

Photomicrosensor with 50- to 100-mA direct switching capacity for built-in application.

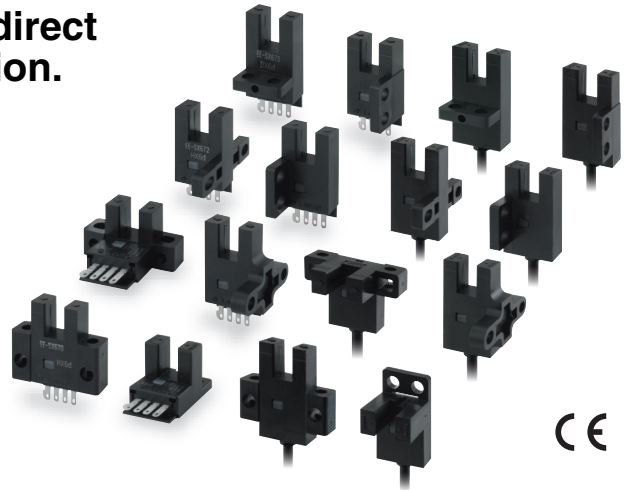
- Series includes models that enable switching between dark-ON and light-ON operation.
- Response frequency as high as 1 kHz.
- Easy operation monitoring with bright light indicator.
- Wide operating voltage range: 5 to 24 VDC
- Models in which the light indicator turns ON for dark-ON operation are also available.
- A wide range of variations in eight different shapes.
- Flexible robot cable is provided as a standard feature. *2



Be sure to read *Safety Precautions* on page 5.

*1. Pre-wired Models are available only in the EE-SX67 Series.







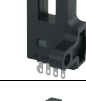
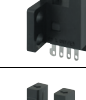

*2. Only for Pre-wired Models and Pre-wired Connector Models.



Ordering Information

Connector










 Infrared light

| Appearance | Sensing method | Connecting method | Sensing distance | Output configuration | Indicator mode | Model | |
|---|-------------------------------|---------------------|---|----------------------------------|-------------------|------------|------------|
| | | | | | | NPN output | PNP output |
| Standard  | Through-beam type (with slot) | Connector (4 poles) |  5 mm (slot width) | Dark-ON/Light-ON (selectable) *3 | Incident light | EE-SX670 | EE-SX670P |
| | | | | | No incident light | EE-SX670A | EE-SX670R |
| | | | | Light-ON | Incident light | EE-SX470 | EE-SX470P |
| L-shaped  | | | | Dark-ON/Light-ON (selectable) *3 | Incident light | EE-SX671 | EE-SX671P |
| | | | | | No incident light | EE-SX671A | EE-SX671R |
| | | | | Light-ON | Incident light | EE-SX471 | EE-SX471P |
| T-shaped, slot center 7 mm  | | | | Dark-ON/Light-ON (selectable) *3 | Incident light | EE-SX672 | EE-SX672P |
| | | | | | No incident light | EE-SX672A | EE-SX672R |
| | | | | Light-ON | Incident light | EE-SX472 | EE-SX472P |
| Close-mounting  | | | | Dark-ON/Light-ON (selectable) *3 | Incident light | EE-SX673 | EE-SX673P |
| | | | | | No incident light | EE-SX673A | EE-SX673R |
| | | | | Light-ON | Incident light | EE-SX473 | EE-SX473P |
| Close-mounting  | | | | Dark-ON/Light-ON (selectable) *3 | Incident light | EE-SX674 | EE-SX674P |
| | | | | | No incident light | EE-SX674A | EE-SX674R |
| | | | | Light-ON | Incident light | EE-SX474 | EE-SX474P |
| T-shaped, slot center 10 mm  | | | | Dark-ON/Light-ON (selectable) *3 | Incident light | EE-SX675 | EE-SX675P |
| F-shaped  | | | | Dark-ON/Light-ON (selectable) *3 | Incident light | EE-SX676 | EE-SX676P |
| R-shaped  | | | | Dark-ON/Light-ON (selectable) *3 | Incident light | EE-SX677 | EE-SX677P |

*3. Dark-ON when the L terminal of the connector is opened, and light-ON when the L terminal and positive (+) terminal are connected. Do not connect the L terminal to 0 V when using dark-ON operation. When using light-ON, it is useful to select the connector EE-1001-1. The L terminal and positive (+) terminal of this connector are connected in advance.

Pre-wired Models, Models with Connectors

 Infrared light

| Appearance | Sensing method | Sensing distance | | Output configuration | Indicator mode | Connecting method | Model | |
|--|-------------------------------|---|-------------------|-------------------------------------|----------------|-------------------------------|---------------------|----------------------|
| | | | | | | | NPN output | PNP output |
| Standard  | Through-beam type (with slot) |  | 5 mm (slot width) | Dark-ON/ Light-ON (selectable) * | Incident light | Pre-wired Models (1m) | EE-SX670-WR 1M | EE-SX670P-WR 1M |
| L-shaped  | | | | | | Models with connectors (0.1m) | EE-SX670-C1J-R 0.1M | EE-SX670P-C1J-R 0.1M |
| T-shaped, slot center 7 mm  | | | | | | Pre-wired Models (1m) | EE-SX671-WR 1M | EE-SX671P-WR 1M |
| Close-mounting  | | | | | | Models with connectors (0.1m) | EE-SX671-C1J-R 0.1M | EE-SX671P-C1J-R 0.1M |
| Close-mounting  | | | | | | Pre-wired Models (1m) | EE-SX672-WR 1M | EE-SX672P-WR 1M |
| T-shaped, slot center 10 mm  | | | | | | Models with connectors (0.1m) | EE-SX672-C1J-R 0.1M | EE-SX672P-C1J-R 0.1M |
| F-shaped  | | | | | | Pre-wired Models (1m) | EE-SX673-WR 1M | EE-SX673P-WR 1M |
| R-shaped  | | | | | | Models with connectors (0.1m) | EE-SX673-C1J-R 0.1M | EE-SX673P-C1J-R 0.1M |
| | | | | | | Pre-wired Models (1m) | EE-SX674-WR 1M | EE-SX674P-WR 1M |
| | | | | | | Models with connectors (0.1m) | EE-SX674-C1J-R 0.1M | EE-SX674P-C1J-R 0.1M |
| | | | | | | Pre-wired Models (1m) | EE-SX675-WR 1M | EE-SX675P-WR 1M |
| | | | | | | Models with connectors (0.1m) | EE-SX675-C1J-R 0.1M | EE-SX675P-C1J-R 0.1M |
| | | | | | | Pre-wired Models (1m) | EE-SX676-WR 1M | EE-SX676P-WR 1M |
| | | | | | | Models with connectors (0.1m) | EE-SX676-C1J-R 0.1M | EE-SX676P-C1J-R 0.1M |
| | | | | | | Pre-wired Models (1m) | EE-SX677-WR 1M | EE-SX677P-WR 1M |
| | | | | | | Models with connectors (0.1m) | EE-SX677-C1J-R 0.1M | EE-SX677P-C1J-R 0.1M |

* Dark-ON operation can be used when the L terminal is left unconnected or Light-ON operation can be used when the L terminal and positive (+) terminal are connected to each other. Do not connect the L terminal to 0 V when using dark-ON operation.

Accessories (Order Separately) Connector Models

| Type | Cable length | Model | Remarks |
|----------------------------|--------------|-----------|---|
| Connector | | EE-1001 | |
| | | EE-1001-1 | L terminal and positive (+) terminal are already short-circuited. |
| | | EE-1009 | |
| Connector with Cable | 1 m | EE-1006 | |
| | | EE-1010 | |
| | 2 m | EE-1006 | |
| | | EE-1010 | |
| Connector with Robot Cable | 1 m | EE-1010-R | |
| | 2 m | EE-1010-R | |
| Connector Hold-down Clip | | EE-1006A | For EE-1006 only. |

* Refer to *Accessories* for details.

Accessories (Order Separately) Models with Connectors

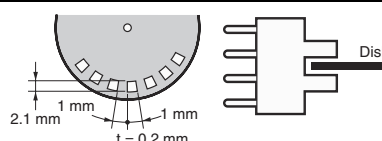
| Type | Cable length | Model | Remarks |
|----------------------------|--------------|-------------|--------------------------|
| Connector with Robot Cable | 2 m | EE-1016-R-1 | For EE-SX67□-C1J-R only. |

Ratings and Specifications

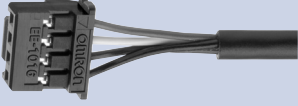
| Type | | Standard | L-shaped | T-shaped, slot center 7 mm | Close-mounting | | T-shaped, slot center 10 mm | F-shaped | R-shaped |
|---------------------------|---------------------------|--|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|---------------------|---------------------|
| NPN models | Connector models | EE-SX670 EE-SX670A EE-SX470 | EE-SX671 EE-SX671A EE-SX471 | EE-SX672 EE-SX672A EE-SX472 | EE-SX673 EE-SX673A EE-SX473 | EE-SX674 EE-SX674A EE-SX474 | EE-SX675 | EE-SX676 | EE-SX677 |
| | Pre-wired models | EE-SX670- WR | EE-SX671- WR | EE-SX672- WR | EE-SX673- WR | EE-SX674- WR | EE-SX675- WR | EE-SX676- WR | EE-SX677- WR |
| | Models with connectors | EE-SX670- CJ1-R | EE-SX671- CJ1-R | EE-SX672- CJ1-R | EE-SX673- CJ1-R | EE-SX674- CJ1-R | EE-SX675- CJ1-R | EE-SX676- CJ1-R | EE-SX677- CJ1-R |
| PNP models | Connector models | EE-SX670P EE-SX670R EE-SX470P | EE-SX671P EE-SX671R EE-SX471P | EE-SX672P EE-SX672R EE-SX472P | EE-SX673P EE-SX673R EE-SX473P | EE-SX674P EE-SX674R EE-SX474P | EE-SX675P | EE-SX676P | EE-SX677P |
| | Pre-wired models | EE-SX670P- WR | EE-SX671P- WR | EE-SX672P- WR | EE-SX673P- WR | EE-SX674P- WR | EE-SX675P- WR | EE-SX676P- WR | EE-SX677P- WR |
| | Models with connectors | EE-SX670P- CJ1-R | EE-SX671P- CJ1-R | EE-SX672P- CJ1-R | EE-SX673P- CJ1-R | EE-SX674P- CJ1-R | EE-SX675P- CJ1-R | EE-SX676P- CJ1-R | EE-SX677P- CJ1-R |
| Item | | | | | | | | | |
| Sensing distance | | 5 mm (slot width) | | | | | | | |
| Sensing object | | Opaque: 2 × 0.8 mm min. | | | | | | | |
| Differential distance | | 0.025 mm | | | | | | | |
| Light source | | GaAs infrared LED with a peak wavelength of 940 nm | | | | | | | |
| Indicator *1 | | Light indicator (red) (turns ON when light is interrupted for models with A or R suffix) | | | | | | | |
| Supply voltage | | 5 to 24 VDC ±10%, ripple (p-p): 10% max. | | | | | | | |
| Current consumption | | 35 mA max. (NPN models), 30 mA max. (PNP models) | | | | | | | |
| Control output | | NPN open collector: 5 to 24 VDC, 100 mA max. 100 mA load current with a residual voltage of 0.8 V max. 40 mA load current with a residual voltage of 0.4 V max. OFF current: 0.5 mA max. PNP open collector: 5 to 24 VDC, 50 mA max. 50 mA load current with a residual voltage of 1.3 V max. OFF current: 0.5 mA max. | | | | | | | |
| Response frequency *2 | | 1 kHz min. (3 kHz average) | | | | | | | |
| Ambient illumination | | 1,000 lx max. with fluorescent light on the surface of the receiver. | | | | | | | |
| Ambient temperature range | | Operating: -25 to +55°C, Storage: -30 to +80°C (with no icing or condensation) | | | | | | | |
| Ambient humidity range | | Operating: 5% to 85%, Storage: 5% to 95% (with no icing or condensation) | | | | | | | |
| Vibration resistance | | Destruction: 20 to 2,000 Hz (peak acceleration: 100 m/s ²) 1.5-mm double amplitude for 2 h (4-min periods) each in X, Y, and Z directions | | | | | | | |
| Shock resistance | | Destruction: 500 m/s ² for 3 times each in X, Y, and Z directions | | | | | | | |
| Degree of protection | | IEC60529 IP50 | | | | | | | |
| Connecting method | | Connector Models (direct soldering possible), Pre-wired Models (Standard cable length: 1 m), Models with Connectors (Standard cable length: 0.1 m) | | | | | | | |
| Wei- ght | Connector models | Approx. 3.1 g | Approx. 3 g | Approx. 2.4 g | Approx. 2.3 g | Approx. 3 g | Approx. 2.7 g | Approx. 2.2 g | Approx. 2.2 g |
| | Pre-wired models | Approx. 18.9 g | Approx. 17.3 g | Approx. 17.8 g | Approx. 16.8 g | Approx. 17.1 g | Approx. 18.3 g | Approx. 16.9 g | Approx. 16.9 g |
| | Models with connectors | Approx. 6.3 g | Approx. 4.7 g | Approx. 5.2 g | Approx. 4.2 g | Approx. 4.5 g | Approx. 5.7 g | Approx. 4.3 g | Approx. 4.3 g |
| Ma- teri- al | Case | Polybutylene phthalate (PBT) | | | | | | | |
| | Cover Emitter/receiver | Polycarbonate | | | | | | | |

*1. The indicator is a GaP red LED (peak wavelength: 690 nm).

*2. The response frequency was measured by detecting the rotating disk shown at the right.

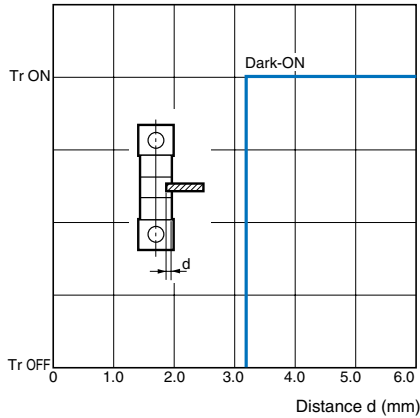


Connector for the EE-SX67 with Junction Connector

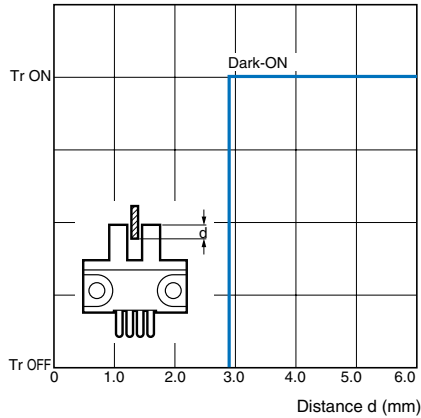
| Product Model | Connector with Robot Cable | |
|--|---|-----------------|
| | EE-1016-R-1 | |
| Appearance |  | |
| Item | | |
| Contact resistance | 25 mΩ max. (at 10 mA DC and 20 mV max.) | |
| Insertion strength | 20 N max. | |
| Surplus strength (housing holding strength) | 15 N min. | |
| Cable length | 2 m | |
| Ambient temperature range | -25 to +85°C | |
| Materials | Housing | Nylon |
| | Contact | Phosphor bronze |

Engineering Data (Typical)

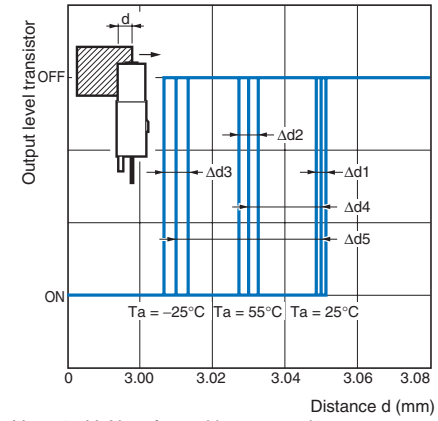
Sensing Position Characteristics



Sensing Position Characteristics



Repeated Sensing Position Characteristics



$V_{CC} = 12\text{ V}$, No. of repetitions: 20, $\Delta d1 = 0.002\text{ mm}$, $\Delta d2 = 0.004\text{ mm}$, $\Delta d3 = 0.005\text{ mm}$, $\Delta d4 = 0.02\text{ mm}$, $\Delta d5 = 0.04\text{ mm}$

Note: The data applies to dark status. Operation may be affected by external light interference or light coming through the sensing object.

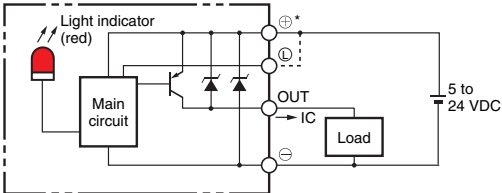
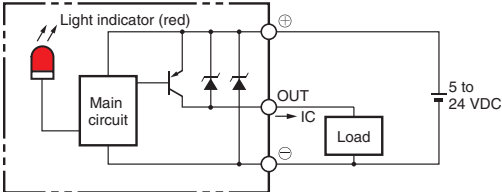
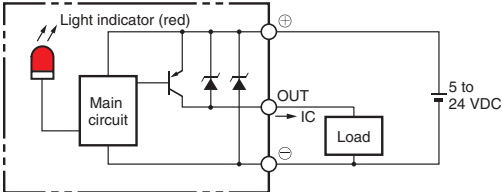
I/O Circuit Diagrams

NPN Output

| Model | Output configuration | Timing charts | Terminal connections | Output circuit |
|---|----------------------|---|---|----------------|
| EE-SX67□ EE-SX67□-WR EE-SX67□-CJ1-R | Light-ON | Incident Interrupted Light indicator (red) ON OFF Output transistor ON OFF Load 1 Operates (e.g., relay) Releases Load 2 H L | Short-circuited between \ominus terminal and positive \oplus terminal | |
| | Dark-ON | Incident Interrupted Light indicator (red) ON OFF Output transistor ON OFF Load 1 Operates (e.g., relay) Releases Load 2 H L | Open between \ominus terminal and positive \oplus terminal *1 | |
| EE-SX670A EE-SX671A EE-SX672A EE-SX673A EE-SX674A | Light-ON | Incident Interrupted Light indicator (red) ON OFF Output transistor ON OFF Load 1 Operates (e.g., relay) Releases Load 2 H L | Short-circuited between \ominus terminal and positive \oplus terminal | |
| | Dark-ON | Incident Interrupted Light indicator (red) ON OFF Output transistor ON OFF Load 1 Operates (e.g., relay) Releases Load 2 H L | Open between \ominus terminal and positive \oplus terminal *1 | |
| EE-SX470 EE-SX471 EE-SX472 EE-SX473 EE-SX474 | Light-ON | Incident Interrupted Light indicator (red) ON OFF Output transistor ON OFF Load 1 (relay) Operates Releases Load 2 H L | --- | |

*1. Do not connect the L terminal to 0 V when using dark-ON operation.

PNP Output

| Model | Output configuration | Timing charts | Terminal connections | Output circuit |
|---|----------------------|---|---|---|
| EE-SX67□P EE-SX67□P-WR EE-SX67□P-CJ1-R | Light-ON | <div>Incident Interrupted</div> <div>Light indicator (red) ON OFF</div> <div>Output transistor ON OFF</div> <div>Load (relay) Operates Releases</div> | Short-circuited between Ⓛ terminal and positive ⊕ terminal |  <p>*The terminal arrangement depends on the model. Check the dimensional diagrams.</p> |
| | Dark-ON | <div>Incident Interrupted</div> <div>Light indicator (red) ON OFF</div> <div>Output transistor ON OFF</div> <div>Load (relay) Operates Releases</div> | Open between Ⓛ terminal and positive ⊕ terminal *1 | |
| EE-SX670R EE-SX671R EE-SX672R EE-SX673R EE-SX674R | Light-ON | <div>Incident Interrupted</div> <div>Light indicator (red) ON OFF</div> <div>Output transistor ON OFF</div> <div>Load (e.g., relay) Operates Releases</div> | Short-circuited between Ⓛ terminal and positive ⊕ terminal |  <p>*The terminal arrangement depends on the model. Check the dimensional diagrams.</p> |
| | Dark-ON | <div>Incident Interrupted</div> <div>Light indicator (red) ON OFF</div> <div>Output transistor ON OFF</div> <div>Load (e.g., relay) Operates Releases</div> | Open between Ⓛ terminal and positive ⊕ terminal *1 | |
| EE-SX470P EE-SX471P EE-SX472P EE-SX473P EE-SX474P | Light-ON | <div>Incident Interrupted</div> <div>Light indicator (red) ON OFF</div> <div>Output transistor ON OFF</div> <div>Load (relay) Operates Releases</div> | --- |  |

*1. Do not connect the L terminal to 0 V when using dark-ON operation.

Safety Precautions

Refer to *Warranty and Limitations of Liability*.

**WARNING**

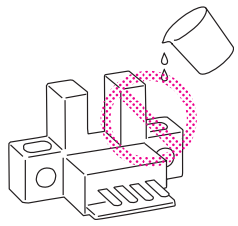
This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.



Precautions for Safe Use

● **Operating Environment**

These Photomicrosensors have an IP50 (conforms to IEC) enclosure and do not have a water-proof or dust-proof structure. Therefore, do not use them in applications in which the sensor will be subjected to splashes from water, oil, or any other liquid. Liquid entering the Sensor may result in malfunction.



Precautions for Correct Use

Make sure that this product is used within the rated ambient environment conditions.

● **Installation**

- When direct soldering to the terminals, use the following guidelines.

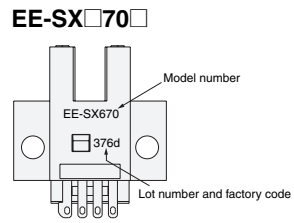
Soldering Conditions

| Item | Temperature | Permissible time | Remarks |
|----------------|-------------|------------------|--|
| Soldering iron | 350°C max. | 3 s max. | The portion between the base of the terminals and the position 1.5 mm from the terminal base must not be soldered. |

- The terminal base uses a polycarbonate resin, which could be deformed by excessive soldering heat, resulting in damage to the product's functionality.

● **Lot Number and Model Number Legend**

In the following diagrams, 376d indicates the lot number and factory where the product was manufactured. Do not include this code with the model number when ordering.



(Unit: mm)

Dimensions

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

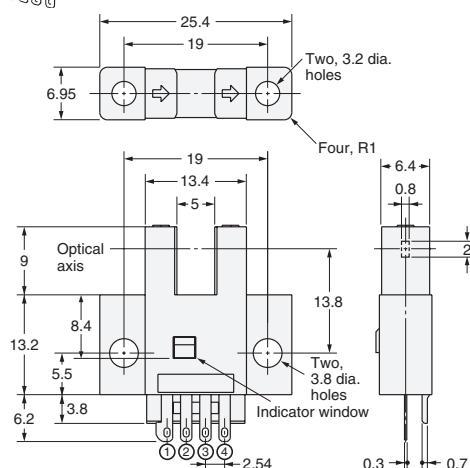
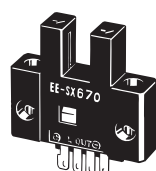
Sensors

EE-SX670/670P
EE-SX670A/670R
EE-SX470/470P

Terminal Arrangement

| | | |
|-----|-----------|-----------|
| (1) | \oplus | Vcc |
| (2) | L | L* |
| (3) | OUT | OUTPUT |
| (4) | \ominus | GND (0 V) |

* Pin 2 is not used for the EE-SX470.

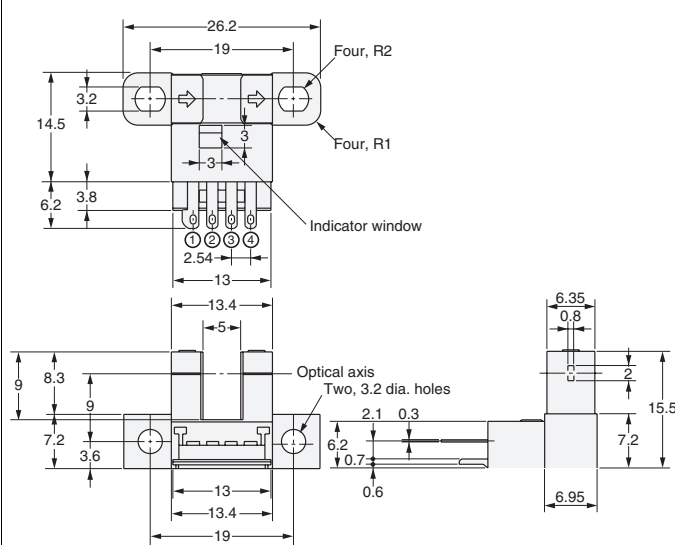
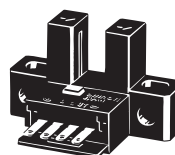


EE-SX671/671P
EE-SX671A/671R
EE-SX471/471P

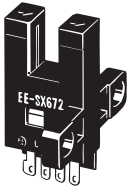
Terminal Arrangement

| | | |
|-----|-----------|-----------|
| (1) | \oplus | Vcc |
| (2) | L | L* |
| (3) | OUT | OUTPUT |
| (4) | \ominus | GND (0 V) |

* Pin 2 is not used for the EE-SX471.



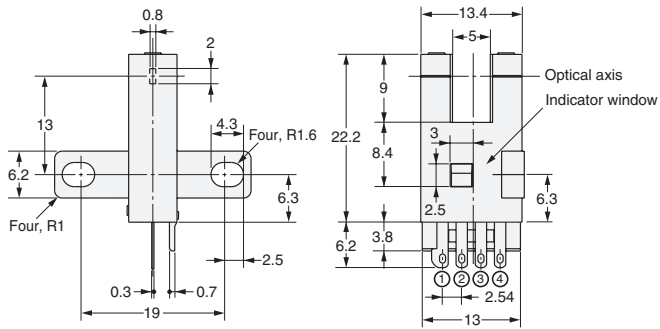
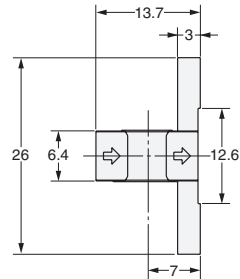
EE-SX672/672P
EE-SX672A/672R
EE-SX472/472P



Terminal Arrangement

| | | |
|-----|-----------|-----------|
| (1) | \oplus | Vcc |
| (2) | L | L* |
| (3) | OUT | OUTPUT |
| (4) | \ominus | GND (0 V) |

* Pin 2 is not used for the EE-SX472.



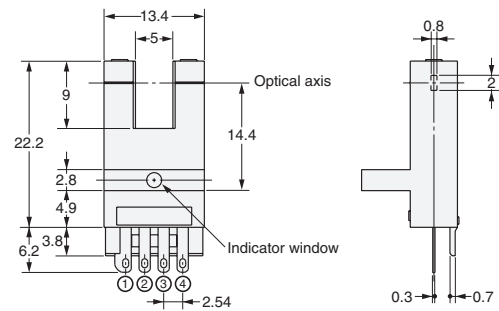
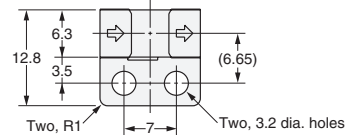
EE-SX673/673P
EE-SX673A/673R
EE-SX473/473P



Terminal Arrangement

| | | |
|-----|-----------|-----------|
| (1) | \oplus | Vcc |
| (2) | L | L* |
| (3) | OUT | OUTPUT |
| (4) | \ominus | GND (0 V) |

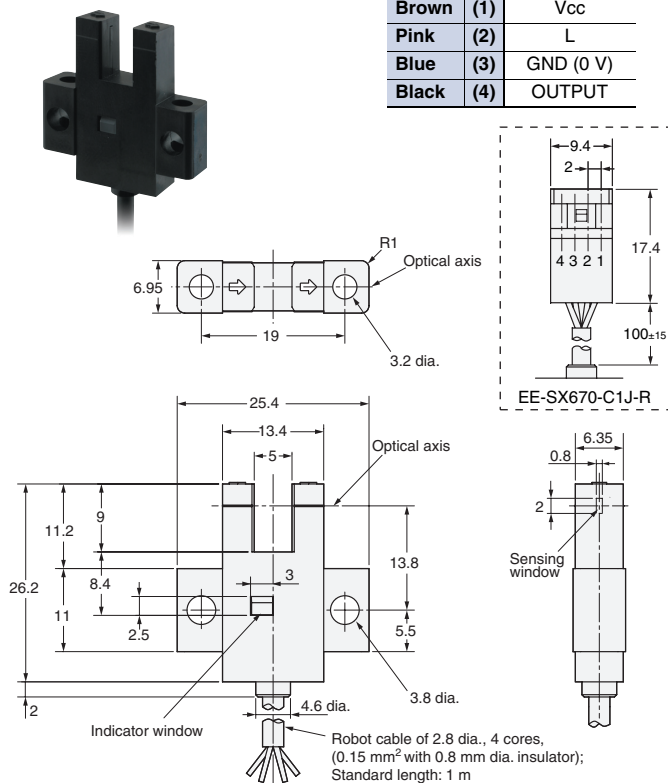
* Pin 2 is not used for the EE-SX473.



EE-SX670-WR/670P-WR EE-SX670-C1J-R/670P-C1J-R

Terminal Arrangement

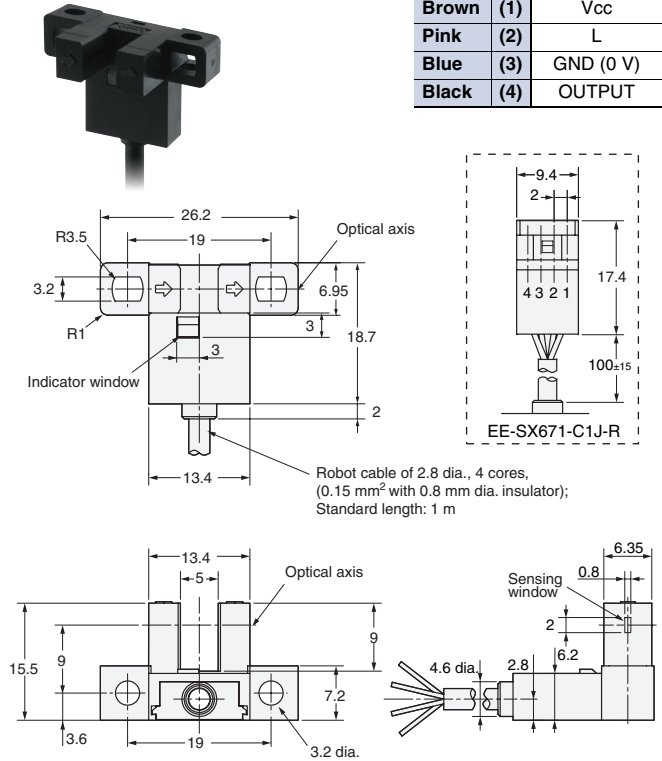
| | | |
|-------|-----|-----------|
| Brown | (1) | Vcc |
| Pink | (2) | L |
| Blue | (3) | GND (0 V) |
| Black | (4) | OUTPUT |



EE-SX671-WR/671P-WR EE-SX671-C1J-R/671P-C1J-R

Terminal Arrangement

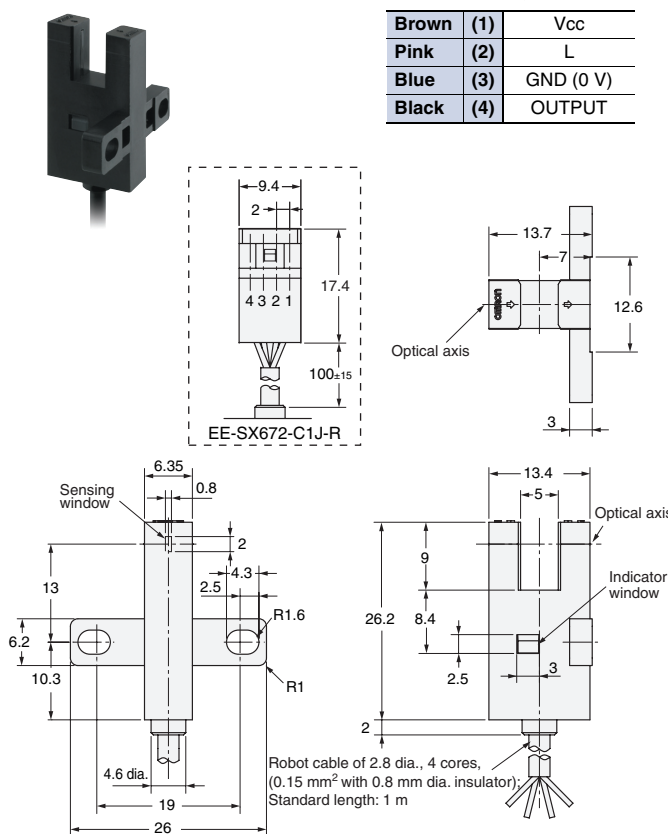
| | | |
|-------|-----|-----------|
| Brown | (1) | Vcc |
| Pink | (2) | L |
| Blue | (3) | GND (0 V) |
| Black | (4) | OUTPUT |



EE-SX672-WR/672P-WR EE-SX672-C1J-R/672P-C1J-R

Terminal Arrangement

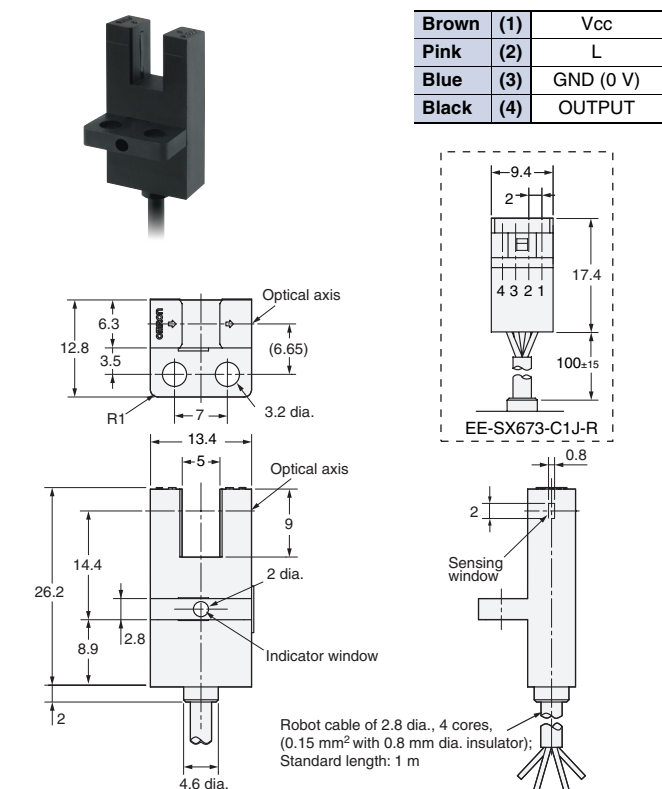
| | | |
|-------|-----|-----------|
| Brown | (1) | Vcc |
| Pink | (2) | L |
| Blue | (3) | GND (0 V) |
| Black | (4) | OUTPUT |



EE-SX673-WR/673P-WR EE-SX673-C1J-R/673P-C1J-R

Terminal Arrangement

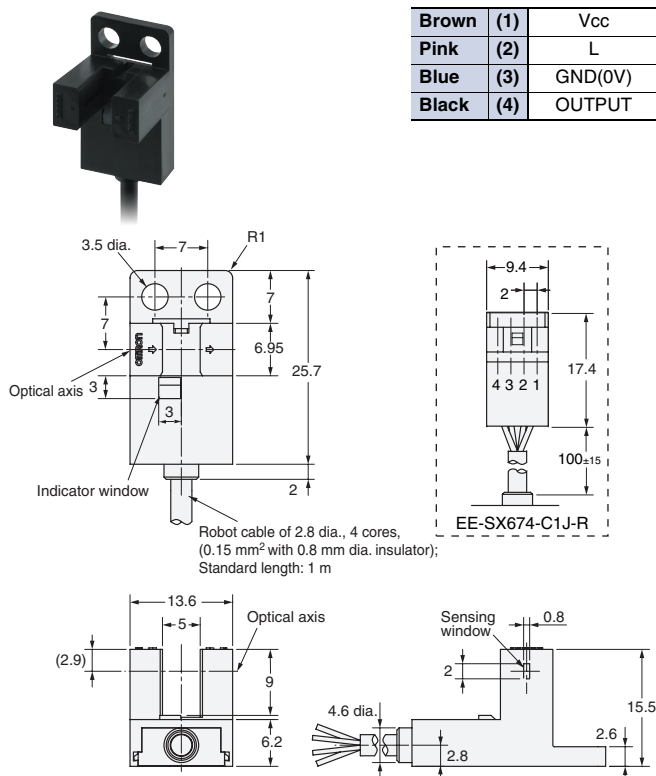
| | | |
|-------|-----|-----------|
| Brown | (1) | Vcc |
| Pink | (2) | L |
| Blue | (3) | GND (0 V) |
| Black | (4) | OUTPUT |



EE-SX674-WR/674P-WR EE-SX674-C1J-R/674P-C1J-R

Terminal Arrangement

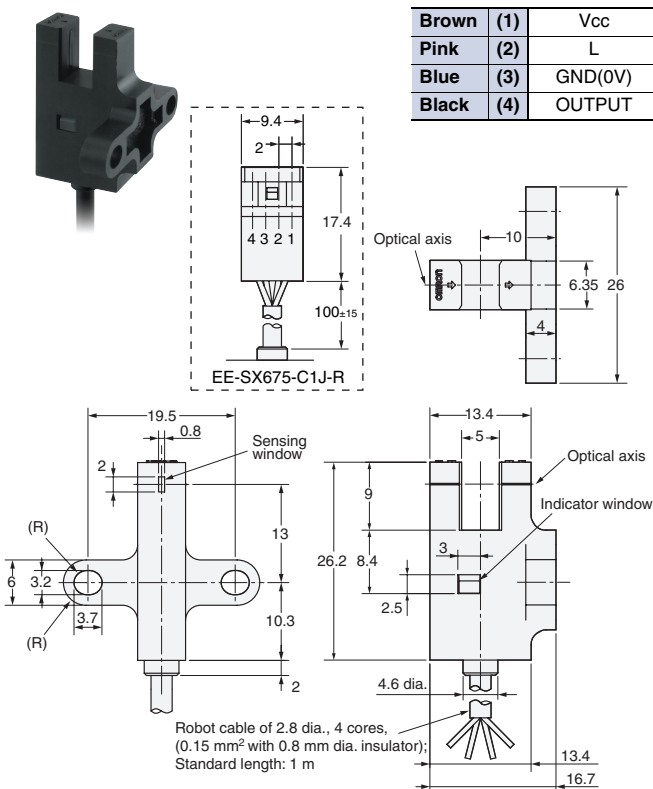
| | | |
|-------|-----|---------|
| Brown | (1) | Vcc |
| Pink | (2) | L |
| Blue | (3) | GND(0V) |
| Black | (4) | OUTPUT |



EE-SX675-WR/675P-WR EE-SX675-C1J-R/675P-C1J-R

Terminal Arrangement

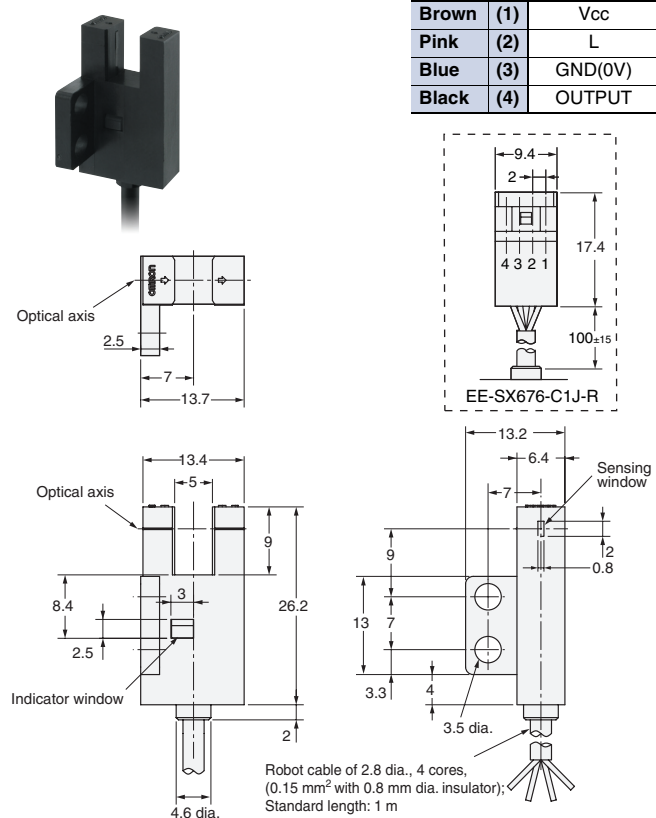
| | | |
|-------|-----|---------|
| Brown | (1) | Vcc |
| Pink | (2) | L |
| Blue | (3) | GND(0V) |
| Black | (4) | OUTPUT |



EE-SX676-WR/676P-WR EE-SX676-C1J-R/676P-C1J-R

Terminal Arrangement

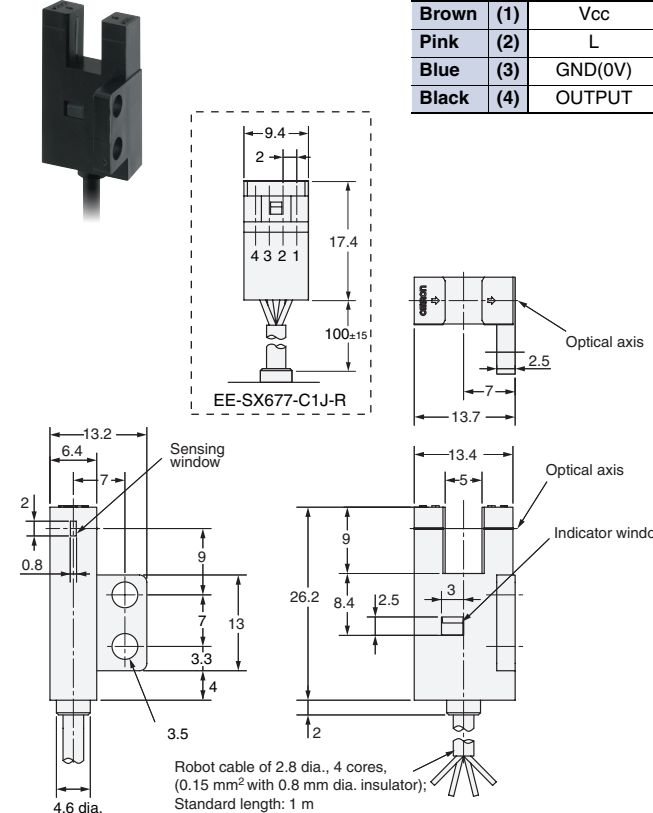
| | | |
|-------|-----|---------|
| Brown | (1) | Vcc |
| Pink | (2) | L |
| Blue | (3) | GND(0V) |
| Black | (4) | OUTPUT |



EE-SX677-WR/677P-WR EE-SX677-C1J-R/677P-C1J-R

Terminal Arrangement

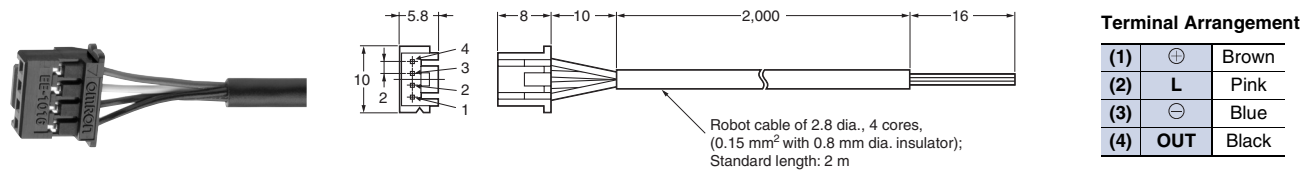
| | | |
|-------|-----|---------|
| Brown | (1) | Vcc |
| Pink | (2) | L |
| Blue | (3) | GND(0V) |
| Black | (4) | OUTPUT |



Accessories (Order Separately)

Connector for the EE-SX67 with Junction Connector

EE-1016-R-1



* Refer to *Accessories* for details.

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