

# E40 Series

## Diameter ø40mm Shaft type/Hollow type/Built-in type Incremental Rotary Encoder

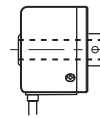
### ■ Features

- 12-24VDC power supply of line driver output(Line-up)
- Easy installation at narrow space
- Small moment of inertia
- Power supply : 5VDC, 12-24VDC ±5%
- Various output types

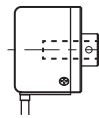
⚠ Please read "Caution for your safety" in operation manual before using.



E40S Series



E40H Series



E40HB Series

### ■ Ordering information

| Series                                                      | Shaft type                     | Hollow type                                           | Pulse/1Revolution | Output phase                                                                                             | Output                                                                                             | Power supply                     | Cable                                             |
|-------------------------------------------------------------|--------------------------------|-------------------------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------------|
| S: Shaft type<br>H: Hollow type<br>HB: Hollow built-in type | External<br>6: ø6mm<br>8: ø8mm | Inner<br>6: ø6mm<br>8: ø8mm<br>10: ø10mm<br>12: ø12mm | Series            | 2: A, B<br>3: A, B, Z<br>4: A, $\bar{A}$ , B, $\bar{B}$<br>6: A, $\bar{A}$ , B, $\bar{B}$ , Z, $\bar{Z}$ | T: Totem pole output<br>N: NPN open collector output<br>V: Voltage output<br>L: Line driver output | 5 : 5VDC ±5%<br>24: 12-24VDC ±5% | No mark: Cable type<br>C: Connector cable type(※) |

※Standard: E40S6-[PULSE]-3-N-24, E40H8-[PULSE]-3-N-24  
E40HB8-[PULSE]-3-N-24

※Cable length : 250mm

### ■ Specifications

| Item                                                                                                                                                       | Diameter ø40mm shaft/hollow shaft/hollow built-in 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, 150, 192, 200, 240, 250, 256, 300, 360, 400, 500, 512, 600, 800, 1000, 1024, 1200, 1500, 1800, 2000, 2048, 2500, 3000, 3600, 5000 (Not indicated resolution is customizable.) |                                                                                                                         |
| 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=1cycle of A phase)                                  |
|                                                                                                                                                            | Control output                                                                                                                                                                                                                                           | Totem pole output                                                                                                       |
|                                                                                                                                                            |                                                                                                                                                                                                                                                          | NPN open collector output                                                                                               |
|                                                                                                                                                            |                                                                                                                                                                                                                                                          | Voltage output                                                                                                          |
|                                                                                                                                                            |                                                                                                                                                                                                                                                          | Line driver output                                                                                                      |
|                                                                                                                                                            | Response time (Rise/Fall)                                                                                                                                                                                                                                | Totem pole output                                                                                                       |
|                                                                                                                                                            |                                                                                                                                                                                                                                                          | NPN open collector output                                                                                               |
|                                                                                                                                                            |                                                                                                                                                                                                                                                          | Voltage output                                                                                                          |
|                                                                                                                                                            |                                                                                                                                                                                                                                                          | 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)                                                             |
| Mechanical specification                                                                                                                                   | Dielectric strength                                                                                                                                                                                                                                      | 750VAC 50/60Hz for 1 minute(Between all terminals and case)                                                             |
|                                                                                                                                                            | Connection                                                                                                                                                                                                                                               | Cable type, 250mm connector cable type                                                                                  |
|                                                                                                                                                            | Starting torque                                                                                                                                                                                                                                          | Shaft type : Max. 40gf·cm(0.004N·m), Hole 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 ※2                                                                                                                                                                                                                             | 5000rpm                                                                                                                 |
|                                                                                                                                                            | Vibration                                                                                                                                                                                                                                                | 1.5mm amplitude or 300m/s <sup>2</sup> at frequency of 10 to 55Hz(for 1 min.) in each of X, Y, Z directions 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 IP50(IEC standard) ※Option type is available for IP64 (IEC standard).                                                                           |                                                                                                                                                                                                                                                          |                                                                                                                         |
| Cable ø5, 5-wire, Length : 2m, Shield cable(Line driver output : ø5, 8-wire) (AWG24, Core diameter: 0.08, Number of cores: 40, Insulator out diameter: ø1) |                                                                                                                                                                                                                                                          |                                                                                                                         |
| Accessory • Shaft type : ø6mm coupling standard, ø8mm coupling(Sold separately) • Hole type : Bracket                                                      |                                                                                                                                                                                                                                                          |                                                                                                                         |
| Approval CE (Except line driver output)                                                                                                                    |                                                                                                                                                                                                                                                          |                                                                                                                         |
| Unit weight Approx. 160g                                                                                                                                   |                                                                                                                                                                                                                                                          |                                                                                                                         |

※1: 'v' pulse is only for A, B phase(Line Driver output is for A,  $\bar{A}$ , B,  $\bar{B}$  phase)

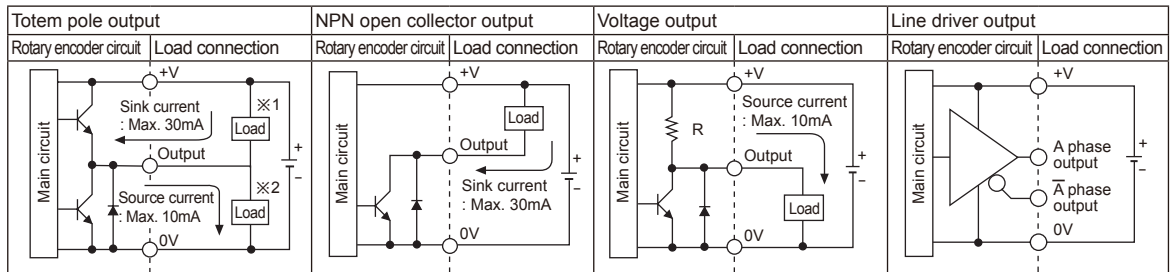
※2: Make sure that. Max response frequency should be lower than or equal to max. allowable revolution when selecting the resolution.

[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/Built-in type

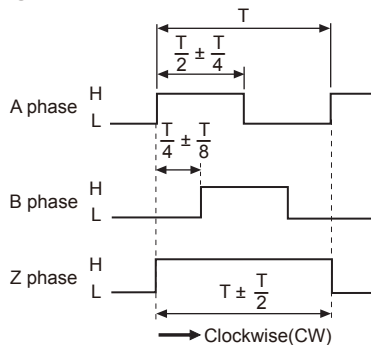
## ■ Control output diagram



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

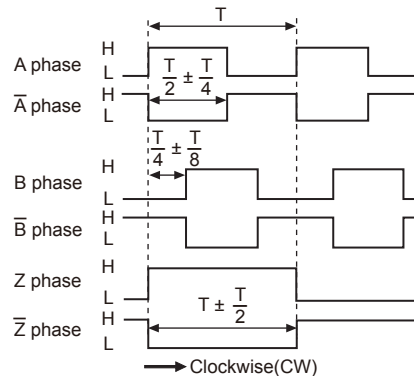
## ■ Output waveform

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



- ※Z phase output is option.
- ※CW : Right turn as from the shaft.

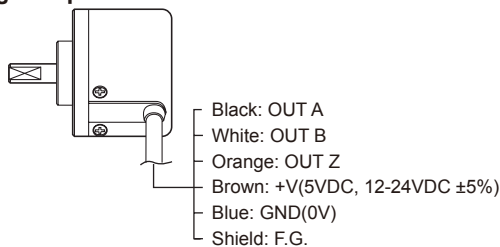
- Line driver output



## ■ Connections

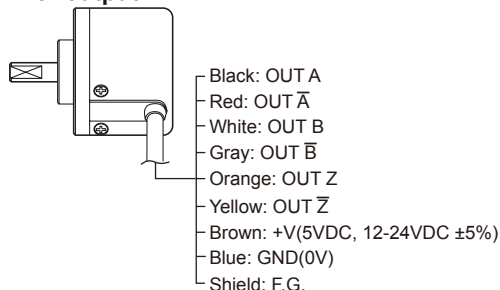
### ◎ Cable type

- 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



### ◎ Connector cable type

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



| Totem pole output/<br>NPN open collector output/<br>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) 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 mode power supply
- (Q) Stepper motor& Driver&Controller
- (R) Graphic/Logic panel
- (S) Field network device
- (T) Software
- (U) Other

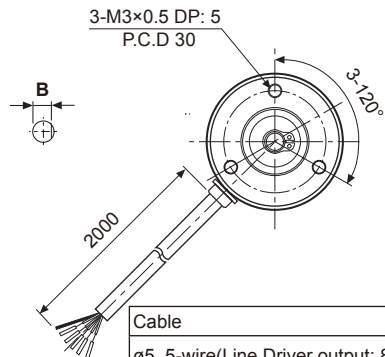
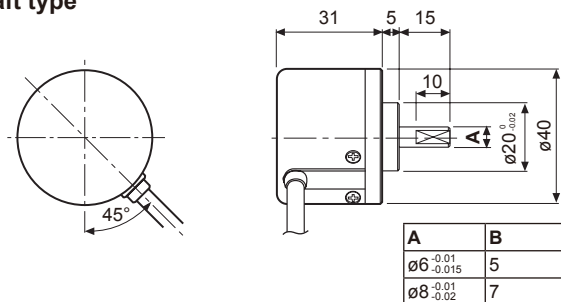
# E40 Series

## ■ Dimensions

(unit: mm)

### ◎ Cable type

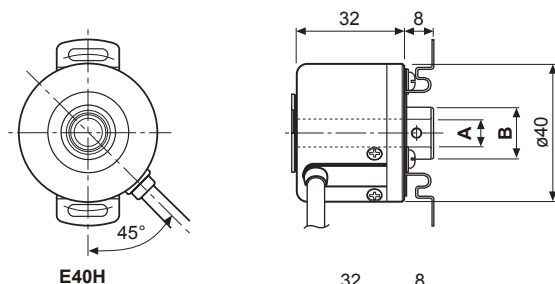
#### ● Shaft type



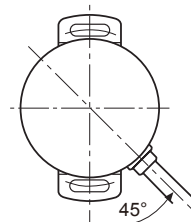
Cable

ø5, 5-wire(Line Driver output: 8-wire),  
Length:2000, Shield cable

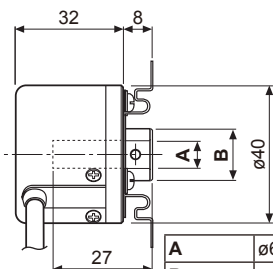
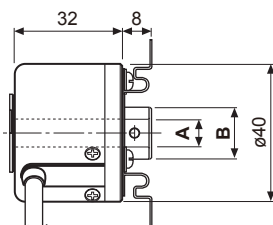
#### ● Hollow shaft / Hollow shaft built-in type



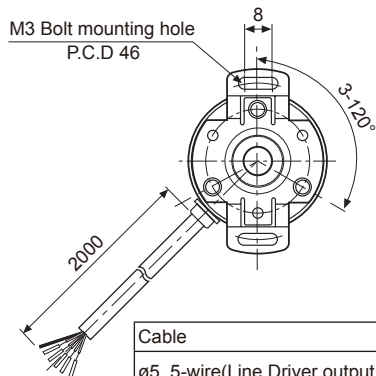
E40H



E40HB



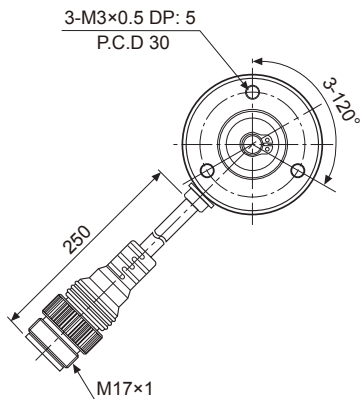
|           |             |    |     |     |
|-----------|-------------|----|-----|-----|
| A         | ø6          | ø8 | ø10 | ø12 |
| B         | ø15         |    | ø17 |     |
| Tolerance | +0.015<br>0 |    |     |     |



Cable

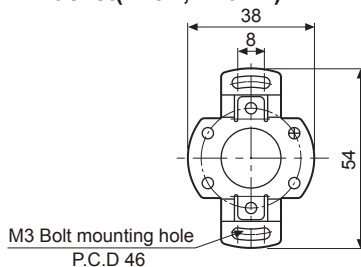
ø5, 5-wire(Line Driver output: 8-wire),  
Length: 2000, Shield cable

### ◎ Connector cable type



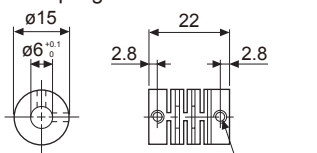
※Connector cable is customizable and refer to the G-10 for specifications.

#### ● Bracket(E40H, E40HB)



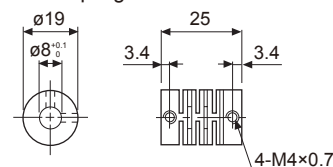
#### ● Coupling(E40S)

##### ● ø6 Coupling



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

##### ● ø8 Coupling



- ※For parallel misalignment, angular misalignment, end-play terms, refer to the F-78 page.
- ※For flexible coupling(ERB Series) information, refer to the F-71 page.