# Cable Amplifier Proximity Sensor

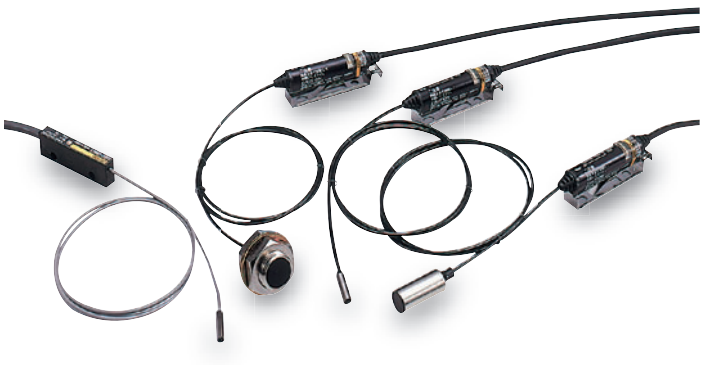
# E2EC

CSM_E2EC_DS_E_8_2

## 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.



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

## 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 *1 *2 |
| | 8 dia. | 2.5 mm | | E2EC-C2R5C1 2M *1 *2 |

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

### 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

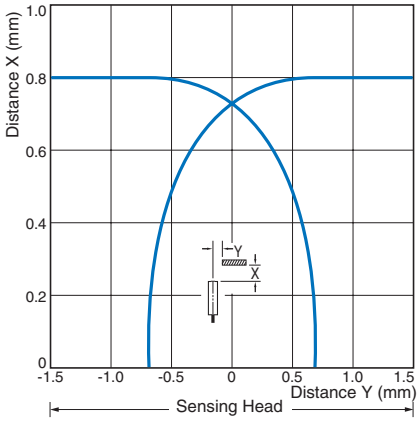
| Item | Model | DC 2-Wire Models | | | | DC 3-Wire Models | |
|---|---|---|---|---|---|---|---|
| | | E2EC-CR8D□ | E2EC-C1R5D□ | E2EC-C3D□ | E2EC-X4D□ | E2EC-CR5C1 | E2EC-C2R5C1 |
| Sensing distance | | 0.8 mm ±15% | 1.5 mm ±10% | 3 mm ±10% | 4 mm ±10% | 0.5 mm ±15% | 2.5 mm ±10% |
| Set distance | | 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 *Engineering Data* 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 *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/O Circuit Diagrams* on page 5 for details. | | | | NO<br>Refer to the timing charts under *I/O Circuit Diagrams* 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$^2$ 10 times each in X, Y, and Z directions | | | | Destruction: 500 m/s$^2$ 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 | | | | | |
| | Clamping 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.

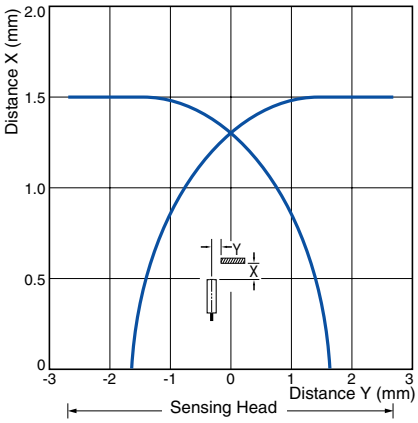
## Engineering Data (Reference Value)

### Sensing Area

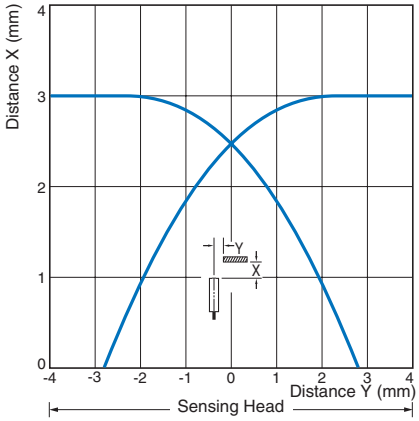
**E2EC-CR8D1**



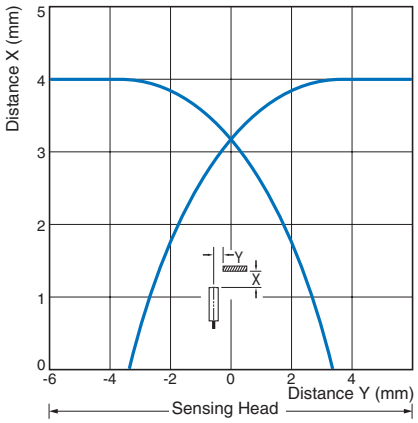

**E2EC-C1R5D1**



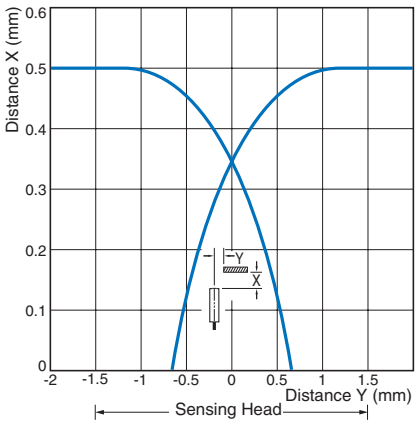

**E2EC-C3D1**



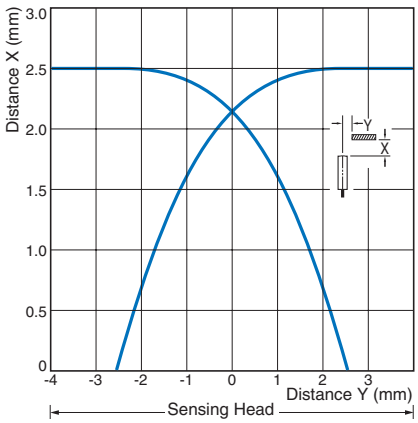

**E2EC-X4D1**




**E2EC-CR5C1**

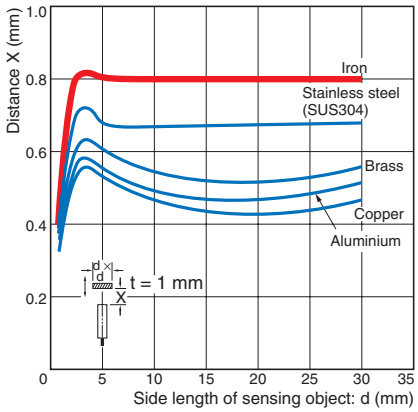



**E2EC-C2R5C1**

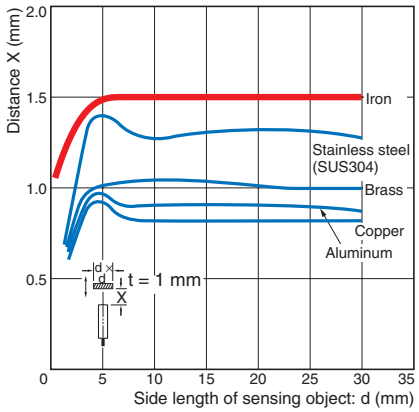


## Influence of Sensing Object Size and Material

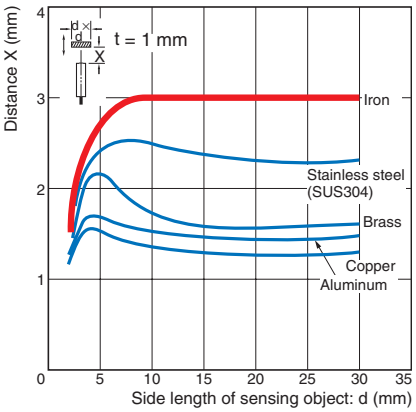
### E2EC-CR8D1



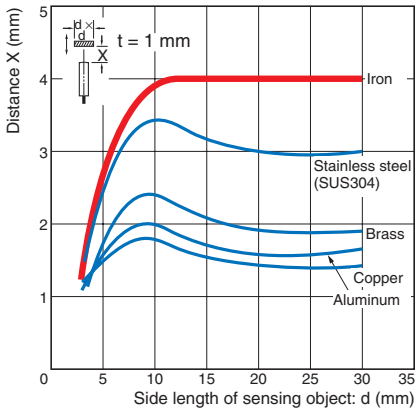

### E2EC-C1R5D1



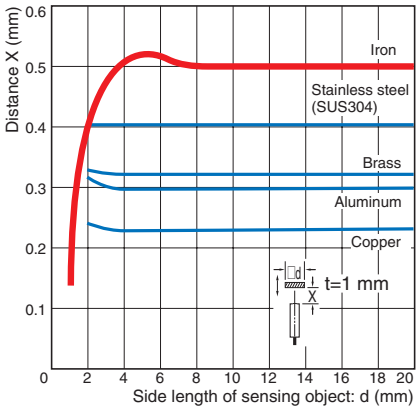

### E2EC-C3D1



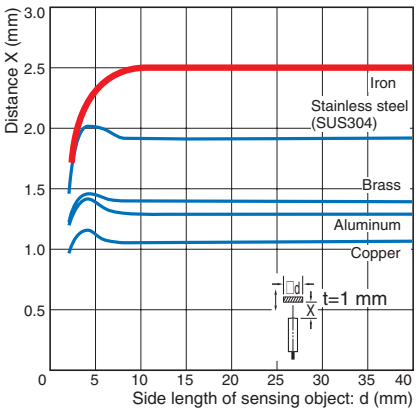

### E2EC-X4D1




### E2EC-CR5C1

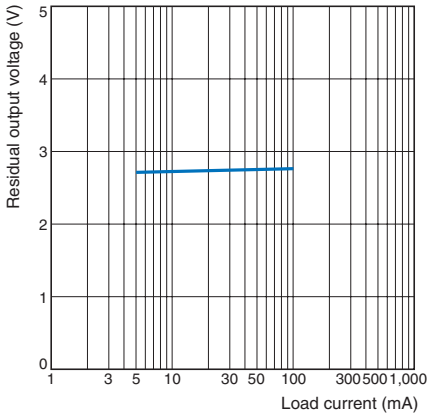



### E2EC-C2R5C1



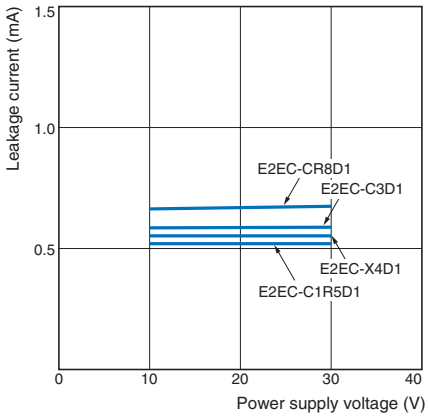

## Residual Output Voltage

### DC 2-Wire Models



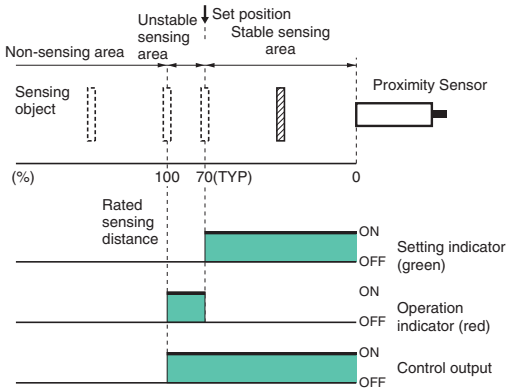
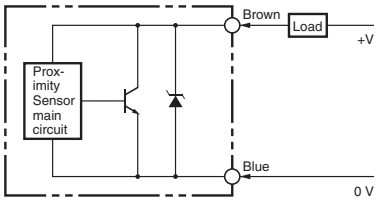
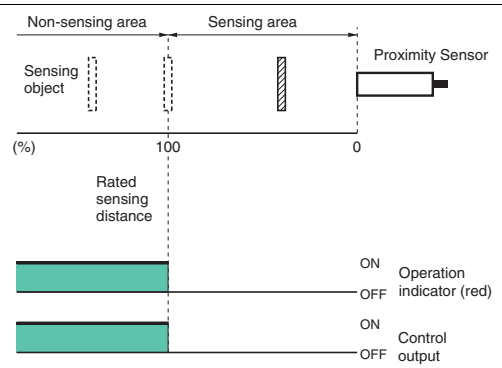

## Leakage Current

### E2EC

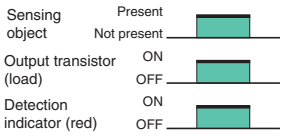
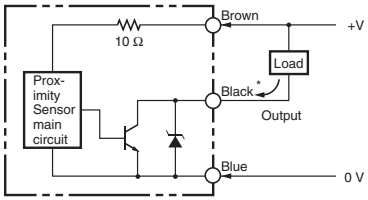


# I/O Circuit Diagrams

## DC 2-Wire Models

| Operation | Model | Timing Chart | Output circuit |
|---|---|---|---|
| NO | E2EC-CR8D1<br>E2EC-C1R5D1<br>E2EC-C3D1<br>E2EC-X4D1 |  |  <br>Note: The load can be connected to either the +V or 0 V side. |
| NC | E2EC-CR8D2<br>E2EC-C1R5D2<br>E2EC-C3D2<br>E2EC-X4D2 |  | |

## DC 3-Wire Models

| Operation | Model | Timing Chart | Output circuit |
|---|---|---|---|
| NO | E2EC-CR5C1<br>E2EC-C2R5C1 |  |  <br>Maximum load current: 100 mA<br>Note: The Sensor may be destroyed if mistakes are made in wiring. |

# 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.**

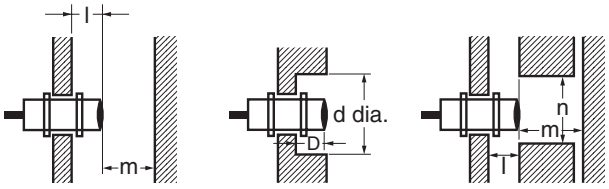
## Precautions for Correct Use

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.

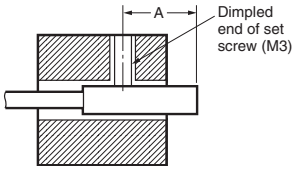

**Mutual Interference** (Unit: mm)

| Model / Item | A | B |
|---|---|---|
| E2EC-CR8D□ | 18 (4) *1 | 6 (3) *1 *2 |
| E2EC-C1R5D□ | 15 (8) *1 | 10.8 (5.4) *1 *2 |
| E2EC-C3D□ | 30 (15) *1 | 16 (8) *1 *2 |
| E2EC-X4D□ | 40 (20) *1 | 24 (12) *1 *2 |
| E2EC-CR5C1 | 20 (10) *1 | 15 (3) *1 *2 |
| E2EC-C2R5C1 | 40 (20) *1 | 25 (15) *1 |

*1. Values in parentheses apply to Sensors operating at different frequencies.
*2. Mutual interference will not occur for close-proximity mounting if models with different frequencies are used together.

### ● 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**

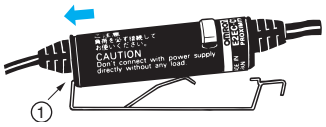
| Model | Tightening | Set screw tightening |
|---|---|---|
| E2EC-CR8D□ | 6 to 10 mm | 0.49 N·m |
| E2EC-C1R5D□ | 8 to 16 mm | |
| E2EC-C3D□ | | 0.98 N·m |
| E2EC-CR5C1 | 6 to 10 mm | 0.39 N·m |
| E2EC-C2R5C1 | 8 to 16 mm | |

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

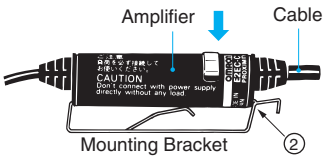
## Amplifier Mounting Bracket for DC 2-Wire Models

### Mounting

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

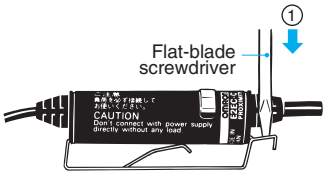



2. Press the other end of the Amplifier onto the Bracket.

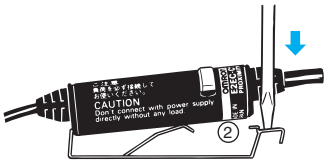



### Dismounting

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




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

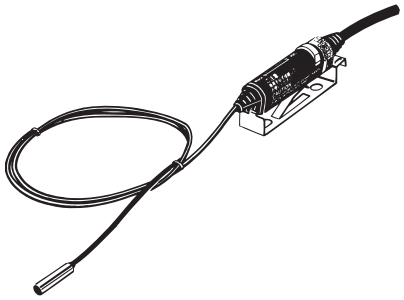


# Dimensions

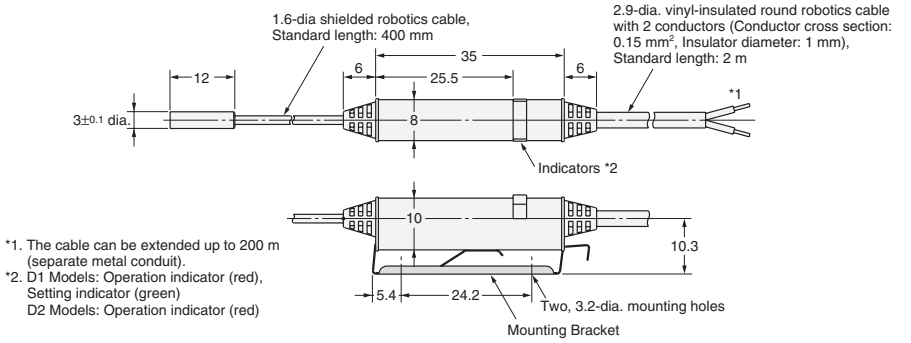
(Unit: mm)
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

## Main Units

### E2EC-CR8D□

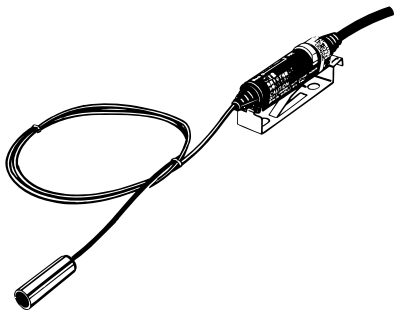


**With Mounting Bracket Attached**

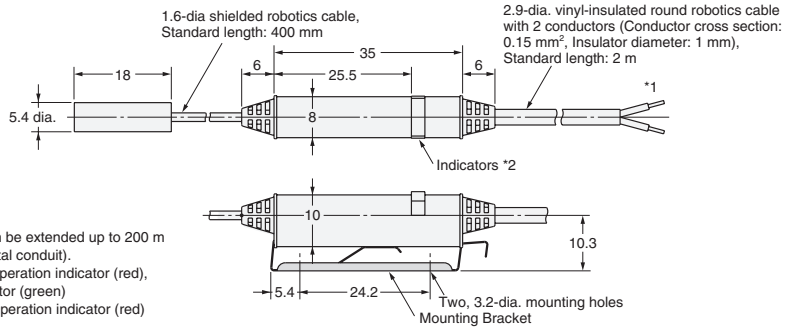



*1. The cable can be extended up to 200 m (separate metal conduit).
*2. D1 Models: Operation indicator (red), Setting indicator (green)
D2 Models: Operation indicator (red)

### E2EC-C1R5D□

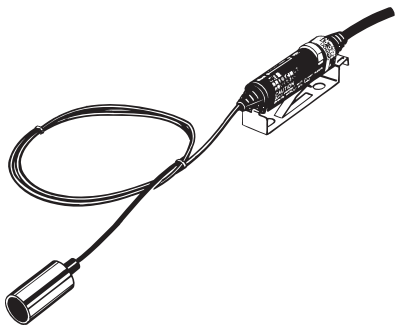


**With Mounting Bracket Attached**

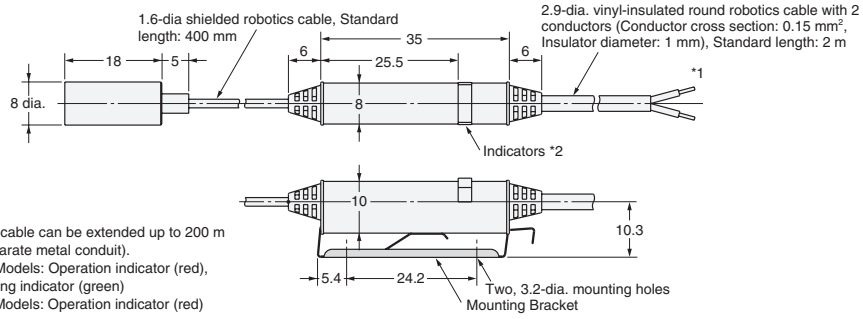



*1. The cable can be extended up to 200 m (separate metal conduit).
*2. D1 Models: Operation indicator (red), Setting indicator (green)
D2 Models: Operation indicator (red)

### E2EC-C3D□

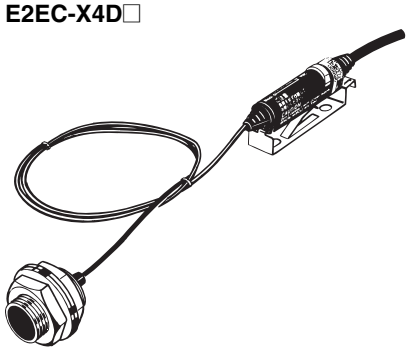


**With Mounting Bracket Attached**

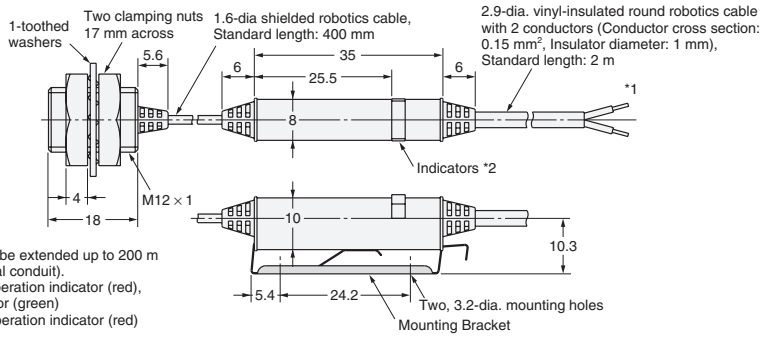



*1. The cable can be extended up to 200 m (separate metal conduit).
*2. D1 Models: Operation indicator (red), Setting indicator (green)
D2 Models: Operation indicator (red)

### E2EC-X4D□

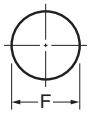


**With Mounting Bracket Attached**



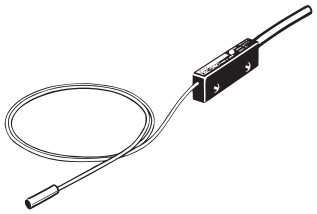

*1. The cable can be extended up to 200 m (separate metal conduit).
*2. D1 Models: Operation indicator (red), Setting indicator (green)
D2 Models: Operation indicator (red)

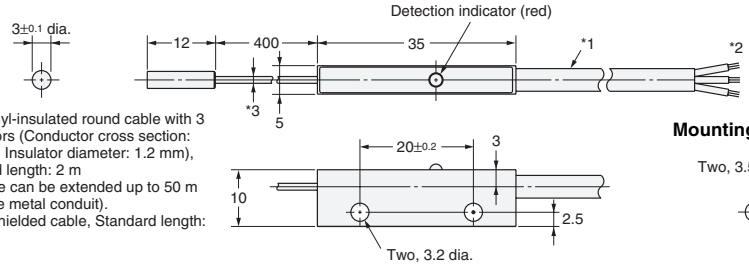
## Mounting Hole Dimensions




| 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. |

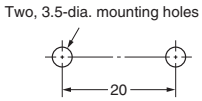
### E2EC-CR5C1



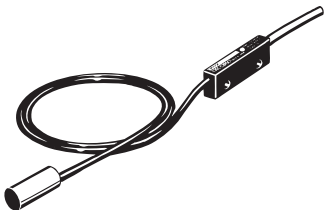


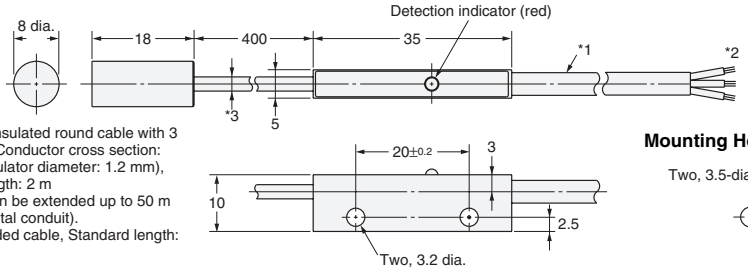

*1. 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm$^2$, Insulator diameter: 1.2 mm), Standard length: 2 m
*2. The cable can be extended up to 50 m (separate metal conduit).
*3. 1.2-dia shielded cable, Standard length: 400 mm

**Mounting Hole Dimensions**



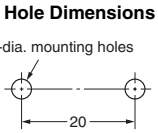

### E2EC-C2R5C1






*1. 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.2 mm$^2$, Insulator diameter: 1.2 mm), Standard length: 2 m
*2. The cable can be extended up to 50 m (separate metal conduit).
*3. 2.5-dia shielded cable, Standard length: 400 mm

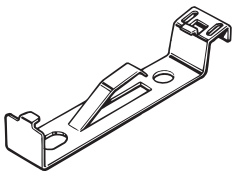
**Mounting Hole Dimensions**



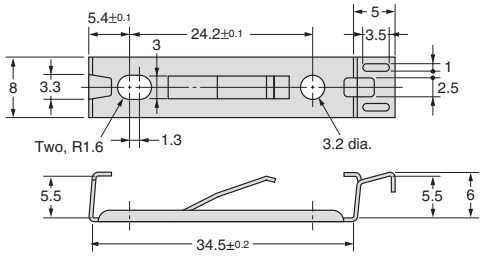

### Mounting Hole Dimensions


| Model | F (mm) |
|---|---|
| E2EC-CR5C1 | 3.3 $^{+0.3}_{0}$ dia. |
| E2EC-C2R5C1 | 8.5 $^{+0.5}_{0}$ dia. |

### Mounting Bracket



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

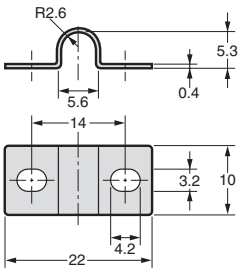



## Accessories (Order Separately)

### Mounting Bracket (for 5.4 dia.)

**Y92E-F5R4**

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



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2012.8

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