

Laser range sensor

PDB series



Precautions

- Please do not use in the following environment
- O Direct sunlight
- O Places with high humidity or easy condensation
- O Places containing corrosive gases
- O Places subject to severe vibration or shock
- Connection and installation
- O Do not use the sensor in an unstable state immediately after the power is turned on, (recommended to test after 30 minutes of power on to achieve desired accuracy)
- © Be sure to carry out wiring with the power off. If a wrong wiring occurs, it will cause a malfunction
- O Please make sure that the power supply voltage is within the rated value before powering on
- © The RS485 signal line cannot be short-circuited with the power supply, otherwise it may cause product failure or damage the product
- When installing the sensor, do not subject the sensor to severe external forces(such as hammering, etc), as this may damage the sensor performance
- $\\ \bigcirc \text{ Do not bend the lead out of the cable with excessive force,} \text{and avoid applying pressure such as pulling}$
- O Thinner will corrode the surface of the filter, it is best to avoid using it
- $\ensuremath{\bigcirc}$ If there is dust on the surface, please wipe it gently with a dry dust-free cloth

Safety Warning

- Do not use in an environment with flammable, explosive or corrosive gases
- The RS485 communication line should not be too long
- Do not disassemble, repair or modify this product without authorization
- This product is dangerous, please do not look directly at the laser or observe the optical system through the lens

Scrap Treatment

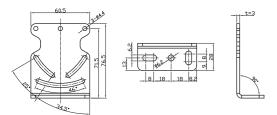
When the product is scrapped, please dispose of it as industrial waste

■ Laser description



• This sensor series are Class 3 laser products, please do not look directly at the laser or observe it through the laser.Warning labels are affixed to this series, please use them according to label instruction

Accessory Dimensions(Mounting bracket ZJP-15)

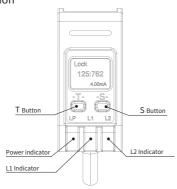


■ Specification

Produ	ucts series	Laser distance measuring sensor
	RS-485	PDB-CM8DGR
Model	420mA	PDB-CM8TGI
	010V	PDB-CM8TGU
Measuri	ing range	0.28m [®]
Measuri	ing accuracy	±1%F.S.®
Repeate	ed stability	±1%F.S.®
Supply	voltage	RS-485:1030VDC;420mA/010V:1224VDC
Consum	nption power	≤700mW
Load cu	irrent	50mA
Voltage	drop	<2.5V
Light so	urce type	Red laser(850nm);Laser level:class 3R
Function	nal principle	TOF
Average	optical power	20mW
Pulse du	uration	50ns
Pulse fre	equency	10MHZ
Detection	on frequency	100HZ
Lightsp	ot size	RS-485:90*90mm(At 5m);420mA/010V:90*90mm(At 5m)
Dimensi	ion	65mm*51mm*23mm
Resoluti	ion	1mm
Output:	1	Digital value:RS-485(Support ModBus protocol);Analog:420mA(Load resistance<300Ω), Analog:010V(Load resistance>5K)
Output 2	2	Switch value:PUSH-PULL/NPN/PNP,NO/NC Settable
Distance	e setting	RS-485:Keypress/RS-485 setting;420mA/010V:Keypress setting
Indicato	or	Power indicator: Green LED;Action indicator: Yellow LED, Yellow LED
Return	difference	3cm below 2m,≤2% above 2m
Protecti	ion circuit	Short circuit, reverse polarity
Built-in	function	Button to lock; button to unlock; action point setting;Output setting; single point teach; Window teach mode setting; factory date reset;Slave address&Port rate setting(only for RS-485)
Service	environment	Operating temperature:-10+50°C
Anti am	bient light	Incandescent light:<20,000lux
Protecti	ion degree	IP67
Material	l	Housing:ABS;Lens cover:PMMA
Vibratio	n resistant	1055Hz Double amplitude 1mm,2hrs each for X,Y,Z direction
Impulse	withsand	500m/s²(About 50G),3 times each for X,Y,Z direction
Connec	tion way	RS-485:2m 5pins PVC cable;420mA:2m 4pins PVC cable;010V:2m 4pins PVC cable
Accesso	ory	Screw (M4×35mm) ×2, Nut×2, Washer×2, Mounting bracket, Operation manual
		· · · · · · · · · · · · · · · · · · ·

Remark: 1 Standard test object: 90% white card

■ Panel introduction



Used to set the unlock, switch output logic of the sensor, operating point, data filtering, analog, reset.

T	Toggle buttom	Switch buttom
S	Set buttom	Set buttom

2.Button Setting function

Function list
Action point single point teaching TEACH A
Operation point window teaching TEACH A, TEACH B
Output logic: NO/NC selection
Output status out:NPN/PNP/PUSH-PULL(PP)selection
Filter level Aver: FAST / MEDIUM / SLOW selection
Analog mapping 4mA
Analog mapping 20mA
Reset
Slave address: 0x80-0xF4 (only for RS-485)
Port rate: 115200/57600/38400/19200/9600 (only for RS-485)

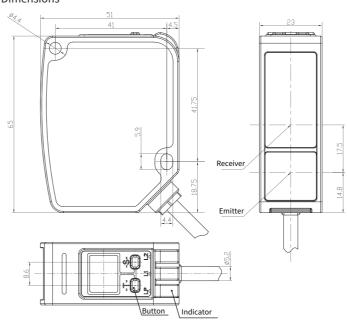
3.Indicator

Used as power indication, sensing indication, alarm indication, setting indication

	,	, ,		
Product name	Color	Always on/off	Flashing	
LP Green		Power indication	_	
L1	Yellow	Sensing indication		
L2	Yellow		_	

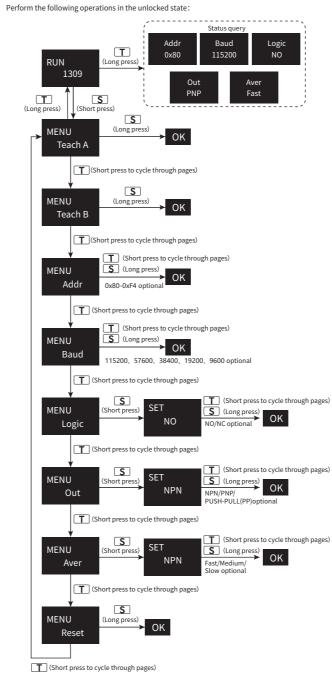
indicator status description						
	Indicator information	Indicator status	Status information			
	Action point is sensed	L1-LED CON ON	L1 and L2 are on at the same time			
	Action point is not sensed	L1-LED L2-LED Off	L1 and L2 are off at the same time			
	Switch output overload	L1-LED	1 and L2 flash asynchronously at a frequency of 6.25Hz			

Dimensions



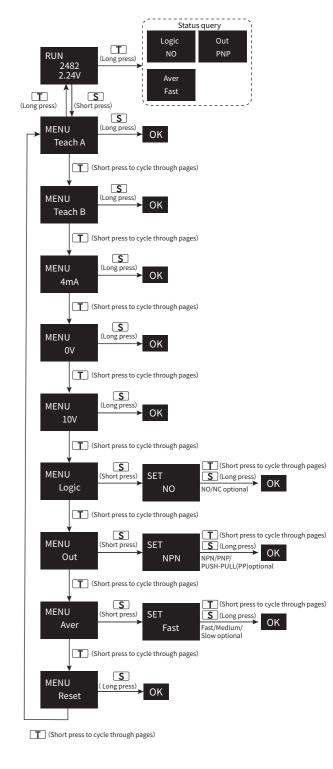
Instructions

- Self-lock and Unlock
- 1.Unlock:When the key is in the self-locking state, long press the S key for 4-6S. When the screen displays UN LOCK, you can press the key.
- 2.Self-lock:If the button is not pressed within 10 minutes of power-on, it locks itself. After pressing the button to LOCK itself, the screen displays LOCK. The corresponding setting operation cannot be performed.
- PDB-CM**485 Output series

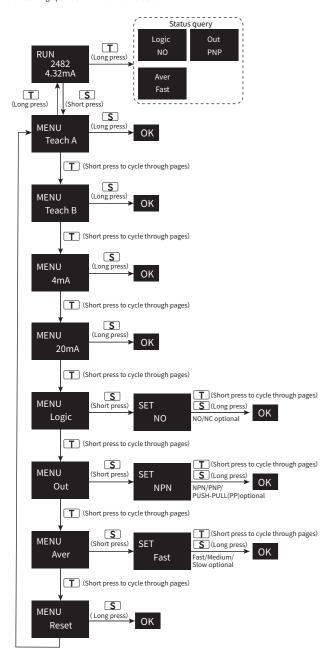


● PDB-CM**Analog voltage

Perform the following operations in the unlocked state:



Perform the following operations in the unlocked state:



T (Short press to cycle through pages)

■ Wiring diagram

RS-485 Output	Analog output 420mA	Analog output 010V
0 BN + 0 BU − RS485 0 BK B 0 WH A 0 GY NPN/PNP	OBN + NPN/PNP	BN + NPN/PNP

Remark: The sensors are equipped with shielded cables, NPN/PNP is the switch output.

RS-485 output: The black and white lines A and B must not be reversed and A and B cannot be short-circuited with the power line " + < - "

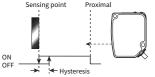
Analog output: The gray line Ia cannot be short-circuited with the power line " + 、-", and there is a small shielded wire in the gray line.

■ Function Description

• Action point single point teaching TEACH A

Within the sensing range, select the first distance value as the operating point and fix the product and the target. When entering the "Teach A" mode, long press the S key to start teaching. For the operation of analog output or 485 output, please refer to "Operation manual".

After teaching at specified position, output ON from the position to the near end of the detection range. Actual operating point: Set value * 101%; Actual exit point: Less than set value * 102%.



• Operation point window teaching TEACH A, TEACH B

Within the sensing range, select the first distance value as the operating point and fix the product and the target. Enter the "Teach A" mode and then long press the S key to start teaching. After success, release the key to automatically return to the initial state of the previous level to complete the teaching of the first action point. Then enter the "Teach B" mode and then long press the S key to start teaching.

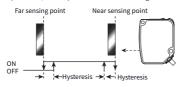
After success, release the key to automatically return to the initial state of the previous level to complete the second

Action point teaching. After success, release the key to automatically return to the initial state of the previous level. For the operation of analog output or 485 output, please refer to "Operation manual".

If you want to return to single-point teaching after completing window teaching, only need to operate "single point teaching", the product will automatically clear the last window teaching value.

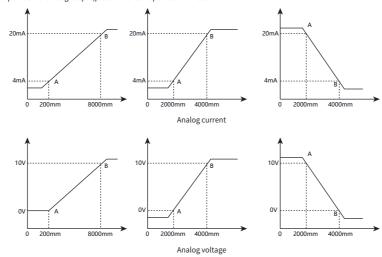
Actual operating point: Set value * 101%; Actual exit point:Less than set value * 102%.

After teaching at the specified 2 positions, the output is ON within the range between 2 positions.



Analog mapping: 4mA, 20mA

Within the sensing range, after selecting the "current" mode, enter "4mA" or "20mA, select the first distance value as the 4mA mapping point(or 20mA mapping point), and fix the sensor and target. The position of 4mA and 20mA(A,B) points within the effective range can be arbitrarily set, And the distance between (a, b) points is greater than 5% of the current distance, the setting is successful. Otherwise, the setting will fail. The default(A,B) is (4mA,20mA). For the position of pages of pages are than 5 for the "control of pages of pages of pages are than 5 for the "control of pages of pag operation of analog output.please refer to "Operation manual"



■ Data transmission (only for RS485)

◆Baud rate:115200(default) ◆Parity check:None

◆Slave default address:0x80

Note:The default address is 0x80.Different slave addresses or different baud rates will have different

1.Master station request message format(Command to read distance information) Eunction code Data start address Data volume (Units

Stave address	Function code	Data star	Data start address Data Volume (Unit: Words) F		Redundancy cn	eck CKC16-	
80	03	9C	7D	MSB:00	LSB:01	LSB:24	MSB:5
Slave station re	esponse messag	e format:					

Slave address Function code Bytes Data Redundancy check CRC16-2 02 MSB LSB LSB MSB

The host computer communicates through RS485, and the sensor data read out needs to be calculated by the following method to obtain actual measured value.(1) Convert the fourth and fifth bytes in the reply packet from the slave station into decimal. The unit is mm.

(2)When the distance is less than 150mm, it is a blind area, and the actual measured value =150; When the distance is greater than 11000mm, the measured range is exceeded, and the actual measured value =11000; For example:The master request message:80 03 9C 7D 00 01 24 53

The slave response message:80 03 02 09 A1 43 B2

The 4th and 5th bytes of the slave's response message are 09 A1, converted to decimal 2465, Actual distance value=2465.

Return: If the setting is successful, the original instruction will be returned; If it fails, an error instruction will be returned.

The master request message format/The address broadcast call command):

z. The master i	The master request message format (the address broadcast call command).								
Slave address	Function code	Address where	data is stored	Data volume (l	Data volume (Unit: words)		Redundancy check CRC16-2		
00	06	9C	7E	00	81	06	33		

The address broadcast call command is used when the address originally set by the sensor is unclear. Modify any current address value to the required value through broadcast command.
Address modification range:0x80~0xF4

For example: The address originally set by the sensor is unknown, and you want to set the address to 0x81

Then send instructions via RS485 bus:00 06 9C 7E 00 81 06 33

The address originally set by the sensor is unknown, and you want to set the address to 0x82

Then send instructions via RS485 bus:00 06 9C 7E 00 82 46 32

Return:There is no return no matter the setting is successfully or fails

3. Master station request message format(Modified address command)

						-		
	Slave address	Function code	Address where data is stored N			y value	Redundancy check CRC16-2	
	80	06	9C	7E	00	85	LSB:18	MSB:30
9	Slave station res	sponse message	format:					

Slave address	Function code	Address where data is stored		Modify value		Redundancy check CRC16-2	
80	06	9C	7E	00	85	LSB:18	MSB:30

The modification is invalid if the modified address is out of range.Return error i								
Slave address	Function code	Error code	Redundancy check CRC16-2					
on	ne	0.2	LCD	мер	l			

The address modification instruction is used to modify any current address value to the required value when the address originally set by the sensor is known. Modify any current address value to the required value through. Address modification range: 0xF4. The effective range of the address setting is 0x80 - 0xF4, and the modification of address takes effect after the power is turned on again.

For example: The address originally set by the sensor is known, and you want to set the address to 0x81

Then send instructions via RS485 bus:80 06 9C 7E 00 81 19 F3
The address originally set by the sensor is known, and you want to set the address to 0x82
Then send instructions via RS 485 bus:81 06 9C 7E 00 82 58 23

Return:If the setting is successful, the original instruction will be returned; If it fails, an error instruction will be returned. For example: Send instructions:80 06 9C 74 00 06 79 93 Return:80 86 03 52 49

4.Master station request message format(Modify the baud rate)

Slave address	Function code	Address where data is stored		Modify value		Redundancy check CRC16-2	
80	06	9C	7F	MSB:00	LSB:02	LSB:09	MSB:92
MSB defaults to	o 00;The LSB bit o	of the modified v	value:Baud rate	setting,a	s follows:		

57600 38400 19200 9600 04

r	ter setting successfully, stave station response message format.									
ĺ	Slave address	Function code	Address where	e data is stored	Modify	/alue	Redundancy cl	neck CRC16-2		
	80	06	9C	7F	MSB	LSB	LSB	MSB		

If it is not within this range, this operation is invalid. The return operation error command:

Slave address Function code Error code Redundancy check CRC16-2									
80	86	02	LSB	MSB					
as haud rate modification command is used when the haud rate originally set by									

Modify any current baud rate value to the required value through the baud rate modification instruction.

Address modification range:115200、57600、38400、19200、9600(Level 5) .The default baud rate of the slave is

0x01(115200).The effective range of the baud rate setting is 0x01~0x05

For example: The baud rate originally set by the sensor is known to be 115200, at this time, you want to set the baud rate to 57600.

Then send instructions via RS485 bus:80 06 9C 7F 00 02 09 92

The baud rate originally set by the sensor is known to be 115200,at this time,you want to set the band rate to 9600
Then send instructions via RS485 bus:80 06 9C 7F 00 05 48 50

Return: If the setting is successful, the original instruction will be returned; If it fails, an error instruction will be returned.

٦	minuster station reduces message formation terms to be setting.												
	Slave address	Function code	Address where	data is stored	Modify	/ value	Redundancy ch	eck CRC16-2					
	80	06	9C	74	MSB:00	LSB:00	LSB:F9	MSB:91					

After setting successfully slave station response message format

Slave address	Function code	tion code Address where data is stored		Modify value		Redundancy check CRC16-2				
80	06	9C	74	MSB:00	LSB:00	LSB:F9	MSB:91			

The switch logic setting instruction is used to modify any current output logic to the required logic value. Modification range: NPN,PNP,PUP(three kinds).

For example:The sensor now wants to set the switching value to NPN Then send commands via RS485 bus:80 06 9C 74 00 00 F9 91

The sensor now wants to set the switching value to PNP

Then send commands via RS485 bus:80 06 9C 74 00 01 38 51 The sensor now wants to set the switching value to PUP

Then send commands via RS485 bus:80 06 9C 74 00 02 78 50 Return: If the setting is successful, the original instruction will be returned; If it fails, an error instruction will be returned.

6.Master station request message format(Switch state setting): Slave address Function code Address where data is stored Modify value Redundancy check CRC16-2

- 00	00	90	13	M2B:00	L2B:00	LSB:48	M2B:30
After setting s	uccessfully,slave	station respon	se message forn	nat:			
Slave address	Function code	Address where	data is stored	Modify	value	Redundancy che	eck CRC16-2
80	06	9C	73	MSB:00	LSB:00	LSB:48	MSB:50

The switch status setting instruction is used to modify any current output status to the required logic value Modification range: NO, NC(Two kinds)

For example:The sensor now wants to set the switching value to NPN
Then send commands via RS485 bus:80 06 9C 73 00 00 48 50

The sensor now wants to set the switching value to PNP

Then send commands via RS485 bus:80 06 9C 73 00 01 89 90
Return:If the setting is successful, the original instruction will be returned; If it fails, an error instruction will be returned.

7. Master station request message format(Filter times setting):

Slave address	slave address Function code Address where data is stored Modify value				Redundancy check CRC16-2		
80	06	9C	77	MSB:00	LSB:00	LSB:09	MSB:91
After setting successfully, Slave station response message format:							
Slave address Function code Address where data is stored Modify value Redundancy check CRC16.2					eck CRC16-2		

77 MSB:00 LSB:00 9C The order of filter times is used to set any current filter times as the required filter value

Modification range: Fast, Medium, Slow(three kinds).

For example: He sensor wants to set the number of filtering times to fast(1st Filtering)
Then send instructions via RS485 bus:80 06 9C 77 00 00 09 91

He sensor wants to set the number of filtering times to medium(8st Filtering)

Then send instructions via RS485 bus:80 06 9C 77 00 01 C8 51
He sensor wants to set the number of filtering times to slow(20st Filtering)
Then send instructions via RS485 bus:80 06 9C 77 00 02 88 50

Return: If the setting is successful, the original instruction will be returned; If it fails, an error If it fails, an error instruction

will be returned. 8. Master station request message format(Reset):

Slave address	Function code	Address where data is stored		Modify value		Redundancy check CRC16-2			
80 06 9C 87 MSB:00 I					LSB:01	LSB:C8	MSB:62		
ter setting successfully, Slave station response message format:									
Slave address	Function code	Address where data is stored		Modify value		Redundancy check CRC16-2			

9C 87 MSB:00 LSB:01 LSB:C8 The reset Settings command is used to restore factory Settings

Send instructions:80 06 9C 87 00 01 C8 62

Return:If the setting is successful,the original instruction will be returned;If it fails,an error If it fails,an error instruction

will be returned.

Address and CRC check errors will not receive the slave data feedback, other errors will be returned to the host error code. The second (function code) of the data frame plus 0X80 indicates an error in the request (illegal function code,illegal data value),If the second part of the data frame (function code) plus 0X80 is greater than 0XFF, the second part returns 0XFF.

(1). The following error instruction is returned (illegal function code):

Slave address	Function code	Error code	Redundancy ch	eck CRC16-2						
80 91 01 LSB MSB										
If the function code is not 0003 or 0006, the function code is invalid										

For example: Send instructions: 80 11 9C 74 00 00 8D 92 Return: 80 91 01 DC 78

Send instructions:80 88 9C 74 00 00 91 8E Return:80 FF 01 F0 18

(2).he following error instruction is returned(illegal Register address): Sla

80 86 02 LSB MSB	ave address	Function code	Error code	Redundancy ch	eck CRC16-2
	80	86	02	LSB	MSB

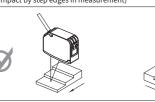
When the register address is wrong, it is considered an illegal function code. For example:Send instructions:80 06 9C 00 00 00 B9 8B Return:80 86 02 93 89 (3).he following error instruction is returned(illegal data value):

	Slave address	Function code	Error code	Redundancy ch	eck CRC16-2					
	80 86 03 LSB MSB									
1	When the register address is wrong, it is considered an illegal Data value.									

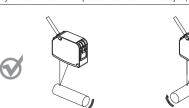
Installation precautions

Measurement of color difference materials(Install in the direction shown in the figure below

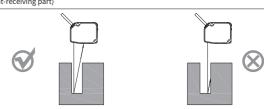
Step surface or segment gap measurement (Install in the direction shown in the figure below to reduce impact by step edges in measurement)



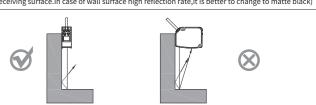
Measurement of rotating objects (Mounting in the direction shown in the figure below to control impact by vertical vibration and position deviation of the object



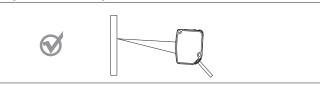
Measurement in narrow places and recessed parts(For installation and measurement in narrow places and holes,take care to avoid blocking the light path from the light-emitting part to the light-receiving part)



Measurement for wall surface mounting(Install in the direction shown in the figure below to reduce the multiple reflected light from the wall surface, since the reflected light will enter the receiving surface. In case of wall surface high reflection rate, it is better to change to matte black)



Detection of shiny objects(Or shiny surface,as shown in the figure below,install the sensor after tilting the sensor at a certain angle)



Mounting bracket ZJP-15 Screw(M4×35mm)

*For mounting, please keep tightening torque < 0.5N·m

Installation

This specification doesn't relate to patent responsibility. Moreover, our company is always devoting to improving product quality, and reserves the right to improve products by changing pattern or size without prior notice. We have considered all the notes when compiling this specification, but for the wrong or clipped parts, and any loss caused by using this manual information, we bear no responsibility.

Shanghai Lanbao Sensing Technology Co., Ltd. Address:No 228,Jinbi Road,Jinhui Industrial Park,Fengxian Area,Shanghai,China

Zip code:201404 TEL:021-57486188 57486181 FAX:021-57486199 Email:market@shlanbao.cn

Hotline:800-820-8259