

SAFETY LIGHT CURTAIN

SL2 Series



Type2 safety solution: Through a reasonable cost control, to achieve the International Standard Safety Design

Features

- Control type: 2 IEC/EN61496-1/2
- Resolution: 14mm and 25mm
- Protecting height: 160mm to 1600mm
- Integrated start / restart lockout
- Light and signal synchronization
- Operation display
- Sensing range: 0.3m to 12m
- Protection level: IP65

备有检测高度 160mm~1,600mm 的丰富调节范围

Extensive range of variations available with sensing widths from 160 mm to 1,600 mm

根据最小检测物体的大小不同，备有 2 种类型。

Two types are available for different minimum sensing object sizes.

<Finger type >SL2-1 series

最小检测物体 \varnothing 14mm

Minimum sensing object \varnothing 14 mm

(光轴间距 10mm)

(10 mm in beam space)

<Arm/Foot type >SL2-25 series

最小检测物体 \varnothing 25mm

Minimum sensing object \varnothing 25 mm

(光轴间距 20mm)

(20 mm in beam space)

光幕传感器 Type2 SL2 系列 Light Curtain Type 2 SL2 series

一眼就可确认入光位置的光轴对齐指示灯

Beam-axis alignment indicators show the incident light position at a glance

光轴对齐指示灯将光幕传感器的光轴分成 4 等分显示。作为光轴的对齐基准，当底端(或顶端)的光轴对齐时，LED 呈红色闪烁。此后，光轴对齐的部分依次亮红灯，如果所有光轴都入光则所有的 LED 均亮绿灯。

Beam-axis alignment indicators display the beam channels of the light curtain in four blocks.

The blocks where the beam axes match will light up in red in turn. When all the beam axes receive light, all the LEDs turn on green light.

稳定入光指示灯

Beam-axis alignment indicator

减少干扰光引起的错误动作

采用双重扫描方式，降低外围设备带来的瞬间干扰光的影响。

Reducing the wrong operation caused by the interference light

Using double-scan mode, reducing the impact of instantaneous interference light from the outside equipment.

通过使用隅角镜，大幅削减成本

Significant cost reduction is achieved by using corner mirror

使用 1 面隅角镜可省下 1 套光幕传感器和外围安全电路。可以大幅降低成本、节省配线。控制类别也不会发生变化。

By using a single corner mirror, light curtain and peripheral safety circuit for one set are eliminated. Enables significant cost reduction and savings on wiring.

要将光幕传感器设置 L 字形，U 字形需要 2 套或 3 套光幕传感器，但若用隅角镜反射光，1 套光幕传感器也能设置 L 字形、U 字形光幕传感器。

The control category is unchanged.

When setting up the light curtains in the L-shape or U-shape, usually two or three sets of the light curtains are required.

However, using the corner mirror to reflect the laser light allows only one set of the light curtains to be set up at the L-shape or U-shape.

隅角镜

corner mirror

种类

Type

手指型 SL2-14 系列

<Finger type >SL2-14 series

最小检测物体 ϕ 14mm

Minimum sensing object ϕ 14 mm

自动复位

Automatic reset

Type	Shape	Sensing distance(Note 1 Operating range)	Model		No. of beam	Protection height (mm)
			NPN	PNP		
Finger Detection type(the beam space is 10mm)		0.2-8m	SL-14ZN2C-16C	SL-14ZP2C-16C	16	160mm
			SL-14ZN2C-32C	SL-14ZP2C-32C	32	320mm
			SL-14ZN2C-48C	SL-14ZP2C-48C	48	480mm
			SL-14ZN2C-64C	SL-14ZP2C-64C	64	640mm
			SL-14ZN2C-80C	SL-14ZP2C-80C	80	800mm
			SL-14ZN2C-96C	SL-14ZP2C-96C	96	960mm

(注 1): 检测距离是在投光器和受光器之间可设定的范围。

(Note1) The "operating range" is the possible setting distance between the emitter and the receiver.

(注 2): 上述型号包含发射器和接收器, 若要单独选择发射器还是接收器, 在上述想好后面中加“-E”表示发射器, 加“-R”表示接收器

(Note 2) The model contains emitter and receiver, if you want to choose the transmitter or receiver alone, add "- E" after the model for transmitter, add "-R" for receiver

例 SL2-14ZP2C-16C 所示的发射器型号为 SL2-14ZP2C-16C-E, 接收器型号为 SL2-14ZP2C-16C-R

Example: Emitter of SL-14ZP2C-16C: SL-14ZP2C-16C-E; Receiver of SL-14ZP2C-16C: SL-14ZP2C-16C-R

手动复位

Manual reset

Type	Shape	Sensing distance(Note 1 Operating range)	Model		No. of beam	Protection height (mm)
			NPN	PNP		
Detection Finger type(the beam space is 10mm)		0.2-8m	SL-14ZN2C-16C	SL-14ZP2C-16C	16	160mm
			SL-14ZN2C-32C	SL-14ZP2C-32C	32	320mm
			SL-14ZN2C-48C	SL-14ZP2C-48C	48	480mm
			SL-14ZN2C-64C	SL-14ZP2C-64C	64	640mm
			SL-14ZN2C-80C	SL-14ZP2C-80C	80	800mm
			SL-14ZN2C-96C	SL-14ZP2C-96C	96	960mm

(注 1): 检测距离是在投光器和受光器之间可设定的范围。

(Note:1) The "operating range" is the possible setting distance between the emitter and the receiver.

(注 2): 上述型号包含发射器和接收器, 若要单独选择发射器还是接收器, 在上述想好后面中

加“-E”表示发射器，加“-R”表示接收器

(Note 2) The model contains emitter and receiver, if you want to choose the transmitter or receiver alone, add "- E" after the model for transmitter, add "-R" for receiver

例 SL2-14ZP2C-16C 所示的发射器型号为 SL2-14ZP2C-16C-E，接收器型号为 SL2-14ZP2C-16C-R

Example: Emitter of SL-14ZP2C-16C: SL-14ZP2C-16C-E; Receiver of SL-14ZP2C-16C: SL-14ZP2C-16C-R

手掌型

Palm type SL2-14 series

最小检测物体 \varnothing 25mm

Minimum sensing object \varnothing 25 mm

自动复位

Automatic reset

Type	Shape	Sensing distance(Note 1) Operating range)	Model		No. of beam	Protection height (mm)
			NPN	PNP		
Detection Finger type(the beam space is 20mm)		0.2-12m	SL-25ZN2C-8C	SL-25ZP2C-8C	8	160mm
			SL-25ZN2C-16C	SL-25ZP2C-16C	16	320mm
			SL-25ZN2C-24C	SL-25ZP2C-24C	24	480mm
			SL-25ZN2C-32C	SL-25ZP2C-32C	32	640mm
			SL-25ZN2C-40C	SL-25ZP2C-40C	40	800mm
			SL-25ZN2C-48C	SL-25ZP2C-48C	48	960mm
			SL-25ZN2C-56C	SL-25ZP2C-56C	56	1120mm
			SL-25ZN2C-64C	SL-25ZP2C-64C	64	1280mm
			SL-25ZN2C-72C	SL-25ZP2C-72C	72	1440mm
SL-25ZN2C-80C	SL-25ZP2C-80C	80	1600mm			

(注 1): 检测距离是在投光器和受光器之间可设定的范围。

(Note:1) The "operating range" is the possible setting distance between the emitter and the receiver.

(注 2): 上述型号包含发射器和接收器，若要单独选择发射器还是接收器，在上述想好后面中加“-E”表示发射器，加“-R”表示接收器

(Note 2) The model contains emitter and receiver, if you want to choose the transmitter or receiver alone, add "- E" after the model for transmitter, add "-R" for receiver

例 SL2-14ZP2C-16C 所示的发射器型号为 SL2-14ZP2C-16C-E，接收器型号为 SL2-14ZP2C-16C-R

Example: Emitter of SL-14ZP2C-16C: SL-14ZP2C-16C-E; Receiver of SL-14ZP2C-16C: SL-14ZP2C-16C-R

手动复位

Manual reset

Type	Shape	Sensing distance(Note 1) Operating range)	Model		No. of beam	Protection height (mm)
			NPN	PNP		
Detection Finger type(the beam space is 20mm)		0.2-12m	SL-25ZN2C-8C	SL-25ZP2C-8C	8	160mm
			SL-25ZN2C-16C	SL-25ZP2C-16C	16	320mm
			SL-25ZN2C-24C	SL-25ZP2C-24C	24	480mm
			SL-25ZN2C-32C	SL-25ZP2C-32C	32	640mm
			SL-25ZN2C-40C	SL-25ZP2C-40C	40	800mm
			SL-25ZN2C-48C	SL-25ZP2C-48C	48	960mm
			SL-25ZN2C-56C	SL-25ZP2C-56C	56	1120mm
			SL-25ZN2C-64C	SL-25ZP2C-64C	64	1280mm
			SL-25ZN2C-72C	SL-25ZP2C-72C	72	1440mm
			SL-25ZN2C-80C	SL-25ZP2C-80C	80	1600mm

(注 1): 检测距离是在投光器和受光器之间可设定的范围。

(Note:1) The "operating range" is the possible setting distance between the emitter and the receiver.

(注 2): 上述型号包含发射器和接收器, 若要单独选择发射器还是接收器, 在上述想好后面中加“-E”表示发射器, 加“-R”表示接收器

(Note 2) The model contains emitter and receiver, if you want to choose the transmitter or receiver alone, add "- E" after the model for transmitter, add "-R" for receiver

例 SL2-14ZP2C-16C 所示的发射器型号为 SL2-14ZP2C-16C-E, 接收器型号为 SL2-14ZP2C-16C-R

Example: Emitter of SL-14ZP2C-16C: SL-14ZP2C-16C-E; Receiver of SL-14ZP2C-16C: SL-14ZP2C-16C-R

投光器、受光器不可设置在此范围内: Emitter and Receiver cannot be placed in this range

检测物体可检测范围: Actual operating range of the sensor

投光器、受光器可设置在此范围内: Setting range of Emitter and Receiver

标准电缆: Standard cable(2m)

延长用电缆:Extension cable(10m)

Y 型连接器电缆:Y Connector cable

	Type	Shape	Model	Description
Standard cable(3m)	Connector(Use for emitter)		SL2-LT-2	Used for connecting to the light curtain
	Connector(Use for receiver)		SL2-LR-2	
Extension cable(10m)	Connector(Use for emitter)		SL2-LT-10	
	Connector(Use for receiver)		SL2-LR-10	

配件 (另售)

Accessories (Sold separately)

Name	Shape	Model	Description
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Laser alignment tool		SL2-LT-1	<p>Beam axis alignment is easy by using easy-to-see laser beam.</p> <p>Main Specifications</p> <ol style="list-style-type: none"> 1.Power supply voltage: 3V 2.Battery: 1.5V (5 alkaline batteries) × 2 (replaceable) 3.Battery life: continuous use of about 30 hours (alkaline batteries, the use of ambient temperature = +25 °C) 4.Light source: red semiconductor laser grade 2 (IEC / JIS / FDA) (maximum output: 1mW cast light peak wavelength: 650nm) 5.Ambient temperature: 0 ~ +40 °C (note not condensation) 6.Material: ABS (body shell) aluminum (installation department) 7.Weight: about 200g (including dry batteries) <p>Accessories: 5 alkaline batteries 2</p>
Test rod		SL2-LT-2	<p>Min. sensing object for regular checking (ø14 mm), with Arm / Foot protection type (min. sensing object ø25 mm)</p>

规格:

Specifications

Type		Minimum sensing object ø25 mm	Minimum sensing object ø25 mm
Model	NPN	SL2-14□N2C-□C	SL2-25□N2C-□C
	PNP	SL2-14□P2C-□C	SL2-25□P2C-□C
Standards	International standard	IEC 61946-1/2(type 2), ISO 13849-1(type 2/Plc), IEC61508-1~7(SIL1)	
Sensing range		0.3 to 8 m	0.3 to 12 m
Min sensing object		Ø14 mm opaque object	Ø25 mm opaque object
Effective aperture angle		±5° or less for an operating range exceeding 3 m (9.843 ft) (conforming to IEC 61496-2 / UL 61496-2)	
Supply voltage		24V DC±10%, Pulsation(P-P): less than 10%	
Control outputs(OSSD 1, OSSD 2)		PNP or NPN transistor 2 output, Load current 500mA or less, Residual voltage: 2.0 V or less (except reduce the voltage by extending the cable)	
sensing height		160-960mm	160-1600mm/*MERGEFOR MAT
Start time after power on		2s or less	
Output operation		ON when all beam channels are received, OFF when one or	

		more beam channels are interrupted
Short-circuit protection	The output load short circuit protection, the power supply reverse connect protection	
Response time	40ms or less	45ms or less
Interlock function	Incorporated(Automatic/manual reset)	
External device monitoring function	Incorporated	
Protection	IP67/IP65(IEC)	
Environmental resistance	Ambient temperature	-10 to +55 °C (No dew condensation or icing allowed), Storage: -25 to +70 °C
	Ambient humidity	30 to 85 % RH, Storage: 30 to 90 % RH
	Ambient illuminance	Incandescent light: 3,500 lx at the light-receiving face
	Voltage with standability	1,000 V AC for one min. between all supply terminals connected together and enclosure
	Insulation resistance	20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure
	Vibration resistance	10 to 55 Hz frequency, 0.75 mm amplitude in X, Y and Z directions for two hours each
	Shock resistance	300 m/s ² acceleration (50 G approx.) in X, Y and Z directions for three times each
Emitting element	Infrared LED (Peak emission wavelength: 940 nm, synchronized scanning system)	
Material	Material: Enclosure: Aluminum, Upper and lower edges : Aluminum, Inner case: Polycarbonate and Polyester resin, Cap: PBT	
Connecting method	Connected by connector	
Cable length (note3)	Total length up to 50 m is possible for both emitter and receiver, with optional mating cables	

(注 1) : 无指定时的测量条件为使用环境=+20℃。

Note1: Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of + 20 °C

(注 2) : 检测距离是在投光器和受光器之间可设定的范围。

Note2: The operating range is the possible setting distance between the emitter and the receiver.

(注 3) : 全长控制在 10m 以下 (投光器和受光器各一根)。

Note3: the cable can be extended within 10 m (for emitter / receiver).

(注 4) : 具体型号参照选型

Note4: Specific model reference to selection

回路连接:

I/O Circuit and Wiring diagrams

PNP output

输入·输出电路图:

Input and output circuit diagram

外部设备监控 (EDM) 有效时:

External device monitoring (EDM) input

PNP output

输入·输出电路图:

Input and output circuit diagram

外部设备监控 (EDM) 无效时:

External device monitoring (EDM) off

Connect type of connector pin of light curtain sensor

Connector pin(NO)	Emitter connector	Receiver connector
1	+24V DC	N/A
2	STOP EMISSION	+24V DC
3	0V	RESET
4	N/A	EDM
5	Shielded cable	OSSD1
6	N/A	OSSD2
7	N/A	0V
8	N/A	Shielded cable

使用注意事项

Cautions For Use

产品目录是您选择产品时的指南，使用时请务必阅读附带的使用说明书。

Product catalog is a guide to select a suitable product. Be sure to read instruction manual attached to the product prior to its use.

出厂时投光器和受光器已调整完毕，请将序列号相同的投光器和受光器组合使用。序列号标记在投光器和受光器的铭牌上。

Both emitter and receiver are combined adjusted on factory setting, please apply both emitter and receiver with the same serial No. The serial No. is indicated on the plates of both emitter and receiver.

开始作业时请务必进行检查，确保安全。

该产品适用于危险部分的驱动装置通过切断电源紧急停止或备有紧急停止装置的各种设备装置。不适用于动作循环中不可停止的设备，敬请注意。

Make sure to carry out the test run before regular operation.

This safety system is for use only on machinery in which the dangerous parts can be stopped immediately, either by an emergency stop unit or by disconnecting the power supply. Do not use this system with machinery which cannot be stopped at any point in its operation cycle.

本装置配备有自诊断功能。

发现异常时，马上进入锁定状态，控制输出(OSSD1、OSSD2)固定在 OFF 状态。

This light curtain incorporates the self-diagnosis function. In case an abnormality is detected during self-diagnosis, the light curtain is put in the lockout state at that instant, and the control output (OSSD 1, OSSD 2) is fixed at the OFF state.

为了确保安全，请每天至少检查一次本装置的遮光状态。

如果不进行自诊断，就不能及早发现意外故障，从而增加危险系数，导致本装置误动作引起重伤甚至死亡。

为了确认控制输出(OSSD1、OSSD2)和辅助输出的所有异常，必须检查本装置的遮光状态。将本装置设置成遮光状态进行检查时，请实施以下任意一种措施。

- 通过测试输入(停止投光功能)，使投光停止。
- 通过测试杆等，遮住光轴。

In order to maintain safe condition of light curtain, inspect the beam interrupted status of the device once a day or more.

Failure to do so could delay the detection of unexpected abnormality and increase the degree of hazard, which may cause the malfunction of light curtain, resulting in serious body injury or death.

In order to check all abnormalities in the OSSD 1, OSSD 2 and auxiliary output, the beam interrupted status of device must be checked. Perform either of two below to inspect the device under beam interrupted status.

- Emission halt by test input (Emission halt function)
- Beam interrupting by test rod

投光停止功能(测试输入)

是指使投光器的投光动作停止的功能。在测试输入(白色)的状态下，可以选择投光/投光停止。

Emission halt function (Test input)

This function stops the emission process of the emitter. You can select whether emission is on or halted by means of the connection status for the test input (white).

Test input	Emission status
0V	Emission
Connect to+24V	Stop Emission

投光停止时，控制输出(OSSD1、OSSD2)OFF。

通过该功能，即使在装置一侧也能确认因干扰导致的错误操作及控制输出(OSSD1、OSSD2)异常。

During emission stopped, the control outputs (OSSD 1, OSSD 2) become OFF status.

By using this function, malfunction due to extraneous noise or abnormality in the control outputs (OSSD 1, OSSD 2) can be determined even from the machinery side.

外部设备监控功能

使用底帽电缆 SL2-LR-□(另售)时，可以使用本功能。检查连接控制输出(OSSD1、OSSD2)的外部安全继电器是否根据控制输出(OSSD1、OSSD2)正常动作。监控外部安全继电器的 b 接点，如果检查到因接点熔敷等引起的异常时，在传感器锁定状态下将控制输出(OSSD1、OSSD2)OFF。

External device monitoring function

This function is available when the bottom cap cable SL2-LR-□ (optional) is used. This is the function for checking whether the external safety relay connected to the control outputs (OSSD 1, OSSD 2) performs normally in accordance with the control outputs (OSSD 1, OSSD 2) or not. Monitor the b contact of the external safety relay, and if any abnormality such as deposit of the contacting point, etc. is detected, change the status of the light curtain into lockout one, and turn OFF the control outputs (OSSD 1, OSSD 2).

外部设备监控功能有效时

请将外部设备监控输入(黄色)连接至控制输出(OSSD1、OSSD2)连接的外部安全继电器的 b 接点。

不使用外部设备监控功能时

请将外部设备监控输入(黄色)接到 0V。

In case of setting the external device monitoring function to enabled

Connect the external device monitoring input (yellow) to the b contact of the external safety relay that is connected to the control outputs (OSSD 1, OSSD 2).

In case of not using the external device monitoring function

Connect the external device monitoring input (yellow) to 0V.

时间表（正常）Time chart (normal)

入光状态: beam received condition

入光: beam received

遮光: beam interrupted

控制输出: control outputs

外部设备: external device

监控输入: monitoring input

外部设备监控的设定时间在 300ms 以下。若超过 300ms，监控将处于锁定状态。

The time set for external device monitoring is 300 ms or less. Exceeding 300 ms turns the light curtain into lockout condition.

锁定状态 lockout condition

Each part name and function

Indicator light	Description
POWER	Green light: working
STATUS	Green light: working Red light: system default or test mode, stop emission
7 segment digital tube	
E.	System default
P.	Power over / under voltage
0	Test mode
No display	Power light with green, working Power light off, emitter supply default

Indicator light	Description
A,B,C,D	Red light: can not receive the signal from emitter Green light: can receive the signal from emitter (All light will be red, if not Synchronize)
STATUS	Green light: output open Red light: output closed
RESET	Light off: no reset function Red light: need push the reset button Green light: working
7 segment digital tube	
E.	System default
P.	Power over / under voltage
0	Test mode
1	Some light synchronize, some light shade
F(2) Alternately	OSSD1 CURRENT >500mA
F(3) Alternately	OSSD1 maintain 24V
F(4) Alternately	OSSD2 CURRENT >500mA
F(5) Alternately	OSSD2 maintain 24V
F(6) Alternately	OSSD1 and OSSD2 short circuit
8	EDM default

配线

Wiring

请参阅使用本装置的地区相关标准进行设置。此外，请勿因接地故障等导致发生危险的误动作，敬请注意。

Please refer to the relevant regional standards for this unit. In addition, please be careful not to cause dangerous operation due to earth faults.

请务必在切断电源的状态下进行配线作业。

Make sure to carry out the wiring in the power supply off condition.

请确认电源的波动，以免电源输入超过额定范围。

Verify that the supply voltage variation is within the rating.

使用市售的开关调节器时，请务必将电源的框架式接地(F.G.)端子接地。

If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.

在本装置安装部周围使用作为干扰发生源的设备(开关调节器、变频马达等)时，请务必将设备的框架式接地(F.G.)端子接地。

In case noise generating equipment (switching regulator, frequency conversion motor, etc.) is used in the vicinity of this sensor, connect the frame ground (F.G.) terminal of the equipment to an actual ground.

请避免与高压线和动力线并行配线，或使用同一配线管，否则会因电磁感应而导致误动作。
Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.

其它
Others

本装置为在工业环境下使用所开发，生产的产品。

使用时，请避开电源接通时的过渡状态(2s)。
Do not use during the initial transient time (2 sec.) after the power supply is switched on.

请勿在蒸气、灰尘等较多的场所使用。
Avoid dust, dirt and steam.

请勿使产品和稀释剂等有机溶剂或水、油以及油脂直接接触。
Take care that the light curtain does not come in direct contact with water, oil, grease, or organic solvents, such as, thinner, etc.

快速起动式、高频点亮式荧光灯的光束会给检测造成影响。虽然因传感器类型而有所差异，但还应注意不要使光束直接投射到传感器上。
Take care that the light curtain is not directly exposed to fluorescent light from a rapid-starter lamp or a high frequency lighting device, as it may affect the sensing performance.

检测区域
Sensing area

安装设备时，请确保必须完全通过检测区域才能到达设备的危险区域。此外，在设备的危险区域进行作业时，请确保部分或整个身体留在检测区域内。若未检测到人体，则会导致重伤甚至死亡。请勿使用任何反射型或回归反射型设备。

Make sure to install this product such that any part of the human body must pass through its sensing area in order to reach the dangerous parts of the machinery. If the human body is not detected, there is a danger of serious injury or death.
Do not use any reflective type or mirror reflective type arrangement.

请将相对的投光器和受光器按相同配套型号(光轴间距、光轴数相同)从上下方向对齐设置。若将不同配套型号进行组合设置，则会因传感器检测不到，而造成重伤甚至死亡。
Emitter and receiver that face each other should be from the same model No. (with same beam axis pitch and number of beam channels) and aligned in the vertical direction. If units from different sets are connected together, it may cause blind spots in the sensing area, and death or serious injury may result.

如果相对 1 个投光器(或受光器)连接多个受光器(或投光器)，则会因传感器检测不到或相互干扰，而导致重伤甚至死亡。
Emitter and receiver that face each other should be from the same model No. (with same

beam axis pitch and number of beam channels) and aligned in the vertical direction. If units from different sets are connected together, it may cause blind spots in the sensing area, and death or serious injury may result.

正确的安装方法

Correct mounting method

危险区域: dangerous part

检测区域: Sensing area

保护构造物: protective structure

错误的安装方法: Wrong mounting method

安全距离

Safety distance

准确地计算安全距离，设备的危险区域及本装置的检测区域之间的距离，应始终大于安全距离。(关于计算公式，请根据最新的标准确认。)若错误计算安全距离或没有留出足够的距离，则会因在到达设备危险区域前不能紧急停止，而导致重伤甚至死亡。

设计系统时，请参阅使用本装置的当地相关标准，再设置本装置。

Calculate the safety distance correctly, and always maintain a distance which is equal to or greater than the safety distance, between the sensing area of this light curtain and the dangerous parts of the machinery. (Please check the latest standards for the equation.) If the safety distance is miscalculated or if sufficient distance is not maintained, there is a danger of serious injury or death.

Before designing the system, refer to the relevant standards of the region where this device is to be used and then install this device.

投光器: Emitter

设备的危险区域: dangerous part of machine

光轴: Beam axis

安全距离: Safety distance

受光器: receiver

欧洲(EU) (依照 EN ISO 13855) (也适用于 ISO 13855 / JIS B 9715)

For Europe (EU) (as EN 999)(Also applicable to ISO 13855)

(最小检测物体为 $\phi 40\text{mm}$ 以下时)

Minimum detectable objects $< \phi 40\text{mm}$

侵入方向与检测区域垂直时

For intrusion direction perpendicular to the sensing area

计算公式 1 $S = K \times T + C$

Equation 1 $S = K \times T + C$

S: 安全距离 (mm)

检测区域线上方(表面上方)和设备的危险区域中，检测区域至最近位置间所需的最小距离。

S: Safety distance (mm)

Minimum required distance between the sensing area surface and the dangerous parts of the machine

K: 人体或物体的侵入速度 (mm/s)

通常以 2,000(mm/s)计算。

K: Intrusion speed of operator's body or objects (mm/sec.)

Normally, taken as 2,000 (mm/sec.) for calculation.

T: 整个装置系统的反应时间(s)

$T = T_m + T_{SL2}$

T_m : 设备的最大停止时间(s)

T_{SL2} : 本装置的反应时间(s)

C: 由本装置的最小检测物体尺寸计算出的追加距离(mm)

但 C 值不可小于等于 0。

$C = 8 \times (d - 14)$

d: 最小检测物体的直径 (mm)

T: Response time of total equipment (sec.)

$T = T_m + T_{SL2}$

T_m : Maximum halting time of machinery (sec.)

T_{SL2} : Response time of the SG2 series (sec.)

C: Additional distance calculated from the size of the minimum sensing object of the light curtain (mm)

However, the value of "C" cannot be 0 or less.

$C = 8 \times (d - 14)$

d: Minimum sensing object diameter

计算安全距离 S 时，有如下 5 种情况。首先，把 $K = 2,000(\text{mm/s})$ 代入上述公式进行计算。

得出的计算结果分为 1) $S < 100$ 、2) $100 \leq S \leq 500$ 、3) $S > 500$ 。

当结果为 3) $S > 500$ 时，以 $K = 1,600(\text{mm/s})$ 代入上述公式进行再次计算。此时的计算结果分为 4) $S \leq 500$ 、5) $S > 500$ 。详情请参阅使用说明书

For calculating the safety distance "S", there are the following five cases. First calculate by substituting the value $K = 2,000$ (mm/sec.) in the equation above.

Then, classify the obtained value of "S" into three cases, 1) $S < 100$, 2) $100 \leq S \leq 500$, and 3) $S > 500$. For Case 3) $S > 500$, recalculate by substituting the value $K = 1,600$ (mm/sec.). After that, classify the calculation result into two cases, 4) $S \leq 500$ and 5) $S > 500$. For details, refer to the instruction manual enclosed with this product.

(最小检测物体大于 $\phi 40\text{mm}$)

Minimum detectable objects $\geq \phi 40\text{mm}$

计算公式 $S = K \times T + C$

Equation 1 $S = K \times T + C$

S: 安全距离 (mm)

Safety distance (mm)

K: 人体或物体的侵入速度 (mm/s)

通常以 1600(mm/s)计算。

Intrusion speed of operator's body or objects (mm/sec.)

Normally, taken as 1600 (mm/sec.) for calculation.

T: 整个装置系统的反应时间(s)

$T = T_m + T_{SL2}$

T_m : 设备的最大停止时间(s)

T_{SL2} : 本装置的反应时间(s)

T: Response time of total equipment (sec.)

$T = T_m + T_{SL2}$

T_m : Maximum halting time of machinery (sec.)

T_{SL2} : Response time of the SL2 series (sec.)

C: 由本装置的最小检测物体尺寸计算出的追加距离(mm) $C=850(\text{mm})$ (常数)

Additional distance calculated from the size of the minimum sensing object of the light curtain (mm) $C=850$ (mm) (constant)

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计算公式 2 $S = K \times (T_s + T_c + T_{SL2} + T_{bm}) + D_{pf}$

Equation 2 $S = K \times (T_s + T_c + T_{SL2} + T_{bm}) + D_{pf}$

S: 安全距离 (mm)

检测区域线上方(表面上方)和设备的危险区域中, 检测区域至最近位置间所需的最小距离。

K: 侵入速度[OSHA 推荐值为 $63(\text{inch/s}) \approx 1,600(\text{mm/s})$]。ANSI B11.19 没有详细说明侵入速度 K。决定 K 值时, 应考虑包括操作人员体力在内的诸多因素。

S: Safety distance (mm)

Minimum required distance between the sensing area surface and the dangerous parts of the machine

K: Intrusion velocity {Recommended value in OSHA is 63 (inch/sec.) $\approx 1,600$ (mm/sec.)}

ANSI B11.19 does not define the intrusion velocity "K". When determining K, consider possible factors including physical ability of operators.

T_s : 最终通过停止控制元件(空气阀等)测量的设备的停止时间(s)

T_c : 使设备的制动器动作所需的设备控制电路的最大反应时间(s)

T_s : Halting time calculated from the operation time of the control element (air valve, etc.) (sec.)

T_c : Maximum response time of the control circuit required for functioning the brake (sec.)

T_{SL2} : 本装置的反应时间(s)

T_{SL2} : Response time of light curtain (sec.)

T_{bm} : 制动监控器允许增加的停止时间(s)

T_{bm} : Additional halting time tolerance for the brake monitor (sec.)

若设备无制动监控器, 则请按照下列公式进行计算。

When the machine is not equipped with a brake monitor, Please follow the following formula to calculate.

$T_{bm} = T_a - (T_s + T_c)$

T_a : 制动监控器设定时间(s)

若设备无制动监控器, 可将 $(T_s + T_c)$ 的 20% 以上作为追加停止时间。

$T_{bm} = T_a - (T_s + T_c)$

Ta: Setting time of brake monitor (sec.)

When the machine is not equipped with a brake monitor, it is recommended that 20 % or more of (Ts + Tc) is taken as additional halting time.

Dpf: 由本装置的最小检测物体尺寸计算出的追加距离 (mm)

Dpf: Additional distance calculated from the size of the minimum sensing object of the light curtain

SL2 Dpf=23.8 (mm)

SL2Dpf=61.2 (mm)

SL2Dpf=129.2 (mm)

SL2Dpf=3.4×(d-0.276) (inch)

≒3.4×(d-7) (mm)

d: 最小检测物体的直径 0.552 (inch) ≒14 (mm) SL2

Minimum sensing object diameter 0.552 (inch) ≈ 14 (mm) SL2

最小检测物体的直径 0.985 (inch) ≒25 (mm) SL2

Minimum sensing object diameter 0.985 (inch) ≈ 25 (mm) SL2

For Europe (EU) (Applicable to EN ISO 13855, also applicable to ISO 13855/JIS B 9715)

For intrusion direction perpendicular to the detecting area

(Minimum detectable objects<φ40mm)

Equation ① $S = K \times T + C$

S: Safety distance (mm)

Minimum required distance between the detecting area surface and the dangerous parts of the machine

K: Intrusion speed of operator's body or objects (mm/sec.)

Normally, taken as 2,000 (mm/sec.) for calculation.

T: Response time of total equipment (sec.)

$T = T_m + T_{SL2}$

Tm: Maximum stopping time of machinery (sec.)

TSL2: Response time of the SG2 series (sec.)

C: Additional distance calculated from the size of the minimum detecting object of the light curtain (mm)

However, the value of "C" cannot be 0 or less.

$C = 8 \times (d - 14)$

d: Minimum detecting object diameter(mm)

For calculating the safety distance of "S", there are following five cases.

First calculate by substituting the value K = 2,000 (mm/sec.) in the equation above.

Then, classify the obtained value of "S" into three cases: 1) $S < 100$, 2) $100 \leq S \leq 500$, and 3) $S > 500$.

For Case 3) $S > 500$, recalculate by substituting the value K = 1,600 (mm/sec.).

Classify the calculation result into two cases, 4) $S \leq 500$ and 5) $S > 500$.

For details, refer to the instruction manual enclosed with this product.

Used in PSDI model, safety distance must be calculated appropriately. For details, please refer to the standard of corresponding region and country.

(Minimum detectable objects $\geq \phi 40\text{mm}$)

$$\text{Equation 1} \quad S = K \times T + C$$

S: Safety distance (mm)

K: Intrusion speed of operator's body or objects (mm/sec.)

Normally, taken as 1600 (mm/sec.) for calculation.

T: Response time of total equipment (sec.)

$$T = T_m + T_{SG2}$$

T_m : Maximum halting time of machinery (sec.)

TSL2: Response time of the SG2 series (sec.)

C: Additional distance calculated from the size of the minimum sensing object of the light curtain (mm)

$$C = 850 \text{ (mm) (constant)}$$

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$$\text{Equation ②} \quad S = K \times (T_S + T_C + T_{SL2} + T_{bm}) + D_{pf}$$

S: Safety distance (mm)

Minimum required distance between the sensing area surface and the dangerous parts of the machine

K: Intrusion speed {Recommended value in OSHA is 63 (inch/sec.) \approx 1,600 (mm/sec.)}

ANSI B11.19 does not define the intrusion speed of "K".

When determining K, consider all possible factors including physical ability of operators.

T_S : Stopping time calculated from the operation time of the control element (air valve, etc.) (sec.)

T_C : Maximum response time of the control circuit required for functioning the brake (sec.)

TSL2: Response time of light curtain (sec.)

T_{bm} : Additional stopping time tolerance for the brake monitor (sec.)

When the machine is not equipped with a brake monitor, please follow the following formula to calculate.

$$T_{bm} = T_a - (T_S + T_C)$$

T_a : Setting time of brake monitor (sec.)

When the machine is not equipped with a brake monitor, it is recommended that 20 % or more of $(T_S + T_C)$ is taken as additional stopping time.

D_{pf} : Additional distance calculated from the size of the minimum sensing object of the light curtain

$$\text{SG2 } D_{pf} = 23.8 \text{ (mm)}$$

$$\text{SG2 } D_{pf} = 61.2 \text{ (mm)}$$

$$\text{SG2 } D_{pf} = 129.2 \text{ (mm)}$$

$$D_{pf} = 3.4 \times (d - 0.276) \text{ (inch)}$$

$$\approx 3.4 \times (d - 7) \text{ (mm)}$$

d: Minimum detecting object diameter 0.552 (inch) \approx 14 (mm) SL2

Minimum detecting object diameter 0.985 (inch) \approx 25 (mm) SL2

Minimum detecting object diameter 1.772 (inch) \approx 45 (mm) SL2

光泽面的影响

Influence of reflective surfaces

安装本装置时，应考虑周围反射性表面的影响，并采取涂装反射面、遮掩、加粗反射面、变更反射面的材质等适当措施。若不考虑光泽面的影响问题而不采取措施，则光幕传感器检测不到，可能导致重伤甚至死亡。

Install the light curtain by considering the effect of nearby reflective surfaces, and take countermeasures such as painting, masking, or changing the material of the reflective surface, etc. Failure to do so may cause the light curtain not to detect, resulting in serious body injury or death.

设置时，请从光反射率高的表面起留出下述值以上的间隔。

Keep the minimum distance given below, between the light curtain and a reflective surface.

侧视图: Side view

有光泽的天花板: reflective ceiling

顶端视图: Top view

有光轴的表面: reflective surface

投光器: Emitter

受光器: Receiver

允许设置区域: install this area

禁止设置区域: Do not install this area

Distance between emitter and receiver	Allowable installation distance A
0.2~3m	0.32m
03~13m	$L/2 \times \tan 2\theta = L \times 0.106(m) (\theta = 6^\circ)$

(注 1):本装置的有效开口角度根据 IEC 61496-2/UL 61496-2 为 $\pm 5^\circ$ ($L > 3m$ 时)以下，但考虑到安装时的光轴偏移等因素，估计有效开口角度为 $\pm 6^\circ$ ，请离开光泽面进行设置。

(Note 1) The effective aperture angle for this device is $\pm 5^\circ$ or less (when $L > 3\text{ m } 9.843\text{ ft}$) as required by IEC 61496-2 / UL 61496-2. However, install this device away from reflective surfaces considering an effective aperture angle of $\pm 6^\circ$ to take care of beam misalignment, etc. during installation.

光幕传感器用隅角镜

Corner mirror

请务必根据光幕传感 SL2 系列的使用说明书进行维护。

如果隅角镜的反射面上附着污垢、水、油等请勿使用。如果扩散或弯曲将无法确保合适的检测范围。

请务必在了解产品附带的使用说明书的基础上，再根据设置条件设置隅角镜及光幕传感器。若不满足设置条件，则可能出现意想不到的错误入光状态，从而导致重伤甚至死亡。

使用说明书可从网站上进行下载。

使用隅角镜时，请勿将光幕传感器 SL2 系列作为回归反射型使用。

隅角镜的反射面材质为玻璃。破损时会有碎玻璃飞溅，敬请注意。

Be sure to carry out maintenance while referring to the instruction manual for the SL2 series of light curtains.

Do not use if dirt, water, or oil, etc. is attached to the reflective surface of this product. Appropriate sensing range may not be maintained due to diffusion or refraction.

Make sure that you have read the instruction manual for the corner mirror thoroughly before setting up the corner mirrors and light curtains, and follow the instructions given. If the equipment is not set up correctly as stipulated in the instruction manual, incident light errors may result in unexpected situations which may result in serious injury or death.

Please download the instruction manuals from our website.

Light curtain SL2 series cannot be used as a retro-reflective type. Avoid installing the light curtain as a retro-reflective type when this product is applied.

The mirror part of this product is made of glass. Note that if it is broken, the glass shards may fly apart.

故障诊断及措施

Fault Diagnosis and Measurements

7 segment digital tube display meaning		
Display	Result	Reason
0	Synchronize default	The emitter and receiver are not aligned.
1	Some light synchronize, some light shade	The emitter and receiver are not aligned, or shaded by something.
F(2) Alternately	OSSD1 CURRENT >500mA	Over current, cable break or earth
F(3) Alternately	OSSD1 maintain 24V	Check the cable connection
F(4) Alternately	OSSD2 CURRENT >500mA	Over current, cable break or earth
F(5) Alternately	OSSD2 maintain 24V	Check the cable connection
F(6) Alternately	OSSD1 and OSSD2 short circuit	Check the cable connection
8	EDM default	Check the cable connection and EDM
E.	System default	Sensor broken
P.	Power over / under voltage(24V)	Check the power supply(24V)
7 segment digital tube display meaning		
Display	Result	Reason
0	External Test	Test connect to 24V
E.	System default	Sensor broken
P.	Power over / under voltage(24V)	Check the power supply(24V)

尺寸图: Dimensions

投光器: Emitter

受光器: Receiver

Model	Sensing height	Sensor length	Mounting space	Length

		A	B	C	D
SL-25□□2C-8C	SL-14□□2C-16C	160	254	300	324
SL-25□□2C-16C	SL-14□□2C-32C	320	414	460	484
SL-25□□2C-24C	SL-14□□2C-48C	480	574	620	644
SL-25□□2C-32C	SL-14□□2C-64C	640	734	780	804
SL-25□□2C-40C	SL-14□□2C-80C	800	894	940	964
SL-25□□2C-48C	SL-14□□2C-96C	960	1054	1100	1124
SL-25□□2C-56C		1120	1214	1260	1284
SL-25□□2C-64C		1280	1374	1420	1444
SL-25□□2C-72C		1440	1534	1580	1604
SL-25□□2C-80C		1600	1694	1740	1764

隅角鏡

Corner mirror

Model	A	B	C	D	E	F
YJ-0001	316	326	378	-	-	272
YJ-0002	476	486	538	-	-	512
YJ-0003	636	646	698	-	-	672
YJ-0004	796	806	858	458±50	-	832
YJ-0005	956	966	1018	538±50	-	992
YJ-0006	1115	1126	1178	618±50	-	1152
YJ-0007	1276	1286	1338	698±50	-	1312
YJ-0008	1436	1446	1498	538±50	1018±50	1472
YJ-0009	1596	1606	1658	591±50	1125±50	1632
YJ-0010	1756	1766	1818	645±50	1231±50	1792
YJ-0011	1916	1926	1978	698±50	1338±50	1962