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LDS-N
LASER DISPLACEMENT SENSORS
Manual

V0

+INSIZE+

Dimension drawing

Circuit Diagram

NPN+Analog quantity

Brown ①	12~24V DC
Pink ②	Input
Grey	Analog output
Shield	Analog grounding
Black ④	Switching Output
Blue ③	0V

NPN+RS485

Brown ①	12~24V DC
Pink ②	Input
Grey	RS485(A+)
Shield	RS485(B-)
Black ④	Switching Output
Blue ③	0V

NPN

Brown ①	12~24V DC
Pink ②	Input
Black ④	Switching Output
Blue ③	0V
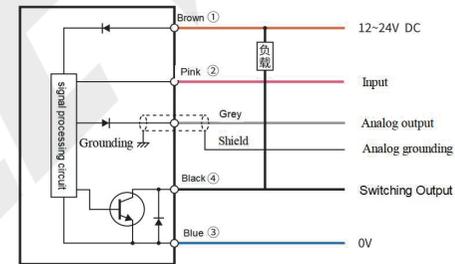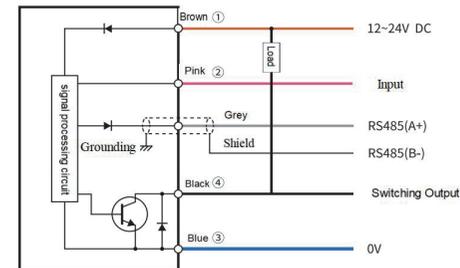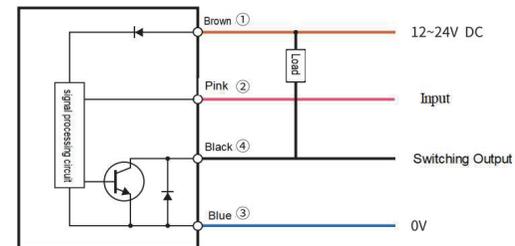
Specification

SPECIFICATION

Code	NPN	LDS-N30	LDS-N50	LDS-N100	LDS-N200	LDS-N400
	NPN+Analog	LDS-N30-MC	LDS-N50-MC	LDS-N100-MC	LDS-N200-MC	LDS-N400-MC
	NPN+RS485	LDS-N30-RS	LDS-N50-RS	LDS-N100-RS	LDS-N200-RS	LDS-N400-RS
Detection method		diffuse reflection				
Basis (center) distance		30mm	50mm	100mm	200mm	400mm
Detection range (F.S.)		25~35mm	35~65mm	65~135mm	120~280mm	200~600mm
Full scale		10mm	30mm	70mm	160mm	400mm
Repeat accuracy		10µm	30µm	70µm	200µm	200~400mm: 600µm 400~600mm: 1500µm
Linear accuracy		±0.2% F.S.				200-400mm: ±0.2% F.S. 200-400mm: ±0.3% F.S.
Temperature drift characteristics		±0.03% F.S./°C				
light source	medium	red diode laser, wavelength 655nm				
	output power	<1mW				
	laser class	IEC Class 2				
Light spot diameter		Ø50µm	Ø70µm	Ø120µm	Ø300µm	Ø500µm
Output	switch mode	NPN open collector, ≤50mA/DC 24V, residual voltage<1.5V				
	analog	analogue voltage: 0~5V (alarm: 5.2V), analogue current: 4~20mA (alarm: 0mA), Chinese display switchable				
	operation	Light.on/Dark.on selectable				
Response time		1.5ms/5ms/10ms, switchable				
Power supply		DC12~24V				
No-load current		<30mA (at supply voltage 24V DC), <60mA (at supply voltage 12V DC)				
Indicator light		output indicator: yellow, power indicator: green				
Protection circuit		reverse polarity protection/surge protection/short circuit protection				
Protection level		IP67				
Withstand voltage		AC1000V, 50/60Hz, 1min				
Vibration resistance		10~55Hz (period 1min), double amplitude 1.5mm, 2H in each X/Y/Z direction				
Impact resistance		500m/S² (approx. 50G), 3 times each in X/Y/Z direction				
Insulation impedance		50MΩ or more (DC500V megohmmeter)				
Material	cover case	aluminium alloy				
	lens	PMMA				
	guidewire	PVC (polyvinyl chloride)				
Connection		switching: lead-in type (4-pole, standard cable length 2m), analogue: lead-in type (5-pole, standard cable length 2m)				
Ambient illumination		incandescent lamp ≤ 3000lux, sunlight ≤ 20000lux				
Ambient temperature		operation: -10~45°C, storage: -20~60°C(non-freezing)				
Ambient humidity		operation: 35~85%RH, storage: 35~85%RH (non-condensing)				
Weight		85g (include cable)				

Installation Steps
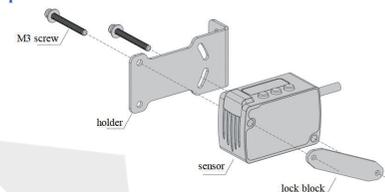
Product Function Settings

A 2-point teaching

① Press the "M" button when there are no objects.
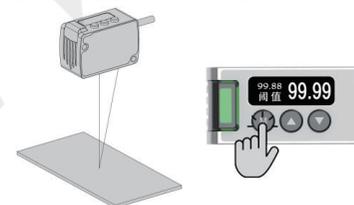
② Press the "M" key when there is an object present
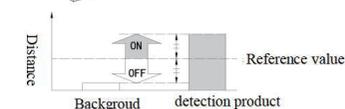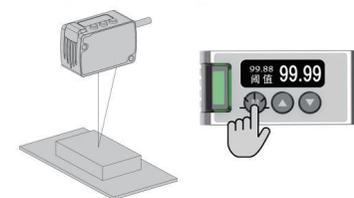
③Complete calibration. (When the difference between two times teachings is small, display deviation too small,and it is necessary to widen the difference and teach again)

B Limited teaching (In the case of small objects and backgrounds)

a   With background for reference
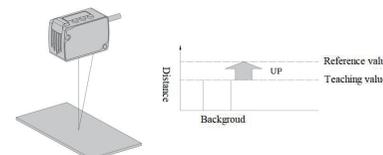
b   When detecting objects for refernce
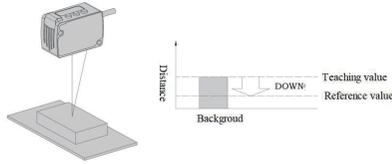
① Press the "M" button when in a background state or there is a detected object.
② With the background object as the reference, press the "▲" button to set the reference value in the sensor.When the object is detected as the reference, detecting the set value of the objec after press the "▼" button
③ Complete calibration

C 1-point teaching (Window Compare Mode)

The method of setting upper and lower limit values is implemented instead of implementing 1-point teaching for the distance between the reference plane of the detected object.Use this function when discriminating within the upper and lower limits.

In the case of implementing 1-point teaching (window comparison mode),Please set the detection output setting in PR mode to [1 point teaching (window comparison mode)] in advance.

For the setting method, please refer to the "⑫PRO Mode Operation Instructions"

① Press the "M" button twice when there is an object being detected.
② Teaching completed.

D 2-point teaching (window comparison mode)

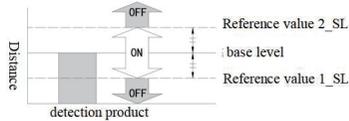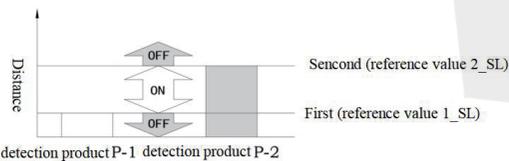In the case of implementing 2-point teaching (window comparison mode),Please set the detection output setting in PRO mode to [2-point teaching (window comparison mode)] in advance.

For the setting method, please refer to the "⑫PRO Mode Operation Instructions".

When teaching, please use the detection product (P-1, P-2) with continuous distance.

① Press the "M" button (1st time) when there is a detected product P-1
② Press the "M" button (second time) while detecting product P-2
③ Complete calibration

E 3-point teaching (window comparison mode)

Perform 3 point (P-1, P-2, P-3) teaching, as shown in the following picture, and set the reference value 1_ SL between the 1st and 2nd times.

Set the reference value 2_ SL between the 2nd and 3rd times,and the method of setting the reference value range.

In the case of 3-point teaching (window comparison mode),Please set the menu detection output setting to [3 point teaching (window comparison mode)] in advance.

After teaching, P-1, P-2, and P-3 will be automatically arranged in ascending order.
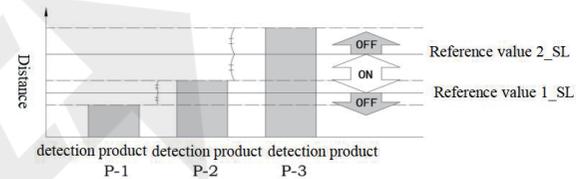
① Press the "M" button (1st time) when there is a detected product P-1.
② Press the "M" button (second time) while detecting product P-2.
③ Press the "M" button (3rd time) while detecting product P-3.
④ Complete calibration

Threshold Fine Tuning Function

Normally detection mode:
Press the "▲" or "▼" keys to directly change the threshold

Window comparison mode:
Press the "▲" or "▼" keys to directly change the threshold.
Press the "▲" and "▼" keys at same time to switch threshold 1 and threshold 2.

Zero adjustment function

Note: Zero adjustment requires setting the display mode to reverse mode in order to operate.
The zero adjustment function means the function of forcing the measured value to be "set to zero". When setting zero adjustment, there is a vertical line on the screen, as shown in the right picture:

Press the "M" and "▲" keys meanwhile to adjust the zero setting
Press the "M" and "▲" keys meanwhile to cancel the zero adjustment

Key locking function

Press the "M" and "▼" keys meanwhile to lock the keys.
Press the "M" and "▼" keys meanwhile to unlock.

Menu setting

Press and hold the "M" button for 3 seconds in the distance display interface to enter the menu setting mode.
In menu setting mode, press and hold "M" for 3 seconds to exit menu setting mode.
In menu setting mode, stop for 20 seconds without pressing any buttons to automatically exit menu setting mode.
After enter the menu setting mode, press the "▲" or "▼" keys to switch menus up and down.
Short press the "M" key to enter the corresponding menu item
① Operation mode: standard, high-speed, high-precision

② Normally open and normally closed: Press the "M" key to enter, switch between "▲" or "▼" for selection, and press "M" to confirm.

Normally open and normally closed   **Normally open**   **normally closed**

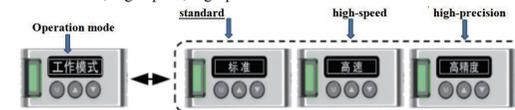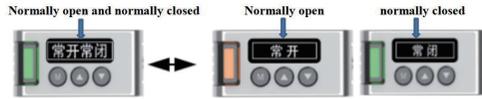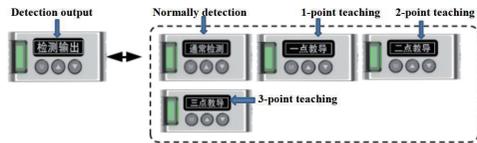③ Detection output: Normal mode, one point teaching, two point teaching, and three point teaching.

Detection output   **Normally detection**   **1-point teaching**   **2-point teaching**   **3-point teaching**

④ Analog selection: 0-5V, 4-20mA.

Analog selection — 0-5V, 4-20mA

⑤ Tolerance: Equivalent to a fine turning adjustment of sensitivity, with a default accuracy of 0.07. It can be adjusted to the lowest level when detecting small differences.

Tolerance

⑥ External input: When selecting the corresponding function, the pink line and 0V are short circuited once;
Zero adjustment: The current value is reset, and ± value is displayed within the range;
Teaching: It can be used as a single press of the "M" button;
Stop laser: The sensor stops emitting laser and not working;

External input   **Zero adjustment**   **Teaching**   **Stop laser**
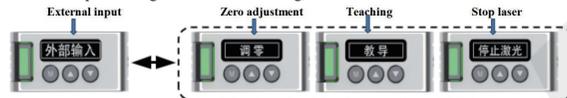
⑦ Output timing: output delay, delayed output, single output, output extension, no timing. The default 5ms is not adjustable.

Output timing   **single output**   **delayed output**   **output extension**
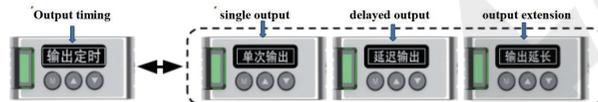
⑧ Display mode: Standard, reverse [changes the current detection value from "+35~-35" to "-35~+35", and the corresponding "0-5V" or "4-20mA" is reversed to "5-0V" or "20-4MA"], with an offset of ± 35 numerical values Change to 0-70.

Display mode   **Standard**   **Reverse**   **Offset**

⑨ Keep: The default is keep Off, and you can select keep On by pressing the up and down keys. When the current detection value reaches the maximum or minimum, the output voltage or current can be maintained. 【A common application is to maintain 0 or 5v even after exceeding the range.】

Keep   **keep On**

Screen Off selection   **Normally on**   **Screen Off selection**

Language   **Simplified Chinese**   **English**

Address   1   255

Reset   **Confirm reset**   **Return**
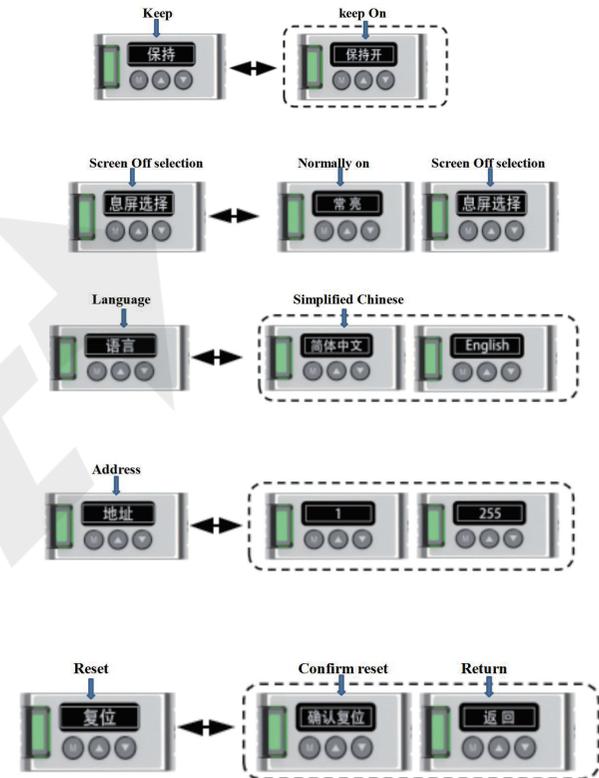
Communication method	RS485
Synchronous method	asynchronous
BAUD	9.6/19.2/38.4/57.6/115.2/256kbps
Data length	8 bits
Stop bit	1 bit
Parity check	No

04H instruction (read input register)

1、Communication frame format

1byte	1byte	2byte	2byte	2byte
Address code	Function code	Register address	Number of registers N	CRC code

2、Response frame format

1byte	1byte	1byte	2N byte	2byte
Address code	Function code	bytes 2N	Register value	CRC code

3、Error frame format

1byte	1byte	1byte	2byte
Address code	Error code	Exception code	CRC code

Read data

Address code	Function code	Register address	Number of register N	CRC	Function Des
0x01	0x04	0x0000	0x0002	0x71CB	Obtain -distance
0x01	0x04	0x0001	0x0001	0x600A	Obtain - operation mode
0x01	0x04	0x0002	0x0001	0x900A	Obtain - NO/NC
0x01	0x04	0x0003	0x0001	0xC1CA	Obtain - detection output
0x01	0x04	0x0004	0x0002	0x300A	Obtain - Tolerance
0x01	0x04	0x0005	0x0001	0x21CB	Obtain - external input
0x01	0x04	0x0006	0x0001	0xD1CB	Obtain - output timing
0x01	0x04	0x0007	0x0001	0x800B	Obtain - output timing time
0x01	0x04	0x0008	0x0001	0xB008	Obtain - display mode
0x01	0x04	0x0009	0x0001	0xE1C8	Obtain - keep
0x01	0x04	0x000A	0x0001	0x11C8	Obtain - screen off selection
0x01	0x04	0x000B	0x0002	0x0009	Obtain zero adjustment value
0x01	0x04	0x000C	0x0002	0xB1C8	Obtain - threshold 1
0x01	0x04	0x000D	0x0002	0xE008	Obtain - threshold 2
0x01	0x04	0x000E	0x0002	0x1008	Obtain - BAUD

Response

Address code	Function code	Number of bytes 2N	Register value	CRC	Response Des
0x01	0x04	0x04			distance
0x01	0x04	0x02	0x0000	0xB930	high-precision
			0x0001	0x78F0	standard
			0x0002	0x38F1	high-speed
0x01	0x04	0x02	0x0000	0xB930	NO
			0x0001	0x78F0	NC
0x01	0x04	0x02	0x0000	0xB930	normally detection
			0x0001	0x78F0	1-point teach
			0x0002	0x38F1	2-point teach
			0x0003	0xF931	3-point teach
0x01	0x04	0x04			tolerance
0x01	0x04	0x02	0x0000	0xB930	zero adjustment
			0x0001	0x78F0	teaching
			0x0002	0x38F1	stop laser
0x01	0x04	0x02	0x0000	0xB930	Untimed
			0x0001	0x78F0	output extension
			0x0002	0x38F1	delay output
			0x0003	0xF931	single output
0x01	0x04	0x02			setting time
0x01	0x04	0x02	0x0000	0xB930	Normally
			0x0001	0x78F0	Reverse
			0x0002	0x38F1	Offset
0x01	0x04	0x02	0x0000	0xB930	keep On
			0x0001	0x78F0	keep Off
0x01	0x04	0x02	0x0000	0xB930	time screen off
			0x0001	0x78F0	Normally on
0x01	0x04	0x04			adjustment value
0x01	0x04	0x04			threshold 1
0x01	0x04	0x04			threshold 2
0x01	0x04	0x04	0x000012C0		4800
			0x00002580		9600
			0x00009600		38400
			0x0001C2000xFB24		115200
			0x0003E800		256000

10H Instruction (Write Multiple Holding Registers)

1、Communication frame format

1byte	1byte	2byte	2byte	1byte	N*2 byte	2byte
Address code	Function code	Register address	Number of registers N	bytes 2N	Register value	CRC code

2、Response frame format

1byte	1byte	2byte	2byte	2byte
Address code	Function code	Register address	Number of registers N	CRC code

3、Error frame format

1byte	1byte	1byte	2byte
Address code	Error code	Exception code	CRC code

Operation Function

Address code	Function code	Register address	Number of register	Number of bytes	Register value	CRC	Function setting
0x01	0x10	0x0000	0x0001	0x02	0x0000	0xA650	Discontinuous output
					0x0001	0x6790	Continuous output
0x01	0x10	0x0001	0x0001	0x02	0x0000	0xA781	high-precision
					0x0001	0x6641	standard
					0x0002	0x2640	high-speed
0x01	0x10	0x0002	0x0001	0x02	0x0000	0xA7B2	NO
					0x0001	0x6672	NC
					0x0000	0xA663	normally detection
0x01	0x10	0x0003	0x0001	0x02	0x0001	0x67A3	1-point teach
					0x0002	0x27A2	2-point teach
					0x0003	0xE662	3-point teach
0x01	0x10	0x0004	0x0002	0x04			tolerance
0x01	0x10	0x0005	0x0001	0x02	0x0000	0xA605	zero adjustment
					0x0001	0x67C5	teaching
					0x0002	0x27C4	stop laser
0x01	0x10	0x0006	0x0001	0x02	0x0000	0xA636	Untimed
					0x0001	0x67F6	output extension
					0x0002	0x27F7	delay output
					0x0003	0xE637	single output
0x01	0x10	0x0007	0x0001	0x02			setting time
0x01	0x10	0x0008	0x0001	0x02	0x0000	0xA718	Normally
					0x0001	0x66D8	Reverse
					0x0002	0x26D9	Offset
0x01	0x10	0x0009	0x0001	0x02	0x0000	0xA6C9	keep On
					0x0001	0x6709	keep Off
0x01	0x10	0x000A	0x0001	0x02	0x0000	0xA6FA	time screen off
					0x0001	0x673A	Normally on
0x01	0x10	0x000B	0x0001	0x02	0x0001	0x66EB	zero adjustment-current detection value
0x01	0x10	0x000C	0x0002	0x04			threshold-input threshold
0x01	0x10	0x000D	0x0002	0x04			threshold-input threshold
0x01	0x10	0x000E	0x0002	0x04	0x000012C0	0x7ED3	4800
					0x00002580	0x6913	9600
					0x00009600	0x1D83	38400
					0x0001C200	0x7283	115200
					0x0003E800	0xCC23	256000
0x01	0x10	0x000F	0x0001	0x02	0x0000	0xA6AF	reset

Response

Address code	Function code	Register address	Number of register	CRC
0x01	0x10	0x0000	0x0001	0x01C9
0x01	0x10	0x0001	0x0001	0x5009
0x01	0x10	0x0002	0x0001	0xA009
0x01	0x10	0x0003	0x0001	0xF1C9
0x01	0x10	0x0004	0x0002	0x4008
0x01	0x10	0x0005	0x0001	0x11C8
0x01	0x10	0x0006	0x0001	0xE1C8
0x01	0x10	0x0007	0x0001	0xB008
0x01	0x10	0x0008	0x0001	0x800B
0x01	0x10	0x0009	0x0001	0xD1CB
0x01	0x10	0x000A	0x0001	0x21CB
0x01	0x10	0x000B	0x0001	0x700B
0x01	0x10	0x000C	0x0002	0x81CB
0x01	0x10	0x000D	0x0002	0xD00B
0x01	0x10	0x000E	0x0002	0x200B
0x01	0x10	0x000F	0x0001	0x31CA