



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 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 machine 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: products.schmersal.com.

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.

Warning about misuse



In case of improper use or manipulation of the safety switchgear, personal hazards or damages to machinery or plant components cannot be excluded. The relevant requirements of the standard ISO 14119 must be observed.

1.6 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:

AZ 200 ST-T-AS



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 non-contact, electronic safety switchgear is designed for application in AS interface Safety at Work and is used for monitoring the position of movable guard systems.



The safety switchgears are classified according to ISO 14119 as type 4 interlocking devices.

The safety function consists in safely switching off the code transmission when the safety guard is opened and maintaining the safe switched off condition for as long as the safety guard is open.

An AS-Interface Safety at Work component functions on the basis of an individual code generator (8 x 4 bit). This safety code is cyclically transmitted over the AS-i network and monitored by the safety monitor.



The user must evaluate and design the safety chain in accordance with the relevant standards and the required safety level.



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 60947-5-3, EN 62026-2, ISO 13849-1, IEC 61508, IEC 62061
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Mechanical life:	≥ 1 million operations
Latching force:	30 N
Protection class:	IP 67
Protection rating:	II,
Overvoltage category:	III
Degree of pollution:	3
Termination:	Connector M12 x 1, 4 pole
Tightening torque for the cover screws:	0.7 ... 1 Nm (Torx T10)
EMC rating:	according to EN 61000-6-2
Switching distances to IEC 60947-5-3:	
Rated operating distance S_{ri} :	6.5 mm
assured switching distance S_{so} :	4 mm
assured switch-off distance S_{gr} :	30 mm
Hysteresis:	max. 1.5 mm
Repeat accuracy:	< 0.5 mm
Electrical data AS-Interface:	
Rated operating voltage U_{er} :	26.5 ... 31.6 VDC, through AS-Interface, reverse polarity-proof (stabilised PELV unit)
Rated operating current I_{er} :	0.1 A
Rated impulse withstand voltage U_{imp} :	800 V
Rated insulation voltage U_{i1} :	32 VDC
No-load current I_{oi} :	typically 0.05 A
Device insulation:	internal short-circuit proof
AS-i specification:	
- Version:	V 2.1
- Profile:	S-0.B.F.E
AS-Interface Inputs:	Datanbits D0 ... D3 condition static 0 or dynamic code transmission
AS-Interface Outputs:	none
Input module address:	preset to address 0, can be changed through AS-interface bus master or hand-held programming device
Diagnostic indication:	
- LED green-red:	AS-Interface supply voltage / communication error or slave address = 0
- LED red:	Internal device error
- LED yellow:	Internal device error
Ambient conditions:	
Ambient temperature:	-25 °C ... +70 °C
Storage and transport temperature:	-25 °C ... +85 °C
Relative humidity:	30% ... 95%, no condensation
Resistance to vibration:	10 ... 150 Hz (amplitude 0.35 mm)
Resistance to shock:	30 g / 11 ms
Actuating speed:	≤ 0.2 m/s
Switching frequency:	≤ 1 Hz
Response time:	< 60 ms
Duration of risk:	< 120 ms
Time to readiness:	< 4 s



1. Use isolated power supply only
2. For use in NFPA 79 Applications only
3. Adapters providing field wiring means are available from the manufacturer. Refer to manufacturers information.

2.5 Safety classification

Standards:	ISO 13849-1, IEC 61508, IEC 62061
PL:	e
Control Category:	4
PFH:	$4 \times 10^{-9} / h$
SIL:	suitable for SIL 3 applications
Mission time:	20 years

3. Mounting

3.1 General mounting instructions



Please observe the relevant requirements of the standards ISO 12100, ISO 14119 and ISO 14120.

For fitting the AZ 200 AS safety switch and the actuator, two mounting holes for M6 screws with washers (washers included in delivery) are provided. The safety switch must not be used as end stop. Any mounting position. The mounting position however must be chosen so that the ingress of dirt and soiling in the used opening is avoided. The unused actuator opening must be sealed by means of the dust-proof flap (included in delivery).

Minimum distance between two safety sensors: 100 mm.

Fitting of the actuator

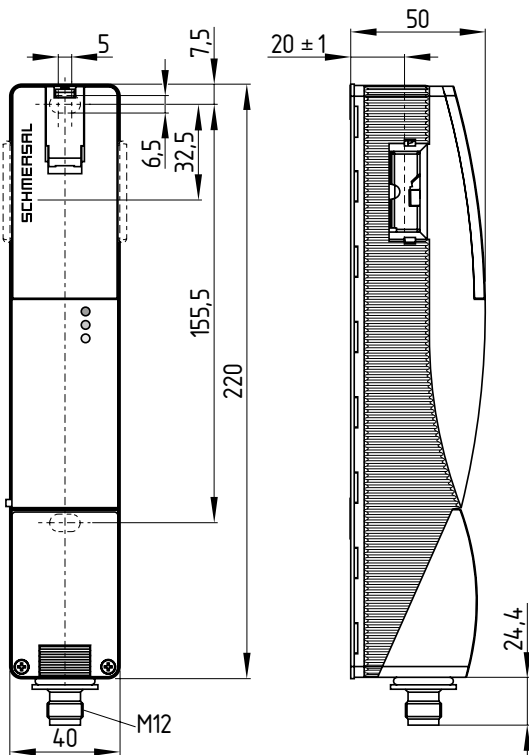
Refer to the mounting instructions manual for the corresponding actuator.



The actuator must be permanently fitted to the safety guards and protected against displacement by suitable measures (tamperproof screws, gluing, drilling of the screw heads).

3.2 Dimensions

All measurements in mm.



4. Electrical connection

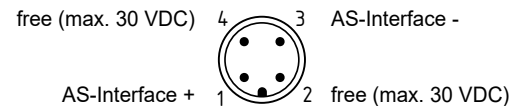
4.1 General information for electrical connection



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

The AZ 200 AS solenoid interlock is supplied through the AS-Interface system. The power supply of the safety switch must provide protection against permanent overvoltage. To that effect, stabilised PELV supply units must be used.

The connection to the AS-Interface system is realised through an M12 connector. The M12 x 1 connector has an A-coding. The wiring configuration of the M12 connector is defined as follows (to EN 62026-2):



5. Functions and configuration

5.1 Mode of operation of the safety outputs

The safety outputs of the AS-i safety monitor are enabled, when the following conditions are met:

- guard door detected
- the actuator is inserted

The opening of the AZ 200 AS safety switch causes the safety outputs of the AS-i safety monitor to be disabled. When the safety guard is closed, the safety outputs are re-enabled.

5.2 Configuration of the safety monitor

The AZ 200 AS component must be parameterised in the configuration software ASIMON as double channel dependent monitoring device with a synchronisation time of typically 100 ms. (Optional: start-up test and local acknowledge, refer to ASIMON manual).



The configuration of the safety monitor must be tested and confirmed by a qualified and authorised safety expert/safety engineer.

5.3 Programming the slave address

The slave address is programmed through the M12 connector. Any address from 1 to 31 can be set by means of the AS-i bus master or a hand-held programming device.

5.4 Status signal "safety release"

The "safety release" status signal from a Safety at Work slave can be cyclically queried by the control system through the AS-i master. To that effect, the 4 input bits with the varying SaW code of a Safety at Work slave are evaluated through an OR operation with 4 inputs in the control system.

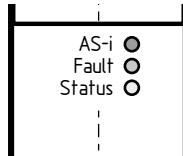
6. Diagnostic

6.1 LED display

The safety switchgear signals the operational state as well as errors through three coloured LEDs installed on the front side of the device.

The LEDs have the following meaning (in accordance with EN 62026-2):

LED red/green (AS-i Duo LED):	AS-Interface supply voltage / AS-Interface communication error / slave address = 0
LED red (Fault):	Device error (see table 2)
LED yellow (status):	Device status/release status (door and actuator detected)



6.2 Error / Error warning

Errors, which no longer guarantee the function of the AZ 200 AS (internal errors) cause the safety outputs to be disabled. Any error that does not immediately affect the safe functionality of the AZ 200 AS (e.g. the ambient temperature too high) will lead to a delayed shut-down (refer to table 3).

After fault rectification, the sensor can be reset by opening the relevant guard door. The safety outputs can be switched back on, thus enabling the machine.

Error warning

If a fault has occurred, which still guarantees the function of the safety switch, the system is safely switched off after 30 minutes. The safety outputs initially remain enabled. The error message can be read out through the parameter port (refer to Table 1). Depending on the type of fault, the machine is not immediately shut down. The control system obtains a preliminary message, which enables a controlled shutdown of the process.

An error warning is deleted/reset as soon as the error cause is eliminated.

6.3 Read-out of the parameter port

The parameter port P0 to P3 of an AS-i slave can be read out through the control interface of the AS-i master (see component description) by means of the "Write parameter" instruction (with hexadecimal value F). This (non-safe) diagnostic information from the reflected parameters or the answer to a "Write parameter instruction" can be used by the user for diagnostic purposes or for the control programme.

Table 1: diagnostic information (P0...P3)

Parameter bit	Condition = 1	Condition = 0
0	Safety guard and actuator detected	Safety guard and actuator not detected
1	Safety release enabled	Safety release not enabled
2	Not used (static 0)	Not used (static 0)
3	Error* detected	No error detected

*To be observed: refer to error warning (switch-off after 30 min.)

Table 2: Diagnostic information of the AZM 200 AS safety switchgear

System condition	LED green-red ³⁾	LED red	LED yellow	Condition AS-i SaW (D0 ... D3)
Guard open	green	Off	Off	static 0
Guard closed, actuator not inserted	green	Off	Off	static 0
Door closed, actuator inserted	green	Off	On	dynamically
Error warning ¹⁾ , actuator inserted, shutdown approaching	green	flashes ²⁾ /on	On	dynamically
Error	green	Flashes ²⁾	Off	static 0
Internal error	green	On	Off	static 0
AS-i error: slave address = 0 or communication error	red	depending on the condition	depending on the condition	static 0

1) after 30 min. → fault / internal fault

2) refer to flash code

3) refer to duo LED (green/red)

Table 3: Error messages

Flash codes (red)	Designation	Autonomous switch-off after	Error cause
4 flash pulses	Error (warning) temperature too high	30 min.	The temperature measurement reveals an internal temperature that is too high
5 flash pulses	Error false target	0 min.	Incorrect or defective actuator
6 flash pulses	Error target combination	0 min.	An invalid combination of targets was detected at the 4 coils of the AZ 200 ST-T-AS. (Currently set: blocking bolt detected & door target not detected → blocking bolt breakage detection or tamper attempt)
Continuous red signal	Internal error	max. 30 min.	

7. Set-up and maintenance

7.1 Functional testing

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

1. Check max. axial misalignment of actuator and safety switchgear
2. Check the switch enclosure for damage
3. Remove particles of dust and soiling

7.2 Maintenance

We recommend a regular maintenance, including the following steps:

- Check the fixing of the safety switch and the actuator
- Check max. axial misalignment of actuator and safety switch
- Check the switch enclosure for damages
- Remove soiling



Measures must be taken to protect against manipulation or against the bypassing of safety device, for example, using an extra actuator.

Damaged or defective components must be replaced.

8. Disassembly and disposal


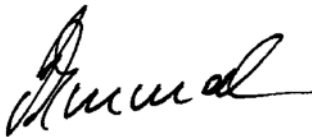
8.1 Disassembly

The safety switchgear must be disassembled in a de-energised condition only.

8.2 Disposal

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

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:	AZ 200 AS	
Type:	See ordering code	
Description of the component:	Safety switch with integrated door detection sensor for safety functions with integrated Safety at Work Interface	
Relevant Directives:	2006/42/EC Machinery Directive 2014/30/EU EMC-Directive 2011/65/EU RoHS-Directive	
Applied standards:	EN 60947-5-3:2013 ISO 14119:2013 EN ISO 13849-1:2015 EN 61508 parts 1-7:2010 EN 62061:2005 + AC:2010 + A1:2013 + A2:2015	
Notified body for the prototype test:	TÜV Rheinland Industrie Service GmbH Am Grauen Stein, 51105 Köln ID n°: 0035	
EC-prototype test certificate:	01/205/5122.02/20	
Person authorised for the compilation of the technical documentation:	Oliver Wacker Möddinghofe 30 42279 Wuppertal	
Place and date of issue:	Wuppertal, 26. February, 2020	
		
	Authorised signature Philip Schmersal Managing Director	

AZ200AS-D-DE



The currently valid declaration of conformity can be downloaded from the internet at products.schmersal.com.

