

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.

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	
	Open-collector output (NPN output)		100, 200, 360	E6A2-CWZ3C (resolution) 0.5M	
			500	Example: E6A2-CWZ3C 100P/R 0.5M	
12 to 24 VDC			100, 200, 360	E6A2-CWZ5C (resolution) 0.5M	
			500	Example: E6A2-CWZ5C 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
	Open-collector output (NPN output)	100, 200, 360		E6A2-CW3C (resolution) 0.5M	
		500		Example: E6A2-CW3C 100P/R 0.5M	
12 to 24 VDC		100, 200, 360		E6A2-CW5C (resolution) 0.5M	
		500		Example: E6A2-CW5C 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
	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	
12 to 24 VDC			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												
E6A2-CS3C *1 E6A2-CS5C *1	Output transistor (The ONs in the above timing chart mean that the output transistor is ON and the OFFs mean that the output transistor is OFF.)													
E6A2-CW3C *2 E6A2-CW5C *2 E6A2-CWZ3C E6A2-CWZ5C	Output transistor Direction of rotation: CW (as viewed from end of shaft) Direction of rotation: CCW (as viewed from end of shaft) 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. (The ONs in the above timing chart mean that the output transistor is ON and the OFFs mean that the output transistor is OFF.)	<table><tr><th>Color</th><th>Signal</th></tr><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></table> *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.	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-CW3E *2, 3 E6A2-CWZ3E *3	Output transistor Direction of rotation: CW (as viewed from end of shaft) Direction of rotation: CCW (as viewed from end of shaft) 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. (“H” and “L” in the diagrams are the output voltage levels of phases A, B, and Z.)													
E6A2-CS3E *1, 3	Output transistor (“H” and “L” in the diagrams are the output voltage levels.)													

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.

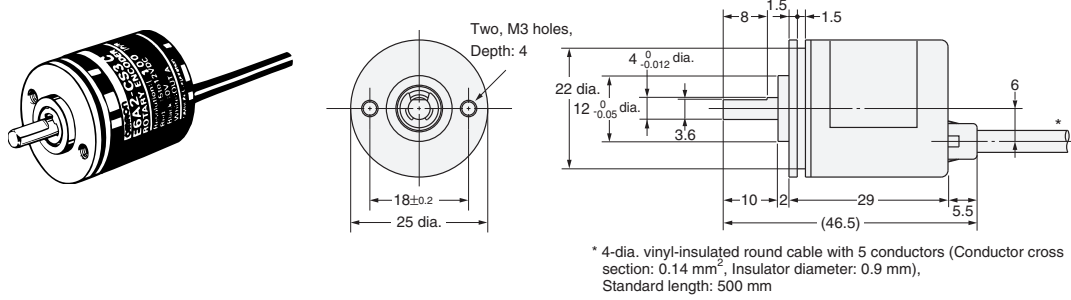
(Unit: mm)

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.

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