

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	
Electrical specification	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	
Mechanical specification	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)	
Mechanical specification	Shaft loading	
	Radial: max. 10kgf, Thrust: max. 2.5kgf	
Mechanical specification	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
Environ-ment	Ambient temp.	-10 to 70°C, storage: -25 to 85°C
	Ambient humi.	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.

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

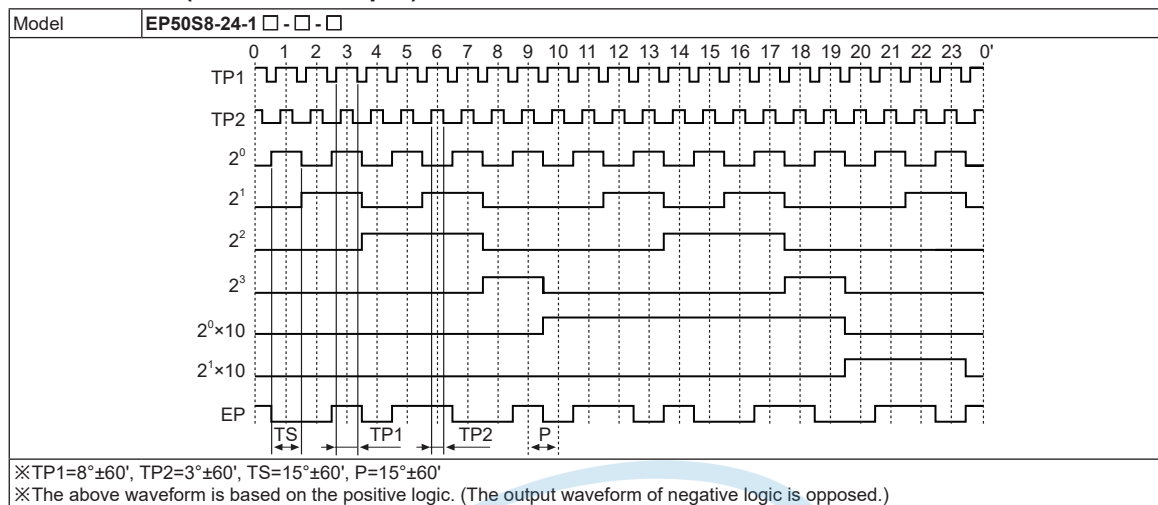
(G) Pressure Sensors

(H) Rotary Encoders

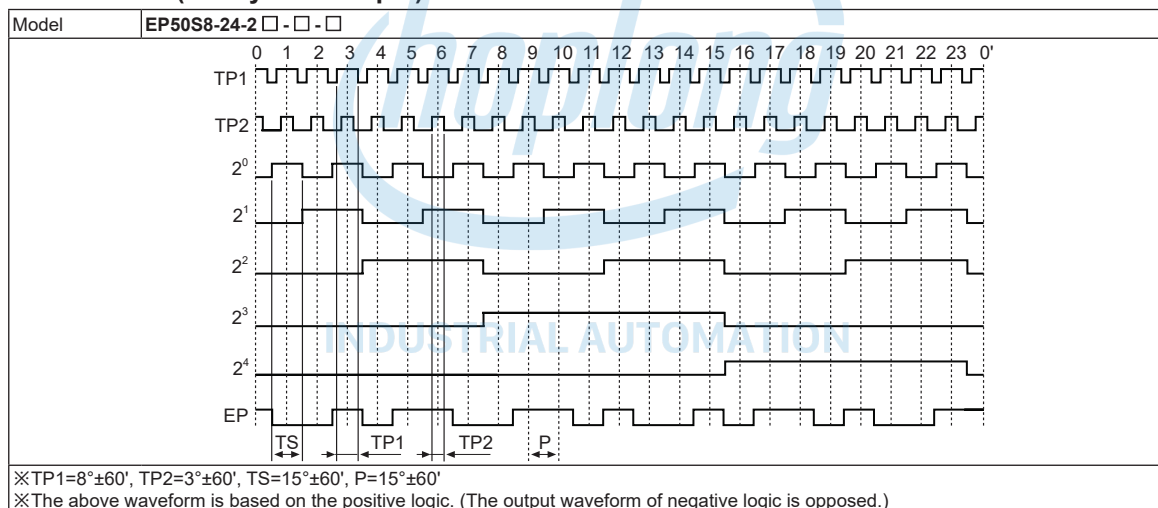
(I) Connectors/
Connector Cables/
Sensor Distribution
Boxes/ Sockets

Output Waveform

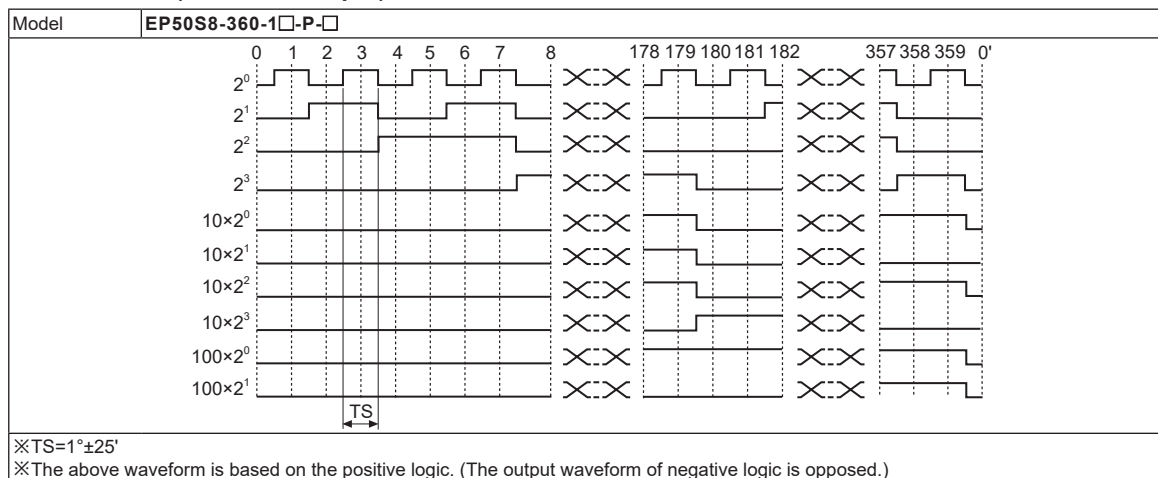
24-division (BCD code output)



24-division (Binary code output)

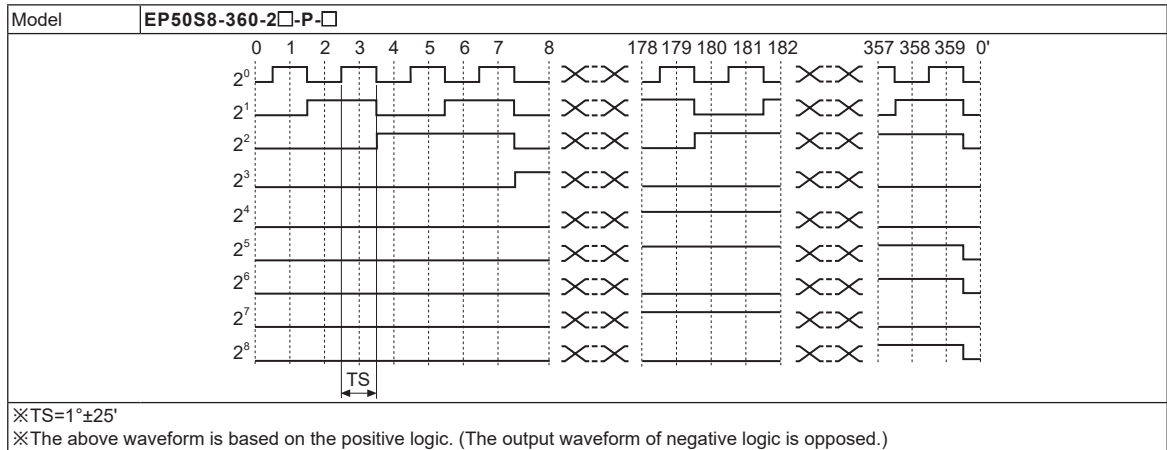


360-division (BCD code output)

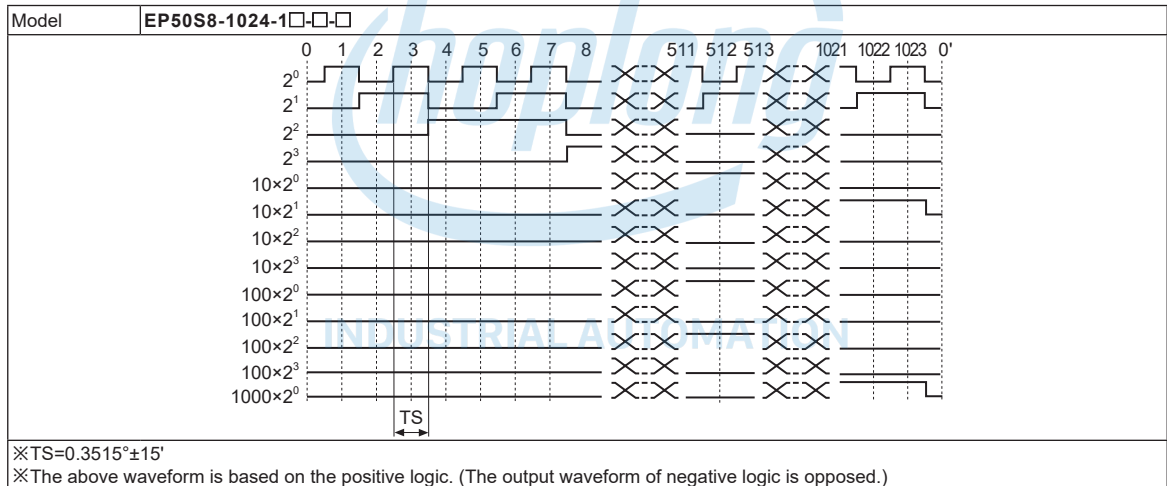


■ Output Waveform

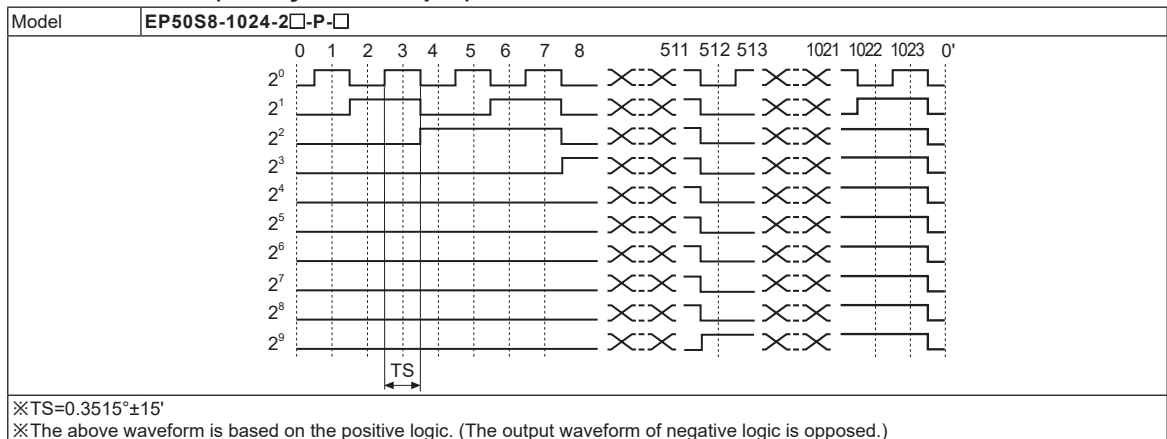
○ 360-division (Binary code output)



○ 1024-division (BCD code output)



○ 1024-division (Binary code output)



SENSORS

CONTROLLERS

MOTION DEVICES

SOFTWARE

(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) LIDAR

(D) Door/Area Sensors

(E) Vision Sensors

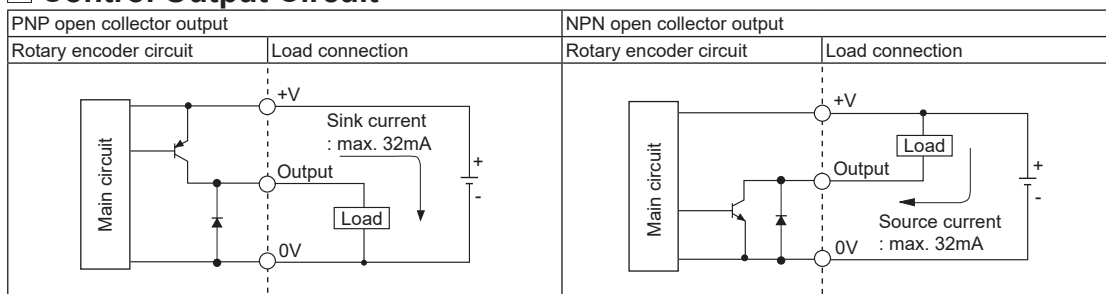
(F) Proximity Sensors

(G) Pressure Sensors

(H) Rotary Encoders

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

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											+V									
												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																					
	White	+V																				
Output wire	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.

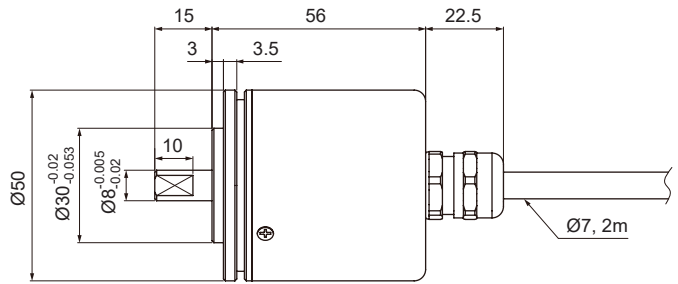
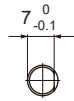
※Encoder metal case and shield cable must be grounded (F.G.).

※N-C (not connected)

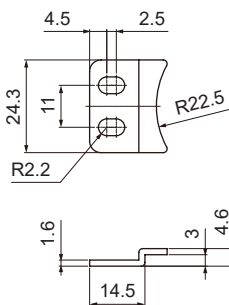
※Please use caution to avoid short circuit when connecting output cables because I/O circuit uses the dedicated driver IC.

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(unit: mm)



SENSORS
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SOFTWARE



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

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

- | | |
|-----|---|
| (A) | Photoelectric Sensors |
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