



Precautions

- Please do not use 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 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 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

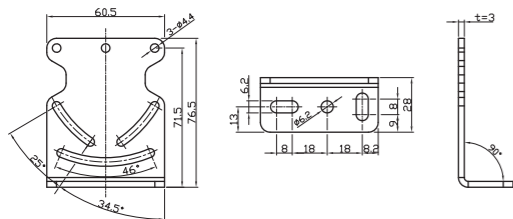
- When the product is scrapped, please dispose of it as industrial waste

Laser description



- This sensor series are Class 3 laser 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 instructions.

Accessory Dimensions (Mounting bracket ZJP-15)

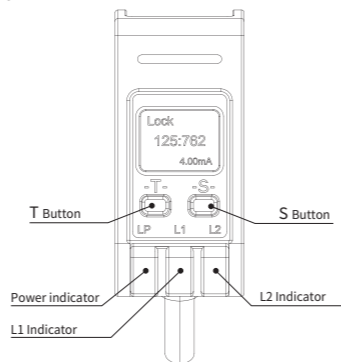


Specification

Products series	Laser distance measuring sensor	
RS-485	PDB-CM8DGR	
Model	4...20mA	PDB-CM8TGI
	0...10V	PDB-CM8TGU
Measuring range	0.2...8m <sup>①</sup>	
Measuring accuracy	±1%F.S. <sup>②</sup>	
Repeated stability	±1%F.S. <sup>③</sup>	
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 power	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(Support ModBus protocol); Analog: 4...20mA(Load resistance <300Ω), Analog: 0...10V(Load resistance >5K)	
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°C	
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/s <sup>2</sup> (About 50G), 3 times each for X,Y,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: ① Standard 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, reset.

T	Toggle button	Switch button
S	Set button	Set button

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

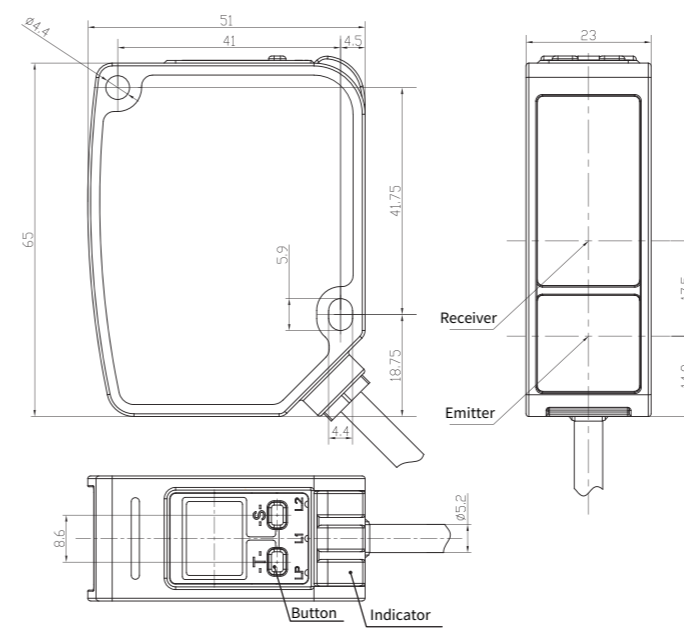
Used as power indication, sensing indication, alarm indication, setting indication

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 On, L2-LED On	L1 and L2 are on at the same time
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	L1 and L2 flash asynchronously at a frequency of 6.25Hz

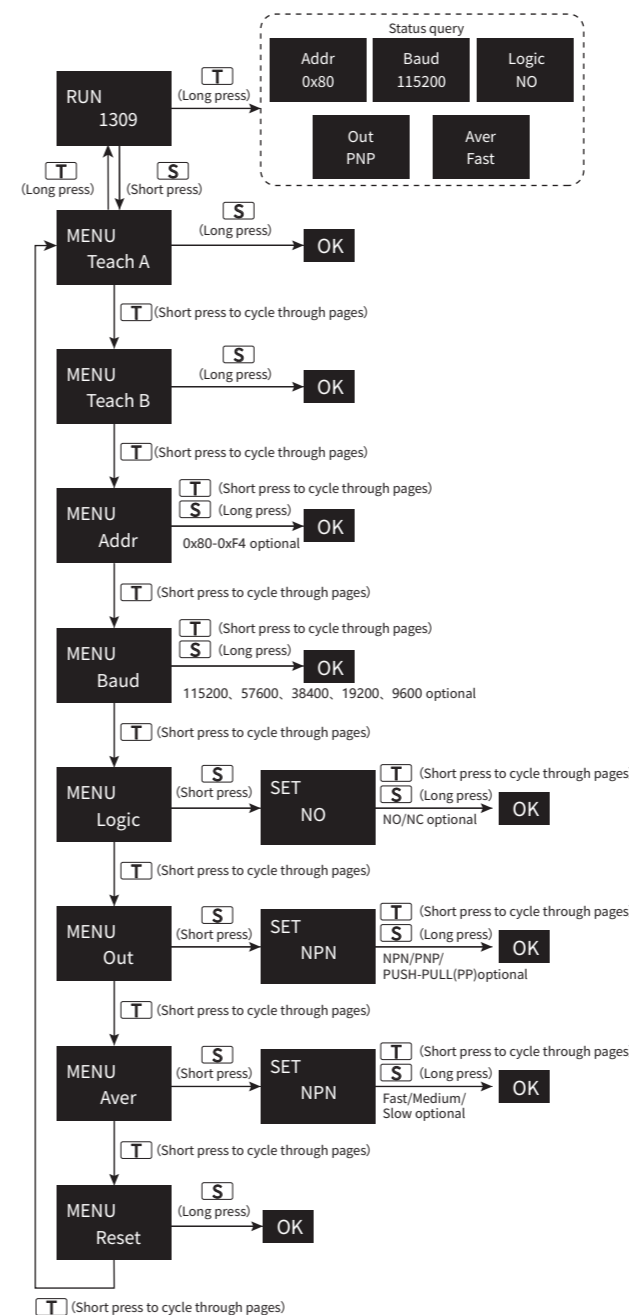
Dimensions



Instructions

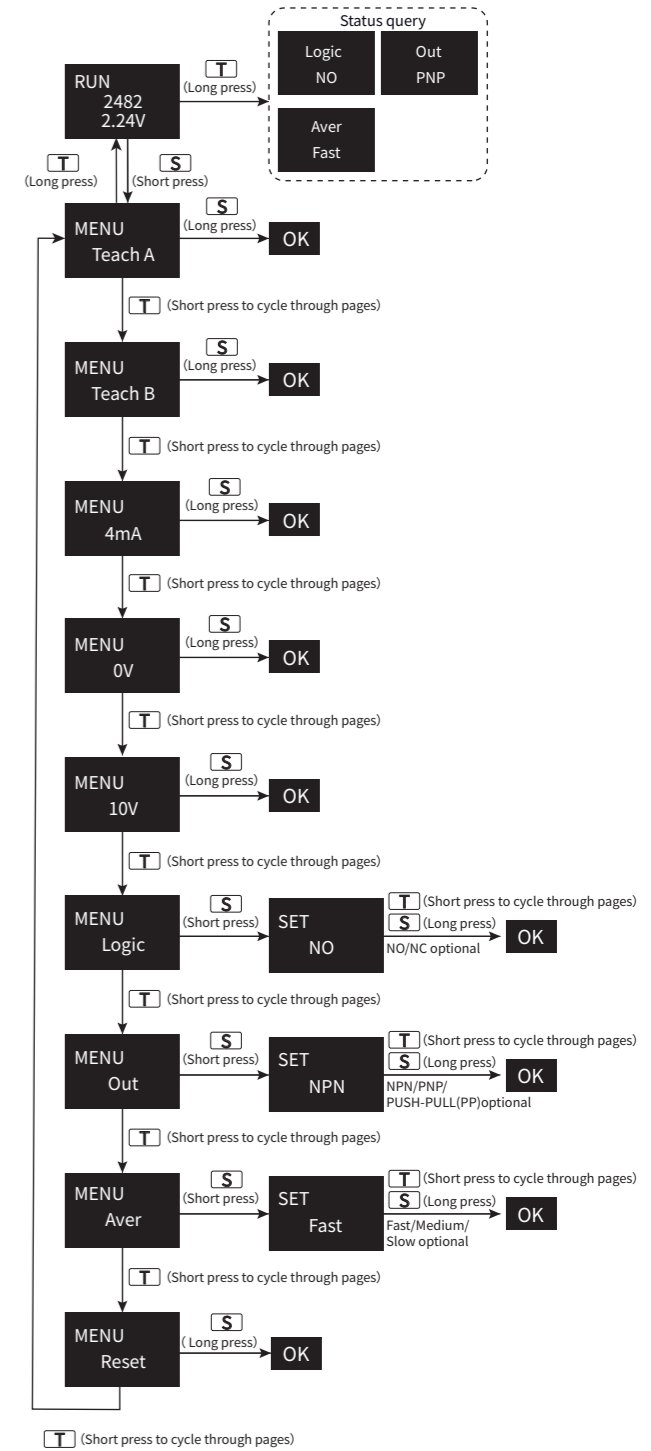
- Self-lock and Unlock
  1. Unlock: When the key is in the self-locking state, long press the S key for 4-6s. When the screen displays UN LOCK, you can press the key.
  2. Self-lock: If the button is not pressed within 10 minutes of power-on, it locks itself. After pressing the button to LOCK itself,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

Perform the following operations in the unlocked state:

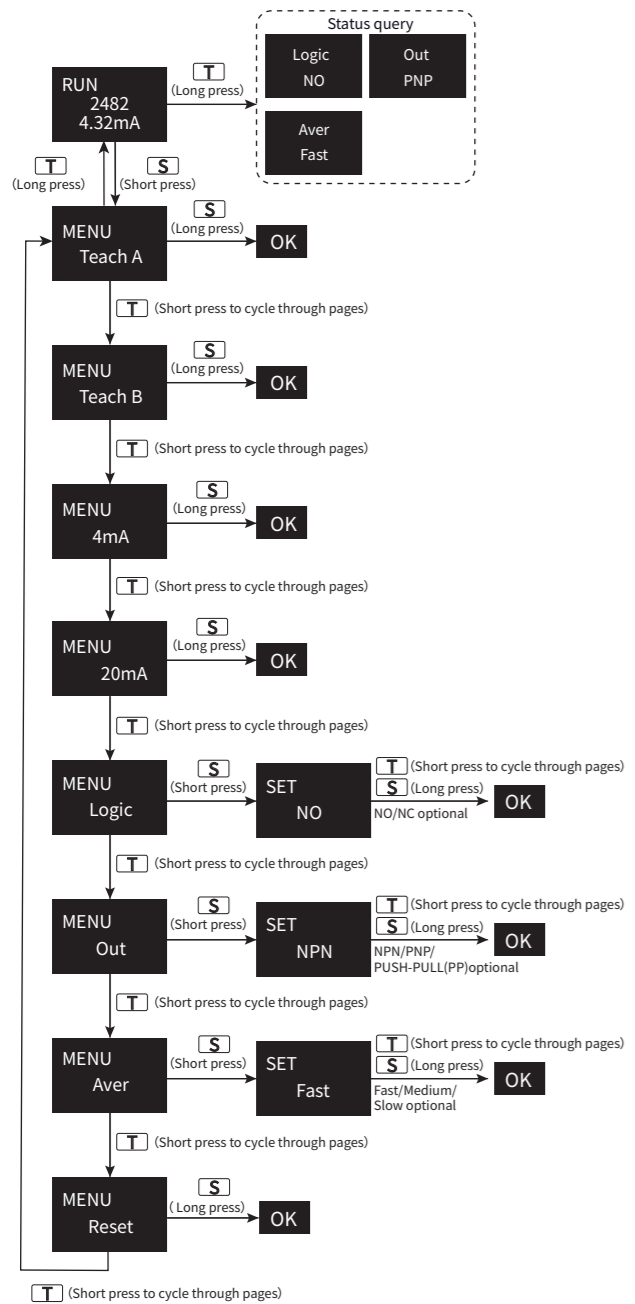


- PDB-CM\*\*Analog voltage
 

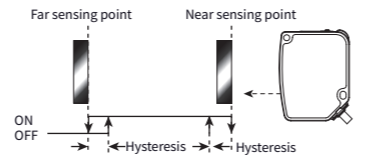
Perform the following operations in the unlocked state:



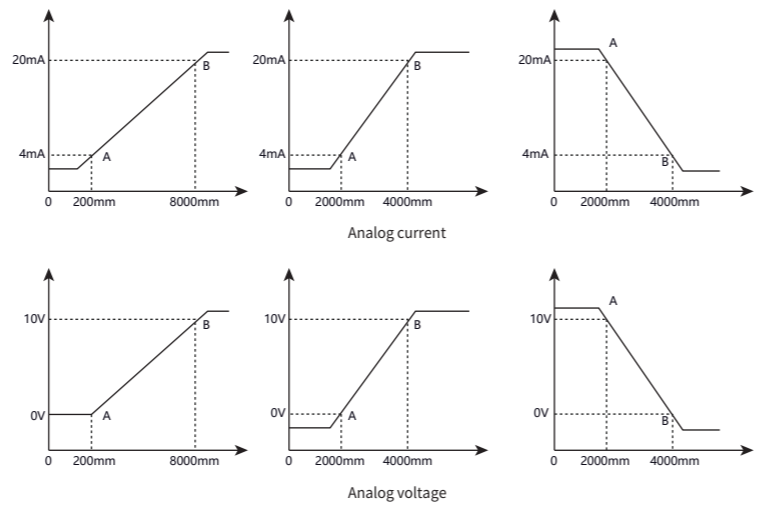
PDB-CM\*\*Analog current  
Perform the following operations in the unlocked state:



**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 operation of analog output,please refer to "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 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.

2. 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 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	Modify value	Redundancy check CRC16-2
80	06	9C	7E	00 85

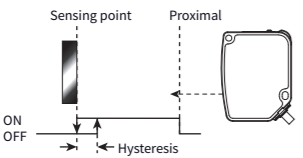
Slave station response message format:

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

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 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.



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

	1,200	57600	38400	19200	9600
	01	02	03	04	05

After setting successfully,slave station response message format:

Slave address	Function code	Address where data is stored	Modify value	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.

5.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,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.

6.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,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.

7.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,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: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 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 LSB:01 LSB:C8 MSB:62

After setting successfully,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 instruction will be returned.

9.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.

(1).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

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

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

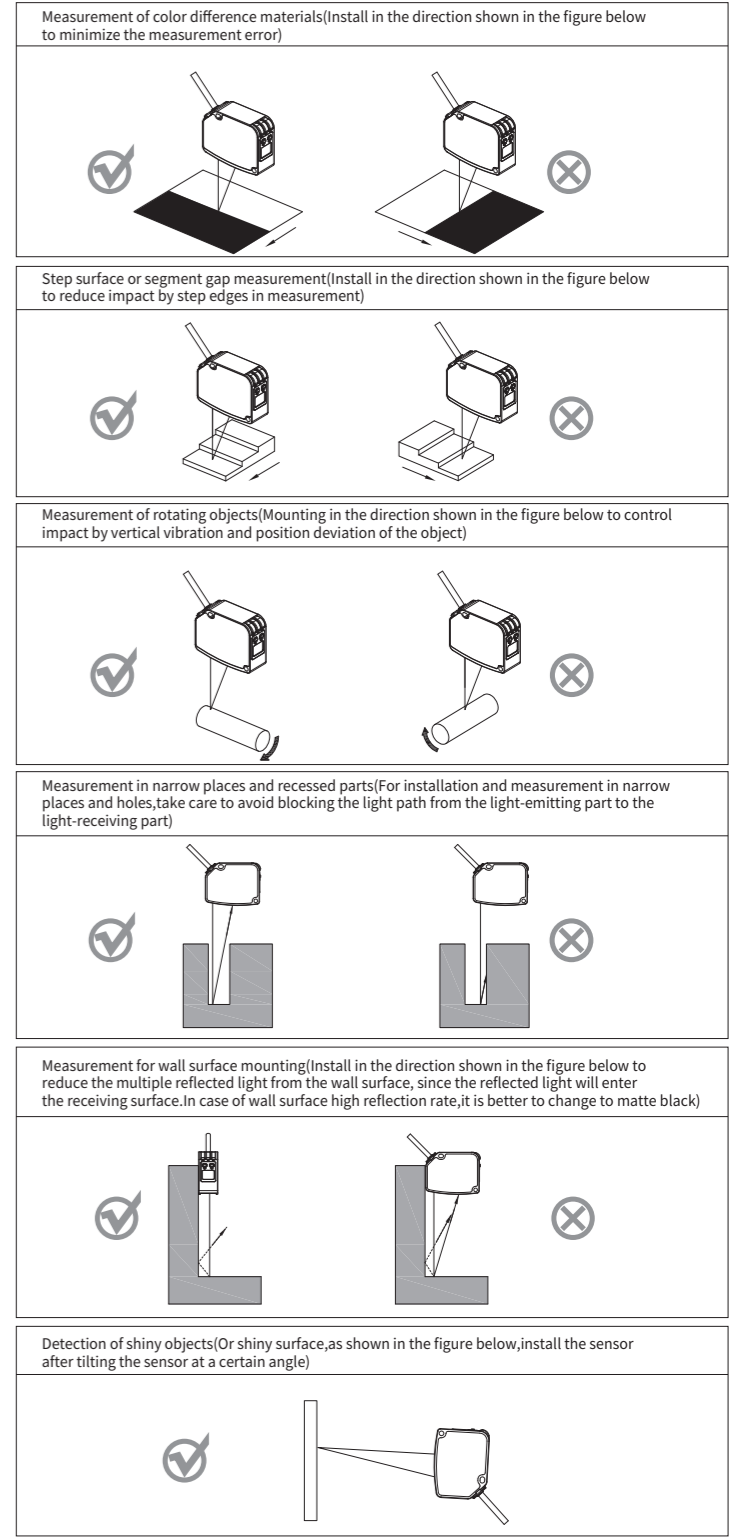
When the register address is wrong, it is considered an illegal function code.  
For example:Send instructions:80 06 9C 00 00 00 B9 8B Return:80 86 02 93 89

(3).he following error instruction is returned(illegal data value):

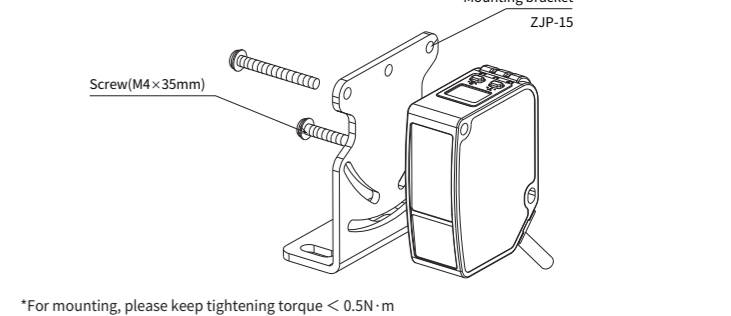
Slave address	Function code	Error code	Redundancy check CRC16-2
80	86	03	LSB MSB

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**



**Installation**

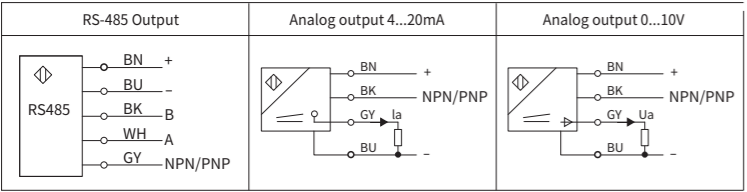


\*For mounting, please keep tightening torque < 0.5N·m

PS-PDB-2023LB V3  
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**Wiring diagram**



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%.