



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

### 9 Declaration of conformity

### 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

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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 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".

> 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 DIN EN 60204-1.

#### 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: www.schmersal.net.

The information contained in this operating instructions manual is provided without liability and is 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.

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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 1088 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:

### SRB 301LC/8

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 on sliding, hinged and removable safety guards as well as emergency stop control devices. They have a defined switch-off behaviour in case of a momentary supply failure.

The safety function is defined as the opening of the enabling circuits 13-14, 23-24 and 33-34 when the inputs C1-S1 and/or D1-S2 are opened. The safety-relevant current paths with the output contacts 13-14, 23-24 and 33-34 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.

EN ISO 13849-1; IEC 6150         Climate resistance:       EN 60068-2-7         Material of the housings:       Plastic, glass-fibre reinforce         Material of the contacts:       AgSnO, self-cleaning, positive driv         Weight:       250         Start conditions:       Automatic or start butto         Feedback circuit (Y/N):       ye         Pull-in delay for automatic start:       typ. 210         Durop-out delay in case of emergency stop:       typ. 30 m         Drop-out delay on "supply failure":       typ. 30 m         Bridging in case of voltage drops:       typ. 30 m         Onnection type:       Screw connectio         Cable section:       min. 0.25 mm² / max. 25 mm         Connecting cable:       rigid or flexibi         Tightening torque for the terminals:       0.6 Nr         With removable terminals (Y/N):       Nei         Mechanical life:       10 million operation         Resistance to vibrations to EN 60068-2-6:       1055 Hz         Material of the operating voltage dres:       12 strates         Protection class:       Enclosure:         Protection class:       Enclosure:         Protection class:       Enclosure:         Protection class:       Terminalis:         Protec	General data Standards:	
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Tightening torque for the terminals:       0.6 Nr         With removable terminals (Y/N):       Nei         Mechanical life:       10 million operation         Electrical life:       Derating curve available on reques         Resistance to shock:       10 g / 11 m         Resistance to vibrations to EN 60068-2-6:       10 55 Hz         Ambient conditions       -25 °C +45 °         Ambient conditions       -40 °C +85 °         Ambient conditions       Enclosure: IP4         Terminals: IP2       Clearance: IP5         Air clearances and creepage       distances to IEC/EN 60664-1:       4 kV/2 (basic insulation         Electrical data       Contact resistance in new state:       max. 100 mf         Power consumption:       max. 2 V       Rated operating voltage U <sub>a</sub> :       24 VDC -15%/+20%         Fuse rating for the operating voltage:       electronic fuse       Tripping current > 0.4 A         Reset after 1 sec       Monitored inputs       Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye       Ye       Ye         Quiputs       -1,500 m = 1.5 mr       -2,500 m = 2.5 mr         Schole length:       -1,500 m = 1.5 mr       -2,500 m = 2.5 mr         Cable length:       -1,500 m = 1.5 mr       -2,500 m = 2.		
With removable terminals (Y/N):       Nei         Mechanical life:       10 million operation         Electrical life:       Derating curve available on request         Resistance to vibrations to EN 60068-2-6:       10 55 H;         amplitude 0.35 mr         Ambient conditions         Ambient conditions         Ambient temperature: $-25  ^\circ C \dots +45  ^\circ$ Storage and transport temperature: $-40  ^\circ C \dots +85  ^\circ$ Protection class:       Enclosure:         Air clearances and creepage       distances to IEC/EN 60664-1:       4 kV/2 (basic insulation temperature)         Power consumption:       max. 100 m         Power consumption:       max. 100 m         Power consumption:       max. 100 m         Rated operating voltage Ue:       24 VDC -15%/+20%         residual ripple max. 100       mex. 100 m         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 <i>A</i> Reset after 1 set         Monitored inputs       max. 100 m         Cross-wire detection (Y/N):       Ye         Number of NC contacts:       Number of NC contacts:         Cable length:       -1,500 m = 1.5 mr         -2,500 m = 2.5 mr       2.500 m = 2.5 mr         Conducti		
Mechanical life:       10 million operation         Electrical life:       Derating curve available on request         Resistance to shock:       10 g / 11 m         Resistance to vibrations to EN 60068-2-6:       10 0 55 H;         Ambient conditions       amplitude 0.35 m         Ambient temperature:       -25 °C +45 °.         Storage and transport temperature:       -40 °C +65 °.         Protection class:       Enclosure: IP4         Air clearances and creepage       distances to IEC/EN 60664-1:       4 kV/2 (basic insulation         Electrical data       Contact resistance in new state:       max. 100 m         Power consumption:       max. 2 V         Rated operating voltage Uee:       24 VDC -15%/+20%         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 <i>J</i> Reset after 1 set         Monitored inputs       Tripping current > 0.4 <i>J</i> Cross-wire detection (Y/N):       Yee         Wire breakage detection (Y/N):       Yee         Number of NC contacts:       -1,500 m = 1.5 mm         Cable length:       -1,500 m = 2.5 mm         -2,500 m = 2.5 mm       -2,500 m = 2.5 mm         -2,500 m = 2.5 mm       -2,500 m = 2.5 mm         -2,500 m = 2.5 mm       -2,500 m		
Electrical life:       Derating curve available on request         Resistance to vibrations to EN 60068-2-6:       10 g / 11 m         Resistance to vibrations to EN 60068-2-6:       10 55 Hz         Ambient conditions       amplitude 0.35 m         Ambient conditions       -25 °C +45 °         Storage and transport temperature:       -40 °C +85 °         Protection class:       Enclosure: IP4         Terminals: IP2       Clearance: IP5         Air clearances and creepage       distances to IEC/EN 60664-1:       4 kV/2 (basic insulation         Electrical data       Contact resistance in new state:       max. 100 m         Power consumption:       max. 2 V         Rated operating voltage U <sub>6</sub> :       24 VDC -15%/+20%         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 A       Reset after 1 set         Monitored inputs       Creas-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye       Ye         Number of NC contacts:       0       -1,500 m = 1.5 mm         Aubier of NC contacts:       -1,500 m = 1.5 mm       -2,500 m = 2.5 mm         Number of Safety contacts:       Number of safety contacts:       Number of safety contacts:         Number of safety contacts:       Numbe		
Resistance to shock:       10 g / 11 m         Resistance to vibrations to EN 60068-2-6:       10 55 H:         Ambient conditions       -25 °C +45 °.         Ambient temperature:       -40 °C +85 °.         Protection class:       Enclosure: IP4         Protection class:       Enclosure: IP4         Air clearances and creepage       distances to IEC/EN 60664-1:       4 kV/2 (basic insulation         Electrical data       Colearance: IP5         Power consumption:       max. 100 m         Power consumption:       max. 2 V         Rate doperating voltage U <sub>c</sub> :       24 VDC -15%/+20%         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 /       Reset after 1 set         Monitored inputs       Constacts:         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Number of NO contacts:       -1,500 m = 1.5 mm         Number of Safety contacts:       -1,500 m = 2.5 mm         Number of safety contacts:       Number of safety contacts:		
Resistance to vibrations to EN 60068-2-6:       10 55 H: amplitude 0.35 mr         Ambient conditions       -25 °C +45 °.         Ambient temperature:       -40 °C +85 °.         Protection class:       Enclosure: IP4         Terminals: IP2       Clearance: IP5         Air clearances and creepage       distances to IEC/EN 60664-1:       4 kV/2 (basic insulation         Electrical data       max. 100 mr         Contact resistance in new state:       max. 100 mr         Power consumption:       max. 20 mr         Pase rating for the operating voltage U.;       24 VDC -15%/+20%         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 /       Reset after 1 set         Monitored inputs       Ye         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Number of NC contacts:       - 1,500 m = 1.5 mr         Cable length:       - 1,500 m = 2.5 mr         - 2,500 m = 2.5 mr       - 2,500 m = 2.5 mr         2-channel with cross-wire short detection       Conduction resistance:         Number of Safety contacts:       Number of signalling outputs:         Number of signalling outputs:       Switching capacity of the safety contacts:         Number of signalling out		Derating curve available on reques
Ambient conditions         Ambient temperature:       -25 °C +45 °.         Storage and transport temperature:       -40 °C +85 °.         Protection class:       Enclosure: IP4         Protection class:       Enclosure: IP5         Air clearances and creepage       distances to IEC/EN 60664-1:       4 kV/2 (basic insulation         Electrical data       Contact resistance in new state:       max. 100 mt         Power consumption:       max. 2 V         Rated operating voltage U <sub>0</sub> :       24 VDC -15%/+20%         residual ripple max. 100       Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 A       Reset after 1 sec         Monitored inputs       Ye       Ye         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Number of NO contacts:       Number of NO contacts:         Number of safety contacts:       Number of safety contacts:         Number of safety contacts:       Number of safety contacts:         Number of safety contacts:       Number of appropriat         Switching capacity of the safety contacts:       6.3 A slow blo         Number of safety contacts:       6.3 A slow blo         Recommended fuse for the auxiliary contacts:       2.4 Slow blo		
Ambient conditions         Ambient temperature: $-25 \ ^{\circ}C \dots +45 \ ^{\circ}$ Storage and transport temperature: $-40 \ ^{\circ}C \dots +85 \ ^{\circ}$ Protection class:       Enclosure: IP4         Terminals: IP2       Clearance: IP5         Air clearances and creepage       distances to IEC/EN 60664-1:       4 KV/2 (basic insulation         Electrical data       Contact resistance in new state:       max. 100 ms         Power consumption:       max. 2 V         Rated operating voltage Ue:       24 VDC $-15\%/+20\%$ residual ripple max. 109       residual ripple max. 109         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 A       Reset after 1 sec         Monitored inputs       Ye         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Number of NO contacts:       Number of NO contacts:         Cable length: $-1,500 \ m = 1.5 \ mm - 2,500 \ m = 2.5 \ mm - 2,500 \ m = $	Resistance to vibrations to EN 6	
Ambient temperature: $-25 \ ^\circ$ C       +45 \ ^\circ         Storage and transport temperature: $-40 \ ^\circ$ C       +85 \ ^\circ         Protection class:       Enclosure: IP4         Terminals: IP2       Clearance: IP5         Air clearances and creepage       distances to IEC/EN 60664-1:       4 kV/2 (basic insulation         EMC rating:       to EMC Directiv         Electrical data       max. 100 ms         Contact resistance in new state:       max. 100 ms         Power consumption:       max. 2 v         Rated operating voltage Ue:       24 VDC -15%/+20%         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 A       Reset after 1 sec         Monitored inputs       Ye         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Number of NO contacts:       Number of NO contacts:         Number of NC contacts:       Number of safety contacts:         Number of safety contacts:       Number of safety contacts:         Number of signalling outputs:       Switching capacity of the safety contacts:         Number of signalling outputs:       Switching capacity of the auxiliary contacts:         Switching capacity of the auxiliary contacts:       6.3 A slow blow <td>Ambient conditions</td> <td>amplitude 0.55 mi</td>	Ambient conditions	amplitude 0.55 mi
Storage and transport temperature: $-40 \ ^{\circ}C \dots +85 \ ^{\circ}d$ Protection class:Enclosure: IP4 Terminals: IP2 Clearance: IP5Air clearances and creepagedistances to IEC/EN 60664-1:4 kV/2 (basic insulation EMC rating:to EMC DirectivElectrical dataContact resistance in new state:Power consumption:max. 2 V Rated operating voltage Ue:Power consumption:max. 2 V Presidual ripple max. 100 msFuse rating for the operating voltage:electronic fuse Tripping current > 0.4 A Reset after 1 secMonitored inputsYeCross-wire detection (Y/N):YeWire breakage detection (Y/N):YeNumber of NC contacts:-1,500 m = 1.5 mm - 2,500 m = 2.5 mm 2-channel with cross-wire short detectioConduction resistance:max. 40 fOutputsNumber of safety contacts:Number of signalling outputs:Switching capacity of the safety contacts:Number of signalling outputs:13-14; 23-24; 33-34 max. 250 V, 6 A ohmi (inductive in case of appropriat protective wiring) min. 10 V / 10 mSwitching capacity of the auxiliary contacts:6.3 A slow bloo Recommended fuse for the auxiliary contacts:Switching capacity of the auxiliary contacts:2.4 slow bloo Contacts:Cutous or safety contacts:6.3 A slow bloo Contacts:Switching capacity of the auxiliary contacts:2.4 slow bloo Contacts:Conduction category to IEC/EN 60947-5-1:AC-15 / DC-13		-25 °C +45 °C
Protection class: Enclosure: IP4 Terminals: IP2 Clearance: IP5 Air clearances and creepage distances to IEC/EN 60664-1: 4 kV/2 (basic insulation EMC rating: to EMC Directiv Electrical data Contact resistance in new state: max. 100 m Power consumption: max. 2 V Rated operating voltage U <sub>e</sub> : 24 VDC -15%/+20% residual ripple max. 109 Fuse rating for the operating voltage: electronic fuse Tripping current > 0.4 <i>A</i> Reset after 1 sec Monitored inputs Cross-wire detection (Y/N): Ye Wire breakage detection (Y/N): Ye Number of NO contacts: Cable length: - 1,500 m = 1.5 mm - 2,500 m = 2.5 mm 2-channel with cross-wire short detection Conduction resistance: max. 40 f Outputs Number of safety contacts: Number of auxiliary contacts: Number of safety contacts: Number of signalling outputs: Switching capacity of the safety contacts: 13-14; 23-24; 33-34 max. 250 V, 6 A ohmin (inductive in case of appropriat protective wiring) min. 10 V / 10 m Switching capacity of the auxiliary contacts: 41-42: 24 VDC / 2. Fuse rating of the safety contacts: 6.3 A slow blow Recommended fuse for the auxiliary contacts: 2 A slow blow Utilisation category to IEC/EN 60947-5-1: AC-15 / DC-13		-25 C +45 V
Terminals: IP2 Clearance: IP5Air clearances and creepage distances to IEC/EN 60664-1:4 kV/2 (basic insulation EMC rating:ENC rating:to EMC DirectivElectrical datamax. 100 msPower consumption:max. 2 VRated operating voltage Ue:24 VDC $-15\%/+20\%$ residual ripple max. 109Fuse rating for the operating voltage:electronic fuse Tripping current > 0.4 A Reset after 1 secMonitored inputsCross-wire detection (Y/N):YeYeWire breakage detection (Y/N):YeNumber of NC contacts:Number of NC contacts:Number of Safety contacts:-1,500 m = 1.5 mr - 2,500 m = 2.5 mr 2-channel with cross-wire short detectionConduction resistance:max. 40 sOutputsNumber of safety contacts:Number of safety contacts:13-14; 23-24; 33-34 max. 250 V, 6 A ohmi (inductive in case of appropriat protective wiring) min. 10 V / 10 mSwitching capacity of the auxiliary contacts:6.3 A slow blowNumber of the safety contacts:6.3 A slow blowOutputsSafety contacts:Switching capacity of the auxiliary contacts:2 A slow blowCommended fuse for the auxiliary contacts:2 A slow blowOutputsSafety contacts:6.3 A slow blowOutputsCapacity of the auxiliary contacts:2 A slow blowConduction category to IEC/EN 60947-5-1:AC-15 / DC-13		
Clearance: IP5         Air clearances and creepage         distances to IEC/EN 60664-1:       4 kV/2 (basic insulation         EMC rating:       to EMC Directiv         Electrical data         Contact resistance in new state:       max. 100 mi         Power consumption:       max. 2 V         Rated operating voltage Ue:       24 VDC -15%/+20%         residual ripple max. 100       residual ripple max. 100         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 A       Reset after 1 set         Monitored inputs       Ye         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Number of NO contacts:       -1,500 m = 1.5 mr         Number of NC contacts:       -1,500 m = 2.5 mr         Conduction resistance:       max. 40 f         Outputs       Number of safety contacts:         Number of safety contacts:       Number of safety contacts:         Number of signalling outputs:       switching capacity of the safety contacts:         Switching capacity of the safety contacts:       6.3 A slow blow         (inductive in case of appropriat protective wiring) min. 10 V / 10 m       Ye         Mumber of safety contacts:       6.3 A slow blow<	FIOLECLIOIT Class.	
Air clearances and creepage distances to IEC/EN 60664-1: 4 kV/2 (basic insulation EMC rating: to EMC Directiv Electrical data Contact resistance in new state: max. 100 m Power consumption: max. 2 V Rated operating voltage U <sub>e</sub> : 24 VDC -15%/+20% residual ripple max. 109 Fuse rating for the operating voltage: electronic fuse Tripping current > 0.4 A Reset after 1 sec Monitored inputs Cross-wire detection (Y/N): Ye Wire breakage detection (Y/N): Ye Number of NO contacts: Number of NC contacts: Cable length: -1,500 m = 1.5 mm -2,500 m = 2.5 mm 2-channel with cross-wire short detection Conduction resistance: max. 40 f Outputs Number of safety contacts: Number of safety contacts: Switching capacity of the auxiliary contacts: A slow blow Recommended fuse for the auxiliary contacts: A c-15 / DC-13		
distances to IEC/EN 60664-1: 4 kV/2 (basic insulation EMC rating: to EMC Directiv Electrical data Contact resistance in new state: max. 100 m Power consumption: max. 2 V Rated operating voltage U <sub>e</sub> : 24 VDC -15%/+20% residual ripple max. 109 Fuse rating for the operating voltage: electronic fuse Tripping current > 0.4 A Reset after 1 sec Monitored inputs Cross-wire detection (Y/N): Ye Wire breakage detection (Y/N): Ye Rumber of NO contacts: Number of NC contacts: Cable length: -1,500 m = 1.5 mm -2,500 m = 2.5 mm 2-channel with cross-wire short detection Conduction resistance: max. 40 s Outputs Number of safety contacts: Number of signalling outputs: Switching capacity of the safety contacts: 13-14; 23-24; 33-34 max. 250 V, 6 A ohmi (inductive in case of appropriat protective wiring) min. 10 V / 10 m Switching capacity of the auxiliary contacts: 2A slow blow Recommended fuse for the auxiliary contacts: 2A slow blow Utilisation category to IEC/EN 60947-5-1: AC-15 / DC-13	Air clearances and croopage	
EMC rating:       to EMC Directiv         Electrical data       max. 100 ms         Contact resistance in new state:       max. 2 V         Power consumption:       max. 2 V         Rated operating voltage Ue:       24 VDC -15%/+20%         residual ripple max. 109       residual ripple max. 109         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 A       Reset after 1 sec         Monitored inputs       Ye         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Number of NO contacts:       Number of NC contacts:         Cable length:       - 1,500 m = 1.5 mm         - 2,500 m = 2.5 mm       2-channel with cross-wire short detection         Conduction resistance:       max. 40 f         Outputs       Number of safety contacts:         Number of safety contacts:       Number of signalling outputs:         Switching capacity of the safety contacts:       13-14; 23-24; 33-34         max. 250 V, 6 A ohmi       (inductive in case of appropriat         protective wiring) min. 10 V / 10 m       Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2         Fuse rating of the safety contacts:       6.3 A slow blow       24 slow blow         Recom		4 k V/2 (basic insulation
Electrical data         Contact resistance in new state:       max. 100 ms         Power consumption:       max. 2 V         Rated operating voltage Ue:       24 VDC -15%/+20%         residual ripple max. 109       residual ripple max. 109         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 A       Reset after 1 set         Monitored inputs       Ye         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Number of NO contacts:       Ye         Number of NC contacts:       -1,500 m = 1.5 mm         Cable length:       - 1,500 m = 2.5 mm         2-channel with cross-wire short detection       Conduction resistance:         Mumber of safety contacts:       Max. 40 s         Number of safety contacts:       Number of signalling outputs:         Number of signalling outputs:       Switching capacity of the safety contacts:         Number of signalling outputs:       Switching capacity of the auxiliary contacts:         Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2.         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Curotacts:       2 A slow blow		
Contact resistance in new state:       max. 100 ms         Power consumption:       max. 2 V         Rated operating voltage Ue:       24 VDC -15%/+20%         residual ripple max. 109       residual ripple max. 109         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 A       Reset after 1 set         Monitored inputs       Ye         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Number of NO contacts:       Number of NC contacts:         Cable length:       - 1,500 m = 1.5 mm         - 2,500 m = 2.5 mm       2-channel with cross-wire short detectio         Conduction resistance:       max. 40 f         Outputs       Number of safety contacts:         Number of signalling outputs:       Switching capacity of the safety contacts:         Switching capacity of the auxiliary contacts:       13-14; 23-24; 33-34         max. 250 V, 6 A ohmi       (inductive in case of appropriat         protective wiring) min. 10 V / 10 m       Switching capacity of the auxiliary contacts:         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-13 <td></td> <td></td>		
Power consumption:       max. 2 V         Rated operating voltage Ue:       24 VDC -15%/+20%         residual ripple max. 109       residual ripple max. 109         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 A       Reset after 1 set         Monitored inputs       Ye         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Number of NO contacts:       Number of NC contacts:         Cable length:       - 1,500 m = 1.5 mm         - 2,500 m = 2.5 mm       2-channel with cross-wire short detectio         Conduction resistance:       max. 40 g         Outputs       Mumber of safety contacts:         Number of signalling outputs:       Switching capacity of the safety contacts:         Switching capacity of the auxiliary contacts:       13-14; 23-24; 33-34         max. 250 V, 6 A ohmic (inductive in case of appropriat protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2.4 slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-13		max 100 m
Rated operating voltage Ue:       24 VDC -15%/+20%         Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 A       Reset after 1 set         Monitored inputs       Ye         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Number of NO contacts:       Ye         Number of NC contacts:       - 1,500 m = 1.5 mm         Conduction resistance:       max. 40 9         Outputs       - 2,500 m = 2.5 mm         Number of safety contacts:       Number of signalling outputs:         Number of signalling outputs:       - 13-14; 23-24; 33-34         max. 250 V, 6 A ohmic (inductive in case of appropriat protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:       - 14-22; 24 VDC / 2         Fuse rating of the safety contacts:       - 6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow		
residual ripple max. 109 Fuse rating for the operating voltage: Fuse rating of the safety contacts: Fuse rating contact		
Fuse rating for the operating voltage:       electronic fuse         Tripping current > 0.4 A       Reset after 1 set         Monitored inputs       Ye         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Barth leakage detection (Y/N):       Ye         Number of NO contacts:       Ye         Number of NC contacts:       - 1,500 m = 1.5 mm         Cable length:       - 1,500 m = 2.5 mm         2-channel with cross-wire short detectio       Conduction resistance:         Mumber of safety contacts:       max. 40 9         Outputs       -         Number of signalling outputs:       -         Switching capacity of the safety contacts:       13-14; 23-24; 33-34         max. 250 V, 6 A ohmic (inductive in case of appropriat protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-13	· · · · · · · · · · · · · · · · · · ·	
Tripping current > 0.4 A         Reset after 1 set         Monitored inputs         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Earth leakage detection (Y/N):       Ye         Number of NO contacts:       Number of NC contacts:         Cable length:       - 1,500 m = 1.5 mm         - 2,500 m = 2.5 mm       2-channel with cross-wire short detectio         Conduction resistance:       max. 40 9         Outputs       Number of safety contacts:         Number of signalling outputs:       Switching capacity of the safety contacts:         Switching capacity of the auxiliary contacts:       13-14; 23-24; 33-34 max. 250 V, 6 A ohmic (inductive in case of appropriat protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-13	Fuse rating for the operating vo	
Reset after 1 sec         Monitored inputs       Ye         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Earth leakage detection (Y/N):       Ye         Number of NO contacts:       Number of NC contacts:         Cable length:       - 1,500 m = 1.5 mm         - 2,500 m = 2.5 mm       2-channel with cross-wire short detectio         Conduction resistance:       max. 40 9         Outputs       Number of safety contacts:         Number of signalling outputs:       Switching capacity of the safety contacts:         Switching capacity of the auxiliary contacts:       13-14; 23-24; 33-34 max. 250 V, 6 A ohmic (inductive in case of appropriat protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2.         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-13	· · · · · · · · · · · · · · · · · · ·	-
Monitored inputs         Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Barth leakage detection (Y/N):       Ye         Number of NO contacts:       Number of NC contacts:         Cable length:       - 1,500 m = 1.5 mm         - 2,500 m = 2.5 mm       2-channel with cross-wire short detection         Conduction resistance:       max. 40 f         Outputs       Mumber of safety contacts:         Number of safety contacts:       Number of signalling outputs:         Switching capacity of the safety contacts:       13-14; 23-24; 33-34 max. 250 V, 6 A ohmic (inductive in case of appropriat protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-13		
Cross-wire detection (Y/N):       Ye         Wire breakage detection (Y/N):       Ye         Earth leakage detection (Y/N):       Ye         Number of NO contacts:       Ye         Number of NC contacts:       - 1,500 m = 1.5 mm         Cable length:       - 1,500 m = 2.5 mm         2-channel with cross-wire short detectio       Conduction resistance:         Mumber of safety contacts:       max. 40 g         Outputs       -         Number of signalling outputs:       -         Switching capacity of the safety contacts:       13-14; 23-24; 33-34 max. 250 V, 6 A ohmic (inductive in case of appropriat protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-13	Monitored inputs	
Wire breakage detection (Y/N):       Ye         Earth leakage detection (Y/N):       Ye         Number of NO contacts:       Ye         Number of NC contacts:       - 1,500 m = 1.5 mm         Cable length:       - 1,500 m = 2.5 mm         2-channel with cross-wire short detectio       Conduction resistance:         Mumber of safety contacts:       max. 40 g         Outputs       -         Number of safety contacts:       -         Number of signalling outputs:       -         Switching capacity of the safety contacts:       13-14; 23-24; 33-34 max. 250 V, 6 A ohmi         (inductive in case of appropriat protective wiring) min. 10 V / 10 m       -         Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2.         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-13		Ye
Earth leakage detection (Y/N):       Ye         Number of NO contacts:       Number of NC contacts:         Cable length:       - 1,500 m = 1.5 mm         - 2,500 m = 2.5 mm       2-channel with cross-wire short detectio         Conduction resistance:       max. 40 g         Outputs       Number of safety contacts:         Number of signalling outputs:       Switching capacity of the safety contacts:         Switching capacity of the auxiliary contacts:       13-14; 23-24; 33-34 max. 250 V, 6 A ohmic (inductive in case of appropriat protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2.         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-13		Ye
Number of NO contacts:         Number of NC contacts:         Cable length:       – 1,500 m = 1.5 mm         - 2,500 m = 2.5 mm         2-channel with cross-wire short detectio         Conduction resistance:       max. 40 g         Outputs         Number of safety contacts:         Number of signalling outputs:         Switching capacity of the safety contacts:         13-14; 23-24; 33-34         max. 250 V, 6 A ohmi         (inductive in case of appropriat         protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:         41-42: 24 VDC / 2         Fuse rating of the safety contacts:         6.3 A slow blow         Recommended fuse for the auxiliary contacts:         2 A slow blow         Utilisation category to IEC/EN 60947-5-1:		
Number of NC contacts:         Cable length:       – 1,500 m = 1.5 mm         - 2,500 m = 2.5 mm         2-channel with cross-wire short detectio         Conduction resistance:       max. 40 g         Outputs         Number of safety contacts:         Number of signalling outputs:         Switching capacity of the safety contacts:         13-14; 23-24; 33-34         max. 250 V, 6 A ohmi         (inductive in case of appropriat         protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:         41-42: 24 VDC / 2         Fuse rating of the safety contacts:         6.3 A slow blow         Recommended fuse for the auxiliary contacts:         2 A slow blow         Utilisation category to IEC/EN 60947-5-1:		
Cable length:       - 1,500 m = 1.5 mm         - 2,500 m = 2.5 mm         2-channel with cross-wire short detectio         Conduction resistance:       max. 40 g         Outputs         Number of safety contacts:         Number of signalling outputs:         Switching capacity of the safety contacts:         13-14; 23-24; 33-34         max. 250 V, 6 A ohmi         (inductive in case of appropriat         protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:         41-42: 24 VDC / 2         Fuse rating of the safety contacts:         6.3 A slow blow         Recommended fuse for the auxiliary contacts:         2 A slow blow         Utilisation category to IEC/EN 60947-5-1:	Number of NC contacts:	
- 2,500 m = 2.5 mm 2-channel with cross-wire short detectio Conduction resistance: max. 40 g Outputs Number of safety contacts: Number of signalling outputs: Switching capacity of the safety contacts: 13-14; 23-24; 33-34 max. 250 V, 6 A ohmi (inductive in case of appropriat protective wiring) min. 10 V / 10 m Switching capacity of the auxiliary contacts: 41-42: 24 VDC / 2. Fuse rating of the safety contacts: 6.3 A slow blow Recommended fuse for the auxiliary contacts: 2 A slow blow Utilisation category to IEC/EN 60947-5-1: AC-15 / DC-13		– 1.500 m = 1.5 mm
Conduction resistance:       max. 40 f         Outputs       Number of safety contacts:         Number of auxiliary contacts:       Number of signalling outputs:         Switching capacity of the safety contacts:       13-14; 23-24; 33-34 max. 250 V, 6 A ohmin (inductive in case of appropriat protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2.         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-13	3	
Conduction resistance:       max. 40 f         Outputs       Number of safety contacts:         Number of auxiliary contacts:       Number of signalling outputs:         Switching capacity of the safety contacts:       13-14; 23-24; 33-34 max. 250 V, 6 A ohmic (inductive in case of appropriat protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-13	:	2-channel with cross-wire short detectio
Outputs         Number of safety contacts:         Number of auxiliary contacts:         Number of signalling outputs:         Switching capacity of the safety contacts:         13-14; 23-24; 33-34         max. 250 V, 6 A ohmi         (inductive in case of appropriat         protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:         41-42: 24 VDC / 2         Fuse rating of the safety contacts:         6.3 A slow blow         Recommended fuse for the auxiliary contacts:         2 A slow blow         Utilisation category to IEC/EN 60947-5-1:		
Number of safety contacts:         Number of auxiliary contacts:         Number of signalling outputs:         Switching capacity of the safety contacts:         13-14; 23-24; 33-34         max. 250 V, 6 A ohmi         (inductive in case of appropriat         protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:         41-42: 24 VDC / 2         Fuse rating of the safety contacts:         6.3 A slow blog         Recommended fuse for the auxiliary contacts:         2 A slow blog         Utilisation category to IEC/EN 60947-5-1:	Outputs	
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Number of signalling outputs:         Switching capacity of the safety contacts:       13-14; 23-24; 33-34 max. 250 V, 6 A ohmi (inductive in case of appropriat protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-13		
Switching capacity of the safety contacts:       13-14; 23-24; 33-34 max. 250 V, 6 A ohmi (inductive in case of appropriat protective wiring) min. 10 V / 10 m         Switching capacity of the auxiliary contacts:       41-42: 24 VDC / 2         Fuse rating of the safety contacts:       6.3 A slow blow         Recommended fuse for the auxiliary contacts:       2 A slow blow         Utilisation category to IEC/EN 60947-5-1:       AC-15 / DC-12		
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Utilisation category to IEC/EN 60947-5-1: AC-15 / DC-13		2
	Fuse rating of the safety contact	6.3 A slow blow
	Fuse rating of the safety contact Recommended fuse for the aux	6.3 A slow blow       kiliary contacts:       2 A slow blow

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  $U_e \pm 0\%$ 

Dimensions H x W x D:

# Operating instructions Safety-monitoring module

### 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
PFH value:	≤ 2.00 × 10 <sup>-8</sup> /h
SIL:	up to 3
Service life:	20 years

The PFH value of 2.00 × 10<sup>-8</sup>/h applies to the combinations of contact load (current through enabling contacts) and number of switching cycles (n<sub>op/y</sub>) 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<sub>cycle</sub>) for the relay contacts.

Diverging applications upon request.

Contact load	n <sub>op/y</sub>	t <sub>cycle</sub>
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 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.

 $\triangle$ 

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
- K2: Status channel 2
- U<sub>B</sub>: Status operating voltage (LED is on, when the operating voltage on the terminals A1-A2 is ON)
- U<sub>i</sub>: Status internal operating voltage (LED is on, when the operating voltage on the terminals C-D is ON and the fuse has not been triggered)

#### 5.2 Description of the terminals

Voltages:	С	+24 VDC/24 VAC
	D	0 VDC/24 VAC
Inputs:	C1-S1	Input channel 1 (+)
	C1-D1	Input channel 2 (+)
	D1-S2	Input channel 2 (-) (with cross-wire short detection)
Outputs:	13-14	First safety enabling circuit
	23-24	Second safety enabling circuit
	33-34	Third safety enabling circuit
Start:	X1-X2	Feedback circuit and external reset
	41-42	Auxiliary NC contact as signalling contact



### Fig. 1

#### 5.3 Notes



Due to the operating principle of the electronic fuse, the customer must check that no hazard is caused by an unexpected restart in circuits without reset button (automatic start).



Signalling outputs must not be used in safety circuits.

### 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.
- 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

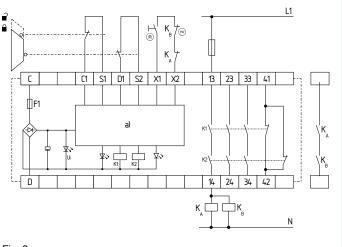
The safety-monitoring module must be disposed of in an appropriate manner in accordance with the national prescriptions and legislations.

### 8. Appendix

#### 8.1 Wiring examples

Dual-channel control, shown for a guard door monitor with two position switches where one has a positive break contact; with external reset button  $(\mathbb{R})$  (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 crosswire shorts in the monitoring circuit.





### 8.2 Start configuration

### External reset button (Fig. 3)

The external reset button is integrated as shown.

The safety-monitoring module is activated upon actuation.

### Automatic start (see Fig. 4)

- The automatic start is programmed by connecting the feedback circuit to the terminals. If the feedback circuit is not required, establish a bridge.
- Caution: Not admitted without additional measure due to the risk of gaining access by stepping behind!
- Caution: Within the meaning of EN IEC 60204-1 paragraph 9.2.5.4.2 and 10.8.3, the operating mode "automatic start" is only restrictedly admissible. In particular, any inadvertent restart of the machine must be prevented by other suitable measures.



X1

в (®

X2

Fig. 3

K

Due to the operating principle of the electronic fuse, the customer must check that no hazard is caused by an unexpected restart in circuits without reset button (automatic start).



# **Operating instructions** Safety-monitoring module

## 8.3 Sensor configuration

### Dual-channel emergency stop circuit with command devices to DIN EN ISO 13850 (EN 418) and EN 60947-5-5 (Fig. 5)

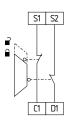
- Wire breakage and earth leakage in the control circuits are detected.
- · Cross-wire shorts between the control circuits are detected.
- Category 4 PL e to DIN EN ISO 13849-1 possible.



Fig. 5

### Dual-channel guard door monitoring circuit with interlocking device to EN 1088 (Fig. 6)

- · With at least one positive-break position switch
- 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 DIN EN ISO 13849-1 possible.





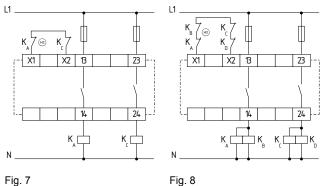
### 8.4 Actuator configuration

### Single-channel control with feedback circuit (Fig. 7)

- 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 (Fig. 8)

- · 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.





#### Differential 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.

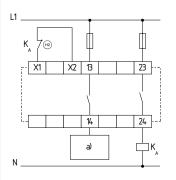
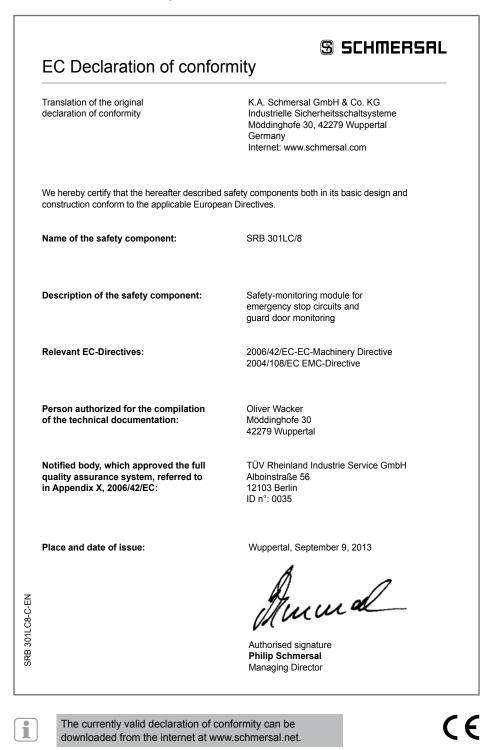


Fig. 9 a) Enabling signal controller

### 9. Declaration of conformity

### 9.1 EC Declaration of conformity



(EN)

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