



**EN** Operating instructions. . . . . pages 1 to 14  
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 indicates 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 Schmersal range of products is not intended for private consumers.

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](http://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.

### 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:

#### Solenoid interlock

AZM201Z-CC-...-2719(-1)  
AZM201Z-CC-...-2784

#### Actuator unit (with emergency exit)

AZ/AZM201-B30-...(P.)2719(-1)  
AZ/AZM201-B30-...(P.)-2719(-1)  
AZ/AZM201-B30-...(P.)-2784



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 and use

The AZM201 with non-contact electronic safety sensors is designed for application in safety circuits and is used for monitoring the position of movable safety guards.



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

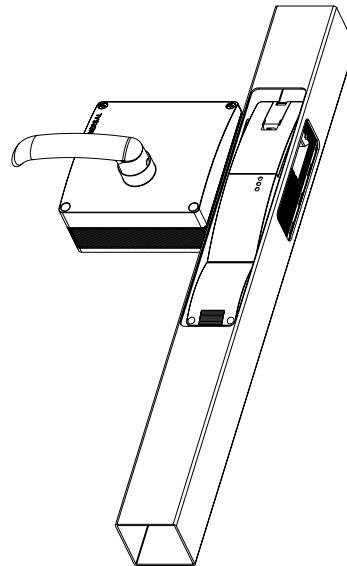
The safety function consists of safely switching off the safety outputs when the safety guard is opened and maintaining the safe switched off condition of the safety outputs for as long as the safety guard is open.



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.

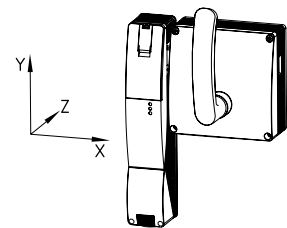
In conjunction with the solenoid interlock, the actuator unit is suitable for fitting inside the hollow profiles of hinged and sliding safety guards. The safety guard can be opened and closed from outside by turning the door-handle.

The actuator is pulled into the actuator unit by a spring. The actuator unit with emergency exit is used to open the safety guard inside the hazardous area. By actuating the emergency exit, the safety guard can be opened from within the hazardous area without the need for unlocking the solenoid interlock. The safety guard cannot be locked from inside.



#### Actuator unit play

X = ± 1.5 mm  
Y = ± 5.0 mm  
Z = ± 1.0 mm



#### Series-wiring

Series-wiring can be set up. In the case of a series connection, the risk time remains unchanged and the reaction time increases by the sum of the reaction time of the inputs per additional unit specified in the technical data. The quantity of devices is only limited by the cable drops and the external cable fuse protection, according to the technical data.



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.

#### 2.4 Technical data

Standards:	EN 60947-5-3, ISO 14119, EN ISO 13849-1, EN 61508
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Active principle:	RFID
Frequency band:	125 kHz
Transmitter output:	max. -6 dBm
Coding level according to 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:	< 4 s
Series-wiring:	Unlimited number of components, please observe external cable protection
Cable length:	max. 200 m (Cable length and cable section alter the voltage drop depending on the output current)

**Mechanical data:**

Holding force $F_{max}$ :	2,600 N
Holding force $F_{Zh}$ :	2,000 N
Latching force:	30 N
Termination:	Cage clamps
Cable entry:	M20
Cable type:	rigid single-wire, rigid multi-wire or flexible
Cable section:	0.25 mm <sup>2</sup> ... 1.5 mm <sup>2</sup> (including conductor ferrules)
Tightening torque for the cover screws:	0.7 ... 1 Nm (Torx T10)
Actuating speed:	≤ 0.2 m/s
Mechanical life:	≥ 1,000,000 operations

**Switching distances to EN 60947-5-3**

Assured switching distance $s_{ao}$ :	4 mm
Assured switch-off distance $s_{ar}$ :	30 mm
Hysteresis:	≤ 1.5 mm
Repeat accuracy:	< 0.5 mm
Switching frequency:	≤ 1 Hz

**Ambient conditions:**

Ambient temperature:	-25 °C ... +60 °C
Storage and transport temperature:	-25 °C ... +85 °C
Relative humidity:	max. 93 %, non condensing, non icing

Degree of protection:	IP66, IP67 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 EN 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:	≤ 1 Hz

**Electrical data:**

Operating voltage $U_e$ :	24 VDC -15% / +10% (stabilised PELV power supply)
No-load supply current $I_0$ :	≤ 0.05 A
Operating current device with magnet switched on:	
- Averaged:	< 0.2 A
- Peak current:	< 0.7 A / 100 ms
Required rated short-circuit current:	100 A
External cable and device fuse rating:	
- cage clamps:	4 A gG when used in accordance with UL 508

**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:	typically 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
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**Electrical data - Safety outputs:**

Safety outputs:	Y1 and Y2
Switching elements:	OSSD, p-type, short-circuit proof
Utilisation category:	DC-13
- Rated operating voltage $U_e$ :	24 VDC
- Rated operating current $I_e$ :	each max. 0.25 A
Leakage current $I_l$ :	≤ 0.5 mA
Voltage drop $U_d$ :	≤ 2 V
Cross-wire monitoring by device:	Yes
Test pulse duration:	< 0.5 ms
Test pulse interval:	1,000 ms
Classification:	ZVEI CB24I

Source:	C2	Sink:	C1	C2	
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**Electrical data - Diagnostic output:**

Diagnostic output:	OUT
Switching element:	p-type, short-circuit proof
Utilisation category:	DC-13
- Rated operating voltage $U_e$ :	24 VDC
- Rated operating current $I_e$ :	max. 0.05 A
Voltage drop $U_d$ :	≤ 4 V

**Electrical data - Magnet control:**

Solenoid input:	IN
Switching thresholds:	-3 V ... 5 V (Low) 15 V ... 30 V (High)
Current consumption per input:	typical 10 mA / 24 V, dynamic 20 mA

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
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**LED switching conditions display:**

green LED:	Supply voltage
yellow LED:	Device condition
red LED:	Fault



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



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.



Este equipamento nao tem direito à proteção contra interferência prejudicial e nao pode causar interferencia em sistemas devidamente autorizados. Para maiores informacoes consultar: [www.gov.br/anatel](http://www.gov.br/anatel)

**2.5 Safety classification**

**- of the interlocking function:**

Standards:	EN ISO 13849-1, EN 61508
PL:	up to e
Category:	4
PFH:	1.9 x 10 <sup>-9</sup> / h
PFD:	1.6 x 10 <sup>-4</sup>
SIL:	suitable for SIL 3 applications
Mission time:	20 years

**- of the guard locking function:**

Standards:	EN ISO 13849-1, EN 61508
PL:	up to d
Category:	2
PFH:	1.0 x 10 <sup>-8</sup> / h
PFD:	8.9 x 10 <sup>-4</sup>
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 AZM201Z-...-1P2PW-... (see Ordering code).



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.



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.



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.

### 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 solenoid interlock, two mounting holes for M6 screws with washers (washers included in delivery) are provided. 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. The unused actuator opening must be sealed by means of the dust-proof flap (included in delivery).



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).



Suitable measures to prevent that the hazardous spot is reached through the door opening must be implemented.

#### 3.2 Mounting set-up

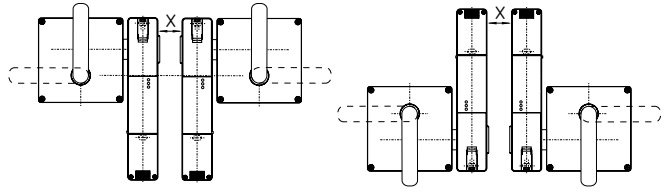


The installation may only be carried out by authorised personnel.

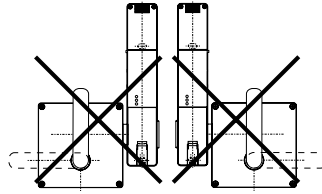
Minimum distance X between two devices: 100 mm

For ergonomic reasons, a vertical handle position is recommended when closed.

#### Admissible mounting set-up



#### Inadmissible mounting set-up



#### 3.3 Manual release

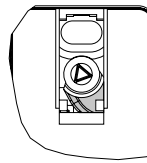
For the machine set-up, the solenoid interlock can be unlocked in de-energised condition. After opening of the plastic flap "A" (refer to image "Dimensions"), the triangular key must be turned clockwise to bring the blocking bolt in unlocking condition. The normal locking function is only restored after the triangular key has been returned to its original position.



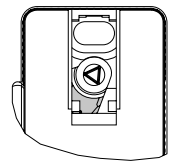
Caution: do not turn beyond the latching point, maximum tightening torque: 1.3 Nm.

After being put into operation, the manual release must be secured by closing the plastic flap "A" and affixing the seal, which is included in delivery.

**Component ready for operation**

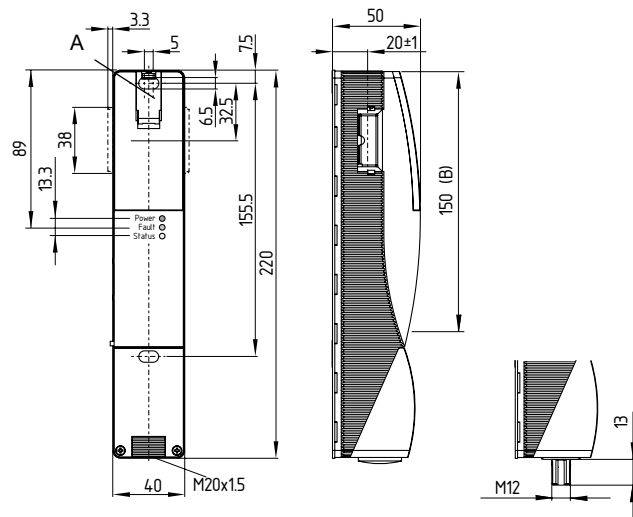


**Component not ready for operation**



#### 3.4 Dimensions

All measurements in mm.



#### Key

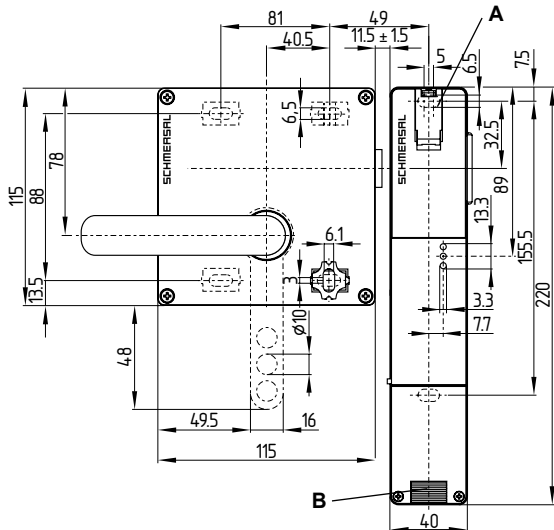
A: Manual release

B: Active RFID area



Metal parts and magnetic fields in the lateral RFID area of the solenoid interlock and the actuator can influence the switching distance or lead to malfunctions.

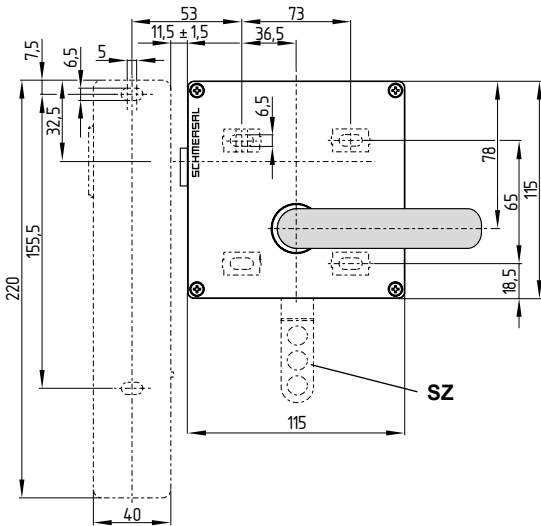
AZM201 with actuator unit



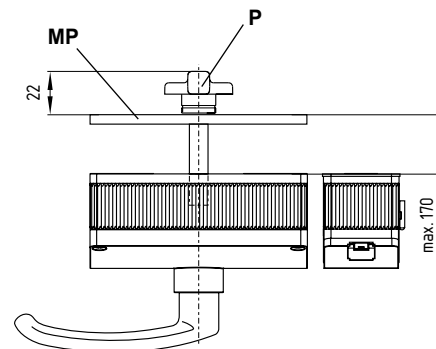
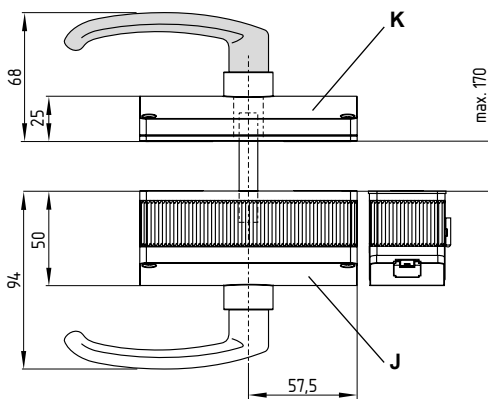
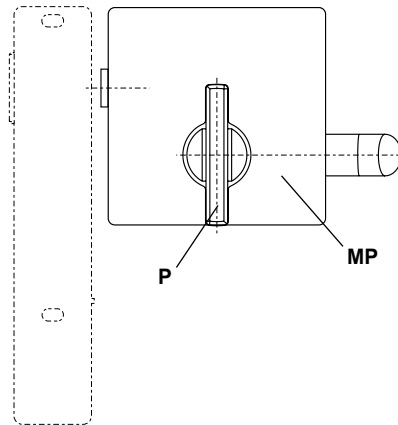
Key

- A = Manual release behind cover
- B = Cable entry M20 x 1.5
- J = Actuator unit G1
- K = Emergency exit P1
- P = Emergency exit P2719-1 or P26-2784
- MP = Mounting plate (not included in delivery)
- SZ = Lockout tag

Emergency exit P1



Emergency exit P2719-1 or P26-2784



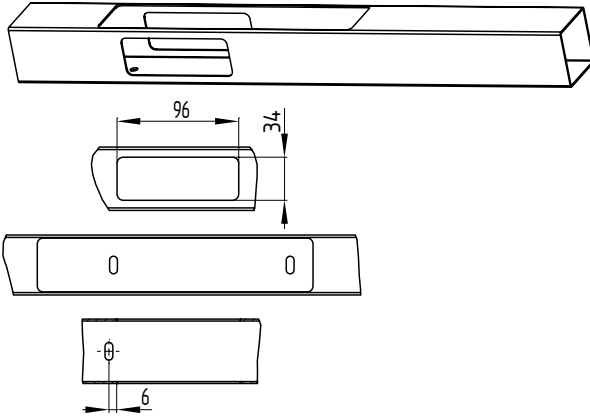
### 3.5 Fitting of solenoid interlock and actuator unit

#### Step 1

- Cut-out for 50 x 50 mm hollow profile
- Install and fix solenoid interlock in hollow profile

**To be observed:**

- Material for hollow profile: S235JR
- Contact surface for the fixation of the solenoid interlock level with the edge of the hollow profile
- For the observance of the tolerance between the actuator and the component enclosure, the hollow profile must be provided with 7 mm longitudinal holes.
- Distance between the top mounting hole (M6) for the solenoid interlock and the front of the lateral cut-out: 6 mm

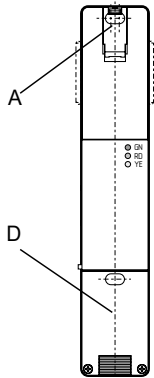


#### Step 2

- To free mounting holes unscrew the cover **C** for the wiring compartment and open flap **A** for the manual release.

**To be observed:**

- Actuation of manual release (beneath flap) with triangular key (included in delivery)

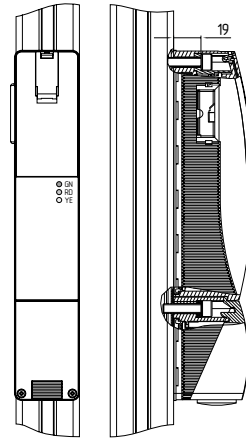


#### Step 3

- Fit the AZM enclosure in the hollow profile flush with the doorpost.

**To be observed:**

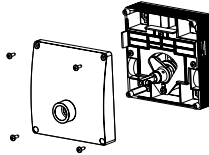
- Screws M6
- Max. torque for solenoid interlock = 8 Nm, cover screw = 0.7...1 Nm (Torx T10)
- Wall thickness of the device 19 mm
- Washers ISO 7089 - 6 (included in delivery)
- For applications with strong vibrations, please observe a proper securing of the screws



Mounting tolerance  
- horizontal:  $\pm 2.5$  mm

#### Step 4

- Unscrew the cover of the actuator unit

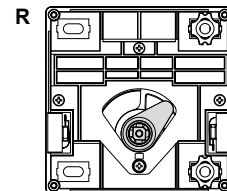
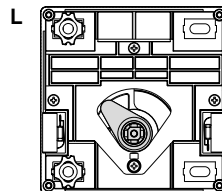


#### Step 5

- Insert sliding blocks as shown (included in delivery)

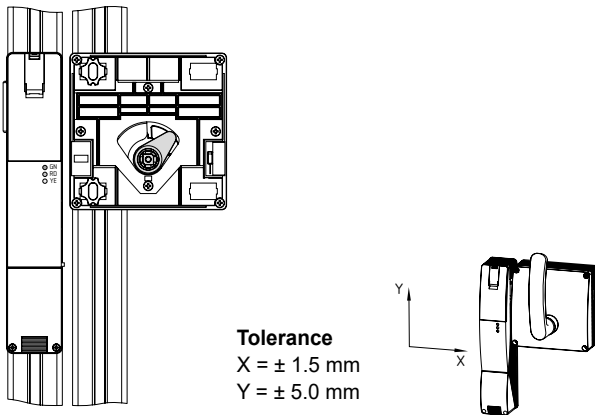
**To be observed:**

- Observe the alignment (notch) of the sliding blocks  
L = for left hinged door  
R = for right hinged door



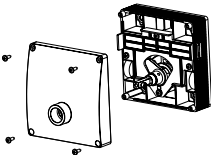
**Step 6**

- Fit the actuator unit to the doorpost.
- To be observed:**
- Actuator unit completely retracted
- Distance between solenoid interlock and actuator unit  $11.5 \pm 1.5$  mm
- Screws M6
- Torque = 8 Nm
- Wall thickness of the device 8 mm
- Washers ISO 7089 - 6 (included in delivery)
- For applications with strong vibrations, please observe a proper securing of the screws



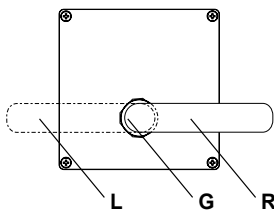
**Step 7**

- Mount the cover on the actuator unit
- To be observed:**
- Actuator unit completely retracted



**Step 8**

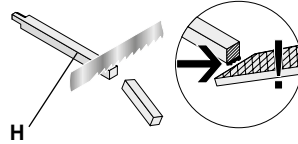
- Fit the door-handle
- To be observed:**
- Door-handle horizontal
- L = for left hinged door
- R = for right hinged door
- G = Hexagonal screw SW 3 with screw lock (included in delivery)
- When fitted without emergency exit, proceed with step 16



Handle position horizontal when open.

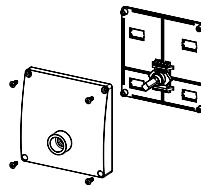
**Step 9 - Mounting emergency exit**

- If an emergency exit is available, cut square tube H at length
- Deburr the cut sides
- To be observed**
- Through-hole for square tube H  $\varnothing 16$  mm
- The square tube must be entered  $12^2$  mm in the actuator enclosure
- When fitted with emergency exit P2719-1 or P26-2784, proceed with step 15



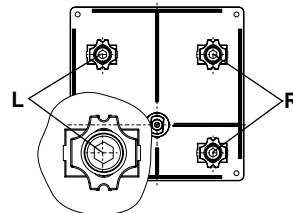
**Step 10 - Mounting emergency exit P1**

- Unscrew the cover of the emergency exit



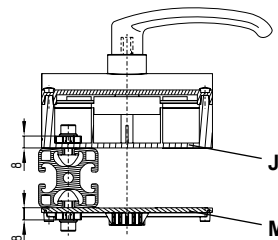
**Step 11 - Mounting emergency exit P1**

- Insert sliding blocks as shown (included in delivery)
- To be observed**
- Observe the alignment (notch) of the sliding blocks
- L = for left hinged door
- R = for right hinged door



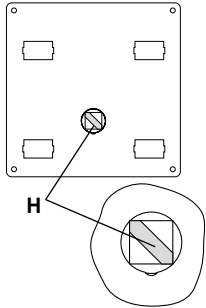
**Step 12 - Mounting emergency exit P1**

- Fit the bottom plate of the emergency exit P1 (M) to the door
- To be observed**
- Actuator completely inserted into the actuator unit J
- Bottom plate M parallel to actuator unit J
- Screws M6
- Torque = 8 Nm
- Wall thickness of the device 8 mm
- Washers ISO 7089 - 6 (included in delivery)
- For applications with strong vibrations, please observe a proper securing of the screws



### Step 13 - Mounting emergency exit P1

- Insert square tube **H** in the rear-side of the actuator unit (position of the chamfer as shown, when actuator unit **G1** is actuated)
- To be observed**
- Insert chamfer of the square into the emergency exit or the cut off side of the square into the actuator unit



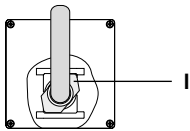
### Step 14 - Mounting emergency exit P1

- Fit the cover and the handle onto the emergency exit **P1**
- To be observed**
- Position of the driving shaft **I** as shown, when actuator unit **G1** is actuated
  - Functional test of the emergency exit handle:

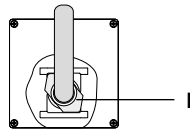
it should be possible to open the safety guard inside the hazardous area; it should not be possible to lock the safety guard from inside. The emergency exit handle must be in upright position when closed.

- After the assembly of the emergency exit **P1**, proceed with step 16

#### For left hinged door



#### For right hinged door



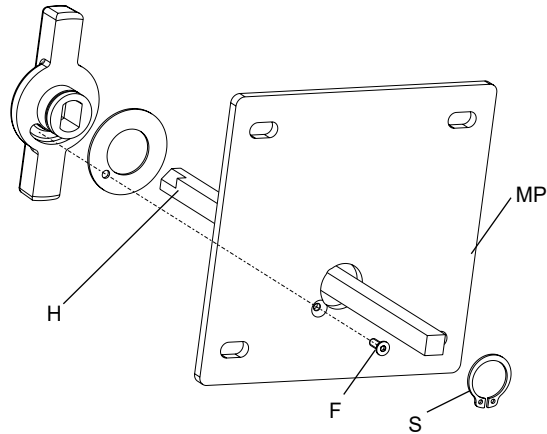
### Step 15 - Mounting emergency exit P2719(-1) or P26-2784

- Insert square rod **H** in the rear of the actuator unit
- Screw the countersunk bolt **F** in the mounting plate **MP** (not included in delivery) or restrict the rotating angle of the emergency exit to 90° by suitable measures
- Insert the emergency exit handle onto the socket of the square rod, tighten and secure with locking ring **S**

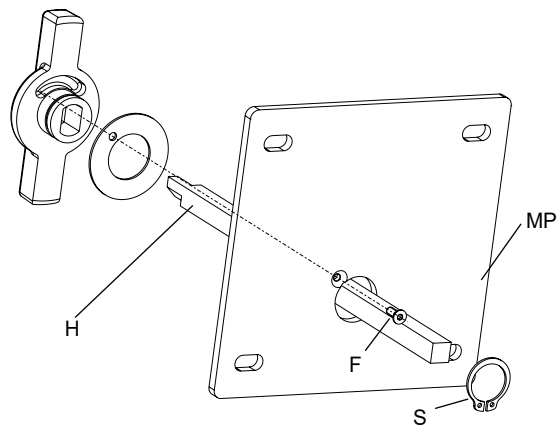
**To be observed:**

- Please observe the position of the emergency exit handle and the socket of the square rod (the image shows the actuator in inserted condition)
- For applications with strong vibrations, please observe a proper securing of the screws
- Functional test of the emergency exit handle: 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. The emergency exit handle must be in upright position when closed.

#### For left hinged door



#### For right hinged door

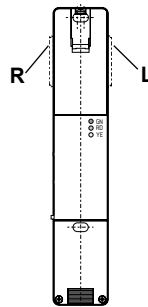


### Step 16

- Clip the dust-proof flap in the unused side

**To be observed:**

- L** = for left hinged door
- R** = for right hinged door

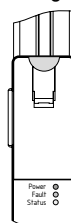


### Step 17

- Seal the cover of the manual release **A**

**To be observed:**

- After being put into operation, the manual release must be secured by installing the seal, which is included in delivery.



#### 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 power supply for the solenoid interlock must provide protection against permanent overvoltage. To that effect, stabilised PELV supply units must be used. The required electrical cable and device fuse protection must be integrated in the installation.

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

For applications up to PL e / category 4 in accordance with EN ISO 13849-1, the safety outputs of the safety switch must have an assessment with the same category (refer to wiring examples).

Inductive loads (e.g. contactors, relays, etc.) are to be provided with suitable interference suppression circuitry.

##### Requirements for the connected safety-monitoring module:

- Dual-channel safety input, suitable for 2 p-type semi-conductor outputs



##### Configuration of the safety controller

If the safety switchgear is connected to electronic safety-monitoring modules, we recommend that you set a discrepancy time of 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.

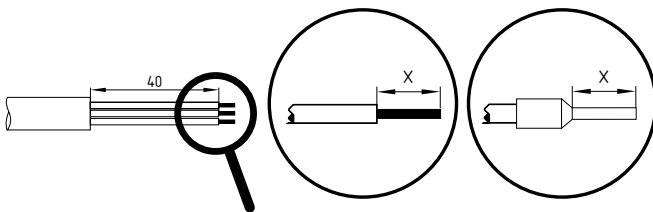


Information for the selection of suitable safety-monitoring modules can be found in the Schmersal catalogues or in the online catalogue on the Internet: [products.schmersal.com](http://products.schmersal.com).

##### 4.2 Cable

The cable entry is realised by a metric M20 gland. This gland must be dimensioned by the user so that it is suitable for the cable used. A cable gland with strain relief and suitable IP protection class must be used.

Settle length  $x$  of the conductor: 7.5 mm



#### 5. Operating principle and actuator coding

##### 5.1 Magnet control

In the power to unlock version of the AZM201, the solenoid interlock is unlocked when the IN signal (= 24V) is set.

In the power to lock version of the AZM201, 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 AZM201 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 AZM201 solenoid interlock; in that case, the safety outputs are re-enabled.

**The safety guard must not be opened.**

##### 5.3 Actuator teaching / actuator detection

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 (5 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 executed allocation of safety interlock 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.

## 6. Diagnostic functions

### 6.1 Diagnostic-LEDs

The solenoid interlock signals the operational state as well as errors through three coloured LED's installed on the front side of the device.

<b>green</b> (Power)	Supply voltage on
<b>yellow</b> (Status)	Switching condition
<b>red</b> (Fault)	Error (see table: Error messages / flash codes red diagnostic LED)

### 6.2 Operating principle of the electronic diagnostic output

The short-circuit proof diagnostic output can be used for central visualisation or control functions, 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.

After fault rectification, the sensor can be reset by opening and relocking the relevant guard door. The safety outputs enable and allow a restart. An interlocking chain must be permanently "locked" to enable the reactivation.



Automatic, electronic locking takes place if more than one fault is detected at the safety outputs or a cross circuit is detected between Y1 and Y2. This means that normal fault acknowledgement is no longer possible. To reset this type of interlock, the solenoid interlock must be isolated from the supply voltage after elimination of the error causes.

#### Error warning

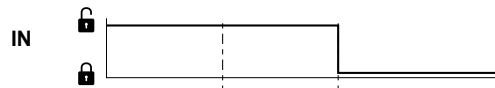
Any error that does not immediately affect the safe functionality of the solenoid interlock (e.g. excess ambient temperature, safety output to external potential, short circuit) will lead to a delayed shut-down (refer to table 1).

A fault has occurred, which causes the safety outputs to be disabled after 30 minutes. 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.

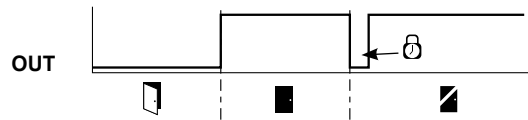
If the fault warning remains on for 30 minutes, the safety outputs are also switched off (red LED flashes, see Table 2).

### Behaviour of the diagnostic outputs of the W variant (Example: power to unlock version)

#### Input signal magnet control



#### Normal sequence, door was locked



#### Door could not be locked or fault

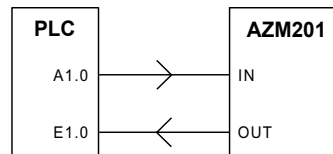


#### Key

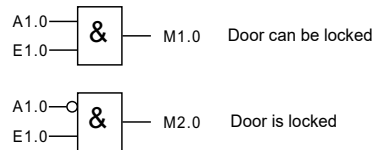
Lock	Unlock
Safety guard open	Safety guard closed
Safety guard not locked or fault	Safety guard locked

Locking time: 150 ... 250 ms, typically 200 ms

### Evaluation of the diagnostic outputs of the W variant



Power to unlock: IN = 0 = locking



Power to lock: IN = 1 = locking

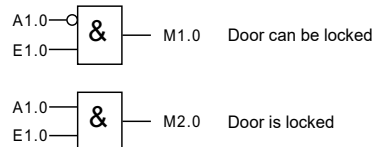


Table 1: the diagnostic function of the AZM201 solenoid interlock

System condition	Solenoid control IN		LED			Safety outputs Y1, Y2 AZM201Z	Diagnostic output OUT -1P2PW
	Power to unlock	Power to lock	green	red	yellow		
Door open	24 V (0 V)	0 V (24 V)	On	Off	Off	0 V	0 V
Door closed, <b>actuator not inserted</b>	24 V	0 V	On	Off	Off	0 V	0 V
Door closed, actuator inserted, <b>not locked</b>	24 V	0 V	On	Off	Flashes	0 V	24 V
Door closed, actuator inserted, <b>interlocking blocked</b>	0 V	24 V	On	Off	Flashes	0 V	0 V
Door closed, actuator inserted and locked	0 V	24 V	On	Off	On	24 V	24 V
<b>Error warning</b> <sup>1)</sup> solenoid interlock locked	0 V	24 V	On	Flashes <sup>2)</sup>	On	24 V <sup>1)</sup>	0 V
<b>Error</b>	0 V (24 V)	24 V (0 V)	On	Flashes <sup>2)</sup> / off <sup>1)</sup>	Off	0 V	0 V
<b>Additionally for variant I1/I2:</b>							
Teach-in procedure actuator started			Off	On	Flashes	0 V	0 V
Only I2: teach-in procedure actuator (release block)			Flashes	Off	Off	0 V	0 V

<sup>1)</sup> after 30 min: disabling due to fault

<sup>2)</sup> 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
6 flash pulses	Error actuator combination	0 min	An invalid combination of actuators was detected (blocking bolt detection or tamper attempt)
Continuous red	Internal fault / overvoltage or undervoltage fault	0 min	Device defective / supply voltage not within specifications

## 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. 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

### 7.2 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. Check max. axial misalignment of actuator and solenoid interlock.
3. Remove particles of dust and soiling
4. 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.**

## 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 example

The application examples shown are suggestions. They do not release the user from carefully checking whether the switchgear and its set-up are suitable for the individual application.

Series-wiring AZM201

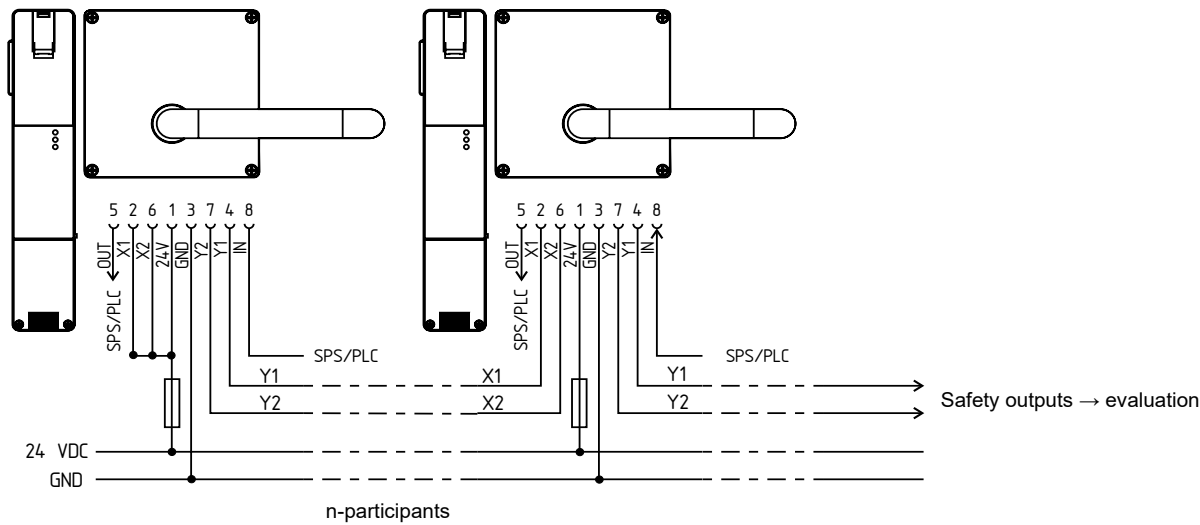
Series-wiring can be set up. In the case of a series connection, the risk time remains unchanged and the reaction time increases by the sum of the reaction time of the inputs per additional unit specified in the technical data. The quantity of devices is only limited by the cable drops and the external cable fuse protection, according to the technical data.

The series-wiring of multiple AZM201 solenoid interlocks is realised by wiring in the control cabinet or in on-site junction boxes.

In the example, 2 AZM 201 solenoid interlocks are wired in series. The diagnostic output ("OUT") and the magnet control ("IN") are separately wired to a conventional PLC for evaluation or control. The maximum cable length of the safety circuits must not exceed 200 m.

In the series-wiring, the 24V-X1-X2 bridge must be removed from all components up to the last component.

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.



9.2 Wiring configuration

24V	24V	X1	X2	IN
AZM201.-.-1P2P.				
GND		Y1	Y2	OUT

Terminal	Wiring configuration
24V	Operating voltage
X1	Safety input 1
GND	Ground
Y1	Safety output 1
OUT	Diagnostic output
X2	Safety input 2
Y2	Safety output 2
IN	Magnet control

10. Set-up and maintenance checklist



## Checklist Set-up and maintenance

### Checking of the AZM201 safety door-handle system

Under the scope of the commissioning and the regular maintenance of the machine, the following items of the safety door-handle system, consisting of the AZM201, the corresponding actuator unit and the emergency exit, must be checked and inspected by a professional:

#### 1. Fixation:

All fixing screws installed and tightened with the specified torque

#### 2. Distance:

Distance  $11.5 \pm 1.5$  mm between AZM201 and actuator unit observed.

#### 3. Emergency exit handle:

After locking, the correct closing of the door must be checked.  
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  
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.  
The emergency exit handle must be in the upright position when closed.

#### 4. Dust shield cap:

Check the tight fitting of the dust-proof cover.

#### 5. Functional testing:

The enabling signal is only transmitted to the safety circuit,  
if the actuator unit is within range of the solenoid interlock and locked.

LED	Status
green	Operating voltage
yellow	Actuator inserted and locked
flashes yellow	Actuator inserted and not locked
red	Error

#### 6. Cover for manual release:

Cover is sealed.

\_\_\_\_\_  
Date / Signature:

11. 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:** AZM201

**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

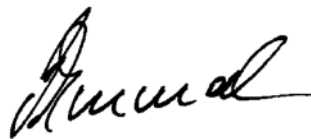
**Applied standards:** EN 60947-5-3:2013  
ISO 14119:2013  
EN 300 330 V2.1.1:2017  
EN ISO 13849-1:2015  
EN 61508 parts 1-7:2010

**Notified body for Type Examination:** TÜV Rheinland Industrie Service GmbH  
Am Grauen Stein, 51105 Köln  
ID n°: 0035

**Type Examination Certificate:** 01/205/5608.01/22

**Person authorised for the compilation of the technical documentation:** Oliver Wacker  
Möddinghofe 30  
42279 Wuppertal

**Place and date of issue:** Wuppertal, August 10, 2022



Authorised signature  
**Philip Schmersal**  
Managing Director



The currently valid declaration of conformity can be downloaded from the internet at [products.schmersal.com](http://products.schmersal.com).

