SCHMERSAL
Elan

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(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. Subject to technical modifications.

The entire concept of the control system, in which the safety component is integrated, must be validated to EN ISO 13849-2.

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 DIN EN 574 must be observed.

26.07.2010 / Index: 421/10 / Teile-Nr. 1182972-EN

### 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:

**SRB 201ZH X3**

⚠ 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 two actuating elements A + B and correspond to a type III/C two-hand control to DIN EN 574.

The safety function is defined as the opening of the enabling circuits 13-14 and 23-24 when one or both actuating elements A + B are released. The safety-relevant current paths with the output contacts 13-14 and 23-24 meet the following requirements under observation of a PFH value assessment (also refer to chapter 2.5 "Safety classification"):
– 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 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: | 200 g |
| Start conditions | Automatic |
| Feedback circuit (Y/N): | Yes |
| Pull-in delay for automatic start: | typ. 50 ms |
| Response time: | typ. 30 ms |
| Simultaneity monitoring: | max. 0,5 s |
| Bridging in case of voltage drops: | typ. 30 ms |
| **Mechanical data** | |
| Connection type: | Screw terminals |
| Cable section: | min. 2 mm² / max. 2 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 |
| Protection class: | Enclosure: IP 40<br>Terminals: IP 20<br>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. 1.5 W |
| Rated operating voltage $U_{e1}$: | 24 VDC –15%/+10%, residual ripple max. 10% |
| Max. fuse rating of the operating voltage: | Internal electronic trip, tripping current > 1.0 mA<br>F3: 1.0 A external |
| **Monitored inputs** | |
| Cross-wire detection (Y/N): | Yes |
| Wire breakage detection (Y/N): | Yes |
| Earth leakage detection (Y/N): | Yes |
| Number of NO contacts: | 2 |
| Number of NC contacts: | 2 |
| Cable lengths: | 1.500 m with 1,5 mm²<br>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: | 0 |
| Switching capacity of the safety contacts: | 13-14; 23-24:<br>max. 250 V, 6 A ohmic (inductive in case of appropriate protective wiring)<br>min. 10 V / 10 mA |
| Switching capacity of the auxiliary contacts: | 31-32: 24 VDC / 2 A |
| Fuse rating of the safety contacts: | external ($I_k$ = 1000 A) to EN 60947-5-1<br>Safety fuse 8 A quick blow,<br>6,3 A slow blow |
| Recommended fuse for the auxiliary contacts: | external ($I_k$ = 1000 A) to EN 60947-5-1<br>Safety fuse 2,5 A quick blow,<br>2 A slow blow |
| Utilisation category to EN 60947-5-1: | AC-15 / DC-13: EN 60947-5-1 |
| Dimensions (H/W/D): | 100 mm x 22.5 mm x 121 mm |

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, EN 60947-5-1, DIN EN 574 |
| PL: | up to e |
| Control category: | up to 4 |
| PFH-value: | ≤ 2,00 x $10^{-8}$/h |
| SIL: | up to 3 |
| Service life: | 20 years |

The PFH value of 2.00 x $10^{-8}$/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 (s / min) |
|---|---|---|
| 20% | 525,600 | 60 s / 1,0 min |
| 40% | 210,240 | 150 s / 2,5 min |
| 60% | 75,087 | 420 s / 7,0 min |
| 80% | 30,918 | 1020 s / 17 min |
| 100% | 12,223 | 2580 s / 43 min |

## 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

## 4 Electrical connection

### 4.1 General information for electrical connection

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.

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

Wiring examples: see appendix

## 5 Operating principle and settings

### 5.1 LED functions
- K1: Status channel 1
- K2: Status channel 2
- UB: Status operating voltage (LED is on, when the operating voltage on the terminals A1-A2 is ON)

### 5.2 Description of the terminals

| | | |
|---|---|---|
| Voltages: | A1 | +24 VDC |
| | A1.1 | + 24 V |
| | A2 | 0 VDC |
| | A2.1 | 0 V |
| Inputs: | S11 | Input channel 1 (+) |
| | S21 | Input channel 2 (-) |
| Outputs: | 13-14 | First safety enabling circuit |
| | 23-24 | Second safety enabling circuit |
| Start: | Y1-Y2 | Feedback circuit |
| | 31-32 | Auxiliary NC contact |

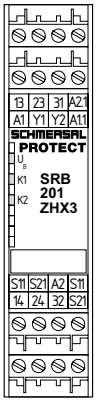


Fig. 1

### 5.3 Notes

Signalling outputs must not be used in safety circuits.

The NC contact of the buttons A + B must be opened, before the NO contact closes. No overlapping contacts to avoid triggering of the fuse.

The pushbuttons A + B must be actuated within a timeframe of < 0.5 sec (simultaneous operation monitoring), otherwise no start enabling signal is given!

## 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

The device has to be integrated into the periodic check-ups according to the Ordinance on Industrial Safety and Health, however at least 1x/year.

**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 with two pushbuttons A and B (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.
- ⓗ = Feedback circuit

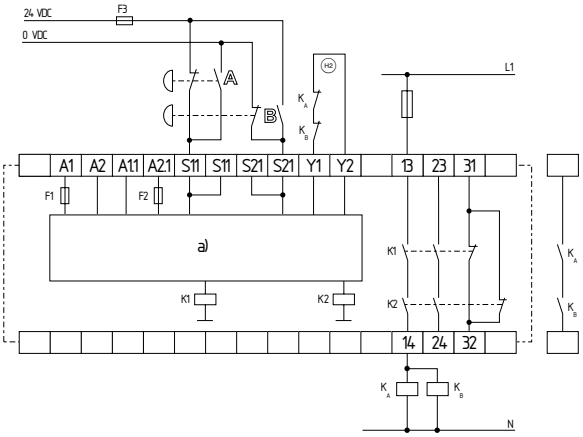


Fig. 2
a) Logic

### 8.2 Sensor configuration

**Two-hand control to DIN EN 574 and EN 60204-1 (see Fig. 3)**

- Malfunctions of every contact as well as earth leakages and cross-wire shorts are detected.
- Feedback circuit: the safety-technical function of external positive-guided contactors is monitored by a series-wiring of the NC contacts with the terminals Y1 and Y2. In idle state, this circuit must be closed.
- Safety category III/C to DIN EN 574
- Category 4 – PL "e" to DIN EN ISO 13849-1 possible

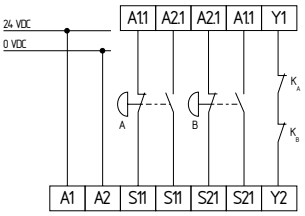


Fig. 3

### 8.3 Actuator configuration

**Single-channel control with feedback circuit (Fig. 4)**

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

**Dual-channel control with feedback circuit (Fig. 5)**

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

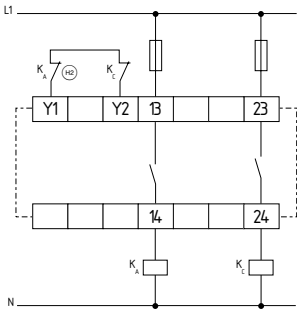


Fig. 4

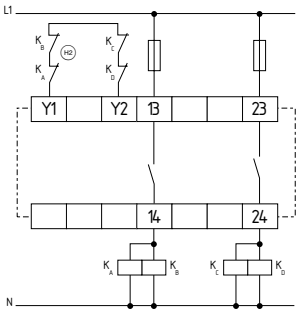


Fig. 5

**Differentiated control with feedback circuit (Fig. 6)**

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

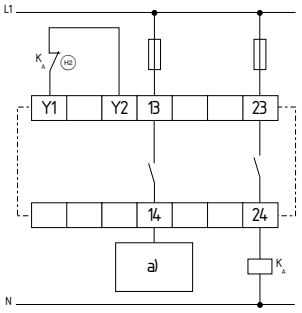


Fig. 6
a) Enabling signal controller

### 8.4 Flow diagram

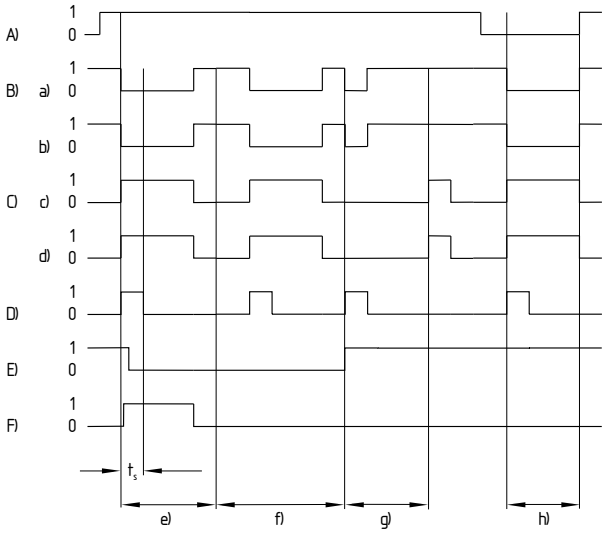


Fig. 7
A) Operating voltage $U_B$;
B) Two-hand button A: the representation is related to the potentials at the terminals of the safety-monitoring module;
a) NC contact S11; b) NO contact S11;
C) Two-hand button B: the representation is related to the potentials at the terminals of the safety-monitoring module;
c) NC contact S21; d) NO contact S21;
D) Simultaneity monitoring $t_s$ (synchronous actuation);
E) Feedback circuit Y1-Y2;
F) Output contacts 13-14, 23-24 potential-free;
e) Trouble-free operating cycle $t_s \leq 0.5$ s;
f) Fault in feedback circuit;
g) Synchronous actuation fault $t_s > 0.5$ s;
h) Fault button A, B before $U_B$ in

### 8.5 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 201ZH X3 |
| **Description of the safety component:** | Safety-monitoring module for type III/C two-hand controls to DIN EN 574 |
| **Harmonised EC-Directives:** | 2006/42/EC EC-Machinery Directive<br>2004/108/EC EMC-Directive |
| **Person authorized for the compilation of the technical documentation:** | Ulrich Loss<br>Möddinghofe 30<br>42279 Wuppertal |
| **Notified body, which approved the full quality assurance system, referred to in Appendix X, 2006/42/EC:** | TÜV Rheinland Industrie Service GmbH<br>Alboinstraße 56<br>12103 Berlin<br>ID n°: 0035 |
| **Place and date of issue:** | Wuppertal, October 6, 2009 |

Authorised signature
Heinz Schmersal
Managing Director

SRB201ZHX3-B-EN

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

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