

Electronic solenoid interlock AZM 200 and safety switch AZ 200 with separate actuator



Overview of the features

Advantages

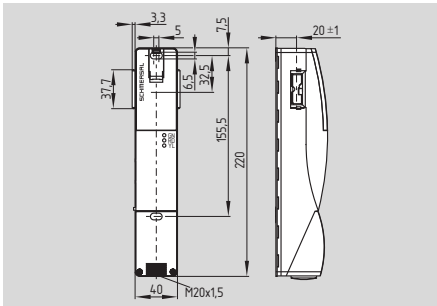
- Sensor technology permits an offset of ± 5 mm between actuator and interlock
- Intelligent diagnostic
- Modern and ergonomic design
- Simple mounting
- Accurate adjustment through slotted holes
- 3 LED's to show the operating status
- 1 or 3 diagnostic outputs

Classification

- Classification PDF-M to EN 60947-5-3
- Up to PL e to EN ISO 13849-1
- Control category 4 to EN 954-1
- Up to SIL 3 applications to IEC 61508, PFH value 4.0×10^{-9} / h

Electronic solenoid interlock AZM 200

AZM 200



- Thermoplastic enclosure
- Sensor technology permits an offset of ± 5 mm between actuator and interlock
- Up to PL e to EN ISO 13849-1
- Control category 4 to EN 954-1 with door detection sensor T (without additional second switch)
- Up to SIL 3 applications to IEC 61508
- Intelligent diagnostic
- Modern and ergonomic design
- Simple mounting
- Accurate adjustment through slotted holes
- Series-wiring (max. 31 components), without detriment to the control category to EN 954-1
- 3 LED's to show the operating status (refer to table)
- Manual release from both sides
- 1 or 3 diagnostic outputs
- Holding force 30 N
- Available with AS-Interface Safety at Work

Approvals



Ordering details

AZM 200 ① ② -T-③④

No.	Replace	Description
①		Solenoid interlock monitoring
	B	Actuator monitoring (only for -1P2PW and -SD2P)
②	SK	Screw terminals
	CC	Cage clamps
	ST1	Connector M23 x 1, (8+1)-pole
	ST2	Connector M12 x 1, 8-pole
③		Outputs: (1st digit = number of diagnostic outputs, 2nd digit = number of safety outputs)

Technical data

Standards: EN 60947-5-1, EN ISO 13849-1, EN 954-1, IEC 61508
 Enclosure: glass-fibre reinforced thermoplastic, self-extinguishing
 Mechanical life: ≥ 1 million operations
 Fmax: 2000 N
 Holding force: 30 N
 Protection class: IP 67 to EN 60529
 Protection class: II,
 Overvoltage category: III
 Degree of pollution: 3
 Connection: screw terminals or cage clamps or connector M12 or M23

Cable section: min. 0.25 mm² max. 1.5 mm² (incl. conductor ferrules)
 Cable entry: M20 x 1.5
Series-wiring: max. 31 components
 Cable length: max. 200m
 (Cable length and cable section alter the voltage drop depending on the output current)

Ambient conditions:
 Ambient temperature: -25 °C ... +60 °C
 Storage and transport temperature: -25 °C ... +85 °C
 Relative humidity: 30% ... 95%, non-condensing
 Resistance to vibration: 10...55 Hz, amplitude 1mm
 Resistance to shock: 30 g / 11 ms
 Switching frequency f: 1 Hz
 Response time: < 60 ms
 Duration of risk: < 120 ms
 Time to readiness: < 4 s
 Actuating speed: ≤ 0.2 m/s

Electrical data:
 U_e: 24 VDC -15% / +10% (stabilised PELV)
 I_e: 1.2 A
 I₀: max. 0.6 A
 U_{imp}: 800 V
 U_i: 32 VDC
 Fuse rating: internally short-circuit proof
 Screw terminals or cage clamps: ≤ 4 A when used to UL 508;
 Connector M12: ≤ 2 A;
 Connector M23: ≤ 4 A

Technical data

Safety inputs X1 and X2:
 U_{e3/Low}: -3V ... 5V
 U_{e3/High}: 15V ... 30V
 I_{e3}: > 2 mA at 24 V

Safety outputs Y1 and Y2:
 p-type, short-circuit proof
 U_{e1}: 0 V to 4 V under U_e
 I_{e1}: max. 0.25 A
 Utilisation category: DC-13
 Leakage current I_r: ≤ 0.5 mA

Diagnostic outputs OUT/OUT2/OUT3:
 p-type, short-circuit proof
 U_{e2}: 0 V to 4 V under U_e
 I_{e2}: max. 0.05 A
 (I_{OUT} + I_{OUT2} + I_{OUT3} ≤ I_{e2})

Utilisation category: DC-13
 Wiring capacitance for -SD2P: max. 50 nF

Solenoid control IN:
 U_{e4/Low}: -3V ... 5V
 U_{e4/High}: 15V ... 30V
 I_{e4}: typically 10 mA at 24 V, dynamically 20 mA
 Solenoid: 100% ED

Classification:
 To EN ISO 13849-1: up to PL e
 To EN 954-1: up to control category 4
 To IEC/EN 61508: up to SIL 3
 PFH value: 4.0 x 10⁻⁹ / h
 Service life: 20 years

Note

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

The actuators and accessories can be found on page 24 and 35.

Accessories for series-wiring with serial diagnostic see page 31 ff.

Suitable connecting cables with mould connector can be found on page 30.

Electronic solenoid interlock AZM 200

Note

LED functions

Green Supply voltage on
 Yellow Operating status
 Red Error (refer to flash codes)

Operating principle of the diagnostic outputs

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

The diagnostic output is not a safety-relevant output!

Depending on the used variant, the following diagnostic signals are transmitted:

1P2P variant:

OUT Safety guard closed

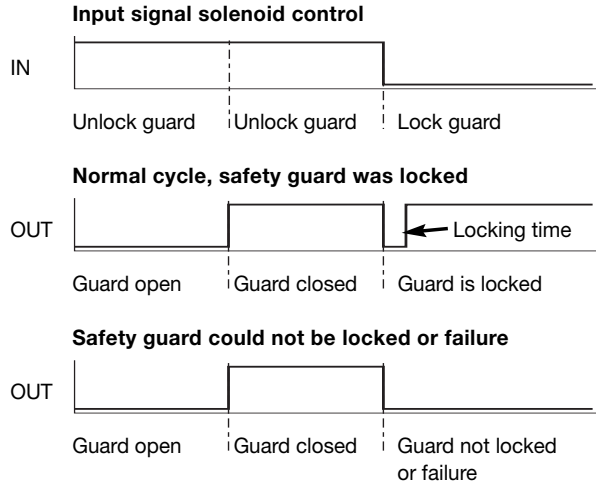
1P2PW variant:

OUT Combined diagnostic signal:
 safety guard closed and
 solenoid interlock locked

The diagnostic tables for the AZM 200 can be found on page 42.

Diagram of the W-variant

Behaviour of the diagnostic output of the W-variant (Example: power-to-unlock version)



Connection

Wiring diagram for devices with integrated connector

Pin configuration	Wiring of the solenoid interlock ...-1P2P.	Wiring of the solenoid interlock ...-SD2P
Pin 1	24V Operating voltage	24V Operating voltage
Pin 2	X1 Safety input 1	X1 Safety input 1
Pin 3	GND Ground	GND Ground
Pin 4	Y1 Safety output 1	Y1 Safety output 1
Pin 5	OUT Diagnostic output	OUT SD output
Pin 6	X2 Safety input 2	X2 Safety input 2
Pin 7	Y2 Safety output 2	Y2 Safety output 2
Pin 8	IN Solenoid control	IN SD input
Pin 9	spare	spare
Ordering suffix -SK	24V 24V X1 X2 IN AZM 200.-1P2P.	24V 24V X1 X2 IN AZM 200.-SD2P.
-CC	GND Y1 Y2 OUT	GND Y1 Y2 OUT

Integrated connector
M23, (8+1)-pole
 (Ordering suffix -ST1)



M12, 8-pole
 (Ordering suffix -ST2)



Safety controller

The programme of suitable safety controllers can be found on page 49 ff.

The control category 4 to EN 954-1 and PL e to EN ISO 13849-1 achieved with these safety controllers depend on the safety controller as well as on the structure of the entire safety circuit.

Note

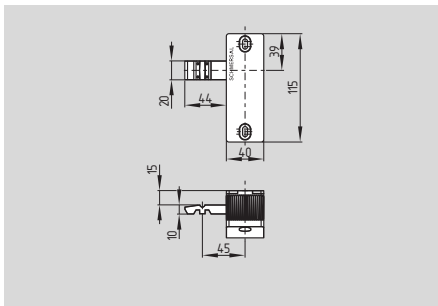
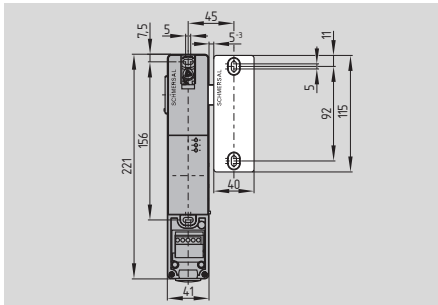
As long as the actuator unit is inserted in the solenoid interlock, the unlocked safety guard can be relocked. In this case, the safety outputs are re-enabled; **opening the safety guard is not required.**

Detailed information about the use of serial diagnostic can be found in the mounting and wiring instructions of the PROFIBUS-Gateway SD-I-DP-V0-2 and in the instructions for integration of the PROFIBUS-Gateway.

A detailed description of the PROFIBUS-Gateway SD-I-DP-V0-2 can be found on page 31 of this catalogue.

Actuators AZ/AZM 200

AZ/AZM 200-B1-...



- Actuator for sliding guards
- Actuator with return spring
- Tolerates overtravel of up to max. 5 mm
- Available with or without emergency exit (P0)

Technical data

Material:

B1 enclosure:

Grivory

Actuator:

zinc die-cast

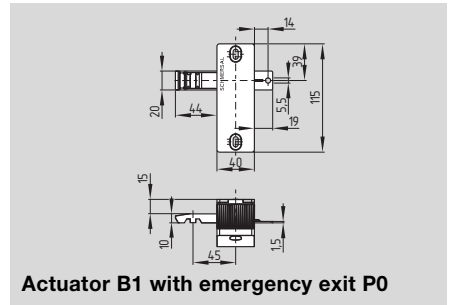
Mechanical life:

≥ 1 million operations

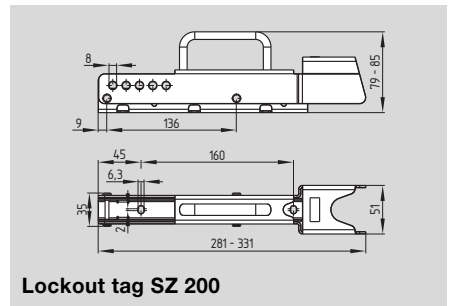
F_{max}:

2000 N

System components



Actuator B1 with emergency exit P0



Lockout tag SZ 200

Approvals



Zertifizierung in Verbindung mit den Geräten AZ/AZM 200

Ordering details

AZ/AZM 200-B1-①T②

No.	Replace	Description
①	L	Actuating direction left
	R	Actuating direction right
②		Without emergency exit
	P0	With emergency exit

Note

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

Ordering details

Actuator B1 with emergency exit

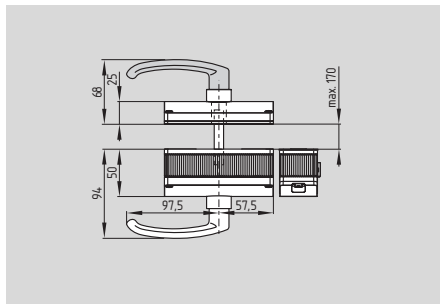
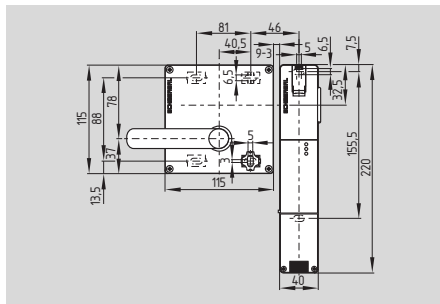
AZ/AZM 200-B1-...-P0

Lockout tag

SZ 200

Actuators AZ/AZM 200

AZ/AZM 200-B30-...

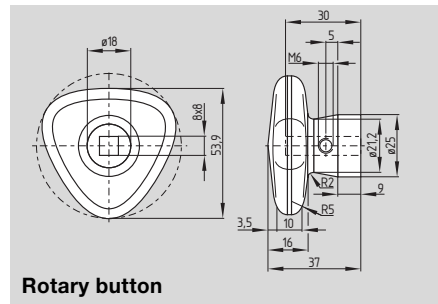


- **Actuator for hinged guards**
- One-hand emergency exit, even in de-energised condition
- Easy and intuitive operation
- NO risk of injury from protruding actuator
- No supplementary door handles required
- Does not protrude into the door opening
- Various handles available
- Can be fitted with or without emergency exit

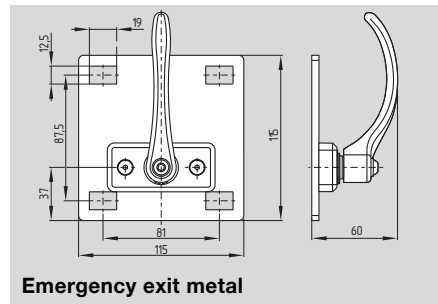
Technical data

Material:
 Actuator unit B30: glass-fibre reinforced thermoplastic, self-extinguishing, fixing holes with metal washer
 Emergency exit P1: glass-fibre reinforced thermoplastic, self-extinguishing, fixing holes with metal washer
 Door handle G1, G2: anodised aluminium
 Panic handle P1, P20, P25: plastic coated aluminium
 Actuator: zinc die-cast
 Mechanical life: ≥ 1 million operations
 F_{max} : 2000 N

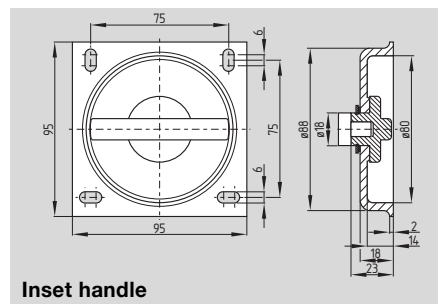
System components



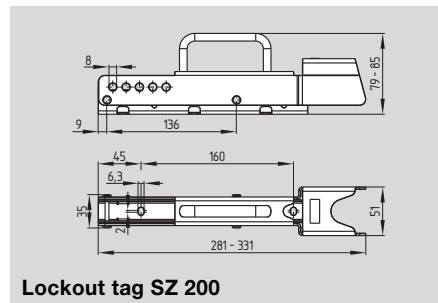
Rotary button



Emergency exit metal



Inset handle



Lockout tag SZ 200

Approvals



Zertifizierung in Verbindung mit den Geräten AZ/AZM 200

Ordering details

AZ/AZM 200-B30-①TA②③

No.	Replace	Description
①	L	Door hinge on left-hand side
	R	Door hinge on right-hand side
②	G1	With door handle
	G2	With rotary button
③	P1	With emergency exit
	P20	With emergency exit metal
	P25	With emergency exit with inset handle

Note

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

Ordering details

Actuator B30 with rotary button **AZ/AZM 200-B30-...-G2**
 with emergency exit metal **AZ/AZM 200-B30-...-P20**
 with inset handle **AZ/AZM 200-B30-...-P25**
 Lockout tag **SZ 200**

Diagnostic tables of the electronic safety switches, solenoid interlocks and safety sensors

Diagnostic of the AZM 200 solenoid interlock with diagnostic output

Operating principle of the diagnostic output	Flash codes (red)	Meaning	Autonomous switch-off after	Cause
<p>The short-circuit proof diagnostic output OUT can be used for central indicating or control functions, for instance in a PLC.</p> <p>The diagnostic output is not a safety-relevant output!</p> <p>Depending on the component variant, the following diagnostic signals are transmitted:</p> <p>1P2P-Variant: OUT Safety guard closed</p> <p>1P2PW-Variant: OUT Combined diagnostic signal: safety guard closed and solenoid interlock locked</p> <p>Failure Failures, which no longer guarantee the proper functioning of the AZM 200 solenoid interlock (internal failures), will result in a deactivation of the safety outputs. Failures, which do not immediately affect the safety function of the AZM 200 solenoid interlock (cross-wire, temperature error, short-circuit + 24 VDC at safety output), will result in a delayed switch-off (see table). After elimination of the failure, the failure message is reset by opening and closing the relevant safety guard. The safety outputs are enabled and allow a restart of the machine. A locking chain must be permanently locked to enable the restart.</p>	1 flash pulse	Failure (warning) output Y1	30 min	Error in output test or voltage at output Y1 although the output is switched off
	2 flash pulses	Failure (warning) output Y2	30 min	Error in output test or voltage at output Y2 although the output is switched off
	3 flash pulses	Failure (warning) cross-wire	30 min	Cross-wire between the output cables or error at both outputs
	4 flash pulses	Failure (warning) ambient temperature too high	30 min	Temperature measurement indicates too high an inner temperature
	5 flash pulses	Error target	0 min	The coding (frequency) of the detected actuator does not match the required value, incorrect or defective actuator
	6 flash pulses	Error target combination	0 min	An invalid combination of targets was detected at the 4 coils of the AZM 200 solenoid interlock. (Current setting: latching bolt detected & door target not detected =>latch breakage or tampering attempt)
	Continuous red	Internal failure	0 min	-

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset in the slave when the failure cause is eliminated.

The diagnostic function of the AZM 200 solenoid interlock

The operating condition of the solenoid interlock as well as possible failures and faults are signalled by means of three-colour LED's, installed to the front of the device.

System condition	Solenoid control IN		LED			Safety outputs Y1, Y2		Diagnostic outputs OUT	
	Power-to-unlock	Power-to-lock	Green	Red	Yellow	AZM 200...	AZM 200 B...	-1P2P	-1P2PW
Safety guard open	24 V (0 V)	0 V (24 V)	On	Off	Off	0 V	0 V	0 V	0 V
Safety guard closed, actuator not inserted	24 V	0 V	On	Off	Off	0 V	0 V	0 V	0 V
Safety guard closed, actuator inserted, not locked	24 V	0 V	On	Off	Flashes	0 V	24 V	24 V	24 V
Safety guard closed, actuator inserted, locking impossible	0 V	24 V	On	Off	Flashes	0 V	24 V	24 V	0 V
Safety guard closed, actuator inserted and locked	0 V	24 V	On	Off	On	24 V	24 V	24 V	24 V
Failure warning¹⁾, Solenoid interlock locked	0 V	24 V	On	Flashes ²⁾	On	24 V ¹⁾	24 V ¹⁾	0 V	0 V
Failure	0 V (24 V)	24 V (0 V)	On	Flashes ²⁾	Off	0 V	0 V	0 V	0 V

¹⁾ after 30 min -> failure

²⁾ refer to flash codes

Diagnostic tables of the electronic safety switches, solenoid interlocks and safety sensors

Diagnostic of the AZM 200 solenoid interlock with serial diagnostic cable

Solenoid interlock with serial diagnostic cable

Solenoid interlocks with serial diagnostic cable have a serial input and output cable instead of the conventional diagnostic output. If solenoid interlocks are daisy-chained, the diagnostic input and output data are transmitted through this series-wiring.

Up to 31 solenoid interlocks can be wired in series. For the evaluation of the serial diagnostic cable, the PROFIBUS-Gateway SD-I-DP-V0-2 is used. This serial diagnostic interface is integrated as slave in an available PROFIBUS DP network, thus allowing for an evaluation of the diagnostic signals by means of a PLC.

The operational information of the response and diagnostic data is 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 are transmitted to the component through an output byte of the PLC.

In case of a communication error between the PROFIBUS-Gateway and the solenoid interlock, the switching condition of the solenoid interlock is maintained.

Failure

A failure has occurred, which resulted in the immediate deactivation of the safety outputs. The failure is reset when the failure cause is eliminated and bit 7 of the request byte changes from 1 to 0 or when the safety guard is opened.

Failures at the safety outputs will only be deleted upon the next release, as the neutralisation of the failure cannot be detected earlier.

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset when the failure cause is eliminated.

Bit n°	Request byte	Response byte	Diagnostic failure warning	Diagnostic failure
Bit 0:	Magnet in, independent of power-to-lock or power-to-unlock principle	Safety output enabled	Error output Y1	Error output Y1
Bit 1:	---	Actuator detected	Error output Y2	Error output Y2
Bit 2:	---	Actuator detected and locked	Cross-wire	Cross-wire
Bit 3:	---	---	Ambient temperature too high	Ambient temperature too high
Bit 4:	---	Input condition X1 and X2	---	Target error, coding error or false target combination
Bit 5:	---	Safety guard detected	Internal failure	Internal failure
Bit 6:	---	Failure warning ¹⁾	Communication error between PROFIBUS-Gateway and solenoid interlock	---
Bit 7:	Failure reset	Failure (enabling path switched off)	Operating voltage too low	---

The described condition is obtained, when bit = 1 ¹⁾ after 30 min -> failure

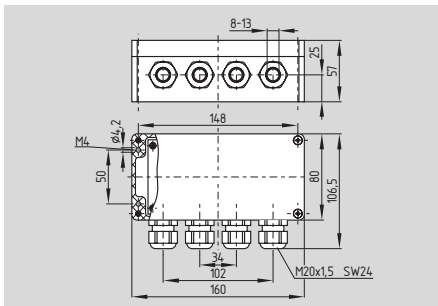
Functional example of the diagnostic LED's, the serial status signals and the safety outputs

System condition	LED's			Safety outputs Y1, Y2	Response byte Bit n°							
	Green	Red	yellow		7	6	5	4	3	2	1	0
Supply voltage on, safety guard open	On	Off	Off	0 V	0	0	0	X	0	0	0	0
Safety guard closed, actuator present	On	Off	Flashes	0 V	0	0	0	X	0	0	1	0
Safety guard closed and locked	On	Off	On	24 V	0	0	0	1	0	1	1	1
Failure warning ¹⁾ , safety guard locked	On	Flashes	On	24 V	0	1	0	1	0	1	1	1
Failure	On	Flashes	Off	0V	1	0	0	X	0	X	X	0

¹⁾ after 30 min -> failure

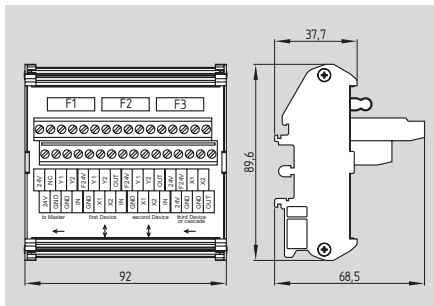
Accessories for series-wiring with serial diagnostic

SD-2V-F-SK



- For field applications, junction box for 2 components, with screw terminals
- The terminals of the junction box are located in a closed enclosure

SD-2V-S-SK



- For control cabinet mounting, junction box for 2 components, with screw terminals
- Enables wiring in the control cabinet onto standard DIN rails

Technical data

Standards:	VDE 0100
Enclosure:	thermoplastic, self-extinguishing
Protection class:	SD-2V-F-SK: IP 65 SD-2V-S-SK: IP 00 to IEC/EN 60529
Insulation protection class:	SD-2V-F-SK: II, III SD-2V-S-SK: II
Overvoltage category:	III
Degree of pollution:	SD-2V-F-SK: 3 SD-2V-S-SK: 2
Connection:	screw terminals
Cable section:	min. 0.25 mm ² max. 2.50 mm ² (incl. conductor ferrules)
Cable entry:	SD-2V-F-SK: 4 x M20x1.5, for cladding diameter 8... 13 mm
Number of connections:	to each SD junction box, 2 (optionally 3) components can be connected
Fuse rating:	3 internal fine fuses, 2 A slow blow, 5 x 20

Ambient conditions:

Ambient temperature:	- 25 °C ... + 70 °C
Storage and transport temperature:	- 25 °C ... + 85 °C
Relative air humidity:	30% ... 95%, non-condensing

Electrical data:

Rated operating voltage U _e :	24 VDC -15% / +10% (stabilised PELV)
Rated operating current I _e :	16 A
Rated impulse withstand voltage U _{imp} :	800 V
Rated insulation voltage U _i :	32 VDC
Fuse rating:	16 A

Approvals



Approvals



Ordering details

SD-2V-F-SK SD junction box for field applications

Ordering details

SD-2V-S-SK SD junction box for control cabinet mounting