SCHMERSAL

EN Operating instructions. . . . . .pages 1 to 6
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:

SRB200X2

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 modules for integration in safety circuits are designed for fitting in control cabinets. They are used for the safe evaluation of the signals of positive break position switches or magnetic safety sensors for safety functions on sliding, hinged and removable safety guards as well as emergency stop control devices and AOPD's.

The safety function is defined as the opening of the enabling circuits 13-14 and 23-24 when the inputs S11 - S12 and/or S11 - S22 are opened or when the supply voltage A1 is disconnected. The safety-relevant current paths with the output contacts 13-14 and 23-24 meet the following requirements under observation of a B_{10D} value assessment (also refer to "Requirements of EN ISO 13849-1"):
– Control category 4 - PL e to EN ISO 13849-1
– SIL 3 to IEC 61508
– SIL CL 3 to EN 62061

To determine the Performance Level (PL) of the entire safety function (e.g. sensor, logic, actuator) to EN ISO 13849-1, an analysis of all relevant components is required.

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:	AgSnO, self-cleaning, positive drive
Weight:	230 g
Start conditions:	start button (monitored)
Feedback circuit (Y/N):	yes
Drop-out delay:	1-channel input circuit: typ. 50 ms 2-channel input circuit: typ. 20 ms
Pull-in delay:	typ. 20 ms
Bridging in case of voltage drops:	typ. 50 ms
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):	No
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 … +60 °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. 1.5 W / 3.0 VA
Rated operating voltage U_e:	24 VDC –15% / +20%, residual ripple max. 10% 24 VAC –15% / +10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic trip, tripping current > 1 mA, reset after approx. 1 s
Current and voltage at:	S11-S12: 24 VDC, continuous current: 40 mA, start impulse: 700 mA / 5 ms S21-S22 24 VDC, continuous current: 40 mA, start impulse: 700 mA / 5 ms S33-S34: 24 VDC, start impulse: 200 mA / 5 ms
Monitored inputs:	
Short-circuit recognition (Y/N):	Yes (if dual-channel)
Wire breakage detection (Y/N):	Yes
Earth leakage detection (Y/N):	Yes
Number of NO contacts:	0
Number of NC contacts:	2
Cable length:	1,500 m = 1.5 mm² 2,500 m = 2.5 mm²
Conduction resistance:	max. 40 Ω
Outputs:	
Number of safety contacts:	2
Number of auxiliary contacts:	0
Number of signalling outputs:	0

Switching capacity of the safety contacts:	13-14; 23-24: 230 VAC / 8 A ohmic (inductive in case of appropriate protective wiring); min. 10 V / 10 mA; AC-15: 230 VAC / 6 A; DC-13: 24 VDC / 6 A
Fuse rating of the safety contacts:	8 A slow blow
Utilisation category to EN 60947-5-1:	AC-15 / DC-13

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

2.5 Safety classification

Standards:	EN ISO 13849-1, IEC 61508
PL:	Stop 0: up to e
Category:	Stop 0: up to 4
DC:	Stop 0: 99% (high)
CCF:	> 65 points
SIL:	Stop 0: up to 3
Mission time:	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

All measurements in mm.

Device dimensions (H/W/D): 100 x 22.5 x 121 mm

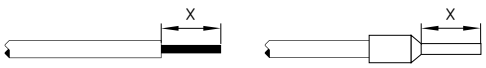
4. Electrical connection

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: 8 mm



Wiring examples: see appendix

5. Operating principle and settings

5.1 LED functions

- K1: Status channel 1
- K2: Status channel 2
- U_B: 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).

5.2 Description of the terminals

Voltages:	A1	+24 VDC/24 VAC
	A2	0 VDC/24 VAC
Inputs:	S11-S12	Input channel 1 (+)
	S21-S22	Input channel 2 (–)
Outputs:	13-14	First safety enabling circuit
	23-24	Second safety enabling circuit
Start:	S33-S34	Feedback circuit and external reset

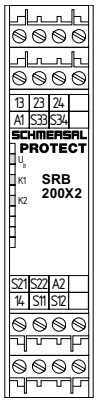


Fig. 1

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 position switches where one has a positive break contact; with external reset button Ⓡ (see Fig. 2)

- 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

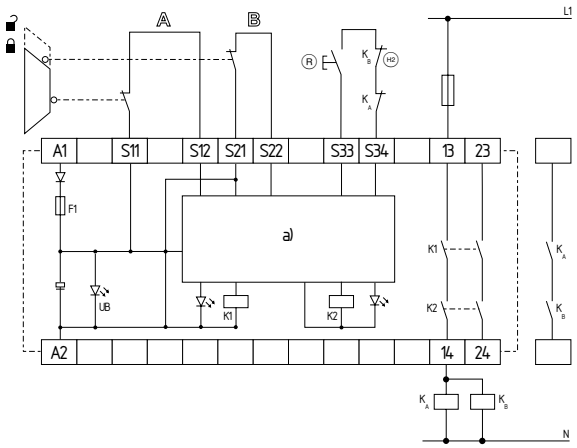


Fig. 2
a) Logic

8.2 Start configuration

External reset button (with edge detection) (see Fig. 3)

- The external reset button is integrated as shown.
- The safety-monitoring module is activated by the reset (after release) of the reset button (= detection of the trailing edge). Faults in the reset button, e.g. welded contacts or manipulations which could lead to an inadvertent restart, are detected in this configuration and will result in an inhibition of the operation.

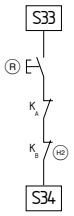


Fig. 3

8.3 Sensor configuration

Single-channel emergency stop circuit with command devices to EN ISO 13850 and EN 60947-5-5 (see Fig. 4)

- Wire breakage and earth leakage in the control circuits are detected.
- Category 1 – PL c to EN ISO 13849-1 possible.

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

- Wire breakage and earth leakage in the control circuits are detected.
- Cross-wire shorts between the control circuits are detected.
- Category 4 – PL e to EN ISO 13849-1 possible

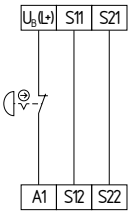


Fig. 4

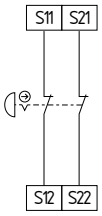


Fig. 5

Single-channel guard door monitoring circuit with interlocking devices to EN ISO 14119 (see Fig. 6)

- At least one contact with positive break required.
- Wire breakage and earth leakage in the control circuits are detected.
- Category 1 – PL c to EN ISO 13849-1 possible.

Dual-channel guard door monitoring circuit with interlocking device to EN ISO 14119 (see Fig. 7)

- At least one contact with positive break required.
- Wire breakage and earth leakage in the control circuits are detected.
- Cross-wire shorts between the control circuits are detected.
- Category 4 – PL e to EN ISO 13849-1 possible.

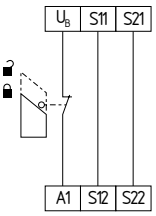


Fig. 6

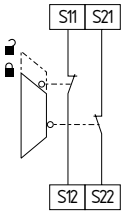


Fig. 7

8.4 Actuator configuration

Single-channel control with feedback circuit (see Fig. 8)

- Suitable for increase in capacity or number of contacts by means of contactors or relays with positive-guided contacts.
- Ⓗ2 = feedback circuit:
  If the feedback circuit is not required, establish a bridge.

Dual-channel control with feedback circuit (see Fig. 9)

- Suitable for increase in capacity or number of contacts by means of contactors or relays with positive-guided contacts.
- Ⓗ2 = feedback circuit:
  If the feedback circuit is not required, establish a bridge.

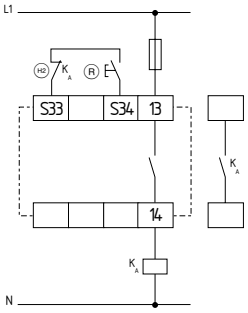


Fig. 8

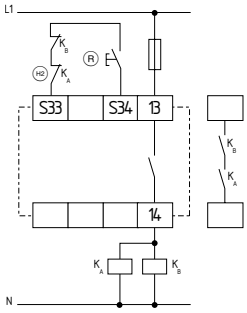


Fig. 9

9. EU Declaration of conformity

EU Declaration of conformity

SCHMERSAL

Original	K.A. Schmersal GmbH & Co. KG Möddinghofe 30 42279 Wuppertal 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:	SRB200X2
Description of the component:	Safety-monitoring module for emergency stop circuits and guard door monitoring
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 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 Möddinghofe 30 42279 Wuppertal
Place and date of issue:	Wuppertal, November 22, 2021

Authorised signature
Philip Schmersal
Managing Director

SRB200X2-D-EN

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

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