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# E3C

CSM_E3C_DS_E_11_2

## Thin, Compact Head Saves Space and Mounts Closely. Built-in Interference Protection Provided.

- Input indicator on the Sensor Unit simplifies settings.



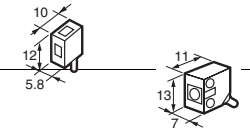
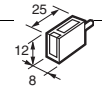
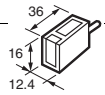
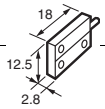
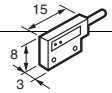
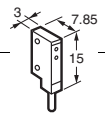
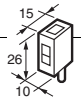
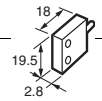
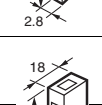
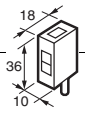
⚠ Be sure to read *Safety Precautions* on page 8.

## Ordering Information

### Sensors

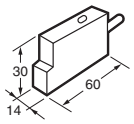
**Sensor Units** [Refer to ***Dimensions*** on page 9.]

Red light / Infrared light

| Sensing method | Application | Appearance | Sensing distance | Model |
|---|---|---|---|---|
| Through-beam (Emitter + Receiver) | Small type |  | 100 mm | **E3C-S10 2M** *1<br>Emitter E3C-S10L 2M<br>Receiver E3C-S10D 2M |
| | |  | 500 mm | **E3C-S50 2M** *1 *2<br>Emitter E3C-S50L 2M<br>Receiver E3C-S50D 2M |
| | |  | 1 m | **E3C-1 2M** *1<br>Emitter E3C-1L 2M<br>Receiver E3C-1D 2M |
| | |  | 2 m | **E3C-2 2M** *1<br>Emitter E3C-2L 2M<br>Receiver E3C-2D 2M |
| | Slim type |  | 200 mm | **E3C-S20W 2M** |
| | |  | | **E3C-S30W 2M** |
| | Side-view |  | 300 mm | **E3C-S30T 2M** |
| | |  | | |
| Diffuse-reflective | Small type |  | 100 mm | **E3C-DS10 2M** |
| | Slim type |  | 50 mm | **E3C-DS5W 2M** |
| | Side-view |  | 100 mm | **E3C-DS10T 2M** |
| | |  | | |
| Convergent-reflective | Small type | | 30±3 mm | **E3C-LS3R 2M** |

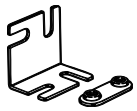
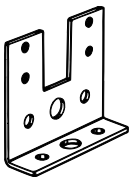
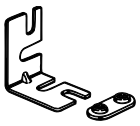
*1. Through-beam Sensors are normally sold in sets that include both the Emitter and Receiver.
*2. You cannot order the Emitter and Receiver with separate model numbers. Always order them together using the model number for the set (E3C-S50 2M).

## Amplifier Units [Refer to *Amplifier Units* on page 12.]

| Power supply | Application | Appearance | Functions | Model |
|---|---|---|---|---|
| DC | Slim type |  | Self diagnostic | **E3C-JC4P 2M** |

## Accessories (Order Separately)

### Mounting Brackets [Refer to *E39-L/E39-S/E39-R* for Dimensions.]

| Appearance | Model | Quantity | Remarks |
|---|---|---|---|
|  | **E39-L41** | 2 | Provided with the E3C-1. |
|  | **E39-L42** | 2 | Provided with the E3C-2.<br>Can be used with the E3C-DS10. |
|  | **E39-L127-T1** | 1 | Can be used with the E3C-S10. |
| | **E39-L127-T2** | 1 | |
| | **E39-L127-T3** | 1 | |
|  | **E39-L31** | 1* | Can be used with the E3C-S50. |

Note: Refer to *E39-L/E39-S/E39-R* for Dimensions.
* When using through-beam models, order one bracket for the Receiver and one for the Emitter.

## Ratings and Specifications

### Sensors

| Item \ Model | E3C-S10 | E3C-S20W | E3C-S50 | E3C-S30T<br>E3C-S30W | E3C-1 | E3C-2 |
|---|---|---|---|---|---|---|
| **Sensing method** | **Through-beam** | | | | | |
| **Sensing distance** | 100 mm | 200 mm | 500 mm | 300 mm | 1 m | 2 m |
| **Standard sensing object** | Opaque, 2-mm dia. min. | | Opaque, 3-mm dia. min. | Opaque, 1.5-mm dia. min. | Opaque, 4-mm dia. min. | Opaque, 8-mm dia. min. |
| **Directional angle** | Emitter/Receiver: 10 to 60° each | | Emitter/Receiver: 10 to 40° each | | Emitter/Receiver: 3 to 20° each | Emitter/Receiver: 3 to 15° each |
| **Light source (wavelength)** | Infrared LED (950 nm) | | | Infrared LED (940 nm) | Infrared LED (950 nm) | |
| **Ambient illuminance (Receiver side)** | Incandescent lamp: 3,000 lx max., Sunlight 10,000 lx max. | | | | | |
| **Ambient temperature range** | Operating/Storage: –25 to 70°C (with no icing or condensation) | | | | | |
| **Ambient humidity range** | Operating/Storage: 35% to 85%RH (with no condensation) | | | | | |
| **Insulation resistance** | 20 MΩ min. at 500 VDC | | | | | |
| **Dielectric strength** | 500 VAC at 50/60 Hz for 1 minute | | | | | |
| **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$^2$ for 3 times each in X, Y, and Z directions | | | | | |
| **Degree of protection** | IEC 60529 IP64<br>Limited to indoor use | IEC 60529 IP50<br>Limited to indoor use | IEC 60529 IP64<br>Limited to indoor use | IEC 60529 IP60<br>Limited to indoor use | IEC 60529 IP66<br>Limited to indoor use | |
| **Connection method** | Pre-wired models (standard length: 2 m) | | | | | |
| **Weight (packed state)** | Approx. 50 g | | | Approx. 24 g | Approx. 60 g | Approx. 120 g |
| **Material** **Case** | Polycarbonate | | ABS | Polycarbonate | | Zinc die-cast |
| **Material** **Lens** | Polycarbonate | | Acrylics | Polycarbonate | | |
| **Material** **Mounting Brackets** | --- | | | | Steel | |
| **Accessories** | Instruction manual | Phillips screw M2×8, spring washer, flat washer, M2 nut, instruction manual | Instruction manual | Phillips screw M2×8, spring washer, flat washer, nut M2, instruction manual | Mounting Bracket (with screws), instruction manual | Mounting Bracket (with screws), instruction manual |

| Item \ Model | E3C-DS5W | E3C-DS10T | E3C-DS10 | E3C-LS3R |
|---|---|---|---|---|
| **Sensing method** | **Diffuse-reflective** | | | **Convergent-reflective** |
| **Sensing distance** | 50 mm (White paper 100 × 100 mm) | 100 mm (White paper 100 × 100 mm) | 100 mm (White paper 50 × 50 mm) | 30 ± 3 mm (White paper 10 × 10 mm) |
| **Differential travel** | 20% max. of sensing distance | | 10% max. | ±3% max. |
| **Light source (wavelength)** | Infrared LED (950 nm) | Infrared LED (950 nm) | | Red LED (680 nm) |
| **Ambient illuminance (Receiver side)** | Incandescent lamp: 3,000 lx max., Sunlight 10,000 lx max. | | | |
| **Ambient temperature range** | Operating/Storage: –25 to 70°C (with no icing or condensation) | | | |
| **Ambient humidity range** | Operating/Storage: 35% to 85%RH (with no condensation) | | | |
| **Insulation resistance** | 20 MΩ min. at 500 VDC | | | |
| **Dielectric strength** | 500 VAC at 50/60 Hz for 1 minute | | | |
| **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$^2$ for 3 times each in X, Y, and Z directions | | | |
| **Degree of protection** | IEC 60529 IP50 (Limited to indoor use) | | IEC 60529 IP64 (Limited to indoor use) | |
| **Connection method** | Pre-wired models (standard length: 2 m) | | | |
| **Weight (packed state)** | Approx. 50 g | | | Approx. 55 g |
| **Material** **Case** | Polycarbonate | | | |
| **Material** **Lens** | Polycarbonate | | | |
| **Accessories** | Phillips screw M2×8, spring washer, flat washer, M2 nut, instruction manual | Instruction manual | | |

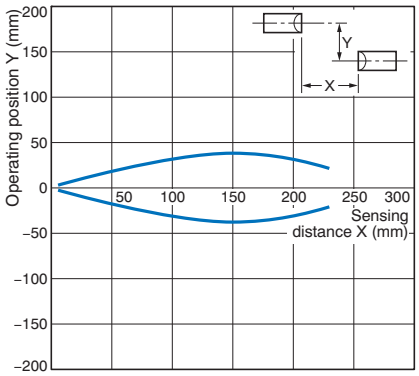
## Amplifier Units

| Item | Model | E3C-JC4P |
|---|---|---|
| Power supply voltage | | 12 to 24 VDC±10%, ripple (p-p): 1 V max. |
| Power (current) consumption | | 40 mA max. |
| Control output | | Load power supply voltage: 24 VDC max., load current: 100 mA max., NPN open collector output type (residual voltage: 1 V max.)<br>Light-ON/Dark-ON switch selectable |
| Timer function | | OFF-delay 0/40 ms (switch selectable) |
| Ambient temperature range | | Operating: −10° to 55°C, Storage: −25° to 70°C (with no icing or condensation) |
| Ambient humidity range | | Operating: 35% to 85%, 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 minute |
| 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: 300 $ms^2$ three times in each of X, Y and Z directions |
| Degree of protection | | IEC IP40 (limited to indoor use) |
| Protection | | Reverse polarity protection, output short-circuit protection, mutual interference prevention |
| Response time | | Operate or reset: 1 ms max. |
| Connection method | | Terminal block input cable pullout (standard cable length: 2 m) |
| Weight (packed state) | | Approx. 80 g |
| Material | Case | ABS |
| | Mounting Brackets | Iron |
| Accessories | | Mounting Bracket,  Adjustment screwdriver, Caution label, Instruction manual |

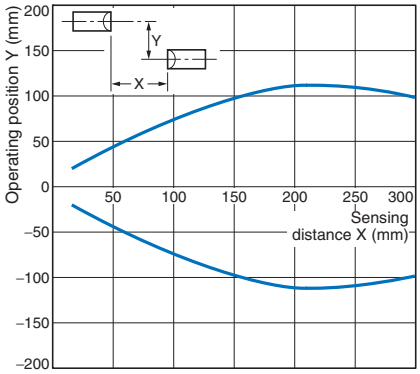
# Engineering Data (Reference Value)

## Parallel Operating Range

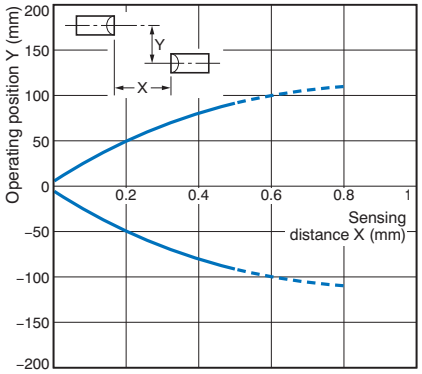
### Through-beam
### E3C-S10



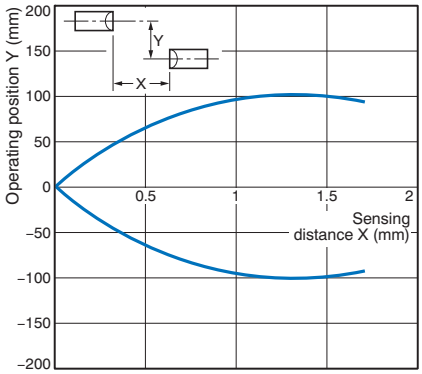

### Through-beam
### E3C-S20W



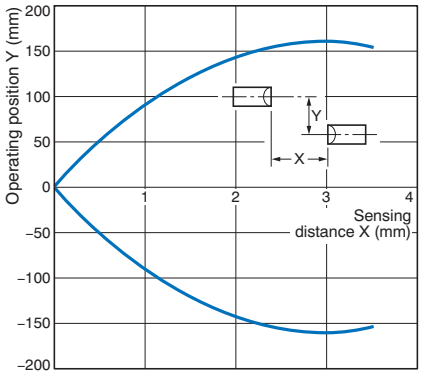

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### E3C-S50



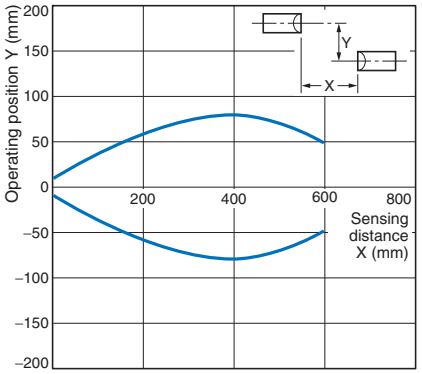

### Through-beam
### E3C-1




### Through-beam
### E3C-2

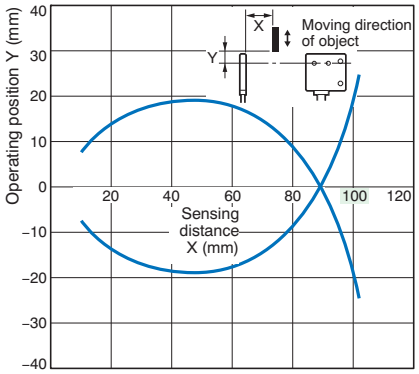



### Through-beam
### E3C-S30T/-S30W

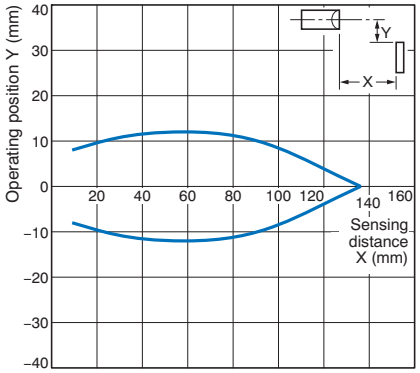



## Operating Range

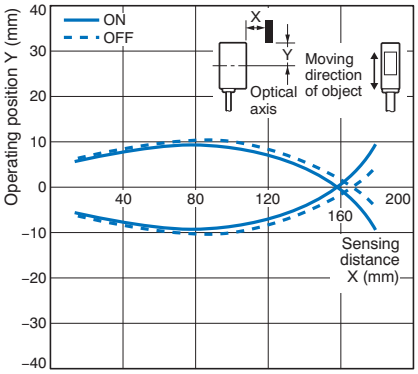
### Diffuse-reflective
### E3C-DS5W



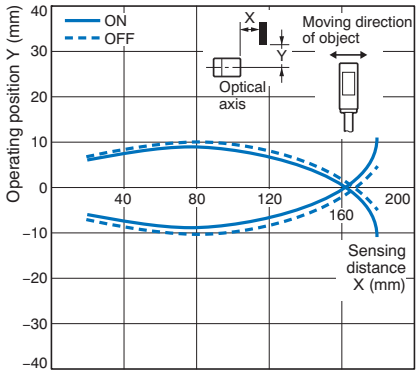

### Diffuse-reflective
### E3C-DS10T



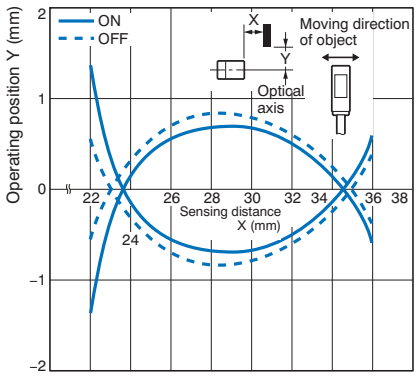

### Diffuse-reflective
### E3C-DS10 (Example 1)



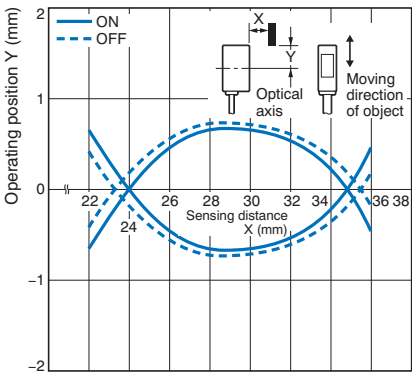
### Diffuse-reflective
### E3C-DS10 (Example 2)




### Convergent-reflective
### E3C-LS3R (Example 1)

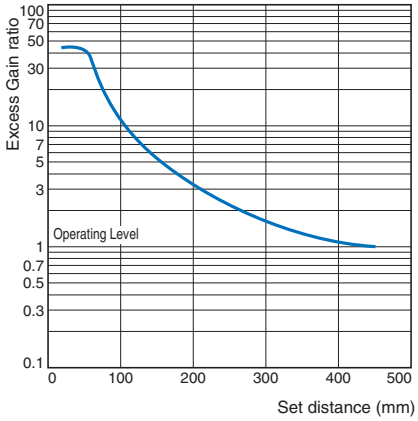



### Convergent-reflective
### E3C-LS3R (Example 2)

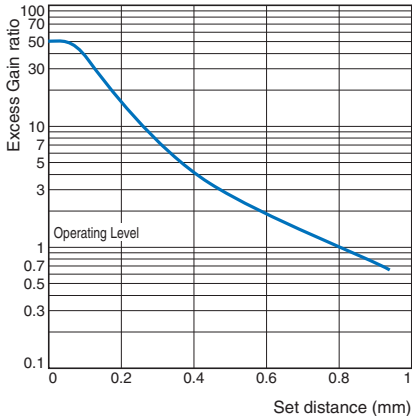



## Excess Gain vs. Set Distance

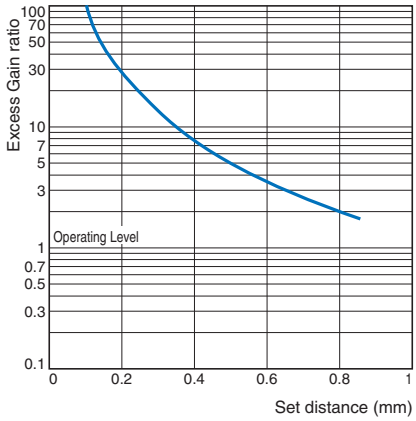
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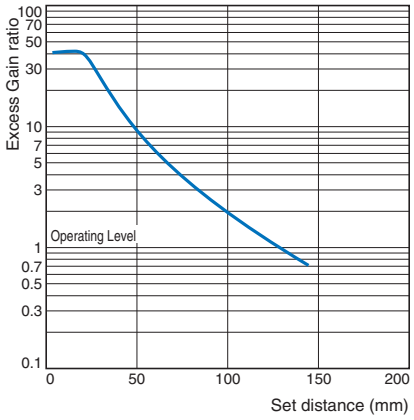

### E3C-S30T/-S30W



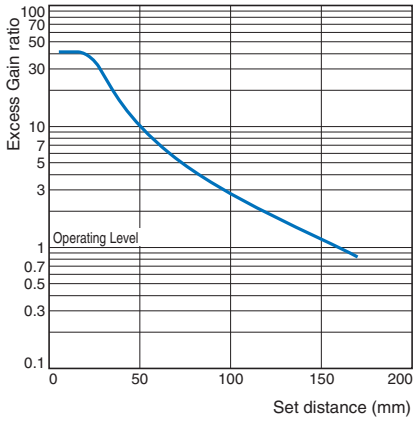

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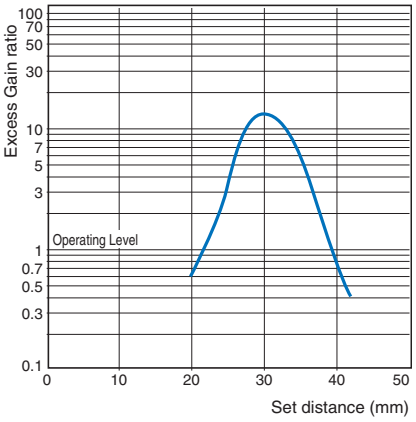

### E3C-DS5W




### E3C-DS10T

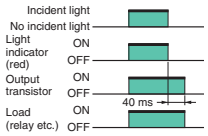
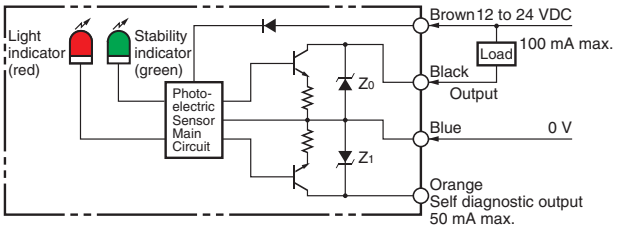
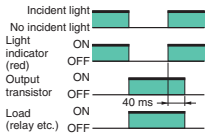



### E3C-LS3R

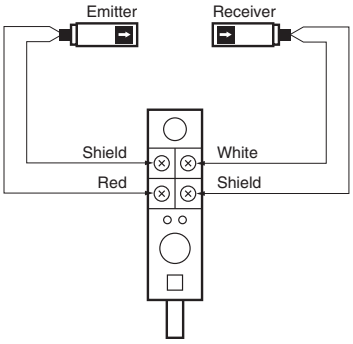
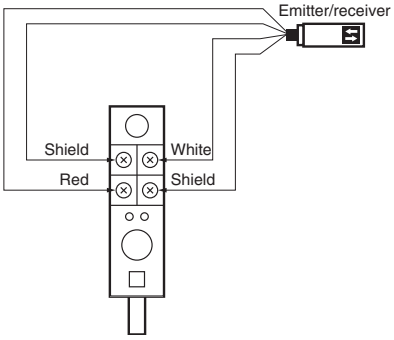


## I/O Circuit Diagrams

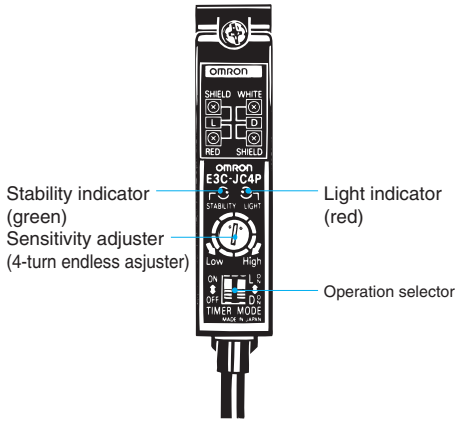
### NPN output

| Model | Operation mode | Timing charts | Operation selector | Output circuit |
|---|---|---|---|---|
| E3C-JC4P | Light-ON |  | L-ON (LIGHT ON) |  |
| | Dark-ON |  | D-ON (DARK ON) | |

## Connection

| Amplifier Units | Connected to the through-beam model | Connected to the reflective model | Note |
|---|---|---|---|
| E3C-JC4P |  |  | Note: 1. The strip-off length of the shielded cable should always be 20 mm max. on the Receiver side (white) and 50 mm max. on the Emitter side (red). |

## Nomenclature/Settings

| Amplifier Units | Nomenclature |
|---|---|
| E3C-JC4P |  |

# Safety Precautions

**Refer to *Warranty and Limitations of Liability*.**

**⚠ WARNING**

**This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.**



## Precautions for Correct Use

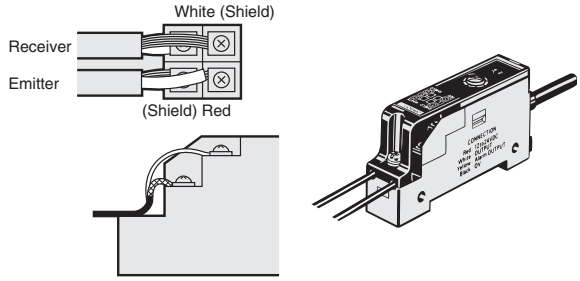
Do not use the product in atmospheres or environments that exceed product ratings.

### Amplifier Units

● **Wiring**

#### Connection of Amplifier Unit and Sensor

Always run the shielded wires of the Emitter and Receiver separately. Also, route the sensor cable along the cable grooves of the cover and sensor and fix it with the cover.

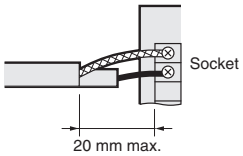



### Sensor Units

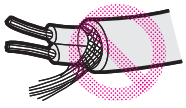
● **Wiring**

#### Extension Cable

- The extension distance of the sensor connection cable should be within 10 m including sensor cable.
- The strip-off length of the core in the connection cable should be 20 mm max. on the Receiver side and 50 mm max. on the Emitter side, and the core should be as short as possible. Avoid using the joint terminal and connector.

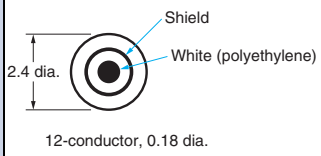
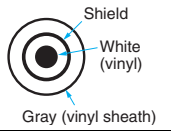
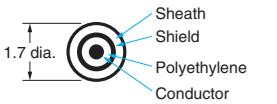
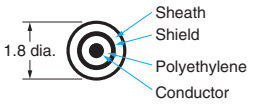



- Use independent shielded wires for the Emitter and Receiver. Using a common shielded wire can cause a malfunction.

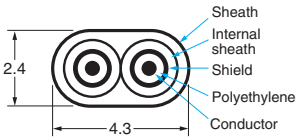
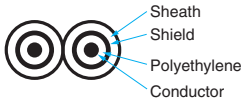


#### Extension Cable

**Through-beam**

| Model \ Cable | Specified cable | Replacement cable |
|---|---|---|
| **E3C-S10**<br>**E3C-1**<br>**E3C-2**<br>**E3C-S50** | Polyethylene insulation shield Round cable<br><br>12-conductor, 0.18 dia. | 1-conductor shield/ vinyl wire, conductor cross section: 0.3 mm² min.<br> |
| **E3C-S20W** | Vinyl insulation shield round cable<br><br>12-conductor, 0.18 dia. | 1-conductor shield/ vinyl wire, conductor cross section: 0.3 mm² min. |
| **E3C-S30T**<br>**E3C-S30W** | Vinyl insulation shield round cable (robot cable)<br><br>30-conductor, 0.08 dia. | |

**Reflective model**

| Model \ Cable | Specified cable | Replacement cable |
|---|---|---|
| **E3C-DS10**<br>**E3C-DS10T**<br>**E3C-VS1G**<br>**E3C-VS3R**<br>**E3C-LS3R** | Vinyl insulation shielded parallel cable<br><br>12-conductor, 0.18 dia. | When there is no1-conductor shielded, vinyl cable (parallel wire), use two 1-conductor shielded, vinyl wires. |
| **E3C-DS5W**<br>**E3C-VS7R**<br>**E3C-VM35R** | Vinyl insulation shielded parallel cable<br><br>7-conductor, 0.18 dia. | When there is no1-conductor shielded, vinyl cable (parallel wire), use two 1-conductor shielded, vinyl wires. |

● **Others**

When the E3C is used in a place where high-frequency noise will be generated, e.g. ultrasonic welder, grounding the 0-V terminal (on the shield side of the connection cable) of the Receiver may avoid a malfunction caused by induction.

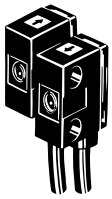
# Dimensions

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

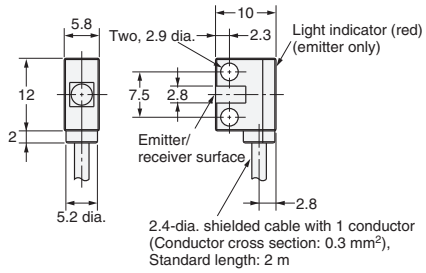
## Sensors

### Sensor Units

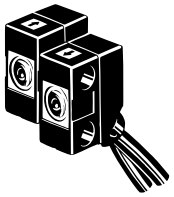
#### E3C-S10



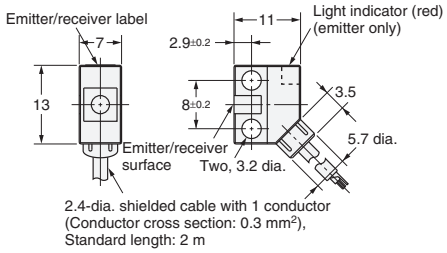
Emitter: E3C-S10L
Receiver: E3C-S10D



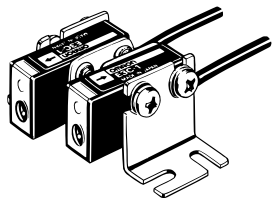

#### E3C-S50



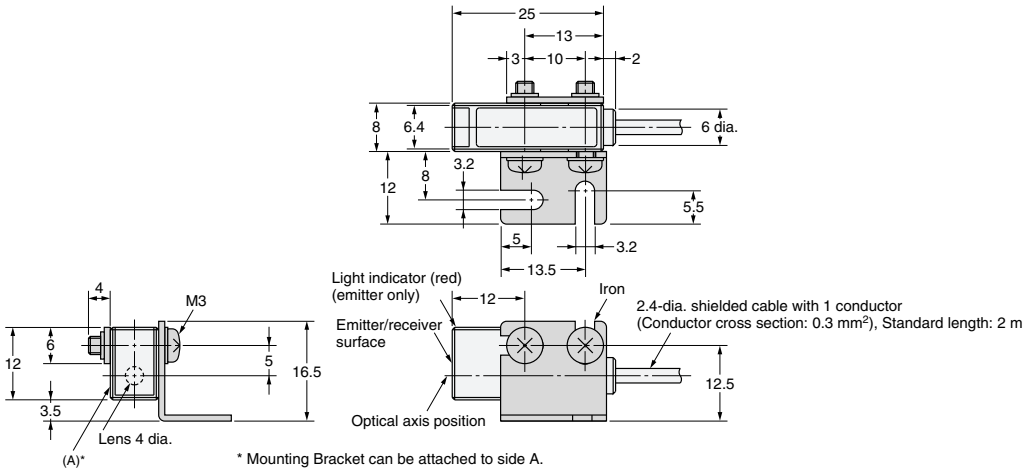
Emitter: E3C-S50L
Receiver: E3C-S50D



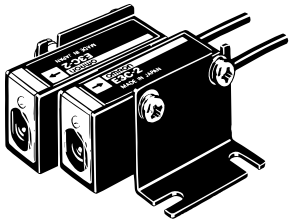

#### E3C-1



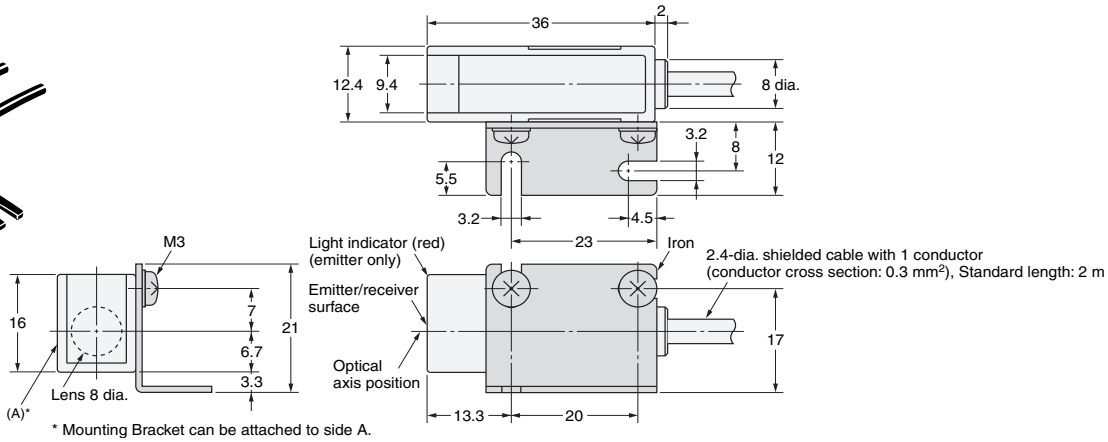
Emitter: E3C-1L
Receiver: E3C-1D



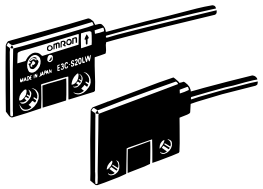

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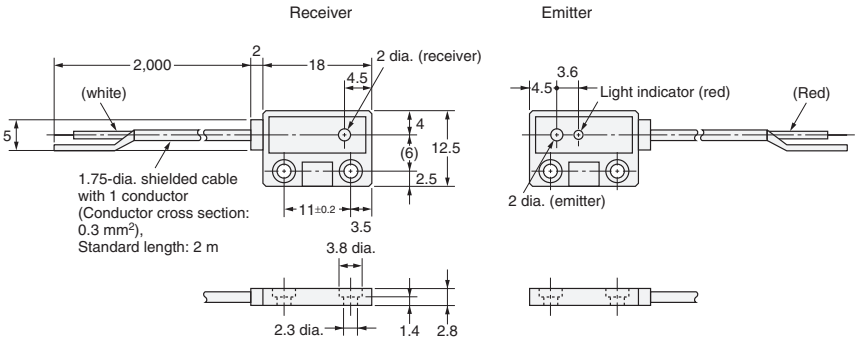
Emitter: E3C-2L
Receiver: E3C-2D



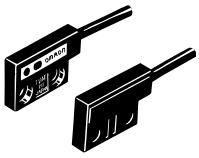
## E3C-S20W



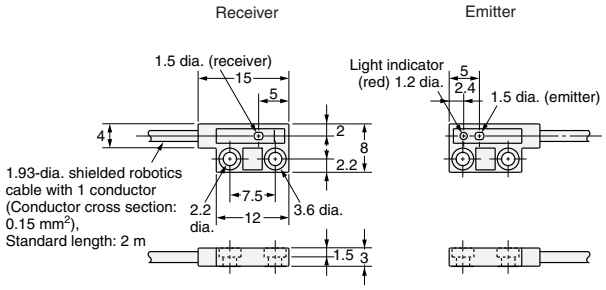
Emitter: E3C-S20LW
Receiver: E3C-S20DW



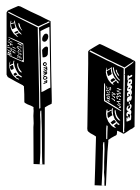

## E3C-S30W



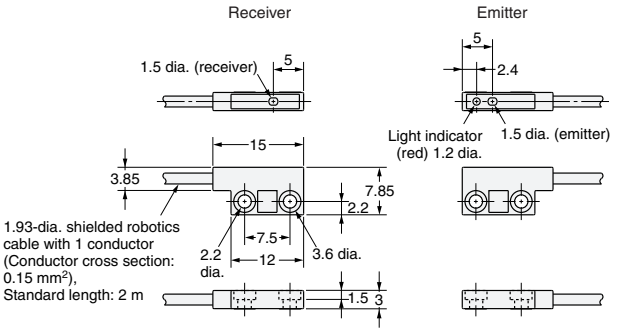
Emitter: E3C-S30LW
Receiver: E3C-S30DW



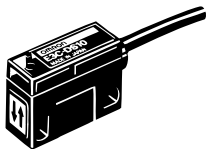

## E3C-S30T

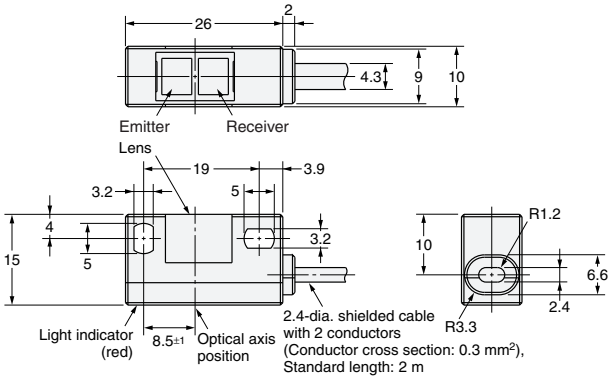


Emitter: E3C-S30LT
Receiver: E3C-S30DT

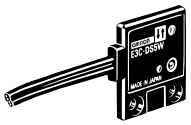


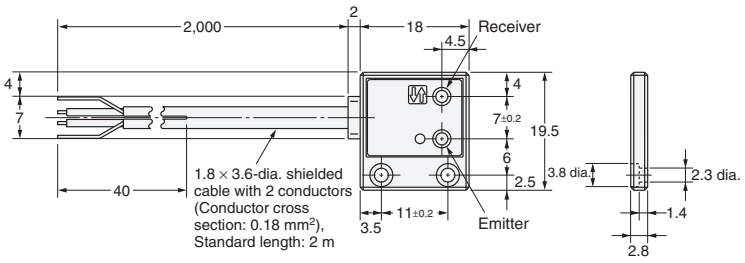

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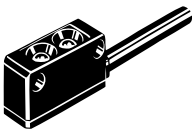


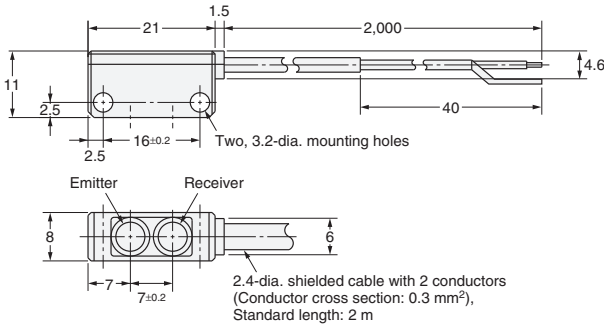
## E3C-DS5W



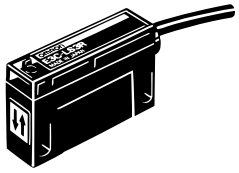


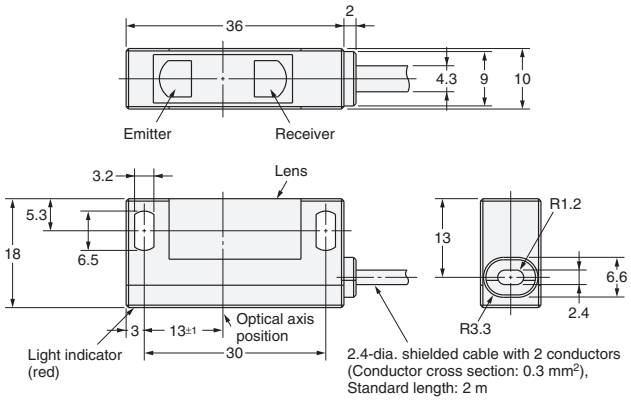

## E3C-DS10T





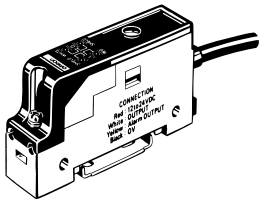

## E3C-LS3R



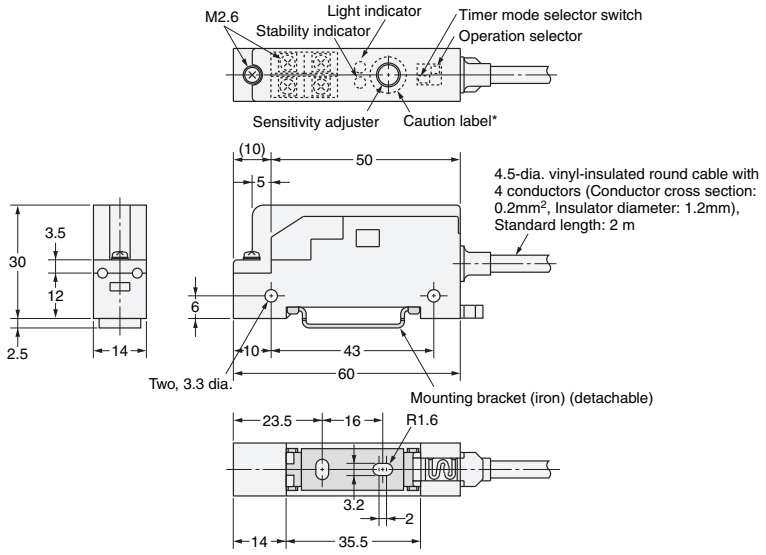


## Amplifier Units

### E3C-JC4P



**With Mounting Bracket Attached**




*After adjusting the sensitivity, attach the caution label at the location indicated by ◌ above to prevent malfunction.

## Accessories (Order Separately)

### Mounting Brackets

Refer to *E39-L/E39-S/E39-R* for details.

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2015.9

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