BLF Series Displacement Sensor User Manual

Warning

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.

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

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.

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

Attention

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.

Installation in the following place may cause malfunctions:

1、place full of dust or steam

2、place where have corrosive gases

3、place where water or oil can directly spill

4、place with serious vibration or impact

This product is not suitable use for outdoor or strong direct light.

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

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.

Do not use this product in water.

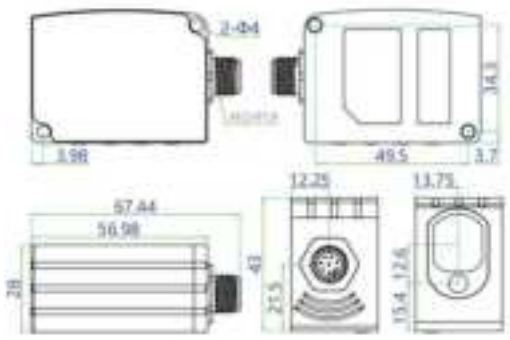
Please do not disassemble, repair, or modify this product without authorization, as this may result in electric shock, fire, or injury to the human body.

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

Operate within the rated range.

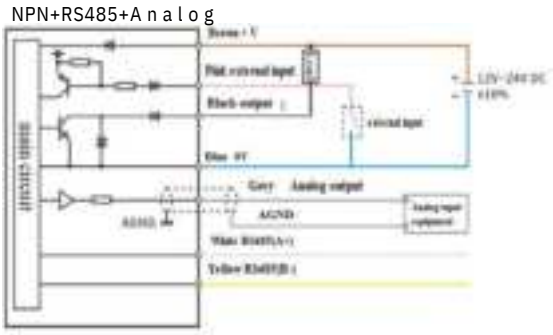
⚠ This product can not used as a safety device to protect the human body

Dimension Drawing

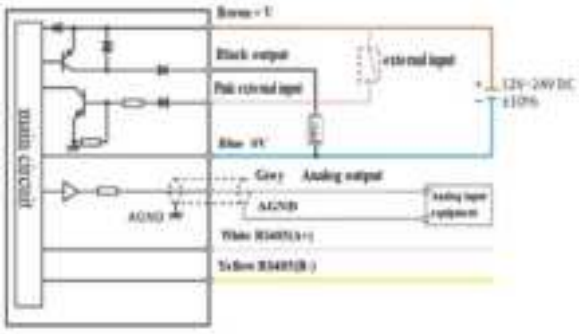


Circuit Diagram

NPN+RS485+A n a l o g



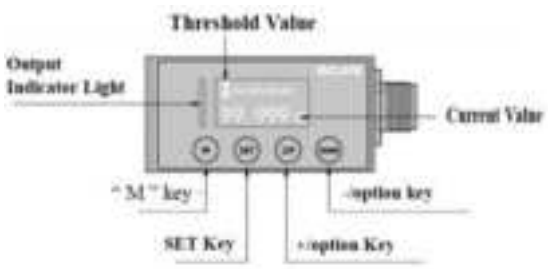
PNP+RS485+A n a l o g



Specifications

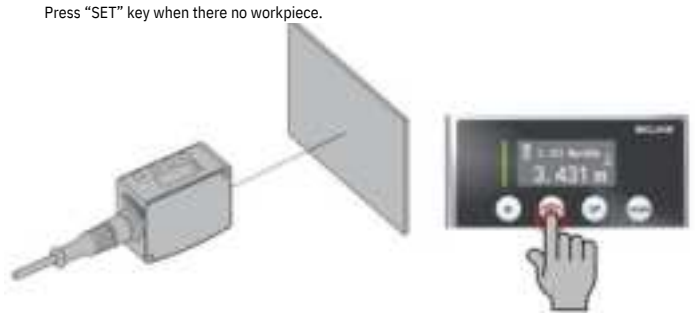
NPN+Analog+485	BLF-100NM-485	BLF-200NM-485	BLF-500NM-485
PNP+Analog+485	BLF-100PM-485	BLF-200PM-485	BLF-500PM-485
Sensing range	0.1m~1m	0.1m~2m	0.1m~5m
NPN+Analog+485	BLF-M10NM-485	BLF-M20NM-485	BLF-M50NM-485
PNP+Analog+485	BLF-M10PM-485	BLF-M20PM-485	BLF-M50PM-485
Sensing range	0.1m~10m	0.1m~20m	0.1m.~50m
Resolution ratio	1mm		
Measurement tolerance	±(2mm+d*0.11‰)		
Light source	Red LED II laser 655 ±10nm<1mW		
Supply voltage	12V~24VDC ±10% PP10%		
Consumption current	≤50mA @24V		
Control Output	NPN or PNP open drain outputs Open drain collector transistor output Max current：50mA Applied voltage：less than 30V DC Residue voltage：less than 1.5V Leakage current：less than 0.1mA		
Output operation	Normally open/Normally close switchable		
Circuit protection	Automatic recovery type		
Analog voltage output	Range: 0~5V(alarm：5.2V) Output impedance：100Ω		
Analog current output	Range:4~20mA(when alarm：0mA) Output impedance：max 300Ω		
Response time	50-200ms		
External input	NPN non-contact input		
Protection degree	P65		
Operationtemperature	-10C ~ +45C (no condense no freeze)		
Storage temperature	-20℃~+65℃		
Operation Humidity	35%~85% RH		
Ambient illuminance	Incandescent lamp:≤ 3000Lx		
Application height	Less than 2000m		
Cable	8 core 2 meter		
Mat er ial	Aluminum		
Weight	150g		
	Indicates the measurement distance. In harsh environments, such as strong sunlight, large temperature fluctuations, and dark reflection surfaces, there may be significant errors in the measurement results. In such cases, increasing the use of the target reflector plate is more effe ct ive		

Panel Description

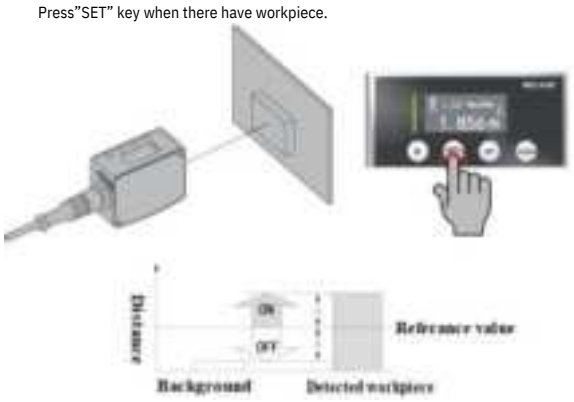


A 2pointteaching

Press “SET” key when there no workpiece.



Press”SET” key when there have workpiece.

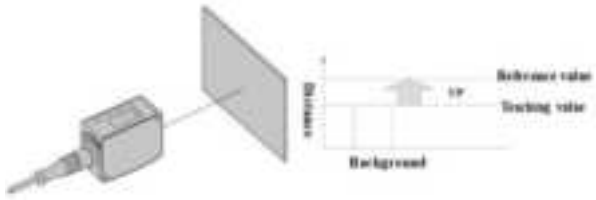


PressCompletecalibration.(whenthedifferencebetweentwotimesteachingissmall,display Deviation too small, and it is necessary to widen the difference and teach again.)

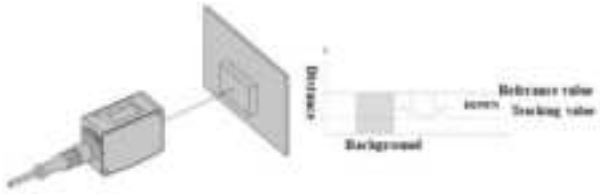
B Limitedteaching

In the case of small objects and backgrounds

a. with the background for reference



b. when detecting objects for reference



①Press “SET” key when in a background state or there is a detected object.

②With the background object as the reference, press the "UP" key 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 " DOWN" button

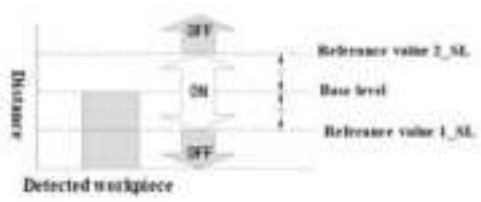
③Complete calibration

C 1pointteaching(windowcomparemode)

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 PRO mode to [1 point teaching (window comparison mode)] in advance.

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



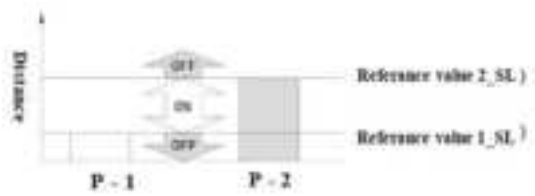
Press the "SET" key twice when there is an object being detected

Teaching completed.

D 2pointteaching(windowcomparemode)

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.

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



Press the "SET" button (1st time) when there is a detected product P-1

Press the "SET" button (second time) while detecting product P-2

Complete calibration

E 3 point teaching (window compare mode)

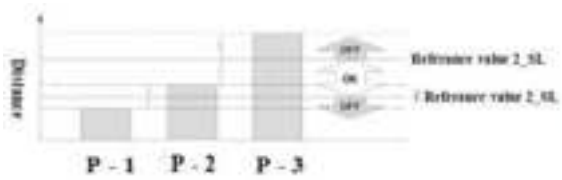
Perform 3- point (P-1, P-2, P-3) teaching, as shown in the following picture, and set the reference value 1_ SL between the 1st and 2nd times.

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.

When teaching, please use the detection product (P-1, P-2,P-3) with different distance.

After teaching, P-1, P-2, and P-3 will be automatically arranged in ascending order.



Press the "SET" button (1st time) when there is a detected product P-1.

Press the "SET" button (second time) while detecting product P-2.

Press the "SET" button (3rd time) while detecting product P-3.

Complete calibration

Threshold Fine Tuning Function

Normally detection mode :

Press the "UP" or "DOWN" keys to directly change the threshold

Window comparison mode :

Short press the "M" key to 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 "UP" keys meanwhile to zero adjustmentsetting

Press the "M" and "UP" keys meanwhile to cancel the zero adjustment

Key Locking Function

Press the "M" and "DOWN" keys meanwhile to lock the keys.

Press the "M" and "DOWN" keys meanwhile to unlock.

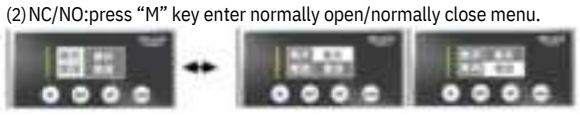
Menu Setting

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.

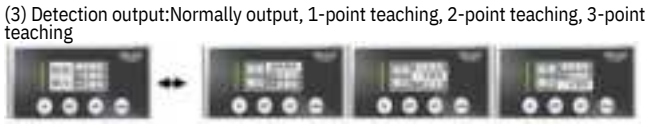
After enter the menu setting mode, Do not press any keys within 20 seconds, will exit the menu setting mode. press the "UP" or "DOWN" keys to switch menus up and down.Short press the "SET" key to enter the corresponding menu

(1) Operation mode: standard and high precision

(2)NC/NO:press “M” key enter normally open/normally close menu.



(3) Detection output:Normally output, 1-point teaching, 2-point teaching, 3-point teaching



(4) Analog selection：0~5V、4~20m A

(5)Tolerance： Only effective for switch output, can adjust the distance of switch disconnection。

(6) External input: when selecting the corresponding function, short circuit the pink wire to the negative pole of the power supply once(more than 30ms) to ttrigger once;

Zero adjustment: The current value is reset to zero (only valid if the display mode is offset or reverse)

Teaching: It can be used as a single press ofthe "M" button ;

Stop measurement: The sensor stop continuous measurement and stop emitting laser at the same time.

(7) Timer: ON-delay, OFF-delay, one-shot timer, Output extension, no timing, time setting. (default 5ms adjustable)

(8) Displaymode:Standard(actualdistance),reverse(thecenterpointoftherangeis0 points, the direction close to the sensor is positive, and vice versa is negative), offset (the farthest range is 0 points, and the distance close to the sensor direction increases)

(9) The default is keep off, and you can select keep on by use “up” and “down” buttons, 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.

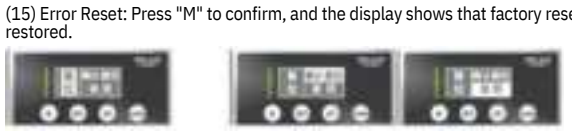
11) Address: Range1-255(only have this menu in 485 version)

(12)Baud rate: 9600/19200/38400/57600/115200/256000 optional.

(13) Measurement reference: front reference (the front end of the product is used as the 0 point position), back reference (The backend of the product serves as the 0 point position)

(14)Distance correction: The distance deviation can be manually set to correct the overall distance error.

(15) Error Reset: Press "M" to confirm, and the display shows that factory reset have been restored.



(16) Language: Provide two language options: Chinese and English.

BLF Series MODBUS Protocol

Communication method	R485
Synchronous way	asynchronous
BAUD rate	9.6/19.2/38.4/57.6/115.2/256kbps
Data length	8 bits
Stop bit	1bits
Parity check	No

03H Instruction (Read Input Register)				
1、Communication frame format				
1byte	1byte	2byte	2byte	2byte
Address Code	Function code	Register address	Number of Register N	CRC code
2、Response frame format				
1byte	1byte	1byte	2N byte	2byte
Address Code	Function code	Number of Bytes 2N	Register value	CRC code
3、Error Frame Format				
1byte	1byte	1byte	2byte	
Address Code	Error code	Exception code	CRC code	

Read Data					
Address Code	Function code	Register address	Number of Register N	CRC	Function description
0x01	0x04	0x0000	0x0002	0x71CB	Obtain-Distance
0x01	0x04	0x0001	0x0001	0x806A	Obtain-Operation Mode
0x01	0x04	0x0002	0x0001	0x906A	Obtain-NO/NC
0x01	0x04	0x0003	0x0001	0xC1CA	Obtain-Detection output
0x01	0x04	0x0004	0x0002	0x300A	Obtain-Hysteresis
0x01	0x04	0x0005	0x0001	0x71CB	Obtain-External Input
0x01	0x04	0x0006	0x0001	0xD1CB	Obtain-Output timer
0x01	0x04	0x0007	0x0001	0x808B	Obtain-Output time
0x01	0x04	0x0008	0x0001	0xB908	Obtain-Display Mode
0x01	0x04	0x0009	0x0001	0xE1C8	Obtain-Hold
0x01	0x04	0x000A	0x0001	0x11C8	Obtain-ECO setting
0x01	0x04	0x000B	0x0002	0x0009	Obtain-Zeroing
0x01	0x04	0x000C	0x0002	0xB1C8	Obtain-Threshold 1
0x01	0x04	0x000D	0x0002	0x2008	Obtain-Threshold 2
0x01	0x04	0x000E	0x0002	0x1008	Obtain-BAUD

Response					
Address Code	Function code	Number of bytes 2N	Register value	CRC	Response Description
0x01	0x04	0x04			Distance
0x01	0x04	0x02	0x0000	0x8910	High Precision
			0x0001	0x785F0	Standard
			0x0002	0x185F1	High speed
0x01	0x04	0x02	0x0000	0x8910	NO (Normally open
			0x0001	0x785F0	NC (Normally close)
0x01	0x04	0x02	0x0000	0x8910	Issuing
			0x0001	0x785F0	1-point teach
			0x0002	0x185F1	2-point teach
			0x0003	0xF911	3-point teach
0x01	0x04	0x04			Hysteresis
0x01	0x04	0x02	0x0000	0x8910	Zero set
			0x0001	0x785F0	Teaching
			0x0002	0x185F1	Light emitting stop
0x01	0x04	0x02	0x0000	0x8910	no timer
			0x0001	0x785F0	OFF-delay
			0x0002	0x185F1	ON-delay
			0x0003	0xF911	one-shot timer
0x01	0x04	0x02			timer setting
0x01	0x04	0x02	0x0000	0x8910	Normal
			0x0001	0x785F0	Invert
			0x0002	0x185F1	offset
0x01	0x04	0x02	0x0000	0x8910	Hold on
			0x0001	0x785F0	Hold off
0x01	0x04	0x02	0x0000	0x8910	ECO OFF
			0x0001	0x785F0	ECO ON
0x01	0x04	0x04			Zeroing Value
0x01	0x04	0x04			Threshold 1
0x01	0x04	0x04			Threshold 2
0x01	0x04	0x04	0x00001C20		4800
			0x00007580		9600
			0x00009600		38400
			0x0001C200	0xFBE4	115200
			0x0003E800		256000

04H Instruction (Write Multiple Holding Registers)						
1、Communication frame format						
1byte	1byte	2byte	2byte	1byte	2*N byte	2byte
Address code	Function code	Register address	Number of register N	Byte 2N	Register Value	CRC code
2、Response frame format						
1byte	1byte	2byte	2byte	1byte		
Address code	Function code	Register address	Number of register N	CRC code		
3、Error Frame Format						
1byte	1byte	1byte	2byte			
Address code	Error code	Exception code	CRC code			

Operation Function						
Address code	Function	Register address	Number of	Bytes	Register Value	CRC	Function Setting
0x01	0x10	0x0000	0x0001	0x02	0x0000	0xA050	Discontinuous
					0x0001	0x6190	Continuous m
0x01	0x10	0x0001	0x0001	0x02	0x0000	0xA781	High precision
					0x0001	0x6841	Standard
					0x0002	0x3840	High speed
0x01	0x10	0x0002	0x0001	0x02	0x0000	0xA7B	NO
					0x0001	0x6872	NC
0x01	0x10	0x0003	0x0001	0x02	0x0000	0xA4F0	Normally ope
					0x0001	0x67A2	1-point teach
					0x0002	0x27A2	2-point teach
					0x0003	0xE8F2	3-point teach
0x01	0x10	0x0004	0x0002	0x04			Hysteresis
0x01	0x10	0x0005	0x0001	0x02	0x0000	0xA050	Zero adjustme
					0x0001	0x67C2	Teach
					0x0002	0x27C4	Stop laser
0x01	0x10	0x0006	0x0001	0x02	0x0000	0xA838	Unused
					0x0001	0x67F8	Output extensi
					0x0002	0x17F7	Delay output
					0x0003	0xE857	Single output
0x01	0x10	0x0007	0x0001	0x02			Time of no tar
0x01	0x10	0x0008	0x0001	0x02	0x0000	0xA718	Normally
					0x0001	0x6BD8	Reverse
					0x0002	0x2BD9	Drift
0x01	0x10	0x0009	0x0001	0x02	0x0000	0xA6C	Keep open
					0x0001	0x6759	Keep close
0x01	0x10	0x000A	0x0001	0x02	0x0000	0xA6F	Timed screen
					0x0001	0x671A	Keep screen o
0x01	0x10	0x000B	0x0001	0x02	0x0001	0x69EB	Zero adjustment - current
0x01	0x10	0x000C	0x0001	0x02	0x0001	0x6F3C	Threshold - Current measured
0x01	0x10	0x000D	0x0001	0x02	0x0001	0x6ED3	Threshold - Current measured
0x01	0x10	0x000E	0x0002	0x04	0x00001C20	0x7ED1	4800
					0x00007580	0xA011	9600
					0x00009600	0x1DD1	38400
					0x0001C200	0x7183	115200
					0x0003E800	0xCC21	256000

Response				
Address code	Function code	Register address	Number of	CRC
0x01	0x10	0x0000	0x0001	0xD1C9
0x01	0x10	0x0001	0x0001	0xC009
0x01	0x10	0x0002	0x0001	0xA009
0x01	0x10	0x0003	0x0001	0xF1C9
0x01	0x10	0x0004	0x0002	0x4008
0x01	0x10	0x0005	0x0001	0x11C8
0x01	0x10	0x0006	0x0001	0xE1C8
0x01	0x10	0x0007	0x0001	0x808B
0x01	0x10	0x0008	0x0001	0x908B
0x01	0x10	0x0009	0x0001	0x00CB
0x01	0x10	0x000A	0x0001	0xC1CB
0x01	0x10	0x000B	0x0001	0x700B
0x01	0x10	0x000C	0x0002	0x01CB
0x01	0x10	0x000D	0x0002	0xD00B
0x01	0x10	0x000E	0x0002	0x700B

Communication example (acquisition distance)

· Sending a command

01 04 00 00 00 02 71 CB

Address code	Function code	Register address	Number of register	CRC
01	04	0000	0002	71CB

· BLFresponse

01 04 04 00 01 19 36 21 C2

Address code	Function code	Number of bytes	Register Value-distance	Check code
01	04	04	00 01 19 36	21 C2

00 01 19 36 is the distance information, unit is mm,converted to decimal distance is 71909mm=71.909mm

9600)Communication example (Set the BAUD rate to 9600)

· Sendingacommand

01 10 00 OE 00 02 04 00 00 25 80 69 13

Address code	Function code	Register address	Number of register	Number of bytes	Register value	CRC
0x01	0x10	0x000E	0x0002	0x04	0x00002580	0x6913

· BLFresponse

01 10 00 OE 00 02 20 0B

Address code	Function code	Register address	Number of register	CRC
0x01	0x10	0x000E	0x0002	0x200B

Note:The sensor address code can be set in the function menu, after the address code is changed, the CRC also needs to be changed at the same time

Quanlity Guarantee

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、QualityGuaranteePeriod

Quality guarantee period is one year,calculated 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 outside of 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、Limitsofliability

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、Suitableforuseandconditions

1)The products of our company are designed and manufactured for general products of general industry. So, the products 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 countermeasures, such as the safety circuit that can minimize the danger even if there is a failure.

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.

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

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

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、RangeofServices

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.