L-com
an INFINITE brand

LASER DISPLACEMENT SENSOR

PXDPCMLD Series

V0.9

User's Manual

Thank you for choosing L-com .Please read the manual carefully before using this product.
1. The product should be applied by someone with a certain level of electrical knowledge.
2. Please read and make sure that you understand how to operate the product before using it.
3. Please keep this manual readily accessible for future reference when needed.

SYMBOL

The following symbols are important information in this manual, please be sure to observe the following.

⚠	There is the risk of causing malfunction or fire, please do not exceed the rated voltage when using.
⚠	There is a risk of rupture, do not use AC power.
⚠	Danger of burns at high temperatures.

NOTICE FOR USE

- The light source of this product is visible semiconductor laser.
- Please pay attention to prevent the laser directly or through the mirror reflection into the eyes.
- If shot into the eye, it may cause blindness.
- This product is not explosion-proof.
- Please do not use it in the environment with flammable or explosive gas or liquid.
- This product does not have the function of automatically stopping laser projection after decomposition .
- Please do not decompose or transform. .
- Please do not use this product as a safety device for the purpose of protecting human body.
- Improper use may cause personal injury, fire and electric shock

NOTED FOR USE LASER

Laser label

The product is classified as class 2 (II) laser product according to laser safety standard. If the laser label on the machine is covered when installing the product, please stick the attached laser label in the visible position

Laser class: Class 2 products;
Maximum laser output <1mW;
Pulse width: max 5ms;
Wavelength: 655nm, IEC 60825-1:2014.

PACKAGE CONFIRMATION

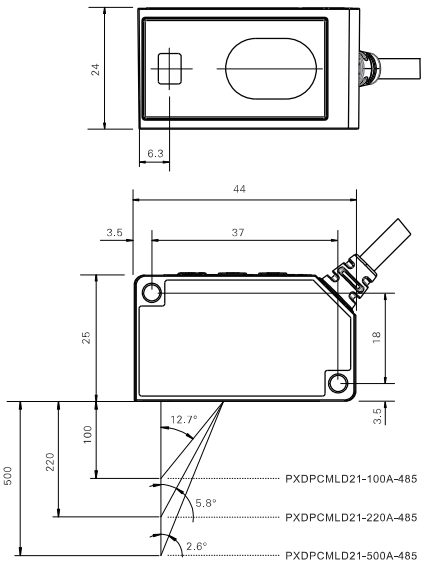
- Laser displacement sensor(1 piece + cable)
- Laser label for (1 piece)
- Simple manual

TECHNICAL SPECIFICATION

Sensing type	Diffuse reflection - triangulation type		
Model No.	PXDPCMLD21-100A-485	PXDPCMLD21-220A-485	PXDPCMLD21-500A-485
Measuring center distance	100mm	220mm	500mm
Measuring range	± 35mm	± 100mm	± 200mm
Spot diameter (Center position)	≈136 x 110 μm	≈ 290 x 238 μm	≈ 541 x 330 μm
Communication interface	Digital IO/MODBUS RS-485		
	Available for:600, 14400, 19200, 38400, 57600, 115200 bps。Factory value:115200bps)		
	Available for: 8,N,1 、8,N,2 、8,O,1 、8,O,2 、8,E,1 、8,E,2		
Light Source	Laser CLASS 2		
Input voltage	12-24VDC ± 10% ，1W		
Analog output	Current range:4~20mA(normal)/22mA(abnormal) ,Load impedance:≦300Ω		
Digital output	Optional function: Measurement range/comparison output, Push-Pull Output ,<100mA		
Digital input	Optional function:Zero/teaching,High-level ≧2V, Low-level ≦0.8V		
Repeat accuracy	70μm	200μm	(300~500mm)300μm (500~700mm)600μm
Linearity	±0.1%	±0.2%	(300~500mm) ±0.2% (500~700mm) ±0.3%
Sampling frequency	1.5ms/ 3ms/5ms (Factory value: ms)		
Indicator	Laser emission: blue light, DO: green light, DI: yellow light		
Protection	Inverse voltage protection, output overcurrent protection, input power surge protection, output surge protection		
Operating ambient temperature	-10 ℃ ~ 50 ℃		
Storage ambient temperature	-25 ℃ ~ 65 ℃		
Operating ambient humidity	30~85%		
Dust and water resistance level	IP67		
Sunlight	3000 lux or less		
Vibration resistance	10 to 55 Hz, 1.5 mm, 3 directions, for 2 hours		
Insulation resistance	20 MΩ or larger 500VDC		
Pressure resistant material	500 VAC 50/60 Hz 1min		
Certification	CE		
Material	Optical window: PC; Housing: aluminium alloy; Wire: PUR		
Connection cables	2m long		
Size	44 x 25 x 24mm		

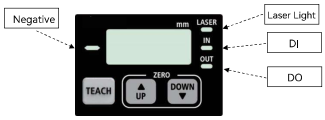
DIMENSION

[mm]

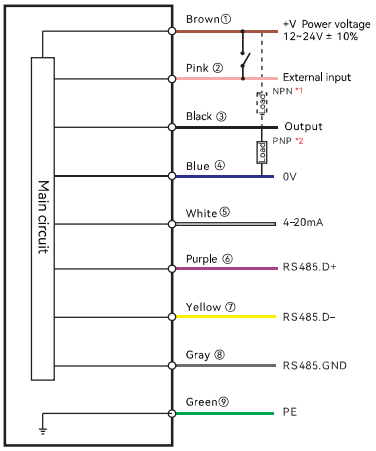


INDICATOR

Indicator	Color	Definition
Laser Light	Blue light	Activation (Laser emission)
OUT	Green light	DO
IN	Yellow light	DI
Negative	Red light	Negative sign



CIRCUIT DIAGRAM

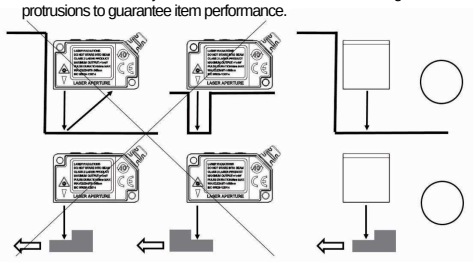


Remark :
1. NPN output connection : Connect Black with Brown (+V)
2. PNP output connection: Connect Black with Blue (0V)

INSTALLATION NOTES

For the best performance, please pay attention to the following during installation:

1) Please keep the sensor parallel to the equipment when it is installed and close to the device to ensure item performance.
2) Please keep the sensor's optical path vertical to its movement's direction when the object needs to be measured from left to right with protrusions to guarantee item performance.

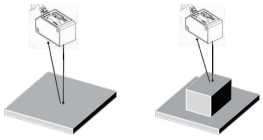


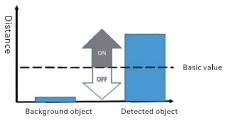
DISPLAY OPERATION

Basic teaching (2 points)

☐ The second teaching position should be 2 times larger than the first one (Hys)

1. 2.





Please press TEACH when there is a background.

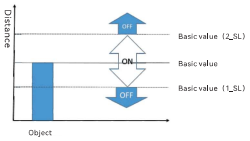
Please press TEACH when there is an object.

When the object can be detected.

When the object cannot be detected.

Single point teaching (window comparison mode)

☐ Output between the upper and lower limits using single-point correction for the distance from the datum of the detection object, setting the upper and lower limits.
☐ 1_SL = height of detected object minus 2 times the strain difference, 2_SL = height of detected object plus 2 times the strain difference after teaching the datum of the detected object.

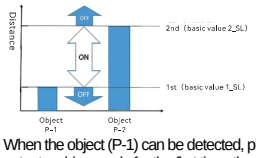


If object is detected, press the key 2 times. (1st time – TEACH mode, 2nd time – TEACH)

At the end of teaching, press TEACH once.

2-point teaching (window comparison mode)

☐ Start 2-point teaching and set the reference value;
☐ Please enter the advanced setting first and set the detection output to _P_2 (2-point teaching mode)
☐ When executing, please use the detection object with different distance (P-1, P-2)



When the object (P-1) can be detected, please press TEACH to enter teaching mode for the first time, then press TEACH for the second time.

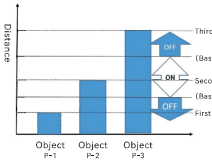
When the object (P-2) can be detected, please press TEACH for the third time.

When the object can be detected, press TEACH for the fourth time to leave.

When the object cannot be detected, press TEACH for the fourth time to leave.

3 Point teaching (window comparison mode)

- To perform 3-point teaching, set the reference value 1_SL between the 1st and 2nd times, and set the reference value 2_SL between the 2nd and 3rd times;
- First,please set detection output to P-3 at advanced setting(3-point teaching)



When there is an object (P-1), press TEACH for the 1st time to enter the teach mode and press TEACH for the 2nd time.

When there is an object (P-2),Press TEACH for the 3rd time;

When there is an object (P-3),Press TEACH for the 4th time;

If the object is detectable, press TEACH for the 5th time to leave;

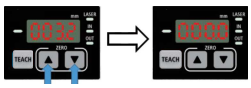
If the object cannot be detected, press TEACH for the 5th time to leave.

◎ Zeroing function

Operate in the main screen as follows:

<zeroing setting>

Press the Up and Down keys simultaneously for 3 seconds



< unzeroing>

Press the Up and Down keys simultaneously for 6 seconds

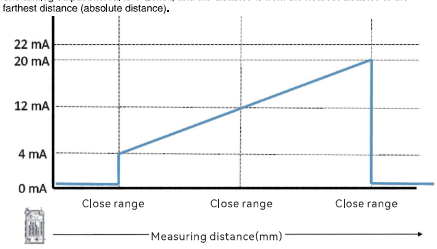
◎ Advanced mode

Press the down button ▼ for 3 seconds to enter the advanced settings menu, then press the down button again for 3 seconds to return to the measurement screen.

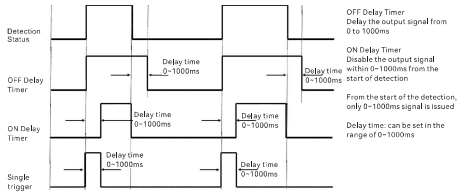
Project	Initial state	Content
Response Time Setting	FASt	Set the response time: FASt : High speed 1.5ms Std : Standard 3ms HrSo : High precision 5ms
Average Move Setting	0128	Set the average speed: "0001" : average 1 time, "0002" : average 2 times, "0004" : average 4 times, "0008" : average 8 times, "0016" : average 16 times, "0032" : average 32 times, "0064" : average 64 times, "0128" : average 128 times, "0256" : 256 times on average, "0512" : average 512 times.
Median Filter Setting	0007	Set the median filter frame: "0001" : Window frame size 1, "0003" : Window frame size 3 "0005" : Window frame size 5, "0007" : Window frame size 7, "0009" : Window frame size 9, "0011" : Window frame size 11, "0013" : Window frame size 13, "0015" : Window frame size 15
Output action setting	L-on	Select the action mode of the control output: "L-on": on when light is applied, "d-on": on when light is not applied
Response Time Setting	-J--	Set the detection output: ".J ": General teaching mode ".P.1": Single point teaching mode ".P.2": Two-point teaching mode ".P.3": Three-point teaching mode
Detection output setting	0003	Hysteresis setting, 1_SL and 2_SL will affect the limits of the adjustment, but the maximum value is..
Setting should differ	non	Set external input: " non": no function "0SEt": zero ".-oF": laser off "tr rS": update data only when triggered
External input setting	non	Set timer, timer setting interval is 0~1000ms " non": no timer "ond ": delayed action " ofd": delayed disconnection "osd ": single trigger (For details, please refer to Timing setting)
Timer setting	Auto	Exposure energy setting: "Auto": According to the non-reflective objects automatically adjust the amount of the received energy, press TEACH you can see the current energy percentage. " uSEr": Manually adjust the amount of received energy, press TEACH to set the percentage of received energy.
Exposure Setting	-0008	Release the negative limit: Adjustment range is the minimum measurable range
Negative limit adjustment	0008	The output is set at the positive limit: Adjustment range is the maximum of the measurable range
Positive limit adjustment	1152	Baud rate setting: "1152": 115200 bps, " 576 ": 57600 bps " 384": 38400 bps, " 192 ": 19200 bps, " 144": 14400 bps, " 96": 9600 bps
Baud rate setting	r8n1	Communication format setting: " r8n1": ASCII,8,N,1, " r8n2": ASCII,8,O,1, " r8E1": ASCII,8,E,1, " r8m2": ASCII,8,N,2, " r8o2": ASCII,8,O,2, " r8E2": ASCII,8,E,2, " -8n1": RTU,8,N,1, "-8n2 ": RTU,8,O,1, " -8E1": RTU,8,E,1, "-8o2 ": RTU,8,N,2, " -8o2": RTU,8,O,2, "-8E2 ": RTU,8,E,2。
Communication format setting	0001	Station number setting: 1~127 available for setting
Station number setting	no	Reset setting: " no": Cancel setting, " YES": Restore factory setting value
Reset setting		

◎ Analog Output

The analog output interval is 4~20mA, and the distance is from the nearest distance to the farthest distance (absolute distance).



◎ Digital Output Timer Setting



COMMUNICATION PARAMETER LIST

◎Communication via RS485
◎Baud rate supported: 9,600, 14400, 19200, 38400, 57600, 115200bps
◎Supported communication formats: 8,N,1、8,N,2、8,O,1、8,O,2、8,E,1、8,E,2
◎Communication protocol: Modbus RTU, ASCII
◎Supported communication addresses: 1 to 127
◎Function code: 03H reads the contents of the staging register; 06H indicates that 1 byte is written to the address

Position	Supported Code	Name	Description
1000H (R/W)	(03H,06H)	Device address	Device address:1~127
1002H (R/W)	(03H,06H)	Communication baud rate	0x01: 9600 0x02: 14400 0x03: 19200 0x04: 38400 0x05: 57600 0x06: 115200 (Preset value)
1003H (R/W)	(03H,06H)	Communication baud rate	0x01: ASCII, 8, N, 1 0x02: ASCII, 8, O, 1 0x03: ASCII, 8, E, 1 0x04: ASCII, 8, N, 2 0x05: ASCII, 8, O, 2 0x06: ASCII, 8, E, 2 0x07: RTU, 8, N, 1 (Preset value) 0x08: RTU, 8, O, 1 0x09: RTU, 8, E, 1 0x0A: RTU, 8, N, 2 0x0B: RTU, 8, O, 2 0x0C: RTU, 8, E, 2
1004H~1005H (R)	(03H)	Communication baud rate	Displacement sensor records absolute position output: PXDPCMLD21-100A-485: 65000~135000um PXDPCMLD21-220A-485:120000~320000um PXDPCMLD21-500A-485:300000~700000um

1006H~1007H (R)	(03H)	Relative position	Displacement sensor records relative position = absolute position - zeroed Position
1008H (R/W)	(03H,06H)	Setting to zero	0x00: Turn off the zeroing function, 0x01 : Set zeroing
1009H~ 100AH(R)	(03H)	Zeroing position	Zeroing point position
100BH (R/W)	(03H,06H)	One_SL Position	Lower limit position of comparator (unit: 0.1mm)
100CH			Reserved
100DH (R/W)	(03H,06H)	Two_SL Position	Upper limit position of comparator (unit: 0.1mm)
100EH			Reserved
100FH (R/W)	(03H)	Weighting position	PD Upper weighting position
1010H (R)	(03H)	Exposure class	Exposure class in auto exposure mode (1~100)
1011H (R/W)	(03H,06H)	Response time	0x01: 1.5ms (Preset value) 0x03: 3ms 0x05: 5ms
1012H (R/W)	(03H,06H)	Moving average setting	0x01: No average 0x02: Average 2 times 0x04: Average 4 times 0x08: Average 8 times 0x10: Average of 16 times 0x20: Average 32 times 0x40: average 64 times 0x80: Average 128 times (preset value) 0x100: average 256 times 0x200: average 512 times
1013H (R/W)	(03H,06H)	Median filter setting	0x01: Window size 1 0x03: Window size 3 0x05: Window size 5 0x07: Window size 7 (preset value) 0x09: Window size 9 0x0B: Window size 11 0x0D: Window size 13 0x0F: Window size 15
1014H (R/W)	(03H,06H)	Output delay mode setting	0x01: Normal output mode (preset value) 0x02: Off-delay 0x03: On-delay 0x04: One-shot
1015H (R/W)	(03H,06H)	Output delay time	Range: 0x0000~0x03E8: (0~1000ms) 0x05 (preset value)

1016H (R/W)	(03H,06H)	Action Output Normally open/ normally closed	0x01: Normally closed (preset value) 0x02: Normally open
1017H (R/W)	(03H,06H)	External input function	0x01: No function (preset value) 0x02: Zeroing function 0x03: Laser off 0x04: Trigger function
1018H (R/W)	(03H,06H)	Hysteresis (Hys)	MLD21-500A-485: unit:0.1mm
1019H (R/W)	(03H,06H)	Auto/Manual Adjustment Adjust exposure level	0x01: Automatic adjustment 0x02: Manual adjustment
101AH (R/W)	(03H,06H)	Manual exposure setting Class	Exposure level setting by manual mode 0x01~0x64 (1~100)
101BH (R/W)	(03H,06H)	Detection output setting	0x00: General detection mode 0x01: 1-point teaching (window comparison mode) 0x02: 2-point teaching (window comparison mode) 0x03: 3-point teaching (window comparison mode)
101CH ~ 101DH (R)	(03H)	Version Reading	Version Reading
101EH (R)	(03H)	DO Reading	0x00 : No output 0x01: Output started
101FH (R)	(03H)	DI Reading	0x00 : No output 0x01: Output started
10C7H (R)	(06H)	Restore the factory settings	0x01: Restore the factory settings

PRECAUTIONS

- Make sure that the power is turned off when connecting the device.
- Make sure that the supply voltage changes within the rated range.
- If the power supply is supplied by a commercial switch regulator, make sure that the power supply ground terminal (F.G) is grounded.
- Be sure to ground the device ground terminal (F.G)
- Do not use within 0.5 sec of switching on the power.
- Do not run the line with a high voltage line or a power cord or in a wire tube, which may cause malfunction due to induction.
- Protect the device from dust and humidity.
- Avoid exposure or direct contact with water, oil, grease or organic solvents such as thinner.

WARRANTY

Warranty period

- The product warranty period is one year, from the date of delivery of the product to the date of purchase.

Warranty range

1. L-com will repair the product free of cost if there is a malfunction caused by L-com Company within the above- mentioned warranty period. But the following will not be covered by the warranty:
   - Damage caused due to failure in following operating instructions or user manual specifically, when the L-com company has fulfilled the technical requirements in the given environment.
   - Malfunction that occurs due to purchaser's equipment or software rather than product defects.
   - Malfunction caused by modifications or repairs by non-L-com company personnel. (Please ensure that correct repair or replacement of wearing parts is done in accordance with the operating instructions or provided user manual to avoid malfunction.)
   - Malfunction or inefficiency of the product after delivery caused due to unpredictable changes in science and technology.
   - Damage or malfunction caused by fire, earthquake, floods and/or other natural disasters or abnormal voltage and other external factors.
2. The warranty is limited to the conditions specified in Article (1), and L-com Company shall not be liable for any indirect loss (damage to equipment, loss of opportunity, loss of profits, etc.) or other loss caused by its equipment.