SCHMERSAL

Version 1

EN Operating instructions . . . . . .pages 1 to 8
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.

02.2021 / 103027863-EN / C

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

This operating instructions manual applies to the following types:

AZM150SK-①R②③④-⑤-⑥

No.	Option	Description	
①		Magnet:	Actuator:
	02 / 11	2 NC	1 NO / 1 NC
	11 / 11	1 NO / 1 NC	1 NO / 1 NC
	11 / 02	1 NO / 1 NC	2 NC
	02 / 02	2 NC	2 NC
②		Standard coded (Actuator not included in delivery)	
	I	Individually coded (incl. actuator, see ⑥)	
③		Power to unlock	
	A	Power to lock	
④		Manual release	
	T	Emergency exit	
	N	Emergency release	
⑤	024	U_s 24 VDC	
	110	U_s 110 VAC	
	230	U_s 230 VAC	
⑥		Including actuator for individually coded versions I:	
	B1	Straight actuator B1 included	
	B5	Angled actuator B5 included	
	B6L	Incl. flexible actuator B6, left	
	B6R	Incl. flexible actuator B6, right	

Standard coded actuator (not included in delivery)

AZM150-B1	Straight actuator
AZM150-B5	Angled actuator
AZM150-B6	Flexible actuator

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 solenoid interlock has been designed to prevent in conjunction with the control part of a machine, movable safety guards from being opened before hazardous conditions have been eliminated. The AZM150 solenoid interlocks with individual coding offer a higher protection against tampering and remain off when the guard system is unlocked or 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.

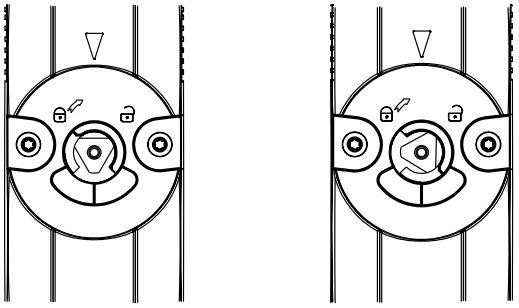
The safety switchgears are classified according to EN ISO 14119 as type 2 interlocking devices. Designs with individual coding are classified as highly coded.

Manual release

(for set-up, maintenance, etc.)
The manual release is realised by turning the triangular key, so that the locking bolt is pulled into the unlocking position. The normal locking function is only restored after the triangular key has been returned to its original position. After being put into operation, the manual release must be secured by installing the seal, which is included in delivery.

Manual release

Locked **Unlocked**



Triangular key TK-M5 (101100887) available as accessory.

Emergency release (ordering suffix -N)

(Fitting only from outside the hazardous area)

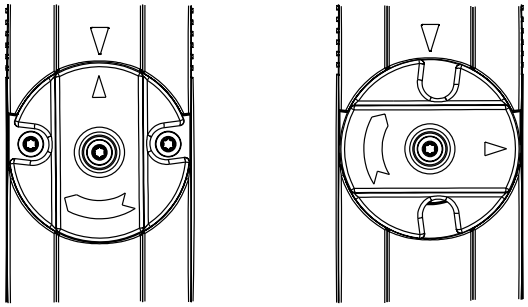
The emergency release should only be used in an emergency. The solenoid interlock should be installed and/or protected so that an inadvertent opening of the interlock by an emergency release can be prevented.
The emergency release must be clearly labelled that it should only be used in an emergency. The label can be used that was included in the delivery.

To activate the emergency release, turn the red lever 90 in the direction of the arrow as far as it will go. In this position, the safety guard 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.

Emergency exit (Ordering suffix -T)
(Fitting and actuation only from within the hazardous area)
To activate the emergency exit of version T, turn the red lever 90 in the direction of the arrow as far as it will go. In this position, the safety guard can be opened. The blocked position is cancelled by turning the lever in the opposite direction. In unlocked position, the safety guard is protected against unintentional closing.

Emergency release / Emergency exit

Locked **Unlocked**



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:	EN 60947-5-1, EN ISO 14119
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Actuator and locking bolt:	stainless steel 1.4301
Contact material:	Silver
Coding level according to EN ISO 14119:	
- Standard coding version:	low
- Individual coding version:	high
Degree of protection:	IP65, IP67
Insulation protection class:	II, ⧈
Overvoltage category:	II
Degree of pollution:	2
Contact type:	Change-over contact with double break type Zb, with galvanically separated contact bridges
Switching system:	⊖ acc. EN 60947-5-1 slow action, NC contact with positive break
Positive break travel (unlocked):	5 mm
Positive break force (unlocked):	10 N for each NC contact fitted
Connection:	screw terminals
Cable type:	flexible
Max. cable section:	0.25 mm² … 1.5 mm² (incl. conductor ferrules without plastic collar)
Cable entry:	3x M20
Holding force F_{max}:	1,950 N
Holding force F_{Zh}:	1,500 N
Latching force:	50 N
Actuating speed:	0.3 m/s
Actuating frequency:	max. 1,000 operations/h
Mechanical life:	> 500,000 operations
Ambient temperature:	–25 °C … +55 °C
Storage temperature:	–40 °C … +85 °C
Relative humidity:	max. 93 %, no condensation, no icing

Electrical data:

Utilisation category:	AC-15, DC-13
- Rated operating current/voltage I_e/U_e:	4 A / 230 VAC 4 A / 24 VDC
Rated impulse withstand voltage U_{imp}:	4 kV
Rated insulation voltage U_i:	300 V
Thermal test current I_{the}:	5 A
Max. fuse rating:	6 A gG
Required rated short-circuit current:	1,000 A
Rated control voltage U_s:	24 VDC 110 VAC 230 VAC

Electrical data – Magnet control:

Magnet switch-on time:	100%
Power consumption:	max. 8.5 W
Accepted test pulse duration on input signal:	≤ 5.0 ms
- With test pulse interval of:	≥ 50 ms

2.5 Safety classification of the interlocking function

Standards:	EN ISO 13849-1
Envisaged structure:	
- Basically:	applicable up to Cat. 1 / PL c
- With 2-channel usage and fault exclusion mechanism*:	applicable up to Cat. 3 / PL d with suitable logic unit
B_{10D} NC contact:	1,000,000
B_{10D} NO contact at 10% ohmic contact load:	500,000
Mission time:	20 years

* If a fault exclusion to the 1-channel mechanics is authorised.

$$MTTF_D = \frac{B_{10D}}{0{,}1 \times n_{op}} \qquad n_{op} = \frac{d_{op} \times h_{op} \times 3600\ s/h}{t_{cycle}}$$

(Determined values can vary depending on the application-specific parameters h_{op}, d_{op} and t_{cycle} as well as the load.)

If multiple safety components are wired in series, the Performance Level to EN ISO 13849-1 will be reduced due to the restricted error detection under certain circumstances.

2.6 Safety classification of the guard locking function

If the device is used as an interlock for personal safety, a safety classification of the guard locking function is required.

When classifying the interlock function, a distinction must be made between monitoring of the interlock function (locking function) and controlling the unlocking function.

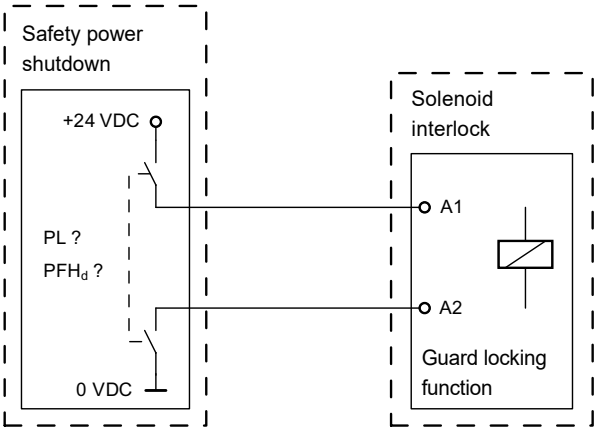
The following safety classification of the unlocking function is based on the application of the principle of safety energy disconnection for the solenoid supply

The classification of the release function is only valid for devices with monitored guard locking function and in the power to unlock version (see ordering code).

A fault exclusion for the guard locking function can be assumed by an external safety energy disconnection.

In this case, the guard locking function does not have an effect on the failure probability of the unlock function.

The safety level of the unlock function is determined exclusively by the external safety power shutdown.



Fault exclusion with regard to wiring routing must be observed.

If for a certain application the power to unlock version of a solenoid interlock cannot be used, 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.

3. Mounting

3.1 General mounting instructions

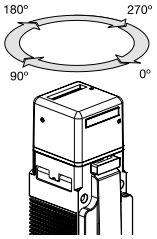
Please observe the remarks of the standards EN ISO 12100, EN ISO 14119 and EN ISO 14120.

4 M5 holes are provided for mounting the enclosure. The solenoid interlock is double insulated. The use of an earth wire is not authorised. The solenoid interlock must not be used as an 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. Unused actuator openings must be sealed with slot sealing plugs.

Detailed information on actuators with standard coding (not included in delivery) AZM150-B1, AZM150-B5 and AZM150-B6 and their mounting can be found in the actuator operating instructions.

The insertion funnel on the head of the interlock allows insertion of a flexible actuator with an axial offset of ≤ ±1 and a height offset of ≤ ±1. The actuator must be inserted into the actuator head easily. For doors that do not ensure this is possible, a door catch must be installed to prevent damage to the device.

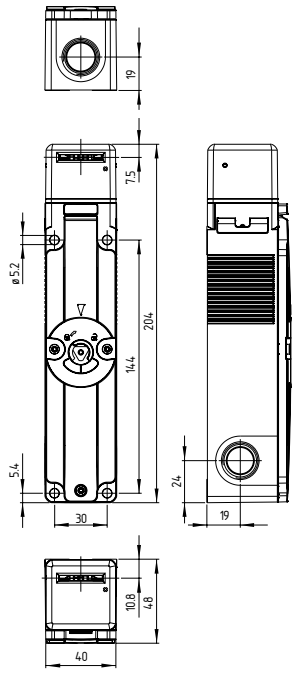
Choosing the actuating planes
Offsetting the actuating head enables actuation of 8 levels. This requires the (captive) cover screws to be undone and the cover to be removed. After rotating the actuating head in the corresponding direction, engage the cover again and tighten the covers screws to 0.5 Nm.



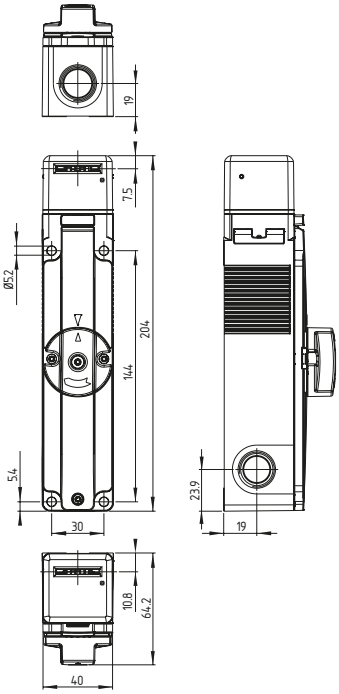
When used in ambient temperatures > 40°C, the solenoid interlock must be protected against contact with inflammable materials or inadvertent personal contact.

3.2 Dimensions
All measurements in mm.

AZM150

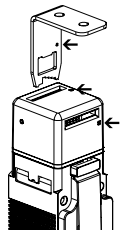


AZM150
with emergency lever -N or -T.



3.3 Mounting of individually coded actuators

The marks on the used actuator opening of the solenoid interlock and on the actuator must be opposite.



In the as-delivery condition, the actuator of the individually coded safety switch AZM150 -... I is inserted in the upper actuator inlet.

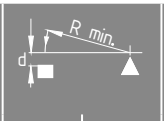
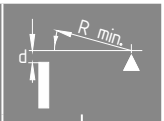
On delivery, the actuator is in inserted condition. For power-to-unlock components, the actuator must be released by means of the manual release. If the triangular key is turned 90°, the locking bolt is pulled into the unlocking position. The normal locking function is only restored after the triangular key has been returned to its original position.

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).

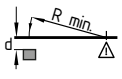
Please observe that, when fixing the switch e.g. by means of rivetting or welding, the insertion depth of the actuator is not modified. There are different actuator types available.

The actuators AZM150-B1 and AZM150-B5 are preferably used for sliding and removable safety guards. For hinged guards, the AZM150-B6L or AZM150-B6R actuator.

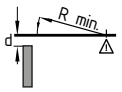
When the switch is fitted on a hinged safety guard, please ensure that the point of rotation is located within the range of the upper surface of the safety switch, in which the actuator hook is inserted (refer to table).

Actuating radii					
		R_{min} [mm]	d [mm]	R_{min} [mm]	d [mm]
	AZM150-B6L	250	18.5	250	23
	AZM150-B6R	250	18.5	250	23
	AZM150-B1				
	AZM150-B5				

Key



Actuator radii, when the actuator is pivoted in from the front

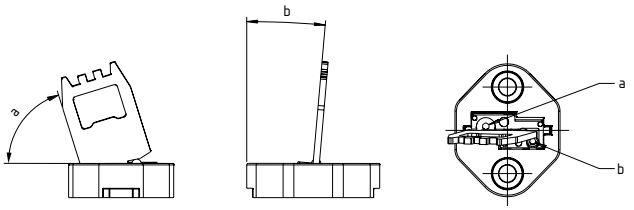


Actuator radii, when the actuator is pivoted in from above

The axis of the hinge must be d mm above and in a parallel plane to the top surface of the safety switch. The basis setting provides a minimum radius of R_{min}.

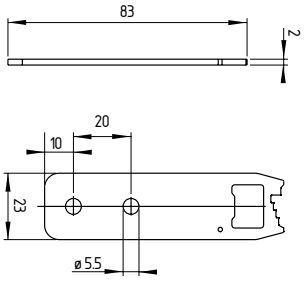
Setting screw

The AZM150-B6L or AZM150-B6R actuator is set to the smallest radius in factory. To increase the radius, the setting screws a + b must be turned by means of a hexagonal key A/F 2 mm.

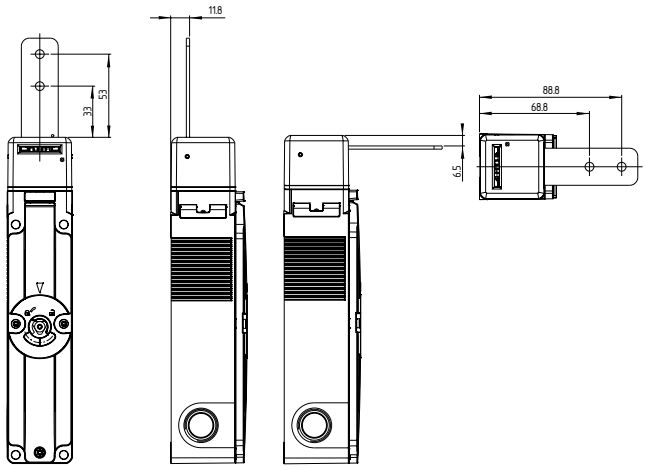


Strength of the actuator screws 5.6.

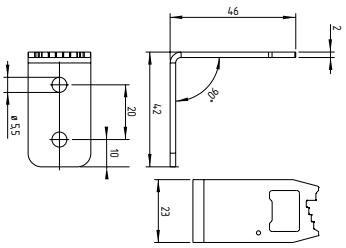
Actuator AZM150-B1



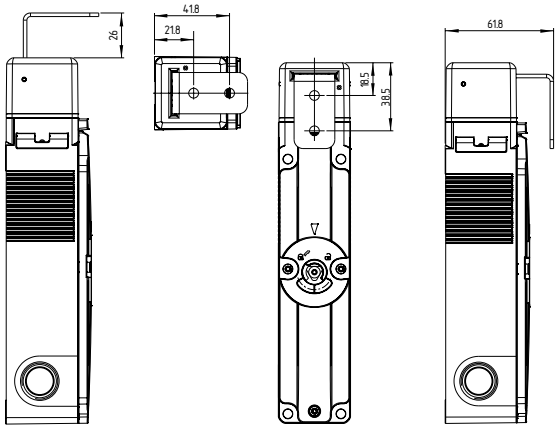
Installation position with actuator inserted
(all measurements ± 0.3 mm)



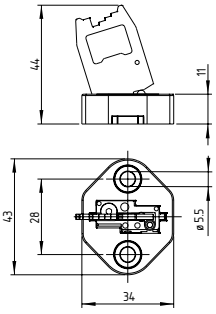
Actuator AZM150-B5



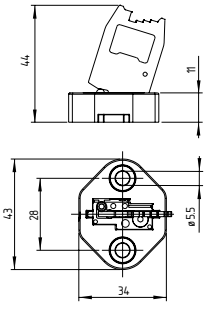
Installation position with actuator inserted
(all measurements ± 0.3 mm)



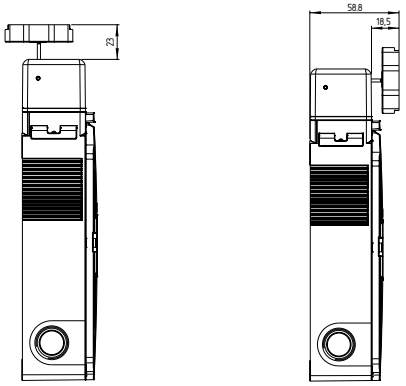
Actuator AZM150-B6L



Actuator AZM150-B6R



Installation position with actuator inserted
(all measurements ± 0.3 mm)



3.4 Accessories

	Designation / description	Ordering code
Triangular key	TK-M5	101100887
Lockout tag	SZ150-1	153027887
Cable gland	M20 x 1,5	on request
Tamperproof screws	M5 x 15, 2 (incl. washers)	on request

4. Electrical connection

4.1 General information for electrical connection

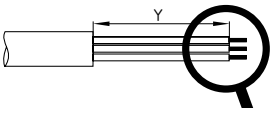
The electrical connection may only be carried out by authorised personnel in a de-energised condition.

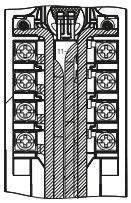
If the risk analysis indicates the use of a monitored interlock they are to be connected in the safety circuit with the contacts indicated with the symbol ⊥.

Appropriate cable glands with a suitable degree of protection are to be used. The desired insertion opening should be opened with a suitable tool. After wiring, the wiring compartment must be cleaned (i.e. remove excess cables etc.).

Max. cable section: 0.25 … 1.5 mm²
(incl. conductor ferrules without plastic collar)

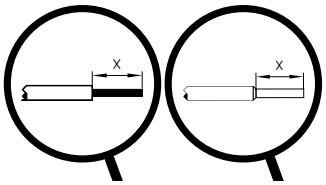
Removal of cable sheathing





A1	A2
1.	y = 67 mm
2.	y = 57 mm
3.	y = 47 mm
4.	y = 37 mm

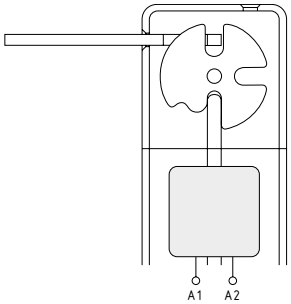
Settle length x of the conductor: 6 mm



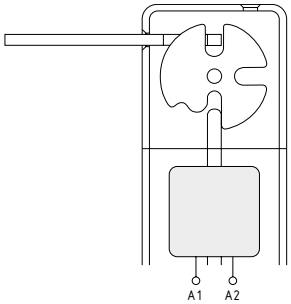
4.2 Contact variants

Contacts shown in a de-energised condition and with the actuator inserted.

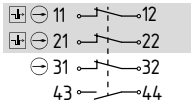
Power to unlock
Guard system closed
and interlocked



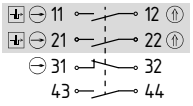
Power to lock
Guard system closed
and not interlocked



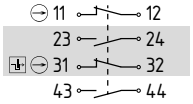
AZM150...-02/11



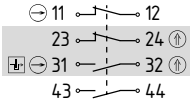
AZM150...-02/11...A



AZM150...-11/11



AZM150...-11/11...A



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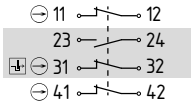

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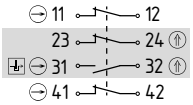

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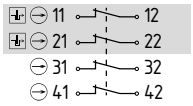

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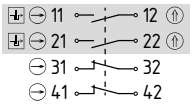
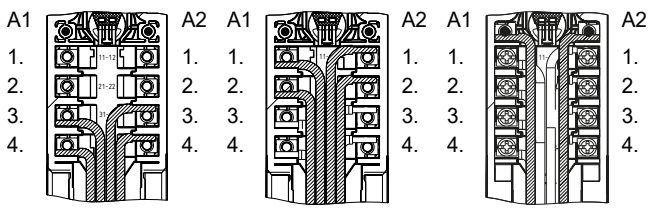


Key

- Magnetic contact
- Positive break NC contact
- Monitoring the interlock according to EN ISO 14119
- Actuated

4.3 Wiring examples

When routing the cables, account for an offset of the terminals at the left and right terminal screws.
Route the cables neatly next to or above the other cables.



5. Set-up and maintenance

5.1 Functional testing

The safety function of the safety components must be tested. The following conditions must be previously checked and met:
1. Fitting of the solenoid interlock and the actuator
2. Check the integrity of the cable entry and connections
3. Check the switch enclosure for damage

5.2 Maintenance

A regular visual inspection and functional test, including the following steps, is recommended:
1. Check for tight installation of the actuator and the switch
2. Remove particles of dust and soiling
3. Check cable entry and connections

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.

6. Disassembly and disposal

6.1 Disassembly

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

6.2 Disposal

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

7. EU Declaration of conformity

EU Declaration of conformity

SCHMERSAL China

Original

SCHMERSAL
Industrial Switchgear (Shanghai) Co., Ltd.
Cao Ying Road 3336
201712 Shanghai / Qingpu
P.R.CHINA
http://www.schmersal.com.cn

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: AZM150

Type: See ordering code

Description of the component: Interlocking device with electromagnetic interlock for safety functions

Relevant Directives:

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

Applied standards:
EN 60947-5-1:2017
EN ISO 14119:2013

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Place and date of issue: Shanghai, February 1, 2021

Authorised signature
Uwe Seeger
Managing Director

AZM150-B-EN

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

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