

IndraControl XFE01.1-SY-01

Safety Extension Module

Operating Instructions
R911376654

Edition 06



Revision history

Edition 06

2024-07

Refer to [tab. 1-1 "Revision history" on page 1](#)

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1 About this documentation

Editions of this documentation

Edition	Release date	Note
Edition 01	2016-10	First edition
Edition 02	2017-06	Chapter "Safety standards" revised, new chapter "Ordering data", standards and warning instructions modified for UL
Edition 03	2019-05	References supplemented
Edition 04	2021-09	Standards updated
Edition 05	2022-06	SD card supplemented, supplements in the table "Further documents"
Edition 06	2024-07	Standards updated

Tab. 1-1: Revision history

1.1 Overview on target groups and product phases

In the following illustration, the framed activities, product phases and target groups refer to the present documentation.

Example: In the product phase "Mounting (assembly/installation)", the "mechanic/electrician" can execute the activity "unpack, mount and install" using this documentation.

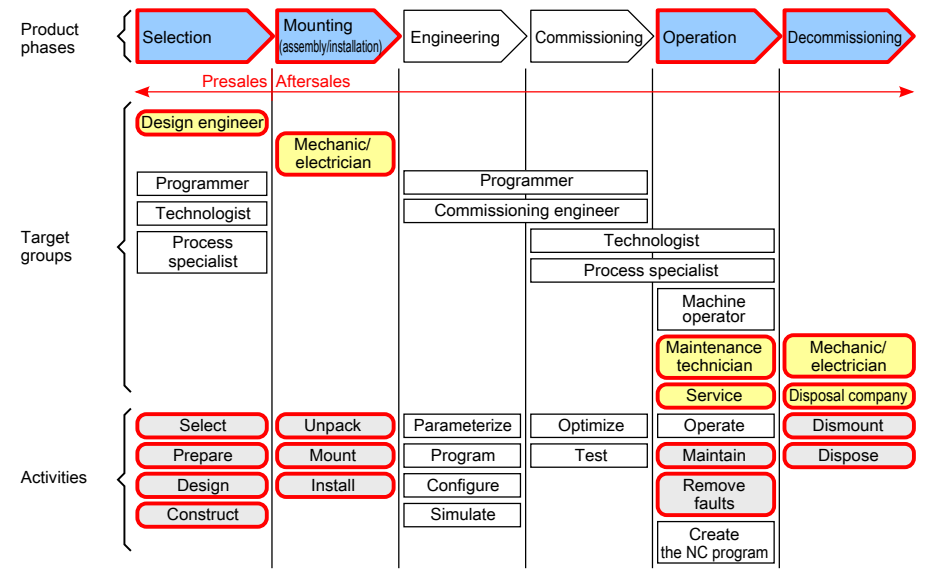


Fig. 1-1: Assigning the present documentation to the target groups, product phases and activities of the target group

1.2 Purpose

This operating instructions provides information on the safe mounting and the electric installation of the Safety extension module IndraControl XFE01.1-SY-01 to the technical employees of the machine manufacturer or the machine operator. This documentation does not provide instructions on the operation of the machine into which the Safety extension module IndraControl XFE01.1-SY-01 is integrated. For more information, refer to the operating instructions of the machine.

1.3 Qualifications

Required qualification: Individual who is able to assess the tasks assigned and to identify possible safety risks owing to qualification in the subject, knowledge and experience. The individual should also be familiar with the standards and regulations.

1.4 Scope

This operating instruction applies to the Safety extension module with the type code "XFE01.1-SY-01".

For the type code specifications, refer to [chapter 15 "Ordering information" on page 36](#).

1.5 Related documents

Title	Description
IndraWorks 14VRS	R911341694
SafeLogic	Application Description
Project Configuration	This documentation is intended as guideline when creating a safety-related application
IndraWorks 15VRS	R911398635
SafeLogic	Application Description
Project Configuration	This documentation is intended as guideline when creating a safety-related application

Title	Description
IndraWorks	R911341520
SafeLogic 14VRS	Commissioning Manual
First Steps	This documentation contains descriptions about the following topics: • Creation and use of a safety application • Basics of the data exchange between the safety application and the standard application of the IndraLogic XLC/IndraMotion MLC/IndraMotion MTX 14VRS • Information on diagnostics and troubleshooting • Programming under SafeLogic
IndraWorks	R911400170
SafeLogic 15VRS	Commissioning Manual
First Steps	This documentation contains descriptions about the following topics: • Creation and use of a safety application • Basics of the data exchange between the safety application and the standard application of the IndraLogic XLC/IndraMotion MLC/IndraMotion MTX 15VRS • Information on diagnostics and troubleshooting • Programming under SafeLogic
IndraLogic XLC	R911341696
IndraMotion MLC 14VRS	Project Planning Manual
SafeLogic System Overview	This documentation describes the project planning of safety-related devices in the systems IndraLogic XLC and IndraMotion MLC
ILC	R911400164
MLC 15VRS	Project Planning Manual
SafeLogic System Overview	This documentation provides an overview on the safety-specific Bosch Rexroth system solutions. This documentation describes the safety control SafeLogic compact and the Safety Extension module.
IndraMotion	R911341698
MTX 14VRS	Project Planning Manual
SafeLogic System Overview	This documentation provides an overview on the safety-specific Bosch Rexroth system solutions. This documentation describes the safety control SafeLogic compact and the Safety function module.

Title	Description
MTX 15VRS	R911398637
SafeLogic System Overview	Project Planning Manual This documentation provides an overview on the safety-specific Bosch Rexroth system solutions. This documentation describes the safety control SafeLogic compact and the Safety function module.
IndraControl	R911340665
XM2x	Operating Instructions
Controls	This operating instructions instructs the technical staff of the machine manufacturer on a safe mechanical and electrical mounting and commissioning
IndraControl	R911345566
XM4	Operating Instructions
Controls	This operating instructions instructs the technical staff of the machine manufacturer on a safe mechanical and electrical mounting and commissioning
IndraControl VAP 01	R911339613
Power Supply Unit	Operating Instructions This document instructs the technical staff of the machine manufacturer on how to perform the mechanical and electrical installation safely and on how to commission it at the power supply unit

Tab. 1-2: Related documents



If a documentation is not available, please contact the Bosch Rexroth Service.

1.6 Customer feedback

Customer requests, comments or suggestions for improvement are of great importance to us. Please email your feedback on the documentations to Feedback.Documentation@boschrexroth.de. Directly insert comments in the electronic PDF document and send the PDF file to Bosch Rexroth.

2 Product identification and scope of delivery

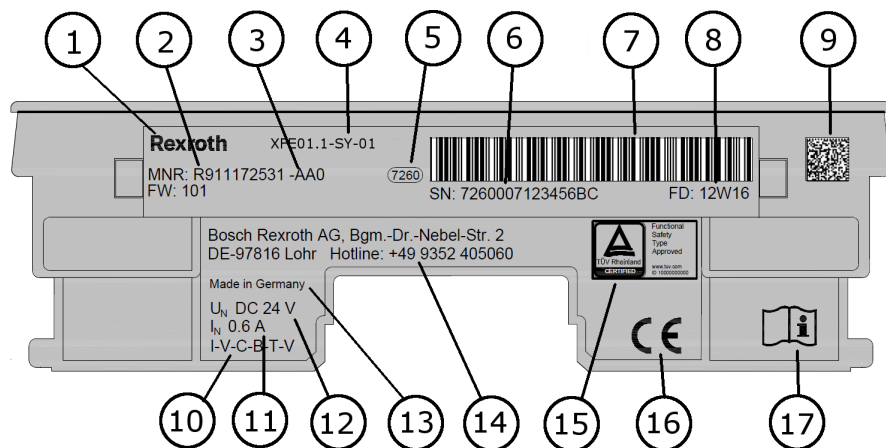
2.1 Product identification

The Safety extension module IndraControl XFE01.1-SY-01 is connected to the left-handed extension bus of the control connected. The lower part of the hous-

ing of the extension module IndraControl XFE01.1-SY-01 is grey, the upper part of the housing is yellow.

The type code is attached as label on the side of the lower part of the housing of the Safety extension module IndraControl XFE01.1-SY-01.

2.2 Product identification



- | | | | |
|---|----------------------------|----|-----------------------------------|
| 1 | Word mark | 10 | Check digit |
| 2 | Part number | 11 | Nominal current |
| 3 | State of revision | 12 | Nominal voltage |
| 4 | Type name (type code) | 13 | Manufacturing country |
| 5 | Plant number | 14 | Company address |
| 6 | Serial number | 15 | Certification stamp TÜV-Rheinland |
| 7 | Rexroth bar code | 16 | CE conformity marking |
| 8 | Manufacturing date (yyWww) | 17 | Graphic symbol of the equipment |
| 9 | QR code | | |

Fig. 2-1: Exemplary type plate

2.3 Scope of delivery

- Safety extension module IndraControl XFE01.1-SY-01
- 24 V power connector XA-CN01
- Bus base module XA-BS11 for IndraControl extension modules
- Safety instructions

3 Using safety instructions

3.1 Structure of the safety instructions

The safety instructions are structured as follows:

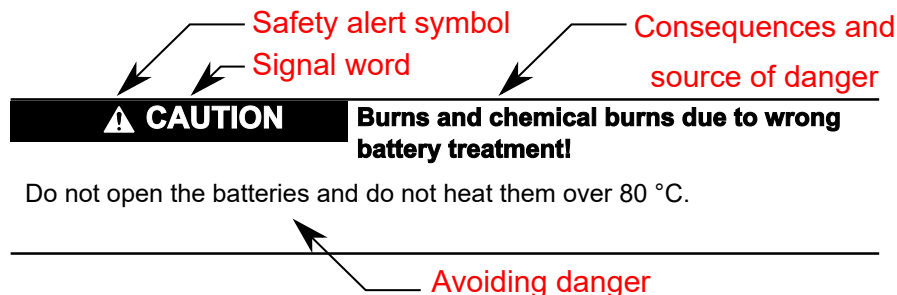


Fig. 3-1: Structure of the safety instructions

3.2 Explaining signal words and safety alert symbol

The safety instructions in this documentation contain specific signal words (danger, warning, caution, notice) and, if necessary, a safety alert symbol (according to ANSI Z535.6-2006).

The signal word draws attention to the safety instruction and indicates the risk potential.

The safety alert symbol (triangular safety reflector with exclamation marks), preceding the signal words Danger, Warning, Caution indicates hazards for persons.

DANGER

In case of non-compliance with this safety instruction, death or serious injury **will** occur.

WARNING

In case of non-compliance with this safety instruction, death or serious injury **can** occur.

CAUTION

In case of non-compliance with this safety instruction, minor or moderate injury can occur.

NOTICE

In case of non-compliance with this safety instruction, material damage can occur.

3.3 Symbols used

Pointers are displayed as follows:



This is a note.

Tips are displayed as follows:



This is a tip.

3.4 Explaining the signal alert symbol on the device



If this symbol is on your device, you have to observe the documentation on the device. The respective documentation informs on the type of hazard as well as the steps required to avoid this hazard.

4 Intended use

The Bosch Rexroth Safety extension module IndraControl XFE01.1-SY-01 is a safety component. It becomes only a safety-related control system (IndraMotion MLC SafeLogic) if used with a Rexroth IndraControl XM control. For information on the hardware of the IndraMotion MLC SafeLogic, refer to the documentation of the hardware used (refer to [chapter 1.5 "Related documents" on page 2](#)).

The Safety extension module IndraControl XFE01.1-SY-01 is used to securely process logic signals of periphery components (sensors) according to the sequential program and to provide logic signals for periphery components (actuators). The sequential program can be freely programmed using the Engineering system. Even though the control system was developed, manufactured and tested according to the safety standards and certified by an accredited test institute, using this component does not automatically ensure a functionally safe machine. The machine manufacturer has to perform a risk analysis and take corresponding protective measures to reduce risks and to validate their effect even though it was accredited and developed according to the safety standards. The functional safety can only be ensured by comprehensively implementing the requirements (e.g. systematic measures, software requirements, integrating the sensors and actuators) according to the applicable standards (EN ISO 13849, EN 62061 and EN 61131-6).

NOTICE

Risk of damaging the Safety extension module if not expressly stated accessories, mounting parts and other components, cables, lines and software and firmware are used

The Safety extension module IndraControl XFE01.1-SY-01 may only be used as intended and combined with the accessories and attachments specified in this documentation. Components that are not expressly mentioned must neither be attached nor connected. It is strictly prohibited to change and operate components (individual parts) as well as using firmware that is not permitted.

The Safety extension module IndraControl XFE01.1-SY-01 may only be operated under the mounting, installation and ambient conditions (such as temperature, protection class, humidity, EMC) specified in this documentation. Also refer to [chapter 6 "Ambient conditions" on page 9](#).

A typical area of application of the Safety extension module IndraControl XFE01.1-SY-01 is the implementation of safety-related controls for:

- Handling and mounting systems
- Food and packaging machines
- Printing and processing machines
- Machine tools
- Compactors
- Foundry and rolling technology
- Conveying engineering
- Building automation
- Special purpose machines
- Wood processing machines
- Hydraulic machines

The operation is not permitted for the following systems according to the following standards and guidelines:

- Lifts (directive 2006/42/EC)
- ATEX (directive 2014/34/EU)
- Burner control systems (EN 298)
- Safety systems for unfired pressure vessels (EN 764-7:2002/AC:2006)

5 Spare parts and accessories

5.1 Accessories

Type code	Product description	Part number
XA-CN01	24 V plug	R911173741
XA-BS11	Bus base module for IndraControl extension modules	R911173772
SUP-M01-ENDHALTER	2 pieces of snap-on end brackets for 35 mm NS 35/7,5 or NS 35/15 support rail; width: 9.5 mm	R911170685
MICRO SD 1GB	SD card (cannot be ordered anymore)	1070924212
MICRO SD 1GB 01	SD card	R911416004

Tab. 5-1: Ordering data for accessories

5.2 Wear parts

The Safety extension module has no wear parts.

6 Ambient conditions

	In operation	Storage and transport
Area of application	Only in interior spaces	–
Ambient temperature of the control	+5 °C to +55 °C	-40 °C to +85 °C
Relative humidity	10% to 95%, condensing not permitted	10% to 95%, condensing not permitted
Contamination level	2 acc. to EN 61131-2	2 acc. to EN 61131-2
Air pressure and	86 kPa to 106 kPa	55 kPa to 106 kPa
Operating altitude	(up to 2,000 m above sea level)	(Up to 4,700 m above sea level)
Degree of protection	IP 20 acc. to EN 60529	IP 20 acc. to EN 60529
Warning if internal temperature is low	≤ 5 °C	–
Switch-off if internal temperature is low	≤ 1 °C	–
Warning if internal temperature is high	≥ 86 °C	–
Switch-off if internal temperature is high	≥ 89 °C	–

	In operation	Storage and transport
Overvoltage category	II	–
Protection class	III, EN 61010-2-201	–

Tab. 6-1: Climatic ambient conditions and characteristics

	In operation	Storage and transport
Mounting position	It is specified by the control	–
Sinusoidal vibrations	5 Hz ≤ f ≤ 9 Hz: 3.5 mm amplitude 9 Hz ≤ f ≤ 150 Hz: 5.0 g Acc. to EN 60068-2-6	–
Shock stress	30 g peak value, period of 11 ms Acc. to EN 60068-2-27	–
Noise-induced oscillation	–	10 Hz to 200 Hz with 1 (m/s ²) 2/Hz 200 Hz to 1,500 Hz with 0.3 (m/s ²) 2/Hz Crest factor = 3

Tab. 6-2: Mechanical ambient conditions and characteristics

	In operation
Emitted interference of the housing	30 MHz to 230 MHz: 40 dB (μV/m) Q
Check acc. to EN 55016	230 MHz to 1000 MHz: 40 dB (μV/m) Q
Emitted interference of the mains connection	0.15 MHz to 0.5 MHz: 79 dB (μV) Q, 66 dB (μV) M 0.5 MHz to 30 MHz: 73 dB (μV) Q, 60 dB (μV) M
Check acc. to EN 55016	

Tab. 6-3: Electromagnetic operating conditions: Testing noise emission acc. to EN 61000-6-4

	In operation
ESD standard	Air discharge up to ±8 kV, criterion A
Check acc. to EN 61000-4-2	Contact discharge up to ±4 kV, criterion A
ESD	Air discharge up to ±8 kV, criterion FS
increased noise level	Contact discharge up to ±6 kV, criterion FS
Electromagnetic HF field standard	80 MHz – 1,000 MHz: 10 V/m
Check acc. to EN 61000-4-3	1.4 GHz – 2.0 GHz: 3 V/m 2.0 GHz – 2.7 GHz: 1 V/m

	In operation
Electromagnetic HF field	80 MHz – 1,000 MHz: 20 V/m
increased noise level	1.4 GHz – 2.0 GHz: 10 V/m 2.0 GHz – 2.7 GHz: 3 V/m
Fast transients (burst), standard	Affected interfaces 1 kV
Check acc. to EN 61000-4-4	Supply voltage 2 kV
Fast transients (burst)	Affected interfaces 2 kV
increased noise level	Supply voltage 4 kV
Surge, standard	Asymmetric coupling:
Check acc. to EN 61000-4-5	0.5 kV (supply lines) 1 kV (signal/data lines)
	Symmetric coupling: 0.5 kV (supply lines)
Surge	Asymmetric coupling:
increased noise level	2 kV (supply lines) 2 kV (signal and data lines)
	Symmetric coupling: 1 kV (supply lines)
HF coupling to lines	0.15 MHz to 80 MHz: 10 V _{eff} , criterion A
Check acc. to EN 61000-4-6	
HF coupling to lines	0.15 MHz to 80 MHz: 20 V _{eff} , criterion FS
Increased noise level	
Voltage dips, short interruptions and voltage fluctuations at DC mains inputs	DC 24 V supply voltage: 20 interruptions every 10 s, interruption period of 10 ms
Check acc. to EN 61000-4-29	
Voltage dips, short interruptions and voltage fluctuations at DC mains inputs	DC 24 V supply voltage:
Increased requirements	1. 40% UT (rated voltage) for 10 ms 2. 0% UT (rated voltage) for 20 ms Voltage deviation of -15 % to +20 % 3 attempts, period of 10 s

Tab. 6-4: Electromagnetic operating conditions: Testing electromagnetic compatibility acc. to EN 61000-6-2 as well as increased noise level acc. to EN 61326-3-1

NOTICE

In case of overheating, the Safety extension module IndraControl XFE01.1-SY-01 goes into a safe

Provide sufficient ventilation and cooling to ensure that the ambient temperature of the control does not exceed 55°C.

NOTICE

Due to the ambient conditions required to operate the Safety extension modules, the following restrictions result for the entire system

- The operating height of the entire system is reduced from 4700 m to 2000 m
- The ambient temperature of the entire system in operation reduces from the range between -25°C and +60°C to the range between + 5°C and +55°C

NOTICE

Defective product due to gases jeopardizing functions

Due to the risk of corrosion, avoid sulphurous gases (e.g. sulphur dioxide (SO₂) and hydrogen sulphide (H₂S)). The product is not resistant against these gases.

NOTICE

Failure of the product due to contaminated air

- The ambient air must not contain acids, alkaline solutions, corrosive agents, salts, metal vapors and other electrically conductive contaminants in high concentrations
- The devices to be installed into the housings and installation compartments must at least comply with the degree of protection IP 54 according to EN 60529.
- The device shall be provided in a suitable fire enclosure in the end-use application.

NOTICE

Risk to damage the device due to external influences

Keep the device away from oils and emulsions.



This is a product that corresponds to the limit values of the emitted interference of class A (industrial environments). This is a product that does *not* correspond to the limit values of the emitted interference of class B (residential area and small enterprises)

When using the product in residential areas or small enterprises, the operator has to take actions to prevent radio interferences (also refer to EN 55022).

7 Technical data

7.1 Voltage supply

The Safety extension module IndraControl XFE01.1-SY-01 is supplied with 12 V via a separate connection.

The input voltage of the Safety extension module is DC 24 V (as per the requirements acc. to EN 61131-2). The voltage is supplied from PELV power supply units with safe separation acc. to EN 50178 and EN 60950-1.

Nominal voltage	DC 24 V +20%, -15%, PELV
Residual ripple	±5 %
U_{Lmax}	30 V
U_{Lmin}	19.2 V
Maximum current consumption of the module from 0.2 A	
U_L at nominal voltage	

Tab. 7-1: Operating voltage and current consumption IndraControl XFE01.1-SY-01

NOTICE

The Safety extension module IndraControl XFE01.1-SY-01 goes into a safe state in case of undervoltage or overvoltage

Ensure that the voltages remain in the specified range.

7.2 Safety-related characteristic values

Safety integrity level SIL	SIL3 (EN 61508 and EN 61131-6)
Performance level PL	PL e (EN ISO 13849-1)
Hardware error tolerance	HFT = 1
Category	Category 4 (EN ISO 13849-1)
PFH (average frequency of a dangerous failure per hour)	4.5×10^{-10} 1/h
PFD _{avg} (average probability of a dangerous failure in case of request)	3.9×10^{-5}

Service life T_M	20 years (EN ISO 13849); no proof test required
MTTF _d (mean time to failure)	2,500 years
DC _{avg} (average diagnostic coverage)	99 % $\triangleq$ high
Types of failure	If the internal diagnostics of the Safety extension module IndraControl XFE01.1-SY-01 detects an error, the module goes into the safe state, that is, no more safe bus telegrams are sent

7.3 Dimensions and weight

Dimensions (W × H × D)	35 × 122.4 × 95.8 mm
Weight (without packaging)	200 g

8 Standards

8.1 Standards used

The Safety function module IndraControl XFE01.1-SY-01 was developed according to the following standards.

8.1.1 General standards

EN IEC 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Noise immunity for industrial environments
IEC EN 61000-6-4	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments
EN 60204-1	Safety of machinery – Electrical equipment of machines – Part 1: General requirements
EN 61131-1	Programmable controllers – Part 1: General information
EN 61131-2	Programmable controllers – Part 2: Equipment requirements and tests
EN 61131-3	Programmable controllers – Part 3: Programming languages

Tab. 8-1: General standards

8.1.2 Safety standards

EN 61131-6	Programmable controllers – Part 6: Functional safety
EN 61511-1	Functional safety – Safety-instrumented systems for the process industry sector – Part 1: Framework, definitions, system, hardware and software requirements
EN 61508	Functional safety of electrical/electronic/programmable electronic safety-related systems Part 1-7
EN ISO 13849-1	Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design
EN ISO 13849-2	Safety of machinery – Safety-related parts of control systems – Part 2: Validation
EN 61326-3-1	Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) – General industrial applications

Tab. 8-2: Safety standards

8.2 TÜV certificate

EC Type-Examination Certificate



Product Safety
Functional
Safety
www.tuv.com
ID 0600000000

Reg.-No.: 01/205/5272.02/21

Product tested	Safety-related programmable electronic system	Certificate holder	Bosch Rexroth AG Bgm.-Dr.-Nebel-Str. 2 97816 Lohr am Main Germany
Type designation	SafeLogic Control, Details see actual "Revision List SafeLogic Control Bosch Rexroth AG"		
Codes and standards	EN ISO 13849-1:2015 EN 62061:2005 + AC:2010 + A1:2013 + A2:2015 IEC 61508 Parts 1-7:2010 EN 61508 Parts 1-7:2010 EN 61131-6:2012 EN 61131-2:2007 IEC 61131-2:2017 EN 61326-3-1:2017		
Intended application	The programmable electronic safety system complies with the requirements of the relevant standards (Cat. 4 / PL e according to EN ISO 13849-1, SIL CL 3 according to EN 62061 / EN 61508 / EN 61131-6) and can be used in applications up to PL e according to EN ISO 13849-1 and SIL 3 according to EN 62061 / EN 61508. The product was also reviewed in reference to the requirements of EN 61511-1:2017 + A1:2017 and EN 60204-1:2018 applicable during a type examination and can be used in application as such.		
Specific requirements	The instructions of the associated Installation, Operating and Safety Manual shall be considered.		
It is confirmed, that the product tested complies with the requirements for machines defined in Annex I of the EC Directive 2006/42/EC.			
Valid until 2026-08-31			
The issue of this certificate is based upon an evaluation in accordance with the Certification Program TM 31 V1.0:2017 in its actual version, whose results are documented in Report No. 906/EZ 574.17/21 dated 2021-08-31. This certificate is valid only for products, which are identical with the product tested.  <i>Jelena Stenzel</i> Dipl.-Ing. Jelena Stenzel			
Köln, 2021-08-31		Notified Body for Machinery, NB 0035	

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Fig. 8-1: TÜV certificate for IndraControl SafeLogic

8.3 CE marking

8.3.1 Declaration of conformity



The Safety extension module IndraControl XFE01.1-SY-01 as safety component corresponds to the following directives:

- Machinery directive 2006/42/EC
- EMC directive 2014/30/EU



Loss of CE conformity due to modifications at the device

CE marking applies only to the device upon delivery. After modifying the device, verify the CE conformity.



For the declaration of conformity, go to the Bosch Rexroth media directory: <https://www.boschrexroth.com/MediaDirectory>, search term "DCTC-30131-003".

8.4 UL/CSA-certified



The Safety extension module IndraControl XFE01.1-SY-01 is certified according to:

- UL 61010-1 – Edition 3
UL 61010-2-201 – Edition 1 (Industrial Control Equipment)
- CSA C22.2 NO. 61010-1-12 UPDATE – Edition 3
CSA C22.2 NO. 61010-2-201:14 – Edition 1

Approved under UL file no. E210730.

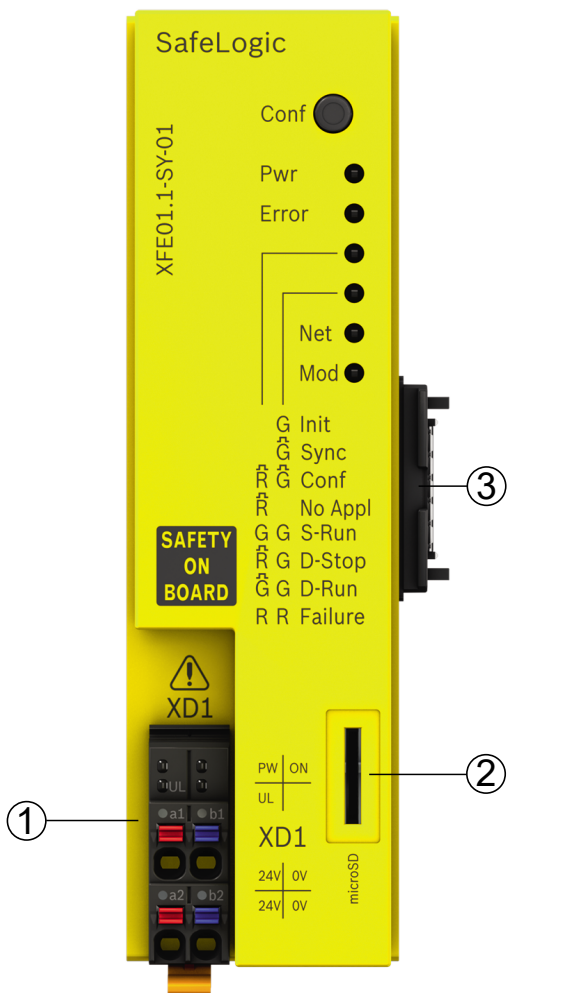


Loss of UL/CSA conformity due to modifications at the device

UL and CSA marking applies only to the device upon delivery. After modifying the device, verify the UL and CSA conformity.

9 Interfaces

9.1 Connection position



- ① Voltage supply
- ② SD card slot

- ③ Attached bus base module

Fig. 9-1: Interfaces of the Safety extension module

NOTICE

Attaching and detaching connections under voltage can damage the Safety extension module!

Switch off the supply voltage before attaching or detaching any connections!

9.2 SD card slot

There is a SD extension module with an equipped SD card on the Safety extension card IndraControl XFE01.1-SY-01. This memory card is used to save user-specific data [boot application, logbooks (devices and application) as well as user management data].

For the position of the SD card slot, refer to [fig. 9-1 "Interfaces of the Safety extension module" on page 18](#).



If the SD card is removed during operation, the control goes into the system error response, i.e. in the safe state.

10 Mounting, dismantling and electric installation

10.1 Housing dimensions

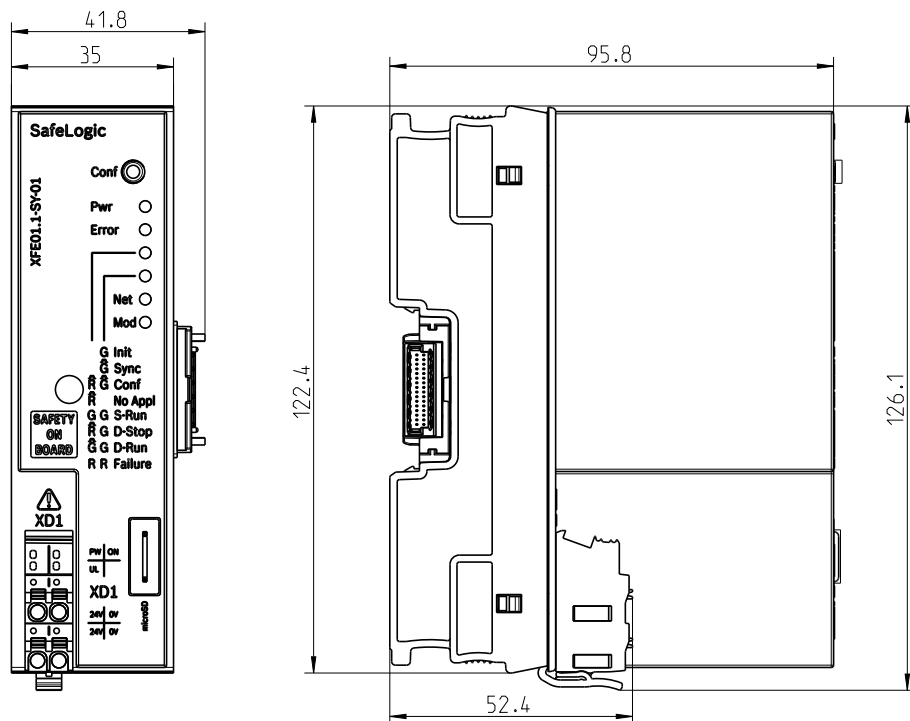


Fig. 10-1: Housing dimensions of the Safety extension module IndraControl XFE01.1-SY-01

10.2 Installation notes

NOTICE

Danger of module destruction due to electrostatic discharge!

Comply with the required safety measures against electrostatic discharge (ESD) acc. to EN 61340-5-1 when operating the Safety extension module.

- **Mounting location**

The extension module has the degree of protection IP 20 and is thus intended for use in a closed control cabinet or control box (terminal box) of the degree of protection IP 54 or higher

- Mounting rail

Mount the extension module on a 35 mm standard support rail. The preferred overall height of the support rail is 7.5 mm (corresponds to TH 35-7.5 acc. to EN 60715).

Mount the extension module as described in this chapter.

The fastening distance of the support rails may not exceed 200 mm. This distance is required to ensure stability while mounting and dismantling the control or the IndraControl extension modules

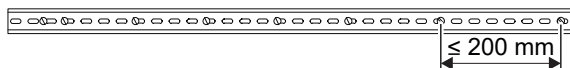


Fig. 10-2: Support rail fastening (in mm)

NOTICE

Electronic damage due to fastening elements of the support rail

If screws and rivets are too high on the support rail, the bus base modules do not really engage on the support rail. Use only screws and rivets with a structural height of up to 3 mm to fasten the support rail.

- End clamps

Fasten end clamps on both sides of the IndraControl XM station. End clamps guarantee the correct fastening of the control and the modules connected to them on the support rail and they are used as lateral end elements

- Do not route cables parallel to motor cables over a long distance or other strong interference sources to avoid the coupling of interferences
- The LED displays may not be hidden
- Wire all connecting cables in loops
- Use strain reliefs for all cables
- Keep the maximum possible distance from interference sources
- Ensure the minimum distances for sufficient ventilation as specified in the operating instructions of the XM control. (refer to [chapter 1.5 "Related documents" on page 2](#))

In case of a several line design, the supply air has to be measured under each line and its limit value may not be exceeded. For information on ambient temperatures, refer to [chapter 6 "Ambient conditions" on page 9](#)

- Additionally, provide sufficient distance for mounting, dismantling, plugs and cables

10.3 Mounting

NOTICE

Destruction of components due to mounting under voltage!

- Before mounting or dismantling components, disconnect the control - including its components - from voltage
- Connect the voltage only after the control and its components have been set up



The extension bus base module can only be mounted if the control is not attached to the control bus base module.

1. Press the IndraControl extension bus base modules for the IndraControl extension modules on the top-hat rail on the left next to the control bus base module until all latching is safely closed (see (A) in the following figure).
2. Move the first IndraControl extension bus base module (see (B)) to the right and connect the IndraControl extension bus base module with the bus base module of the control (see (D) in the following figure).
3. Move the other IndraControl extension bus base modules to the right until all bus base modules are connected to each other (see (C) in the following figure).

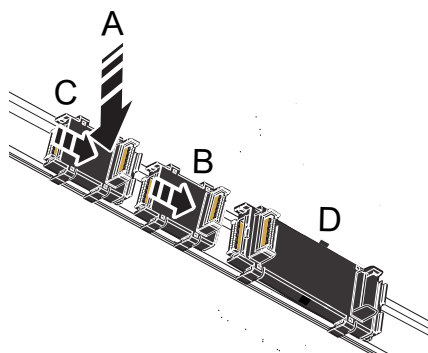


Fig. 10-3: Interconnect extension bus base modules and connect them to the control bus base module

4. Fit the extension modules and the XMx control on the bus bases.

10.4 Dismounting

WARNING

Do not dismantle the control, modules or plugs under voltage. The system might start accidentally!

Disconnect the complete station and the components before dismantling the components! Connect the voltage only again after dismantling.



For dismantling, use a common tool such as a slotted screwdriver with a 2.5 mm blade.

10.4.1 Dismounting steps

NOTICE

Destruction of components due to dismantling under voltage!

Before mounting or dismantling components, disconnect the control - including its components - from voltage.

Removing extension modules from top-hat rail

1. Remove the left end clamp.
2. Use a suitable tool (e.g. slotted screwdriver) and put it first into the upper and then into the lower disengaging mechanism (base latch) of the control and disengage the control (see (A) in the following figure). The base latches are locked in the open position.
3. Remove the extension module vertically to the support rail (see (B) in the following figure). The base latches engage again in idle position.

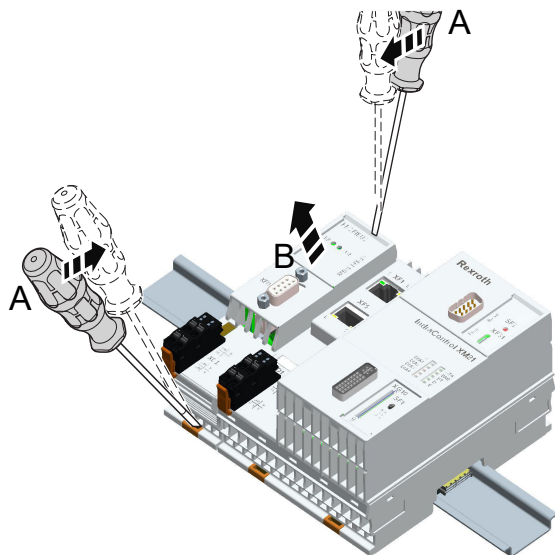


Fig. 10-4: Removing extension modules from top-hat rail

10.5 Electric installation

⚠ WARNING

Danger of personal injury due to incorrect mounting or electric installation!

- Any dangerous system states, which might cause personal injury, must be prevented!
- Protection upon direct and indirect contact must be ensured by the specified measures (connection to protective conductor, insulation, etc.)!

NOTICE

Danger of material damage due to incorrect mounting or electric installation!

- Any dangerous system states, which might cause material damage, must be prevented!
- Protection upon direct and indirect contact must be ensured by the specified measures (connection to protective conductor, insulation, etc.)!

10.5.1 External power supply unit



The voltage is supplied via the PELV power supply units with safe separation acc. to EN 50178 and EN 60950-1.

All control components are supplied from 24 V voltage supplies.

Use the Bosch Rexroth power supply unit VAP01.1H-W23-024-010-NN, part number R911171065, for the logic supply. For further information on the external power supply unit and on the creation of overvoltage categories, refer to the documentation of the power supply unit (refer to [chapter 1.5 "Related documents" on page 2](#)).

All lines of the 24 V voltage supply have to be routed separately from lines carrying higher voltages.

All peripherals, such as digital sensors or actuators connected to the interfaces of the control, also have to comply with the criteria of safety-separated circuits.



The same external power supply unit has to supply the 24 V voltage supply of the XMx control and the extension modules. Bridge the cables between the power connectors XD1.

10.5.2 Voltage supply for the control and for the extension modules

The voltage supply for the control and the extension modules is supplied via the XD1 plug.



Connect the power connector with cables with a conductor cross-section of AWG 16-22 (0.34 mm² - 1.5 mm²).



Use only copper cables for the connection.



Use only cables designed for ≥ 75 °C.



Observe the color-coding of the plugs.



Only the "XA-CN01" power connector is permitted to connect the 24 V supply voltage (see [chapter 5 "Spare parts and accessories" on page 9](#)).

Power connector XD1

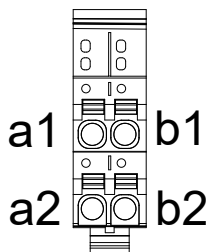


Fig. 10-5: Power connector XD1

Plug contact	Signal	Function
a1, a2	$U_L + 24\text{ V}$	DC 24 V supply voltage (U_L)
b1, b2	GND	GND (U_L) (ground supply voltage)

Tab. 10-1: Pin assignment of the power connector XD1

10.5.3 24 V voltage supply

The voltage of 24 V can be supplied with or without electrical isolation to the I/O terminals of the XM control.

The same external power supply unit has to supply the 24 V voltage supply of the XM control and the extension modules. Connect the voltage supply to the XD1 plugs of the XM control and then bridge the cables to the power connectors XD1 of the extension modules.

Dimensioning the voltage infeed

Observe the maximum currents when dimensioning the voltage supply. A voltage between 20.4 V and 28.8 V has to be applied directly at the device.

This voltage range also has to be maintained if:

- there are variations in mains voltage, e.g. caused by different loads of the mains
- there are varying load states, such as short-circuit, normal load, lamp load or no load

The maximum conductor cross section for the voltage supply is 1.5 mm².

10.5.4 Grounding

NOTICE

Control failure due to insufficient grounding

An optimum grounding is required to impede possible interferences from the control and to discharge them to the ground.

Functional earth



Only the functional earth (FE) is used for the Safety extension module IndraControl XFE01.1-SY-01, extension modules and the IndraControl S20 components. The functional earth (FE) is only used to discharge disturbances. For individuals, the functional earth is not intended as protection against electric shock.

The control is grounded via the top-hat rail. The top-hat rail, on which the control is mounted, has to be mounted to a grounded metal carrier, e. g. the rear panel of the control cabinet.

The Safety extension module IndraControl XFE01.1-SY-01 and the IndraControl S20 I/O modules are at least provided with one FE spring (metal clip) at their lower side creating an electric connection to the support rail while mounting.

If necessary, provide the top-hat rail with a separate grounding connection.

Voltage jumper

The voltage jumper FE (functional earth) is routed from the control through all connected IndraControl S20 modules. This ensures that these terminals are grounded once the control, the supply terminals and the top-hat rail were grounded properly.

Potential equalization

Potential equalization acc. to VDE 0100 part 540 has to be provided between the system parts and the voltage supply.

Information on the protective conductor system

All system components have to be connected to the PE protective conductor system at the connectors marked accordingly.

Free-of-ground design for the XM4 control

NOTICE

Due to an earth-free setup, the Safety module XFE01.1-SY-01 might fail.

Do not use the Safety module XFE01.1-SY-01 with an earth-free setup.

The XM4 control is designed free-of-ground. Also refer to the operating instructions of the IndraControl XM4, [R911345566](#).

10.5.5 Shielding

NOTICE

Control failure due to insufficient shielding

Provide sufficient shielding.

The shielding reduces any effects of interferences on the system.

Observe the following when shielding:

- Fasten the shielding as extensively as possible
- Ensure proper contact between connector and terminal
- Avoid damaging or squeezing conductors
- Note the wire specifications when connecting the shielding
- Shield the closest possible to the signal clamping points



Route all power cables and data cables in separate cable channels.

11 Commissioning

11.1 General information

The product cannot be operated upon delivery. It has to be parameterized or programmed.

The documentations providing information on the commissioning and project configuration are listed in [chapter 1.5 "Related documents" on page 2](#).



WARNING

An incorrect commissioning can cause fatal immaterial and material damages!

Ensure that a qualified person checks, documents and releases the system in which the Safety extension module IndraControl XFE01.1-SY-01 is used before its initial commissioning.

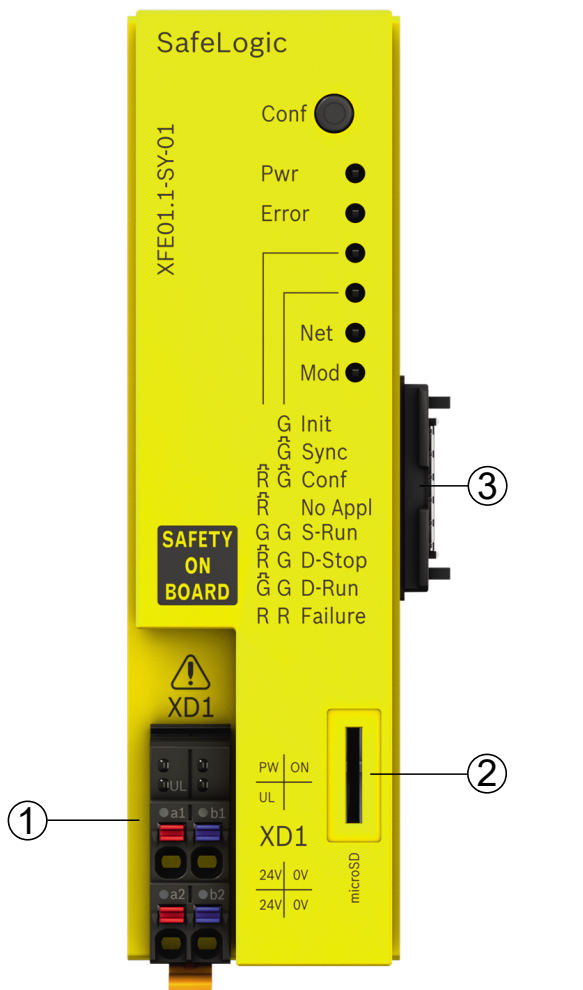
Before the commissioning, ensure that there is no person in the danger zone.

Ensure that the danger zone cannot be accessed.

11.2 IT security

The operation of installations, systems and machines requires the implementation of an integral concept for state-of-the-art IT security. Bosch Rexroth products are part of this integral concept. Bosch Rexroth product characteristics have to be taken into consideration in an integral IT security concept. The relevant characteristics are documented in the IT security guideline ([R911342562](#)).

12 Device description



- ① 24 V voltage supply
- ② SD slot with SD card

- ③ Attached bus base module

Fig. 12-1: Safety extension module IndraControl XFE01.1-SY-01

12.1 SD card

The application program (boot application), user management data as well as two logbooks (devices and application) are stored on an SD card and also remain if the power supply fails.

12.2 Operating and error displays

12.2.1 "Conf" pushbutton

Press the "Conf" pushbutton once to confirm the established communication between the programming system and the Safety extension module upon initial login. This confirmation ensures that you are only connected to the selected Safety extension module IndraControl XFE01.1-SY-01 and not accidentally to a different Safety module.

12.2.2 LED

The display LED indicates the following:

LED	Color and status	Description
Pwr	Off	No power supply from the standard control present
	Red	Error: The voltage monitoring of the Safety function module IndraControl XFE01.1-SY-01 switched off the safe logic voltage
	Green	All internal voltages of the Safety extension module IndraControl XFE01.1-SY-01 are within the permitted range
Error	Off	The Safety extension module IndraControl XFE01.1-SY-01 is ready
	Red	The Safety extension module IndraControl XFE01.1-SY-01 is not ready. This LED is on during the initialization phase. If the LED is still on after the initialization (approx. 1 min) or if the LED is permanently switched on at runtime, integrated self-tests determined a "fatal error" (e.g. hardware error). The Safety extension module IndraControl XFE01.1-SY-01 is then probably defective and has to be replaced. Contact the Bosch Rexroth Service

Tab. 12-1: LEDs to display operational readiness

LED "Run" (Color and status)	LED "Failure" (Color and status)	Operating state of the Safety extension module IndraControl XFE01.1-SY-01
Off	Off	No power supply provided or hardware reset triggered
Off	Green	Initialization phase; first part (ca. 30 s) is running
Red	Off	Initialization phase; second part (ca. 10 s) is running

LED "Run" (Color and status)	LED "Failure" (Color and status)	Operating state of the Safety extension module IndraControl XFE01.1-SY-01
Red, flashing	Off	Ready for download. The Safety extension module IndraControl XFE01.1-SY-01 does not contain any valid application or a download is not yet completed
Red	Green, flashing	Request to press the "Conf" pushbutton
Red	Green	SAFETY STOP
Green	Green	SAFETY RUN
Red, flashing	Green	DEBUG STOP
Green, flashing	Green	DEBUG RUN or SERVICE RUN
Red	Red	FAILURE STOP
Red	Red, flashing	Exceptional state of the Safety extension module
Red, flashing	Red, flashing	IndraControl XFE01.1-SY-01 due to an internal error. The different displays are used to pinpoint errors
Red, flashing	Green, flashing	Firmware update is running
Green, flashing	Red, flashing	Special operating mode for the Bosch Rexroth service employees

Tab. 12-2: Operating state display of the Safety extension module IndraControl XFE01.1-SY-01

LED	Color and status	Description
Mod	Off	No power supply present or no CSos configuration loaded
	Green, flashing	Standby state
	Green	Normal mode
	Red, flashing	Error that can be eliminated
	Red	Error that cannot be eliminated
	Red/green, flashing	Self-test or configuration
Net	Off	No power supply present or no CSos configuration loaded
	Green, flashing	No valid bus connection
	Green	Bus connection OK
	Red, flashing	Timeout
	Red	Critical connection error
	Red/green, flashing	Communication error

Tab. 12-3: Special displays for CIP Safety on Sercos

12.2.3 LED on XD1 plug

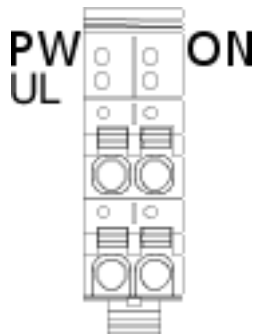


Fig. 12-2: LEDs on the XD1 plug
The following function is assigned to the LED on the XD1 plug:

LED	Color	Function
UL	Green	24 V supply voltage connected and within the permitted range
PW	Green	All internal voltages are present
ON	Green	Module is ready to operate

Tab. 12-4: LED function on the XD1 plug

13 Troubleshooting and debugging

13.1 General information

For information on the display LED and the pushbutton, refer to [chapter 12.2 "Operating and error displays" on page 31](#).



Repairs at the device by the customer are not permitted. Exceptions are maintenance works listed in the chapter "Maintenance".

For further information in the event of repair, please contact the Bosch Rexroth Service.

14 Maintenance



Only the maintenance works at the device listed in this chapter are permitted.

For further information in the event of repair, please contact the Bosch Rexroth Service.

14.1 Cleaning notes

NOTICE

The front panel is dissolved by solvents!

- Do not use any solvents (e. g. diluents) for cleaning!

14.2 Maintenance notes

The Safety extension module IndraControl XFE01.1-SY-01 runs without maintenance. Check the Safety extension module IndraControl XFE01.1-SY-01 at least annually. The check includes:

- Correct position of the extension module
- Correct position of all plug connections and terminal connection
- Damage or rupture

Replace the extension card IndraControl XFE01.1-SY-01 immediately if damaged. In case of damages, please contact the Bosch Rexroth Service.

14.3 Replacing SD card

NOTICE

Unintended exchange of the SD card can damage the Safety extension module IndraControl XFE01.1-SY-01

Only qualified service personnel is allowed to exchange the SD card.



- Approved SD cards may be used, see [tab. 5-1 "Ordering data for accessories" on page 9!](#)
- Formatting: 1 GB, FAT (standard), size of the allocation units: 16 kilobytes
- For the position of the SD card, refer to [fig. 12-1 "Safety extension module IndraControl XFE01.1-SY-01" on page 30.](#)

To replace the SD card, proceed as follows:

1. Disconnect the complete system from voltage. This includes the IndraControl XM control. The Safety extension module IndraControl XFE01.1-SY-01 is connected to this control.
2. Secure the system against restart.
3. Unmount the Safety extension module IndraControl XFE01.1-SY-01, see [chapter 10.4 "Dismounting" on page 23.](#)

4. Put down the Safety extension module IndraControl XFE01.1-SY-01 on its right side on a suitable pad. Thus, the type plate of the XFE01.1-SY-01 becomes visible from top.
5. Remove the cover plugs from the SD card slot.
6. Press the SD card towards the back into the slot down until the SD card disengages.
7. Remove the SD card from the slot.
8. Insert the new SD card into the slot with the labeling up.
9. Press the SD card towards the back into the slot down until the SD card engages.
10. Check whether the SD card correctly engaged into the slot.
11. Mount the cover plugs on the SD card slot again.
12. Mount the Safety extension module IndraControl XFE01.1-SY-01, see [chapter 10.3 "Mounting" on page 22](#).
13. Commission the system again.

15 Ordering information

15.1 Type code

Type short description	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5
Example:	X	F	E	0	1	.	1	-	S	Y	-	0	1		
Device type 1															
IO-Box															
..... = X															
Device type 2															
Function extension ... = F															
Extension type															
Ext. board (slip-on) = B															
Ext. card (flitting) = C															
Ext. module (stackable) = E															
Type of construction															
Type 1 - PCIe = 01															
Type 2 - S20 = 02															
Design															
HW-Design = 1															
Function type															
Communication interface = CX															
Field bus = FB															
I/O connection = IO															
Safety = SY ¹⁾															
Memory volatile = M0															
Function (corresponding to the function type)															
Field bus															
No field bus = 00															
Sercos Master = 01															
Sercos Slave = 02															
RT-Ethernet configurable Master = 03															
RT-Ethernet configurable Slave = 04															
Profibus Master = 10															
Profibus Slave = 11															
Safety															
Safe Logic to SIL3 = 01 ¹⁾															
Note:															
1) Function type "SY" only available with function Safety "01"															

Fig. 15-1: Type code of the Safety extension module IndraControl XFE01.1-SY-01
Bosch Rexroth AG R911376654_Edition 06

15.2 Accessories and spare parts

For ordering information on accessories and spare parts, refer to [chapter 5 "Spare parts and accessories" on page 9](#).

15.3 Ordering data

Type code	Product description	Part number
XFE01.1-SY-01	Extension Module Safety CPU for IndraControl XM	R911173399

16 Disposal

16.1 General information

Dispose the products according to the respective valid national standard.

16.2 Return

For disposal, our products can be returned free of charge. However, the products must be free of remains like oil and grease or other impurities.

Furthermore, the products returned for disposal must not contain any undue foreign substances or components.

Send the products free of charge to the following address:

Bosch Rexroth AG
Electric Drives and Controls
Bürgermeister-Dr.-Nebel-Straße 2
97816 Lohr, Germany

16.3 Packaging

The packaging material consists of cardboard, plastics, wood or styrofoam. Packaging material can be recycled anywhere.

For ecological reasons, please do not return empty packages.

17 Service and support

Our worldwide service network provides an optimized and efficient support. Our experts offer you advice and assistance should you have any queries. You can contact us **24/7**.

Service Germany

Our technology-oriented Competence Center in Lohr, Germany, is responsible for all your service-related queries for electric drive and controls.

Contact the **Service Hotline** and **Service Helpdesk** under:

Phone: +49 9352 40 5060
Fax: +49 9352 18 4941
E-mail: service.svc@boschrexroth.de
Internet: <http://www.boschrexroth.com>

Additional information on service, repair (e.g. delivery addresses) and training can be found on our internet sites.

Service worldwide

Outside Germany, please contact your local service office first. For hotline numbers, refer to the sales office addresses on the internet.

Preparing information

To be able to help you more quickly and efficiently, please have the following information ready:

- Detailed description of malfunction and circumstances
- Type plate specifications of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your e-mail address)

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