



EN Operating instructions..... pages 1 to 6
Translation of the original operating instructions

FR Vous trouverez la version actuelle du mode d'emploi dans votre langue nationale officielle sur l'Internet, www.schmersal.net.

ES Encontrará el manual de instrucciones actual en su idioma oficial de la UE en nuestra página de Internet www.schmersal.net.

NL U vindt de huidige versie van de gebruikshandleiding in uw officiële landstaal op het Internet, www.schmersal.net.

IT Il manuale d'istruzioni aggiornato nella vostra lingua (lingua ufficiale UE) è scaricabile in Internet all'indirizzo www.schmersal.net.

JP EU公用語で書かれた最新の取扱説明書は、インターネット (www.schmersal.net) からダウンロードできます。

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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

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 proper functionality of the entire machinery 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 Elan 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



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 standard EN 1088 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:

SRB 400NE-① / SRB 402NE-①		
No.	Option	Description
①	24 V	24 VAC / VDC
	230 V	230 VAC



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 Destination and use

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 for safety functions or BNS20-2rz type magnetic safety sensors from Schmersal.

The safety-relevant current path with the output contacts 13-14, 23-24, 33-34 and 43-44 meet the following requirements under observation of a B_{10d} value assessment (also refer to "Requirements to DIN EN ISO 13849-1"):

- control category 4 – PL e to DIN EN ISO 13849-1
- corresponds to SIL 3 to DIN EN 61508-2
- corresponds to SILCL 3 to DIN EN 62061
(corresponds to control category 4 to DIN EN 954-1)

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

2.4 Technical data

General data:	
Standards:	IEC/EN 60204-1, EN 60947-5-1, EN ISO 13849-1, IEC/EN 61508
Climate resistance:	EN 60068-2-78
Fixing:	Snaps onto standard DIN rails to DIN EN 60715
Terminal designations:	EN 60947-1
Material of the enclosure:	glass-fibre reinforced thermoplastic, ventilated
Material of the contacts:	AgSnO, AgNi, self-cleaning, positive drive
Weight:	24 V: 370 g 230 V: 550 g

Start conditions	Automatic
Feedback circuit available:	Yes
Pull-in delay:	typ. 0.5 s
Drop-out delay in case of emergency stop:	typ. 50 ms
Pull-in delay auxiliary contacts:	57-58, 67-68 (only SRB 402NE): adjustable 0...5 sec (factory setting 5 sec)

Mechanical data:	
Connection type:	Screw terminals
Cable section:	min. 2 mm ² / max. 2 mm ²
Connecting cable:	rigid or flexible
Tightening torque for the terminals:	0.6 Nm
With removable terminals:	Yes
Mechanical life:	10 million operations
Resistance to shock:	10 g / 11 ms
Resistance to vibrations to EN 60068-2-6:	10 ... 55 Hz, amplitude 0.35 mm
Ambient temperature:	–25°C ... +45°C
Storage and transport temperature:	–40°C ... +85°C

Protection class:	Enclosure: IP 40 Terminals: IP 20 Wiring compartment: IP 54
Air clearances and creepage distances to IEC/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:	24 V: max. 6 W / 6 VA 230 V: max. 6 W / 7.8 VA
Rated operating voltage U _e :	24 VDC –15% / +20%, residual ripple max. 10% 24 VAC, 230 VAC: –15% / +10%

Frequency range:	50 Hz / 60 Hz
Max. fuse rating of the operating voltage:	internal F1: T 1 A

Monitored inputs:	
Cross-wire detection:	Yes
Wire breakage detection:	Yes
Earth leakage detection:	Yes
Number of NO contacts:	0
Number of NC contacts:	4

Outputs:	
Number of safety contacts:	4
Number of auxiliary contacts:	SRB 402NE: 2 pc.
Switching capacity of the safety contacts:	230 VAC: 6 A ohmic (inductive in case of appropriate protective wiring); 13-14 or 23-24 max. 6 A; 33-34 or 43-44 max. 6 A; 13-14 and 23-24 max. 4.2 A each; 33-34 and 43-44 max. 4.2 A each;

Switching capacity of the auxiliary contacts:	230 VAC: 2 A ohmic; AC-15: 250 V / 2 A; DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	6.3 A slow blow
Recommended fuse for the auxiliary contacts:	2 A slow blow
Utilisation category to EN 60947-5-1:	AC-15, DC-13
Dimensions (H/W/D):	100 mm × 45 × 121 mm
The data specified in this manual is applicable when the component is operated with rated operating voltage U _e ±0%.	

2.5 Safety classification

Standards:	EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:	up to e
Control category:	up to 4
DC:	99% (high)
CCF:	> 65 points
SIL:	up to 3
Service life:	20 years
B _{10d} value (for one channel):	20%: 20,000,000 40%: 7,500,000 60%: 2,500,000 80%: 1,000,000 100%: 400,000

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

For an average annual demand rate of n_{op} = 126,720 cycles per year, Performance Level PL e can be obtained at maximum load.

- n_{op} = average number of activations per year
- d_{op} = average number of operating days per year
- h_{op} = average number of operating hours per day
- t_{cycle} = average demand rate of the safety function in s
(e.g. 4 × per hour = 1 × per 15 min. = 900 s)

(Specifications can vary depending on the application-specific parameters h_{op}, d_{op} and t_{cycle} as well as the load.)

3 Mounting

3.1 General mounting instructions

Mounting: snaps onto standard DIN rails to EN 60715.

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

3.2 Dimensions

All measurements in mm.

Device dimensions (H/W/D): 100 x 45 x 121 mm
with plugged-in terminals: 120 × 45 × 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.

Wiring examples: see appendix

5 Operating principle and settings

5.1 LED functions

- K1: Status channel 1, limit switch LHS
- K2: Status channel 2, limit switch LHS
- K3: Status channel 1, limit switch RHS
- K4: Status channel 2, limit switch RHS
- K5: Time-delayed channel
- U_B: Status operating voltage (LED is on, when the operating voltage on the terminals A1-A2 is ON)
- 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)

5.2 Description of the terminals

(see Fig. 2)

Voltages:	A1	+24 VAC / VDC or 230 VAC
	A2	0 VAC / VDC
Inputs:	S11-S12	Input channel 1 right
	S11-S22	Input channel 2 right
	S31-S32	Input channel 1 left
	S41-S42	Input channel 2 left
Outputs:	13-14	First safety enabling circuit right
	23-24	Second safety enabling circuit right
	33-34	First safety enabling circuit left
	43-44	Second safety enabling circuit left
		Only SRB 402NE:
	57-58	Time-delayed auxiliary contact
	67-68	Time-delayed auxiliary contact

Opening the front cover (see Fig. 2)

- To open the front cover, insert a slot screwdriver in the top and bottom cover notch and gently lift it (only required for SRB 402NE).
- When the front cover is open, the electrostatic discharge requirements must be respected and observed.



Only touch the components after electrical discharge!

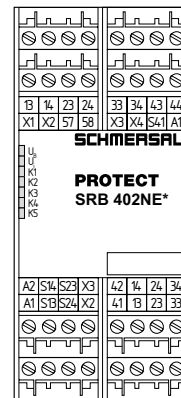


Fig. 1
The SRB 400NE does not have the auxiliary contacts 57-58 and 67-68

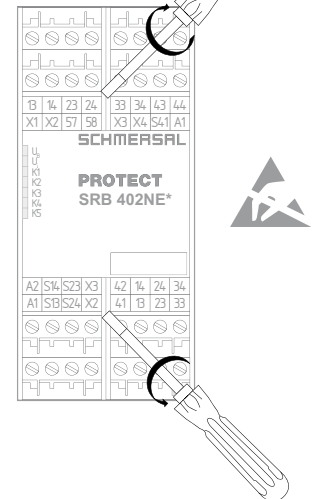


Fig. 2

Setting the pull-in delay (only SRB 402NE) (Fig. 3)

- The pull-in delay (0...5 sec) is set by means of a potentiometer located at the front of the enclosure (behind the front cover).
- The pull-in delay of the safety-monitoring module is set to 5 sec in factory. Upon the customer's request, the safety-monitoring module can be supplied with a different setting.
- A clockwise rotation of the potentiometer causes the pull-in delay to be decreased.

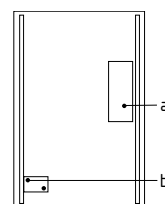


Fig. 3
a) Fuse;
b) Potentiometer

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

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.

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

The example represent a dual-channel control of a circuit with limit switches (Fig. 4).

- Relay outputs: 1-channel control, suitable for contact reinforcement or multiplication by means of contactors or relays with positive-drive contacts. S = feedback circuits
- The control system recognises wire-breakage and earth faults in the monitoring circuit.
- * Fuse 1 A T
- ** To be bridge for the 24V version
- *** Limit switch RHS
- **** Limit switch LHS
- (FE) = Feedback circuit

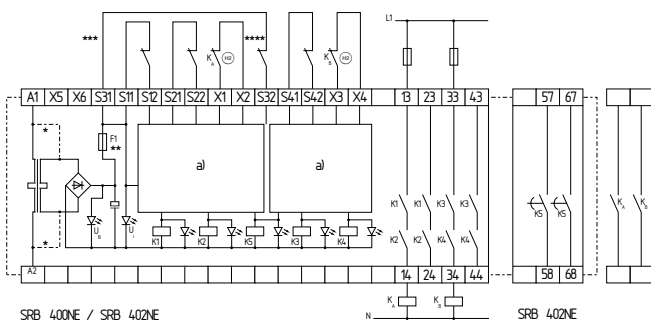


Fig. 4
a) Channel control

8.2 Sensor configuration

The connection of magnetic safety switches to the safety-monitoring modules is only admitted when the requirements of the standard EN 60947-5-3 are observed.



The following safety sensors from Schmersal meet the requirements:

- BNS 20-2rz



Caution! 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.

**SRB 400NE/SRB 402NE, switch-off in end position:
Dual-channel control of magnetic safety switches to EN 60947-5-3**

- The control system recognises wire-breakage, earth faults and cross-wire shorts in the control circuit.
- Fig. 5: limit switch LHS, partially acting on switch-off level 1 (safety enabling circuits 13-14, 23-24)
- Fig. 6: limit switch RHS, partially acting on switch-off level 2 (safety enabling circuits 33-34, 43-44)

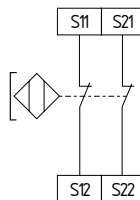


Fig. 5

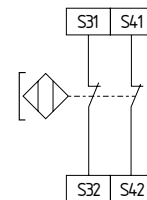


Fig. 6

**SRB 402NE, preliminary switch-off and switch-off in end position:
Dual-channel control of magnetic safety switches to EN 60947-5-3
(see Fig. 7 and 8)**

- The enabling circuits 13-14 and 23-24 are closed again by the bridge X5-X6 after the release of the limit switch.

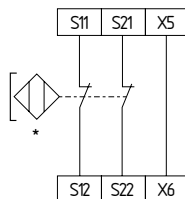


Fig. 7
* = limit switch

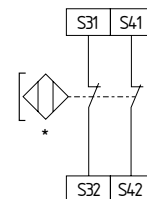


Fig. 8
* = preliminary limit switch

SRB 402NE (see Fig. 9)

- The time-delayed auxiliary contacts 57-58 and 67-68 can be set with a pull-in delay from 0 to 5 sec.
- When the control contacts are opened, the auxiliary contacts will close after the set pull-in delay.
- Function 5 ("brake activation circuit"): when the limit switch is actuated, the drives are switched off. By means of the K5 outputs with pull-in delay, the drives can be enabled with reduced speed.

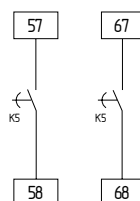


Fig. 9

8.3 Actuator configuration

Single-channel control with feedback circuit (Fig. 10)

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

Dual-channel control with feedback circuit (Fig. 11)

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

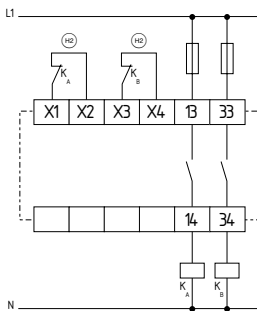


Fig. 10

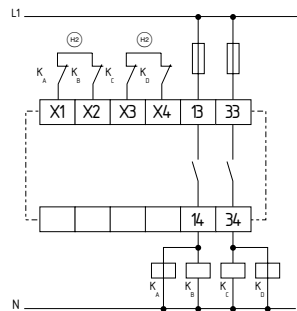


Fig. 11

8.4 Flowcharts

Flowchart SRB 400NE / SRB 402NE (Fig. 12)

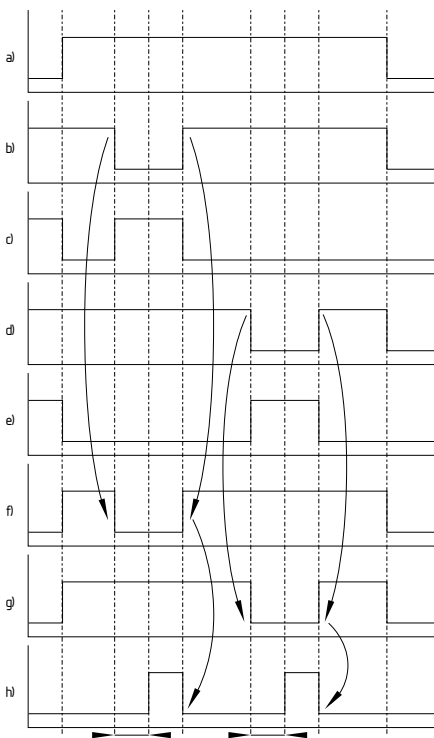


Fig. 12
a) Operating voltage U_B ;
b) Limit switch RHS (S12-S22);
c) Feedback circuit X1-X2;
d) Limit switch LHS (S32-S42);
e) Feedback circuit X3-X4;
f) Enabling circuit 13-14 / 23-24;
g) Enabling circuit 33-34 / 43-44;
h) Auxiliary contact 57-58 / 67-68;
* = pull-in delay

Flowchart SRB 402NE, preliminary limit switch and limit switch (Fig. 13)

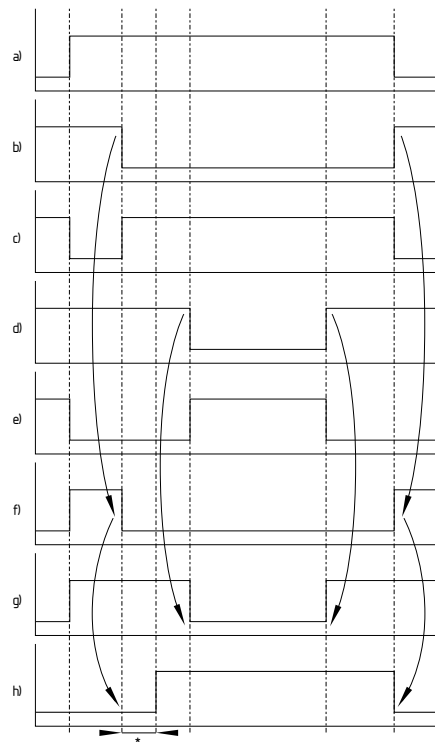

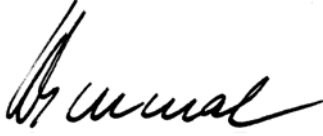


Fig. 13
a) Operating voltage U_B ;
b) Preliminary limit switch S32-S42;
c) Feedback circuit X3-X4;
d) Limit switch S12-S22;
e) Feedback circuit X1-X2;
f) Enabling circuit 33-34 / 43-44;
g) Enabling circuit 13-14 / 23-24;
h) Auxiliary contact 57-58 / 67-68;
* = pull-in delay

8.5 EC Declaration of conformity

	
<h2>EC Declaration of conformity</h2>	
Translation of the original declaration of conformity	Elan Schaltelemente GmbH & Co. KG Im Ostpark 2 · 35435 Wettenberg Germany Internet: www.elan.de
We hereby certify that the hereafter described safety components both in its basic design and construction conforms to the applicable European Directives.	
Name of the safety component:	SRB 400NE / SRB 402NE
Description of the safety component:	Safety-monitoring module for guard door monitoring and BNS20-2rz type magnetic safety switches from Schmersal
Harmonised EC-Directives:	2006/42/EC EC-Machinery Directive 2004/108/EC EMC-Directive
Person authorized for the compilation of the technical documentation:	Ulrich Loss 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 Alboinstraße 56 12103 Berlin ID n°: 0035
Place and date of issue:	Wuppertal, October 6, 2009
SRB400NE-B-EN	
	Authorised signature Heinz Schmersal Managing Director



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



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