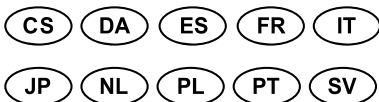




EN Operating instructions pages 1 to 5
Original



Detailed user information at products.schmersal.com.

1. About this document

This document provides all the information you need for the mounting, set-up and commissioning to ensure the safe operation and disassembly of the switchgear. The operating instructions enclosed with the device must always be kept in a legible condition and accessible.

All operations described in the 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 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.

The information contained in this operating instructions manual is provided without liability and is subject to technical modifications.

Products in Schmersal's range are not intended to be used by private end consumers.

2. Product description

2.1 Purpose

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

2.2 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. There are no residual risks, provided that the safety instructions as well as the instructions regarding mounting, commissioning, operation and maintenance are observed.

2.3 Exclusion of liability

We shall accept no liability for damages and malfunctions resulting from defective mounting or failure to comply with the 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.

2.4 Technical Data

General data

Standards	EN ISO 13849-1, EN ISO 14119, EN IEC 60947-5-3, EN IEC 61508
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Coding level according to EN ISO 14119	I1 variant: High I2 variant: High Standard coded variant: Low
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Working principle	RFID
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Frequency band RFID	125 kHz
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Transmitter output RFID, maximum	-6 dB/m
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Time to readiness, maximum	4,000 ms
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Duration of risk, maximum	200 ms
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Reaction time, switching off safety outputs via actuator, maximum	100 ms
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Reaction time, switching off safety outputs via safety inputs, maximum	1.5 ms
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Degree of protection	IP66, IP67
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Safety classification

Standards	EN ISO 13849-1, EN IEC 61508
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Safety classification - Interlocking function

Performance Level, up to	e
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Category	4
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PFH value	1.90×10^{-9} /h
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PFD value	1.60×10^{-4}
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Safety Integrity Level (SIL), suitable for applications in	3
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Mission time	20 Year(s)
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Safety classification - Guard locking function

Performance Level, up to	d
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Category	2
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PFH value	1.00×10^{-8} /h
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PFD value	8.90×10^{-4}
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Safety Integrity Level (SIL), suitable for applications in	2
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Mission time	20 Year(s)
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Mechanical data

Mechanical life, minimum	1,000,000 Operations
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Holding force F_{max} , maximum	2,600 N
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Note (clamping force F_{max})	1,300 N when used with the AZ/AZM201-B30 actuator, for indoor use.
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Holding force F_{zh} in accordance with EN ISO 14119	2,000 N
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Note (clamping force F_{zh})	1,000 N when used with the AZ/AZM201-B30 actuator, for indoor use.
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Latching force	30 N
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Type of the fixing screws	2x M6
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Tightening torque of the fastening screws for the housing cover	0.7 ... 1 Nm (Torx T10)
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Mechanical data - Connection technique

Connection type	Screw terminals, Connector M12, 8-pole, Spring pulley connection
Allowed type of cable	solid single-wire, solid multi-wire, flexible
Cable section	0.25 mm ² ... 1.5 mm ² (All indications including the conductor ferrules.)
Cable entry	1x M20
Length of sensor chain, maximum	200 m
Note (length of the sensor chain)	Cable length and cross-section change the voltage drop depending on the output current
Note (series-wiring)	Unlimited number of devices, observe external line fusing, max. 31 devices in case of serial diagnostic SD

Electrical data

Operating voltage	24 VDC -15 % / +10 %
No-load supply current I_0 , maximum	50 mA
Current consumption with magnet ON, average	200 mA
Current consumption with magnet ON, peak	700 mA / 100 ms
Required rated short-circuit current	100 A
External wire and device fuse rating	2 A gG (Connector M12, 8-pole) 4 A gG (Screw terminals) 4 A gG (Spring pulley connection)

Fuse rating to UL 508, maximum	4 A
Switching frequency, maximum	1 Hz

Electrical data - Magnet control

Designation, Magnet control	IN
Switching thresholds	-3 V ... 5 V (Low) 15 V ... 30 V (High)
Current consumption at 24V	10 mA
Test pulse duration, maximum	5 ms
Test pulse interval, minimum	40 ms

Electrical data - Safety digital inputs

Designation, Safety inputs	X1 and X2
Switching thresholds	-3 V ... 5 V (Low) 15 V ... 30 V (High)
Current consumption at 24V	5 mA
Test pulse duration, maximum	1 ms
Test pulse interval, minimum	100 ms

Electrical data - Safety digital outputs

Designation, Safety outputs	Y1 and Y2
Design of control elements	short-circuit proof, p-type
Voltage drop U_d , maximum	2 V
Leakage current I_r , maximum	0.5 mA
Utilisation category DC-13	24 VDC / 0.25 A
Test pulse duration, maximum	0.5 ms
Test pulse interval, typical	1000 ms

Electrical data - Diagnostic outputs

Designation, Diagnostic outputs	OUT
Design of control elements	short-circuit proof, p-type

Voltage drop U_d , maximum	4 V
Utilisation category DC-13	24 VDC / 0.05 A

Electrical data - Serial diagnostic SD

Designation, Serial diagnostic SD	OUT
Design of control elements	short-circuit proof, p-type
Operating current	150 mA
Wiring capacitance	50 nF

3. Mounting



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).



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.

Manual release

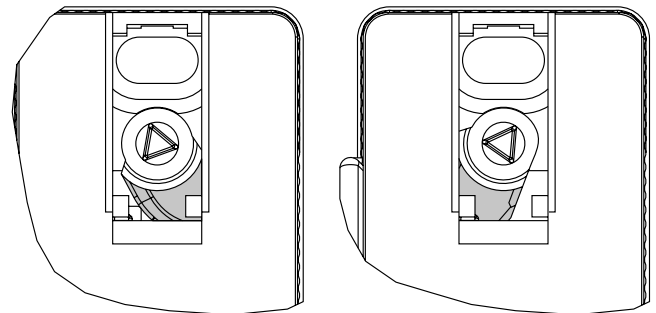
For the machine set-up, the solenoid interlock can be unlocked in a de-energised condition. After opening of the plastic cover, the triangular key must be turned clockwise to bring the blocking bolt into an unlocked condition. The normal locking function is only restored after the triangular key has 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 and affixing the seal, which is included in delivery.

Component ready for operation Component not ready for operation



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.

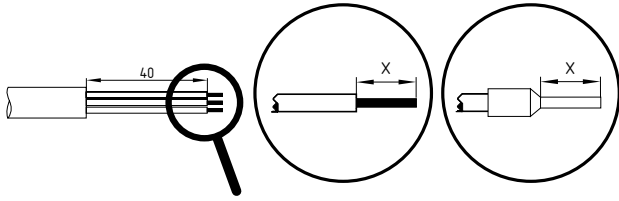
The required electrical cable fuse protection must be integrated in the installation.



The fitted 24V, X1, X2 bridge is included in the delivery of ...-1P2PW and ...-SD2P.

Settle length x of the conductor:

- on screw terminals (SK): 8 mm
- on cage clamps (CC) of type s, r or f: 7.5 mm



Tightening torque for the cover screws: 0.7 ... 1 Nm (Torx T10)

Requirements for the connected safety-monitoring module:
Dual-channel safety input, suitable for 2 p-type semi-conductor outputs

4.2 Wiring configuration

Function safety switchgear		Pin configuration of the connector ST2, M12, 8-pole	Configuration of the removable terminal blocks
	with conventional diagnostic output	with serial diagnostic function	
24V	Ue	1	1
X1	Safety input 1	2	2
GND	GND	3	5
Y1	Safety output 1	4	7
OUT	Diagnostic output	5	9
X2	Safety input 2	6	3
Y2	Safety output 2	7	8
IN	Magnet control	8	4
	without function	-	6

View Terminal block for ordering suffix -SK or -CC

24V	24V	X1	X2	IN
AZM201-...-1P2PW-				
GND		Y1	Y2	OUT

View Version with removable terminal blocks

24V	24V	X1	X2	IN
AZM201-...-SD2P-				
GND		Y1	Y2	OUT

1	2	3	4
AZM201-...-1P2PW-			
5	6	7	8

5. 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. Once the operating voltage is switched back on, the actuator must be detected once more in order to activate the actuator code that has been taught in. In this way, the activated code is definitively saved!

For ordering suffix -I1, the executed allocation of safety switch-gear 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. Active principle and diagnostic functions

6.1 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 (= 24V) is set.

6.2 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.

It is not necessary to open the safety guard.

In the B-variant AZM201B, the opening of the safety guard causes the safety outputs to be disabled.

6.3 Diagnostic-LEDs

green (Power) Supply voltage on

yellow (Status) Operating condition

red (Fault) Error (see table 2: Error messages / flash codes red diagnostic LED)

6.4 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 safety switchgear (internal errors) cause the safety outputs to be disabled within the duration of risk. After fault rectification, the error message is reset by opening and re-closing the corresponding safety guard.



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.

Fault warning

A fault that does not immediately endanger the safety function of the safety switchgear (e.g. too high ambient temperature, safety output at external potential, cross-circuit) leads to delayed shutdown (see Table 2). 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).

Table 1: Diagnostic information of the safety switchgear

System condition	Magnet control IN		LED			Safety outputs Y1, Y2		Diagnostic output OUT -1P2PW
	Power to unlock	Power to lock	green	red	yellow	AZM201Z	AZM201B	
Door open	24 V (0 V)	0 V (24 V)	On	Off	Off	0 V	0 V	0 V
Door closed, actuator not inserted	24 V	0 V	On	Off	Off	0 V	0 V	0 V
Door closed, actuator inserted, not locked	24 V	0 V	On	Off	Flash-es	0 V	24 V	24 V
Door closed, actuator inserted, interlocking blocked	0 V	24 V	On	Off	Flash-es	0 V	24 V	0 V
Door closed, actuator inserted and locked	0 V	24 V	On	Off	On	24 V	24 V	24 V
Error warning¹⁾ solenoid interlock locked	0 V	24 V	On	Flash-es ²⁾	On	24 V ¹⁾	24 V ¹⁾	0 V
Error	0 V (24 V)	24 V (0 V)	On	Flash-es ^{2)/} Off ¹⁾	Off	0 V	0 V	0 V
Additionally for variant I1/I2:								
Teach-in procedure actuator started			Off	On	Flash-es	0 V	0 V	0 V
Only I2: teach-in procedure actuator (release block)			Flash-es	Off	Off	0 V	0 V	0 V

¹⁾ after 30 min. disabling due to fault

²⁾ see 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 signal	Internal fault / overvoltage or undervoltage fault	0 min	Device defective / supply voltage not within specifications

6.5 Solenoid interlock with serial diagnostic function SD

Solenoid interlocks with serial diagnostic function 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 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

Errors which no longer guarantee the function of the safety switchgear (internal errors) cause the safety outputs to be disabled within the duration of risk. 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.



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

A fault that does not immediately endanger the safety function of the safety switchgear (e.g. too high ambient temperature, safety output at external potential, cross-circuit) leads to delayed shutdown. 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).

Diagnostic error (warning)

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

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 in, irrespective of power to lock or power to unlock principle	Safety output activated	Error output Y1	Error output Y1
Bit 1:	---	Actuator detected	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
Bit 5:	---	Door 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)	Operating voltage too low	---

¹⁾ after 30 min -> fault

7. Set-up and maintenance

The safety function of the safety components must be tested. 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:

1. Check for a secure installation of the actuator and the solenoid interlock
2. Check max. axial misalignment of actuator and solenoid interlock.
3. Fitting and integrity of the cable connections.
4. Check the switch enclosure for damages
5. Remove particles of dust and 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. Declaration of conformity

We declare under our sole responsibility that the products mentioned comply with all relevant provisions of the directives and regulations listed below and conform to the following standards.

Relevant Directives:

2006/42/EG SI 2008/1597
2014/53/EU SI 2017/1206
2011/65/EU SI 2012/3032

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 the prototype test:

TÜV Rheinland
Industrie Service GmbH
Am Grauen Stein
51105 Köln
ID n°: 0035

Test certificate:

01/205/5608.01/22



TÜV Rheinland UK
1011 Stratford Road
Solihull, B90 4BN
ID n°: 2571

01/205U/5608.00/22



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

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