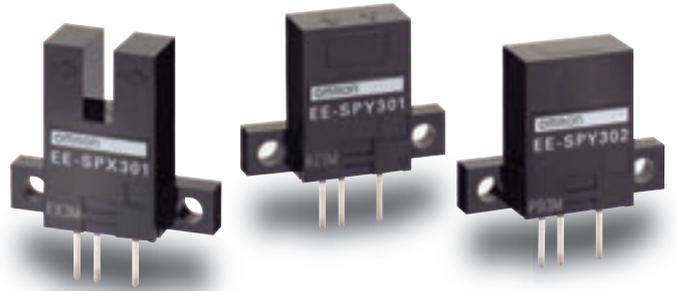




## Photomicrosensor with light modulation is not influenced by external light.

- Voltage-output models with wide operating voltage range (5 to 24 VDC).
- Fitted with an easy-to-adjust optical axis mark.
- Easy adjustment and optical axis monitoring with a light indicator.



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

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

## Ordering Information

### Sensors

Infrared light

| Appearance          | Sensing method                | Sensing distance |                     | Output type | Output configuration | Model     |
|---------------------|-------------------------------|------------------|---------------------|-------------|----------------------|-----------|
|                     | Through-beam type (with slot) |                  | 3.6 mm (slot width) | NPN output  | Dark-ON              | EE-SPX301 |
|                     |                               |                  |                     |             | Light-ON             | EE-SPX401 |
| Horizontal type<br> | Reflective type               |                  | 5 mm                |             | Dark-ON              | EE-SPY301 |
|                     |                               |                  |                     |             | Light-ON             | EE-SPY401 |
| Vertical type<br>   | Reflective type               |                  | 5 mm                |             | Dark-ON              | EE-SPY302 |
|                     |                               |                  |                     |             | Light-ON             | EE-SPY402 |

### Accessories (Order Separately)

| Type                         | Cable length          | Model    | Remarks           |
|------------------------------|-----------------------|----------|-------------------|
| Connector                    |                       | EE-1002  |                   |
|                              | Connector with Cable  | 1 m      | EE-1003           |
| NPN/PNP Conversion Connector | 0.46 m (total length) | EE-2001  |                   |
| Connector Hold-down Clip     |                       | EE-1003A | For EE-1003 only. |

\* Refer to *Accessories* for details.

## Ratings and Specifications

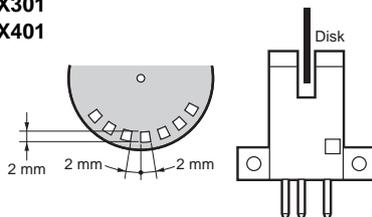
| Sensing method            |        | Through-beam type (with slot)   | Reflective type  |
|---------------------------|--------|---|--|
| Item                      | Models | EE-SPX301, EE-SPX401  | EE-SPY301, EE-SPY401<br>EE-SPY302, EE-SPY402                   |
| Sensing distance          |        | 3.6 mm (slot width)   | 5 mm (Reflection factor: 90%; white paper 15 × 15 mm) *1       |
| Sensing object            |        | Opaque: 1 × 0.5 mm min.   | ---  |
| Differential distance     |        | 0.05 mm max.  | 0.2 mm max.<br>(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:<br>Load power supply voltage: 5 to 24 VDC<br>Load current: 80 mA max.<br>OFF current: 0.5 mA max.<br>80 mA load current with a residual voltage of 1.0 V max.<br>10 mA load current with a residual voltage of 0.4 V max. |  |
| Response frequency *3     |        | 500 Hz min.   | 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<br>Storage: -25 to +65°C (with no icing)  |  |
| Ambient humidity range    |        | Operating: 5% to 85%<br>Storage: 5% to 95% (with no condensation)   |  |
| Vibration resistance      |        | Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 h each in X, Y, and Z directions  |  |
| Shock resistance          |        | Destruction: 500 m/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   |  |

\*1. Operation may not be possible near the Sensor.

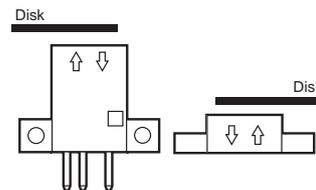
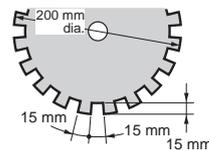
\*2. The indicator is a GaP red LED (peak wavelength: 700 nm).

\*3. The response frequency was measured by detecting the following rotating disk.

EE-SPX301  
EE-SPX401



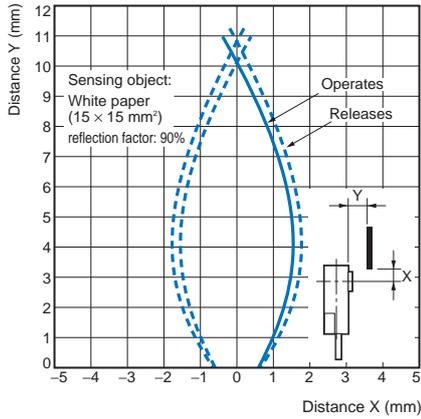
EE-SPY30  
EE-SPY40



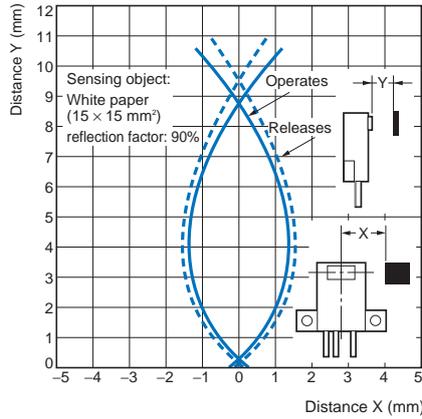
Engineering Data (Reference Value)

Operating Range Characteristics

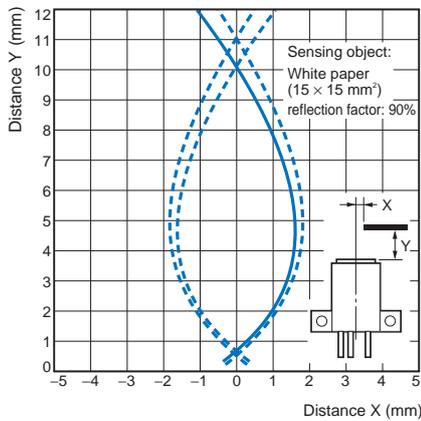
EE-SPY301, EE-SPY401



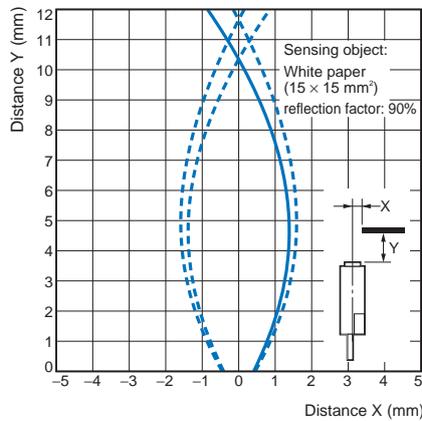
EE-SPY301, EE-SPY401



EE-SPY302, EE-SPY402

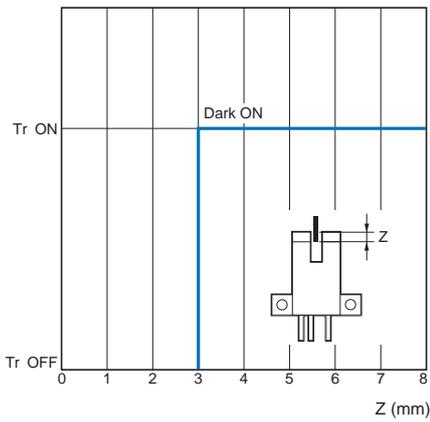


EE-SPY302, EE-SPY402

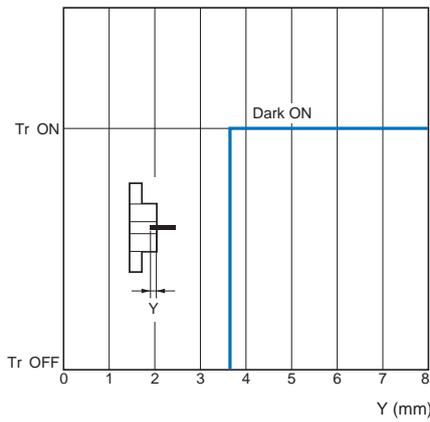


Sensing Position Characteristics

EE-SPX301 (Z Direction)

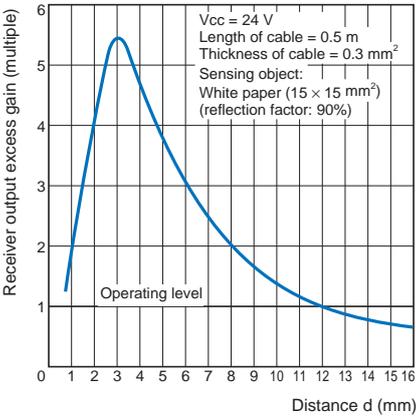


EE-SPX301 (Y Direction)



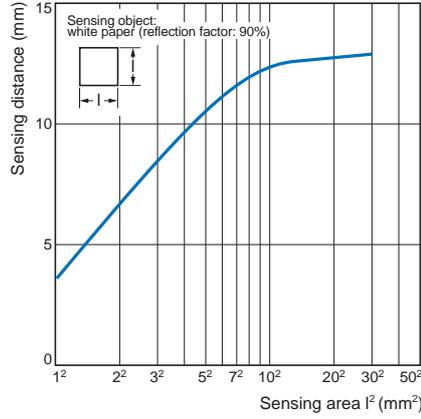
**Receiver Output Excess Gain vs. Sensing Distance Characteristics**

EE-SPY□□□



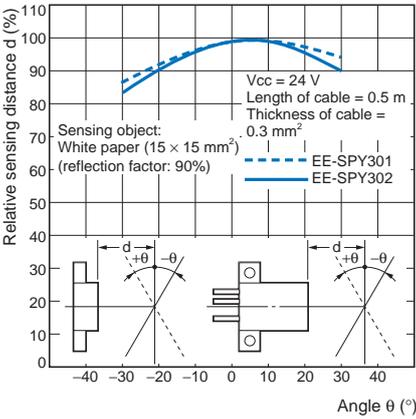
**Sensing Distance vs. Object Area Characteristics**

EE-SPY□□□



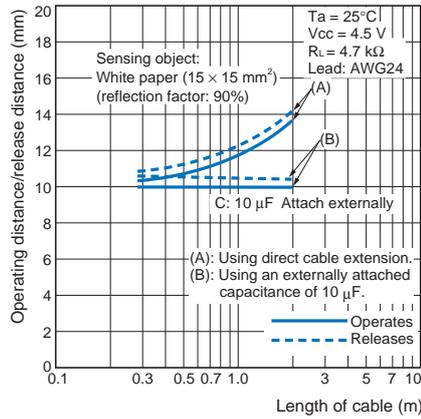
**Sensing Angle vs. Sensing Distance Characteristics**

EE-SPY□□□



**Dependency on Cable Length for Operation Distance/Release Distance**

EE-SPY□□□



I/O Circuit Diagrams

NPN Output

| Model                               | Output configuration | Timing charts | Output circuit |
|-------------------------------------|----------------------|---------------|----------------|
| EE-SPX401<br>EE-SPY401<br>EE-SPY402 | Light-ON             |               |                |
| EE-SPX301<br>EE-SPY301<br>EE-SPY302 | Dark-ON              |               |                |

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**

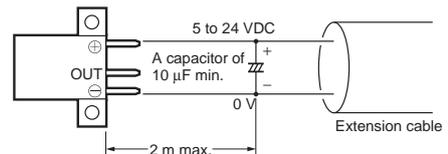
Make sure that this product is used within the rated ambient environment conditions.

● **Mounting**

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.

● **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.

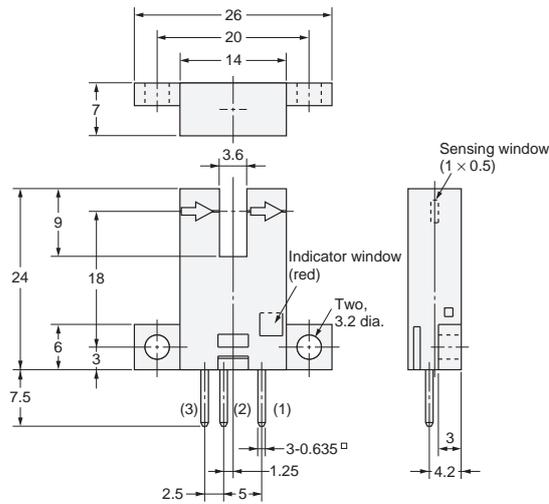
(Unit: mm)

## Dimensions

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

### Sensors

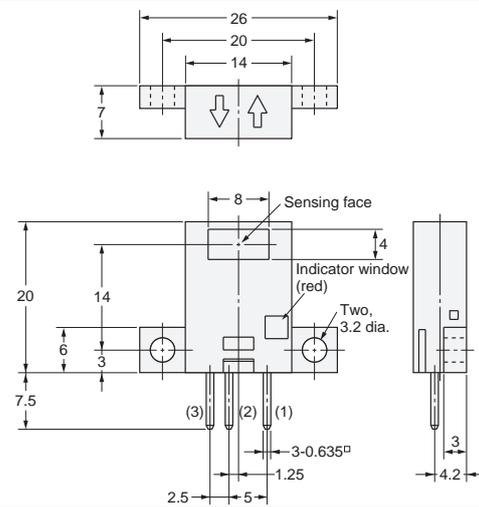
EE-SPX301  
EE-SPX401



#### Terminal Arrangement

|     |     |           |
|-----|-----|-----------|
| (1) | ⊕   | Vcc       |
| (2) | OUT | OUTPUT    |
| (3) | ⊖   | GND (0 V) |

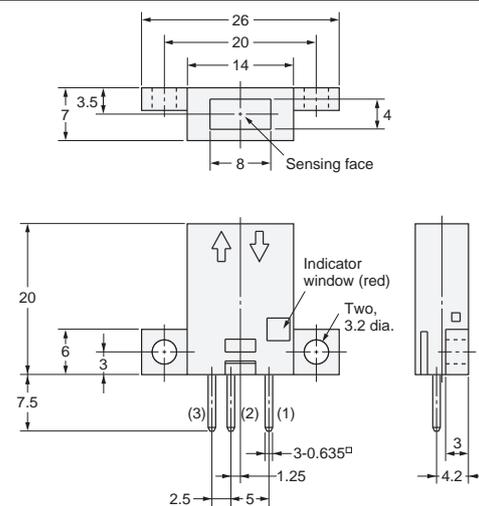
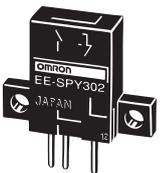
EE-SPY301  
EE-SPY401



#### Terminal Arrangement

|     |     |           |
|-----|-----|-----------|
| (1) | ⊕   | Vcc       |
| (2) | OUT | OUTPUT    |
| (3) | ⊖   | GND (0 V) |

EE-SPY302  
EE-SPY402



#### Terminal Arrangement

|     |     |           |
|-----|-----|-----------|
| (1) | ⊕   | Vcc       |
| (2) | OUT | OUTPUT    |
| (3) | ⊖   | GND (0 V) |

### Accessories (Order Separately)

\* Refer to *Accessories* for details.

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