

E6A2-C

Compact Encoder with External Diameter of 25 mm



- Incremental model
- External diameter of 25 mm.
- Resolution of up to 500 ppr.



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

For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Ordering Information

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

Power supply voltage	Output configuration	Output phases	Resolution (pulses/rotation)	Model	
5 to 12 VDC	Voltage output	Phases A, B, and Z	100, 200, 360	E6A2-CWZ3E (resolution) 0.5M	
			500	Example: E6A2-CWZ3E 100P/R 0.5M	
12 to 24 VDC	Open-collector output (NPN output)			100, 200, 360	E6A2-CWZ3C (resolution) 0.5M
				500	Example: E6A2-CWZ3C 100P/R 0.5M
5 to 12 VDC	Voltage output	Phases A and B	100, 200, 360	E6A2-CW3E (resolution) 0.5M	
			500	Example: E6A2-CW3E 100P/R 0.5M	
12 to 24 VDC	Open-collector output (NPN output)			100, 200, 360	E6A2-CW3C (resolution) 0.5M
				500	Example: E6A2-CW3C 100P/R 0.5M
5 to 12 VDC	Voltage output	Phase A	10, (20) *, 60, 100, 200, 300, 360	E6A2-CS3E (resolution) 0.5M	
			500	Example: E6A2-CS3E 10P/R 0.5M	
12 to 24 VDC	Open-collector output (NPN output)			10, 20, 60, 100, 200, 300, 360	E6A2-CS3C (resolution) 0.5M
				500	Example: E6A2-CS3C 10P/R 0.5M
			10, 20, 60, 100, 200, 300, 360	E6A2-CS5C (resolution) 0.5M	
			500	Example: E6A2-CS5C 10P/R 0.5M	

* Only a 2-m cable is available for the 20P/R Model.

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-CWZ3E	E6A2-CWZ3C	E6A2-CWZ5C	E6A2-CW3E	E6A2-CW3C	E6A2-CW5C	E6A2-CS3E	E6A2-CS3C	E6A2-CS5C
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		50 mA max.	30 mA max.		30 mA max.	20 mA max.		30 mA max.	20 mA max.	
Resolution (pulses/rotation)		100, 200, 360, 500						10, 20, 60, 100, 200, 300, 360, 500		
Output phases		Phases A, B, and Z			Phases A and B			Phase A		
Output configuration		Voltage output	NPN open-collector output		Voltage output	NPN open-collector output		Voltage output	NPN 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												
<p>E6A2-CS3C E6A2-CS5C</p> <p>Brown V_{cc} (E6A2-C□□3C: +5 to 12 V) (E6A2-C□□5C: +12 to 24V)</p> <p>Black, white, orange Output (Black: phase A, White: phase B, Orange: phase Z)</p> <p>30 VDC 30 mA max.</p> <p>Blue 0 V</p>	<p>Output transistor</p> <p>ON OFF</p> <p>$T(100\%)$ $1/2T \pm 1/4T (50\% \pm 25\%)$</p> <p>(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>E6A2-CW3C E6A2-CW5C E6A2-CWZ3C E6A2-CWZ5C</p> <p>Brown V_{cc} (E6A2-C□□3C: +5 to 12 V) (E6A2-C□□5C: +12 to 24V)</p> <p>Black, white, orange Output (Black: phase A, White: phase B, Orange: phase Z)</p> <p>30 VDC 30 mA max.</p> <p>Blue 0 V</p>	<p>Output transistor</p> <p>Direction of rotation: CW (as viewed from end of shaft) Direction of rotation: CCW (as viewed from end of shaft)</p> <p>Phase A ON OFF Phase B ON OFF Phase Z ON OFF</p> <p>Phase A ON OFF Phase B ON OFF Phase Z ON OFF</p> <p>Note: Phase A is $1/4 T \pm 1/8 T$ faster than phase B. Note: Phase A is $1/4 T \pm 1/8 T$ slower than phase B.</p> <p>(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>	<table border="1"> <thead> <tr> <th>Color</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>Brown</td> <td>V_{cc}</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-C□□□) do not output signals (no connection). 2. The white and orange wires of Single Models (E6A2-C□□□) do not output signals (no connection). 3. Voltage Output Models are capable of sinking a maximum current of 20 mA.</p>	Color	Signal	Brown	V_{cc}	Black	Phase A	White	Phase B	Orange	Phase Z	Blue	0 V (common)
Color	Signal													
Brown	V_{cc}													
Black	Phase A													
White	Phase B													
Orange	Phase Z													
Blue	0 V (common)													
<p>E6A2-CW3E E6A2-CWZ3E</p> <p>Brown V_{cc} (+5 to 12 V)</p> <p>2 kΩ</p> <p>Black, white, orange Output (Black: phase A, White: phase B, Orange: phase Z)</p> <p>20 mA max.</p> <p>Blue 0 V</p>	<p>Output transistor</p> <p>Direction of rotation: CW (as viewed from end of shaft) Direction of rotation: CCW (as viewed from end of shaft)</p> <p>Phase A H L Phase B H L Phase Z H L</p> <p>Phase A H L Phase B H L Phase Z H L</p> <p>Note: Phase A is $1/4 T \pm 1/8 T$ faster than phase B. Note: Phase A is $1/4 T \pm 1/8 T$ slower than phase B.</p> <p>(“H” and “L” in the diagrams are the output voltage levels of phases A, B, and Z.)</p>													
<p>E6A2-CS3E</p> <p>Brown V_{cc} (+5 to 12 V)</p> <p>2 kΩ</p> <p>Black, white, orange Output (Black: phase A, White: phase B, Orange: phase Z)</p> <p>20 mA max.</p> <p>Blue 0 V</p>	<p>Output transistor</p> <p>H L</p> <p>$T(100\%)$ $1/2T \pm 1/4T (50\% \pm 25\%)$</p> <p>(“H” and “L” in the diagrams are the output voltage levels.)</p>													

Safety Precautions

Refer to *Warranty and Limitations of Liability*.

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

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.

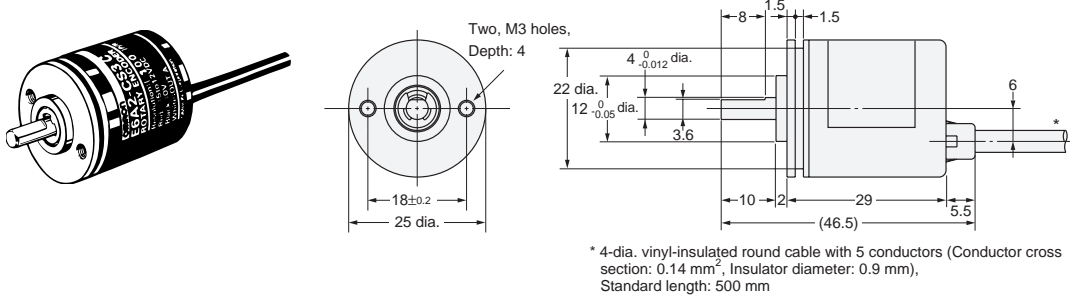
(Unit: mm)

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.

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