New Product

CMOS Laser Sensor with Built-in Amplifier
ZX0

Stable Detection of Level Differences in the Order of 0.1 mm

• Dependable detection without being influenced by color, material, or surface conditions.
• Stable detection of small level differences or small workpieces.
• Models with different distance specifications for installation in essentially any location.
• Easy setup with one button.
• Compact design with built-in amplifier to reduce installation work and space requirements.

Features

Stability

Detection of Essentially Any Workpiece
CMOS Image Sensor That Stably Detects Object without Being Influenced by Color, Material, or Surface Conditions

A CMOS image sensor combines with a step-less laser power adjustment algorithm to produce stable detection of all types of workpieces from black rubber with low reflectivity to stainless steel and other highly glossy materials.

<table>
<thead>
<tr>
<th>Model</th>
<th>Sensing distance</th>
<th>Detectable level difference</th>
<th>Spot diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZX0-LD50</td>
<td>40 to 60 mm</td>
<td>0.2 mm*</td>
<td>0.17 mm*</td>
</tr>
<tr>
<td>ZX0-LD100</td>
<td>65 to 135 mm</td>
<td>0.7 mm*</td>
<td>0.33 mm*</td>
</tr>
<tr>
<td>ZX0-LD300</td>
<td>150 to 450 mm</td>
<td>3.0 mm*</td>
<td>0.52 mm*</td>
</tr>
<tr>
<td>ZX0-LD600</td>
<td>200 to 1,000 mm</td>
<td>15.0 mm*</td>
<td>0.56 mm*</td>
</tr>
</tbody>
</table>

*1. When the ambient temperature is 10 to 40°C.
*2. Reference values at the center of sensing distance.

Stable Detection of Small Level Differences or Small Workpieces
High Resolution and Narrow Beam Provide Stable Detection of Small Level Differences and Small Workpieces

The use of a CMOS image sensor ensures high resolution and enables detection of small level differences. An extremely narrow laser beam spot ensures detection of small workpieces.

Simplicity

Elimination of Installation Restrictions
Models with Different Distance Specifications for Installation in Essentially Any Location and with Built-in Amplifier.

Models with four different distances, from long-distance to short-distance detection, cover a wide range of user designs. The built-in amplifier achieves a smaller body. And because you do not need to install an amplifier unit, installation work and footprint are reduced. Also, an IP67 body and robot cable are used to eliminate installation environment restrictions.

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

Refer to the Precautions for all Photoelectric Sensors and Safety Precautions on page 5.
## Ordering Information

### Sensors (Refer to Dimensions on page 6)

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Connection method</th>
<th>Cable length</th>
<th>Sensing distance</th>
<th>Model</th>
<th>NPN output</th>
<th>PNP output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-wired</td>
<td>2 m</td>
<td>50 ± 10 mm</td>
<td>40 ± 60</td>
<td>ZX0-LD50A61 2M</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ZX0-LD50A61 5M</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ZX0-LD50A66 0.5M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-wired connector</td>
<td>0.5 m</td>
<td></td>
<td></td>
<td>ZX0-LD50A81 2M</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Pre-wired</td>
<td>2 m</td>
<td>100 ± 35 mm</td>
<td>65 ± 135</td>
<td>ZX0-LD100A61 2M</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ZX0-LD100A61 5M</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ZX0-LD100A66 0.5M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-wired connector</td>
<td>0.5 m</td>
<td></td>
<td></td>
<td>ZX0-LD100A81 2M</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Pre-wired</td>
<td>2 m</td>
<td>300 ± 150 mm</td>
<td>150 ± 450</td>
<td>ZX0-LD300A61 2M</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ZX0-LD300A61 5M</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ZX0-LD300A66 0.5M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-wired connector</td>
<td>0.5 m</td>
<td></td>
<td></td>
<td>ZX0-LD300A81 2M</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Pre-wired</td>
<td>2 m</td>
<td>600 ± 400 mm</td>
<td>200 ± 1,000</td>
<td>ZX0-LD600A61 2M</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ZX0-LD600A61 5M</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ZX0-LD600A66 0.5M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-wired connector</td>
<td>0.5 m</td>
<td></td>
<td></td>
<td>ZX0-LD600A81 2M</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ZX0-LD600A81 5M</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ZX0-LD600A86 0.5M</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Sensors with Class 1 lasers are also available. Add an “L” to the end of the model number when ordering. (Example: ZX0-LD50A61L 2M)

### Accessories (sold separately)

#### Extension Cables for Pre-wired Connector Models (Refer to Dimensions on page 7)

<table>
<thead>
<tr>
<th>Cable length</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 m</td>
<td>ZX0-XC10R</td>
</tr>
<tr>
<td>20 m</td>
<td>ZX0-XC20R</td>
</tr>
</tbody>
</table>

#### Mounting Brackets

A Mounting Bracket is not provided with the Sensor. Order a Mounting Bracket separately if required. (Refer to Dimensions on page 7)

<table>
<thead>
<tr>
<th>Applicable sensors</th>
<th>Appearance</th>
<th>Model</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZX0-LD50</td>
<td>E39-L180</td>
<td></td>
<td>Mounting Bracket: 1</td>
</tr>
<tr>
<td>ZX0-LD100</td>
<td></td>
<td></td>
<td>Nut plate: 1 Phillips screws (M3 × 30): 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Applicable sensors</th>
<th>Appearance</th>
<th>Model</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZX0-LD300</td>
<td>E39-L181</td>
<td></td>
<td>Mounting Bracket: 1</td>
</tr>
<tr>
<td>ZX0-LD600</td>
<td></td>
<td></td>
<td>Nut plate: 1 Phillips screws (M4 × 35): 2</td>
</tr>
</tbody>
</table>
Ratings and Specifications

### Model NPN output PNP output

<table>
<thead>
<tr>
<th>Item</th>
<th>ZX0-LD50A61/ZX0-LD50A66</th>
<th>ZX0-LD100A61/ZX0-LD100A66</th>
<th>ZX0-LD300A61/ZX0-LD300A66</th>
<th>ZX0-LD600A61/ZX0-LD600A66</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing distance</td>
<td>50 ± 10 mm</td>
<td>100 ± 35 mm</td>
<td>300 ± 150 mm</td>
<td>600 ± 400 mm</td>
</tr>
<tr>
<td>Standard detectable level difference <strong>1</strong></td>
<td>0.2 mm</td>
<td>0.7 mm</td>
<td>3.0 mm</td>
<td>15 mm</td>
</tr>
<tr>
<td>Ambient temperature of 10 to 40 °C</td>
<td>0.5 mm</td>
<td>1.0 mm</td>
<td>6.0 mm</td>
<td>25 mm</td>
</tr>
<tr>
<td>Light source (wavelength)</td>
<td>Visible-light semiconductor laser (wavelength: 660 nm, IEC/EN Class 2, FDA Class 2 <strong>2)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spot diameter (reference value) (Defined at the measurement center distance) <strong>3</strong></td>
<td>0.17 mm dia.</td>
<td>0.33 mm dia.</td>
<td>0.52 mm dia.</td>
<td>0.56 mm dia.</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>10 to 30 VDC (including 10% ripple (p-p))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>2,500 mW max. (105 mA max. at 24 VDC, 210 mA max. at 12 VDC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control output</td>
<td>Load power supply voltage: 30 VDC max., Load current: 100 mA max. (Residual voltage: 1 V max. (load current 10 mA or less), 2 V max. (load current of 10 to 100 mA))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitor output</td>
<td>Current output: 4 to 20 mA, maximum load resistance: 300 Ω (The output is 20 mA for the nearest point in the measurement range in respect to the Sensor and 4 mA for the farthest point.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functions</td>
<td>Smart tuning, keep function, background removal, OFF-delay timer, ON-delay timer, one-shot timer, ON/OFF-delay timer, zero reset, area output, eco function, hysteresis width setting, and setting initialization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicators</td>
<td>Digital display (red), output indicator (OUT1, OUT2) (orange), zero reset indicator (orange), menu indicator (orange), laser ON indicator (green), and smart tuning indicator (blue)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>Judgment output: Super-high-speed (SHS) Mode: 1.5 ms, Very-high-speed (VHS) Mode: 3 ms, High-speed (HS) Mode: 10 ms, or Standard (STND) Mode: 50 ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laser OFF input</td>
<td>200 ms max.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero reset input</td>
<td>200 ms max.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient illumination</td>
<td>Illumination on received light surface: 7,500 lx or less (incandescent light) Illumination on received light surface: 5,000 lx or less (incandescent light)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Operating: −10 to 55 °C; Storage: −15 to 70 °C (with no icing or condensation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>Operating and storage: 35% to 85% (with no condensation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dielectric strength</td>
<td>1,000 VAC, 50/60 Hz, 1 minute</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration resistance (destruction)</td>
<td>10 to 55 Hz, 1.5-mm double amplitude, 2 hours each in X, Y, and Z directions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock resistance (destruction)</td>
<td>500 m/s² for 3 times each in X, Y, and Z directions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree of protection <strong>4</strong></td>
<td>IEC IP67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection method <strong>5</strong></td>
<td>Pre-wired model (Standard cable length: 2 m) Pre-wired connector model (Standard cable length: 0.5 m)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (packed state/sensor only)</td>
<td>Pre-wired models (2 m) Approx. 240 g / Approx. 180 g Approx. 270 g / Approx. 210 g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre-wired models (5 m) Approx. 450 g / Approx. 330 g Approx. 480 g / Approx. 360 g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre-wired connector models (0.5 m) Approx. 170 g / Approx. 110 g Approx. 200 g / Approx. 140 g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td>Case and cover: Polybutylene terephthalate, Optical window: Glass, Cable: PVC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessories</td>
<td>Instruction sheet, Laser warning label (English), and FDA certification label</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Refer to the table given below for the ratings and specifications of Sensors with Class 1 lasers.

**1** The values were measured at the center of the sensing distance using OMRON’s standard sensing object (white ceramic).

**2** Classified as Class 2 by IEC60825-1 criteria in accordance with the FDA standard provisions of Laser Notice No. 50. CDRH registration has been completed. (Center for Devices and Radiological Health) (Accession Number: 1210040)

**3** Spot diameter: Defined as 1/e² (13.5%) of the central intensity at the measurement center distance. False detections can occur in the case there is light leakage outside the defined region and the surroundings of the target object have a high reflectance in comparison to the target object.

**4** Accurate measurements may not be possible for workpieces that are smaller than the spot diameter.

**5** IP67 protection applies to the connector on pre-wired connector models if an extension cable is connected.

**6** Use a Pre-wired Connector Model together with an Extension Cable (10 m or 20 m).

### Ratings and Specifications of Sensors with Class 1 lasers (ZX0-LD□L)

The ratings and specifications that are different from those of the Sensors with Class 2 lasers are given below.

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ZX0-LD50A61L/ZX0-LD50A81L</td>
<td>ZX0-LD300A61L/ZX0-LD300A81L</td>
</tr>
<tr>
<td></td>
<td>ZX0-LD100A61L/ZX0-LD100A81</td>
<td>ZX0-LD600A61L/ZX0-LD600A81</td>
</tr>
<tr>
<td>FDA Class</td>
<td>Class 1 0.24 mW max.</td>
<td>Class 1 0.24 mW max.</td>
</tr>
<tr>
<td>IEC/EN Class</td>
<td>Class 1 0.24 mW max.</td>
<td>Class 1 0.24 mW max.</td>
</tr>
<tr>
<td>Ambient illumination</td>
<td>Illumination on received light surface 5,000 lx or less (incandescent light)</td>
<td>Illumination on received light surface 2,500 lx or less (incandescent light)</td>
</tr>
<tr>
<td>Connection method</td>
<td>Pre-wired model (2 m)</td>
<td>Pre-wired model (2 m)</td>
</tr>
<tr>
<td>Accessories</td>
<td>Instruction sheet and Explanatory label (English), FDA certification label</td>
<td>Instruction sheet and Explanatory label (English), FDA certification label</td>
</tr>
</tbody>
</table>

Accession Number: 1210040
ZX0
Engineering Data (Reference Value)

Spot Diameter Vs. Distance

I/O Circuit Diagrams

NPN Output Model

PNP Output Model

Brown: 10 to 30 VDC
White: OUT1 judgment output
Blue: GND (0 V)
Orange: TUNE1 input
Pink: TUNE2 input
Purple: Zero reset input
Red: LD-OFF input
Black: Monitor output
Current output: 4 to 20 mA
Shield: Monitor GND
Internal circuits
Load: 300 Ω max.

Brown: 10 to 30 VDC
White: OUT1 judgment output
Blue: GND (0 V)
Orange: TUNE1 input
Pink: TUNE2 input
Purple: Zero reset input
Red: LD-OFF input
Black: Monitor output
Current output: 4 to 20 mA
Shield: Monitor GND
Internal circuits
Load: 300 Ω max.
Safety Precautions

Be sure to read the precautions for all models in the website at: http://www.ia.omron.com/.

This datasheet contains information only for selecting the appropriate model. Be sure to read the Instruction Sheet for usage precautions prior to using the product.

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SAFETY PRECAUTIONS FOR USING LASER EQUIPMENT

The ZX0-LD uses a laser as the light source. Lasers are classified based on EN standard (EN 60825-1).

**WARNING**

Do not expose your eyes to the laser radiation either directly or indirectly (i.e., after reflection from a mirror or shiny surface). Loss of sight may possibly occur in case of the exposure to laser high power density.

Do not disassemble the product. Doing so may cause the laser beam to leak, resulting in the danger of visual impairment.

- The ZX0-LD has the following WARNING label or explanatory label on the side of the sensor.

Using in the U.S.

When using devices in which ZX0-LD is installed in the U.S., the devices are subjected to the U.S. FDA (Food and Drug Administration) laser regulations. ZX0 series is classified into Class 2 or Class 1 by the standard of IEC/EN60825-1 according to deviations of Laser Notice No. 50 of this standard, and reported to CDRH (Center for Devices and Radiological Health). (Accession Number: 1210040)

Replace the WARNING label or Explanatory Label with the corresponding English label and put the FDA Certification label (supplied with the sensor).

Using in a country other than the U.S.

For countries other than Japan and the U.S., warning labels or explanatory labels must be replaced by English ones (supplied with the product).

Using in Europe

ZX0-LD are classified in Class 2 under EN 60825-1, and ZX0-LD are classified in Class 1 under EN 60825-1.

Note: For Precautions for safe use and Precautions for correct use, refer to the Instruction Sheet supplied with the product.
ZX0

Dimensions

**Sensors**

**Pre-wired Models**
- ZX0-LD50A6
- ZX0-LD100A6

**Pre-wired Connector Models**
- ZX0-LD50A6
- ZX0-LD100A6

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**Pre-wired Models**
- ZX0-LD50A6
- ZX0-LD100A6

**Pre-wired Connector Models**
- ZX0-LD50A6
- ZX0-LD100A6

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**Display, Indicators, and Controls**

- **[MENU]** Menu indicator (orange)
- **[ZERO]** Zero reset indicator (orange)
- **[OUT1]** Output indicator (orange)
- **[OUT2]** Output indicator (orange)
- **[LD ON]** Laser ON indicator (green)
- **[TUNE]** TUNE button
- **[ST]** Smart tuning indicator (blue)
- **[MODE]** MODE button
- **[UP]** UP button
- **[DOWN]** DOWN button

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**Pre-wired Connector**

Tune button

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*ZX0-LD50: L = 50, A = 21°
ZX0-LD100: L = 100, A = 11.5°*
Accessories (sold separately)

Extension Cables for Pre-wired Connector Models
ZX0-XC10R (10 m)
ZX0-XC20R (20 m)

![Diagram showing cable and mounting bracket dimensions]

* Cable length (L) is as follows.
ZX0-XC10R: 10 m, ZX0-XC20R: 20 m

**Mounting Bracket for ZX0-LD50/ZX0-LD100**
E39-L180

**Mounting Bracket**
- Material: Stainless steel (SUS304)
- Thickness: 1.5 mm
- Accessories: Two phillips screws (M3x30, P = 0.5, Stainless steel) and one nut plate

**Nut plate**
- Material: Stainless steel (SUS304)
- Thickness: 2.0 mm
- Accessories: Two phillips screws (M4x35, P = 0.7, Stainless steel) and one nut plate

**Installation Method (ZX0-LD50 /ZX0-LD100..)**
Using E39-L180 Mounting Bracket

![Diagram showing installation method with E39-L180]

**Mounting Bracket for ZX0-LD300/ZX0-LD600**
E39-L181

**Mounting Bracket**
- Material: Stainless steel (SUS304)
- Thickness: 2.0 mm
- Accessories: Two phillips screws (M3x30, P = 0.5, Stainless steel) and one nut plate

**Nut plate**
- Material: Stainless steel (SUS304)
- Thickness: 2.0 mm
- Accessories: Two phillips screws (M4x35, P = 0.7, Stainless steel) and one nut plate

**Installation Method (ZX0-LD300 /ZX0-LD600..)**
Using E39-L181 Mounting Bracket

![Diagram showing installation method with E39-L181]
Terms and Conditions Agreement

Read and understand this catalog.

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Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

Suitability of Use.

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer’s application or use of the Product. At Buyer’s request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer’s application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Programmable Products.

Omron Companies shall not be responsible for the user’s programming of a programmable Product, or any consequence thereof.

Performance Data.

Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron’s test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron’s Warranty and Limitations of Liability.

Change in Specifications.

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron’s representative at any time to confirm actual specifications of purchased Product.

Errors and Omissions.

Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.