



EN Operating instructions. pages 1 to 6
Original

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1. About this document

1.1 Function

This operating instructions manual provides all the information you need for the mounting, set-up and commissioning for 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 correct functionality of the entire machine or plant.

The safety-monitoring module must be exclusively used in accordance with the versions listed below or for the applications authorised by the manufacturer. Detailed information regarding the range of applications can be found in the chapter "Product description".

1.5 General safety instructions

The user must observe the safety instructions in this operating instructions manual, the country specific installation standards as well as all prevailing safety regulations and accident prevention rules.

 Further technical information can be found in the Schmersal catalogues or in the online catalogue on the Internet: 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 damages to machinery or plant components cannot be excluded.

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:

SE-400 C

2.2 Special versions

For special versions, which are not listed in the order code below 2.1, these specifications apply accordingly, provided that they correspond to the standard version.

2.3 Purpose

The safety-monitoring module evaluates the signal of one SE safety edge (signal generator). The safety-monitoring module is designed for fitting into control cabinets (IP54).

The safety-monitoring module only must be used in combination with the SE-R/SE-T transmitter/receiver unit (SE-SET sensor kit) of the signal generator.



The signal generator and the corresponding safety-monitoring module together build the safety edge system to ISO 13856-2.

If one of the connected safety edges is actuated, the safety contacts of the safety-monitoring module are opened.



The entire concept of the control system, in which the safety component is integrated, must be validated to the relevant standards.

2.4 Technical data

Standards:	ISO 13856-2
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
Response time:	32 ms
Opening duration:	typ. 15 ms
Bemessungsbetriebsspannung U_e :	24 VDC (+20% / -10%)
Power consumption:	< 4 W
Fuse rating supply voltage:	1 A slow blow
Monitored inputs:	
Cross-wire detection:	yes
Wire breakage detection:	yes
Earth connection detection:	yes
Outputs:	
Stop category 0:	2
Stop category 1:	0
Number of safety contacts:	2
Number of auxiliary contacts:	0
Number of signalling outputs:	1
Max. switching capacity of the safety contacts:	3 A / 230 VAC 1 A / 24 VDC
Signalling output:	NPN-open-Collector; $U_{max.} = 36 V$; $I_{max.} = 50 mA$
Utilisation category to IEC 60947-5-1:	AC-15: 230 V / 3 A DC-13: 24 V / 1 A
Recommended fuse for the contacts:	4 A slow blow
Mechanical life:	10 million operations
LED:	Supply voltage, Safety edge functions
Ambient conditions:	
Environmental temperature:	-20 °C ... +55 °C
Protection class:	Enclosure: IP40 Terminals: IP20 Clearance: IP54
Degree of pollution:	2
Overvoltage category:	III
Resistance to vibration:	10 ... 55 Hz, amplitude 0.15 mm
Mounting:	snaps onto standard rail to EN 60715
Connection type:	Screw connection
Max. cable section:	2.5 mm ² wire or 1.5 mm ² strand with conductor ferrules
Weight:	184 g
Dimensions (H x W x D):	100 x 22.5 x 120 mm

2.5 Classification

Standards:	ISO 13849-1
PL:	e
Control Category:	4
PFH-value:	5×10^{-8} /h
Mission time:	20 years

The aforementioned safety values are applicable to the combination consisting of the SE-SET sensor kit (SE-T transmitter, SE-R receiver) and the safety-monitoring module. The hollow rubber profile must not be taken into consideration for the safety classification.

3. Mounting

3.1 General mounting instructions

Mounting of the safety switching device in a control cabinet (IP54).

Mounting: snaps onto standard rails to EN 60715.

The device is equipped with a latching element at the rear for fixing onto a standard rail.

3.2 Dimensions

Device dimensions (H/W/D): 100 x 22.5 x 120 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.

4.2 Connector

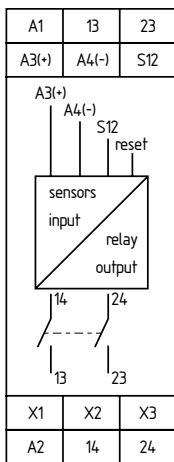
Only the output contact 14/24 is a safety contact. To guarantee the safety function, both output channels 13/23 must be wired in series. Otherwise, the evaluation of the signals must be dual-channel with the required safety level. The safety-monitoring module is supplied with a bridge between output 13/23.

The output contact X1 is a signalling contact and no safety contact.

Automatic reset

This function can be realised by bridging the terminals X2, X3.

4.3 Pin configuration



A1 (+): 24 V-

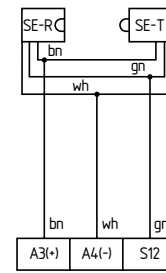
A2 (-): The supply voltage is on = LED "power" is on

Terminal connections:

- Switch operating voltage on at terminals A1(+) and A2(-).
- Closing the reset circuit: connect the start/reset button to X2/X3.
- Automatic reset: this function is realised by bridging the terminals X2, X3.
- Connect transmitter/receiver: wire the terminals brown, white, green from the transmitter and the receiver according to the wiring example.
- Integrate the safety output in the machine circuit: terminal 14/24.
- Signalling output X1 is no safety output and must only be used as signalling contact (relay output).
- Cable section max. 2.5 mm² (incl. conductor ferrules)
- Capacity 150 nF/km
- Resistance: 28 Ohm/km
- The output contacts must be preceded by a fuse (4 A slow blow).
- Provide adequate protective wiring of the output contacts in case of capacitive and inductive loads.
- Enabling paths safely separated up to 300 V to EN 60664-1.

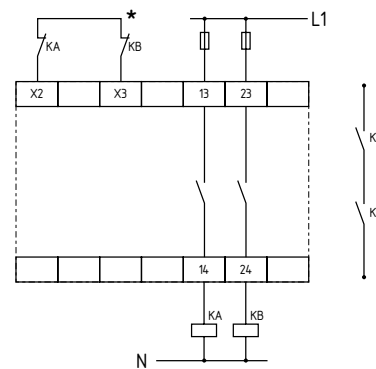
4.4 Wiring examples

Input



Connection of one safety edge (signal generator), not actuated = LED "SE" on.

Output level



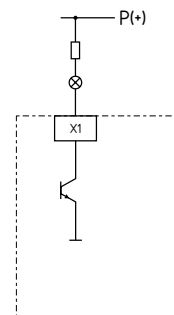
Safety output: dual-channel control

Safety edges not actuated = safety output enabled
 = 13/14 and 23/24 closed
 = LED "SE" on

Example: X2/X3: Function Start/reset button

(* Feedback and rest circuit in series)

After switch-on of the supply voltage and actuation of the safety edge, the connection X2/X3 must be briefly closed. After that, the output level is activated if the safety edge is not actuated.



Signalling output: without contact

Safety edge not actuated = signalling output low ohmic

4.5 Commissioning

The safety function of the safety-monitoring module must be tested. The following conditions must be previously checked and met:

1. Correct fitting of the safety-monitoring module
2. Fitting and integrity of the power cable

4.6 Operating principle

When the operating voltage is switched on, the safety contact 14/24 is open and the signalling contact X1 is high-impedance. To start the device, the reset button must be actuated for at least 1.5 seconds. The relays K1, K2 are energised, when the light path in the profile is clear. After the reset button is released or the connection between X2 and X3 is interrupted, the relays K1, K2 remain locked. The machine enabling circuit 14/24 is closed and X1 becomes low-impedance. If the light path in the profile is interrupted, the machine enabling circuit 14/24 is interrupted. If the light path is cleared again, the reset button must be actuated to trigger a new start.

4.7 Diagnostic / error messages

- The safety-monitoring module detects short-circuits and wire breakage of the connecting cables from the sensors.
- Malfunctions of the contacts: in case of contact welding, no reactivation is possible after actuation of the safety edge.
- LED "CHANNEL" off: safety edge actuated, reset button not yet actuated.
- LED "POWER" off: no supply voltage
- No reaction to manual reset: safety edge still actuated, safety edge or cable connection damaged, defective safety-monitoring module.

5. Maintenance

5.1 Maintenance of the safety-monitoring module

In the case of correct installation and adequate use, the safety-monitoring module features maintenance-free functionality. A regular visual inspection and functional test, including the following steps, is recommended:

- Check the correct fixing of the safety monitoring module
- Check the cable for damage.

Under rough operating conditions, we recommend a regular check of the function of the entire system.
(Also refer to the enclosed mounting and inspection protocol.)

Damaged or defective components must be replaced.

5.2 Wear test at the rubber profile

The safety edge must be checked once a year for damages by means of a visual check. In case of damages, the safety edge must be exchanged, as in this case, the safety function no longer is completely guaranteed. The following checks must be performed:

- Check the rubber profile for damages, e.g. cracks
- Check if the elasticity of the rubber profile is not affected, e.g. due to ageing
- Check for damages and correct fixing
- Trigger the safety edge by manually actuating the rubber profile

6. Disassembly and disposal


6.1 Disassembly

The safety monitoring module must be disassembled in the de-energised condition only.

6.2 Disposal

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

7.1 Mounting and inspection protocol



EC Declaration inspection protocol

Origin of the safety edge system K.A. Schmersal GmbH & Co. KG
Mödinghofe 30
42776 Neerl. Weerth
Germany
Internet: www.schmersal.com

Under the scope of the commissioning and the regular maintenance of the machine, the following items of the safety edge system must be checked and inspected by a professional:

We hereby certify that the hereafter described safety components both in its basic design and construction conform to the applicable European Directives.

Machine/ Construction project _____	Signal evaluation _____
Date of first putting into operation _____	Profile signal generator _____
Name of the fitter _____	Transmitter _____
	Receiver _____
	Aluminium profile _____

1. Visual check of the signal generator

Inspection of the signal generator's surface and the connections, to ensure the absence of damages preventing correct operation.

2. Visual check of the signal transmission

Check and inspection of the connections and the wiring for defects and changes.

3. Visual check of the signal evaluation

Check and inspection of the enclosure and its electrical connections for defects and changes.

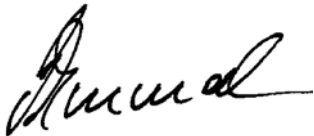
4. Functional test of the safety edge

Actuation of the signal generator at multiple arbitrary positions. The sensitivity of the safety edge must be present throughout the entire active actuating surface. Check of the LED's in the evaluation. The machine must not be restarted if hazards are present.

Please enclose the protocol in the machine documentation.

Date / Signature:

8. EU Declaration of conformity

EU Declaration of conformity		
Original	K.A. Schmersal GmbH & Co. KG Mödinghofe 30 42279 Wuppertal Germany Internet: www.schmersal.com	
We hereby certify that the hereafter described components both in their basic design and construction conform to the applicable European Directives.		
Name of the component:	SE-400 C	
Type:	See ordering code	
Description of the component:	Safety-monitoring module for monitoring optoelectronic safety edges of the SE 40/70 series with SE-SET sensor kit	
Relevant Directives:	Machinery Directive	2006/42/EC
	EMC-Directive	2014/30/EU
	RoHS-Directive	2011/65/EU
Applied standards:	EN ISO 13856-2:2013 EN ISO 13849-1:2015 EN 12978:2003 + A1:2009	
Notified body for the prototype test:	TÜV Rheinland Industrie Service GmbH Am Grauen Stein 51105 Köln ID n°: 0035	
EC-prototype test certificate:	01/205/5007.02/19	
Person authorised for the compilation of the technical documentation:	Oliver Wacker Mödinghofe 30 42279 Wuppertal	
Place and date of issue:	Wuppertal, March 22, 2019	
		
	Authorised signature Philip Schmersal Managing Director	

SE400C-G-DE



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

