**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

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

### Ordering Information

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<th>Control output</th>
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<td>T: Totem pole output</td>
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### Specifications

#### Resolution (PPR)※1
- *1: *' pulse is only for A, B phase (line driver output is for A, A, ∼B, ∼B phase). Not indicated resolutions are customizable.

#### Output phase
- A, B, Z phase (line driver A, A, ∼B, ∼B phase)

#### Phase difference of output
- Phase difference between A and B: $T = \frac{I}{6} \pm \frac{5}{6}$ (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. 10mA, Residual voltage: Max. 0.4VDC
- **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

#### Response time (rise/fall)
- **Totem pole output**
  - NPN open collector output: Max. 1μs (cable length: 2m, I sink = 20mA)
  - Voltage output: Max. 0.5μs (cable length: 2m, I sink = 20mA)

#### Electrical specifications
- **Max. max. 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)
- **Dielectric strength**
  - 750VAC 50/60Hz for 1 minute (between all terminals and case)
- **Connection**
  - Radial cable type, Radial cable connector type
- **Starting torque**
  - S type: max. 40gf·cm (0.004N·m), H/HB type: max. 50gf·cm (0.005N·m)
- **Shaft loading**
  - Radial: max. 2kgf, Thrust: max. 1kgf
- **Max. allowable revolution**※2
  - 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℃, storage: -25 to 85℃
  - 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)
- **Accessories**
  - S: Ø6mm coupling standard, Ø8mm coupling (sold separately) • H/HB type: Bracket
- **Approval**
  - CE (except line driver output)

### Environment resistance is rated at no freezing or condensation.

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※1: “*” pulse is only for A, B phase (line driver output is for A, A, ∼B, ∼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.

[Max. response revolution (rpm) = Max. response frequency × 60 sec]
**Control Output Diagram**

- Totem pole output type can be used for NPN open collector output type (X1) or Voltage output type (X2).
- All output circuits of A, B, Z phase are same. (line driver output is A, A, B, B, Z, Z)

**Output Waveform**

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

- Line driver output

**Connections**

- Radial cable type
  - Totem pole output / NPN open collector output / Voltage output
  - Line driver output

- Radial cable connector type
  - Totem pole output / NPN open collector output / Voltage output
  - Line driver output

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**Connections**

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

- Line driver output

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**Radial cable connector type**

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

- Line driver output

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**Connections**

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

- Line driver output

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**Radial cable connector type**

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

- Line driver output
## Dimensions

### Radial cable type

- **Shaft type**

### Hollow shaft / Blind hollow shaft type

![Diagram of Hollow shaft / Blind hollow shaft type]

<table>
<thead>
<tr>
<th>A</th>
<th>Ø6</th>
<th>Ø8</th>
<th>Ø10</th>
<th>Ø12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø6</td>
<td>10</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø8</td>
<td>15</td>
<td>7</td>
<td></td>
<td></td>
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</tbody>
</table>

- **Bracket (E40H, E40HB)**

- **Coupling (E40S)**

### Radial cable connector type

- **Connector cable type**

  - Ø5mm, 5-wire (line driver output: 8-wire), 2000mm, Shield cable

- **Bracket (E40, E40HB)**

- **Coupling (E40S)**

- **Ø6 Coupling**

- **Ø8 Coupling**

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

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※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.