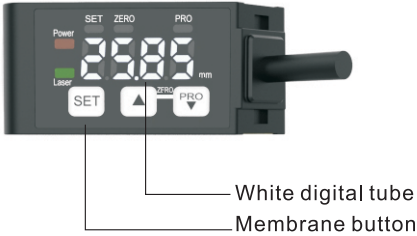


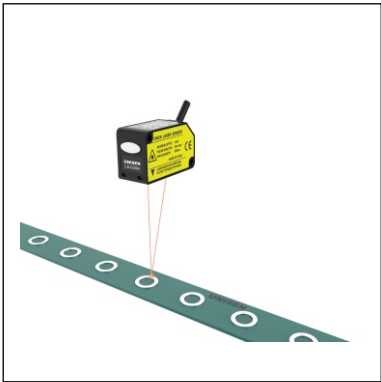
CMOS laser Displacement sensor LS series

Product characteristics

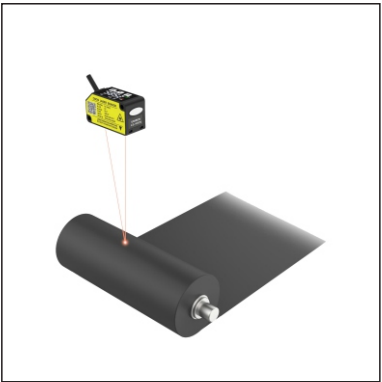
- Short, medium and long detection distances (optional)
- Small volume, small light spot and high precision
- Dual output of switching value and analog at the same time
- Multiple functions, multiple detection modes
- White digital tube shows the distance value, clear and bright



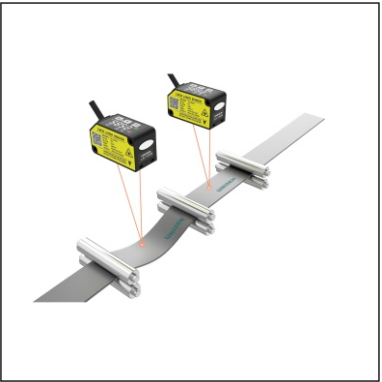
Application



Check whether there is micro flat pad



Detect the residual volume of coil material

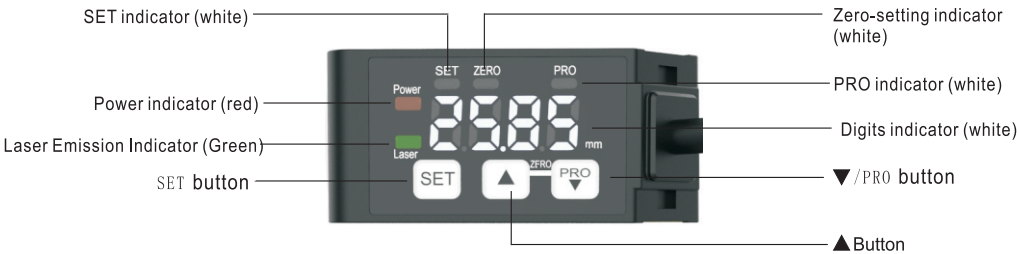


Test the bending amount of sheet material

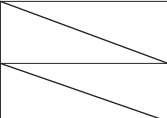
Product catagory

Appearance	Type	Model	Detection distance	Output mode	Repeatability
	Short distance	LS-030N	30±5mm	Switch output type	10μm
		LS-030MN	30±5mm	Switch + analog	10μm
		LS-030P	30±5mm	Switch output type	10μm
		LS-030MP	30±5mm	Switch + analog	10μm
		LS-050N	50±15mm	Switch output type	50μm
		LS-050MN	50±15mm	Switch + analog	50μm
		LS-050P	50±15mm	Switch output type	50μm
		LS-050MP	50±15mm	Switch + analog	50μm
	Medium distance	LS-100N	100±35mm	Switch output type	100μm
		LS-100MN	100±35mm	Switch + analog	100μm
		LS-100P	100±35mm	Switch output type	100μm
		LS-100MP	100±35mm	Switch + analog	100μm
		LS-200N	200±80mm	Switch output type	200μm
		LS-200MN	200±80mm	Switch + analog	200μm
		LS-200P	200±80mm	Switch output type	200μm
		LS-200MP	200±80mm	Switch + analog	200μm
	Long distance	LS-400N	400±200mm	Switch output type	400μm/800μm
		LS-400MN	400±200mm	Switch + analog	400μm/800μm
		LS-400P	400±200mm	Switch output type	400μm/800μm
		LS-400PN	400±200mm	Switch + analog	400μm/800μm

Description

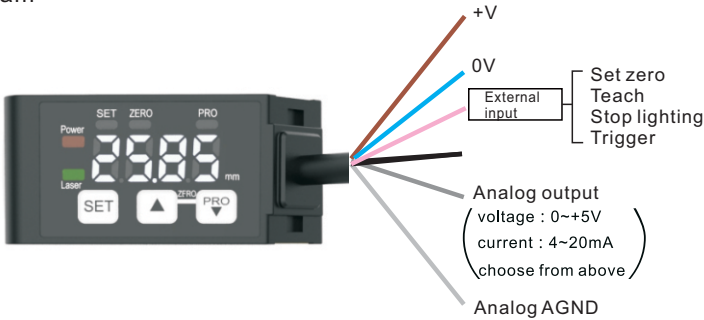


Product specifications

Type		Switch output type	Dual output type	Switch output type	Dual output type	Switch output type	Dual output type
Model	NPN output	LS-030N	LS-050MN	LS-100MN	LS-200MN	LS-400N	LS-400MN
	PNP output	LS-030P	LS-050MP	LS-100MP	LS-200MP	LS-400P	LS-400MP
Detection distance		30mm	50mm	100mm	200mm	400mm	
Detection range		±5mm	±5mm	±35mm	±80mm	±200mm	
Repeat accuracy		10μm	50μm	100μm	200μm	400μm (200mm - 400mm) 800μm (400mm - 600mm)	
Linearity		±0.2% F.S.				±0.2% F.S. (200mm-400mm) ±0.3% F.S. (400mm-600mm)	
Temperature		± 0.03% F.S. / C					
Light source		Red laser, class 2, Max.output: 1mW, wavelength of light-emiting beam: 655nm					
Beam diameter		About 50μm	About 100μm	About 150μm	About 300μm	About 500μm	
Supply voltage		12V ~ 24V DC ± 10%, Pipple p-p10%.					
Consumption current		Max. 40mA(24V DC), max. 60mA(12V DC)					
Control output		NPN output Open-collection transistor Max. sink current: 50 mA Applied voltage: 30V DC or less (Between control output to 0V) Residual voltage: 1.5V or less (At 50 mA sink current) Leakage current: 0.1 mA or less			PNP output Open-collection transistor Max. sink current: 50 mA Applied voltage: 30V DC or less (Between control output to +V) Residual voltage: 1.5V or less (At 50 mA sink current) Leakage current: 0.1 mA or less		
Output		Switchable between Light.On or Dark.On					
Short circuit protection		Incorporated (auto reset type)					
Voltage analog output (Alarm: 5.2V)		Output range: 0V-5V Output impedance: 100Ω					Output range: 0V-5V Output impedance: 100Ω
Current analog output (Alarm: 0mA)		Output range: 4-20mA Output impedance: 300Ω or less					Output range: 4-20mA Output impedance: 300Ω or less
Response time		Switchable between 1.5ms/ 5ms/ 10ms					
External input		NPN non-contact input, effective: 0V -1.2V DC input impedance: 10KΩ					
Protection level		IP 67 (IEC)					
Degree of soiling		2					
Ambient temperature		-10 to 40 °C,storage: -20 to 60 °C, No freezing					
Ambient humidity		35% - 85% RH					
Environment illumination		Incandescent light: 3000 lux					
Elevation		Below 2000m					
Cable		With 0.15mm, 5-core composite cable, 2m					
Material		Body shell: aluminum, front cover plate: acrylic					
Weight		About 85g (including cable)					
Application specification		Compliance with EMC instructions					

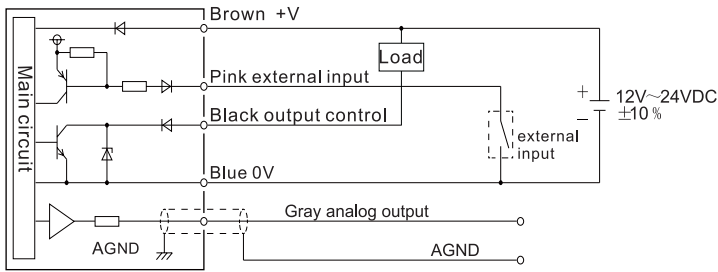
*Supply voltage: 24V DC, ambient temperature: +20°C, response time: 10ms, and analogue output value of measurement center distance are used for unspecified measurement conditions. The subject is white paper.
Object: white paper

Wiring diagram

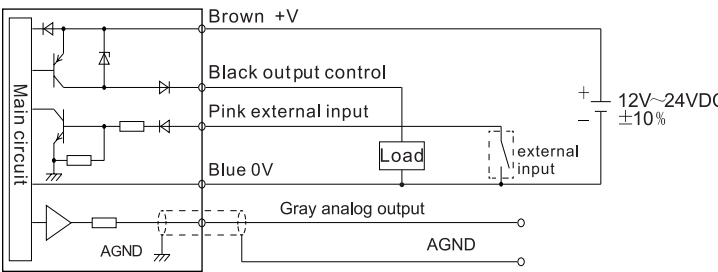


I / O circuit diagram

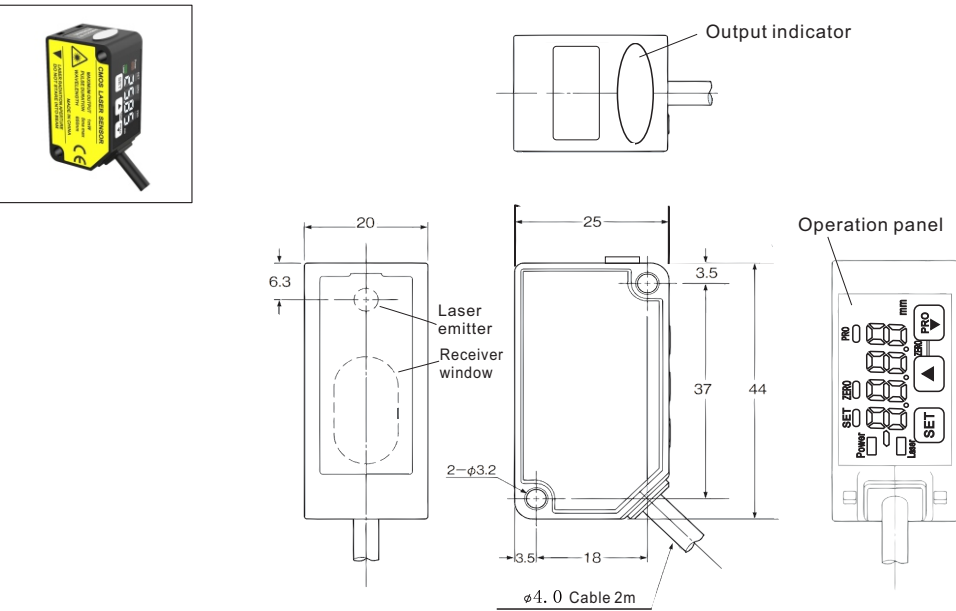
NPN output



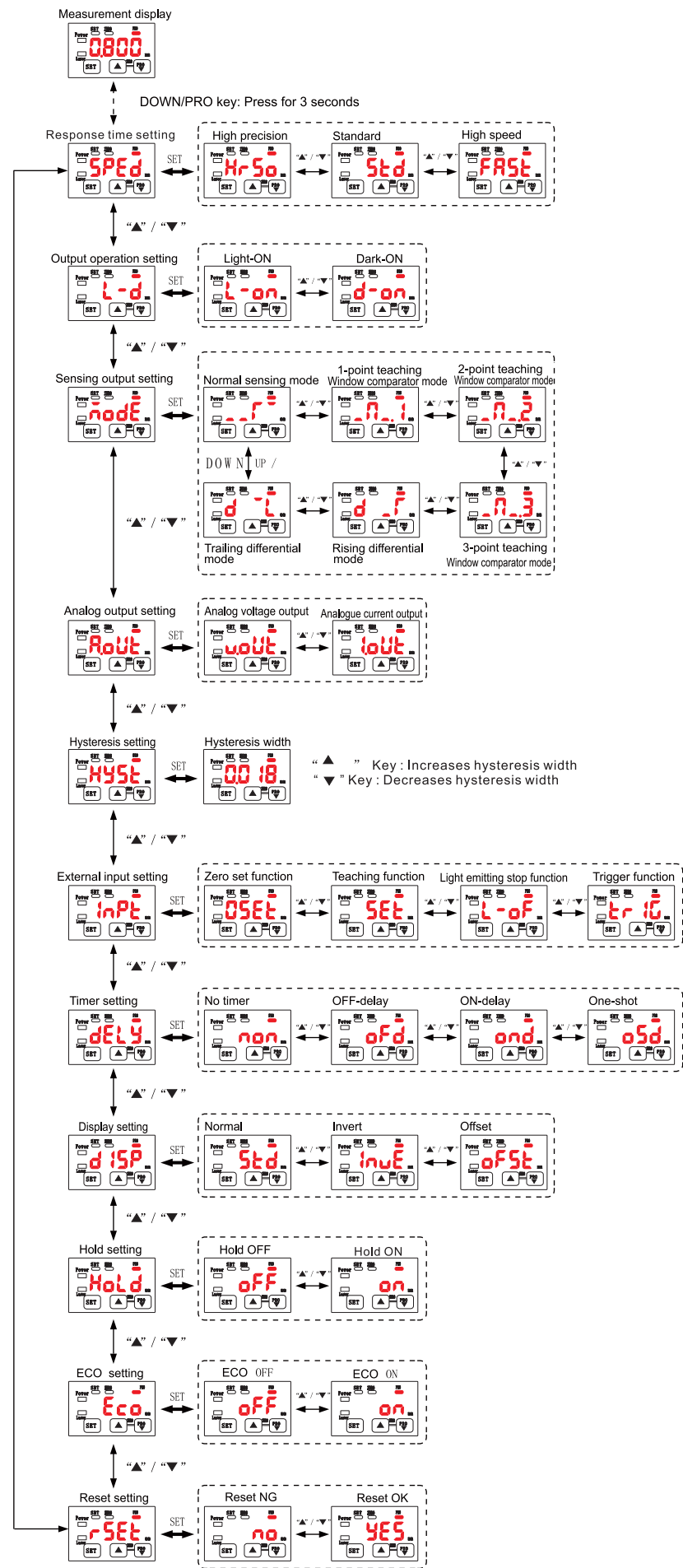
PNP output



Dimensions



Procedure



Function operation and install state

Type	Initial state	Content
Response speed setting	Mr-50	Set the response time. "Mr-50": High precision 10ms "Std": Standard 5ms "Fast": High speed 1.5ms
Output operation setting	L-on	Select the control output operation mode. "L-on": Light-ON "d-on": Dark-ON
Sensing output setting	--f--	Set the sensing output. "--f--": Normal sensing mode ".N.1": 1-point teaching (Window comparator mode) ".N.2": 2-point teaching (Window comparator mode) ".N.3": 3-point teaching (Window comparator mode) "d-f": Trailing differential mode "d-L": Trailing differential mode
Analog output setting	vout	Analog output setting "vout": Voltage analog output "iout": Current analog output
Hysteresis setting	< LS-030N > 00.10 < LS-050N > 00.3 < LS-100N > 00.7 < LS-200N > 0.2 < LS-400N > 0.8	Set the hysteresis width LS-030N : 0.001mm ~ 5.00mm LS-050N : 0.001mm ~ 15.00mm LS-100N : 0.02mm ~ 35.00mm LS-200N : 0.1mm ~ 80.0mm LS-400N : 0.2mm ~ 200.0mm
External input setting	0Set	Set the external input. "0Set": Zero set function "Set": Teaching function "L-of": Light emitting stop function "tr-19": Trigger function
Timer setting	non	Set the timer operation. The timer time is fixed at 5ms. "non": No timer "ofd": OFF-delay timer "ond": ON-delay timer "osd": One-shot timer
Display setting	Std	The display of the measured value can be changed. "Std": Normal "invE": Invert "oFSE": Offset
Hold setting	off	Set the control output and the analogue output operation when a measurement error occurs (insufficient light intensity, saturation of light intensity, out of measurement range). "rFF": Hold OFF "rr": Hold ON
ECO Setting	off	The digital display can be set to go OFF when key operation is not performed for 30 seconds. Current consumption can be reduced. "off": ECO OFF "on": ECO ON
Reset setting	no	Return to the default setting (factory setting). "no": Reset NG "YES": ResetOK

The PRO indicator (RED) will turn ON when the PRO mode is set.

When the DOWN key is pressed for 3 seconds or more in the middle the PRO MODE setting, the display returns to the measurement display.

Error indication

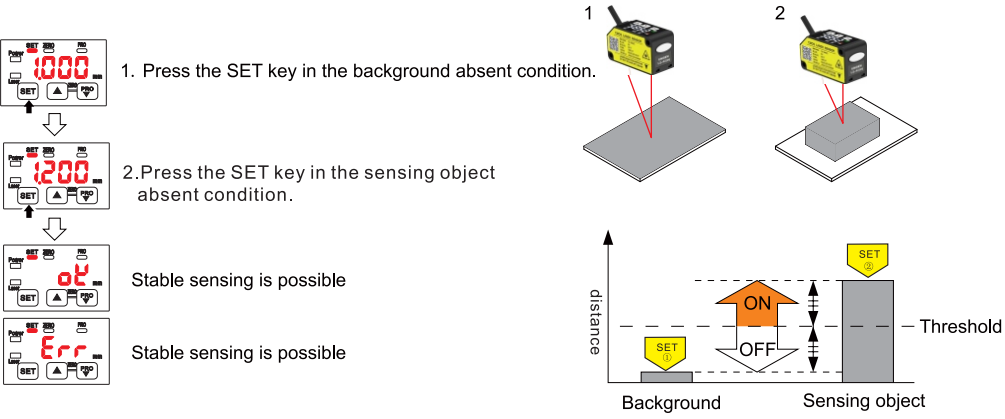
In case of errors, attempt the following measures

Error indication	Description	Remedy
< Hold OFF > --f-- < Hold ON > Measured value	Insufficient amount of reflected light. The sensing object is out of the sensing	Confirm that the sensing distance is within the specification range. Adjust the installation angle off the sensor
E001	Flash memory is damaged or passed its expectancy	Please contact our office
E011	Load off the sensing output is short-circuit causing an over-current to flow	Turn OFF the power and check the load
E021	The semiconductor laser is damaged or passed its life expectancy	Please contact our office
E031	During zero adjustment, normal measurement failed. Since the display setting is set to "Offset", the zero set function can not be used	Confirm that the sensing distance is within the specification range. Set the display to any setting except "Offset."
E041	During teaching, the measurement is not normal	Confirm the sensing distance is within the specification range

Procedure

2 Point teaching

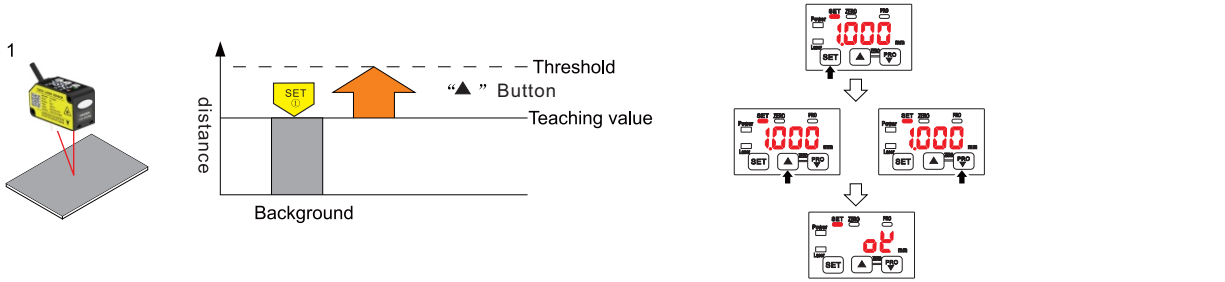
Basic teaching methods



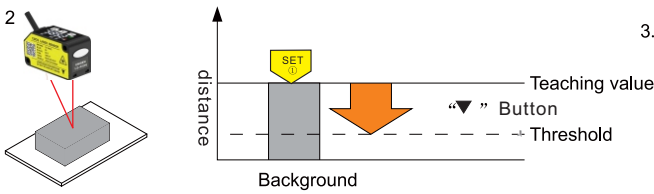
Limited teaching

This is teaching method in case small object or object in background are existing.

When an object in background is used as reference



When a sensing object is used as reference



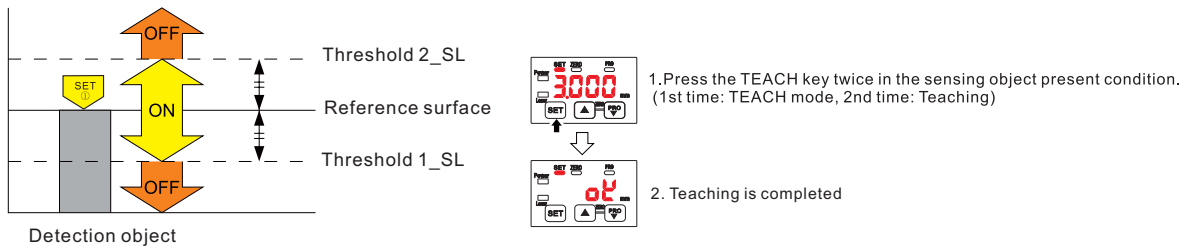
1-point teaching (Window comparison mode)

The method of setting the upper limit and the lower limit is adopted instead of 1 point teaching for the distance between the detection object datum.

This function is used when discriminating between upper and lower limits

In the case of 1 point teaching (window comparison mode) , please set 1 point teaching (window comparison mode) in the detection output setting of PRO mode in advance.

In the state of detecting objects, the reference value can be set simply by pressing the set key. In addition, it is judged to be OK in the range of 2 datum values, and NG outside the range



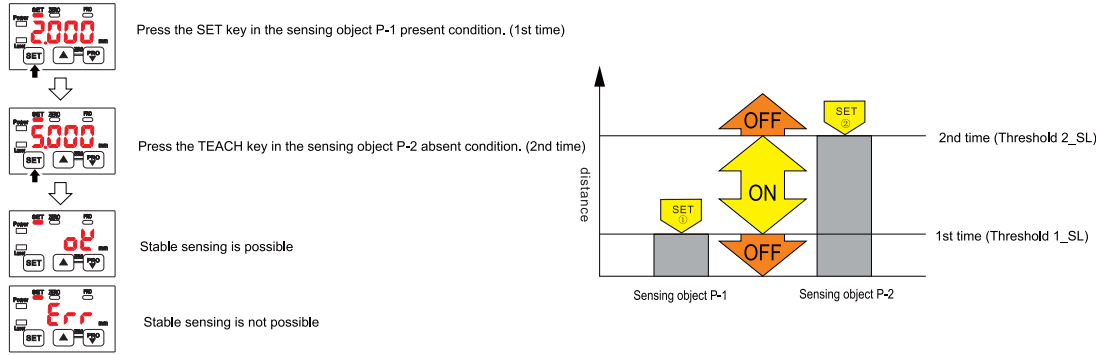
Teaching function

2-point teaching (Window comparison mode)

This is method to set the threshold range by conducting the 2-point teaching. When performing 2-point teaching (window comparator mode), preset "Window comparator mode 2" in the sensing output setting of the PRO mode.

For the setting, refer to "PRO MODE SETTING."

When conducting teaching, use sensing objects (P-1 and P-2) whose distance are different from each other.



3-point teaching (Window comparator mode)

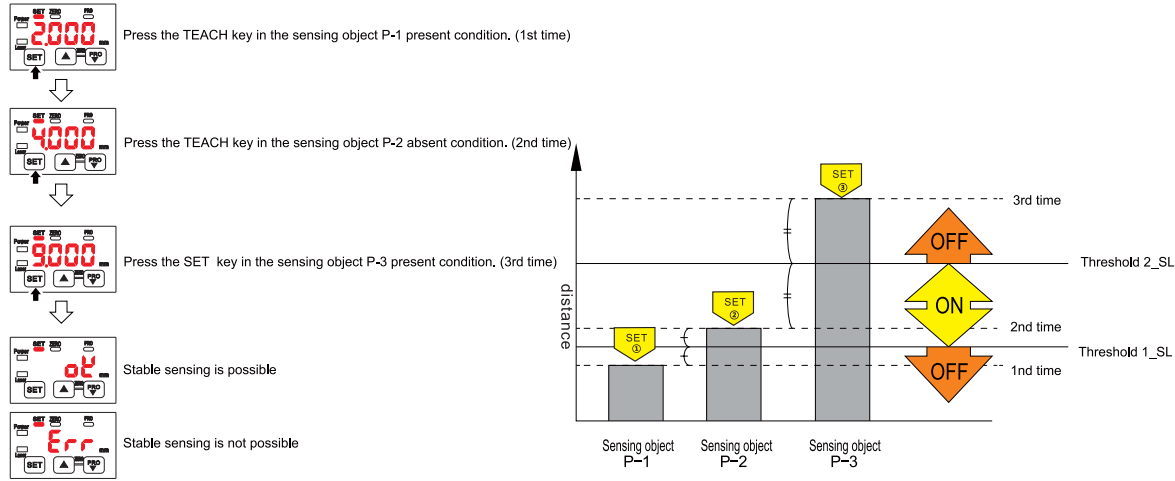
This is the method to perform 3-point teaching (P-1, P-2, P-3) and to set the threshold range by setting threshold 1_SL in the mid-point between the 1st time and 2nd time, and threshold 2_SL in the mid-point between the 2nd time and 3rd time as shown in the following figure.

When performing 3-point teaching (window comparator mode), preset "Window comparator mode 3" in the sensing output setting of the PRO mode.

For the setting, refer to "PRO MODE SETTING."

When performing teaching, use sensing objects (P-1, P-2, P-3) with different distance.

After teaching, P-1, P-2 and P-3 will be automatically rearranged from the smaller value.

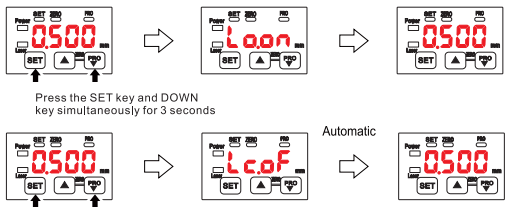


Key lock function

The key lock function is to prevent acceptance of key operations, so that the conditions set in each setting mode are not changed accidentally.

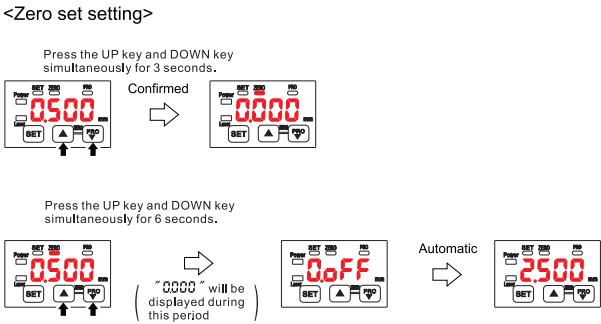
When key operation is performed after the key lock is set, "LoC" will be displayed on the digital display.

<Key lock setting>

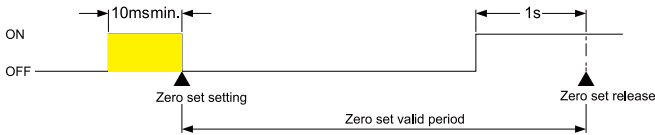


Zero set function

The zero set function is the function to compulsorily set the measured value to "zero".
The zero set indicator (yellow) will turn ON when the zero set is valid.
When the zero set function is executed while the peak / bottom hold function is valid, the held measured value will be reset.
When the display setting is set to Offset, the zero set function cannot be set.



The setting or releasing of the zero set from an external input operates as in the following figure.



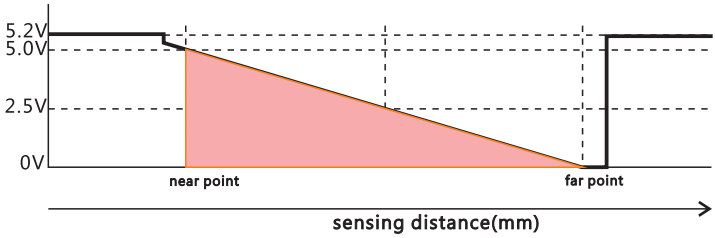
When the power is turned ON again, zero set from external input can be released.
At this time, the zero set will not be saved.
Even when the zero set is set in the sensor, the zero set can be set or released from an external input. However, when the power is turned ON again, the zero set setting in the sensor will be displayed.

(※) When saved to the sensor through external input settings
Please use the external input settings set in 9 PRO mode to make the save valid.

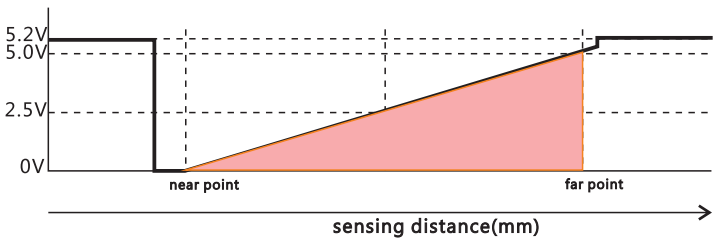
Analog output

Current analog output

1 Display setting: normal and display

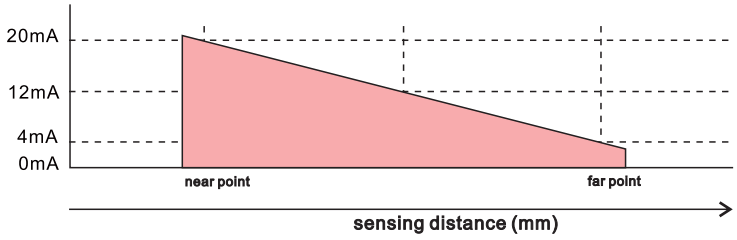


2 Display setting: over turn

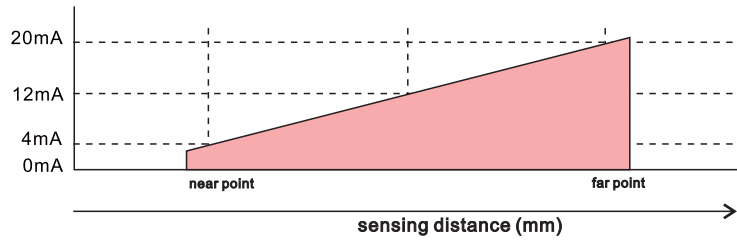


Current analog output

1 Display setting: normal and display



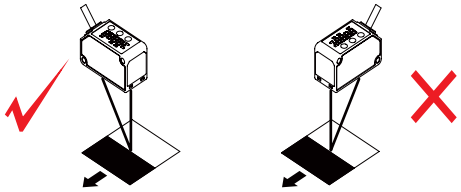
2 Display setting: over turn



Installation direction

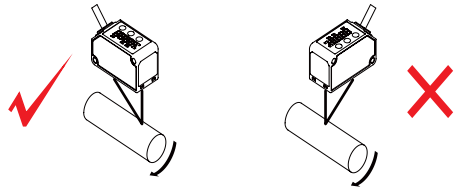
Direction relative to the moving object

<In the case of material and colour difference.>
When measuring, when the material and color of the moving object are extremely different, the measurement error can be controlled to a minimum by installing it in the direction shown in the following figure.



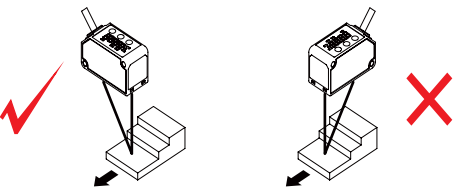
<Measuring rotating objects>

When measuring a rotating object, please install it in the direction shown in the figure below, so as to restrain the influence of up-down vibration and position offset of the object.

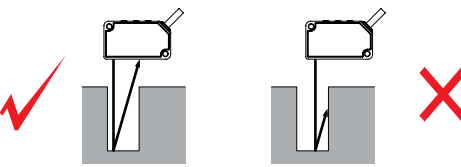


<In the case of step difference>

In the case of moving measurement object with step difference, install it according to the method shown in the figure below, so as to restrain the influence of step difference edge.



Measurements in narrow locations and depressions
When measuring in narrow places and small holes, when installing, please pay attention to avoid blocking the light path of the emitting part and the receiving part.



When the sensor is mounted on the wall
Installation should be according to the method shown in the following figure so as not to cause multiple light emitted from the wall to enter the light receiving part. In addition, in the case of high reflectivity of the wall, good results can be obtained if it is changed to dull black.

