

# E40 Series

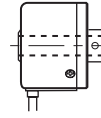
## Shaft Type/Hollow Shaft Type/Blind Hollow Shaft Type Ø40mm Incremental Rotary Encoder

### ■ Features

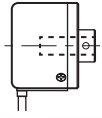
- Easy installation at narrow space
- Low moment of inertia
- Power supply: 5VDC, 12-24VDC ±5%
- Various output types



E40S Series



E40H Series



E40HB Series

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



### ■ Ordering Information

<b>E40</b>	<b>H</b>	<b>8</b>	<b>5000</b>	<b>3</b>	<b>N</b>	<b>24</b>	
Series	Shaft type	Hollow type	Pulses/revolution	Output phase	Control output	Power supply	Cable
Ø40mm	External	Inner	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: Radial cable type C: Radial cable connector type
S: Shaft type							
H: Hollow shaft type	6: Ø6mm 8: Ø8mm	6: Ø6mm 8: Ø8mm 10: Ø10mm 12: Ø12mm					
HB: Blind hollow shaft type							

### ■ Specifications

Item	Shaft Type/Hollow Shaft Type/Blind Hollow Shaft Type Ø40mm Incremental Rotary Encoder		
Resolution (PPR) <sup>*1</sup>	*1, *2, *5, 10, *12, 15, 20, 23, 25, 30, 35, 40, 45, 50, 60, 75, 100, 120, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600, 5000		
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
	Response time (rise/fall)	Line driver output	• [Low] - Load current: Max. 20mA, Residual voltage: 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	
		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	Over 100MΩ (at 500VDC megger between all terminals and case)		
Dielectric strength	750VAC 50/60Hz for 1 minute (between all terminals and case)		
Connection	Radial cable type, Radial cable connector type		
Mechanical specification	Starting torque	S type: max. 40gf·cm (0.004N·m), H/HB type: max. 50gf·cm (0.005N·m)	
	Moment of inertia	Max. 40g·cm <sup>2</sup> (4×10 <sup>-6</sup> kg·m <sup>2</sup> )	
	Shaft loading	Radial: max. 2kgf, Thrust: max. 1kgf	
	Max. allowable revolution <sup>*2</sup>	5,000rpm	
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	IP50 (IEC standard)		
Cable	Ø5mm, 5-wire (line driver output: 8-wire), 2m, Shield cable (AWG24, core diameter: 0.08, number of cores: 40, insulator out diameter: Ø1mm)		
Accessory	• S: Ø6mm coupling standard, Ø8mm coupling (sold separately) • H/HB type: Bracket		
Approval	CE (except line driver output)		
Unit weight	Approx. 120g		

\*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.

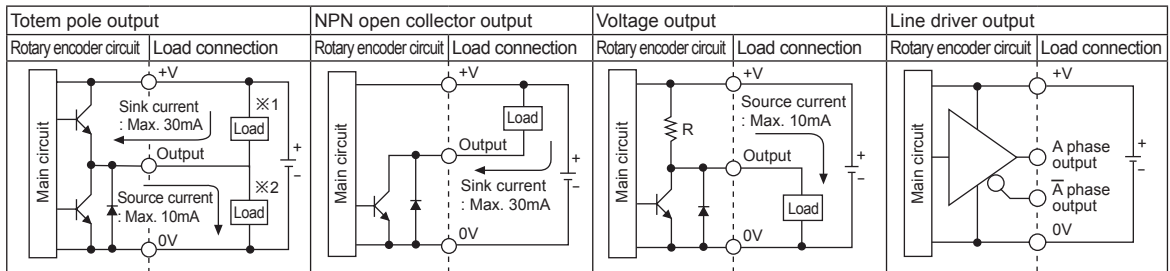
\*2: Make sure that max. response revolution should be lower than or equal to max. allowable revolution when selecting the resolution.

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

※Environment resistance is rated at no freezing or condensation.

# Incremental Ø40mm Shaft/Hollow Shaft/Blind Hollow Shaft Type

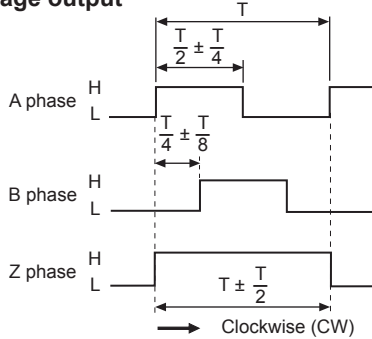
## Control Output Diagram



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

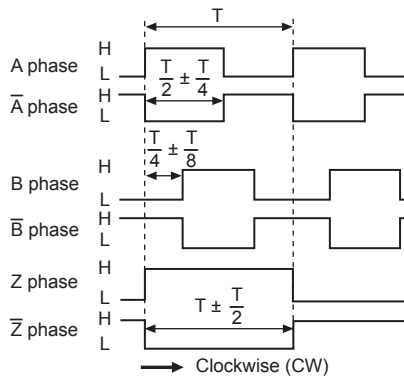
## Output Waveform

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



※Z reverse phase output is optional.

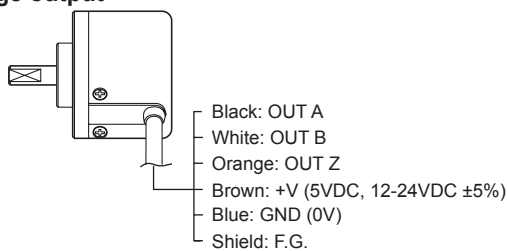
- Line driver output



## Connections

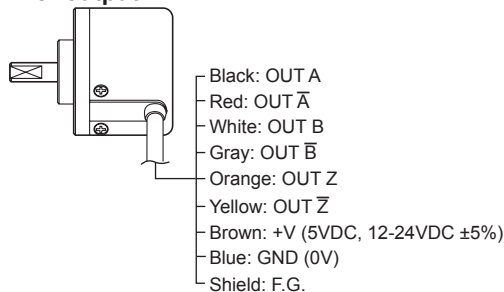
### Radial cable type

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



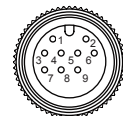
- ※Unused wires must be insulated.
- ※The metal case and shield wire of encoder should be grounded (F.G.).

- Line driver output



### Radial cable 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 should be grounded separately.

(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

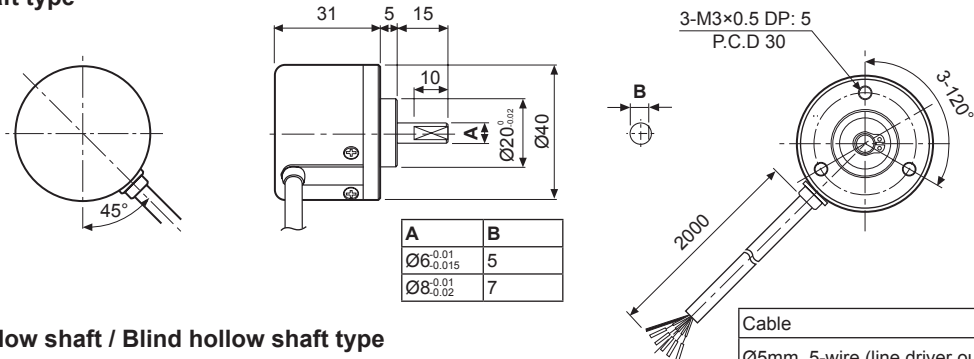
# E40 Series

## ■ Dimensions

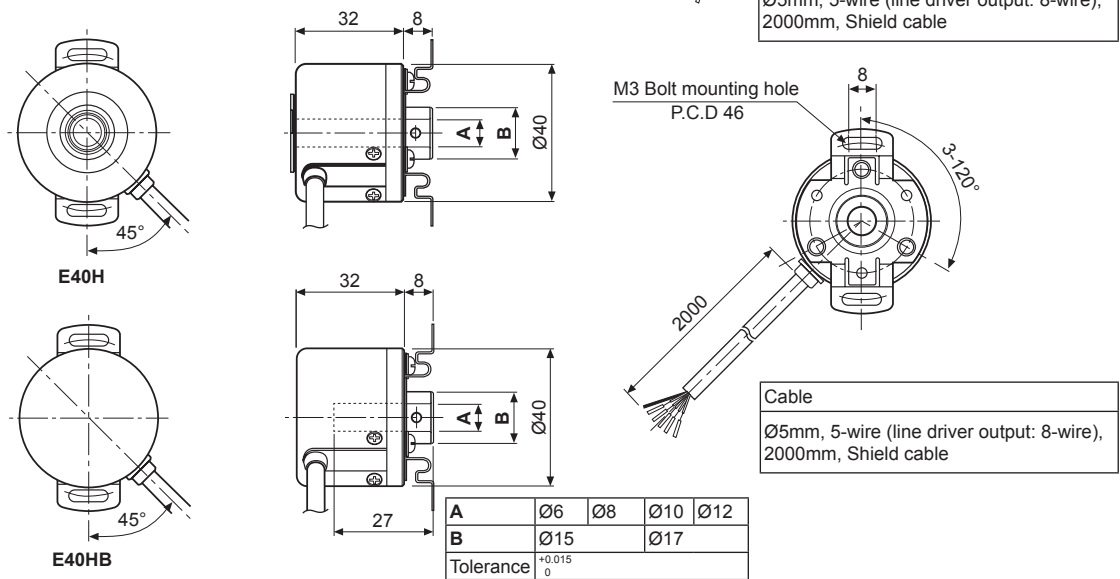
(unit: mm)

### ◎ Radial cable type

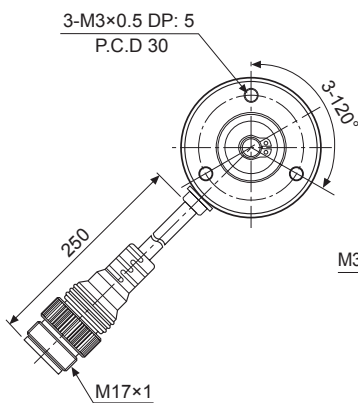
#### ● Shaft type



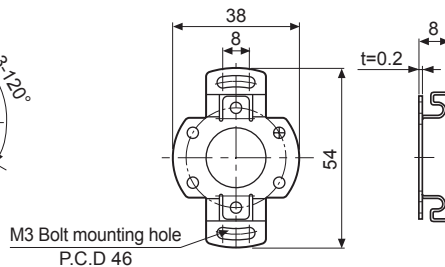
#### ● Hollow shaft / Blind hollow shaft type



### ◎ Radial cable connector type

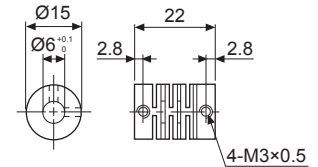


#### ● Bracket (E40H, E40HB)

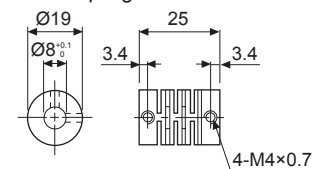


#### ● Coupling (E40S)

##### ● Ø6 Coupling



##### ● Ø8 Coupling



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

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

※Do not load overweight on the shaft.

※When mounting the coupling to the encoder shaft, if there is combined misalignment (parallel, angular misalignment) between rotating encoder shaft and mate shaft, it may cause encoder and coupling's life cycle to shorten.

※For parallel misalignment, angular misalignment, end-play terms, refer to page F-87.

※For flexible coupling (ERB Series) information, refer to page F-80.