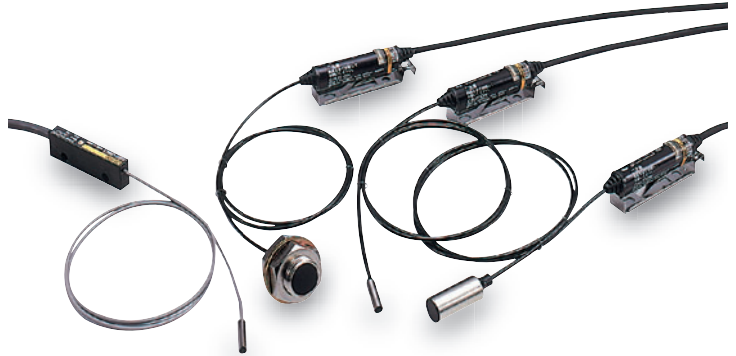


## Subminiature Sensors with Long-distance Detection

- Shielded Sensor Heads from 3-mm to M12 diameters that can be embedded in metal.
- Robotics cables provided as a standard feature (DC 2-Wire Models).
- Indicator provided in Amplifier cable for easy confirmation of operation.
- Power supply range of 5 to 24 VDC for DC 3-Wire Models.



Be sure to read *Safety Precautions* on page 6.



## Ordering Information

**Sensors** [Refer to *Dimensions* on page 7.]

### DC 2-Wire Models

| Appearance                                                                                   |          | Sensing distance |  | Model            |                  |
|----------------------------------------------------------------------------------------------|----------|------------------|--|------------------|------------------|
|                                                                                              |          |                  |  | Operation mode   |                  |
|                                                                                              |          |                  |  | NO               | NC               |
|  Shielded | 3 dia.   | 0.8 mm           |  | E2EC-CR8D1 2M *  | E2EC-CR8D2 2M *  |
|                                                                                              | 5.4 dia. | 1.5 mm           |  | E2EC-C1R5D1 2M * | E2EC-C1R5D2 2M * |
|                                                                                              | 8 dia.   | 3 mm             |  | E2EC-C3D1 2M *   | E2EC-C3D2 2M *   |
|                                                                                              | M12      | 4 mm             |  | E2EC-X4D1 2M *   | E2EC-X4D2 2M *   |

\* Models with different frequencies are also available. The model numbers are E2EC-□□□□5 (example: E2EC-CR8D15).

### DC 3-Wire Models

| Appearance                                                                                   |        | Sensing distance |  | Model                     |                  |
|----------------------------------------------------------------------------------------------|--------|------------------|--|---------------------------|------------------|
|                                                                                              |        |                  |  | Output configuration      | NO               |
|  Shielded | 3 dia. | 0.5 mm           |  | NPN open-collector output | E2EC-CR5C1 2M *  |
|                                                                                              | 8 dia. | 2.5 mm           |  |                           | E2EC-C2R5C1 2M * |

\* Models with different frequencies are also available. The model numbers are E2EC-□□□□5 (example: E2EC-CR5D15).

## Accessories (Order Separately)

### Mounting Bracket

The Mounting Bracket for the E2EC-C1R5D□ is not provided with the Sensor. Order a Mounting Bracket separately if required. [Refer to *Dimensions* on page 8.]

| Appearance                                                                          | Model     | Applicable Sensors               |
|-------------------------------------------------------------------------------------|-----------|----------------------------------|
|  | Y92E-F5R4 | E2EC-C1R5D□ (5.4-mm-dia. Sensor) |

## Ratings and Specifications

| Item                                             |                  | Model                                              | DC 2-Wire Models                                                                                                      |              |                    |                       | DC 3-Wire Models                                                                             |                    |
|--------------------------------------------------|------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------|--------------------|-----------------------|----------------------------------------------------------------------------------------------|--------------------|
|                                                  |                  |                                                    | E2EC-CR8D□                                                                                                            | E2EC-C1R5D□  | E2EC-C3D□          | E2EC-X4D□             | E2EC-CR5C1                                                                                   | E2EC-C2R5C1        |
| Sensing distance                                 |                  |                                                    | 0.8 mm ±15%                                                                                                           | 1.5 mm ±10%  | 3 mm ±10%          | 4 mm ±10%             | 0.5 mm ±15%                                                                                  | 2.5 mm ±10%        |
| Set distance                                     |                  |                                                    | 0 to 0.56 mm                                                                                                          | 0 to 1.05 mm | 0 to 2.1 mm        | 0 to 2.8 mm           | 0 to 0.3 mm                                                                                  | 0 to 1.7 mm        |
| Differential travel                              |                  |                                                    | 10% max. of sensing distance                                                                                          |              |                    |                       |                                                                                              |                    |
| Detectable object                                |                  |                                                    | Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to <i>Engineering Data</i> on page 3.)    |              |                    |                       |                                                                                              |                    |
| Standard sensing object                          |                  |                                                    | Iron, 5 × 5 × 1 mm                                                                                                    |              | Iron, 8 × 8 × 1 mm | Iron, 12 × 12 × 1 mm  | Iron, 5 × 5 × 1 mm                                                                           | Iron, 8 × 8 × 1 mm |
| Response frequency<br>*1                         |                  |                                                    | 1.5 kHz                                                                                                               |              | 1 kHz              |                       |                                                                                              |                    |
| Power supply voltage (operating voltage range)   |                  |                                                    | 12 to 24 VDC (10 to 30 VDC), ripple (p-p): 10% max.                                                                   |              |                    |                       | 5 to 24 VDC (4.75 to 30 VDC), ripple (p-p): 10% max.                                         |                    |
| Current consumption                              |                  |                                                    | ---                                                                                                                   |              |                    |                       | 10 mA max.                                                                                   |                    |
| Leakage current                                  |                  |                                                    | 0.8 mA max.                                                                                                           |              |                    |                       | ---                                                                                          |                    |
| Control output                                   | Load current     | 5 to 100 mA                                        |                                                                                                                       |              |                    |                       | NPN open-collector output, 100 mA max. (30 VDC max.)                                         |                    |
|                                                  | Residual voltage | 3 V max. (Load current: 100 mA, Cable length: 2 m) |                                                                                                                       |              |                    |                       | 1 V max. (Load current: 100 mA, Cable length: 2 m)                                           |                    |
| Indicators                                       |                  |                                                    | D1 Models: Operation indicator (red), Setting indicator (green)<br>D2 Models: Operation indicator (red)               |              |                    |                       | Detection indicator (red)                                                                    |                    |
| Operation mode (with sensing object approaching) |                  |                                                    | D1 Models: NO<br>D2 Models: NC<br>Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 5 for details. |              |                    |                       | NO<br>Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 5 for details.    |                    |
| Protection circuits                              |                  |                                                    | Load short-circuit protection, Surge suppressor                                                                       |              |                    |                       | Surge suppressor                                                                             |                    |
| Ambient temperature range                        |                  |                                                    | Operating/Storage: -25 to 70°C (with no icing or condensation)*2                                                      |              |                    |                       |                                                                                              |                    |
| Ambient humidity range                           |                  |                                                    | Operating/Storage: 35% to 95% (with no condensation)                                                                  |              |                    |                       |                                                                                              |                    |
| Temperature influence                            |                  |                                                    | ±20% max. of sensing distance at 23°C in the temperature range of -25 to 70°C                                         |              |                    |                       |                                                                                              |                    |
| Voltage influence                                |                  |                                                    | ±2.5% max. of sensing distance at rated voltage in the rated voltage ±15% range                                       |              |                    |                       | ±5% max. of sensing distance at the rated voltage range in the voltage range of 4.75 to 30 V |                    |
| Insulation resistance                            |                  |                                                    | 50 MΩ min. (at 500 VDC) between current-carrying parts and case                                                       |              |                    |                       |                                                                                              |                    |
| Dielectric strength                              |                  |                                                    | 1,000 VAC for 1 min between current-carrying parts and case                                                           |              |                    |                       | 500 VAC 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 <sup>2</sup> 10 times each in X, Y, and Z directions                                           |              |                    |                       | Destruction: 500 m/s <sup>2</sup> 10 times each in X, Y, and Z directions                    |                    |
| Degree of protection                             |                  |                                                    | IEC 60529 IP67,<br>In-house standards: oil-resistant (For Sensor Head only)                                           |              |                    |                       | IEC 60529 IP64                                                                               |                    |
| Connection method                                |                  |                                                    | Pre-wired Models (Standard cable length: 2 m)                                                                         |              |                    |                       |                                                                                              |                    |
| Weight (packed state)                            |                  |                                                    | Approx. 45 g                                                                                                          |              |                    |                       |                                                                                              |                    |
| Materials                                        | Case             | Brass                                              |                                                                                                                       |              |                    |                       |                                                                                              |                    |
|                                                  | Sensing surface  | ABS                                                |                                                                                                                       |              |                    |                       |                                                                                              |                    |
|                                                  | Clamp-ing nut    | ---                                                |                                                                                                                       |              |                    | Brass (nickel-plated) | ---                                                                                          |                    |
|                                                  | Toothed washer   | ---                                                |                                                                                                                       |              |                    | Iron (zinc-plated)    | ---                                                                                          |                    |
| Accessories                                      |                  |                                                    | Amplifier Mounting Bracket, Instruction manual                                                                        |              |                    |                       | Instruction manual                                                                           |                    |

\*1. The response frequency is an average value.

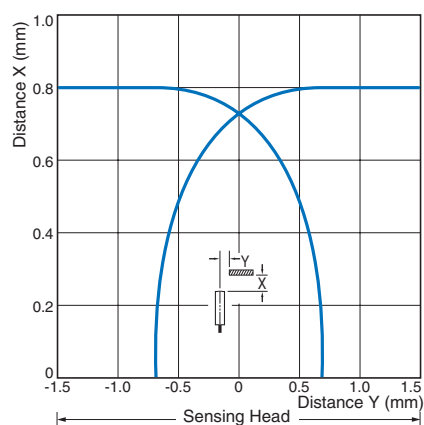
Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

\*2. Incorrect operation may occur if there is a large temperature difference between the Sensor Head and the Amplifier Unit.

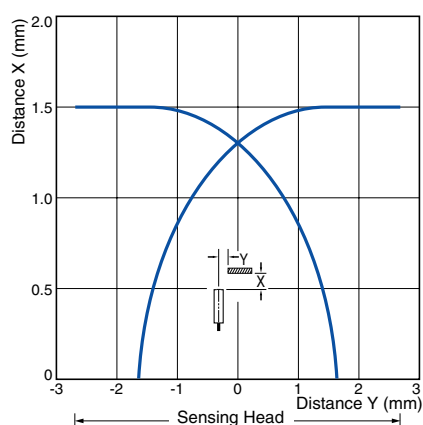
## Engineering Data (Typical)

### Sensing Area

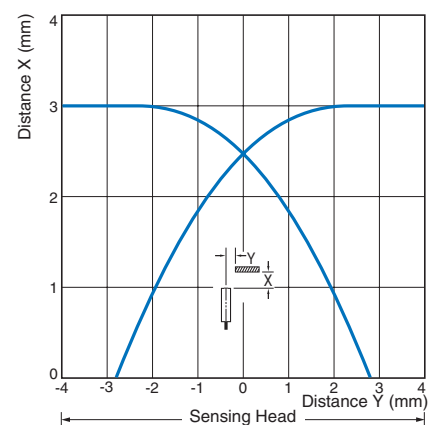
#### E2EC-CR8D1



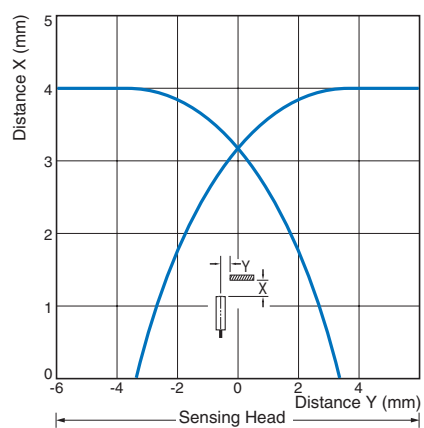
#### E2EC-C1R5D1



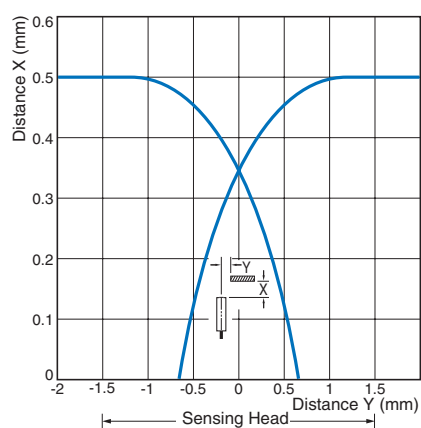
#### E2EC-C3D1



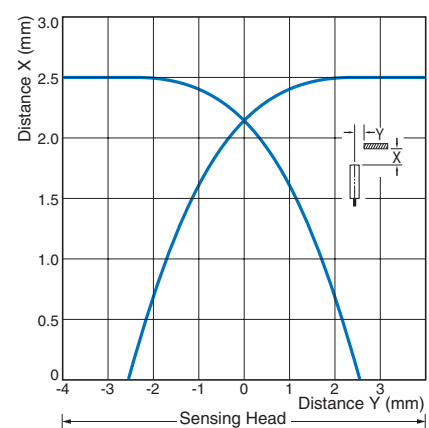
#### E2EC-X4D1



#### E2EC-CR5C1

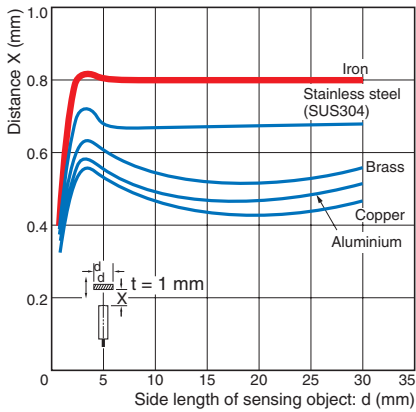


#### E2EC-C2R5C1

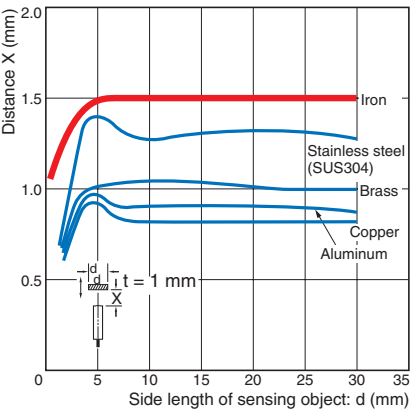


Influence of Sensing Object Size and Material

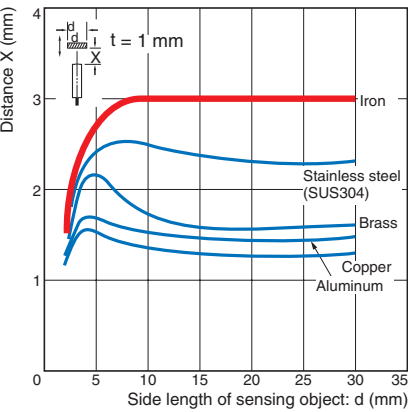
E2EC-CR8D1



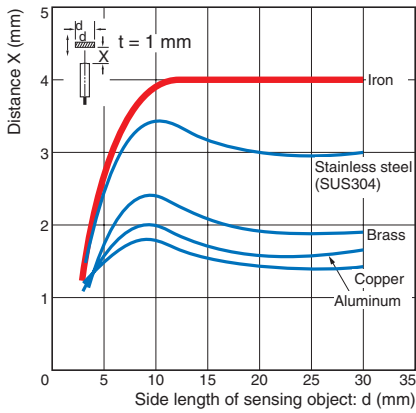
E2EC-C1R5D1



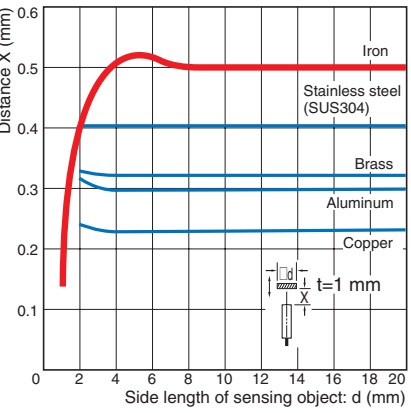
E2EC-C3D1



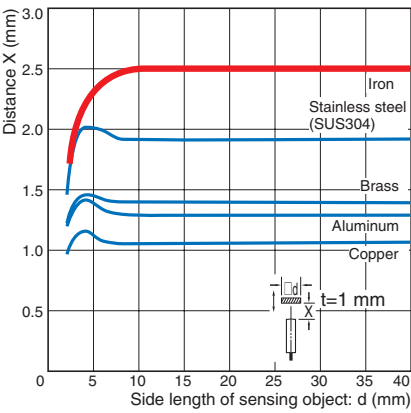
E2EC-X4D1



E2EC-CR5C1

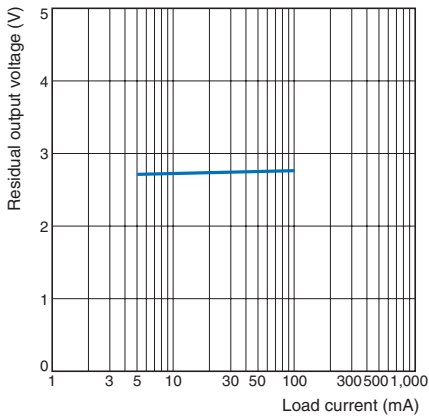


E2EC-C2R5C1



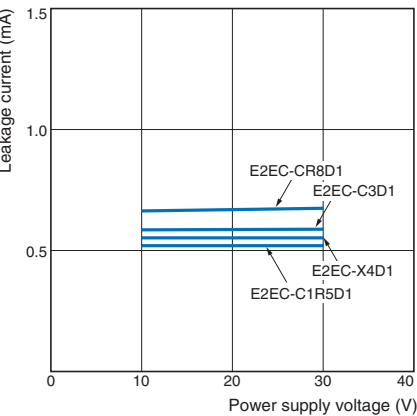
Residual Output Voltage

DC 2-Wire Models



Leakage Current

E2EC



## I/O Circuit Diagrams

### DC 2-Wire Models

| Operation | Model                                               | Timing Chart                                                                                                                                                                                                                                                                                                                | Output circuit                                                       |
|-----------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| NO        | E2EC-CR8D1<br>E2EC-C1R5D1<br>E2EC-C3D1<br>E2EC-X4D1 | <p>Non-sensing area    Unstable sensing area    Set position    Stable sensing area</p> <p>Sensing object</p> <p>Proximity Sensor</p> <p>(%)    100    70(TYP)    0</p> <p>Rated sensing distance</p> <p>ON    OFF    ON    OFF</p> <p>Setting indicator (green)</p> <p>Operation indicator (red)</p> <p>Control output</p> | <p>Note: The load can be connected to either the +V or 0 V side.</p> |
| NC        | E2EC-CR8D2<br>E2EC-C1R5D2<br>E2EC-C3D2<br>E2EC-X4D2 | <p>Non-sensing area    Sensing area</p> <p>Sensing object</p> <p>Proximity Sensor</p> <p>(%)    100    0</p> <p>Rated sensing distance</p> <p>ON    OFF    ON    OFF</p> <p>Operation indicator (red)</p> <p>Control output</p>                                                                                             | <p>Note: The load can be connected to either the +V or 0 V side.</p> |

### DC 3-Wire Models

| Operation | Model                     | Timing Chart                                                                                                                                                                                                                    | Output circuit                                                                                               |
|-----------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| NO        | E2EC-CR5C1<br>E2EC-C2R5C1 | <p>Non-sensing area    Sensing area</p> <p>Sensing object</p> <p>Proximity Sensor</p> <p>(%)    100    0</p> <p>Rated sensing distance</p> <p>ON    OFF    ON    OFF</p> <p>Operation indicator (red)</p> <p>Control output</p> | <p>Maximum load current: 100 mA</p> <p>Note: The Sensor may be destroyed if mistakes are made in wiring.</p> |

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.



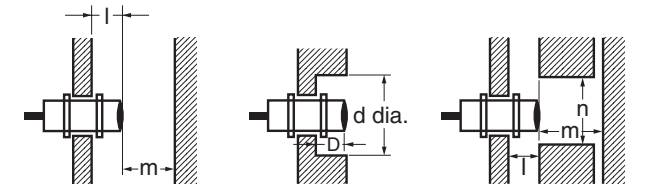
**Precautions for Correct Use**

Do not use this product under ambient conditions that exceed the ratings.

● Design

Influence of Surrounding Metal

When mounting the Sensor within a metal panel, ensure that the clearances given in the following table are maintained. Failure to maintain these distances may cause deterioration in the performance of the Sensor.



Influence of Surrounding Metal (Unit: mm)

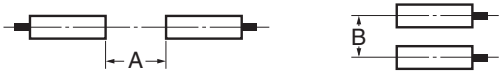
| Model       | Item | l | d   | D | m   | n    |
|-------------|------|---|-----|---|-----|------|
| E2EC-CR8D   |      | 0 | 3   | 0 | 2.4 | 6    |
| E2EC-C1R5D  |      |   | 5.4 |   | 4.5 | 10.8 |
| E2EC-C3D    |      |   | 8   |   | 9   | 16   |
| E2EC-X4D    |      |   | 12  |   | 12  | 24   |
| E2EC-CR5C1  |      |   | 3   |   | 1.5 | 5    |
| E2EC-C2R5C1 |      |   | 8   |   | 10  | 21   |

Influence of Temperature

Incorrect operation may occur if there is a large temperature difference between the Sensor Head and the Amplifier Unit.

Mutual Interference

When installing Sensors face-to-face or side-by-side, ensure that the minimum distances given in the following table are maintained.



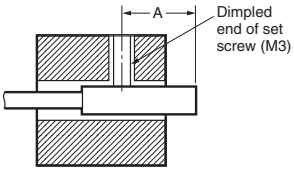
Mutual Interference (Unit: mm)

| Model       | Item | A       | B          |
|-------------|------|---------|------------|
| E2EC-CR8D□  |      | 18 (4)  | 6 (3)      |
| E2EC-C1R5D□ |      | 15 (8)  | 10.8 (5.4) |
| E2EC-C3D□   |      | 30 (15) | 16 (8)     |
| E2EC-X4D□   |      | 40 (20) | 24 (12)    |
| E2EC-CR5C1  |      | 20 (10) | 15 (3)     |
| E2EC-C2R5C1 |      | 40 (20) | 25 (15)    |

Note: Values in parentheses apply to Sensors operating at different frequencies.

● Mounting

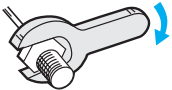
- Refer to the following table for the torque and tightening ranges applied to mount the E2EC-C Unthreaded Cylindrical Model. Tightening must be as given in the following table.



Permissible Tightening Range and Torque

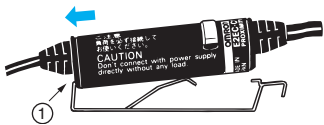
| Model       | Tightening | Set screw tightening |
|-------------|------------|----------------------|
| E2EC-CR8D□  | 6 to 10 mm | 0.49 N·m             |
| E2EC-C1R5D□ | 8 to 16 mm |                      |
| E2EC-C3D□   | 8 to 16 mm | 0.98 N·m             |
| E2EC-CR5C1  | 6 to 10 mm | 0.39 N·m             |
| E2EC-C2R5C1 | 8 to 16 mm |                      |

- The tightening torque applied to the E2EC-X4D□ Threaded Cylindrical Models must be 12 N·m max.

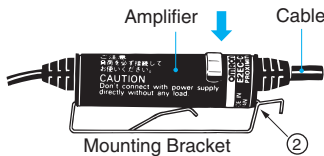


Amplifier Mounting Bracket for DC 2-Wire Models  
Mounting

- Insert the Amplifier into the trapezoidal end (i.e., the fixing side) of the Mounting Bracket.

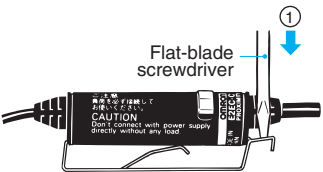


- Press the other end of the Amplifier onto the Bracket.

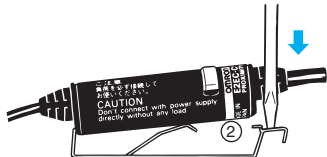


Dismounting

- Lightly press the hook on the Mounting Bracket with a flat-blade screwdriver.



- The Amplifier will be automatically released due to the spring force of the Mounting Bracket.

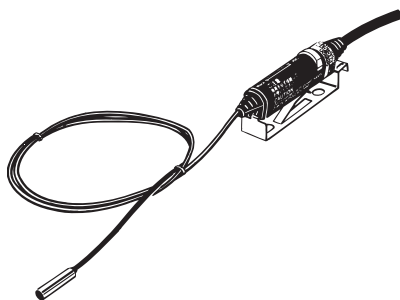


## Dimensions

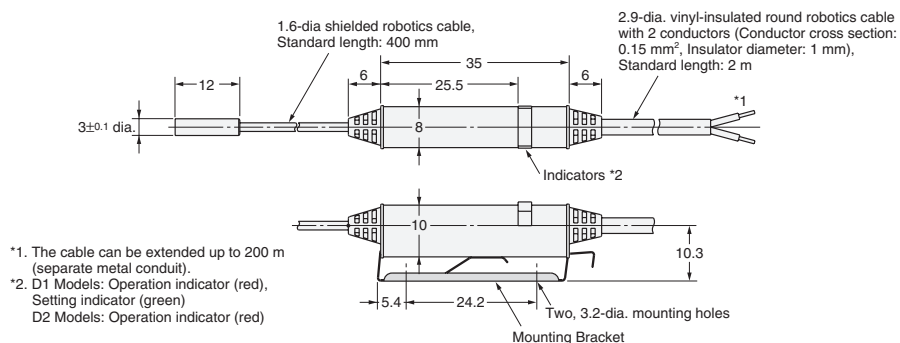
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

### Main Units

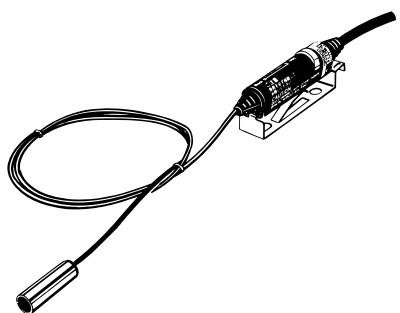
#### E2EC-CR8D□



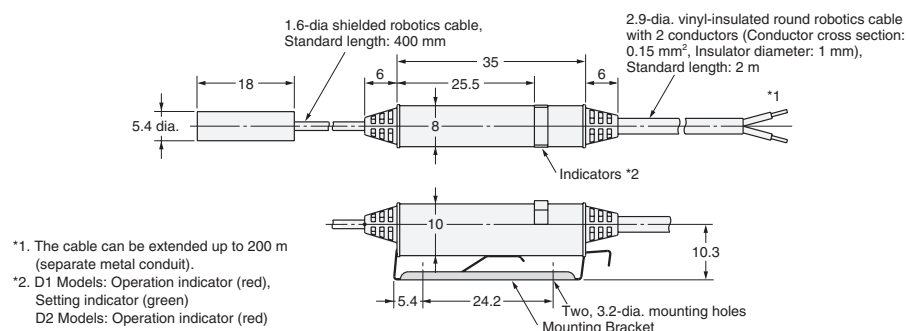
#### With Mounting Bracket Attached



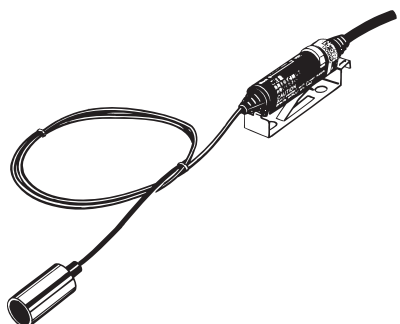
#### E2EC-C1R5D□



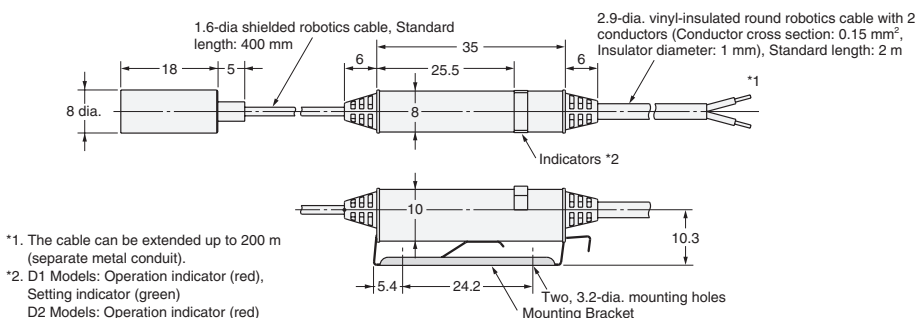
#### With Mounting Bracket Attached



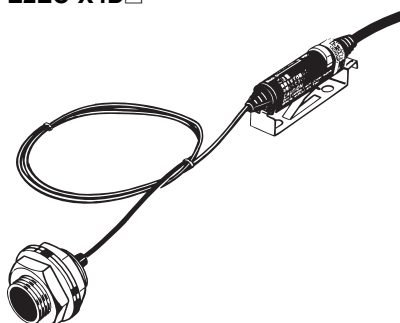
#### E2EC-C3D□



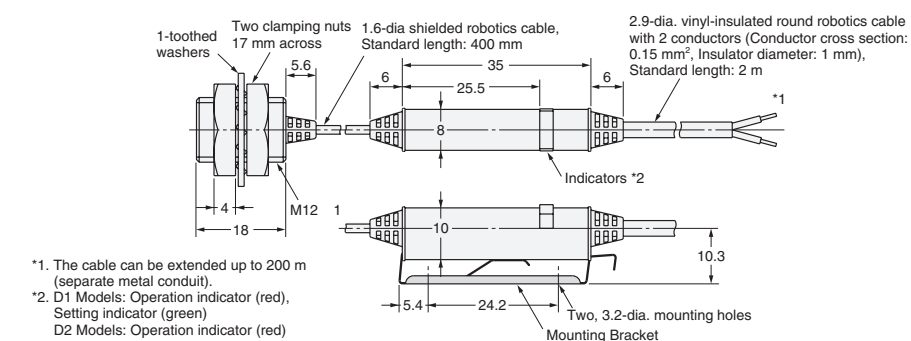
#### With Mounting Bracket Attached



#### E2EC-X4D□



#### With Mounting Bracket Attached

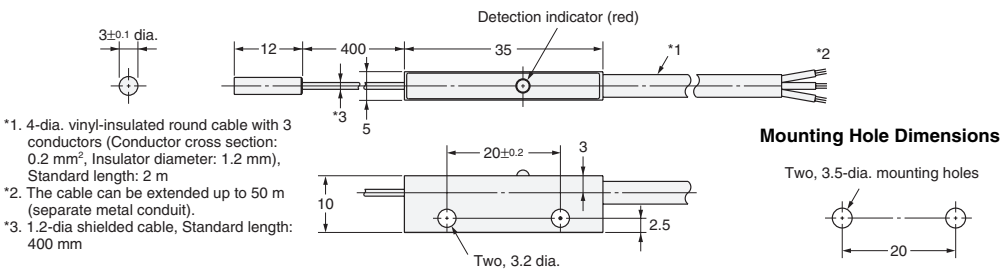
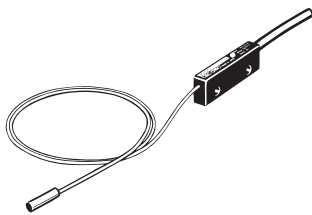


### Mounting Hole Dimensions

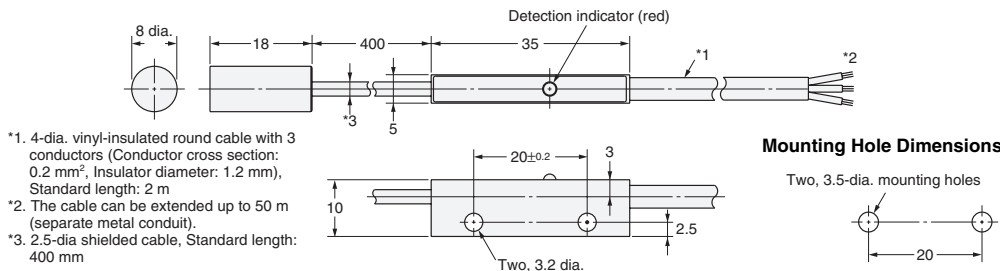
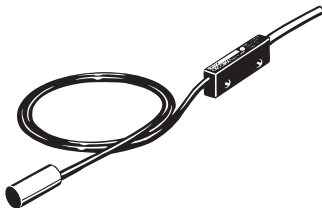


| Model       | F (mm)                |
|-------------|-----------------------|
| E2EC-CR8D□  | 3.3 $^{+0.3}_0$ dia.  |
| E2EC-C1R5D□ | 5.7 $^{+0.3}_0$ dia.  |
| E2EC-C3D□   | 8.5 $^{+0.5}_0$ dia.  |
| E2EC-X4D□   | 12.5 $^{+0.5}_0$ dia. |

E2EC-CR5C1



E2EC-C2R5C1

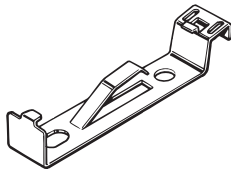


Mounting Hole Dimensions

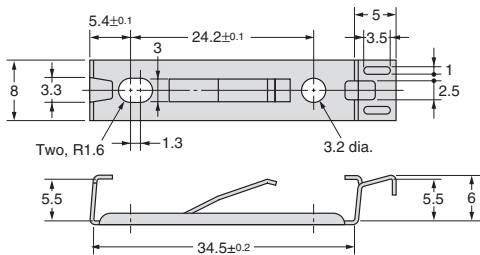


| Model       | F (mm)                                |
|-------------|---------------------------------------|
| E2EC-CR5C1  | 3.3 <sup>+0.3</sup> <sub>0</sub> dia. |
| E2EC-C2R5C1 | 8.5 <sup>+0.5</sup> <sub>0</sub> dia. |

Mounting Bracket



Material: Stainless steel (SUS301)  
Note: Provided with DC 2-Wire Models.



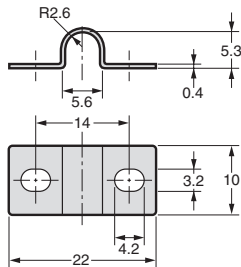
Accessories (Order Separately)

Mounting Bracket (for 5.4 dia.)

Y92E-F5R4



Material: Stainless steel (SUS304)  
Note: Used for E2EC-C1R5D□ Head.



## 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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OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

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## Application Considerations

### SUITABILITY FOR USE

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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