Amplifier built-in extraordinarily small and slim size

Smallest body, just 3.5 mm 0.138 in thick

It can be mounted in a very small space as its size is just W10 × H14.5 × D3.5 mm W0.394 × H0.571 × D0.138 in (thru-beam, front sensing type).

Flexible mounting

The diffuse reflective type sensor is front sensing and is so thin that it gives an impression of being just pasted on the mounting base. The thru-beam type is available as front sensing type, as well as, side sensing type, allowing flexible mounting.

A wide variety of narrow-beam type! Light diffusion is approx. 1/2 of standard type.

Less interference with no slit, narrow-pitch can be set.

The pitch of installation is 1/2 of conventional models, so that the close-installation is possible. No cost is necessary to purchase or install a slit.

Possible to sense a minute object less than ø0.5 mm ø0.039 in with no slit.

The series is applicable to sense a minute object without any cost.

Long sensing range of 1 m 3.281 ft with narrow beam

A long 1 m 3.281 ft sensing range is possible with narrow beam.
APPLICATIONS

Positioning of PCBs
Detecting ICs
Detecting PCB rack

Detecting wafer cassette
Detecting thin ring
Checking for absence of capacitor in tray

BASIC PERFORMANCE

Electric power saving *

The EX-10 series achieves reductions in power consumption of up to 65%. These sensors contribute to environmental friendliness.
* Effective from production in October 2010.

High-speed response time: 0.5 ms

The sensor is suitable for detecting small and high-speed traveling objects.

Minimum sensing object: ø1 mm ø0.039 in

EX-11□, EX-11E□, EX-15 and EX-15E are incorporated with ø1 mm ø0.039 in slit masks so that ø1 mm ø0.039 in, or more, object can be detected. Hence, they are suitable for precise positioning or small parts detection.

Long sensing range: 1 m 3.281 ft

A sensing range of 1 m 3.281 ft has been realized with a slim size of just 3.5 mm 0.138 in. It can be used to detect even wide IC trays.

Background suppression

Hardly affected by background
Even a specular background separated by 100 mm 3.937 in, or more, is not detected. (However, the background should be directly opposite. A spherical or curved background may be detected.)

Black object reliably detected
It can reliably detect dark color objects since it is convergent reflective type.

Electric power saving *

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Ultra-slim Photoelectric Sensor  EX-10 SERIES Ver.2

**ENVIRONMENTAL RESISTANCE**

Incorporated an inverter countermeasure circuit *

The EX-10 series become significantly stronger against inverter light and other extraneous light.

* Effective from production in October 2010.

Waterproof IP67

The sensor can be hosed down because of its IP67 construction and the non-corrosive stainless steel mounting bracket.

Note: However, take care that if it is exposed to water splashes during operation, it may detect a water drop itself.

**MOUNTING / SIZE**

Mountable with M3 screws

Non-corrosive stainless steel type sensor mounting bracket is also available.

- **MS-EX10-1**  
  [Cold rolled carbon steel (SPCC)]

- **MS-EX10-11**  
  [Stainless steel (SUS304)]

- **MS-EX10-2**  
  [Cold rolled carbon steel (SPCC)]

- **MS-EX10-12**  
  [Stainless steel (SUS304)]

- **MS-EX10-3**  
  [Cold rolled carbon steel (SPCC)]

(Bending durability)

Flexible cable type EX□-□R is available. It is most suitable for moving parts, such as robot arm, etc.

**FUNCTIONS**

A Bright 2-color indicator

A convenient 2-color indicator has been incorporated in the miniature body.

**OTHERS**

Less resources used *

Based on environmental considerations, simplified packaging is used in order to reduce waste. In addition, the bag is made from polyethylene which produces no toxic gases even when burned.

* Effective from production in October 2010.
## ORDER GUIDE

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<th>Type</th>
<th>Appearance</th>
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<td></td>
<td>EX-11B</td>
<td>EX-11B-PN</td>
<td>Dark-ON</td>
</tr>
<tr>
<td></td>
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<td>EX-13A</td>
<td>EX-13A-PN</td>
<td>Light-ON</td>
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<td></td>
<td>EX-13B</td>
<td>EX-13B-PN</td>
<td>Dark-ON</td>
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<td></td>
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<td>EX-13A</td>
<td>EX-13A-PN</td>
<td>Light-ON</td>
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<td>EX-13B</td>
<td>EX-13B-PN</td>
<td>Dark-ON</td>
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<td></td>
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<td></td>
<td>EX-13B</td>
<td>EX-13B-PN</td>
<td>Dark-ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EX-15</td>
<td>EX-15-PN</td>
<td>Switchable either Light-ON or Dark-ON</td>
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<td>EX-17</td>
<td>EX-17-PN</td>
<td>Switchable either Light-ON or Dark-ON</td>
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<td></td>
<td></td>
<td></td>
<td>EX-14A</td>
<td>EX-14A-PN</td>
<td>Light-ON</td>
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<td></td>
<td></td>
<td>EX-14B</td>
<td>EX-14B-PN</td>
<td>Dark-ON</td>
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<td></td>
<td>EX-11A</td>
<td>EX-11A-PN</td>
<td>Light-ON</td>
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<td></td>
<td></td>
<td>EX-11B</td>
<td>EX-11B-PN</td>
<td>Dark-ON</td>
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<td></td>
<td></td>
<td>EX-13A</td>
<td>EX-13A-PN</td>
<td>Light-ON</td>
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<td>EX-13B</td>
<td>EX-13B-PN</td>
<td>Dark-ON</td>
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<td>EX-13A</td>
<td>EX-13A-PN</td>
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<td>EX-13B</td>
<td>EX-13B-PN</td>
<td>Dark-ON</td>
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<td>EX-13B</td>
<td>EX-13B-PN</td>
<td>Dark-ON</td>
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<td>EX-15</td>
<td>EX-15-PN</td>
<td>Switchable either Light-ON or Dark-ON</td>
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<td>EX-17</td>
<td>EX-17-PN</td>
<td>Switchable either Light-ON or Dark-ON</td>
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<td>EX-14A</td>
<td>EX-14A-PN</td>
<td>Light-ON</td>
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<td>EX-14B</td>
<td>EX-14B-PN</td>
<td>Dark-ON</td>
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<td>EX-11A</td>
<td>EX-11A-PN</td>
<td>Light-ON</td>
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<td>EX-11B</td>
<td>EX-11B-PN</td>
<td>Dark-ON</td>
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<td>EX-13A</td>
<td>EX-13A-PN</td>
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<td>EX-13B</td>
<td>EX-13B-PN</td>
<td>Dark-ON</td>
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<td>EX-13A-PN</td>
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<td>EX-13B</td>
<td>EX-13B-PN</td>
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<td></td>
<td></td>
<td>EX-13B</td>
<td>EX-13B-PN</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>EX-15</td>
<td>EX-15-PN</td>
<td>Switchable either Light-ON or Dark-ON</td>
</tr>
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<td></td>
<td>EX-14A</td>
<td>EX-14A-PN</td>
<td>Light-ON</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EX-14B</td>
<td>EX-14B-PN</td>
<td>Dark-ON</td>
</tr>
</tbody>
</table>

**Flexible cable type**

Flexible cable type is also available for NPN output type. (excluding narrow beam type EX-□S□: and sensor with operation mode switch on the bifurcation EX-15-J17□:)

When ordering this type, suffix “-R” to the model No.
(e.g.) Flexible cable type of EX-11A is “EX-11A-R”.

**5 m 16.404 ft cable length type**

5 m 16.404 ft cable length type (standard: 2 m 6.562 ft) is also available for NPN output type. (excluding narrow beam type EX-□S□: and flexible cable type)

When ordering this type, suffix “-CS” to the model No.
(e.g.) 5 m 16.404 ft cable length type of EX-11A is “EX-11A-CS”.

---

**NOTE:** Mounting bracket is not supplied with the sensor. Please select from the range of optional sensor mounting brackets (MS-EX10-□). Sensor mounting brackets (MS-EX10-□) can not be used for the narrow beam type (EX-□S□).

Notes:
1. The sensor does not detect even a specular background if it is separated by 100 mm or more. (However, the background should be directly opposite. A spherical or curved background may be detected.)
2. The model No. with "P" shown on the label affixed to the thru-beam type sensor is the emitter, "D" shown on the label is the receiver.
NOTE: Sensor mounting brackets cannot be used for the narrow beam type (EX-□S□).

<table>
<thead>
<tr>
<th>Designation</th>
<th>Model No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-EX10-1</td>
<td></td>
<td>Mounting bracket for the front sensing type sensor [Cold rolled carbon steel (SPCC)] (The thru-beam type sensor needs two brackets.)</td>
</tr>
<tr>
<td>MS-EX10-2</td>
<td></td>
<td>Mounting bracket for the side sensing type sensor [Cold rolled carbon steel (SPCC)] (The thru-beam type sensor needs two brackets.)</td>
</tr>
<tr>
<td>MS-EX10-3</td>
<td></td>
<td>L-shaped mounting bracket sensor [Cold rolled carbon steel (SPCC)] (The thru-beam type sensor needs two brackets.)</td>
</tr>
<tr>
<td>MS-EX10-11</td>
<td></td>
<td>Mounting bracket for the front sensing type sensor [Stainless steel (SUS304)] (The thru-beam type sensor needs two brackets.)</td>
</tr>
<tr>
<td>MS-EX10-12</td>
<td></td>
<td>Mounting bracket for the side sensing type sensor [Stainless steel (SUS304)] (The thru-beam type sensor needs two brackets.)</td>
</tr>
<tr>
<td>MS-EX10-13</td>
<td></td>
<td>L-shaped mounting bracket [Stainless steel (SUS304)] (The thru-beam type sensor needs two brackets.)</td>
</tr>
</tbody>
</table>

Sensor mounting bracket (Note 1)

**Slit mask**

- **OS-EX10-12** (Slit size ø1.2 mm ø0.047 in)
  - Slit on one side: Sensing range: 600 mm 23.622 in \[EX-19-\] 250 mm 9.843 in \[EX-12-\], Min. sensing object: ø2 mm ø0.079 in
  - Slit on both sides: Sensing range: 400 mm 15.748 in \[EX-19-\] 200 mm 7.874 in \[EX-12-\], Min. sensing object: ø1.2 mm ø0.047 in

- **OS-EX10-15** (Slit size ø1.5 mm ø0.059 in)
  - Slit on one side: Sensing range: 800 mm 31.496 in \[EX-19-\] 350 mm 13.780 in \[EX-13-\], Min. sensing object: ø2 mm ø0.079 in
  - Slit on both sides: Sensing range: 500 mm 19.685 in \[EX-19-\] 300 mm 11.811 in \[EX-13-\], Min. sensing object: ø1.5 mm ø0.059 in

- **OS-EX10E-12** (Slit size ø1.2 mm ø0.047 in)
  - Slit on one side: Sensing range: 250 mm 9.843 in \[EX-13E-\] 150 mm 5.906 in \[EX-17E-\], Min. sensing object: ø2 mm ø0.079 in
  - Slit on both sides: Sensing range: 200 mm 7.874 in \[EX-13E-\] 130 mm 5.118 in \[EX-17E-\], Min. sensing object: ø1.2 mm ø0.047 in

**Sensor checker**

- CHX-SC2
  - It is useful for beam alignment of thru-beam type sensors. The optimum receiver position is given by indicators, as well as an audio signal.

**Mounting screw**

- MS-M2
  - Mounting screws with washers (50 pcs. lot). It can mount securely as it is spring washer attached.

Notes:
1) Can not be used for the narrow beam type (EX-□S□).
2) Refer to p.980 for details of the sensor checker CHX-SC2.
## SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Thru-beam standard type</th>
<th>Thru-beam standard type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model No. (Note 2)</td>
<td>Light-ON</td>
<td>Dark-ON</td>
</tr>
<tr>
<td></td>
<td>EX-11A(-PN)</td>
<td>EX-11B(-PN)</td>
</tr>
<tr>
<td></td>
<td>EX-11EA(-PN)</td>
<td>EX-11EB(-PN)</td>
</tr>
<tr>
<td>Sensing range</td>
<td>150 mm 5.906 in</td>
<td>500 mm 19.685 in</td>
</tr>
<tr>
<td>Min. sensing object</td>
<td>ø1 mm ±0.039 in opaque object (Completely beam interrupted object) Setting distance between emitter and receiver: 150 mm 5.906 in</td>
<td>ø2 mm ±0.079 in opaque object (Completely beam interrupted object) Setting distance between emitter and receiver: 500 mm 19.685 in</td>
</tr>
<tr>
<td>Hysteresis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>0.05 mm ±0.002 in or less</td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>12 to 24 V DC ±10 % Ripple P-P 10 % or less</td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>Emitter: 10 mA or less, Receiver: 10 mA or less</td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>&lt;NPN output type&gt; NPN open-collector transistor • Maximum sink current: 50 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 2 V or less (at 50 mA sink current) 1 V or less (at 16 mA sink current)</td>
<td>&lt;PNP output type&gt; PNP open-collector transistor • Maximum source current: 50 mA • Applied voltage: 30 V DC or less (between output and +V) • Residual voltage: 2 V or less (at 50 mA source current) 1 V or less (at 16 mA source current)</td>
</tr>
<tr>
<td>Utilization category</td>
<td>DC-12 or DC-13</td>
<td></td>
</tr>
<tr>
<td>Short-circuit protection</td>
<td>Incorporated</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>0.5 ms or less</td>
<td></td>
</tr>
<tr>
<td>Operation indicator</td>
<td>Orange LED (lights up when the output is ON)</td>
<td></td>
</tr>
<tr>
<td>Incident beam indicator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stability indicator</td>
<td>Green LED (lights up under stable light received condition or stable dark condition)</td>
<td></td>
</tr>
<tr>
<td>Pollution degree</td>
<td>3 (Industrial environment)</td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td>IP67 (IEC)</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>−25 to +55 °C −13 to +131 °F (No dew condensation or icing allowed), Storage: −30 to +70 °C −22 to +158 °F</td>
<td></td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>35 to 85 % RH, Storage: 35 to 85 % RH</td>
<td></td>
</tr>
<tr>
<td>Ambient illuminance</td>
<td>Incandescent light: 3,000 fL at the light-receiving face</td>
<td></td>
</tr>
<tr>
<td>EMC</td>
<td>EN 60947-5-2</td>
<td></td>
</tr>
<tr>
<td>Voltage withstandability</td>
<td>1,000 V AC for one min. between all supply terminals connected together and enclosure</td>
<td></td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>20 MQ, or more, with 250 V DC megger between all supply terminals connected together and enclosure</td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>10 to 500 Hz frequency, 3 mm 0.118 in amplitude in X, Y and Z directions for two hours each</td>
<td></td>
</tr>
<tr>
<td>Shock resistance</td>
<td>500 m/s² acceleration (50 G approx.) in X, Y and Z directions for three times each</td>
<td></td>
</tr>
<tr>
<td>Emitting element</td>
<td>Red LED (Peak emission wavelength: 680 nm 0.027 mil (EX-19E:: 624 nm 0.025 mil), modulated)</td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Enclosure: Polyethylene terephthalate Lens: Polylyate</td>
<td></td>
</tr>
<tr>
<td>Cable (Note 5)</td>
<td>0.1 mm² 3-core (thru-beam type emitter: 2-core) flexible cable, 2 m 6.562 ft long</td>
<td></td>
</tr>
<tr>
<td>Cable extension</td>
<td>Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver)</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx</td>
<td></td>
</tr>
<tr>
<td>Accessories</td>
<td>Mounting screws: 1 set</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C ±73.4 °F.
2) Model Nos. having the suffix “-PN” are PNP output type.
3) The flexible cable type (model Nos. having suffix “-R”) has a 0.1 mm² 3-core (thru-beam type emitter: 2-core) flexible cable, 2 m 6.562 ft long.
### SPECIFICATIONS

#### Type
- **Thru-beam - narrow beam type**
  - Front sensing: Light-ON
  - Side sensing: Dark-ON
  - Model No.: EX-11SA(PN)
  - Sensing range: 150 mm
  - Min. sensing object: ø0.5 mm opaque object
  - Hysteresis: 5% or less of optical distance
  - Repeatability: 0.05 mm or less
  - Supply voltage: 12 to 24 V DC
  - Current consumption: 10 mA or less
  - Output: NPN open-collector transistor
  - Protection: IP67 (IEC)
  - Shock resistance: 35 to 85 % RH
  - Vibration resistance: 5 m/s²
  - Pollution degree: 3 (Industrial environment)
  - Protection: EN 60947-5-2
  - Emission: Red LED
  - Material: Enclosure: Polyethylene terephthalate
    - Lens: Polylute
  - Cable (Note 6): 0.1 mm² 3-core (thru-beam type emitter: 2-core) flexible cable, 2 m
  - Weight: Net weight (each emitter and receiver): 20 g approx.
  - Accessories: Mounting screws: 1 set

- **Thru-beam - with operation mode switch on bifurcation**
  - Front sensing: Light-ON
  - Side sensing: Dark-ON
  - Model No.: EX-11SA(PN)
  - Sensing range: 150 mm
  - Min. sensing object: ø0.5 mm opaque object
  - Hysteresis: 5% or less of optical distance
  - Repeatability: 0.05 mm or less
  - Supply voltage: 12 to 24 V DC
  - Current consumption: 10 mA or less
  - Output: NPN open-collector transistor
  - Protection: IP67 (IEC)
  - Shock resistance: 35 to 85 % RH
  - Vibration resistance: 5 m/s²
  - Pollution degree: 3 (Industrial environment)
  - Protection: EN 60947-5-2
  - Emission: Red LED
  - Material: Enclosure: Polyethylene terephthalate
    - Lens: Polylute
  - Cable (Note 6): 0.1 mm² 3-core (thru-beam type emitter: 2-core) flexible cable, 2 m
  - Weight: Net weight (each emitter and receiver): 20 g approx.
  - Accessories: Mounting screws: 1 set

#### Notes:
1. Where measurement conditions have not been specified precisely, the conditions were used at an ambient temperature of +23 °C ± 3.4 °F.
2. Model Nos. having the suffix "-PN" are PNP output type.
3. Either Light-ON or Dark-ON can be selected by the operation mode switch.
4. The sensing range and the hysteresis of convergent reflective type sensor are specified for white non-glossy paper (50 × 50 mm 1.969 × 1.969 in) as the object.
5. The min. sensing objects are specified in case the emitter / receiver sensing range is to set the maximum.
6. The flexible cable type (model Nos. having suffix "-*") has a 0.1 mm² 3-core (thru-beam type emitter: 2-core) flexible cable, 2 m.
I/O CIRCUIT AND WIRING DIAGRAMS

EX-11, EX-11S, EX-13, EX-13S, EX-19, EX-19S, EX-14
NPN output type

I/O circuit diagram

Color code
(Brown) +V
(Black) Output (Note)
(Blue) 0 V

Load

Internal circuit
Users’ circuit

Note: The emitter of the thru-beam type sensor does not incorporate the output.

Symbols … D1: Reverse supply polarity protection diode
D2: Reverse output polarity protection diode
ZD: Surge absorption zener diode
Tr: NPN output transistor

Wiring diagram

Brown
Black (Note)
Blue

Load

12 to 24 V DC ±10 %

Note: The emitter of the thru-beam type sensor does not incorporate the black wire.

EX-11S-PN, EX-13S-PN, EX-19S-PN, EX-14-PN
PNP output type

I/O circuit diagram

Color code
(Brown) +V
(Black) Output (Note)
(Blue) 0 V

Load

Internal circuit
Users’ circuit

Note: The emitter of the thru-beam type sensor does not incorporate the output.

Symbols … D1: Reverse supply polarity protection diode
D2: Reverse output polarity protection diode
ZD: Surge absorption zener diode
Tr: PNP output transistor

Wiring diagram

Brown
Black (Note)
Blue

Load

12 to 24 V DC ±10 %

Note: The emitter of the thru-beam type sensor does not incorporate the black wire.

EX-15, EX-15E, EX-17, EX-17E
NPN output type

I/O circuit diagram

Color code
(Brown) +V
(Black) Output
(Blue) 0 V

Load

Internal circuit
Users’ circuit

Symbols … D1: Reverse supply polarity protection diode
D2: Reverse output polarity protection diode
ZD: Surge absorption zener diode
Tr: NPN output transistor

Wiring diagram

Brown
Black
Blue

Load

12 to 24 V DC ±10 %

Note: The emitter of the thru-beam type sensor does not incorporate the black wire.

EX-15, EX-15E, EX-17, EX-17E wiring diagram
**SENSING CHARACTERISTICS (TYPICAL)**

### Thru-beam type

#### Parallel deviation

- **EX-11E**
- **EX-15E**

#### Angular deviation

- **EX-17E**

*Optical properties of side sensing types (EX-□E□)

Due to the optical properties of side sensing types, note that sensing may be affected if multiple sensors are positioned in such a way that optical axes intersect as shown in the diagram below.

- Beam from Emitter 1 may be caught by Receiver 2.
- There is no problem when sensors are installed in parallel (although the distance between sensors should be $t \times 2$ or more).

#### Parallel deviation with slit

- **EX-13E**
- **EX-17E**

#### Thru-beam type

- **EX-19E**

### Thru-beam type

#### Parallel deviation

- **EX-19E**

#### Angular deviation

- **EX-17E**

### Thru-beam type

#### Parallel deviation

- **EX-11S**
- **EX-11SE**

#### Parallel deviation

- **EX-13S**
- **EX-13SE**

#### Parallel deviation

- **EX-15S**
- **EX-15SE**

### Thru-beam type

#### Parallel deviation

- **EX-19S**
**SENSING CHARACTERISTICS (TYPICAL)**

**EX-14□**

**Sensing fields**
- Horizontal (left and right) direction
- Vertical (up and down) direction

**Correlation between lightness and sensing range**

The sensing region (typical) is represented by oblique lines in the left figure. However, the sensitivity should be set with enough margin because of slight variation in products.

**Correlation between material (50 × 50 mm 1.969 × 1.969 in) and sensing range**

The bars in the graph indicate the sensing range (typical) for the respective material. However, there is a slight variation in the sensing range depending on the product. Further, if there is a reflective object (conveyor, etc.) in the background of the sensing object, since it affects the sensing, separate it by more than twice the sensing range shown in the left graph.

**PRECAUTIONS FOR PROPER USE**

- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

**Mounting**

- In case of mounting on tapped holes (Unit: mm in)

  **Side sensing**

  ![Side sensing diagram]

  The tightening torque should be 0.2 N·m or less.

- In case of using attached screws and nuts (Unit: mm in)

  **Side sensing**

  ![Side sensing diagram]

  The tightening torque should be 0.2 N·m or less.
The CAD data in the dimensions can be downloaded from our website.
**DIMENSIONS (Unit: mm in)**

The CAD data in the dimensions can be downloaded from our website.

**EX-14**

![Diagram of EX-14 sensor](image)

- Stability indicator (Green)
- Operation indicator (Orange)

**MS-EX10-1**

- Sensor mounting bracket (Optional)
- Assembly dimensions
- Mounting drawing with EX-14 □

**MS-EX10-2**

- Sensor mounting bracket (Optional)
- Assembly dimensions
- Mounting drawing with EX-11E □ and EX-13E □

Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated)

Two M2 (length 4 mm 0.157 in) pan head screws are attached.

Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated)

Two M2 (length 8 mm 0.315 in) pan head screws are attached.
DIMENSIONS (Unit: mm in)

MS-EX10-3

Assembly dimensions
Mounting drawing with EX-14:

Material: Cold rolled carbon steel (SPCC)
(Uniform chrome plated)

Two M2 (length 4 mm 0.157 in) pan head screws and two M2 (length 8 mm 0.315 in) pan head screws are attached.

MS-EX10-11

Assembly dimensions
Mounting drawing with EX-14:

Material: Stainless steel (SUS304)

Two M2 (length 4 mm 0.157 in) pan head screws [stainless steel (SUS304)] are attached.

MS-EX10-12

Assembly dimensions
Mounting drawing with EX-11E and EX-13E

Material: Stainless steel (SUS304)

Two M2 (length 8 mm 0.315 in) pan head screws [stainless steel (SUS304)] are attached.

The CAD data in the dimensions can be downloaded from our website.
**DIMENSIONS (Unit: mm in)**

**MS-EX10-13**

Material: Stainless steel (SUS304)

Two M2 (length 4 mm 0.157 in) pan head screws [stainless steel (SUS304)] and two M2 (length 8 mm 0.315 in) pan screws [stainless steel (SUS304)] are attached.

Assembly dimensions

Mounting drawing with EX-14:

The CAD data in the dimensions can be downloaded from our website.