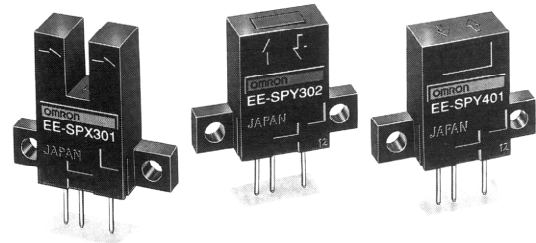


## Photomicrosensor

EE-SPX/  
EE-SPY

### Light Modulation Effectively Reduces External Light Interference

- Easy adjustment and optical axis monitoring with a Light-ON indicator.
- Wide operating voltage range (5 to 24 VDC) makes smooth connection possible with programmable controllers (PC).
- Easy-to-wire connector assures ease of maintenance.
- Fitted with an easy-to-adjust optical axis mark.



### Ordering Information

Appearance	Sensing method	Sensing distance	Output configuration	Model	Weight
	Transmissive-type (channel-type)	3.6 mm (channel width)	Light-OFF	EE-SPX301	Approx. 2.6 g
			Light-ON	EE-SPX401	
	Reflective type	5 mm	Light-OFF	EE-SPY302	
			Light-ON	EE-SPY402	
	Reflective type	5 mm	Light-OFF	EE-SPY301	
			Light-ON	EE-SPY401	

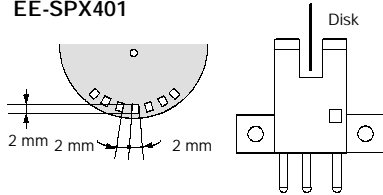
### Specifications

#### ■ Ratings

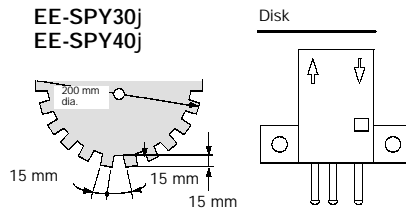
Item	Transmissive-type (channel-type)	Reflective
	EE-SPX301, EE-SPX401	EE-SPY301, EE-SPY401, EE-SPY302, EE-SPY402
Supply voltage	5 to 24 VDC $\pm 10\%$ , ripple (p-p): 5% max.	
Current consumption	Average: 15 mA max.; Peak: 50 mA max.	
Rated sensing distance	3.6 mm (channel width)	5 mm (Reflection factor: 90%; white paper: 15 × 15 mm) (see note 3)
Standard reference object	Opaque: 0.5 × 1 mm <sup>2</sup> min.	Transparent and opaque
Differential distance	0.05 mm max.	0.2 mm (with a sensing distance of 3 mm, horizontally)
Control output	At 5 to 24 VDC: 80-mA load current ( $I_C$ ) with a residual voltage of 1.0 V max. 10-mA load current ( $I_C$ ) with a residual voltage of 0.4 V max.	
Indicator (see note 1)	Light indicator (red)	
Response frequency (see note 2)	500 Hz	100 Hz
Connecting method	Dedicated connectors: EE-1002, EE-1003 (with 1 m cable attached) (soldering not possible)	
Light source	GaAs infrared LED (pulse lighting) with a peak wavelength of 940 nm	
Receiver	Si photo-diode with a sensing wavelength of 850 nm max.	

- Note:**
1. The indicator is a GaP red LED (peak emission wavelength: 700 nm).
  2. The response frequency was measured by detecting the following Disks rotating.

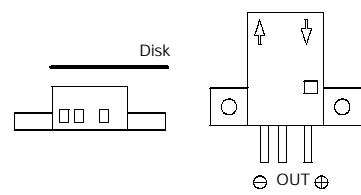
EE-SPX301  
EE-SPX401



EE-SPY30j  
EE-SPY40j



Terminal Arrangement



3. Depending on the sensor's immediate environment, it may not function.

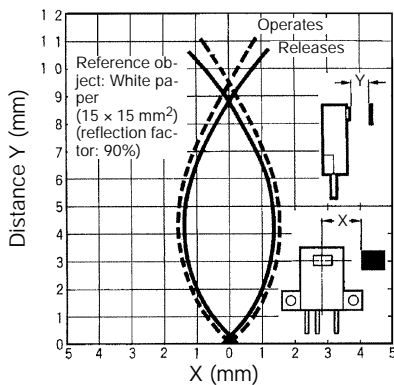
■ Characteristics

Ambient illumination	Incandescent light: 3,000 lx max.
Enclosure ratings	IEC IP50
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 55 Hz, 1.5-mm double amplitude for 2 hrs each in X, Y, and Z directions
Material	Polycarbonate
Shock resistance	Destruction: 500 m/s <sup>2</sup> (approx. 50G) for 3 times each in X, Y, and Z directions
Cable	2 m max. (AWG22 min.)

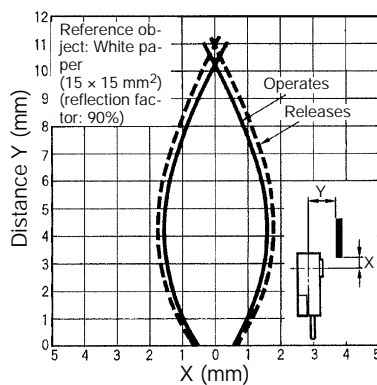
Engineering Data

Operating Range (Typical)

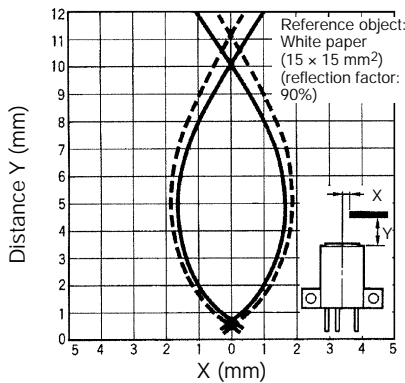
EE-SPY301, EE-SPY401



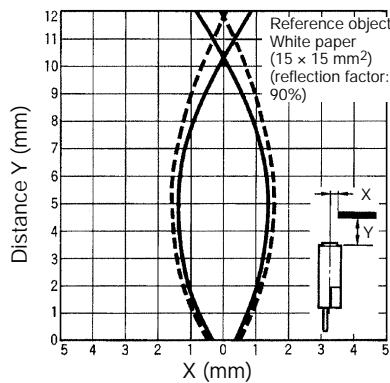
EE-SPY301, EE-SPY401



EE-SPY302, EE-SPY402

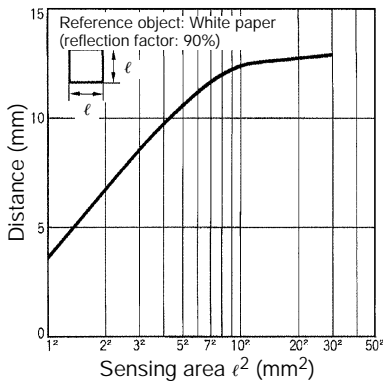


EE-SPY302, EE-SPY402



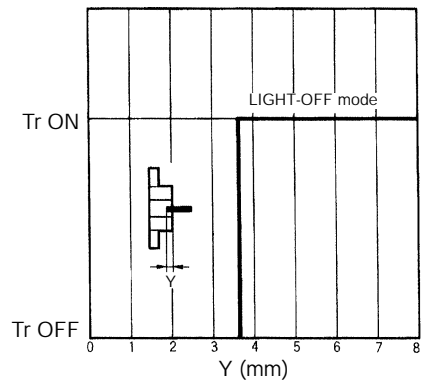
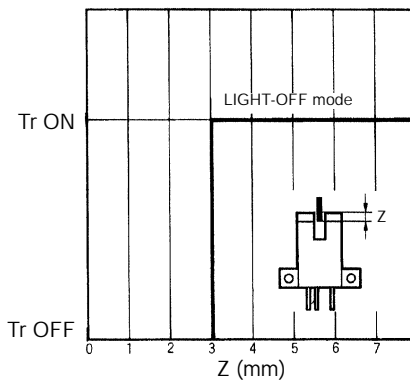
**Sensing Distance vs. Object Area (Typical)**

EE-SPYj j j



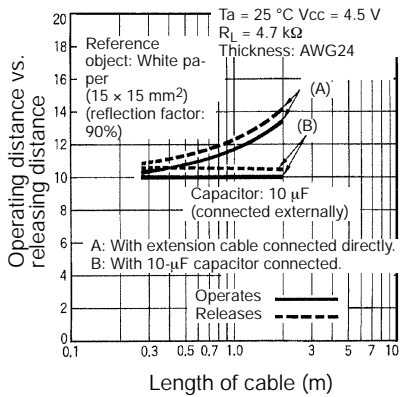
**Sensing Position Characteristics (Typical)**

EE-SPX301



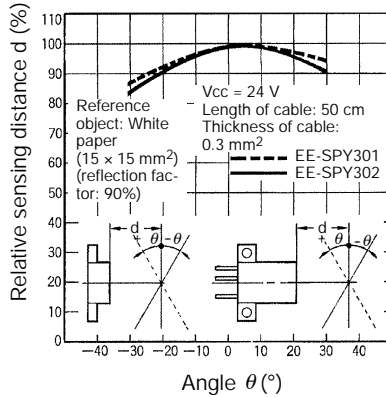
**Operating/Reset Distance vs. Cable Length (Typical)**

EE-SPYj j j



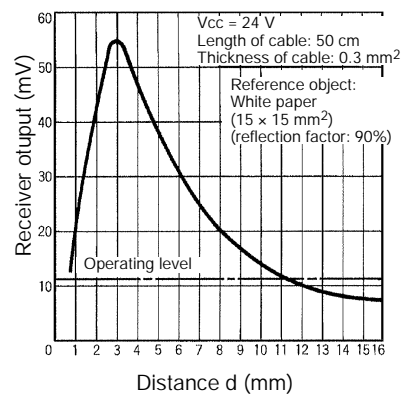
**Sensing Angel vs. Sensing Distance (Typical)**

EE-SPYj j j



**Receiver Output vs. Sensing Distance (Typical)**

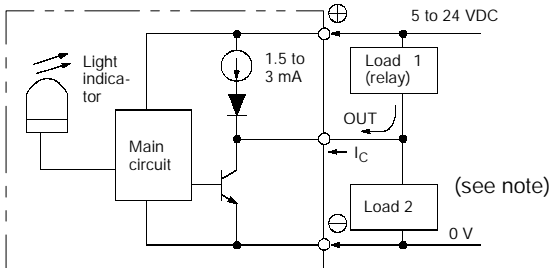
EE-SPYj j j



**Operation**

**Output Circuit Diagrams**

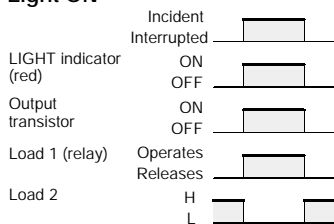
**Light ON/OFF**



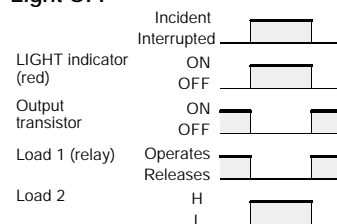
Note: Voltage output (when the sensor is connected to a transistor circuit).

**Timing Chart**

EE-SPX401, EE-SPY401, EE-SPY402  
Light ON



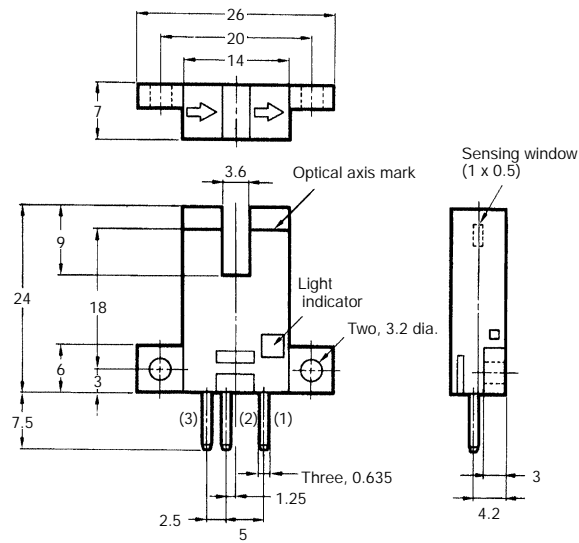
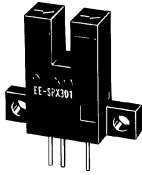
EE-SPX301, EE-SPY301, EE-SPY302  
Light OFF



# Dimensions

Note: All units are in millimeters unless otherwise indicated.

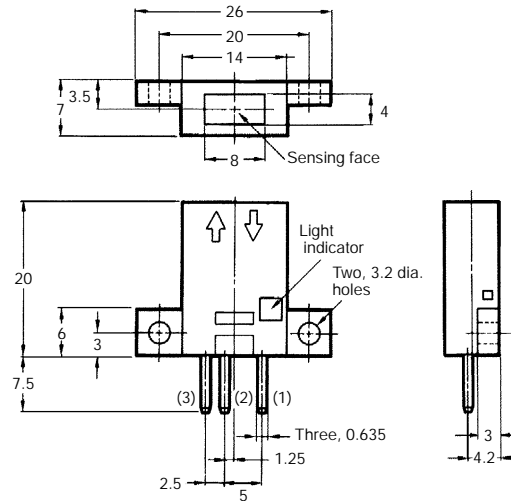
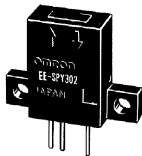
EE-SPX301  
EE-SPX401



### Terminal Arrangement

(1)	⊕	Vcc
(2)	OUT	OUT PUT
(3)	⊖	GND (0 V)

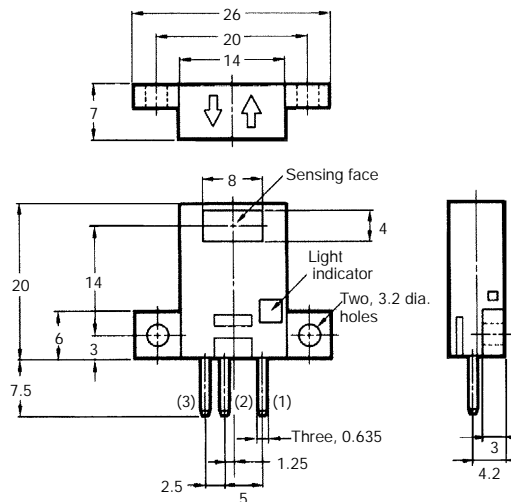
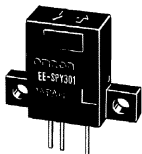
EE-SPY302  
EE-SPY402



### Terminal Arrangement

(1)	⊕	Vcc
(2)	OUT	OUT PUT
(3)	⊖	GND (0 V)

EE-SPY301  
EE-SPY401



### Terminal Arrangement

(1)	⊕	Vcc
(2)	OUT	OUT PUT
(3)	⊖	GND (0 V)

### Connector

EE-1002, EE-1003 and EE-1003A. For dimensions refer to page 74.

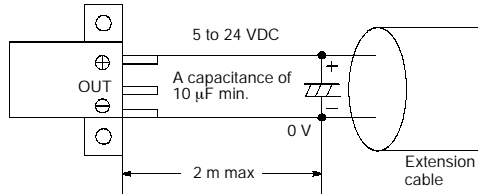
# Precautions

Refer to page NO TAG, *Precautions* in *Technical Information*, for general precautions.

## Wiring

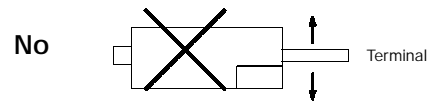
Use a cable with a thickness greater than the AWG22 and a length of 2 m max. must be connected to the output terminals.

To use a cable longer than 2 m, attach a capacitor with a capacitance of approximately 10  $\mu\text{F}$  to the wires as shown below (the distance between the terminal and the capacitor must be within 2 m):



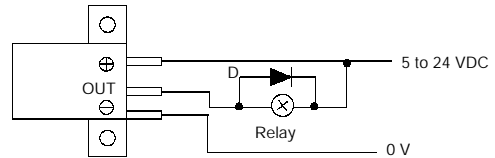
Do not solder the cable to the connectors. Use the EE-1002 Connector or EE-1003 Connector (with a 1-m cable attached) to connect the cable to the output terminals. Use the EE1003A Connector Holder to prevent accidental disconnection of the EE-1003 Connector from the EE-SPY301/401/302/402 Photomicrosensor.

Do not impose excessive force on the terminals (refer to the diagram below). Excess force will damage the terminals.



Do not disconnect the EE-1003 Connector from the photomicrosensor when power is supplied to the photomicrosensor or sensor damage could result.

Wire as shown by the following illustration to connect a small inductive load (a relay for example) to the photomicrosensor. A diode must be connected parallel to the relay to absorb the reverse voltage.



The sensing distance for the EE-SPY Reflective-type Photomicrosensor with built-in amplifier varies from 8 to 20 mm depending on the product (90% reflective white paper). Do not place glossy objects in the background of the sensing object.

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