

# High Precision Positioning Inductive Proximity Sensor

## E2C-EDA

CSM\_E2C-EDA\_DS\_E\_8\_5

### Proximity Sensor with Separate Amplifier Enables Easily Making High-precision Sensitivity Settings.

- Wide variety of Sensor Heads to select according to the application. Flexible cables are used between Preamplifiers and Amplifier Units of the Sensor Heads.
- High resistance to changes in ambient temperature. Temperature characteristics of 0.08%/°C (for 5.4-dia. models).
- Make simple and reliable detection settings with micron-level precision using the teaching function.
- Check the sensing excess gain level on the digital display.
- Support for high-precision positioning and screening with fine positioning to maximize variations.
- The E2C-EDA0 supports an EtherCAT Sensor Communications Unit or CompoNet Sensor Communications Unit.



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

Be sure to read *Safety Precautions* on page 10.

## Ordering Information

**Sensors** [Refer to *Dimensions* on page 12.]

### Sensor Heads

| Type                                                                                | Appearance                                                                          |                                                                                     | Sensing distance                                                                    |        |      | Repeat accuracy                   | Cable specification               | Model       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------|------|-----------------------------------|-----------------------------------|-------------|
| Shielded                                                                            |  | 3 dia. × 18 mm                                                                      |  | 0.6 mm |      | 1 μm                              | Free cutting *2                   | E2C-EDR6-F  |
|                                                                                     |                                                                                     | 5.4 dia. × 18 mm                                                                    |  | 1 mm   |      | 1 μm                              | Standard *2                       | E2C-ED01    |
|                                                                                     |                                                                                     |                                                                                     |                                                                                     |        |      |                                   | Free cutting *2                   | E2C-ED01-F  |
|                                                                                     |                                                                                     |                                                                                     |                                                                                     |        |      |                                   | With Protective Spiral Tube *1 *2 | E2C-ED01-S  |
|                                                                                     |                                                                                     |                                                                                     |                                                                                     |        |      |                                   | Standard *2                       | E2C-ED02    |
|                                                                                     |                                                                                     | 8 dia. × 22 mm                                                                      |  | 2 mm   |      | 2 μm                              | Free cutting *2                   | E2C-ED02-F  |
|                                                                                     | With Protective Spiral Tube *1 *2                                                   |                                                                                     |                                                                                     |        |      |                                   | E2C-ED02-S                        |             |
|                                                                                     |  | M10 × 22 mm                                                                         |  | 2 mm   |      | 2 μm                              | Standard *2                       | E2C-EM02    |
|                                                                                     |                                                                                     |                                                                                     |                                                                                     |        |      |                                   | Free cutting *2                   | E2C-EM02-F  |
|                                                                                     |                                                                                     |                                                                                     |                                                                                     |        |      |                                   | With Protective Spiral Tube *1 *2 | E2C-EM02-S  |
|  | 30 × 14 × 4.8 mm                                                                    |  | 5 mm                                                                                |        | 2 μm | Standard *2                       | E2C-EV05                          |             |
|                                                                                     |                                                                                     |                                                                                     |                                                                                     |        |      | Free cutting *2                   | E2C-EV05-F                        |             |
|                                                                                     |                                                                                     |                                                                                     |                                                                                     |        |      | With Protective Spiral Tube *1 *2 | E2C-EV05-S                        |             |
| Unshielded                                                                          |  | M18 × 46.3 mm                                                                       |  | 7 mm   |      | 5 μm                              | Standard *2                       | E2C-EM07M   |
|                                                                                     |                                                                                     |                                                                                     |                                                                                     |        |      |                                   | Free cutting *2                   | E2C-EM07M-F |
|                                                                                     |                                                                                     |                                                                                     |                                                                                     |        |      |                                   | With Protective Spiral Tube *1 *2 | E2C-EM07M-S |
| Heat-resistant                                                                      |  | M12 × 22 mm                                                                         |  | 2 mm   |      | 2 μm                              | Standard *2                       | E2C-EM02H   |

\*1 Ask your OMRON representative for information on the Protective Spiral Tube.

\*2 Overall length of free-cut cable: 3.5 m, Length from the Sensor Head to the Preamplifier: 0.5 m (Overall length of the standard cable with Protective Spiral Tube: 2.5 m, Length from the Sensor Head to the Preamplifier: 2 m)

## Amplifier Units

### Amplifier Units with Cables

| Item            |                       | Appearance                                                                        | Functions                                                   | Model        |              |
|-----------------|-----------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------|--------------|--------------|
|                 |                       |                                                                                   |                                                             | NPN output   | PNP output   |
| Advanced models | Twin-output models    |  | Area output, open circuit detection, differential operation | E2C-EDA11 2M | E2C-EDA41 2M |
|                 | External-input models |                                                                                   | Remote setting, differential operation                      | E2C-EDA21 2M | E2C-EDA51 2M |

### Amplifier Units with Wire-saving Connectors (An Amplifier Unit Connector (sold separately) is required.)

| Item            |                       | Appearance                                                                        | Functions                                                   | Model      |            |
|-----------------|-----------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------|------------|------------|
|                 |                       |                                                                                   |                                                             | NPN output | PNP output |
| Advanced models | Twin-output models    |  | Area output, open circuit detection, differential operation | E2C-EDA6   | E2C-EDA8   |
|                 | External-input models |                                                                                   | Remote setting, differential operation                      | E2C-EDA7   | E2C-EDA9   |

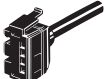
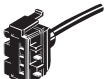
**Note:** These models allow you to use an E3X-DRT21-S VER.3 Sensor Communications Unit. When using the E3X-DRT21-S VER.3, use an E3X-CN02 Connector without a Cable for the Wire-saving Connector.

### Amplifier Unit with Connector for EtherCAT or CompoNet Sensor Communications Units [Refer to Dimensions page 16]

| Item           |                   | Appearance                                                                        | Functions                                                   | Model    | Applicable Sensor Communications Unit |
|----------------|-------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------|----------|---------------------------------------|
| Advanced model | Twin-output model |  | Area output, open circuit detection, differential operation | E2C-EDA0 | E3X-ECT                               |
|                |                   |                                                                                   |                                                             |          | E3X-CRT                               |

## Wire-saving Connectors (Order Separately)

**Note:** Protector seals provided. [Refer to E3X-DA-S/MDA.]

| Item             | Appearance                                                                          | Cable length | No. of conductors | Model    |
|------------------|-------------------------------------------------------------------------------------|--------------|-------------------|----------|
| Master Connector |  | 2 m          | 4                 | E3X-CN21 |
| Slave Connector  |  |              | 2                 | E3X-CN22 |

### Ordering Precaution for Amplifier Units with Wire-saving Connectors

A Connector is not provided with the Amplifier Unit.  
Refer to the following tables when ordering.

| Amplifier Unit  |            |            | + | Applicable Connector (Order Separately) |                 |
|-----------------|------------|------------|---|-----------------------------------------|-----------------|
| Model           | NPN output | PNP output |   | Master Connector                        | Slave Connector |
| Advanced models | E2C-EDA6   | E2C-EDA8   | + | E3X-CN21                                | E3X-CN22        |
|                 | E2C-EDA7   | E2C-EDA9   |   |                                         |                 |

When Using 5 Amplifier Units

|                           |   |                    |                    |
|---------------------------|---|--------------------|--------------------|
| Amplifier Units (5 Units) | + | 1 Master Connector | 4 Slave Connectors |
|---------------------------|---|--------------------|--------------------|

**Mobile Console (Order Separately)** [Refer to E3X-DA-S/MDA.]

| Appearance                                                                        | Model                                        | Remarks                                                                 |
|-----------------------------------------------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------|
|  | <b>E3X-MC11-SV2</b><br>(model number of set) | Mobile Console with Head, Cable, and AC adapter provided as accessories |
|  | <b>E3X-MC11-C1-SV2</b>                       | Mobile Console                                                          |
|  | <b>E3X-MC11-H1</b>                           | Head                                                                    |
|  | <b>E39-Z12-1</b>                             | Cable (1.5 m)                                                           |

**Note:** Use the E3X-MC11-SV2 Mobile Console with E2C-EDA-series Amplifier Units. If you use a Mobile Console like the E3X-MC11-S, some functions may not operate. For details, refer to *Ratings and Specifications* for E3X-DA-S/MDA.

**Accessories (Order Separately)****Mounting Bracket**

A Mounting Bracket is not provided with the Amplifier Unit. Order a Mounting Bracket separately if required.

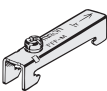
[Refer to E39-L, F39-L, E39-S, and E39-R.]

| Appearance                                                                          | Model           | Quantity |
|-------------------------------------------------------------------------------------|-----------------|----------|
|  | <b>E39-L143</b> | 1        |

**End Plate**

An End Plate is not provided with the Amplifier Unit. Order an End Plate separately if required.

[Refer to PFP-□.]

| Appearance                                                                          | Model        | Quantity |
|-------------------------------------------------------------------------------------|--------------|----------|
|  | <b>PFP-M</b> | 1        |

**Extension Cables for Sensor Head**

An Extension Cable is not provided with the Amplifier Unit. Order an Extension Cable separately if required.

[Refer to Dimensions on page 13.]

| Cable length | Model           | Quantity |
|--------------|-----------------|----------|
| 2 m          | <b>E22-XC2R</b> | 1        |
| 7 m          | <b>E22-XC7R</b> |          |

## Rating and Specifications

### Sensor Heads

| Model                         |                            | E2C-EDR6-F                                                                                                                                            | E2C-ED01(-□)                                  | E2C-ED02(-□)    | E2C-EM02(-□) | E2C-EM07(-□)        | E2C-EV05(-□)     | E2C-EM02H         |                     |
|-------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------|--------------|---------------------|------------------|-------------------|---------------------|
| Item                          |                            | 3 dia. × 18 mm                                                                                                                                        | 5.4 dia. × 18 mm                              | 8 dia. × 22 mm  | M10 × 22 mm  | M18 × 46.3 mm       | 30 × 14 × 4.8 mm | M12 × 22 mm       |                     |
| Sensing distance              |                            | 0.6 mm                                                                                                                                                | 1 mm                                          | 2 mm            |              | 7 mm                | 5 mm             | 2 mm              |                     |
| Sensing object                |                            | Magnetic metal<br>(The sensing distance will decrease when sensing non-magnetic metal. Refer to <i>Engineering Data (Reference Value)</i> on page 6.) |                                               |                 |              |                     |                  |                   |                     |
| Standard sensing object       |                            | 5 × 5 × 3 mm                                                                                                                                          |                                               | 10 × 10 × 3 mm  |              | 22 × 22 × 3 mm      | 15 × 15 × 3 mm   | 20 × 20 × 3 mm    |                     |
|                               |                            | Material: iron (S50C)                                                                                                                                 |                                               |                 |              |                     |                  |                   |                     |
| Repeat accuracy *1            |                            | 1 μm                                                                                                                                                  |                                               | 2 μm            |              | 5 μm                | 2 μm             |                   |                     |
| Hysteresis distance           |                            | Variable                                                                                                                                              |                                               |                 |              |                     |                  |                   |                     |
| Temperature characteristic *1 | Sensor Head                | 0.3%/°C                                                                                                                                               | 0.08%/°C                                      |                 |              |                     | 0.04%/°C         | 0.2%/°C           |                     |
|                               | Preamplifier and Amplifier | 0.08%/°C                                                                                                                                              |                                               |                 |              |                     |                  |                   |                     |
| Ambient temperature *2        | Operating                  | −10°C to 60°C (with no icing or condensation)                                                                                                         |                                               |                 |              |                     |                  | −10°C to 200°C *3 |                     |
|                               | Storage                    | −10°C to 60°C<br>(with no icing or condensation)                                                                                                      | −20°C to 70°C (with no icing or condensation) |                 |              |                     |                  |                   |                     |
| Ambient humidity              |                            | Operating/storage: 35% to 85% (with no condensation)                                                                                                  |                                               |                 |              |                     |                  |                   |                     |
| Insulation resistance         |                            | 50 MΩ min. (at 500 VDC)                                                                                                                               |                                               |                 |              |                     |                  |                   |                     |
| Dielectric strength           |                            | 1,000 VAC at 50/60 Hz for 1 min between current carry 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: 500 m/s <sup>2</sup> for 3 times each in X, Y, and Z directions                                                                          |                                               |                 |              |                     |                  |                   |                     |
| Degree of protection          |                            | IEC60529 IP67                                                                                                                                         |                                               |                 |              |                     |                  | IEC60529 IP60 *4  |                     |
| Connection method             |                            | Connector (standard cable length: 2.5 m (2 m between Head and Preamplifier)<br>“-F” model cable length: 3.5 m (0.5 m between Head and Preamplifier)   |                                               |                 |              |                     |                  |                   |                     |
| Weight (packed state)         |                            | Approx. 120 g (Models with protective spiral tube (“-S” models) are approx. 90 g heavier.)                                                            |                                               |                 |              |                     |                  |                   |                     |
| Material                      | Sensor Head                | Case                                                                                                                                                  | Brass                                         | Stainless steel | Brass        |                     | Zinc             | Brass             |                     |
|                               |                            | Sensing surface                                                                                                                                       | Heat-resistant ABS                            |                 |              |                     |                  | PEEK              |                     |
|                               |                            | Clamping nut                                                                                                                                          | ---                                           |                 |              | Nickel-plated brass |                  | ---               | Nickel-plated brass |
|                               |                            | Toothed washer                                                                                                                                        | ---                                           |                 |              | Zinc-plated iron    |                  | ---               | Zinc-plated iron    |
|                               | Preamplifier               | PES                                                                                                                                                   |                                               |                 |              |                     |                  |                   |                     |
| Accessories                   |                            | Preamplifier Mounting Brackets, Instruction Manual                                                                                                    |                                               |                 |              |                     |                  |                   |                     |

\*1 The repeat accuracy and temperature characteristic are for a standard sensing object positioned midway through the rated sensing distance.

\*2 A sudden temperature rise even within the rated temperature range may degrade characteristics.

\*3 For the Sensor Head only without the preamplifier (-10 to 60°C). With no icing or condensation.

\*4 Do not operate in areas exposed to water vapor because the enclosure is not waterproof.

## Amplifier Units

| Type                               |                                | Advanced Models with Twin Outputs                                                                                                                                                                                                                                                                                                                                                           |                                  |                                                                                       | Advanced Models with External Inputs                                                       |                                  |
|------------------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------|
|                                    |                                | Pre-wired Model                                                                                                                                                                                                                                                                                                                                                                             | Model with Wire-saving Connector | Model for Sensor Communications Unit                                                  | Pre-wired Model                                                                            | Model with Wire-saving Connector |
| Model                              | NPN output                     | E2C-EDA11                                                                                                                                                                                                                                                                                                                                                                                   | E2C-EDA6                         | E2C-EDA0 *1                                                                           | E2C-EDA21                                                                                  | E2C-EDA7                         |
| Item                               | PNP output                     | E2C-EDA41                                                                                                                                                                                                                                                                                                                                                                                   | E2C-EDA8                         |                                                                                       | E2C-EDA51                                                                                  | E2C-EDA9                         |
| Supply voltage                     |                                | 12 to 24 VDC ±10%, ripple (p-p): 10% max.                                                                                                                                                                                                                                                                                                                                                   |                                  |                                                                                       |                                                                                            |                                  |
| Power consumption                  |                                | 1,080 mW max. (current consumption: 45 mA at power supply voltage of 24 VDC)                                                                                                                                                                                                                                                                                                                |                                  |                                                                                       |                                                                                            |                                  |
| Control output                     |                                | Load power supply voltage: 26.4 VDC max.; NPN/PNP open collector output; load current: 50 mA max. (residual voltage: 1 V max.)                                                                                                                                                                                                                                                              |                                  |                                                                                       |                                                                                            |                                  |
| Response time                      | Super-high-speed mode *2       | 150 μs for operation and reset respectively                                                                                                                                                                                                                                                                                                                                                 |                                  | ---                                                                                   | 150 μs for operation and reset respectively                                                |                                  |
|                                    | High-speed mode                | 300 μs for operation and reset respectively                                                                                                                                                                                                                                                                                                                                                 |                                  |                                                                                       |                                                                                            |                                  |
|                                    | Standard mode                  | 1 ms for operation and reset respectively                                                                                                                                                                                                                                                                                                                                                   |                                  |                                                                                       |                                                                                            |                                  |
|                                    | High-resolution mode           | 4 ms for operation and reset respectively                                                                                                                                                                                                                                                                                                                                                   |                                  |                                                                                       |                                                                                            |                                  |
| Functions                          | Differential detection         | Switchable between single edge and double edge detection mode<br>Single edge: Can be set to 300 μs, 500 μs, 1 ms, 10 ms, or 100 ms<br>Double edge: Can be set to 500 μs, 1 ms, 2 ms, 20 ms, or 200 ms.                                                                                                                                                                                      |                                  |                                                                                       |                                                                                            |                                  |
|                                    | Timer function                 | Select from OFF-delay, ON-delay, or one-shot timer.<br>1 ms to 5 s (1 to 20 ms set in 1-ms increments, 20 to 200 ms set in 10-ms increments, 200 ms to 1 s set in 100-ms increments, and 1 to 5 s set in 1 s-increments)                                                                                                                                                                    |                                  |                                                                                       |                                                                                            |                                  |
|                                    | Zero-reset                     | Negative values can be displayed.<br>Zero-reset is accompanied by a change of detection distance.<br>After zero-reset, some threshold level may also cause a change of the indication by influence of other settings.                                                                                                                                                                       |                                  |                                                                                       |                                                                                            |                                  |
|                                    | Initial reset                  | Settings can be returned to defaults as required.                                                                                                                                                                                                                                                                                                                                           |                                  |                                                                                       |                                                                                            |                                  |
|                                    | Mutual interference prevention | Possible for up to 5 Units. *2<br>Intermittent oscillation method (Response time = (number of Units connected + 1) ×15 ms)                                                                                                                                                                                                                                                                  |                                  |                                                                                       |                                                                                            |                                  |
|                                    | Hysteresis settings            | Setting range: 10 to 2,000                                                                                                                                                                                                                                                                                                                                                                  |                                  |                                                                                       |                                                                                            |                                  |
|                                    | I/O settings                   | Output setting (Select from channel 2 output, area output, self-diagnosis, or open circuit detection.)                                                                                                                                                                                                                                                                                      |                                  |                                                                                       | Input setting (Select from teaching, fine positioning, zero-reset, synchronous detection.) |                                  |
| Digital display                    |                                | Select from the following: Incident level + threshold, incident level percentage +threshold, incident light peak level + incident light bottom level (updated with output), long bar display, incident level + peak hold, incident level + channel                                                                                                                                          |                                  |                                                                                       |                                                                                            |                                  |
| Display orientation                |                                | Switching between normal/reversed display is possible.                                                                                                                                                                                                                                                                                                                                      |                                  |                                                                                       |                                                                                            |                                  |
| Ambient temperature *3             |                                | Operating:<br>When connecting 1 to 2 Units: −10°C to 55°C, When connecting 3 to 5 Units: −10°C to 50°C, When connecting 6 to 16 Units: −10°C to 45°C<br><br>When used in combination with an EDR6-F<br>When connecting 3 to 4 Units: −10°C to 50°C, When connecting 5 to 8 Units: −10°C to 45°C, When connecting 9 to 16 Units: −10°C to 40°C<br><br>Storage: −20°C to 70°C (with no icing) |                                  |                                                                                       |                                                                                            |                                  |
| Ambient humidity                   |                                | Operating/storage: 35% to 85% (with no condensation)                                                                                                                                                                                                                                                                                                                                        |                                  |                                                                                       |                                                                                            |                                  |
| Insulation resistance              |                                | 20 MΩ min. (at 500 VDC)                                                                                                                                                                                                                                                                                                                                                                     |                                  |                                                                                       |                                                                                            |                                  |
| Dielectric strength                |                                | 1,000 VAC at 50/60 Hz for 1 min                                                                                                                                                                                                                                                                                                                                                             |                                  |                                                                                       |                                                                                            |                                  |
| Vibration resistance (Destruction) |                                | 10 to 55 Hz with a 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions                                                                                                                                                                                                                                                                                                       |                                  | 10 to 150 Hz with a 0.7-mm double amplitude for 80 min each in X, Y, and Z directions | 10 to 55 Hz with a 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions      |                                  |
| Shock resistance (Destruction)     |                                | 500 m/s <sup>2</sup> for 3 times each in X, Y, and Z directions                                                                                                                                                                                                                                                                                                                             |                                  | 150 m/s <sup>2</sup> for 3 times each in X, Y, and Z directions                       | 500 m/s <sup>2</sup> for 3 times each in X, Y, and Z directions                            |                                  |
| Degree of protection               |                                | IEC60529 IP50                                                                                                                                                                                                                                                                                                                                                                               |                                  |                                                                                       |                                                                                            |                                  |
| Connection method                  |                                | Pre-wired                                                                                                                                                                                                                                                                                                                                                                                   | Wire-saving connector            | Connector for Sensor Communications Unit                                              | Pre-wired                                                                                  | Wire-saving connector            |
| Weight (packed state)              |                                | Approx. 100 g                                                                                                                                                                                                                                                                                                                                                                               | Approx. 55 g                     | Approx. 55 g                                                                          | Approx. 100 g                                                                              | Approx. 55 g                     |
| Material                           | Case                           | PBT (polybutylene terephthalate)                                                                                                                                                                                                                                                                                                                                                            |                                  |                                                                                       |                                                                                            |                                  |
|                                    | Cover                          | Polycarbonate                                                                                                                                                                                                                                                                                                                                                                               |                                  |                                                                                       |                                                                                            |                                  |

\*1 This model allow you to use an E3X-ECT EtherCAT Sensor Communications Unit or E3X-CRT CompoNet Sensor Communications Unit.

\*2 Communications functions, mutual interference prevention, and communications with the Mobile Console are all disabled if the detection mode is set to the super-high-speed mode.

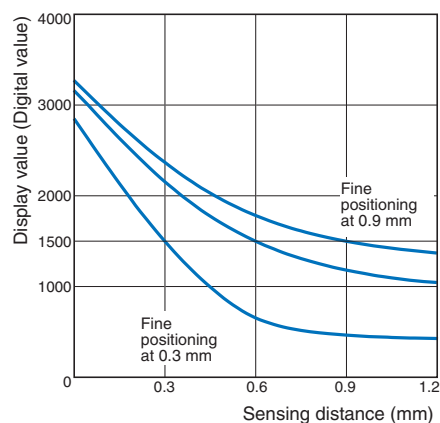
\*3 The following temperature ranges apply for operation when an E3X-ECT or E3X-CRT Sensor Communications Unit is used with the E2C-EDA0: Groups of 1 or 2 Amplifier Units: 0 to  $55^{\circ}\text{C}$ , Groups of 3 to 5 Amplifier Units: 0 to  $50^{\circ}\text{C}$ , Groups of 6 to 16 Amplifier Units: 0 to  $45^{\circ}\text{C}$ , Groups of 17 to 30 Amplifier Units (with the E3X-ECT): 0 to  $40^{\circ}\text{C}$ .

The following temperature ranges apply when an E3X-ECT or E3X-CRT Sensor Communications Unit is used with the E2C-EDR6-F: Groups of 3 or 4 Amplifier Units: 0 to  $50^{\circ}\text{C}$ , Groups of 5 to 8 Amplifier Units: 0 to  $45^{\circ}\text{C}$ , Groups of 9 to 16 Amplifier Units: 0 to  $40^{\circ}\text{C}$ , Groups of 17 to 30 Amplifier Units (with the E3X-ECT): 0 to  $35^{\circ}\text{C}$ .

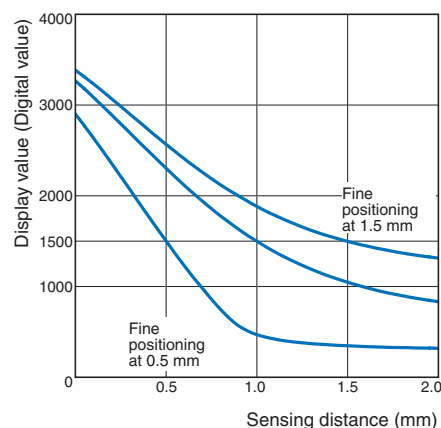
# Engineering Data (Reference Value)

## Sensing Distance vs. Display Values

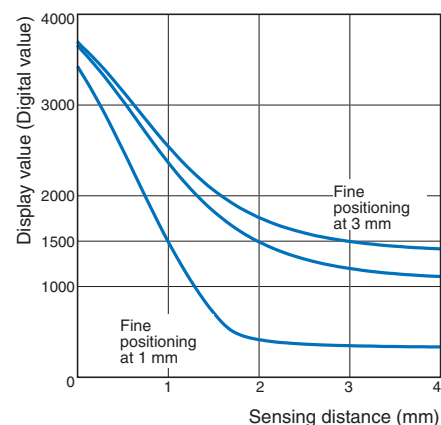
E2C-EDR6-F



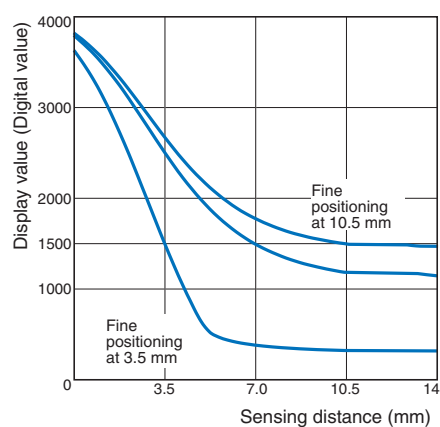
E2C-ED01(-□)



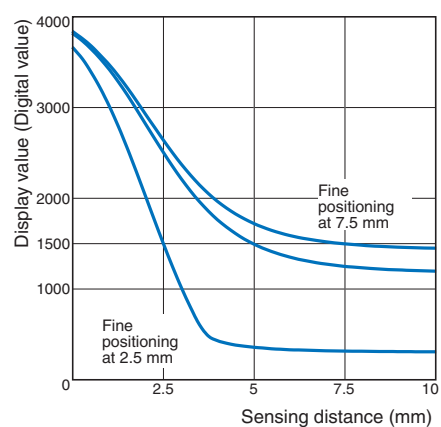
E2C-ED02(-□)/EM02(-□)



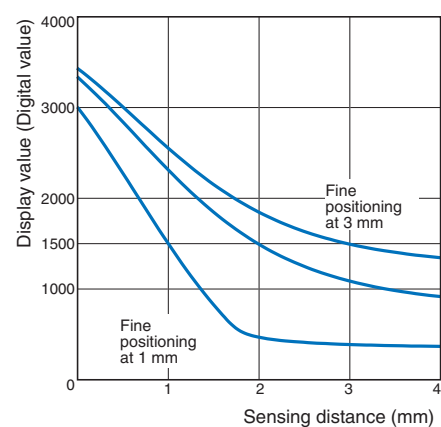
E2C-EM07(-□)



E2C-EV05(-□)

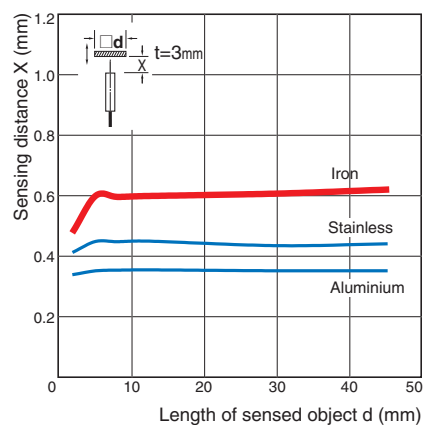


E2C-EM02H

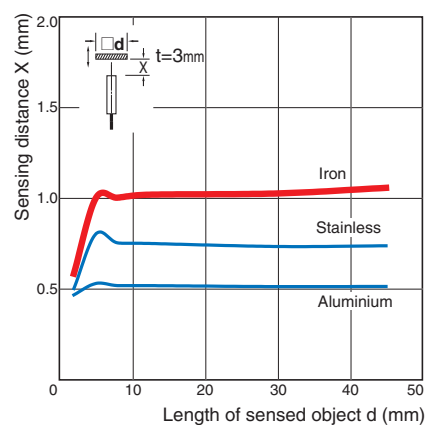


## Influence of Sensing Object Size and Material

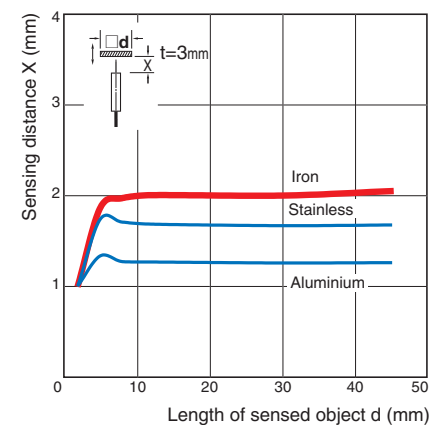
E2C-EDR6-F

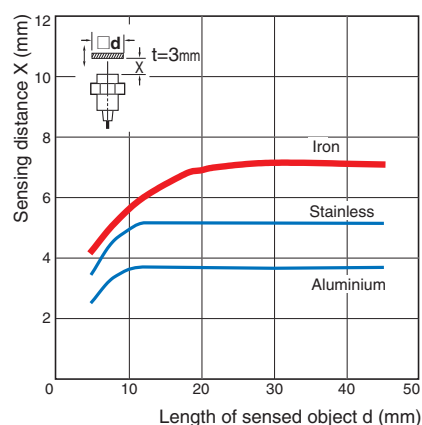
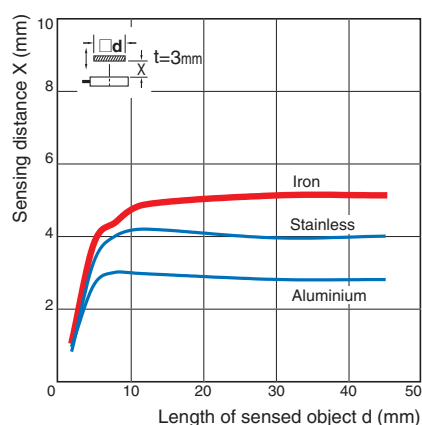
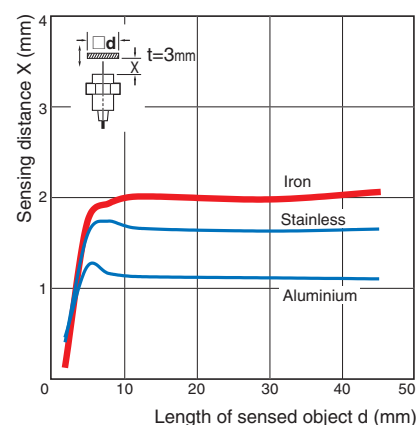
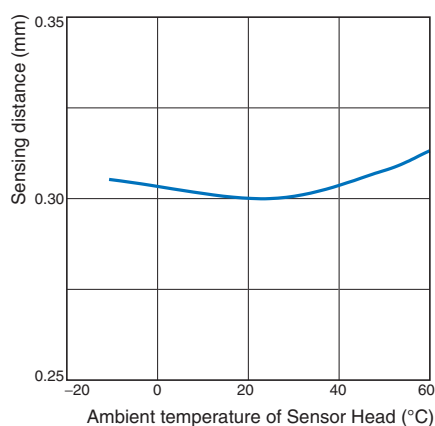
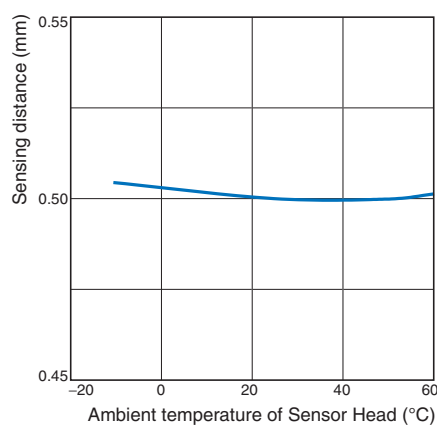
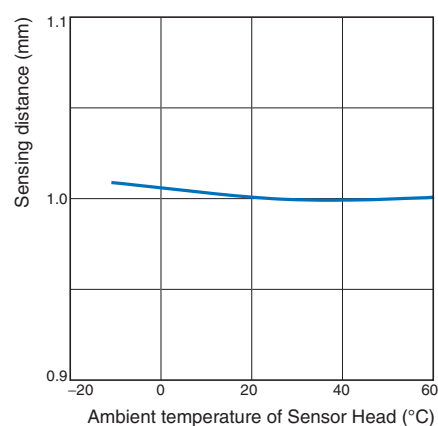
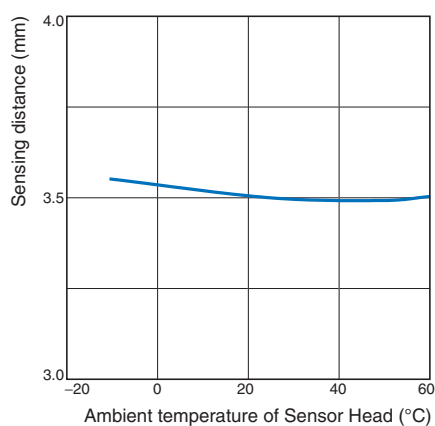
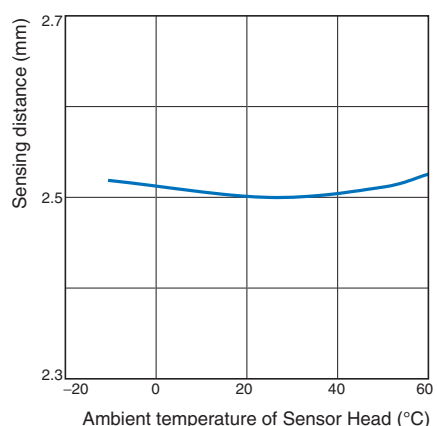
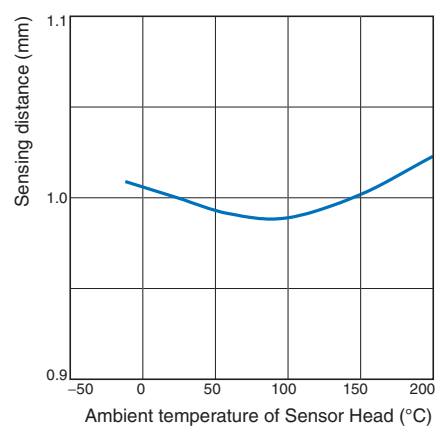


E2C-ED01(-□)



E2C-ED02(-□)/EM02(-□)



**E2C-EM07(-□)****E2C-EV05(-□)****E2C-EM02H****Influence of Sensor Head Temperature****E2C-EDR6-F****E2C-ED01(-□)****E2C-ED02(-□)/EM02(-□)****E2C-EM07(-□)****E2C-EV05(-□)****E2C-EM02H**

I/O Circuit Diagrams

NPN Output

| Model                 | Operation mode       | Timing chart                                                                                                                                                                                                                                                                                           | Mode selector | Output circuit |
|-----------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|
| E2C-EDA11<br>E2C-EDA6 | NO (Normally open)   | <div><div>Sensing object</div><div>Yes</div><div>No</div><div>Operation indicator (orange)</div><div>Lit</div><div>Not lit</div><div>Output transistor</div><div>ON</div><div>OFF</div><div>Load (relay, etc.)</div><div>Operate</div><div>Reset</div><div>(Between brown and black lines)</div></div> | NO            |                |
|                       | NC (Normally closed) | <div><div>Sensing object</div><div>Yes</div><div>No</div><div>Operation indicator (orange)</div><div>Lit</div><div>Not lit</div><div>Output transistor</div><div>ON</div><div>OFF</div><div>Load (relay, etc.)</div><div>Operate</div><div>Reset</div><div>(Between brown and black lines)</div></div> | NC            |                |
| E2C-EDA21<br>E2C-EDA7 | NO (Normally open)   | <div><div>Sensing object</div><div>Yes</div><div>No</div><div>Operation indicator (orange)</div><div>Lit</div><div>Not lit</div><div>Output transistor</div><div>ON</div><div>OFF</div><div>Load (relay, etc.)</div><div>Operate</div><div>Reset</div><div>(Between brown and black lines)</div></div> | NO            |                |
|                       | NC (Normally closed) | <div><div>Sensing object</div><div>Yes</div><div>No</div><div>Operation indicator (orange)</div><div>Lit</div><div>Not lit</div><div>Output transistor</div><div>ON</div><div>OFF</div><div>Load (relay, etc.)</div><div>Operate</div><div>Reset</div><div>(Between brown and black lines)</div></div> | NC            |                |

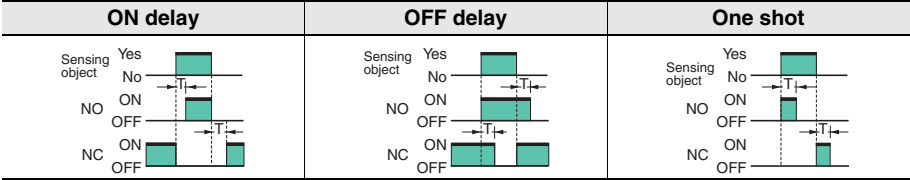
**Note: 1.** Setting Areas for Twin-output Models  
Normally open: .....ON between the thresholds for Channel 1 and Channel 2  
Normally closed: ..OFF between the thresholds for Channel 1 and Channel 2  
**2.** Timing Charts for Timer Settings (T: Set Time)

| ON delay                                                                                                                                        | OFF delay                                                                                                                                       | One shot                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <div><div>Sensing object</div><div>Yes</div><div>No</div><div>NO</div><div>ON</div><div>OFF</div><div>NC</div><div>ON</div><div>OFF</div></div> | <div><div>Sensing object</div><div>Yes</div><div>No</div><div>NO</div><div>ON</div><div>OFF</div><div>NC</div><div>ON</div><div>OFF</div></div> | <div><div>Sensing object</div><div>Yes</div><div>No</div><div>NO</div><div>ON</div><div>OFF</div><div>NC</div><div>ON</div><div>OFF</div></div> |

PNP Output

| Model                 | Operation mode       | Timing chart                                                                                                                                                                                                                                                                                | Mode selector | Output circuit |
|-----------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|
| E2C-EDA41<br>E2C-EDA8 | NO (Normally open)   | <div><div>Sensing object</div><div>Yes</div><div>No</div><div>Operation indicator (orange)</div><div>Lit</div><div>Not lit</div><div>Output transistor</div><div>ON</div><div>OFF</div><div>Load (relay, etc.)</div><div>Operate</div><div>Reset (Between blue and black lines)</div></div> | NO            |                |
|                       | NC (Normally closed) | <div><div>Sensing object</div><div>Yes</div><div>No</div><div>Operation indicator (orange)</div><div>Lit</div><div>Not lit</div><div>Output transistor</div><div>ON</div><div>OFF</div><div>Load (relay, etc.)</div><div>Operate</div><div>Reset (Between blue and black lines)</div></div> | NC            |                |
| E2C-EDA51<br>E2C-EDA9 | NO (Normally open)   | <div><div>Sensing object</div><div>Yes</div><div>No</div><div>Operation indicator (orange)</div><div>Lit</div><div>Not lit</div><div>Output transistor</div><div>ON</div><div>OFF</div><div>Load (relay, etc.)</div><div>Operate</div><div>Reset (Between blue and black lines)</div></div> | NO            |                |
|                       | NC (Normally closed) | <div><div>Sensing object</div><div>Yes</div><div>No</div><div>Operation indicator (orange)</div><div>Lit</div><div>Not lit</div><div>Output transistor</div><div>ON</div><div>OFF</div><div>Load (relay, etc.)</div><div>Operate</div><div>Reset (Between blue and black lines)</div></div> | NC            |                |

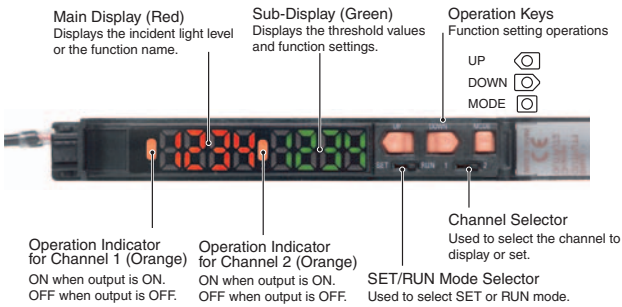
**Note: 1.** Setting Areas for Twin-output Models  
Normally open: .....ON between the thresholds for Channel 1 and Channel 2  
Normally closed: ..OFF between the thresholds for Channel 1 and Channel 2  
**2.** Timing Charts for Timer Settings (T: Set Time)



Nomenclature

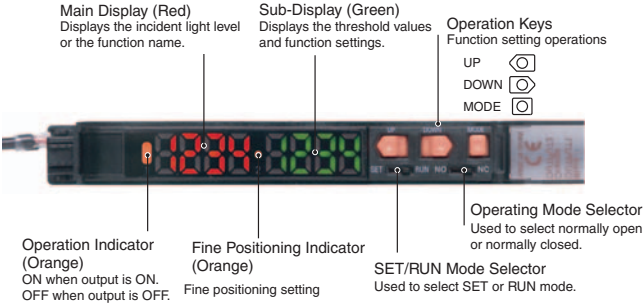
Amplifier Units  
Twin-output Models

(E2C-EDA11/EDA41/EDA6/EDA8/EDA0)



External-input Models

(E2C-EDA21/EDA51/EDA7/EDA9)



## Safety Precautions

Refer to *Warranty and Limitations of Liability*.

### ⚠ WARNING

Do not use this product in any safety device used for the protection of human lives.



### Precautions for Correct Use

Do not use this product in operating atmospheres or environments outside the specified ratings.

## Amplifier Units

### Design

#### Power ON

The Sensor is ready to sense an object within 200 ms after turning the power ON. If the load and Sensor are connected to different power supplies, always turn ON the Sensor power first.

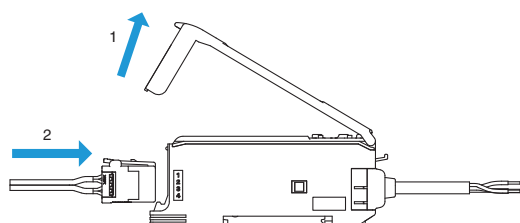
#### Cable

Use an external power cable of cross-section of 0.3 mm<sup>2</sup> or more for the Amplifier, and the total length of the cable must be 30 m or less.

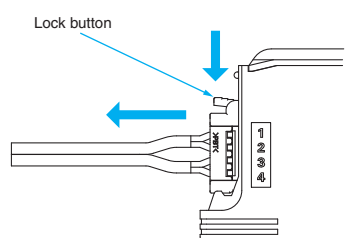
## Connecting Sensor Heads

### Connecting and Disconnecting Sensor Heads

1. Open the protective cover.
2. Making sure that the lock button is up, insert the fibers all the way to the back of the Connector insertion opening.



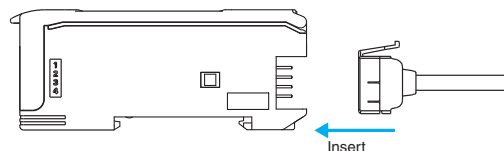
To disconnect the Sensor Head, pull out the fibers while pressing on the lock button.



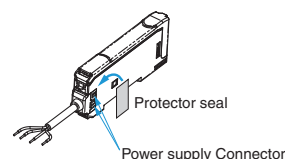
## Connecting and Disconnecting Wire-saving Connectors

### <Connecting Connectors>

1. Insert the Master or Slave Connector into the Amplifier Unit until it clicks into place.



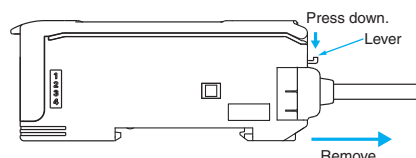
2. Apply the supplied seal to the non-connection surface of the Master/Slave Connector.



**Note:** Apply the seal to the grooved side.

### <Disconnecting Connectors>

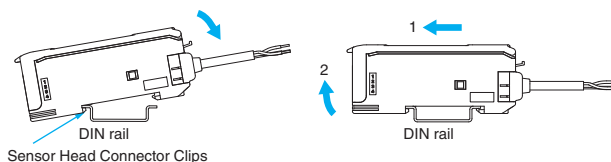
1. Slide the Slave Amplifier Unit.
2. After the Amplifier Unit has been separated, press down on the lever on the Connector and remove it. (Do not attempt to remove Connectors without separating them from other Amplifier Units first.)



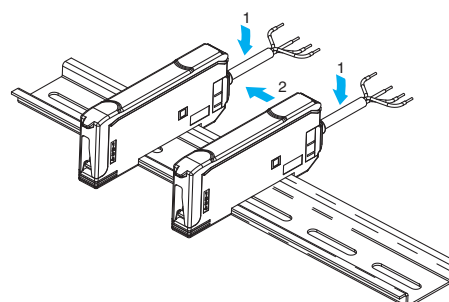
## Installing and Removing Amplifier Units

### <Installing Amplifier Units>

1. Install the Units one by one to the DIN rail.



2. Slide one Unit toward the other, match the clips at the front ends, and then bring them together until they "click."



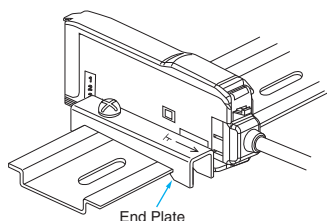
### <Removing Amplifier Units>

Slide one Unit away from the other and remove them one by one. (Do not remove the connected Units together from the DIN rail.)

- Note:**
1. When the Amplifier Units are connected to each other, the operable ambient temperature changes depending on the number of connected Amplifier Units. Check page 5 in *Rating and Specifications*.
  2. Before connecting or disconnecting the Units, always switch power OFF.

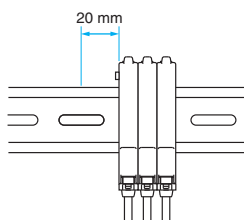
## End Plate Mounting (PFP-M)

Mount End Plates on Amplifier Units to avoid movement due to vibration. When a Mobile Console is installed, mount the End Plate facing as shown in the following diagram.



## Mounting a Communications Head for the Mobile Console

Leave a space of at least 20 mm on the left side of the Units for a Mobile Console Communications Head.



## EEPROM Write Error

If the data is not written to the EEPROM correctly due to a power failure or static-electric noise, initialize the settings using the keys on the Amplifier Unit.

## Optical Communications

When using more than one Amplifier Unit, mount the Units side-by-side. Do not slide or remove Units while they are in use.

## Miscellaneous

### Protective Cover

Be sure to put on the Protective Cover before use.

### Mobile Console

Use the E3X-MC11-SV2 Mobile Console for E2C-EDA-series Amplifier Units. Other Mobile Consoles, such as the E3X-MC11, cannot be used.

## Sensor Head and Amplifier Unit Connection

Be sure to use only specified Sensor Head and Amplifier Unit combinations. The E3C-LDA-series Photoelectric Sensor with Separate Digital Amplifier \*1 is not compatible, and the E2C-EDA must not be used with products from that series.

\*1 Orders for E3C-LDA series will be accepted until the end of February 2022.

## Warm-up

The digital display will slowly change until the circuits stabilize after the power is turned ON. It takes about 30 minutes after the power is turned ON before the E2C-EDA is ready to sense.

## Maintenance Inspection

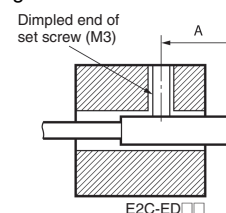
- Be sure to turn OFF the power before adjusting, connecting, or disconnecting the Sensor Head.
- Do not use thinner, benzene, acetone, or kerosene to clean the Sensor Head or Amplifier Unit.

## Sensor Heads Mounting

### Mounting Sensor Heads

- Use the dimensions from the following table to mount unthreaded cylindrical models (E2C-ED-□□). Do not tighten screws with torque exceeding 0.2 N·m when mounting Sensor Heads.

| Model      | Tightening range A |
|------------|--------------------|
| E2C-EDR6-F | 9 to 18 mm         |
| E2C-ED01□□ | 9 to 18 mm         |
| E2C-ED02□□ | 11 to 22 mm        |



- Use the torque given in the following table to tighten threaded cylindrical models (E2C-EM□□).

| Model       | Tightening torque |
|-------------|-------------------|
| E2C-EM02□□  | 15 N·m max.       |
| E2C-EM07M□□ | 15 N·m max.       |
| E2C-EM02H□□ | 5.9 N·m max.      |

- Do not use torque exceeding 0.5 N·m to tighten screws when mounting flat models (E2C-EV□□).
- Use a bending radius of at least 8 mm for the Sensor Head cable.
- Use only the special extension cable to extend the cable between the Sensor Head and the Amplifier Unit.

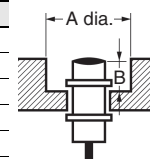
| Model    | Cable length |
|----------|--------------|
| E22-XC2R | 2 m          |
| E22-XC7R | 7 m          |

## Effects of Surrounding Metal

- Provide a minimum distance between the Sensor and the surrounding metal as shown in the table below.

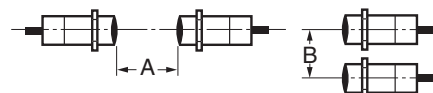
### Effects of Surrounding Metal (Units: mm)

| Model       | Counterbore A | Protrusion B |
|-------------|---------------|--------------|
| E2C-EDR6-F  | 3.1           | 0            |
| E2C-ED01□□  | 5.4           | 0            |
| E2C-ED02□□  | 8             | 0            |
| E2C-EM02□□  | 10            | 0            |
| E2C-EM07M□□ | 35            | 20           |
| E2C-EV05□□  | 14 × 30       | 4.8          |
| E2C-EM02H□□ | 12            | 0            |



## Mutual Interference

- If more than one Sensor Head is installed face to face or in parallel, make sure that the distances between two Units adjacent to each other are the same as or larger than the corresponding values shown in the following table.
- The distance between Sensor Heads may be narrower than specified with these Sensors because the Mutual Interference Prevention Function is used for optical communications between the Amplifier Units.



### Mutual Interference

(Units: mm)

| Model       | Face-to-face arrangement A | Parallel arrangement B | Face-to-face arrangement using the Mutual Interference Prevention Function A' | Parallel arrangement using the Mutual Interference Prevention Function B' |
|-------------|----------------------------|------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| E2C-EDR6-F  | 14                         | 10                     | 3.5                                                                           | 3.1                                                                       |
| E2C-ED01□□  | 45                         | 20                     | 9                                                                             | 5.4                                                                       |
| E2C-ED02□□  | 35                         | 30                     | 21                                                                            | 8 *2                                                                      |
| E2C-EM02□□  | 36                         | 30                     | 21                                                                            | 10 *2                                                                     |
| E2C-EM07M□□ | 140                        | 120                    | 35                                                                            | 18 *2                                                                     |
| E2C-EV05□□  | 65                         | 30                     | 21                                                                            | 14 *2                                                                     |
| E2C-EM02H□□ | 45                         | 30                     | 21                                                                            | 12 *2                                                                     |

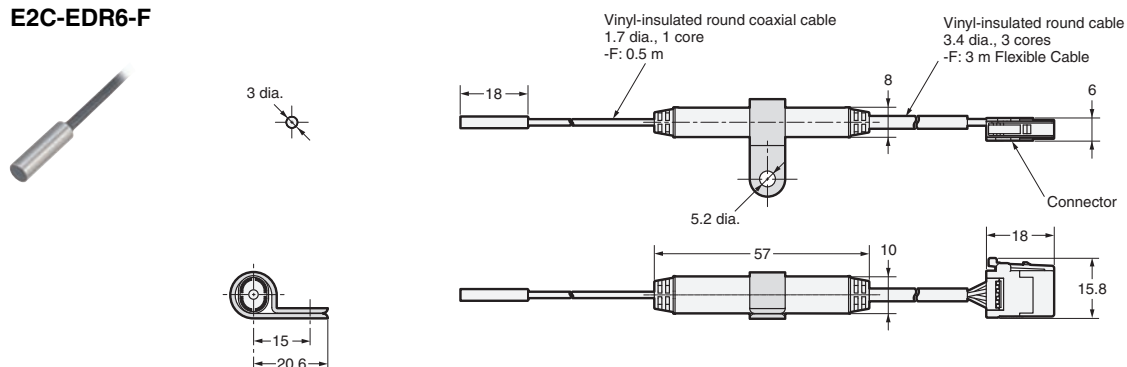
\*2 Mutual interference does not occur for close-proximity mounting when the Mutual Interference Prevention Function is effective.

# Dimensions

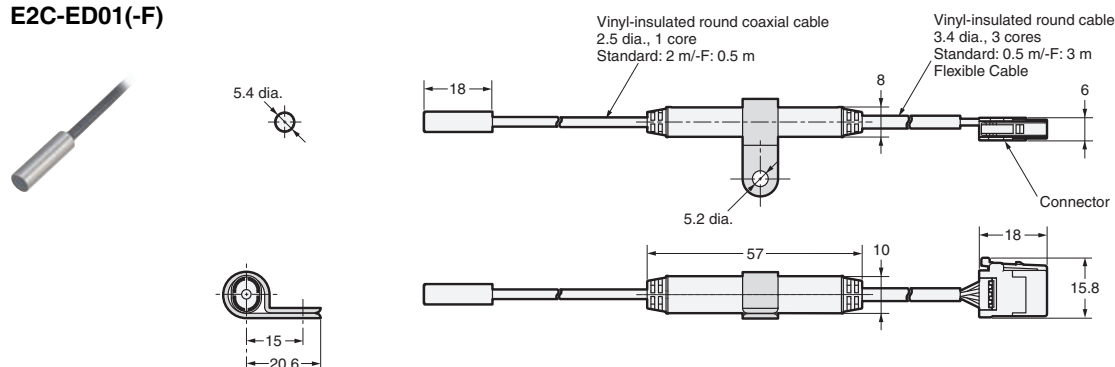
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

## Sensor Heads

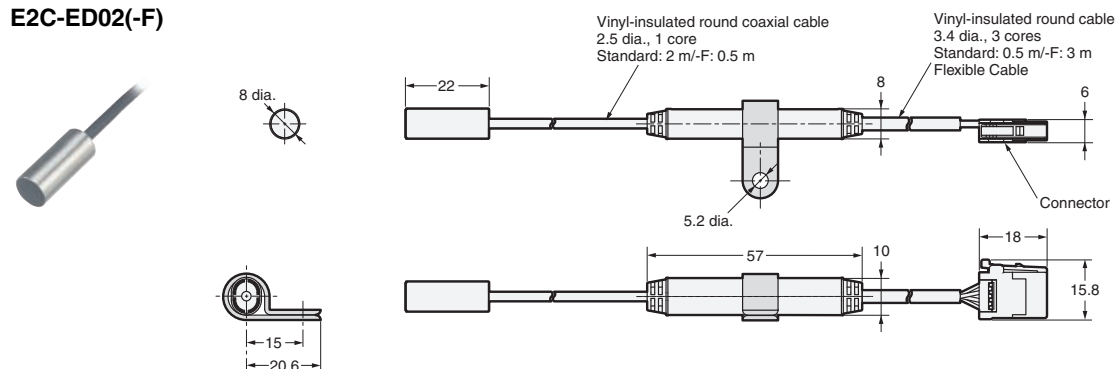
### E2C-EDR6(-F)



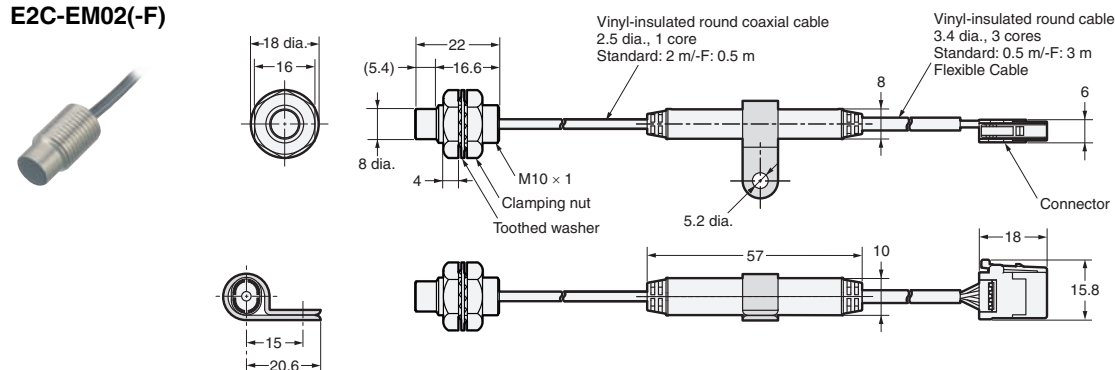
### E2C-ED01(-F)



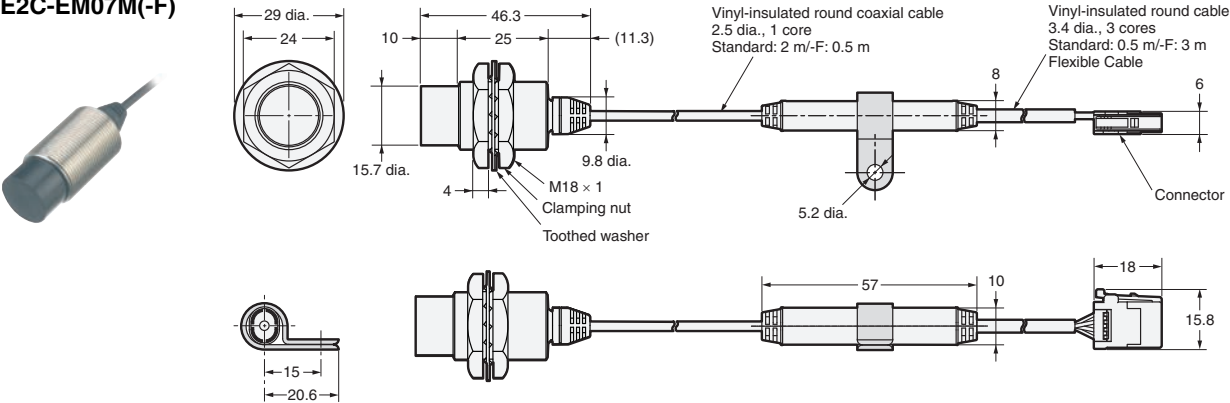
### E2C-ED02(-F)



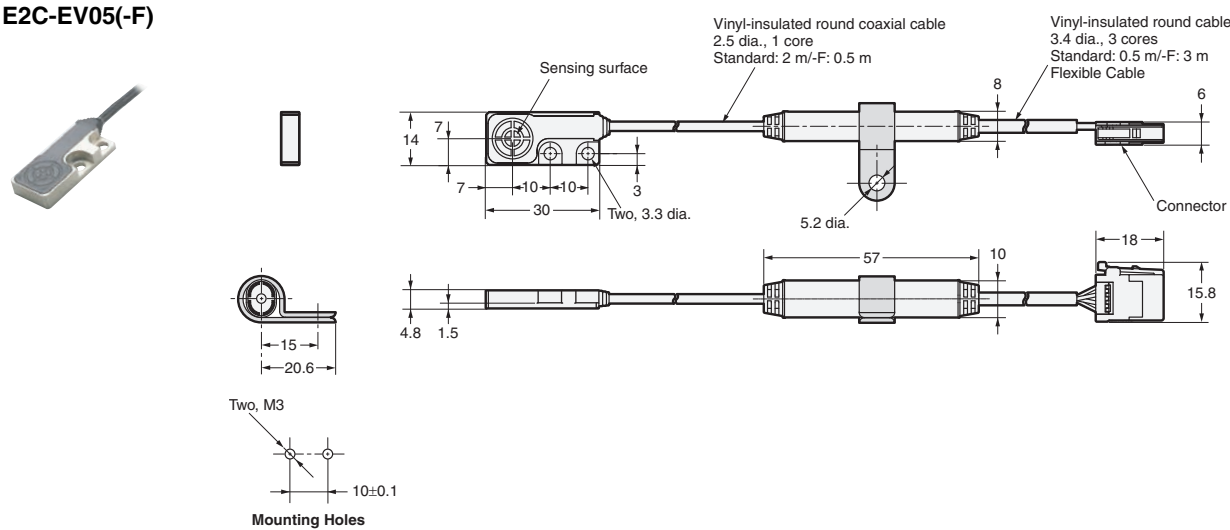
### E2C-EM02(-F)



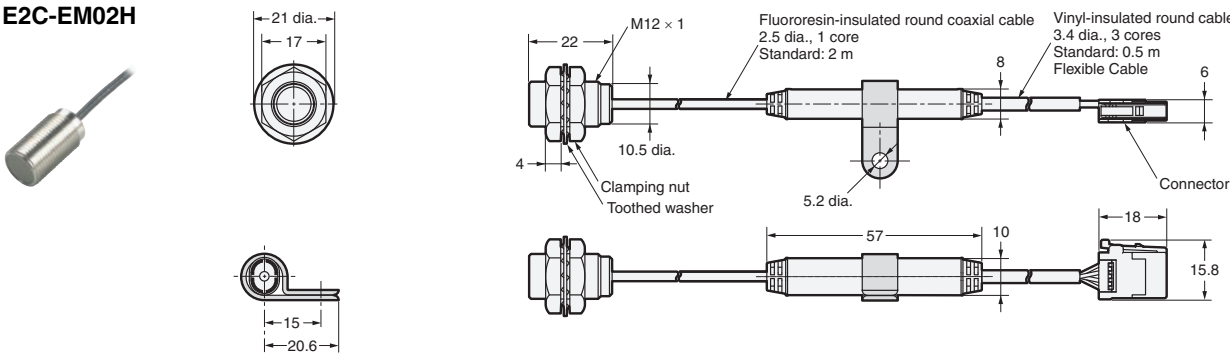
E2C-EM07M(-F)



E2C-EV05(-F)

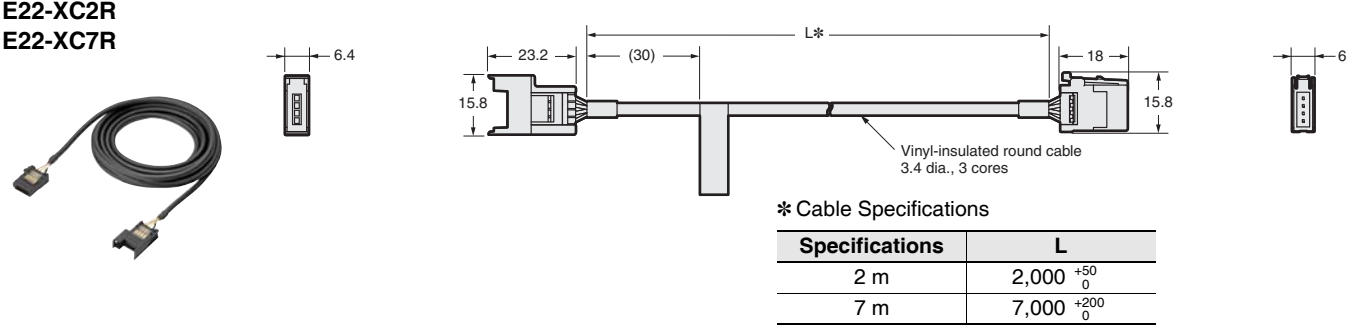


E2C-EM02H



Extension Cables for Sensors Head

E22-XC2R  
E22-XC7R



## Amplifier Units

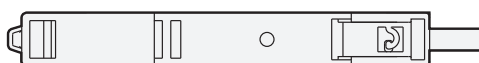
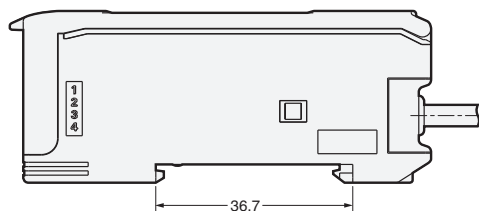
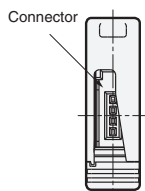
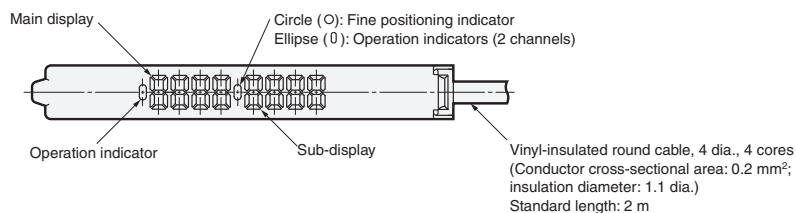
### Amplifier Units with Cables

E2C-EDA11

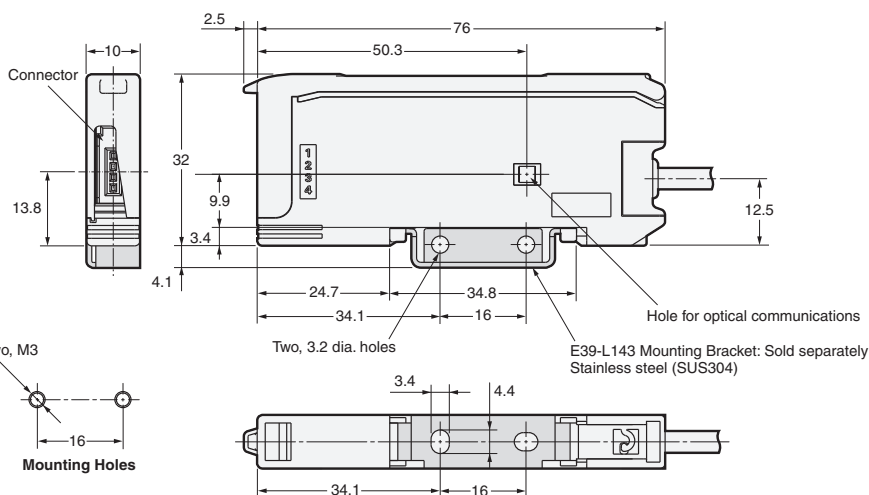
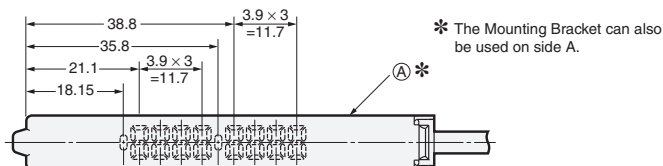
E2C-EDA21

E2C-EDA41

E2C-EDA51

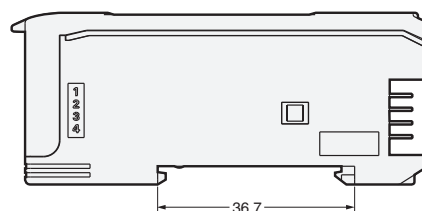
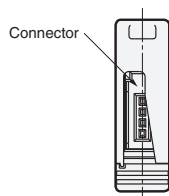
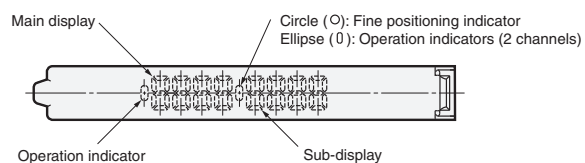


### With Mounting Bracket Attached

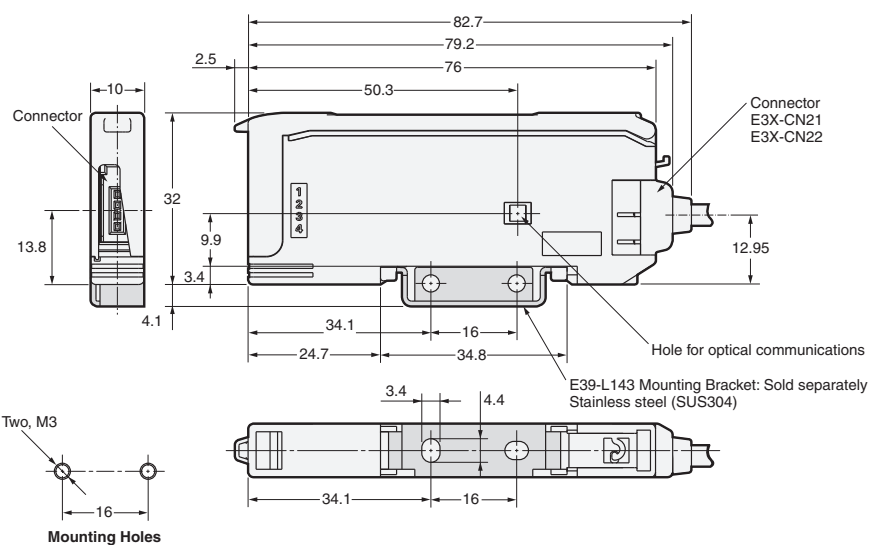
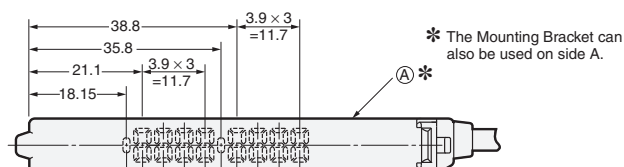


## Amplifier Units with Wire-saving Connectors

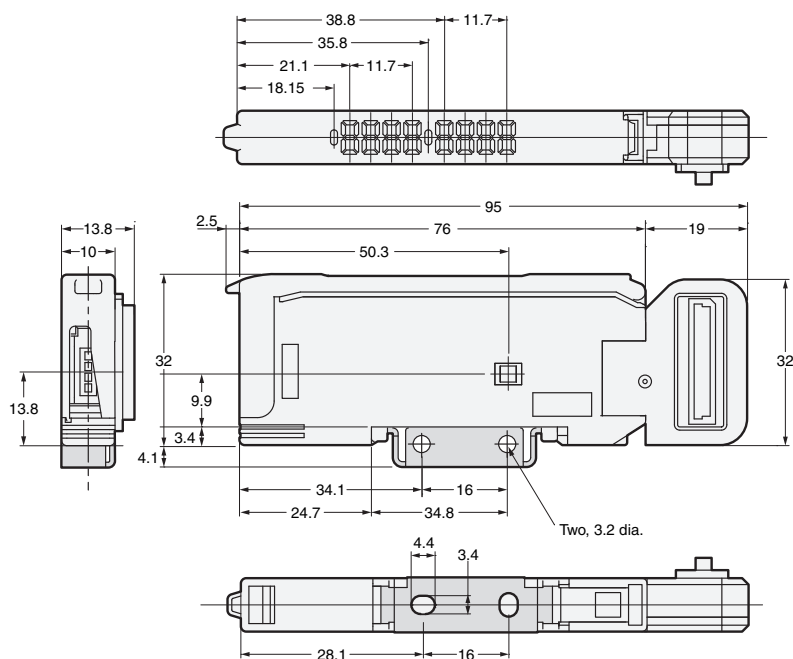
E2C-EDA6  
E2C-EDA7  
E2C-EDA8  
E2C-EDA9



### With Mounting Bracket Attached



### Amplifier Unit with Connector for Sensor Communications Unit E2C-EDA0



### Amplifier Unit Connectors

Refer to *E3X-DA-S/MDA* for details.

### Mobile Console

Refer to *E3X-DA-S/MDA* for details.

### Accessories (Order Separately)

#### Mounting Brackets

Refer to *E39-L* for details.

#### End Plate

Refer to *DIN rail* for details.

## Terms and Conditions Agreement

### 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.

### Warranties.

(a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.

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