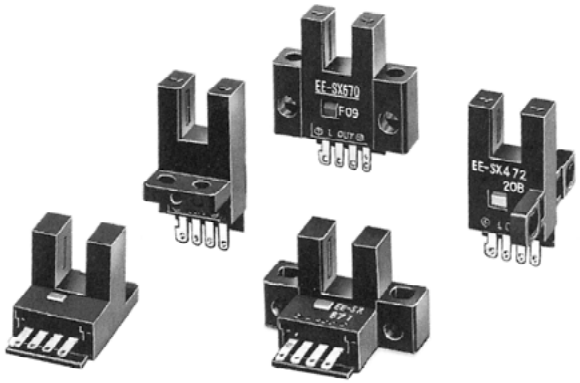
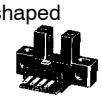
# EE-SX670/671/672/673/674A/R

## Photomicrosensor with Dark-ON Indicator in Variety of Mounting Styles




- Light-ON operation possible (by short-circuiting the terminals)
- Response frequency as high as 1 kHz
- Wide operating voltage range (5 to 24 VDC) makes smooth connection possible with TTLs, relays, and programmable controllers (PLCs)
- Easy to maintain, plugs into connector cordset EE-1006
- Compact photomicrosensor with a built-in amplifier and special IC makes it possible to directly switch up to 100 mA (NPN models)
- Circuit integrated into molded housing made of a tough, fiberglass-reinforced PBT resin

## Ordering Information

| Appearance | Sensing method | Slot width | Slot depth | Output configuration | Weight | **Part number** |
|---|---|---|---|---|---|---|
| Standard  | Slot | 5 mm | 9 mm | Light-ON/Dark-ON (See note) | Approx. 3.1 g | **EE-SX670A** |
| | | | | | | **EE-SX670R** |
| L-shaped  | | | | | Approx. 3.0 g | **EE-SX671A** |
| | | | | | | **EE-SX671R** |
| T-shaped  | | | | | Approx. 2.4 g | **EE-SX672A** |
| | | | | | | **EE-SX672R** |
| Close-mounting  | | | | | Approx. 2.3 g | **EE-SX673A** |
| | | | | | | **EE-SX673R** |
| Close-mounting  | | | | | Approx. 3.0 g | **EE-SX674A** |
| | | | | | | **EE-SX674R** |

Note: These models can be used as Light-ON when the L terminal and positive (+) terminal are connected to each other. To use them as Dark-ON, do not connect these terminals to each other. Connector EE-1001 can be used for Light-ON operation.

## ■ ACCESSORIES

| Name | Part number |
|---|---|
| Solder connector | **EE-1001** |
| Connector with 2 m cable | **EE-1006** |
| Connector holder for EE-1006 | **EE-1006A** |

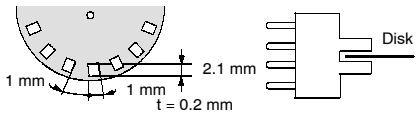
# Specifications

## ■ RATINGS

| Item | | Standard | L-shaped | T-shaped | Close-mounting |
|---|---|---|---|---|---|
| Output Type | NPN output | EE-SX670A | EE-SX671A | EE-SX672A | EE-SX673A<br>EE-SX674A |
| | PNP output | EE-SX670R | EE-SX671R | EE-SX672R | EE-SX673R<br>EE-SX674R |
| Supply voltage | | 5 to 24 VDC ±10%, ripple (p-p): 10% max. | | | |
| Current consumption | | NPN models: 35 mA max., PNP models: 30 mA max. | | | |
| Slot width | | 5 mm | | | |
| Standard reference object | | Opaque: 2 x 0.8 mm | | | |
| Differential distance | | 0.025 mm | | | |
| Control output | | NPN open collector output models:<br>At 5 to 24 VDC: 100 mA load current ($I_C$) with a residual voltage of 0.8 V max.<br>When driving TTL: 40 mA load current ($I_C$) with a residual voltage of 0.4 V max.<br>PNP open collector output models:<br>At 5 to 24 VDC: 50 mA load current ($I_C$) with a residual voltage of 1.3 V max. | | | |
| Output configuration | Transistor on output stage without detecting object | OFF (ON if set to Light-ON) | | | |
| | Transistor on output stage with detecting object | ON (OFF if set to Light-ON) | | | |
| Indicator (See note 1.) | Without detecting object | OFF | | | |
| | With detecting object | ON | | | |
| Response frequency (See note 2.) | | 1 kHz max. (3 kHz typ.) | | | |
| Light source | | GaAs infrared LED with a peak wavelength of 940 nm | | | |
| Receiver | | Si photo-transistor with a sensing wavelength of 850 nm max. | | | |
| Connecting method | | EE-1001/1006 Connectors; soldering terminals/cordset | | | |

Note: 1. The indicator is GaP red LED (peak emission wavelength: 690 nm).

2. The response frequency was measured by detecting the following disks rotating.



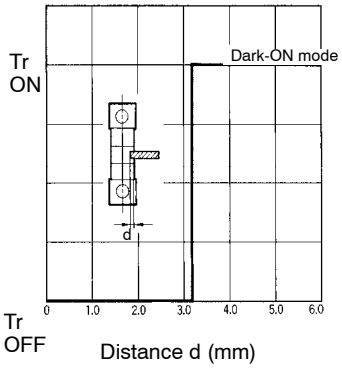
## ■ CHARACTERISTICS

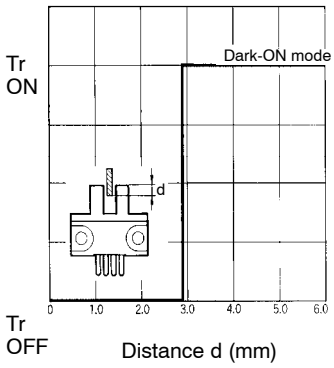
| | | |
|---|---|---|
| Ambient illumination (See note 1.) | | Fluorescent light: 1,000 ℓ x max. |
| Ambient temperature | Operating | -25°C to 55°C (-13°F to 131°F) |
| | Storage | -30°C to 80°C (-22°F to 176°F) |
| Ambient humidity | Operating | 5% to 85% |
| | Storage | 5% to 95% |
| Vibration resistance | | Destruction: 20 to 2,000 Hz, (with a peak acceleration of 10G's), 1.5-mm double amplitude for 2 hrs (with 4-minute cycles) each in X, Y, and Z directions |
| Shock resistance | | Destruction: 500 $m/s^2$ for 3 times each in X, Y, and Z directions |
| Soldering heat resistance (See note 2.) | | 260±5°C when the portion between the tip of the terminals and the position 1.5 mm to the terminal base is dipped into the solder for 10±1 seconds |
| Degree of protection | | IEC 60529, IP50 |
| Materials | Case | Polybutylene phthalate (PBT) |
| | Cover | Polycarbonate (PC) |
| | Emitter/Receiver | Polycarbonate (PC) |

Note: 1. The ambient luminance is measured on the surface of the receiver.
2. This conforms to MIL-STD-750-2031-1.

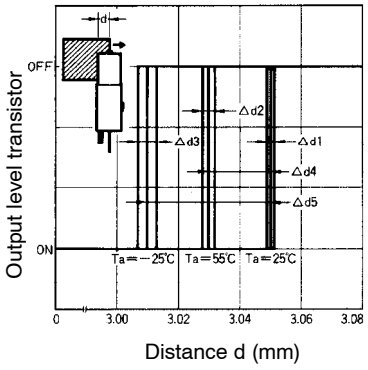
# Engineering Data

## ■ SENSING POSITION CHARACTERISTICS (TYPICAL)




## ■ REPEATED SENSING POSITION CHARACTERISTICS (TYPICAL)



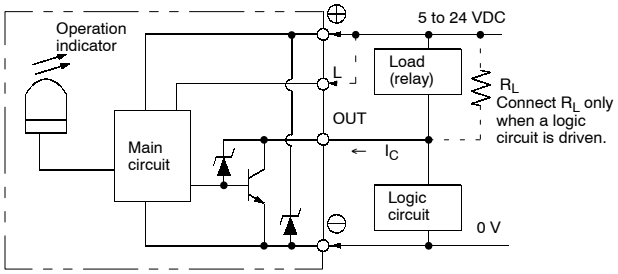

No. of repetitions: 20 at $V_{cc}$ = 12 V
△d1 = 0.002 mm
△d2 = 0.004 mm
△d3 = 0.005 mm
△d4 = 0.02 mm
△d5 = 0.04 mm

# Operation

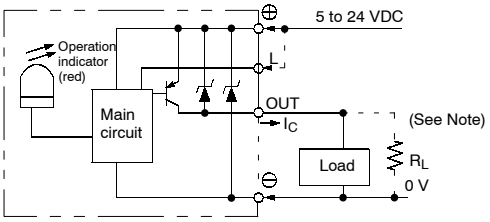
## ■ INTERNAL/EXTERNAL CIRCUIT DIAGRAM

### Light-ON/Dark-ON

**NPN Output**



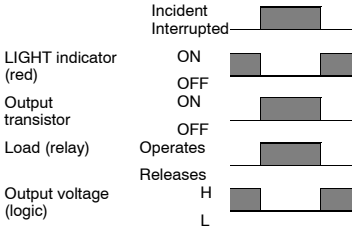

**PNP Output**



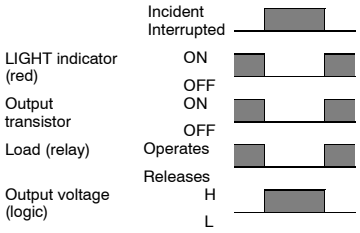

Note: When using a voltage output, always insert a resistor in $R_L$.

## ■ TIMING CHART

**Light-ON**



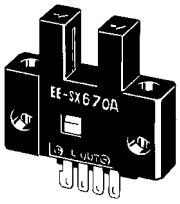

**Dark-ON**

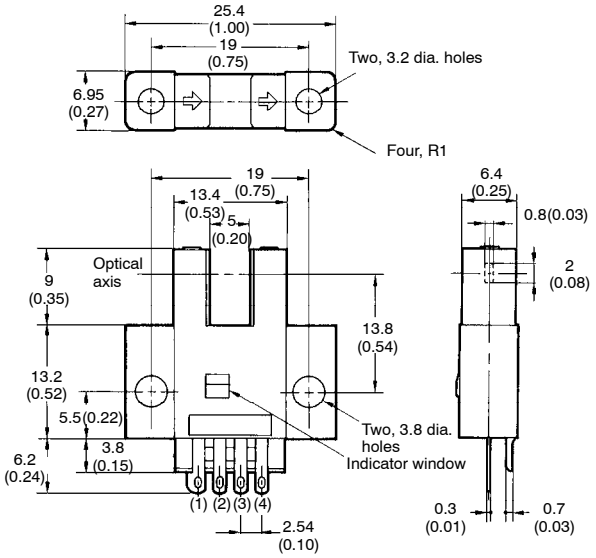



# Dimensions

Unit: mm (inch)

## ■ EE-SX670A/R

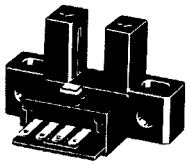


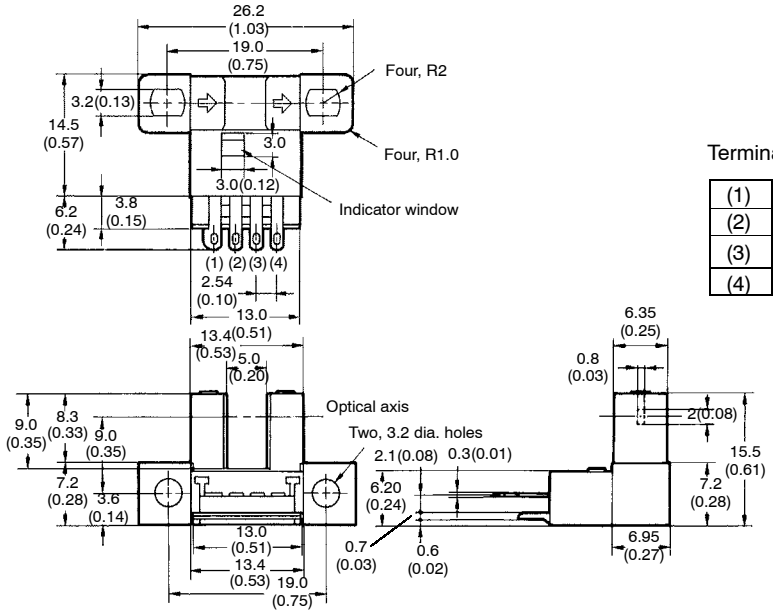




Terminal Arrangement

| | | |
|---|---|---|
| (1) | ⊕ | $V_{CC}$ |
| (2) | L | L |
| (3) | OUT | OUTPUT |
| (4) | ⊖ | GND (0 V) |

## ■ EE-SX671A/R

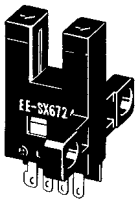


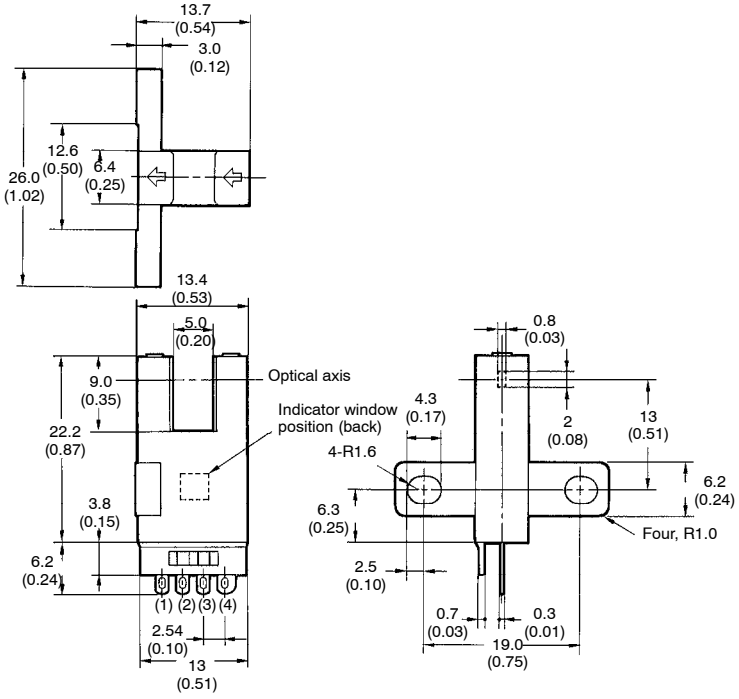



Terminal Arrangement

| | | |
|---|---|---|
| (1) | ⊕ | $V_{CC}$ |
| (2) | L | L |
| (3) | OUT | OUTPUT |
| (4) | ⊖ | GND (0 V) |

## ■ EE-SX672A/R

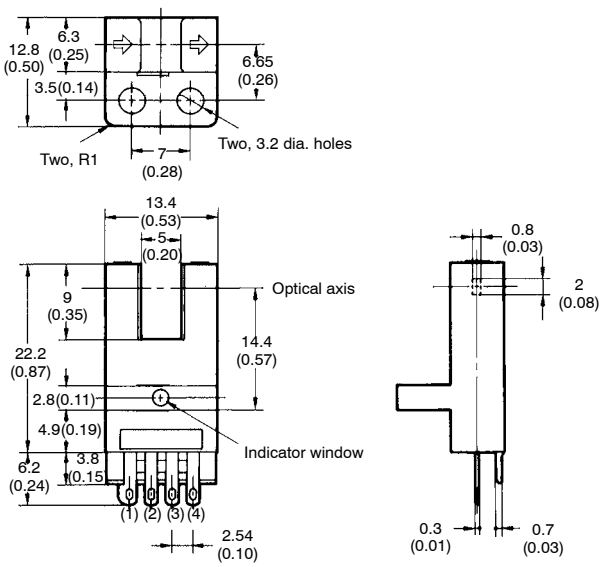



Terminal Arrangement

| | | |
|---|---|---|
| (1) | ⊕ | $V_{CC}$ |
| (2) | L | L |
| (3) | OUT | OUTPUT |
| (4) | ⊖ | GND (0 V) |

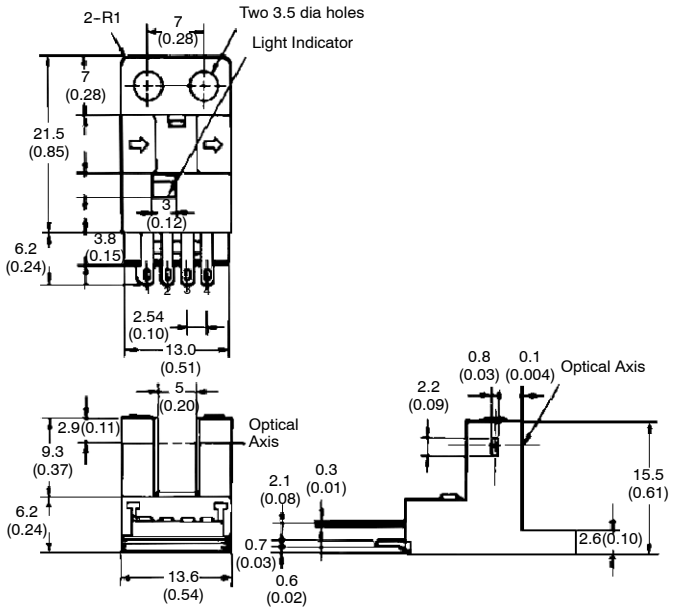
## ■ EE-SX673A/R


Terminal Arrangement

| | | |
|---|---|---|
| (1) | ⊕ | $V_{CC}$ |
| (2) | L | L |
| (3) | OUT | OUTPUT |
| (4) | ⊖ | GND (0 V) |

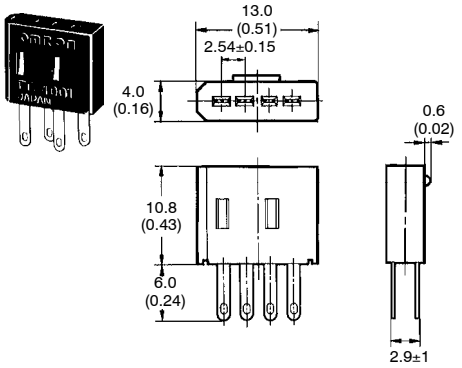
## ■ EE-SX674A/R



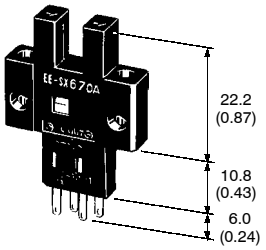

Terminal Arrangement

| | | |
|---|---|---|
| (1) | ⊕ | $V_{CC}$ |
| (2) | L | L |
| (3) | OUT | OUTPUT |
| (4) | ⊖ | GND (0 V) |

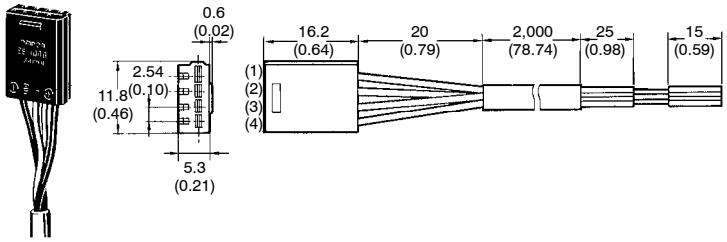
## ■ EE-1001 SOLDER CONNECTOR




## ■ EE-SX67□A/R WITH EE-1001 CONNECTOR




## ■ EE-1006 CONNECTOR WITH CABLE

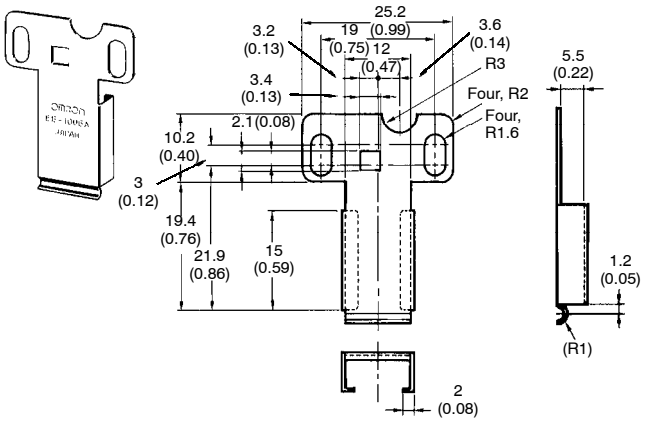



Terminal Arrangement - IEC Colors

| | | | |
|---|---|---|---|
| (1) | Brown (Red) | ⊕ | $V_{CC}$ |
| (2) | Pink (Yellow) | L | L |
| (3) | Black (White) | OUT | OUTPUT |
| (4) | Blue (Black) | ⊖ | GND (0 V) |

Note: Older standard colors are shown in parentheses. Connector comes with a 2-m attached cable.

## ■ EE-1006A CONNECTOR HOLDER




# Precautions

Refer the Technical Information Section for general precautions.

The sensing window is made of a polycarbonate resin which withstands chloride solvents and strong acids but is soluble in strong alkali, aromatic hydrocarbons, and aliphatic hydrocarbonate chloride solvents.

The casing material uses a PBT resin but is soluble in strong alkali solvents.

The temperature of the terminals at the time of soldering must not exceed the characteristics found in the table provided here:

| Item | Temperature | Permissible time | Remarks |
|---|---|---|---|
| Dip | 260°C | 10 sec | The portion between the base of the terminals and the position 1.5 mm from the terminal base must not be soldered. |
| Iron | 350°C | 3 sec | |

The terminal base uses a polycarbonate resin, which could be deformed by excessive soldering heat.

**NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.**

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