

EP50S Series

Shaft Type Ø50mm Single-turn Absolute Rotary Encoder

■ Features

- Compact size of external diameter: Ø50mm
- Various output code: BCD, Binary, Gray code
- Various and high resolution (720, 1024-division)
- Protection structure IP64 (dust-proof, oil-proof)

■ Applications

- Precision machine tool, Fabric machinery, Robot, Parking system



 Please read "Safety Considerations" in the instruction manual before using.



■ Ordering Information

EP50S	8	1024	1	R	P	24
Series	Shaft diameter	Pulses/revolution	Output code	Revolution direction	Control output	Power supply
Ø50mm shaft type	Ø8mm	Refer to resolution	1: BCD code 2: Binary code 3: Gray code	F: Output increases by CW rotation direction at the shaft R: Output increases by CCW rotation direction at the shaft	P: PNP open collector output N: NPN open collector output	5 : 5VDC±5% 24: 12-24VDC ±5%

■ Specifications

Item		Shaft Type Ø50mm Single-turn Absolute Rotary Encoder	
Model	PNP open collector output	EP50S8-□□□□-P-□	
	NPN open collector output	EP50S8-□□□□-N-□	
Resolution		6, 8, 10, 12, 16, 20, 24, 32, 40, 45, 48, 64, 90, 128, 180, 256, 360, 512, 720, 1024-division	
Electrical specification	Control output	PNP open collector output	Output voltage: min. (power supply-1.5)VDC≡, load current: max. 32mA
		NPN open collector output	Load current: max. 32mA, residual voltage: max. 1VDC≡
	Response time (rise, fall)		Ton=800nsec, Toff=max. 800nsec (cable: 2m, I sink = 32mA)
	Max. response frequency		35kHz
	Power supply		• 5VDC≡±5% (ripple P-P: max. 5%) • 12-24VDC≡±5% (ripple P-P: max. 5%)
	Current consumption		Max. 100mA (disconnection of the load)
	Insulation resistance		Over 100MΩ (at 500VDC megger between all terminals and case)
	Dielectric strength		750VAC 50/60Hz for 1 min (between all terminals and case)
Connection		Axial cable type (cable gland)	
Mechanical specification	Starting torque		Max. 70gf·cm (0.0069N·m)
	Moment of inertia		Max. 40g·cm ² (4×10 ⁻⁶ kg·m ²)
	Shaft loading		Radial: max. 10kgf, Thrust: max. 2.5kgf
	Max. allowable revolution ^{※1}		3,000rpm
Vibration		1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours	
Shock		Approx. max. 50G	
Environment	Ambient temp.	-10 to 70°C, storage: -25 to 85°C	
	Ambient humidity	35 to 85%RH, storage: 35 to 90%RH	
Protection structure		IP64 (IEC standard)	
Cable		Ø7mm, 15-wire, 2m, Shield cable (AWG28, core diameter: 0.08mm, number of cores: 40, insulator diameter: Ø0.8mm)	
Accessory		Bracket, Coupling	
Approval		CE	
Weight ^{※2}		Approx. 482g (approx. 398g)	

※1: In case of Parallel type model, Make sure that Max. response revolution should be lower than or equal to max. allowable revolution when selecting the resolution.

$$[\text{Max. response revolution (rpm)}] = \frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec}$$

※2: The weight includes packaging. The weight in parenthesis is for unit only.

※Environment resistance is rated at no freezing or condensation.

Absolute Ø50mm Single-turn Shaft Type

Specifications

Item		Shaft Type Ø50mm Single-turn Absolute Rotary Encoder			
Model	PNP open collector output	EP50S8-□□□□-P-□			
	NPN open collector output	EP50S8-□□□□-N-□			
Output code		Division	BCD code	Binary code	Gray code
Output phase / Output angle※1		1024	TS: 0.3515° ±15'(13bit)	TS: 0 3515° ±15'(10bit)	TS: 0.703° ±15'(10bit)
		720	TS: 0.5° ±25'(11bit)	TS: 0 5° ±25'(10bit)	TS: 1° ±25'(10bit)
		512	TS: 0.703° ±15'(11bit)	TS: 0.703° ±15'(9bit)	TS: 1.406° ±15'(9bit)
		360	TS: 1° ±25'(10bit)	TS: 1° ±25'(9bit)	TS: 2° ±25'(9bit)
		256	TS: 1.406° ±15'(10bit)	TS: 1.406° ±15'(8bit)	TS: 2.8125° ±15'(8bit)
		180	TS: 2° ±25'(9bit)	TS: 2° ±25'(8bit)	TS: 4° ±25'(8bit)
		128	TS: 2.8125° ±15'(9bit)	TS: 2 8125° ±15'(7bit)	TS: 5.625° ±15'(7bit)
		90	TS: 4° ±25'(8bit)	TS: 4° ±25'(7bit)	TS: 8° ±25'(7bit)
		64	TS: 5.625° ±15'(7bit)	TS: 5.625° ±15'(6bit)	TS: 11.25° ±15'(6bit)
		48	TS: 7.5° ±25'(7bit)	TS: 7 5° ±25'(6bit)	TS: 15° ±25'(6bit)
		45	TS: 8° ±25'(7bit)	TS: 8° ±25'(6bit)	TS: 16° ±25'(6bit)
		40	TP1: 5° ±60'(1bit) TP2: 2° ±60'(1bit) TS: 9° ±60'(6bit) EP: 9° ±60'(1bit)	TP1: 5° ±60'(1bit) TP2: 2° ±60'(1bit) TS: 9° ±60'(6bit) EP: 9° ±60'(1bit)	TP1: 5° ±60'(1bit) TP2: 2° ±60'(1bit) TS: 18° ±60'(6bit) EP: 9° ±60'(1bit)
		32	TP1: 7° ±60'(1bit) TP2: 2° ±60'(1bit) TS: 11.25° ±60'(6bit) EP: 11.25° ±60'(1bit)	TP1: 7° ±60'(1bit) TP2: 2° ±60'(1bit) TS: 11.25° ±60'(5bit) EP: 11.25° ±60'(1bit)	TP1: 7° ±60'(1bit) TP2: 2° ±60'(1bit) TS: 22.5° ±60'(5bit) EP: 11.25° ±60'(1bit)
		24	TP1: 8° ±60'(1bit) TP2: 3° ±60'(1bit) TS: 15° ±60'(6bit) EP: 15° ±60'(1bit)	TP1: 8° ±60'(1bit) TP2: 3° ±60'(1bit) TS: 15° ±60'(5bit) EP: 15° ±60'(1bit)	TP1: 8° ±60'(1bit) TP2: 3° ±60'(1bit) TS: 30° ±60'(5bit) EP: 15° ±60'(1bit)
		20	TP1: 12° ±60'(1bit) TP2: 2° ±60'(1bit) TS: 18° ±60'(5bit) EP: 18° ±60'(1bit)	TP1: 12° ±60'(1bit) TP2: 2° ±60'(1bit) TS: 18° ±60'(5bit) EP: 18° ±60'(1bit)	TP1: 12° ±60'(1bit) TP2: 2° ±60'(1bit) TS: 36° ±60'(5bit) EP: 18° ±60'(1bit)
		16	TP1: 15° ±60'(1bit) TP2: 2° ±60'(1bit) TS: 22.5° ±60'(5bit) EP: 22.5° ±60'(1bit)	TP1: 15° ±60'(1bit) TP2: 2° ±60'(1bit) TS: 22.5° ±60'(4bit) EP: 22.5° ±60'(1bit)	TP1: 15° ±60'(1bit) TP2: 2° ±60'(1bit) TS: 45° ±60'(4bit) EP: 22.5° ±60'(1bit)
		12	TP1: 15° ±60'(1bit) TP2: 3° ±60'(1bit) TS: 30° ±60'(5bit) EP: 30° ±60'(1bit)	TP1: 15° ±60'(1bit) TP2: 3° ±60'(1bit) TS: 30° ±60'(4bit) EP: 30° ±60'(1bit)	TP1: 15° ±60'(1bit) TP2: 3° ±60'(1bit) TS: 60° ±60'(4bit) EP: 30° ±60'(1bit)
		10	TP1: 30° ±60'(1bit) TP2: 12° ±60'(1bit) TS: 36° ±60'(4bit) EP: 36° ±60'(1bit)	TP1: 30° ±60'(1bit) TP2: 12° ±60'(1bit) TS: 36° ±60'(4bit) EP: 36° ±60'(1bit)	TP1: 30° ±60'(1bit) TP2: 12° ±60'(1bit) TS: 72° ±60'(4bit) EP: 36° ±60'(1bit)
		8	TP1: 39° ±60'(1bit) TP2: 15° ±60'(1bit) TS: 45° ±60'(3bit) EP: 45° ±60'(1bit)	TP1: 39° ±60'(1bit) TP2: 15° ±60'(1bit) TS: 45° ±60'(3bit) EP: 45° ±60'(1bit)	TP1: 39° ±60'(1bit) TP2: 15° ±60'(1bit) TS: 90° ±60'(3bit) EP: 45° ±60'(1bit)
		6	TP1: 53° ±60'(1bit) TP2: 15° ±60'(1bit) TS: 60° ±60'(3bit) EP: 60° ±60'(1bit)	TP1: 53° ±60'(1bit) TP2: 15° ±60'(1bit) TS: 60° ±60'(3bit) EP: 60° ±60'(1bit)	TP1: 53° ±60'(1bit) TP2: 15° ±60'(1bit) TS: 120° ±60'(3bit) EP: 60° ±60'(1bit)

※1: TS=Signal Pulse, TP=Timing Pulse, EP=Even Parity

SENSORS

CONTROLLERS

MOTION DEVICES

SOFTWARE

(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) LIDAR

(D) Door/Area Sensors

(E) Vision Sensors

(F) Proximity Sensors

(G) Pressure Sensors

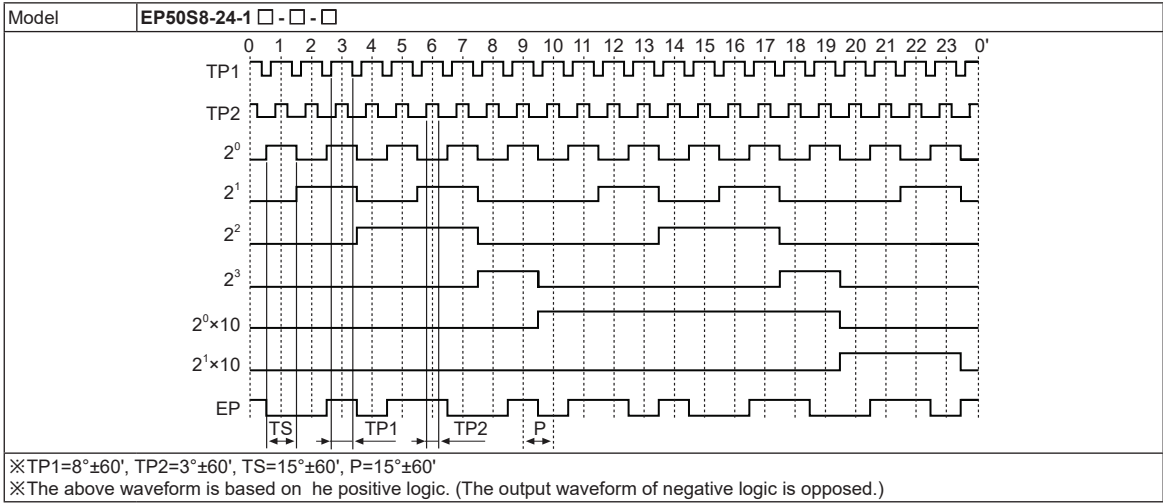
(H) Rotary Encoders

(I) Connectors/
Connector Cables/
Sensor Distribution
Boxes/ Sockets

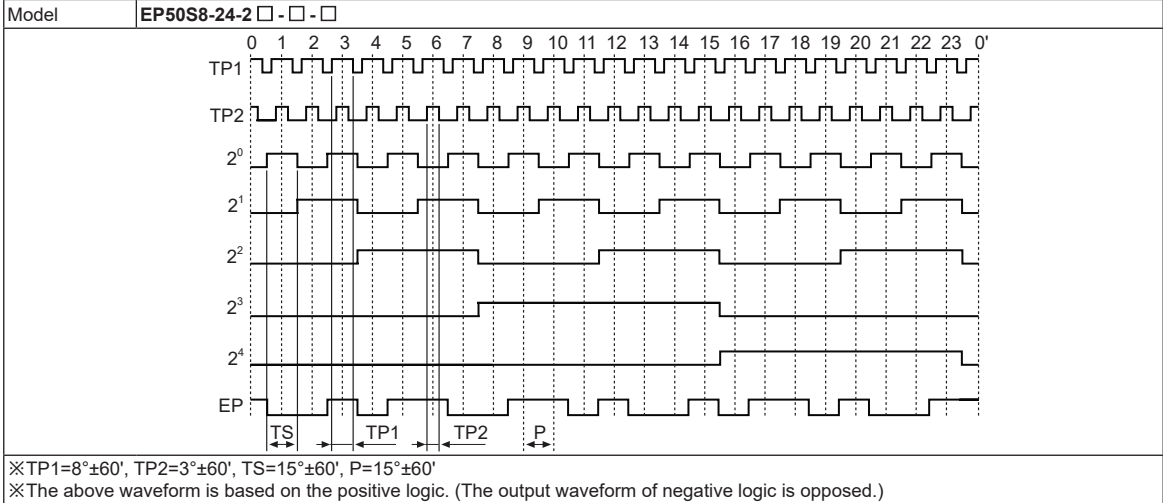
EP50S Series

■ Output Waveform

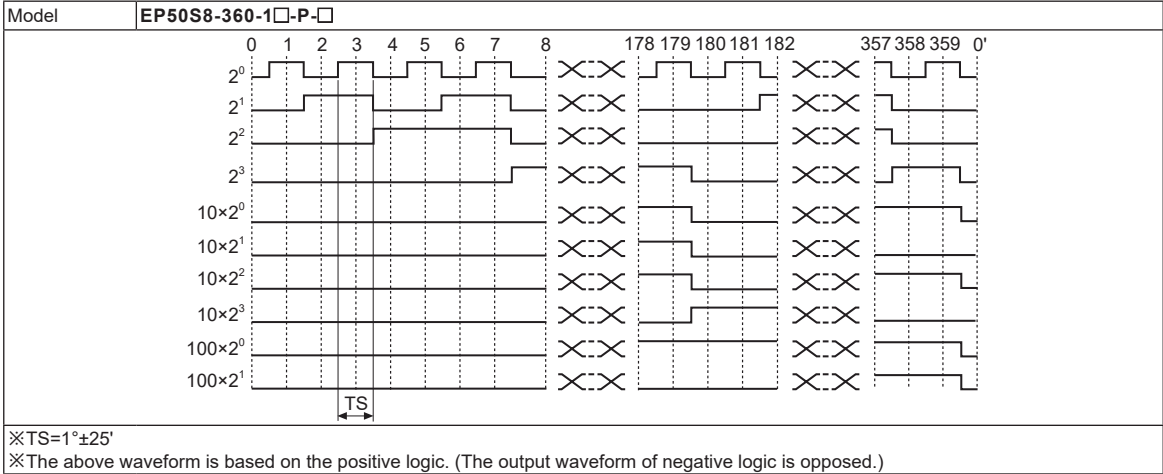
○ 24-division (BCD code output)



○ 24-division (Binary code output)



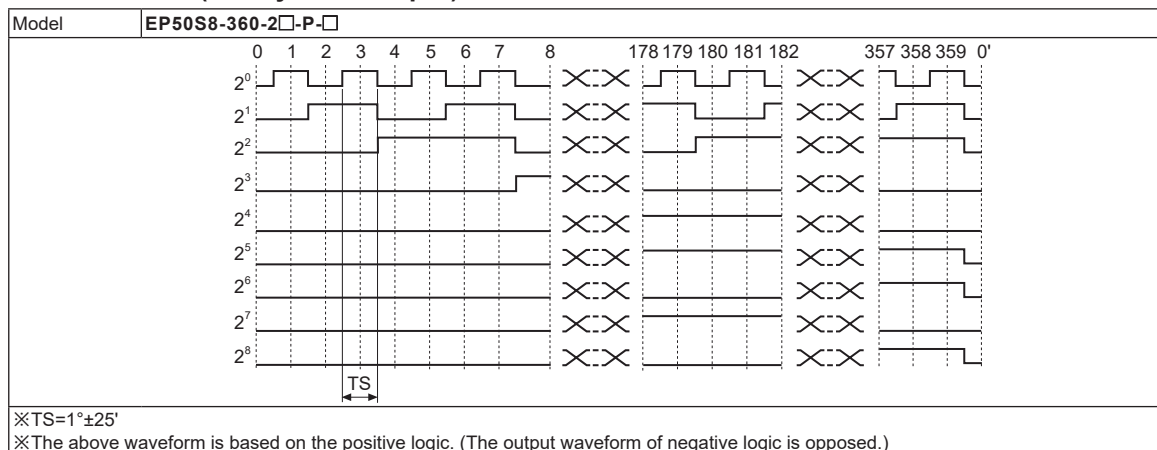
● 360-division (BCD code output)



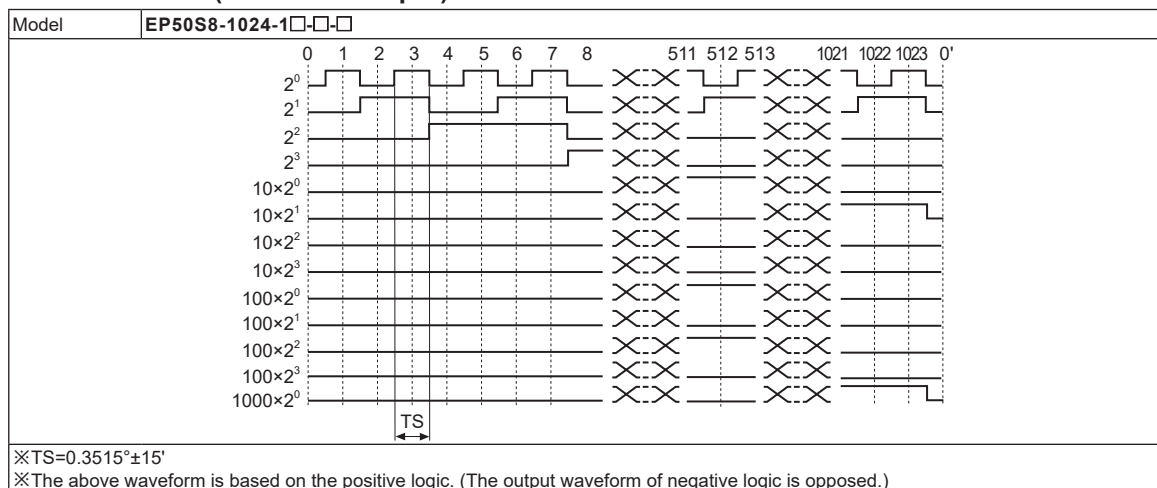
Absolute Ø50mm Single-turn Shaft Type

■ Output Waveform

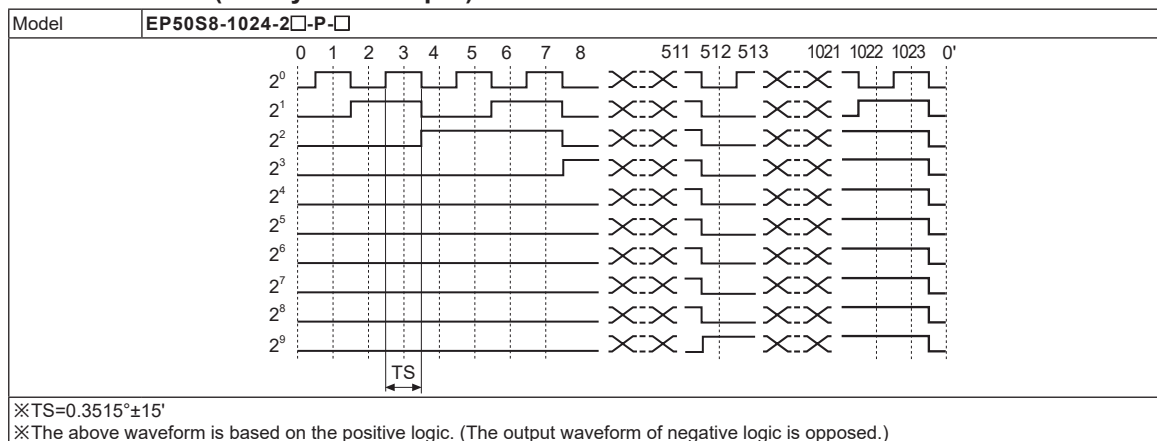
○ 360-division (Binary code output)



○ 1024-division (BCD code output)



○ 1024-division (Binary code output)



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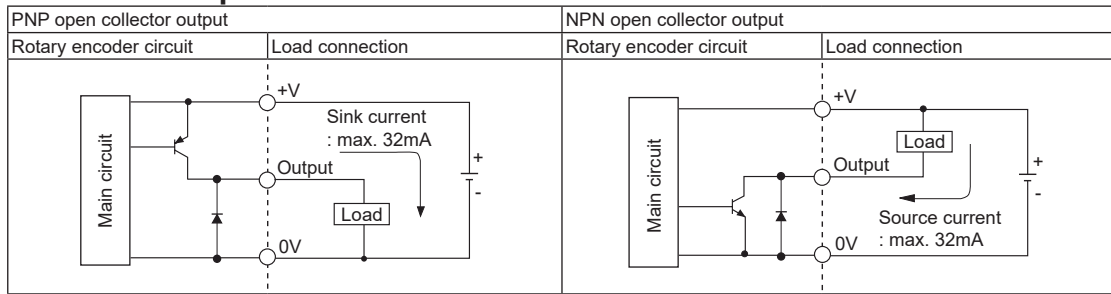
(G) Pressure Sensors

(H) Rotary Encoders

(I) Connectors/
Connector Cables/
Sensor Distribution
Boxes/ Sockets

EP50S Series

■ Control Output Circuit



※Each bit of output has the same circuit.

※Please be aware of the fact that overload and short circuit may cause circuit break.

■ Connections

◎ BCD code

Resolution		6	8	10	12	16	20	24	32	40	45	48	64	90	128	180	256	360	512	720	1024
Color	Power																				
	White	+V																			
	Black	0V																			
Output wire	Brown	2 ⁰																			
	Red	2 ¹																			
	Orange	2 ²																			
	Yellow	N·C		2 ³																	
	Blue	N·C			2 ⁰ ×10																
	Purple	N·C							2 ¹ ×10												
	Gray	N·C									2 ² ×10										
	White/Brown	TP1									N·C		2 ³ ×10								
	White/Red	TP2									N·C					2 ⁰ ×100					
	White/Orange	EP									N·C								2 ¹ ×100		
	White/Yellow	N·C																	2 ² ×100		
	White/Blue	N·C																			2 ³ ×100
	White/Purple	N·C																			2 ⁰ ×1000
		Shield wire	Signal shield cable (F.G.)																		

※Unused wires must be insulated.

※Encoder metal case and shield cable must be grounded (F.G.).

※N-C (not connected)

※Please use caution to avoid short circuit when connecting output cables because I/O circuit uses the dedicated driver IC.

※Do not apply tensile strength over 30N to the cable.

◎ Binary code/Gray code

Resolution		6	8	10	12	16	20	24	32	40	45	48	64	90	128	180	256	360	512	720	1024	
Color	Power																					
Output wire	White	+V																				
	Black	0V																				
	Brown	2 ⁰																				
	Red	2 ¹																				
	Orange	2 ²																				
	Yellow	N-C		2 ³																		
	Blue	N-C				2 ⁴																
	Purple	N-C								2 ⁵												
	Gray	N-C										2 ⁶										
	White/Brown	TP1										N-C				2 ⁷						
	White/Red	TP2										N-C								2 ⁸		
White/Orange	EP										N-C										2 ⁹	
Shield wire	Signal shield cable (F.G.)																					

※Unused wires must be insulated.

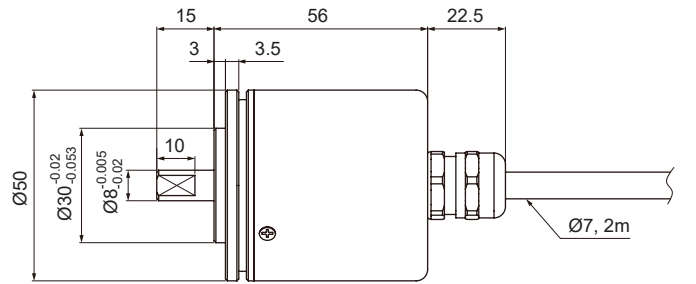
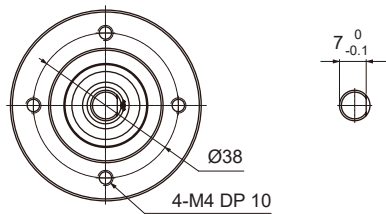
※Encoder metal case and shield cable must be grounded (F.G.).

※N-C (not connected)

※Please use caution to avoid short circuit when connecting output cables because I/O circuit uses the dedicated driver IC.

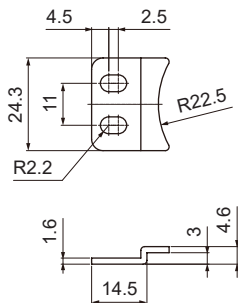
※Do not apply tensile strength over 30N to the cable.

Dimensions

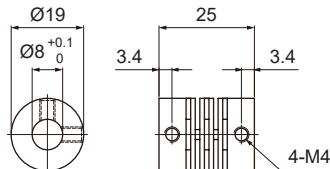


(unit: mm)

 Bracket



⊙ Coupling



- Parallel misalignment: max. 0.25mm
- Angular misalignment: max. 5°
- End-play: max. 0.5mm

※Do not load overweight on the shaft.

※Do not put strong impact when insert a coupling into shaft. Failure to follow this instruction may result in product damage.

※Fix the unit or a coupling by a wrench under 0.15N·m of torque.

※When you install this unit, if eccentricity and deflection angle are larger, it may shorten the life cycle of this unit.

※For parallel misalignment, angular misalignment, end-play terms, refer to the "Glossary" section of Technical Description.

※For flexible coupling (ERB series) information, refer to the ERB series section.

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