LNTECH®

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.

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1 Basic Introduction

1.1 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.

1.2 Features

1.2.1 Specifications Varieties, Application Wide

The protective height of conventional products is from 100mm to 2840mm;

Protective Range:

STF series, reflection type, protective range: 400~3000mm

STD series, direct protection type, protective range: 0~15000mm

STQ series, multi-sides protection, protective range: <=12000mm(two sides), <=8000mm(three sides)

SNA series, direct protection type, protective range: 0~3000mm

SNB series, direct protection type, protective range: 0~8000mm

SNQ series, multi-sides protection, protective range: <=6000mm(two sides), <=4000mm(three sides)

1.2.2 Perfect Self-examining Function

Ensures that it can not send the mistaken signals to the supervised electric machines even malfunctions occur to the photoelectric protector itself.

1.2.3 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.

1.2.4 Immunity

The protector is immune to electromagnetic field interference, radio interference, flashlight, welding arc light and surrounding light interference.

1.2.5 A Durable Life and a High Reliability

It can be changed when the output relay (safety relay) is up to use life.

1.2.6 Good Anti-vibration Performance and Easy to Use

1.3 Working Schematic Drawing and Terminology

1.3.1 Working schematic drawing

The protector consists of light curtain, signal cables, controller and control cables. The light curtain can form infrared light curtain, detect the signal of passing or intercepting, and send the signal to control box that also supplies power to the light curtain. The control box processes the signal and outputs the closed or opened signal used safety relay, and then connects the control trip circuit of the press by control cable or other protective equipment to protect the workers.

The protector can be divided into reflection type, direct protection type, multi-sides protection type, the following diagrams are used to describe them.

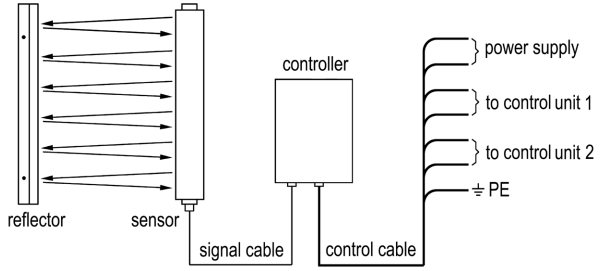


Figure 1-1 The working schematic drawing of reflection type (STF series)

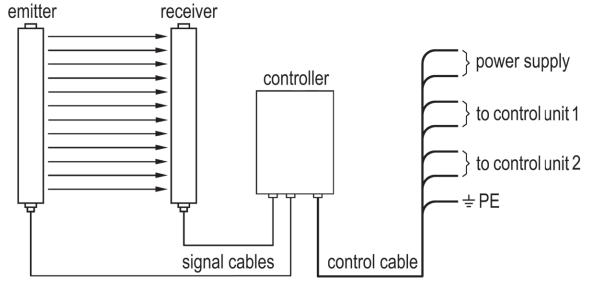


Figure 1-2 The working schematic drawing of direct protection type protector (STD, SNA, SNB series)

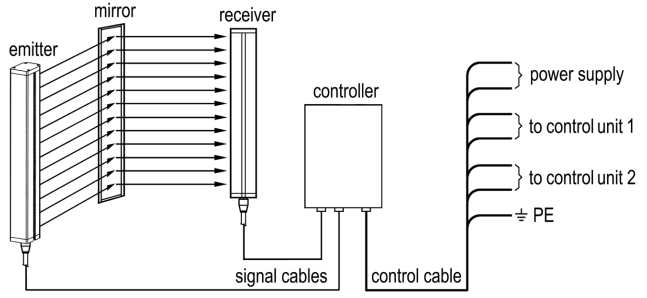


Figure 1-3 The working schematic drawing of 2 or 3 sides protector (STQ, SNQ series)

1.3.2 Terminology

Light beam

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

Optical axis

It is the middle line of the light beam.

Optical 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.

Light curtain

The infrared light from the emitter unit directs to the corresponding receiver unit (direct protection type),or reflects to the corresponding receiver unit (multi-sides protection),or from the emitter unit of the sensor to the corresponding receiver unit (reflection type), then forms the infrared monitoring of region.

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 curtain sensor

All of the optical components such as the emitter, the receiver, or the sensor, produce the light curtain.

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.

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.

Emitter

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

Receiver

The receiver consists of receiver units; it can accept the modulated light and deal with them.

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 intercepting light 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.

Controller

Controller used to supply electrical source to emitters and receivers; process light passing signal or intercepting light signal; output control signal to control press braking circuits, or warning circuits to alarm.

Signal cable

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

Control cable

The control cable used to connect the controller and control circuits of press.

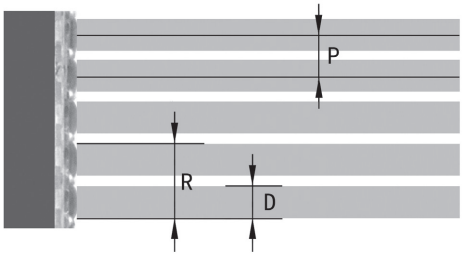
Protective range

The protector can protect length scope.

Protective height

The protector can protect height scope.

1.4 Relations between Optical Axis Pitch and Resolution



P is light axis pitch,
R is physical resolution (Max.),
D is the effective passing light diameter of the lens,
their relation is:
R=P+D

Figure 1-4 Relations between optical axis pitch and protection object

1.5 Classification of the Protector

The protector consists of light curtain device, signal cable, controller and control cable.

1.5.1 Classification of the light curtain device

The light curtain devices can be divided into reflection type ,direct protection type and multi-sides protection type according to generate in the form of the light curtains, be divided into ST type and SN type according to the figure, be divided into six series according to protective range. Considering all these factors, the light curtain devices typically categorized as follows:

The light curtain is classified as following table

Series	Description
STF series	Light curtain type: reflection type Parts: sensor, reflector, signal cable External dimensions: 50×74×H Protective range: 400~3000mm
STD series	Light curtain type: direct protection type Parts: emitter, receiver, signal cable External dimensions: 50×74×H Protective range: 0~15000mm
STQ series	Light curtain type: multi-sides protection type Parts: emitter, receiver, one or two mirror(s),signal cable External dimensions: 50×74×H Protective range: <=12000mm, two sides; <=8000mm, three sides
SNA series	Light curtain type: direct protection type Parts: emitter, receiver, signal cable External dimensions: 35×53×H Protective range: 0~3000mm
SNB series	Light curtain type: direct protection type Parts: emitter, receiver, signal cable External dimensions: 35×53×H Protective range: 0~8000mm
SNQ series	Light curtain type: multi-sides protection type Parts: emitter, receiver, signal cable External dimensions: 35×53×H Protective range: <=6000mm, two sides; <=4000mm, three sides.

1.5.2 Classification of the controller

The controller can be divided into inside placed and outside placed according to the install location, be divided into single side and double sides according to the number of controlling the light curtain sensors. Considering all these factors, the controllers typically categorized as follows:

Type	Description
W	Mounting location: outside placed, mount the controller to the main body of the machine directly, outside the electrical cabinet Box material: metal, surface spray-paint; External dimensions: 80×241×205 Control cable: 2.5m, 5×0.5RVV; Control cable port: 7P crimped terminals Signal cable port: 1 (for STF series) or 2 (for STD, STQ, SNA, SNB, SNQ series) sockets Control light curtain number: 1set Outputs: 2 N/O relay output
N	Mounting location: inside placed, mount the controller inside the electrical cabinet Box material: plastic External dimensions: 89×79×111 Control cable: 1.0m, 5×0.5RVV; Control cable port: 10P plug terminals Signal cable port: 12P plug terminals Control light curtain number: 1 set. Outputs: 2 N/O relay output
ND	Mounting location: inside placed, mount the controller inside the electrical cabinet Box material: plastic External dimensions: 89×79×111 Control cable: 1.0m, 5×0.5RVV; Control cable port: 10P plug terminals Signal cable port: 12P plug terminals Control light curtain number: 1 set. Outputs: 2 N/O relay outputs
SR	Mounting location: inside placed, mount the controller inside the electrical cabinet Box material: plastic External dimensions: 22.5×96×116 Control cable: ---; Control cable port: 4P*2 plug terminals Signal cable port: 4P *2 plug terminals Control light curtain number: 1 set. Outputs: 2 N/O, 1N/C relay outputs
S	Mounting location: outside placed, mount the controller to the main body of the machine directly, outside the electrical cabinet Box material: metal, surface spray-paint; External dimensions: 80×241×205 Control cable: 2.5m, 5×0.5RVV; Control cable port: 7P crimped terminals Signal cable port: 2 (for STF series) or 4 (for STD, STQ, SNA, SNB, SNQ series) sockets Control light curtain number: 2 sets Outputs: 2 N/O relay output

1.6 Technical Parameters

The protector technical parameters sheet

Operating power	AC220V/110V ±15% 50/60Hz or DC24V ±15%
Output contact capacity	AC250V5A, cosφ=0.3
Power consumption	<15W
Ambient temperature	-10°C ~ 55°C
Humidity	20°C, <=85%RH
Response time	<20ms
Insulating resistance	>100MΩ
Dielectric strength	AC1500V, one minute, no sparkle appears
Resistance to light interference	10000Lux (angle of incidence >=5°)
Mechanical life of relay	>=10,000,000 times (can be changed)
Immunity from electrical noise	IEC/EN 61000-4-4: type IV; IEC 61000-4-2: type IV
Anti vibration ability	IEC/EN 60068-2-6: Freqency range, 10 ~ 55Hz; Sweep rate, 1 octave/min; Amplitude, 0.35±0.05mm; Number of sweeps, 20 for each axis, for 3 axes
Light source	Infrared light, 940nm
Shell material	Sensor: Aluminium alloy; W, S type controller: Thin steel plate; N, ND type controller: ABS SR type safety relay:PPO
Sealing	Sensor: IP65 W, S type controller: IP54; N, ND type controller: IP20 SR type safety relay:IP50;
Light axis pitch	STF series: 40mm STD series: 10mm, 20mm, 40mm, 80mm STQ series: 20mm, 40mm, 80mm SNA series: 20mm, 30mm, 40mm, 80mm SNB series: 20mm, 30mm, 40mm, 80mm SNQ series: 20mm, 30mm, 40mm, 80mm
Protective range	STF series: 400~3000mm STD series: 0~15000mm STQ series: <=12000mm (2 sides), <=8000mm (3 sides) SNA series: 0~3000mm SNB series: 0~8000mm SNQ series: <=6000mm (2 sides), <=4000mm (3 sides)
Protective height	Protective height H=(xx-1)optical axis pitch, xx is the number of light beams

Notice:

If no special instructions, when leave factory the power supply is set to:

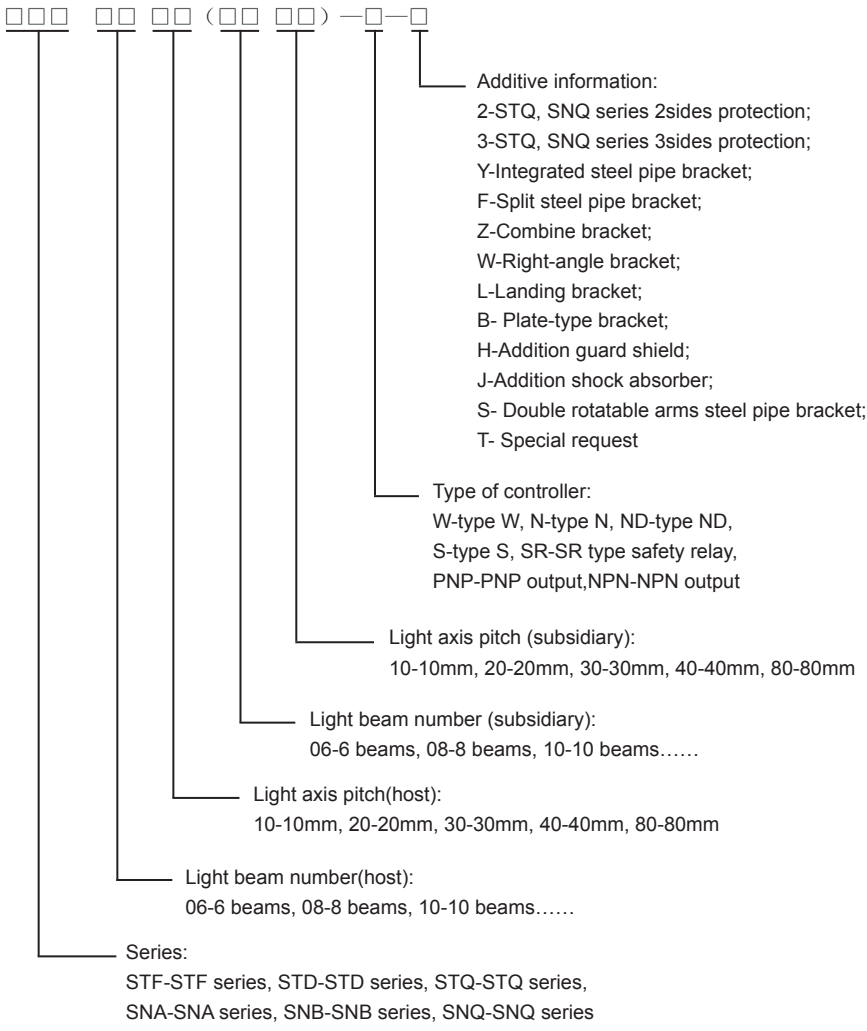
W,S,N,ND type controller: AC220V;

SR type safety relay: DC24V;

NPN, PNP output type light curtain: DC12V/DC24V.

1.7 Specifications

The specifications of the protector contains three parts spaced by "-"; the fist part denotes the light curtain, if no subsidiary light curtain, omit the brackets and the contents of the brackets; the second part denotes controller, if it is NPN or PNP output, there is no controller; the third part denotes additive information, entries listed can combine and list, T is the special request, and need specify aside:



Note:

If the beam number, the optical axis pitch are three digits, then the first two digits are replaced by a letter: A-10,B-11,C-12,D-13,E-14 and so on.

For example:

STF1240-S-Y

The STF series, 12 light beams, optical axis pitch is 40mm, S type controller, controls two sets light curtains, mounting the integrated steel pipe brackets;

SNB2640-N-SH

The SNB series, 26 light beams, optical axis pitch is 40mm, N type controller, mounting double rotatable arms steel pipe brackets, addition guard shields;

STQ1640-W-2L

The STQ series,16 light beams, optical axis pitch is 40mm, W type controller, two sides protection, mounting landing brackets;

STD1620 (2820) -W-T

The STD series,16 light beams (host), optical axis pitch is 20mm (host), 28 light beams (subsidiary), optical axis pitch is 20mm (subsidiary), W type controller, special request installation.

1.8 The Length of Signal and Control Cable

The standard cable lengths are as follows:

<table>
<tr><th rowspan="7">Signal cable</th><th>Light curtain</th><th>W type controller</th><th>N, ND,SR type controller</th><th>S type controller</th></tr>
<tr><td>STF series</td><td>2.5m 1 strip</td><td>3m 1 strip</td><td>front: 2.5m 1 strip
back: 5m 1 strip</td></tr>
<tr><td>STD series</td><td>3m, 10m each 1 strip</td><td>3m, 10m each 1 strip</td><td>front: 3m, 10m each 1 strip
back: 5m, 12m each 1 strip</td></tr>
<tr><td>STQ series</td><td>3m, 10m each 1 strip</td><td>3m, 10m each 1 strip</td><td></td></tr>
<tr><td>SNA series</td><td>2m, 4m each 1 strip</td><td>2m, 4m each 1 strip</td><td>front: 2m, 4m each 1 strip
back: 3m, 5m each 1 strip</td></tr>
<tr><td>SNB series</td><td>2m, 6m each 1 strip</td><td>2m, 6m each 1 strip</td><td>front: 2m, 6m each 1 strip
back: 4m, 8m each 1 strip</td></tr>
<tr><td>SNQ series</td><td>3m, 8m each 1 strip</td><td>3m, 8m each 1 strip</td><td></td></tr>
<tr><td colspan="2" rowspan="5">Control cable</td><td colspan="3">W type controller: 2.5m</td></tr>
<tr><td colspan="3">N type controller: ---</td></tr>
<tr><td colspan="3">ND type controller: ---</td></tr>
<tr><td colspan="3">S type controller: 2.5m</td></tr>
<tr><td colspan="3">SR type safety relay: ---</td></tr>
<tr><td colspan="3">The cable connecting host and subsidiary</td><td>1m two strips</td></tr>
</table>

Note:

If you have special request for length of cables when order, we should provide as your request.

1.9 A Schedule of Protector Specification

STF series
STFxx40 xx=04, 06, 08.....40, protective height H = (xx-1) × 40

STD series
STDxx10 xx=24, 32, 40.....D6 (136), protective height H = (xx-1) × 10
STDxx20 xx=08, 12, 16.....72, protective height H = (xx-1) × 20
STDxx40 xx=04, 06, 08.....36, protective height H = (xx-1) × 40
STDxx80 xx=02, 04, 06.....36, protective height H = (xx-1) × 80

STQ series
STQxx20 xx=08, 12, 16.....72, protective height H = (xx-1) × 20
STQxx40 xx=04, 06, 08.....36, protective height H = (xx-1) × 40
STQxx80 xx=02, 04, 06.....36, protective height H = (xx-1) × 80

SNA series
SNAxx20 xx=06, 08, 10.....72, protective height H = (xx-1) × 20
SNAxx30 xx=06, 08, 10.....72, protective height H = (xx-1) × 30
SNAxx40 xx=04, 06, 08.....72, protective height H = (xx-1) × 40
SNAxx80 xx=02, 04, 06.....36, protective height H = (xx-1) × 80

SNB series
SNBxx20 xx=06, 08, 10.....72, protective height H = (xx-1) × 20
SNBxx30 xx=06, 08, 10.....72, protective height H = (xx-1) × 30
SNBxx40 xx=04, 06, 08.....72, protective height H = (xx-1) × 40
SNBxx80 xx=02, 04, 06.....36, protective height H = (xx-1) × 80

SNQ series
SNQxx20 xx=06, 08, 10.....72, protective height H = (xx-1) × 20
SNQxx30 xx=06, 08, 10.....72, protective height H = (xx-1) × 30
SNQxx40 xx=04, 06, 08.....72, protective height H = (xx-1) × 40
SNQxx80 xx=02, 04, 06.....36, protective height H = (xx-1) × 80

Note:

xx is the number of light beams.
If the beam number, the optical axis pitch are three digits, then the first two digits are replaced by a letter: A-10,B-11,C-12,D-13,E-14 and so on.

2 Controller

The controller has four functions as follows:

A. Supplies the power for sensors

The controller is input AC220V/AC110V power, supplies DC12V power for light curtain sensors through transforming, rectifying and regulating, ensures that they can run normally.

B. Processes signal

Connects the sensor by signal cables, and processes the passing or intercepting signal sent by sensor, and drives the output relays.

C. Outputs relay contact signal

Outputs the control signal to equipment by control cable. The relay contacts are closed when the light curtain is passing, and are opened when the light curtain is intercepted.

D. Supplies the ground point

Supplies the ground point for the protector, ensures the electricity is safe and the protector has better anti-jamming ability.

The controller is divided into W, N, ND, S type and SR type safety relay, according to the installation and the number of controlled light curtain.

W type controller:

Controls one set light curtain, and is mounted to the main body of the machine directly.

N, ND type controller and SR type safety relay:

Controls one set light curtain, and is mounted inside the electrical cabinet.

S type controller:

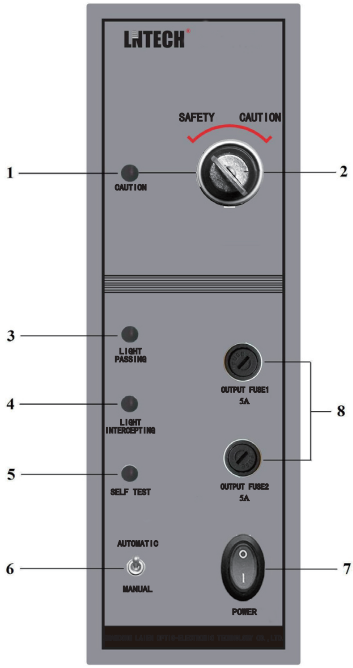
Controls two sets light curtain, and is mounted to the main body of the machine directly.

Respectively introduced as follows:

2.1 W Type Controller

W type controller controls one set light curtain, is mounted to the main body of the machine directly, outside the electrical cabinet.

2.1.1 The panel description for W type controller



1.No protection indicator (yellow)
2.Key switch

Warning

When the key switch on the "SAFETY" position, the LED is dark, the protector is on the protective state. When the key switch on the "CAUTION" position, the LED is twinkling, the protector can not protect. Other protections must be taken.
The key must be kept by manager.

3.Light passing indicator (green)
4.Light intercepting indicator (red)
5.Self-test indicator (red)
6.Self-test switch
7.Power switch (with power indicator of red)
8.Output fuse
Over-current protection of OSSD1, OSSD2, 5A

Light curtain and indicator state		
Light curtain state	**Light passing indicator**	**Light intercepting indicator**
Passing	¤	●
Intercepting	●	¤

Figure 2-1 The panel explanation for W type controller

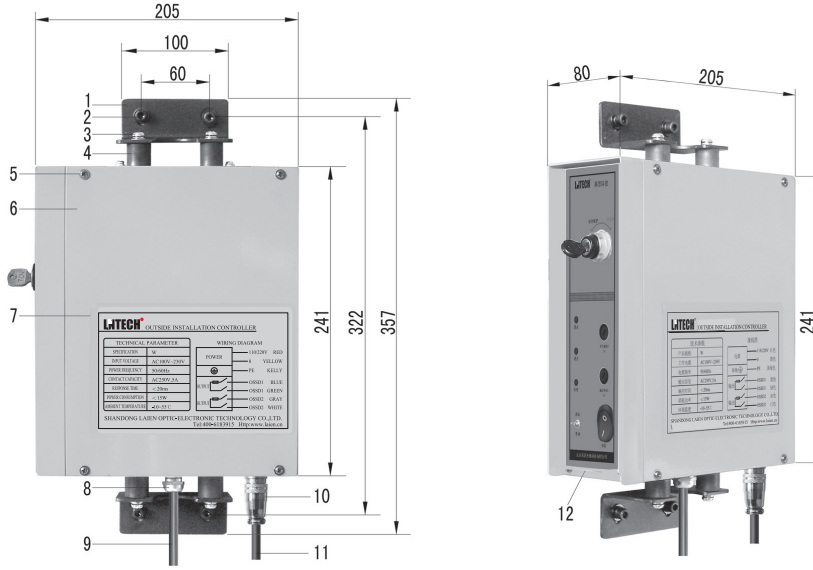
2.1.2 Self-test switch and the power switch

Self-test switch is used to detect the self-testing function of the protector by manual.
The purpose of setting self-test switch is simulating a fault to the controller.
When the two output relays are not in the synchronization, the controller can check out, the self-test indicator(red) twinkles, the OSSD1 and OSSD2 are open until the fault is relieved.

The usage of the self-test switch: When the self-test switch is on the “MANUAL” position, intercept the light curtain, the self-test indicator(red) twinkles, OSSD1 and OSSD2 are open until the fault is relieved.

Please make the self-test switch on the “AUTOMATIC” position when normal working.
When the power switch is on the “1” position, the controller is on. When the power switch is on the “0” position, the controller is off.

2.1.3 The parts description and external dimensions for W type controller



1. Controller fixed bracket
2. M6×16 inner-hexagon bolt
3. M6×12 assembled bolt
4. Ø20×20 rubber shock absorber
5. M4×6 screws
6. The box lid of controller
7. Technical label
8. Control cable port
9. Control cable
10. Signal cable plug
11. Signal cable
12. Controller panel

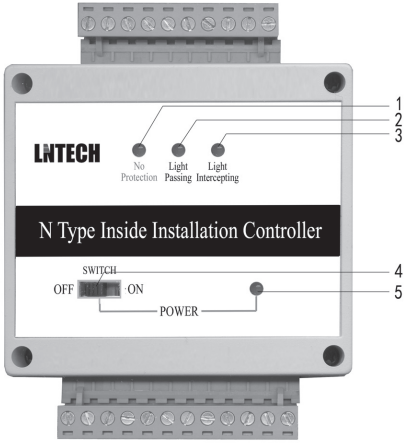
Figure 2-2 The parts description and external dimensions of W type controller

According to the external dimensions of the controller, choose the appropriate mounting position on the body of the press or other equipment; And the position must be prevented collision, advantageous for operation and easy to maintain.
If periphery has the strong electromagnetism noise source (for example transducer, high frequency machine and so on), should be far away from them to avoid the interference.

2.2 N Type Controller

N type controller controls one set light curtain, is mounted inside the electrical cabinet.

2.2.1 The panel description for N type controller



1. No protection indicator (yellow)
2. Light passing indicator (green)
3. Light intercepting indicator (red)
4. Power switch
5. Power indicator (red)

! Warning

When the power switch is on the "ON" position, the protector can protect; When the power switch is on the "OFF" position, the protector can not protect. Other protections must be taken.

The state of the power switch and indicators			
Power switch	ON		OFF
Power indicator	¤		●
No protection indicator	●		●
Protection state	protection		protection
Light curtain state	Light passing	Light intercepting	No working
Light passing indicator	¤	●	●
Light intercepting indicator	●	¤	●

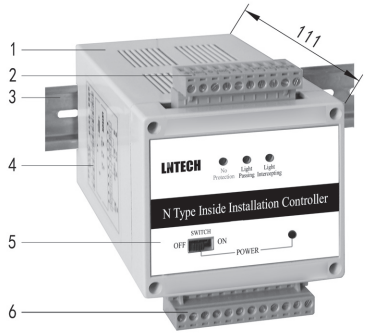
Figure 2-3 The panel description for N type controller

! Attention

When the power switch is "ON", the indicator of no protection (yellow) is twinkling, the power indicator and the light passing indicator are bright, the light intercepting indicator is dark. B1,B2 are reserved two posts for muting. Short B1 and B2, OSSD1 and OSSD2 are closed, the protection function is failure and can not protect. Be careful to set the function.

! Warning **Forbid short B1, B2 without taking other protection ways.**

2.2.2 The parts description and external dimensions for N type controller



1. Controller body
2. Plug to connect control circuit 10P
3. 35mm electrical rail
4. Wiring diagram (the other side is technical label)
5. Controller panel
6. Plug to connect the light curtain 12P

Figure 2-4 The parts description for N type controller

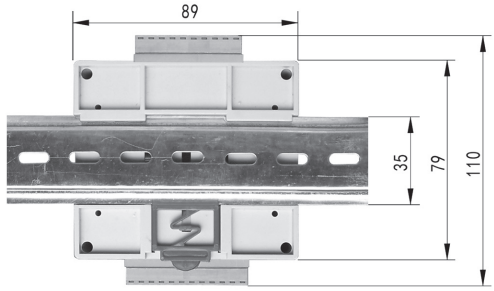


Figure 2-5 The external dimensions for N type controller

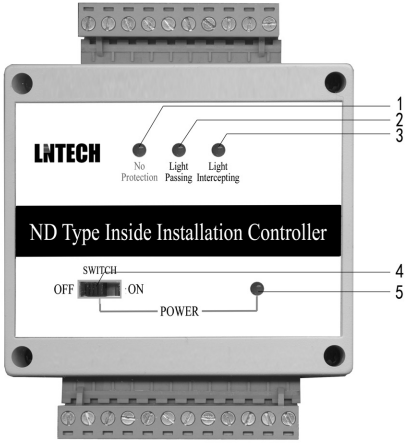
N type controller is directly inserted into 35mm rails of the inside electrical cabinet of press or equipment, refer to the figure 2-5.

If periphery has strong electromagnetism noise source (for example transducer, high frequency machine and so on), the controller should be far away from them to avoid the interference.

2.3 ND Type Controller

ND type controller controls one set light curtain, is mounted inside the electrical cabinet.

2.3.1 The panel description for ND type controller



1. No protection indicator (yellow)
2. Light passing indicator (green)
3. Light intercepting indicator (red)
4. Power switch
5. Power indicator (red)

! Warning

When the power switch is on the "ON" position, the protector can protect; When the power switch is on the "OFF" position, the protector can not protect. Other protections must be taken.

The state of the power switch and indicators			
Power switch	ON		OFF
Power indicator	¤		●
No protection indicator	●		●
Protection state	protection		protection
Light curtain state	Light passing	Light intercepting	No working
Light passing indicator	¤	●	●
Light intercepting indicator	●	¤	●

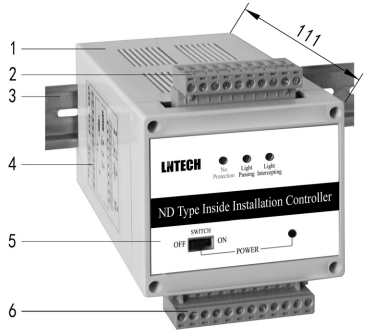
Figure 2-6 The panel description for ND type controller

! Attention

When the power switch is "ON", the indicator of no protection (yellow) is twinkling, the power indicator and the light passing indicator are bright, the light intercepting indicator is dark. B1,B2 are reserved two posts for muting. Short B1 and B2, OSSD1 and OSSD2 are closed, the protection function is failure and can not protect. Be careful to set the function.

! Warning **Forbid short B1, B2 without taking other protection ways.**

2.3.2 The parts description and external dimensions for ND type controller



1. Controller body
2. Plug to connect control circuit 10P
3. 35mm electrical rail
4. Wiring diagram (the other side is technical label)
5. Controller panel
6. Plug to connect the light curtain 12P

Figure 2-7 The parts description for ND type controller

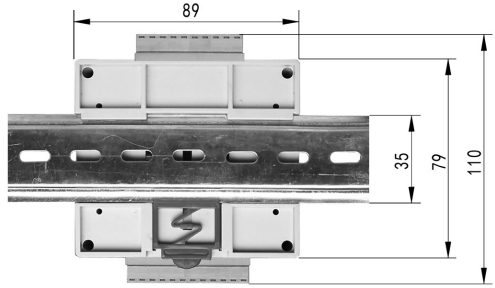


Figure 2-8 The external dimensions for ND type controller

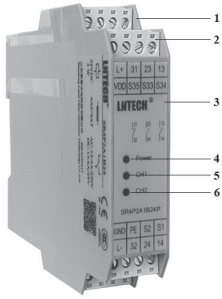
ND type controller is directly inserted into 35mm rails of the inside electrical cabinet of press or equipment, refer to the figure 2-8.

If periphery has strong electromagnetism noise source (for example transducer, high frequency machine and so on), the controller should be far away from them to avoid the interference.

2.4 SR Series Safety Relay

SR series safety relay, model of SR4P2A1B24N/P can control one set light curtain, is mounted inside the electrical cabinet by 35mm rails. SR4P2A1B24N is fit for NPN type light curtain; SR4P2A1B24P is fit for PNP type light curtain devices.

2.4.1 The Unit Description for SR series safety relay



1. Controller body
2. Terminals
3. Controller panel
4. Power indicator
5. CH1 indicator
6. CH2 indicator

Figure 2-9 The part description and technical parameters for SR series safety relay

The Safety Relay can be operated with 24VDC. It has following features:

◆Relay outputs: 2 safety contacts (N/O), 1 auxiliary contact (N/C);
◆Connections for photoelectric protection devices;
◆Status indicators;
◆Feedback control loop for monitoring of external contactors/relays possible.

The relay complies with the following safety requirements:

◆The circuit is redundant with built-in self-monitoring;
◆The safety function remains effective in the case of a component failure;
◆The correct opening and closing of the safety function relays is tested automatically in each on-off cycle.

Function Description

◆The Safety Relay provide a safety-oriented interruption of a safety circuit. When theoperating voltage is supplied, the LED "Power" is illuminated. The unit is ready for operation, when the reset circuit S33-S34 is closed.
◆Input circuit closed (e.g. the photoelectric protection devices output signals), Relay K1 and K2 energize and retain themselves. The status indicators for "CH1" , "CH2" illuminate.The N/O (normal open)safety contacts (13-14/23-24) will be closed, the auxiliary N/C (normal close) contact (31-32) will be opened.
◆Input circuit is opened (e.g. the photoelectric protection devices output no signal), K1 and K2 de-energize. The status indicators for "CH1 ", "CH2" go out .The N/O safety contacts (13-14/23-24) will be opened, the auxiliary N/C contact (31-32) will be closed.

Operating Modes:

◆Two-channel operation:

Redundancy in the input circuit. Earth faults in the emergency stop circuit and short across the emergency stop push button are also detected.

◆Automatic reset :

Unit is active as soon as the input circuits are closed.

◆Manual reset(only SR4P2A1B24N/P):

Only When a reset button has been pressed, then released,the unit can be active. Automatic activation following a loss/return of supply voltage is thereby prevented.

◆Increase in the number of available contacts by connection of external contactors/relays.

Reset circuit settings:

◆Automatic reset: Bridge S33-S34.

◆Manual reset: Connect the reset button to S33-S35. Only When a reset button has been pressed, then released, the unit can be active.

2.4.2 The dimension and technical datas of SR series safety relay

Figure 2-10 The dimension and technical datas of SR series safety relay

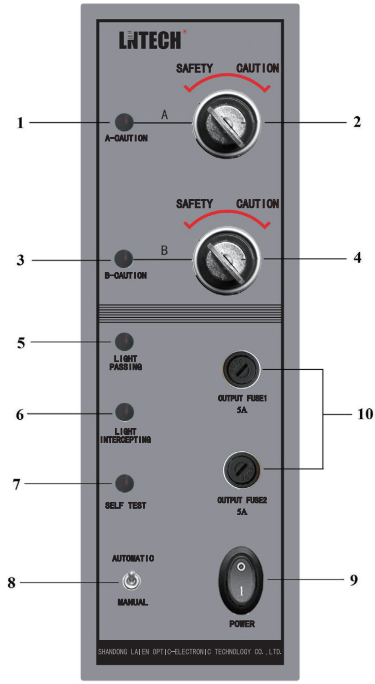
Technical Data	
Supply Voltage	24VDC
Voltage range	15~10%
Power Consumption	3W
Switched Capacity	AC-152A/250V; DC-13, 3A/24V Stand to EN60947-5-1
Output contact	2N/O,1N/C
Contact fuse protection	4A T or 6A F
Safety Category	Safety Level:EN ISO 13849-1 (up to Cat.4/PLe) Safety Integrity Level:EN 62061 (up to SIL3)
Double channel with contact short circuit	
Environment	Stand to EN60068-2-78
Ambient temperature	-10 ~ 55°C
Storage temperature	-40 ~ 85°C
Shake **Frequency** **Amplitude**	Stand to EN60068-2-6 10~55HZ 0.33mm
Protecting housing	IP50
Max cable cross section	0.2~2.5mm^2
Torque setting for screw terminal	0.5Nm
Dimension (L×W×H) mm	96×22.5×116
Weight	360g

Caution: If periphery has strong electromagnetism noise source (for example transducer, high frequency machine and so on), the controller should be far away from them to avoid the interference.

2.5 S Type Controller

S type controller controls two sets light curtain, is mounted to the main body of the machine directly, outside the electrical cabinet.

2.5.1 The panel description for S type controller



1. A-side no protection indicator(yellow)
2. A-side key switch
3. B-side no protection indicator(yellow)
4. B-side key switch

Warning

When the key switch on the "SAFETY" position, the LED is dark, the protector is protection state. When the key switch on the "CAUTION" position, the LED is twinking, the protector can not protect. Other protections must be taken.

The key must be kept by manager.

5. Light passing indicator (green)
6. Light intercepting indicator (red)
7. Self-test indicator (red)
8. Self-test switch
9. Power switch (with power indicator of red)
10. Output fuse

    Over-current protection of OSSD1, OSSD2, 5A.

Light curtain and indicator state		
Light curtain state	**Light passing indicator**	**Light intercepting indicator**
Passing (both sets)	¤	●
Intercepting (one or both sets)	●	¤

Figure 2-11 The panel description for S type controller

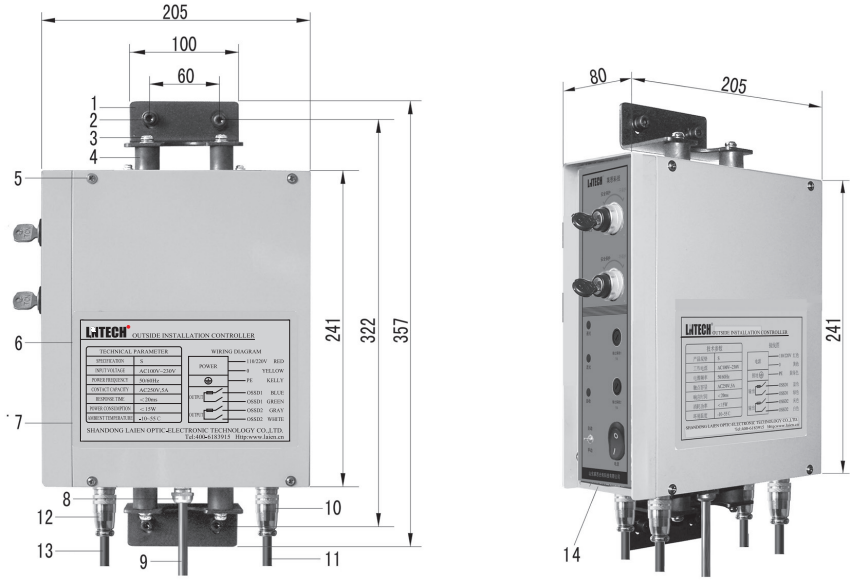
2.5.2 Self-test switch and the power switch

Self-test switch is used to detect the self-testing function of the protector by manual.
The purpose of setting self-test switch is simulating a fault to the controller.
When the two output relays are not in the synchronization, the controller can check out, the self-test indicator(red) twinkles, the OSSD1 and OSSD2 are open until the fault is relieved.

The usage of the self-test switch: When the self-test switch is on the “MANUAL” position, intercept the light curtain, the self-test indicator(red) twinkles, OSSD1 and OSSD2 are open until the fault is relieved.

Please make the self-test switch on the “AUTOMATIC” position when normal working.
When the power switch is on the “1” position, the controller is on. When the power switch is on the “0” position, the controller is off.

2.5.3 The parts description and external dimensions for S type controller



1. Controller fixed bracket
2. M6×16 inner-hexagon bolt
3. M6×12 assembled bolt
4. Ø20×20 rubber shock absorber
5. M4×6 screws
6. The box lid of controller
7. Technical label
8. Control cable port
9. Control cable
10. A-set signal cable plug
11. A-set signal cable
12. B-set control cable plug
13. B-set control cable
14. Controller panel

Figure 2-12 The parts description and external dimensions for S type controller

According to the external dimensions of the controller, choose the appropriate mounting position on the body of the press or other equipment; And the position must be prevented collision, advantageous for operation and easy to maintain.
If periphery has the strong electromagnetism noise source (for example transducer, high frequency machine and so on), the controller should be far away from them to avoid the interference.

3 Attentions for Installation

! Attention

Before installation, please unpack the package box and checkup packing component according to the packing detailed list;
During installation, please shut off power supply to avoid electric shock.

3.1 To Determine a Safety Distance

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.

3.1.1 The Formula 1

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).

3.1.2 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.

3.1.3 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.

3.1.4 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 3-1 stipulations at least.

Table 3-1

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.

3.2 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

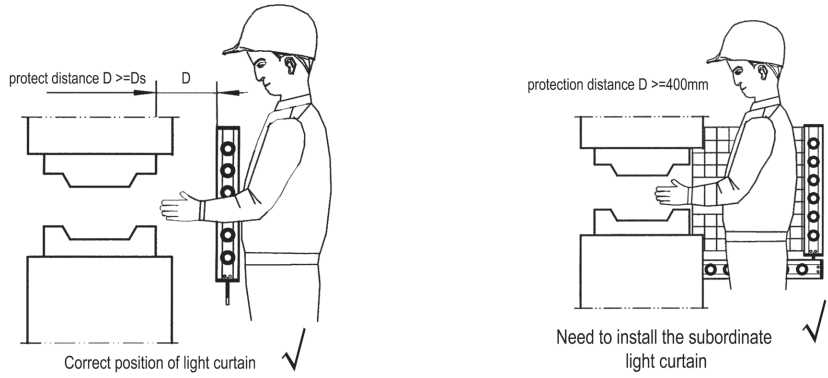


Figure.3.1 Correct placement position schematic drawing for light curtain

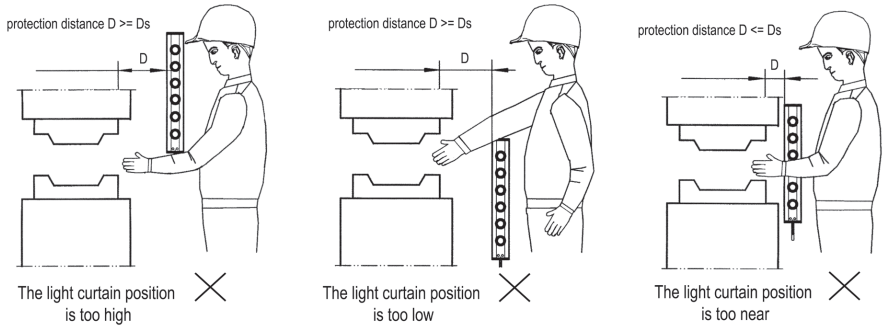


Figure.3.2 Incorrect placement position schematic drawing for light curtain

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.

3.3 Attentions for Neighboring Placement

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.

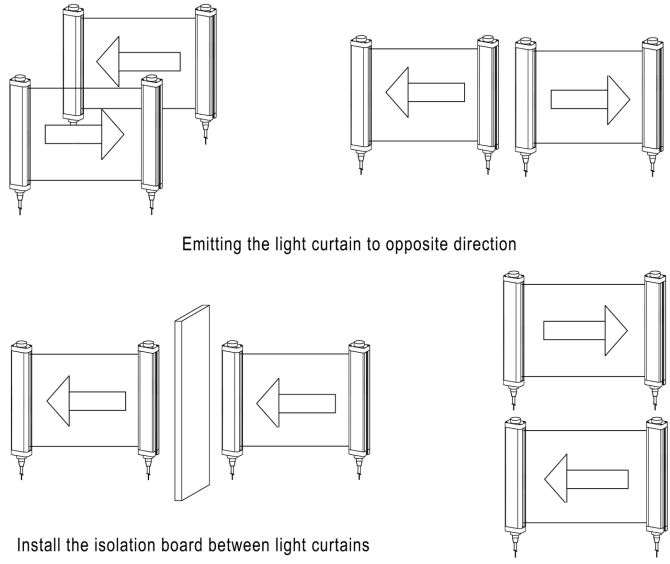


Figure 3.3 Placement schematic drawing for prevented the neighboring light curtain disturbs mutually

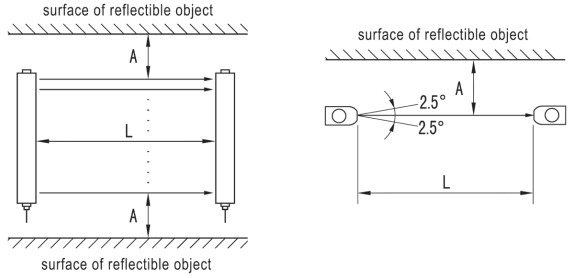
! Warning

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.

3.4 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.



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

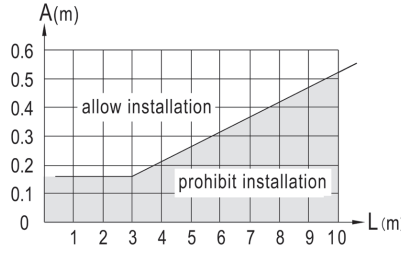


Figure 3-4 The placement position schematic drawing of prevented the influence from the reflecting surface around the light curtain

! Warning

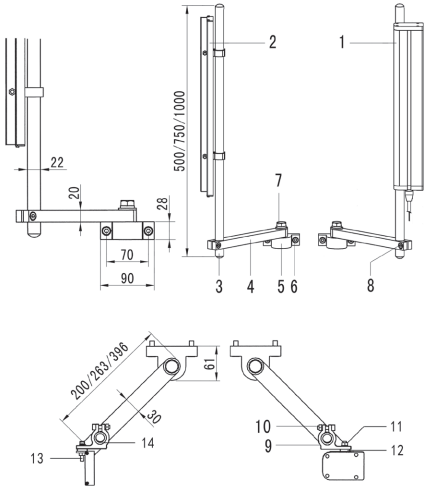
A. The smooth reflecting surface around the light curtain, can cause the protector to lose the normal function, so as to lose the protective function.

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.

3.5 The Description of Mounting Fittings

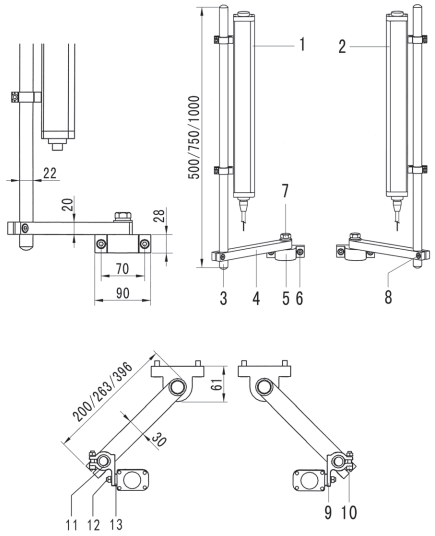
The main ways of the installation consist of split steel pipe bracket, integrated steel pipe bracket and combined bracket. They can meet the needs of the installation.

3.5.1 Split steel pipe brackets



1. Sensor of ST type
2. Reflector/mirror
3. Steel pipe Ø22
4. Rotatable bracket
5. Fixed stand
6. Fixed bolt with equipment M8×20
7. Connection bolt between rotatable bracket and fixed stand M16×45
8. Clamping bolt with steel pipe M8×20
9. b-shape clamp
10. Clamping bolt with steel pipe M6×25
11. T-shape bolt M6×22
12. Rubber shock absorber
13. Connection bolt M6×20
14. Plastic washer

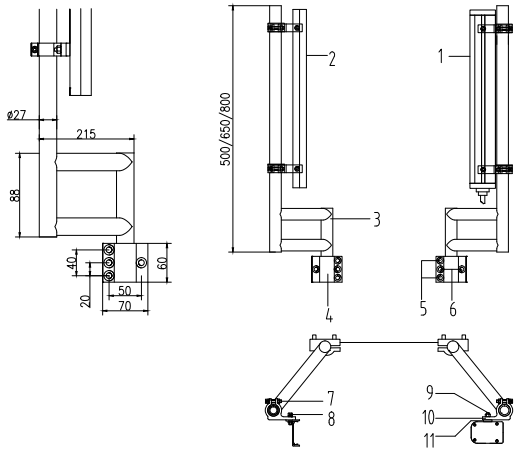
Figure 3-5 Fixed the ST type light curtain by split steel pipe brackets



1. Emitter of SN type
2. Receiver of SN type
3. Steel pipes Ø22
4. Rotatable bracket
5. Fixed stand
6. Fixed bolt with equipment M8×20
7. Connection bolt between rotatable bracket and fixed stand M16×45
8. Clamping bolt with steel pipe M8×20
9. b-shape clamp
10. Clamping bolt with steel pipe M6×25
11. Plastic washer
12. T-shape bolt M6×22
13. Rubber shock absorber

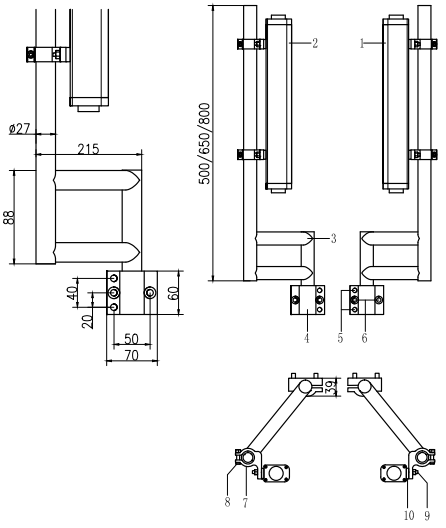
Figure 3-6 Fixed the SN type light curtain by split steel pipe brackets

3.5.2 Integrated steel pipe brackets



1. Sensor of ST type
2. Reflector/mirror
3. Steel pipe Ø27
4. Fixed stand
5. Clamping bolt with integrated steel pipe M8×20
6. Fixed bolt with equipment M8×30
7. b-shape clamp
8. Connection bolt M6×20
9. Clamping bolt with steel pipe M6×25
10. T-shape bolt M6×22
11. Rubber shock absorber

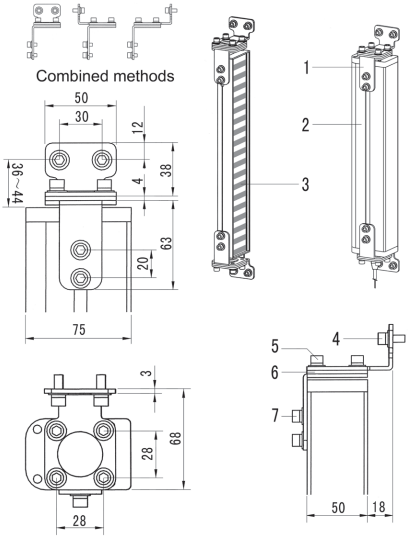
Figure 3-7 Fixed the ST type light curtain by integrated steel pipe brackets



1. Emitter of SN type
2. Receiver of SN type
3. Steel pipe Ø27
4. Fixed stand
5. Clamping bolt with integrated steel pipe M8×20
6. Fixed bolt with equipment M8×30
7. b-shape clamp
8. Clamping bolt with steel pipe M6×25
9. T-shape bolt M6×22
10. Rubber shock absorber

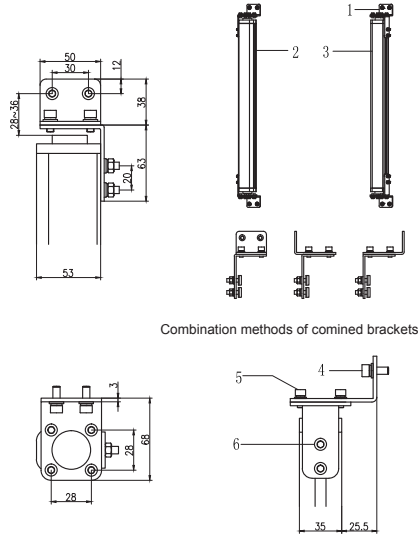
Figure 3-8 Fixed the SN type light curtain by integrated steel pipe brackets

3.5.3 Combined brackets



1. Combined bracket
2. Sensor of ST type
3. Reflector/mirror
4. Connection bolt between the bracket and equipment M6×16
5. Angle adjusting bolt M6×16
6. Rubber shock absorber
7. T-shape bolt

Figure 3-9 Fixed the ST type light curtain by combined brackets



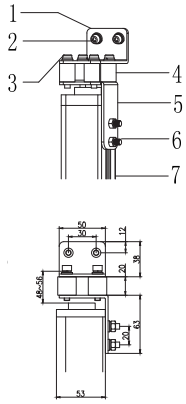
1. Combined bracket
2. Emitter
3. Receiver
4. Connection bolt between the bracket and equipment M6×16
5. Angle adjusting bolt M6×16
6. T-shape bolt

Figure 3-10 Fixed the SN type light curtain by combined brackets

3.5.4 Other methods for mounting

Other methods are used to solve some special problems, they are provided for special requests. These methods can be used for SN and ST type light curtain, to save space, only enumerate one here.

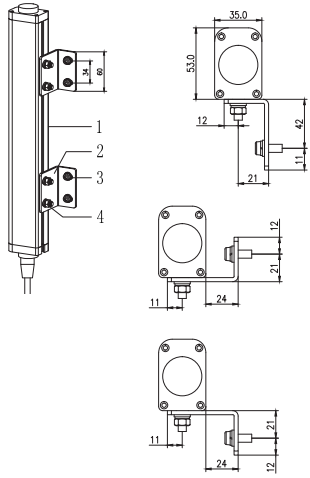
The combined brackets added shock absorbers, install 4 Ø20×20 shock absorbers between two combined brackets, it can reduce the vibration effectively, and mainly used in where the vibration is larger.



1. Combined bracket A
2. Connection bolt between the bracket and equipment M6×16
3. Angle adjusting bolt M6×12
4. Rubber shock absorber Ø20×20
5.Combined bracket B
6. T-shape bolt
7. sensor

Figure 3-11 Mounting the sensor with combined brackets, added rubber shock absorbers

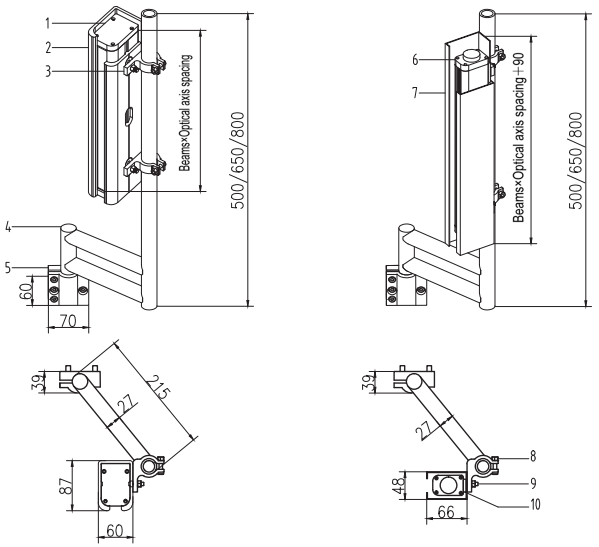
The right-angle bracket is simple and practical for fixing, it is fixed through two right-angle brackets with the sensor on mechanical device's column, the shortcoming is the angle not easy to adjust, it is suitable for the fitting smooth surface.



1. Sensor
2. Right-angle bracket
3. fixed bolt M6×16
4. T-shape bolt

Figure 3-12 Mounting the sensor with right-angle brackets

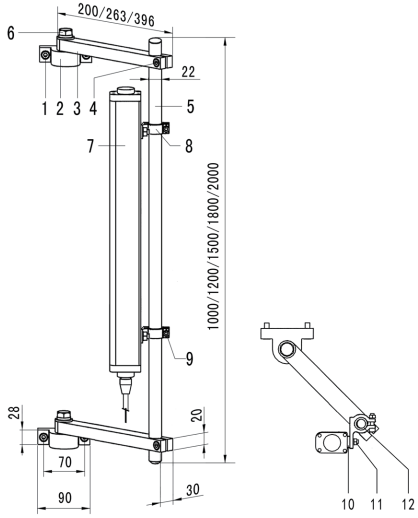
The shield is to solve the problem that the sensor is collided to damage frequently.



1. ST type sensor
2. ST type shield
3. b-shape clamp
4. Integrated steel pipe bracket
5. Fixed stand
6. SN type sensor
7. SN type shield
8. Clamping bolt M6×25
9. T-shape bolt
10. Rubber shock absorber

Figure 3-13 Mounting the sensor with shield

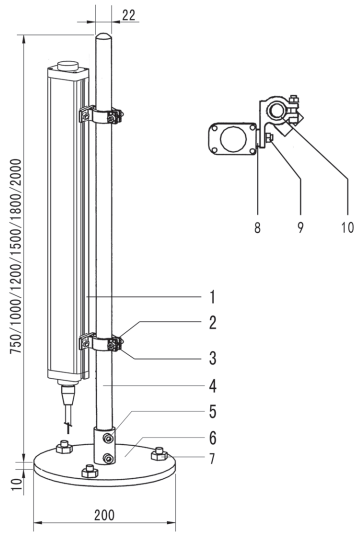
The double rotatable arms steel pipe bracket is to solve the problem that the light curtain is supported unreliable when the steel pipe surpasses 1000mm.



1. Fixed bolt with equipment M8×20
2. Fixed stand
3. Rotatable bracket
4. Clamping bolt with steel pipe M8×20
5. Steel pipe Ø22
6. Connection bolt between rotatable bracket and fixed stand M16×45
7. Sensor
8. b-shape clamp
9. Clamping bolt M6×25
10. Rubber shock absorber
11. T-shape bolt M6×22
12. Plastic washer

Figure 3-14 Mounting the sensor with double rotatable arms steel pipe brackets

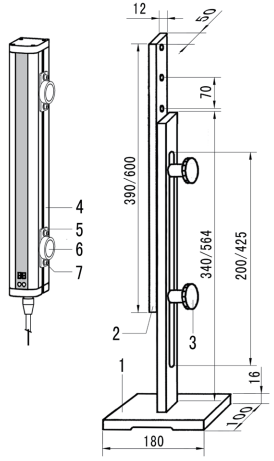
Landing steel pipe bracket is used in the area protection generally, it can reduce the vibration to be smallest.



1. Sensor
2. b-shape clamp
3. Clamping bolt with steel pipe M6×25
4. Steel pipe Ø22
5. Clamping bolt with steel pipe M6×12
6. Fixed stand
7. Expansible bolt in the ground M10×100
8. Rubber shock absorber
9. T-shape bolt M6×22
10. Plastic washer

Figure 3-15 Mounting the sensor with landing steel pipe bracket

The plate-type bracket has two force magnets (in chart not to draw) under its foundation, they can make the foundation adsorb tight on the press floor, through adjusting the adjustment board, it is possible to change the light curtain's uprightness position, it is used in the press replacing mold frequently.



1. Foundation
2. Adjustment board
3. Adjustment bolt
4. Sensor
5. Magnet junction panel
6. Magnet
7. Connection bolt M6×12

Figure 3-16 Mounting the sensor with plate-type brackets

3.6 Tools Needed in Installation

A. An electric portable drill, bore bits (sized Ø4.2, Ø5.0, Ø6.7 and Ø10)
B. Hand taps (sized M6 and M8)
C. Screwdrivers, both cross-ended and knife-ended,
D. 6-cornered spanners (5mm, 6mm)
E. Adjustable wrench12”
F. Nipper pliers

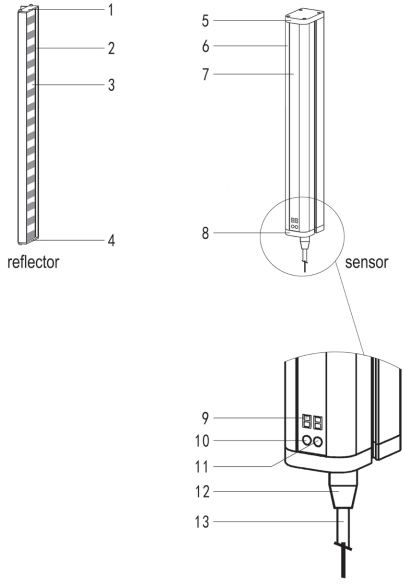
A drill of Ø5.0 and a tap of M6 are needed when installing fixed the brackets as combined, right-angle and W, S type controller fixed.
A drill of Ø6.7 and a tap of M8 are needed when installing fixed stands.
A set of Ø4.2 aiguilles is needed installing the rails for N, ND type controller.
A set of Ø10 aiguilles is needed to drill the wiring channel for signal electronic cable..

4 Mounting

4.1 STF Series Light Curtain

STF series light curtain is consisted of reflector and receiver, the receiver contains many emit units and relevant receive units, the emit units emit infrared to reflector, the light beams are reflected back to the receiver, and form the protective light curtain, the protective range is 400~3000mm.

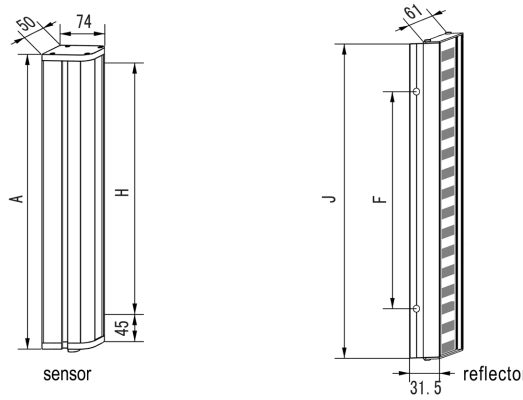
4.1.1 Parts' function description of STF series



1. Reflector's up cover
2. Reflector outer shield
3. Reflective piece
4. Reflector's under cover,
5. Sensor up cover
6. Sensor outer shied
7. Light filter
8. Sensor under cover,
9. Numerical codes display:
   Display serial number of the light beam which is first interrupted,display "88" when all light beams are passing.
10. Light passing indicator, green
11. Light intercepting indicator, red
12. Signal cable plug unit for sensor
13. Signal cable

Figure 4-1 Parts' function description of STF series

4.1.2 Parts' external dimension of STF series



A: Height of sensor; H: Height of protection
J: Height of reflector; F: Fixed hole center distance

Beams	Spec.	A	H	F	J
4	STF0440	210	120	110	210
6	STF0640	290	200	190	290
8	STF0840	370	280	270	370
10	STF1040	450	360	330	450
12	STF1240	530	440	420	530
14	STF1440	610	520	500	610
16	STF1640	690	600	580	690
18	STF1840	770	680	620	850
20	STF2040	850	760	700	950
22	STF2240	930	840	750	1050
24	STF2440	1010	920	800	1150
26	STF2640	1090	1000	850	1200
28	STF2840	1170	1080	900	1300
30	STF3040	1250	1160	950	1400
32	STF3240	1330	1240	1000	1500
34	STF3440	1410	1320	1050	1600
36	STF3640	1490	1400	1100	1700
38	STF3840	1570	1480	1150	1750
40	STF4040	1650	1560	1200	1800

Figure 4-2 Parts' external dimension of STF series

4.1.3 Mounting by integrated steel pipe bracket

4.1.4 Mounting by split steel pipe bracket

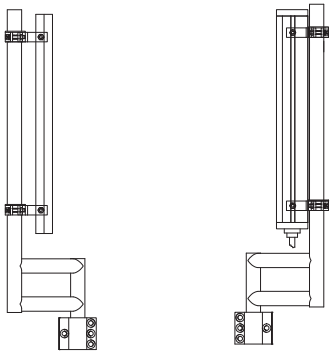


Figure 4-3 STF series mounting by integrated steel pipe brackets

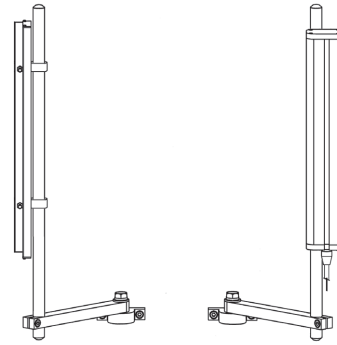


Figure 4-4 STF series mounting by split steel pipe brackets

4.1.5 Mounting by combined bracket

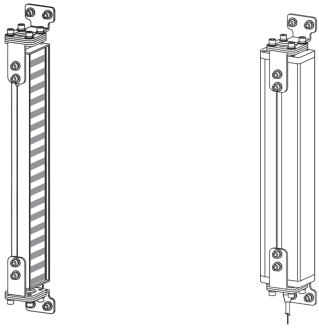


Figure 4-5 STF series mounting by combined brackets, fitting absorption of shock rubber packing

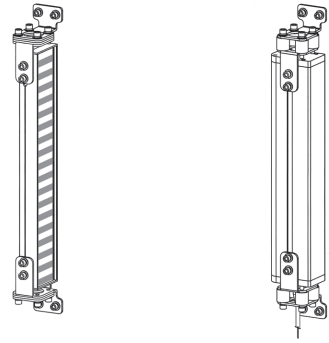
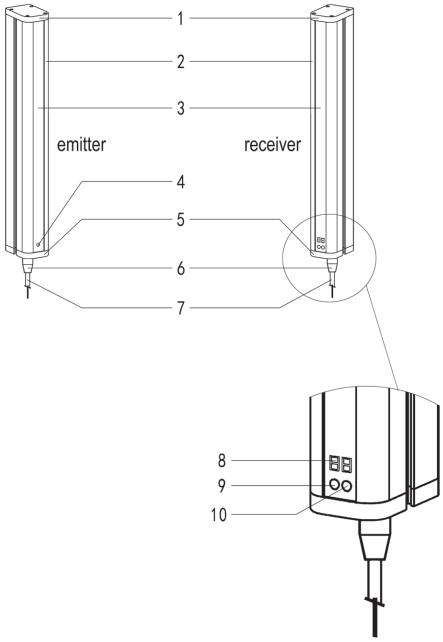


Figure 4-6 STF series mounting by combined brackets, fitting rubber shock absorbers

4.2 STD Series Light Curtain

STD series light curtain is consisted of emitter and receiver, the emitter contains many emit units,the receiver contains many receive units, the emitter emits infrared, the light beams send directly to the receiver, and form the protective light curtain, the protective range is 0~15000mm.

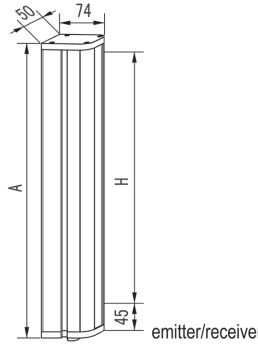
4.2.1 Parts' function description



1. Sensors up cover
2. Sensors outer shield
3. Light filter
4. Emitter power indicator
5. Sensors under cover,
6. Signal cable plug unit for sensor
7. Signal cable
8. Numerical codes display:
   Display serial number of the light beam which is first interrupted, display "88" when all light beams are passing.
9. Light passing indicator, green
10. Light intercepting indicator, red

Figure 4-7 Parts' function description of STD series

4.2.2 Parts external dimensions



A: Height of sensor;
H: Height of protection

Figure 4-8 Part's external dimension of STD series

Beams	Light axis pitch 40mm			Light axis pitch 20mm			Light axis pitch 10mm			Light axis pitch 80mm		
	Spec.	A	H	Spec.	A	H	Spec.	A	H	Spec.	A	H
2										STD0280	210	80
4	STD0440	210	120							STD0480	370	240
6	STD0640	290	200							STD0680	530	400
8	STD0840	370	280	STD0820	210	140				STD0880	690	560
10	STD1040	450	360							STD1080	850	720
12	STD1240	530	440	STD1220	290	220				STD1280	1010	880
14	STD1440	610	520							STD1480	1170	1040
16	STD1640	690	600	STD1620	370	300				STD1680	1330	1200
18	STD1840	770	680							STD1880	1490	1360
20	STD2040	850	760	STD2020	450	380				STD2080	1650	1520
22	STD2240	930	840									
24	STD2440	1010	920	STD2420	530	460	STD2410	290	230			
26	STD2640	1090	1000									
28	STD2840	1170	1080	STD2820	610	540						
30	STD3040	1250	1160									
32	STD3240	1330	1240	STD3220	690	620	STD3210	370	310			
34	STD3440	1410	1320									
36	STD3640	1490	1400	STD3620	770	700						
40	STD4040	1650	1560	STD4020	850	780	STD4010	450	390			
44	STD4440	1810	1720	STD4420	930	860						
48	STD4840	1970	1880	STD4820	1010	940	STD4810	530	470			
52	STD5240	2130	2040	STD5220	1090	1020						
56	STD5640	2290	2200	STD5620	1170	1100	STD5610	610	550			
60	STD6040	2450	2360	STD6020	1250	1180						
64	STD6440	2610	2520	STD6420	1330	1260	STD6410	690	630			
68	STD6840	2770	2680	STD6820	1410	1340						
72	STD7240	2930	2840	STD7220	1490	1420	STD7210	770	710			
80							STD8010	850	790			
88							STD8810	930	870			
96							STD9610	1010	950			
104							STDA410	1090	1030			
112							STDB210	1170	1110			
120							STDC010	1250	1190			
128							STDC810	1330	1270			
136							STDD610	1410	1350			

4.2.3 Mounting by integrated steel pipe bracket

4.2.4 Mounting by split steel pipe bracket

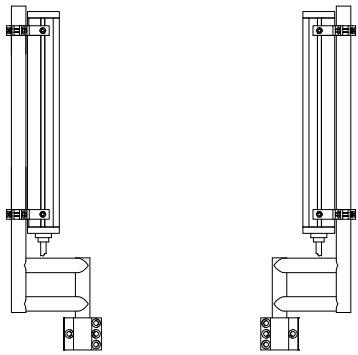


Figure 4-9 STD series mounting by integrated steel pipe brackets

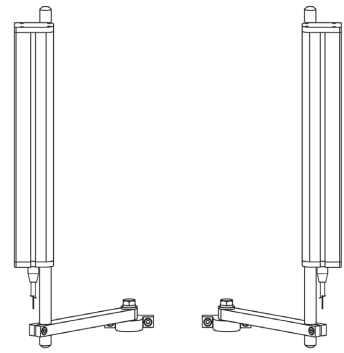


Figure 4-10 STD series mounting by split steel pipe brackets

4.2.5 Mounting by combined bracket

4.2.6 Mounting by the combined brackets added shock absorbers

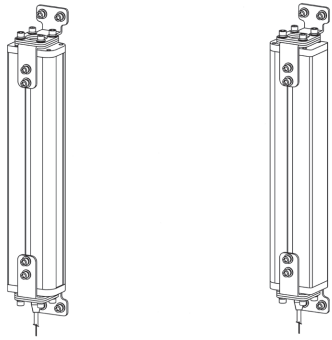


Figure 4-11 STD series mounting by combined brackets, fitting absorption of shock rubber packings

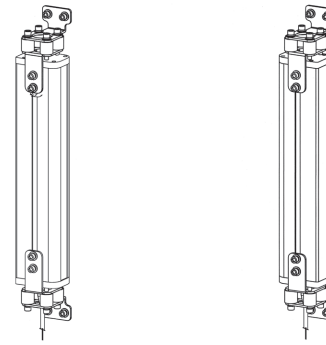
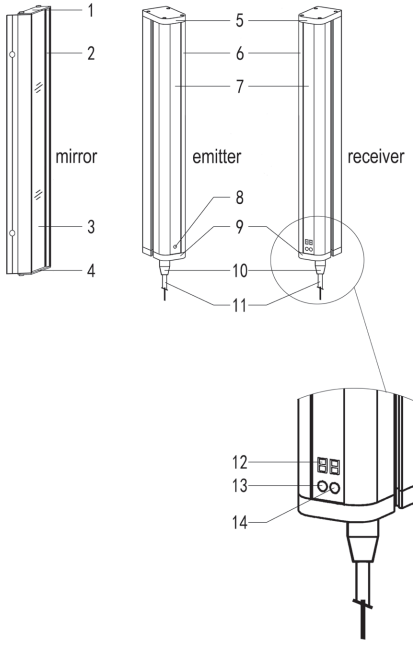


Figure 4-12 STD series mounting by combined brackets, fitting rubber shock absorbers

4.3 STQ Series Light Curtain

STQ series light curtain is consisted of emitter, mirror and receiver, the emitter contains many emit units, the receiver contains many receive units, the emitter emits infrared, the light beams are reflected by the 1 or 2 mirror(s), and their transfer direction are changed, then to the receiver, form 2 or 3 sides protective light curtain, the protective range: <=12000mm, 2 sides;<=8000mm, 3sides.

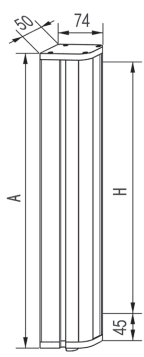
4.3.1 Parts' function description



1. Mirror up cover
2. Mirror outer shield
3. Coated glass
4. Mirror under cover
5. Sensor up cover
6. Sensor outer shield
7. Light filter
8. Emitter power indicator
9. Sensor under cover
10. Signal cable plug unit for sensor
11. Signal cable
12. Numerical codes display:
    Display serial number of the light beam which is interrupted, display "88" when all light beams are passing.
13. Light passing indicator, green
14. Light intercepting indicator, red

Figure 4-13 Parts' function description of STQ series

4.3.2 Parts' external dimension of STQ series



emitter/receiver

mirror

A: Height of sensor;
H: Height of protection
J: Height of reflector;
F: Fixed hole center distance

The F, J value of optical axis pitch 20mm, 80mm reference value of optical axis pitch 40mm.

Beams	Light axis pitch 40mm					Light axis pitch 20mm			Light axis pitch 80mm		
	Spec.	A	H	F	J	Spec.	A	H	Spec.	A	H
2									STQ0280	210	80
4	STQ0440	210	120	110	290				STQ0480	370	240
6	STQ0640	290	200	190	370				STQ0680	530	400
8	STQ0840	370	280	270	450	STQ0820	210	140	STQ0880	690	560
10	STQ1040	450	360	330	530				STQ1080	850	720
12	STQ1240	530	440	420	610	STQ1220	290	220	STQ1280	1010	880
14	STQ1440	610	520	500	690				STQ1480	1170	1040
16	STQ1640	690	600	580	770	STQ1620	370	300	STQ1680	1330	1200
18	STQ1840	770	680	620	850				STQ1880	1490	1360
20	STQ2040	850	760	700	950	STQ2020	450	380	STQ2080	1650	1520
22	STQ2240	930	840	750	1050						
24	STQ2440	1010	920	800	1150	STQ2420	530	460			
26	STQ2640	1090	1000	850	1200						
28	STQ2840	1170	1080	900	1300	STQ2820	610	540			
30	STQ3040	1250	1160	950	1400						
32	STQ3240	1330	1240	1000	1500	STQ3220	690	620			
34	STQ3440	1410	1320	1050	1600						
36	STQ3640	1490	1400	1100	1700	STQ3620	770	700			
40						STQ4020	850	780			
44						STQ4420	930	860			
48						STQ4820	1010	940			
52						STQ5220	1090	1020			
56						STQ5620	1170	1100			
60						STQ6020	1250	1180			
64						STQ6420	1330	1260			
68						STQ6820	1410	1340			
72						STQ7220	1490	1420			

Figure 4-14 Parts' external dimension of STQ series

4.3.3 Mounting layout chart

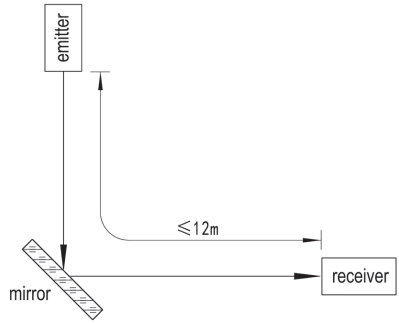


Figure 4-15 2 sides protection mounting layout chart

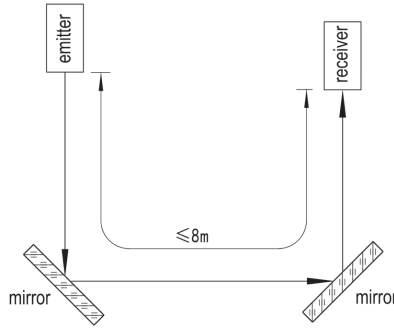


Figure 4-16 3 sides protection mounting layout chart

4.3.4 Mounting by landing brackets

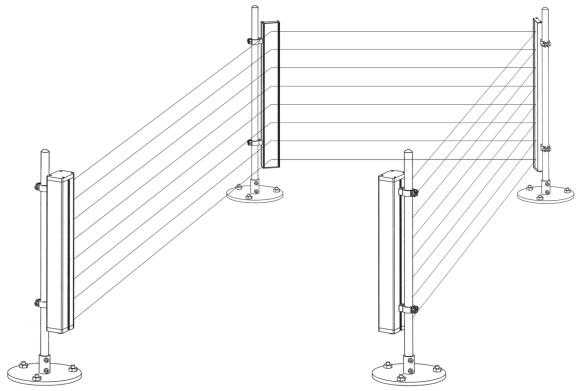


Figure 4-17 Mounting by landing brackets

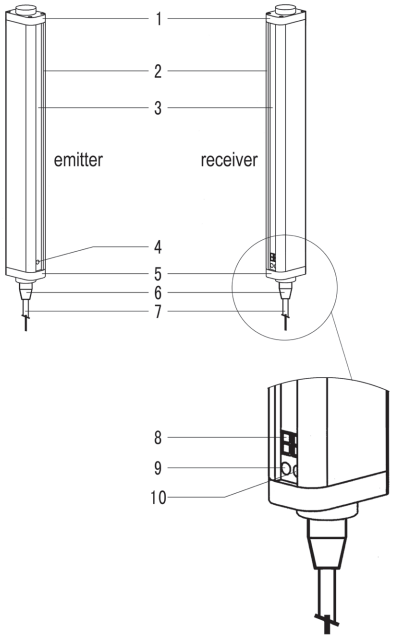
4.4 SNA/SNB Series Light Curtain

SNA/SNB series light curtain is consisted of emitter and receiver, the emitter contains many emit units, the receiver contains many receive units, the emitter emits infrared, the light beams send directly to the receiver, and form the protective light curtain.

The protective range of SNA series is 0~3000mm;

The protective range of SNB series is 0~8000mm.

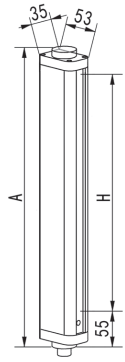
4.4.1 Parts' function description



1. Sensor up cover
2. Sensor outer shield
3. Light filter
4. Emitter power indicator
5. Sensor under cover
6. Signal cable plug unit for sensor
7. Signal cable
8. Numerical codes display:
   Display serial number of the light beam which is interrupted, display "88" when all light beams are passing.
9. Light passing indicator, green
10. Light intercepting indicator, red

Figure 4-18 Parts' function description of SNA/SNB series

4.4.2 Parts' external dimension



A: Height of sensor;
H: Height of protection

Beams	Light axis pitch 40mm			Light axis pitch 30mm			Light axis pitch 20mm			Light axis pitch 80mm		
	Spec.	A	H	Spec.	A	H	Spec.	A	H	Spec.	A	H
2										SNA/B0280	225	80
4	SNA/B0440	225	120							SNA/B0480	385	240
6	SNA/B0640	305	200	SNA/B0630	245	150	SNA/B0620	185	100	SNA/B0680	545	400
8	SNA/B0840	385	280	SNA/B0830	305	210	SNA/B0820	225	140	SNA/B0880	705	560
10	SNA/B1040	465	360	SNA/B1030	365	270	SNA/B1020	265	180	SNA/B1080	865	720
12	SNA/B1240	545	440	SNA/B1230	425	330	SNA/B1220	305	220	SNA/B1280	1025	880
14	SNA/B1440	625	520	SNA/B1430	485	390	SNA/B1420	345	260	SNA/B1480	1185	1040
16	SNA/B1640	705	600	SNA/B1630	545	450	SNA/B1620	385	300	SNA/B1680	1345	1200
18	SNA/B1840	785	680	SNA/B1830	605	510	SNA/B1820	425	340	SNA/B1880	1505	1360
20	SNA/B2040	865	760	SNA/B2030	665	570	SNA/B2020	465	380	SNA/B2080	1665	1520
22	SNA/B2240	945	840	SNA/B2230	725	630	SNA/B2220	505	420			
24	SNA/B2440	1025	920	SNA/B2430	785	690	SNA/B2420	545	460			
26	SNA/B2640	1105	1000	SNA/B2630	845	750	SNA/B2620	585	500			
28	SNA/B2840	1185	1080	SNA/B2830	905	810	SNA/B2820	625	540			
30	SNA/B3040	1265	1160	SNA/B3030	965	870	SNA/B3020	665	580			
32	SNA/B3240	1345	1240	SNA/B3230	1025	930	SNA/B3220	705	620			
34	SNA/B3440	1425	1320	SNA/B3430	1085	990	SNA/B3420	745	660			
36	SNA/B3640	1505	1400	SNA/B3630	1145	1050	SNA/B3620	785	700			
40	SNA/B4040	1665	1560	SNA/B4030	1265	1170	SNA/B4020	865	780			
44	SNA/B4440	1825	1720	SNA/B4430	1385	1290	SNA/B4420	945	860			
48	SNA/B4840	1985	1880	SNA/B4830	1505	1410	SNA/B4820	1025	940			
52	SNA/B5240	2145	2040	SNA/B5230	1625	1530	SNA/B5220	1105	1020			
56	SNA/B5640	2305	2200	SNA/B5630	1745	1650	SNA/B5620	1185	1100			
60	SNA/B6040	2465	2360	SNA/B6030	1865	1770	SNA/B6020	1265	1180			
64	SNA/B6440	2625	2520	SNA/B6430	1985	1890	SNA/B6420	1345	1260			
68	SNA/B6840	2785	2680	SNA/B6830	2105	2010	SNA/B6820	1425	1340			
72	SNA/B7240	2945	2840	SNA/B7230	2225	2130	SNA/B7220	1505	1420			

Figure 4-19 Parts' external dimension of SNA/SNB series

4.4.3 Mounting by integrated steel pipe bracket

4.4.4 Mounting by split steel pipe bracket

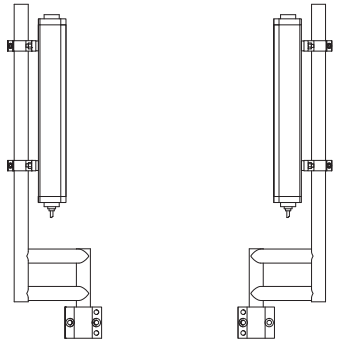


Figure 4-20 SNA/SNB series mounting by integrated steel pipe brackets

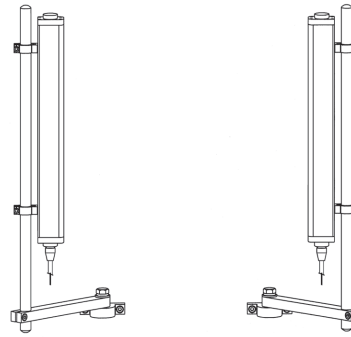


Figure 4-21 SNA/SNB series mounting by split steel pipe brackets

4.4.5 Mounting by combined right-angle bracket

4.4.6 Mounting by the combined brackets added shock absorbers

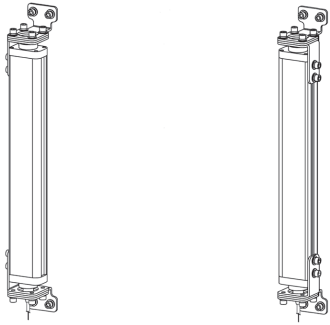


Figure 4-22 SNA/SNB series mounting by combined brackets, fitting absorption of shock rubber packings

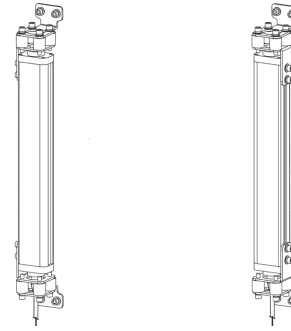


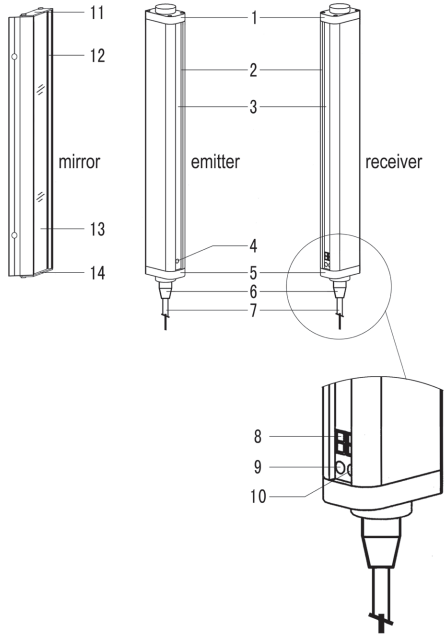
Figure 4-23 SNA/SNB series mounting by combined brackets, fitting rubber shock absorbers

4.5 SNQ Series Light Curtain

SNQ series light curtain is consisted of emitter, mirror and receiver, the emitter contains many emit units, the receiver contains many receive units, the emitter emits infrared, the light beams are reflected by the 1 or 2 mirror(s), and their transfer direction are changed, then to the receiver, form the 2 or 3 sides protective light curtains.

The protective range of the SNQ series:<=6000mm, 2 sides; <=4000mm, 3sides.

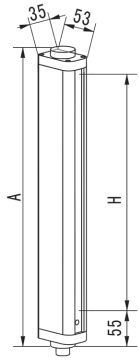
4.5.1 Parts' function description



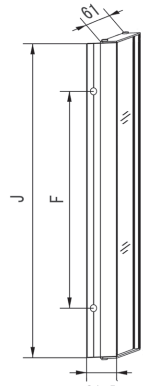
1. Sensor up cover
2. Sensor outer shield
3. Light filter
4. Emitter power indicator
5. Sensor under cover
6. Plug connect signal cable unit with the sensor
7. Signal cable
8. Numerical codes display: Display serial number of the light beam which is interrupted, display "88" when all light beams are passing.
9. Light passing indicator, green
10. Light intercepting indicator, red
11. Mirror up cover
12. Mirror outer shield
13. Coated glass
14. Mirror under cover

Figure 4-24 Parts' function description of SNQ series

4.5.2 Parts' external dimension of SNQ series



emitter/receiver



mirror

A: Height of sensor;
H: Height of protection
J: Height of reflector;
F: Fixed hole center distance

The F, J value of optical axis pitch 20mm, 30mm, 80mm reference value of optical axis pitch 40mm.

Beams	Light axis pitch 40mm					Light axis pitch 30mm			Light axis pitch 20mm			Light axis pitch 80mm		
	Spec.	A	H	F	J	Spec.	A	H	Spec.	A	H	Spec.	A	H
2												SNQ0280	225	80
4	SNQ0440	225	120	110	290							SNQ0480	385	240
6	SNQ0640	305	200	190	370	SNQ0630	245	150	SNQ0620	185	100	SNQ0680	545	400
8	SNQ0840	385	280	270	450	SNQ0830	305	210	SNQ0820	225	140	SNQ0880	705	560
10	SNQ1040	465	360	330	530	SNQ1030	365	270	SNQ1020	265	180	SNQ1080	865	720
12	SNQ1240	545	440	420	610	SNQ1230	425	330	SNQ1220	305	220	SNQ1280	1025	880
14	SNQ1440	625	520	500	690	SNQ1430	485	390	SNQ1420	345	260	SNQ1480	1185	1040
16	SNQ1640	705	600	580	770	SNQ1630	545	450	SNQ1620	385	300	SNQ1680	1345	1200
18	SNQ1840	785	680	620	850	SNQ1830	605	510	SNQ1820	425	340	SNQ1880	1505	1360
20	SNQ2040	865	760	700	950	SNQ2030	665	570	SNQ2020	465	380	SNQ2080	1665	1520
22	SNQ2240	945	840	750	1050	SNQ2230	725	630	SNQ2220	505	420			
24	SNQ2440	1025	920	800	1150	SNQ2430	785	690	SNQ2420	545	460			
26	SNQ2640	1105	1000	850	1200	SNQ2630	845	750	SNQ2620	585	500			
28	SNQ2840	1185	1080	900	1300	SNQ2830	905	810	SNQ2820	625	540			
30	SNQ3040	1265	1160	950	1400	SNQ3030	965	870	SNQ3020	665	580			
32	SNQ3240	1345	1240	1000	1500	SNQ3230	1025	930	SNQ3220	705	620			
34	SNQ3440	1425	1320	1050	1600	SNQ3430	1085	990	SNQ3420	745	660			
36	SNQ3640	1505	1400	1100	1700	SNQ3630	1145	1050	SNQ3620	785	700			
40									SNQ4020	865	780			
44									SNQ4420	945	860			
48									SNQ4820	1025	940			
52									SNQ5220	1105	1020			
56									SNQ5620	1185	1100			
60									SNQ6020	1265	1180			
64									SNQ6420	1345	1260			
68									SNQ6820	1425	1340			
72									SNQ7220	1505	1420			

Figure 4-25 Parts' external dimension of SNQ series

4.5.3 Mounting layout chart

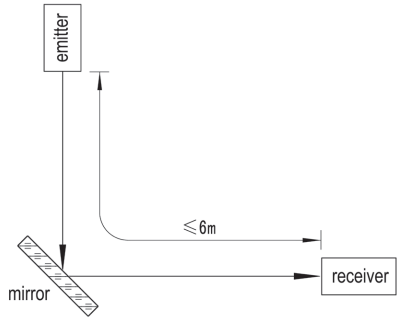


Figure 4-26 2 sides protection mounting layout chart of SNQ series

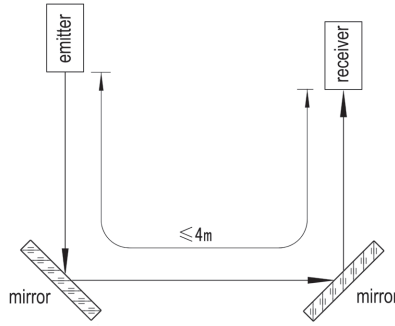


Figure 4-27 3 sides protection mounting layout chart of SNQ series

4.5.4 Mounting by landing brackets

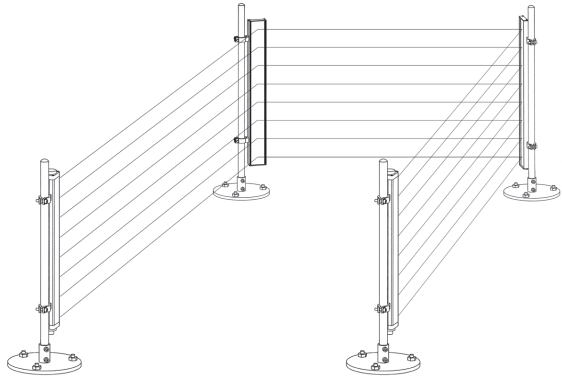


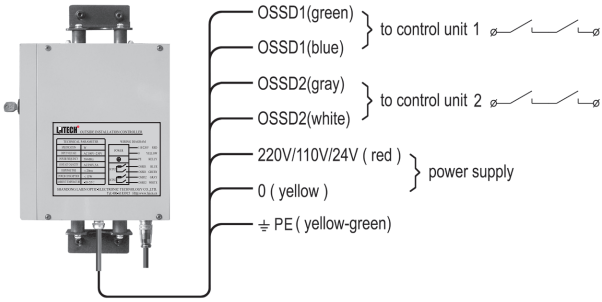
Figure 4-28 SNQ series mounting by landing brackets

5 Wiring

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!**

5.1 The Control Cable's Function Description

5.1.1 The control cable's function description of W, S type controller

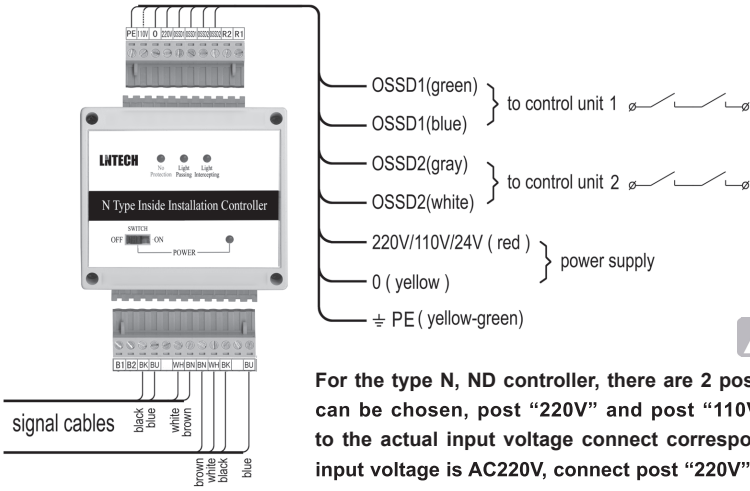


Attention

In the factory settings, AC220V is set for W type, S type controller' s power supply; if the power supply is AC110V, should turn on the controller lid, and find the change-over switch on the electric circuit, and then dial to "110V" position.

Figure 5-1 The control cable's function description of W, S type controller

5.1.2 The control cable's function description of N, ND type controller



Attention

For the type N, ND controller, there are 2 posts of terminal can be chosen, post "220V" and post "110V", according to the actual input voltage connect corresponding post, if input voltage is AC220V, connect post "220V" and post "0", if input voltage is AC110V, connect post "110V" and post "0".

Figure 5-2 The control cable's function description of N, ND type controller

Warning **R1,R2 are the prepared reset terminal, can set "self-lock" function.**
B1, B2 are the muting contacts. In the power state, short B1and B2, control security function failure, OSSD1, OSSD2 closed. Please be careful to use!

5.1.3 The wiring description of SR type safety relay

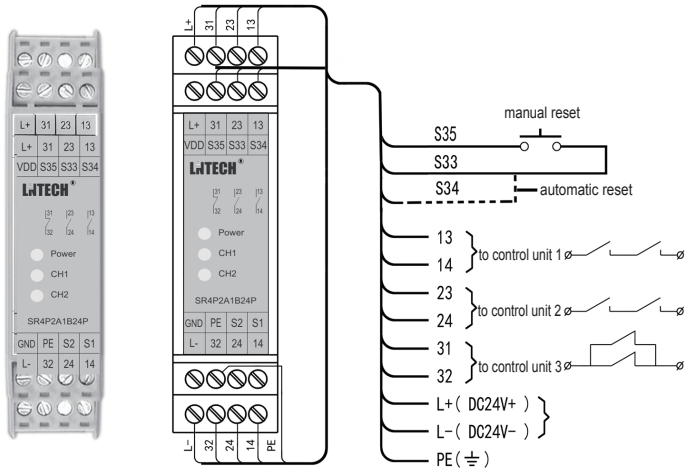


Figure 5-3 The control cable's function description of W, S type controller

Attention **The power supply of SR type safety relay is DC24V, L+ connects with positive pole of DC24V, L- connects with negative pole of DC24V.**

5.2 Wiring with Controller and the Press or Equipment

5.2.1Wiring the power supply

W, S, N, ND type controller: “AC220V/110V “(red) and “0” (yellow) are the AC power supply wires, which should be wired correctly according to the marking, and be sure not wrong!

SR type safety relay: the power supply is DC24V, 2 terminals were set in the factory, “L+” is DC24V+, “L-” is DC24V-.

5.2.2 Wiring the earth connection

“⏚” PE(yellow-green) is earth connection, should be connected in terminal grounding according to the marking.

Warning

The earth connection and the grounding must be well!

5.2.3 Wiring the control wire OSSD1, OSSD2

A. OSSD1 (green and blue) and OSSD2 (gray and white) must be connected into control circuits as Figure 5.5 or Figure 5.6. When the light passing, OSSD1, OSSD2 are close, the machine can run; when the light interrupting, they are open, the machine can’t run.

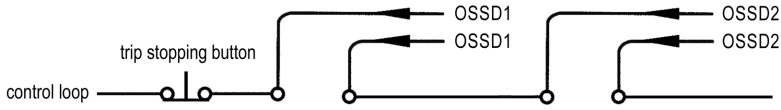


Figure 5-5 OSSD1, OSSD2 wiring with single control loop of press

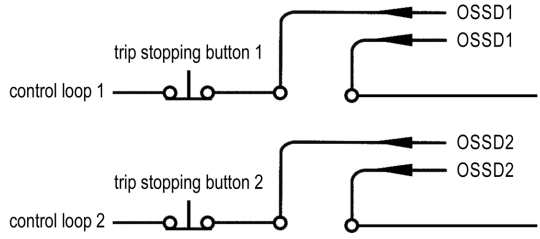


Figure 5-6 OSSD1, OSSD2 wiring with double control loop of press

B. The press control circuit can set “No Protection” in the back-way of the slide block without additional wiring.

C. If the press is not able to set “No Protection” in the back-way of the slide block, it should be connect a cam switch in a collateral way, let the pair of normally-opened contacts of cam switch connect with OSSD1,OSSD2, as shown in Figure 5.7

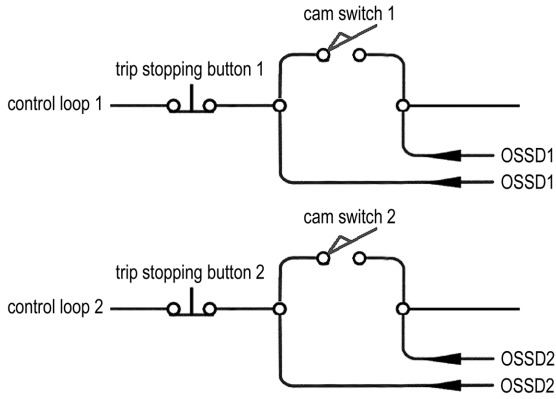


Figure 5-7 “No Protection” in the back-way of the slide block function is achieved by cam switch.

Warning

A. The cam switch must be passive contacts.
B. If the cam switch angle adjustment is not correct or the cam switch failure, there will be serious consequences.

5.2.4 Cam switch angle adjustment

If it is safety to permit to achieve “No Protection” in the back-way of the slide block, adjust the positions and angle of cam switch in accordance with conditions illustrated in Figure 5.5.

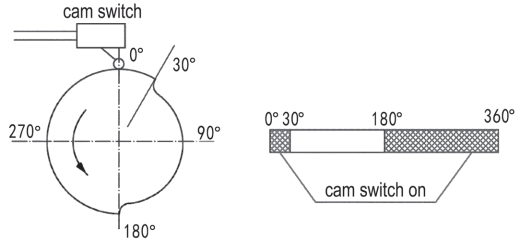


Figure 5-8 Structure of cam switch and its schematic drawing for operation conditions

Warning

The angle of the cam switch determines “no protection” area and relates to the safety for operators. Please operate carefully!

5.2.5 “Self-lock function” setting

N, ND type controller has reserved two posts as “R1” and “R2”, it is easy to set “self-lock function”. In the factory setting, “R1” and “R2” are internal connected, if set “self-lock function”, please contact us.

For the W, S type controller setting “self-lock function”, must be explained on order, or be set by the service personnel.

5.2.6 The reservation muting contacts

B1, B2 are the reservation muting contacts. You can set the muting function only when you need and ensure safety by other protection way. Short B1 and B2, control security function failure, OSSD1, OSSD2 closed. Please be careful to use.

! Warning

You should not short B1, B2 without other safe measures.

5.3 Wiring with Controller and Sensors

5.3.1 W, S type controller wiring with sensors

A. The W, S type controller wiring with light curtain sensors used signal cables, both sides used the thread type connector connection, to connect easily and quickly.

B. The STF series light curtain sensor used 3 core shielded cable, the STD, STQ, SNA, SNB, SNQ series light curtain sensors used 5 core shielded cable.

C. The W controller is used to control 1 set of the light curtain; When it is fitted with the STF series light curtain, the sensors may connect with the only one plug under the controller. When it is fitted with the STD, STQ, SNA, SNB, SNQ series light curtain, one of the sensors may connect with any one of the two plugs under the controller.

The S controller is used to control 2 sets of the light curtain, the plugs divided into two groups;

When it is fitted with the STF series light curtains, the “Front” side sensor may connect with the plug marking “Front protection” under the controller, the “Behind” sensor may connect with the plug marking “Behind protection” under the controller.

When it is fitted with the STD, STQ, SNA, SNB, SNQ series light curtains, the “Front” side sensors may connect with the two plugs marking “Front protection” under the controller, the “Behind” sensors may connect with the two plugs marking “Behind protection” under the controller; and in the same group, one of the sensors may connect with any one of the two plugs.

D. When inserting the connector, the key of plug and the trough of socket must tally certainly, jog the endof plug, and screw tight the thread clockwise.

E. When disassembling the connector, screw the thread counter clockwise, and then pull out lightly.

5.3.2 N, ND, SRcontroller wiring with sensors

A. The N, ND, SR type controller wiring with light curtain sensors used signal cables, one end is used the thread type connector (N type-5P, ND, SR type-7P) connection, another end is used the binding posts.

B. When inserting the connector, the key of plug and the trough of socket must tally certainly, jog the endof plug, and screw tight the thread clockwise. When disassembling the connector, screw the thread counter clockwise, and then pull out lightly.

C. When wiring the binding posts and connecting terminal of controller, according the color labeled on the terminal, connecting the corresponding wire, screw tight the bolts of the terminal.

Note:

For wiring N, ND, SR type controller, the shielded wire of the signal electric cable is wired together with blue wire, and it is sheaved by the blue plastic cannula.

⚠ Attention

In following kinds of situations, the protector should be damaged:

A. Do not correspond the key and trough to insert connector!

B. Not according to wiring diagram wiring!

C. Inserting and pulling the connector charged!

5.3.3 Wiring schematic drawing of controller and sensor(s)

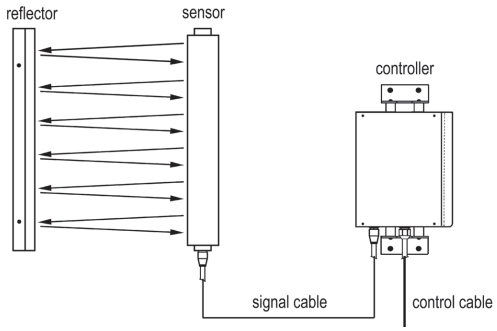


Figure 5-9 Wiring schematic drawing of W type controller and sensor (STF series)

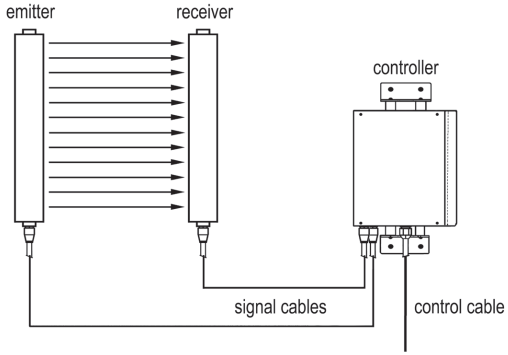


Figure 5-10 Wiring schematic drawing of W type controller and sensors (STD, SNA, SNB series)

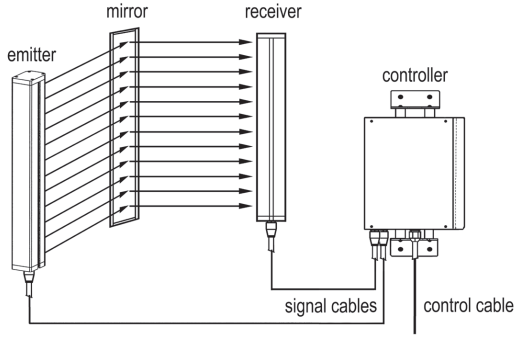


Figure 5-11 Wiring schematic drawing of W type controller and sensors (STQ, SNQ series)

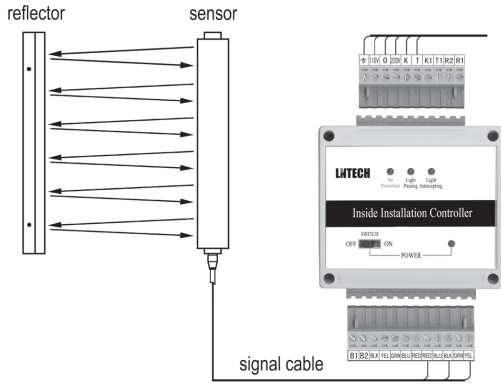


Figure 5-12 Wiring schematic drawing of N type controller and sensor (STF series)

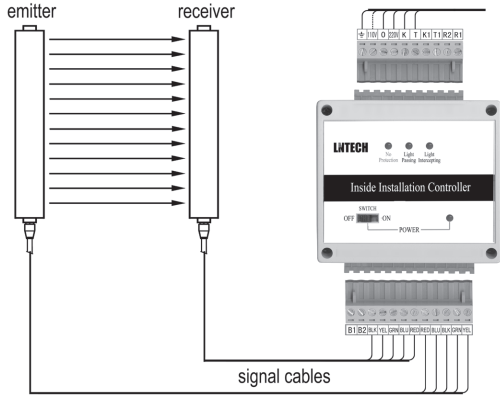


Figure 5-13 Wiring schematic drawing of N type controller and sensors (STD, SNA, SNB series)

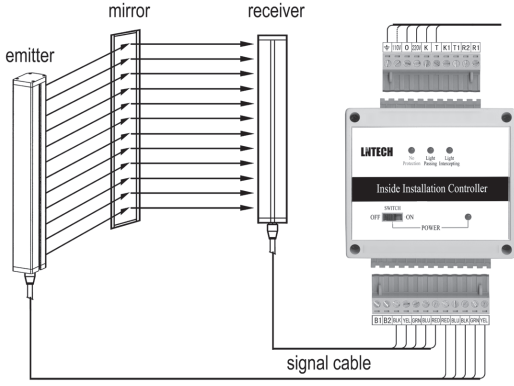


Figure 5-14 Wiring schematic drawing of N type controller and sensors (STQ, SNQ series)

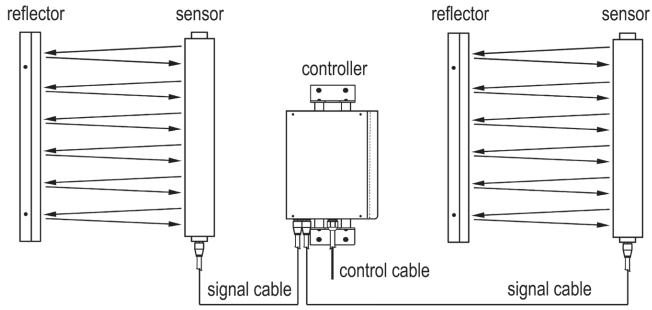


Figure 5-15 Wiring schematic drawing of S type controller and sensors (STF series)

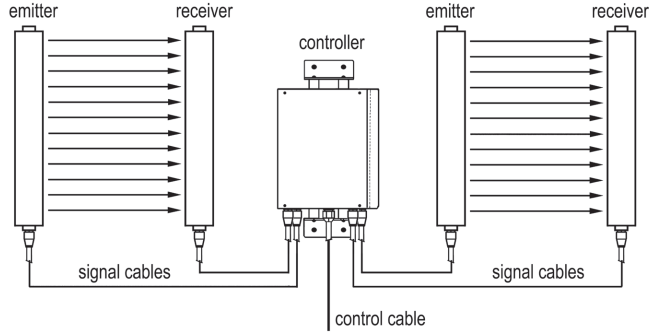


Figure 5-16 Wiring schematic drawing of S type controller and sensors (STD, SNA, SNB series)

Note: The diagram of the ND type controller connection with the light curtain sensor is similar as the N type controller, so has not listed here.

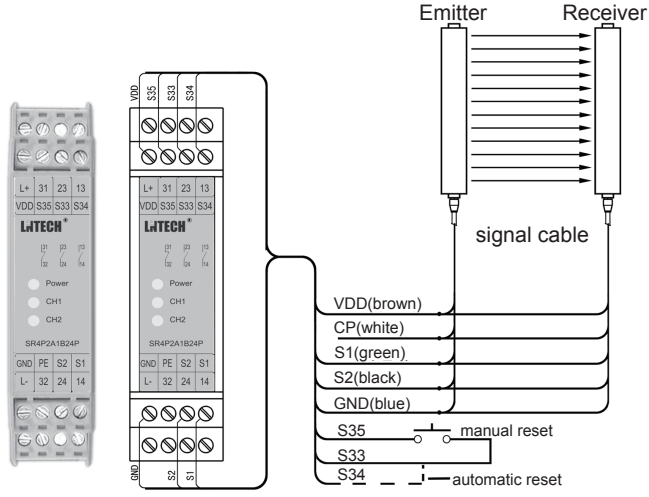


Figure 5-17 Wiring schematic drawing of SR type safety relay and sensors (STD, SNA, SNB series)

5.3.4 The signal cable's function description

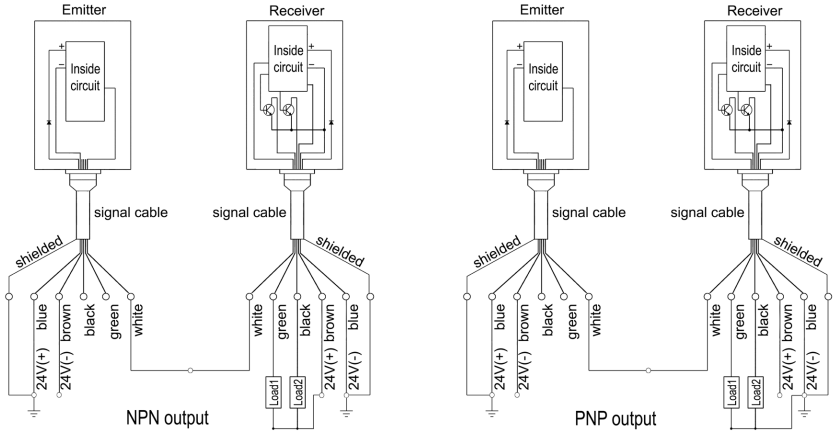
5P connecter

Part	Footprint	Color	Name	Remark
Emitter	1	Blue	0V	GND
	2	Brown	DC12V	VDD
	3	--	Shield	Shield
	4	White	CP	Connecting line between emitter and receiver
	5	Black	--	--
Receiver	1	Blue	0V	GND
	2	Brown	DC12V	VDD
	3	--	Shield	Shield
	4	White	CP	Connecting line between emitter and receiver
	5	Black	S	Pulse signal output

7P connecter

Part	Footprint	Color	Name	Remark
Emitter	1	Blue	0V	GND
	2	Brown	DC12V or DC24V	VDD
	3	Green	--	--
	4	White	CP	Connecting line between emitter and receiver
	5	Black	--	--
	6	--	--	--
	7	--	Shield	Shield
Receiver	1	Blue	0V	GND
	2	Brown	DC12V or DC24V	VDD
	3	Green	OSSD2	NPN/PNP output
	4	White	CP	Connecting line between emitter and receiver
	5	Black	OSSD1	NPN/PNP output
	6	--	--	--
	7	--	Shield	Shield

5.4 Wiring of NPN, PNP Output Type Protector



The loads in chart are external units (compulsion guidance type relay or contactor)

Figure 5-18 Wiring schematic drawing of NPN, PNP output type protector

Technical parameter:

Emitter work power source: DC24V/DC12V, 50mA;

Receiver work power source: DC24V/DC12V, 130mA (not contain output load);

Response time: <10ms;

Maximum output current: 150mA.

5.5 Wiring of Host-subsidiary Sensors

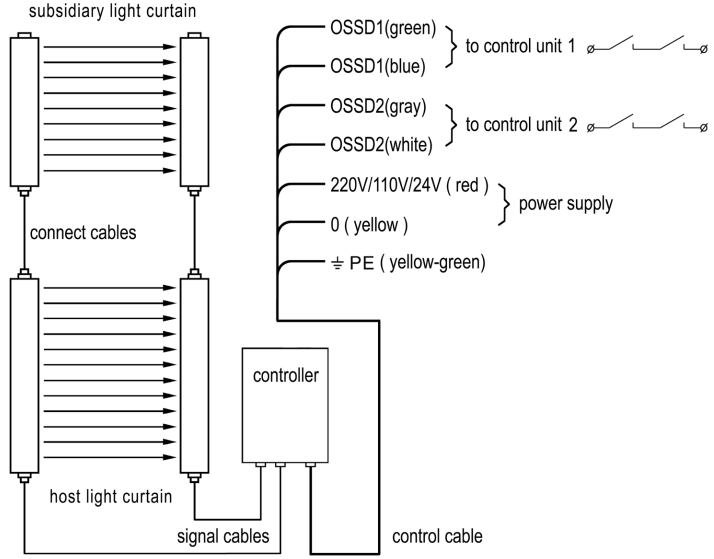


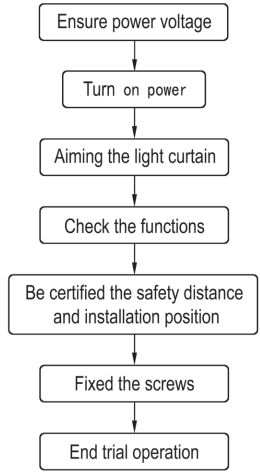
Figure 5-19 Wiring schematic drawing of host-subsidiary sensors

6 Adjustment and Operation Test

! 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.

6.1 Adjustment of Protector



A. Check power voltage

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

B. Turn on power

Type W controller: Turn the key switch in "SAFETY", turn the power switch in "ON", turn the self-test switch in "AUTOMATIC".

Type N, ND controller: Turn the power switch in "ON".

Type S controller: Turn the power switch in “ON”, then turn both A and B side key switch in "SAFETY", turn the self-test switch in "AUTOMATIC".

C. light-receiving

Reflection type (STF series): Adjust the position and angle of the reflector and receiver, until the green light from the receiver is bright.

Direct receiving type (STD, SNA, SNB series): Adjust the position and angle of the emitter and receiver, until the green light from the receiver is bright.

Multi-sides protection type (STQ, SNQ series): Adjust the position and angle of the emitter, mirror(s) and receiver, until the green light from the receiver is 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.

E. Check the safety distance and installation position

Ensure that the protector can effectively play a protective effect.

F. Fix the installation position

Fix the all screws of the protector, make the installation position fixed, and guarantee the protector work reliably.

G. Adjustment over

6.2 Operation Test of Entire System

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

6.2.1 Intercept light curtain and observe indicators if they transform according to form 6.1 (for fitting W, N,S type controller) or 6.2 (for fitting controller).

Form 6.1 conditions of operation for fitting W,N,S type controller.

Light curtain	Indicators of receiver		Indicators of controller		Relay contacts output
	Green	Red	Passing	Intercepting	
Light passing	¤	●	¤	●	Make
Light intercepting	●	¤	●	¤	Break

6.2.2 Intercepting the light curtain in protective area (during the course of 30°~180°, the cam switch of “No Protection” in the back-way is open), the slide of press should stop immediately.

6.2.3 If the press has set “No Protection” in the back-way, when the slide arrives at bottom-end, block light curtain, the slide of press should move upward.

6.2.4 If the relevant items above are satisfied, the operation test is successful; the press may be put into operation.

6.3 The Usage of Self-test Switch

6.3.1 W, S type controller have set the “self-test” switch.

6.3.2 The purpose of setting “self-test” switch is simulating a fault to the controller.

When the two relays are not synchronical, the controller can check out, the self-test indicator(red) twinkles, OSSD1, OSSD2 are closed until the fault is released.

6.3.3 The usage of the self-test switch: Put the self-test switch of W, S type in the “MANUAL” position, intercepting the light curtain, the self-test indicator (red) twinkles, OSSD1, OSSD2 are open until the fault is released.

Then, the self-test function is normal.

6.3.4 Normal working, you should put the self-test switch of W, S type in the “AUTOMATIC” position.

6.4 The Usage of Power Switch

6.4.1 W, S type controller have set power switch.

6.4.2 Put the power switch of W, S type controller in the “ON” position, controller is on. Put the power switch of W, S type controller in the “OFF” position, controller is off.

7 Operation, Check and Maintenance

7.1 Attention

A. Before put into operation for every shift, check the protector according to 6.2 to ensure that it controls the press normally.
B. During operation, do not change the position of light curtain.
C. The key of controller's switch should take care of by the manager.
D. When changed the mould, the position of light curtain should be adjusted by an authorized person.
E. When a malfunction happened, only professional technicians are allowed for repairing.
F. Before replacing or installing protector and transmitting wires cables, power to protector should be switched off. It is operated only by professional technicians.
G. The mechanical life of a relay is 10,000,000 times. Relays should be replaced when it is up to life.
H. During operation, do not let work pieces, tools or waste matters hit the protector.
I. 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).
J. 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, S type controller, keep the power on and put the key switch in "CAUTION" position;
B. For N, ND type controller, keep the power on and short B1 and B2;

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

7.2 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 7.1

Form 7.1 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 norma	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 reflective pieces or mirror	If reflective pieces or mirror is broken, replace it immediately. Unpack the end cover of reflector, pull out the broken reflective pieces or 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			

! Attention

Check them before operating, besides periodic inspection.

8 Simple Examination and Repair

8.1 Simple Troubles of System

Form 8.1 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.
	Controller has a fault.	Consult form 8.2 simple troubles of controller 1.
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 protector output control wire OSSD1 and OSSD2 are broken with the press control unit.	Wiring again and right.
	The press control unit has a fault.	Examine the press control unit.
	Controller has a fault	Consult form 8.2 simple troubles of controller 2.
The protector indicators display normally, but the press can not stop when the light curtain is blocked.	Short circuit OSSD1, Short circuit OSSD2	Examine the control unit.
	The cam switch is shorting, or the cam switch angle is not correct.	Adjust the cam switch again and ensure it is right.
	Short circuit between B1□B2 of N,ND type controller	Release the wiring between B1,B2
Turn off the power of the controller, the press can not run still.	The press control unit has a short circuit.	Examine the control unit.
	Controller has a fault	Examine the output contect wiring
Turn on the power of the controller, the press can not run, but it can run normally when turn off the power.	Controller has a fault	Consult form 8.2 simple troubles of controller 3.
	Sensor has a fault	Consult form 8.3 simple troubles of sensor.

Note:

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

8.2 Simple Troubles of Controller

Form 8.2 Simple troubles of controller

Phenomenon	Reason	Solution
1. The protector does not work, various indicators are not light up.	The power fuse is open circuit	Replace the same fuse, W,S type controller: 5x20/0.5A;N,ND type controller use PPTC and will recover until the fault is released.
	Transformer secondary circuit fuse is open circuit	Inspects the corresponding electric circuit unit.
	The power switch has a fault	Replace the same switch.
	Transformer secondary is damaged.	Replace the same transformer.
2. The protector indicators display normally, but the press can not run normally.	The fuse in OSSD1, OSSD2 control circuit is open circuit	Replace the same fuse, 5x20,5A.
	The relays service life already surpassed	Replace two same relays.
3. The light curtain and wiring are correct, but the controller can not work normally.	The controller circuit is damaged.	Replace the same controller, or contact with supplier.

8.3 Simple Troubles of Sensor

Form 8.3 Simple troubles of sensor

Phenomenon	Reason	Solution
The sensor red indicator is light up, but green indicator is not light up.	The light curtain is not aiming correctly.	Adjust the light curtain again.
	The optical parts surface is dirty, affects the light passing.	Using the clean and soft cotton yarn to clean them.
	The sensor circuit is damaged.	Replace the same sensor, or contact with supplier.

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