

## Compact Encoder (External Diameter: 25 mm)

- Models with origin output (phase Z) for positioning applications.
- Resolution of 500 ppr in an Encoder with an external diameter of only 25 mm.



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

## Ordering Information

**Encoders** [Refer to *Dimensions* on page 4.]

| Output phases      | Power supply voltage | Output configuration  | Resolution (pulses/rotation)   | Model                               |
|--------------------|----------------------|-----------------------|--------------------------------|-------------------------------------|
| Phase A            | 5 to 12 VDC          | Voltage output        | 10, 20, 60, 100, 200, 300, 360 | <b>E6A2-CS3E (resolution) 0.5M</b>  |
|                    |                      |                       | 500                            | Example: E6A2-CS3E 10P/R 0.5M       |
|                    |                      | Open-collector output | 10, 20, 60, 100, 200, 300, 360 | <b>E6A2-CS3C (resolution) 0.5M</b>  |
|                    |                      |                       | 500                            | Example: E6A2-CS3C 10P/R 0.5M       |
|                    | 12 to 24 VDC         |                       | 10, 20, 60, 100, 200, 300, 360 | <b>E6A2-CS5C (resolution) 0.5M</b>  |
|                    |                      |                       | 500                            | Example: E6A2-CS5C 10P/R 0.5M       |
| Phases A and B     | 5 to 12 VDC          | Voltage output        | 100, 200, 360                  | <b>E6A2-CW3E (resolution) 0.5M</b>  |
|                    |                      |                       | 500                            | Example: E6A2-CW3E 100P/R 0.5M      |
|                    |                      | Open-collector output | 100, 200, 360                  | <b>E6A2-CW3C (resolution) 0.5M</b>  |
|                    |                      |                       | 500                            | Example: E6A2-CW3C 100P/R 0.5M      |
|                    | 12 to 24 VDC         |                       | 100, 200, 360                  | <b>E6A2-CW5C (resolution) 0.5M</b>  |
|                    |                      |                       | 500                            | Example: E6A2-CW5C 100P/R 0.5M      |
| Phases A, B, and Z | 5 to 12 VDC          | Voltage output        | 100, 200, 360                  | <b>E6A2-CWZ3E (resolution) 0.5M</b> |
|                    |                      |                       | 500                            | Example: E6A2-CWZ3E 100P/R 0.5M     |
|                    |                      | Open-collector output | 100, 200, 360                  | <b>E6A2-CWZ3C (resolution) 0.5M</b> |
|                    |                      |                       | 500                            | Example: E6A2-CWZ3C 100P/R 0.5M     |
|                    | 12 to 24 VDC         |                       | 100, 200, 360                  | <b>E6A2-CWZ5C (resolution) 0.5M</b> |
|                    |                      |                       | 500                            | Example: E6A2-CWZ5C 100P/R 0.5M     |

**Accessories (Order Separately)** [Refer to *Dimensions* on *Rotary Encoder Accessories*.]

| Name                   | Model           | Remarks                      |
|------------------------|-----------------|------------------------------|
| Coupling               | <b>E69-C04B</b> | Provided with the product.   |
| Servo Mounting Bracket | <b>E69-1</b>    | Provided with the E6A2-CWZ□. |

Refer to *Accessories* for details.

## Ratings and Specifications

| Item                             | Model  | E6A2-CS3E                                                                                                             | E6A2-CS3C                                                                                                              | E6A2-CS5C                                         | E6A2-CW3E                                                                                                             | E6A2-CW3C                                                                                                              | E6A2-CW5C                                         | E6A2-CWZ3E                                                                                                            | E6A2-CWZ3C                                                                                                             | E6A2-CWZ5C                                        |
|----------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| 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            |        | 30 mA max.                                                                                                            | 20 mA max.                                                                                                             |                                                   | 30 mA max.                                                                                                            | 20 mA max.                                                                                                             |                                                   | 50 mA max.                                                                                                            | 30 mA max.                                                                                                             |                                                   |
| Resolution (pulses/rotation)     |        | 10, 20, 60, 100, 200, 300, 360, 500                                                                                   |                                                                                                                        |                                                   | 100, 200, 360, 500                                                                                                    |                                                                                                                        |                                                   |                                                                                                                       |                                                                                                                        |                                                   |
| Output phases                    |        | Phase A                                                                                                               |                                                                                                                        |                                                   | Phases A and B                                                                                                        |                                                                                                                        |                                                   | Phases A, B, and Z                                                                                                    |                                                                                                                        |                                                   |
| Output configuration             |        | Voltage output                                                                                                        | Open-collector output                                                                                                  |                                                   | Voltage output                                                                                                        | Open-collector output                                                                                                  |                                                   | Voltage output                                                                                                        | Open-collector output                                                                                                  |                                                   |
| Output capacity                  |        | Output resistance: 2 kΩ<br>Output current: 20 mA max.<br>Residual voltage: 0.4 V max.<br>(Output current: 20 mA max.) | Applied voltage: 30 VDC max.<br>Sink current: 30 mA max.<br>Residual voltage: 0.4 V max.<br>(at sink current of 30 mA) |                                                   | Output resistance: 2 kΩ<br>Output current: 20 mA max.<br>Residual voltage: 0.4 V max.<br>(Output current: 20 mA max.) | Applied voltage: 30 VDC max.<br>Sink current: 30 mA max.<br>Residual voltage: 0.4 V max.<br>(at sink current of 30 mA) |                                                   | Output resistance: 2 kΩ<br>Output current: 20 mA max.<br>Residual voltage: 0.4 V max.<br>(Output current: 20 mA max.) | Applied voltage: 30 VDC max.<br>Sink current: 30 mA max.<br>Residual voltage: 0.4 V max.<br>(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.<br>(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.<br>(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.<br>(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 <sup>-7</sup> kg·m <sup>2</sup> 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 <sup>2</sup> 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<br>E6A2-CS5C               | <p>Brown <math>V_{CC}</math><br/>(E6A2-CS3C: +5 to 12 V)<br/>(E6A2-CS5C: +12 to 24 V)<br/>Black, white, orange<br/>Output<br/>(Black: phase A,<br/>White: phase B,<br/>Orange: phase Z)<br/>30 VDC<br/>30 mA max.<br/>Blue 0 V</p> | Output transistor<br> | <table><tr><th>Color</th><th>Signal</th></tr><tr><td>Brown</td><td><math>V_{CC}</math></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> <p>Note: 1. The white and orange wires of Single Models (E6A2-CS□□) do not output signals (no connection).<br/>2. The white and orange wires of Single Models (E6A2-CS□□) do not output signals (no connection).<br/>3. Voltage Output Models are capable of sinking a maximum current of 20 mA.</p> | Color | Signal | Brown | $V_{CC}$ | Black | Phase A | White | Phase B | Orange | Phase Z | Blue | 0 V (common) |
| Color                                |                                                                                                                                                                                                                                    | Signal                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |        |       |          |       |         |       |         |        |         |      |              |
| Brown                                |                                                                                                                                                                                                                                    | $V_{CC}$              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |        |       |          |       |         |       |         |        |         |      |              |
| Black                                |                                                                                                                                                                                                                                    | Phase A               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |        |       |          |       |         |       |         |        |         |      |              |
| White                                | Phase B                                                                                                                                                                                                                            |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |        |       |          |       |         |       |         |        |         |      |              |
| Orange                               | Phase Z                                                                                                                                                                                                                            |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |        |       |          |       |         |       |         |        |         |      |              |
| Blue                                 | 0 V (common)                                                                                                                                                                                                                       |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |        |       |          |       |         |       |         |        |         |      |              |
| E6A2-CW3C<br>E6A2-CW5C               | Direction of rotation: CW<br>(as viewed from end of shaft)<br>Output transistor<br>                                                                                                                                                |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |        |       |          |       |         |       |         |        |         |      |              |
| E6A2-CWZ3C<br>E6A2-CWZ5C             | Direction of rotation: CCW<br>(as viewed from end of shaft)<br>Output transistor<br>                                                                                                                                               |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |        |       |          |       |         |       |         |        |         |      |              |
| E6A2-CW3E<br>E6A2-CWZ3E<br>E6A2-CS3E | <p>Brown <math>V_{CC}</math> (+5 to 12 V)<br/>Black, white, orange<br/>Output (Black: phase A,<br/>White: phase B,<br/>Orange: phase Z)<br/>2 kΩ<br/>20 mA max.<br/>Blue 0 V</p>                                                   | Output transistor<br> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |        |       |          |       |         |       |         |        |         |      |              |

Note: 1. \*(H) and (L) indicate the output levels of Voltage Output Models.  
2. Output A leads B by  $1/4 T \pm 1/8 T$  when the shaft revolves clockwise, while A lags behind B by  $1/4 T \pm 1/8 T$  when the shaft revolves counterclockwise.

## 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.

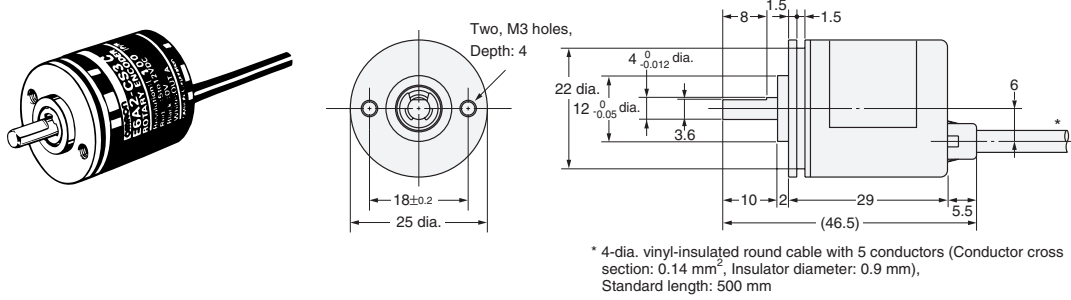
(Unit: mm)

## 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.

## 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.

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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.

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### 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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- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



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