Slot-type Photomicrosensor

EE-SX97

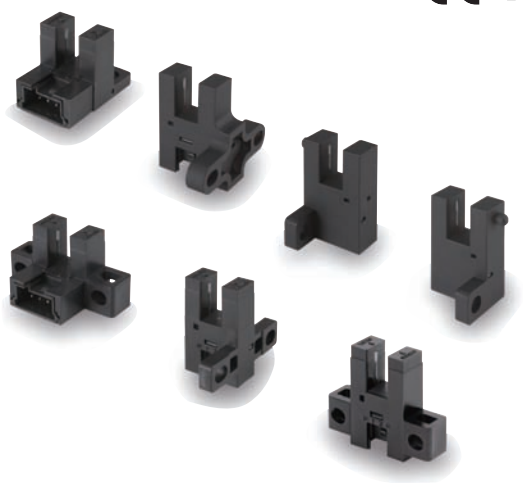
CSM_EE-SX97_DS_E_1_4

Built-in connector enables downsizing and easier connection. Protective circuit for safe operation.

- **A built-in connector minimizes the shape and dimensional requirements.**
- **Two outputs: light-ON and dark-ON.**
- **Complete lineup including seven different shapes.**
- **Safer operation with built-in power supply reverse polarity protection.**
- **Output overcurrent protection with a thermal shutdown circuit (patent pending).** *1
- **The indicator can be seen from many directions to enable installation in more locations.**
- **Connector with lock that mates with commercially available connectors.** *2

*1. Output overcurrent protection is provided only on output 2 (OUT2) on NPN models.
*2. Recommended connector:
J.S.T. Mfg. Co., Ltd. Contacts: SPHD-001T-P0.5, Housing: PAP-04V-S
Ask the manufacturer of the connector for details.

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

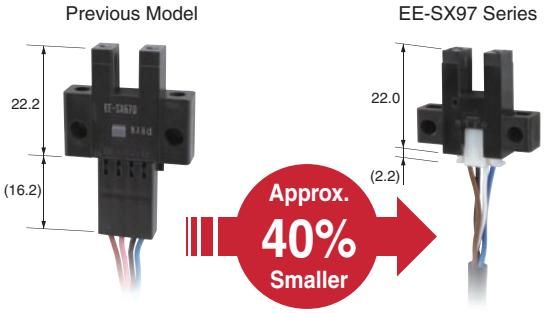


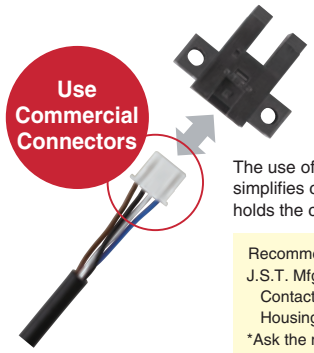
For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Features

Built-in Connector for Downsizing and Easier Connection

A built-in connector minimizes the shape and dimensional requirements. And wiring costs can be reduced by using commercially available connectors.



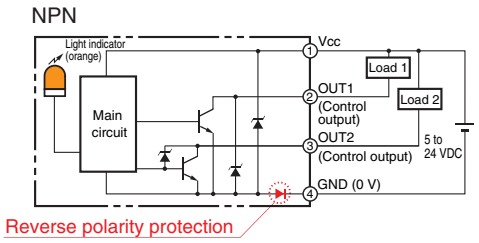


The use of a commercially available connector simplifies connections and the positive lock holds the connector in place.

Recommended Connector:
J.S.T. Mfg. Co., Ltd.
Contacts: SPHD-001T-P0.5,
Housing: PAP-04V-S
*Ask the manufacturer of the connector for details.

Safer Operation with Built-in Power Supply Reverse Polarity Protection

The built-in power supply reverse polarity protection protects against reverse connection of the power supply or outputs for safer operation at the assembly site.

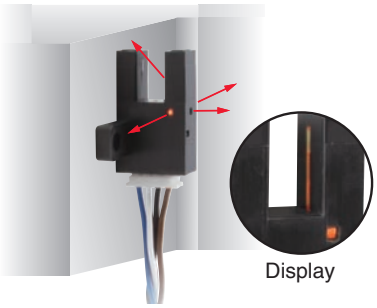


Built-in Thermal Shutdown Circuit

Control output 2 on models with NPN outputs is protected from output overcurrents by a built-in thermal shutdown circuit.

Easy-to-see Indicator

The indicator can be seen from up to four directions to enable installation in more locations.



Two Outputs: Light-ON and Dark-ON

All models provide both a light-ON and dark-ON output so that the output can be switched according to the application simply by changing the wiring.

Ordering Information

Sensors

Infrared light

Appearance	Sensing method	Connecting method	Sensing distance		Operating mode	Indicator mode	Model	
							NPN output	PNP output
Standard 	Through-beam type (with slot)	Connector model (4 poles)	Infrared light	5 mm (slot width)	Dark-ON/ Light-ON (2 outputs)	Incident light	**EE-SX970-C1**	**EE-SX970P-C1**
L-shaped 							**EE-SX971-C1**	**EE-SX971P-C1**
T-shaped, slot center 7 mm 							**EE-SX972-C1**	**EE-SX972P-C1**
Close-mounting 							**EE-SX974-C1**	**EE-SX974P-C1**
T-shaped, slot center 10 mm 							**EE-SX975-C1**	**EE-SX975P-C1**
F-shaped 							**EE-SX976-C1**	**EE-SX976P-C1**
R-shaped 							**EE-SX977-C1**	**EE-SX977P-C1**

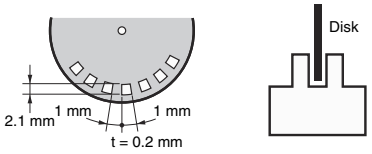
Accessories (Order Separately)

Type	Cable length	Model
Connector with Cable	1 m	**EE-1017 1M**
	3 m	**EE-1017 3M**
Connector with Robot Cable	1 m	**EE-1017-R 1M**
	3 m	**EE-1017-R 3M**

Ratings and Specifications

Item	Type	Standard	L-shaped	T-shaped, slot center 7 mm	Close-mounting	T-shaped, slot center 10 mm	F-shaped	R-shaped
	NPN	EE-SX970-C1	EE-SX971-C1	EE-SX972-C1	EE-SX974-C1	EE-SX975-C1	EE-SX976-C1	EE-SX977-C1
	PNP	EE-SX970P-C1	EE-SX971P-C1	EE-SX972P-C1	EE-SX974P-C1	EE-SX975P-C1	EE-SX976P-C1	EE-SX977P-C1
Sensing distance		5 mm (slot width)						
Sensing object		Opaque: 2 × 0.8 mm min.						
Differential distance		0.025 mm max. *1						
Light source (Peak wavelength)		Infrared LED with a peak wavelength of 940 nm						
Indicator		Light indicator (orange LED)						
Supply voltage		5 to 24 VDC ±10%, ripple (p-p): 10% max.						
Current consumption		21 mA max.						
Control output		Load power supply voltage: 5 to 24 VDC, Load current: 50 mA max., Off-state current : 0.5mA max, 50 mA load current with a residual voltage of 1.0 V max., 5 mA load current with a residual voltage of 0.4 V max.						
Protection circuit		Power supply reverse polarity protection; output reverse polarity protection; overcurrent protection (only OUT2 on models with NPN output)						
Response frequency		1 kHz min. (3 kHz average) *2						
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)		10 to 2,000 Hz 0.75-mm single amplitude (15-min periods, 10 cycles) each in X, Y, and Z directions						
Shock resistance (Destruction)		Destruction: 500 m/s^2 for 3 times each in X, Y, and Z directions						
Degree of protection		IEC 60529 IP50						
Connecting method		Connector						
Weight (Packed state)		Approx. 3 g						
Material	Case/Cover	Polybutylene terephthalate (PBT)						
	Emitter/receiver	Polycarbonate (PC)						

*1. The differential distance is the value when a sensing object is moved in a lateral direction to the slot.
*2. The response frequency was measured by detecting the following rotating disk.



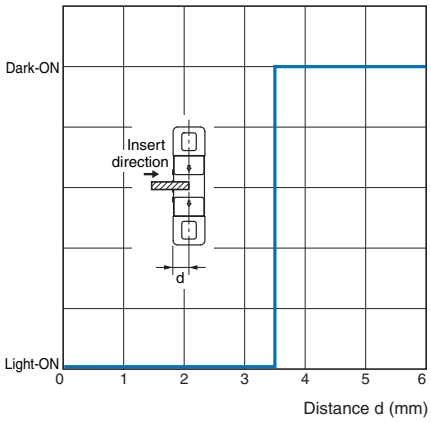
Connector

Item		Connector with Cable	Connector with Robot Cable
Product		Connector with Cable	Connector with Robot Cable
Model		EE-1017	EE-1017-R
Appearance			
Contact resistance		25 mΩ max. (at 10 mA DC and 20 mV max.)	
Insertion strength		20 N max.	
Surplus strength		1.5 N min.	
Cable length		1 m, 3 m	
Ambient temperature range		–10 to +60°C	
Materials	Housing	Nylon	
	Contact	Phosphor bronze	

Engineering Data (Reference Value)

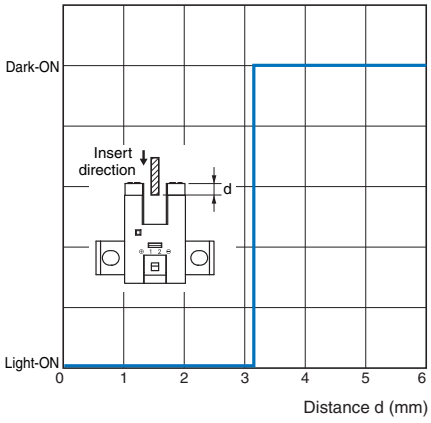
Sensing Position Characteristics

EE-SX970



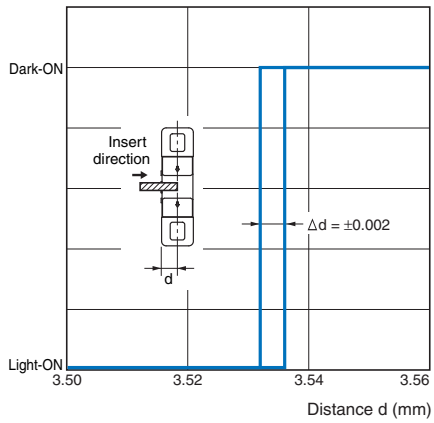
Sensing Position Characteristics

EE-SX970



Repeated Sensing Position Characteristics

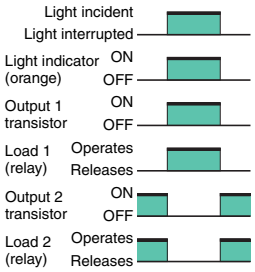
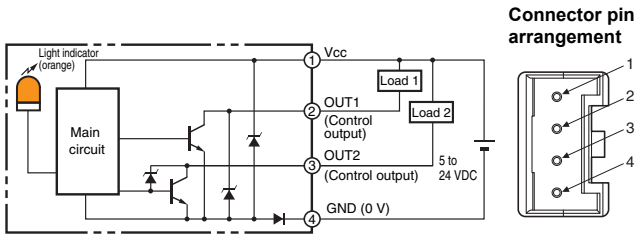
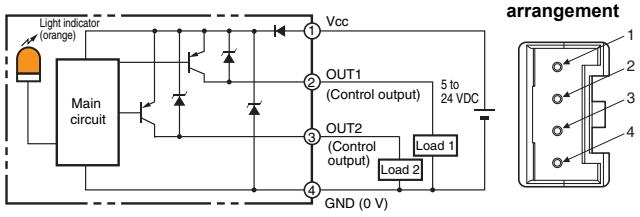
EE-SX970



Vcc = 24 V, No. of repetitions: 20, Ta = 25°C
Differential distance = 0.025 mm max.

Note: Data is provided for dark conditions. Light interference and the translucence of the sensing object can affect operation.

I/O Circuit Diagrams

Output configuration	Model	Output transistor operation status	Timing charts	Output circuit
NPN output	EE-SX970-C1 EE-SX971-C1 EE-SX972-C1 EE-SX974-C1 EE-SX975-C1 EE-SX976-C1 EE-SX977-C1	OUT1: Light-ON OUT2: Dark-ON		
PNP output	EE-SX970P-C1 EE-SX971P-C1 EE-SX972P-C1 EE-SX974P-C1 EE-SX975P-C1 EE-SX976P-C1 EE-SX977P-C1			

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

- Mount the Sensor with two M3 screws, using plain washers and spring washers to ensure the screws will not become loose. Use a tightening force of 0.54 N·m max.

● Wiring

Unused Output Lines

Be sure to isolate output lines that are not going to be used.

Wiring method

Connection is made using a connector. Do not solder to the pins (leads). The pins (leads) are soldered to the internal board of the Sensor. Therefore, direct soldering of the pins (leads) may result in an internal disconnection causing malfunction.

● Others

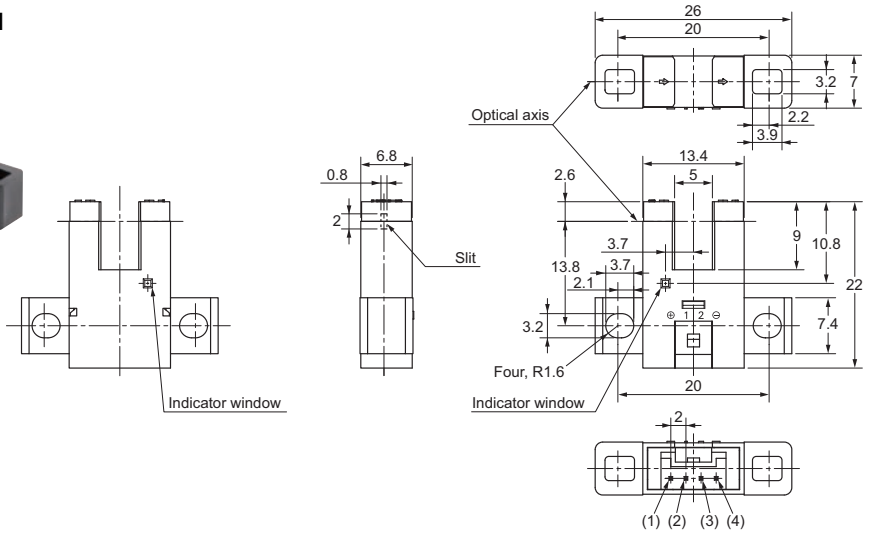
- The power cable connected to the Sensor must not be more than 10 m in length.
- Only output 2 (OUT2) on NPN models is provided with overcurrent protection.
  If an overcurrent occurs, heat generated by the output transistor will activate the thermal shutdown circuit and OUT2 will turn OFF. Check the wiring and load current and cycle the power supply. If there is no overcurrent, normal operation will be resumed. (The thermal shutdown circuit will be activated again if there is an overcurrent.)
  This function does not provide protection against load short circuits. If the electric power of the output transistor increases due to a load short-circuit or near load short-circuit, the Sensor may be damaged.
- An output pulse may occur when the power supply is turned ON depending on the power supply and other conditions. The operation of the Sensor will be stable 100 ms after turning ON the power supply.

Dimensions

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

Sensors

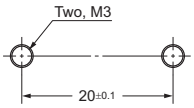
EE-SX970-C1
EE-SX970P-C1



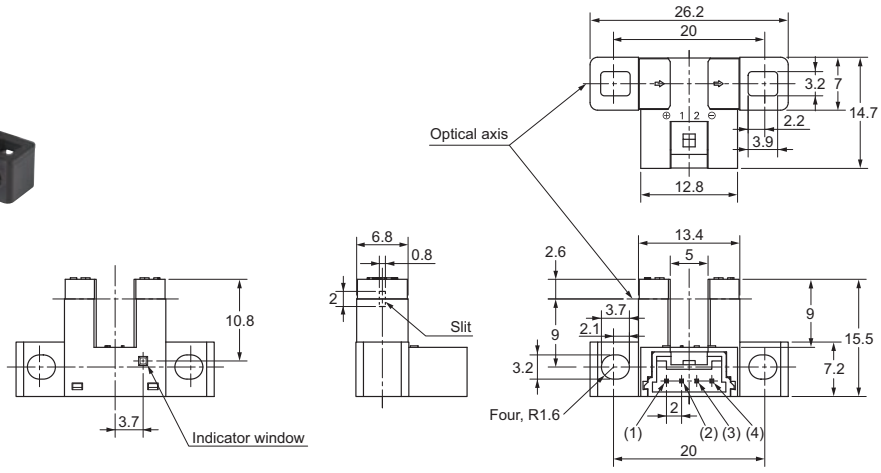
Terminal Arrangement

(1)	+	Vcc
(2)	1	OUTPUT1
(3)	2	OUTPUT2
(4)	–	GND (0 V)

Mounting screw holes



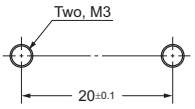
EE-SX971-C1
EE-SX971P-C1



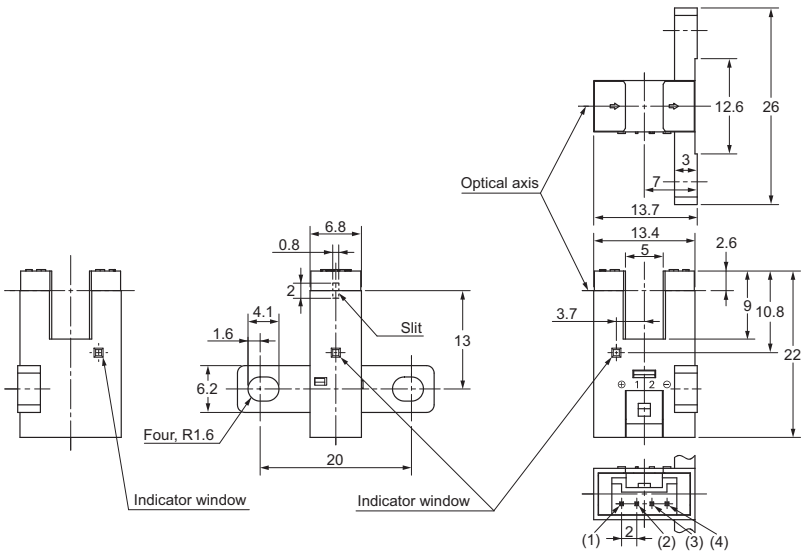
Terminal Arrangement

(1)	+	Vcc
(2)	1	OUTPUT1
(3)	2	OUTPUT2
(4)	–	GND (0 V)

Mounting screw holes



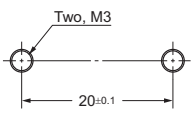
EE-SX972-C1
EE-SX972P-C1



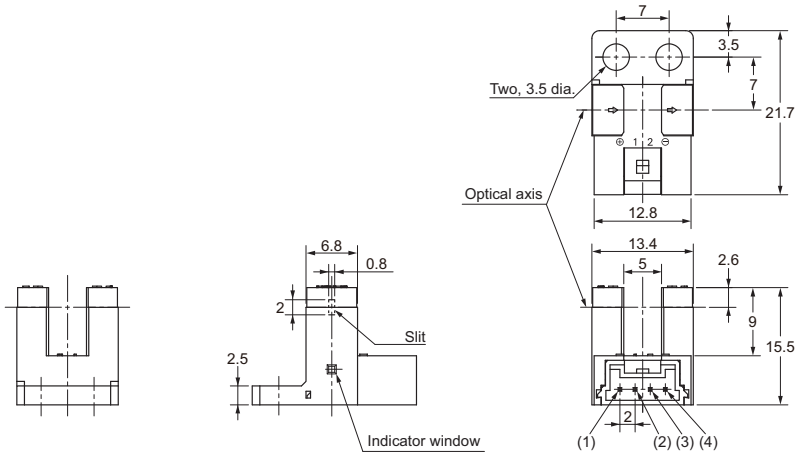
Terminal Arrangement

(1)	+	Vcc
(2)	1	OUTPUT1
(3)	2	OUTPUT2
(4)	–	GND (0 V)

Mounting screw holes



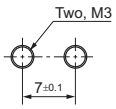
EE-SX974-C1
EE-SX974P-C1



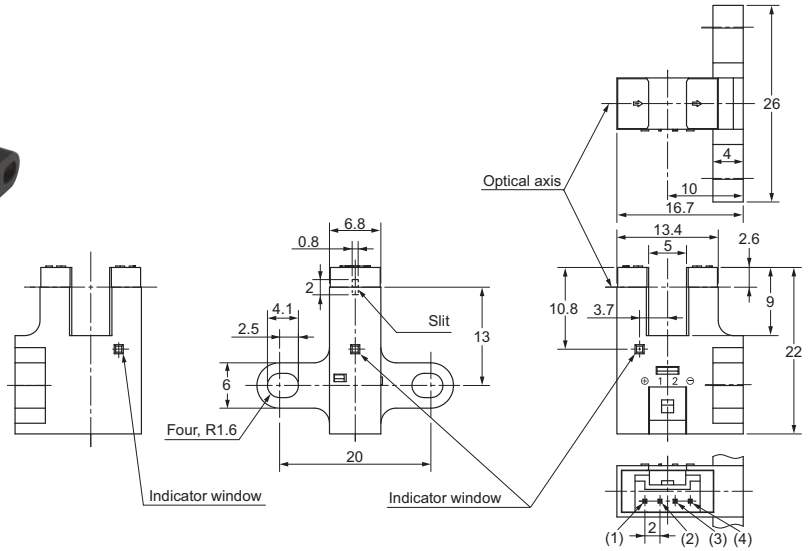
Terminal Arrangement

(1)	+	Vcc
(2)	1	OUTPUT1
(3)	2	OUTPUT2
(4)	–	GND (0 V)

Mounting screw holes



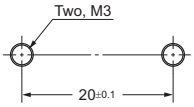
EE-SX975-C1
EE-SX975P-C1



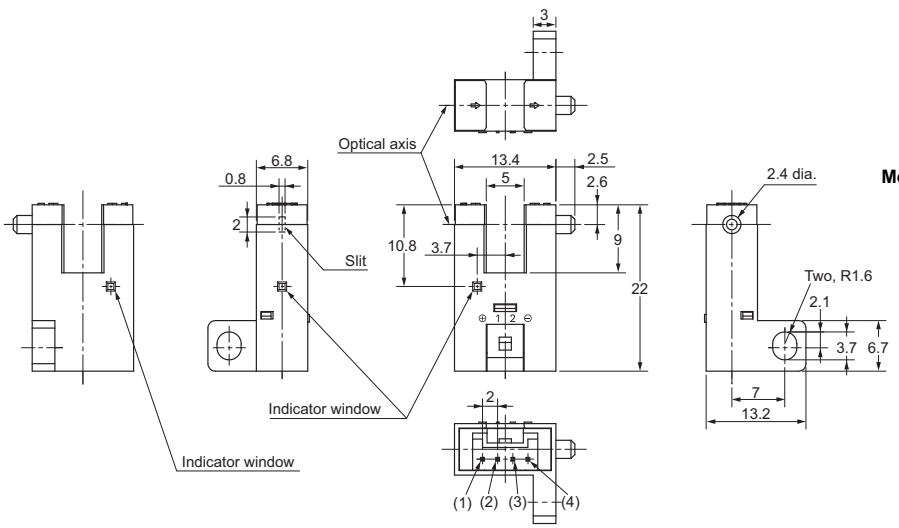
Terminal Arrangement

(1)	+	Vcc
(2)	1	OUTPUT1
(3)	2	OUTPUT2
(4)	–	GND (0 V)

Mounting screw holes



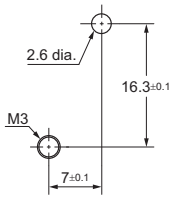
EE-SX976-C1
EE-SX976P-C1



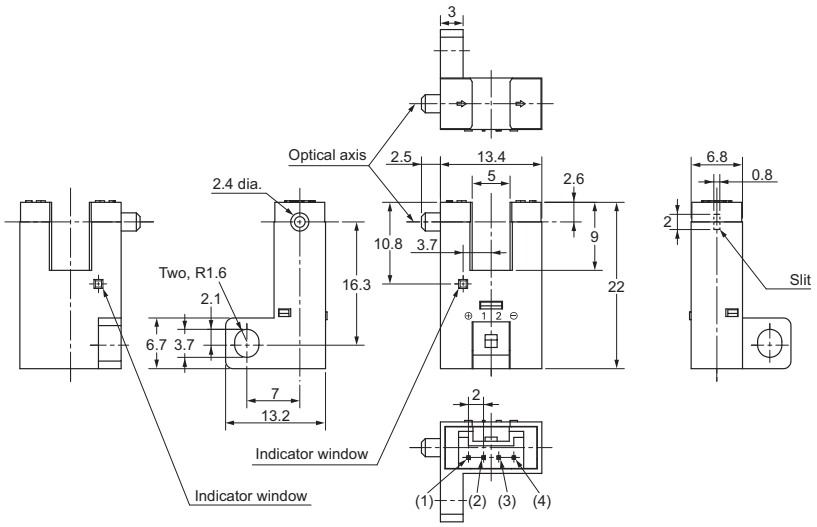
Terminal Arrangement

(1)	+	Vcc
(2)	1	OUTPUT1
(3)	2	OUTPUT2
(4)	–	GND (0 V)

Mounting screw holes



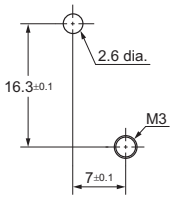
EE-SX977-C1
EE-SX977P-C1



Terminal Arrangement

(1)	+	Vcc
(2)	1	OUTPUT1
(3)	2	OUTPUT2
(4)	–	GND (0 V)

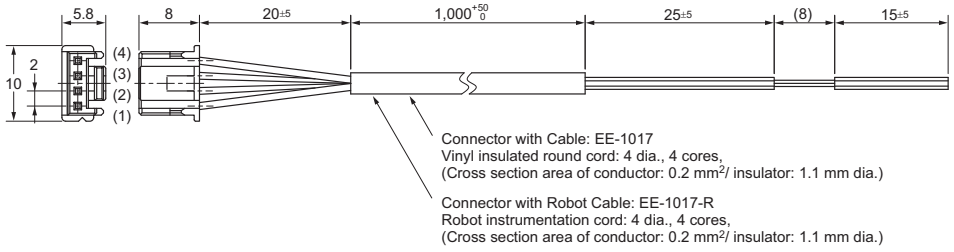
Mounting screw holes



Accessories (Order Separately)

Connector

Connector with Cable
EE-1017
Connector with Robot Cable
EE-1017-R



Terminal Arrangement

(1)	+	Brown
(2)	1	Black
(3)	2	White
(4)	–	Blue

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Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

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2023.7

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OMRON Corporation
Industrial Automation Company

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