

High-resolution Encoder

- Incremental model
- External diameter of 55 mm.
- Resolution of up to 6,000 ppr.



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° $\pm 25^\circ$ 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°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		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		Direction of rotation: CW (as viewed from end of shaft) Note: Phase A is $1/4 T \pm 7/100 T$ faster than phase B. Phase Z is synced with phase A. Direction of rotation: CCW (as viewed from end of shaft) Note: Phase A is $1/4 T \pm 7/100 T$ slower than phase B. Phase Z is synced with phase A.	Direction of rotation: CW (as viewed from end of shaft) 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. Direction of rotation: CCW (as viewed from end of shaft) 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.																												
Connection		Wiring <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> 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. 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.		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	
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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.

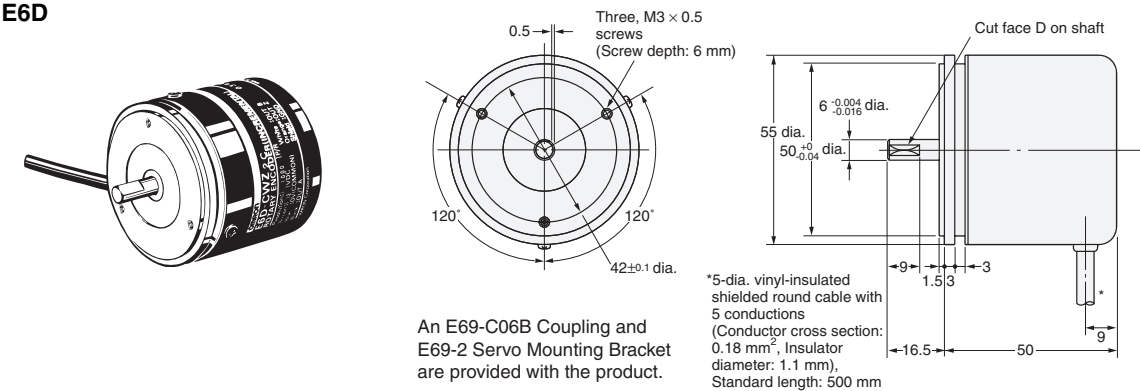
(Unit: mm)

Dimensions

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

Encoder

E6D



Accessories (Order Separately)

Refer to *Accessories* for details.

Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

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In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

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OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

ERRORS AND OMISSIONS

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

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