



EN	Operating instructions.	pages 1 to 8
	Translation of the original operating instructions	

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1. About this document

1.1 Function

This operating instructions manual provides all the information you need for the mounting, set-up and commissioning to ensure the safe operation and disassembly of the safety switchgear. The operating instructions must be available in a legible condition and a complete version in the vicinity of the device.

1.2 Target group: authorised qualified personnel

All operations described in this operating instructions manual must be carried out by trained specialist personnel, authorised by the plant operator only.

Please make sure that you have read and understood these operating instructions and that you know all applicable legislations regarding occupational safety and accident prevention prior to installation and putting the component into operation.

The machine builder must carefully select the harmonised standards to be complied with as well as other technical specifications for the selection, mounting and integration of the components.

1.3 Explanation of the symbols used



Information, hint, note:

This symbol is used for identifying useful additional information.



Caution: Failure to comply with this warning notice could lead to failures or malfunctions.

Warning: Failure to comply with this warning notice could lead to physical injury and/or damage to the machine.

1.4 Appropriate use

The products described in these operating instructions are developed to execute safety-related functions as part of an entire plant or machine. It is the responsibility of the manufacturer of a machine or plant to ensure the correct functionality of the entire machinery or plant.

The safety switchgear must be exclusively used in accordance with the versions listed below or for the applications authorised by the manufacturer. Detailed information regarding the range of applications can be found in the chapter "Product description".

1.5 General safety instructions

The user must observe the safety instructions in this operating instructions manual, the country-specific installation standards as well as all prevailing safety regulations and accident prevention rules.



Further technical information can be found in the Schmersal catalogues or in the online catalogue on the Internet: www.schmersal.net.

The information contained in this operating instructions manual is provided without liability and is subject to technical modifications.

There are no residual risks, provided that the safety instructions as well as the instructions regarding mounting, commissioning, operation and maintenance are observed.

1.6 Warning about misuse

Warning icon: In case of improper use or manipulation of the safety switchgear, personal hazards or damages to machinery or plant components cannot be excluded when safety switchgear is used. The relevant requirements of the ISO 14119 must be observed.

1.7 Exclusion of liability

We shall accept no liability for damages and malfunctions resulting from defective mounting or failure to comply with this operating instructions manual. The manufacturer shall accept no liability for damages resulting from the use of unauthorised spare parts or accessories.

For safety reasons, invasive work on the device as well as arbitrary repairs, conversions and modifications to the device are strictly forbidden; the manufacturer shall accept no liability for damages resulting from such invasive work, arbitrary repairs, conversions and/or modifications to the device.

2. Product description

2.1 Ordering code

This operating instructions manual applies to the following types:

Table with 3 columns: No., Option, Description. Row 1: 1, F2, without local acknowledge / with local acknowledge / lateral active surface. Row 2: CSP 34-S-1 actuator

2.2 Special versions

For special versions, which are not listed in the order code below 2.1, these specifications apply accordingly, provided that they correspond to the standard version.

2.3 Comprehensive quality insurance to 2006/42/EC

Schmersal is a certified company to appendix X of the Machinery Directive. As a result, Schmersal is entitled to autonomously conduct the conformity assessment procedure for the products listed in Appendix IV of the MD without involving a notified body. The EC prototype test certificates are available upon request or can be downloaded from the Internet at www.schmersal.com.

2.4 Destination and use

The non-contact, electronic CSP 34 safety sensor is designed for application in safety circuits and is used for monitoring the position of movable safety guards. In this application, the safety sensor monitors the closed position of hinged, sliding or removable safety guards by means of the coded electronic CSP 34-S-1 actuator. The electronic CSP 34-S-1 actuator is available with 20 different codings. The possibility of "paired coding" of the safety sensor and the actuator leads to a higher protection against tampering.

Coding of the safety sensor and the actuator

To activate the safety function (coding) of the CSP 34 for the first time, the associated actuator must be brought into the detection area of the switched on safety sensor. The automatic learn process of the actuator code is signalled on the safety sensor by the lighting up of the red LED and flashing of the yellow LED at the same time. After 10 seconds the cycling flashes indicate that the supply voltage of the safety sensor should be switched off for a few seconds so the code can be saved. (If no shut down takes place within 5 seconds the safety sensor stops the learn process and indicates a false actuator by flashing 5 times.) When the power is switched on, the actuator must be detected again and the final allocation of the safety sensor to actuator is stored. The safety sensor can therefore not be activated by any other coding.

The coding and the ordering suffix of the actuator are located on the side of the actuator head. When the device is fitted, this labelling is hidden by the mounting bracket, which is secured by means of a pin. This complicates the identification for reordering duplicates and therefore leads to an increased protection against tampering.

Information icon: The safety switchgears are classified according to ISO 14119 as type 4 switching devices.

Local acknowledge (ordering suffix F2)

When safety gate monitoring by the safety sensor CSP 34F2 is required, an acknowledge button should be positioned so that the danger area can be viewed. When the acknowledge button is pressed, a voltage change from 0 V to 24 V occurs on pin 8 and then returns (pulse duration 0.3 - 3 seconds). If the gate is closed the safety outputs are released with the negative signal edge. After the gate is opened it needs to be acknowledge before it can be released again. The safety sensor CSP 34F2 can be switched in series with other CSS range devices. In this way non-visible sections of a complex machine can be released successively. The order of release is not important, even with mixed applications of CSP and CSS safety sensors. A combination with a CSS 34F0 or a CSS 34F1 safety sensor as an input device for direct control of safety equipment is also possible.

Series-wiring

Max. 31 sensors can be wired in series. In this way, a 200 m long sensor chain can be set up.

Warning icon: The user must evaluate and design the safety chain in accordance with the relevant standards and the required safety level. If multiple safety sensors are involved in the same safety function, the PFH values of the individual components must be added.

Warning icon: The entire concept of the control system, in which the safety component is integrated, must be validated to the relevant standards.

2.5 Technical data

Standards:	IEC 60947-5-3; ISO 13849-1; IEC 61508, IEC 62061
Enclosure:	glass-fibre reinforced thermoplastic
Operating principle:	inductive
Coding levels according to ISO 14119:	medium
Actuator:	CSP 34-S-1

Switching distances to IEC 60947-5-3:

Rated operating distance S_n :	11 mm
Assured switching distance S_{ao} :	8 mm
Assured switch-off distance S_{ar} :	15 mm
Hysteresis:	max: 1.5 mm
Repeat accuracy R:	< 0.5 mm
Switching frequency f:	3 Hz
Series-wiring:	max. 31 devices
Cable length:	max. 200 m
Connector:	M12, 8-pin in casing

Ambient conditions:

Ambient temperature T_u :	
- with output current ≤ 0.1 A / output:	-25 °to +70 °C
- with output current ≤ 0.25 A / output:	-25 °C to +65 °C
Storage and transport temperature:	-25 °C ... +85 °C
Resistance to vibration:	10 ... 55 Hz, amplitude 1 mm
Resistance to shock:	30 g / 11 ms
Protection class:	IP65, IP67 to IEC 60529

Electrical data:

Rated operating voltage U_e :	24 VDC -15% / +10% (stabilised PELV)
Rated operating current I_e :	0.6 A
Required rated short-circuit current:	100 A
Fuse:	2.0 A

The cable section of the interconnecting cable must be observed for both wiring variants!

Rated insulation voltage U_i :	32 VAC/DC
Rated impulse withstand voltage U_{imp} :	800 V
No-load current I_o :	0.1 A
Response time:	< 30 ms
Duration of risk:	< 60 ms
Protection class:	II
Overvoltage category:	III
Degree of pollution:	3
EMC rating:	according to IEC 60947-5-3
Electromagnetic interference:	according to IEC 60947-5-3

Safety outputs Y1/Y2: normally open function, 2 channel, p-type, short-circuit proof

Voltage drop:	< 1 V
Rated operating voltage U_{e1} :	min. ($U_e - 1$ V)
Leakage current I_r :	< 0.5 mA
Rated operating current I_{e1} :	max. 0.25 A, dependent on ambient temperature

Minimum operating current I_m :	0.5 mA
Utilisation category:	DC-12, DC-13

Diagnostic output: short-circuit proof, p-type

Voltage drop:	< 5 V
Rated operating voltage U_{e2} :	min. ($U_e - 5$ V)
Operating current I_{e2} :	max. 0.05 A
Utilisation category:	DC-12, DC-13

2.6 Safety classification

Standards:	ISO 13849-1, IEC 61508, IEC 62061
PL:	e
Control Category:	4
PFH value:	3.6×10^{-9} / h
SIL:	suitable for SIL 3 applications
Service life:	20 years

3. Mounting

3.1 General mounting instructions



During fitting, the requirements of ISO 14119 must be observed.

The component can be mounted in any position. The active lateral surfaces of the safety sensor and the actuator, which are marked with the type plate, must be opposite. The sensor enclosure must not be used as an end stop.

The CSP 34 safety sensor and the corresponding CSP 34-S-1 actuator are supplied with mounting plate. With the slotted holes of the mounting plates, possible tolerances can be horizontally and vertically compensated. The components are fitted with M4 screws. The safety sensors and the actuators can be clipped onto the mounting plate with different actuating directions. Both components are fixed by means of a locking cap.



Safety sensor and actuator must be permanently fitted to the safety guards and protected against displacement by suitable measures (tamperproof screws, gluing, drilling of the screw heads).



The mounting plates must be pinned after their fixation. The mounting brackets also must be secured by means of the supplied locking pin to protect them against tampering.

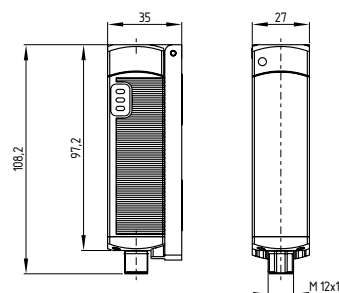
At an ambient temperature of over 55°C, the safety sensor must be fitted so that it is protected against unintentional contact with persons.

To avoid any interference inherent to this kind of system and any reduction of the switching distances, please observe the following guidelines:
Minimum distance between two sensors: 100 mm

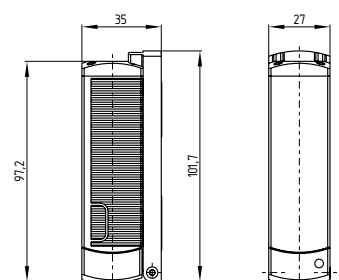
3.2 Dimensions

All measurements in mm.

Safety sensor



Actuator



Alternative suitable actuators with different design: refer to www.schmersal.net.

Technical drawing of the integrated mounting plate. The top view shows a rectangular plate with a total width of 101.7 mm and a total height of 27 mm. The distance between the centers of the two main circular holes is 42.5 mm. The distance from the left edge to the center of the first hole is 4.5 mm. The distance from the center of the first hole to the center of the second hole is 50 mm. The distance from the center of the second hole to the right edge is 4.5 mm. The plate has a central slot with a width of 8 mm and a depth of 25 mm. The plate is labeled with dimensions 8, 25, 101.7, 42.5, 4.5, 50, and 27. The plate is also labeled with 'Holes to be pinned' and 'Hole for the pin'. The plate is also labeled with 'R2.1' and 'R6.6'.

S	Switching distance
X	Possible vertical offset along the side surface of the nameplate
Y	Possible horizontal offset along the side surface of the nameplate
S_{on}	Switch-on distance
S_{off}	Switch-off distance
S_h	Hysteresis range $S_h = S_{off} - S_{on}$
S_{ao}	Assured switching distance to IEC 60947-5-3
S_{ar}	Assured switch-off distance to IEC 60947-5-3

A technical drawing of a vertical radiator. It shows a side view of the radiator with a series of horizontal fins. Dimension 'X' is indicated by a vertical double-headed arrow on the left, representing the height of the radiator. Dimension 'Y' is indicated by a horizontal double-headed arrow at the top, representing the width of the radiator. There are also small circular symbols on the right side of the radiator, possibly representing mounting holes or valves.



5.2 Maintenance

In the case of correct installation and adequate use, the safety sensor features maintenance-free functionality.

A regular visual inspection and functional test, including the following steps, is recommended:

- Check the fitting of the sensor and the actuator
- Remove soiling
- Check the cable for damage.



Measures must be taken to protect against manipulation or against the bypassing of safety device, for example, using an extra actuator.

Damaged or defective components must be replaced.

6. Operating principle and diagnostic functions

6.1 Mode of operation of the safety outputs

The opening of a safety guard, i.e. the actuator is removed out of the active zone of the sensor, will immediately disable the safety outputs (also refer to Switching distance of the CSP 34 safety sensor). Any error that does not immediately affect the functionality of the safety sensor (e.g. the ambient temperature being too high, interference potential at a safety output, cross-wire short) will lead to a delayed shut-down. The safety outputs are disabled after 30 minutes if the error is not rectified.

After the rectification of the error, the error message is reset by opening the corresponding safety guard.

6.2 Operating principle of the diagnostic LED's

The safety sensor indicates the operating condition and faults by means of three-colour LED's located in the lateral surfaces of the sensor. A diagnostic output additionally indicates the operating condition. These signals can be used in a downstream control.

The green LED's indicate that the safety sensor is ready for operation. The supply voltage is on. The yellow LED's indicate the switching condition of the safety outputs. If the actuator is near the limit of the sensor's switching distance, the LED's will flash (1 Hz). The flashing can be used to prematurely detect changes in the clearance between the safety sensor and the actuator (e.g. sagging of a safety guard). The sensor must

be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine. If an error is detected, the red LED will be activated.

Flash codes red diagnostic LED

LED indication (red)	Error cause
1 flash pulse	Error output Y1
2 flash pulses	Error output Y2
3 flash pulses	Cross-wire Y1/Y2
4 flash pulses	ambient temperature too high
5 flash pulses	Wrong or defective actuator
Continuous red	Internal error

6.3 Operating principle of the electronic diagnostic output

A diagnostic output additionally indicates the operating condition (refer to table 1). These signals can be used in a downstream control.

The short circuit proof diagnostic output OUT can be used for central visualisation or control functions, e.g. in a PLC. It indicates the switching condition as shown in the table. The diagnostic output can also be used to detect clearance variations between the sensor and the actuator in the same way as the yellow LED. An active fault causes the diagnostic output to be disabled. The safety outputs are disabled after max. 30 minutes if the fault is not rectified. The signal combination, diagnostic output disabled and safety channels still enabled, can be used to stop the production process in a controlled manner. After fault rectification, the error message is reset by opening and re-closing the corresponding safety guard. The safety outputs enable and allow a restart.

Note (for F2 variant with local acknowledge)

The inverse signal combination, diagnostic output enabled and safety outputs disabled, can be used to generate a signal to trigger a local acknowledge.

Table 1: Examples of the diagnostic function of the CSP 34 safety sensor

Sensor function		LED green	red	yellow	Diagnostic output	Safety outputs Y1, Y2	Note
I.	Supply voltage on, not actuated	On	Off	Off	0 V	0 V	Voltage on, no evaluation of the voltage quality
II.	Actuated, safety outputs enabled	On	Off	On	24 V	24 V	The yellow LED always signals the presence of an actuator within range
III.	Actuated, actuator in limit area	On	Off	Flashes (1Hz)	24 V pulsed	24 V	The sensor must be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine
IV.	Actuated, safety outputs disabled ¹⁾	On	Off	Flashes (5Hz)	24 V	0 V	Sensor is waiting for local acknowledge
V.	Actuated, in limit range and safety outputs disabled ¹⁾	On	Off	flashes alternating (1Hz/5Hz)	24 V pulsed	0 V	LED indication combines the sensor functions III. and IV.; sensor is waiting for local acknowledge
VI.	Actuator, error warning	On	On/ flashes	On	0 V	24 V	After 30 minutes if the error is not rectified
VII.	Actuated, fault	On	On/ flashes	On	0 V	0 V	Refer to table with flash codes

¹⁾ only for F2 variant with local acknowledge

7. Disassembly and disposal

7.1 Disassembly

The safety switchgear must be disassembled in a de-energised condition only.

7.2 Disposal

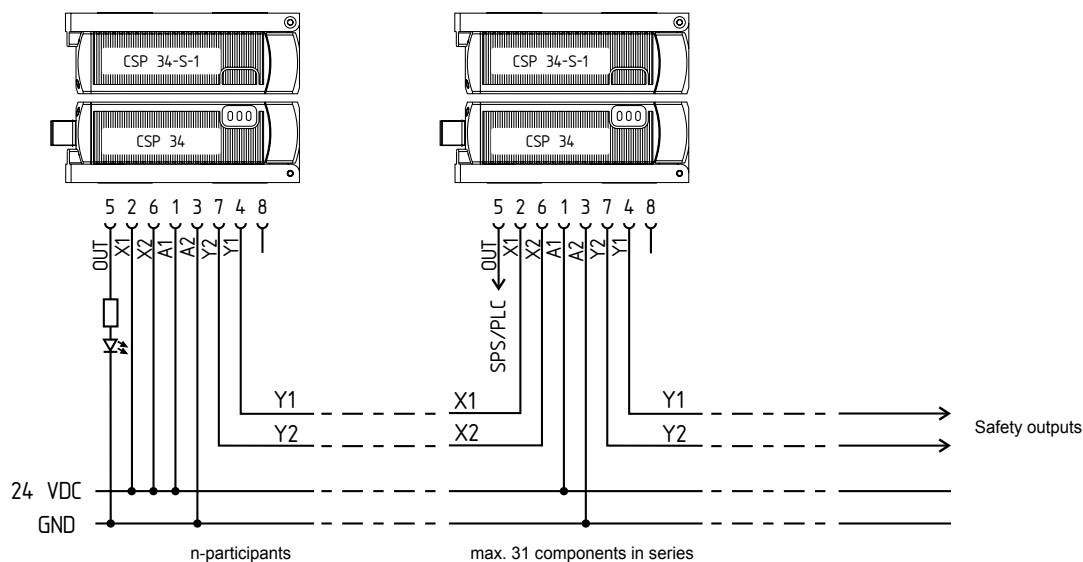
The safety switchgear must be disposed of in an appropriate manner in accordance with the national prescriptions and legislations.

8. Appendix

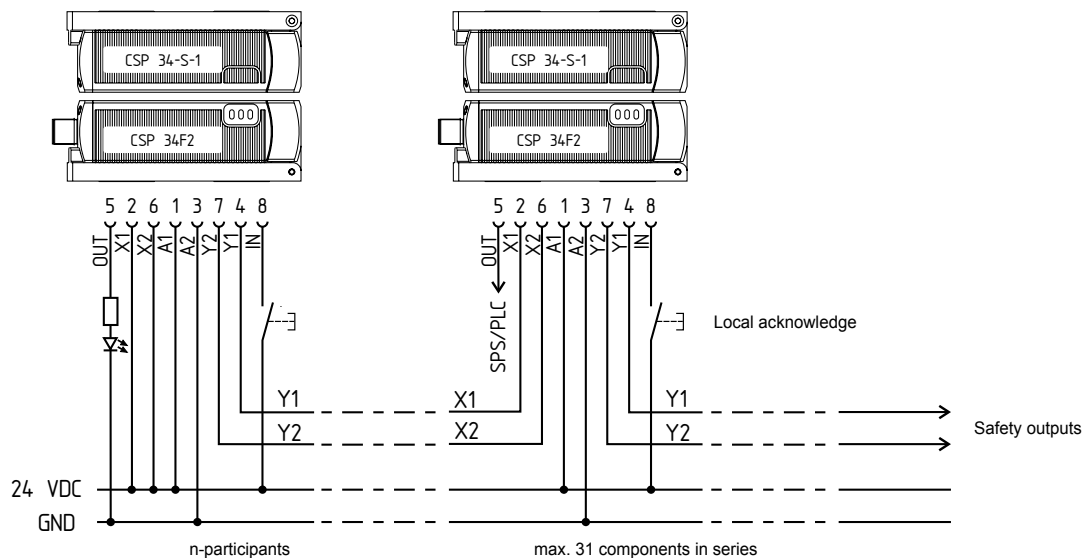
8.1 Wiring examples

The application examples shown are suggestions. They however do not release the user from carefully checking whether the switchgear and its set-up are suitable for the individual application.

Wiring example 1: CSP 34 without local acknowledge



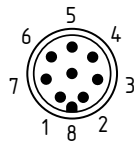
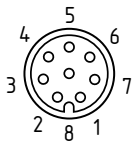
Wiring example 2: CSP 34F2 with local acknowledge



8.2 Connection example

Schedule 4: Wiring of the safety sensor with cable or integrated connector

Function safety switchgear			Pin configuration of the integrated connector	Colour code of the Schmersal connector	possible colour codes of other conventional connectors	
	with conventional diagnostic output	with serial diagnostic function			to IEC 60947-5-2: 2008	to DIN 47100
A1	U _e		1	BN	BN	WH
X1	Safety input 1		2	WH	WH	BN
A2	GND		3	BU	BU	GN
Y1	Safety output 1		4	BK	BK	YE
OUT	Diagnostic output	SD output	5	GY	GY	GY
X2	Safety input 2		6	VT	PK	PK
Y2	Safety output 2		7	RD	VT	BU
IN	without function	SD input	8	PK	OR / shielded	RD



Connecting cables with coupling (female)

IP67, M12, 8-pole - 8 x 0.23 mm²

Cable length 2.5 m **101209963**

Cable length 5 m **101209964**

Cable length 10 m **101209960**


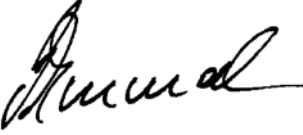
IP69K, M12, 8-pole - 8 x 0.21 mm²

Cable length 5 m **101210560**

Cable length 5 m, angled **101210561**

9. Declaration of conformity

9.1 EC Declaration of conformity

 SCHMERSAL	
EC Declaration of conformity	
Translation of the original Declaration of Conformity	K.A. Schmersal GmbH & Co. KG Möddinghofe 30 42279 Wuppertal Germany Internet: www.schmersal.com
We hereby certify that the hereafter described safety components both in its basic design and construction conform to the applicable European Directives.	
Name of the safety component:	CSP 34
Type:	Refer to ordering code
Description of the safety component:	Non-contact safety sensor
Relevant EC-Directives:	2006/42/EC EC-Machinery Directive 2004/108/EC EMC-Directive
Person authorised for the compilation of the technical documentation:	Oliver Wacker Möddinghofe 30 42279 Wuppertal
Notified body, which approved the full quality assurance system, referred to in Appendix X, 2006/42/EC:	TÜV Rheinland Industrie Service GmbH Alboinstr. 56 12103 Berlin ID n°: 0035
Place and date of issue:	Wuppertal, March 10, 2015
CSP34-C-EN	
	Authorised signature Philip Schmersal Managing Director



The currently valid declaration of conformity can be downloaded from the internet at www.schmersal.net.



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