



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. The relevant requirements of the standard ISO 14119 must be observed.

1.7 Exclusion of liability

We shall accept no liability for damages and malfunctions resulting from defective mounting or failure to comply with this operating instructions manual. The manufacturer shall accept no liability for damages resulting from the use of unauthorised spare parts or accessories.

For safety reasons, invasive work on the device as well as arbitrary repairs, conversions and modifications to the device are strictly forbidden; the manufacturer shall accept no liability for damages resulting from such invasive work, arbitrary repairs, conversions and/or modifications to the device.

2. Product description

2.1 Ordering code

This operating instructions manual applies to the following types:

AES 117 ①

No.	Option	Description
①	5	without start-up test
	6	with start-up test



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 Purpose

The safety-monitoring modules for integration in safety circuits are designed for fitting in control cabinets. They are used for the safe evaluation of the signals of positive break position switches for safety functions or magnetic safety sensors on sliding, hinged and removable safety guards as well as emergency stop control devices.

Additionally, two external relays, which can be used for increase in capacity or number of contacts, are monitored through feedback circuits.

Design

The safety-monitoring module has a dual-channel structure. It includes two safety relays with monitored positive action contacts. The NO contacts of the relays, which are wired in series, build the enabling contacts.



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: IEC 60204-1, IEC 60947-5-1, IEC 60947-5-3, ISO 13849-1, IEC 61508, BG-GS-ET-14, BG-GS-ET-20

Start conditions:	Automatic
Feedback circuit available:	yes
Start-up test:	AES 1175: no, AES 1176: yes
Pull-in delay for automatic start:	adjustable 0.1 / 1.0 second
Drop-out delay in case of "emergency stop":	< 50 ms
Rated operating voltage U_e :	24 VDC \pm 15%
Rated operating current I_e :	0.2 A
Rated insulation voltage U_i :	250 V
Rated impulse withstand voltage U_{imp} :	4.8 kV
Thermal test current I_{the} :	6 A
Internal electronic fuse:	no
Power consumption:	< 5 W

Monitored inputs:

Cross-wire short detection:	yes
Wire breakage detection:	yes
Earth connection detection:	yes
Number of NC contacts:	1
Number of NO contacts:	1

Outputs:

Stop category 0:	1
Stop category 1:	0
Number of safety contacts:	1
Number of auxiliary contacts:	0
Number of signalling outputs:	0
Switching capacity of the safety contacts 13/14:	6 A
Utilisation category to IEC 60947-5-1:	AC-15: 230 V / 3 A DC-13: 24 V / 2 A
Max. fuse rating:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD

Ambient conditions:

Operating temperature:	0 °C ... +55 °C
Storage and transport temperature:	-25 °C ... +70 °C
Protection class:	Enclosure: IP40 Terminals: IP20 Clearance: IP54

Degree of pollution:	2
Mounting:	snaps onto standard DIN rail to EN 60715
Connection type:	Screw connection
Min. cable section:	0.25 mm ²
Max. cable section:	2.5 mm ² , solid strand or multi-strand lead (including conductor ferrules)
Tightening torque:	0.6 Nm
Weight:	190 g
Dimensions (H x W x D):	100 x 22.5 x 121 mm

2.5 Safety classification

Standards:	ISO 13849-1; IEC 61508
PL:	up to d
Control category:	up to 3
PFH-value:	1.0 x 10 ⁻⁷ / h; applicable for applications with up to max. 50,000 switching cycles / year and max. 80 % contact load. Diverging applications upon request.
SIL:	up to 2
Service life:	20 years

3. Mounting

3.1 General mounting instructions

Mounting: snaps onto standard DIN rails to EN 60715.

3.2 Dimensions

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



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.



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 IEC 60204-1.

5. Operating principle and settings

5.1 Operating principle after the operating voltage is switched on AES 1175

1. The functionality of the safety-monitoring module is tested.
2. If the safety guard is closed or the emergency stop button released, the enabling paths of the safety-monitoring module will close. The LED is green.
3. The cable and the connected safety switch are only tested when the safety guard is opened; the emergency stop button is tested by actuation (no start-up test).

AES 1176

1. The functionality of the safety-monitoring module is tested.
2. The safety guard must be actuated, in order to check the cables and the connected safety switch or the emergency stop button must be actuated (start-up test).
3. If the safety guard is closed or the emergency stop button released, the enabling paths of the safety-monitoring module will close. The LED is green.

If the safety guard is opened or the emergency-stop button is actuated, the enabling path of the safety-monitoring module will open. The machine is stopped and the LED flashes yellow.

Inputs

Connect the safety switch or the emergency stop switch to the inputs S13-S14 /S21-S22. X1 / X2 separate inputs for the feedback of the external contactors.

Extension of enable delay time

On safety guards with strong residual vibrations, the end position of a non-contact position switch is often "overrun". This causes the safety-monitoring module to generate an error message. To avoid this, the "enabling delay time" can be extended by removing the device cover and setting an internal bridge (jumper).

Bridge closed:	enabling delay time = 1.0 second
Bridge closed:	enabling delay time = 0.1 second (factory setting)

Additional outputs

External relays for increase in capacity or number of contacts are wired to the additional outputs Y1 and Y2. The function of the external relays (with positive action contacts) is tested through the inputs X1 and X2. The redundancy of the safety-monitoring module thereby is maintained.

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

6.2 Maintenance

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.



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 the de-energised condition only.

7.2 Disposal

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

8. Appendix

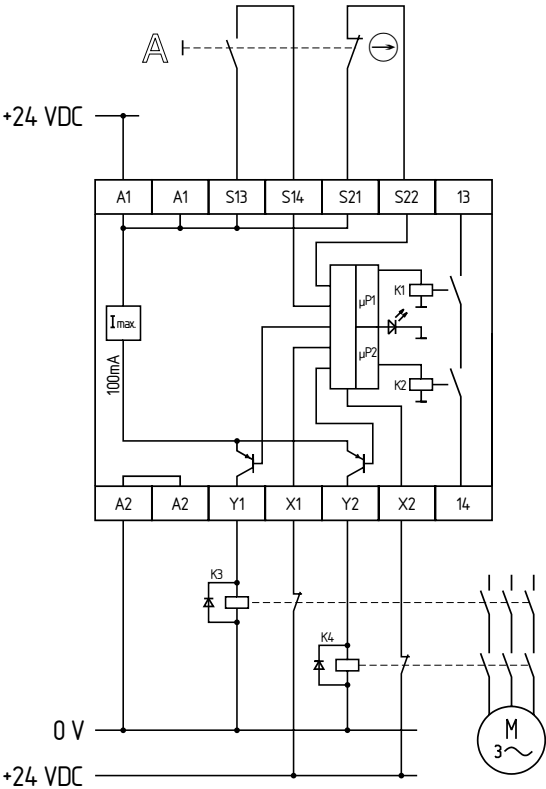
8.1 Wiring examples

The application examples shown are suggestions. They however do not release the user from carefully checking whether the switchgear and its set-up are suitable for the individual application.

The wiring diagram is shown with guard doors closed and in a de-energised condition. Inductive loads (e.g. contactors, relays, etc.) are to be provided with suitable interference suppression circuitry. Do not connect additional loads to terminal S..

AES 1175 / 1176

Increase in capacity or number of contacts, external contactor monitoring



Key
⊖ Positive break
A Safety switch

8.2 Integral System Diagnostics (ISD)

The LED indication of the safety-monitoring modules shows the different switching conditions and errors. The following tables show the different switching conditions.

Tables switching condition indication

Diagnostic LED	System condition
The LED is green.	Enabling paths closed
LED flashes yellow (0.5 Hz)	Enabling paths open
LED flashes yellow (2 Hz)	Safety guard closed, however no release; possible causes: incorrect operation (only one contact actuated upon opening) or voltage drop → perform start-up test

Table error indications

Indication (orange) LED	Error	Cause
1 impulse 	switch	Defective supply voltage lead, defective switch, erroneous fitting of the switch; switch only partially actuated* for at least 5 s
2 impulses 	The external relay is not pulled in or drops out after being activated.	Defective supply voltage lead to the relay or relay contact; Defective relay
3 impulses 	The external relay does not drop out when switched off.	Defective supply voltage lead to the relay or relay contact; Defective relay
4 impulses 	Interference signals at the inputs (no safe evaluation assured)	Too high capacitive or inductive interference at the switch's cables or the supply voltage lead
5 impulses 	One or both relays did not close within the monitoring time	Too low operating voltage U _e ; Defective relay
6 impulses 	Relay not disabled upon the actuation of the switch	May be due to contact welding
7 impulses 	Dynamic monitoring of both channels (cross-monitoring) failure	Fault in one channel; internal data transmission interrupted

* Partial actuation: position of the switch, in which only one contact was actuated.

Deleting the error message

The error message is deleted once the fault has been rectified and after the connected switch has been actuated to check the various functions (open and then close the safety guard).

9. EU Declaration of conformity

EU Declaration of conformity



Original

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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: AES 1135/1136, AES 1145/1146,
AES 1155/1156, AES 1165/1166,
AES 1175/1176,
AES 1235/1236,
AES 1265/1266

Type: See ordering code

Description of the component: Safety-monitoring module

Relevant Directives: Machinery Directive 2006/42/EC
EMC-Directive 2014/30/EU
RoHS-Directive 2011/65/EU

Applied standards: DIN EN 60947-5-1:2010,
DIN EN ISO 13849-1:2016,
DIN EN ISO 13849-2:2013

Notified body for the prototype test: DGUV Test
Prüf- und Zertifizierungsstelle
Fachbereich Elektrotechnik
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ID n°: 0340

EU-prototype test certificate: ET 17048

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



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