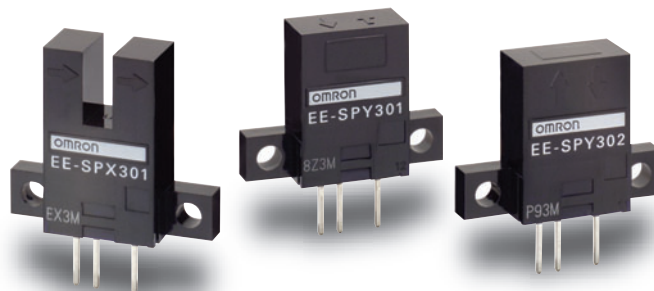




Photomicrosensor with light modulation is not influenced by external light.

- 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 | Reflective type | 5 mm | | Dark-ON | EE-SPY301 |
| | | | | Light-ON | EE-SPY401 |
| Vertical type | 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

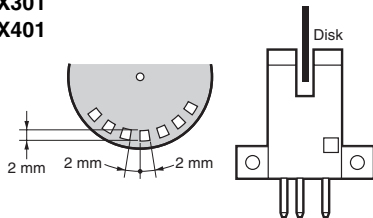
| Sensing method | | Through-beam type (with slot) | Reflective type |
|---------------------------|--------|---|--|
| Item | Models | EE-SPX301, EE-SPX401 | EE-SPY301, EE-SPY401 EE-SPY302, EE-SPY402 |
| Sensing distance | | 3.6 mm (slot width) | 5 mm (Reflection factor: 90%; white paper 15 × 15 mm) *1 |
| Sensing object | | Opaque: 1 × 0.5 mm min. | --- |
| Differential distance | | 0.05 mm max. | 0.2 mm max. (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 | | 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 Storage: -25 to +65°C (with no icing) | |
| Ambient humidity range | | Operating: 5% to 85% 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 ² 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.

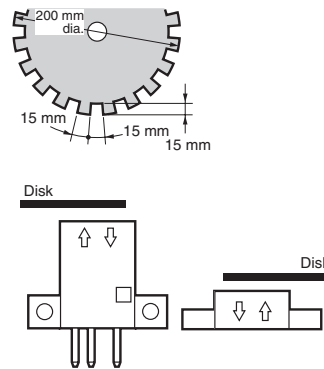
*2. The indicator is a GaP red LED (peak wavelength: 700 nm).

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

EE-SPX301
EE-SPX401



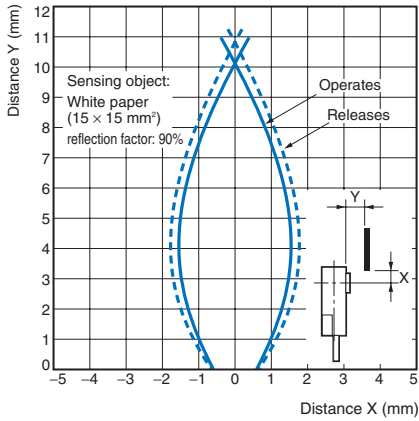
EE-SPY30
EE-SPY40



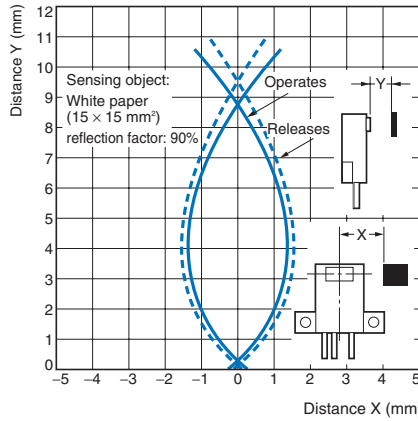
Engineering Data (Reference Value)

Operating Range Characteristics

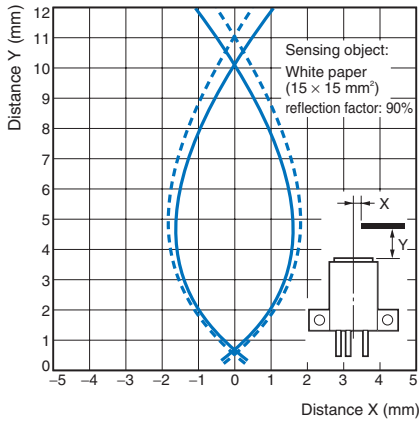
EE-SPY301, EE-SPY401



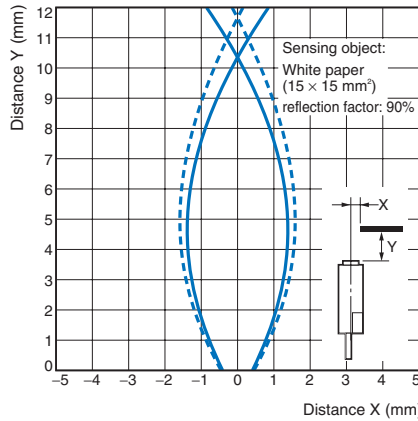
EE-SPY301, EE-SPY401



EE-SPY302, EE-SPY402

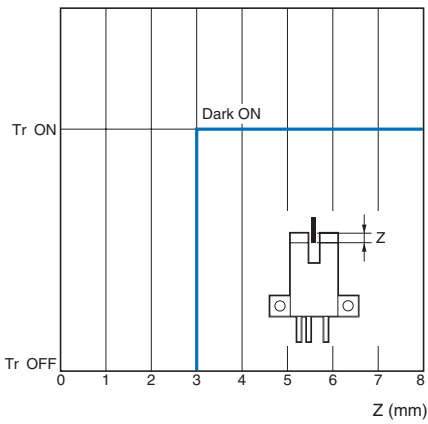


EE-SPY302, EE-SPY402

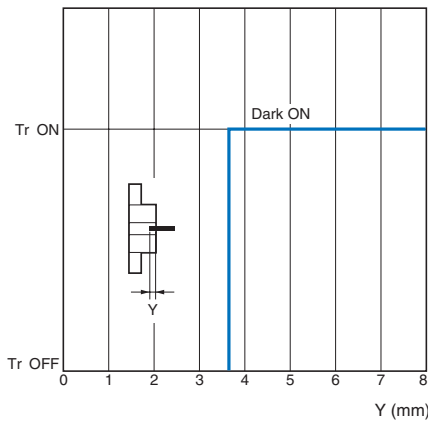


Sensing Position Characteristics

EE-SPX301 (Z Direction)

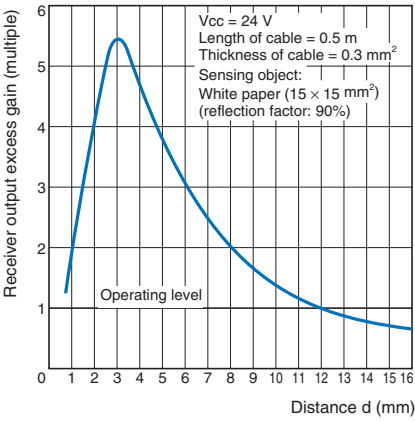


EE-SPX301 (Y Direction)



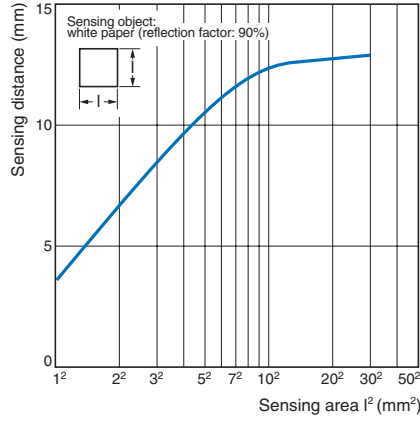
Receiver Output Excess Gain vs. Sensing Distance Characteristics

EE-SPY□□□



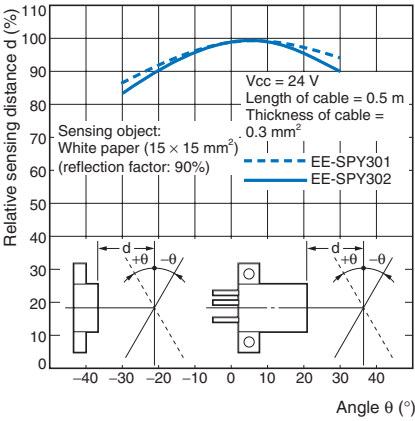
Sensing Distance vs. Object Area Characteristics

EE-SPY□□□



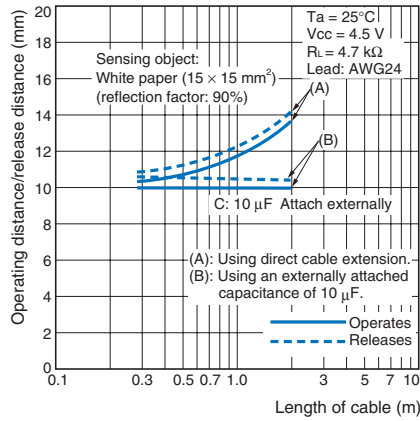
Sensing Angle vs. Sensing Distance Characteristics

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 EE-SPY401 EE-SPY402 | Light-ON | | |
| EE-SPX301 EE-SPY301 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

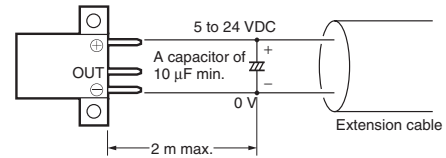
Make sure that this product is used within the rated ambient environment conditions.

● **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 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.)



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

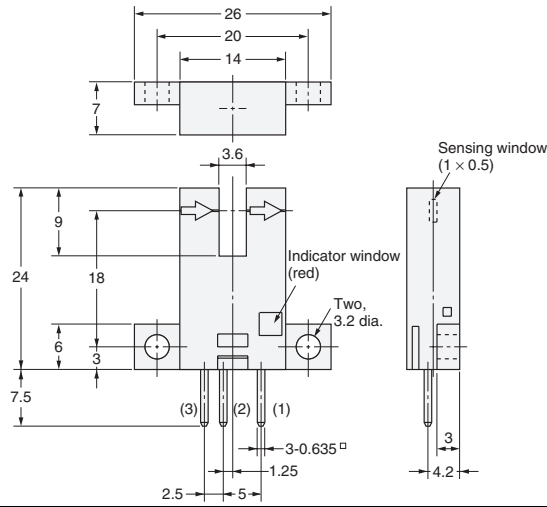
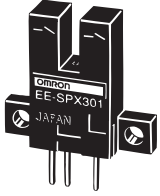
(Unit: mm)

Dimensions

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

Sensors

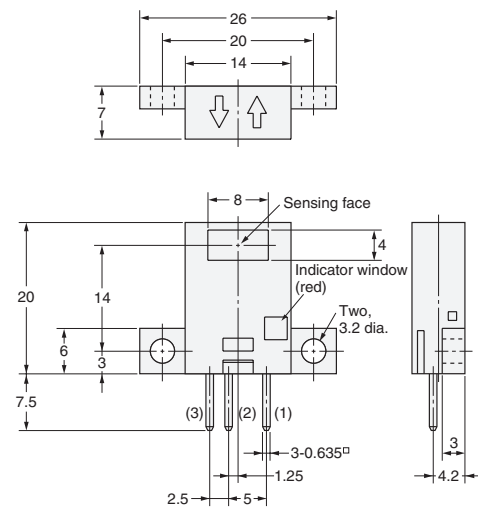
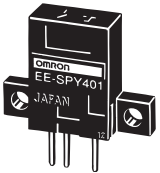
EE-SPX301
EE-SPX401



Terminal Arrangement

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

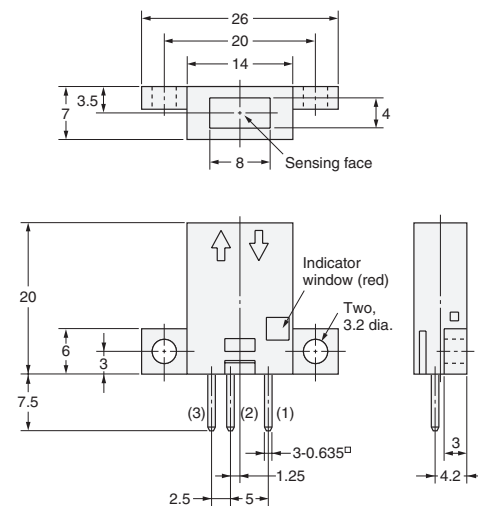
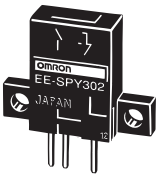
EE-SPY301
EE-SPY401



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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