

# 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

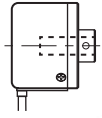
⚠ Please read "Caution for your safety" in operation manual before using.



E40S Series



E40H Series



E40HB Series

### ■ Ordering information

**E40** **H** **8** **5000** **3** **N** **24**

| 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>Inner | 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 ※Standard: A, B, Z  
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=1 cycle of A phase)         |  |
|                          | Control output   | Totem pole output   | • Low - Load current:Max. 30mA, Residual voltage : Max. 0.4VDC<br>• 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 voltage : Max. 0.5VDC<br>• High - Load current : -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   |
|                          |  | 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)  |   |  |
| Dielectric strength      | 750VAC 50/60Hz for 1 minute(Between all terminals and case)  |   |  |
| Connection               | Cable type, 250mm connector cable type   |   |  |
| Mechanical specification | 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 revolution should be lower than or equal to max. allowable revolution when selecting the resolution.

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

※Environment resistance is rated at no freezing or condensation.

# Incremental ø40mm Shaft/Hollow Shaft/Built-in type

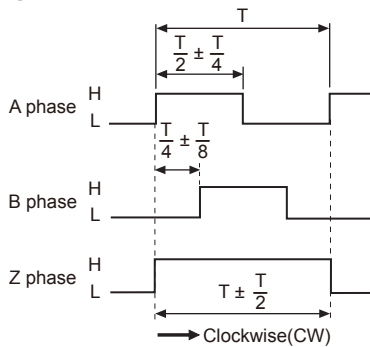
## Control output diagram



- 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,  $\bar{Z}$ )

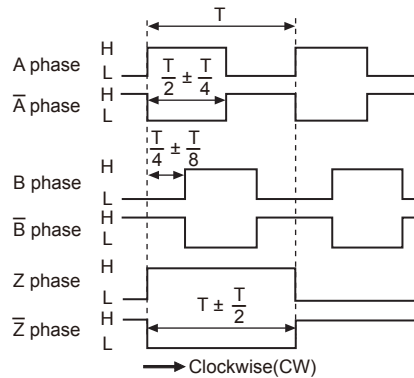
## Output waveform

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



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

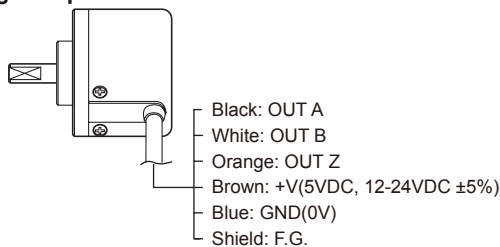
- Line driver output



## Connections

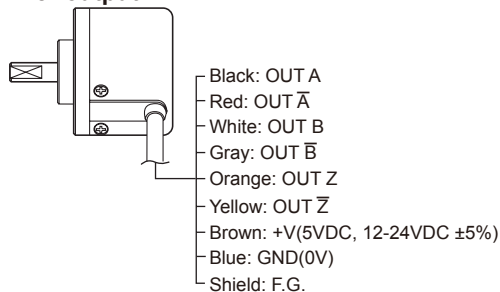
### ◎ Cable type

- 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

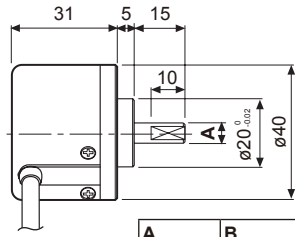
# E40 Series

## ■ Dimensions

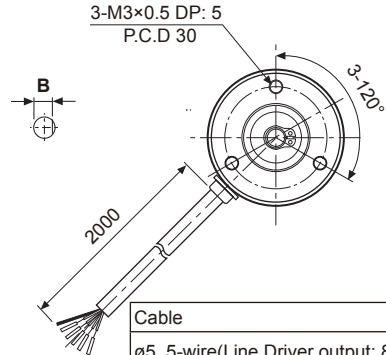
(unit: mm)

### ◎ Cable type

#### ● Shaft type

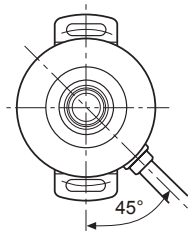


| A                                     | B |
|---------------------------------------|---|
| ø6 <sup>-0.01</sup> <sub>-0.015</sub> | 5 |
| ø8 <sup>-0.01</sup> <sub>-0.02</sub>  | 7 |

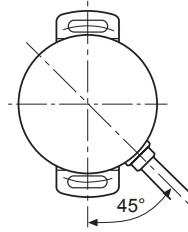
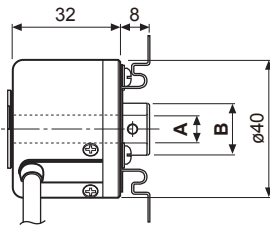


Cable  
ø5, 5-wire(Line Driver output: 8-wire),  
Length:2000, Shield cable

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



E40H



E40HB

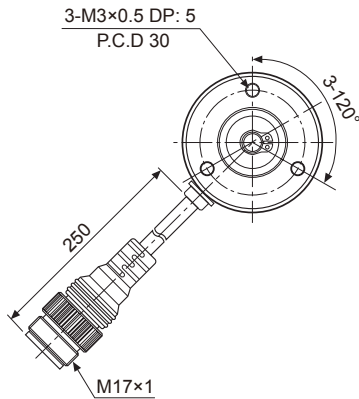


| A         | ø6          | ø8 | ø10 | ø12 |
|-----------|-------------|----|-----|-----|
| B         | ø15         |    | ø17 |     |
| Tolerance | +0.015<br>0 |    |     |     |



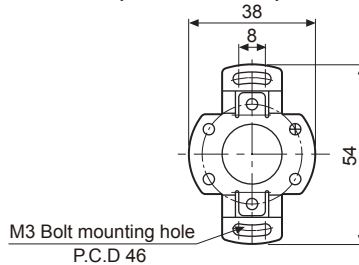
Cable  
ø5, 5-wire(Line Driver output: 8-wire),  
Length: 2000, Shield cable

### ◎ Connector cable type



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

### ● Bracket(E40H, E40HB)

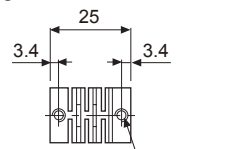


### ● Coupling(E40S)

#### ● ø6 Coupling



#### ● ø8 Coupling



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

- ※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.