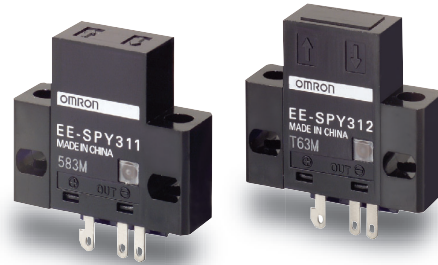



Light Convergent Reflective Photomicrosensor EE-SPY31/41

Accurately detects objects placed in front of shiny Background.


- A shiny background can be used as long as the distance between the sensor and the background is 20 mm or more.
- Detects minute objects such as a 0.05-mm-dia. pure copper wire.
- Small dispersion in sensing distance.
- Light modulation effectively reduces external light interference.
- Wide operating voltage range: 5 to 24 VDC






 Refer to *Precautions* on page 72.

Ordering Information

List of Models

 Infrared light

Appearance	Sensing method	Sensing distance		Output type	Output configuration	Model
Horizontal type 	Convergent reflective type		2 to 5 mm	NPN output	Dark-ON	EE-SPY311
					Light-ON	EE-SPY411
Vertical type 					Dark-ON	EE-SPY312
					Light-ON	EE-SPY412

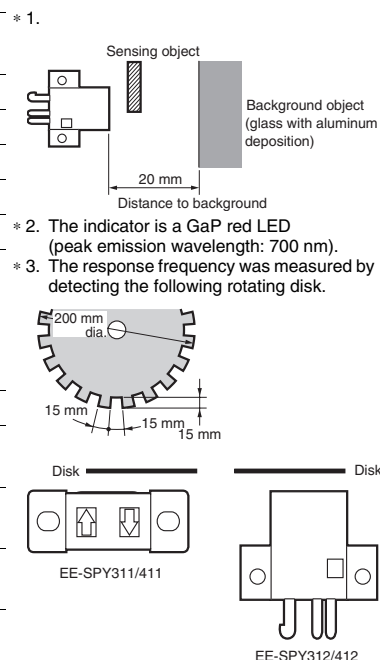
Accessories (Order Separately)

Type	Cable length	Model
Connector		EE-1001
		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
NPN/PNP Conversion Connector	0.46 m (total length)	EE-2002

Refer to *Accessories* on page 97 for details.

Ratings/Characteristics

Item	Models	EE-SPY311, EE-SPY411, EE-SPY312, EE-SPY412
Sensing distance		2 to 5 mm (Reflection factor: 90%; white paper 15 × 15 mm)
Minimum sensing object		Pure copper wire (0.05 mm dia.)
Distance to background *1		20 mm max. (glass with aluminum deposition)
Differential distance		0.2 max. (with a sensing distance of 3 mm, horizontally)
Light source		GaAs infrared LED with a peak wavelength of 940 nm
Indicator *2		Light indicator (red)
Supply voltage		5 to 24 VDC ±10%, ripple (p-p): 5% max.
Current consumption		Average: 15 mA max., Peak: 50 mA max.
Control output		NPN voltage output: Load power supply voltage: 5 to 24 VDC Load current: 80 mA max. 80 mA load current with a residual voltage of 1.0 V max. 10 mA load current with a residual voltage of 0.4 V max.
Response frequency *3		100 Hz min.
Ambient illumination		3,000 lx max. with incandescent light or sunlight on the surface of the receiver
Ambient temperature		Operating: -10 to +55°C Storage: -25 to +65°C
Ambient humidity		Operating: 5% to 85% Storage: 5% to 95%
Vibration resistance		Destruction: 10 to 50 Hz, 1.5-mm double amplitude for 2 h each in X, Y, and Z directions
Shock resistance		Destruction: 500m/s ² for 3 times each in X, Y, and Z directions
Enclosure rating		IEC IP50
Connecting method		Special connector (soldering not possible)
Weight		Approx. 2.6 g
Material	Case	Polycarbonate
	Holder	Polybutylene phthalate (PBT)



I/O Circuits

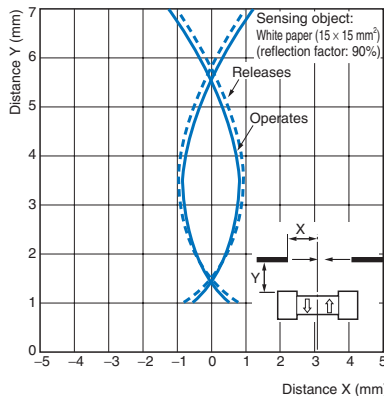
NPN Output

Model	Output configuration	Timing charts	Output circuit
EE-SPY411 EE-SPY412	Light-ON		<p>* Voltage output (when the sensor is connected to a transistor circuit)</p>
EE-SPY311 EE-SPY312	Dark-ON		

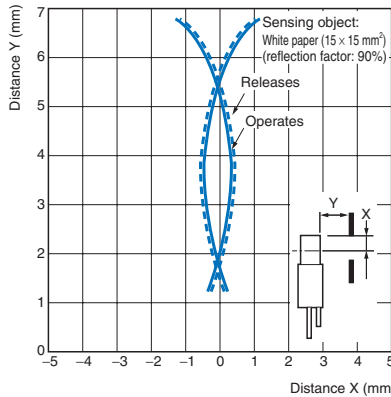
Engineering Data

Operating Range Characteristics (Typical)

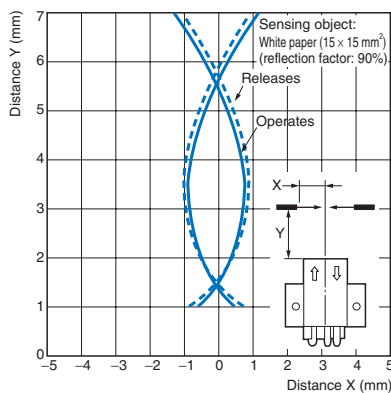
EE-SPY311/411



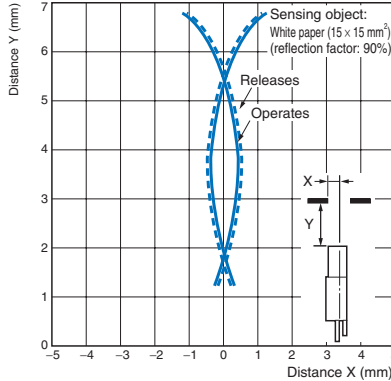
EE-SPY311/411



EE-SPY312/412

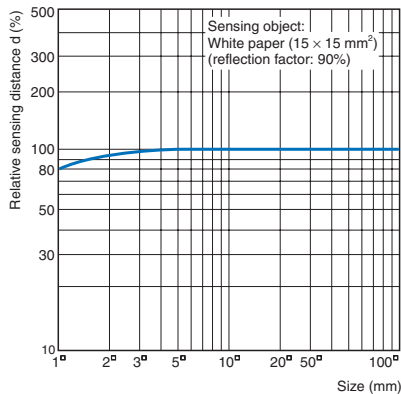


EE-SPY312/412



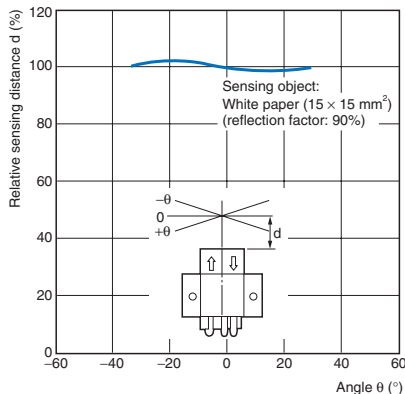
Sensing Distance vs. Object Area Characteristics (Typical)

EE-SPY□□□



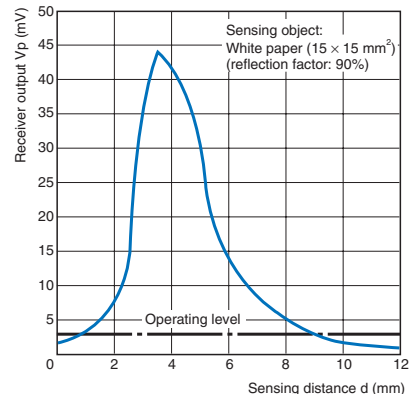
Sensing Angle vs. Sensing Distance Characteristics (Typical)

EE-SPY312/412



Receiver Output vs. Sensing Distance Characteristics (Typical)

EE-SPY□□□



Precautions

Refer to *General Precautions* on page 23 to 28 for general precautions.

Warning

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

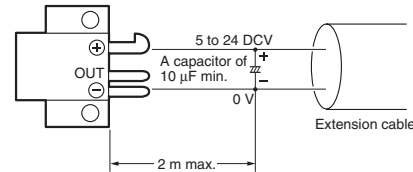


Precautions for Correct Use

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

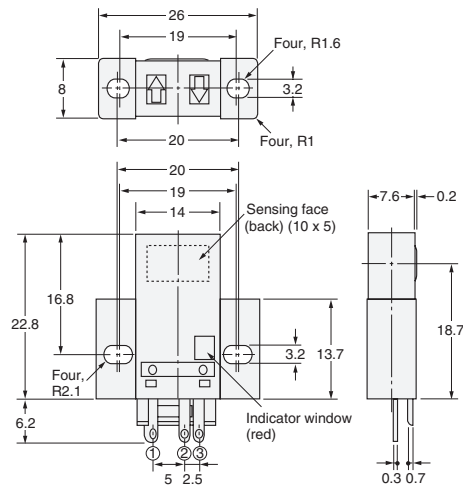
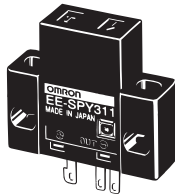
● Wiring

- Connection is made using a connector. Do not solder to the pins (leads).
- When extending the cable, use an extension cable with conductors having a total cross-section area of 0.3 mm². The total cable length must be 2 m maximum.
- To use a cable length longer than 2 m, attach a capacitor with a capacitance of approximately 10 μF to the wires as shown below. The distance between the terminal and the capacitor must be within 2 m. (Use a capacitor with a dielectric strength that is at least twice the Sensor's power supply voltage.)



Dimensions (Unit: mm)

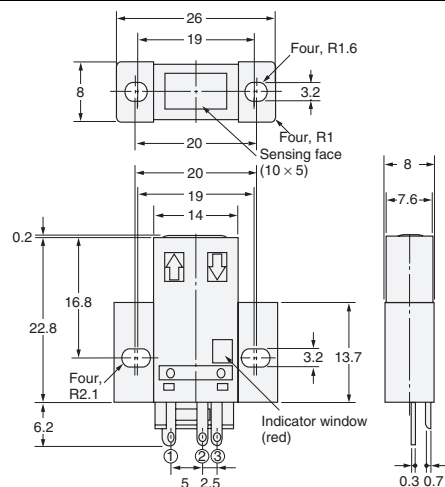
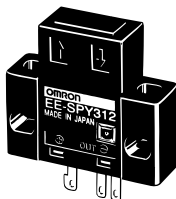
EE-SPY311
EE-SPY411



Terminal Arrangement

(1)	+	Vcc
(2)	OUT	OUTPUT
(3)	-	GND (0 V)

EE-SPY312
EE-SPY412



Terminal Arrangement

(1)	+	Vcc
(2)	OUT	OUTPUT
(3)	-	GND (0 V)

Accessories (Order Separately)

Refer to *Connectors* on page 97 for details on [connectors](#).