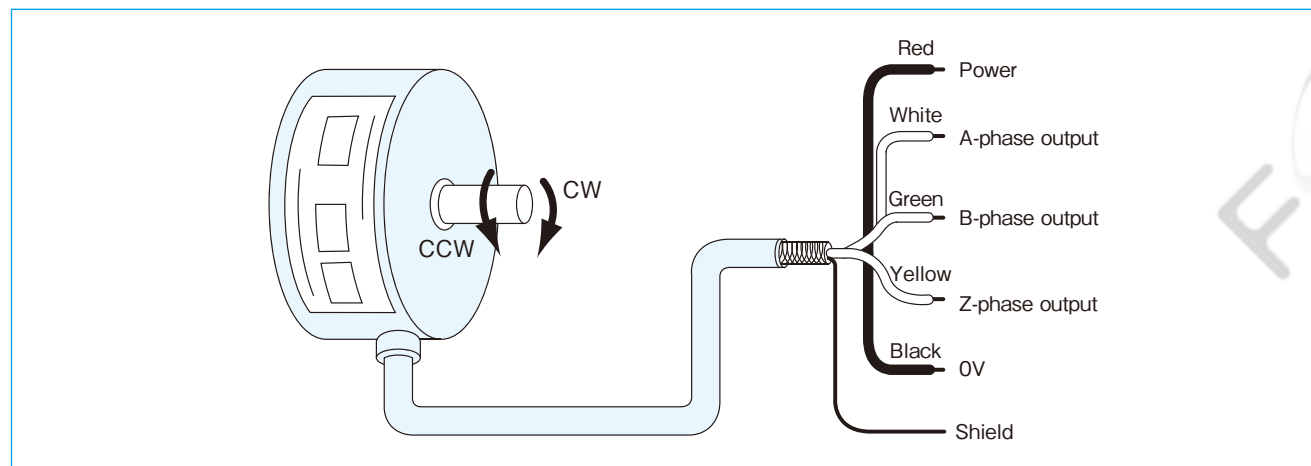
Incremental encoder

- 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.

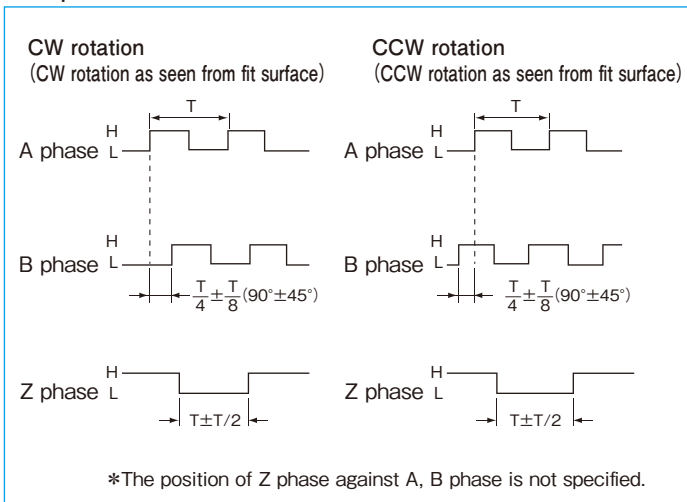
Output circuit diagram



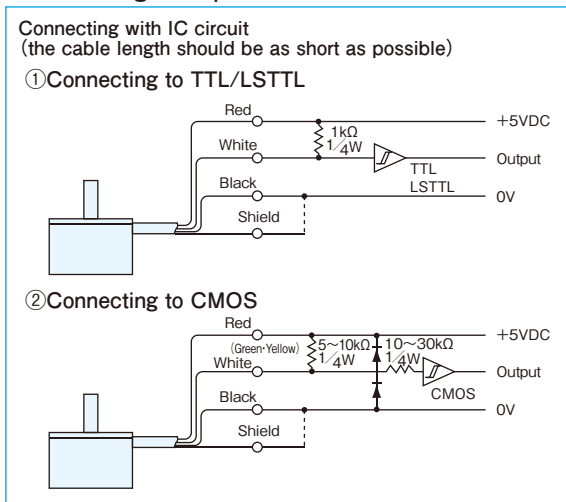
A capacitor (0.1μF) is connected between 0V and FG (frame ground).



Output waveform



Connecting example

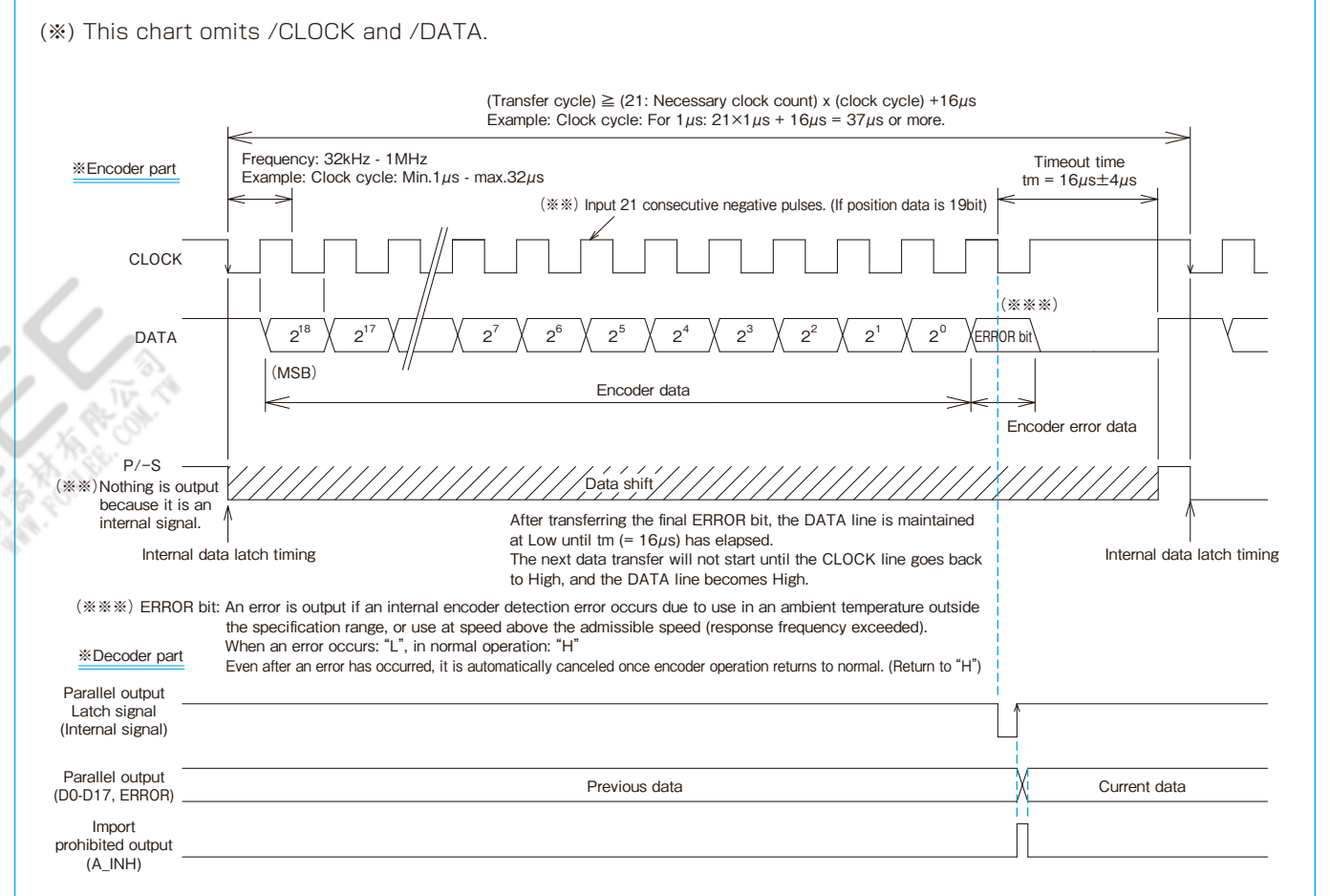


Absolute encoder

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



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.

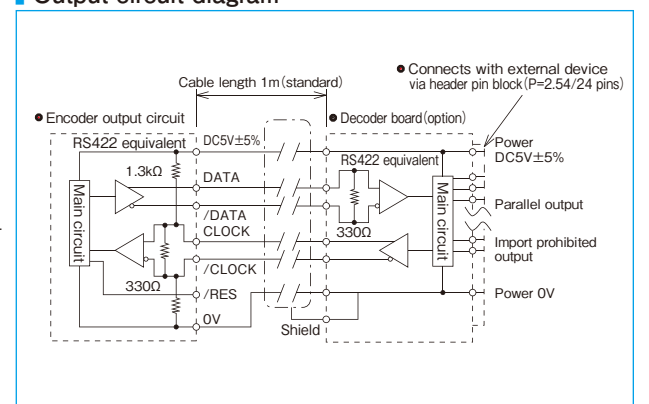
Decoder board TH No. (8pin)

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

- ※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.

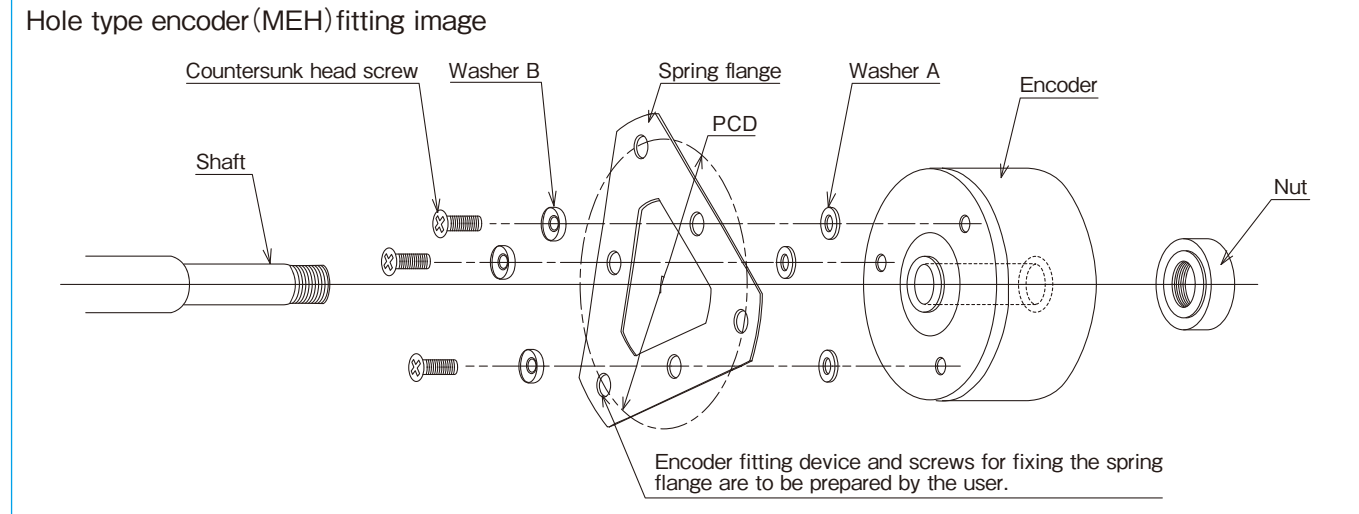
Output circuit diagram



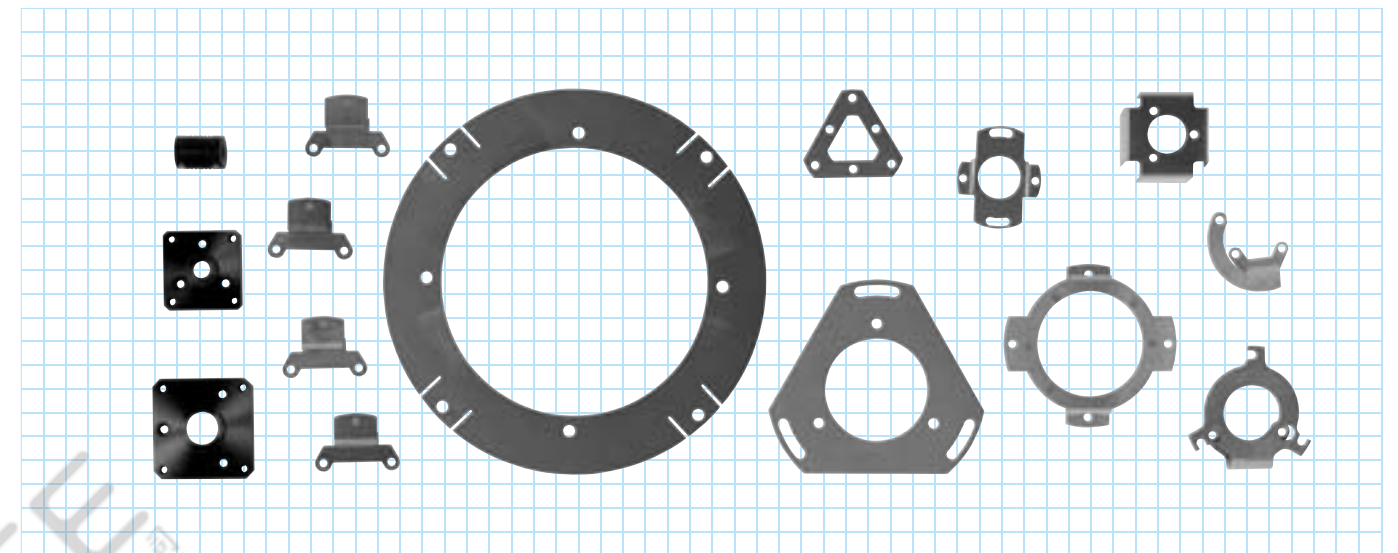
Setting Option/Coupling

▼ Hall type encoder (MEH/MAH) Mounting method

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



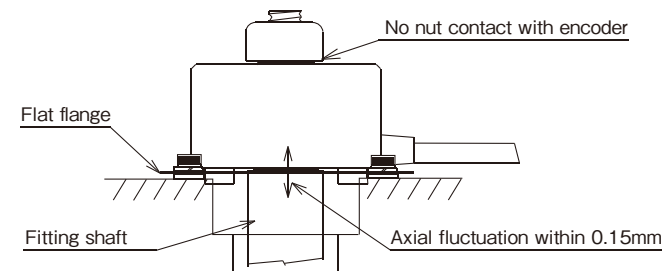
For the spring flange, see Setting Option (P84).



Precautions in assembling the hole-type encoder

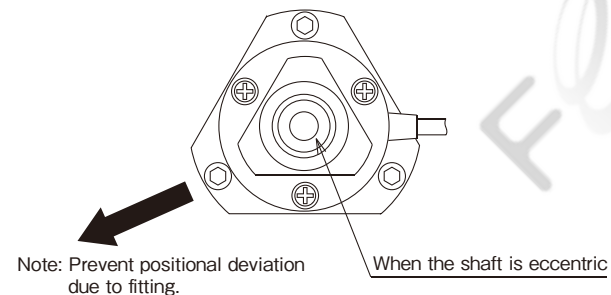
Effect on encoder of thrust load

Absorption of axial fluctuation of flat flange is within 0.15mm



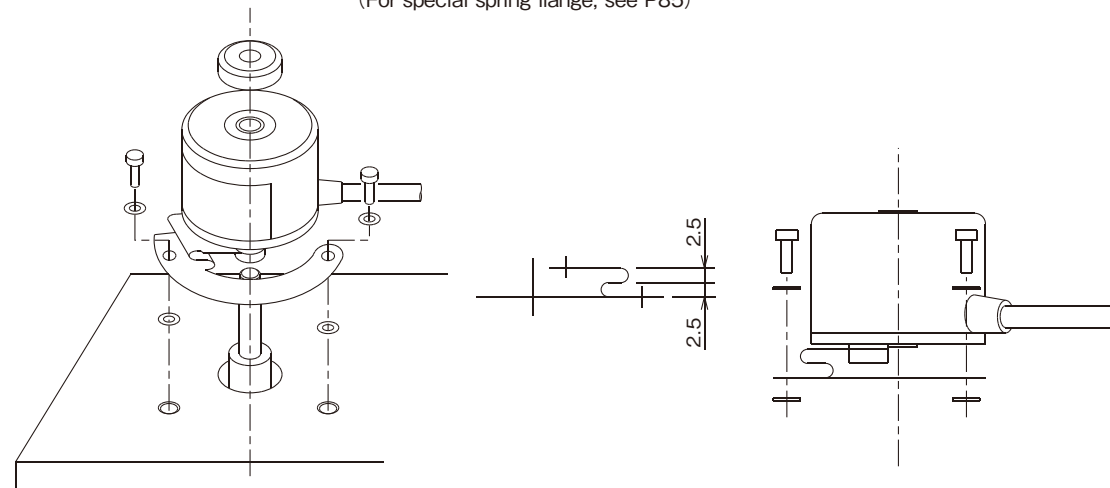
Effect on encoder of radial load

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)



▼ 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	—

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.