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)

E50S — **8** — **8000** — **3** — **N** — **24** — ☐

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, $\overline{A}$, B, $\overline{B}$ 6: A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$	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

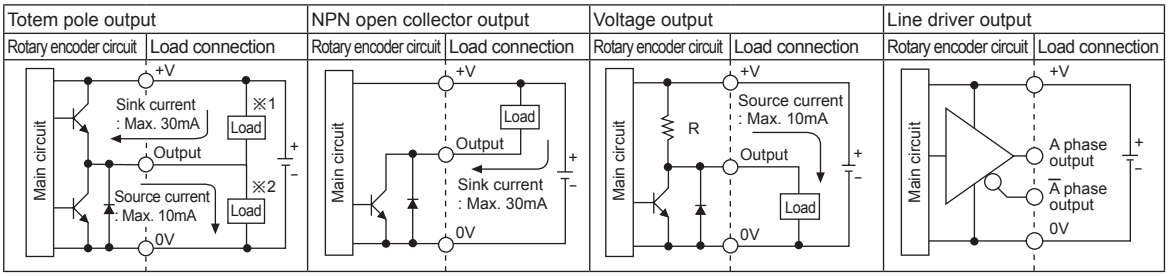
※Standard: E50S8-PULSE-3-N-24 ※Cable length: 250mm

■ Specifications

Item			Diameter Ø50mm shaft type of incremental rotary encoder
Resolution (P/R)※1			*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, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$ 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	• 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
	Response time (Rise/Fall)	Totem pole output	Max. 1μs (Cable length: 2m, I sink = 20mA)
		NPN open collector output	
		Voltage output	
		Line driver output	Max. 0.5μs (Cable length: 2m, I sink = 20mA)
	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)※2 / Max. 800gf·cm (0.08N·m)※3
	Moment of inertia		Max. 80g·cm² (8×10^{-6} kg·m²)※2 / Max. 400g·cm² (4×10^{-5} kg·m²)※3
	Shaft loading		Radial: 10kgf, Thrust: 2.5kgf
	Max. allowable revolution※4		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℃, storage: -25 to 85℃
	Ambient humidity		35 to 85%RH, storage: 35 to 90%RH
Protection structure			Cable type, Connector cable type: IP50 (IEC standard)※5, 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 CE (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, $\overline{A}$, B, $\overline{B}$ 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) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60$ sec 】
※5: 'Cable type, Connector cable type is option as IP64 protection.
※Environment resistance is rated at no freezing or condensation.

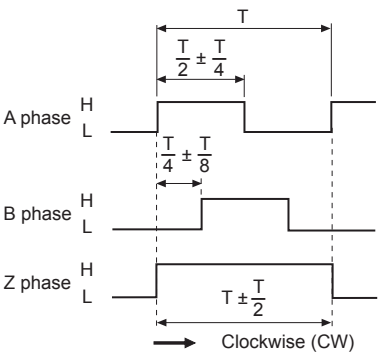
▣ Control Output Diagram



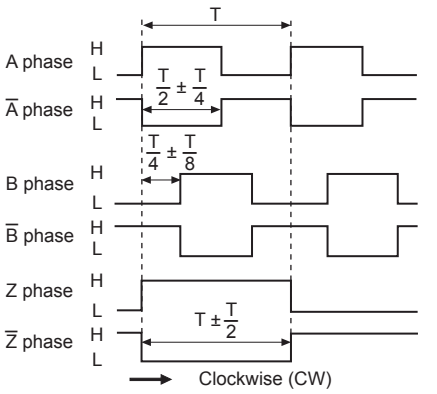
- Totem pole output type can be used for NPN open collector output type (※1) or Voltage output type (※2).
- The output circuit of A, B, Z phase are same. (Line driver output is A, Ā, B, B̄, Z, Z̄)

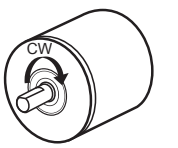
▣ Output Waveform

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



• Line driver output

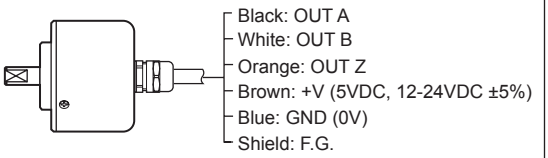




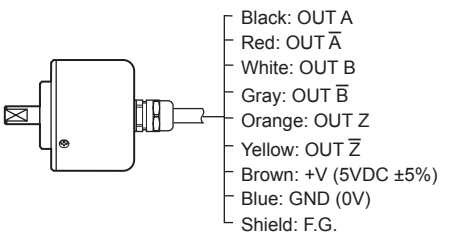
▣ Connections

◎ Cable type

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



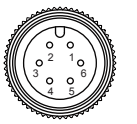
• Line driver output



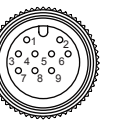
※Unused wires must be insulated.
※The shield cable and metal case of encoder must be grounded (F.G.)

◎ Cable connector type / Connector type

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



• Line driver output



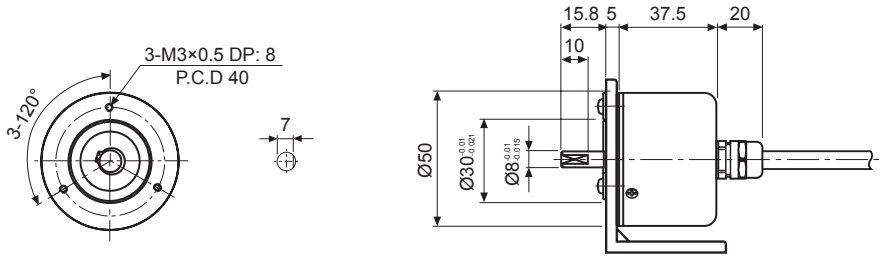
Totem pole output/ NPN open collector output/ Voltage output			Line driver output		
Pin No	Function	Cable color	Pin No	Function	Cable color
①	OUT A	Black	①	OUT A	Black
②	OUT B	White	②	OUT Ā	Red
③	OUT Z	Orange	③	+V	Brown
④	+V	Brown	④	GND	Blue
⑤	GND	Blue	⑤	OUT B	White
⑥	F.G.	Shield	⑥	OUT B̄	Gray
—			⑦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

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

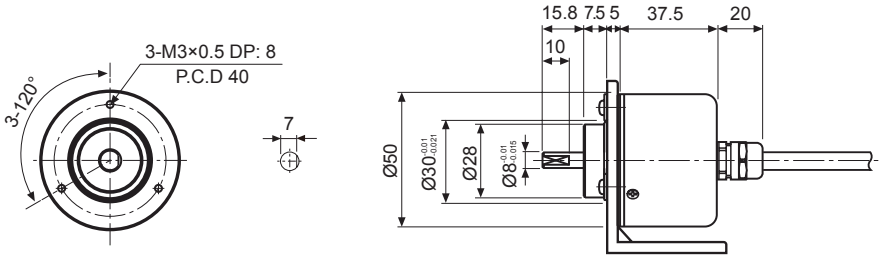
▣ Dimensions

(unit: mm)

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



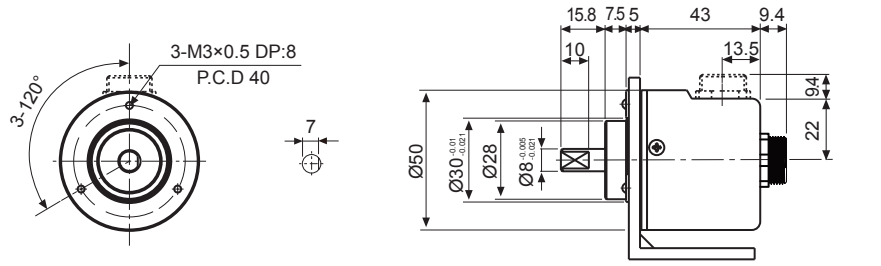
◎ Cable type, Connector cable type (Protection: IP64) (Option)



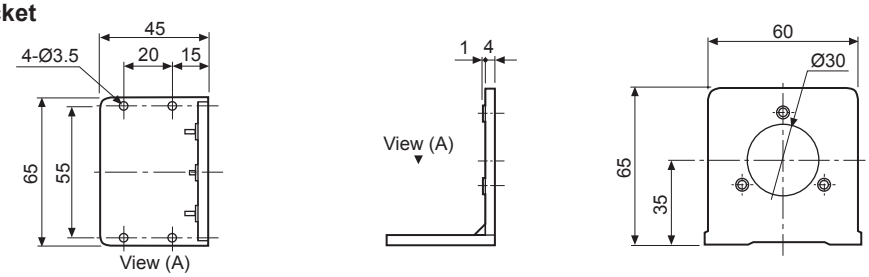
Cable for Cable type	Cable for Connector cable type
Ø5mm, 5-wire (Line driver output: 8-wire), Length: 2000mm, Shield cable	Ø5mm, 5-wire (Line driver output: 8-wire), Length: 250mm, Shield cable

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

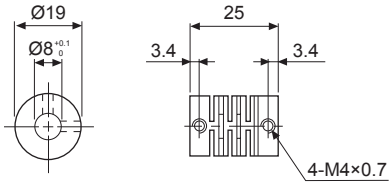
◎ Axial / Radial connector type (Protection: IP65)



• 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.