NEW

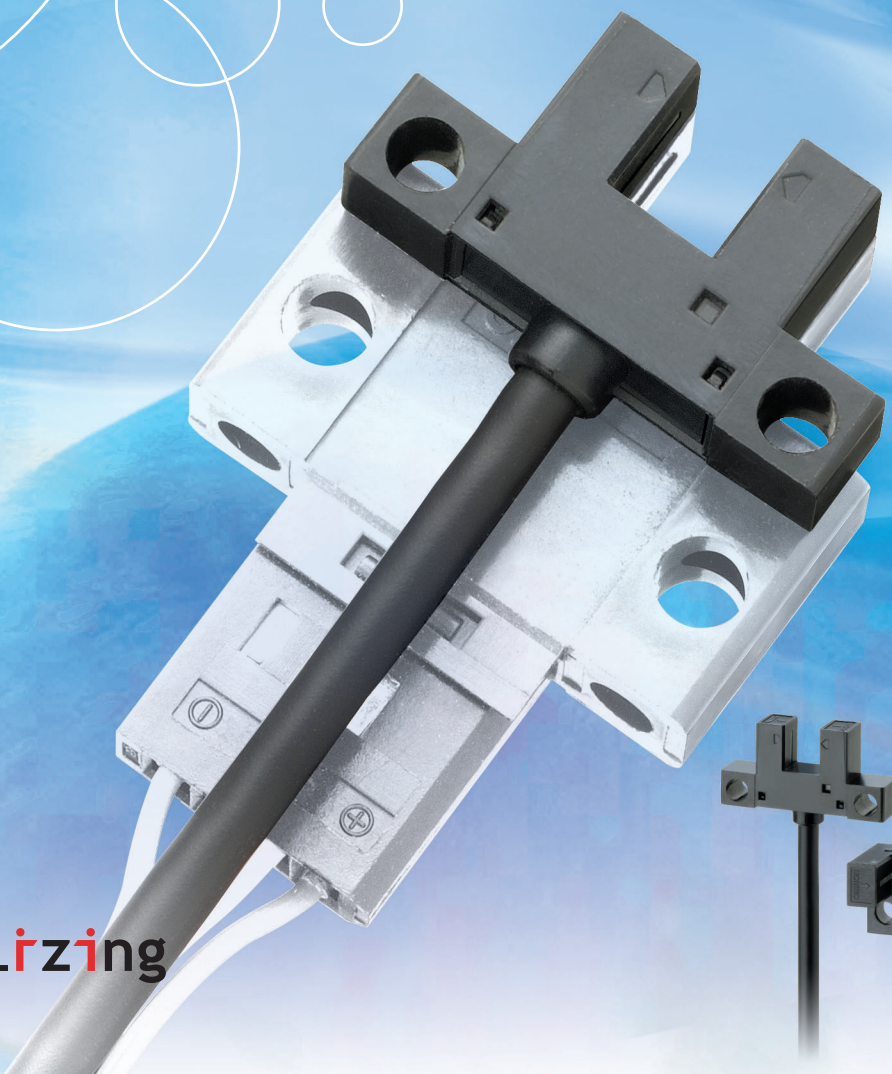
OMRON

Compact Pre-wired Photomicrosensor with Amplifier (Non-modulated)

EE-SX91

Photo micro sensor

The Ultimate
Compact Photomicrosensor,
Perfectly Easy to Use



Actual Size

realizing

Meeting Customer Needs with the Most Robust Photomicrosensor

The Eight EE-SX91 Features

Feature 1 A Compact Size and Choice of Five Models for a Wide Range of Applications

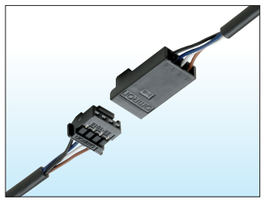
Select any of five models to minimize the space required.

Feature 2 Maximum Load Current of 100 mA

Output control of up to 100 mA is supported for either NPN or PNP outputs.

Feature 3 Models with Connectors Simplify Wiring and Maintenance

Using models with connectors allows wiring to be used as it is, with no need to replace anything but sensors.



Feature 4 Flexible Robot Cables: Standard on All Models

Robot Cables are effective for moving parts, and are provided as standard equipment with all models.

Feature 5 Compact NPN and PNP Output Models

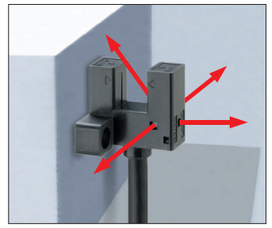
Both NPN and PNP output models are available for use according to system requirements.

Feature 6 Both Light-ON and Dark-ON Outputs

Both light-ON and dark-ON outputs are provided on all models, allowing outputs to be switched by simply changing the wiring according to the application.

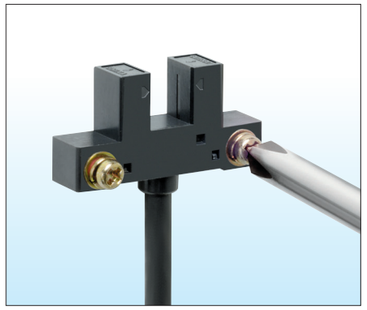
Feature 7 Indicator Visible from Many Directions for Installation in Any Location

The light indicator can be checked from up to four directions.



Feature 8 Mount Using M3 or M2 Screws

The EE-SX91 can be mounted using M3 or M2 screws, so it can easily replace an existing compact sensor mounted with M2 screws.



Compact Pre-wired Photomicrosensor with Amplifier (Non-modulated)

EE-SX91

Meeting Customer Needs with Compact Sensors that Mount with M3 Screws

- Both light-ON and dark-ON outputs (antivalent outputs) provided.
- A compact size and choice of five models for a wide range of applications.
- Compact NPN and PNP output models.
- Mount using M3 or M2 screws.
- Indicator is visible from many directions for installation in any location.
- Maximum load current of 100 mA.
- Models with connectors simplify wiring and maintenance.
- Flexible robot cables are standard on all models.

Ordering Information

List of Models

Models with Robot Cables

Infrared light

Appearance	Sensing method	Sensing distance	Output configuration	Indicator mode	Connecting method (Cable length)	Model	
						NPN output	PNP output
Standard 	Through-beam type (with slot)	5 mm (slot width)	Light-ON Dark-ON (2 outputs)	Lit when light is incident	Pre-wired models (1 m)	**EE-SX910-R**	**EE-SX910P-R**
					Models with connectors (0.3 m)	**EE-SX910-C1J-R**	**EE-SX910P-C1J-R**
L-shaped 					Pre-wired models (1 m)	**EE-SX911-R**	**EE-SX911P-R**
					Models with connectors (0.3 m)	**EE-SX911-C1J-R**	**EE-SX911P-C1J-R**
F-shaped 					Pre-wired models (1 m)	**EE-SX912-R**	**EE-SX912P-R**
					Models with connectors (0.3 m)	**EE-SX912-C1J-R**	**EE-SX912P-C1J-R**
R-shaped 					Pre-wired models (1 m)	**EE-SX913-R**	**EE-SX913P-R**
					Models with connectors (0.3 m)	**EE-SX913-C1J-R**	**EE-SX913P-C1J-R**
U-shaped 					Pre-wired models (1 m)	**E-SX914-R**	**EE-SX914P-R**
					Models with connectors (0.3 m)	**EE-SX914-C1J-R**	**EE-SX914P-C1J-R**

Accessories (Order Separately)

Connector with Robot Cable

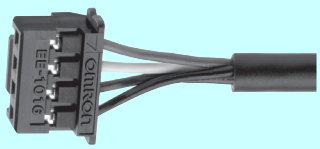
Type	Cable length	Model	Remarks
Connector with Cable	2 m	**EE-1016-R**	Connector with lock, AWG26, 4-core Robot Cable

Ratings and Specifications

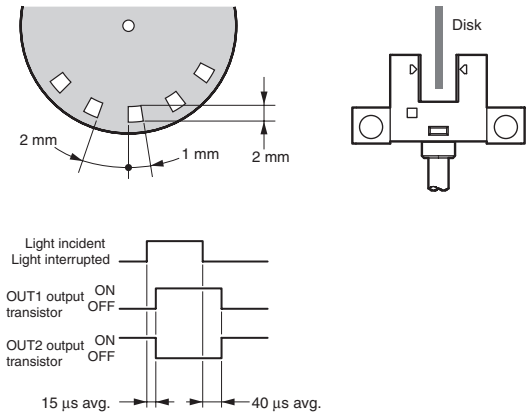
Item		Type	Standard	L-shaped	F-shaped	R-shaped	U-shaped
	NPN models	Pre-wired models	EE-SX910-R	EE-SX911-R	EE-SX912-R	EE-SX913-R	EE-SX914-R
		Models with connectors	EE-SX910-C1J-R	EE-SX911-C1J-R	EE-SX912-C1J-R	EE-SX913-C1J-R	EE-SX914-C1J-R
	PNP models	Pre-wired models	EE-SX910P-R	EE-SX911P-R	EE-SX912P-R	EE-SX913P-R	EE-SX914P-R
		Models with connectors	EE-SX910P-C1J-R	EE-SX911P-C1J-R	EE-SX912P-C1J-R	EE-SX913P-C1J-R	EE-SX914P-C1J-R

Supply voltage		5 to 24 VDC ±10%, ripple (p-p): 10% max.
Current consumption		15 mA max.
Sensing distance		5 mm (slot width)
Differential distance		0.025 mm max.
Light source		GaAs infrared LED
Sensing object		Opaque: 1.2 × 0.8 mm min.
Control output		Load power supply voltage: 5 to 24 VDC Load current: 100 mA max. 100 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.
Indicator		Light indicator (red LED)
Protection circuits		Power supply reverse polarity protection; output reverse polarity protection
Response frequency		3 kHz min. (8 kHz average) Light incident: 15 μs average; light interrupted: 40 μs 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)		10 to 2,000 Hz 0.75-mm single amplitude for 2.5 h (15-min periods, 10 cycles) each in X, Y, and Z directions
Shock resistance (Destruction)		500 m/s^2 for 3 times each in X, Y, and Z directions
Connecting method		Pre-wired Models (standard cable length: 1 m), Models with Connectors (standard cable length: 0.3 m)
Enclosure rating		IEC IP50
Weight (packaged)	Pre-wired Models	Approx. 17 g
	Models with Connectors	Approx. 7 g
Materials	Case	Polybutylene phthalate (PBT)
	Cover	
	Emitter/receiver	Polycarbonate (PC)

Applicable Connector

Item		Product / Model: Connector with Cable / EE-1016-R
Appearance		
Contact resistance		25mΩ 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

* The response frequency was measured by detecting the following rotating disk. The response times for light incidence and light interruption are shown in the timing chart.

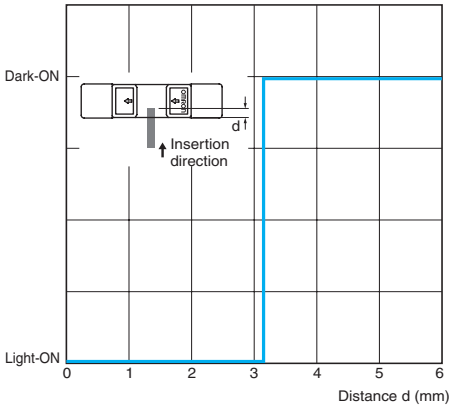


EE-SX91

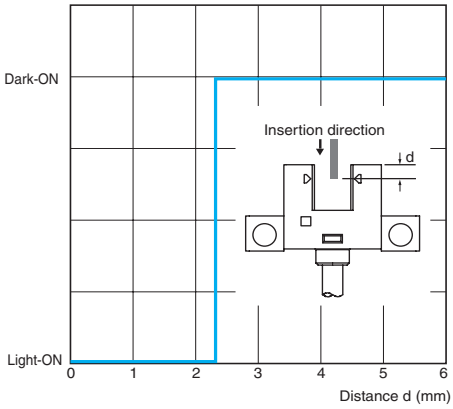
Engineering Data (Typical)

Sensing Position Characteristics

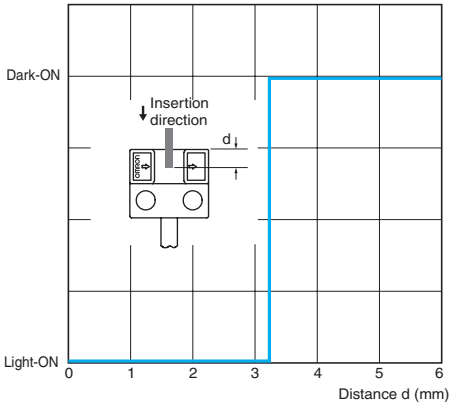
EE-SX910



EE-SX910

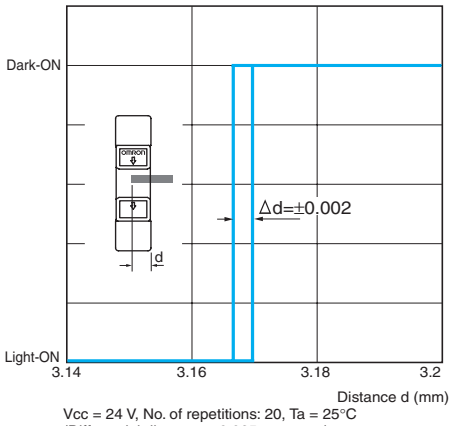


EE-SX911



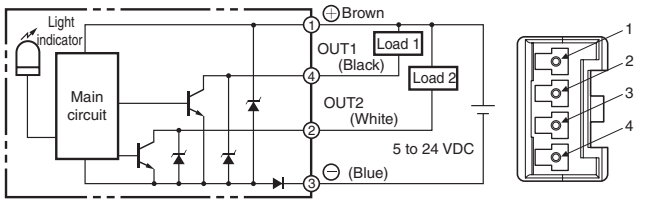
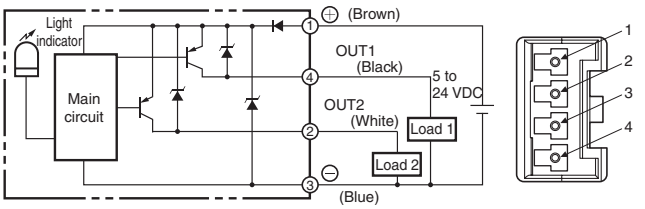
Repeated Sensing Position Characteristics

EE-SX910



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

I/O Circuits

Output type	Model	Output transistor operation status	Timing charts	Output circuit
NPN output	EE-SX910-R EE-SX910-C1J-R EE-SX911-R EE-SX911-C1J-R EE-SX912-R EE-SX912-C1J-R EE-SX913-R EE-SX913-C1J-R EE-SX914-R EE-SX914-C1J-R	OUT1: Light-ON OUT2: Dark-ON	Light incident Light interrupted Light indicator (red) ON / OFF Output 1 transistor ON / OFF	
PNP output	EE-SX910P-R EE-SX910P-C1J-R EE-SX911P-R EE-SX911P-C1J-R EE-SX912P-R EE-SX912P-C1J-R EE-SX913P-R EE-SX913P-C1J-R EE-SX914P-R EE-SX914P-C1J-R		Load 1 (relay) Operates / Releases Output 2 transistor ON / OFF Load 2 (relay) Operates / Releases	

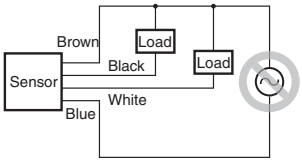
Safety Precautions

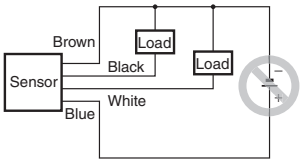
⚠ WARNING

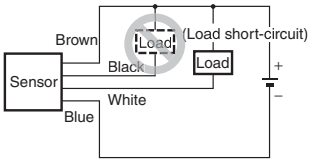
Do not use this product in sensing devices designed to provide human safety.

Precautions for Safe Use

- Power Supply Voltage
  Do not exceed the voltage range indicated in the specifications. Applying a voltage exceeding the specifications or using an AC power supply may result in rupture or burning.
- Faulty Wiring
  Do not reverse the power supply polarity. Doing so may result in rupture or burning.
- Do not short-circuit the load. (Do not connect to the power supply.)
  Doing so may result in rupture or burning.
- Dispose of this product as industrial waste.







Precautions for Correct Use

●Installation

- It is assumed that EE-SX91 Sensors will be built into a device. These Sensors use non-modulated light and are not equipped to deal with interference from an external light source. When they are used in locations subject to external light interference, such as near a window or under an incandescent light, install them to minimize the effects of external light interference.
- Mount the Sensors securely on a flat surface.
- Use M3 or M2.0 screws to secure the Photomicrosensor. (The stronger M3 screws are recommended. In addition, use flat washers and spring washers to prevent the screws from loosening.) Refer to the following table for the correct tightening torque.

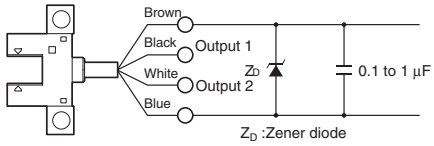
Screw diameter	Tightening torque
M2.0	0.15 N·m max.
M3	0.54 N·m max.

- If the Sensor is to be used on a moving part, secure the cable connection point so that it is not directly subjected to stress.

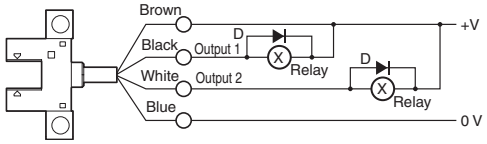
●Wiring

Countermeasures Against Surge

If there is surge in the power supply, try connecting a capacitor (with a capacitance of 0.1 to 1 μF) or a Zener diode (ZD with a rated voltage of 30 to 35 V). Use the Sensor only after confirming that the surge has been removed.



- When driving a small inductive load, such as a relay, wire as shown below. (Be sure to connect a diode to absorb the reverse voltage.)



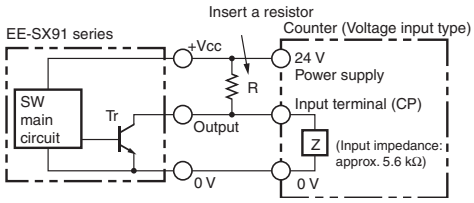
- If Photomicrosensor wires are placed in the same tubes or ducts as high-voltage lines or power lines, induction may be received and may result in faulty operation or burning. Either wire the Photomicrosensor separately or place the wires in separate tubes.

Unused Output Lines

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

Connecting to Devices with Voltage Input Specifications

A Sensor with an open-collector output can be connected to a counter with a voltage input by connecting a resistor between the power source and output. Select a resistor with reference to the following example. The resistance of the resistor is generally 4.7 Ω and its wattage is 1/2 W for a supply voltage of 24 V and 1/4 W for 12 V.



Example: EE-SX91 Series
Load Resistance of 4.7 kΩ Connected in a Counter

Counter Specifications

Input impedance	5.6 KΩ
Voltage judged as high level (input ON)	4.5 to 30 VDC
Voltage judged as low level (input OFF)	0 to 2 VDC

The high and low levels are found using the following formulas. The input device specifications must satisfy both formulas.

High level:

$$\text{Input voltage } V_H = \frac{Z}{R+Z} \quad Vcc = \frac{5.6\text{ k}}{4.7\text{ k}+5.6\text{ k}} \times 24\text{ V} = 13\text{ V}$$

Low level:

$$\text{Load current } Ic = \frac{Vcc}{R} = \frac{24\text{ V}}{R} = 5.1\text{ mA} \leq 100\text{ mA}$$

Input voltage $V_L \leq 1.0$ V (Residual voltage for 100-mA load current)

Note: Refer to the ratings of the Sensor for the residual voltage of the load current.

●Other Precautions

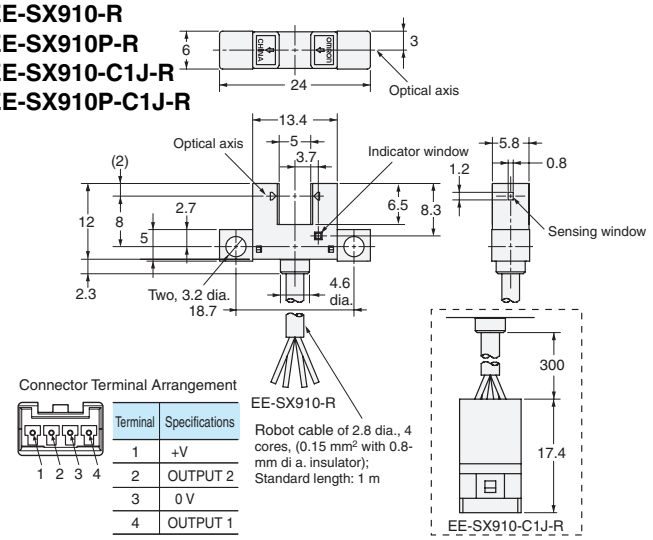
- Do not disconnect the Connector from the Sensor when power is supplied to the Sensor, or Sensor damage could result.
- Do not install the Sensor in the following places to prevent malfunction or trouble:
  1. Places exposed to dust or oil mist
  2. Places exposed to corrosive gas
  3. Places directly or indirectly exposed to water, oil, or chemicals
  4. Outdoor or places exposed to intensive light, such as direct sunlight
- Be sure to use the Sensor under the rated ambient temperature.
- The Sensor may be dissolved by exposure to organic solvents, acids, alkali, or aromatic hydrocarbons, causing deterioration in characteristics. Do not expose the Sensor to such chemicals.

EE-SX91

Dimensions (Unit: mm)

Photomicrosensors

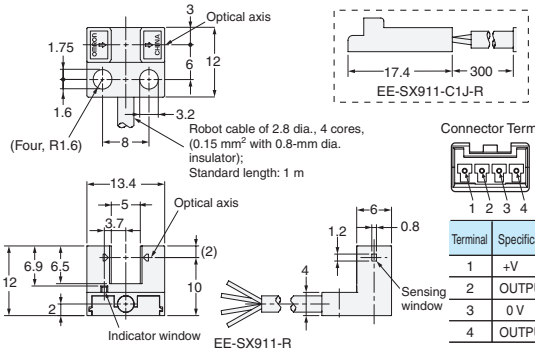
EE-SX910-R
EE-SX910P-R
EE-SX910-C1J-R
EE-SX910P-C1J-R



Connector Terminal Arrangement

Terminal	Specifications
1	+V
2	OUTPUT 2
3	0 V
4	OUTPUT 1

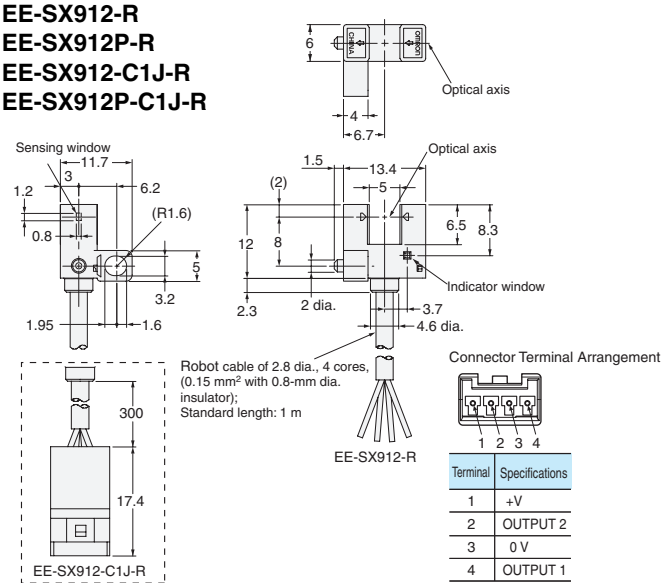
EE-SX911-R
EE-SX911P-R
EE-SX911-C1J-R
EE-SX911P-C1J-R



Connector Terminal Arrangement

Terminal	Specifications
1	+V
2	OUTPUT 2
3	0 V
4	OUTPUT 1

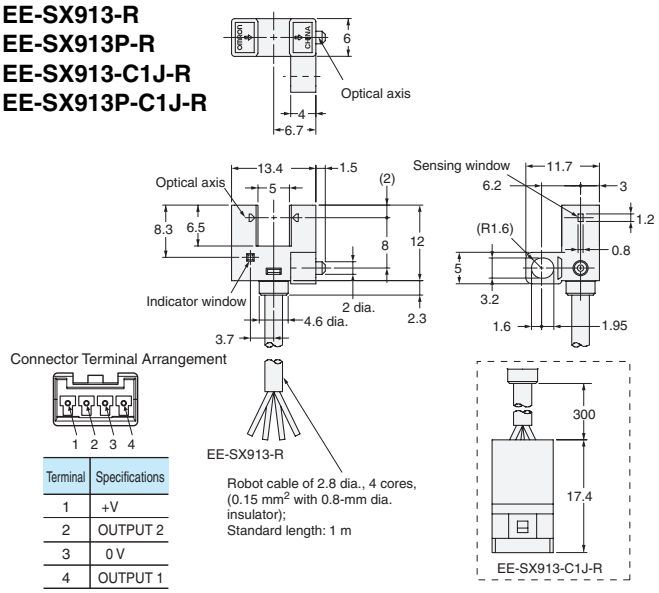
EE-SX912-R
EE-SX912P-R
EE-SX912-C1J-R
EE-SX912P-C1J-R



Connector Terminal Arrangement

Terminal	Specifications
1	+V
2	OUTPUT 2
3	0 V
4	OUTPUT 1

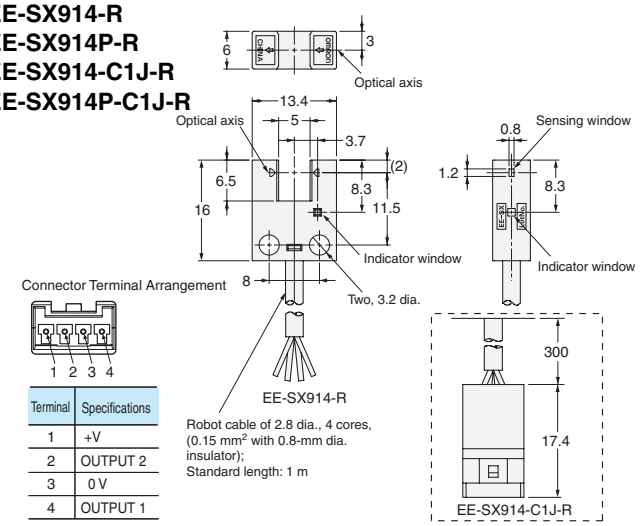
EE-SX913-R
EE-SX913P-R
EE-SX913-C1J-R
EE-SX913P-C1J-R



Connector Terminal Arrangement

Terminal	Specifications
1	+V
2	OUTPUT 2
3	0 V
4	OUTPUT 1

EE-SX914-R
EE-SX914P-R
EE-SX914-C1J-R
EE-SX914P-C1J-R



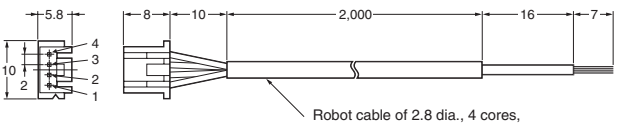
Connector Terminal Arrangement

Terminal	Specifications
1	+V
2	OUTPUT 2
3	0 V
4	OUTPUT 1

Accessories (Order Separately)

Connector with Robot Cable

EE-1016-R



Terminal Arrangement

①	⊕	Brown
②	OUTPUT 2	White
③	⊖	Blue
④	OUTPUT 1	Black

MEMO

MEMO

MEMO

This document provides information mainly for selecting suitable models. Please read Instruction Sheet or Manual carefully for information that the user must understand and accept before purchase, including information on warranty, limitations of liability, and precautions.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E376-E1-01 **In the interest of product improvement, specifications are subject to change without notice.**

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