Built-in Power Supply Photoelectric Sensor

E3JM

Model Contribute to Overall Cost Reduction

**E3JM Terminal Block Models**

- Easy to wire and adjust.

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

Be sure to read Safety Precautions on page 6.

### Ordering Information

**Sensors** *(Refer to Dimensions on page 8.)*

<table>
<thead>
<tr>
<th>Sensing method</th>
<th>Appearance</th>
<th>Connection method</th>
<th>Sensing distance</th>
<th>Operation mode</th>
<th>Output configuration</th>
<th>Functions</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through-beam (Emitter + Receiver)*</td>
<td>Terminal block</td>
<td>-</td>
<td>10 m (switch selectable)</td>
<td>Relay</td>
<td>--</td>
<td></td>
<td>E3JM-10M4-NN</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E3JM-10M4-G-NN, E3JM-10M4-NN-US</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DC SSR</td>
<td></td>
<td></td>
<td>E3JM-10M4T-NN, E3JM-10M4T-G-NN, E3JM-10M4T-NN-US</td>
</tr>
<tr>
<td>Retro-reflective with MSR function</td>
<td></td>
<td></td>
<td>4 m</td>
<td>Relay</td>
<td>--</td>
<td></td>
<td>E3JM-R4M4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E3JM-R4M4-G, E3JM-R4M4-US</td>
</tr>
<tr>
<td>Diffuse-reflective</td>
<td></td>
<td></td>
<td>700 mm</td>
<td></td>
<td></td>
<td></td>
<td>E3JM-R4S4, E3JM-R4S4-G, E3JM-R4S4-US</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E3JM-R4S4-G, E3JM-R4S4-US</td>
</tr>
</tbody>
</table>

*Through-beam Sensors are sold in sets that include both the Emitter and Receiver. An order for the Emitter or Receiver alone cannot be accepted. Note: Tightening nuts, washers, and rubber bushings are not provided with UL-listed models.

### Accessories (Order Separately)

**Slit** *(A Slit is not provided with the Sensor for through-beam. Order a Slit separately if required.)* *(Refer to Dimensions on page 8.)*

<table>
<thead>
<tr>
<th>Slit width</th>
<th>Sensing distance</th>
<th>Minimum detectable object (reference value)</th>
<th>Model</th>
<th>Quantity</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mm × 20 mm</td>
<td>E3JM-10-4(T)-NN</td>
<td>1.2 m 1-mm dia.</td>
<td>E39-S39</td>
<td>1</td>
<td>Slit each for the Emitter and Receiver (2 Slits total) Can be used with the E3JM-10-4(T)-NN, E3JM-10-4(T)-G-NN and E3JM-10-4(T)-NN-US Models.</td>
</tr>
</tbody>
</table>

**Reflectors** *(A Reflector is required for each Retro-reflective Sensor.)*

The E39-R1 Reflector is provided with the Sensor. Order other Reflectors separately if required. *(Refer to Dimensions on E39-L/E39-S/E39-R)*

<table>
<thead>
<tr>
<th>Name</th>
<th>Sensing distance</th>
<th>Model</th>
<th>Quantity</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflectors</td>
<td>E3JM-R4-4(T)</td>
<td>E39-R1</td>
<td>1</td>
<td>Provided with the E3JMR4-4(T), E3JM-R4-4(T)-G and E3JM-R4-4(T)-US Models.</td>
</tr>
</tbody>
</table>

Note: Refer to Reflectors on E39-L/E39-S/E39-R on your OMRON website for details.

### Mounting Bracket

Some Mounting Brackets are provided with the Sensor. Order other Mounting Brackets separately if required. *(Refer to E39-L/E39-S/E39-R)*
**Mounting Bracket**

Some Mounting Brackets are provided with the Sensor. Order other Mounting Brackets separately if required. (Refer to E39-L/E39-S/E39-R)

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
<th>Quantity</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="E39-L53" /></td>
<td>E39-L53</td>
<td>1</td>
<td>Provided with the E3JM.</td>
</tr>
<tr>
<td><img src="image" alt="E39-L51" /></td>
<td>E39-L51</td>
<td>1</td>
<td>Height of optical axis can be adjusted.</td>
</tr>
</tbody>
</table>

## Ratings and Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>Through-beam model</th>
<th>Retro-reflective model (with MSR function)</th>
<th>Diffuse-reflective model</th>
</tr>
</thead>
</table>

### Sensing method

- **Through-beam model**
- **Retro-reflective model (with MSR function)**
- **Diffuse-reflective model**

### Sensing distance

- **E3JM-10**: 10 m
- **E3JM-R4**: 4 m (When using E39-R1)
- **E3JM-DS70**: White paper (200 x 200 mm): 700 mm

### Standard sensing object

- Opaque: 14.8-mm dia. min.
- Opaque: 75-mm dia. min.
- ---

### Differential travel

- **E3JM-10**: 20% max. of sensing distance
- **E3JM-R4**: ---
- **E3JM-DS70**: ---

### Directional angle

- **E3JM-10**: Both Emitter and Receiver 3° to 20°
- **E3JM-R4**: 1° to 5°
- **E3JM-DS70**: ---

### Light source (wavelength)

- **E3JM-10**: Infrared LED (950 nm)
- **E3JM-R4**: Red LED (660 nm)
- **E3JM-DS70**: Infrared LED (950 nm)

### Power supply voltage

- **DC**: 12 to 240 VDC±10%, ripple (p-p): 10% max.
- **AC**: 24 to 240 VAC±10%, 50/60 Hz

### Power consumption

- **DC**: 3 W max. (Emitter 1 W max. Receiver 2 W max.)
- **AC**: 3 W max. (Emitter 1 W max. Receiver 2 W max.)

### Control output

- **Relay output**: (E3JM-10-4(T)(-NN) model): SPDT, 250 VAC, 3A (cos φ=1) max., 5 VDC, 10 mA max.
- **DC SSR output**: (E3JM-10-4(T)(-NN-US) model): 48 VDC, 100 mA max. (residual voltage: 2 V max.)

### Life expectancy (relay output)

- **Mechanical**: 50,000,000 times min. (switching frequency: 18,000 times/h)
- **Electrical**: 100,000 times min. (switching frequency: 1,800 times/h)

### Response time

- **Relay output**: (E3JM-10-4(T)(-NN) models) Operate or reset: 30 ms max.
- **DC SSR output**: (E3JM-10-4(T)(-NN-US) models) Operate or reset: 5 ms max.

### Sensitivity adjustment

- --- One-turn adjuster

### Timer function

- ON-delay/Off-delay/One-shot delay switch selectable
- Delay time: 0.1 to 5 s (adjustable), only for E3JM-10-4(T)(-NN)

### Ambient illumination (Receiver side)

- Incandescent lamp: 3,000 lx max.

### Ambient temperature range

- Operating: -25°C to 55°C, Storage: -30°C to 70°C (with no icing or condensation)

### Ambient humidity range

- Operating: 45% to 95% (with no condensation), Storage: 35% to 95% (with no condensation)

### Insulation resistance

- 20 MΩ min. at 500 VAC

### Dielectric strength

- 2,000 VAC, 50/60 Hz for 1 min.

### Vibration resistance

- **Destruction**: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions
- **Malfunction**: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions

### Shock resistance

- **Destruction**: 500 m/s² 3 times each in X, Y, and Z directions
- **Malfunction**: 100 m/s² 3 times each in X, Y, and Z directions

### Degree of protection

- IEC 60529: IP66

### Connection method

- Terminal block

### Weight (packed state)

- Approx. 270 g
- Approx. 160 g

### Material

- **Case**: ABS (Acrylonitril Butadiene Styrene)
- **Lens**: Methacrylic resin
- **Cover**: Polycarbonate
- **Mounting Bracket**: Iron

### Accessories

- Mounting Bracket (with screw), Nuts, Terminal Protection Cover, One set of cable connection nuts (excluding -US Models), Instruction manual, Reflector (E39-R1: only for Retro-reflective Sensors)

*The timer cannot be disabled for models with timer functions (E3JM-10-4(T)(-NN-US)).
Engineering Data (Reference Value)

Parallel Operating Range

Through-beam
E3JM-10□4(T)-NN

Through-beam
E3JM-10□4(T)-NN + E39-S39 (Optional Slit)
(A Slit is mounted to the Emitter and Receiver.)

Retro-reflective
E3JM-R4□4(T) + E39-R1
(Supplied Reflector)

Operating Range

Diffuse-reflective
E3JM-DS70□4(T)

Sensing Object Size vs. Sensing Distance

E3JM-DS70□4(T)
### Relay Output Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Timing chart</th>
<th>Output circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3JM-10M4(T)(-G)-NN(-US)</td>
<td></td>
<td><img src="image1" alt="Relay Output Model Diagram" /></td>
</tr>
<tr>
<td>E3JM-10M4(T)(-G)-NN(-US)</td>
<td></td>
<td><img src="image2" alt="Relay Output Model Diagram" /></td>
</tr>
<tr>
<td>E3JM-10M4(T)(-G)-NN(-US)</td>
<td></td>
<td><img src="image3" alt="Relay Output Model Diagram" /></td>
</tr>
<tr>
<td>Refer to page 6 for information on Sensors with timers (T).</td>
<td></td>
<td><img src="image4" alt="Relay Output Model Diagram" /></td>
</tr>
</tbody>
</table>

### DC SSR Output Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Timing chart</th>
<th>Output circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3JM-10S4(T)(-G)-NN(-US)</td>
<td></td>
<td><img src="image5" alt="DC SSR Output Model Diagram" /></td>
</tr>
<tr>
<td>E3JM-10S4(T)(-G)-NN(-US)</td>
<td></td>
<td><img src="image6" alt="DC SSR Output Model Diagram" /></td>
</tr>
<tr>
<td>E3JM-10S4(T)(-G)-NN(-US)</td>
<td></td>
<td><img src="image7" alt="DC SSR Output Model Diagram" /></td>
</tr>
<tr>
<td>Refer to page 6 for information on Sensors with timers (T).</td>
<td></td>
<td><img src="image8" alt="DC SSR Output Model Diagram" /></td>
</tr>
</tbody>
</table>

Note: Connect terminal 1 to any polarity and terminal 2 to the power supply because there is no polarity on the Emitter side.  
# This is the light indicator on Sensors without a timer and the operation indicator on Sensors with a timer.
**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.

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**Precautions for Correct Use**

Do not use the product in atmospheres or environments that exceed product ratings.

- **Designing**

  **Operation**

  Note: The white part of the DIP switch indicates which setting is selected.

<table>
<thead>
<tr>
<th>Switch configuration</th>
<th>Switch selection</th>
<th>Timing charts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Models without timer</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MODE</td>
<td>D·ON L·ON</td>
<td></td>
</tr>
<tr>
<td><strong>Operation selector</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MODE</td>
<td>0 D·ON L·ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 D·ON L·ON</td>
<td></td>
</tr>
<tr>
<td><strong>Operation selector</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MODE</td>
<td>0 D·ON L·ON</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 D·ON L·ON</td>
<td></td>
</tr>
</tbody>
</table>

- **Models with timer**

  **Operation selector**

  Note: The operation selector is the same as that for models without a timer.

  | MODE | D·ON L·ON | | |
  | 0 ON Off | | |
  | 1 ON Off | | |

**Output Relay Contact**

If E3JM is connected to a load with contacts that spark when the load is turned OFF (e.g., a contactor or valve), the normally-closed side may be turned ON before the normally-open side is turned OFF or vice-versa. If both normally-open output and normally-closed output are used simultaneously, apply a surge suppressor to the load.
● Wiring

Connecting and Wiring

• We recommend connecting a cable with a conductor cross-section of 0.3 mm² and an outer diameter of 6 to 8 mm.
• Be sure to firmly tighten the cover in order to maintain waterproof and dustproof properties. The screw size of the conduit sockets is shown in the following table.

<table>
<thead>
<tr>
<th>Model</th>
<th>Conduit socket thread size</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3JM-PF1/2</td>
<td>PF1/2</td>
</tr>
<tr>
<td>E3JM-PG13.5</td>
<td>PG13.5</td>
</tr>
<tr>
<td>E3JM-1/2-14NPT</td>
<td>1/2-14NPT</td>
</tr>
</tbody>
</table>

• When using the DC SSR output model, the total of the load current for the Light-ON output (NO) and that for the Dark-ON (NC) should be 100 mA max. If the total exceeds 100 mA, the load short-circuit protection function will be activated (this function will be reset when the power of the Photoelectric Sensor is turned OFF).

Cable End Treatment

Adjust the four wires to the same length when the Ta output is to be used only. If both the Ta and Tb outputs are to be used, treat them as shown in the following diagram.

Recommended example

Recommended Crimp Terminal Dimensions (Unit: mm)

<table>
<thead>
<tr>
<th>Round type</th>
<th>Fork type</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 max. 3.6 dia. min.</td>
<td>7 max. 3.6 dia. min.</td>
</tr>
<tr>
<td>19 max</td>
<td></td>
</tr>
</tbody>
</table>

Note: Use terminals with insulation tube (recommended crimp terminal: 1.25 to 3.5).

● Others

Terminal Protection Cover (Provided)

The terminal protection cover is designed to improve safety by maintaining the sensitivity properties of the product and by preventing any contact with charged sections while it is being operated with the mode set to the timer mode. Mount the product as shown in the following diagram (mount the Through-beam Model on the Receiver side).

Ambient Conditions (Installation Area)

The E3JM will malfunction if installed in the following places.
• Places where the E3JM is exposed to a dusty environment.
• Places where corrosive gases are produced.

★ These parts are not provided with models with a -US suffix.

Recommended example

* These parts are not provided with models with a -US suffix.
Dimensions

**E3JM**

(Unit: mm)

### Sensors

**E3JM-10×4(T)-NN**

**E3JM-10×4(T)-G-NN**

**E3JM-10×4(T)-NN-US**

**E3JM-R4×4(T)**

**E3JM-R4×4(T)-G**

**E3JM-R4×4(T)-US**

**E3JM-DS70×4(T)**

**E3JM-DS70×4(T)-G**

**E3JM-DS70×4(T)-US**

**With Mounting Bracket Attached**

**With Mounting Bracket Attached**

#### Mounting Holes

Two, M6

Two, M6

#### Notes:

1. Emitter: Power indicator
   
2. Receiver: Light indicator (without timer function)
   
3. Operation indicator (with timer function)

#### Accessories (Order separately)

**Seal-type Long Slit**

**E39-S39**

**Mounting Brackets**

Refer to E39-L/E39-S/E39-R on your OMRON website for details.

#### Materials:

*Polyester 0.1-mm thick*