SCHMERSAL

EN Operating instructions. . . . . .pages 1 to 8
Original

Content

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-monitoring module. 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

Products in Schmersal's range are not intended to be used by private end consumers.

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 machine or plant.

The safety-monitoring module 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: products.schmersal.com.

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.

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1.6 Warning about misuse

In case of inadequate or improper use or manipulations of the safety-monitoring module, personal hazards or damage to machinery or plant components cannot be excluded. The relevant requirements of the standards EN ISO 14119 and EN ISO 13850 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.

The safety-monitoring module must only be used when the enclosure is closed, i.e. with the front cover fitted.

2. Product description

2.1 Ordering code

This operating instructions manual applies to the following types:

SRB207AN

Only if the information described in this operating instructions manual are realised correctly, the safety function and therefore the compliance with the Machinery Directive is maintained.

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 Purpose

The safety-monitoring module for integration in safety circuits is designed for fitting in control cabinets. It is used for the safe evaluation of the signals of positive break position switches for safety functions or magnetic safety sensors on sliding, hinged and removable safety guards as well as emergency stop control devices. Up to 6 safety guards can be monitored by means of the SRB207AN safety-monitoring module.

Design

The safety-monitoring module has a multichannel structure. It includes safety relays with monitored positive action contacts. The NO contacts of the relays, which are wired in series, build the enabling contacts. 6 signalling outputs signal the position of the corresponding safety guard.

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

2.4 Technical data

General data:	
Standards:	EN 60204-1, EN 60947-5-1, EN ISO 13849-1, IEC 61508
Climate resistance:	EN 60068-2-78
Mounting:	snaps onto standard rail to EN 60715
Terminal designations:	EN 60947-1
Material of the housings:	Plastic, glass-fibre reinforced thermoplastic, ventilated
Material of the contacts:	AgCdO, self-cleaning, positive drive
Weight:	300 g
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
Pull-in delay for automatic start:	typ. 120 ms
Pull-in delay with reset button:	typ. 30 ms
Drop-out delay in case of emergency stop:	typ. 20 ms / max. 35 ms
Drop-out delay on "supply failure":	On request
Mechanical data:	
Connection type:	Screw connection
Cable section:	min. 0,25 mm² / max. 2,5 mm²
Connecting cable:	rigid or flexible
Tightening torque for the terminals:	0.6 Nm
With removable terminals (Y/N):	yes
Mechanical life:	10 million operations
Electrical life:	Derating curve available on request
Resistance to shock:	10 g / 11 ms
Resistance to vibrations to EN 60068-2-6:	10 ... 55 Hz, amplitude 0.35 mm
Ambient conditions:	
Ambient temperature:	–25 °C … +45 °C
Storage and transport temperature:	–40 °C … +85 °C
Degree of protection:	Enclosure: IP40 Terminals: IP20 Clearance: IP54
Air clearances and creepage distances to EN 60664-1:	4 kV/2 (basic insulation)
EMC rating:	to EMC Directive
Electrical data:	
Contact resistance in new state:	max. 100 mΩ
Power consumption:	max. 3.6 W / 6.6 VA
Rated operating voltage U_e:	24 VDC –15% / +20%, residual ripple max. 10%
Fuse rating for the operating voltage:	F1: internal electronic trip, tripping current > 1 A; reset after disconnection of the supply voltage
Monitored inputs:	
Cross-wire detection (Y/N):	Yes
Wire breakage detection (Y/N):	Yes
Earth leakage detection (Y/N):	Yes
Number of NO contacts:	1 … 6
Number of NC contacts:	1 … 6
Cable length:	1,500 m with 1.5 mm², 2,500 m with 2.5 mm²
Conduction resistance:	max. 40 Ω
Outputs:	
Number of safety contacts:	2
Number of auxiliary contacts:	1
Number of signalling outputs:	6
Switching capacity of the safety contacts:	13-14 / 23-24: max. 250 V, 6 A ohmic (inductive in case of appropriate protective wiring)
Fuse rating of the safety contacts:	6.3 A slow blow
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A DC-13: 24 V / 6 A

The data specified in this manual are applicable when the component is operated with rated operating voltage U_e ±0%.

2.5 Safety classification

Standards:	EN ISO 13849-1, IEC 61508
PL:	up to e
Control category:	up to 3
DC:	99% (high)
CCF:	> 65 points
PFH value:	≤ 2,00 × 10^{-8}/h
SIL:	up to 3
Service life:	20 years

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

Contact load	$n_{op/y}$	t_{cycle}
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

3. Mounting

3.1 General mounting instructions

Mounting: snaps onto standard rails to EN 60715.

Snap the bottom of the enclosure slightly tilted forwards in the rail and push up until it latches in position.

To avoid EMC disturbances, the physical ambient and operational conditions at the place where the product is installed, must meet the provisions laid down in the paragraph "Electromagnetic Compatibility (EMC)" of EN 60204-1.

3.2 Dimensions

Device dimensions (H/W/D): 100 x 45 x 121 mm

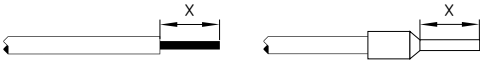
4. Electrical connection

4.1 General information for electrical connection

The electrical connection may only be carried out by authorised personnel in a de-energised condition.

As far as the electrical safety is concerned, the protection against unintentional contact of the connected and therefore electrically interconnected apparatus and the insulation of the feed cables must be designed for the highest voltage, which can occur in the device.

Settle length x of the conductor: 7 mm



Wiring examples: see appendix

5. Operating principle and settings

5.1 Operating principle after the operating voltage is switched on

With the guard door closed or the emergency stop command devices unlocked, the enabling paths are closed as soon as the start button is pushed. During the start command, the falling edge is detected, when the contacts of the downstream relays acting on the feedback circuit are closed.

If the safety guard is opened or the emergency-stop button is actuated, the enabling paths of the safety-monitoring module will open. The machine is stopped and the LED K1 and K2 will go out. The corresponding signal output signals which guard was opened.

Inputs S11/S12-S22/S73/S74;
S31/S32-S42/S83/S84;
S51/S52-S62/S93/S94

Safety switches or emergency stop command devices with one NC and one NO contact must be connected to the inputs. If not all inputs are wired, a bridge must be established between Sx1 and Sx2 of the non-used input.

Start button/feedback circuit X1/X2
Connect start button/feedback circuit to the inputs X1 and X2 according to the wiring diagram

Automatic start X1-X3
The automatic start is programmed by connecting the feedback circuit to the terminals X1-X3. If no start button and no feedback circuit is used, a bridge must be established between X1 and X3.

Outputs
Enabling paths 13-14, 23-24: NO contacts for safety function

Signalling output Y1-Y6
0 V safety guard open / no enabling signal
24 V safety guard closed / enabling signal

Auxiliary contact 31-32
Conditions of the enabling paths
The signalling outputs and the auxiliary contact must not be integrated in the safety circuit.

5.2 LED functions

- K1: Status channel 1
- K2: Status channel 2
- U_i: Status internal operating voltage (LED is on, when the operating voltage on the terminals A1-A2 is ON and the fuse has not been triggered)

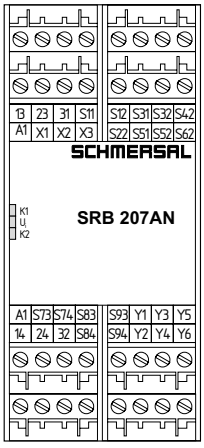


Fig. 1

5.3 Circuitry hints

Signalling outputs must not be used in safety circuits.

Due to the operating principle of the electronic fuse, the customer must check that no hazard is caused by an unexpected restart in circuits without reset button (automatic reset).

6. Set-up and maintenance

6.1 Functional testing

The safety function of the safety-monitoring module must be tested. The following conditions must be previously checked and met:

1. Correct fixing
2. Check the integrity of the cable entry and connections
3. Check the safety-monitoring module's enclosure for damage.
4. Check the electrical function of the connected sensors and their influence on the safety-monitoring module and the downstream actuators

6.2 Maintenance

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

1. Check the correct fixing of the safety-monitoring module
2. Check the cable for damages
3. Check electrical function

If a manual functional check is necessary to detect a possible accumulation of faults, then this must take place during the intervals noted as follows:

- at least every month for PL e with category 3 or category 4 (according to EN ISO 13849-1) or SIL 3 with HFT (hardware fault tolerance) = 1 (according to EN 62061);
- at least every 12 months for PL d with category 3 (according to EN ISO 13489-1) or SIL 2 with HFT (hardware fault tolerance) = 1 (according to EN 62061).

Damaged or defective components must be replaced.

7. Disassembly and disposal

7.1 Disassembly

The safety-monitoring module must be disassembled in a de-energised condition only. Push up the bottom of the enclosure and hang out slightly tilted forwards.

7.2 Disposal

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

8. Appendix

8.1 Wiring examples

Dual-channel control, shown for a guard door monitor; with two contacts, where at least one is a positive break contact; with external reset button Ⓡ

- Relay outputs: Suitable for 2-channel control, for increase in capacity or number of contacts by means of contactors or relays with positive-guided contacts.
- The control system recognises wire-breakage, earth faults and cross-wire shorts in the monitoring circuit.
- Ⓗ2 = Feedback circuit

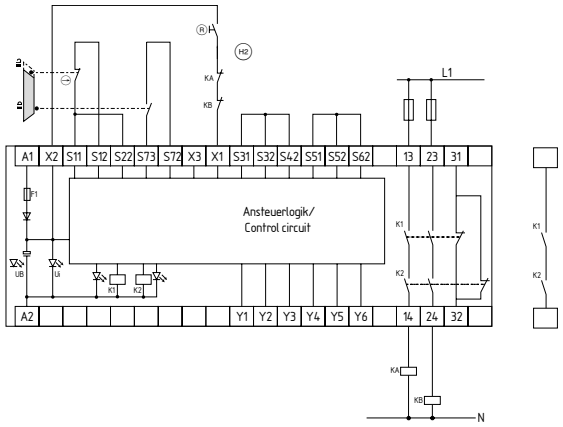


Fig. 2

8.2 Start configuration

External reset button (non-monitored start) (see Fig. 3)

- The external reset button is integrated in the feedback circuit in series.
- The manual start or the activation of the module occurs when the button is pressed (not when it is released!).

Automatic start (see Fig. 4)

- The automatic start is programmed by connecting the feedback circuit to the terminals X1-X3. If the feedback circuit is not required, establish a bridge.
- **Caution: Not admitted without additional measure due to the risk of gaining access by stepping behind!**
- When the SRB207AN safety-monitoring module is used with the operating mode "Automatic start", an automatic restart after a shutdown in case of emergency must be prevented by the upstream control to EN 60204-1 paragraph 9.2.3.4.2.

Due to the operating principle of the electronic fuse, the customer must check that no hazard is caused by an unexpected restart in circuits without reset button (automatic reset).

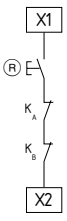


Fig. 3

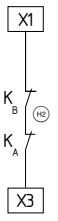


Fig. 4

8.3 Sensor configuration

Dual-channel emergency stop circuit with command devices to EN ISO 13850 and EN 60947-5-5 (see Fig. 5)

Dual-channel guard door monitoring circuit with interlocking device to EN ISO 14119 (see Fig. 5)

Dual-channel control of magnetic safety switches according to EN 60947-5-3 (see Fig. 5)
- The control system recognises wire breakage and earth faults in the control circuit.
- Cross-wire shorts between the control circuits are detected.
- Category 3 – PL e to EN ISO 13849-1 possible.

To control the risk of error accumulation, which is especially required in category 3 – PL e, we recommend regularly checking the circuit by means of a start-up test

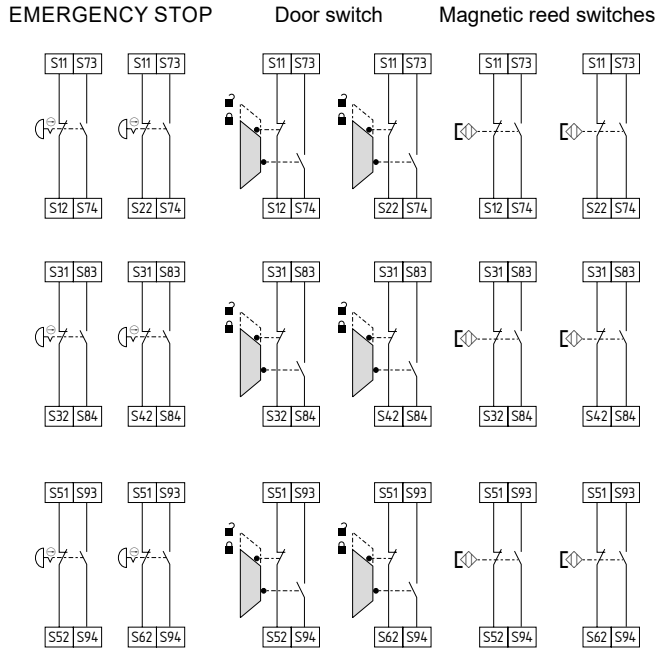


Fig. 5

The connection of magnetic safety switches to the SRB207AN safety-monitoring module is only admitted when the requirements of the standard EN 60 947-5-3 are observed.

As the technical data are regarded, the following minimum requirements must be met:
– switching capacity: min. 240 mW
– switching voltage: min. 24 VDC
– switching current: min. 10 mA

For example, the following safety sensors meet the requirements:
– BNS 33-02Z-2187, BNS 33-02ZG-2187
– BNS 260-02Z, BNS 260-02ZG
– BNS 260-02/01Z, BNS 260-02/01ZG

When sensors with LED are wired in the control circuit (protective circuit), the following rated operating voltage must be observed and respected:
– 24 VDC with a max. tolerance of –5 %/+20 %

Otherwise availability problems could occur, especially in series-wired sensors, where a voltage drop in the control circuit is triggered by LED's for instance.

8.4 Actuator configuration

Single-channel control (see Fig. 6)
- Suitable for increase in capacity or number of contacts by means of contactors or relays with positive-guided contacts.
- If the feedback circuit is not required, establish a bridge.
- (H2) = Feedback circuit

Dual-channel control with feedback circuit (see Fig. 7)
- Suitable for increase in capacity or number of contacts by means of contactors or relays with positive-guided contacts.
- If the feedback circuit is not required, establish a bridge.
- (H2) = Feedback circuit

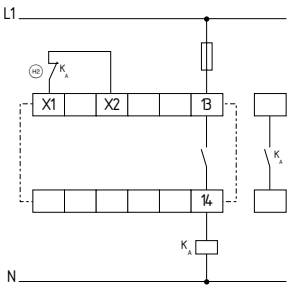


Fig. 6

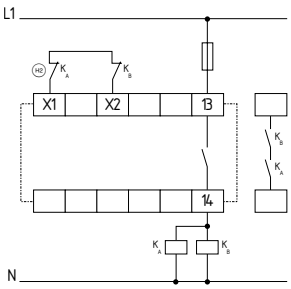


Fig. 7

8.5 Pin configuration (depending on the number of doors)

(Unused sensor inputs must be accordingly bridged)

Number of sensors to be monitored: 1; pin configuration:

NC contacts	S11/S12
NO contacts	S73/S74
Bridges	S11/S22
	S31/S32/S42
	S51/S52/S62

Number of sensors to be monitored: 2; pin configuration:

NC contacts 1	S11/S12
NC contacts 2	S11/S22
NO contacts 1	S73/S74
NO contacts 2	S73/S74
Bridges	S31/S32/S42
	S51/S52/S62

Number of sensors to be monitored: 3; pin configuration:

NC contacts 1	S11/S12
NC contacts 2	S11/S22
NC contacts 3	S31/S32
NO contacts 1	S73/S74
NO contacts 2	S73/S74
NO contacts 3	S83/S84
Bridges	S31/S42
	S51/S52/S62

Number of sensors to be monitored: 4; pin configuration:

NC contacts 1	S11/S12
NC contacts 2	S11/S22
NC contacts 3	S31/S32
NC contacts 4	S31/S42
NO contacts 1	S73/S74
NO contacts 2	S73/S74
NO contacts 3	S83/S84
NO contacts 4	S83/S84
Bridges	S51/S52/S62

Number of sensors to be monitored: 5; pin configuration:

NC contacts 1	S11/S12
NC contacts 2	S11/S22
NC contacts 3	S31/S32
NC contacts 4	S31/S42
NC contacts 5	S51/S52
NO contacts 1	S73/S74
NO contacts 2	S73/S74
NO contacts 3	S83/S84
NO contacts 4	S83/S84
NO contacts 5	S93/S94
Bridges	S51/S62

Number of sensors to be monitored: 6; pin configuration:

NC contacts 1	S11/S12
NC contacts 2	S11/S22
NC contacts 3	S31/S32
NC contacts 4	S31/S42
NC contacts 5	S51/S52
NC contacts 6	S51/S62
NO contacts 1	S73/S74
NO contacts 2	S73/S74
NO contacts 3	S83/S84
NO contacts 4	S83/S84
NO contacts 5	S93/S94
NO contacts 6	S93/S94
Bridges:	none

9. EU Declaration of conformity

EU Declaration of conformity

SCHMERSAL

Original

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Germany
Internet: www.schmersal.com

We hereby certify that the hereafter described components both in their basic design and construction conform to the applicable European Directives.

Name of the component: SRB207AN

Description of the component: Safety-monitoring module for emergency stop circuits, guard door monitoring and magnetic safety switches

Relevant Directives:

Machinery Directive	2006/42/EC
EMC-Directive	2014/30/EU
RoHS-Directive	2011/65/EU

Applied standards:
EN 60947-5-1:2004 + AC:2005 + A1:2009
EN 60947-5-1:2017
EN ISO 13850:2015
EN ISO 13849-1:2015
EN ISO 13849-2:2012

Notified body, which approved the full quality assurance system, referred to in Appendix X, 2006/42/EC:
TÜV Rheinland Industrie Service GmbH
Am Grauen Stein, 51105 Köln
ID n°: 0035

Person authorised for the compilation of the technical documentation:
Oliver Wacker
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Place and date of issue: Wuppertal, November 22, 2021

Authorised signature
Philip Schmersal
Managing Director

SRB207AN-E-EN

The currently valid declaration of conformity can be downloaded from the internet at products.schmersal.com.

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