



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.



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 damages to machinery or plant components cannot be excluded. The relevant requirements of the standard EN 1088 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 3075



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 module for integration in safety circuits is designed for fitting in control cabinets. It is used for the safe evaluation of the signals of magnetic safety sensors on sliding, hinged and removable safety guards. In conjunction with two positive-guided external contactors, a protection of up to four safety guards can be set up.

Design

The safety-monitoring module has a redundant structure. Two microprocessors build the heart of the safety-monitoring module. The enabling outputs for connecting the external positive-guided contactors as well as all inputs of the safety-monitoring module are monitored and evaluated by both microprocessors. The five additional transistor outputs are short-circuit proof and can be used for signalling purposes.

2.4 Technical data

Standards: IEC / EN 60204-1; EN 60947-5-3;
EN ISO 13849-1; IEC 61508;
BG-GS-ET-14; BG-GS-ET-20

Start conditions:	Automatic or start button
Feedback circuit available:	yes
Start-up test:	no
Pull-in delay for automatic start:	adjustable 0.1 / 1.0 second
Drop-out delay:	< 50 ms
Rated operating voltage U_e :	24 VDC \pm 15%
Rated operating current I_e :	0.3 A without external contactors and additional outputs

Rated insulation voltage U_i :	50 V
Rated impulse withstand voltage U_{imp} :	500 V
Internal electronic fuse:	yes
Power consumption:	< 8 W

Monitored inputs:

Cross-wire short detection:	yes
Wire breakage detection:	yes
Earth connection detection:	no
Number of NC contacts:	4
Number of NO contacts:	4

Outputs:

Stop category 0:	2
Stop category 1:	0
Number of safety contacts:	2
Number of auxiliary contacts:	0
Number of signalling outputs:	4

Switching capacity of the safety contacts:	Semi-conductor outputs p-type 24 VDC, 700 mA, short circuit proof
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Switching capacity of the signalling outputs:	24 VDC, 250 mA, short circuit proof
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LED display:	ISD
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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
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Mounting:	Snaps onto standard DIN rail to EN 60715
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Connection type:	Screw connection
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Min. cable section:	0.25 mm ²
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Max. cable section:	4.0 mm ² , solid strand or multi-strand lead (including conductor ferrules)
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Weight:	300 g
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Dimensions (H x W x D):	100 x 75 x 110 mm
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2.5 Safety classification

Standards:	EN ISO 13849-1; IEC 61508
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PL:	up to d
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Control category:	up to 3
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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.
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SIL:	up to 2
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Service life:	20 years
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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 75 x 110 mm

4. Electrical connection

4.1 General information for electrical connection



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

Wiring examples: see appendix

5. Operating principle and settings

5.1 Operating principle after the operating voltage is switched on

If a safety guard is opened, the microprocessors disable the enabling outputs and therefore the external contactors. The enabling outputs are re-enabled, when the function of these outputs and all connected components has been checked. During a switch-on cycle (opening and closing of at least one safety guard), all individual faults, which could lead to a hazardous situation, are detected at the switches, the cables and wires as well as in the safety-monitoring module itself. This always causes the enabling outputs and therefore the connected external contactors as well to be disabled.

Extension of enable delay time

On safety guards with strong residual vibrations, the end position of a non-contact position switch is often "overrun". As a result, an error message of the safety-monitoring module is usually generated.

To avoid this, the "enabling delay time" can be extended by removing the device cover and setting the internal bridge located in the middle of the board (refer to "Settings" drawing).

With jumper: enabling delay time = 1 second
Without jumper: enabling delay time = 0.1 second
 (factory setting)

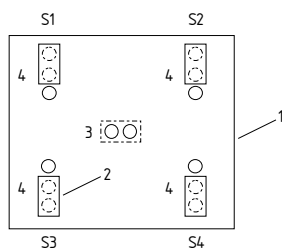
Setting the contact type (S13/S14)

After removal of the enclosure cover, the contact type can be individually set for each safety guard by means of jumpers on the board (refer to "Settings" drawing). S21/S22 always is a NC contact.

Contact combinations

NC/NC contact jumper inside
NO/NC contact jumper outside (factory setting)

Settings



Key
1 Board
2 Jumper
3 Enable delay time
4 Contact type

additional transistor outputs

Y1: "high", safety guard 1 open
Y2: "high", safety guard 2 open
Y3: "high", safety guard 3 open
Y4: "high", safety guard 4 open
Y5: "high", system OK

Start function and feedback circuit of the external positive-guided contactors X1 / X2

The series-wired NC contacts of the external contactors must be connected to X1 (+) and X2. In addition to that, a series-wired "pushbutton" can be used to trigger the start function.

Enabling function X3 / X4

A "switch" can be connected to the terminals X3 (+) and X4, by means of which the enabling outputs Y14 and Y24 can be enabled or disabled when the safety guard is closed. If this function is not used, establish a bridge.

Outputs Y14 / Y24

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.

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.

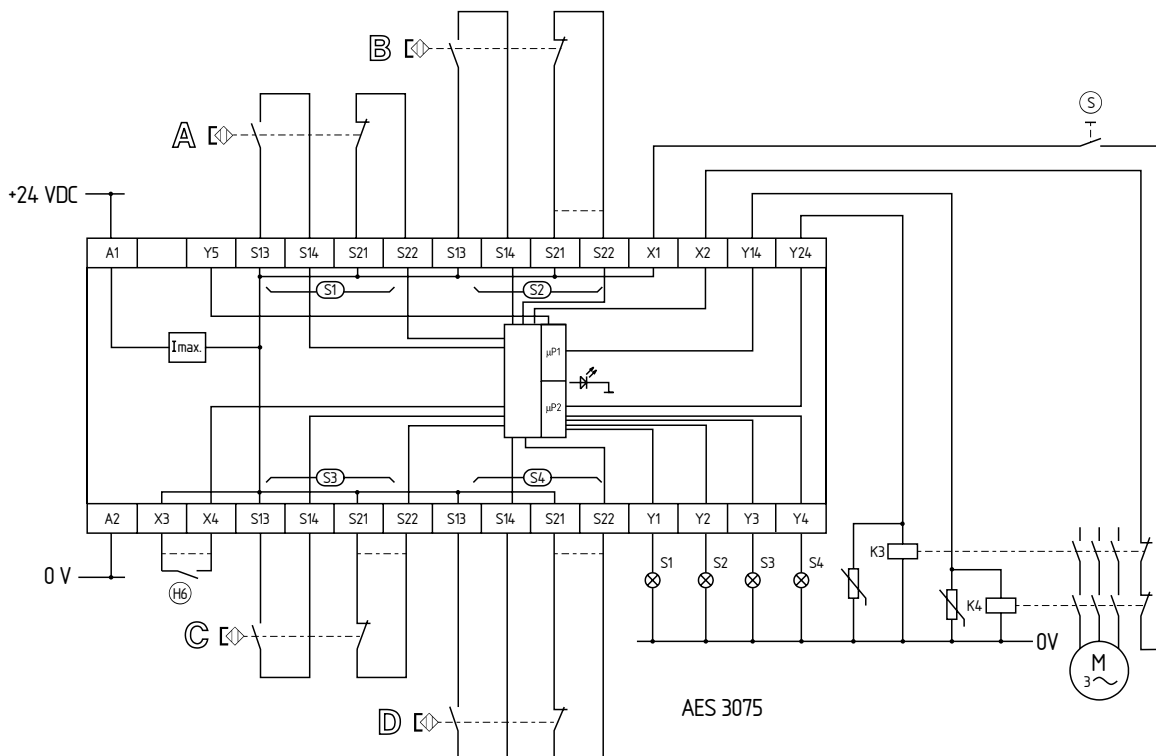
The wiring diagram is shown with guard doors closed and in a de-energised condition. Inductive loads (e.g. contactors, relays, etc.) are to be provided with suitable interference suppression circuitry. Do not connect additional loads to terminal S..

Monitoring of four safety guards (cascading) by means of a magnetic safety sensor of the BNS series

If less than 4 switches are connected, the unused terminals S21/S22 must be bridged before a NC contact is connected. This applies to the position of the jumpers in the safety-monitoring module with NC/NO configuration. The feedback circuit monitors the position of the positive-guided NC contacts of the contactors K3 and K4. A start pushbutton (NO) can be optionally integrated in the feedback circuit. With the guard door closed, the enabling paths are then not closed until the start push button has been operated.

Key

- A - D  Non-contact safety sensor
-  Start button
-  Pushbutton: enabling signal on/off



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







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 circuit Y14 und Y 24 "high"
LED flashes green	Enable delay time running
The LED is yellow	At least one safety guard open
LED flashes yellow	The feedback circuit is open. The enabling input X4 is open.

Table error indications


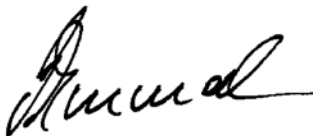
Indication (orange) LED	Error	Cause
1 impulse 	Error safety guard 1	Defective supply voltage lead, defective switch, erroneous fitting of the switch; switch only partially actuated* for at least 5 s; cross-wire short
2 impulses 	Error safety guard 2	Refer to error safety guard 1
3 impulses 	Error safety guard 3	Refer to error safety guard 1
4 impulses 	Error safety guard 4	Refer to error safety guard 1
5 impulses 	Enabling outputs Y14 and Y24	Cross-wire short; Short-circuit
6 impulses 	Additional transistor outputs Y1-Y5	Short-circuit
7 impulses 	Interference signals at the inputs	Too high capacitive or inductive interference at the inputs or the supply voltage lead, no safe evaluation
8 impulses 	Feedback circuit	Defective feedback message of the external contactors, erroneous wiring of the feedback circuit

* 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 switches have been actuated to check the various functions (open and then close the safety guard).

9. EU Declaration of conformity

EU Declaration of conformity		
Original	K.A. Schmersal GmbH & Co. KG Möddinghofe 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:	AES 3075	
Type:	See ordering code	
Description of the component:	Safety-monitoring module for non-contact safety switches and safety relay combination in connection with the BNS series magnetic safety switches	
Relevant Directives:	Machinery Directive EMC-Directive RoHS-Directive	2006/42/EC 2014/30/EU 2011/65/EU
Applied standards:	DIN EN 60947-5-3:2014, 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 Gustav-Heinemann-Ufer 130 50968 Köln ID n°: 0340	
EU-prototype test certificate:	ET 16122	
Person authorised for the compilation of the technical documentation:	Oliver Wacker Möddinghofe 30 42279 Wuppertal	
Place and date of issue:	Wuppertal, November 10, 2017	
		
	Authorised signature Philip Schmersal Managing Director	

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



K. A. Schmersal GmbH & Co. KG
Möddinghofe 30, D - 42279 Wuppertal
Postfach 24 02 63, D - 42232 Wuppertal

Phone: +49 - (0)2 02 - 64 74 - 0
Telefax: +49 - (0)2 02 - 64 74 - 1 00
E-Mail: info@schmersal.com
Internet: <http://www.schmersal.com>