Low-cost Encoder with Diameter of 50 mm

# E6CP-A

CSM_E6CP-A_DS_E_6_5

## General-purpose Absolute Encoder with External Diameter of 50 mm

- Absolute model.
- External diameter of 50 mm.
- Resolution: 256 (8-bit).
- Lightweight construction using plastic body.

⚠ Be sure to read *Safety Precautions* on page 5.

## Ordering Information

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

| Power supply voltage | Output configuration | Resolution (divisions) | Connector for H8PS Cam Positioner | Model |
|---|---|---|---|---|
| 5 to 12 VDC | Open-collector output | 256 (8-bit) | None | **E6CP-AG3C 256P/R 2M** |
| 12 to 24 VDC | | | | **E6CP-AG5C 256P/R 2M** |
| | | | Supported | **E6CP-AG5C-C 256P/R 2M** |

Note: When connecting to the H8PS, use the E6CP-AG5C-C, which is connected using a connector. It cannot be used on other models.

### Accessories (Order Separately)

**[Dimensions: Refer to *Accessories* for coupling dimensions and to page 5 for the dimensions of other accessories.]**

| Name | Model | Remarks | |
|---|---|---|---|
| Couplings | **E69-C06B** | Provided with the E6CP-AG3C and E6CP-AG5C. | |
| | **E69-C68B** | Different end diameter | |
| | **E69-C610B** | Different end diameter | |
| | **E69-C06M** | Metal construction | |
| Servo Mounting Bracket | **E69-2** | Provided with the product. (Three brackets in a set.) | |
| Extension Cable | **E69-DF5** | 5 m | Models are also available with 15-m and 98-m cables. |
| | **E69-DF10** | 10 m | |
| | **E69-DF20** | 20 m | |

Refer to *Accessories* for details.

## Ratings and Specifications

| Item / Model | | E6CP-AG3C | E6CP-AG5C | E6CP-AG5C-C |
|---|---|---|---|---|
| **Power supply voltage** | | 5 VDC –5% to 12 VDC +10%, ripple (p-p): 5% max. | 12 VDC –10% to 24 VDC +15%, ripple (p-p): 5% max. | |
| **Current consumption*1** | | 90 mA max. | 70 mA max. | |
| **Resolution (rotations)** | | 256 (8-bit) | | |
| **Output code** | | Gray code | | |
| **Output configuration** | | Open-collector output | | |
| **Output capacity** | | Applied voltage: 28 VDC max.<br>Sink current: 16 mA max.<br>Residual voltage: 0.4 V max. (at sink current of 16 mA) | | |
| **Maximum response frequency*2** | | 5 kHz | | |
| **Logic** | | Negative logic (high = 0, low = 1) | | |
| **Accuracy** | | ±1° max. | | |
| **Direction of rotation** | | Output code incremented by CW (as viewed from the end of the shaft) | | |
| **Rise and fall times of output** | | 1 μs max. (Control output voltage: 16 V, Load resistance: 1 kΩ, Output cable: 2 m max.) | | |
| **Starting torque** | | 0.98 mN·m max. | | |
| **Moment of inertia** | | $1 \times 10^{-6}$ kg·m$^2$ max. | | |
| **Shaft loading** | **Radial** | 29.4 N | | |
| | **Thrust** | 19.6 N | | |
| **Maximum permissible speed** | | 1,000 r/min | | |
| **Ambient temperature range** | | Operating: –10 to 55°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** | | 200 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: 1,000 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: 2 m) | | Connector Models (Standard cable length: 2 m) |
| **Material** | | Case: ABS, Main unit: PPS, Shaft: SUS416, Mounting Bracket: Galvanized iron | | |
| **Weight (packed state)** | | Approx. 200 g | | |
| **Accessories** | | Coupling (excluding Connector Models), Servo Mounting Bracket,<br>Hexagonal wrench (excluding Connector Models), Instruction manual | | |

*1. An inrush current of approximately 8 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:

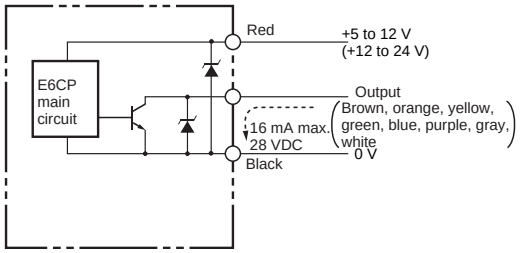
$$\text{Maximum electrical response speed (rpm)} = \frac{\text{Maximum response frequency}}{\text{Resolution}} \times 60$$

This means that the 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

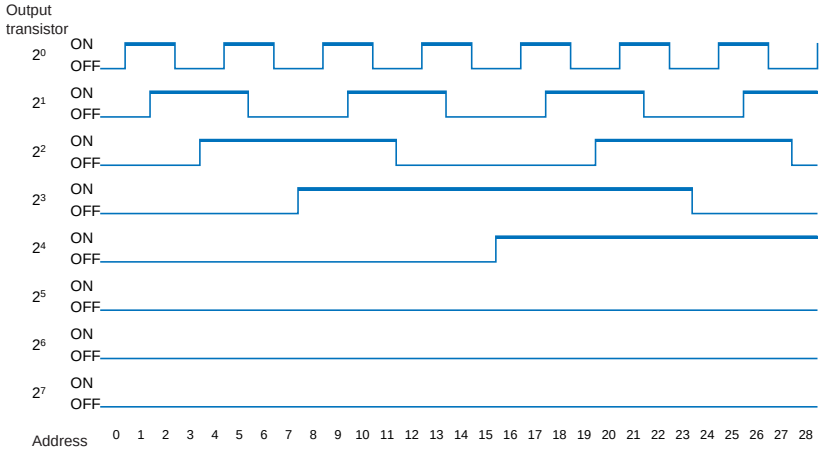
| E6CP-AG3C, E6CP-AG5C | E6CP-AG5C-C |
|---|---|

## Output Circuits




## Output mode

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




## Connection

| Color | E6CP-AG3C | E6CP-AG5C |
|---|---|---|
| Red | Power supply 5 to 12 VDC | Power supply 12 to 24 VDC |
| Black | 0 V (common) | |
| Brown | Output $2^0$ | |
| Orange | Output $2^1$ | |
| Yellow | Output $2^2$ | |
| Green | Output $2^3$ | |
| Blue | Output $2^4$ | |
| Purple | Output $2^5$ | |
| Gray | Output $2^6$ | |
| White | Output $2^7$ | |

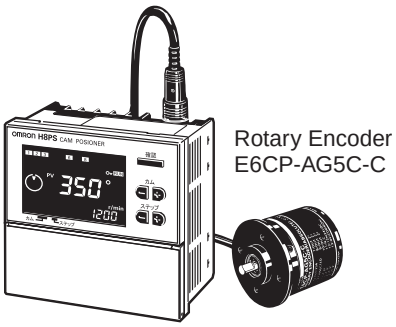
Note: The circuit is the same for all bit outputs.
Each E6CP Rotary Encoder has one main circuit.

| Terminal No. | E6CP-AG5C-C |
|---|---|
| 1 | Connected internally |
| 2 | |
| 3 | Output $2^5$ |
| 4 | Output $2^1$ |
| 5 | Output $2^0$ |
| 6 | Output $2^7$ |
| 7 | Output $2^4$ |
| 8 | Output $2^2$ |
| 9 | Output $2^3$ |
| 10 | Output $2^6$ |
| 11 | --- |
| 12 | Power supply: 12 to 24 VDC |
| 13 | 0 V (common) |

Note: The circuit is the same for all bit outputs.
Each E6CP Rotary Encoder has one main circuit.

## Positioner Connection Example

### H8PS Cam Positioner Connection




Note: The E6CP-AG5C cannot be connected to the H8PS.

### Ordering Information

| Model |
|---|
| **H8PS-8A** |
| **H8PS-8AP** |
| **H8PS-8AF** |
| **H8PS-8AFP** |
| **H8PS-16A** |
| **H8PS-16AP** |
| **H8PS-16AF** |
| **H8PS-16AFP** |
| **H8PS-32A** |
| **H8PS-32AP** |
| **H8PS-32AF** |
| **H8PS-32AFP** |

### Specifications

| | |
|---|---|
| **Rated voltage** | 24 VDC |
| **Cam precision** | 0.5° (for 720 resolution), 1° (for 256/360 resolution) |
| **No. of output points** | 8-point output type: 8 cam outputs, 1 RUN output, 1 pulse output<br>16-point output type: 16 cam outputs, 1 RUN output, 1 pulse output<br>32-point output type: 32 cam outputs, 1 RUN output, 1 pulse output |
| **Encoder response** | RUN mode, test mode:<br>256/360 resolution ..... 1,600 r/min max. (1,200 r/min when advance compensation is set for four cams or more)<br>720 resolution ..... 800 r/min max. (600 r/min when advance compensation is set for four cams or more) |
| **Additional functions** | ● Origin compensation (zeroing)<br>● Rotation direction switching<br>● Angle display switching<br>● Teaching<br>● Pulse output<br>● Angle/number of rotations display switching<br>● Puncture *<br>● Angle advance<br>● Number of rotations alarm output<br>● Setting with support software (order separately) * |

Note: For 16-point and 32-point output types only

## 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.

● **Mounting**

For front-surface mounting, the maximum tightening torque is 1.76 N·m. (Effective screw length: 7 mm min.)

● **Wiring**

Spurious pulses may be generated for outputs when power is turned ON. Wait at least 1 s after turning ON the power to the Encoder before using the connected device.

● **Connection**

Spurious pulses may be generated when power is turned ON and OFF. Wait at least 1 s after turning ON the power to the Encoder before using the connected device, and stop using the connected device at least 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.

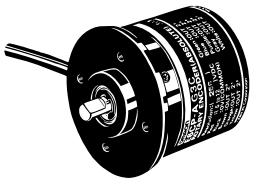
(Unit: mm)

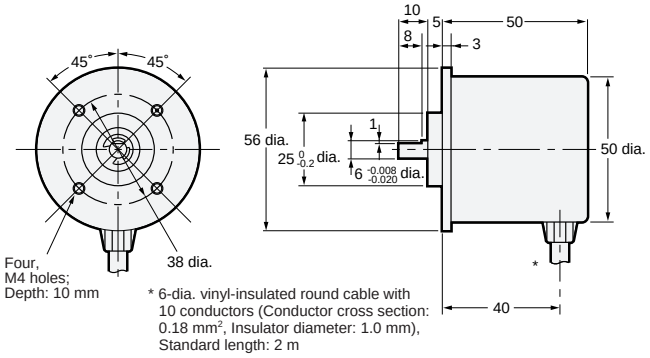
## Dimensions

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

### Encoder

**E6CP-AG3C**
**E6CP-AG5C**

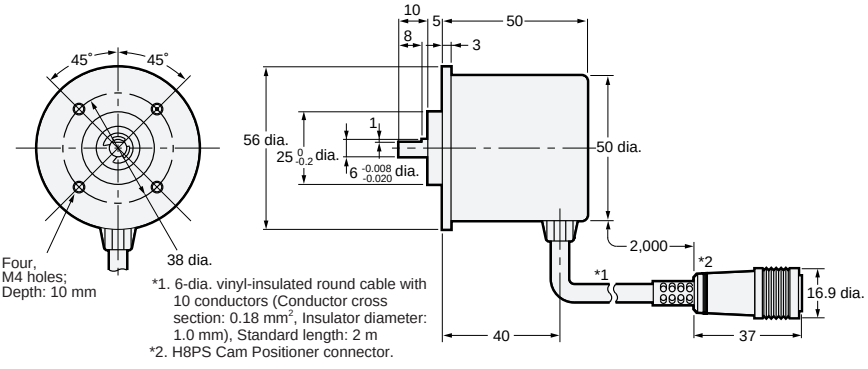





* 6-dia. vinyl-insulated round cable with 10 conductors (Conductor cross section: 0.18 mm², Insulator diameter: 1.0 mm), Standard length: 2 m

The E69-C06B Coupling is provided.

**E6CP-AG5C-C**



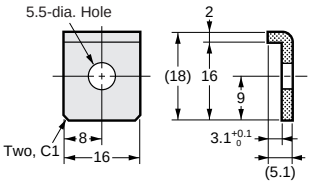

*1. 6-dia. vinyl-insulated round cable with 10 conductors (Conductor cross section: 0.18 mm², Insulator diameter: 1.0 mm), Standard length: 2 m
*2. H8PS Cam Positioner connector.

The E69-C06B Coupling is sold separately.

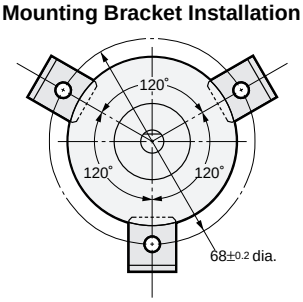
## Accessories (Order Separately)

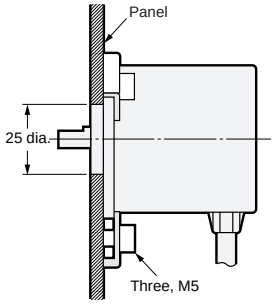
### Servo Mounting Bracket

**E69-2**




**Mounting Bracket Installation**

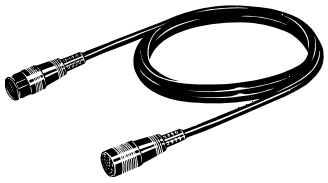


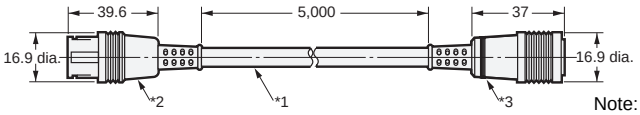




Note: Provided with the product.

### Extension Cable

**E69-DF5**






*1. 6-dia. shielded cable with 12 conductors
(Conductor cross section: 0.2 mm$^2$, Insulator diameter: 1.1 mm),
Standard length: 5 m
*2. Connects to connector on E6CP-AG5C-C.
*3. Connects to H8PS Cam Positioner.

Note: 1. The E69-DF5 (5 m) is also available with the following cable lengths: 10 m, 15 m, 20 m, and 98 m.
2. Cable can be extended to 100 m when the H8PS Cam Positioner is connected.

### Couplings

**E69-C06B**
**E69-C68B**
**E69-C610B**
**E69-C06M**
Refer to *Accessories* for details.

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