Unrivaled

world smallest*
Self-Contained High Precision Laser Sensor

* Based on research conducted by our company as of January 2012
Introducing world smallest* amplifier built-in laser sensor

Due to the customized IC and optical design, high precision detection is fulfilled in a world smallest size with directivity and visibility achievable only by laser. The laser adopted is Class 1 (JIS / IEC / FDA) laser that is safe to use, so that there is no need to separate the areas of sensor usage.

* Based on research conducted by our company as of January 2012

**Thru-beam type (EX-L211, EX-L212)**

- **Minute object detection type (EX-L211)**
  The beam is purposely widened to have a lower beam density and little beam spread so that when detecting minute objects, even a slight change in the light received intensity will not be missed.
  Spot size: 6 × 4 mm 0.236 × 0.157 in approx.
  (Visual reference value at a sensing distance of 1 m 3.281 ft)

- **Long sensing range type (EX-L212)**
  A long range detection of 3 m 9.843 ft is achieved. High precision detection with minimum beam spread is possible even in a long range.
  Spot size: 8 × 5.5 mm 0.315 × 0.217 in approx.
  (Visual reference value at a sensing distance of 1 m 3.281 ft)

**Reflective type (EX-L291)**

- **Long sensing range type**
  Achieving ease of installation and 4 m 13.123 ft long sensing range.
  Spot size: 6 × 4 mm 0.236 × 0.157 in approx.
  (Visual reference value at a sensing distance of 1 m 3.281 ft)

**Spot reflective type (EX-L221)**

- **Minute object detection type**
  Highly precise sensing with minimum 0.01 mm 0.0004 in diameter.
  Many applications are possible due to the 300 mm 11.811 in long sensing range.
  Spot size: ø1 mm ø0.039 in
  (Visual reference value at a sensing distance of 300 mm 11.811 in)

**Convergent reflective type (EX-L261, EX-L262)**

- **Spot type (EX-L261)**
  Highly precise sensing with minimum 0.01 mm 0.0004 in diameter.
  Not affected by the background, and able to reliably sense unevenly-colored workpieces.
  Spot size: ø1 mm ø0.039 in
  (Visual reference value at a sensing distance of 50 mm 1.969 in)

- **Line spot type (EX-L262)**
  Able to sense thin, glossy or curved-surface workpieces due to line beam.
  Spot size: 1 × 5 mm 0.039 × 0.197 in approx.
  (Visual reference value at a sensing distance of 50 mm 1.969 in)

**Sensing range**

<table>
<thead>
<tr>
<th>Type</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minute object detection</td>
<td>1 m 3.281 ft</td>
</tr>
<tr>
<td>Long sensing range</td>
<td>3 m 9.843 ft</td>
</tr>
<tr>
<td>Long sensing range</td>
<td>4 m 13.123 ft</td>
</tr>
<tr>
<td>Reflective type</td>
<td></td>
</tr>
<tr>
<td>Minute object detection</td>
<td>45 mm to 300 mm</td>
</tr>
<tr>
<td></td>
<td>1.772 in to 11.811 in</td>
</tr>
<tr>
<td>Spot type</td>
<td></td>
</tr>
<tr>
<td>Spot</td>
<td>20 mm to 50 mm</td>
</tr>
<tr>
<td></td>
<td>0.787 in to 1.969 in</td>
</tr>
<tr>
<td>Line spot type</td>
<td></td>
</tr>
<tr>
<td>Line</td>
<td>20 mm to 70 mm</td>
</tr>
<tr>
<td></td>
<td>0.787 in to 2.756 in</td>
</tr>
</tbody>
</table>
Stable convergent distance sensing

For sensing when background object presents

Due to convergent distance sensing, the background has very little effect, enabling stable sensing. Sensitivity adjuster allows you to adjust sensitivity to avoid sensing background objects when the distance between the workpiece and background objects is small.

For sensing unevenly-colored workpieces

Able to reliably sense unevenly-colored workpieces.

For sensing thin, glossy or curved-surface workpieces (Line spot type EX-L262)

Able to sense glossy or curved-surface workpieces, such as PCB and metallic pipes, due to a wide line laser beam.
EX-L200 SERIES
Other Features

Same mounting pitch as ultra-compact photoelectric sensor

EX-L200 series has the same mounting pitch as ultra-compact photoelectric sensor EX-20 series so that the time taken in designing is saved.

Strong against water and dust with protection structure IP67

The sensor can be used even in environment where water or dust present because of its protection structure IP67.

Safe Class 1 Lasers

This sensor incorporating safe Class 1 lasers (JIS/IEC/FDA) as its light source. There is no need to use different sensors in different regions such as Europe or North America.

M3 screw used for secure tightening

The mounting holes have metal sleeves inserted to prevent damage to the sensor due to over tightening of the screws. (Tightening torque: 0.5 N•m)

Conductor thickness 1.5 times increased to make wiring easier

The lead wire conductor’s thickness is increased to 0.15 mm\(^2\) from 0.1 mm\(^2\) of the conventional ultra-compact photoelectric sensor. This makes it easier to perform crimping work on the cables for better workability. In addition, the tensile strength of the crimping area has become stronger.

Sensitivity adjuster

(EX-L211, EX-L221, EX-L261, EX-L262, EX-L291)

A sensitivity adjuster of world smallest size is incorporated to offer strong performance in minute detection or high precision detection.

Low current consumption

The laser light source contributes to low current consumption, as it is approx. 5 mA lower than a LED light source.

Switchable output operation

The output operation switching input enables the switching of Light-ON or Dark-ON in one unit. This prevents ordering mistake and reduces the maintenance of spare parts.

15/06/2012
Laser is applicable for various usages.

- Detecting ICs that are out of position in multiple palettes
- Confirming arrival of substrate
- Detecting objects from an opening
- Detecting tip of very thin pipe
- Checking protrusion of wafer
- Determining electric parts position
- Detecting processed holes
- Detecting chip components
- Detecting O-ring
- Checking protrusion of tray in storage
- Determining cutting position of sheet
- Sensing unevenly-colored workpieces
- Sensing only the top 0.9 mm 0.012 in thick PCB
- Sensing glossy or curved-surface workpiece, such as metallic pipes
<table>
<thead>
<tr>
<th>Type</th>
<th>Appearance</th>
<th>Sensing range</th>
<th>Model No.</th>
<th>Emission spot size (Typical)</th>
<th>Sensitivity adjuster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thru-beam</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minute object detection</td>
<td></td>
<td>1 m 3.281 ft</td>
<td>EX-L211</td>
<td>Approx. 6 x 4 mm 0.236 x 0.157 in</td>
<td>Incorporated</td>
</tr>
<tr>
<td>Long sensing range</td>
<td></td>
<td>3 m 9.843 ft</td>
<td>EX-L212</td>
<td>Approx. 8 x 5.5 mm 0.315 x 0.217 in</td>
<td></td>
</tr>
<tr>
<td>Retroreflective</td>
<td></td>
<td></td>
<td>EX-L291</td>
<td>Approx. 6 x 4 mm 0.236 x 0.157 in</td>
<td>Incorporated</td>
</tr>
<tr>
<td>Minute object detection</td>
<td></td>
<td>4 m 13.123 ft</td>
<td>EX-L291-P</td>
<td>(at a sensing distance of 1 m 3.281 ft)</td>
<td></td>
</tr>
<tr>
<td>Spot</td>
<td></td>
<td></td>
<td>EX-L221</td>
<td>ø1 mm ø0.039 in or less (at a sensing distance of 300 mm 11.811 in)</td>
<td>Incorporated</td>
</tr>
<tr>
<td>Convergent reflector</td>
<td></td>
<td></td>
<td>EX-L261</td>
<td>ø1 mm ø0.039 in or less (at a sensing distance of 50 mm 1.969 in)</td>
<td></td>
</tr>
<tr>
<td>Line spot</td>
<td></td>
<td></td>
<td>EX-L262</td>
<td>Approx. 1 x 5 mm 0.038 x 0.197 in (at a sensing distance of 50 mm 1.969 in)</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1) The model No. with “E” shown on the label affixed to the thru-beam type sensor is the emitter, “D” shown on the label is the receiver. (e.g.) Emitter of EX-L211: EX-L211E, Receiver of EX-L211: EX-L211D
2) The sensing range is the value for RF-330 reflector. The sensing range represents the actual sensing range of the sensor. The sensing ranges itemized in “A” of the table below may vary depending on the shape of sensing object. Be sure to check the operation with the actual sensing object.

### M8 pigtailed type and 5 m 16.404 ft cable length type

M8 pigtailed type and 5 m 16.404 ft cable length type (standard: 2 m 6.562 ft) are also available. When ordering these types, suffix “-J” for the M8 pigtailed type, “-C5” for the 5 m 16.404 ft cable length type to the model No. Please order the mating cable for the M8 pigtailed type separately.

(e.g.) M8 pigtailed type of EX-L211-P is “EX-L211-P-J”
5 m 16.404 ft cable length type of EX-L211-P is “EX-L211-P-C5”

#### Mating cable (2 cables are required for the thru-beam type.)

<table>
<thead>
<tr>
<th>Type</th>
<th>Model No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight</td>
<td>CN-24A-C2</td>
</tr>
<tr>
<td></td>
<td>CN-24A-C5</td>
</tr>
<tr>
<td></td>
<td>CN-24A-C2</td>
</tr>
<tr>
<td></td>
<td>CN-24A-C5</td>
</tr>
<tr>
<td>Elbow</td>
<td>CN-24AL-C2</td>
</tr>
<tr>
<td></td>
<td>CN-24AL-C5</td>
</tr>
</tbody>
</table>

#### Package without reflector

Retroreflective type is also available without the reflector.

<table>
<thead>
<tr>
<th>Type</th>
<th>Model No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPN output</td>
<td>PNP output</td>
</tr>
<tr>
<td>Retroreflective type</td>
<td>EX-L291-Y</td>
</tr>
<tr>
<td>M8 pigtailed type</td>
<td>EX-L291-J-Y</td>
</tr>
<tr>
<td>5 m cable length type</td>
<td>EX-L291-C5-Y</td>
</tr>
</tbody>
</table>

**Accessories**

- **MS-EXL2-2** (Mounting plate for thru-beam type): 1 pc.
- **MS-EXL2-3** (Mounting plate for retroreflective / spot reflective / convergent reflective type): 1 pc.
- **RF-330** (Reflector): 1 pc.

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1) The illustration is straight type.
2) The sensing range is specified for white non-glossy paper (100 x 100 mm 3.937 x 3.937 in) as the object.
3) Refer to “OPTIONS” (p.8) for the polarizing filter PF-EXL2-1 and the reflector RF-210.
4) When positioning the reflector nearby, the angular characteristic become more narrow. Adjust the angle of a sensor or reflector.
5) The sensing range is specified for white non-glossy paper (100 x 100 mm 3.937 x 3.937 in) as the object.
### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Type</th>
<th>Thru-beam</th>
<th>Retroreflective</th>
<th>Spot reflective</th>
<th>Convergent reflective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model No.</td>
<td>NPN output</td>
<td>EX-L211</td>
<td>EX-L212</td>
<td>EX-L291</td>
<td>EX-L221</td>
</tr>
<tr>
<td></td>
<td>PNP output</td>
<td>EX-L211-P</td>
<td>EX-L212-P</td>
<td>EX-L291-P</td>
<td>EX-L221-P</td>
</tr>
<tr>
<td>Sensing range</td>
<td>1 m 3.281 ft</td>
<td>3 m 9.843 ft</td>
<td>4 m 13.123 ft</td>
<td>(Note 2)</td>
<td>45 to 300 mm</td>
</tr>
<tr>
<td>Emission spot size (Typical)</td>
<td>Approx. 4 mm 0.157 in (vertical) ( \times ) 15 mm 0.591 in (horizontal) (at a sensing distance of 1 m) ( \left( \text{Note 4} \right) )</td>
<td>Approx. 4.5 mm 0.177 in (vertical) ( \times ) 16 mm 0.630 in (horizontal) (at a sensing distance of 1 m) ( \left( \text{Note 4} \right) )</td>
<td>Approx. 6 mm 0.236 in (vertical) ( \times ) 26 mm 1.024 in (horizontal) (at a sensing distance of 1 m) ( \left( \text{Note 4} \right) )</td>
<td>( \left( \text{at a sensing distance of 1 m} \right) )</td>
<td>( \left( \text{at a sensing distance of 1 m} \right) )</td>
</tr>
<tr>
<td>Sensing object</td>
<td>Opaque object of ø0.3 mm or more</td>
<td>Opaque object of ø2 mm or more</td>
<td>Opaque, transparent or transparent object</td>
<td>Opaque object of ø3 mm or more</td>
<td>Opaque object of ø3 mm or more</td>
</tr>
<tr>
<td>Minimum sensing object (Typical) (Note 5)</td>
<td>Opaque object of ø0.3 mm or more</td>
<td>Opaque object of ø2 mm or more</td>
<td>Opaque, translucent or transparent object</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>( \left( \text{Note 5} \right) )</td>
<td>( \left( \text{Note 5} \right) )</td>
<td>( \left( \text{Note 5} \right) )</td>
<td>( \left( \text{Note 5} \right) )</td>
<td>( \left( \text{Note 5} \right) )</td>
</tr>
<tr>
<td>Repeatability (Typical) (repeatability to sensing axis) (Note 5)</td>
<td>0.01 mm 0.0004 in or less</td>
<td>0.02 mm 0.0008 in or less</td>
<td>0.04 mm 0.0020 in or less</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>12 to 24 V DC ±10 % Ripples: 0.1 % or less</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>Emitter: 10 mA or less, Receiver: 10 mA or less</td>
<td>15 mA or less</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>&lt;NPN output type&gt;</td>
<td>NPN open-collector transistor</td>
<td>Maximum sinking current: 50 mA</td>
<td>Applied voltage: 24.6 V DC or less (between output and 0 V)</td>
<td>Residual voltage: 2 V or less (at 50 mA sink current)</td>
</tr>
<tr>
<td></td>
<td>&lt;PNP output type&gt;</td>
<td>PNP open-collector transistor</td>
<td>Maximum source current: 50 mA</td>
<td>Applied voltage: 26.4 V DC or less (between output and +V)</td>
<td>Residual voltage: 2 V or less (at 50 mA source current)</td>
</tr>
<tr>
<td>Output operation</td>
<td>Light-ON / Dark-ON selectable by the output switching input</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-circuit protection</td>
<td>Incorporated (short-circuit protection / inverse polarity protection)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>0.5 ms or less</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation indicator</td>
<td>Orange LED (lights up when the output is ON) (incorporated on the receiver for thru-beam type)</td>
<td></td>
<td></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) (incorporated on the receiver for thru-beam type)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power indicator</td>
<td>Green LED (lights up when the power is ON) (incorporated on the emitter)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic interference prevention function</td>
<td>Incorporated (Two sensors can be mounted close together.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity adjuster</td>
<td>Continuously variable adjuster (receiver)</td>
<td>Continuously variable adjuster</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td>IP67 (IEC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>(-10 ) to +55 °C (+14 ) to +131 °F ( \left( \text{No dew condensation or icing allowed} \right) )</td>
<td>Storage: (-30 ) to +70 °C (-22 ) to +158 °F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>35 to 85 % RH</td>
<td>Storage: 35 to 85 % RH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient illuminance</td>
<td>Incandescent light: 3,000 lx at the light-receiving face</td>
<td></td>
<td></td>
<td></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>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>10 to 300 Hz, 1.5 mm 0.059 in amplitude (10 G max.) in X, Y and Z directions for two hours each</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock resistance</td>
<td>500 m/s(^2) acceleration (50 G approx.) in X, Y and Z directions for three times each</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emitting element</td>
<td>Red semiconductor laser Class 1 (IEC / JIS / FDA) (Note 6) ( \left( \text{Maximum output} \right) )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Enclosure: Polybutylene terephthalate, Front cover: Acrylic, Lens: Glass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable</td>
<td>0.15 mm(^2) 4-core (emitter of a thru-beam type: 2-core) cable, 2 m 6.562 ft long</td>
<td>Extension up to total 50 m 164.042 ft is possible with 0.3 mm(^2), or more, cable (thru-beam type: both emitter and receiver).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Net weight: Emitter: 45 g approx., Receiver: 45 g approx., Gross weight: 90 g approx.</td>
<td>Net weight: 45 g approx., Gross weight: 60 g approx.</td>
<td></td>
<td></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) The sensing range is the value for RF-330 reflcctor. The sensing range represents the actual sensing range of the sensor. The ranges itemized in \( \text{A} \) of the table below may vary depending on the shape of sensing object. Be sure to check the operation with the actual sensing object. 3) The sensing range is specified for white non-glossy paper \( 100 \times 100 \) mm 3.937 x 3.937 in\( \left( \text{as the object} \right) \). 4) EX-L212\(\text{: In the case sensing distance is 3 m 9.843 ft, the emission spot size is H 17 \times W 11 \) in H 0.669 \times W 0.433 in (visual reference value). 5) Typical values when the sensitivity adjuster is optimally adjusted \(5/06/2012\). 6) This product complies with 21 CFR 1040.10 and 1040.11 Laser Notice No. 50, dated June 24, 2007, issued by CDRH \( \left( \text{Center for Devices and Radiological Health} \right) \) under the FDA (Food and Drug Administration). For details, refer to the Laser Notice No. 50.

### ACCESSORY

- **RF-210**: 21 CFR 1040.10 and 1040.11 Laser Notice No. 50, dated June 24, 2007, issued by CDRH (Center for Devices and Radiological Health) under the FDA (Food and Drug Administration). For details, refer to the Laser Notice No. 50.
## OPTIONS

<table>
<thead>
<tr>
<th>Designation</th>
<th>Model No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor mounting bracket</td>
<td>MS-EXL2-1</td>
<td>Foot angled mounting bracket (The thru-beam type sensor needs two brackets.)</td>
</tr>
<tr>
<td>Universal sensor mounting bracket</td>
<td>MS-EXL2-4</td>
<td>It can adjust the height and the angle of the sensor. (The thru-beam type sensor needs two brackets.)</td>
</tr>
<tr>
<td>Polarizing filter</td>
<td>PF-EXL2-1</td>
<td>Polarizing filter for retroreflective type Stabilizes sensitivity of the reflective surface.</td>
</tr>
<tr>
<td>Reflector</td>
<td>RF-210</td>
<td>For retroreflective type EX-L291: Sensing range: 1.8 m, 5.906 in (Note)</td>
</tr>
<tr>
<td>Reflector mounting bracket</td>
<td>MS-RF21-1</td>
<td>Protective mounting bracket for RF-210 It protects the reflector from damage and maintains alignment.</td>
</tr>
</tbody>
</table>

Note: Set the distance between the reflector and sensor to be at least 0.16 m, 0.525 in. Refer to “ORDER GUIDE” (p.8) for details.

## I/O CIRCUIT DIAGRAMS

### NPN output type

**I/O circuit diagrams**

![Color code of wire / Terminal No. of pigtailed type]

- **Sensor circuit**
  - (Brown / 1) +V
  - (Pink / 2) Output operation switching input (Note 1, 2, 3)
  - (Black / 4) Output (Note 1)
  - (Blue / 3) 0 V

- **Internal circuit**
  - User’s circuit

- **Material: Stainless steel (SUS304)**

- **Two M3 (length 14 mm) screws with washers [stainless steel (SUS)] are attached.**

**Notes:**
1. The emitter of a thru-beam type does not incorporate output (black / 4) and output operation switching input (pink / 2).
2. Be able to select either Light-ON or Dark-ON by wiring the output operation switching input (pink / 2) as shown in the following table.

<table>
<thead>
<tr>
<th>Type</th>
<th>Light-ON</th>
<th>Dark-ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thru-beam retroreflective</td>
<td>Connect to 0 V</td>
<td>Connect to + V or, Open</td>
</tr>
<tr>
<td>Spot reflective</td>
<td>Connect to + V or, Open</td>
<td>Connect to 0 V</td>
</tr>
</tbody>
</table>

* Insulate the output operation switching input wire (pink / 2) when leaving it open.

3. When connecting the mating cable to thepigtailed type, color code of wire is "white".

### PNP output type

**I/O circuit diagrams**

![Color code of wire / Terminal No. of pigtailed type]

- **Sensor circuit**
  - (Brown / 1) +V
  - (Black / 4) Output (Note 1)
  - (Pink / 2) Output operation switching input (Note 1, 2, 3)

- **Internal circuit**
  - User’s circuit

- **Material: Stainless steel (SUS304)**

- **Two M3 (length 14 mm) screws with washers are attached.**

**Connecter pin position (pigtailed type)**

![2 Sensing mode selection input (Note) 3 4 Output (Note)](image)

* Note: The emitter of a thru-beam type does not incorporate output and output operation switching input.

## SENSING CHARACTERISTICS (TYPICAL)

### EX-L211

#### Thru-beam type

**Parallel deviation**

![Graph](image)

**Angular deviation**

![Graph](image)

15/06/2012

### EX-L212

#### Thru-beam type

**Parallel deviation**

![Graph](image)

**Angular deviation**

![Graph](image)
## SENSING CHARACTERISTICS (TYPICAL)

**EX-L291**

### Parallel deviation
- **Horizontal direction**
- **Vertical direction**

### Angular deviation
- **Horizontal direction**
- **Vertical direction**

**EX-L221**

### Sensing field

### Correlation between sensing object size and sensing range

### Correlation between lightness and sensing range

**EX-L261**

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

### Correlation between lightness and sensing range

### Emitted beam

### Correlation between material and sensing range (face-to-face)

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**EX-L200**

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

- Lightness shown on the left may differ slightly from the actual object condition.

- 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, or adjust the sensitivity adjuster. Make sure to confirm detection with an actual sensor.

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*5/6/2012*
**EX-L200**

### Sensing Characteristics (Typical)

**EX-L262**

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

**Emitted beam**

**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 and sensing range (face-to-face)**

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, or adjust the sensitivity adjuster.

Make sure to confirm detection with an actual sensor.

### Precautions for Proper Use

- This catalog is a guide to select a suitable product. Be sure to read the instruction manual attached to the product prior to its 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.

- This product is Class 1 laser in compliance with IEC / JIS and FDA regulations 21 CFR 1040.10 and 1040.11. Do not look at the laser beam through optical system such as a lens.

### Dimensions (Unit: mm in)

**EX-L211(-P)**

- Sensor
- Stability indicator (Green)
- Operation indicator (Orange)
- Sensitivity adjuster
- 8.2 mm 0.323 in
- 6.4 mm 0.252 in
- 6.2 mm 0.244 in
- 0.921 mm 0.036 in
- 0.146 mm 0.004 in

Notes: 1) It is the laser radiation indicator (green) on the emitter.
2) It is incorporated in EX-L211(-P) only.

**EX-L212(-P)**

- Sensor

**EX-L211(-P)-J**

- Sensor
- Stability indicator (Green)
- Operation indicator (Orange)
- Sensitivity adjuster
- 8.2 mm 0.323 in
- 6.4 mm 0.252 in
- 6.2 mm 0.244 in
- 0.921 mm 0.036 in
- 0.146 mm 0.004 in

Notes: 1) It is the laser radiation indicator (green) on the emitter.
2) It is incorporated in EX-L211(-P)-J only.

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

**Mounting**

- When mounting this sensor, use a mounting plate (MS-EXL2-2, MS-EXL2-3). Without using the mounting plate, beam misalignment may occur. Also, install the mounting plate in between the sensor and the mounting surface.
- The tightening torque should be 0.5 N·m or less.
- Note: The mounting direction of the mounting plate is fixed. Install in a way so that the bending shape is facing the sensor side.

**EX-L211**

Mounting plate MS-EXL2-2 (Accessory)

**EX-L291/-L211/-L261/-L262**

Mounting plate MS-EXL2-3 (Accessory)

M3 screw (Purchase separately.)
The CAD data in the dimensions can be downloaded from our website.

Assembly dimensions with polarizing filter (PF-EXL2-1)

Mounting drawing with EX-L291(-P)

Sensor
- Stability indicator (Green)
- Operation indicator (Orange)
- Sensitivity adjuster

EX-L291(-P) EX-L221(-P)

Receiving part
Emitting part

6.4 0.252

8.2 0.323

2-ø3.2 ø0.126 mounting holes

6.4 0.252

8.2 0.323

2-ø3.2 ø0.126 mounting holes

Sensor
- Stability indicator (Green)
- Operation indicator (Orange)
- Sensitivity adjuster

EX-L291(-P)-J EX-L221(-P)-J

Receiving part
Emitting part

6.4 0.252

8.2 0.323

2-ø3.2 ø0.126 mounting holes

Sensor
- Stability indicator (Green)
- Operation indicator (Orange)
- Sensitivity adjuster

RF-330

Reflector (Accessory for EX-L291(-P))

Material: Acrylic (Reflector)
ABS (Base)

RF-210

Reflector (Optional)

Material: Acrylic (Reflector)
ABS (Base)

Two M3 (length 8 mm 0.315 in) screws with washers and two nuts are attached.

Material: Stainless steel (SUS304)
Two M3 (length 12 mm 0.472 in) screws with washers are attached.

Assembly dimensions for RF-210 (Optional)

MS-RF21-1

Material: Stainless steel (SUS304)

Two M3 (length 12 mm 0.472 in) screws with washers are attached.

15/06/2012
**EX-L200**

**DIMENSIONS (Unit: mm in)**

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

### MS-EXL2-1

**Sensor mounting bracket (Optional)**

<table>
<thead>
<tr>
<th>Component</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiving part</td>
<td>12.5 x 0.492</td>
</tr>
<tr>
<td>Emitting part</td>
<td>3.2 x 0.126</td>
</tr>
<tr>
<td>3.5 x 0.138</td>
<td></td>
</tr>
<tr>
<td>Rating</td>
<td>43</td>
</tr>
</tbody>
</table>

**MS-EXL2-2**

**Mounting plate (Accessory for EX-L211/g401)**

<table>
<thead>
<tr>
<th>Component</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiving part</td>
<td>10.6 x 0.411</td>
</tr>
<tr>
<td>Emitting part</td>
<td>2.6 x 0.102</td>
</tr>
<tr>
<td>8 x 0.315</td>
<td></td>
</tr>
</tbody>
</table>

**MS-EXL2-3**

**Mounting plate (Accessory for EX-L2911/L2211/L261)**

<table>
<thead>
<tr>
<th>Component</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiving part</td>
<td>10.6 x 0.411</td>
</tr>
<tr>
<td>Emitting part</td>
<td>2.6 x 0.102</td>
</tr>
<tr>
<td>8 x 0.315</td>
<td></td>
</tr>
</tbody>
</table>

### MS-EXL2-4

**Universal sensor mounting bracket (Optional)**

<table>
<thead>
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<th>Component</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiving part</td>
<td>6.7 x 0.264</td>
</tr>
<tr>
<td>Emitting part</td>
<td>8.8 x 0.346</td>
</tr>
<tr>
<td>2 x 3.2 x 0.126 mounting holes</td>
<td></td>
</tr>
</tbody>
</table>

**Material:** Stainless steel (SUS304)

Two M3 (length 14 mm 0.551 in) screws with washers (stainless steel SUS304) are attached.

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**Note:** This is the adjustable range of the movable part.

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**Note:** This is the adjustable range of the movable part.