



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

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1. About this document

1.1 Function

This operating instructions manual provides all the information you need for the mounting, set-up and commissioning to ensure the safe operation and disassembly of the safety switchgear. 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 machinery or plant.

The safety switchgear 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 improper use or manipulation of the safety switch-gear, personal hazards or damages to machinery or plant components cannot be excluded when safety switchgear is used. 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:

AZS 2305.①

No.	Option	Description
①		24 VDC
	1	110 VAC
	2	230 VAC



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 fail-safe delay timer is designed for control cabinet mounting. It is used wherever a safe rating of a time "T" is required due to the inertial movement of a machine or due to the operating time of the plant.

Design/operating principle

The fail-safe delay timer has a dual-channel structure. The time is manually set in each channel by means of rotary and sliding switches (refer to Setting the time "T"). It includes two safety relays with monitored positive action contacts. The series-wired relay contacts build the enabling paths.



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; ISO 13849-1; IEC 61508
Enclosure:	glass-fibre reinforced thermoplastic
Mounting:	snaps onto standard DIN rail to EN 60715
Connection:	Screw connection: max. 2.5 mm ² (including conductor ferrules)
Protection class:	terminals IP20, enclosure IP40 to IEC 60529
Start conditions:	Automatic
Rated operating voltage U _e :	AZS 2305: 24 VDC ± 15%; AZS 2305.1: 110 VAC ± 15%; AZS 2305.2: 230 VAC ± 15%
Rated operating current:	0.1 A at 24 VDC
Power consumption:	< 5 W
Rated insulation voltage:	250 V
Rated impulse withstand voltage:	4 kV
Thermal test current I _{me} :	6 A
Internal electronic fuse:	yes
Time range:	0.1 s ... 99 min
t _{min} :	0.1 s
t _{max} :	99 min
Time tolerance:	< 2 %
Inputs monitoring:	S1 (S14), S1 (S22)
Cross-wire detection:	yes
Wire breakage detection:	yes
Earth connection detection:	yes
Input resistance:	approx. 2 kΩ against GND
Input signal "1":	10 ... 30 VDC
Input signal "0":	0 ... 2 VDC
Outputs:	
- 13-14 / 23-24 / 33-34:	3 enabling paths each with 2 NO relay contacts in series
Utilisation category:	AC-15, DC-13
Rated operating voltage/current U _e /I _e :	2 A/250 VAC; 2 A/24 VDC
Switching voltage:	max. 250 VAC
Load current:	max. 3 A (ohmic load)
Switching capacity:	max. 750 VAC
Max. fuse rating:	6 A (quick blow) incoming series connected
Additional outputs:	Y1, Y2, U _e - 4 V; 100 mA, short-circuit proof, p-type
Ambient temperature:	0 °C ... +55 °C
Storage and transport temperature:	-25 °C ... +70 °C
Max. cable length:	100 m of 0.75 mm ² conductor
Max. switching frequency:	10 Hz
Resistance to vibration:	10 ... 55 Hz; amplitude 0.35 mm ±15% at the control circuit
Resistance to shock:	30 g / 11 ms
EMC rating:	conforming to EMC Directive

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
SIL:	up to 2
Service life:	20 years

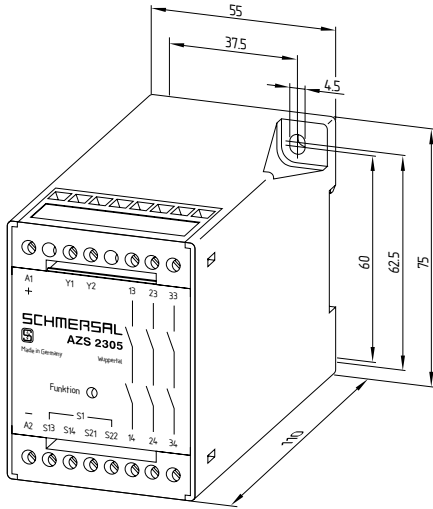
3. Mounting

3.1 General mounting instructions

Mounting: snaps onto standard DIN rails to EN 60715.

3.2 Dimensions

All measurements in 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

1. The functioning of the fail-safe delay timer is checked.
2. An initialisation stage is started during the parity check of the set time values. In case of varying time values, the red LED is on. The initialisation stage of the fail-safe delay timer is maintained until both times are matching due to modification of the switches positions.
3. The fail-safe delay timer is in starting position, when the NO contact at S1 (S13/S14) is closed and the NC contact at S1 (S21/S22) is opened. The relay contacts are open and the time registration is stopped. In case of a signal change at both inputs, the rating of the set time is started. The yellow LED is intermittently on. The LED flashes during these intermissions. The minimum unoccupied cycle time can be determined by means of the number of these impulses (see Table 2). In case of an unoccupied cycle time of one minute, the impulse frequency will increase permanently until the relay contacts are closed after expiration of this time.
4. The input signal at S1 is continuously monitored. In case of a change, the relay contacts are opened and the time measurement is stopped.

Signal input S1

S13/S14: connection NO contact

S21/S22: connection NC contact

Outputs

Enabling paths 13-14/23-24/33-34

NO contacts for safety functions

Additional outputs Y1/Y2

Y1: "Enabling signal"; the enabling paths are closed

Y2: "Error"; if the fail-safe delay timer detects an error, Y2 is switched.



The additional outputs Y1 and Y2 must not be integrated in the safety circuit.

5.2 Setting of the time "T"

The setting of time "T" is realised by means of rotary and sliding switches and is only saved after the operating voltage is switched on. The sliding switches are changing the time factor and the rotary switches the numerical value. To change the time, the enclosure cover must be removed. (Caution: please observe the handling prescriptions, electroshock hazard). The symbols of the rotary and sliding switches are represented at the rear of the cover. These switches must have the same setting for channel I and II. By rotating the upper rotary switch, the unit position and by rotating the lower rotary switch the tens position of the numerical value is changed. The time "T" is calculated by multiplying the numerical value and the time factor.

Table 1: Representation of the sliding switch positions and their assigned time factor

Time range	Sliding switch				Time factor	Time "T"
	1	2	3	4		
0.1 ... 9.9 s	1	0	1	0	0.1 s	Numerical value x 0.1 s
1.0 ... 99 s	0	0	0	0	1.0 s	Numerical value x 1.0 s
10 ... 990 s	0	1	0	1	10 s	Numerical value x 10 s
1.0 ... 99 min	1	1	1	1	60 s	Numerical value x 60 s

Determination of the unoccupied cycle time

During the rating of the time "T", the yellow LED flashes with brief impulses. The residual unoccupied cycle time can be derived from the number of these impulses. Table 2 represents the remaining unoccupied cycle time depending on the impulses.

Table 2: Number of impulses depending on the unoccupied cycle time

Number of impulses n	1	2	3	4	5	6
minimum unoccupied cycle time	T/2	T/4	T/8	T/16	T/32	T/64

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 example

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.

Monitoring of a sliding, hinged or removable safety guard with a solenoid interlock of the AZM 161 series. The safety guard monitor of the series AES monitors the position of the safety guard.

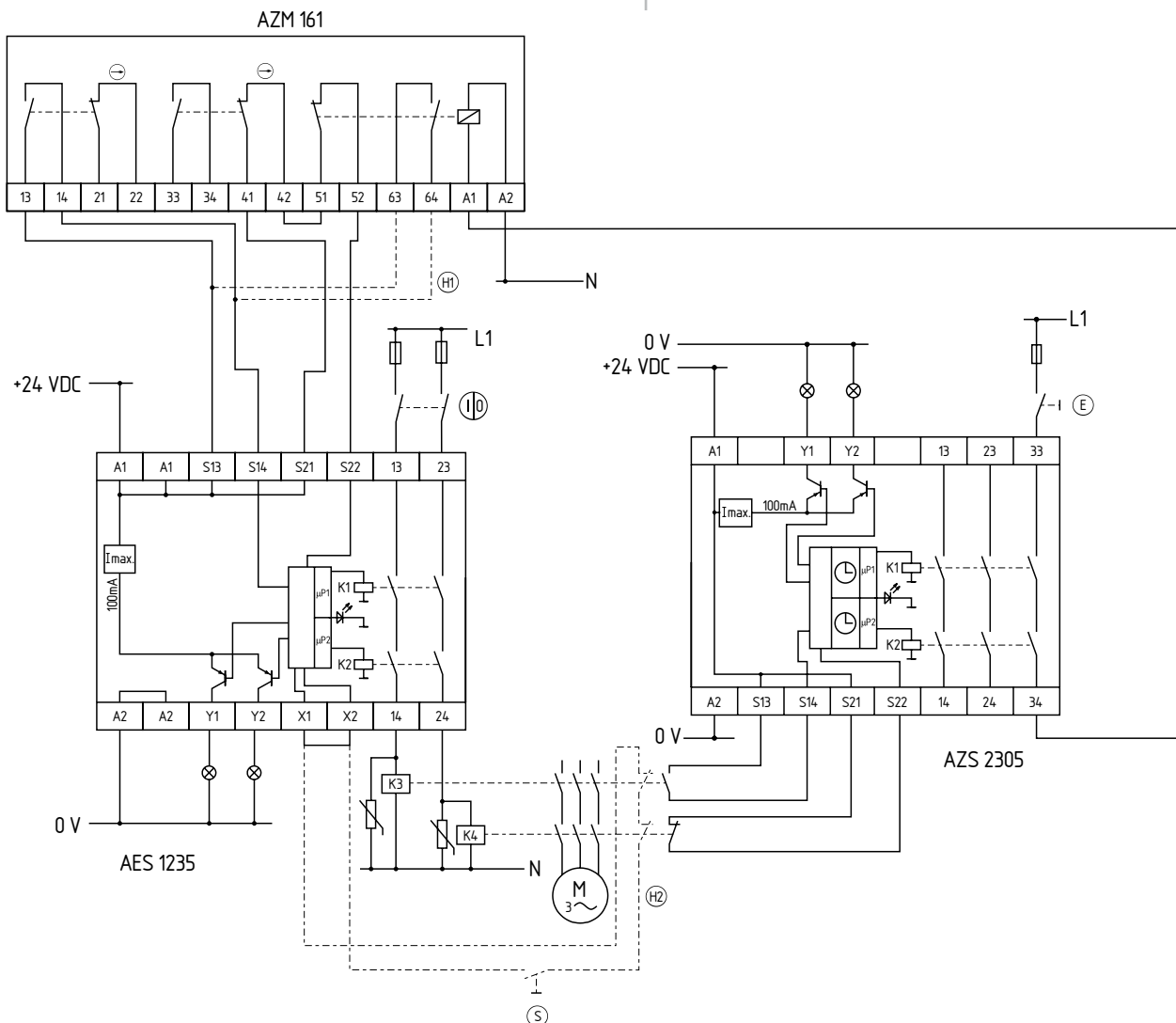
The wiring diagram is shown with guard doors closed and in a de-energised condition. Inductive loads (e.g. contactors, relays, etc.) are to be provided with suitable interference suppression circuitry.

Key

- Ⓔ Unlock solenoid interlock
- Ⓕ Optional: Safety guard must not be opened after the release
- Ⓖ Optional: Feedback circuit increases the safety, but not the control category
- Ⓗ Start button (optional)



To be observed for AC variants: AC supply through A1-A2, GND of the internal 24 VDC control voltage is on terminal PE.




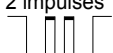



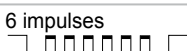
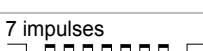
8.2 Integral System Diagnostics (ISD)

The safety monitoring modules LED display to show the different switching conditions and faults. The following tables show the different switching conditions.

Tables switching condition indication

Diagnostic LED	System condition
The LED is red	Comparison time value channel I with time value channel II faulty (setting coding and sliding switches)
The LED is green	Enabling paths closed
LED flashes yellow (0.5 Hz)	Input signal in starting position, enabling paths opened
LED flashes yellow (refer to table 2)	Time rating realised, maximum residual time value can be derived from table 2

Table error indications

Indication (orange) LED	Error	Cause
1 impulse 	Input signal S14/S22 at S1	Feeder cable for signal input S1 defective; Error during signal change*
2 impulses 	Time processing	Time value channel I too high
3 impulses 	Time processing	Time value channel II too high
4 impulses 	Interference at inputs, no safe evaluation	Too high capacitive or inductive interference at the inputs 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 	Relays not deactivated upon signal change	May be due to contact welding
7 impulses 	Dynamic monitoring of both channels (cross-monitoring) failure	Internal data transmission interrupted

* Signal change:


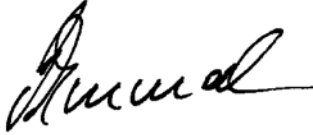
The signal change has only occurred at one input or the signal change has occurred at both inputs with intervals of over 5 seconds.

Deleting the error message

The fault message is deleted once the fault has been rectified and after the input signal S1 has been switched to starting position to check the various functions.

9. EC Declaration of conformity

9.1 EC Declaration of conformity

	
EC Declaration of conformity	
Translation of the original Declaration of Conformity	K.A. Schmersal GmbH & Co. KG Möddinghofe 30 42279 Wuppertal Germany Internet: www.schmersal.com
We hereby certify that the hereafter described safety components both in its basic design and construction conform to the applicable European Directives.	
Name of the safety component:	AZS 2305
Description of the safety component:	Relay safety combination / Fail-safe delay timer
Relevant EC-Directives:	2006/42/EC EC-Machinery Directive 2004/108/EC EMC-Directive
Person authorized for the compilation of the technical documentation:	Oliver Wacker Möddinghofe 30 42279 Wuppertal
Notified body, which approved the full quality assurance system, referred to in Appendix X, 2006/42/EC:	TÜV Rheinland Industrie Service GmbH Alboinstrasse 56 12103 Berlin ID n°: 0035
Place and date of issue:	Wuppertal, March 5, 2015
AZS2305-C-EN	
	Authorised signature Philip Schmersal Managing Director



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



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