Incremental 60-mm-dia. Rotary Encoder

E6F-C

CSM_E6F-C_DS_E_6_2

Rugged Rotary Encoder

- Incremental model
- External diameter of 60 mm.
- Resolution of up to 1000 ppr.
- IP65 oil-resistance with strong shaft.
  Radial: 120 N, Thrust: 50 N

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

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

Ordering Information

Encoders [Refer to *Dimensions* on page 5.]

Power supply voltage	Output configuration	Resolution (pulses/rotation)	Model
12 to 24 VDC	Complementary output	100, 200, 360, 500, 600	**E6F-CWZ5G (resolution) 2M** Example: E6F-CWZ5G (100P/R) 2M
		1,000	
	NPN open-collector output	1,000	**E6F-CWZ5C (1000P/R) 2M**

Accessories (Order Separately) [Refer to *Dimensions* on page 5 for servo mounting bracket and to *Accessories* for coupling dimensions.]

Name	Model	Remarks
Couplings	**E69-C10B**	---
	E69-C610B	Different end diameter
	E69-C10M	Metal construction
Servo Mounting Bracket	**E69-2**	(Three brackets in a set.)

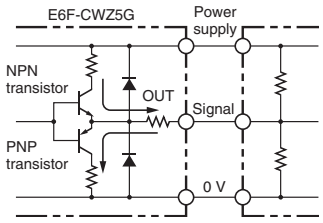
Refer to *Accessories* for details.

Ratings and Specifications

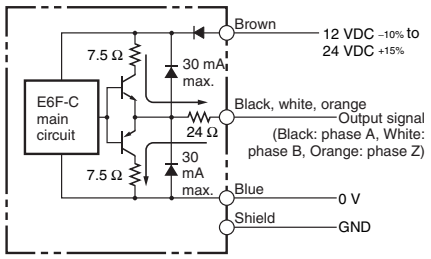
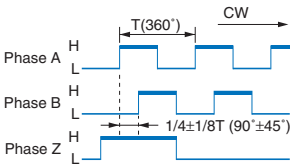
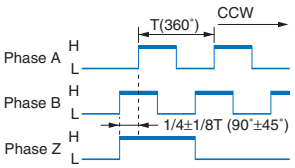
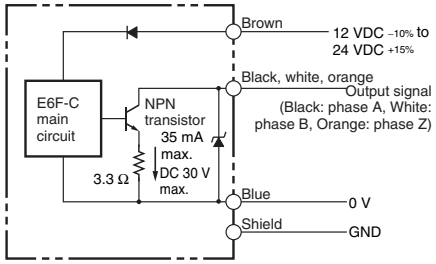
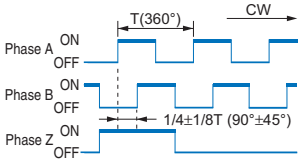
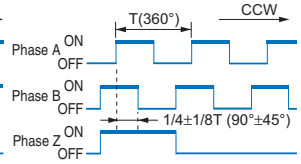
Item / Model		E6F-CWZ5G	E6F-CWZ5C
Power supply voltage		12 VDC −10% to 24 VDC +15%, ripple (p-p): 5% max.	
Current consumption*1		100 mA max.	
Resolution (pulses/rotation)		100, 200, 360, 500, 600, 1,000	1,000
Output configuration		Complementary outputs*2	NPN open-collector output
Output capacity		Output voltage: VH = Vcc −3 V min. (Io = 30 mA), VL = 2 V max. (Io = −30 mA) Output current: ±30 mA	Applied voltage: 30 VDC max. Sink current: 35 mA max. Residual voltage: 0.4 V max. (at sink current of 35 mA)
Maximum response frequency		83 kHz	
Phase difference between outputs		90°± 45° between A and B (1/4 T ± 1/8 T)	
Rise and fall times of output		1 μs max. (Cable length: 2 m, Output current: 30 mA)	1 μs max. (Cable length: 2 m, Control output voltage: 5 V, Load resistance: 1 kΩ)
Starting torque		10 mN·m max. at room temperature, 15 mN·m max. at low temperature	
Moment of inertia		3×10^{-6} kg·m^2 max.; 1.5×10^{-6} kg·m^2 max. at 600 P/R max.	
Shaft loading	**Radial**	120 N	
	Thrust	50 N	
Maximum permissible speed		5,000 r/min	
Protection circuits		Power supply reverse polarity protection, Output load short-circuit protection	
Ambient temperature range		Operating: −10 to 70°C (with no icing), Storage: −25 to 85°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 500 Hz, 150 m/s^2 or 2-mm double amplitude for 11 min 3 times each in X, Y, and Z directions	
Shock resistance		Destruction: 1,000 m/s^2 3 times each in X, Y, and Z directions	
Degree of protection		IEC 60529 IP65, in-house standards: oilproof	
Connection method		Pre-wired Models (Standard cable length: 2 m)	
Material		Case: Zinc alloy, Main unit: Aluminum, Shaft: SUS420J2	
Weight (packed state)		Approx. 400 g	
Accessories		Instruction manual Note: Coupling, mounting bracket and hex-head spanner are sold separately.	

*1. An inrush current of approximately 9 A will flow for approximately 5 μs when the power is turned ON.

*2. Complementary Outputs
The complementary output has two output transistors (NPN and PNP) as shown at the right. These two output transistors alternately turn ON and OFF depending on the high or low output signal. When using them, pull up to the positive power supply voltage level or pull down to 0 V. The complementary output allows flow-in or flow-out of the output current and thus the rising and falling speeds of signals are fast. This allows a long cable distance. They can be connected to open-collector input devices (NPN, PNP).



I/O Circuit Diagrams

Output Circuits	Output mode	Connection
E6F-CWZ5G 	Direction of rotation: CW (as viewed from end of shaft)  Note: Phase A is 1/4 T ± 1/8 T faster than phase B. Direction of rotation: CCW (as viewed from end of shaft)  Note: Phase A is 1/4 T ± 1/8 T slower than phase B. "H" and "L" in the diagrams are the output voltage levels of phases A, B, and Z.	
E6F-CWZ5C 	Direction of rotation: CW (as viewed from end of shaft)  Note: Phase A is 1/4 T ± 1/8 T faster than phase B. Direction of rotation: CCW (as viewed from end of shaft)  Note: Phase A is 1/4 T ± 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.	

Color	Terminal
Brown	Power supply (+Vcc)
Black	Output phase A
White	Output phase B
Orange	Output phase Z
Blue	0 V (common)

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 to 0 V or to an external ground.

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

Cable Extension Characteristics

- When the cable length is extended, the output waveform startup time is lengthened and it affects the phase difference characteristics of phases A and B.

* Recommended Cable
Conductor cross section: 0.2 mm^2
Spiral shield
Conductor resistance: 92 Ω/km max. (20°C)
Insulation resistance: 5 Ω/km min. (20°C)

- The output waveform startup time changes not only according to the length of the cable, but also according to the load resistance and the cable type.
- Extending the cable length not only changes the startup time, but also increases the output residual voltage.

● Connection

- 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.
- When the complementary output is used, the output will turn OFF when the load short-circuit protection circuit operates. To clear this condition, turn OFF the power supply, check the condition of the

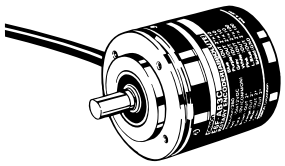
(Unit: mm)

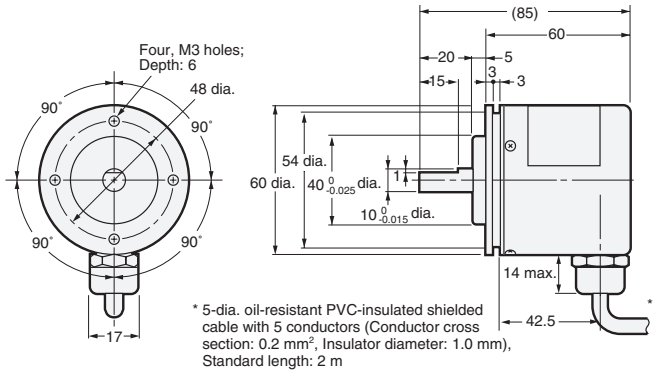
Dimensions

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

Encoder

E6F-CWZ5G

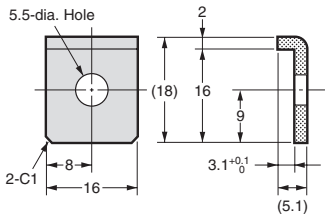




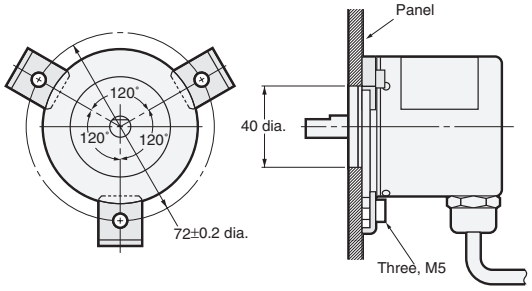
Accessories (Order Separately)

Servo Mounting Bracket

E69-2



Mounting Bracket Installation



Couplings

E69-C10B
E69-C610B
E69-C10M

Refer to *Accessories* for details.

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