КАТАЛОГ

Optoelectronic safety systems for the protection of man and machine

You will also find detailed information regarding our product variety on our website:

Online documentation in 13 languages

The online catalogue for our customers is permanently updated. The Main catalogue can be consulted on the Internet in as much as 13 languages.
The technical data of our entire product range are available 24/7, always upto-date. The declarations of conformity, the test certificates and the mounting instructions can be consulted or even downloaded as well.

Service for designers

The online catalogue also includes the technical drawings of our products – a special service to designers. In this way, they can be downloaded and directly fed in CAD-systems.
The Schmersal homepage furthermore contains up-to-date information on general subjects, technical articles on machine safety as well as news regarding events and trainings.
To be bookmarked!

The direct way

If you need further information or you want personal advice, you can call us as well:
Tel. +49-(0) 2 02-64 74-0.

The addresses of our representations in Germany and abroad can be found on the front pages of this catalogue.

We are at your disposal –
anyplace, anywhere, anytime!

Warning!

The Schmersal programme is not intended for private consumers, i.e. that they are not consumer products within the meaning of the European Directives (in Germany within the meaning of § 5 GPSG) or other national laws.

Subject to technical modifications and errors.

The data specified in this catalogue are carefully checked typical standard values.

Descriptions of technical correlations, details on external control units, installation and operating instructions or similar have been provided to the best of our knowledge. This however does not mean that any warranted characteristics or other properties under liability law may be assumed, which extend beyond the “General Terms and Conditions of Delivery of Products and Services of the Electrical Industry”.

We trust you will understand that the user must check our information and recommendations before using our equipment.

Content

Schmersal offers its customers a comprehensive range of products for optoelectronic safeguarding of hazardous areas, ranging from light barriers, light grids and light curtains with different functions (e.g. blanking, muting, cascading) up to laser scanners. A large range of accessories, e.g. deflecting mirrors, mounting brackets etc. helps the user fitting and using those active optoelectronic protective devices (AOPD) in his specific application.

This brochure contains a brief introduction of the individual optoelectronic product families as well as the main accessories for the AOPD systems of the Schmersal Group.

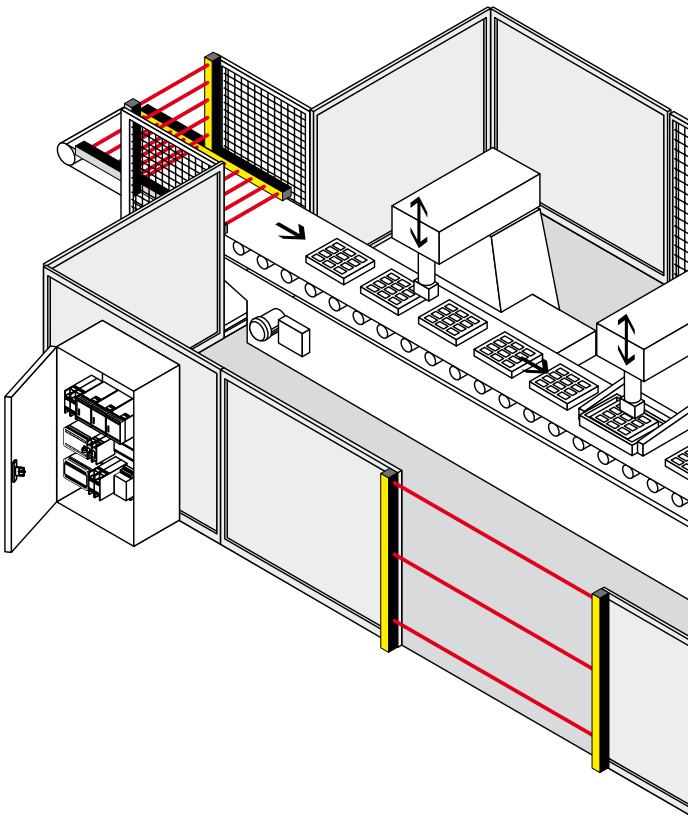
The technical data of the individual devices are completed with wiring examples, e.g. in combination with Safety monitoring modules or for integration in the AS-i Safety at Work System. Appropriate components can be wired into a complete safety system.

EN 61

The field of automation is subject to a permanent and innovative change of products and applications. The focus is on increasing the productivity and realising a smooth-running production process with a minimum of human interventions on machinery and systems. The ideal, a fully automated and totally safe machine however will always remain a dream, though the robots used in production plants already are a big step towards this goal.
Human intervention and knowledge will always be required for the commissioning, monitoring and maintenance of modern industrial systems. Man however is not infallible and ignorance or lack of information, thoughtlessness or negligence often leads to damages.

For these reasons European directives such as the Machinery Directive 2006/42/EG and their corresponding standards were implemented at European level.
These standards aim at detecting and constructively avoiding all possible risks and hazards during the planning and project phase of machines and systems. Safety components must be used to minimise or eliminate the residual risks. In this way, manufacturers and users are making equivalent efforts to set up an optimal process flow, which offers the highest possible protection to the operating staff. The challenge for all manufacturers of safety components is to design efficient and safe product solutions for mechanical engineers. Flaps and doors are the simplest means of access to the machine.
These separating hardguarding safety solutions offer an efficient and effective protection against hazardous movements and products being ejected from the machine. When these safety guards are opened, the machine is brought to standstill (through the corresponding safety sensor transmitting the “stop” signal to the control), which interrupts and therefore slows down the production. In case of continuous processes, which must not be interrupted, solenoid interlocks protect man and the work piece against damages.
Safety fences are not suitable for production processes requiring the material to be transported into the working area by means of conveyor belts, as they do not allow for an ergonomic and optimal work sequence.

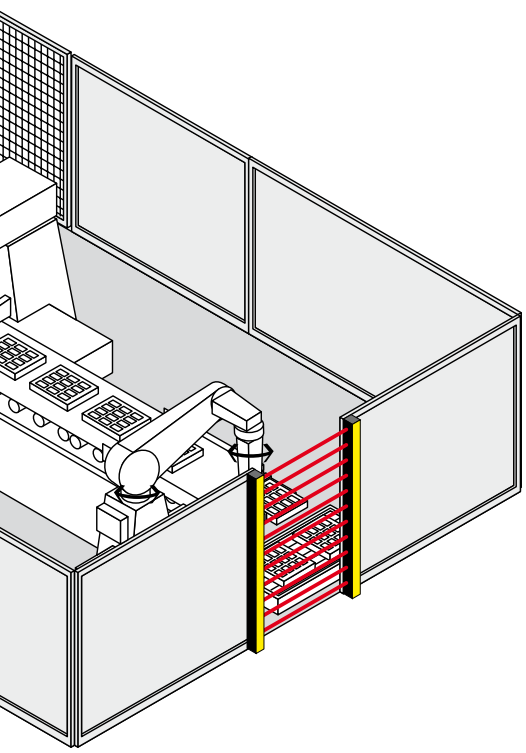
These separating hardguarding safety solutions offer an efficient and effective protection against hazardous movements and products being ejected from the machine.



496

Typical applications:

- Power-driven machines
- Power-driven presses in metalworking, plastics, leather, stone working and rubber processing industry
- Folding presses and cutters
- Power-driven machines
- Power-driven presses in metalworking, plastics, leather, stone working and rubber processing industry
- Folding presses and cutters
- Filter presses
- Punching machines in leather, textile and plastics processing
- Robots stations and welding booths
- Materials handling and storage technology
- und vieles mehr



Depending on the application, the AOPD's are used for point of operation, danger zone and perimeter guarding. The user can choose from a large range of different optoelectronic safety solutions e.g. light barriers, light grids, light curtains and laser scanners.

Optoelectronic

Safety light barriers

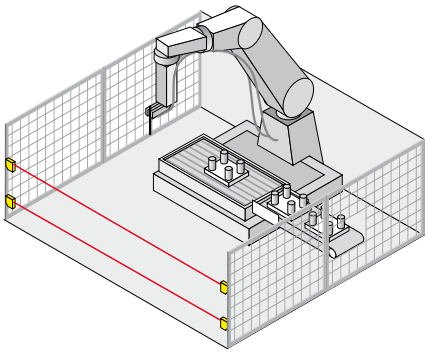
The safety light barrier systems of the SLB range are active optoelectronic protective devices (AOPD) fulfilling the Control Category 2 or 4 in accordance with EN 954-1 or EN 61496. These systems are used as entry guards on hazardous zones, points of operation and entrances.
They protect human life without restricting the production flow.
Typical applications for safety light barriers are on robots, automatic-processing plants, transfer lines, rack storages and pallet loaders.
The entire safety light barrier system includes a light emitter, a light receiver and a safety monitoring module.
This module monitors the signals of the emitter.
If the light beam is interrupted, a signal is emitted to bring the dangerous movement of the machine to standstill.
The safety monitoring module integrates functions such as start and restart inhibit as well as a contactor monitoring.
The maintenance-free safety sensors of the system with protection class IP 67 offer an integrated soiling check.
Because of their small size, safety light barriers can be fitted almost everywhere.

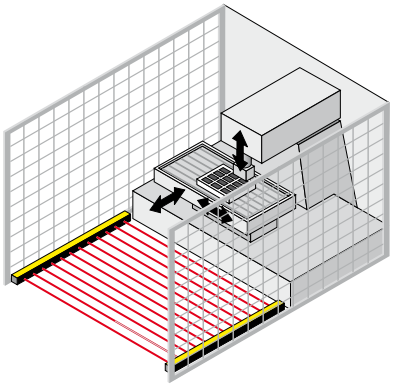
Safety light grids / light curtains

The safety light curtains and safety light grids of the SLC and SLG meet the requirements of Control Category 2 or 4 to EN 954-1 and Type 2 or Type 4 to EN 61496.
They safeguard points of operation and hazardous areas on different applications, e.g. presses, robot stations, injection moulding machines, pallet machines, etc.
In these active optoelectronic protective devices (AOPD), the emitter and receiver are fitted in two separate enclosures. An invisible infrared signal is sent from the emitter and monitored by the receiver. If the light beam is interrupted by an object or a person, a stop signal is emitted to bring the machine to standstill.
The protection field is defined by the height and width of the protection field. The protected height is the range between the first and last infrared light beam of a light curtain. The protected height defines the physical size of the system to be used.
The protected width or operating range is the distance between the transmitter and receiver unit.

For an accurate detection of objects with different sizes in the hazardous area, the user can choose between light grids and light curtains with different resolutions. Here, the following rule applies: the smaller the distance between two adjacent light beams, the more accurate the detection sensitivity of the AOPD.
For the detection of body parts, a distinction is made between finger, hand and body protection.
DIN EN ISO 13857 sets the biometric data for finger protection to 14 mm, for hand detection to 30 mm, for leg detection up to 70 mm and for body detection to over 70 mm.
Safety light grids with 2, 3 or 4 individual beams are generally used to detect the penetration of the entire human body.
Safety light curtains are multiple beam systems (Resolution < 40 mm) and can also detect smaller objects in case of intrusion into the protected field. The maintenance- free safety light curtains and light grids can be smoothly fitted using an M12 connector and are equipped a diagnostic interface and LED indication for status messages.

Depending on the type of safety light curtain or light grid used, the components offer an integrated monitoring module with start/restart inhibit and external device monitoring.
Additional functions such as blanking, muting and cascading of the light curtains are available as well.
The SLC and SLG product series therefore offer a maximum of flexibility for safeguarding different points of operation.





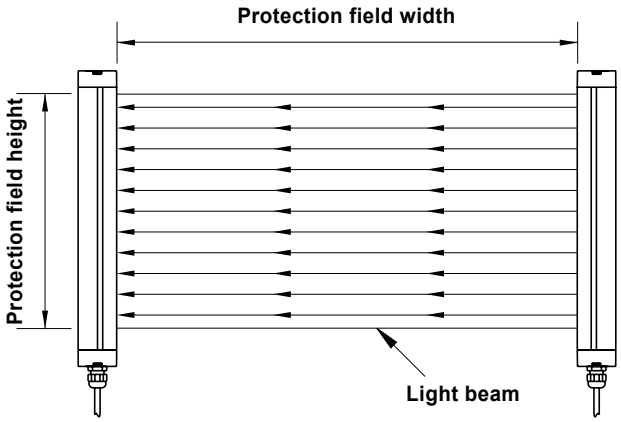
safety systems

Important conditions for the use of optoelectronic safety devices:

In order to choose the appropriate active optoelectronic protective device (AOPD) such as light barriers, light curtains/ grids to use them correctly, both the requirements of the standards (EN 61496, EN ISO 13849, EN ISO 13855, C standards etc.) and product-specific features (detection sensitivity, range, etc.) must be taken into account.
AOPD's can be used, provided that:

- the dangerous movement can be stopped at all times and that it is ensured that the dangerous area can only be reached after the movement has come to standstill,
- The protected width or operating range is the distance between the transmitter and receiver unit.
- no objects (work pieces, sparks, liquids, etc.) can be ejected,
- the AOPD meet the requirements of Type 2 or Type 4 acc. to EN 61496,
- the dangerous area can only be reached by passing through the protected field of the AOPD,
- reaching over, under or through the protected field is impossible,
- the start or restart command devices are fitted in such a way that the entire hazardous area is completely visible from the outside and that it cannot be activated from within the hazardous area
- and the safety distance is calculated and constructively applied in accordance with EN ISO 13855.

The effectiveness of the safety guard corresponds to the risk assessment, which was carried out during the planning and design phase, taking all important boundary conditions, e.g. environment, machine and function into account.



Safety distances for light curtains

The safety laser scanners of the LS series are used for protection of man on machines, where dangerous movements can occur.

The standard EN ISO 13855 provides the user with detailed information about the calculation of the minimum safety distances. These include the following important influencing factors:

- stopping time of the entire system, taking the different reaction times of the individual systems into account (e.g. machine, safety monitoring module, AOPD etc.)
- capacity of the AOPD to detect body parts (fingers, hand and entire human body)
- set-up of the safety guard in normal condition (vertical fitting), parallel condition (horizontal fitting) or at an arbitrary angle in front of the safety guard and
- the speed at which the protection field is approached.

For the calculation of the minimum safety distance **S** to the hazardous area,
EN ISO 13855 presents the following general formula:

S = K x T + C

Where:
S the safety distance to the hazardous area (mm)

K the approach speed of the body or the body part (mm/s)

T total reaction time of the system (s)
(including the machine's run-out time, the reaction time of the safety guard and the safety monitoring module etc.)

C additional distance (mm) before the safety guard

Normal approach for light curtains: (Resolution: max. 40 mm)

The minimum safety distance **S** is calculated using the following formula:

S = 2000 T + 8(D-14)

(D = Resolution).

This formula applies to safety distances up to 500 mm.
The minimum safety distance Smin must not be less than 100 mm.

If the calculation produces a distance larger than 500 mm for **S**, the calculation can be repeated with a lower approach speed:

S = 1600 T + 8 (D-14)

In this case, Smin may not be less than 500 mm.

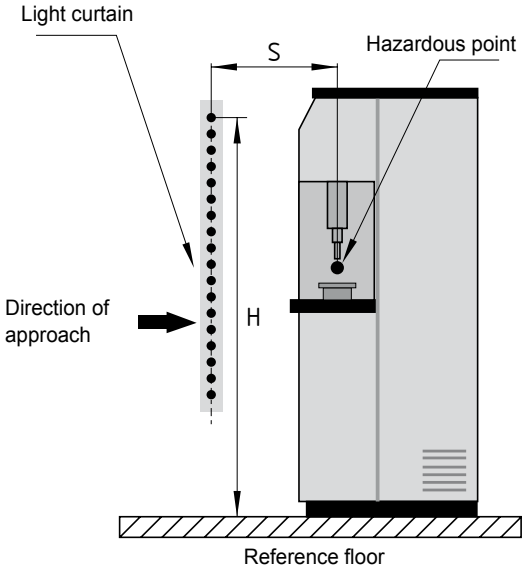
If the hazardous spot of the machine can be reached from top due to its special configuration, the top beam of the light barrier must be calculated and fitted with CRO in accordance with Table 1
(EN ISO 13855).

Normal approach for light curtains: (Resolution: from 40 mm up to max. 70 mm)

The minimum safety distance **S** is calculated using the following formula:

S = 1600 T + 850

The height of the topmost light beam must be at least 900 mm, the height of the lowermost light beam maximum 300 mm above the bottom (for the protection of children younger than 14: 200 mm)



distance

Normal approach for light grids: (Resolution: > 70 mm)

The minimum safety distance **S** is calculated using the following formula:

S = 1600 T + 850

For safety guards with multiple beams, height H (mm) above the reference floor of the individual beams must be applied in the following way:

Number of beams	Height above the reference floor
2	400, 900
3	300, 700, 1100
4	300, 600, 900.12

When using light curtains or light grids, particular attention must be paid to the tampering possibilities of the safety guard and to the mechanical risks (e.g. crushing, shearing, cutting, ejection).

Horizontal approach for light curtains/grids (Resolution: > 50 mm)

The minimum safety distance **S** is calculated using the following formula:

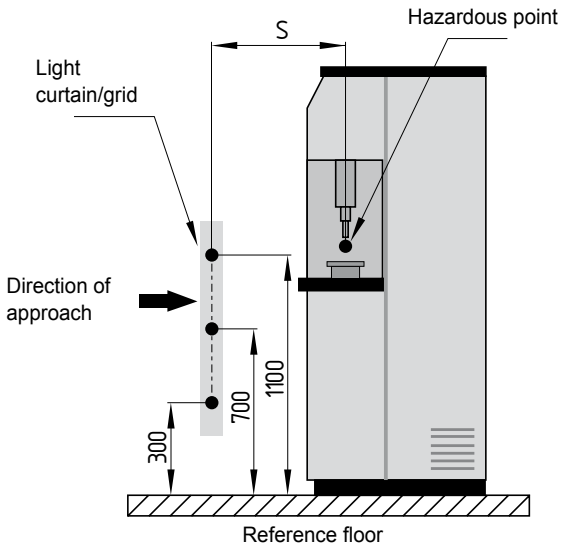
S = 1600 T + 1200 – 0.4 H

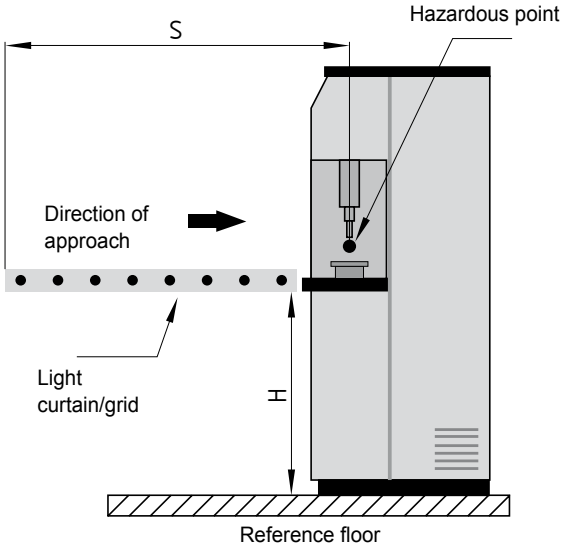
Here, Smin is 850 mm. The lowest authorised height H depends on the resolution D of the light curtain:

H = 15 (D-50)

For this type of safety guard, the maximum height H is 1000 mm.
In the risk analysis, special attention must be paid to the prevention of unintentional undetected access from underneath the protection field.

Further calculation examples can be found in DIN EN ISO 13855 as well as in the mounting instructions of the SLC/ SLG safety sensors.





Master/Slave cascading

For the SLC/SLG…M/S product series, the master light curtain can be extended with another (slave) light curtain (cascading). In this way, multiple protection fields can be generated. A protection field is created between the emitter and receiver and between the slave components.

This device cascading provides for a comfortable and efficient protection of contiguous protection fields against reaching over or through the protection field. The slave light curtains are connected to the master by means of an M12 connector.
The master and slave light curtains are available in different sizes and resolutions and allow for almost any combination.

Muting

If goods or objects must be transported in or out of the hazardous area without stopping the machine, the safety light curtain must be automatically and temporarily suspended.

To this end, two or four muting sensors are used to detect whether a person is approaching the hazardous area or a transport system enters or leaves the hazardous area. Suitable muting sensors are light barriers, proximity switches or position switches.

The integrated safety-muting controller of the safety light curtain or light grid monitors and controls the muting process.

The safety outputs are not disabled. Any malfunction of the monitored signal source will cause the OSSD's to be switched off.
Depending on the application, different light curtains with integrated muting function are available.
Detailed product information can be found in the manuals.

Blanking /Floating Blanking

If continuity of the production process is required, a part of the protection field can be blanked without triggering a stop signal.
In this way, objects such as work pieces can be fed or a conveyor belt can be positioned at a fixed position in the protection field.

The integrated floating blanking function of the SLC 440 light curtains enables a flexible blanking of up to 2 adjacent light beams in the protection field of the light curtain. This function is required to ensure that one or two adjacent light beams can be interrupted at an undefined position in the protection field.

In this way, objects such as fixtures or materials with slightly varying heights can be fed through the light curtain without triggering a stop signal. Different blanking functions are available. The distinguishing feature of the different modes is the number of light beams that can be interrupted by an object. In addition to that, it can be defined whether the object may interrupt the protection field permanently or only temporarily. The interrupted light beams can be at any position in the protection field.

Aport from the first infrared light beam (the beam closest to the connector), any light beam can be used for blanking.

When blanking is applied, the resolution of the light curtain changes. The technical documentation of the different light curtains includes the tables with the effective resolutions D to calculate the minimum safety distance to EN ISO 13855.

Further technical product information can be found in this brochure.

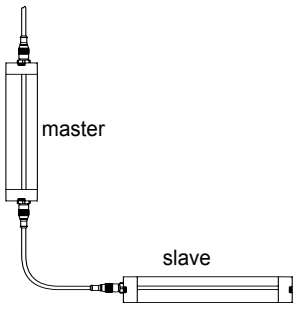
Cyclic operation
Cyclic operation is a mode of operation, in which the machine automatically starts a work process, as soon as the operator releases the protection zone of the light grid.
A cycle is defined as the one-time interruption and release of the protection zone.
In one-cycle operation, a new machine cycle is initiated, when the protection zone is interrupted one time.

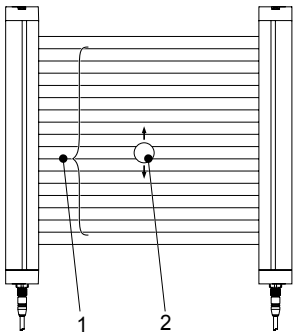
Example:
The material is fed automatically without interruption of the protection zone. After initialisation, the machine starts the first cycle. The operator now interrupts the protection zone to remove the material. The next cycle starts automatically.

In two-cycle operation, a new machine cycle is started when the protection zone is interrupted twice.

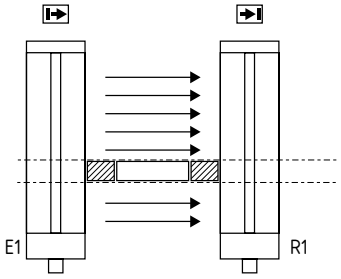
Example:
The operator loads the machine and gives the start command. After the process is finished, the operator removes the processed material (1st cycle) and loads a new part for processing (2nd cycle). The next cycle starts automatically.

The light grid additionally monitors a signal (machine contact) of the machine, which signals the end of the hazardous movement. This signal is used for the cycle reset and enables an immediate intervention in the protection zone.





1 Floating-Blanking-Area
2 Movable object



Testing of the safety guards

The master and slave light curtains are available in different sizes and resolutions and allow for almost any combination.

Initial inspection of safety guards

The initial inspection of safety guards includes the inspection of the hereafter mentioned conditions and circumstances:

- Checking the compliance of the AOPD operation with the current utilisation of the machine
- Checking the suitability and the capability of the selected safety guard, the assembly and the operating mode to counteract apparent hazards
- Checking the compliance of the AOPD with the type required by EN 61496
- Checking the compliance of the AOPD's interlinking up to the signal transmission in the forwarding control system with the required control category
- Checking whether the AOPD is tamper-proof

Periodic inspection of safety guards

In addition to the inspection services, "the initial inspection of safety guards" includes the "periodic inspection":

- Checking whether the safety guard is capable of processing the application
- Subsequent adjustment of the AOPD
- Removal of soiling
- Elimination of minor failures, for as far as this is possible within a reasonable period of time.

Are not included in the service scope: the reprogramming of the protection fields as well as the parameter setting of programmable systems.

Execution of the run-on measurement

The conductance of run-on measurements includes the hereafter described performances:

- Measuring the stopping time on the basis of multiple individual measurements
- Calculating the safety distance to EN ISO 13855 or possible other prevailing regulations, (harmonised) C-standards

The customer will receive a test report in writing of every agreed inspection service.

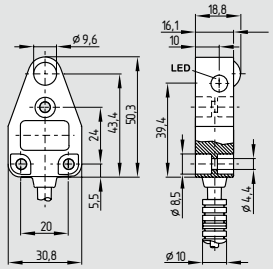
Always up-to-date
Online on the internet

Safety light barriers

System features:

- Type 2 and Type 4 to EN 61496
- Up to 4 pairs of one-way light barriers can be connected
- Different functions: Start/Restart interlock Contactor monitoring Cyclic testing
- Integrated soiling check
- Status and error indication
- Signalling outputs for external indications
- Maintenance- free
- Extremely compact design
- Simple, flexible mounting and adjustment

SLB 200



- Range to 4 m
- LEDs visible from both sides
- Protection class IP67

Approvals

TÜV CE

Technical data

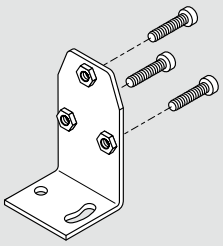
Standards:	IEC/EN 61496
Control Category:	2
Enclosure:	ABS 10 % GF
Enclosure dimensions:	31 x 50.5 x 19 mm
Connection:	
- emitter:	10 cm cable with male connector M8, 3-pole
- receiver:	10 cm cable with male connectorM8, 4-pole
Max. cable length:	50 m
Protection class:	IP67
Response time:	30 ms *
Range:	4 m
Start/Restart interlock:	*
Contactor control:	*
Light emission wavelength:	880 nm
U_e:	24 VDC ± 20%
Safety outputs:	*
Angle of radiation:	± 4°
Min. size of object:	9 mm Ø
LED status indication:	soiling, switching condition and power on
Ambient temperature:	−10 °C … +55 °C
Storage and transport temperature:	−20 °C … +80 ºC

* only in combination with safety monitoring module SLB 200-C04-1R

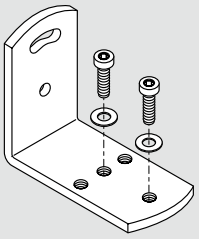
System components

SLB 200-C04-1R

Connector plug



Mounting angle BF 31



Mounting angle BF UNI 1

Ordering details

SLB 200-①31-21

Nr.	Option	Description
①	E/R	Emitter / receiver

Note

The system components (safety monitoring module, cable, etc.) are not included in delivery.

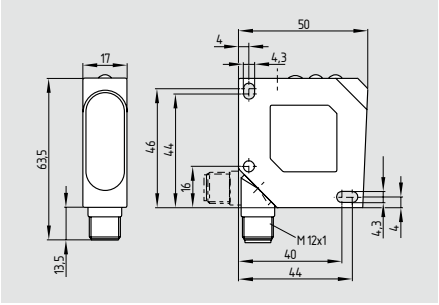
Ordering details

Monitoring of safety light barriers
SLB 200-C04-1R **refer to page 4-6**

Connector plug (female)
for emitter: 3-pole straight
without cable **101210562**
with cable 2 m **101210564**
with cable 5 m **101210566**
for receiver: M8, 4-pole straight
without cable **101210015**
with cable 2 m **101209946**
with cable 5 m **101209942**

Mounting angles **BF 31**
Mounting angles universal **BF UNI 1**

SLB 400



- Range to 15 m
- Connecting plug can be rotated
- LED switching conditions display
- Protection class IP67

Approvals

Technical data

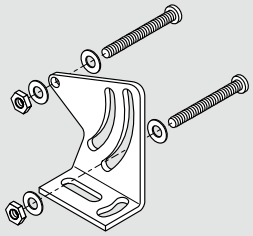
Standards:	IEC/EN 61496
Control Category:	4*
Enclosure:	ABS
Enclosure dimensions:	50 x 50 x 17 mm
Connection:	M12, 4-pole coupler socket, can be rotated
Max. cable length:	100 m
Protection class:	IP67
Response time:	25 ms*
Range:	15 m
Start/Restart interlock:	*
Contactor control:	*
Light emission wavelength:	880 nm
U_e:	24 VDC ± 20%
Safety outputs:	*
Angle of radiation:	± 2°
Min. size of object:	13 mm Ø
LED status indication:	soiling, switching condition and power on
Ambient temperature:	0 °C … +60 °C
Storage and transport temperature:	−20 °C … +80 ºC

* only in combination with safety monitoring module SLB 400-C10-1R

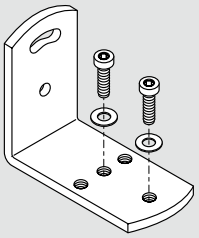
System components

SLB 400-C10-1R

Connector plug



Mounting angle BF 50



Mounting angle BF UNI 1

Ordering details

SLB 400-①50-21P

Nr.	Option	Description
①	E/R	Emitter / receiver

Note

The system components (safety monitoring module, cable, etc.) are not included in delivery.

Ordering details

Monitoring of safety light barriers
SLB 400-C10-1R **refer to page 4-8**

Connector plug (female) for emitter/receiver: M12, 4-pole straight

without cable	**101208522**
with cable 2 m	**101209937**
with cable 5 m	**101209918**

Mounting angles	**BF 50**
Mounting angles universal	**BF UNI 1**

SLB 200-C

- Up to two pairs of light barrier devices can be connected
- Co-ordinated for use with SLB 200 R/E safety light barriers
- 1 safety contact, STOP 0
- 1 signalling output
- Operating voltage 24 VDC
- Test input
- LED display of switching conditions
- Response time ≤ 30 ms
- Start/Restart interlock can be switched active or inactive
- Contactor monitoring can be switched active or inactive
- Additional cyclic testing

Technical data

Standards:	IEC/EN 61496-1/-2, IEC 60947-5-3, IEC 61508
Start conditions:	Test button, start-reset button, ON/OFF coding
Feedback circuit (Y/N):	yes
Max. switching frequency:	10 Hz
Rated operating voltage U_e:	24 VDC ± 20%
Rated operating current I_e:	180 mA
Outputs:	
Stop category 0:	1
Stop category 1:	0
Number of safety contacts:	1
Number of auxiliary contacts:	0
Number of signalling outputs:	1
Max. switching capacity of the safety contacts:	8 A
Switching capacity of the signalling outputs:	500 mA
Max. fuse rating of the safety contacts:	4 A gG D-fuse
Utilisation category to EN 60947-5-1:	AC-15: 250 V / 2 A DC-13: 24 V / 2 A
Ambient conditions:	
Environmental temperature:	0 °C … +50 °C
Storage and transport temperature:	−20 °C … +80 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw connection
max. cable section:	4.0 mm² (incl. conductor ferrules)
Dimensions (Height/Width/Depth):	84 x 45 x 118 mm

Approvals

TÜV CE

Ordering details

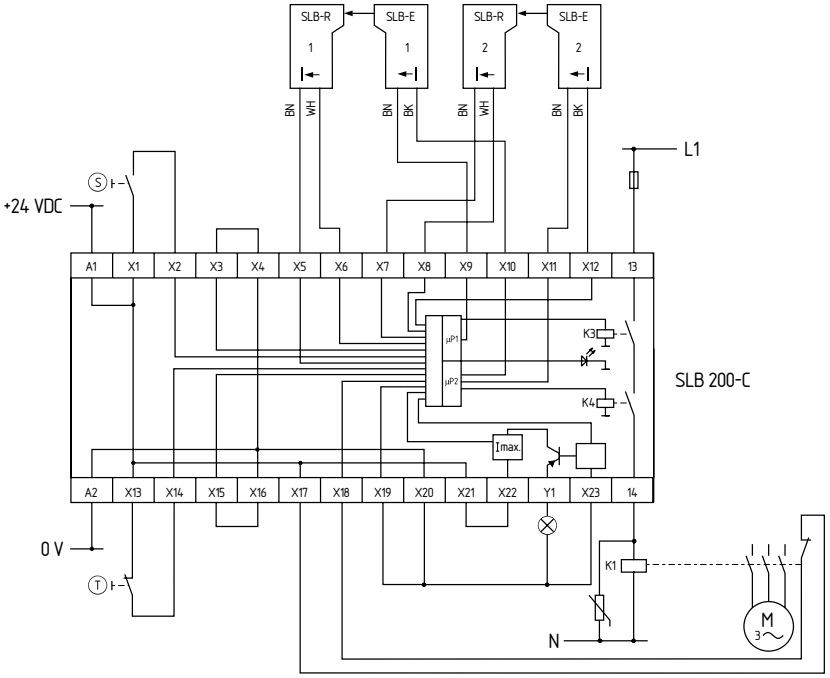
SLB 200-C04-1R

Safety light barriers

Note

- Monitoring two pairs of light barrier devices and the power contactor using the SLB 200-C safety monitoring module
- Test push button Ⓣ
  The test push button is connected to X13 and X14 in order to carry out a check of the light barrier monitoring function. The terminals X15 and X16 must be bridged.
- The wiring diagram is shown for the de-energised condition.
- Contactor check
  To monitor an external contactor, the feedback circuit is connected to X17 and X18. The terminals X19 and X20 must be bridged.
- Start push button Ⓢ
  The start push button can be used to start the monitoring of the light barriers for a new start or after an interruption. The terminals X3 and X4 must be bridged.
- It is also possible to connect only one pair of light barrier devices.

Wiring diagram



Note

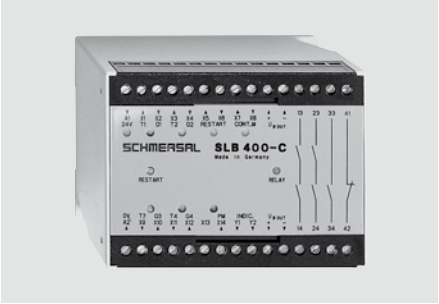
In order to set for the desired mode of operation and number of light barriers connected, remove the front cover of the safety monitoring module. As supplied all switches are in Position 1.

The required functions can be selected by means of the internal DIPswitches.

	DIPswitch 1	**DIPswitch 2**	**DIPswitch 3**
Position 1	With contactor check	With start/restart interlock	Connection of two light barriers
Position 2	Without contactor check	Without start/restart interlock	Connection of one light barrier

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

SLB 400-C



- Up to 4 light barrier pairs SLB 400 can be connected
- Co-ordinated for use with SLB 400 R/E safety light barriers
- 2 safety contacts, STOP 0
- 2 signalling outputs
- Cross-wire monitoring
- ISD Integral System Diagnostics
- Operating voltage 24 VDC
- Feedback circuit to monitor external contactors
- Two short-circuit proof additional transistor outputs
- Response time ≤ 30 ms
- Start/Restart interlock can be switched active or inactive
- Contactor monitoring can be switched active or inactive
- Can be coded

Technical data

Standards:	IEC/EN 61496-1/-2, IEC 60947-5-3, IEC 61508
Start conditions:	Start-reset button, ON/OFF coding
Feedback circuit (Y/N):	yes
Max. switching frequency:	10 Hz
Rated operating voltage U_e:	24 VDC ± 15%
Rated operating current I_e:	0.3 A without additional transistor outputs and safety light barriers
Max. fuse rating of the operating voltage:	1 A
Outputs:	
Stop category 0:	2
Stop category 1:	0
Number of safety contacts:	2
Number of auxiliary contacts:	2
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	2 A
Switching capacity of the auxiliary contacts:	2 A
Switching capacity of the signalling outputs:	100 mA
Max. fuse rating of the safety contacts:	2 A gG D-fuse
Utilisation category to EN 60947-5-1:	AC-15: 250 V / 2 A DC-13: 24 V / 2 A
LED display:	ISD
Ambient conditions:	
Environmental temperature:	0 °C … +55 °C
Storage and transport temperature:	−25 °C … +70 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw connection
max. cable section:	4.0 mm² (incl. conductor ferrules)
Dimensions (Height/Width/Depth):	75 x 99.7 x 110 mm

Approvals

Ordering details

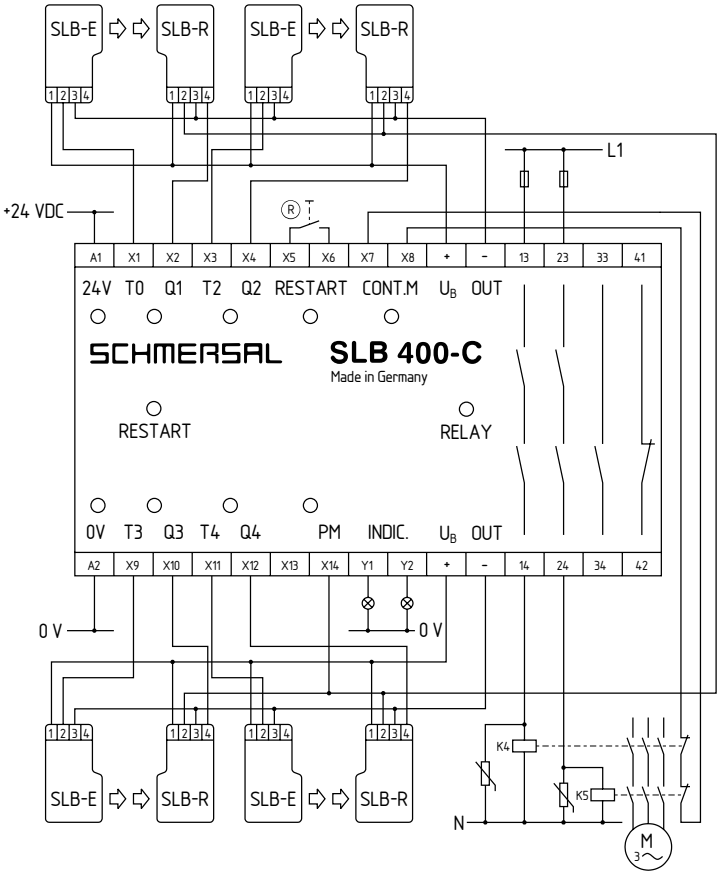
SLB 400-C10-1R

Safety light barriers

Note

- Monitoring up to four pairs of light barrier devices and the power contactors using the SLB 400-C safety monitoring module
- The wiring diagram is shown for the de-energised condition.
- Connection of two pairs of safety light barrier devices
  When two pairs of safety light barriers are connected, the terminals X9-X10 and X11-X12 must be bridged.
- Restart push button Ⓡ
  The restart function can be selected by means of the DIPswitches. When a start push button is connected to X5 and X6, it must be operated for min. 250 ms and max. 5 s after an interruption of the safety light barriers.

Wiring diagram



ISD

The following faults are registered by the safety monitoring modules and indicated by ISD

- Short-circuit on the connecting leads
- Interruption of the connecting leads
- Failure of the safety relay to pull-in or drop-out
- Fault on the input circuits or the relay control circuits of the safety monitoring module
- Mutual influence between the connected pairs of light barrier device and others on neighbouring systems

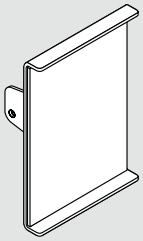
Note

The ISD tables (Intergral System Diagnostics) for analysis of the fault indications and their causes are shown in the manual.

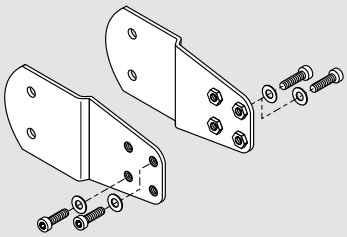
Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Safety light barriers accessories SLB 200 and SLB 400

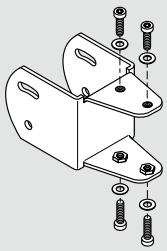
System components



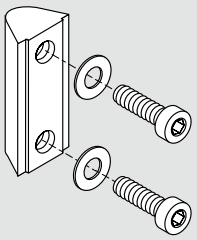
Mirror SLB 200/400 SMA 80



Mounting angle BF SMA 80-1



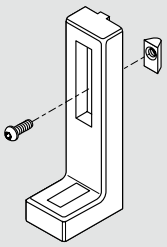
Mounting angle BF SMA 80-2



T-slot nut NST 20-8

System components

Mounting post ST 1250



Floor-stand base STB 1

Ordering details

Mirror	**SMA 80**
Mounting angles for mirror	**BF SMA 80-1**
Mounting angles for mirror	**BF SMA 80-2**
T-slot nut	**NST 20-8**

Ordering details

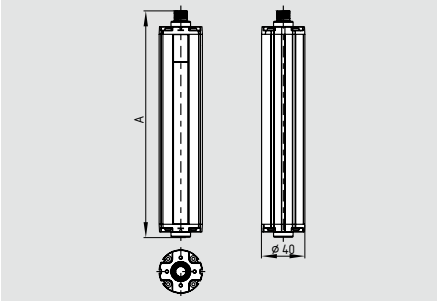
Mounting post	**ST 1250**
Floor-stand base	**STB 1**

Safety light curtains and safety light grids

System features:

- Type 2 and Type 4 to EN 61496
- Different integrated functionalities:
  - Start/restart interlock
  - Contactor control
  - Integrated double acknowledgment
  - Muting
  - Blanking
  - Master/Slave
- Diagnostics display
- Optical synchronisation
- Maintenance- free
- Compact design
- Simple, flexible mounting and adjustment

SLC 220 standard

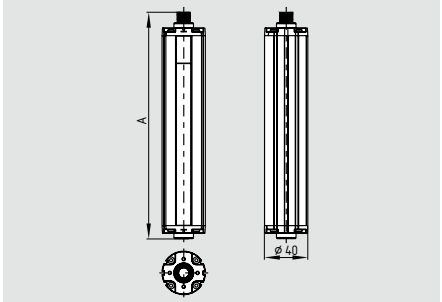


- **Safety light curtain**
- Type 2 to IEC/EN 61496-1, -2
- Resolution 30 and 80 mm
- Protection field heights 175 mm ... 1675 mm
- Integrated start/restart interlock
- Integrated contactor control
- Integrated blanking function
- Diagnostic and parametrization interface
- Range 0.3 m ... 14 m
- Integrated self-test
- Fail-safe transistor outputs
- Status display
- Protection class IP65
- Signalling output

Legend: A = Total lenght
Protection field height 175 mm
A = 216 mm
Protection field height 250 ... 1675 mm
A = 28.5 mm + Protection field height

Approvals

SLG 220 standard



- **Safety light grid**
- 2-, 3- or 4-beam light grid
- Range 0.3 ... 30 m

Legend: A = Total lenght
A = 78.5 mm + Distance between outermost beams

Approvals

Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 2
Enclosure:	aluminium
Enclosure dimensions:	Ø 40 mm
Connection:	Connector plug M12, 8-pole
Max. cable length:	100 m / 1Ω
Protection class:	IP65 to EN 60529
Response time:	9 … 45 ms (depends on length and resolution)
Detection sensitivity (Resolution):	30 and 80 mm
Protection field height:	
- Resolution 30 mm	175 ... 1675 mm
- Resolution 80 mm	325 ... 1675 mm
- 2-, 3-, 4-beam	500, 800, 900 mm
Protection field width, Range:	0.3 ... 6 m (Standard),
- SLC	4 ... 14 m (High range)
- SLG	5 ... 30 m (High range)
Start/restart interlock:	Integrated
Contactor control:	Integrated
Blanking function:	Integrated
Light emission wavelength:	880 nm (infrared)
U_e:	24 VDC ± 10%
Safety outputs:	2 x PNP, 200 mA
Signalling output:	PNP 100 mA
Power consumption:	Emitter 4 W, Receiver 8 W
Data interface:	RS 485
Status and diagnostics:	LED display
Ambient temperature:	−10 °C … +50 °C
Storage and transport temperature:	−20 °C … +70 °C
Classification:	
Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to d
Category:	up to 2
PFH-value:	3.59 x 10^{-8}/h
SIL:	up to 2
Service life:	20 years

Ordering details

SLC 220-E/R①-②RFB-③

No.	Option	Description
①	xxxx	Protected heights (mm), available lengths: 0175*, 0250*, 0325, 0475, 0625, 0775, 0925, 1075, 1225, 1375, 1525, 1675
②	30, 80	Resolution 30, 80 mm
③		Range 0.3 m ... 6 m
	H	High Range 4 m ... 14 m

Note:
* only for resolution 30 mm

Ordering details

SLG 220-E/R①RF-②

No.	Option	Description
①		Distance between outermost beams:
	0500-02	500 mm, 2-beam
	0800-03	800 mm, 3-beam
	0900-04	900 mm, 4-beam
②		Range 0.3 m ... 6 m
	H	High Range 5 m ... 30 m

Mounting brackets are included in the delivery.

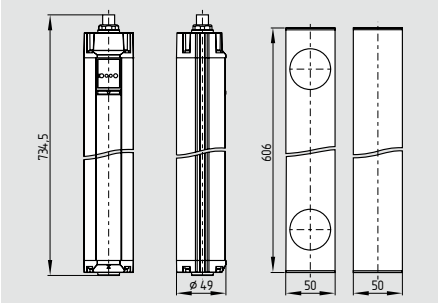
Note:
Converter for the parametrization NSR 0700

Ordering details

Connector:
Female connector M12, 8-pole straight
for emitter/receiver

cable length 5 m	**101207728**
cable length 10 m	**101207729**
cable length 20 m	**101207730**

SLG 220-P



- **Safety light grid**
- Emitter and receiver in one enclosure (retro reflector)
- Type 2 to IEC/EN 61496-1, -2
- Protection field heights 500 mm
- 2-beam light grid
- Range 0.3 m ... 6 m
- Fail-safe transistor outputs
- Status display
- Protection class IP65

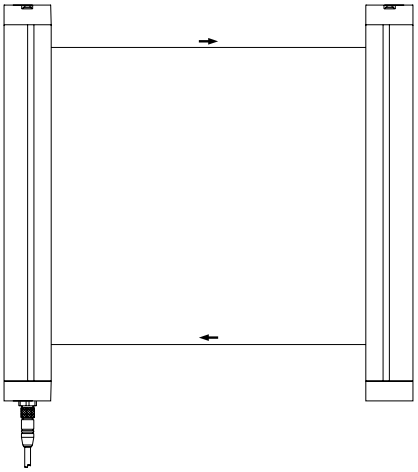
Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 2
Enclosure:	aluminium
Enclosure dimensions:	Ø 40 mm
Deflecting mirror:	50 x 50 x 606 mm
Connection:	Connector plug M12, 8-pole
Max. cable length:	100 m / 1 Ω
Protection class:	IP65 to EN 60529
Response time:	12 ms
Detection sensitivity (Resolution):	500 mm
Protection field height:	500 mm
Protection field width, Range:	0.3 m ... 6 m
Light emission wavelength:	880 nm (infrared)
U_e:	24 VDC ± 10%
Safety outputs:	2 x PNP, 200 mA
Signalling output:	PNP, 100 mA
Power consumption:	10 W
Data interface:	-
Status and diagnostics:	LED display
Ambient temperature:	−10 °C … +50 °C
Storage and transport temperature:	−20 °C … +70 °C

Classification:

Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to d
Category:	up to 2
PFH-value:	3.59 x 10^{-7}/h
SIL:	up to 2
Service life:	20 years

Technical data



Approvals

TÜV cULus CE

Ordering details

SLG 220-P-E/R0500-02RF
ULS-P-0500

Note

Mounting brackets are included in the delivery.

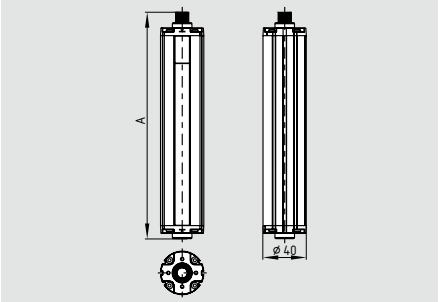
Note:
Converter for the parametrization NSR 0700

Ordering details

Connector:
Female connector M12, 8-pole straight

cable length 5 m	**101207728**
cable length 10 m	**101207729**
cable length 20 m	**101207730**

SLC 220 Master / Slave



- **Safety light curtain**
- Type 2 to IEC/EN 61496-1, -2
- Resolution 30 and 80 mm
- Protection field height:
  Master 175 mm ... 1675 mm
  Slave 325 mm ... 775 mm
- Integrated start/restart interlock
- Integrated contactor control
- Diagnostic and parametrization interface
- Cascading of Master and Slave devices
- Range 0.3 m ... 6 m
- Fail-safe transistor outputs
- Status display
- Protection class IP65
- Signalling output
- Integrated self-test

Legend: A = Total lenght
Protection field height 175 mm
A = 216 mm
Protection field height 250 ... 1675 mm
A = 28.5 mm + Protection field height

Approvals

TÜV cULus CE

Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 2
Enclosure:	aluminium
Enclosure dimensions:	Ø 40 mm
Connection:	Connector plug
- Master emitter:	M12, 8-pole
- Master receiver:	M12, 8-pole
- Slave emitter:	M12, 6-pole
- Slave receiver:	M12, 6-pole
Max. cable length:	100 m / 1Ω
Max. cable length: (Master/Slave)	0.3 m
Protection class:	IP65 to EN 60529
Response time:	12 … 65 ms (depends on length and resolution)
Detection sensitivity (Resolution):	30 and 80 mm
Protection field height:	
- Resolution 30 mm	175 ... 2450 mm
- Resolution 80 mm	325 ... 2450 mm
Protection field width, Range:	0.3 ... 6 m
Start/restart interlock:	Integrated
Contactor control:	Integrated
Cascading: (Master/Slave)	Possible
Light emission wavelength:	880 nm (infrared)
U_e:	24 VDC ± 10%
Safety outputs:	2 x PNP, 200 mA
Signalling output:	PNP, 100 mA
Power consumption:	Emitter 4 W, Receiver 8 W
Data interface:	RS 485
Status and diagnostics:	LED display
Ambient temperature:	−10 °C … +50 °C
Storage and transport temperature:	−20 °C … +70 °C

Classification:

Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to d
Category:	up to 2
PFH-value:	3.59 x 10^{-8}/h
SIL:	up to 2
Service life:	20 years

System components

Connector

Ordering details

SLC 220-E/R①-②-RFB③

No.	Option	Description
①	xxxx	Protected heights (mm), available lengths: 0175*, 0250*, 0325, 0475, 0625, 0775, 0925, 1075, 1225, 1375, 1525, 1675
②	30, 80	Resolution 30, 80 mm
③	M	Master function
	S	Slave function**

Different lengths and resolutions can be combined for Master/Slave.

Mounting brackets are included in the delivery.

Ordering details

Note:
* only for resolution 30 mm
** only protected heights 325 mm ... 775 mm

Converter for the parametrization NSR 0700

Ordering details

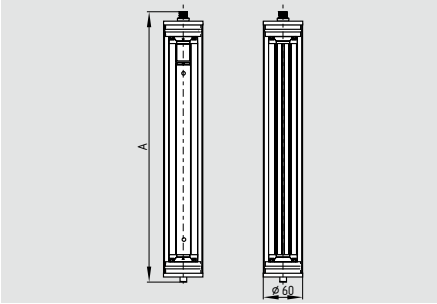
Connector:
Female connector M12, 8-pole straight
for emitter/receiver

cable length 5 m	**101207728**
cable length 10 m	**101207729**
cable length 20 m	**101207730**

for Master/Slave Verbindung
Female connector 2 x M12, 6-pole straight

cable length 0.3 m	**KA-0907**

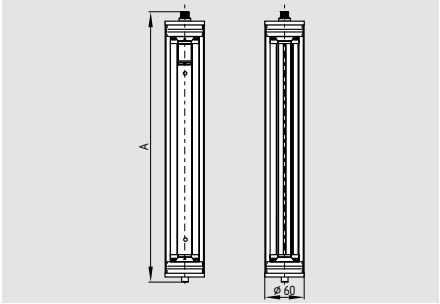
SLC 220 IP69K



- **Safety light curtain**
- Type 2 to IEC/EN 61496-1, -2
- Resolution 30 and 80 mm
- Protection field heights 175 mm ... 1675 mm
- Protection class IP69K
- Integrated start/restart interlock
- Integrated contactor control
- Integrated blanking function
- Diagnostic and parametrization interface
- Range 0.3 m ... 14 m
- Integrated self-test
- Fail-safe transistor outputs
- Status display
- Signalling output

Legend: A = Total lenght
A = 54 mm + Protection field height

SLG 220 IP69K



- **Safety light grid**
- 2-, 3- or 4-beam light grid
- Range 0.3 ... 30 m

Legend: A = Total lenght
A = 104 mm + Distance between outermost beams

Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 2
Enclosure:	aluminium protective tube housing PMMA
Enclosure dimensions:	Ø 60 mm
Connection:	Cable (5 m) with connector M12, 8-pole
Max. cable length:	100 m / 1Ω
Protection class:	IP69K
Response time:	9 … 45 ms (depends on length and resolution)
Detection sensitivity (Resolution):	30 and 80 mm
Protection field height:	
- Resolution 30 mm	175 ... 1675 mm
- Resolution 80 mm	325 ... 1675 mm
- 2-, 3-, 4-beam	500, 800, 900 mm
Protection field width, Range:	0.3 ... 6 m (Standard),
- SLC	4 ... 14 m (High range)
- SLG	5 ... 30 m (High range)
Start/restart interlock:	Integrated
Contactor control:	Integrated
Blanking function:	Integrated
Light emission wavelength:	880 nm (infrared)
U_e:	24 VDC ± 10%
Safety outputs:	2 x PNP, 200 mA
Signalling output:	PNP, 100 mA
Power consumption:	Emitter 4 W, Receiver 8 W
Data interface:	RS 485
Status and diagnostics:	LED display
Ambient temperature:	−10 °C … +50 °C
Storage and transport temperature:	−20 °C … +70 °C

Classification:

Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to d
Category:	up to 2
PFH-value:	3.59 x 10^{-8}/h
SIL:	up to 2
Service life:	20 years

Approvals

TÜV cULus CE

Ordering details

SLC 220-E/R①-②-69-RFB-③

No.	Option	Description
①	xxxx	Protected heights (mm), available lengths: 0175*, 0250*, 0325, 0475, 0625, 0775, 0925, 1075, 1225, 1375, 1525, 1675
②	30, 80	Resolution 30, 80 mm
③		Range 0.3 m ... 6 m
	H	High Range 4 m ... 14 m

Note:
* only for resolution 30 mm

Approvals

TÜV cULus CE

Ordering details

SLG 220-E/R①-69-RF-②

No.	Option	Description
①		Distance between outermost beams:
	0500-02	500 mm, 2-beam
	0800-03	800 mm, 3-beam
	0900-04	900 mm, 4-beam
②		Range 0.3 m ... 6 m
	H	High Range 5 m ... 30 m

Mounting brackets (**V4A**) are included in the delivery.

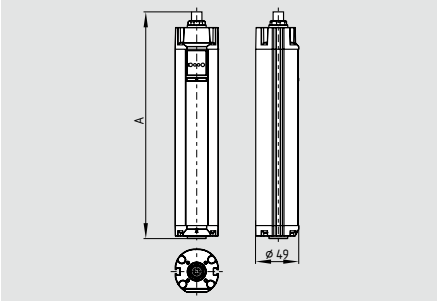
Note:
Converter for the parametrization NSR 0700

Ordering details

Connector:
Female connector M12, 8-pole straight

cable length 5 m	**101207728**
cable length 10 m	**101207729**
cable length 20 m	**101207730**

SLC 420 standard



- **Safety light curtain**
- Type 4 to IEC/EN 61496-1, -2
- Resolution 14, 30 and 50 mm
- Protection field heights 170 mm ... 1770 mm
- Integrated start/restart interlock
- Integrated contactor control
- Integrated blanking function (fixed and mobile blanking)
- Diagnostic and parametrization interface
- Range 0.3 m ... 18 m
- Fail-safe transistor outputs
- Optical synchronisation
- Status display
- Protection class IP67

Legend: A = Total lenght
A = 84.5 mm + Protection field height

Approvals

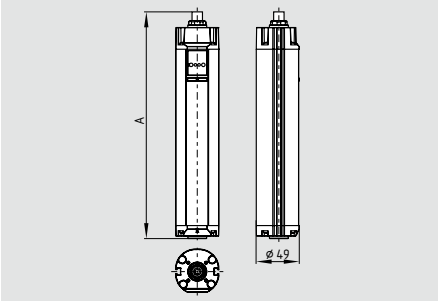
TÜV cULus CE

Ordering details

SLC 420-E/R①-②-RFB-③

No.	Option	Description
①	xxxx	Protected heights (mm) available lengths: 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050,1130, 1210, 1290, 1370, 1450, 1530*, 1610*, 1690*,1770*
②	14, 30, 50	Resolution 14, 30, 50 mm
③		Range 0.3 m ... 7 m**
		Range 0.3 m ... 10 m *
	H	High Range* 0.3 m ... 18 m***

SLG 420 standard



- **Safety light grid**
- 2-, 3- or 4-beam light grid
- Range 0.3 ... 40 m

Legend: A = Total lenght
2-beam A = 734.5 mm
3 and 4-beam A = 1054.5 mm

Approvals

TÜV cULus CE

Ordering details

SLG 420-E/R①-RF-②

No.	Option	Description
①	Distance between outermost beams:	
	0500-02	500 mm, 2-beam
	0800-03	800 mm, 3-beam
	0900-04	900 mm, 4-beam
②		Range 0.3 m ... 18 m
	H	Range 8 m ... 40 m

Mounting brackets are included in the delivery.

Note:
* only for resolution 30 mm, 50 mm
** only for resolution 14 mm
*** only for resolution 30 mm

Converter for the parametrization NSR 0801

Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 4
Enclosure:	aluminium
Enclosure dimensions:	Ø 49 mm
Connection:	Connector plug
- Emitter:	M12, 4-pole,
- Receiver:	M12, 8-pole
Max. cable length:	100 m / 1 Ω
Protection class:	IP67 to EN 60529
Response time:	10 … 27 ms (depends on length and resolution)
Detection sensitivity (Resolution):	14, 30 and 50 mm
Protection field height:	
- Resolution 14 mm	170 ... 1450 mm
- Resolution 30, 50 mm	170 ... 1770 mm
- 2-, 3-, 4-beam	500, 800, 900 mm
Protection field width, Range:	
- Resolution 14 mm	0.3 m ... 7 m
- Resolution 30, 50 mm	0.3 m ... 10 m
- High Range/Resolution 30 mm	0.3 m ... 18 m
- 2-, 3-, 4-beam	0.3 m ... 18 m
- High Range 2-, 3-, 4-beam	8 m ... 40 m
Start/restart interlock:	Integrated
Contactor control:	Integrated
Blanking function:	Integrated
Cascading: (Master/Slave)	-
Light emission wavelength:	880 nm (infrared)
U_e:	24 VDC ± 10%
Safety outputs:	2 x PNP, 500 mA
Power consumption:	Emitter 4 W, Receiver 8 W
Data interface:	RS 485
Status and diagnostics:	LED display
Ambient temperature:	−10 °C … +50 °C
Storage and transport temperature:	−20 °C … +70 °C
Classification:	
Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to e
Category:	up to 4
PFH-value:	7.42 x 10^{-9}/h
SIL:	up to 3
Service life:	20 years

Ordering details

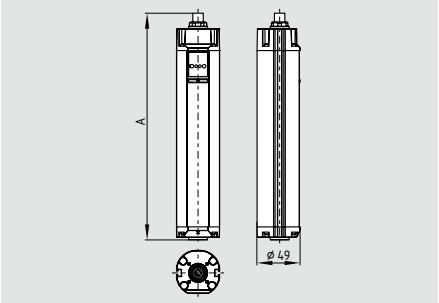
Connector:
Female connector M12, 4-pole straight
for emitter

cable length 5 m	**101207741**
cable length 10 m	**101207742**
cable length 20 m	**101207743**

Female connector M12, 8-pole straight
for receiver

cable length 5 m	**101207728**
cable length 10 m	**101207729**
cable length 20 m	**101207730**

SLC 420 Master / Slave



- **Safety light curtain**
- Type 4 to IEC/EN 61496-1, -2
- Resolution 14, 30 and 50 mm
- Protection field height:
  Master 170 mm ... 1770 mm
  Slave 170 mm ... 650 mm
- Integrated start/restart interlock
- Integrated contactor control
- Integrated blanking function
- Diagnostic and parametrization interface
- Cascading of Master and Slave devices
- Range 0.3 m ... 18 m
- Fail-safe transistor outputs
- Optical synchronisation
- Status display

Legend: A = Total lenght
A = 84.5 mm + Protection field height

Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 4
Enclosure:	aluminium
Enclosure dimensions:	Ø 49 mm
Connection:	Connector plug
- Master emitter:	M12, 4-pole
- Master receiver:	M12, 8-pole
- Slave emitter:	M12, 4-pole
- Slave receiver:	M12, 8-pole
Max. cable length:	100 m / 1 Ω
Max. cable length: (Master/Slave)	0.8 m
Protection class:	IP67 to EN 60529
Response time:	10 … 37 ms (Depends on length and resolution)
Detection sensitivity (Resolution):	14, 30 and 50 mm
Protection field height:	
- Resolution 14 mm	170 ... 2100 mm
- Resolution 30, 50 mm	170 ... 2420 mm
Protection field width, Range:	
- Resolution 14 mm	0.3 m ... 7 m
- Resolution 30, 50 mm	0.3 m ... 10 m
- High Range	0.3 m ... 18 m
Start/restart interlock:	Integrated
Contactor control:	Integrated
Blanking function:	Integrated
Cascading: (Master/Slave)	Possible
Light emission wavelength:	880 nm (infrared)
U_e:	24 VDC ± 10%
Safety outputs:	2 x PNP, 500 mA
Power consumption:	Emitter 4 W, Receiver 8 W
Data interface:	RS 485
Status and diagnostics:	LED display
Ambient temperature:	−10 °C … +50 °C
Storage and transport temperature:	−20 °C … +70 °C

Classification:

Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to e
Category:	up to 4
PFH-value:	7.42 x 10^{-9}/h
SIL:	up to 3
Service life:	20 years

System components

Connector

Approvals

TÜV cULus CE

Ordering details

SLC 420-E/R①-②-RFB-③④

No.	Option	Description
①	xxxx	Protected heights (mm) available lengths: 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450, 1530*, 1610*, 1690*, 1770*
②	14, 30, 50	Resolution 14, 30, 50 mm
③		Range 0.3 m ... 7 m**
		Range 0.3 m ... 10 m*
	H**	High Range 0.3 m ... 18 m**

Ordering details

SLC 420-E/R①-②-RFB-③④

No.	Option	Description
④	M	Master function
	S***	Slave function

Mounting brackets are included in the delivery.

Note:
* only for resolution 30 mm
** only for resolution 30 and 50 mm
*** Protection field heights 170 ... 650 mm

Converter for the parametrization NSR 0801

Ordering details

Connector:
Female connector M12, 4-pole straight
for emitter

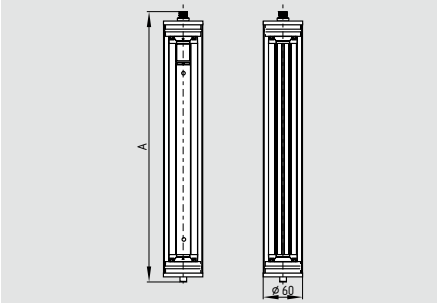
cable length 5 m	**101207741**
cable length 10 m	**101207742**
cable length 20 m	**101207743**

Female connector M12, 8-pole straight
for receiver

cable length 5 m	**101207728**
cable length 10 m	**101207729**
cable length 20 m	**101207730**

for Master/Slave connection:
Female connector M12, 4-pole straight
for emitter cable length 0.8 m **101207744**
Female connector M12, 8-pole straight
for receiver cable length 0.8 m **101207749**

SLC 420 IP69K



- **Safety light curtain**
- Type 4 to IEC/EN 61496-1, -2
- Resolution 14 mm, 30 mm
- Protection field heights 170 mm ... 1450 mm
- Protection class IP69K
- Integrated start/restart interlock
- Integrated contactor control
- Integrated blanking function (fixed and mobile blanking)
- Diagnostic and parametrization interface
- Range 0.3 m ... 10 m
- Fail-safe transistor outputs
- Optical synchronisation
- Status display

Legend: A = Total lenght
A = 97 mm + Protection field height

Approvals

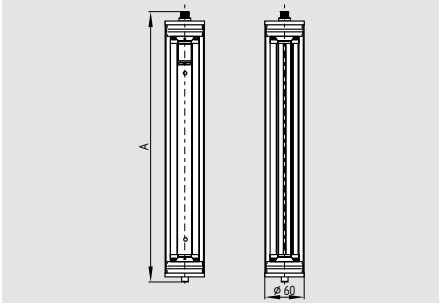
TÜV cULus CE

Ordering details

SLC 420-E/R①-②-69-RFB

No.	Option	Description
①	xxxx	Protected heights (mm) available lengths: 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450
②	14	Resolution 14 mm with a range of 0.3 m ... 7 m
	30	Resolution 30 mm with a range of 0.3 m ... 10 m

SLG 420 IP69K



- **Safety light grid**
- 2-, 3- or 4-beam light grid
- Range 0.3 ... 18 m

Legend: A = Total lenght
2-beam A = 747 mm
3 and 4-beam A = 1067 mm

Approvals

TÜV cULus CE

Ordering details

SLG 420-E/R①-69-RF

No.	Option	Description
①	Distance between outermost beams:	
	0500-02	500 mm, 2-beam
	0800-03	800 mm, 3-beam
	0900-04	900 mm, 4-beam

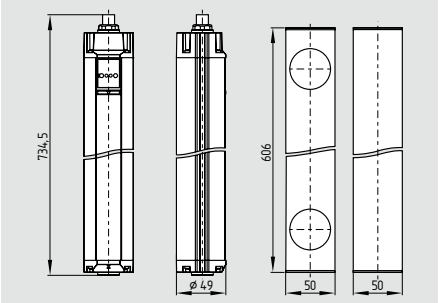
Mounting brackets (**V4A**) are included in the delivery.

Note:
Converter for the parametrization NSR 0801

Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 4
Enclosure:	aluminium protective tube housing PMMA
Enclosure dimensions:	Ø 60 mm
Connection:	Cable (5 m) with
- Receiver	connector M12, 8-pole
- Emitter	connector M12, 4-pole
Max. cable length:	100 m / 1 Ω
Protection class:	IP69K to EN 60529
Response time:	10 … 27 ms (depends on length and resolution)
Detection sensitivity (Resolution):	14, 30 mm
Protection field height:	
- Resolution 14, 30 mm	170 ... 1450 mm
- 2-, 3-, 4-beam	500, 800, 900 mm
Protection field width, Range:	
- Resolution 14 mm	0.3 m ... 7 m
- Resolution 30 mm	0.3 m ... 10 m
- 2-, 3-, 4-beam	0.3 m ... 18 m
Start/restart interlock:	Integrated
Contactor control:	Integrated
Blanking function:	Integrated
Cascading: (Master/Slave)	-
Light emission wavelength:	880 nm (infrared)
U_e:	24 VDC ± 10%
Safety outputs:	2 x PNP, 500 mA
Power consumption:	Emitter 4 W, Receiver 8 W
Data interface:	RS 485
Status and diagnostics:	LED display
Ambient temperature:	−10 °C … +50 °C
Storage and transport temperature:	−20 °C … +70 °C
Classification:	
Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to e
Category:	up to 4
PFH-value:	7.42 x 10^{-9}/h
SIL:	up to 3
Service life:	20 years

SLG 422-P



- **Safety light grid**
- Emitter and receiver in one enclosure (retro reflector)
- Type 4 to IEC/EN 61496-1, -2
- Protection field heights 500 mm
- 2-beam light grid
- Integrated start/restart interlock
- Integrated contactor control
- Range 0.3 m ... 7 m
- Fail-safe transistor outputs
- Status display
- Protection class IP67

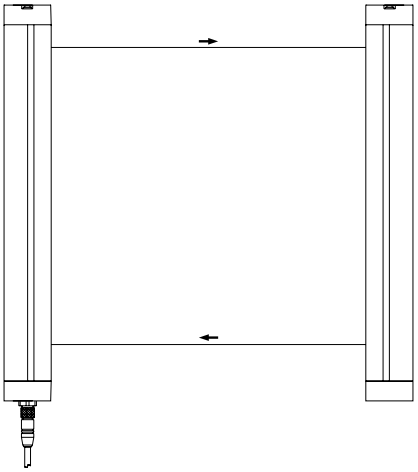
Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 4
Enclosure:	aluminium
Enclosure dimensions:	Ø 49 mm
Deflecting mirror:	50 x 50 x 606 mm
Connection:	Connector plug M12, 8-pole
Max. cable length:	100 m / 1 Ω
Protection class:	IP67 to EN 60529
Response time:	10 ms
Detection sensitivity (Resolution):	500 mm
Protection field height:	500 mm
Protection field width, Range:	0.3 m ... 7 m
Start/restart interlock:	Integrated
Contactor control:	Integrated
Light emission wavelength:	880 nm (infrared)
U_e:	24 VDC ± 10%
Safety outputs:	2 x PNP, 500 mA
Power consumption:	10 W
Data interface:	-
Status and diagnostics:	LED display
Ambient temperature:	−10 °C … +50 °C
Storage and transport temperature:	−20 °C … +70 °C

Classification:

Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to e
Category:	up to 4
PFH-value:	7.42 x 10^{-9}/h
SIL:	up to 3
Service life:	20 years

Technical data



Approvals

TÜV cULus CE

Ordering details

SLG 422-P-E/R0500-02-RF
ULS-P-0501

Note

Mounting brackets are included in the delivery.

Note:
Converter for the parametrization NSR 0801

Ordering details

Connector:
Female connector M12, 8-pole straight

cable length 5 m	**101207728**
cable length 10 m	**101207729**
cable length 20 m	**101207730**

SLC 430

- **Safety light curtain**
- Type 4 to IEC/EN 61496-1, -2
- Resolution 30 mm
- Protection field heights 236 mm ... 1804 mm
- Slim design, size 12 x 20 mm
- Integrated start/restart interlock
- Integrated contactor control
- Range 0.3 m ... 3.5 m*
- Status display
- Protection class IP65

NSR-0605

Enclosure dimensions: 240 x 160 mm

Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 4 in combination with evaluation unit NSR-0605
Enclosure:	aluminium
Enclosure dimensions:	12 x 20 mm
Connection:	Connector plug M12, 4-pole
Max. cable length:	100 m / 1 Ω
Protection class:	IP65 to EN 60529
Response time including relay output:	50 ms
Detection sensitivity (Resolution):	30 mm
Protection field height:	236 ... 1804 mm
Protection field width, Range*:	0.3 m ... 3.5 m
Start/restart interlock:	Integrated
Contactor control:	Integrated
Light emission wavelength:	880 nm (infrared)
U_e:	22 ... 30 VDC 18 ... 25 VAC
Power consumption:	8 W

System:

Data interface:	RS 485
Status and diagnostics:	LED display
Ambient temperature:	0 °C … +50 °C
Storage and transport temperature:	−10 °C … +70 °C
Safety outputs:	2 x Relay contact 250 V / 4 A
Signalling output:	1 x Relay contact 42 V / 4 A

Classification:

Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to e
Category:	up to 4
PFH-value:	1.26 x 10^{-8}/h
SIL:	up to 3
Service life:	20 years

Approvals

TÜV cSPus CE

Ordering details

SLC 430-E/R①-30-RF-SYS

No.	Option	Description
①	xxxx	Protected heights (mm) available lengths: 0236, 0460, 0684, 0908, 1132, 1356, 1580, 1804

Note:
* Range up to 5 m upon request

Ordering details

Included in delivery:
- Emitter and receiver including mounting set
- Evaluation unit **NSR-0605**,
- Connector set (cable length 5 m) **101207718**

Ordering details

Connector:
Female connector M8, 4-pole straight
for emitter/receiver

cable length 5 m	**101207718**
cable length 10 m	**101207719**

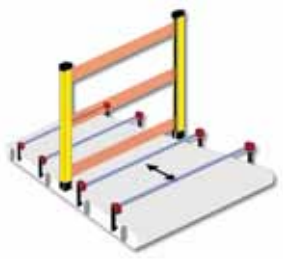
Safety light curtains with integrated muting-, blanking- and Cyclic-function

System features:

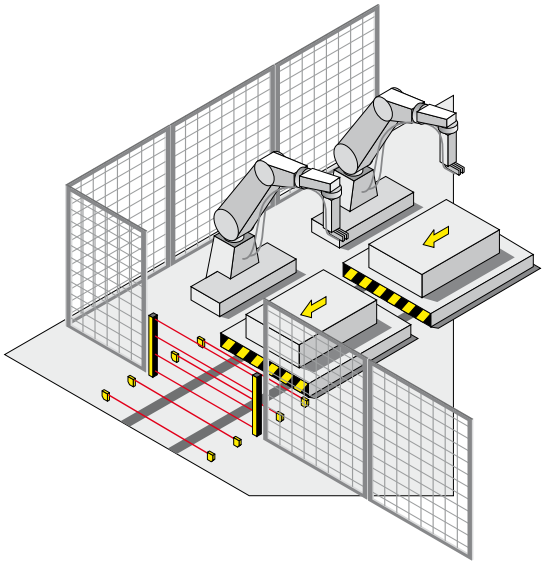
- Type 4 to IEC 61496
- Integrated muting function
- Muting sensors can be directly connected
- Integrated override function
- Integrated cyclic operation function
- Diagnostics display
- Optical synchronisation
- Compact design
- Simple, flexible mounting and adjustment

SLC/SLG 425I

The SLC/SLG 415I is a system for universal use with integrated muting function. The M8 connectors allow a direct connection and flexible positioning of the different muting sensors (e.g. inductive, capacitive or optical sensors). In this way, a safe triggering of the muting function can be obtained for objects of different sizes. The additional integrated override function allows for a controlled restart of the machine to transport the accumulated material out of the protection field after a failure. The safety light curtains/grids with muting function enable a smooth and trouble-free material feeding (input and output), whilst offering a permanent protection of human life.

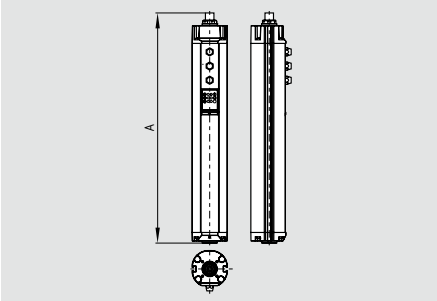


- Integrated muting function for material transport in 1 or 2 directions
- Connection of 2 or 4 external muting sensors
- Connection of different muting sensors
- Direct connection (M8) of the muting sensors to the SLC/SLG
- Muting controller for crosswise or parallel arrangement of the external sensors
- Adjustable muting time of 30 s, 90 min or 100 h
- Integrated override function
- Range up to 18 m



Safety light curtains with integrated muting-, blanking- and Cyclic-function

SLC 425I

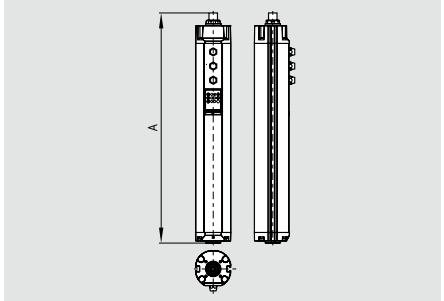


- **Safety light curtain**
- Type 4 to IEC/EN 61496-1, -2
- Resolution 14 and 30 mm
- Protection field heights 170 mm ... 1770 mm
- Integrated start/restart interlock
- Integrated contactor control
- Integrated muting and override function
- Integrated blanking function (fixed and mobile blanking)
- Cyclic operation (1 ... 8 Cycles)
- Range 0.3 ... 10 m
- Fail-safe transistor outputs
- Optical synchronisation
- Status display
- Different muting sequences can be parameterized
- Protection class IP67

Legend: A = Total lenght
Emitter:
A = 84.5 mm + Protection field height
Receiver:
A = 148.5 mm + Protection field height

Approvals

SLG 425I



- **Safety light grid**
- 2-, 3-, 4-beam light grid
- Protection field heights 500, 800 or 900 mm
- Range 0.3 ... 18 m

Legend: A = Total lenght
Emitter:
2-beam A = 804 mm
3 and 4-beam A = 1124 mm
Receiver:
2-beam A = 868 mm
3 and 4-beam A = 1188 mm

Approvals

Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 4
Enclosure:	aluminium
Enclosure dimensions:	Ø 49 mm
Connection:	Connector plug
- Emitter:	M12, 4-pole,
- Receiver:	M12, 8-pole,
- Muting sensors:	2 x connector plugs M8, 3-pole
- Muting lamp:	M8, 3-pole
Max. cable length:	100 m / 1 Ω
Protection class:	IP67 to EN 60529
Response time:	7 … 28.5 ms (Depends on length and resolution)
Detection sensitivity (Resolution):	14 and 30 mm
Protection field height:	
- Resolution 14 mm	170 ... 1450 mm
- Resolution 30 mm	170 ... 1770 mm
- 2-, 3-, 4-beam	500, 800, 900 mm
Protection field width, Range:	
- Resolution 14 mm	0.3 m ... 7 m
- Resolution 30 mm	0.3 m … 10 m
- 2-, 3-. 4-beam	0.3 m ... 18 m
Start/restart interlock:	Integrated
Contactor control:	Integrated
Muting and override function:	Integrated
Muting sensors:	2 or 4 external sensors
Light emission wavelength:	880 nm (infrared)
U_e:	24 VDC ± 10%
Safety outputs:	2 x PNP, 500 mA
Power consumption:	Emitter 4 W, Receiver 8 W
Data interface:	RS 485
Status and diagnostics:	LED display
Ambient temperature:	−10 °C … +50 °C
Storage and transport temperature:	−20 °C … +70 °C

Classification:

Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to e
Category:	up to 4
PFH-value:	7.42 x 10^{-9}/h
SIL:	up to 3
Service life:	20 years

Ordering details

SLC 425I-E/R①-②-RFBC

No.	Option	Description
①	xxxx	Protected heights (mm) available lengths: 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450, 1530*, 1610*, 1690*, 1770*
②	14, 30	Resolution 14 mm, 30 mm

Ordering details

SLG 425I-E/R①-RF

No.	Option	Description
①	Distance between outermost beams:	
	0500-02	500 mm, 2-beam
	0800-03	800 mm, 3-beam
	0900-04	900 mm, 4-beam

Mounting brackets are included in the delivery.

Note:
* only for resolution 30 mm

Converter for the parametrization NSR 0801

Ordering details

Connector:
Female connector M12, 4-pole straight
for emitter

cable length 5 m	**101207741**
cable length 10 m	**101207742**
cable length 20 m	**101207743**

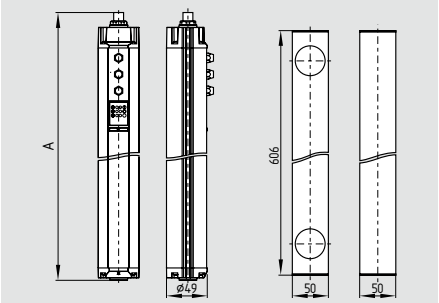
Female connector M12, 8-pole straight
for receiver

cable length 5 m	**101207728**
cable length 10 m	**101207729**
cable length 20 m	**101207730**

Connecting cabel for the muting sensors

M8, 3-pole to M12, 4-pole, 2 m	**101210312**

SLG 425-IP



- **Safety light grid**
- Emitter and receiver in one enclosure (retro reflector)
- Type 4 to IEC/EN 61496-1, -2
- Protection field heights 500 mm
- 2-beam light grid
- Integrated start/restart interlock
- Integrated muting and override function
- Range 0.3 m ... 7 m
- Fail-safe transistor outputs
- Status display
- Protection class IP67

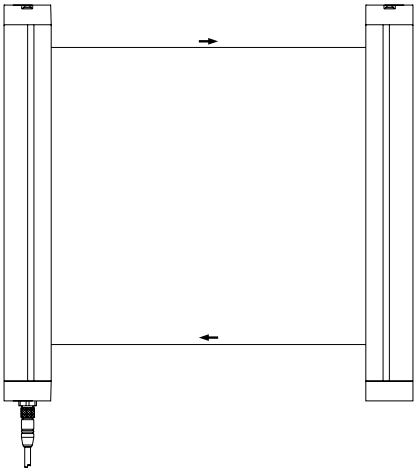
Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 4
Enclosure:	aluminium
Enclosure dimensions:	Ø 49 mm
Deflecting mirror:	50 x 50 x 606 mm
Connection:	Connector plug
- emitter/receiver:	M12, 8-pole
Max. cable length:	100 m / 1 Ω
Protection class:	IP67 to EN 60529
Response time:	15 ms
Detection sensitivity (Resolution):	500 mm
Protection field height:	500 mm
Protection field width, Range:	0.3 m ... 7 m
Start/restart interlock:	Integrated
Light emission wavelength:	880 nm (infrared)
U_e:	24 VDC ± 10%
Safety outputs:	2 x PNP, 500 mA
Power consumption:	10 W
Data interface:	RS 485
Status and diagnostics:	LED display
Ambient temperature:	−10 °C … +50 °C
Storage and transport temperature:	−20 °C … +70 °C

Classification:

Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to e
Category:	up to 4
PFH-value:	7.42 x 10^{-9}/h
SIL:	up to 3
Service life:	20 years

Technical data



Approvals

TÜV cULus CE

Ordering details

SLG 425IP-E/R0500-02-RF
ULS-P-0501

Note

Mounting brackets are included in the delivery.

Note
Converter for the parametrization NSR 0801

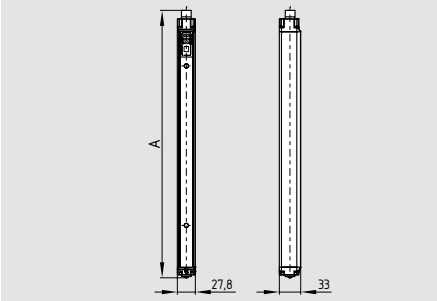
Ordering details

Connector:
Female connector M12, 8-pole straight

cable length 5 m	**101207728**
cable length 10 m	**101207729**
cable length 20 m	**101207730**

Safety light curtains with integrated diagnostics and parameter setting

SLC 440



- **Safety light curtain**
- Type 4 to EN 61496-1, CLC/TS 61496-2
- Resolution 14 and 30 mm
- Protection field heights 170 mm ... 1770 mm
- Integrated start/restart interlock
- Integrated contactor control
- Integrated blanking function (fixed and mobile blanking)
- Diagnostic and parametrization interface
- Range 0,3 m ... 10 m
- Fail-safe transistor outputs
- Optical synchronisation
- LED Status display, 7-segment display
- Protection class IP67

Legend: A = Total lenght
A = 81 mm + Protection field height

Approvals

TÜV cULus CE

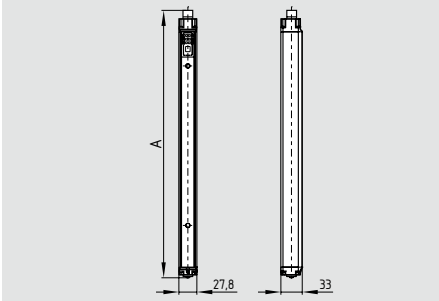
Ordering details

SLC 440-E/R①-②-01

No.	Option	Description
①	xxxx	Protected heights (mm) available lengths: 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290*, 1370*, 1450*, 1530*, 1610*, 1690*, 1770*
②	14	Resolution 14 mm with a range of 0.3 m ... 7 m
	30	Resolution 30 mm with a range of 0.3 m ... 10 m

-01 = integrated status indication (option)
* only for resolution 30 mm

SLG 440



- **Safety light grid**
- 2-, 3- or 4-beam light grid
- Range 0,3 ... 12 m

Legend: A = Total lenght
2-beam A = 610 mm
3-beam A = 910 mm
4-beam A = 1010 mm

Approvals

TÜV cULus CE

Ordering details

SLG 440-E/R①-01

No.	Option	Description
①	Distance between outermost beams:	
	0500-02	500 mm, 2-beam
	0800-03	800 mm, 3-beam
	0900-04	900 mm, 4-beam
		Range 0.3 … 12 m

-01 = integrated status indication (option)

Technical data

Standards:	EN 61496-1; CLC/TS 61496-2
Category:	Type 4
Enclosure:	aluminium
Enclosure dimensions:	27.8 x 33 mm
Connection:	Connector plug
- Emitter:	M12, 4-pole,
- Receiver:	M12, 8-pole
Max. cable length:	100 m / 1 Ω
Protection class:	IP67 to EN 60529
Response time:	10 … 27 ms (depends on length and resolution)
Detection sensitivity (Resolution):	14 and 30 mm
Protection field height:	
- Resolution 14 mm	170 ... 1210 mm
- Resolution 30 mm	170 ... 1770 mm
- 2-, 3-, 4-beam	500, 800, 900 mm
Protection field width, Range:	
- Resolution 14 mm	0.3 m ... 7 m
- Resolution 30 mm	0.3 m ... 10 m
- 2-, 3-, 4-beam	0.3 m ... 12 m
Start/restart interlock:	Integrated
Contactor control:	Integrated
Blanking function:	Integrated
Light emission wavelength:	880 nm (infrared)
U_e:	24 VDC ± 10%
Safety outputs:	2 x PNP, 250 mA
Power consumption:	Emitter 1,8 W, Receiver 3,8 W
Status and diagnostics:	LED-, 7-segment display
Ambient temperature:	−10 °C … +50 °C
Storage and transport temperature:	−25 °C … +70 °C
Classification:	
Standards:	EN ISO 13849-1; EN 62061
PL:	up to e
Category:	up to 4
PFH-value:	
- SLC 440	11,4 x 10^{-9} /h
- SLG 440	8,14 x 10^{-9} /h
SIL:	up to 3
Service life:	20 years

Ordering details

Connector:
Female connector M12, 4-pole straight
for emitter

cable length 5 m	**101207741**
cable length 10 m	**101207742**
cable length 20 m	**101207743**

Female connector M12, 8-pole straight
for receiver

cable length 5 m	**101207728**
cable length 10 m	**101207729**
cable length 20 m	**101207730**

Cable for the parametrization

cable length 1 m	**101217615**

Safety light curtains and safety light grids – accessories

System components

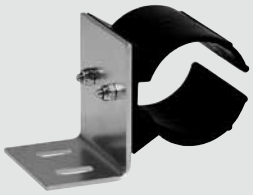
Programming cable KA-0974

Alignment kit EA-5

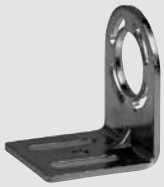
Muting lamp with wall bracket MK2

Mounting kit MS-1000 / MS 1072

System components



Mounting kit MS-1010



Mounting kit MS-1031 for ULS-A4

Mounting kit MS-1035

Mounting kit MS-1051

System components

Mounting kit MS-1073

Mounting kit MS-690

Vibration damper MSD-2 / MSD-4

Test rod PLS-01, PLS-02

Ordering details

Programming cable	
for SLC/SLG 440	**KA-0974**
Laser alignment tool	
for SLC / SLG 220	**EA5**
for SLC /SLG 420-425	**EA5**
Lighting element	
Muting lamp with LED block	**MK2**
Operating conditions indication	
Mounting kit for SLC /SLG 220	
4 x angle incl. screws	**MS-1000**
2 x angle incl. screws	**MS-1072**

Ordering details

Mounting kit for central fixation for SLC /SLG 220	
2 x angle	**MS-1010**
Mounting kit for ULS-A4	
2 x angle incl. screws	**MS-1031**
MS-1035 Mounting kit for SLC/SLG 420-425 (V4A)	
4 x angle incl. screws	**MS-1035**
Mounting kit for lateral fixation for SLC/SLG 420-425	
Consisting of 2 steel angles, 4 screws and 4 T-slot nuts	**MS-1051**

Ordering details

Mounting kit for deflecting mirror ULS-M	
2 x angle	**MS-1073**
Mounting kit for SLC 430	
2 x clamping profile	**MS-690**
Vibration damper	
8 x vibration damper for SLC/SLG 220	**MSD-2**
8 x vibration damper for SLC/SLG 420-425 and for SLC/SLG 440	**MSD-4**
Test rod	
for resolution 30 mm	**PLS-01**
for resolution 14 mm	**PLS-02**

Safety light curtains and safety light grids – accessories

System components

Bus converter NSR-0801

Bus converter NSR-0700

Deflecting mirror ULS-M

System components

Deflecting mirror ULS-A4, Ø 49 mm

Mounting stands MST

Muting Carrier Set

System components

Protective enclosure with deflecting mirror

Protective enclosure for light grids SG

Ordering details

Bus converter

Converter for the parametrization of SLC/SLG 420-425 USB 2.0 interface	**NSR 0801**
Converter for the parametrization of SLC / SLG 220 RS232 interface	**NSR 0700**

Deflecting mirror ULS-M incl. mounting angle

Mirror height 350 mm	**ULS-M-0350**
Mirror height 500 mm	**ULS-M-0500**
Mirror height 650 mm	**ULS-M-0650**
Mirror height 800 mm	**ULS-M-0800**
Mirror height 950 mm	**ULS-M-0950**
Mirror height 1250 mm	**ULS-M-1250**
Mirror height 1550 mm	**ULS-M-1550**
Mirror height 1700 mm	**ULS-M-1700**

Ordering details

Deflecting mirror ULS-A4 incl. mounting angle

Mirror height 200 mm	**ULS-A4-0200**
Mirror height 400 mm	**ULS-A4-0400**
Mirror height 550 mm	**ULS-A4-0550**
Mirror height 700 mm	**ULS-A4-0700**
Mirror height 850 mm	**ULS-A4-0850**
Mirror height 1000 mm	**ULS-A4-1000**

Mounting stands

Height including plinth 500 mm	**MST-0500**
Height including plinth 750 mm	**MST-0750**
Height including plinth 1000 mm	**MST-1000**
Height including plinth 1250 mm	**MST-1250**
Height including plinth 1500 mm	**MST-1500**
Height including plinth 1750 mm	**MST-1750**
Height including plinth 2000 mm	**MST-2000**

Muting Carrier Set

2 x aluminium profile	**MT-0400**

Ordering details

Protective enclosure with deflecting mirror

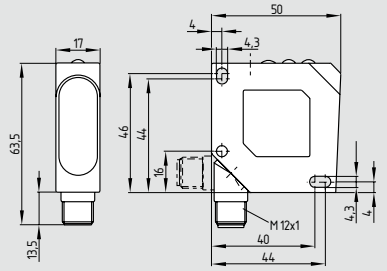
Version for 2-beam light grid	**ULS-ST2**
Version for 3-beam light grid	**ULS-ST3**
Version for 4-beam light grid	**ULS-ST4**

Protective enclosure for light grids SLG

Height 1334 mm hot-dip galvanised	**SG2**
Height 1334 mm RAL 1021	**SG4**

Reflection light sensor (Muting sensor)

LF 50-11P



- Range up to 5.5 m
- Connector plug can be rotated
- LED status display
- Protection class IP67
- Infrared light 660 nm
- Laser protection class 1
- Polarisation filter
- Antivalent switching outputs

Approvals

CE

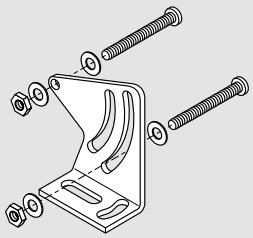
Technical data

Standards:	EN 60974-5-2
Laser protection class 1	EN 60825-1-10/03
Enclosure:	ABS
Enclosure dimensions:	50 x 50 x 17 mm
Connection:	Connector plug M12, 4-pole, can be rotated
Max. cable length:	100 m
Protection class:	IP67
Switching frequency:	2500 Hz
Range:	0 ... 5.5 m
Infrared laser light:	660 nm
U_e:	10 ... 30 VDC
Switching output:	2 x PNP 200 mA
Beam diameter:	5 ... 24 mm
LED status display:	soiling, switching condition and power on
Ambient temperature:	−20 °C ... +60 °C
Storage and transport temperature:	−20 °C … +80 °C

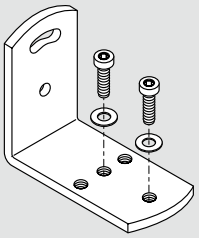
System components

Reflector R 51 x 61-L

Reflector R D83



Mounting angle BF 50



Mounting angle BF UNI 1

Ordering details

LF 50-11P

Note:
System components (cables, mounting angles, etc.) not included in the delivery.

Ordering details

Connector	
M12, 4-pole, without cable	**101208522**
M12, 4-pole, cable length 2 m	**101209937**
M12, 4-pole, cable length 5 m	**101209918**
Connecting cable KA-0965 to connect SLG 425I	
M12, 4-pole to M8, 3-pole, 2 m	**101210312**

Ordering details

Reflector	**R 51 x 61-L**
Reflector	**R D83**
Mounting angle	**BF 50**
Mounting angle universal	**BF UNI 1**

Safety monitoring modules for optoelectronic safety components

Besides the traditional safety relay controls, Schmersal offers CE-type tested safety controls or other safety-oriented bus systems (e.g. AS-i Safety at Work) for different levels of complexity and combination depths.
Which provide the user with many visualization and diagnostic possibilities.

SRB 301MA

- Suitable for signal processing of emergency stop command devices, interlocking devices, outputs connected to potentials and magnetic safety switches
- 1 or 2 channel control
- 3 safety contacts, STOP 0
- 1 additional acknowledgement output
- Reset function with trailing edge
- Optionally with short-circuit recognition (through switch)
- 4 LEDs to show operating conditions

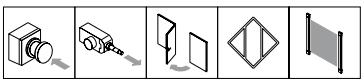
Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with reset button:	typ. 15 ms
Drop-out delay in case of emergency stop:	≤ 15 ms
Drop-out delay on „supply failure“:	typ. 80 ms
Rated operating voltage U_e:	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 500 mA, reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	1.8 W; 4.4 VA
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	230 VAC, 8 A ohmic (inductive in case of appropriate protective wiring); min. 10 V, 10 mA
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A DC-13: 24 V / 6 A
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	−25 °C … +60 °C
Storage and transport temperature:	−40 °C … +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.25 mm²
- max. cable section:	2.5 mm²
Weight:	250 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals

Ordering details

SRB 301MA



Classification

Safety parameters:

Standards:	EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:	STOP 0: up to e
Category:	STOP 0: up to 4
PFH value:	STOP 0: ≤ 2.00 x 10^{-8}/h
SIL:	STOP 0: up to 3
Mission time:	20 years

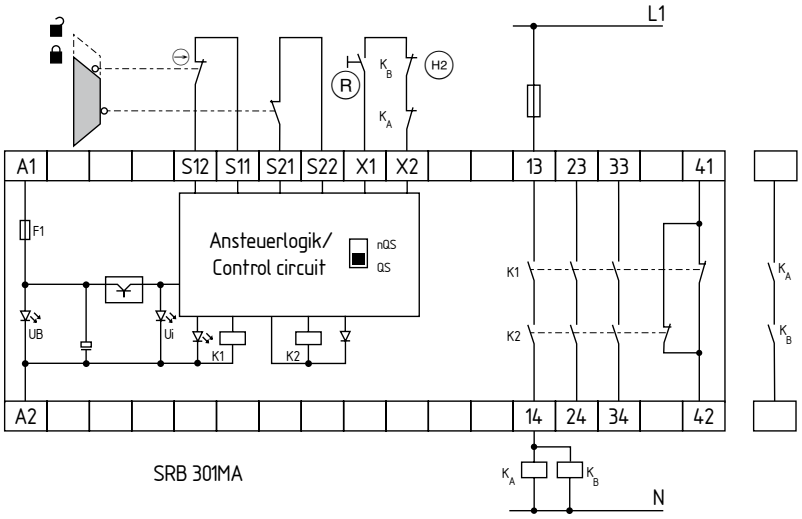
The PFH value of 2.00 x 10^{-8}/h applies to the combinations of contact load (current through enabling contacts) and number of switching cycles (n-op/y) mentioned in the table below. At 365 operating days per year and a 24-hours operation, this results in the below-mentioned switching cycle times (t-cycle) for the relay contacts.
Diverging applications upon request.

Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Note

- Monitors a guard door to PL e and category 4.
- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button Ⓡ and feedback circuit Ⓗ2.
- The feedback circuit monitors the position of the contactors Ka and Kb.
- Switch setting:
  The cross-wire short detection function (factory default) is programmed by means of the switch located underneath the front cover of the module:
  Position nQS (top):
  no cross-wire short protection, suitable for 1-channel applications and applications with outputs with potential in the control circuits.
  Position QS (bottom):
  cross-wire short protection, suitable for 2-channel applications without outputs with potential in the control circuits.
- For 1-channel control, connect NC contact to S11/S12 and bridge S12/S22 (QS-switch = nQS)
- Connect potential p-type outputs of safety light grids/curtains to S12/S22. The devices must have the same reference potential. (QS-switch = nQS)
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

SRB 301MC

- Suitable for signal processing of emergency stop command devices, interlocking devices, outputs connected to potentials and magnetic safety switches
- 1 or 2 channel control
- 3 safety contacts, STOP 0
- 1 additional acknowledgement output
- Automatic reset function
- Optionally with short-circuit recognition (through switch)
- 4 LEDs to show operating conditions

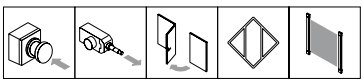
Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 100 ms
ON delay with reset button:	typ. 20 ms
Drop-out delay in case of emergency stop:	≤ 20 ms
Drop-out delay on „supply failure“:	typ. 80 ms
Rated operating voltage U_e:	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 500 mA, reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	2.0 W; 4.9 VA
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	230 VAC, 8 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A DC-13: 24 V / 6 A
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	−25 °C … +60 °C
Storage and transport temperature:	−40 °C … +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.25 mm²
- max. cable section:	2.5 mm²
Weight:	250 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals

Ordering details

SRB 301MC-24V



Classification

Safety parameters:	
Standards:	EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:	STOP 0: up to e
Category:	STOP 0: up to 4
PFH value:	STOP 0: ≤ 2.00 x 10^{-8}/h
SIL:	STOP 0: up to 3
Mission time:	20 years

The PFH value of 2.00 x 10^{-8}/h applies to the combinations of contact load (current through enabling contacts) and number of switching cycles (n-op/y) mentioned in the table below. At 365 operating days per year and a 24-hours operation, this results in the below-mentioned switching cycle times (t-cycle) for the relay contacts.
Diverging applications upon request.

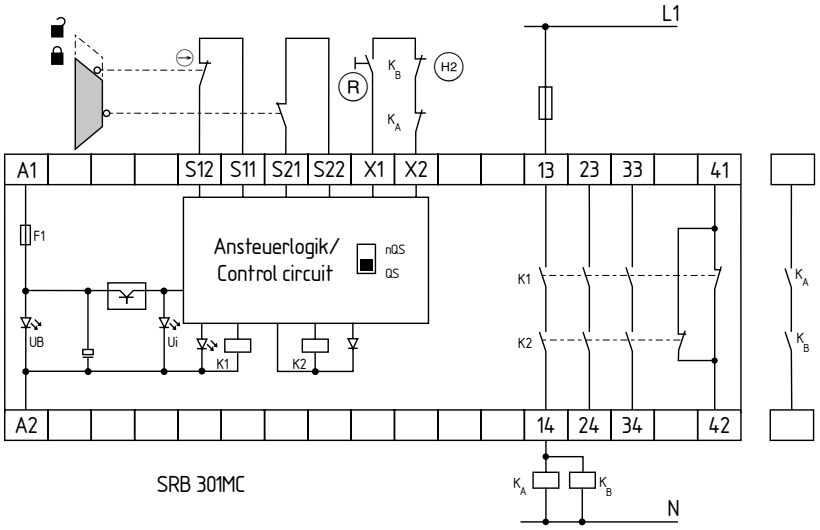
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Safety monitoring modules for optoelectronic safety components

Note

- Monitors a guard door to PL e and category 4.
- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button Ⓡ and feedback circuit Ⓗ2.
- The feedback circuit monitors the position of the contactors Ka and Kb.
- Switch setting:
  The cross-wire short detection function (factory default) is programmed by means of the switch located underneath the front cover of the module:
  Position nQS (top):
  no cross-wire short protection, suitable for 1-channel applications and applications with outputs with potential in the control circuits.
  Position QS (bottom):
  cross-wire short protection, suitable for 2-channel applications without outputs with potential in the control circuits.
- For 1-channel control, connect NC contact to S11/S12 and bridge S12/S22 (QS-switch = nQS)
- Connect potential p-type outputs of safety light grids/curtains to S12/S22. The devices must have the same reference potential. (QS-switch = nQS)
- Automatic start:
  The automatic start is programmed by connecting the feedback circuit to the terminals X1/X2. If the feedback circuit is not required, establish a bridge.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Glossary

Definitions and terms:

Start interlock:
A device preventing the automatic release and therefore the automatic machine start when the power supply of the AOPD is switched on or interrupted and switched on again.

AOPD:
The abbreviation of **A**ctive **O**ptoelectronic **P**rotective **D**evice.

Resolution:
The resolution or minimum object sensitivity represents the minimum size of an object that is detected in each part of the protection field.

Optoelectronic safety devices:
The here described are optoelectronic safety guards (AOPD), e.g. safety light barriers, safety light curtains and safety light grids as well as laser scanners and their corresponding safety relay modules

Type 2 acc. to EN 61496-1:
The Type 2 AOPD is a protective device, whose safety function is checked by means of regular tests. These devices must meet the requirements of Control Category 2 acc. to EN 954-1.

Type 4 acc. to EN 61496-1:
The Type 4 AOPD is a protective device, whose safety function is not affected by a failure or error in the system. These devices must meet the requirements of Control Category 4 acc. to EN 954-1.

Blanking:
In this configurable operation mode a safety light curtain blanks out a precisely defined area in the protection field. The operation mode. “Blanking“ allows objects to be present in the sending area with out deactivating the light curtain safety outputs. “Fixed Blanking“ is when a fixed set of adjacent light beams are rendered inactive for the purpose of entering an object and pans into the protective area. “Floating Blanking“ is when a set member (one or more) of adjacent beams is allowed to ignore the presence of an object and not deactivating the OSSDs of the light curtain.

Muting:
Muting is a temporary automatic suspension of a safeguarding function by safety-related parts of the control system during otherwise safe conditions in the operation of a machine. The safeguarding function is realized through 2 or 4 muting sensors, which can distinguish between persons and objects.
The suspension condition is signalled by means of a muting signal lamp.

OSSD:
Output **S**ignal **S**witching **D**evice of the AOPD (to EN 61496)

Protection field:
The protection zone is an invisible, two-dimensional light curtain consisting of infrared light beams, installed between the emitter and receiver unit. Depending on the chosen resolution (detection sensitivity) objects of a specific size intruding this light curtain will be detected.

Operating Range:
The operating range is the maximum distance that may exit between the light curtain´s ermitter and its receiver.

Protected height:
The protected height is a vertical area between the first and the last infrared light beam of an optoelectronic safety guard. (not the total housing lenght)
The beginning and the end of this area is marked with symbols on the SLC/SLG’s enclosure.

Restart interlock:
A device preventing the automatic restart of the machine, when the protection field is interrupted during a dangerous machine cycle or when the operating mode of the machine is set or changed.

Other publications

Companies

- Image brochure
- Product overview

Our updated image brochure includes "facts and figures" regarding the Schmersal Group. This brochure will introduce our business activities and our international production sites to you. And you will get a deeper insight in a medium-sized owner-managed company, which is successful for more than six decades already - according to the motto "Safe living, safe working".

The product overview gives you a concised overview how our range of approx. 18,000 safety switchgear is categorised. You will find the comprehensive description of this overview in our catalogues and product brochures (see below).

Products

Catalogues

- Safety technology
- Automation technology
- Explosion protection
- Elevator technology

Thematic brochures

- Electronic safety sensors and solenoid interlocks
- Safety Control PROTECT PSC
- AS-Interface Safety at Work
- Ex switchgear
- Control devices and indicator lights
- Safety relay modules PROTECT SRB

In the comprehensive catalogues, you will find our entire range of default switchgear, which the Schmersal Group offers for the individual businesses and fields of competence. All data can also be quickly found by means of intelligent search functions in our online catalogue at www.schmersal.net, where they can be download as well.

Our thematic brochures give you an overview of the principles, application possibilities and product range of the individual series and technologies.

Branches

- Food
- Woodworking
- Packaging
- Machine tools
- Elevators and Escalators

For a number of core industries of the machinery and plant construction, we have developed dedicated products and solutions, which do not only optimise the safety level, but the productivity of the machines as well.

We offer, for instance, different series of safety switchgear, which have been developped in accordance with the "Hygienic Design" principles; due to their protection class IP 69K, they can be cleaned using high-pressure jet steamers, a commonly used tool in many food-processing companies.

Services

- MRL News
- tec.nicum
- Safety Consulting

The "Safety Consulting" brochure gives you an overview of our worldwide services. Get informed about the service offer of our Safety Consultants, who can help you for instance with the CE Conformity Declaration process!

In our tec.nicum training centre, we regularly organise interesting seminars, lectures and workshops regarding machinery safety. Request our up-to-date programme!

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The Schmersal Group

For many years the privately owned Schmersal Group has been developing and manufacturing products to enhance occupational safety. What started out with the development and manufacture of a very wide variety of mechanical and non-contact switchgear has now become the world's largest range of safety systems and solutions for the protection of man and machine. Over 1,200 employees in more than 50 countries around the world are developing safety technology solutions in close cooperation with our customers, thus contributing to a safer world.

Motivated by the vision of a safe working environment, the Schmersal Group's engineers are constantly working on the development of new devices and systems for every imaginable application and requirement of the different industries. New safety concepts require new solutions and it is necessary to integrate new detection principles and to discover new paths for the transmission and evaluation of the information provided by these principles. Furthermore, the set of ever more complex standards, regulations and directives relating to machinery safety also requires a change in thinking from the manufacturers and users of machines.

These are the challenges which the Schmersal Group, in partnership with machinery manufacturers, is tackling and will continue to tackle in the future.

Product ranges

Safe switching and monitoring
- Guard door monitoring safety switches
- Command devices with safety function
- Tactile safety devices
- Optoelectronic safety devices

Safe signal processing
- Safety monitoring modules
- Safety controllers
- Safety bus systems

Automation
- Position detection
- Command and signalling devices

Industries

- Elevators and escalators
- Packaging
- Food
- Machine tools
- Wood working

Services

- Application advice
- CE conformity assessment
- Risk assessment in accordance with the Machinery Directive
- Stop time measurements
- Training courses

Competences

- Machine safety
- Automation
- Explosion protection
- Hygienic design