SCHMERSAL

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

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1. About this document

1.1 Function

These operating instructions provide all the information required for mounting, commissioning, safe operation and also disassembly of the device. 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 passive fieldbox must only be used according to the following versions or for applications that are approved 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: www.schmersal.net.

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.

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1.6 Warning about misuse

In the event of improper or unintended use or tampering, use of the passive fieldbox could expose persons to danger or cause damage to the machine or system components.

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:

PFB-SD-4M12-SD

Option	Description
PFB	Passive fieldbox
SD	Evaluation side: SD interface
4M12	4 device connectors for M12 connector
SD	Device connection: SD interface

2.2 Destination and use

The passive fieldbox PFB-SD-4M12-SD is designed for the connection of 4 electronic safety relays in SD interface version of the manufacturer SCHMERSAL. It serves to connect up to 4 safety switchgear units in series.
In order to increase the safety function, it is possible to connect multiple passive fieldboxes in series.

The secure OSSD outputs of the connected safety relays are switched in series and wired to a compatible security analysis by the passive fieldbox PFB-SD-4M 12-SD.

The non-secure SD interface signals of the devices are connected in series and wired to an SD Gateway.

The user must evaluate and design the safety chain in accordance with the relevant standards and the required safety level.

2.3 Technical data

Standards:	IEC 60947-1
Materials:	
- Enclosure:	polyamide / PA 6 GF
- Inspection window:	polyamide / PACM 12
- Encapsulation:	polyurethane / 2K PU
- Labelling plates:	polycarbonate / PC
Mechanical data	
Type of electrical connection:	Panel jack / integrated socket
Connection:	
- Connectors:	M12 / 8-pole, A-coded
- Power:	M12-Power / 4-pole, T-coded
- IN & OUT signals:	M12 / 4-pole, A-coded
Tightening torque of connectors:	
- M12 connector:	max. 1.5 Nm
- Recommended for SCHMERSAL cables:	1.0 Nm
Fixing screws:	2x M6
Tightening torque of the fixing screws:	max. 3.0 Nm
Ambient conditions	
Ambient temperature:	−20 °C … +65 °C
Storage and transport temperature:	−25 °C … +70 °C
Relative humidity:	10 % … 95 %, non condensing
Resistance to shock:	30 g / 11 ms
Resistance to vibration:	5 … 10 Hz, amplitude 3.5 mm; 10 … 150 Hz, amplitude 0.35 mm / 5 g
Protection class:	IP67 to IEC 60529
Protection class:	III
Insulation values to IEC 60664-1:	
- Rated insulation voltage Ui:	32 VDC
- Rated impulse withstand voltage U_{imp}:	0.8 kV
- Over-voltage category:	III
- Degree of pollution:	3
Electrical data	
Supply voltage U_B:	24 VDC -15% / +10% (stabilised PELV mains unit)
Rated operating voltage U_e:	24 VDC
Operating current I_e:	
- Fieldbox (external fuse protection required):	10 A
- Derating M12 Power connector:	10 A to 55 °C 7 A to 65 °C
- Device connection: (internal protection available)	0.8 A
- Safety outputs Y1 and Y2:	0.1 A
Device connection line fuse:	Automatically resetting fuse element 1.5 A
LED indications	
1 green LED „Pwr“:	Supply voltage fieldbox
4 green LED "P":	Fuse-element device connection 1 - 4
4 yellow LED "I“:	Input safety enable device connection 1 - 4

Protection class IP67 is only reached if all M12 connectors and blanking plugs, as well as the inspection window are properly fastening with screws.

All fieldboxes have a good resistance against chemicals and oil. When used in aggressive media (.e.g chemicals, oils, lubricants and coolants in high concentrations) the material resistance must in each case be checked in advance for the specific application.

3. Mounting

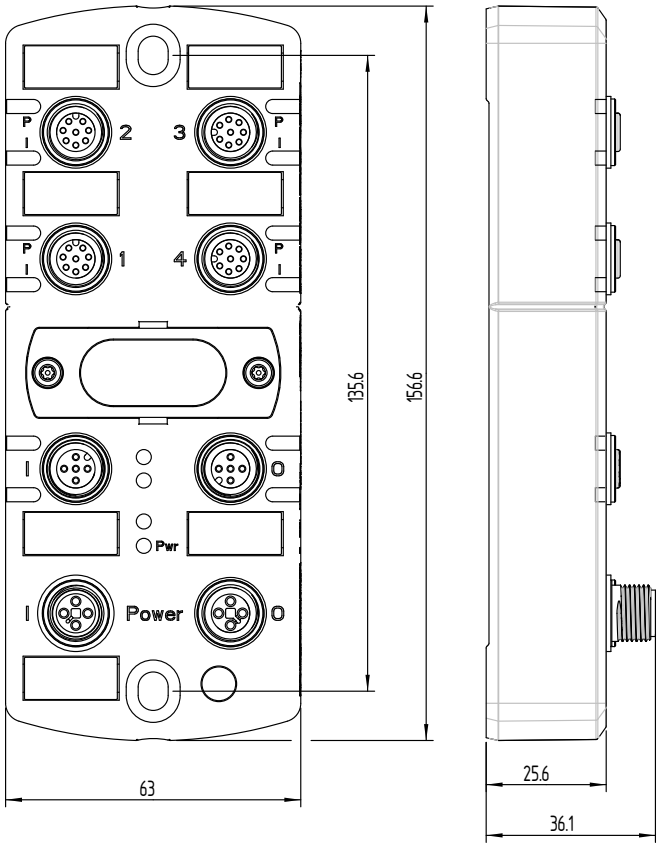
3.1 General mounting instructions

Fasten fieldbox with two M6-screws on a flat mounting surface, for mechanically strain-free installation. The maximum tightening torque is 3.0 Nm. Any mounting position.

Do not install fieldbox outside closed room

3.2 Dimensions

All measurements in mm.



3.3 Accessories

3.3.1 Cables

Power - Cable M12, 4 poles, straight, T-coded		
5.0 m	Pre-wired cable, female connector	103013430
10.0 m	Pre-wired cable, female connector	103013431
3.0 m	Connecting cable, male / female connectors	103013432
5.0 m	Connecting cable, male / female connectors	103013433
7.5 m	Connecting cable, male / female connectors	103013434

IN & OUT signals - Cable M12, 4 poles, straight, A-coded		
5.0 m	Pre-wired cable, male connector	103013421
10.0 m	Pre-wired cable, male connector	103013422
3.0 m	Connecting cable, male / male connectors	103013423
5.0 m	Connecting cable, male / male connectors	103013424
7.5 m	Connecting cable, male / male connectors	103013425

Device connection - Cable M12, 8 poles, straight, A-coded		
0.5 m	Connecting cable, male / female connectors	101217786
1.0 m	Connecting cable, male / female connectors	101217787
1.5 m	Connecting cable, male / female connectors	101217788
2.5 m	Connecting cable, male / female connectors	101217789
3.5 m	Connecting cable, male / female connectors	103013428
5.0 m	Connecting cable, male / female connectors	101217790
7.5 m	Connecting cable, male / female connectors	103013429

3.3.2 Colour codes of the Schmersal cables

M12, 4-pole			M12, 8-pole		
PIN	Conductor colour		PIN	Conductor colour	
1	BN	Brown	1	WH	White
2	WH	White	2	BN	Brown
3	BU	Blue	3	GN	Green
4	BK	Black	4	YE	Yellow
–	–	–	5	GY	Grey
–	–	–	6	PK	Pink
–	–	–	7	BU	Blue
–	–	–	8	RD	Red

3.3.3 Further accessories

Sealing stickers for inspection window, 4 pcs	103013919
Protective caps for M12 sockets, 10 pcs	103013920
Labels, frame 4 x 5 pcs	103013921

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.

To supply the fieldbox, cables with a cross-section of maximum 1.5 mm² can be connected.
Secure the supply voltage of the fieldbox with a 10 A fuse.

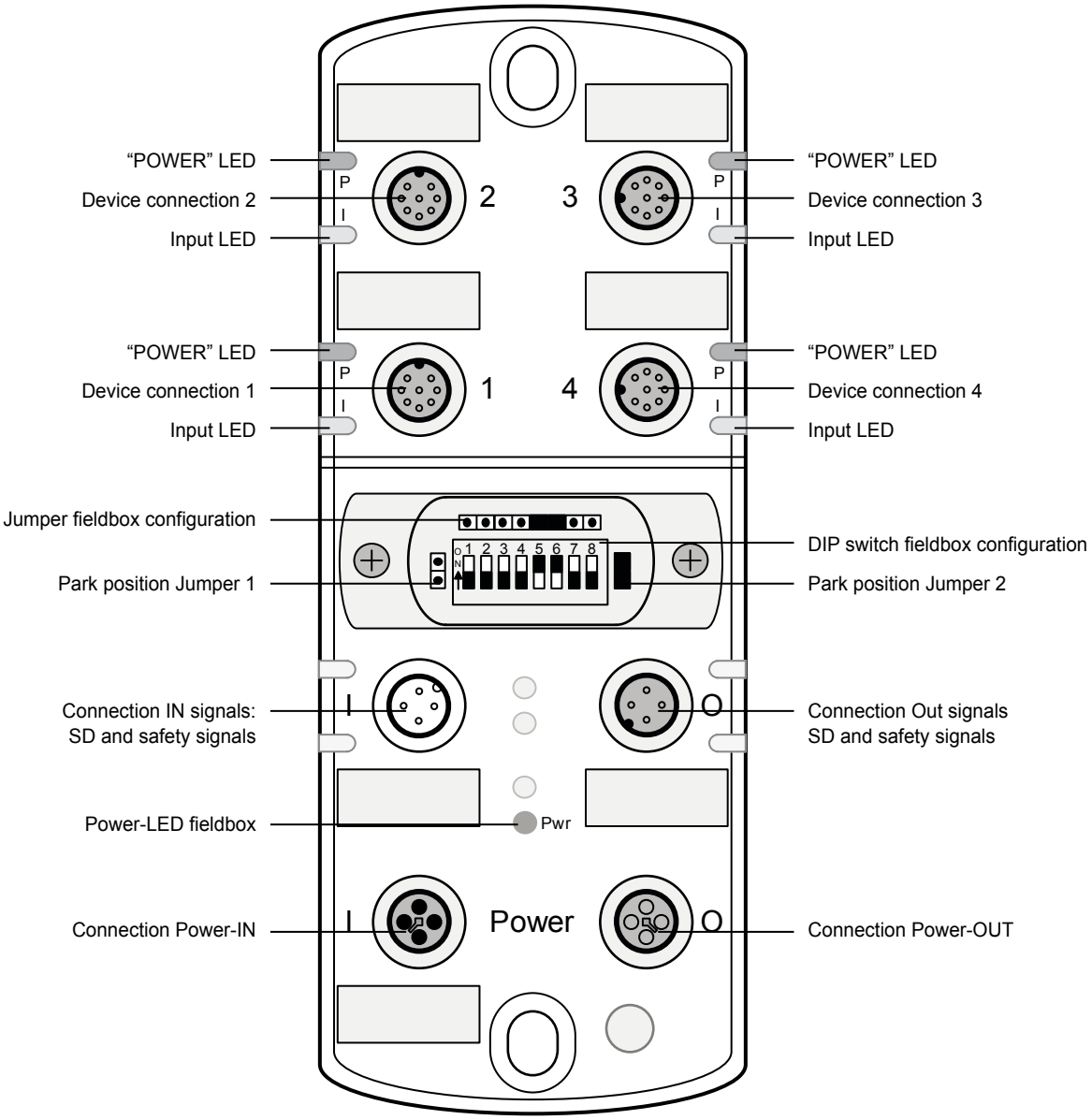
4.2 LED indicators and fuse elements

The fileldbox features 4 yellow and 5 green LED indicators.

1 green LED "Pwr"	Supply voltage status of the fieldbox
4 green LED "P" at device connection	Fuse-element status device connection
4 yellow LED "I" at device connection	Safety enable status connnected device

The 4 device connections are each equipped with an automatically resetting 1.5 A fuse for wiring protection.
If the fuse element triggers, the respective green power LED "P" goes out.

4.3 Pin assignment of module connection



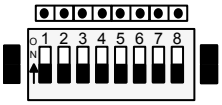
4.4 DIP switch configuration and jumper

When you open the inspection window, ensure that no moisture or excessive humidity penetrates into the fieldbox.

The position of the DIP switch and the jumper is shown in black.

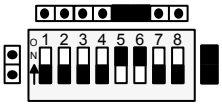
Fieldbox in the centre of a series circuit.

4 devices connected



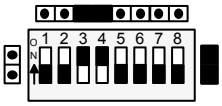
No jumper set
All switches OFF

3 devices connected



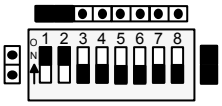
Jumper 5/6 set
Switch 5+6 ON

2 devices connected



Jumper 3/4 set
Switch 3+4 ON

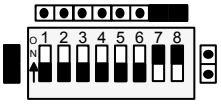
1 device connected



Jumper 1/2 set
Switch 1+2 ON

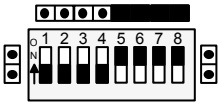
Last fieldbox in the series circuit

4 devices connected



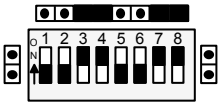
Jumper 7/8 set
Switch 7+8 ON

3 devices connected



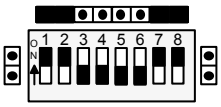
Jumper 5/6 and 7/8 set
Switch 5+6 and 7+8 ON

2 devices connected



Jumper 3/4 und 7/8 set
Switch 3+4 and 7+8 ON

1 device connected



Jumper 1/2 and 7/8 set
Switch 1+2 and 7+8 ON

The sealing labels available as an accessory can be used to seal the inspection window after the configuration has been checked.

4.5 Connector configuration

4.5.1 Connector configuration of device connection

PIN	Colour*	Signal	Description of device signals
1	WH	A1	+24 VDC device supplied
2	BN	X1	Safety input 1
3	GN	A2	0 VDC device supply
4	YE	Y1	Safety output 1
5	GY	OUT	Diagnostic output
6	PK	X2	Safety input 2
7	BU	Y2	Safety output 2
8	RD	IN	Solenoid control

4.5.2 Connnector pin assignment Power IN & OUT of fieldbox

PIN	Colour*	Signal	Description
1	BN	A1	+24 VDC device supplied
2	WH	A2	0 VDC device supply
3	BU	A2	0 VDC device supply
4	BK	A1	+24 VDC device supply

4.5.3 Connector pin assignment IN signals of the fieldbox

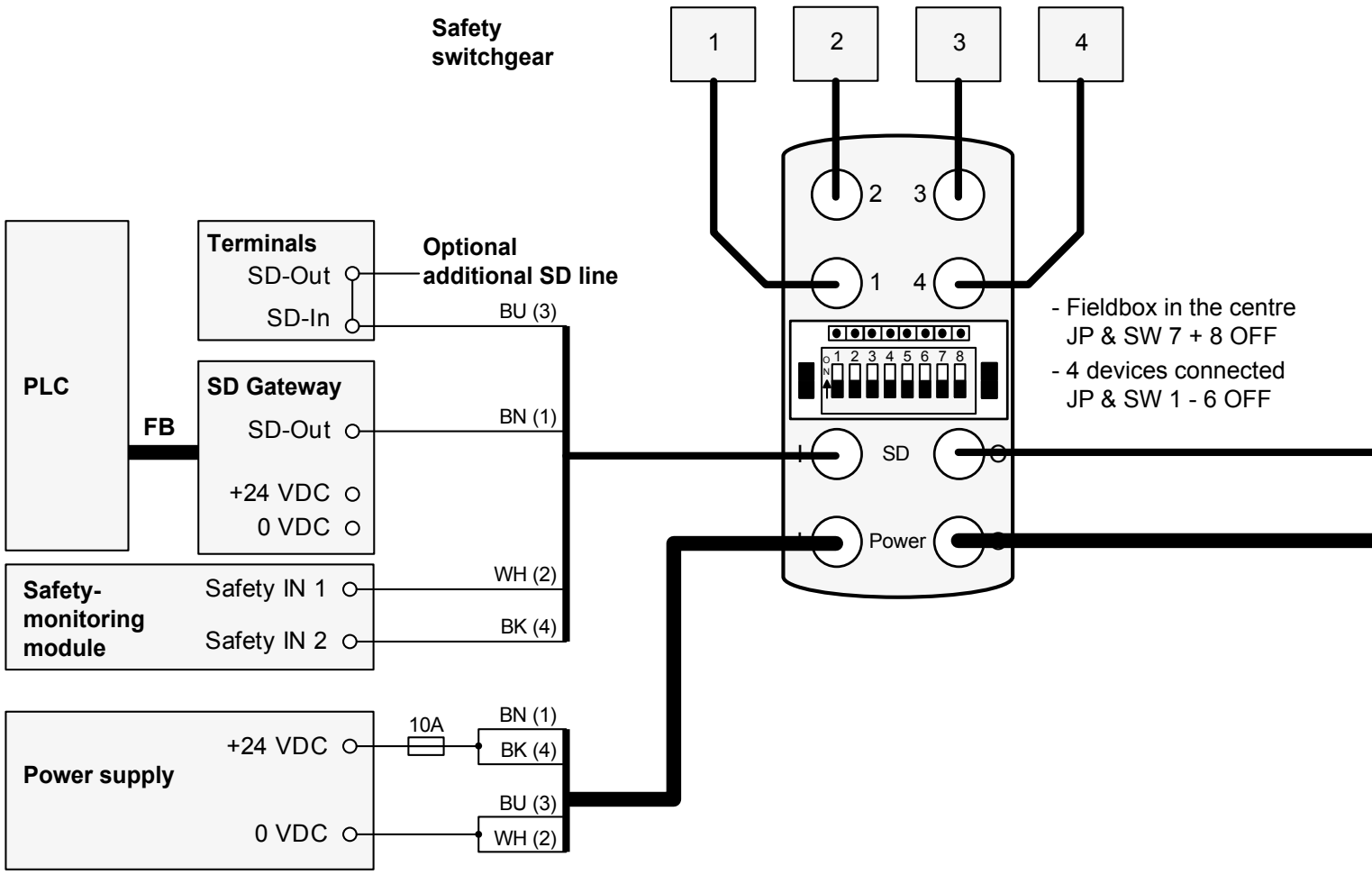
PIN	Colour*	Signal	Description
1	BN	IN	Input SD interface
2	WH	Y1	Safety output 1
3	BU	OUT	Output SD interface
4	BK	Y2	Safety output 2

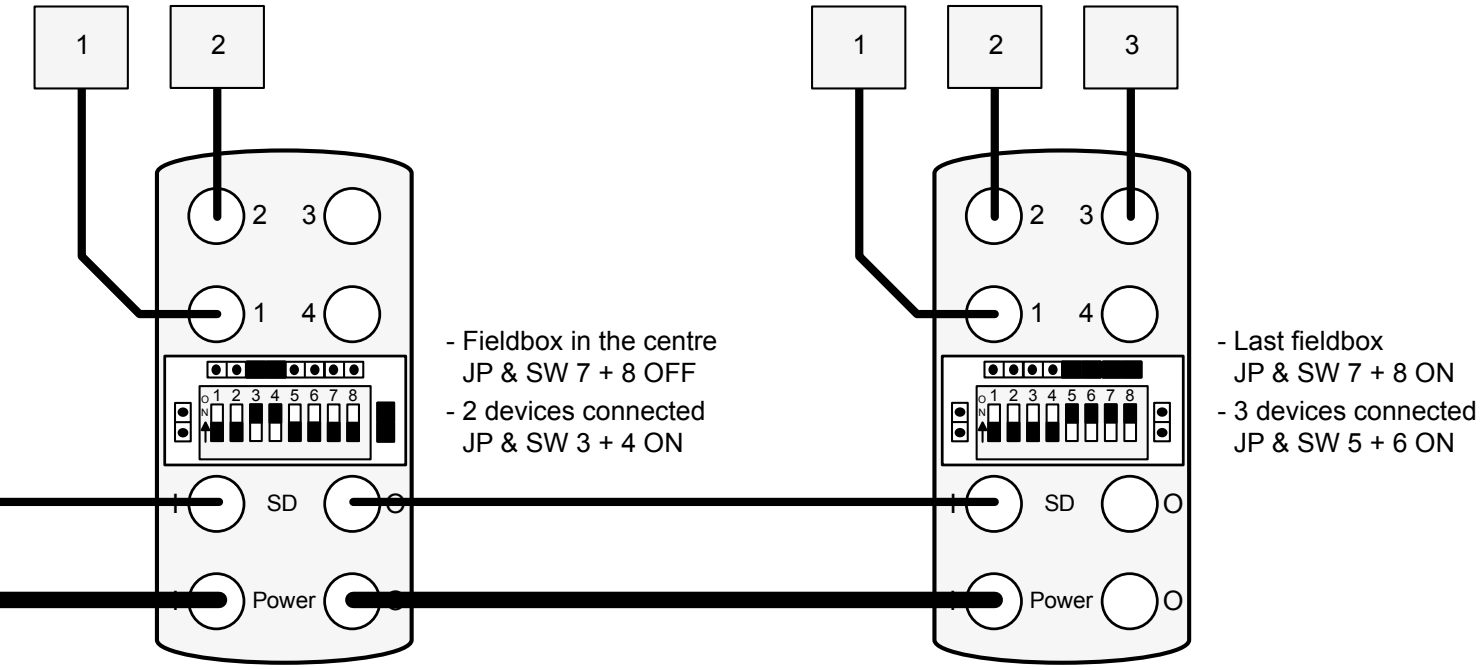
4.5.4 Connector pin assignment OUT signals of the Fieldbox

PIN	Colour*	Signal	Description
1	BN	OUT	Output SD interface
2	WH	X1	Safety input 1
3	BU	IN	Input SD interface
4	BK	X2	Safety input 2

* Color code of SCHMERSAL M12 accessory cables

4.6 Wiring example




1
2
2 3
1 4
ON 1 2 3 4 5 6 7 8
I SD O
I Power O
- Fieldbox in the centre
JP & SW 7 + 8 OFF
- 2 devices connected
JP & SW 3 + 4 ON
1
2
3
2 3
1 4
ON 1 2 3 4 5 6 7 8
I SD O
I Power O
- Last fieldbox
JP & SW 7 + 8 ON
- 3 devices connected
JP & SW 5 + 6 ON

5. Set-up and maintenance

5.1 Functional testing

A check must be carried out to ensure that the projected safety function is effective.

⚠ The security function, the configuration of the DP switch and the jumper, as well as the proper installation, must be checked by the responsible security expert / security officer.

5.2 Maintenance

The passive fieldbox operates error-free if installed and used properly.

6. Disassembly and disposal

6.1 Disassembly

Only disassemble the passive fieldbox if it is in de-energized state.

6.2 Disposal

Dispose of the passive fieldbox properly in accordance with national regulations and laws.

7. Configuration

7.1 Configuration examples

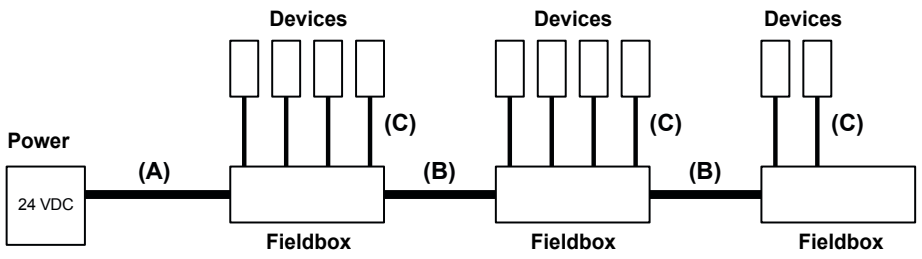
3 configurations are shown respectively for the different SCHMERSAL devices. One configuration with long cable lengths (maximum), one configuration with medium cable lengths (medium) and one configuration with shorter cable lengths (small).

The following assumptions are made for the configuration examples listed in the table:

- The examples represent maximum configurations. If individual cable lengths are shortened, larger systems are possible
- 2 x 1.5 mm² power supply wiring and 10 A fuse protection
- Use of SCHMERSAL cables
- The cable lengths listed in the table between power supply and the 1st field box, and between fieldboxes are maximum lengths. Reducing the individual cable lengths is not critical.

Device / configuration version	Max. number of devices	Equals number of fieldboxes	Length of the cable (A) up to the 1st fieldbox	Length of the cables (B) between the fieldboxes	Length of stub cables (C) for device connection
AZM 200 / Maximum	16	4	10.0 m	10.0 m	7.5 m
AZM 200 / Medium	20	5	7.5 m	7.5 m	5.0 m
AZM 200 / Small	22	5.5	7.5 m	5 m	3.5 m
MZM 100 / Maximum	18	4.5	10.0 m	10.0 m	7.5 m
MZM 100 / Medium	22	5.5	7.5 m	7.5 m	5.0 m
MZM 100 / Small	26	6.5	7.5 m	5 m	3.5 m
AZM 300 / Maximum	24	6	10.0 m	10.0 m	7.5 m
AZM 300 / Medium	28	7	7.5 m	7.5 m	5.0 m
AZM 300 / Small	31	8	7.5 m	5 m	3.5 m
RSS & CSS / Maximum	31	8	10.0 m	10.0 m	7.5 m
RSS & CSS / Medium	31	8	7.5 m	7.5 m	5.0 m
RSS & CSS / Small	31	8	7.5 m	5 m	3.5 m
Mixed / Maximum	24	6	10.0 m	10.0 m	7.5 m
Mixed / Medium	28	7	7.5 m	7.5 m	5.0 m
Mixed / Small	31	8	7.5 m	5 m	3.5 m

Mixed fitting of fieldbox: 2 x MZM 100, 1 x AZM 300 and 1 x RSS / CSS



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