

# 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.



Refer to the **Precautions for all Photoelectric Sensors and Safety Precautions** on page 5.



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

## Features

### Stability

#### Detection of Essentially Any Workpiece

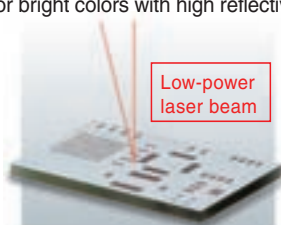
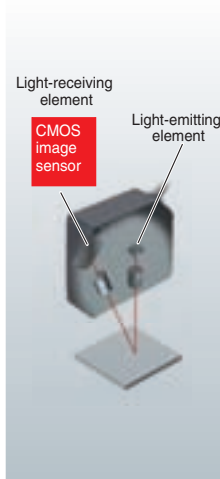
CMOS Image Sensor That Stably Detects Object without Being Influenced by Color, Material, or Surface Conditions

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.

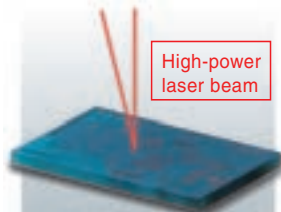
CMOS Image Sensor

Step-less Laser Power Adjustment Algorithm

For bright colors with high reflectivity:



For dark colors with low reflectivity:



#### 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.



Model	Sensing distance	Detectable level difference <sup>*1</sup>	Spot diameter <sup>*2</sup>
ZX0-LD50	40 to 60 mm	0.2 mm	0.17 mm
ZX0-LD100	65 to 135 mm	0.7 mm	0.33 mm
ZX0-LD300	150 to 450 mm	3.0 mm	0.52 mm
ZX0-LD600	200 to 1,000 mm	15.0 mm	0.56 mm

\*1. When the ambient temperature is 10 to 40°C.

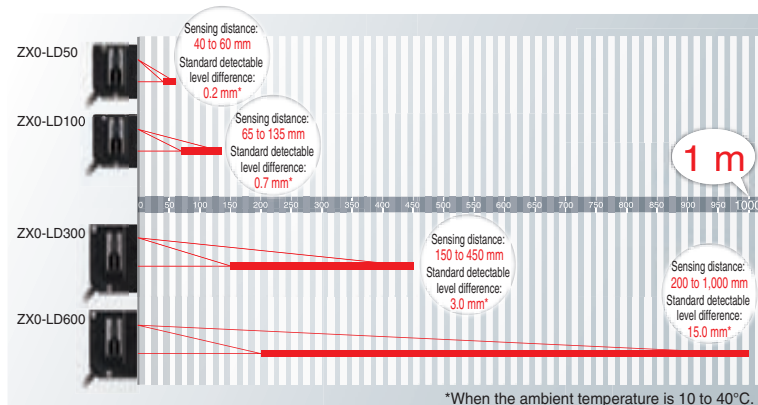
\*2. Reference values at the center of sensing distance.

### 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.


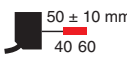
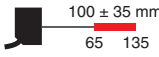

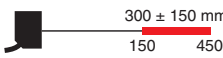
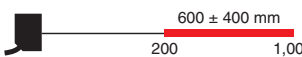


\*When the ambient temperature is 10 to 40°C.

# ZX0

## Ordering Information

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

Appearance	Connection method	Cable length	Sensing distance	Model	
				NPN output	PNP output
	Pre-wired	2 m		ZX0-LD50A61 2M *	ZX0-LD50A81 2M *
		5 m		ZX0-LD50A61 5M	ZX0-LD50A81 5M
	Pre-wired connector	0.5 m		ZX0-LD50A66 0.5M	ZX0-LD50A86 0.5M
	Pre-wired	2 m		ZX0-LD100A61 2M *	ZX0-LD100A81 2M *
		5 m		ZX0-LD100A61 5M	ZX0-LD100A81 5M
	Pre-wired connector	0.5 m		ZX0-LD100A66 0.5M	ZX0-LD100A86 0.5M
	Pre-wired	2 m		ZX0-LD300A61 2M *	ZX0-LD300A81 2M *
		5 m		ZX0-LD300A61 5M	ZX0-LD300A81 5M
	Pre-wired connector	0.5 m		ZX0-LD300A66 0.5M	ZX0-LD300A86 0.5M
	Pre-wired	2 m		ZX0-LD600A61 2M *	ZX0-LD600A81 2M *
		5 m		ZX0-LD600A61 5M	ZX0-LD600A81 5M
	Pre-wired connector	0.5 m		ZX0-LD600A66 0.5M	ZX0-LD600A86 0.5M

\* 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)

Cable length	Model
10 m	ZX0-XC10R
20 m	ZX0-XC20R

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

Applicable sensors	Appearance	Model	Contents
ZX0-LD50□ ZX0-LD100□		E39-L180	Mounting Bracket: 1 Nut plate: 1 Phillips screws (M3 × 30): 2
ZX0-LD300□ ZX0-LD600□		E39-L181	Mounting Bracket: 1 Nut plate: 1 Phillips screws (M4 × 35): 2

## Ratings and Specifications

		Model	NPN output	ZX0-LD50A61 ZX0-LD50A66	ZX0-LD100A61 ZX0-LD100A66	ZX0-LD300A61 ZX0-LD300A66	ZX0-LD600A61 ZX0-LD600A66
Item			PNP output	ZX0-LD50A81 ZX0-LD50A86	ZX0-LD100A81 ZX0-LD100A86	ZX0-LD300A81 ZX0-LD300A86	ZX0-LD600A81 ZX0-LD600A86
Sensing distance				50 ± 10 mm	100 ± 35 mm	300 ± 150 mm	600 ± 400 mm
Standard detectable level difference *1	Ambient temperature of 10 to 40°C			0.2 mm	0.7 mm	3.0 mm	15 mm
	Ambient temperature of -10 to 55°C			0.5 mm	1.0 mm	6.0 mm	25 mm
Light source (wavelength)				Visible-light semiconductor laser (wavelength: 660 nm, 1 mW max., IEC/EN Class 2, FDA Class 2 *2)			
Spot diameter (reference value) (Defined at the measurement center distance) *3				0.17 mm dia.	0.33 mm dia.	0.52 mm dia.	0.56 mm dia.
Power supply voltage				10 to 30 VDC (including 10% ripple (p-p))			
Power consumption				2,500 mW max. (105 mA max. at 24 VDC, 210 mA max. at 12 VDC)			
Control output				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))			
Monitor output				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.)			
Functions				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			
Indicators				Digital display (red), output indicator (OUT1, OUT2) (orange), zero reset indicator (orange), menu indicator (orange), laser ON indicator (green), and smart tuning indicator (blue)			
Response time	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			
	Laser OFF input			200 ms max.			
	Zero reset input			200 ms max.			
Ambient illumination				Illumination on received light surface: 7,500 lx or less (incandescent light)		Illumination on received light surface: 5,000 lx or less (incandescent light)	
Ambient temperature				Operating: -10 to 55°C, Storage: -15 to 70°C (with no icing or condensation)			
Ambient humidity				Operating and storage: 35% to 85% (with no condensation)			
Dielectric strength				1,000 VAC, 50/60 Hz, 1 minute			
Vibration resistance (destruction)				10 to 55 Hz, 1.5-mm double amplitude, 2 hours each in X, Y, and Z directions			
Shock resistance (destruction)				500 m/s <sup>2</sup> 3 times each in X, Y, and Z directions			
Degree of protection *4				IEC IP67			
Connection method *5				Pre-wired model (Standard cable length: 2 m) Pre-wired connector model (Standard cable length: 0.5 m)			
Weight (packed state/sensor only)	Pre-wired models (2 m)			Approx. 240 g / Approx. 180 g		Approx. 270 g / Approx. 210 g	
	Pre-wired models (5 m)			Approx. 450 g / Approx. 330 g		Approx. 480 g / Approx. 360 g	
	Pre-wired connector models (0.5 m)			Approx. 170 g / Approx. 110 g		Approx. 200 g / Approx. 140 g	
Materials				Case and cover: Polybutylene terephthalate, Optical window: Glass, Cable: PVC			
Accessories				Instruction sheet, Laser warning label (English), and FDA certification label			

**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/e<sup>2</sup> (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.

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

\*4. IP67 protection applies to the connector on pre-wired connector models if an extension cable is connected.

\*5. 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.

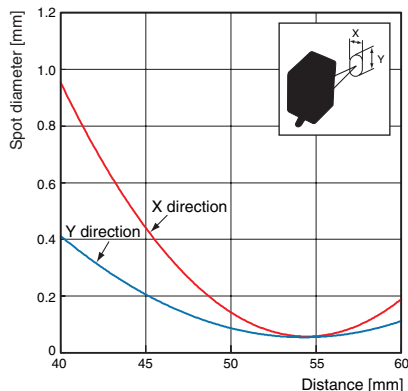
Item	Model	ZX0-LD50A61L/ZX0-LD50A81L ZX0-LD100A61L/ZX0-LD100A81	ZX0-LD300A61L/ZX0-LD300A81L ZX0-LD600A61L/ZX0-LD600A81L
FDA Class	Class1 0.24 mW max.		
IEC/EN Class	Class1 0.24 mW max.		
Ambient illumination	Illumination on received light surface 5,000 lx or less (incandescent light)		Illumination on received light surface 2,500 lx or less (incandescent light)
Connection method	Pre-wired model (2 m)		
Accessories	Instruction sheet and Explanatory label (English), FDA certification label		

Accession Number: 1210040

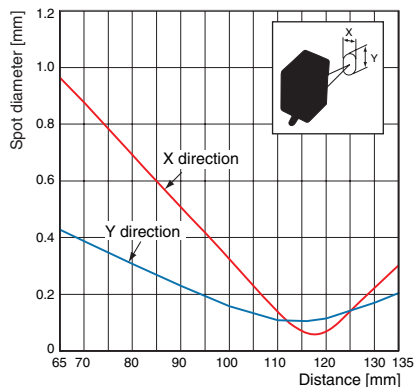
## Engineering Data (Reference Value)

### Spot Diameter Vs. Distance

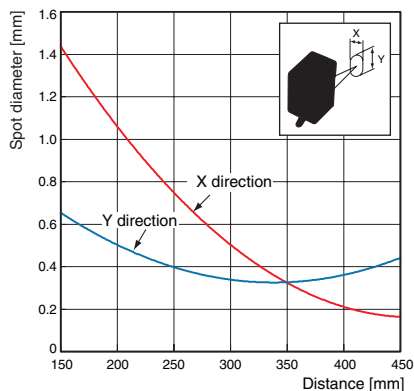
**ZX0-LD50**



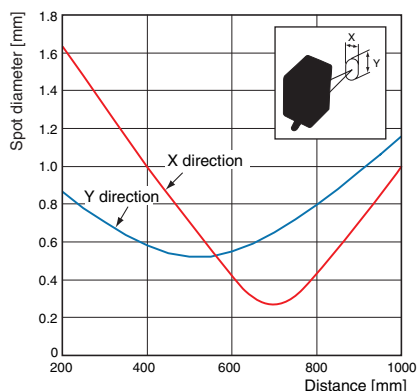
**ZX0-LD100**



**ZX0-LD300**

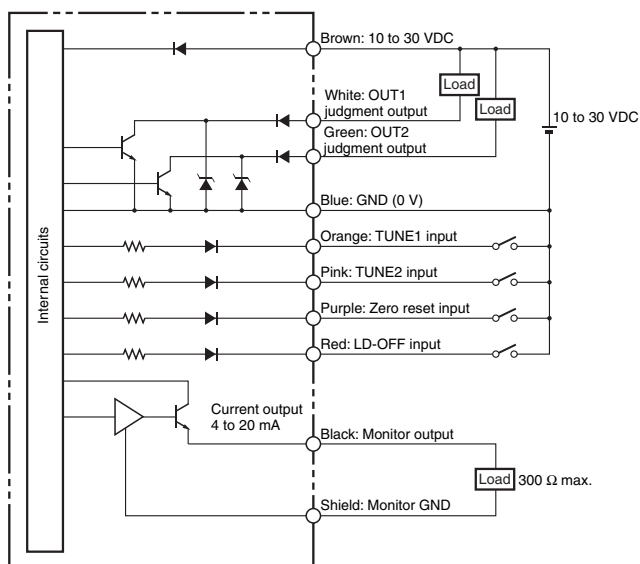


**ZX0-LD600**

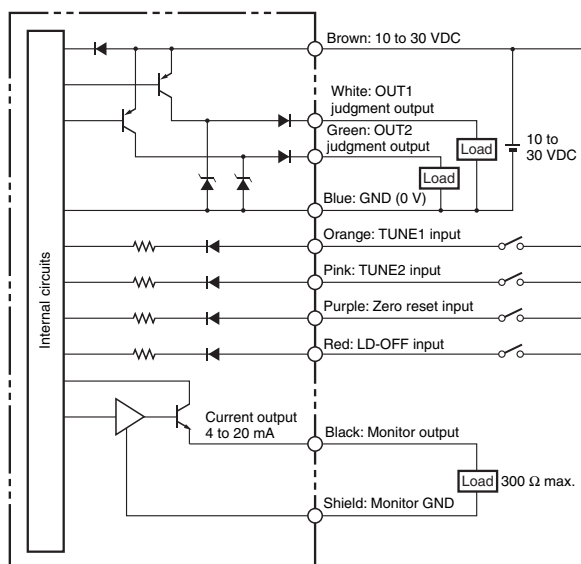


## I/O Circuit Diagrams

### NPN Output Model



### PNP Output Model



## 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.**

### 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.**



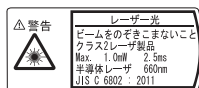
**Do not disassemble the product. Doing so may cause the laser beam to leak, resulting in the danger of visual impairment.**



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

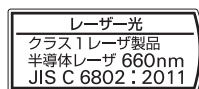
**ZX0-LD□□**

**Laser Warning Label**



**ZX0-LD□□L**

**Explanatory Label**



#### 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).

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No.50,dated(JUNE 24,2007)  
OMRON Corporation  
Shikokaji Horikawa,Shimogyo-ku,  
Kyoto 600-8530 JAPAN  
Place of manufacture:  
AYABE Factory,OMRON Corp.  
Manufactured in

#### 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□□L 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.

## Sensors

### Pre-wired Models

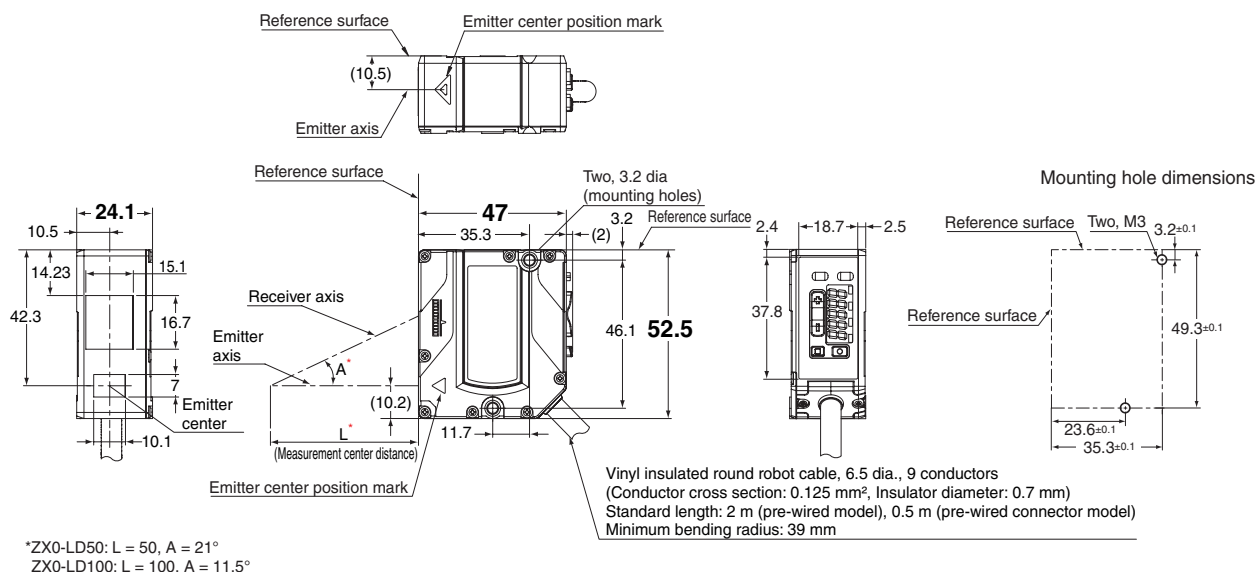
ZX0-LD50A□1(L)

ZX0-LD100A□1(L)

### Pre-wired Connector Models

ZX0-LD50A□6

ZX0-LD100A□6



### Pre-wired Models

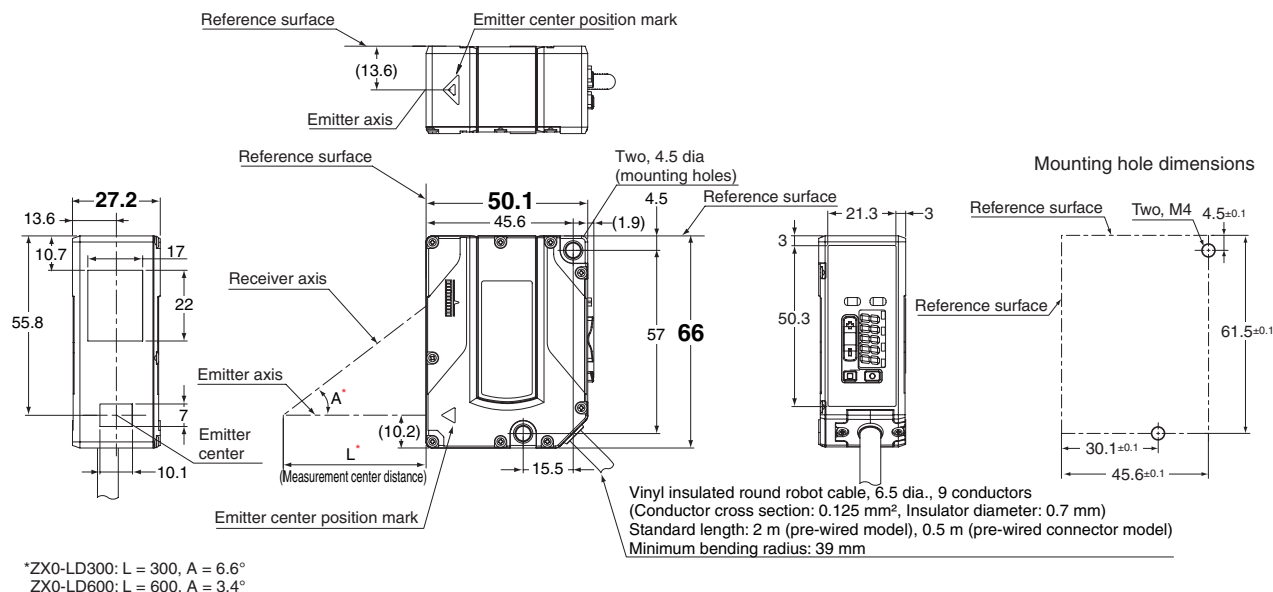
ZX0-LD300A□1(L)

ZX0-LD600A□1(L)

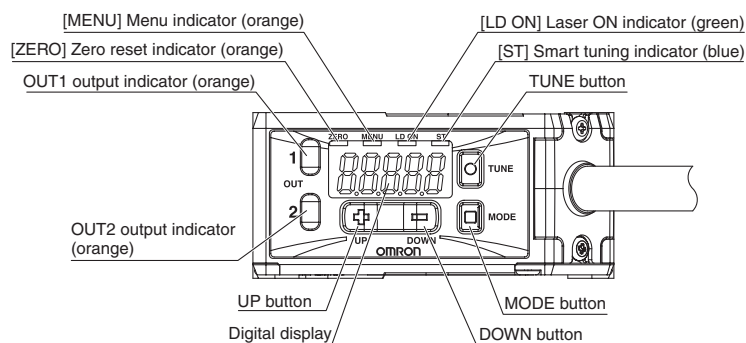
### Pre-wired Connector Models

ZX0-LD300A□6

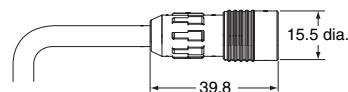
ZX0-LD600A□6



## Display, Indicators, and Controls



## Pre-wired connector

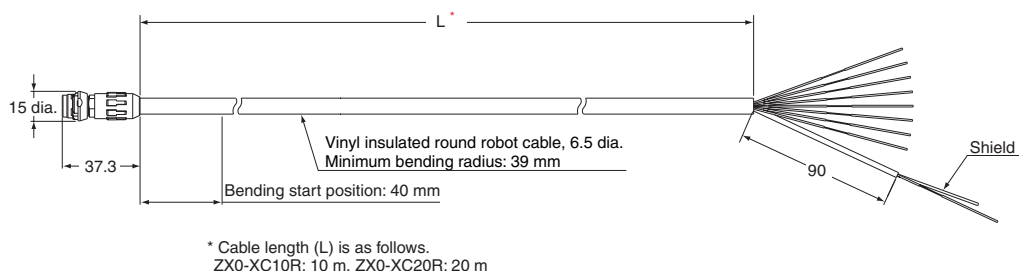


## Accessories (sold separately)

### Extension Cables for Pre-wired Connector Models

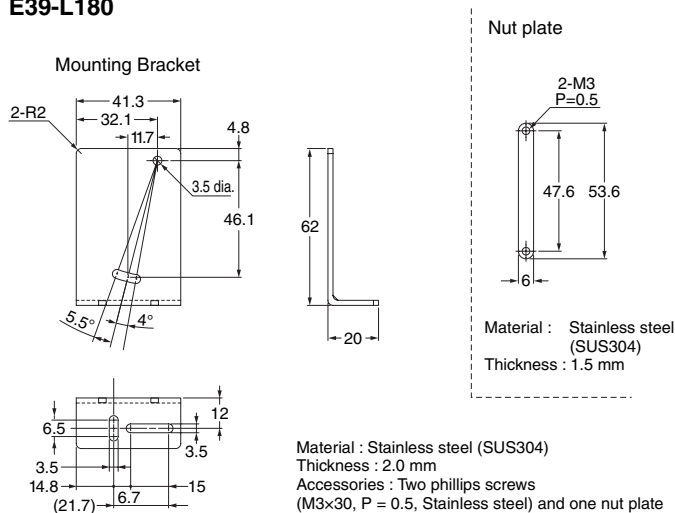
ZX0-XC10R (10 m)

ZX0-XC20R (20 m)



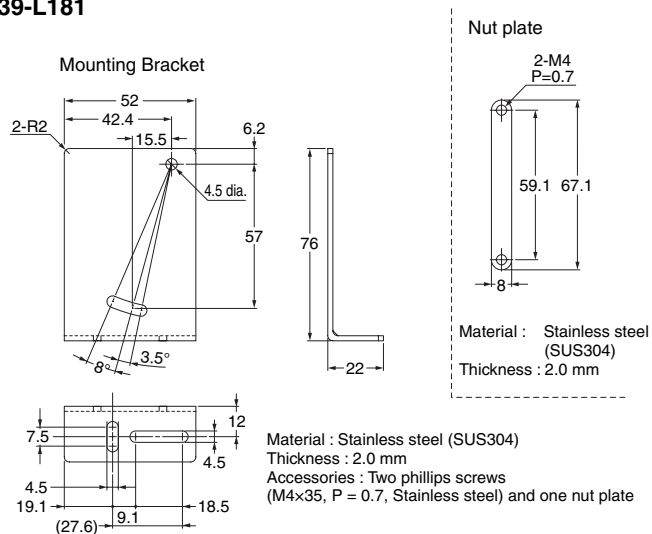
### Mounting Bracket for ZX0-LD50□/ZX0-LD100□

E39-L180



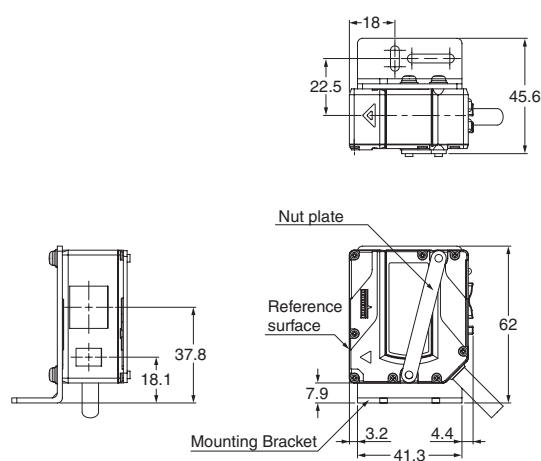
### Mounting Bracket for ZX0-LD300□/ZX0-LD600□

E39-L181



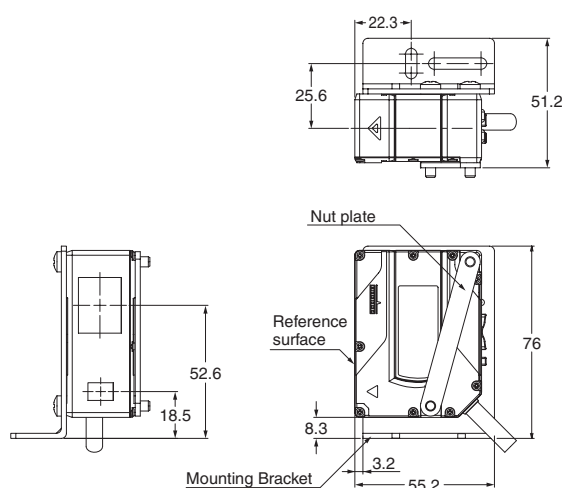
### Installation Method (ZX0-LD50□/ZX0-LD100□)

Using E39-L180 Mounting Bracket



### Installation Method (ZX0-LD300□/ZX0-LD600□)

Using E39-L181 Mounting Bracket



This image shows a full page of white paper with horizontal grey ruling lines. The word "MEMO" is printed at the top center in bold black capital letters. There are 26 horizontal lines in total, creating 27 rows. The first row is above the "MEMO" header.



# Terms and Conditions Agreement

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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.

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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.

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0815 (0815)

# Mouser Electronics

Authorized Distributor

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## Omron:

[ZX0-LD300A860.5M](#) [ZX0-LD50A615M](#) [ZX0-LD50A860.5M](#) [ZX0-LD600A812M](#) [ZX0-LD600A860.5M](#) [ZX1-LD100A61L2M](#) [ZX0-LD100A612M](#) [ZX0-LD600A81L2M](#) [ZX0-LD100A615M](#) [ZX0-LD50A660.5M](#) [ZX1-LD600A81L2M](#) [ZX0-LD100A860.5M](#) [ZX0-LD300A815M](#) [ZX0-LD100A815M](#) [ZX0-LD50A815M](#) [ZX0-LD600A612M](#) [ZX1-LD100A81L2M](#) [ZX1-LD300A61L2M](#) [ZX1-LD300A81L2M](#) [ZX1-LD50A61L2M](#) [ZX1-LD50A81L2M](#) [ZX1-LD600A61L2M](#)