

E50S Series

Diameter ϕ 50mm Shaft type Incremental Rotary encoder

Line-up

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 \pm 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	—	5000	—	3	—	N	—	24	—	
Series	Shaft diameter	Pulse/1 Revolution	Output phase	Output	Power supply	Cable					
Diameter ϕ 50mm, shaft type	ϕ 8mm	Refer to resolution	2:A, B 3:A, \bar{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 \pm 5% 24:12–24VDC \pm 5%	No mark:Normal type C:Cable outgoing connector type(*) CR:Rear side outgoing connector integrated type CS:Side outgoing connector integrated type					

*Standard:E50S8-PULSE-3-N-24

*Cable length:250mm

Specifications

Item		Diameter ϕ 50mm shaft type of incremental rotary encoder	
Resolution(P/R)		(Note1) *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	
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=1cycle of A phase)	
Electrical specification	Control output	Totem pole output	• Low \Rightarrow Load current:Max. 30mA, Residual voltage : Max. 0.4VDC • High \Rightarrow Load current:Max. 10mA, Output voltage(Power supply 5VDC):Min. (Power supply-2.0)VDC, Output voltage(Power supply 12–24VDC):Min. (Power supply-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 \Rightarrow Load current : Max. 20mA, Residual : Max. 0.5VDC • High \Rightarrow Load current : Max. -20mA, Output voltage (Power supply 5VDC) : Min. 2.5VDC, Output voltage (Power supply 12–24VDC) : Min. (Power supply-3.0)VDC
Response time (Rise/Fall)	Totem pole output	Max. 1 μ s (Cable length : 2m, I sink = 20mA)	
	NPN open collector output		
	Voltage output		
	Line driver output		
Max. Response frequency		300kHz	
Power supply		• 5VDC \pm 5% (Ripple P-P : Max. 5%) • 12–24VDC \pm 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. 100M Ω (at 500VDC megger between all terminals and case)	
Dielectric strength		750VAC 50/60Hz for 1 minute (Between all terminals and case)	
Connection		Cable outgoing type, 200mm cable outgoing connector type, Connector integrated type (Rear, Side)	
Mechanical specification	Starting torque		Max. 70gf \cdot cm (0.007N \cdot m) (Note2) / Max. 800gf \cdot cm (0.08N \cdot m) (Note3)
	Moment of inertia		Max. 80g \cdot cm ² (8 \times 10 ⁻⁶ kg \cdot m ²) (Note2) / Max. 400g \cdot cm ² (4 \times 10 ⁻⁵ kg \cdot m ²) (Note3)
	Shaft loading		Radial : 10kgf, Thrust : 2.5kgf
	Max. allowable revolution		(Note4) 5000rpm
Vibration		1.5mm amplitude at frequency of 10 to 55Hz (for 1 min.) in each of X, Y, Z directions for 2 hours	
Shock		Max. 75G	
Ambient temperature		-10 to 70 $^{\circ}$ C (at non-freezing status), Storage : -25 to 85 $^{\circ}$ C	
Ambient humidity		35 to 85%RH, Storage : 35 to 90%RH	
Protection		Normal type, Cable outgoing connector type: IP50 (IEC standard) (Note5) , Connector integrated type: IP65 (IEC standard)	
Cable		ϕ 5mm, 5P, Length : 2m, Shield cable (Line driver output : ϕ 5mm, 8P) (AWG 24, Core wire diameter : 0.08mm, No. of core wire : 40, Insulator out diameter : ϕ 1mm)	
Accessory		ϕ 8mm coupling, bracket	
Approval		Normal type \Rightarrow CE (Except for line driver output)	
Unit weight		Approx. 275g, Connector integrated type : 180g	

* **(Note1)** '*' pulse is only for A, B phase (Line driver output is for A, \bar{A} , B, \bar{B} phase).

* **(Note2)** This value is for normal type, cable outgoing connector type (Protection: IP50).

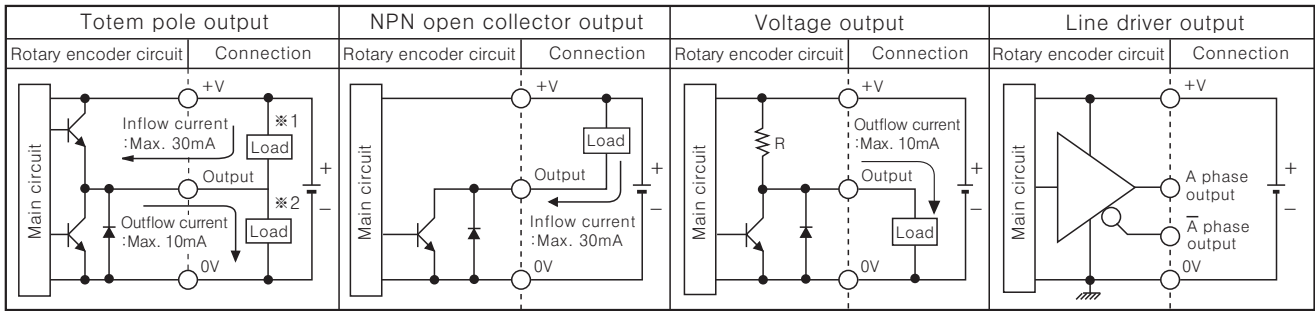
* **(Note3)** This value is for normal type, cable outgoing connector type (Protection: IP64)/connector integrated type (Protection: IP65)

* **(Note4)** Make sure that max. response revolution should be lower than or equal to max. allowable revolution when selecting the resolution.
[Max. response resolution (rpm) = $\frac{\text{Max. response frequency}}{\text{Resolution}} \times 60 \text{ sec.}$]

* **(Note5)** 'Normal type, cable outgoing connector type is option as IP64 protection.

Incremental ϕ 50mm Shaft Type

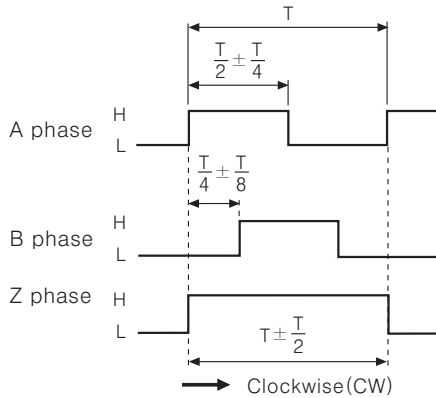
Control output diagram



- 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 the same. (Line driver output is A, \bar{A} , B, \bar{B} , Z, \bar{Z})

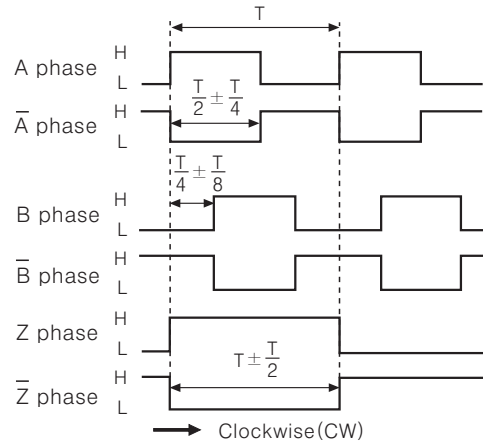
Output waveform

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



*CW : Right turn as from the shaft

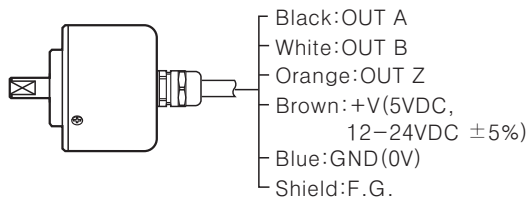
- Line driver output



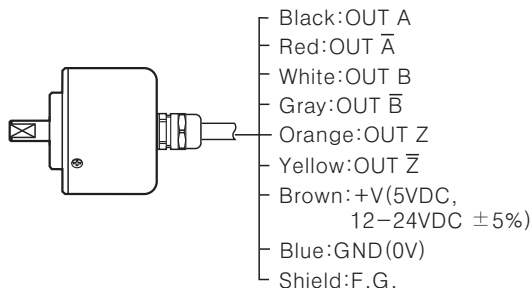
Connections

Normal 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 outgoing connector/ Connector integrated 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.

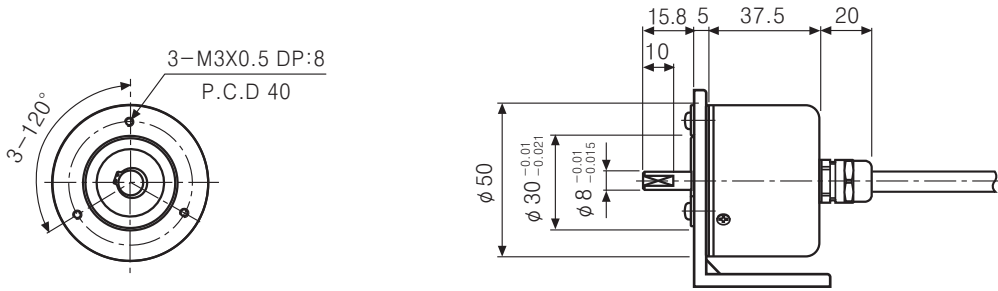
(A)	Photo electric sensor
(B)	Fiber optic sensor
(C)	Door/Area sensor
(D)	Proximity sensor
(E)	Pressure sensor
(F)	Rotary encoder
(G)	Connector/Socket
(H)	Temp. controller
(I)	SSR/Power controller
(J)	Counter
(K)	Timer
(L)	Panel meter
(M)	Tacho/Speed/Pulse meter
(N)	Display unit
(O)	Sensor controller
(P)	Switching power supply
(Q)	Stepping motor & Driver & Controller
(R)	Graphic/Logic panel
(S)	Field network device
(T)	Production stoppage models & replacement

E50S Series

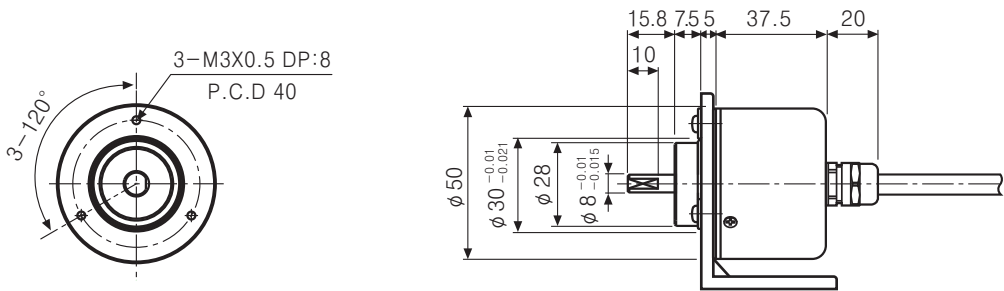
Dimensions

(Unit:mm)

Normal type, Cable outgoing connector type(Protection : IP50)



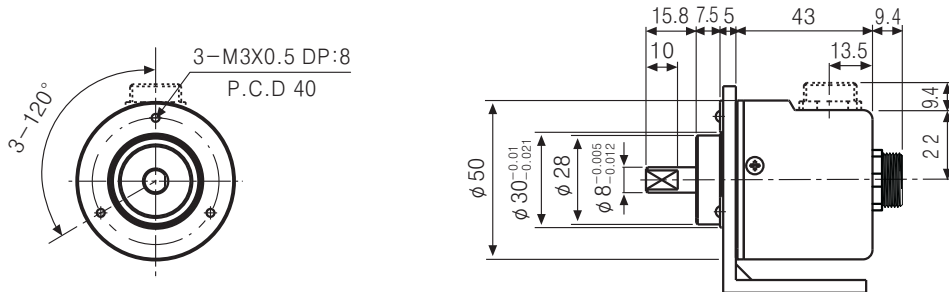
Normal type, Cable outgoing connector type(Protection : IP64)



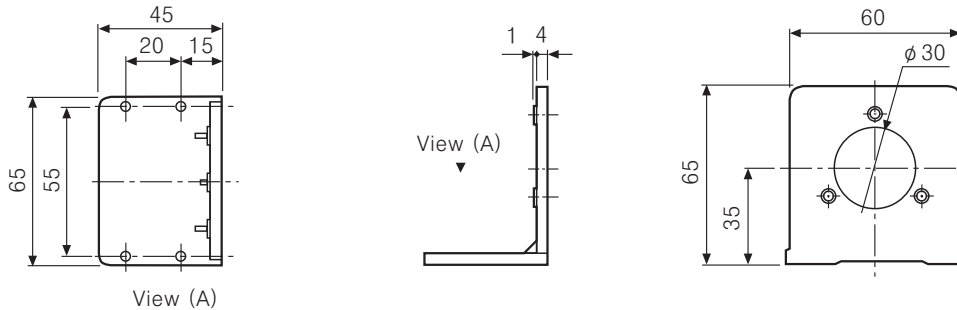
Cable for normal type	Cable for Cable outgoing connector type
φ 5mm, 5P(Line driver output:8P), Length:2000mm, Shield cable	φ 5mm, 5P(Line driver output:8P), Length:250mm, Shield cable

※ Connector cable is sold separately and see G-6 for specifications.

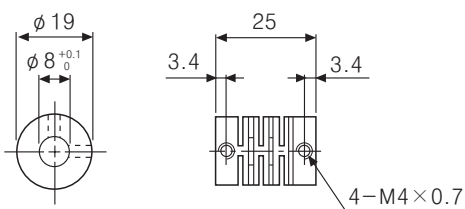
Rear/Side connector integrated type(Protection: IP65)



Bracket



Coupling(E50S)



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

※For parallel misalignment, angular misalignment, End-play terms, refer to F-69 page.

※For flexible coupling(ERB series) information, refer to F-62 page.