

EP50S Series

Shaft Type Ø50mm 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 "Caution for your safety" in operation manual before using.



■ Ordering Information

EP50S **8** - **1024** - **1** **R** - **P** - **24**

Series	Shaft diameter	Steps/revolution	Output code	Revolution direction	Control output	Power supply
50mm 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 Absolute Rotary Encoder								
Mode	PNP open collector output	EP50S8-□□□□-P-□								
Mode	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	Output phase / Output angle*1	Output code	Division	BCD code	Binary code	Gray code	Division	BCD code	Binary code	Gray code
		1024	20	TS: 0.3515°±15' (13-bit)	TS: 0.3515°±15' (10-bit)	TS: 0.703°±15' (10-bit)	20	TP1: 12°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 18°±60' (5-bit) EP: 18°±60' (1-bit)	TP1: 12°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 18°±60' (5-bit) EP: 18°±60' (1-bit)	TP1: 12°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 18°±60' (5-bit) EP: 18°±60' (1-bit)
				TS: 0.5°±25' (11-bit)	TS: 0.5°±25' (10-bit)	TS: 1°±25' (10-bit)				
				TS: 0.703°±15' (11-bit)	TS: 0.703°±15' (9-bit)	TS: 1.406°±15' (9-bit)				
				TS: 1°±25' (10-bit)	TS: 1°±25' (9-bit)	TS: 2°±25' (9-bit)				
		256	16	TS: 1.406°±15' (10-bit)	TS: 1.406°±15' (8-bit)	TS: 2.8125°±15' (8-bit)	16	TP1: 15°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 22.5°±60' (5-bit) EP: 22.5°±60' (1-bit)	TP1: 15°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 22.5°±60' (5-bit) EP: 22.5°±60' (1-bit)	TP1: 15°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 22.5°±60' (5-bit) EP: 22.5°±60' (1-bit)
				TS: 2°±25' (9-bit)	TS: 2°±25' (8-bit)	TS: 4°±25' (8-bit)				
				TS: 2.8125°±15' (9-bit)	TS: 2.8125°±15' (7-bit)	TS: 5.625°±15' (7-bit)				
				TS: 4°±25' (8-bit)	TS: 4°±25' (7-bit)	TS: 8°±25' (7-bit)				
		64	12	TS: 5.625°±15' (7-bit)	TS: 5.625°±15' (6-bit)	TS: 11.25°±15' (6-bit)	12	TP1: 15°±60' (1-bit) TP2: 3°±60' (1-bit) TS: 30°±60' (5-bit) EP: 30°±60' (1-bit)	TP1: 15°±60' (1-bit) TP2: 3°±60' (1-bit) TS: 30°±60' (5-bit) EP: 30°±60' (1-bit)	TP1: 15°±60' (1-bit) TP2: 3°±60' (1-bit) TS: 30°±60' (5-bit) EP: 30°±60' (1-bit)
				TS: 7.5°±25' (7-bit)	TS: 7.5°±25' (6-bit)	TS: 15°±25' (6-bit)				
				TS: 8°±25' (7-bit)	TS: 8°±25' (6-bit)	TS: 16°±25' (6-bit)				
				TP1: 7°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 9°±60' (6-bit) EP: 9°±60' (1-bit)	TP1: 5°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 9°±60' (6-bit) EP: 9°±60' (1-bit)	TP1: 5°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 18°±60' (6-bit) EP: 9°±60' (1-bit)				
		40	10	TP1: 7°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 11.25°±60' (6-bit) EP: 11.25°±60' (1-bit)	TP1: 7°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 11.25°±60' (6-bit) EP: 11.25°±60' (1-bit)	TP1: 7°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 22.5°±60' (5-bit) EP: 11.25°±60' (1-bit)	10	TP1: 30°±60' (1-bit) TP2: 12°±60' (1-bit) TS: 36°±60' (4-bit) EP: 36°±60' (1-bit)	TP1: 30°±60' (1-bit) TP2: 12°±60' (1-bit) TS: 36°±60' (4-bit) EP: 36°±60' (1-bit)	TP1: 30°±60' (1-bit) TP2: 12°±60' (1-bit) TS: 36°±60' (4-bit) EP: 36°±60' (1-bit)
				TP1: 7°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 11.25°±60' (6-bit) EP: 11.25°±60' (1-bit)	TP1: 7°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 22.5°±60' (5-bit) EP: 11.25°±60' (1-bit)	TP1: 7°±60' (1-bit) TP2: 2°±60' (1-bit) TS: 45°±60' (3-bit) EP: 45°±60' (1-bit)				
				TP1: 8°±60' (1-bit) TP2: 3°±60' (1-bit) TS: 15°±60' (6-bit) EP: 15°±60' (1-bit)	TP1: 8°±60' (1-bit) TP2: 3°±60' (1-bit) TS: 15°±60' (6-bit) EP: 15°±60' (1-bit)	TP1: 8°±60' (1-bit) TP2: 3°±60' (1-bit) TS: 30°±60' (5-bit) EP: 15°±60' (1-bit)				
TP1: 8°±60' (1-bit) TP2: 3°±60' (1-bit) TS: 15°±60' (6-bit) EP: 15°±60' (1-bit)	TP1: 8°±60' (1-bit) TP2: 3°±60' (1-bit) TS: 30°±60' (5-bit) EP: 15°±60' (1-bit)			TP1: 8°±60' (1-bit) TP2: 3°±60' (1-bit) TS: 60°±60' (3-bit) EP: 60°±60' (1-bit)						
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)								

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

Absolute Ø50mm Shaft Type

Specifications

Item		Shaft Type Ø50mm Absolute Rotary Encoder
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: 10kgf, Thrust: 2.5kgf
	Max. allowable revolution ^{※2}	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 temperature	-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	
Unit weight ^{※3}	Approx. 482g (approx. 398g)	

※2: 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.

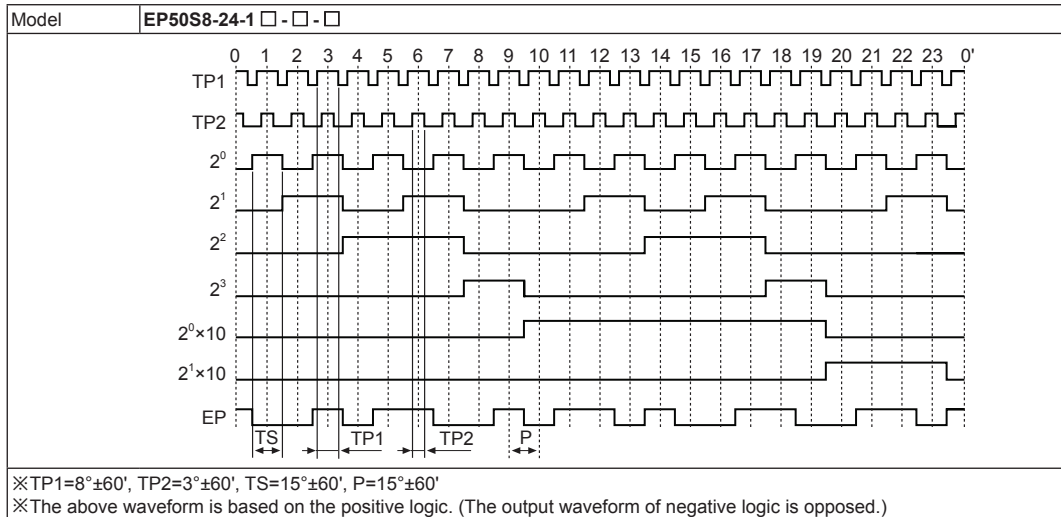
$$[\text{Max. response revolution (rpm)}] = \frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec}$$

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

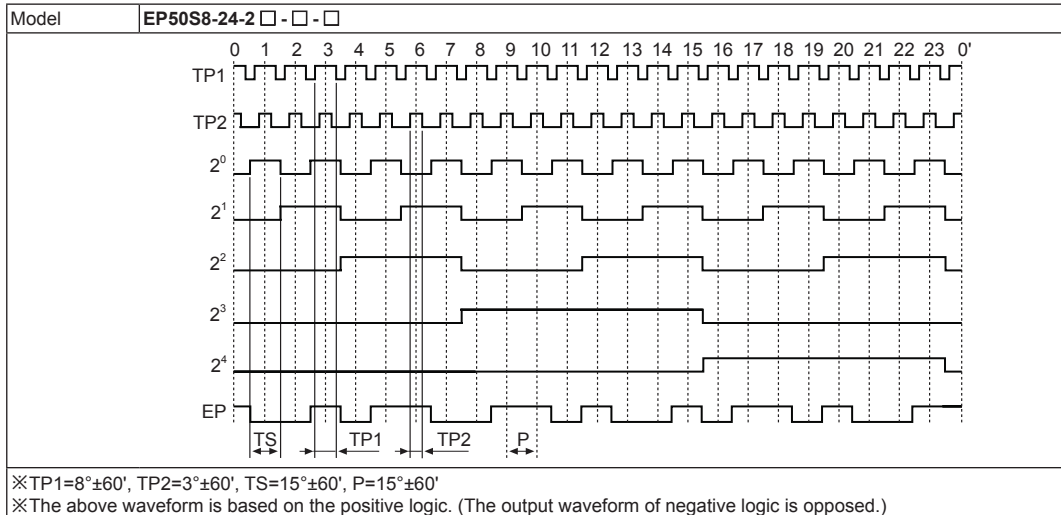
※Environment resistance is rated at no freezing or condensation.

Output Waveform

• 24-division (BCD code output)



• 24-division (Binary code output)



(A) Photoelectric Sensors

(B) Fiber Optic Sensors

(C) Door/Area Sensors

(D) Proximity Sensors

(E) Pressure Sensors

(F) Rotary Encoders

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

(H) Temperature Controllers

(I) SSRs / Power Controllers

(J) Counters

(K) Timers

(L) Panel Meters

(M) Tacho / Speed / Pulse Meters

(N) Display Units

(O) Sensor Controllers

(P) Switching Mode Power Supplies

(Q) Stepper Motors & Drivers & Controllers

(R) Graphic/ Logic Panels

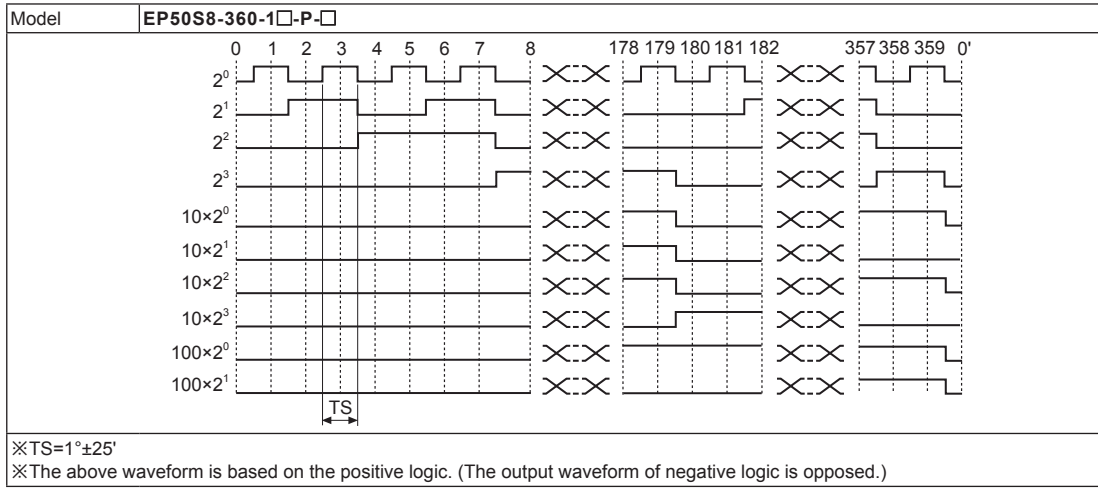
(S) Field Network Devices

(T) Software

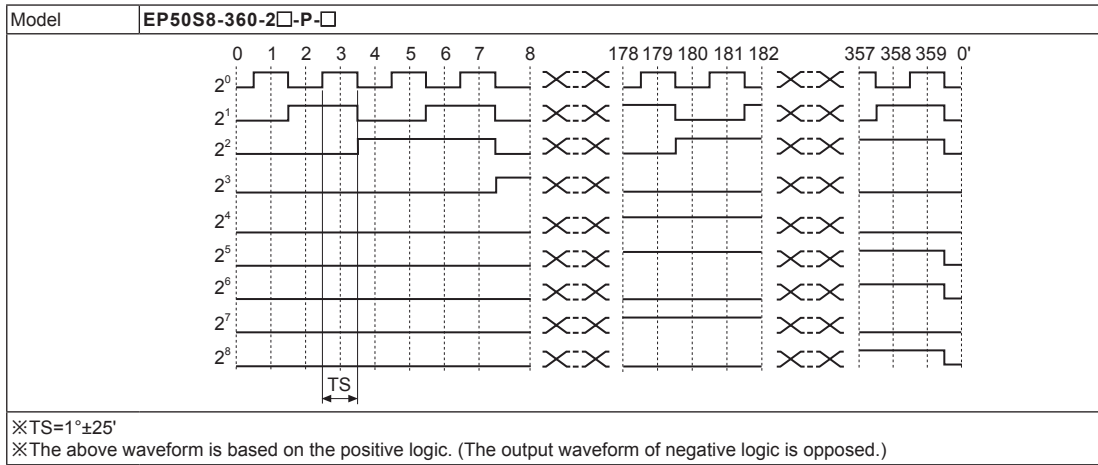
EP50S Series

Output Waveform

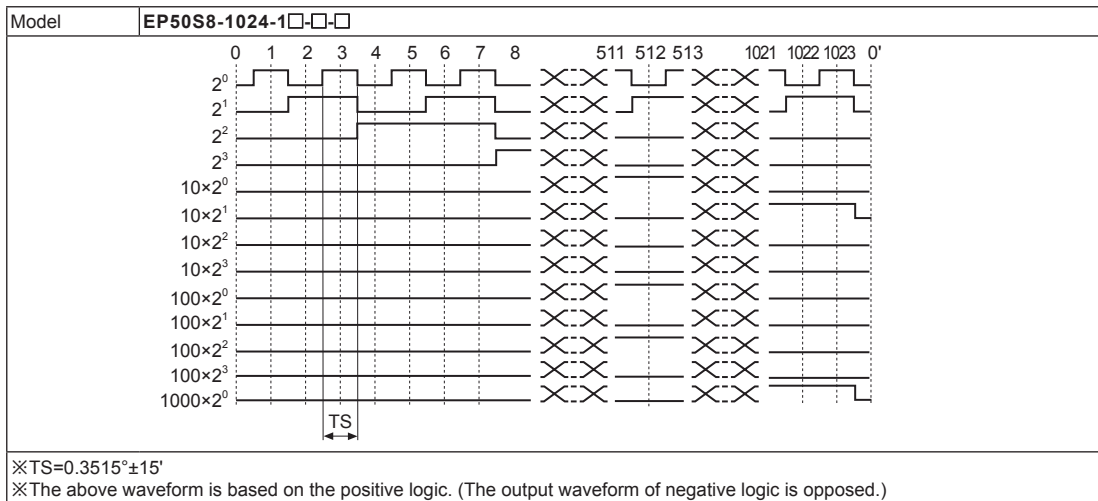
• 360-division (BCD code output)



• 360-division (Binary code output)



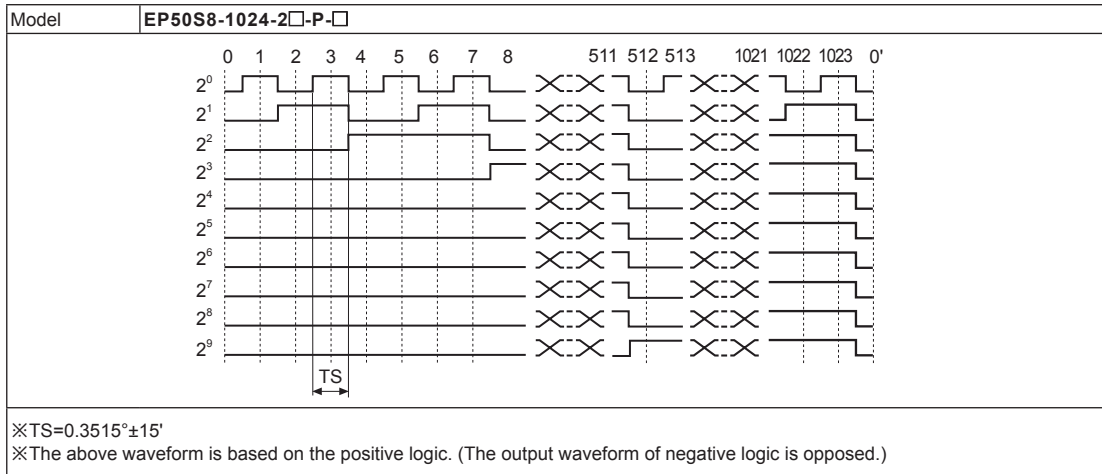
• 1024-division (BCD code output)



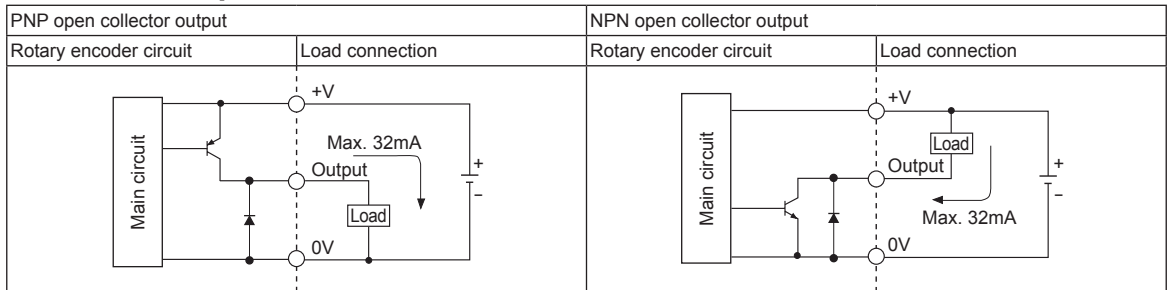
Absolute Ø50mm Shaft Type

Output Waveform

• 1024-division (Binary code output)



Control Output I/O 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		Color																							
		6	8	10	12	16	20	24	32	40	45	48	64	90	128	180	256	360	512	720	1024				
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 ³ ×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) : Not using.
 ※Please use caution to avoid short circuit when connecting output cables because I/O circuit uses the dedicated driver IC.

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- (D) Proximity Sensors
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- (G) Connectors/ Connector Cables/ Sensor Distribution Boxes/Sockets
- (H) Temperature Controllers
- (I) SSRs / Power Controllers
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- (K) Timers
- (L) Panel Meters
- (M) Tacho / Speed / Pulse Meters
- (N) Display Units
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