Safety in system:
Protection vor man and machine

INSTALLATION SYSTEMS
FOR SAFE SERIES CONNECTION

SCHMERSAL
THE DNA OF SAFETY

INTRODUCTION

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Optimum safety solutions for your production processes

Based on the world's largest programme of safety switchgear, the Schmersal Group develops safety systems and safety solutions tailored to individual requirements. After all, it is not just about safeguarding individual machines but complex plant systems.

Having flexibility in production is becoming an increasingly important factor in today's production: The batch sizes are becoming smaller and there needs to be a fast and simple way to adapt the machines to changing products and market conditions. Of equal importance are high plant availability and overall cost-effective production.

But there need not be a conflict between economical operation and the highest level of safety, as our latest development shows: The Schmersal safety installation systems enable not just low cost wiring of safety switchgear in series but also highly variable safety architectures thanks to the combination of various components. Here, the "serial diagnostic" interface is used to transfer non-safe diagnostic data so that malfunctions and machine downtimes can be rectified quickly or avoided altogether.

Which path is the right one for your individual requirements? We will be happy to advise you – and our newly founded business area, tec.nicum, is a service that can provide assistance.

Talk to us – we look forward to working with you.

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DESCRIPTION OF SAFETY INSTALLATION SYSTEMS
INTRODUCTION

Schmersal safety installation systems

Schmersal safety installation systems are installation aids for fast, simple and thereby low cost wiring of safety switchgear in series.
The solutions are divided into two areas: **passive distributors and fieldboxes** for the connection of electronic safety switchgear as well as **active input expander modules** for the connection of safety switches and safety sensors with contact outputs or as electronic versions.

The **passive distributors** for installation in switching cabinets or terminal boxes and the **fieldboxes** for field wiring with protection class IP67 are suitable for series wiring of different kinds of **electronic safety switchgear** such as sensors and interlocks.
With the **passive installation systems** it is possible to realise **mixed series connection** of electronic safety sensors and interlocks from Schmersal. The distributors and fieldboxes are available in different versions for parallel IO wiring and for wiring to the Schmersal SD interface.

The **active input expander modules** are used for safe series connection of switches and sensors to contact outputs or electronic OSSD outputs. Within the active input expander modules, the individual switch contacts or OSSD outputs are reliably evaluated by an electronic system and as a series circuit safely AND-linked.

Passive distribution modules PDM

Passive fieldboxes PFB

Active input expander modules SRB-E

Schmersal SD-Interface

The "**S**eries **D**iagnostic" interface is used for transferring non-safe data where electronic safety switchgear is connected in series.

Safety sensors and interlocks that feature the SD interface can transfer extensive diagnostic data from the individual devices with series-wiring via the SD gateway and a field bus to a control system. Interlocks with series-wiring can also be locked or unlocked individually via the SD interface. There are additional control functions on some interlocks from Schmersal, such as the latching force adjustment on the MZM 100-SD.

A mixed installation of sensors and interlocks to form a safety function can be realised in the field easily with the SD interface. The diagnosis data and the actuating data are transferred in the SD interface in series via one wire from the SD gateway to the first SD slave, and from there to the next SD slave and so on. Addressing of the SD slaves takes place automatically. An SD gateway can communicate with up to 31 SD slaves. These 31 SD slaves can also be divided into several different safety functions.

Example SD data of solenoid interlock MZM 100-SD

Bit n°	Request byte	Response byte	Diagnosis message: Error warning	Diagnosis message: Error
Bit 0:	Magnet in, error reset	Safety output activated	Error output Y1	Error output Y1
Bit 1:	Latching force bit	Actuator detected	Error output Y2	Error output Y2
Bit 2:	Latching force bit	Solenoid interlock locked	Cross-wire short	Cross-wire short
Bit 3:	Latching force bit	–	Magnet temperature too high	Magnet temperature too high
Bit 4:	–	Input condition X1 and X2	Locking blocked or F < 500 N	Incorrect or defective actuator
Bit 5:	–	–	Internal device error	Internal device error
Bit 6:	–	Error warning	Communication error between the field bus gateway and the safety switchgear	Violent separation of actuator and solenoid interlock (only in connection with "Solenoid interlock monitored")
Bit 7:	Error reset	Error (enabling path switched off)	Operating voltage too low	Operating voltage too low

DESCRIPTION OF SAFETY INSTALLATION SYSTEMS
OVERVIEW

Passive distribution modules PDM

PDM

- Installation in a switching cabinet or in terminal boxes
- Mixed series connection possible of 1–4 electronic safety sensors or solenoid interlocks
- Several modules can be switched in series for more comprehensive safety functions
- Individual protection of safety switchgear for every device connection with auto-reset fuses
- Can be configured easily via DIP switches
- Individual diagnosis and actuation of connected safety switchgear
- Wiring via spring-type terminals suitable for 0.25–1.5 mm² / 10 A
- Compact design with a width of only 45 mm on the profile rail
- Versions available for parallel IO wiring and for SD interface

Passive fieldboxes PFB

PFB

- Heavy duty IP67 version for installation in the field
- Mixed series connection possible of 1–4 electronic safety sensors or solenoid interlocks with 8-pin M12 connector
- Several fieldboxes can be connected in series for more comprehensive safety functions
- Individual protection of safety switchgear for every device connection with auto-reset fuses
- Can be configured easily via DIP switches
- Individual diagnosis and actuation of connected safety switchgear
- Voltage supply via new M12 power plug with cross section of 1.5 mm² / 10 A
- Compact fieldbox with dimensions 63 mm x 156 mm
- Versions available for parallel IO wiring and SD interface

Active input expander modules SRB-E

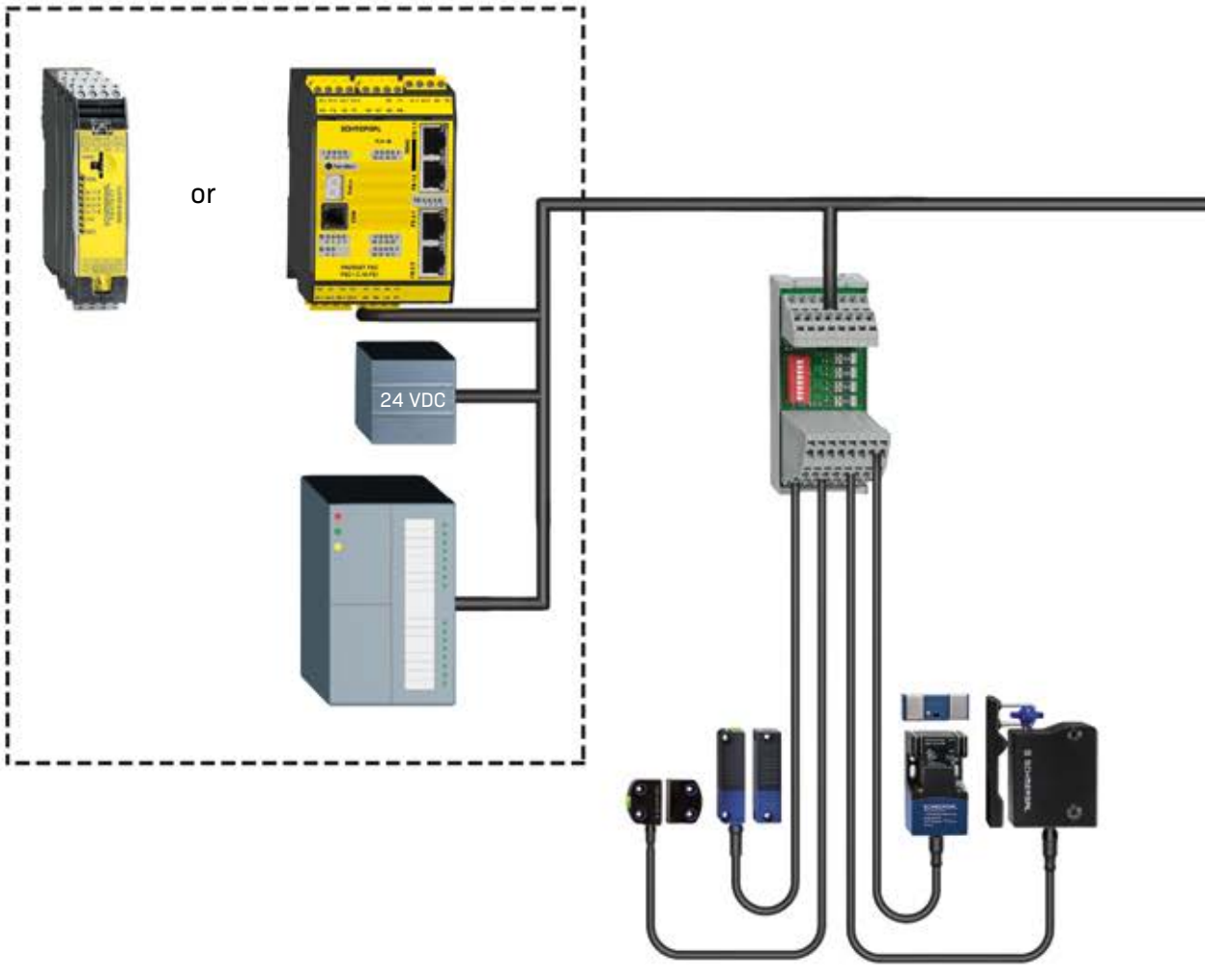
- Installation in a switching cabinet or in terminal boxes
- Mixed series connection possible of 1–4 safety switches or safety sensors with contact outputs or OSSD outputs
- Several modules can be switched in series for more comprehensive safety functions
- Active electronic evaluation of connected safety switchgear
- Safety level of cat. 4 / PL e / SIL 3 for series connection of switches and sensors with contact outputs
- Different contact configurations of switches and sensors can be selected
- Function settings can be configured easily via rotary switch
- Individual diagnosis of connected safety switchgear
- Removable screw-type terminals or spring-type terminals
- Compact module with a width of just 22.5 mm on the profile rail

PROTECT SRB-E-204PE

PDM-IOP
PASSIVE DISTRIBUTION MODULES FOR PARALLEL IO WIRING

Product advantages PDM-IOP-4CC-IOP

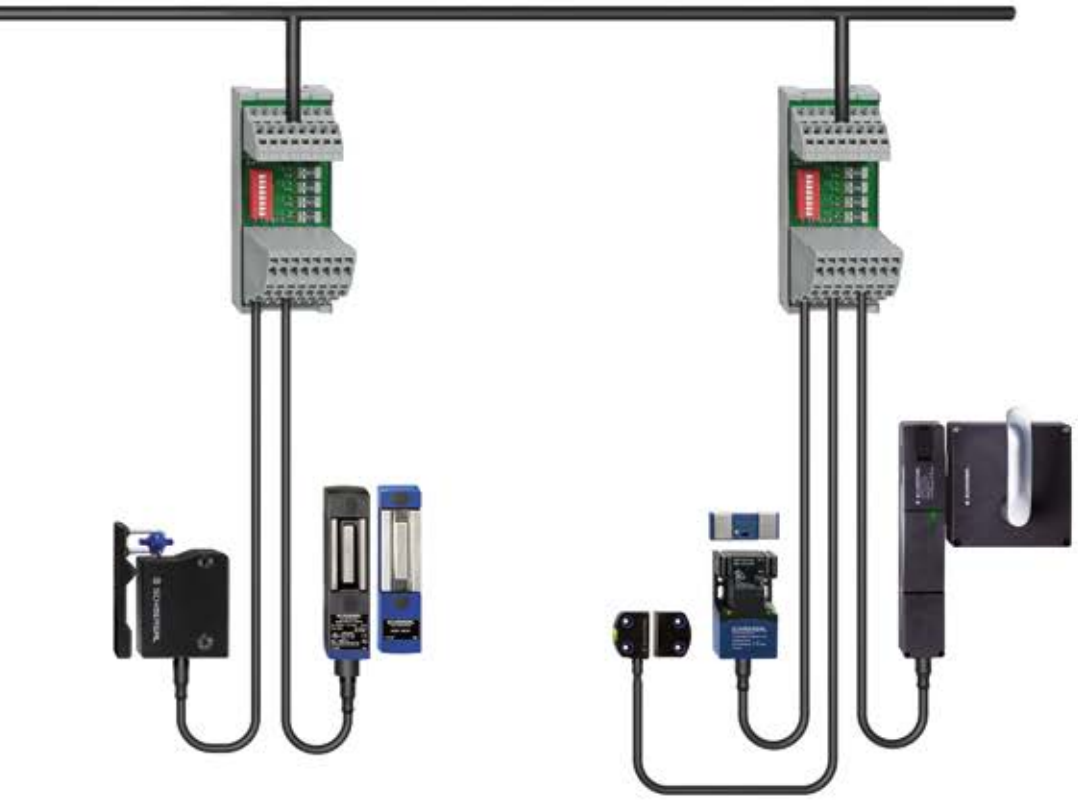
- Easy and low cost installation for electronic safety switchgear
- 1– 4 safety sensors or solenoid interlocks can be connected, mixed connection also possible
- Device is connected via 4 x 8-pin 4-layer spring-type terminal
- Simple configuration of number of devices via DIP switches
- Diagnosis signals from safety switchgear can be evaluated individually, solenoid interlocks can be actuated individually
- Direct and simple series connection of modules possible
- 10 A power supply to modules with a wire cross section of 1.5 mm²
- Individual protection of device connections with auto-reset fuses and indication of fuse status via LED
- PSC1 safety controllers or safety-monitoring modules can be used
- Compact version for installation in terminal boxes with a width of just 45 mm



Example layout of PDM-IOP with Schmersal safety switchgear

Type	Max. number of devices	Max. number of modules	Module to module wire	Wire to device
RSS sensors	36	9	max. 5 m to 10 m*	max. 3.5 m to 7.5 m*
AZM 300	24	6		
MZM 100	18	5		
AZM 200	16	4		

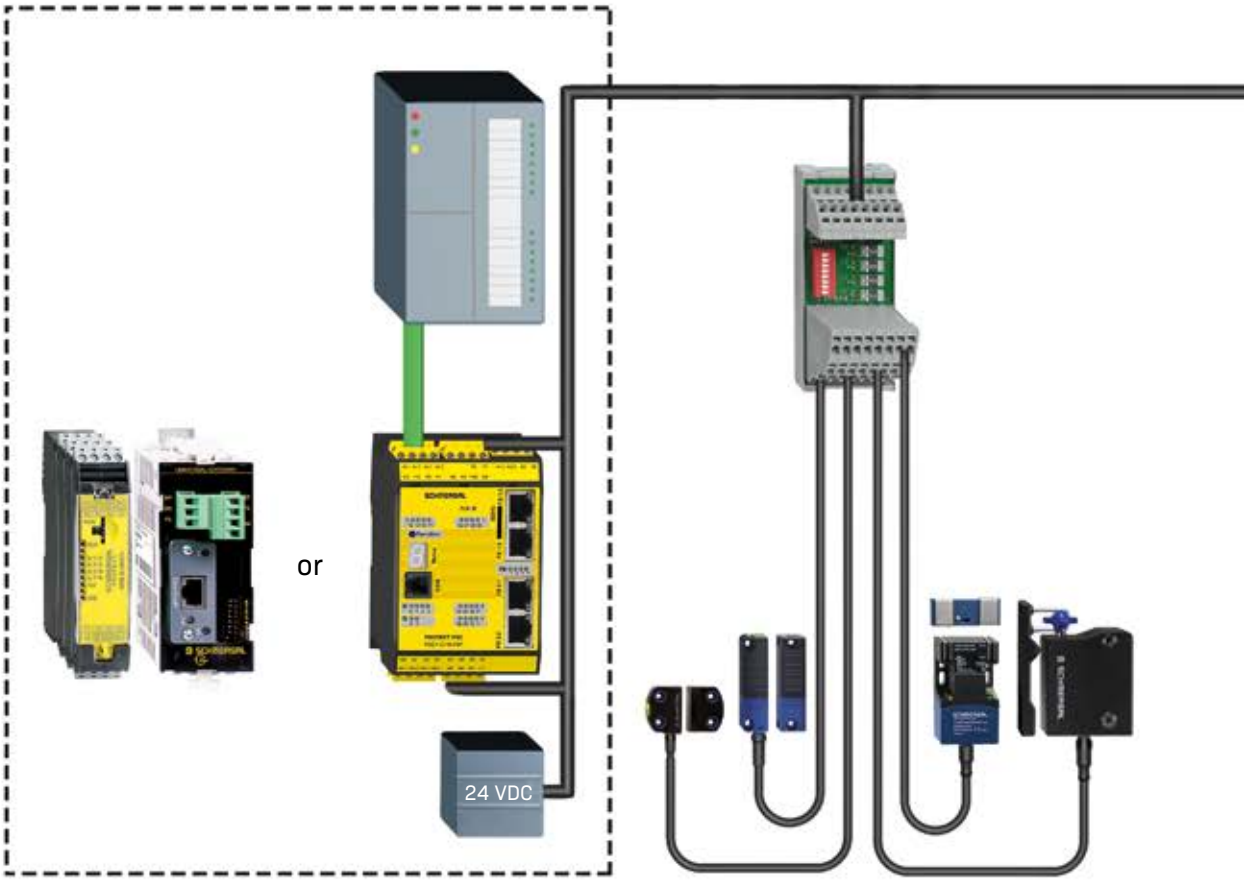
*Depends on number of devices



PDM-SD
PASSIVE DISTRIBUTION MODULES FOR SD-INTERFACE

Product advantages of PDM-SD-4CC-SD

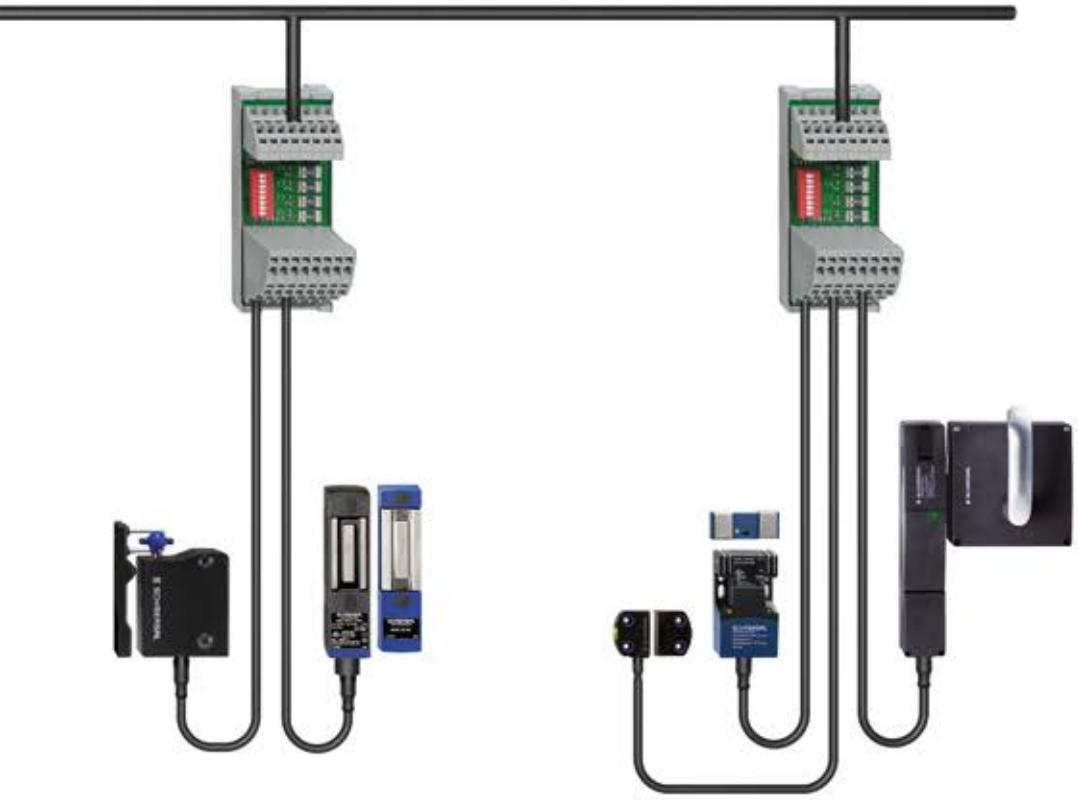
- Easy and low cost installation for electronic safety switchgear
- 1– 4 safety sensors or solenoid interlocks can be connected, mixed connection also possible
- Device is connected via 4 x 8-pin 4-layer spring-type terminal
- Simple configuration of number of devices via DIP switches
- Individual evaluation via SD interface of diagnostic signals from safety switchgear, solenoid interlocks can be actuated individually
- Direct and simple series connection of modules possible
- 10 A power supply to modules with a wire cross section of 1.5 mm²
- Individual protection of device connections with auto-reset fuses and indication of safety status via LED
- PSC1-FB safety controller or safety-monitoring modules can be used together with SD gateway
- SD gateways available for various field buses (PROFIBUS, PROFINET, EtherCAT, EthernetIP, CC-Link, Modbus TCP, DeviceNet, CANopen)
- Several independent safety functions can be realised with one SD gateway
- Compact version for installation in terminal boxes with a width of just 45 mm



Example layout of PDM-SD with Schmersal safety switchgear

Type	Max. number of devices	Max. number of modules	Module to module wire	Wire to device
RSS sensors	31	8	max. 5 m to 10 m*	max. 3.5 m to 7.5 m*
AZM 300	24	6		
MZM 100	18	5		
AZM 200	16	4		

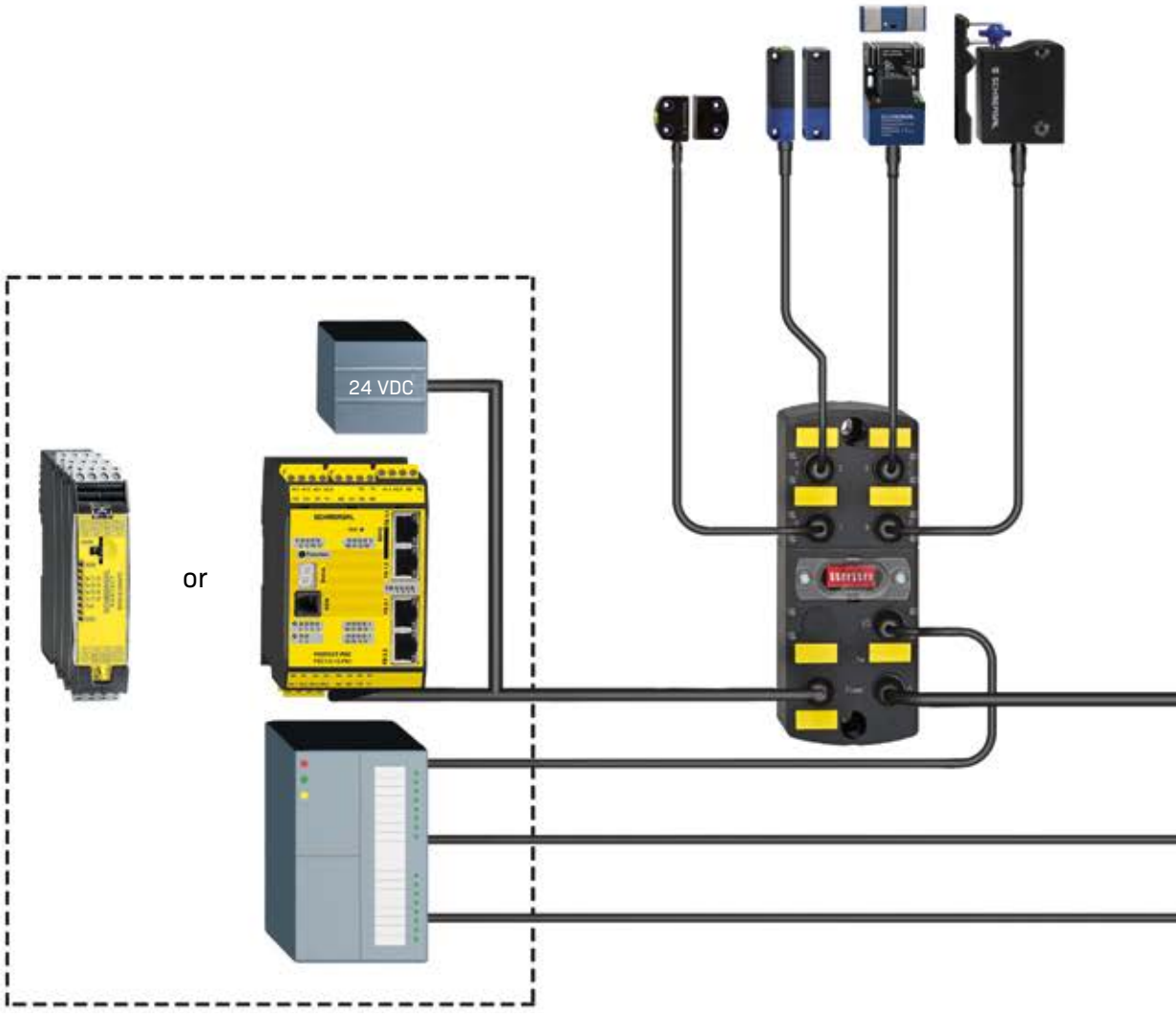
*Depends on number of devices



PFB-IOP
PASSIVE FIELDBOXES FOR PARALLEL IO WIRING

Product advantages of PFB-IOP-4M12-IOP

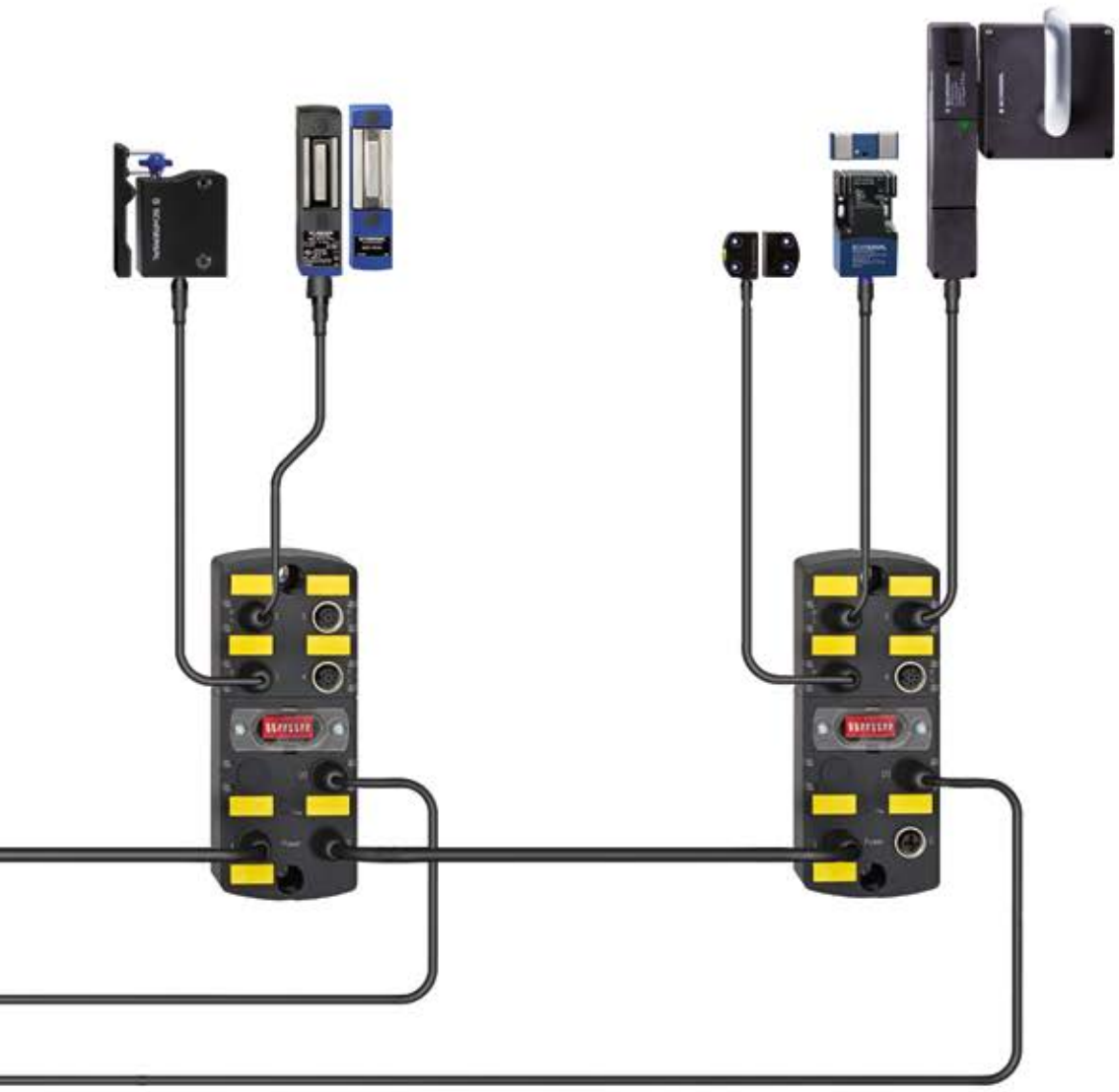
- Simple and low cost plug & play field installation for electronic safety switchgear from Schmersal
- 1– 4 safety sensors or solenoid interlocks can be connected, mixed connection also possible
- Device connected via 8-pin M12 connector
- Simple configuration of number of devices via DIP switches behind screw-on protective cover
- Individual evaluation of diagnostic signals from safety switchgear, solenoid interlocks can be actuated individually
- Direct and simple series connection of boxes in field possible
- 10 A power supply of fieldbox with cross section of 1.5 mm²
- Individual protection of device connections with auto-reset fuses
- Every device connection has diagnostic LEDs for checking the safety and status of the fuse
- PSC1 safety controllers or safety-monitoring modules can be used
- Heavy duty version with practice-orientated IP67 protection class
- Extensive range of accessories available



Example layout of PFB-IOP with Schmersal safety switchgear

Type	Max. number of devices	Max. number of boxes	Box to box wire	Wire to device
RSS sensors	36	9	max. 5 m to 10 m*	max. 3.5 m to 7.5 m*
AZM 300	24	6		
MZM 100	18	5		
AZM 200	16	4		

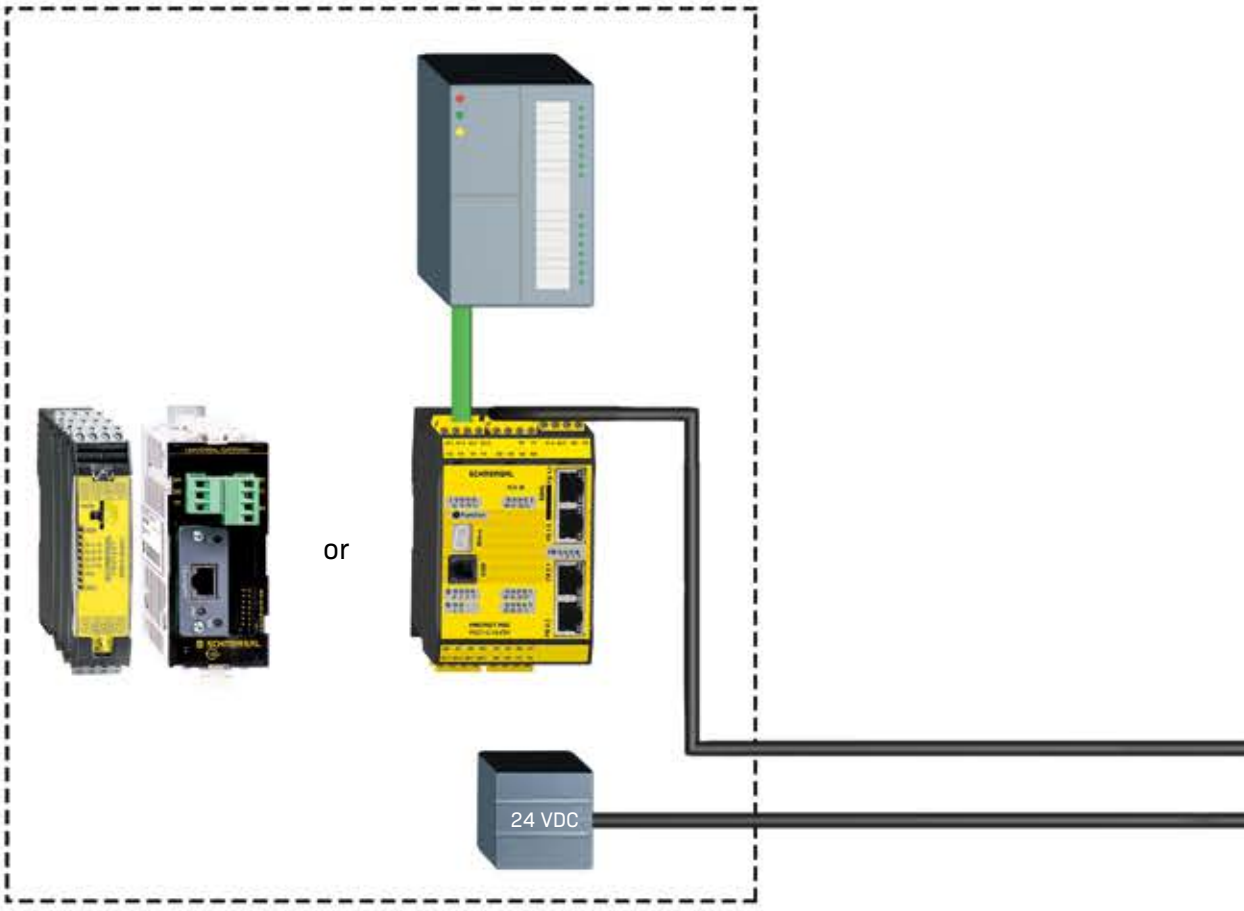
*Depends on number of devices



PFB-SD
PASSIVE FIELDBOXES FOR SD-INTERFACE

Product advantages of PFB-SD-4M12-SD

- Simple and low cost plug & play field installation for electronic safety switchgear from Schmersal
- 1– 4 safety sensors or solenoid interlocks can be connected, mixed connection also possible
- Device connected via 8-pin M12 connector
- Simple configuration of number of devices via DIP switches behind screw-on protective cover
- Individual evaluation via SD interface of diagnostic signals from safety switchgear, solenoid interlocks can be actuated individually
- Direct and simple series connection of boxes in field possible
- 10 A power supply of fieldbox with wire cross section of 2x 1.5 mm²
- Individual protection of device connections with auto-reset fuses
- Every device connection has diagnostic LEDs for checking the safety and status of the fuse
- PSC1-FB safety controller or safety-monitoring modules can be used together with SD gateway
- SD gateways available for various field buses (PROFIBUS, PROFINET, EtherCAT, EthernetIP, CC-Link, Modbus TCP, DeviceNet, CANopen)
- Several independent safety functions can be realised with one SD gateway
- Heavy duty version with practice-orientated IP67 protection class
- Extensive range of accessories available



Example layout of PFB-SD with Schmersal safety switchgear

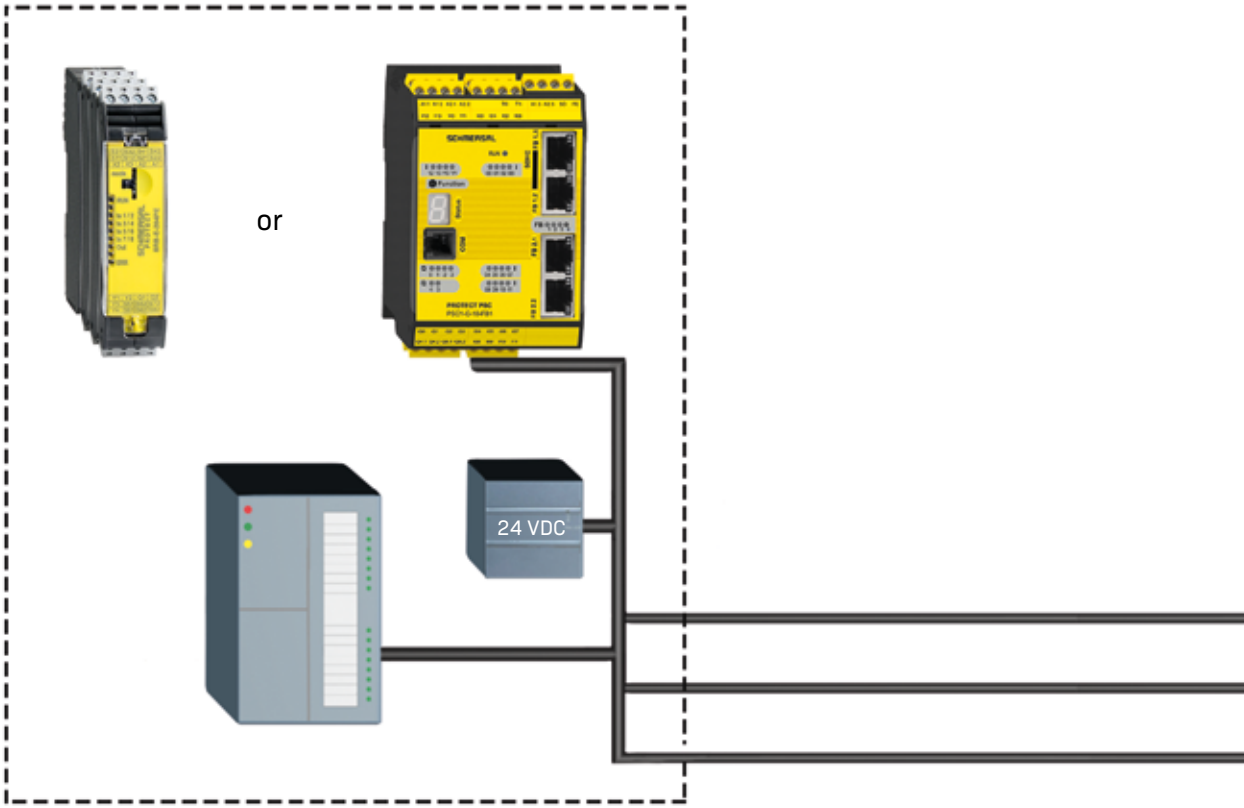
Type	Max. number of devices	Max. number of boxes	Box to box wire	Wire to device
RSS sensors	31	8	max. 5 m to 10 m*	max. 3.5 m to 7.5 m*
AZM 300	31	8		
MZM 100	26	7		
AZM 200	22	6		

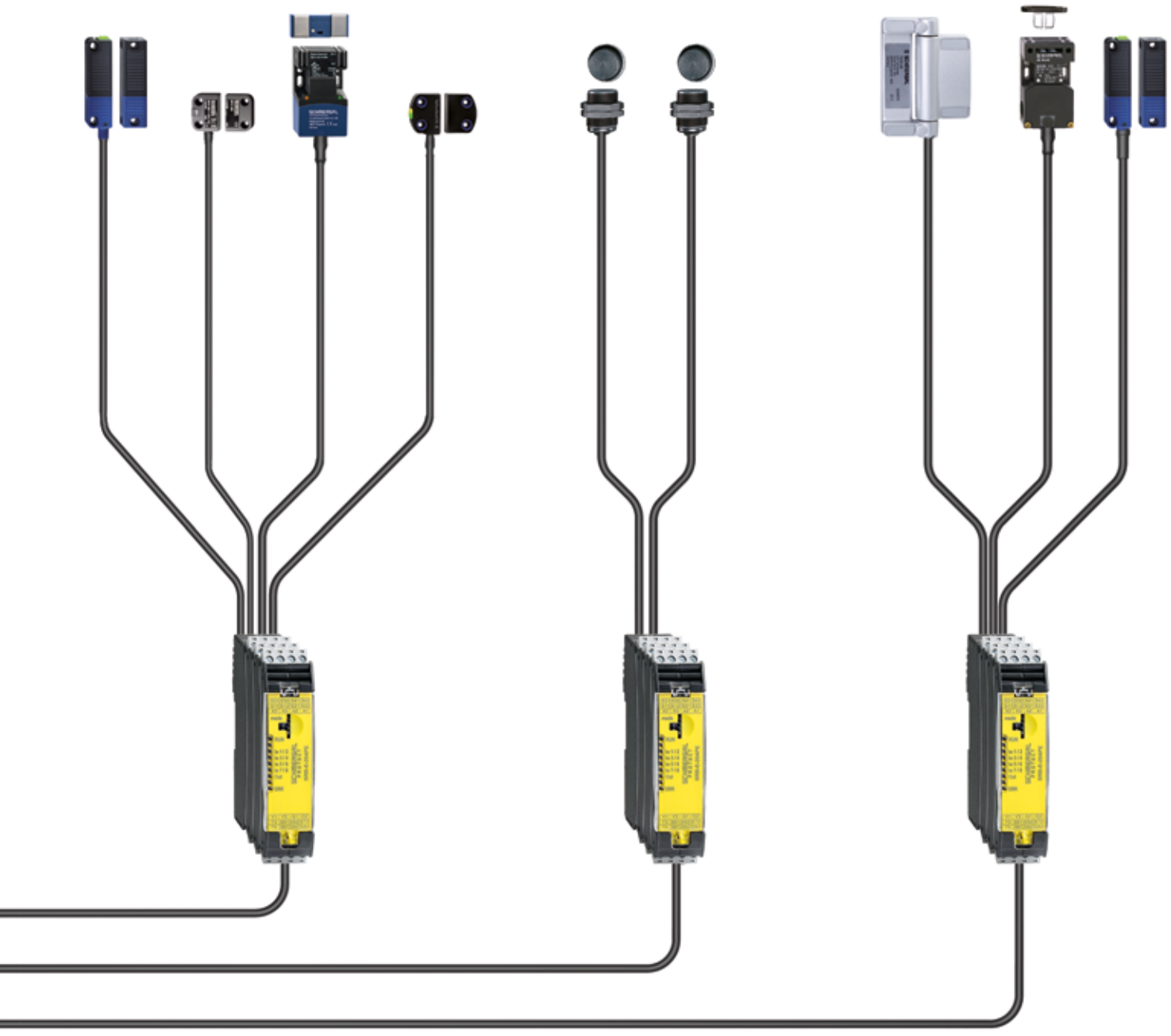
*Depends on number of devices

SRB-E-PE
ACTIVE INPUT EXPANDER MODULES FOR SAFETY SWITCHGEAR

Product advantages SRB-E-204PE

- Simple and low cost installation of electronic or electromechanical safety switchgear
- 1– 4 sensors or switches with contact outputs or OSSD outputs can be connected, mixed connection also possible
- Device is connected via removable screw-type or spring-type terminals
- Simple configuration of device version and contact versions via rotary switch
- Individual evaluation of diagnostic signals from safety switchgear
- Direct and simple series connection of modules possible
- PSC1 safety controllers or safety-monitoring modules can be used
- Compact version for installation in terminal boxes, only 22.5 mm wide





PRODUCT OVERVIEW:
OVERVIEW OF DIFFERENT TYPES

		Description	Type designation	Part number
Passive distribution modules PDM		Passive distribution module for IO parallel wiring of safety switchgear	**PDM-IOP-4CC-IOP**	**103012160**
		Passive distribution module for SD interface systems of safety switchgear	**PDM-SD-4CC-SD**	**103012161**
Passive fieldboxes PFB		Passive fieldbox for IO parallel wiring of safety switchgear	**PFB-IOP-4M12-IOP**	**103013573**
		Passive fieldbox for SD interface systems of safety switchgear	**PFB-SD-4M12-SD**	**103013574**
Active input expander module SRB-E		Active input expander module for safety switches and safety sensors	**SRB-E-204PE**	**103008070**
SD-Interface-Gateways SD-I		SD-Gateway PROFIBUS	**SD-I-DP-V02**	**101192805**
		SD-Gateway PROFINET	**SD-I-U-PN**	**101209434**
		SD-Gateway Ethernet/IP	**SD-I-U-EIP**	**101210747**
		SD-Gateway EtherCAT	**SD-I-U-EC**	**103008132**
		SD-Gateway DeviceNET	**SD-I-U-DN**	**101209432**
		SD-Gateway CC-Link	**SD-I-U-CCL**	**101209435**
		SD-Gateway CAN open	**SD-I-U-CAN**	**101209433**
		SD-Gateway Modbus TCP	**SD-I-U-MT**	**101218029**

ACCESSORIES
FOR PASSIVE FIELDBOXES

	Description	Length [m]	Type designation	Part number
M12 power cables, 4-pin, straight, T-coded	Pre-wired cable, female connector	5.0	**A-K4P-M12P-S-G-5M-BK-2-X-T-4**	**103013430**
		10.0	**A-K4P-M12P-S-G-10M-BK-2-X-T-4**	**103013431**
	Connecting cable, male / female connectors	3.0	**V-SK4P-M12P-S-G-3M-BK-2-X-T-4**	**103013432**
		5.0	**V-SK4P-M12P-S-G-5M-BK-2-X-T-4**	**103013433**
		7.5	**V-SK4P-M12P-S-G-7,5M-BK-2-X-T-4**	**103013434**
M12 SD wires, IN and OUT signals, 4-pin, straight, A-coded	Pre-wired cable, male connector	5.0	**A-S4P-M12-S-G-5M-BK-2-X-A-4-69**	**103013421**
		10.0	**A-S4P-M12-S-G-10M-BK-2-X-A-4-69**	**103013422**
	Connecting cable, male / male connectors	3.0	**V-SS4P-M12-S-G-3M-BK-2-X-A-4-69**	**103013423**
		5.0	**V-SS4P-M12-S-G-5M-BK-2-X-A-4-69**	**103013424**
		7.5	**V-SS4P-M12-S-G-7,5M-BK-2-X-A-4-69**	**103013425**
M12 IO wires, 8-pin, straight, A-coded	Pre-wired cable, male connector	5.0	**A-S8P-M12-S-G-5M-BK-2-X-A-4-69**	**103013426**
		10.0	**A-S8P-M12-S-G-10M-BK-2-X-A-4-69**	**103013427**
M12 device connection cables, 8-pin, straight, A-coded	Connecting cable, male / female connectors	0.5	**V-SK8P-M12-S-G-0,5M-BK-2-X-A-4-69**	**101217786**
		1.0	**V-SK8P-M12-S-G-1M-BK-2-X-A-4-69**	**101217787**
		1.5	**V-SK8P-M12-S-G-1,5M-BK-2-X-A-4-69**	**101217788**
		2.5	**V-SK8P-M12-S-G-2,5M-BK-2-X-A-4-69**	**101217789**
		3.5	**V-SK8P-M12-S-G-3,5M-BK-2-X-A-4-69**	**103013428**
		5.0	**V-SK8P-M12-S-G-5M-BK-2-X-A-4-69**	**101217790**
		7.5	**V-SK8P-M12-S-G-7,5M-BK-2-X-A-4-69**	**103013429**

	Description	Amount	Type designation	Part number
Further accessories	Adhesive seal for PFB / SFB	4	**ACC-PFB-SFB-SLLAB-4PCS**	**103013919**
	M12 protective caps for PFB / SFB	10	**ACC-PFB-SFB-M12-PCAP-10PCS**	**103013920**
	Labels for PFB / SFB	20	**ACC-PFB-SFB-LAB-SN-20PCS**	**103013921**

THE SCHMERSAL GROUP
PROTECTION FOR MAN AND MACHINE

In the demanding field of machine safety, the owner-managed Schmersal Group is one of the international market leaders. The company, which was founded in 1945, has a workforce of about 2000 people and seven manufacturing sites on three continents along with its own companies and sales partners in more than 60 countries.

Customers of the Schmersal Group include global players from the area of mechanical engineering and plant manufacturing as well as operators of machinery. They profit from the company's extensive expertise as a provider of systems and solutions for machine safety. Furthermore, Schmersal specialises in various areas including food & beverage, packaging, machine tools, lift switchgear, heavy industry and automotive.

A major contribution to the systems and solutions offered by the Schmersal Group is made by tec.nicum with its comprehensive range of services: certified Functional Safety Engineers advise machinery manufacturers and machinery operators in all aspects relating to machinery and occupational safety – and do so with product and manufacturer neutrality. Furthermore, they design and realise complex solutions for safety around the world in close collaboration with the clients.

SAFETY PRODUCTS

- Safety switches and sensors, solenoid interlocks
- Safety controllers and safety relay modules, safety bus systems
- Optoelectronic and tactile safety devices
- Automation technology: position switches, proximity switches

SAFETY SYSTEMS

- Complete solutions for safeguarding hazard areas
- Individual parametrisation and programming of safety controllers
- Tailor-made safety technology – be it for individual machines or a complex production line
- Industry-specific safety solutions

SAFETY SERVICES

- tec.nicum academy – Seminars and training
- tec.nicum consulting – Consultancy services
- tec.nicum engineering – Design and technical planning
- tec.nicum integration – Execution and installation

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