

E6A2-C

Compact Encoder (External Diameter: 25 mm)

- Models with origin output (phase Z) for positioning applications.
- Resolution of 500 ppr in an Encoder with an external diameter of only 25 mm.



 Be sure to read *Safety Precautions* on page 3.

Ordering Information

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

| Output phases | Power supply voltage | Output configuration | Resolution (pulses/rotation) | Model |
|-----------------------|-----------------------|-----------------------|------------------------------------------------------------------------|---------------------------------------------------------------------|
| Phase A | 5 to 12 VDC | Voltage output | 10, 20, 60, 100, 200, 300, 360 500 | E6A2-CS3E (resolution) 0.5M Example: E6A2-CS3E 10P/R 0.5M |
| | | Open-collector output | 10, 20, 60, 100, 200, 300, 360 500 | E6A2-CS3C (resolution) 0.5M Example: E6A2-CS3C 10P/R 0.5M |
| | 12 to 24 VDC | | Open-collector output | 10, 20, 60, 100, 200, 300, 360 500 |
| | | Phases A and B | | 5 to 12 VDC |
| Open-collector output | 100, 200, 360 500 | | E6A2-CW3C (resolution) 0.5M Example: E6A2-CW3C 100P/R 0.5M | |
| | 12 to 24 VDC | | Open-collector output | 100, 200, 360 500 |
| Phases A, B, and Z | | | | 5 to 12 VDC |
| | Open-collector output | 100, 200, 360 500 | E6A2-CWZ3C (resolution) 0.5M Example: E6A2-CWZ3C 100P/R 0.5M | |
| | | 12 to 24 VDC | Open-collector output | 100, 200, 360 500 |

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

| Name | Model | Remarks |
|------------------------|-----------------|------------------------------|
| Coupling | E69-C04B | Provided with the product. |
| Servo Mounting Bracket | E69-1 | Provided with the E6A2-CWZ□. |

Refer to *Accessories* for details.

Ratings and Specifications

| Item | Model | E6A2-CS3E | E6A2-CS3C | E6A2-CS5C | E6A2-CW3E | E6A2-CW3C | E6A2-CW5C | E6A2-CWZ3E | E6A2-CWZ3C | E6A2-CWZ5C |
|----------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Power supply voltage | | 5 VDC -5% to 12 V +10%, ripple (p-p): 5% max. | | 12 VDC -10% to 24 VDC +15%, ripple (p-p): 5% max. | 5 VDC -5% to 12 V +10%, ripple (p-p): 5% max. | | 12 VDC -10% to 24 VDC +15%, ripple (p-p): 5% max. | 5 VDC -5% to 12 V +10% ripple (p-p): 5% max. | | 12 VDC -10% to 24 VDC +15%, ripple (p-p): 5% max. |
| Current consumption*1 | | 30 mA max. | 20 mA max. | | 30 mA max. | 20 mA max. | | 50 mA max. | 30 mA max. | |
| Resolution (pulses/rotation) | | 10, 20, 60, 100, 200, 300, 360, 500 | | | 100, 200, 360, 500 | | | | | |
| Output phases | | Phase A | | | Phases A and B | | | Phases A, B, and Z | | |
| Output configuration | | Voltage output | Open-collector output | | Voltage output | Open-collector output | | Voltage output | Open-collector output | |
| Output capacity | | Output resistance: 2 kΩ Output current: 20 mA max. Residual voltage: 0.4 V max. (Output current: 20 mA max.) | Applied voltage: 30 VDC max. Sink current: 30 mA max. Residual voltage: 0.4 V max. (at sink current of 30 mA) | | Output resistance: 2 kΩ Output current: 20 mA max. Residual voltage: 0.4 V max. (Output current: 20 mA max.) | Applied voltage: 30 VDC max. Sink current: 30 mA max. Residual voltage: 0.4 V max. (at sink current of 30 mA) | | Output resistance: 2 kΩ Output current: 20 mA max. Residual voltage: 0.4 V max. (Output current: 20 mA max.) | Applied voltage: 30 VDC max. Sink current: 30 mA max. Residual voltage: 0.4 V max. (at sink current of 30 mA) | |
| Maximum response frequency*2 | | 30 kHz | | | | | | | | |
| Phase difference between outputs | | --- | | | Phase difference between phases A and B: 90°±45° | | | | | |
| Output duty factor | | 50±25% | | | --- | | | | | |
| Rise and fall times of output | | 1.0 μs max. (Cable length: 500 mm, Sink current: 10 mA) | 1.0 μs max. (Cable length: 500 mm, Control output voltage: 5 V, Load resistance: 1 kΩ) | | 1.0 μs max. (Cable length: 500 mm, Sink current: 10 mA) | 1.0 μs max. (Cable length: 500 mm, Control output voltage: 5 V, Load resistance: 1 kΩ) | | 1.0 μs max. (Cable length: 500 mm, Sink current: 10 mA) | 1.0 μs max. (Cable length: 500 mm, Control output voltage: 5 V, Load resistance: 1 kΩ) | |
| Starting torque | | 1 mN·m max. | | | | | | | | |
| Moment of inertia | | 1 × 10 ⁻⁷ kg·m ² max. | | | | | | | | |
| Shaft loading | Radial | 10 N | | | | | | | | |
| | Thrust | 50 N | | | | | | | | |
| Maximum permissible speed | | 5,000 r/min | | | | | | | | |
| Ambient temperature range | | Operating: -10 to 55°C (with no icing), Storage: -25 to 80°C (with no icing) | | | | | | | | |
| Ambient humidity range | | Operating/storage: 35% to 85% (with no condensation) | | | | | | | | |
| Insulation resistance | | 20 MΩ min. (at 500 VDC) between current-carrying parts and case | | | | | | | | |
| Dielectric strength | | 500 VAC, 50/60 Hz for 1 min between current-carrying parts and case | | | | | | | | |
| 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: 500m/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: 500 mm) | | | | | | | | |
| Material | | Case: Aluminum alloy, Main unit: Aluminum, Shaft: SUS420J2, Mounting Bracket: Galvanized iron | | | | | | | | |
| Weight (packed state) | | Approx. 35 g | | | | | | | | |
| Accessories | | Coupling, Servo Mounting Bracket (provided with the E6A2-CWZ□), Hexagonal wrench, Instruction manual | | | | | | | | |

*1. An inrush current of approximately 9 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 E6A2-C 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

| Model | Output circuits | Output mode | Connection | | | | | | | | | | | | |
|--------------------------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|-------|-----|-------|---------|-------|---------|--------|---------|------|--------------|
| E6A2-CS3C E6A2-CS5C | | <p>Output transistor</p> | <table border="1"> <thead> <tr> <th>Color</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>Brown</td> <td>Vcc</td> </tr> <tr> <td>Black</td> <td>Phase A</td> </tr> <tr> <td>White</td> <td>Phase B</td> </tr> <tr> <td>Orange</td> <td>Phase Z</td> </tr> <tr> <td>Blue</td> <td>0 V (common)</td> </tr> </tbody> </table> <p>Note: 1. The white and orange wires of Single Models (E6A2-CS□□) do not output signals (no connection). 2. The white and orange wires of Single Models (E6A2-CS□□) do not output signals (no connection). 3. Voltage Output Models are capable of sinking a maximum current of 20 mA.</p> | Color | Signal | Brown | Vcc | Black | Phase A | White | Phase B | Orange | Phase Z | Blue | 0 V (common) |
| Color | | Signal | | | | | | | | | | | | | |
| Brown | | Vcc | | | | | | | | | | | | | |
| Black | Phase A | | | | | | | | | | | | | | |
| White | Phase B | | | | | | | | | | | | | | |
| Orange | Phase Z | | | | | | | | | | | | | | |
| Blue | 0 V (common) | | | | | | | | | | | | | | |
| E6A2-CW3C E6A2-CW5C | <p>Direction of rotation: CW (as viewed from end of shaft)</p> <p>Output transistor</p> | | | | | | | | | | | | | | |
| E6A2-CWZ3C E6A2-CWZ5C | <p>Direction of rotation: CCW (as viewed from end of shaft)</p> <p>Output transistor</p> | | | | | | | | | | | | | | |
| E6A2-CW3E | | <p>Direction of rotation: CCW (as viewed from end of shaft)</p> <p>Output transistor</p> | <p>Note: 1. *(H) and (L) indicate the output levels of Voltage Output Models.</p> <p>2. Output A leads B by $1/4 T \pm 1/8 T$ when the shaft revolves clockwise, while A lags behind B by $1/4 T \pm 1/8 T$ when the shaft revolves counterclockwise.</p> | | | | | | | | | | | | |
| E6A2-CWZ3E | | <p>Output transistor</p> | | | | | | | | | | | | | |
| E6A2-CS3E | | <p>Output transistor</p> | | | | | | | | | | | | | |

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

E6A2-C



Accessories (Order Separately)

Coupling

Servo Mounting Bracket

E69-C04B

E69-1

Refer to *Accessories* for details.

Read and Understand This Catalog

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2008.11

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