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-IOP-4M12-IOP

Option	Description
PFB	Passive fieldbox
IOP	Evaluation side: IO parallel
4M12	4 device connections for M12 connector
IOP	Device connection: IO parallel

2.2 Destination and use

The PFB-IOP-4M 12-IOP passive fieldbox is designed for the connection of 4 electronic safety switchgear units with parallel IO signals manufactured by SCHMERSAL. It serves to connect up to 4 safety switchgear units in series.
To increase the safety functionality, more passive fielboxes can also be connected in series.

With the PFM-IOP-4M-12-IOP passive fieldbox, the secure OSSD outputs of the connected safety switchgear units are connected in series and wired to a relevant safety-monitoring module.

The non-secure IO signals of the devices are wired in parallel to a control system.

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:	Connector socket /male connector
Connector:	
- Device connections:	M12 / 8-pole, A-coded
- Power:	M12-Power / 4-pole, T-coded
- I/O signals:	M12 / 8-pole, A-coded
Expansion torque of the plug connections:	
- 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 "I":	Input safety enable device connections 1 - 4
4 yellow LED "I":	Input safety enable device connections 1 - 4

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

All fieldboxs have a good resistance to chemicals and oil. When used in aggressive media (such as chemicals, oils, greases and coolants in higher concentrations) the material resistance must be checked in advance for compatibility with the application.

3. Mounting

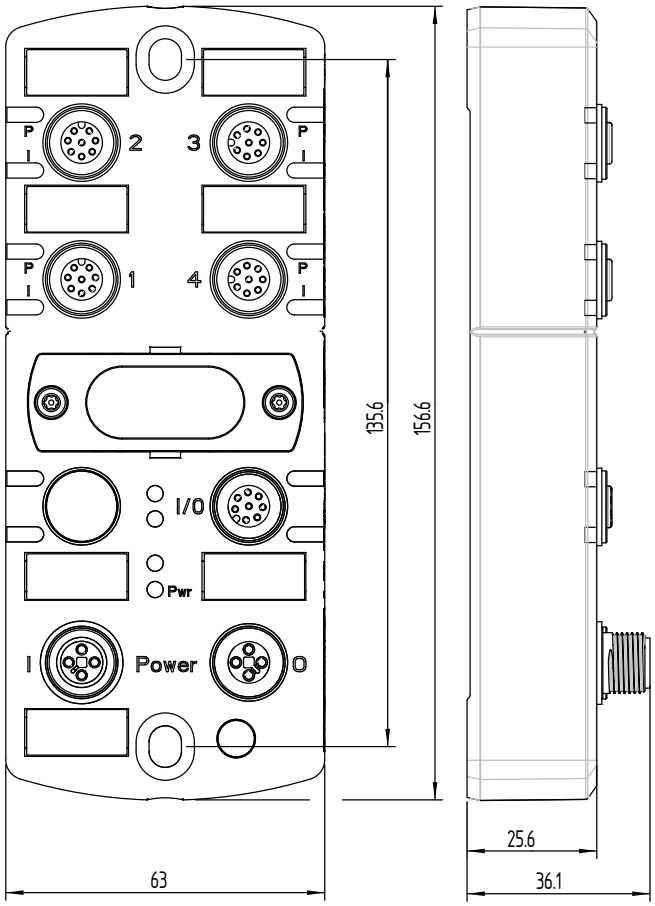
3.1 General mounting instructions

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 rooms.

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

I/O signals - cables M12, 8-pole, straight, A-coded		
5.0 m	Pre-wired cable, male connector	103013426
10.0 m	Pre-wired cable, male connector	103013427

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

Seal 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, M12 power connectors, cables with a cross-section of max. 1.5 mm² can be connected to the fieldbox.
The supply voltage of the fieldbox is to be protected with a fuse with a 10 A rating.

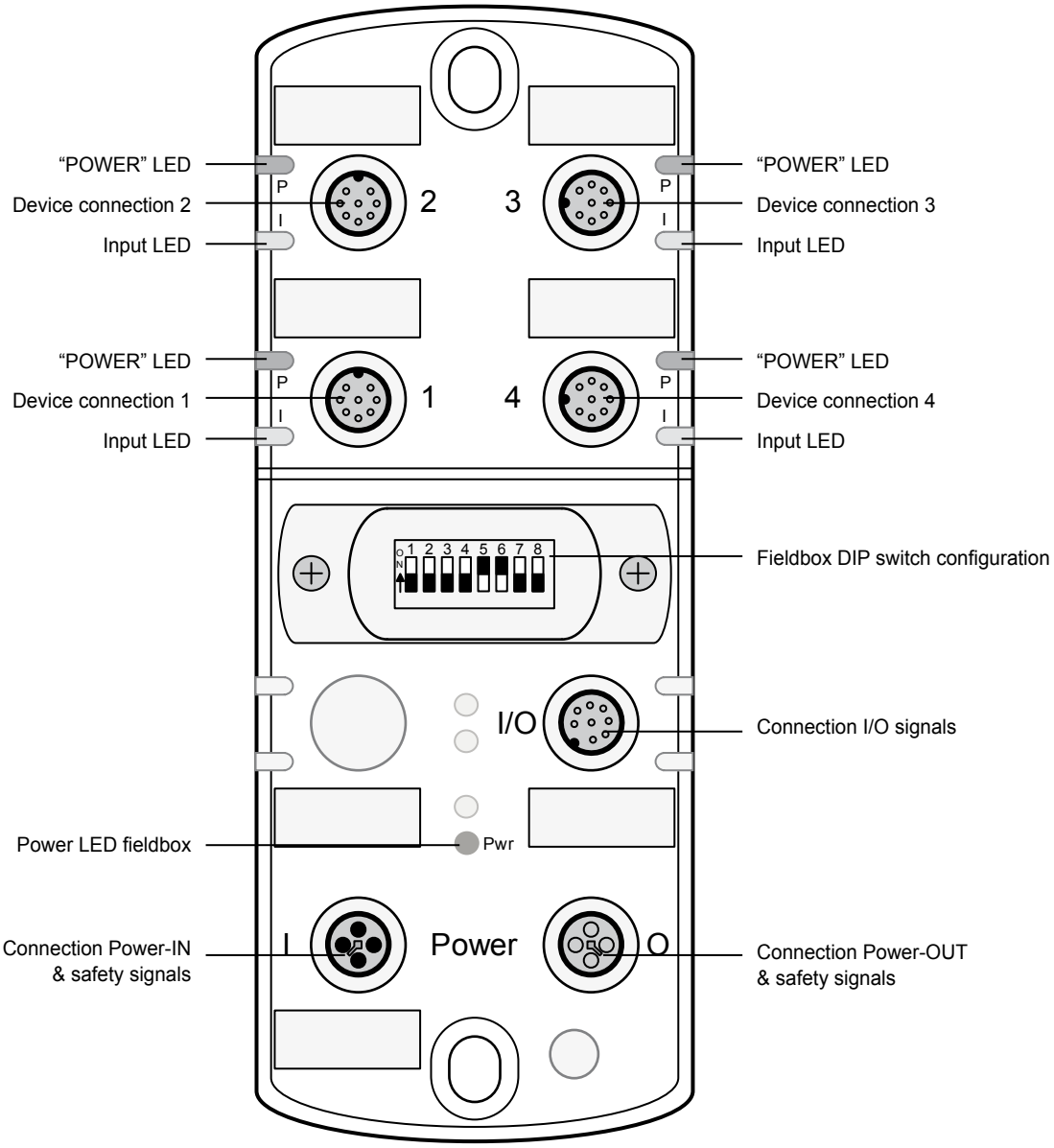
4.2 LED indicators and fuse elements

The fieldbox 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	Data connection fuse element status
4 yellow LED "I" at device connection	Safety enable status at connected 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 corresponding green power LED 'P' goes out.

4.3 Fieldbox connection overview



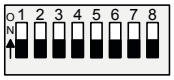
4.4 DIP switch configuration

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

The position of the DIP switch is shown in black.

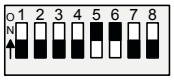
Fieldbox in the centre of a series circuit

4 devices connected



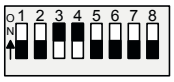
All switches OFF

3 devices connected



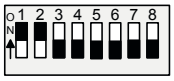
Switch 5+6 ON

2 devices connected



Switch 3+4 ON

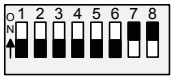
1 device connected



Switch 1+2 ON

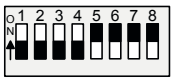
Last fieldbox in the series wiring

4 devices connected



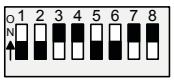
Switch 7+8 ON

3 devices connected



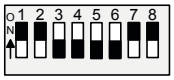
Switch 7+8 ON
Switch 5+6 ON

2 devices connected



Switch 7+8 ON
Switch 3+4 ON

1 device connected



Switch 7+8 ON
Switch 1+2 ON

You can use the seal sticker, available as an accessory, to seal the inspection window once 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 supplied
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 Connector configuration Power IN of the fieldbox

PIN	Colour*	Signal	Description
1	BN	A1	+24 VDC device supplied
2	WH	Y1	Safety output 1
3	BU	A2	0 VDC device supplied
4	BK	Y2	Safety output 2

4.5.3 Connector configuration Power OUT of the fieldbox

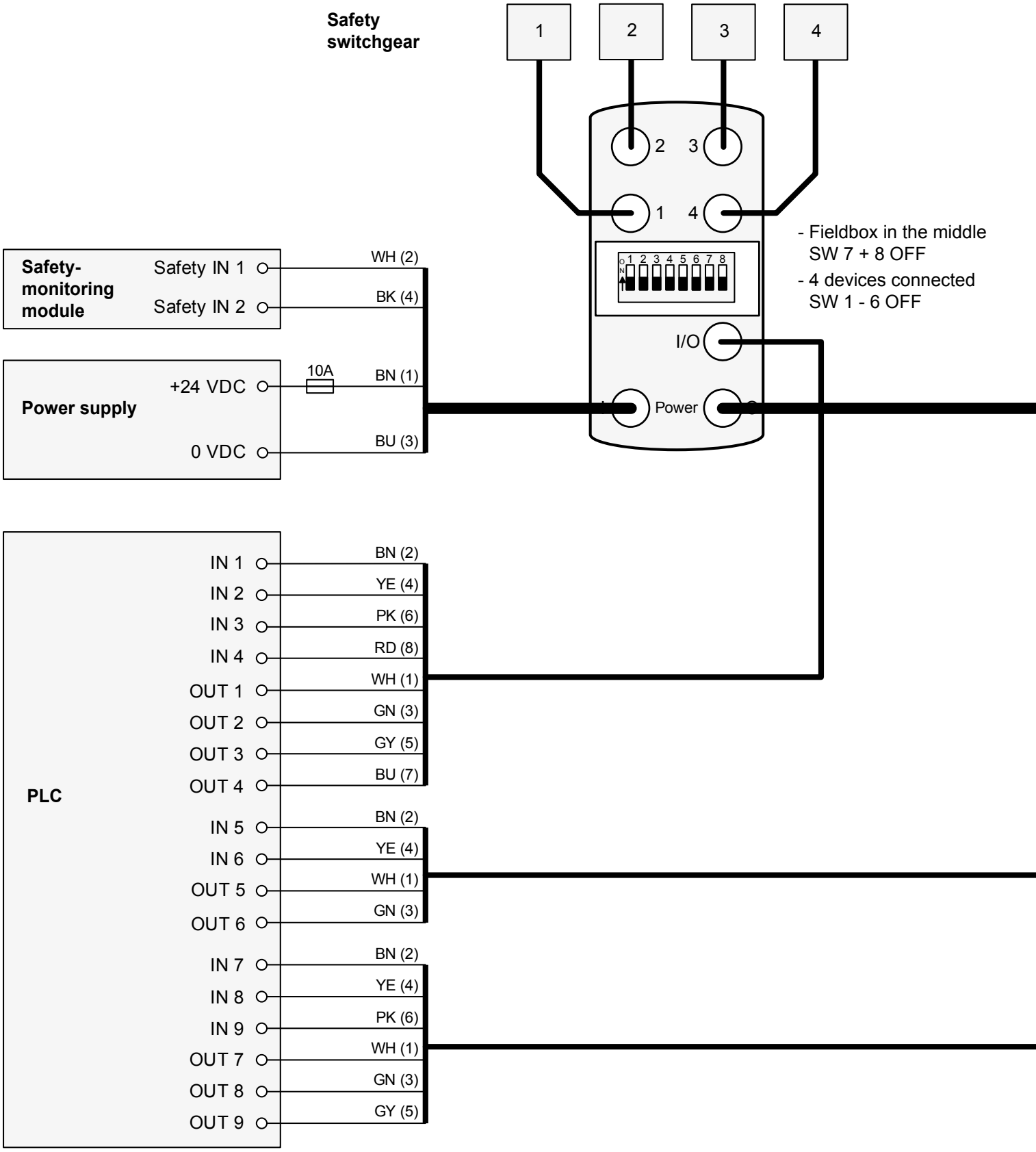
PIN	Colour*	Signal	Description
1	BN	A1	+24 VDC device supplied
2	WH	X1	Safety input 1
3	BU	A2	0 VDC device supplied
4	BK	X2	Safety input 2

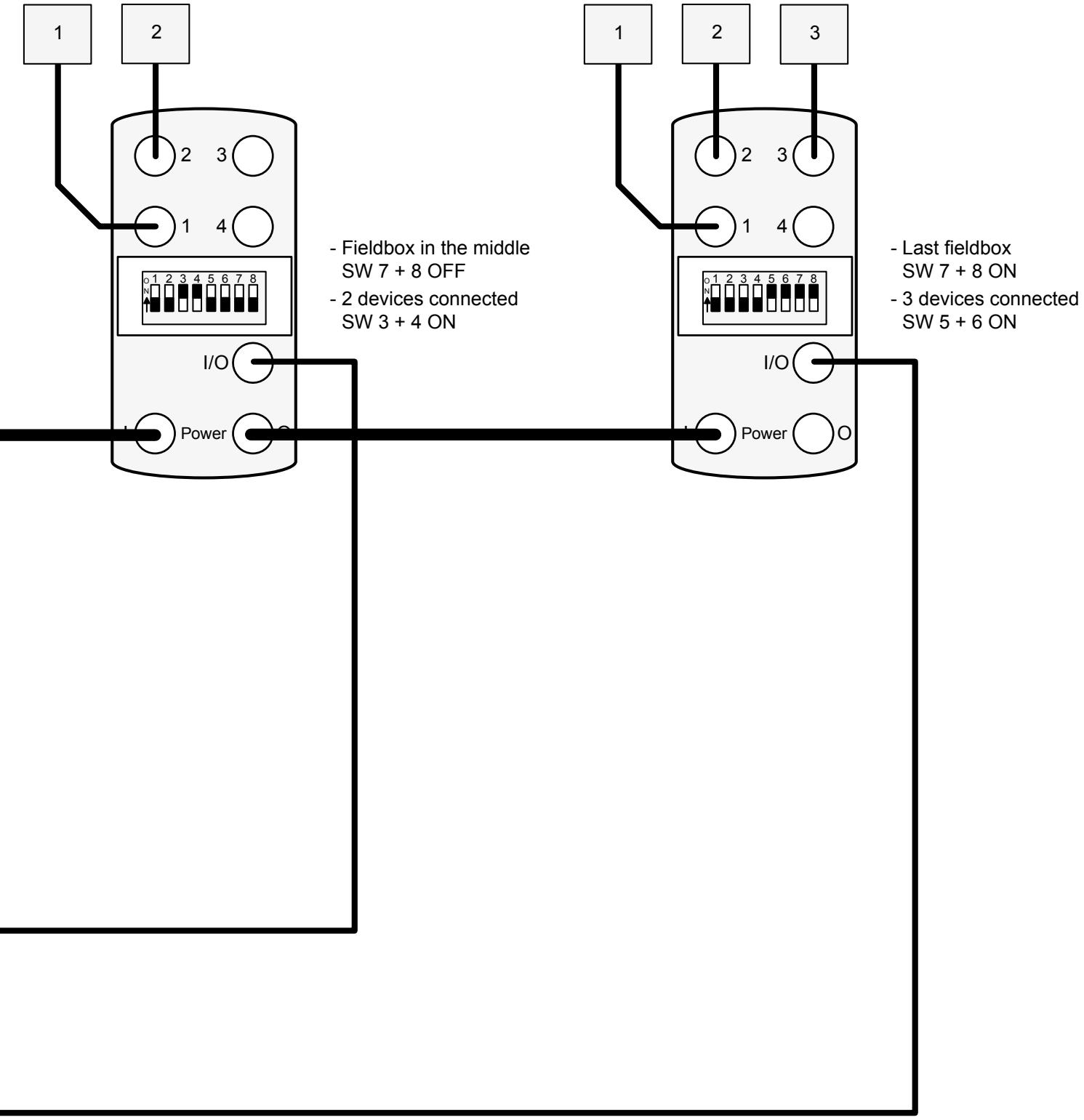
4.5.4 Connector configuration I/O of the fieldbox

PIN	Colour*	Signal	Description
1	WH	IN 1	Solenoid control of the device connector 1
2	BN	OUT 1	Diagnostics signal of the device connector 1
3	GN	IN 2	Solenoid control of device connector 2
4	YE	OUT 2	Diagnostics signal of the device connector 3
5	GY	IN 3	Solenoid control of the device connector 3
6	PK	OUT 3	Diagnostics signal of device connector 3
7	BU	IN 4	Solenoid control of device connector 4
8	RD	OUT 4	Diagnostics signal of device connector 4

* Colour codes of the device connector

4.6 Wiring example




1
2
2
3
1
4
ON 1 2 3 4 5 6 7 8
I/O
Power
- Fieldbox in the middle
SW 7 + 8 OFF
- 2 devices connected
SW 3 + 4 ON
1
2
3
2
3
1
4
ON 1 2 3 4 5 6 7 8
I/O
Power
O
- Last fieldbox
SW 7 + 8 ON
- 3 devices connected
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 safety function, the DIP switch configuration and correct installation must be checked by the responsible safety specialist / safety representative.

5.2 Maintenance

If installed correctly and used as intended, the passive fieldbox requires no maintenance.

6. Disassembly and disposal

6.1 Disassembly

The passive fieldbox may only be removed when de-energised.

6.2 Disposal

The passive fieldbox is to be disposed of in the correct manner as per the national regulations and legislation.

7. Configuration

7.1 Configuration examples

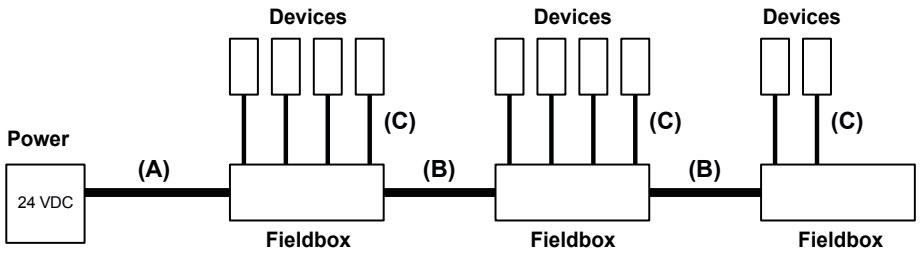
3 configurations are shown respectively for the different SCHMERSAL devices. One configuration with long cable lengths (maximum), one configuration with medium cable lengths (medium) and one configuration with shorter cable lengths (small).

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
- 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 fieldbox as well as between the 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 cable (A) until 1st fieldbox	Length of cables (B) between the fieldboxes	Length of stub cables (C) for device connection
AZM 200 / Maximum	10	2.5	10.0 m	10.0 m	7.5 m
AZM 200 / Medium	12	3	7.5 m	7.5 m	5.0 m
AZM 200 / Small	16	4	7.5 m	5 m	3.5 m
MZM 100 / Maximum	12	3	10.0 m	10.0 m	7.5 m
MZM 100 / Medium	16	4	7.5 m	7.5 m	5.0 m
MZM 100 / Small	18	4.5	7.5 m	5 m	3.5 m
AZM 300 / Maximum	16	4	10.0 m	10.0 m	7.5 m
AZM 300 / Medium	20	5	7.5 m	7.5 m	5.0 m
AZM 300 / Small	24	6	7.5 m	5 m	3.5 m
RSS & CSS / Maximum	28	7	10.0 m	10.0 m	7.5 m
RSS & CSS / Medium	32	8	7.5 m	7.5 m	5.0 m
RSS & CSS / Small	36	9	7.5 m	5 m	3.5 m
Mixed / Maximum	16	4	10.0 m	10.0 m	7.5 m
Mixed / Medium	18	4.5	7.5 m	7.5 m	5.0 m
Mixed / Small	22	5.5	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



K. A. Schmersal GmbH & Co. KG
Möddinghofe 30, D - 42279 Wuppertal
Postfach 24 02 63, D - 42232 Wuppertal

Phone: +49 - (0)2 02 - 64 74 - 0
Telefax: +49 - (0)2 02 - 64 74 - 1 00
E-Mail: info@schmersal.com
Internet: http://www.schmersal.com