SCHMERSAL
Elan

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

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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 402EM

⚠ This device is designed as expander safety-monitoring module. The safety function is only realised in conjunction with the basic device. To this effect, the device must be connected in accordance with the wiring example!

⚠ 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 and the safe contact multiplication of an upstream safety-monitoring module.

The safety function is defined as the opening of the enabling circuits 13-14, 23-24, 33-34 and 43-44 when the supply voltage A1-A2 is disconnected. 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, self-cleaning, positive drive
Weight:	215 g
Start conditions	Automatic
Feedback circuit (Y/N):	Yes
Pull-in delay:	≤ 30 ms
Drop-out delay:	≤ 35 ms
Mechanical data:	
Connection type:	Screw connection
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 (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
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:	max. 1.0 VA
Rated operating voltage U_e:	24 VDC –15% / +20%, residual ripple max. 10% 24 VAC –15% / +10%
Frequency range:	50 Hz / 60 Hz
Max. fuse rating of the operating voltage:	F1: T 1.0 A / 250 V
Monitored inputs:	
Cross-wire detection (Y/N):	No
Wire breakage detection (Y/N):	Yes
Earth leakage detection (Y/N):	Yes
Number of NO contacts:	0
Number of NC contacts:	0
Conduction resistance:	max. 40 Ω
Outputs:	
Number of safety contacts:	4
Number of auxiliary contacts:	2
Number of signalling outputs:	0
Switching capacity of the safety contacts:	**13-14; 23-24; 33-34; 43-44:** max. 250 V, 6 A ohmic (inductive in case of appropriate protective wiring) min. 10 V / 10 mA
Switching capacity of the auxiliary contacts:	51-52; 61-62: 24 VDC / 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: EN 60947-5-1:2007
Dimensions (H/W/D):	100 mm x 22,5 mm x 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:	Stop 0: up to e
Control category:	Stop 0: up to 4
DC:	Stop 0: 99% (high)
CCF:	> 65 points
SIL:	Stop 0: up to 3
Service life:	20 years
B_{10d} value (for one channel):	Low voltages range 20%: 20,000,000 40%: 7,500,000 60%: 2,500,000 80%: 1,000,000 Maximum load 100%: 400,000

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

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 22.5 x 121 mm
with plugged-in terminals: 120 × 22.5 × 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/K2: status channels 1 and 2

5.2 Terminal description

Voltages:	A1	+24 VDC/24 VAC
	A2	0 VDC/24 VAC
Outputs:	13-14	First safety enabling circuit
	23-24	Second safety enabling circuit
	33-34	Third safety enabling circuit
	43-44	Fourth safety enabling circuit
Start:	X1-X2	Feedback circuit
	51-52	Auxiliary NO contact
	61-62	Auxiliary NC contact

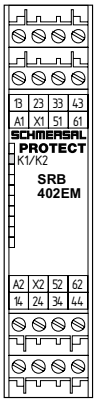

Fig. 1

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 proper fixation 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 example

Single-channel control at terminal A1 of the SRB 402EM expander module through a safety release of the basic module (Fig. 1)

- The terminals X1 and X2 of the expander module must be connected to the feedback circuit or the single-switch circuit of the basic module.

Safety notice: the expander module must be wired in accordance with the wiring example. The safety function is only realised in conjunction with the basic device.

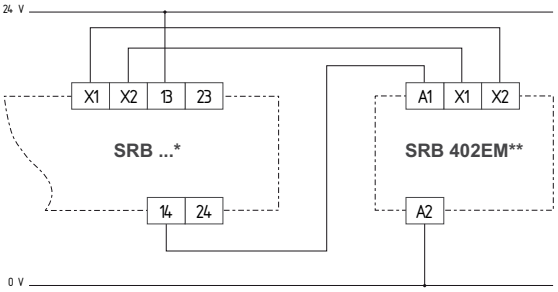

Fig. 2
* = basic module;
** = expander module

8.2 Internal wiring diagram

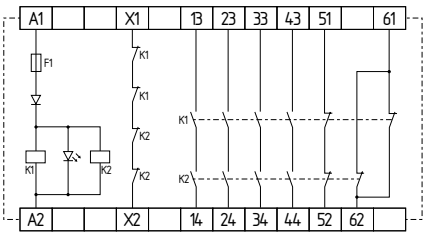

Fig. 3

8.3 EC Declaration of conformity

EC Declaration of conformity

Translation of the original declaration of conformity
valid as of December 29, 2009

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 402EM
Description of the safety component:	Safety-monitoring module as expander module in conjunction with a safety-monitoring module as basic device
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

Authorised signature
Heinz Schmersal
Managing Director

SRB402EM-B-EN

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

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