Operating instructions
Safety fieldbox

SCHMERSAL

EN Operating instructions. . . . . .pages 1 to 12
Original

Content

---

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 safety fieldbox. The operating instructions must be available in a legible condition and a complete version in the vicinity of the device. For additional information please refer to the manual "Safety Field Box SFB-EIP".

1.2 Further applicable documents
Enter search term "SFB-EIP" in the Schmersal Online Catalogue at: **products.schmersal.com**.
• Manual: Safety Field Box SFB-EIP
• Operating instructions: Safety Field Box SFB-EIP
• EDS File

1.3 Target group: authorised qualified personnel
All operations described in this operating instructions and in the 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 the manual 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.

1.4 Explanation of the symbols used

| ℹ | **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. |

1.5 Appropriate use
Products in Schmersal's range are not intended to be used by private end 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 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".

x.000 / 05.2023 / v.A.   -   103015472-EN / B / 2023-06-05

1.6 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.

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.

1.7 Warning about misuse

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

1.8 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:

SFB-EIP-8M12-IOP

Option	Description
SFB	Safety fieldbox
EIP	EtherNet/IP
8M12	8 device ports for M12 connector, 8-pole
IOP	Device connection: IO parallel

2.2 Purpose

The SFB-EIP-8M12-IOP safety fieldbox is designed for connection of up to 8 safety switchgear units with parallel IO signals to a EtherNet/IP / CIP Safety network.
A maximum of 4 BDF200-FB control panels can be connected.

⚠️ Only safety switchgears are allowed to be connected for which the feedback of an external voltage can be safely excluded.

The safety signals from the connected safety switchgear are forwarded to a safety controller via the safety field bus for evaluation.
For larger safety applications, multiple fieldboxes can be connected to the power supply and field bus in series.

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

The non-safe IO signals of the connected devices are connected to the control system via the field bus.

Safety switchgear with parallel IO signals can be connected to device ports X0 - X7.
BDF200-FB control panels can only be connected to device ports X4 - X7.

ℹ️ **Manual: Safety fieldbox SFB-EIP**
Further information on the commissioning of the safety SFB-EIP fieldbox can be found in the manual.

ℹ️ **EDS file for safety fieldbox SFB-EIP**
The EDS file for the SFB-EIP can be found on the internet at **products.schmersal.com** after searching 'SFB-EIP'.
An EDS file is also saved in the device. The file can be downloaded via the integrated web server (see 'Info' page).

2.3 Technical data

Standards:	EN 61131-1, EN 61131-2, EN 60947-5-3 EN ISO 13849-1, IEC 61508
Time to readiness:	≤ 12 s
Reaction Time Safety Input SFB:	≤ 20 ms
Reaction Time Safety Output SFB:	≤ 50 ms
Device Watchdog Time SFB:	12 ms
Materials:	
- Enclosure:	polyamide / PA 6 GF
- Viewing window:	polyamide / PACM 12
- Encapsulation:	polyurethane / 2K PU
- Labelling plates:	polyamide / PA
Mechanical data	
Electrical connection version:	Built-in socket / connector
- Device ports X0 - X7:	M12/8-pole, A-coded
- Power I/O:	M12-POWER/4-pole, T-coded
- EtherNet/IP P1/P2:	M12/4-pole, D-coded
M12 connector tightening torque:	min. 0.8 Nm / max. 1.5 Nm
- Recommended for Schmersal cables:	1.0 Nm
Fixing screws:	2 x M6
- Tightening torque:	max. 3.0 Nm
Viewing window screws:	2 x Torx 10
- Tightening torque:	0.5 … 0.6 Nm
Ambient conditions	
Ambient temperature:	−25 °C … +55 °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
Degree of protection:	IP66/IP67 acc. EN 60529
Installation altitude above sea level:	max. 2,000 m
Protection class:	III
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
Electrical data – Power I/O	
Supply voltage U_B:	24 VDC -15% / +10% (stabilised PELV mains unit)
Current consumption SFB:	200 mA
Rated operating voltage U_e:	24 VDC
Rated operating current I_e:	10 A (external fuse protection required)
Device fuse rating:	≤ 10 A slow blow when used to UL 61010

🅲🆄🅻🆄🆂 Adapters providing field wiring means are available from the manufacturer. Refer to manufacurer's information.
Use power cables with minimum AWG14, 80°C, 24Vdc rating.
UL 248 fuse (slow blow) or UL 489 Circuit breaker, rated max. 10 A or equivalent.

Electrical data – Device ports X0 - X7:

Maximum cable length:	30 m
Safety inputs:	**X1 and X2**
Switching thresholds (acc. EN 61131, type 1):	−3 V … 5 V (Low)
	13 V … 30 V (High)
Current consumption per input:	< 10 mA / 24 V
Permissible residual drive current:	< 1.0 mA
Accepted test pulse duration on input signal:	0.01 ms … 1.0 ms
- With test pulse interval of:	20 ms … 120 s
Classification:	ZVEI CB24I

Sink:	C1		Source:	C1	C2	C3

Test pulse outputs: **Y1 and Y2**

Switching elements:	p-type, short-circuit proof
Rated operating voltage U_e:	24 VDC
Rated operating current I_e:	Y1: 15 mA
	Y2: 10 mA at 24 V/30 mA at GND
Leakage current I_r:	≤ 0.5 mA
Voltage drop U_d:	≤ 1 V
Test pulse duration:	≤ 1 ms
Test pulse interval:	500 ms
Classification:	ZVEI CB24I

Source:	C1		Sink:	C1		

Digital output: **DO**

Switching elements:	2 p-type, short-circuit proof
Utilisation category:	DC-12 / DC-13
Rated operating voltage U_e:	24 VDC
Rated operating current I_e:	0.8 A
Leakage current I_r:	≤ 0.5 mA
Voltage drop U_d:	≤ 2 V
Inductive load:	≤ 400 mH
Switching frequency output:	≤ 1 Hz
Test pulse duration:	≤ 1 ms
Test pulse interval:	15 … 500 ms
Classification:	ZVEI CB24I

Source:	C1		Sink:	C1		

Diagnostics input/FB interface: **DI**

Switching thresholds:	−3 V … 5 V (Low)
	13 V … 30 V (High)
Current consumption per input:	< 12 mA / 24 V
Permissible residual drive current:	< 1.0 mA
Input debounce filter:	10 ms
FB interface data transmission rate:	19.2 kBaud
Power supply devices:	**A1 and A2**
Rated operating voltage U_e:	24 VDC
Rated operating current I_e:	0.8 A
Device port line fuse:	1.5 A
	(integrated automatic resettable fuse)

Electrical data – EtherNet/IP P1/P2:

Field bus protocol:	EtherNet/IP / CIP Safety
Specification:	
- EtherNet/IP:	V1.27
- Supported options:	DLR
- CIP Safety	V2.22
Transmission rate:	100 Mbit/s Full Duplex
Addressing:	via DHCP / BootP
Integrated switch:	Dual port, 100 Mbit/s
Supported EtherNet/IP services:	LLDP
Service interface:	Web interface HTTP

LED indications:

8 x LED green/red 'E':	Error LED, device port
8 x LED yellow 'I':	Input LED, device port
2 x LED green 'L':	Link LED, Ethernet port
2 x LED yellow 'A':	Activity LED, Ethernet port
1 x LED green/red 'MS':	Module Status LED
1 x LED green/red 'NS':	Network Status LED
1 x LED green/red 'Err':	Error LED, fieldbox
1 x LED green 'Pwr':	Power LED, fieldbox

⚠ 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.

⚠ The sum of the total current of the individual device ports X0 – X7 for outputs A1 (power supply to devices) and DO (digital output) should not exceed 850 mA.

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

2.4 Safety classification
- Safety inputs, 2-channel:

Standards:	EN ISO 13849-1, IEC 61508, EN 62061
PL:	e
Control Category:	4
DC:	99 %
PFH:	1.7×10^{-9} /h
PFD_{avg}:	1.5×10^{-4}
SIL:	suitable for SIL 3 applications
Mission time:	20 years
Response time of local safety input > EtherNet/IP:	20 ms

The SFB fulfills the requirements as PDDB according to EN 60947-5-3 in combination with magnetic sensors (2 NC contacts) up to PL e / SIL 3.

- Safety inputs, 1-channel:

Standards:	EN ISO 13849-1, IEC 61508, EN 62061
PL:	d
Control Category:	2
DC:	90 %
PFH:	2.3×10^{-7} /h
PFD_{avg}:	2.0×10^{-2}
SIL:	suitable for SIL 1 applications
Mission time:	20 years
Response time of local safety input > EtherNet/IP:	20 ms
Test interval for error detection:	10 s

- Safety outputs, 1 wire (PL d):

Standards:	EN ISO 13849-1, IEC 61508, EN 62061
PL:	d
Control Category:	3
DC:	90 %
PFH:	1.0×10^{-7} /h
PFD_{avg}:	8.8×10^{-3}
SIL:	suitable for SIL 2 applications
Mission time:	20 years
EtherNet/IP reaction time > local safety output:	50 ms

- Safety outputs, 2 wires (PL e):

Standards:	EN ISO 13849-1, IEC 61508, EN 62061
PL:	e
Control Category:	4
DC:	99 %
PFH:	1.8×10^{-9} /h
PFD_{avg}:	1.6×10^{-4}
SIL:	suitable for SIL 3 applications
Mission time:	20 years
EtherNet/IP reaction time > local safety output:	50 ms

ℹ The PFH values already include an additional factor of 0.5×10^{-9} /h for the network.

Safety response times, SFB-EIP
The overall reaction time of a safety function is made up of the following:
• Reaction time of the connected safety switchgear
• Reaction time safety fieldbox SFB-EIP
• Reaction time Safety Controller, incl. transmission time field bus
• Reaction time of Output
• Reaction time of safety shut-off element (actuator)

⚠ In addition to the maximum reaction times of the SFB-EIP, the response times of the connected safety switchgear, the determined "Connection Reaction Time Limit", the reaction time of output and the reaction times of other components, as for example actuators, must be taken into calculation.

⚠ The maximum acceptable response times of the safety functions are defined in the risk analysis of the machine.

3. Mounting

⚠ The field box must be installed in a way that only authorised specialist personnel can access it.
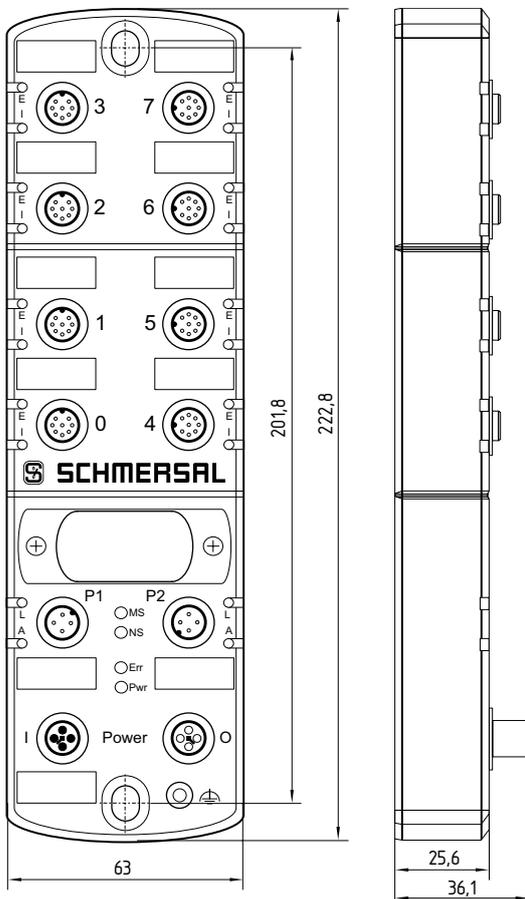
3.1 General mounting instructions
Fasten fieldbox with two M6-screws on a flat mounting surface, for mechanically strain-free installation. The maximum tightening torque is 3.0 Nm. Any mounting position.

⚠ Do not install fieldbox outside closed rooms.

3.2 Dimensions
All measurements in mm.

3.3 Accessories
Further accessories can be found under the search term "SFB-EIP" in the Schmersal Online Catalogue at **products.schmersal.com**.

3.3.1 Pre-wired and connecting cables

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
10.0 m	Connecting cable, male / female connectors	103013125
15.0 m	Connecting cable, male / female connectors	103038984
20.0 m	Connecting cable, male / female connectors	103038566
30.0 m	Connecting cable, male / female connectors	103038567

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
20.0 m	Pre-wired cable, female connector	103038975
30.0 m	Pre-wired cable, female connector	103038976
1.5 m	Connecting cable, male / female connectors	103025136
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
10.0 m	Connecting cable, male / female connectors	103038978

Ethernet – Cable M12, 4 poles, straight, D-coded, shielded		
5.0 m	Connecting cable, RJ45 to connector M12	103013435
7.5 m	Connecting cable, RJ45 to connector M12	103013436
10.0 m	Connecting cable, RJ45 to connector M12	103013437
20.0 m	Connecting cable, RJ45 to connector M12	103038980
1.5 m	Connecting cable, male / male connectors	103038982
3.0 m	Connecting cable, male / male connectors	103013438
5.0 m	Connecting cable, male / male connectors	103013439
7.5 m	Connecting cable, male / male connectors	103013440
10.0 m	Connecting cable, male / male connectors	103038983

3.3.2 Adapter cables

M12-Adapter cables, 8 poles to 4 poles		
2.5 m	VFB-SK8P/4P-M12-S-G-2,5M-BK-2-X-A-4	103032864
5.0 m	VFB-SK8P/4P-M12-S-G-5M-BK-2-X-A-4	103032865

Y-Adapter cables for Schmersal AOPD		
1.0 m	SFB-Y-SLCG-COM-8P-S-G-1M-BK-2-X-A-4	103032866
1.0 m	SFB-Y-SLCG-8P-S-G-1M-BK-2-X-A-4	103032867

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	103035090

EN

SCHMERSAL

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 safety fieldbox, M12 power connectors, cables with a cross-section of max. 1.5 mm² can be connected to the fieldbox.

⚠️ In case of a fault, a voltage of up to 60 V can be applied to the device ports.

4.2 Notes for replacing the device

ℹ️ **The replacement device must be in the factory settings!** If necessary, perform a "factory reset" without the memory stick inserted (s. a. Manual SFB-EIP).

To replace a defective SFB, follow the steps below:
• Bring the machine and the SFB into a de-energised state.
• Set the rotary coding switch on the replacement device to the selected IP mode.
• Carefully pull the memory stick out of the defective SFB-EIP.
• Insert the memory stick into the replacement device
• Connect network cables and power supply to replacement device
• Power up the SFB-EIP
  – After a short boot phase, the SFB will acknowledge the acceptance of the network parameters with 3 times GREEN flashing of the module error LED (Err) and will change to RUN mode.
  – If the module error LED (Err) flashes 3 times RED, the replacement device was not reset to factory settings!
    The module error LED (Err) then flashes fast with 3 Hz RED.
    Remove the memory stick and execute a factory reset with the SFB.
    Then try to replace the device again as described above.
• Close the viewing window, mount and install the unit
• Put the system and SFB back into operation

⚠️ The safety functions, configuration of the safety fieldbox and correct installation must be checked by a responsible safety specialist/safety representative.

### 4.3 Power supply and fuse protection

The supply voltage of the safety fieldbox is to be protected with a fuse of 10 A. In order to increase the cable cross section for the supply voltage of the fieldbox, both connections from Us and GND must be connected in parallel. Pins 1 + 4 and 2 + 3 in the fieldbox are bridged.
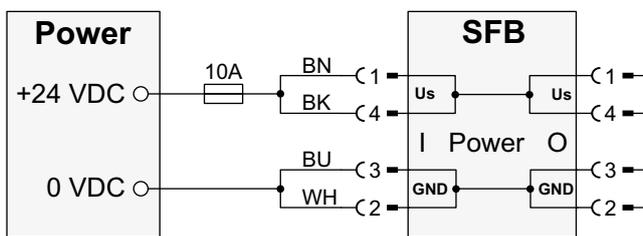
4.4 Internal fuse elements device ports

The device ports X0 - X7 are designed for 0.8 A continuous current and equipped in each case with an auto-resettable fuse of 1.5 A for line protection. If the fuse element is triggered, the red LED on the device port flashes with 4 pulses.
After eliminating the overload at one of the device ports, the fuse resets itself after a short cool-down phase.
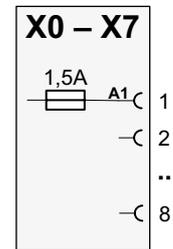
4.5 Earth concept and shielding
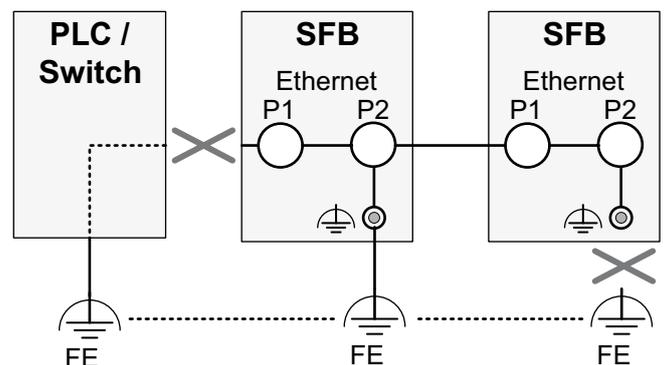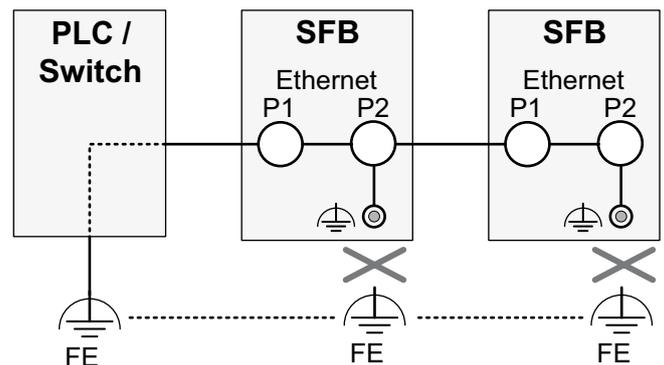
A functional earth is connected for fault-free operation of the safety fieldbox. Earth loops must be avoided when connecting the functional earth.

The FE functional earth is normally connected via the switch. In the event of EMC problems, the fieldbox can be earthed via the separate FE connection.
An earth strap is available as an accessory.

Wiring examples for avoidance of earth loops:

4.6 Overview of connections and LED indicators

Device port X0 – X3

Device port X4 – X7

with FB interface
for BDF200-FB

Error LED X3
Device port X3
Input LED X3

Error LED X7
Device port X7
Input LED X7

Error LED X2
Device port X2
Input LED X2

Error LED X6
Device port X6
Input LED X6

Error LED X1
Device port X1
Input LED X1

Error LED X5
Device port X5
Input LED X5

Error LED X0
Device port X0
Input LED X0

Error LED X4
Device port X4
Input LED X4

SCHMERSAL

Rotary coding switch
Safety address

Link P1 LED
Ethernet port P1
Activity port P1 LED
Fieldbox error LED
Fieldbox power LED

Link P2 LED
Ethernet port P2
Activity port P2 LED
LED Module Status
LED Network Status

P1   P2
MS
NS
Err
Pwr

Power-IN port

Power-OUT port

Power

FE connection, fieldbox

4.7 Connector configuration of device ports X0 – X7

Version: M12 socket, 8-pin, A-coded

PIN	Colour*	Signal	Description of fieldbox signals
1	WH	A1	+ 24 VDC device supply
2	BN	Y1	Test pulse output 1, safety channel 1 supply
3	GN	A2	0 VDC device supply
4	YE	X1	Safety input 1
5	GY	DI	Diagnostic-input / FB-Interface
6	PK	Y2	Test pulse output 2, safety channel 2 supply
7	BU	X2	Safety input 2
8	RD	DO	Safe output

X4 – X7 additional with FB interface for BDF200-FB

⚠ The default setting is used for safety switchgear with electronic OSSDs. If safety switchgear with dry contacts are used, cross fault monitoring must be activated.
For safety switchgear with electronic OSSDs, cross fault detection of the device connection cable must be carried out by the safety switchgear.

4.8 Connector configuration POWER I/O

Version: M12 power connector/socket, 4-pin, T-coded

PIN	Colour*	Signal	Description of fieldbox signals	
1	BN	Us	+ 24 VDC SFB supply	(= PIN 4)
2	WH	GND	0 VDC SFB supply	(= PIN 3)
3	BU	GND	0 VDC SFB supply	(= PIN 2)
4	BK	Us	+ 24 VDC SFB supply	(= PIN 1)

4.9 Connector configuration EtherNet/IP P1/P2

Version: M12 socket, 4-pin, D-coded

PIN	Colour*	Signal	Description of fieldbox signals
1	YE	TD+	Transmit-Data +
2	WH	RD+	Receive-Data +
3	OG	TD-	Transmit-Data -
4	BU	RD-	Receive-Data -
Flange		FE	Ethernet shielding

* Colour code of SCHMERSAL M12 cables

4.10 Setting the IP-Mode and factory reset
Carefully remove the viewing window. (Screws Torx 10)

ℹ **The screws of the viewing window are not secured.**
Keep the screws safe so that they do not get lost.

⚠ **Caution!**
Electrostatically sensitive components.
Do not touch the printed circuit board directly.

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

The 3 rotary coding switches behind the viewing window can be used to set the IP address and to carry out a factory reset of the SFB.

x 100   x 10   x 1
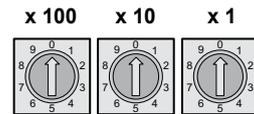
IP-Mode	Description
0 0 0	DHCP mode (Delivery condition)
0 0 1 … 2 5 4	Fixed IP address selected (Default IP address: 192.168.1.xxx)
8 8 8	Execute factory reset SFB
9 9 8	Transfer network parameters from SFB to memory stick
9 9 9	DHCP mode
2 5 5 … 8 8 7	**Switch positions without function!**
8 8 9 … 9 9 7	Module Error LED (Err) flashes 2 pulses RED

Select IP-Mode:
• Remove power from the SFB
• Select IP-Mode (DHCP or fixed IP address)
• Resupply power to the SFB

ℹ When the SFB-EIP is put into operation for the first time, the network parameters must then be setup using the BootP-DHCP tool (s. a. Manual SFB-EIP).

Carrying out an SFB factory reset:
• Bring the machine and the SFB into a de-energized state
• Check if memory stick is inserted, remove if necessary
• Set rotary coding switch to 8 8 8
• Supply SFB-EIP with power again
  – After a short boot phase, the SFB acknowledges the successful factory reset with 3 times GREEN flashing of the module error LED (Err). Afterwards the SFB changes to module error (shut-down)and the module error LED (Err) lights RED.
  – If the module error LED (Err) flashes RED fast with 3 Hz, the factory reset was not successful!
    Check the process and then try the factory reset again.
• Bring the SFB back to the de-energized state and set the rotary coding switch to the required IP mode again
• If necessary, insert memory stick again
• Close the viewing window, mount and install the unit
• Put the system and SFB back into operation

ℹ **More information about the issues:**
• Setting the IP mode
• Factory Reset
• Transfer network parameters from SFB to memory stick
can be found in the SFB-EIP manual.

5. Diagnostic functions

5.1 LED indicators, device ports X0 - X7
There are 2 LED indicators on each device port.
A green/red error LED and a yellow input LED to display the switching condition at the safety inputs.

Error LED (E)
The error LED may exhibit the following display and flashing pattern:

LED display		Description
GREEN	ON	No fault at device port
GREEN	Flashes	Device port fault can be acknowledged
RED	1 impulse	Safety input cross-fault
RED	2 impulses	Safety input fault
RED	3 impulses	Test pulse output fault
RED	4 impulses	Device supply overload
RED	5 impulses	Digital output overload
RED	6 impulses	Digital output fault
RED	7 impulses	FB interface fault (only device ports 4-7)

Input LED (I)
The input LED may exhibit the following display and flashing pattern:

LED display		Description
YELLOW	OFF	Both safety inputs LOW
YELLOW	ON	Both safety inputs HIGH
YELLOW	Flashes	Only one safety input HIGH, or discrepancy/stable time fault

5.2 LED indicators, EtherNet/IP ports P1/P2
There are 2 LED indicators at the Ethernet ports.
A green link LED and yellow activity LED.

LED link (L)
The link LED may exhibit the following display and flashing pattern:

LED display		Description
GREEN	ON	Connection to Ethernet active

LED Activity (A)
The activity LED may exhibit the following display and flashing pattern:

LED display		Description
YELLOW	Flashes	Ethernet data transmission active

5.3 Central LED indicators, SFB-EIP
There are 4 LEDs for central diagnostics of the fieldbox. A green/red LED for the module status, a green/red LED for the network status, a green/red error LED and a green power LED.

Module Status LED (MS)
The module status LED may exhibit the following display and flashing pattern:

LED display		Description
GREEN	Flashes	Standby, waiting for connection
GREEN	ON	Operating
RED	Flashes	Parameterisation fault
RED	ON	Internal fault SFB

Network Status LED (NS)
The network status LED may exhibit the following display and flashing pattern:

LED display		Description
OFF		No IP address
GREEN	Flashes	Not connected
GREEN	ON	Connected
RED	Flashes	Connection timeout
RED	ON	Duplicate IP or Network fault

Fieldbox error LED (Err)
The error LED may exhibit the following display and flashing pattern:

LED display		Description
GREEN	ON	Field box in RUN
GREEN	Flashes	Module fault can be acknowledged
GREEN	3 flashes one time	Writing parameters or factory reset successful
RED	3 flashes one time	Replacement device is not reset to factory settings
RED	ON	Internal field box fault
RED	3 Hz flashing	Writing of network parameters or factory reset not successful
RED	1 impulse	Internal over temperature fault
RED	2 impulses	Invalid SNN / TUNID
RED	3 impulses	RPI time not valid
RED	4 impulses	Acknowledge impulse length fault
RED	5 impulses	Test pulse output overload fault
RED	6 impulses	Overvoltage fieldbox U > 29 V

Fieldbox power LED (Pwr)
The power LED may exhibit the following display and flashing pattern:

LED display		Description
GREEN	ON	Supply voltage of fieldbox OKAY
GREEN	1 Hz	Low voltage warning U < 20 V
GREEN	3 Hz	Low voltage fault U < 17 V
GREEN	OFF	Fieldbox switched off U < 12 V or U > 34 V

6. Set-up and maintenance

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

⚠️ The safety functions, configuration of the safety fieldbox and correct installation must be checked by a responsible safety specialist/safety representative.

6.2 Maintenance
The safety fieldbox operates error-free if installed and used properly.

7. Disassembly and disposal

7.1 Disassembly
Only disassemble the safety fieldbox if it is in de-energized state.

7.2 Disposal
Dispose of the safety fieldbox properly in accordance with national regulations and laws.

8. Annex system configuration

8.1 Configuration examples of the power supply
If the power supply of each fieldbox is separated and in a star configuration, the maximum cable length of a fieldbox series is limited only by the maximum permissible cable length of the field bus used.

If the power supply from fieldbox to fieldbox is looped through, the following maximum configurations apply.
3 different configurations are shown respectively for the different SCHMERSAL safety switchgear. 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 the power supply and the first fieldbox as well as the individual fieldboxes are the maximum lengths. Reducing the individual cable lengths is not critical.
• For interlocks, these designs are based on simultaneous activation of all lock and unlock functions. In the event of delayed activation of the lock and unlock function, larger systems are possible.

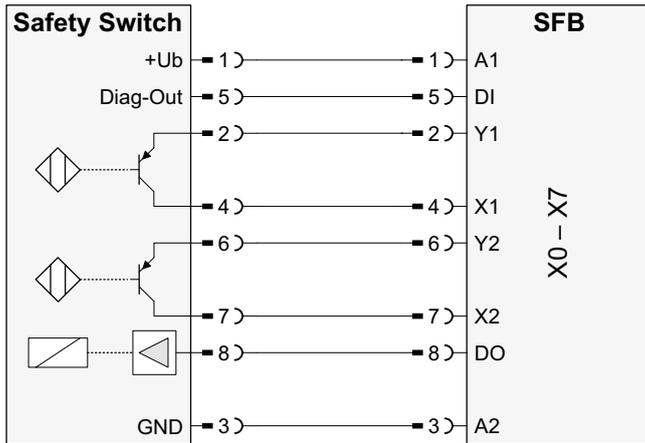| Device / configuration version	Max. number of devices	Equals number of fieldboxes	Length of the cable (A) up to the first fieldbox	Length of the cables (B) between the fieldboxes	Length of stub cables (C) for device connection
AZM 201 / Maximum	16	2	10.0 m	10.0 m	7.5 m
AZM 201 / Medium	20	2.5	7.5 m	7.5 m	5.0 m
AZM 201 / Small	24	3	7.5 m	5 m	3.5 m
MZM 100 / Maximum	20	2.5	10.0 m	10.0 m	7.5 m
MZM 100 / Medium	24	3	7.5 m	7.5 m	5.0 m
MZM 100 / Small	28	3.5	7.5 m	5 m	3.5 m
AZM 300 / Maximum	28	3.5	10.0 m	10.0 m	7.5 m
AZM 300 / Medium	32	4	7.5 m	7.5 m	5.0 m
AZM 300 / Small	40	5	7.5 m	5 m	3.5 m
AZM 400 / Maximum	16	2	10.0 m	10.0 m	7.5 m
AZM 400 / Medium	16	2	7.5 m	7.5 m	5.0 m
AZM 400 / Small	16	2	7.5 m	5 m	3.5 m
AZM 1xx / Maximum	20	2.5	10.0 m	10.0 m	7.5 m
AZM 1xx / Medium	24	3	7.5 m	7.5 m	5.0 m
AZM 1xx / Small	28	3.5	7.5 m	5 m	3.5 m
RSS & CSS / Maximum	48	6	10.0 m	10.0 m	7.5 m
RSS & CSS / Medium	56	7	7.5 m	7.5 m	5.0 m
RSS & CSS / Small	64	8	7.5 m	5 m	3.5 m
Mixed / Maximum	24	3	10.0 m	10.0 m	7.5 m
Mixed / Medium	28	3.5	7.5 m	7.5 m	5.0 m
Mixed / Small	32	4	7.5 m	5 m	3.5 m

Mixed fitting of fieldbox: 2 x AZM 201, 2 x MZM 100, 2 x AZM 300 and 2 x RSS / CSS
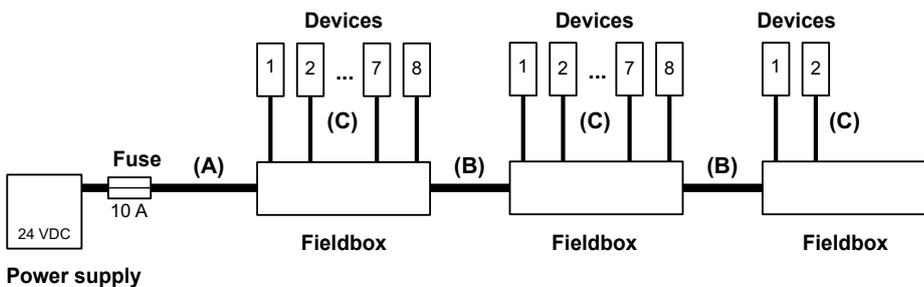
A useful design tool for calculating the real voltage drops is available on the Internet at **www.system-engineering-tool.com**
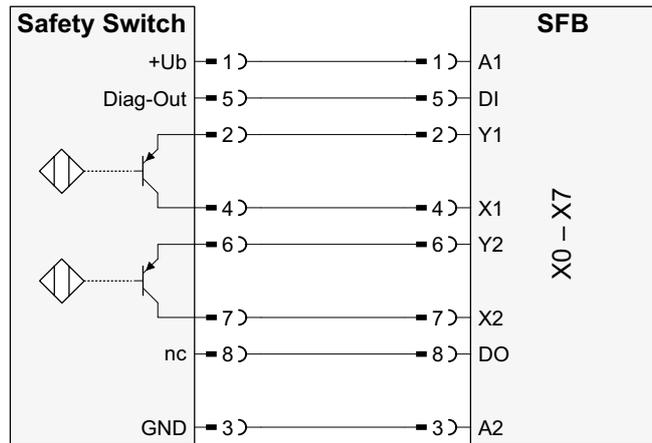
8.2 Wiring example of the safety switches

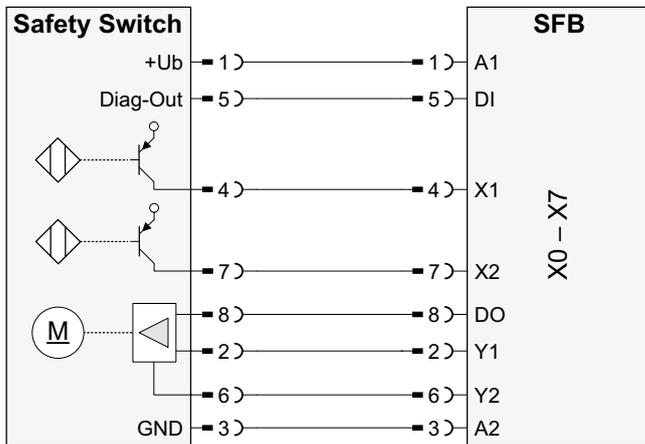**Electronic interlock, unlocking function via 1 wire**

Safety Switch				SFB	
+Ub	1	—	1	A1	
Diag-Out	5	—	5	DI	
	2	—	2	Y1	
	4	—	4	X1	X0 – X7
	6	—	6	Y2	
	7	—	7	X2	
	8	—	8	DO	
GND	3	—	3	A2	

SCHMERSAL devices: MZM100, AZM201, AZM300, AZM40, …

Electronic interlock, unlocking function via 2 wires

Safety Switch				SFB	
+Ub	1	—	1	A1	
Diag-Out	5	—	5	DI	
	4	—	4	X1	
	7	—	7	X2	X0 – X7
	8	—	8	DO	
	2	—	2	Y1	
	6	—	6	Y2	
GND	3	—	3	A2	

SCHMERSAL devices: AZM400, …

Electromechanical interlock, unlocking function via 1 wire

Safety Switch				SFB	
	1	—	1	A1	
Diag.	5	—	5	DI	
	2	—	2	Y1	
	4	—	4	X1	X0 – X7
	6	—	6	Y2	
	7	—	7	X2	
	8	—	8	DO	
	3	—	3	A2	
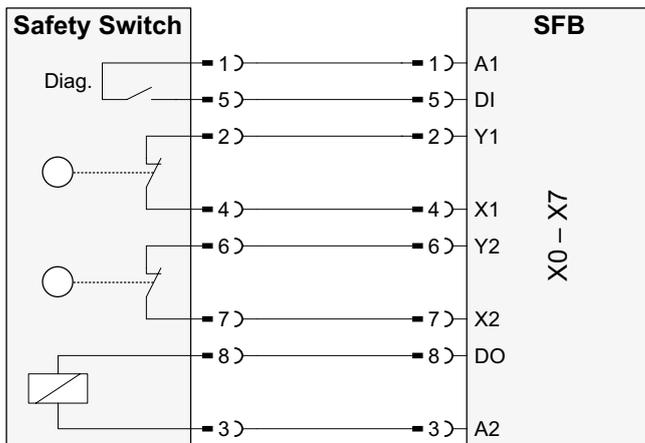
SCHMERSAL devices: AZM 161-FB, AZM 170-FB, AZM150-ST, …

Electronic sensor, 8-pin

Safety Switch				SFB	
+Ub	1	—	1	A1	
Diag-Out	5	—	5	DI	
	2	—	2	Y1	
	4	—	4	X1	X0 – X7
	6	—	6	Y2	
	7	—	7	X2	
nc	8	—	8	DO	
GND	3	—	3	A2	

SCHMERSAL devices: CSS series, RSS series, …

Electronic sensor, 4/5-pin

Safety Switch				SFB	
+Ub	1	—	1	A1	
Diag-Out	5	- - -	5	DI	
			2	Y1	
	2	—	4	X1	X0 – X7
			6	Y2	
	4	—	7	X2	
			8	DO	
GND	3	—	3	A2	

Different safety switchgear

Electronic E-STOP, BDF 200 FB, FB interface

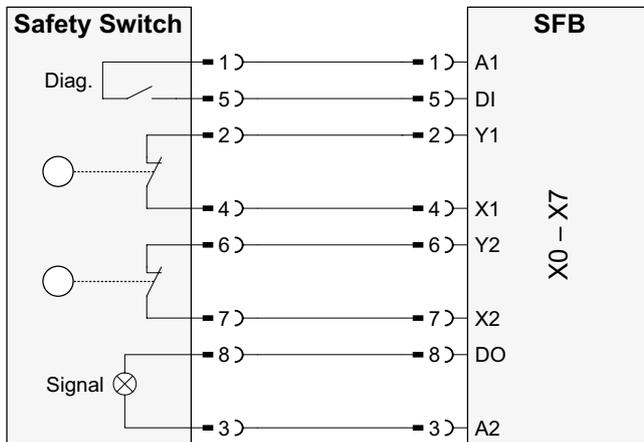| Safety Switch				SFB	
+Ub	1	—	1	A1	
FB-Interface	5	—	5	DI/FB	
	2	—	2	Y1	
	4	—	4	X1	X4 – X7
	6	—	6	Y2	
	7	—	7	X2	
nc	8	—	8	DO	
GND	3	—	3	A2	
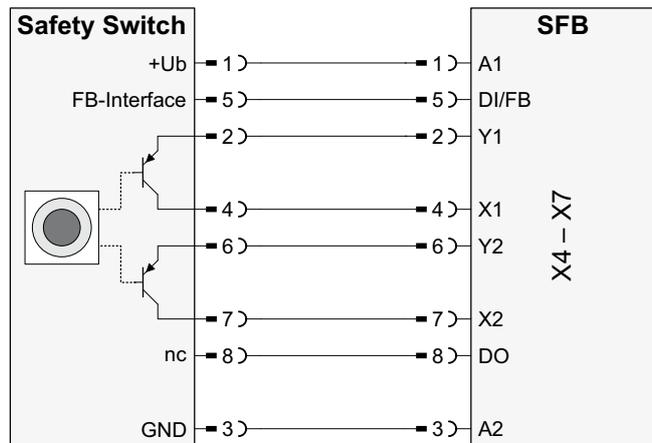
SCHMERSAL devices: BDF 200-FB, …

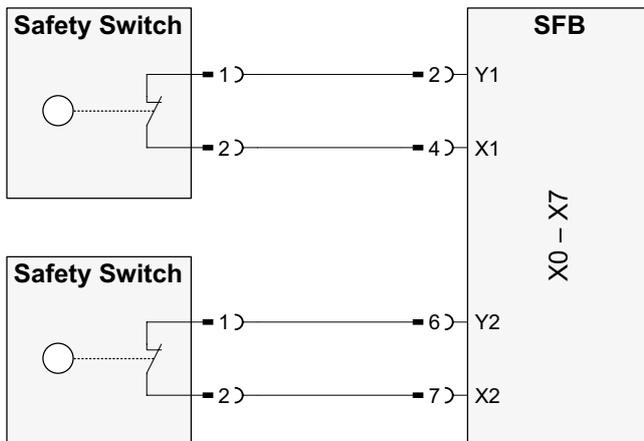**Electromechanical switches/sensors, 2-channel, 4-pin**
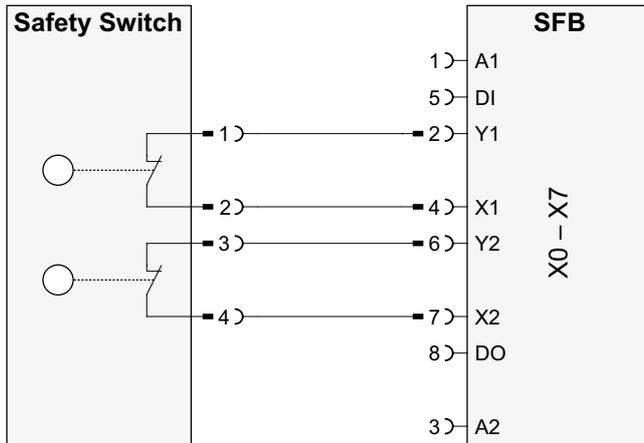
SCHMERSAL devices: BNS series, TESK, …

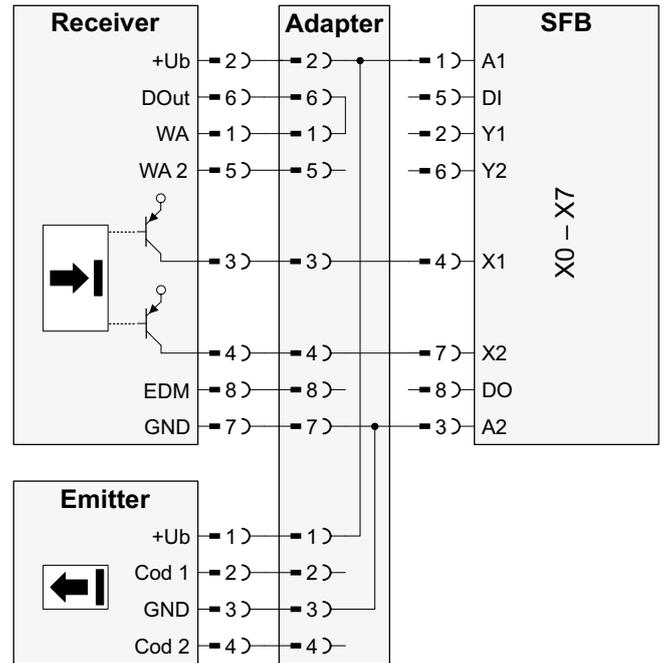**Electromechanical switches, 2-channel, 8-pin**

SCHMERSAL devices: BDF100-NH(K), AZ series, PS series, ZQ series, …

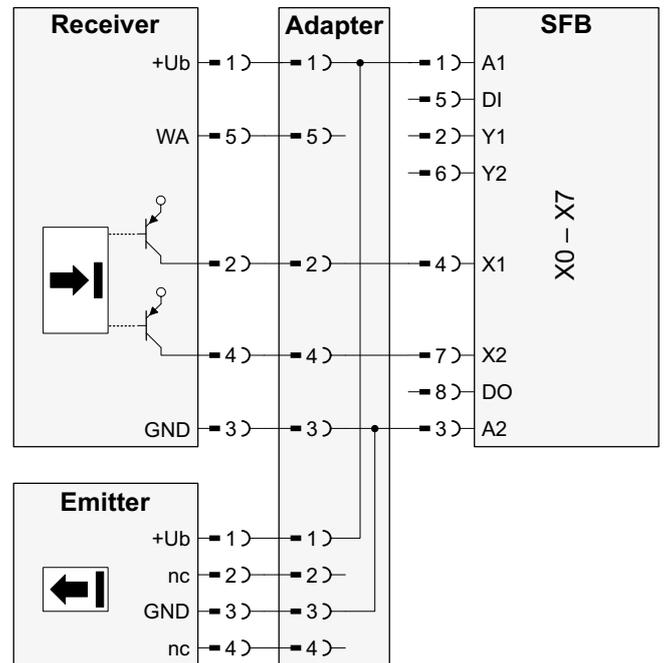**2 electromechanical switches, 1-channel, forcibly interrupted**

Different safety switchgear

Optoelectronic AOPD, 8-pin

SCHMERSAL devices: SLC 440, SLG 440, …

**Optoelectronic AOPD, 5-pin**

SCHMERSAL devices: SLC 440 COM, SLG 440 COM, SLB 440, …

 Other wiring examples can be found in the **'Manual: Safety Field Box SFB-EIP'** on the internet at **products.schmersal.com**.

9. EU Declaration of conformity

EU Declaration of conformity   **SCHMERSAL**

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: SFB-EIP

Type: See ordering code

Description of the component: Safety fieldbox (IO module with fieldbox interface)

Relevant Directives: 2006/42/EC   Machinery Directive
                                        2014/30/EU   EMC-Directive
                                        2011/65/EU   RoHS-Directive

Applied standards: EN 61131-2:2007
                                        EN 60947-5-3:2013
                                        EN ISO 13849-1:2015
                                        IEC 61508 parts 1-7:2010

Notified body for the prototype test: TÜV Rheinland Industrie Service GmbH
                                        Am Grauen Stein, 51105 Köln
                                        ID n°: 0035

EC-prototype test certificate: 01/205/5878.03/23

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

Place and date of issue: Wuppertal, June 5, 2023
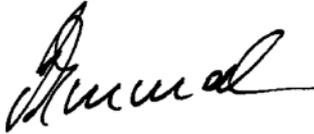
Authorised signature
Philip Schmersal
Managing Director

SFB-EIP-B-EN

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

K.A. Schmersal GmbH & Co. KG
Möddinghofe 30, 42279 Wuppertal
Germany
Phone: +49 202 6474-0
Telefax: +49 202 6474-100
E-Mail: info@schmersal.com
Internet: www.schmersal.com