

## Pre-wired Models

 Infrared light

| Appearance                                                                                                       | Sensing method                | Sensing distance                                                                  |                   | Output configuration                       | Indicator mode | Connecting method     | Model          |                 |
|------------------------------------------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------|-------------------|--------------------------------------------|----------------|-----------------------|----------------|-----------------|
|                                                                                                                  |                               |                                                                                   |                   |                                            |                |                       | NPN output     | PNP output      |
| Standard<br>                    | Through-beam type (with slot) |  | 5 mm (slot width) | Dark-ON/<br>Light-ON (selectable)<br>*1 *2 | Incident light | Pre-wired Models (1m) | EE-SX670-WR 1M | EE-SX670P-WR 1M |
| L-shaped<br>                    |                               |                                                                                   |                   |                                            |                |                       | EE-SX671-WR 1M | EE-SX671P-WR 1M |
| T-shaped, slot center 7 mm<br>  |                               |                                                                                   |                   |                                            |                |                       | EE-SX672-WR 1M | EE-SX672P-WR 1M |
| Close-mounting<br>              |                               |                                                                                   |                   |                                            |                |                       | EE-SX673-WR 1M | EE-SX673P-WR 1M |
| Close-mounting<br>              |                               |                                                                                   |                   |                                            |                |                       | EE-SX674-WR 1M | EE-SX674P-WR 1M |
| T-shaped, slot center 10 mm<br> |                               |                                                                                   |                   |                                            |                |                       | EE-SX675-WR 1M | EE-SX675P-WR 1M |
| F-shaped<br>                   |                               |                                                                                   |                   |                                            |                |                       | EE-SX676-WR 1M | EE-SX676P-WR 1M |
| R-shaped<br>                  |                               |                                                                                   |                   |                                            |                |                       | EE-SX677-WR 1M | EE-SX677P-WR 1M |

\*1. 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.

\*2. If you do not use the L terminal wire ((2) pink) when you use a Connector with Cable for an EE-1006 or EE-1010-series Photomicrosensor, noise may affect the Photomicrosensor. To prevent the effects of noise, cut the unused L terminal wire at the base of the connector and wrap it with insulating tape to prevent it from coming in contact with other terminals.

## 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 1M     |                                                                                                                                                    |
|                            |              | EE-1010 1M *   |                                                                                                                                                    |
|                            | 2 m          | EE-1006 2M     |                                                                                                                                                    |
|                            |              | EE-1010 2M *   |                                                                                                                                                    |
| Connector with Robot Cable | 1 m          | EE-1010-R 1M * |                                                                                                                                                    |
|                            | 2 m          | EE-1010-R 2M * |                                                                                                                                                    |
| Connector Hold-down Clip   |              | EE-1006A       | Applicable Photomicrosensors<br>For EE-SX670□ and 470□ only.<br>(Can be used only with EE-1006 Connectors for the Photomicrosensors listed above.) |

Note: For details, refer to the Photomicro Sensors Accessories on EE-□ which can be accessed from your OMRON website.

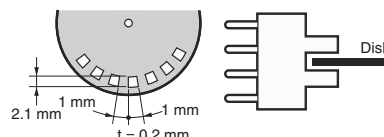
\* EE-1009- or EE-1010-series Connectors have a builtin locking mechanism to prevent cable disconnection when only the cable is pulled. To remove the Connector from the Sensor, grip the top and bottom of the Connector firmly and push into the Sensor once before pulling out. The locking mechanism prevents the Connector from being removed by pulling on the cable only and enables removal only when the Connector (housing) is pulled.

## Ratings and Specifications

| Type                      |                     | Standard                                                                                                                                                                                                                                                                                                                                                                     | L-shaped                          | T-shaped,<br>slot center<br>7 mm  | Close-mounting                    |                                   | T-shaped,<br>slot center<br>10 mm | F-shaped         | R-shaped         |
|---------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|------------------|------------------|
| NPN<br>models             | Connector<br>models | EE-SX670<br>EE-SX670A<br>EE-SX470                                                                                                                                                                                                                                                                                                                                            | EE-SX671<br>EE-SX671A<br>EE-SX471 | EE-SX672<br>EE-SX672A<br>EE-SX472 | EE-SX673<br>EE-SX673A<br>EE-SX473 | EE-SX674<br>EE-SX674A<br>EE-SX474 | EE-SX675                          | EE-SX676         | EE-SX677         |
|                           | Pre-wired<br>models | EE-SX670-<br>WR                                                                                                                                                                                                                                                                                                                                                              | EE-SX671-<br>WR                   | EE-SX672-<br>WR                   | EE-SX673-<br>WR                   | EE-SX674-<br>WR                   | EE-SX675-<br>WR                   | EE-SX676-<br>WR  | EE-SX677-<br>WR  |
| PNP<br>models             | Connector<br>models | EE-SX670P<br>EE-SX670R                                                                                                                                                                                                                                                                                                                                                       | EE-SX671P<br>EE-SX671R            | EE-SX672P<br>EE-SX672R            | EE-SX673P<br>EE-SX673R            | EE-SX674P<br>EE-SX674R            | EE-SX675P                         | EE-SX676P        | EE-SX677P        |
|                           | Pre-wired<br>models | EE-SX670P-<br>WR                                                                                                                                                                                                                                                                                                                                                             | EE-SX671P-<br>WR                  | EE-SX672P-<br>WR                  | EE-SX673P-<br>WR                  | EE-SX674P-<br>WR                  | EE-SX675P-<br>WR                  | EE-SX676P-<br>WR | EE-SX677P-<br>WR |
| Item                      |                     |                                                                                                                                                                                                                                                                                                                                                                              |                                   |                                   |                                   |                                   |                                   |                  |                  |
| Sensing distance          |                     | 5 mm (slot width)                                                                                                                                                                                                                                                                                                                                                            |                                   |                                   |                                   |                                   |                                   |                  |                  |
| Sensing object            |                     | Opaque: 2 × 0.8 mm min.                                                                                                                                                                                                                                                                                                                                                      |                                   |                                   |                                   |                                   |                                   |                  |                  |
| Differential distance     |                     | 0.025 mm                                                                                                                                                                                                                                                                                                                                                                     |                                   |                                   |                                   |                                   |                                   |                  |                  |
| Light source              |                     | 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       |                     | 12 mA max. (Connector models, L terminal open), 35 mA max. (NPN pre-wired models), 30 mA max. (PNP pre-wired models)                                                                                                                                                                                                                                                         |                                   |                                   |                                   |                                   |                                   |                  |                  |
| Control output            |                     | NPN open collector: 5 to 24 VDC, 100 mA max.<br>100 mA load current with a residual voltage of 0.8 V max.<br>40 mA load current with a residual voltage of 0.4 V max.<br>OFF current (leakage current): 0.5 mA max.<br>PNP open collector: 5 to 24 VDC, 50 mA max.<br>50 mA load current with a residual voltage of 1.3 V max.<br>OFF current (leakage current): 0.5 mA max. |                                   |                                   |                                   |                                   |                                   |                  |                  |
| Protection circuits       |                     | Load short circuit protection (Connector models), No circuit protection (Pre-wired models)                                                                                                                                                                                                                                                                                   |                                   |                                   |                                   |                                   |                                   |                  |                  |
| 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 <sup>2</sup> )<br>1.5-mm double amplitude for 2 h (4-min periods) each in X, Y, and Z directions                                                                                                                                                                                                                     |                                   |                                   |                                   |                                   |                                   |                  |                  |
| Shock resistance          |                     | Destruction: 500 m/s <sup>2</sup> 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),<br>Models with Connectors (Standard cable length: 0.1 m)                                                                                                                                                                                                                        |                                   |                                   |                                   |                                   |                                   |                  |                  |
| Wei-<br>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   |
| Ma-<br>teri-<br>al        | Case                | Polybutylene phthalate (PBT)                                                                                                                                                                                                                                                                                                                                                 |                                   |                                   |                                   |                                   |                                   |                  |                  |
|                           | Cover               | Polycarbonate                                                                                                                                                                                                                                                                                                                                                                |                                   |                                   |                                   |                                   |                                   |                  |                  |
|                           | Emitter/receiver    |                                                                                                                                                                                                                                                                                                                                                                              |                                   |                                   |                                   |                                   |                                   |                  |                  |

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

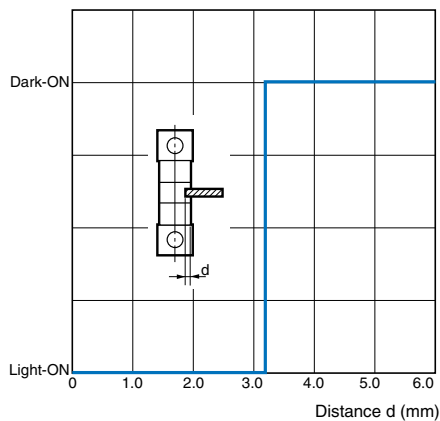
\*2. The response frequency was measured by detecting the rotating disk shown at the right.



## Engineering Data (Reference Value)

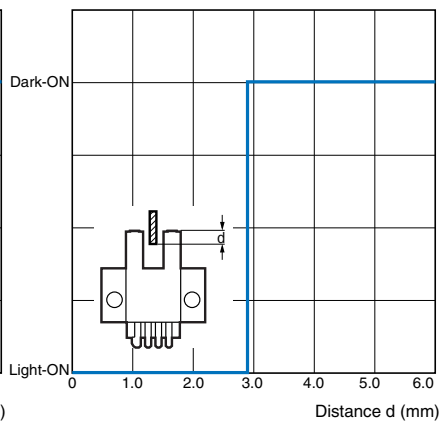
## Sensing Position Characteristics

EE-SX47□/67□



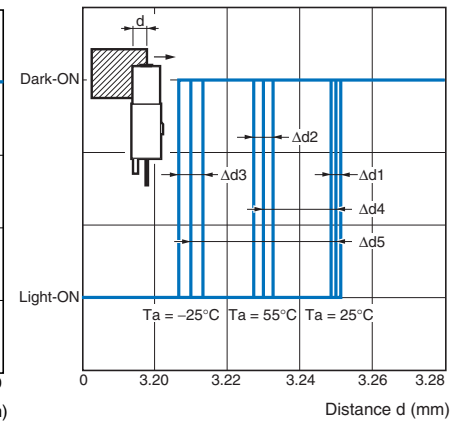
## Sensing Position Characteristics

EE-SX47□/67□



## Repeated Sensing Position Characteristics

EE-SX47□/67□



$V_{CC} = 12\text{ V}$ , No. of repetitions: 20,  $\Delta d_1 = 0.002\text{ mm}$ ,  $\Delta d_2 = 0.004\text{ mm}$ ,  $\Delta d_3 = 0.005\text{ mm}$ ,  $\Delta d_4 = 0.02\text{ mm}$ ,  $\Delta d_5 = 0.04\text{ mm}$

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□<br>EE-SX67□-WR                                       | Light-ON             | Incident Interrupted<br>Light indicator (red) ON<br>Output transistor ON<br>Load Operates (e.g., relay) Releases   | Short-circuited between<br>① terminal and positive ⊕ terminal | <b>EE-SX67□<br/>EE-SX67□A</b><br> |
|                                                               | Dark-ON              | Incident Interrupted<br>Light indicator (red) OFF<br>Output transistor OFF<br>Load Operates (e.g., relay) Releases | Open between<br>① terminal and positive ⊕ terminal<br>*1 *2   |                                   |
| EE-SX670A<br>EE-SX671A<br>EE-SX672A<br>EE-SX673A<br>EE-SX674A | Light-ON             | Incident Interrupted<br>Light indicator (red) ON<br>Output transistor ON<br>Load Operates (e.g., relay) Releases   | Short-circuited between<br>① terminal and positive ⊕ terminal | <b>EE-SX67□-WR</b><br>            |
|                                                               | Dark-ON              | Incident Interrupted<br>Light indicator (red) OFF<br>Output transistor ON<br>Load Operates (e.g., relay) Releases  | Open between<br>① terminal and positive ⊕ terminal<br>*1 *2   |                                   |
| EE-SX470<br>EE-SX471<br>EE-SX472<br>EE-SX473<br>EE-SX474      | Light-ON             | Incident Interrupted<br>Light indicator (red) OFF<br>Output transistor ON<br>Load Operates (relay) Releases        | ---                                                           |                                   |

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

\*2. If you do not use the L terminal wire ((2) pink) when you use a Connector with Cable for an EE-1006 or EE-1010-series Photomicrosensor, noise may affect the Photomicrosensor. To prevent the effects of noise, cut the unused L terminal wire at the base of the connector and wrap it with insulating tape to prevent it from coming in contact with other terminals.

## PNP Output

| Model                                                         | Output configuration | Timing charts                                                                                                            | Terminal connections                                          | Output circuit                                                                         |
|---------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------|
| EE-SX67□P<br>EE-SX67□P-WR                                     | Light-ON             | Incident Interrupted<br>Light indicator (red) ON OFF<br>Output transistor ON OFF<br>Load (relay) Operates Releases       | Short-circuited between<br>Ⓛ terminal and positive ⊕ terminal | <p>*The terminal arrangement depends on the model. Check the dimensional diagrams.</p> |
|                                                               | Dark-ON              | Incident Interrupted<br>Light indicator (red) ON OFF<br>Output transistor ON OFF<br>Load (relay) Operates Releases       | Open between<br>Ⓛ terminal and positive ⊕ terminal<br>*1 *2   |                                                                                        |
| EE-SX670R<br>EE-SX671R<br>EE-SX672R<br>EE-SX673R<br>EE-SX674R | Light-ON             | Incident Interrupted<br>Light indicator (red) ON OFF<br>Output transistor ON OFF<br>Load (e.g., relay) Operates Releases | Short-circuited between<br>Ⓛ terminal and positive ⊕ terminal | <p>*The terminal arrangement depends on the model. Check the dimensional diagrams.</p> |
|                                                               | Dark-ON              | Incident Interrupted<br>Light indicator (red) ON OFF<br>Output transistor ON OFF<br>Load (e.g., relay) Operates Releases | Open between<br>Ⓛ terminal and positive ⊕ terminal<br>*1 *2   |                                                                                        |

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

\*2. If you do not use the L terminal wire ((2) pink) when you use a Connector with Cable for an EE-1006 or EE-1010-series Photomicrosensor, noise may affect the Photomicrosensor. To prevent the effects of noise, cut the unused L terminal wire at the base of the connector and wrap it with insulating tape to prevent it from coming in contact with other terminals.

## Safety Precautions

Refer to *Warranty and Limitations of Liability*.

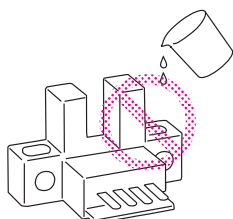
 **WARNING**

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. |

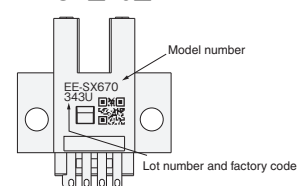
- The terminal base uses a polycarbonate resin, which could be deformed by excessive soldering heat, resulting in damage to the product's functionality.

## ● Lot Number and Model Number Legend

In the following diagrams, 343U indicates the lot number and factory where the product was manufactured. Do not include this code with the model number when ordering.

The QR code on connector models is used by OMRON only.

EE-SX□70□



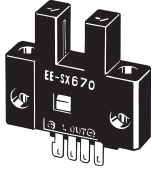
(Unit: mm)

## Dimensions

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

### Sensors

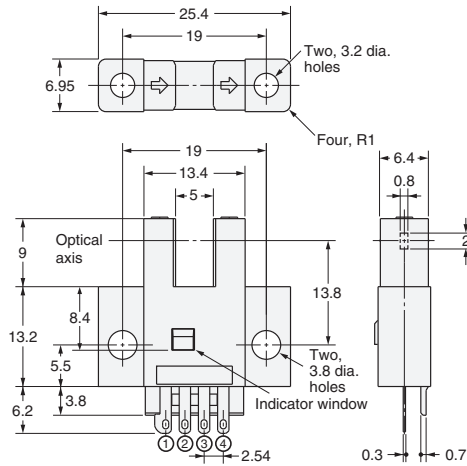
#### EE-SX670/670P EE-SX670A/670R EE-SX470



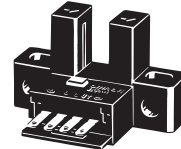
##### Terminal Arrangement

|     |     |           |
|-----|-----|-----------|
| (1) | ⊕   | Vcc       |
| (2) | L   | L*        |
| (3) | OUT | OUTPUT    |
| (4) | ⊖   | GND (0 V) |

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



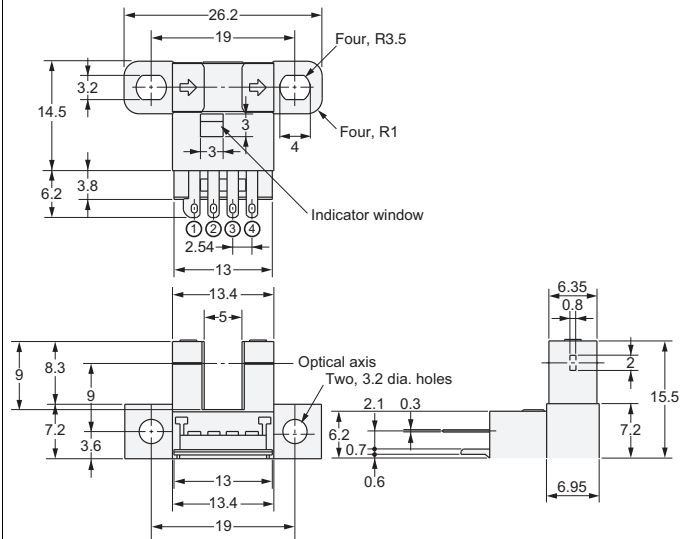
#### EE-SX671/671P EE-SX671A/671R EE-SX471



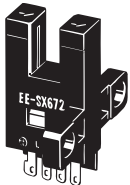
##### Terminal Arrangement

|     |     |           |
|-----|-----|-----------|
| (1) | ⊕   | Vcc       |
| (2) | L   | L*        |
| (3) | OUT | OUTPUT    |
| (4) | ⊖   | GND (0 V) |

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



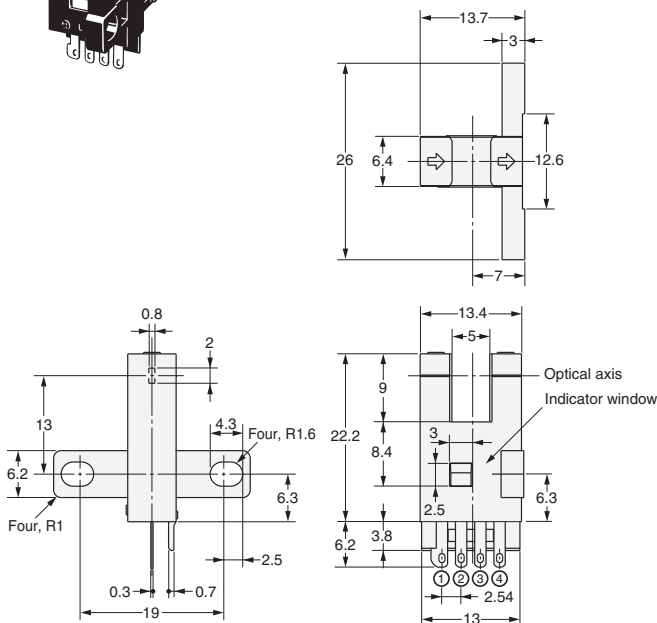
#### EE-SX672/672P EE-SX672A/672R EE-SX472



##### Terminal Arrangement

|     |     |           |
|-----|-----|-----------|
| (1) | ⊕   | Vcc       |
| (2) | L   | L*        |
| (3) | OUT | OUTPUT    |
| (4) | ⊖   | GND (0 V) |

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



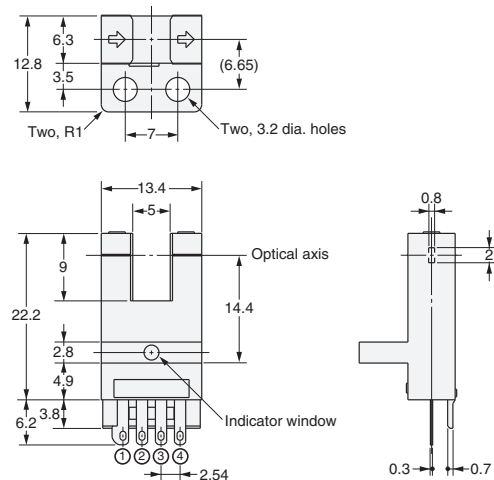
#### EE-SX673/673P EE-SX673A/673R EE-SX473



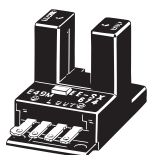
##### Terminal Arrangement

|     |     |           |
|-----|-----|-----------|
| (1) | ⊕   | Vcc       |
| (2) | L   | L*        |
| (3) | OUT | OUTPUT    |
| (4) | ⊖   | GND (0 V) |

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



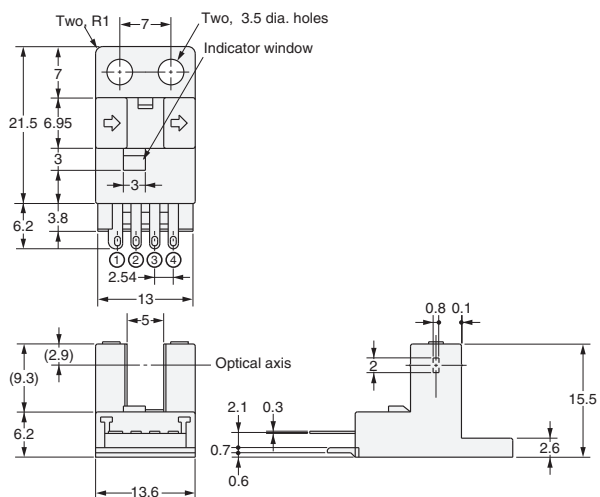
EE-SX674/674P  
EE-SX674A/674R  
EE-SX474



Terminal Arrangement

|     |     |           |
|-----|-----|-----------|
| (1) | ⊕   | Vcc       |
| (2) | L   | L*        |
| (3) | OUT | OUTPUT    |
| (4) | ⊖   | GND (0 V) |

\* Pin 2 is not used for the EE-SX474.

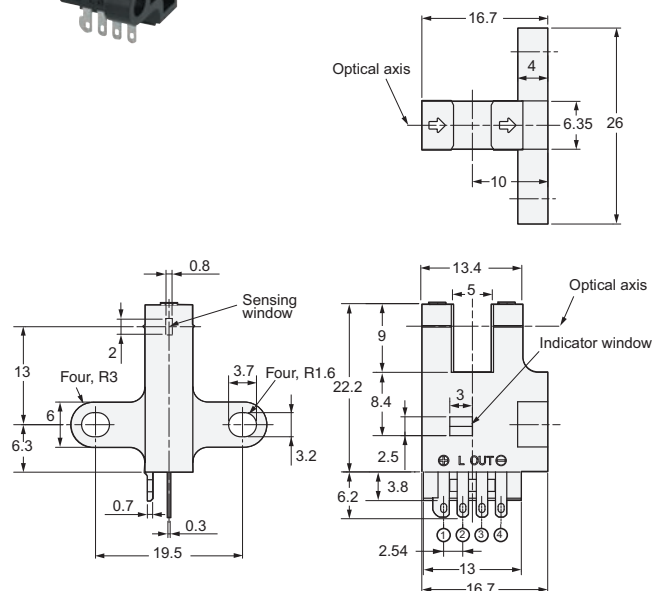


EE-SX675/675P



Terminal Arrangement

|     |     |           |
|-----|-----|-----------|
| (1) | ⊕   | Vcc       |
| (2) | L   | L         |
| (3) | OUT | OUTPUT    |
| (4) | ⊖   | GND (0 V) |

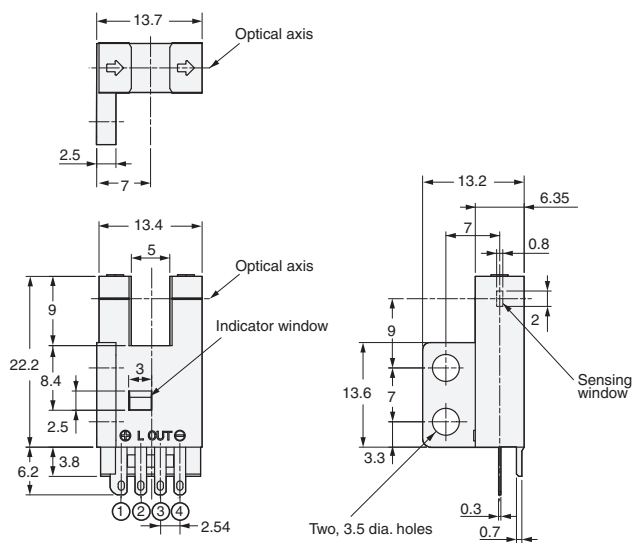


EE-SX676/676P



Terminal Arrangement

|     |     |           |
|-----|-----|-----------|
| (1) | ⊕   | Vcc       |
| (2) | L   | L         |
| (3) | OUT | OUTPUT    |
| (4) | ⊖   | GND (0 V) |

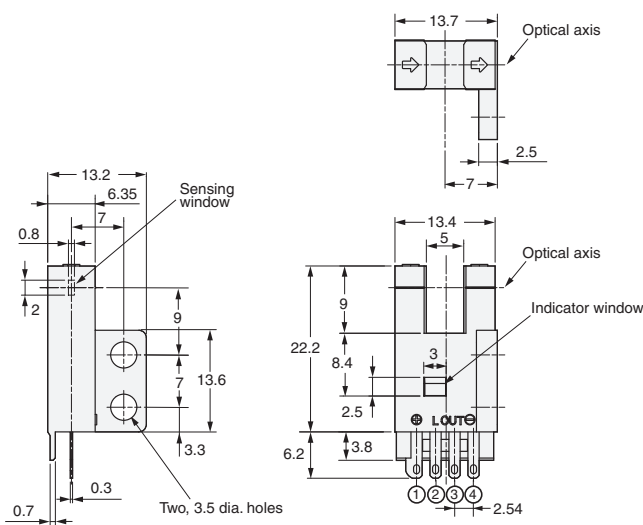


EE-SX677/677P



Terminal Arrangement

|     |     |           |
|-----|-----|-----------|
| (1) | ⊕   | Vcc       |
| (2) | L   | L         |
| (3) | OUT | OUTPUT    |
| (4) | ⊖   | GND (0 V) |

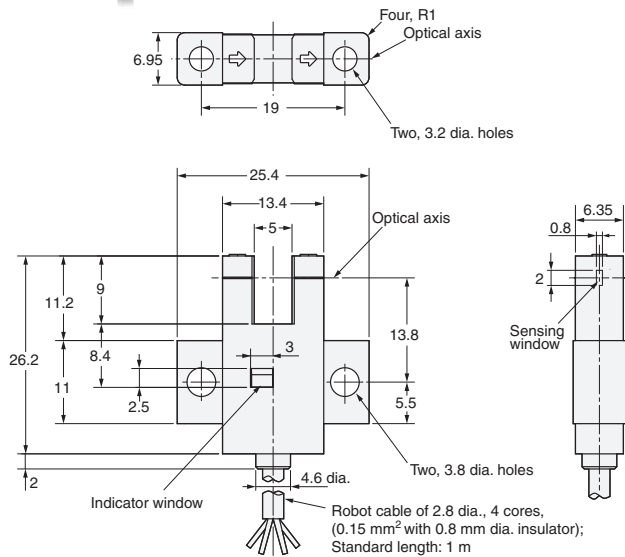


EE-SX670-WR/670P-WR



Terminal Arrangement

|       |           |
|-------|-----------|
| Brown | Vcc       |
| Pink  | L         |
| Blue  | GND (0 V) |
| Black | OUTPUT    |

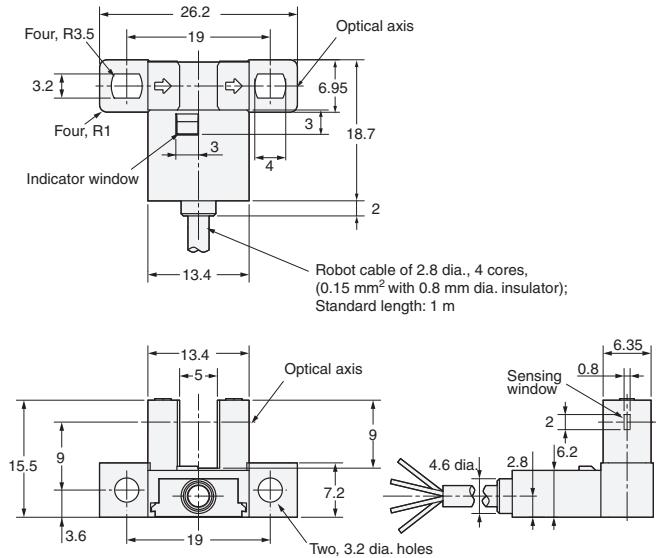


EE-SX671-WR/671P-WR



Terminal Arrangement

|       |           |
|-------|-----------|
| Brown | Vcc       |
| Pink  | L         |
| Blue  | GND (0 V) |
| Black | OUTPUT    |

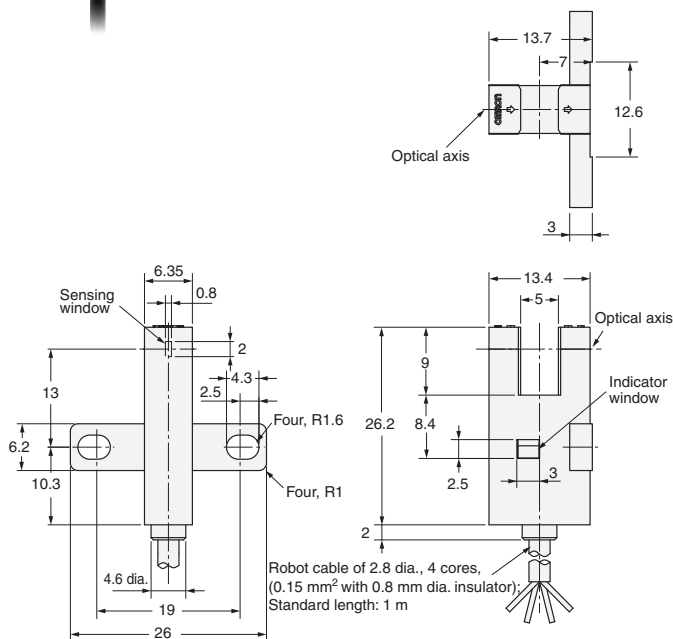


EE-SX672-WR/672P-WR



Terminal Arrangement

|       |           |
|-------|-----------|
| Brown | Vcc       |
| Pink  | L         |
| Blue  | GND (0 V) |
| Black | OUTPUT    |

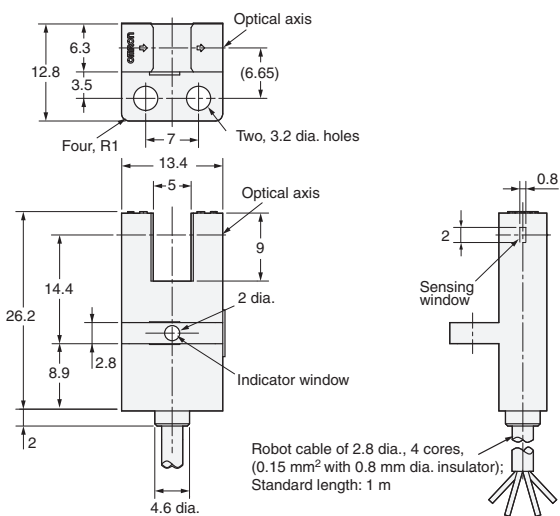


EE-SX673-WR/673P-WR



Terminal Arrangement

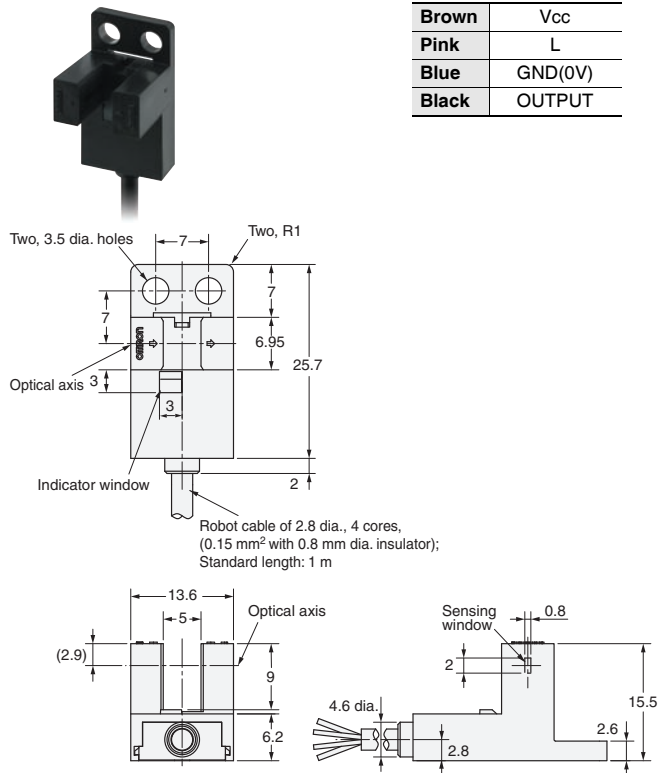
|       |           |
|-------|-----------|
| Brown | Vcc       |
| Pink  | L         |
| Blue  | GND (0 V) |
| Black | OUTPUT    |



EE-SX674-WR/674P-WR

Terminal Arrangement

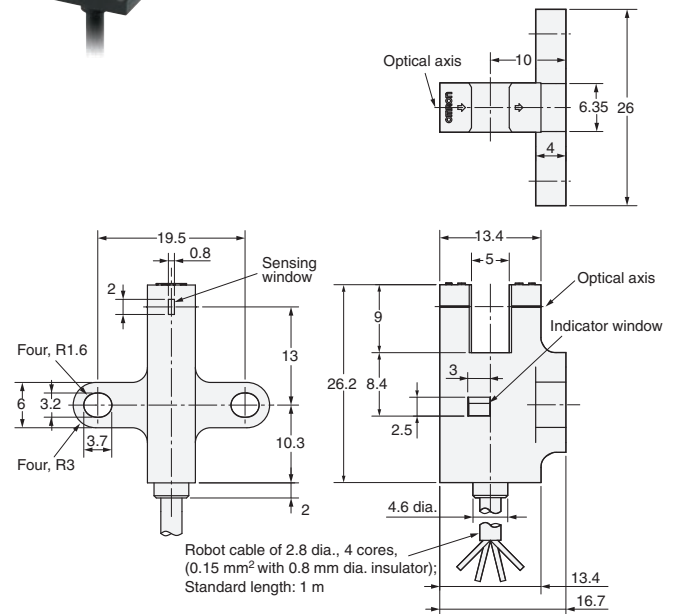
|       |         |
|-------|---------|
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| Pink  | L       |
| Blue  | GND(0V) |
| Black | OUTPUT  |



EE-SX675-WR/675P-WR

Terminal Arrangement

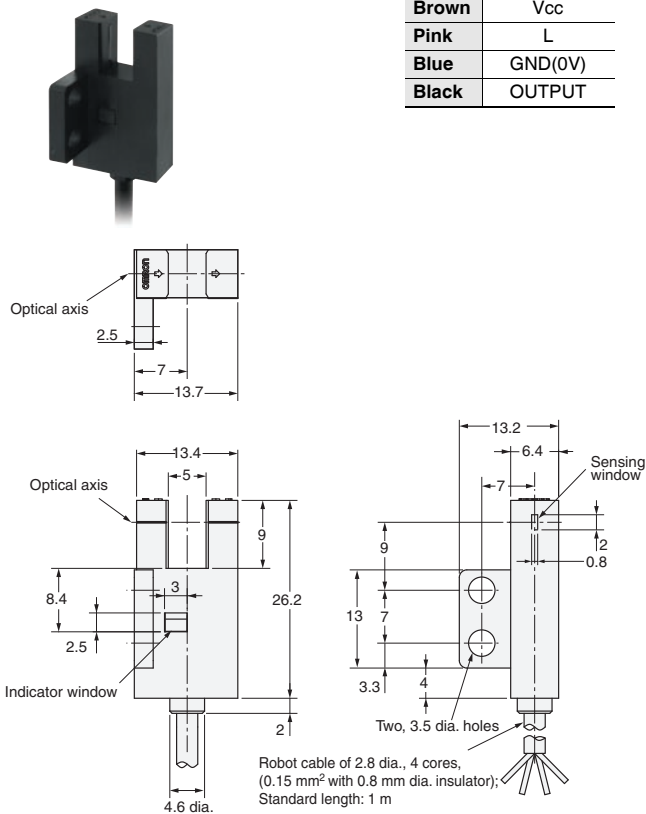
|       |         |
|-------|---------|
| Brown | Vcc     |
| Pink  | L       |
| Blue  | GND(0V) |
| Black | OUTPUT  |



EE-SX676-WR/676P-WR

Terminal Arrangement

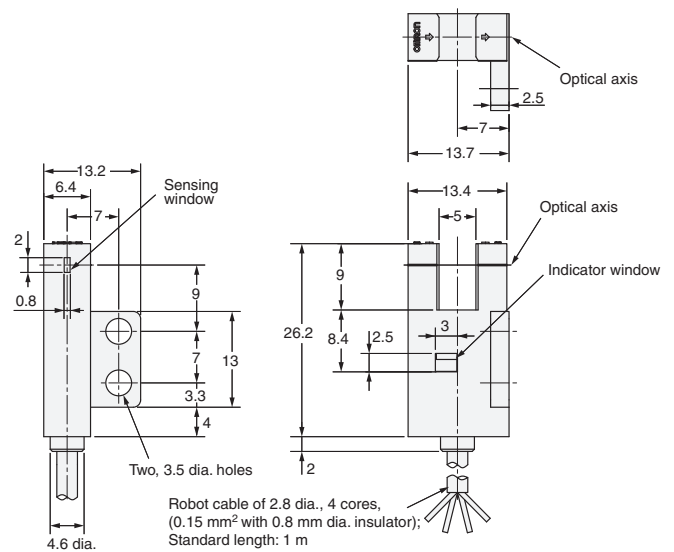
|       |         |
|-------|---------|
| Brown | Vcc     |
| Pink  | L       |
| Blue  | GND(0V) |
| Black | OUTPUT  |



EE-SX677-WR/677P-WR

Terminal Arrangement

|       |         |
|-------|---------|
| Brown | Vcc     |
| Pink  | L       |
| Blue  | GND(0V) |
| Black | OUTPUT  |



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