LANBAO
PDB Series Laser Range Sensor

LANBO PDB Series Laser Range Sensor Instruction Manual

Contents

LANBAO

LANBO PDB Series Laser Range Sensor

Product Usage Instructions

- Avoid using the sensor in direct sunlight, high humidity, places with corrosive gases, or areas prone to severe vibration or shock.
- Avoid using thinner to clean the sensor surface as it may corrode the filter. Instead, gently wipe off dust with a dry, dust-free cloth.

Safety Warning

- Avoid using the sensor in environments with flammable, explosive, or corrosive gases.
- Do not use the RS485 communication line excessively long.
- Do not disassemble, repair, or modify the product without authorization.
- Avoid direct exposure to the laser beam or observing the optical system through the lens.

FAQ

- **Q:** Can the sensor be used outdoors?
- **A:** It is not recommended to use the sensor in direct sunlight or high-humidity environments. Please refer to the precautions section in the manual for more details.
- **Q:** How should I clean the sensor?
- **A:** Avoid using thinner to clean the sensor surface. Simply wipe off any dust with a dry, dust-free cloth gently.
- **Q:** What should I do if the product needs to be disposed of?
- **A:** When scrapping the product, dispose of it as industrial waste following proper waste disposal guidelines.

Precautions

Please do not use it in the following environment

- Direct sunlight
- Places with high humidity or easy condensation
- Places containing corrosive gases
- Places subject to severe vibration or shock

Connection and installation

- 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 the desired accuracy)
- Be sure to carry out wiring with the power off. If a wrong wiring occurs, it will cause a malfunction
- Please make sure that the power supply voltage is within the rated value before powering on
- Please use the rated load
- 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
- Do not bend the lead out of the cable with excessive force, and avoid applying pressure such as pulling

Cleaning

- Thinner will corrode the surface of the filter, it is best to avoid using it
- 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

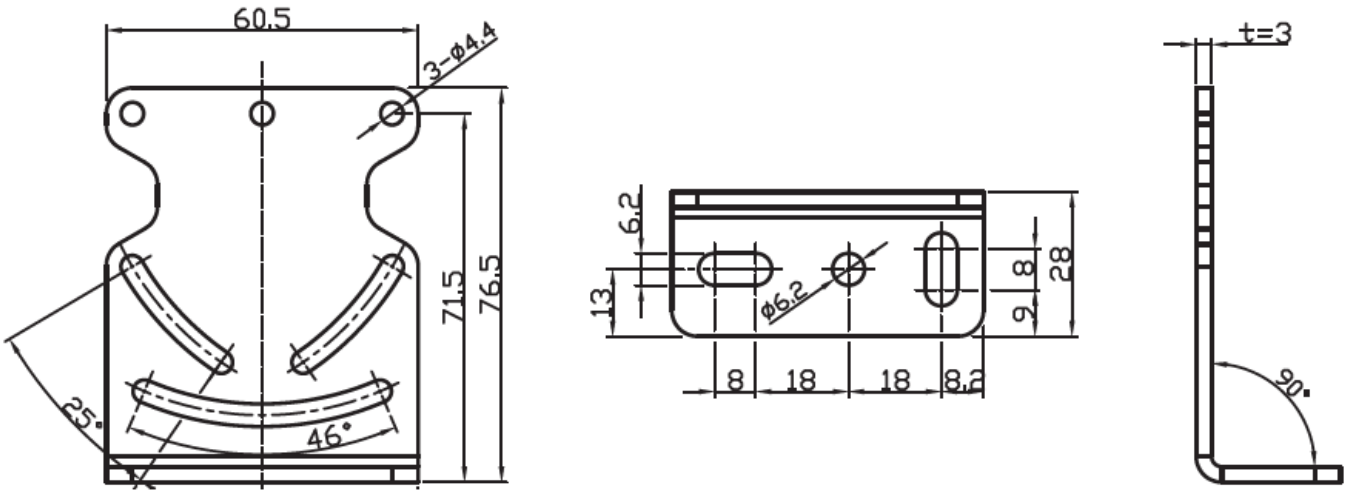
Scrap Treatment

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

Laser Description

- This sensor series are Class 3 laser product, 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 instructions.

Accessory Dimensions(Mounting bracket ZJP-15



Specification

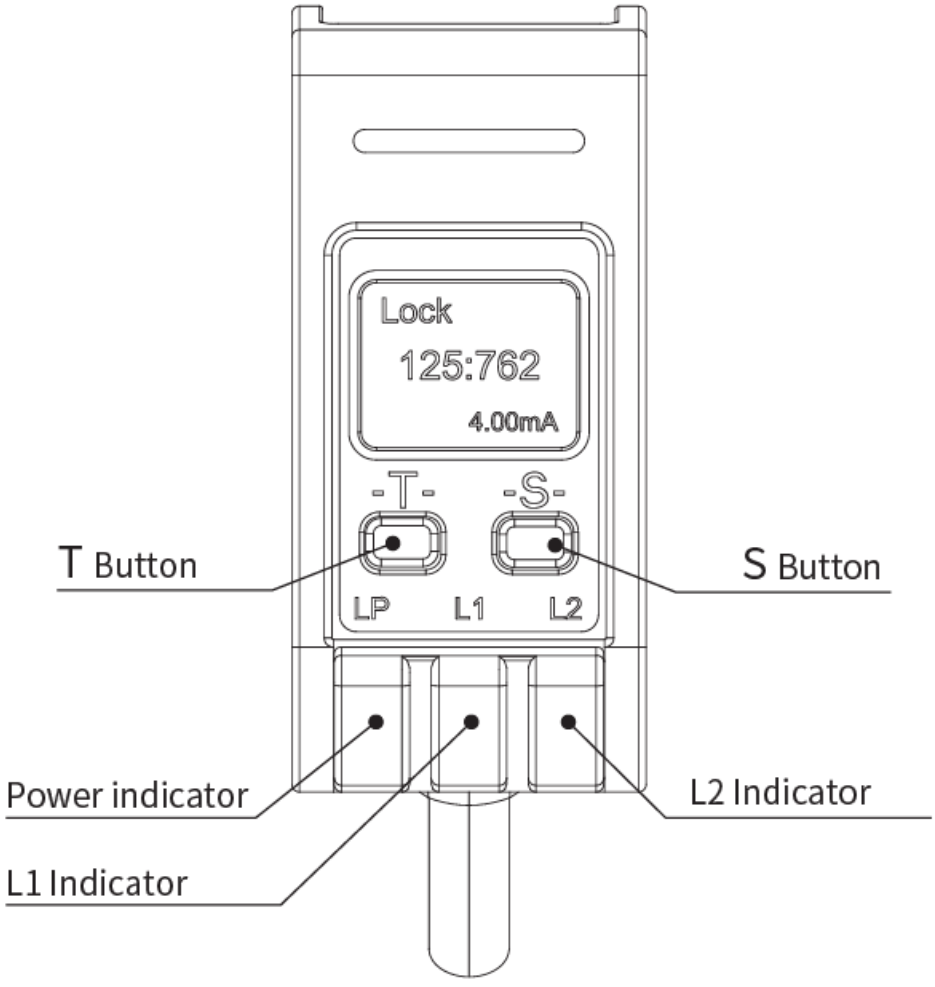
Products series		Laser distance measuring sensor
Model	RS-485	PDB-CM8DGR
	4…20mA	PDB-CM8TGI
	0…10V	PDB-CM8TGU
Measuring range		0.2…8m①
Measuring accuracy		±1 F.S.①

Repeated stability	±1 F.S.①
Supply voltage	RS-485:10…30VDC;4…20mA/0…10V:12…24VDC
Consumption power	≤700mW
Load current	50mA
Voltage drop	<2.5V
Light source type	Infrared laser(850nm);Laser level:class 3R
Functional principle	TOF
Average optical po wer	20mW
Pulse duration	50ns
Pulse frequency	10MHZ
Detection frequency	100HZ
Light spot size	RS-485:90*90mm(At 5m);4…20mA/0…10V:90*90mm(At 5m)
Dimension	65mm*51mm*23mm
Resolution	1mm
Output 1	Digital value:RS-485(SuppoArnt aMlogd:B0u..s.1p0rVo(tLoocaodl)r;eAsniastloang:c4e. .. 250Km) A(Load resistance 300Ω),
Output 2	Switch value: PUSH-PULL/NPN/PNP, NO/NC Settable
Distance setting	RS-485:Keypress/RS-485 setting;4…20mA/0…10V:Keypress setting
Indicator	Power indicator: Green LED; Action indicator: Yellow LED, Yellow LED
Return difference	3cm below 2m,≤2% above 2m
Protection 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℃
Anti ambient light	Incandescent light: 20,000lux
Protection degree	IP67
Material	Housing: ABS; Lens cover: PMMA
Vibration resistant	10…55Hz Double amplitude 1mm,2hrs each for X, Y, Z direction
Impulse withstand	500m/s²(About 50G),3 times each for X, Y, and Z direction
Connection way	RS-485:2m 5pins PVC cable;4…20mA:2m 4pins PVC cable;0…10V:2m 4pins PVC cable
Accessory	Screw M4×35mm ×2 Nut×2 Washer×2 Mounting bracket Operation manual

Remark: ①Standard test object:90 white card

Panel introduction



1. Button

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

T	Toggle button Switch button
S	Set buttom Set buttom

2. Button Setting function

Function list
Action point Function list TEACH A Operation point single point teaching A, TEACH B window teaching TEACH
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

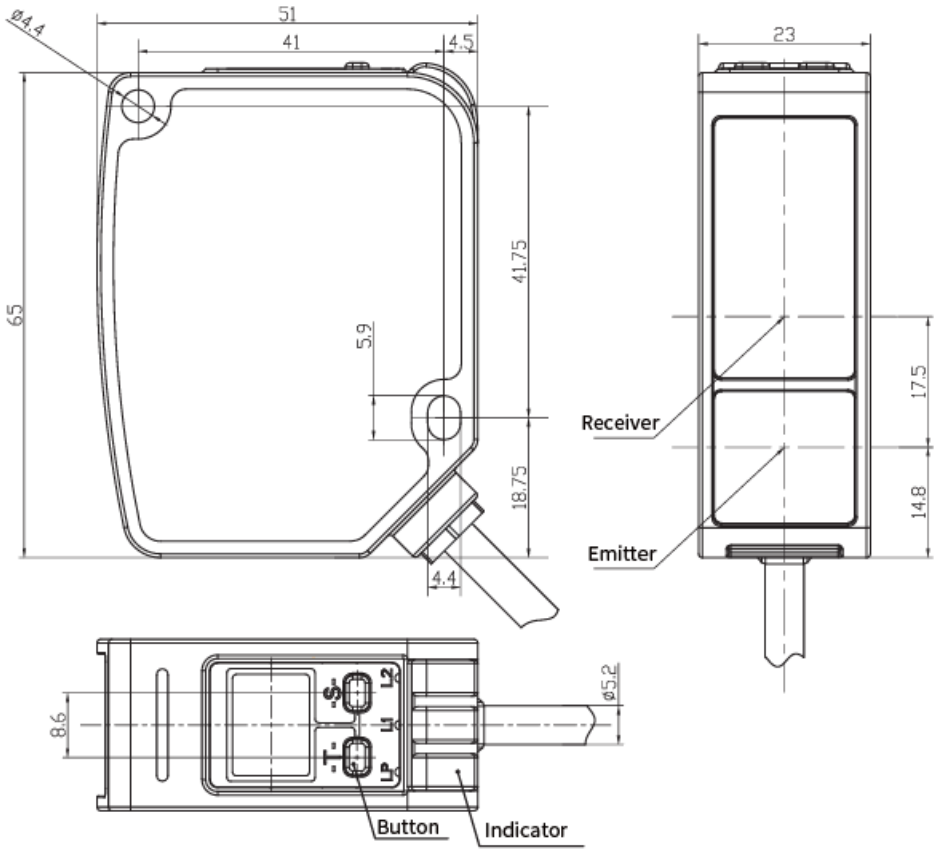
Used as power indication, sensing indication, alarm indication, setting indication

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

Indicator status description

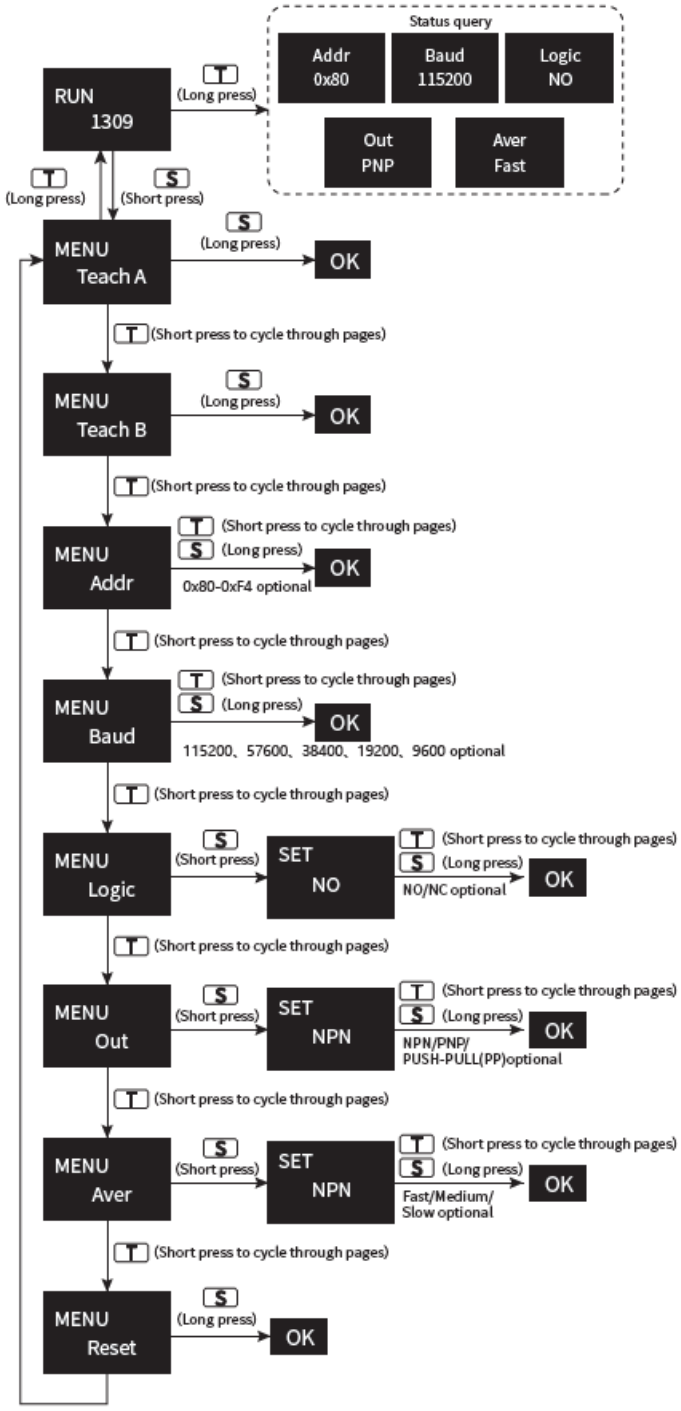
Indicator information	Indicator status	Status information
The action point is sensed	L1-LED On L2-LED On	L1 and L2 are on at the same time
The action point is not sensed	L1-LED Off L2-LED Off	L1 and L2 are off at the same time
Switch output overload	L1-LED 6.25Hz L2-LED 6.25Hz	1 anadt aL2frfleqasuhenacsynocfh6r.o2n5Houzsly

Dimensions



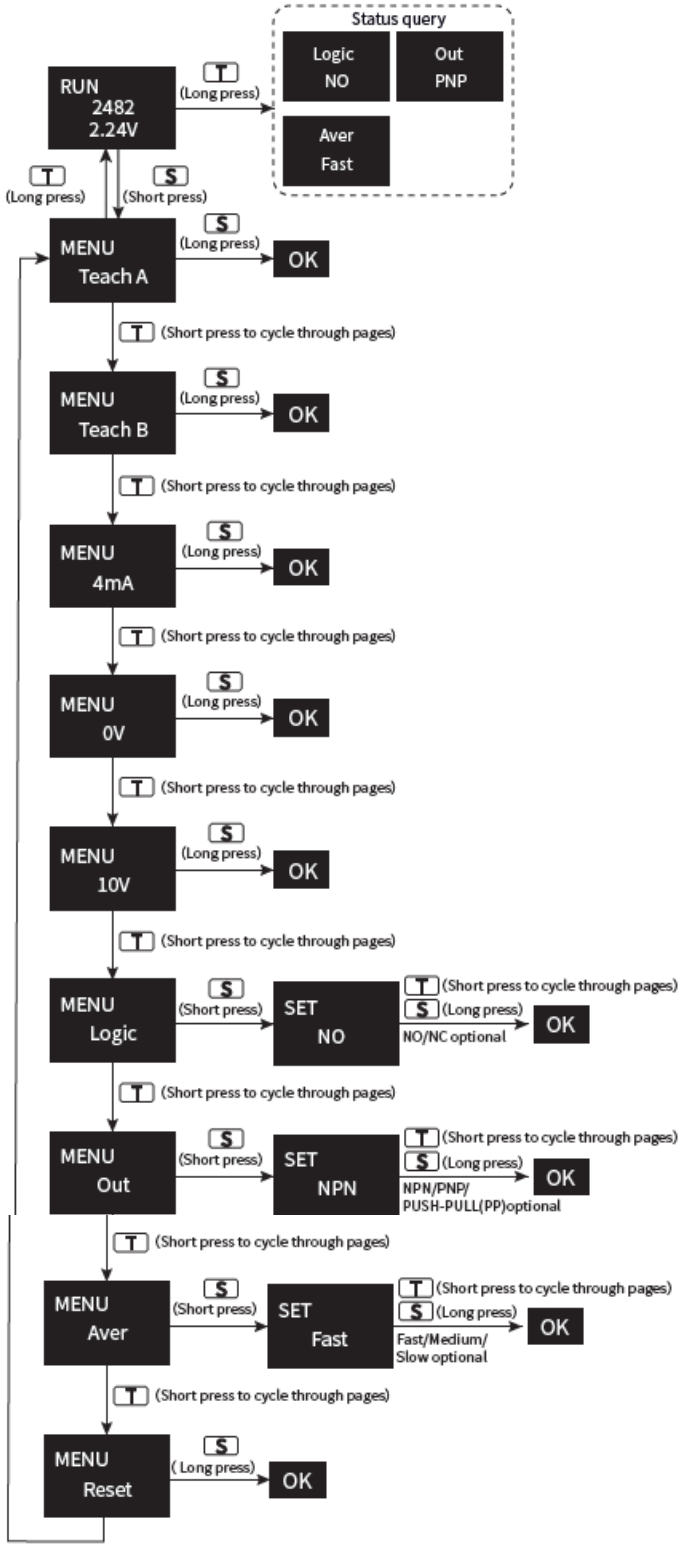
Instructions

- Self-lock and Unlock
  - Unlock: When the key is self-locking, long press the S key for 4-6S.
    When the screen displays UN LOCK, you can press the key.
  - 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
- Perform the following operations in the unlocked state:



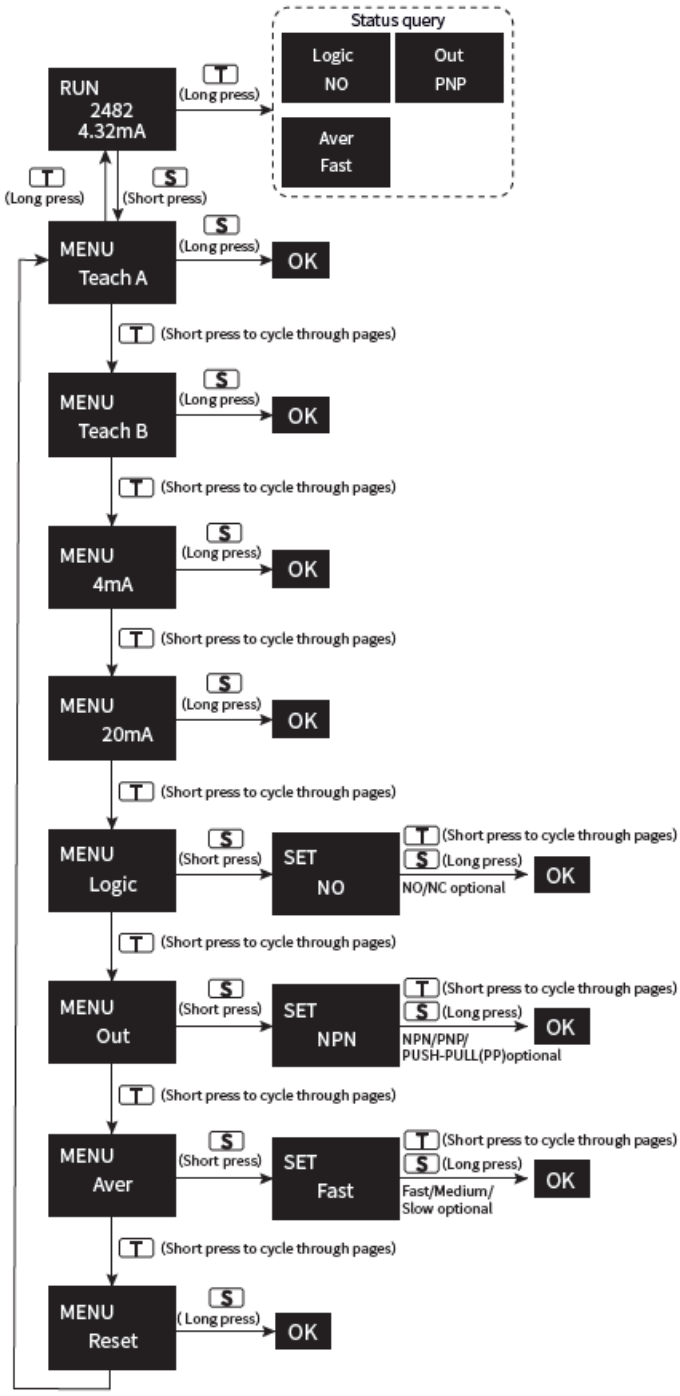
- **T** (Short press to cycle through

PDB-CM**Analog voltage
Perform the following operations in the unlocked state:



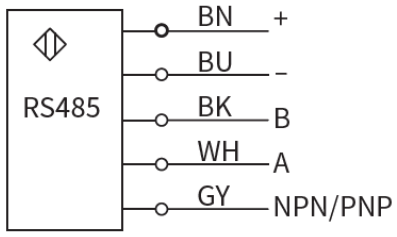
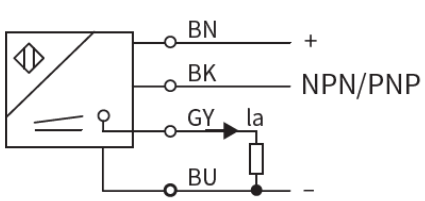
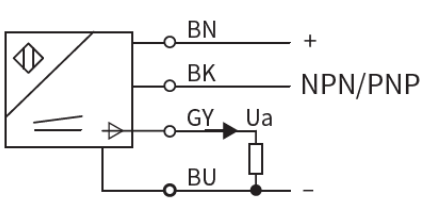
- **T** (Short press to cycle through)

PDB-CM**Analog current
Perform the following operations in the unlocked state:



- **T** (Short press to cycle through)

Wiring Diagram

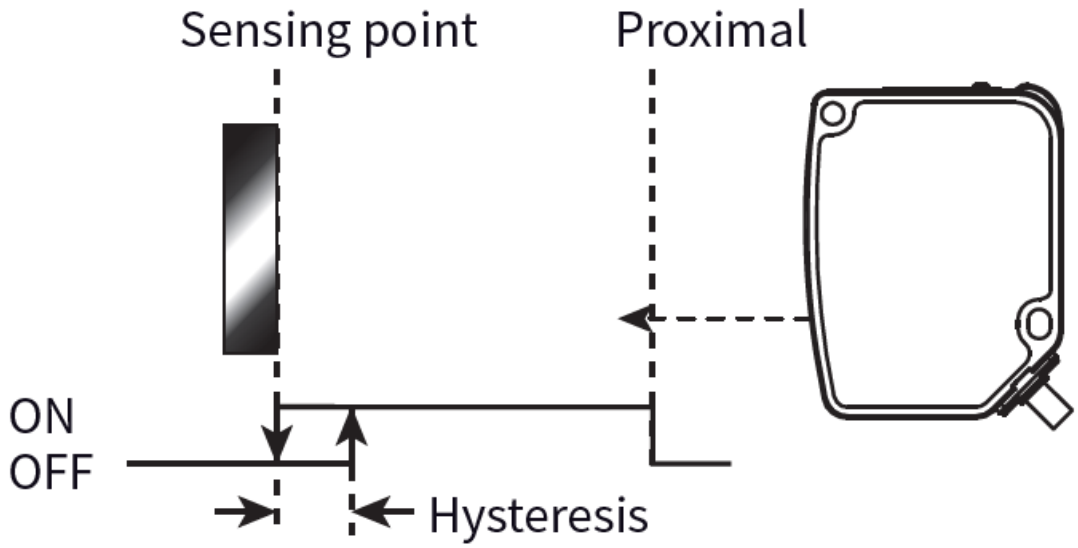
RS-485 Output	Analog output 4...20mA	Analog output 0...10V
		

- **Remark:** The sensors are equipped with shielded cables, and 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.

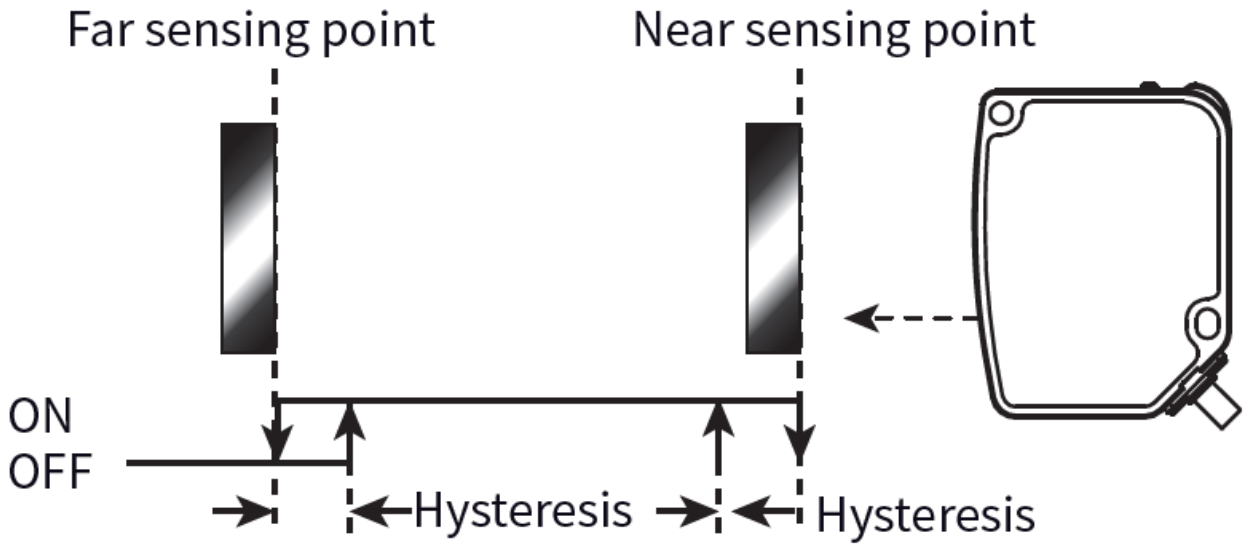
Function Description

- 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 the “Operation manual”.
- After teaching at the 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%.



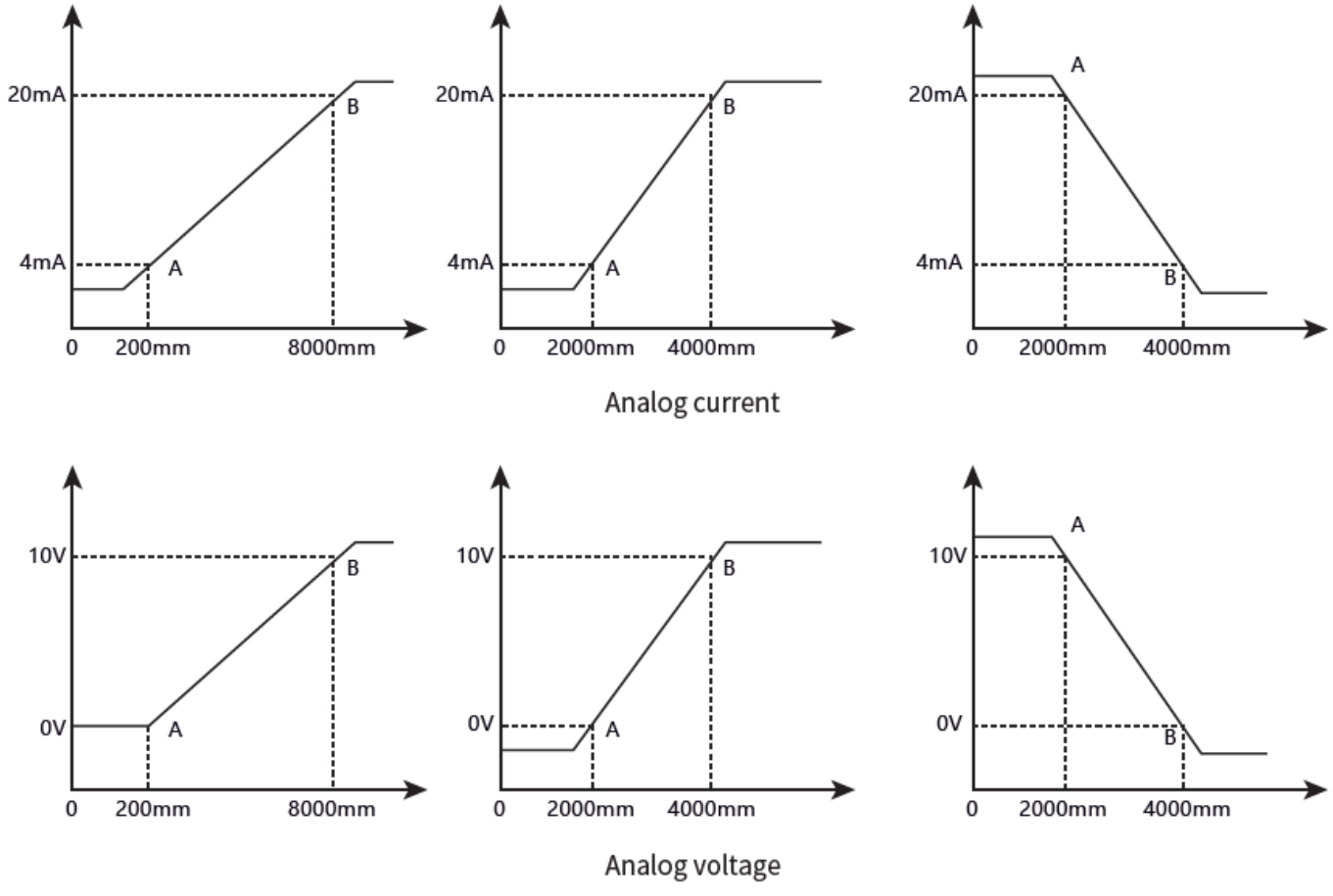
Operation point window teaching TEACH A, TEACH B

- 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 the “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 the 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 if 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 operation of analog output, please refer to the “Operation manual”.



Data transmission (only for RS485)

- Baud rate:115200(default)
- Parity check: None
- Data bits:8
- Stop bit:1
- Slave default address:0x80

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

1. Master station request message format(Command to read distance information)

Slave address	Function code	Data start address		Data volume (Unit: words)		Redundancy check CRC16-2	
80	03	9C	7D	MSB:00	LSB:01	LSB:24	MSB:53

- Slave station response message format:

Slave address	Function code	Bytes	Data		Redundancy check CRC16-2	
80	03	02	MSB	LSB	LSB	MSB

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

Slave address	Function code	Address where data is stored		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 the 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 whether the setting is sucessfully or fails.

Master station request message format(Modified address command):

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

Slave station response 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 instruction

Slave address	Function code	Error code	Redundancy check CRC16-2	
80	06	02	LSB	MSB

- 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:0x80~0xF4.The effective range of the address setting is 0x80 ~ 0xF4, and the modification of the 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.

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 00; The LSB bit of the modified value: Baud rate setting, as follows

Slave address	Function code	Address where data is stored				Redundancy check 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

- The baud rate modification command is used when the baud rate originally set by the sensor is known.
- 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 baud 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.

Master station request message format(Switching logic setting):

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

- After setting successfully, the slave station response message format

Slave address	Function 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.
- Master station request message format(Switch state setting):

Slave address	Function code	Address where data is stored		Modify value		Redundancy check CRC16-2	
80	06	9C	73	MSB:00	LSB:00	LSB:48	MSB:50

After setting successfully, the slave station response message format

Slave address	Function code	Address where data is stored		Modify value		Redundancy check 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.
- Master station request message format(Filter times setting)

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, the Slave station response message format

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

- 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: The 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
- The 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
- The sensor wants to set the number of filtering times to slow(20th 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.

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	LSB:01	LSB: C8	MSB:62

After setting successfully, the Slave station response message format

Slave address	Function code	Address where data is stored		Modify value		Redundancy check CRC16-2	
80	06	9C	87	MSB:00	LSB:01	LSB: C8	MSB:62

- 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.

Error feedback

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.

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

Slave address	Function code	Error code	Redundancy check CRC16-2	
80	91	01	LSB	MSB

If the function code is not 0X03 or 0X06, 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 he following error instruction is returned(illegal Register address):

Slave address	Function code	Error code	Redundancy check CRC16-2	
80	86	02	LSB	MSB

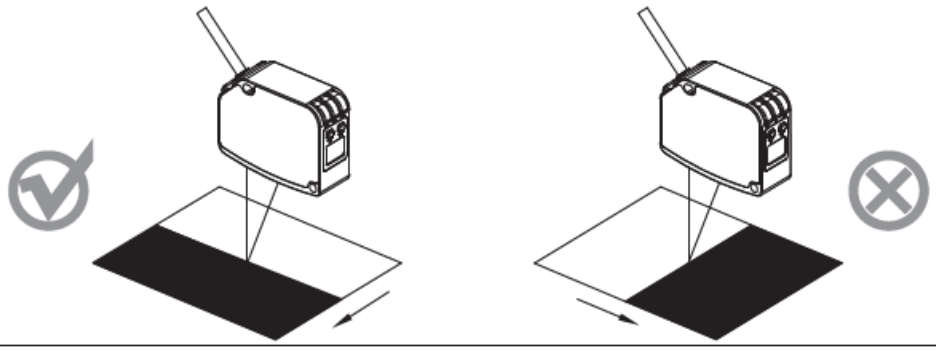
When the registered address is wrong, it is considered an illegal function code.
For example:Send instructions:80 06 9C 00 00 00 B9 8B Return:80 86 02 93 89 he following error instruction is returned(illegal data value):

Slave address	Function code	Error code	Redundancy check CRC16-2	
80	86	03	LSB	MSB

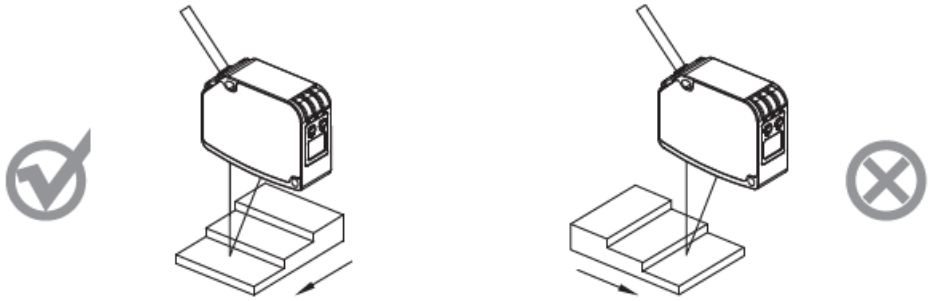
- When the register address is wrong, it is considered an illegal Data value.
- For example:Send instructions:80 06 9C 74 00 06 79 93 Return:80 86 03 52 49

Installation precautions

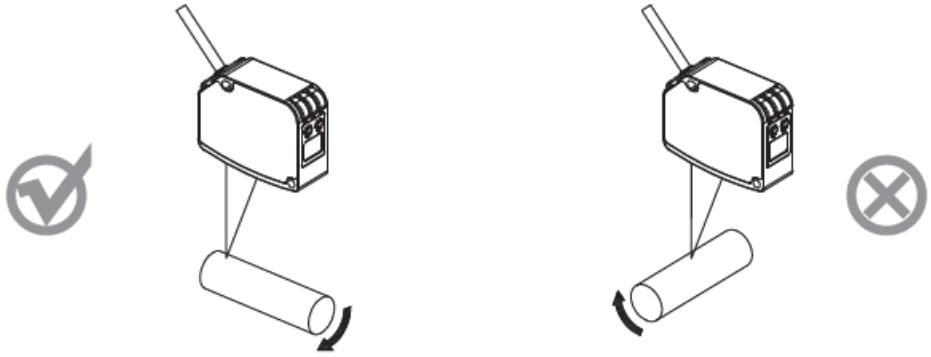
Measurement of color difference materials(Install in the direction shown in the figure below to minimize the measurement error)



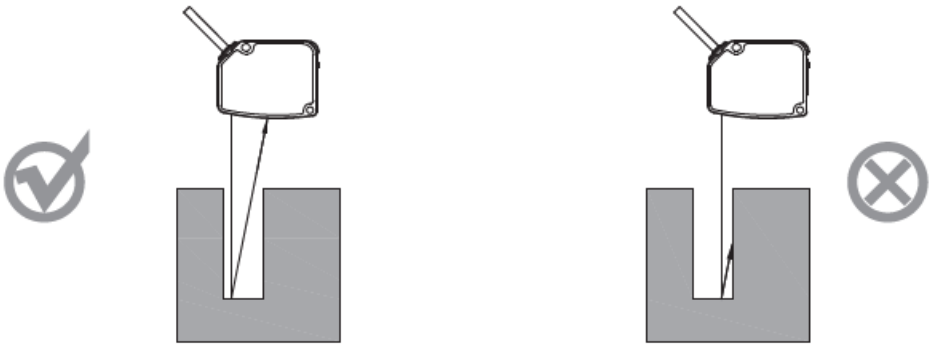
Step surface or segment gap measurement(Install in the direction shown in the figure below to reduce impact by step edges in measurement)



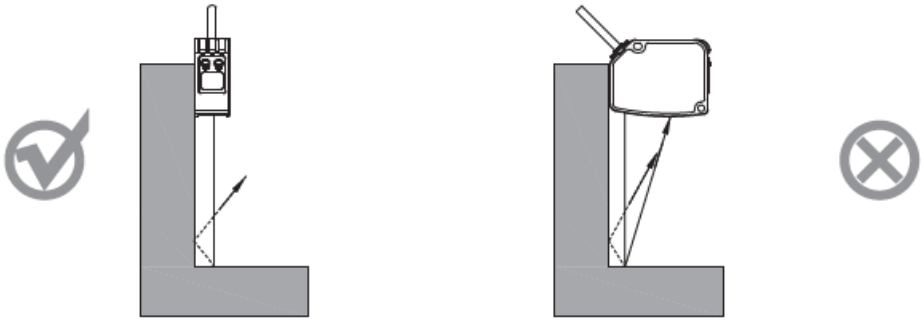
Measurement of rotating objects(Mounting in the direction shown in the figure below to control impact by vertical vibration and position deviation of the object)



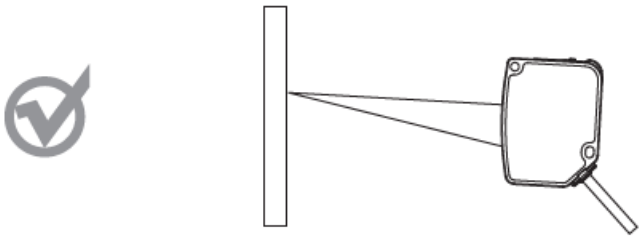
Measurement in narrow places and recessed parts(For installation and measurement in narrow places and holes,take care to avoid blocking the light path from the light-emitting part to the light-receiving part)



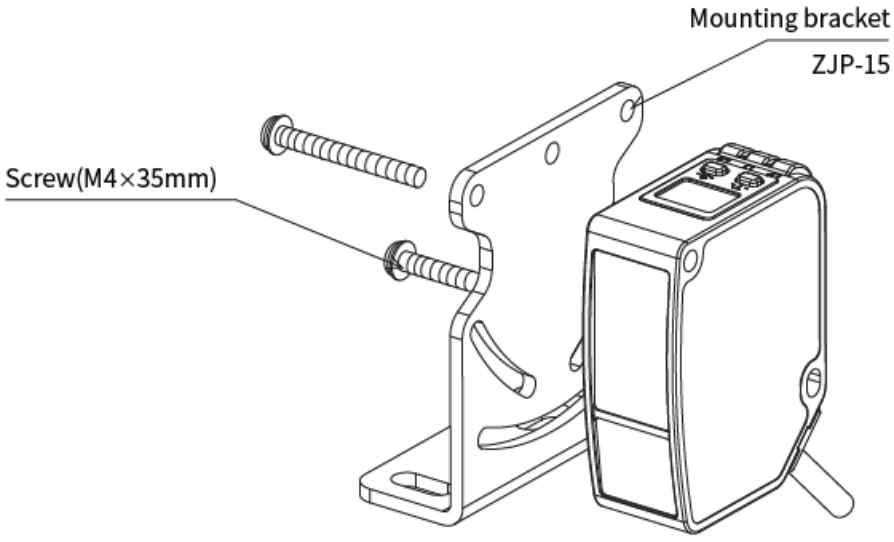
Measurement for wall surface mounting(Install in the direction shown in the figure below to reduce the multiple reflected light from the wall surface, since the reflected light will enter the receiving surface.In case of wall surface high reflection rate,it is better to change to matte black)



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



Installation



- For mounting, please keep tightening torque 0.5N·m

PS-PDB-2023LB V3

This specification doesn’t relate to patent responsibility. Moreover, our company is always devoted 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.

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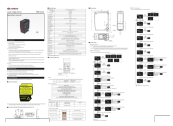
Documents / Resources

	LANBO PDB Series Laser Range Sensor [pdf] Instruction Manual CM8, PDB series, PDB Series Laser Range Sensor, PDB Series, Laser Range Sensor, Range Sensor, Sensor

References

- The domain name line.rs is for sale
- User Manual