# Smart Sensors Laser Sensors CMOS Type

# ZX2

CSM_ZX2_DS_E_6_5

## Stable measurement that is unaffected by workpiece changes. The simple setting for everyone.

- High-precision measurement to approx. 10 µm.
- Stable measurement regardless of movement or changes in workpiece color or material.
- Smart tuning for optimal setting with one button for essentially any user.
- The 11-segment display enables reading characters at a glance.
- Four built-in banks make changeovers easy.
- Stable measurement in harsh environments with IP67 protection for Sensor Head and robot cable.
- Laser life indicator to prevent line stoppage through visualization.

Be sure to read *Safety Precautions* on page 11

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

## Features

### Stability

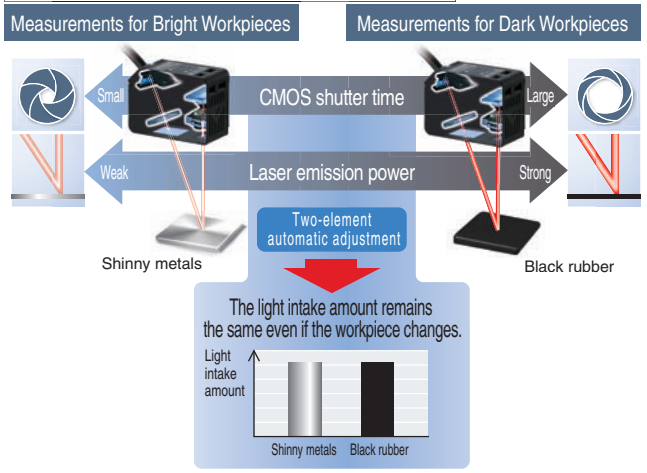
#### Measurements to a Precision in the Order of 10 µm for any Workpiece

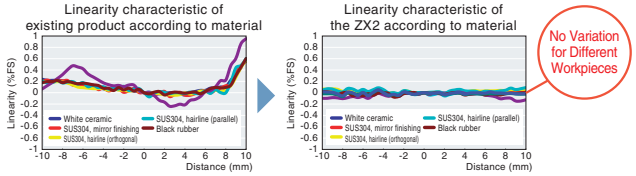
Stable measurement even for changes in colors and materials or for moving workpieces with CMOS that has a dynamic range of two million times

Patented *2

The use of a unique OMRON HSDR-CMOS (high-speed and dynamic range) image sensor and a step-less laser power adjustment algorithm enable stable measurements for any color or surface conditions, from metals to substrates, rubber, and transparent objects. Linearity of ±0.05~0.3%F.S. achieves a measurement precision in the order of ±10~30µm. *1

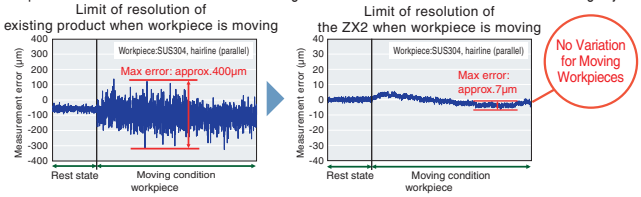
Stable measurements on objects with changing color/material




Stable measurements on moving objects

A line beam is used in addition to an emitter beam when dealing with rough surfaces to average out the amount of reflected light and to offset the amount of light received at a high-speed measurement period of 30 µs in order to reduce variations in received light and to enable stable measurements for moving objects.




*1. The resolution, angle characteristic, measuring range, linearity, spot diameter, and other specifications differ among models. Refer to *Ratings and Specifications* for details.
The linearity indicates the error with respect to the ideal straight line of the displacement output in the case of measuring Omron's standard target object. Linearity and measured value may vary depending on target object. Before final installation, test the sensor required for the application to validate that the desired measurements have been obtained.

*2. "Patented" means that we obtained a patent in Japan. (As of October 2019)

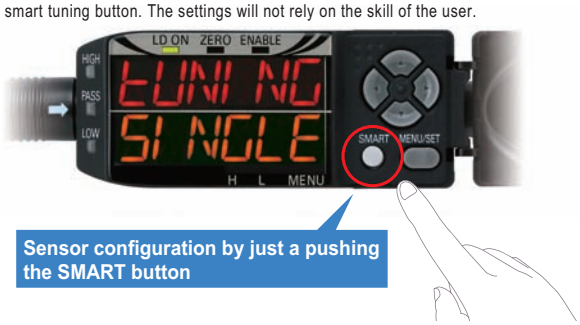
### Easy

#### Essentially Anyone Can Set Optimum Conditions

Easily select smart tuning with one button.

Patented *2

The optimum settings for stable measurement can be achieved with one smart tuning button. The settings will not rely on the skill of the user.




Three selectable tunings

More accurate settings are made possible by the three tuning methods for different workpiece types and surface conditions.

**Scene.1**

One type of workpiece

**Single smart tuning**

Best configuration for stable detection in case of objects do not change by pushing the button for one second

**Scene.2**

Several types of workpiece

**Multi-smart tuning**

Ideal configuration for stable detection of changing objects by pushing the button for three seconds

**Scene.3**

Surface conditions of the workpiece are variable

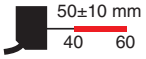
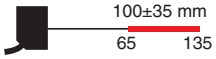
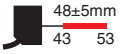
**Active smart tuning**

Continuous configuration improvement for the stable detection of all locations by pushing the button for five seconds

# Ordering Information

## Units

### Sensor Heads [Dimensions → page 11]

| Appearance | Sensing method | Beam shape | Sensing distance | Resolution | Model |
|---|---|---|---|---|---|
| Diffuse reflection type  | Diffuse-reflective | Line beam |   | 1.5 µm | **ZX2-LD50L 0.5M** |
| | | Spot beam | | | **ZX2-LD50 0.5M** |
| | | Line beam |   | 5 µm | **ZX2-LD100L 0.5M** |
| | | Spot beam | | | **ZX2-LD100 0.5M** |
| | Regular-reflective | Spot beam |   | 1.5 µm | **ZX2-LD50V 0.5M** |

### Amplifier Units [Dimensions → page 11]

| Appearance | Power supply | Output type | Model |
|---|---|---|---|
|  | DC | NPN | **ZX2-LDA11 2M** |
| | | PNP | **ZX2-LDA41 2M** |

## Accessories (sold separately)

These are not included with the Sensor Head or Amplifier Unit. Please order as necessary.

### Calculating Unit [Dimensions → page 12]

| Appearance | Model |
|---|---|
|  | **ZX2-CAL** |

### Communications Interface Unit [Dimensions → page 12]

| Appearance | Type | Model |
|---|---|---|
|  | RS-232C | **ZX2-SF11** |

### Sensor Head Extension Cables [Dimensions → page 12]

| Cable Length | Model |
|---|---|
| 1 m | **ZX2-XC1R** |
| 4 m | **ZX2-XC4R** |
| 9 m | **ZX2-XC9R** |
| 20 m | **ZX2-XC20R** |

**Note:** Extension cables cannot be coupled and used together.

### Mounting Brackets [Dimensions → page 13]

| Applicable Sensor Head | Appearance | Model | Remarks |
|---|---|---|---|
| ZX2-LD50V<br>ZX2-LD50L<br>ZX2-LD50 |  | **E39-L178** | Mounting Brackets (1)<br>Nut Plate (1)<br>Phillips screws (M30 × 30) (2) |
| ZX2-LD100L<br>ZX2-LD100 |  | **E39-L179** | |

## Sensor Head

# Sensor Heads for Various Applications-select the Range and Type of Beam

### New Regular-reflective Sensor Head Designed for Optimal Wafer Measurement

**ZX2-LD50L** Line beam type
**ZX2-LD50** Spot beam type

| | | |
|---|---|---|
| Measurement range | 50mm±10mm | |
| Resolution | 1.5μm | |
| Linearity | Line beam | ±0.05%F.S.*1 |
| | Spot beam | ±0.10%F.S.*1 |
| Beam size | Line beam | Approx.60μm×2.6mm |
| | Spot beam | Approx.60μm dia. |

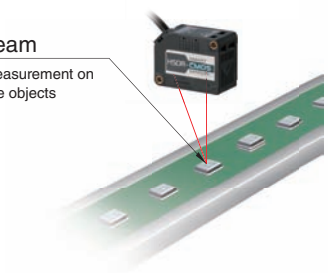
**ZX2-LD50V** Spot beam type (regular-reflective)

| | | |
|---|---|---|
| Measurement range | 48mm±5mm | |
| Resolution | 1.5μm | |
| Linearity | Spot beam | ±0.3%F.S. |
| Beam size | Spot beam | Approx.60μm dia. |

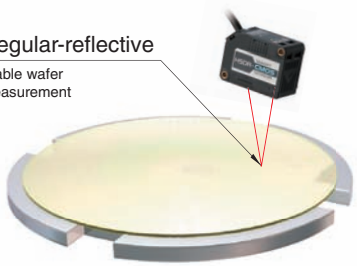
**ZX2-LD100L** Line beam type
**ZX2-LD100** Spot beam type

| | | |
|---|---|---|
| Measurement range | 100mm±35mm | |
| Resolution | 5μm | |
| Linearity | Line beam | ±0.05%F.S.*2 |
| | Spot beam | ±0.10%F.S.*2 |
| Beam size | Line beam | Approx.110μm×2.7mm |
| | Spot beam | Approx.110μm dia. |

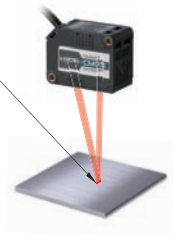
Spot beam
Precise measurement on micro-scale objects



Regular-reflective
Stable wafer measurement



Line beam
Stable measurement on rough-surfaced objects



*1 Using 40 to 50mm
*2 Using 65 to 100mm

## Reliable measurements in harsh environments

### IP67, robot cable & temperature characteristic 0.02% F.S./°C

IP67 protection class enables to use the sensor in harsh environments. A robot cable is used as standard between the head and amplifier, that the unit can be used reliably on moving parts. In addition, as 3D UV bond is used to fix the optical components rather than screws, stress can be controlled and a temperature characteristic 0.02% F.S./°C* is realized.

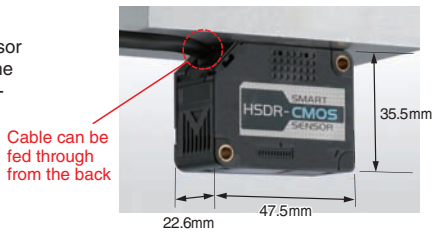
* If the room temperature varies 1°C, the measured value varies 0.02% F.S. (corresponding to 4μm for the Model ZX2-LD50)

## Compact sensor for easy mounting

### World smallest*

The world's smallest CMOS laser displacement sensor head is realized in a resin case. Enables to mount the sensor in smallest spaces and to minimize measurement errors arising from temperature fluctuations.

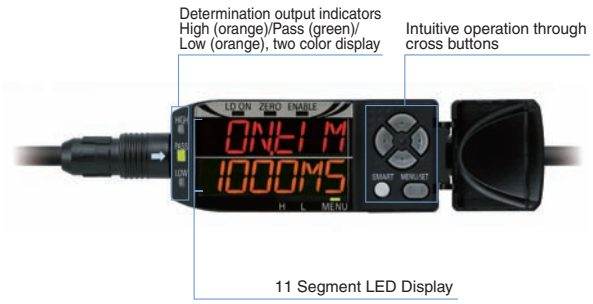
* According to OMRON investigation of CMOS laser displacement sensors performed in September 2010.



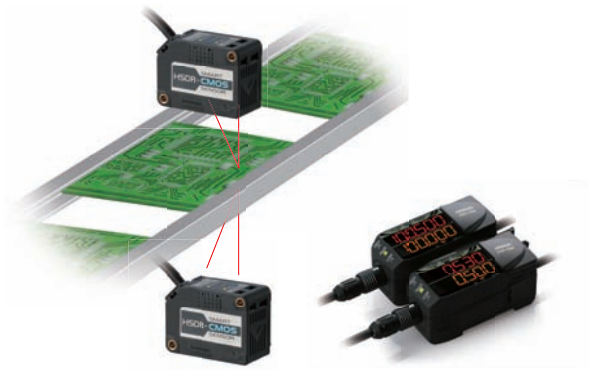
# Amplifier and Calculating Unit

## Ease of Use by “LED Display” and “Calculating Unit”

### 11-segment LED display for intuitive configuration




### Easy calculations of measurements

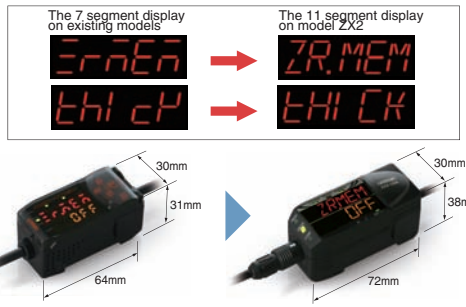


## No need for a manual

### 11 Segment LED Display

An 11 segment LED display is integrated in the compact housing. Alphanumeric characters can be read with ease and there is no need to refer to a manual.

Comparison of the existing 7 segment LED display and the 11 segment LED display





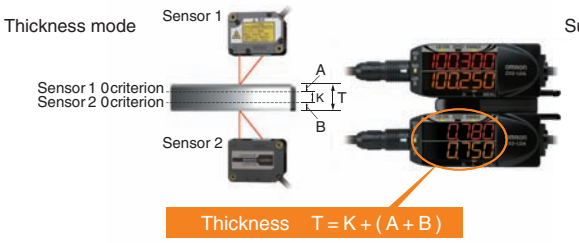


The compact housing stays just as it is

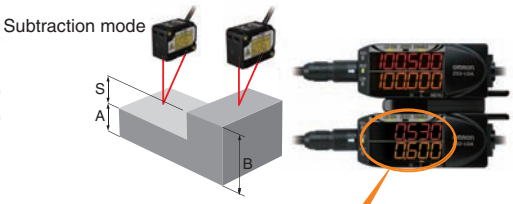
## Perform two calculations with ease

### Thickness + subtraction mode

The calculated results of two sensor heads are displayed on the amplifier unit by just connecting the calculating unit between the two amplifier units. The calculation function can be chosen from the two modes of thickness and subtraction. It is also possible to prevent mutual interference by coupling via the calculating units. (Up to five amplifier units can be connected.)




Thickness T = K + ( A + B )




Level difference S = B - A

## Easy change of setup

### Equipped with 4 banks

The amplifier unit is equipped with four bank functions. Easy change of setup between four modes is supported by just switching between the bank functions.


Amplifier unit + Bank unit

Built into the unit

# Specifications

## Diffuse-reflective Sensor Heads

| Item / Model | ZX2-LD50L | ZX2-LD50 | ZX2-LD100L | ZX2-LD100 |
|---|---|---|---|---|
| Optical system | Diffuse reflective | | | |
| Light source (wave length) | Visible-light semiconductor laser with a wavelength of 660 nm and an output of 1mW max. | | | |
| | EN class 2, FDA class 1 *5 | | | |
| Measurement center point | 50 mm | | 100 mm | |
| Measurement range | ±10 mm | | ±35 mm | |
| Beam shape | Line | Spot | Line | Spot |
| Beam size *1 | Approx. 60 μm × 2.6 mm | Approx. 60 μm dia. | Approx.110 μm × 2.7 mm | Approx. 110 μm dia. |
| Resolution *2 | 1.5 μm | | 5 μm | |
| Linearity *3 | ±0.05% F.S. (40 to 50 mm) | ±0.1% F.S. (40 to 50 mm) | ±0.05% F.S. (65 to 100 mm) | ±0.1% F.S. (65 to 100 mm) |
| Temperature characteristic *4 | 0.02% F.S. /°C | | | |
| Ambient illumination | Incandescent lamp: 10,000 lx max. (on light receiving side) | | | |
| Ambient temperature | Operating: 0 to 50 °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 for 1 min. | | | |
| Vibration resistance (destruction) | 10 to 150 Hz, 0.7-mm double amplitude, 80 min. each in X, Y, and Z directions | | | |
| Shock resistance (destruction) | 300 m/s$^2$ 3 times each in six directions (up/down, left/right, forward/backward) | | | |
| Degree of protection | IEC60529, IP67 | | | |
| Connection method | Connector connection (standard cable length: 500 mm) | | | |
| Weight (packed state) | Approx. 160 g (main unit only: Approx. 75 g) | | | |
| Materials | Case and cover: PBT (polybutylene terephtahalate), Optical window: Glass, Internal thread: Brass, Cable: PVC | | | |
| Accessories | Instruction sheet, Ferrite core ×1 (made by TDK Corp. ZCAT1730-0730A), Laser warning label (English), FDA | | | |

## Regular-reflective Sensor Head

| Item / Model | ZX2-LD50V |
|---|---|
| Optical system | Regular reflective |
| Light source (wave length) | Visible-light semiconductor laser with a wavelength of 660 nm and an output of 0.24 mW max. EN class 1, FDA class 1 *5 |
| Measurement center point | 48mm |
| Measurement range | ±5mm |
| Beam shape | Spot |
| Beam size *1 | Approx. 60 μm dia. |
| Resolution *2 | 1.5 μm |
| Linearity *3 | ±0.3%F.S. (entire range) |
| Temperature characteristic *4 | 0.06%F.S./°C |
| Ambient illumination | Incandescent lamp: 10,000lx max. (on light receiving side) |
| Ambient temperature | Operating: 0 to 50 °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 for 1 minute |
| Vibration resistance (destruction) | 10 to 150 Hz, 0.7-mm double amplitude, 80 minutes, each in X,Y,and Z directions |
| Shock resistance (destruction) | 300 m/s$^2$ 3 times each in six directions (up/down,left/right,forward/backward) |
| Degree of protection | IEC 60529, IP67 |
| Connection method | Connector connection (standard cable length: 500 mm) |
| Weight (packed state) | Approx.160g (Sensor Head only: Approx.75g) |
| Materials | Case and cover: PBT (polybutylene terephtahalate), Optical window: Glass, Internal thread: Brass, Cable: PVC |
| Accessories | Instruction sheet, Ferrite core ×1 (made by TDK Corp. ZCAT1730-0730A), Laser warning label (English), FDA |

**Note:** False detection outside the measurement range can occur in the case of an object with high reflectance.

*1. Beam size: Defined as 1/e$^2$ (13.5 %) of the center optical intensity at the minimum value of the measurement range (effective value).
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. Correct measurements may not be obtained if the workpiece is smaller than the beam size.

*2. Resolution: indicates the degree of fluctuation (±3σ) of analog output when connected to the ZX2-LDA.
(The measured value is given for the center distance for OMRON's standard target object (diffuse-reflective models: white ceramic object, regular-reflective models:1/4 λ flat mirror) when the response time of the ZX2-LDA is set to 128 ms.)
Indicates the repetition accuracy for when the workpiece is in a state of rest. Not an indication of distance accuracy.
Resolution performance may not be satisfied in a strong electromagnetic field.

*3. Linearity: indicates the error with respect to the ideal straight line of the displacement output in the case of measuring Omron' s standard target object. Linearity and measured value may vary depending on target object.
F.S. indicates the full scope of the measurement range. (ZX2-LD50(L): 20 mm)

*4. Temperature characteristic: Value for the case the space between the sensor head and Omron' s standard target object is secured by an aluminum jig. (Measured at the measurement center distance)

*5. These Sensors are classified as Class 1 under EN 60825-1 and the regulations of Laser Notice No. 56 for FDA certification.
CDRH registration has been completed.

## Amplifier Units

| Item / Model | ZX2-LDA11 | ZX2-LDA41 |
|---|---|---|
| Measurement period *1 | Min. 30 μs | |
| Response time | 60 μs, 120 μs, 240 μs, 500 μs, 1 ms, 2 ms, 4 ms, 8 ms, 12 ms, 20 ms, 36 ms, 66 ms, 128 ms, 250 ms, 500ms | |
| Analog output *2 | 4 to 20 mA, Max. load resistance: 300Ω/±5 VDC or 1 to 5 VDC, Output impedance: 100Ω | |
| Judgement outputs (HIGH/PASS/LOW: 3 outputs), error output | NPN open-collector outputs, 30 VDC, 50 mA max. (residual voltage: 1 V max. for load current 10 mA max., 2V max. for load current above 10 mA) | PNP open-collector outputs, 30 VDC, 50 mA max. (residual voltage: 1 V max. for load current 10 mA max., 2 V max. for load current above 10 mA) |
| Laser OFF input, zero reset input, timing input, reset input, bank input | ON: Short-circuited with 0-V terminal or 1.2 V or less<br>OFF: Open (leakage current: 0.1 mA max.) | ON: Supply voltage short-circuited or supply voltage within -1.2 V<br>OFF: Open (leakage current: 0.1 mA max.) |
| Functions | Smart tuning, scaling, sample hold, peak hold, bottom hold, peak-to-peak hold, self-peak hold, self-bottom hold, average hold, zero reset, On-delay timer, OFF-delay timer, keep/clamp switch, (A-B) calculations *3, thickness calculation *3, mutual interference prevention *3, laser deterioration detection, bank function (4 banks), differential function | |
| Indications | Judgement indicators: HIGH (orange), PASS (green), LOW (orange), 11-segment main display (red), 11-segment sub-display (orange), laser ON (green), zero reset (green), enable (green), menu (green), HIGH threshold (orange), LOW threshold (orange) | |
| Power supply voltage | 10 to 30 VDC, including 10% ripple (p-p) | |
| Power consumption | 3,000 mW max. (at 24 VDC: 125 mA max., at 12 VDC: 250 mA max.) | |
| Ambient temperature | Operating: 0 to 50 °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 for 1 min. | |
| Vibration resistance (destruction) | 10 to 150 Hz, 0.7-mm double amplitude, 80 min. each in X, Y, and Z directions | |
| Shock resistance (destruction) | 300 m/s² 3 times each in six directions (up/down, left/right, forward/backward) | |
| Degree of protection | IEC60529, IP40 | |
| Connection method | Prewired (standard cable length: 2 m) | |
| Weight (packed state) | Approx. 200 g (main unit only: Approx. 135 g) | |
| Materials | Case: PBT (polybutylene terephtahalate), Cover: Polycarbonate, Display: Methacrylic resin, Button: Polyacetal, Cable: PVC | |
| Accessories | Instruction sheet | |

*1. In the case of Omron's standard target object (white ceramic)
*2. Select current output (4 to 20 mA) and voltage output (±5V or 1 to 5V) by MENU mode.
*3. Calculating unit (ZX2-CAL) is necessary. Calculations are possible for up to two amplifier units. Mutual interference prevention is possible for up to five amplifier units.

## Calculating Unit

| Item / Model | ZX2-CAL |
|---|---|
| Applicable Amplifier Units | ZX2-LDA11, ZX2-LDA41 |
| Current consumption | 12 mA max. (supplied from the Smart Sensor Amplifier Unit) |
| Ambient temperature | Operating: 0 to +50°C, storage: -15 to +70°C (with no icing or condensation) |
| Ambient humidity | Operating and storage: 35% to 85% (with no condensation) |
| Connection method | Connector |
| Dielectric strength | 1,000 VAC, 50/60 Hz for 1 minute |
| Vibration resistance (destruction) | 10 to 150 Hz, 0.7-mm double amplitude, 80 minutes, each in X,Y,and Z directions |
| Shock resistance (destruction) | 300 m/s² 3 times each in six directions (up/down, left/right, forward/backward) |
| Materials | Case: ABS, Display: Methacrylic resin |
| Weight (packed state) | Approx. 50g<br>(Calculating Unit only: Approx. 15g) |
| Accessories | Instruction sheet |

## ZX2-series Communications Interface Unit

| Item / Model | | | ZX2-SF11 |
|---|---|---|---|
| Power supply voltage | | | 10 to 30 V DC ±10% (including 10% ripple (p-p)) (Supplied from Sensor Amplifier.) |
| Power consumption | | | 720 mW max. (at 24 V: 30 mA max., at 12 V: 60 mA max.) (Not including Sensor Amplifier current consumption or output current |
| Applicable Amplifier Units | | | ZX2-LDA□□ (Production after November 2013) |
| Applicable Amplifier Unit versions | | | Sensor Amplifier Unit version: V1.330 or higher<br>(The Sensor Amplifier version is shown on the sub-digital display when the power of the Sensor Amplifier is turned ON.) |
| Max. No. of Amplifier Units | | | 5 |
| Communications functions | Port | | RS-232C (9-pin, D-Sub connector) |
| | Communications method | | Full duplex |
| | Synchronization method | | Start/stop synchronization |
| | Transmission code | | ASCII |
| | Baud rate | | 38,400 (at shipping)/9,600 bps switchable |
| | Data bit length | | 8 bits |
| | Parity check | | None |
| | Stop bit length | | 1 bit |
| | Data delimiter | Receiving | CR or CR + LF is automatically recognized. |
| | | Sending | CR + LF fixed |
| Indicators | | | Power supply: green, Sensor communications: green, Sensor communications error: red, External terminal communications: green, External terminal communications error: red |
| Protective circuits | | | Power supply reverse polarity protection |
| Ambient temperature | | | Operating: 0 to 50°C, storage: -15 to 60°C (with no icing or condensation) |
| Ambient humidity | | | Operating and storage: 35% to 85% (with no condensation) |
| Insulation resistance | | | 20 MΩ min. (at 500 VDC) |
| Dielectric strength | | | 1,000 VAC, 50/60 Hz for 1 min, Leakage current: 10 mA max. |
| Materials | | | Case: PBT (polybutylene terephthalate), Cover: Polycarbonate |
| Accessories | | | Instruction sheet, 2 clamps |

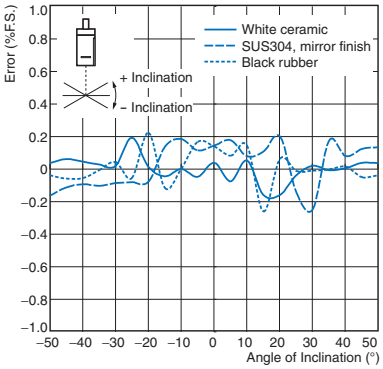
# Engineering Data (Reference Value)

## Angle Characteristic

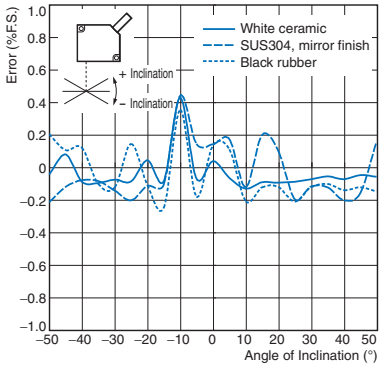
The angle characteristic is a plot of the inclination of the sensing object in the measurement range and the maximum value of the error to analog output.
**Note:** SUS304 = Stainless steel SUS304

### ZX2-LD50

**Side-to-side Inclination**

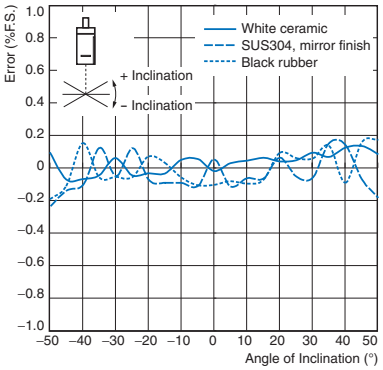



**Front-to-back Inclination**

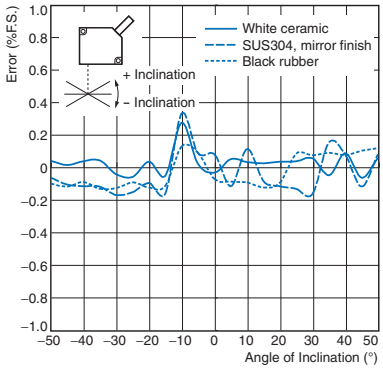



### ZX2-LD50L

**Side-to-side Inclination**

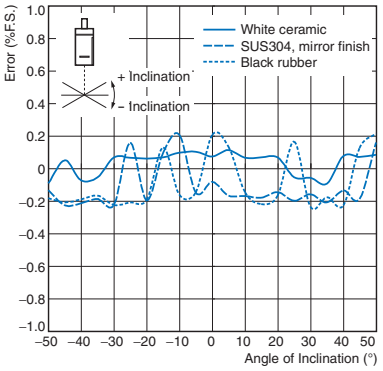



**Front-to-back Inclination**

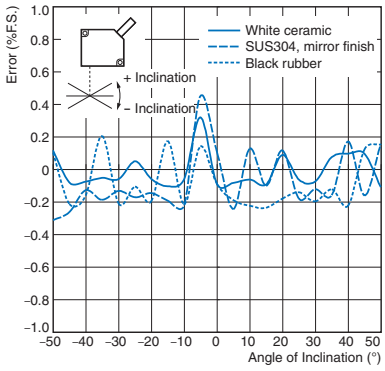



### ZX2-LD100

**Side-to-side Inclination**

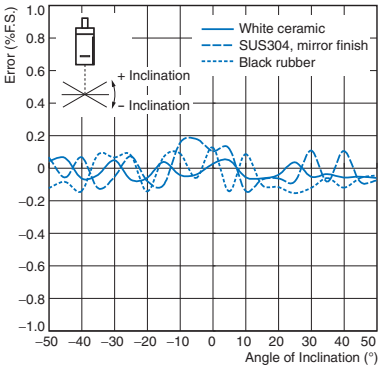



**Front-to-back Inclination**

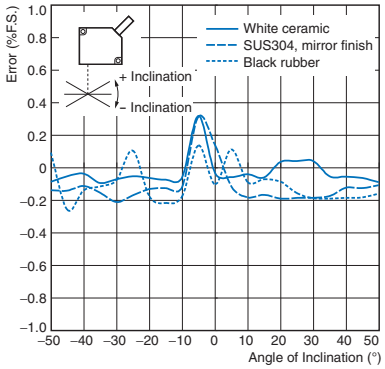



### ZX2-LD100L

**Side-to-side Inclination**



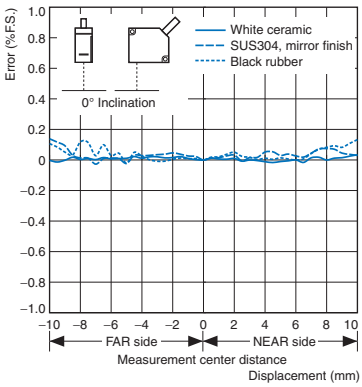

**Front-to-back Inclination**



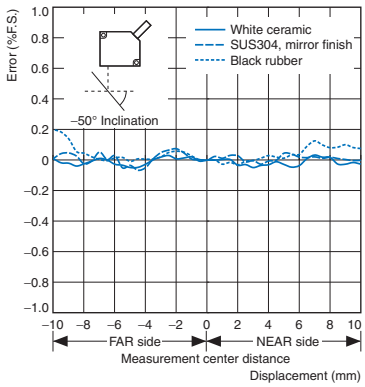
## Linearity Characteristic for Different Materials

### ZX2-LD50

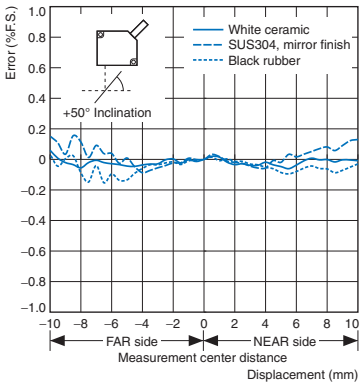
#### 0° Inclination




#### −50° Inclination Front-to-back

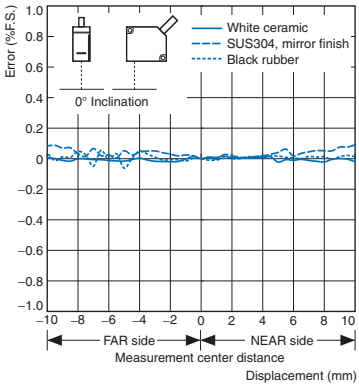



#### +50° Inclination

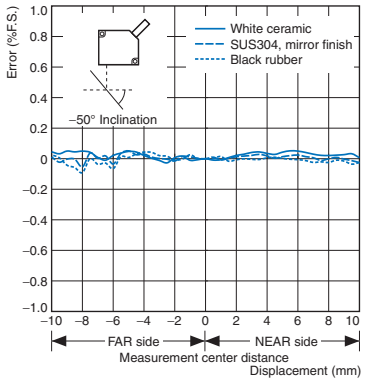



### ZX2-LD50L

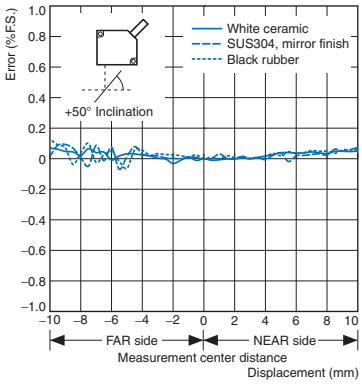
#### 0° Inclination




#### −50° Inclination Front-to-back

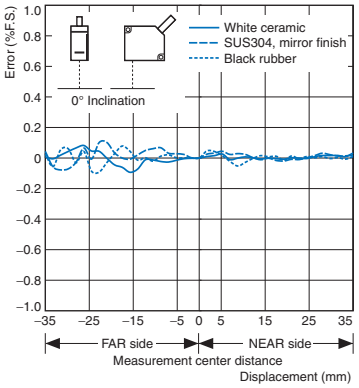



#### +50° Inclination

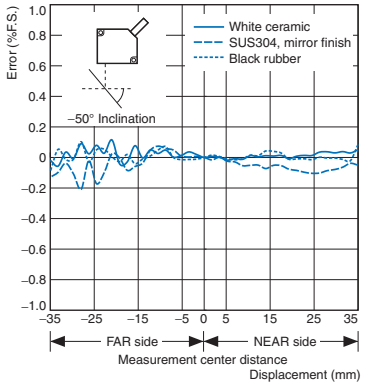



### ZX2-LD100

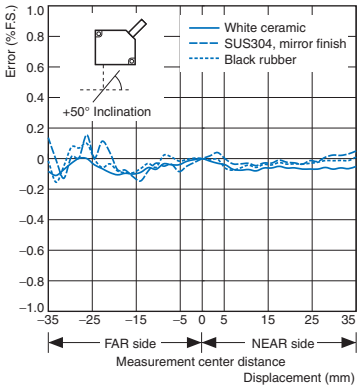
#### 0° Inclination




#### −50° Inclination Front-to-back

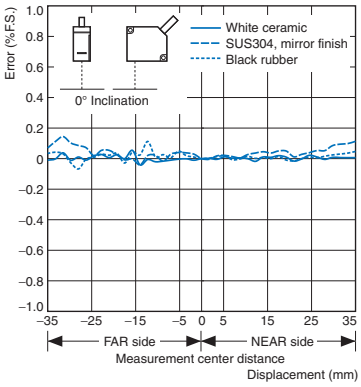



#### +50° Inclination

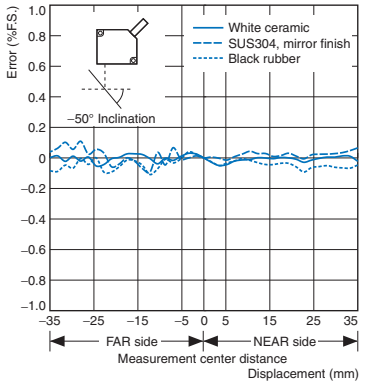



### ZX2-LD100L

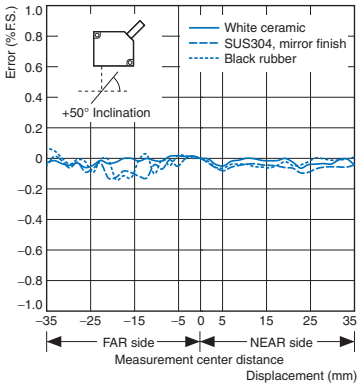
#### 0° Inclination




#### −50° Inclination Front-to-back




#### +50° Inclination

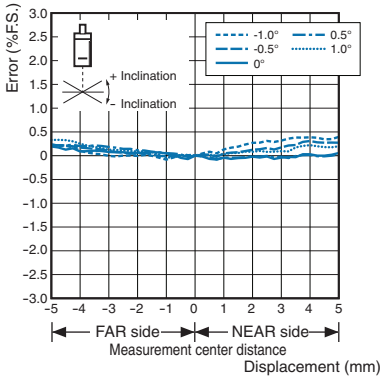



**Note:** The x-axis displacement indicates the measurement distance displayed by the amplifier unit. The measurement distance displayed by the amplifier unit takes the measurement center distance as 0, and the NEAR and FAR sides from the sensor are displayed by + and –, respectively.

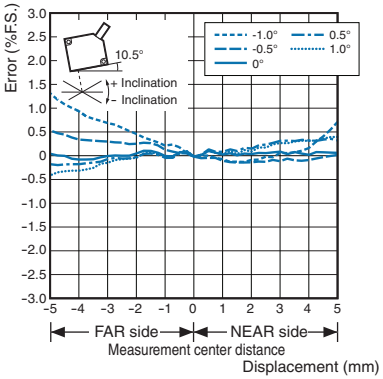
## Angle Characteristic

### ZX2-LD50V

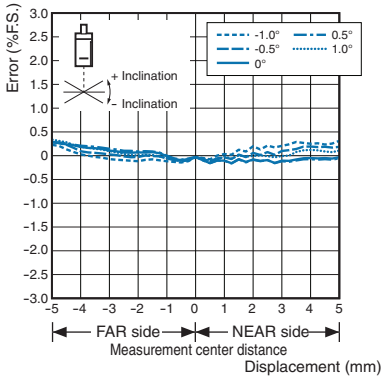
#### Side-to-side Inclination for Flat Mirror



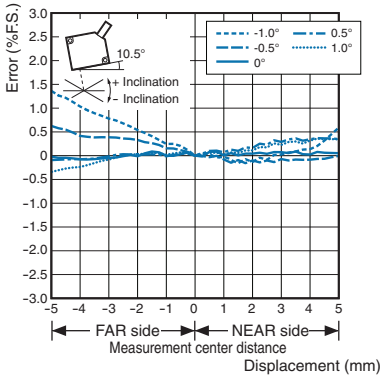

#### Front-to-back Inclination for Flat Mirror



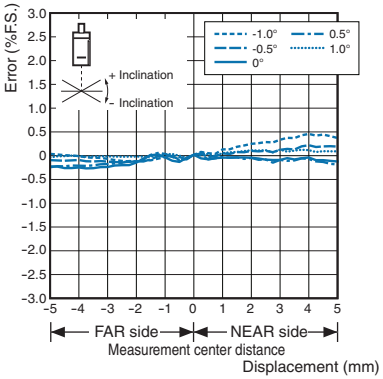

#### Side-to-side Inclination for Silicon Wafer



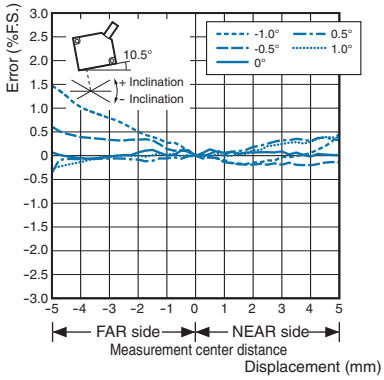

#### Front-to-back Inclination for Silicon Wafer




#### Side-to-side Inclination for Glass



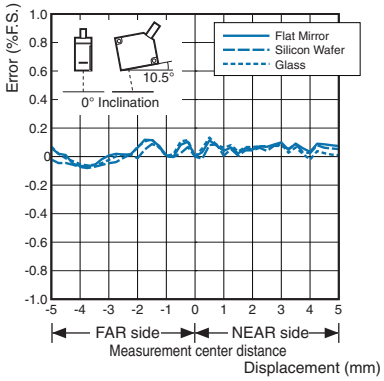

#### Front-to-back Inclination for Glass




## Linearity Characteristic for Different Materials

### ZX2-LD50V

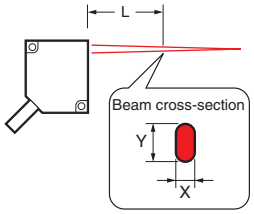
#### 0° Inclination



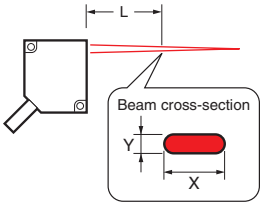

**Note:** The x-axis displacement indicates the measurement distance displayed by the amplifier unit. The measurement distance displayed by the amplifier unit takes the measurement center distance as 0, and the NEAR and FAR sides from the sensor are displayed by + and –, respectively.

## Beam Size

### Spot Beams




### Line Beams




**ZX2-LD50**

| L * | +10 mm | 0 mm | –4 mm | –10 mm |
|---|---|---|---|---|
| X | Approx. 600 µm | Approx. 160 µm | Approx. 40 µm | Approx. 220 µm |
| Y | Approx. 350 µm | Approx. 90 µm | Approx. 60 µm | Approx. 130 µm |

**ZX2-LD50L**

| L * | +10 mm | 0 mm | –4 mm | –10 mm |
|---|---|---|---|---|
| X | Approx. 2.6 mm | Approx. 2.6 mm | Approx. 2.6 mm | Approx. 2.6 mm |
| Y | Approx. 350 µm | Approx. 90 µm | Approx. 60 µm | Approx. 130 µm |

**ZX2-LD100**

| L * | +35 mm | 0 mm | –20 mm | –35 mm |
|---|---|---|---|---|
| X | Approx. 1.1 mm | Approx. 400 µm | Approx. 70 µm | Approx. 250 µm |
| Y | Approx. 550 µm | Approx. 190 µm | Approx. 110 µm | Approx. 150 µm |

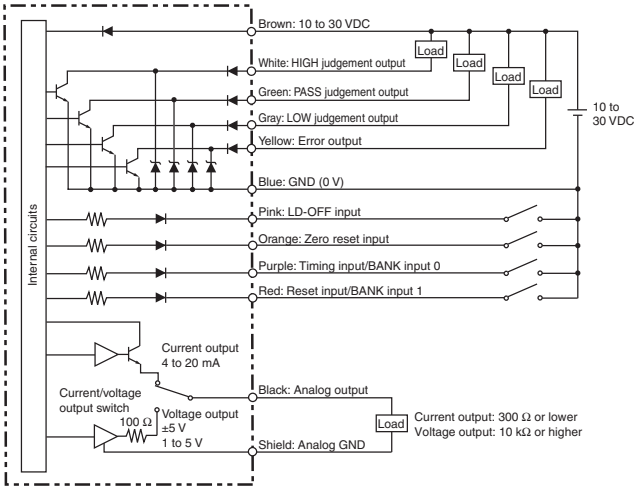
**ZX2-LD100L**

| L * | +35 mm | 0 mm | –20 mm | –35 mm |
|---|---|---|---|---|
| X | Approx. 2.1 mm | Approx. 2.5 mm | Approx. 2.7 mm | Approx. 2.9 mm |
| Y | Approx. 550 µm | Approx. 190 µm | Approx. 110 µm | Approx. 150 µm |

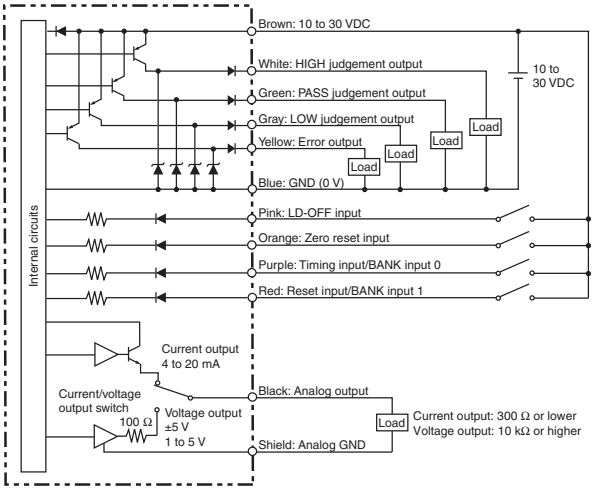
* Measurement distance displayed by the amplifier unit. The measurement distance displayed by the amplifier unit takes the measurement center distance as 0, and the NEAR and FAR sides from the sensor are displayed by + and –, respectively.

# I/O Circuit Diagrams

## NPN Amplifier Unit (ZX2-LDA11)



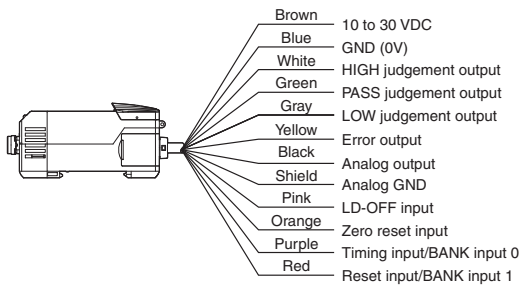

## PNP Amplifier Unit (ZX2-LDA41)




# Wiring

## Amplifier Units

**ZX2-LDA11/ZX2-LDA41**




**Note: 1.** Use a separate stabilized power supply for the Amplifier Unit, particularly when high resolution is required.

**2.** Wire the Unit correctly. Incorrect wiring may result in damage to the Unit. (Do not allow wiring, particularly the Analog output, to come into contact with other wires.)

**3.** Use the 0-V ground (blue) for the power supply and use the Analog ground (shield) for Analog output. Each of these grounds must be used for the designed purpose. When not using the Analog output, connect the Analog ground (shield) to the 0-V ground (blue).

# Safety Precautions

**For details, refer to common precautions, warranty, limitation of liability, and other related information.**

**⚠ WARNING**

**This product is not designed or rated for ensuring safety of persons.**
**Do not use it for such purposes.**

Precautions for Correct Use and Other Details
Refer to the "**Smart Sensors Laser Displacement Sensors CMOS Type ZX2 Series User's Manual**" (Cat. No. Z310).

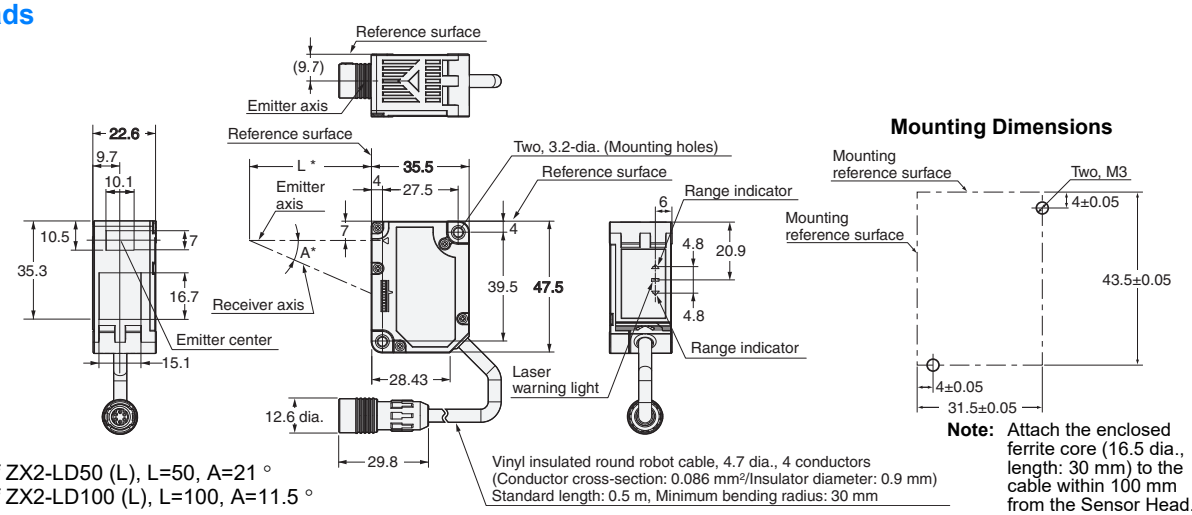
# Dimensions

**(Unit: mm)**
**Tolerance class IT16 applies to dimensions in thes data sheet unless otherwise specified.**

## Units

### Sensor Heads

**ZX2-LD50**
**ZX2-LD50L**
**ZX2-LD100**
**ZX2-LD100L**
**ZX2-LD50V**

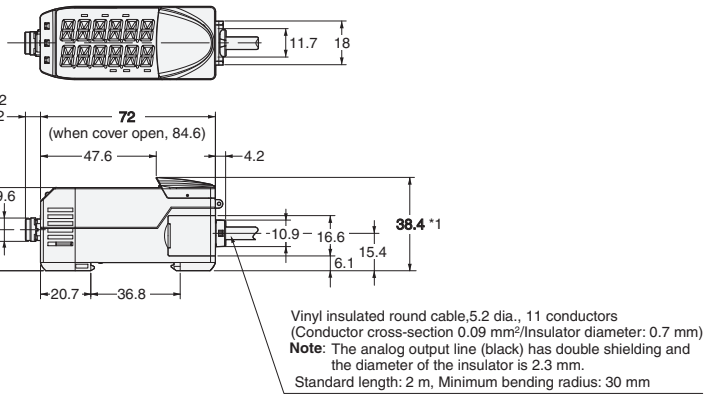



* In the case of ZX2-LD50 (L), L=50, A=21 °
In the case of ZX2-LD100 (L), L=100, A=11.5 °

**Note:** Attach the enclosed ferrite core (16.5 dia., length: 30 mm) to the cable within 100 mm from the Sensor Head.

### Amplifier Units

**ZX2-LDA11**
**ZX2-LDA41**

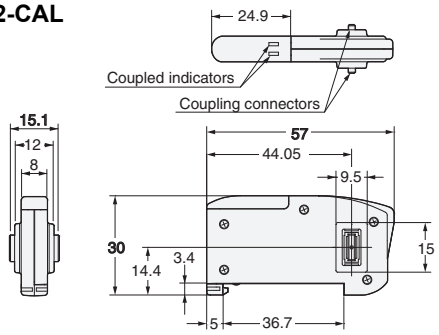



*1. Maximum height when cover open: 56
*2. Minimum length when connected: 50

# Accessories (sold separately)

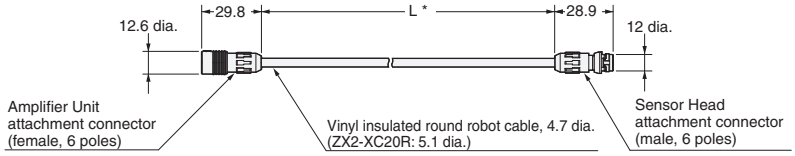
## Calculating Unit

**ZX2-CAL**




## Sensor Head Extension Cables

**ZX2-XC1R**
**ZX2-XC4R**
**ZX2-XC9R**
**ZX2-XC20R**

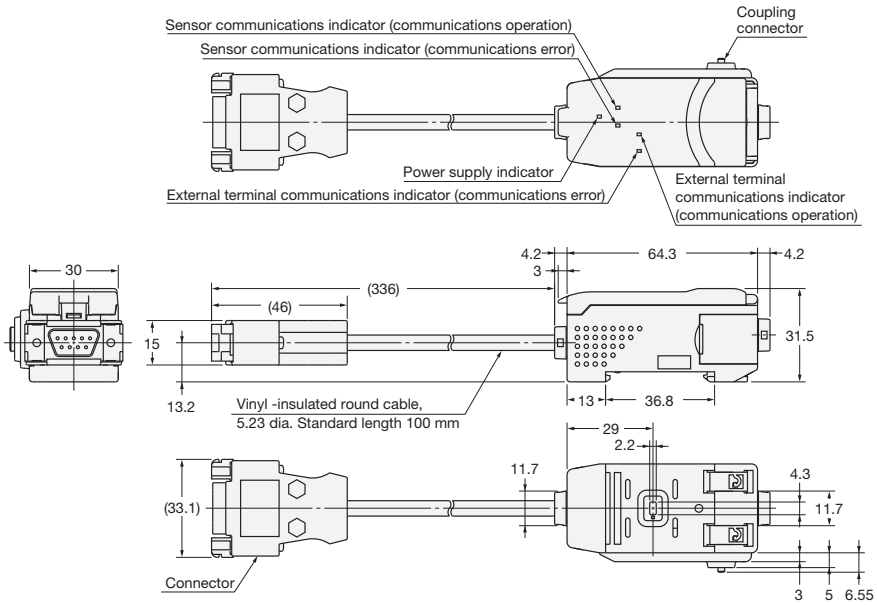



* Length L is as follows.
ZX2-XC1R: 1 m, ZX2-XC4R: 4 m, ZX2-XC9R: 9 m, ZX2-XC20R: 20 m
Minimum bending radius: 30 mm

**Note:** Attach the enclosed ferrite cores (16.5 dia., length: 30 mm) within 100 mm of each end of the extension cable.

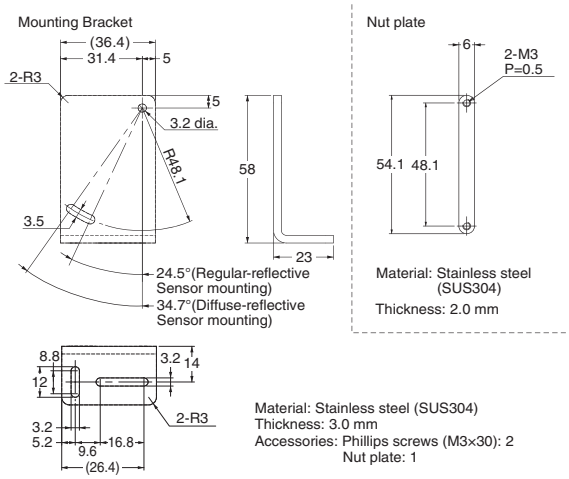
## ZX2-series Communications Interface Unit

**ZX2-SF11**



## Mounting Bracket

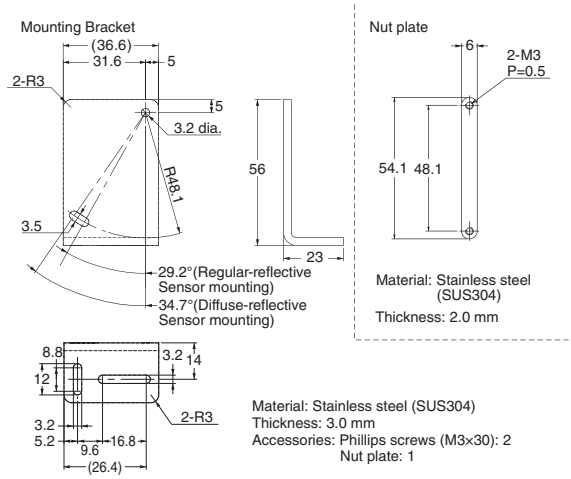
### E39-L178




Material: Stainless steel (SUS304)
Thickness: 3.0 mm
Accessories: Phillips screws (M3×30): 2
Nut plate: 1

## Mounting Bracket

### E39-L179

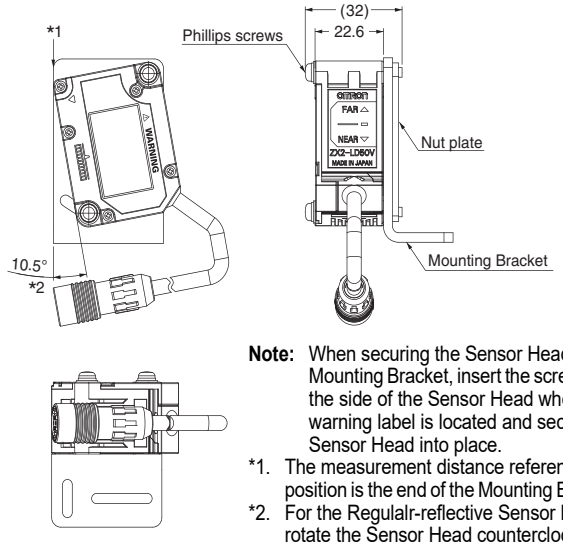



Material: Stainless steel (SUS304)
Thickness: 3.0 mm
Accessories: Phillips screws (M3×30): 2
Nut plate: 1

*Use this Mounting Bracket when installing the ZX2-LD100 (L) as a normal Diffuse-reflective or Regular-reflective Sensor Head.

## Installation Method for Regular-reflective Sensor Head

### Using a E39-L178 Mounting Bracket:



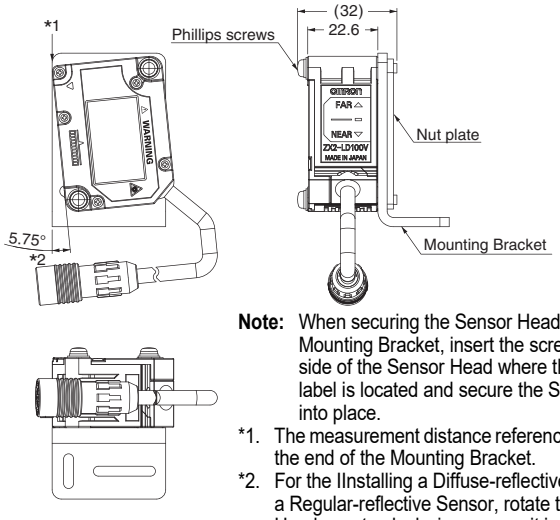

**Note:** When securing the Sensor Head in the Mounting Bracket, insert the screws into the side of the Sensor Head where the warning label is located and secure the Sensor Head into place.

*1. The measurement distance reference position is the end of the Mounting Bracket.

*2. For the Regulalr-reflective Sensor Heads, rotate the Sensor Head counterclockwise, secure it in place, and then perform any necessary fine adjustments.

## Installation Method for Regular-reflective Sensor Heads (Installing a Diffuse-reflective Sensor Head as a Regular-reflective Sensor Head)

### Using a E39-L179 Mounting Bracket:



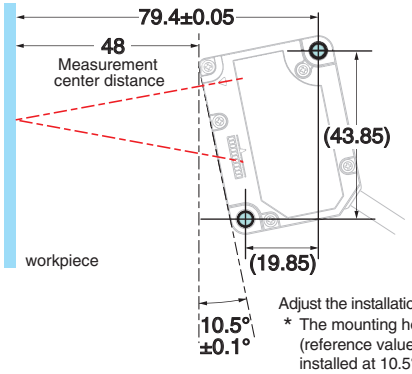

**Note:** When securing the Sensor Head in the Mounting Bracket, insert the screws into the side of the Sensor Head where the warning label is located and secure the Sensor Head into place.

*1. The measurement distance reference position is the end of the Mounting Bracket.

*2. For the IInstalling a Diffuse-reflective Sensor as a Regular-reflective Sensor, rotate the Sensor Head counterclockwise, secure it in place, and then perform any necessary fine adjustments.

### Not Using a Mounting Bracket:

Tilt the Sensor Head towards the workpiece as shown below.

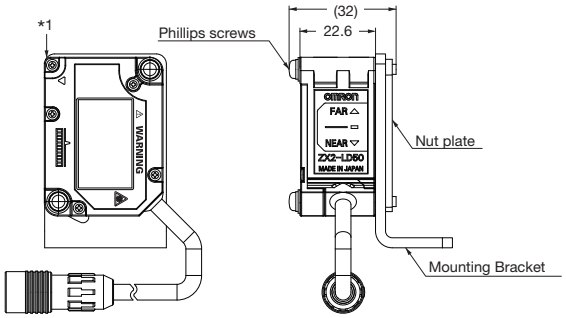


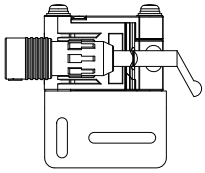

Adjust the installation so that the angle is 10.5° ±0.1°.

* The mounting hole dimensions in parentheses (reference values) are for when the Sensor is installed at 10.5°.

## Installation Method for Diffuse-reflective Sensor Heads

### Using a E39-L178, E39-L179 Mounting Bracket:



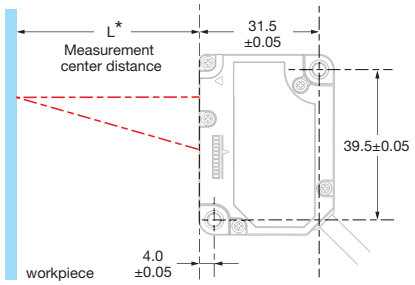



*1 The measurement distance reference position is the Sensor's sensing surface.

**Note:** When securing the Sensor Head in the Mounting Bracket, insert the screws into the side of the Sensor Head where the warning label is located and secure the Sensor Head into place.

### Not Using a Mounting Bracket:

Mount the Sensor Head in relation to the workpiece as shown below.




* ZX2-LD50 (L): 50
ZX2-LD100 (L): 100

## Terms and Conditions Agreement

Read and understand this catalog.
Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranties.
(a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.
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