



EN Operating instructions. pages 1 to 6
Original

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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-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.

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:

SRB100DR



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 SRB100DR is not an autonomous safety-monitoring module, but a "superimposed device", which generates a safe reset signal by means of a double acknowledgment (reset impulse approx. 100 ms). The start configuration of the downstream device must be realised in accordance with the datasheet of this device.



In this application, the reset buttons must be set up so that the operator has a good overview over the entire protected area.

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 two reset buttons, which are installed independent from each other in a plant and which must be successively actuated within a certain period of time (adjustable).

In this application, the reset buttons must be set up so that the operator has a good overview over the entire protected area.

The reset signal is safely transmitted to the reset input of a downstream safety-monitoring module (impulse approx. 100 ms).

The safety function is defined as the closing of the safety contact 13-14 (pulse approx. 100 ms) when reset button 1 and reset button 2 have been actuated within the preset monitoring time (3...30 s possible by means of DIP switch). The safety-relevant current path with output contact 13-14 meets 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: AgNi, self-cleaning, positive drive

Weight: 250 g

Start conditions: Automatic

Feedback circuit (Y/N): No

Pull-in delay: after 2nd acknowledgement 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): 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 ... +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. 3.2 W / 6.0 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 > 500 mA, Reset after approx. 1 s

Monitored inputs:

Short-circuit recognition (Y/N): No

Wire breakage detection (Y/N): Yes

Earth leakage detection (Y/N): Yes

Number of NO contacts: 2

Number of NC contacts: 0

Conduction resistance: max. 40 Ω

Outputs:

Number of safety contacts:	1
Number of auxiliary contacts:	0
Number of signalling outputs:	0

Switching capacity of the safety contacts: max. 250 VAC: 8 A ohmic
(inductive in case of appropriate protective wiring);

Fuse rating of the safety contacts: external ($I_k = 1000\text{ A}$)
to EN 60947-5-1
6 A gL, 8 A slow blow

Utilisation category to EN 60947-5-1: AC-15: 230 V / 3 A,
DC-13: 24 V / 2 A

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

2.5 Safety classification

Standards: EN ISO 13849-1, IEC 61508

PL: up to e

Control category: up to 4

PFH value: $\leq 2.0 \times 10^{-8}/\text{h}$

SIL: up to 3

Mission time: 20 years

The PFH value of $2.0 \times 10^{-8}/\text{h}$ applies to the combinations of contact load (current through enabling contacts) and number of switching cycles (n_{oply}) 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_{oply}	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
with plugged-in terminals: 120 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: 7 mm



Wiring examples: see appendix

5. Operating principle and settings

5.1 LED functions

- K1: Status reset 1
- K2: Status reset 2
- K3: Status reset impulse
- U_B : Status operating voltage (LED is on, when the operating voltage on the terminals A1-A2 is ON)

5.2 Description of the terminals

Voltage	A1	+24 VDC/24 VAC
	A2	0 VDC/24 VAC
Inputs	X1-X2	Input reset 1
	X3-X4	Input reset 2
Outputs	13-14	Reset input of a downstream safety-monitoring module

Opening the front cover (see Fig. 2)

- To open the front cover, insert a slotted screwdriver in the top and bottom cover notch and gently lift it.
- When the front cover is open, the electrostatic discharge requirements must be respected and observed.
- After setting, the front cover must be fitted back in position.
- The set drop-out delay must be entered on the front cover.



Only touch the components after electrical discharge!

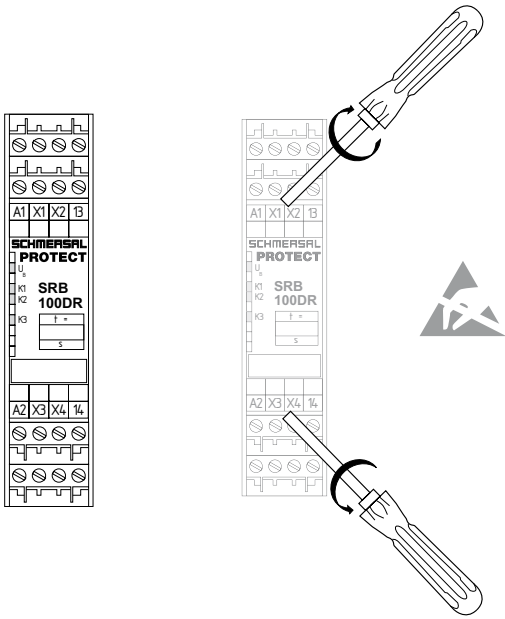


Fig. 1

Fig. 2

Time setting

DIP switch settings (see Fig. 3 and 4)

- The DIP switches are located underneath the front cover of the safety-monitoring module.
- Both DIP switches SW 1 (channel 1) and SW 2 (channel 2) must be set identically.
- Condition on delivery: 3.0 s

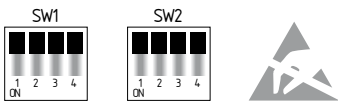


Fig. 3

DIP switch setting	Monitoring time	DIP switch setting	Monitoring time
	3.0 s		17.4 s
	4.8 s		19.2 s
	6.6 s		21.0 s
	8.4 s		22.8 s
	10.2 s		24.6 s
	12.0 s		26.4 s
	13.8 s		28.2 s
	15.6 s		30.0 s

Fig. 4 Tolerance of the monitoring time $\pm 20\%$

5.3 Setting report

This report regarding the setting of the device must be completed accordingly by the customer and enclosed in the technical manual of the machine.

The setting report must be available whenever a safety check is performed.

Company: _____

The safety-monitoring module is used in the following machine:

Machine n° _____ Machine type _____ Module n° _____

Set on monitoring time: _____

Set on (date) _____ Signature of the responsible person _____

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 example

- Start configuration: 2 time-dependent reset/on switches 1st and 2nd monitoring time between the 1st and 2nd reset button from 3 ... 30 s adjustable through DIP switches.
- Actuator configuration: single-channel control (output impulse approx. 100 ms) of the reset input of a downstream safety-monitoring module.
- Edge detection: After the device is reset, the trailing edge is evaluated, so that errors, e.g. welded contacts or manipulations cannot lead to dangerous situations.

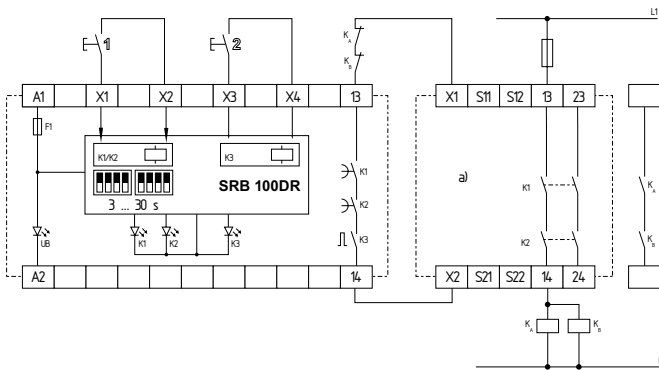


Fig. 3
a) SRB, eg. SRB301ST or SRB211ST

8.2 Start configuration

(see Fig. 4)

- The both reset buttons are wired to the terminals X1-X2 (1st reset button) and X3-X4 (2nd reset button).
- Both reset buttons must be actuated in sequence, i.e. first button 1, then button 2.
- An additional safety feature of the signal processing of the button signals is the edge detection, i.e. the trailing edge is evaluated after reset of the device, so that errors, e.g. welded contacts or manipulations, cannot lead to dangerous situations.

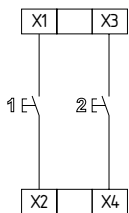


Fig. 4

8.3 Actuator configuration

(see Fig. 5)

Integration of the SRB100DR safety-monitoring module

- The reset button of the safety-monitoring module, which must be fit for double acknowledgment, is replaced by the SRB100DR safety-monitoring module. All safety-monitoring modules from the Schmersal Group can be connected to the SRB100DR.

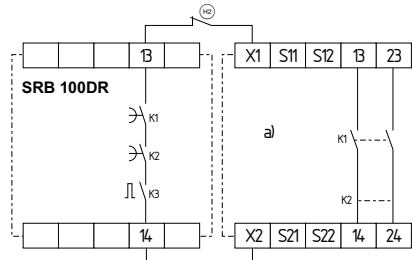

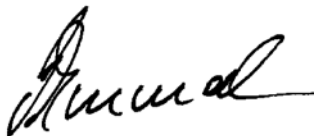


Fig. 5
a) Safety-monitoring module, e.g. SRB301ST or SRB211ST

9. EU Declaration of conformity

EU Declaration of conformity		
Original	K.A. Schmersal GmbH & Co. KG Mödinghofe 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:	SRB100DR	
Description of the component:	Safety-monitoring module as superimposed device, which generates a safe reset signal by means of a double acknowledgment	
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 Mödinghofe 30 42279 Wuppertal	
Place and date of issue:	Wuppertal, November 22, 2021	
		
	Authorised signature Philip Schmersal Managing Director	

SRB100DR-E-EN



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

