

# Ultracompact, Ultrathin Photoelectric Sensor with Built-in Amplifier

## E3T

### The Improved E3T Series with Easier, Smoother Mounting and Installation

- Newly added Through-beam, Long-distance (2 m) Sensors (E3T-ST3□).
- Easy installation with M3-mounting Sensors (E3T-ST□□M, E3T-FD□□M, and E3T-SL□□M).
- Small Cylindrical Sensors for one-point mounting also added to the Series. (E3T-C□□□(S)).



 Be sure to read *Safety Precautions* on page 13.

### Lineup Overview

| Appearance                     |                                                                                                  | Sensing method            | Through-beam | Retro-reflective | Diffuse-reflective | Convergent-reflective | BGS-reflective |
|--------------------------------|--------------------------------------------------------------------------------------------------|---------------------------|--------------|------------------|--------------------|-----------------------|----------------|
| Rectangular type               | Side-view<br> | M2-mounting               | ●            | ●                | ---                | ●                     | ---            |
|                                |                                                                                                  | <b>NEW</b><br>M3-mounting | ●            | ---              | ---                | ●                     | ---            |
|                                | Flat<br>      | M2-mounting               | ●            | ---              | ●                  | ---                   | ●              |
|                                |                                                                                                  | <b>NEW</b><br>M3-mounting | ---          | ---              | ●                  | ---                   | ---            |
| <b>NEW</b><br>Cylindrical type | Top-view<br>  | ---                       | ●            | ---              | ●                  | ---                   | ---            |
|                                | Side-view<br> | ---                       | ●            | ---              | ---                | ---                   | ---            |

# E3T

## Ordering Information

**Sensors** [Refer to Dimensions on page 14.]

■ Red light □ Infrared light

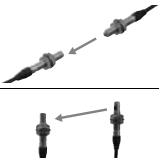
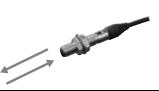
**M2-mounting Sensors** A set of mounting screws is included with the Sensor.

| Sensing method                         | Appearance                                                                          | Sensing distance                                     | Operation mode | Model                  |                        |
|----------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------|----------------|------------------------|------------------------|
|                                        |                                                                                     |                                                      |                | NPN output             | PNP output             |
| Through-beam<br>(Emitter + Receiver)*2 |    | 2 m                                                  | Light-ON       | E3T-ST31 2M <b>NEW</b> | E3T-ST33 2M <b>NEW</b> |
|                                        |                                                                                     | (Sensitivity Adjustment Unit can be used.)           | Dark-ON        | E3T-ST32 2M <b>NEW</b> | E3T-ST34 2M <b>NEW</b> |
|                                        |                                                                                     | 1 m                                                  | Light-ON       | E3T-ST11 2M            | E3T-ST13 2M            |
|                                        |                                                                                     | (Sensitivity Adjustment Unit can be used.)           | Dark-ON        | E3T-ST12 2M            | E3T-ST14 2M            |
|                                        |    | 300 mm                                               | Light-ON       | E3T-ST21 2M            | E3T-ST23 2M            |
|                                        |                                                                                     |                                                      | Dark-ON        | E3T-ST22 2M            | E3T-ST24 2M            |
|                                        |                                                                                     | 500 mm                                               | Light-ON       | E3T-FT11 2M            | E3T-FT13 2M            |
|                                        |                                                                                     |                                                      | Dark-ON        | E3T-FT12 2M            | E3T-FT14 2M            |
|                                        |                                                                                     | 300 mm                                               | Light-ON       | E3T-FT21 2M            | E3T-FT23 2M            |
|                                        |                                                                                     |                                                      | Dark-ON        | E3T-FT22 2M            | E3T-FT24 2M            |
| Retro-reflective                       |    | Using the E39-R4 Reflector provided 200 mm [30 mm]*1 | Light-ON       | E3T-SR41 2M*3          | E3T-SR43 2M*3          |
|                                        |                                                                                     | Using the E39-R37-CA 100 mm [10 mm]*1                | Dark-ON        | E3T-SR42 2M*3          | E3T-SR44 2M*3          |
| Diffuse-reflective                     |    | 5 to 30 mm                                           | Light-ON       | E3T-FD11 2M            | E3T-FD13 2M            |
|                                        |                                                                                     |                                                      | Dark-ON        | E3T-FD12 2M            | E3T-FD14 2M            |
| Convergent-reflective                  |    | 5 to 15 mm                                           | Light-ON       | E3T-SL11 2M            | E3T-SL13 2M            |
|                                        |                                                                                     |                                                      | Dark-ON        | E3T-SL12 2M            | E3T-SL14 2M            |
|                                        |                                                                                     | 5 to 30 mm                                           | Light-ON       | E3T-SL21 2M            | E3T-SL23 2M            |
|                                        |                                                                                     |                                                      | Dark-ON        | E3T-SL22 2M            | E3T-SL24 2M            |
| BGS-reflective                         |  | 1 to 15 mm                                           | Light-ON       | E3T-FL11 2M            | E3T-FL13 2M            |
|                                        |                                                                                     |                                                      | Dark-ON        | E3T-FL12 2M            | E3T-FL14 2M            |
|                                        |                                                                                     | 1 to 30 mm                                           | Light-ON       | E3T-FL21 2M            | E3T-FL23 2M            |
|                                        |                                                                                     |                                                      | Dark-ON        | E3T-FL22 2M            | E3T-FL24 2M            |

**M3-mounting Sensors** **NEW** A set of mounting screws is not included with the Sensor. Order a Screw Set separately if required.

| Sensing method                         | Appearance                                                                          | Sensing distance | Operation mode | Model        |              |
|----------------------------------------|-------------------------------------------------------------------------------------|------------------|----------------|--------------|--------------|
|                                        |                                                                                     |                  |                | NPN output   | PNP output   |
| Through-beam<br>(Emitter + Receiver)*2 |  | 1 m              | Light-ON       | E3T-ST11M 2M | E3T-ST13M 2M |
|                                        |                                                                                     |                  | Dark-ON        | E3T-ST12M 2M | E3T-ST14M 2M |
|                                        |                                                                                     | 300 mm           | Light-ON       | E3T-ST21M 2M | E3T-ST23M 2M |
|                                        |                                                                                     |                  | Dark-ON        | E3T-ST22M 2M | E3T-ST24M 2M |
| Diffuse-reflective                     |  | 5 to 30 mm       | Light-ON       | E3T-FD11M 2M | E3T-FD13M 2M |
|                                        |                                                                                     |                  | Dark-ON        | E3T-FD12M 2M | E3T-FD14M 2M |
| Convergent-reflective                  |  | 5 to 15 mm       | Light-ON       | E3T-SL11M 2M | E3T-SL13M 2M |
|                                        |                                                                                     |                  | Dark-ON        | E3T-SL12M 2M | E3T-SL14M 2M |
|                                        |                                                                                     | 5 to 30 mm       | Light-ON       | E3T-SL21M 2M | E3T-SL23M 2M |
|                                        |                                                                                     |                  | Dark-ON        | E3T-SL22M 2M | E3T-SL24M 2M |

**Small Cylindrical Sensors** **NEW** A set of mounting nuts is included with the Sensor.

| Sensing method                        | Appearance                                                                          | Sensing distance | Operation mode | Model        |              |
|---------------------------------------|-------------------------------------------------------------------------------------|------------------|----------------|--------------|--------------|
|                                       |                                                                                     |                  |                | NPN output   | PNP output   |
| Through-beam<br>(Emitter + Receiver)  |  | 1 m              | Light-ON       | ---          | ---          |
|                                       |                                                                                     |                  | Dark-ON        | E3T-CT12 2M  | E3T-CT14 2M  |
|                                       |                                                                                     | 500 mm           | Light-ON       | ---          | ---          |
|                                       |                                                                                     |                  | Dark-ON        | E3T-CT22S 2M | E3T-CT24S 2M |
| Diffuse-reflective<br>(with adjuster) |  | 3 to 50 mm       | Light-ON       | E3T-CD11 2M  | E3T-CD13 2M  |
|                                       |                                                                                     |                  | Dark-ON        | ---          | ---          |

\*1. Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

\*2. The model number of the Emitter is expressed by adding an "L" to the set model number in the table. Example: E3T-ST11-L 2M  
The model number of the Receiver is expressed by adding a "D" to the set model number in the table. Example: E3T-ST11-D 2M  
Orders for individual Emitters and Receivers are accepted. (Modifications are required for some models.)

\*3. Models are available either with or without the E39-R37-CA Reflector included.

Models with E39-R37-CA Reflector. E3T-SR4□-S  
Models without Reflector. E3T-SR4□-C

## Variety of Connection Specifications

The models with the connection specifications marked with a black circle in the table are available. These are applicable only to M2-mounting Sensors. The model number indication is a combination of the basic model and the connection specification.

Example: E3T-ST11-M1TJ 0.3M

Basic model number    Connection specification

### NPN Output

| Model                    |                  |                | Model number example     | E3T-ST11-M1TJ 0.3M                                       | E3T-ST11 5M                   | E3T-ST11R 2M                        | E3T-ST11-ECON 0.3M                              | E3T-ST11-ECON 2M                              |
|--------------------------|------------------|----------------|--------------------------|----------------------------------------------------------|-------------------------------|-------------------------------------|-------------------------------------------------|-----------------------------------------------|
| Sensing method           | Sensing distance | Operation mode | Connection specification | M12 pre-wired Smartclick Connector (cable length: 0.3 m) | Pre-wired (cable length: 5 m) | Pre-wired robot (cable length: 2 m) | e-CON pre-wired connector (cable length: 0.3 m) | e-CON pre-wired connector (cable length: 2 m) |
|                          |                  |                | Basic model number       | -M1TJ 0.3M                                               | 5M                            | R 2M                                | -ECON 0.3M                                      | -ECON 2M                                      |
| Through-beam (side-view) | 2 m              | Light-ON       | E3T-ST31                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
|                          |                  | Dark-ON        | E3T-ST32                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
|                          | 1 m              | Light-ON       | E3T-ST11                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
|                          |                  | Dark-ON        | E3T-ST12                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
|                          | 300 mm           | Light-ON       | E3T-ST21                 | ●                                                        | ●                             | ---                                 | ●                                               | ●                                             |
|                          |                  | Dark-ON        | E3T-ST22                 | ●                                                        | ●                             | ---                                 | ●                                               | ●                                             |
| Through-beam (flat)      | 500 mm           | Light-ON       | E3T-FT11                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
|                          |                  | Dark-ON        | E3T-FT12                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
|                          | 300 mm           | Light-ON       | E3T-FT21                 | ●                                                        | ---                           | ---                                 | ●                                               | ●                                             |
|                          |                  | Dark-ON        | E3T-FT22                 | ●                                                        | ---                           | ---                                 | ●                                               | ●                                             |
| Retro-reflective         | 200 mm (100 mm)* | Light-ON       | E3T-SR41                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
|                          |                  | Dark-ON        | E3T-SR42                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
| Diffuse-reflective       | 5 to 30 mm       | Light-ON       | E3T-FD11                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
|                          |                  | Dark-ON        | E3T-FD12                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
| Convergent-reflective    | 5 to 15 mm       | Light-ON       | E3T-SL11                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
|                          |                  | Dark-ON        | E3T-SL12                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
|                          | 5 to 30 mm       | Light-ON       | E3T-SL21                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
|                          |                  | Dark-ON        | E3T-SL22                 | ●                                                        | ●                             | ●                                   | ●                                               | ●                                             |
| BGS-reflective           | 1 to 15 mm       | Light-ON       | E3T-FL11                 | ●                                                        | ---                           | ●                                   | ---                                             | ---                                           |
|                          |                  | Dark-ON        | E3T-FL12                 | ●                                                        | ---                           | ●                                   | ---                                             | ---                                           |
|                          | 1 to 30 mm       | Light-ON       | E3T-FL21                 | ●                                                        | ---                           | ●                                   | ●                                               | ---                                           |
|                          |                  | Dark-ON        | E3T-FL22                 | ●                                                        | ---                           | ●                                   | ---                                             | ---                                           |

\*The sensing distance depends on the Reflector that is used. The sensing distance is 200 mm if an E39-R4 is used and 100 mm if an E39-R37-CA is used.

### PNP Output

| Model                    |                  |                | Model number example     | E3T-ST13-M1TJ 0.3M                                       | E3T-ST13 5M                   | E3T-ST13R 2M                        |
|--------------------------|------------------|----------------|--------------------------|----------------------------------------------------------|-------------------------------|-------------------------------------|
| Sensing method           | Sensing distance | Operation mode | Connection specification | M12 pre-wired Smartclick Connector (cable length: 0.3 m) | Pre-wired (cable length: 5 m) | Pre-wired robot (cable length: 2 m) |
|                          |                  |                | Basic model number       | -M1TJ 0.3M                                               | 5M                            | R 2M                                |
| Through-beam (side-view) | 2 m              | Light-ON       | E3T-ST33                 | ●                                                        | ●                             | ●                                   |
|                          |                  | Dark-ON        | E3T-ST34                 | ●                                                        | ●                             | ●                                   |
|                          | 1 m              | Light-ON       | E3T-ST13                 | ●                                                        | ●                             | ●                                   |
|                          |                  | Dark-ON        | E3T-ST14                 | ●                                                        | ●                             | ●                                   |
|                          | 300 mm           | Light-ON       | E3T-ST23                 | ●                                                        | ---                           | ---                                 |
|                          |                  | Dark-ON        | E3T-ST24                 | ●                                                        | ---                           | ---                                 |
| Through-beam (flat)      | 500 mm           | Light-ON       | E3T-FT13                 | ●                                                        | ●                             | ●                                   |
|                          |                  | Dark-ON        | E3T-FT14                 | ●                                                        | ●                             | ●                                   |
|                          | 300 mm           | Light-ON       | E3T-FT23                 | ●                                                        | ---                           | ---                                 |
|                          |                  | Dark-ON        | E3T-FT24                 | ●                                                        | ●                             | ---                                 |
| Retro-reflective         | 200 mm (100 mm)* | Light-ON       | E3T-SR43                 | ●                                                        | ●                             | ●                                   |
|                          |                  | Dark-ON        | E3T-SR44                 | ●                                                        | ●                             | ●                                   |
| Diffuse-reflective       | 5 to 30 mm       | Light-ON       | E3T-FD13                 | ●                                                        | ●                             | ●                                   |
|                          |                  | Dark-ON        | E3T-FD14                 | ●                                                        | ●                             | ●                                   |
| Convergent-reflective    | 5 to 15 mm       | Light-ON       | E3T-SL13                 | ●                                                        | ●                             | ●                                   |
|                          |                  | Dark-ON        | E3T-SL14                 | ●                                                        | ●                             | ●                                   |
|                          | 5 to 30 mm       | Light-ON       | E3T-SL23                 | ●                                                        | ●                             | ●                                   |
|                          |                  | Dark-ON        | E3T-SL24                 | ●                                                        | ●                             | ●                                   |
| BGS-reflective           | 1 to 15 mm       | Light-ON       | E3T-FL13                 | ●                                                        | ---                           | ●                                   |
|                          |                  | Dark-ON        | E3T-FL14                 | ●                                                        | ---                           | ●                                   |
|                          | 1 to 30 mm       | Light-ON       | E3T-FL23                 | ●                                                        | ---                           | ●                                   |
|                          |                  | Dark-ON        | E3T-FL24                 | ●                                                        | ---                           | ●                                   |

\*The sensing distance depends on the Reflector that is used. The sensing distance is 200 mm if an E39-R4 is used and 100 mm if an E39-R37-CA is used.

## Accessories (Order Separately)

**Accessories for M2-mounting Sensors** These accessories are not included with the Sensor. Order them separately if required.

| Name                                                                        |          | Applicable Sensor | Model    | Quantity                                                                                 | Dimensions page                              | Remarks                                                                                                                                    |
|-----------------------------------------------------------------------------|----------|-------------------|----------|------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Mutual Interference Prevention Filter for Through-beam Side-view Sensors *1 |          | E3T-ST3□          | E39-E14  | 4<br>(Two each for Emitter and Receiver)                                                 | 19                                           | Sensing distance 1 m                                                                                                                       |
|                                                                             |          | E3T-ST1□          |          |                                                                                          |                                              | Sensing distance 0.5 m                                                                                                                     |
| Slit for Through-beam Side-view Sensors                                     | 0.5 dia. | E3T-ST3□          | E39-S63  | 2<br>(One each for Emitter and Receiver; common with Slit widths of 1 dia. and 0.5 dia.) |                                              | Sensing distance 200 mm, Minimum detectable object (typical) 0.5-mm dia.                                                                   |
|                                                                             |          | E3T-ST1□          |          |                                                                                          |                                              | Sensing distance 100 mm, Minimum detectable object (typical) 0.5-mm dia.                                                                   |
|                                                                             |          | E3T-ST2□          |          |                                                                                          |                                              | Sensing distance 30 mm, Minimum detectable object (typical) 0.5-mm dia.                                                                    |
|                                                                             | 1 dia.   | E3T-ST3□          |          |                                                                                          |                                              | Sensing distance 600 mm, Minimum detectable object (typical) 1-mm dia.                                                                     |
|                                                                             |          | E3T-ST1□          |          |                                                                                          |                                              | Sensing distance 300 mm, Minimum detectable object (typical) 1-mm dia.                                                                     |
|                                                                             |          | E3T-ST2□          |          |                                                                                          |                                              | Sensing distance 100 mm, Minimum detectable object (typical) 1-mm dia.                                                                     |
| Slit for Through-beam Flat Sensors                                          | 0.5 dia. | E3T-FT1□          | E39-S64  | Sensing distance 50 mm, Minimum detectable object (typical) 0.5-mm dia.                  |                                              |                                                                                                                                            |
|                                                                             |          | E3T-FT2□          |          | Sensing distance 30 mm, Minimum detectable object (typical) 0.5-mm dia.                  |                                              |                                                                                                                                            |
|                                                                             | 1 dia.   | E3T-FT1□          |          | Sensing distance 100 mm, Minimum detectable object (typical) 1-mm dia.                   |                                              |                                                                                                                                            |
|                                                                             |          | E3T-FT2□          |          | Sensing distance 50 mm, Minimum detectable object (typical) 1-mm dia.                    |                                              |                                                                                                                                            |
| Sensitivity Adjustment Unit for Through-beam Side-view Sensors              |          | E3T-ST3□          | E39-E10  | 1                                                                                        | Sensing distance (typical) 1,200 to 1,800 mm |                                                                                                                                            |
|                                                                             |          | E3T-ST1□          |          |                                                                                          | Sensing distance (typical) 300 to 800 mm     |                                                                                                                                            |
| Mounting Brackets for Side-view Sensors *2                                  |          | E3T-S□□□          | E39-L116 | 1                                                                                        | 20                                           | Nut plate provided                                                                                                                         |
|                                                                             |          |                   | E39-L117 |                                                                                          |                                              |                                                                                                                                            |
|                                                                             |          |                   | E39-L118 |                                                                                          |                                              |                                                                                                                                            |
| Mounting Brackets for Flat Sensors *2                                       |          | E3T-F□□□          | E39-L119 |                                                                                          | 21                                           | ---                                                                                                                                        |
|                                                                             |          |                   | E39-L120 |                                                                                          |                                              |                                                                                                                                            |
| Screw Set for Side-view Sensors *3*4                                        |          | E3T-S□□□          | E39-L164 | 2 for each                                                                               | ---                                          | Material: Iron (Same type as provided with the Sensor.)<br>Contents: Phillips screws (M2×14), Hexagonal nuts, Spring washers, Flat washers |
| Screw Set for Flat Sensors *3*4                                             |          | E3T-F□□□          | E39-L165 |                                                                                          |                                              | Material: Iron (Same type as provided with the Sensor.)<br>Contents: Phillips screws (M2×8), Hexagonal nuts, Spring washers, Flat washers  |
| SUS Screw Set for Flat Sensors *3                                           |          | E3T-F□□□          | E39-L172 | 2                                                                                        |                                              | Material: SUS304<br>Contents: Bolt with hexagonal hole (M2×6)                                                                              |
| SUS Screw Set for Side-view Sensors *3                                      |          | E3T-S□□□          | E39-L173 | 2 for each                                                                               |                                              | Material: SUS304<br>Contents: Bolt with hexagonal hole (M2×12), Hexagonal nuts, Spring washers, Flat washers                               |

\*1. An arrow indicates the polarization direction. Mutual interference can be prevented by using different polarization directions for adjacent Emitters/Receivers.

\*2. When using Through-beam Sensors (E3T-ST□□, E3T-FT□□), order one bracket for the Emitter and one for the Receiver.

\*3. Order two Sets, one for the Emitter and one for the Receiver, for Through-beam Sensors (E3T-ST□□ or E3T-FT□□).

This is the Screw Set for mounting the Sensor to the Mounting Bracket. Order this Set if you lose the screws. Do not use this Screw Set to mount the Mounting Bracket to the equipment.

\*4. This is included with the Sensor.

### Accessories for M3-mounting Sensors

These accessories are not included with the Sensor. Order them separately if required.

| Name                                      |          | Applicable Sensor | Model    | Quantity                                 | Dimensions page | Remarks                                                                                                      |
|-------------------------------------------|----------|-------------------|----------|------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------|
| Slits for Through-beam Side-view Sensors  | 0.5 dia. | E3T-ST1□M         | E39-S76A | 2<br>(One each for Emitter and Receiver) | 19              | Sensing distance 100 mm,<br>Minimum detectable object (typical) 0.5-mm dia.                                  |
|                                           |          | E3T-ST2□M         |          |                                          |                 | Sensing distance 30 mm,<br>Minimum detectable object (typical) 0.5-mm dia.                                   |
|                                           | 1 dia.   | E3T-ST1□M         | E39-S76B |                                          |                 | Sensing distance 300 mm,<br>Minimum detectable object (typical) 1-mm dia.                                    |
|                                           |          | E3T-ST2□M         |          |                                          |                 | Sensing distance 100 mm,<br>Minimum detectable object (typical) 1-mm dia.                                    |
| Mounting Bracket for Side-view Sensors *1 |          | E3T-S□□□M         | E39-L166 | 1                                        | 22              | Nut plate provided                                                                                           |
| Mounting Bracket for Flat Sensors         |          | E3T-FD□□M         | E39-L167 |                                          |                 | ---                                                                                                          |
| Back-mounting Spacer for Flat Sensors     |          |                   | E39-L168 |                                          |                 | Use this Spacer when mounting a Flat Sensor (E3T-FD□□M) from the back.                                       |
| SUS Screw Set for Flat Sensors *2         |          | E3T-FD□□M         | E39-L170 | 2                                        | ---             | Material: SUS304<br>Contents: Bolt with hexagonal hole (M3×6)                                                |
| SUS Screw Set for Side-view Sensors *1*2  |          | E3T-S□□□M         | E39-L171 | 2 for each                               |                 | Material: SUS304<br>Contents: Bolt with hexagonal hole (M3×15), Hexagonal nuts, Spring washers, Flat washers |

\*1. When using Through-beam Sensors (E3T-ST□□M), order one bracket for the Emitter and one for the Receiver.

\*2. This is the Screw Set for mounting the Sensor to the Mounting Bracket. Order this Set if you lose the screws. Do not use this Screw Set to mount the Mounting Bracket to the equipment.

### Accessories for Small Cylindrical Sensors

| Name                                             | Applicable Sensor     | Model   | Quantity                                   | Dimensions Page | Remarks                                                                         |
|--------------------------------------------------|-----------------------|---------|--------------------------------------------|-----------------|---------------------------------------------------------------------------------|
| SUS Nut Set for Through-beam Sensors *1          | E3T-CT□□<br>E3T-CT□□S | E39-M5  | 4 (Hexagonal nuts),<br>2 (Toothed washers) | ---             | Material: SUS303<br>(Same type as provided with the Sensor.)                    |
| SUS Nut Set for Diffuse-reflective Sensors       | E3T-CD□□              | E39-M6  | 2 (Hexagonal nuts),<br>1 (Toothed washers) |                 |                                                                                 |
| Adjustment Driver for Diffuse-reflective Sensors |                       | E39-G17 | 1                                          |                 | This Driver is used to turn the sensitivity adjuster.<br>Provided with E3T-CD□□ |

\*1. This Nut Set is for the Emitter/Receiver. This is the Nut Set for mounting the Sensor. Order this Set if you lose the screws.

### Accessories for All Sensors

| Name                                               | Applicable Sensor | Model         | Quantity | Dimensions Page | Remarks                                                                                                                                                                    |
|----------------------------------------------------|-------------------|---------------|----------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Small Reflectors<br>(for Retro-reflective Sensors) | E3T-SR4□          | E39-R4        | 1        | 18              | Sensing distance 200 mm [30 mm] *1<br>Minimum detectable object 2-mm dia.<br>Provided with the E3T-SR4□                                                                    |
|                                                    | E3T-SR4□-S        | E39-R37-CA *2 |          |                 | Sensing distance 100 mm [10 mm] *1<br>Minimum detectable object 2-mm dia.<br>Provided with the E3T-SR4□-S                                                                  |
| Tape Reflectors<br>(for Retro-reflective Sensors)  | E3T-SR4□-C        | E39-RS1-CA *2 |          | 19              | Sensing distance 100 mm [10 mm] *1<br>Minimum detectable object 2-mm dia.<br>Use Tape Reflectors in combination with the E3T-SR4□-C, which does not come with a Reflector. |
|                                                    |                   | E39-RS2-CA *2 |          |                 |                                                                                                                                                                            |
|                                                    |                   | E39-RS3-CA *2 |          |                 |                                                                                                                                                                            |

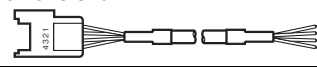
\*1. Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

\*2. The E3T-SR4□ cannot be used with the E39-R37 or E39-RS1/2/3 (without CA) Tape Reflectors.

The E39-□-CA Reflector is for use only with the E3T-SR4□. It cannot be used with other Sensors.

### Sensor I/O Connectors

(Models with Pre-wired Connectors: A Connector is not provided with the Sensor. Be sure to order a Connector separately.)

| Size                      | Cable          | Appearance                                                                                                                       | Cable type   |        | Model                  |
|---------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------|--------------|--------|------------------------|
| M12<br>(For -M1TJ models) | Standard cable | <div>Straight</div> <div></div>               | 2 m          | 4-wire | <b>XS5F-D421-D80-A</b> |
|                           |                |                                                                                                                                  | 5 m          |        | <b>XS5F-D421-G80-A</b> |
| e-CON                     |                | <div>Connector on one end</div> <div></div>   | 2 m          |        | <b>E39-ECON2M</b>      |
|                           |                |                                                                                                                                  | 5 m          |        | <b>E39-ECON5M</b>      |
|                           |                | <div>Connector on both ends</div> <div></div> | 0.5 to 1 m   |        | <b>E39-ECONW□M</b>     |
|                           |                |                                                                                                                                  | 1.1 to 1.5 m |        |                        |
|                           |                | 1.6 to 2 m                                                                                                                       |              |        |                        |

Note: When using Through-beam Sensors, order one connector for the Emitter and one for the Receiver.

# E3T

## Ratings and Specifications

| Sensing method<br><br>Appearance    |                 | Through-beam                                                                                                                                                                                             |                        |                       |                                                                                                              |          |                                                                                                                          |                                                                                                                     | Retro-reflective (without M.S.R. function)                                                                                                                                                               |
|-------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     |                 | Rectangular type (Side-view)<br>                                                                                        |                        |                       | Rectangular type (Flat)<br> |          | Cylindrical type (Top-view)<br>         | Cylindrical type (Side-view)<br> | Rectangular type (Side-view)<br>                                                                                      |
| Item                                |                 |                                                                                                                                                                                                          |                        |                       |                                                                                                              |          |                                                                                                                          |                                                                                                                     |                                                                                                                                                                                                          |
| NPN output                          | Light-ON        | E3T-ST31                                                                                                                                                                                                 | E3T-ST11<br>E3T-ST11M  | E3T-ST21<br>E3T-ST21M | E3T-FT11                                                                                                     | E3T-FT21 | ---                                                                                                                      | ---                                                                                                                 | E3T-SR41                                                                                                                                                                                                 |
|                                     | Dark-ON         | E3T-ST32                                                                                                                                                                                                 | E3T-ST12<br>E3T-ST12M  | E3T-ST22<br>E3T-ST22M | E3T-FT12                                                                                                     | E3T-FT22 | E3T-CT12                                                                                                                 | E3T-CT22S                                                                                                           | E3T-SR42                                                                                                                                                                                                 |
| PNP output                          | Light-ON        | E3T-ST33                                                                                                                                                                                                 | E3T-ST13<br>E3T-ST13M  | E3T-ST23<br>E3T-ST23M | E3T-FT13                                                                                                     | E3T-FT23 | ---                                                                                                                      | ---                                                                                                                 | E3T-SR43                                                                                                                                                                                                 |
|                                     | Dark-ON         | E3T-ST34                                                                                                                                                                                                 | E3T-ST14<br>E3T-ST14M  | E3T-ST24<br>E3T-ST24M | E3T-FT14                                                                                                     | E3T-FT24 | E3T-CT14                                                                                                                 | E3T-CT24S                                                                                                           | E3T-SR44                                                                                                                                                                                                 |
| Sensing distance                    |                 | 2 m                                                                                                                                                                                                      | 1 m                    | 300 mm                | 500 mm                                                                                                       | 300 mm   | 1 m                                                                                                                      | 500 mm                                                                                                              | 200 mm [30 mm] *1 (Using the E39-R4)<br>100 mm [10 mm] *1 (Using the E39-R37-CA)                                                                                                                         |
| Standard sensing object             |                 | Opaque, 3-mm dia. min.                                                                                                                                                                                   | Opaque, 2-mm dia. min. |                       | Opaque, 1.3-mm dia. min.                                                                                     |          | Opaque, 4-mm dia. min.                                                                                                   | Opaque, 5-mm dia. min.                                                                                              | Opaque, 27-mm dia. min.                                                                                                                                                                                  |
| Minimum detectable object (typical) |                 | Opaque, 3-mm dia.                                                                                                                                                                                        | Opaque, 2-mm dia.      |                       | Opaque, 1.3-mm dia.                                                                                          |          | ---                                                                                                                      |                                                                                                                     | 2-mm dia. (Sensing distance 100 mm)                                                                                                                                                                      |
| Hysteresis (white paper)            |                 | ---                                                                                                                                                                                                      |                        |                       |                                                                                                              |          |                                                                                                                          |                                                                                                                     |                                                                                                                                                                                                          |
| Black/white error                   |                 | ---                                                                                                                                                                                                      |                        |                       |                                                                                                              |          |                                                                                                                          |                                                                                                                     |                                                                                                                                                                                                          |
| Directional angle                   |                 | Emitter: 2 to 20°<br>Receiver: 2 to 70°                                                                                                                                                                  |                        |                       | Emitter: 3 to 25°<br>Receiver: 3° min.                                                                       |          | Receiver: 2°                                                                                                             | Receiver: 10°                                                                                                       | 2 to 20°                                                                                                                                                                                                 |
| Light source (wavelength)           |                 | Red LED (650 nm)                                                                                                                                                                                         |                        |                       |                                                                                                              |          | Red LED (630 nm)                                                                                                         | Red LED (625 nm)                                                                                                    | Red LED (650 nm)                                                                                                                                                                                         |
| Power supply voltage                |                 | 12 to 24 VDC ±10%, ripple (p-p) 10% max.                                                                                                                                                                 |                        |                       |                                                                                                              |          |                                                                                                                          |                                                                                                                     |                                                                                                                                                                                                          |
| Current consumption                 |                 | 30 mA max. (Emitter 10 mA max., Receiver 20 mA max.)                                                                                                                                                     |                        |                       |                                                                                                              |          | 30 mA max. (Emitter 15 mA max., Receiver 15 mA max.)                                                                     |                                                                                                                     | 20 mA max.                                                                                                                                                                                               |
| Control output                      |                 | Load power supply voltage: 26.4 VDC max.<br>Load current: 50 mA max. (residual voltage: 2 V max. for load current of 10 to 50 mA, 1 V max. for load current of less than 10 mA)<br>Open-collector output |                        |                       |                                                                                                              |          | Load power supply voltage: 30 VDC max.<br>Load current: 80 mA max. (residual voltage: 1 V max.)<br>Open-collector output |                                                                                                                     | Load power supply voltage: 26.4 VDC max.<br>Load current: 50 mA max. (residual voltage: 2 V max. for load current of 10 to 50 mA, 1 V max. for load current of less than 10 mA)<br>Open-collector output |
| Protection circuits                 |                 | Power supply and control output reverse polarity protection,<br>Output short-circuit protection                                                                                                          |                        |                       |                                                                                                              |          | Power supply reverse polarity protection,<br>Output short-circuit protection                                             |                                                                                                                     | Power supply and control output reverse polarity protection,<br>Output short-circuit protection,<br>Mutual interference prevention                                                                       |
| Response time                       |                 | Operate or reset: 1 ms max.                                                                                                                                                                              |                        |                       |                                                                                                              |          | Operate or reset: 0.5 ms max.                                                                                            |                                                                                                                     | Operate or reset: 1 ms max.                                                                                                                                                                              |
| Ambient illumination                |                 | Incandescent lamp: 5,000 lx max., Sunlight: 10,000 lx max.                                                                                                                                               |                        |                       |                                                                                                              |          | Incandescent lamp: 3,000 lx max.                                                                                         |                                                                                                                     | Incandescent lamp: 5,000 lx max., Sunlight: 10,000 lx max.                                                                                                                                               |
| Ambient temperature range           |                 | Operating: -25 to +55°C<br>Storage: -40 to +70°C<br>(with no icing or condensation)                                                                                                                      |                        |                       |                                                                                                              |          | Operating: -25 to +55°C<br>Storage: -30 to +70°C<br>(with no icing or condensation)                                      |                                                                                                                     | Operating: -25 to +55°C<br>Storage: -40 to +70°C<br>(with no icing or condensation)                                                                                                                      |
| Ambient humidity range              |                 | Operating: 35% to +85%<br>Storage: 35% to +95%<br>(with no condensation)                                                                                                                                 |                        |                       |                                                                                                              |          | Operating or Storage: 35% to +85%<br>(with no condensation)                                                              |                                                                                                                     | Operating: 35% to +85%<br>Storage: 35% to +95%<br>(with no condensation)                                                                                                                                 |
| Insulation resistance               |                 | 20 MΩ min. at 500 VDC                                                                                                                                                                                    |                        |                       |                                                                                                              |          |                                                                                                                          |                                                                                                                     |                                                                                                                                                                                                          |
| Dielectric strength                 |                 | AC1,000V, 50/60 Hz for 1 min.                                                                                                                                                                            |                        |                       |                                                                                                              |          | AC500V, 50/60 Hz for 1 min.                                                                                              |                                                                                                                     | AC1,000V, 50/60 Hz for 1 min.                                                                                                                                                                            |
| Vibration resistance (destruction)  |                 | 10 to 2,000 Hz, 1.5-mm double amplitude or 300 m/s² for 0.5 hours each in X, Y, and Z directions                                                                                                         |                        |                       |                                                                                                              |          | 10 to 55Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions                                           |                                                                                                                     | 10 to 2,000 Hz, 1.5-mm double amplitude or 300 m/s² for 0.5 hours each in X, Y, and Z directions                                                                                                         |
| Shock resistance (destruction)      |                 | 1,000 m/s² 3 times each in X, Y, and Z directions                                                                                                                                                        |                        |                       |                                                                                                              |          | 500 m/s² 3 times each in X, Y, and Z directions                                                                          |                                                                                                                     | 1,000m/s² 3 times each in X, Y, and Z directions                                                                                                                                                         |
| Degree of protection                |                 | IP67 (IEC 60529)                                                                                                                                                                                         |                        |                       |                                                                                                              |          | IP65 (IEC 60529)                                                                                                         |                                                                                                                     | IP67 (IEC 60529)                                                                                                                                                                                         |
| Connection method                   |                 | Pre-wired (standard length: 2 m)                                                                                                                                                                         |                        |                       |                                                                                                              |          |                                                                                                                          |                                                                                                                     |                                                                                                                                                                                                          |
| Weight (packed state)               |                 | Approx. 40 g                                                                                                                                                                                             |                        |                       |                                                                                                              |          | Approx. 60 g                                                                                                             |                                                                                                                     | Approx. 20 g                                                                                                                                                                                             |
| Materials                           | Case            | PBT (polybutylene terephthalate)                                                                                                                                                                         |                        |                       |                                                                                                              |          | SUS303                                                                                                                   |                                                                                                                     | PBT (polybutylene terephthalate)                                                                                                                                                                         |
|                                     | Display window  | Denatured polyarylate                                                                                                                                                                                    |                        |                       |                                                                                                              |          | Polysulfone                                                                                                              |                                                                                                                     | Denatured polyarylate                                                                                                                                                                                    |
|                                     | Lens            | Denatured polyarylate                                                                                                                                                                                    |                        |                       |                                                                                                              |          | Polysulfone                                                                                                              |                                                                                                                     | Methacrylic resin                                                                                                                                                                                        |
|                                     | Hexagonal nuts  | ---                                                                                                                                                                                                      |                        |                       |                                                                                                              |          | SUS303                                                                                                                   |                                                                                                                     | ---                                                                                                                                                                                                      |
|                                     | Toothed washers | ---                                                                                                                                                                                                      |                        |                       |                                                                                                              |          | SUS303                                                                                                                   |                                                                                                                     | ---                                                                                                                                                                                                      |
| Accessories *2                      |                 | Instruction manual, Phillips screws (Side-view Sensors: M2 × 14, Flat Sensors: M2 × 8), Nuts, Spring washers, Flat washers *2                                                                            |                        |                       |                                                                                                              |          | Instruction manual, Hexagonal nuts, Toothed washers                                                                      |                                                                                                                     | Instruction manual, Phillips screws (M2×14), Nuts, Spring washers, Flat washers, E39-R4 (E3T-SR4□ only), E39-R37-CA (E3T-SR4□-S only)                                                                    |

\*1.Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

\*2.Only the *Instruction Manual* is included with an M3-mounting Sensor (E3T-ST□□M). Order the Set of Mounting Screws separately if required.

| Sensing method<br>Appearance        |                 | Diffuse-reflective                                                                                                                                                                                       |                                                                                                                          | Convergent-reflective                                                                                                                                                                                    |                                        | BGS-reflective                                                                      |                                        |
|-------------------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------|
|                                     |                 | Rectangular type (Flat)                                                                                                                                                                                  | Cylindrical type (Top-view)                                                                                              | Rectangular type (Side-view)                                                                                                                                                                             |                                        | Rectangular type (Flat)                                                             |                                        |
| Item                                |                 |                                                                                                                         |                                         |                                                                                                                       |                                        |  |                                        |
| NPN<br>output                       | Light-ON        | E3T-FD11<br>E3T-FD11M                                                                                                                                                                                    | E3T-CD11                                                                                                                 | E3T-SL11<br>E3T-SL11M                                                                                                                                                                                    | E3T-SL21<br>E3T-SL21M                  | E3T-FL11                                                                            | E3T-FL21                               |
|                                     | Dark-ON         | E3T-FD12<br>E3T-FD12M                                                                                                                                                                                    | ---                                                                                                                      | E3T-SL12<br>E3T-SL12M                                                                                                                                                                                    | E3T-SL22<br>E3T-SL22M                  | E3T-FL12                                                                            | E3T-FL22                               |
| PNP<br>output                       | Light-ON        | E3T-FD13<br>E3T-FD13M                                                                                                                                                                                    | E3T-CD13                                                                                                                 | E3T-SL13<br>E3T-SL13M                                                                                                                                                                                    | E3T-SL23<br>E3T-SL23M                  | E3T-FL13                                                                            | E3T-FL23                               |
|                                     | Dark-ON         | E3T-FD14<br>E3T-FD14M                                                                                                                                                                                    | ---                                                                                                                      | E3T-SL14<br>E3T-SL14M                                                                                                                                                                                    | E3T-SL24<br>E3T-SL24M                  | E3T-FL14                                                                            | E3T-FL24                               |
| Sensing distance                    |                 | 5 to 30 mm<br>(50 × 50 mm white paper)                                                                                                                                                                   | 3 to 50 mm<br>(100 × 100 mm white paper)                                                                                 | 5 to 15 mm<br>(50 × 50 mm white paper)                                                                                                                                                                   | 5 to 30 mm<br>(50 × 50 mm white paper) | 1 to 15 mm<br>(50 × 50 mm white paper)                                              | 1 to 30 mm<br>(50 × 50 mm white paper) |
| Standard sensing object             |                 | ---                                                                                                                                                                                                      |                                                                                                                          |                                                                                                                                                                                                          |                                        |                                                                                     |                                        |
| Minimum detectable object (typical) |                 | 0.15-mm dia.<br>(sensing distance 10 mm)                                                                                                                                                                 | ---                                                                                                                      | 0.15-mm dia.<br>(sensing distance 10 mm)                                                                                                                                                                 |                                        | 0.15-mm dia. non-glossy object<br>(sensing distance 10 mm)                          |                                        |
| Hysteresis (white paper)            |                 | 6 mm max.                                                                                                                                                                                                | 15% or less of the sensing distance                                                                                      | 2 mm max.                                                                                                                                                                                                | 6 mm max.                              | 0.5 mm max.                                                                         | 2 mm max.                              |
| Black/white error                   |                 | ---                                                                                                                                                                                                      |                                                                                                                          |                                                                                                                                                                                                          |                                        |                                                                                     | 15% max.                               |
| Directional angle                   |                 | ---                                                                                                                                                                                                      |                                                                                                                          |                                                                                                                                                                                                          |                                        |                                                                                     |                                        |
| Light source (wavelength)           |                 | Red LED (650 nm)                                                                                                                                                                                         | Infrared LED (870 nm)                                                                                                    | Red LED (650 nm)                                                                                                                                                                                         |                                        |                                                                                     |                                        |
| Power supply voltage                |                 | 12 to 24 VDC ±10%, ripple (p-p) 10% max.                                                                                                                                                                 |                                                                                                                          |                                                                                                                                                                                                          |                                        |                                                                                     |                                        |
| Current consumption                 |                 | 20 mA max.                                                                                                                                                                                               |                                                                                                                          |                                                                                                                                                                                                          |                                        |                                                                                     |                                        |
| Control output                      |                 | Load power supply voltage: 26.4 VDC max.<br>Load current: 50 mA max. (residual voltage: 2 V max. for load current of 10 to 50 mA, 1 V max. for load current of less than 10 mA)<br>Open-collector output | Load power supply voltage: 30 VDC max.<br>Load current: 80 mA max. (residual voltage: 1 V max.)<br>Open-collector output | Load power supply voltage: 26.4 VDC max.<br>Load current: 50 mA max. (residual voltage: 2 V max. for load current of 10 to 50 mA, 1 V max. for load current of less than 10 mA)<br>Open-collector output |                                        |                                                                                     |                                        |
| Protection circuits                 |                 | Power supply and control output reverse polarity protection,<br>Output short-circuit protection,<br>Mutual interference prevention                                                                       | Power supply reverse polarity protection,<br>Output short-circuit protection                                             | Power supply and control output reverse polarity protection,<br>Output short-circuit protection,<br>Mutual interference prevention                                                                       |                                        |                                                                                     |                                        |
| Response time                       |                 | Operate or reset: 1 ms max.                                                                                                                                                                              | Operate or reset: 0.5 ms max.                                                                                            | Operate or reset: 1 ms max.                                                                                                                                                                              |                                        |                                                                                     |                                        |
| Ambient illumination                |                 | Incandescent lamp: 5,000 lx max., Sunlight: 10,000 lx max.                                                                                                                                               | Incandescent lamp: 3,000 lx max.                                                                                         | Incandescent lamp: 5,000 lx max., Sunlight: 10,000 lx max.                                                                                                                                               |                                        |                                                                                     |                                        |
| Ambient temperature range           |                 | Operating: -25 to +55°C<br>Storage: -40 to +70°C<br>(with no icing or condensation)                                                                                                                      | Operating: -25 to +55°C<br>Storage: -30 to +70°C<br>(with no icing or condensation)                                      | Operating: -25 to +55°C<br>Storage: -40 to +70°C<br>(with no icing or condensation)                                                                                                                      |                                        |                                                                                     |                                        |
| Ambient humidity range              |                 | Operating: 35% to +85%<br>Storage: 35% to +95%<br>(with no condensation)                                                                                                                                 | Operating or Storage: 35% to +85%<br>(with no condensation)                                                              | Operating: 35% to +85%<br>Storage: 35% to +95%<br>(with no condensation)                                                                                                                                 |                                        |                                                                                     |                                        |
| Insulation resistance               |                 | 20 MΩ min. at 500 VDC                                                                                                                                                                                    |                                                                                                                          |                                                                                                                                                                                                          |                                        |                                                                                     |                                        |
| Dielectric strength                 |                 | 1,000 VAC, 50/60 Hz for 1 min.                                                                                                                                                                           | 500 VAC, 50/60 Hz for 1 min.                                                                                             | 1,000 VAC, 50/60 Hz for 1 min.                                                                                                                                                                           |                                        |                                                                                     |                                        |
| Vibration resistance (destruction)  |                 | 10 to 2,000 Hz,<br>1.5-mm double amplitude or 300 m/s <sup>2</sup> for 0.5 hours each in X, Y, and Z directions                                                                                          | 10 to 55Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions                                           | 10 to 2,000 Hz, 1.5-mm double amplitude or 300 m/s <sup>2</sup> for 0.5 hours each in X, Y, and Z directions                                                                                             |                                        |                                                                                     |                                        |
| Shock resistance (destruction)      |                 | 1,000 m/s <sup>2</sup> 3 times each in X, Y, and Z directions                                                                                                                                            | 500 m/s <sup>2</sup> 3 times each in X, Y, and Z directions                                                              | 1,000m/s <sup>2</sup> 3 times each in X, Y, and Z directions                                                                                                                                             |                                        |                                                                                     |                                        |
| Degree of protection                |                 | IP67 (IEC 60529)                                                                                                                                                                                         | IP65 (IEC 60529)                                                                                                         | IP67 (IEC 60529)                                                                                                                                                                                         |                                        |                                                                                     |                                        |
| Connection method                   |                 | Pre-wired (standard length: 2 m)                                                                                                                                                                         |                                                                                                                          |                                                                                                                                                                                                          |                                        |                                                                                     |                                        |
| Weight (packed state)               |                 | Approx. 20 g                                                                                                                                                                                             | Approx. 40 g                                                                                                             | Approx. 20 g                                                                                                                                                                                             |                                        |                                                                                     |                                        |
| Materials                           | Case            | PBT (polybutylene terephthalate)                                                                                                                                                                         | SUS303                                                                                                                   | PBT (polybutylene terephthalate)                                                                                                                                                                         |                                        |                                                                                     |                                        |
|                                     | Display window  | Denatured polyarylate                                                                                                                                                                                    | Epoxy                                                                                                                    | Denatured polyarylate                                                                                                                                                                                    |                                        |                                                                                     |                                        |
|                                     | Lens            | Denatured polyarylate                                                                                                                                                                                    | Polysulfone                                                                                                              | Denatured polyarylate                                                                                                                                                                                    |                                        |                                                                                     |                                        |
|                                     | Hexagonal nuts  | ---                                                                                                                                                                                                      | SUS303                                                                                                                   | ---                                                                                                                                                                                                      |                                        |                                                                                     |                                        |
|                                     | Toothed washers | ---                                                                                                                                                                                                      | SUS303                                                                                                                   | ---                                                                                                                                                                                                      |                                        |                                                                                     |                                        |
| Accessories *                       |                 | Instruction manual, Phillips screws(M2 × 8), Nuts, Spring washers, Flat washers *                                                                                                                        | Instruction manual, Hexagonal nuts, Toothed washers, Adjustment driver                                                   | Instruction manual, Phillips screws(M2 × 14), Nuts, Spring washers, Flat washers *                                                                                                                       |                                        | Instruction manual, Phillips screws(M2 × 8), Nuts, Spring washers, Flat washers     |                                        |

\*Only the *Instruction Manual* is included with an M3-mounting Sensor (E3T-FD□□M or E3T-SL□□M). Order the Set of Mounting Screws separately if required.



# E3T

## Engineering Data (Typical)

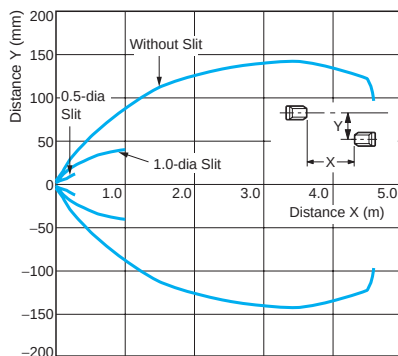
### M2-mounting and M3-mounting Sensors

#### Parallel Operating Range

##### Through-beam

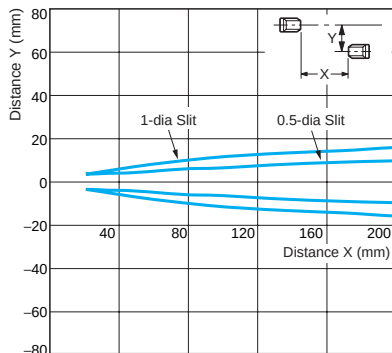
###### E3T-ST3□ + E39-S63 Slit

(A Slit is mounted to the Emitter and Receiver.)



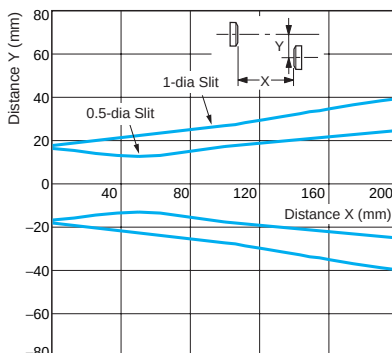
###### E3T-ST1□(M) + E39-S63 Slit (Enlarged graph)

(A Slit is mounted to the Emitter and Receiver.)



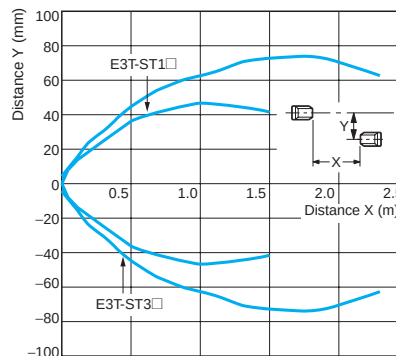
###### E3T-ST2□(M) + E39-S63 Slit (Enlarged graph)

(A Slit is mounted to the Emitter and Receiver.)



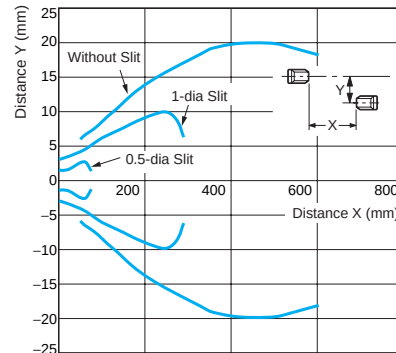
###### E3T-ST□□ + E39-E14 Mutual interference prevention filter

(A Slit is mounted to the Emitter and Receiver.)



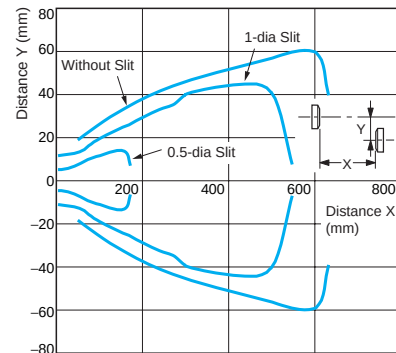
###### E3T-ST2□(M) + E39-S63 Slit

(A Slit is mounted to the Emitter and Receiver.)



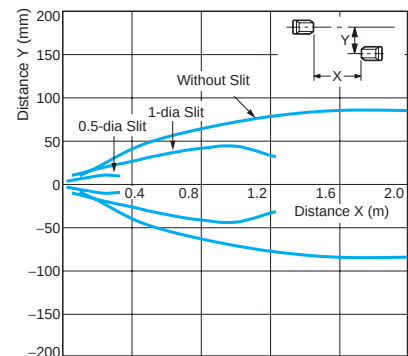
###### E3T-ST2□ + E39-S64 Slit

(A Slit is mounted to the Emitter and Receiver.)



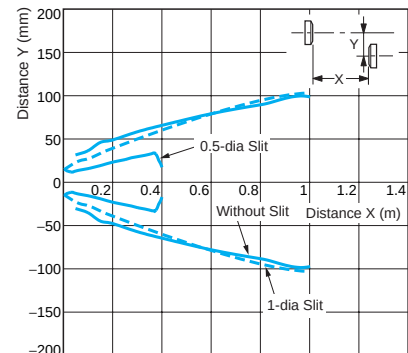
###### E3T-ST1□(M) + E39-S63 Slit

(A Slit is mounted to the Emitter and Receiver.)



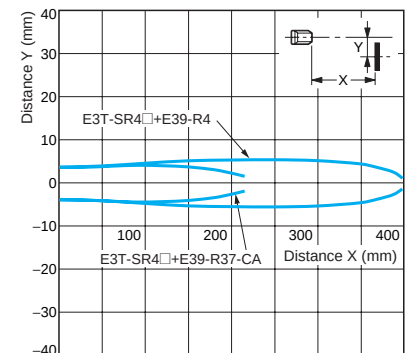
###### E3T-FT1□ + E39-S64 Slit

(A Slit is mounted to the Emitter and Receiver.)



#### Retro-reflective

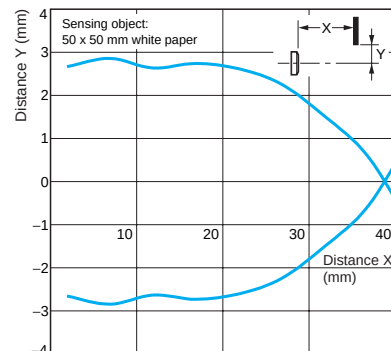
##### E3T-SR4□



#### Operating Range

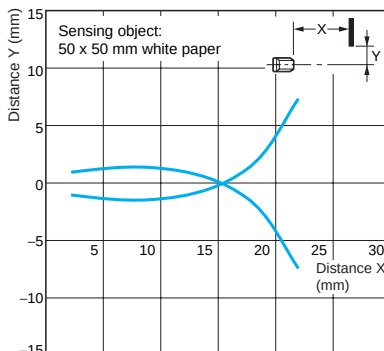
##### Diffuse-reflective

###### E3T-FD1□(M)

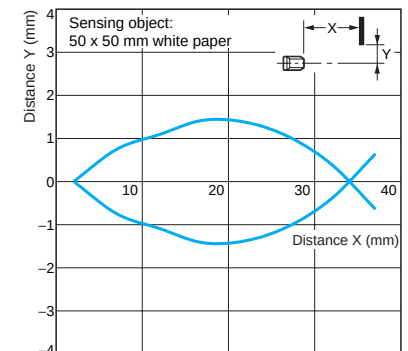


##### Convergent-reflective

###### E3T-SL1□(M)



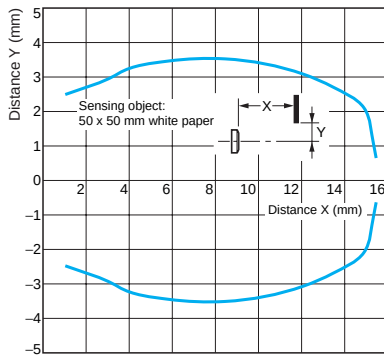
###### E3T-SL2□(M)



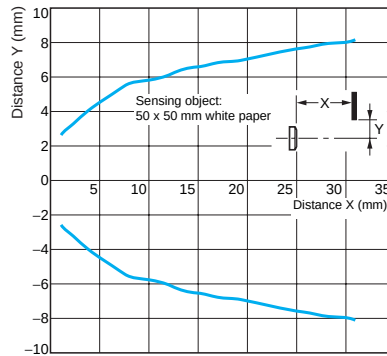


**BGS-reflective**

**E3T-FL1□**



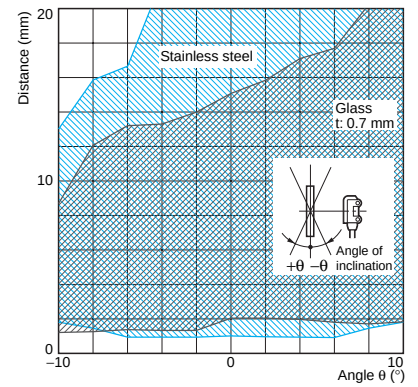
**E3T-FL2□**



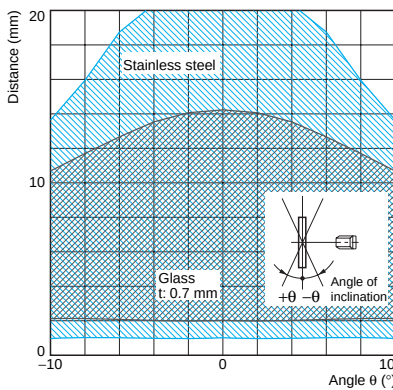
**Inclination Detection Area Characteristic**

**Convergent-reflective**

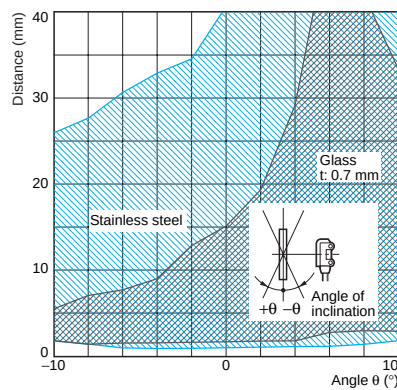
**E3T-SL1□(M) (Top to Bottom)**



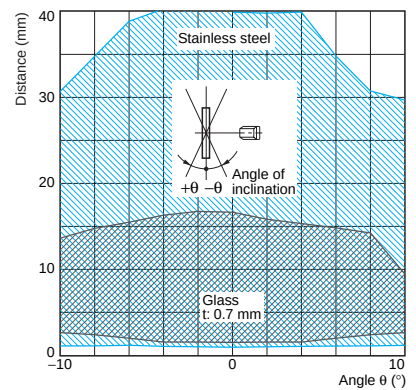
**E3T-SL1□(M) (Right to Left)**



**E3T-SL2□(M) (Top to Bottom)**

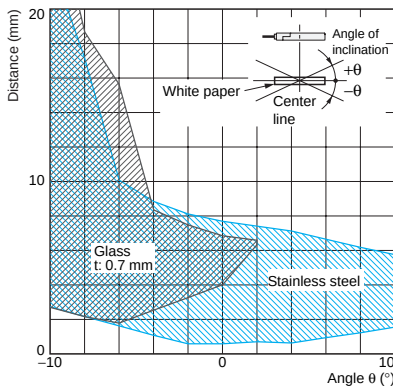


**E3T-SL2□(M) (Right to Left)**

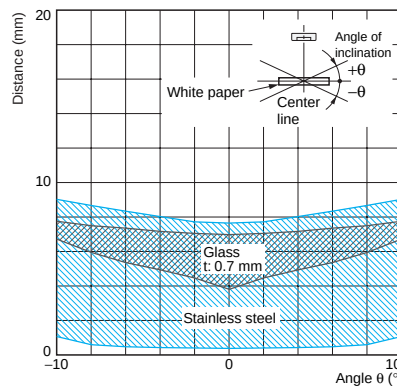


**BGS-reflective**

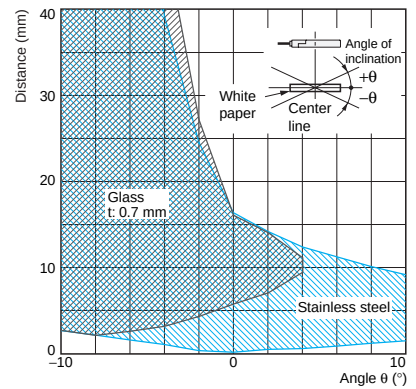
**E3T-FL1□ (Top to Bottom)**



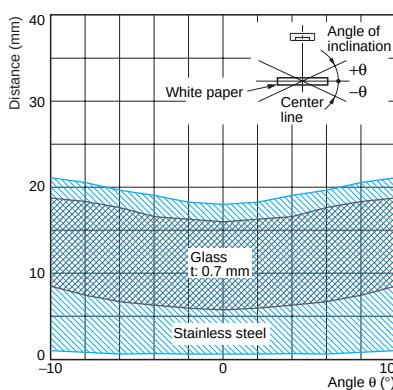
**E3T-FL1□ (Right to Left)**



**E3T-FL2□ (Top to Bottom)**



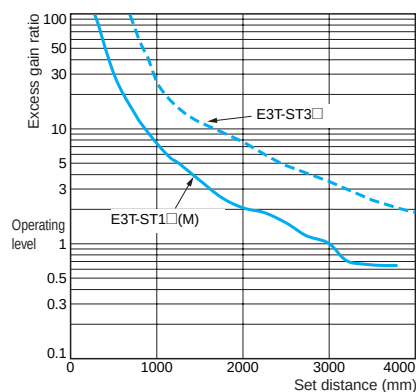
**E3T-FL2□ (Right to Left)**



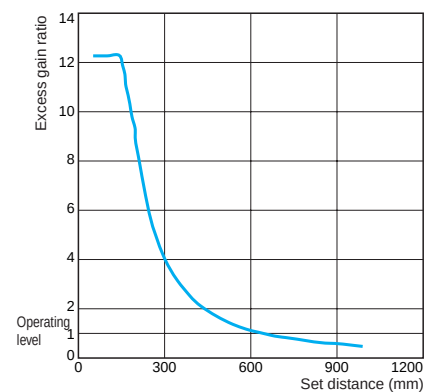
**Excess Gain vs. Set Distance**

**Through-beam**

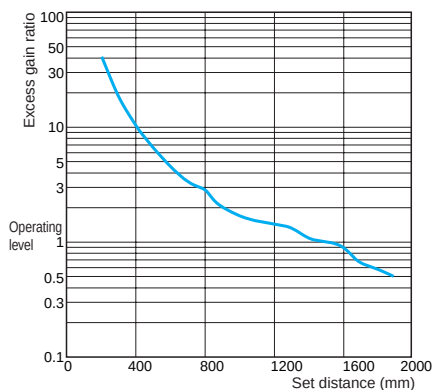
**E3T-ST1□(M)/E3T-ST3□**



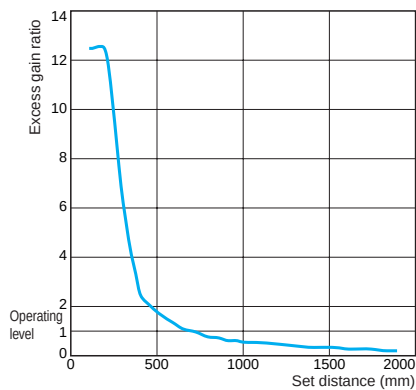
**E3T-ST2□(M)**



**E3T-FT1□**

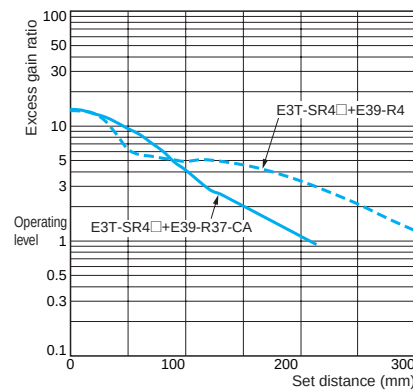


**E3T-FT2□**



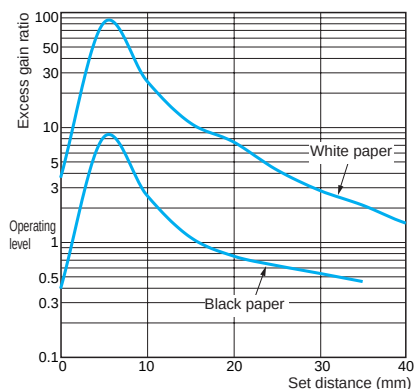
## Retro-reflective

**E3T-SR4□**



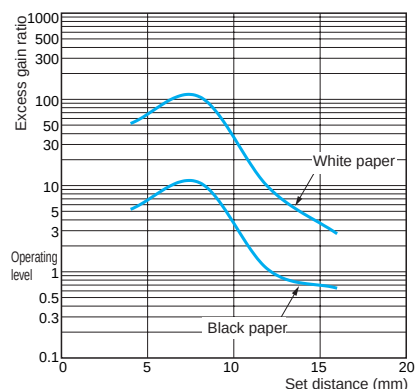
## Diffuse-reflective

**E3T-FD1□(M)**

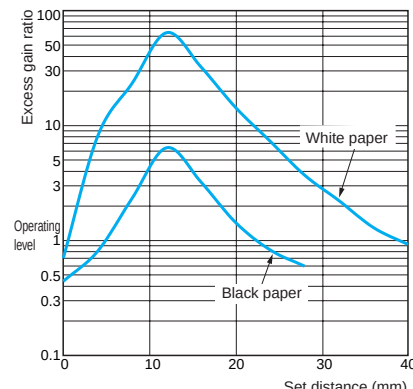


## Convergent-reflective

**E3T-SL1□(M)**



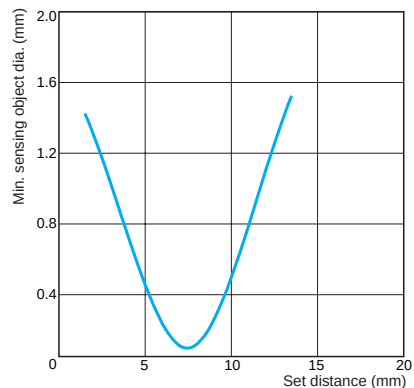
**E3T-SL2□(M)**



## Sensing Object Size vs. Sensing Distance

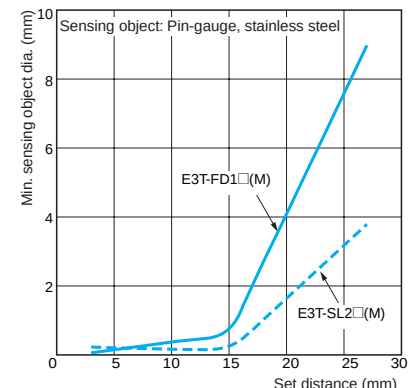
### Convergent-reflective

**E3T-SL1□(M)**



### Diffuse/Convergent-reflective

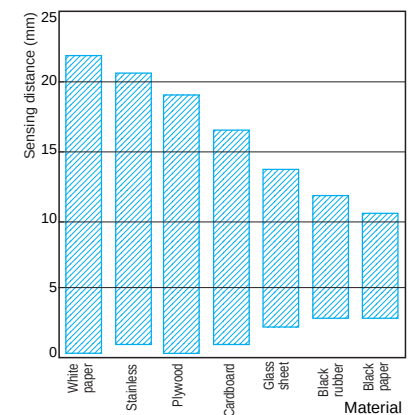
**E3T-FD1□(M)/E3T-SL2□(M)**



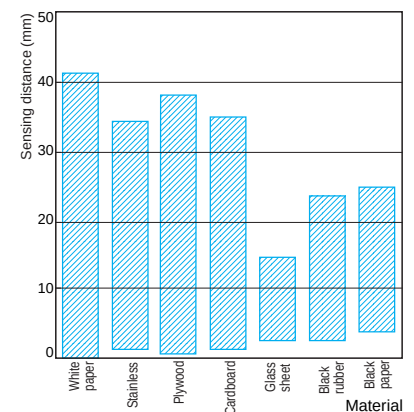
## Sensing Distance vs. Material

### Convergent-reflective

**E3T-SL1□(M)**

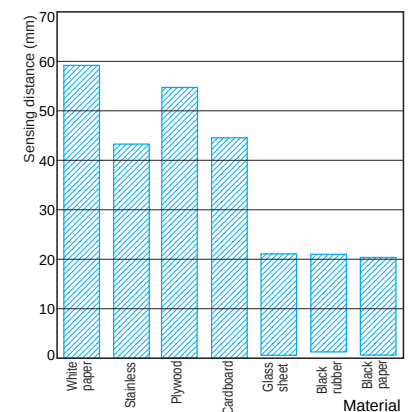


**E3T-SL2□(M)**



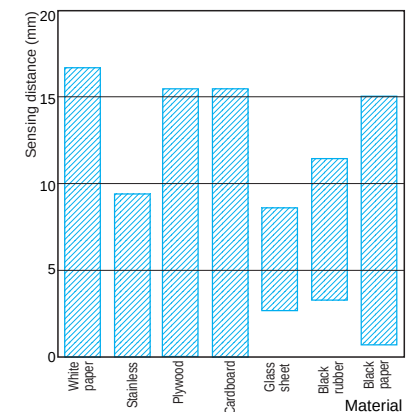
### Diffuse-reflective

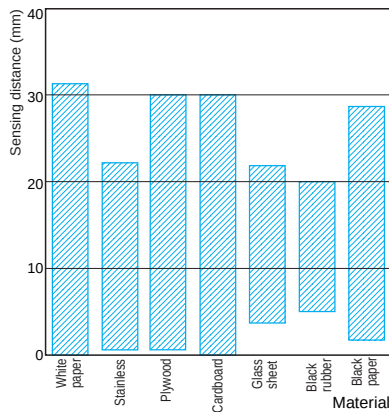
**E3T-FD1□(M)**



### BGS-reflective

**E3T-FL1□**

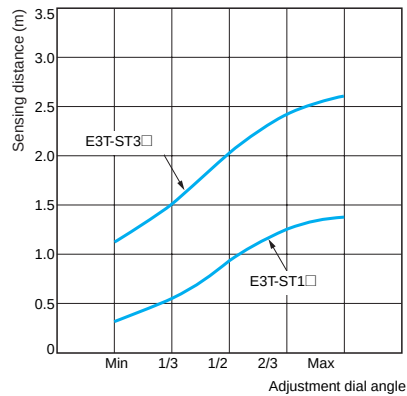


**E3T-FL2**

### Sensing Distance Characteristics of Sensitivity Adjustment Unit (when Completing Optical Axis Adjustment)

**E3T-ST1 + E39-E10 Sensitivity Adjustment Unit**

**E3T-ST3 + E39-E10 Sensitivity Adjustment Unit**

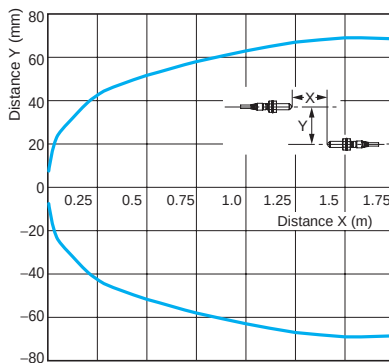


## Small Cylindrical Sensors

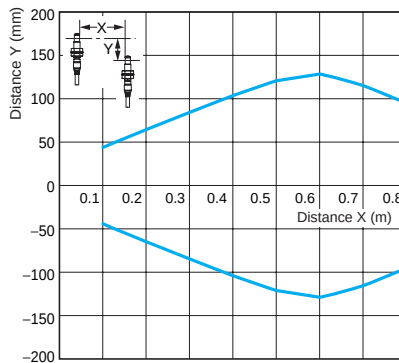
### Parallel Operating Range

#### Through-beam

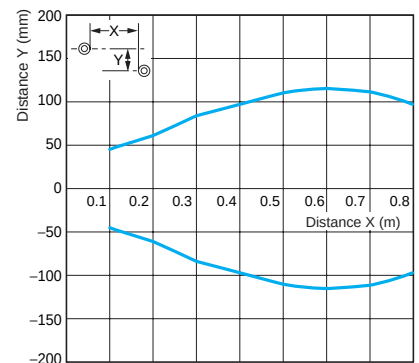
##### E3T-CT1



##### E3T-CT2S (Top to Bottom)



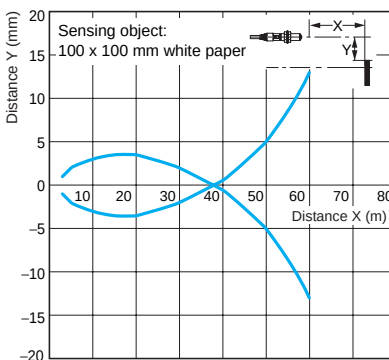
##### E3T-CT2S (Right to Left)



### Operating Range

#### Diffuse-reflective

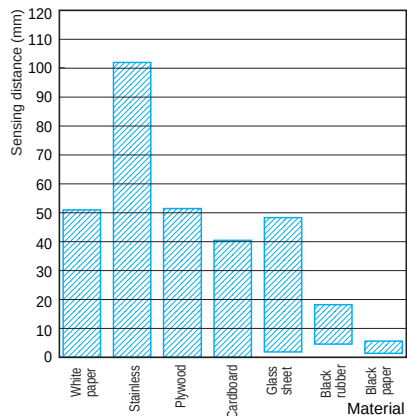
##### E3T-CD1



### Sensing Distance vs. Material

#### Diffuse-reflective

##### E3T-CD1



E3T

I/O Circuit Diagrams

NPN Output

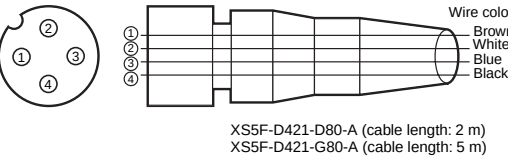
| Model                              | Operation mode | Timing charts                                                                                                                                                                                                             | Output circuit                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E3T-□□□1<br>E3T-□□□1M              | Light-ON       | <p>Light incident<br/>Light interrupted</p> <p>Operation indicator (orange)<br/>ON OFF</p> <p>Output transistor<br/>ON OFF</p> <p>Load (e.g., relay)<br/>Operate Reset</p> <p>(Between brown (1) and black (4) leads)</p> | <p>Through-beam Receivers and Reflective Sensors</p> <p>Through-beam Emitters</p> <p>Connector Pin Arrangement*3</p> <p>M12 e-CON</p> <p>Note: Pin 2 is not used. Pins 2 and 4 are not used with Through-beam Emitters.</p> <p>*1. There is no diode for Small Cylindrical Sensors (E3T-C□□□(S)).<br/>*2. This is 80 mA max. for Small Cylindrical Sensors (E3T-C□□□(S)).<br/>*3. These connectors do not apply to the E3T-□□□□M and E3T-C□□□(S).</p> |
| E3T-□□□2<br>E3T-□□□2M<br>E3T-□□□2S | Dark-ON        | <p>Light incident<br/>Light interrupted</p> <p>Operation indicator (orange)<br/>ON OFF</p> <p>Output transistor<br/>ON OFF</p> <p>Load (e.g., relay)<br/>Operate Reset</p> <p>(Between brown (1) and black (4) leads)</p> | <p>Through-beam Receivers and Reflective Sensors</p> <p>Through-beam Emitters</p> <p>Connector Pin Arrangement*3</p> <p>M12 e-CON</p> <p>Note: Pin 2 is not used. Pins 2 and 4 are not used with Through-beam Emitters.</p> <p>*1. There is no diode for Small Cylindrical Sensors (E3T-C□□□(S)).<br/>*2. This is 80 mA max. for Small Cylindrical Sensors (E3T-C□□□(S)).<br/>*3. These connectors do not apply to the E3T-□□□□M and E3T-C□□□(S).</p> |

PNP Output

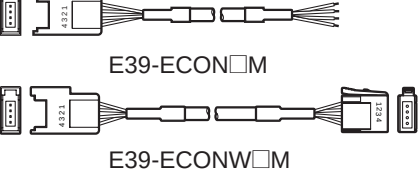
| Model                              | Operation mode | Timing charts                                                                                                                                                                                                            | Output circuit                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E3T-□□□3<br>E3T-□□□3M              | Light-ON       | <p>Light incident<br/>Light interrupted</p> <p>Operation indicator (orange)<br/>ON OFF</p> <p>Output transistor<br/>ON OFF</p> <p>Load (e.g., relay)<br/>Operate Reset</p> <p>(Between blue (3) and black (4) leads)</p> | <p>Through-beam Receivers and Reflective Sensors</p> <p>Through-beam Emitters</p> <p>Connector Pin Arrangement*3</p> <p>M12 e-CON</p> <p>Note: Pin 2 is not used. Pins 2 and 4 are not used with Through-beam Emitters.</p> <p>*1. There is no diode for Small Cylindrical Sensors (E3T-C□□□(S)).<br/>*2. This is 80 mA max. for Small Cylindrical Sensors (E3T-C□□□(S)).<br/>*3. These connectors do not apply to the E3T-□□□□M and E3T-C□□□(S).</p> |
| E3T-□□□4<br>E3T-□□□4M<br>E3T-□□□4S | Dark-ON        | <p>Light incident<br/>Light interrupted</p> <p>Operation indicator (orange)<br/>ON OFF</p> <p>Output transistor<br/>ON OFF</p> <p>Load (e.g., relay)<br/>Operate Reset</p> <p>(Between blue (3) and black (4) leads)</p> | <p>Through-beam Receivers and Reflective Sensors</p> <p>Through-beam Emitters</p> <p>Connector Pin Arrangement*3</p> <p>M12 e-CON</p> <p>Note: Pin 2 is not used. Pins 2 and 4 are not used with Through-beam Emitters.</p> <p>*1. There is no diode for Small Cylindrical Sensors (E3T-C□□□(S)).<br/>*2. This is 80 mA max. for Small Cylindrical Sensors (E3T-C□□□(S)).<br/>*3. These connectors do not apply to the E3T-□□□□M and E3T-C□□□(S).</p> |

Plugs (Sensor I/O Connectors)

M12 Connector



e-CON connector



Pin arrangement

| Classification | Wire color | Connector pin No. | Application        |
|----------------|------------|-------------------|--------------------|
| DC             | Brown      | 1                 | Power supply (+V)  |
|                | White      | 2                 | —                  |
|                | Blue       | 3                 | Power supply (0 V) |
|                | Black      | 4                 | Output             |

Note: Pin 2 is not used. Pin 2 and 4 are not used with Through-beam Emitters.

## Safety Precautions

Refer to *Warranty and Limitations of Liability*.

**WARNING**

This product is not designed or rated for ensuring safety of persons. Do not use it for such purpose.

Do not apply AC power to the E3T, otherwise the E3T may rupture.



### Precautions for Correct Use

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

#### ● Wiring

The maximum power supply voltage is 26.4 VDC. Before turning the power ON, make sure that the power supply voltage be not more than maximum voltage.

#### Load short-circuit protection

The E3T incorporates a load short-circuit protection function. If the load short-circuits, the output of the E3T will be turned OFF. Then, recheck the wiring and turn on the E3T again to reset the load short-circuit protection function. The load short-circuit protection function will work if there is a current flow that is 1.5 times larger than the rated load current. When using a capacitance load, be sure that the inrush current will not exceed 1.5 times larger than the rated current.

#### ● Mounting

When mounting the Sensor, never strike it with a heavy object, such as a hammer. Doing so may reduce its watertight properties. Use screws with spring, flat, or toothed washers to secure the Sensor. Tightening Torque

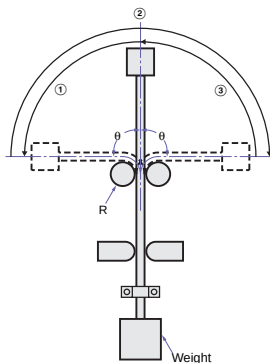
M2-mounting Sensors: 0.15 N·m max

M3-mounting Sensors: 0.5 N·m max

Small Cylindrical Sensors: 1 N·m max

#### Mounting the Sensor on Moving Parts

Consider models that use break resistant cables (e.g., Robotics Cables) if the Sensor will be mounted on a moving part, such as a robot hand. The flexing resistance of Robotics Cable at approximately 400 thousand times is far superior to that of standard cable at approximately 14 thousand times.



#### Cable Bending Rupture Test (Tough Cable Breaking Test)

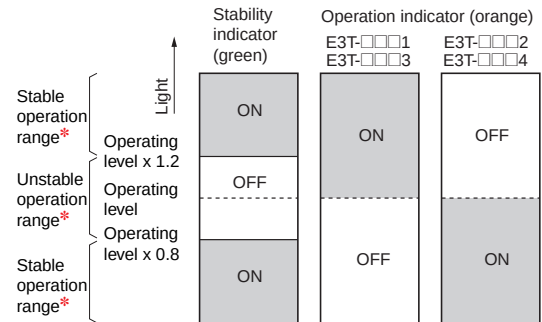
The cable is repeatedly bent with power supplied to check the number of bends until the current is turned OFF.

| Specimen |                                       | Standard cable<br>2.4-mm dia.<br>(7/0.127-mm dia.),<br>3 conductors | Robotics cable<br>2.4-mm dia.<br>(20/0.08-mm dia.),<br>3 conductors |
|----------|---------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|
| Test     | Bending angle (θ)                     | 90° each to the left and right                                      |                                                                     |
|          | Bending speed                         | 50 times/min                                                        |                                                                     |
|          | Load                                  | 200 g                                                               |                                                                     |
|          | Operation per bend                    | Once in 1 to 3 in the diagram                                       |                                                                     |
|          | Curvature radius of support point (R) | 5 mm                                                                |                                                                     |
| Result   |                                       | Approx. 14,000 times                                                | Approx. 400,000 times                                               |

#### ● Adjusting

##### Indicators

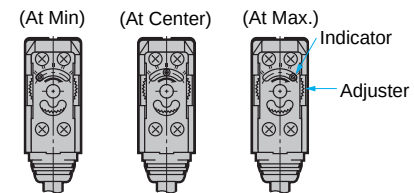
- The following graphs indicate the status of each operating level.
- Be sure to use the E3T within the stable operating range.



\* If the E3T's operating level is set to the stable operation range, the E3T will be in most reliable operation without being influenced by temperature change, voltage fluctuation, dust, or setting change. If the operating level cannot be set to the stable operation range, pay attention to environmental changes while operating the E3T.

#### Use of E39-E10 Sensitivity Adjustment Unit

(Dark-ON: E3T-ST12)



- Mount the Unit on the Receiver.
- Set the adjuster of the Sensitivity Adjustment Unit to Max. (Before shipping: Max.)
- After mounting on the Sensor, adjust the optical axis and secure the Sensor.
- Place a workpiece between the Emitter and Receiver and gradually turn the adjuster counterclockwise toward the Min. side. Stop turning the adjuster when the operation indicator and stability indicator (green) turn ON.
- Remove the workpiece and confirm that the operation indicator is OFF and the stability indicator (green) is ON. This completes the adjustment.

Note: If the light attenuation rate due to a workpiece is 40% or less, the stability indicator will not turn ON whether or not light is received. When the variation of light is small such as when sensing semi-transparent workpieces, carefully perform preliminary testing.

#### E3T-CD□□ Sensitivity Adjustment

Use the special screwdriver that is provided with the Sensor to adjust the sensitivity. Do not exceed 0.8 N·m when turning the adjuster.

#### ● Others

##### Do not install the E3T in the following locations.

- Locations subject to excessive dust or dirt
- Locations subject to direct sunlight
- Locations subject to corrosive gas
- Locations subject to contact with organic solvents
- Locations subject to vibration and shock
- Locations subject to contact with water, oil, or chemicals
- Locations subject to high humidities that might result in condensation

# E3T

## Dimensions

(Unit: mm)

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

### Sensors

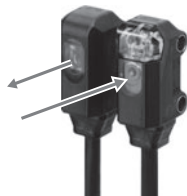
#### M2-mounting Sensors

##### Through-beam Side-view Sensors

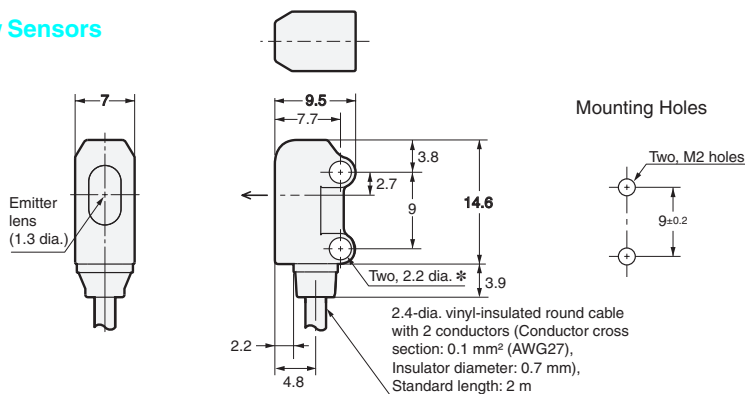
E3T-ST1□ (Emitter)

E3T-ST2□ (Emitter)

E3T-ST3□ (Emitter)



Emitter: E3T-ST□□-L  
Receiver: E3T-ST□□-D



\*The mounting holes are made of SUS301.

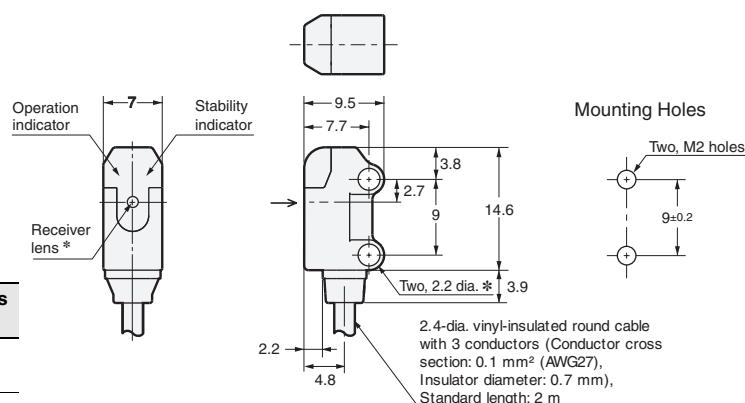
E3T-ST1□ (Receiver)

E3T-ST2□ (Receiver)

E3T-ST3□ (Receiver)

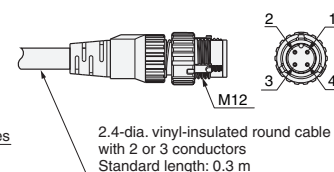
\*The receiver lens diameters are given below.

| Model                    | Receiver lens diameter |
|--------------------------|------------------------|
| E3T-ST1□-D<br>E3T-ST2□-D | (1.3 dia.)             |
| E3T-ST3□-D               | (2.4 dia.)             |

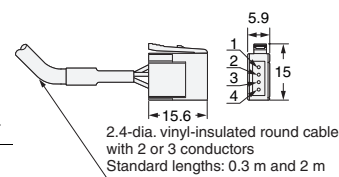


\*The mounting holes are made of SUS301.

#### M12 Smartclick Pre-wired Connector Model (E3T-ST□□-M1TJ/E3T-FT□□-M1TJ)



#### e-CON Pre-wired Connector Model (E3T-ST□□-ECON/E3T-FT□□-ECON)



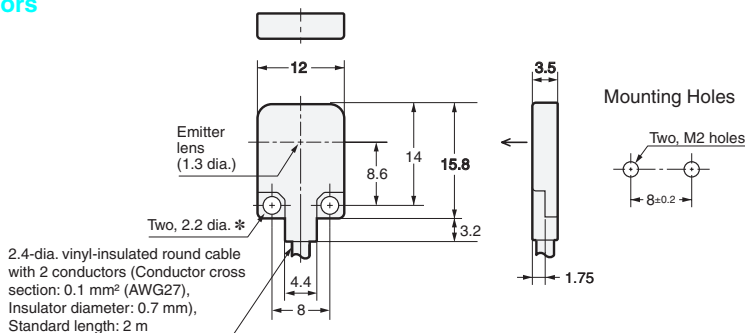
##### Through-beam Flat Sensors

E3T-FT1□ (Emitter)

E3T-FT2□ (Emitter)



Emitter: E3T-FT□□-L  
Receiver: E3T-FT□□-D



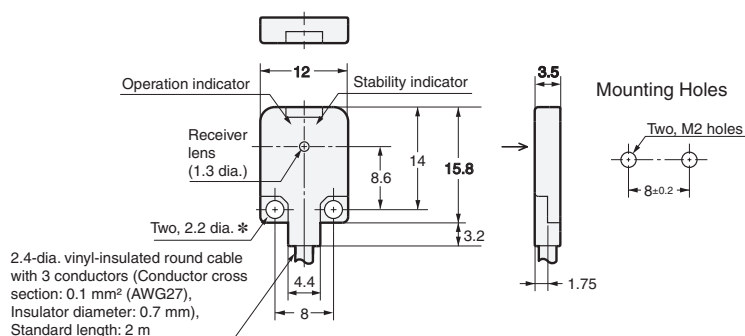
\*The mounting holes are made of SUS301.

| Terminal No. | Specifications         |
|--------------|------------------------|
| 1            | +V                     |
| 2            | ---                    |
| 3            | 0 V                    |
| 4            | Output (receiver only) |

\*Refer to *Mounting the Sensor on Moving Parts* on page 13 for details on Robotics Cable models.

E3T-FT1□ (Receiver)

E3T-FT2□ (Receiver)

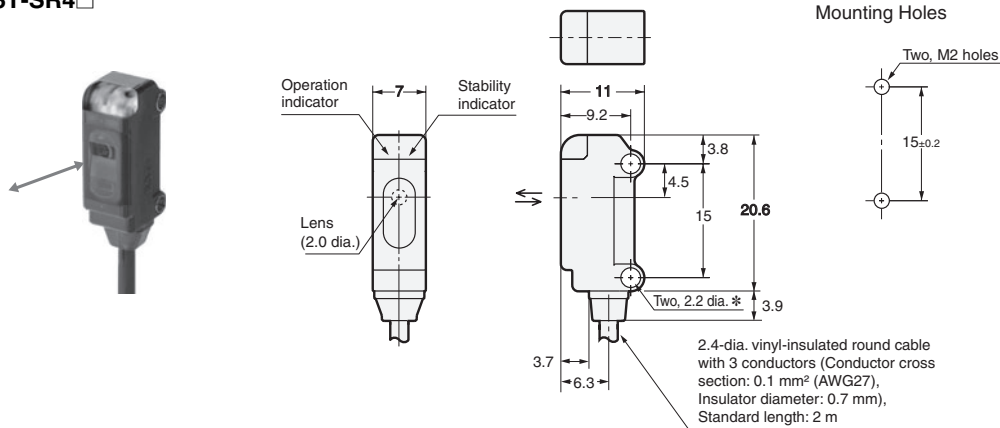


\*The mounting holes are made of SUS301.



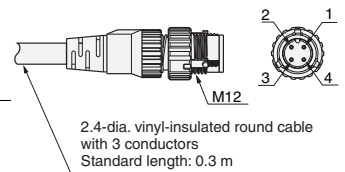
## Retro-reflective Side-view Sensors

### E3T-SR4



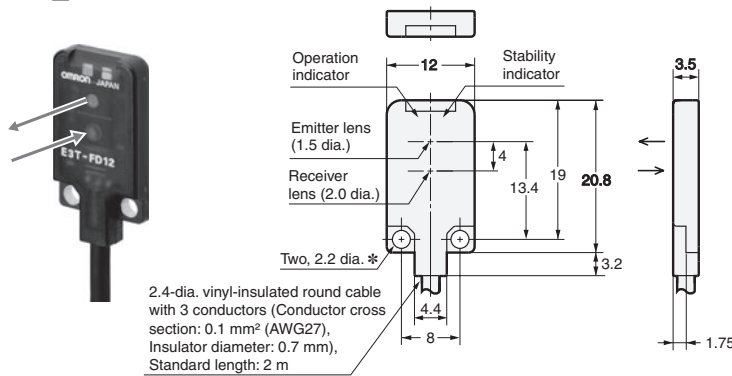
\*The mounting holes are made of SUS301.

**M12 Smartclick Pre-wired Connector Model**  
(E3T-SR□□-M1TJ/E3T-FD□□-M1TJ/  
E3T-SL□□-M1TJ)



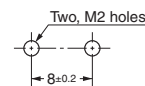
## Diffuse-reflective Flat Sensors

### E3T-FD1

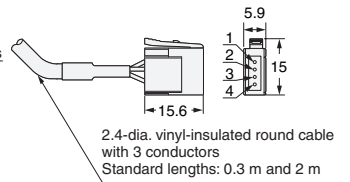


\*The mounting holes are made of SUS301.

#### Mounting Holes



**e-CON Pre-wired Connector**  
(E3T-SR□□-ECON/E3T-FD□□-ECON/  
E3T-SL□□-ECON)

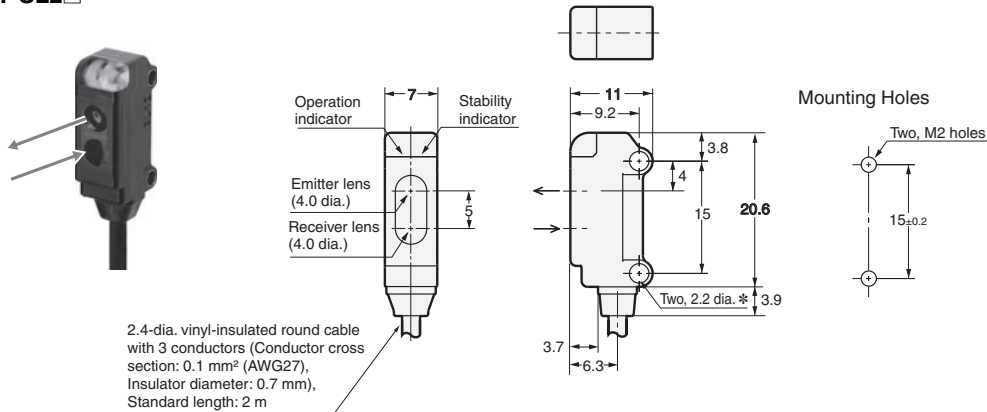


| Terminal No. | Specifi-cations |
|--------------|-----------------|
| 1            | +V              |
| 2            | ---             |
| 3            | 0 V             |
| 4            | Output          |

## Convergent-reflective Side-view Sensors

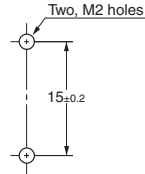
### E3T-SL1

### E3T-SL2



\*The mounting holes are made of SUS301.

#### Mounting Holes

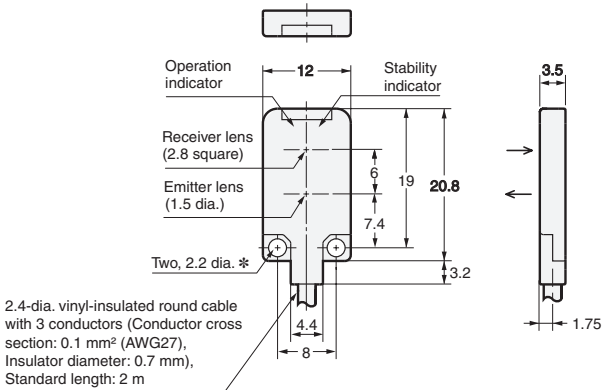
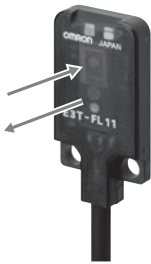


\*Refer to *Mounting the Sensor on Moving Parts* on page 13 for details on Robotics Cable models.

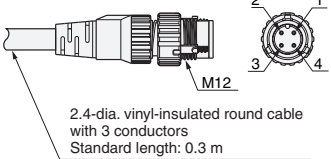


BGS-reflective Flat Sensors

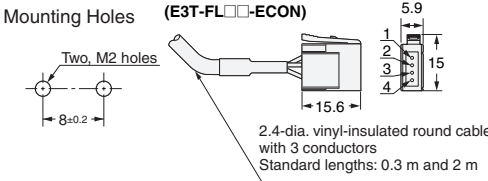
- E3T-FL1□
- E3T-FL2□



M12 Smartclick Pre-wired Connector Model (E3T-FL□□-M12J)



e-CON Pre-wired Connector (E3T-FL□□-ECON)



\*The mounting holes are made of SUS301.

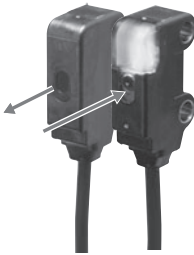
| Termi-<br>nal No. | Specifi-<br>cations |
|-------------------|---------------------|
| 1                 | +V                  |
| 2                 | ---                 |
| 3                 | 0 V                 |
| 4                 | Output              |

\*Refer to *Mounting the Sensor on Moving Parts* on page 13 for details on Robotics Cable models.

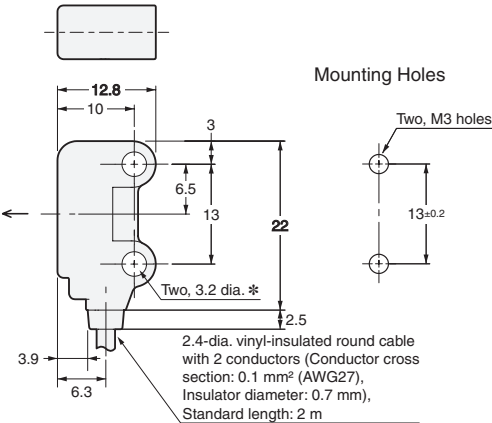
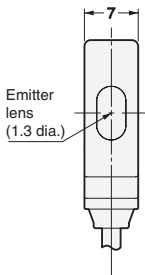
M3-mounting Sensors

Through-beam Side-view Sensors

- E3T-ST1□M (Emitter)
- E3T-ST2□M (Emitter)

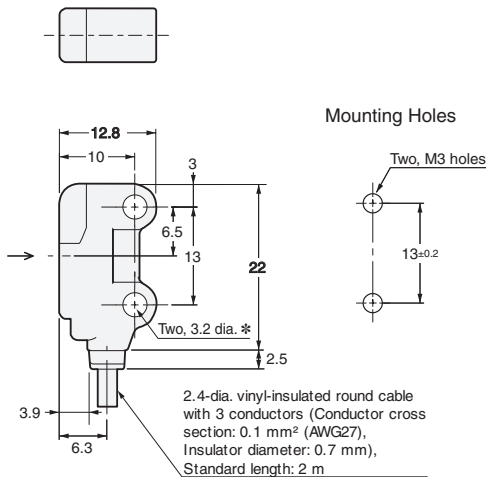
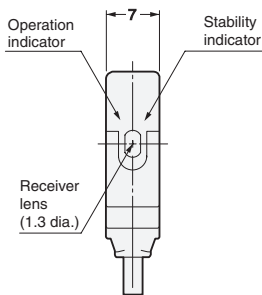


Emitter: E3T-ST□□M-L  
Receiver: E3T-ST□□M-D



\*The mounting holes are made of SUS304.

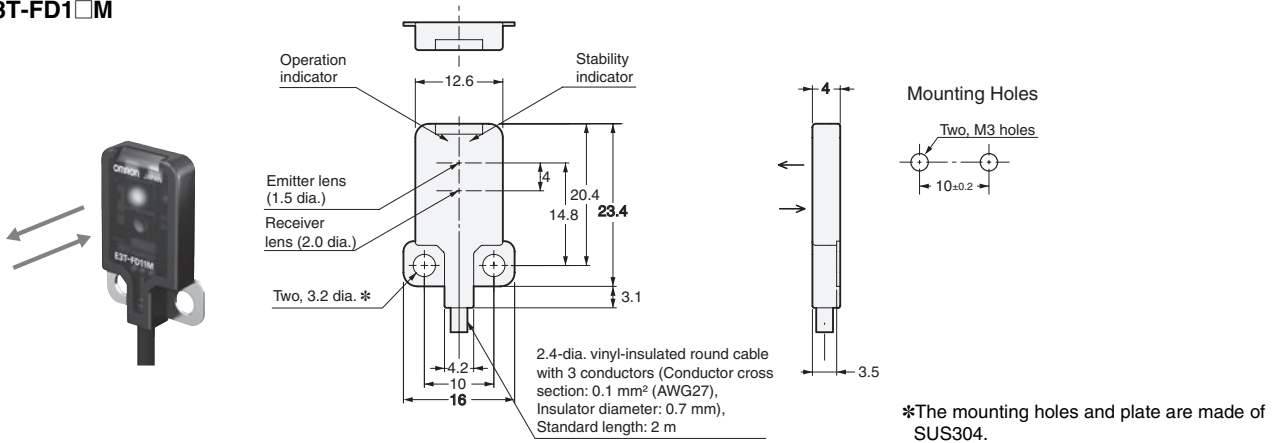
- E3T-ST1□M (Receiver)
- E3T-ST2□M (Receiver)



\*The mounting holes are made of SUS304.

## Diffuse-reflective Flat Sensors

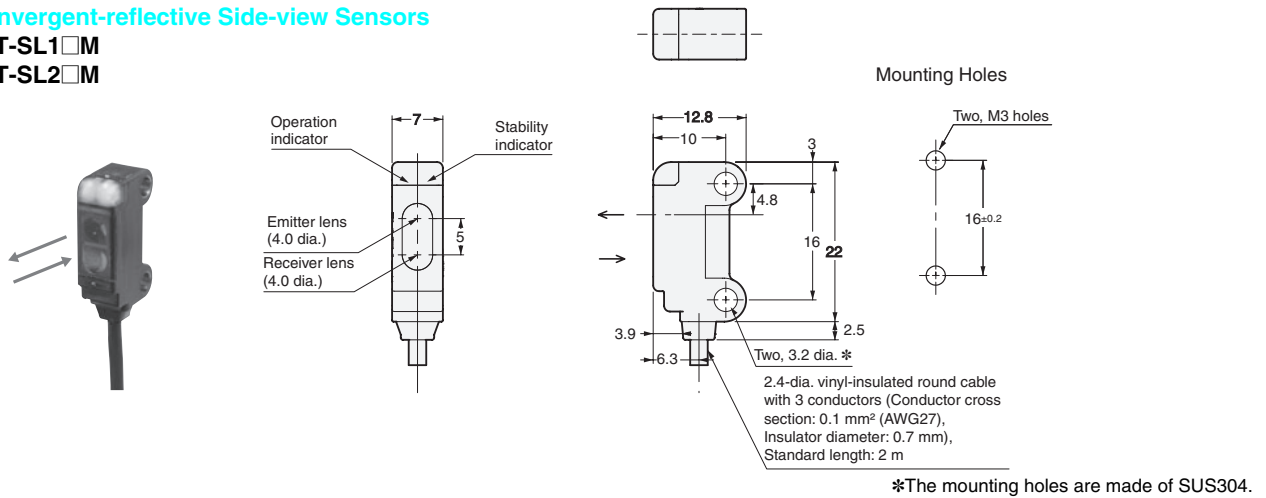
### E3T-FD1□M



## Convergent-reflective Side-view Sensors

### E3T-SL1□M

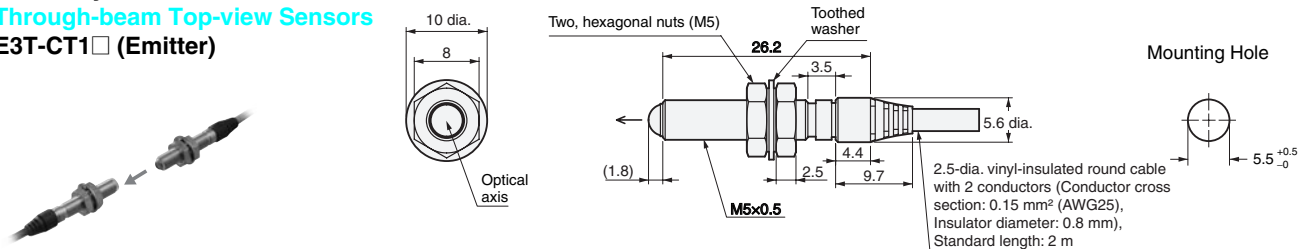
### E3T-SL2□M



## Small Cylindrical Sensors

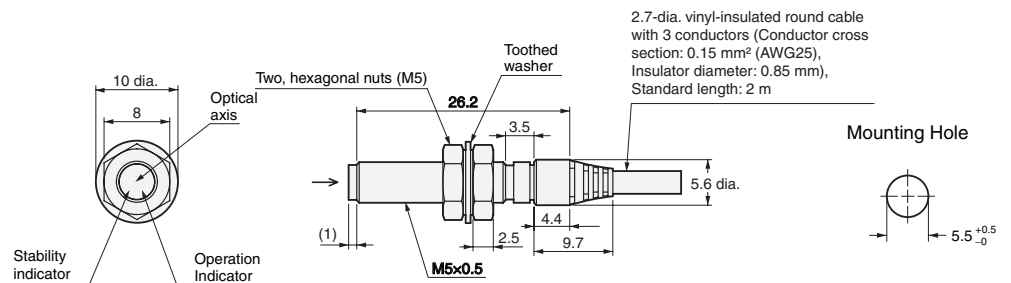
### Through-beam Top-view Sensors

### E3T-CT1□ (Emitter)



Emitter: E3T-CT1□-L  
Receiver: E3T-CT1□-D

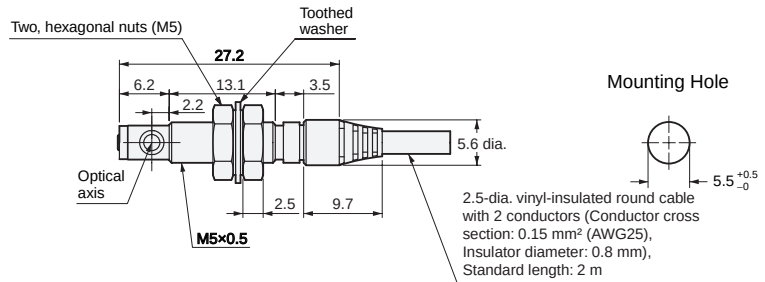
### E3T-CT1□ (Receiver)



# E3T

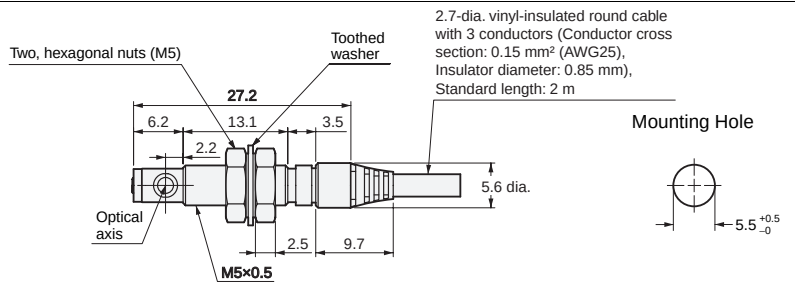
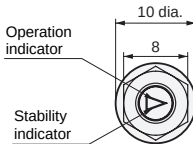
## Through-beam Side-view Sensors

### E3T-CT2□S (Emitter)



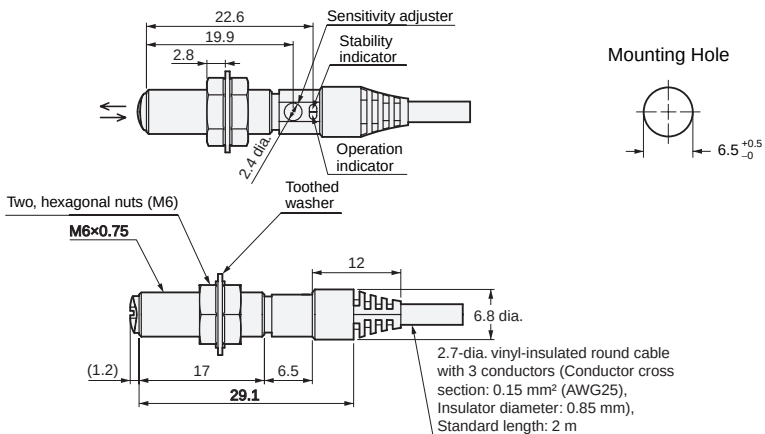
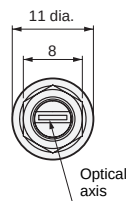
Emitter: E3T-CT2□S-L  
Receiver: E3T-CT2□S-D

### E3T-CT2□S (Receiver)



## Diffuse-reflective Top-view Sensors

### E3T-CD1□



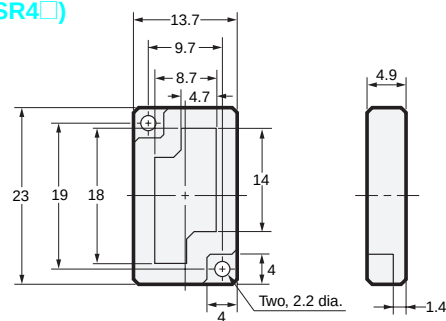
## Accessories

### Reflector (Provided with E3T-SR4□)

#### E39-R4



Material, reflective surface: acrylic  
Rear surface: ABS

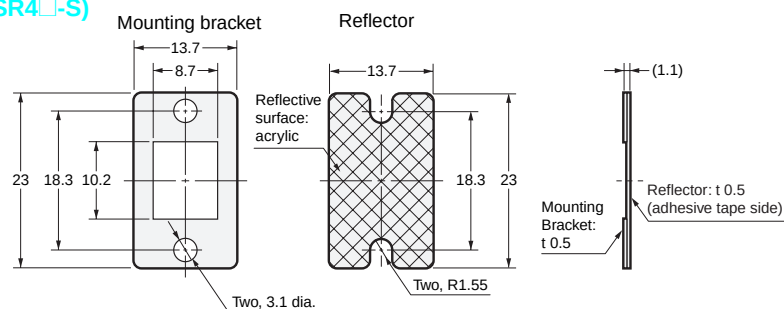


### Reflector (Provided with E3T-SR4□-S)

#### E39-R37-CA



Material: Mounting plate: stainless steel (SUS301)  
Reflective surface: acrylic

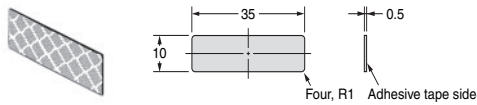


**Note:** The reflective plate and mounting plate (1) come as a set.

## Accessories (Order Separately)

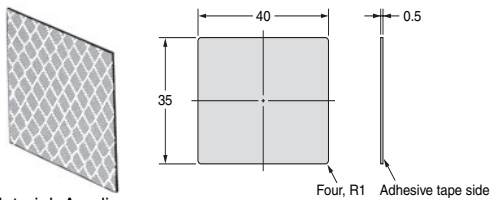
### Tape Reflectors

#### E39-RS1-CA



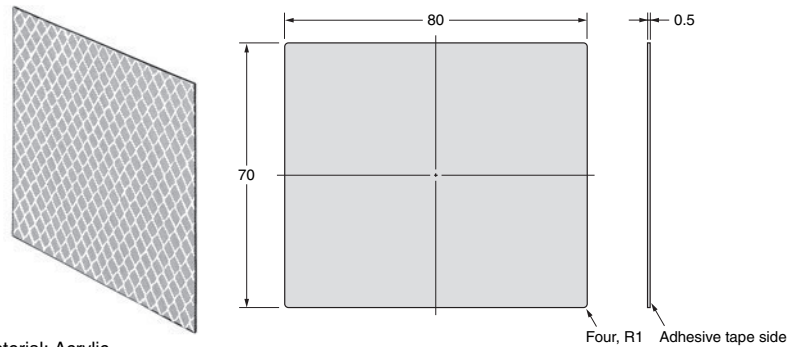
Material: Acrylic

#### E39-RS2-CA



Material: Acrylic

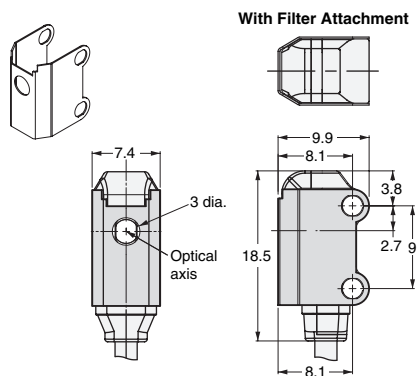
#### E39-RS3-CA



Material: Acrylic

### Mutual Interference Prevention Filter for E3T-ST3□/ST1□ Through-beam Sensors

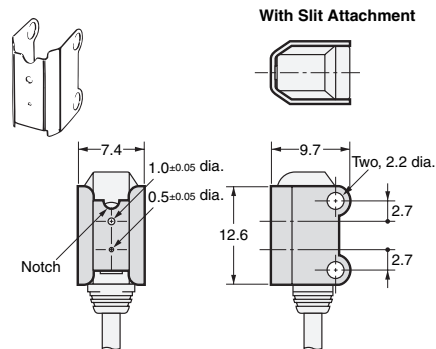
#### E39-E14



Material: 0.2-mm thick stainless steel (SUS301)

### Slit for E3T-ST□□ Through-beam Sensors

#### E39-S63

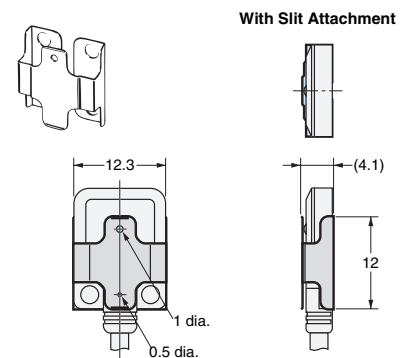


Material: 0.2-mm thick stainless steel (SUS301)

**Note:** Align the notch direction of the Slit when installing on the Emitter and Receiver.

### Slit for E3T-FT□□ Through-beam Sensors

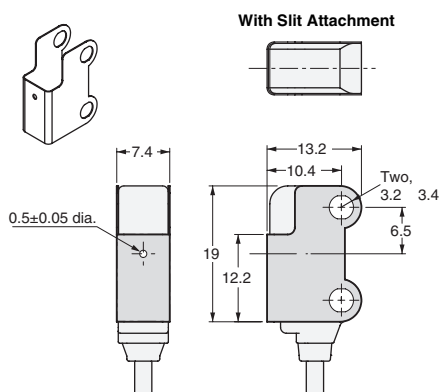
#### E39-S64



Material: 0.1-mm thick stainless steel (SUS301)

### 0.5-dia Slit for E3T-ST□□□□ Through-beam Sensors

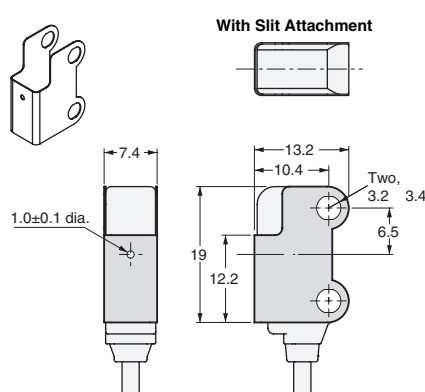
#### E39-S76A



Material: 0.2-mm thick stainless steel (SUS301)

### 1-dia Slit for E3T-ST□□□□ Through-beam Sensors

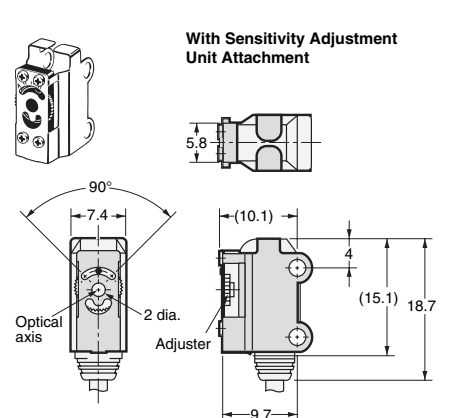
#### E39-S76B



Material: 0.2-mm thick stainless steel (SUS301)

### Sensitivity Adjustment Unit for E3T-ST1□/ST3□ Through-beam Sensors

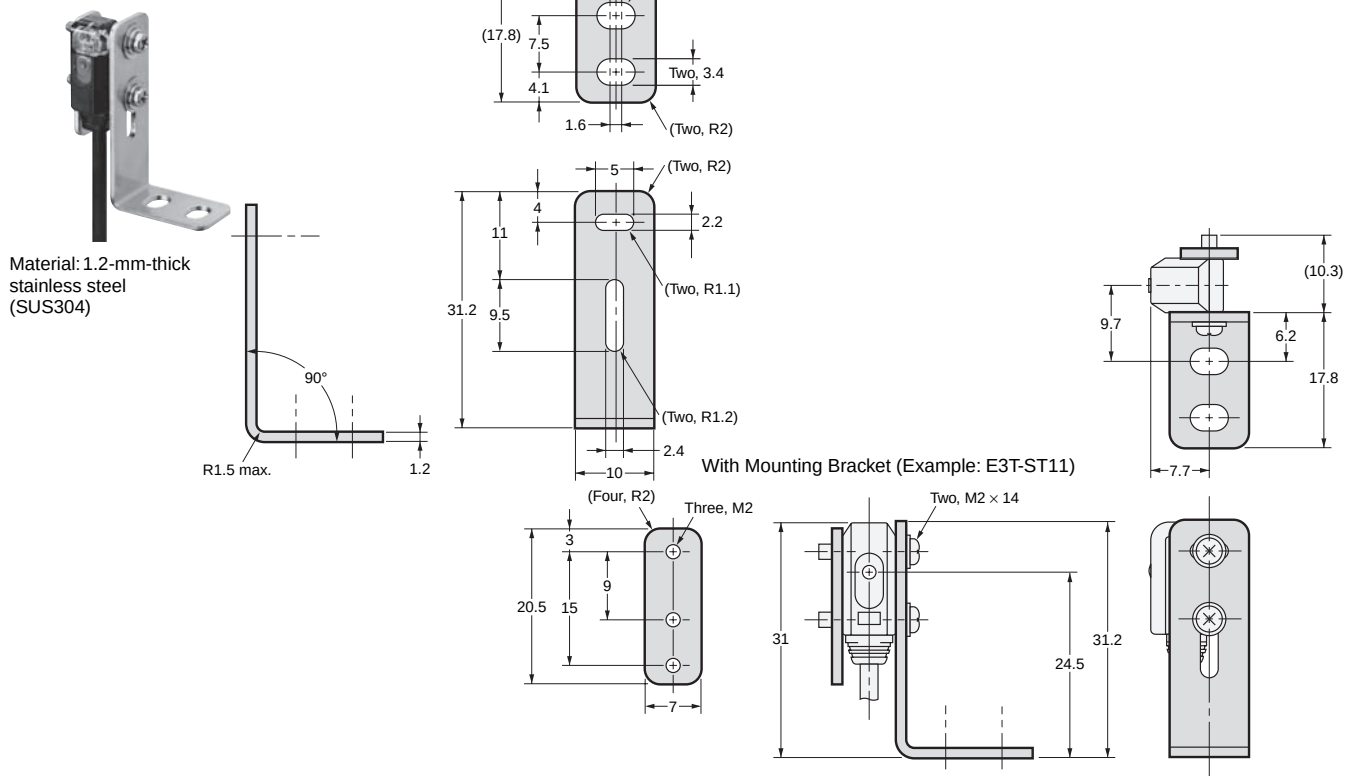
#### E39-E10



Material: stainless steel (SUS301)

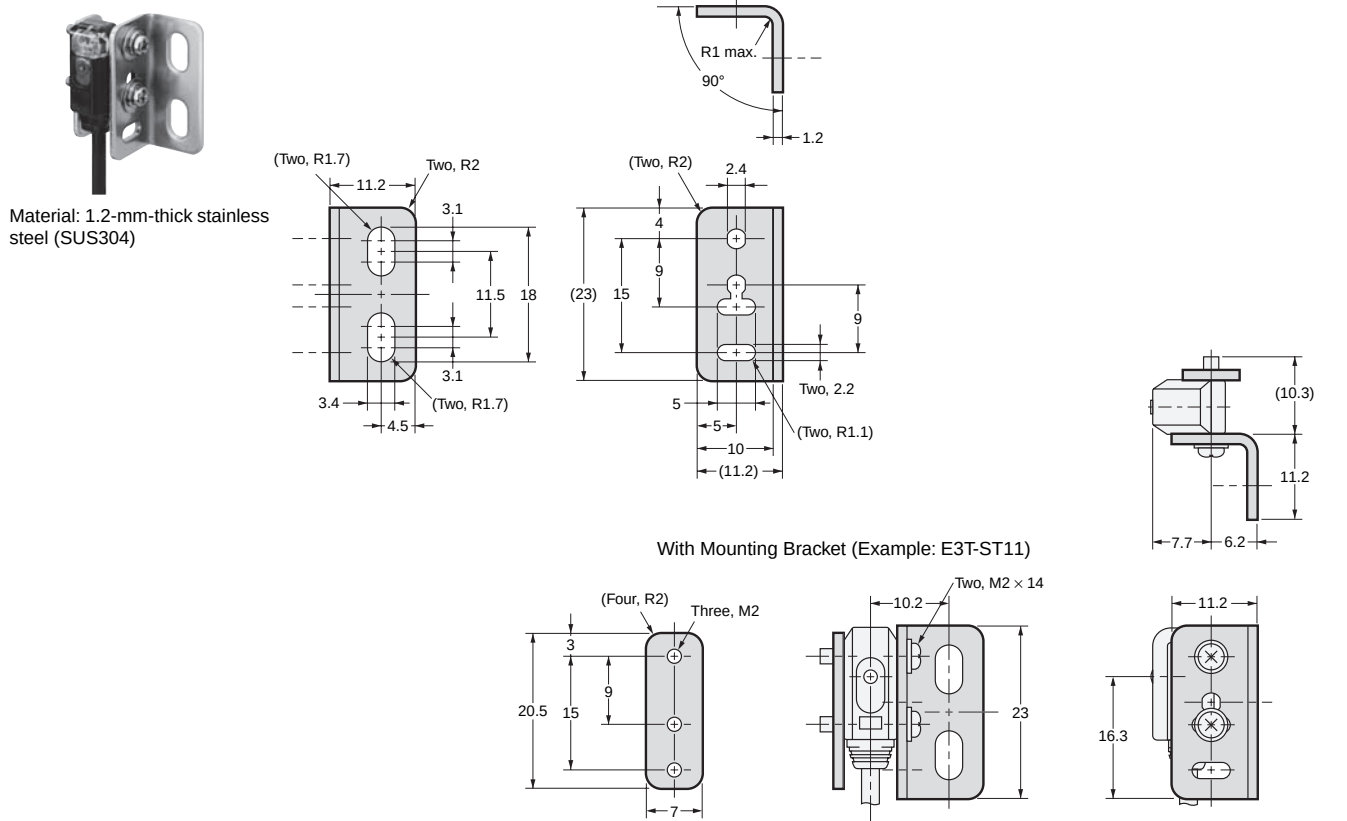
## Mounting Bracket for M2-mounting Side-view Sensors

E39-L116



## Mounting Bracket for M2-mounting Side-view Sensors

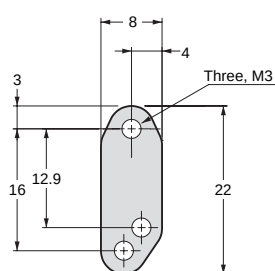
E39-L117



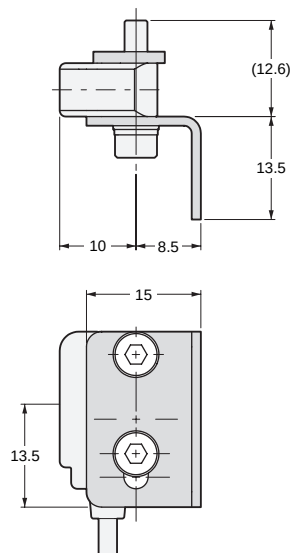
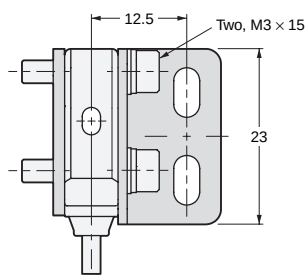




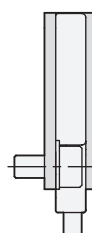
**E39-L166**



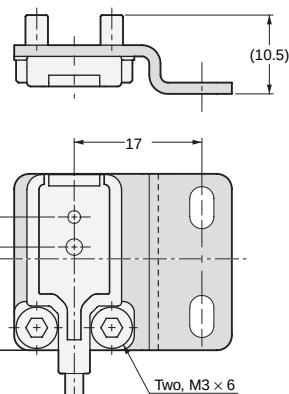
With Mounting Bracket  
(Example: E3T-ST11M)



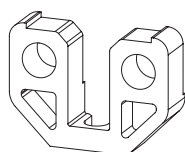
**E39-L167**



With Mounting Bracket  
(Example: E3T-FD11M)



**E39-L168**



Note: Use this Spacer when mounting the Sensor from the back.

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CSM\_3\_1\_1210

**Cat. No. E407-E1-01**

Printed in Japan  
(1010)



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