


# 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






 Be sure to read *Safety Precautions* on page 4.

## Ordering Information

### Sensors

 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
Vertical type 					Light-ON	EE-SPY411
					Dark-ON	EE-SPY312
					Light-ON	EE-SPY412

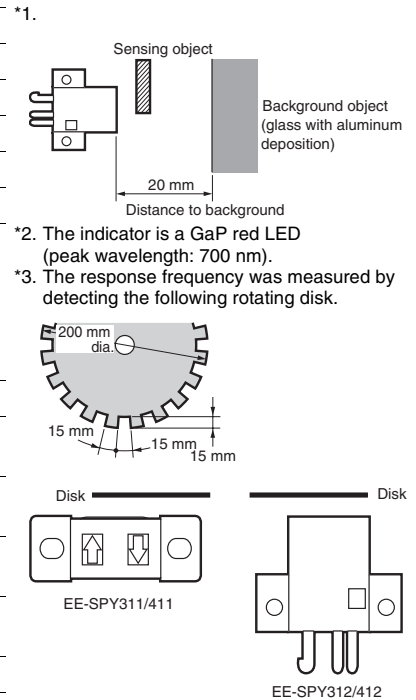
### Accessories (Order Separately)

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* for details.

Ratings and Specifications

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 mm (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. OFF current: 0.5 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 range		Operating: -10 to +55°C Storage: -25 to +65°C
Ambient humidity range		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 <sup>2</sup> for 3 times each in X, Y, and Z directions
Degree of protection		IEC IP50
Connecting method		Special connector (soldering not possible)
Weight		Approx. 2.6 g
Material	Case	Polycarbonate
	Holder	Polybutylene phthalate (PBT)



I/O Circuit Diagrams

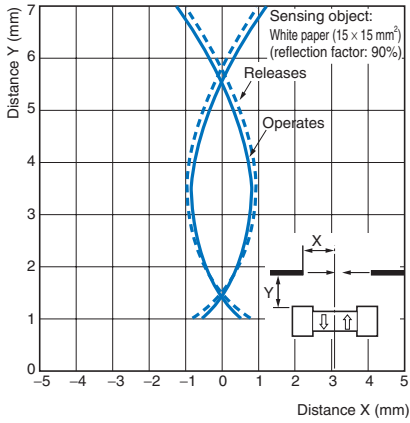
NPN Output

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		

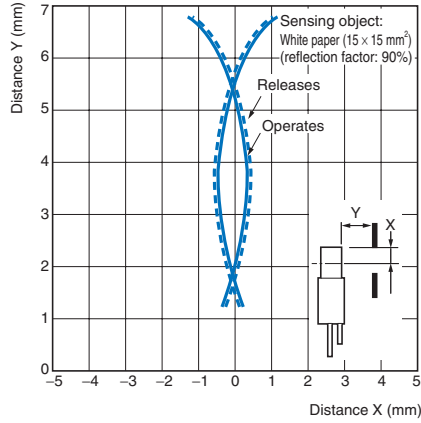
Engineering Data (Typical)

Operating Range Characteristics

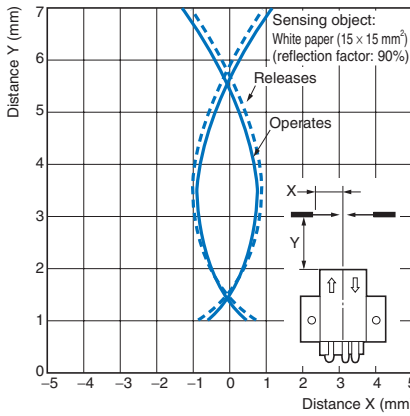
EE-SPY311/411



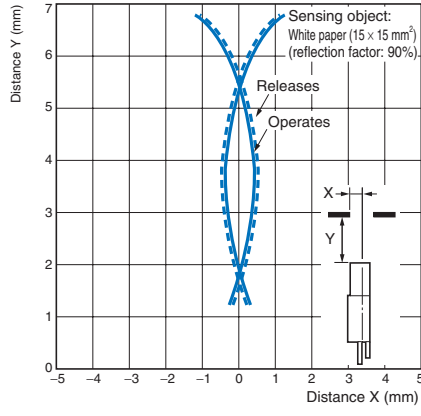
EE-SPY311/411



EE-SPY312/412

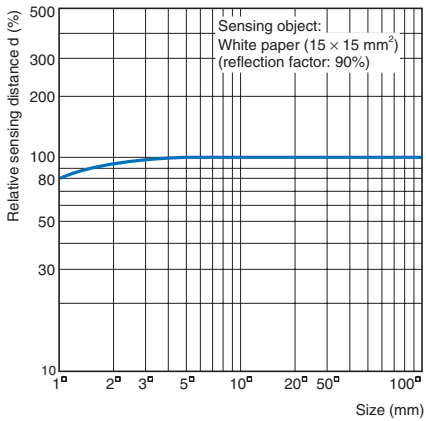


EE-SPY312/412



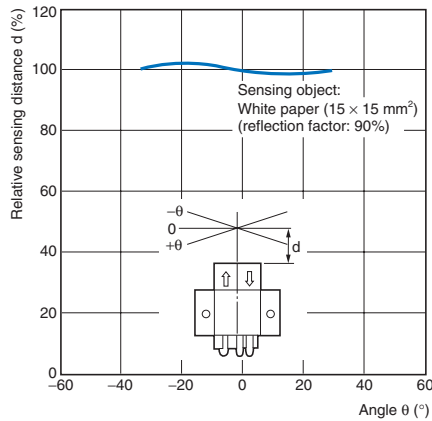
Sensing Distance vs. Object Area Characteristics

EE-SPY□□□□



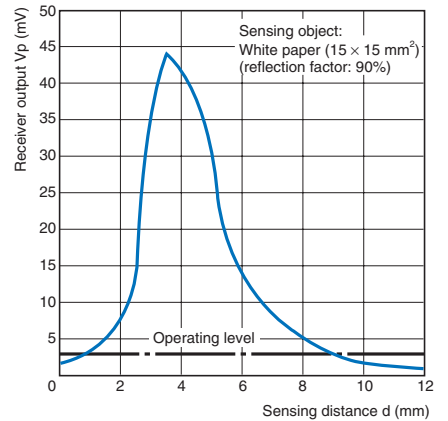
Sensing Angle vs. Sensing Distance Characteristics

EE-SPY312/412



Receiver Output vs. Sensing Distance Characteristics

EE-SPY□□□□



## 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.



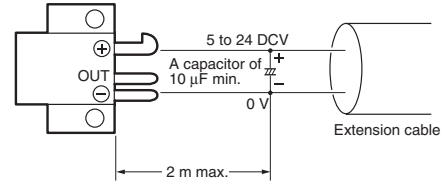
**Precautions for Correct Use**

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 mm<sup>2</sup>. 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.)



- Make sure the total length of the power cable connected to the product is less than 10 m even if a capacitor is inserted.

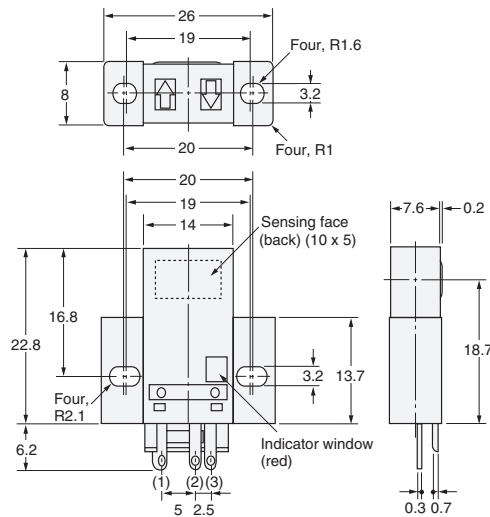
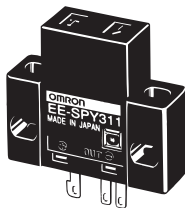
(Unit: mm)

## Dimensions

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

### Sensors

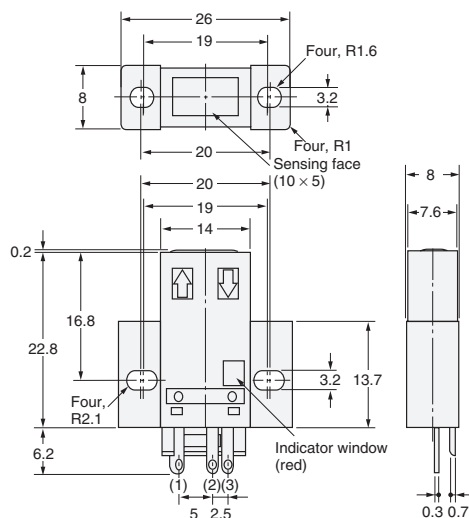
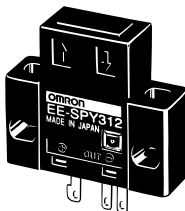
EE-SPY311  
EE-SPY411



**Terminal Arrangement**

(1)	+	V <sub>CC</sub>
(2)	OUT	OUTPUT
(3)	-	GND (0 V)

EE-SPY312  
EE-SPY412



**Terminal Arrangement**

(1)	+	V <sub>CC</sub>
(2)	OUT	OUTPUT
(3)	-	GND (0 V)

### Accessories (Order Separately)

\* Refer to *Accessories* for details.

## Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

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- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

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2008.11

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