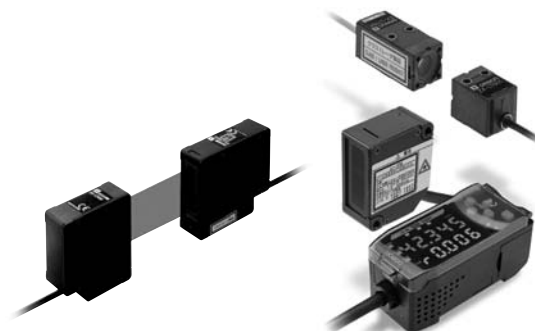


Smart Sensors (Laser Type) ZX Series (ZX-L-N)



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

Ordering Information

■ Sensors

Sensor Heads (Reflective)

Optical system	Beam shape	Sensing distance	Resolution*1	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 reflective	Spot beam	30±2 mm	0.25 μm	ZX-LD30V
	Line beam			ZX-LD30VL

*1. For an average count of 4,096.

Sensor Heads (Through-beam)

Optical system	Measuring width	Sensing distance	Resolution*1	Model *2
Through-beam	1-mm dia.	0 to 500 mm	4 μm	ZX-LT001
	1 to 2.5-mm dia.	500 to 2000 mm	---	
	5 mm	0 to 500 mm	4 μm	ZX-LT005
	10 mm			ZX-LT010
	30 mm		12 μm	ZX-LT030 0.5M

*1. For an average count of 64.

*2. The cable length for all models is 0.5 m.

Amplifier Units

Appearance	Power supply	Output type	Model
	DC	NPN	ZX-LDA11-N 2M
		PNP	ZX-LDA41-N 2M

Note: Compatible connection with the Sensor Head.

Accessories (Order Separately)

Calculating Unit

Appearance	Model
	ZX-CAL2

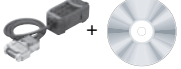
Side-view Attachments

Appearance	Applicable Sensor Head	Model	Quantity
	ZX-LT1001/LT005	ZX-XF12	1
	ZX-LT010	ZX-XF22	

Logging Tool for Personal Computers

Appearance	Name	Model
	Communications Interface Unit (RS-232C)	ZX-SF11
	Smart Monitor *3 (Logging Software + Function Setting Software)	ZX-SW11EV3 *1

Setup Tool for Personal Computer

Appearance	Name	Model
	Communications Interface Unit (RS-232C) + Smart Monitor Basic *2 *3 (Function Setting Software)	ZX-SFW11EV3 *1

*1. The ZX-SFW11EV3 or ZX-SW11EV3 is required to use the Smart Monitor with the ZX-LDA11-N/41-N. Earlier versions cannot be used.

*2. The Smart Monitor Basic does not have a logging function. Other than the logging function, the Smart Monitor Basic supports the same functions as the Smart Monitor.

*3. It is prohibited to copy, to reproduce, and to distribute a part of or whole part of this document without the permission of OMRON Corporation.

Cables with Connectors on Both Ends (for Extension) *1

Cable length	Model	Quantity
1 m	ZX-XC1A 1M	1
4 m	ZX-XC4A 4M	
8 m	ZX-XC8A 8M	
9 m *2	ZX-XC9A 9M	

*1. Robot cable models are also available. The model numbers are ZX-XC□R.

*2. For use only with Reflective Sensors.

Bank Unit

Appearance	Model
	ZX-SB11

Specifications

■ Sensor Heads (Reflective)

Item	Model	ZX-LD40	ZX-LD100	ZX-LD300	ZX-LD30V	ZX-LD40L	ZX-LD100L	ZX-LD300L	ZX-LD30VL
Optical system	Diffuse reflective				Regular re- flective	Diffuse reflective			Regular reflecte- tive
Light source (wave length)	Red light emitting semiconductor laser with a wavelength of 650 nm and an output of 1 mW max.								
Laser class	Class 1 (EN/IEC, JIS, GB/T) Class II (FDA)								
Measurement point	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 size*1	50-μm dia.	100-μm dia.	300-μm dia.	75-μm dia.	75 μm x 2 mm	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% FS (entire range)	±0.2% FS (80 to 120 mm)	±2% FS (200 to 400 mm)	±0.2% FS (entire range)	±0.2% FS (32 to 48 mm)	±0.2% FS (80 to 120 mm)	±2% FS (200 to 400 mm)	±0.2% FS (entire range)	
Temperature characteristic*4	±0.03% FS/°C (Except for ZX-LD300 and ZX-LD300L, which are ±0.1% FS/°C.)								
Ambient illumination	Incandescent lamp: 3,000 lx max. (on light receiving side)								
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								
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, IP50				IEC60529, IP40	IEC60529, IP50			IEC60529, IP40
Connection method	Connector relay (standard cable length: 500 mm)								
Weight (packed state)	Approx. 150 g				Approx. 250 g	Approx. 150 g			Approx. 250 g
Materials	Case: PBT (polybutylene terephthalate), Cover: Aluminum, Lens: Glass				Case and cover: Alumi- num, Lens: Glass	Case: PBT (polybutylene terephthalate), Cover: Aluminum, Lens: Glass			Case and cov- er: Aluminum, Lens: Glass
Accessories	Instruction sheet, Laser warning label (English)								

*1. Beam size: The beam size is defined by $1/e^2$ (13.5%) of the strength of the beam at the beam center (measured value). Incorrect detection may occur if there is light leakage outside the defined spot and the material around the sensing object is more reflective than the sensing object.

*2. Resolution: The resolution is the deviation ($\pm 3\sigma$) in the linear output when connected to the ZX-LDA Amplifier Unit. (The resolution is measured with the standard reference object (white ceramic), at the measurement point with the ZX-LDA set for an average count of 4,096 per period.) The resolution is given at the repeat accuracy for a stationary workpiece, and is not an indication of the distance accuracy. The resolution may be adversely affected under strong electromagnetic fields.

*3. Linearity: The linearity is given as the error in an ideal straight line displacement output when measuring the standard reference object. The linearity and measurement values vary with the object being measured.

*4. Temperature characteristic: The temperature characteristic is measured at the measurement point with the Sensor and reference object (OMRON's standard reference object) secured with an aluminum jig.

Note: Highly reflective objects can result in incorrect detection by causing out-of-range measurements.

■ Sensor Heads (Through-beam)

Item	Model	ZX-LT001		ZX-LT005	ZX-LT010	ZX-LT030
Optical system		Through-beam				
Light source (wave length)		Red light emitting semiconductor laser with a wavelength of 650 nm				
	Maximum output	0.2 mW max.		0.35 mW max.		0.2 mW max.
Laser class		Class 1 (EN/IEC, JIS, GB/T) Class II (FDA)				
Measurement width		1-mm dia.	1- to 2.5-mm dia.	5 mm	10 mm	30 mm
Measurement distance		0 to 500 mm	500 to 2,000 mm	0 to 500 mm		
Minimum sensing object		8-μm dia. (opaque)	8- to 50-μm dia. (opaque)	0.05-mm dia. (opaque)	0.1-mm dia. (opaque)	0.3-mm dia. (opaque)
Resolution*1		4 μm *2	---	4 μm *3		12 μm *4
Temperature characteristic		±0.2% FS/°C				±0.3% FS/°C
Ambient illumination		Incandescent lamp: 10,000 lx max. (on light-receiving side)				
Ambient temperature		Operating: 0 to 50°C, Storage: -25 to 70°C (with no icing or condensation)				
Ambient humidity		Operating: 35% to 85% (with no condensation)				
Degree of protection		IEC60529, IP40				
Connection method		Connector relay (standard cable length: 500 mm)				
Weight (packed state)		Approx. 220 g				Approx. 450 g
Cable length		Extendable up to 10 m with special extension cable.				
Materials	Case	Polyetherimide				Zinc die-cast
	Cover	Polycarbonate				
	Front filter	Glass				
Tightening torque		0.3 N·m max.				
Accessories		Instruction sheet, Sensor Head-Amplifier Connection Cable				
		Optical axis adjustment seal				Mounting Bracket

*1. This value is obtained by converting the deviation ($\pm 3\sigma$) in the linear output that results when the sensor head is connected to the amplifier unit, into the measurement width.

*2. For an average count of 64. The value is 5 μm for an average count of 32.

This is the value that results when a minimum sensing object blocks the light near the center of the 1-mm measurement width.

*3. For an average count of 64. The value is 5 μm for an average count of 32.

*4. For an average count of 64. The value is 15 μm for an average count of 32.

■ Amplifier Units

Item	Model	ZX-LDA11-N	ZX-LDA41-N
Measurement period*1		150 μ s	
Possible average count settings		1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1,024, 2,048, or 4,096	
Temperature characteristic		When connected to a Reflective Sensor Head: 0.01% FS/°C, When connected to a Through-beam Sensor Head: 0.1% FS/°C	
Linear output*2		Current output: 4 to 20 mA/FS, Max. load resistance: 300 Ω Voltage output: ± 4 V (± 5 V, 1 to 5 V *3), Output impedance: 100 Ω	
Judgement outputs (3 outputs: HIGH/PASS/LOW)*1		NPN open-collector outputs, 30 VDC, 50 mA max. Residual voltage: 1.2 V max.	PNP open-collector outputs, 30 VDC, 50 mA max. Residual voltage: 2 V max.
Laser OFF input, zero reset input, timing input, reset input		ON: Short-circuited with 0-V terminal or 1.5 V or less OFF: Open (leakage current: 0.1 mA max.)	ON: Supply voltage short-circuited or supply voltage within 1.5 V OFF: Open (leakage current: 0.1 mA max.)
Functions		Measurement value display, present value/set value/light level/resolution display, scaling, display reverse, display OFF mode, ECO mode, number of display digit changes, sample hold, peak hold, bottom hold, peak-to-peak hold, self-peak hold, self-bottom hold, average hold, delay hold, intensity mode, zero reset, initial reset, ON-delay timer, OFF-delay timer, one-shot timer, deviation, previous value comparison, sensitivity adjustment, keep/clamp switch, direct threshold value setting, position teaching, 2-point teaching, automatic teaching, hysteresis width setting, timing inputs, reset input, monitor focus, linear output compensation, (A-B) calculations*4, (A+B) calculations*4, mutual interference*4, laser deterioration detection, zero reset memory, zero reset display, key lock	
Indications		Operation indicators: High (orange), pass (green), low (yellow), 7-segment main display (red), 7-segment subdisplay (yellow), laser ON (green), zero reset (green), enable (green)	
Power supply voltage		12 to 24 VDC $\pm 10\%$, Ripple (p-p): 10% max.	
Current consumption		140 mA max. with power supply voltage of 24 VDC (with Sensor connected)	
Ambient temperature		Operating and storage: 0 to 50°C (with no icing or condensation)	
Ambient humidity		Operating and storage: 35% to 85% (with no condensation)	
Insulation resistance		20 M Ω min. at 500 VDC	
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)	
Connection method		Prewired (standard cable length: 2 m)	
Weight (packed state)		Approx. 350 g	
Materials		Case: PBT (polybutylene terephthalate), Cover: Polycarbonate	
Accessories		Instruction sheet	

*1. The response time for the first linear output or judgment output is calculated as follows (with fixed sensitivity): Measurement period $\times$ (Average count setting + 1). The response time for the second and later outputs is the measurement period specified in the table.

*2. The output can be switched between a current output and voltage output using a switch on the bottom of the Amplifier Unit.

*3. Setting is possible via the monitor focus function.

*4. A Calculating Unit (ZX-CAL2) is required.

■ Calculating Unit

Item	ZX-CAL2
Applicable Amplifier Units	ZX-LDA11-N/41-N/ZX-EDA11/41/ZX-TDA11/41
Current consumption	12 mA max. (supplied from the Smart Sensor Amplifier Unit)
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)
Connection method	Connector
Dielectric strength	1,000 VAC, 50/60 Hz for 1 min
Insulation resistance	100 MΩ (at 500 VDC)
Vibration resistance (destructive)	10 to 150 Hz, 0.7-mm double amplitude 80 min each in X, Y, and Z directions
Shock resistance (destructive)	300 m/s ² 3 times each in six directions (up/down, left/right, forward/backward)
Materials	Display: Acrylic, Case: ABS resin
Weight (packed state)	Approx. 50 g

■ ZX-series Communications Interface Unit

Item		ZX-SF11
Current consumption		60 mA max. (supplied by the Amplifier Unit)
Applicable Amplifier Units		ZX Series
Applicable Amplifier Unit versions		ZX-LDA□1-N Ver. 2.100 or higher ZX-EDA□1 Ver. 1.100 or higher ZX-TDA□1 Ver. 1.000 or higher
Max. No. of Amplifier Units		5 (max. 2 with calculating unit)
Communications functions	Communications port	RS-232C port (9-pin D-Sub Connector)
	Communications protocol	CompoWay/F*
	Baud rate	38,400 bps
	Data configuration	Data bits: 8, Parity: none, Start bits: 1, Stop bits: 1, Flow control: none
Indicators		Power supply: green, Sensor communications: green, Sensor communications error: red, External terminal communications: green, External terminal communications error: red
Protective circuits		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

* Contact your OMRON representative for CompoWay/F communications specifications.

Engineering Data (Reference Value)

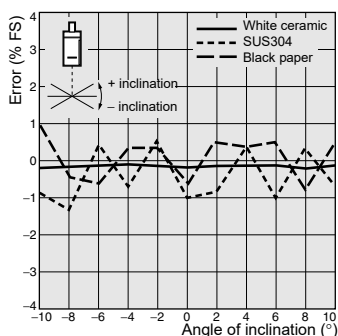
Angle Characteristic (Reflective Sensors)

The angle characteristic plots the relation between the inclination of the measurement object and the error in the linear output at the measurement point.

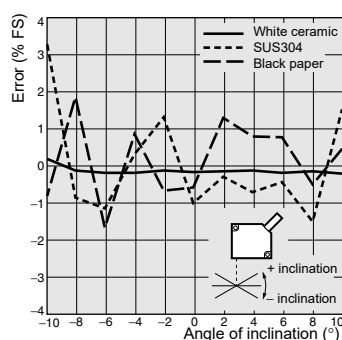
Note: SUS304 = Stainless steel SUS304

●ZX-LD40

Side-to-side Inclination

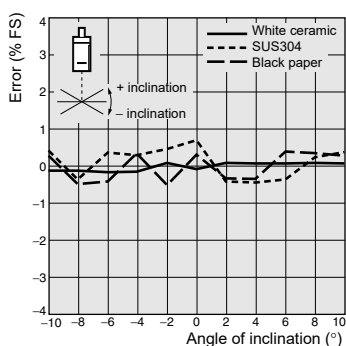


Front-to-back Inclination

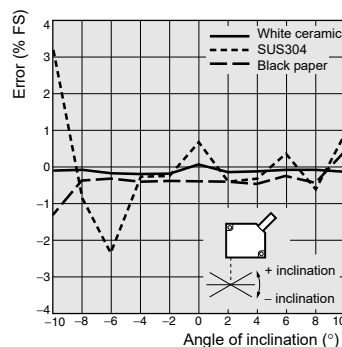


●ZX-LD40L

Side-to-side Inclination

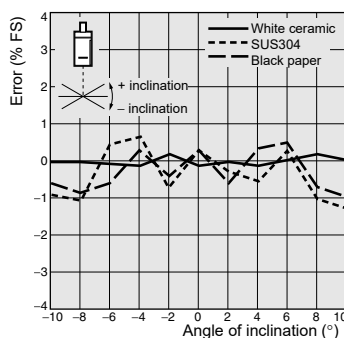


Front-to-back Inclination

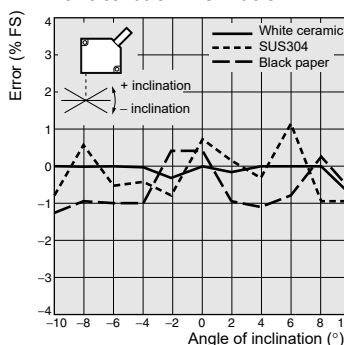


●ZX-LD100

Side-to-side Inclination

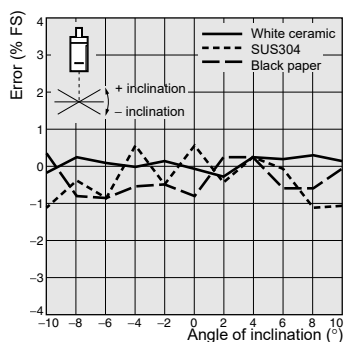


Front-to-back Inclination

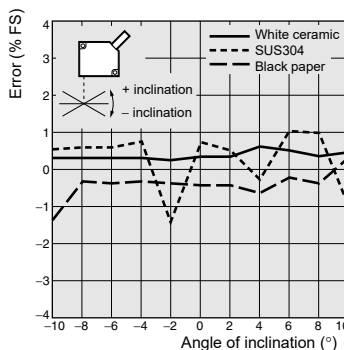


●ZX-LD100L

Side-to-side Inclination

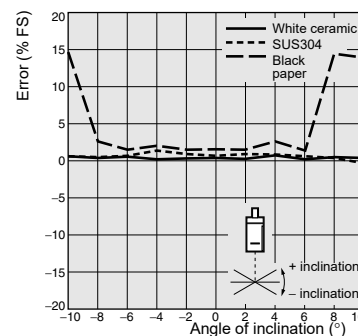


Front-to-back Inclination

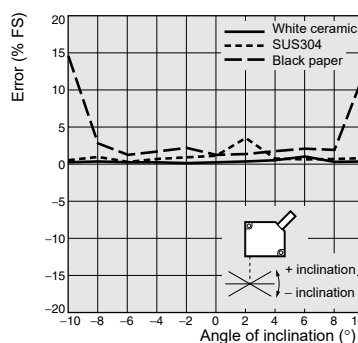


●ZX-LD300

Side-to-side Inclination

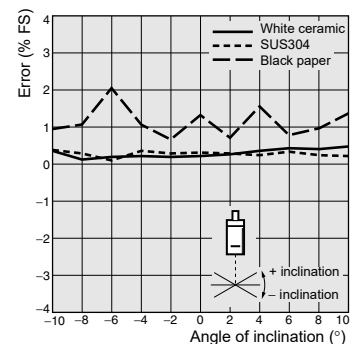


Front-to-back Inclination

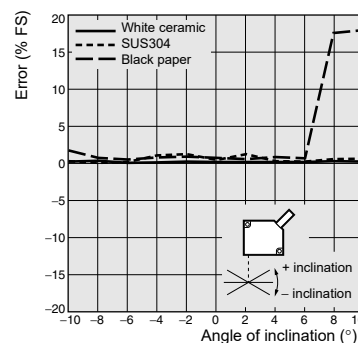


●ZX-LD300L

Side-to-side Inclination

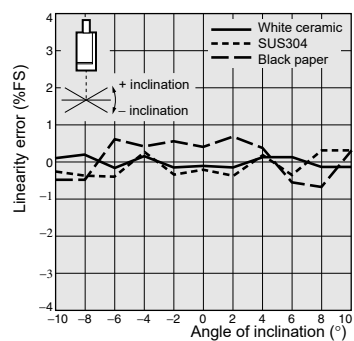


Front-to-back Inclination

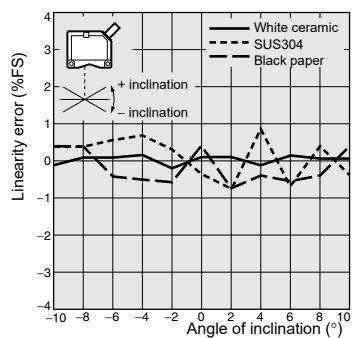


● ZX-LD30V

Side-to-side Inclination

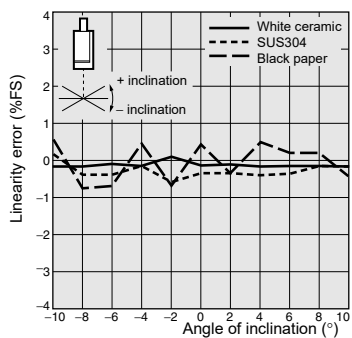


Front-to-back Inclination

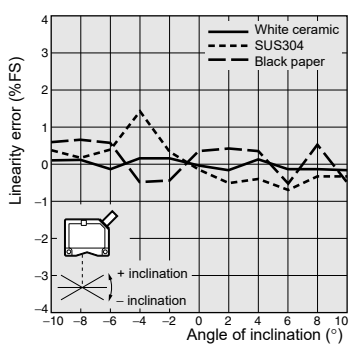


● ZX-LD30VL

Side-to-side Inclination



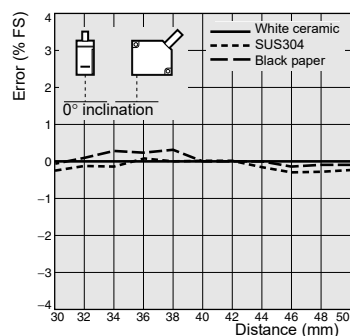
Front-to-back Inclination



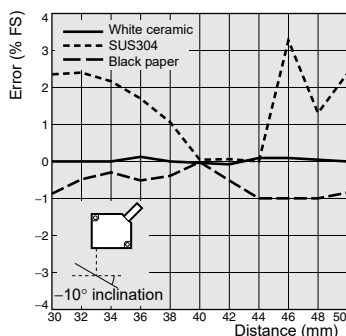
Linearity Characteristic for Different Materials (Reflective Sensors)

● ZX-LD40

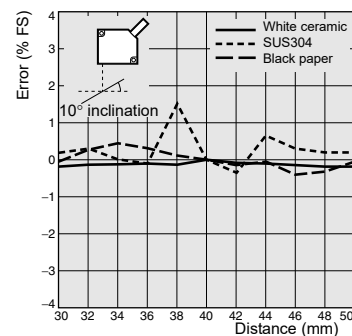
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-10° Inclination Front-to-back

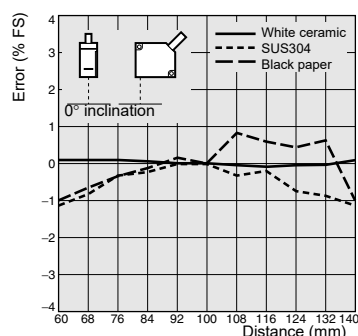


10° Inclination

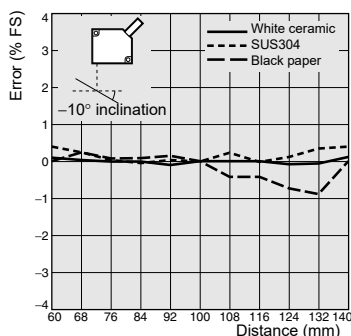


● ZX-LD100

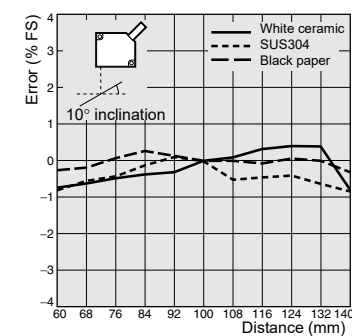
0° Inclination



-10° Inclination Front-to-back

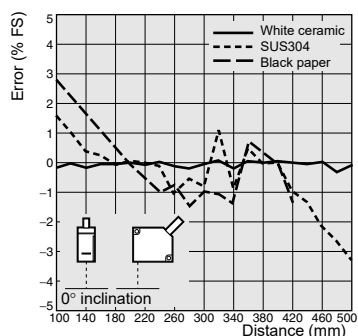


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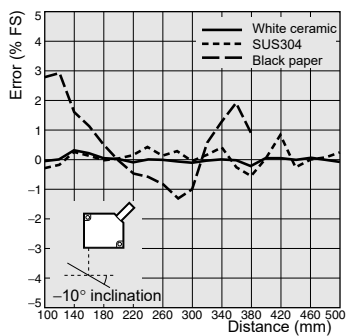


● ZX-LD300

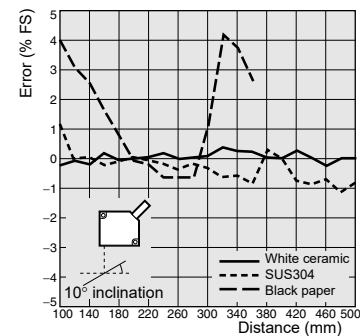
0° Inclination



-10° Inclination Front-to-back

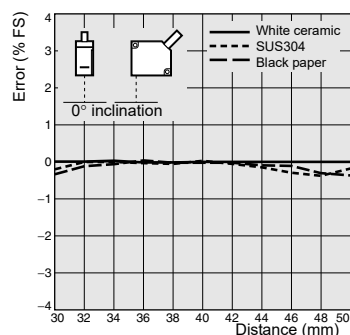


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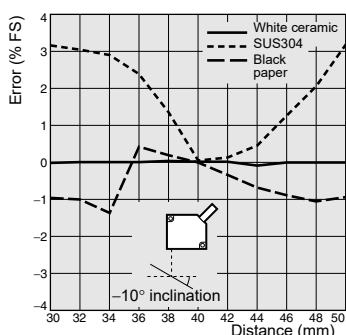


● ZX-LD40L

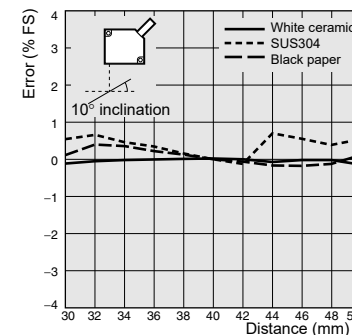
0° Inclination



-10° Inclination Front-to-back

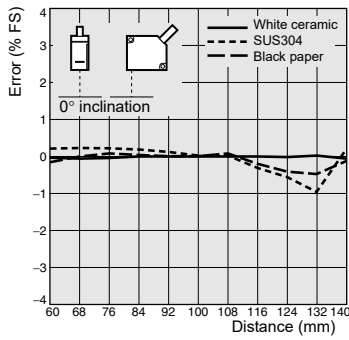


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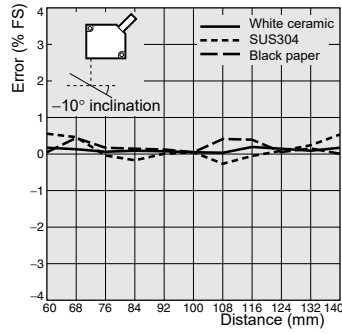


● ZX-LD100L

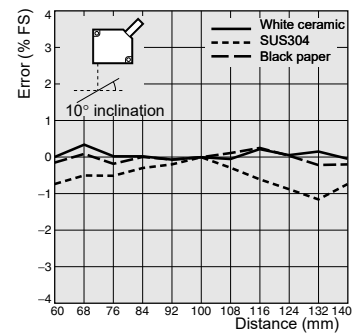
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-10° Inclination Front-to-back

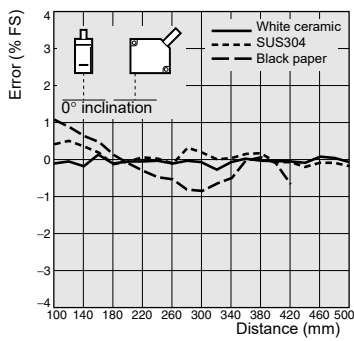


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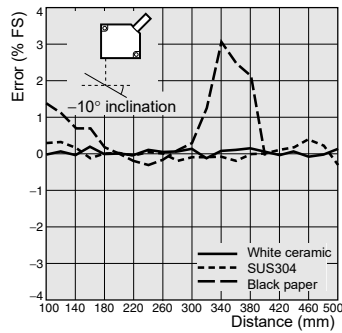


● ZX-LD300L

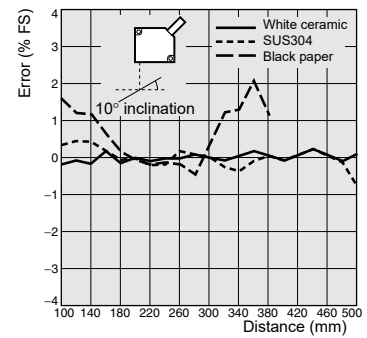
0° Inclination



-10° Inclination Front-to-back

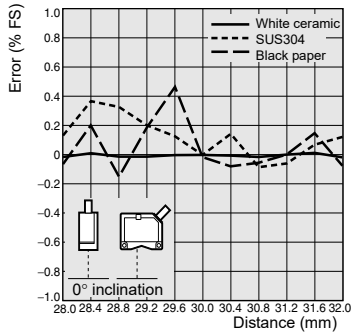


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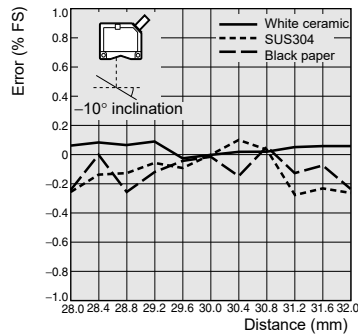


● ZX-LD30V

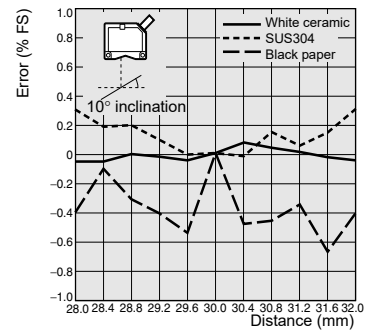
0° Inclination



-10° Inclination Front-to-back

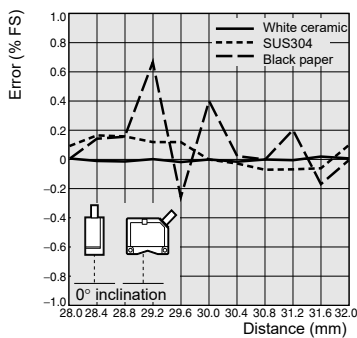


10° Inclination

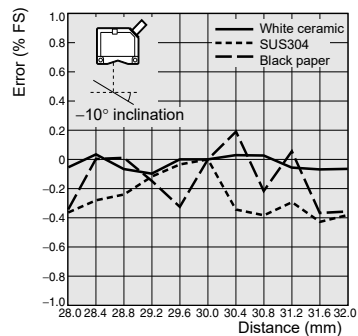


● ZX-LD30VL

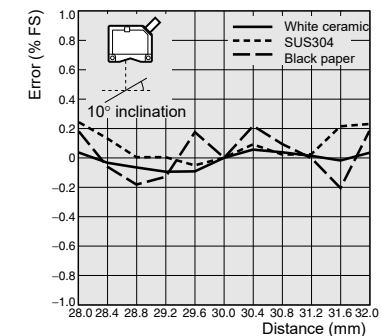
0° Inclination



-10° Inclination Front-to-back

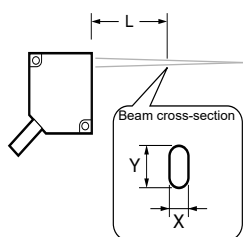


10° Inclination



Beam Size (Reflective Sensors)

● Spot Beams



ZX-LD40

L	30 mm	40 mm	50 mm
X	240 μm	40.0 μm	250 μm
Y	350 μm	30.0 μm	370 μm

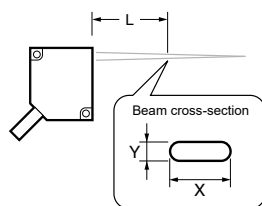
ZX-LD100

L	60 mm	100 mm	140 mm
X	390 μm	100 μm	430 μm
Y	620 μm	65.0 μm	650 μm

ZX-LD300

L	100 mm	300 mm	500 mm
X	1,050 μm	180 μm	1,100 μm
Y	450 μm	300 μm	850 μm

● Line Beams



ZX-LD40L

L	30 mm	40 mm	50 mm
X	2,000 μm	2,000 μm	2,000 μm
Y	240 μm	50.0 μm	250 μm

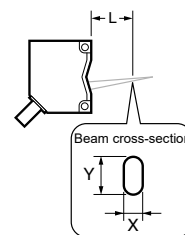
ZX-LD100L

L	60 mm	100 mm	140 mm
X	2,000 μm	2,000 μm	2,000 μm
Y	410 μm	100 μm	430 μm

ZX-LD300L

L	100 mm	300 mm	500 mm
X	2,000 μm	2,000 μm	2,500 μm
Y	750 μm	300 μm	650 μm

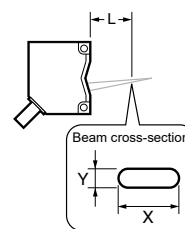
● Spot Beams



ZX-LD30V

L	28 mm	30 mm	32 mm
X	60.0 μm	30.0 μm	120 μm
Y	50.0 μm	40.0 μm	90.0 μm

● Line Beams



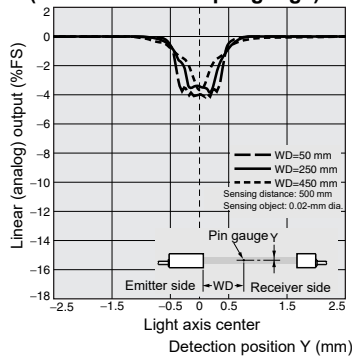
ZX-LD30VL

L	28 mm	30 mm	32 mm
X	1,800 μm	1,800 μm	1,800 μm
Y	90.0 μm	60.0 μm	110 μm

Sensing Object Characteristics (Through-beam Sensors)

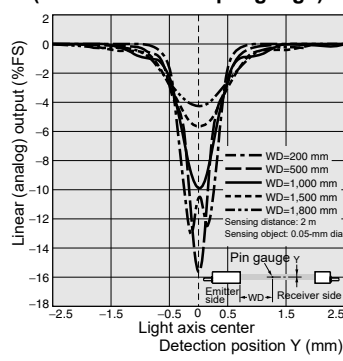
● ZX-LT001

(For 0.02-mm-dia. pin gauge)



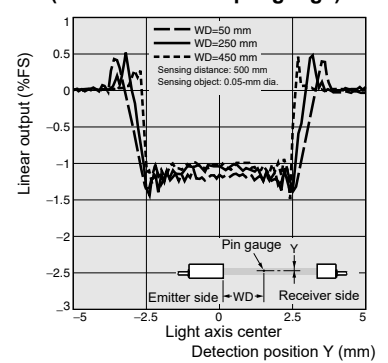
● ZX-LT001

(For 0.05-mm-dia. pin gauge)



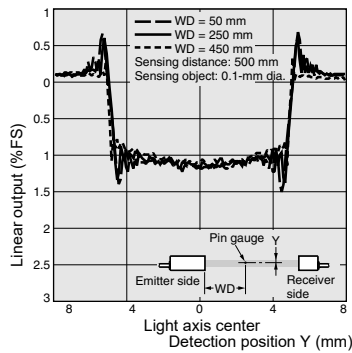
● ZX-LT005

(For 0.05-mm-dia. pin gauge)



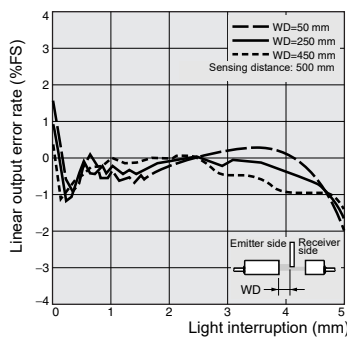
● ZX-LT010

(For 0.1-mm-dia. pin gauge)

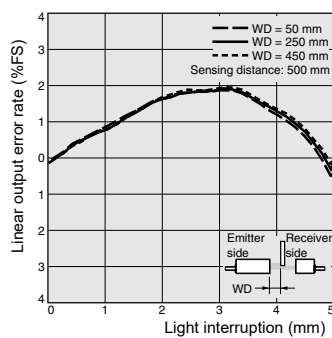


Linearity Characteristics

● ZX-LT005



● ZX-LT010

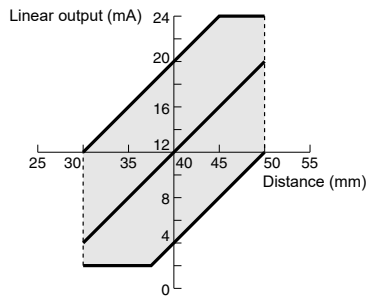


Linear Output vs. Sensing Distance

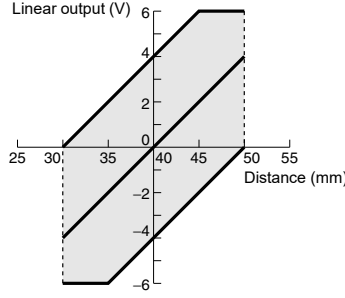
The output can be switched between a current output and a voltage output using a switch on the Amplifier Unit.

ZX-LD40/LD40L

Current Output

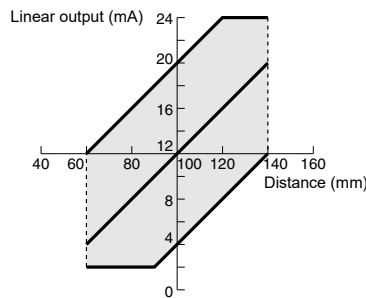


Voltage Output

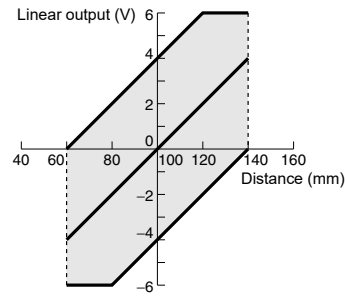


ZX-LD100/LD100L

Current Output

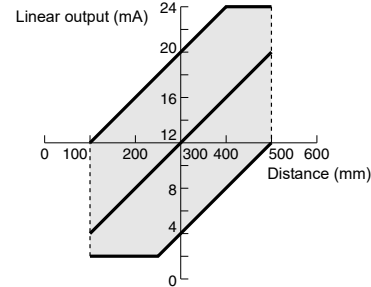


Voltage Output

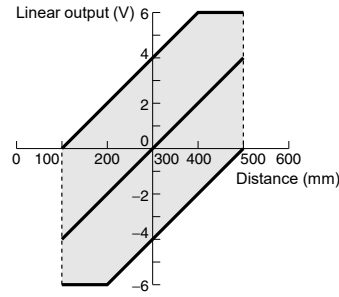


ZX-LD300/LD300L

Current Output

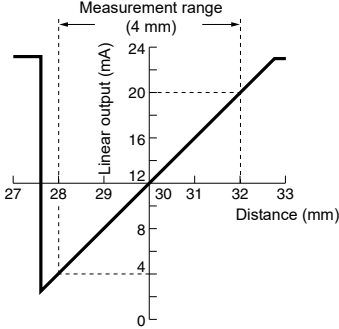


Voltage Output

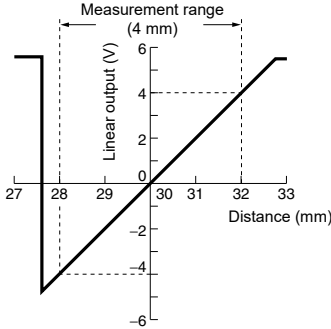


ZX-LD30V/LD30VL

Current Output

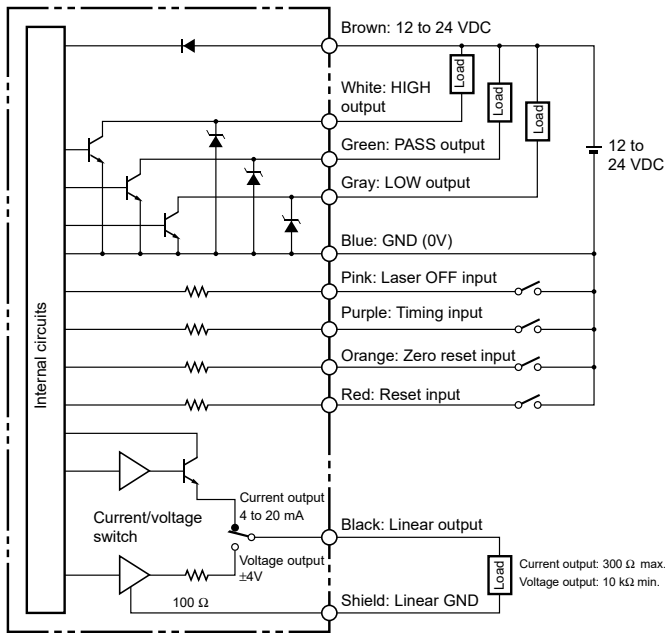


Voltage Output

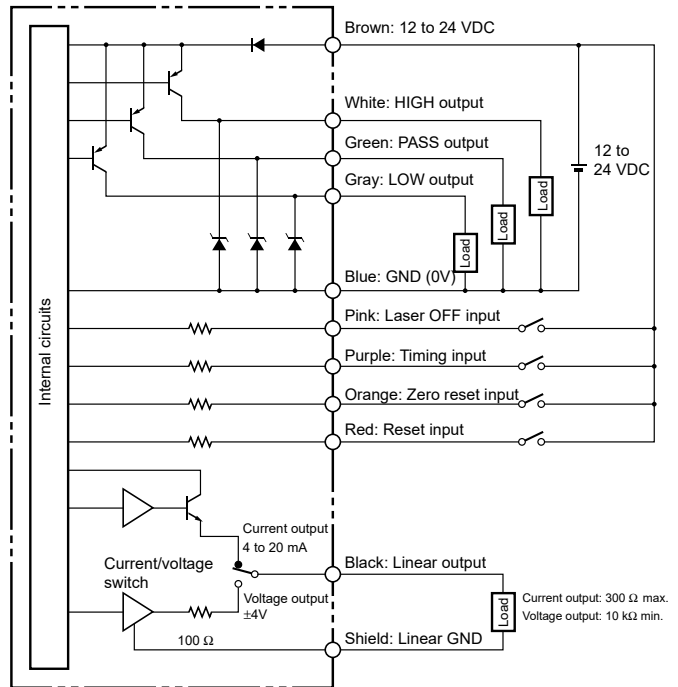


I/O Circuit Diagrams

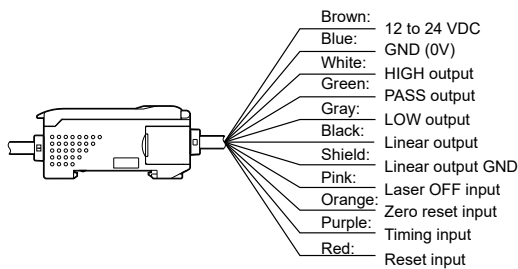
NPN Amplifier Unit: ZX-LDA11-N



PNP Amplifier Unit: ZX-LDA41-N



Connections: Amplifier Unit

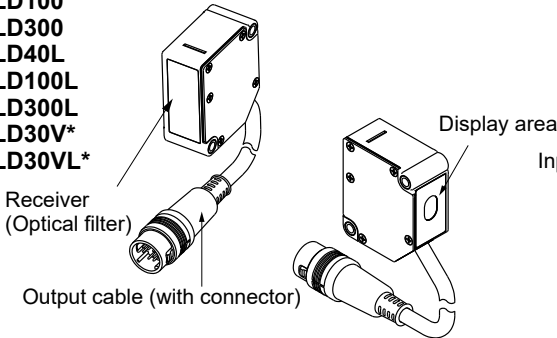


- Note 1.** Use a separate stabilized power supply for the Amplifier Unit, particularly when high resolution is required.
- 2.** Wire the Unit correctly. Incorrect wiring may result in damage to the Unit. (Do not allow wiring, particularly the linear output, to come into contact with other lines.)
- 3.** Use the 0-V line (blue) for the power supply and use the shield wire (linear output ground) together with the linear output (black line) for linear output. Each of these grounds must be used for the designed purpose. When not using the linear output, connect the linear ground (shield) to the 0-V ground.

Part Names

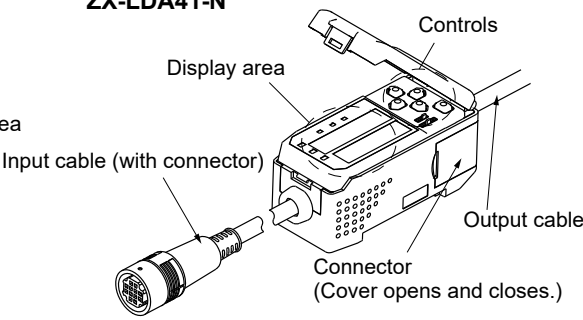
Sensor Heads (Reflective)

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



Amplifier Units

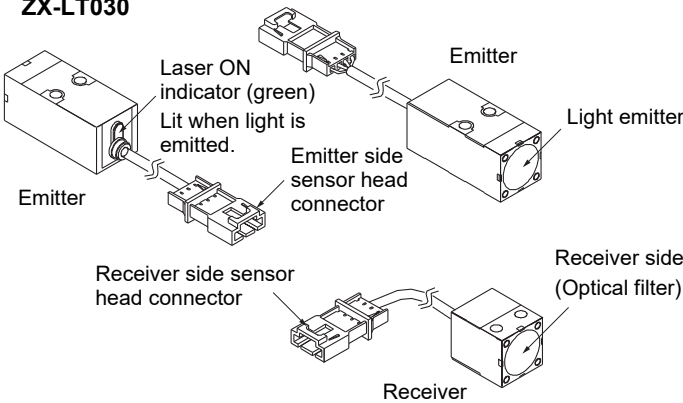
ZX-LDA11-N
ZX-LDA41-N



*The dimensions for these models are slightly different. Refer to page 23 for details.

Sensor Heads (Through-beam)

ZX-LT001
ZX-LT005
ZX-LT010
ZX-LT030



Calculating Unit ZX-CAL2

