


E6H-C

Hollow-shaft Encoder

- Incremental model.
- External diameter of 40 mm.
- Resolution of up to 3,600 ppr.
- Slim design at only 26 mm thick.



 Be sure to read *Safety Precautions* on page 4.

Ordering Information

Encoders [Refer to *Dimensions* on page 4.]

| Power supply voltage | Output configuration | Resolution (pulses/rotation) | Model |
|----------------------|-----------------------|--|--|
| 5 to 24 VDC | Open-collector output | 300, 360, 500, 600, 720, 800, 1,000, 1,024 | E6H-CWZ6C (resolution) 0.5M Example: E6H-CWZ6C 300P/R 0.5M |
| | | 1,200, 1,500, 1,800, 2,000, 2,048 | |
| | | 2,500, 3,600 | |
| 5 to 12 VDC | Voltage output | 300, 360, 500, 600, 720, 800, 1,000, 1,024 | E6H-CWZ3E (resolution) 0.5M Example: E6H-CWZ3E 300P/R 0.5M |
| | | 1,200, 1,500, 1,800, 2,000, 2,048 | |
| | | 2,500, 3,600 | |
| 5 to 12 VDC | Line-driver output | 300, 360, 500, 600, 720, 800, 1,000, 1,024 | E6H-CWZ3X (resolution) 0.5M Example: E6H-CWZ3X 300P/R 0.5M |
| | | 1,200, 1,500, 1,800, 2,000, 2,048 | |
| | | 2,500, 3,600 | |

Ratings and Specifications

| Item | Model | E6H-CWZ6C | E6H-CWZ3E | E6H-CWZ3X |
|----------------------------------|--------|---|--|---|
| Power supply voltage | | 5 VDC -5% to 24 VDC +15%, ripple (p-p): 5% max. | 5 VDC -5% to 12 VDC +10%, ripple (p-p): 5% max. | |
| Current consumption*1 | | 100 mA max. | | 150 mA max. |
| Resolution (pulses/rotation) | | 300, 360, 500, 600, 720, 800, 1,000, 1,024, 1,200, 1,500, 1,800, 2,000, 2,048, 2,500, 3,600 | | |
| Output phases | | Phases A, B, and Z | | Phases A, \bar{A} , B, \bar{B} , Z, and \bar{Z} |
| Output configuration | | Open-collector output | Voltage output | Line-driver output*4 |
| Output capacity | | Applied voltage: 35 VDC max. Sink current: 35 mA max. Residual voltage: 0.7 V max. (at sink current of 35 mA) | Output resistance: 1 k Ω Sink current: 30 mA max. Residual voltage: 0.7 V max. (at sink current of 30 mA) | Output current: High level: $I_o = -10$ mA Low level: $I_s = 10$ mA Output voltage: $V_o = 2.5$ V min. $V_s = 0.5$ V |
| Maximum response frequency*2 | | 100 kHz | | |
| Phase difference between outputs | | $90^\circ \pm 45^\circ$ between A and B ($1/4$ T \pm $1/8$ T) | | |
| Rise and fall times of output | | 1 μ s max. (Control output voltage: 5 V, Load resistance: 1 k Ω , Output cable: 500 mm) | 1 μ s max. ($I_o = -10$ mA, $I_s = 10$ mA, Output cable: 500 mm) | |
| Starting torque | | 1.5 mN·m max. | | |
| Moment of inertia | | 2×10^{-6} kg·m ² max. | | |
| Shaft loading | Radial | 29.4 N | | |
| | Thrust | 4.9 N | | |
| Maximum permissible speed | | 10,000 r/min | | |
| Ambient temperature range | | Operating: -10 to 70°C (at 90% humidity max.), Storage: -30 to 85°C (with no icing) | | |
| Ambient humidity range | | Operating/Storage: 90% max. (with no condensation) | | |
| Insulation resistance | | Excluded because of capacitor ground. | | |
| Dielectric strength | | Excluded because of capacitor ground. | | |
| Vibration resistance | | Destruction: 10 to 500 Hz, 100 m/s ² or 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions | | |
| Shock resistance | | 300 m/s ² for 11 ms 3 times each in X, Y, and Z directions (excluding shock to the shaft) | | |
| Degree of protection*3 | | IEC 60529 IP50 | | |
| Connection method | | Pre-wired Models (Standard cable length: 0.5 m) | | |
| Material | | Case: Iron, Main unit: Aluminum, Pressboard panel: SUS304 | | |
| Weight (packed state) | | Approx. 120 g | | |
| Accessories | | Instruction manual | | |

*1. An inrush current of approximately 6 A will flow for approximately 0.3 ms when the power is turned ON.

*2. The maximum electrical response speed is determined by the resolution and maximum response frequency as follows:

$$\text{Maximum electrical response speed (rpm)} = \frac{\text{Maximum response frequency}}{\text{Resolution}} \times 60$$

This means that the Rotary Encoder will not operate electrically if its speed exceeds the maximum electrical response speed.

*3. No protection is provided against water or oil.

*4. The line driver output is a data transmission circuit compatible with RS-422A and long-distance transmission is possible with a twisted-pair cable. The quality is equivalent to AM26LS31.

I/O Circuit Diagrams

| Model | Output Circuits | Output mode | Connection | | | | | | | | | | | | | | | | | | |
|------------|------------------------|--|--|-------|----------|-------|---------------------|-------|----------------|-----------|------------------------|--------|----------------|-----------|------------------------|--------|----------------|------------|------------------------|------|--------------|
| E6H-CWZ6C | | <p>Open-collector output Direction of rotation: CW (as viewed from end of shaft)</p> <p>Direction of rotation: CCW (as viewed from end of shaft)</p> | <table border="1"> <thead> <tr> <th>Color</th> <th>Terminal</th> </tr> </thead> <tbody> <tr> <td>Brown</td> <td>Power supply (+Vcc)</td> </tr> <tr> <td>Black</td> <td>Output phase A</td> </tr> <tr> <td>White</td> <td>Output phase B</td> </tr> <tr> <td>Orange</td> <td>Output phase Z</td> </tr> <tr> <td>Blue</td> <td>0 V (common)</td> </tr> </tbody> </table> | Color | Terminal | Brown | Power supply (+Vcc) | Black | Output phase A | White | Output phase B | Orange | Output phase Z | Blue | 0 V (common) | | | | | | |
| Color | Terminal | | | | | | | | | | | | | | | | | | | | |
| Brown | Power supply (+Vcc) | | | | | | | | | | | | | | | | | | | | |
| Black | Output phase A | | | | | | | | | | | | | | | | | | | | |
| White | Output phase B | | | | | | | | | | | | | | | | | | | | |
| Orange | Output phase Z | | | | | | | | | | | | | | | | | | | | |
| Blue | 0 V (common) | | | | | | | | | | | | | | | | | | | | |
| E6H-CWZ3E | | <p>Voltage output Direction of rotation: CW (as viewed from end of shaft)</p> <p>Direction of rotation: CCW (as viewed from end of shaft)</p> | <table border="1"> <thead> <tr> <th>Color</th> <th>Terminal</th> </tr> </thead> <tbody> <tr> <td>Brown</td> <td>Power supply (+Vcc)</td> </tr> <tr> <td>Black</td> <td>Output phase A</td> </tr> <tr> <td>White</td> <td>Output phase B</td> </tr> <tr> <td>Orange</td> <td>Output phase Z</td> </tr> <tr> <td>Blue</td> <td>0 V (common)</td> </tr> </tbody> </table> | Color | Terminal | Brown | Power supply (+Vcc) | Black | Output phase A | White | Output phase B | Orange | Output phase Z | Blue | 0 V (common) | | | | | | |
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| White | Output phase B | | | | | | | | | | | | | | | | | | | | |
| Orange | Output phase Z | | | | | | | | | | | | | | | | | | | | |
| Blue | 0 V (common) | | | | | | | | | | | | | | | | | | | | |
| E6H-CWZ3X | | <p>Line-driver output Direction of rotation: CW (as viewed from end of shaft)</p> <p>Direction of rotation: CCW (as viewed from end of shaft)</p> | <table border="1"> <thead> <tr> <th>Color</th> <th>Terminal</th> </tr> </thead> <tbody> <tr> <td>Brown</td> <td>Power supply (+Vcc)</td> </tr> <tr> <td>Black</td> <td>Output phase A</td> </tr> <tr> <td>Black/red</td> <td>Output phase \bar{A}</td> </tr> <tr> <td>White</td> <td>Output phase B</td> </tr> <tr> <td>White/red</td> <td>Output phase \bar{B}</td> </tr> <tr> <td>Orange</td> <td>Output phase Z</td> </tr> <tr> <td>Orange/red</td> <td>Output phase \bar{Z}</td> </tr> <tr> <td>Blue</td> <td>0 V (common)</td> </tr> </tbody> </table> <p>Note: 1. Receiver: AM26LS32 equivalent 2. "Black/red" indicates a red strip.</p> | Color | Terminal | Brown | Power supply (+Vcc) | Black | Output phase A | Black/red | Output phase \bar{A} | White | Output phase B | White/red | Output phase \bar{B} | Orange | Output phase Z | Orange/red | Output phase \bar{Z} | Blue | 0 V (common) |
| Color | Terminal | | | | | | | | | | | | | | | | | | | | |
| Brown | Power supply (+Vcc) | | | | | | | | | | | | | | | | | | | | |
| Black | Output phase A | | | | | | | | | | | | | | | | | | | | |
| Black/red | Output phase \bar{A} | | | | | | | | | | | | | | | | | | | | |
| White | Output phase B | | | | | | | | | | | | | | | | | | | | |
| White/red | Output phase \bar{B} | | | | | | | | | | | | | | | | | | | | |
| Orange | Output phase Z | | | | | | | | | | | | | | | | | | | | |
| Orange/red | Output phase \bar{Z} | | | | | | | | | | | | | | | | | | | | |
| Blue | 0 V (common) | | | | | | | | | | | | | | | | | | | | |

Note: Normally connect GND to 0 V or to an external ground.

Safety Precautions

Refer to *Warranty and Limitations of Liability*.

⚠ WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.

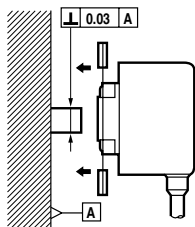


Precautions for Correct Use

Do not use the Encoder under ambient conditions that exceed the ratings.

● **Mounting**

- The diameter of the mating shaft must be $8_{-0.004}^{-0.012}$ mm and 8 to 11 mm long from the mounting surface.
- The allowable displacement in the mating shaft must 0.05 mm in the radial direction and 0.3 mm in the thrust direction.
- The mounting surface and shaft must be perpendicular to within 0.03 mm.
- When securing the Encoder, do not allow force to be applied to the leaf spring.



Eccentricity will develop in the Encoder if the above values are not satisfied, and the mounting leaf spring may be destroyed.

- When securing the Encoder, use two M3 screws to secure the leaf spring to the mounting surface.
- Use the Allen set screw provided with the hollow shaft to secure the shaft. Use a tightening torque of 0.4 N·m and apply screw lock glue to the screw to prevent it from becoming loose.
- If wiring after securing the Encoder, do not pull on the cable. Also, do not apply shock to the Encoder or hollow shaft.
- If the Encoder phase Z must be aligned with the origin of the installation device, mount the Encoder while checking the phase Z output.

● **Wiring**

Spurious pulses may be generated when power is turned ON and OFF. Wait at least 0.1 s after turning ON the power to the Encoder before using the connected device, and stop using the connected device at least 0.1 s before turning OFF the power to the Encoder. Also, turn ON the power to the load only after turning ON the power to the Encoder.

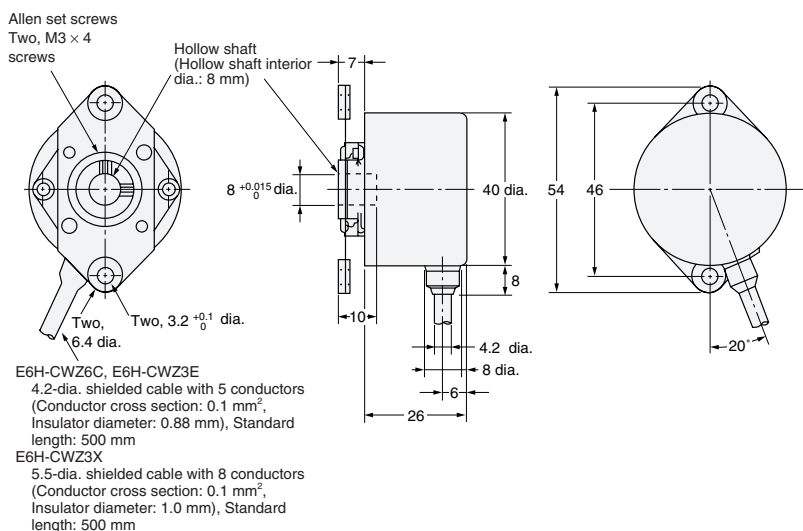
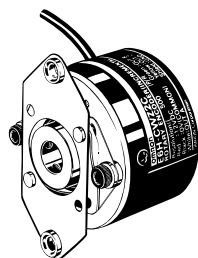
Rotary Encoder Recommended Power Supplies: Consult your OMRON representative for details.

(Unit: mm)

Dimensions

Tolerance class IT16 applies to dimensions in this datasheet unless otherwise specified.

E6H-C



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2010.8

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