OMRON

Miniature photoelectric sensors in M5 and M6 sized housing

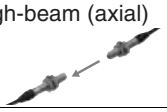
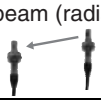
# E3T-C

**The E3T-C family of miniature photoelectric sensors is the ideal solution when mounting space is crucial.**

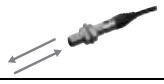
- axial and radial M5 sized through-beam sensors
- axial M6 sized diffuse-reflective sensors
- pre-wired models in stainless steel housing

## Ordering Information

M5 cylindrical housing  Red light  Infrared light

| Sensor type | Sensing distance | Operation mode | Order code | |
|---|---|---|---|---|
| | | | NPN output | PNP output |
| Through-beam (axial)  | 1 m | Dark-ON | E3T-CT12 2M | E3T-CT14 2M |
| Through-beam (radial)  | 500 mm | Dark-ON | E3T-CT22S 2M | E3T-CT24S 2M |

M6 cylindrical housing  Red light  Infrared light

| Sensor type | Sensing distance | Operation mode | Order code | |
|---|---|---|---|---|
| | | | NPN output | PNP output |
|  | 3 to 50 mm | Light-ON | E3T-CD11 2M | E3T-CD13 2M |

## Ratings and Specifications

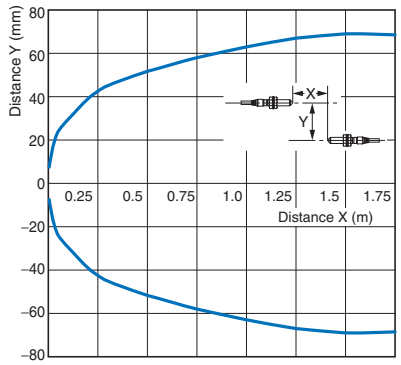
| Item | | Through-beam | | Diffuse-reflective |
|---|---|---|---|---|
| | | Cylindrical type (Top-view)  | Cylindrical type (Side-view)  | Cylindrical type (Top-view)  |
| NPN output | Light-ON | --- | --- | E3T-CD11 |
| | Dark-ON | E3T-CT12 | E3T-CT22S | --- |
| PNP output | Light-ON | --- | --- | E3T-CD13 |
| | Dark-ON | E3T-CT14 | E3T-CT24S | --- |
| Sensing distance | | 1 m | 500 mm | 3 to 50 mm (100 × 100 mm white paper) |
| Standard sensing object | | Opaque, 4-mm dia. min. | Opaque, 5-mm dia. min. | --- |
| Hysteresis (white paper) | | --- | | 15% or less of the sensing distance |
| Directional angle | | Receiver: 2° | Receiver: 10° | --- |
| Light source (wavelength) | | Red LED (630 nm) | Red LED (625 nm) | Infrared LED (870 nm) |
| Power supply voltage | | 12 to 24 VDC ±10%, ripple (p-p) 10% max. | | |
| Current consumption | | 30 mA max. (Emitter 15 mA max., Receiver 15 mA max.) | | 20 mA max. |
| Control output | | Load power supply voltage: 30 VDC max.<br>Load current: 80 mA max.<br>(residual voltage: 1 V max.)<br>Open-collector output | | |
| Protection circuits | | Power supply reverse polarity protection,<br>Output short-circuit protection | | |
| Response time | | Operate or reset: 0.5 ms max. | | |
| Ambient illumination | | Incandescent lamp: 3,000 lx max. | | |
| Ambient temperature range | | Operating: −25 to +55°C<br>Storage: −30 to +70°C<br>(with no icing or condensation) | | |
| Ambient humidity range | | Operating or Storage: 35% to +85% (with no condensation) | | |
| Insulation resistance | | 20 MΩ min. at 500 VDC | | |
| Dielectric strength | | 500 VAC, 50/60 Hz for 1 min. | | |
| Vibration resistance (destruction) | | 10 to 55Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions | | |
| Shock resistance (destruction) | | 500 m/s$^2$ 3 times each in X, Y, and Z directions | | |
| Degree of protection | | IP65 (IEC 60529) | | |
| Connection method | | Pre-wired (standard length: 2 m) | | |
| Weight (packed state) | | Approx. 60 g | | Approx. 40 g |
| Materials | Case | SUS303 | | |
| | Display window | Polysulfone | | Epoxy |
| | Lens | Polysulfone | | |
| | Hexagonal nuts | SUS303 | | |
| | Toothed washers | SUS303 | | |
| Accessories | | Instruction manual, Hexagonal nuts, Toothed washers | | Instruction manual, Hexagonal nuts, Toothed washers, Adjustment driver |

# Engineering Data (Typical)

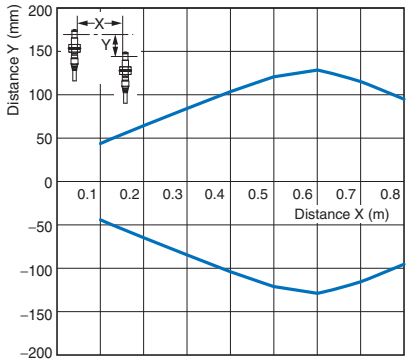
## Parallel Operating Range

**Through-beam**

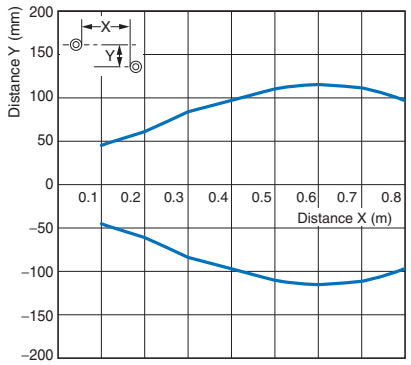
**E3T-CT1□**




**E3T-CT2□S (Top to Bottom)**



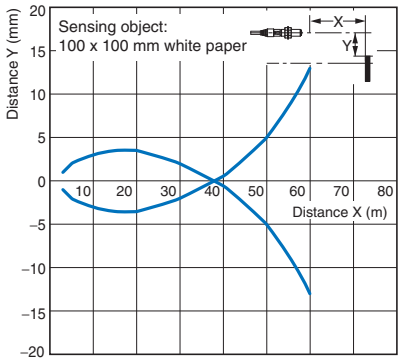

**E3T-CT2□S (Right to Left)**




## Operating Range

**Diffuse-reflective**

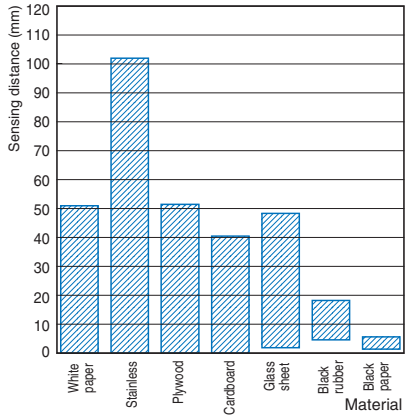
**E3T-CD1□**




## Sensing Distance vs. Material

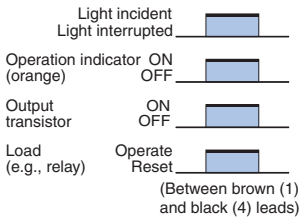
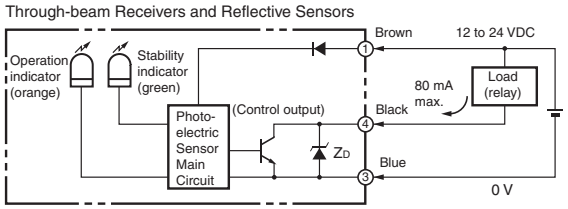
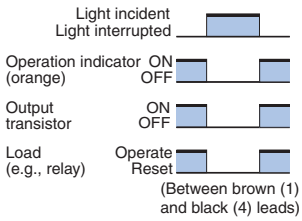
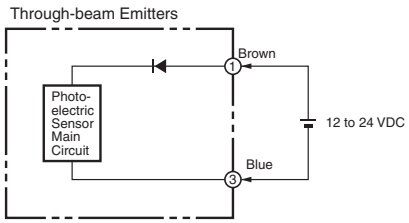
**Diffuse-reflective**

**E3T-CD1□**

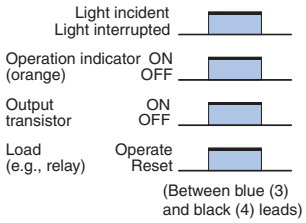
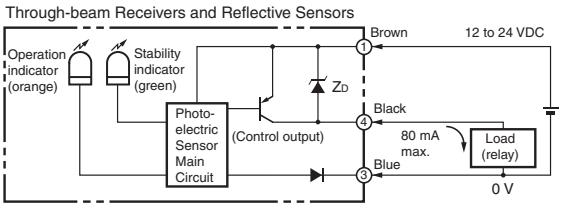
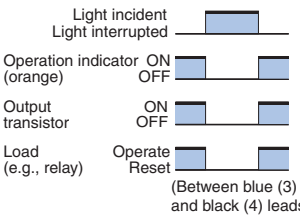
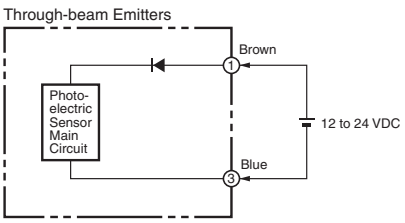


# I/O Circuit Diagrams

## NPN Output

| Model | Operation mode | Timing charts | Output circuit |
|---|---|---|---|
| E3T-CD11 | Light-ON |  |  |
| E3T-CT12<br>E3T-CT22S | Dark-ON |  |  |

## PNP Output

| Model | Operation mode | Timing charts | Output circuit |
|---|---|---|---|
| E3T-CD13 | Light-ON |  |  |
| E3T-CT14<br>E3T-CT24S | Dark-ON |  |  |

# 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**

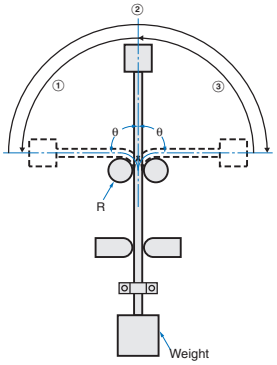
The E3T incorporates a load short-circuit protection function. If the load short-circuits, the output of the E3T will be turned OFF. Then, recheck the wiring and turn on the E3T again to reset the load short-circuit protection function. The load short-circuit protection function will work if there is 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
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)**

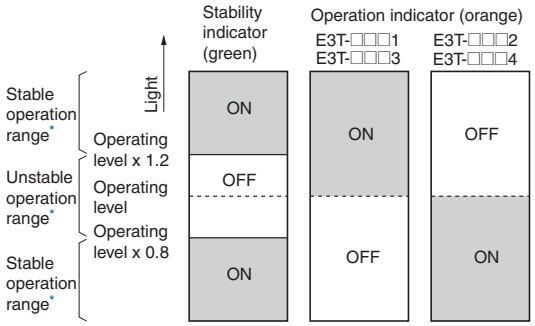
The cable is repeatedly bent with power supplied to check the number of bends until the current is turned OFF.

| Test | Specimen | Standard cable 2.4-mm dia. (7/0.127-mm dia.), 3 conductors | Robotics cable 2.4-mm dia. (20/0.08-mm dia.), 3 conductors |
|---|---|---|---|
| Con-tents/ condi-tions | 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 fs 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.

**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

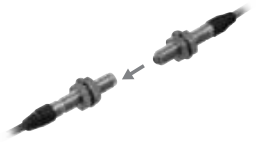
# Dimensions

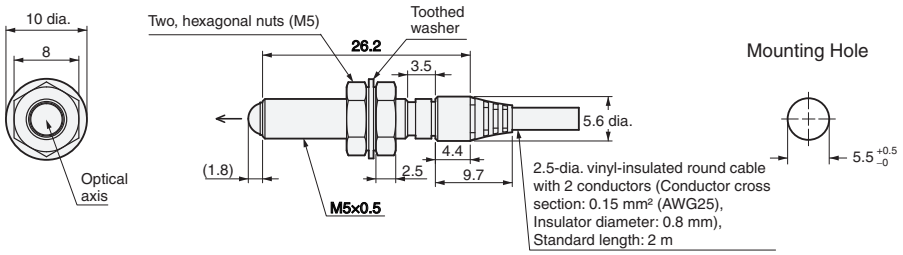
(Unit: mm)
Tolerance class IT16 applies to dimensions in this datasheet unless otherwise specified.

## Small Cylindrical Sensors

### Through-beam Top-view Sensors

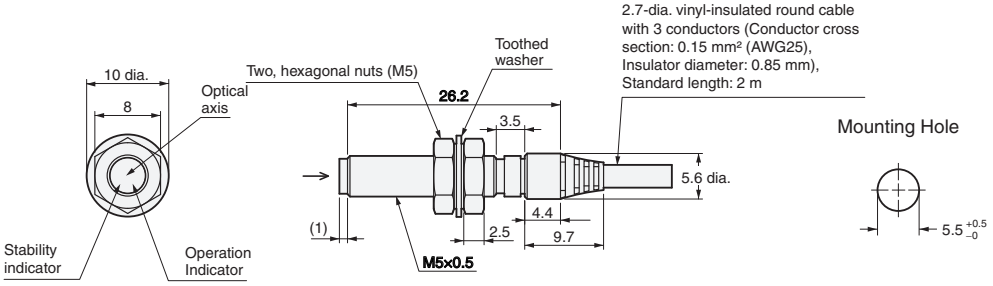
**E3T-CT1□ (Emitter)**





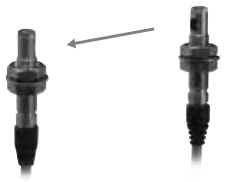

Emitter: E3T-CT1□-L
Receiver: E3T-CT1□-D

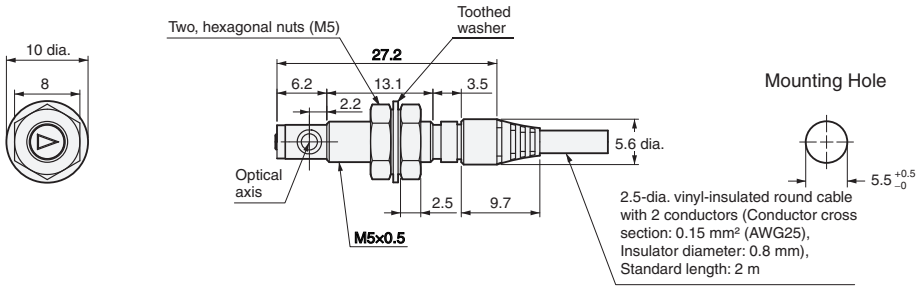
**E3T-CT1□ (Receiver)**




### Through-beam Side-view Sensors

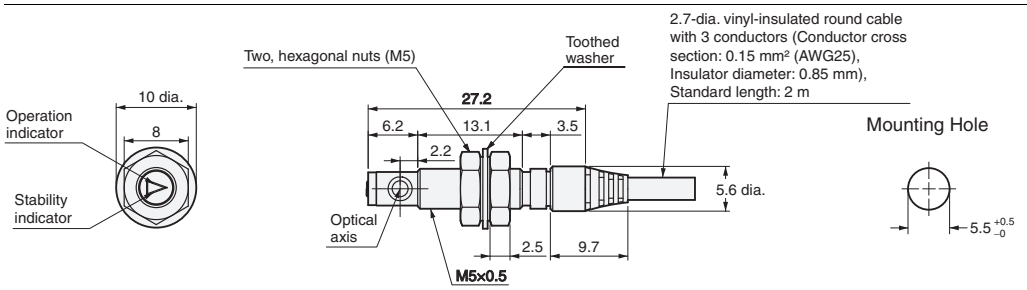
**E3T-CT2□S (Emitter)**





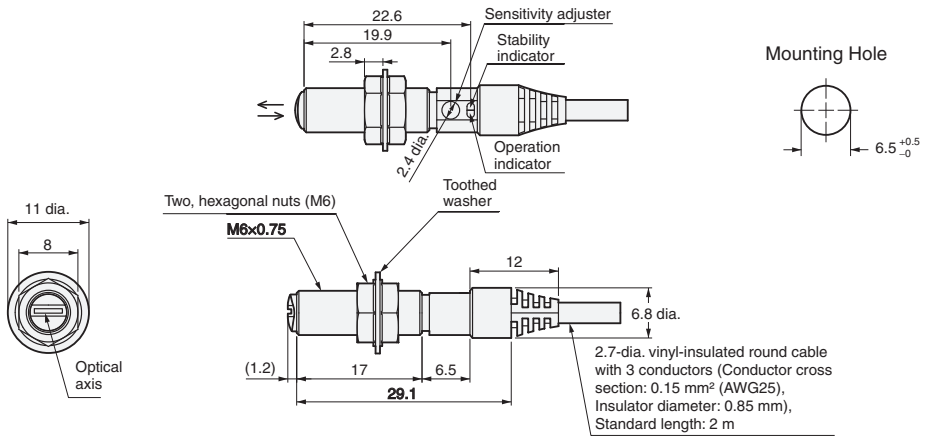

Emitter: E3T-CT2□S-L
Receiver: E3T-CT2□S-D

**E3T-CT2□S (Receiver)**




### Diffuse-reflective Top-view Sensors

**E3T-CD1□**



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