



INSTRUCTION SHEET

Thank you for selecting an OMRON product. This sheet primarily describes precautions required in installing and operating the product.

- A specialist who has the knowledge of electricity must treat the product.
- Please read this manual carefully, and use it correctly after thoroughly understanding the product.
- Please keep this manual properly for future reference whenever it is necessary.



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* 0 1 9 9 5 6 0 - 4 E *

PRECAUTIONS ON SAFETY

Meanings of Signal Words



WARNING Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

Explanation of Signs



● **Laser beam**
Indicates caution on potential laser beam hazard.



● **Do not disassemble**
Indicates prohibition when there is a risk of minor injury from electrical shock or other source if the product is disassembled.

Alert Statements



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



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



SAFETY PRECAUTIONS FOR USING LASER EQUIPMENT

The ZX1-LD uses a laser as the light source. Lasers are classified based on EN standard (EN 60825-1)

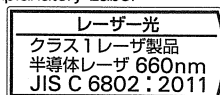
Labeling on Laser Use

The ZX1-LD has the following WARNING label or explanatory label on the side of the sensors.

· ZX1-LD□□
Laser Warning Label



· ZX1-LD□□L
Explanatory Label



Using in a country other than U.S.

• For countries other than Japan and U.S., warning labels or explanatory labels must be replaced by English ones (supplied with the product). EN60825-1 is provided for products used in Europe, and the content of this standard differs.

• The ZX1-LD is categorized as a Class 2 or Class 1 device as stipulated in EN60825-1:2007.

When using devices in which ZX1-LD is installed in the U.S., the devices are subjected to the U.S. FDA (Food and Drug Administration) laser regulations. ZX1 series is classified into Class 2 or Class 1 by the standard of IEC/EN60825-1 according to deviations of Laser Notice NO.50 of this standard, and reported to CDRH (Center for Devices and Radiological Health).

Accession Number
(ZX1-LD□□ : 1210041-000)
(ZX1-LD□□L : 1210041-001)

Replace the WARNING label or explanatory label with the corresponding English label and put the FDA Certification label.

Please make sure that the label are affixed at the correct locations as indicated.

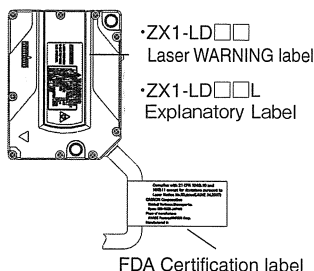
· ZX1-LD□□
Laser Warning Label
(Class 2 label / Aperture label)



· ZX1-LD□□L
Explanatory Label



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



· ZX1-LD□□
Laser WARNING label
· ZX1-LD□□L
Explanatory Label

FDA Certification label

PRECAUTIONS FOR SAFE USE

The following precautions must be observed, since they are essential to ensure safety in operation.

Installation Environment

- Do not use the Sensor in locations subject to explosive or flammable gases.
- To ensure safety in operation and maintenance, do not install the Sensor near high-voltage equipment or power devices.

Power Supply and Wiring

- Do not impose voltage exceeding the rated voltage: 10 to 30 VDC, including 10% ripple (p-p).
- When supplying power to the Sensor, make sure that the polarity of the power is correct, and do not connect to an AC power supply.
- Do not short-circuit the power for the open collector output. Short-circuiting the load may cause fire or damage on the Sensor.
- Connect the load correctly. Short-circuiting the load may cause fire or damage on the Sensor.
- Keep the load within the rated range. Overloading may result in fire or damage on the Sensor.
- Wire the product cable separately from high-voltage or power lines. Placing them in the same wiring or the same duct may cause induction, resulting in the product malfunction or damage.
- Always turn off the power of the Sensor before connecting or disconnecting the cable or connector.
- Do not use the Sensor for the safety circuits in nuclear power or life-critical applications.
- Implement safety measures e.g. fail-safe circuits.

Installation

- Make sure that all installation screws must be tighten securely.
Tightening torque: M3, 0.5N·m (ZX1-LD50□□/ZX1-LD100□□)
M4, 1.2N·m (ZX1-LD300□□/ZX1-LD600□□)

Others

- Do not attempt to disassemble, deform by pressure, incinerate, repair, or modify this product.
- When disposing of the product, treat as industrial waste.
- If you notice an abnormal condition such as a strange odor, extreme heating of the unit, or smoke, immediately stop using the product, turn off the power, and consult your dealer.

PRECAUTIONS FOR CORRECT USE

Installation Location

Do not install the product in locations subjected to the following conditions:

- Surrounding air temperature outside the rating
- Rapid temperature fluctuations (causing condensation)
- Relative humidity outside the range of 35 to 85%
- Presence of corrosive or flammable gases
- Presence of dust, salt, or iron particles
- Direct vibration or shock
- Reflection of intense light (such as other laser beams, electric arc-welding machines, or ultra-violet light)
- Direct sunlight or near heaters
- Water, oil, or chemical fumes or spray, or mist atmospheres
- Strong magnetic or electric field
- In the water, rain, or outdoors

Power Supply and Wiring

- Do not supply the power to the Sensor before checking the I/O wiring.
- Ground the FG terminal when using a commercially-available switching regulator.
- If the power supply line is subject to surges, connect a surge absorber that meets the conditions of the operating environment.
- Do not turn ON the power after wiring before making sure that the power supply is connected correctly; there are no faulty connections, e.g. load short-circuits; the load current is correct. Incorrect wiring may result in failure.
- Use a ZX0-XC□R Extension Cable (sold separately) to extend the Sensor's cable. Use only one cable. Do not extend the cable for the Sensor to a length exceeding 20 m.
- The display and indicators turn ON after approx. 2.5 seconds after the power is turned ON.

Warming Up

- After turning ON the power, allow the Sensor to warm up for approx. 30 minutes prior to use. The circuitry is not stable immediately after turning the power ON, and the values gradually change until the Sensor is completely warmed up. When using LD-OFF input for a long period of time, perform warming up for more than 30 minutes after cancelling LD-OFF.

Maintenance and Inspection

- Always turn OFF the power of the Sensor before connecting or disconnecting the cable or for making adjustment.
- Do not use thinner, alcohol, benzene, acetone, or kerosene to clean the Sensor.
- If considerable foreign matter or dust collects on the glass surface of the front of Sensor, use a blower brush (for camera lenses) to blow off the foreign matter. Avoid blowing it off with your breath. For a small amount of foreign matter or dust, gently wipe with a soft cloth. Do not wipe hard. The damaged glass surface may result in detection errors.

Sensing Object

The product cannot accurately measure the following types of objects: Transparent objects, objects with an extremely low reflective sensor ratio, objects smaller than the spot diameter, objects with a large curvature, excessively inclined objects, etc.

Checking the Package Content

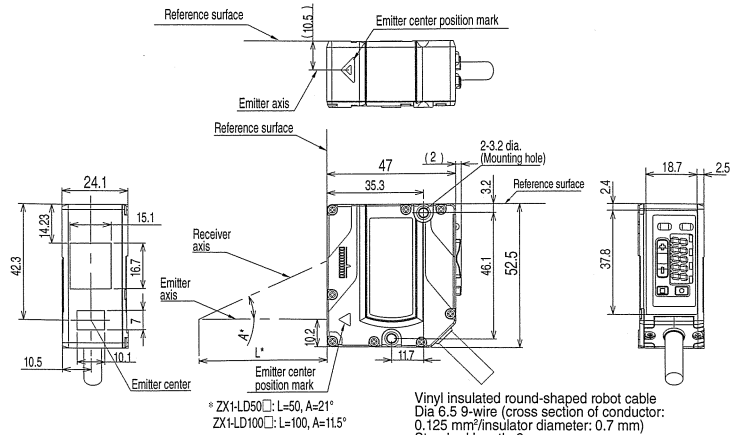
- Sensor: 1
 - Instruction sheet (this sheet): 1 each (Japanese and English)
 - FDA Certification label : 1
 - Laser Warning Label : 1 each (Japanese and English)
- (The explanatory labels are attached to ZX1-LD□□L instead of the warning explanation labels.)

1 Installation

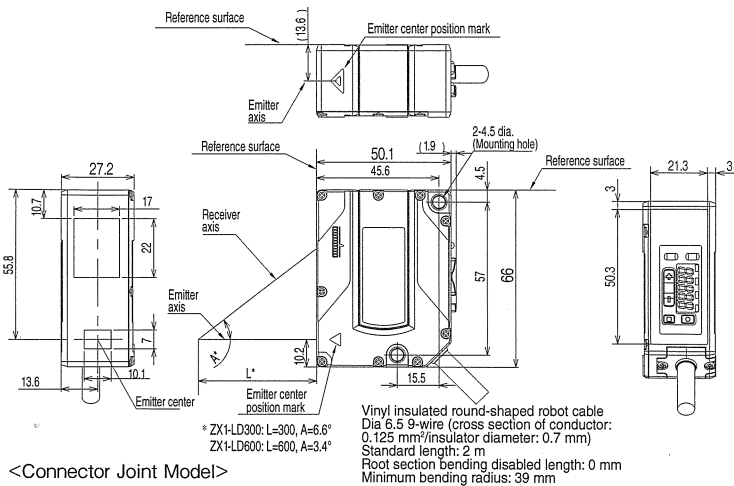
1-1 Dimensions

(Unit: mm)

ZX1-LD50□/ZX1-LD100□

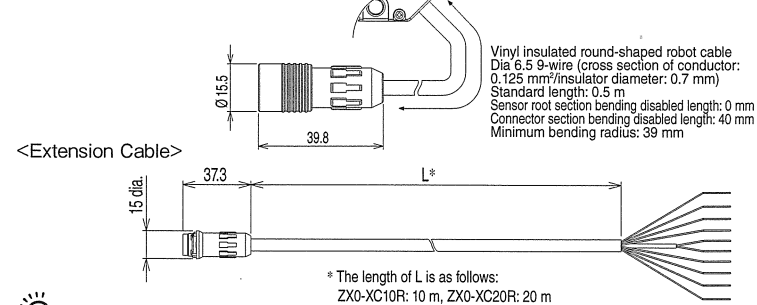


ZX1-LD300□/ZX1-LD600□



<Connector Joint Model>

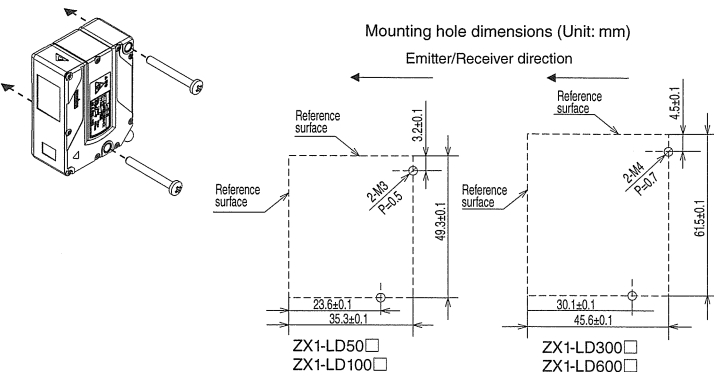
ZX1-LD50□6/ZX1-LD100□6 ZX1-LD300□6/ZX1-LD600□6



The extension cable is the robot cable, the same as the cable of the Sensor Unit.

1-2 Mounting Sensor

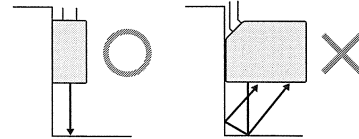
To mount ZX1-LD50 and ZX1-LD100□, use M3 screws (tightening torque: 0.5 N·m) and ZX1-LD300□ and ZX1-LD600□, M4 screws (tightening torque: 1.2 N·m).



Do not touch the sensor emitter and receiver sections. Correct detection may not be possible if fingerprints are attached to these areas. If fingers have inadvertently touched the areas, wipe the areas using a soft, clean cloth.

Caution on Mounting Direction

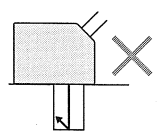
<Detection Near the Wall Surface>



The Sensor is less influenced by ambient lighting.

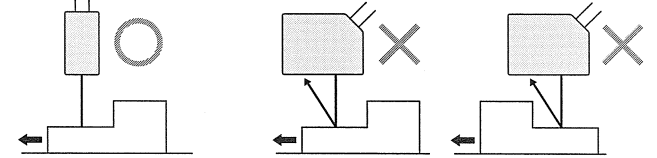
The Sensor is easily influenced by ambient lighting, which may cause detection value variations.*

<Cavity Detection>



Detection is not possible if the emitter or receiver section is blocked.

<Detection of Workpiece with Level Difference>



Stable detection is possible regardless of level difference.

Level difference may cause an abnormal detection value.

* Before performing tuning, apply mat paint on the wall surface or turn ON the background suppression function to avoid laser light reflection. Refer to * 5. Background suppression function, ④ Detailed Settings*

1-3 Wiring

The table below shows individual external I/O wires and their roles.

Wire color	Name	Role
Brown	Power supply	Connect to 10 to 30 VDC (including 10% ripple (p-p)). Used as the common I/Os terminal for all I/O except monitor output for a PNP output type.
Blue	GND	0-V power supply terminal. Used as the common I/Os terminal for all I/O except monitor output for an NPN output type.
White	OUT1 Judgment output	Outputs the CH1 judgment result.
Green	OUT2 Judgment output	Outputs the CH2 judgment result.
Black	Analog output	Outputs the current value according to the measurement result. (4 to 20 mA)
Shield	Analog GND	0-V ground line for monitor output. Connect this line separately from the blue (0 V) GND. [Important] Be sure to connect to blue (0 V).
Orange	TUNE1 input	Inputs tuning to CH1.
Pink	TUNE2 input	Inputs tuning to CH2.
Purple	Zero reset input	Used to execute or cancel zero reset.
Red	LD-OFF input	ON: Laser turns OFF (radiation stop). In this state, analog output, digital display, judgment output and judgment output display are output based on keep function settings. The digital display shows [LdOFF].

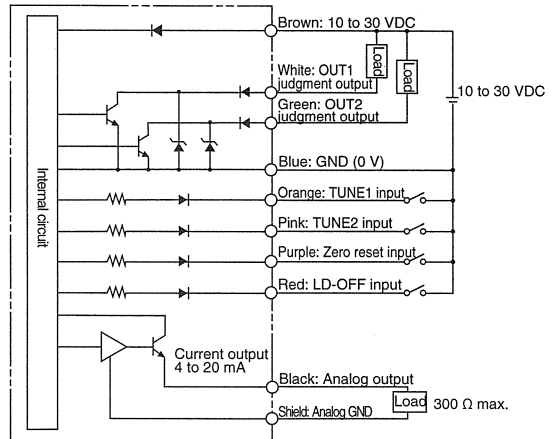


The individual wire colors and roles are the same between pre-wired and connector joint models.

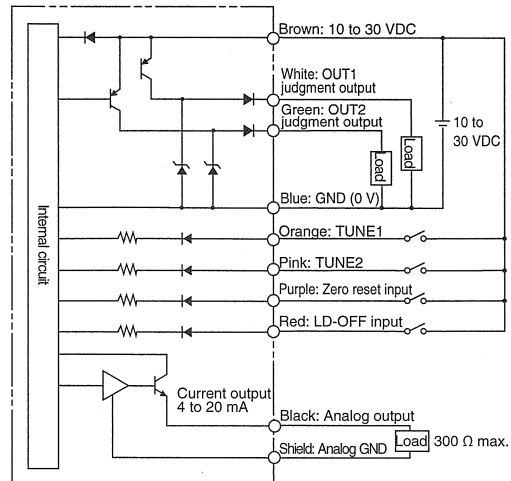


Wire the Sensor correctly. Unused wires must be insulated. Incorrect wiring may result in damage to the Sensor.

I/O Circuit Diagram <NPN Output Type>



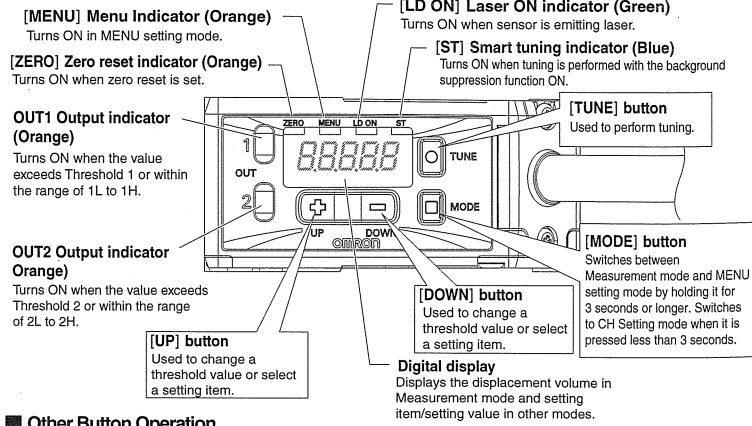
I/O Circuit Diagram <PNP Output Type>



2 Settings

2-1 Setting and Display Overview

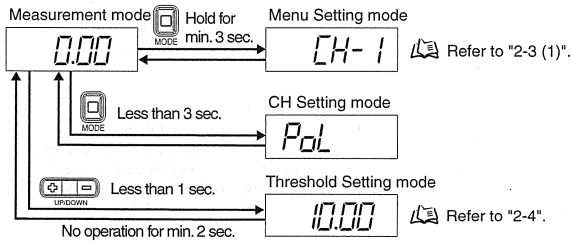
Nomenclature and Function



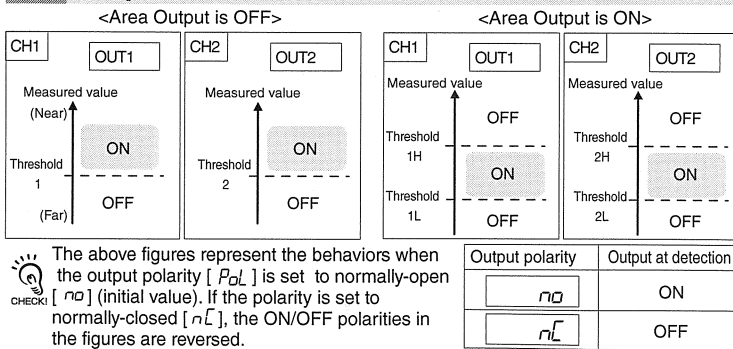
Other Button Operation

Tuning		Refer to "2-3"
Zero reset setting	+ simultaneously for less than 3 sec.	Refer to "3 (1)"
Zero reset cancel	+ simultaneously for min. 3 sec.	Refer to "3 (1)"
Key lock setting/cancel	+ simultaneously for min. 3 sec.	Refer to "3 (2)"

Switching to Individual Modes



2-2 Output and Threshold Value



2-3 Tuning

Quick Reference for Tuning Operation (Perform tuning after selecting a CH)

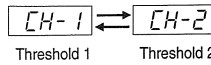
CH setting mode	Press button to enter CH setting mode, and then press or button to select a CH.
1-point tuning Refer to "2-3 (1)", "2-3 (4)"	Press TUNE button for 3 to 5 seconds.
2-point tuning Refer to "2-3 (2)", "2-3 (3)"	Press TUNE button once for the 1st point. Press TUNE button once for the 2nd point.
Tuning mode without workpiece Refer to "2-3 (5)"	Press TUNE button for 5 seconds.

- TUNE1 input (external input terminal) can also replace the button operations for tuning to CH1. Tuning can be performed for TUNE2 to CH2.
- The allocation of button and external input terminals can be fixed by changing the tuning type. Refer to "2. Tuning Type, 4 Detailed Settings"
- When setting the background suppression function to ON and performing tuning, the measurement value and sensitivity level can be limited according to the sensitivity. Use it when abnormal distance is detected due to diffuse reflection caused by surrounding walls, etc. Refer to "5. Background suppression function, 4 Detailed Settings"
- When performing tuning, threshold values are recorded in EEPROM (non-volatile memory) in the sensor. The writing life of EEPROM is 100,000 times. Be careful of writing life when performing measurement-by-measurement tuning.

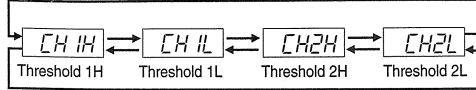
(1) Switch Channel to Set Threshold

CH Setting Mode

- Briefly press the button in Measurement mode.
- The channel display changes in the following sequence by pressing the button.



<Area Output is ON>



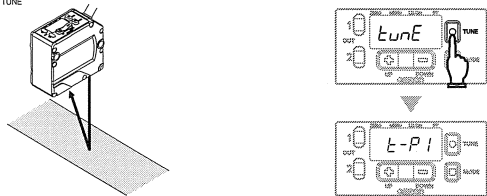
- Press the button to return to measurement mode.

(2) Detect for Workpiece Presence/Absence

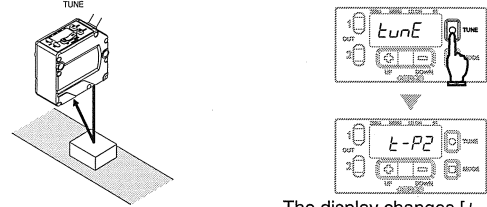
2-point Tuning

Used to distinguish between two objects with different height from the Sensor e.g. OK and NG, workpiece and background (reference surface) or workpieces A and B.

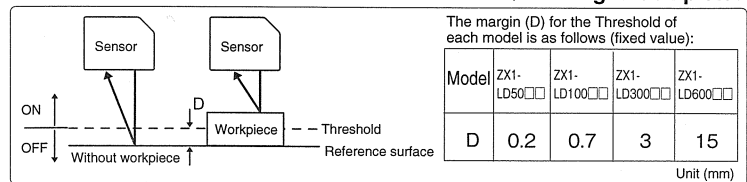
- Press the button (within 1 sec.) once without a workpiece.



- Lightly press the button once again with a workpiece.



Setting is Completed



The order of the workpiece does not matter. Refer to "5 Error Messages".

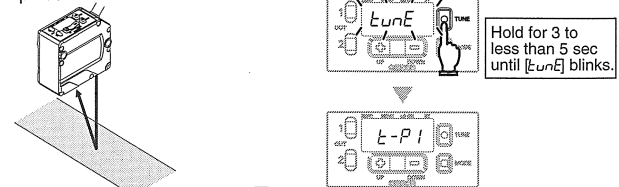
(3) Detect for Workpiece Presence/Absence

(Tuning Only Using Reference Surface)

1-point Tuning

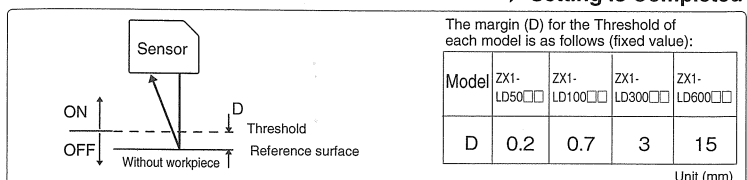
Used to judge the presence/absence of a workpiece by referring to the pre-determined background (reference surface).

- Hold the button (minimum 3 and less than 5 seconds) until [tunE] blinks without a workpiece.



- When [tunE] starts blinking, release the button.

Setting is Completed




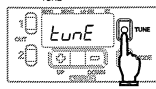
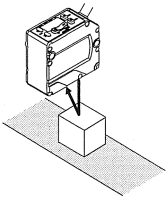
(4) Set Upper Limit and Lower Limit (Using Area Output)

● 2-point Area Tuning


Refer to "7. Area Output, ④ Detailed Settings"

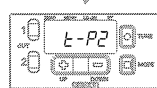
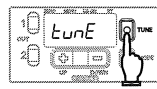
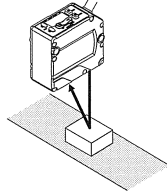
Used to judge if the workpiece is within the range by using the upper limit and lower limit workpieces.

1. Select "ON" for area output in menu setting mode to return to measurement mode.
2. Set the workpiece at the desired upper limit and lightly press the  button.



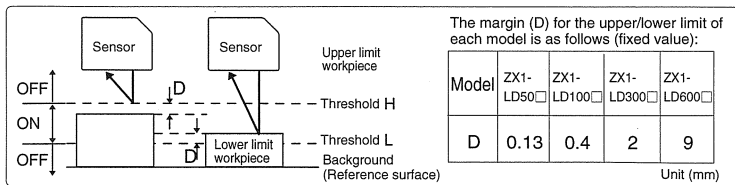
The display changes [tunE] → [t-P 1] → [Pnt 2].

3. Set the workpiece at the desired lower limit and lightly press the  button.



The display changes [tunE] → [Pnt 2] and 2-point tuning is completed. The measured value display returns.

➡ Setting is Completed





● The order of the workpiece does not matter.

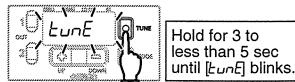
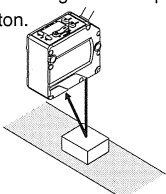
(5) Set Plus/Minus (±) Tolerance

● 1-point Area Tuning

Refer to "7. Area Output, ④ Detailed Settings"

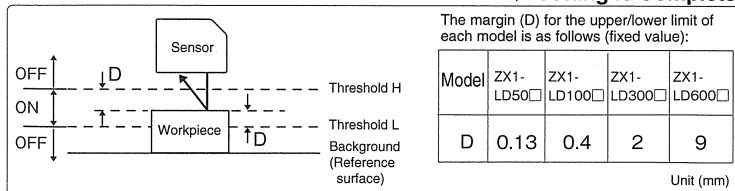
Used to assign the upper and lower limits to one actual workpiece and judge if the workpiece is within the range.

1. Set the AREA item in the menu to "ON" and return to the measured value display.
2. Hold the  button (3 to less than 5 seconds) until [tunE] blinks with a workpiece to detect on the reference surface.
3. When [tunE] starts blinking on the display, release the  button.



The display changes [tunE] → [t-P 1] and 1-point area tuning is completed. The measured value display returns.

➡ Setting is Completed



● To set plus and minus threshold values using "0" as the background, use the zero reset function to reset the distance to "0". Then, perform 1-point area tuning.

Refer to "③ Convenient Setting Features (1)"


(6) When (2) to (5) Methods Failed

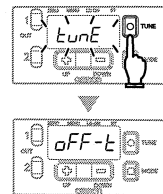
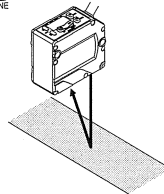
● Tuning mode without Workpiece (Area Output is OFF)

Used to judge the presence/absence of a workpiece using the pre-determined background (reference surface) as the reference. Unlike 1-point tuning, this method focuses on the detection of the absence of workpiece. Insufficient light level or outside-range errors caused by complicated workpiece appearance are judged as "the presence of the workpiece".


● Tuning mode without Workpiece (Area Output is ON)

Used to assign the upper and lower limits to the distance from the reference surface and judge if a workpiece is within the range. Unlike 2-point tuning, this method focuses on the detection of the absence of workpiece. Insufficient light level or outside-range errors caused by complicated workpiece appearance are judged as "the presence of the workpiece".

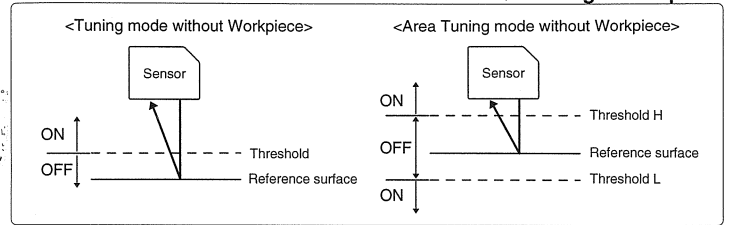
1. Hold the  button (5 sec. or longer) until [tunE] blinks rapidly without a workpiece.



Hold for 3 to less than 5 sec until [tunE] blinks rapidly.


2. When [tunE] in the display starts blinking rapidly, release the  button.


➡ Setting is Completed




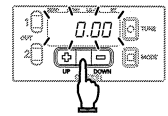
2-4 Fine Adjustment of Threshold Value

● Threshold Value Setting

To loosen or tighten the ON/OFF switching conditions, use the  buttons for minute adjustment of the threshold values.

 Increase threshold

 Decrease threshold



● The OUT1 indicator keeps blinking while "Threshold 1/ Threshold 1H/ Threshold 1L" is being changed. The OUT2 indicator keeps blinking while "Threshold 2/ Threshold 2H/ Threshold 2L" is being changed.

2-5 Fine Adjustment of Hysteresis Width

● Hysteresis Width Setting

A minute step can be judged by adjusting the hysteresis width according to the workpiece. However, note that the judgment output varies if lowering the hysteresis width while the displacement value is varying due to moving workpiece or low reflection light intensity.

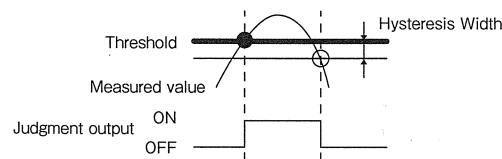
● What is Hysteresis Width?

A point in which a judgment output turns from OFF to ON is called an operating point, and a point in which a judgment output turns from ON to OFF is called a return point. On this sensor, threshold means operating point, and a distance to the return point can be set based on the hysteresis width.

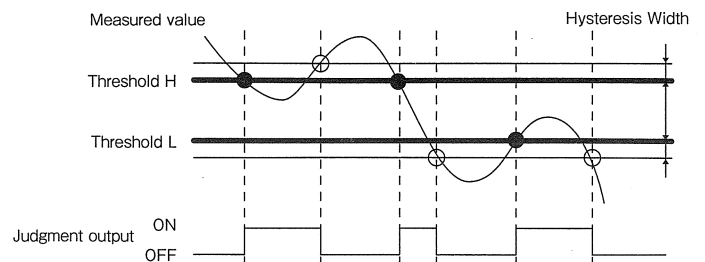


● Note that the direction where the hysteresis width is set for the threshold differs depending on ON/OFF of the area output.

Area output is OFF



Area output is ON



3 Convenient Setting Features

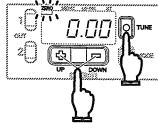
(1) Reset the Present Distance to "0"

● Zero Reset

The present distance value can be reset to "0".

1. Simultaneously press the and , or the and , once for a short time.

The present value changes to "0" and zero reset is completed. The zero reset indicator turns ON.



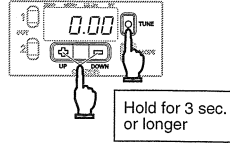
➡ **Setting is Completed**



A zero reset can be performed by turning the zero reset input that is an external input terminal for 4 ms or longer and less than 3 seconds instead of using the button.

● Zero Reset Cancel

1. To cancel zero reset function, simultaneously press the and , or the and , for at least 3 seconds.



➡ **Zero Reset is Cancelled**



A zero reset can be cancelled by turning the zero reset input that is an external input terminal for 3 seconds or longer instead of using the button.

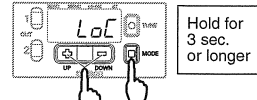
(2) Avoid Mis-operation

● Key Lock Function

Used to disable the button operations in Measurement mode.

1. Simultaneously press the and , or the and , for at least 3 seconds.

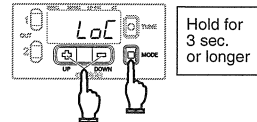
The display shows [LoC].



➡ **Setting is Completed**

● Key Lock Cancel

1. To unlock the key operation after key lock setting, simultaneously press the and , or the and , for at least 3 seconds.



➡ **Key Lock is Cancelled**



A key lock state is retained after power is turned ON.

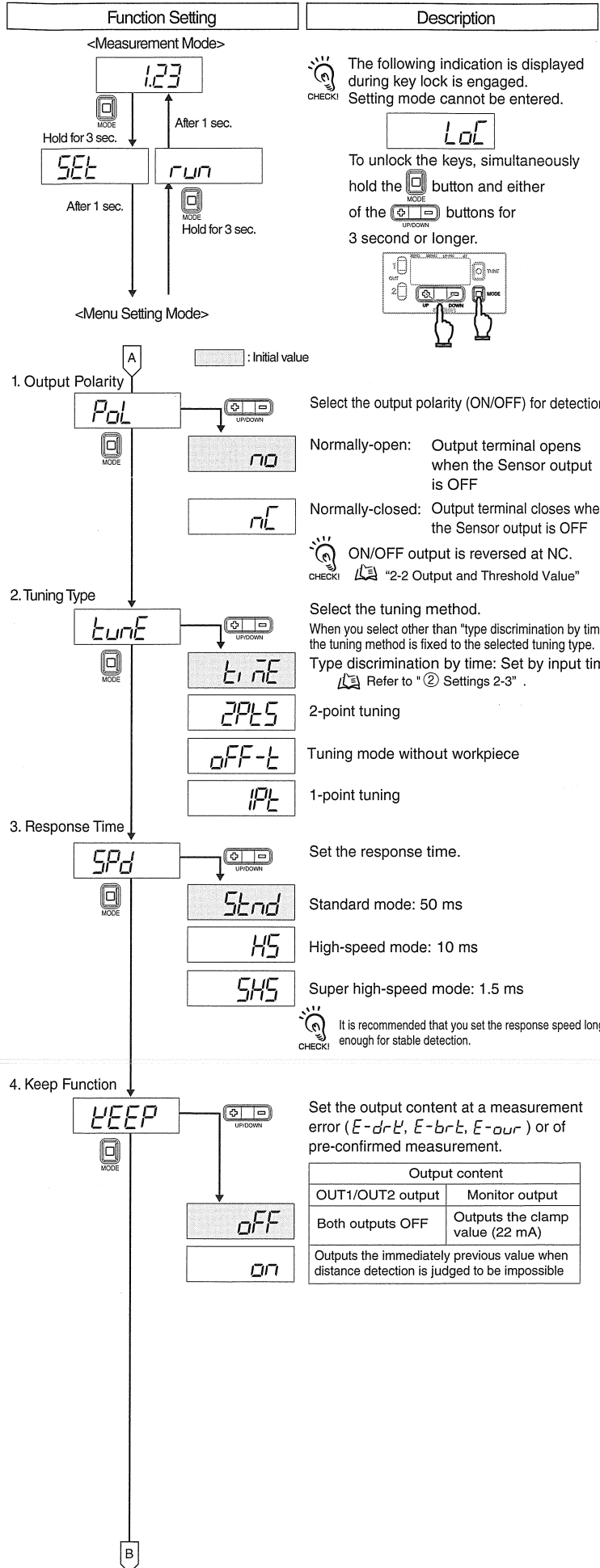
4 Detailed Settings

To enter the Menu Setting mode, hold for at least 3 seconds.

The Menu Setting mode provides the following function settings.

Pressing the from the item setting moves to the next item menu.

All the settings are common to CH1 and CH2.



5. Scaling Function

SCAL

UP/DOWN MODE

Standard: **Stnd**

User: **USER**

The range of analog outputs for measured values can be arbitrarily configured.

Standard setting: Set an initial value to measured value according to an output.

User setting: Arbitrarily set a measurement value corresponding to the output.

Unit (mm)

Unit (mm)

When setting the 1st point of the measurement value for 4mA and 20mA outputs, the measurement value cannot be set in the area indicated by x because the 2nd point is the minimum set value.

To reverse the set values of 4mA and 20mA, set one of the measurement values near the CENTER before setting the both values due to the minimum set value.

6. Background Suppression Function

Smart

UP/DOWN MODE

off

on

Set the Sensor only to be sensitive to the workpiece condition in tuning.

Sensitivity is not restricted.

Post-tuning measured value and sensitivity are restricted according to the sensitivity in tuning.

The background suppression function becomes effective by performing tuning after changing the setting to ON.

When shifted from the limited range of the sensitivity, the display shows *E-dr-E* or *E-br-E*. The function is ready after the smart tuning indicator (blue) turns ON.

Smart tuning indicator

7. Hysteresis width

HYS

UP/DOWN MODE

Standard: **Stnd**

User: **USER**

Set a hysteresis width. The hysteresis width has been set to the threshold so that the judgment output does not become unstable near the boundary.

Standard setting: Set an initial value to the hysteresis width.

User setting: Set an arbitrary hysteresis width.

	Initial value	Setting range
LD50	0.07mm	0.00~10.00mm
LD100	0.3mm	0.00~35.00mm
LD300	1mm	0.0~150.0mm
LD600	6mm	0.0~400.0mm

A minute step can be judged by lowering the hysteresis width. However, note that the reflection output may become unstable when the reflection light intensity is low.

8. Timer Function

Timer

UP/DOWN MODE

LoFF

offd

on-d

Shot

onoff

Specify the timer operation time.

The timer function is not used.

Off-delay timer: Holds output ON if the detection time is short and unable to detect with PLC.

On-delay timer: Delays output ON after detection.

One shot timer: Outputs for a certain period of time even if the workpiece size varies.

On/Off-delay timer: Delays both outputs ON/OFF.

Unit: M Sec

1

9999

ON OFF

Off-delay ON OFF

On-delay ON OFF

One shot ON OFF

On/Off-delay ON OFF

T = Timer value

*1: If OFF time < Timer value, the output does not turn OFF.
*2: If ON Time < Timer value, the output does not turn ON.
*3: If OFF -> ON condition is satisfied during output, the timer is ignored.

9. Area Output

Area

UP/DOWN MODE

off

on

Specify whether the area output function is used or not used.

Area output is not used.

Area output is used. The output turns ON when the measured value enters the Threshold L to Threshold H range.

OFF ON OFF

Sensor ON Sensor OFF

Workpiece

OFF ON OFF

Workpiece

Workpiece

Threshold H

Threshold L

10. Zero Reset Memory

SR

UP/DOWN MODE

off

on

Set whether the measured value at the time of zero reset is held even after power is turned OFF.

Zero reset memory disabled

Zero reset memory enabled

If the zero reset memory is kept "ON", values are written to EEPROM (nonvolatile memory) inside the sensor unit every time the zero reset is performed. The EEPROM can be written up to 100,000 times. Writing for each measurement may result in malfunction. Be careful of the writing life when using the sensor with eco function ON.

11. Eco Function

Eco

UP/DOWN MODE

off

on

Use this function when the power consumption should be saved or detailed values should not be displayed.

Eco function disabled

Eco function enabled

When the eco function is enabled, the display changes to the eco display, turning OFF the digital display, if any operation is not performed for 30 seconds in RUN mode. The normal display returns by pressing any button when the eco function is engaged.

112 Setting Reset

rSt

UP/DOWN MODE

no.P

YES.P


All the settings are reset to the factory default settings.

Setting reset cancel

Press the button while this message is shown to execute setting reset.

5 Error Messages

The following table shows the error details and remedies displayed on the digital display.

Error Name/Display	Cause (Described in Operation Manual)	Remedy
LD malfunction error E-Ld	Laser diode is deteriorated.	Turn OFF the power and check if the Sensor is correctly wired; and turn ON the power again. If the error persists, the Sensor is faulty. Replace it with a new Sensor.
System error E-SYS	Sensor is faulty	
EEPROM error 1 E-RE1	Sensor setting memory error	Turn OFF the power and check if the Sensor is correctly wired; and turn ON the power again. If the error persists, the Sensor is faulty. Replace it with a new Sensor.
EEPROM error 2 E-RE2	Sensor setting memory error	Hold the  key for 3 sec. or longer to reset the settings. If the error is not solved, the Sensor is faulty. Replace it with a new Sensor.
Load short-circuit detection error E-Sht	Judgment output short-circuit	Turn OFF the power and check if OUT1/OUT2 lines are not short-circuited; then, turn ON the power again.
Tuning execution error E-tun	Tuning failure	Set the response time to a slower value and retry tuning. Check if the distance between the Sensor and the workpiece is within the measurement range; then retry tuning.
Insufficient incident light level error E-drt	Insufficient incident light level	Delay response time or adjust the distance between Sensor and workpiece so that the S sensor can detect it. The light reception level is equal to or less than the limited sensitivity during background suppression function operation.
Incident light level saturation error E-brt	Measurement error due to saturated incident light level	Avoid regular reflected light from entering into the sensor. The light reception level is equal to or more than the limited sensitivity during background suppression function operation.
Measurement out-of-range error E-our	Measurement value outside the measurement range	Set the distance between the Sensor and workpiece within the measurement range.

6 Ratings and Specifications

Model	NPN output	Pre-wire model				Connector joint model			
		ZX1-LD 50A61	ZX1-LD 50A61L	ZX1-LD 100A61	ZX1-LD 100A61L	ZX1-LD 50A66	ZX1-LD 100A66	ZX1-LD 300A66	ZX1-LD 600A66
		ZX1-LD 50A81	ZX1-LD 50A81L	ZX1-LD 100A81	ZX1-LD 100A81L	ZX1-LD 300A81	ZX1-LD 300A81L	ZX1-LD 600A81	ZX1-LD 600A81L
		ZX1-LD 50A86	ZX1-LD 50A86L	ZX1-LD 100A86	ZX1-LD 100A86L	ZX1-LD 300A86	ZX1-LD 300A86L	ZX1-LD 600A86	ZX1-LD 600A86L
Dimensions		52.5mm x 47mm x 24.1mm				66mm x 50.1mm x 27.2mm			
Measurement range		50 ± 10 mm		100 ± 35 mm		300 ± 150 mm		600 ± 400 mm	
Light source (wavelength)		Visible-light semiconductor laser (660 nm)							
FDA class *2		class 2 (1mW max.)	class 1 (0.24mW max.)	class 2 (1mW max.)	class 1 (0.24mW max.)	class 2 (1mW max.)	class 1 (0.24mW max.)	class 2 (1mW max.)	class 1 (0.24mW max.)
JIS standard IEC/EN class		class 2 (1mW max.)	class 1 (0.24mW max.)	class 2 (1mW max.)	class 1 (0.24mW max.)	class 2 (1mW max.)	class 1 (0.24mW max.)	class 2 (1mW max.)	class 1 (0.24mW max.)
Spot diameter (Typical) (Defined at the center of the sensing distance) *1		Dia. 0.17 mm		Dia. 0.33 mm		Dia. 0.52 mm		Dia. 0.56 mm	
Power supply voltage		10 to 30 VDC, including 10% ripple (p-p)							
Current consumption		250 mA max. (Power supply voltage: 10 VDC)							
Analog output		Current output: 4 to 20 mA, max. load resistance: 300 Ω							
Indications		Digital display (Red), Output indicators (OUT1, OUT2) (Orange), Zero reset indicator (Orange), Menu indicator (Orange), Laser ON indicator (Green), and Smart tuning indicator (Blue)							
Response time	Judgment output	Super high-speed (SHS) mode: 1 ms, High-speed (HS) mode: 10 ms, Standard (STND) mode: 100 ms							
	Laser OFF input ZERO input	200 ms max.							
Ambient illumination		Incandescent lamp: 7500 lux max.	Incandescent lamp: 5,000 lux max.	Incandescent lamp: 7500 lux max.	Incandescent lamp: 5,000 lux max.	Incandescent lamp: 7500 lux max.	Incandescent lamp: 5,000 lux max.	Incandescent lamp: 7500 lux max.	Incandescent lamp: 5,000 lux max.
Warming up		30 min. after power ON; analog output fluctuation ± 0.1% F.S. max.							
Linearity *2		±0.15% F.S.		±0.15% F.S.		±0.25% F.S.		±0.25% F.S. (Near side) ±0.5% F.S. (All ranges)	
Temperature characteristics *3		±0.03% F.S./°C		±0.03% F.S./°C		±0.03% F.S./°C		±0.04% F.S./°C	
Static resolution *4		2 μm		7 μm		30 μm		80 μm	
Surrounding air temperature		Operating: -10 to +55°C, Storage: -15 to +70°C (with no icing or condensation)							
Ambient humidity		Operating and storage: 35% to 85% (with no condensation)							
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min.							
Vibration resistance		10 to 150 Hz, 1.5-mm double amplitude, 2 hours, each in X, Y, and Z directions							
Shock resistance		500 m/s ² , 3 times each in X, Y, and Z directions							
Standard cable length *5		2 m (Pre-wired model), 5 m (Pre-wired model) *7, 0.5 m (Connector-joint model) *7							
Degree of protection *6		IEC 60529, IP67							
Connection method									
Weight (packed state/ main unit only)	Pre-wired model (2 m)	Approx. 240 g/Approx. 180 g				Approx. 270 g/Approx. 210 g			
	Connector joint model (0.5 m)	Approx. 170 g/Approx. 110 g				Approx. 200 g/Approx. 140 g			
Materials		Case and cover: PBT (polybutylene terephthalate), Optical window: Glass, Cable: PVC							
Standards		EC standard conformity, RoHS compliance							

*1. Spot size: Defined at the 1/e² (13.5%) of the central intensity at the measurement center distance. Measurement may be influenced if there is light leakage outside the defined region and the surroundings of the target object have a high reflectance in comparison to the target object. Correct measured values may not be obtained if a workpiece with smaller diameter than the spot size is detected.

*2. It shows the error in relation to the ideal curve of the displacement output when measuring OMRON's standard physical object (white ceramic) under the environment at 25°C.

*3. Temperature characteristics at the center of sensing distance when the space between the sensor and workpiece is locked with aluminum jig.

*4. Static definition with the background suppression function ON for tuning with STND mode and standard white ceramic.

*5. Connector-joint model cable: Use it together with a 10 m or 20 m extension cable.

*6. The connector joint model connector section can achieve IP67 if it is connected via an extension cable.

*7. Only 2 m (Pre-wired type) is available for ZX1-LD□□L.

Judgment outputs	NPN open-collector outputs		PNP open-collector outputs	
	Rated output	Residual voltage	Rated output	Residual voltage
External inputs	ON	Short-circuited with 0-V terminal or 1.5 V or less	ON	Supply voltage short-circuited or within supply voltage -1.5 V max.
	OFF	Open (Leakage current: 0.1 mA max.)	OFF	Open (Leakage current: 0.1 mA max.)

7 Maintenance: Troubleshooting

The table below describes non permanent hardware errors and their troubleshooting.

Phenomena	Cause	Remedy
No digital display.	Is the Eco function not turned ON?	Turn OFF the Eco function. Refer to "④ Detailed Settings".
Display is blank.	Is the power supply ON? Are the cables not broken?	Check the wiring, the power supply voltage and capacity. Refer to "① Installation 1-3".
The Sensor restarts during operation.		
Laser is not emitted. [LdOFF] appears in the display.	Is LD OFF input not short-circuited?	Check the wiring. Refer to "① Installation 1-3".
Input signal is not received.	Individual wires may not be correctly connected; or there may be a broken line.	Check the wiring. Refer to "① Installation 1-3".
Measured value is not stable, fluctuating depending on the day or time.	Temperature characteristic may be the cause.	Perform warming up at least for 30 minutes. Periodically zero-reset the value using a standard target object for compensation.
[E-drt] appears in the display.	Is the detection distance not too long and out of the measurement range? Is the emitter surface not blocked by dust, dirt or a jig?	Check the Sensor installation environment.
OUT1 indicator/OUT2 indicator blinks.	There may be mutual interference with other sensors.	Check the installation environment and take measures to prevent the interference by other sensors such as laser beam path or reflected stray lights.
OUT1 indicator/OUT2 indicator keeps turning ON even when the values are outside the measurement range.	The Keep function may be set: [KEEP] = [on], and reception light level may be insufficient: [E-drt] or the value may be outside the measurement range: [E-our].	Set the Keep function to: [KEEP] = [on].
An abnormal distance is detected in an area apparently out of the measurement range.	A characteristic phenomenon that can sometimes occur with sensors.	Set the Background Suppression function to: [S-AR-E] = [on] and perform smart tuning. Refer to "④ Detailed Settings". Check the measurement distance between the target object and the Sensor.
Want to reset to the initial setting.	—	Reset the settings. Refer to "④ Detailed Settings".

Suitability for Use

THE PRODUCTS CONTAINED IN THIS SHEET ARE NOT SAFETY RATED. THEY ARE NOT DESIGNED OR RATED FOR ENSURING SAFETY OF PERSONS, AND SHOULD NOT BE RELIED UPON AS A SAFETY COMPONENT OR PROTECTIVE DEVICE FOR SUCH PURPOSES. Please refer to separate catalogs for OMRON's safety rated products.

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the products in the customer's application or use of the product.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used. Know and observe all prohibitions of use applicable to this product.

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

See also Product catalog for Warranty and Limitation of Liability.

- EUROPE
OMRON EUROPE B.V. Sensor Business Unit
Carl-Benz Str.4, D-71154 Nufringen Germany
Phone: 49-7032-811-0 Fax: 49-7032-811-199
- NORTH AMERICA
OMRON ELECTRONICS LLC
One Commerce Drive Schaumburg, IL 60173-5302 U.S.A.
Phone: 1-847-843-7900 Fax: 1-847-843-7787
- ASIA-PACIFIC
OMRON ASIA PACIFIC PTE. LTD.
No. 438A Alexandra Road #05-05-08(Lobby 2),
Alexandra Technopark, Singapore 119967
Phone: 65-6835-3011 Fax: 65-6835-2711
- CHINA
OMRON(CHINA) CO., LTD.
Room 2211, Bank of China Tower,
200 Yin Cheng Zhong Road,
PuDong New Area, Shanghai, 200120, China
Phone: 86-21-5037-2222 Fax: 86-21-5037-2200

OMRON Corporation

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