High-resolution Encoder with Diameter of 55 mm

E6D-C

CSM_E6D-C_DS_E_5_1

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 ±5%, ripple (p-p): 5% max.	12 VDC ±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 kΩ 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°±25° between A and B (1/4 T ± 0.07 T)	
Rise and fall times of output		1 μs max.	
Starting torque		9.8 mN·m max.	
Moment of inertia		3×10^{-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	

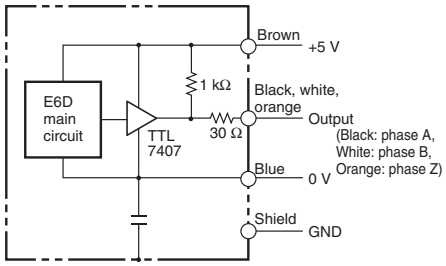
*1. An inrush current of approximately 2 A will flow for approximately 50 μs when the power is turned ON.
*2. The maximum electrical response speed is determined by the resolution and maximum response frequency as follows:

$$\text{Maximum electrical response speed (rpm)} = \frac{\text{Maximum response frequency}}{\text{Resolution}} \times 60$$

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.

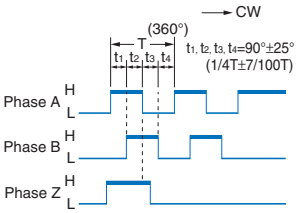
I/O Circuit Diagrams

E6D-CWZ1E



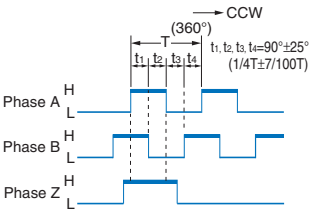
E6D-CWZ1E Voltage output

Direction of rotation: CW
(as viewed from end of shaft)



Note: Phase A is 1/4 T ± 7/100 T faster than phase B.
Phase Z is synced with phase A.

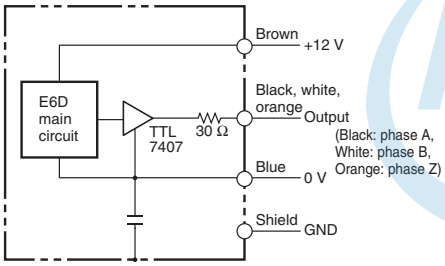
Direction of rotation: CCW
(as viewed from end of shaft)



Note: Phase A is 1/4 T ± 7/100 T slower than phase B.
Phase Z is synced with phase A.

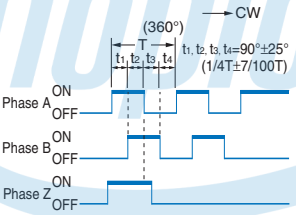
("H" and "L" in the diagrams are the output voltage levels of phases A, B, and Z.)

E6D-CWZ2C



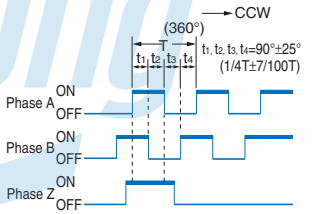
E6D-CWZ2C Open-collector output

Direction of rotation: CW
(as viewed from end of shaft)



Note: Phase A is 1/4 T ± 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 ± 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.)

Model / Color	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	

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.

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.

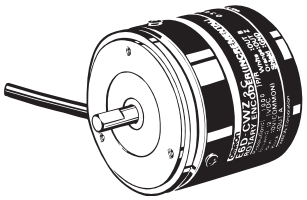
(Unit: mm)

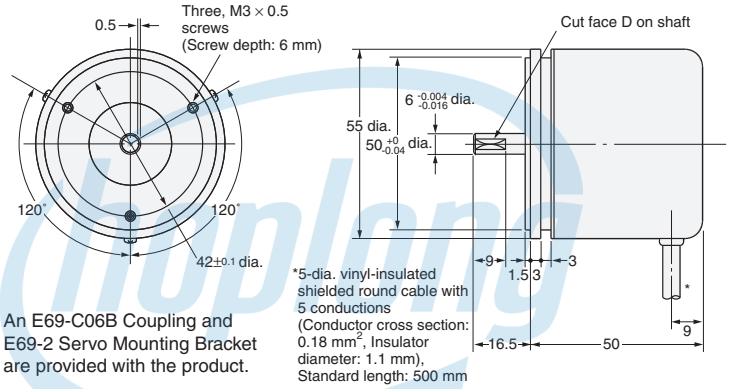
Dimensions

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.

Accessories (Order Separately)

Refer to *Accessories* for details.

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