

## Diameter Ø50mm Shaft Type Incremental Rotary Encoder

### ■ Features

- 12-24VDC power supply of line driver output (Line-up)
- Suitable for measuring angle, position, revolution, speed, acceleration and distance
- Power supply: 5VDC, 12-24VDC ±5%

### ■ Applications

- Various tooling machinery, packing machine and general industrial machinery, etc.

**⚠ Please read "Caution for your safety" in operation manual before using.**



### ■ Ordering Information (Former Name: ENB)

<b>E50S</b>	<b>8</b>	<b>8000</b>	<b>3</b>	<b>N</b>	<b>24</b>
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Series	Shaft diameter	Pulse/1Revolution	Output phase	Control output	Power supply	Cable
Diameter Ø50mm, shaft type	Ø8mm	Refer to resolution	2: A, B 3: A, B, Z 4: A, $\bar{A}$ , B, $\bar{B}$ 6: A, $\bar{A}$ , B, $\bar{B}$ , Z, $\bar{Z}$	T: Totem pole output N: NPN open collector output V: Voltage output L: Line driver output	5 :5VDC ±5% 24:12-24VDC ±5%	No mark: Cable type C: Connector cable type (※) CR: Axial connector type CS: Radial connector type

※Standard: E50S8-PULSE-3-N-24

※Cable length: 250mm

### ■ Specifications

Item		Diameter Ø50mm shaft type of incremental rotary encoder	
Resolution (P/R) <sup>*1</sup>		*1, *2, *5, 10, 12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 125, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600, 5000, 6000, 8000	
Electrical specification	Output phase	A, B, Z phase (Line driver: A, $\bar{A}$ , B, $\bar{B}$ , Z, $\bar{Z}$ phase)	
	Phase difference of output	Phase difference between A and B: $\frac{T}{4} \pm \frac{T}{8}$ (T=1 cycle of A phase)	
	Control output	Totem pole output	• Low - Load current: Max. 30mA, Residual voltage: Max. 0.4VDC • High - Load current: Max. 10mA, Output voltage (Power voltage 5VDC): Min. (Power voltage-2.0)VDC, Output voltage (Power voltage 12-24VDC): Min. (Power voltage-3.0)VDC
		NPN open collector output	Load current: Max. 30mA, Residual voltage: Max. 0.4VDC
		Voltage output	Load current: Max. 10mA, Residual voltage: Max. 0.4VDC
	Line driver output	Line driver output	• Low - Load current: Max. 20mA, Residual: Max. 0.5VDC • High - Load current: Max. -20mA, Output voltage (Power voltage 5VDC): Min. 2.5VDC, Output voltage (Power voltage 12-24VDC): Min. (Power voltage-3.0)VDC
		Totem pole output	Max. 1μs (Cable length: 2m, I sink = 20mA)
		NPN open collector output	
	Response time (Rise/Fall)	Voltage output	Max. 0.5μs (Cable length: 2m, I sink = 20mA)
		Line driver output	
Max. Response frequency		300kHz	
Power supply		• 5VDC ±5% (Ripple P-P: Max. 5%) • 12-24VDC ±5% (Ripple P-P: Max. 5%)	
Current consumption		Max. 80mA (disconnection of the load), Line driver output: Max. 50mA (disconnection of the load)	
Insulation resistance		Min. 100MΩ (at 500VDC megger between all terminals and case)	
Dielectric strength		750VAC 50/60Hz for 1 minute (Between all terminals and case)	
Connection		Cable type, 250mm connector cable type, Connector type (Axial, Radial)	
Mechanical specification	Starting torque	Max. 70gf·cm (0.007N·m) <sup>*2</sup> / Max. 800gf·cm (0.08N·m) <sup>*3</sup>	
	Moment of inertia	Max. 80g·cm <sup>2</sup> (8×10 <sup>-6</sup> kg·m <sup>2</sup> ) <sup>*2</sup> / Max. 400g·cm <sup>2</sup> (4×10 <sup>-5</sup> kg·m <sup>2</sup> ) <sup>*3</sup>	
	Shaft loading	Radial: 10kgf, Thrust: 2.5kgf	
	Max. allowable revolution <sup>*4</sup>	5000rpm	
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. 75G	
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		Cable type, Connector cable type: IP50 (IEC standard) <sup>*5</sup> , Connector type: IP65 (IEC standard)	
Cable		Ø5mm, 5-wire, Length: 2m, Shield cable (Line driver output: Ø5mm, 8-wire) (AWG 24, Core diameter: 0.08mm, Number of cores: 40, Insulator out diameter: Ø1mm)	
Accessory		Ø8mm coupling, bracket	
Approval		Cable type <b>CE</b> (Except for line driver output)	
Unit weight		Approx. 275g, Connector type: Approx. 180g	

※1: \*\* pulse is only for A, B phase (Line driver output is for A,  $\bar{A}$ , B,  $\bar{B}$  phase). Not indicated resolutions are customizable.

※2: This value is for Cable type, Connector cable type (Protection: IP50).

※3: This value is for Cable type, Connector cable type (Protection: IP64)/Connector type (Protection: IP65)

※4: Make sure that max. response revolution should be lower than or equal to max. allowable revolution when selecting the resolution.

【Max. response resolution (rpm) =  $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec}$ 】

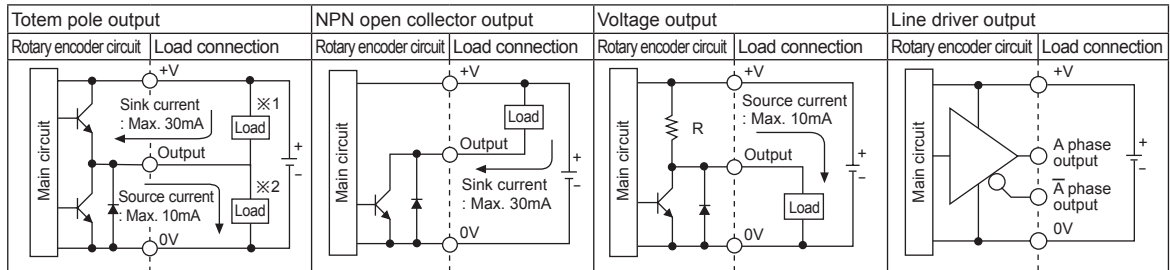
※5: 'Cable type, Connector cable type is option as IP64 protection.

※Environment resistance is rated at no freezing or condensation.

(A)	Photoelectric Sensors
(B)	Fiber Optic Sensors
(C)	Door/Area Sensors
(D)	Proximity Sensors
(E)	Pressure Sensors
(F)	Rotary Encoders
(G)	Connectors/ 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

# E50S Series

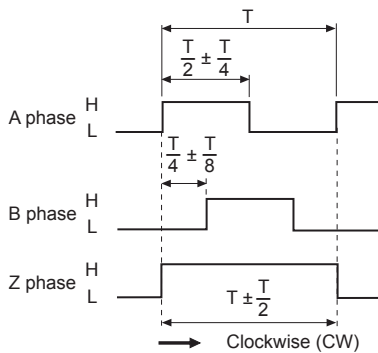
## Control Output Diagram



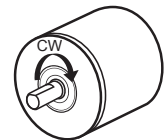
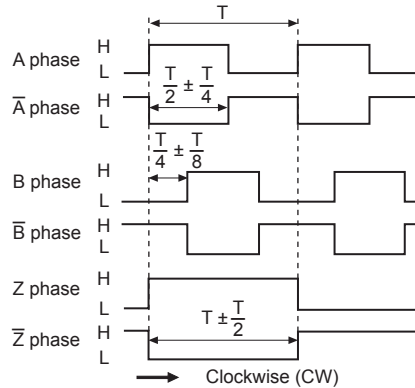
- Totem pole output type can be used for NPN open collector output type (※1) or Voltage output type (※2).
- The output circuit of A, B, Z phase are same. (Line driver output is A,  $\bar{A}$ , B,  $\bar{B}$ , Z,  $\bar{Z}$ )

## Output Waveform

- Totem pole output / NPN open collector output / Voltage output



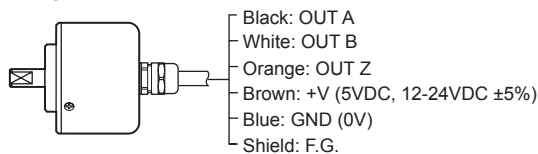
- Line driver output



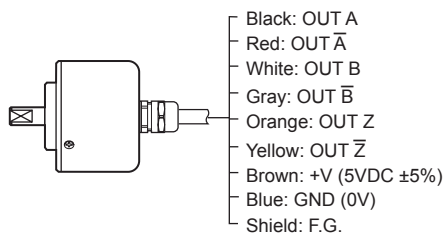
## Connections

### ⊙ Cable type

- Totem pole output / NPN open collector output / Voltage output



- Line driver output



- ※ Unused wires must be insulated.
- ※ The shield cable and metal case of encoder must be grounded (F.G.)

### ⊙ Cable connector type / Connector type

- Totem pole output / NPN open collector output / Voltage output
- Line driver output



Totem pole output/ NPN open collector output/ Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT $\bar{A}$	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G.	Shield	⑥	OUT $\bar{B}$	Gray
			⑦	OUT Z	Orange
			⑧	OUT $\bar{Z}$	Yellow
			⑨	F.G.	Shield

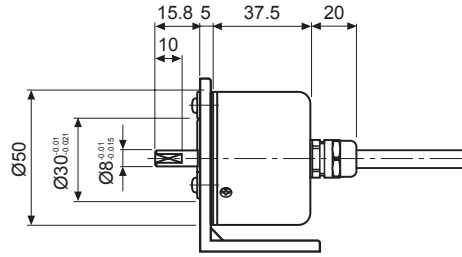
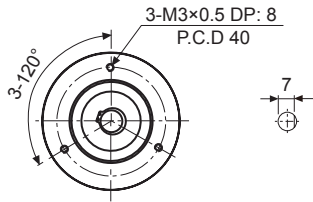
※F.G. (Field Ground): It must be grounded separately.

# Incremental Ø50mm Shaft Type

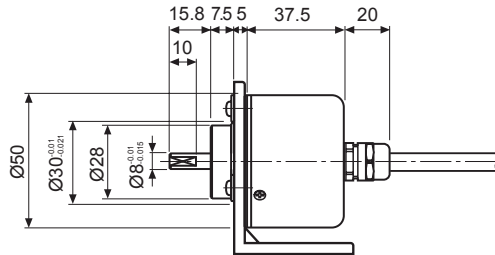
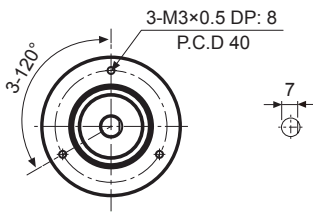
## ■ Dimensions

(unit: mm)

### ◎ Cable type, Connector cable type (Protection: IP50)



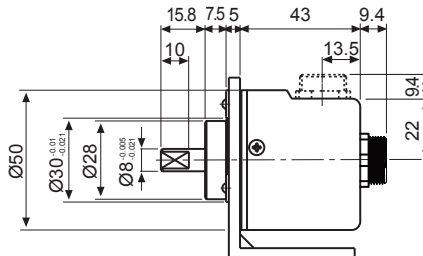
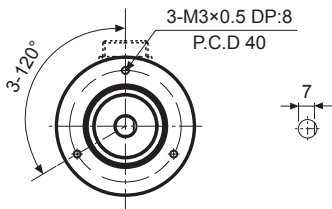
### ◎ Cable type, Connector cable type (Protection: IP64) (Option)



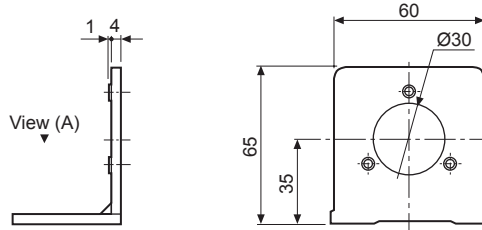
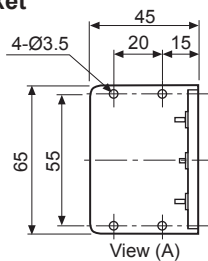
Cable for Cable type	Cable for Connector cable type
Ø5mm, 5-wire (Line driver output: 8-wire), Length: 2000mm, Shield cable	Ø5mm, 5-wire (Line driver output: 8-wire), Length: 250mm, Shield cable

※Connector cable is sold separately and refer to page G-10 for specifications.

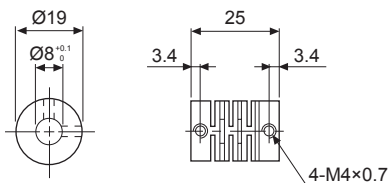
### ◎ Axial / Radial connector type (Protection: IP65)



### ● Bracket



### ● Coupling (E50S)



- Parallel misalignment: Max. 0.25mm
- Angular misalignment: Max. 5°
- End-play: Max. 0.2mm

※For parallel misalignment, angular misalignment, end-play terms, refer to page F-71.

※For flexible coupling (ERB Series) information, refer to page F-64.

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