LNTECH®

S4 SERIES PHOTOELECTRIC PROTECTOR

INSTALLATION AND USAGE MANUAL

Please read this document carefully and thoroughly before installation and operation, because the correct and optimum use of this product is important for the personal safety. Please give the user this document with the photoelectric protector if you are an agent, a dealer or a machine manufacturer which forms a complete set, because this document is important to guide the user correctly to install and operate.

SHANDONG LAIEN OPTIC-ELECTRONIC TECHNOLOGY CO. ,LTD.

Foreword

This operating instruction manual is designed to address the technical personnel of the machine manufacturer or the machine operator in regards to safe mounting, wiring, commissioning, operation and maintenance of the photoelectric protector.

The photoelectric protector (herein after called "protector") is electro-sensitive protective equipment (ESPE); it is also named "safety light curtain".

It is used in a vertical or horizontal position, can be satisfied wherever hazardous points-of-operation and danger areas require safeguarding.

The protector only protects the rectangular region of the light curtain. If it is installed not to be correct, either operation is not according to the instruction manual and the correlation security working rule, or the stamping equipments have faults, or other possible causes, it is unable to exert the protective function.

Therefore, before installation and operation the protector, please read carefully and understand fully related items in the instruction manual, in particular apprehend about the items stressed as "Warning", "Attention" and so on.

In operating, please understand correctly and fully the operating performance about the protector, operate strictly according to the requests proposed in the instruction manual, stipulate the relevant security working rule.

Application is only introduced that the protector is used on the press in this instruction manual; other applications may be consulted this instruction manual.

The contents of this instruction manual are explained by Shandong Laien Optic-electronic Technology Limited Company, if you have any unclear items, please contact us.

Prohibitions:

On the content, it will be modified because of the improved device or other reasons in the future. Please understand without notification in advance.

This manual is made professionally, but there is still something imperfect. If you have found the unclear place, wrong pages or missing pages, etc, please notify our local LNTECH office of the nearest distributor.

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1 Important Information

1.1 Summarize

This manual contains instruction ,operation,installation,wiring,maintenance and troubleshooting of the S4 series production.

This manual don't offer the instruction of the machine installed the S4 series.The instruction of related machine operation may reference the instruction of machinery manufacture.

1.2 The Makeup of This Manual

This manual contains following chapters:

- Important information contains emphasis information,the makeup of this manual,control dependability information,certificate,directive and so on.
- Basic introduction contains the usage,features, working schematic drawing and terminology,technical parameter data and specification of the S4 series photoelectric protector.
- Setting and introduction of the user self-service function
- Attentions for installation of the protector must be noticed contains calculating a safe distance, determination of placement position and attentions for neighboring placement.
- The function of S4 series parts and shell size.
- Wiring contains wiring instruction for controller terminals,wiring for NPN/PNP output.
- Ajustment
- Check and maintenance
- Troubleshooting

1.3 Control Dependability

The"control dependability"is main indicated that the design ,structure,and connection of the equipment,system and interface should be fufilled with that if the single fault in any of these parts occurs, it shuld not hinder the implementation of the normal stop action, it should be to prevent the start up of the follow-up action before troubleshooting.

S4 series incorporate dual-channel redundancy and self-diagnosis function.

This design complys with IEC/EN 61496-1 and IEC/pr EN 61496-2 standards and meets the requirements for a Type 4 Active Optoelectronic Protective Device, the safest level for safety products. A single fault or an accumulation of faults in the type 4 device should not lead to the loss of the safety function.It will keep the safety function for ever.

1.4 EU Directives Verification

Directives	No.
Machinery Directive	2006/42/EC
Low Voltage Directive	2006/95/EC
EMC Directive	2004/108/EC

1.5 EU Standards Verification

The S4 series is designed in compliance with the following EU standards.

Directives	No.
EN 292	Safety of machinery; basic concepts, general principles for design
EN 60204-1	Machinery safety - Machinery electrical equipment
EN ISO 13849-1	Safety of machinery -- Safety-related parts of control systems -- Part 1: General principles for design
IEC/EN 61496-1	Machinery safety-Electro-sensitive protective equipment-Part 1:General requirements and tests
IEC/pr EN 61496-2	Machinery safety-Electro-sensitive protective equipment-Part 2:Active opto-electronic protective devices

The installation and usage of the S4 series must comply with applicable EU standards(not all list)

Directives	No.
EN ISO 13849-1	Safety of machinery -- Safety-related parts of control systems -- Part 1: General principles for design
EN 61496-1	Machinery safety-Electro-sensitive protective equipment-Part 1:General requirements and tests
IEC/pr EN 61496-2	Machinery safety-Electro-sensitive protective equipment-Part 2: Active opto-electronic protective devices
EN 60204-1	Machinery safety - Machinery electrical equipment
EN ISO 12100-1	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology
EN ISO 12100-2	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles
EN ISO 14121-1	Safety of machinery - Risk assessment - Part 1: Principles
IEC 61508-1…-7	Functional safety of electrical/electronic/programmable electronic safety-related systems
EN 62061	IEC 62061: Safety of machinery - Functional safety of electrical, electronic and programmable control systems
EN 292	Safety of machinery; basic concepts, general principles for design
EN 999	Safety of machinery - The positioning of protective equipment in respect of approach speeds of parts of the human body
EN 13857	Safety of machinery -- Safety distances to prevent hazard zones being reached by upper and lower limbs
EN 692	Machine Security - Mechanical Press
EN 693	Machine Security - Hydraulic Press
EN 201	Injection Molding Machine

1.6 GB Standards Verification

The S4 series must comply with the following GB standards

Directives	No.
GB 5226.1	Machinery safety - Machinery electrical equipment
GB/T 16855-1	Safety of machinery -- Safety-related parts of control systems -- Part 1: General principles for design
GB/T 19436-1	Machinery safety-Electro-sensitive protective equipment-Part 1:General requirements and tests
GB/T 19436-2	Machinery safety-Electro-sensitive protective equipment-Part 2:Active opto-electronic protective devices
GB 4584-2007	Specification of active opto-electronic protective devices for presses
GB/T 15706-1	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology
GB/T 15706-2	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles
GB/T 16856-1	Safety of machinery - Risk assessment - Part 1: Principles
GB/T 20438-1…-7	Functional safety of electrical/electronic/programmable electronic safety-related systems
GB 27607-2011	Mechanical Press - Safety requirements
GB 28243-2012	Mydrolic plate bender- Safety requirements
GB 28240-2012	Shears—Safety requirements

2 Basic Introduction

2.1 Terminology

Emitter

The emitter consists of emitter units; it can emit the modulated light signal.

Sensor

The sensor consists of emitter units and (or) receiver units. It can emit and (or) accept the modulated light and form light curtain with a reflector (or through reflector/mirror). Output a light passing signal or light intercepting signal to controller. In order to be advantageous for the description, sometimes also refers to the emitter and (or) the receiver.

Reflector

The reflector used to reflect the modulated light from emitter units to receiver units.

Mirror

The mirror used to change the light direction of transmission from emitter units to receiver units, to form multi-sides protection light curtain.

Signal cable

The signal cable used to connect the emitter, receiver and the controller, or connect the sensor and controller.

Light curtain device

All the components that the sensor and the reflector of the reflection type, the emitter and the receiver of the direct protection type and the reflector, the emitter and the receiver of the multi-sides protection type, produce the light curtain.

Light beam

The emitter unit sends out the infrared light, forms a bunch of parallel light after passing optics part.

Beam center line

It is the middle line of the light beam.

Light axis pitch

The distance of optical axis between the neighboring two bunches of light, uses to express the light beam density of light curtain, the optical axis spacing is smaller, and the light beam is more crowded.

Detection precision

The light curtains' ability to detect the size of test piece, it means when the light curtain is shaded anywhere, active opto-electronic protective device can have induction function and when the device keeps off state, it needs the diameter value of the smallest test piece.

Protective range

The protector can protect length scope.

Light beam number

It is quantity of the light beams that sending out from emitter, the same as the quantity of the emitter units in the emitter.

Light passing

It is the output state of the protector when the light curtain is not intercepted.

Light intercepting

It is the output state of the protector when the light curtain is intercepted.

2.2 Usage

The Photoelectric Protector is also named Safety Light Curtain, Safety Grating and so on. It is mainly used for mechanical processing equipment, hazardous work areas, machinery and equipment to prevent injury to the operator and caused injury or accident by into the dangerous region, to protect personal safety.

The protector can achieve all trip protection for press which its slide could be stopped by brake at any place in its slide's trip, or can achieve protection of the trip between 30°~180° by using cam.

Using the protector in industrial manipulators, mould shapers, packaging equipments, automatic equipments, jointing pipelining and other operating regions with danger, it can give an alarm after entering the hazardous area or interlock with the safety system of the equipment, to protect personal safety.

2.3 Features

Specifications Varieties, Application Wide
The protective height of conventional products is from 113mm to 1493mm;

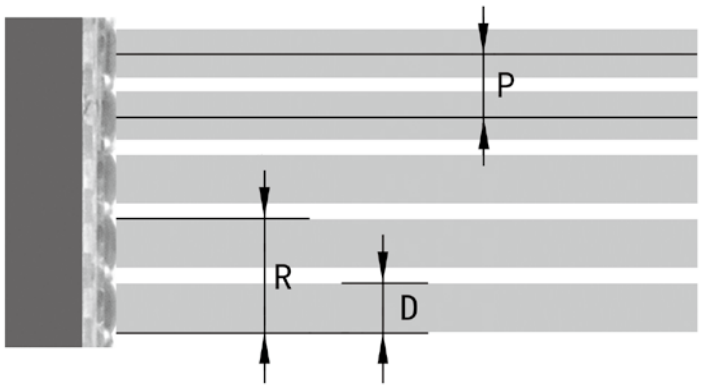
Pefect self-checking function
Ensure that the photoelectric protector don't send the mistaken signal to the controlled electrical equipment when it has faults.

The Self-locking Function
If preset the self-locking function, the press slide stops moving after interception of light curtain. But the press can not be restart, when the light curtain is recovered to passing through state. It shall be restart by pressing the reset button.

Immunity
For the electromagnetism signal,the intense lamplight,the welding and surrounding light source has better immunity.

Durable life and High reliability
Good Anti-vibration
EDM Function
Auxiliary Focusing Function
Floating Blanking Function
Fixed Blanking Function
Wiring Indicating Function
Troubles Indicating Function
Second Trigger Function
Elective output mode(NPN or PNP)

2.4 Relations between Light Axis Pitch and Detection precision



P is light axis pitch,
R is detection precision,
D is the width of the lens(6.5mm)
R=P+D
R=14mm,protect the figure
R=21mm,protect the hand or fingure,
R=36mm,protect the arm or hand

Figure 2-1 Relations between light axis pitch and protection object

2.5 Technical Parameters

The protector technical parameters sheet

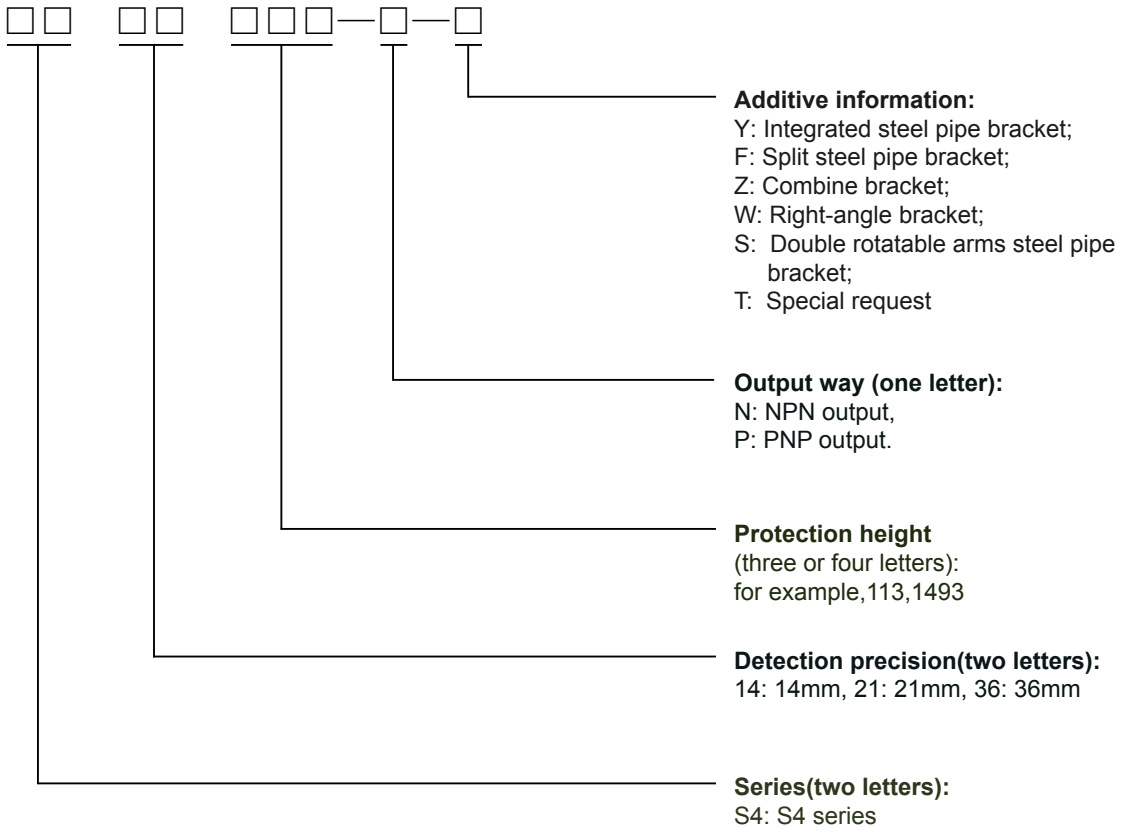
Performance characteristics		
Protective range		0～6000mm
Protective height		H=(beams-1)×light axis pitch
Detection precision		14mm, 21mm,36mm
Light axis pitch		7.5mm,15mm,30mm
Light source		Infrared light, 850nm
EAA		Max 2.5°
Resistance to light interference		10000Lux (angle of incidence >=5°)
Electrical properties		
Operating power		DC24V±15%
Power consumption		<10W(without load)
Control output		Dual transistor output（PNP or NPN）、load current 100mA，residual voltage below 1.4V
Auxiliary output		Single transistor output （PNP）、load current 120mA，residual voltage below 1.4V
Response time		5～35ms
Status indicator	Emitter	light passing(green),light intercepting(red),LED indicator light;state,fault indicator(LED display)
	Receiver	light passing(green),light intercepting(red),LED indicator light;state、fault indicator(LED display)
Noise immunity		IEC61000-4-4：level Ⅲ/IEC61000-4-2：level Ⅲ
Insulating resistance		＞100MΩ
Dielectric strength		AC1500V，60s
Physical characteristics		
Ambient temperature		-10℃～55℃
Humidity		20℃,RH≤85%
Vibration		Frequency range: 10 to 55 Hz Sweep rate: 1 octave/min Amplitude: 0.35 ± 0.05 mm. Number of sweeps: 20 for each of three mutually perpendicular axes
Sealing		IP65
Shell material		Sensor: Aluminium alloy; Light filter: PMMA

2.6 Specifications

The specifications of the protector contains five parts spaced by "-"; the fist part denotes the light curtain; the second part denotes the detection precision; the third part denotes protection height; the fourth part denotes the output way; the fifth part denotes other information.

For example:

S4-14-113 - P - W S4 series, the detection precision is 14mm, the protection height is 113mm, PNP output and using the Right-angle bracket.



2.7 Working schematic drawing

The protector consists of emitter,receiver,signal cables. The light curtain can form infrared light curtain, detect the signal of passing or intercepting, transmits the the signal of passing or intercepting light through the signal cable through .

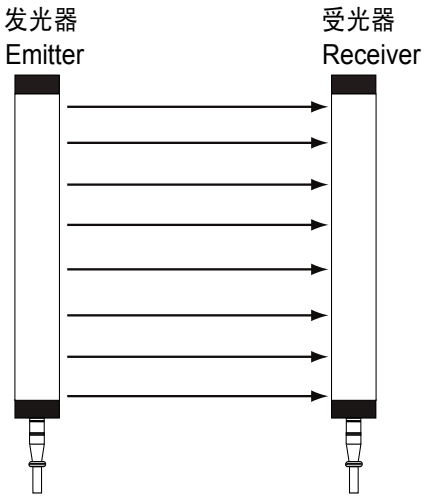
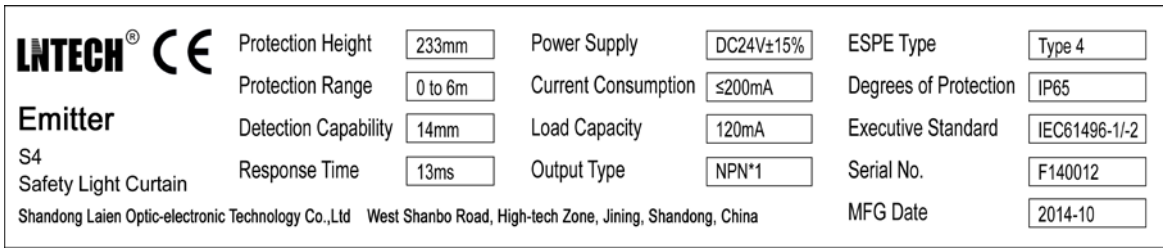
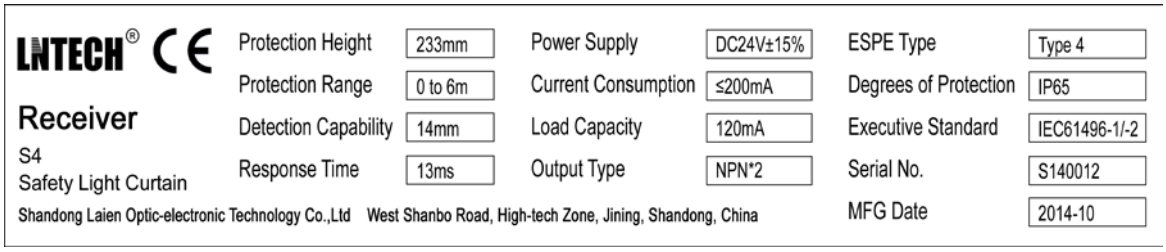


Figure 2-2 Working schematic drawing of S4 series

2.8 Technical label





3 User self-service function

3.1 User self-service function introduction

Shandong laien optic-electronic technology co., ltd. bases on the customer's demand and the using environment, equips two devices (S4 - H, S4 - U) for the S4 protector, used in advanced function.

S4's advanced functions: Fixed Blanking Function, Floating Blanking Function, Second Trigger Function, output way switchover

Fixed Blanking Function:

The user can close S4 pretector's one or more light beams as required.

Floating Blanking Function:

The user closes the light beam is dynamic. For example, open the floating blanking function, set 2, blank two or less than two light beams, protector is in the condition of light passing. Blank more than two light beams, protector is in the condition of light intercepting. Set 5 , blank five or less than five light beams, protector is in the condition of light passing. Blank more than five light beams, protector is in the condition of light intercepting.

Second Trigger Function:

Obscure the odd times, protector is in the condition of light passing. Obscure even times, protector is in the condition of light intercepting.

Output way switchover:

Output way can be switched between double road PNP and NPN, can't be switched between single PNP and NPN. A special CLOCK output is used in controller with our company, other usage occasion is invalid.

Warning

1. Setting fixed or floating function, the detection precision becomes low. At this time, take other protective measures to protect the area, or adjust the safe distance of the light curtain.
2, Set up the second trigger function, trigger time is more than 30 s, reset again.

3.2 The function and operation of the handheld device

Please make sure the handheld device‘s battery has been installed correctly or power adapter is connected before power on.

1. Press the power key, device initializing and self-checking, then standby mode
2. Enter the main menu interface, if communication is not successful, Check the cable connection and power. In the main interface, user can choose "photoelectric information", "function", "instructions", "about LNTECH" according to their own needs.

Photoelectric Information:

select "photoelectric information" through the cursor and then press the "OK" button. Handheld devices query the current information. Including: light beams, output condition, number of floating blanking, whether open droubles indicatingfFunction or not, and the light beams of fixed blanking. just query , cannot be modified.

Function:

1. Select "function" through the cursor, then press "OK" button. Handheld device will enter the function menu. Including: floating blanking function, fixed blanking function, output way function, second trigger function.
2. Select "floating blanking function" through the cursor,and then press the button "OK". Handheld device will enter the menu of "floating blanking function". Pressing the up or down key can increse or reduce the light beams, press "F1" to save.
3. Select "fixed blanking function" through the cursor, and then press the button "OK". The device will enter the mode of "fixed blanking function". Pressing the right or left key can select number of the light beams .Pressing the up or down key can turn pages, press "F1" to save.
4. Select the output way through the cursor, and then press the button of OK. Pressing the right or left key can change the output way, press F1 to save.
5. Select "second trigger function" through the cursor, then press ok button,. The device will enter "second trigger function". Pressing up or down key can open or close the second trigger function, press F1 to save.

Instructions:

Select the "instructions" through the cursor, press OK. The device will enter the interface of instructions.

About LNTECH:

Select the "about LNTECH" through the cursor, then press OK button. You can get the contact way of the company.

! Warning

Setting the S4 through S4-H,S4-U, the factory default state will change. According to actual environment,Users need change carefully to avoid protector's abnormal using and even happen a dangerous accident.Don't shut off the power or pull out the cable during the process of setting.If the data written wrong, please write data again. After setting, check again, make sure that the result is right.

3.3 The function and operation of the self-service software

Before using, make sure the PC or notebook has installed S4 special self-help software.

1. Connect USB to USB controlling box and PC. Connect 9 core cable to recever and USB control box.

2. Open the S4 special self-help software, then enter user name and password.(default user name:laienkeji password: 00000000). Click the login button, enter the following interface:

! Attention

The software user name and password must be modified in the first time, and there must be a special person responsible for control to prevent unnecessary amendments .

3. Clicking "open the device" button will open all software functions

4. Users choose function according to usage

Setting Output mode:
The mouse clicks the PNP output drop-down menu, choose the output mode, and then click the output mode button,finally click save.

Setting floating blanking function:
The mouse clicks the floating blanking input box, input the light beams as required, and then click the floating blanking, finally click save.

Setting second trigger function:
The mouse clicks the second trigger function button to open or close the function.

Setting fixed blanking function:
The mouse clicks the fixed blanking modification parameter list, changing "start" switch to "off".

If you need to track the status of equipment, click 

button.If you need to exit the setup, click 

button. If you need to save the Settings, click 

button.

4 Installation

4.1 To Determine a Safety Distance

(1) The safety distance is the minimum distance that must be maintained between the light curtain and the dangerous parts of the machine, so that the machine can be stopped before a human body or an object can reach the dangerous parts .

In order to guarantee the operator's personal safety, the light curtain's installment position must meet the requirements of the safety distance, otherwise a possible accident may occur.

Regarding the press which the slide can stop in the optional position, its safety distance Ds computational method is given by the formula 1.

Ds = KT + C ..... Formula 1

In the formula:

Ds---Safety distance, the unit is millimeter (mm);

K---Intrusion velocity of operator’s body or object, the unit is millimeter per second (mm/s);

T---Total response time of equipment, the unit is second (s);

C---Additional distance, the unit is millimeter (mm).

(2) K Value Determination

When the light curtain is installed in a horizontal position, taken as 1600mm/s for calculation.

When the light curtain is installed in a vertical position, and the safety distance is no longer than 500mm, taken as 2000mm/s; if the safety distance is longer than 500mm, then taken as 1600mm/s for calculation.

(3) T Value Determination

The total response time of equipment T includes two parts, response time of the protector and maximum halting time of the equipment.

The response time of the protector is given by the supplier.

The maximum halting time of the equipment needs to be measured.

(4) C Value Determination

Additional distance C is determined according to the distance that the operator’s hands enter the light curtain and extend to hazard point by certain speed, until the protector is able to achieve protection condition.

When the press is not used the self-lock (start - restart locking) function by the protector, according to its examination precision, when calculating safety distance, should use the Table 4-1 stipulations at least.

Table 4-1

Examination precision Unit: mm	Additional distance C Unit: mm	Carried on the traveling schedule start by the photoelectric protector
<=14	0	Be allowed
14 to 20	80	
20 to 30	130	
30 to 40	240	Be not allowed
>40	850	

When the press is used the self-lock (start - restart locking) function by the photoelectric protector, may take as C=0.

! Warning

A. The safe distance is one of essential conditions that the photoelectric protector ensures to realize protection function, must calculate the safety distance correctly.

B. Installation must guarantee that minimum distance between light curtain and dangerous area is bigger than the safety distance.

! Attention

A. Adopt the emergency stop time of the label on the press if the production date is less than one year.

B. It is necessary to mensurate the emergency stop time of the machine, compare with the time of the label on the press and the production date, if the production date is more than one year, and choose the bigger one.

4.2 To Determine Placement Position

Warning **The placement position is one of necessary conditions for photoelectric protector to achieve protection function. It must be correct.**

Placement position is a light curtain position in relation to up and down margins of mould opening in press, i.e. in the condition which safety distance is ensured to achieve, the position of the lowest light beam of the protector could not be higher than the down margin of mould opening, the position of the highest light beam of the protector could not be lower than the up margin of mould opening. The protection height of light curtain used on press must be insured:

Protection height >slide traveling schedule + adjustment quantity

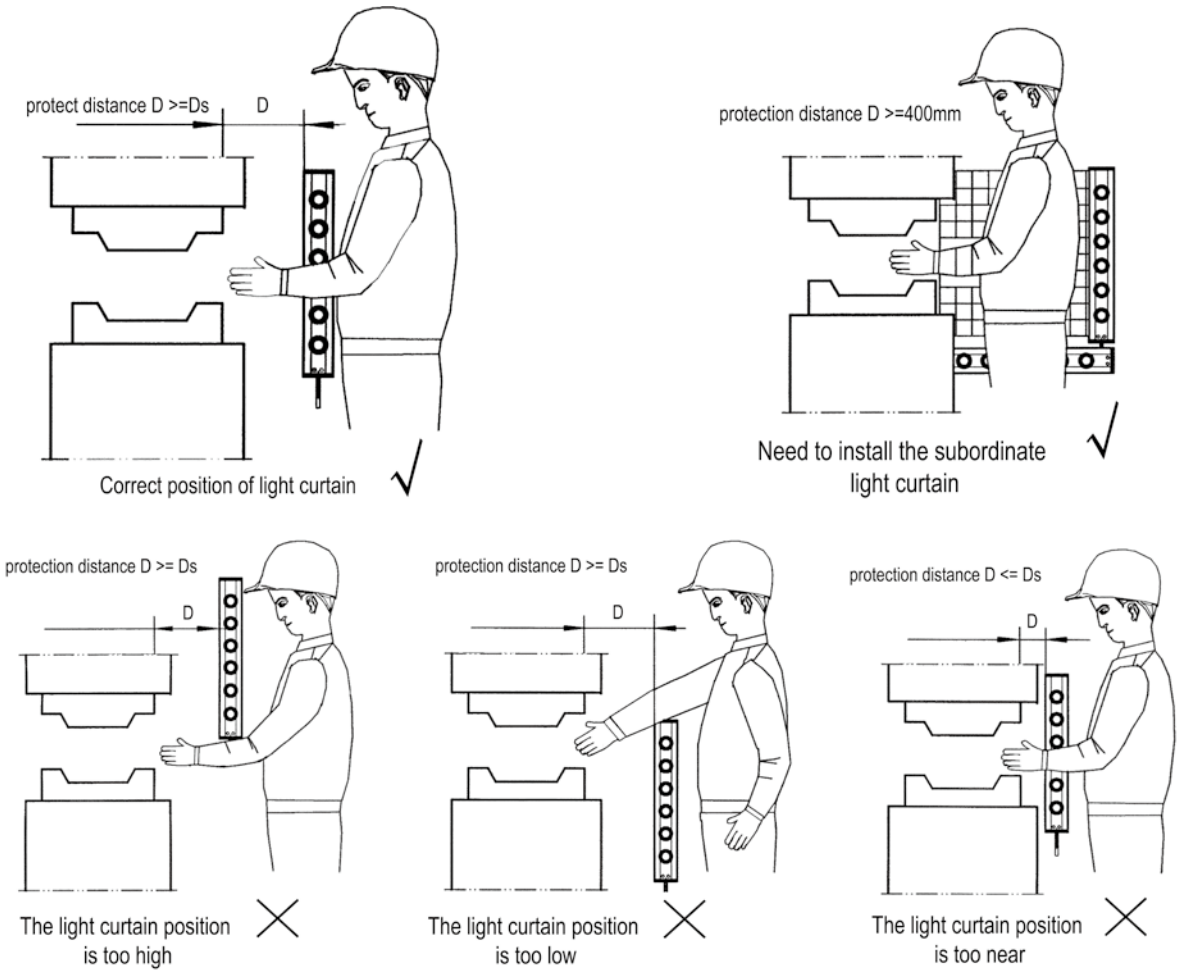


Figure 4-2 Placement position schematic drawing for light curtain

Warning

A. The safety distance and placement position shall be readjusted if the mould used in press is change to a new one.

B. If the press faults, it must be checked and repaired; or even if the protector is installed in correct position, safety cannot be ensured.

C. When safety distance is over 400mm, necessary assistant means should be taken.

4.3 Installation of multiple protectors

When 2 or more protectors are installed one close to another, it is easy to produce disturbs mutually between the light curtains. In order to avoid the emitter sends out light signal to the neighbor another receiver, it should be placement to reference the figure following.

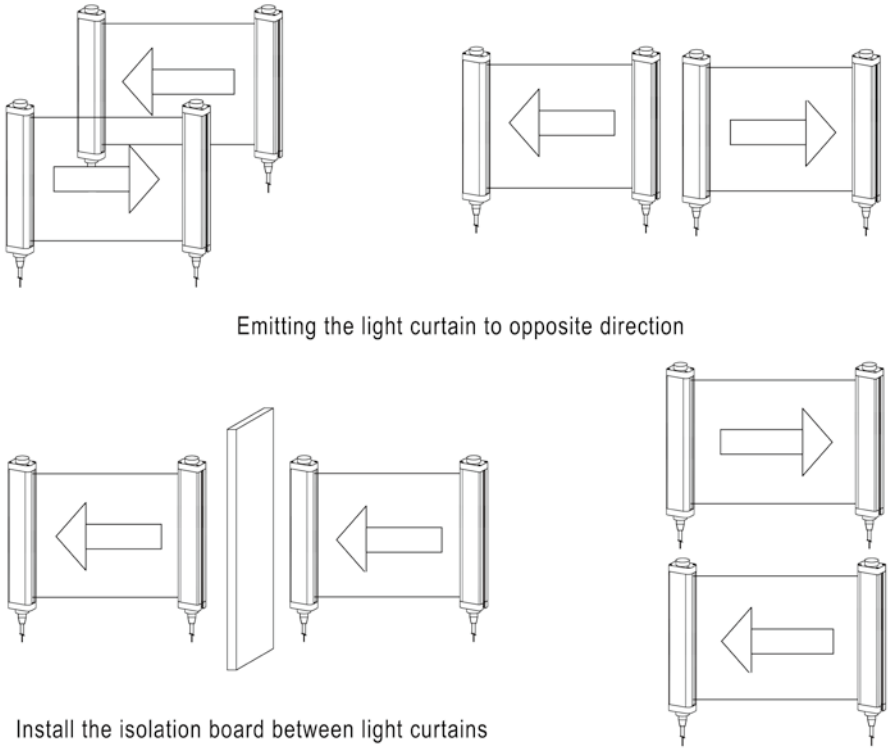


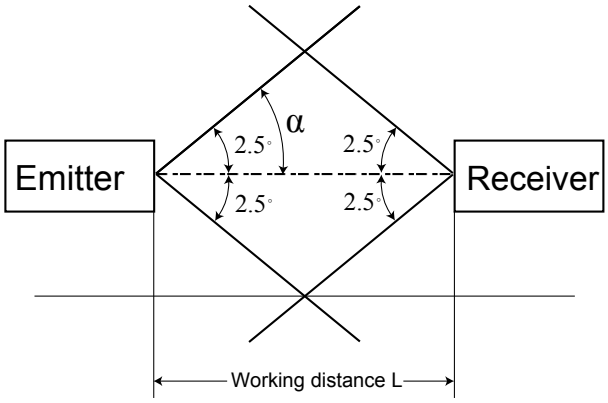
Figure 4-3 Placement schematic drawing for prevented the neighboring light curtain disturbs mutually

A. The mutual disturbance between the protectors can cause the protectors to lose the normal function, so as to lose the protective function.

B. Please act according to the special details, use correct placement method, eliminate the disturbance between the protectors and guarantee the security.

4.4 Reflecting Surface Influence around the Light Curtain

If it has the smooth reflecting surface around the light curtain, like the metal plate, the floor, the ceiling, the work piece, the cover, the partition board, the glass plate and so on, the protector placement position must be apart from the reflecting surface farther than value A (m), value A can be calculated by the formula in form, or be consulted from the coordinates chart.



The cone has a aperture Angle alpha, it formed between the optical axis and a light beam on the edge of the cone.
Alpha = aperture Angle of the light beam
L = the distance between the emitter and receiver

Protection range L	Permitted distance A
0.3 to 3m	0.16m
>3m	L × tan2.5°=L×0.052

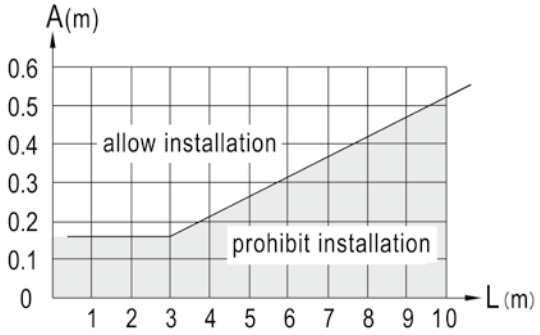


Figure 4-4 The placement position schematic drawing of prevented the influence from the reflecting surface around the light curtain

! Warning

A. The smooth reflecting surface around the light curtain, can cause the protector to lose the normal function, so as to lose the protective function.

B. The placement position of the protector, must be as far as possible away the reflecting object, or cover up the reflecting object, eliminates the disturbance around the light curtain, guarantee the security.

4.5 Accessories

The ways of installation showed in this page,integrated steel pipe brackets/split steel pipe brackets and combined brackets are three kind of main installation ways which almost can satisfy the protector's mounting.
Combined bracket is composed of two parts,their combination angle can be changed by changing the installation position.
The right-angle bracket is simple and practical for fixing,it is fixed through two right-angle brackets with the sensor on mechanical device column,its shortcoming is that the angle is not easy to adjust,it is suitable for the fitting surface which is smooth situation.

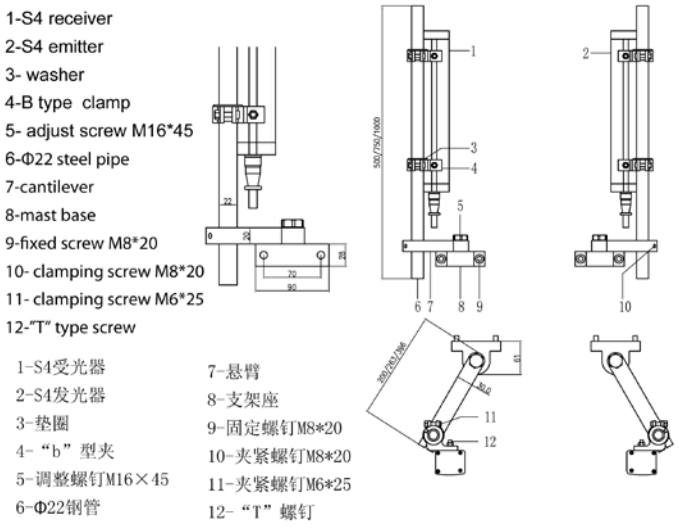


Figure 4-5 Installation of split steel pipe brackets

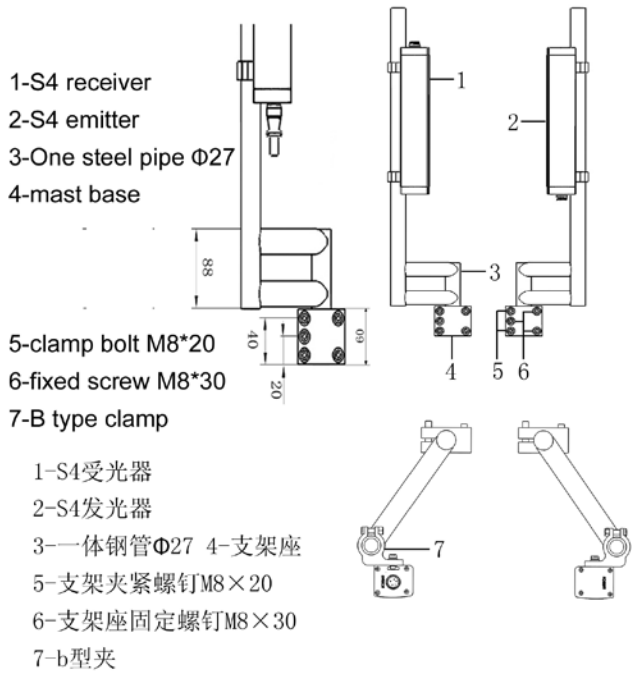


Figure 4-6 Installation of integrated steel pipe brackets

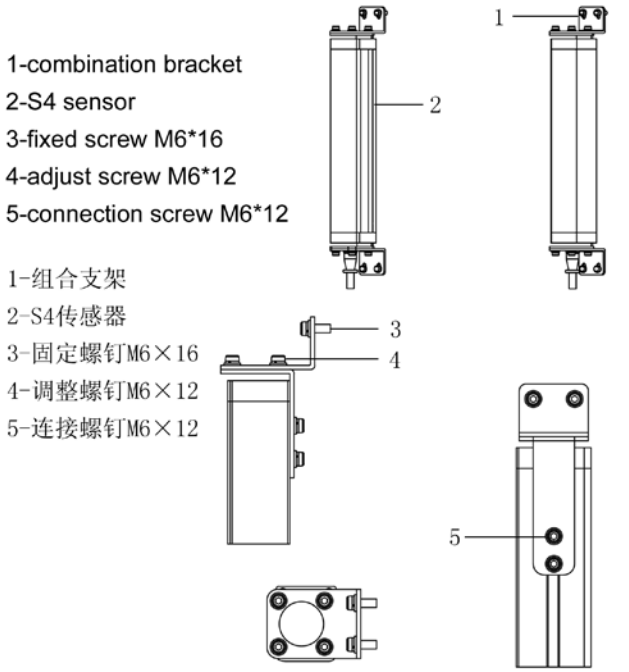


Figure 4-7 Installation of combined brackets

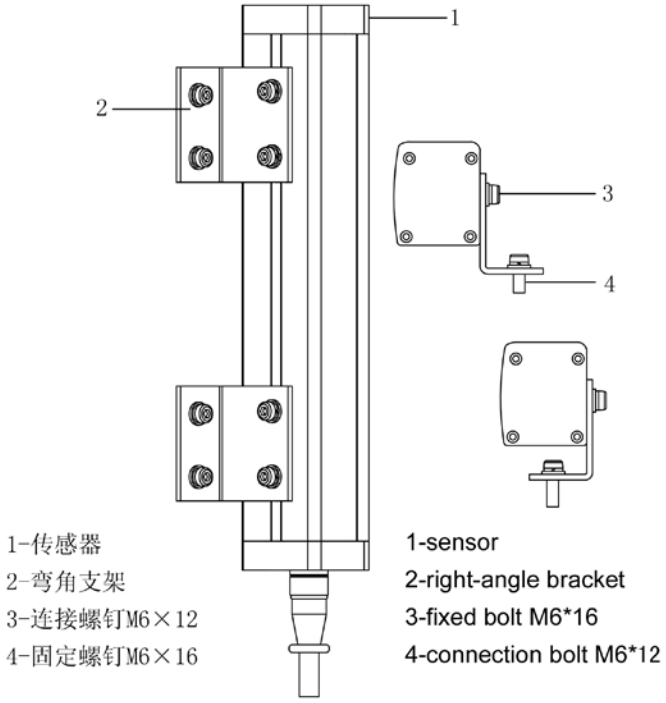


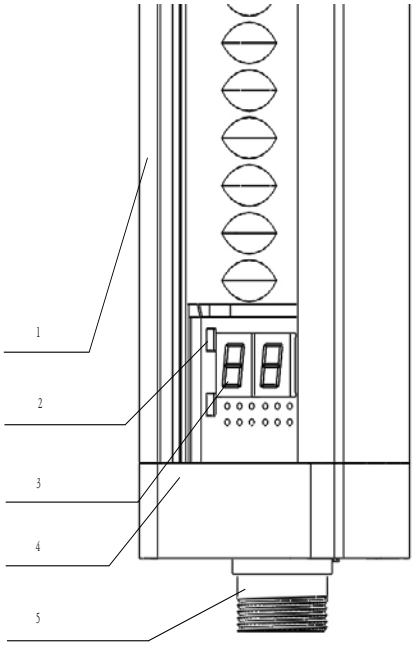
Figure 4-8 Right-angle brackets

4.6 Installation tools

Electric drill,bit(Φ4.2,Φ5.0,Φ6.8,Φ10)
Screw tap(Size:M6,M8)
Crosshead and A"screwdriver
Sechskant-Schraubendreher(Size:5mm,6mm)
12 "shifting wrench
long flat nose pliers and so on

5 S4 Series Light Curtain's installation

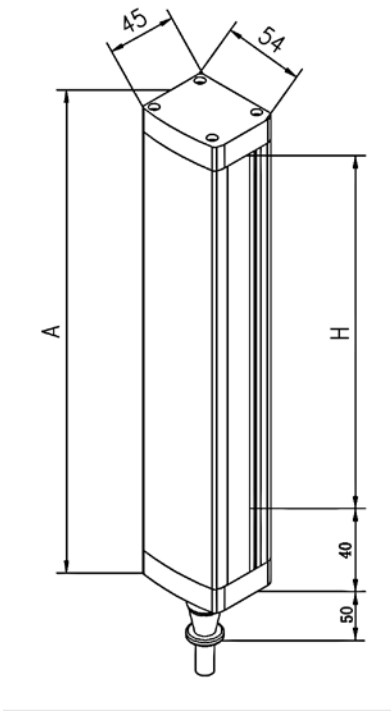
5.1 S4 parts' function description



1. Sensor shell
2. Indicator light: Light passing indicator, green. Light intercepting indicator, red.
3.Digital display
(1)receiver digital display:Light intercepting indicator, the number of intercepted light beam. Light passing indicator,light intensity. Failure indication,failure state
(2)emitter digital display: Light passing indicator,—. Light intercepting indicator,⊥. Failure indication,failure state.
4.The top cover
5.Parts that connects the sensor and the signal cable

Figure 5-1 Parts' function description of S4 series

5.2 Specification sheet and external dimensions



R 14mm			R 21mm			R 36		
Spc	XX	H	Spc	XX	H	Spc	XX	H
S4-14-113	16	113	**S4-21-105**	8	105	**S4-36-90**	4	90
S4-14-173	24	173	**S4-21-165**	12	165	**S4-36-150**	6	150
S4-14-233	32	233	**S4-21-225**	16	225	**S4-36-210**	8	210
S4-14-293	40	293	**S4-21-285**	20	285	**S4-36-270**	10	270
S4-14-353	48	353	**S4-21-345**	24	345	**S4-36-330**	12	330
S4-14-413	56	413	**S4-21-405**	28	405	**S4-36-390**	14	390
S4-14-473	64	473	**S4-21-465**	32	465	**S4-36-450**	16	450
S4-14-533	72	533	**S4-21-525**	36	525	**S4-36-510**	18	510
S4-14-593	80	593	**S4-21-585**	40	585	**S4-36-570**	20	570
S4-14-653	88	653	**S4-21-645**	44	645	**S4-36-630**	22	630
S4-14-713	96	713	**S4-21-705**	48	705	**S4-36-690**	24	690
S4-14-773	104	773	**S4-21-765**	52	765	**S4-36-750**	26	750
S4-14-833	112	833	**S4-21-825**	56	825	**S4-36-810**	28	810
S4-14-893	120	893	**S4-21-885**	60	885	**S4-36-870**	30	870
S4-14-953	128	953	**S4-21-945**	64	945	**S4-36-930**	32	930
S4-14-1013	136	1013	**S4-21-1005**	68	1005	**S4-36-990**	34	990
S4-14-1073	144	1073	**S4-21-1065**	72	1065	**S4-36-1050**	36	1050
S4-14-1133	152	1133	**S4-21-1125**	76	1125	**S4-36-1110**	38	1110
S4-14-1193	160	1193	**S4-21-1185**	80	1185	**S4-36-1170**	40	1170
S4-14-1253	168	1253	**S4-21-1245**	84	1245	**S4-36-1230**	42	1230
S4-14-1313	176	1313	**S4-21-1305**	88	1305	**S4-36-1290**	44	1290
S4-14-1373	184	1373	**S4-21-1365**	92	1365	**S4-36-1350**	46	1350
S4-14-1433	192	1433	**S4-21-1425**	96	1425	**S4-36-1410**	48	1410
S4-14-1493	200	1493	**S4-21-1485**	100	1485	**S4-36-1470**	50	1470

H:Protective height
A:S4 sensor overall height
XX:Beams
Spc:Specification
R: Detection precesion

Figure 5-2 External dimensions of S4 series

6 Wiring of S4 Series Sensor

Warning

The electric power supply shall be shut off before wiring, so as to avoid electric shock. The wiring shall be operated strictly in accordance with the wiring diagrams.All modifications about the circuit units of protector are forbidden!

To access to the PLC, consider the effect of inversion detection impulse.

K1 and K2 is external equipment, choose forced guide safety relay or magnetic contact.

The figure below is the manual reset mode, please connect the light red line (red T) to 24VDC if need automatic reset.

6.1 Wiring of NPN Output Type Protector

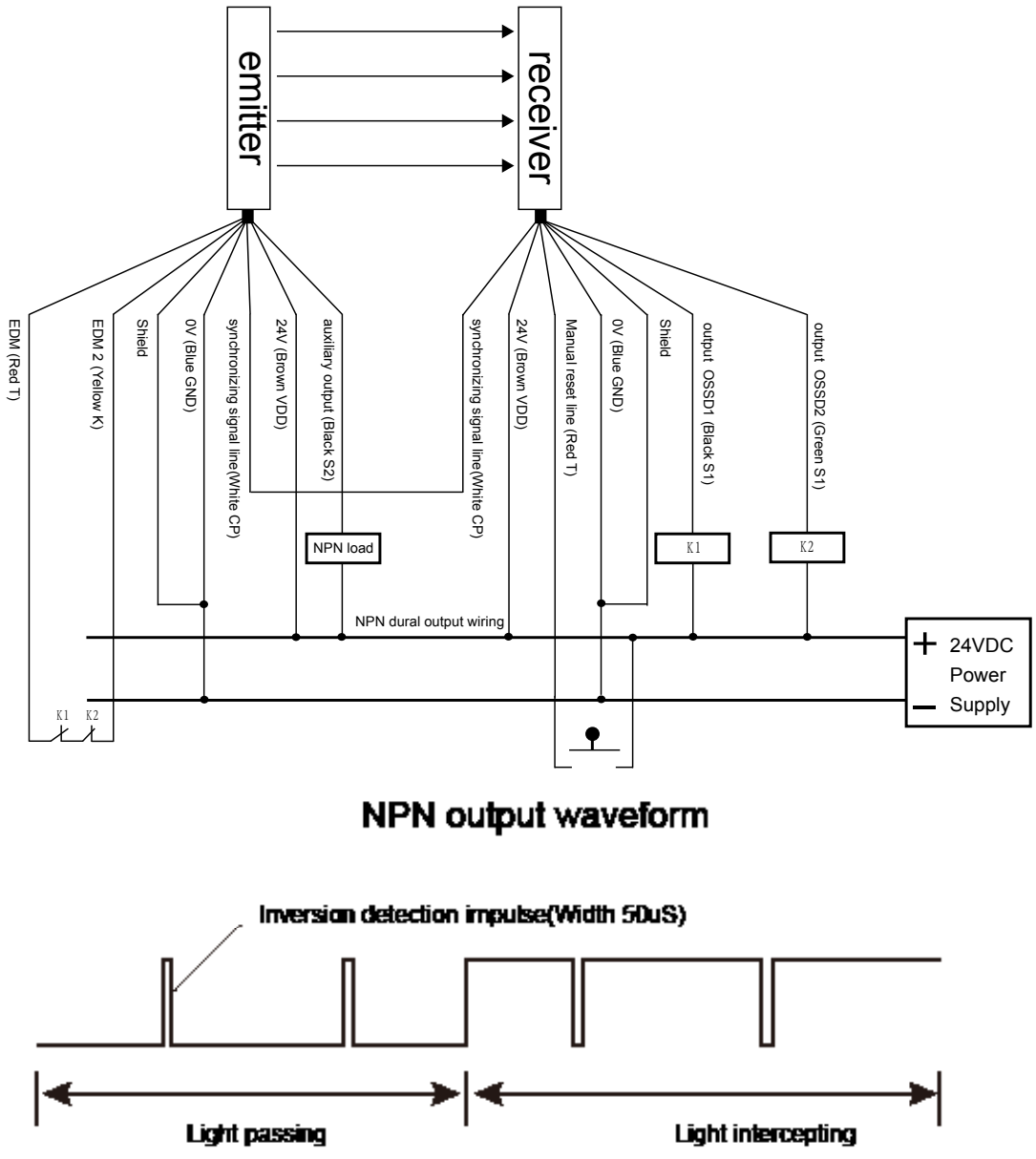
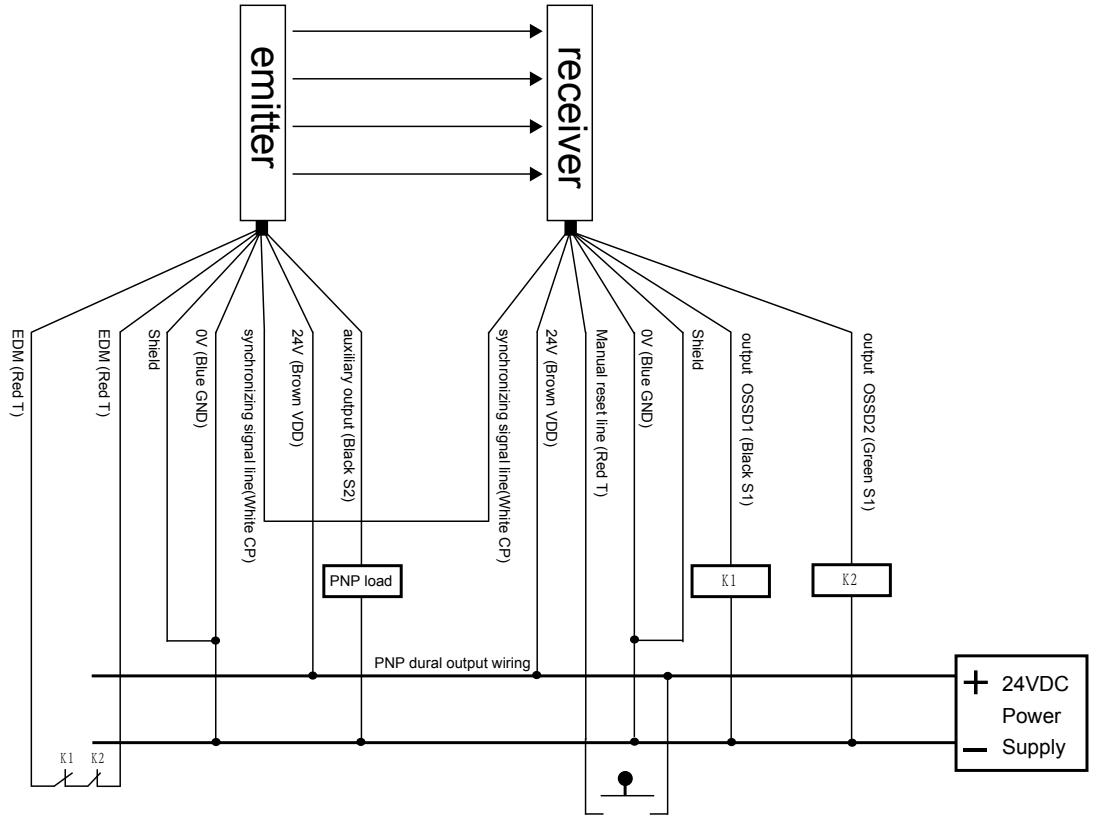


Figure 6-1 Wiring of NPN Output Type Protector and output waveform

6.2 Wiring of PNP Output Type Protector



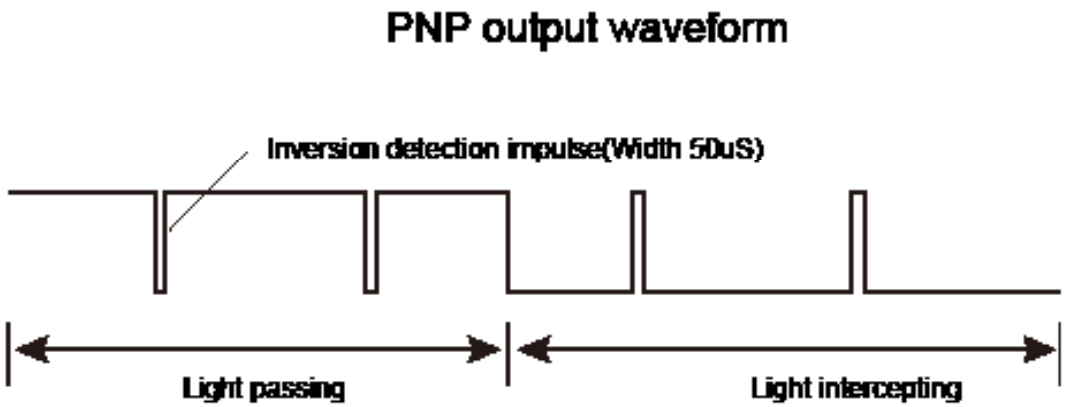
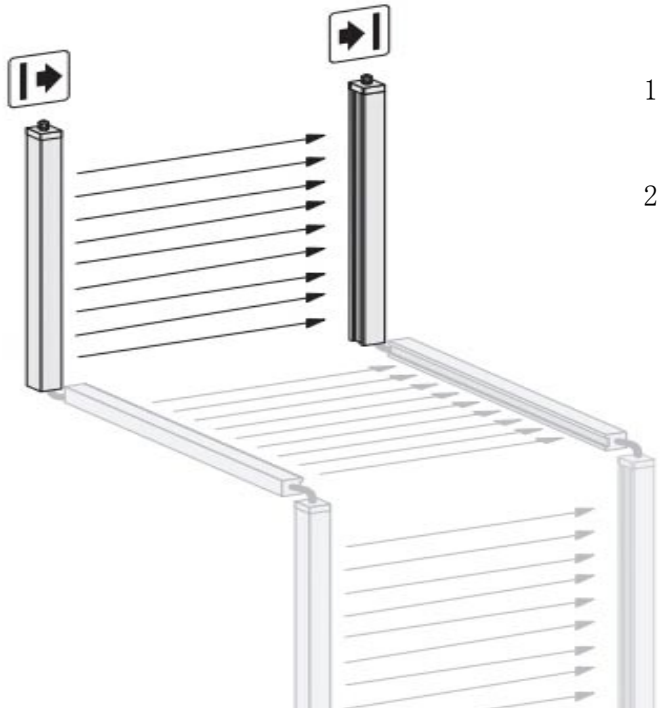


Figure 6-2 Wiring of PNP Output Type Protector and output waveform

6.3 The signal table

Parts	Pin	Cable Color	Function	Comments
Emitter	1	Blue	0V	GND
	2	Brown	DC12V or DC24V	VCC
	3	Green	OSSD3	Aux output
	4	White	CP	Link line between emitter and receive
	5	Yellow	EDM1	Relay detection
	6	Red	EDM2	Relay detection
	7	Shield	SHIELD	Shield
Receiver	1	Blue	0V	GND
	2	Brown	DC12V or DC24V	VCC
	3	Green	OSSD2	NPN output or PNP output (Assign)
	4	White	CP	Link line between emitter and receiver
	5	Black	OSSD1	NPN output or PNP output (Assign)
	6	Red	RESET	Reset
	7	Shield	SHIELD	Shield
	8	Non		Unassigned
	9	Non		Unassigned

6.4 Cascade light cutrain

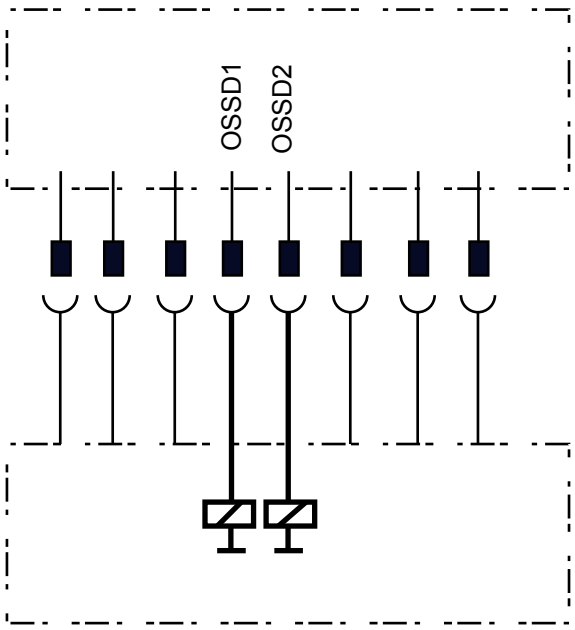


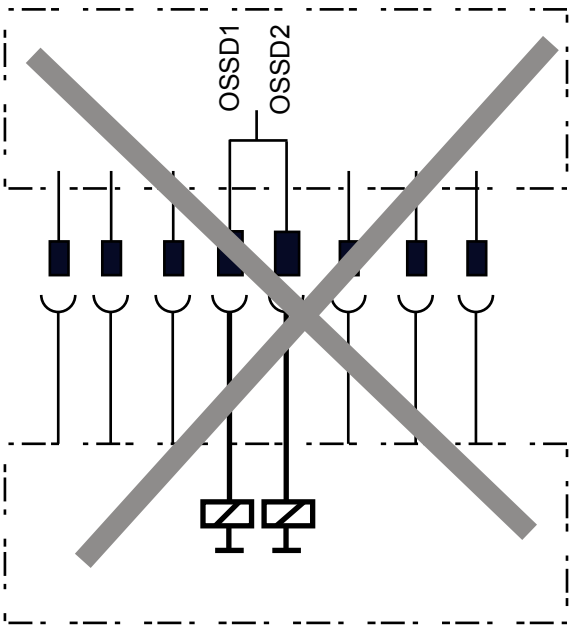
1、To provide effective protection, choose cascade light curtain, most three-level cascade.

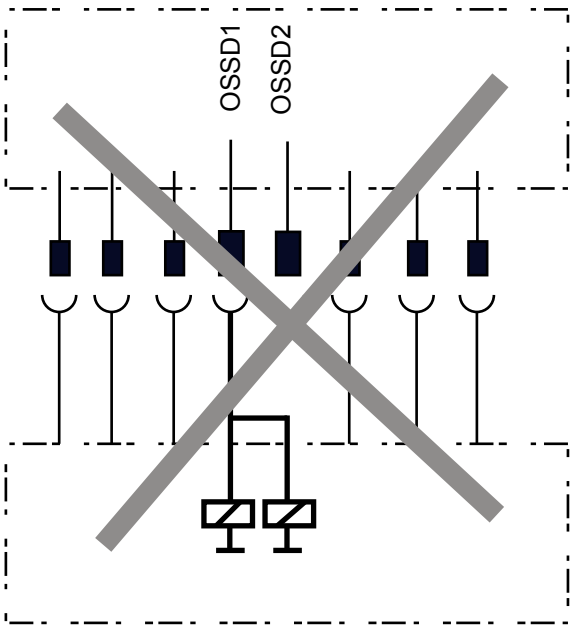
2、The longest signal table between the cascade light curtain is 1m.

6.5 Warning of wiring

Separate OSSD1 and OSSD2.
Don't connect OSSD1 and OSSD2, not sure the security of the signal.
Make sure the signal processing is separate from another.





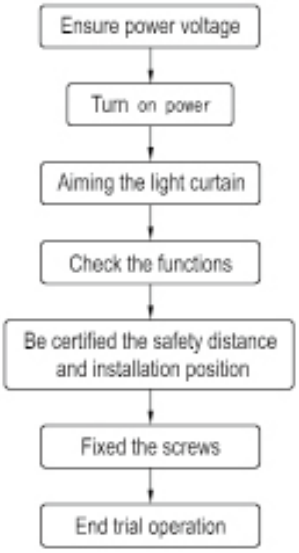


7 Debugging of S4 sensor

7.1 Debugging of emitter and receiver

⚠ Attention

Check carefully the wiring to ensure that all wire connections are correct after installation is over. If all wires are right, then electrify and debug.



A. Check power voltage

Ensure that the power voltage conform to the technical label, the range is less than ±15%.

B. Turn on power

After power on, device is in the process of self-check, about 3 seconds, digital display “7”.

C. light-receiving

Direct receiving type (S4 series): Adjust the position and angle of the emitter and receiver, until the green light from the receiver and emitter are bright.

D. Check

Check the protector is OK with intercepting every beam.

Intercepting, the light intercepting indicator (red) is bright, the light passing indicator (green) is dark.

Passing, the light passing indicator (green) is bright, the light intercepting indicator(red) is dark.

7.2 Operation Test of Entire System

Operation test of entire system is needed to ensure a perfect safety after finishing check and before normal operation.

Intercept light curtain and observe indicators if they transform according to form 7.1.

Form 7.1 conditions of operation

Light curtain	Indicators of receiver		Indicators of receiver	
	Green	Red	Green	Red
Light passing	¤	●	¤	●
Light intercepting	●	¤	●	¤

Intercepting the light curtain in protective area , the slide of press should stop immediately.

8 Operation, Check and Maintenance

8.1 Attention

A. Before put into operation for every shift, check the protector to ensure that it controls the press normally.

B. During operation, do not change the position of light curtain.

C. When changed the mould, the position of light curtain should be adjusted by an authorized person.

D. When a malfunction happened, only professional technicians are allowed for repairing.

E. Before replacing or installing protector and transmitting wires cables, power to protector should be switched off. It is operated only by professional technicians.

F. During operation, do not let work pieces, tools or waste matters hit the protector.

G. When a protector with a reset button is applied, the slide of press stops at once every time when light curtain is blocked; when light curtain is recovered from the blocked state to light passing state, only by pressing reset button , the slide could move downward (or press re-start).

H. If the protector and press are not normal, please stop immediately to use the protector, and protect by other means, and check them at once.

⚠ Warning

When a protector is constrained to stop using:

A. For W type controller, keep the power on and put the key switch in "CAUTION" position;

When the protector is constrained to stop using, other protection means shall be taken during the time.

8.2 Check and Maintenance

It is important to check and make maintenance for protector so as to ensure operators' safety. Periodical check and maintenance shall be made. A detail for check and maintenance is showed as form 8.1

Form 8.1 Check and maintenance

Item	Contents	Means	Time
Check	Check for light curtain face	Confirmation of all passing, reflecting face clean and no broken	Before operating
	Confirmation of incepting light (test every beams)	Block one by one beam of light curtain; check if indication states are normal	Before operating
	Check for protection function	In entire protected slide travel (or ownward strokes between 30 to 180 degrees, is set cam switch for "no protection" in back-way), block light curtain, the slide of press should stop immediately	Before operating
	Check for screws	Confirmation of all screws tightly fixed	Six months
	Check for wiring terminates	Confirmation of all screws tightly fixed, and all wiring well connected	Six months
	Check for relay	Confirmation of relays tightly installed, well contacts and normal operation	Six months
maintenance	Replace relays	Prize up stopper gear on the plastic tie with the screw driver, release the tie, remove the old relay and replace new then re-tie tightly	More than life
	Cleaning for light curtain units	Clean with soft cotton yarn soaked water or detergent, prohibit cleaning with organic solvent	Implement based on conditions
	Replacing filters of sensor	If filter is broken, replace it immediately. Unpack the end cover of sensor, pull out the broken filter, insert the new one, and then fix the end cover	Implement based on conditions
	Replacing mirror	If mirror is broken, replace it immediately. Unpack the end cover of reflector, pull out the broken mirror, insert the new one, and then fix the end cover	Implement based on conditions
	Fix and replace screws	Fix loosen screws tightly, replace the damaged	Implement based on conditions
Inspection is needed before operation unless periodic inspection			

Check them before operating, besides periodic inspection.

9 Simple Examination and Repair

9.1 Simple Troubles of System

Form 9.1 Simple troubles of system

Phenomenon	Reason	Solution
The protector does not work, various indicators are not light up.	Power is not supplied.	Inspect the power source and the wiring, provide the correct power source.
	The power supply voltage is wrong	Wiring correctly,the recovery insurance can restore
The protector works intermittently, indicators flicker.	The wiring of control cable is not good;	Fix tight the screws of the terminal.
	The light curtain is not aiming correctly	Adjust the light curtain again.
The protector indicators display normally, but the press can not run normally.	The output of light curtain is wrong	Wiring again and right.
	The press control unit has a fault.	Examine the press control unit.
Digital display F1	internal self-test failure	Send manufacturer maintenance
Emitter digital display F2 or F3	Sensor wiring fault	Check the emitter EDM line (red line, yellow line) is falling off or broken
Digital display F7	Sensor wiring fault	Receiver is not connected or is falling off or broken
Digital display F4	OSSD1 or OSSD2 output fault	Check OSSD1 or OSSD2, send factory maintenance
Digital display F9	Duplex output failure	Restart the light curtain, if repeated, please check whether there is any equipment power supply EMI, or send factory maintenance
Receiver digital display is ok, emitter Digital display H	Feeder signal or output signal failure	The output signal and the controller (relay) input is inconsistent; Or output signal caused by disconnection

Note:

Simple troubles of the protector on other machines can refer to above.

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