

E6D-C

High-resolution Model for Measurement Instruments and High-precision Positioning

- Resolution of up to 6,000 ppr in Encoders with an external diameter of only 55 mm.
- High-speed response at 200 kHz.
- Wide ambient operating temperature range: -10 to 70°C.
- Rugged construction with radial shaft loading of 50 N and thrust shaft loading of 30 N.



 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 VDC | Voltage output | 1,000 | E6D-CWZ1E (resolution) 0.5M Example: E6D-CWZ1E 1000P/R 0.5M |
| | | 2,000 | |
| | | 3,600 | |
| | | 5,000 | |
| | | 6,000 | |
| 12 VDC | Open-collector output | 1,000 | E6D-CWZ2C (resolution) 0.5M Example: E6D-CWZ2C 1000P/R 0.5M |
| | | 2,000 | |
| | | 3,600 | |
| | | 5,000 | |
| | | 6,000 | |

Note: In addition to the models listed at the left, models with either voltage outputs or open-collector outputs are also available with the following resolutions (pulses/rotation): 720, 800, 1,024, 1,200, 1,500, 1,800, 2,048, 2,500, 3,000, 3,200, and 4,096.

Accessories (Order Separately) [Refer to *Dimensions on Rotary Encoder Accessories.*]

| Name | Model | Remarks |
|------------------------|------------------|----------------------------|
| Couplings | E69-C06B | Provided with the product. |
| | E69-C68B | Different end diameter |
| | E69-C610B | Different end diameter |
| | E69-C06M | Metal construction |
| Servo Mounting Bracket | E69-2 | Provided with the product. |

Refer to *Accessories* for details.

Ratings and Specifications

| Item | Model | E6D-CWZ1E | E6D-CWZ2C |
|----------------------------------|--------|--|--|
| Power supply voltage | | 5 VDC \pm 5%, ripple (p-p): 5% max. | 12 VDC \pm 10%, ripple (p-p): 5% max. |
| Current consumption*1 | | 150 mA max. | |
| Resolution (pulses/rotation) | | 1,000, 2,000, 3,600, 5,000, 6,000 | |
| Output phases | | Phases A, B, and Z | |
| Output configuration | | Voltage output | Open-collector output |
| Output capacity | | Output resistance: 1 k Ω Sink current: 35 mA max. Residual voltage: 0.7 V max. (at sink current of 10 mA) | Applied voltage: 30 VDC max. Sink current: 35 mA max. Residual voltage: 1 V max. (at sink current of 35 mA) Residual voltage: 0.7 V max. (at sink current of 10 mA) |
| Maximum response frequency*2 | | 200 kHz | |
| Phase difference between outputs | | 90 $^{\circ}$ \pm 25 $^{\circ}$ between A and B (1/4 T \pm 0.07 T) | |
| Rise and fall times of output | | 1 μ s max. | |
| Starting torque | | 9.8 mN·m max. | |
| Moment of inertia | | 3 \times 10 ⁻⁶ kg·m ² max. | |
| Shaft loading | Radial | 50 N (20 N to maintain accuracy) | |
| | Thrust | 30 N (10 N to maintain accuracy) | |
| Maximum permissible speed | | 12,000 r/min | |
| Ambient temperature range | | Operating: -10 to 70 $^{\circ}$ C (with no icing), Storage: -25 to 80 $^{\circ}$ C (with no icing) | |
| Ambient humidity range | | Operating/Storage: 35% to 85% (with no condensation) | |
| Insulation resistance | | Excluded because of capacitor ground. | |
| Dielectric strength | | Excluded because of capacitor ground. | |
| Vibration resistance | | Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions | |
| Shock resistance | | Destruction: 500 m/s ² 3 times each in X, Y, and Z directions | |
| Degree of protection*3 | | IEC 60529 IP50 | |
| Connection method | | Pre-wired Models (Standard cable length: 0.5 m) | |
| Material | | Case: Zinc alloy, Main unit: Aluminum, Shaft: SUS303, Mounting Bracket: Galvanized iron | |
| Weight (packed state) | | Approx. 280 g | |
| Accessories | | E69-C06B Coupling, E69-2 Servo Mounting Bracket, Hexagonal wrench, Instruction manual | |

*1. An inrush current of approximately 2 A will flow for approximately 50 μ s 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.

I/O Circuit Diagrams

| Item Model | E6D-CWZ1E | E6D-CWZ2C | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------|--|--|--------------------|-------|-----------|-----------|-------|--|-------------------|--------------------|-------|--|----------------|--|-------|--|----------------|--|--------|--|----------------|--|------|--|--------------|--|--------|--|-----|--|
| Output configuration | Voltage output | Open-collector output | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Output Circuits | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Output mode | <p>Direction of rotation: CW (as viewed from end of shaft)</p> <p>Note: Phase A is $1/4 T \pm 7/100 T$ faster than phase B. Phase Z is synced with phase A.</p> <p>Direction of rotation: CCW (as viewed from end of shaft)</p> <p>Note: Phase A is $1/4 T \pm 7/100 T$ slower than phase B. Phase Z is synced with phase A.</p> | <p>Direction of rotation: CW (as viewed from end of shaft)</p> <p>Note: Phase A is $1/4 T \pm 7/100 T$ faster than phase B. Phase Z is synced with phase A. The ONs in the above timing chart mean that the output transistor is ON and the OFFs mean that the output transistor is OFF.</p> <p>Direction of rotation: CCW (as viewed from end of shaft)</p> <p>Note: Phase A is $1/4 T \pm 7/100 T$ slower than phase B. Phase Z is synced with phase A. The ONs in the above timing chart mean that the output transistor is ON and the OFFs mean that the output transistor is OFF.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Connection | <p>Wiring</p> <table border="1"> <thead> <tr> <th>Color</th> <th>Model</th> <th>E6D-CWZ1E</th> <th>E6D-CWZ2C</th> </tr> </thead> <tbody> <tr> <td>Brown</td> <td></td> <td>Power supply +5 V</td> <td>Power supply +12 V</td> </tr> <tr> <td>Black</td> <td></td> <td>Phase A output</td> <td></td> </tr> <tr> <td>White</td> <td></td> <td>Phase B output</td> <td></td> </tr> <tr> <td>Orange</td> <td></td> <td>Phase Z output</td> <td></td> </tr> <tr> <td>Blue</td> <td></td> <td>0 V (common)</td> <td></td> </tr> <tr> <td>Shield</td> <td></td> <td>GND</td> <td></td> </tr> </tbody> </table> <p>Note: 1. The shielded cable outer core (shield) is not connected to the inner area or to the case. 2. The phase A, phase B, and phase Z circuits are all identical. 3. Normally, connect GND externally to 0 V or to ground.</p> <p>Peripheral Device Precautions (1) When connecting to a counter, use the 12-VDC Model E6D-CWZ2C. (2) For counters with voltage inputs, insert pull-up resistance of 4.7 Ω and 1/4 W.</p> | | Color | Model | E6D-CWZ1E | E6D-CWZ2C | Brown | | Power supply +5 V | Power supply +12 V | Black | | Phase A output | | White | | Phase B output | | Orange | | Phase Z output | | Blue | | 0 V (common) | | Shield | | GND | |
| Color | Model | E6D-CWZ1E | E6D-CWZ2C | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brown | | Power supply +5 V | Power supply +12 V | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Black | | Phase A output | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| White | | Phase B output | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Orange | | Phase Z output | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Blue | | 0 V (common) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Shield | | GND | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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.

● 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.

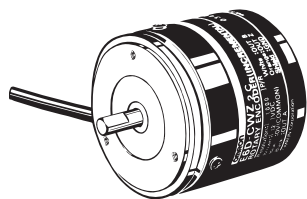
(Unit: mm)

Dimensions

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

Encoder

E6D



An E69-C06B Coupling and E69-2 Servo Mounting Bracket are provided with the product.



*5-dia. vinyl-insulated shielded round cable with 5 conductors (Conductor cross section: 0.18 mm^2 , Insulator diameter: 1.1 mm), Standard length: 500 mm

Accessories (Order Separately)

Refer to *Accessories* for details.

Read and Understand This Catalog

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In the interest of product improvement, specifications are subject to change without notice.

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Industrial Automation Company

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