High Precision Positioning Inductive Proximity Sensor

E2C-EDA

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.

Ordering Information

Sensors [Refer to Dimensions on page 12.]

<table>
<thead>
<tr>
<th>Sensor Heads</th>
<th>Type</th>
<th>Appearance</th>
<th>Sensing distance</th>
<th>Repeat accuracy</th>
<th>Cable specification</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shielded</td>
<td>Cylindrical</td>
<td>3 dia. × 18 mm</td>
<td>0.6 mm</td>
<td>1 μm</td>
<td>Free cutting</td>
<td>E2C-EDR6-F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4 dia. × 18 mm</td>
<td>1 mm</td>
<td>1 μm</td>
<td>Standard</td>
<td>E2C-ED01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 dia. × 22 mm</td>
<td>2 mm</td>
<td>2 μm</td>
<td>Standard</td>
<td>E2C-ED02</td>
</tr>
<tr>
<td></td>
<td>Screw</td>
<td>M10 × 22 mm</td>
<td>2 mm</td>
<td>2 μm</td>
<td>Standard</td>
<td>E2C-EM02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 × 14 × 4.8 mm</td>
<td>5 mm</td>
<td>2 μm</td>
<td>Standard</td>
<td>E2C-EV05</td>
</tr>
<tr>
<td></td>
<td>Flat</td>
<td>30 × 14 × 4.8 mm</td>
<td>5 mm</td>
<td>2 μm</td>
<td>Standard</td>
<td>E2C-EV05-F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M10 × 22 mm</td>
<td>2 mm</td>
<td>2 μm</td>
<td>Standard</td>
<td>E2C-EV05-S</td>
</tr>
<tr>
<td>Unshielded</td>
<td>Screw</td>
<td>M18 × 46.3 mm</td>
<td>7 mm</td>
<td>5 μm</td>
<td>Standard</td>
<td>E2C-EM07M</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M12 × 22 mm</td>
<td>2 mm</td>
<td>2 μm</td>
<td>Standard</td>
<td>E2C-EM02H</td>
</tr>
<tr>
<td></td>
<td>Heat-resistant</td>
<td>M12 × 22 mm</td>
<td>2 mm</td>
<td>2 μm</td>
<td>Standard</td>
<td>E2C-EM02H</td>
</tr>
</tbody>
</table>

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)

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.
Amplifier Units

Amplifier Units with Cables

<table>
<thead>
<tr>
<th>Item</th>
<th>Appearance</th>
<th>Functions</th>
<th>Model</th>
<th>NPN output</th>
<th>PNP output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced models</td>
<td>Twin-output models</td>
<td>Area output, open circuit detection, differential operation</td>
<td>E2C-EDA11 2M</td>
<td>E2C-EDA41 2M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>External-input models</td>
<td>Remote setting, differential operation</td>
<td>E2C-EDA21 2M</td>
<td>E2C-EDA51 2M</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Appearance</th>
<th>Functions</th>
<th>Model</th>
<th>NPN output</th>
<th>PNP output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced models</td>
<td>Twin-output models</td>
<td>Area output, open circuit detection, differential operation</td>
<td>E2C-EDA6</td>
<td>E2C-EDA8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>External-input models</td>
<td>Remote setting, differential operation</td>
<td>E2C-EDA7</td>
<td>E2C-EDA9</td>
<td></td>
</tr>
</tbody>
</table>

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]

<table>
<thead>
<tr>
<th>Item</th>
<th>Appearance</th>
<th>Functions</th>
<th>Model</th>
<th>Applicable Sensor Communications Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced model</td>
<td>Twin-output model</td>
<td>Area output, open circuit detection, differential operation</td>
<td>E2C-EDA0</td>
<td>E3X-ECT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E3X-CRT</td>
</tr>
</tbody>
</table>

Wire-saving Connectors (Order Separately)
Note: Protector seals provided. [Refer to E3X-DA-S/MDA.]

<table>
<thead>
<tr>
<th>Item</th>
<th>Appearance</th>
<th>Cable length</th>
<th>No. of conductors</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Connector</td>
<td></td>
<td>2 m</td>
<td>4</td>
<td>E3X-CN21</td>
</tr>
<tr>
<td>Slave Connector</td>
<td></td>
<td></td>
<td>2</td>
<td>E3X-CN22</td>
</tr>
</tbody>
</table>

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 Units

<table>
<thead>
<tr>
<th>Model</th>
<th>NPN output</th>
<th>PNP output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced models</td>
<td>E2C-EDA6</td>
<td>E2C-EDA8</td>
</tr>
<tr>
<td></td>
<td>E2C-EDA7</td>
<td>E2C-EDA9</td>
</tr>
</tbody>
</table>

When Using 5 Amplifier Units

<table>
<thead>
<tr>
<th>Amplifier Units (5 Units)</th>
<th>Master Connector</th>
<th>Slave Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3X-CN21</td>
<td>E3X-CN22</td>
<td></td>
</tr>
</tbody>
</table>

1 Master Connector | 4 Slave Connectors
Mobile Console (Order Separately) [Refer to E3X-DA-S/MDA.]

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Mobile Console" /></td>
<td>E3X-MC11-SV2 (model number of set)</td>
<td>Mobile Console with Head, Cable, and AC adapter provided as accessories</td>
</tr>
<tr>
<td><img src="image2" alt="Mobile Console" /></td>
<td>E3X-MC11-C1-SV2</td>
<td>Mobile Console</td>
</tr>
<tr>
<td><img src="image3" alt="Head" /></td>
<td>E3X-MC11-H1</td>
<td>Head</td>
</tr>
<tr>
<td><img src="image4" alt="Cable" /></td>
<td>E39-Z12-1</td>
<td>Cable (1.5 m)</td>
</tr>
</tbody>
</table>

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.]

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image5" alt="Mounting Bracket" /></td>
<td>E39-L143</td>
<td>1</td>
</tr>
</tbody>
</table>

**End Plate**
An End Plate is not provided with the Amplifier Unit. Order an End Plate separately if required. [Refer to PFP-□.]

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image6" alt="End Plate" /></td>
<td>PFP-M</td>
<td>1</td>
</tr>
</tbody>
</table>

**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.]

<table>
<thead>
<tr>
<th>Cable length</th>
<th>Model</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 m</td>
<td>E22-XC2R</td>
<td>1</td>
</tr>
<tr>
<td>7 m</td>
<td>E22-XC7R</td>
<td>1</td>
</tr>
</tbody>
</table>
### Sensor Heads

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>E2C-EDR6-F</th>
<th>E2C-ED01(-)</th>
<th>E2C-ED02(-)</th>
<th>E2C-EM02(-)</th>
<th>E2C-EM07(-)</th>
<th>E2C-EV05(-)</th>
<th>E2C-EM02H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing distance</td>
<td></td>
<td>0.6 mm</td>
<td>1 mm</td>
<td>2 mm</td>
<td>7 mm</td>
<td>5 mm</td>
<td>2 mm</td>
<td></td>
</tr>
<tr>
<td>Sensing object</td>
<td></td>
<td>Magnetic metal</td>
<td>(The sensing distance will decrease when sensing non-magnetic metal. Refer to Engineering Data (Reference Value) on page 6.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard sensing object</td>
<td></td>
<td>5 x 5 x 3 mm</td>
<td>10 x 10 x 3 mm</td>
<td>22 x 22 x 3 mm</td>
<td>15 x 15 x 3 mm</td>
<td>20 x 20 x 3 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeat accuracy</td>
<td></td>
<td>1 μm</td>
<td>2 μm</td>
<td>5 μm</td>
<td>2 μm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis distance</td>
<td></td>
<td>Variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature characteristic</td>
<td>Sensor Head</td>
<td>0.3%/°C</td>
<td>0.08%/°C</td>
<td>0.04%/°C</td>
<td>0.2%/°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preamp and Amplifier</td>
<td>0.08%/°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td>−10°C to 60°C (with no icing or condensation)</td>
<td></td>
<td></td>
<td>−10°C to 200°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>−20°C to 70°C (with no icing or condensation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient humidity</td>
<td></td>
<td>Operating/storage: 35% to 85% (with no condensation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation resistance</td>
<td></td>
<td>50 MΩ min. (at 500 VDC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dielectric strength</td>
<td></td>
<td>1,000 VAC at 50/60 Hz for 1 min between current carry parts and case</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td></td>
<td>Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock resistance</td>
<td></td>
<td>Destruction: 500 m/s² for 3 times each in X, Y, and Z directions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree of protection</td>
<td></td>
<td>IEC60529 IP67</td>
<td></td>
<td></td>
<td>IEC60529 IP60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection method</td>
<td></td>
<td>Connector (standard cable length: 2.5 m (2 m between Head and Preamp))</td>
<td></td>
<td></td>
<td>−F model cable length: 3.5 m (0.5 m between Head and Preamp)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (packed state)</td>
<td></td>
<td>Approx. 120 g (Models with protective spiral tube (−S models) are approx. 90 g heavier.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material</th>
<th>Sensor Head</th>
<th>Case</th>
<th>Stainless steel</th>
<th>Brass</th>
<th>Zinc</th>
<th>Brass</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Brass</td>
<td>Stainless steel</td>
<td>Brass</td>
<td>Zinc</td>
<td>Brass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clamping nut</td>
<td>---</td>
<td>Nickel-plated brass</td>
<td>---</td>
<td>Nickel-plated brass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Toothed washer</td>
<td>---</td>
<td>Zinc-plated iron</td>
<td>---</td>
<td>Zinc-plated iron</td>
</tr>
</tbody>
</table>

**Accessories**

- Preamplifier Mounting Brackets, Instruction Manual

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*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

<table>
<thead>
<tr>
<th>Model Item</th>
<th>Type</th>
<th>Advanced Models with Twin Outputs</th>
<th>Advanced Models with External Inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre-wired Model</td>
<td>Model with Wire-saving Connector</td>
</tr>
<tr>
<td>NPN output</td>
<td>E2C-EDA11</td>
<td>E2C-EDA6</td>
<td>E2C-EDA0</td>
</tr>
<tr>
<td>PNP output</td>
<td>E2C-EDA41</td>
<td>E2C-EDA8</td>
<td></td>
</tr>
</tbody>
</table>

**Supply voltage:** 12 to 24 VDC ±10%, ripple (p-p): 10% max.

**Power consumption:** 1.080 mW max. (current consumption: 45 mA at 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:** 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
  - Single edge: Can be set to 300 μs, 500 μs, 1 ms, 10 ms, or 100 ms
  - Double edge: Can be set to 500 μs, 1 ms, 2 ms, 20 ms, or 200 ms.
- **Timer function:** Select from Offset-delay, ON-delay, or one-shot timer
  - 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.
  - Zero-reset is accompanied by a change of detection distance.
  - 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
  - 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:
  - 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
  - When used in combination with an EDR6-F:
    - 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
- 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
- (Shock)
  - 500 m/s² for 3 times each in X, Y, and Z directions
  - 150 m/s² 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
- 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

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#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°C, Groups of 3 to 8 Amplifier Units: 0 to 50°C, Groups of 9 to 16 Amplifier Units: 0 to 45°C, Groups of 17 to 30 Amplifier Units (with the E3X-ECT): 0 to 40°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 55°C, Groups of 5 to 8 Amplifier Units: 0 to 45°C, Groups of 9 to 16 Amplifier Units: 0 to 40°C, Groups of 17 to 30 Amplifier Units (with the E3X-ECT): 0 to 35°C.
Engineering Data (Reference Value)

Sensing Distance vs. Display Values

**Influence of Sensing Object Size and Material**

**E2C-EDR6-F**

**E2C-ED01(-@)**

**E2C-ED02(-@)/EM02(-@)**

**E2C-EM07(-@)**

**E2C-EV05(-@)**

**E2C-EM02H**

**E2C-EDA**
Influence of Sensor Head Temperature

E2C-EM07(-\(\square\))

E2C-EV05(-\(\square\))

E2C-EM02H

E2C-EDR6-F

E2C-ED01(-\(\square\))

E2C-ED02(-\(\square\))/EM02(-\(\square\))

E2C-EM07(-\(\square\))

E2C-EV05(-\(\square\))

E2C-EM02H

0.35
0.30
0.25

0.55
0.50
0.45

0.9
0.8
0.7

1.1
1.0
0.9

1.1
1.0
0.9

3.5
3.0

2.7
2.3

1.1
1.0

Ambient temperature of Sensor Head (°C)

Ambient temperature of Sensor Head (°C)

Ambient temperature of Sensor Head (°C)

Sensing distance (mm)
I/O Circuit Diagrams

NPN Output

<table>
<thead>
<tr>
<th>Model</th>
<th>Operation mode</th>
<th>Timing chart</th>
<th>Mode selector</th>
<th>Output circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2C-EDA11</td>
<td>NO ( Normally open)</td>
<td>[Diagram]</td>
<td>NO</td>
<td>[Diagram]</td>
</tr>
<tr>
<td>E2C-EDA6</td>
<td>NC ( Normally closed)</td>
<td>[Diagram]</td>
<td>NC</td>
<td>[Diagram]</td>
</tr>
<tr>
<td>E2C-EDA21</td>
<td>NO ( Normally open)</td>
<td>[Diagram]</td>
<td>NO</td>
<td>[Diagram]</td>
</tr>
<tr>
<td>E2C-EDA7</td>
<td>NC ( Normally closed)</td>
<td>[Diagram]</td>
<td>NC</td>
<td>[Diagram]</td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>ON delay</th>
<th>OFF delay</th>
<th>One shot</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Diagram]</td>
<td>[Diagram]</td>
<td>[Diagram]</td>
</tr>
</tbody>
</table>

Operation indicator (orange) ch1
Operation indicator (orange) ch2
Brown
Load
Black
Control output ch1
Blue
Control output ch2
12 to 24 VDC

Display
Operation indicator (orange)
Black
Control output ch1
Orange
External input
12 to 24 VDC

Sensor main circuits
Fine positioning indicator (orange)
Brown
Load
Black
Control output ch1
Blue
External input
12 to 24 VDC

Sensing object
Yes No
ON OFF
NO NC

Sensing object
Yes No
ON OFF
NO NC

Sensing object
Yes No
ON OFF
NO NC

Sensing object
Yes No
ON OFF
NO NC
### Twin-output Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Operation mode</th>
<th>Timing chart</th>
<th>Mode selector</th>
<th>Output circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2C-EDA41</td>
<td>NO (Normally open)</td>
<td>Sensing object: Yes, No</td>
<td>OFF delay: ON, OFF</td>
<td>One shot: NC</td>
</tr>
<tr>
<td>E2C-EDA8</td>
<td></td>
<td>Operation indicator (orange): ON, OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2C-EDA51</td>
<td>NO (Normally open)</td>
<td>Sensing object: Yes, No</td>
<td>OFF delay: ON, OFF</td>
<td>One shot: NC</td>
</tr>
<tr>
<td>E2C-EDA9</td>
<td></td>
<td>Operation indicator (orange): ON, OFF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### PNP Output

- **NO (Normally open):** Normally open: \( \text{ON} \) between the thresholds for Channel 1 and Channel 2
- **NC (Normally closed):** Normally closed: \( \text{OFF} \) between the thresholds for Channel 1 and Channel 2

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

#### Nomenclature

**Amplifier Units**

**External-input Models**

- **(E2C-EDA11/EDA41/EDA8/EDA0)**
- **(E2C-EDA21/EDA51/EDA7/EDA9)**

- **Main Display (Red):** Displays the incident light level or the function name.
- **Sub-Display (Green):** Displays the threshold values and function settings.
- **Operation Keys:**
  - UP: Increases the value.
  - DOWN: Decreases the value.
  - MODE: Switches between different modes.
- **Operation Indicator for Channel 1 (Orange):**
  - ON when output is ON.
  - OFF when output is OFF.
- **Operation Indicator for Channel 2 (Orange):**
  - ON when output is ON.
  - OFF when output is OFF.
- **SET/RUN Mode Selector:**
  - ON when output is SET.
  - OFF when output is RUN.
- **Channel Selector:**
  - Used to select the channel to display or set.
- **Fine Positioning Indicator (Orange):**
  - ON when output is ON.
  - OFF when output is OFF.
- **Operating Mode Selector:**
  - Used to select normally open or normally closed.

- **External Display (Red):**
  - Displays the incident light level or the function name.
- **Sub-Display (Green):** Displays the threshold values and function settings.
- **Operation Keys:**
  - UP: Increases the value.
  - DOWN: Decreases the value.
  - MODE: Switches between different modes.
- **Operation Indicator (Orange):**
  - ON when output is ON.
  - OFF when output is OFF.
- **Fine Positioning Indicator (Orange):**
  - ON when output is ON.
  - OFF when output is OFF.
- **Operating Mode Selector:**
  - Used to select SET or RUN mode.
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 mm² 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 is not compatible, and the E2C-EDA must not be used with products from that series.

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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Tightening range A</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2C-ED06-F</td>
<td>9 to 18 mm</td>
</tr>
<tr>
<td>E2C-ED01</td>
<td>9 to 18 mm</td>
</tr>
<tr>
<td>E2C-ED02</td>
<td>11 to 12 mm</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2C-EM02</td>
<td>15 N·m max.</td>
</tr>
<tr>
<td>E2C-EM07M</td>
<td>15 N·m max.</td>
</tr>
<tr>
<td>E2C-EM02H</td>
<td>5.9 N·m max.</td>
</tr>
</tbody>
</table>

- 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.

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Counterbore A</th>
<th>Protrusion B</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2C-EDR6-F</td>
<td>3.1</td>
<td>0</td>
</tr>
<tr>
<td>E2C-ED01</td>
<td>5.4</td>
<td>0</td>
</tr>
<tr>
<td>E2C-ED02</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>E2C-EM02</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>E2C-EM07M</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>E2C-EV05</td>
<td>14 × 30</td>
<td>4.8</td>
</tr>
<tr>
<td>E2C-EM02H</td>
<td>12</td>
<td>0</td>
</tr>
</tbody>
</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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Face-to-face arrangement A</th>
<th>Parallel arrangement B using the Mutual Interference Prevention Function A'</th>
<th>Parallel arrangement B using the Mutual Interference Prevention Function B'</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2C-EDR6-F</td>
<td>14</td>
<td>10</td>
<td>3.5</td>
</tr>
<tr>
<td>E2C-ED01</td>
<td>45</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td>E2C-ED02</td>
<td>35</td>
<td>30</td>
<td>21</td>
</tr>
<tr>
<td>E2C-EM02</td>
<td>36</td>
<td>30</td>
<td>21</td>
</tr>
<tr>
<td>E2C-EM07M</td>
<td>140</td>
<td>120</td>
<td>35</td>
</tr>
<tr>
<td>E2C-EV05</td>
<td>65</td>
<td>30</td>
<td>21</td>
</tr>
<tr>
<td>E2C-EM02H</td>
<td>45</td>
<td>30</td>
<td>21</td>
</tr>
</tbody>
</table>

* Mutual interference does not occur for close-proximity mounting when the Mutual Interference Prevention Function is effective.
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

Sensor Heads

**E2C-EDR6-F**
- 3 dia.
- 5.2 dia.
- Connector
- Vinyl-insulated round coaxial cable
  - 1.7 dia., 1 core
  - F: 0.5 m
- Vinyl-insulated round cable
  - 3.4 dia., 3 cores
  - F: 3 m Flexible Cable

**E2C-ED01(-F)**
- 5.4 dia.
- 5.2 dia.
- Connector
- Vinyl-insulated round coaxial cable
  - 2.5 dia., 1 core
  - Standard: 2 m/F: 0.5 m
- Vinyl-insulated round cable
  - 3.4 dia., 3 cores
  - Standard: 0.5 m/F: 3 m Flexible Cable

**E2C-ED02(-F)**
- 8 dia.
- 5.2 dia.
- Connector
- Vinyl-insulated round coaxial cable
  - 2.5 dia., 1 core
  - Standard: 2 m/F: 0.5 m
- Vinyl-insulated round cable
  - 3.4 dia., 3 cores
  - Standard: 0.5 m/F: 3 m Flexible Cable

**E2C-EM02(-F)**
- 16 dia.
- 5.2 dia.
- Connector
- Vinyl-insulated round coaxial cable
  - 2.5 dia., 1 core
  - Standard: 2 m/F: 0.5 m
- Vinyl-insulated round cable
  - 3.4 dia., 3 cores
  - Standard: 0.5 m/F: 3 m Flexible Cable
- M10 × 1
- Clamping nut
- Toothed washer
Extension Cables for Sensors Head

**E2C-EDA**

**E2C-EM07M(-F)**

Vinyl-insulated round coaxial cable 2.5 dia., 1 core

- Standard: 2 m
- Flexible: 0.5 m

Vinyl-insulated round cable 3.4 dia., 3 cores

- Standard: 0.5 m
- Flexible: 3 m

**E2C-EV05(-F)**

Vinyl-insulated round coaxial cable 2.5 dia., 1 core

- Standard: 2 m
- Flexible: 0.5 m

Vinyl-insulated round cable 3.4 dia., 3 cores

- Standard: 0.5 m
- Flexible: 3 m

**E2C-EM02H**

Fluorescent-insulated round coaxial cable 2.5 dia., 1 core

- Standard: 2 m

Vinyl-insulated round cable 3.4 dia., 3 cores

- Standard: 0.5 m
- Flexible: 3 m

**Extension Cables for Sensors Head**

**E22-XC2R**

**E22-XC7R**

<table>
<thead>
<tr>
<th>Specifications</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 m</td>
<td>2,000</td>
</tr>
<tr>
<td>7 m</td>
<td>7,000</td>
</tr>
</tbody>
</table>
Amplifier Units

Amplifier Units with Cables
E2C-EDA11
E2C-EDA21
E2C-EDA41
E2C-EDA51

Connector

Circle (○): Fine positioning indicator
Ellipse (□): Operation indicators (2 channels)

Main display
Operation indicator
Sub-display

Vinyl-insulated round cable, 4 dia., 4 cores
(Conductor cross-sectional area: 0.2 mm²;
insulation diameter: 1.1 dia.)

Standard length: 2 m

With Mounting Bracket Attached

The Mounting Bracket can also be used on side A.

Mounting Holes

Two, M3

Stainless steel (SUS304)

E39-L143 Mounting Bracket: Sold separately
Amplifier Units with Wire-saving Connectors

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

Circle (○): Fine positioning indicator
Ellipse (⋮): Operation indicators (2 channels)

With Mounting Bracket Attached

The Mounting Bracket can also be used on side A.

Hole for optical communications

Mounting Bracket: Sold separately
Stainless steel (SUS304)

Connector

Mounting Holes

Two, M3
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.
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