

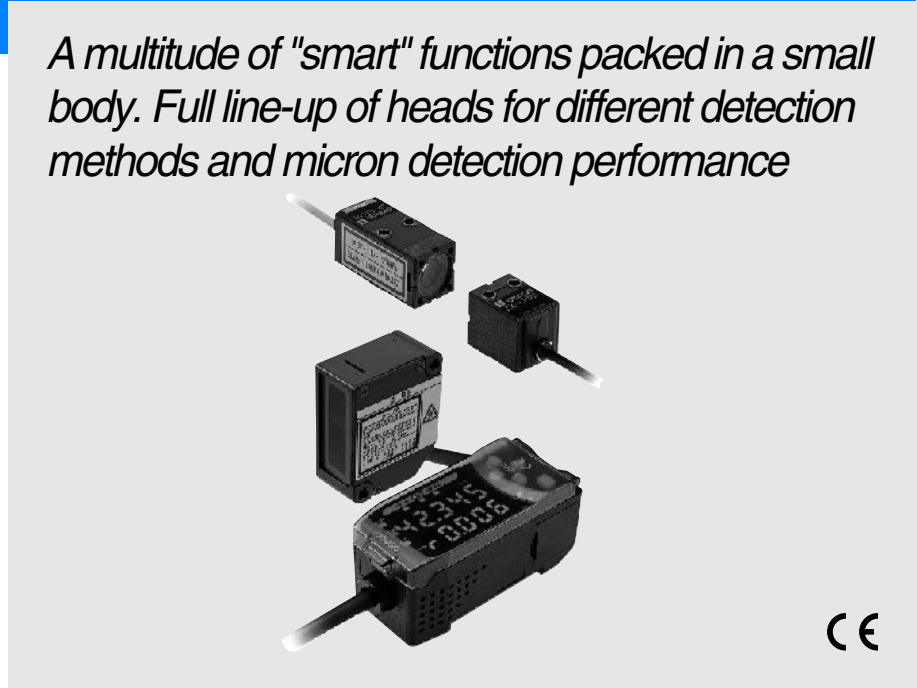
Displacement Sensors / Width-measuring Sensors

| | | | |
|--------------------------------|---------------------------------|---------|------|
| Displacement Sensors | Smart Sensors | ZX | B-2 |
| Width- measuring Sensors | Parallel Beam Linear Sensors | Z4LB V2 | B-22 |

Smart Laser Sensor

ZX *Unique Plug & Play Concept from precise measurement*

A multitude of "smart" functions packed in a small body. Full line-up of heads for different detection methods and micron detection performance



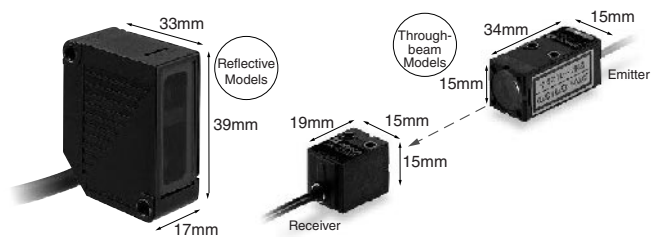
Features

The world's smallest and lightest laser sensor.

It is the world's lightest. A body size similar to a photoelectric sensor permits space conservation and solves installation space problems.

Naturally, we have also achieved a high-speed response on the same level as a photoelectric sensor.

* High-speed sampling: 0.15 ms (response speed: 0.3 ms)



Platform architecture as a optimum solution

Platform architecture allows users to configure a variety range of sensor-heads to one amplifier.

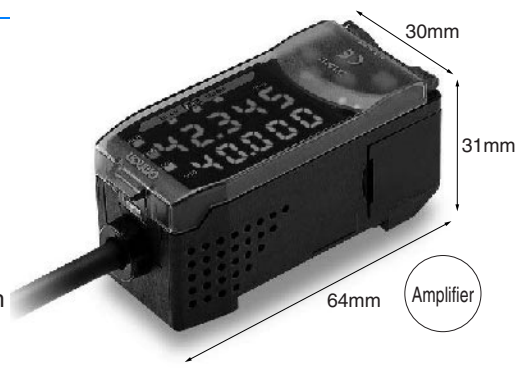
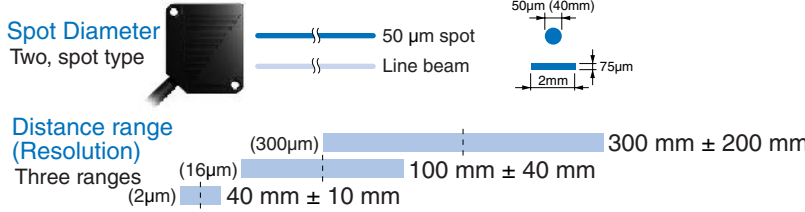
Plug & Play provides easy sensorhead replacement and easy maintenance.

Our line-up includes 8 reflective-type models and 3 Through-beam-type models.

Reflective Models

Class 2 visible-light laser

Minute work is detected by a spot beam, and regular work is detected by a line beam. Smart adaptation to meet the needs of the application. Furthermore, the system seamlessly covers a measurement range of 28 mm to 500 mm.

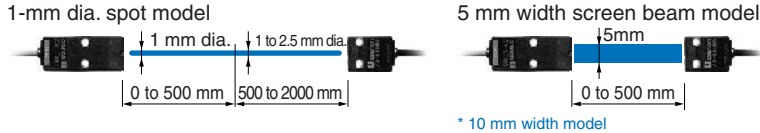


Through-beam Models

Class 1 visible-light laser

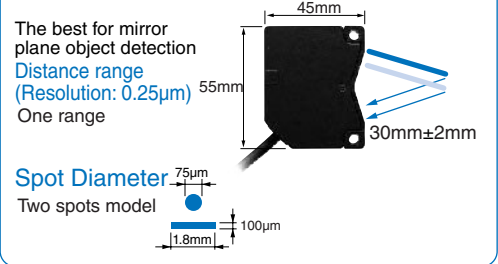
High-precision positioning is accomplished with a 1 mm dia. spot beam, and area detection is accomplished with a 5 mm width / 10 mm width screen beam.

Measurement width and distance range (Resolution: 4mm)



Regular reflection type (displacement)

CLASS 2 Visible Light Laser



Many useful functions are provided.

Calculation settings that eliminate the need for a digital panel meter Patent pending

A calculation unit can be inserted between two amplifiers to display the calculation results of two sensor units on one of the amplifiers. Settings are accomplished by simply entering the necessary parameters in one of the amplifiers.



Includes a sensor life monitor.

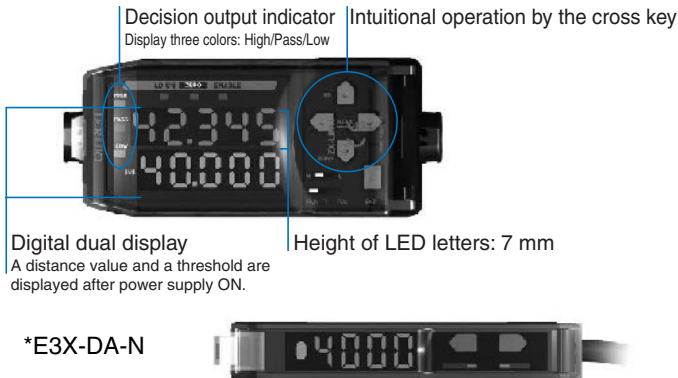
The laser diode (LD) life is detected automatically and the operator alerted.

When LD deterioration is detected, the sub-display alerts you. This gives you time to take action before the LD dies.



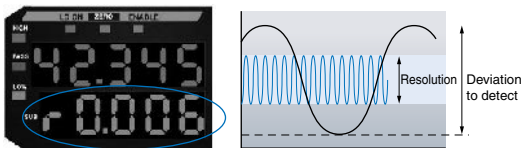
Top priority is given to easy operation.

Sophisticated functions and high performance, with ease of use. This is a key feature of the ZX. The interface comes from our E3X-DA-N* Digital Fiber Amplifier. Feel how simple it is to operate.



Obtain the resolution with ease Patent pending

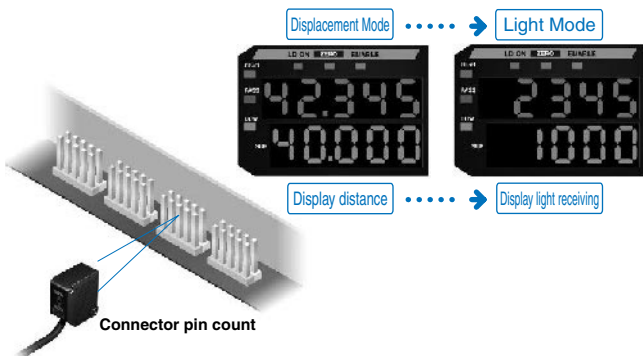
Simply perform detection of the work you wish to test, and you can check the resolution. The resolution is displayed so you can check how much fluctuation there is to the threshold setting and decide whether detection is possible with certitude.



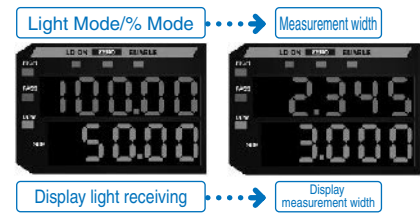
Reflective Models

Light intensity mode for high-performance laser photoelectric detection

Light intensity detection is possible using the minute spot of the laser beam. The sensor be used not only as a displacement meter, but also as a high-precision laser photoelectric sensor for detection of minute work with a background object and color difference. Select displacement mode or light intensity mode as appropriate for the application to establish the optimum function settings.



Through-beam Models



Multiple teaching functions.

Positioning / 2-point / auto-matching

Includes three types of teaching functions on the same level as a photoelectric sensor.

Positioning teaching

Ideal for high-precision positioning applications.

Two-point teaching

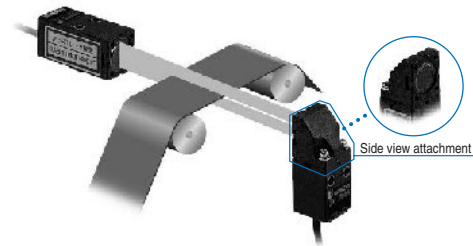
Ideal for detection of minute level differences between two points.

Automatic teaching

Ideal for applications where teaching is performed without stopping the work.

Install in any direction.


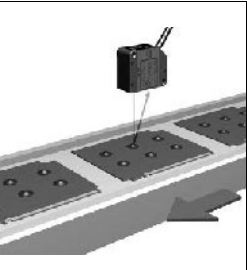

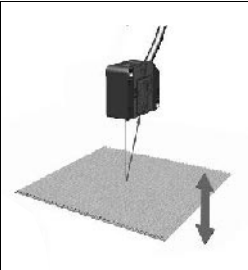



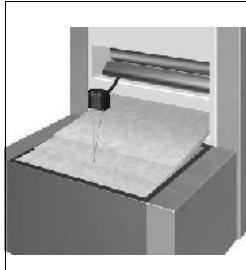

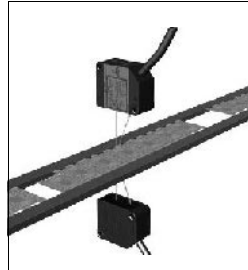

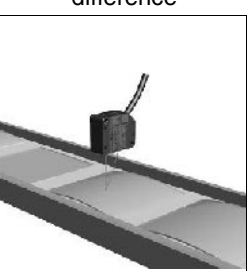

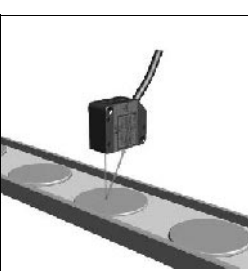

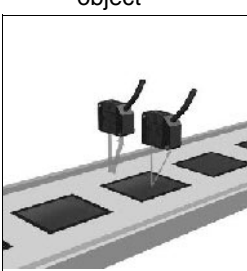

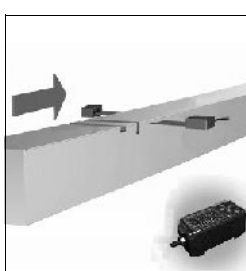

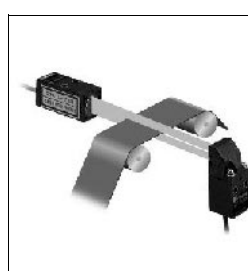
A side viewer attachment (optional) can be installed to enable various installations



Wide variety of easy-to-use functions.

Scaling, display reverse, display off mode, ECO mode, change number of display digits, measurement processing (various timer functions and hold functions), threshold value settings, input/output settings, mutual interference (when using a computing unit), function lock, initial reset, zero reset, differential function, sensitivity selection, monitor focus, etc.

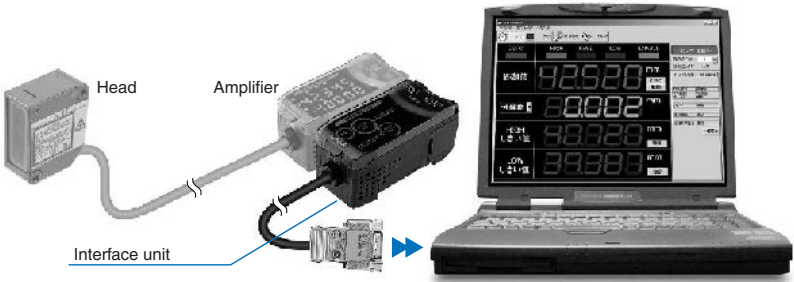
Application

| | | | | |
|---|--|--|---|--|
|  <p>Height measurement of a minute object</p>  |  <p>Face positioning</p>  |  <p>Face swing/ eccentricity</p>  |  <p>Sheet count</p>  |  <p>Thickness of object with flutter</p>  |
|  <p>Detection of warping / level difference</p>  |  <p>Continuous measurement</p>  |  <p>Detection of presence of thin object</p>  |  <p>Gap detection</p>  |  <p>Shape detection</p>  |

Features

Connect to a computer for full use of sensor performance.

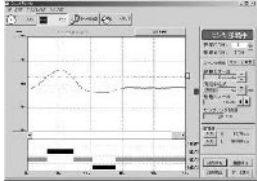
Use the computer monitor screen for enhanced panel display. Easy processing of detection results such as waveform monitor and data logging results, which used to make system configuration more easy.



Waveform monitoring function

Easy monitoring of waveforms, which was previously only possible with an oscilloscope. Plenty of easy-to-use functions, such as drag and drop threshold value setting.

Waveform monitoring



Quality control as you desire.

Data logging
Log detection data and manage a status history for effective and efficient quality control and implementation of countermeasures for problems.



Settings are supported by a list display
Settings that are complicated if the amplifier panel must be used can be easily accomplished by referring to the Function menu. The settings can also be easily imported to and exported from a text editor.



Summary of PC software specifications

- Digital numerical value monitoring
 - Tolerance direct threshold value setting
 - Various teaching settings
 - Waveform monitoring
 - Waveform collection
 - Waveform observation/editing
 - Waveform saving/reading
 - Data logging
 - Various collection condition settings
 - Supports Microsoft Excel
 - Configuration function
 - Amplifier unit function settings (observation scaling, input scaling, etc.)
 - Saving/reading of amplifier setting conditions
- **Microsoft Excel is either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

* Screen images may in some cases differ from the actual product.

Ordering Information

Sensors

Sensor head (reflection type)

| Optical method | Beam shape | Sensing distance | Resolution * | Model |
|-------------------------|------------|------------------|--------------|------------------|
| Diffuse-reflective | Spot beam | 40 ± 10 mm | 2 μm | ZX-LD40 |
| | | 100 ± 40 mm | 16 μm | ZX-LD100 |
| | | 300 ± 200 mm | 300 μm | ZX-LD300 |
| | Line beam | 40 ± 10 mm | 2 μm | ZX-LD40L |
| | | 100 ± 40 mm | 16 μm | ZX-LD100L |
| | | 300 ± 200 mm | 300 μm | ZX-LD300L |
| Regular reflection type | Spot beam | 30 ± 2 mm | 0.25 μm | ZX-LD30V |
| | Line beam | | | ZX-LD30VL |


* At average count of 4,096 times

Sensor head (transmissive type)

| Optical method | Measurement width | Sensing distance | Resolution * | Model |
|----------------|-------------------|------------------|--------------|-----------------|
| Through-beam | 1 mm dia. | 0 to 2,000 mm | 4 μm | ZX-LT001 |
| | 5 mm | 0 to 500 mm | | ZX-LT005 |
| | 10 mm | | | ZX-LT010 |

* At average count of 64 times


Amplifier Units

| Shape | Power supply | Output specifications | Model |
|--|--------------|-----------------------|-----------------|
|  | DC | NPN output | ZX-LDA11 |
| | | PNP output | ZX-LDA41 |


Note: Compatible with sensor head connection.

Accessories (Order Separately)


Computing unit

| Shape | Model |
|---|---------------|
|  | ZX-CAL |

Side view attachment

| Shape | Suitable sensor head | Model |
|---|----------------------|----------------|
|  | ZX-LT001 ZX-LT005 | ZX-XF12 |
| | ZX-LT010 | ZX-XF22 |

"Smart monitor" sensor function setting tool for computer connection.

| Shape | Name | Model |
|---|--------------------------------------|----------------|
|  | For ZX, communication interface unit | ZX-SF11 |
| CD-ROM | For ZX, function setting software | ZX-SW11 |

Two-sided connector cable (for extension)

| Cable length | Model | Quantity |
|--------------|----------------|----------|
| 1 m | ZX-XC1A | 1 pc. |
| 4 m | ZX-XC4A | |
| 8 m | ZX-XC8A | |
| 9 m * | ZX-XC9A | |

* Only for reflective types.

Rating/Performance

Sensor head (reflection type)

| Item Model | ZX-LD40 | ZX-LD100 | ZX-LD300 | ZX-LD30V | ZX-LD40L | ZX-LD100L | ZX-LD300L | ZX-LD30VL |
|-----------------------------|---|---------------------------|--------------------------|------------------------------------|--|---------------------------|--------------------------|------------------------------------|
| Optical method | Diffuse reflection | | | Regular reflection | Diffuse reflection | | | Regular reflection |
| Light source (wave length) | Visible-light semiconductor laser (wavelength 650 nm, 1 mW or less, Class 2) | | | | | | | |
| Measurement center distance | 40 mm | 100 mm | 300 mm | 30 mm | 40 mm | 100 mm | 300 mm | 30 mm |
| Measurement range | ±10 mm | ±40 mm | ±200 mm | ±2 mm | ±10 mm | ±40 mm | ±200 mm | ±2 mm |
| Beam shape | Spot | | | | Line | | | |
| Beam diameter *1 | 50 mm dia. | 100 mm dia. | 300 mm dia. | 75 mm dia. | 75 μm x 2mm | 150 μm x 2 mm | 450 μm x 2 mm | 100 μm x 1.8 mm |
| Resolution*2 | 2 μm | 16 μm | 300 μm | 0.25 μm | 2 μm | 16 μm | 300 μm | 0.25 μm |
| Linearity*3 | ±0.2% F.S. (entire range) | ±0.2% F.S. (80 to 121 mm) | ±2% F.S. (200 to 401 mm) | ±0.2% F.S. (entire range) | ±0.2% F.S. (32 to 49 mm) | ±0.2% F.S. (80 to 121 mm) | ±2% F.S. (200 to 401 mm) | ±0.2% F.S. (entire range) |
| Temperature drift*4 | ±0.03% F.S./°C (±0.1% F.S./°C for ZX-LD300/ZX-LD300L) | | | | | | | |
| Ambient illuminance | Incandescent lamp: 3,000 lux max. | | | | | | | |
| Ambient temperature | Operating: 0°C to 50°C, Storage: -15°C to 60°C (with no icing or condensation) | | | | | | | |
| Ambient humidity | Operating/Storage: 35% to 85% RH (with no condensation) | | | | | | | |
| Insulation resistance | 20 M Ω at 500 VDC | | | | | | | |
| Dielectric strength | 1,000 VAC at 50/60 Hz for 1 minute | | | | | | | |
| Vibration resistance | 10 to 150 Hz, 0.7 mm double amplitude for 80 minutes each in X, Y, and Z directions | | | | | | | |
| Shock resistance | 300 m/s ² , 6 directions, 3 times each (up-down, left-right, forward-backward) | | | | | | | |
| Protective structure | IEC 60529 IP50 | | | IEC Standard IP40 | IEC 60529 IP50 | | | IEC Standard IP40 |
| Connection method | Junction connector (standard length: 500 mm) | | | | | | | |
| Weight (Packed state) | Approx. 150 g | | | Approx. 250 g | Approx. 150 g | | | Approx. 250 g |
| Material | Case: PBT (polybutylene terephthalate), Cover: Aluminum, Lens: Glass | | | Case, Cover: Aluminum, Lens: Glass | Case: PBT (polybutylene terephthalate), Cover: Aluminum, Lens: Glass | | | Case, Cover: Aluminum, Lens: Glass |
| Accessories | Operation manual, laser warning labels (English characters) | | | | | | | |

- *1. Beam diameter: This is the value of the measurement center distance (actual value), and is defined at 1/e² (13.5%) of the central light intensity. If there is stray light outside, the defined area and the area around the object has a higher reflectance than the object.
- *2. Resolution: Indicates the amount of fluctuation (±3 δ) in the linear output when connected to the ZX-LDA. (The measured value when the average count of the ZX-LDA is set to 4,096 and our standard object (white ceramic) is used for the central distance.) This indicates the repeatability precision when the work is in a static state, and does indicate the distance precision. The resolution performance may not be satisfactory in a strong electromagnetic field.
- *3. Linearity: This indicates the error with respect to the ideal straight line of the displacement output when measuring our standard object.
- *4. Temperature characteristic: The value when the distance between the sensor and the object (our standard object) is fixed using an aluminum jig. (Measured at the measurement center distance.)

Note: When an object has a high reflectance, detection errors are possible outside the measurement range.

Sensor head (transmissive type)

| Item Model | ZX-LT001 | ZX-LT005 | ZX-LT010 |
|----------------------------|--|-----------------------------|---|
| Optical method | Through-beam | | |
| Light source (wave length) | Visible-light semiconductor laser (wavelength 650 nm, 1 mW or less, Class 1) | | |
| Measurement width | 1 mm dia. | 1 to 2.5 mm dia. | 5 mm |
| Sensing distance | 0 to 500 mm | 500 to 2,000 mm | 0 to 500 mm |
| Min. sensing object | 8 mm dia. Opaque object | 8 to 50 μm Opaque object | Opaque: 0.05 mm dia. Opaque: 0.1 mm dia. |
| Resolution*1 | 4 μm*2 | --- | 4 μm*3 |
| Temperature drift | 0.2%F.S./ | | |
| Ambient illuminance | Incandescent lamp: 3,000 lux max. | | |
| Ambient temperature | Operating: 0°C to 50°C, Storage: -25°C to 70°C (with no icing or condensation) | | |
| Protective structure | IEC 60529 IP40 | | |
| Cable length | Can be extended to 10 m with the special extension cable. | | |
| Material | Case: polyetherimide, case cover: polycarbonate, front cover: glass | | |
| Clamping torque | 0.3 N ² m max. | | |
| Accessories | Optical axis adjustment seal, sensor head - amplifier unit connector cable, operation manual | | |

- *1. The amount of fluctuation ($\pm 3 \delta$) of the linear output when connected to an amplifier unit, converted to a detection span.
- *2. When the average count is 64. 5 μm when the count is 32. The value when the smallest detection object shades the vicinity of the center of the 1 mm dia. detection span.
- *3. When the average count is 64. 5 μm when the count is 32.

Amplifier Units

| Item Model | ZX-LDA11 | ZX-LDA41 |
|---|--|--|
| Measurement period | 150 μs | |
| Possible average count settings *1 | 1/2/4/8/16/32/64/128/256/512/1,024/2,048/4,096 times | |
| Temperature drift | When reflective head is connected: 0.01% F.S./°C, when transmissive head is connected: 0.1% F.S./°C | |
| Linear output *2 | 4 to 20 mA/F.S., maximum load resistance of 300 Ω ±4 V (±5 V, 1 to 5 V *3), output impedance of 100 Ω. | |
| Decision output (HIGH/PASS/LOW: 3 outputs) *1 | NPN open collector output, 30 VDC 50 mA max., residual voltage 1.2 V or less | PNP open collector output, 30 V DC 50 mA max., residual voltage 2 V or less |
| Laser OFF input / zero reset input / timing input / reset | When ON: supply voltage 1.5 V or less, when OFF: open circuit (maximum leakage current 0.1 mA or less) | When ON: supply voltage 1.5 V or less, when OFF: open circuit (maximum leakage current 0.1 mA or less) |
| Functions | Measurement value display, setting value and incident level and resolution display, scaling, display reverse, display off mode, ECO mode, change number of display digits, sample hold, peak hold, bottom hold, peak to peak hold, self peak hold, self-bottom hold, intensity mode, zero reset, initial reset, on-delay timer, off-delay timer, one-shot timer, differential, sensitivity selection, keeping clamp change, threshold value settings, positioning teaching, two-point teaching, automatic teaching, hiss width variable, timing input, reset input, monitor focus, (A-B) operation, (A+B) operation *4, mutual interference *4, laser degradation detection zero reset memory, function lock | |
| Indicator lamp | Operation indicator lamp: high (orange), pass (green), low (yellow), 7-segment digital main display (red), 7-segment digital sub-display (yellow), laser ON (green), zero reset (green), enable display (green) | |
| Power supply voltage | 12 to 24 VDC ±10%, ripple (p-p) : 10% max. | |
| Current consumption | 200 mA or less (when sensor is connected) | |
| Ambient temperature | Operating: 0°C to 50°C, Storage: -15°C to 60°C (with no icing or condensation) | |
| Ambient humidity | Operating/Storage: 35% to 85% RH (with no condensation) | |
| Insulation resistance | 20 M Ω at 500 VDC | |
| Dielectric strength | 1,000 VAC at 50/60 Hz for 1 minute | |
| Vibration resistance | 10 to 150 Hz, 0.7 mm double amplitude for 80 minutes each in X, Y, and Z directions | |
| Shock resistance | 300 m/s ² , 6 directions, 3 times each (up-down, left-right, forward-backward) | |
| Protective structure | --- | |
| Connection method | Pre-wired models (standard length: 2 m) | |
| Weight (Packed state) | Approx. 350 g | |
| Material | Case: PBT (polybutylene terephthalate), Cover: Polycarbonate | |
| Accessories | Instruction manual | |

- *1. The response speed of linear output (when the sensitivity is fixed) is calculated as (measurement period) x (average count setting + 1). The response speed of decision output (when the sensitivity is fixed) is calculated as (measurement period) x (average count setting + 1).
- *2. Current/voltage can be switched using the switch on the bottom of the amplifier unit.
- *3. Can be set with the monitor focus function.
- *4. Computing unit is required.

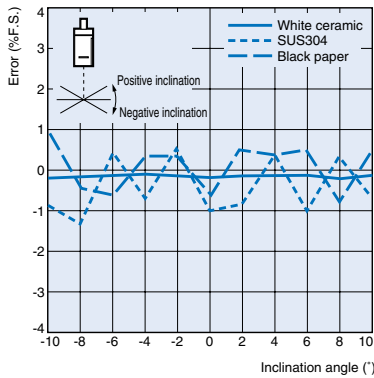
Characteristic data (typical)

Angle characteristics (reflective type)

The angle characteristics are a plot of the inclination of the measured object vs. errors occurring in linear output at the measurement center distance.

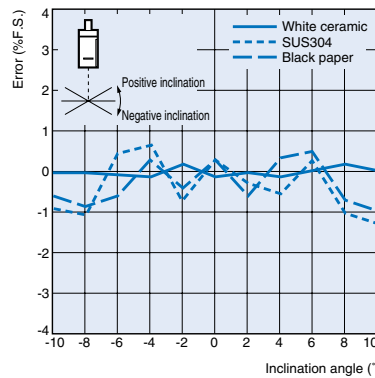
ZX-LD40

Angular properties of vertical inclination



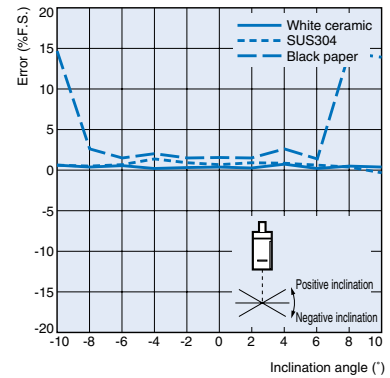
ZX-LD100

Angular properties of vertical inclination

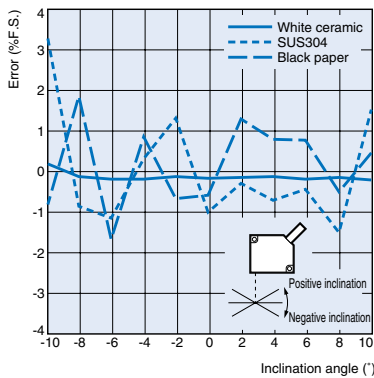


ZX-LD300

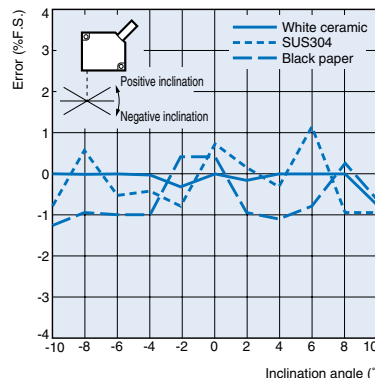
Angular properties of vertical inclination



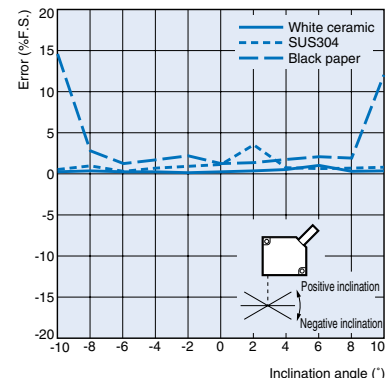
Angle characteristics with respect to horizontal inclination



Angle characteristics with respect to horizontal inclination

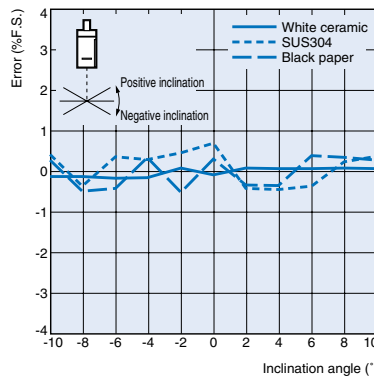


Angle characteristics with respect to horizontal inclination



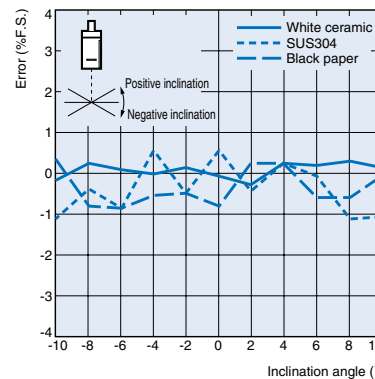
ZX-LD40L

Angular properties of vertical inclination



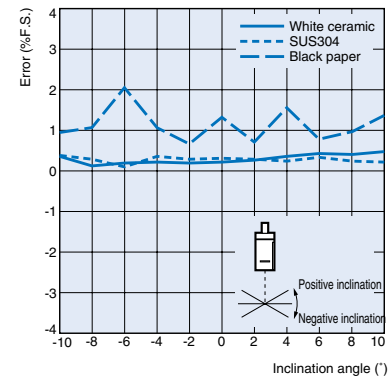
ZX-LD100L

Angular properties of vertical inclination

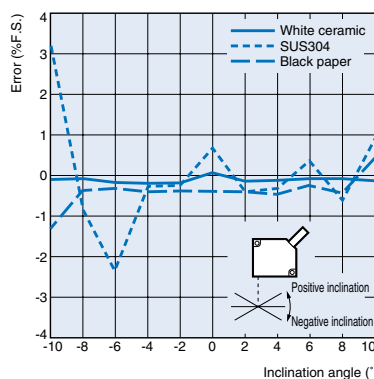


ZX-LD300L

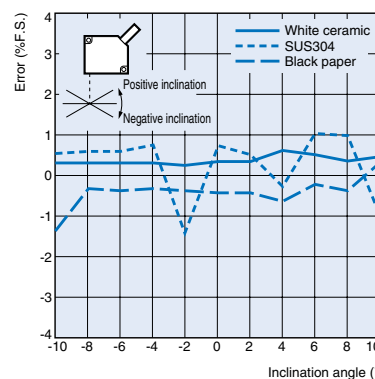
Angular properties of vertical inclination



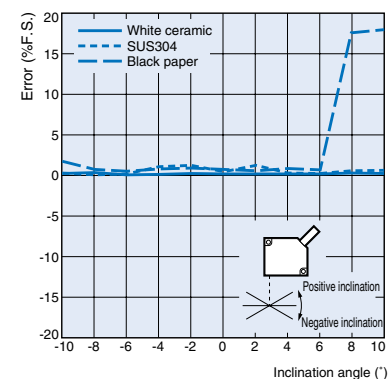
Angle characteristics with respect to horizontal inclination



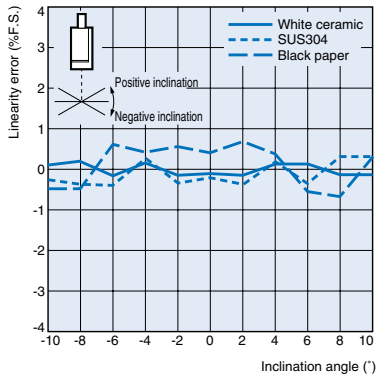
Angle characteristics with respect to horizontal inclination



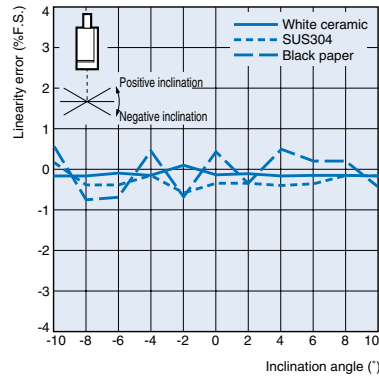
Angle characteristics with respect to horizontal inclination



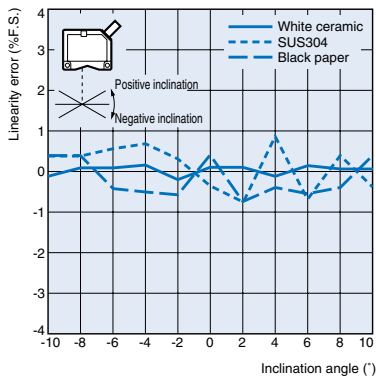
ZX-LD30V
Angular properties of vertical inclination



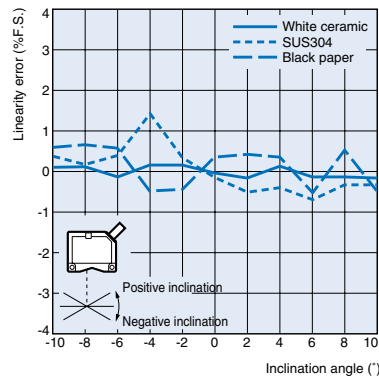
ZX-LD30VL
Angular properties of vertical inclination



Angle characteristics with respect to horizontal inclination



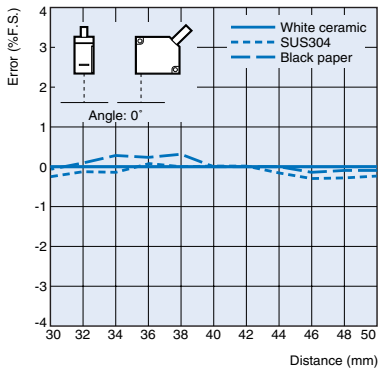
Angle characteristics with respect to horizontal inclination



Linearity characteristics depending on material (reflective type)

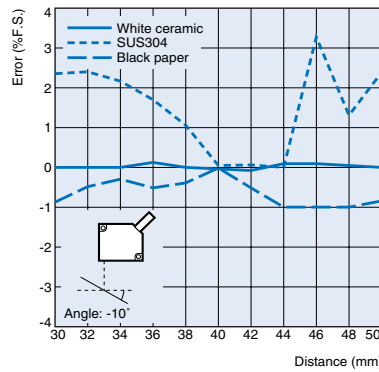
ZX-LD40

Inclination angle 0°

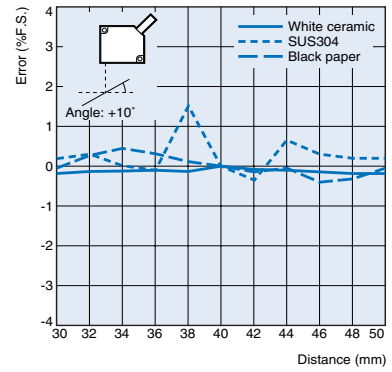


In case of a horizontal inclination

Inclination angle -10°

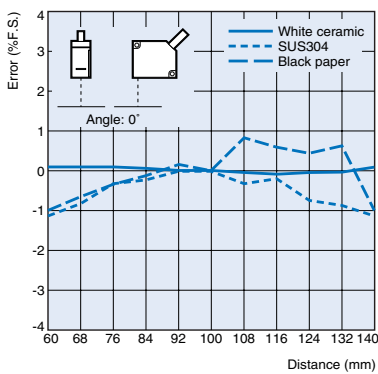


Inclination angle +10°



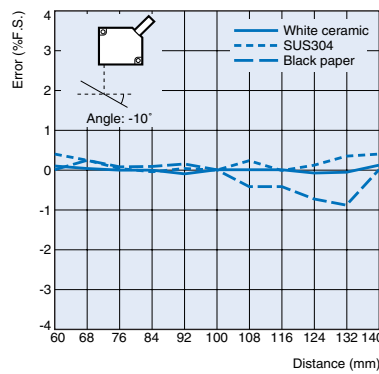
ZX-LD100

Inclination angle 0°

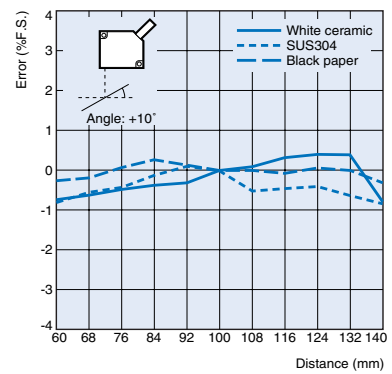


In case of a horizontal inclination

Inclination angle -10°

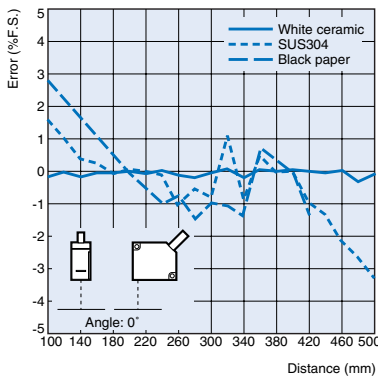


Inclination angle +10°



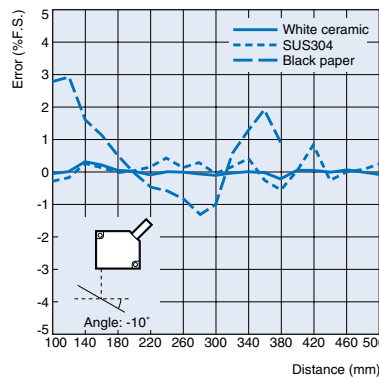
ZX-LD300

Inclination angle 0°

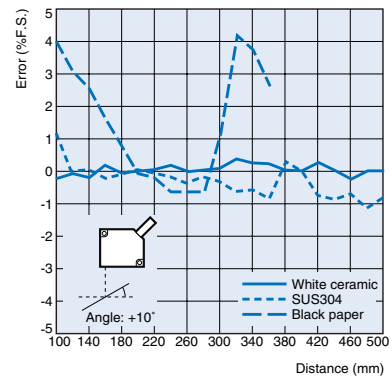


In case of a of a horizontal inclination

Inclination angle -10°

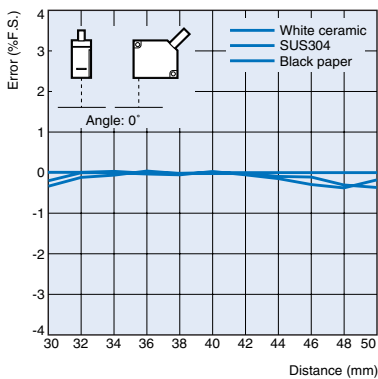


Inclination angle +10°



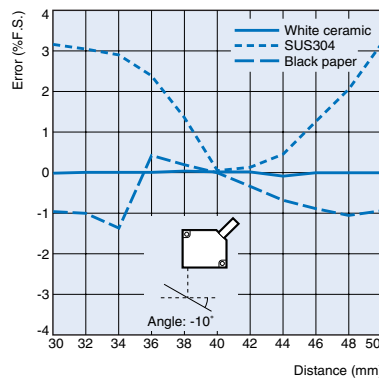
ZX-LD40L

Inclination angle 0°

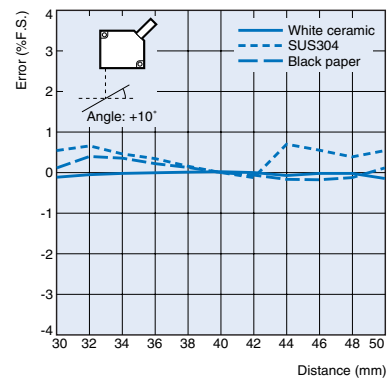


In case of a of a horizontal inclination

Inclination angle -10°



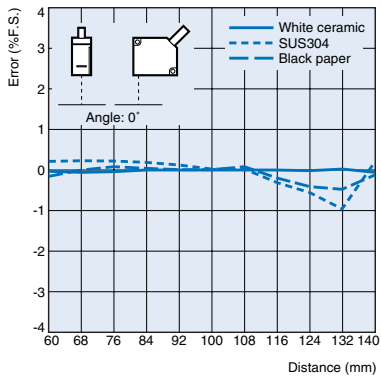
Inclination angle +10°



ZX

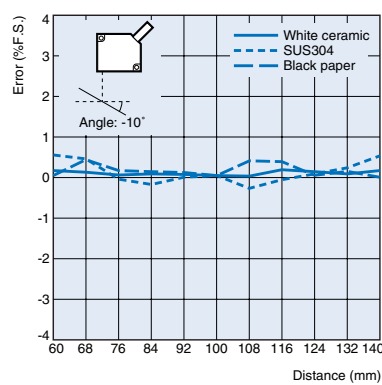
ZX-LD100L

Inclination angle 0°

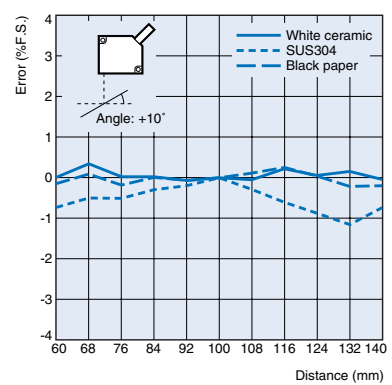


In case of a horizontal inclination

Inclination angle -10°

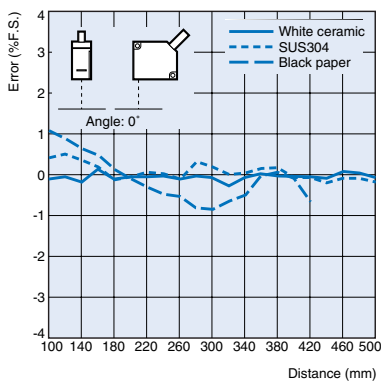


Inclination angle +10°



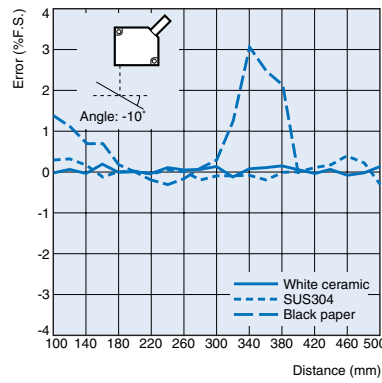
ZX-LD300L

Inclination angle 0°

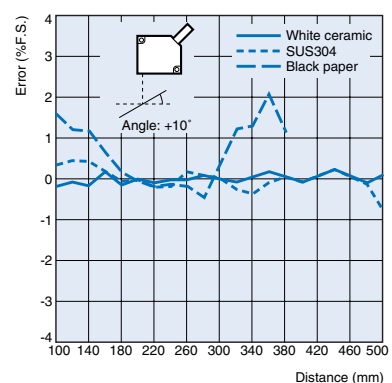


In case of a horizontal inclination

Inclination angle -10°

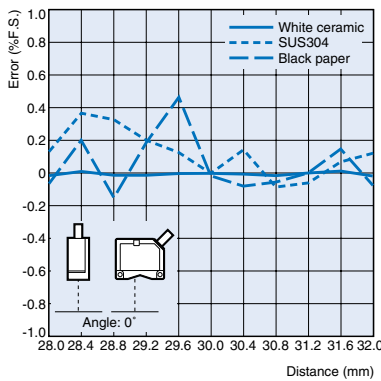


Inclination angle +10°



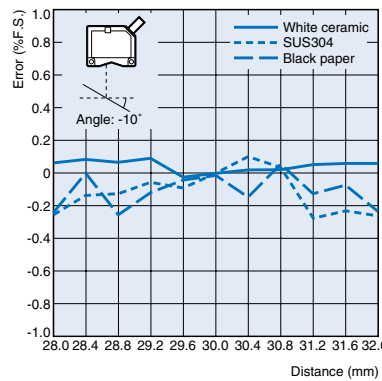
ZX-LD30V

Inclination angle 0°

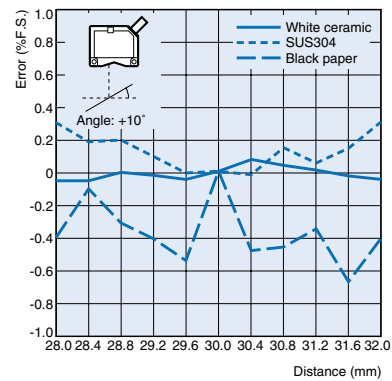


In case of a horizontal inclination

Inclination angle -10°

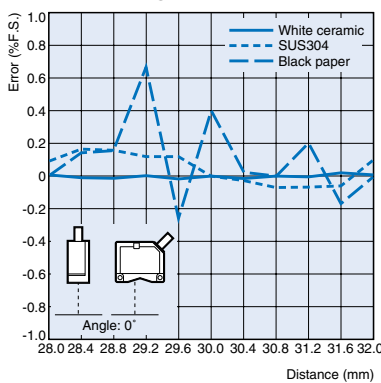


Inclination angle +10°



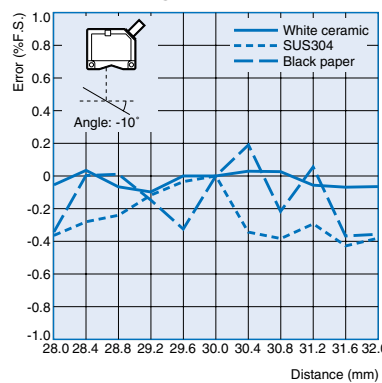
ZX-LD30VL

Inclination angle 0°

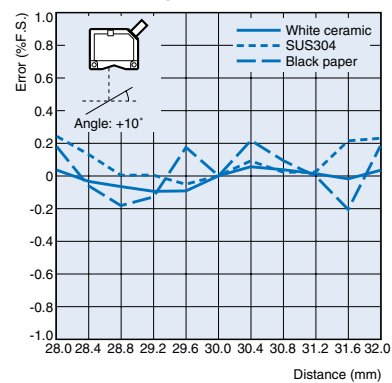


In case of a horizontal inclination

Inclination angle -10°

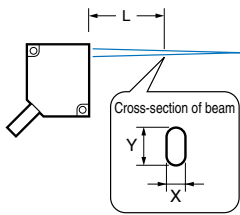


Inclination angle +10°



Spot diameter (reflective type)

Spot beam type



ZX-LD40

| | | | |
|-------|--------|---------|--------|
| L | 30 mm | 40 mm | 50 mm |
| X (m) | 240 μm | 40.0 μm | 250 μm |
| Y (m) | 350 μm | 30.0 μm | 370 μm |

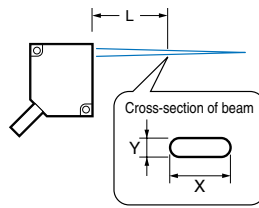
ZX-LD100

| | | | |
|-------|--------|---------|--------|
| L | 60 mm | 100 mm | 140 mm |
| X (m) | 390 μm | 100 μm | 430 μm |
| Y (m) | 620 μm | 65.0 μm | 650 μm |

ZX-LD300

| | | | |
|-------|----------|--------|----------|
| L | 100 mm | 300 mm | 500 mm |
| X (m) | 1,050 μm | 180 μm | 1,100 μm |
| Y (m) | 450 μm | 300 μm | 850 μm |

Line beam type



ZX-LD40L

| | | | |
|-------|----------|----------|----------|
| L | 30 mm | 40 mm | 50 mm |
| X (m) | 2,000 μm | 2,000 μm | 2,000 μm |
| Y (m) | 240 μm | 50.0 μm | 250 μm |

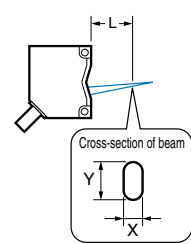
ZX-LD100L

| | | | |
|-------|----------|----------|----------|
| L | 60 mm | 100 mm | 140 mm |
| X (m) | 2,000 μm | 2,000 μm | 2,000 μm |
| Y (m) | 410 μm | 100 μm | 430 μm |

ZX-LD300L

| | | | |
|-------|----------|----------|----------|
| L | 100 mm | 300 mm | 500 mm |
| X (m) | 2,000 μm | 2,000 μm | 2,500 μm |
| Y (m) | 750 μm | 300 μm | 650 μm |

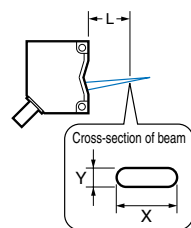
Spot beam type



ZX-LD30V

| | | | |
|-------|---------|---------|---------|
| L | 28 mm | 30 mm | 32 mm |
| X (m) | 60.0 μm | 30.0 μm | 120 μm |
| Y (m) | 50.0 μm | 40.0 μm | 90.0 μm |

Line beam type



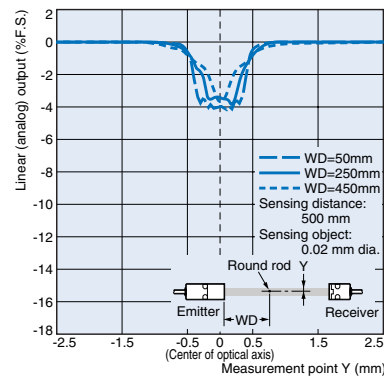
ZX-LD30VL

| | | | |
|-------|----------|----------|----------|
| L | 28 mm | 30 mm | 32 mm |
| X (m) | 1,800 μm | 1,800 μm | 1,800 μm |
| Y (m) | 90.0 μm | 60.0 μm | 110 μm |

Detection object characteristics (transmissive type)

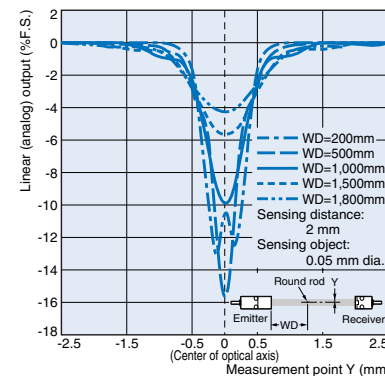
ZX-LT001

(Using a 0.02 mm dia. pin gauge)



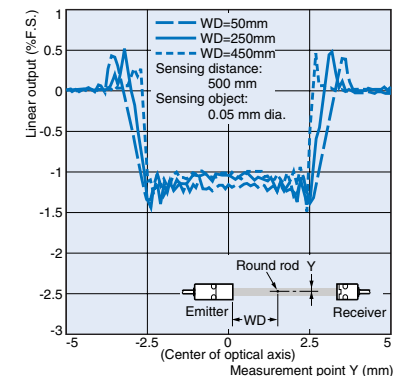
ZX-LT001

(Using a 0.05 mm dia. pin gauge)



ZX-LT001

(Using a 0.05 mm dia. pin gauge)



Linearity properties

ZX-LT005

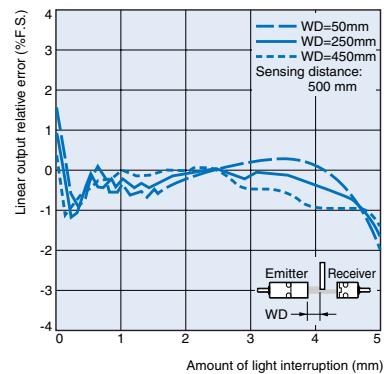
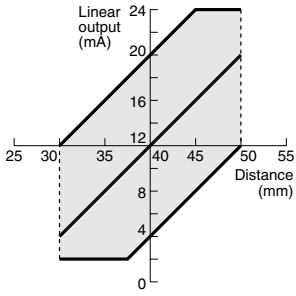


Diagram showing correlation between linear output and detection distance

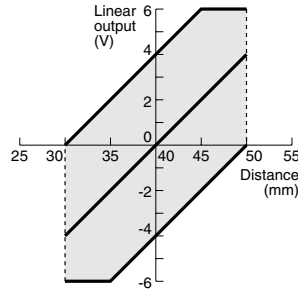
Current or voltage can be selected with the amplifier unit switch.

ZX-LD40/LD40L

(Current output)

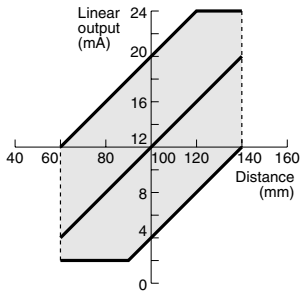


(Voltage output)

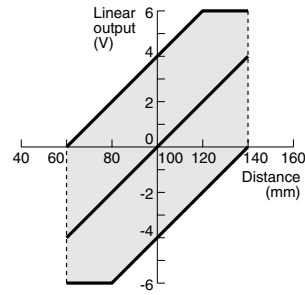


ZX-LD100/LD100L

(Current output)

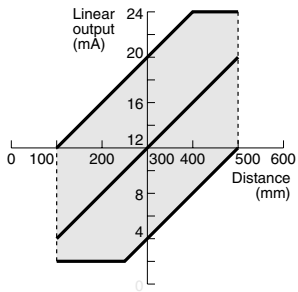


(Voltage output)

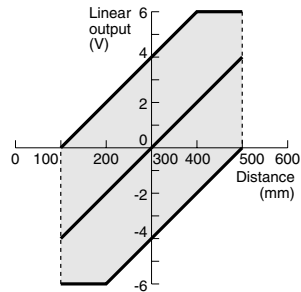


ZX-LD300/LD300L

(Current output)

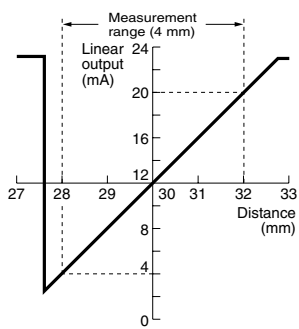


(Voltage output)

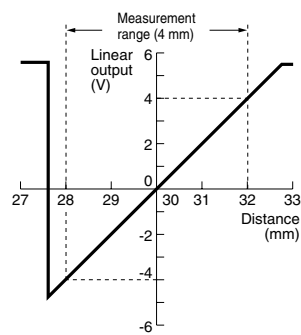


ZX-LD30V/LD30VL

(Current output)

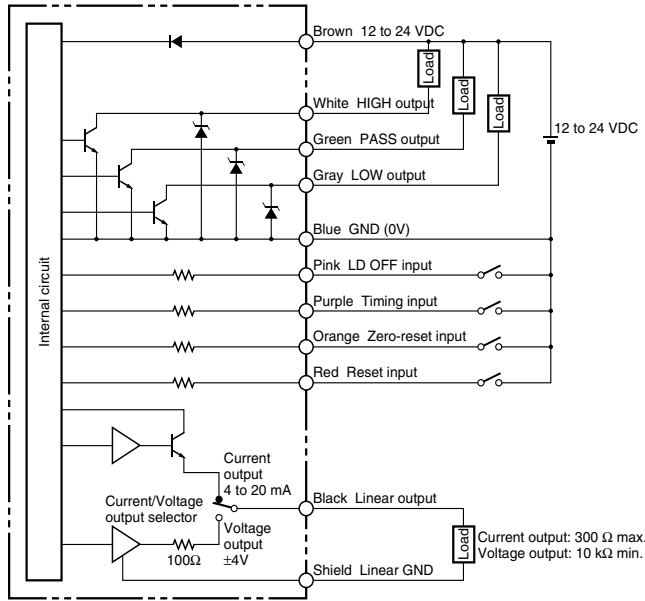


(Voltage output)

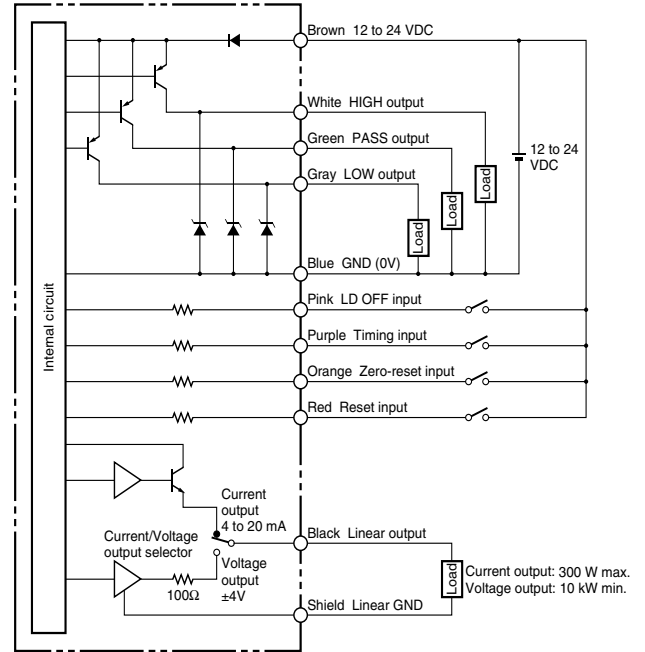


Input/output stage circuit schematic

NPN type: ZX-LDA11

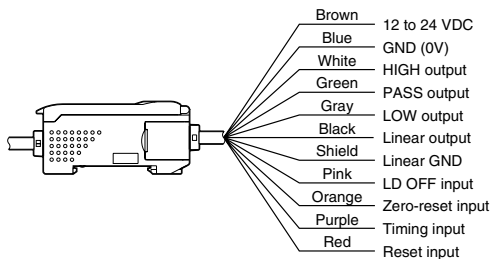


PNP type: ZX-LDA41



Connection

Amplifier Units

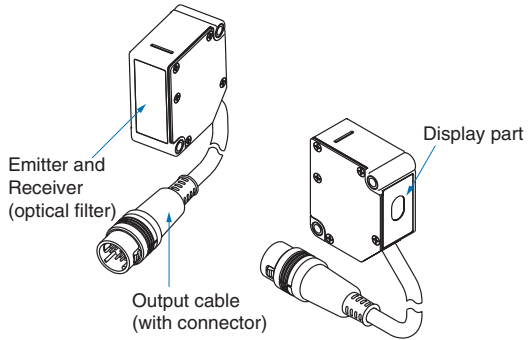


- Note: 1. In particular, when high resolution is necessary, provide a stable power source separate from other power systems.
2. Damage may result if not wired correctly. (In particular, do not allow the linear output to contact other wires.)
3. Green (0 V) is for the power supply. The outer covering of the shield wire (linear GND) is used for linear output along with the black wire (linear output). Even if you will not be using the linear output, connect the linear GND to GND (0 V).

Nomenclature:

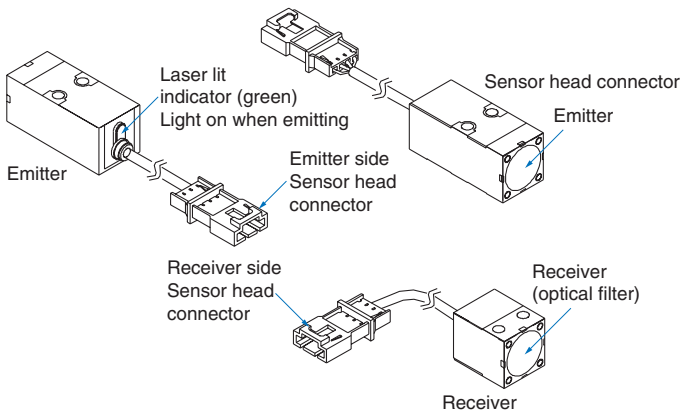
Sensor head (reflection type)

- ZX-LD40
- ZX-LD100
- ZX-LD300
- ZX-LD40L
- ZX-LD100L
- ZX-LD300L
- ZX-LD30V
- ZX-LD30VL



Sensor head (transmissive type)

- ZX-LT001
- ZX-LT005
- ZX-LT010

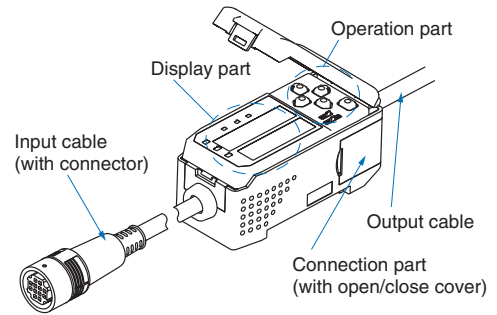


Communication interface

- ZX-SF 11

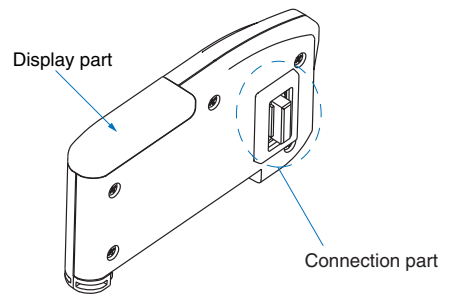
Amplifier Units

- ZX-LDA11
- ZX-LDA41

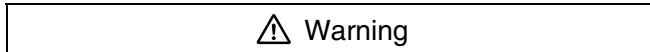


Computing unit

- ZX-CAL



Precautions



Laser safety

Safety measures are required for laser devices both in Japan and abroad. Brief explanations of three cases are given below, including use in Japan and assembling in Japan and then exporting to other countries.



Europe

The ZX Sensor Heads are Class 1 and Class 2 Laser Products according to EN 60825-1 (IEC825-1). (The outline is given in the following table.)

Summary of user precautions

| Requirements subclause | Classification | | | | | | |
|---------------------------|---|-----------------------------|-----------------|-----------------------------|--|--|-----------------------|
| | Class 1 | Class 1M | Class 2 | Class 2M | Class 3R | Class 3B | Class 4 |
| Laser safety iffucer 10.1 | Not required but recommended for applications that involve direct viewing of the laser beam | | | | Not required for visible emission Required for non-visible emission | Required | |
| Remote interlock 10.2 | Not required | | | | | Connect to room or door circuits | |
| Key control 10.3 | Not required | | | | | Remove key when not in use | |
| Beam attenuator | Not required | | | | | When in use prevents inadvertent exposure | |
| Emission indicator device | Not required | | | | Indicates laser is energized for nonvisible wave-lengths | Indicates laser is energized | |
| Warning signs 10.5 | Not required | | | | | Follow precautions on warning signs | |
| Beam path 10.6 | Not required | Class 1M *1 as for Class 3B | Not required | Class 2M *2 as for Class 3B | Terminate beam at end of useful length | | |
| Specular reflection 10.7 | No requirements | Class 1M *1 as for Class 3B | No requirements | Class 2M *2 as for Class 3B | Prevent unintentional reflections | | |
| Eye protection 10.8 | No requirements | | | | | Required if engineering and administrative procedures not practicable and MPE exceeded | |
| Protective clothing 10.9 | No requirements | | | | | Sometimes required | Specific requirements |
| Training 10.10 | No requirements | Class 1M *1 as for Class 3R | No requirements | Class 2M *2 as for Class 3R | Required for all operator and maintenance personnel | | |

*1. Class 1M laser products that failed condition 1 of table 10. Not required for Class 1M laser products that failed condition 2 of table 10.

*2. Class 2M laser products that failed condition of table 10. Not required for Class 2M laser products that failed condition 2 of table 10.

Note: This table is intended to provide a convenient summary of precautions. See text of this standard for complete precautions.



ZX-LD□□□/ ZX-LD30V□

Classification of reflective-type sensor heads

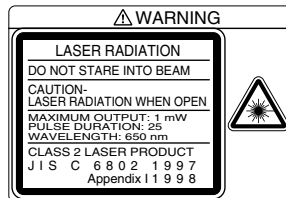
Class 2

Classification of reflective-type sensor head of ZX-LT□□□

Class 1

Laser-related labeling

The warning label at right is attached to the side of the sensor head.



Handing Instructions

The ZX-LD□□□/ ZX-LD30V□ emits visible laser light. Do not look directly at the light. Terminate the light path of the laser beam before use. If a reflective mirror surface is in the light path, ensure that the reflected light path is enclosed in the beam. In cases where the light path must be open, ensure that it is kept away from eye-height.

(U.S.A.)

Exports of products equipped with this device to the U.S.A. are governed by the laser standards of the Food and Drug Administration of the U.S.A.

The ZX Laser Series is classified as Class I and Class II device according to FDA (21 CFR1040.10).

Please inquire for detailed information on exporting to the U.S.A..

(Countries other than the U.S.A.)

- ZX-LD□□□/ ZX-LD30V@ reflective-type (displacement) sensor head: In countries other than Japan and the U.S.A., replace the warning label with the provided English label.
- For the ZX-LT□□□ transmissive-type (displacement) sensor head, the warning label already includes English, thus replacement is not necessary.
- With respect to exports to Europe, a different standard exists, Europe EN60825.

Correct Use

Design

Object

Some object materials and forms may not permit measurement, or may reduce the accuracy of measurement (transparent materials or materials with an extremely low reflectance; steeply inclined objects, etc.).

Power Supply and Wiring

- Do not connect or disconnect the connector while powered. Damage may result.
- Allow the system to warm up for about 10 minutes after turning on the power.
- Upon completed wiring, verify that the power source is wired correctly, that there are no incorrect connections that will cause load shorts, and that the load current is appropriate before turning on the power. Incorrect wiring may result in damage.
- When extending the cable, ensure that the overall length does not exceed 10 m from both the sensor head and the amplifier unit. If you need to extend the cable from the sensor head, use the optional extension cable (ZX-XC□A). For wiring from the amplifier unit, use the same type of shielded cable.
- If the power line is subject to surges, connect a surge protector.
- If you are using a computing unit, connect the linear GND terminals of the amplifier units.

Compatibility

The sensor head and amplifier unit are compatible. A sensor head purchased later can also be used.

Mutual Interference

This sensor head allows the amplifier units to be used in conjunction by connecting a computing unit (ZX-CAL) between the amplifier units.

Cleaning

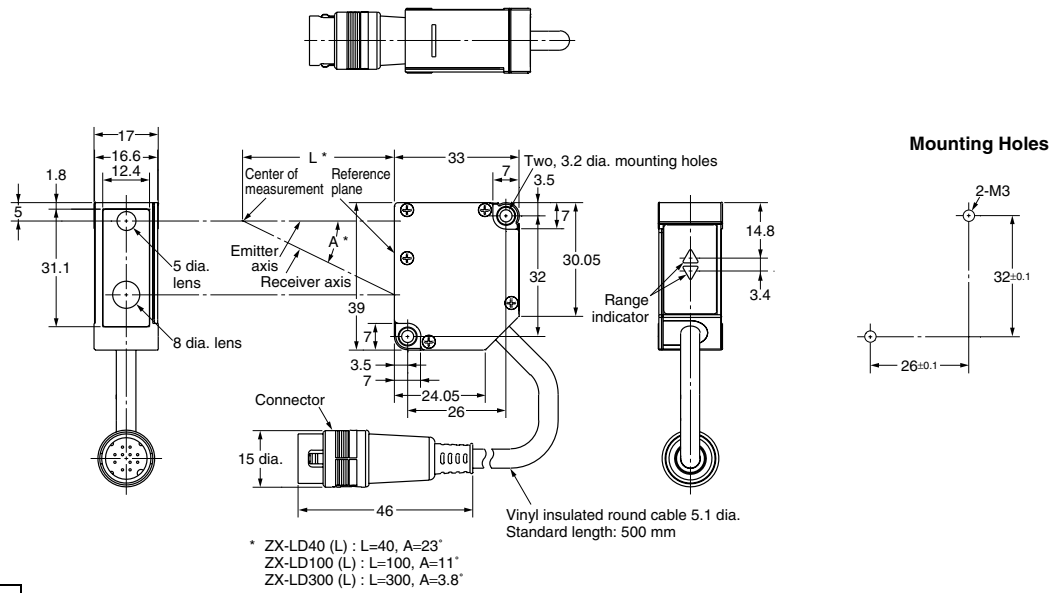
Do not use thinner, benzene, acetone, or kerosene, or similar chemicals.

Dimensions (Unit: mm)

Sensors

Sensor head (diffuse reflection type)

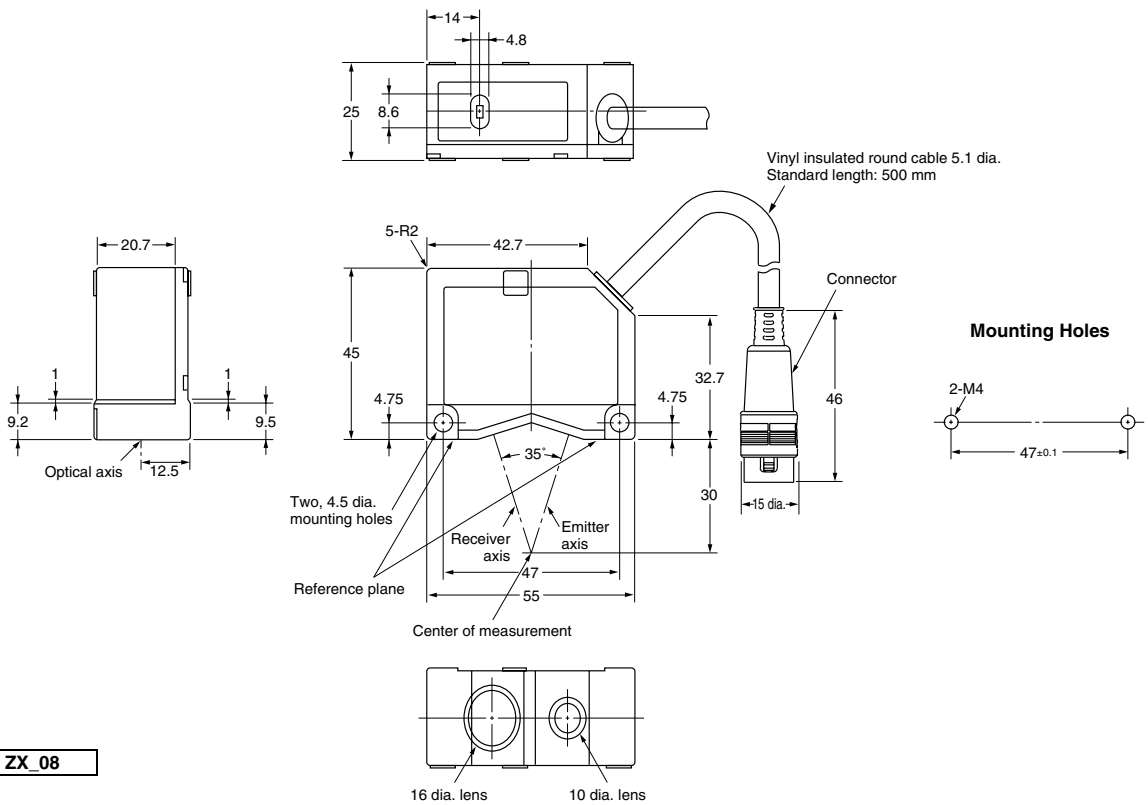
- ZX-LD40
- ZX-LD100
- ZX-LD300
- ZX-LD40L
- ZX-LD100L
- ZX-LD300L



CAD file ZX_02

Sensor head (regular reflection type)

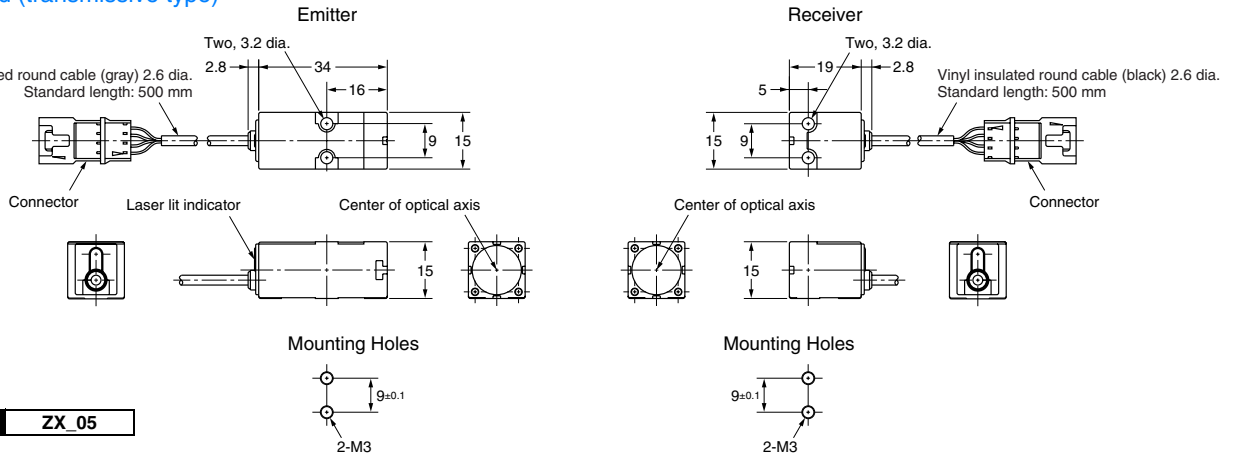
- ZX-LD30V
- ZX-LD30VL



CAD file ZX_08

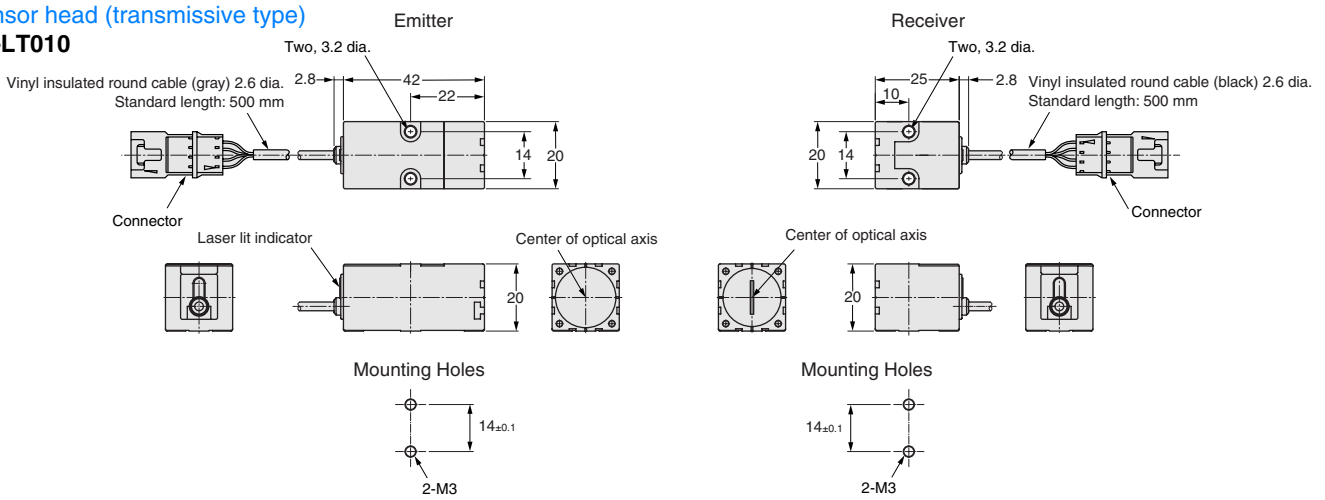
Sensor head (transmissive type)

ZX-LT001
ZX-LT005



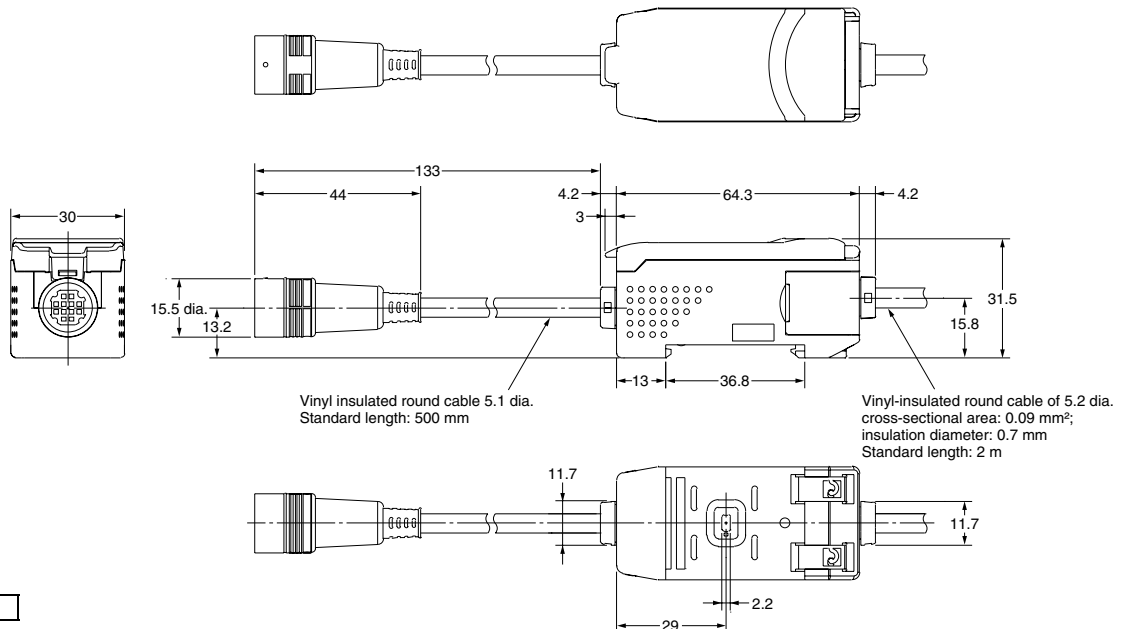
Sensor head (transmissive type)

ZX-LT010



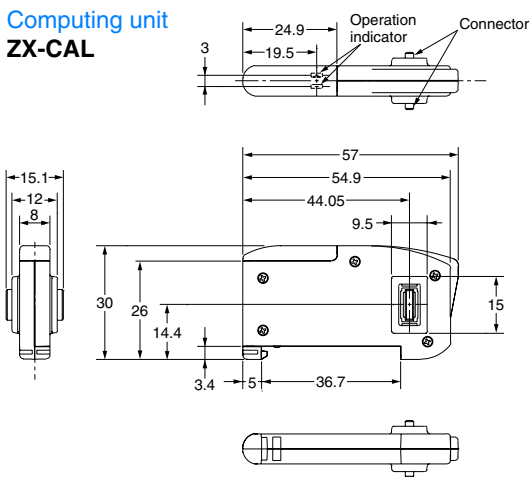
Amplifier Units

ZX-LDA11
ZX-LDA41



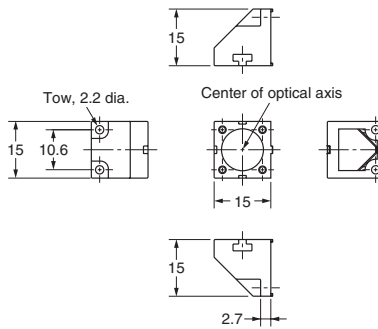
Accessories (Order Separately)

Computing unit
ZX-CAL



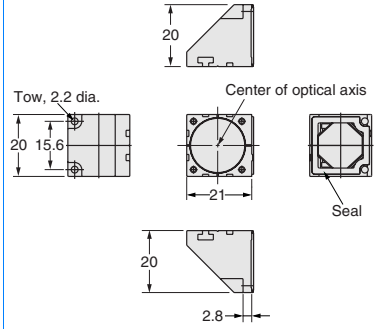
CAD file **ZX_03**

Side view attachment
ZX-XF12

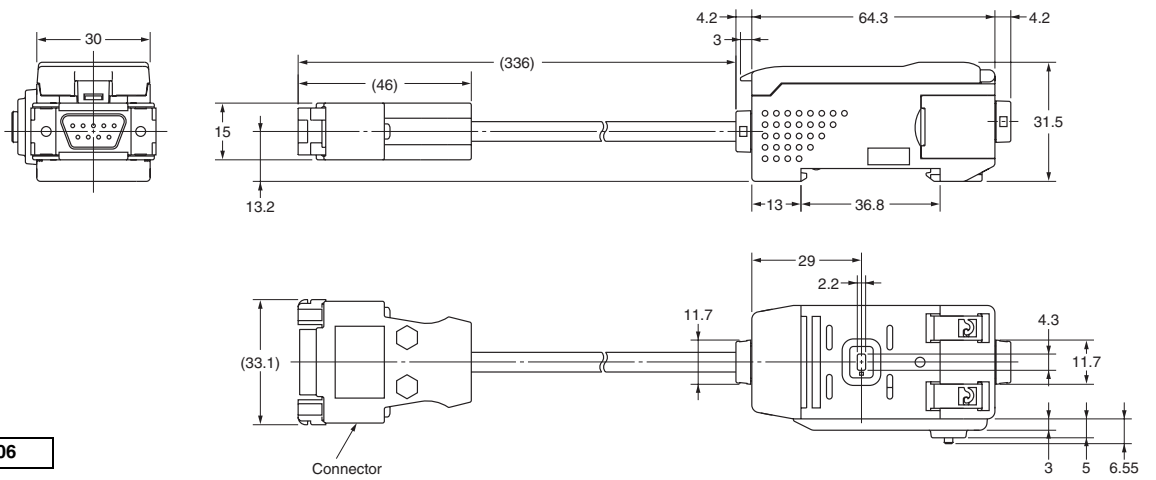
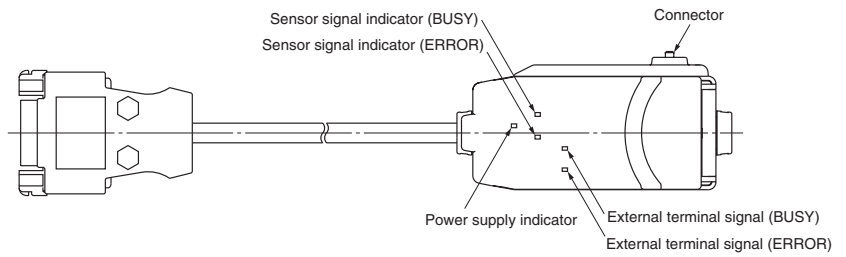


CAD file **ZX_07**

Side view attachment
ZX-XF22



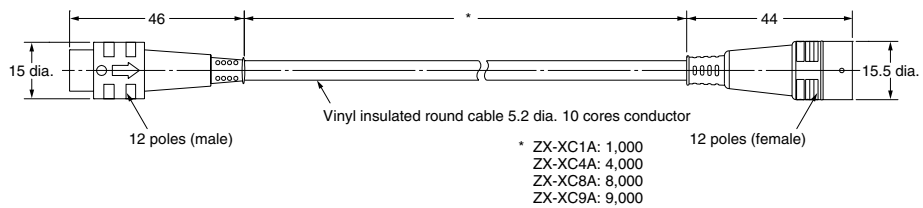
Communication interface unit for ZX
ZX-SF11



CAD file **ZX_06**

Two-sided connector cable
(for extension)

- ZX-XC1A (1 m)**
- ZX-XC4A (4 m)**
- ZX-XC8A (8 m)**
- ZX-XC9A (9 m)**



Parallel Beam Linear Sensor

Z4LB V2

Parallel Laser-Beam for in-area detection, also large/small detection and edge positioning



Features

Easy-to-use amplifier

Equipped with digital display



Includes hold function

Full set of hold functions, including peak, bottom, peak-to-peak, and sample hold.

Also features a "self-hold" function that eliminates the need for a timing sensor. Bothersome fine adjustment of the timing position is made easy, enabling you to catch the target point with ease and certitude.

Includes bank function

2-bank switching for easy change of setup!

PASS/NG output addition

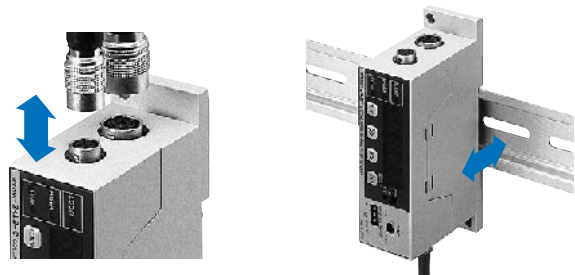
The decision output can be set according to the application. HIGH/LOW inversion output can also be selected.

Zero function

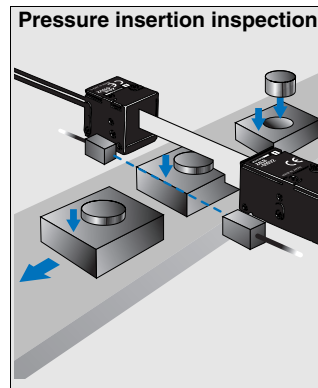
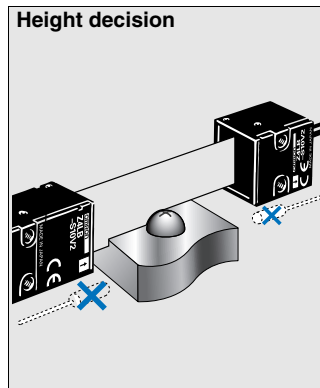
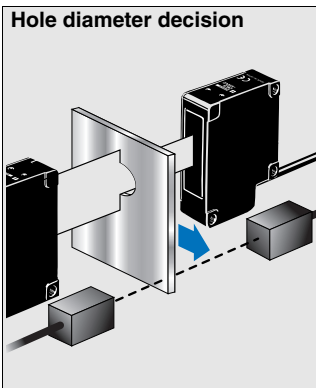
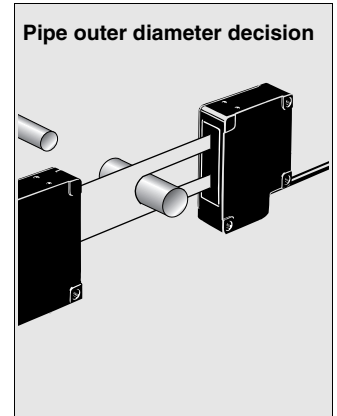
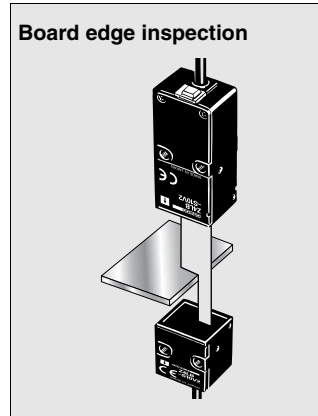
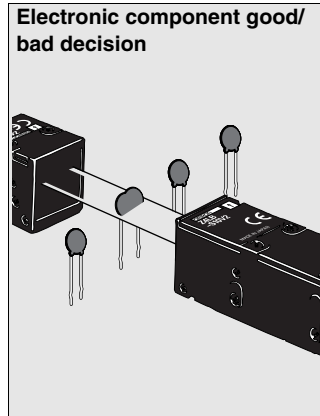
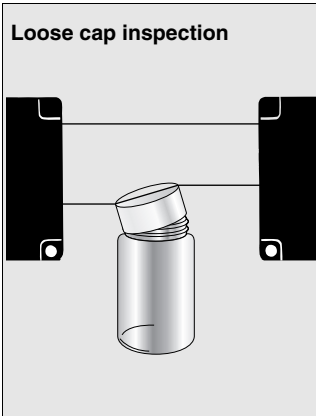
In applications such as level-difference detection with respect to a reference surface, use the zero function each time to ensure a high-precision decision. Settings are accomplished by external input or panel keys.

Easy one-touch connection

- Connector allows one-touch connection of the sensor and amplifier.
- One-touch installation of the DIN rail, too.



Application



Z4LB V2

Features

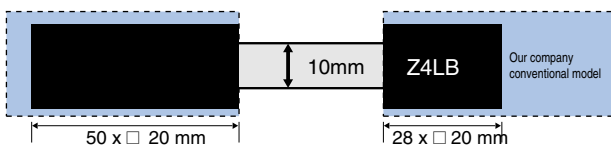
Sensor head for safety and space-saving

JIS Class 1 laser safety allows operation without concern.

Visible light, so adjustment of the optical axis is easy.

Ultra-compact sensor head, only 1/3 our regular size (10 mm type)

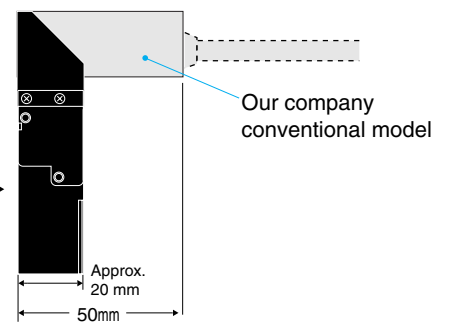
The light receiver is especially small, only 28 x □20 mm. Space-conserving mounting is possible.



Side view attachment conserves even more space.

Side view attachment makes it possible to mount the projector in one-half the space (10 mm type).

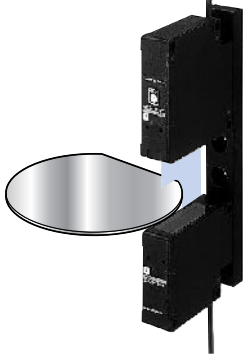
Emitter when using Z49-F3L



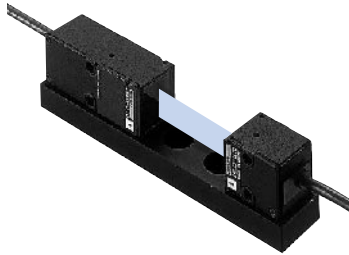
One-side darkening, high-precision type is available.

The definitive solution to one-side darkening applications.

Linearity during one-side darkening is $\pm 0.5\%$, ideal for orientation flat positioning and web guiding of sheets.




The projector and receiver are integrated into a single unit, eliminating the need for optical axis adjustment.




Ordering Information

Sensors

Sensors on Standard Models

 Visible light


| Sensing distance | Measurement width | Model |
|---|-------------------|-------------------|
|  0 to 300 mm | 10 mm | Z4LB-S10V2 |
| | 30 mm | Z4LB-S30V2 |

Amplifiers on Standard Models

| Model | |
|-----------------|------------------|
| NPN model | PNP type |
| Z4LB-CV2 | Z4LB-CPV2 |

One-side Interruption High-precision Models

 Visible light

| Measurement range | Measurement width | Model | |
|---|-------------------|---------------------|----------------------|
| | | NPN model | PNP type |
|  40 mm fixed | 10 mm | Z4LB-A1040V2 | Z4LB-A1040PV2 |
| | 30 mm | Z4LB-A3040V2 | Z4LB-A3040PV2 |

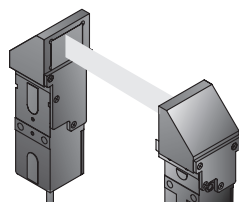
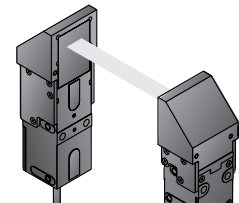
Accessories (Order Separately)

Extension Cable

| Application | Model | Cable length |
|---|----------------|--------------|
| Connection between Sensor and Amplifier | Z49-C13 | 3 m |
| | | 8 m |

Note: Projector/receiver set. When ordering, please specify the cable length as well as the model. (Example: Z49-C13, 3 m)

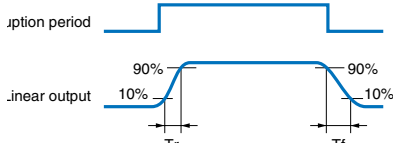
Side view attachment

| Application | Model |
|--|----------------------------|
| Vertical beam  | Emitter Z49-F2L |
| | Receiver Z49-F2D |
| Horizontal beam  | Emitter Z49-F3L |
| | Receiver Z49-F3D |

Rating/Performance

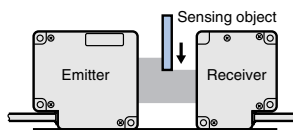
| Item | Type Sensors | Standard Models (Separate Type) | | One-side Interruption High-precision Models | |
|----------------------------------|---|---|--|--|--|
| | | Z4LB-S10V2 | Z4LB-S30V2 | --- | --- |
| | | NPN model | Z4LB-CV2 | | Z4LB-A1040V2 |
| Amplifiers/One-side Interruption | PNP type | Z4LB-CPV2 | | Z4LB-A1040PV2 | Z4LB-A3040PV2 |
| Light source (wave length) | | Visible light semiconductor laser (wavelength 650 nm, JIS Class 1) | | | |
| Measurement width | | 10 mm | 30 mm | 10 mm | 30 mm |
| Sensing distance | | 0 to 300 mm | | 40 mm | |
| Min. sensing object | | 0.1 mm dia. | 0.2 mm dia. | 0.1 mm dia. | 0.2 mm dia. |
| Response time | | *1 0.3 or 5 ms (switch-selectable) | | | |
| Linear output | Output voltage | 1 to 5 V (output impedance 100 Ω, permissible load resistance 10 kΩ or higher) | | | |
| | Resolution | *2 5 μm (5 ms) 10 μm (0.3 ms) | 15 μm (5 ms) 30 μm (0.3 ms) | 5 μm (5 ms) 10 μm (0.3 ms) | 15 μm (5 ms) 30 μm (0.3 ms) |
| | Linearity | --- | | ±0.5%F.S., | |
| | Temperature drift | Sensors | 0.1%F.S./°C, | | |
| | | Amplifier | 0.02%F.S./°C, | | |
| Control output | Decision output HIGH, LOW (PASS, NG) | NPN model | NPN open collector output, 30 VDC 100 mA or less, residual voltage 1.2 V or less | | |
| | | PNP type | PNP open collector output, 30 V DC 100 mA or less, residual voltage 2.0 V or less | | |
| Control inputs | LD OFF input Timing input Forced-zero input Bank selection in- | NPN model | When ON: 0-V short circuit or 1.5 V or less; when OFF: open (leakage current 0.1 mA or less) | | |
| | | PNP type | When ON: power supply voltage short circuit or within -1.5 V; when OFF: open (leakage current 0.1 mA or less) | | |
| Main functions | | Measured value display function, hold function, bank switching function, decision output setting function, scaling function | | | |
| Power supply voltage | | 12 to 24 VDC ±10%, ripple (p-p) : 10% max. | | | |
| Current consumption | | 200 mA max. | | | |
| Ambient illuminance | | Incandescent lamp: 3,000 lux max. | | | |
| Ambient temperature | | Operating: 0°C to 50°C, Storage: -15°C to 60°C (with no icing) | | | |
| Ambient humidity | | Operating/Storage: 35% to 85% RH (with no condensation) | | | |
| Vibration resistance | Sensors | 10 to 150 Hz, half amplitude 0.75 mm, maximum acceleration 100 m/s ² | | | |
| | Amplifier | 10 to 150 Hz, half amplitude 0.15 mm, maximum acceleration 20 m/s ² | | | |
| Dielectric strength | Sensors | 1,000 VAC at 50/60 Hz for 1 minute | | | |
| | Amplifier | 300 VAC at 50/60 Hz for 1 minute | | | |
| Protective structure | | IEC Standard IP40 | | | |
| Connection method | | Connector type (standard length of sensor cable: 2 m, standard length of amplifier cable: 2 m) | | | |
| Material | | Sensor: zinc diode, amplifier: ABS | | | |
| Weight (including package) | Sensor/ Oneside Interruption High-precision Model | Approx. 310 g (Unit projector: approximately 110 g, unit receiver: approximately 105 g (including 2 m cable)) | Approx. 790 g (Unit projector: approximately 230 g, unit receiver: approximately 195 g (including 2 m cable)) | Approx. 610 g (Unit projector: approximately 280 g, unit receiver: approximately 210 g (including 2 m cable)) | Approx. 900 g (Unit projector: approximately 510 g, unit receiver: approximately 210 g (including 2 m cable)) |
| | Amplifier | Approximately 450 g (unit: approximately 210 g (including 2 m cable)) | | --- | |
| Accessories | | Mounting brackets, instruction manual, label | | Instruction manual, label | |

*1. The response time is the increasing time (i.e., the time required to go from 10% to 90% of the maximum output) or decreasing time (i.e., the time required to go from 90% to 10% of the maximum output) for linear output when the light interruption period is rectangular in shape as shown below:



*2. The resolution values are conversion values for peak-to-peak linear outputs.

*3. Linearity: Error with respect to an ideal line when measurement is performed with one-side darkening in the range 5% to 95% F.S. at the central position between the projector and receiver. Example - Z4LB-A1040V2:



0.5 to 9.5 mm range

*4. Typical example of single-stand measurement with the sensor and amplifier. Temperature characteristics when the Z49-F□□ is attached are as follows. Typical example: 0.3% F.S./°C (measurement distance 300 mm)

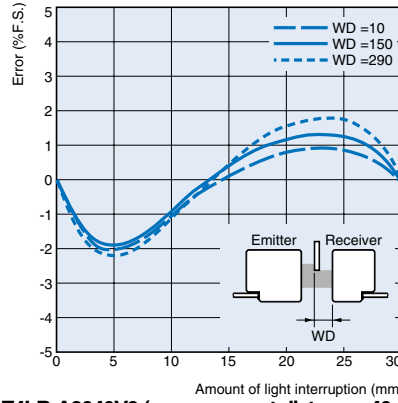
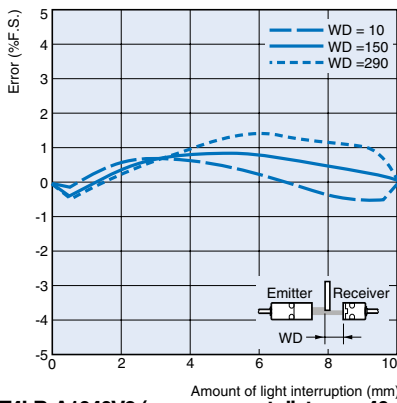
*5. "F.S." stands for full scale. In the case of the Z4LB-S10V2, for example, the F.S. value is 10 mm.

*6. The weight of the Z49-F□□ Side-view Attachment is approx. 50 g.

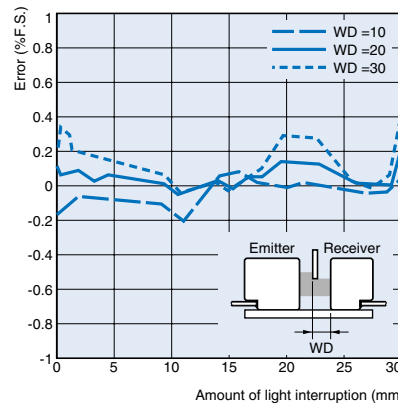
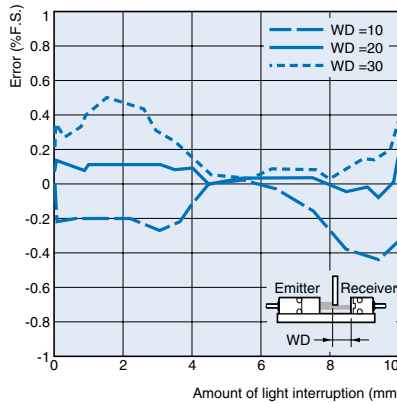
Characteristic data (typical)

Linearity (WD: distance from light receiver to measurement work)

Z4LB-S10V2 (measurement distance: 300 mm) **Z4LB-S30V2 (measurement distance: 300 mm)**

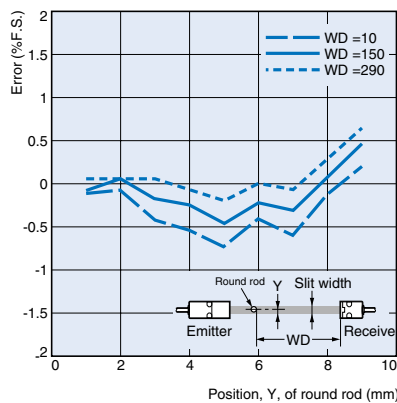


Z4LB-A1040V2 (measurement distance: 40 mm) **Z4LB-A3040V2 (measurement distance: 40 mm)**

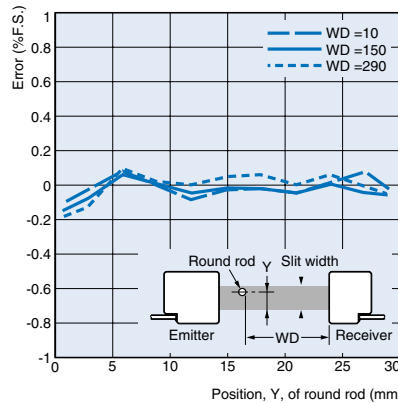


Error due to round bar position (measurement distance: 300 mm, WD: distance from light receiver to work)

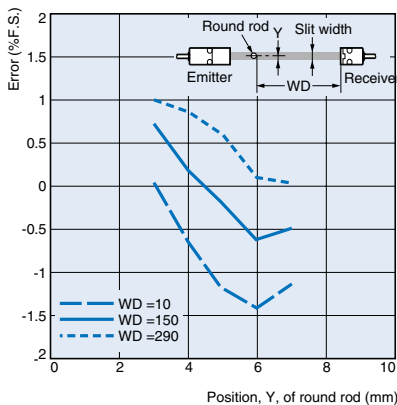
Z4LB-S10V2 (1 mm dia. round bar)



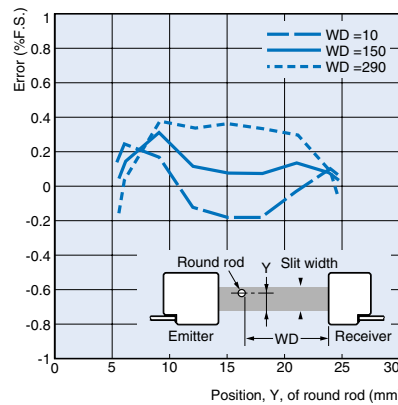
Z4LB-S30V2 (1 mm dia. round bar)



Z4LB-S10V2 (5 mm dia. round bar)



Z4LB-S30V2 (10 mm dia. round bar)



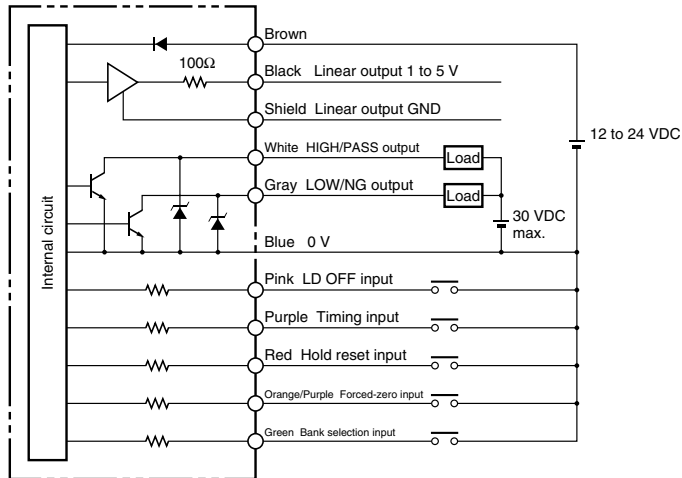
Z4LB V2

Input/output stage circuit scheme

NPN model

Standard Model: Z4LB-CV2

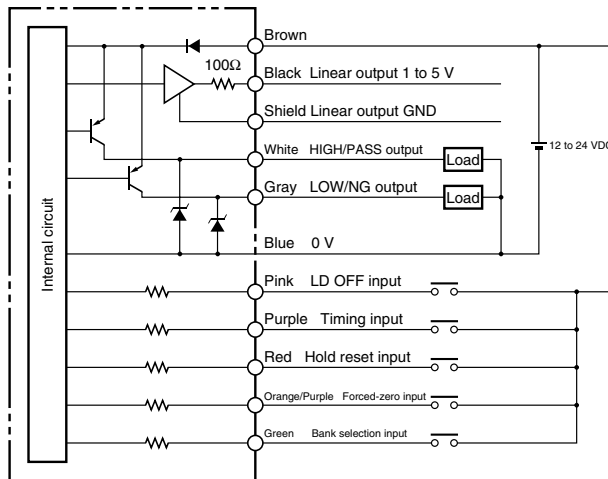
High-precision type: Z4LB-A□□V2



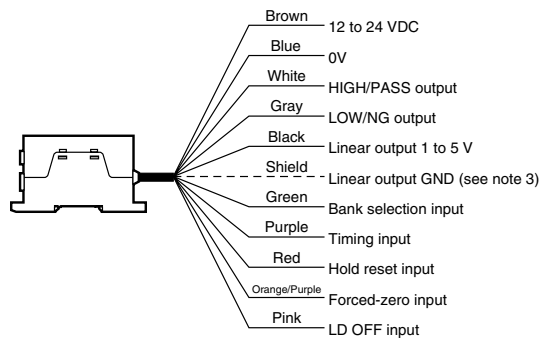
PNP type

Standard Model: Z4LB-CPV2

High-precision type: Z4LB-A□□PV2



Connection



Note: 1 . In particular, when high resolution is necessary, provide a stable power source separate from other power systems.

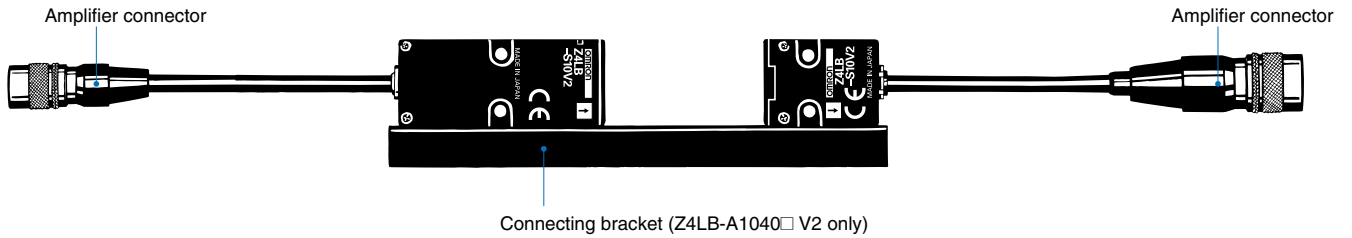
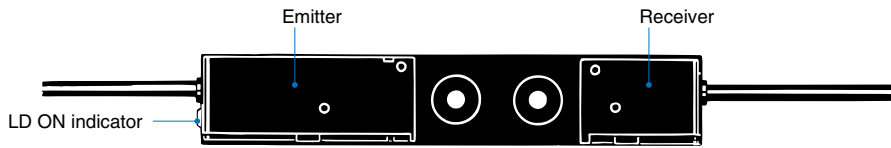
2 . Damage may result if not wired correctly. (In particular, do not allow the linear output to contact other wires.)

3 . 0V (blue) and Linear GND (shield) are connected internally through a resistor. Blue (0V) is for power supply, and the shield outer cover (Linear GND) and black wire (Linear output) are both for linear output.

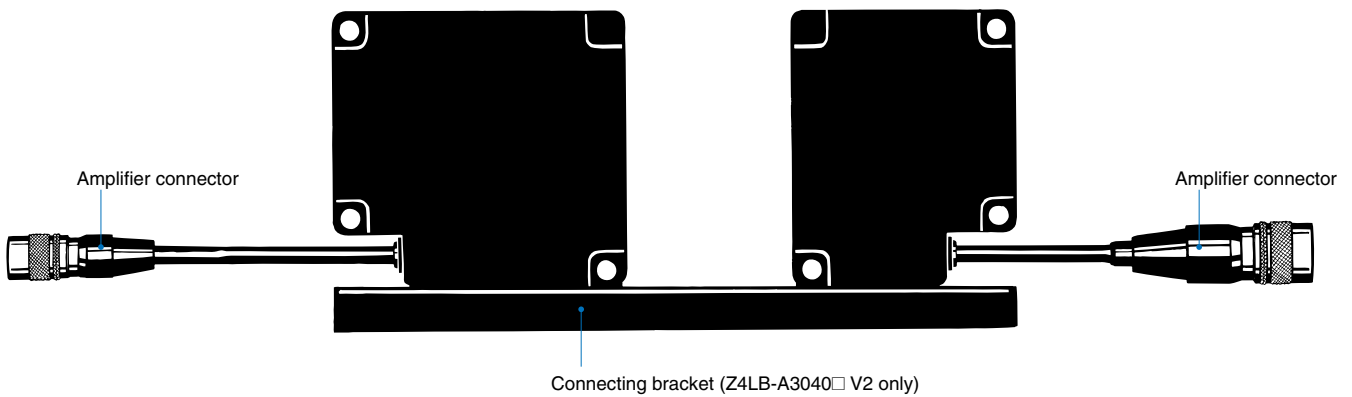
Nomenclature:

Sensors

Z4LB-S10V2
Z4LB-A1040□V2

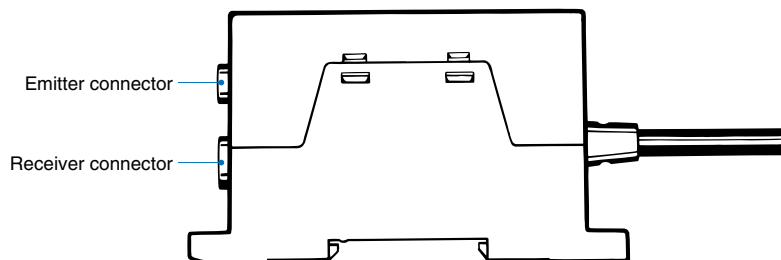
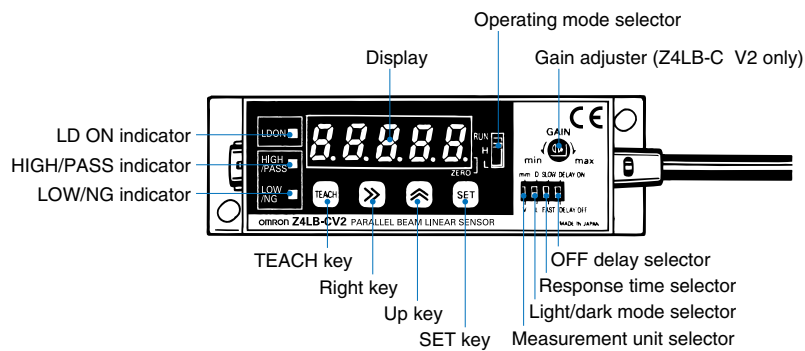


Z4LB-S30V2
Z4LB-A3040□V2



Amplifier

Z4LB-C□V2
Z4LB-A1040□V2
Z4LB-A3040□V2

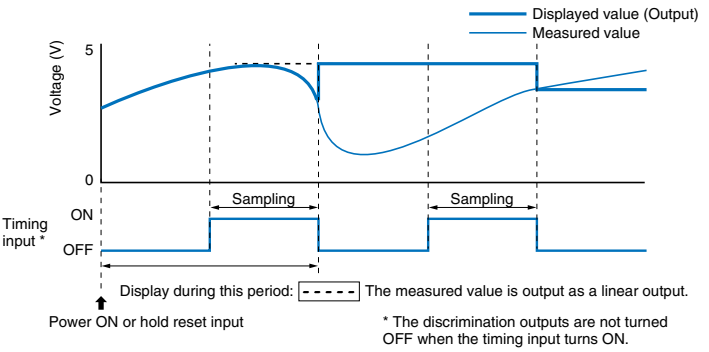
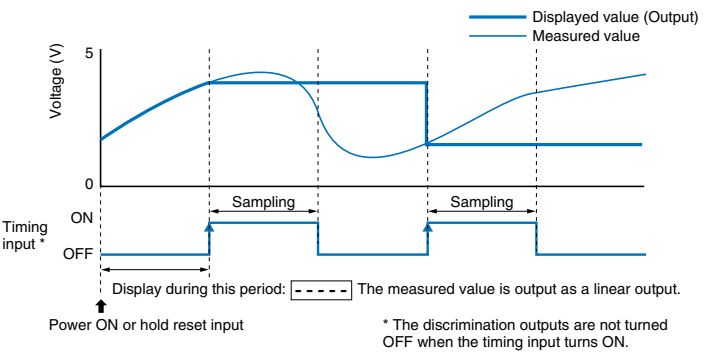
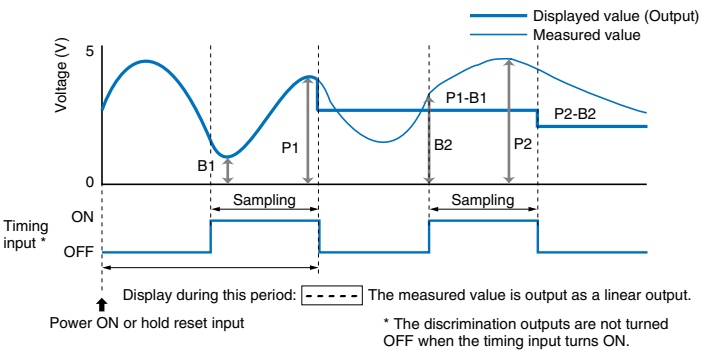
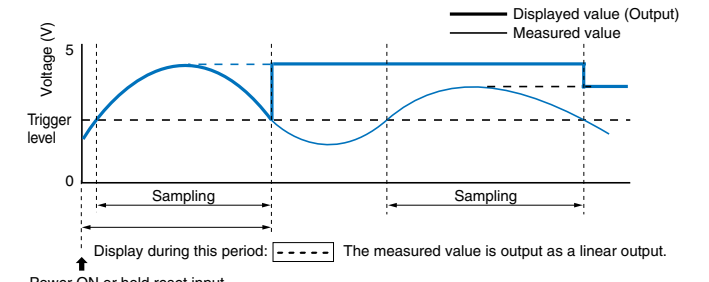


Z4LB V2

Functions


| Name | | Functions | | | | | | | | | |
|---|--|---|---------------|-----------|----------|--------|-----------------------------------|--------------------------|--------|------------------|--------------------------|
| Display function | LD ON indicator lamp | <ul style="list-style-type: none"> Lights when laser beams are emitted. The Sensor and Amplifier indicators light at the same time. | | | | | | | | | |
| | Display with measurement unit (selection and light/dark mode selection functions) | <ul style="list-style-type: none"> Displays either linear output voltage (V) or length (mm) according to the measurement unit selector switch setting. If the measurement unit is set to length (mm), set the measurement width to be used. The default setting is 10 mm. The amount of incident light or light interruption can be selected using the light/dark mode selector switch. | | | | | | | | | |
| | HIGH/PASS indicator | <ul style="list-style-type: none"> Lights when HIGH/PASS discrimination output turns ON. | | | | | | | | | |
| | Lights when LOW/NG discrimination output turns ON. | <ul style="list-style-type: none"> Lights when LOW/NG discrimination output turns ON. | | | | | | | | | |
| | Forced-zero indicator (displayed as the lowest decimal place) | <ul style="list-style-type: none"> Lights when the forced-zero settings are enabled in RUN mode. | | | | | | | | | |
| Output function | Linear output (with light/dark mode selection function) | <ul style="list-style-type: none"> Outputs voltage (1 to 5 VDC) proportional to the amount of incident light or light interruption. The light/dark mode selector switch is used to select either light or dark mode. <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Light mode</p> </div> <div style="text-align: center;"> <p>Light mode</p> </div> </div> | | | | | | | | | |
| | HIGH/PASS output (with discrimination output setting and short-circuit protection functions) | <ul style="list-style-type: none"> One of the following discrimination output modes can be selected according to the application. HIGH/LOW Output Mode: Turns ON when measured value > HIGH threshold PASS/NG Output Mode: Turns ON when LOW threshold < measured value < HIGH threshold HIGH/LOW Inverted Output Mode: Turns ON when measured value < HIGH threshold The default setting is HIGH/LOW Output Mode. | | | | | | | | | |
| | LOW/NG output (with discrimination output setting and short-circuit protection functions) | <ul style="list-style-type: none"> One of the following discrimination output modes can be selected according to the application. HIGH/LOW Output Mode: Turns ON when measured value > LOW threshold PASS/NG Output Mode: Turns ON when measured value < LOW threshold or measured value > HIGH threshold HIGH/LOW Inverted Output Mode: Turns ON when measured value < LOW threshold The default setting is HIGH/LOW Output Mode. | | | | | | | | | |
| Input function | LD OFF input | <ul style="list-style-type: none"> When LD OFF is input, the laser stops emitting light. L_{OFF} appears in the display, and the linear output, HIGH/LOW decision indicator lamp and output retain their previous states. The display (LD ON indicator lamp) and all outputs retain their previous values. | | | | | | | | | |
| | Forced-zero input | <ul style="list-style-type: none"> Displays the measured value as zero when the unit is set to length (mm). The value is set if forced-zero input is ON for 0.2 to 0.8 s and cleared if it is ON for 1 s or more. To set forced-zero or clear forced-zero, press and hold down the SET Key for 3 s while in RUN mode. | | | | | | | | | |
| | Timing input | <ul style="list-style-type: none"> Forced actuation of OFF HIGH/PASS or LOW/NG discrimination output if this input turns ON during "normal" measurement. Controls sampling timing if this input turns ON during "hold" measurement. The default setting is "normal." | | | | | | | | | |
| | Bank selection input (Bank switching function) | <ul style="list-style-type: none"> There are two banks, for each of which a threshold value can be set. If the bank selection input is enabled, the thresholds to be used for evaluation can be switched. The default setting is "disabled." <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Bank</th> <th>NPN model</th> <th>PNP type</th> </tr> </thead> <tbody> <tr> <td>Bank 1</td> <td>Open or connected to 12 to 24 VDC</td> <td>Open or connected to 0 V</td> </tr> <tr> <td>Bank 2</td> <td>Connected to 0 V</td> <td>Connect to 12 to 24 V DC</td> </tr> </tbody> </table> | Bank | NPN model | PNP type | Bank 1 | Open or connected to 12 to 24 VDC | Open or connected to 0 V | Bank 2 | Connected to 0 V | Connect to 12 to 24 V DC |
| | Bank | NPN model | PNP type | | | | | | | | |
| Bank 1 | Open or connected to 12 to 24 VDC | Open or connected to 0 V | | | | | | | | | |
| Bank 2 | Connected to 0 V | Connect to 12 to 24 V DC | | | | | | | | | |
| Hold reset input | <ul style="list-style-type: none"> Resets the held value if this input turns ON during "hold" measurement. | | | | | | | | | | |
| Threshold value setting function | Direct setting | <ul style="list-style-type: none"> The thresholds are set to desired values by using the Right Key, Up Key, and SET Key. | | | | | | | | | |
| | Teaching setting | <ul style="list-style-type: none"> The thresholds are set to desired values by teaching. The HIGH threshold output turns ON when the HIGH threshold is equal to or below a measured value. The LOW threshold output turns ON when the LOW threshold is equal to or above a measured value. | | | | | | | | | |
| Hold (See below) | <ul style="list-style-type: none"> Holds the display and output values. Select from six hold methods according to the application (peak hold, bottom hold, sample hold, peak-to-peak hold, self peak hold, and self bottom hold). The default setting is "normal." | | | | | | | | | | |
| Backup functions | <ul style="list-style-type: none"> Specifies whether to back up the forced-zero set value. If the value is to be retained after the Sensor is turned OFF, always enable the backup. The default setting is "enabled". | | | | | | | | | | |
| Response time switching function | <ul style="list-style-type: none"> The resolution changes with the response time. Select the required response time, taking the resolution into consideration. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Switch</th> <th>Response time</th> </tr> </thead> <tbody> <tr> <td>FAST</td> <td>0.3 ms</td> </tr> <tr> <td>SLOW</td> <td>5 ms</td> </tr> </tbody> </table> | Switch | Response time | FAST | 0.3 ms | SLOW | 5 ms | | | | |
| Switch | Response time | | | | | | | | | | |
| FAST | 0.3 ms | | | | | | | | | | |
| SLOW | 5 ms | | | | | | | | | | |
| Off delay function | <ul style="list-style-type: none"> The HIGH/LOW discrimination outputs will have a 40 ms OFF delay if the OFF delay selector is set to ON. | | | | | | | | | | |
| Gain adjustment (for standard model only) | <ul style="list-style-type: none"> Adjusts the full scale of linear output and display. | | | | | | | | | | |

Hold functions

| Name | Functions | Timing chart |
|-------------------------------------|---|--|
| Normal | Measurement is performed continuously and measurement results are displayed and output. | --- |
| Peak Hold and Bottom Hold | The maximum or the minimum value while the timing input is ON is displayed, output, and held. The discrimination outputs are controlled according to the displayed value and output value. |  |
| Sample Hold | The current value when the timing input turns ON is displayed, output, and held. The discrimination outputs are controlled according to the displayed value and output value. |  |
| Peak-to-peak Hold | Retains the "max. value - min. value" while the timing input is on, and displays and outputs the value. The decision output makes a decision with respect to the displayed value and output value. |  |
| Self-peak Hold and Self-bottom Hold | The maximum value (self-peak hold) or the minimum value (self-bottom hold) while the measured value equals to or exceeds the trigger level (self-peak hold), or equals to or is smaller than the trigger level (self-bottom hold), is displayed, output, and held. The discrimination outputs are controlled according to the displayed value and output value. |  |

Z4LB V2

Precautions

 **Warning**

Be careful not to expose your eyes directly to the laser beam or to the light reflected by a mirror-smooth object.



The laser beam emitted from the laser has high power density and its entry in your eyes may cause blindness.

Laser safety

- Safety measures are required for laser devices both in Japan and abroad. Brief explanations follow of requirements for use in Japan and requirements for export to other countries after assembly in Japan. For details, see the corresponding standards.

(1) Japan

JIS C 6802:1997 "Safety Standards for Laser Products" sets forth safety measures that users must implement based on the class of laser product.

Summary of user precautions

| Requirements subclause | Classification | | | | | | |
|---------------------------|---|-----------------------------|-----------------|-----------------------------|--|--|-----------------------|
| | Class 1 | Class 1M | Class 2 | Class 2M | Class 3R | Class 3B | Class 4 |
| Laser safety iffucer 10.1 | Not required but recommended for applications that involve direct viewing of the laser beam | | | | Not required for visible emission Required for non-visible emission | Required | |
| Remote interlock 10.2 | Not required | | | | | Connect to room or door circuits | |
| Key control 10.3 | Not required | | | | | Remove key when not in use | |
| Beam attenuator | Not required | | | | | When in use prevents inadvertent exposure | |
| Emission indicator device | Not required | | | | Indicates laser is energized for nonvisible wavelengths | Indicates laser is energized | |
| Warning signs 10.5 | Not required | | | | | Follow precautions on warning signs | |
| Beam path 10.6 | Not required | Class 1M *1 as for Class 3B | Not required | Class 2M *2 as for Class 3B | Terminate beam at end of useful length | | |
| Specular reflection 10.7 | No requirements | Class 1M *1 as for Class 3B | No requirements | Class 2M *2 as for Class 3B | Prevent unintentional reflections | | |
| Eye protection 10.8 | No requirements | | | | | Required if engineering and administrative procedures not practicable and MPE exceeded | |
| Protective clothing 10.9 | No requirements | | | | | Sometimes required | Specific requirements |
| Training 10.10 | No requirements | Class 1M *1 as for Class 3R | No requirements | Class 2M *2 as for Class 3R | Required for all operator and maintenance personnel | | |

*1. Class 1M laser products that failed condition 1 of table 10. Not required for Class 1M laser products that failed condition 2 of table 10.

*2. Class 2M laser products that failed condition of table 10. Not required for Class 2M laser products that failed condition 2 of table 10.

Note: This table is intended to provide a convenient summary of precautions. See text of this standard for complete precautions.

Classification of Z4LB

Class 1

Labels related to laser

The explanatory label at right is attached to the side of the sensor.



Handling Instructions

This sensor is equipped with a laser emission indicator lamp and a laser-off input circuit. An interlock function can be configured using an external circuit

(2) U.S.A.

The E3L laser photoelectric switch meets the standards required by the Food and Drug Administration (FDA) in the US. The Z4LB has been registered with the CDRH (Center for Devices and Radiological Health).

Classification of Z4LB

Class 2

Note: Note that the FDA classifies this as a Class 2 device.

U.S. regulations

U.S. Federal law regarding laser safety applies to this product, and as such it is subject to the regulations of the FDA (Food and Drug Administration) in accordance with the required procedures. Z4LB has been registered with the CDRH (Center for Devices and Radiological Health). (Class II Laser Product)

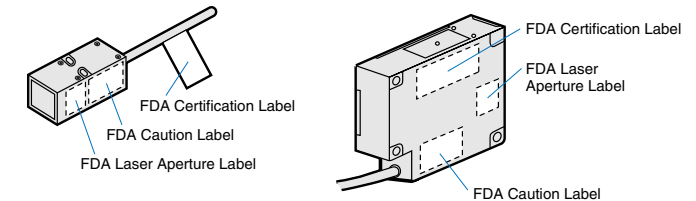
A label in accordance with FDA technical standards is included. When exporting to the U.S.A., refer to the following diagram and replace the label on the sensor with that label. The Z4LB is intended to be incorporated into the final system device. Base the incorporation on the following technical standards.

* U.S. Federal Law: 21CFR1040.10 and 1040.11

Technical standards for laser products and "laser products for special uses"

Z4LB-S10V2
Z4LB-A1040□V2

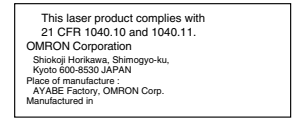
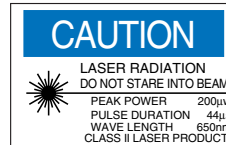
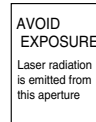
Z4LB-S30V2
Z4LB-A3040□V2



FDA Laser Aperture Label

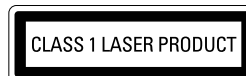
FDA Caution Label

FDA Certification Label



(3) Countries other than the U.S.A.

- For countries other than Japan or the U.S.A., replace the warning label with the included English label.
- With respect to export to Europe, the regulations are different as set forth in European standard EN60825.



Z4LB V2

Correct Use

Design

Compatibility

- There is general compatibility between Sensors and Amplifiers for standard models. However, the emitters and the receivers are inspected as sets before delivery. Operation is possible using the emitters or the receivers from other sets, but in order to satisfy specifications, the serial number of the emitter and the receiver must be the same.
- With high-precision models, the Sensor and the Amplifier are adjusted as a set. Only use combinations with the same serial number.

Mutual Interference

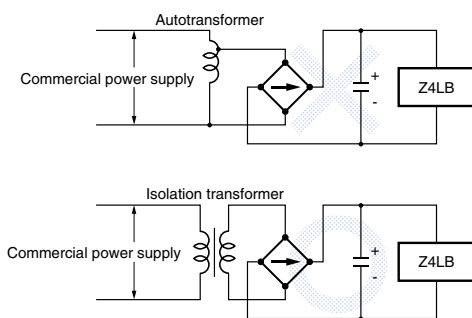
Two or more sensors can be used in contact with each other, however, if more beams are brought in close proximity, errors will result.

Wiring Considerations

About wiring

- The Z49-C13 Extension cable (3 or 8 m in length) can be connected to the Sensor cable or Amplifier cable. The total length of the Sensor cable or Amplifier cable, however, must be 10 m or less. Use a shielded cable to extend the Amplifier cable, in which case, a shielded cable that is the same as that of the Amplifier cable must be used.
- Use an isolation transformer for the power supply of the Z4LB V2 as shown in the following. Do not use an autotransformer (single-winding transformer).

Note:

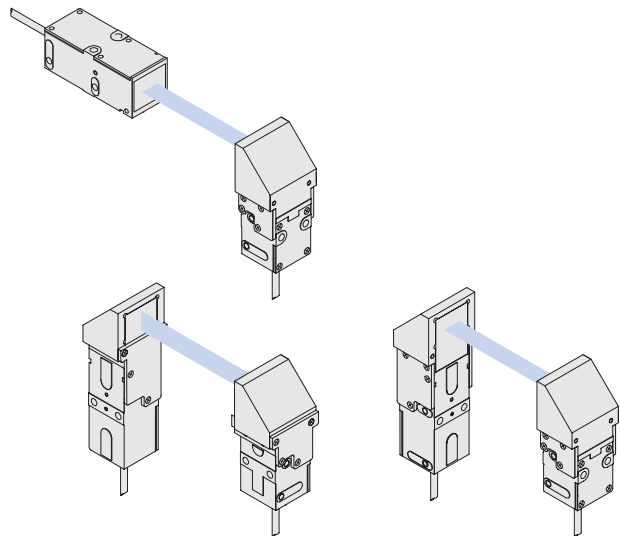


Miscellaneous

Installation of Side-view Attachment

Handling Instructions

- Do not apply excessive shock to the Attachment. Doing so may result in damage.
- The Attachment can be used attached to either the emitter or the receiver, but not both.



Installation Precautions

- Do not touch any internal parts during installation. Dirt inside the Attachment may affect the high-performance reflective mirror inside and cause malfunction.
- During Attachment installation tighten the mounting screws to a torque not exceeding 0.2 Nm.

One-side darkening, high-precision type

Do not remove the projector and the light receiver from the connective fitting. Once removed, correct measurement will no longer be possible.

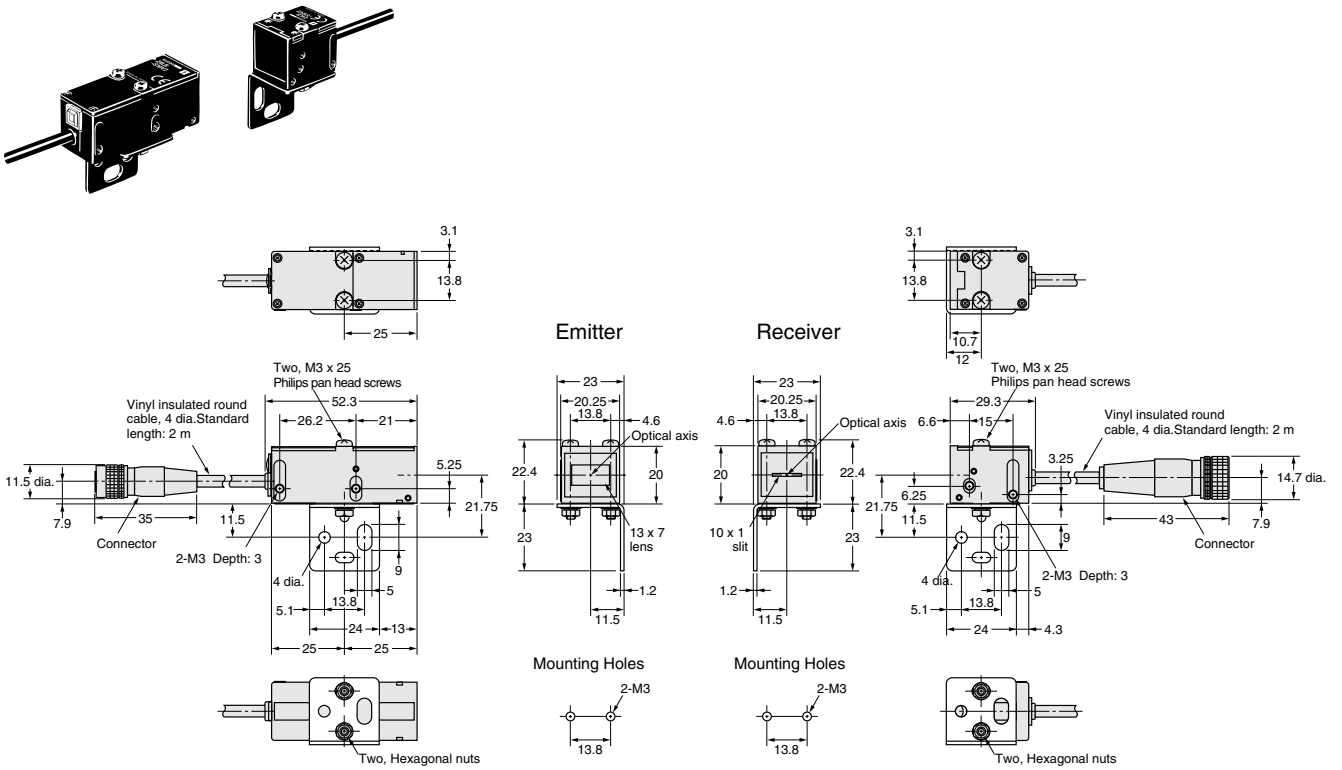
Dimensions (Unit: mm)

Sensors

Sensors

Z4LB-S10V2

CAD file Z4LB_02

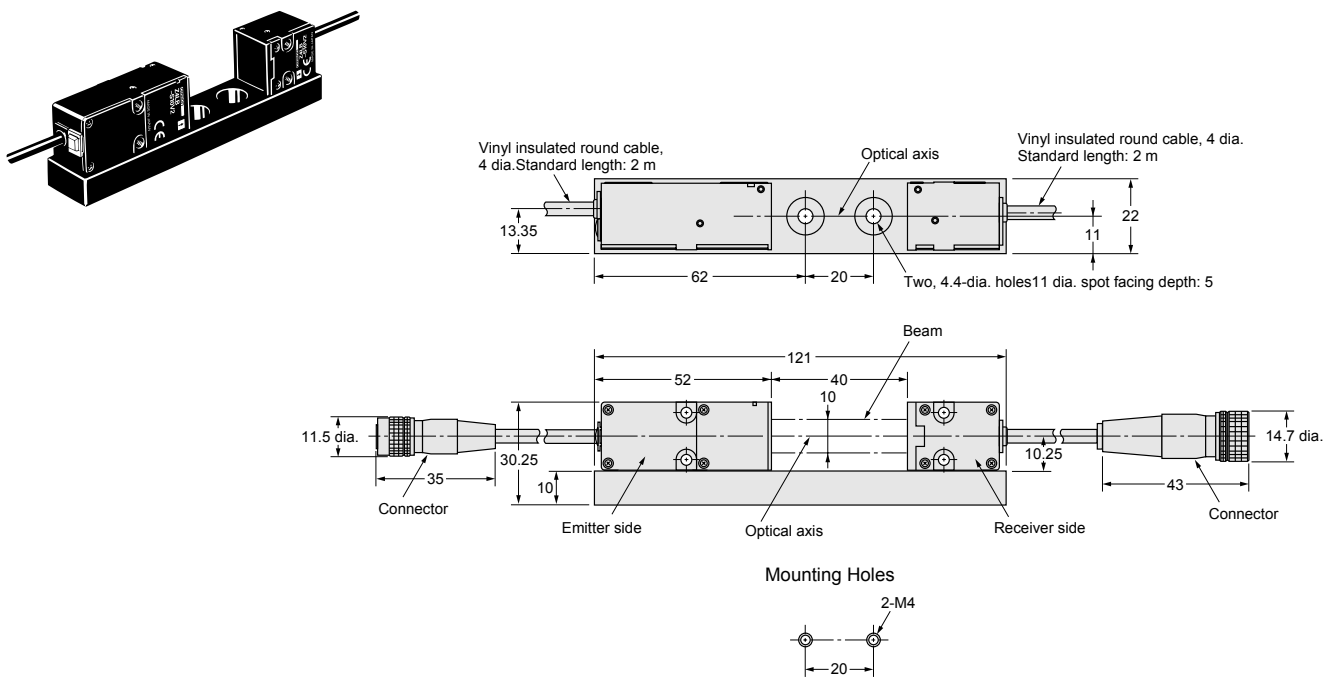


Z4LB V2

Sensors

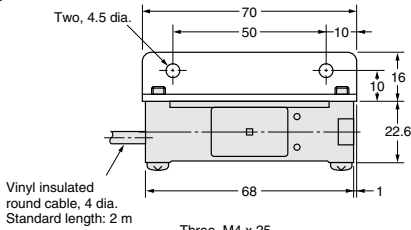
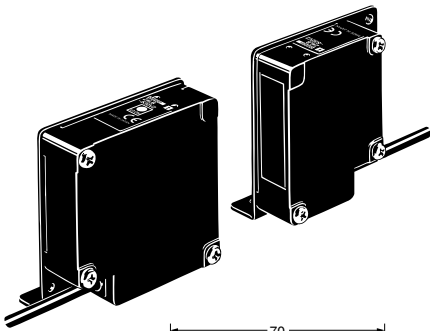
Z4LB-A1040□V2

CAD file Z4LB_04

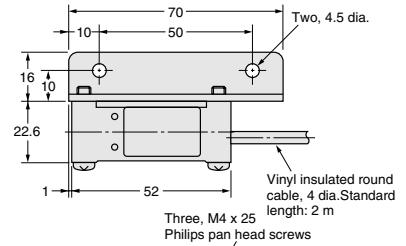


Sensors
Z4LB-S30V2

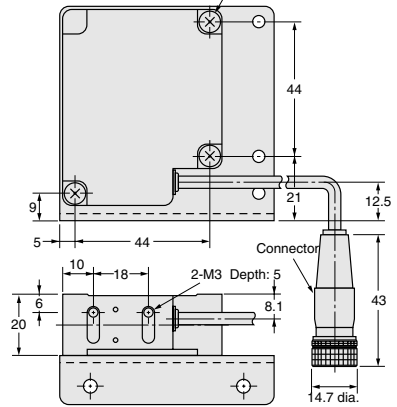
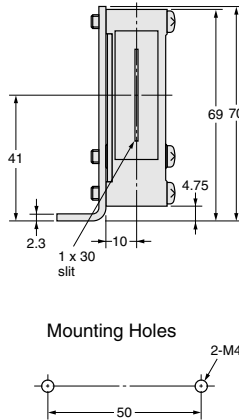
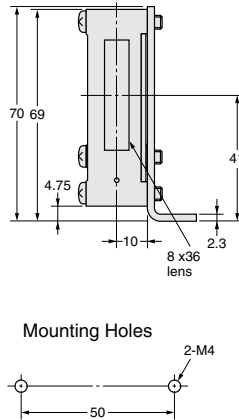
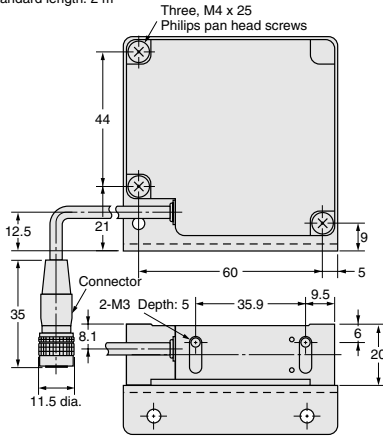
CAD file Z4LB_01



Emitter

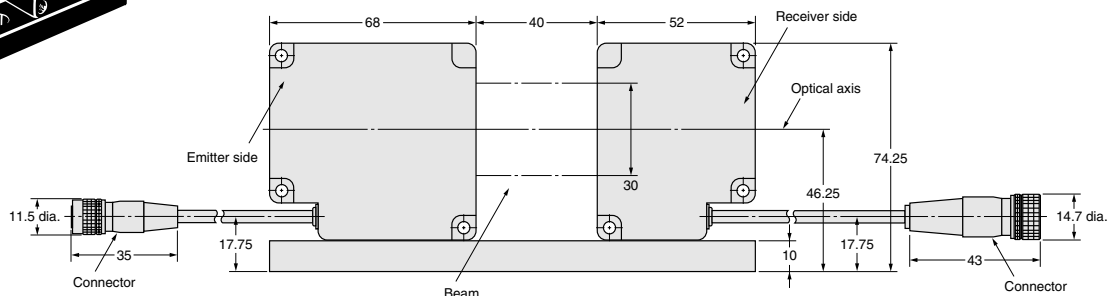
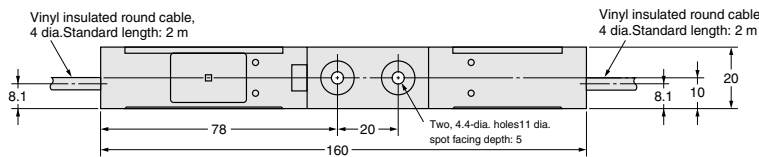
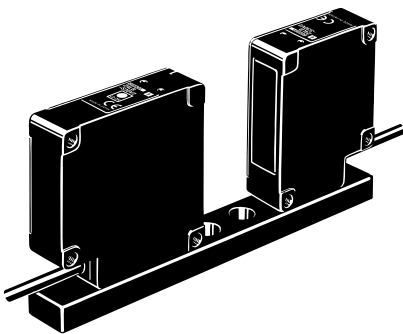


Receiver

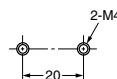


Sensors
Z4LB-A3040□V2

CAD file Z4LB_05



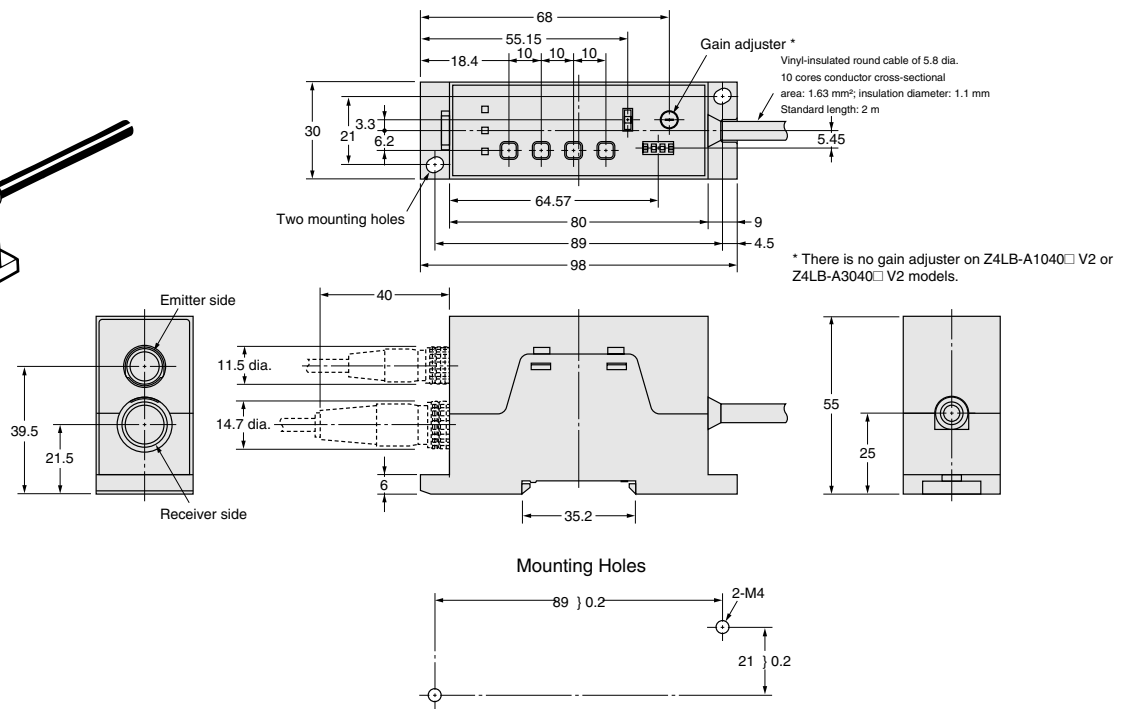
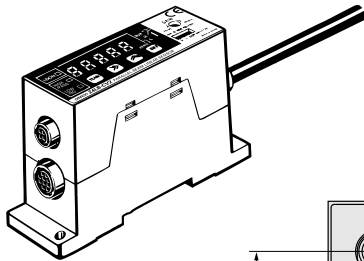
Mounting Holes



Amplifier

Z4LB-C□V2
 Z4LB-A1040□V2
 Z4LB-A3040□V2

CAD file Z4LB_03

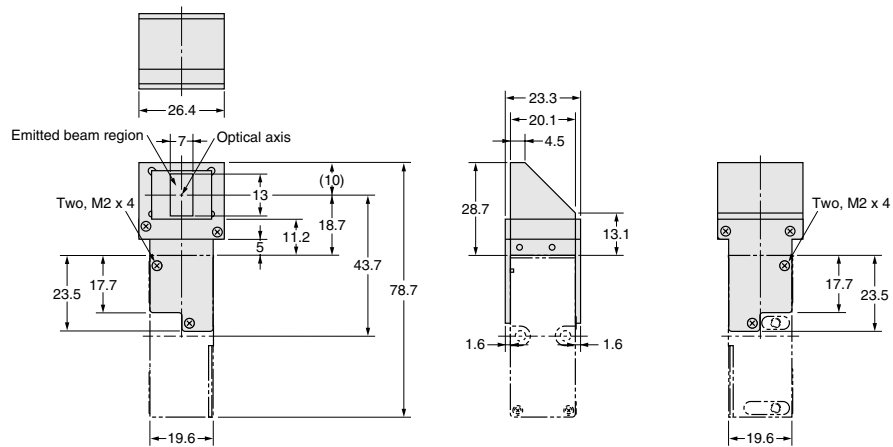


Z4LB V2

Accessories (Order Separately)

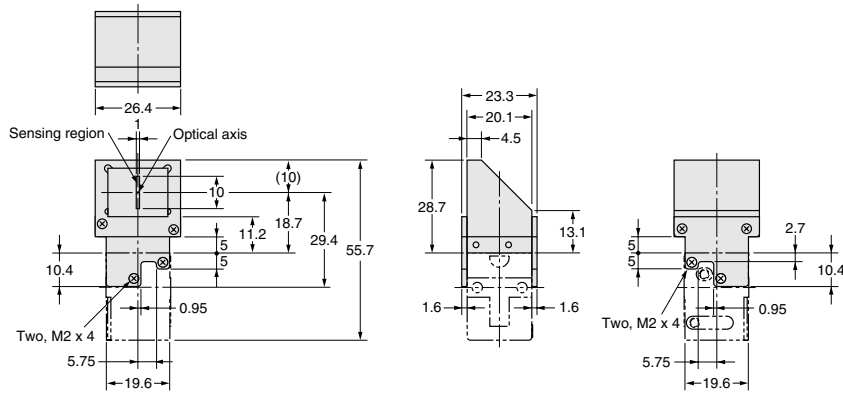
Side view attachment
 Vertical Beam
 Z49-F2L (For Emitter)

CAD file Z49_01



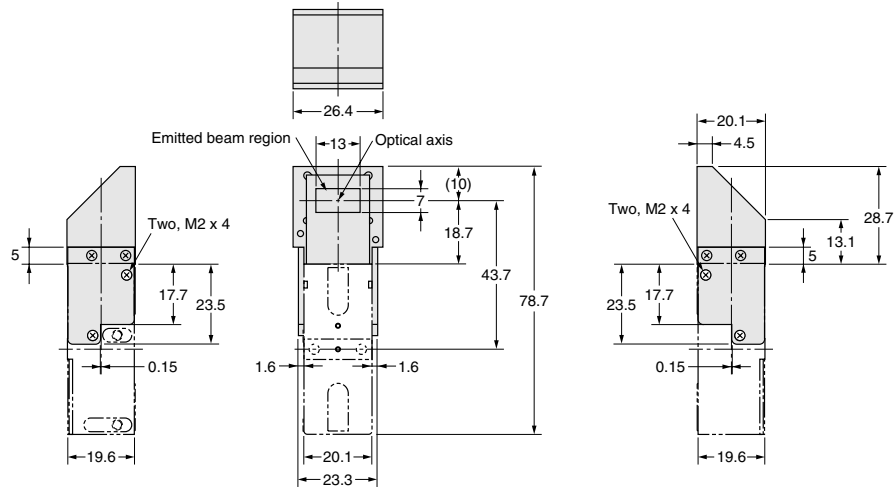
Side view attachment
Vertical Beam
Z49-F2D (For Receiver)

CAD file Z49_02



Side view attachment
Horizontal Beam
Z49-F3L (For Emitter)

CAD file Z49_03



Side view attachment
Horizontal Beam
Z49-F3D (For Receiver)

CAD file Z49_04

