Manual

Safety Field Box SFB-EIP

SCHMERSAL

THE DNA OF SAFETY

Type description   **Part no.**

SFB-EIP-8M12-IOP   103015480

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Table of Contents

1 Introduction

1.1 About this document

1.1.1 Purpose of this document

This manual provides all the information required for mounting, commissioning, safe operation and also disassembly of the safety fieldbox.

This document instructs the technical staff of the machine manufacturer or machine operator on the safe use of the devices.

1.1.2 Further applicable documents

Document	Part number	Location
Operating instructions SFB-EIP	103015472	Included in the scope of delivery or downloadable from www.products.schmersal.com [1]
Manual SFB-EIP	103046733	Downloadable from www.products.schmersal.com [1]
EDS File	---	Stored in the device and downloadable with the web server or from Internet at www.products.schmersal.com [1]
1) Enter search term "SFB-EIP" in the Schmersal Online Catalog at www.products.schmersal.com		

1.1.3 Target group: authorized qualified personnel

All operations described in this 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 manual and the 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.

1.1.4 Explanation of the symbols used

	⚠ 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.

	INFORMATION
i	This symbol is used for identifying useful additional information.

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1.1.5 Used short forms

Short form	Meaning
SFB	Safety Field Box
EIP	EtherNet/IP with CIP safety
ODVA	EtherNet/IP standardization and user organisation
EDS	Electronic Data Sheet
TUNID	Target Unique Identifier
SNN	Safety Network Number
SCID	Safety Configuration Identifier
RPI	Requested Packet Intervall
LLDP	Link Layer Discovery Protocol
1oo1	1 out of 1, single channel application (IEC 61508)
1oo2	1 out of 2, two channel (redundant) application (IEC 61508)
OSSD	Output Signal Switching Device / safety PNP semiconductor switching output
PELV	Protective Extra Low Voltage / protective extra low voltage with safe isolation

1.2 Safety instructions

1.2.1 General safety instructions

The user must observe the safety instructions in this manual and the operating instructions, the country specific installation standards as well as all prevailing safety regulations and accident prevention rules.

	INFORMATION
i	Further technical information can be found in the Schmersal catalogues or in the online catalogue on the Internet at www.products.schmersal.com .

The information contained in this operating instruction 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.

1.2.2 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 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 chapter 2 "Product description".

1.2.3 Warning about misuse

	⚠ WARNING
⚠	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.

1.2.4 Exclusion of liability

We shall accept no liability for damages and malfunctions resulting from defective mounting or failure to comply with this manual / operating instruction.
The manufacturer shall accept no liability for damages resulting from the use of unauthorized 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.

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2 Product description

2.1 Module description

2.1.1 Purpose, ordering code, module overview

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 to the device ports X4 – X7.

⚠ WARNING
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.

⚠ WARNING
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.

INFORMATION
BDF200-FB control panels can only be connected to device ports X4 - X7.

Ordering code

This manual applies to the following types:

SFB-EIP-8M12-IOP

Option	Description
SFB	Safety Field Box
EIP	EtherNet/IP with CIP-Safety
8M12	8 device ports for M12 connector, 8-pole
IOP	Device connection: I/O parallel

Module overview

Device ports X0 – X3

Device ports X4 – X7
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

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Memory-Stick

Rotary coding switch
IP Address

LED Link P1
Ethernet-Port P1
LED Activity Port P1

LED Link P2
Ethernet-Port P2
LED Activity Port P2

LED Field box-Error
LED Field box-Power

LED Module Status
LED Network Status

Power-IN connector

Power-OUT connector

FE connection field box

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2.1.2 Safety inputs and test pulse outputs

The SFB-EIP-8M12-IOP has two safety inputs and two test pulse outputs for the supply of dry contacts at each of the 8 device ports X0 - X7.

These safety inputs are usable for:

1 channel safety switches (1oo1) with dry NC contacts

– Cross fault monitoring to all other safety inputs of the fieldbox
– Debounce filter / stable time filter for the input signal
– Supply contact by test pulse outputs with test pulse duration 1 ms and test pulse interval 500 ms

2 channel safety switches (1oo2) with dry NC contacts

– Cross fault monitoring to all other safety inputs of the fieldbox
– Debounce filter / stable time filter for the input signals
– Supply contacts by test pulse outputs with test pulse duration 1 ms and test pulse interval 500 ms

2 channel Safety switches (1oo2) with 24 V-PNP solid state outputs (OSSDs)

– **No cross fault monitoring** of the device connection cables by the fieldbox
– Debounce filter / stable time filter for the input signals
– Supply safety inputs of the safety switchgear with 24 VDC **without test pulses**
– When the OSSD is switched on, **negative test pulses** with a length of 10 µs to 1 ms and an interval of 20 ms to 120 s must be sent.

⚠	⚠ **WARNING**
	For safety switchgear with electronic OSSDs, cross fault detection of the device connection cable must be carried out by the safety switchgear!

2.1.3 Safety outputs

The SFB-EIP-8M12-IOP has a safety digital output at each of the 8 device ports X0 - X7 for controlling loads up to 0.8 A and a configurable safety signal output for controlling 2-channel safety inputs up to 15 mA.

Safety output via 1 wire (digital output DO)

– Safety digital output (PP switching) up to PL d, for controlling e.g. solenoids in interlocks
– Tested output, short-circuit and overload protected

Safety output via 2 wires (digital output DO and test pulse output Y1)

– Safety digital outputs (2P switching) up to PL e, for controlling e.g. interlocks with 2-channel locking functions or for 2-channel control of safety relay modules, e.g. SRB-E-301ST
– Tested outputs, short-circuit and overload protected

2.1.4 Diagnostic input / FB interface

The SFB-EIP-8M12-IOP has one diagnostic input at each of the 8 device ports X0 - X7 for status signals of the connected safety switchgear.

At the 4 device ports X4 - X7 a FB interface is additionally integrated on this input.

The non-safe signals from command and signalling devices, e.g. the BDF200-FB, can be transmitted via the single-wire FB-Interface interface.

FB interface automatically detects if a safety switchgear with integrated FB interface is connected.

2.1.5 CIP safety communication

CIP safety is a functionally safe expansion of standard communication via EtherNet/IP. Communication based on CIP safety is safe against alteration, transmission errors and changes to the telegram sequence, etc.

The Safety Field Box SFB-EIP is a CIP safety module in the EtherNet/IP network.

The module establishes a safety communication to a CIP safety master and transmits safety data via "CIP Safety" and functional data via "CIP Functional Data".

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2.1.6 EtherNet/IP Linear topology

The SFB-EIP supports the Linear topology.
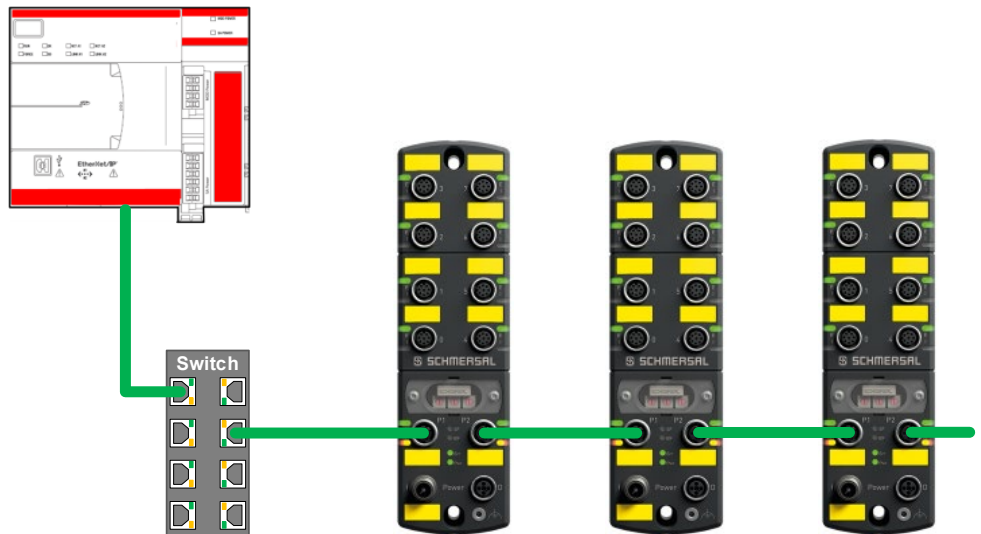
	INFORMATION
i	Further information about the configuration of **Linear topology** can be found in the "Safety Controller User Manual" of your controller system.

2.1.7 EtherNet/IP Star topology

The SFB-EIP supports the Star topology.
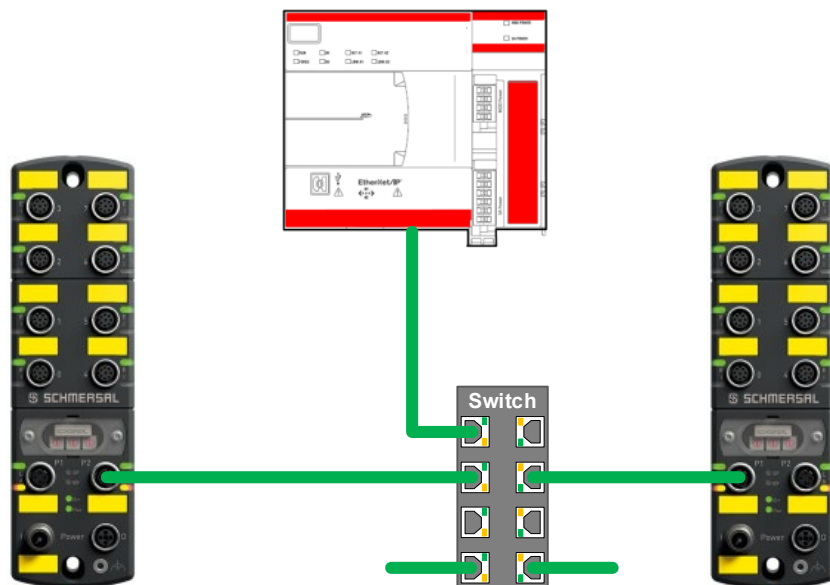
	INFORMATION
i	Further information about the configuration of **Star topology** can be found in the "Safety Controller User Manual" of your controller system.

2.1.8 EtherNet/IP Device Level Ring (DLR) topology

The SFB-EIP supports the Device Level Ring (DLR) topology.

A DLR network is a single-fault-tolerant ring network that is intended for the interconnection of automation devices without the need for more switches.

The ring topology offers these advantages:

• Media redundancy

• Fast-network fault detection and reconfiguration

• Resiliency of a single-fault-tolerant network

• Easy implementation without more hardware requirements
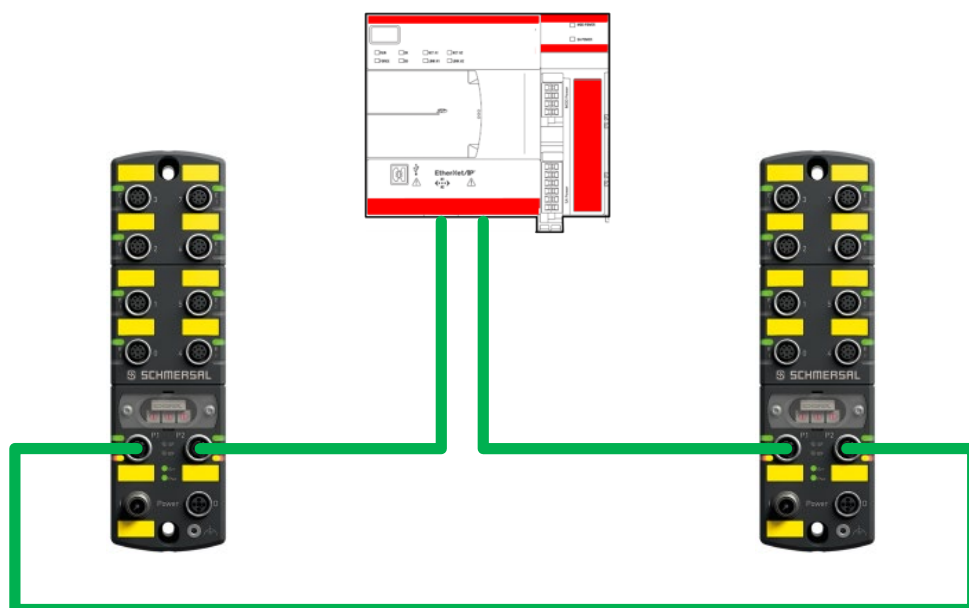
	INFORMATION
i	Further information about the configuration of **DLR topology** can be found in the "Safety Controller User Manual" of your controller system.

2 Product description

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A typical system layout with the wiring of the safety switchgears is shown in the figure below.
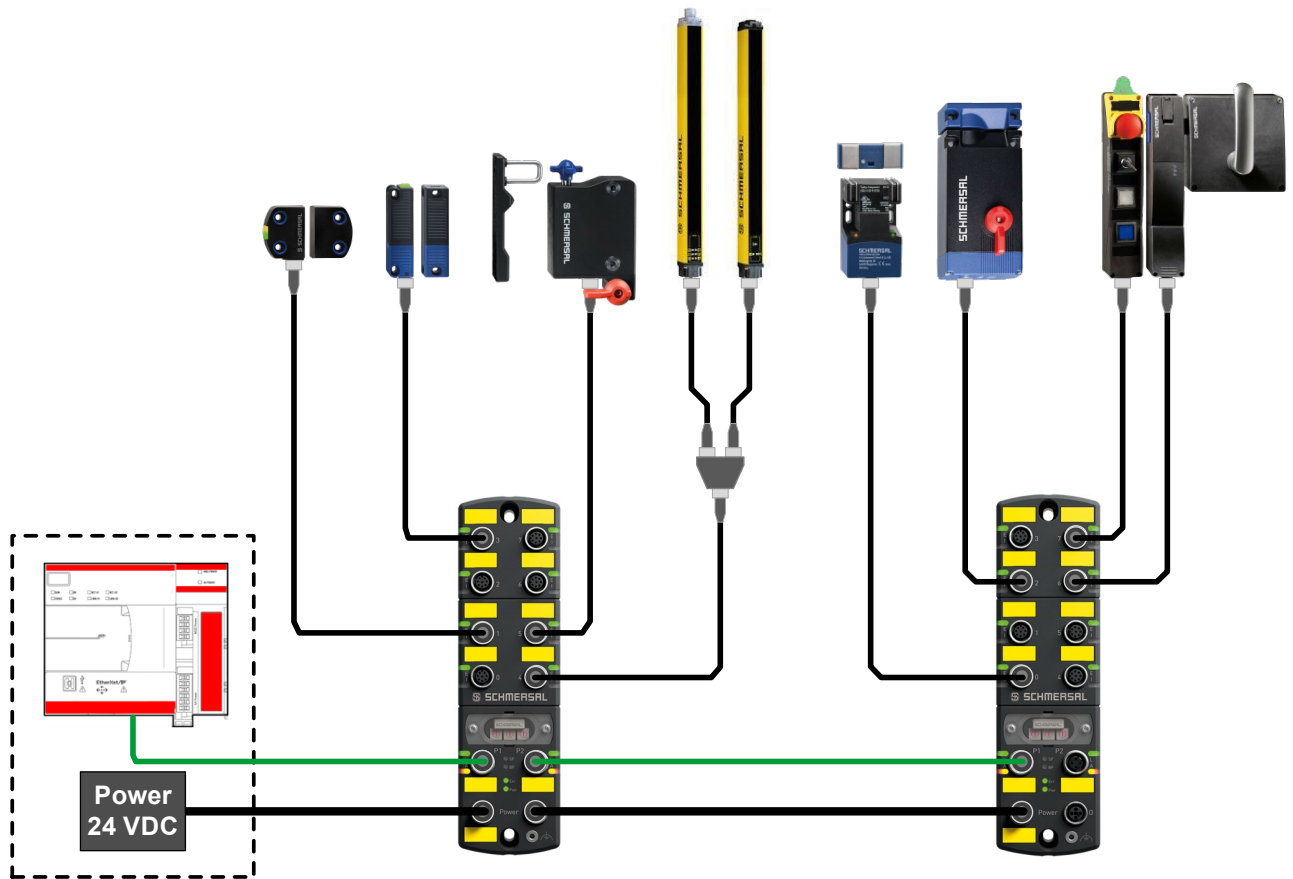
	INFORMATION
i	Further information about the connection of the different safety switchgear can be found in chapter 2.2 and 2.3.

2.1.10 EtherNet/IP services LLDP and Multicast

LLDP services (Link Layer Discovery Protocol)

The SFB-EIP supports the LLDP services according to the EtherNet/IP specification.

Multicast

Multicast connections are **not supported** by the safety fieldbox.

The safety signals and the non-safety diagnostic signals of the connected safety switchgear are interpreted in the Safety PLC.

The Safety PLC can transfer this interpreted data to other IO-Controllers in EtherNet/IP network.

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2.2 Configurable functions SFB-EIP

2.2.1 Parameter data sets of the device ports

Four different configurations (Types) can be selected for each device port.

The parameter data sets (Types) are used to configure the device ports for the different safety switchgears.

A debounce filter / stable time filter is integrated for all safety inputs.

The parameters for the stable time filter are fixed for the different parameter data set types.

The operation of the stable time filter is described in chapter 2.2.2.

Type	Device Parameters	Parameters Stable-Time-Filter
A	**Input:** 2 channel OSSD / **Output:** 1 wire	Stable time: 0,1 s / Monitoring time: 2 s
B	**Input:** 2 channel OSSD / **Output:** 2 wires	Stable time: 0,1 s / Monitoring time: 2 s
C	**Input:** 2 channel Contacts / **Output:** 1 wire	Stable time: 0,5 s / Monitoring time: 10 s
D	**Input:** 2x 1 channel Contact / **Output:** 1 wire	Stable time: 0,5 s / Monitoring time: 10 s

Parameter data set Type A, safety monitoring 1oo2

Cross fault detection: OFF / Safety switchgear handles cross fault detection.

– for electronic safety switches and sensors with 2-channel OSSD output
– for electronic solenoid interlocks with 2-channel OSSD output and 1 wire control of the unlocking function

Parameter data set Type B, safety monitoring 1oo2

Cross fault detection: OFF / Safety switchgear handles cross fault detection.

– for electronic solenoid interlocks with 2-channel OSSD output and 2 wires control of the unlocking function
– for Safety-Relay-Modules (SRB-E) with 2 channel safety inputs

⚠	⚠ **WARNING**
	For safety switchgear with electronic OSSDs, cross fault detection of the device connection cable must be carried out by the safety switchgear! The SFB-EIP monitors the test pulses on the outputs of the safety switchgear.

Parameter data set Type C, safety monitoring 1oo2

Cross fault detection: ON / SFB handles cross fault detection.

– for electromechanics safety switches and sensors with 2 NC contacts
– for electromechanics solenoid interlocks with 2 NC contacts and
  1 wire control of the unlocking function

Parameter data set Type D, safety monitoring 1oo1

Cross fault detection: ON / SFB handles cross fault detection.

– for 2 individual electromechanical safety switches with 1 NC contact

INFORMATION
Further information about the connection of the different safety switchgear can be found in chapter 2.3.

2.2.2 Description stable time filter

The stable time filter is used for bouncing safeguards.

The stable time filter automatically detects when a bouncing safeguard has come to a standstill, in other words when it has come to a "stable" situation.
If a constant switch-on signal is received at both inputs for the duration of the stable time, the safety function is switched on.

In difference to discrepancy time filters, the release of the safety function is only delayed by the set stable time in the stable time filter and the release of the safety function is not time-dependent, but only when the safeguard has actually come to a standstill.

The stability time filter is required for safety switchgear with contacts.
In safety switchgear with electronic OSSDs, the output signals are normally filtered internally.

Operation of the stable time filter when using 2 channel safety inputs

– The stability time filter effects an intelligent discrepancy monitoring of the input signals.
– If one contact is switched on for the first time, the monitoring time is started.
– If both contacts are switched on for the duration of the stable time inside the set monitoring time, the safety function is switched on.
– If the contacts do not come to a standstill, the fault message "Discrepancy / stability time fault Device-Port X…" is displayed after the monitoring time has passed.
– If only one contact, temporary or permanent, is switched off or the two contacts do not come to a standstill, the fault message is also displayed after the monitoring time has passed.

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Operation of the stable time filter when using 1 channel safety inputs

− The stable time filter effects a debounce function for the input signal.

− If the contact is switched on for the first time, the monitoring time is started.

− If the contact is switched on for the duration of the stable time inside the set monitoring time, the safety function is switched on.

− If the contact does not come to a standstill, the fault message "Discrepancy / stability time fault Device-Port X…" is displayed after the monitoring time has passed.

− If the contact switches off temporary or does not come to a standstill, the error message is also displayed after the monitoring time has passed

Frequency limit of the input signal:

The maximum switching frequency of the input signal depends on the adjusted stability time.

The switch-on time and also the switch-off time of the input signal must both be present at the input for at least 2 x the adjusted stable time.

The cut-off frequency of the input signal is therefore 2.5 Hz for the parameter data sets Type A and Type B.

For the parameter data sets Type C and Type D, the cut-off frequency is therefore 0.5 Hz.

2.3 Wiring examples and parameterization

2.3.1 Electronic safety sensor, 8-pole M12 connector

Type A: Safety sensor with electronic OSSD, monitoring 1oo2

Parameters	Values Type A	Connection example
Safety inputs	2 channels	
Cross-fault detection	OFF	
Safety outputs	1 wire (PL d)	
Monitoring time	2 s	
Stable time	0.1 s	
Safety classification Inputs X1 & X2 – up to Cat 4 / PL e / SIL 3 Output DO: –		

SCHMERSAL devices: CSS range, RSS range, …

2.3.2 Electronic safety sensor / AOPD, 4/5-pole M12 connector

Type A: Safety sensor with electronic OSSD, monitoring 1oo2

Parameters	Values Type A	Connection example
Safety inputs	2 channels	
Cross-fault detection	OFF	
Safety outputs	1 wire (PL d)	
Monitoring time	2 s	
Stable time	0.1 s	
Safety classification Inputs X1 & X2 – up to Cat 4 / PL e / SIL 3 Output DO: –		

Various safety switchgears from different manufacturers.

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2.3.3 Electronic safety interlock, interlock function via 1 wire

Type A: Solenoid interlock with electronic OSSD, monitoring 1oo2

Parameters	Values Type A	Connection example
Safety inputs	2 channels	
Cross-fault detection	OFF	
Safety outputs	1 wire (PL d)	
Monitoring time	2 s	
Stable time	0.1 s	
Safety classification Inputs X1 & X2 − up to Cat 4 / PL e / SIL 3 Output DO: − up to Cat 3 / PL d / SIL 2		

SCHMERSAL devices: MZM 100, AZM 200, AZM 201, AZM 300, AZM 40, …

2.3.4 Electronic safety interlock, interlock function via 2 wires

Type B: Solenoid interlock with electronic OSSD, monitoring 1oo2

Parameters	Values Type B	Connection example
Safety inputs	2 channels	
Cross-fault detection	OFF	
Safety outputs	2 wires (PL e)	
Monitoring time	2 s	
Stable time	0.1 s	
Safety classification Inputs X1 & X2 − up to Cat 4 / PL e / SIL 3 Outputs DO & Y1: − up to Cat 4 / PL e / SIL 3		

SCHMERSAL devices: AZM 400, …

ℹ	**INFORMATION**
	The safety output Y1 can be loaded with a maximum of 15 mA.

2.3.5 Electromechanical safety interlock, interlock function via 1 wire

Type C: Solenoid interlock with dry contacts equivalent, monitoring 1oo2

Parameters	Values Type C	Connection example
Safety inputs	2 channels	
Cross-fault detection	**ON**	
Safety outputs	1 wire (PL d)	
Monitoring time	10 s	
Stable time	0.5 s	
Safety classification Inputs X1 & X2 – up to Cat 4 / PL e / SIL 3 Output DO: – up to Cat 3 / PL d / SIL 2		

SCHMERSAL devices: AZM 161-FB, AZM 170-FB, AZM 150-ST, …

	⚠ WARNING
⚠	For safety switchgear with dry contacts, cross-fault detection must be activated ! **Set to parameter type C.**

2.3.6 Electronic E-STOP and control panels with FB-Interface, 8-pole M12 connector

Type A: E-STOP pushbuttons with electronic OSSD and FB-Interface, monitoring 1oo2

Parameters	Values Type A	Connection example
Safety inputs	2 channels	
Cross-fault detection	OFF	
Safety outputs	1 wire (PL d)	
Monitoring time	2 s	
Stable time	0.1 s	
Safety classification Inputs X1 & X2 – up to Cat 4 / PL e / SIL 3 Output DO: –		

SCHMERSAL devices: BDF 200-FB, …

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2.3.7 Electromechanical safety sensor or safety switch, 4-pole M12 connector

Type C: Safety switch or sensor with dry contacts equivalent, monitoring 1oo2

Parameters	Values Type C	Connection example
Safety inputs	2 channels	
Cross-fault detection	**ON**	
Safety outputs	1 wire (PL d)	
Monitoring time	10 s	
Stable time	0.5 s	
Safety classification Inputs X1 & X2 − up to Cat 4 / PL e / SIL 3 Output DO: −		

SCHMERSAL devices: BNS range, TESK, …

⚠ WARNING
For safety switchgear with dry contacts, cross-fault detection must be activated ! **Set to parameter type C.**

2.3.8 Electromechanical safety switch, 8-pole M12 connector

Type C: Safety switch with dry contacts equivalent, monitoring 1oo2

Parameters	Values Type C	Connection example
Safety inputs	2 channels	
Cross-fault detection	**ON**	
Safety outputs	1 wire (PL d)	
Monitoring time	10 s	
Stable time	0.5 s	
Safety classification Inputs X1 & X2 − up to Cat 4 / PL e / SIL 3 Output DO: − up to Cat 3 / PL d / SIL 2		

SCHMERSAL devices: AZ range, PS range, BDF 100-NH(K), ZQ range, …

⚠ WARNING
For safety switchgear with dry contacts, cross-fault detection must be activated ! **Set to parameter type C.**

2.3.9   Connection of single-channel safety switches

Type D: One or two safety switches 1 channel with dry contacts, monitoring 1oo1

Parameters	Values Type D	Connection example
Safety inputs	1 channel	
Cross-fault detection	**ON**	
Safety outputs	1 wire (PL d)	
Monitoring time	10 s	
Stable time	0.5 s	
Safety classification Inputs X1 & X2 – up to Cat 2 / PL d / SIL 1 Output DO: –		

Various safety switchgear from different manufacturers.

	⚠ **WARNING**
⚠	For safety switchgear with dry contacts, cross-fault detection must be activated ! **Set to parameter type D.**

2.3.10   Safety-Relay-Module SCHMERSAL SRB-E

Type A: Safety-Relay-Modules with 2 channel safety inputs, monitoring 1oo2

Parameters	Values Type A	Connection example
Safety inputs	2 channels	
Cross-fault detection	OFF	
Safety outputs	2 wires (PL e)	
Monitoring time	2 s	
Stable time	0.1 s	
Safety classification Inputs X1 & X2 – Outputs DO & Y1: – up to Cat 4 / PL e / SIL 3		

	INFORMATION
ℹ	The safety output Y1 can be loaded with a maximum of 15 mA.

All SCHMERSAL Safety-Relay-Modules of the SRB-E series with 2 inputs for pulsed 24V signals
up to a load of < 15 mA can be connected. (e.g. SRB-E-301ST, SRB-E-201ST/LC, etc.)

2.3.11 Optoelectronic AOPD SCHMERSAL, 4/8-pole M12 connector

Type A: Active opto-electronic protective devices AOPD with electronic OSSD, monitoring 1oo2

Parameters	Values Type A	Connection example
Safety inputs	2 channels	
Cross-fault detection	OFF	
Safety outputs	1 wire (PL d)	
Monitoring time	2 s	
Stable time	0.1 s	
Safety classification Inputs X1 & X2 − up to Cat 4 / PL e / SIL 3 Output DO: −		

SCHMERSAL devices: SLC 440 range, SLG 440 range, …

2.3.12 Optoelectronic AOPD, 4/5-pole M12 connector

Type A: Active opto-electronic protective devices AOPD with electronic OSSD, monitoring 1oo2

Parameters	Values Type A	Connection example
Safety inputs	2 channels	
Cross-fault detection	OFF	
Safety outputs	1 wire (PL d)	
Monitoring time	2 s	
Stable time	0.1 s	
Safety classification Inputs X1 & X2 − up to Cat 4 / PL e / SIL 3 Output DO: −		

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

2.4 Technical Data

2.4.1 General technical Data

Designation	Value
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
   Device ports X0 – X7
   Power I/O
   EtherNet/IP P1/P2
	Build in socket / connector
	M12 / 8-pole A-coded
	M12-POWER / 4-pole, T-coded
	M12 / 4-pole, D-coded

M12 connector tightening torque Recommended for SCHMERSAL cables	min. 0.8 Nm / max. 1.5 Nm 1.0 Nm
Fixing screws Tightening torque	2x M6 max. 3.0 Nm
Viewing window screws Tightening torque	2x Torx 10 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 to 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
   Rated impulse withstand voltage U_{imp}
   Over-voltage category
   Degree of pollution
	
	32 VDC
	0.8 kV
	III
	3

⚠	**⚠ CAUTION**
	Protection class IP66 / IP67 is only reached if all M12 connectors and blanking plugs, as well as the viewing window are properly fastening with screws.

⚠	**⚠ CAUTION**
	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.

2.4.2 Electrical Data

Designation	Value
Electrical Data – Power I / O	
Supply voltage U_B	24 VDC -15% / +10% (stabilised PELV mains unit)
Rated operating voltage U_e	24 VDC
Current consumption SFB	200 mA
Rated operating current I_e	10 A (external fuse protection required)
Device fuse rating	≤ 10A slow blow when used to UL 61010
Electrical Data – Device ports X0 – X7	
Maximum cable length X0 – X7	30 m
Safety inputs	**X1 and X2**
Switching threshold (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 With test pulse interval of	0.01 … 1.0 ms 20 ms … 120 s
Classification	ZVEI CB24I

Sink:		C1		Source:		C1	C2	C3	

Designation	Value
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

Sink:		C1		Source:		C1			

Designation	Value
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

Sink:		C1		Source:		C1			

⚠ CAUTION
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.

Designation	Value
Diagnostic 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	
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

2.5 Safety classification

2.5.1   Safety inputs 2 cannels

Designation	Value
Standards	EN ISO 13849-1, IEC 61508, EN 62061
PL	e
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 fulfils the requirements as PDDB (proximity switch with defined behaviour under fault conditions) according to EN 60947-5-3 in combination with magnetic sensors (2 NC contacts) up to PL e / SIL 3.

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2.5.2   Safety inputs 1-channel

Designation	Value
Standards	EN ISO 13849-1, IEC 61508, EN 62061
PL	d
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

2.5.3   Safety outputs 1 wire (PL d)

Designation	Value
Standards	EN ISO 13849-1, IEC 61508, EN 62061
PL	d
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

2.5.4   Safety outputs 2 wires (PL e)

Designation	Value
Standards	EN ISO 13849-1, IEC 61508, EN 62061
PL	e
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

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

2.5.5 Safety response time SFB-EIP

The overall reaction time of a safety function is made up of the following individual times:

- Reaction time of connected safety switchgear
  (see operating instructions safety switchgear)
- **Reaction time Safety fieldbox SFB-EIP**
- Reaction time Safety controller (PLC) incl. transmission time field bus
  (see Safety Controller User Manual)
- Reaction time of Output
- Reaktion time of safety shut-off element (actuator)

⚠ WARNING
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.

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

The safety field box SFB-EIP has the following specifications:

WC Delay Time Safety Inputs SFB:	20 ms	(Reaction time Safety Input)
WC Delay Time Safety Outputs SFB:	50 ms	(Reaction time Safety Output)
Device Watchdog Time SFB:	12 ms	(Device WD_Time)

General information about the "Safety Function Response Time" (SFRT)

The "Safety Function Response Time" (SFRT) is the maximum time in which the safety system responds to changes in input signals or to module errors.

In order to calculate the reaction time of a safety function, the overall system from the safety switching device to the actuator must always be considered.
(Refer to DIN EN IEC 61784-3-2)

Safety function response time
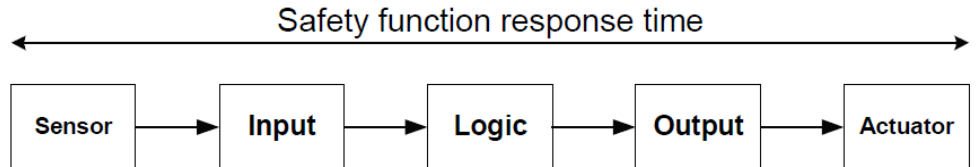
For individual components in the safety function, a risk time or watchdog time (WD Time) may be specified in the data sheet in addition to the reaction time.

For a 1-fault safety system, the longest watchdog time difference (ΔT WD_Time) must be added to the sum of all reaction times to calculate the Safety Function Response Time (SFRT).

Calculation of the "Safety Function Response Time" (SFRT)

Example:

Calculation of the "Safety Function Response Time" (SFRT)
for a **Safety Input Function** of the SFB-EIP:

Reaction Time:	Safety Sensor	100 ms	(100 ms Reaction Time Sensor)
ΔT WD_Time:	*Safety Sensor*	*+100 ms*	*(200 ms Risk Time Sensor)*
Reaction Time:	Safety Input SFB	20 ms	(20 ms Reaction Time SFB)
ΔT WD_Time:	*Safety Input SFB*	*+12 ms*	*(12 ms WD_Time SFB)*
Reaction Time:	Controller + Bus	< 80 ms	(Connection Reaction Time)
Reaction Time:	Output	30 ms	(Power contactor)
Reaction Time:	Actuator	**??? ms**	(e.g. Drive)

Total Reaction Time:		230 ms	
Safety Function Response Time:		**330 ms**	*(+ longest ΔT WD_Time)*

	INFORMATION
i	Further information about the configuration of a "Safety Module" can be found in the "Safety Controller User Manual" of your controller system.

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

3 Installation

3.1 Mounting

| ⚠	⚠ CAUTION
	The field box must be installed in a way that only authorised specialist personnel can access it.

3.1.1 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.

⚠	⚠ CAUTION
	Do not install fieldbox outside closed rooms.

3.1.2 Dimensions

All measurements in mm.
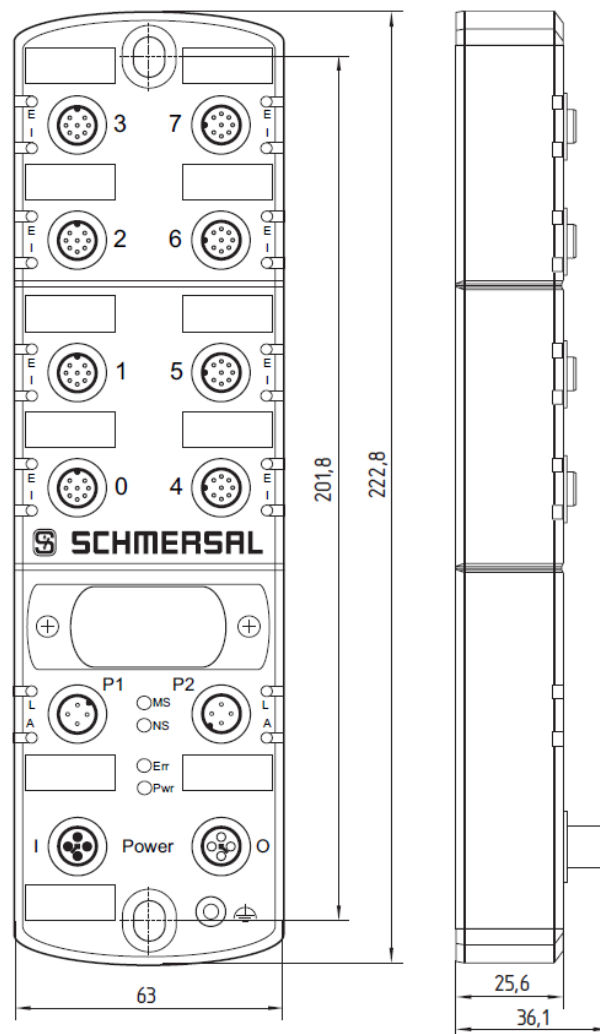
3.1.3 Disassembly and disposal

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

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

3.1.4 Accessories

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

Pre-wired and connecting cables

	Description	Length [m]	Type designation	Part number
M12 Power cables, 4-poe, 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**
		20,0	**A-K4P-M12P-S-G-20M-BK-2-X-T-4**	**103038975**
		30,0	**A-K4P-M12P-S-G-30M-BK-2-X-T-4**	**103038976**
	Connecting cable, male / female	1,5	**V-SK4P-M12P-S-G-1,5M-BK-2-X-T-4**	**103025136**
		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**
		10,0	**V-SK4P-M12P-S-G-10M-BK-2-X-T-4**	**103038978**
M12 Ethernet cables, 4-pole, straight, D-coded, shielded	Connecting cable, RJ45 to M12	5,0	**AIE-S4P-M12/RJ45-S-G-5M-GN-2-X-D-1**	**103013435**
		7,5	**AIE-S4P-M12/RJ45-S-G-7,5M-GN-2-X-D-1**	**103013436**
		10,0	**AIE-S4P-M12/RJ45-S-G-10M-GN-2-X-D-1**	**103013437**
		20,0	**AIE-S4P-M12/RJ45-S-G-20M-GN-2-X-D-1**	**103038980**
	Connecting cable, male / male	1,5	**VIE-SS4P-M12-S-G-1,5M-GN-2-X-D-1**	**103038982**
		3,0	**VIE-SS4P-M12-S-G-3M-GN-2-X-D-1**	**103013438**
		5,0	**VIE-SS4P-M12-S-G-5M-GN-2-X-D-1**	**103013439**
		7,5	**VIE-SS4P-M12-S-G-7,5M-GN-2-X-D-1**	**103013440**
		10,0	**VIE-SS4P-M12-S-G-10M-GN-2-X-D-1**	**103038983**
M12 Device connection cables, 8-pole, straight, A-coded	Connecting cable, male / female	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**
		10,0	**V-SK8P-M12-S-G-10M-BK-2-X-A-4-69**	**103013125**
		15,0	**V-SK8P-M12-S-G-15M-BK-2-X-A-4-69**	**103038984**
		20,0	**V-SK8P-M12-S-G-20M-BK-2-X-A-4-69**	**103038566**
		30,0	**V-SK8P-M12-S-G-30M-BK-2-X-A-4-69**	**103038567**

Adapter cables

	Description	Length [m]	Type designation	Part number
Adapter connecting cables, 8-pole M12 to 4-pole M12, Sensors with OSSD.	Connecting cable, male / female	2,5	**VFB-SK8P/4P-M12-S-G-2,5M-BK-2-X-A-4**	**103032864**
		5,0	**VFB-SK8P/4P-M12-S-G-5M-BK-2-X-A-4**	**103032865**
Y-Adapter cables for Schmersal AOPD, SLC/G-440, SLC/G-440-COM and SLB-440.	Y-Adapter cable, male / female	1,0	**SFB-Y-SLCG-8P-S-G-1M-BK-2-X-A-4**	**103032867**
		1,0	**SFB-Y-SLCG-COM-8P-S-G-1M- BK-2-X-A-4**	**103032866**

Further accessories

	Description	Amount	Type description	Part number
Further accessories	Labels for PFB/SFB	20 pcs.	**ACC-PFB-SFB-LAB-SN-20PCS-V2**	**103035090**
	M12 Protective caps for PFB/SFB	10 pcs.	**ACC-PFB-SFB-M12-PCAP-10PCS**	**103013920**
	Adhesive seal for PFB/SFB	4 pcs.	**ACC-PFB-SFB-SLLAB-4PCS**	**103013919**

3.2 Electrical connection

3.2.1 General information for electrical connection

⚠ CAUTION
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.

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

3.2.2 Notes for replacing the device

For easy replacement of a defective SFB-EIP, the memory stick inserted behind the viewing window is used.

The network parameters (TUNID, subnet mask and gateway IP) are stored on the memory stick.

⚠ CAUTION
The replacement device must be in the factory settings ! If necessary, perform a "factory reset" **without the memory stick** inserted. (Refer to chapter 4.3.3)

To replace a defective SFB-EIP, follow the steps below:

- Bring the machine and the SFB into a de-energized 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 the unit and install the device ports
- Put the system and SFB back into operation

⚠ WARNING
The safety functions, configuration of the safety fieldbox and correct installation must be checked by a responsible safety administrator / safety representative after a device replacement.

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3.2.3 Overview of connections and LED indicators

Device ports X0 – X3

Error-LED X3
Device port X3
Input-LED X3

Error-LED X2
Device port X2
Input-LED X2

Error-LED X1
Device port X1
Input-LED X1

Error-LED X0
Device port X0
Input-LED X0

Device ports X4 – X7
FB-Interface for BDF200-FB

Error-LED X7
Device port X7
Input-LED X7

Error-LED X6
Device port X6
Input-LED X6

Error-LED X5
Device port X5
Input-LED X5

Error-LED X4
Device port X4
Input-LED X4

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Memory-Stick

Rotary coding switch
IP Address

LED Link P1
Ethernet-Port P1
LED Activity Port P1
LED Field box-Error
LED Field box-Power

Power-IN connector

LED Link P2
Ethernet-Port P2
LED Activity Port P2

LED Module Status
LED Network Status

Power-OUT connector

FE connection field box

3.2.4 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.
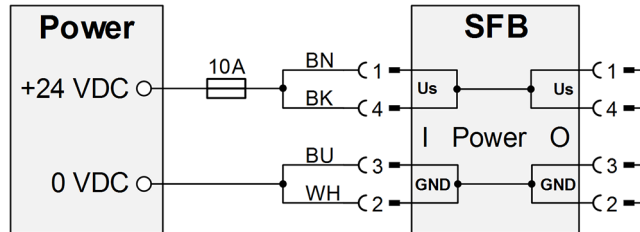
Internal fuse elements device ports

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.
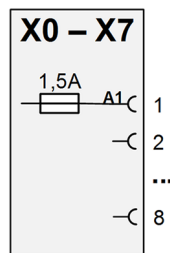
3.2.5 Earth concept and shielding

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.
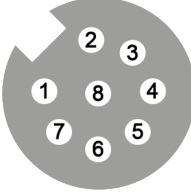
An earth strap is available as an accessory.

Wiring examples for avoidance of earth loops:
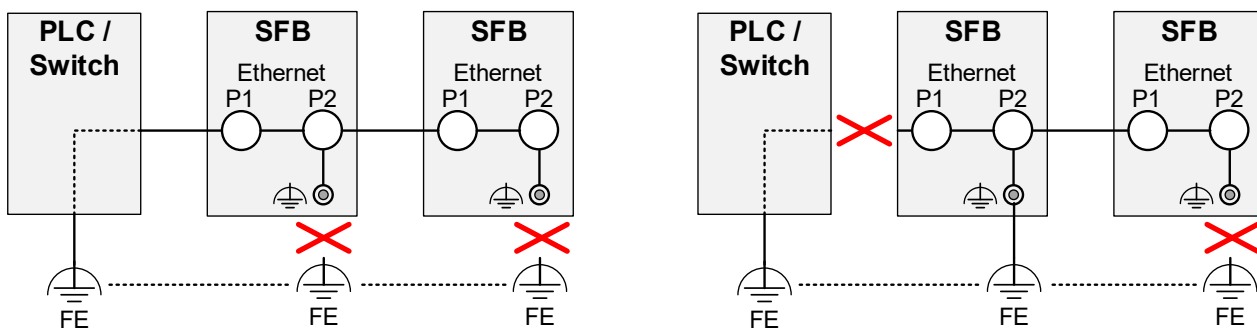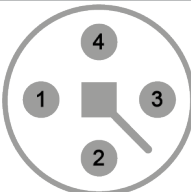
3.2.6 Connector device ports X0 – X7

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

Pin assignment	Pin	Colour	Signal	Description of fieldbox signals
	1	WH	A1	+24 VDC device supply, internal fused, max. 0.8 A
	2	BN	Y1	Test pulse output 1, supply safety channel 1
	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, supply safety channel 2
	7	BU	X2	Safety input 2
	8	RD	DO	Safety output, max. 0.8 A

⚠	**⚠ CAUTION**
	The pulse output / safety output Y1 can be loaded with a maximum of 15 mA at 24 VDC. The pulse output / safety output Y2 can be loaded with a maximum of 10 mA at 24 VDC and of 30 mA at 0 VDC.

⚠	**⚠ WARNING**
	In case of a fault, a voltage of up to 60 V can be applied to the device ports.
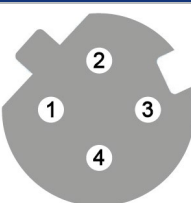
3.2.7 Connector Power I/O

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

Pin assignment	Pin	Colour	Signal	Description of fieldbox signals
	1	BN	Us	+24 VDC power supply SFB (bridged with Pin 4)
	2	WH	GND	0 VDC power supply SFB (bridged with Pin 3)
	3	BU	GND	0 VDC power supply SFB (bridged with Pin 2)
	4	BK	Us	+24 VDC power supply SFB (bridged with Pin 1)

3.2.8 Connector EtherNet/IP P1/P2

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

Pin assignment	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 the SCHMERSAL M12 cables, acc. DIN 47100

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

3.3 LED diagnostic indicators

3.3.1 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 device ports (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 *Send acknowledgement pulse or power reset*
🔴	Red, flashes 1 pulses	Cross-fault safety inputs *Check cord set and device*
🔴	Red, flashes 2 pulses	Parameter fault / Fault safety inputs *No test pulses, check parameter, cord set and device*
🔴	Red, flashes 3 pulses	Fault test pulse outputs *Check cord set and device*
🔴	Red, flashes 4 pulses	Overload device power supply *Fuse device power supply has tripped, check cord set and device*
🔴	Red, flashes 5 pulses	Overload digital output *Current limiter activated, check cord set and device*
🔴	Red, flashes 6 pulses	Cross-fault digital output *Check cord set and device*
🔴	Red, flashes 7 pulses	Fault FB-Interface (only device port 4-7) *Check cord set and device*

	INFORMATION
ℹ️	Some errors can no longer be detected after passivation of the device port. The red flashing patterns for these errors are displayed at the affected port for approx. 60 seconds.

Input-LED device ports (I)

The input LED may exhibit the following display and flashing pattern:

LED	Display	Description
⚪	OFF	Both safety inputs LOW
🟡	Yellow, ON	Both safety inputs HIGH
🟡	Yellow, flashes	Only one safety input HIGH, or discrepancy / stable time error

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3.3.2 LED indicators, EtherNet/IP ports P1/P2

There are 2 LED indicators at the Ethernet ports.

A green link LED and yellow activity LED.

Link LED (L)

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

LED	Display	Description
🟢	Green, ON	Connection to Ethernet active

Activity LED (A)

The activity LED may exhibit the following display and flashing pattern:

LED	Display	Description
🟡	Yellow, flashes	Ethernet data transmission active

3.3.3 Central LED indicators of SFB-EIP

There are 4 LEDs for central diagnostics of the fieldbox:

- (MS) = green / red dual LED for Module Status
- (NS) = green / red dual LED for Network Status
- (Err) = green / red dual LED for fieldbox errors
- (Pow) = green LED for power supply

The MS-LED and the NS-LED comply with the specifications according to the "CIP NETWORKS LIBRARY Vol.5 CIP safety".

Module Status LED (MS)

The Modul Status LED may exhibit the following display and flashing pattern:

LED	Display	Description
🟢	Green, flashes	Standby *SFB waiting for connection*
🟢	Green, ON	Operating *SFB works error free*
🔴	Red, flashes	Parameterisation error *IP address was later changed (check rotary coding switch)*
🔴	Red, ON	Internal fieldbox fault *Try power reset / module defective*
🔴🟢	Red / Green, flashing	Self-test and waiting for parameters *SFB executes self-test and waits for parameters*

Network Status LED (NS)

The Network Status LED may exhibit the following display and flashing pattern:

LED	Display	Description
○	OFF	No IP address *No IP address configured*
(green flashing)	Green, flashes	Not connected *No CIP connection established*
●	Green, ON	Connected *CIP connection available*
(red flashing)	Red, flashes	Connection Timeout *Timeout of the CIP connection*
●	Red, ON	Duplicate IP or Network fault *Duplicate IP address detected or network error*
(red/green flashing)	Red / Green, flashing	TUNID is being assigned *SFB carries out parameterization*

Error-LED fieldbox (Err)

The Error LED may exhibit the following display and flashing pattern:

LED	Display	Description
●	Green, ON	Fieldbox in RUN
(green flashing)	Green, flashes	Module fault can be acknowledged *Acknowledge via global acknowledgement pulse or by power reset*
(green flashing)	Green, 3 flashes **one time**	Writing of network parameters or factory reset successful *Transfer of network parameters to memory stick or EEPROM successful*
(red flashing)	Red, 3 flashes **one time**	Replacement device is not reset to factory settings *Remove memory stick and execute factory reset with replacement device*
●	Red, ON	Internal fieldbox fault *Try power reset / module defective*
(red flashing)	Red, flashing **3 Hz**	Writing of network parameters or factory reset not successful *Check process and try again*
(red flashing)	Red, flashes 1 pulses	Internal over temperature fault *Check ambient temperature*
(red flashing)	Red, flashes 2 pulses	Fault: Invalid SNN / TUNID *Check rotary coding switch / change SNN*
(red flashing)	Red, flashes 3 pulses	Fault: Requested Packet Interval RPI too short or too long *Check / Increase RPI time*
(red flashing)	Red, flashes 4 pulses	Fault acknowledgement pulse length *Check 500 ms pulse time for acknowledgement*
(red flashing)	Red, flashes 5 pulses	Fault overload test pulse outputs *Check cord set and device*
(red flashing)	Red, flashes 6 pulses	Over voltage fieldbox U > 29 V *Check power supply*

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Power-LED fieldbox (Pwr)

The power LED may exhibit the following display and flashing pattern:

LED	Display	Description
🟢	Green, ON	Supply voltage of fieldbox OKAY
🟢	Green, flashes 1 Hz	Low voltage warning U < 20 V *Check power supply*
🟢	Green, flashes 3 Hz	Low voltage fault U < 17 V *Check power supply*
⚪	OFF	Fieldbox switched off U < 12 V or U > 34 V *Check power supply*

4 Set-up

4.1 Set-up and maintenance

4.1.1 Set-up

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

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

4.1.2 Maintenance

The safety fieldbox operates maintenance-free if installed and used properly.

4.2 Precautions to be followed in use

⚠ WARNING
If devices with different SIL levels are used in a safety function, the implications in the network must be carefully considered. Use only components complying with safety standard corresponding to the required safety level.

⚠ WARNING
Before activating the Safety Look in the PLC, first verify all safety functions.

⚠ WARNING
If you choose to configure safety connections with an SCID=0, you are responsible for ensuring that originators and targets have the correct configurations.

4.3 Configuration of the SFB-EIP

4.3.1 Project engineering

The project engineering of the SFB-EIP in Studio 5000 is done in two data areas:

Cyclic data (Assemblies)

The cyclic communication transports the safety I/O data and the functional status information via the corresponding input or output assembly.

Acyclic CIP Generic Messages (Explicit Messages)

Diagnostic and status data are provided via vendor-specific CIP objects, which can be requested by the PLC via CIP Generic Messages (Expicit Messages).

The SFB-EIP transfers the diagnostic data, the device port parameters and the module status in the different CIP objects.

The data areas are described in chapter 4.4.1 and 4.4.2.

The project engineering of the SFB-EIP should be done in the following steps

- Install EDS file of SFB-EIP in Studio 5000
- Select the IP mode with rotary coding switches
  - Establish network connection and supply SFB with power
- Start BootP DHCP tool and set IP address
- Set "Safety Task Period" for safety program in Studio 5000
- Configure "New Module" in Studio 5000 and add SFB-EIP
  - Set "Name" to device and set "IP address"
- Set "Requested Packet Intervall" (RPI) for Safety Inputs to 20 ms
- Configure the safety parameters for the device ports under "Safety Configuration" (parameter sets A / B / C / D for device ports).
- "Download" the project to the PLC
- Implementing a program for the acknowledgement of module faults and device port faults

	INFORMATION
i	**During power-up, module errors can be detected by the SFB !** The SFB then sets an "acknowledgement request" and in the web server all displays on the "Status Device Ports" page are set to RED. To cancel the passivation, it may be necessary to send an initial acknowledgement pulse. (Refer to chapter 5.3.1)

	INFORMATION
i	Further information about the configuration of a "Safety Module" can be found in the "Safety Controller User Manual" of your controller system.

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

4.3.2 Install EDS file

The device data required for project planning is saved in EDS files (Electronic Data Sheet).

You will find the EDS file for the SFB-EIP:

− Online at www.products.schmersal.com / search keyword "SFB"

− Downloadable from device via the web server info page (Refer to chapter 6)

The import procedure for the EDS files is described in the "Safety Controller User Manual" of your controller system.

Select "EDS Hardware Installation Tool" in tab "TOOLS"
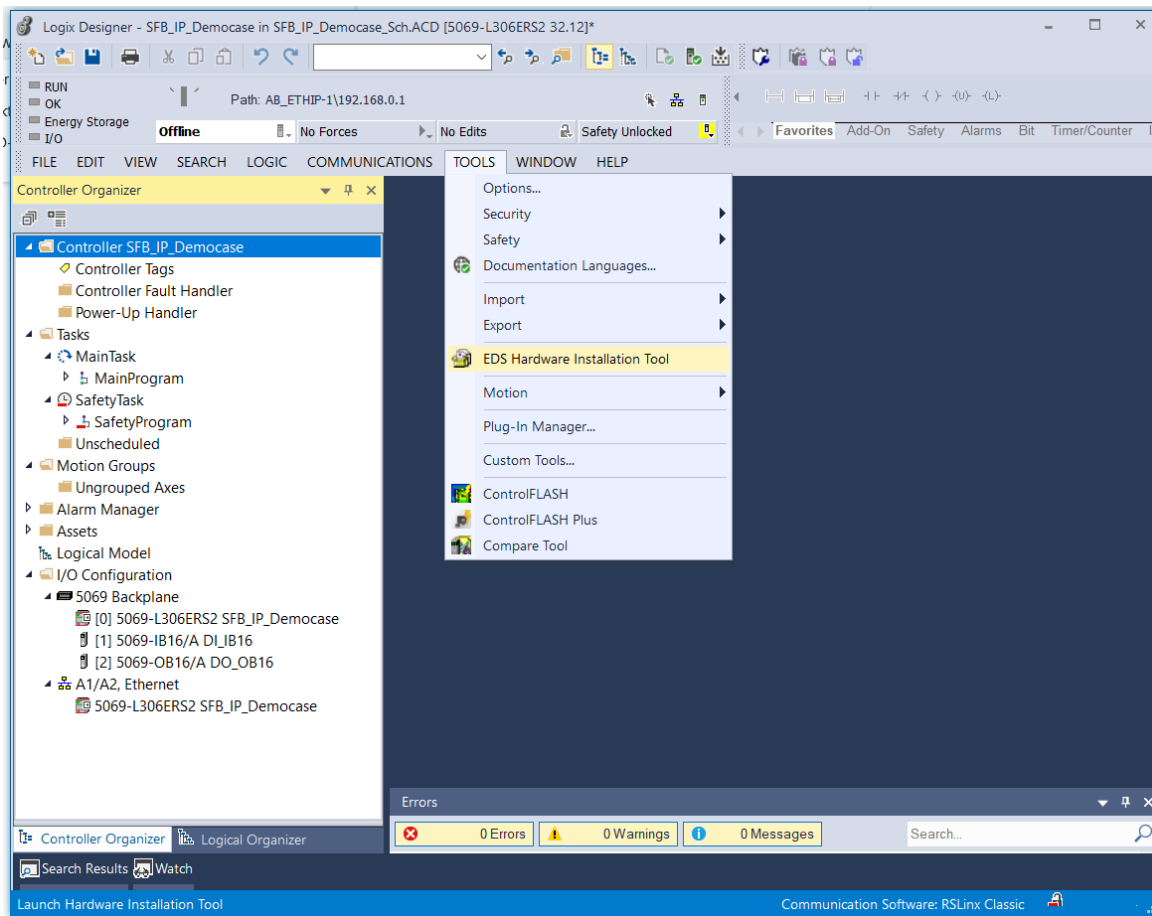
Install EDS file "SFB-EIP-8M12-IOP.eds" with the EDS Wizard:

Start EDS Wizard
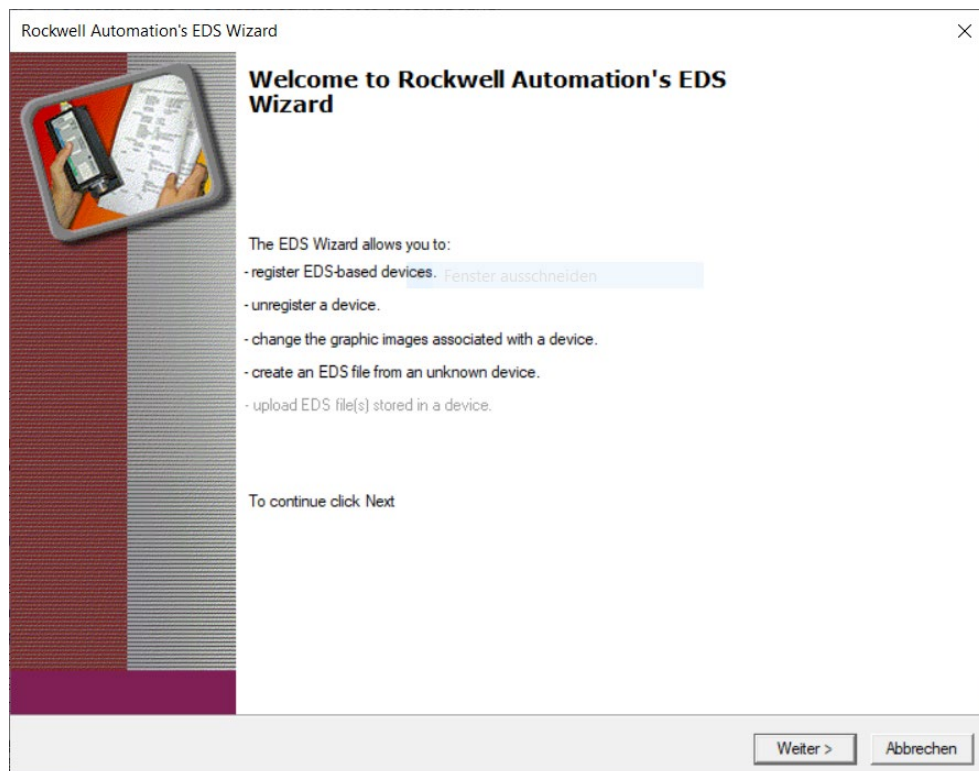
Select Option "Register an EDS file"
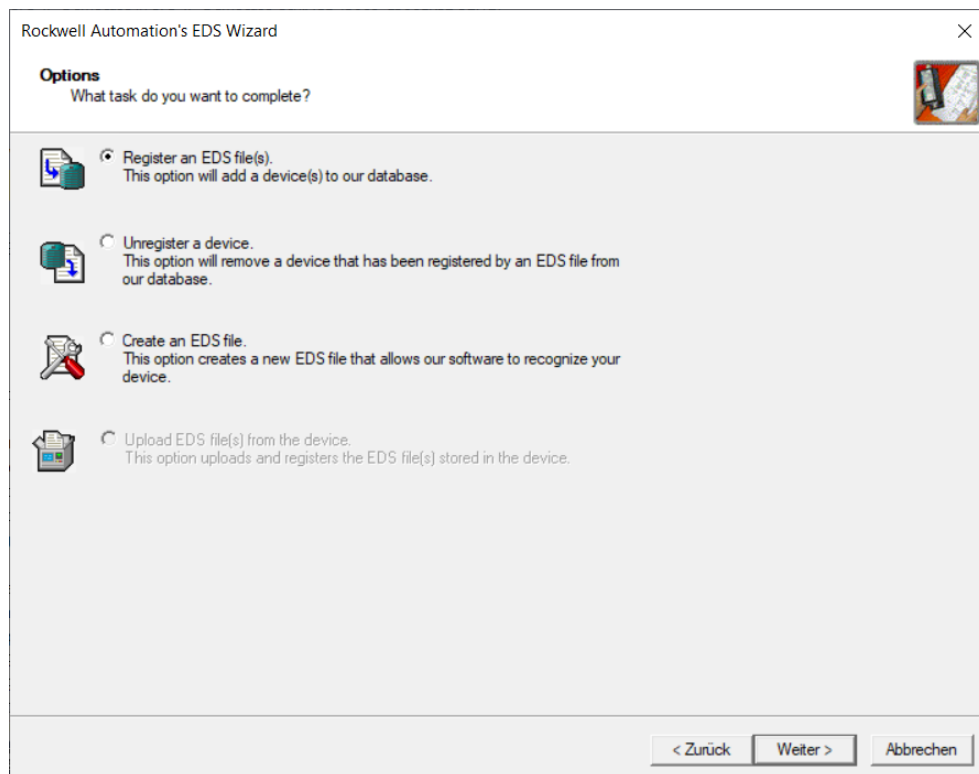
Select EDS file "SFB-EIP-8M12-IOP.eds"
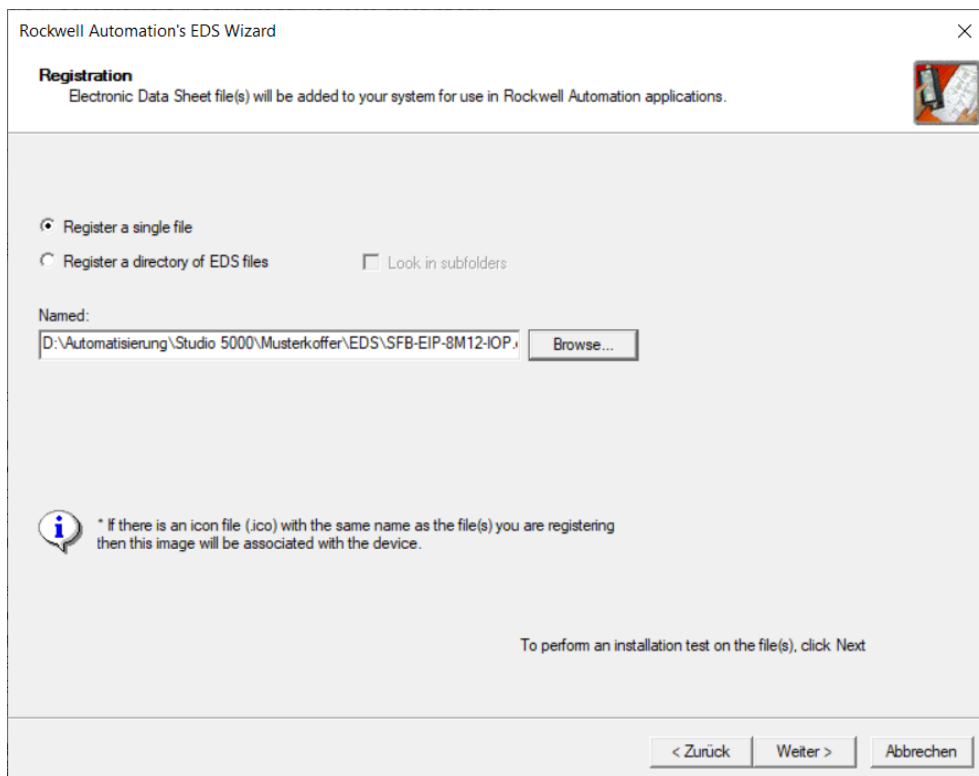
SFB-EIP with the ICON is displayed

Confirm registration

Rockwell Automation's EDS Wizard   ✕

Final Task Summary
This is a review of the task you want to complete.

You would like to register the following device.
    SFB-EIP-8M12-IOP

< Zurück   Weiter >   Abbrechen

Rockwell Automation's EDS Wizard   ✕

You have successfully completed the EDS Wizard.
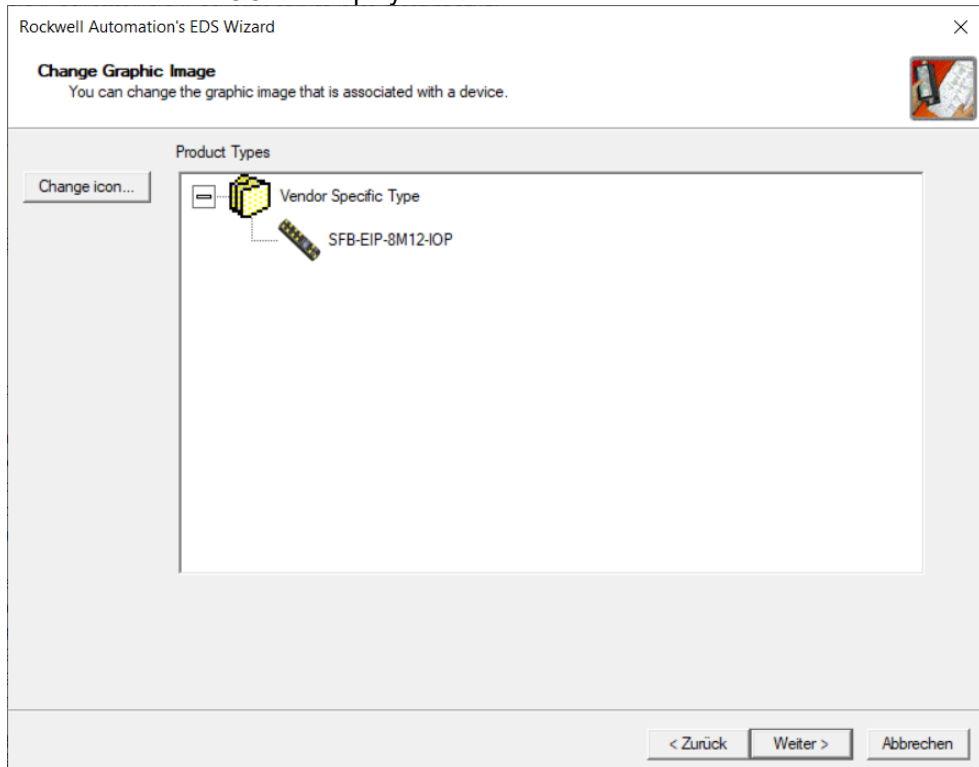
Fertig stellen
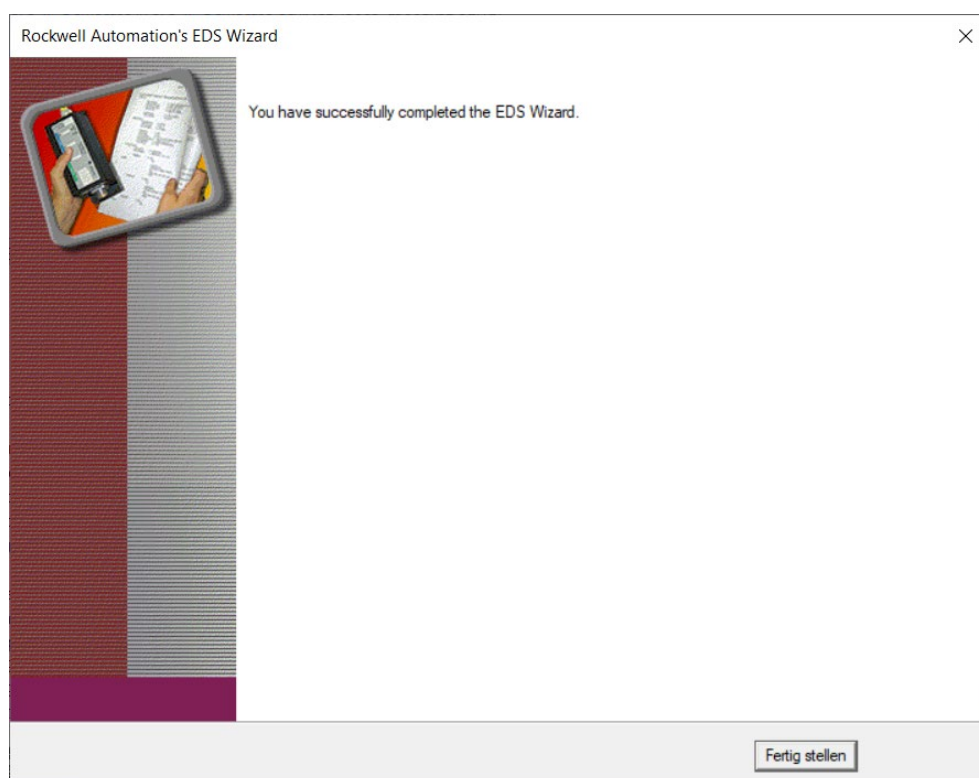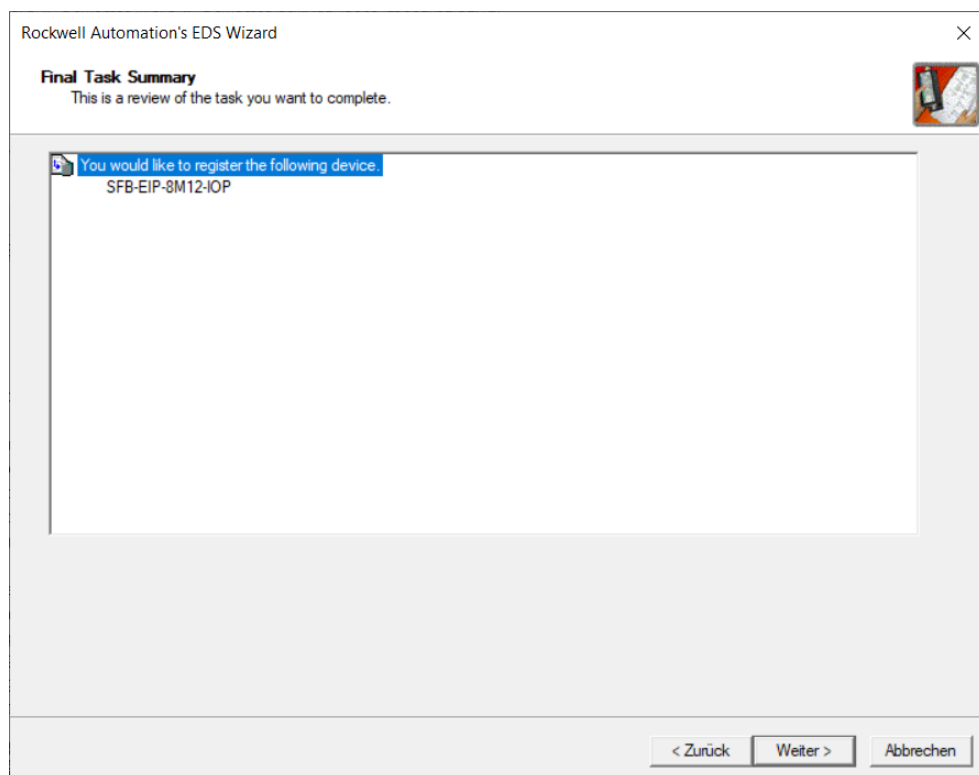
4.3.3 Setting the IP-Mode and factory reset

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

Carefully remove the viewing window. (Screws Torx 10)

⚠	**⚠ CAUTION**
	The screws in the viewing window are not locked! Keep the screws safe so that they do not get lost.

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

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

⚠	**⚠ WARNING**
	Set a suitable network IP-Address before connecting the module to a safety network.

x 100   x 10   x 1
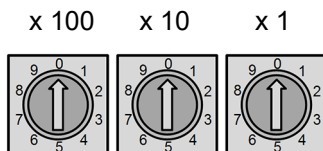
IP-Mode

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

- Switch SFB-EIP de-energized
- Select IP mode (DHCP or fixed IP address, see above)
- Close the viewing window again
- Supply SFB-EIP with power again

➔ When the SFB-EIP is put into operation for the first time, the network parameters (IP address, subnet mask and gateway IP) must then be setup using the **BootP-DHCP tool**.

➔ If the module error LED (Err) flashes rapidly in **RED at 3 Hz** when the SFB is switched on after the boot phase, an empty memory stick has been installed. The memory stick must be **configured manually** afterwards (Refer to chapter 4.3.4) or exchanged.

Carrying out an SFB factory reset

The factory reset deletes the network parameters (TUNID, subnet mask and gateway IP) in the SFB-EIP.

	INFORMATION
i	If the memory stick is inserted when the factory reset is executed, the network parameters on the memory stick are also deleted. A start-up of the SFB-EIP is then only possible with the **BootP-DHCP tool.**

	⚠ CAUTION
⚠	**SFB-EIP must be in the delivery state during the first commissioning !** If necessary, perform a "factory reset" **without the memory stick** inserted.

To execute a factory reset, follow the steps below:

- 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 again
- Mount and install the unit
- Put the system and SFB back into operation

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

4.3.4 Memory stick configuration afterwards

If the memory stick was not inserted during setup, this can be configured manually afterwards.

	INFORMATION
i	**Memory stick must be in delivery condition for this !** A memory stick that has already been used before cannot be used here.

The afterwards configuration of the memory stick is also necessary, if the module Error LED (Err) flashes fast with **3 Hz RED** after the boot phase when the SFB was switched on.
Then there is already an **empty memory stick** in a SFB with configured network parameters.

To configure the memory stick manually, follow the steps below:

- Bring the machine and the SFB into a de-energized state
- Insert empty memory stick in SFB
- Set rotary coding switch to 9 9 8
- Supply SFB-EIP with power again
➔ After a short boot phase the SFB acknowledges the successful configuration 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 transfer of the network parameters to the memory stick was **not successful !**
Check if the memory stick is in the delivery state and try again with **a new** memory stick.

- Bring the SFB back to the de-energized state and set the rotary coding switch to the required IP mode again
- Close the viewing window again
- Mount and install the unit
- Put the system and SFB back into operation

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

4.3.5 Set IP address with BootP DHCP tool

If the IP address has to be set with the BootP DHCP tool, the Module-Status LED (MS) flashes green.

Start BootP DHCP tool and select a network interface
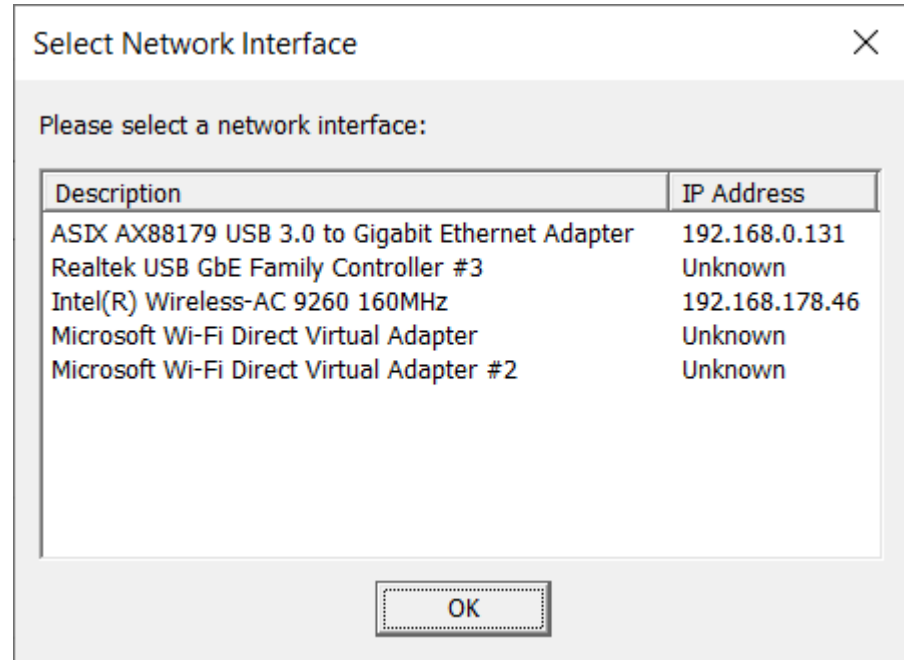
Wait until the MAC address of the desired client is displayed.

Note:

- This process may take a few minutes

- You can identify Schmersal fieldbus-based devices by the following MAC range: **14:C3:C2:xx:xx:xx**
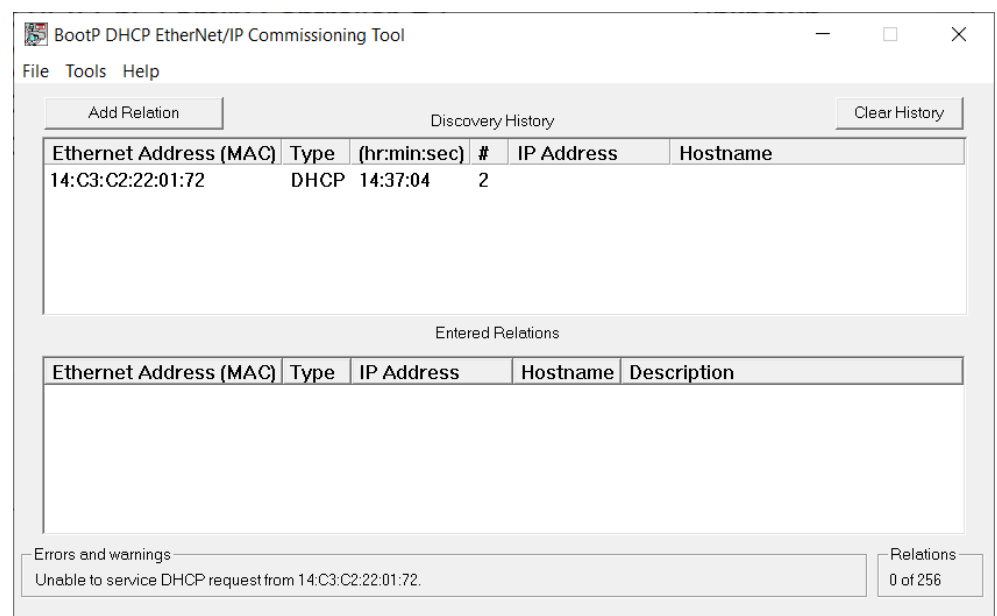
Select the wanted client by double-clicking on it and enter the IP address in the "New Entry" window under "Client".
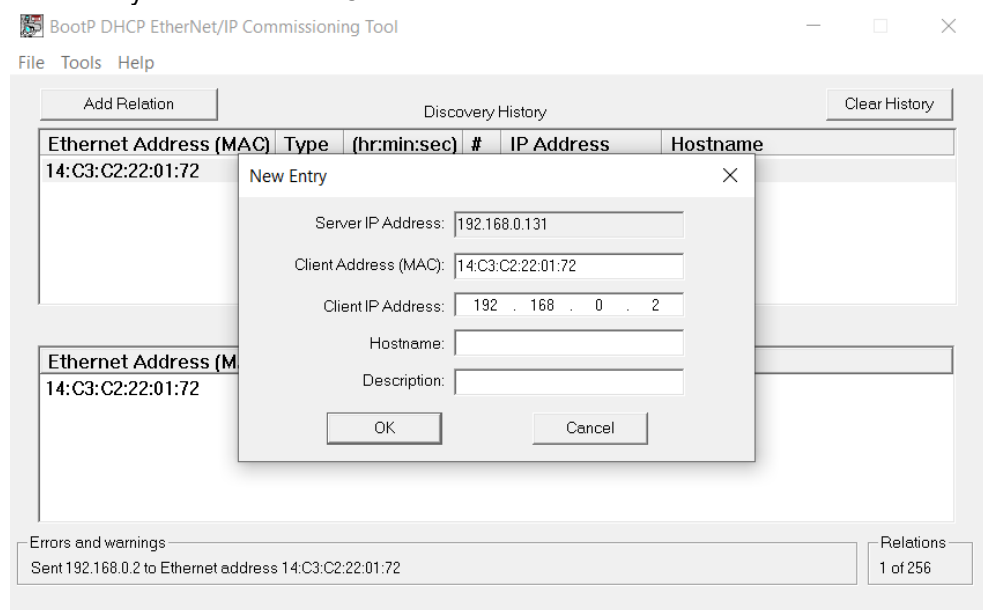
Wait until the entered IP address is displayed in the **upper part** of the program window

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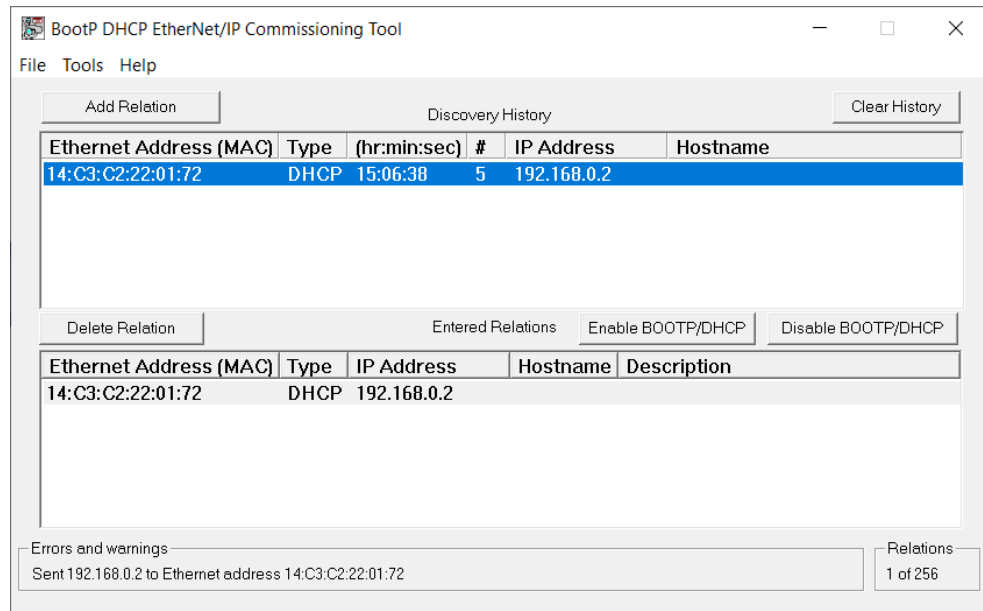
Select the client in the **lower part** of the program window and click
"Disable BOOTP/DHCP".
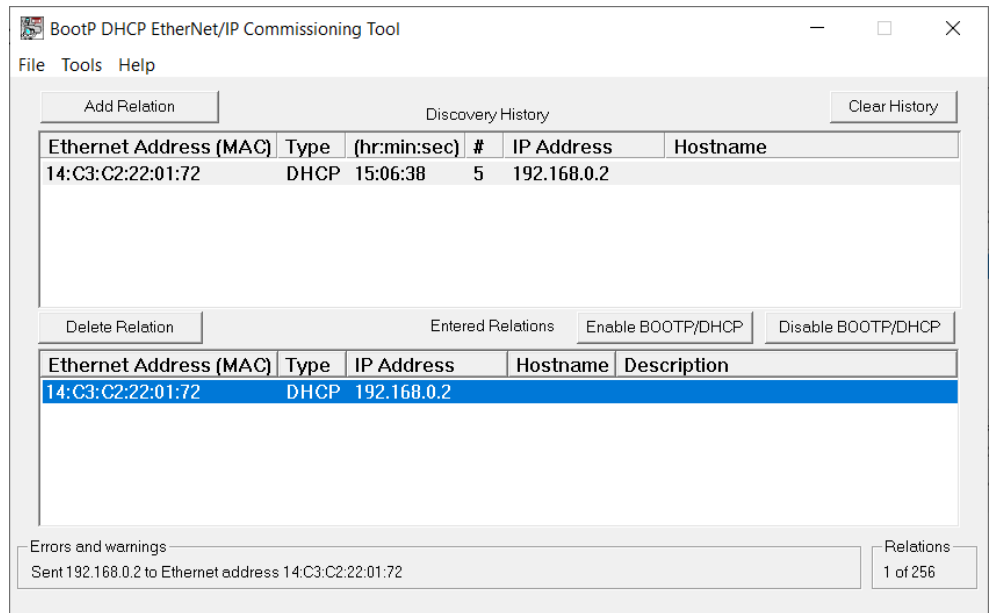
	INFORMATION
	After successful disabling, the client is no longer displayed in the program window. The Module-Status LED (MS) lights permanently green.

4.3.6 Set "Safety Task Period" for safety program

Right-click on "Safety Task" and select "Properties" from the context menu.
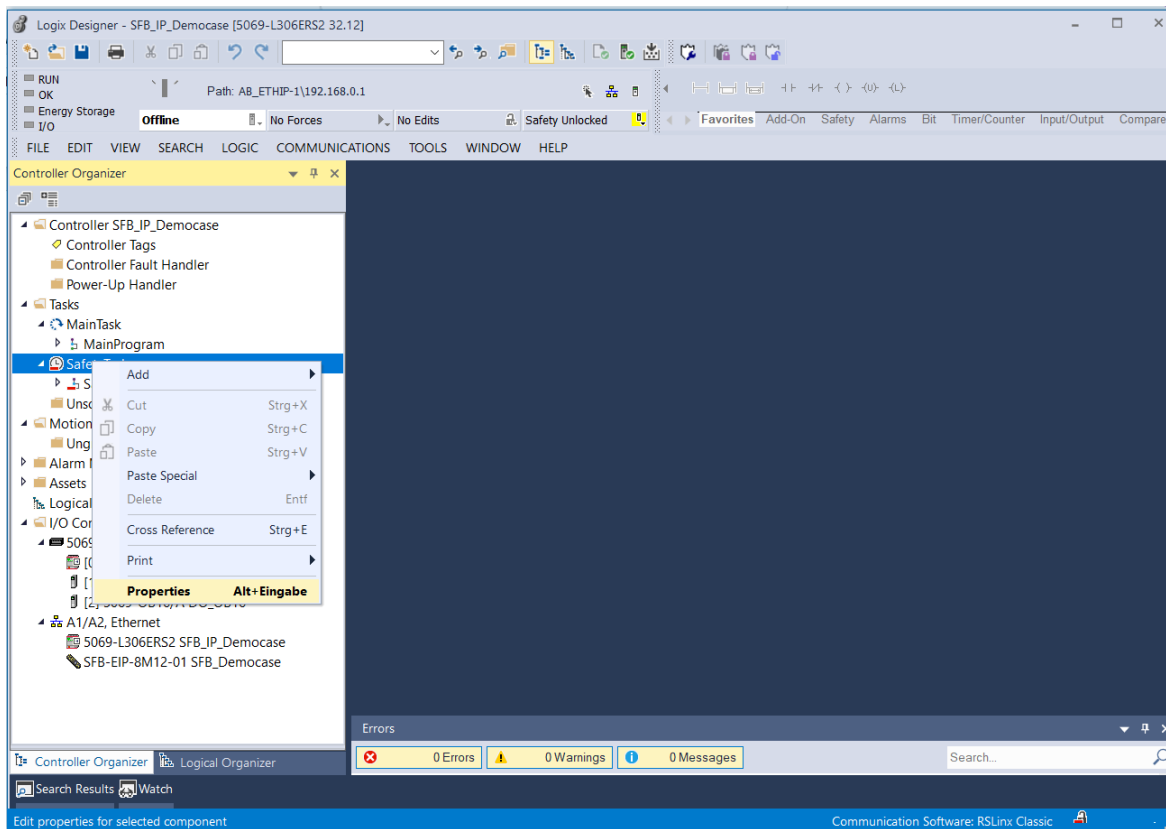
Set the "Safety Task Period" to 20 ms under "Configuration"
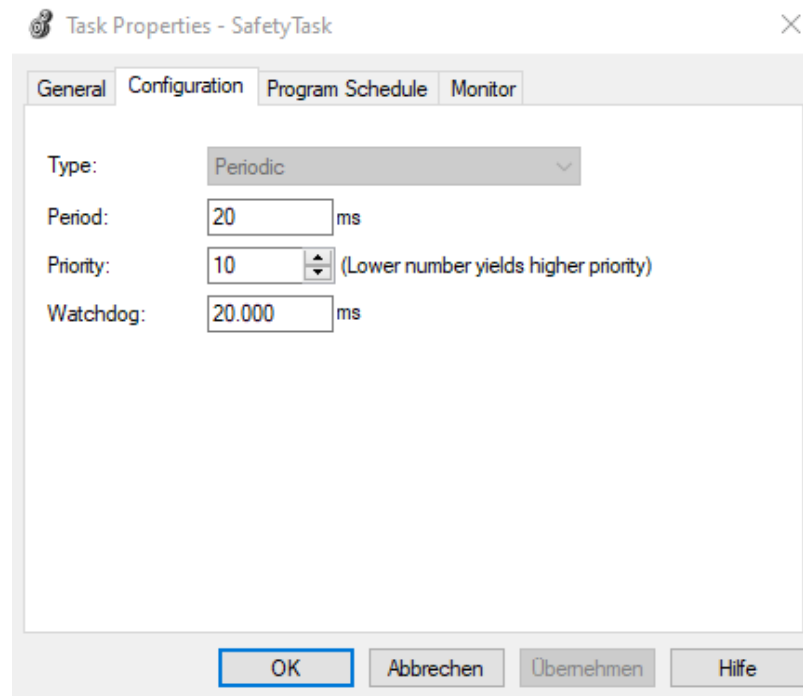
4.3.7 Add SFB-EIP as New Module

Right-click on the Ethernet node and select "New Module" in the context menu
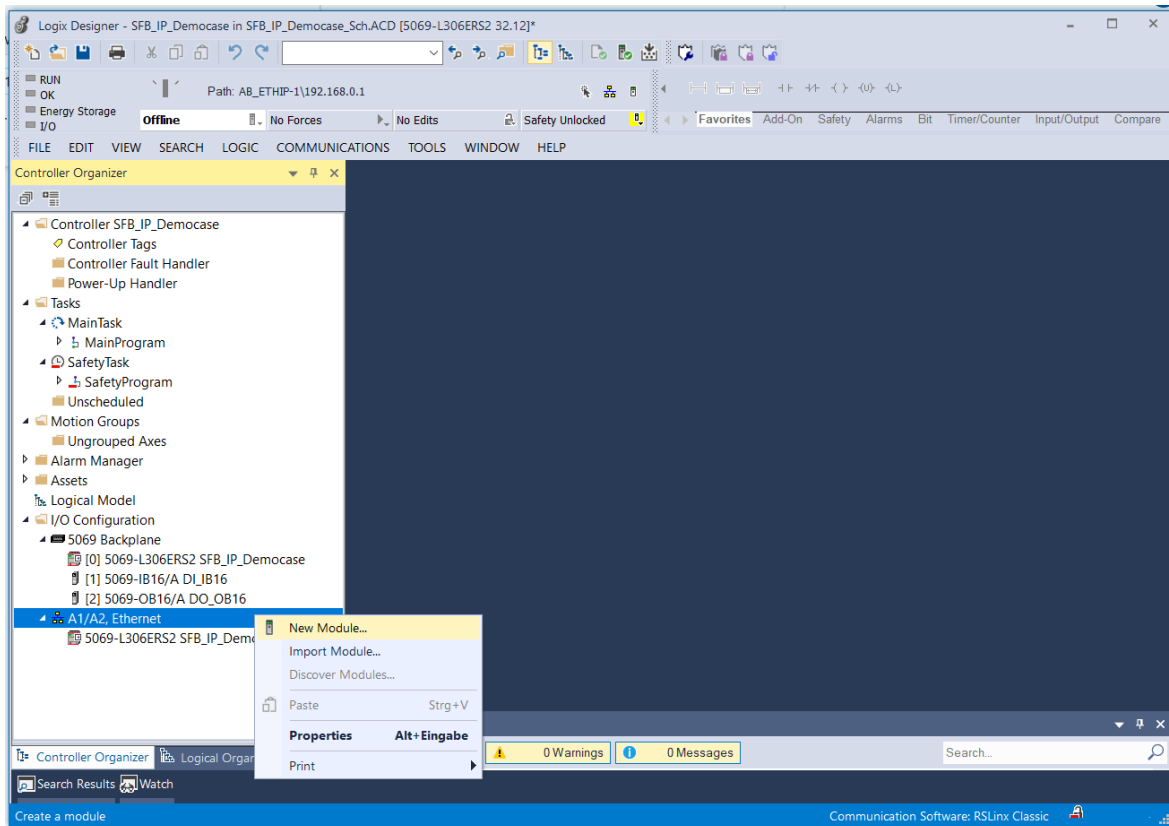
In the following dialog, enter "SFB" in the search field, select the "SFB-EIP-V01" and confirm with "Create".
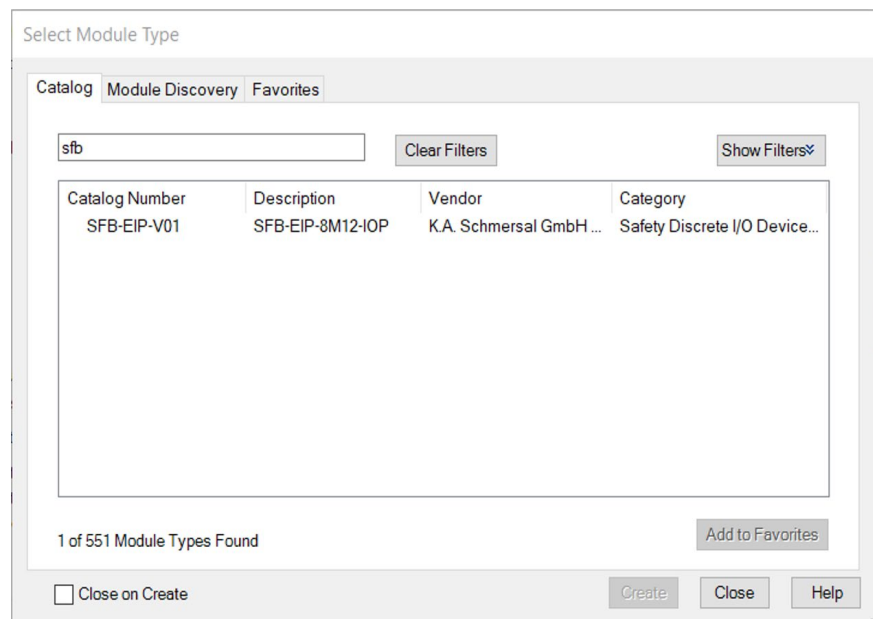
Under "New Module" in the tab "General" at "Name" set the device name and enter the IP address of the SFB-EIP.

Set the IP address specified with BootP DHCP or the fixed IP address set on the SFB-EIP here.

⚠	**WARNING**
	When assigning the SNN manually, make sure that the SNN is unique in each safety network or safety subnet.

⚠	**WARNING**
	Safety Controllers (Originator) that have an „Automatic" SNN setting feature should only use that feature when the safety system is not being relied upon.

4.3.8 Set Request Packet Interval (RPI)

In the "Safety" register, the times for the "Requested Packet Interval (RPI)" for the "Safety Inputs" of the SFB-EIP can be set in the range 12 ms - 500 ms.

The RPI time for the "Safety Outputs" corresponds to the "Safety Task Period".
The Safety Task Period for the SFB-EIP should be set to 20 ms.

The default RPI times for the SFB-EIP are defined as follows:
- RPI time Safety Input: 20 ms
- RPI time Safety Output: 20 ms   (corresponds to Safety Task Period)
We recommended that you use these default values.

ℹ	**INFORMATION**
	Please note that the time settings for the safety task period and the RPI have an impact on the load of the network and the PLC, as well as on the "Safety Response Time" of the SFB-EIP. The times must be included in the calculation of the "Safety Function Response Time (SFRT)". (s. a. chapter 2.5.5)

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

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Set the Request Packet Interval (RPI) for the safety inputs under "Safety"
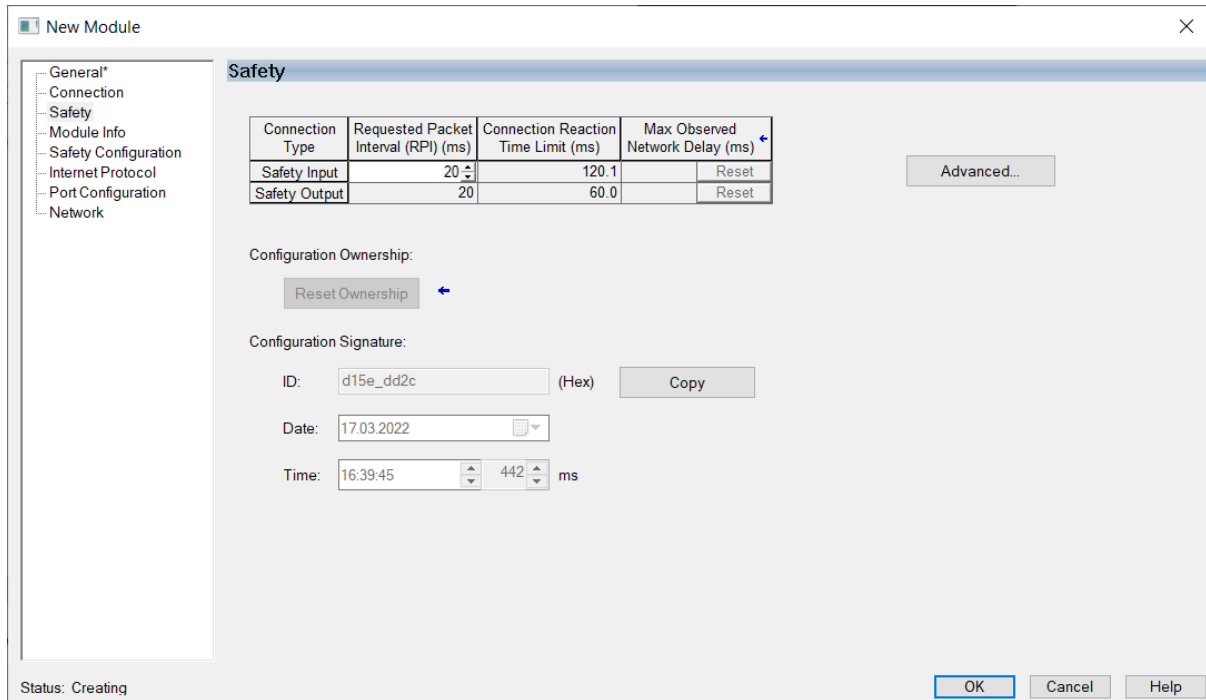
The values for the "Connection Reaction Time Limit" under "Advanced" should then be set as follows:
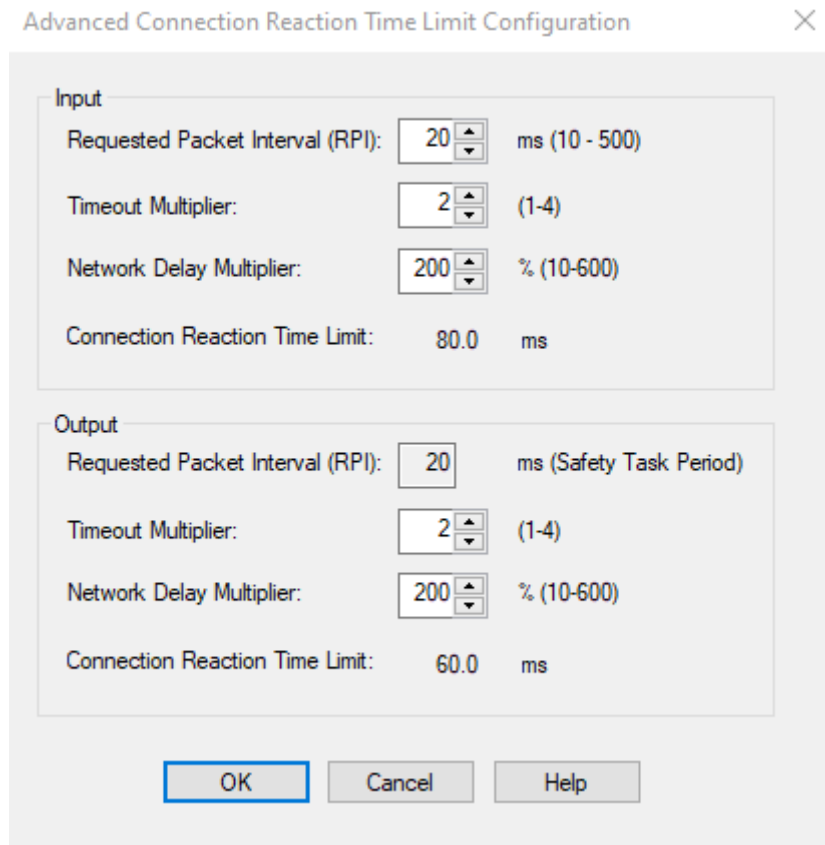
Information to the "Connection Reaction Time Limit"

The „Connection Reaction Time Limit" determines the monitoring time for the Safety Task in the PLC and the Ethernet/IP communication between the PLC and the SFB-EIP.

This ensures that communication problems or failures of individual components switch the PLC or the SFB-EIP to a safety state.

	INFORMATION
i	Set the Connection Reaction Time Limit high enough to tolerate communication delays. In case of errors, however, the reaction time of the overall system should not get too high. Normally the default values of "Timeout Multiplier = 2" and "Network Delay Multiplier = 200%" are enough.

|	INFORMATION
i	Further information about the configuration of a "Safety Module" can be found in the "Safety Controller User Manual" of your controller system.

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

RPI time "Functional Data"

The RPI for the "Functional Data" can be set in the "Connection" tab under "New Module".

The default value of 20 ms is set via the EDS file.

We recommend that you use this default value.

4.3.9   Configure Safety Parameters for the device ports

Each device port can be configured with 4 different parameter data sets (types) for the different safety switchgear.

Device parameters of the 4 types:

Type	Device Parameters	Parameters Stable-Time-Filter
A	**Input:** 2 channel OSSD / **Output:** 1 wire	Stable time: 0,1 s / Monitoring time: 2 s
B	**Input:** 2 channel OSSD / **Output:** 2 wires	Stable time: 0,1 s / Monitoring time: 2 s
C	**Input:** 2 channel Contacts / **Output:** 1 wire	Stable time: 0,5 s / Monitoring time: 10 s
D	**Input:** 2x 1 channel Contact / **Output:** 1 wire	Stable time: 0,5 s / Monitoring time: 10 s

Basic information on the parameterization of the device ports can be found in chapter 2.2.1.

In chapter 2.3 you will find connection examples for different safety switchgear with the corresponding parameter data set types.

Set the required port configuration in the "Safety Configuration" tab and confirm with "OK".
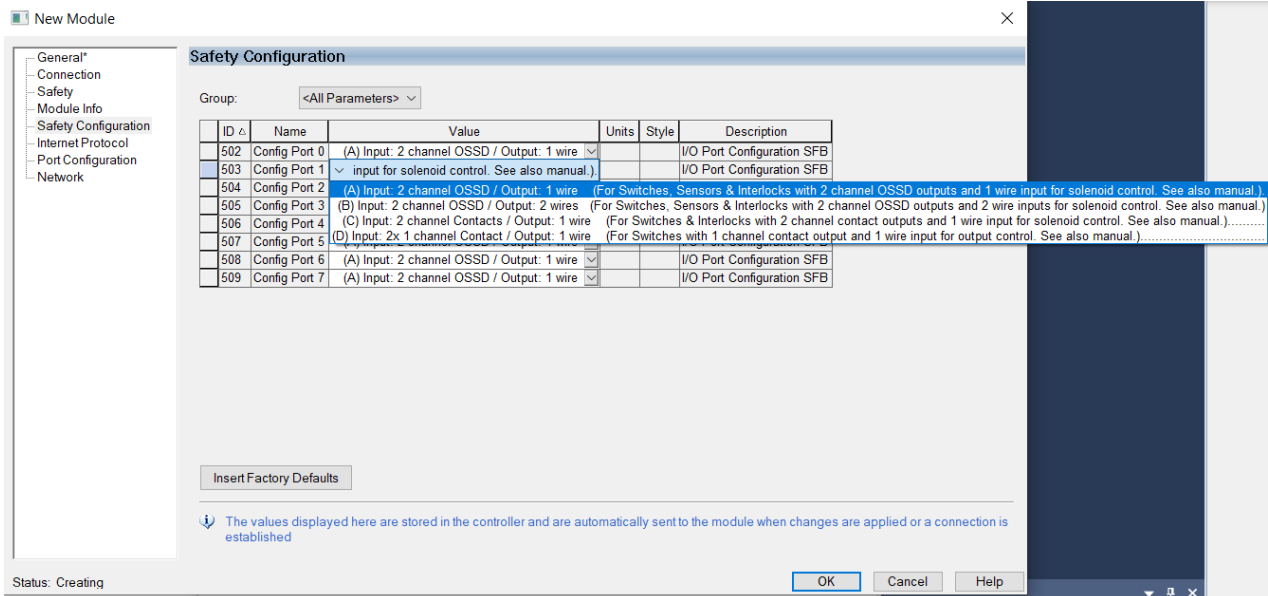
After the configuration is completed, the SFB-EIP is displayed on the left side in the navigation tree with its icon.

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

4.4 Data Layout SFB-EIP

4.4.1 Cyclic data (Assemblies)

The cyclic communication transports the safety I/O data and the functional status information via the corresponding input or output assembly.

The direction of the data to be transferred is always defined from the PLC's point of view.

By using the SFB-EIP **EDS file** (Refer to chapter 4.3.2), no assemblies have to be configured in Studio 5000, because they are described in the EDS file.

Module Definition: **SFB-EIP**
Menu selection: **General & Module Definition**
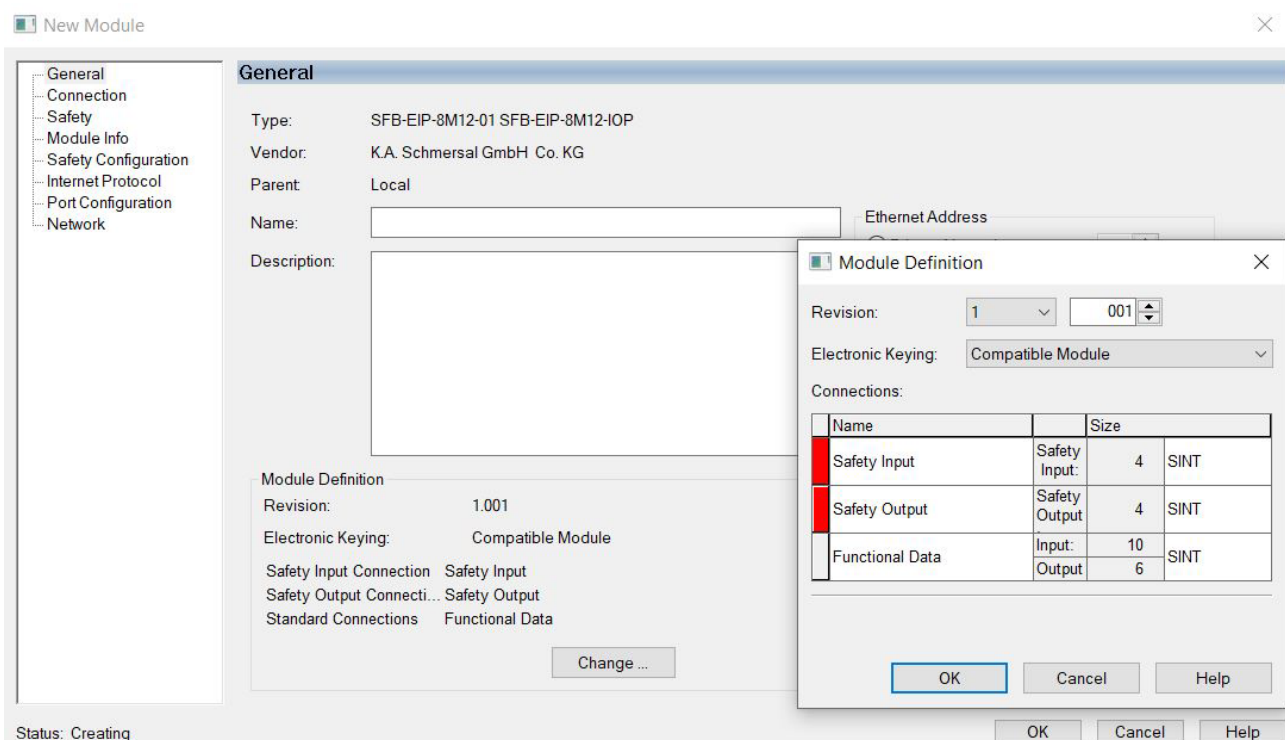
The bit assignment of the data bytes in the individual assemblies are described below. In the column "Contr.-Tags" you find as reference the controller tags in which the corresponding bytes are located.

Assembly 768: Safety Input A768, Input data (SFB => PLC)

Data Type	Contr.-Tags	SFB Data	Bit	Signal
SINT [0…3]	Device Name:	Safety Input Data		
SINT [0]	:SI.Data[0].x	Safety Input X1/X2 2-channel device Safety Inputs X1 AND X2 1-channel device Safety Input X1	0 1 2 3 4 5 6 7	Device port X0 Device port X1 Device port X2 Device port X3 Device port X4 Device port X5 Device port X6 Device port X7
SINT [1]	:SI.Data[1].x	Safety Input X2 2-channel device --- 1-channel device Safety Input X2	0 1 2 3 4 5 6 7	Device port X0 Device port X1 Device port X2 Device port X3 Device port X4 Device port X5 Device port X6 Device port X7
SINT [2]	:SI.Data[2].x	Qualifier-Bit Device port 0 = Device port passivated 1 = Device port active *A copy of the qualifier bits are in:* *- Functional Data under:* *Device Name:I.Data[1].x*	0 1 2 3 4 5 6 7	Qualifier port X0 Qualifier port X1 Qualifier port X2 Qualifier port X3 Qualifier port X4 Qualifier port X5 Qualifier port X6 Qualifier port X7
SINT [3]	:SI.Data[3].x	*Not used ! (internal padding byte)*		---

	INFORMATION
i	If **one** 2-channel device is connected, only **1** safety bit for the device is transmitted into **Assembly 768** in **Device Name:SI.Data[0].x**. If **two** 1-channel devices are connected, **2** safety bits are transmitted separately for each device in **Device Name:SI.Data[0].x** and **Device Name:SI.Data[1].x**.

Assembly 769: Safety Output A769, Output data (PLC => SFB)

Data Type	Contr.-Tags	SFB Data	Bit	Signal
SINT [0…3]	Device Name:	Safety Output Data		
SINT [0]	:SO.Data[0].x	Safety Output Safety Outputs DO	0 1 2 3 4 5 6 7	Device port X0 Device port X1 Device port X2 Device port X3 Device port X4 Device port X5 Device port X6 Device port X7
SINT [1].[3]	:SI.Data[1].[3]	*Not used ! (internal padding byte)*		---

The communication areas of the SFB can be monitored and unlabelled under "Controller Tags"
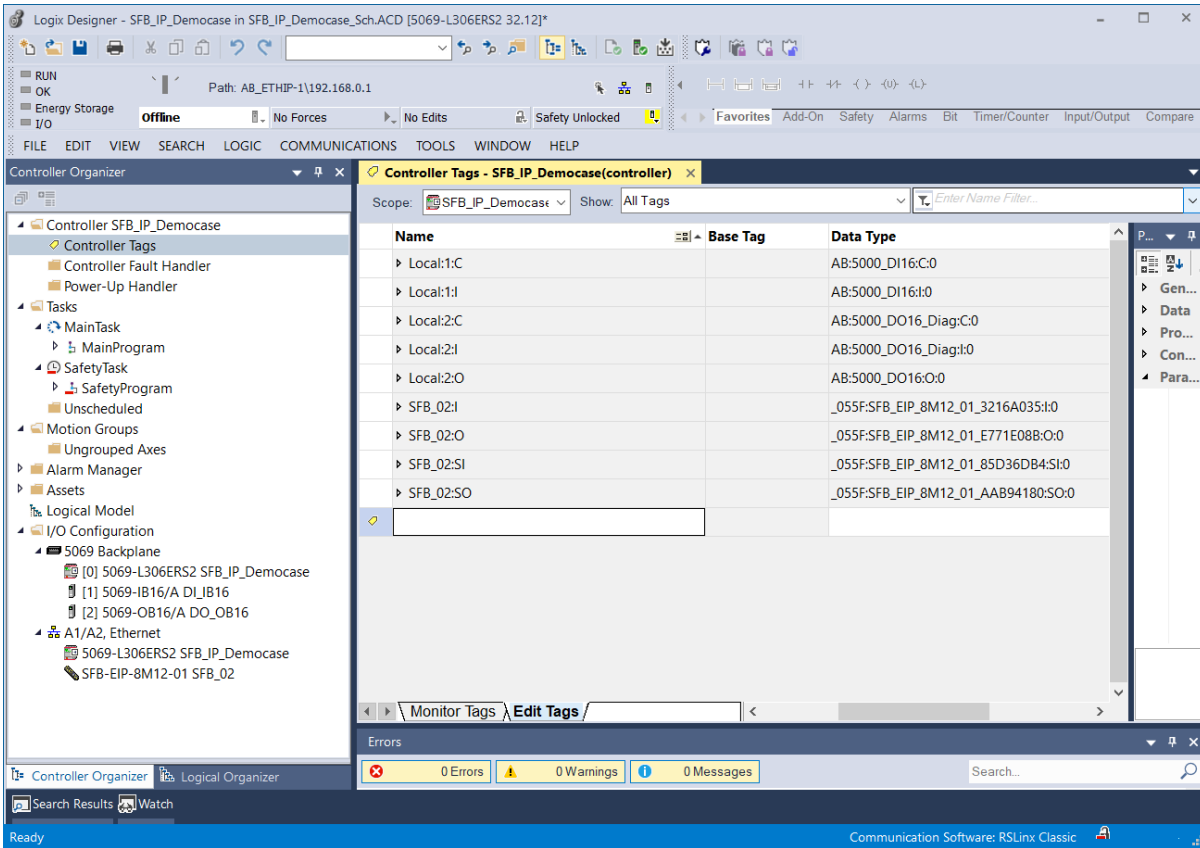
Controller tags for the Safety Input and Output data

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Data Type	Contr.-Tags	SFB Data	Bit	Signal
SINT [0…9]	Device Name:	Functional Input Data		
SINT [1]	:I.Data[0].x	Qualifier-Bit Device port 0 = Device port passivated 1 = Device port active *Copy of the qualifier bits from:* *- Safety Input Data under:* *Device Name:SI.Data[2].x*	0 1 2 3 4 5 6 7	Device port X0 Device port X1 Device port X2 Device port X3 Device port X4 Device port X5 Device port X6 Device port X7
SINT [1]	:I.Data[1].x	Fault-Flags (Bit 0-2) 0 = Fault detected 1 = No fault present Request fault acknowledgement (Bit 7) 0 = no request 1 = Fault can be acknowledged	0 1 2 3 4 5 6 7	Fault-Flag Module Fault-Flag Device port Fault-Flag COM FB interface Diagnostic data valid --- --- --- Request acknowledgement
SINT [2]	:I.Data[2].x	Diagnosis Selector 0 = IO-Device diagnosis 1 = FB-Interface device diagnosis Device port X0 – X3 **only IO** Device port X4 – X7 **IO or FB**	0 1 2 3 4 5 6 7	Device diagnosis X0 Device diagnosis X1 Device diagnosis X2 Device diagnosis X3 Device diagnosis X4 Device diagnosis X5 Device diagnosis X6 Device diagnosis X7
SINT [3]	:I.Data[3].x	Diagnosis signals IO-Devices only 0 = Device diagnosis Bit is LOW 1 = Device diagnosis Bit is HIGH	0 1 2 3 4 5 6 7	Device diagnosis X0 Device diagnosis X1 Device diagnosis X2 Device diagnosis X3 Device diagnosis X4 Device diagnosis X5 Device diagnosis X6 Device diagnosis X7
SINT [4]	:I.Data[4].x	FB-I Response data from device at X4 0/1 = FB-I response bits BDF200 *FB-I response data, see also* *operating instructions BDF200-SD/FB*	0 1 2 3 4 5 6 7	E-STOP **not** actuated NO contact Pos. 2 NC contact Pos. 2 NO contact Pos. 3 NC contact Pos. 3 NO contact Pos. 4 Fault warning FB device Fault at FB device
SINT [5]	:I.Data[5].x	FB-I Response data from device at X5 0/1 = FB-I response bits BDF200 *FB-I response data, see also* *operating instructions BDF200-SD/FB*	0 1 2 3 4 5 6 7	E-STOP **not** actuated NO contact Pos. 2 NC contact Pos. 2 NO contact Pos. 3 NC contact Pos. 3 NO contact Pos. 4 Fault warning FB device Fault at FB device

SINT [6]	:I.Data[6].x	FB-I Response data from device at X6 0/1 = FB-I response bits BDF200 *FB-I response data, see also operating instructions BDF200-SD/FB*	0 1 2 3 4 5 6 7	E-STOP **not** actuated NO contact Pos. 2 NC contact Pos. 2 NO contact Pos. 3 NC contact Pos. 3 NO contact Pos. 4 Fault warning FB device Fault at FB device
SINT [7]	:I.Data[7].x	FB-I Response data from device at X7 0/1 = FB-I response bits BDF200 *FB-I response data, see also operating instructions BDF200-SD/FB*	0 1 2 3 4 5 6 7	E-STOP **not** actuated NO contact Pos. 2 NC contact Pos. 2 NO contact Pos. 3 NC contact Pos. 3 NO contact Pos. 4 Fault warning FB device Fault at FB device
SINT [8]	:I.Data[8].x	Module or port fault number - 0 no fault - 1...99 Fault number		Fault number 0…99 -> Poll fault list ! (Refer to chapter 4.4.2)
SINT [9]	:I.Data[9].x	*Not used ! (internal padding byte)*		---

Controller tags for the functional Input data

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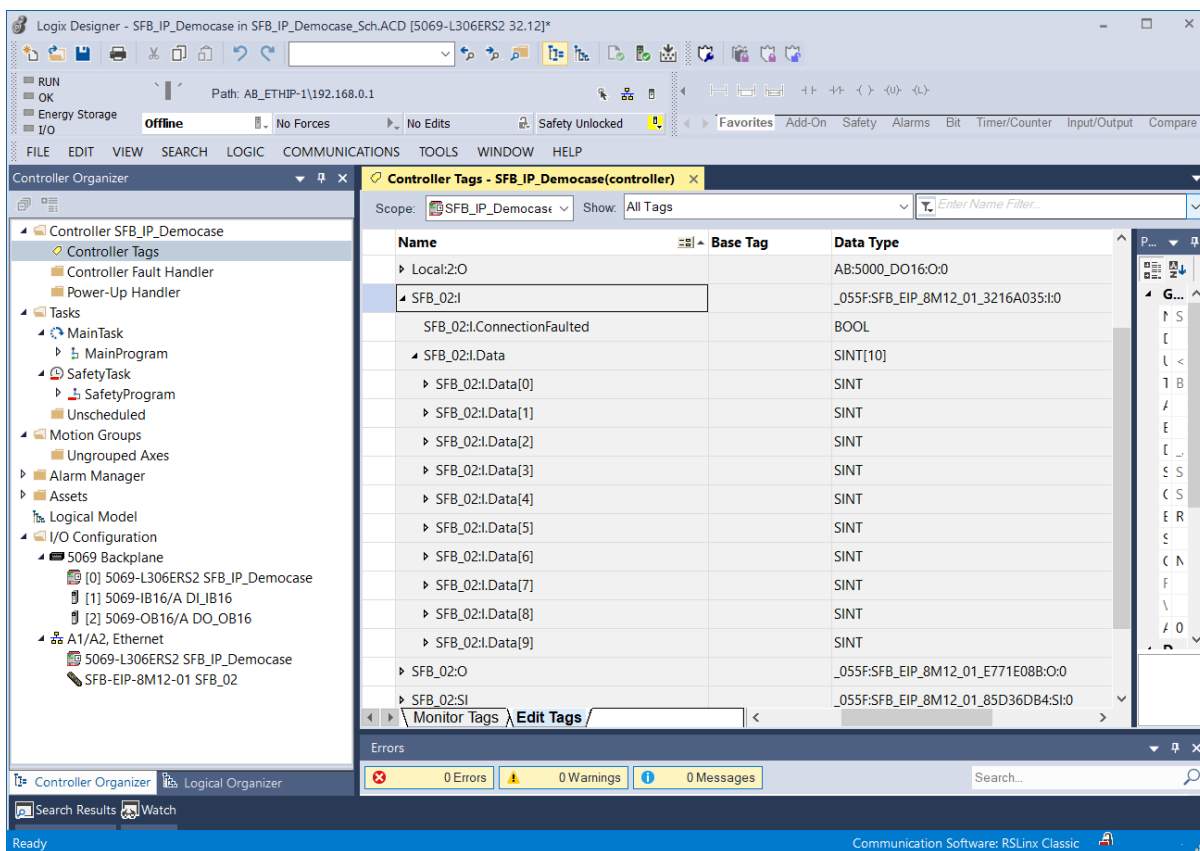
Assembly 152: Functional Data A152, Output data (PLC => SFB)

Data Type	Contr.-Tags	SFB Data	Bit	Signal
SINT [0…5]	Device Name:	Functional Output Data		
SINT [0]	:O.Data[0].0	Acknowledge fault / Bit 0 High Pulse 500 ms = Acknowledge fault	0 1-7	Acknowledge fault ---
SINT [1]	:O.Data[1].x	FB-I Request data for device at X4 0/1 = FB-I request bits BDF200 *FB-I request data, see also operating instructions BDF200-SD/FB*	0 1 2 3 4 5 6 7	--- LED G24 Signal lamp red LED G24 Signal lamp green LED in push button Pos. 2 LED in push button Pos. 3 LED in push button Pos. 4 --- Acknowledge device fault
SINT [2]	:O.Data[2].x	FB-I Request data for device at X5 0/1 = FB-I request bits BDF200 *FB-I request data, see also operating instructions BDF200-SD/FB*	0 1 2 3 4 5 6 7	--- LED G24 Signal lamp red LED G24 Signal lamp green LED in push button Pos. 2 LED in push button Pos. 3 LED in push button Pos. 4 --- Acknowledge device fault
SINT [3]	:O.Data[3].x	FB-I Request data for device at X6 0/1 = FB-I request bits BDF200 *FB-I request data, see also operating instructions BDF200-SD/FB*	0 1 2 3 4 5 6 7	--- LED G24 Signal lamp red LED G24 Signal lamp green LED in push button Pos. 2 LED in push button Pos. 3 LED in push button Pos. 4 --- Acknowledge device fault
SINT [4]	:O.Data[4].x	FB-I Request data for device at X7 0/1 = FB-I request bits BDF200 *FB-I request data, see also operating instructions BDF200-SD/FB*	0 1 2 3 4 5 6 7	--- LED G24 Signal lamp red LED G24 Signal lamp green LED in push button Pos. 2 LED in push button Pos. 3 LED in push button Pos. 4 --- Acknowledge device fault
SINT [5]	:O.Data[5].x	*Not used ! (internal padding byte)*		---

Controller tags for the functional Output data

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4.4.2 Acyclic CIP Generic Messages (Explicit Messages)

Diagnostic and status data are provided via vendor-specific CIP objects, which can be requested by the PLC via CIP Generic Messages (Expicit Messages).

The SFB-EIP transfers the diagnostic data, the device port parameters and the module status in the different CIP objects.

	INFORMATION
i	Further information about the configuration of "Expicit Messages" can be found in the "Safety Controller User Manual" of your controller system.

	INFORMATION
i	Do not poll the acyclic CIP objects in a shorter interval than 100 ms !

Fault Logbook (Logbook)

The fault logbook shows the fault history of the last 30 faults that occurred and those that have already "removed", i.e. are no longer active.

The list is organized as follows:

CIP-Object 848 (Hex 350):   **Fault Logbook**
Instance / Attribute: **Instance 1 and Attribute 1**

List entry number	Byte Position in Array	Content / Data
0	Byte 0	Fault number
	Byte 1	10 = Module Fault / 0 … 7 = Number of faulty device port
	Byte 2 … 5	Timestamp of the message *(Format: DINT / Seconds after Power ON)*
1	Byte 6	Fault number
	Byte 7	10 = Module Fault / 0 … 7 = Number of faulty device port
	Byte 8 … 11	Timestamp of the message *(Format: DINT / Seconds after Power ON)*
2 … 28	…	…
29	Byte 174	Fault number
	Byte 175	10 = Module Fault / 0 … 7 = Number of faulty device port
	Byte 176 … 179	Timestamp of the message *(Format: DINT / Seconds after Power ON)*

List of current faults (Fault list)

The list of current faults shows the last 30 fault messages.

In the list of current faults, active ("Detected") and no longer active ("Removed") faults are displayed.

The currently passivated device ports are also displayed in this list.
(Fault message 10 – 17)

The list is organized as follows:

CIP-Object 848 (Hex 350):   **Fault list**
Instance / Attribute: **Instance 1 and Attribute 2**

List entry number	Byte Position in Array	Content / Data
0	Byte 0	Fault number
	Byte 1	1 = Fault active / 0 = Fault removed
	Byte 2	10 = Module Fault / 0 … 7 = Number of faulty device port
	Byte 3 … 6	Timestamp of the message *(Format: DINT / Seconds after Power ON)*
1	Byte 7	Fault number
	Byte 8	1 = Fault active / 0 = Fault removed
	Byte 9	10 = Module Fault / 0 … 7 = Number of faulty device port
	Byte 10 … 13	Timestamp of the message *(Format: DINT / Seconds after Power ON)*
2 … 28	…	…
29	Byte 203	Fault number
	Byte 204	1 = Fault active / 0 = Fault removed
	Byte 205	10 = Module Fault / 0 … 7 = Number of faulty device port
	Byte 206 … 209	Timestamp of the message *(Format: DINT / Seconds after Power ON)*

SCHMERSAL

List of device port parameters

The list of device port parameters shows the parameter types set for the individual device ports.

1 = Type A   Input: 2 channel OSSD / Output: 1 wire
2 = Type B   Input: 2 channel OSSD / Output: 2 wires
3 = Type C   Input: 2 channel Contacts / Output: 1 wire
4 = Type D   Input: 2x 1 channel Contact / Output: 1 wire

(s. a. chapter 2.2.1)

The list is organized as follows:

CIP-Object 849 (Hex 351):   **Device port parameters**
Instance / Attribute: **Instance 1 and Attribute 1**

Device port number	Byte Position in Array	Content / Data
X0	Byte 0	Parameter type 1 / 2 / 3 / 4 for device port X0
X1	Byte 1	Parameter type 1 / 2 / 3 / 4 for device port X1
X2	Byte 2	Parameter type 1 / 2 / 3 / 4 for device port X2
X3	Byte 3	Parameter type 1 / 2 / 3 / 4 for device port X3
X4	Byte 4	Parameter type 1 / 2 / 3 / 4 for device port X4
X5	Byte 5	Parameter type 1 / 2 / 3 / 4 for device port X5
X6	Byte 6	Parameter type 1 / 2 / 3 / 4 for device port X6
X7	Byte 7	Parameter type 1 / 2 / 3 / 4 for device port X7

The list of module status messages shows the status of the different module sections.

The following information is available:

- Fault status module / port
- Status of the power supply
- Status of module temperature
- Operating status Module
- Operating status network

The list is organized as follows:

CIP-Object 850 (Hex 352): Module status messages
Instance / Attribute: Instance 1 and Attribute 1

List entry number	Byte Position in Array	Content / Data	
0	Byte 0 … 3	Current Timestamp of SFB *(Format: DINT / Seconds after Power ON)*	
1	Byte 4	Status module: Status device ports:	Bit 0: 1 = RUN Bit 0: 0 = Module fault active Bit 1: 1 = OK Bit 1: 0 = Fault on device port
2	Byte 5	Status supply voltage:	Bit 0: 1 = OK Bit 1: 1 = Limit range Bit 2: 1 = Under voltage
3	Byte 6 … 7	Value supply voltage:	INT / Dec 237 = 23,7 Volt
4	Byte 8	Status SFB temperature:	Bit 0: 1 = OK Bit 1: 1 = Limit range Bit 2: 1 = Over temperature
5	Byte 9	Value SFB temperature	SINT / Dec 53 = 53° C
6	Byte 10	MS Module Status:	Bit 0: 1 = Operating Bit 1: 1 = Standby Bit 2: 1 = Recoverable Fault Bit 3: 1 = Internal Fault SFB Bit 4: 1 = Waiting for parameters / Test
7	Byte 11	NS Network Status:	Bit 0: 1 = Connected Bit 1: 1 = Not connected Bit 2: 1 = No IP-Address Bit 3: 1 = Timeout of Connection Bit 4: 1 = Duplicate IP-Address Bit 5: 1 = Parameterization of SFB

The current timestamp can also be separately requested.

CIP-Object 850 (Hex 352): Timestamp
Instance / Attribute: Instance 1 and Attribute 2

List entry number	Byte Position in Array	Content / Data
0	Byte 0 … 3	Current Timestamp of SFB *(Format: DINT / Seconds after Power ON)*

SCHMERSAL

5 Diagnostic system

5.1 SFB-EIP Diagnostics

The safety fieldbox SFB-EIP can detect module faults and device port faults.

In case of module faults, the SFB-EIP is completely passivated.
Module faults are for example, over temperature of the SFB, under voltage or internal module faults.

In case of device port faults, only the affected device port X0 - X7 is passivated.
Device port faults are for example, cross-faults on the device connection cables or faults in the connected safety switchgear.

Module faults and device port faults are acknowledged via a uniform acknowledgement mechanism. (Refer to chapter 5.3)

The SFB-EIP transmits all diagnostic information via vendor-specific CIP objects.

These can be acyclically read by the PLC with a CIP Generic Message (Explicit Message). (Refer to chapter 4.4.2)

INFORMATION
Further information about the configuration of "Expicit Messages" can be found in the "Safety Controller User Manual" of your controller system.

5.1.1 Diagnostic messages Module faults

Error No.	Error message	Help information / Note
	Module faults SFB	
99	Internal fault	Try power reset / Module defect
90	Fault: Communication break EthernetIP	Check Ethernet connection
91	Fault: Requested Packet Interval RPI too short or too long	Check / Increase RPI time
01	Fault: Invalid SNN / TUNID	Check rotary coding switch / change SNN
02	SCID changed	Safety-Configuration was changed
03	Fault: acknowledge pulse time	Check acknowledge pulse time (500 ms)
04	Warning: under voltage U < 20,4 V	Check supply voltage
05	Fault: under voltage U < 17 V	Check supply voltage
06	Fault: overload pulse outputs Device-Port 0-7	Check load on Device-Ports
07	Fault: overvoltage U > 29 V	Check supply voltage
08	Warning: over temperature T > 80 °C	Check ambient temperature
09	Fault: internal over temperature T > 85 °C	Check ambient temperature

INFORMATION
At error 06 "Overload pulse outputs" the pulse outputs are switched off. The error can therefore no longer be detected and the message "Fault removed" appears.

5.1.2 Diagnostic messages Device-Port faults

The "Device-Port passivated" status indicates that a device port has been switched to the safety state due to a fault.

"Device-Port passivated" is only displayed in the "List of active errors".
(Refer to chapter 4.4.2)

Error No.	Error message	Help information / Note
	Status Device-Ports	**Fault at Device-Port**
10	Device-Port X0 passivated	See previous message single error at X0
11	Device-Port X1 passivated	See previous message single error at X1
12	Device-Port X2 passivated	See previous message single error at X2
13	Device-Port X3 passivated	See previous message single error at X3
14	Device-Port X4 passivated	See previous message single error at X4
15	Device-Port X5 passivated	See previous message single error at X5
16	Device-Port X6 passivated	See previous message single error at X6
17	Device-Port X7 passivated	See previous message single error at X7

	INFORMATION
i	"Device port passivated" is reported if a previous fault had passivated the device port.

Error No.	Error message	Help information / Note
	Fault Safety-Inputs	**Cross-fault Safety-Inputs at Device-Port**
20	Fault: safety inputs Device-Port X0	Cross-fault monitoring wrong parameterized or cross-fault safety inputs X0. Check parameter setting, cord set and device.
21	Fault: safety inputs Device-Port X1	Cross-fault monitoring wrong parameterized or cross-fault safety inputs X1. Check parameter setting, cord set and device.
22	Fault: safety inputs Device-Port X2	Cross-fault monitoring wrong parameterized or cross-fault safety inputs X2. Check parameter setting, cord set and device.
23	Fault: safety inputs Device-Port X3	Cross-fault monitoring wrong parameterized or cross-fault safety inputs X3. Check parameter setting, cord set and device.
24	Fault: safety inputs Device-Port X4	Cross-fault monitoring wrong parameterized or cross-fault safety inputs X4. Check parameter setting, cord set and device.
25	Fault: safety inputs Device-Port X5	Cross-fault monitoring wrong parameterized or cross-fault safety inputs X5. Check parameter setting, cord set and device.
26	Fault: safety inputs Device-Port X6	Cross-fault monitoring wrong parameterized or cross-fault safety inputs X6. Check parameter setting, cord set and device.
27	Fault: safety inputs Device-Port X7	Cross-fault monitoring wrong parameterized or cross-fault safety inputs X7. Check parameter setting, cord set and device.

	INFORMATION
i	"Fault safety inputs" is reported if either the cross-fault-monitoring was not activated when connecting contacts or a cross-fault is detected by a safety input X1 or X2 against +24 VDC, 0 VDC or between them.

	INFORMATION
i	This fault can only be acknowledged after the safety guard has been opened one time without fault.

	INFORMATION
i	The message "Fault safety inputs" is automatically reset when test pulses are detected on the safety inputs for 10 s after the safety guard is closed again.

Error No.	Error message	Help information / Note
	Fault Pulse-Outputs	**Cross-fault Pulse-Outputs at Device-Port**
30	Fault: pulse outputs Device-Port X0	Cross-fault pulse outputs X0, check cord set and device.
31	Fault: pulse outputs Device-Port X1	Cross-fault pulse outputs X1, check cord set and device.
32	Fault: pulse outputs Device-Port X2	Cross-fault pulse outputs X2, check cord set and device.
33	Fault: pulse outputs Device-Port X3	Cross-fault pulse outputs X3, check cord set and device.
34	Fault: pulse outputs Device-Port X4	Cross-fault pulse outputs X4, check cord set and device.
35	Fault: pulse outputs Device-Port X5	Cross-fault pulse outputs X5, check cord set and device.
36	Fault: pulse outputs Device-Port X6	Cross-fault pulse outputs X6, check cord set and device.
37	Fault: pulse outputs Device-Port X7	Cross-fault pulse outputs X7, check cord set and device.

	INFORMATION
ℹ	"Fault pulse outputs" is reported if there is a cross-fault between a pulse output Y1 or Y2 and +24 VDC, 0 VDC or between them. All pulse outputs are switched off if there is a cross-fault to 0 VDC.

	INFORMATION
ℹ	10 s after correcting the fault, the message "Fault removed" appears and the fault can be acknowledged.

Error No.	Error message	Help information / Note
	Overload fault Power-Supply	**Overload Power-Supply at Device-Port**
40	Fault: overload power supply Device-Port X0	Fuse power supply X0, has tripped check cord set and device.
41	Fault: overload power supply Device-Port X1	Fuse power supply X1, has tripped check cord set and device.
42	Fault: overload power supply Device-Port X2	Fuse power supply X2, has tripped check cord set and device.
43	Fault: overload power supply Device-Port X3	Fuse power supply X3, has tripped check cord set and device.
44	Fault: overload power supply Device-Port X4	Fuse power supply X4, has tripped check cord set and device.
45	Fault: overload power supply Device-Port X5	Fuse power supply X5, has tripped check cord set and device.
46	Fault: overload power supply Device-Port X6	Fuse power supply X6, has tripped check cord set and device.
47	Fault: overload power supply Device-Port X7	Fuse power supply X7, has tripped check cord set and device.

	INFORMATION
ℹ	"Overload power supply device port" is reported if the internal auto-resettable fuse has tripped.

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Error No.	Error message	Help information / Note
	Overload fault Digital-Output	**Overload Digital-Output at Device-Port**
50	Fault: overload digital output Device-Port X0	Current limiter digital output X0 activated, check cord set and device.
51	Fault: overload digital output Device-Port X1	Current limiter digital output X1 activated, check cord set and device.
52	Fault: overload digital output Device-Port X2	Current limiter digital output X2 activated, check cord set and device.
53	Fault: overload digital output Device-Port X3	Current limiter digital output X3 activated, check cord set and device.
54	Fault: overload digital output Device-Port X4	Current limiter digital output X4 activated, check cord set and device.
55	Fault: overload digital output Device-Port X5	Current limiter digital output X5 activated, check cord set and device.
56	Fault: overload digital output Device-Port X6	Current limiter digital output X6 activated, check cord set and device.
57	Fault: overload digital output Device-Port X7	Current limiter digital output X7 activated, check cord set and device.

	INFORMATION
i	"Overload digital output" is reported if the electronic current limitation of the digital output has tripped.

	INFORMATION
i	If the device port is passivated, the error can no longer be detected and the message "Fault removed" appears.

Error No.	Error message	Help information / Note
	Fault Digital-Output	**Cross-fault Digital-Output at Device-Port**
60	Fault: digital output Device-Port X0	Cross-fault digital outputs X0, check cord set and device.
61	Fault: digital output Device-Port X1	Cross-fault digital outputs X1, check cord set and device.
62	Fault: digital output Device-Port X2	Cross-fault digital outputs X2, check cord set and device.
63	Fault: digital output Device-Port X3	Cross-fault digital outputs X3, check cord set and device.
64	Fault: digital output Device-Port X4	Cross-fault digital outputs X4, check cord set and device.
65	Fault: digital output Device-Port X5	Cross-fault digital outputs X5, check cord set and device.
66	Fault: digital output Device-Port X6	Cross-fault digital outputs X6, check cord set and device.
67	Fault: digital output Device-Port X7	Cross-fault digital outputs X7, check cord set and device.

	INFORMATION
i	"Fault digital output" is reported if there is a cross-fault from a digital output to +24 VDC, 0 VDC or an external potential.

	INFORMATION
i	If there is a cross-fault between the digital output and +24V, the master switch is switched off internally and all digital outputs DO 0 - DO 7 are switched off.

	INFORMATION
i	If the error message appears several times, there is a permanent short circuit. If the device port is passivated, the error can no longer be detected and the message "Fault removed" appears".

Error No.	Error message	Help information / Note
	Discrepancy- / Stable time fault	**Discrepancy- / Stable time out**
70	Discrepancy / stable time error Device-Port X0	Monitoring time at X0 exceeded, check safety guard.
71	Discrepancy / stable time error Device-Port X1	Monitoring time at X1 exceeded, check safety guard.
72	Discrepancy / stable time error Device-Port X2	Monitoring time at X2 exceeded, check safety guard.
73	Discrepancy / stable time error Device-Port X3	Monitoring time at X3 exceeded, check safety guard.
74	Discrepancy / stable time error Device-Port X4	Monitoring time at X4 exceeded, check safety guard.
75	Discrepancy / stable time error Device-Port X5	Monitoring time at X5 exceeded, check safety guard.
76	Discrepancy / stable time error Device-Port X6	Monitoring time at X6 exceeded, check safety guard.
77	Discrepancy / stable time error Device-Port X7	Monitoring time at X7 exceeded, check safety guard.

	INFORMATION
i	A "discrepancy / stability time error" is reported if there is either a temporary or permanent discrepancy (a difference) between the two input signals, or the input signals are not stable (Refer to chapter 2.2.2). This error is also reported if the safeguard has not been closed correctly or if a temporary single-channel switch-off has occurred.

	INFORMATION
i	Discrepancy errors can also be detected for electronic safety switchgear (= switched off cross-fault detection) if there is a short circuit to +24 VDC or 0 VDC at the safety inputs X1/X2 or the pulse outputs Y1/Y2. Check device connection cables!

	INFORMATION
i	This fault can only be acknowledged after the safety guard has been opened one time without fault. For certain types of interlocks, it may be necessary to switch off the operating voltage of the interlock or of the SFB one time in order to acknowledge the fault.

Error No.	Error message	Help information / Note
	Fault FB-Interface	**FB-Interface disturbed at Device-Port**
84	Fault: FB-Interface Device-Port X4	No valid response from device at X4, check cord set and device.
85	Fault: FB-Interface Device-Port X5	No valid response from device at X5, check cord set and device.
86	Fault: FB-Interface Device-Port X6	No valid response from device at X6, check cord set and device.
87	Fault: FB-Interface Device-Port X7	No valid response from device at X7, check cord set and device.

	INFORMATION
i	"Fault FB-Interface" is reported as long as no communication with the FB-Interface device (BDF200-FB) is possible.

5.2 System behaviour in the event of an error

	INFORMATION
i	**During power-up, module errors can be detected by the SFB !** The SFB then sets an "acknowledgement request" and in the web server all displays on the "Status Device Ports" page are set to RED. To cancel the passivation, it may be necessary to send an initial acknowledgement pulse. (Refer to chapter 5.3.1)

	⚠ WARNING
⚠	The user must specify depending on the necessary safety requirements whether an automatic restart of the safety function is permissible.

5.2.1 Module error

If a module error is detected, the SFB-EIP responds as follows:

− The SFB is completely passivated, i.e. all 8 device ports are passivated.
  All input and output data are set to "0".

− All qualifier bits of the device ports X0 - X7 are reset to "0".
  (*„1" = Device port activated and „0" = Device port passivated*)
  (*:SI.Data[2].x   - Assembly 768 „Safety Input Data", refer to chapter 4.4.1*)
  (*:I.Data[0].x   - Assembly 151 „Functional Data", refer to chapter 4.4.1*)

− The module status LED (MS) of the SFB flashes RED.
  (*Refer to chapter 3.3.3*)

− The module Error LED (Err) of the SFB displays a RED flashing code.
  (*Refer to chapter 3.3.3*)

− The SFB-PN sets the fault flag "Module" as collective error message.
  (*:I.Data[1].0   - Assembly 151 „Functional Data", refer to chapter 4.4.1*)

− The SFB sends the fault number in the cyclic data.
  (*:I.Data[8].0-7   - Assembly 151 „Functional Data", refer to chapter 4.4.1*)

− The SFB writes the fault number into the fault list.
  (*CIP-Objekt 848 (Hex 350) „ Acyclic data", refer to chapter 4.4.2*)

− Normally, a message (LED or display) is also signalled on the PLC.
  This depends on the type of PLC used.

5.2.2 Device port error

If a device port fault is detected, the SFB-EIP responds as follows:

- The device port is passivated, all input and output data are set to "0".

- The qualifier bit of the faulty device ports X0 - X7 are reset to "0".
  ("1" = Device port activated and "0" = Device port passivated)
  (:SI.Data[2].x - Assembly 768 „Safety Input Data", refer to chapter 4.4.1)
  (:I.Data[0].x - Assembly 151 „Functional Data", refer to chapter 4.4.1)

- The module status LED (MS) of the SFB flashes RED.
  (Refer to chapter 3.3.3)

- The Error LED (E) at the device port displays a RED flashing code.
  (Refer to chapter 3.3.1)

- The SFB-PN sets the fault flag "Device Port" as collective error message.
  (:I.Data[1].1 - Assembly 151 „Functional Data", refer to chapter 4.4.1)

- At FB-Interface communication errors the fault flag "COM FB-Interface" is set.
  (:I.Data[1].2 - Assembly 151 „Functional Data", refer to chapter 4.4.1)

- The SFB sends the fault number in the cyclic data.
  (:I.Data[8].0-7 - Assembly 151 „Functional Data", refer to chapter 4.4.1)

- The SFB writes the fault number into the fault list.
  (CIP-Objekt 848 (Hex 350) „ Acyclic data", refer to chapter 4.4.2)

5.2.3 Errors in safety related communication to Safety PLC

Errors in safety-related communication are detected by mechanisms defined in the CIP-Safety profile.
The system reacts according to the responses defined in the CIP-Safety profile.

In the event of an error in the safety related communication, all input and output data of the SFB-EIP are set to "0" and the module remains passivated until the error in the communication has been corrected.

After eliminating the error in the safety-related communication, the module error must be acknowledged. *(Refer to chapter 5.3.1)*

5.3 Acknowledgement corrected faults

5.3.1 Acknowledgement module faults

If a module error is detected, all device slots are passivated.
(Refer to chapter 5.2.1)

An acknowledge request is sent when the detected module fault is removed and when no further module fault is detected.

Acknowledgement Request:
(:I.Data[1].7   - Assembly 151 „Functional Data", refer to chapter 4.4.1)

The module faults are acknowledged with the global acknowledge pulse.

Acknowledgement Pulse:
(:O.Data[0].0 - Assembly 152 „Functional Data", refer to chapter 4.4.1)

5.3.2 Acknowledgement device port faults

If a device port fault is detected, only the faulty device port is passivated.
(Refer to chapter 5.2.2)

If a port is free of faults again, i.e. all port faults at this port are removed and at the same time no module fault is active, an acknowledge request is sent.

This is also done if further faults have been detected at some other port.

Acknowledgement Request:
(:I.Data[1].7   - Assembly 151 „Functional Data", refer to chapter 4.4.1)

The device port faults are acknowledged with the global acknowledge pulse.

Acknowledgement Pulse:
(:O.Data[0].0 - Assembly 152 „Functional Data", refer to chapter 4.4.1)

	INFORMATION
i	For the acknowledgement of module faults and device port faults, the qualifier bits, the error flags, one bit for the request of the fault acknowledgement (fault removed) and one bit for the acknowledgement pulse are used. These bits are described in chapter 4.4.1 "Cyclic Data (Assemblies)".

5.3.3 Acknowledgement with global acknowledgement pulse

The real acknowledgement is done via an acknowledgement pulse of 500 ms (+/- 150 ms) which is sent from the PLC to the SFB-EIP.

The pulse always globally acknowledges all removed module faults and device port faults !

Faults that have not yet been removed are not acknowledged.

Module fault / Device port fault is removed / can be acknowledged:

- *Module faults:*
  The module Error-LED (Err) flashes GREEN. *(Refer to chapter 3.3.3)*
- *Device port faults:*
  Error-LED (E) of the device port flashes GREEN. *(Refer to chapter 3.3.1)*
- SFB-EIP sets the "Fault acknowledgement request" to "1".
  (:I.Data[1].7 - Assembly 151 „Functional Data", refer to chapter 4.4.1)
- The acknowledge request for a removed module or port fault can be evaluated by the PLC.
- The fault can then be acknowledged with an acknowledgement pulse of 500 ms (+/- 150 ms) and the module or the device port is reactivated.
  (:O.Data[0].0 - Assembly 152 „Functional Data", refer to chapter 4.4.1)
- The qualifier bits of the device ports are set to "1" again.
  (:SI.Data[2].x - Assembly 768 „Safety Input Data", refer to chapter 4.4.1)
  (:I.Data[0].x - Assembly 151 „Functional Data", refer to chapter 4.4.1)
- The module status LED (MS) of the SFB lights GREEN again.
  (s. a. chapter 3.3.3)
- *Module faults:*
  The module Error-LED (Err) lights GREEN again *(Refer to chapter 3.3.3)*
- *Device port faults:*
  The Error-LED (E) of the device port lights GREEN again
  (Refer to chapter 3.3.1)
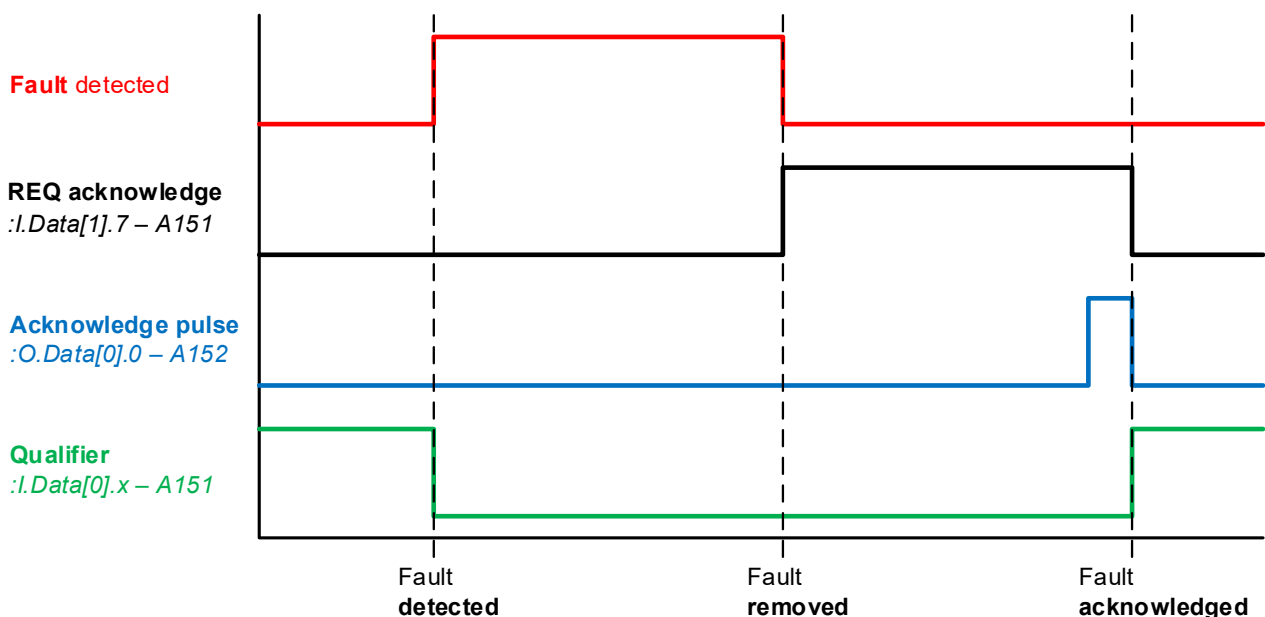
6 Web Server

6.1 Description Web server

A web server for displaying status and diagnostic data is integrated in the SFB-EIP.

If the IP address is known, the web server can be started by entering the IP address in the address bar of an Internet browser.

	INFORMATION
i	The field box and the network adapter of the computer must be in the same network (IP area).

The IP address of the SFB-EIP can also be found via the Rockwell tool "RSLinx".

6.1.1 Page: SFB Home

The "SFB Home" page displays an overview of the most important status, network and device data.

Pos.	Graphic	Definition	Description
1		Language	The language of the display can be changed between German and English with the language buttons.
2	Blink SFB	Blink SFB	The "Blink SFB" button sends a signal to a connected field box and the MS/NS LEDs flashes red/green for a few seconds.
3	Refresh Page	Refresh Page (actualisation)	The page is updated automatically every 4 seconds. The "Refresh Page" button can be used to manually refresh the page at any time.

The "Diagnostics" page displays the fault messages that the field box has sent to the PLC. The fault messages should be stored in the controller.

The SFB-EIP stores these fault messages only so long as switched on.

Each fault message is displayed with a time stamp, a status icon, the fault number and the fault description.

Time stamp	Display when a fault was detected after power-on of the field box. The time starts again after each power-on of the field box!
Status icon	Fault active „Fault incoming" Fault fixed „Fault outgoing"
Fault number	Displays the fault number which was detected.
Description	Display of the fault message with the fault description. If you move the mouse pointer over the description, the help text of the fault message is displayed!

Delete faults from the list

If faults have been fixed (outgoing), they can be deleted from the fault list of the SFB-EIP via the button "Erase corrected faults".

6.1.3 Page: Status Device Ports

SFB Safety Field Box Status Device Ports			SCHMERSAL Safe solutions for your industry		
SFB Home	**Device Port 3**		**Device Port 7**		
	Error Status	🟩	Error Status	🟩	
Diagnostic	Status Safety Inputs	🟩	Status Safety Inputs	🟩	
	Status Safety Outputs	🟥	Status Safety Outputs	🟥	
Status Device Ports	**Device Port 2**		**Device Port 6**		
	Error Status	🟩	Error Status	🟩	
	Status Safety Inputs	🟩	Status Safety Inputs	🟥	
Parameters	Status Safety Outputs	🟥	Status Safety Outputs	🟥	
	Device Port 1		**Device Port 5**		
	Error Status	🟩	Error Status	🟩	
	Status Safety Inputs	🟥	Status Safety Inputs	🟥	
Help	Status Safety Outputs	🟥	Status Safety Outputs	🟥	
	Device Port 0		**Device Port 4**		
Info	Error Status	🟩	Error Status	🟩	
	Status Safety Inputs	🟥	Status Safety Inputs	🟩	
	Status Safety Outputs	🟥	Status Safety Outputs	🟥	
Blink SFB					
Refresh Page					

The "Status Device Ports" page displays the fault status and I/O status of each device port.

The meaning of the colours of the status indicators are explained on the "Help" page. (Refer to chapter 6.1.5)

Device-Port Error Status	🟩	Device-Port OK
	🟥	Device-Port Failure
Device-Port Status Safety-Inputs	🟩	Safety-Inputs ON
	🟧	Discrepance-Failure
	🟥	Safety-Inputs OFF
Device-Port Status Safety-Output	🟩	Safety-Output ON
	🟥	Safety-Output OFF

6.1.4   Page: Parameters

SFB Home

Diagnostic

Status Device Ports

Parameters

Help

Info

Blink SFB

Refresh Page

DevicePort3

Configuration Type	1
Cross fault detection	Off
Safety Inputs	2channels
Stable time	0.1 s
Monitoring time	2 s
Safety Outputs	1wires (PLd)

DevicePort2

Configuration Type	1
Cross fault detection	Off
Safety Inputs	2channels
Stable time	0.1 s
Monitoring time	2 s
Safety Outputs	1wires (PLd)

DevicePort1

Configuration Type	1
Cross fault detection	Off
Safety Inputs	2channels
Stable time	0.1 s
Monitoring time	2 s
Safety Outputs	1wires (PLd)

DevicePort0

Configuration Type	1
Cross fault detection	Off
Safety Inputs	2channels
Stable time	0.1 s
Monitoring time	2 s
Safety Outputs	1wires (PLd)

DevicePort7

Configuration Type	1
Cross fault detection	Off
Safety Inputs	2channels
Stable time	0.1 s
Monitoring time	2 s
Safety Outputs	1wires (PLd)

DevicePort6

Configuration Type	1
Cross fault detection	Off
Safety Inputs	2channels
Stable time	0.1 s
Monitoring time	2 s
Safety Outputs	1wires (PLd)

DevicePort5

Configuration Type	1
Cross fault detection	Off
Safety Inputs	2channels
Stable time	0.1 s
Monitoring time	2 s
Safety Outputs	1wires(PLd)

DevicePort4

Configuration Type	3
Cross fault detection	On
Safety Inputs	2channels
Stable time	0.5 s
Monitoring time	10 s
Safety Outputs	1wires (PLd)

The "Parameters" page displays the "Configuration Type" and the set parameter values from each device port.

If the SFB-EIP has not been parameterized yet, the parameter values are empty!

6.1.5   Page: Help

SFB Safety Field Box
Help

SCHMERSAL
Safe solutions for your industry

		Display		Status	
SFB Home		Status Module	🟩	RUN	
			🟥	Module Failure	
Diagnostic		Status Power Supply	🟩	OK	U > 20,4 VDC
			🟧	Limit Range	U > 17,0 VDC
Status Device Ports			🟥	Under or over Limit	U < 17 VDC or U > 29 VDC
		Module Temperature	🟩	OK	T < 80 ° C
Parameters			🟧	Limit Range	T > 80 ° C
			🟥	Over Limit	T > 85 ° C
		Modulestatus MS	🟩	Operating	
			🟧	Standby, Selftest	
Help			🟥	Minor, Major Fault	
		Networkstatus NS	🟩	Connected	
Info			🟧	No Connect, Selftest	
			🟥	Timeout, Duplicate IP	
		Link Port 1/2	🟩	Link active	
			🟥	Link down	
Blink SFB		Device-Port Error Status	🟩	Device-Port OK	
Refresh Page			🟥	Device-Port Failure	
		Device-Port Status Safety-Inputs	🟩	Safety-Inputs ON	
			🟧	Discrepance-Failure	
			🟥	Safety-Inputs OFF	
		Device-Port Status Safety-Output	🟩	Safety-Output ON	
			🟥	Safety-Output OFF	

The "Help" page shows the meaning of the colours of all status displays on the web server.

In addition, the limit values are displayed for the supply voltage and the field box temperature.

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6.1.6 Page: Info

SFB Home	Download EDS file
Diagnostic	Type Code
Status Device Ports	Order Number
Parameters	

Download EDS file

Type Code   SFB-EIP-8M12-IOP
Order Number   103015480

- SFB Home
- Diagnostic
- Status Device Ports
- Parameters
- Help
- **Info**

Blink SFB
Refresh Page

K. A. Schmersal GmbH & Co. KG
Möddinghofe 30
D-42279 Wuppertal

Germany

www.schmersal.com

The "Info" page shows the type designation, the order number and the support address of Schmersal.

The EDS file saved in the field box can be downloaded using the "Download EDS File" button.

7 Annex

7.1 Configuration examples for power supply

If each field box is supplied with power individually, the maximum length of a field box line is limited only by the maximum cable length of the field bus.

However, if the power supply is looped through from field box to field box, the maximum ratings given below apply.

Three different configurations are shown for each of 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 design examples listed in the table on the next page,
apply to the following assumptions:

- The examples represent maximum configurations.
  If individual cable length is reduced, larger systems are possible.
- Wiring of the power supply with 2 x 1.5 mm² and fuse protection with 10 A.
- Use of SCHMERSAL cables.
- The cable lengths listed in the table between the power supply and the 1st field box, as well as between the field boxes, are the maximum lengths.
  Reducing the individual cable length is not critical.
- These designs assume simultaneous control of all lock or unlock functions for the connected solenoid interlocks.
  Larger systems are possible with time shift activation of the lock or unlock function.
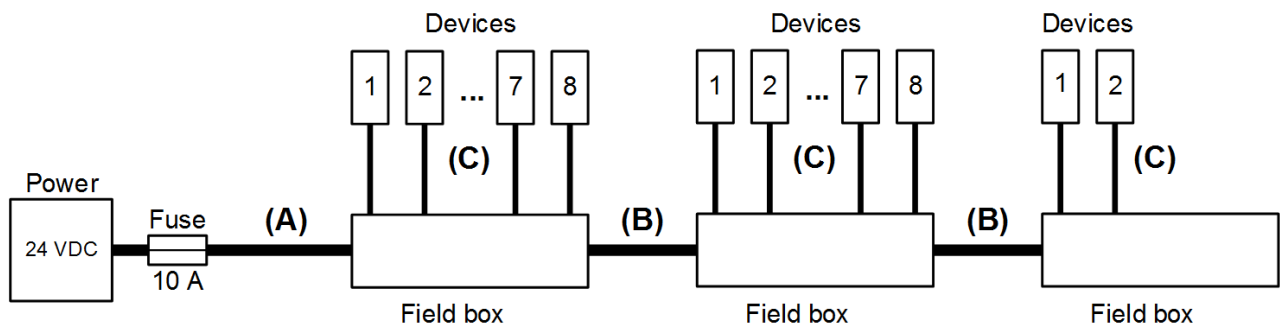
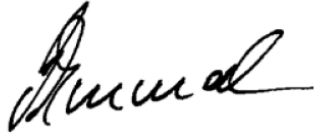|	**INFORMATION**
i	A useful design tool for calculating the real voltage drops is available on the Internet at www.system-engineering-tool.com .

Device / configuration version	Max. number of devices	Number of field boxes	Length of cable (A) until 1st field box	Length of cables (B) between the field boxes	Length of 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	1.0 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 assembly of the field box: 2 x AZM 201, 2 x MZM 100, 2 x AZM 300 and 2 x RSS / CSS

	INFORMATION
ℹ	A useful design tool for calculating the real voltage drops is available on the Internet at www.system-engineering-tool.com .

7 Annex

SCHMERSAL

7.2 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 of the technical documentation:	Oliver Wacker Möddinghofe 30 42279 Wuppertal
Place and date of issue:	Wuppertal, June 5, 2023

Authorised signature
Philip Schmersal
Managing Director

SFB-EIP-B-EN

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

SCHMERSAL
THE DNA OF SAFETY

www.schmersal.com