



EN Operating instructions. pages 1 to 12
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.

1.6 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 EN 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

AZM300^①-^②-ST-^③-^④-^⑤

No.	Option	Description
①	Z	Solenoid interlock monitored
	B	Actuator monitored
②		Standard coding
	I1	Individual coding
	I2	Individual coding, re-teaching enabled
③	1P2P	1 p-type diagnostic output and 2 p-type safety outputs
	SD2P	Serial diagnostic output and 2 p-type safety outputs
④		Power to unlock
	A	Power to lock
⑤		Manual release
	N	Emergency release
	T	Emergency exit
	T8	Emergency exit, distance 8.5 mm

Actuator **AZ/AZM300-B1**

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 Comprehensive quality insurance to 2006/42/EC

Schmersal is a certified company to appendix X of the Machinery Directive. As a result, Schmersal is entitled to autonomously conduct the conformity assessment procedure for the products listed in Appendix IV of the MD without involving a notified body. The prototype test certificates are available upon request or can be downloaded from the Internet at products.schmersal.com.

2.4 Purpose

The non-contact, electronic safety switchgear is designed for application in safety circuits and is used for monitoring the position and locking of movable safety guards.



The safety switchgears are classified according to EN ISO 14119 as type 4 interlocking devices. Designs with individual coding are classified as highly coded.

The different variants can be used as safety switch with interlocking function either as solenoid interlock.



If the risk analysis indicates the use of a monitored interlock then a variant with the monitored interlock is to be used, labelled with the symbol.

The actuator monitoring variant (B) is a safety switch with an interlock function for process protection.

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



Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the safety guard can be opened immediately on failure of the power supply or upon activation of the main switch.

Emergency exit (-T/-T8)



Fitting and actuation only from within the hazardous area.

To activate the emergency exit, turn the red lever in the direction of the arrow to the end stop. The safety outputs switch off and the guard system can be opened. The blocked position is cancelled by turning the lever in the opposite direction. In the unlocked position, the guard system is secured against unintentional locking.

Emergency release (-N)



Fitting and actuation only from outside the hazardous area.

To activate the emergency release turn the red lever in the direction of the arrow to the end stop. The safety outputs switch off and the guard system can be opened. The lever is latched and cannot be returned to its original position. To cancel the blocking condition, the central mounting screw must be loosened to such extent that the lever can be turned back into its original position. The screw must then be re-tightened.

It is possible to combine an emergency exit with an emergency release. Please note that when the red lever is actuated, the opposite lever also rotates. As such, the procedure outlined above must be followed to release the emergency release lever.

Series-wiring

Series-wiring can be set up. The reaction and risk times increase by up to 1.5 ms per additional device when connected in series. The quantity of devices is only limited by the cable drops and the external cable fuse protection, according to the technical data. Series-wiring of up to 31 AZM300 ... SD components with serial diagnostics is possible. In devices with the serial diagnostics function (ordering suffix -SD), the serial diagnostics connections are wired in series and connected to a SD Gateway for evaluation purposes. Wiring examples for series-wiring, refer to appendix.



The user must evaluate and design the safety chain in accordance with the relevant standards and the required safety level. If multiple safety switchgears are involved in the same safety function, the PFH values of the individual components must be added.



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

2.5 Technical data

Standards:	IEC 60947-5-3, EN ISO 14119, EN ISO 13849-1, IEC 61508
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Working principle:	RFID
Frequency band:	125 kHz
Transmitter output:	max. -6 dBm
Coding level according to EN ISO 14119:	
- I1-version:	high
- I2-version:	high
- Standard coding version:	low
Reaction time, switching off outputs Y1, Y2 via:	
- Actuator:	≤ 100 ms
- Inputs X1, X2:	≤ 1.5 ms
Duration of risk:	≤ 200 ms
Time to readiness:	≤ 5 s
Series-wiring:	Unlimited number of components, please observe external cable protection, max. 31 components in case of serial diagnostics
Length of the sensor chain:	max. 200 m (cable length and cable section alter the voltage drop depending on the output current)
Mechanical data	
Holding force F_{max} :	1,500 N
Holding force F_{Zh} :	1,150 N
Latching force:	25 N / 50 N
Mechanical life:	≥ 1,000,000 operations
- when used as door stop:	≥ 50,000 operations for safety guards ≤ 5 kg and actuating speed ≤ 0.5 m/s
Angular misalignment between solenoid interlock and actuator:	≤ 2°
Connection:	Connector plug M12, 8-pole, A-coded
Fixing screws:	2x M6
Tightening torque of the fixing screws:	6 ... 7 Nm
Switching distances to IEC 60947-5-3	
Typical switching distance:	2 mm
Assured switching distance s_{ao} :	1 mm
Assured switch-off distance s_{ar} :	20 mm
Ambient conditions	
Ambient temperature:	0 °C ... +60 °C
Storage and transport temperature:	-10 °C ... +90 °C
Relative humidity:	max. 93 %, non condensing, non icing
Degree of protection:	IP66, IP67, IP69 to EN 60529
Installation altitude above sea level:	max. 2,000 m
Protection class:	III
Resistance to shock:	30 g / 11 ms
Resistance to vibration:	10 ... 150 Hz, Amplitude 0.35 mm
Insulation values to IEC 60664-1:	
- Rated insulation voltage U_i :	32 VDC
- Rated impulse withstand voltage U_{imp} :	0.8 kV
- Over-voltage category:	III
- Degree of pollution:	3
Switching frequency:	≤ 0.5 Hz
Electrical Data	
Operating voltage U_B :	24 VDC -15 % / +10 % (stabilised PELV - power supply)
No-load supply current I_0 :	< 0.1 A
Operating current device with magnet switched on:	
- Averaged:	< 0.2 A
- Peak current:	< 0.35 A / 200 ms

Required rated short-circuit current:	100 A
External wire and device fuse rating:	2 A gG
Electrical data – Safety inputs	
Safety inputs:	X1 and X2
Switching thresholds:	- 3 V ... 5 V (Low), 15 V ... 30 V (High)
Current consumption per input:	≤ 5 mA / 24 V
Accepted test pulse duration on input signal:	≤ 1.0 ms
- With test pulse interval of:	≥ 100 ms
Classification:	ZVEI CB24I
Sink:	C1
Source:	C1 C2 C3

Electrical data – Safety outputs	
Safety outputs:	Y1 and Y2
Switching elements:	p-type, short-circuit proof
Utilisation category:	DC-12, DC-13
- Rated operating voltage U_g :	24 VDC
- Rated operating current I_g :	each max. 0.25 A
Leakage current I_l :	≤ 0.5 mA
Voltage drop U_d :	≤ 4 V
Cross-wire monitoring by device:	Yes
Test pulse duration:	≤ 0.3 ms
Test pulse interval:	1,000 ms
Classification:	ZVEI CB24I
Source:	C2
Sink:	C1 C2

Electrical data – Diagnostic output	
Diagnostic output:	OUT
Switching element:	p-type, short-circuit proof
Utilisation category:	DC-12, DC-13
- Rated operating voltage U_g :	24 VDC
- Rated operating current I_g :	max. 0.05 A
Voltage drop U_d :	≤ 4 V

Electrical data – Magnet control	
Solenoid input:	IN
Switching thresholds:	- 3 V ... 5 V (Low), 5 V ... 30 V (High)
Power consumption:	10 mA / 24 V
Magnet switch-on time:	100 %
Accepted test pulse duration on input signal:	≤ 5.0 ms
- With test pulse interval of:	≥ 40 ms
Classification:	ZVEI CB24I
Sink:	C0
Source:	C1 C2 C3

Serial diagnostic SD	
Operating current:	0.15 A
Wiring capacitance:	max. 50 nF

LED switching conditions display	
Green LED:	Supply voltage
Yellow LED:	Device condition
Red LED:	Fault



This device is intended to be powered by a Listed Limited Voltage, Limited Current or Class 2 source. This device shall be powered with the use of a Listed (CYJV) cable/connector assembly rated 24 Vdc, 0,8 A minimum.



This device complies with part 15 of the FCC Rules and contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s): Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This device complies with the Nerve Stimulation Exposure Limits (ISED SPR-002) for direct touch operations. Changes or modifications not expressly approved by K.A. Schmersal GmbH & Co. KG could void the user's authority to operate the equipment.



L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) L'appareil ne doit pas produire de brouillage.
- (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet appareil est conforme aux limites d'exposition relatives à la stimulation des nerfs (ISED CNR-102) pour les opérations tactiles directes. Changements ou modifications non expressément approuvés par K.A. Schmersal GmbH & Co. KG pourrait annuler le droit de l'utilisateur à utiliser l'équipement.

2.6 Safety classification

- of the interlocking function:

Standards:	EN ISO 13849-1, IEC 61508
PL:	up to e
Control category:	4
PFH:	$5.2 \times 10^{-10} / h$
PFD:	4.5×10^{-5}
SIL:	suitable for SIL 3 applications
Mission time:	20 years

- of the guard locking function:

Standards:	EN ISO 13849-1, IEC 61508
PL:	up to d
Control category:	2
PFH:	$2.0 \times 10^{-9} / h$
PFD:	1.8×10^{-4}
SIL:	suitable for SIL 2 applications
Mission time:	20 years



The safety consideration of the guard locking function only applies for standard devices with monitored solenoid interlock AZM300Z-...-1P2P-... (see Ordering code). A safety assessment of the guard locking function for devices with serial diagnostics "SD2P" is not allowed due to the non-safe locking/unlocking signal from the SD Gateway



The actuation of the interlock must be compared externally with the OSSD release. If a shut-down now occurs due to an unintentional unlocking this is detected by an external diagnostic.



If for a certain application the power to unlock version of a solenoid interlock cannot be used, then for this exception an interlock with power to lock can be used if additional safety measure need to be realised that have an equivalent safety level.



The safety analysis of the guard locking function refers to the component solenoid interlock AZM as part of the complete system. On the customer side further measures such as safe actuation and safe cable installation to prevent faults are to be implemented. In the event of a fault resulting in the unlocking of the guard locking, this is detected by the solenoid interlock and the safety gates Y1/Y2 switch off. When such a fault occurs the protection equipment may open immediately, just once, before the safe condition of the machine is reached. The system reaction of category 2 allows that a fault can occur between tests causing the loss of the safety function which is detected by the test.

3. Mounting

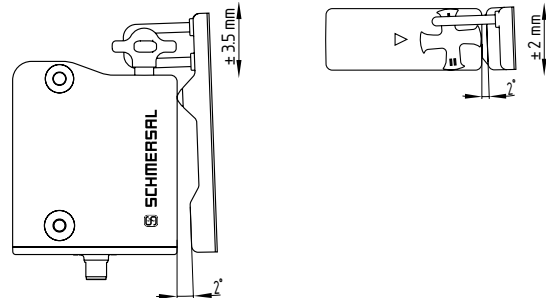
3.1 General mounting instructions



Please observe the remarks of the standards EN ISO 12100, EN ISO 14119 and EN ISO 14120.

For the correct fixing of the solenoid interlock and the actuator, two mounting holes for M6 screws are provided (tightening torque: 6 ... 7 Nm).

Any mounting position. The system must only be operated with an angle of $\leq 2^\circ$ between the solenoid interlock and the actuator.



The solenoid interlock can be used as an end stop. Dependant upon the door weight and the actuating speed, the mechanical life could be reduced.

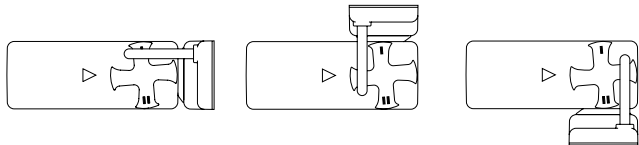
Mounting of the solenoid interlock and the actuator

Refer to the mounting instructions manual for the corresponding actuator.



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

Actuating directions



The diagrams show a closed guard system with a set latching force of 50 N (for adjustment of latching force, see chapter 5.4).



Provide for a sufficient insertion of the actuator into the rotary handle.

Correct

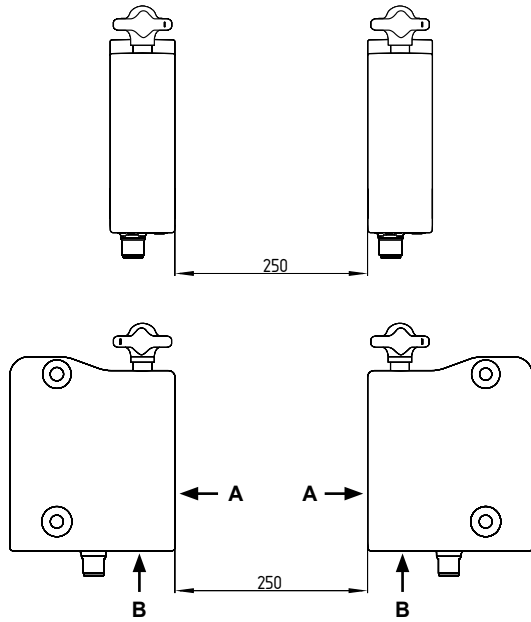
False



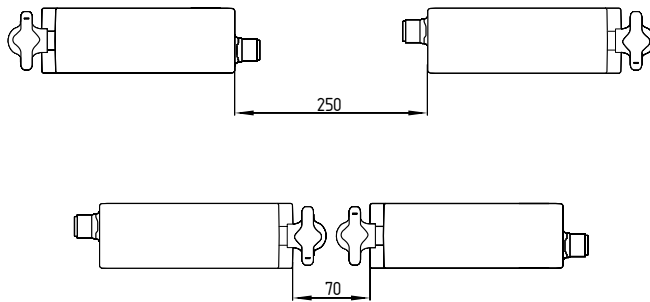
To avoid any interference inherent to this kind of system and any reduction of the switching distances, please observe the following guidelines:

- The presence of metal chips in the vicinity of the solenoid interlock is liable to modify the switching distance.
- Keep away from metal chips.

Minimum distance between two solenoid interlocks
as well as other systems with same frequency (125 kHz)



The minimum distance from metallic securing surfaces to the face side "A" and underside "B" of the device is 5 mm.

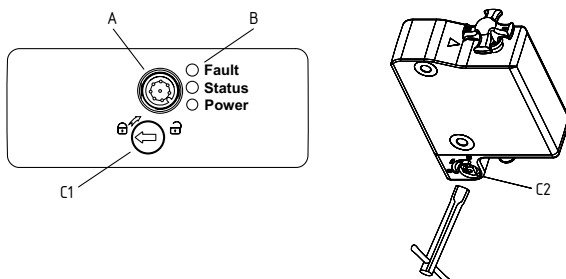


3.2 Manual release

For the machine set-up, the solenoid interlock can be unlocked in a de-energised condition. The solenoid interlock is unlocked by turning the manual release in the position

The normal locking function is only restored after the manual release has been returned to its original position

Caution: do not turn beyond the end stop!



Key

- A: connector plug M12, 8-pole
- B: LED display
- C1: Manual release by means of slotted screwdriver
- C2: Manual release by means of triangular key TK-M5

The manual release must be protected against accidental actuation, e.g. by using the enclosed seal after completing commissioning.

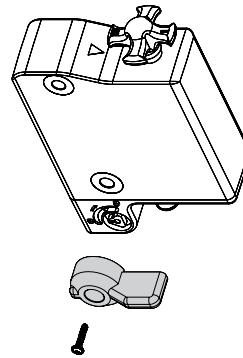
3.3 Emergency exit -T/-T8 or emergency release -N

With variants that have both emergency exit and emergency release, the red lever is loosely supplied. Before first use, mount the lever on the triangular part of the release using the screw supplied so that the arrow in the triangle and pin on the red lever are congruent.

The installation of the lever is possible on both sides. The opposite side can be used as a manual release by means of a triangular key TK-M5.



Reset of the manual release by actuating the red emergency exit lever must be prevented by the user.



Emergency exit (-T/-T8)

Fitting and actuation only from within the hazardous area.



Emergency release (-N)

Fitting and actuation only from outside the hazardous area.

The emergency release should only be used in an emergency. The solenoid interlock should be installed and/or protected so that an inadvertent opening of the interlock by an emergency release can be prevented.

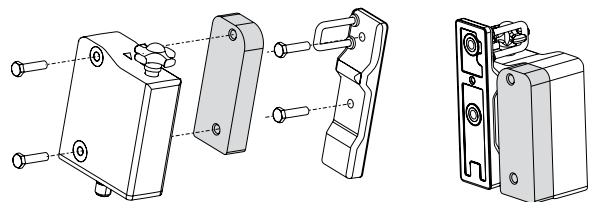
The emergency release must be clearly labelled that it should only be used in an emergency. The label can be used that was included in the delivery.



To ensure correct operation of emergency exit -T/-T8 and emergency release -N, the safety door/guard must not be in a mechanically tensioned state.

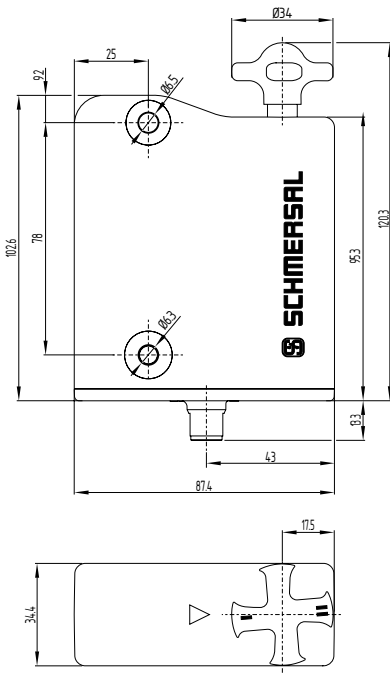
3.4 Mounting with mounting plate

For doors, which close flush with the door frame, the optional mounting plate MP-AZ/AZM300-1 can be used.



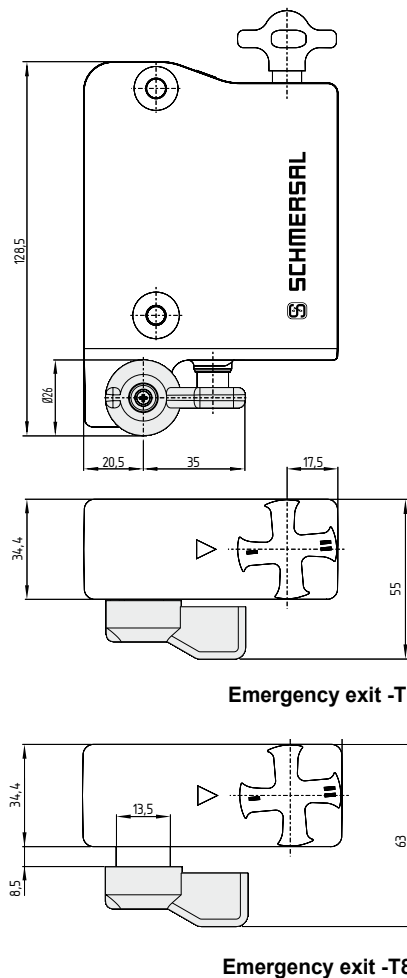
3.5 Dimensions

All measurements in mm.



AZM300...-T/-T8 and -N

Device with emergency exit or emergency release

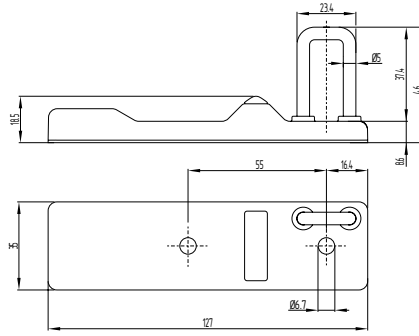


Emergency exit -T

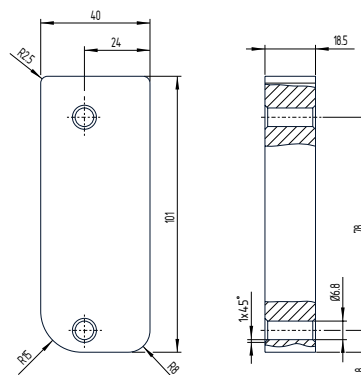
Emergency exit -T8

3.6 Actuator and accessories

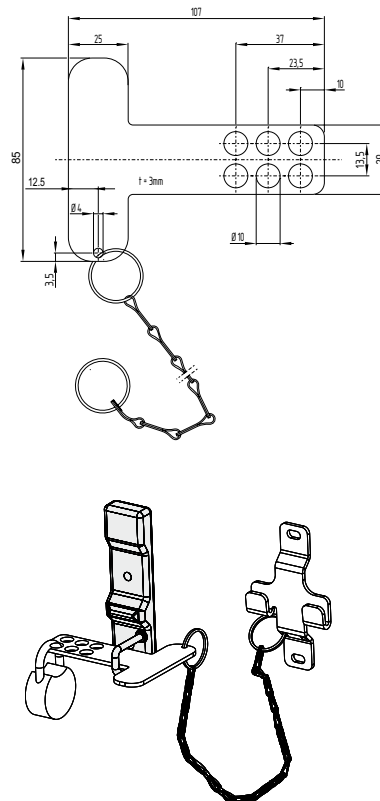
Actuator AZ/AZM300-B1 (not included in delivery)



Mounting plate MP-AZ/AZM300-1 (available as accessory)



Lockout tag SZ 200-1 (available as accessory)



Bowden cable release ACC-AZM300-BOW-.-.M-.M

Observe the additional notes in the operating instructions of the Bowden cable release.

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 voltage inputs A1, X1, X2 and IN must have a protection against permanent overvoltage. Supply units according to EN 60204-1 is recommended.

The required electrical cable fuse protection must be integrated in the installation.

The safety outputs can be integrated in the safety circuit of the control system.

Requirements for the connected safety-monitoring module:

- Dual-channel safety input, suitable for p-type semi-conductor outputs



Configuration of the safety-monitoring module

If the safety sensor is connected to electronic safety-monitoring modules, we recommend that you set a discrepancy time of min. 100 ms. The safety inputs of the safety-monitoring module must be able to blank a test impulse of approx. 1 ms. The safety-monitoring module does not need to have a cross-wire short monitoring function, if necessary, the cross-wire short monitoring function must be disabled.



Information for the selection of suitable safety-monitoring modules can be found in the Schmersal catalogues or in the online catalogue on the Internet: products.schmersal.com.

Cable design in case of serial diagnostics



When wiring SD devices, please observe the voltage drop on the cables and the current carrying capacity of the individual components.

The wiring capacity of the connecting cable of the solenoid interlock must not exceed 50 nF. Depending on the strand structure, normal unshielded 30 m long control cables LIYY 0.25 mm² to 1.5 mm² have a wiring capacitance of approx. 3 ... 7 nF.

5. Operating principle, actuator coding and latching force adjustment

5.1 Magnet control

In the power to unlock version of the AZM300, the solenoid interlock is unlocked when the IN signal (= 24V) is set. In the power to lock version of the AZM300, the solenoid interlock is locked when the IN signal (= 24 V) is set.

5.2 Mode of operation of the safety outputs

In the standard AZM 300Z variant, the unlocking of the solenoid interlock causes the safety outputs to be disabled. The unlocked safety guard can be relocked as long as the actuator is inserted in the AZM 300Z solenoid interlock; in that case, the safety outputs are re-enabled. It is not necessary to open the safety guard.

In the AZM300B version, only the opening of the safety guard causes the safety outputs to be disabled.

If the safety outputs are already enabled, any error that does not immediately affect the functionality of the solenoid interlock (e.g. too high an ambient temperature, interference potential at the safety outputs, cross-wire short) will lead to a warning message, the disabling of the diagnostic output and the delayed shutdown of the safety outputs.

safety outputs are disabled if the error warning is active for 30 minutes. The signal combination, diagnostic output disabled and safety channels still enabled, can be used to stop the production process in a controlled manner. After the rectification of the error, the error message is reset by opening the corresponding safety guard. For devices with serial diagnostic, a bit can be set/deleted in the call telegram to reset the fault.

5.3 Actuator coding

Solenoid interlocks with standard coding are ready to use upon delivery.

Individually coded solenoid interlocks and actuators will require the following "teach-in" procedure:

1. Switch the solenoid interlock's voltage supply off and back on.
2. Introduce the actuator in the detection range. The teach-in procedure is signalled at the solenoid interlock, green LED off, red LED on, yellow LED flashes (1 Hz).
3. After 10 seconds, brief yellow cyclic flashes (3 Hz) request the switch-off of the operating voltage of the solenoid interlock. (If the voltage is not switched off within 5 minutes, the solenoid interlock cancels the "teach-in" procedure and signals a false actuator by 5 red flashes).
4. After the operating voltage is switched back on, the actuator must be detected once more in order to activate the taught actuator code. In this way, the activated code is definitively saved!

For ordering suffix -I1, the thus executed allocation of safety switchgear and actuator is irreversible.

For ordering suffix -I2, the "teach-in" procedure for a new actuator can be repeated an unlimited number of times. When a new actuator is taught, the code, which was applicable until that moment, becomes invalid. Subsequent to that, an enabling inhibit will be active for ten minutes, thus providing for an increased protection against tampering. The green LED will flash until the expiration of the time of the enabling inhibit and the detection of the new actuator. In case of power failure during the lapse of time, the 10-minutes tampering protection time will restart.

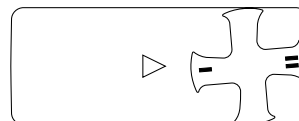
5.4 Adjustment of the latching force

In order to enable trouble-free functionality of the device, the rotary handle must be in position I or II when the safety guard is open. In the intermediate positions, locking is impossible.

The latching force is changed by turning the rotary handle by 180°.

In position I, the latching force is approx. 25 N.

In position II, the latching force is approx. 50 N.



6. Diagnostic function

6.1 Diagnostic-LEDs

The solenoid interlock signals the operating condition, as well as errors through 3-colour LEDs.

green (Power)	supply voltage on
yellow (Status)	operating condition
red (Fault)	Error (see table 2: Error messages / flash codes red diagnostic LED)

6.2 Solenoid interlock with conventional diagnostic output

The short-circuit proof diagnostic output OUT can be used for central visualisation or control tasks, e.g. in a PLC.

The diagnostic output is not a safety-related output.

Error

Errors, which no longer guarantee the function of the solenoid interlock (internal errors) cause the safety outputs to be disabled immediately. Any error that does not immediately affect the safe functionality of the solenoid interlock (e.g. excess ambient temperature, safety output to external potential, short circuit) will lead to a delayed shut-down (refer to table 2).

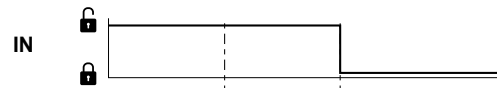
After fault rectification, the error message is reset by opening and re-closing the corresponding safety guard.

Error warning

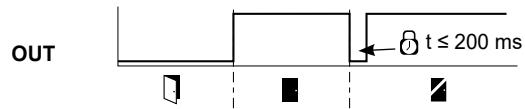
A fault has occurred, which causes the safety outputs to be disabled after 30 minutes (LED "fault" flashes, see Table 2). The safety outputs initially remain enabled. This signal combination, diagnostic output disabled and safety channels still enabled, can be used to stop the production process in a controlled manner. An error warning is deleted when the cause of error is eliminated.

Behaviour of diagnosis output based on interlock with power to unlock as an example

Input signal magnet control



Normal sequence, door was locked



Door could not be locked or fault



Key

	Safety guard open		Safety guard closed		Locking time
	Safety guard not locked or fault		Safety guard locked		
	Lock		Unlock		

Table 1: Diagnostic information of the safety switchgear

System condition	Magnet control IN:		LED			Safety outputs Y1, Y2		Diagnostic output OUT
	Power to unlock	Power to lock	green	red	yellow	AZM300Z	AZM300B	
Guard open	24 V (0 V)	0 V (24 V)	On	Off	Off	0 V	0 V	0 V
Door closed, not locked	24 V	0 V	On	Off	Flashes	0 V	24 V	24 V
Door closed, locking impossible	0 V	24 V	On	Off	Flashes	0 V	24 V	0 V
Door closed and locked	0 V	24 V	On	Off	On	24 V	24 V	24 V
Error warning ¹⁾	0 V	24 V	On	Flashes ²⁾	On	24 V ¹⁾	24 V ¹⁾	0 V
Error	0 V (24 V)	24 V (0 V)	On	Flashes ²⁾	Off	0 V	0 V	0 V
Additionally for variant I1/I2:								
Teach-in procedure actuator started			Off	On	Flashes	0 V	0 V	0 V
Only I2: teach-in procedure actuator (release block)			Flashes	Off	Off	0 V	0 V	0 V

¹⁾ after 30 min: disabling due to fault

²⁾ refer to flash code

Table 2: Error messages / flash codes red diagnostic LED

Flash codes (red)	Designation	Autonomous switch-off after	Error cause
1 flash pulse	Error (warning) at output Y1	30 min	Fault in output test or voltage at output Y1, although the output is disabled.
2 flash pulses	Error (warning) at output Y2	30 min	Fault in output test or voltage at output Y2, although the output is disabled.
3 flash pulses	Error (warning) cross-wire short	30 min	Cross-wire short between the output cables or fault at both outputs
4 flash pulses	Error (warning) temperature too high	30 min	The temperature measurement reveals an internal temperature that is too high
5 flash pulses	Actuator fault	0 min	Incorrect or defective actuator, bracket broken
6 flash pulses	Fault rotary handle	0 min	Rotary handle not in authorised intermediate position
Continuous red signal	Internal error	0 min	Device defective

6.3 Solenoid interlock with serial diagnostic function SD

Solenoid interlocks with serial diagnostic cable have a serial input and output cable instead of the conventional diagnostic output. If solenoid interlocks are wired in series, the diagnostic data are transmitted through the series-wiring of the inputs and outputs.

Max. 31 solenoid interlocks can be wired in series. For the evaluation of the serial diagnostics line either the PROFIBUS-Gateway SD-I-DP-V0-2 or the Universal-Gateway SD-I-U-... are used. This serial diagnostic interface is integrated as a slave in an existing field bus system. In this way, the diagnostic signals can be evaluated by means of a PLC.

The necessary software for the integration of the SD-Gateway is available for download at products.schmersal.com.

The response data and the diagnostic data are automatically and permanently written in an input byte of the PLC for each solenoid interlock in the series-wired chain. The request data for each solenoid interlock is transmitted to the component through an output byte of the PLC. In case of a communication error between the SD-gateway and the solenoid interlock, the switching condition of the solenoid interlock is maintained.

Error

A fault has occurred, which causes the safety outputs to be disabled. The fault is reset, when the cause is eliminated and bit 7 of the request byte changes from 1 to 0 or the safety guard is opened. Faults at the safety outputs are only deleted upon the next release, as the fault rectification cannot be detected sooner.

Error warning

A fault has occurred, which causes the safety outputs to be disabled after 30 minutes. The safety outputs initially remain enabled. This enables the shutdown of the process in a controlled manner. An error warning is deleted when the cause of error is eliminated.

Diagnostic error (warning)

If an error (warning) is signalled in the response byte, detailed fault information can be read out.



Accessories for the series-wiring

For convenient wiring and series-wiring of SD components, the SD junction boxes PFB-SD-4M12-SD (variant for the field) and PDM-SD-4CC-SD (variant for control cabinet on carrier rail) are available along with additional comprehensive accessories. Detailed information is available on the Internet, products.schmersal.com.



On wiring SD devices, please pay attention to the voltage drop on the cables and the current carrying capacity of the individual components.

Table 3: I/O data and diagnostic data

(The described condition is reached, when Bit = 1)

Bit n°	Request byte	Response byte	Diagnostic error warning	Diagnostic error
Bit 0:	Magnet on, irrespective of power to lock or power to unlock principle	Safety output activated	Error output Y1	Error output Y1
Bit 1:	---	Safety guard closed AND locking/unlocking possible	Error output Y2	Error output Y2
Bit 2:	---	Actuator detected and locked	Cross-wire short	Cross-wire short
Bit 3:	---	---	Temperature too high	Temperature too high
Bit 4:	---	Input condition X1 and X2	---	Incorrect or defective actuator, bracket broken
Bit 5:	---	Valid actuator detected	Internal device error	Internal device error
Bit 6:	---	Error warning ¹⁾	Communication error between the field bus Gateway and the safety switchgear	---
Bit 7:	Error reset	Error (enabling path switched off)	Rotary handle not in authorised intermediate position	Rotary handle not in authorised intermediate position

¹⁾ after 30 min -> fault

The leading diagnosis message through bit 1 indicates whether locking or unlocking of the guard system is possible.

The solenoid interlock **cannot be unlocked** if e.g. the door pulls the turret out of its rest position beyond the set latching force.

This can occur if doors are heavily distorted or when pulling the door.

The solenoid interlock can only be **locked** if the turret is in the rest position, i.e. the latching force is sufficient to pull the guard system into the correct position.

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 solenoid interlock.
2. Check max. angular misalignment (see "Mounting" part)
3. Fitting and integrity of the cable connections.
4. Check the switch enclosure for damage.
5. Remove particles of dust and soiling.
6. For variants with an emergency exit and emergency release, the following is to be considered:
 - For variants with emergency exits it should be possible to open the safety guard inside the hazardous area; it should not be possible to lock the safety guard from inside.
 - By operating the emergency release lever outside of the hazardous zone it must be possible to open the guard system.

7.2 Maintenance

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

- Check for a secure installation of the actuator and the solenoid interlock
- Check max. axial misalignment of actuator and solenoid interlock.
- Check max. angular misalignment (see "Mounting" part)
- Fitting and integrity of the cable connections.
- Check the switch enclosure for damages
- Remove soiling



Adequate measures must be taken to ensure protection against tampering either to prevent tampering of the safety guard, for instance by means of replacement actuators.

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.

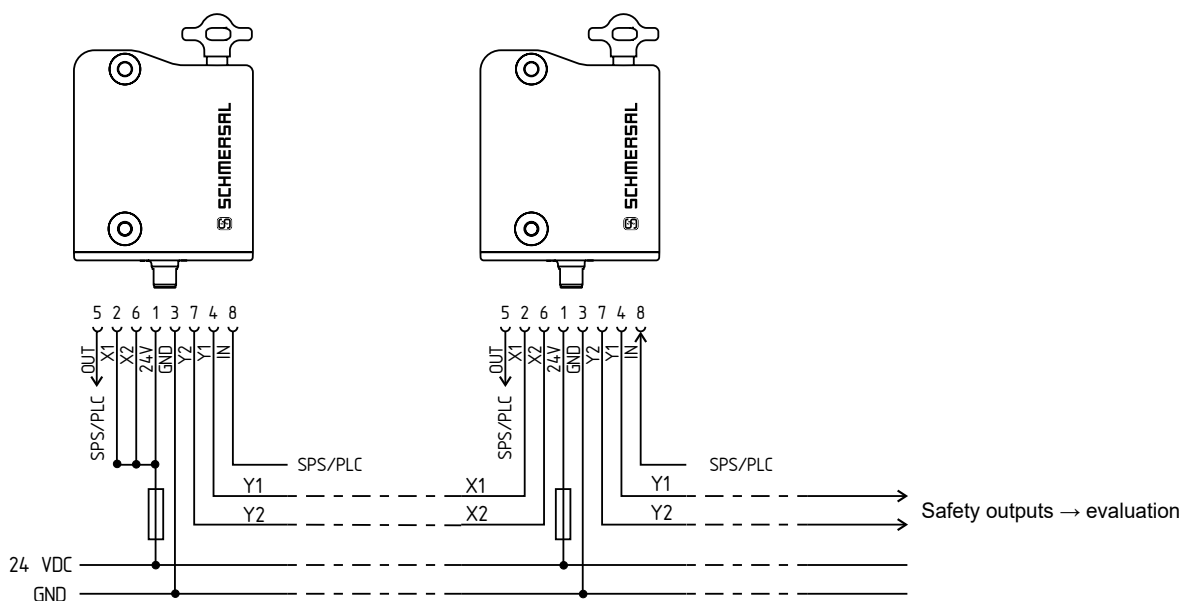
9. Appendix

9.1 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.

Wiring example 1: Series-wiring of the AZM300 with conventional diagnostic output

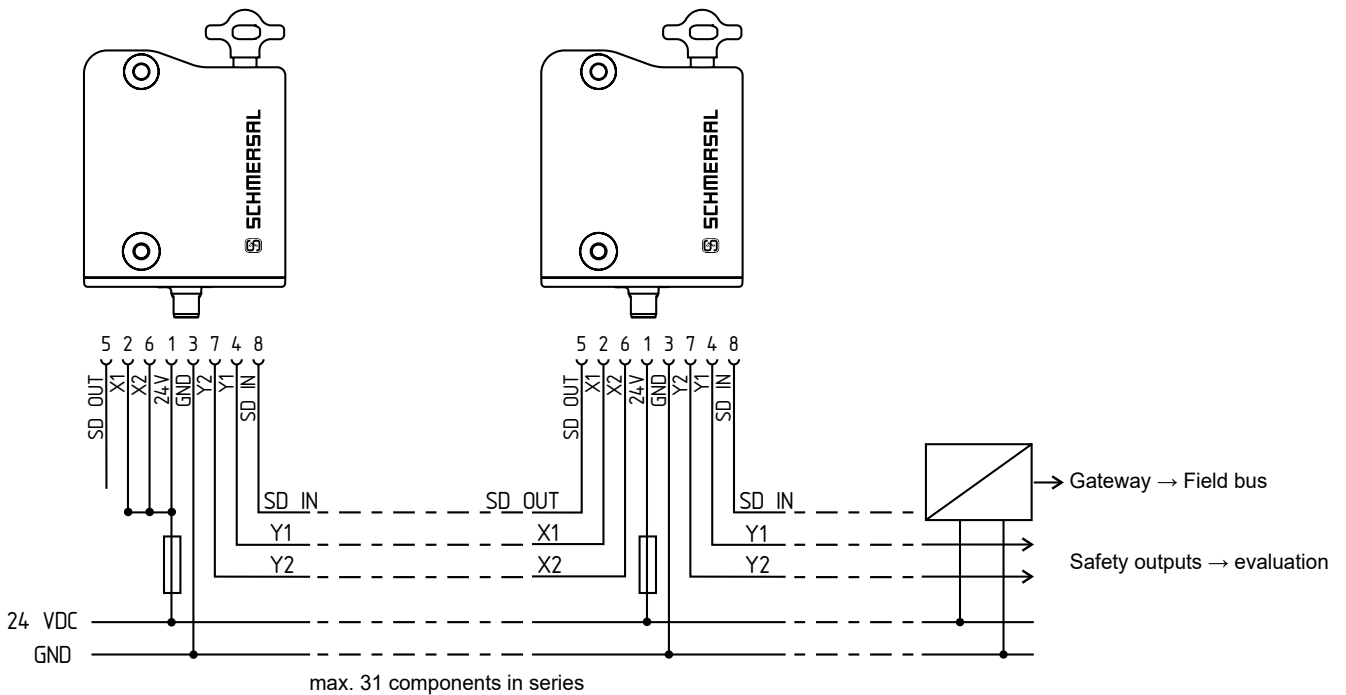
The voltage is supplied at both safety inputs of the terminal safety component of the chain (considered from the safety-monitoring module). The safety outputs of the first safety component are wired to the safety-monitoring module.



Wiring example 2: Series-wiring of the AZM300 with serial diagnostic function

The safety outputs of the first safety component are wired to the safety-monitoring module.

The serial Diagnostic Gateway is connected to the serial diagnostic input of the first safety component.



9.2 Wiring configuration and connector accessories

Function safety switchgear		Pin configuration of the connector	Colour codes of the Schmersal connectors		Poss. colour code of other commercially available connectors according to EN 60947-5-2
			IP67 / IP69 to DIN 47100	IP69K (PVC)	
	With conventional diagnostic output	With serial diagnostic function			
A1	U _e		1	WH	BN
X1	Safety input 1		2	BN	WH
A2	GND		3	GN	BU
Y1	Safety output 1		4	YE	BK
OUT	Diagnostic output	SD output	5	GY	GY
X2	Safety input 2		6	PK	VT
Y2	Safety output 2		7	BU	RD
IN	Solenoid control	SD input	8	RD	PK


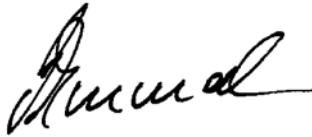
Connecting cables with coupling (female)
IP67 / IP69, M12, 8-pole – 8 x 0,25 mm²
to DIN 47100

Cable length	Ordering code
2.5 m	103011415
5.0 m	103007358
10.0 m	103007359
15.0 m	103011414

Connecting cables with coupling (female)
IP69K, M12, 8-pole – 8 x 0,21 mm²

Cable length	Ordering code
5.0 m	101210560
5.0 m, angled	101210561
10.0 m	103001389

10. EU Declaration of conformity

EU Declaration of conformity		 SCHMERSAL
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:	AZM300	
Type:	See ordering code	
Description of the component:	Interlocking device with electromagnetic interlock for safety functions	
Relevant Directives:	Machinery Directive	2006/42/EC
	RED-Directive	2014/53/EU
	RoHS-Directive	2011/65/EU
Applied standards:	IEC 60947-5-3:2013, EN ISO 14119:2013, EN 300 330 V2.1.1:2017, EN ISO 13849-1:2015, IEC 61508 parts 1-7:2010	
Notified body for the prototype test:	TÜV Rheinland Industrie Service GmbH Am Grauen Stein, 51105 Köln ID n°: 0035	
EC-prototype test certificate:	01/205.5281.03/20	
Person authorised for the compilation of the technical documentation:	Oliver Wacker Mödinghofe 30 42279 Wuppertal	
Place and date of issue:	Wuppertal, February 18, 2021	
		
	Authorised signature Philip Schmersal Managing Director	

AZM300-H-EN



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

