Slot-type Photomicrosensor (Non-modulated) *1

EE-SX47/67

CSM_EE-SX47_67_DS_E_3_1

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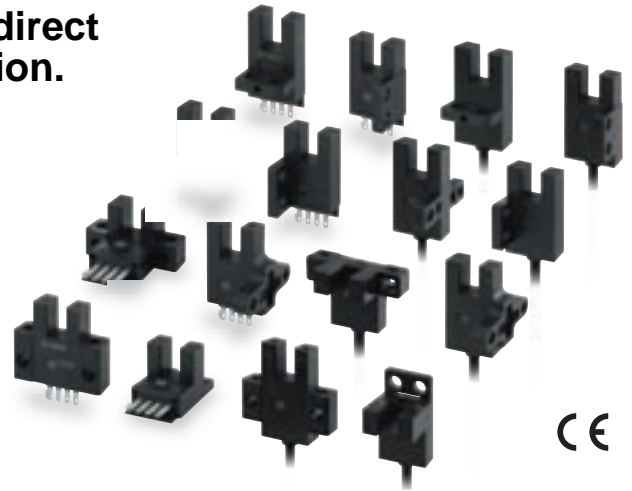
⚠ Be sure to read *Safety Precautions* on page 5.

*1. Pre-wired Models are available only in the EE-SX67 Series.
*2. Only for Pre-wired Models and Pre-wired Connector Models.

CE

Ordering Information

Connector

☐ Infrared light

Appearance		Sensing method	Connect-ing 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.

OMRON

1

Pre-wired Models, Models with Connectors

☐ Infrared light

Appearance		Sensing method	Sensing distance			Output configura-tion	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
								Models with connectors (0.1m)	EE-SX670-C1J-R 0.1M	EE-SX670P-C1J-R 0.1M
L-shaped								Pre-wired Models (1m)	EE-SX671-WR 1M	EE-SX671P-WR 1M
								Models with connectors (0.1m)	EE-SX671-C1J-R 0.1M	EE-SX671P-C1J-R 0.1M
T-shaped, slot center 7 mm								Pre-wired Models (1m)	EE-SX672-WR 1M	EE-SX672P-WR 1M
								Models with connectors (0.1m)	EE-SX672-C1J-R 0.1M	EE-SX672P-C1J-R 0.1M
Close-mounting								Pre-wired Models (1m)	EE-SX673-WR 1M	EE-SX673P-WR 1M
								Models with connectors (0.1m)	EE-SX673-C1J-R 0.1M	EE-SX673P-C1J-R 0.1M
Close-mounting								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
T-shaped, slot center 10 mm								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
F-shaped								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
R-shaped								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
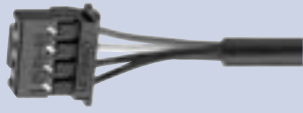
	Type	Standard	L-shaped	T-shaped, slot center 7 mm	Close-mounting		T-shaped, slot center 10 mm	F-shaped	R-shaped
NPN models	Connector models	EE-SX670 EE-SX670A EE-SX470	EE-SX671 EE-SX671A EE-SX471	EE-SX672 EE-SX672A EE-SX472	EE-SX673 EE-SX673A EE-SX473	EE-SX674 EE-SX674A EE-SX474	EE-SX675	EE-SX676	EE-SX677
	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)

Weight	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
Material	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.

2.1 mm 1 mm 1 mm t = 0.2 mm Disk
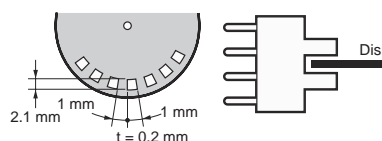
Connector for the EE-SX67 with Junction Connector

Product		Connector with Robot Cable
Model		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

Distance d (mm)

Sensing Position Characteristics

Distance d (mm)
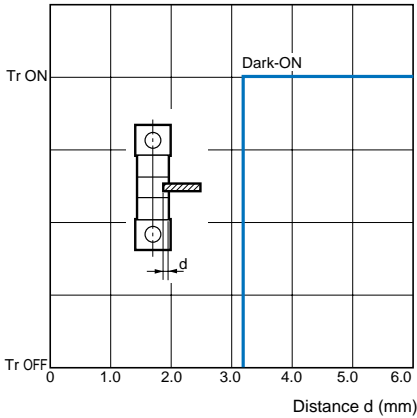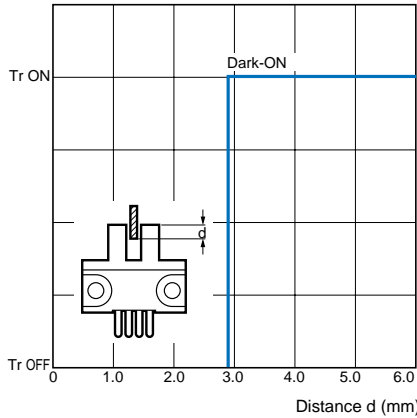
Repeated Sensing Position Characteristics

Distance d (mm)
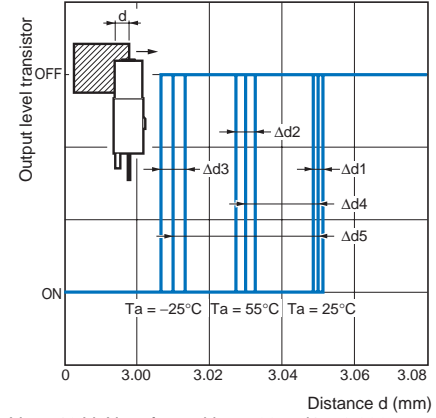
Vcc =12 V, No. of repetitions: 20, $\Delta d1$ = 0.002 mm, $\Delta d2$ = 0.004 mm, $\Delta d3$ = 0.005 mm, $\Delta d4$ = 0.02 mm, $\Delta d5$ = 0.04 mm

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		Short-circuited between ⓛ terminal and positive ⊕ terminal	
	Dark-ON		Open between ⓛ terminal and positive ⊕ terminal *1	
EE-SX670A EE-SX671A EE-SX672A EE-SX673A EE-SX674A	Light-ON		Short-circuited between ⓛ terminal and positive ⊕ terminal	
	Dark-ON		Open between ⓛ terminal and positive ⊕ terminal *1	
EE-SX470 EE-SX471 EE-SX472 EE-SX473 EE-SX474	Light-ON		---	

*The terminal arrangement depends on the model. Check the dimensional diagrams.

*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	Incident / Interrupted; Light indicator (red) ON/OFF; Output transistor ON/OFF; Load (relay) Operates/Releases	Short-circuited between Ⓛ terminal and positive ⊕ terminal	
	Dark-ON	Incident / Interrupted; Light indicator (red) ON/OFF; Output transistor ON/OFF; Load (relay) Operates/Releases	Open between Ⓛ terminal and positive ⊕ terminal *1	*The terminal arrangement depends on the model. Check the dimensional diagrams.
EE-SX670R EE-SX671R EE-SX672R EE-SX673R EE-SX674R	Light-ON	Incident / Interrupted; Light indicator (red) ON/OFF; Output transistor ON/OFF; Load (e.g., relay) Operates/Releases	Short-circuited between Ⓛ terminal and positive ⊕ terminal	
	Dark-ON	Incident / Interrupted; Light indicator (red) ON/OFF; Output transistor ON/OFF; Load (e.g., relay) Operates/Releases	Open between Ⓛ terminal and positive ⊕ terminal *1	
EE-SX470P EE-SX471P EE-SX472P EE-SX473P EE-SX474P	Light-ON	Incident / Interrupted; Light indicator (red) ON/OFF; Output transistor ON/OFF; Load (relay) Operates/Releases	---	

*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.
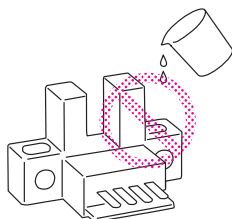
Precautions for Correct Use

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	Temper-ature	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.

EE-SX□70□

EE-SX670 ——— Model number

376d

Lot number and factory code
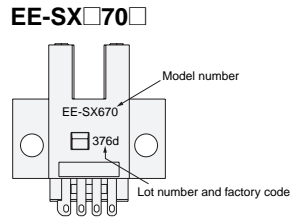
(Unit: mm)

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

* Pin 2 is not used for the EE-SX470.
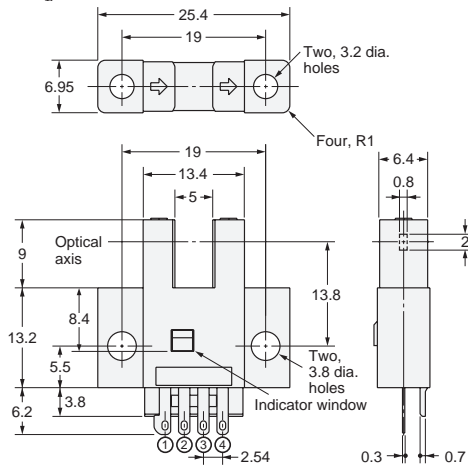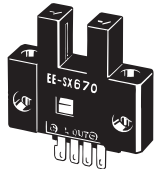
EE-SX671/671P
EE-SX671A/671R
EE-SX471/471P

Terminal Arrangement

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

* Pin 2 is not used for the EE-SX471.
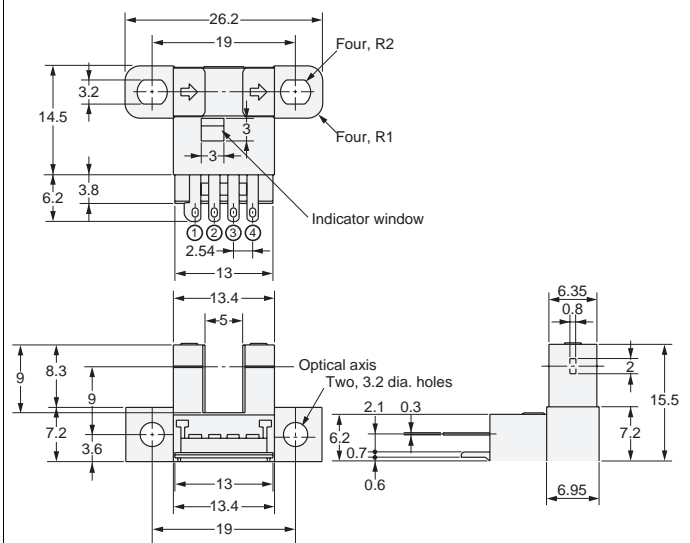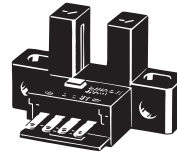
EE-SX672/672P
EE-SX672A/672R
EE-SX472/472P
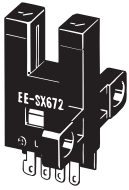
Terminal Arrangement

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

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

13.7
3
26
6.4
12.6
7

0.8
2
13
4.3 Four, R1.6
6.2
6.3
Four, R1
2.5
0.3 0.7
19

13.4
5
9
Optical axis
Indicator window
22.2
3
8.4
6.3
2.5
6.2
3.8
① ② ③ ④
2.54
13
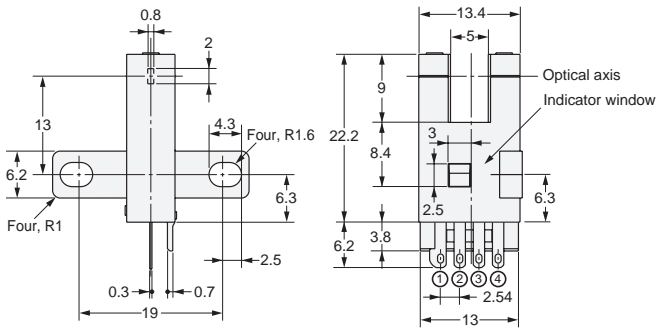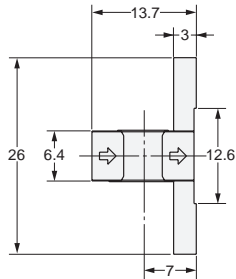
EE-SX673/673P
EE-SX673A/673R
EE-SX473/473P

Terminal Arrangement

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

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

6.3
12.8
3.5
(6.65)
Two, R1
7
Two, 3.2 dia. holes

13.4
5
9
Optical axis
22.2
14.4
2.8
4.9
6.2
3.8
Indicator window
① ② ③ ④
2.54

0.8
2
0.3 0.7

EE-SX674/674P
EE-SX674A/674R
EE-SX474/474P

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

Terminal Arrangement

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

EE-SX670-C1J-R

Robot cable of 2.8 dia., 4 cores,
(0.15 mm² with 0.8 mm dia. insulator);
Standard length: 1 m
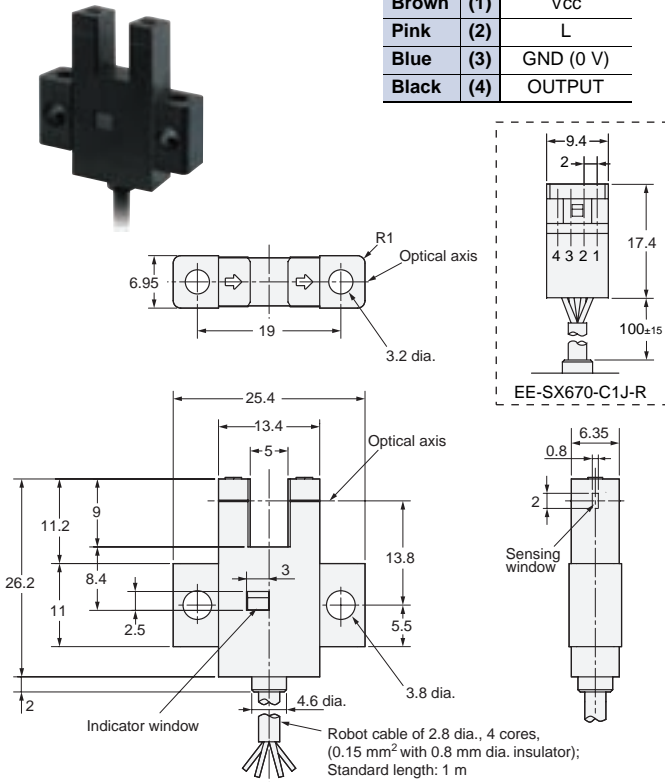
EE-SX671-WR/671P-WR
EE-SX671-C1J-R/671P-C1J-R

Terminal Arrangement

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

EE-SX671-C1J-R

Robot cable of 2.8 dia., 4 cores,
(0.15 mm² with 0.8 mm dia. insulator);
Standard length: 1 m
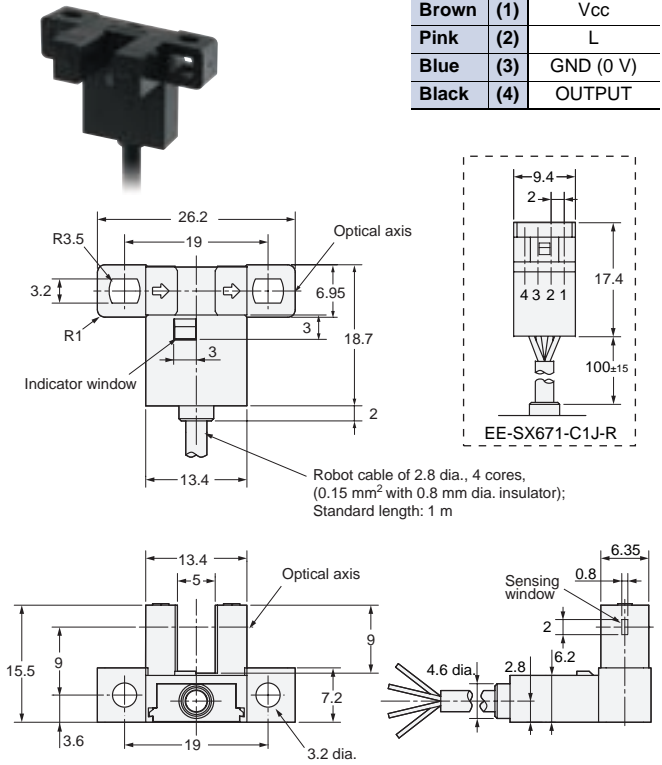
EE-SX672-WR/672P-WR
EE-SX672-C1J-R/672P-C1J-R

Terminal Arrangement

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

EE-SX672-C1J-R

Robot cable of 2.8 dia., 4 cores,
(0.15 mm² with 0.8 mm dia. insulator);
Standard length: 1 m
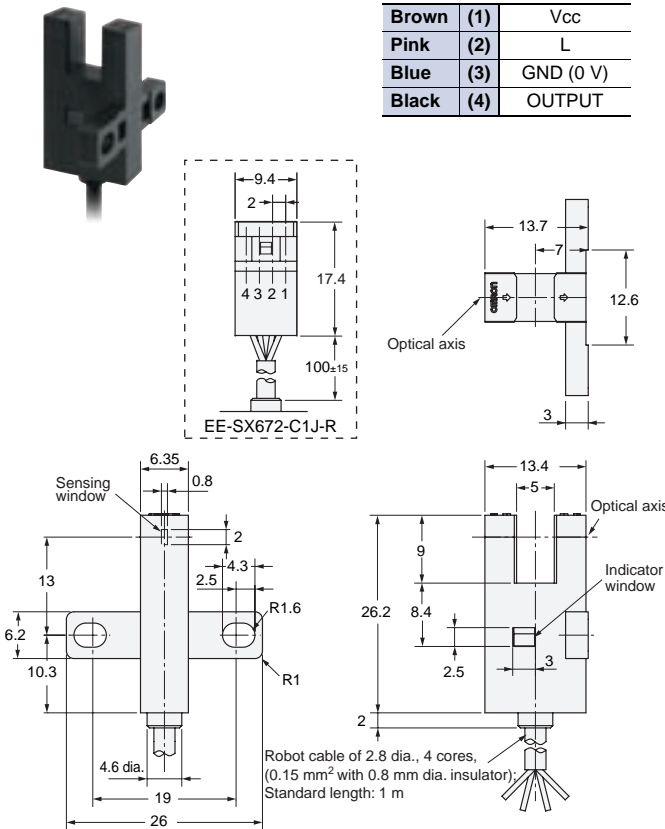
EE-SX673-WR/673P-WR
EE-SX673-C1J-R/673P-C1J-R

Terminal Arrangement

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

EE-SX673-C1J-R

Robot cable of 2.8 dia., 4 cores,
(0.15 mm² with 0.8 mm dia. insulator);
Standard length: 1 m

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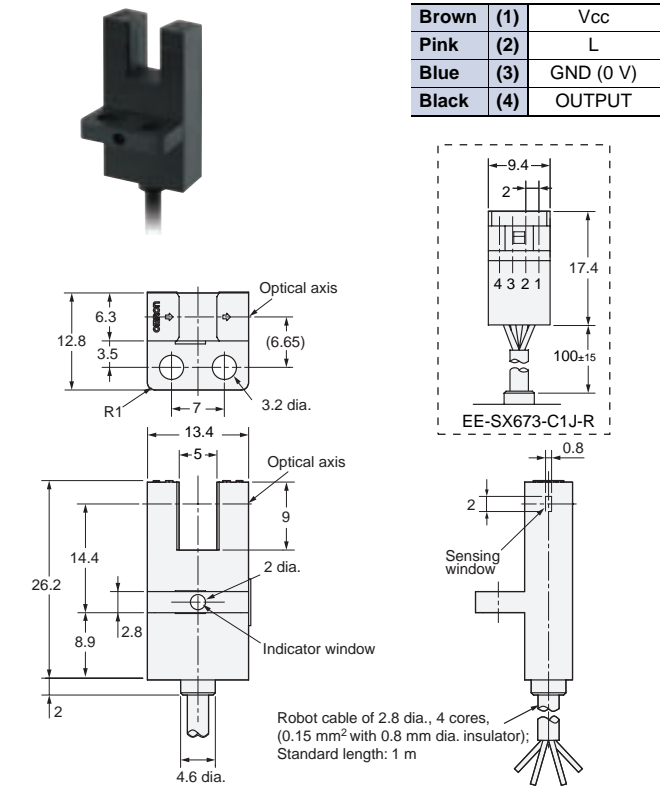
EE-SX674-WR/674P-WR
EE-SX674-C1J-R/674P-C1J-R

Terminal Arrangement

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

3.5 dia. 7 R1

7

7 6.95 25.7

Optical axis 3

3

Indicator window

2

Robot cable of 2.8 dia., 4 cores, (0.15 mm² with 0.8 mm dia. insulator); Standard length: 1 m

9.4
2
17.4
4 3 2 1
100±15

EE-SX674-C1J-R

13.6
5
Optical axis
(2.9)
9
6.2

Sensing window 0.8
2
4.6 dia.
2.8
2.6
15.5
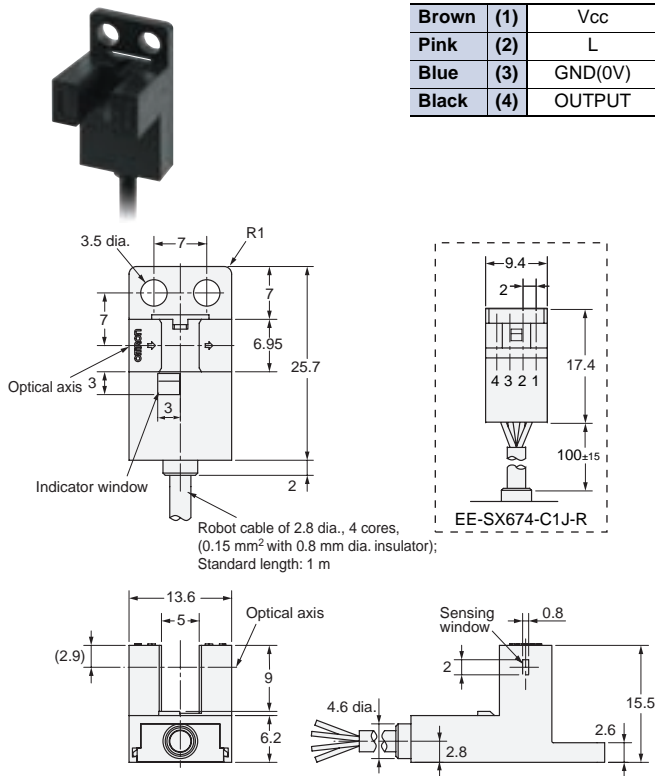
EE-SX675-WR/675P-WR
EE-SX675-C1J-R/675P-C1J-R

Terminal Arrangement

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

9.4
2
17.4
4 3 2 1
100±15

EE-SX675-C1J-R

Optical axis 10
6.35 26
4

19.5 0.8
Sensing window
2
(R)
6 3.2
3.7
(R)
13
10.3
2

13.4
5
Optical axis
9
Indicator window
26.2 8.4
3
2.5

Robot cable of 2.8 dia., 4 cores, (0.15 mm² with 0.8 mm dia. insulator); Standard length: 1 m

4.6 dia.
13.4
16.7
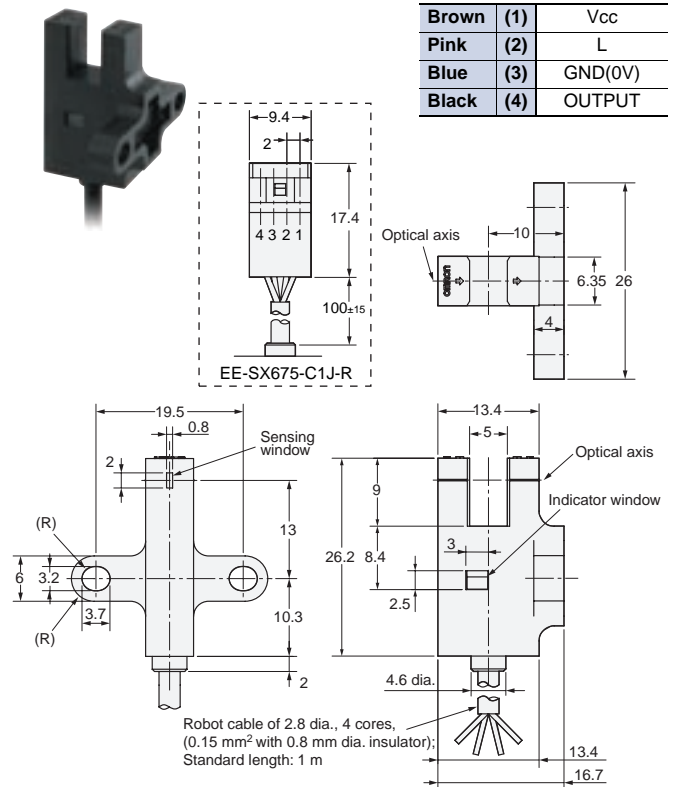
EE-SX676-WR/676P-WR
EE-SX676-C1J-R/676P-C1J-R

Terminal Arrangement

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

Optical axis
2.5
7
13.7

9.4
2
17.4
4 3 2 1
100±15

EE-SX676-C1J-R

13.4
5
Optical axis
9
8.4 3
2.5
26.2
Indicator window
2
4.6 dia.

13.2
6.4
7
Sensing window
9
13 7
3.3 4
3.5 dia.

2
0.8

Robot cable of 2.8 dia., 4 cores, (0.15 mm² with 0.8 mm dia. insulator); Standard length: 1 m
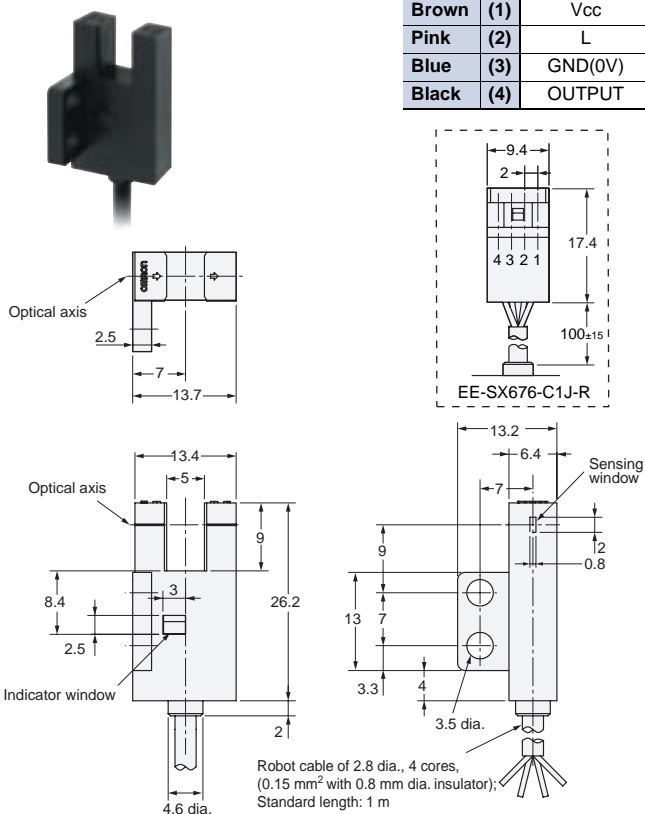
EE-SX677-WR/677P-WR
EE-SX677-C1J-R/677P-C1J-R

Terminal Arrangement

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

9.4
2
17.4
4 3 2 1
100±15

EE-SX677-C1J-R

Optical axis
2.5
7
13.7

13.2
6.4
7
Sensing window
2
0.8
9
13 7
3.3
4
3.5

13.4
5
Optical axis
9
Indicator window
26.2 8.4 2.5
3
2

Robot cable of 2.8 dia., 4 cores, (0.15 mm² with 0.8 mm dia. insulator); Standard length: 1 m

4.6 dia.
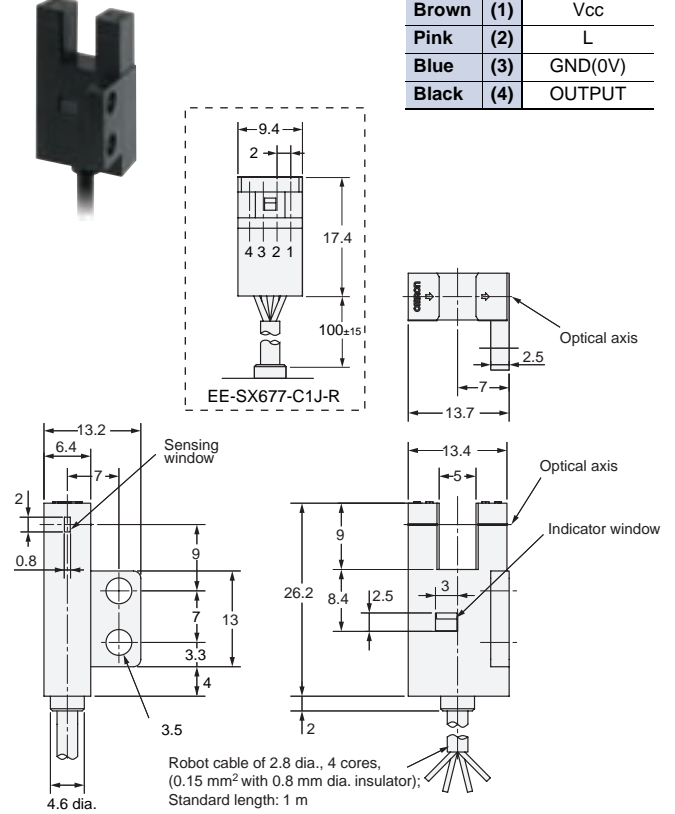
Accessories (Order Separately)
Connector for the EE-SX67 with Junction Connector

EE-1016-R-1

Robot cable of 2.8 dia., 4 cores,
(0.15 mm^2 with 0.8 mm dia. insulator);
Standard length: 2 m
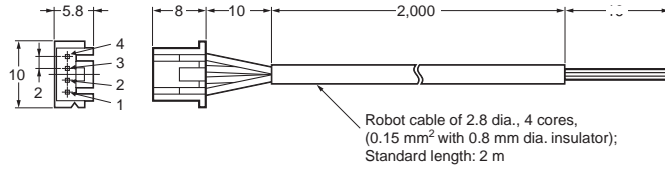
Terminal Arrangement

(1)	$\oplus$	Brown
(2)	**L**	Pink
(3)	$\ominus$	Blue
(4)	**OUT**	Black

* Refer to *Accessories* for details.