

# MTL



ISO 9001 certification  
JQA-1995



ISO 14001 certification  
JQA-EM5919

# MICRO ENCODER

Product Catalog

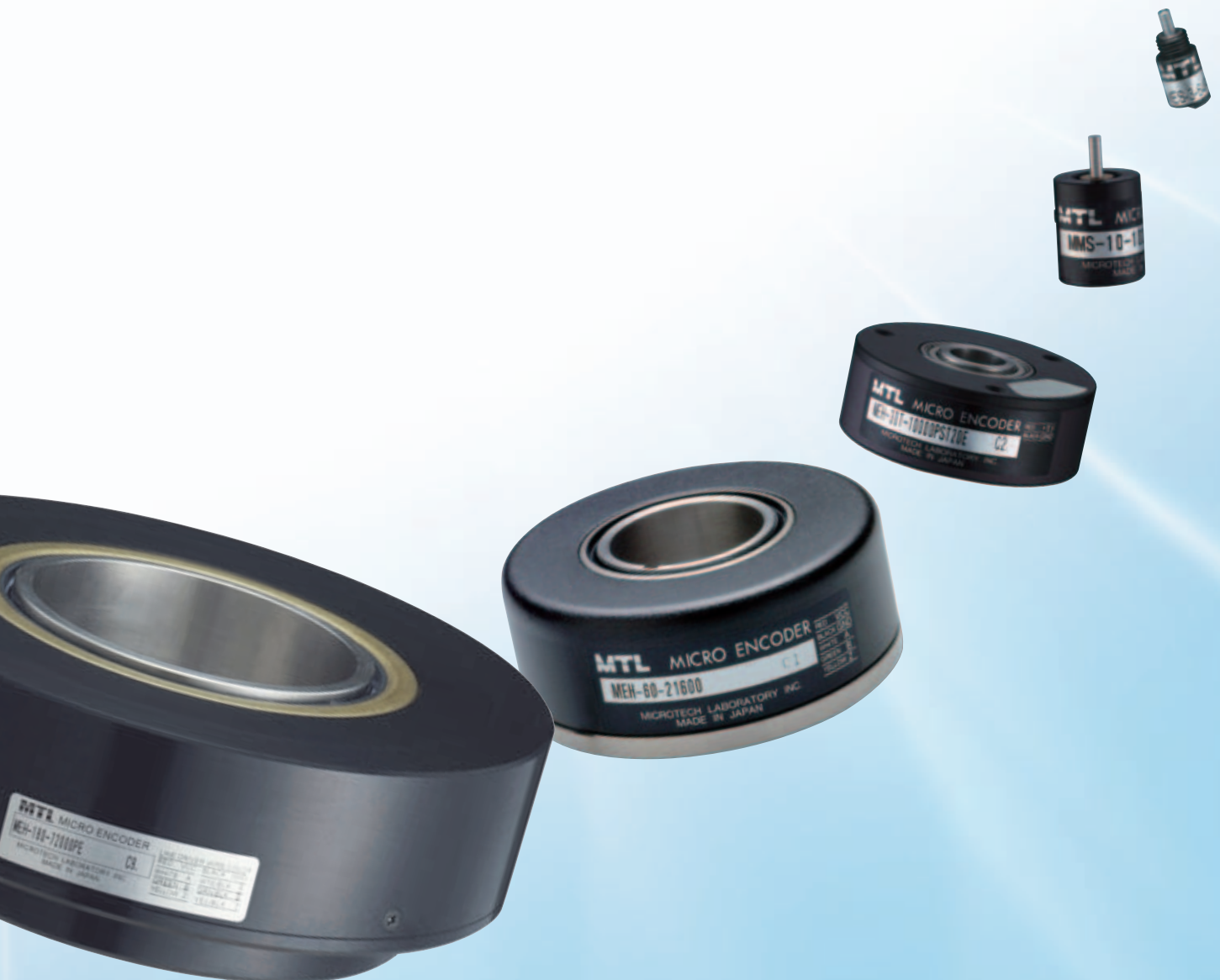


MICROTECH LABORATORY INC.

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.



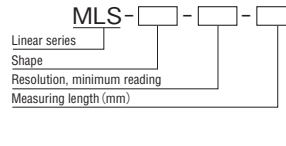
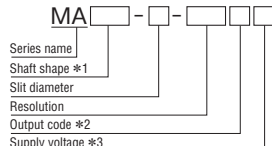
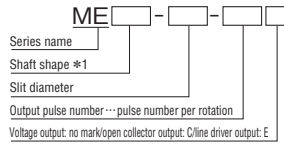
# MICRO ENCODER Description

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
<b>ME series</b>		MES-3P MES-3PST	$\phi 5 \times 9.6$ $6 \times 8.6$	64P/R, 100P/R 1024P/R	<ul style="list-style-type: none"> <li>The smallest model of ultra-small series.</li> <li>A, B, and Z phase output.</li> <li>Open collector output.</li> </ul>	7 8
		MES-6-□PC MES-6-□PST□C	$\phi 7.5 \times 10.5$ $\phi 7.5 \times 10.5$	100~500	<ul style="list-style-type: none"> <li>A, B, and Z phase output.</li> <li>Open collector output.</li> </ul>	9 10
		ME□-9-□P□	$\phi 13 \times 20$	32 1,024 (16,000)	<ul style="list-style-type: none"> <li>Compactness, light weight.</li> <li>A, B, and Z phase output.</li> <li>Hollow-shaft type convenient for small motors.</li> <li>Option</li> <li>With built-in PST <math>\times 2, \times 4, \times 8, \times 16</math> multiplication circuit</li> </ul>	11 12
		ME□-12-□P□	$\phi 20 \times 20$ (S)	60 2,048 (32,000)	<ul style="list-style-type: none"> <li>Compactness, light weight.</li> <li>A, B, and Z phase output.</li> <li>Availability of hollow-shaft type convenient for small motors.</li> <li>Option</li> <li>With built-in PST <math>\times 2, \times 4, \times 8, \times 16</math> multiplication circuit</li> </ul>	13 14
		MEH-14-2250 PSTN□E	$\phi 21 \times 16.5$	2,250 (72,000)	<ul style="list-style-type: none"> <li>Compact high-resolution incremental encoder</li> <li>Hollow shaft with 2.6 mm inner diameter.</li> <li>PSTN <math>\times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20, \times 32</math></li> </ul>	15 16
		ME□-17-□P	$\phi 20 \times 15$	100 500	<ul style="list-style-type: none"> <li>Compactness, light weight.</li> <li>A, B, and Z phase output.</li> <li>Availability of 3 types of shaft shape, single-shaft types <math>\phi 2</math> and <math>\phi 4</math> and hollow-shaft type.</li> </ul>	17 18
		MEH-19-3375 PSTN□E	$\phi 30 \times 16.5$	3,375 (108,000)	<ul style="list-style-type: none"> <li>Compact high-resolution incremental encoder</li> <li>Hollow shaft with 5 mm inner diameter.</li> <li>PSTN <math>\times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20, \times 32</math></li> </ul>	19 20
		ME□-20-□P□	$\phi 32 \times 22$	40 7,200 (144,000)	<ul style="list-style-type: none"> <li>Thin and compact popular type.</li> <li>Availability of shaft shape to meet various fitting systems.</li> <li>Option</li> <li>With built-in PST <math>\times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20</math> multiplication circuit</li> </ul>	21 22
		MEH-28-6750 PSTN□E	$\phi 40 \times 16.5$	6,750 (216,000)	<ul style="list-style-type: none"> <li>Compact high-resolution incremental encoder</li> <li>Hollow shaft with 8 mm inner diameter.</li> <li>PSTN <math>\times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20, \times 32</math></li> </ul>	23 24
		ME□-30-□P□	$\phi 44 \times 22$	40 10,800 (216,000)	<ul style="list-style-type: none"> <li>Thin and compact popular type.</li> <li>Availability of shaft shape to meet various fitting systems.</li> <li>Option</li> <li>With built-in PST <math>\times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20</math> multiplication circuit</li> </ul>	25 26
		MEH-30T-□PST□E	$\phi 44 \times 18$	20,000 200,000	<ul style="list-style-type: none"> <li>Thickness: 18mm</li> <li>Diameter hollow shaft: <math>\phi 10</math>mm</li> <li>Output pulse: 200,000P/R</li> <li>Maximum response frequency: 1 MHz</li> </ul>	27 28
		MES-40-□P□	$\phi 56 \times 36.8$	100 15,000 (300,000)	<ul style="list-style-type: none"> <li>Robust, general-purpose type.</li> <li>Hostile-environment and drip-proof specifications are also available.</li> <li>Load-resistance.</li> <li>Option</li> <li>With built-in PST <math>\times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20</math> multiplication circuit</li> </ul>	29 30
		MES-45-□-□□ (Old model: RK1•RKW1)	$\phi 55 \times 50$	360 9,000	<ul style="list-style-type: none"> <li>Strong type</li> <li>Environment resistance</li> </ul>	31 32
		ME□-50-□P□	$\phi 65 \times 30$	500 10,800 (216,000)	<ul style="list-style-type: none"> <li>Thin and compact popular type.</li> <li>Availability of shaft shape to meet various fitting methods.</li> <li>Option</li> <li>With built-in PST <math>\times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20</math> multiplication circuit</li> </ul>	33 34
		MEH-59-□PST□E	$\phi 70 \times 16.5$	1,024 (648,000)	<ul style="list-style-type: none"> <li>Thin and high resolution incremental encoder</li> <li>Hollow shaft of 25 in inside diameter.</li> <li>PSTN <math>\times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20, \times 32</math></li> <li>PSTG <math>\times 25, \times 50, \times 100</math></li> </ul>	35 36
		MEH-60-□P□	$\phi 74 \times 30$	100 21,600 (432,000)	<ul style="list-style-type: none"> <li>High resolution.</li> <li>Easy-to-fit thin type.</li> <li>Large hollow shaft of 30 in inside diameter.</li> <li>Option</li> <li>With built-in PST <math>\times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20</math> multiplication circuit</li> </ul>	37 38
		MEH-85-□P□	$\phi 100 \times 26$	150 21,600 (432,000)	<ul style="list-style-type: none"> <li>High resolution.</li> <li>Easy-to-fit thin type.</li> <li>Large hollow shaft of 36 in inside diameter.</li> <li>Option</li> <li>With built-in PST <math>\times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20</math> multiplication circuit</li> </ul>	39 40
		MEH-130-□P□	$\phi 150 \times 50$	360 36,000 (720,000)	<ul style="list-style-type: none"> <li>High resolution.</li> <li>Large hollow shafts of 60 and 75 in inside diameter.</li> <li>Option</li> <li>With built-in PST <math>\times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20</math> multiplication circuit</li> </ul>	41 42
		MEH-180-□P□	$\phi 200 \times 71$	36,000 72,000 (1440,000)	<ul style="list-style-type: none"> <li>High resolution.</li> <li>Large hollow shaft of 90 in inside diameter.</li> <li>Option</li> <li>With built-in PST <math>\times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20</math> multiplication circuit</li> </ul>	43 44
<b>MGH series</b>		MGH-20-□□ MGH-30-□□	$\phi 32 \times 22.5$ $\phi 44 \times 21$	40~1,200 40~2,000	<ul style="list-style-type: none"> <li>Light weight, compactness.</li> <li>Modular type best suited for small motors.</li> </ul>	45 46
	<b>MG series</b>		MG-20-□□ MG-30-□□	Diameter rotating slit $\phi 22$ Diameter rotating slit $\phi 31.6$	100~1,200 100~2,000	<ul style="list-style-type: none"> <li>Kit where the rotating slit and sensor unit are separate pieces.</li> <li>Compact and lightweight. Best suited for space-saving designs.</li> <li>A, B, and Z phase output.</li> </ul>

How to read type name



\*1

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

\*2

Gray	Pure binary	BCD
G	N	B

\*3










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

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



**Absolute**

Series name	Appearance	Type name	Outside dimensions	Resolution	Features	Page
<b>Single turn type</b>		MAS-3-4096N1	φ6×8.6	4096 2048 1024	●12bit, super-compact, smallest model in its series ●SSI interface	50
		MMS-10-[ ]G1	φ13×17.2	256 (8bit) } 1,024 (10bit)	●Outer diameter: φ13mm ●Height: 15.5mm ●Resolution: 1024 divisions ●SSI interface	51
		MAS-10-256G	φ13×15.5	256 (8bit)	●Ultra compact 8-bit absolute type ●Gray code output without reading error	52
		MAS-14-[ ]N1	φ21×16.5	32,768 (15bit) 65,536 (16bit) 131,072 (17bit) 262,144 (18bit)	●18bit small high-resolution absolute encoder ●SSI interface	53
		MA[ ]-17-[ ]1	φ20×21	256 (8bit) } 1,024 (10bit)	●Small absolute type. ●Availability of single-shaft (4 in diameter) and hollow shaft (2 in inside diameter). ●The output codes are gray code, pure binary code, and BCD code.	54
		MAS-18-[ ]N1	φ25×15	32,768 (15bit) 65,536 (16bit) 131,072 (17bit) 262,144 (18bit)	●17bit small high-resolution absolute encoder ●SSI interface	55
		MAH-19-[ ]N1	φ30×16.5	65,536 (16bit) 131,072 (17bit) 262,144 (18bit) 524,288 (19bit)	●19bit small high-resolution absolute encoder ●Hollow shaft type (5 in inside diameter) ●SSI interface	56
		MA[ ]-20-[ ]-1	φ32×24	256 (8bit) } 4,096 (12bit)	●Thin and compact 12-bit absolute encoder ●Availability of shaft shape to meet various fitting systems. ●The output codes are gray code, pure binary code, and BCD code.	57
		MAH-28-[ ]N1	φ40×16.5	262,144 (18bit) 524,288 (19bit) 1,048,576 (20bit)	●20bit small high-resolution absolute encoder ●Hollow shaft type (8 in inside diameter) ●SSI interface	58
		MA△-36-※※※N1	φ46×30	1048576 524288 262144	●Compact 20-bit absolute encoder ●SSI interface ●Availability of shaft shape to meet various fitting systems.	59
		MA[ ]-36-[ ]	φ46×30	256 (8bit) } 16,384 (14bit)	●Compact absolute encoder. ●Robust, hostile-environment type. ●Availability of shaft shape to meet various fitting systems.	60
		MA[ ]-42-[ ]	φ52×30	256 (8bit) } 4,096 (12bit)	●12bit absolute encoder ●The output codes are gray code, pure binary code, and BCD code.	61
		MAH-59-2097152N1	φ70×18	2097152 1048576 524288	●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	●21bit high-resolution absolute encoder. ●Large hollow shaft of 36 in inside diameter. ●SSI interface	63
<b>Multi turn type</b> <i>(Multiple-rotation)</i>		MAS-36-1000MT-S	φ46×30	1000×256	●Electronic multi-revolution absolute encoder. ●Single-revolution: 1,000 divisions, multi-revolution: -128 to 127 rotations. ●Binary output at decoder.	64
		MXH-36-256-1024GC5N	φ46×37	1024×256	●Mechanical multi-revolution absolute encoder, no battery backup required. ●φ8mm fully hollow shaft.	65
		MXS-36-[ ]-[ ]C6[ ]	φ46×55	128~1,024 (10bit)	●Multiple-rotation absolute encoder	66
		MXS-42-[ ]-[ ]-[ ]-[ ]	φ65×63.5	128~4,096 (12bit)	●Multiple-rotation absolute encoder	67

## Wire-type linear scale

Series name	Appearance	Type name	Features	Page
<b>Incremental formula</b>		MLS-12-□-□	<ul style="list-style-type: none"> <li>●Smallest in the series: Outside dimensions 23 x 24 x 25 (H)</li> <li>●Stroke: 250 mm</li> <li>●Resolution: Selection from among 0.1mm, 0.04mm</li> <li>●Lightweight: 60 g</li> </ul>	69
		MLS-30-□-□	<ul style="list-style-type: none"> <li>●Wire draw-out-type linear encoder. Detection of linear position to correspond to the draw-out amount of the wire.</li> <li>●Minimum reading 0.02mm, 0.2mm <math>\approx</math>0.005mm, 0.05mm is possible with 4-multiplying circuits.</li> <li>●Measuring range: 500mm, 1000mm.</li> <li>●Also available is a set type with indicator.</li> </ul>	70
		MLS-37-1024※◎-1500	<ul style="list-style-type: none"> <li>●Wire draw-out-type linear encoder. Detection of linear position to correspond to the draw-out amount of the wire.</li> <li>●Minimum reading 0.01mm <math>\approx</math>0.025mm is possible with 4-multiplying circuits.</li> <li>●Measuring range: 1500mm.</li> </ul>	71
		MLS-45-540※-4000	<ul style="list-style-type: none"> <li>●Compact and slim version of the MLS-50</li> <li>●Minimum reading 0.4mm <math>\approx</math>0.1mm is possible with 4-multiplying circuits.</li> <li>●Measuring range: 4000mm.</li> </ul>	72
		MLS-50-□-□	<ul style="list-style-type: none"> <li>●Wire draw-out type linear encoder. Detection of linear position corresponding to the draw-out amount of the wire.</li> <li>●Minimum reading 0.4mm <math>\approx</math>0.1mm is possible with 4-multiplying circuits.</li> <li>●Measuring range: 2000mm, 4000mm.</li> <li>●Also available is a set type with indicator.</li> </ul>	73
<b>Absolute formula</b>		MLA-17-□□1-60	<ul style="list-style-type: none"> <li>●Wire draw-out-type linear absolute encoder.</li> <li>●Smallest in the series: Outside dimensions 23 x 24 x 27.4 (H)</li> <li>●Output 1,024 (G, N) or 1,000 (B)</li> <li>●Main Applications: Robot Machine, small actuator, manipulator and etc.</li> </ul>	74
		MLA-30-□□□-90	<ul style="list-style-type: none"> <li>●Wire draw-out-type linear absolute encoder.</li> <li>●Minimum reading 0.088mm, 0.09mm</li> <li>●Output 1,024 (G, N) or 1,000 (B)</li> </ul>	75
		MLA-37-1024GC5NV-1500	<ul style="list-style-type: none"> <li>●Wire draw-out-type linear absolute encoder.</li> <li>●Reading 0.1mm</li> <li>●Measuring range: 1500mm.</li> </ul>	76
		MLA-42-□-□	<ul style="list-style-type: none"> <li>●Wire pulling linear absolute encoder Detection of absolute position does not need backup.</li> <li>●Resolution/measuring range: 0.1/400 mm, 0.25/1000 mm, 0.5/2000 mm, 1/4000 mm</li> </ul>	77

## Roller encoder / Counter

<b>Roller encoder REH series</b>		REH-30-□R□	<ul style="list-style-type: none"> <li>●Roller type linear encoder.</li> <li>●Easy measuring.</li> <li>●Minimum reading 0.1 to 1mm.</li> </ul>	79
<b>Measuring angle/ measuring length DC series</b>		DC-□□□□□□	<ul style="list-style-type: none"> <li>●Small and robust counter.</li> <li>●Decimal point moving, dividing/multiplying possible.</li> </ul>	80

		Page	
<b>Technical data</b>	Incremental encoder	81	
	Timing Chart for Serial Communications	82	
<b>Fitting Method</b>	Hole Type Encoder	83	
	Shaft Type Encoder	86	
<b>Setting Option/Coupling</b>	Spring flange	List of dimensions and accessories	84
		Special spring flange	85
<b>Frequently Asked Questions</b>	Issuance of Certificate of Non-applicability	87	
	Shipping charges		
	Purchase method (Contact)		
	Troubleshooting		
<b>Limitations on use, warranty</b>	Using our products safely	88	
	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

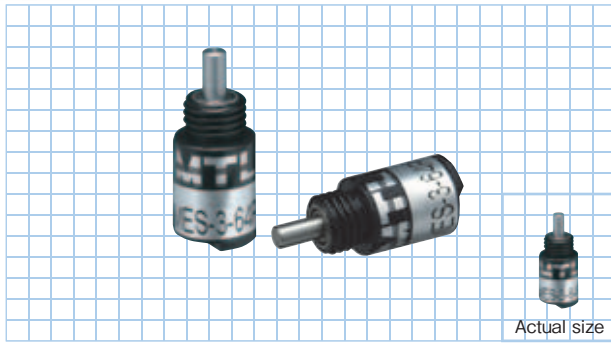
Abundant lineup, covering outer diameter  $\Phi 6$  -  $\Phi 200$ mm, resolution 40P/R - 1,440,000P/R, and hollow diameter  $\Phi 5$  -  $\Phi 90$ mm.

Choose from single-shaft type, double-shaft type, tubular-shaft type, and hollow-shaft type. These attributes can be combined to suit diverse applications.

<p>MES-3P/MES-3PST</p> 	<p>MES-6P/MES-6-125PST16C</p> 	<p>ME-9-P</p> 	<p>ME-12-P</p> 	<p>MEH14</p> 
<p>ME-17-P</p> 	<p>MEH-19</p> 	<p>ME-20-P</p> 	<p>MEH-28</p> 	<p>ME-30-P</p> 
<p>MEH-30T</p> 	<p>MES-40-P</p> 	<p>MES-45</p> 	<p>ME-50-P</p> 	<p>MEH-59</p> 
<p>MEH-60-P</p> 	<p>MEH-85-P</p> 	<p>MEH-130-P</p> 	<p>MEH-180-P</p> 	<p>MGH</p> 
<p>MG-20/30</p> 				

# MES-3P series

[Square Wave/Incremental]

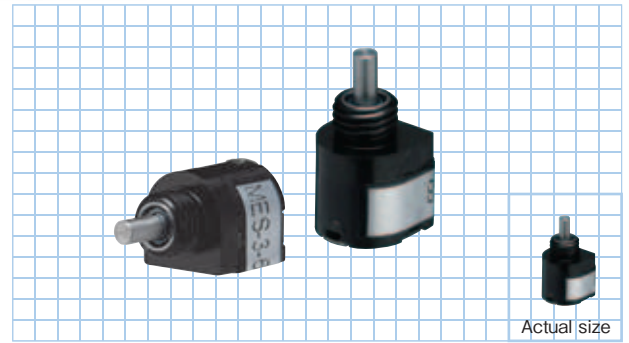


## Specifications

Item	Type name	MES-3-64P
Supply voltage		DC3.2±0.1V
Current consumption		15mA or less
Detection system		Incremental
Output	Output pulse number (Standard) [Pulse number/rotation]	64P/R, 100P/R
	Output phase	A, B, Z phase
	Output form	Square wave, Voltage (C-MOS) output
	Output capacity	CMOS output: Output current IOL=+8mA, IOH=-2mA Output voltage: VOL≤0.3V (when IOL=+1mA) VOH≥Vcc-0.3V (when IOH=-1mA) Output withstand voltage: 3.3V or less (power supply voltage or less)
	Maximum response frequency (response pulse number)	100kHz
	Output phase difference	A, B phase difference: T/4±T/8 Z phase T±0.5T
	Waveform rise/fall time	2μs or less (When 150mm flexible cable extended using 300mm AWG30 cable)
Allowable load of shaft (electrical)	Radial	0.98N (100gf)
	Thrust	0.98N (100gf)
Maximum allowable revolutions (mechanical)		6,000r/min
Working ambient temperature/humidity		0°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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions
Cable		Flexible cable: Length approx. 150mm
Mass		5g (including flexible cable)

# MES-3PST series

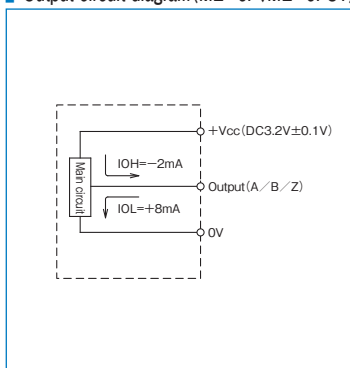
[Square Wave/Incremental]



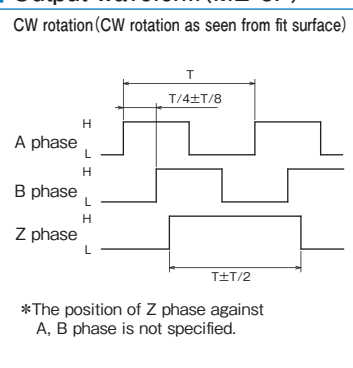
## Specifications

Item	Type name	MES-3-64PST16
Supply voltage		DC3.2±0.1V
Current consumption		20mA or less
Detection system		Incremental
Output	Output pulse number (Standard) [Pulse number/rotation]	1,024 pulse/rotation (64 pulses/rotation multiplied ×16 electrically)
	Output phase	A, B, Z phase
	Output form	Square wave, Voltage (C-MOS) output
	Output capacity	CMOS output: Output current IOL=+8mA, IOH=-2mA Output voltage: VOL≤0.3V (when IOL=+1mA) VOH≥Vcc-0.3V (when IOH=-1mA) Output withstand voltage: 3.3V or less (power supply voltage or less)
	Maximum response frequency (response pulse number)	100kHz
	Output phase difference	Phase difference between neighboring A/B phases: T/4 ± T/8 Waveform ratio of 1T: T ± 0.35T Z phase width: 1T (Synchronized with 1T of B phase)
	Waveform rise/fall time	2μs or less (When 150mm flexible cable extended using 300mm AWG30 cable)
Allowable load of shaft (electrical)	Radial	0.98N (100gf)
	Thrust	0.98N (100gf)
Maximum allowable revolutions (mechanical)		6,000r/min
Working ambient temperature/humidity		0°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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions
Cable		Flexible cable: Length approx. 150mm
Mass		5g (including flexible cable)

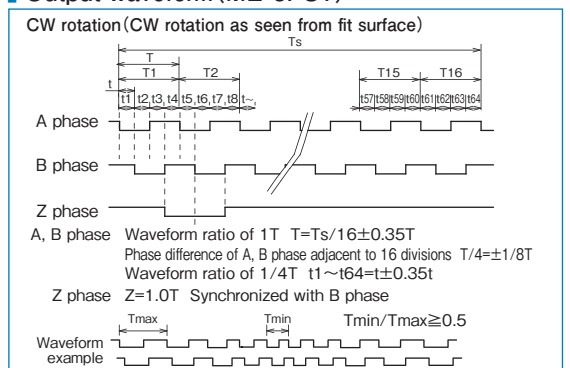
## Output circuit diagram (ME-3P, ME-3PST)



## Output waveform (ME-3P)



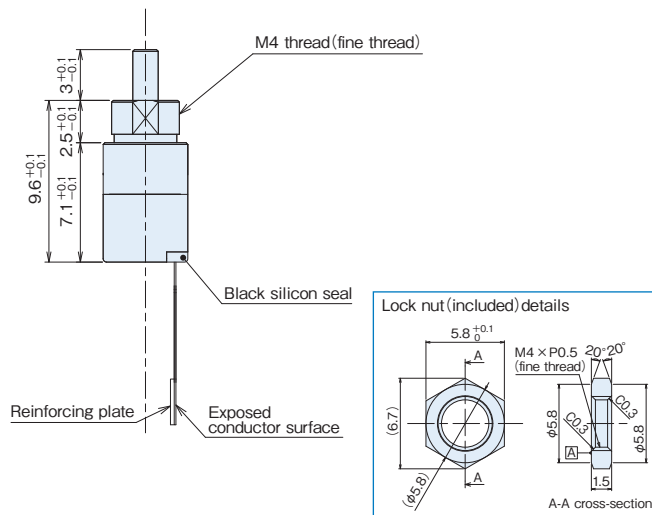
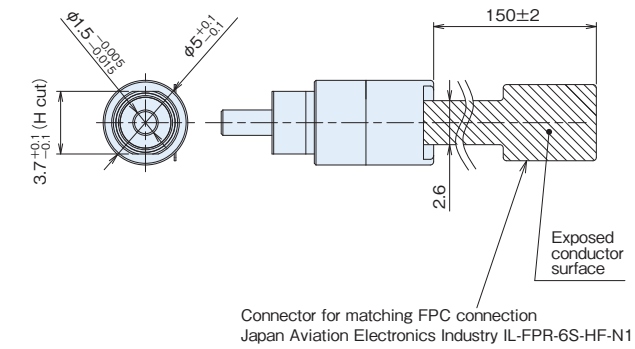
## Output waveform (ME-3PST)





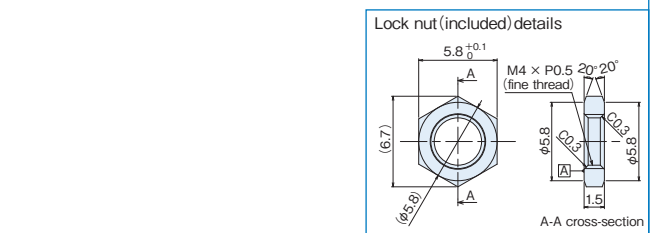
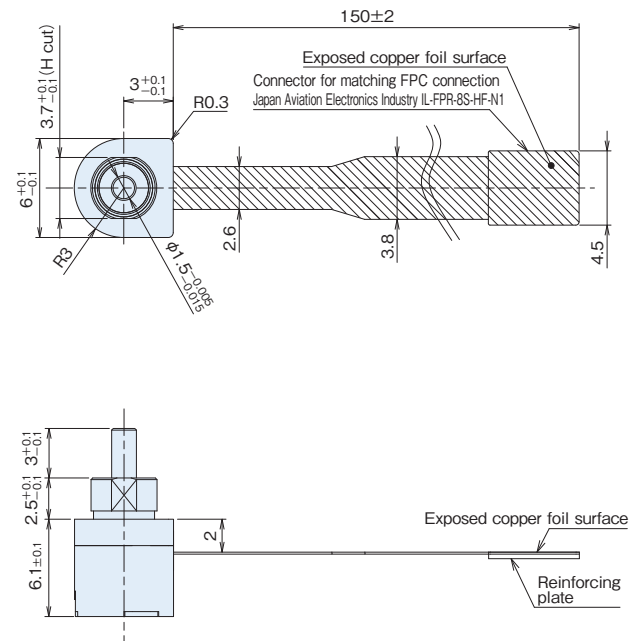
**Outside dimensions**

**MES-3P**

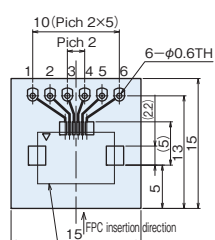


**Outside dimensions**

**MES-3PST**



**Terminal board (included) details**

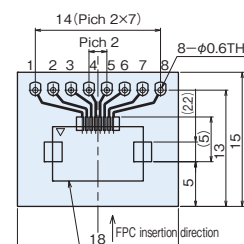


Connector: Japan Aviation Electronics Industry IL-FPR-6S-HF-N1

**Wiring chart**

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

**Terminal board (included) details**



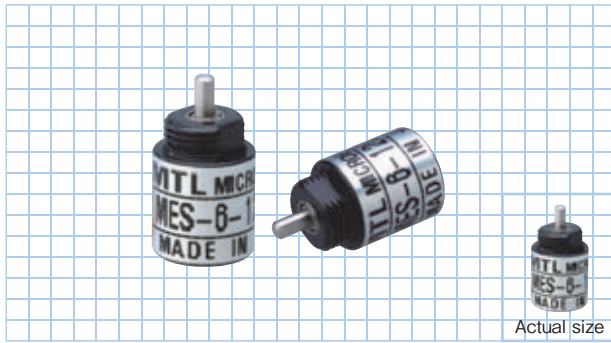
Connector: Japan Aviation Electronics Industry IL-FPR-8S-HF-N1

**Wiring chart**

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

# MES-6-P series

[Square Wave/Incremental]

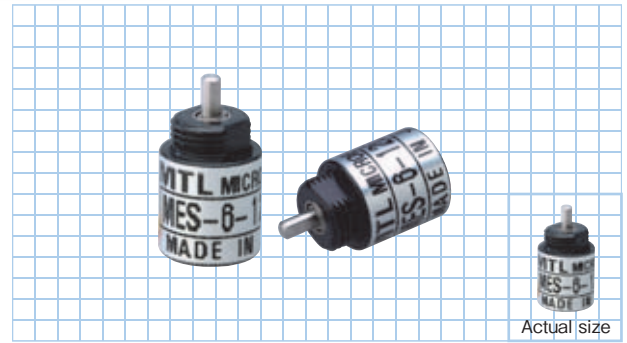


## Specifications

Type name		MES-6-□□PC
Item		Pulse number
Supply voltage		DC5V ±10%
Current consumption		30mA or less (under no load)
Detection system		Incremental
Output	Output pulse number (Standard) [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
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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions	
Cable	Vinyl wire (AWG32) Cable length 300mm	
Mass	5g	

# MES-6-I25PSTI6C

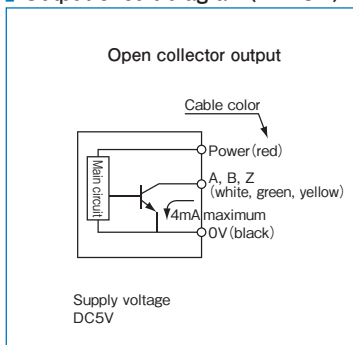
[Square Wave/Incremental]



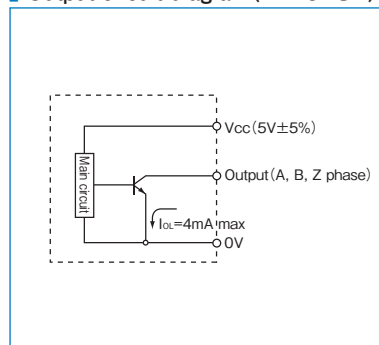
## Specifications

Type name		MES-6-□□PST□□C
Item		Pulse number Multiplication
Supply voltage		DC5V ±5%
Current consumption		30mA or less
Detection system		Incremental
Output	Output pulse number (Standard) [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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions	
Cable	Vinyl wire (AWG32) Cable length 300mm	
Mass	5g	

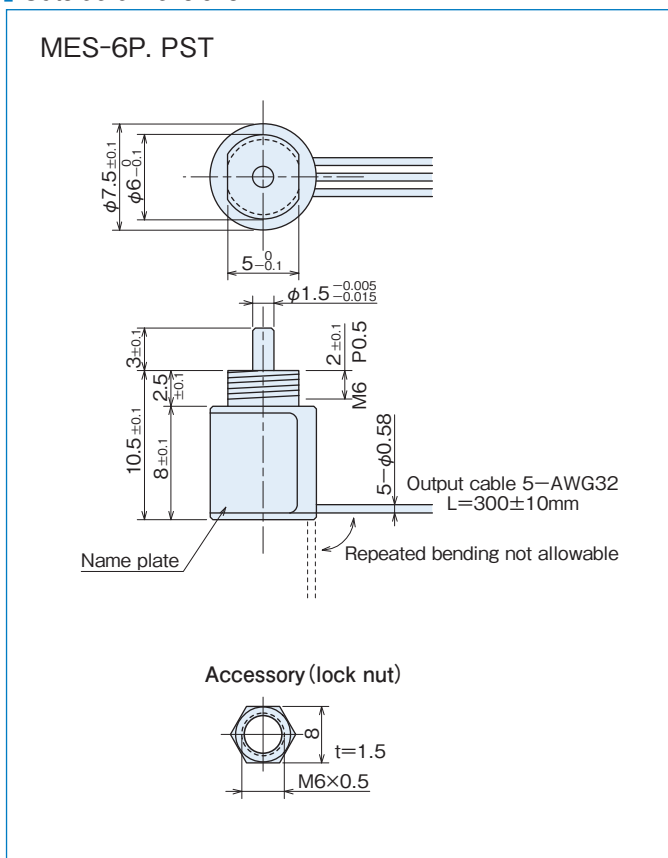
## Output circuit diagram (ME-6P)



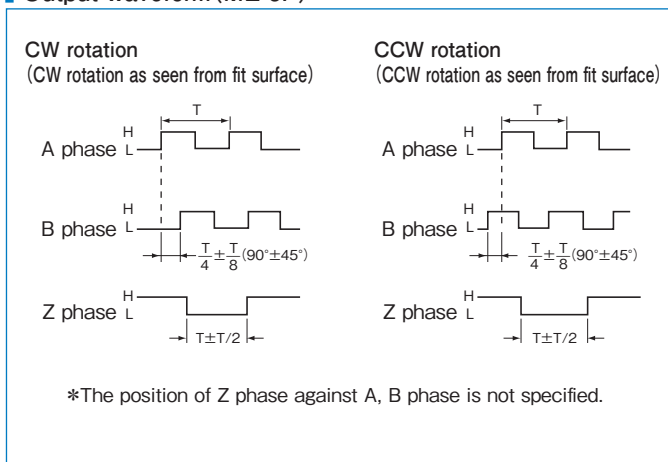
## Output circuit diagram (ME-6PST)



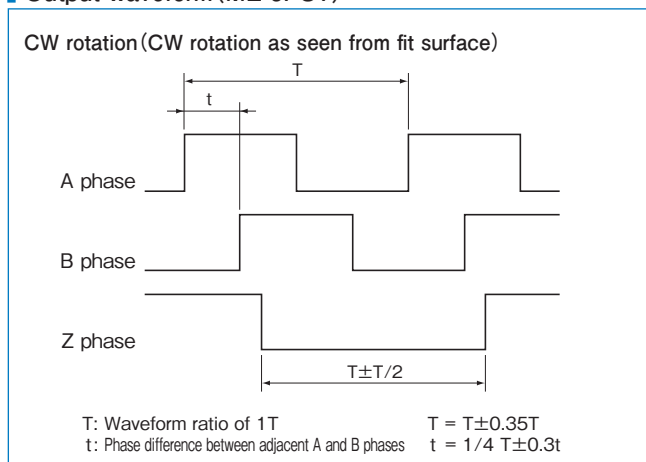
**Outside dimensions**



**Output waveform (ME-6P)**

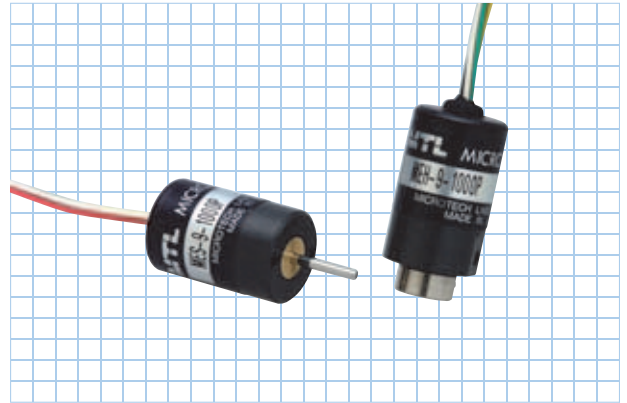


**Output waveform (ME-6PST)**



# ME-9-P series

[Square Wave/Incremental]



## Specifications

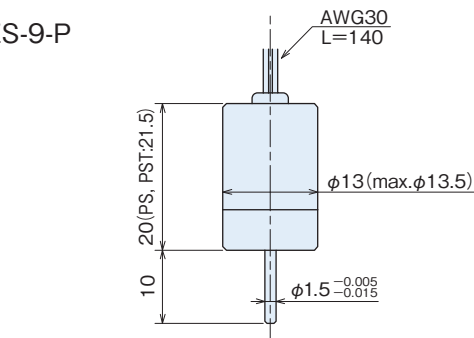
Type name		ME <input type="checkbox"/> -9- <input type="checkbox"/> P <input type="checkbox"/>			
Item		Shaft shape ●S=single shaft ●H=hollow shaft	Pulse number ●Noentry=Voltage output ●C=open collector output ●E=line driver output	Output circuit ●ST <input type="checkbox"/> (2·4·8·16)	
		Square wave		Built-in multiplication circuit (×2·×4·×8·×16)	
Supply voltage		DC5V ±10%		DC5V ±5%	
Current consumption		40mA or less (under no load)		50mA or less (under no load)	
Detection system		Incremental		Incremental	
Output	Output pulse number (Standard) [Pulse number/rotation]	32 100 200 256	300 360 500	900(*) 1,000(*) 1,024	EX 1,000×2 (2,000) 1,000×4 (4,000) 1,000×8 (8,000) 1,000×16 (16,000)
	Output 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)	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	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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s <sup>2</sup> (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

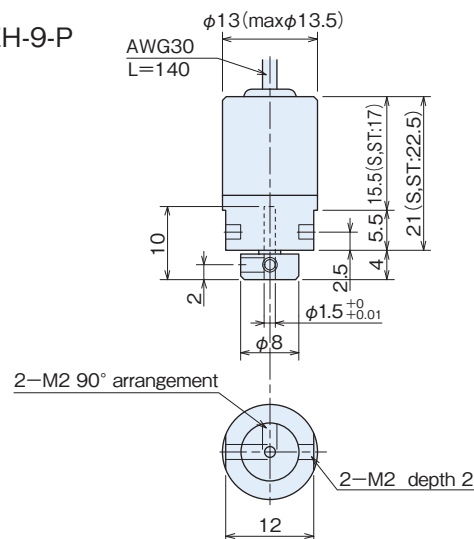
**Outside dimensions**

MES-9-P



2-M2 depth 3 equal arrangement  
PCD=10

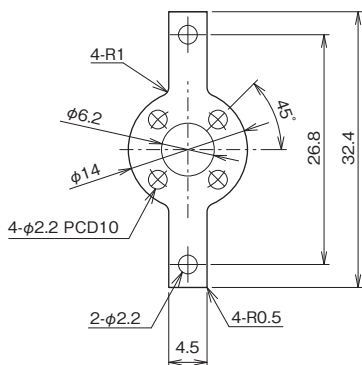
MEH-9-P



2-M2 90° arrangement

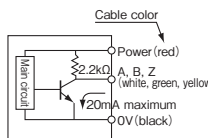
2-M2 depth 2

**Spring flange MEH-9(Included)**



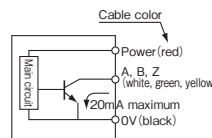
**Output circuit diagram (Square wave)**

Voltage output (standard type)



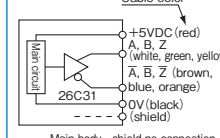
Supply voltage DC5V

Open collector output (option)



Supply voltage DC5V

Line driver output (option)

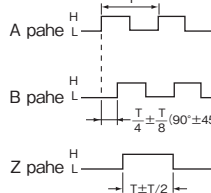


Main body—shield no connection  
Supply voltage DC5V

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

**Output waveform (Square wave) Voltage/Open collector**

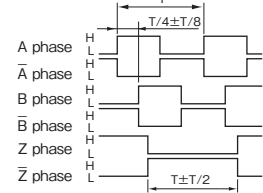
CW rotation (CW rotation as seen from fit surface)



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

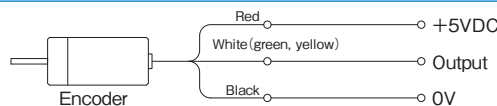
**Output waveform (Square wave) Line driver**

CW rotation (CW rotation as seen from fit surface)



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

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

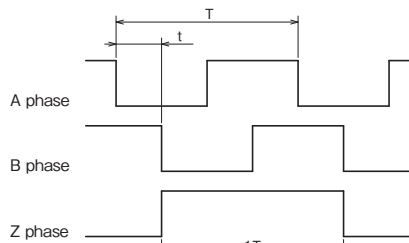


Cable color	Red	Black	White	Green	Yellow	Brown	Blue	Orange
Signal	+5V	0V	A phase	B phase	Z phase	A-bar phase	B-bar phase	Z-bar phase

\*Line driver output.

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

CW rotation (CW rotation as seen from fit surface)



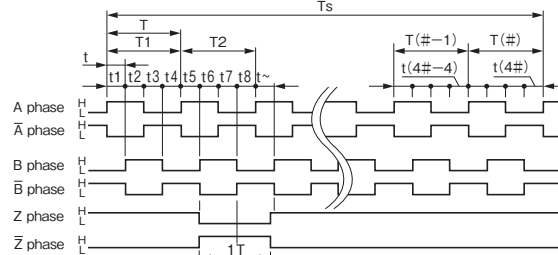
Synchronous with 1T of B phase

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

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

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

CW rotation (CW rotation as seen from fit surface)

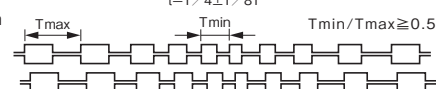


Synchronous with 1T of B phase

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

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

Waveform example



# ME-12-P series

[Square Wave/Incremental]



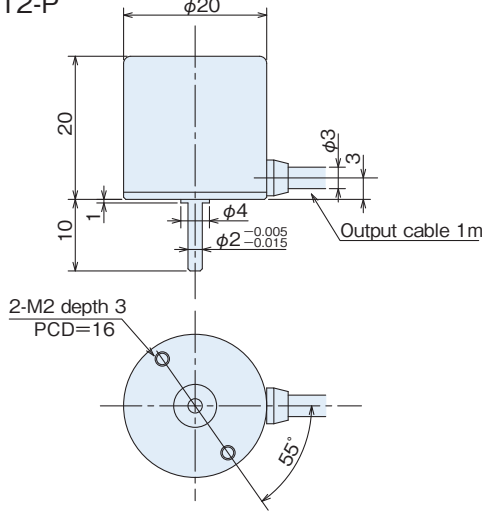
## Specifications

Type name		ME□-12-□P□				
Item		Shaft shape	Pulse number	Output circuit		
		●S=single shaft ●H=hollow shaft		●Noentry=Voltage output ●C=open collector output ●E=line driver output	●ST□(2·4·8·16)	
		Square wave		Built-in multiplication circuit (×2·×4·×8·×16)		
Supply voltage		DC5V ±10%		DC5V ±5%		
Current consumption		40mA or less (under no load)		60mA or less (under no load)		
Detection system		Incremental		Incremental		
Output	Output pulse number (Standard) [Pulse number/rotation]	60 100 125(*) 200 256(*)	300 360 500 600 900	1,000(*) 1,024(*)	1,500(*) 1,800(*) 2,000(*) 2,048(*)	EX 2,000×2(4,000) 2,000×4(8,000) 2,000×8(16,000) 2,000×16(32,000)
	Output 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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions			
Cable	Outside diameter φ3 5-core vinyl wire AWG28 Insulated shield cable (length 1m)		Outside diameter φ3 5-core vinyl wire AWG28 Insulated shield cable (length 1m)			
Mass	40g		40g			

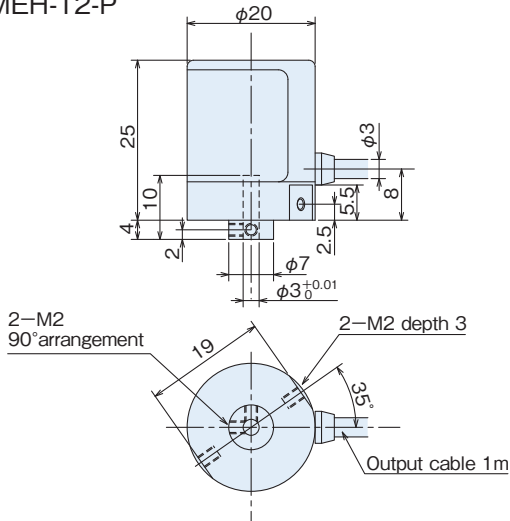
\*Handled by built-in multiplier circuit

**Outside dimensions**

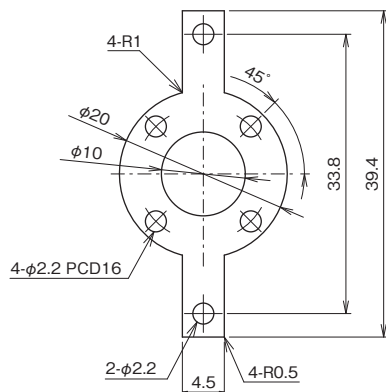
MES-12-P



MEH-12-P

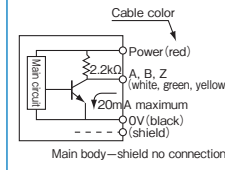


**Spring flange MEH-12 (Included)**

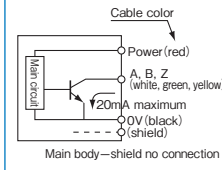


**Output circuit diagram**

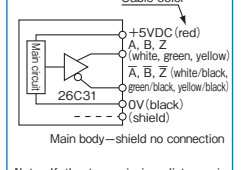
Voltage output (standard type)



Open collector output (option)

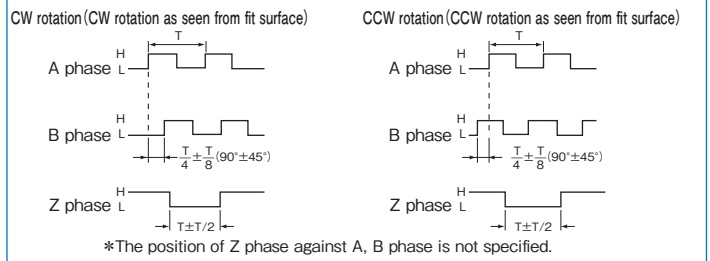


Line driver output (option)

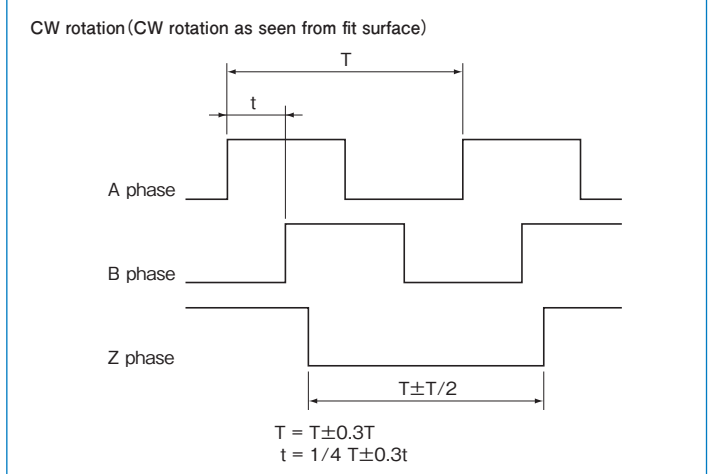


A capacitor (0.1μF) is connected between 0V and FG (frame ground).  
Note: This capacitor is not connected to the voltage or open collector output of the built-in multiplier circuit.

**Output waveform (Square wave)**



**Output waveform / Built-in multiplication circuit (x2·x4·x8·x16)**



# MEH-14 series

[Square Wave/Incremental]

- ▶ Outside dimensions  $\phi 2.1 \times 16.5\text{mm}$
- ▶ Through Shaft

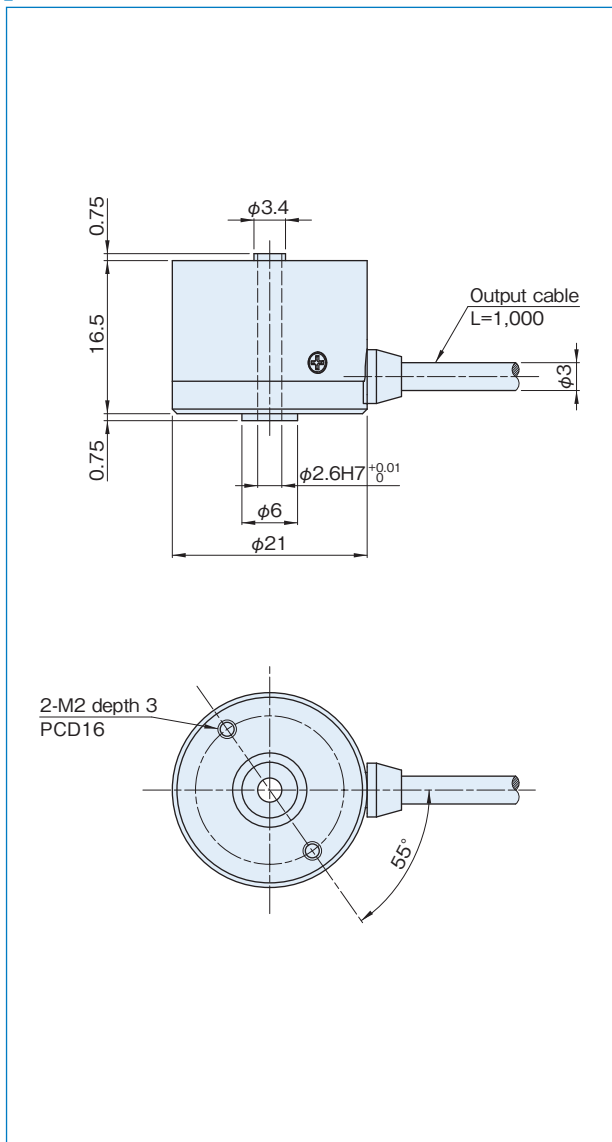


## Specifications

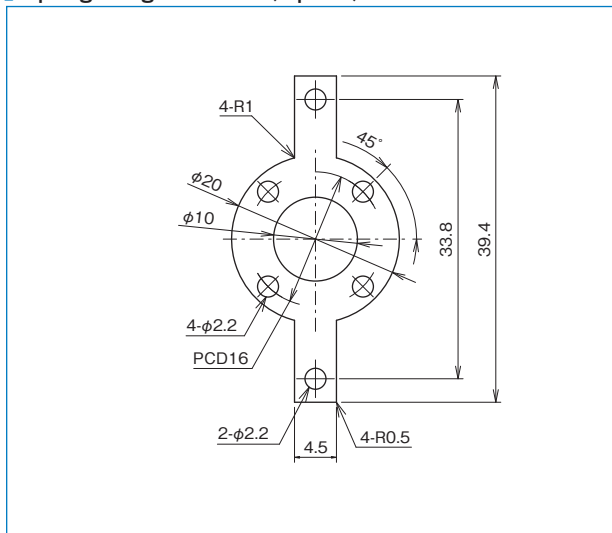
Type name	MEH-14-2250 PSTN <input type="checkbox"/> E
Item	
Detection system	Incremental
Output phase	A, $\bar{A}$ , B, $\bar{B}$ , Z, $\bar{Z}$ phase CS phase(U, $\bar{U}$ , V, $\bar{V}$ , W, $\bar{W}$ )
Output form	Square, Line driver output
Output pulse number(P/R)	2250, 4500(2250×2), 9000(2250×4) 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): ±20mAmax. Output voltage VoI: 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 $\phi 3.0$ 8-cores shield cable(without CS phase: 14-cores) AWG30
Mass	35g(excluding cable)



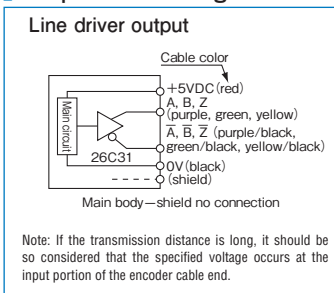
**Outside dimensions**



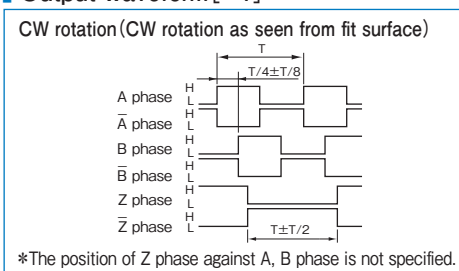
**Spring flange MEH-14 (Option)**



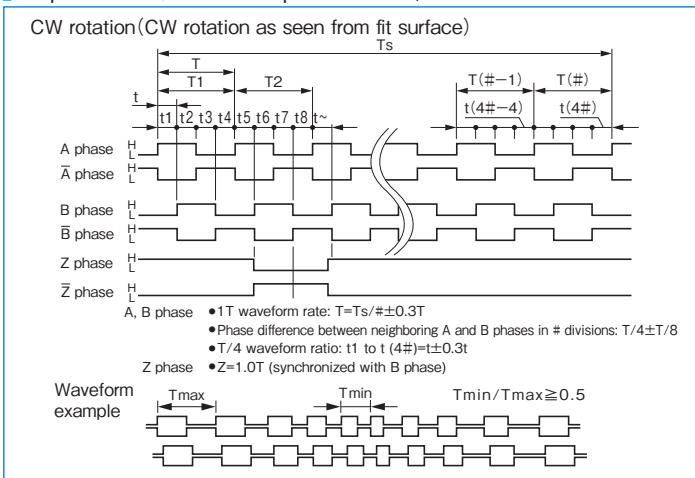
**Output circuit diagram**



**Output waveform [x1]**

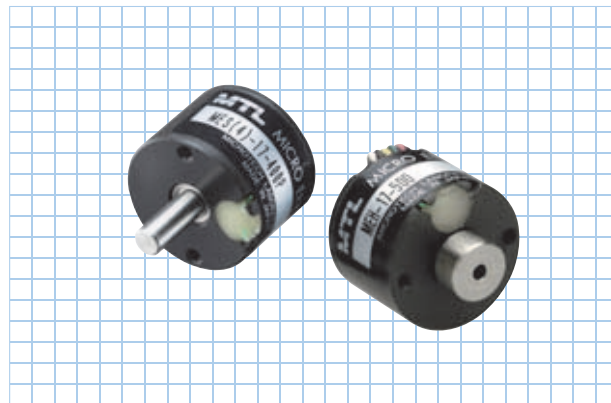


**Output waveform / Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20·x32)**



# ME-17-P series

[Square Wave/Incremental]

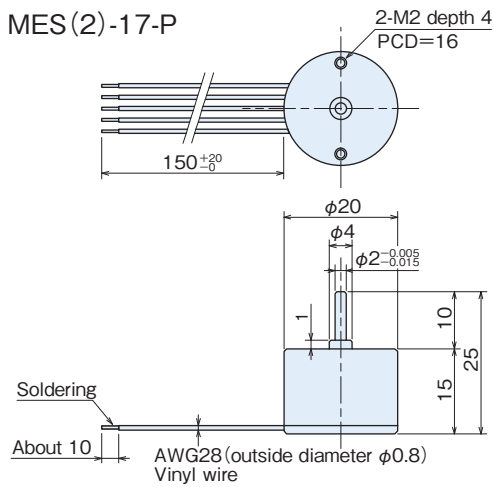


## Specifications

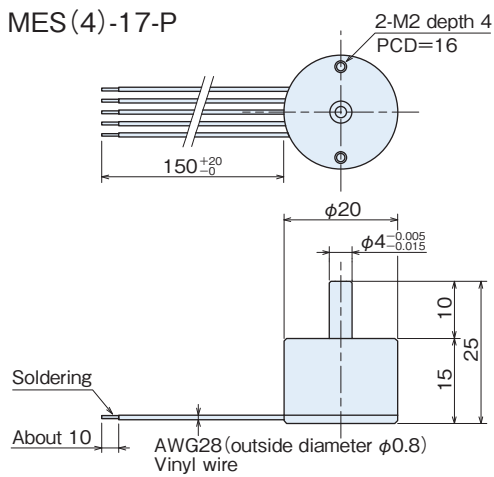
Type name		ME□-17-□P□		
Item		Shaft shape	Pulse number	Output circuit
		●S(2)=φ2 single shaft ●S(4)=φ4 single shaft ●H=hollow shaft		●Noentry=Voltage output ●C=open collector output
Supply voltage		DC5V ±10%		
Current consumption		30mA or less (under no load)		
Detection system		Incremental		
Output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

**Outside dimensions**

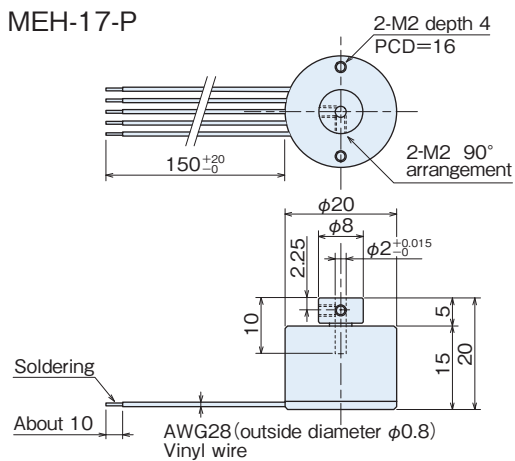
MES(2)-17-P



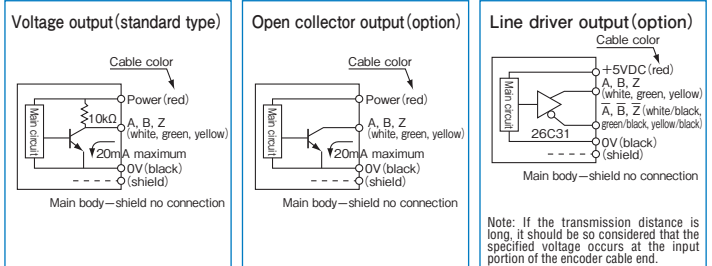
MES(4)-17-P



MEH-17-P

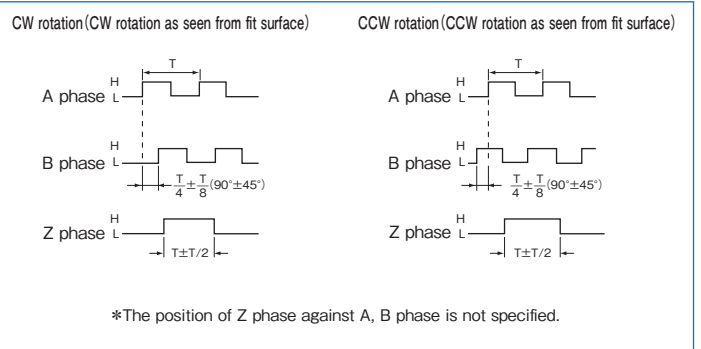


**Output circuit diagram**



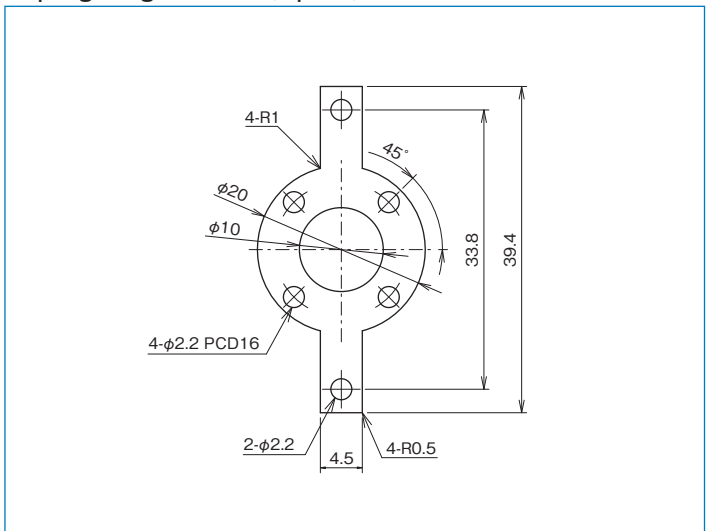
A capacitor (0.1μF) is connected between 0V and FG (frame ground).

**Output waveform**



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

**Spring flange MEH-17 (Option)**



# MEH-19 series

[Square Wave/Incremental]

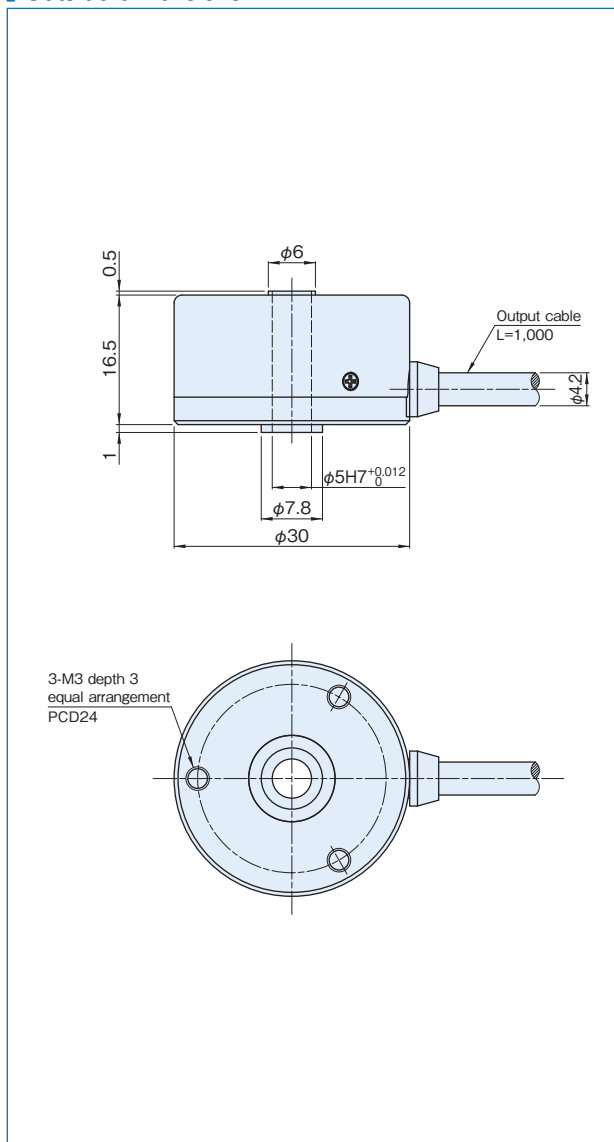
- Outside dimensions  $\phi 30 \times 16.5\text{mm}$
- Through Shaft



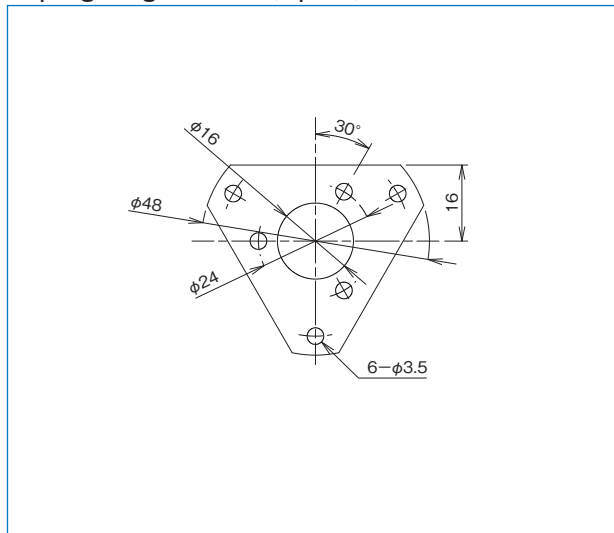
## Specifications

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, $\bar{V}$ , $\bar{W}$ , $\bar{W}$ )
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): ±20mAmax. Output voltage Vol: 0.5Vmax. VoH: 2.5Vmin.
Maximum allowable revolutions	6000r/min
Working ambient temperature/humidity	-10°C~+70°C/RH35%~90% no dewing
Storing ambient temperature	-20°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)

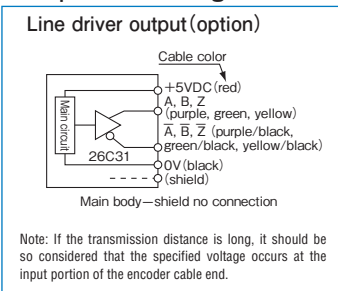
**Outside dimensions**



**Spring flange MEH-19 (Option)**

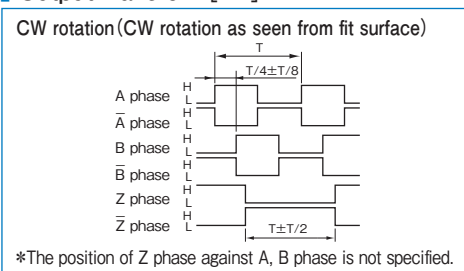


**Output circuit diagram**

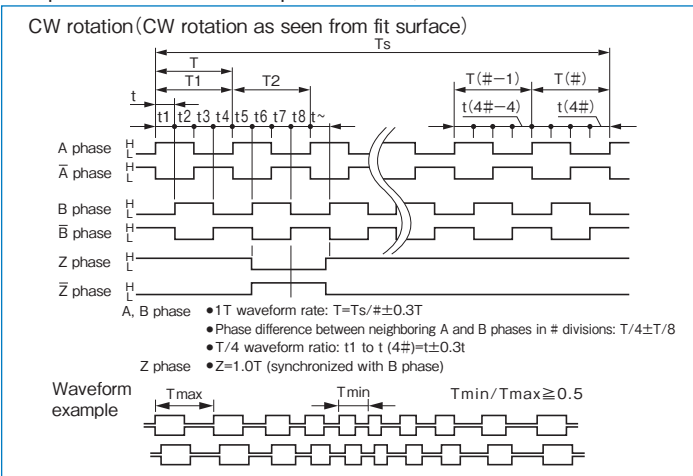


A capacitor (0.1  $\mu$ F) is connected between 0V and FG (frame ground).

**Output waveform [x1]**

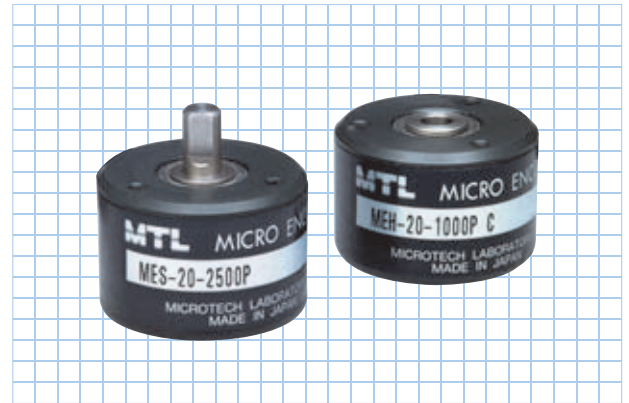


**Output waveform / Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20·x32)**



# ME-20-P series

[Square Wave/Incremental]



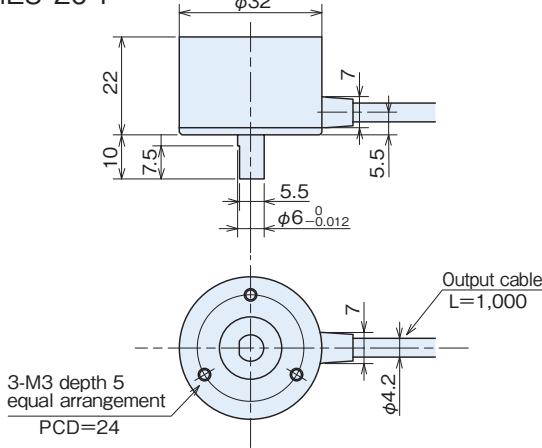
## Specifications

Type name		ME□-20-□P□			
Item	Shaft shape		Output circuit		
	●S=single shaft	●H=hollow shaft	●No entry=voltage output		
		Pulse number	●C=open collector output		
		●D=double shaft			
		●C4=open collector output DC24V			
		●E=line driver output			
		●ST□(2·4·5·8·10·16·20)			
		<b>Square wave</b>		<b>Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)</b>	
Supply voltage		Voltage / Open collector: DC5V -5% ~ 12V +10% Open collector C4: DC24V ±10% Line driver: DC5V -5% ~ 5V +10%		Voltage / Open collector: DC5V -5% ~ 12V +10% Line driver: DC5V ±5%	
Current consumption		70mA or less (under no load)		100mA or less (under no load)	
Detection system		Incremental		Incremental	
IndiNO	Output pulse number (Standard) [Pulse number/rotation]	40 250 512	600 1,800(*) 800 2,000(*) 1,000 2,048(*) 1,024 2,500(*) 1,200 3,600(*) 1,500 5,400(*) 7,200(*)	EX 7,200x2 (14,400) 7,200x4 (28,800) 7,200x5 (36,000) 7,200x8 (57,600) 7,200x10 (72,000) 7,200x16 (115,200) 7,200x20 (144,000)	
	Output phase	A, B, Z phase		A, B, Z phase	
	Output form	Square wave		Square wave	
	Output capacity	Sink current: 20mA Residual voltage: 0.5V or less (at 10mA)		Sink current: 20mA Residual voltage: 0.5V or less (at 10mA) Open collector output: Load voltage DC 13.2V max	
	Maximum response frequency (response pulse number)	100kHz		Line driver output: 50kHz x (by multiplication) Voltage·Open collector output: 100kHz	
	Output phase difference	A, B phase difference 90° ±45° (T/4 ± T/8) Z phase T ± T/2 (see Output Waveform)		Refer to the figure on the right	
	Waveform rise/fall time	2μs or less (output cable 1m or less)		—	
	Allowable load of shaft (electrical)	Radial	19.6N (2kgf)	14.7N (1.5kgf)	14.7N (1.5kgf)
Thrust		9.8N (1kgf)	4.9N (0.5kgf)	4.9N (0.5kgf)	
Maximum allowable revolutions (mechanical)	6,000r/min		6,000r/min		
Working ambient temperature/humidity	-10°C ~ 70°C RH35% ~ 90% no dewing		-10°C ~ 70°C RH35% ~ 90% no dewing		
Storing ambient temperature	-20°C ~ 80°C		-20°C ~ 80°C		
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		
Impact resistance	Durability 500m/s <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions		
Cable	Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)		Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)		
Mass	70g		70g		

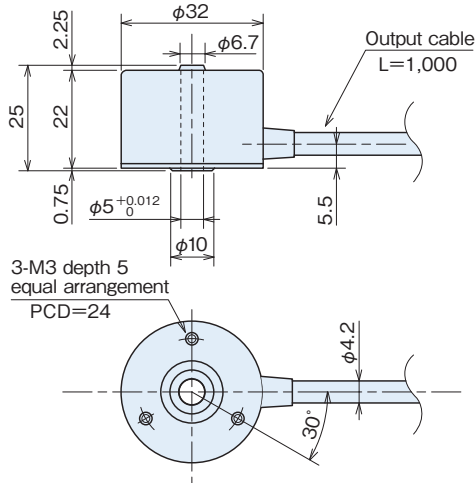
\*Handled by built-in multiplier circuit

**Outside dimensions**

**MES-20-P**

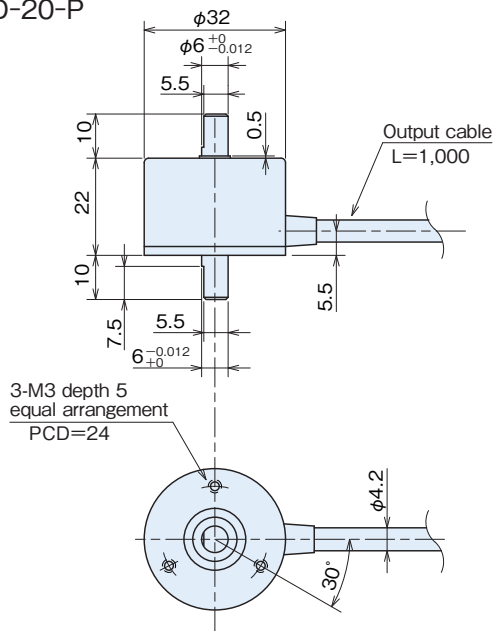


**MEH-20-P**

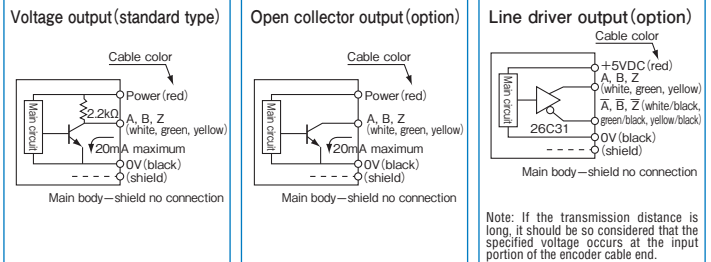


Other than the hollow shaft of bore diameter  $\phi 5\text{mm}$  (standard), we also have  $\phi 4\text{mm}$ .

**MED-20-P**

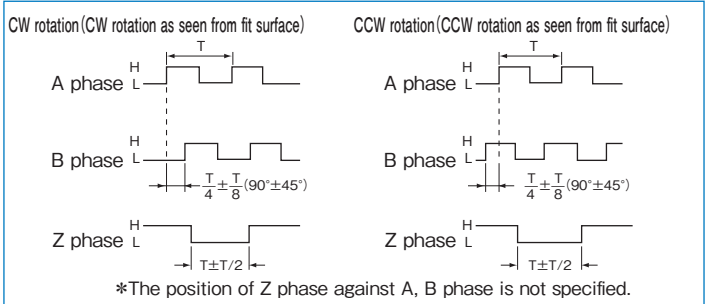


**Output circuit diagram**

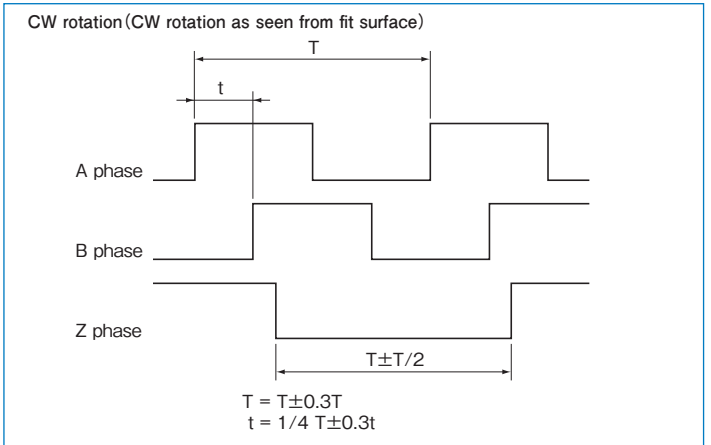


A capacitor (0.1 $\mu\text{F}$ ) is connected between 0V and FG (frame ground).

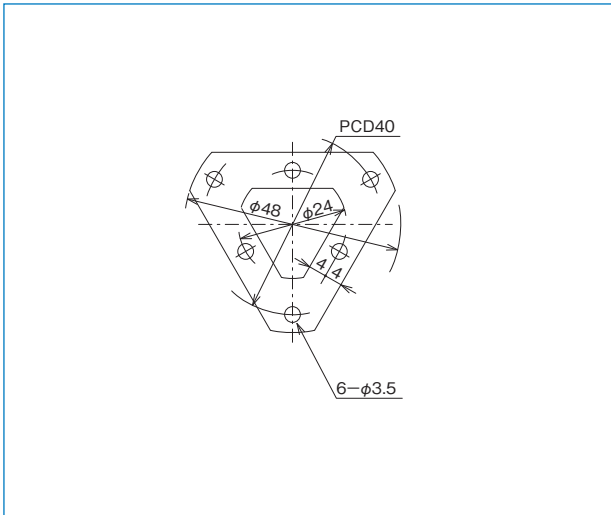
**Output waveform (Square wave)**



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



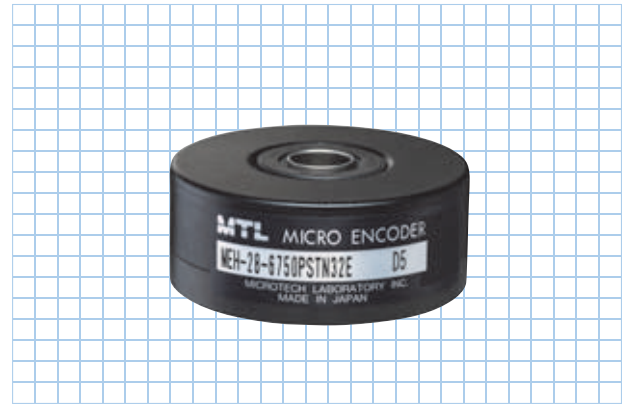
**Spring flange MEH-20 (Option)**



# MEH-28 series

[Square Wave/Incremental]

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

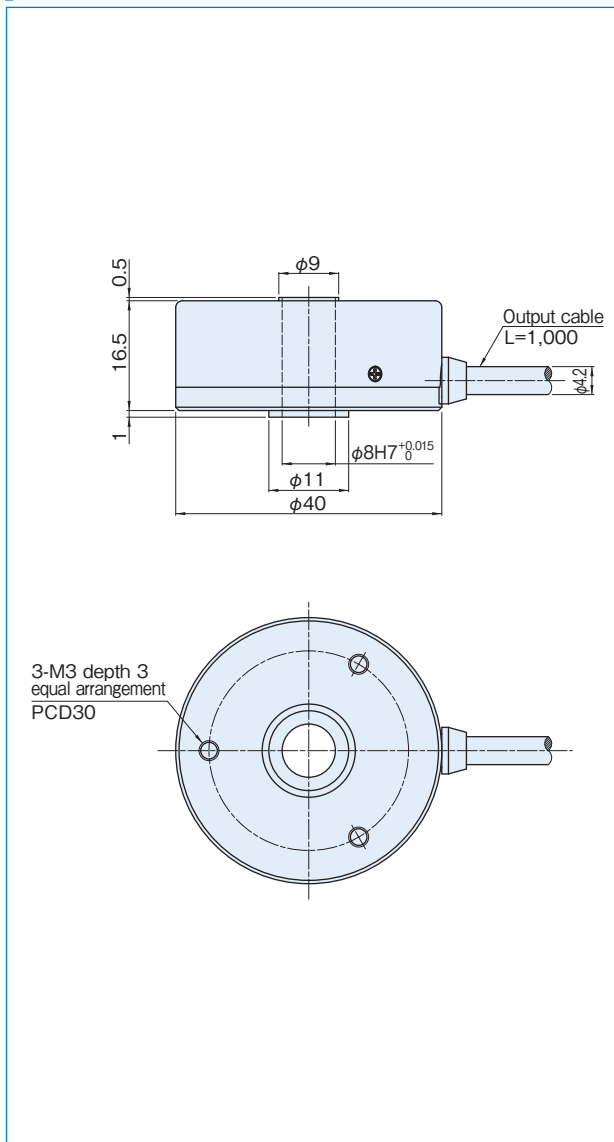


## Specifications

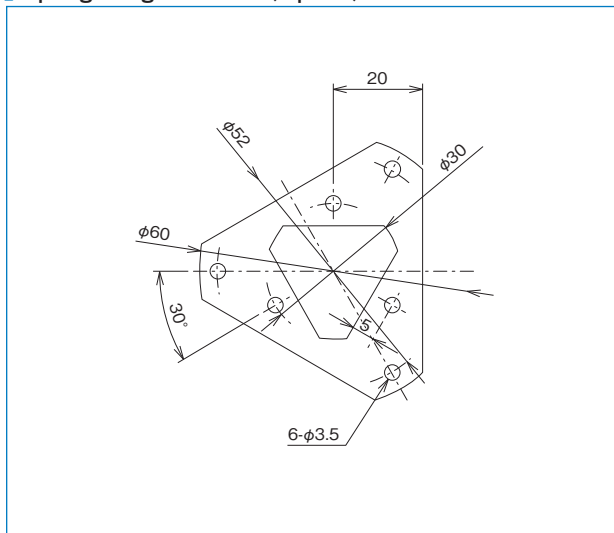
Type name	MEH-28-6750 PSTN□E
Item	
Detection system	Incremental
Output phase	A, $\bar{A}$ , B, $\bar{B}$ , Z, $\bar{Z}$ phase CS phase(U, $\bar{U}$ , V, $\bar{V}$ , W, $\bar{W}$ )
Output form	Square, Line driver output
Output pulse number (P/R)	6750, 13500 (6750×2), 27000 (6750×4) 33750 (6750×5), 54000 (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): $\pm 20\text{mAmax.}$ Output voltage VoI: 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 $\phi 4.2$ 8cores shield cable (without CS phase: 14-cores) AWG30
Mass	80g (excluding cable)



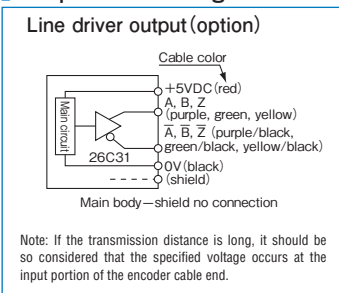
**Outside dimensions**



**Spring flange MEH-28 (Option)**

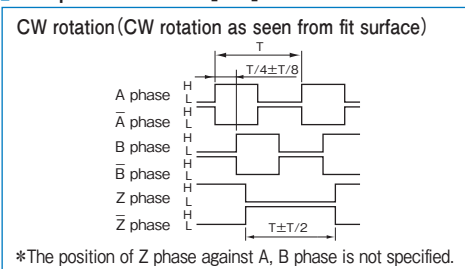


**Output circuit diagram**

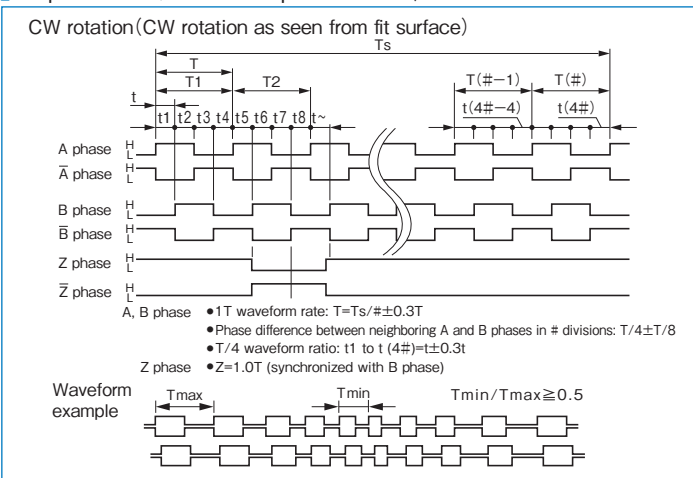


A capacitor (0.1  $\mu F$ ) is connected between 0V and FG (frame ground).

**Output waveform [x1]**

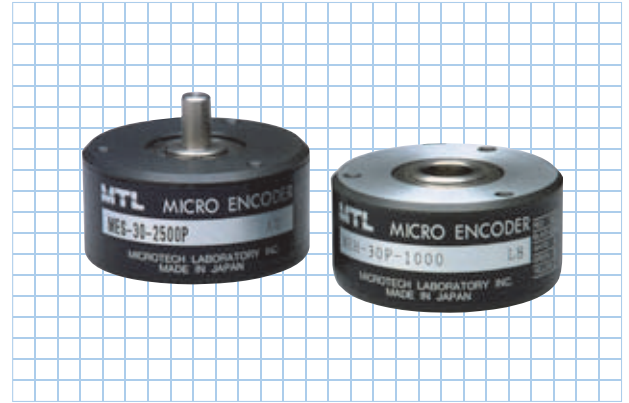


**Output waveform / Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20·x32)**



# ME-30-P series

[Square Wave/Incremental]



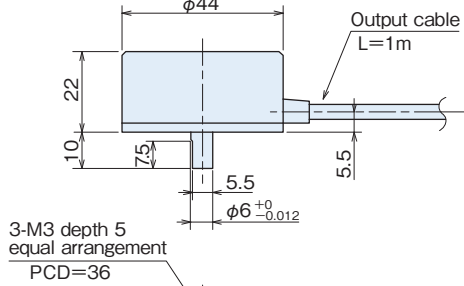
## Specifications

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	
		●E=line driver output ●ST□(2·4·5·8·10·16·20)		
		<b>Square wave</b>		
Supply voltage	Voltage / Open collector: DC5V-5%~12V+10% Open collector C4: DC24V±10% Line driver: DC5V±5%		Built-in multiplication circuit (X2·X4·X5·X8·X10·X16·X20) Voltage: DC5V-5%~12V+10% Open collector: DC5V-5%~24V+15% Line driver: DC5V±5%	
Current consumption	70mA or less (under no load)		100mA or less (under no load)	
Detection system	Incremental		Incremental	
Output	Output pulse number (Standard) [Pulse number/rotation]	40 250 500 50 300 512 60 360 600 100 400 200 450	720 2,500(*) 800 3,600(*) 900 4,096(*) 1,000 4,500(*) 1,024 5,000(*) 1,200 6,000(*) 1,500 8,192(*) 1,800 9,000(*) 2,000(*) 10,000(*) 2,048(*) 10,800(*)	
	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		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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions	
Cable	Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)		Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)	
Mass	140g		140g	

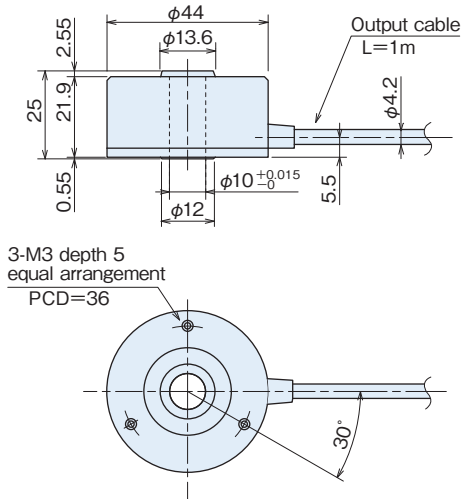
\*Handled by built-in multiplier circuit

**Outside dimensions**

**MES-30-P**

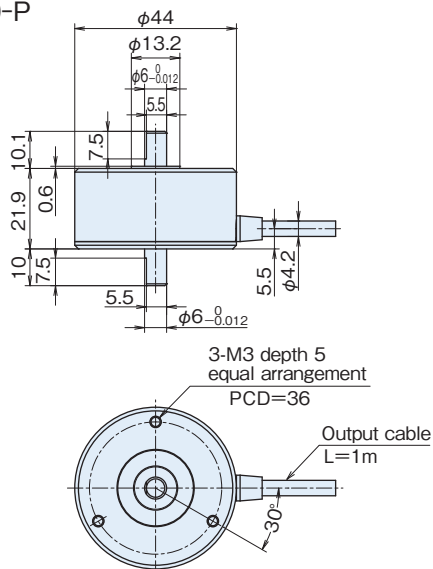


**MEH-30-P**

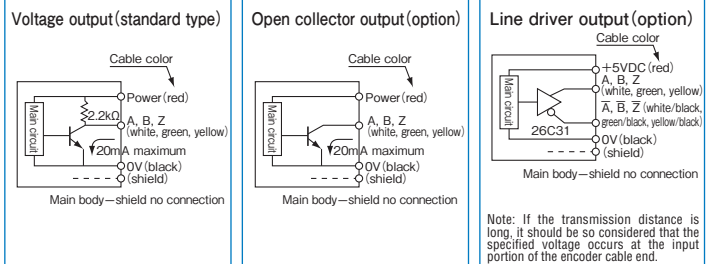


We have the hollow shaft of bore diameter  $\phi 10$ mm (standard) as well as  $\phi 8$ mm and 12mm.

**MED-30-P**

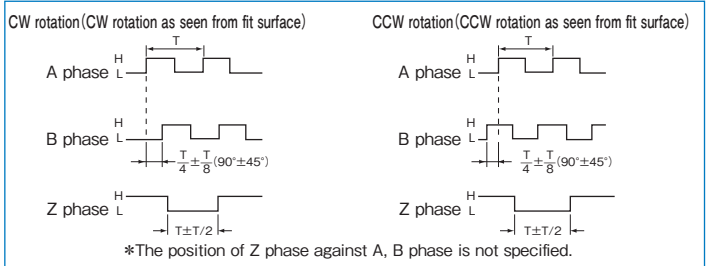


**Output circuit diagram**

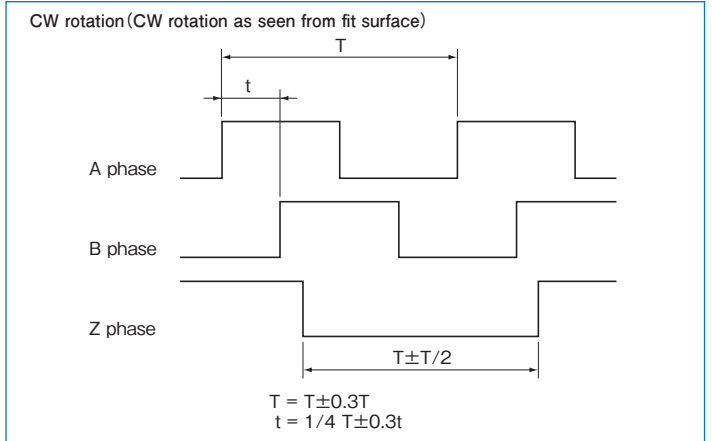


A capacitor (0.1 $\mu$ F) is connected between 0V and FG (frame ground).

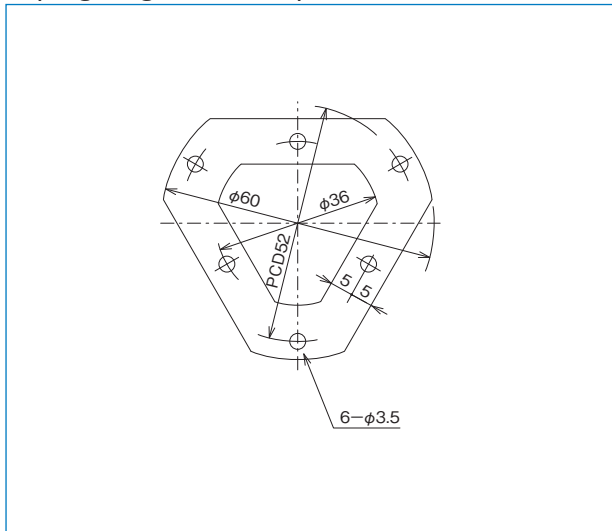
**Output waveform (Square wave)**



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



**Spring flange MEH-30 (Option)**



# MEH-30T series

[Square Wave/Incremental]

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

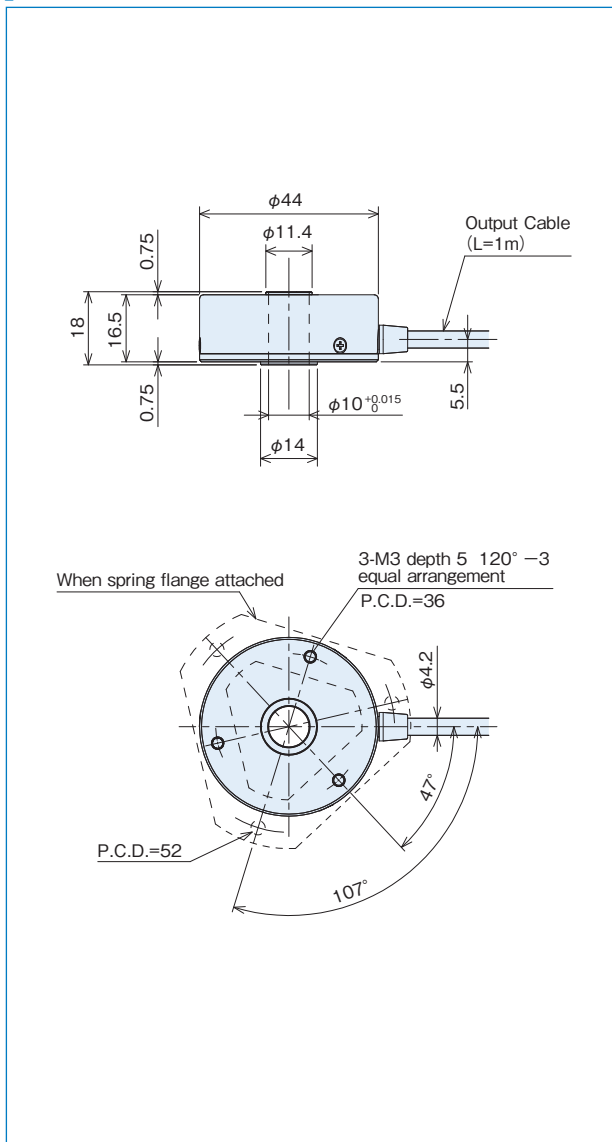


## Specifications

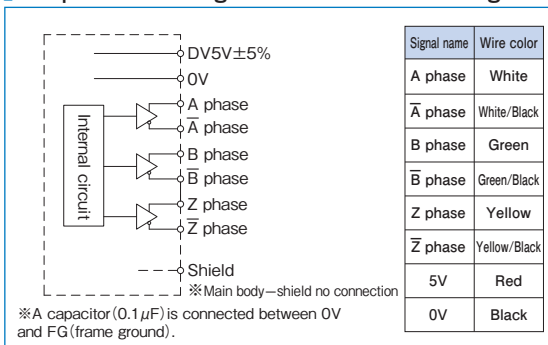
Type name	MEH-30T-10000 PST20 E
Item	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">             Pulse number           </div> <div style="text-align: center;">             By multiplication (<math>\times 2, 4, 5, 8, 10, 16, 20</math>)           </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 (Io): $\pm 20$ mAmax. Output voltage Vol: 0.5Vmax. VoH: 2.5Vmin.
Maximum allowable revolutions	6000r/min
Working ambient temperature/humidity	$-10^{\circ}\text{C} \sim +70^{\circ}\text{C}$ 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 <sup>2</sup> (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.

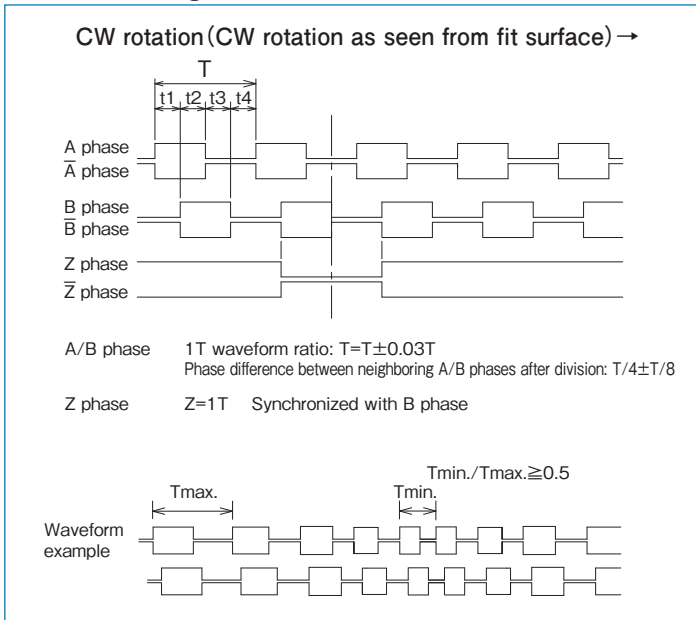
**Outside dimensions**



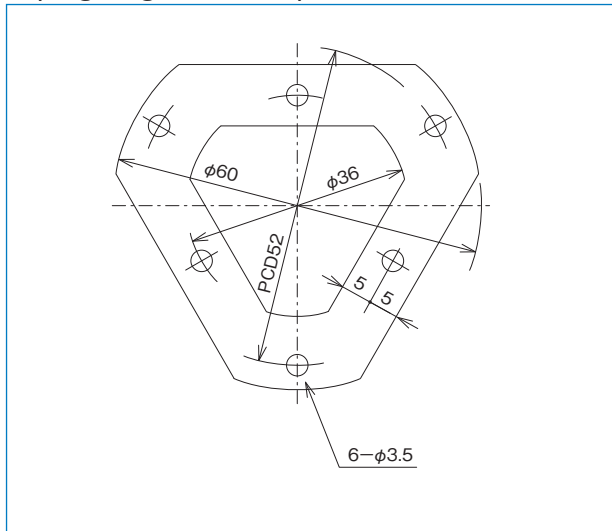
**Output circuit diagram and connection diagram**



**Connection diagram**

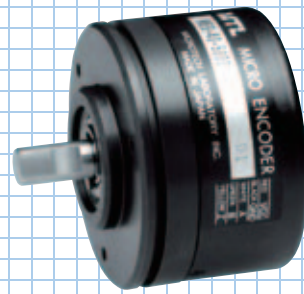


**Spring flange MEH-30 (Option)**



# MES-40-P series

[Square Wave/Incremental]

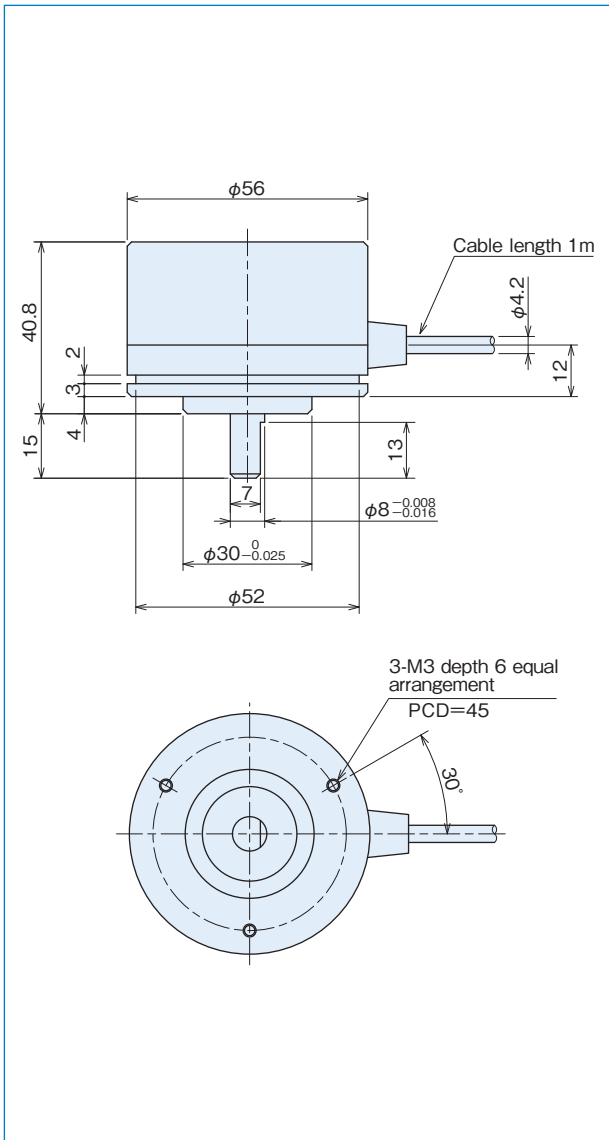


## Specifications

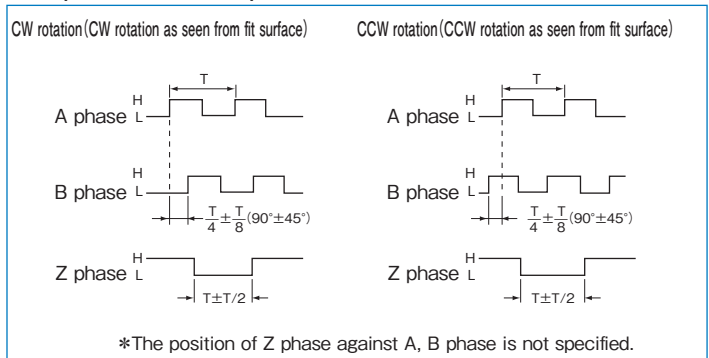
Type name		MES-40- <input type="checkbox"/> P <input type="checkbox"/>				
Item		Pulse number		Output circuit		
				●No entry=voltage output	●E=line driver output	
				●C=open collector output	●ST <input type="checkbox"/> (2·4·5·8·10·16·20)	
				●C4=open collector output DC24V		
		<b>Square wave</b>			<b>Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)</b>	
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 input	Output pulse number (Standard) [Pulse number/rotation]	100	600	2,048	8,192 (*)	EX 10,000x2 (20,000) 10,000x4 (40,000) 10,000x5 (50,000) 10,000x8 (80,000) 10,000x10 (100,000) 10,000x16 (160,000) 10,000x20 (200,000)
		200	720	2,500	9,000 (*)	
		250	800	3,000	10,000 (*)	
		256	1,000	3,600 (*)	10,800 (*)	
		300	1,024	4,000 (*)	11,250 (*)	
		360	1,200	4,096 (*)	15,000 (*)	
		400	1,500	5,000 (*)		
		500	1,800	5,400 (*)		
	512	2,000 (*)	6,000 (*)			
	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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions			Durability 500m/s <sup>2</sup> (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

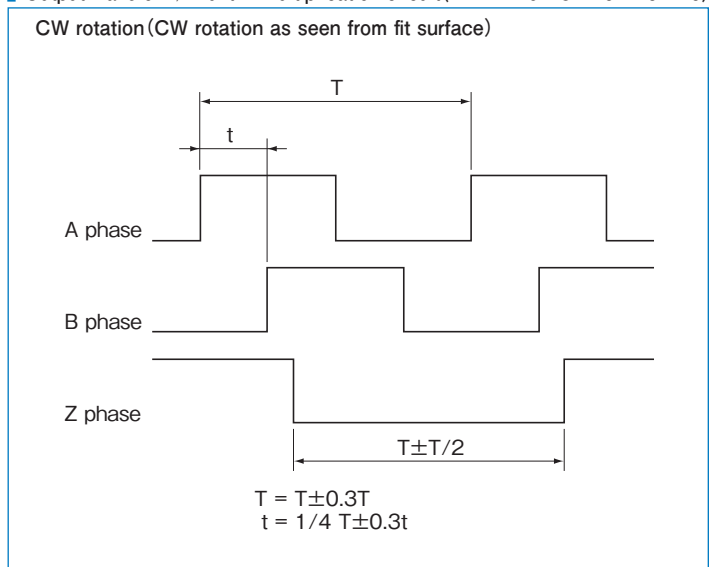
**Outside dimensions**



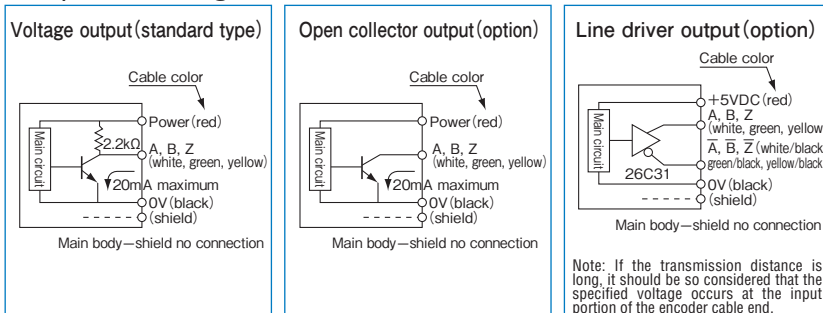
**Output waveform (Square wave)**



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



**Output circuit diagram**

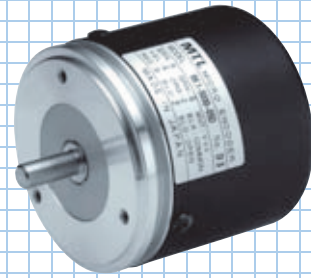


A capacitor (0.1  $\mu$ F) is connected between 0V and FG (frame ground).

# MES-45 series

[Square Wave/Incremental]

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



Old model: RK1·RKW1

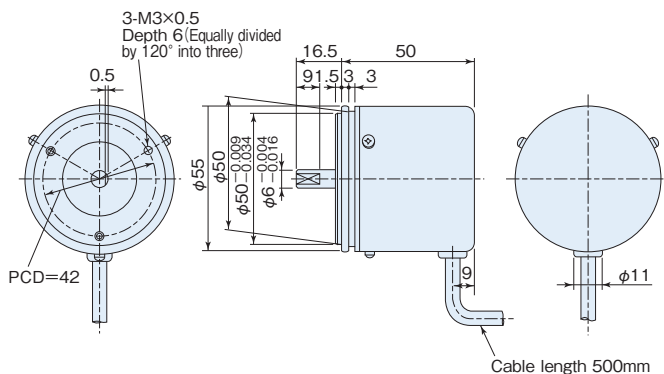
## Specifications

Type name	MES□-45-1000-05C		
Item	<ul style="list-style-type: none"> <li>No entry=standard type</li> <li>W=drip-proof type</li> </ul>	Resolution	Input voltage ●05=5V ●12=12V ●24=24V
			Output circuit ●No entry=voltage output ●C=open collector output ●D=differential driver output
Supply voltage	DC5V -5%~12V+10% (voltage output/differential driver output) DC5V -5%~24V+15% (open collector output)		
Current consumption	120mA max (voltage output) 100mA max (open collector output) 150mA max (differential driver output: driver no load)		
Output pulse number (Standard) [Pulse number/rotation]	360 500 512 600 720 800 1,000	1,024 1,200 1,500 1,800 2,000 2,048 2,500	3,000 3,200 3,600 4,096 5,000 6,000 9,000
Maximum response frequency	200kHz		
Allowable load of shaft (electrical)	Radial	49.0N (5kgf)	
	Thrust	29.4N (3kgf)	
Maximum allowable revolutions (mechanical)	6,000r/min		
Working ambient temperature/humidity	-10°C~70°C/ RH95% max no dewing		
Storing ambient temperature	-30°C~80°C		
Vibration resistance	Durability 0-500Hz, double amplitude 1.52mm 2 hours each in X, Y, and Z directions		
Impact resistance	Durability 490m/s <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions		
Cable	Outside diameter φ5 5-core vinyl wire AWG28 Insulated shield cable (length 500mm)		
Mass	280g		

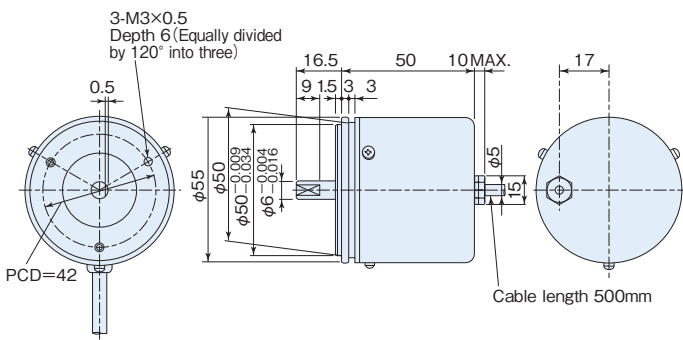


**Outside dimensions**

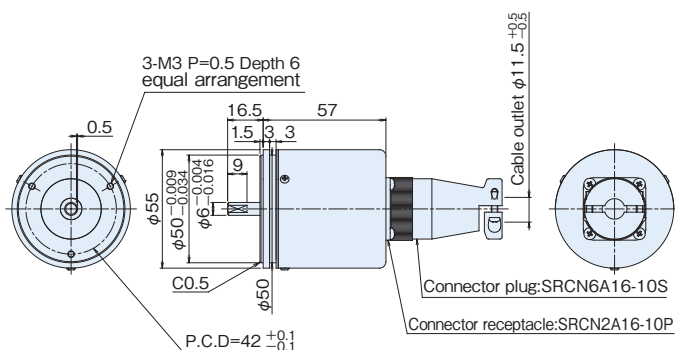
**MES-45 (Standard type)**



**MESW-45 (Option; drip-proof type)**

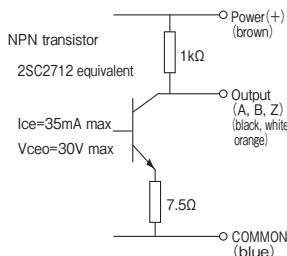


**Connector**

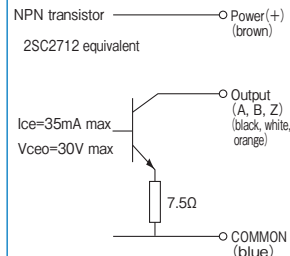


**Output circuit diagram**

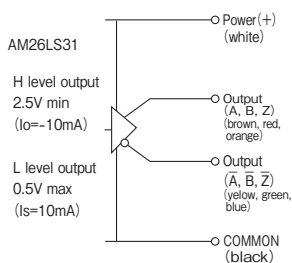
**Voltage output (standard type)**



**Open collector output**

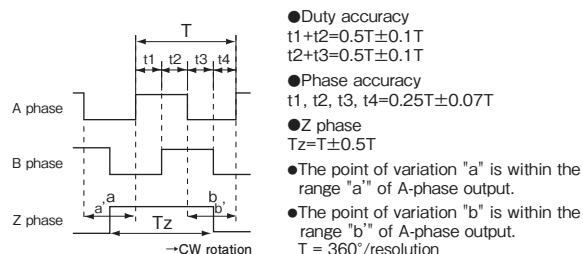


**Differential driver output**

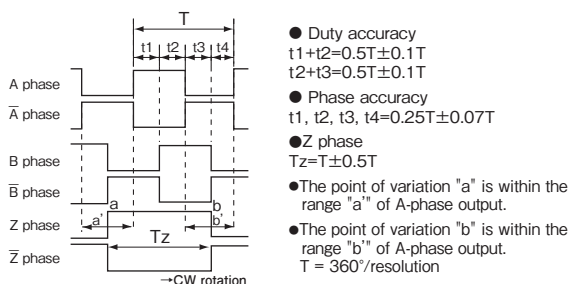


**Output waveform**

**Voltage output/open collector output**

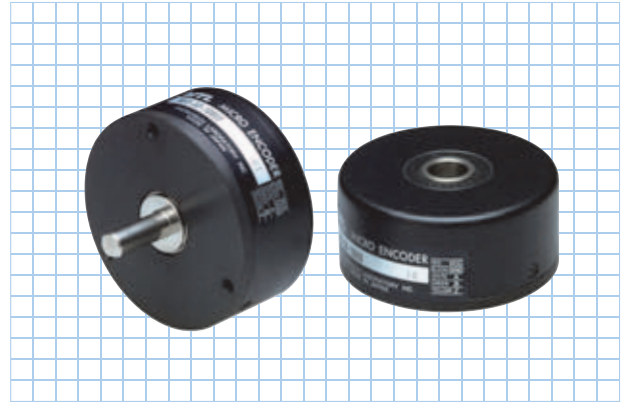


**Differential driver output**



# ME-50-P series

[Square Wave/Incremental]

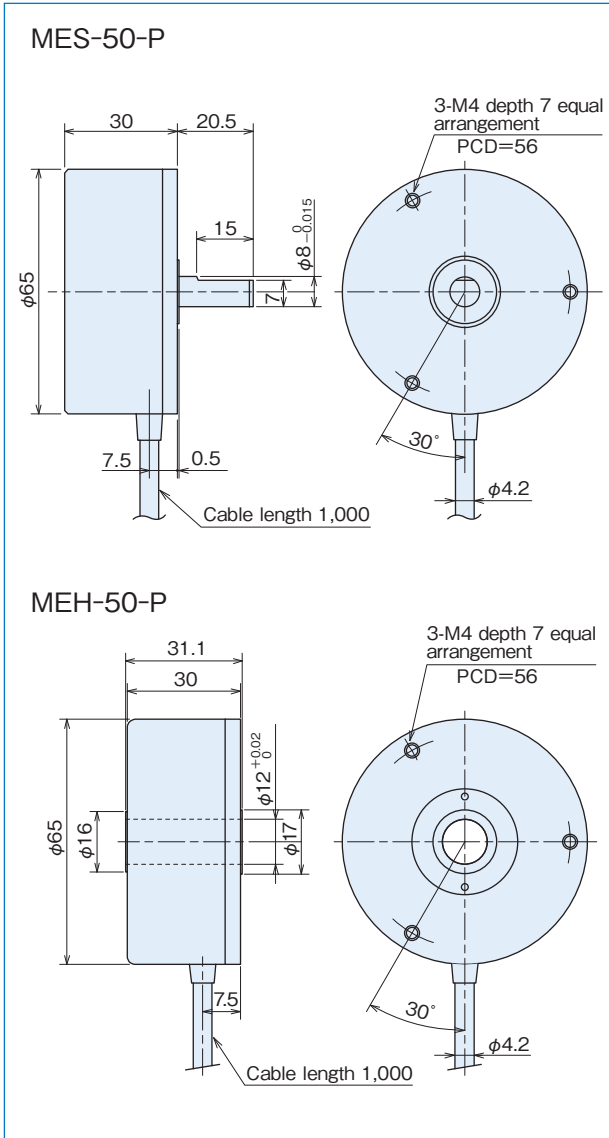


## Specifications

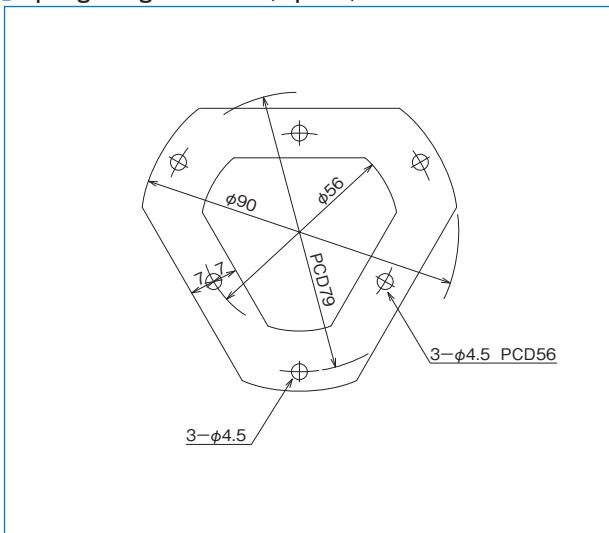
Type name		ME□-50-□P□				
Item	Shaft shape		Pulse number	Output circuit		
	●S=single shaft	●H=hollow shaft		●No entry=voltage output	●C=open collector output	●C4=open collector output DC24V
					●E=line driver output ●ST□(2·4·5·8·10·16·20)	
		<b>Square wave</b>		<b>Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)</b>		
Supply voltage	Voltage / Open collector: DC5V-5%~12V+10% Open collector DC24V: DC24V±10% Line driver: DC5V±5%			Voltage: DC5V-5%~12V+10% Open collector: DC5V-5%~24V+10% Line driver: DC5V±5%		
Current consumption	60mA or less (under no load)			100mA or less (under no load)		
Detection system	Incremental			Incremental		
Output	Output pulse number (Standard) [Pulse number/rotation]	500 900 1,000 1,024	2,000 3,000 3,600 4,096(*)	5,000(*) 5,400(*) 6,000(*) 9,000(*) 10,000(*)	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) Open collector output: 100kHz	
	Output phase difference	A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)			Refer to the figure on the right	
Waveform rise/fall time	2μs or less (output cable 1m or less)			-		
Allowable load of shaft (electrical)	Radial	19.6N (2kgf)		9.8N (1kgf)		
	Thrust	9.8N (1kgf)		4.9N (0.5kgf)		
Maximum allowable revolutions (mechanical)	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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions			Durability 500m/s <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions		
Cable	Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)			Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable (length 1m)		
Mass	220g			220g		

\*Handled by built-in multiplier circuit

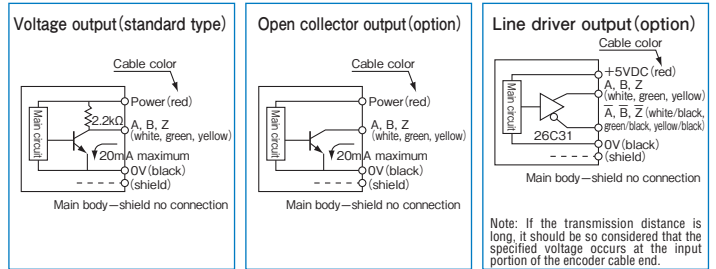
**Outside dimensions**



**Spring flange MEH-50 (Option)**

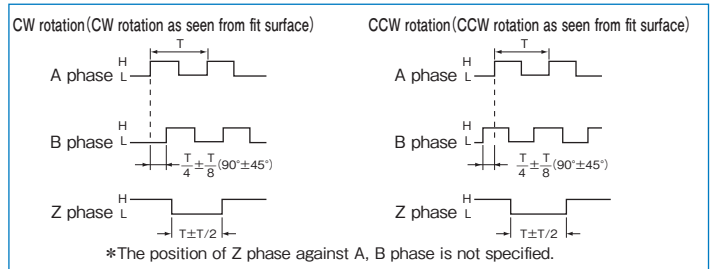


**Output circuit diagram**

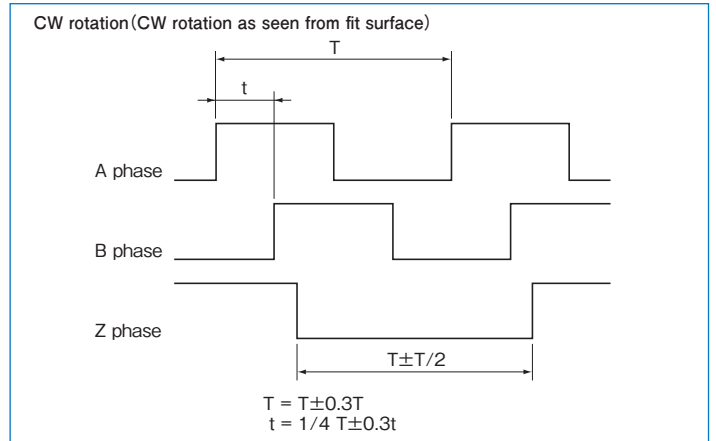


A capacitor (0.1 $\mu\text{F}$ ) is connected between 0V and FG (frame ground).

**Output waveform (Square wave)**



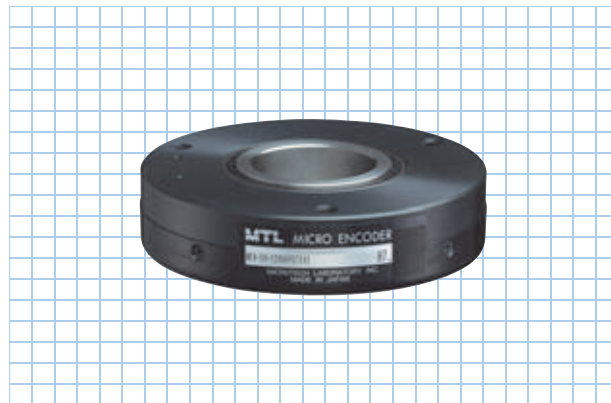
**Output waveform / Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)**



# MEH-59 series

[Square Wave/Incremental]

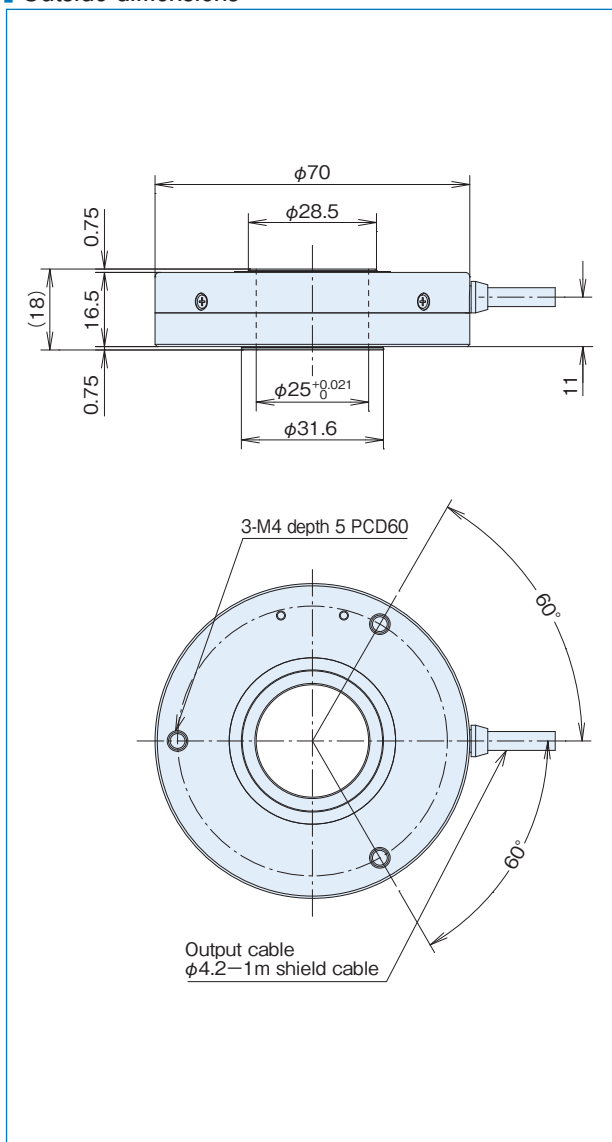
- Outside dimensions  $\phi 70 \times 16.5\text{mm}$  Incremental encoder
- Resolution 648000(12960 $\times$ 50), Hollow shaft  $\phi 25$



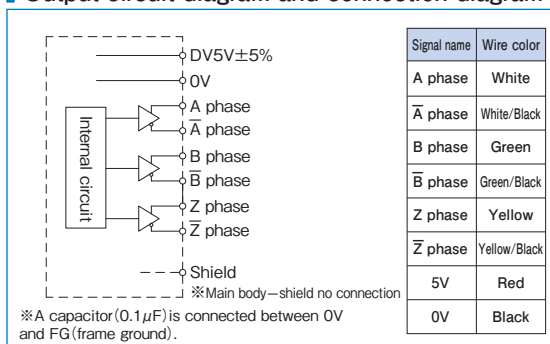
## Specifications

Type name	MEH-59-12960PSTN□E ( $\times 1, \times 2, \times 4, \times 5, \times 8, \times 10, \times 16, \times 20, \times 32$ )	MEH-59-12960PSTG□E ( $\times 25, \times 32, \times 50$ )
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	1024(1024 $\times$ 1), 2048(1024 $\times$ 2) 4096(1024 $\times$ 4), 5120(1024 $\times$ 5) 8192(1024 $\times$ 8), 10240(1024 $\times$ 10) 16384(1024 $\times$ 16), 20480(1024 $\times$ 20) 32768(1024 $\times$ 32)	324000(12960 $\times$ 25) 414720(12960 $\times$ 32) 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°C $\sim$ +70°C / RH35% $\sim$ 90% (no dewing)	
Storing ambient temperature	-20°C $\sim$ +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 AWG30 (length 1m) *without CS phase: 14-cores	
Mass	200g	

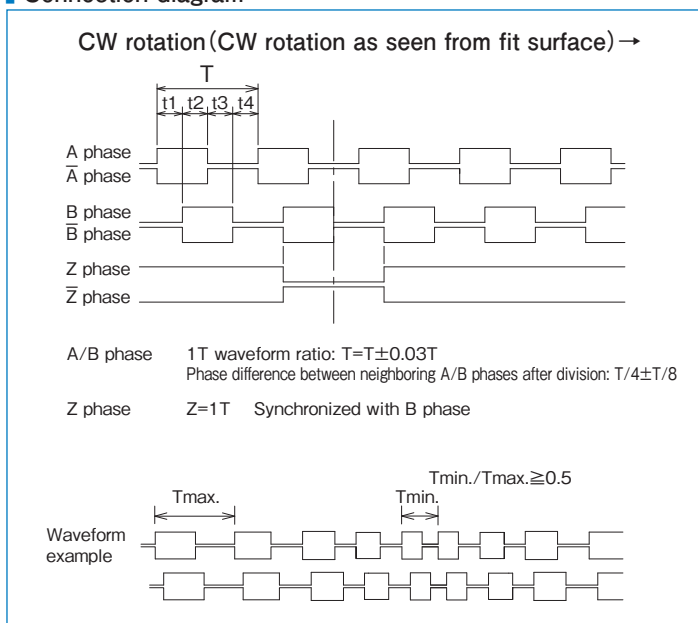
**Outside dimensions**



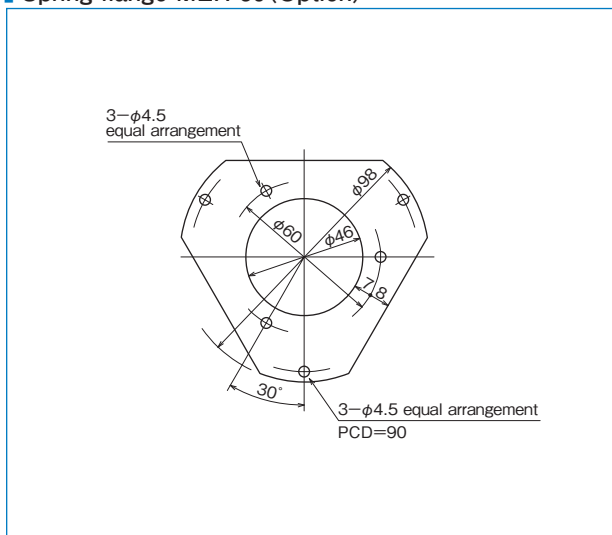
**Output circuit diagram and connection diagram**



**Connection diagram**

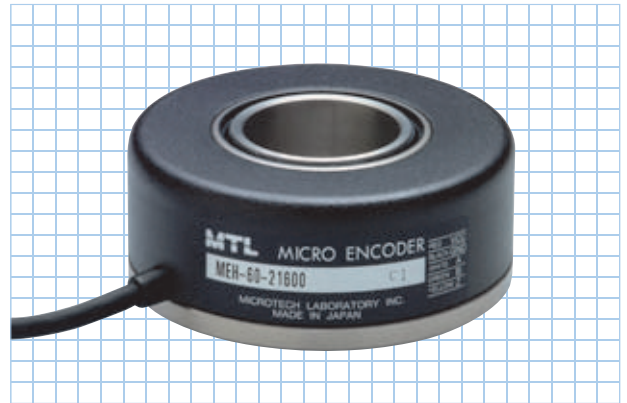


**Spring flange MEH-60 (Option)**



# MEH-60-P series

[Square Wave/Incremental]



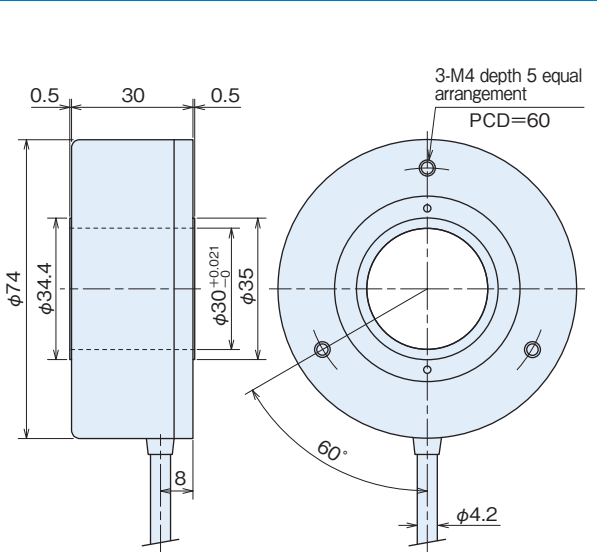
## Specifications

Type name		MEH-60-□□P□□				
Item		Pulse number		Output circuit		
		●No entry=voltage output		●E=line driver output		
		●C=open collector output		●ST□(2·4·5·8·10·16·20)		
		●C4=open collector output DC24V				
		Square wave		Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20)		
Supply voltage		Voltage/Open collector DC5V-5%~12V+10% Open collector DC24V:DC24V±10% Line driver:DC5V±5%		Voltage:DC5V-5%~12V+10% Open collector:DC5V-5%~24V+10% Line driver:DC5V±5%		
Current consumption		60mA or less *120mA or less (under no load)		100mA or less (under no load)		
Detection system		Incremental		Incremental		
Output input	Output pulse number (Standard) [Pulse number/rotation]	100 180 200 360 400 500	600 1,000	1,024 1,800 2,000 3,600 4,000 5,000 5,400(*1)	8,100(*1) 9,000(*1) 10,000(*1) 10,800(*1) 20,250(*1, 2) 21,600(*1, 2)	EX 21,600×2(43,200) 21,600×4(86,400) 21,600×5(108,000) 21,600×8(172,800) 21,600×10(216,000) 21,600×16(345,600) 21,600×20(432,000)
	Output phase	A, B, Z phase		A, B, Z phase		
	Output form	Square wave		Square wave		
	Output capacity	Sink current:20mA Residual voltage:0.5V or less (at 10mA)		-		
	Maximum response frequency (response pulse number)	100kHz		Line driver output:50kHz×(by multiplication) Open collector output:100kHz		
	Output phase difference	A, B phase difference 90°±45°(T/4±T/8) Z phase T±T/2 (see Output Waveform)		Refer to the figure on the right		
	Waveform rise/fall time	2μs or less (output cable 1m or less)		-		
Allowable load of shaft (electrical)	Radial	19.6N(2kgf)	9.8N(1kgf)	9.8N(1kgf)		
	Thrust	9.8N(1kgf)	4.9N(0.5kgf)	4.9N(0.5kgf)		
Maximum allowable revolutions (mechanical)	1,000r/min		1,000r/min			
Working ambient temperature/humidity	0°C~60°C RH35%~90% no dewing		0°C~60°C RH35%~90% no dewing			
Storing ambient temperature	-20°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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s <sup>2</sup> (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			

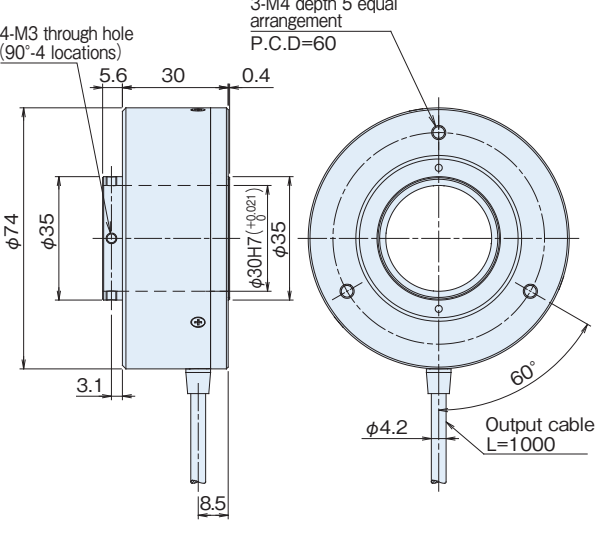
\*1: Handled by built-in multiplier circuit

\*2: The mass changes

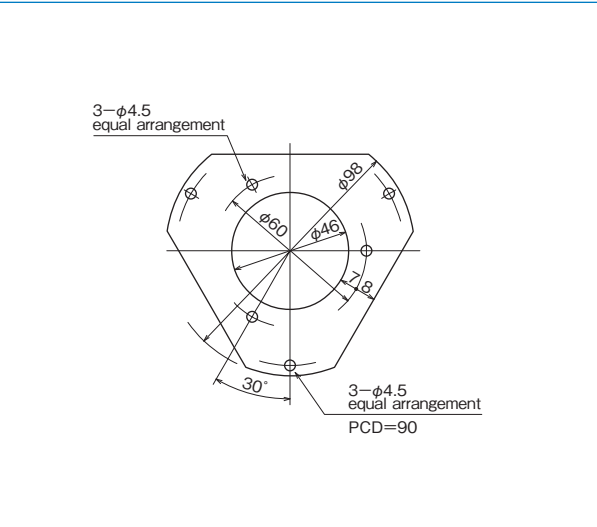
**Outside dimensions**



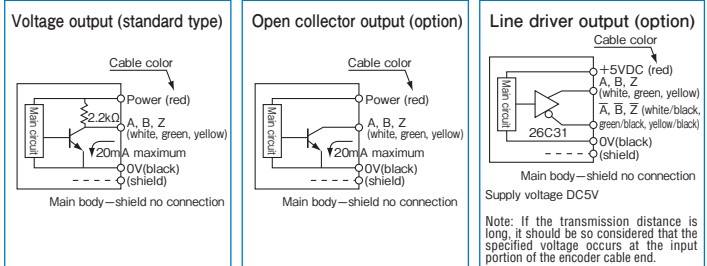
**Follow shaft type**



**Spring flange MEH-60 (Option)**

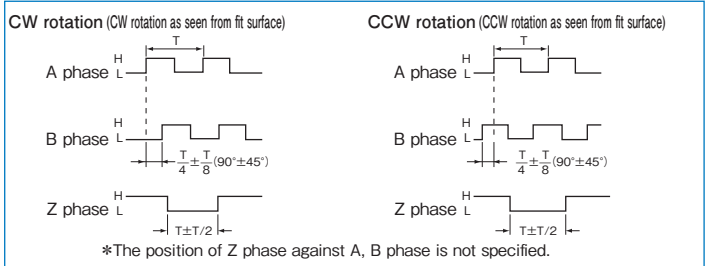


**Output circuit diagram**

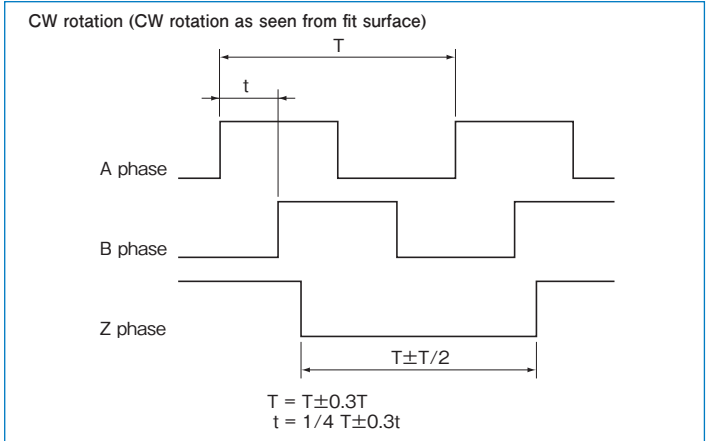


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

**Output waveform (Square wave)**

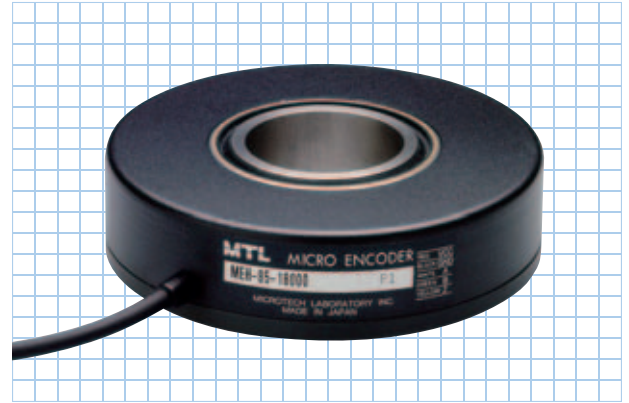


**Output waveform / Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)**



# MEH-85-P series

[Square Wave/Incremental]



## Specifications

Type name		MEH-85-□□P□			
Item		Pulse number		Output circuit	
				<ul style="list-style-type: none"> <li>●No entry=voltage output</li> <li>●C=open collector output</li> <li>●C4=open collector output DC24V</li> </ul>	
		Square wave		Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)	
Supply voltage		Voltage/Open collector:DC5V-5%~12V+10% Open collector DC24V:DC24V±10% Line driver:DC5V±5%		Voltage:DC5V-5%~12V+10% Open collector:DC5V-5%~24V+10% Line driver:DC5V±5%	
Current consumption		Voltage/Open collector output:60mA or less(under no load) Line driver:140mA or less(under no load)		140mA or less(under no load)	
Detection system		Incremental		Incremental	
Output	Output pulse number (Standard) [Pulse number/rotation]	150 200 500 1,000 1,024	1,500 3,600 4,500 5,400 5,625 7,200(*) 8,192(*) 10,800(*) 11,250(*) 18,000(*)	20,250(*) 21,600(*)	EX 18,000×2(36,000) 18,000×4(72,000) 18,000×5(90,000) 18,000×8(144,000) 18,000×10(180,000) 18,000×16(288,800) 18,000×20(360,000)
	Output phase	A, B, Z phase		A, B, Z phase	
	Output form	Square wave		Square wave	
	Output capacity	Sink current:20mA Residual voltage:0.5V or less(at 10mA)		—	
	Maximum response frequency (response pulse number)	100kHz		Voltage/Open collector output:100kHz Line driver output:75kHz×(by multiplication)	
	Output phase difference	A, B phase difference 90°±45°(T/4±T/8) Z phase T±T/2(see Output Waveform)		Refer to the figure on the right	
	Waveform rise/fall time	2μs or less(output cable 1m or less)		—	
	Allowable load of shaft (electrical)	Radial	9.8N(1kgf)		9.8N(1kgf)
Thrust		4.9N(0.5kgf)		4.9N(0.5kgf)	
Maximum allowable revolutions (mechanical)	1,000r/min		1,000r/min		
Working ambient temperature/humidity	0°C~60°C RH35%~90% no dewing		0°C~60°C RH35%~90% no dewing		
Storing ambient temperature	-20°C~80°C		-20°C~80°C		
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions		
Impact resistance	Durability 500m/s <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions		Durability 500m/s <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions		
Cable	Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable(length 1m)		Outside diameter φ4.2 5-core vinyl wire AWG28 Insulated shield cable(length 1m)		
Mass	520g	620g	1,050g	1,050g	

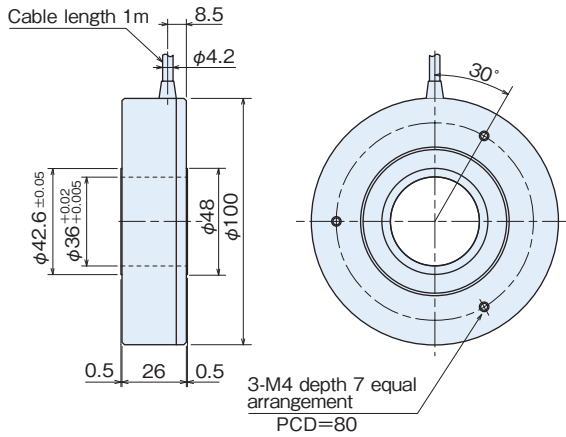
\*Handled by built-in multiplier circuit



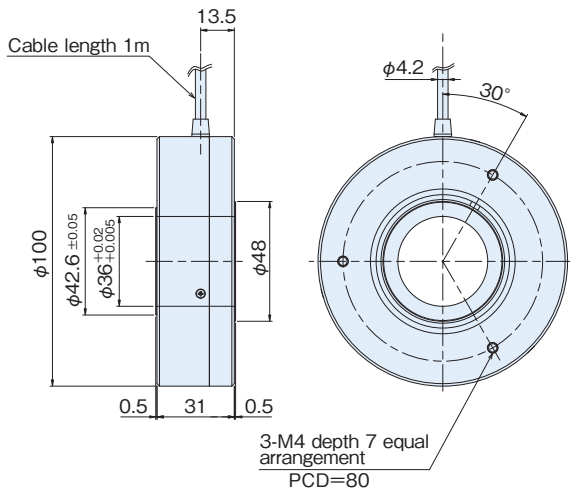
**Outside dimensions**

**MEH-85-P**

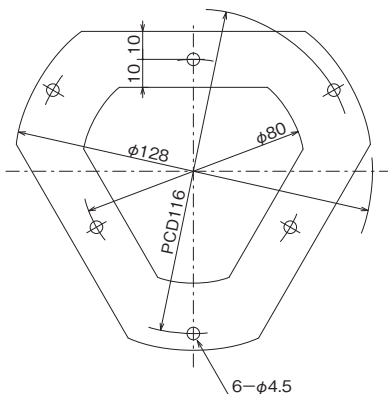
※ 1,024 pulse or less



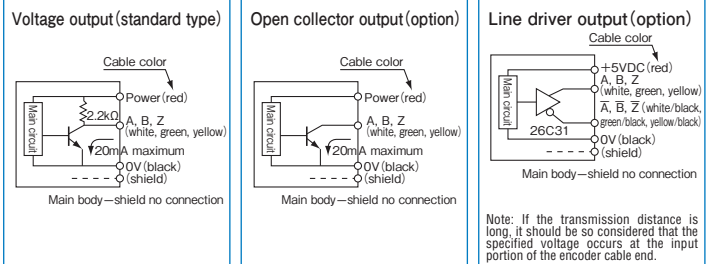
**MEH-85-P (1,500 pulse or more),  
MEH-85-PS, MEH-85-PST**



**Spring flange MEH-85 (Option)**

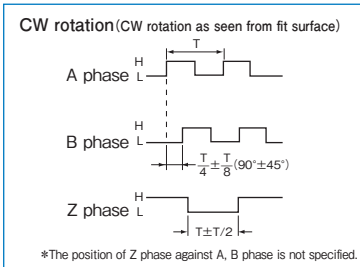


**Output circuit diagram**

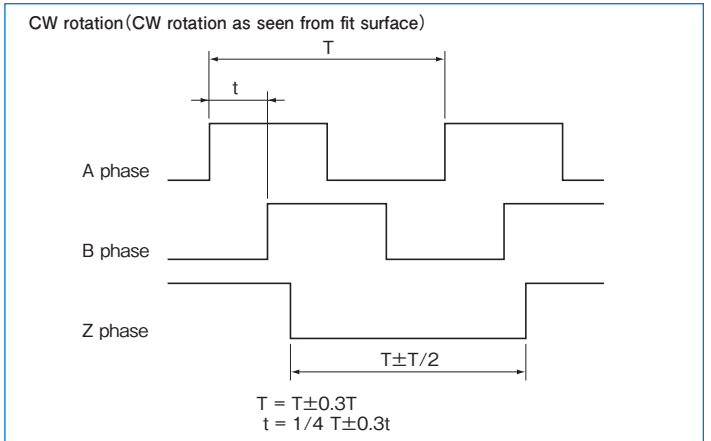


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

**Output waveform (Square wave)**

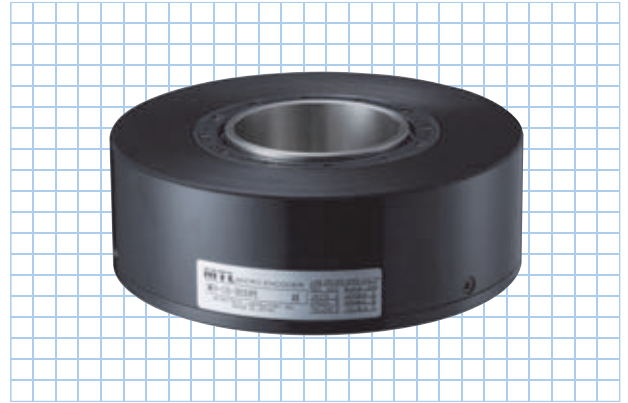


**Output waveform / Built-in multiplication circuit (x2·x4·x5·x8·x10·x16·x20)**



# MEH-130-P series

[Square Wave/Incremental]



## Specifications

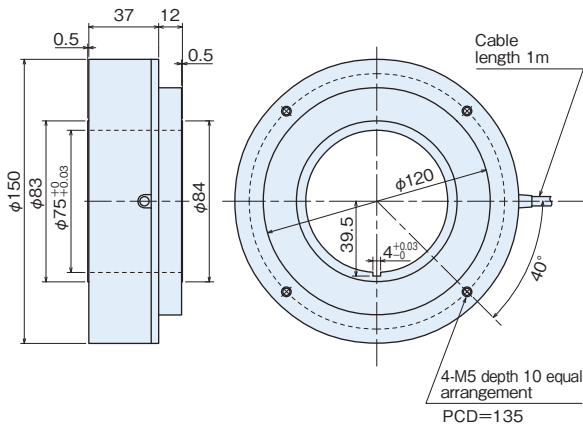
Type name		MEH-130- <input type="checkbox"/> P <input type="checkbox"/>	
Item		Pulse number: <input type="checkbox"/> Output circuit: ●No entry=voltage output ●E=line driver output ●C=open collector output ●ST <input type="checkbox"/> (2·4·5·8·10·16·20)	
		Square wave	Built-in multiplication circuit (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		1,024 pulse or less 60mA or less 4,500 pulse or more 100mA or less (under no load)	150mA or less (under no load)
Detection system		Incremental	Incremental
Output	Output pulse number (Standard) [Pulse number/rotation]	360 5,000 28,125(*) 512 9,000 32,400(*) 600 11,250(*) 1,024 20,250(*) 4,500 25,000(*)	EX 32,400×2 (64,800) 32,400×4 (129,600) 32,400×5 (162,000) 32,400×8 (259,200) 32,400×10 (324,000) 32,400×16 (518,400) 32,400×20 (648,000)
	Output phase	A, B, Z phase	A, B, Z phase
	Output form	Square wave	Square wave
	Output capacity	Sink current:20mA Residual voltage:0.5V or less (at 10mA)	—
	Maximum response frequency (response pulse number)	100kHz	Line driver output:75kHz× (by multiplication) Open collector output:100kHz
	Output phase difference	A, B phase difference 90°±45° (T/4±T/8) Z phase T±T/2 (see Output Waveform)	Refer to the figure on the right
	Waveform rise/fall time	2μs or less (output cable 1m or less)	—
Allowable load of shaft (electrical)	Radial	19.6N (2kgf)	19.6N (2kgf)
	Thrust	9.8N (1kgf)	9.8N (1kgf)
Maximum allowable revolutions (mechanical)	1,000r/min	1,000r/min	
Working ambient temperature/humidity	0°C~60°C RH35%~90% no dewing	0°C~60°C RH35%~90% no dewing	
Storing ambient temperature	-20°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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions	Durability 500m/s <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions	
Cable	Outside diameter φ4.2 vinyl wire AWG28 (1024P/R or less) Outside diameter φ6.5 (14-core) vinyl wire (4500P/R or more) Insulated shield cable (length 1m)	Outside diameter φ6.5 14-core vinyl wire AWG28 Insulated shield cable (length 1m)	
Mass	3kg	3kg	

\*Handled by built-in multiplier circuit

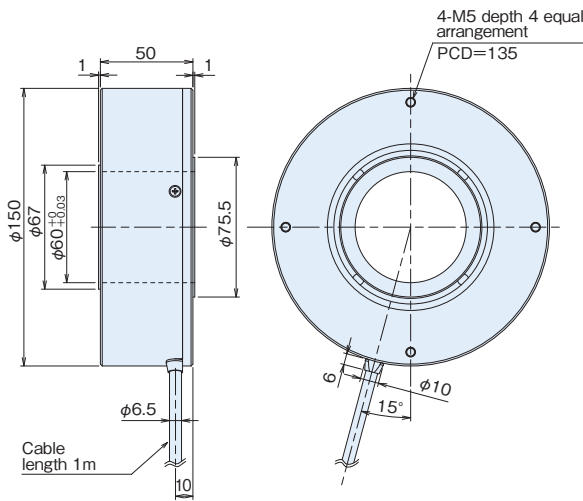
**Outside dimensions**

**MEH-130-P**

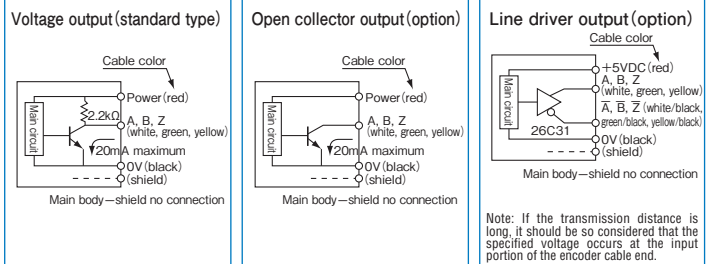
\*1,024 pulse or less



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

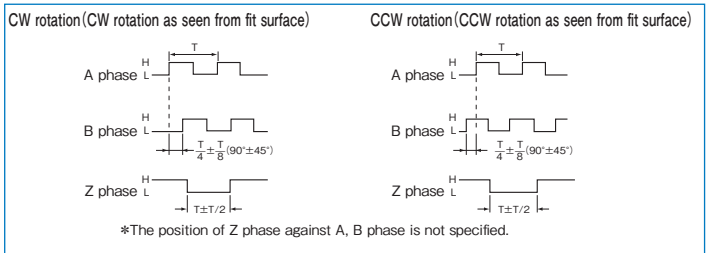


**Output circuit diagram**

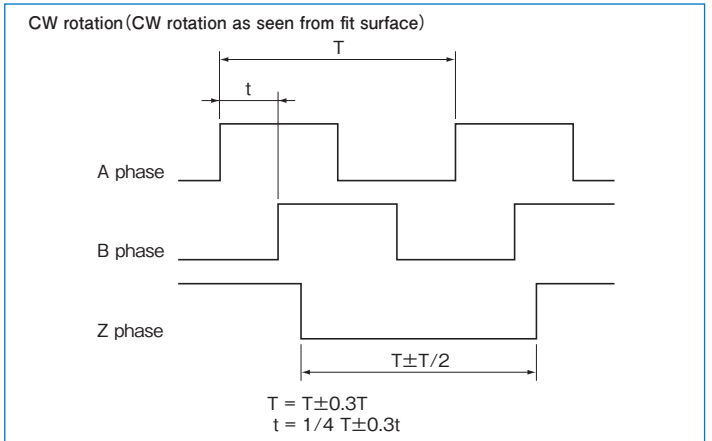


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

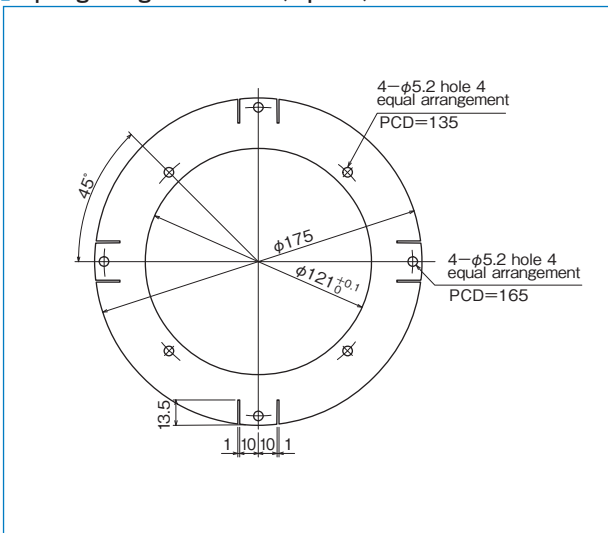
**Output waveform (Square wave)**



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

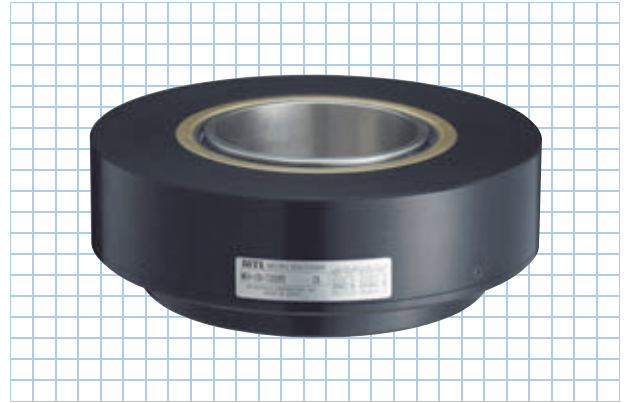


**Spring flange MEH-130 (Option)**



# MEH-180-P series

[Square Wave/Incremental]

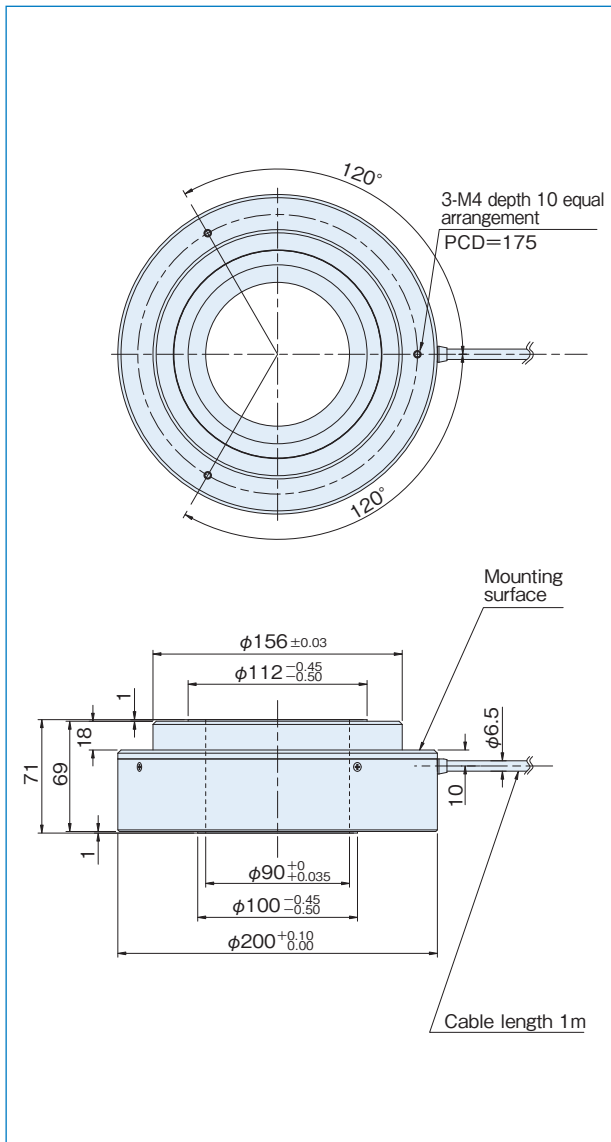


## Specifications

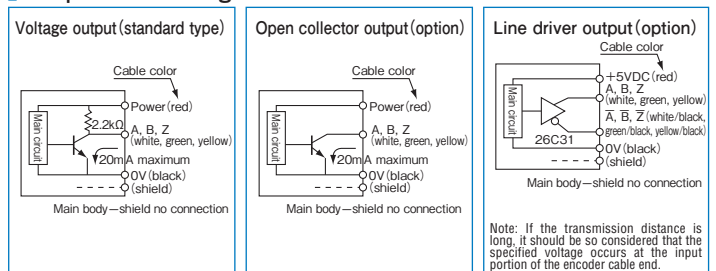
Type name		MEH-180- <input type="checkbox"/> P <input type="checkbox"/>	
Item		Pulse number Output circuit ●No entry=voltage output ●C=open collector output	●E=line driver output ●ST <input type="checkbox"/> (2·4·5·8·10·16·20)
		<b>Square wave</b>	<b>Built-in multiplication circuit (×2·×4·×5·×8·×10·×16·×20)</b>
Supply voltage		Voltage:DC5V-5%~12V+10% Open collector DC24V:DC24V±10% Line driver:DC5V±5%	Voltage:DC5V-5%~12V+10% Open collector DC24V:DC24V±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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions	Durability 500m/s <sup>2</sup> (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**

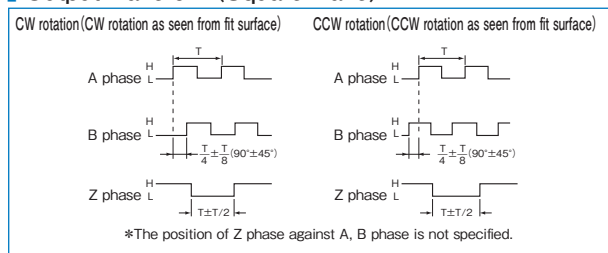


**Output circuit diagram**

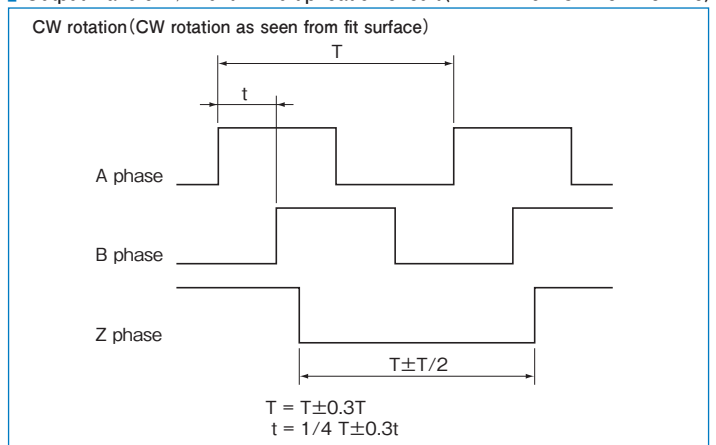


A capacitor (0.1μF) is connected between 0V and FG (frame ground).

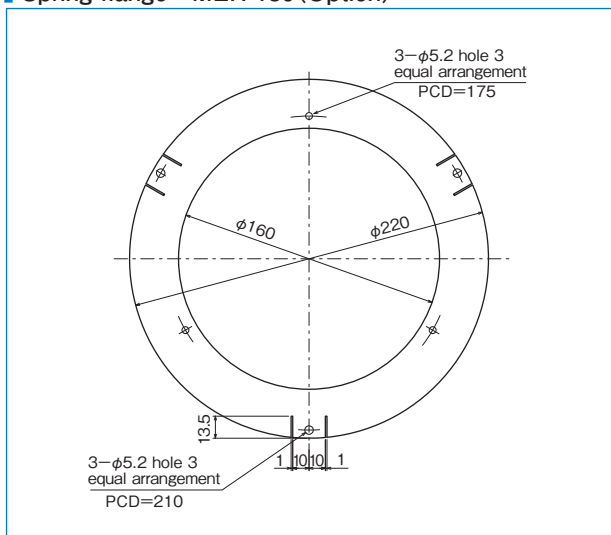
**Output waveform (Square wave)**



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



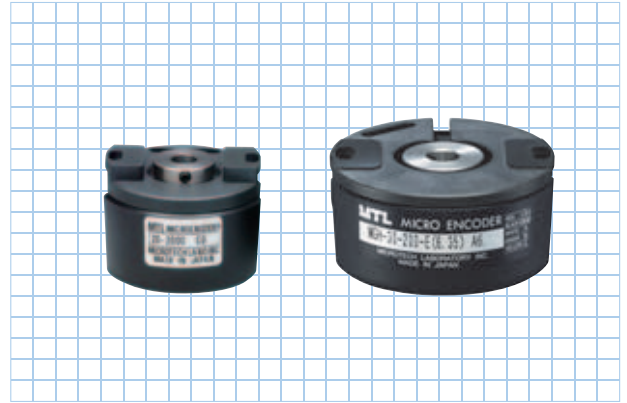
**Spring flange MEH-180 (Option)**



# MGH series

[Square Wave/Incremental]

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



MGH-20, MGH-30

## Specifications

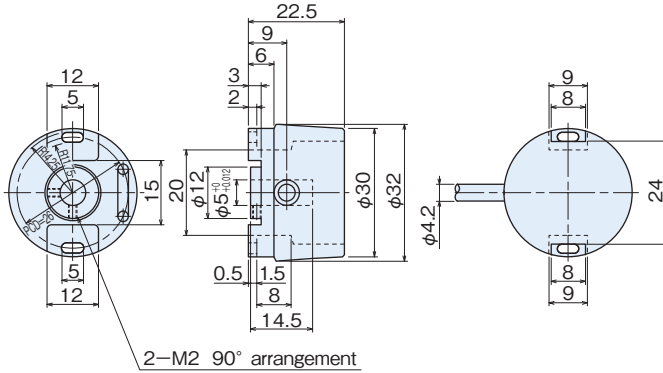
Type name	MGH-20-□□			MGH-30-□□			
Item	Pulse number	Output circuit		Pulse number	Output circuit		
		<ul style="list-style-type: none"> <li>●No entry=voltage output</li> <li>●C=open collector output</li> <li>●E=line driver output</li> </ul>			<ul style="list-style-type: none"> <li>●No entry=voltage output</li> <li>●C=open collector output</li> <li>●E=line driver output</li> </ul>		
Supply voltage	DC5V±10%						
Current consumption	60mA or less (under no load)						
Detection system	Incremental						
Output	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	
	Output phase	A, B, Z phase					
	Output form	Square wave					
	Output capacity	Sink current:20mA Residual voltage:0.5V or less (at 10mA)			Sink current:20mA Residual voltage:0.5V or less (at 10mA)		
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						
Waveform rise/fall time	2μs or less (cable of 1m or less)						
Maximum allowable revolutions (mechanical)	6,000r/min						
Working ambient temperature/ humidity	-10°C~70°C RH35%~90% no dewing						
Storing ambient temperature	-20°C~80°C						
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions						
Impact resistance	Durability 500m/s <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions						
Cable	Outside diameter φ4.2(φ6.8) 8-core(19-core)vinyl wire AWG 28 Insulated shield cable length 1m(length 0.5m)						
Mass	60g			150g			

## Allowable change amount of fitting shaft

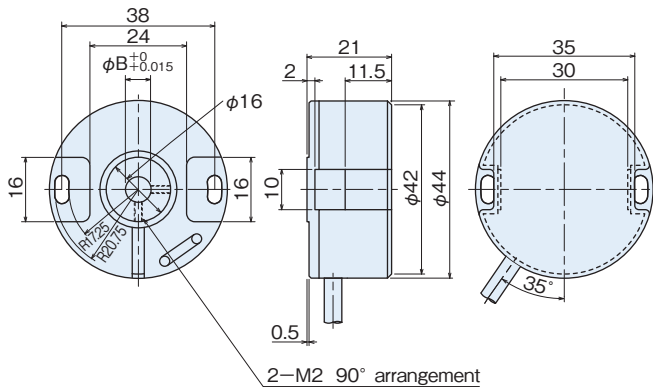
	Pulse number	100~200	250~600	800~1,200
MGH-20				
MGH-30				
Allowable eccentricity	Radial	±0.02mm		±0.01mm
	Thrust	±0.1mm	±0.05mm	±0.02mm

**Outside dimensions**

**MGH-20**



**MGH-30**

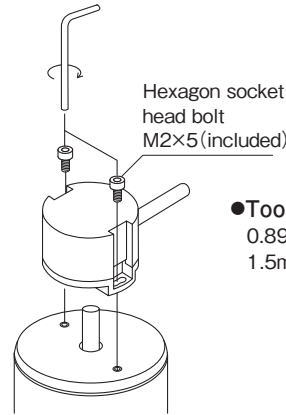


$\phi B = \phi 8\text{mm}$  (Standard)  
 $= \phi 6.35\text{mm}$   
 $= \phi 5\text{mm}$

**Assembling image of MGH series**

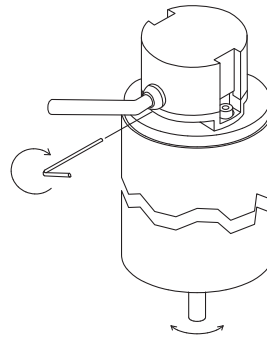
**MGH-20, 30**

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

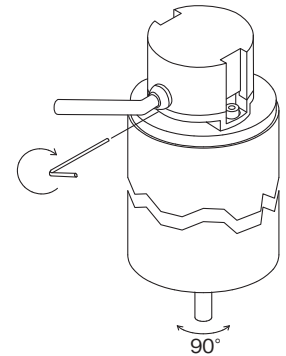


- Tools to be used**
- 0.89mm hexagon wrench (included)
  - 1.5mm hexagon wrench

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



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



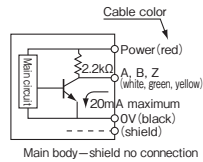
Note: Evenly tighten the screws in 2. ① and 2. ②  
 Note: Recommended tightening torque: 0.18 N·m

3. Affix encoder to base of rotating axle.

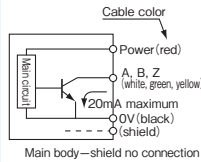
Note: Recommended tightening torque: 0.18 N·m

**Output circuit diagram**

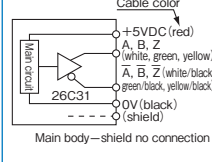
**Voltage output (standard type)**



**Open collector output (option)**



**Line driver output (option)**

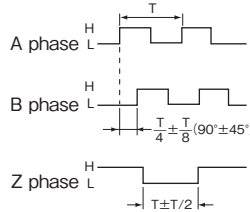


Note: If the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end.

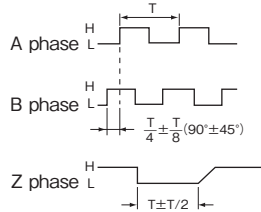
A capacitor (0.1 μF) is connected between 0V and FG (frame ground).

**Output waveform (Square wave)**

CW rotation (CW rotation as seen from fit surface)



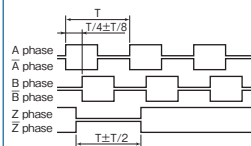
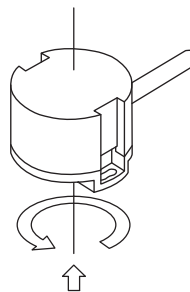
CCW rotation (CCW rotation as seen from fit surface)



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

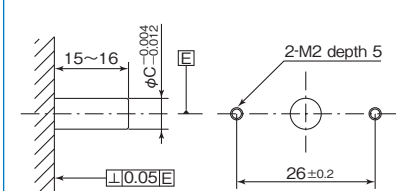
**Output waveforms**

CW rotation as seen from fitting surface

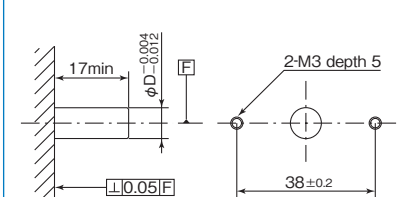


**Fitting shaft dimensions**

**MGH-20**

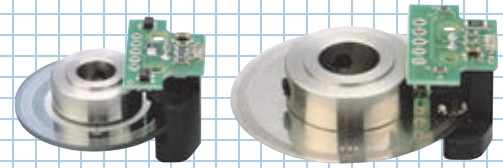


**MGH-30**



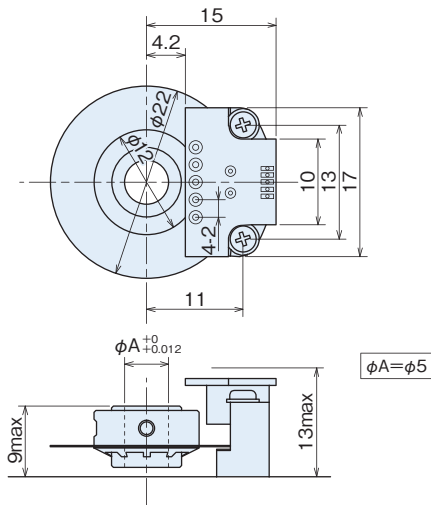
# MG series

[Module Kit]

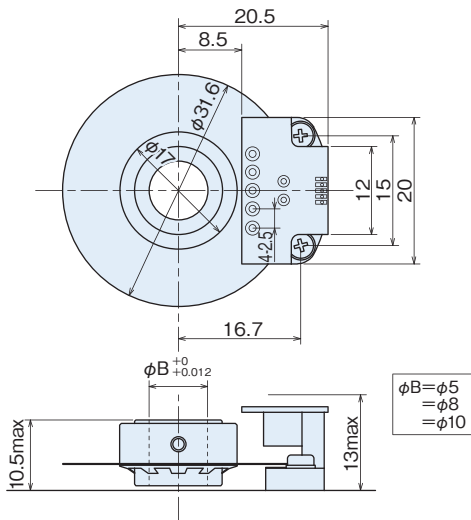


## Outside dimensions

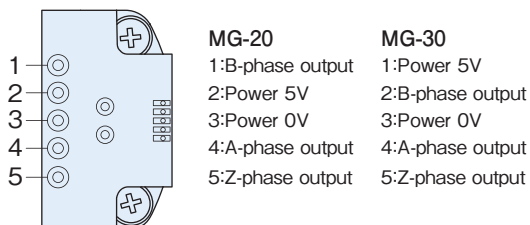
MG-20



MG-30



## Output pin position encoder



## Specifications

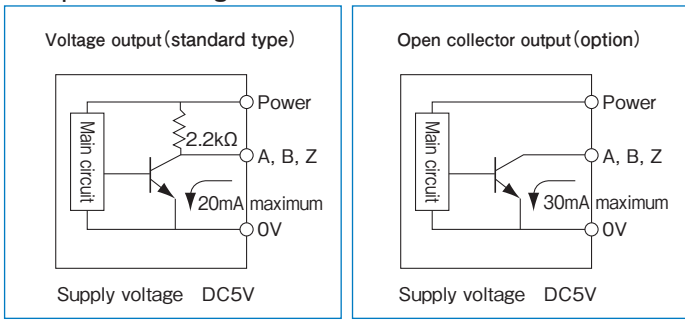
Item	Type name	MG-20-□□	MG-30-□□			
	Pulse number	10000	10000			
	Output circuit	●No entry=voltage output ●C=open collector output	●No entry=voltage output ●C=open collector output			
Supply voltage	DC5V±10%					
Current consumption	30mA or less (under no load)					
Detection system	Incremental					
Output	Output pulse number (Standard) [Pulse number/rotation]	100	500	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 <sup>2</sup> (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

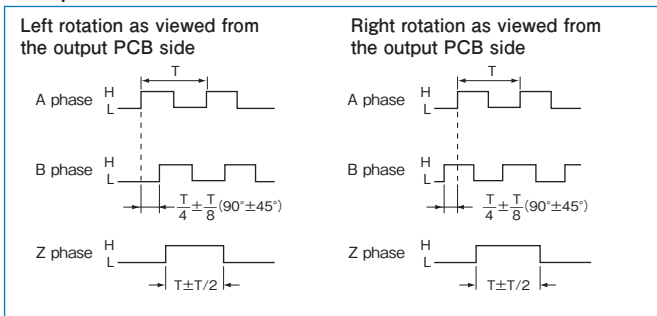
MG-20	Pulse number	100~200	250~600	800~1,200
	MG-30	Pulse number	100~300	400~1,024
Allowable eccentricity	Radial	±0.05mm		±0.02mm
	Thrust	±0.2mm	±0.1mm	±0.05mm



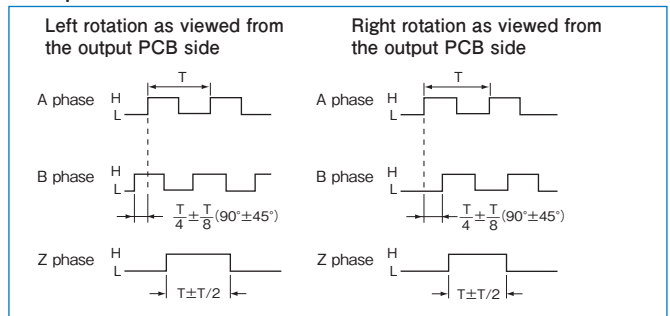
**Output circuit diagram**



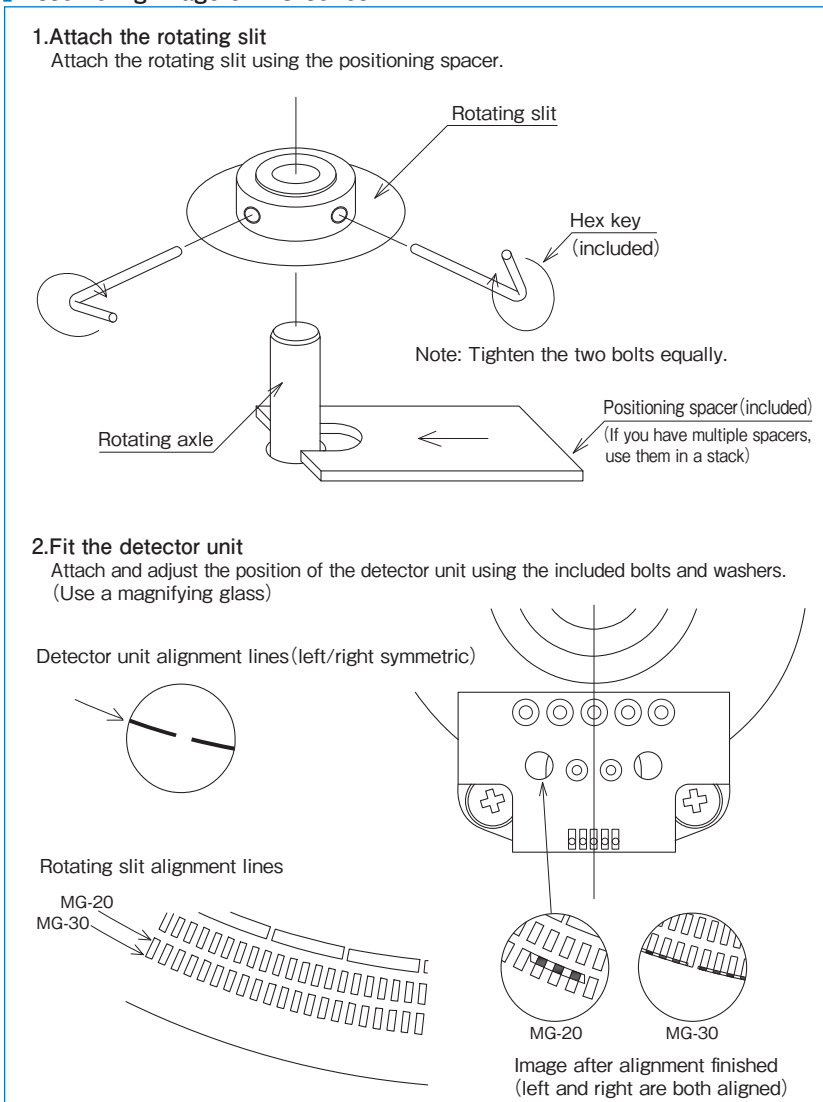
**Output waveforms MG-20**



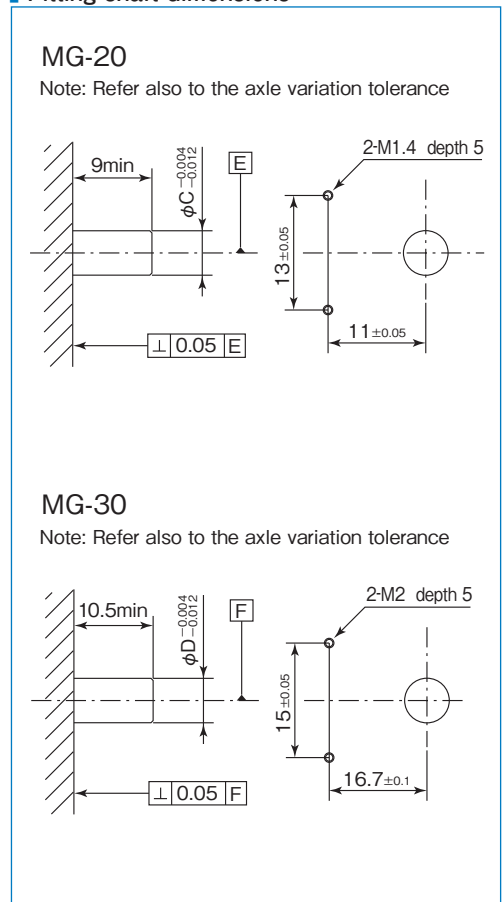
**Output waveforms MG-30**



**Assembling image of MG series**



**Fitting shaft dimensions**



# Absolute

Choose from outer diameter  $\Phi 6$  -  $\Phi 100$ 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



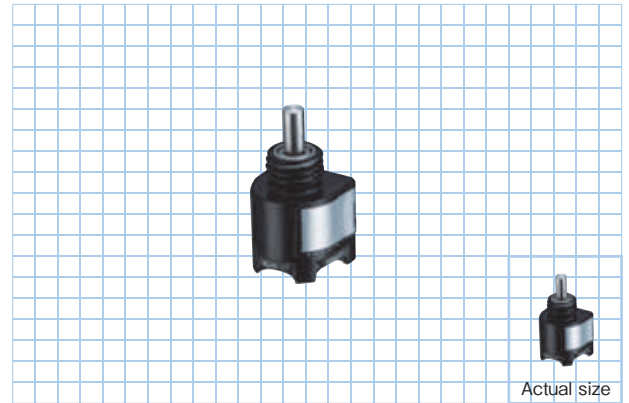
## Multi turn type



# MAS-3 series

[Absolute]

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



## Encoder Specifications

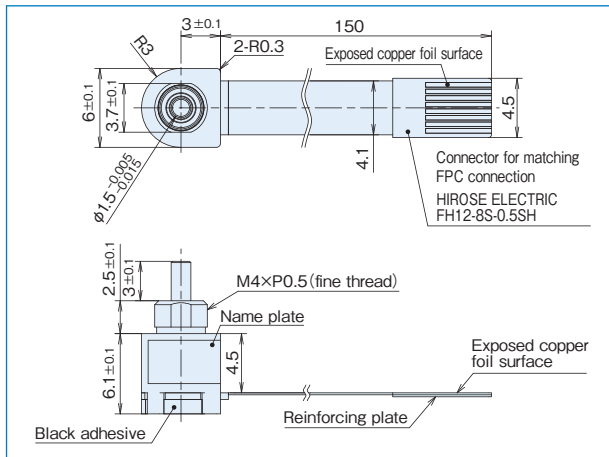
Item	Type name	MAS-3-4096N1
Supply voltage		DC5V $\pm 5\%$
Current consumption		40mA or less (under no load)
Resolution		4096, 2048, 1024
Allowable revolutions		6000r/min
Allowable load of shaft (electrical)	Radial	0.98N (100g)
	Thrust	0.98N (100g)
Working temperature/humidity		0°C ~ +60°C / RH35% ~ 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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions
Cable		Flexible cable (length 150mm)
Mass		5g (not including I/F box)

## Receiver specifications (37x37 PCB)

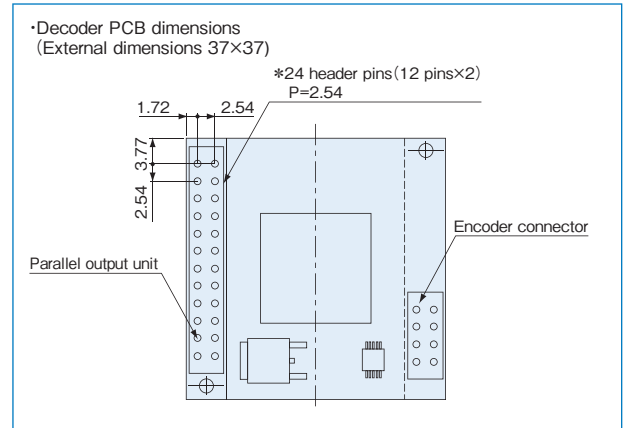
Item	Type name	DECODER- $\triangle\triangle$ bit
Supply voltage		DC5V $\pm 5\%$
Current consumption		60mA or less (110mA or less including encoder)
Parallel data update cycle		60 $\mu$ s (16.7kHz)
Output circuit		NPN open collector output (when using parallel output)
Output capacity		Sink current 20mA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

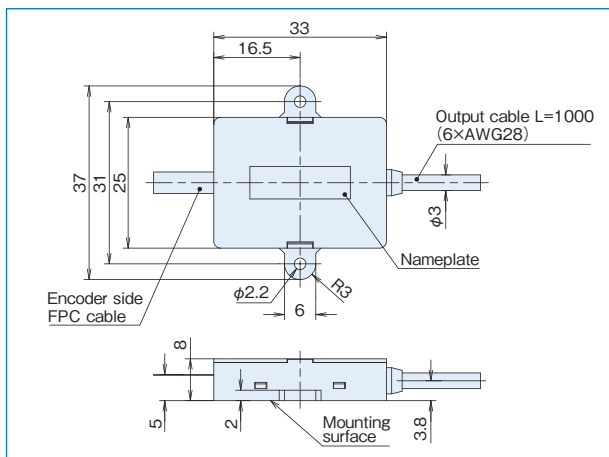
## Encoder Outside dimensions



## Receiver Outside dimensions (Option)



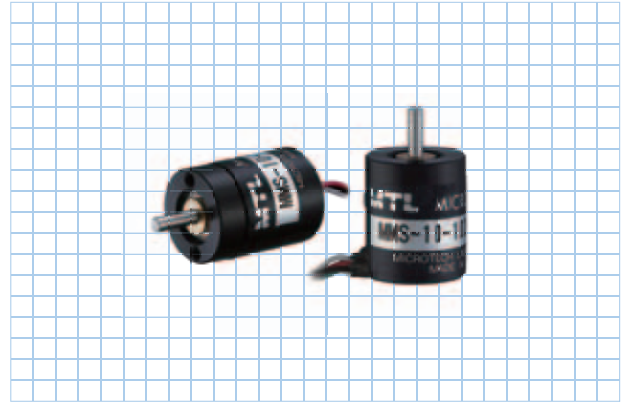
## Outside dimensions of the I/F box



# MMS-10 series

[Absolute]

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



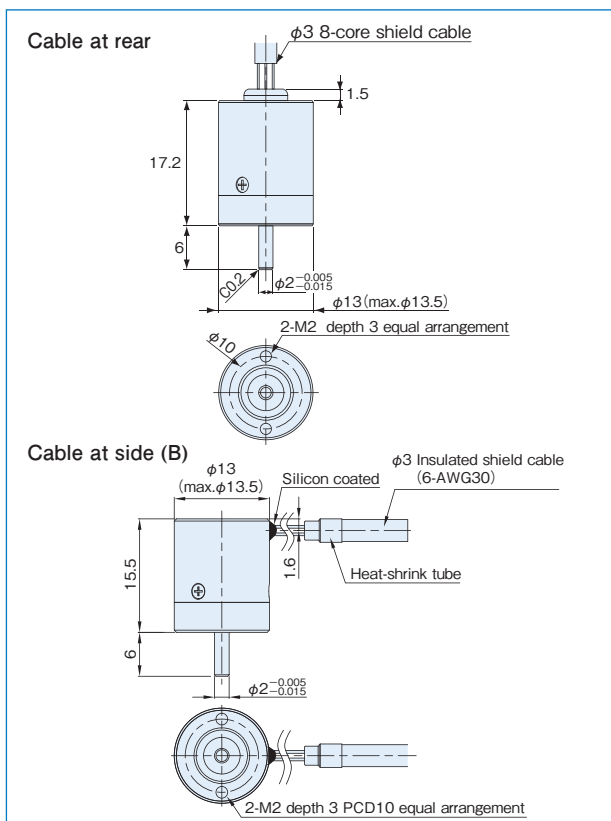
## Encoder Specifications

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

## Connection

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

## Encoder Outside dimensions



## Decoder specifications (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		$60\mu\text{s}$ (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)

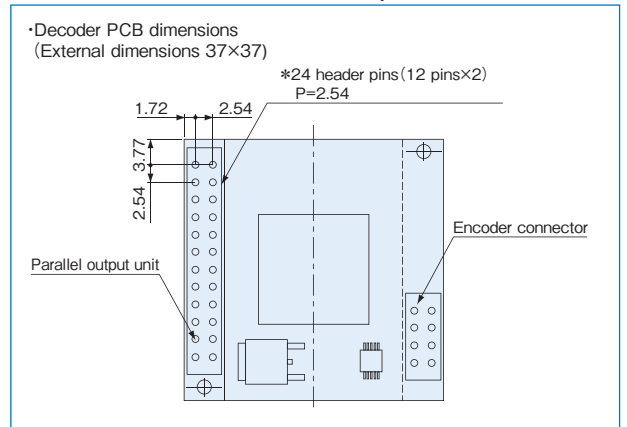
$\triangle\triangle \dots 8, 9, 10$  (corresponding to the encoder resolution)

## Connection diagram

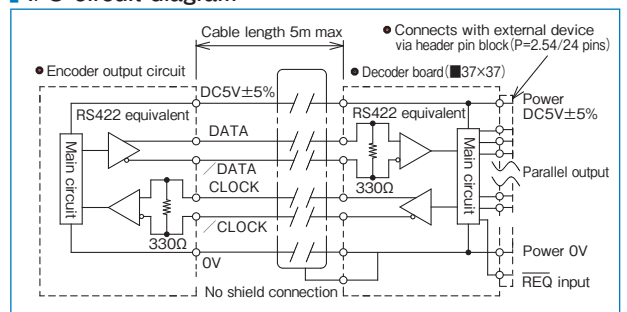
Decoder board TH No.

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)



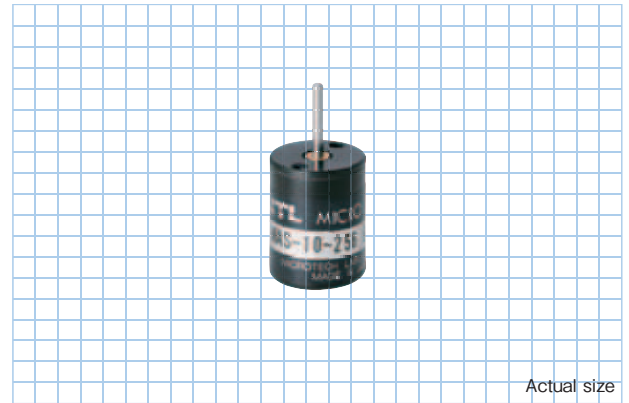
## I/O circuit diagram



# MAS-10 series

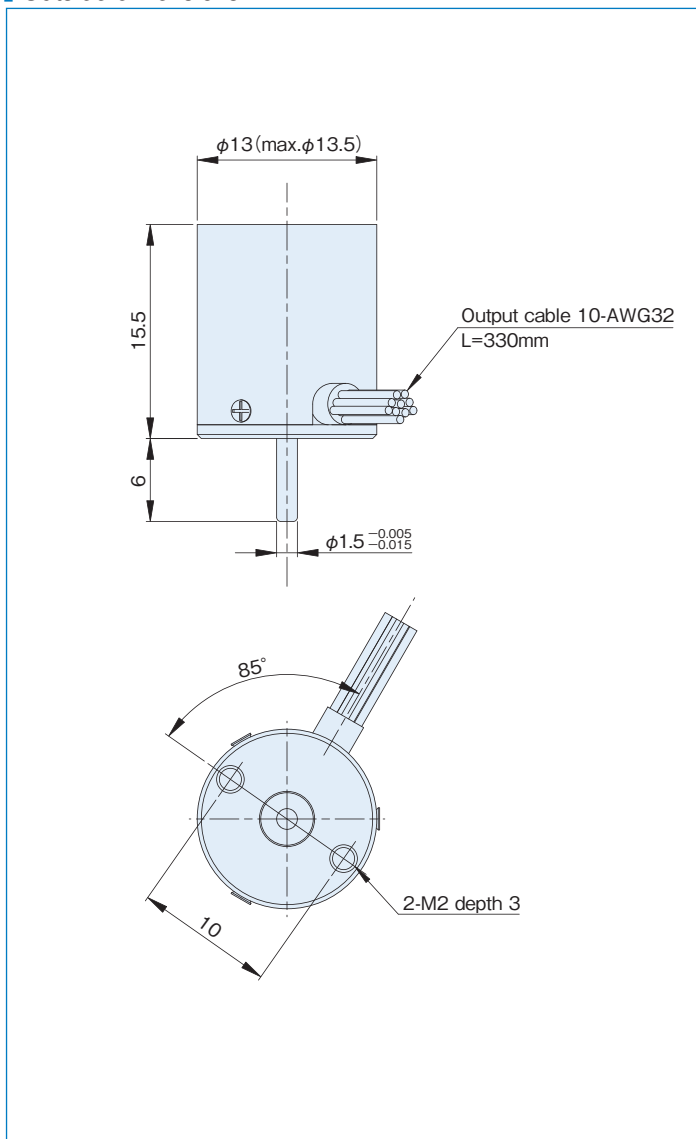
[Absolute]

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



Actual size

## Outside dimensions



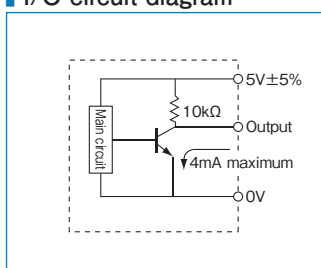
## Specifications

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~+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 <sup>2</sup> (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 <sup>0</sup>
Orange	Output 2 <sup>1</sup>
Yellow	Output 2 <sup>2</sup>
Green	Output 2 <sup>3</sup>
Blue	Output 2 <sup>4</sup>
Purple	Output 2 <sup>5</sup>
Gray	Output 2 <sup>6</sup>
White	Output 2 <sup>7</sup>

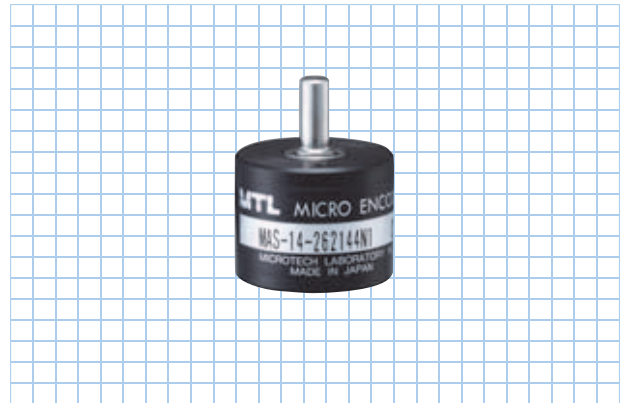
## I/O circuit diagram



# MAS-14 series

[Absolute]

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



## Specifications

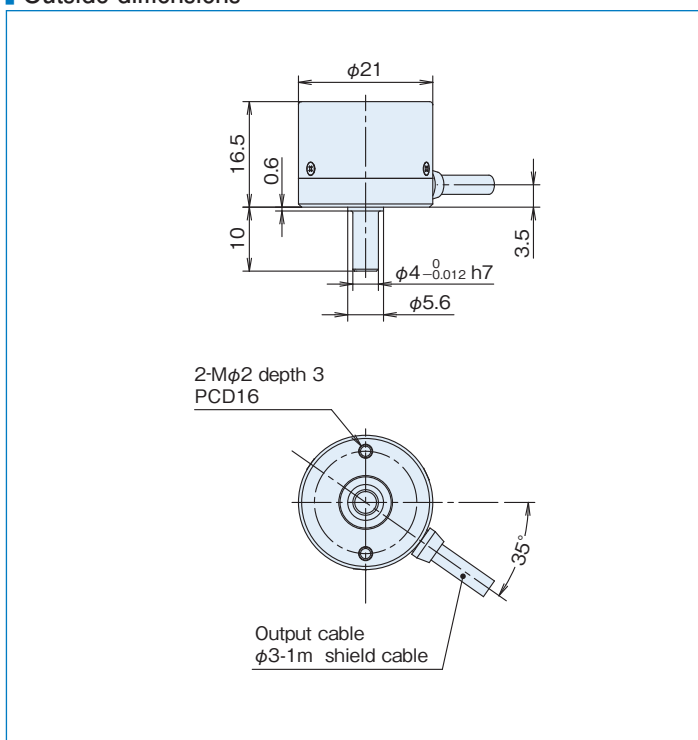
Type name	MAS-14- <input type="text"/> N1
Item	
Supply voltage	DC5V $\pm$ 5%
Current consumption	100mA or less (under no load)
Resolution	32,768 (15bit), 65,536 (16bit), 131,072 (17bit), 262,144 (18bit)
Allowable rotation	6000r/min
Allowable load of shaft (electrical)	Radial 0.98N (100gf)
	Thrust 1.9N (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 <sup>2</sup> (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)
Communication method	RS-422 Communication (four-wire) SSI Format

## Decoder specifications (37×37 PCB)

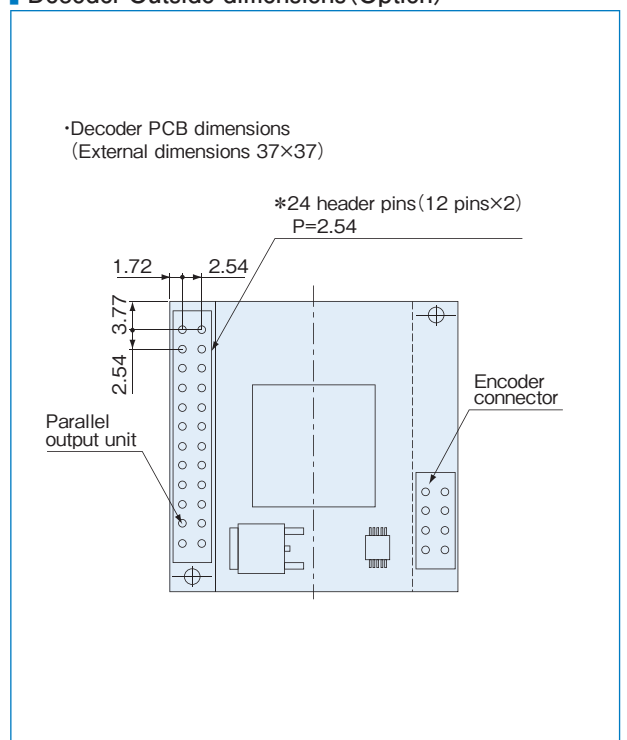
Type name	DECODER- $\triangle\triangle$ bit
Item	
Supply voltage	DC5V $\pm$ 5%
Current consumption	60mA or less (160mA or less including encoder)
Parallel data update cycle	60 $\mu$ s (16.7kHz)
Output circuit	NPN open collector output (when using parallel output)
Output capacity	Sink current 20mA or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

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

## Outside dimensions



## Decoder Outside dimensions (Option)



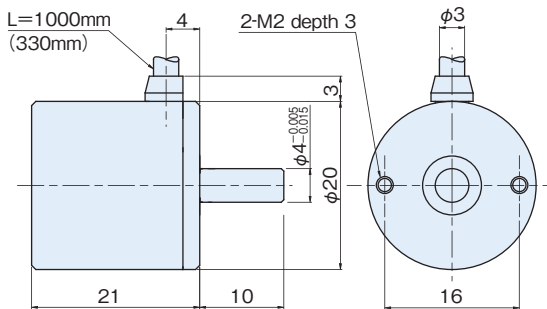
# MA-17 series

[Absolute]

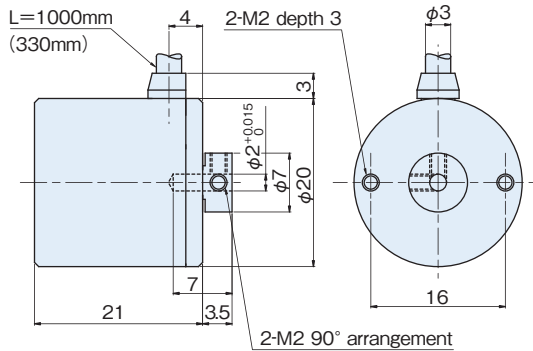


## Outside dimensions

MAS-17

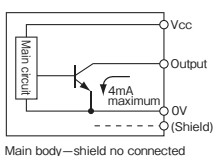


MAH-17



## Output circuit diagram

Each output circuit



## Specifications

Type name		MA□-17-□□1	
Item	Shaft shape ●S=single shaft ●H=hollow shaft	Pulse number G N B	
Supply voltage	DC5V ±5%		
Current consumption	80mA or less (under no load)		
Output code	G:gray code, N:Pure binary code, B:BBC code		
Logic	Negative logic (H=0, L=1)		
Resolution	G, N		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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions		
Cable	256:Outside diameter φ3 10-core vinyl wire Insulated shield cable (length 1m)		
	512:1024:1000:Vinyl wire (AWG30) Cable length 330mm		
Mass	40g (excluding cable)		

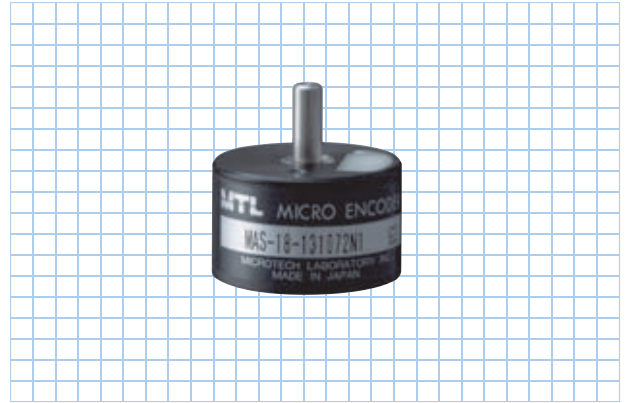
## Connection

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

# MAS-18 series

[Absolute]

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



## Encoder specifications

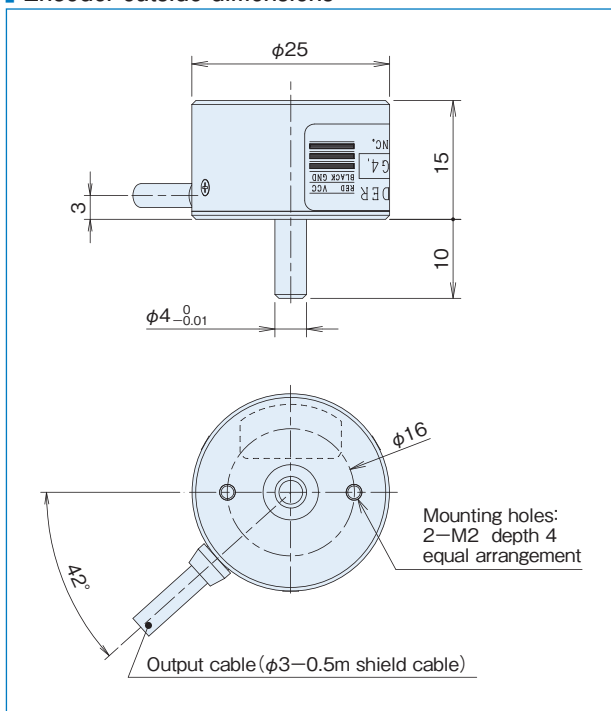
Item	Type name	MAS-18-□□N1
Supply voltage		DC5V $\pm 5\%$
Current consumption		100mA or less (under no load)
Resolution		32,768 (15bit), 65,536 (16bit) 131,072 (17bit), 262,144 (18bit)
Allowable revolutions		6000r/min
Allowable load of shaft (electrical)	Radial	1.9N (200gf)
	Thrust	1.9N (200gf)
Working temperature/humidity		$-10^{\circ}\text{C} \sim +70^{\circ}\text{C}$ / RH35%~90%
Storage temperature		$-20^{\circ}\text{C} \sim +80^{\circ}\text{C}$
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability $500\text{m/s}^2$ (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

## Decoder Specifications (■37×37 PCB)

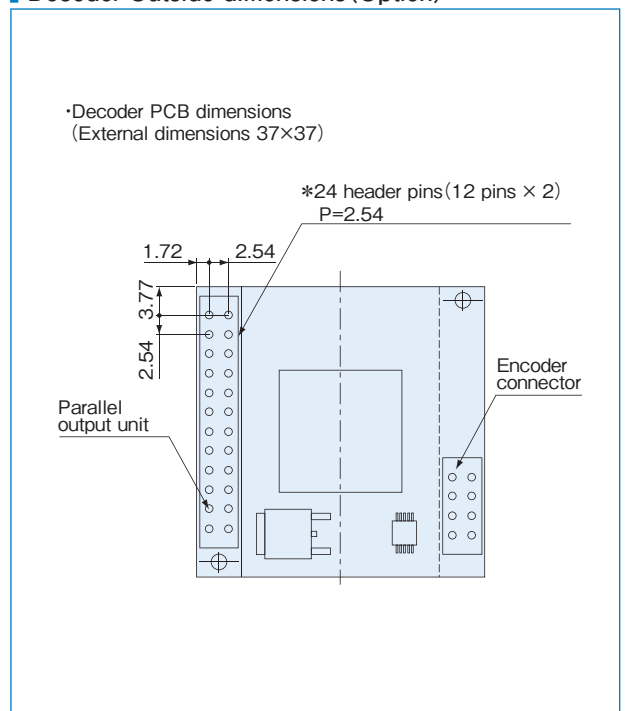
Item	Type name	DECODER-△△bit
Supply voltage		DC5V $\pm 5\%$
Current consumption		60mA or less (160mA or less including encoder)
Parallel data update cycle		$60\mu\text{s}$ (16.7kHz)
Output circuit		NPN open collector output (when using parallel output)
Output capacity		Sink current 20mA max. Load voltage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

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

## Encoder outside dimensions



## Decoder Outside dimensions (Option)

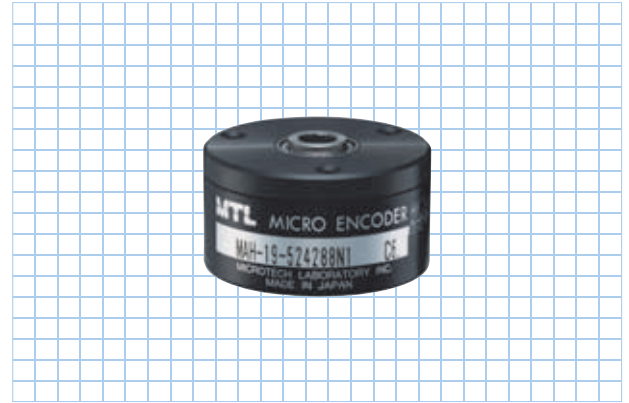




# MAH-19 series

[Absolute]

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



## Specifications

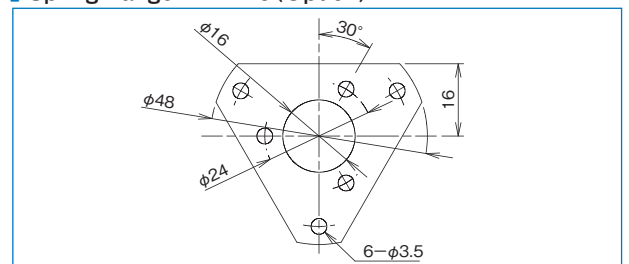
Type name	MAH-19- <input type="text"/> N1
Item	
Supply voltage	DC5V $\pm$ 5%
Current consumption	100mA or less (under no load)
Resolution	65,536 (16bit), 131,072 (17bit) 262,144 (18bit), 524,288 (19bit)
Allowable rotation	6000r/min
Allowable load of shaft (electrical)	Radial 9.8N (1kgf)
	Thrust 4.9N (0.5kgf)
Working temperature/humidity	-10°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 <sup>2</sup> (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)
Communication method	RS-422 Communication (four-wire) SSI Format

## Decoder specifications (37 $\times$ 37 PCB)

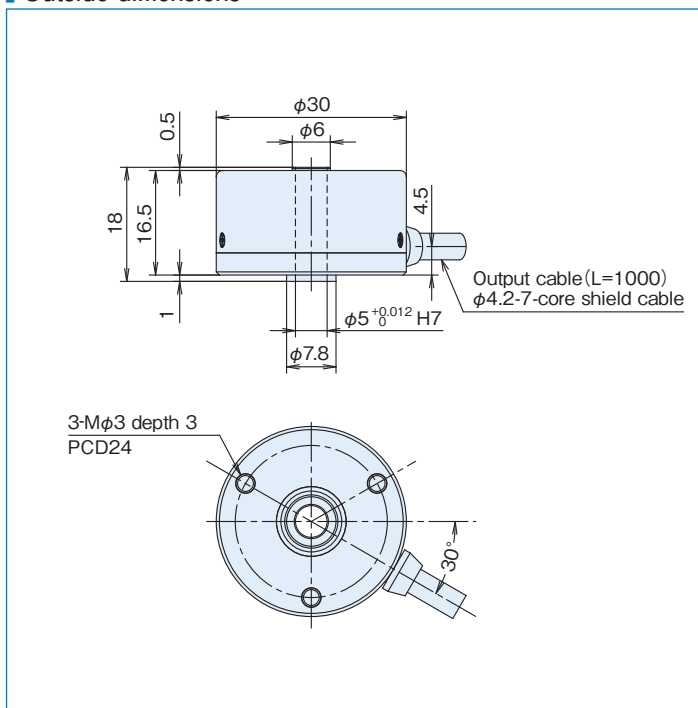
Type name	DECODER- $\triangle\triangle$ bit
Item	
Supply voltage	DC5V $\pm$ 5%
Current consumption	60mA or less (160mA or less including encoder)
Parallel data update cycle	60 $\mu$ s (16.7kHz)
Output circuit	NPN open collector output (when using parallel output)
Output capacity	Sink current 20mA or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

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

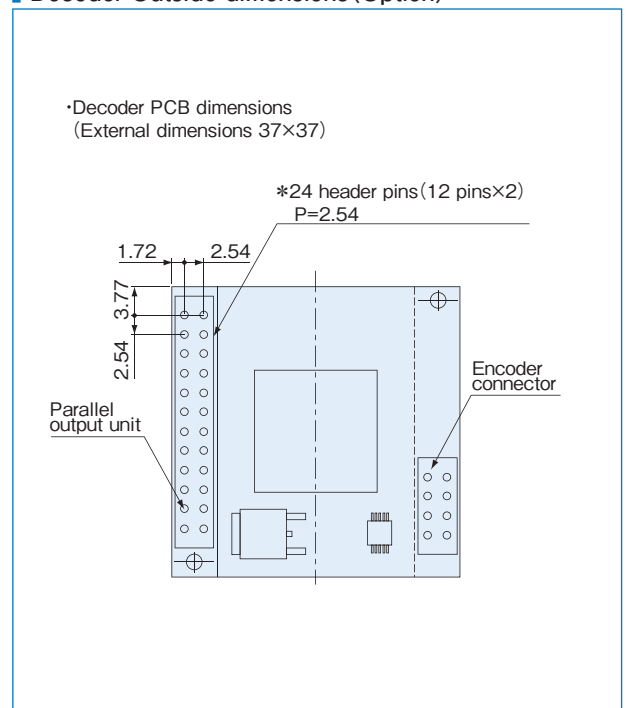
## Spring flange MEH-19 (Option)



## Outside dimensions



## Decoder Outside dimensions (Option)



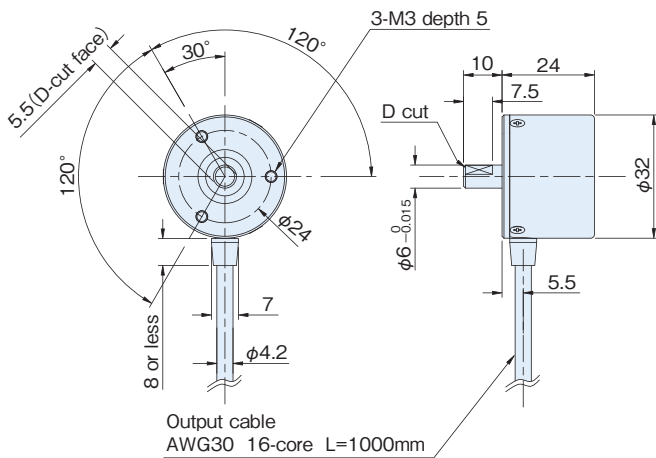
# MA-20 series

[Absolute]

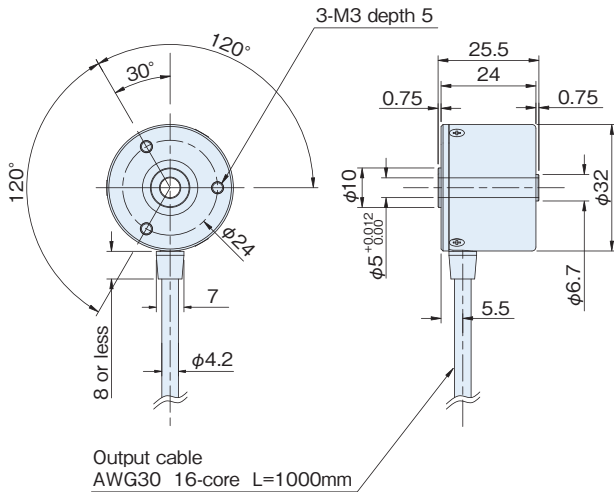


## Outside dimensions

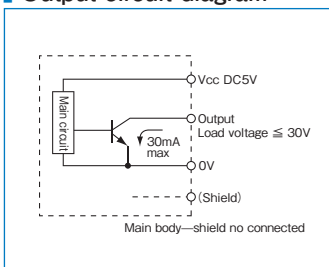
### MAS-20



### MAH-20



## Output circuit diagram



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

## Specifications

Type name		MA□-20-□□1	
		Shaft shape	Pulse number
		●S=single shaft	●G=gray code
		●H=hollow shaft	●N=pure binary code
			●B=BCD code
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	256 512	1,024 2,048	4,096 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 <sup>2</sup> (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

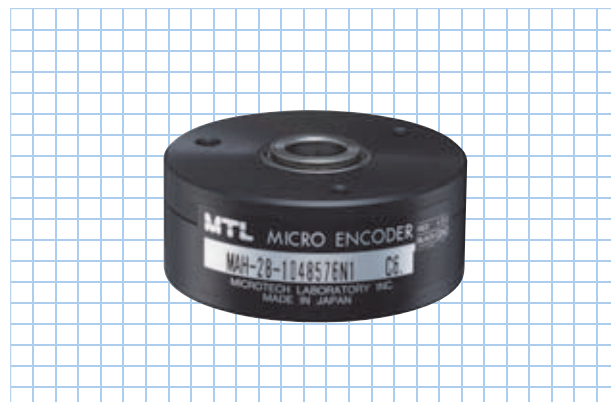
Cable color	Type	Output signal		
		MA-20-□G1	MA-20-□N1	MA-20-□B1
Brown		Output 2 <sup>0</sup>		Output 2 <sup>0</sup>
Brown/Black		Output 2 <sup>1</sup>		Output 2 <sup>1</sup>
Orange		Output 2 <sup>2</sup>		Output 2 <sup>2</sup>
Orange/Black		Output 2 <sup>3</sup>		Output 2 <sup>3</sup>
Yellow		Output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

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

# MAH-28

[Absolute]

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



## Specifications

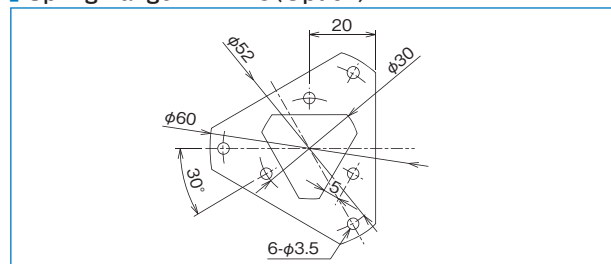
Type name	MAH-28- <span style="border: 1px solid black; display: inline-block; width: 40px; height: 15px;"></span> N1	
Item		
Supply voltage	DC5V $\pm$ 5%	
Current consumption	100mA or less (under no load)	
Resolution	262,144 (18bit) 524,288 (19bit) 1,048,576 (20bit)	
Allowable rotation	6000r/min	
Allowable load of shaft (electrical)	Radial	14.7N (1.5kgf)
	Thrust	4.9N (0.5kgf)
Working temperature/humidity	-10°C~70°C / RH35%~90% no dewing	
Storage temperature	-20°C~80°C	
Vibration resistance	Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions	
Impact resistance	Durability 500m/s <sup>2</sup> (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)	
Communication method	RS-422 Communication (four-wire) SSI Format	

## Decoder specifications (37 $\times$ 37 PCB)

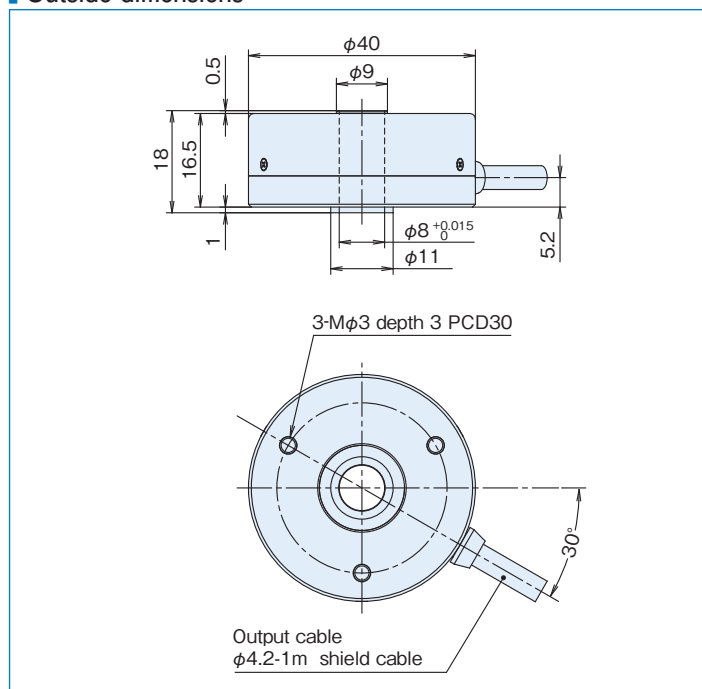
Type name	DECODER- $\triangle\triangle$ bit	
Item		
Supply voltage	DC5V $\pm$ 5%	
Current consumption	60mA or less (160mA or less including encoder)	
Parallel data update cycle	60 $\mu$ s (16.7kHz)	
Output circuit	NPN open collector output (when using parallel output)	
Output capacity	Sink current 20mA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

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

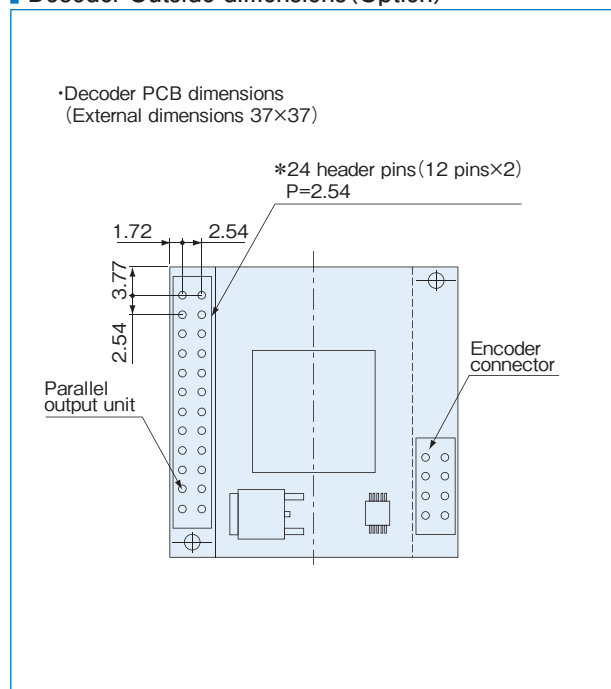
## Spring flange MEH-28 (Option)



## Outside dimensions



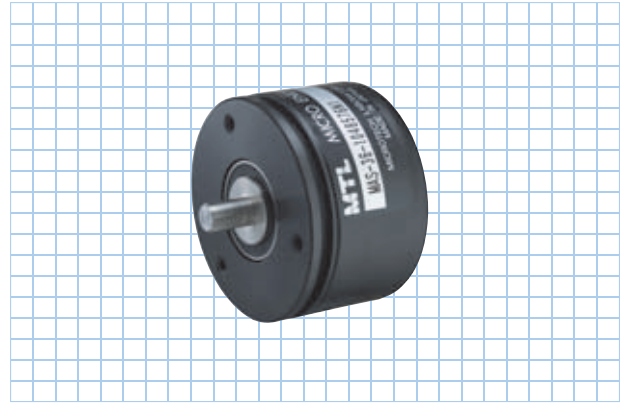
## Decoder Outside dimensions (Option)



# MA-36-20bit

[Absolute]

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



## Specifications

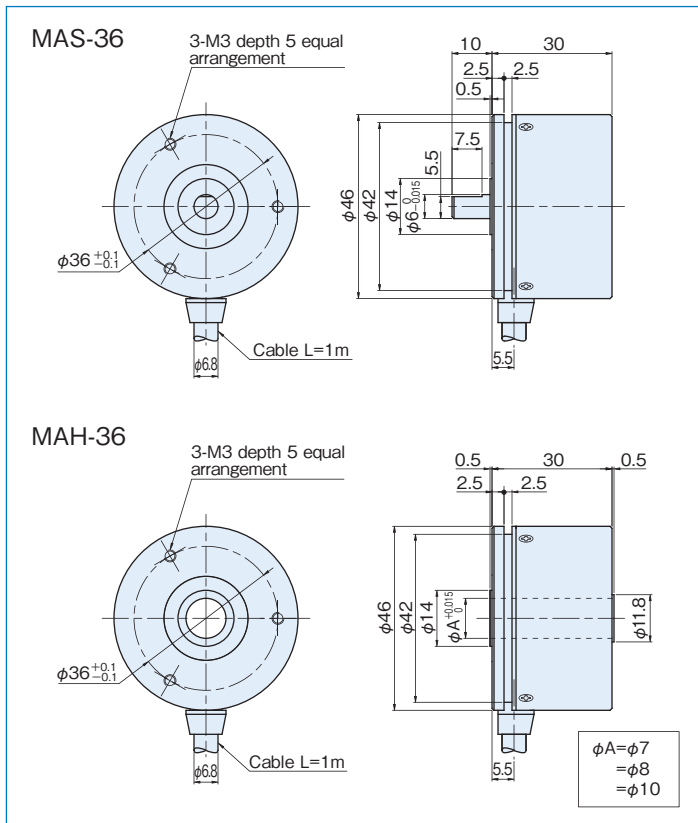
Type name	MA $\Delta$ -36- <input type="text"/> N1	
Item		
Supply voltage	DC5V $\pm$ 5% (at end of encoder cable)	
Current consumption	100mA or less (under no load)	
Resolution	1,048,576 (20bit), 524,288 (19bit), 262,144 (18bit)	
Allowable rotation	6000r/min	
Allowable load of shaft (electrical)	Radial	19.6N (2kgf)
	Thrust	9.8N (1kgf)
Working temperature/humidity	-10°C~70°C / RH90% or less (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 <sup>2</sup> (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)	
Communication method	RS-422 Communication (four-wire) SSI Format	

## Decoder specifications (37 $\times$ 37 PCB)

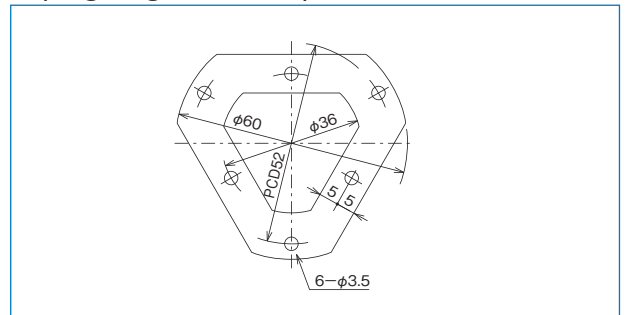
Type name	DECODER- $\Delta\Delta$ bit
Item	
Supply voltage	DC5V $\pm$ 5%
Current consumption	60mA or less (160mA or less including encoder)
Parallel data update cycle	60 $\mu$ s (16.7kHz)
Output circuit	NPN open collector
Output capacity	Sink current 20mA or less Load voltage 35V or less Residual voltage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

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

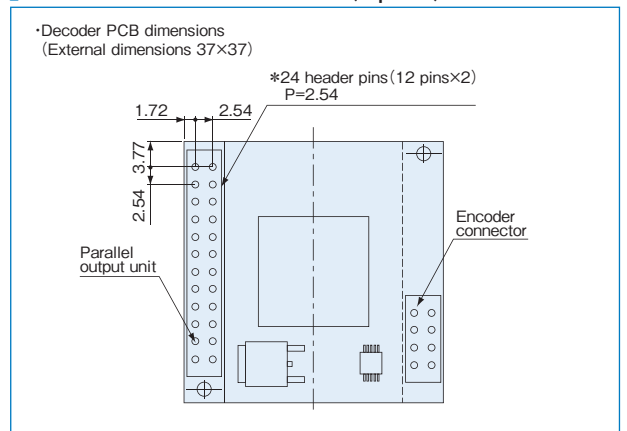
## Outside dimensions



## Spring flange MEH-30 (Option)

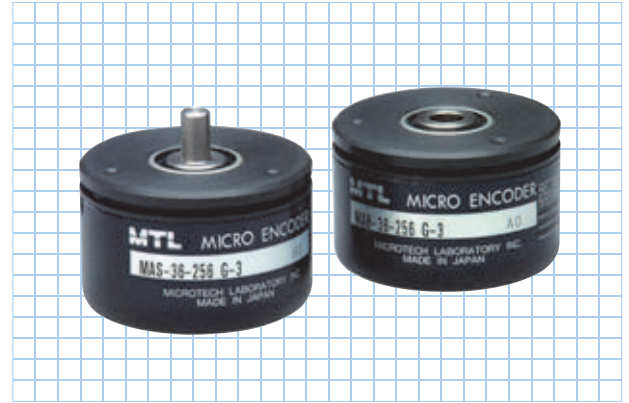


## Decoder Outside dimensions (Option)

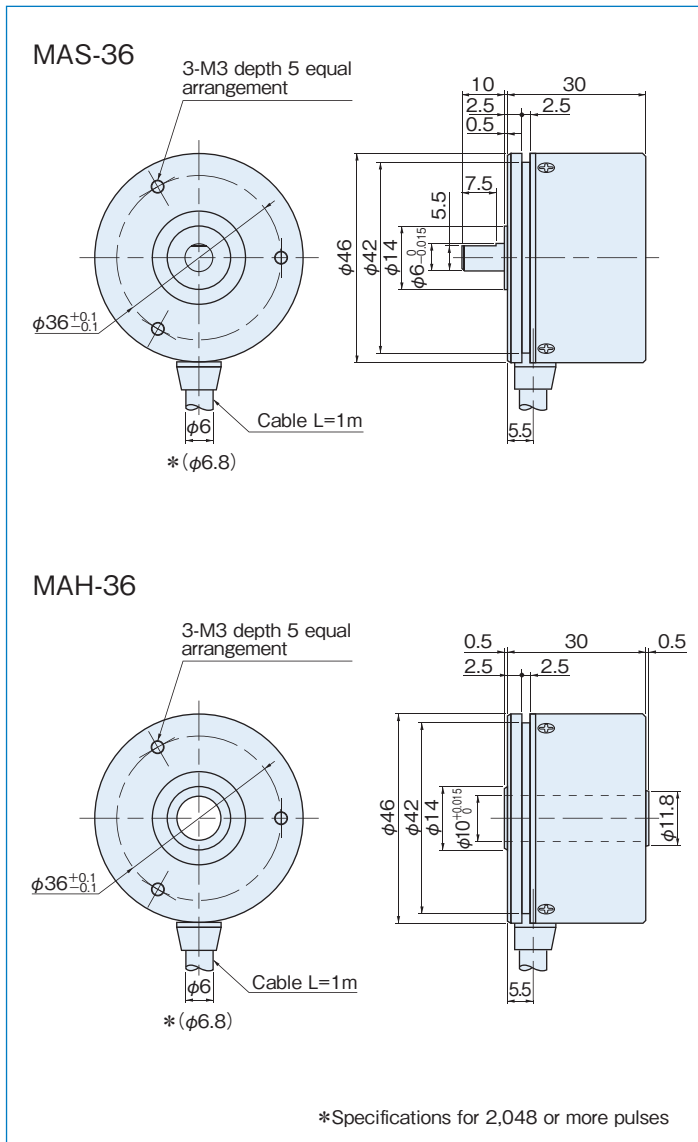


# MA-36 series

[Absolute]



## Outside dimensions



## Specifications

Type name		MA□-36-□□□□	
Item		Shaft shape - Pulse number - Output code Supply voltage ●S=single shaft ●G=gray code ●1=DC5V ●H=hollow shaft ●N=pure binary code ●5=DC12V~24V ●B=BCD code	
Supply voltage	1:DC5V±5% 5:DC12V-10%~24V+15%		
Current consumption	1024P or less:100mA or less (under no load) 2048P or more:150mA or less (under no load)		
Output code	G: gray code N: pure binary code	B: BCD code	
Logic	Negative logic (H=0, L=1)		
Resolution	256 720 4,096 360 1,024 8,192 512 2,048 16,384	1,000	
Output circuit	NPN open collector		
Output capacity	Sink current each bit 30mA max, Output residual voltage:0.5V or less (Cable length 1m, Sink current: at 30mA)		
Allowable load of shaft (electrical)	Radial	19.6N (2kgf)	
	Thrust	9.8N (1kgf)	
Maximum revolutions (mechanical)	6,000r/min		
Maximum response frequency	10kHz (1,024 or less) 15kHz (2,048 pulse) 30kHz (4,096 pulse)	60kHz (8,192 pulse) 120kHz (16,384 pulse)	
Working temperature/humidity	-10°C~70°C / RH95% or less no dewing		
Storage temperature	-25°C~85°C * -20°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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions		
Cable	Outside diameter φ6.0 16-core vinyl wire AWG28 Insulated shield cable (length 1m)		
Mass	300g or less (excluding cable)		

\*Specifications for 2,048 or more pulses

## Connection (1,024 pulse or less)

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

## Connection (2,048 pulse or more)

Cable color	Output signal	
	MA36-□G1	MA36-□N1
Brown	Output 2 <sup>0</sup>	
Brown / Black	Output 2 <sup>1</sup>	
Orange	Output 2 <sup>2</sup>	
Orange / Black	Output 2 <sup>3</sup>	
Yellow	Output 2 <sup>4</sup>	
Yellow / Black	Output 2 <sup>5</sup>	
Green	Output 2 <sup>6</sup>	
Green / Black	Output 2 <sup>7</sup>	
Blue	Output 2 <sup>8</sup>	
Blue / Black	Output 2 <sup>9</sup>	
Purple	Output 2 <sup>10</sup>	
Purple / Black	Output 2 <sup>11</sup>	
Gray	Output 2 <sup>12</sup>	
Gray / Black	Output 2 <sup>13</sup>	
Red	Vcc	
Red / Black	N.C.	N.C.
Black	(*) Latch input (LE)	0V

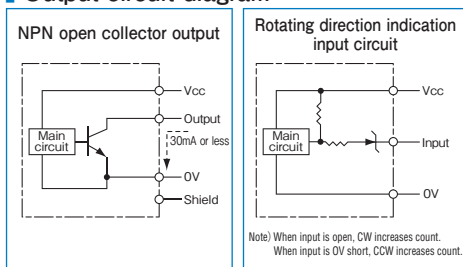
Note: The shield is in the encoder and not connected. A capacitor (0.1μF) is connected between 0V and FG.

## Resolution and code No.

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

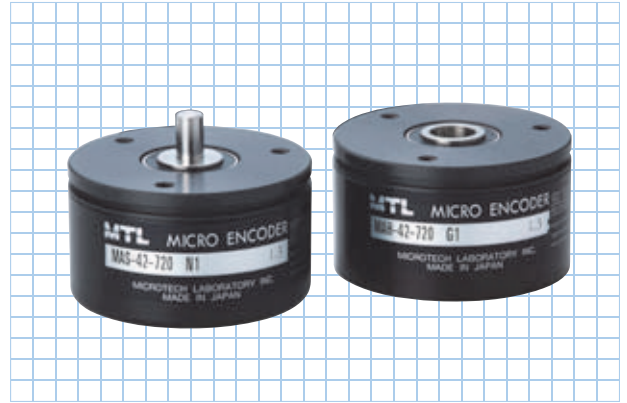
Resolution	Code No.
2,048	0~2,047
4,096	0~4,095
8,192	0~8,191
16,384	0~16,383

## Output circuit diagram



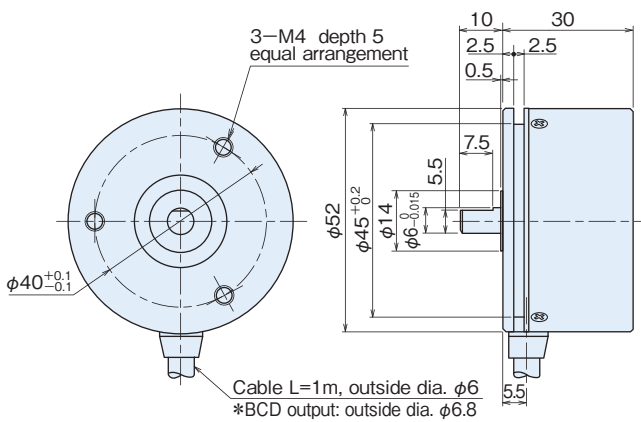
# MA-42 series

[Absolute]

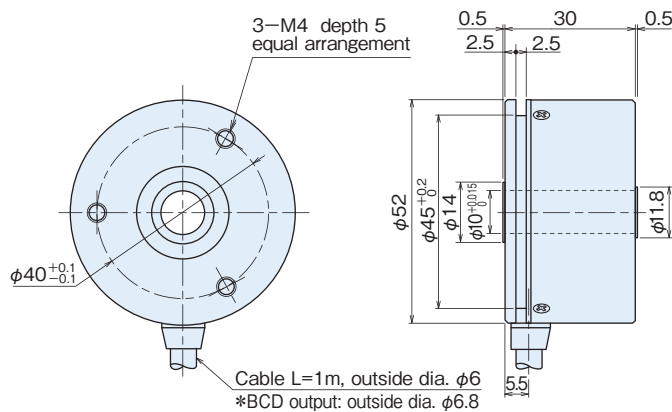


## Outside dimensions

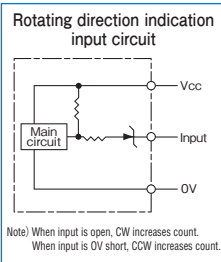
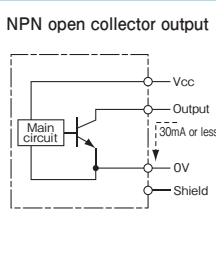
### MAS-42



### MAH-42



## I/O circuit diagram



## Specifications

Type name		MA□-42-□□□□			
Item		Shaft shape	Pulse number	Output code	Supply voltage
		●S=single shaft ●H=hollow shaft	●G=gray code ●N=pure binary code ●B=BCD code	●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	256 512 1,024 4,096 360 720 2,048	1,000 3,600			
Output circuit	NPN open collector				
Output capacity	Sink current each bit 30mA, Residual voltage:0.4V or less (Sink current: at 30mA)				
Allowable load of shaft (electrical)	Radial	19.6N (2kgf)			
	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 <sup>2</sup> (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 <sup>0</sup>	2 <sup>0</sup>	2 <sup>0</sup>	2 <sup>0</sup>
Brown/black	2 <sup>1</sup>	2 <sup>1</sup>	2 <sup>1</sup>	2 <sup>1</sup>
Orange	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>	2 <sup>2</sup>
Orange/black	2 <sup>3</sup>	2 <sup>3</sup>	2 <sup>3</sup>	2 <sup>3</sup>
Yellow	2 <sup>4</sup>	2 <sup>4</sup>	2 <sup>4</sup>	2 <sup>0</sup> ×10
Yellow/black	2 <sup>5</sup>	2 <sup>5</sup>	2 <sup>5</sup>	2 <sup>1</sup> ×10
Green	2 <sup>6</sup>	2 <sup>6</sup>	2 <sup>6</sup>	2 <sup>2</sup> ×10
Green/black	2 <sup>7</sup>	2 <sup>7</sup>	2 <sup>7</sup>	2 <sup>3</sup> ×10
Blue	2 <sup>8</sup>	2 <sup>8</sup>	2 <sup>8</sup>	2 <sup>0</sup> ×100
Blue/black	2 <sup>9</sup>	2 <sup>9</sup>	2 <sup>9</sup>	2 <sup>1</sup> ×100
Purple	2 <sup>10</sup>	2 <sup>10</sup>	2 <sup>10</sup>	2 <sup>2</sup> ×100
Purple/black	2 <sup>11</sup>	2 <sup>11</sup>	2 <sup>11</sup>	2 <sup>3</sup> ×100
Gray	—	—	—	2 <sup>0</sup> ×1000
Gray/black	—	—	—	2 <sup>1</sup> ×1000
White	—	—	—	Not connected
White/black	—	—	—	Not connected
Red/black	Not connected	Rotating direction indication input		
Red	Supply power			
Black	OV (COMMON)			
Black	OV (COMMON)			

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

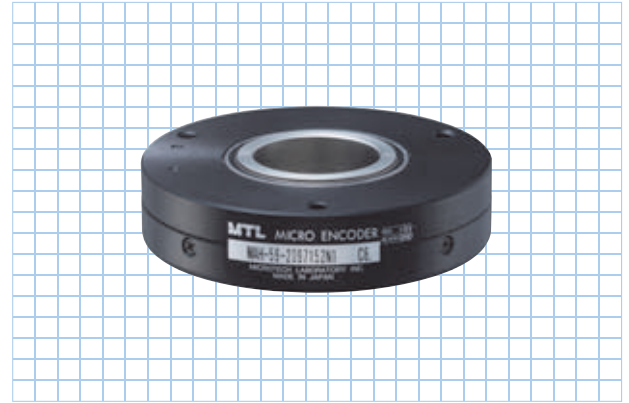
## Resolution and code No.

Resolution	Code No.	Resolution	Code No.
256	0~255	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		

# MAH-59 series

[Absolute]

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



## Specifications

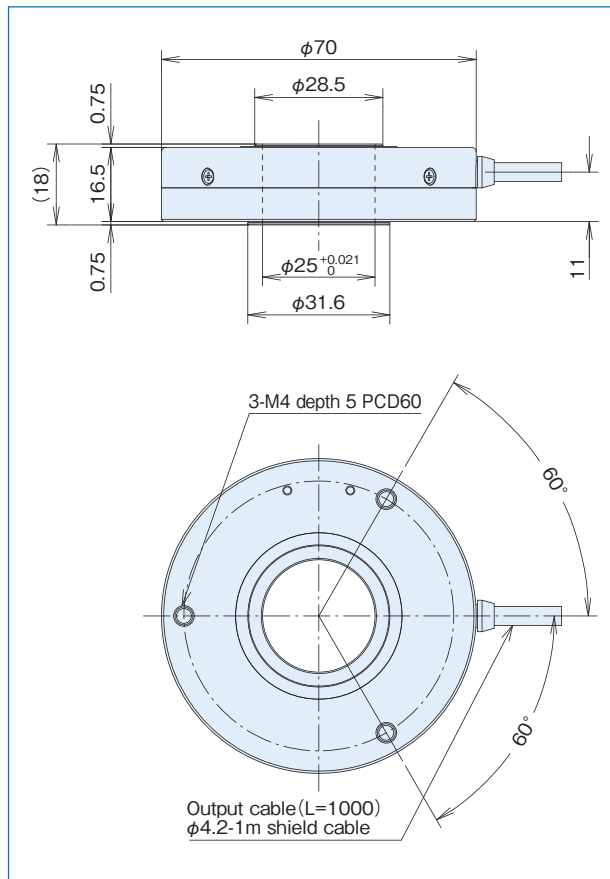
Item	Type name	MAH-59- <input type="text"/> N1
Supply voltage		DC5V $\pm 5\%$
Current consumption		100mA or less (under no load)
Resolution		2,097,152 (21bit), 1,048,576 (20bit), 524,288 (19bit)
Allowable rotation		1000rpm
Allowable load of shaft (electrical)	Radial	9.8N (1.0kg)
	Thrust	4.9N (0.5kg)
Working temperature/humidity		$-10^{\circ}\text{C} \sim +70^{\circ}\text{C} / \text{RH}35\% \sim 90\%$
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 <sup>2</sup> (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
Communication method		RS-422 Communication (four-wire) SSI Format

## Decoder specifications (37×37 PCB)

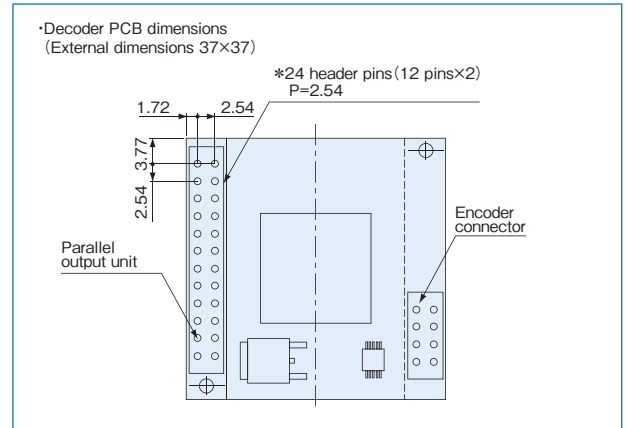
Item	Type name	DECODER- $\triangle\triangle$ bit
Supply voltage		DC5V $\pm 5\%$
Current consumption		60mA or less (110mA or less including encoder)
Parallel data update cycle		60 $\mu\text{s}$ (16.7kHz)
Output circuit		NPN open collector output (when using parallel output)
Output capacity		Sink current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

$\triangle\triangle \dots 19, 20$  (corresponding to the encoder resolution)

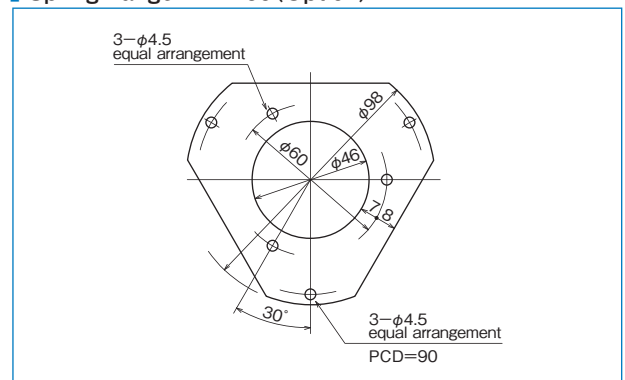
## Outside dimensions



## Decoder Outside dimensions (Option)



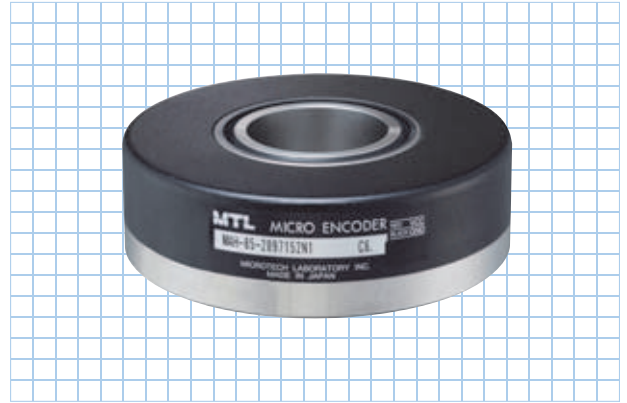
## Spring flange MEH-60 (Option)



# MAH-85 series

[Absolute]

- Outside dimensions  $\phi 100 \times 31$  mm  
21 bit absolute encoder
- Resolution: 2097152, SSI interface, Hollow shaft  $\phi 36$



## Specifications

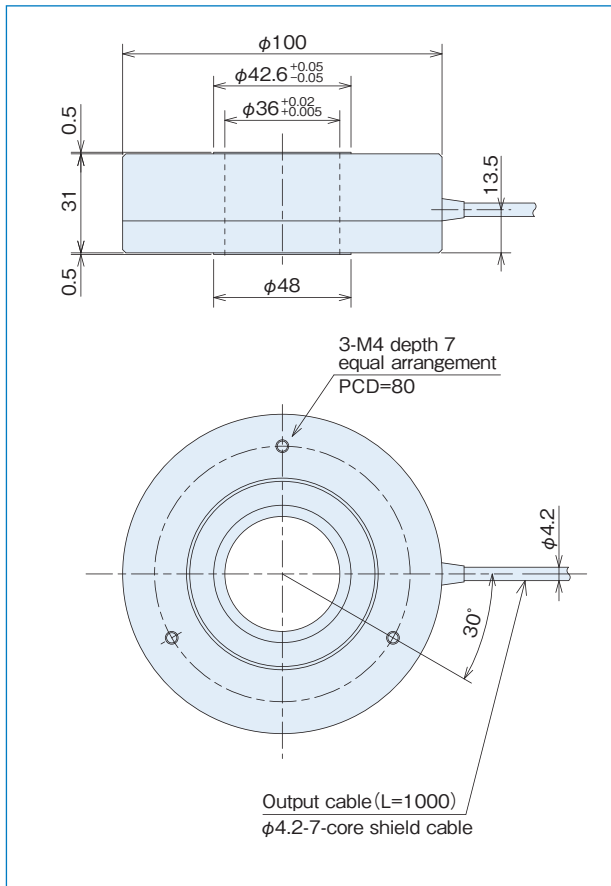
Item	Type name	MAH-85-2097152N1
Supply voltage		DC5V $-5\% \sim 24V + 10\%$ (At the edge of encoder cable)
Current consumption		250mA or less (under no load)
Resolution		2097152, 1048576, 524288, 262144
Allowable rotation		1000r/min
Allowable load of shaft (electrical)	Radial	4.9N (0.5kg)
	Thrust	4.9N (0.5kg)
Working temperature/humidity		$0^{\circ}\text{C} \sim +60^{\circ}\text{C} / \text{RH} 35\% \sim 90\%$
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 $500\text{m/s}^2$ (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		700g
Communication method		RS-422 Communication (four-wire) SSI Format

## Decoder specifications (37×37 PCB)

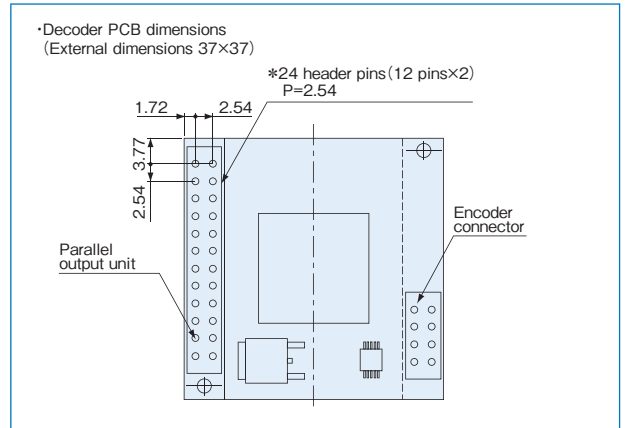
Item	Type name	DECODER- $\triangle\triangle$ bit
Supply voltage		DC5V $\pm 5\%$
Current consumption		60mA or less (310mA or less including encoder)
Parallel data update cycle		$60\mu\text{s}$ (16.7kHz)
Output circuit		NPN open collector output (when using parallel output)
Output capacity		Sink current 20mA or less Load voltage 35V or less Residual voltage 0.4V or less (sink current 10mA)
Logic		Negative logic (H=0, L=1)
Connection		Power supply and parallel signal output by P=2.54 header pins (see diagram below)

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

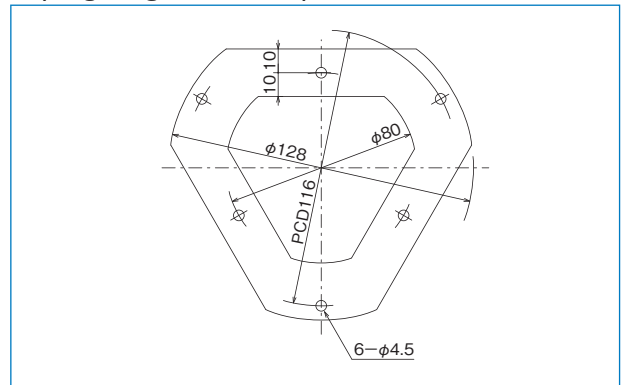
## Outside dimensions



## Decoder Outside dimensions (Option)



## Spring flange MEH-85 (Option)





# MAS-36-MT series

[Electronic multi-revolution absolute encoder]

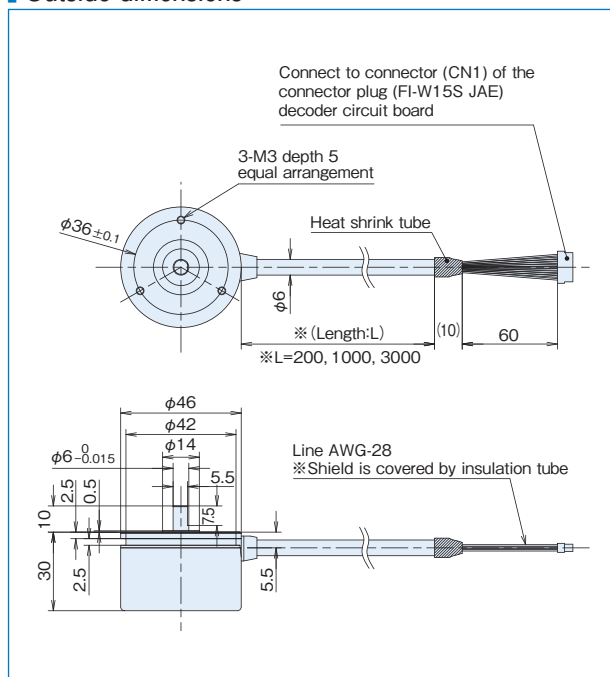
- Outside dimensions  $\phi 46 \times 30\text{mm}$
- Resolution: 1000 $\times$ 256



## Specifications

Item	Type name	MAS-36-1000MT-S
Supply voltage		DC5V $\pm 5\%$ , ripple (p-p) 5% or less
Current consumption		100mA or less (under no load)
Resolution		Single-revolution part 1,000 divisions/ Multi-revolution part -128 to 127 revolutions Allowable shaft rotation angle when power supply is cut off $\pm 80^\circ$
Alarm output		Counter overflow output
Output		Serial output (pure binary code, Positive logic)
Output circuit		Line driver output (RS485 compliant)
Response speed		25kHz (1500rpm)
Allowable load of shaft (electrical)	Radial	19.6N (2kg)
	Thrust	9.8N (1kg)
Working temperature/humidity		$-10^\circ\text{C} \sim +70^\circ\text{C}$ / RH35% $\sim$ 90%
Vibration resistance		Durability 55Hz, double amplitude 1.5mm 2 hours each in X, Y, and Z directions
Impact resistance		Durability 500m/s <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter $\phi 6$ 16-core connector Insulated shield cable AWG28 (length 200mm)
Mass		300g or less

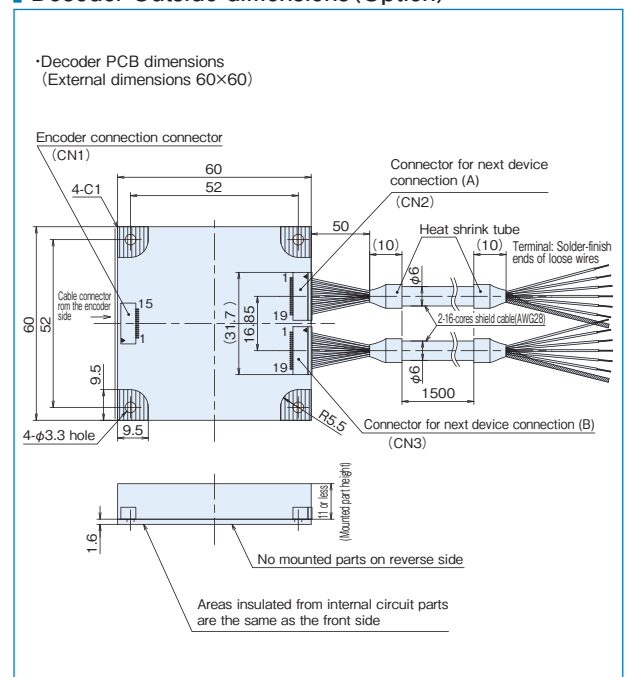
## Outside dimensions



## Decoder specifications (60 $\times$ 60 PCB)

Item	Type name	MA-36-MT-DECODER
Supply voltage		DC12V $-10\% \sim 24\text{V} +15\%$
Current consumption		150mA or less (including encoder, stepless output load)
Output		Single-revolution absolute parallel data (ABS 0-9) Multi-revolution absolute parallel data (TKN 0-7) Counter overflow alarm (COF)
Absolute data output code		Pure binary code, Negative logic (H=0, L=1)
Input		Single-revolution absolute data reset input (ARST) Multi-revolution absolute data reset input (TRST) (100ms or less, 1mA or less)
Absolute signal update cycle		3 $\mu\text{s}$ typ. (333kHz)
Output circuit		NPN open collector output
Output capacity		Sink current 20mA or less Load voltage 30V or less Residual voltage 0.4V or less
Connection		Outside diameter $\phi 6$ 16-core vinyl wire Insulated shield cable (length 1.5m)

## Decoder Outside dimensions (Option)



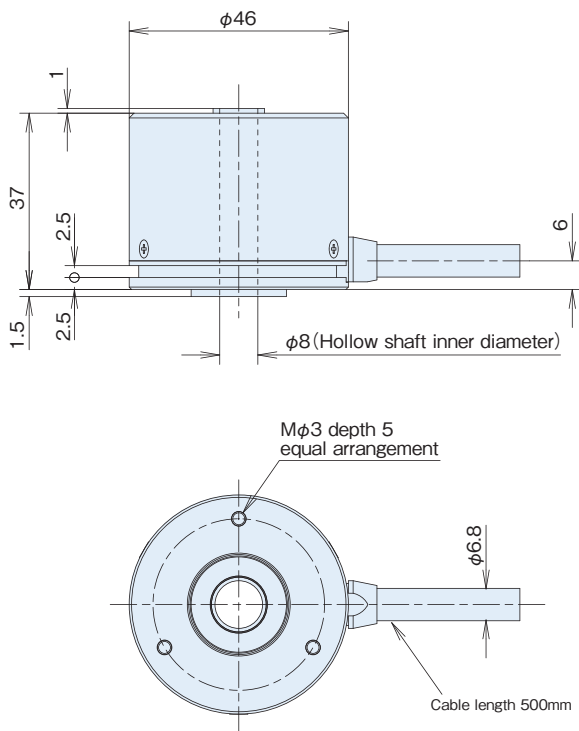
# MXH-36 series

[Slim multi-revolution absolute encoder]

- ▶ Outside dimensions  $\phi 46 \times 37 \text{mm}$
- ▶ Resolution 1,024×256, mechanical multi-revolution, no battery backup required



## Outside dimensions



## Specifications

Item	Type name	MXH-36-256-1024GC5N
Supply voltage		1:DC5V $\pm 5\%$ 2:DC12V $-10\% \sim 24V+15\%$
Current consumption		150mA or less (under no load)
Resolution		Single-revolution part: 1,024 divisions/ Multi-revolution part: 256 revolutions
Output		Parallel output (Gray code or pure binary code)
Output circuit		NPN open collector output
Output logic		Standard: Negative logic (*Positive logic selection is available)
Allowable rotation (mechanical)		5000r/min <sup>-1</sup> (instantaneous)
Maximum response frequency		40kHz (10kHz at guaranteed accuracy)
Shaft allowable load (electrical)	Radial	19.6N (2kgf)
	Thrust	9.8N (1kgf)
Working temperature/humidity		$-10^{\circ}\text{C} \sim 60^{\circ}\text{C} / \text{RH}35\% \sim 90\%$
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
Vibration resistance		Durability 11msec (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter $\phi 6.8$ 0-core vinyl wire Insulated shield cable (length 500mm)
Mass		150g or less (excluding cable)

## Connection

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

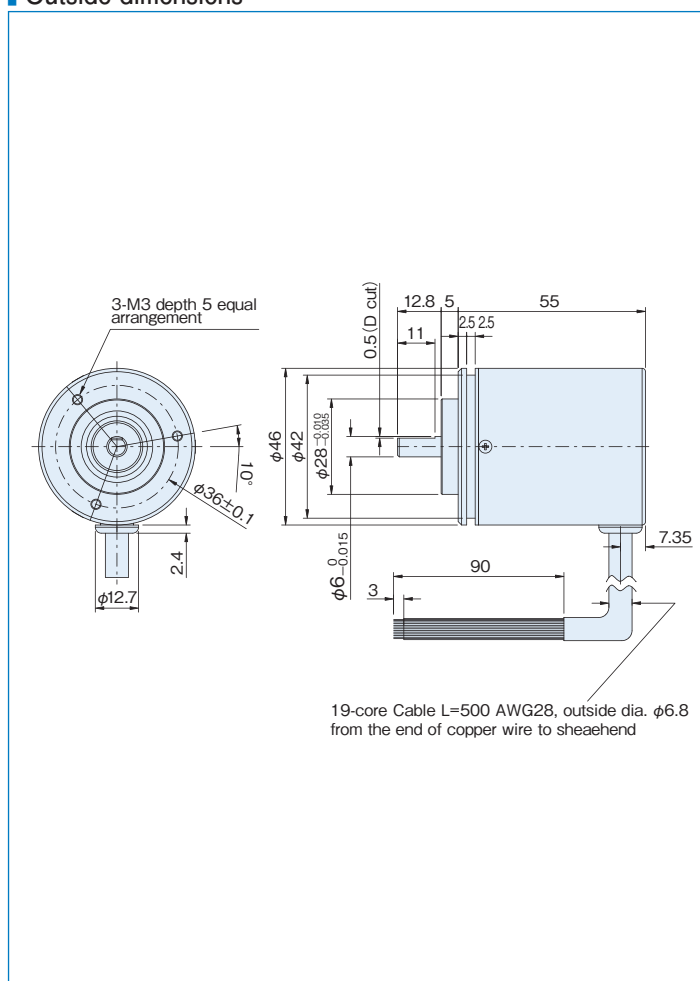
(\*)shielding cable is non-connected in encoder.

# MXS 36-series

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



## Outside dimensions



## Specifications

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

## Connection

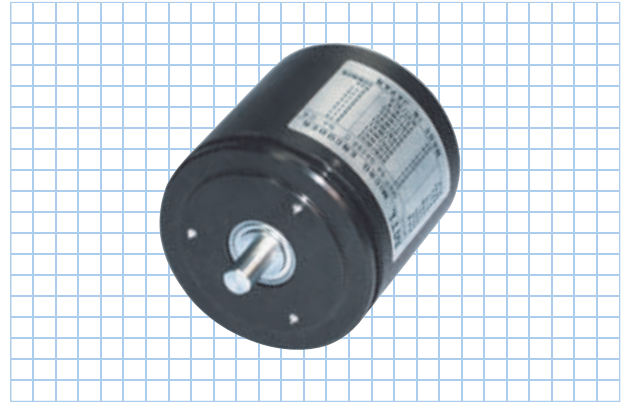
Cable color	Output signal	Cable color	Output signal
Brown	2 <sup>0</sup>	Purple	2 <sup>10</sup>
Brown/Black	2 <sup>1</sup>	Purple/Black	2 <sup>11</sup>
Orange	2 <sup>2</sup>	Gray	2 <sup>12</sup>
Orange/Black	2 <sup>3</sup>	Gray/Black	2 <sup>13</sup>
Yellow	2 <sup>4</sup>	White	2 <sup>14</sup>
Yellow/Black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

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

# MXS-42 series

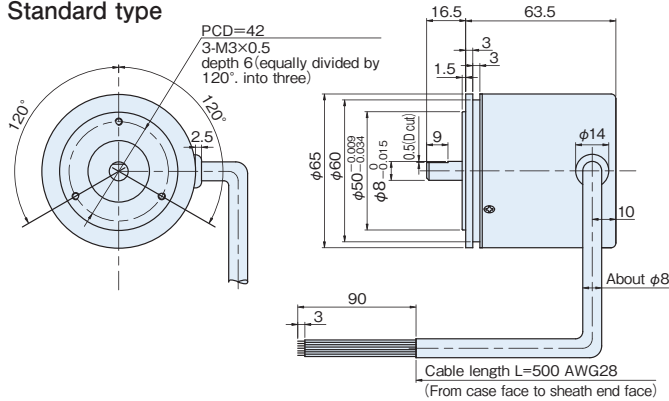
[High-resolution Multiple-rotation  
(100 rotations max) Absolute Type Encoder]

- High-reliability operation without internal battery is possible. (Batteryless)
- Permitting a total count of  $2^{18}$  max. high-resolution
- O.D.  $\phi 65 \times 63.5$
- Multiple-rotation (100 rotations max.) absolute output
- Selection of gray code output without reading error or pure binary code
- Selection of side-cable, rear-cable, or connector type
- IP64 drip-proof option possible (rear-cable type)

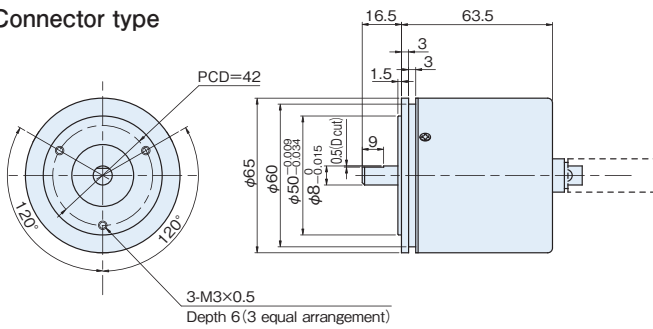


## Outside dimensions

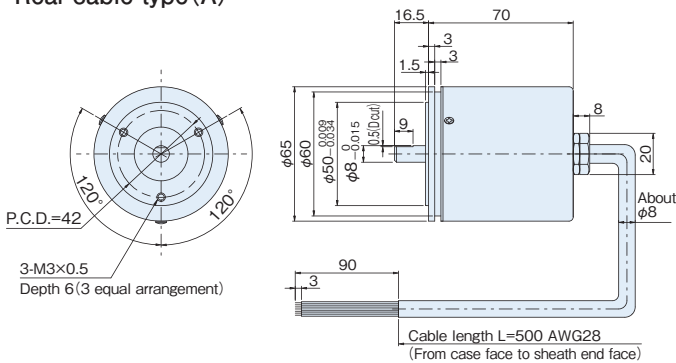
### Standard type



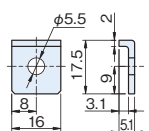
### Connector type



### Rear-cable type (A)



### Detailed servo mount clamp



## Specifications

Type name		MXS-42-○○○-□□□□□□□□□□
Protective structure:		W: Waterproof
Number of multi-turn revolutions:		1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 30, 40, 50, 60, 80, 100
Single turn resolution:		1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 30, 40, 50, 60, 80, 100
Output signal coding: G, N Note: For 100 multi-rotation, N only		G: Gray code, N: Pure binary code
Output format: Unmarked, C		Unmarked: Standard, C: Increment on reverse rotation
Power supply voltage: 3, 6 Note: For 100 multi-rotation, 1.5		3: 3V, 6: 6V
Option V: Increment on reverse rotation (V indicates values increases in CCW direction)		V: Increment on reverse rotation
Option N: Negative logic Note: For 100 multi-rotation, N only		N: Negative logic
Cable placement: B: side attached (standard), A: rear attached (waterproof type W only), unmarked: Connector attached		B: side attached, A: rear attached, unmarked: Connector attached
Supply voltage	Voltage output: 3 DC5V-5%~12V+10% Open collector output: 6 DC5V-5%~24V+15% For 100 rotations: Open collector output: 1 DC5V±5% Open collector output: 5 DC12V-10%~DC24V+15%	
Current consumption	Voltage output: 3 450mA or less Open collector output: 6 240mA or less	
Output code	G: gray code N: pure binary code	
Output logic	No mark: positive logic; N: negative logic	
Output pulse number (Standard)	128	1,024
[Pulse number/rotation]	256	2,048
	512	4,096
Rotation number	2·4·8·16·32·64·100 (DC5V, N code only)	
Maximum response frequency	40kHz (10kHz during guaranteed precision)	
Shaft allowable load (electrical)	Radial	49N (5kgf)
	Thrust	29.4N (3kgf)
Working temperature/humidity	-10°C~70°C/RH95% or less (no dewing)	
Storage temperature	-20°C~80°C	
Vibration resistance	Durability 0-500Hz, double amplitude 1.52mm 2 hours each in X, Y, and Z directions	
Impact resistance	Durability 11msec (about 50G) 3 times each in X, Y, and Z directions	
Mass	600g or less (excluding cable)	

## Connection

### a) Cable

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

### b) Connector

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

Note:

- Shielding cable is non-connected in encoder.
- Those cable which are unnecessary for signals are to be cut.
- The form below indicate 64 multi-turn and 4096P/R. When resolution is not enough, it becomes NC.

# Wire-type linear scale

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

MLS-12



MLS-30



MLS-37



MLS-45



MLS-50



MLA-17



MLA-30



MLA-37



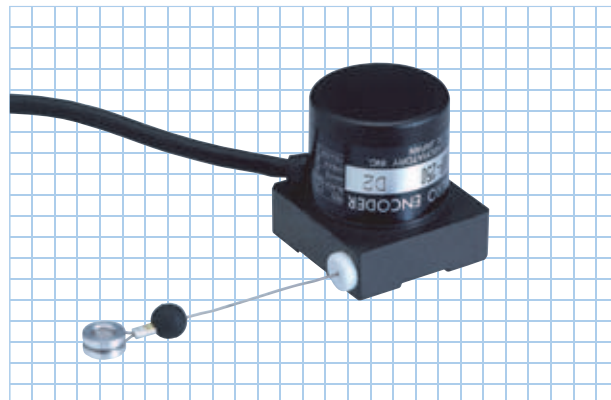
MLA-42



# MLS-12 series

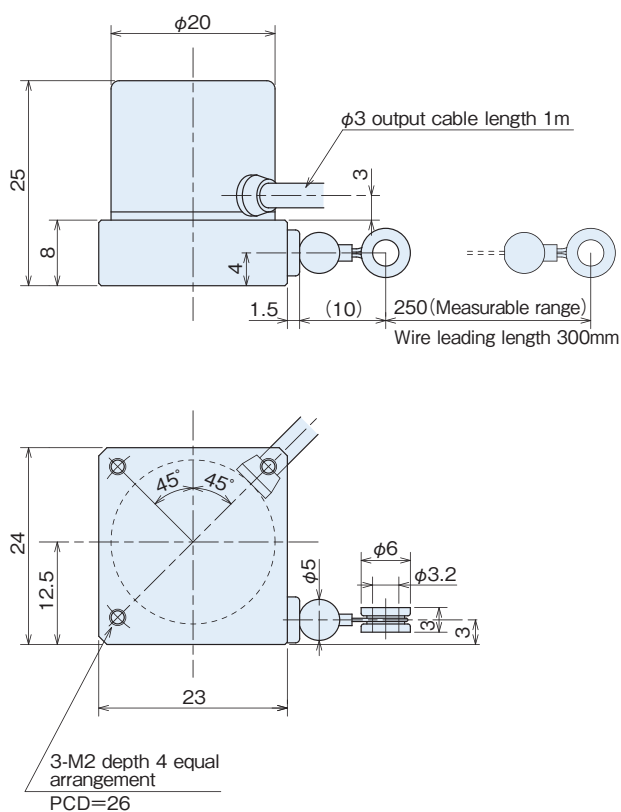
[Wire-Type Linear Scale]

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



## Outside dimensions

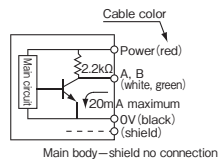
MLS-12



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

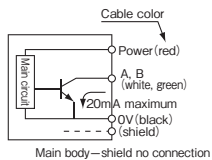
## Output circuit diagram

Voltage output (standard type)



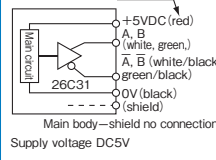
Supply voltage DC5V to 12V

Open collector output (option)



Supply voltage DC5V to 12V

Line driver output (option)

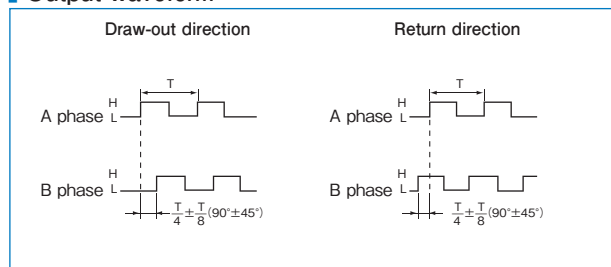


Note: If the transmission distance is long, it should be so considered that the specified voltage occurs at the input portion of the encoder cable end.

## Specifications

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

## Output waveform

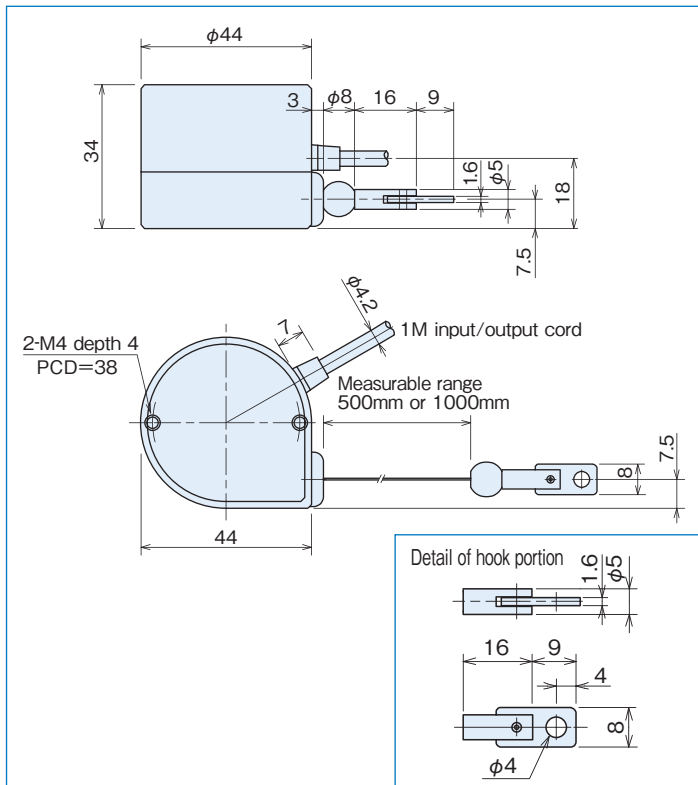


# MLS-30 series

[Wire-Type Linear Scale]

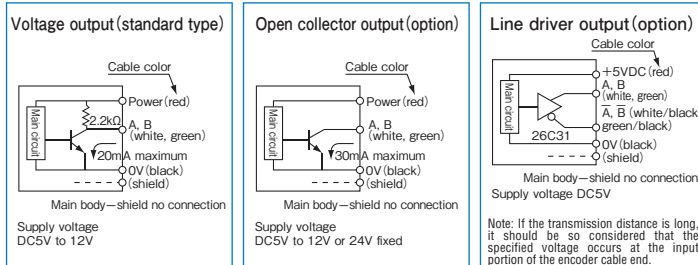


## Outside dimensions



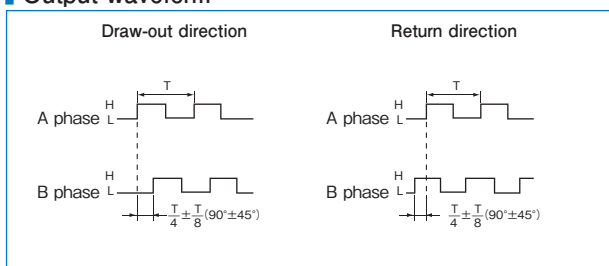
Note: Usage warning: The wire may stop midway through retracting.  
When this happens, slowly pull out the full length and then slowly retract again before using.

## Output circuit diagram



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

## Output waveform



## Specifications/linear scale encoder (detection portion)

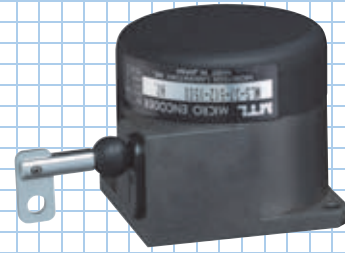
Type name	MLS-30-□ □ -500 -1000			
	Pulse number		Output circuit	
			<ul style="list-style-type: none"> <li>●No entry=voltage output</li> <li>●C=open collector output</li> <li>●E=line driver output</li> <li>●C4=open collector output DC24V</li> </ul>	
Item	MLS-30-450-500	MLS-30-450-1000	MLS-30-4500-500	MLS-30-4500-1000
Measuring range mm	500	1,000	500	1,000
Output pulse/1mm	5	5	50	50
Stroke speed mm/sec	1,000	1,000	1,000	1,000
Absolute accuracy mm	±0.25	±0.5	±0.25	±0.5
Minimum resolution mm	0.2	0.2	0.02	0.02
Supply voltage	DC5V-5%~12V+10% DC24V±10%(option) Line driver:DC5V±5%		DC5V-5%~12V+10% DC24V±10%(option) Line driver:DC5V±5%	
Current consumption	60mA or less (under no load)			
Output phase	A phase, B phase			
Output form	Square wave			
Output capacity	Sink current 20mA or less, residual voltage 0.5V or less (at 10mA)			
Response frequency	100kHz			
Output phase	A, B phase difference 90°±45°			
Waveform rise/fall time	2μsec or less			
Wire tensile force	0.98N~2.94N (100gf~300gf)			
Working ambient temperature/humidity	0°C~50°C/RH35%~90%			
Storage ambient temperature	-20~80°C			
Vibration resistance	Endurance 10 to 55Hz Double amplitude 2 hours each in X, Y, and Z directions			
Impact resistance	Durability 500m/s <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions			
Cable	Insulated shield wire Outside diameter φ4.2 vinyl wire			
Mass	185g			

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

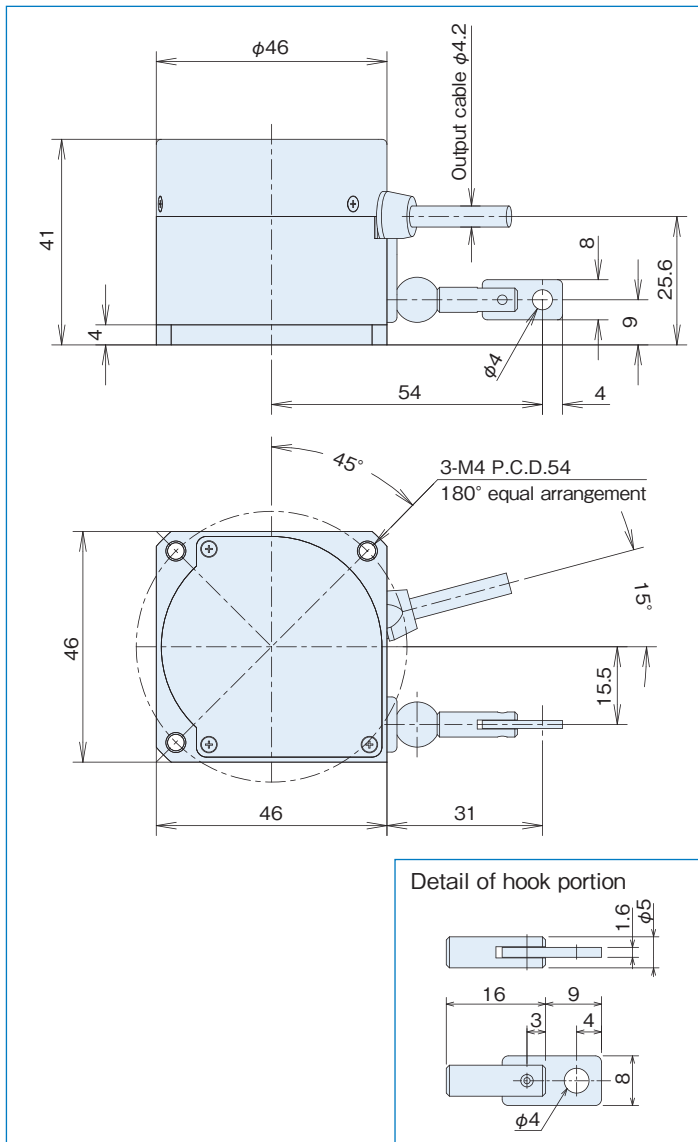
# MLS-37 series

[Wire-Type Linear Scale]

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

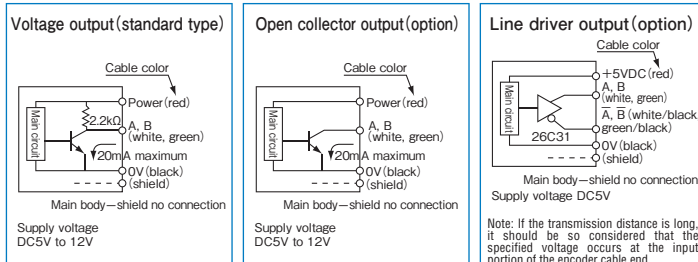


## Outside dimensions



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

Item	Type name	MLS-37-1024※◎-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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions
Cable		Outside diameter φ4.2 4-core(8-core) Insulated shield cable AWG 28 (length 1000mm)
Mass		250g or less (excluding cable)

※Refer to the DC Series for the counter specification.

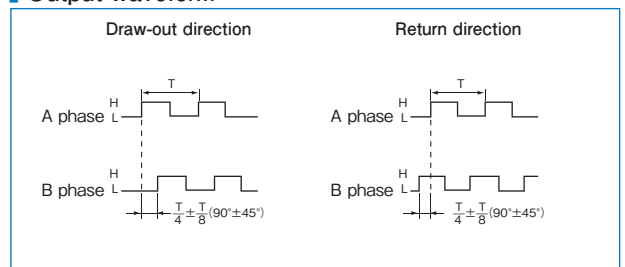
(Note 1) The line driver specification is DC5V power supply voltage only.  
DC12-24V is only available for open collector output.

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

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

(Note 4) 3-M4 PCD54 can also be used as a φ3.5 hole for M3 mounting.

## Output waveform

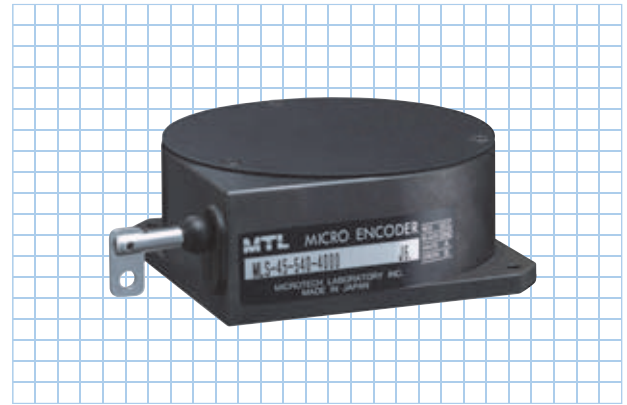




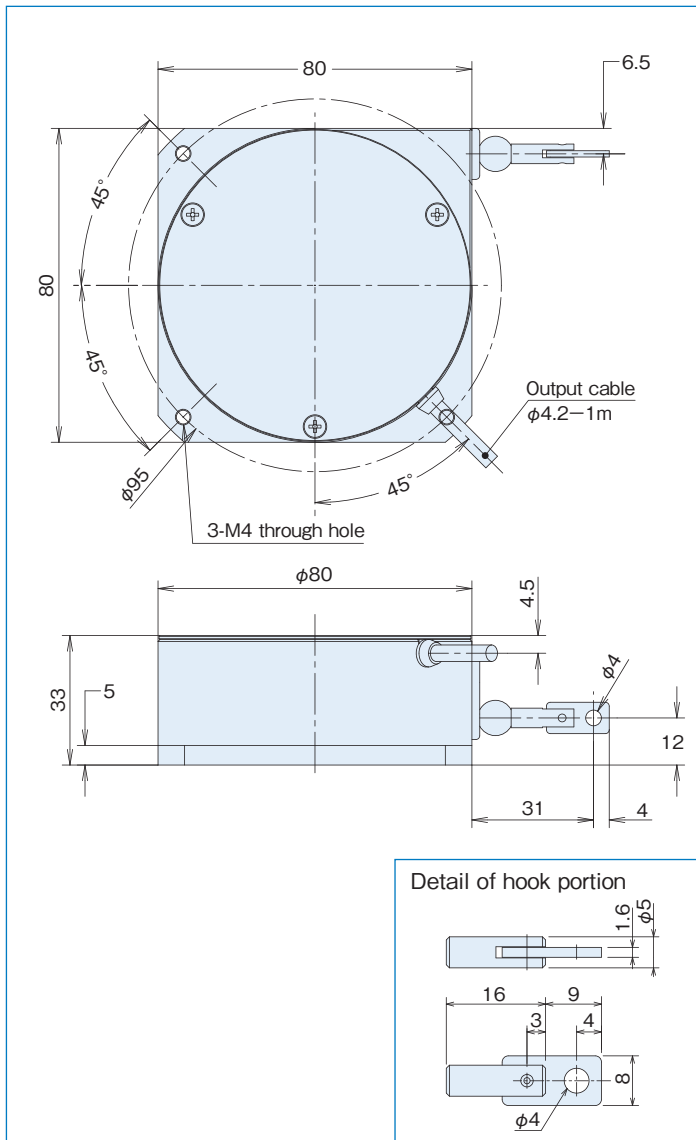
# MLS-45 series

[Wire-Type Linear Scale]

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

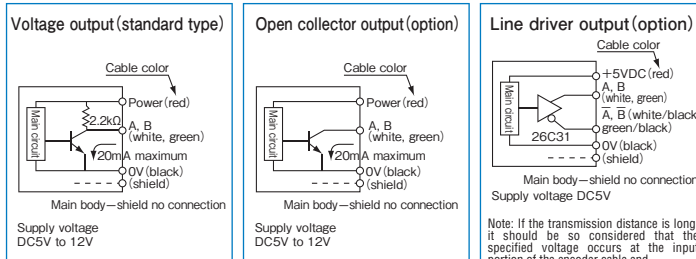


## Outside dimensions



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

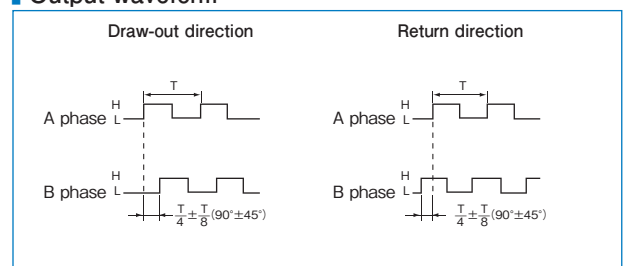


## Specifications

Type name	MLS-45- <input type="text"/> - <input type="text"/> -2000-4000
Item	Pulse number Output circuit ●N3=entry=voltage output ●C=open collector output ●E=line driver output ●C4=open collector output DC24V
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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions
Cable	Outside diameter φ4.2 4-core (8-core) Insulated shield cable (length 1000mm)
Mass	700g or less (excluding cable)

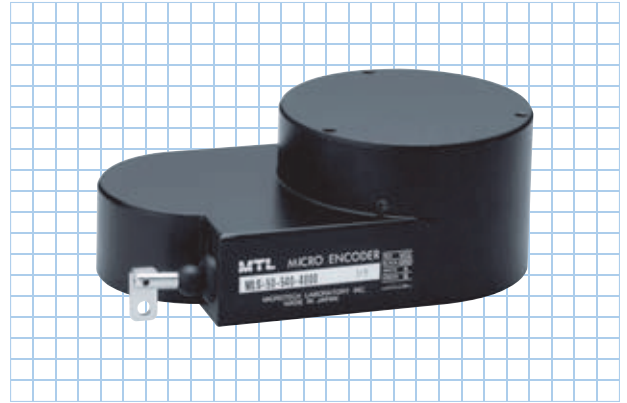
※ Refer to the DC Series for the counter specification.  
(Note 1) 3-M4 PCD95 can also be used as a φ3.5 hole for M3 mounting.

## Output waveform

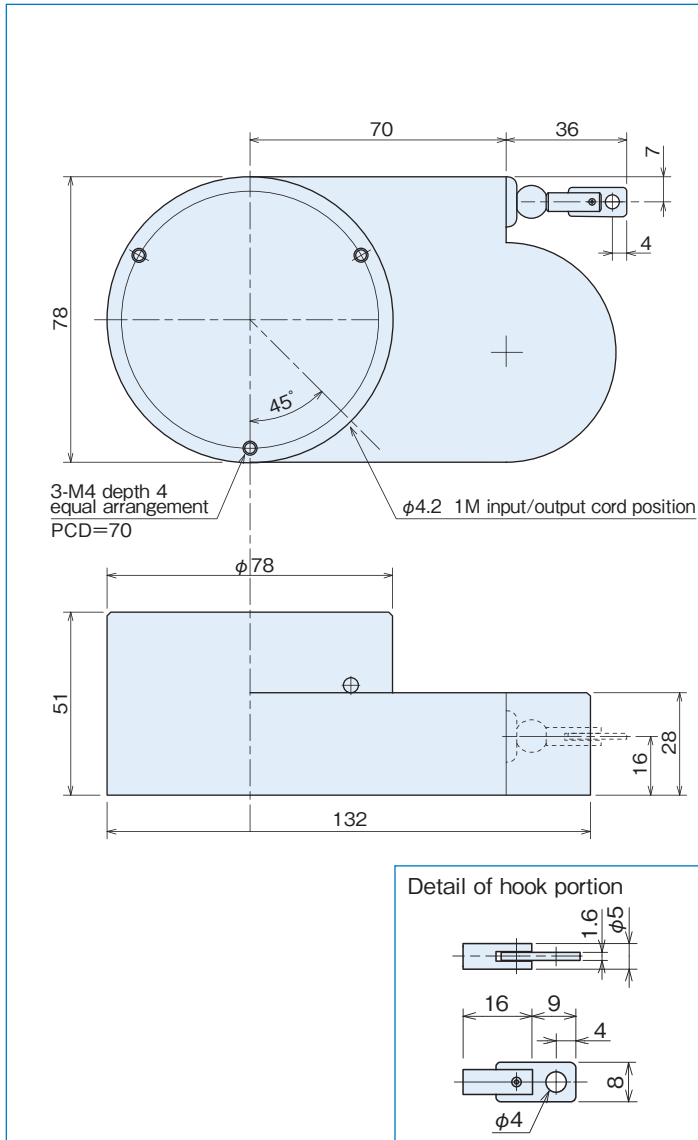


# MLS-50 series

[Wire-Type Linear Scale]

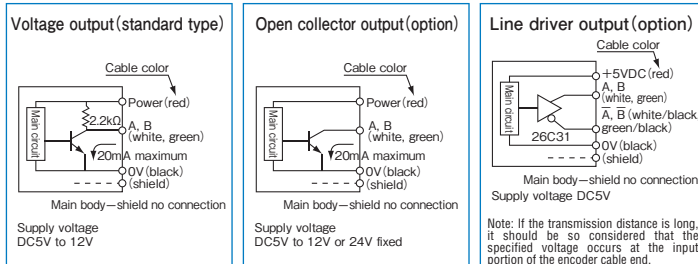


## Outside dimensions



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



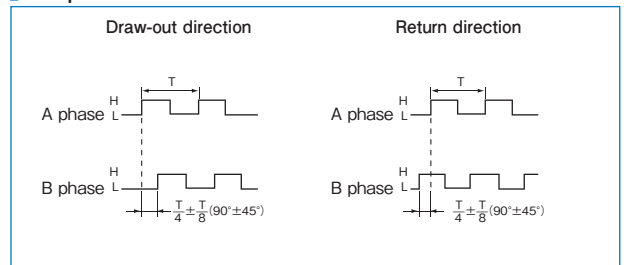
A capacitor (0.1  $\mu$ F) is connected between 0V and FG (frame ground).

## Specifications/linear scale encoder (detection portion)

Item	Type name	
	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	$\pm 2$	$\pm 4$
Minimum resolution mm	0.4	0.4
Supply voltage	DC5V $\pm 5\%$ ~12V $\pm 10\%$ DC24V $\pm 15\%$ (option) Line driver: DC5V $\pm 5\%$	
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 $90^\circ \pm 45^\circ$	
Waveform rise/fall time	2 $\mu$ sec or less	
Wire tensile force	3.9N~6.8N (400~700gf)	
Working ambient temperature/humidity	0 $^\circ$ C~50 $^\circ$ C / RH35%~90%	
Storage ambient temperature	-20~80 $^\circ$ 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 $\phi 4.2$ 4-core vinyl wire (Cable length 1000mm)	
Mass	850g	

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

## Output waveform



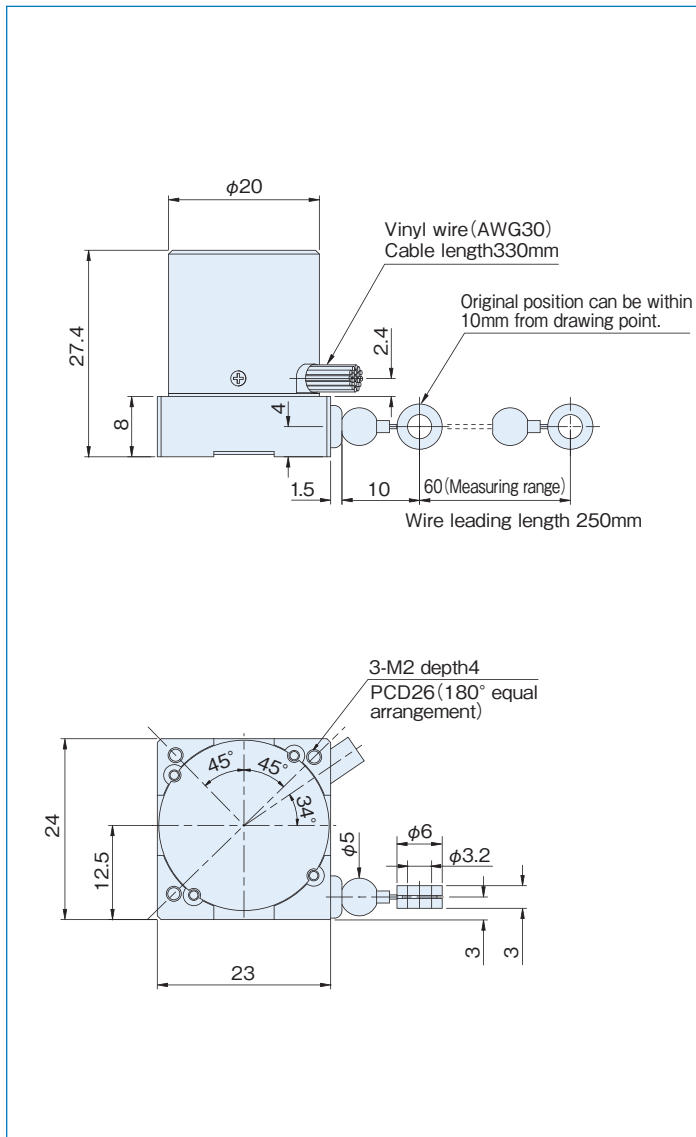
# MLA-17 series

[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.

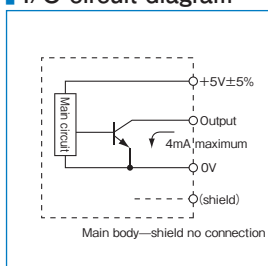


## Outside dimensions



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



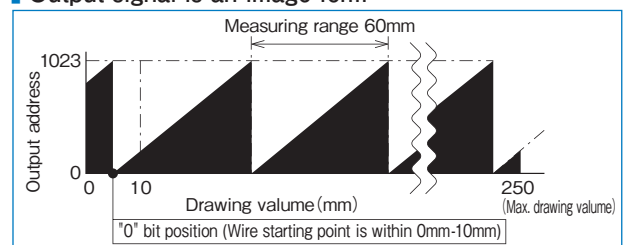
## Specifications

Type name	MLA-17- <input type="text"/> <input type="text"/> 1-60
Item	Pulse number 1,024 (G, N) or 1,000 (B)      Output code ●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 <sup>0</sup>		Output 2 <sup>0</sup>
Brown / Black	Output 2 <sup>1</sup>		Output 2 <sup>1</sup>
Orange	Output 2 <sup>2</sup>		Output 2 <sup>2</sup>
Orange / Black	Output 2 <sup>3</sup>		Output 2 <sup>3</sup>
Yellow	Output 2 <sup>4</sup>		Output 2 <sup>0</sup> ×10
Yellow / Black	Output 2 <sup>5</sup>		Output 2 <sup>1</sup> ×10
Green	Output 2 <sup>6</sup>		Output 2 <sup>2</sup> ×10
Green / Black	Output 2 <sup>7</sup>		Output 2 <sup>3</sup> ×10
Blue	Output 2 <sup>8</sup>		Output 2 <sup>0</sup> ×10 <sup>2</sup>
Blue / Black	Output 2 <sup>9</sup>		Output 2 <sup>1</sup> ×10 <sup>2</sup>
Purple	—		Output 2 <sup>2</sup> ×10 <sup>2</sup>
Purple / Black	—		Output 2 <sup>3</sup> ×10 <sup>2</sup>

## Output signal is an image form



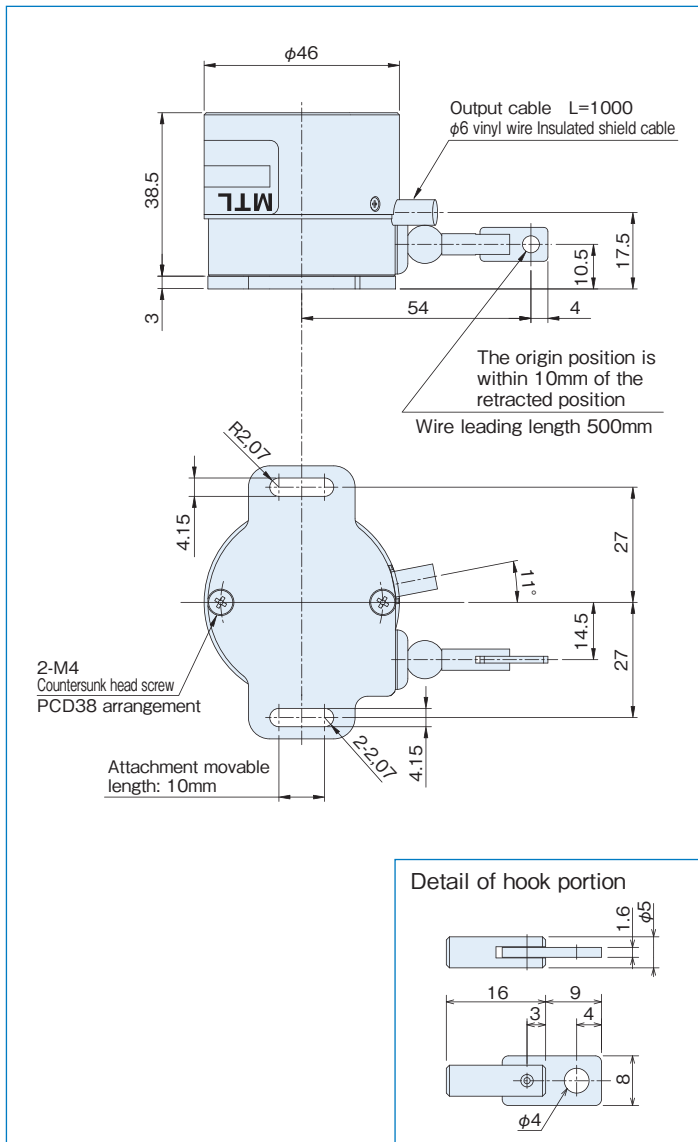
# MLA-30 series

[Absolute Linear Scale]

- Outside dimensions: 46×41.5mm
- Length measurement resolution: 0.088mm,  
Measured distance 90mm  
(Maximum position 500mm)

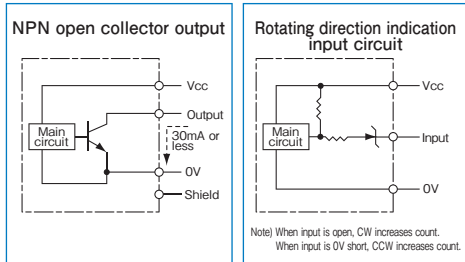


## Outside dimensions



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

## I/O circuit diagram



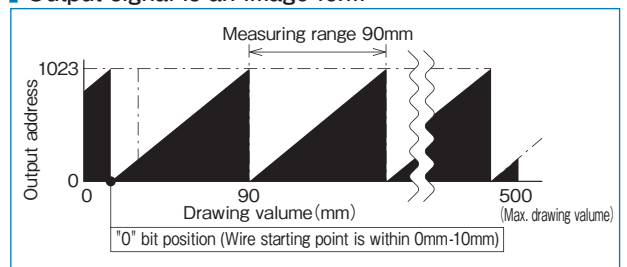
## Specifications

Type name	MLA-30- <input type="text"/> -90
Item	Pulse number <input type="text"/> Output code <input type="text"/> ●G=Gray code    ●N=Pure binary code ●B=BCD code    Supply voltage (1, 5)
Supply voltage	1:DC5V±5% 5:DC12V-10%~24V+15%
Current consumption	100mA or less (under no load)
Output code	G:gray code    N:pure binary code    B:BCD code
Logic	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 <sup>0</sup>			Blue	2 <sup>8</sup>	2 <sup>9</sup> ×100	
Brown / Black	2 <sup>1</sup>			Blue / Black	2 <sup>9</sup>	2 <sup>1</sup> ×100	
Orange	2 <sup>2</sup>			Purple	NC	2 <sup>2</sup> ×100	
Orange / Black	2 <sup>3</sup>			Purple / Black	NC	2 <sup>3</sup> ×100	
Yellow	2 <sup>4</sup>	2 <sup>9</sup> ×10		Red / Black	—	*Rotating direction indication input	
Yellow / Black	2 <sup>5</sup>	2 <sup>1</sup> ×10		Red	Vcc		
Green	2 <sup>6</sup>	2 <sup>2</sup> ×10		Black	COMMON		
Green / Black	2 <sup>7</sup>	2 <sup>3</sup> ×10		Black	COMMON		

## Output signal is an image form



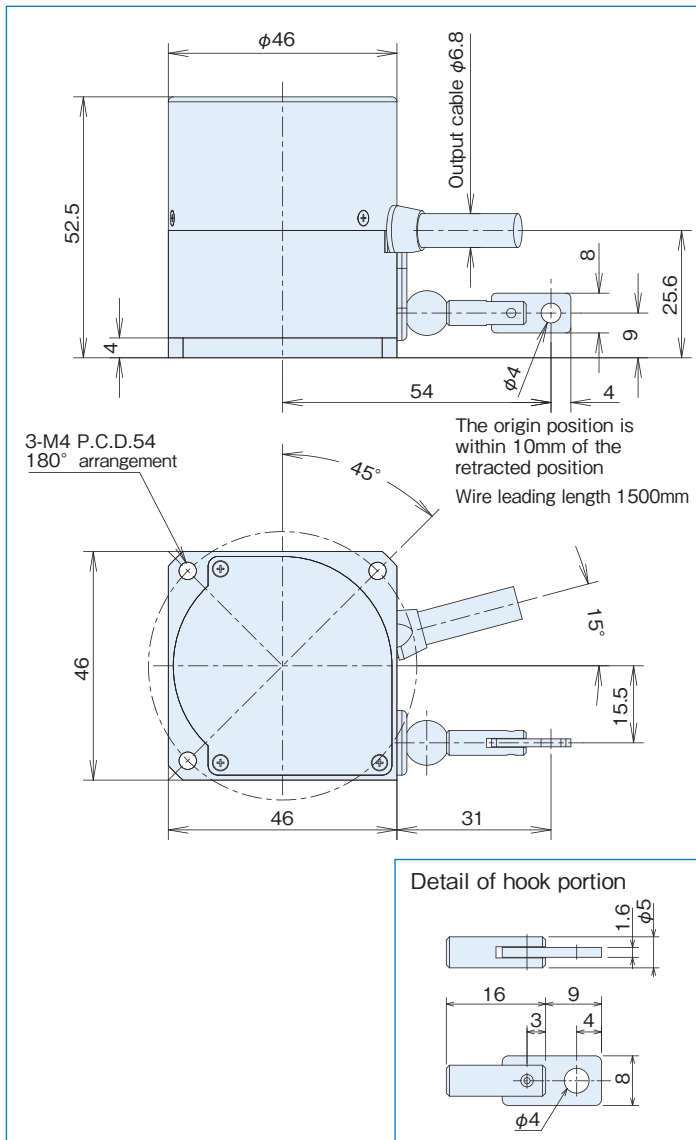
# MLA-37 series

[Absolute Linear Scale]

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

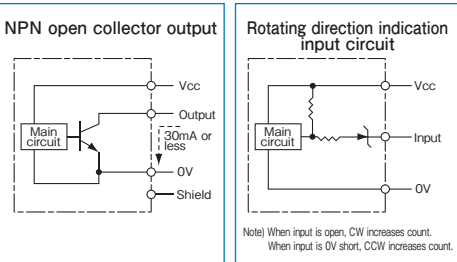


## Outside dimensions



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-37-1024 <input type="checkbox"/> C <input type="checkbox"/> -1500
Item	Output code ●G=Gray code ●N=Pure binary code Output logic (No entry, N) Supply voltage (1, 5)
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.

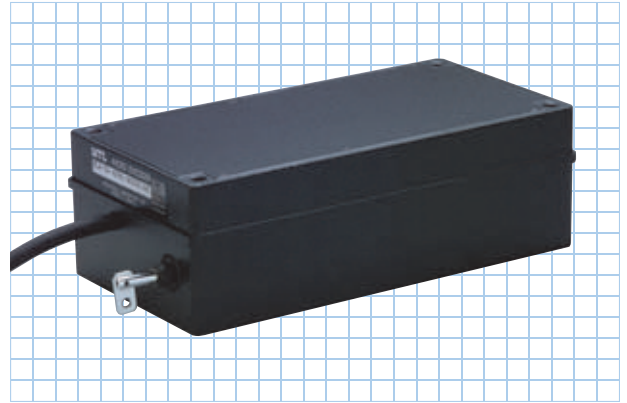
## Connection

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

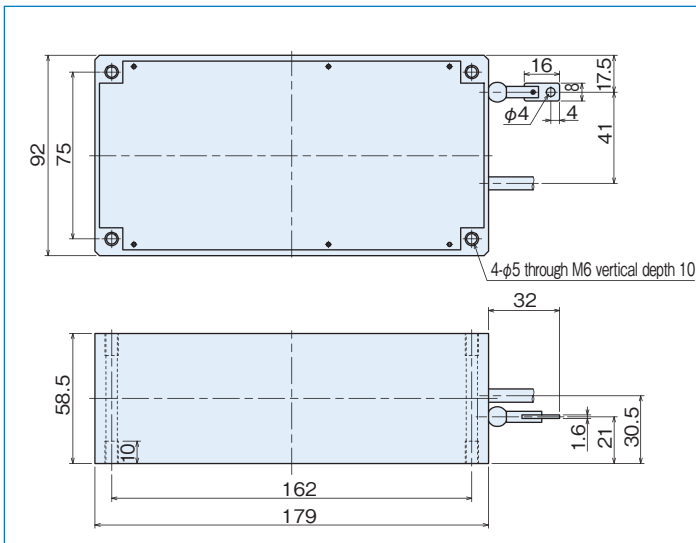
(\*) shielding cable is non-connected in encoder.

# MLA-42 series

[Absolute Linear Scale]



## Outside dimensions



## Specifications

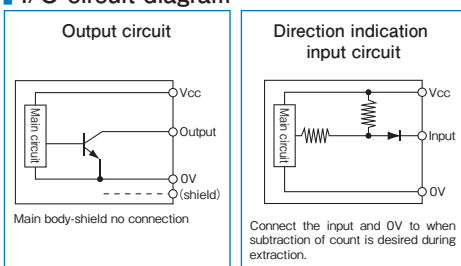
Item	Type name	MLA-42-4096
		Output code Supply voltage Measuring range
Supply voltage		1:DC5V±10% 5:DC12V-10%~24V+15%
Current consumption		70mA or less (under no load), 100mA or less (under no load)
Output code		G: gray code N: pure binary code
Logic		Negative logic (H=0, L=1)
Output circuit		NPN open collector
Output capacity		Sink current 20mA or less Residual voltage 0.5V or less (at 10mA)
Maximum response frequency		10kHz
Working temperature		0°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 <sup>2</sup> (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 <sup>1</sup>
Brown/black	Output 2 <sup>1</sup>
Orange	Output 2 <sup>2</sup>
Orange/black	Output 2 <sup>3</sup>
Yellow	Output 2 <sup>4</sup>
Yellow/black	Output 2 <sup>5</sup>
Green	Output 2 <sup>6</sup>
Green/black	Output 2 <sup>7</sup>
Blue	Output 2 <sup>8</sup>
Blue/black	Output 2 <sup>9</sup>
Purple	Output 2 <sup>10</sup>
Purple/black	Output 2 <sup>11</sup>
Gray	No connection
Gray/black	No connection

# 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

REH-30R

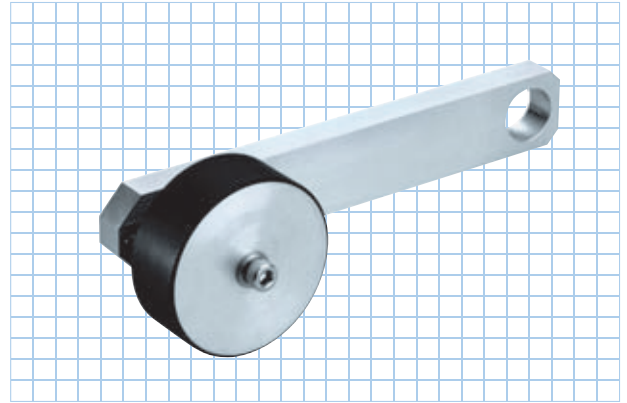


DC

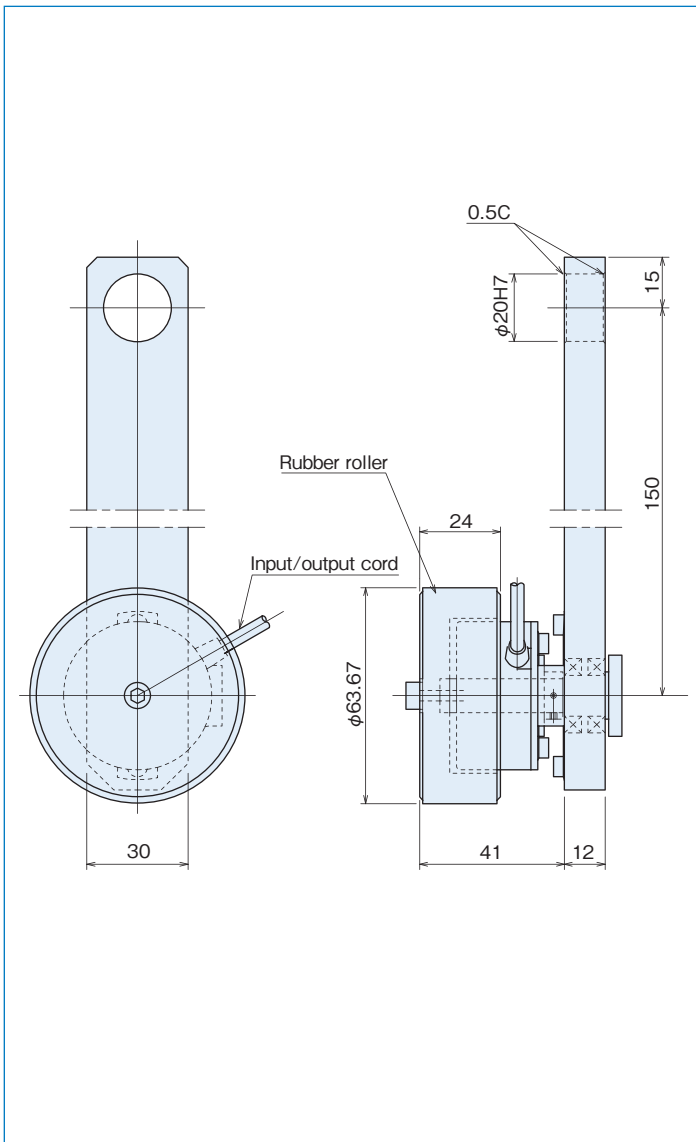


# REH-30R series

[Roller Encoder]



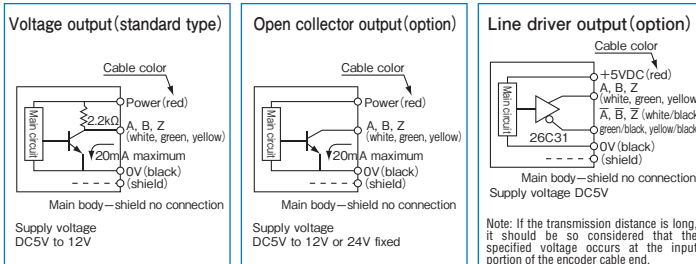
## Outside dimensions



## Specifications

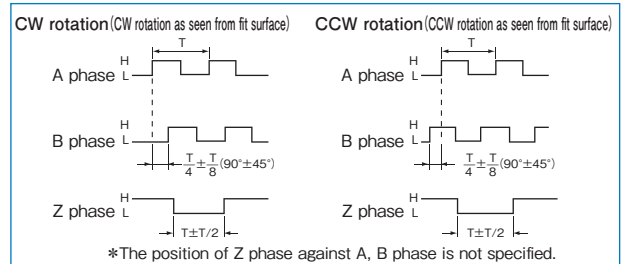
Type name	REH-30- <input type="checkbox"/> R <input type="checkbox"/>				
Item	Pulse number    Output circuit ●No entry=voltage output ●C=open collector output ●C4=open collector output DC24V ●E=line driver output				
Supply voltage	Voltage/Open collector:DC5V-5%~12V+10% DC24V±10%(open collector output 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 <sup>2</sup> (about 50G) 3 times each in X, Y, and Z directions				
Cable	Outside diameter φ4.2 5-core vinyl wire Insulated shield cable (length 1m)				
Mass	400g				

## Output circuit diagram



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

## Output waveform



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

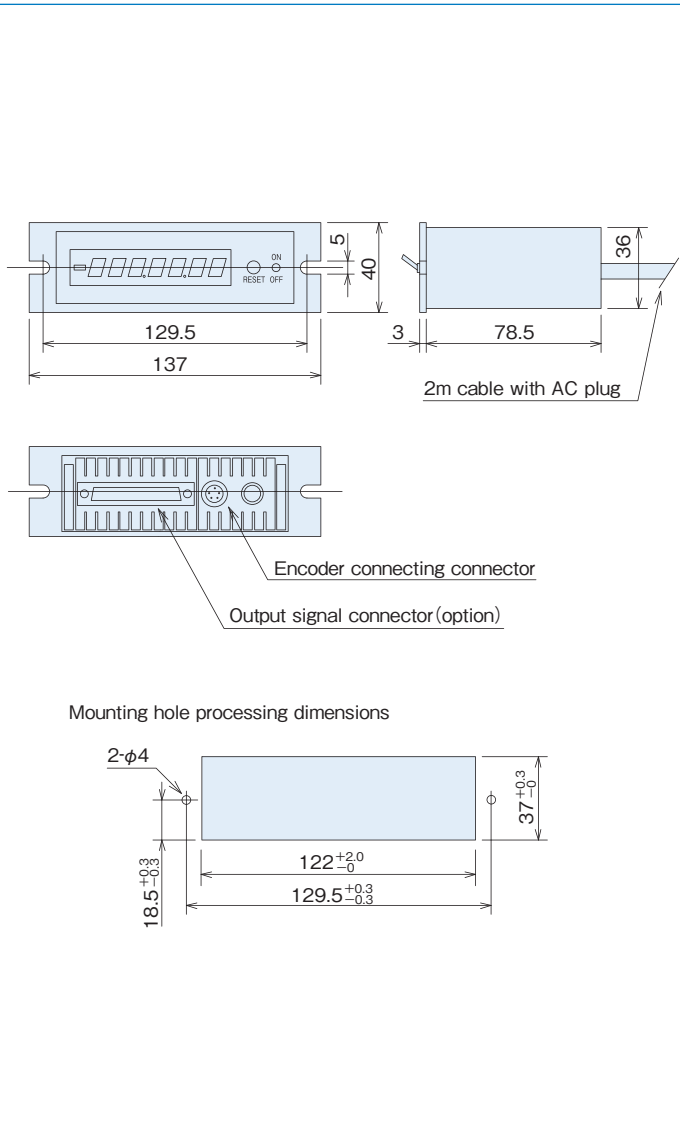


# DC series

[Measuring Angle/Measuring Length Counter]



## Outside dimensions



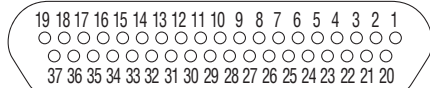
## Counter specifications

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

## Option

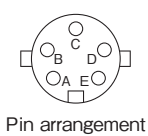
### ●BCD parallel output (output IC 74HC573)



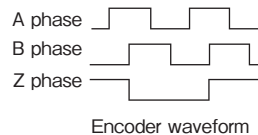
Terminal No.	Signal name	Terminal No.	Signal name	Terminal No.	Signal name
1	2 <sup>0</sup> (A)×10 <sup>0</sup>	14	2 <sup>2</sup> (C)×10 <sup>6</sup>	27	2 <sup>3</sup> (D)×10 <sup>3</sup>
2	2 <sup>2</sup> (C)×10 <sup>0</sup>	15	NC	28	2 <sup>1</sup> (B)×10 <sup>4</sup>
3	2 <sup>0</sup> (A)×10 <sup>1</sup>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

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

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



A:5V  
B:A phase  
C:B phase  
D:GND  
E:Z phase  
RESET  
Shield ) Option

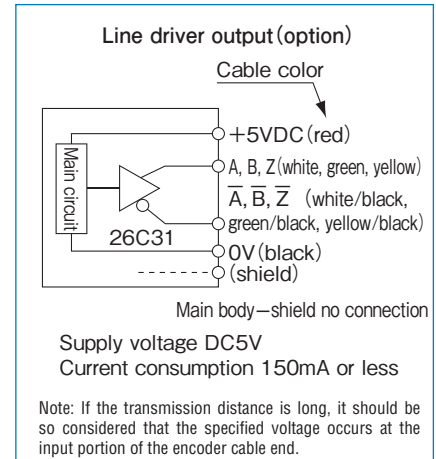
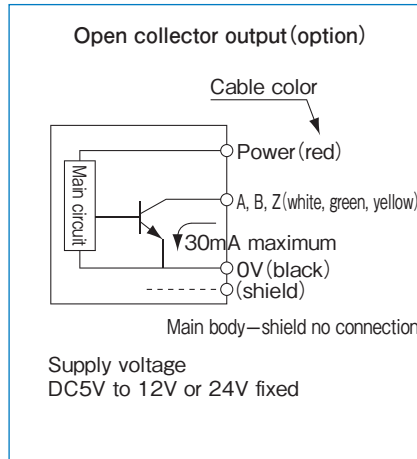
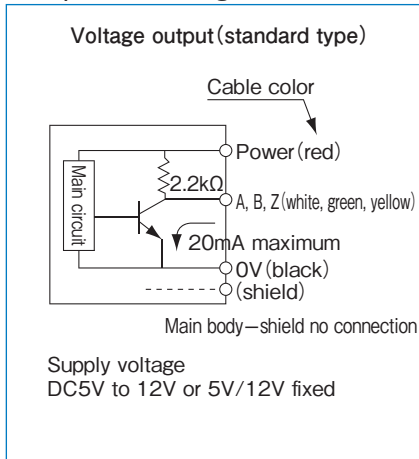


# Technical data

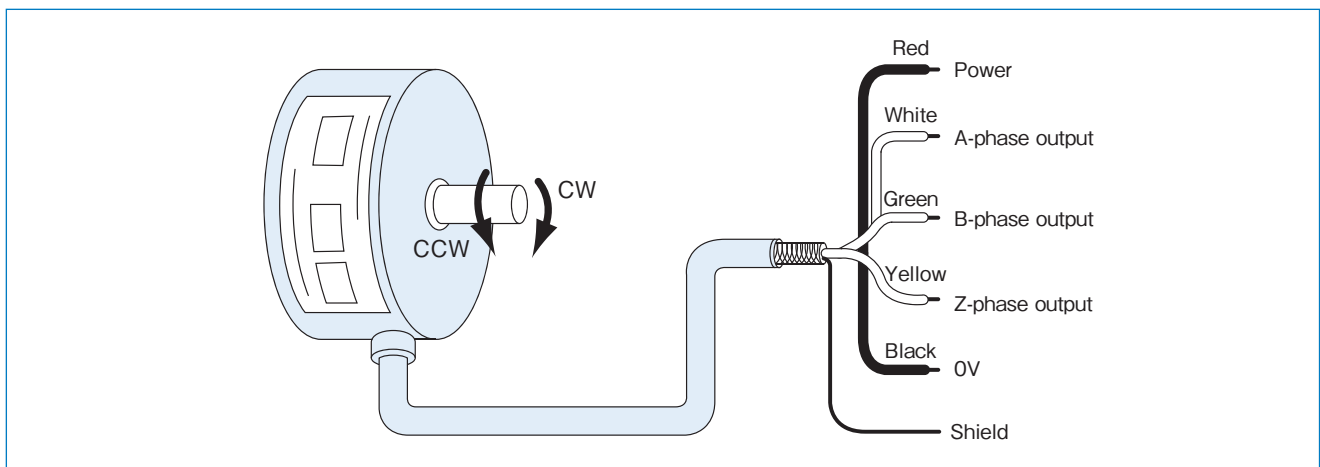
## Incremental encoder

- ▶ 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.

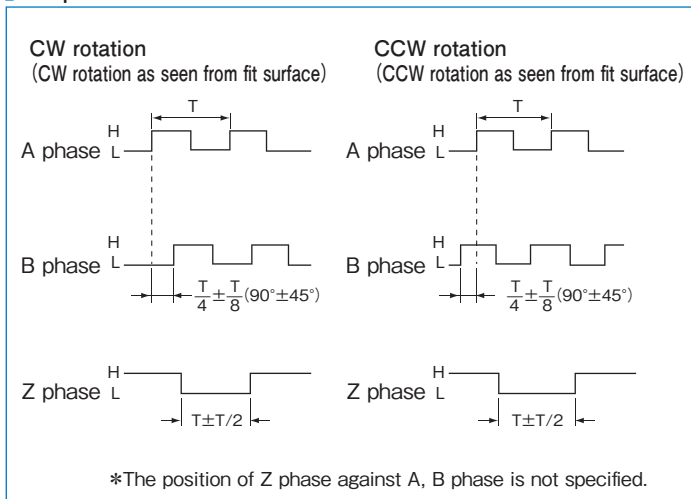
### Output circuit diagram



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



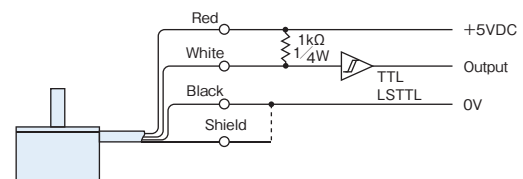
### Output waveform



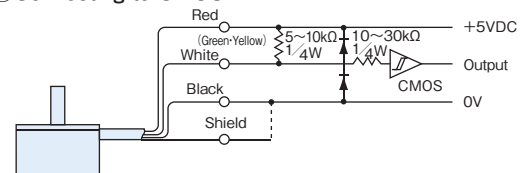
### Connecting example

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

#### ① Connecting to TTL/LSTTL



#### ② Connecting to CMOS



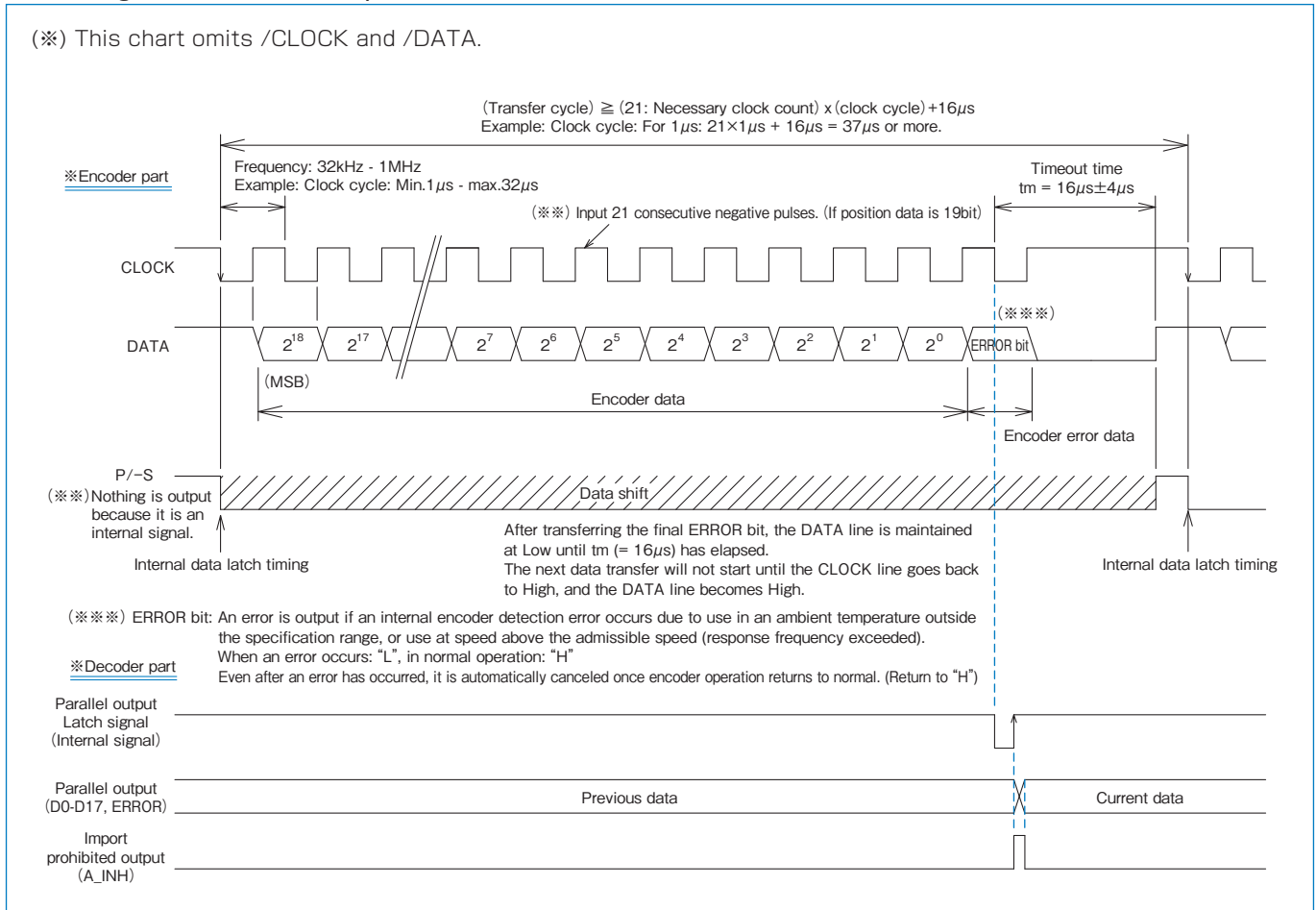
# ▼ Absolute encoder

## ● Timing Chart for Serial Communications

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

### I/O timing chart ※For 19bit output data

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



## ● If an optional decoder circuit board is used

### Connection ※If 19bit (524,288)

#### Decoder board TH No. (24pin)

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

#### Decoder board TH No. (8pin)

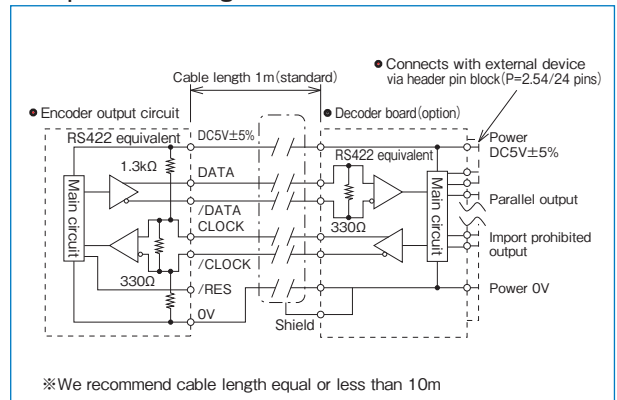
TH No.	Cable color	Encoder connection
1	Red	DC5V±5%
2, 4	Black	0V (COMMON)
3	—	N.C.
5	White	DATA
6	White/Black	/DATA
7	Green	CLOCK
8	Green/Black	/CLOCK

※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.

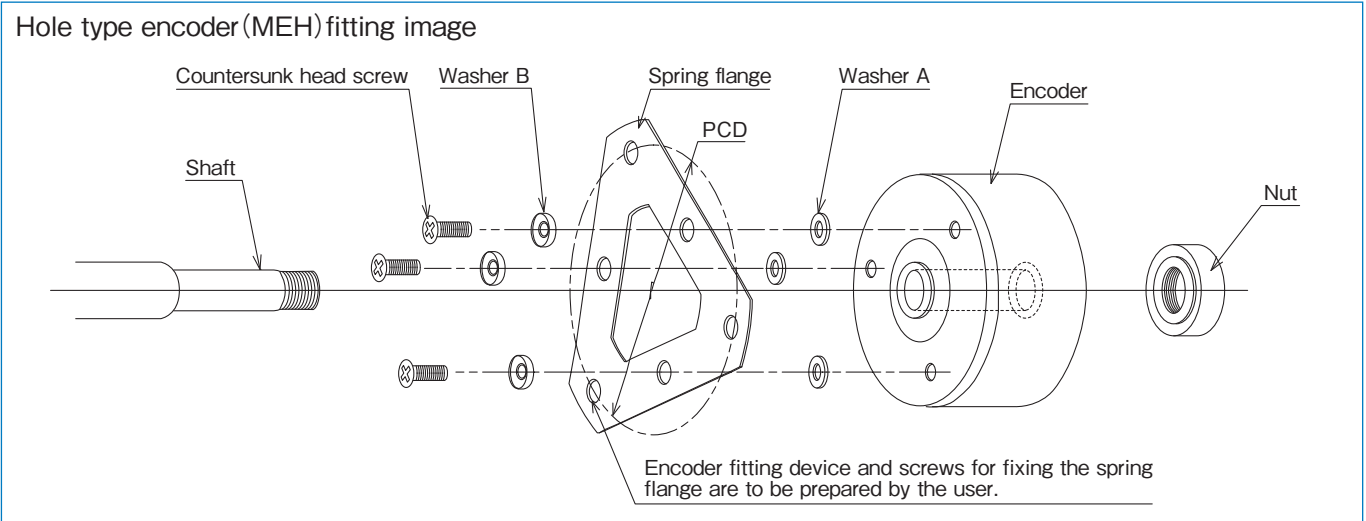
### Output circuit diagram



# ▼ Hall type encoder (MEH/MAH) Mounting method

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

Hole type encoder (MEH) fitting image

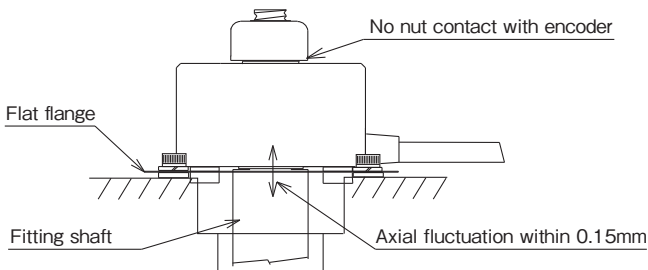


For the spring flange, see Setting Option (P84).

## Precautions in assembling the hole-type encoder

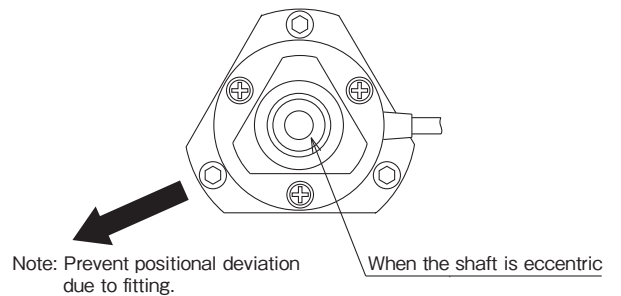
### Effect on encoder of thrust load

Absorption of axial fluctuation of flat flange is within 0.15mm



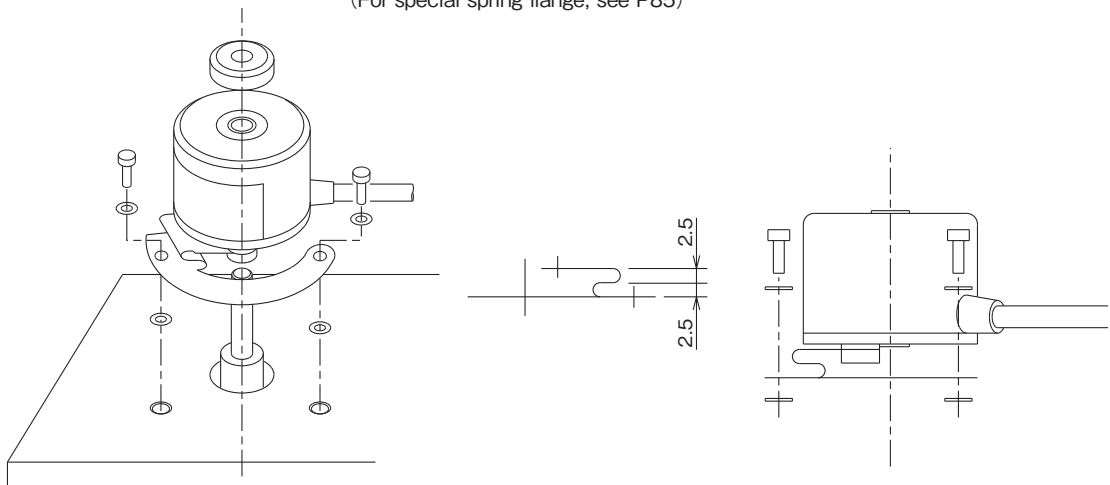
### Effect on encoder of radial load

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

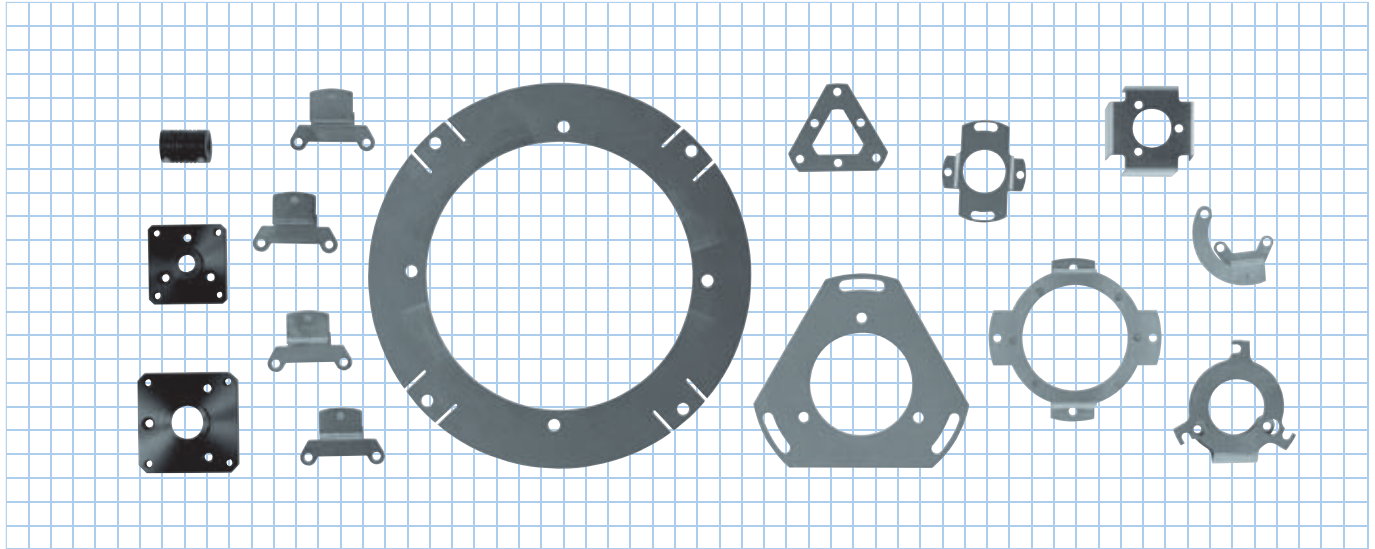


When radial fluctuation is large, consider the method shown below.

(For special spring flange, see P85)

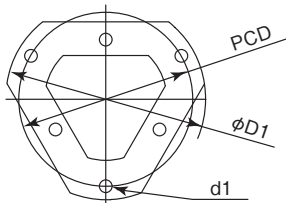
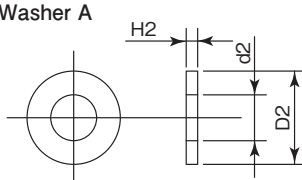
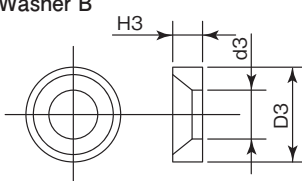
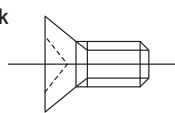
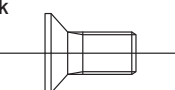


# Setting Option/Coupling



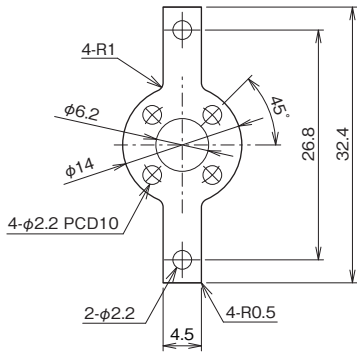
## ▼ Spring flange (Use with a hollow shaft type encoder)

### List of dimensions and accessories

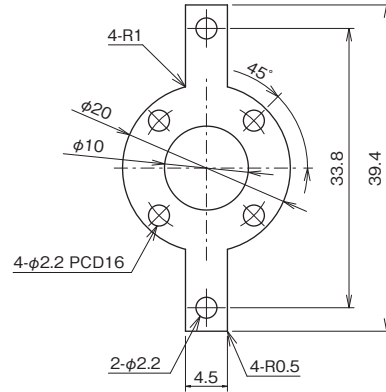
Type name (encoder series)	MEH-	20	30	50	60	85	130	180	MAH-36	MAH-42
Spring flange	PCD	40	52	79	90	116	165	210	52	64
	D1	48	60	90	98	128	175	220	60	76
	d1	3.5	3.5	4.5	4.5	4.5	5.2 (4 equal arrangement)	5.2 (3 equal arrangement)	3.5	4.5
	H1 (plate thickness)	0.1	0.1	0.1	0.2	0.2	0.5	0.5	0.1	0.1
Washer A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

"\*" indicates standard attachment.  
Others are options.

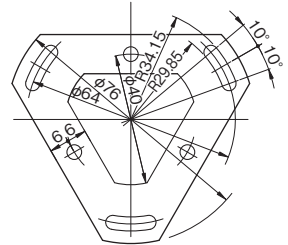
\* ME-9P, \* MA-10



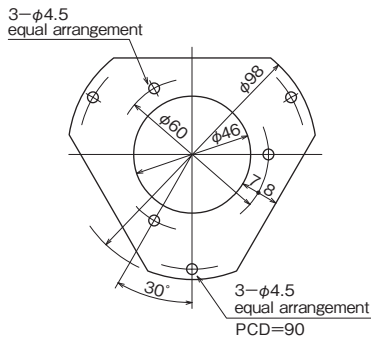
\* ME-12P, \* MA-17, MEH-17, MEH-14



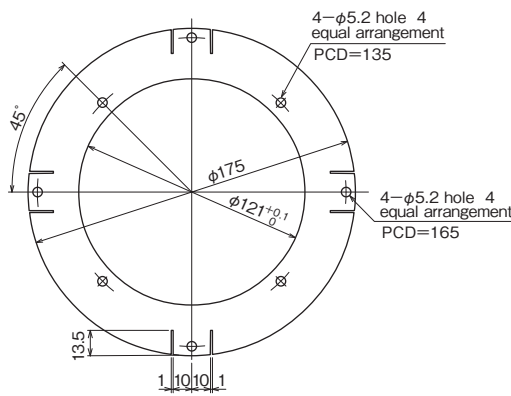
MAH-42



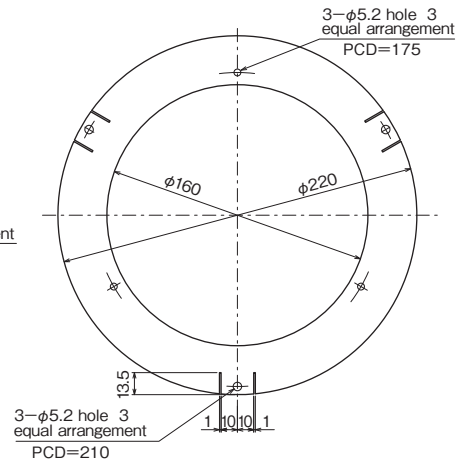
MEH-60



MEH-130

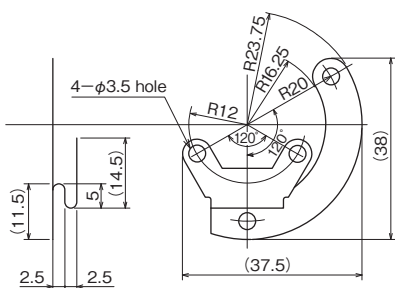


MEH-180

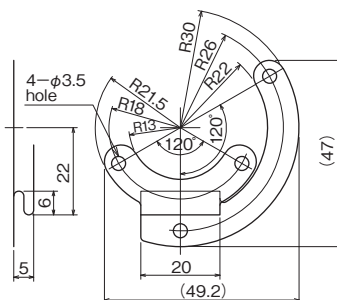


Special spring flange (this type is recommended when fluctuation in radial direction is large)

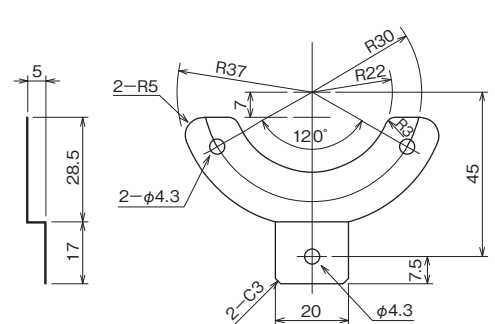
MEH-20SP (plate thickness 0.1t)



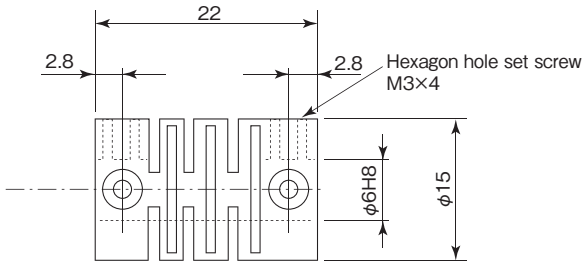
MEH-30SP (plate thickness 0.15t)



MEH-60SP2 (plate thickness 0.3t)



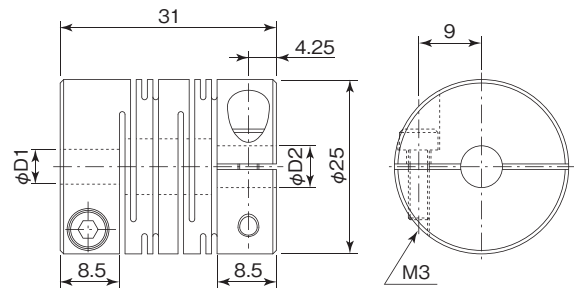
**Coupling GJ6x6 (for MES-20, 30)**



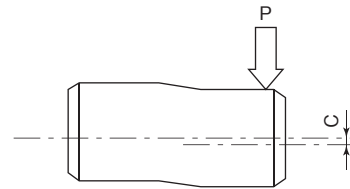
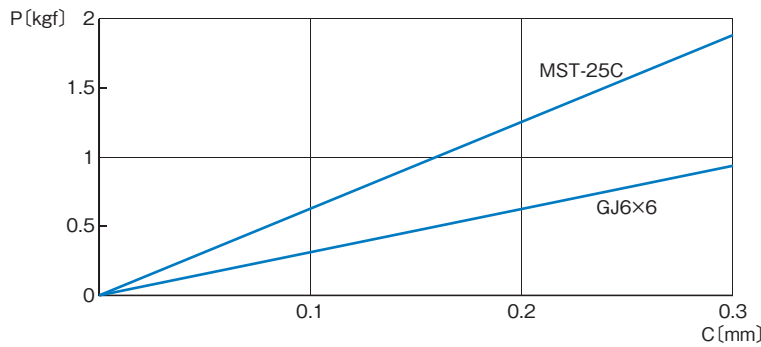
(1) Material: Polyacetal resin containing glass  
 (2) others than  $\phi 6$ - $\phi 6$  are available.

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

**Clamping type**



**Eccentric spring characteristics**

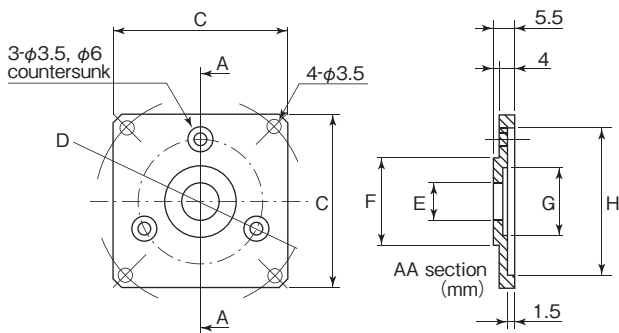


It should be used under optimum conditions to maintain the accuracy of the encoder and also for prolonged use.

**Fitting Method for Shaft Type Encoder (MES/MAS)**

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

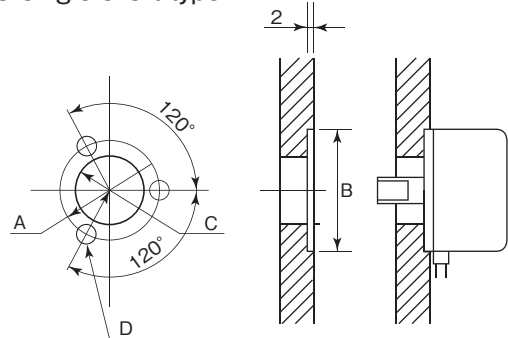
**Flange MEF-20 (for MES-20), MEF-30 (for MES-30)**



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

**Fitting dimensions**

**MES single-shaft type**



Type name	A	B	C	D
MES-20	$\phi 24$	$\phi 32_{+0.15}^{+0.2}$	$\phi 16$	3- $\phi 3.5$
MES-30	$\phi 36$	$\phi 44_{+0.15}^{+0.2}$	$\phi 28$	3- $\phi 3.5$
MES-40	$\phi 45$	$\phi 56_{+0.25}^{+0.3}$	$\phi 30$	3- $\phi 3.5$
MES-50	$\phi 56$	$\phi 65_{+0.25}^{+0.3}$	$\phi 32$	3- $\phi 4.5$

## Frequently Asked Questions

### Issuance of Certificate of Non-applicability

Provide the following three items when exporting.

- (1) End user name
- (2) Export destination country name
- (3) Purpose of use

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

### Shipping charges

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

### Purchase method (Contact)

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



E-mail: [mtl@mtl.co.jp](mailto: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

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

 <b>Danger</b>	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.
 <b>Danger</b>	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.
 <b>Warning</b>	The encoder is constructed from precision components, and may lose functionality if dropped. Handle with care.
 <b>Warning</b>	Running wires parallel to high voltage lines or drive lines may cause malfunctions or damage. Keep wires separated.
 <b>Warning</b>	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.



## MICRO ENCODER

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

**MTL** MICROTECH LABORATORY INC.

■ **Head office:** 8-1-46 Honcho, Kamitsuruma, minami-ku Sagami-hara-shi Kanagawa 252-0318, Japan PHONE.81-42-746-0123 FAX.81-42-746-0960  
E-mail: [mtl@mtl.co.jp](mailto:mtl@mtl.co.jp)

<https://www.mtl.co.jp/en.html>



ISO 9001 certification  
JQA-1935



ISO 14001 certification  
JQA-EM5919