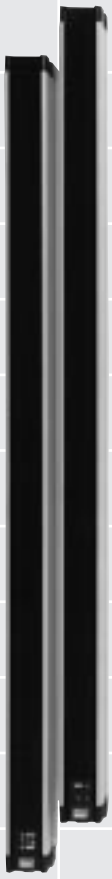
MSL
Multi-Beam Photoelectric Safety Switch

▶ ACCESS GUARDING IN DANGER AREAS ◀

▶ TRIED AND TESTED KNOW-HOW IN STATE-OF-THE-ART TECHNOLOGY ◀

▶ UNIVERSAL AND FUTURE-ORIENTED APPLICATIONS ◀



SICK

Contents

Approvals

EU Europe

EC prototype test conducted by

TÜV Rheinland
Am Grauen Stein
51105 Köln

CERTIFIED DIN EN ISO 9001 QUALITY SYSTEM
Reg. No. 19462-2

CE

Generally recognized technical regulations and the quality assurance system ISO 9000 are carefully applied during the development and production of SICK products.

1 General

MSL multi-beam photoelectric safety switches from SICK are non-contact safety devices with 2 to 35 beams. They function as a two unit through-beam system, comprising a sender and receiver unit and are suitable for guarding access and danger areas.
The MSL satisfies the requirements to pr EN 50 100, safety category 4. It is a self-monitoring, non-contact safety device.

The devices are designed for industrial applications and are characterized by:

- Tried and tested Know-how in state-of-the-art technology
- Adaptable to reliable PLC
- No wearing parts
- Practical size
- Robust, modular construction
- Universal application
- Simple installation
- Integrated evaluation function

For practical applications, the following specifications apply *(Fig. 1)*:

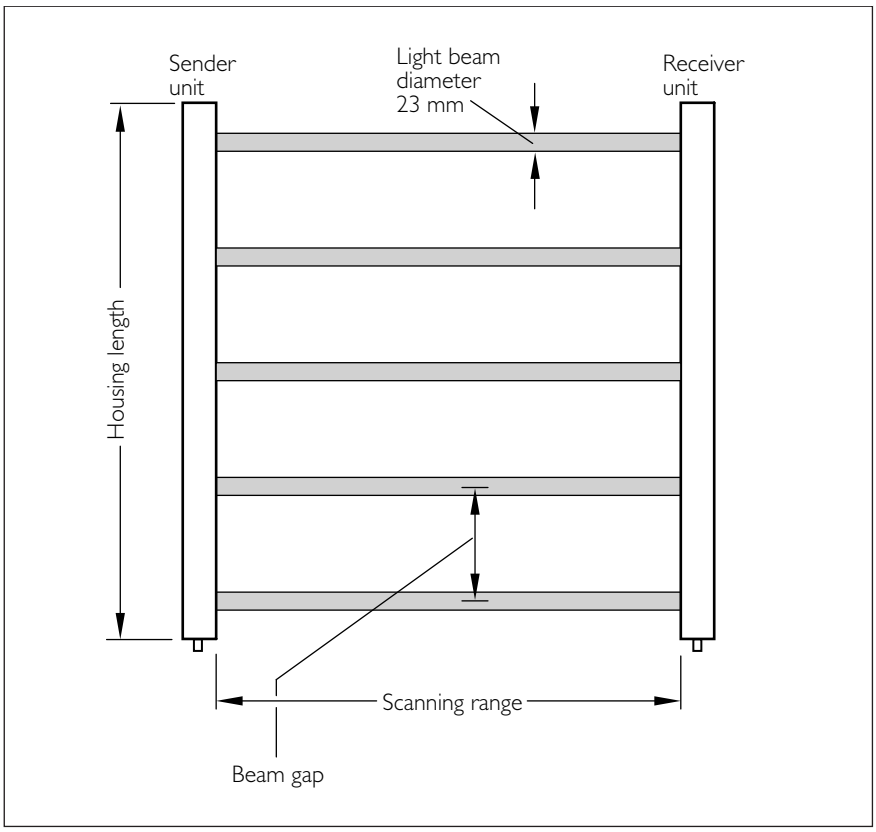


Fig. 1. Threshold values for an MSL multi-beam photoelectric safety switch

Maximum scanning range	20 or 70 m
Minimum beam gap	50 mm (resolution 73 mm)
Maximum beam gap	500 mm
Minimum number of beams	2 beams
Maximum number of beams	35 beams
Minimum housing length	300 mm
Maximum housing length	1800 mm
Minimum resolution	75 mm

1.1 Features

The special features of the MSL multi-beam photoelectric safety switch are as follows:

- Modern micro-processor technology and specially developed ICs (ASICs)
- Actively monitored semi-conductor outputs
- Connectable terminal chamber with PG connector or quick-disconnect plug
- Short response time (20 ms)
- Large signal reserve (factor 2)
- Optical synchronization of sender and receiver unit
- Multi-flank guarding possible by using corner mirrors
- Certified to pr EN 50 100
- EC prototype test
- Functions:
  External device monitoring
  Restart inhibit
- Muting as additional module

2 Device/System Construction

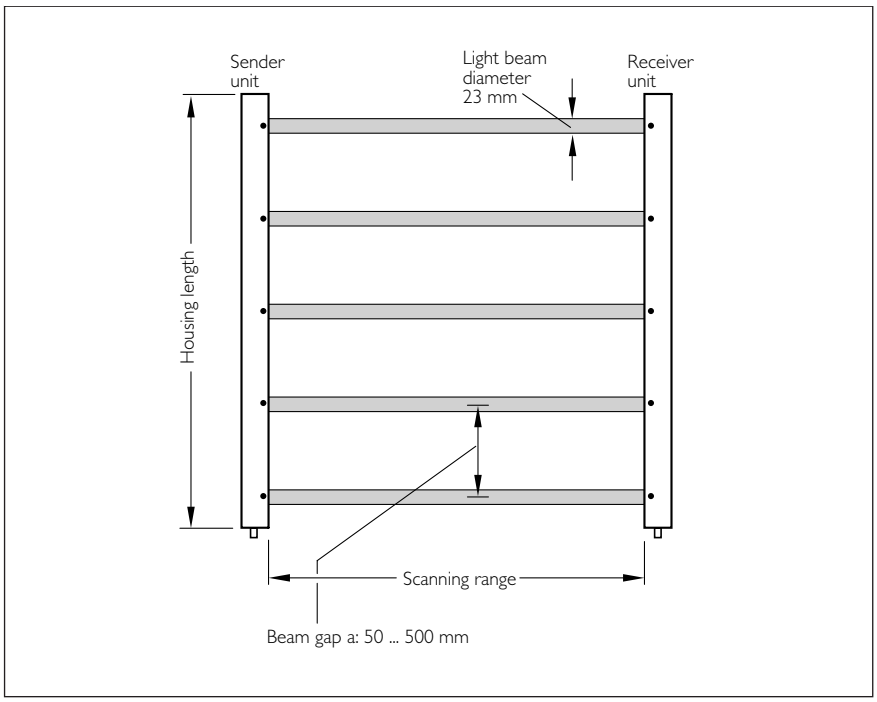


Fig. 2. System construction of MSL multi-beam photoelectric safety switch

The MSL has a modular design. All of the optical and electronic components are accommodated in a torsionally rigid yet slim-line housing. The MSL multi-beam photoelectric safety switch comprises

- MSLS sender unit and
- MSLE receiver unit

Both function with at least 2 and max. 35 light beams (*Fig. 2*). The individual light beams between the sender and receiver unit produce a protective field which is defined by the number of beams and the gap between them.
The position of the light beam is indicated by a marking on the housing.
The sender and receiver are synchronized optically, i.e. no electrical connections are required between the two components.

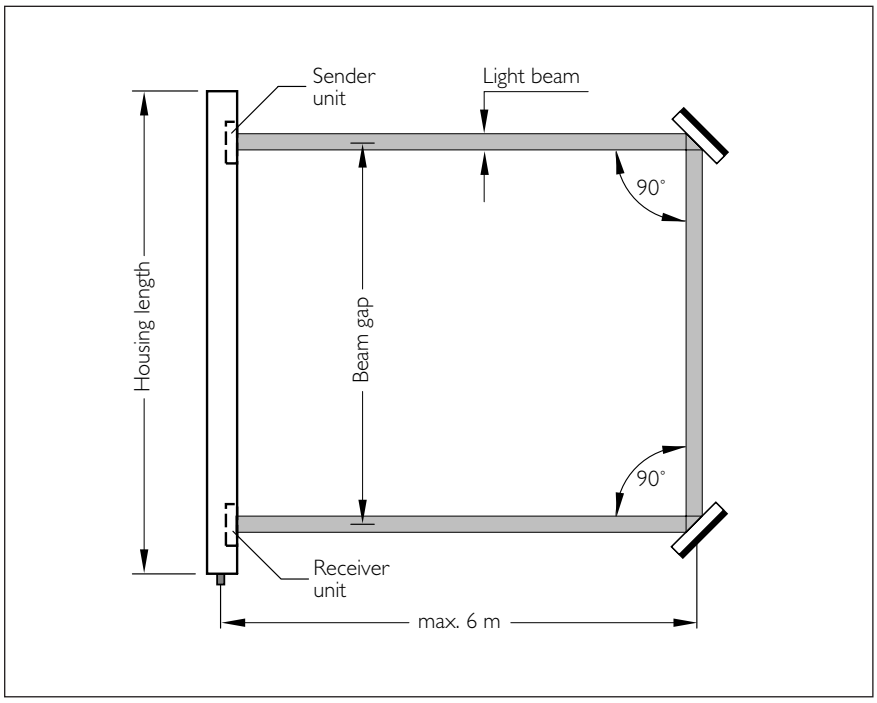


Fig. 3. System construction of MSLZ photoelectric safety switch

The MSL-Z variant ...

... of the MSL photoelectric safety switch is, like the MSL, a non-contact safety device – but with one active and one passive side. It is suitable for access guarding and hazardous zone guarding with passive mirror side. As with the MSL, the MSLZ meets the requirements of pr EN 50 100, safety category 4.
The active side contains the sender and receiver elements spaced to provide a beam gap of 500 mm *(Fig. 3)*. The passive side is produced using corner mirrors. The scanning range is the distance between the sender and receiver element. The following reference values apply to the MSLZ:

Gap:	
Active/passive side	7.5 m
Beam gap	500 mm

3 Functioning

Both the receiver and the sender are supplied with 24 V direct voltage.
The sender module light pulses are fed to the receiver module.

3.1 Status indicator

The respective operating states are indicated by indicators on the sender and receiver unit of the MSL (*Fig. 4*).

3.2 Diagnosis elements

The LEDs on the sender and receiver (or on the MSLZ) are also used for diagnosis of the respective operating status. See *Table 1a* (for senders **up to serial number 9652xxx**), *1b* (for senders **from serial number 9701xxx**) and *2*.

3.3 Diagnosis aids

The indicators on the sender and receiver unit enable rapid troubelshooting for the Service department.

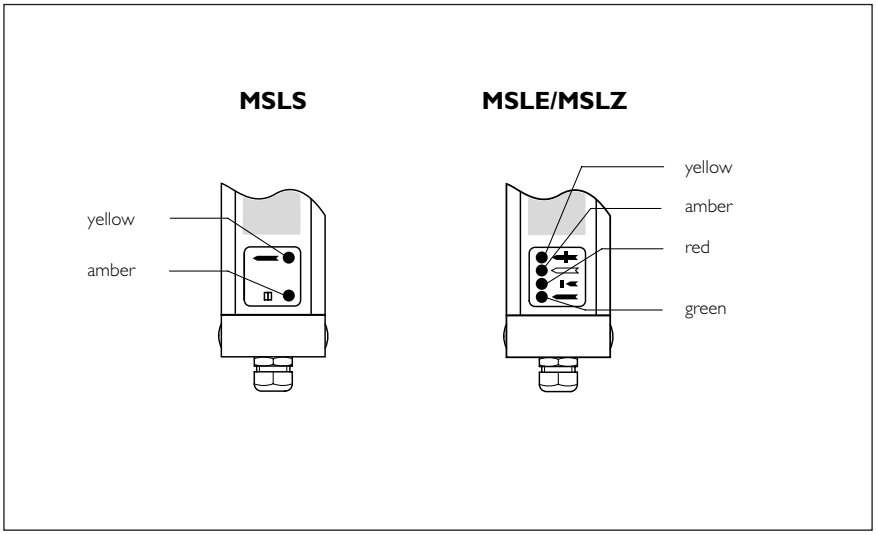


Fig. 4. Indicators on the sender and receiver unit of the MSL multi-beam photoelectric safety switch

Amber	Yellow	Function / cause
Lights up		Operating voltage applied
	Lights up	Sender active
	Does not light up	MCC test; lockout

Tab. 1a. LEDs on the sender: up to serial number 9652xxx

Amber	Yellow	Function / cause
Lights up		Operating voltage applied
Flashes (8/s)	Flashes (8/s)	Lockout: sender
	Flashes (1/s)	MCC test
	Lights up	Sender active, range 15…70 m
	Yellow out	Sender active, range 0.5…20 m

Tab. 1b. LEDs on the sender: from serial number 9701xxx

Mode				Function / Cause
Green	Red	Amber	Yellow	
Continuous				Light beam free and outputs active
	Continuous			Light beam broken and outputs inactive
	Continuous		Flash 1/s	Actuate command unit
	Continuous	Flash 2/s	Flash 2/s	Lockout: contacts released

Tab. 2. Indicators on the receiver unit or on the MSLZ

4 Applications and Operating Conditions

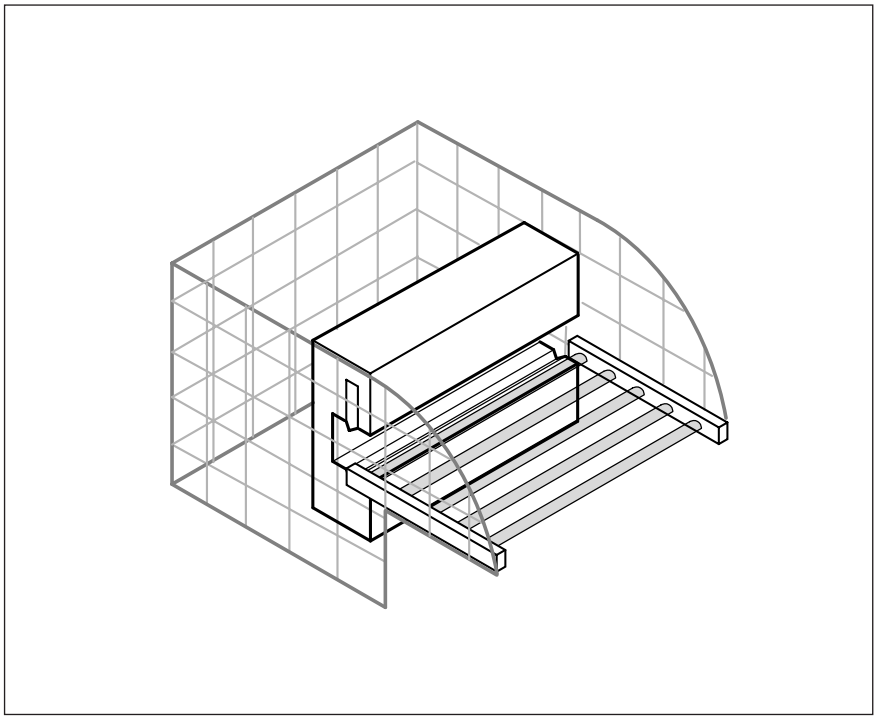


Fig. 5. Access guarding with 5-beam MSL multi-beam photoelectric safety switch

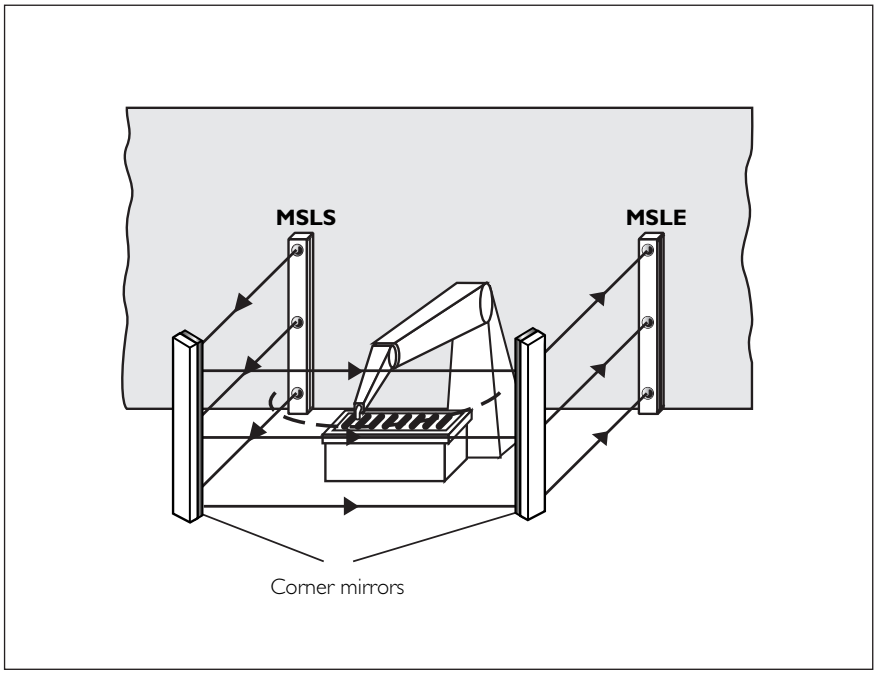


Fig. 6. MSL three-beam multi-beam photoelectric safety switch to guard access to robot

4.1 Applications

The MSL multi-beam photoelectric safety switch is used to monitor and guard access to danger areas.

Typical applications are:

- Hazardous zone guarding (*Fig. 5*)
- Access guarding for processing centers (*Fig. 6*), punch and stacking machines, palletization systems, and paving machines

4.2 Operating conditions

The protective function of the MSL can only be provided if the following requirements are satisfied:

- It must be possible to influence control of the machine or system electrically (MC = machine tool).
- It must be possible to stop the hazardous motion of the machine at any time.
- The MSL must be configured in such a way that entering the hazardous zone breaks at least one light beams.

Shutdown can only be ensured if the full diameter of the light beam (23 mm) is broken.
Release is only possible by reversing the restart inhibit (RES) using a command unit.
The command unit must be configured in such a way that it cannot be actuated from within the hazardous zone.

The MSL must be positioned so that, when the light beams are broken, the point of operation can only be reached when the danger status of the PT is lifted.
The prerequisite for this is that a safety distance is maintained between the light beams and the nearest point of operation. This safety distance is determined according to pr EN 999 (see *5.2 Safety gap to point of operation*).

Personnel located within the danger area but outside the protective field are not detected. Therefore, it must be ensured that all dangerous states only exist if there are no personnel located within the danger area. Implementation and installation of the safety devices are subject to the official and legal regulations. These regulations vary according to the application.

4.3 Corner mirrors

By using the MSL and one corner mirror, it is possible to monitor two sides of a danger area. If two corner mirrors are used, it is possible to monitor three sides (*Fig. 7*). Each mirror reduces the scanning range by 10 m.

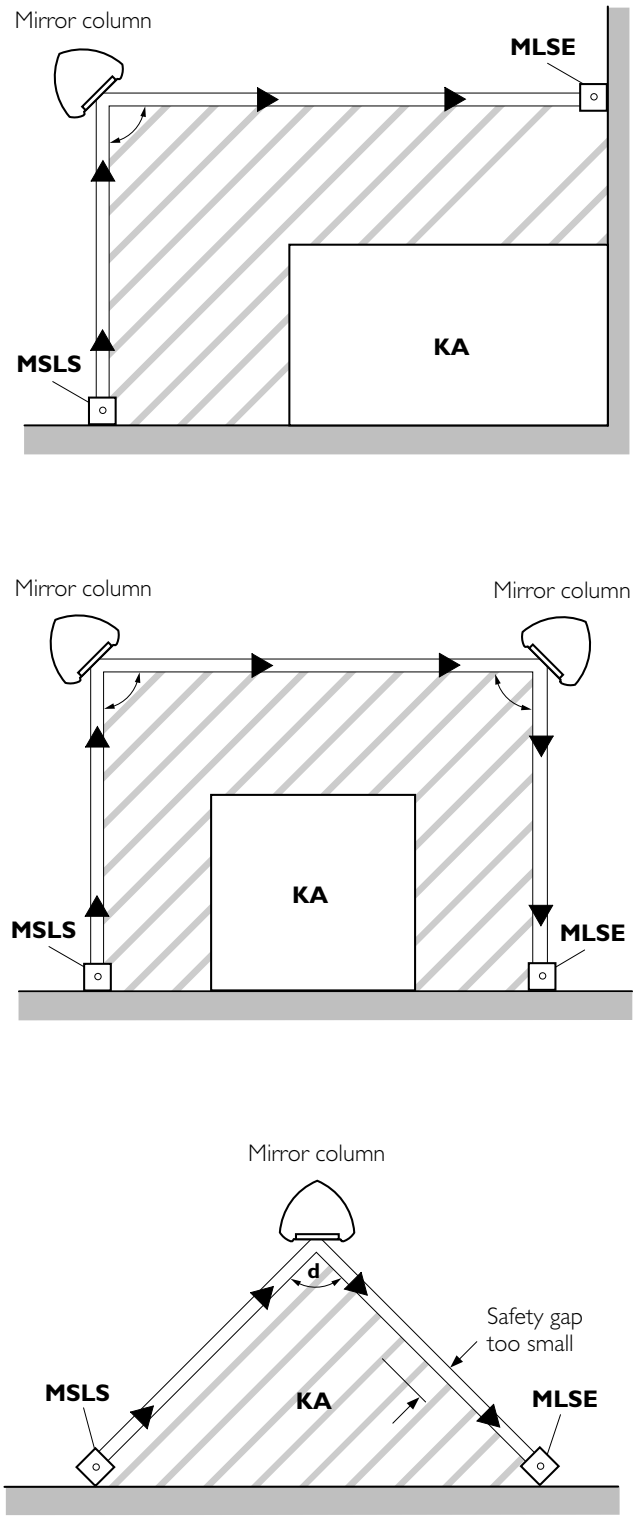


Fig. 7. Multi-flank access guarding of danger areas using MSL multi-beam photoelectric safety switch

5 Mechanical Configuration and Mounting

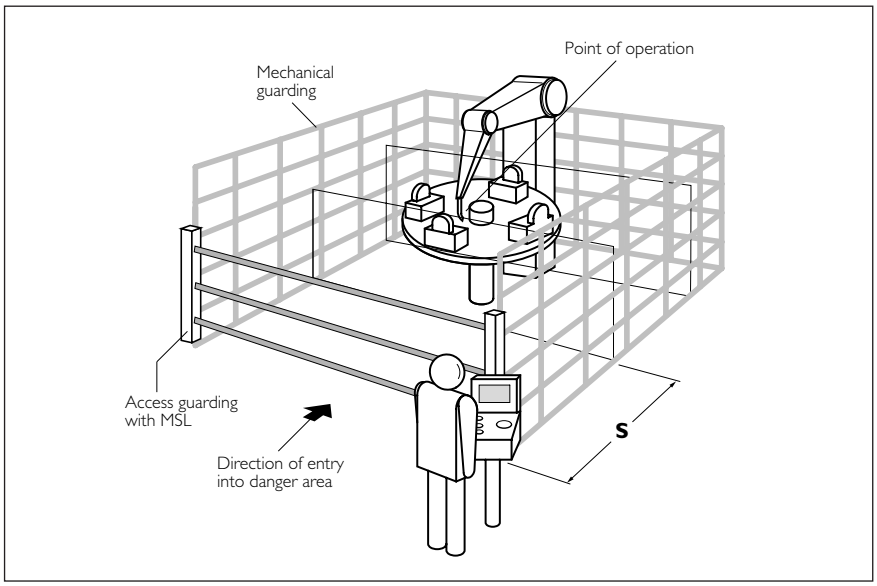


Fig. 8. Safety gap and height from point of operation for vertical multi-beam access guarding

5.1 General

The MSL can be operated in any installation position. The devices are installed so that the danger area can only be reached by breaking at least one beam. Selection of the MSL type (i.e. number of beams and distance between beams) is determined by the requirements of the machine and official regulations.

During risk analysis, it must be taken into account that it must not be possible to bypass the protective field by:

- creeping under the light beams
- reaching over the light beams
- reaching between two light beams
- climbing between two light beams

5.2 Safety gap to the point of operation

A safety gap must be maintained between the protective field and the point of operation. This gap is to ensure that the point of operation can only be entered if the hazardous motion of the machine has stopped (*Fig. 8*). The safety gap (to pr EN 775, 999, and 294) depends on:

- the machine stopping time,
- the response time of the safety device, and
- the approach speed

The stopping time is a measured variable of the machine.

5.2.1 General formula to determine the safety gap to pr EN 999

The safety gap S is calculated using the following formula:

$$S = (K \cdot T) + C$$

S Safey gap in mm
T Stopping time of machine + response time of active optoelectronic protective device (AOPD)
C Allowance for calculated safety gap in mm
K Approach speed

5.2.2 Safety gap for multi-beam access guarding to pr EN 999

Several individual beams are used to prevent the entire body or parts of the body that are larger than the minimum beam gap from entering the danger area. For access guarding, an approach speed of 1600 mm/s is used as the basis for the approach speed. C is 850 mm.

The minimum distance to the danger area is calculated using the following formula:

$$S = (1600\ \text{mm/s} \cdot T) + 850\ \text{mm}$$

Number of beams	Height above reference level, e.g. floor, in mm	Beam gap in mm
2	400, 900	500
3	300, 700, 1100	400
4	300, 600, 900, 1200	300

Tab 3. Number of beams, height above reference level, and beam gap

5.2.3 Safety gap for horizontal multi-beam danger area guarding to pr EN 999

The safety gap for horizontal zone guarding is calculated using the following formula:

S = (1600 mm/s • T) + (1200 mm – 0.4 • H)

H Height of protective field above the reference level, e.g. floor, in mm.

With this configuration, the height (H) of the protective field must not be greater than 1000 mm. During risk assessment, unintentional access by creeping under the light beams must also be taken into consideration. The minimum permissible height (H) of the protective field must be calculated as follows:

H = 15 (d – 50 mm)

d Resolution of safety device

The resolution is derived from beam gap + light beam section.

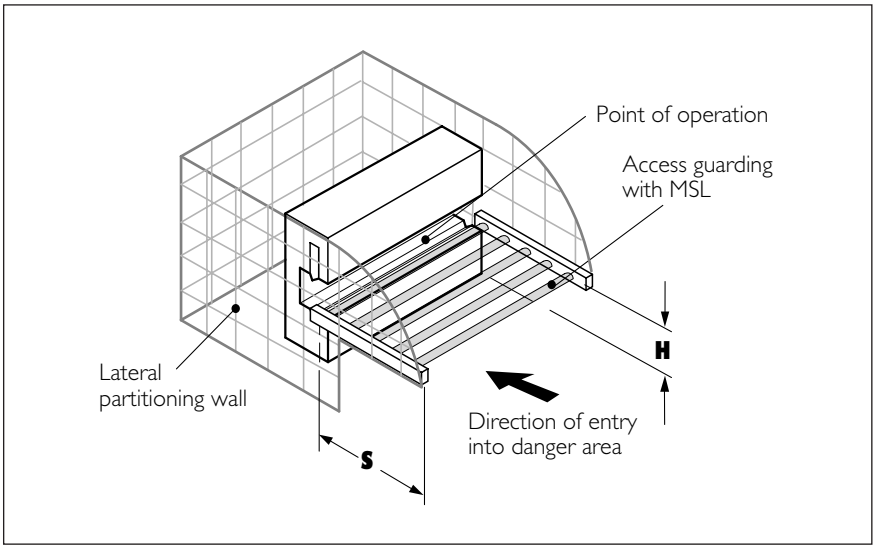


Fig. 9. Safety gap S and height H for hazardous zone guarding

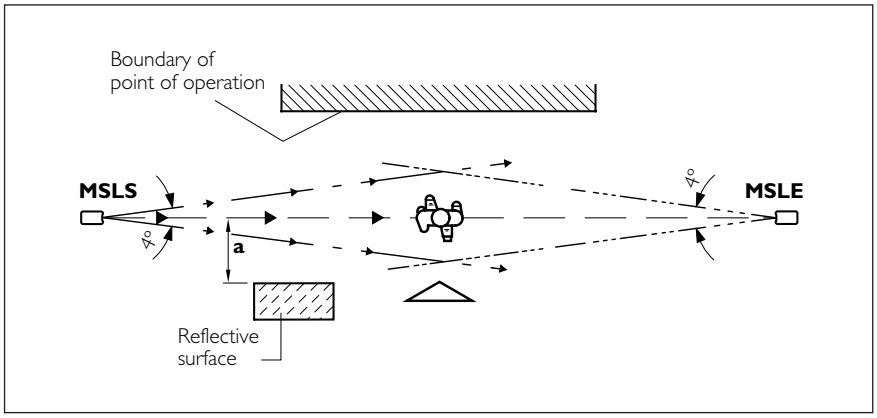


Fig. 10. Correctly installed, correctly aligned, no deflection

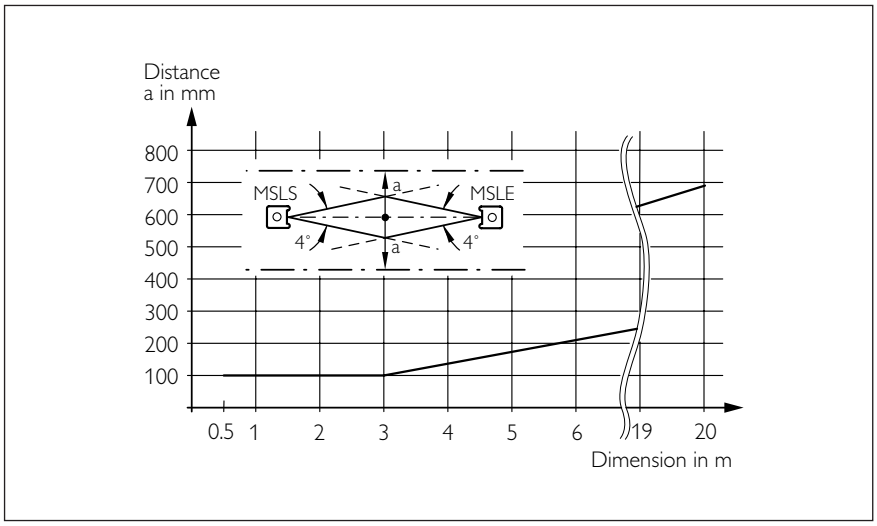


Fig. 11. Required distance a according to the distance between the sender and receiver unit

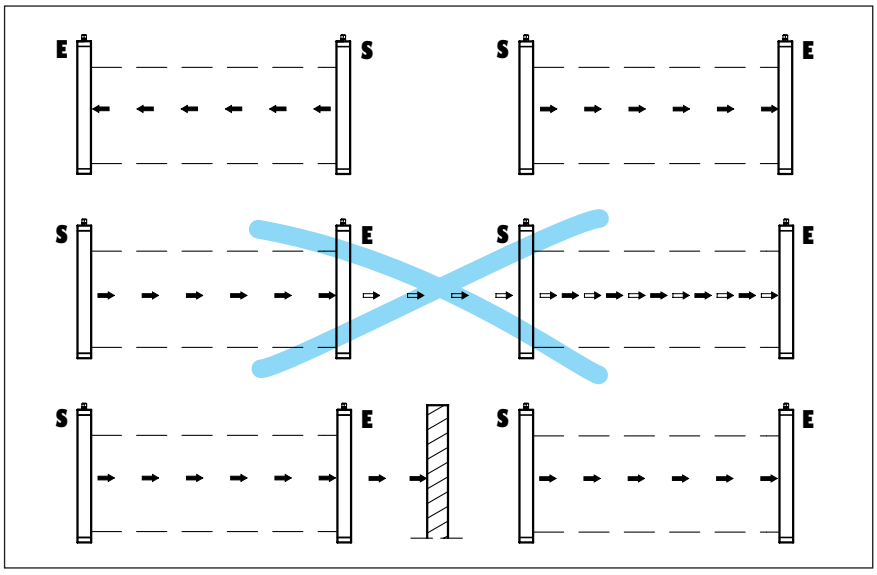


Fig. 12. Installation of two MSL systems in series: with different beam directions (above), with wall between two systems (below)

5.3 Distance to reflective surfaces

Reflective surfaces within the sender and receiver may cause deflection resulting in obstacles not being detected. A minimum distance a must therefore be kept between the reflective objects and the optical axis (*Fig. 10*). The distance (a) depends on the dimension between the sender and receiver unit and on the alignment of the devices (*Fig. 11*).

5.4 Multiple guarding

If two MSL units are used per guarding system, it must be ensured that the two units cannot influence each other. Since the light beams diverge, their cross-section becomes greater as the distance between the MSLS and MSLE increases. The light beams from the sender unit may only be received by its accompanying receiver unit. To eliminate any mutual influence, it must be ensured that they are positioned correctly during installation (*Fig. 12*).

5.5 Mechanical mounting

4 sliding brackets with M5 thread are provided as standard fixtures to mechanically mount each sender and receiver unit. These sliding brackets are attached to the slot on the side of the housing.
Pivotting or shock-absorbing brackets are available as an optional extra on request (*Fig. 13*).
The sliding bracket can be used where no large mechanical tolerances have to be compensated. The pivoted bracket allows the sensor to be adjusted horizontally by ± 2°.
In addition, the brackets can also be used with recessed shock absorbers in order to reduce the stress caused by vibration. Sliding nuts in the housings are used to attach the bracket to the sender and receiver units.

Note

To prevent the photoelectric switch from being moved, the supports must be attached at a distance of 20 to 30 mm from the end caps.

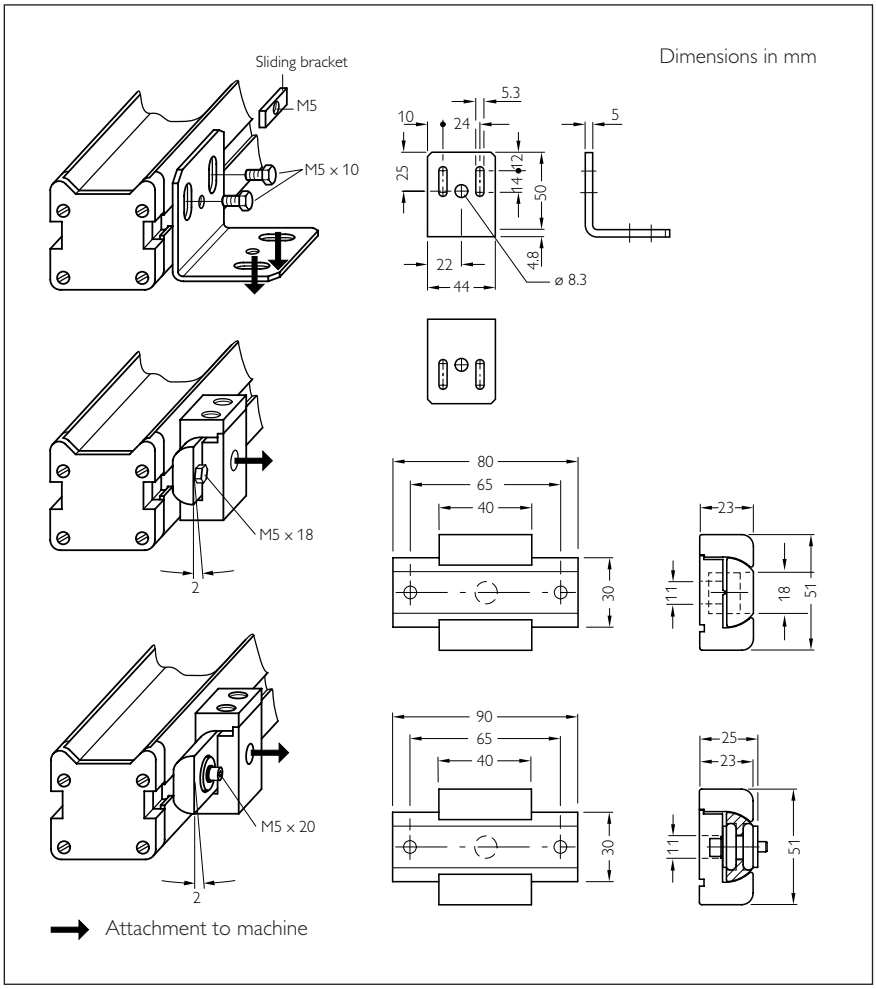


Fig. 13. Possibilities for mechanically mounting the MSL (top to bottom): mounting bracket, pivoted bracket, and bracket with shock absorption

5.6.1 Post 400

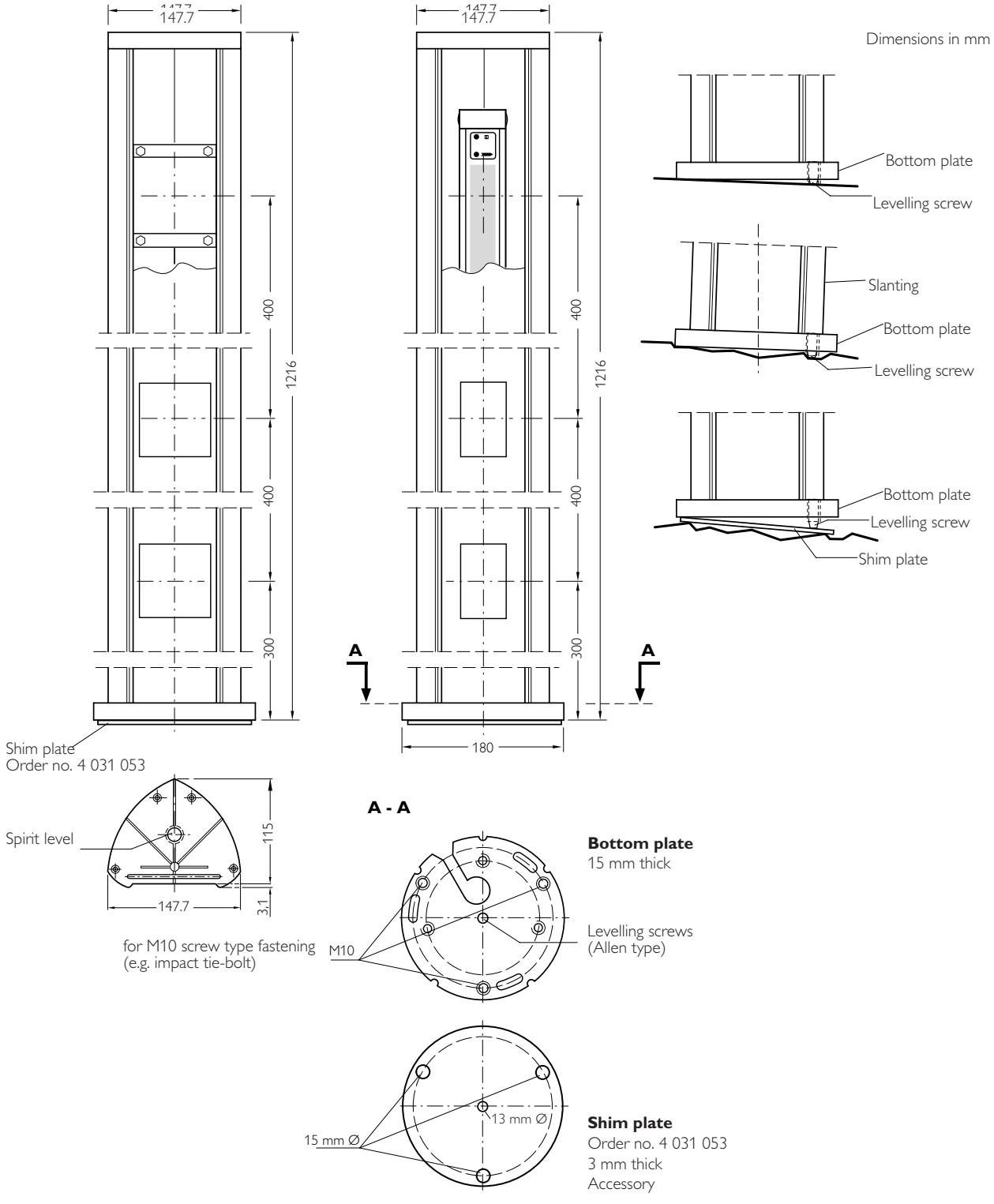


Fig. 14. Post 400: left: mirror column, right: housing column

5.6.2 Post 500

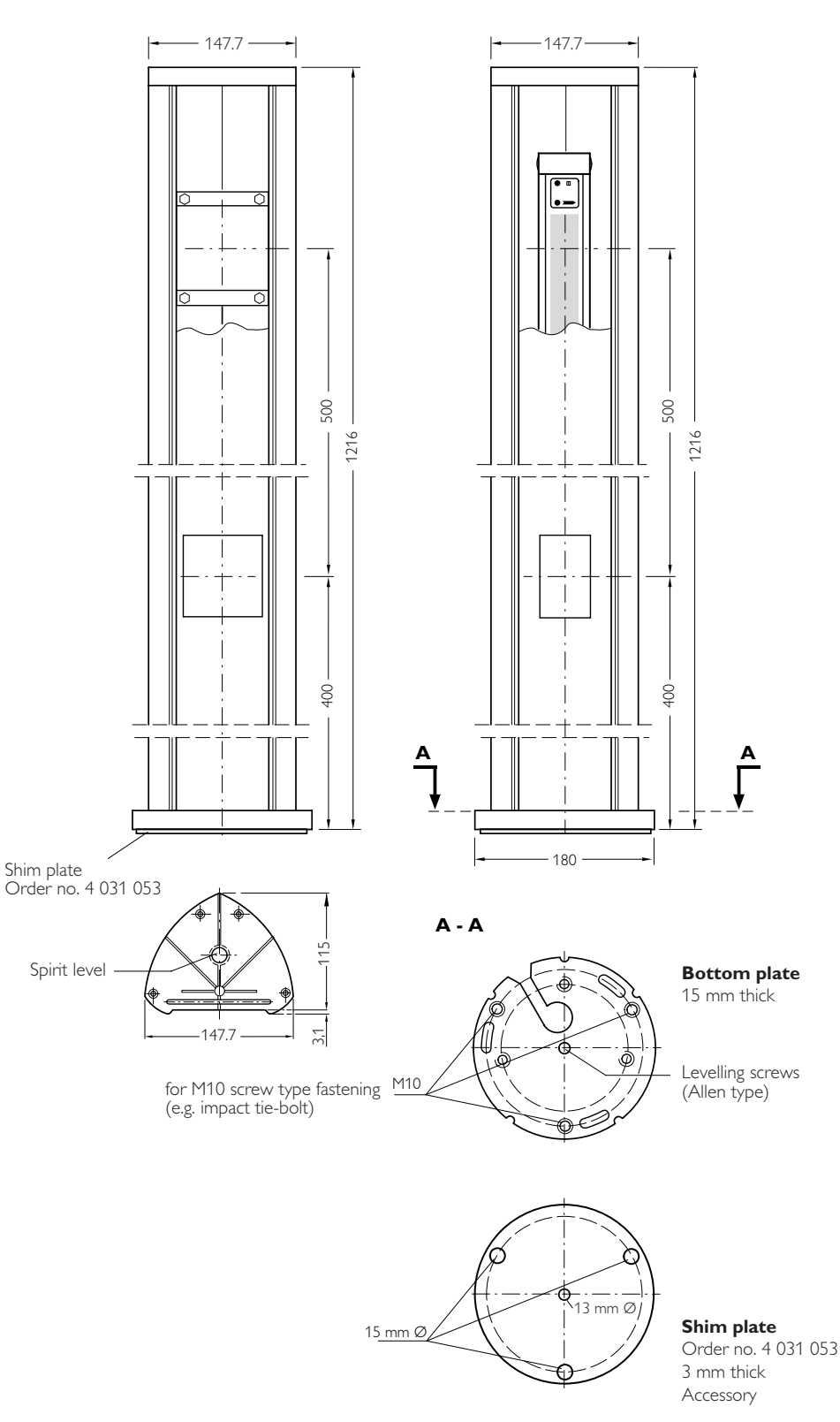


Fig. 15. Post 500: left: mirror column, right: housing column

5.6.3 Corner mirror PSK 45

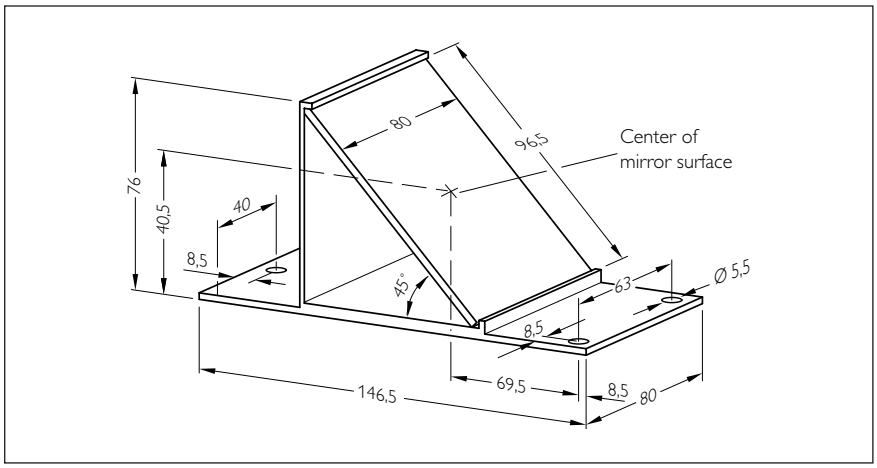


Fig. 16. Dimensional drawing of corner mirror PSK 45

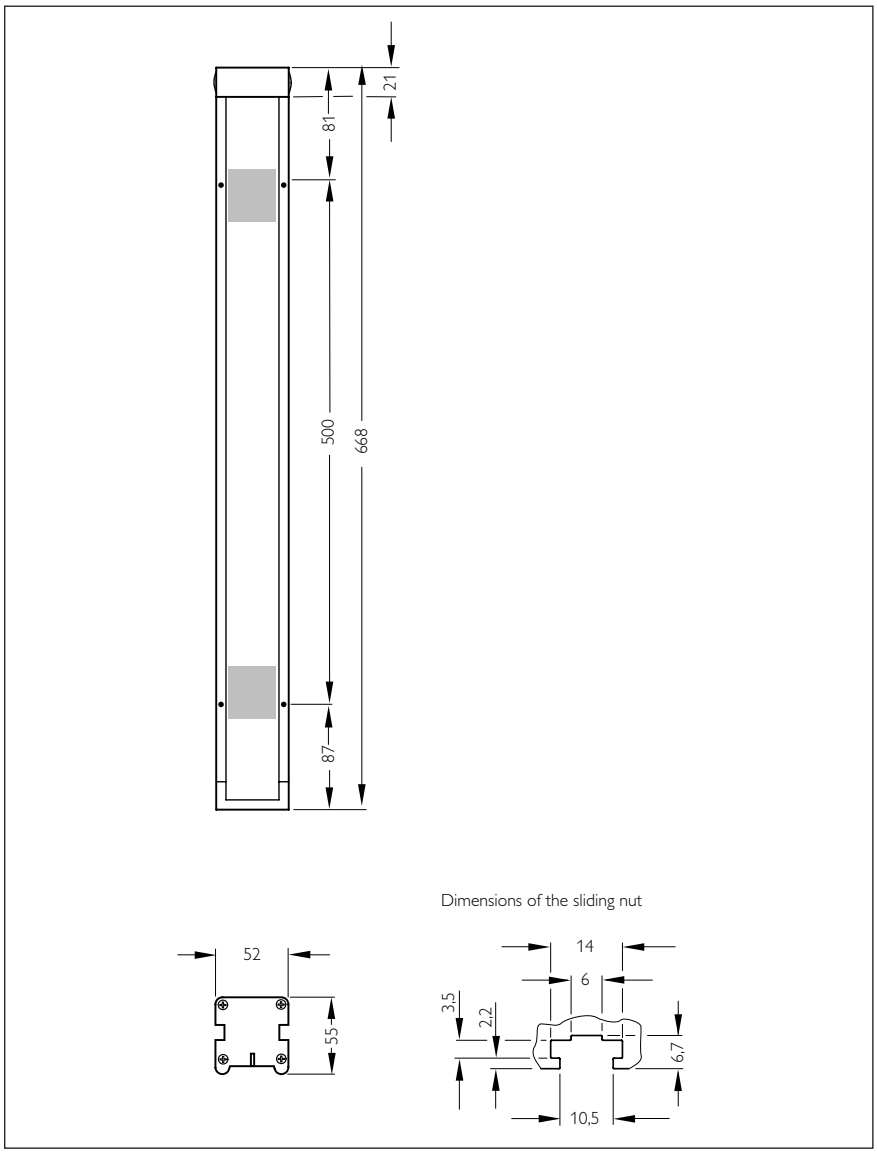


Fig. 17. Dimensional drawing of corner mirror PSZ

The corner mirror PSK 45 *(Fig. 16)* is unsuitable for mounting to columns. The order number 5 306 053 includes a mounting kit. The corner mirror PSZ is spezially designed as the passive element of the MSLZ *(Fig. 17)*. The mirrors are fitted in the MSLZ housing profile. The PSZ has the following advantages:

- nor mirror cleaning required (IP65 housing)
- simple alignment
- tolerates slight misalignment

6 Operating Modes

In the case of MSL multi-beam photoelectric safety switches, it is possible to select different operating modes at the device (depending on requirements).

6.1 Restart inhibit (restart switch)

- *without restart inhibit*:
  When the protective field has been broken and released again, the protective field is automatically reactivated without a command unit having to be actuated (e.g. start button), and the MC can continue its hazardous motion once the beam path is free.
  In this case, the restart inhibit must be an element of the MC's control system.
- *with restart inhibit*:
  When the protective field has been broken and released again, the outputs are only reactivated after a command unit has been actuated. The MC can then continue its hazardous motion once the light beam is free.

6.2 External device monitoring (EDM)

External device monitoring is a safety function which checks to ensure that the contacts and relays directly connected to the outputs are functioning correctly.

Deselecting external device monitoring

- If a reliable PLC is used
- If external device monitoring is used in the machine control system

Electrical connection of the receiver unit and the exact functional principle are described in *7.3.3 External device monitoring input*.

The voltage supply must be disconnected when the operating mode is changed.

6.3 Muting with additional MSM module

Transporting material to the production site without interrupting operating procedures is a problem often faced in automatic production processes. The photoelectric safety switch is not able to distinguish between material and personnel.
The muting circuit with its external sensors and additional module is a solution to this problem. Muting briefly deactivates the protective field provided by the photoelectric switch to allow objects to be transported into the danger area. The interaction of the photoelectric light switch, the muting sensors, and the muting controller in the additional module enable the system to make a simple distinction between personnel and transported objects, and this in turn ensures safety.
Typical applications for muting circuits are:

- access guarding for high-bay racking warehouses
- access guarding for palletization systems
- access guarding for welding systems
- access guarding for automatic assembly lines

The following can be used as muting sensors:

- photoelectric switches
- photoelectric proximity switches
- inductive sensors
- mechanical switches

Detailed functional and connection information can be found in the technical description for muting.

7 Electrical Installation

7.1 General

Connection of the MSL components is simple. The sender and receiver units are connected directly to the machine controller. No other evaluation units are required.

The length of the cables to the machine controller must not exceed 70 m. The exact requirements are listed in Tab. *10 Technical Data*.

The sender unit is connected to the machine controller using a 5-wire connection. The receiver unit is connected to the machine controller using an 8-wire connection. The maximum cable cross-section that can be used is 1.5 mm^2 solid and 1 mm^2 with jacket. Both components have a plug-in terminal strip in the terminal chamber. Alternatively, the terminal chamber (end cap) is also available with prepared plug insert.
Both components are supplied with a direct voltage of 24 V DC (± 20 %).

In accordance with pr EN 60 204, the external power supply must bridge brief power failures lasting 20 ms (U_{min} = 18 V). Suitable power supply units are available from SICK as accessories (Siemens Series 6 EW 1).

Note:

The MSL must be de-energized before it is connected to the power supply or before the electrical connection is modified.

7.2 Sender unit

Fig. 18 shows the electrical connection diagram for the sender unit.

7.2.1 MCC test input

Testing allows the connected switching elements to be checked. The sender is switched off during testing.
An NC relay in the machine controller is connected to the test input (MCC = machine control contact). Testing is triggered with a min. tripping time of 75 ms (*Fig. 19*).
The machine controller must conduct the test when the machine is in a non-dangerous motion phase, otherwise the MC receives a shutdown signal.

Note
The MSL does not provide any protection during the test procedure.

7.2.2 Scanning range of the sender unit

- Sender scanning range 15 m ... 70 m:
  The connection diagram for sender units with this scanning range is shown right in Fig. 20.

Note
The jumper must be attached between 5 and 6 on the terminal strip (if the PG connector is used) or in the cable entry (if the Interconnectron plug is used).

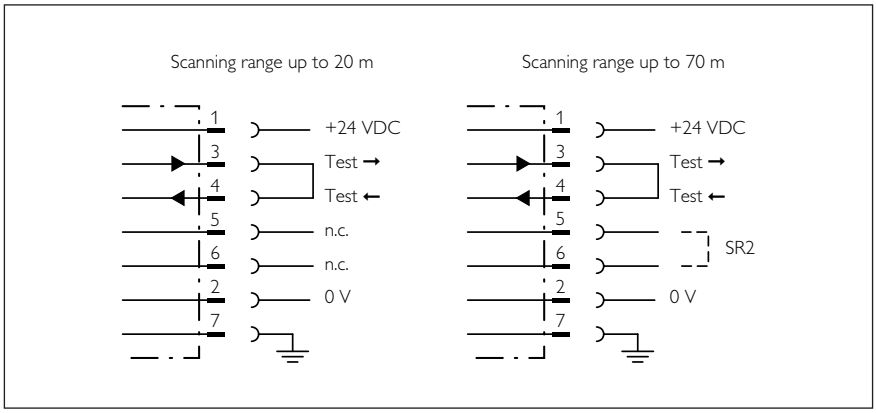


Fig. 18. Connection diagram for sender unit: scanning range up to 20 m (left), 70 m (right)

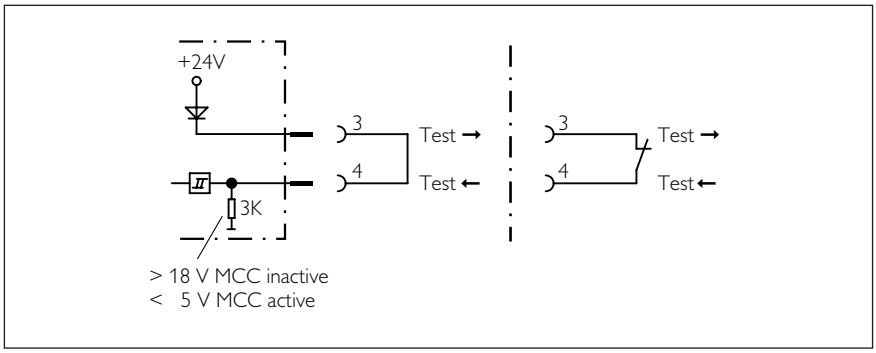


Fig. 19. Testing the MSL using the MCC test input

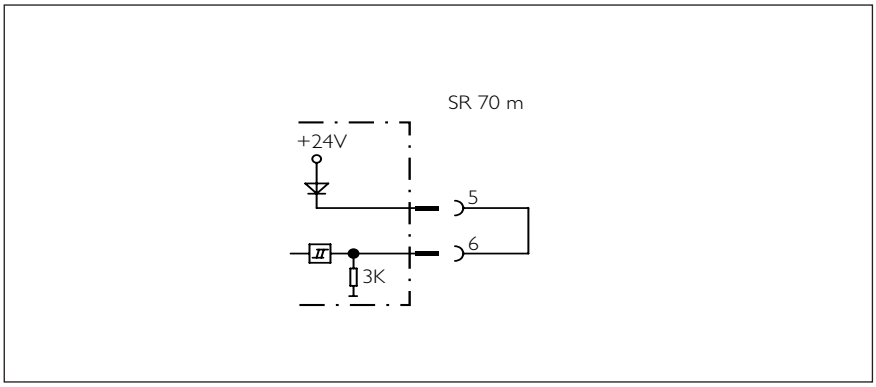


Fig. 20. MSL range switching: 70 m

7.3 Receiver unit

The electrical connection diagram for the receiver unit and MSLZ is shown in *Fig. 21*.

7.3.1 Switching output

Both outputs OSSD 1 and OSSD 2 are actively monitored PNP semi-conductor outputs. The outputs have a carrying capacity of max. 0.5 A and are not potential-free.
If the light beam is free, the two outputs are HIGH (active).
The output voltage U_a of both channels depends on the supply voltage U_V and the switched load and is at least:

$U_a = U_V - 2.5$ V

Note

Connection of the receiver outputs OSSD 1 and OSSD 2 (Fig. 23)

- An additional supply voltage must not be applied to the outputs
- Both output signals must be processed separately. They must not be connected in series or parallel.

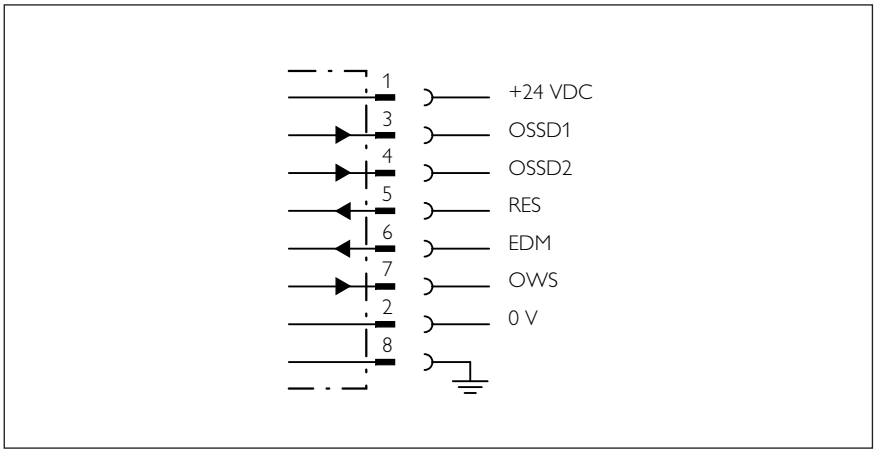


Fig. 21. Connection diagram for the receiver unit and MSLZ

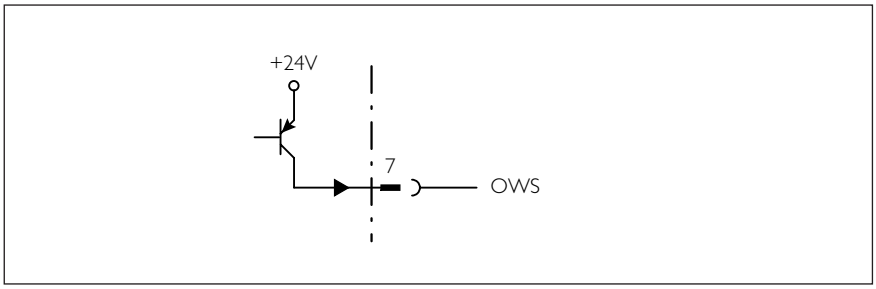


Fig. 22. Contamination output

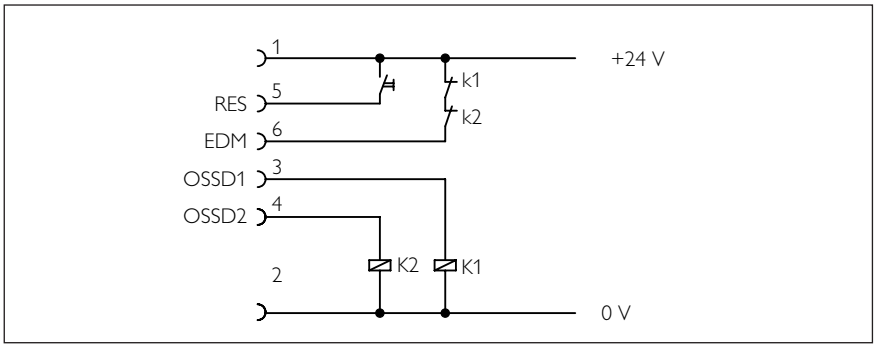


Fig. 23. Connection diagram for command unit and contacts with external device monitoring

7.3.2 Contamination output (OWS)

The contamination output (OWS) is a PNP semi-conductor output which is HIGH (active) if the light beam is free and contamination is present (no signal reserve) (*Fig. 22*).
The contamination output is neither potential-free nor fail-safe.
The OWS outputs of several MSLs can be connected together to *one* sensor switch or one PLC input.

Light grid contaminated:	
Voltage at output	high
Light grid not contaminated:	
Voltage at output	low
Output current	100 mA

7.3.3 Input for external device monitoring (EDM)

External device monitoring is used to check the switching elements (e.g. contacts) which are triggered by the sensor outputs. External device monitoring is performed whenever the light beam is broken before the MC restarts and begins its hazardous motion.
The outputs of the light grid and switching elements are HIGH (active) if the light beam is free.
If external device monitoring is selected as the operating mode using the DIP switches, the switching element contacts to be monitored are connected to the EDM input (*Fig. 23*).
EDM waits until the contacts have reached their normal position (+24 V) and then isolates the outputs OSSD 1 and OSSD 2 (HIGH (active) if light beam is free). This happens since the two NC contacts (k 1, k 2) must close if the switching elements (K 1, K 2) return to their normal position when the light beam is broken.

After 300 ms, the external device monitoring system waits until the switching elements become active. The input contacts k 1 and k 2 must then be open.

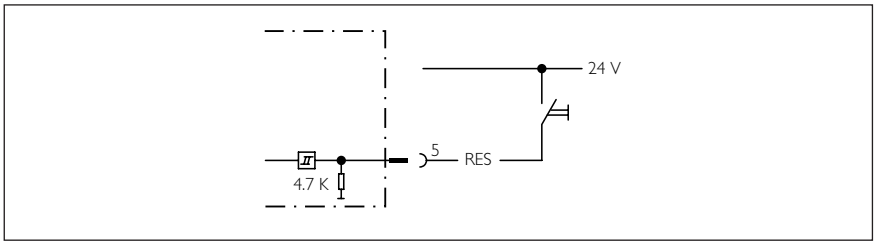


Fig. 24. Connection for the command unit at the receiver unit or MSLZ

7.3.4 Command unit input restart switch (RES)

If the operating mode with restart inhibit is selected (Chapter 6.2), an NO contact is connected to the + 24 V power supply at the command unit input (*Fig. 24*).
If the light beam is free, the yellow LED on the receiver flashes to indicate this: actuate command unit.
When the command unit is actuated and then released, the sensor activates the outputs OSSD 1 and OSSD 2 (green LED lights up on the receiver).

7.4 Typical circuits

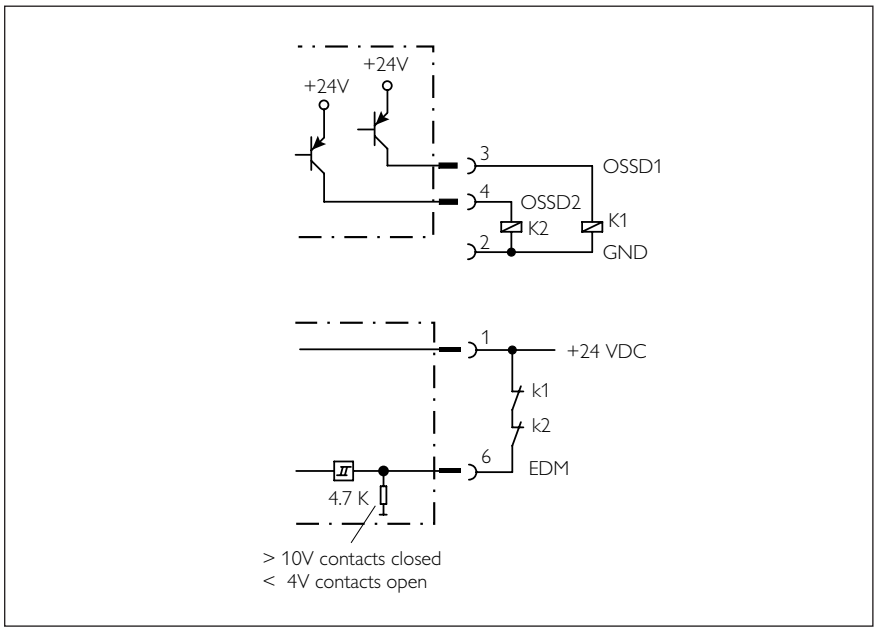


Fig. 25. Connection of contacts with external device monitoring

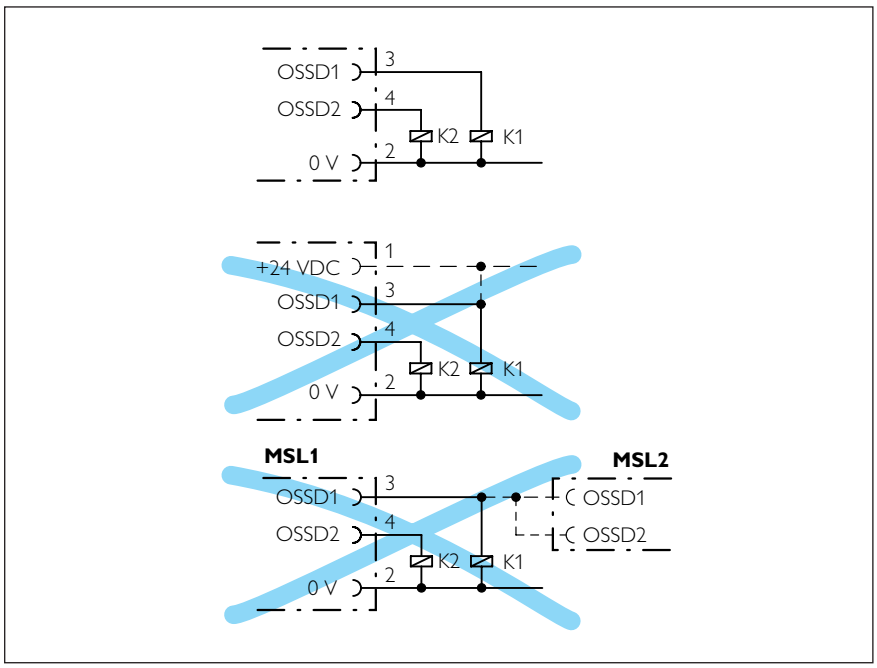


Fig. 26. Correct and incorrect connection of the contacts

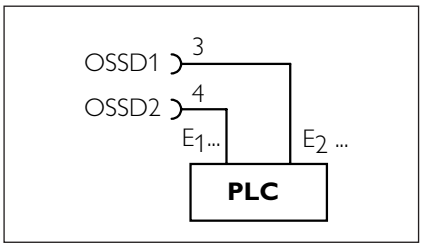


Fig. 27. Two-channel connection of the receiver unit or MSLZ to a reliable PLC

8 Connection Diagrams

8.1 Connection diagram for plug-in terminal chamber

Figs. 28 and *30* show the pin assignment in the MSL's terminal chamber.

8.2 Layout of plug inserts

Fig. 29 shows the layout of the Harting plug. *Fig. 31* shows the layout of the Interconnectron plug.

Note

If the Interconnectron plug is used, a power supply with reliable electrical separation to DIN/VDE 551 must be used.

Pin	Function
1	24 V DC
2	0 V
3	Test out
4	Test in
5	SR
6	SR
7	⏚

Tab. 4. Pin assignment of the sender unit (Interconnectron, Harting)

Pin	Function
1	24 V DC
2	0 V
3	OSSD 1
4	OSSD 2
5	RES
6	EDM
7	OWS
8	⏚
9	n. c.
10	n. c.
11	n. c.
12	n. c.

Tab. 6. Pin assignment of the receiver unit and MSLZ (with Harting plug)

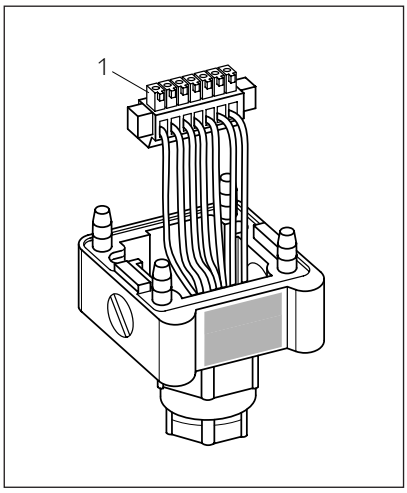


Fig. 28. Terminal strip in the connection chamber

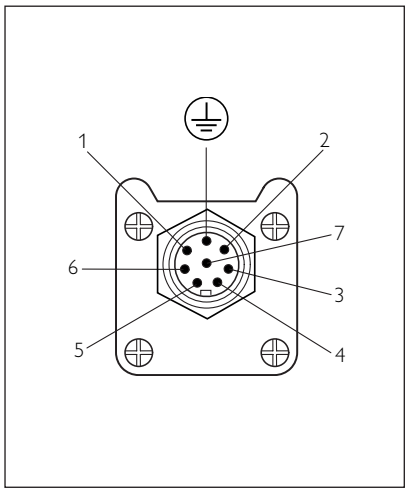


Fig. 29. Pin assignment of the Harting R15 plug

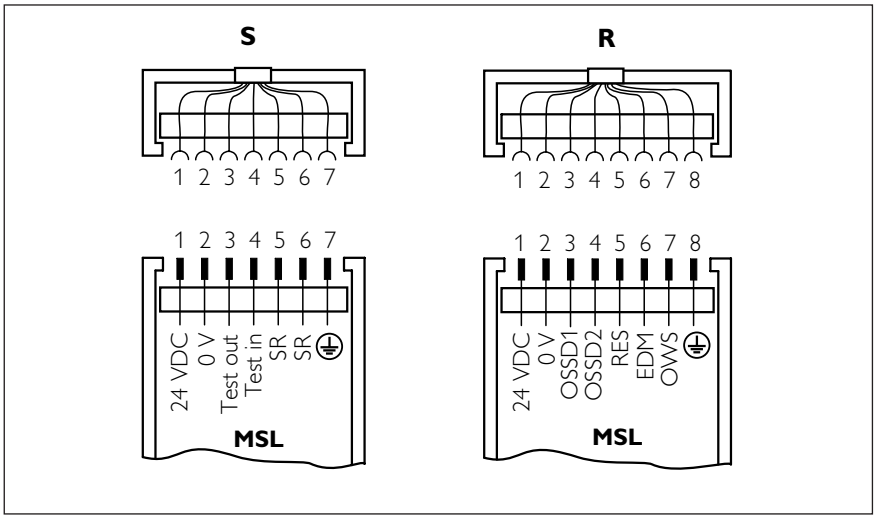


Fig. 30. Pin assignment of the sender and receiver

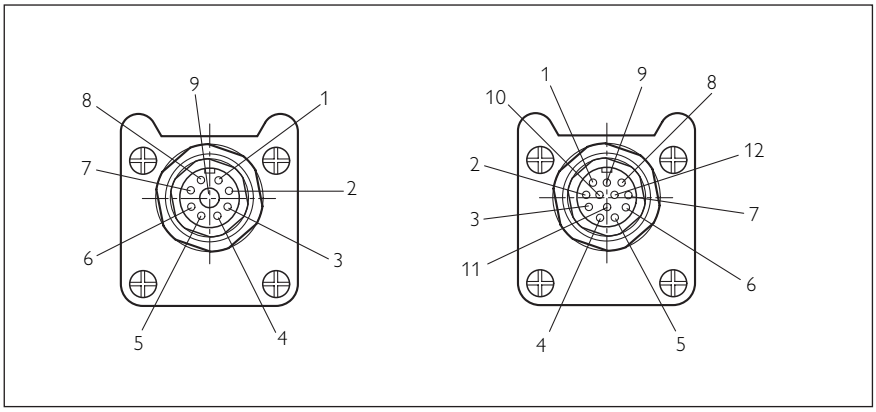
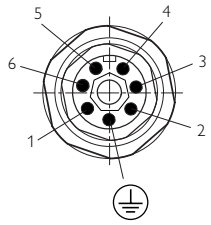


Fig. 31. Pin assignment of the Interconnectron plug for the sender (left) and receiver unit or of the MSLZ (right)

Sender

Hirschmann (6-pole + PE)
Terminal chamber 7 021 353

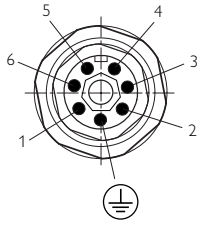


Pin	Function
1	+ 24 V
2	0 V
3	Test ➜
4	Test ➜
5	SR
6	SR
⏚	PE

Cable gland, crimp
straight 6 006 612
angled 6 006 613

Receiver

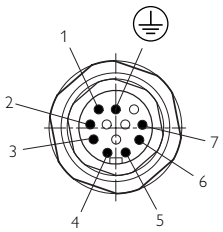
Hirschmann (6-pole + PE)
Terminal chamber 2 018 539



Pin	Function
1	+ 24 V
2	0 V
3	OSSD 1
4	OSSD 2
5	RES
6	EDM
⏚	PE

Cable gland, crimp
straight 6 006 612
angled 6 006 613

Hirschmann (11-pole + PE)
Terminal chamber 2 018 584



Pin	Function
1	+ 24 V
2	0 V
3	OSSD 1
4	OSSD 2
5	RES
6	EDM
7	OWS
⏚	PE

Cable gland, crimp
6 010 549

Fig. 32. Pin assignment of the Hirschmann plug for sender (left) and receiver unit or of the MSLZ (right)

9 Status Indicator: Causes and Error Analysis

Tab. 6 gives errors, their causes, and rectification.

Note

A distinction must be made between senders with serial numbers as follows:

- **up to 9652xxx** and
- **ab 9701xxx**.

	Fault	Cause	Checks and rectification
Sender unit up to No. 9652xxxx	Amber LED does not light up	No supply voltage	Check voltage
	Yellow LED does not light up	Sender inactive	Change MSLS
		Break between terminal 3 and 4 (test contact)	Check for breaks
		Device in LOCKOUT not light up, change MSLS.	Operating voltage on/off, if the yellow LED still does
Sender unit up to No. 9701xxxx	Amber LED does not light up	No supply voltage	Check voltage
	Amber and yellow LEDs flash 8/s	Device in lockout	Operating voltage on/off Change MSLS Contact SICK Service
	Yellow LED flashes 1/s	Break between terminal 3 and 4 (test contact)	Check continuity
Receiver unit Indicators on the sender unit: On	Indicator on MSLS is lit, none of the four indicators lights up on the MSLE	No supply voltage at the MSLE	Change voltage at MSLE Change MSLE
	The red LED on the MSLE is permanently lit (light not received)	System maladjusted MSLE receiver unit faulty Break at MSLS test input	Realign MSLE and MSLS Change MSLE Check testing
	Amber LED and red LED on the MSLE is lit	System or corner mirror maladjusted Exit window of MSLE/MSLS and/or corner mirror contaminated	Realign system and/or corner mirror Clean exit window and/or corner mirror
	Green LED and amber LED on the MSLE are lit	Exit window of MSLE/MSLS and/or corner mirror contaminated	Clean exit window and/or corner mirror
	Red LED and amber LED are lit and the yellow LED flashes on the MSLE	Exit window and/or corner mirror contaminated and prompt: actuate command unit	Clean exit window and/or corner window and actuate command unit
	Red LED on the MSLE is lit and the amber and/or yellow LEDs flash	Device in LOCKOUT Contacts not picked up	Operating voltage on/off, if the green LED still does not light up, change MSLE Check NC contacts k 1 and k 2
	Red LED on the MSLE is lit and the yellow LED flashes	Command unit not actuated	Actuate and release command unit
	The red LED on the MSLE is permanently lit	24 V DC continuously applied to RES input during operation	Check RES Operating voltage OFF/ON

Tab. 6. Analyzing errors using the indicators

10 Technical Data for Multi-Beam Photoelectric Safety Switch (MSL)

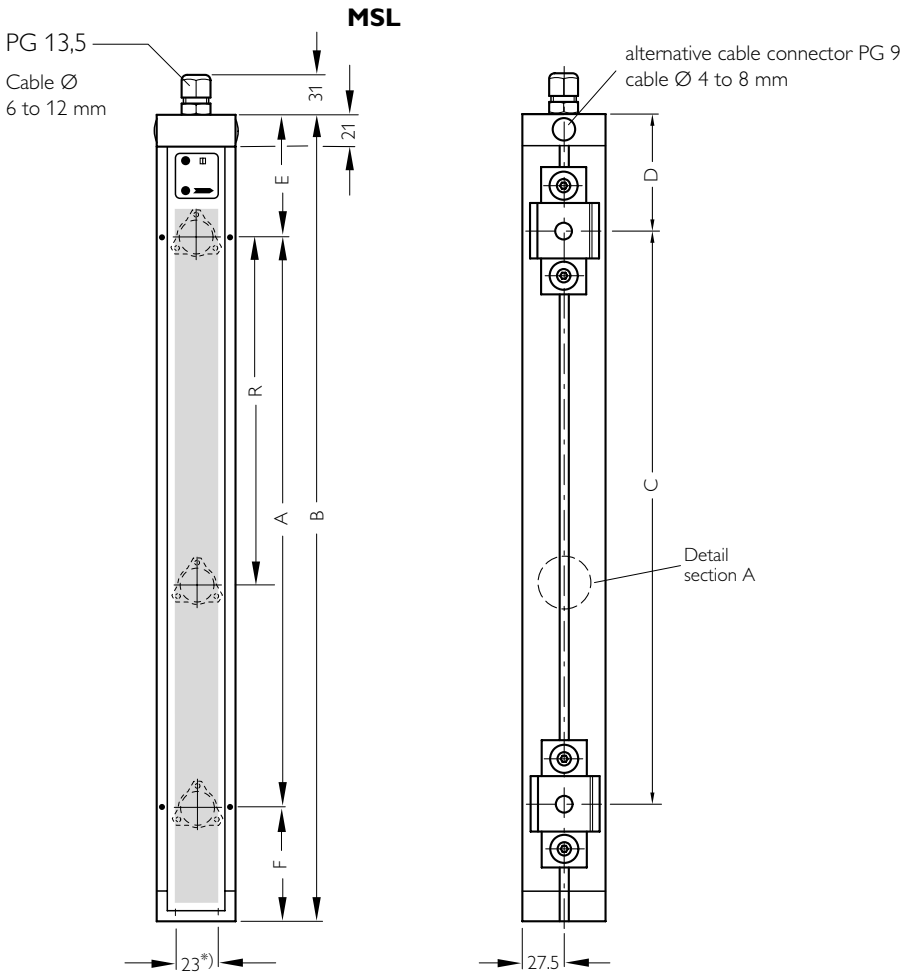
	Min.	Typ.	Max.
Protective field range (Range), type-dependent	0,5 m 15 m		20 m 70 m
Beam gap	50 mm		500 mm
Resolution (type-dependent)	73 mm		
Protection class	I		
Enclosure rating	IP 65		
Supply voltage U_V	19,2 V	24 V	28,8 V
Ripple [1]			2,5 V_{SS}
Voltage if power fails (20 ms)	18 V		
Synchronization	optical, without seperate synchronization cable		
On-transition time after applying the supply voltage of sender and receiver		1,5 s	
Sender Unit			
Test output		U_V – 1,4 V	
Test input			
Input resistance (HIGH)	2,4 kΩ (against 0 V)		
Sender, inactive (Test)	0 V		5 V
Sender, active	17,8 V		U_V
Reaction time on test		90 ms	100 ms
Wave length		880 nm	
Power consumption			7 W
Weight (for MSLS 03-140)		3,14	
Receiver unit			
Supply connections (OSSD)	2 PNP semiconductors, short-circuit protected [2], crossed connection-monitored		
Switching HIGH (U_{eff})	U_V – 3 V		U_V
Switching current	5 mA		500 mA
Leakage current [3]			2,4 mA
Load capacity			2,2 µF
Switching frequency [4]			2,2 H
Load inductance			4/s
Test impulse data [5]			
Test impulse width	70 µs	140 µs	160 µs
Test impulse rate	1 ms	9 ms	10 ms
Permissible cable resistance between unit and load [6]			2,5 Ω
Response time			20 ms
Switch-on time after break in light-beam		30 ms	420 ms
Power consumption			5 W
External contact monitoring input			
Input resistance	2,5 kΩ (against 0 V)		
Working position at	18,5 V		U_V
Rest position at	0 V		5 V
Permissible release time of contactors	no restriction		
Permissible response time of contactors			300 ms

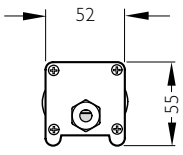
Voltage in DC • Reference point for measured values: equipment plug

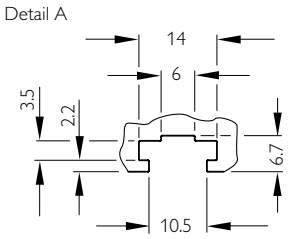
	Min.	Typ.	Max.
Command unit input			
Input resistance (HIGH)	2,5 kΩ (against 0 V)		
Command unit operated at	18,5 V		U_V
Command unit released	0 V		5 V
Duration of command unit operation	50 ms		
Contamination signalling output open collector	not short-circuit-proof		
Output current			100 mA
Weight (for MSLE 03-140)		3,14 kg	
Connection	Plug-in terminal chamber		
Max. conductor cross section			1 mm² with sleeve 1,5 mm² without sleeve
Cable length	Dependent on load, power supply unit and wire cross-section. The technical specifications must be observed.		
(from 10 m to 70 m)	shielded		
Operating mode (type-dependent)	With restart inhibit and external contact monitoring.		
Safety category	Type 4		
Tested to	pr EN 50 100 Teil 1 und 2		
Ambient operating temperature	0 °C		+ 55 °C
Storage temperature	– 25 °C		+ 70 °C
Air humidty (non-condensing)	15 %		95 %
Vibration resistance	5 g, 10 ... 55 Hz to IEC 68-2-6		
Shock resistance	10 g, 16 ms to IEC 68-2-29		
Dimensions	see 11, *Dimensional drawings*		

⚠ [1]) The voltage must not exceed or fall below the set limits.
[2]) Applies for voltages between U_V and 0 V.
⚠ [3]) In the case of an error (interruption of the 0 V cable) the output behaves like a resistor > 13 kΩ after U_V. The downstream control element must identify this state as LOW. The safe PLC detects this state.
[4]) With a low switching frequency, the max. permissible load inductance is higher.
[5]) In the active state, the outputs are tested in a cycle (switch LOW briefly). When selecting the downstream control elements ensure that the test impulses with the parameters listed above do not lead to a shutdown.
⚠ [6]) The individual conductor resistor to the downstream control element must be limited to this value so that a crossed connection between the outputs can be identified. (EN 60 204 *Electrical Equip. of Machines, Part 1: General Requirements* must be observed.)

11 Dimensional Drawings







*) optical axis sender of exit window

	A	B	C	D	E	F	R
MSL 02-150	500	684	524	80	107	77	500
MSL 03-122	440	597	437	80	107	50	220
MSL 03-140	800	985	825	80	107	78	400
MSL 20-107	1330	1585	1425	80	107	148	70
MSL 23-107	1540	1736	1576	80	107	89	70
MSLZ 01-150	500	684	524	80	97	87	500

MSL with 73 mm resolution

	A	B	C	D	E	F	R
MSL 14-105	650	835	675	80	107	78	50
MSL 17-105	800	985	825	80	107	78	50
MSL 20-105	950	1135	975	80	107	78	50
MSL 23-105	1100	1285	1125	80	107	78	50
MSL 26-105	1250	1435	1275	80	107	78	50
MSL 29-105	1400	1586	1426	80	107	79	50
MSL 32-105	1550	1736	1576	80	107	79	50
MSL 35-105	1700	1886	1726	80	107	79	50

12 Selection Table, MSL

Sender unit MSL

Sender Beams	Beam gap mm	Scanning range m	Type	Part number
2	500	0.5 ... 20	MSLS 02-15021	1 013 748
2	500	15 ... 70	MSLS 02-15011	1 012 295
3	220	0.5 ... 20	MSLS 03-12221	1 013 749
3	220	15 ... 70	MSLS 03-12211	1 013 763
3	400	0.5 ... 20	MSLS 03-14021	1 103 750
3	400	15 ... 70	MSLS 03-14011	1 013 746

Sender Beams	Resolution mm	Scanning range m	Type	Part number
20	93	0.5 ... 20	MSLS 20-10721	1 016 067
20	93	15 ... 70	MSLS 20-10711	1 015 702
23	93	0.5 ... 20	MSLS 23-10721	1 015 924
23	93	15 ... 70	MSLS 23-10711	1 015 866
14	73	0.5 ... 20	MSLS 14-10521	1 016 529
14	73	15 ... 70	MSLS 14-10511	1 016 522
17	73	0.5 ... 20	MSLS 17-10521	1 016 530
17	73	15 ... 70	MSLS 17-10511	1 016 523
20	73	0.5 ... 20	MSLS 20-10521	1 016 531
20	73	15 ... 70	MSLS 20-10511	1 016 524
23	73	0.5 ... 20	MSLS 23-10521	1 016 391
23	73	15 ... 70	MSLS 23-10511	1 016 390
26	73	0.5 ... 20	MSLS 26-10521	1 016 532
26	73	15 ... 70	MSLS 26-10511	1 016 525
29	73	0.5 ... 20	MSLS 29-10521	1 016 533
29	73	15 ... 70	MSLS 29-10511	1 016 526
32	73	0.5 ... 20	MSLS 32-10521	1 016 534
32	73	15 ... 70	MSLS 32-10511	1 016 527
35	73	0.5 ... 20	MSLS 35-10521	1 016 535
35	73	15 ... 70	MSLS 35-10511	1 016 528

The order numbers for the MSL device variants

- with/without external contact monitoring
- with/without restart inhibit

are available on request.

Receiver unit MSL and MSLZ ...

... without Muting

Receiver Beams	Beam gap mm	with RES and EDM Type	Part number
2	500	MSLE 02-15011	1 012 296
3	220	MSLE 03-12211	1 013 764
3	400	MSLE 03-14011	1 013 747
MSLZ			
Sender-/receiver unit MSLZ			
1	500	MSLZ 01-15031	1 013 771
Gap: active/passive side 7.5 m			

Receiver Beams	Resolution mm	with RES and EDM Type	Part number
20	93	MSLE 20-10711	1 015 703
23	93	MSLE 23-10711	1 015 867
14	73	MSLE 14-10511	1 016 536
17	73	MSLE 17-10511	1 016 537
20	73	MSLE 20-10511	1 016 538
23	73	MSLE 23-10511	1 016 392
26	73	MSLE 26-10511	1 016 539
29	73	MSLE 29-10511	1 016 540
32	73	MSLE 32-10511	1 016 541
35	73	MSLE 35-10511	1 016 542

... with Muting

Receiver Beams	Beam gap mm	with RES and EDM Type	Part number
2	500	MSLE 02-15051 A	1 015 566
3	220	MSLE 03-12251 A	1 015 567
3	400	MSLE 03-14051 A	1 015 568
MSLZ			
Sender-/receiver unit MSLZ			
1	500	MSLZ 01-15061 A	1 015 569
Gap: active/passive side 7.5 m			

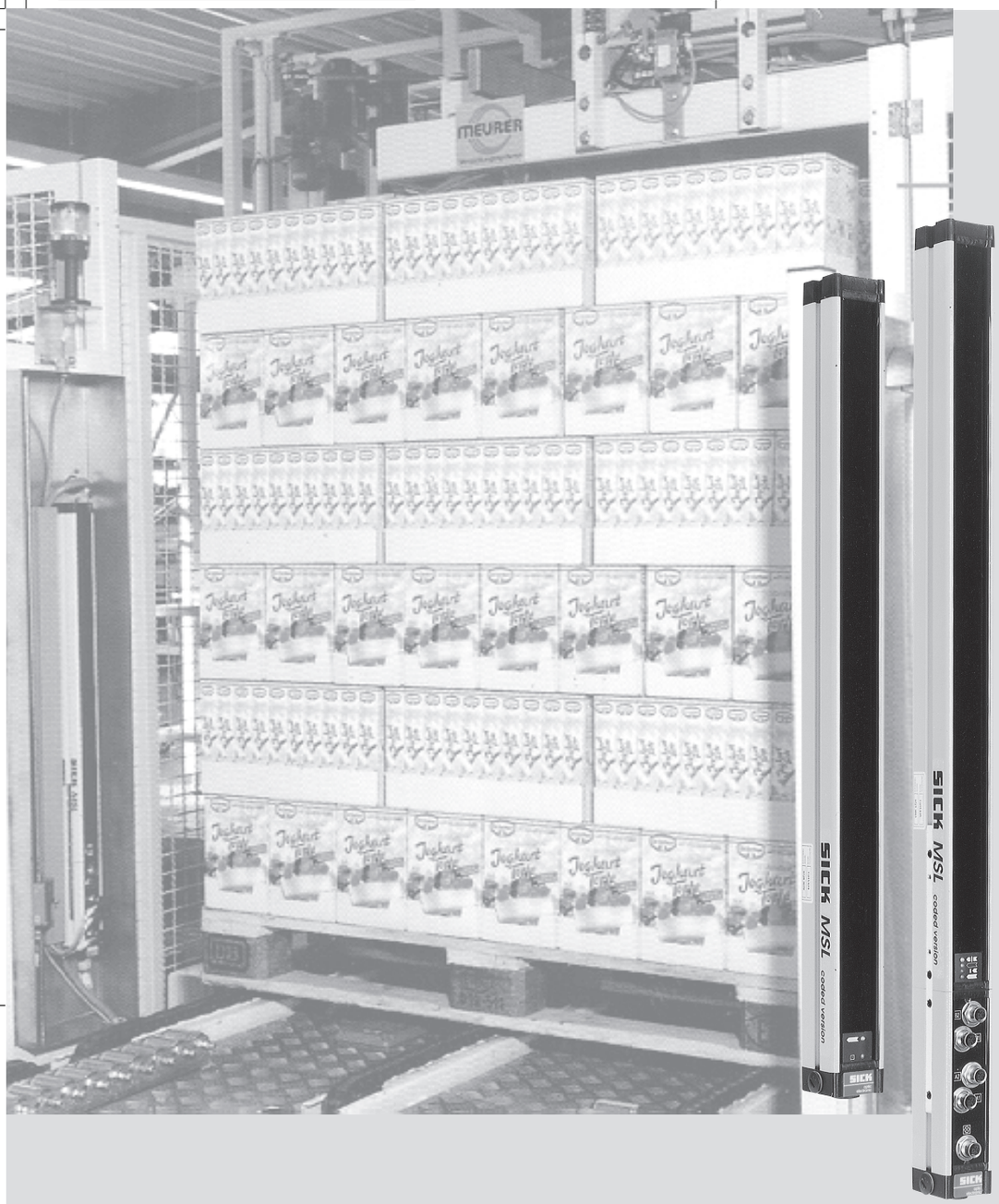
RES Restart inhibit **EDM** External device monitoring

13 Selection Table, Accessories

Type		Designation	Order number
Mounting bracket		Sliding block, packing unit 4 pcs *)	2 017 550
		Sliding block, extra, packing unit 1 pce	5 305 719
		Mounting set 1: Mounting bracket, rigid, packing unit 4 pcs	7 021 352
		Mounting set 2: Mounting bracket, pivoted, packing unit 4 pcs	2 017 751
		Mounting set 3: Mounting bracket, pivoted, with vibration absorber packing unit 4 pcs	2 017 752
		Mounting set 4: Mounting bracket, pivoted, with vibration and shock absorber, packing unit 4 pcs	2 018 742
Power supply unit		Power supply unit, 24 V DC, 2.5 A	6 010 361
		Power supply unit, 24 V DC, 4 A	6 010 362
AR 60		Alignment aid	1 012 522
		Adapter AR 60/MSL for assembly in device column and if the mounting bracket is installed at beam height	2 016 629
		Adapter AR 60 MSL/FGS, clip-on	4 030 282
Connection		Terminal chamber with PG cable guide	
	Interconnectron	Device plug, crimp, attached to terminal chamber	
		for sender unit (9-pole)	2 017 536
		for receiver unit (12-pole)	2 017 537
		for receiver unit (12-pole), angled	2 017 755
	Harting R 15	Device plug, crimp, attached to terminal chamber	
		for sender unit, straight	2 018 549
		for receiver unit, straight	2 018 550
		for sender unit, angled	2 019 081
		for receiver unit, angled	2 018 551
		Cable gland for sender and receiver unit, cable diam. 11 ... 15 mm	6 011 105
		Cable gland for sender and receiver unit, cable diam. 15 ... 20.5 mm	6 011 058
	Hirschmann	Device plug, crimp, attached to terminal chamber	
		for sender unit (6-pole + PE)	7 021 354
		for receiver unit (6-pole + PE)	2 018 539
		for receiver unit (11-pole + PE)	2 018 584
		Cable gland for sender and receiver unit, straight (6-pole + PE)	6 006 612
		Cable gland for sender and receiver unit, angled (6-pole + PE)	6 006 613
		Cable gland for receiver unit, straight (11-pole + PE)	6 010 549
Muting module MSM			1 013 769
		Muting lamp with 2 m of cable with plug and brackets for MSM	2 017 768
		Muting lamp with 10 m of cable and plugs for MSM	2 018 504
		Sensor cable with one plug for MSM	
		2 m	6 010 974
		5 m	6 010 976
		10 m	6 008 652
		Sensor cable with two plugs, one for the MSM and one for the i.e. WT 24	
		2 m	6 008 649
		5 m	6 008 650
		Angled plug for muting sensor without cable	6 008 651
		Spare lamp	6 008 654
		Spare housing	6 008 645
Columns		Mirror column 400 complete with mirrors	1 015 040
		Housing column 400	2 018 153
		Mirror column 500 complete with mirrors	1 015 041
		Housing column 500	2 018 154
		Mounting assembly for MSL in column assembly (one mounting assembly required per sender and per receiver)	2 017 541
Spares:		Insert for mirror column with 45° mirror 400 or 500	2 018 537
PSK 45		Corner mirror, not suitable for post assembly	5 306 053
PSZ 01		Corner mirror for MSLZ housing	1 015 693

*) Four sliding blocks for both sender and receiver are included in the basic package

The basic package is indicated by the gray background



TECHNICAL DESCRIPTION

MSM

Muting-Expansion Module for MSL

SICK
optic
electronic

Reg. Nr. 19462-2

Contents

8 008 652

Abbreviations

MSM	Muting expansion module mounted on MSLE
MSLE	Multibeam photoelectric safety switch: Receiver
MSLS	Multibeam photoelectric safety switch: Sender
MSLZ	Multibeam photoelectric safety switch with active sender/receiver unit with passive mirror unit
OSSD	**O**utput **S**ignal **S**witching **D**evice
PSZ	Corner mirror

1 About this document

1.1 Function of this document

This document provides information on deployment of the muting expansion module MSM. It does not replace the technical description of the photoelectric safety switch MSL.
It contains information on

- Application
- Mounting
- Electrical installation
- Ordering

1.2 Target group of this document

This document is intended for planning and development engineers of machinery and plant which is to be fitted with optoelectronic safety devices.

1.3 Information contained in this document

This technical description contains information necessary for selection and deployment of the device. However, the planning and installation of safety devices on power-driven machinery requires fundamental specialist knowledge which this *technical description* does not provide. Furthermore, all official and legal regulations must be observed. In this respect, too, this document is unable to provide comprehensive details on all relevant regulations. In Germany, the directives of the employers' liability insurance associations (ZH 1/597) and the Machinery Directive 89/392/EEC ff. must in particular be observed.
More detailed information concerning accident prevention and optoelectronic safety devices can be obtained directly from SICK AG (including *Safe Machines* - a SICK guide to the use of optoelectronic safety devices) or your local SICK office or representative.

1.4 Symbols used in this document

Some of the information presented in this document is highlighted in order to ensure quick access to it:

Note A "Note" gives information about special features of the device

Explanation An "Explanation" provides background knowledge on a topic; it promotes understanding of the technical aspects of operating the device.

Recommendation A "Recommendation" helps to ensure optimum working with the device.

IMPORTANT

Warning notice!

A warning notice protects against accidents.

Always read warning notices thoroughly and follow the instructions given in them carefully.

2 Safety

The device can only fulfill its safety role if it is used correctly. In particular, this means that it must be installed ”safe” - that is, to be fail-safe.
The muting expansion module MSM (in conjunction with the multibeam photoelectric safety switch MSL) conforms to the safety requirements in accordance with

- Safety category type 4 to pr EN 50 100

2.1 Areas of use of the device

Multibeam photoelectric safety switches (MSL) with the MSM muting expansion module are non-contact safety devices to protect access to hazardous areas, including a muting function for the automated transport of material into the hazardous area.

2.2 Conditions of use of the device

The MSM in conjunction with the MSL may only be used as stipulated under subsection 2.1, *Areas of use of the device*. If it is used for any other purpose, or if any modifications are made to the device - including during mounting and installation - all warranty claims against SICK AG shall be rendered void.

2.3 General safety instructions and safety measures

IMPORTANT

Safety instructions

As the muting module is used in conjunction with the photoelectric safety switch MSL, the safety instructions given in the technical description of the MSL must also be followed.

The following points must be observed in order to guarantee conditions of use of the muting module:

- The instructions on electrical connection and commissioning must be followed.
- Installation and electrical connection is to be performed only by specialist personnel with practical technical training and knowledge of the applicable safety regulations.
- The device must be tested and commissioned into operation by qualified personnel, where stipulated by the applicable rules and regulations.
- The personnel operating the machine fitted with the photoelectric safety switch must be instructed as to its use by specialist personnel prior to beginning work. Said instruction is the responsibility of the machine owners.
- Prior to initial commissioning the following points must be observed:

  1. The hazardous area must be in full view of any person activating the restart or override commands.
  2. Muting sensors must be arranged such that muting cannot be triggered unintentionally by any person (*Fig. 1* and *2*).

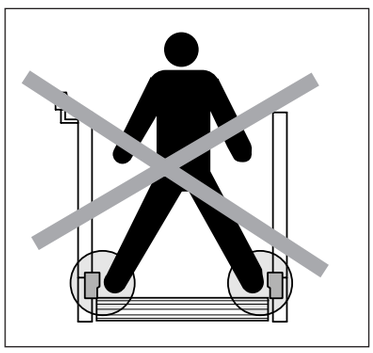


Fig. 1: Opposing sensors must not be activated simultaneously

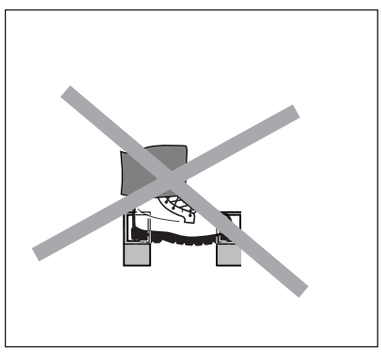


Fig. 2: Adjacent sensors must not be activated simultaneously

3. Muting must only be activated within the time span when the pallet with its load is blocking access to the hazardous area.
4. Muting must be activated automatically, but must not be dependent on one single electrical signal.
5. Muting must not be entirely dependent on software signals.
6. The muting condition must be cancelled, and the safety device re-primed, as soon as the pallet has passed through.

3 Product description

3.1 System setup

The existing sender/receiver unit setup of the MSL or MSLZ is supplemented by the muting module MSM. It is accommodated in the same housing as the photoelectric safety switch, and is attached to the receiver unit by a mounting rail (*Fig. 3*).

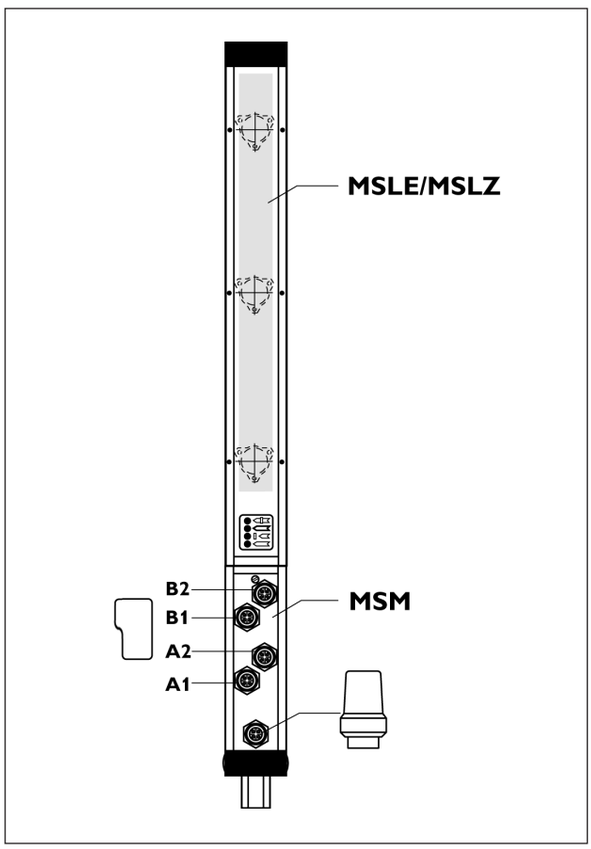


Fig. 3: One unit: photoelectric safety switch and muting expansion module

In order to differentiate between people and materials, additional sensor signals are required. Two or four sensors can be connected for this purpose. The number of sensors is determined by the geometry of the object being detected and by the applicable safety requirements. The safe functioning of testable sensors is automatically tested by the muting module (see 3.3.1).

A muting indicator lamp is also essential for operation. It signals the increased safety risk during muting. It must always be connected in operation, as its functioning is monitored.
The sensors and the lamp are plugged directly into the muting module and supplied with the 24 V DC operating voltage.

3.2 Mode of functioning of the device

The muting module logically evaluates the signals of the connected muting sensors and, when a valid muting condition is encountered, mutes the photoelectric safety switch. The material will automatically pass through on this conveyor.
.

Muting condition

Using **one** sensor pair:

A 1 & A 2	Muting of the MSL

Using **two** sensor pair:

A 1 & A 2	Muting of the MSL
B 1 & B 2	Muting of the MSL

For a **short time** the following condition must apply:

A 1 & A 2 & B 1 & B 2	(for the other sensor pair to adopt the muting condition)

3.3 System components

3.3.1 Sensors

Generally, any kind of sensor can be used:

- Optical sensors
- Inductive sensors
- Mechanical switches
- Signals from the controller

The muting sensors must, however, have the following technical data:

Sensor output	PNP, relay output
Power supply	24 V DC ± 20 %
Max. power consumption per sensor	0,25 A
Max. cable length	10 m
Muting sensor output voltage	24 V ± 20 %
Input resistance of MSM	> 1 kΩ
Plug connection	(pre-assembled cables from SICK or self-wired plugs; see 5.2, *Muting sensors and muting indicator lamp* and 9, *Selection tables*)

Testable sensors

The MSM automatically tests the sensors, but at present it can only test the following optical sensors:

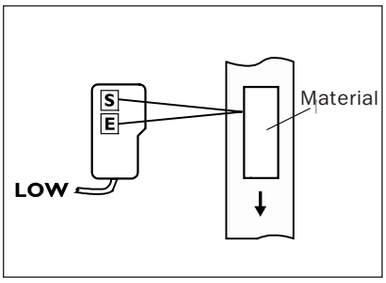


Fig. 4: Optical sensor as testable sensor

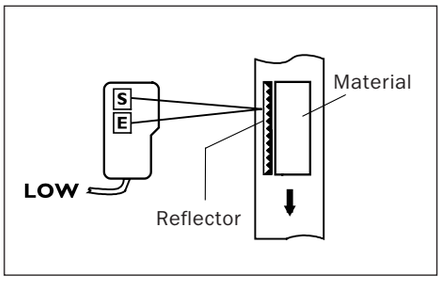


Fig. 5: Photoelectric reflex switch as testable sensor

Note With the photoelectric reflex switch the reflector must be mounted on the traversing material. If this is not possible, the sensor can only be used in ”non-testable” form.

Technical requirements for testable sensors:

- Test in active state (when material activates sensor).
- Sensor output signal ”LOW” in active state.

Functions of testing

To ensure that the muting sensor is connected and functioning, when the sensor is active a short test signal (LOW signal) is sent to the sensor every 20 minutes and its response (HIGH signal at the output) is awaited. The test pulse lasts 30 ms and has no influence on the muting function.

Advantages of testable sensors

- Additional safeguard against manipulation
- Defects in the muting sensor are revealed
- Faster material flow is made possible, because the material can be placed directly end-to-end on the conveyor.

Non-testable sensors

The non-testable sensors include all other sensor types not mentioned in the preceding subsection. For non-testable sensors the sensor output signal is ”HIGH” in the active state. The following safety rules apply to the use of non-testable sensors:

- On power-up all muting sensors must be inactive, otherwise the muting indicator lamp will flash at 2 Hz (twice per second).
- With continuous muting, simultaneity monitoring of the muting sensors must be selected.
- The cables between the MSM and the sensors must be laid with care to avoid crossed connections between the cables of the sensors of one pair.

Recommendation SICK recommends using SICK optical muting sensors. They can be used according to type (light or dark switching), in testable/non-testable form. Their setting is described in subsection 3.4, *Selectable device functions*.

Sensor	Type	Testable	Non-testable
Photoelectric proximity switch	WT 24 WT 27	Dark-switching	Light-switching
	WT 260	Not possible	Light-switching
Photoelectric reflex switch	WL 24 WL 27	Dark-switching, Reflector movable on object	Dark-switching Dark-switching
	WL 260	Not possible	
Through-beam photoelectric switch	WS 24 / WE 24 WS 27 / WE 27 WS 260 / WE 260	Not possible	Dark-switching

Table 1: Selection and setting of the SICK optical muting sensors in muting applications: all outputs PNP; other designs possible

3.3.2 Muting indicator lamp

An external muting indicator lamp is required to signal the muting function.

Note This lamp is essential. Without it the muting function is not possible. This also applies if the lamp fails. Exception: in override (manual acknowledgment, see 6, *Override,* and 6.2, *Muting with integral override*).

Technical data:

Power supply	24 V DC (supplied via MSM)
Bulb output	max. 4 W Current range 20 ... 200 mA
Max. cable length	10 m
Bulb life	approx. 2500 h

SICK offers three different muting indicator lamp variants as accessories (see *Figs. 6* to *8*).

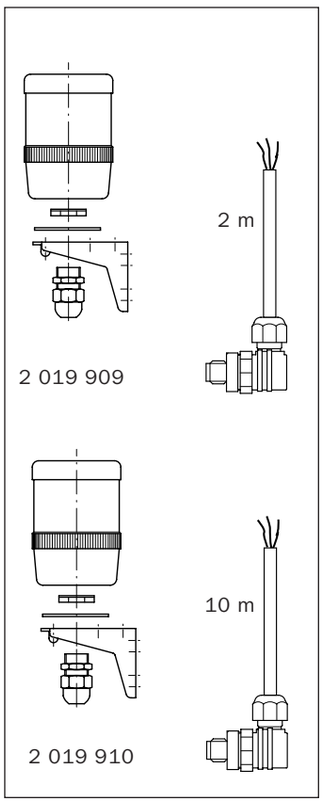


Fig. 6: Muting indicator lamp, LED version, with mounting bracket

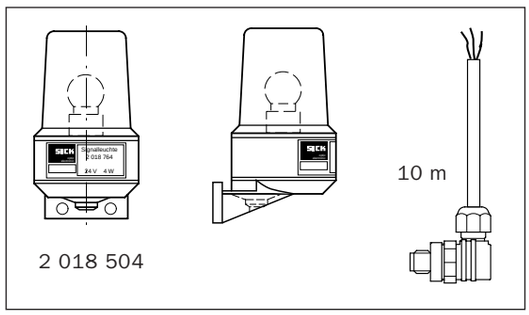


Fig. 7: Muting indicator lamp, version with incandescent bulb, with mounting bracket for wall mounting

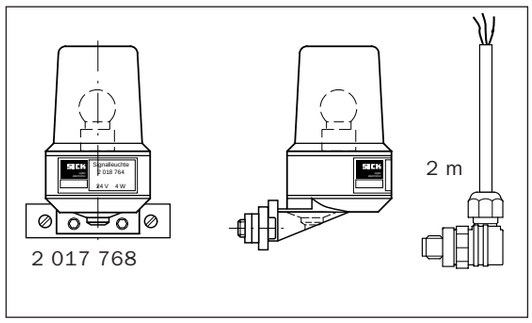


Fig. 8: Muting indicator lamp, version with incandescent bulb, with mounting bracket and kit for mounting in groove on side of MSL

2 017 768

3.4 Selectable device functions

The device has selectable functions. They should be selected to suit the respective application.
The configurations are:

- **Sensor test**

Setting of whether testable or non-testable muting sensors are connected.

- **Simultaneity monitoring**

The sensors of one sensor pair must be activated within 3 seconds when the function is selected; otherwise no muting is possible. The function is intended to protect against manipulation (e.g. masking of an optical sensor). Therefore activate whenever the application permits.

- **Number of sensor pairs**

Set the number of sensor pairs used (1 or 2).

- **Total muting time**

The total muting time must not exceed 60 seconds; otherwise muting is interrupted. The function is intended to protect against manipulation (as simultaneity monitoring). When total muting time monitoring is selected a conveyor stop is ignored by the MSM.

Note When the cap on the MSM is unscrewed, DIP switches can be accessed to select the desired configuration. For this, two DIP switches must always be set in the same direction, depending on function (see *Table 2*).

Function	**Associated switches**	**Function:**	
Sensor test	1 and 5	off	**on**
Simultaneity monitoring (3 s)	2 and 6	off	**on**
Number of sensor pairs	3 and 7	1 sensor pairs	**2 sensorpairs**
Total muting time (60 s)	4 and 8	off	**on**

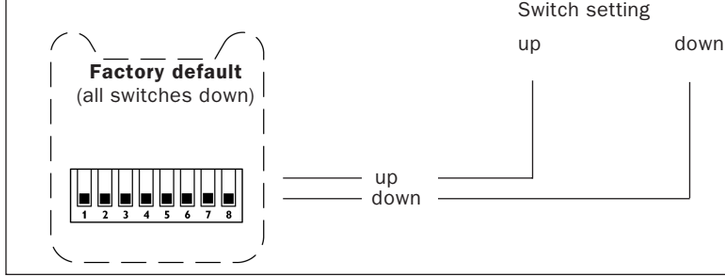


Table 2: Functions of the DIP switches

On the following pages we present examples of applications which also include a number of examples of DIP switch settings.

3.5 Application examples

The following examples show how setups with one or two sensor pairs might look. Since there are no limits to the sensor setups, only a few common examples are presented, in order to illustrate the principle of their setup.

3.5.1 Principles in the setup of muting sensors

The muting sensors must always be arranged such that the material can pass unhindered, but a person is reliably detected. In addition to the **general safety instructions given in subsection 2.3**, we also recommend that you follow the principles set out below:

- The sensors should detect only the material and not the means of conveyance (pallet or vehicle), so that no persons can drive into the hazardous area (*Fig. 9*).

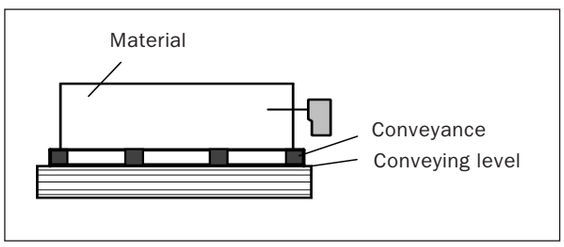


Fig. 9: The sensors should detect the load, not the pallet

- Secure the setup against manipulation, where appropriate use differing sensor types in combination and/or link to signals from the controller.
  Even better:
  Use testable optical sensors with background suppression, such as WT 24 from SICK (*Fig. 10*).

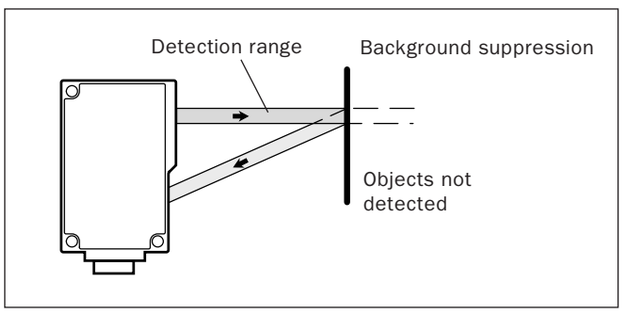


Fig. 10: Recommended: photoelectric proximity switch with background suppression, such as WT 24

- Where possible, select the monitoring function ”Simultaneity monitoring 3 s” and/or ”Total muting time 60 s” on the MSM. These functions help to reveal crossed connections and continuous manipulation to the sensor. Consequently, the sensors must not be too far apart (in the direction of the conveyor), so that the material can reach the sensors within the given times.
  Formula:

Sensor spacing = Conveyor speed x 3 s (or 60 s as appropriate)

- The material (pallet, vehicle ...) must be detected by the muting sensors over its entire length; that is, there must be no interruption of the sensor output signals.
  This is of particular importance where material is shifted on the pallet or where different materials vary the reference height for the sensors.
- Each muting operation must be complete before new material reaches the first sensors again.
- Since internal evaluation of the sensor signals takes some time, the material's detection point must not be too close to the light beams of the photoelectric safety switch. A minimum distance must therefore be maintained (*Fig. 11*).

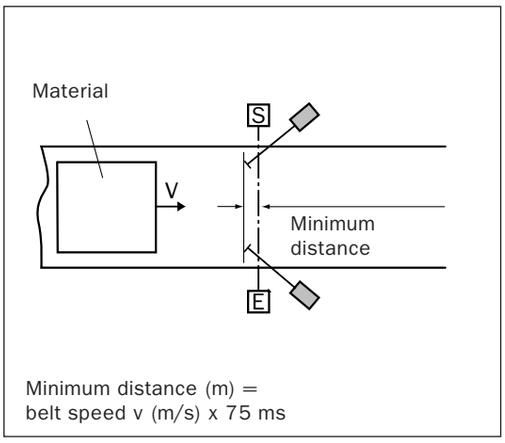
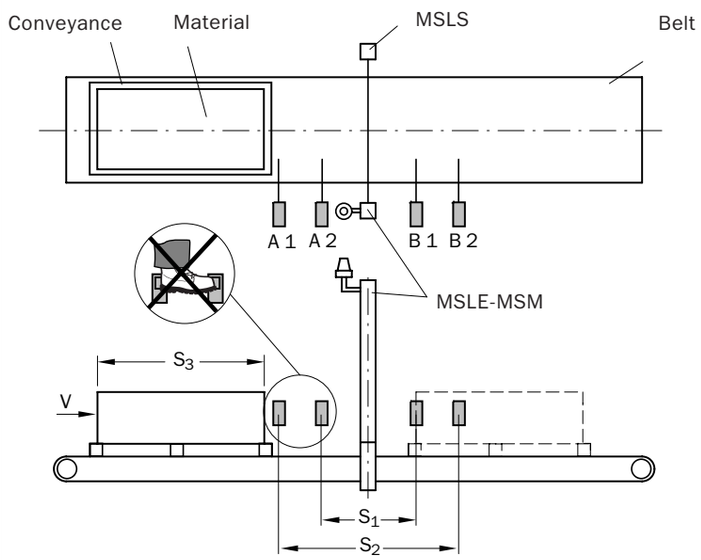


Fig. 11: For the detection line of the muting sensors a minimum distance to the beams of the photoelectric safety switch must be maintained

3.5.2 Muting with two sensor pairs, serial setup

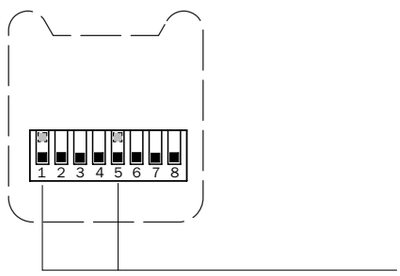
Figure 12 shows a serial setup of the muting sensors. Material flow is possible in both directions, because the setup is symmetrical. Suitable sensors:

- All kinds of sensors



S_1 = Distance between inner sensors (m)
S_2 = Distance between outer sensors (m)
with S_1 and S_2 symmetrical to the MSL
S_3 = Length of material in direction of belt (m)
v = (Belt) speed (m/s)
▯ = Sensor

Distances
v • 150 ms ≤ S_1 < v • 60 s
S_2 < S_3 so briefly A 1 & A 2 & B 1 & B 2



DIP switch settings on the MSM

- With or without sensor test
- Without simultaneity monitoring 3 s
- With 2 sensor pairs
- With total muting time monitoring 60 s

Setting different according to sensor type:

Testable sensors:	Switches 1 and 5 down
Non-testable sensors:	Switches 1 and 5 up

Fig. 12: Muting with two sensor pairs, serial setup

3.5.3 Muting with two sensor pairs, parallel setup

Figure 13 shows a parallel setup of the muting sensors. Material flow is possible in both directions, because the setup is symmetrical. Suitable sensors:

- All kinds of non-optical sensors
- Optical scanners (photoelectric proximity switches), where possible with background suppression; avoid mutual interference

Note Scanning distance of muting sensors should not be overlapping.

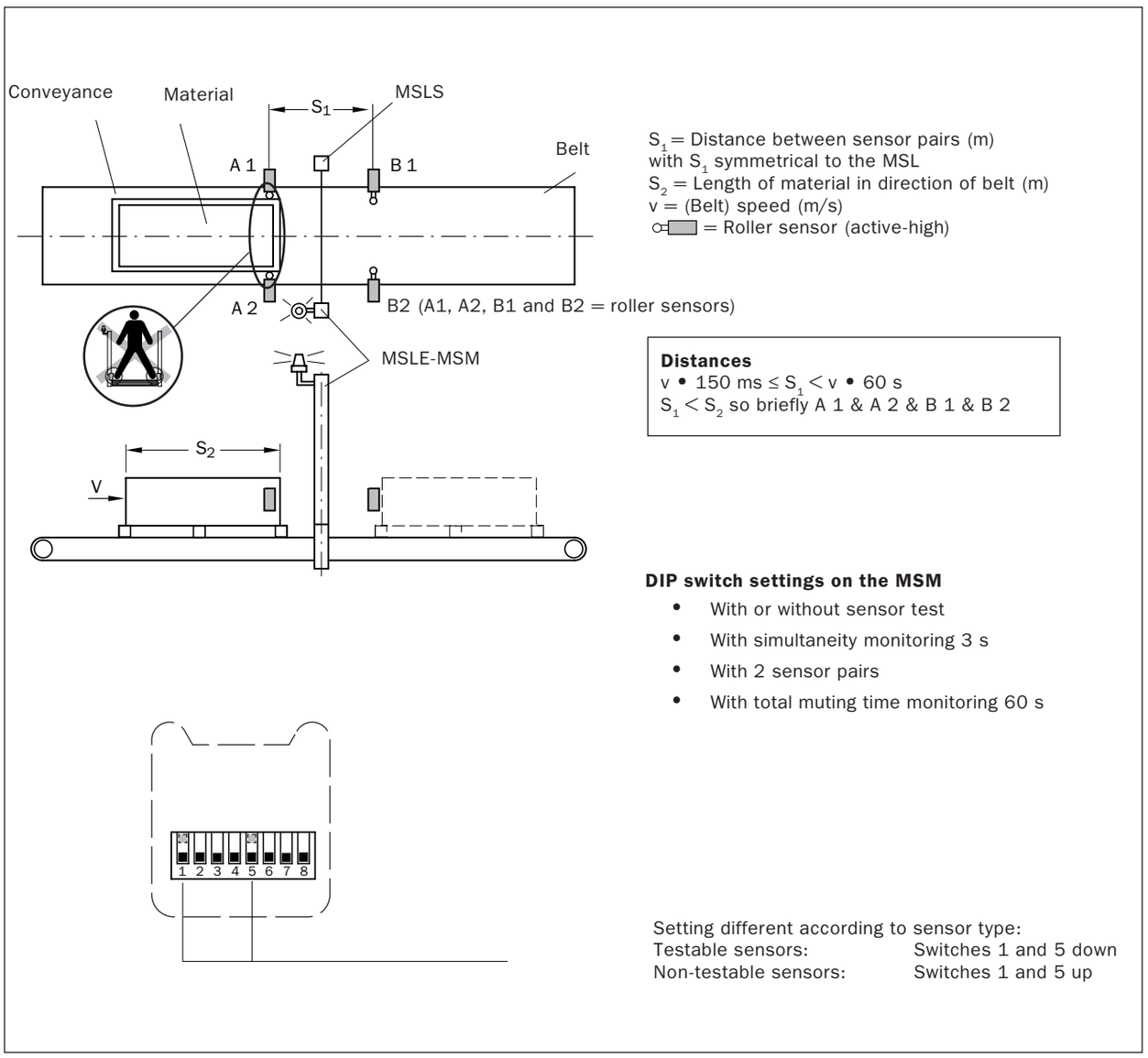


Fig. 13: Muting with two sensor pairs, parallel setup

3.5.4 Muting with one sensor pair, crossed sensors

Figure 14 shows a crossed setup of two muting sensors. Material flow is possible in both directions.

Note Use terminals A1 and A2.

Suitable sensors:

- Through-beam photoelectric switches
- Photoelectric reflex switches

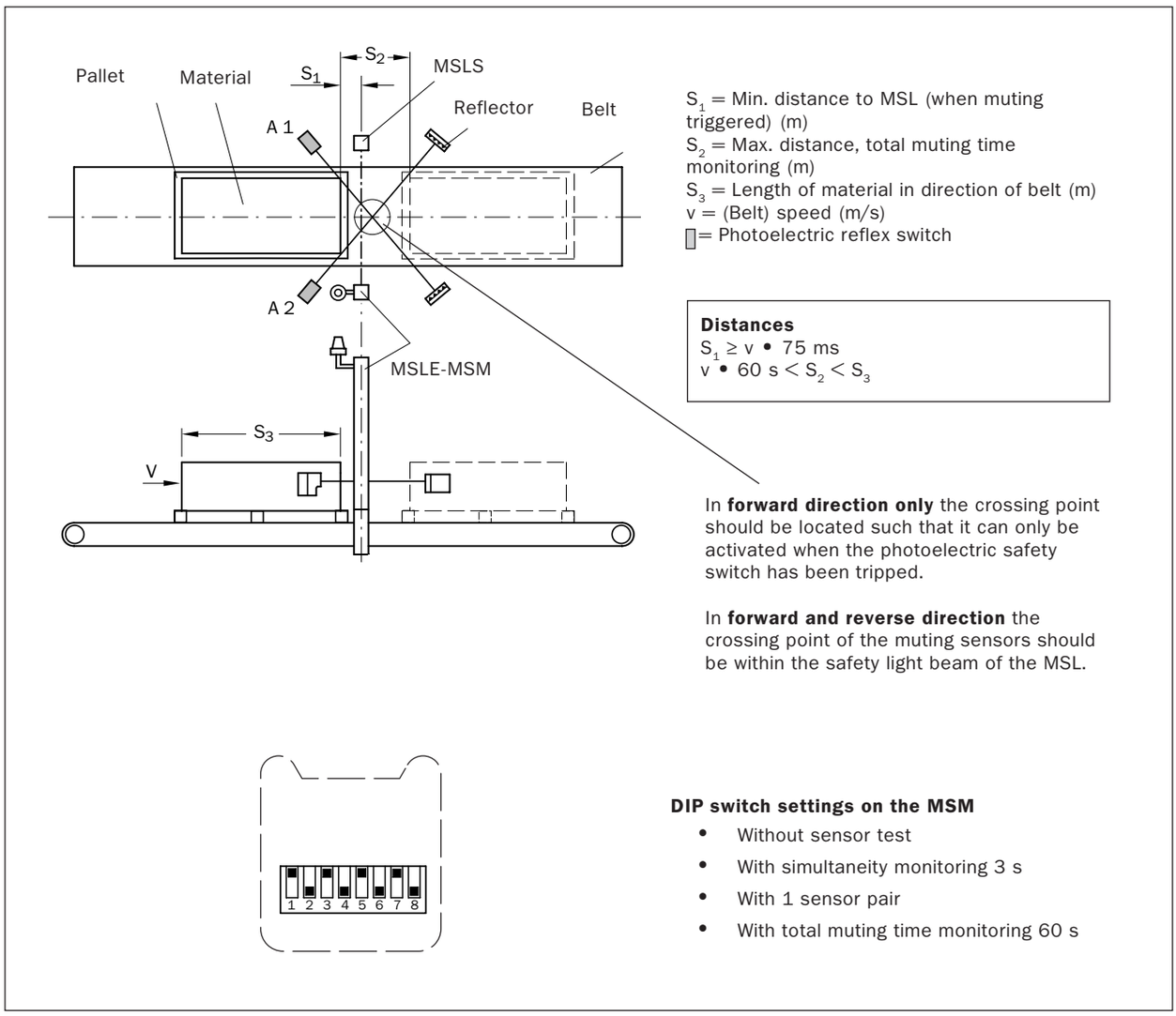


Fig. 14: Muting with one sensor pair, crossed sensors

4 Mounting

The muting module is shipped ready mounted on the multibeam photoelectric safety switch (MSL). The MSL can be mounted as before, merely allowing for the additional space required for the muting module (for mounting of MSL see relevant technical description or MSL operating instructions).
The sensors and the muting indicator lamp are mounted as described in the preceding sections.

If the MSM muting module is ordered separately, mounting instructions are supplied with the device.

5 Electrical installation

5.1 Photoelectric safety switch

The terminals of the receiver unit MSLE are located on the MSM. As there are no other changes in terms of electrical connections, the *MSL Technical Description* applies in this respect.

5.2 Muting sensors and muting indicator lamp

The muting sensors are connected via cable plugs to the MSM. The maximum connectable cable length is 10 metres, and the maximum connectable cable cross-section 0.75 mm². Cable diameters: 3.0 ... 6.5 mm

If only one sensor pair is connected, terminals A 1 and A 2 on the MSM are used. As already described, the number of sensor pairs used must be set on the DIP switches on the MSM.

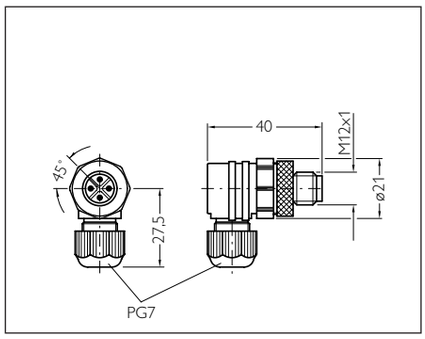


Fig. 15: Angled plug for muting sensor (order no. 6 008 651)

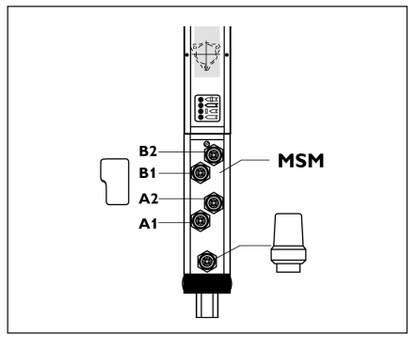


Fig. 16: Connections on the MSM muting expansion module

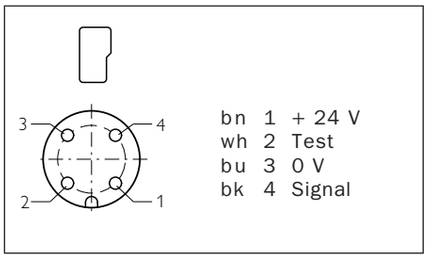


Fig. 17: Connection diagram, muting sensor: device plug on MSM

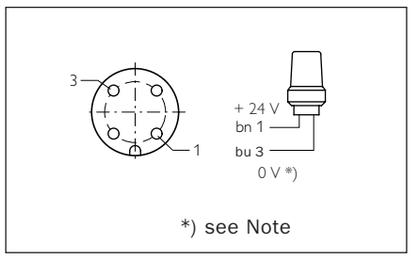


Fig. 18: Connection diagram, muting indicator lamp: device plug on MSM

Note When connecting the muting sensors and lamp please lamp please ensure the following:

- ➢ Does the contact assignment on the sensor and on the MSM match ?
- ➢ Wire test connection only on testable sensors.
- ➢ 0 V of MSM lamp connection must not be connected to external 0 V.
- ➢ When using non-testable sensors, lay cables with care to avoid crossed connections.

6 Override

The override function allows material left within the range of the photoelectric safety switch to be easily removed (e.g. after a power failure, emergency-off stop, etc.). For this the photoelectric safety switch is manually muted.

Reccommendation For a system reset (power off/on) an additional switch is useful.

6.1 Muting with standard override

The override is implemented by an external circuit. By way of an additional key-operated switch relays K 1 / K 2 are switched directly to 24 V and so override outputs OSSD 1 and OSSD 2 (*Fig. 19*).

WARNING

Instructions for connection

- The override function must only be activated by means of a key-operated switch (with forced resetting device and 2 switching contacts for K 1 / K 2) in machine or controller manual mode.
- The override key-operated switch and the button for the restart inhibit must not be identical.
- The key-operated switch must be mounted such that the hazardous area is in full view from it.

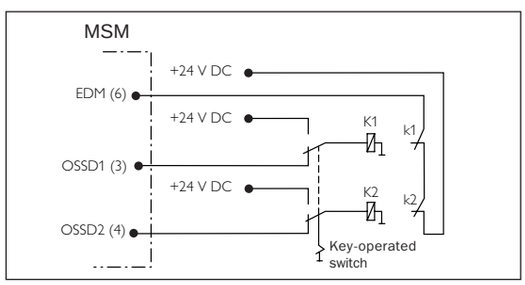


Fig. 19: Circuitry example: override function

Note For software release see rating plate. If no software release is printed on it, software release 1.8 applies.

	sw 1.8	**sw 1.9**
Online Diagnosis	not possible	Possible

Only: MSLE xx-xxx5xx, MSLZ xx-1xx6xx; MSM 01-xx

6.2 Muting with integral override

With integral override the photoelectric safety switch can be muted after an error by way of the restart button. This is signalled by the muting indicator lamp flashing at a frequency of 2 Hz (twice per second).

Explanation Muting modules with integral override have a different part number to the standard version (see 9, *Selection tables*).

WARNING

Instructions for connection

- The override and restart buttons are identical.
- The button must be mounted such that the hazardous area is in full view from it.
- If the override button needs to be pressed in two successive muting cycles, the muting setup and the sensors must be checked.
- Affix the supplied safety notice (reference to operation and connection of the command unit) in a clearly visible position next to the command unit.

Note It is advisable to use the internal MSL restart inhibit as shown in the following circuit diagram (Fig. 20).

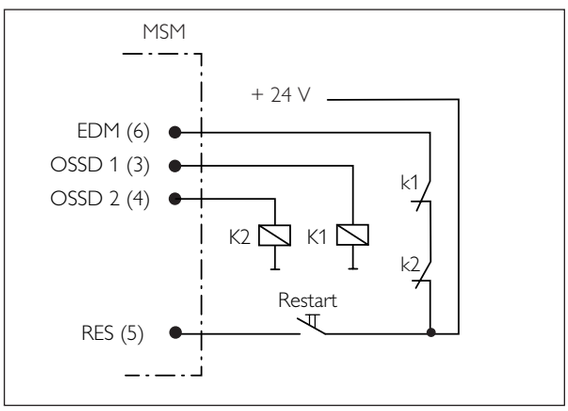


Fig. 20: Circuitry example with integral override version

Depending on the software status of the MSM, different preconditions apply and different functions are implemented.

Note For software release see rating plate. If no software release is printed on it, software release 1.6 applies.

	Software release< 1.6	**Software release ≥ 1.6**
Number of muting sensor pairs	2	1 or 2
Restart after timeout errors on MSM	Deactivate muting sensors	Override button or deactivate muting sensors
Online diagnosis	Not possible	Possible
MSL software upgrade for override function	Possible for MSL as from serial no. 9 710 xxxx	Possible for MSL as from serial no. 9 710 xxxx
Operation despite error situation (e.g. lamp defective)	Not possible	For 30 min. by repeated starting with override

Table 3: Software releases and functions implemented in them

7 Fault diagnosis

The illuminated signals on the display panels of the sender and receiver units of the MSL provide unambiguous fault diagnosis. Additional information is delivered by the muting indicator lamp's flash mode. If only the MSM is defective, the photoelectric safety switch remains operational on its own, with its safety function.

7.1 Illuminated signals on receiver unit of MSL/MSM: Diagnostic table

As well as error messages which may originate from the receiver of the photoelectric safety switch (see Fault diagnosis), the presence or defective state of the muting indicator lamp is also signaled.

LEDs, Receiver unit	Condition	Cause	Test and remedy
Green LED lit Yellow LED flashing 5 s	Free light path	Defective muting indicator lamp	Replace muting indicator lamp, check muting lamp output (4 W)
Red LED lit Yellow LED flashing 5 s	Broken light path	Defective muting indicator lamp	Replace muting indicator lamp, check muting lamp output (4 W)

Table 4: Malfunction indication on multibeam photoelectric safety switch MSL

	Causes	Standard	Override sw < 1.6	Override sw ≥ 1.6	Test and remedy
2-Hz-flash 2 x in 1 s	Start/sequence error	●	● ●	● ●	Deactivate sensors Override possible
	Simultaneity/	●	●	●	Deactivate sensors
	total time error			●	Override possible
1 x in 10 s	Configuration error	●	●	●	Check DIP switch setting
2 x in 10 s	Muting sensor test only on testable sensors	●	●	●	Check functioning of sensors
	Impermissible override start conditions		●		Establish permissible start condition
	Override for longer than 30 min			●	Switch off and back on, test muting setup
3 x in 10 s	Internal error	●	●	●	Switch off and back on

Table 5: Malfunction indication by the muting indicator lamp

If no software release is printed on the rating plate, software release < 1.6 applies.

7.2 Procedure for fault diagnosis based on a flowchart

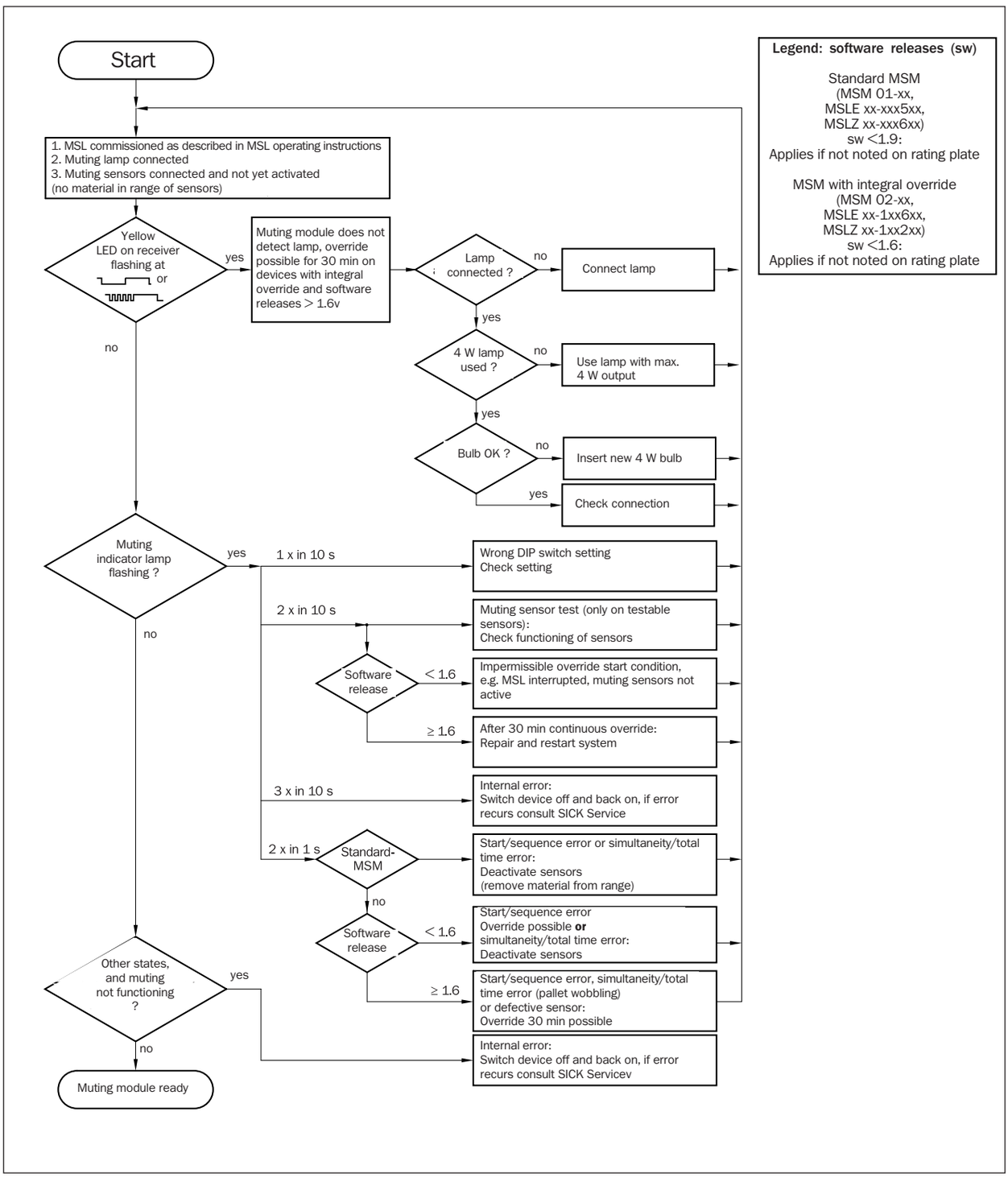


Fig. 21: Flowchart for muting indication when commissioning

7.3 Procedure for replacing the muting indicator lamp

The muting indicator lamp should be replaced as set out in the flowchart below (*Fig. 22*).

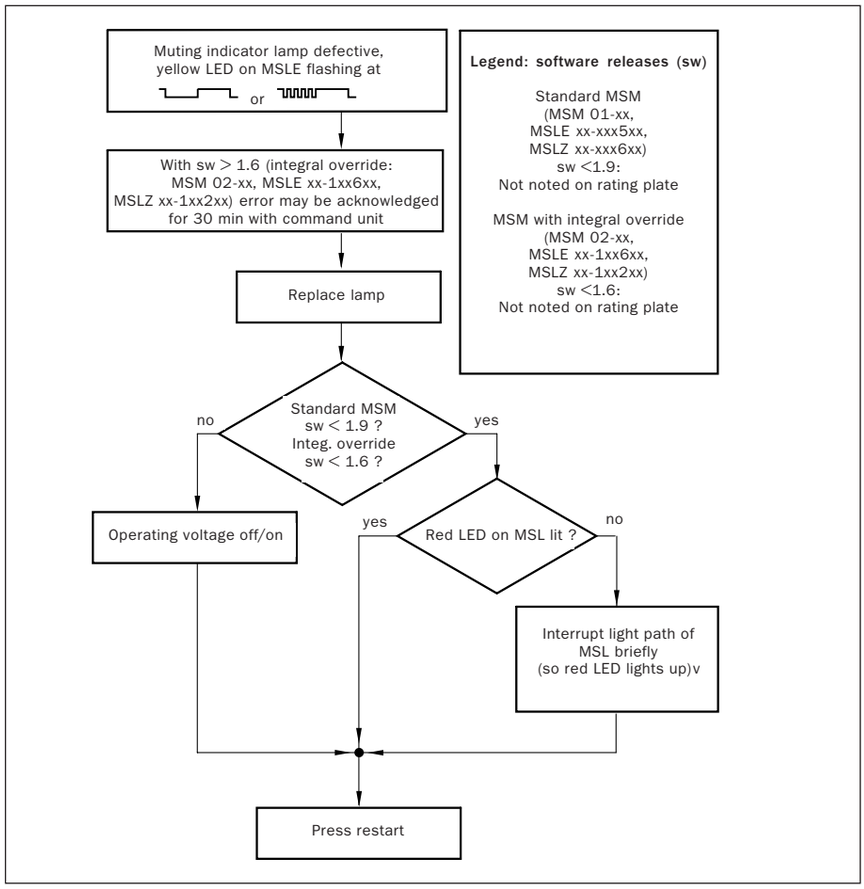


Fig. 22: Flowchart for replacement of the muting indicator lamp

If no software release is printed on the rating plate, software release < 1.6 or < 1.9 as appropriate applies.

8 Technical data

8.1 Technical data MSM

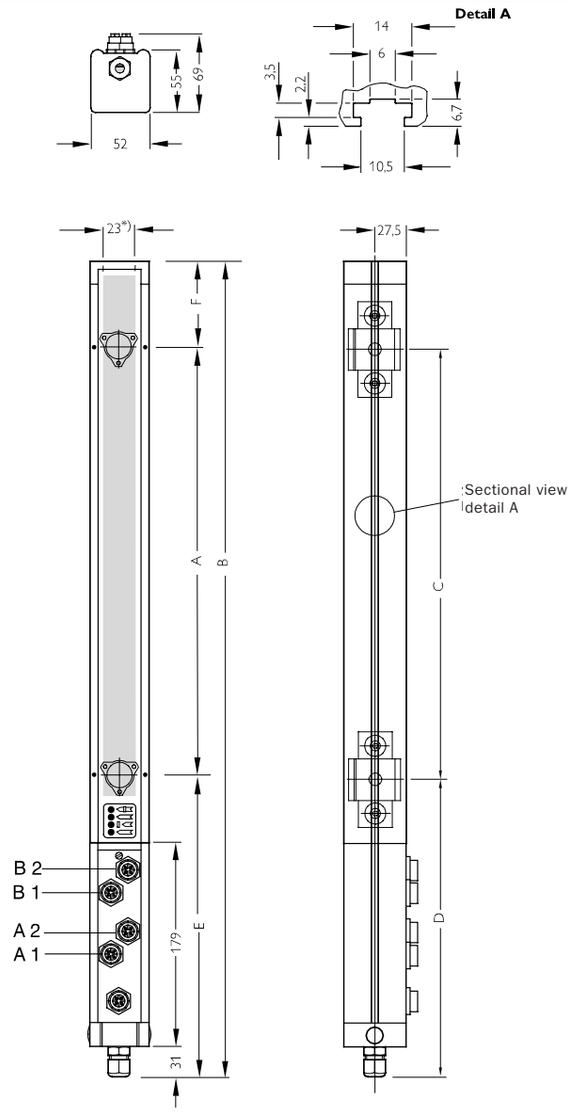
Operating data	
Power supply	24 V DC ± 20 % (as MSL)
Enclosure rating	1
Safety category	Type 4
Protection	IP 65
Ambient operating temperature	0 ... 55 °C
Air humidityAir humidity	15 ... 95 %
Storage temperature	– 25 ... 75 °C
Vibration resistance	5 g, 10 ... 55 Hz to IEC 68-2-6
Shock resistance	10 g, 16 ms to IEC 68-2-29
Power consumption max.Power consumption max.	
Receiver unit	7 W (without sensors and muting indicator lamp)

The functioning of the MSM is independent of its mounting.

8.2 Other technical data

Sensors	Section 3.3.1
Muting indicator lamp	Section 3.3.2

8.3 Dimensional drawings



	A	B	C	D	E	F
MSL 02-x50	500	684	524	80	300	77
MSL 03-x22	440	597	437	80	300	50
MSL 03-x40	800	985	825	80	300	78
MSLZ 01-x50	500	684	524	80	290	87

9 Selection tables

Description	Part no.
MSM muting module, separate, supplied unmounted *)	1 013 769
MSM muting module with integral override, separate, supplied unmounted *)	1 015 699
MSM indicator lamp with bulb	
incl. 2 m lead, plugs and mounting bracket	2 017 768
incl. 10 m lead, plug	2 018 504
MSM indicator lamp with LED	6 020 745
incl. 2 m lead, plug	2 019 909
incl. 10 m lead, plug	2 019 910
Muting sensor cable	
2 m, complete with plugs, for WT 24 only	6 008 649
5 m, complete with plugs, for WT 24 only	6 008 650
2 m, with plug for MSM and free end	6 010 974
5 m, with plug for MSM and free end	6 010 976
10 m, with plug for MSM and free end	6 008 652
Angled plug for muting sensor	6 008 651
max. 0,75 mm^2, for cable diameters 3,0 ... 6,5 mm	
Replacement parts	
Replacement bulb for muting indicator lamp, 4 W	6 008 654
Replacement housing for muting indicator lamp	6 008 645
Cap for device plug on MSM	6 011 170

*) For fitting on MSL

Muting expansion module mounted on MSLZ or MSL receiver unit

Beams	Beam spacing	Type	Part no.	Muting Standard Override	Muting Integral Override
2	500 mm	MSLE 02-15011	1 012 296	–	–
		MSLE 02-15051 A	1 015 566	●	–
		MSLE 02-15061 A	1 015 701	–	●
3	220 mm	MSLE 03-12211	1 013 764	–	–
		MSLE 03-12251 A	1 015 567	●	–
		MSLE 03-12261 A	1 015 851	–	●
3	400 mm	MSLE 03-14011	1 013 747	–	–
		MSLE 03-14051 A	1 015 568	●	–
		MSLE 03-14061 A	1 015 700	–	●
MSLZ Sender/receiver unit					
1	500 mm	MSLZ 01-15061	1 015 569	–	–
		MSLZ 01-15061 A	1 015 569	●	–
		MSLZ 01-15021 A	1 015 803	–	●

Distance active/passive side max. 7.5 m (with PSZ: 6.5 m)s

10 Index

WSU 26/2 – WEU 26/2
Photoelectric Safety Switch

▶ EASY INSTALLATION ◀

▶ UNIVERSAL USABILITY ◀

▶ SOLID CONSTRUCTION ◀

SICK

Contents

Standards and Regulations
To be observed in use and installation

Warning
Failure to observe may result in dangerous operation

Usage
Information regarding how to use the product correctly and efficiently

This technical description must be observed when installing and commissioning the WSU 26/2 - WEU 26/2. Inspection and commissioning must be carried out by specialists, if this is specified in the directives or guidelines.

Approvals

EU Europe

EC prototype test conducted by

BG - Berufsgenossenschaft
(Trade association)
Fachausschuß Eisen und Metall III
(Technical committee
for iron and metal III)
Graf-Recke-Str. 69
D-40239 Düsseldorf

Approval number: 97074

Generally recognized technical regulations and quality assurance system ISO 9000 are carefully applied during the development and production of SICK products.

1 General Introduction

The WSU 26/2 / WEU 26/2 photoelectric safety switch is a single-beam non-contact protective system. It consists of a WSU light sender and a WEU light receiver. The light beam between the emitting and receiving units provides access protection for hazardous areas.

The safety switch is designed for industrial applications. Its features include

- universal usability
- easy installation
- solid construction
- heated front screen, i.e. it can be deployed even in unfavorable ambient conditions.

The WSU/WEU complies with safety requirements according to pr EN 50.100, safety category type 4.

The following key data are applicable in practical use:

Scanning range	0.5 ... 18 m 15 ... 70 m
Beam diameter	23 mm

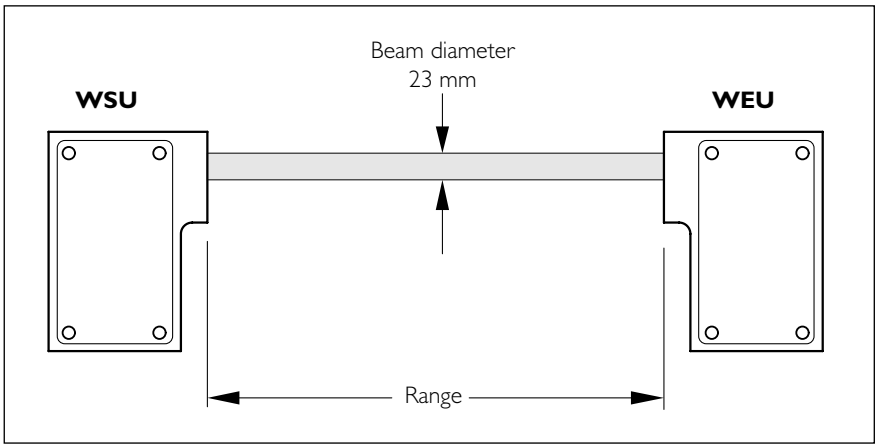


Fig. 1: System construction of the WSU 26/2 / WEU 26/2 photoelectric safety switch

2 Device/System Construction

The WSU/WEU comprises:

- WSU 26/2 sender unit and
- WEU 26/2 receiver unit

Each complete break in the light beam between the light sender and light receiver triggers a signal which can be used to immediately stop the dangerous movement of the power-driven machinery (abbreviated as "PDM").

The WSU 26/2 / WEU 26/2 serves as a protective cut-off device to protect hazardous areas on power-driven machinery. The machinery may be:

- plastics machinery
- stackers
- settling machinery in the stoneworking industry
- machining centers

The WSU/WEU 26/2 must not be used as a hand or finger guard.

3 Description of Function

The WSU and WEU are mounted separately in die-cast housings. Each has its own power supply (*Fig. 2*).
The WSU contains a clock generator and the sender diode. The diode emits infrared pulses at the clock rate set by the generator, which are evaluated by the receiver unit WEU if the light path is uninterrupted.
The WEU contains the output relays A and B, which pick up if the light path is uninterrupted.
If the light path or the connection between terminals 10 and 11 on the WSU is interrupted (testing), both relays are released.

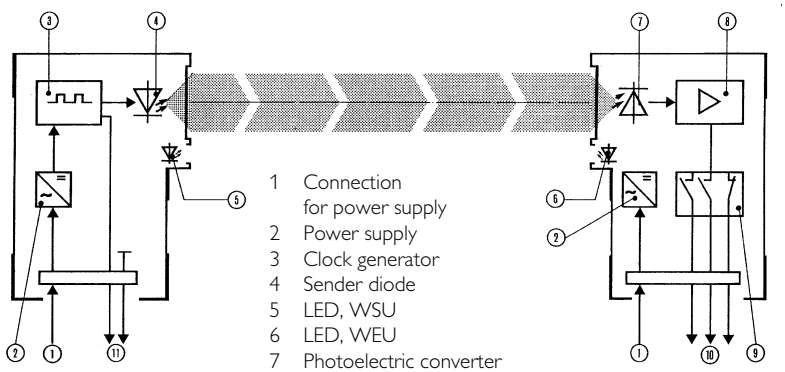


Fig. 2: Principle of function of the WSU/WEU 26/2, AC version

4 Possible Areas of Application and Application Conditions

4.1 Possible Areas of Application

The WSU/WEU provides access protection for hazardous areas (*Fig. 3*).

4.2 Application Conditions

Safe cut-off can only be effected when the light beam diameter of 23 mm is fully covered.

The protective function of the WSU/WEU is ensured when the conditions set out in the adjacent box are met.

The power-driven machinery ("PDM") must be controllable by electrical means.

The dangerous movement of the machine must be able to be stopped at any time.

The WSU/WEU must be positioned so that entry into the hazardous area is only possible by breaking the light beam.

The *command unit* must be positioned so that it cannot be activated from the hazardous area.

5 Mechanical Arrangement and Mounting

5.1 Safety distance

The WSU/WEU must be attached such that, if the light beam is broken during hazardous movement of the machinery, the point-of-operation can only be reached when this hazardous movement has ceased. For this purpose, a safety distance S must be maintained between the nearest boundary of the point-of-operation and the light beam (*Fig. 4*). The safety distance depends on the machine stopping time and on the approach speed of the personnel.

The machine stopping time must be determined by repeating measurements under practical conditions. 1.6 m/s is the recommended approach speed. The safety distance is calculated as follows:

$$S = v\,(t_1 + t_2) + C$$

S	Safety distance (mm)
v	Approach speed 1.6 m/s
t_1	Machine stopping time (ms)
t_2	Response time of WEU (22 ms)
C	Dependent on number of beams (1, 2, or 3), see Table 1

§

pr EN 999
Safety of machinery
Approach speed of body parts for arrangement of protective systems

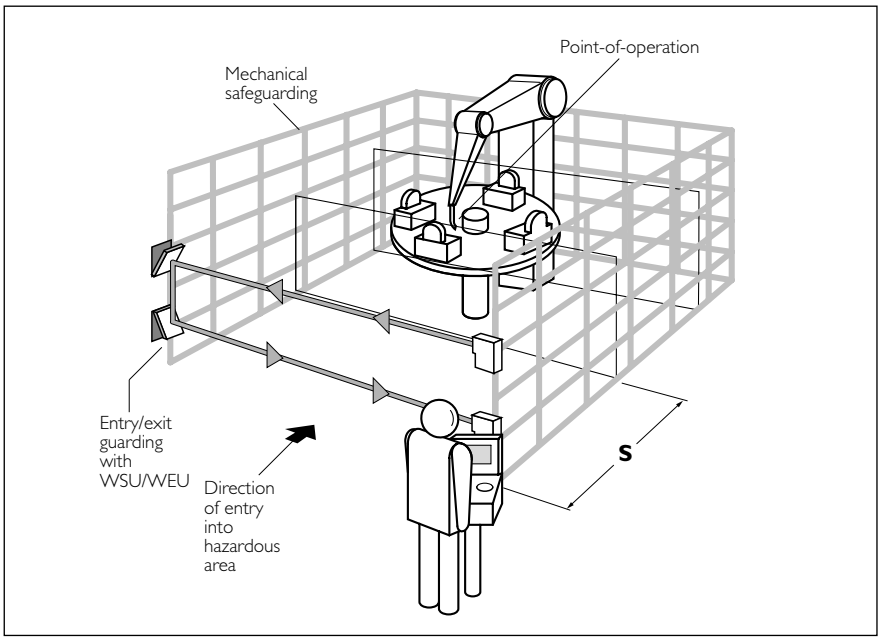


Fig. 4: Safety distance to light beam

Table 1 shows which C value must be used for which application.

Number of beams	1	2	3
Height of beam(s) above floor (mm)	750	400 900	300 700 1100
C	1200	850	850

Table 1: Height of beams above floor

The WSU/WEU must be attached such that, if the light beam is broken during hazardous movement of the machinery, the point-of-operation can only be reached when the power-driven machinery is no longer in a hazardous state.

For this purpose, a safety distance must be maintained between the light beam and the nearest boundary of the point-of-operation. This safety distance is determined according to pr EN 999.

People within the hazardous area but outside the light beam are not detected. It must, however, be ensured that any hazardous state can only be initiated when there is no one in the hazardous area.

Use and mounting of the protective systems is subject to the relevant official rules and regulations. These provisions differ depending on the area of application.

5.2 Mechanical Mounting

The WSU and WEU units can be mounted on one of the sides of their housing or using the mounting bracket, depending on site circumstances. The mounting bracket greatly assists alignment. The devices can be mounted in any operating position. However, the WSU and WEU should be mounted such that the axis of the light beam emitted by the WSU always matches the axis of the WEU optic (alignment sight).

The mounting brackets should be affixed so that all fixing screws are easily accessible for alignment purposes. Figure 5 shows examples. The devices should be attached such that the opposing device can be aligned in the alignment sight.

If, for reasons of space, the devices need to be arranged as shown in *Figures 5 a and b*, hexagon screws must be used.

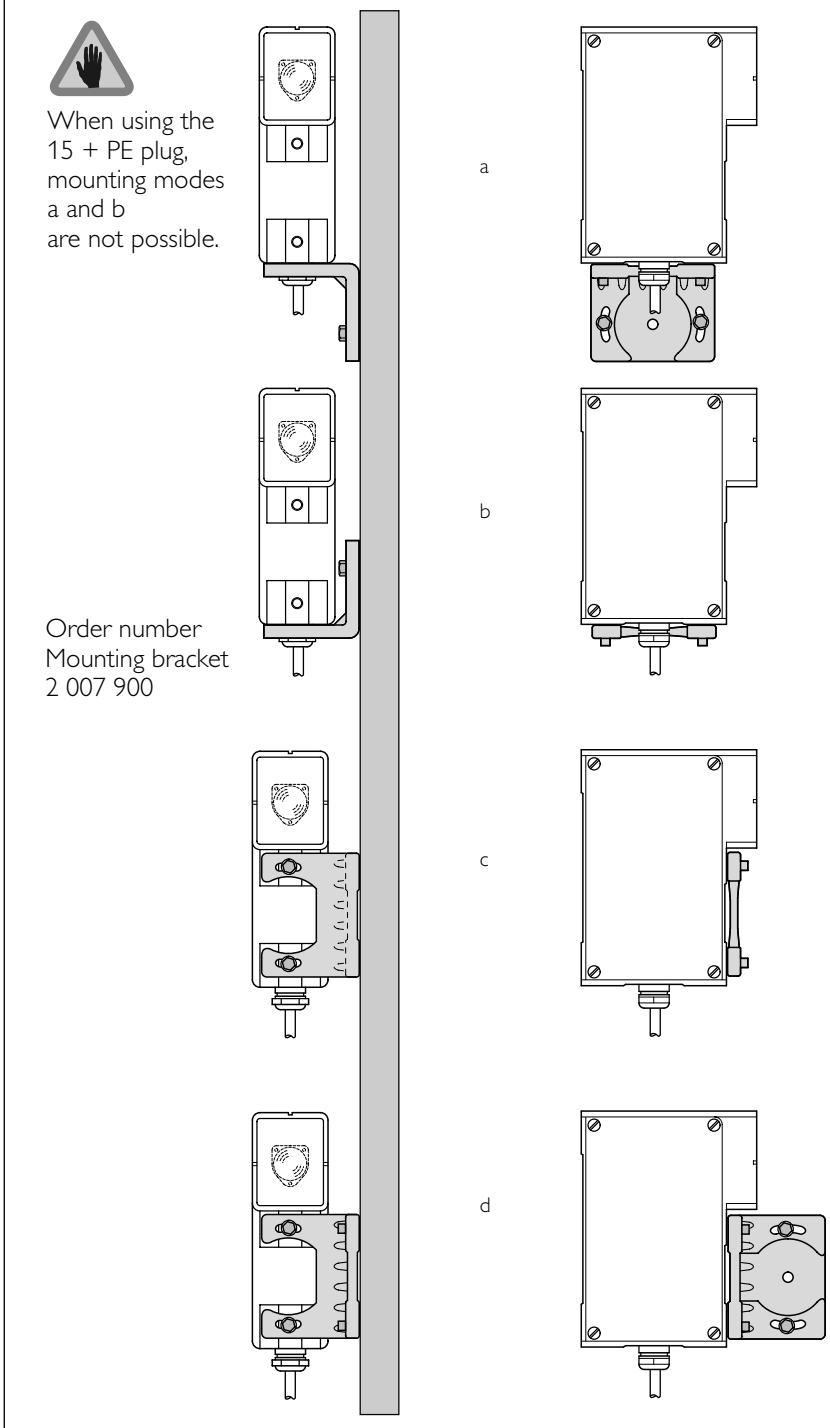


Fig. 5: Mounting options using a mounting bracket

5.3 Multiple Safeguarding

When using two WSU/WEU units in a protective system, the possibility of mutual interference must be excluded. Since the light beam of the WSU diverges, the cross-section of the beam increases as the distance between the WSU and WEU grows. The following conditions must therefore be met when arranging the WSU/WEU:

5.3.1 Mutual Interference

The light beam of the WSU must only be received by the corresponding WEU. To prevent mutual interference between several WSU/WEU installations arranged adjacent to or above each other, the specified beam diameters must be taken into account when mounting the devices (*Fig. 6*).

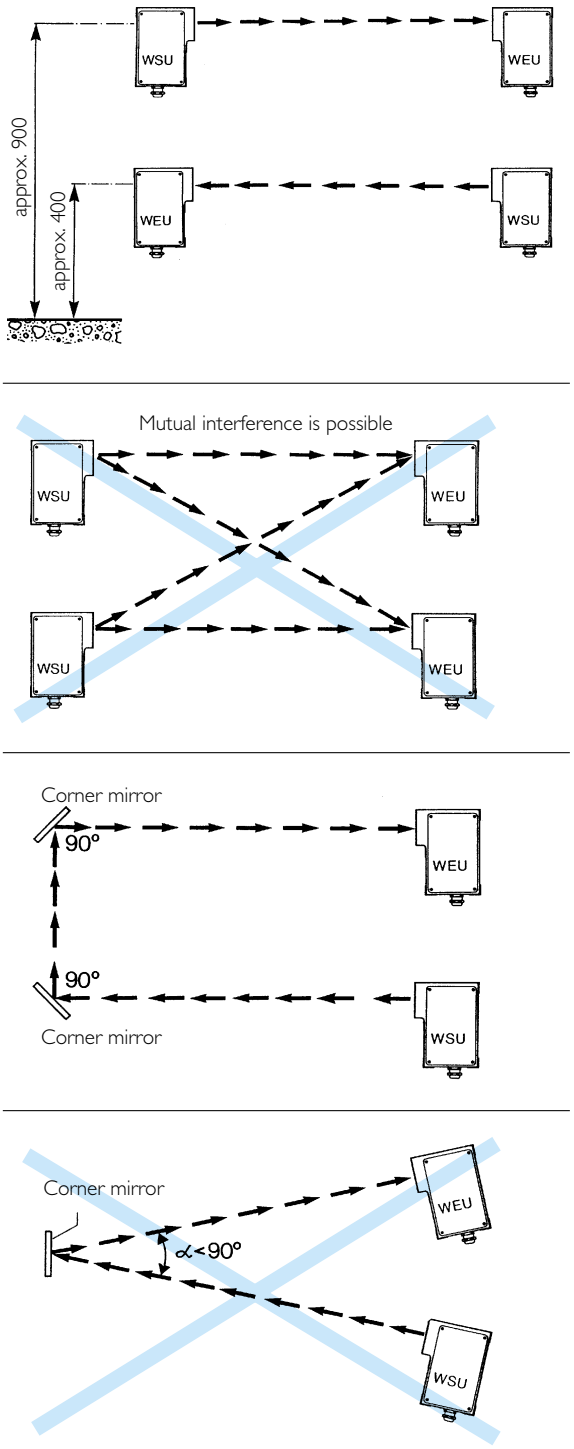


Fig. 6: Safeguarding a hazardous area with WSU/WEU

There are two versions of the WSU, for operating ranges 0.5 ... 18 m and 15 ... 70 m. The WSU must not be used for operating ranges below 15 m. The operating range is given on the rating plate.

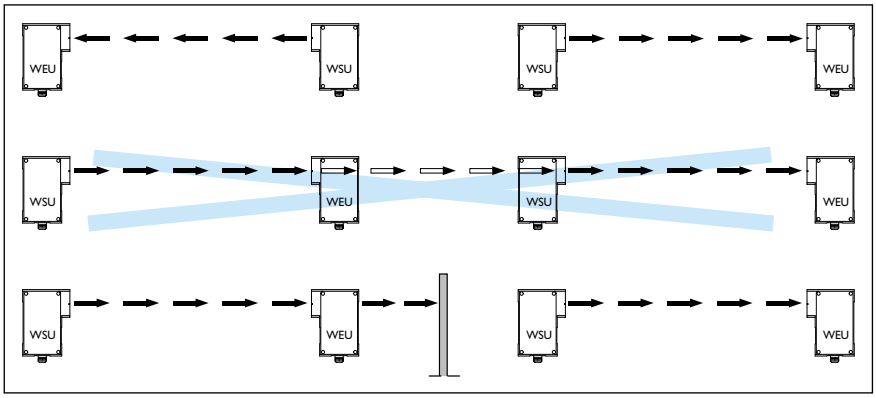


Fig. 7: Mounting of two WSU/WEU units in series

5.4 Corner mirrors

In conjunction with corner mirrors, the WSU/WEU provides multi-sided, two-beam access protection (*Fig. 8 and 9*).

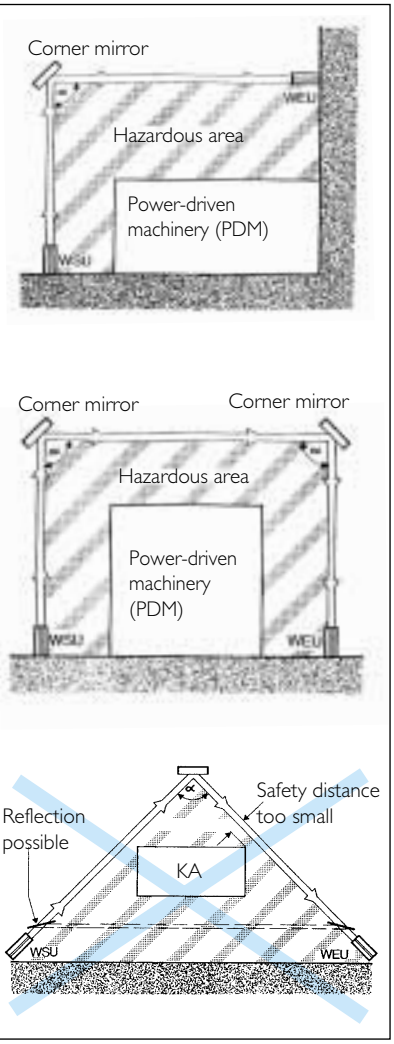


Fig. 8: Multi-sided protection of hazardous areas

The use of corner mirrors reduces the scanning range of the WSU/WEU system as cited in the table.

Number of mirrors	Reduced scanning range **0.5 ... 18 m WSU**	Reduced scanning range **15 ... 70 m WSU**
1	17 m	67 m
2	15.5 m	61 m
3	13 m	51 m
4	11 m	42 m

Tab. 2: Reduction in scanning range when using corner mirrors

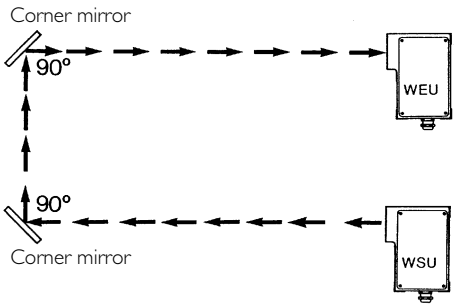


Fig. 9: Two-beam protection with a WSU/WEU 26 system

The use of more than 2 mirrors requires a very accurate alignment.

6 Mounting

6.1 Mounting Requirements

The devices should be mounted and connected in accordance with the on-site application conditions and connections, taking account of the following:

The scanning range is based on the width of the area being protected. Bypassing or encircling must be prevented by suitable (mechanical) means.
Where one or more WSU/WEU units are used, the height and number of light beams must comply with the applicable regulations.
There must be no reflective surfaces in the emitting or receiving beam path.
The minimum distance must be maintained.

6.2 Detecting Reflections

The light beam must not be unintentionally reflected back to the receiver by reflective surfaces. Reflections can be detected as follows:

Cover the light beam between the sender and receiver fully with an obstacle (100 mm x 100 mm) and slowly move the obstacle from the sender unit to the receiver unit.
While this is happening the green LED on the WEU must not light up. If it lights up even just briefly during this check, reflection is occurring.
See also *8. Commissioning*.

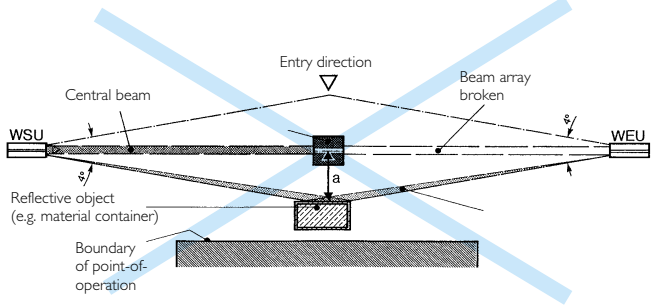


Fig. 10: Incorrect mounting: reflective object in divergent light beam. No detection of the obstacle due to reflection. No protection.

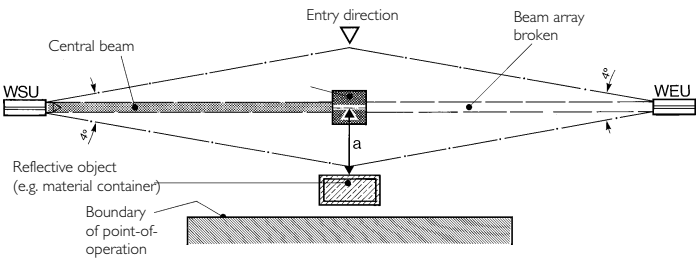


Fig. 11: Correct mounting, correctly aligned: reflective object outside divergent light beam. No reflection. The obstacle is clearly detected.

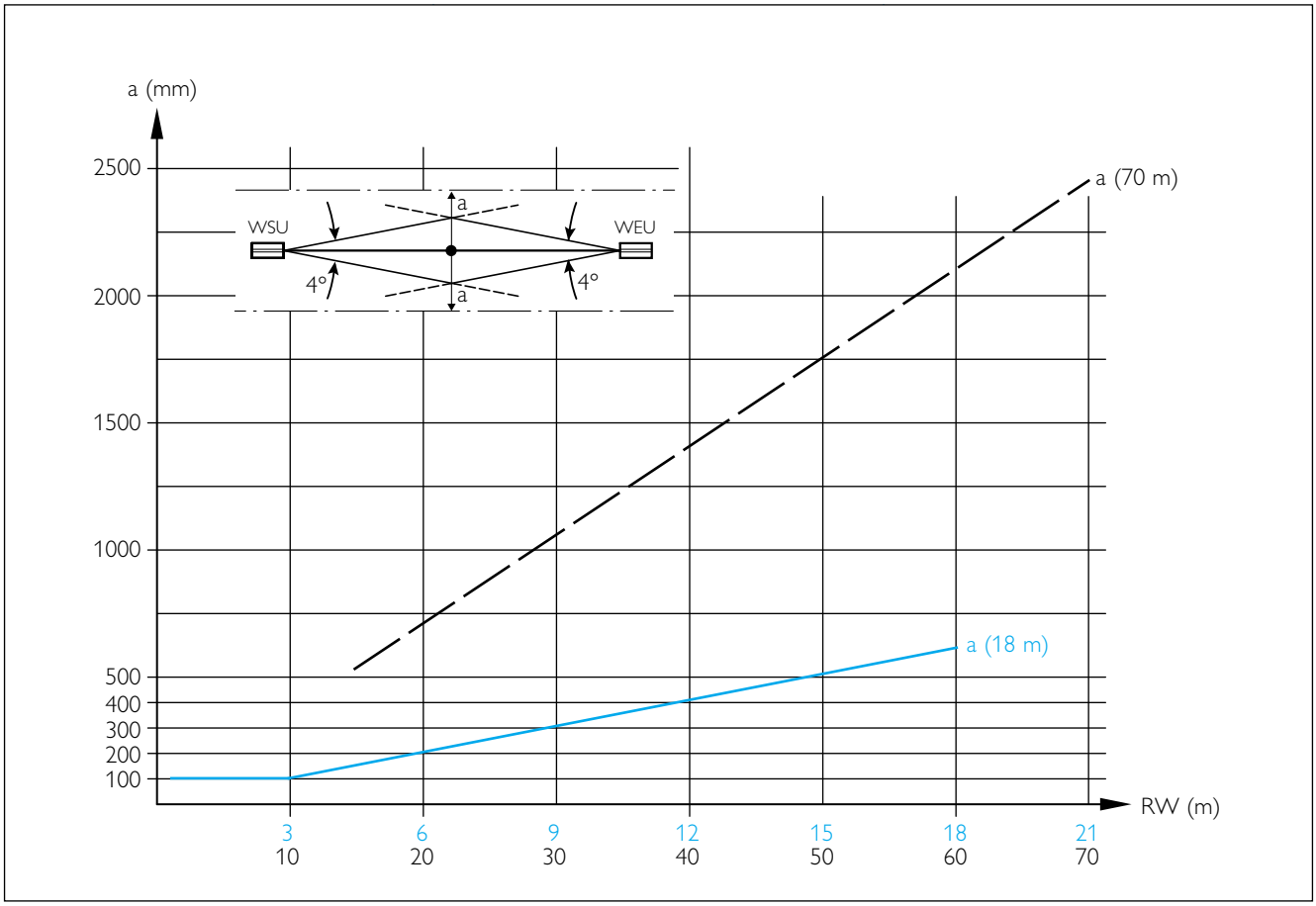


Fig. 12: Distance a as a function of scanning range SR

7 Electrical Connection

7.1 General Introduction

Depending on type, the WSU/WEU 26/2 photoelectric safety switch is available for a supply voltage of

- 24 V DC
- 115 V AC or
- 230 V AC.

The rating plate gives details.

The two system components must be of the same voltage version and the same scanning ranges.
Single- or fine-wire conductors up to 1.5 mm^2 can be connected to the screwless terminals (to VDE 0607). Stripping length: 11 mm.

At least two outputs must be connected to the downstream machine controller (*Fig. 20/21*). Each of the two outputs (NO contacts) must be assigned an electromagnetic switching element.

The electrical connection of the WSU/WEU must only be made or changed with the power disconnected.

Unscrew the housing cover to connect the WSU/WEU with a PG connector.

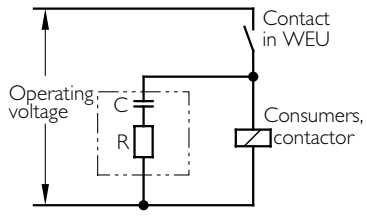
Before connection, check that the supply voltage and mains frequency on-site are consistent with the specifications on the rating plate.

The cable is fed through the PG connector and connected inside the device, or connected to the equipment plug. The wiring diagram is depicted again on the housing cover of the respective device.

The enclosure rating for the devices can only be guaranteed when the cable is properly clamped in the PG connector and the housing seals fit perfectly. Where long leads are used, the cable cross-sections should be chosen to ensure the devices are always supplied with the required voltage (see Technical Data).

Arc-suppression elements are essential under inductive load! Arc-suppression elements must be connected in parallel with the inductance. Connection in parallel with the output contact is not permitted.

Diodes must **not** be used as arc-suppression elements.



Guide values for arc-suppression elements

Operating voltage V	Order no.	R Ω	C µF
115 ... 230	6 001 224	220	0.22
24	6 001 225	100	2.2

Plastic-encapsulated; connecting wires NYAF 0.5 dia. with cable lugs; mounting with adhesive tape or cable tie.

Tab. 3: Overview for arc-suppression elements

7.2 Wiring Diagram

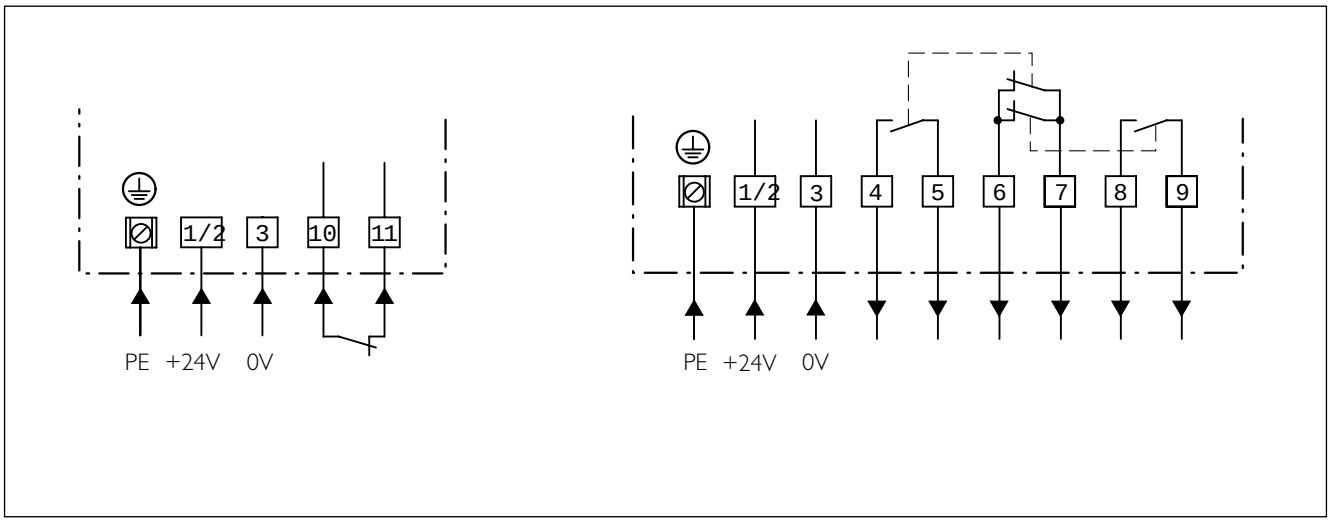


Fig. 13: Wiring diagram WSU/WEU for 24 V DC supply, with PG connector

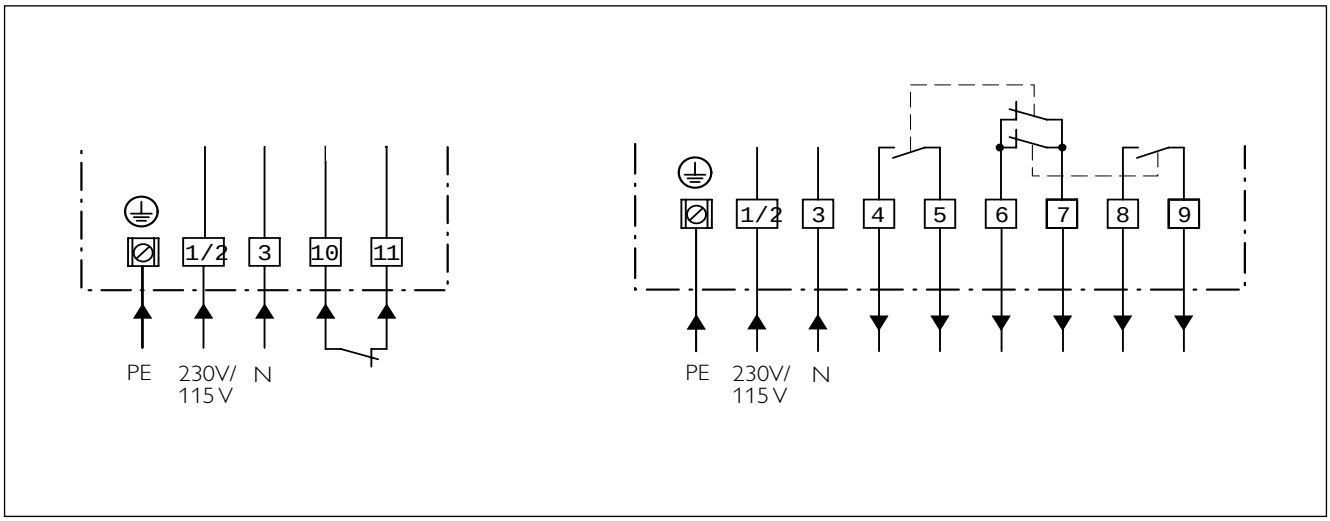


Fig. 14: Wiring diagram WSU/WEU for AC supply, with PG connector

Connecting leads max. 1.5 mm²

WSU
Test contact (10, 11)

Floating	U	24 V DC
	I	10 mA
Opening time	t	≥ 50 ms

WEU
Outputs (4 - 9)

Umax.	250 V AC
Imax.	2 A per output
Imin.	0.02 A per output

SICK WSU 26/2 – WEU 26/2

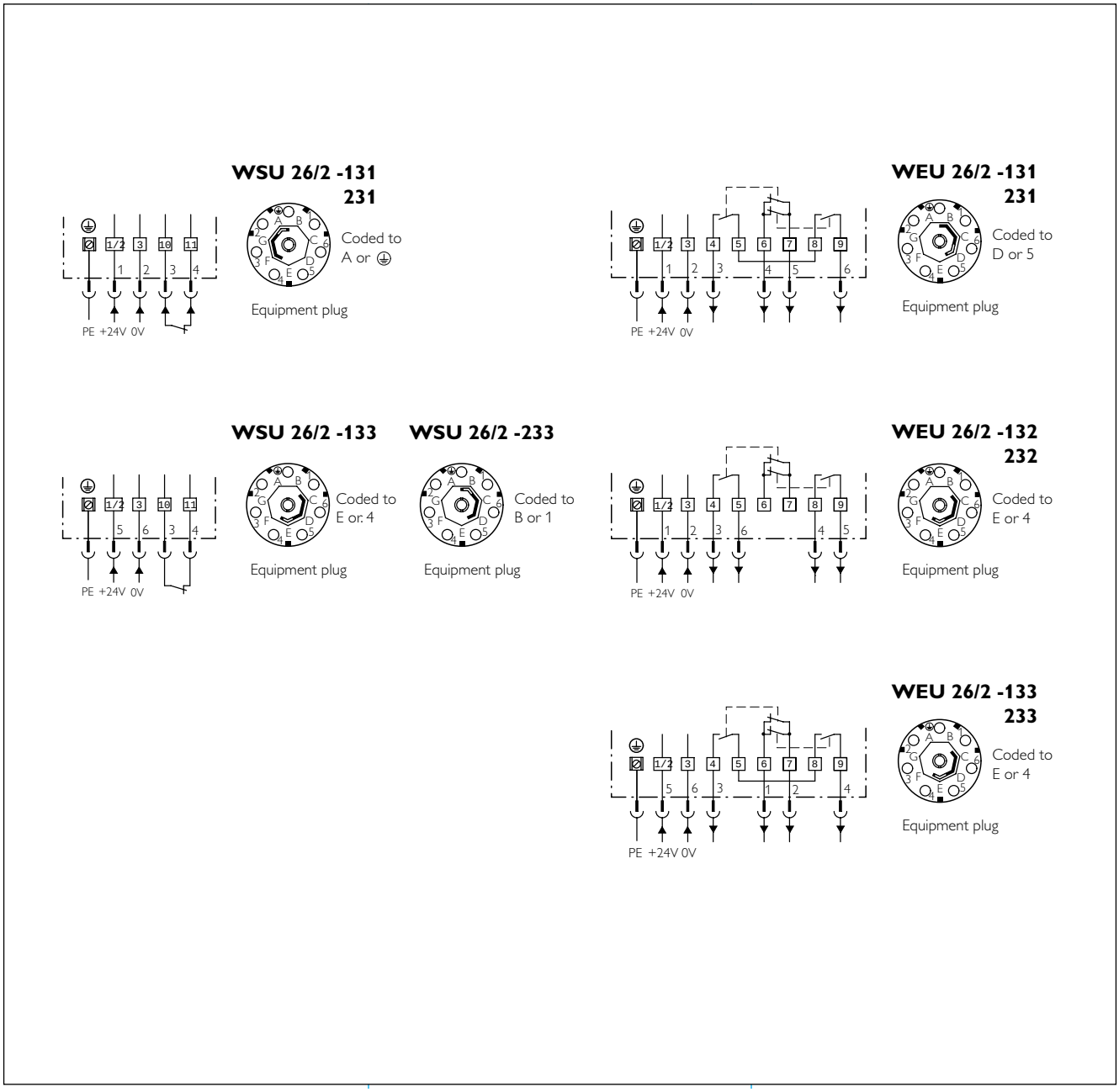


Fig. 15: Wiring diagram WSU/WEU 26/2 for 24 V DC supply, interchangeable design

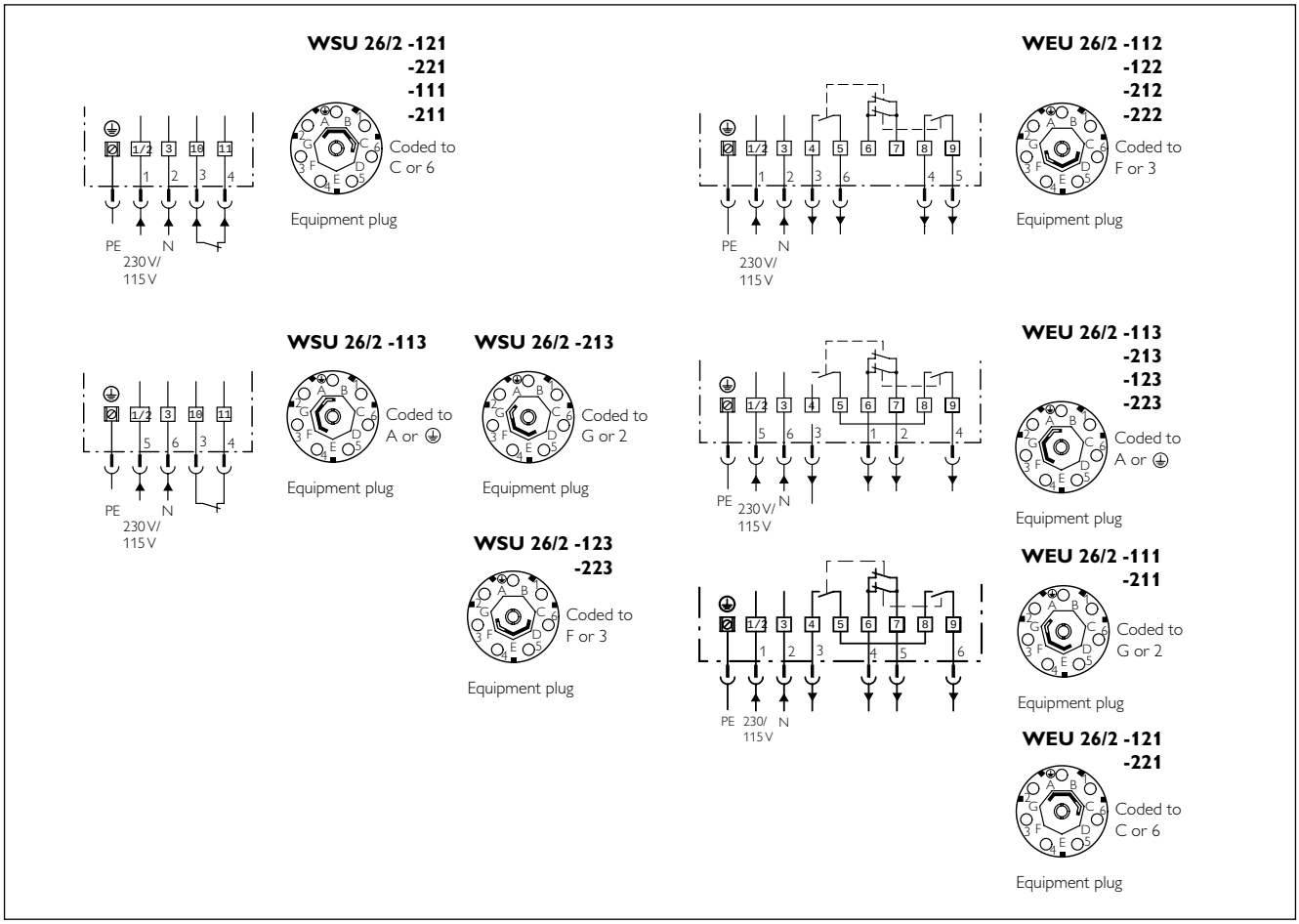
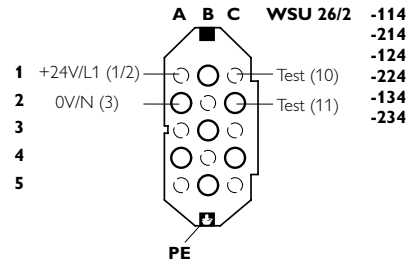
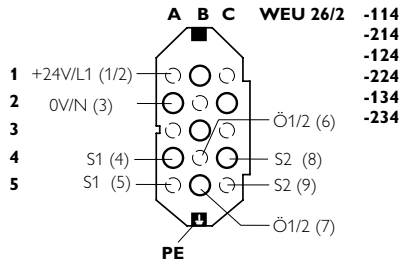


Fig. 16: Wiring diagram WSU/WEU 26/2 for AC supply, interchangeable design



	A	B	C
1	24 V L 1 (1/2)	n.c.	Test (10)
2	0V N (3)	n.c.	Test (11)
3	n.c.	n.c.	n.c.
4	n.c.	n.c.	n.c.
5	n.c.	n.c.	n.c.



	A	B	C
1	24 V L 1 (1/2)	n.c.	n.c.
2	0V N (3)	n.c.	n.c.
3	n.c.	n.c.	n.c.
4	S 1 (4)	Ö 1/2 (6)	S 2 (8)
5	S 1 (5)	Ö 1/2 (7)	S 2 (9)

Fig. 17: Pin assignment WSU/WEU 26/2, AC/DC version with equipment plug (15 + PE)

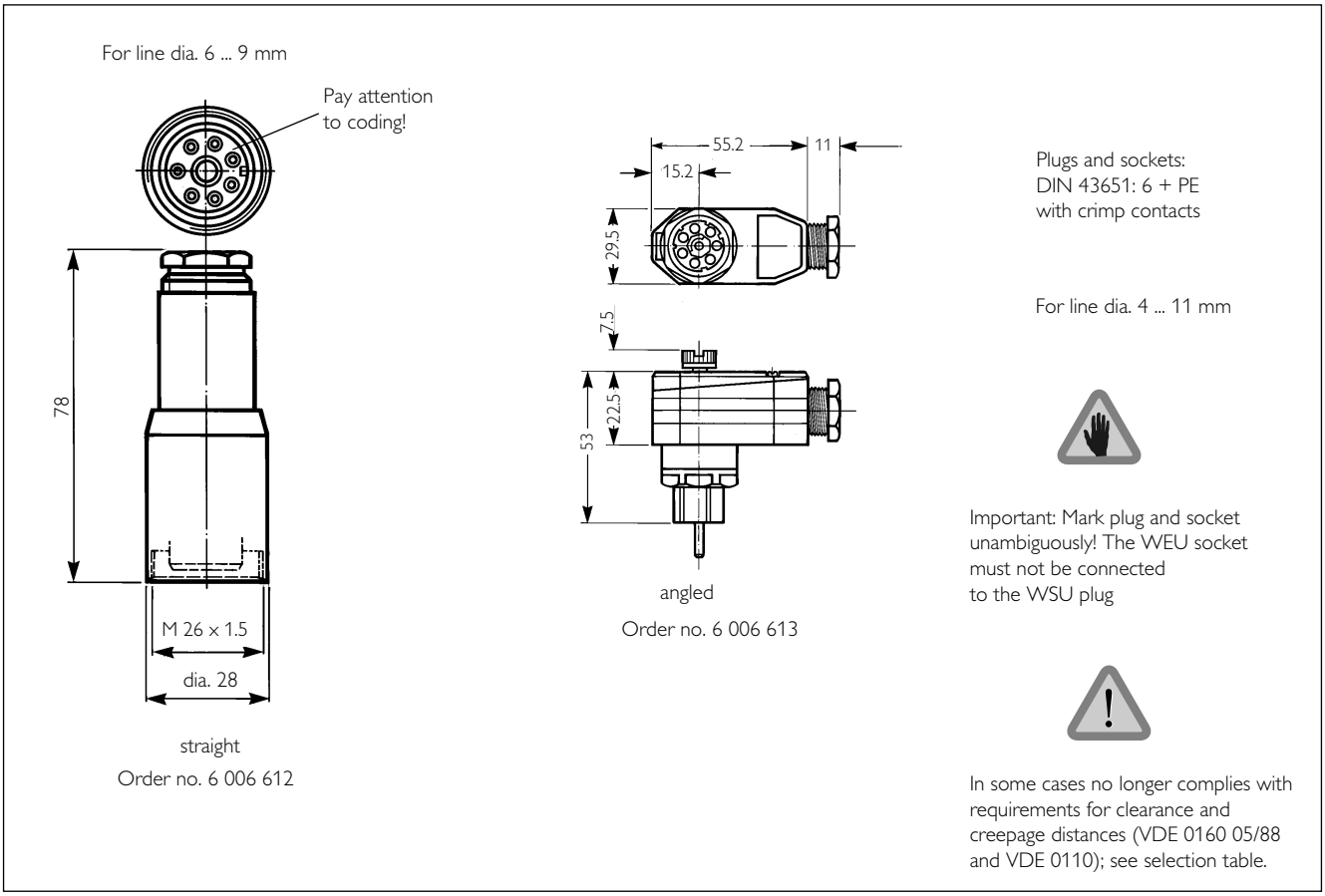


Fig. 18: Cable receptacles 6 + PE

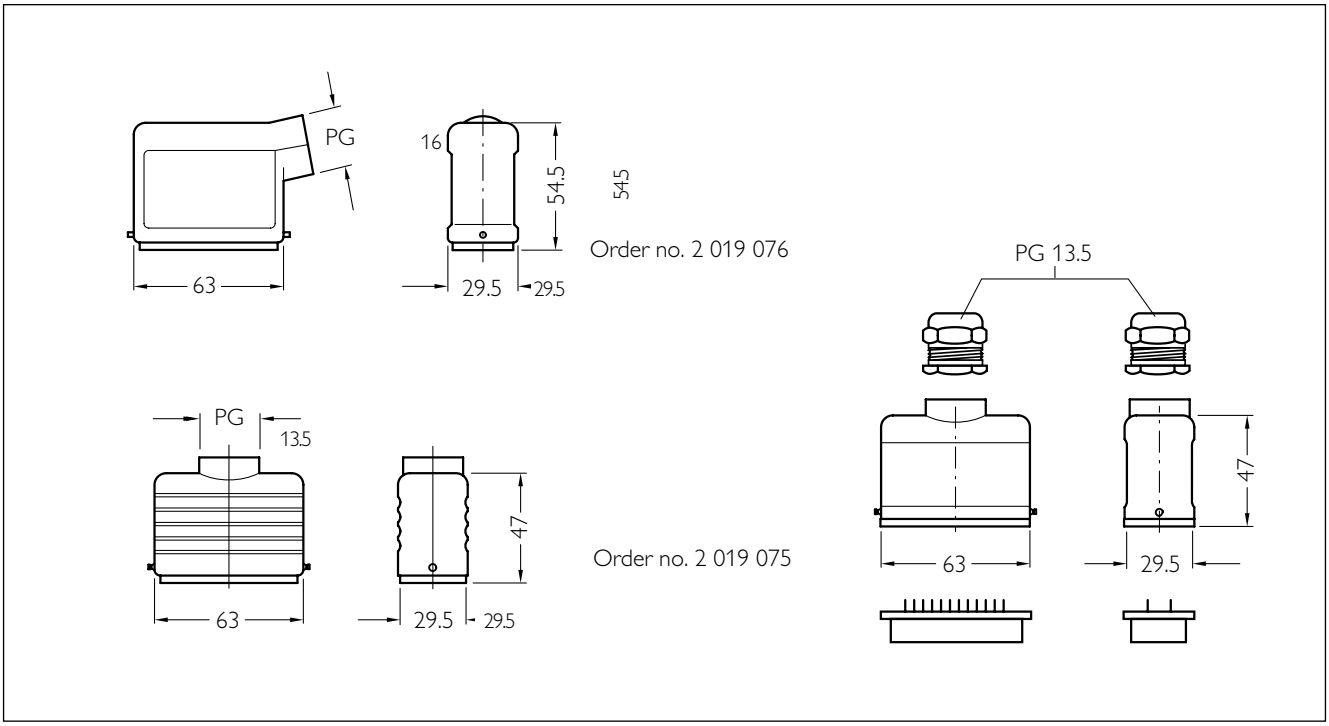


Fig. 19: Cable receptacles 15 + PE

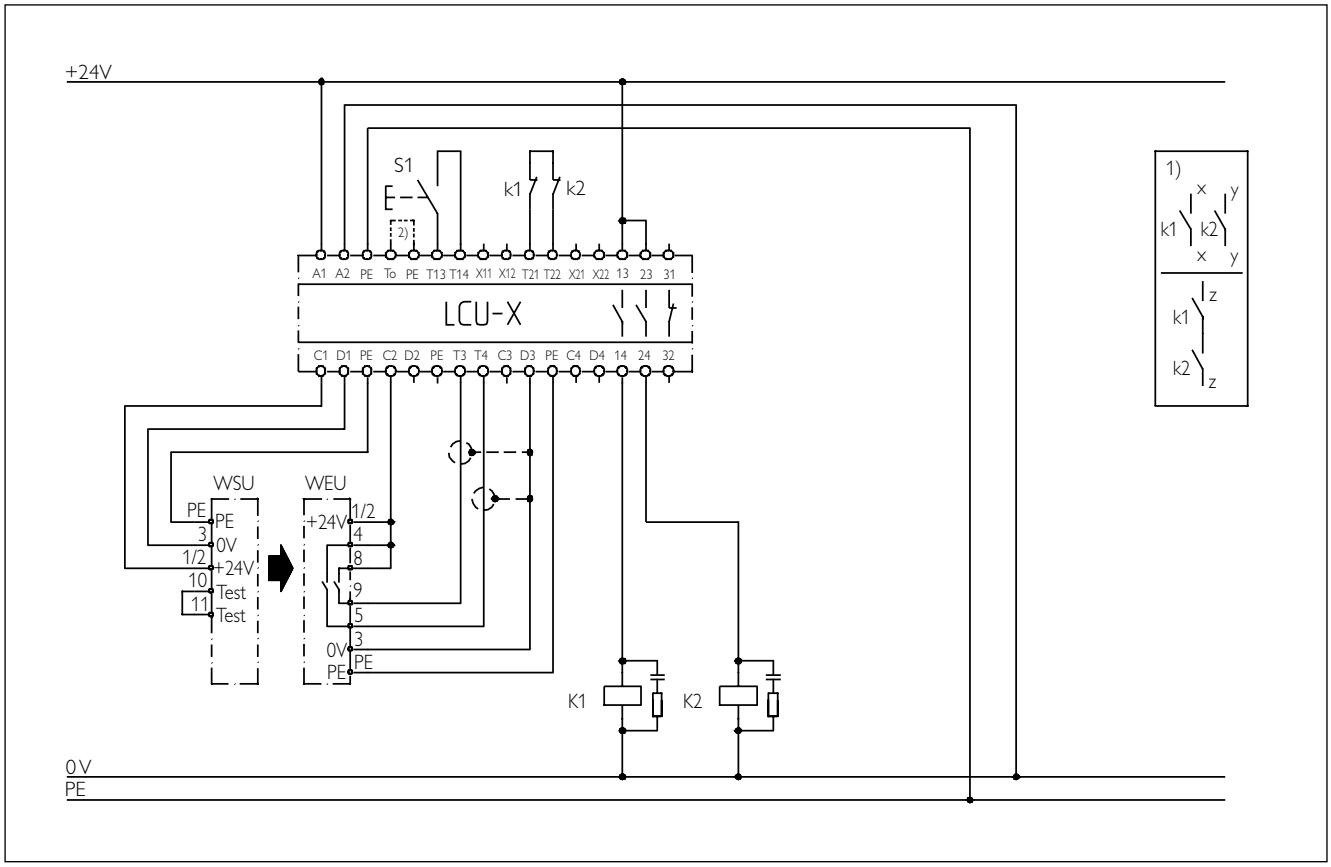
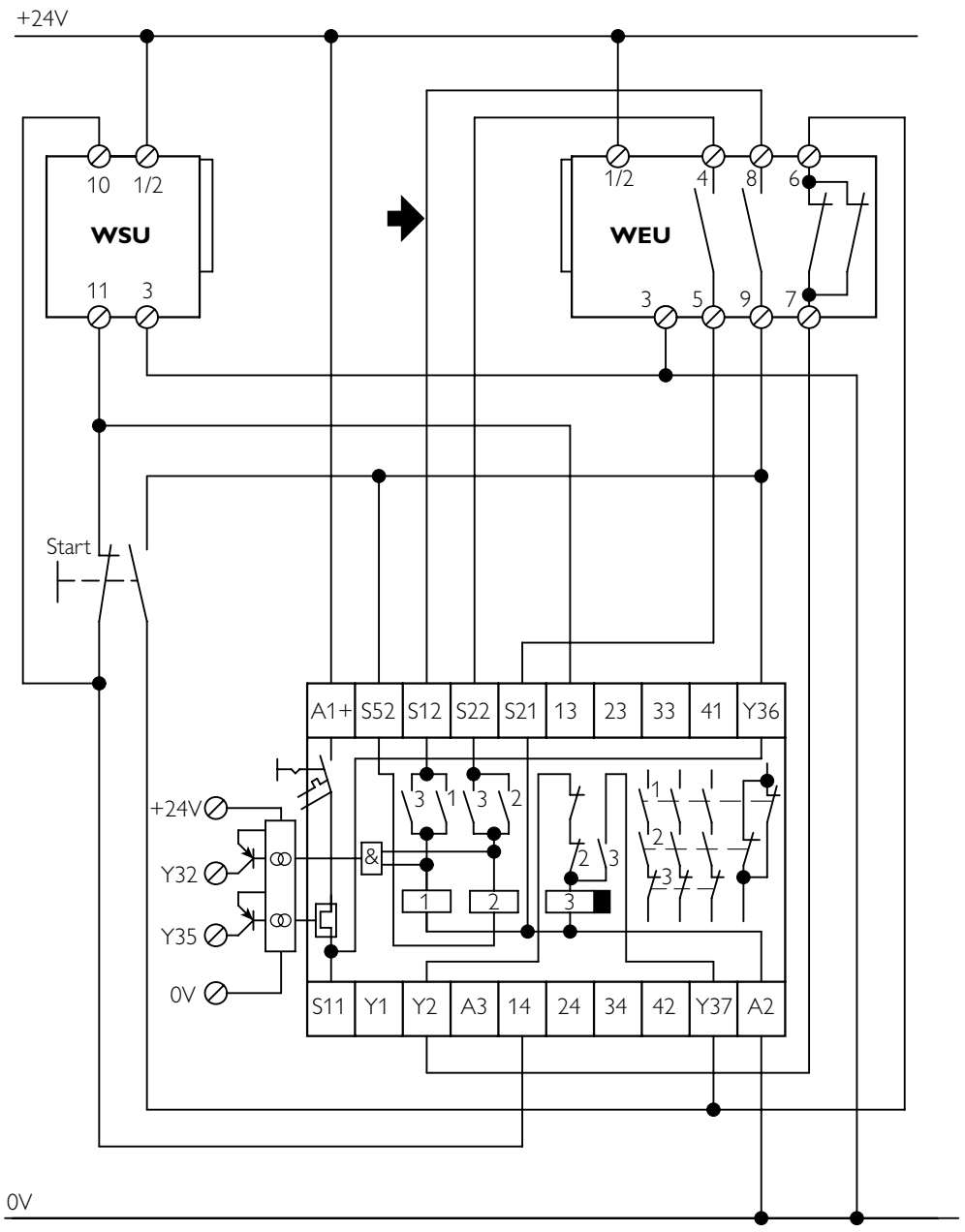
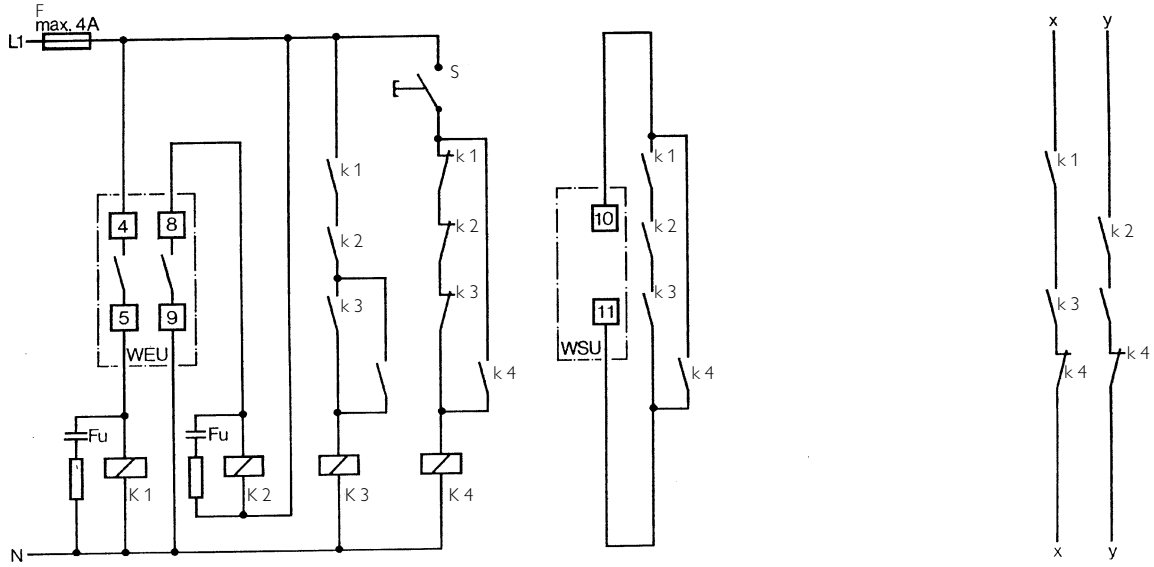


Fig. 20: WSU/WEU 26/2 with Safety Interface LCU-X



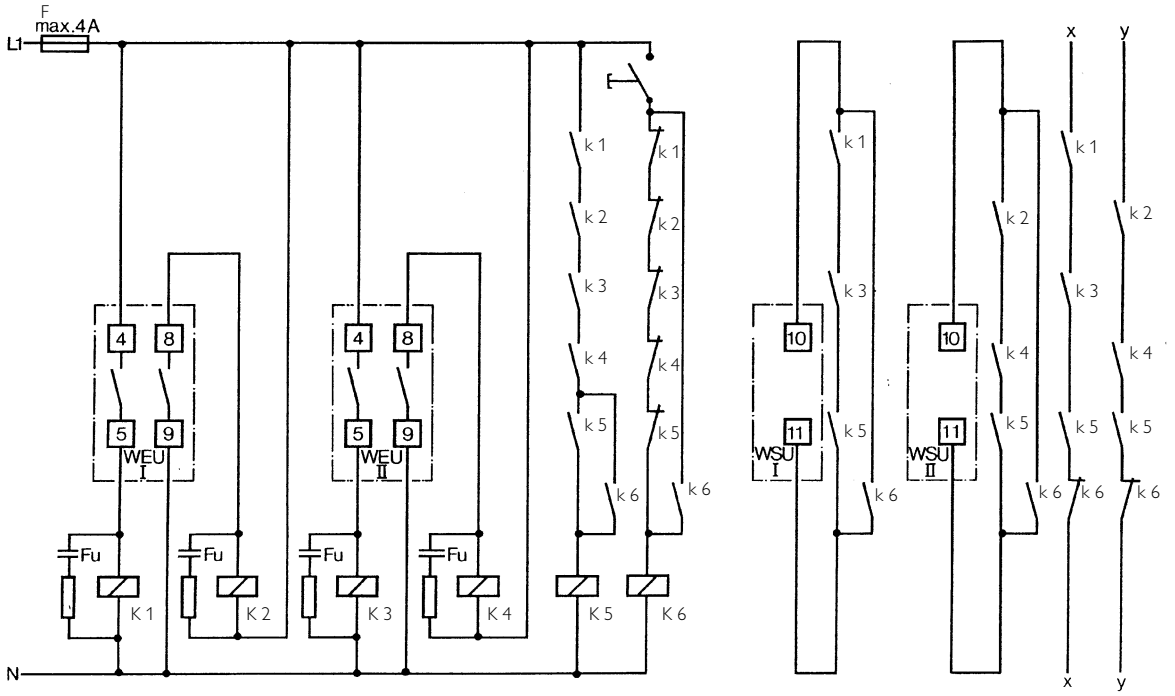
Outside switch cabinet separate line laying to receiver. Terminals 1, 3, 8 and 9 and 4, 5, 6 and 7 respectively in one plastic-sheathed cable. Use PG 21 (order no. 5 305 978) and PG extension (order no. 5 306 052).

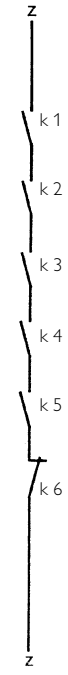
Fig. 21: WSU/WEU 26/2 with PNOZ 8 (Pilz); BIA-tested application no. 01131202933



K1 to K4	Contactors or relays with positively-driven contacts (not supplied)
Fu	Arc-suppression, essential
S	Command unit, e.g. pushbutton, key-operated switch etc. Press button S to start, otherwise red LED on WEU remains lit.
x and y	Insert in safe machine controller to interrupt the hazardous movement. For safety reasons, the two contact rows (x and y) must be inserted separately into the controller (two-channel).
z	If, in exceptional cases, depending on the risk assessment, the controller of the power-driven machinery is only of single-channel design, contact row z can be used.

Fig. 22: Example of a connection with one WSU/WEU-26 system





K1 to K6	Contactors or relays with positively-driven contacts (not supplied)
Fu	Arc-suppression, essential
S	Command unit, e.g. pushbutton, key-operated switch etc. Press button S to start, otherwise red LED on WEU remains lit.
x and y	Insert in safe machine controller to interrupt the hazardous movement. For safety reasons, the two contact rows (x and y) must be inserted separately into the controller (two-channel).
z	If, in exceptional cases, depending on the risk assessment, the controller of the power-driven machinery is only of single-channel design, contact row z can be used.

Fig. 23: Example of a connection with two WSU/WEU-26 systems

8 Commissioning

8.1 Alignment of WSU and WEU

After checking the electrical connections, loosen the fixing screws on the WSU/WEU and align the devices to each other roughly using the alignment sight.
For further alignment keep pressing button S or jumper terminals 10 and 11 on the WSU and switch on the devices. When this is done the LED on the WSU (yellow LED) lights up (*Fig. 24*).
Align the devices to each other so that the green and yellow LEDs on the WEU light up.
For optimum alignment, ascertain the limits of the emitting and receiving ranges by swiveling the WSU and WEU horizontally and vertically one after the other. Just before the limit of the optical range the yellow LED on the WEU begins to flash (*Fig. 26*). Beyond the optical range the red LED on the WEU lights up.
Then secure the WSU and WEU respectively in the middle of the resulting ranges. The yellow LED on the WEU must be permanently lit.

8.2 Alignment of WSU and WEU with Alignment Aid AR 60

For precise alignment of the WSU and WEU the alignment aid AR 60 is available.
The alignment aid is clamped in front of the WSU and WEU respectively on a bracket (*Fig. 25*), which is mounted underneath the optic and held in place by two screws.
The AR 60 emits a visible laser beam which exactly marks the optical axes of WSU and WEU if they are correctly mounted.

8.3 Checking

Incorrect alignment may mean that an obstacle is not detected or that operational safety is not attained (*Fig. 24*).
The functional safety of the photoelectric safety switch is checked by breaking the light beam continually and along its entire length, from just in front of the WEU back to the WSU (surface area 100 mm x 100 mm). While this check is being performed, the red LED on the WEU must remain continuously lit. If it does not, investigate the diversion of the light beam between the WSU and the WEU (reflection may be occurring, see *6.2 Detecting Reflections*).

A function check of this kind must be carried out

- daily prior to start of production,
- after any change in the WSU/WEU configuration,
- after any servicing or maintenance work on the protective system.

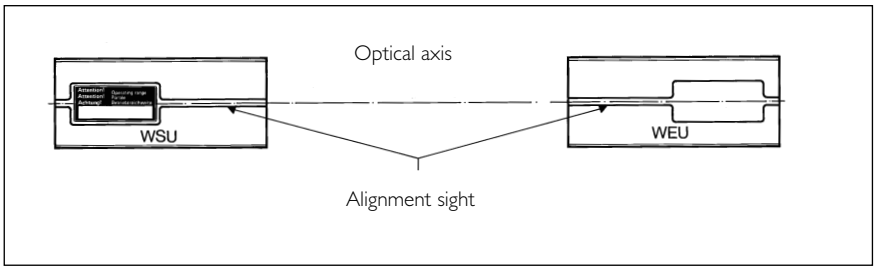


Fig. 24: Alignment with the aid of the alignment sight

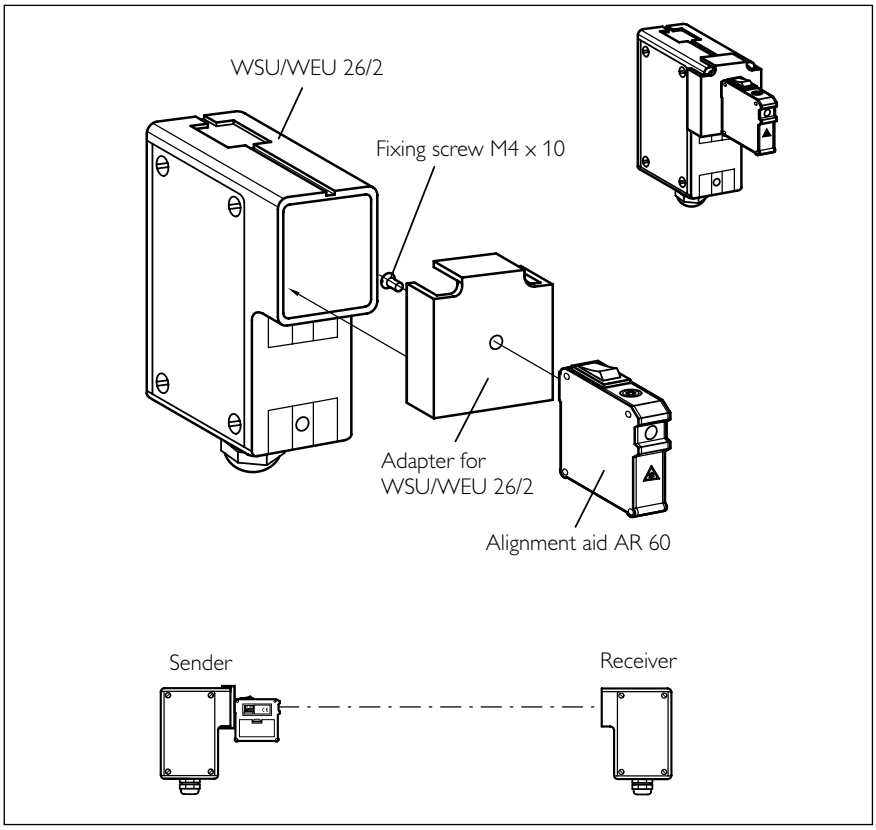


Fig. 25: Laser alignment aid AR 60 and WSU/WEU

9 Maintenance

The front screens of the WSU and WEU should be cleaned at regular intervals, according to the site conditions. The screens must only be cleaned with a clean, soft cloth or with cotton wool.
Use plastic cleaner as the cleaning agent.

10 Commissioning

Since the WSU/WEU is a protective system, it is recommended that the system be commissioned into operation by an expert. Experts are deemed to be only persons trained in the handling of such safety equipment who are

- employees of SICK,
- employees of SICK subsidiaries and representatives abroad,
- employees of companies who operate large quantities of SICK safety equipment at their premises, provided they have been trained by SICK and have been assigned by their employers to perform such duties.

11 Malfunctions

11.1 Diagnostic Elements

The LEDs on the WSU and WEU indicate the following operating states (*Fig. 26*):

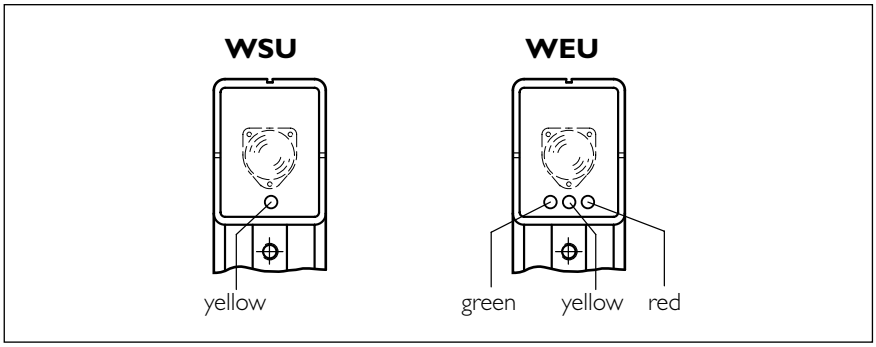


Fig. 26: LEDs of the WSU and WEU

	**Continuously lit**	**yellow**	Operating voltage applied (test contact closed)
	Off	**yellow**	No operating voltage applied or test active (For duration of test)
	**Continuously lit**	**green**	Light beam of sender unit reaching receiver
		yellow	Sufficient light received
		red	Light beam broken, briefly during test
		yellow + red	Interference of another emitter element
	Flashing	**yellow**	Insufficient light received, unit still functioning
	Off	**green**	No operating voltage applied, light beam broken, test performed
		yellow	Light beam broken, testing performed, no operating voltage applied
		red	No operating voltage applied, light received from sender

Tab. 4: Functioning of the LEDs

Simple malfunctions can be rectified by referring to the chart below. Before opening up the units clean the housing thoroughly to prevent dirt entering the interior.

Do not touch any electrical connections when the unit is open and switched on.

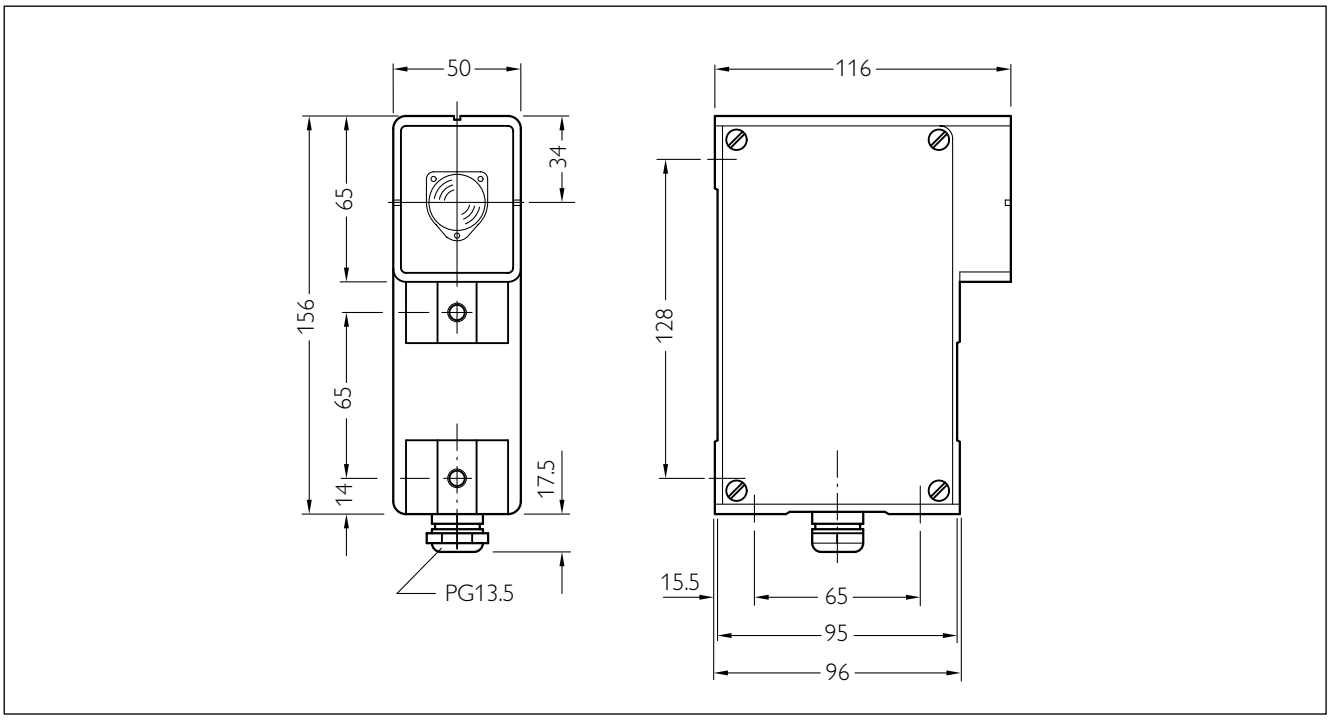
Fault	Cause	Testing and remedy
LED on WSU not lit	No power supply	Check voltage
	Break between terminals 10 and 11 (test contact)	Check passage
LED on WSU lit, none of the three LEDs on the WEU lit	No power supply on WEU	Check voltage on WEU
	Break at relay contact Relay defective	Replace unit
The red LED on the WEU is permanently lit (no light being received)	Unit out of alignment	Re-align WSU and WEU units
	Front screen dirty	Clean front screens of WSU and WEU
	Test input (sender) interrupted	Check testing
	Receiver WEU defective	Replace unit
	Sender WSU not emitting	On WSU briefly switch power off and on again (min. 1 s)
	Sender WSU defective	Replace unit
The yellow LED on the WEU flashes (insufficient light being received)	Units or corner mirrors out of alignment	Adjust units or corner mirrors to optimum alignment
	Front screen of WSU/WEU or corner mirror dirty	Clean front screen or corner mirror
The yellow and red LEDs on the WEU are permanently lit	Electronics activated:	On WEU briefly switch power off and on again (min. 1 s)
	Interference of another emitter element	WEU must only respond to the corresponding WSU
	Electronic card defective	Replace unit

.

12 Technical Data WSU 26/2 / WEU 26/2

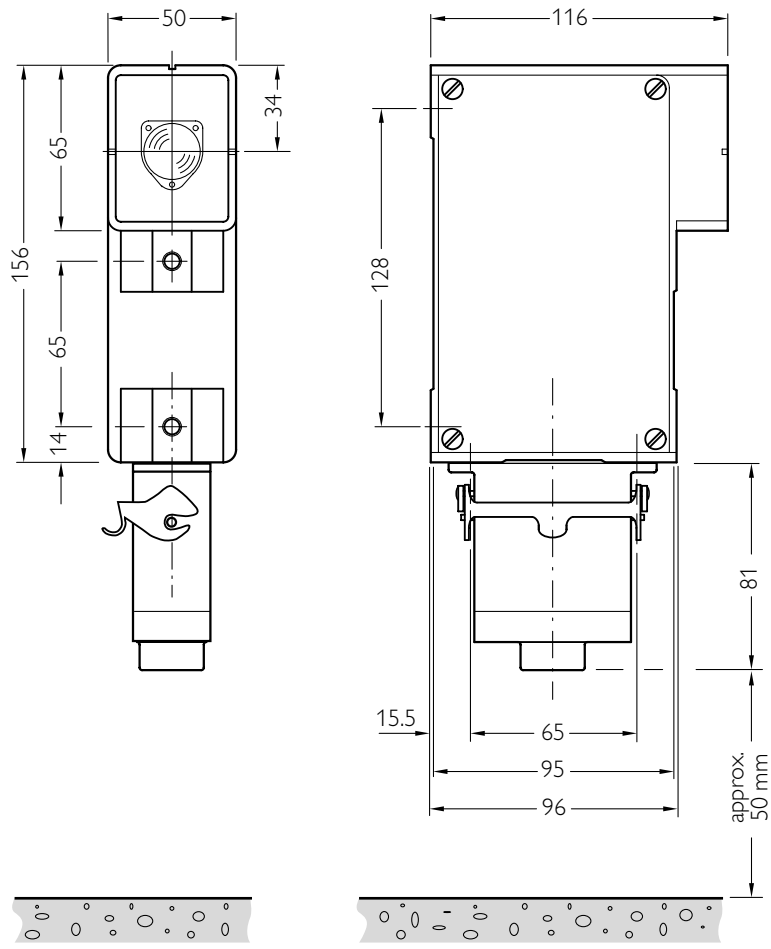
Dimensions		
	Protective field range	0.5 ... 18 m, 15 ... 70 m
	Number of beams	1 beam
	Light beam diameter	23 mm
Sender/receiver unit		
	Supply voltage (Uv)	24 V DC ± 20 %
		230 V DC ± 10 % / - 15 %
		115 V DC ± 10 % / - 15 %
	Ripple	Max. 5 % of U_V
	Frequency	48 ... 62 Hz with AC version
	Input, sender	Test contact
	Test time	max. 150 ms
	Min. opening time of NC contact for test	75 ms
	Power consumption (typical)	
	Voltage version	24 V 115 V 230 V
	Sender unit	4 W 7 W 7 W
	Receiver unit	6 W 10 VA 10 VA
	Synchronization	Optical
	Outputs	Relay max. operating frequency 0.2 Hz (1 operation in 5 s)
	Switching current (max./min.)	2 A / 0.02 A
	Switching voltage (max./min.)	250 V AC / 24 V DC
	Response time	≤ 22 ms
	Connection cable:	PG connector: IP 67 Connection plug: IP 65
	Front screen heating	As standard
Operating data		
	Protection class	I
	Enclosure rating	IP 65 (connection plug) IP 67 (PG connector)
	Safety category	Satisfies type 4 requirements
	Requirements	To pr EN 61496 Part I/Part II
	Ambient operating temperature	– 25 ... + 55 °C
	Storage temperature	– 25 ... + 70 °C
	Air humidity	15 ... 95 %
	Vibrostability	5 g, 10 ... 55 Hz to IEC 68-2-6
	Impact resistance	10 g, 16 ms to IEC 68-2-29
	Weight	Sender unit Approx. 0.9 ... 1.3 kg Receiver unit Approx. 1.0 ... 1.4 kg

13 Dimensional Drawing

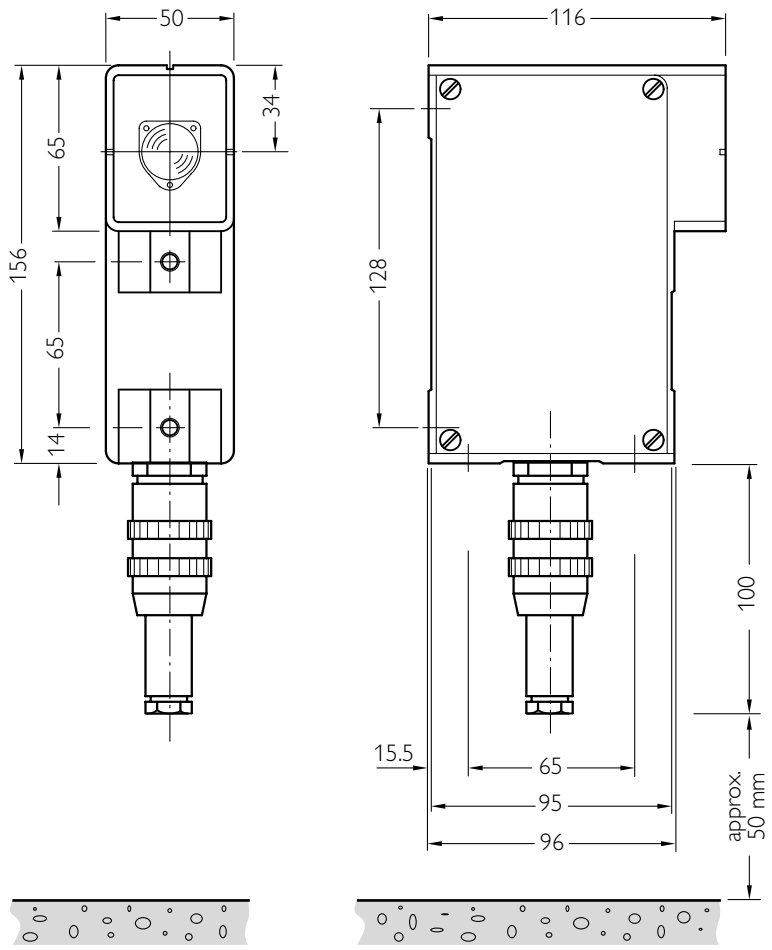


Dimensional Drawing WSU 26/2-xx0 and WEU 26/2-xx0

SICK WSU 26/2 – WEU 26/2

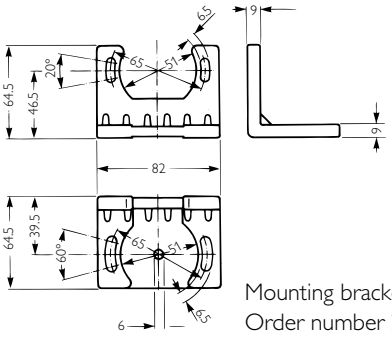


Dimensional Drawing WSU 26/2-xx4 and WEU 26/2-xx4

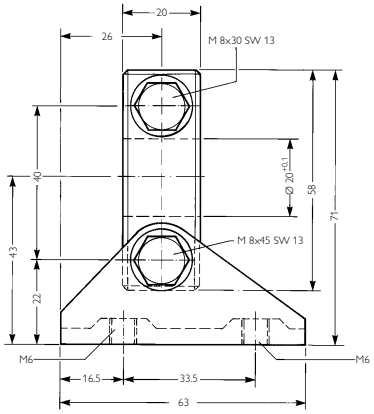


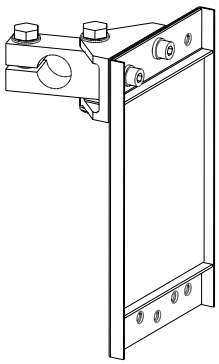
Dimensional Drawing WSU 26/2-xx1 and -xx3 and WEU 26/2-xx1, -xx2 and -xx3

SICK WSU 26/2 – WEU 26/2

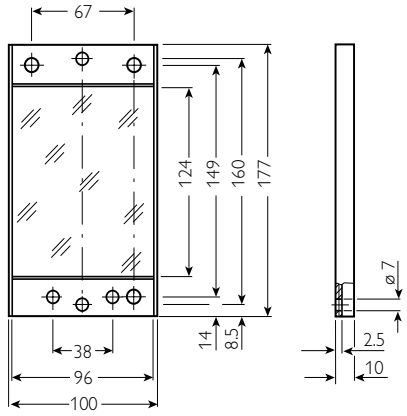


Mounting bracket
Order number 2 007 900

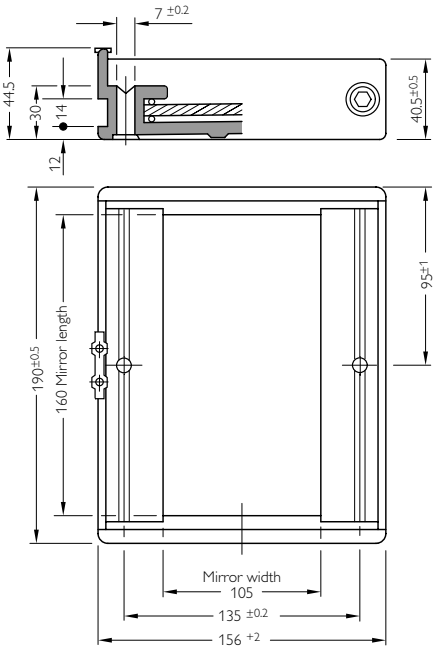




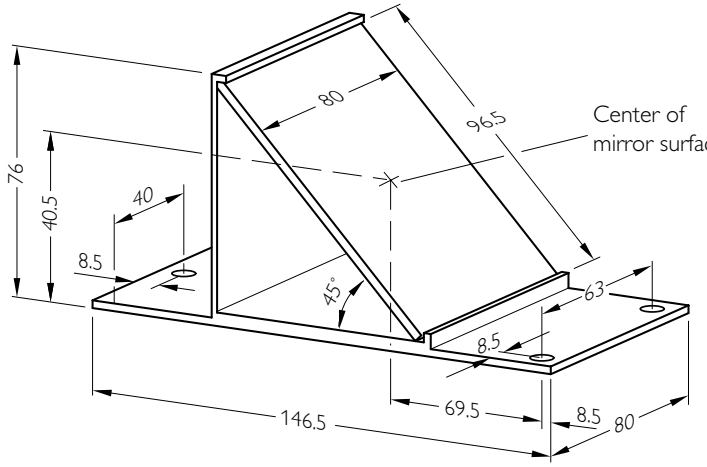
Bracket for corner mirror PSK 1
Order number 2 009 292



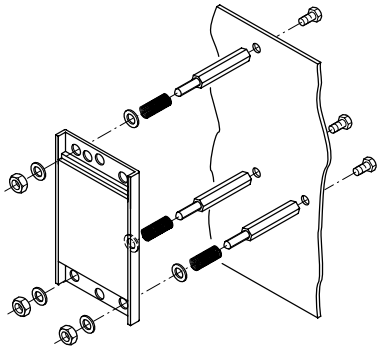
Corner mirror PSK 1
Order number 1 005 229



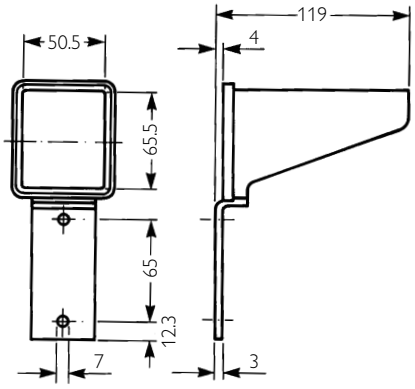
Corner mirror PNS 105-1
Order number 1 004 076



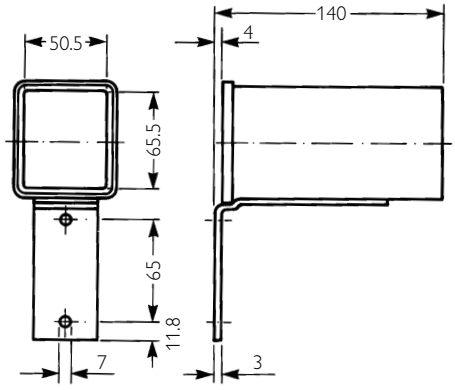
Corner mirror PSK 45
Order number 5 306 053



Mounting set for PSK 1
Order number 2 012 473



Snow shield
Order number 1 003 619



Dust shield
Order number 1 003 556

14 At a glance: What is new about the WSU/WEU 26/2 in relation to the WSU/WEU 26?

Previously: WSU 26 / WEU 26
Now: WSU 26**/2** / WEU 26**/2**

- The optical axis of the WSU/WEU 26/2 is shifted 6 mm toward the device connection.
- There are two terminals for connection of the power supply: terminal 1/2 and terminal 3.
- Voltage versions
  - 230 V AC
  - 115 V AC
  - 24 V DC
- A new adapter is required for AR 60.
- No fiber-optic cable version is available.
- An additional marking on the side identifies the middle of the beam.
- The scanning ranges have changed:

WSU/WEU 26	WSU/WEU 26/2
0.5 ... 30 m	0.5 ... 18 m
30 ... 60 m	15 ... 70 m

For each range segment there is a sender **and** a receiver.

- The beam diameter has changed:

WSU/WEU 26	WSU/WEU 26/2
33 mm	23 mm

- Connector version: the previous connector no longer complies with requirements for clearance and creepage distances (VDE 0160 05/88 and VDE 0110).
- New front screen: may only be cleaned with plastic cleaner.
- The power consumption has increased:

WSU/WEU 26	WSU/WEU 26/2	Version
5 VA / 7 VA	7 VA / 10 VA	115/230 V AC
3 W / 5 W	4 W / 6 W	24 V DC

- Response time
  WSU/WEU 26: 20 ms
  WSU/WEU 26/2: 22 ms

Components of the (new) WSU/WEU 26/2 system cannot be combined with components of the (old) WSU/WEU 26 system. When exchanging in the event of repair please note that the following combinations are not possible:

~~WSU 26 with WEU 26/2~~
~~WSU 26/2 with WEU 26~~

Exchange in pairs.

15 Selection Table WSU / WEU

Voltage	Scanning range	Termination type	Sender unit Type	Order number	Receiver unit Type	Order number
230 V AC	0.5 ... 18 m	PG	WSU 26/2-110	1 015 615	WEU 26/2-110	1 015 616
		Plug	WSU 26/2-111	1 015 712	WEU 26/2-111	1 015 713
		Plug *)	WSU 26/2-113	1 015 715	WEU 26/2-113	1 015 715
		Plug *)			WEU 26/2-112	1 015 714
		Plug 15 + PE*)	WSU 26/2-114	1 015 834	WEU 26/2-114	1 015 835
	15 ... 70 m	PG	WSU 26/2-210	1 015 731	WEU 26/2-210	1 015 743
		Plug	WSU 26/2-211	1 015 733	WEU 26/2-211	1 015 744
		Plug *)	WSU 26/2-213	1 015 736	WEU 26/2-213	1 015 748
		Plug *)			WEU 26/2-212	1 015 746
		Plug 15 + PE*)	WSU 26/2-214	1 015 840	WEU 26/2-214	1 015 841
115 V AC	0.5 ... 18 m	PG	WSU 26/2-120	1 015 717	WEU 26/2-120	1 015 718
		Plug	WSU 26/2-121	1 015 719	WEU 26/2-121	1 015 720
		Plug *)	WSU 26/2-123	1 015 723	WEU 26/2-123	1 015 722
		Plug *)			WEU 26/2-122	1 015 721
		Plug 15 + PE*)	WSU 26/2-124	1 015 836	WEU 26/2-124	1 015 837
	15 ... 70 m	PG	WSU 26/2-220	1 015 738	WEU 26/2-220	1 015 749
		Plug	WSU 26/2-221	1 015 740	WEU 26/2-221	1 015 750
		Plug *)	WSU 26/2-223	1 015 737	WEU 26/2-223	1 015 505
					WEU 26/2-222	1 015 751
		Plug 15 + PE*)	WSU 26/2-224	1 015 842	WEU 26/2-224	1 015 843
24 V DC	0.5 ... 18 m	PG	WSU 26/2-130	1 015 724	WEU 26/2-130	1 015 725
		Plug	WSU 26/2-131	1 015 726	WEU 26/2-131	1 015 727
		Plug *)	WSU 26/2-133	1 015 730	WEU 26/2-133	1 015 729
		Plug *)			WEU 26/2-132	1 015 728
		Plug 15 + PE*)	WSU 26/2-134	1 015 838	WEU 26/2-134	1 015 839
	15 ... 70 m	PG	WSU 26/2-230	1 015 745	WEU 26/2-230	1 015 504
		Plug	WSU 26/2-231	1 015 747	WEU 26/2-231	1 015 753
		Plug *)	WSU 26/2-233	1 015 739	WEU 26/2-233	1 015 755
		Plug *)			WEU 26/2-232	1 015 754
		Plug 15 + PE*)	WSU 26/2-234	1 015 844	WEU 26/2-234	1 015 845

*) See electrical wiring diagram

Selection of plug variant, WSU/WEU

Since 1989 VDE 0160 05/88 and VDE 0110 have stipulated doubled clearance and creepage distances. In the following cases the necessary clearance and creepage distances of the 6-PE Hirschmann connecting plug on the WEU are not met:

Supply voltage WEU	Voltage at WEU output relays	Remarks
230 V AC	230 V AC	Only in case of separated circuits/phases (e.g. L1 to L2)
230 V AC	24 V DC	–
24 V DC	230 V AC	–

In order to meet the VDE requirements for clearance and creepage distances in these cases, the square 15-pin + PE plug must be used.

14.1 Conversion List

WSU to be replaced	Nex type 26/2 Scanning range 0.5 ... 18 m		Scanning range 15 ... 70 m	
WSU 26-110	WSU 26/2-110	1 015 615	WSU 26/2-210	1 015 731
WSU 26-111	WSU 26/2-111	1 015 712	WSU 26/2-211	1 015 733
WSU 26-112	WSU 26/2-113	1 015 716	WSU 26/2-213	1 015 736
WSU 26-120	WSU 26/2-120	1 015 717	WSU 26/2-220	1 015 738
WSU 26-121	WSU 26/2-121	1 015 719	WSU 26/2-221	1 015 740
WSU 26-130	WSU 26/2-130	1 015 724	WSU 26/2-230	1 015 745
WSU 26-131	WSU 26/2-131	1 015 726	WSU 26/2-231	1 015 747
WSU 26-132	WSU 26/2-133	1 015 730	WSU 26/2-233	1 015 739
WSU 26-210			WSU 26/2-210	1 015 731
WSU 26-211			WSU 26/2-211	1 015 733
WSU 26-212			WSU 26/2-213	1 015 736
WSU 26-220			WSU 26/2-220	1 015 738
WSU 26-221			WSU 26/2-221	1 015 740
WSU 26-230			WSU 26/2-230	1 015 745
WSU 26-231			WSU 26/2-231	1 015 747
WSU 26-232			WSU 26/2-233	1 015 739

WEU to be replaced	New type 26/2 Scanning range 0.5 ... 18 m		Scanning range 15 ... 70 m	
WEU 26-710	WEU 26/2-110	1 015 616	WEU 26/2-210	1 015 743
WEU 26-712	WEU 26/2-112	1 015 713	WEU 26/2-211	1 015 744
WEU 26-713	WEU 26/2-113	1 015 715	WEU 26/2-213	1 015 748
WEU 26-720	WEU 26/2-120	1 015 718	WEU 26/2-220	1 015 749
WEU 26-730	WEU 26/2-130	1 015 725	WEU 26/2-230	1 015 504
WEU 26-731	WEU 26/2-131	1 015 727	WEU 26/2-231	1 015 753
WEU 26-732	WEU 26/2-132	1 015 728	WEU 26/2-232	1 015 754
WEU 26-733	WSU 26/2-133	1 015 729	WEU 26/2-233	1 015 755

16 Selection Table, Accessories

Description		Order number
Alignment aid AR 60, complete		1 015 741
Adapter for alignment aid AR 60		4 031 156
Mounting bracket for WSU/WEU		2 007 900
Corner mirror PSK 1, for scanning range 0.5 ... 18 m		1 005 229
Mounting set for PSK 1		2 012 473
Hinged bracket for corner mirror PSK 1 (x 1)		2 009 292
Corner mirror PNS 105-1, for scanning range 15 ... 70 m		1 004 076
Corner mirror PSK 45		5 306 053
Cable receptacle, straight, 6 + PE (plastic)		6 006 612
Cable receptacle, angled, 6 + PE (plastic)		6 006 613
Cable receptacle, 15 + PE, lateral cable outlet, PG 16		2 019 076
Cable receptacle, 15 + PE, straight cable outlet, PG 13.5		2 019 075
Arc-suppression element 0.22 µF + 220 Ω (115 ... 230 V)		6 001 224
Arc-suppression element 2.2 µF + 100 Ω (24 V)		6 001 225
Switching amplifier LCU-X	24 V DC	1 013 410
Switching amplifier (PILZ)		
Switching amplifier PST 1	24 V DC	6 010 808
	230 V AC	6 010 809
Switching amplifier PST 3	24 V DC	6 008 424
	230 V AC	6 008 423
Switching amplifier PNOZ 8	24 V DC	6 010 810
	230 V AC	6 010 811
PG cable gland PG 21 for use of 2 cables with PNOZ 8		5 305 978
PG extension PG 13.5 to PG 21 for use of 2 cables with PNOZ 8		5 306 052

SIGUARD safety systems - SIGUARD 3SE7 cable-operated switches - Safety Int.

Overview

SIGUARD 3SE7 cable-operated switches – Safety Integrated

2 contact elements, one-side actuation, IP 5 degree of protection, latching to EN 18

- Cable length smaller than 6 , w/o latching or with latching (unlatching by pulling)
  - 3SE7 30 – moulded-plastic enclosed to EN 0 47
  - 3SE7 10 – moulded-plastic enclosed to EN 0 47
  - 3SE7 30 – metal-enclosed to EN 0 41
- Cable length smaller than 25 , w/o latching or with latching (unlatching by pushbutton or key)
  - 3SE7 50 – metal-enclosed with dust protection and alignment opening
- Cable length smaller than 50 , w/o latching or with latching (unlatching by pushbutton or key)
  - 3SE7 40 – metal-enclosed with dust protection
- Conveyor belt unbalance protection device, with latching, (unlatching by pushbutton)
  - 3SE7 10 – metal-enclosed

2 x 2 contact elements, two-side actuation, IP 5 degree of protection, latching to EN 18

- 2 cables with lengths smaller than 50 , with latching (unlatching by pushbutton)
  - 3SE7 60 – metal-enclosed

Area of application

SIGUARD cable-operated switches are used for monitoring or for EMERGENCY- STOP facilities on particularly endangered system sections.

As the effective range of a cable-operated switch is limited by the length of the cord, large systems can also be protected.

SIGUARD cable-operated switches (requiring pulling at both ends) and of the conveyor belt off-track protection device are used primarily for monitoring very long belt systems.

Standards and specifications

Switches with latching for use in EMERGENCY-STOP facilities comply with EN 18. The contacts of the SIGUARD cable-operated switches and of the belt tracker are positively driven.

Mode of operation

SIGUARD cable-operated switches with one-side actuation are held in free position by the pre-tension force of the turnbuckle. With versions 3SE7 110, -210, -230, both contacts (1 O + 1 C) are closed in this state. One contact opens in case of cable rupture, the other in case of cable pull.

With versions 3SE7 40, -150, -230, two contacts are available for signalling cable rupture or pull. The NO contact is used, for example, for signalling purposes.

On switches with interlocking, the locking must be deactivated beforehand in order to return the SIGUARD cable-operated switch to its free position.

Technical data

3SE7			
Standards and specifications	IEC 0 47-5-1/EN 0 47-5-1/ DIN VDE 0660 Part 200 EN 60 04-1		
Enclosure **Cover** • 3SE7 10, 2SE 10, 3SE7 30	GD-Al alloy, color-painted, jet-black RAL 005 Thermoplastic, shock-resistant Metal		
Degree of protection	IP 65 acc. to EN 0 29/DIN VDE 0470-1		
Contact material	Fine silver		
Ambient temperature	-25 °C to +70 °C		
Type of connection	M 3.5 screw connection, self-releasing terminal clamp		
Actuation	By pulling or rupture of the cable		
Fixing **Mounting spacing**	Designed for M 5 30 m and 40 m		
Cable entry	1 x Pg 13.5 (2 x Pg 16 for 3SE7 60, 3SE7 10)		
Electrical design **Electrical loading** **Min. loading** **Short-circuit protection**	IEC 0 47-5-1, electrically isolated contacts 400 V AC 24 V AC/DC 6 A (slow)	6 A 10 mA	(AC-15)
Mechanical endurance	> 1 x 10^6 operating cycles		

Approvals	UL/CSA

SIEMENS

SIGUARD
Seilzugschalter

3SE7140-...
3SE7150-...

CE

Betriebsanleitung

Bestell-Nr.: 3ZX1012-OSE70-2AN1 **Deutsch**

Anwendung: Sicherheits-Seilzugschalter werden an den Stellen eingesetzt, wo ein Not-Aus-Befehl von jedem Punkt einer Maschine, einer Einrichtung oder einer Anlage erreichbar sein muß. Durch Zug an der vorgespannten Reißleine wird ein Not-Aus-Befehl geschaltet.

Aufbau/Wirkungsweise: Bei vorgespanntem Drahtseil sind die Kontakte 21-22 geschlossen und die Kontakte 13-14 geöffnet. Bei Seilzug und bei Seilriß werden die Kontakte 21-22 geöffnet und 13-14 geschlossen. Bei Seilzugschaltern mit Verriegelung werden bei Seilzug oder Seilriß die Kontakte 21-22 im geöffneten und 13-14 im geschlossenen Zustand verriegelt. Die Entriegelung kann durch Druckknopf oder Schlüsselentriegelung erfolgen.
Das Entriegeln ist nur in Mittelstellung - vorgespannte Stellung - möglich.

Montage: Bei der Montage ist der Schalter so weit vorzuspannen, bis sich die Schaltnocke in Mittelstellung befindet.
Der Seilzugschalter muß so montiert werden, daß ein Entriegeln von Hand gefahrlos möglich ist.
Vor Anbringen des Zugseiles muß der Mantel im Klemmbereich vom Drahtseil entfernt werden. Das Drahtseil ist entsprechend Montagehinweise zu montieren.
Da sich bei Seilzug die Seilkauschen verformen, sollte das Seil nach der Montage mehrmals kräftig gezogen werden. Anschließend muß das Seil mit einer Seil-Klemme oder über die Augenschraube bzw. Spannschloß nachgespannt werden.
Bei Abspannlängen über 10 m sind Seilunterstützungen erforderlich. Bedingt durch das Wärmedehnungsverhalten des Seiles, wird mit zunehmender Seillänge der Umgebungstemperaturbereich eingeschränkt.

Technische Daten

Angewandte Normen:	IEC 947-5-1/EN 60947-5-1 DIN VDE 0660-200
Gehäuse:	GK-AL Legierung, farblackiert
Deckel:	schlagfester Thermoplast
Schutzart:	IP 65 nach IEC 529/EN 60 529 /
Schaltsystem:	⊖ gem. IEC 947-5-1 1 Öffner- und 1 Schließerkontakt, Sprungkontakt Öffnerkontakte zwangsgeführt
Anschlußart:	Schraubanschluß M3,5 ; selbstabhebende Klemmbügel
Kabeleinführung:	3SE7140-... = 1 x Pg 13,5 3SE7150-... = 2 x Pg 13,5
Seillänge:	3SE7140-... max. 50 m 3SE7150-... max. 25 m (Umgebungstemperaturbereich beachten)
Mech. Lebensdauer:	10^7 Schaltspiele
Zul. Betriebstemperatur:	-25°C bis +70°C (Seillänge beachten)
zul. Elektr. Belastung:	400 V AC / 6 A (AC-15)
Kurzschlußfestigkeit:	6 A (träge)

Operating Instruction

Order-Nr.: 3ZX1012-OSE70-2AN1 **English**

Application: Emergency stop pull-wire switches are employed wherever an emergency stop command must be available at any point on a machine, device or plant. An emergency stop command is triggered when pulling the pretensioned tug line

Design/Function: With the wire pretensioned the contacts 21-22 are closed and 13-14 are open. Contacts 21-22 open and 13-14 close if the wire is pulled or breaks. With emergency stop pull-wire switches with latching contacts
21-22 are latched in the opened and 13-14 in the closed condition if the wire is pulled or in case of wire break. Unlatch the contacts by using push button, or key turn.
Unlatching is only possible in mid-position (pretensioned position).

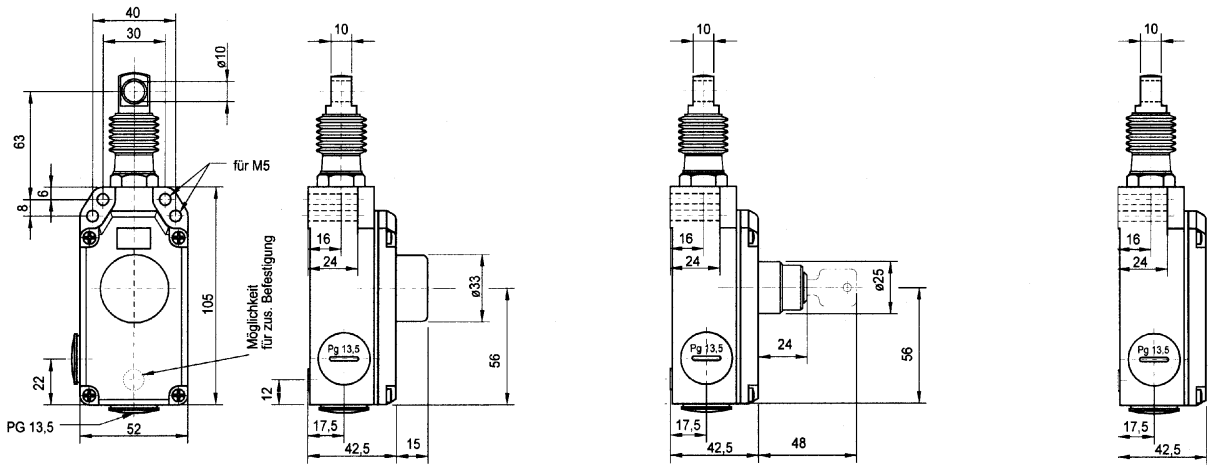
Installation: When fitting, pretension the switch until the switching actuator is in the middle position.
Fit the emergency stop pull-wire switch so that it is possible to savely unlatch it manually.
Remove the sleeve in the pull wire grip area before fitting the pull wire. Fit the pull wire in accordance with the assembly notes Firmly pull on the wire several times after fitting, as the wire thimble of the pull wire can be deformed. Following this, re-tension the wire with a wire clamp or via the eye bolt or tensioner. A wire support is required when the wire is spanned over a length exceeding 10 m.
Due to the thermal expansion of the wire, the ambient temperature range is limited as the wire length increases.

Technical Data

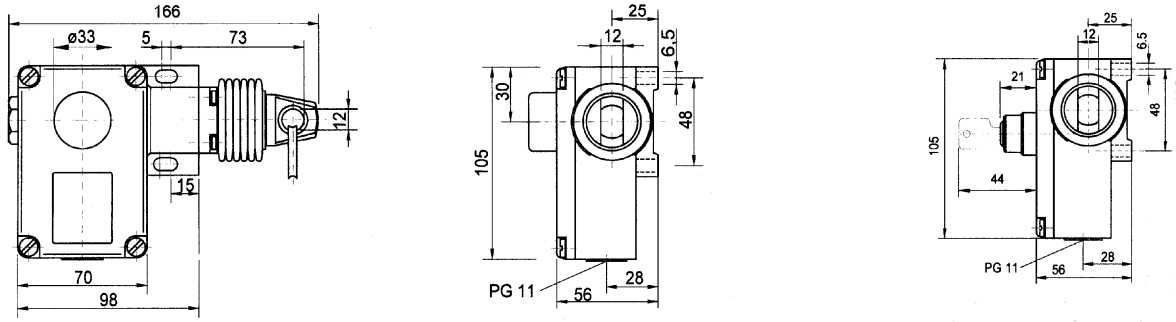
Conformity to standards:	IEC 947-5-1/EN 60947-5-1 DIN VDE 0660-200
Housing:	GK-AL alloy, colour painted
Cover:	thermoplastic, unbreakable
Protection class::	IP 65 DIN VDE 0470-1
Schaltsystem:	⊖ as per IEC 947-5-1
Contact system:	1 NC- and 1 NO-contact snap action contact, NC-contact positive break
Fixing:	Screw connection M3.5; self-lifting clamps
Cable entry:	3SE7140-... = Pg 13,5 3SE7150-... = 2x Pg 16
Wire length:	3SE7140-... max. 50 m 3SE7150-... max. 25 m (Take note of ambient temperature range)
Mech. life:	10^7 cycles
Ambient temperature:	-25° C to + 70° C (take note of wire length)
Max. electrical load:	400 V AC / 6 A (AC 15)
Short circuit resistance:	6 A (time lag)

1. Maßbilder/*Dimension drawings*

3SE7150-... 1BD 1CD 1DD

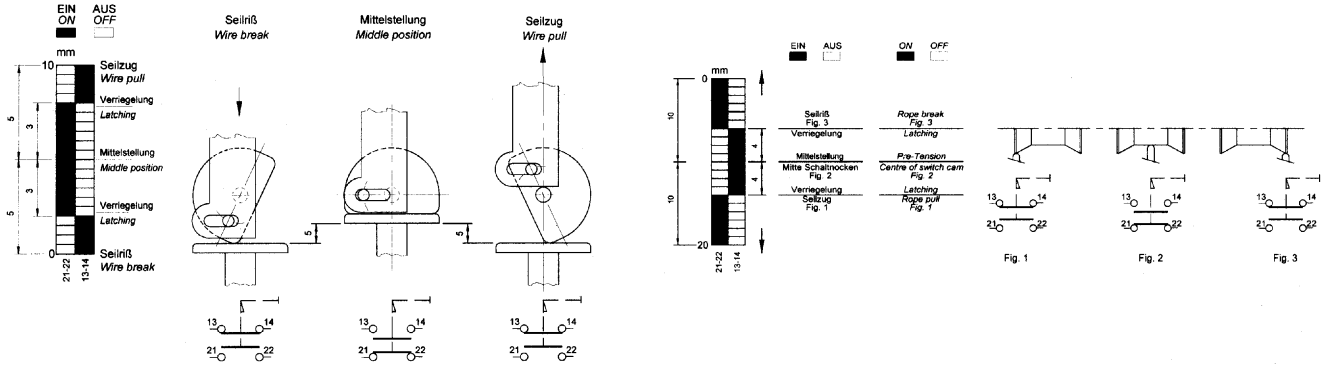


3SE7140-... 1BD 1CD

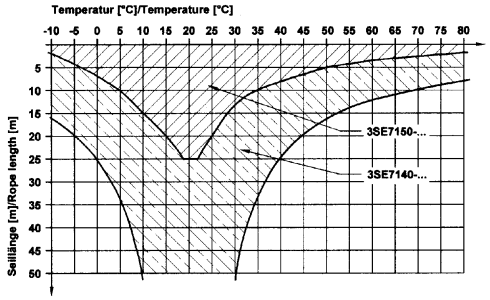


2. Schaltbilder/*switch diagramm*

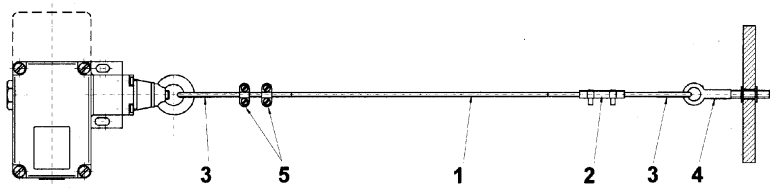
3SE7150-... 3SE7140-...



3. Montagehinweise/*assembly notes*



Empfohlene Seillängen bei Sicherheits-Seilzugschaltern in Abhängigkeit vom Umgebungstemperaturbereich.
Recommended rope length with emergency stop pull-wire switches depending on ambient temperature ranges.



1 = Drahtseil
2 = Seil - Klemme
3 = Seilkausche
4 = Augenschraube
5 = Drahtseilklemme

1 = Wire rope
2 = wire - Clamp
3 = Wire thimble
4 = Eye bolt
5 = Wire clamp

Achtung: Bei Abspannlängen über 10 m sind Seilunterstützungen erforderlich,
d. h., bei der Type 3SE7150-... alle 3 m
bei der Type 3SE7140-... alle 5 m

Attention: Install a rope support if rope exceeds 10 m!
with type 3SE7150-... all 3 m
with type 3SE7140-... all 5 m

01.26.0262/0998/2000wd