PIKTEC

FJM High Precision Laser Sensor

Warning

1 The light source of this product use visiable laser. It is prohibited to directly or indirectly reflect the laser beam into the eyes. It may cause a risk of blindness if the laser beam enter to eyes.

2 This product does not have explosion-proof structure. Prohibit use inflammable, explosive gas or explosive liquid environments.

3 Do not disassemble or modify this product as it is not designed to automatically turn off laser emission when the product is opened. If the client disassembles or changes this product without permission, it may cause personal injury, fire, or electric shock danger.

4 Do not according the manual to control, adjust or operate may cause dangerous radiation leaks.

Attention

1 Wiring, connecting/disconnecting interfaces, and other operations when the power is turned on are very dangerous. Please be sure to turn off the power before operation.

2 Installation in the following places may cause malfunctions:

A place full of dust or steam

A place where have corrosive gases

A place where water or oil can directly spill

A place with serious vibration or impact

3 This product is not suitable for outdoor use.

4 Do not use this sensor in an unstable state(eg:short time after power turned on), need about 15 minutes warm up time.

5 If it is necessary to use a switching power regulator, please ground the grounding terminal. Do not connect to high-voltage cables or power lines. Failure to operate will cause sensor damage or malfunction,each product in differences, Therefore, there may be slight differences in the detection characteristics of the product.

6 Do not use this product in water.

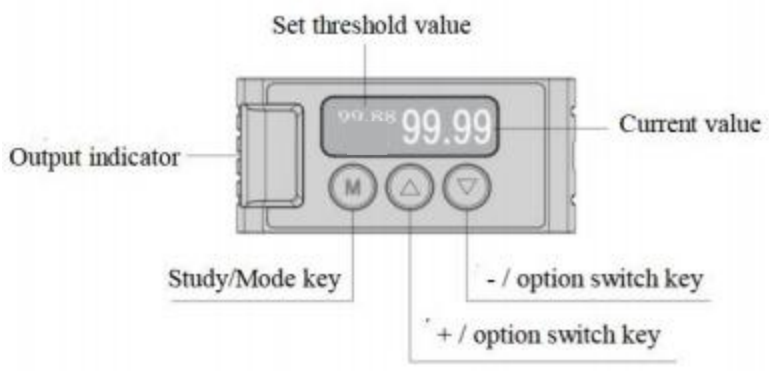
7 Please do not disassemble, repair, or modify this product without authorization, as this may result in electric shock, fire, or injury to the human body.

8 Clean the dust on the transmitting or receiving components to maintain correct detection. Avoid direct impact of objects on this product

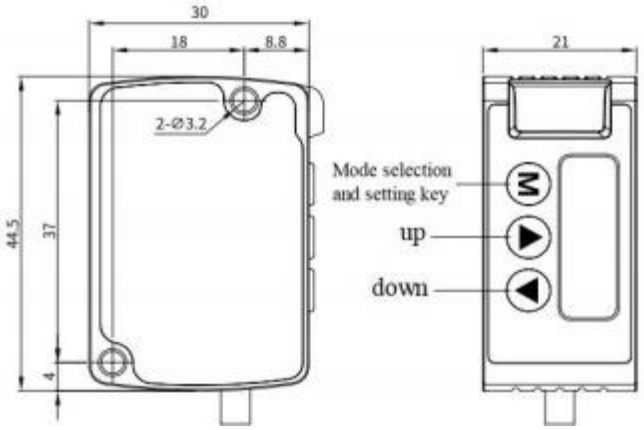
9 Operate within the rated range.

This product can not be used as a safety device to protect the human body

Panel Description

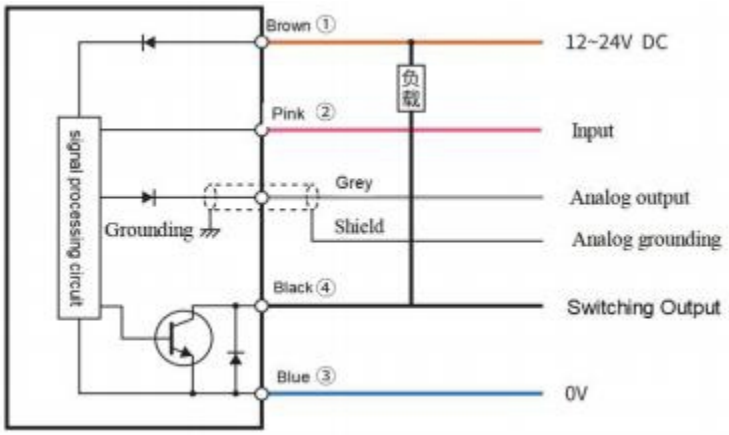


Dimension drawing

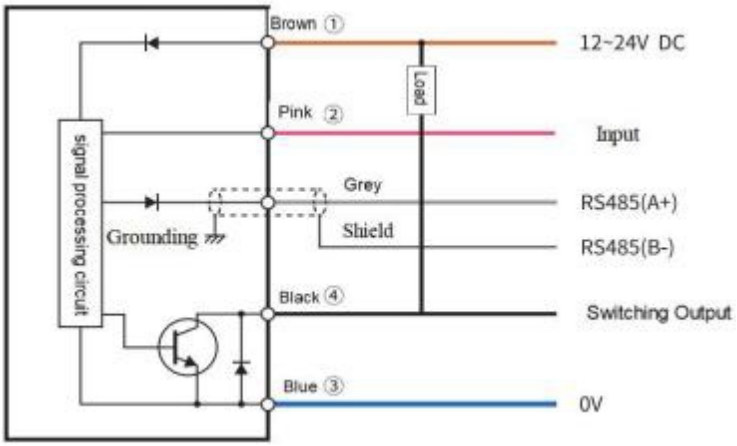


Circuit Diagram

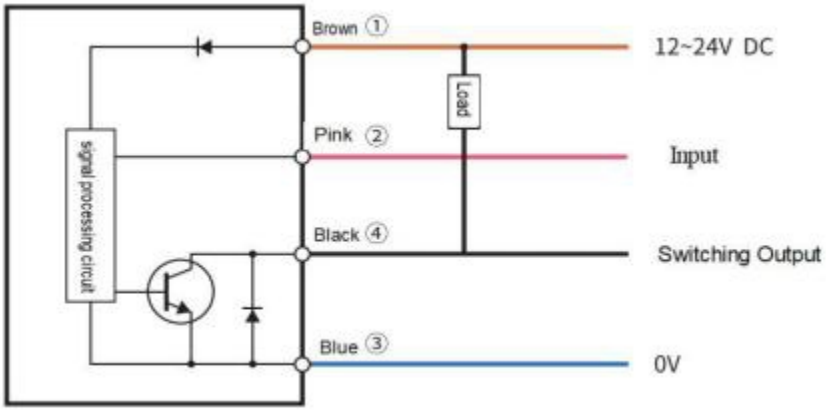
NPN+Analog quantity



NPN+RS485



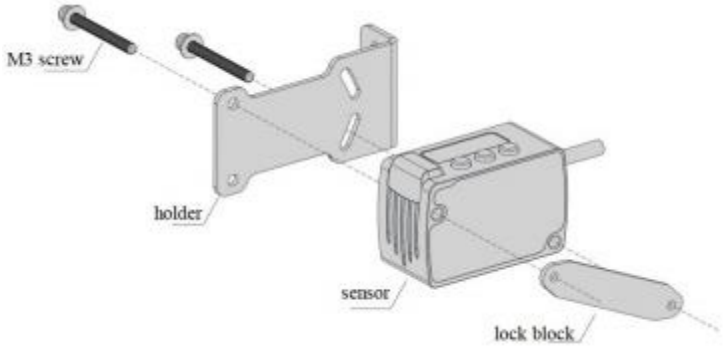
NPN



Specification

lodel No	NPN	FJM-235PB
	NPN+Analog	FJM-235POB
	NPN+RS485	FJM-235PB-485
Detection Type		Diffuse reflection
Datum (center) Distance		235mm
Sensing Range(F.S.)		35~435mm
Full Scale		400mm
Repeat Accuracy		35~135mm: 0.1mm 135~235mm:0.3mm 235~335mm:0.8mm 335~435mm:1.5mm
Linear Precision		35~200mm:±0.1% F.S. 200~400mm:±0.2% F.S. 400~435mm:±0.3% F.S.
Temperature Drift		±0.03% F.S./℃
Light Source	Mediun	Red laser, wavelength 655nm
	Output Power	<1mW
	Laser Class	IEC Class 2
Output	Switching Output	NPN Open collector, ≤ 50mA/DC 24V, residual voltage<1.5V
	Analog Output	Analog voltage: 0~5V (5.2V during alarm); Analog current: 4~20mA (alarm: 0mA), switchable
Output Operation		Light.on/Dark.on selectable
Response Time		1.5ms/5ms/10ms, switchable
Operation Voltage		DC 12~24V ±10%
nsumption (no-load) Current		<30mA (at supply voltage 24V DC) , <60mA (at supply voltage 12V DC)
Indicator		Output indicator light: yellow; Power indicator light : green
Ambient Illuminace		Incandescent lamp ≤ 3000Lux; Sunlight ≤ 20000Lux
Ambient Temperature		Operation temperature: -10℃~45℃; Storage temperature: -20℃~60℃ (no freezing)
Ambient Humidity		Operation humidity: 35%~85% RH; Storage humidity: 35%~85% RH (no condensation)
Protection Circuit		reversal protection/surge protection/short circuit protection
Protection Level		IP67(IEC)
Vibration Resistance		10~55Hz , dual amplitude 1.5mm, X/Y/Z each direction 30 min
Impact Resistance		300m/s2 X/Y/Z each direction 3 times
Material	Housing Material	aluminum alloy
	Lens	PMMA
	Cable	PVC
Connection Type		Include 2 meters 5 core standard cable (cable diameter 4.0mm), can be customize
Weight		about 85g (include 2 meters 5 core standard cable)

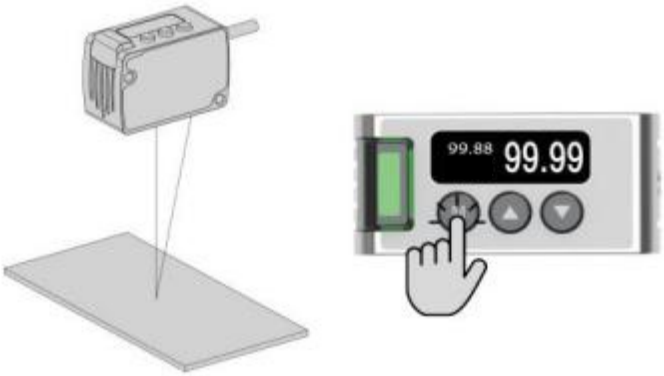
Installation Steps



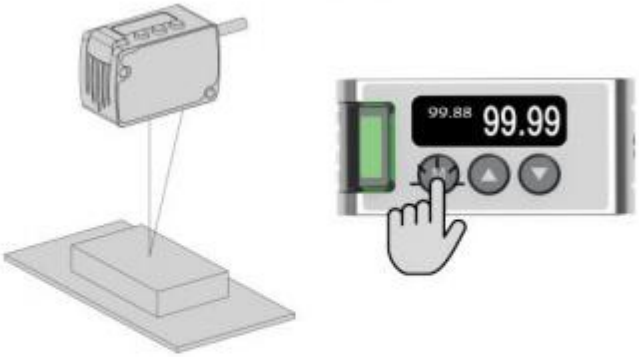
Product Function Settings

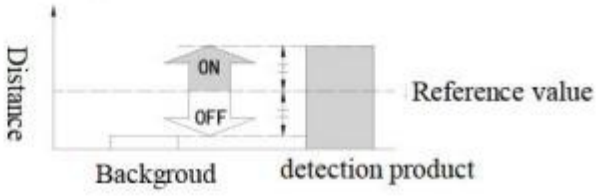
A. 2-point teaching

① Press the "M" button when there are no objects.



② Press the "M" key when there is an object present

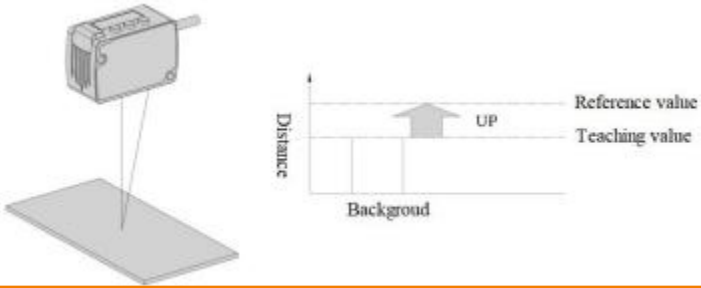




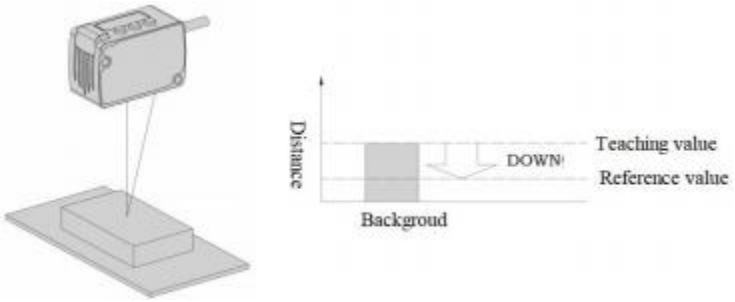
③Complete calibration. (When the difference between two times teachings is small, display deviation too small,and it is necessary to widen the difference and teach again)

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

a With background for reference



b When detecting objects for refernce



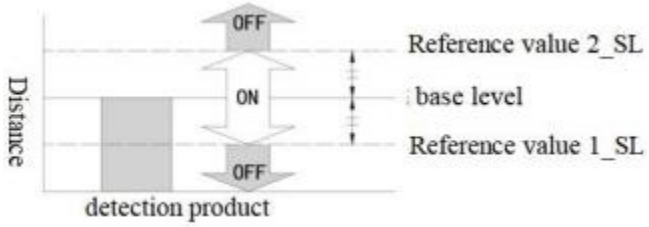
① Press the "M" button when in a background state or there is a detected object.
② With the background object as the reference, press the " ▲ " button to set the reference value in the sensor. When the object is detected as the reference, detecting the set value of the objec after press the " ▼ " button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

C. 1-point teaching (Window Compare Mode)

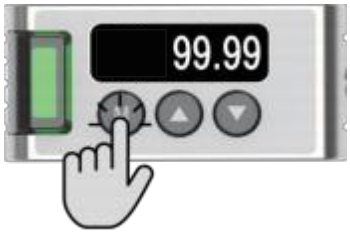
The method of setting upper and lower limit values is implemented instead of implementing 1-point teaching for the distance between the reference plane of the detected object. Use this function when discriminating within the upper and lower limits.

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.

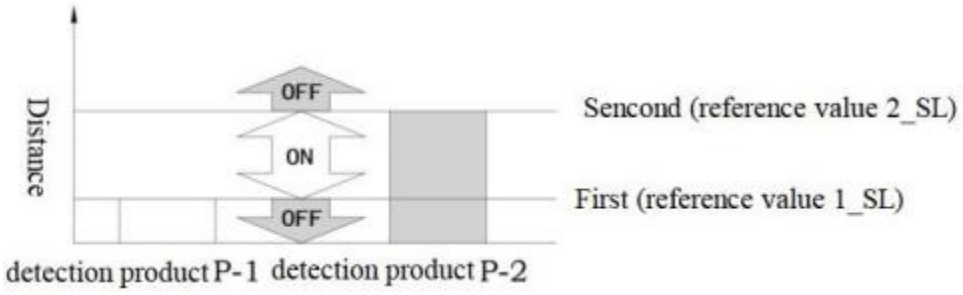


D 2-point teaching (window comparison mode)

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

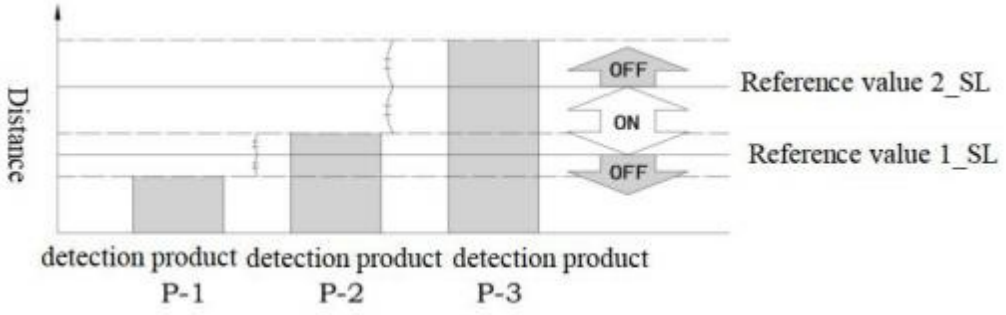
E 3-point teaching (window comparison mode)

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

F. Background teaching mode

Facing the background, short press the SET key first, then long press the SET key to complete the instruction;
In this mode, you can to detect any non transpaent objects in a non background state

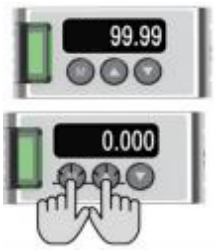
G. Super background teaching mode

Set the teaching mode to “super background” first, facing th background, press the SET key shortly, and then long press the SET key to complete the instruction; in this mode, any project in a non background state can be detected; (especial for transpaent objects, it can detect the presence or absence of transparent objects, but cannot detect thickness,distance of transparent workpiece)

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.

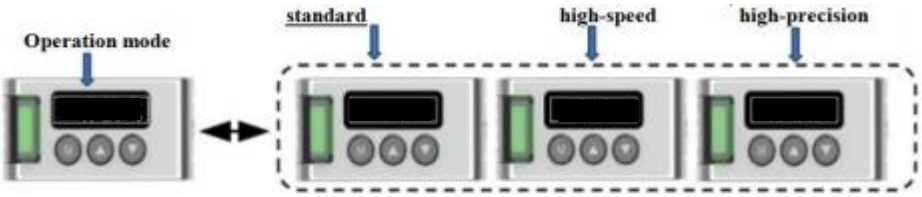
Menu setting

Press and hold the "M" key 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.

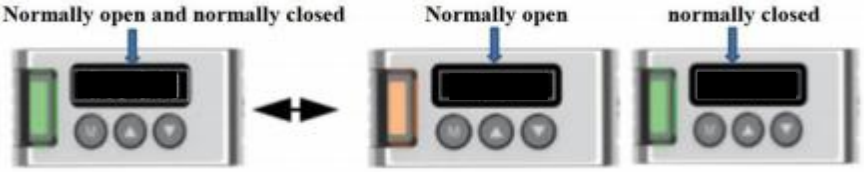
In menu setting mode, stop for 20 seconds without pressing any buttons to automatically exit menu setting mode. After enter the menu setting mode, press the " ▲ " or " ▼ " keys to switch menus up and down.

Short press the "M" key to enter the corresponding menu

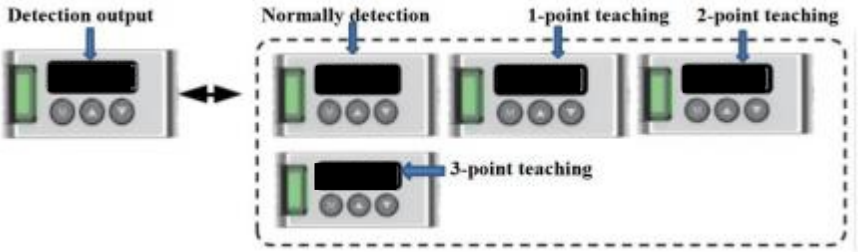
◯ Operation mode: standard, high speed, high precision



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



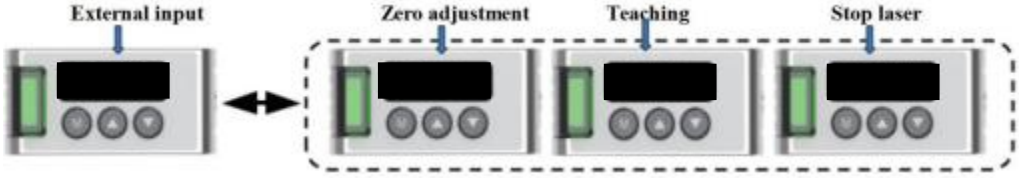
③ Detection output: Normal mode, one point teaching, two point teaching, and three point teaching.



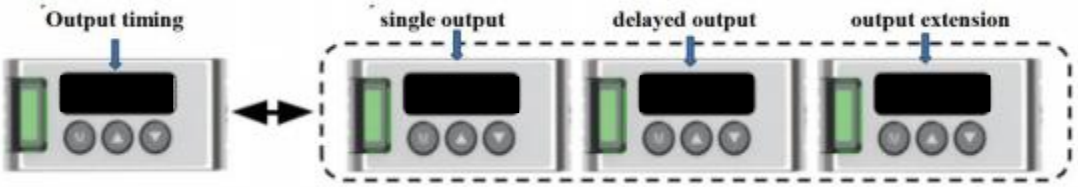
④ Analog selection: 0-5V, 4-20mA.

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.

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;

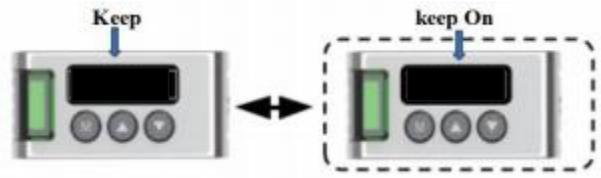


⑦ Timer : output delay, delayed output, single output, output extension, no timing. The default 5ms is not adjustable.

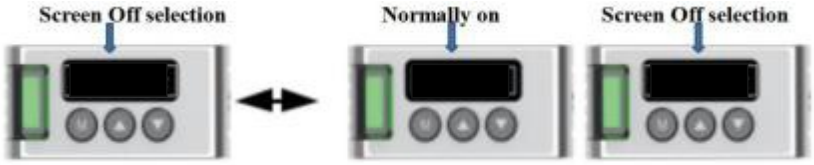


⑧ Display mode: Standard, reverse [changes the current detection value from "+35~-35" to "-35~+35", and the corresponding "0-5V" or "4-20mA" is reversed to "5-0V" or "20-4MA"], with an offset of ± 35 numerical values Change to 0-70.

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.】



⑩ Screen Off selection: Normally on, timed screen Off .



BL series MODBUS protocol

Communication specific ation

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						Response					
Address code	Function code	Register address	Number of register N	CRC	Function Des	Address code	Function code	Number of bytes 2N	Register value	CRC	Response Des
0x01	0x04	0x0000	0x0002	0x71CB	Obtain -distance	0x01	0x04	0x04			distance
0x01	0x04	0x0001	0x0001	0x600A	Obtain - operation mode	0x01	0x04	0x02	0x0000	0xB930	high-precision
									0x0001	0x78F0	standard
									0x0002	0x38F1	high-speed
0x01	0x04	0x0002	0x0001	0x900A	Obtain - NO/NC	0x01	0x04	0x02	0x0000	0xB930	NO
									0x0001	0x78F0	NC
0x01	0x04	0x0003	0x0001	0xC1CA	Obtain - detection output	0x01	0x04	0x02	0x0000	0xB930	normally detection
									0x0001	0x78F0	1-point teach
									0x0002	0x38F1	2-point teach
									0x0003	0xF931	3-point teach
0x01	0x04	0x0004	0x0002	0x300A	Obtain - Tolerance	0x01	0x04	0x04			tolerance
0x01	0x04	0x0005	0x0001	0x21CB	Obtain - external input	0x01	0x04	0x02	0x0000	0xB930	zero adjustment
									0x0001	0x78F0	teaching
									0x0002	0x38F1	stop laser
0x01	0x04	0x0006	0x0001	0xD1CB	Obtain - output timing	0x01	0x04	0x02	0x0000	0xB930	Untimed
									0x0001	0x78F0	output extension
									0x0002	0x38F1	delay output
									0x0003	0xF931	single output
0x01	0x04	0x0007	0x0001	0x800B	Obtain - output timing time	0x01	0x04	0x02			setting time
0x01	0x04	0x0008	0x0001	0xB008	Obtain - display mode	0x01	0x04	0x02	0x0000	0xB930	Normally
									0x0001	0x78F0	Reverse
									0x0002	0x38F1	Offset
0x01	0x04	0x0009	0x0001	0xE1C8	Obtain - keep	0x01	0x04	0x02	0x0000	0xB930	keep On
									0x0001	0x78F0	keep Off
0x01	0x04	0x000A	0x0001	0x11C8	Obtain - screen off selection	0x01	0x04	0x02	0x0000	0xB930	time screen off
									0x0001	0x78F0	Normally on
0x01	0x04	0x000B	0x0002	0x0009	Obtain zero adjustment value	0x01	0x04	0x04			adjustment value
0x01	0x04	0x000C	0x0002	0xB1C8	Obtain - threshold 1	0x01	0x04	0x04			threshold 1
0x01	0x04	0x000D	0x0002	0xE008	Obtain - threshold 2	0x01	0x04	0x04			threshold 2
0x01	0x04	0x000E	0x0002	0x1008	Obtain - BAUD	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								Response				
Address code	Function code	Register address	Number of register	Number of bytes	Register value	CRC	Function setting	Address code	Function code	Register address	Number of register	CRC
0x01	0x10	0x0000	0x0001	0x02	0x0000	0xA650	Discontinuous output	0x01	0x10	0x0000	0x0001	0x01C9
					0x0001	0x6790	Continuous output					
0x01	0x10	0x0001	0x0001	0x02	0x0000	0xA781	high-precision	0x01	0x10	0x0001	0x0001	0x5009
					0x0001	0x6641	standard					
					0x0002	0x2640	high-speed					
0x01	0x10	0x0002	0x0001	0x02	0x0000	0xA7B2	NO	0x01	0x10	0x0002	0x0001	0xA009
					0x0001	0x6672	NC					
					0x0000	0xA663	normally detection					

0x01	0x10	0x0003	0x0001	0x02	0x0001	0x67A3	1-point teach	0x01	0x10	0x0003	0x0001	0xF1C9
					0x0002	0x27A2	2-point teach					
					0x0003	0xE662	3-point teach					
0x01	0x10	0x0004	0x0002	0x04			tolerance	0x01	0x10	0x0004	0x0002	0x4008
0x01	0x10	0x0005	0x0001	0x02	0x0000	0xA605	zero adjustment	0x01	0x10	0x0005	0x0001	0x11C8
					0x0001	0x67C5	teaching					
					0x0002	0x27C4	stop laser					
0x01	0x10	0x0006	0x0001	0x02	0x0000	0xA636	Untimed	0x01	0x10	0x0006	0x0001	0xE1C8
					0x0001	0x67F6	output extension					
					0x0002	0x27F7	delay output					
					0x0003	0xE637	single output					
0x01	0x10	0x0007	0x0001	0x02			setting time	0x01	0x10	0x0007	0x0001	0xB008
0x01	0x10	0x0008	0x0001	0x02	0x0000	0xA718	Normally	0x01	0x10	0x0008	0x0001	0x800B
					0x0001	0x66D8	Reverse					
					0x0002	0x26D9	Offset					
0x01	0x10	0x0009	0x0001	0x02	0x0000	0xA6C9	keep On	0x01	0x10	0x0009	0x0001	0xD1CB
					0x0001	0x6709	keep Off					
0x01	0x10	0x000A	0x0001	0x02	0x0000	0xA6FA	time screen off	0x01	0x10	0x000A	0x0001	0x21CB
					0x0001	0x673A	Normally on					
0x01	0x10	0x000B	0x0001	0x02	0x0001	0x66EB	zero adjustment-current detection value	0x01	0x10	0x000B	0x0001	0x700B
0x01	0x10	0x000C	0x0002	0x04			threshold-input threshold	0x01	0x10	0x000C	0x0002	0x81CB
0x01	0x10	0x000D	0x0002	0x04			threshold-input threshold	0x01	0x10	0x000D	0x0002	0xD00B
0x01	0x10	0x000E	0x0002	0x04	0x000012C0	0x7ED3	4800	0x01	0x10	0x000E	0x0002	0x200B
					0x00002580	0x6913	9600					
					0x00009600	0x1D83	38400					
					0x0001C200	0x7283	115200					
					0x0003E800	0xCC23	256000					
0x01	0x10	0x000F	0x0001	0x02	0x0000	0xA6AF	reset	0x01	0x10	0x000F	0x0001	0x31CA

Product Warranty

When ordering our products only reference sample, the following guarantees, disclaimers, conditions of fitness etc should apply when no special instructions are mentioned in the quotation sheet, contract, specification, etc.

Before order please ensure you read and confirming following.

1、 Quality Guarantee Period

Quality guarantee period is one year,calculate d from the date when product delivered to buyer's destination.

2、 Range of guarantee,

We will repair the commodity free if the damage caused by our company.

It's will not belong to the range of guarantee if caused by following reason:

1) Damage caused by use under conditions except the conditions, environment and use method described in the product manual of the company.
2) Faults not caused by our company.
3) Product damage caused by the personal modification and repair except the manufacturer.
4) Didn't according to usage method of our company description
5) After the goods are delivered, the problem caused by unpredictable scientific level
6) Other failures caused by natural disasters, disasters and other factors.

At the same time, the above guarantee only refers to the company's products, and the other damage caused by the company's product failure is excluded from the guarantee range.

3、 limits of liability

1) The Company should not be liable for any special loss, indirect loss, and other related losses (eg:equipment damage, loss of opportunity, loss of profit) caused by incorrect use of company's products.
2) When using programmable equipment, our company will not assume any responsibility for the programming carried out by non-company personnel and the consequences arising therefrom

4、 Suitable for use and conditions

1) The products of our company are designed and manufactured for general products of general industry. So, the product of our company should not be used for the following applications and not suitable for their use.If it is necessary to be used in the following occasions, please discuss with the sales of our company to confirm the product specification, and select the product which suitable. At the same time, we should consider various safety countermeasur es, such as the safety circuit that can minimize the danger even if there is a failure.

a. Facilities that have a serious impact on life and property, such as atomic energy control equipment, incineration equipment, railway, aviation and vehicle equipment, medical equipment, entertainment equipment, safety devices and equipment that must comply with the special provisions of administrative agencies and individual industries.

b. Public utilities such as gas, water, power supply systems, 24- hour continuous operation systems and other equipment requiring high reliability.

c. Systems, equipment and devices that may endanger personal and property.

d. Outdoor use under similar or similar conditions.

2) When the user uses the company's products in occasions closely related to personal and property safety, the overall risk of the system should be clear. In order to ensure safety, special redundancy design should be adopted. At the same time, according to the applicable purpose of the company's products in the system, supporting power distribution and settings should be supply.
3) Please be sure to follow the precautions and prohibitions to avoid incorrect use and damage caused by a third party.

5、 Range of Services

The product price does not include the dispatch fee of technicians and other service fees. If you have any demand in this, you can contact us to negotiate.