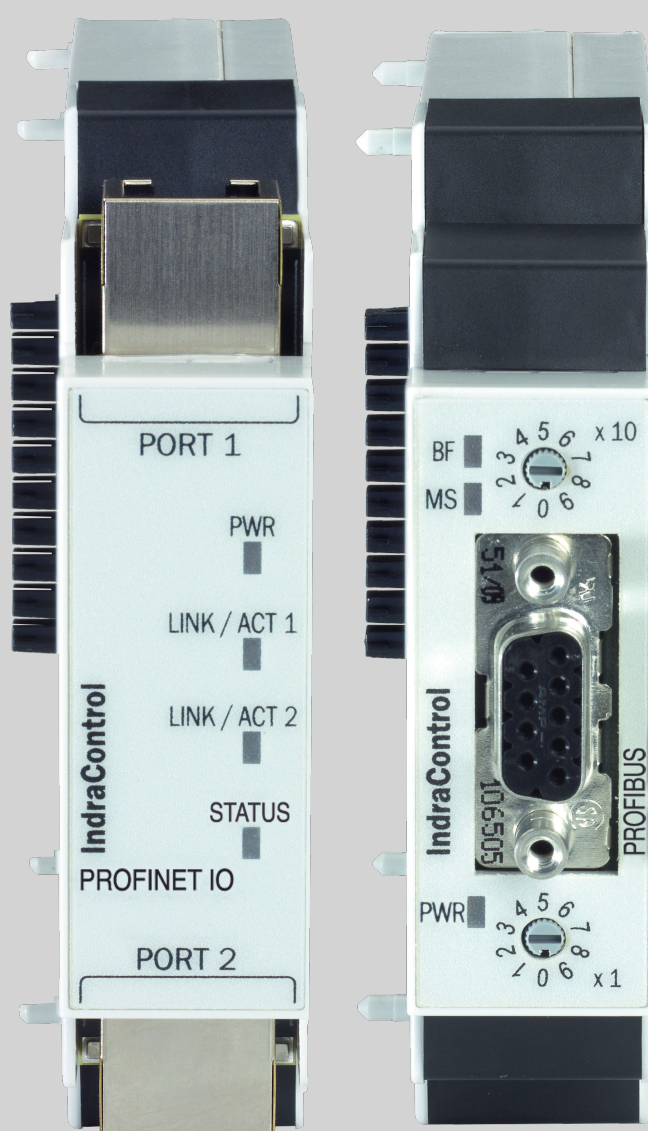


IndraControl SafeLogic compact

Diagnostic Gateways

Operating Instructions
R911332752

Edition 05



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1 About this document

Please read this chapter carefully before using these operating instructions and the SafeLogic compact diagnostic gateways.

Editions of this documentation

Edition	Release Date	Note
Edition 01	2011-07	First edition
Edition 02	2011-11	Supplements, corrections
Edition 03	2013-04	Supplements
Edition 04	2014-04	Supplements
Edition 05	2018-06	Update for Designer V1.8.0

Tab. 1-1: Change Record

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.

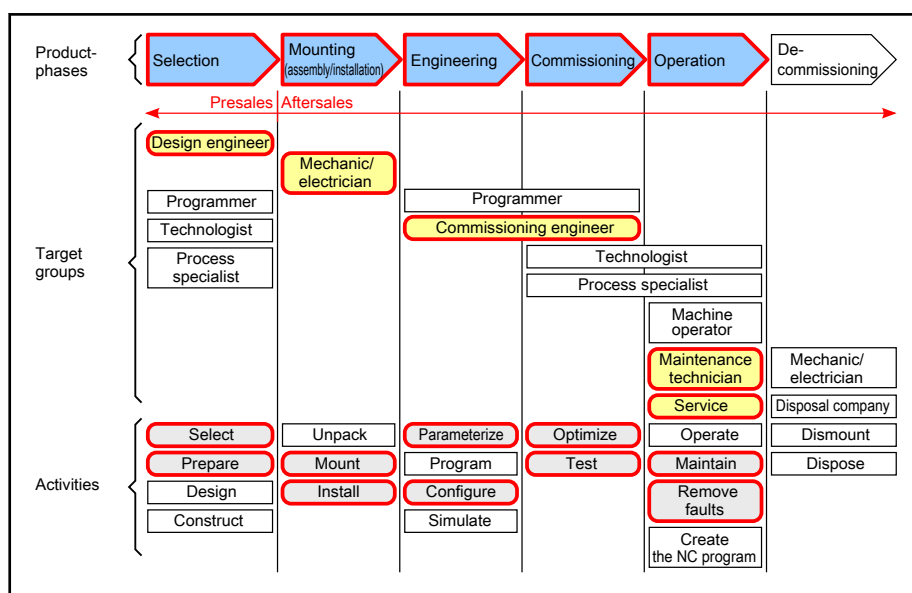


Fig. 1-1: Assigning this documentation to the target groups, product phases and target group activities

1.2 Purpose

The operating instructions can only be used in connection with other SafeLogic compact operating instructions (see [chapter 1.4 "SafeLogic compact operating instructions and assembly instructions" on page 6](#), below). The operating instructions provide the technical personnel at the machine manufacturer or machine operating organization information on safe mounting, adjustment, electrical installation, commissioning as well as on operation and maintenance of the diagnostic gateways.

About this document

These operating instructions do not provide information on the operation of the machine in which a SafeLogic compact modular safety control and a diagnostic gateway is integrated. For information on the operation, refer to the operating instructions of the respective machine.

1.3 Scope

These operating instructions can be used for all SafeLogic compact diagnostic gateways.

1.4 SafeLogic compact operating instructions and assembly instructions

For the SafeLogic compact system, operating instructions with clearly distinguished fields of application as well as assembly instructions for each module are provided.

- The following mounting instructions are provided with each SafeLogic compact module (Rexroth part numbers).
 - [R911334400](#)
 - [R911334401](#)
 - [R911334402](#)
 - [R911334403](#)
 - [R911334404](#)
 - [R911339570](#)
 - [R911343758](#)
 - [R911343761](#)

The assembly instructions provide information about the basic technical specifications of the modules and contain simple assembly instructions. Use the assembly instructions when assembling SafeLogic compact safety components.

- The "Rexroth SafeLogic compact Hardware" operating instructions (Rexroth part number [R911332745](#)) describes all SafeLogic compact modules and their functions in detail. Use the operating instructions when configuring SafeLogic compact safety components
- The "SafeLogic compact Diagnostic Gateways" operating instructions describe all SafeLogic compact diagnostic gateways and their functions in detail
- The "IndraControl SafeLogic compact Sercos Gateway" operating instructions ([Rexroth part number R911338431](#)) describe the SafeLogic compact Sercos gateway and its technical data, assembly, configuration, commissioning and maintenance
- The "SafeLogic compact Designer Software" operating instructions (Rexroth part number [R911332748](#)) describe the software-supported configuration and parameterization of the SafeLogic compact safety components. In addition, the Designer Software operating instructions contain descriptions of the diagnostic functions that are important for operation and detailed information for the identification and elimination of errors. Use the operating instructions when configuring, commissioning and operating the SafeLogic compact safety components

1.5 Documentation structure

The operating instructions contain information about the SafeLogic compact diagnostic gateways about the following topics:

- Information on safety and intended use
- Product description
- Mounting
- Description of the Ethernet gateways
- Description of the Profibus gateways
- Implementation into a network
- Configuration using the SafeLogic Designer configuration software
- Data transfer to and from the network
- Status information, planning and related mapping
- Technical data

1.6 Information representation

1.6.1 Safety instructions

If there are safety instructions in the documentation, they contain certain signal words ("Danger", "Warning", "Caution", "Notice") and sometimes a safety alert symbol (acc. 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.

The safety instructions are represented as follows in this documentation:

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.

About this document

1.6.2 Symbols used

Note Notes are shown as follows:



This is a note for the user.

Tip Tips are shown as follows:



This is a tip for the user.

1.6.3 Terms and abbreviations

Term	Explanation
ACR	Automatic configuration recovery = Function to automatically restore or multiply the configuration of connected EFI-compatible safety sensors such as laser sensors and light curtains
CSV	Comma separated values
EFI	Enhanced Function Interface (safe device communication)
h	Hexadecimal notation (e.g. 72h = 114)
SINT	Short Integer = 1 Byte
UDINT	Unsigned Double Integer = 4 Bytes = 2 Words
UINT	Unsigned Integer = 2 Bytes = 1 Word
USINT	Unsigned short integer = 1 Byte

Tab. 1-2: Terms and abbreviations

1.7 Trademark

Windows 98, Windows NT 4.0, Windows 2000, Windows XP and Internet Explorer are registered trademarks of Microsoft Corporation in the USA and other countries.

Other product and company names mentioned in this document are trademarks or entered trademarks of the respective companies.

1.8 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 For safety

This chapter deals with your own safety and the safety of the equipment operators.

Please read this chapter carefully before working with a diagnostic gateway.

2.1 Qualified personnel

The diagnostic gateway must only be installed, commissioned and serviced by qualified safety personnel.

Qualified is who...

- has undergone the appropriate technical training
- and
- has been instructed by the responsible machine operator in the operation of the machine and the current valid safety guidelines
- and
- have access to the operating instructions of the diagnostic gateway and SafeLogic compact modular safety controller and have read and familiarized themselves with the operating instructions

2.2 Intended use

The diagnostic gateways can only be operated with a SafeLogic compact system. The firmware version of the connected SafeLogic compact CPUx must be at least V2.0.0, the version of the SafeLogic Designer configuration software must be at least 1.3.0.



The diagnostic gateway device description files can be found in the installation directory of the SafeLogic Designer in the "DeviceDescriptions" subfolder:

- GSDML file of SLC-0-GPNT for Profinet /O
- GSD file of SLC-0-GPRO for Profibus DP

The diagnostic gateways do not have a dedicated voltage supply.

WARNING

The diagnostic gateways are not suitable for operation on a safety field bus!

These gateways only generate non-safety-related field bus data (status bytes) for control and diagnostic purposes.

WARNING

Do not use data from a diagnostic gateway for safety related applications!

With the diagnostic gateways it is possible to integrate non-safe data into the logic editor such that the safety function of the SafeLogic compact system is compromised. Do not integrate a gateway in a SafeLogic compact system without checking the hazard source by an expert for safety.

These modules may only be used by qualified safety personnel and only on the machine where they have been installed and initialized by qualified safety personnel in accordance with the operating instructions.

For safety

⚠ WARNING**Pay attention to the safety notes and safety measures on the diagnostic gateways!**

Any warranty claim against the Bosch Rexroth AG shall be waived if the device is modified or changed in any way - even within the framework of mounting or installation.



- During the mounting, installation and usage of the diagnostic gateway, observe the standards and directives applicable in your country
- The following national/international statutory provisions apply to installation and use as well as commissioning and periodic technical inspections of the SafeLogic compact Sercos Gateways GS3S:
 - EMC Directive 2004/108/EC
 - Provision and use of work equipment directive 2009/104/EC
 - Accident prevention regulations and safety rules
- The operating instruction of the machine has to be provided to the operator of the machine where a SafeLogic compact system is used. The machine operator is to be instructed in the use of the device by qualified safety personnel and must be instructed to read the operating instructions

⚠ WARNING**Only use the SafeLogic compact system in an industrial environment!**

The SafeLogic compact system meets the prerequisites for class A (industrial applications) according to the "emission" standard. The SafeLogic compact system is thus only intended for use in an industrial environment.

UL applications For UL applications the device must be used with a Class 2 power supply or Class 2 transformer in accordance with UL1310 or UL1585.

2.3 Environmentally-friendly behavior

The diagnostic gateways are designed for minimum impact on the environment and consume only a minimum of energy and resources.



At work, always act in an environmentally responsible manner.

2.3.1 Disposal

Unusable or irreparable devices should always be disposed as per the applicable national regulations on waste disposal (e.g. European waste code 16 02 14).



We would be pleased to be of assistance to you on the disposal of these devices. Contact us.

2.3.2 Separation of materials

 **CAUTION**

Only appropriately trained personnel are allowed to separate materials!

Caution is required when dismantling devices. There is a risk of injuries.

Before you send the devices for appropriate recycling, it is necessary to separate the different materials of the diagnostic gateways.

- Separate the housing from the rest of the parts (in particular the circuit board)
- Dispose of the separated components in the corresponding recycling centers (see the following table)

Components	Disposal
Product	
• Housing	Plastic recycling
• PCBs, cables, plugs and electrical connection pieces	Electronic recycling
Packaging	
• Cardboard, paper	Paper and cardboard recycling

Tab. 2-1: Overview on disposal according to materials

3 Product Description Diagnostic Gateways

The diagnostic gateways allow the SafeLogic compact system to send and receive non-safety related data to and from the external field bus system for control and diagnostics purposes.



In these operating instructions, the data exchanged between the SafeLogic compact system and the respective network will be considered always from the network master (PLC) point of view. Therefore, data sent from the SafeLogic compact system into the network will be referred to as input data while data received from the network will be referred to as output data.

WARNING

Do not operate a diagnostic gateway on a safety field bus!

The diagnostic gateways are not suitable for operation on a safety field bus. The diagnostic gateways do not support any safety mechanism, which would be mandatory to communicate within a safety network. The diagnostic gateways only generate non-safety-related field bus data (status bytes) for control and diagnostic purposes.

WARNING

Do not use the diagnostic gateways for safety-related applications!

The diagnostic gateways enable integration of non-safe data into the logic editor to influence the safety function of the SafeLogic compact system. Do not integrate a gateway in a SafeLogic compact system without having this hazard source checked by an expert for safety.

Configuration of the diagnostic gateways is performed using the SafeLogic Designer configuration software on a PC or notebook connected to the SafeLogic CPU over RS232 interface or connected to the EtherNet gateways over EtherNet TCP/IP.

The safety-relevant logic operation of the SafeLogic compact system does not depend on the gateway. If the SafeLogic compact system has been configured to allow non-safety-related information to be integrated from the field bus to the logic editor, disabling the gateway can result in problems with the availability of the system.

A diagnostic gateway can only be operated in a SafeLogic compact system. The diagnostic gateway is not equipped with a dedicated voltage supply. Two gateways can simultaneously be operated per system.

The gateways are housed in an installation housing with a width of 22.5 mm for 35 mm rails according to DIN EN 60 715 (DIN rail).



Order information can be found under [chapter 8.5 "Ordering information diagnostic gateways" on page 103](#).

3.1 Device Variants

Two diagnostic gateways are available for the different network types. For Ethernet networks, the Profinet IO gateway SLC-0-GPNT is suitable. The Profibus DP gateway SLC-0-GPRO is a field bus gateway without EtherNet functionality.

Product Description Diagnostic Gateways

	SLC-0-GPNT	SLC-0-GPRO
Network type	Profinet IO Slave, Conformance Class A	Profibus DP slave
EtherNet TCP/IP socket interface	Client/server	–
TCP/IP configuration interface	Available at port 9000	–

Tab. 3-1: Device variants and their main features



The date of manufacturing is printed on the type plate:
FD: yyWww, yy = year, ww = calendar week.



If two computers establish TCP/IP connections in parallel with a SafeLogic compact main module via port 9000 of an Ethernet gateway, the SafeLogic compact main module communicates only via the connection established last. This causes the other computer to establish an additional connection without closing the connection established before. At some point, there are too many open connections to the computers via the gateways where only messages on maintaining of these open connections (keep alive messages) are exchanged. This causes the SafeLogic compact station to switch to lock-out status.

3.2 Firmware versions

To add a gateway to a SafeLogic compact system in Designer configuration, the suitable step of the respective gateway has to be selected.

Firmware version	Step
V1.xx.x	1.xx
V2.xx.x	2.xx

Tab. 3-2: Firmware versions



- The firmware version can be found on the type label of the device.
- When reading a SafeLogic compact system by means of the designer, the firmware version of the device is recognized automatically.

3.3 Data transmitted into the network (network input data sets)

3.3.1 Available data

The diagnostic gateways can provide the following data:

- **Operating data**
 - **Logic results** of SafeLogic compact main module (SLC-3-CPUx) (see [chapter 3.3.3 "Logic Results" on page 17](#))
 - **Input values** (HIGH/LOW) for all SafeLogic compact input extension modules in the system and EFI devices connected (see [chapter 3.3.4 "Module and EFI Input and Output Values" on page 17](#))

- **Output values** (HIGH/LOW) for all SafeLogic compact input extension modules in the system and EFI devices connected (see [chapter 3.3.4 "Module and EFI Input and Output Values" on page 17](#))
- **Output data** from a different network, i.e. data that has been received by a second gateway in the SafeLogic compact system (see [chapter 3.3.6 "Routing of Data from a Second Network" on page 20](#))
- **Gateway direct output values:** It is possible to write logic results directly from the logic editor into the gateway (see [section chapter 7.3.5 "Direct Gateway Output Values" on page 95](#))
- **Diagnostics**
 - **Check sums** (CRCs) (see [chapter 3.3.7 "Configuration checksums" on page 20](#))
 - **Error and status information** for all modules except for SLC-A-UE410-2RO and SLC-A-UE410-4RO (see [chapter 3.3.8 "Error and Status Information of the Modules" on page 20](#))

3.3.2 Data sets

The physical SafeLogic compact modules are not represented as typical hardware modules in the network. Instead, the data available from the SafeLogic compact system has been organized into four input data sets.

- **Data set 1** (max. 50 bytes) contains the operating data. The data set can be compiled using the SafeLogic Designer tool. Upon delivery there is a default selection for the content of data set 1 which can be freely modified. For details, refer to [tab. 3-4 "Overview of the input data sets 1–3 \(basic gateway setting\)" on page 16](#)
 For the SLC-0-GPNT and the SLC-0-GPRO, data set 1 has been subdivided in five input data blocks, where data block 1-4 contain 12 bytes each and data block 5 contains two bytes. For detailed information see the section on the related gateway
- **Data set 2** (32 bytes) contains the system configuration CRCs. Refer to [tab. 3-4 "Overview of the input data sets 1–3 \(basic gateway setting\)" on page 16](#)
- **Data set 3** (60 bytes) contains the individual module status and diagnostics data with four (4) bytes per module. For details, refer to [tab. 3-7 "Meaning of module status bits for SLC-3-XTDI, SLC-3-XTIO, SLC-3-CPUx and diagnostic gateways" on page 21](#)
- **Data set 4** (60 bytes) is currently filled with reserved values

The following table provides an overview of data sets available for individual gateways.

	Data set 1	Data set 2	Data set 3	Data set 4
SLC-0G-PNT	Profinet I/O or TCP/IP	Profinet I/O or TCP/IP	Profinet I/O or TCP/IP	Profinet I/O or TCP/IP
SLC-0G-PRO	Profibus DP	–	– ¹⁾	–

Tab. 3-3: Availability of data sets 1–4

1) By means of SLC-0-GPRO, diagnostic data is provided via Profibus standard DP-V0 diagnostics. For further information on provision of status and diagnostic data by means of the Profibus DP gateway, please refer to [chapter 6.1 "Profibus DP gateway" on page 73](#)

Product Description Diagnostic Gateways

	Data set 1	Data set 2	Data set 3
Byte 0	Input values module 1	Overall CRC	Module status module 0
Byte 1	Input values module 2		Module 0 is always the CPU
Byte 2	Input values module 3		
Byte 3	Input values module 4		For detailed information about the module status see tab. 3-7 "Meaning of module status bits for SLC-3-XTDI, SLC-3-XTIO, SLC-3-CPUx and diagnostic gateways" on page 21
Byte 4	Input values module 5	System CRC	Status module 1
Byte 5	Input values module 6	(SCID)	
Byte 6	Input values module 7		
Byte 7	Input values module 8		
Byte 8	Input values module 9	Reserved	Status module 2
Byte 9	Input values module 10		
Byte 10	Input values module 11		
Byte 11	Input values module 12		
Byte 12	Output values module 1	Verified configuration	Status module 3
Byte 13	Output values module 2	CRC	
Byte 14	Output values module 3		
Byte 15	Output values module 4		

Product Description Diagnostic Gateways

	Data set 1	Data set 2	Data set 3
Byte 16	Output values module 5	Reserved	Status module 4
Byte 17	Output values module 6		
Byte 18	Output values module 7		
Byte 19	Output values module 8		
Byte 20	Output values module 9		Status module 5
Byte 21	Output values module 10		
Byte 22	Output values module 11		
Byte 23	Output values module 12		
Byte 24	Logic result 0		Status module 6
Byte 25	Logic result 1		
Byte 26	Logic result 2		
Byte 27	Logic result 3		
Byte 28	Gateway direct output values 1		Status module 7
Byte 29	Gateway direct output values 2		
Byte 30	Gateway direct output values 3		
Byte 31	Gateway direct output values 4		
Byte ...	Not assigned		...
Byte 49	Not assigned		...
Byte ...			...
Byte 56			Status module 14
Byte 57			Module 13 and 14
Byte 58			are always the
Byte 59			gateways
Length	50 bytes	32 bytes	60 bytes

Tab. 3-4: Overview of the input data sets 1–3 (basic gateway setting)

3.3.3 Logic Results

Logic results generated by the logic editor of the SafeLogic compact main unit can be made available to the network. Up to 20 bytes are available where each bit represents one logic result from the logic editor. Data set 1 containing the logic results can be customized. For detailed information see the chapter on the related gateway and in [chapter 7 "Layout and content of the process mapping "](#) on page 91.

3.3.4 Module and EFI Input and Output Values

The diagnostic gateways can transmit all input and output states of all SafeLogic compact modules and EFI devices connected to the SafeLogic compact system into the network. Data set 1 containing the input and output values and the EFI information can be customized. For detailed information see the chapter on the related gateway and in [chapter 7 "Layout and content of the process mapping "](#) on page 91.

Product Description Diagnostic Gateways

Module status

The SafeLogic compact gateways can transmit the status of the connected modules into the network. For this purpose, a total of 6 bytes are available.

General information

Module status	Size	Meaning	Assignment
Input data status	2 bytes	One sum bit per module for the module input status 0 = Error 1 = No error	Bit 0 = SLC-3-CPUx Bit 1 = Extension module 1 Bit 2 = Extension module 2 ...
Output data status	2 bytes	One sum bit per module for the module output status 0 = Error 1 = No error	Bit 13 = Gateway 1 Bit 14 = Gateway 2 Bit 15 = Reserved
Position status	2 bytes	One sum bit per module for the module input and output status (AND link of status input data and status output data) 0 = Error 1 = No error	

Tab. 3-5: Module status

Information on meaning of status bits can be found in the "Rexroth IndraControl SafeLogic compact Software Designer" operating instructions in the chapter on "module input and output status bits in the logic editor".



The input and output status for the SLC-3-XTIO and SLC-3-XTDI modules is available only with firmware version V2.00.0 and higher.

Input values and output values of modules

Input values and output values for I/O modules

For each module, 1 byte is available for data set 1.

The input values indicate the state of the pre-evaluation on the I/O module. This state corresponds to the state of the element in the logic of the main module. The level at the related terminal cannot be clearly indicated by this as the data may be set to low independently from the level at the input terminal (e.g. I1–I8) due to cross circuit detection or two-channel evaluation.

If two-channel input elements are configured at an I/O module, the state of pre-evaluation of the respective element is only indicated by the lower-value bit (e.g. bit 0 for I1 and I2, bit 2 for I3 and I4, bit 4 for I5 and I6, bit 6 for I7 and I8).

In this case, the higher-value bit (bits 1, 3, 5 and 7) is used as follows:

Firmware version SLC-3-XTIO	Dual-channel equivalent switches	Dual-channel complementary switches
V1.xx	Same state as the lower-value bit	Inverted state of the lower-value bit
V2.00 and higher	Status of pre-evaluation 0 = Error 1 = No error	

Tab. 3-6: Application of the higher-value bit at two-channel evaluation at I/O module SLC-3-XTIO

Input values for I/O modules

For each module with outputs, one 1 byte is available for data set 1.

The output values indicate the status of the control information from the logic of the main module for the respective element on the I/O module. The level at the related terminal cannot be clearly indicated by this as the output may be deactivated due to cross circuit or overload detection.

If two-channel output elements are configured at an I/O module, only the lower-value bit is used for control information (e.g. bit 0 for Q1 and Q2, bit 2 for Q3 and Q4, bit 4 for Q5 and Q6, bit 6 for Q7 and Q8). In this case, the higher-value bit (bits 1, 3, 5 and 7) is not used (low).

Input values for MOCx modules

For each MOCx module, 2 bytes are available for data set 1. The input values indicate the status of the signals from the logic of the main module to the MOCx logic. Bit 16 and bit 17 of the usable bits from the main module for MOCx logic are not available here.

Output values for MOCx modules

For each MOCx module, 2 bytes are available for data set 1. The output values indicate the status of the signals from the MOCx logic to the logic of the main module.

EFI System Information

The main modules SLC-3-CPU1 and SLC-3-CPU3 are equipped with 2 EFI interfaces. An EFI interface is a safe communication interface between CPU1/CPU3 devices or to periphery devices.

An EFI interface offers the following possibilities:

- Reading out information from the safety devices.
- Transfer of commands to the safety devices.

The diagnostic gateways allow these EFI devices connected to the SLC-3-CPU1 to transmit their data into the network.



It is only possible to select the EFI data in byte arrays. 4 byte arrays for each connected EFI device are available. Some of the data content is reserved and can not be used at the PLC.

Further information about the properties, functions and benefits of the EFI interfaces can be found in the Flexi Soft Hardware operating instructions "Rexroth IndraControl SafeLogic compact Hardware", see [chapter 1.4 "SafeLogic compact operating instructions and assembly instructions" on page 6](#).

3.3.5 Direct Gateway Output Values

It is possible to write values directly from the logic editor into a gateway. There are four bytes reserved for this in the default settings for data set 1, however up to all 50 bytes of data set 1 can be defined as gateway direct output values. For detailed information, refer to [chapter 7.3.5 "Direct Gateway Output Values" on page 95](#).

3.3.6 Routing of Data from a Second Network

If your SafeLogic system contains two gateways, it is possible to route information received by the first gateway from one network (e.g. from a Modbus PLC) into a second network via the second gateway (e.g. to a Profibus master) and vice versa.

3.3.7 Configuration checksums

Data set 2 contains the following configuration checksums of the SafeLogic compact system:

- Total checksum:
If ACR is disabled: The same value as the SafeLogic compact checksum.
If ACR is enabled: Checksum from SafeLogic compact checksum and ACR checksum
- SafeLogic compact checksum:
This checksum covers the configuration of the SafeLogic compact system, i.e. for all SafeLogic compact modules. The SafeLogic compact checksum excludes the configuration of connected EFI devices
- SafeLogic compact checksum (verified):
This is the verified checksum of the SafeLogic compact configuration. If this checksum is identical to the SafeLogic compact checksum, the configuration of the SafeLogic compact system is considered verified (LED "CV" flashes in ● yellow)
- ACR checksum:
This checksum covers the ACR configuration for EFI devices

Each check sum is four bytes long. Data set 2 cannot be customized.

3.3.8 Error and Status Information of the Modules

Data set 3 contains the module status information transferred to the network. Four bytes are used for each module (e.g. SLC-3-XTIO). These four bytes are transmitted in Big Endian format.

Data set 3 cannot be customized.

If not specified otherwise, the module status bits have the following meaning:

- 0 = Error
- 1 = No error

Product Description Diagnostic Gateways

Byte	Bit	I/O module SLC-3-XTIO and SLC-3-XTDI ²⁾	Main module SLC-3-CPUx	Gateway modules
0	0	Operating state of the module 1 = Run 0 = Any other state	Operating state of the module: 1 = Run 0 = Any other state	Operating state of the module: 1 = Run 0 = Any other state
	1	Internal tests	Internal tests	Internal tests
	2	Summary of bits 0.5 to 3.7 (external error)	Summary of the bits 0.5 to 3.7 (power supply and EFI)	Summary of bits 0.5 to 3.7 (external error)
	3	Reserved	Reserved	Reserved
	4	Configuration of this module is valid	Configuration of SafeLogic compact system	Configuration of this module is valid
	5	Current supply of the outputs	Power supply	Communication from network
	6	Fast-Shut-Off output	EFI1	Communication to network
	7	Reserved	EFI2	Reserved
1	0	Dual-channel evaluation Input 1–2	EFI link stations in the system 1 = All found 0 = One or more missing	Reserved
	1	Dual-channel evaluation Input 3–4	EFI link stations suspended 1 = None 0 = One or more	
	2	Dual-channel evaluation Input 5–6	Flexi Line status 1 = No errors 0 = Flexi Line teach required and/or communication error to predecessor or successor	
	3	Dual-channel evaluation Input 7–8	Reserved	
	4	Reserved		
	5	Reserved		
	6	Reserved		
	7	Reserved		
2	0	External test signal Input 1	Reserved	Reserved
	1	External test signal Input 2		
	2	External test signal Input 3		
	3	External test signal Input 4		
	4	External test signal Input 5		
	5	External test signal Input 6		
	6	External test signal Input 7		
	7	External test signal Input 8		

²⁾ The module status bits for SLC-3-XTIO and SLC-3-XTDI only completely supported in firmware version V1.13 or higher

Product Description Diagnostic Gateways

Byte	Bit	I/O module SLC-3-XTIO and SLC-3-XTDI ²⁾	Main module SLC-3-CPUx	Gateway modules
3	0	Short circuit monitoring output 1 Short circuit after High	Reserved	Reserved
	1	Short circuit monitoring output 1 Short circuit after Low		
	2	Short circuit monitoring output 2 Short circuit after High		
	3	Short circuit monitoring output 2 Short circuit after Low		
	4	Short circuit monitoring output 3 Short circuit after High		
	5	Short circuit monitoring output 3 Short circuit after Low		
	6	Short circuit monitoring output 4 Short circuit after High		
	7	Short circuit monitoring output 4 Short circuit after Low		

Tab. 3-7: *Meaning of module status bits for SLC-3-XTDI, SLC-3-XTIO, SLC-3-CPUx and diagnostic gateways*

If not specified otherwise, the module status bits have the following meaning:

- 0 = Error
- 1 = No error

Byte	Bit	I/O module SLC-3-XTDS	I/O module SLC-0-STIO	Drive monitor SLC-3-MOCx
0	0	Operating state of the module 1 = Run 0 = Any other state	Operating state of the module: 1 = Run 0 = Any other state	Operating state of the module: 1 = Run 0 = Any other state
	1	Internal tests	Internal tests	Internal tests
	2	Grouping of the bit 0.5 to 3.7 (External error)	Grouping of the bit 0.5 to 3.7 (External error)	Grouping of the bit 0.5 to 3.7 (External error)
	3	Reserved	Reserved	Reserved
	4	Configuration of this module is invalid	Configuration of this module is invalid	Configuration of this module is valid.
	5	Current supply of the outputs	Current supply of the outputs	Encoder 1
	6	Reserved	Reserved	Encoder 2
	7	Monitoring of output load (Overcurrent)	Monitoring of output load (Overcurrent)	Reserved

²⁾ *The module status bits for SLC-3-XTIO and SLC-3-XTDI only completely supported in firmware version V1.13 or higher*

Product Description Diagnostic Gateways

Byte	Bit	I/O module SLC-3-XTDS	I/O module SLC-0-STIO	Drive monitor SLC-3-MOCx
1	0	Dual-channel evaluation of input 1–2	Reserved	Reserved
	1	Dual-channel evaluation of input 3–4		
	2	Dual-channel evaluation of input 5–6		
	3	Dual-channel evaluation of input 7–8		
	4	Reserved		User-defined status bit 1 ¹⁾
	5			User-defined status bit 2 ¹⁾
	6			User-defined status bit 3 ¹⁾
	7			User-defined status bit 4 ¹⁾
2	0	External test signal Input 1	Reserved	Reserved
	1	External test signal Input 2		
	2	External test signal Input 3		
	3	External test signal Input 4		
	4	External test signal Input 5		
	5	External test signal Input 6		
	6	External test signal Input 7		
	7	External test signal Input 8		
3	0	Reserved	Reserved	Reserved
	1			
	2			
	3			
	4			
	5			
	6			
	7			

1) The state of this bit enables application-specific definition in the MOCx logic, e.g. to indicate inadmissible axis motion recognized by a MOCx function block

Tab. 3-8: Meaning of module status bits for SLC-3-XTDS, SLC-0-STIO and SLC-3-MOCx

Example:

Module 2 (SLC-3-XTIO) has a short circuit after high (24 V) at output 3. The following module status is transmitted into the network (only the first 12 of 60 bytes are displayed):

Byte address	00	01	02	03	04	05	06	07	08	09	10	11	...
Byte	MSB			LSB	MSB			LSB	MSB			LSB	...
	3	2	1	0	3	2	1	0	3	2	1	0	...

Product Description Diagnostic Gateways

Byte address	00	01	02	03	04	05	06	07	08	09	10	11	...
Value	FF	FF	FF	FF	FF	FF	FF	FF	EF	FF	FF	FB	...
Meaning	Status module 0 (CPU)				Status module 1 (SLC-3-XTIO)				Status module 2 (SLC-3-XTIO)				...

Tab. 3-9: Example for module status in data set 3

The first bit relevant for the error at module 2 described above is module status byte 0 for module 2. This is byte 11 with the hexadecimal value FB (11111011):

Bit #	7	6	5	4	3	2	1	0
Value	1	1	1	1	1	0	1	1

Tab. 3-10: Example for module status byte 0 of module 2

This corresponds to error message "Summary of bits 0.5 to 3.7 (external error)" see [tablechapter 3.3.8 "Error and Status Information of the Modules" on page 20](#)

The second bit relevant is module status byte 3 for module 2. This is byte 08 with the hexadecimal value EF (11101111):

Bit #	7	6	5	4	3	2	1	0
Value	1	1	1	0	1	1	1	1

Tab. 3-11: Example for module status byte 3 of module 2

This corresponds to error message "Short circuit monitoring output 3, short circuit after high" see [tablechapter 3.3.8 "Error and Status Information of the Modules" on page 20](#)



- Reserved (for future use) = static 1 (no status change)
- If no module exists, all values including the reserved values are set to logic 1

You will find an example process image in section [chapter 5.1.3 "TCP/IP Process Image Example" on page 48](#).

3.4 Data Received from the Network (Network Output Data Sets)

The data received from the network are organized in output data sets (max. 50 bytes). These data sets of SLC-0-GPNT and SLC-0-GPRO contain the output data blocks 1–4 with 12 bytes and output data block 5 contains 2 bytes.

Gateway	Output data block 1 size	Size, output data block 2	Size, output data block 3	Size, output data block 4	Size, output data block 5
SLC-0-GPNT	12 bytes	12 bytes	12 bytes	12 bytes	2 bytes
SLC-0-GPRO	12 bytes	12 bytes	12 bytes	12 bytes	2 bytes

Tab. 3-12: Output data block 1–5 of the different gateways

The contents of the output data blocks can be used within the SafeLogic compact CPU logic editor and can also be made available to another network via a second SafeLogic compact gateway system.

Product Description Diagnostic Gateways



- In order to make the data from the network available in the logic editor or as input to another network, you will have to define a tag name for each bit that shall be used
- Bits without a specific tag name will not be available in the logic editor nor for routing via a second gateway. For detailed information on how to define tag names for the data received please see the related section in the chapters on the different gateways
- The status of the communication to and from the network can be monitored in the logic editor using the module input status bit for data from the network and the module output status bit for data to the network. When the gateway detects a communication faults, the content of the data sets and the corresponding status bit are set to zero (logical 0)
- If the complete communication fails, data of the output data sets and the status bit of the input data are set to zero (logical 0)
- If a connection is closed while still others are available, the MS LED flashes for 10 s Red/Green and an error history entry is made. In this case, the status bits will not be affected

WARNING

Do not use the same output data set number for two different PLC connections or TCP/IP sockets!

The output data set can be written to the EtherNet gateways in parallel by all communication interfaces or TCP/IP sockets, if they use the same output data set number. In that case, the last message overwrites data received earlier.

4 Mounting and basic configuration

4.1 Mounting and demounting

This chapter describes the mounting of the diagnostic gateways.

WARNING

Make sure that the connection of the diagnostic gateway cannot lead to hazardous situations during installation!

Ensure that connecting a diagnostic gateway cannot lead to a hazardous situation when implementing the unit on to the diagnostic system and EtherNet network. Prevent unintended start-up of equipment during connection of a diagnostic gateway.

4.1.1 Steps for mounting the modules

WARNING

The SafeLogic compact system has to be mounted into an environment corresponding to the degree of protection IP 54 (EN 60529), e.g. into a control cabinet with the degree of protection IP 54.

While supply voltage is applied, modules must not be plugged to nor be removed from the SafeLogic compact system.

To ensure full electromagnetic compatibility (EMC), the DIN mounting rail must be connected to functional earth (FE). Additionally connect all network cable shields directly at the control cabinet entrance to a common FE ground line.

- The main module SLC-3-CPUx is positioned at the far left in a SafeLogic compact system
- The two optional gateways follow directly to the right of the main module
- Connect further SafeLogic compact extension modules (e.g. SLC-3-XTIO, SLC-3-XTDI) onto the right side of the gateways and any additional relay modules (SLC-A-UE410-2RO, SLC-A-UE410-4RO) to the extreme right of the entire SafeLogic compact system
- Ensure that suitable ESD protective measures are taken during mounting. Otherwise the devices may be damaged
- The connection between the modules is effected by means of the plug connection integrated in the housing. Take into account that, when replacing a module, the SafeLogic compact modules have to be pushed approx. 10 mm apart before the corresponding module can be removed from the DIN mounting rail
- Take suitable measures to ensure that foreign matter does not penetrate the connector openings, in particular that of the system plug
- Mount the modules in accordance with EN 50 274
- The modules are located in a 22.5 mm wide modular system for 35 mm DIN rails according to EN 60 715 (DIN mounting rail)

Mounting and basic configuration

Mounting a module on the DIN mounting rail

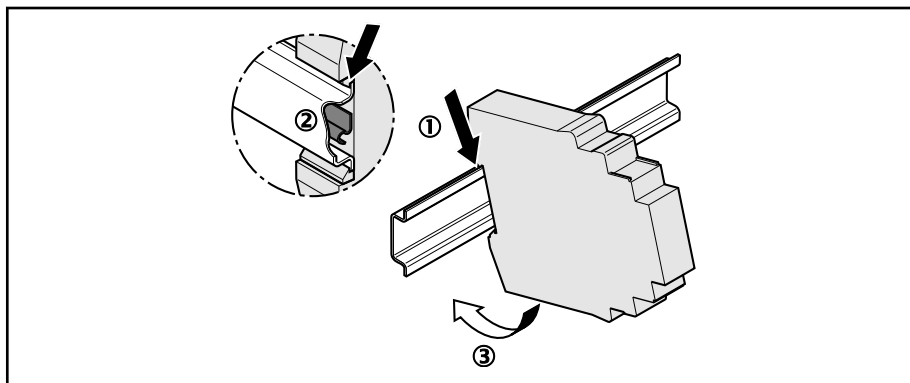


Fig. 4-1: Mounting a module on the DIN mounting rail

1. Make sure that the voltage supply of the SafeLogic compact system is switched off.
2. Hang the device onto the DIN rail (①).
3. Connect the gateways directly onto the right side of the SLC-3-CPUx module of the SafeLogic compact system. Up to two gateways per system are possible.
4. Ensure that the earthing spring contact (②) contacts the DIN mounting rail such that it can electrically conduct.
5. Engage the module onto the DIN rail by pressing it slightly in the direction of the arrow (③).

Installing end clamps

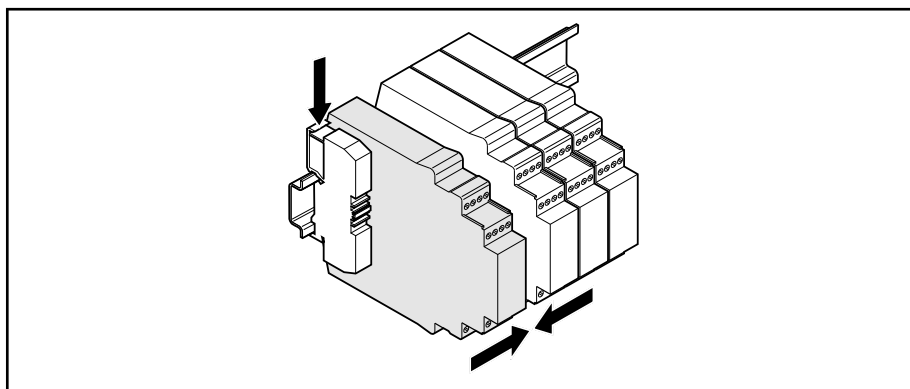


Fig. 4-2: Installing end clamps

1. If there are several modules, slide the modules together individually in the direction of the arrow until the side plug connection latches in.
2. Install end clips on the left and right.

After the mounting, proceed with the following steps:

1. Installing electric contacts (see [chapter 4.2 "Electrical installation "](#) on [page 30](#)).
2. Configuration (refer to [chapter 4.3 "First configuration steps" on page 30](#) and to the "Rexroth IndraControl SafeLogic compact Designer Software", refer to [chapter 1.4 "SafeLogic compact operating instructions and assembly instructions" on page 6](#)).
3. Checking the installation (see Commissioning chapter in the operating instructions "Rexroth SafeLogic compact Hardware", refer to [chapter](#)

Mounting and basic configuration

1.4 "SafeLogic compact operating instructions and assembly instructions" on page 6).

4.1.2 Steps for module demounting

1. Remove the removable terminals with the wiring and the end clamps

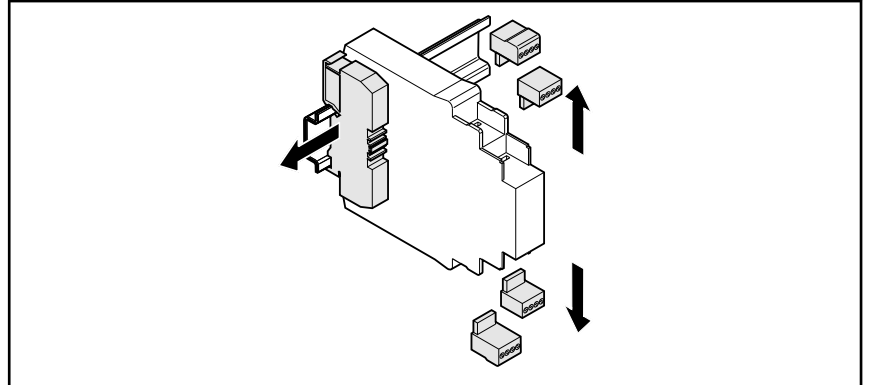


Fig. 4-3: Removing the removable terminals

2. If there are several modules, slide the modules away from each other individually in the direction of the arrow until the side plug connection is separated.

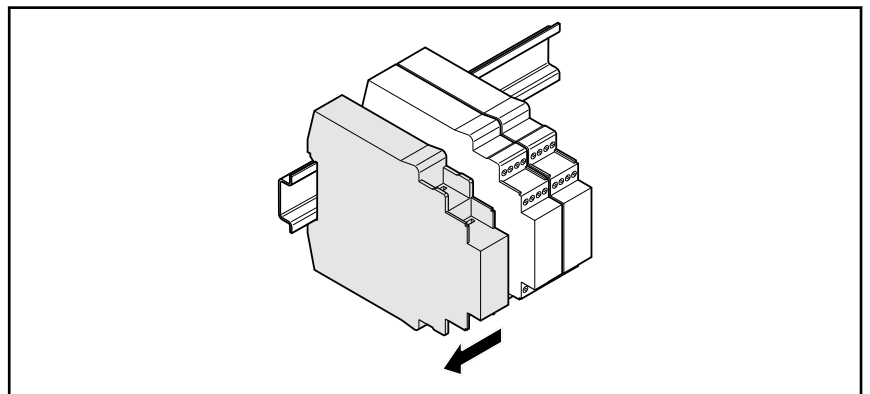


Fig. 4-4: Disconnecting the plug connections

3. Press the module downwards at the rear (①) and remove the module from the DIN mounting rail in the direction of the arrow while keeping it pressed down (②).

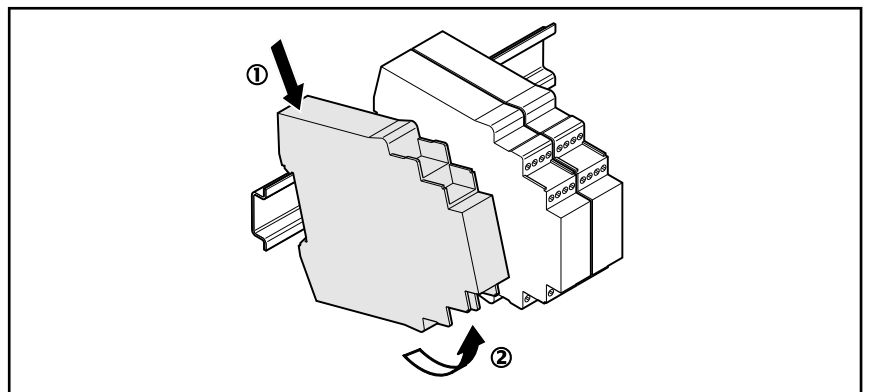


Fig. 4-5: Removing the modules from the DIN mounting rail

4.2 Electrical installation

WARNING

Switch the entire machine/system off line!

The system could start up unexpectedly while you are connecting the devices.



- The diagnostic gateways fulfill the EMC requirements in accordance with the basic specification EN 61 0006-2 for industrial use
- To ensure full electromagnetic compatibility (EMC), the DIN mounting rail must be connected to functional earth (FE)
- The control cabinet or assembly casing of the SafeLogic compact system must comply at least with enclosure rating IP 54
- Mounting according to EN 50 274
- Electrical installation according to EN 60 204-1
- The voltage supply of the devices must be capable of buffering brief mains voltage failures of 20 ms as specified in EN 60 204-1
- The voltage supply has to fulfill the regulations for extra-low voltages with safe separation (SELV, PELV) in accordance with EN 60 664 and EN 50 178 (equipment of electrical power installation with electronic devices)
- Ensure that all the modules of the SafeLogic compact system, the connected protective devices as well as the voltage supplies are connected with the same GND plane. The GND of the RS232 interface is connected internally to the GND of the supply of the main module (A2)
- Connect all field bus and EtherNet cable shields directly at the control cabinet entrance to the functional earth (FE)

4.3 First configuration steps

This chapter describes the basic configuration steps of the gateway:

- Establishing an initial connection between the gateway and a PC or a notebook
- Loading or importing a configuration
- Verifying a configuration

4.3.1 Connection between gateway and PC

1. Connect a PC or notebook to the RS232 interface of the SLC-3-CPUx.
2. Power up the SafeLogic compact system.
3. Open the SafeLogic Designer configuration tool installed on the PC.
4. Click on the interface parameters to ensure the correct communication interface has been selected. The following dialog is displayed:

Mounting and basic configuration

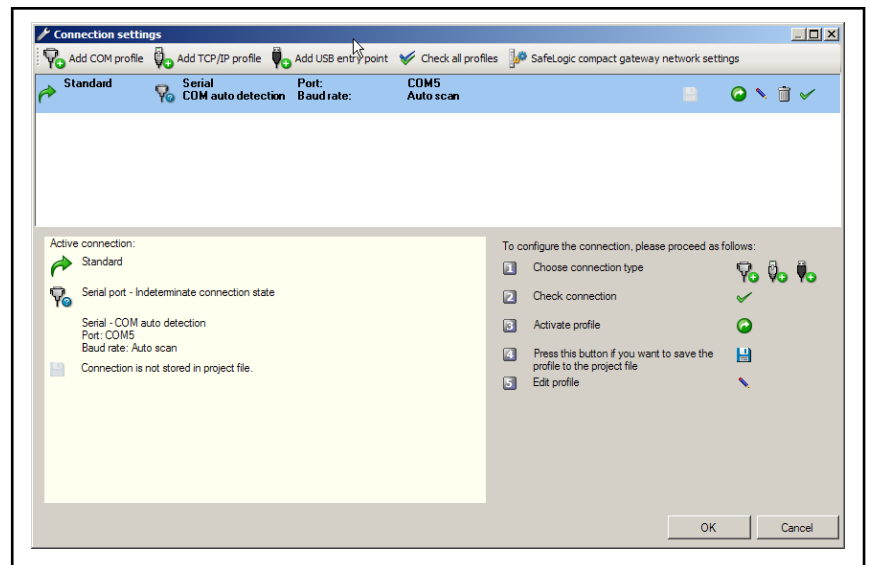


Fig. 4-6: Dialog window "Connection settings"

5. To edit the settings, click on the pencil icon to the right. The following dialog is displayed:

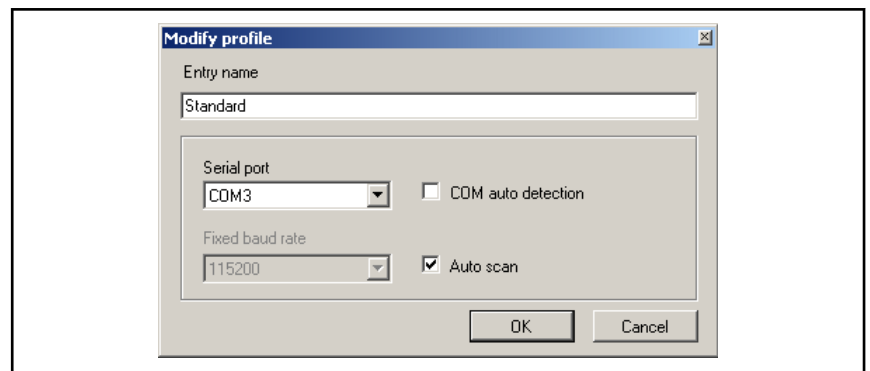


Fig. 4-7: Dialog window "Modify profile"

6. Modify the settings if required and click on **OK**.
 7. Click on **OK** and the dialog window closes.
 8. Click on **Connect to physical device**. The SafeLogic Designer will search for connected SafeLogic compact devices and load the hardware configuration into the "Hardware configuration" dialog. Once all modules have been identified correctly, the SafeLogic compact Designer will ask whether the configuration shall be uploaded.
 9. Click **Yes** to upload the configuration in the subsequent dialog.
- The figure in the following exemplarily shows a hardware configuration:

Mounting and basic configuration

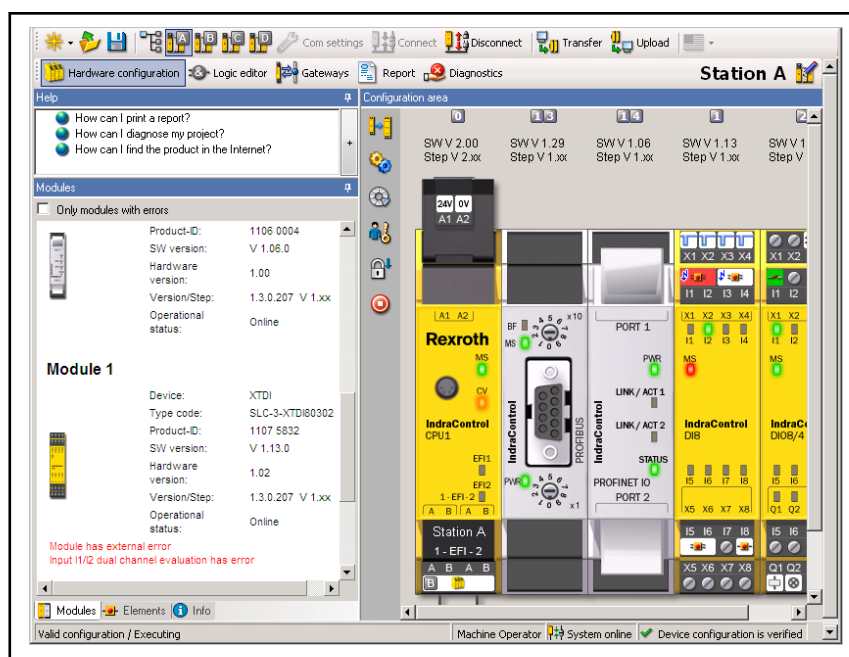


Fig. 4-8: "Hardware configuration" dialog

- Click on **Disconnect** to switch to "Offline" mode if you want to change the configuration of the SafeLogic compact modules

4.3.2 Gateway configuration

For the configuration of the gateways please refer to the sections on the related gateway:

- chapter 5.2 "Profinet IO gateway" on page 55
- chapter 6.1 "Profibus DP gateway" on page 73

For the configuration of the TCP/IP interface of the EtherNet gateways, please refer to the following sections:

- chapter 5.1.1 "TCP/IP Configuration Interface" on page 35
- chapter 5.1.2 "EtherNet TCP/IP-Socket Interface" on page 40

For the configuration of the operational data (data transfer from and to the network), please refer to chapter 7 "Layout and content of the process mapping" on page 91.



More information can be found in the instruction "Rexroth IndraControl SafeLogic compact Designer Software" (see chapter 1.4 "SafeLogic compact operating instructions and assembly instructions" on page 6).

4.3.3 Importing a configuration

Once the configuration is completed successfully, it has to be imported in the SafeLogic compact system. To import a configuration, follow the next steps:

- Click on **Connect** to change to "Online" mode. The SafeLogic Designer connects to the SafeLogic compact system.
- Click **Transfer** to transfer the configuration to the SafeLogic compact system.

Mounting and basic configuration



Depending on the current user level, the user is prompted to log in as "Authorized customer" to be able to import a configuration. Detailed information can be found in the instruction "Rexroth IndraControl SafeLogic compact Designer Software" (see [chapter 1.4 "SafeLogic compact operating instructions and assembly instructions" on page 6](#)).

3. Once the import is completed, the user is prompted to start the CPU module. Depending on your choice, click **Yes** or **No** to leave the dialog.



The application can also be started or stopped in the "Hardware configuration" view using the buttons **Start** or **Stop** when the project is in "online" mode.



More information can be found in the instruction "Rexroth IndraControl SafeLogic compact Designer Software" (see [chapter 1.4 "SafeLogic compact operating instructions and assembly instructions" on page 6](#)).

4.3.4 Verifying a configuration

After the configuration has been transmitted successfully, the SafeLogic compact system can be verified. Therefore, the transmitted configuration data is loaded to the SafeLogic compact system and is compared to the project data. If the data correspond to each other, the data is displayed in a report. Once the user confirms the correctness of data, the system is verified.

1. Click on the **Receiving and comparing the configuration** button in the "Hardware configuration" view. A report of the current configuration will be generated.
2. Click on **Yes** under "Mark device as verified?" if the displayed configuration is the expected configuration. The system is then considered to be verified.



You have to be logged in as Authorized customer to be able to mark a configuration as "verified".

3. If the verification has been completed successfully, a report "Read in and Compare" is generated. It includes essential project information. You can print out or store this report.
4. The status "Verified" or "Not Verified" is displayed in the lower right corner of the SafeLogic Designer and is indicated by a flashing LED LED "CV" at the SafeLogic compact main module.
5. Only if the device and the configuration have been marked as verified, the "Auto start mode" is active in the configuration of the main module. If the configuration is not marked as verified, the system remains in the state "Stop" (LED "CV" at SLC-3-CPUx module is flashing) and has to be started using the SafeLogic Designer.
6. If differences are detected between project data and the loaded configuration data, a message including the information on possible actions is displayed. The configuration can then not be verified. Please comply with the error message information on other actions. Terminate the dialog box by clicking **Close**.
7. When changing a verified configuration, the status is reset to "Not verified"

Mounting and basic configuration

Exception: If you make only non safety-related changes such as modifying the gateway name, the gateway's IP address or the port number for a TCP/IP socket connection, the configuration status remains "verified".



More information can be found in the instruction "Rexroth IndraControl SafeLogic compact Designer Software" (see [chapter 1.4 "SafeLogic compact operating instructions and assembly instructions"](#) on page 6).

4.3.5 Loading a configuration

In "online" mode, a configuration can be read in by the connected SafeLogic compact system:

1. Click on **Read in**. The current configuration of the SafeLogic compact system is loaded to the SafeLogic Designer and can be edited after changing to the "offline" mode.

5 EtherNet gateway

This chapter describes the Ethernet-based Profinet IO diagnostic gateway (SLC-0-GPNT).

5.1 Common features of the EtherNet gateway

5.1.1 TCP/IP Configuration Interface

The SafeLogic EtherNet gateways offer a TCP/IP configuration interface. This allows the configuration of the SafeLogic compact system over EtherNet TCP/IP. The configuration interface runs parallel to the EtherNet TCP/IP or other EtherNet protocols.

WARNING

Do not connect to the SafeLogic compact system via the RS232 and the EtherNet interface at the same time!

The SafeLogic compact system can only communicate with one instance of the SafeLogic Designer. Connecting to the SafeLogic system using multiple instances of the Designer, either on a single PC or multiple PCs, may result in inconsistencies of the configuration and the diagnostics as well as in operational errors. This applies to both RS232 and EtherNet connections equally.

WARNING

Consider the signal delay for remote TCP/IP connections!

Remote TCP/IP connections to the gateway may be unstable if the signal delay is too large.

- Check the signal delay to the gateway using the ping command. Signal delays > 300 ms may cause the connection to break down

Possible solutions:

- Make sure that the connection is fast enough or make another route if this is possible

Or:

- Use a software tool like "TeamViewer" or "PC anywhere" to control a local computer on which the SafeLogic Designer software is installed and connected with the SafeLogic system

Or:

- Contact Bosch Rexroth Support

In order to configure a gateway for TCP/IP configuration for the first time, perform the following steps:

Step 1 Assign an IP Address

1. Connect a PC or notebook to the RS232 interface of the SLC-3-CPUx.
2. Power up the SafeLogic compact system.
3. Open the "SafeLogic Designer" configuration tool installed on the PC and upload the hardware configuration including the gateway.
4. If your project is in "online" mode, click on the **Disconnect** button to switch to "offline" mode.

EtherNet gateway

- Click on the **GPNT Gateway** button over the main window and select the desired gateway or double click on the desired gateway in the hardware configuration view. The gateway configuration view opens.
- Click on the **Gateway configuration** button in the left menu. The following dialog is displayed:

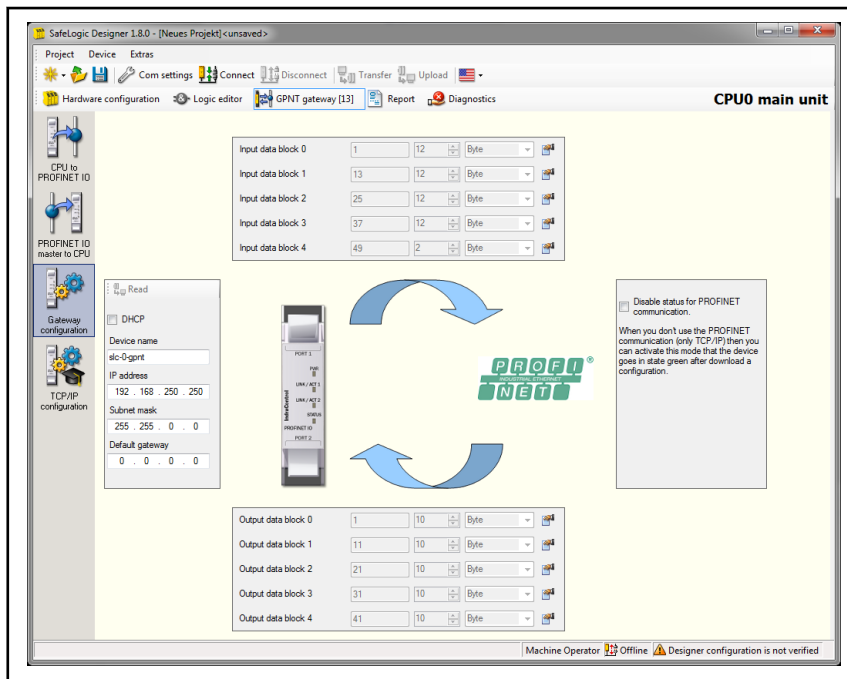


Fig. 5-1: Configuration dialog window for the Profinet IO gateway

On the left side of the dialog you will find the area for the gateway's IP configuration.

- If desired, enter a device name for the gateway.
- Enter a valid IP address for the gateway, and if required a valid Subnet mask and a valid IP address for a Default gateway.

Or:

If your network uses a DHCP server, activate the "DHCP" checkbox

- Click Connect to go "online" and download the configuration to the SafeLogic compact system



- If your project is online, you can use the **Read** IP address button at the upper left corner of the gateway IP configuration area to retrieve the current IP settings of the gateway
- The out-of-the-box default IP address of the gateway is 192.168.250.250. You can find the default IP address also on the type label of the gateway

Step2: Add a TCP/IP Profile to your Project

- Connect one of the two EtherNet ports of the gateway with your EtherNet network using a shielded EtherNet cable.
- Connect a PC (or notebook) to the same EtherNet network. Ensure the IP address settings of the gateway and the PC match the network setup.

EtherNet gateway



You can also connect your PC directly to one of the two EtherNet ports of the gateway. In this case, you can either adapt the IP address settings of your PC or the IP address settings of the gateway to match the other device's IP setup.

3. Open the SafeLogic Designer configuration tool installed on the PC and upload the hardware configuration including the gateway.
4. If your project is in "online" mode, click on the **Disconnect** button to switch to "offline" mode.
5. Click on **Com Settings**. The following dialog is displayed:

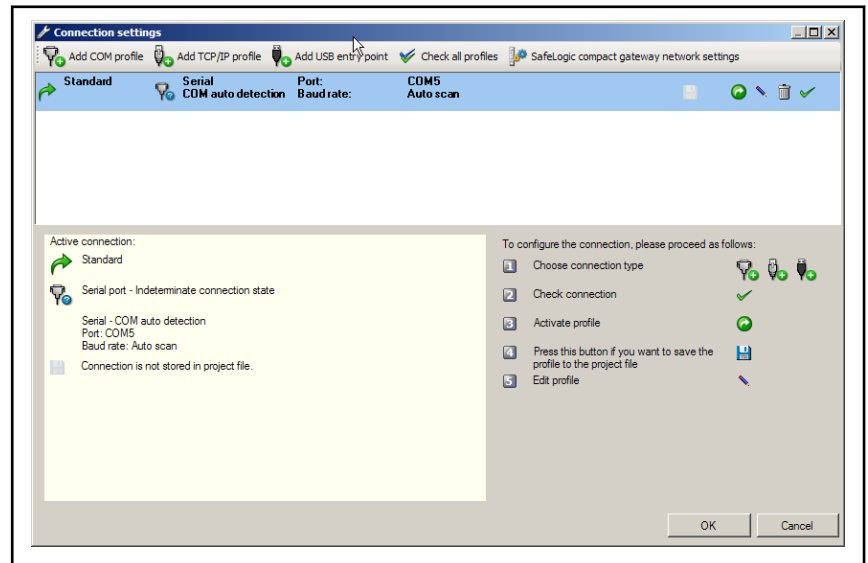


Fig. 5-2: Dialog window "Connection settings"

6. Click on Add **TCP/IP profile**. The following dialog is displayed:

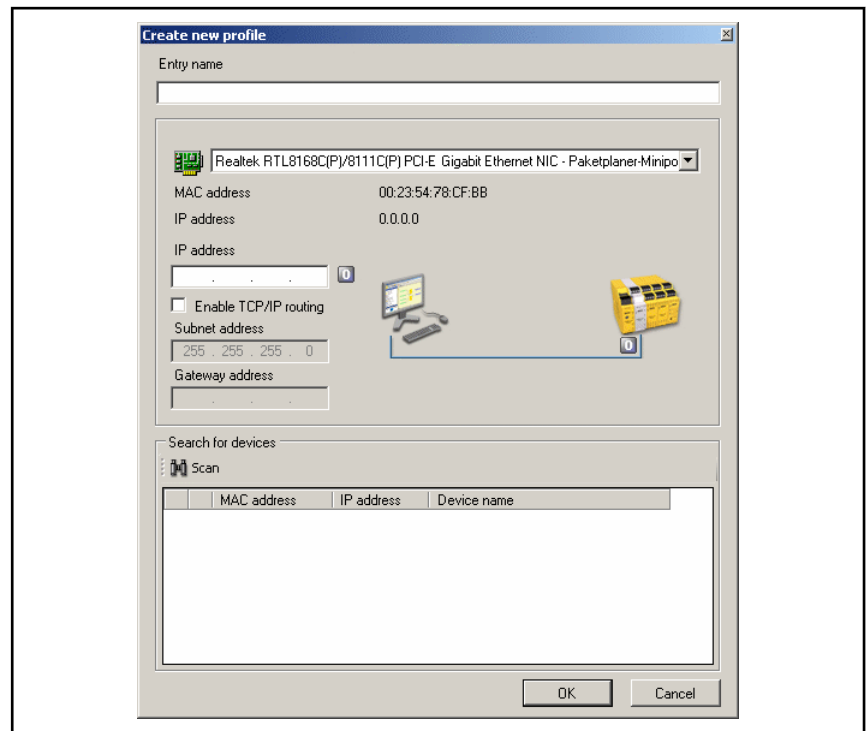


Fig. 5-3: Create new TCP/IP profile dialog

EtherNet gateway

7. Click on **Scan** to search for diagnostic gateways on your EtherNet network. Gateways located will be displayed as shown in the dialog below. The IP address will be displayed as well as their MAC address and device name.

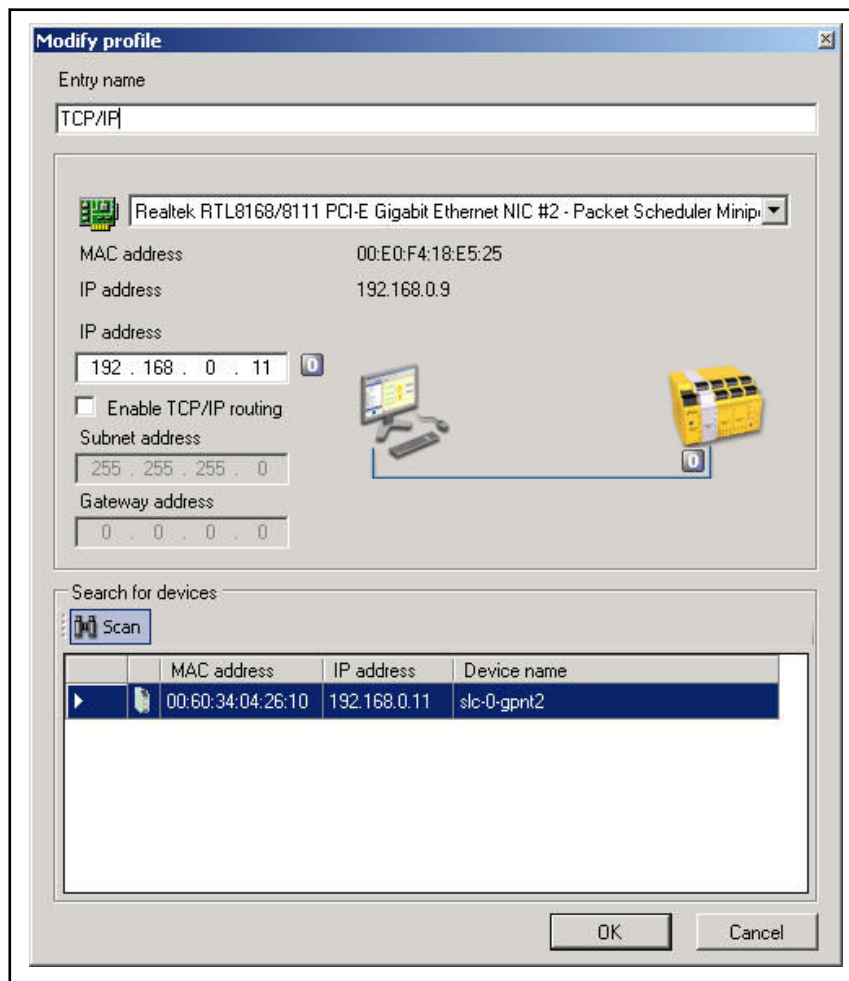


Fig. 5-4: "Create new profile" after a scan has been performed dialog

8. Select the gateway that you want to use for the new profile
9. Enter a name for the profile to the Entry name edit field "Access name"
10. Click **OK**. The profile has now been created and is shown in the connection dialog:

EtherNet gateway

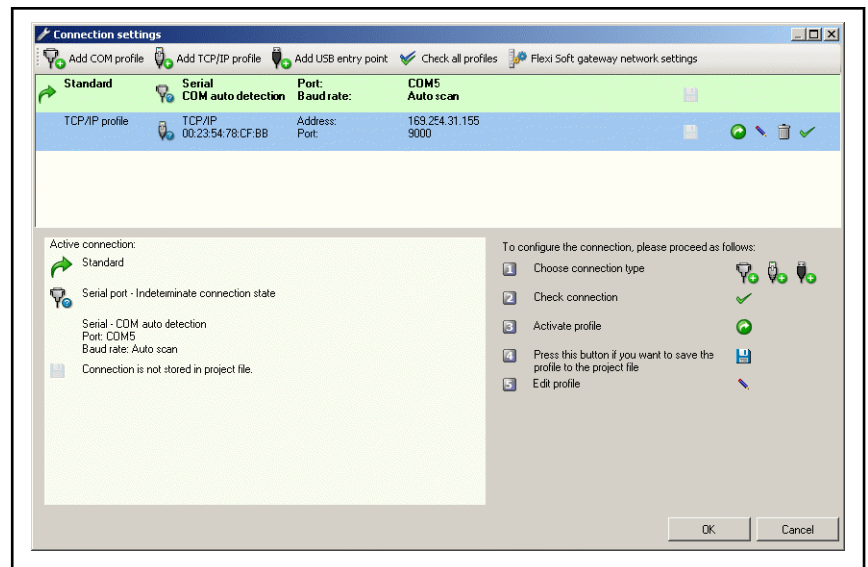


Fig. 5-5: "Connection settings" with new TCP/IP access dialog

In order to use this access, it needs to be activated.

11. Click on the "Activate profile" icon (white arrow in green circle) on the far right. The profile will then be activated and marked as such:

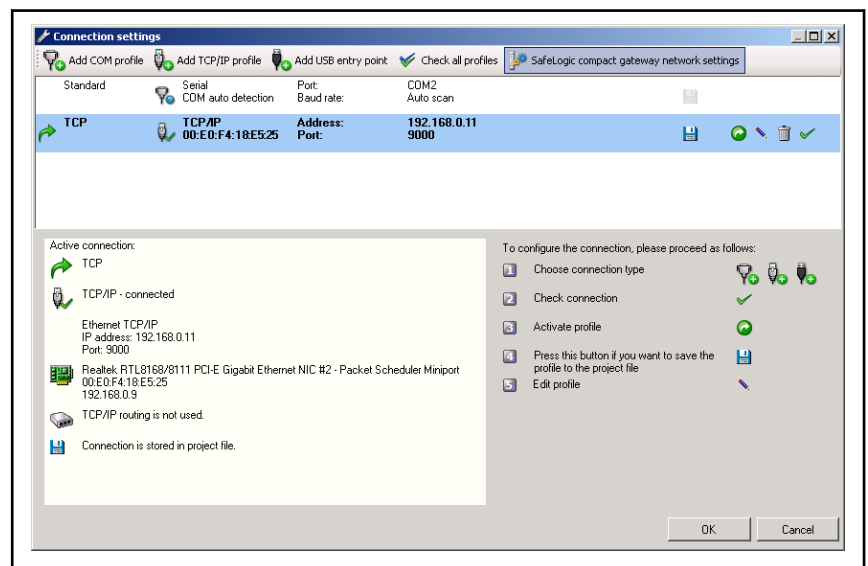


Fig. 5-6: "Connection settings" with new TCP/IP access dialog

12. Click **OK**. All communication to the SafeLogic compact system will now happen via TCP/IP. For access via the serial interface again, it has to be reactivated.



The port number for the TCP/IP configuration interface is pre-set to port 9000 and cannot be changed.

Step 3: Connect via TCP/IP

1. Click on **Connect** to change to "Online" mode.
2. How to change the network settings of a diagnostic gateway:
 Click on the **SafeLogic compact Gateway Network Settings** button. The "Network Scan" dialog is opened.

EtherNet gateway

- Click on **Scan**. Your network is scanned for connected gateways and the devices found are displayed in the list.

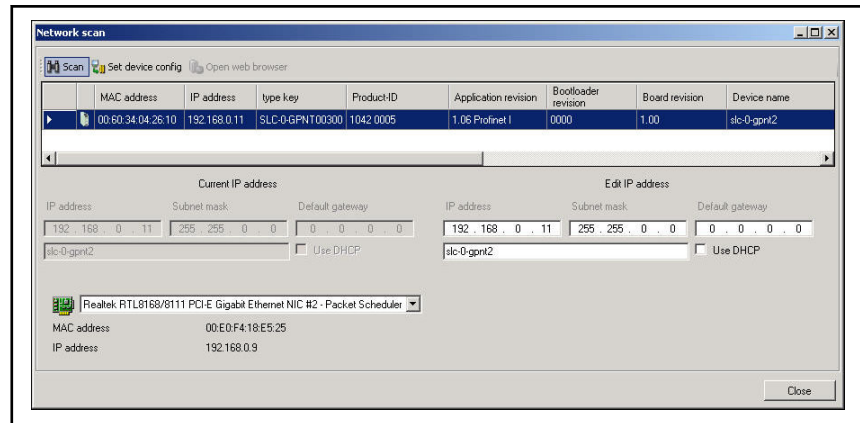


Fig. 5-7: Found gateways in the "Network scan" dialog

- Click on the gateway you want to edit.
- Enter the new settings in the Edit "IP address" area.
- Click on the **Set Device Configuration** button to transfer the new settings to the device.

5.1.2 EtherNet TCP/IP-Socket Interface

Each SafeLogic EtherNet gateway supports a total number of four TCP/IP socket interfaces. This allows up to four different applications to communicate with the gateway at the same time over EtherNet TCP/IP. The network interface of the respective gateway (e.g. Profinet IO) is operating simultaneously. Neither the configuration nor the operation influence the TCP/IP-Socket configuration. It is executed in separate windows of the SafeLogic Designer.

⚠ WARNING

Do not use the same output data set number for two different PLC connections or TCP/IP sockets!

The output data set can be written to the EtherNet gateways in parallel by all communication interfaces or TCP/IP sockets, if they use the same output data set number. In that case, the last message overwrites data received earlier.

The gateway processes the data of a SafeLogic compact system and makes it available in different compilations, the data sets. These data sets are available over the TCP/IP interface. For a detailed description of the data sets, refer to [chapter 3.3 "Data transmitted into the network \(network input data sets\)" on page 14](#).

In order to configure the EtherNet TCP/IP socket interface, perform the following steps:

- Open the SafeLogic Designer and load the hardware configuration including the gateway
- Click on the **GPNT Gateway** button over the main window and select the respective gateway or double click the desired gateway in the hardware configuration view to open the gateway configuration dialog

EtherNet gateway

- Click on **TCP/IP configuration** on the left hand menu. The following dialog is displayed:

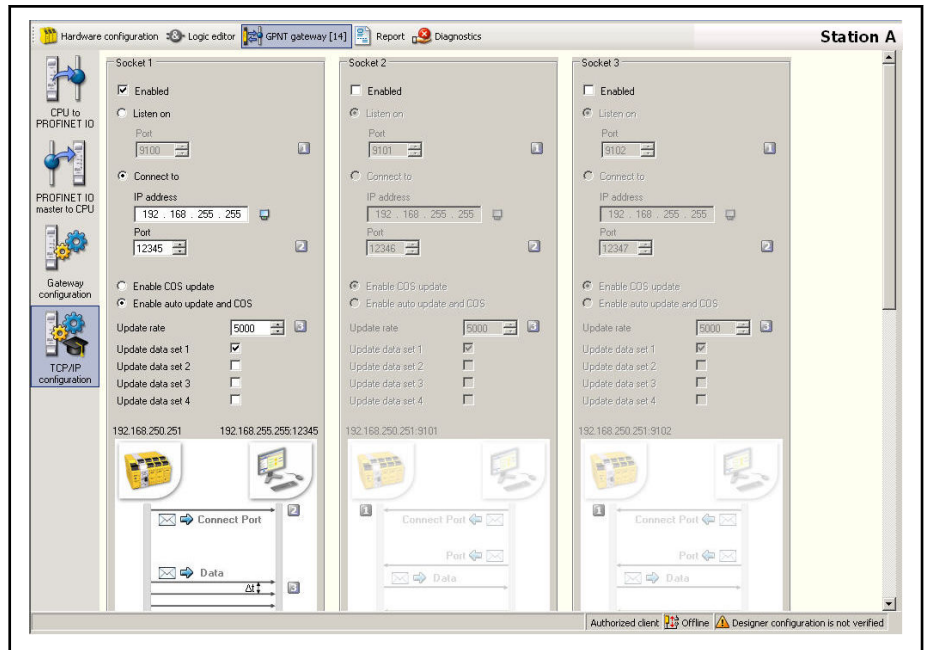


Fig. 5-8: "TCP/IP configuration dialog"

Configuration of the TCP/IP Interface – Who Establishes the Connection

If the diagnostic gateway is to connect to the external application, perform the following configuration steps:

1. Activate the "Connect" to radio button.
2. Set IP address to the "IP address" of the computer the application is running on.
3. Enter the Port number for the application.



The configuration is considered faulty if either the connect socket port or the connect IP address is zero when in "Connect" mode.

If the external application is to connect to the diagnostic gateway, perform the following configuration steps:

1. Activate the "Listen on" radio button.
2. Enter the Port number for the application.



- Suggested port numbers are 9100 to 9103 (default values)
- Port 0 and port 9000 are reserved and can not be used (faulty configuration)
- Port numbers 0 to 1023 are managed by the Internet Assigned Numbers Authority (IANA) and should not be used to prevent collisions. See www.iana.org/

3. Finally, determine how the data is transferred. Follow the steps outlined in the following section.

EtherNet gateway

Data Transfer Method – How the Data is Transferred

Whenever the TCP/IP socket connection has been established (either by an application on a PC or by the gateway itself), there are two possible methods how the data sets can be transferred:

1. the application requests the data sets per command message ("Polling" mode)
or
2. the gateway auto-updates the data sets as per configuration (gateway writes to Address/Port ("Auto Update") mode)

In "Auto Update" mode there are two update modes how the gateways update the data:

1. "COS update" (Change of State): when any data of the input data set change status
2. Heartbeat interval: Data will be send automatically according to the configured heartbeat rate in ms



If the heartbeat interval is enabled, a change of state ("COS") will trigger an immediate update of the data as well, regardless of the set heartbeat rate. i.e. "COS" is always active.

For both methods the following structure of messages applies.

General Message Structure

The request/response message (e.g. telegram) is structured as shown below:

0 1 n

Co	Parameters	Data
mm	(content depends on type of command)	
and		

Tab. 5-1: Structure of the messages

EtherNet gateway

Parameters	Length	Description
Command	WORD	0hex = Undefined (no command)
Polling mode-specific		
00F1hex = Input data set(s) request message		
001Fhex = Input data set(s) response message		
Auto-update specific		
00E1hex = Auto update control		
001Ehex = Auto update control response		
002Ehex = Auto update data set(s) message		
Digital outputs read/write		
00F2hex = Write output data set settings		
002Fhex = Response to write output data set settings		
Parameters	Length determined by command	As defined in specific command
Data	Length determined by command	As defined in specific command

Tab. 5-2: Message structure

Error Response to Invalid Messages

The gateway will set the most significant bit of the command word in the event that an invalid or improperly formatted message is received.

Parameters	Length	Description
Command	WORD	Bit 15 of received command will be set (i.e. command of 00F2hex would become 80F2hex)
Following data	Length determined by command	Unchanged. Returned as it was received

Tab. 5-3: Error response

Application Requests (Polling) Mode

In this mode the gateway will only send any data upon request (e.g. Polling). Therefore, the application shall send request telegrams as per definition below and the gateway will respond with telegrams structured as per definition below.



In order to prevent that the connection will be closed automatically, the application must request data at least every 30 s when "Polling" mode is active.

EtherNet gateway

Polling mode configuration in SafeLogic Designer

In order to configure the Application requests (Polling) mode of the gateway via the SafeLogic Designer tool, perform the following steps:

1. Open the SafeLogic Designer and load the hardware configuration including the gateway.
2. Click on the **Interfaces** button over the main window and select the respective gateway or double click the desired gateway in the hardware configuration view to open the gateway configuration dialog.
3. Click on **TCP/IP configuration** on the left hand menu. The following dialog is displayed:

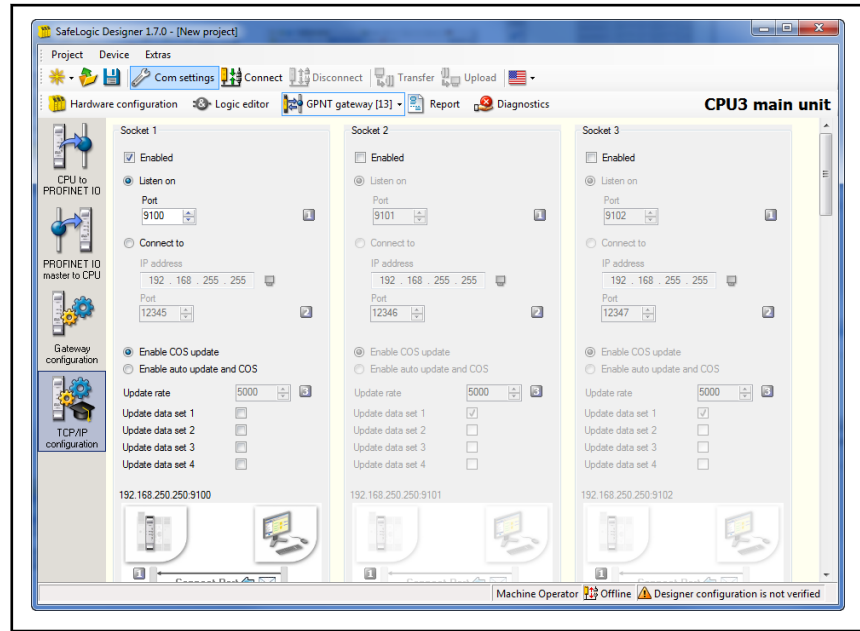


Fig. 5-9: Polling mode configuration

4. Activate the "Listen on" radio button.
5. Enter the "Port" number to which the application will connect.
6. For Polling mode, select the "Activate COS update" update mode.
7. Disable all "Update data set n" checkboxes.

Requesting Input Data Sets

The request message is sent by an application to the gateway. The request message telegram shall be structured as shown below:

Parameters	Length	Value
Command	WORD	00F1hex = Input data set(s) request message
Request data set 1	WORD	0 = Do not send data set 1 1 = Do not send data set 1
Request data set 2	WORD	0 = Do not send data set 2 1 = Send data set 2

EtherNet gateway

Parameters	Length	Value
Request data set 3	WORD	0 = Do not send data set 3 1 = Send data set 3
Request data set 4	WORD	0 = Do not send data set 4 1 = Send data set 4

Tab. 5-4: Data set(s) request message

The response message is returned to the application by the gateway. The response message telegram is structured as shown below:

Parameters	Length	Value
Command	WORD	00F1hex = Input data set(s) request message
Data set 1 length	WORD	0 = Data set not returned in data set(s) data field Not zero = Data set length
Data set 2 length	WORD	0 = Data set not returned in data set(s) data field Not zero = Data set length
Data set 3 length	WORD	0 = Data set not returned in data set(s) data field Not zero = Data set length
Data set 4 length	WORD	0 = Data set not returned in data set(s) data field Not zero = Data set length
Data set data	Array of bytes	Data set information

Tab. 5-5: Response to data set request

Write Output Data Sets

The following command message is sent by the application to the gateway to write to the output data sets:

Parameters	Length	Value
Command	WORD	00F2hex = Set output data set(s) command
Output data set 1 length	WORD	0 = Output data set not included in data set(s) data field Not zero = Data set length
Length, output data set 2	WORD	0 = Output data set not included in data set(s) data field Not zero = Data set length
Length, output data set 3	WORD	0 = Output data set not included in data set(s) data field Not zero = Data set length
Length, output data set 4	WORD	0 = Output data set not included in data set(s) data field Not zero = Data set length

EtherNet gateway

Parameters	Length	Value
Length, output data set 5	WORD	0 = Output data set not included in data set(s) data field Not zero = Data set length
Data set data	Array of bytes	Data set information

Tab. 5-6: Set output data set(s) command message

The response message is returned to the application by the gateway. The response message telegram is structured as shown below:

Parameters	Length	Value
Command	WORD	002Fhex = Response to write output data set settings message
Status	WORD	0 = Success - Output data sets written correctly 1 = Error - Cannot write output data sets due to either: • Interruption of backplane communication • Incorrect routing information

Tab. 5-7: Response to write output data sets

Auto Update mode (Gateway writes to Address/Port)

The gateway can be configured to automatically update the data set information (i.e. the application does not need to send any request messages as it would do in "Polling" mode) once the connection to the application has been made.

The configuration settings are available via the SafeLogic Designer configuration tool or via the TCP/IP interface itself. Using one interface does not disable the other: The "Auto Update" mode could be enabled via SafeLogic Designer and disabled via TCP/IP command, for example.

Configuration via the TCP/IP Interface

This command message is sent by an application to the gateway to configure the "Auto Update" mode. This message can be used to either disable or enable the "Auto Update" mode directly through the TCP/IP interface.

Parameters	Length	Value
Command	WORD	00E1hex = Auto update control
Request data set 1	WORD	0 = Do not send data set 1 1 = Do not send data set 1
Request data set 2	WORD	0 = Do not send data set 2 1 = Send data set 2
Request data set 3	WORD	0 = Do not send data set 3 1 = Send data set 3

EtherNet gateway

Parameters	Length	Value
Request data set 4	WORD	0 = Do not send data set 4 1 = Send data set 4
Heartbeat mode update rate	WORD	0 = Disable heartbeat messages Non-zero = Enable heartbeat message at a specified rate in ms Minimum = 40 ms

Tab. 5-8: Command to configure the "Auto Update" mode



"Auto update" is disabled if all Request Input Data Set flags are set to zero.

The response message returned to the application by the gateway:

Parameters	Length	Value
Command	WORD	001Ehex = Response to the "Auto Update" control message

Tab. 5-9: Response to the configuration of the "Auto Update" mode

Configuration using the SafeLogic Designer

For configuration of the "Auto Update" mode (gateway writes to address/port) of the gateway by means of SafeLogic Designer, proceed as follows:

1. Open the SafeLogic Designer and load the hardware configuration including the gateway.
2. Click on the **GPNT Gateway** button over the main window and select the respective gateway or double click the desired gateway to open the gateway configuration dialog.
3. Click on **TCP/IP configuration** on the left hand menu. The following dialog is displayed:

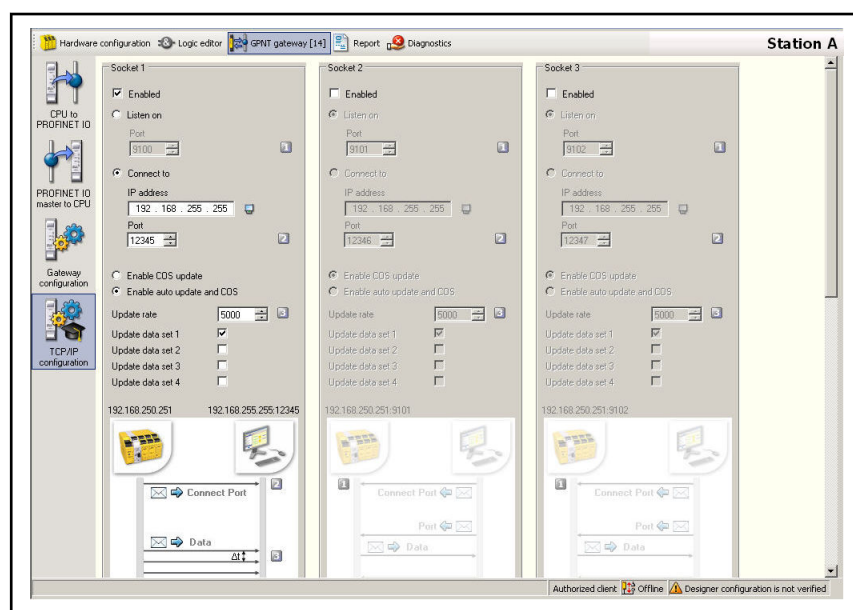


Fig. 5-10: TCP/IP configuration for "auto-update"

4. Activate the "Connect" to radio button.
5. Enter the IP address and the port number the gateway shall write to.

EtherNet gateway

6. Select the "Update" mode: "Enable COS update" or "Enable auto update and COS".
7. If you have selected "Enable auto update and COS", select the Update rate in ms.
8. Select which data sets shall be updated: Check the "Update data set n " checkbox

Normal Operation

The following message is sent from the gateway to the application while the gateway is operated in "Auto Update" mode.

Parameters	Length	Value
Command	WORD	002Ehex = Auto update data set(s) message
Data set 1 length	WORD	0 = Data set not returned in data set(s) data field Not zero = Data set length
Data set 2 length	WORD	0 = Data set not returned in data set(s) data field Not zero = Data set length
Data set 3 length	WORD	0 = Data set not returned in data set(s) data field Not zero = Data set length
Data set 4 length	WORD	0 = Data set not returned in data set(s) data field Not zero = Data set length
Data set data	Array of bytes (length dependent on set definition)	Data set information. For details, refer to chapter 3.3 "Data transmitted into the network (network input data sets)" on page 14 and chapter 7 "Layout and content of the process mapping " on page 91

Tab. 5-10: Message in normal operation of "Auto Update" mode

5.1.3 TCP/IP Process Image Example

The following example shows a possible process image sent by a SLC-0-GPNT gateway via TCP/IP in "Auto Update" mode:

Byte values (hex)	Part of message	Meaning
00 2E	Command	"Auto update" data sets (see tab. 5-10 "Message in normal operation of Auto Update mode" on page 48)
00 32	Command parameters	Length of data set 1: 50 bytes
00 20		Length of data set 2: 32 bytes
00 3C		Length of data set 3: 60 bytes
00 3C		Length of data set 4: 60 bytes

EtherNet gateway

Byte values (hex)	Part of message	Meaning
03 FF 03 03	Data set 1 (default byte assignments, see tab. 3-4 "Overview of the input data sets 1–3 (basic gateway setting)" on page 16)	Logic results 1–4
C0		Input values module 1: C0 = 11000000 = Inputs I8 and I7 "Active"
03		Input values module 2: 03 = 00000011 = Inputs I2 and I1 "Active"
3F 05		Input values module 3–12
05 05 00 00		Output values module 1–12
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		Not assigned
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00		
52 A1 10 4C	Data set 2 (see tab. 3-4 "Overview of the input data sets 1–3 (basic gateway setting)" on page 16)	Overall CRC (same as system CRC)
52 A1 10 4C		System CRC
00 00 00 00		Reserved
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		

EtherNet gateway

Byte values (hex)	Part of message	Meaning
FF FF FF FF	Data set 3	Status module 0 (SLC-3-CPUx): OK
FF FF FF FF	(see tab. 3-4 "Overview of the input data sets 1–3 (basic gateway setting)" on page 16 and tab. 3-7 "Meaning of module status bits for SLC-3-XTDI, SLC-3-XTIO, SLC-3-CPUx and diagnostic gateways" on page 21)	Status Module 1 (e.g. SLC-3-XTDI): OK
FD FB FF FF		Status Module 2 (e.g. SLC-3-XTIO):
		Byte 0: FF = 11111111: No error
		Byte 1: FF = 11111111: No error
		Byte 2: FF = 11111011: Error of the external test signal at input 3
		Byte 3: FD = 11111101: Error: Short circuit after Low at output 1
FF FF FF FF	Data set 3 data is transferred in Big Endian format, i.e. in 32-bit double word format with the most significant byte placed at the very left	Status modules 3–6: OK
FF FF FF FF		
FF FF FF FF		
FF FF FF FF		
FF FF FF FF		Status modules 7–12 (no modules present)
FF FF FF FF		
FF FF FF FF		
FF FF FF FF		
FF FF FF FF		
FF FF FF FF		
FF FF FF FF		Status Module 13 (e.g. SLC-0-GPNT): OK
FF FF FF FF		Status module 14 (no module present)
00 00 00 00	Data set 4	Reserved
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		
00 00 00 00		

Tab. 5-11: TCP/IP process image example

5.1.4 TCP/IP Socket Monitor

The TCP/IP socket monitor allows you to view the input data sets that a gateway transfers into the network via TCP/IP, issue commands to the gateway and to write data to the gateway's output data sets.

The TCP/IP socket monitor is a separate program that is installed with the SafeLogic Designer. You will find the TCP/IP socket monitor in the Windows Start menu under "Programs/Rexroth/SafeLogic compact/Tools/TCP/IP Socket Monitor".

In order to connect to the gateway via the socket monitor, at least one TCP/IP socket must be enabled on the gateway (see section [chapter 5.1.2 "EtherNet TCP/IP-Socket Interface" on page 40](#)).

How to Use the TCP/IP Socket Monitor

1. Power up the SafeLogic compact system.
2. Connect one of the two EtherNet ports of the gateway with your EtherNet network using a shielded EtherNet cable.
3. Connect a PC (or notebook) to the same EtherNet network. Ensure the IP address settings of the gateway and the PC match the network setup.



You can also connect your PC directly to one of the two EtherNet ports of the gateway. In this case, you can either adapt the IP address settings of your PC or the IP address settings of the gateway to match the other device's IP setup.

4. Open the TCP/IP socket monitor. The following window opens:

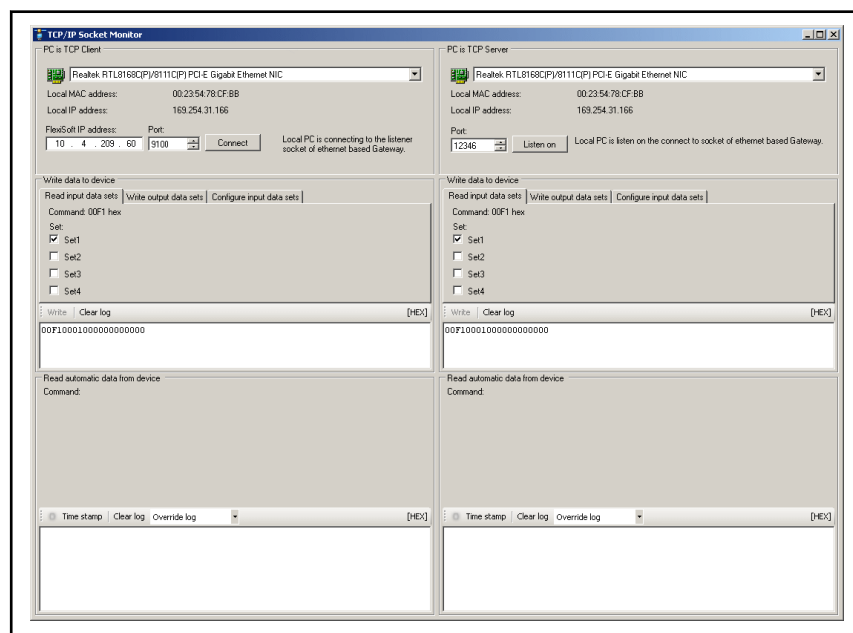


Fig. 5-11: TCP/IP socket monitor

The TCP/IP socket monitor can connect to the gateway either as TCP client or as TCP server, depending on the socket configuration of the gateway.

PC as TCP Client

If at least one socket is enabled and if the gateway is configured to "Listen" on this socket, the PC can connect to the gateway as client.

In a dropdown list in the "PC is TCP Client" area, all available network adapters are displayed:

EtherNet gateway

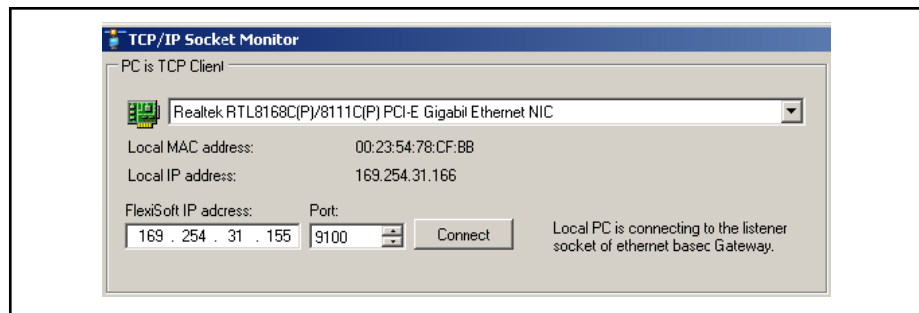


Fig. 5-12: "PC is TCP client" area – gateway is configured to "Listen"

1. Select the network adapter that is connected to the gateway. The MAC address and the IP address of the selected network adapter are displayed beneath the dropdown list.
2. Enter the IP address of the gateway and the port number of the enabled socket.
3. Click on **Connect** to establish the communication to the gateway.

PC as TCP Client

If at least one socket is enabled and if the gateway is configured to "Connect" on this socket, the PC can connect to the gateway as server.

In a dropdown list in the "PC is TCP Server" area, all available network adapters are displayed:

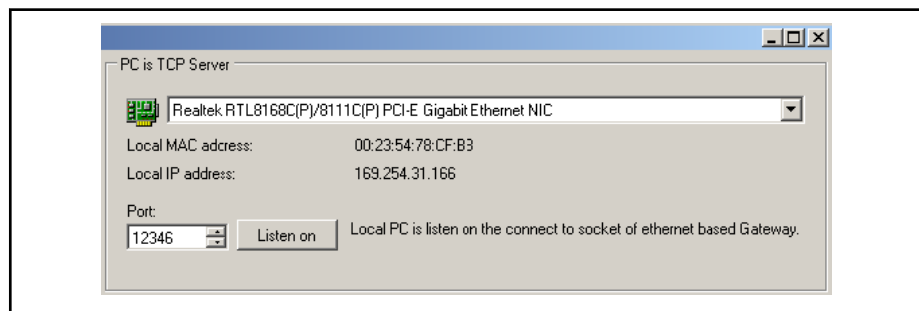


Fig. 5-13: "PC is TCP Server" area – gateway is configured to "Connect"

1. Select the network adapter that is connected to the gateway. The MAC address and the IP address of the selected network adapter are displayed beneath the dropdown list.



The gateway socket must be configured to connect to the local IP address of the PC.

2. Enter the **Port** number on which the enabled socket is configured to connect.
3. Click on **Listen on** to establish the communication to the gateway.

Once the connection to the gateway is established, the further proceedings are alike, no matter whether the PC is connected as client or as server. It is possible to establish a client and a server connection at the same time, if the gateway socket configuration allows this.

Write Data to Device – How to Actuate the Gateway

The "Write data to device" area consists of three tabs which are used to assemble different commands that can be sent to the gateway. The commands are assembled automatically as you activate or deactivate the different options on the tabs and are displayed in the log window. A click on the **Write** button sends the displayed command to the gateway. The **Clear log**

button deletes the displayed command from the log window. It is also possible to edit the command in the log window manually.

Under the "Read input data sets" tab you can request "input data sets from the gateway" using the 00F1hex command (see [tab. 5-4 "Data set\(s\) request message" on page 44](#)).

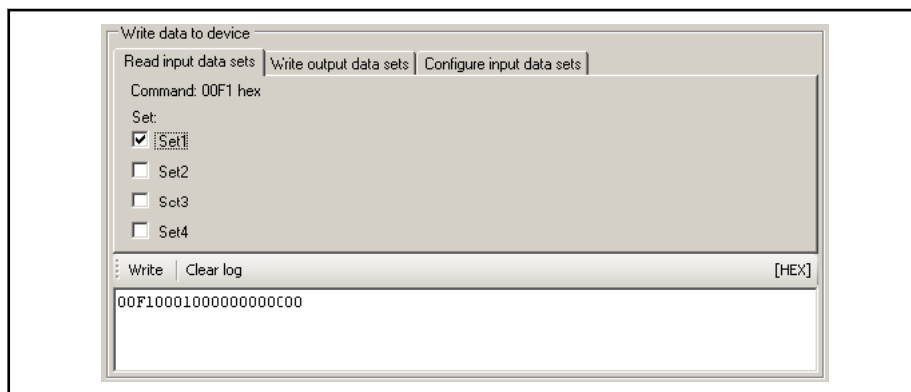


Fig. 5-14: "Write data to device" – Read input data sets

1. Activate all data sets that you want to receive. The command that will be sent is shown in the log window.
2. Click on **Write** to send the command to the gateway. The gateway will respond with a 00F1hex response message (see [tab. 5-5 "Response to data set request" on page 45](#)) that will be shown in the "Read automatic data from device" area below.



If the gateway is configured to send data sets on this socket cyclically or on change of state ("COS" – Change of state), the gateway's response may be overwritten very soon by the next message from the gateway. In this case you should modify the configuration under the "Configure input data sets" tab (see below).

Under the "Write output data sets" tab you can write data to the gateway's output data sets using the 00F2hex command (see [tab. 5-6 "Set output data set\(s\) command message" on page 45](#)).

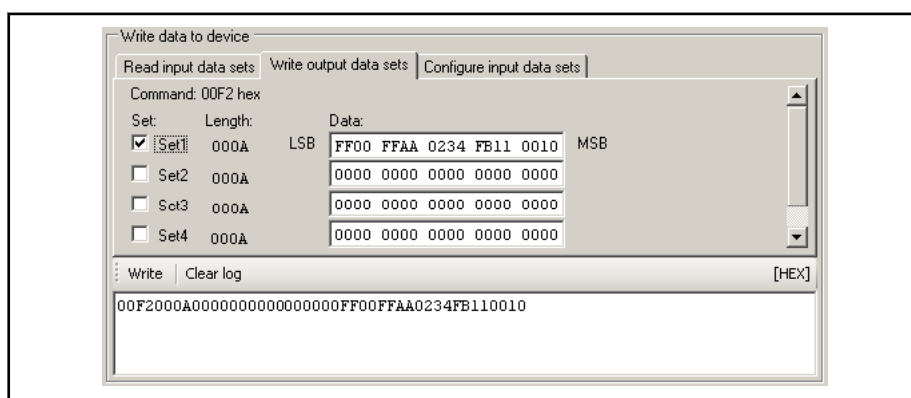


Fig. 5-15: "Write data to device" – Write output data sets

1. Activate all data sets that you want to send and edit the data in the input field for the respective data set. The command that will be sent is shown in the log window.
2. Click on **Write** to send the command to the gateway. The gateway will respond with a 00F2hex response message to indicate whether the

EtherNet gateway

output data sets have been written correctly or if an error has occurred (see [tab. 5-7 "Response to write output data sets" on page 46](#)). The result will be shown in the "Read automatic data from device" area below.

Under the "Configure input data sets" file card you can configure the gateway to send input data sets either on change of state ("COS") or cyclically ("auto update") using the 00E1 hex command (see [tab. 5-8 "Command to configure the Auto Update mode" on page 46](#)).

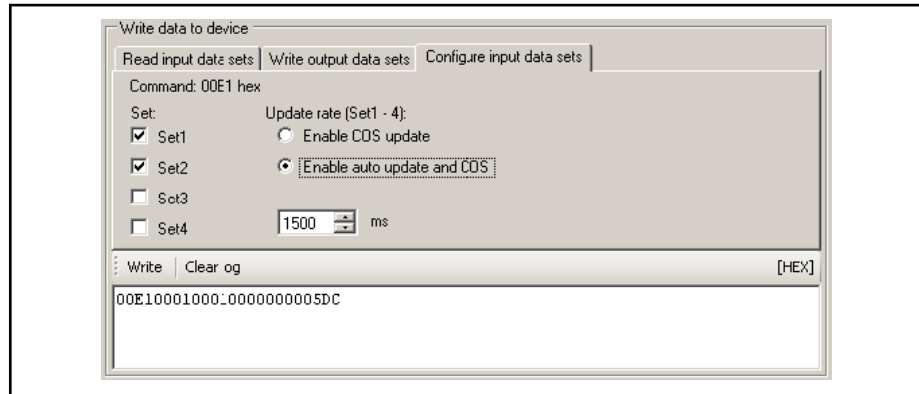


Fig. 5-16: "Write data to device" – Configure input data sets

1. Activate all data sets to receive, choose the "Update" mode (i.e. either COS or "Auto Update" and "COS") and enter the Update rate (40 to 65535 ms), if "Auto Update" is desired. The command that will be sent is shown in the log window.
2. Click on **Write** to send the command to the gateway. The gateway will respond with a 00E1hex response message (see [tab. 5-9 "Response to the configuration of the Auto Update mode" on page 47](#)) that will be shown in the "Read automatic data from device" area below.
3. Depending on the configuration, the gateway will follow up with 002Ehex messages, i.e. the gateway will send the activated data sets as on "COS" and cyclically as configured (see [tab. 5-10 "Message in normal operation of Auto Update mode" on page 48](#)).



- The initial behavior of the gateway when you open the socket monitor depends on the gateway's configuration for the respective socket in your project or on the last 00E1hex command the gateway has received and does not correspond necessarily with the settings displayed in the "Configure input data sets" tab
- The changes you make to the input data sets configuration here will not be stored in your project but will change the behavior of the gateway temporarily, i.e. until the gateway receives another 00E1hex command or until the SafeLogic compact system is restarted

Read Automatic Data from Device – Monitoring the Gateway's Messages

The "Read automatic data from device" area shows the messages sent by the gateway.

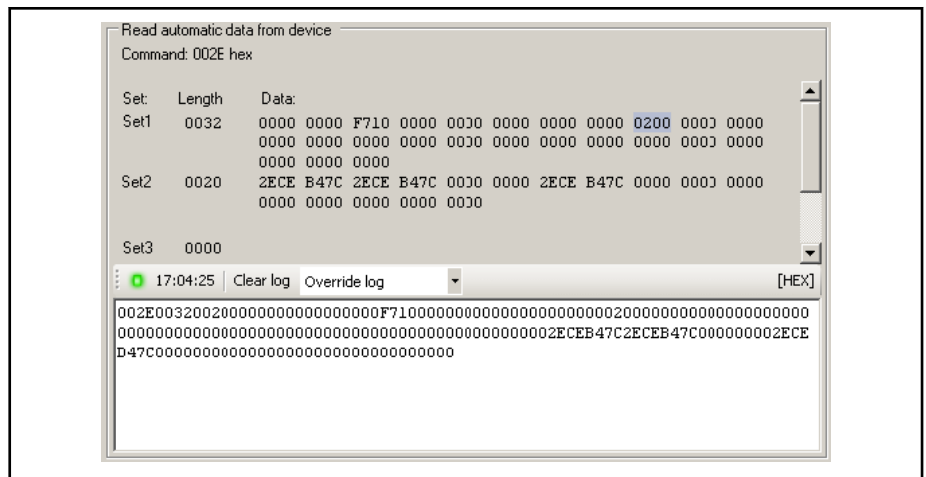


Fig. 5-17: "Read automatic data from device"

1. The last Command and the Data sets that have been sent by the gateway are displayed in the grey part of the area. The data are displayed in blocks of four bytes. Data blocks that have changed value since the last message has been received are highlighted blue.
2. The log window shows the complete command string the gateway has sent.
3. The communication indicator in the upper left corner of the log window title bar lights up green if currently data are received from the gateway.
4. The time stamp in the log window title bar indicates when the last command string has been received.
5. The **Clear log** button erases the log.
6. You can choose from the dropdown list whether the next received command string is to override the last one or if the command string shall be appended at the top of the log.

5.2 Profinet IO gateway

The diagnostic gateway SLC-0-GPNT can be used for Profinet IO.

The GDSML file and the device icon for integration into a PLC with Profinet supply can be found in the program directory of the SafeLogic Designer on your hard disk.

The default installation directory is "C:\Programs\Rexroth\SafeLogic compact \DeviceDescriptions\...".

SLC-0-GPNT supports:

- Profinet IO, Conformance Class A
- LLDP
- SNMP
- MIB II
- Fast integrated switching
- Auto-MDI
- Auto negotiation
- Cyclic I/O communication

5.2.1 Interfaces and Operation

The SLC-0-GPNT is equipped with an integrated 3-port switch for connection with the EtherNet network. Two RJ-45 sockets are available for the connection. The switch functionality allows the SLC-0-GPNT to be used for connection to another EtherNet component (e.g. connection to a notebook) without having to interrupt the EtherNet connection to the network.

EtherNet gateway

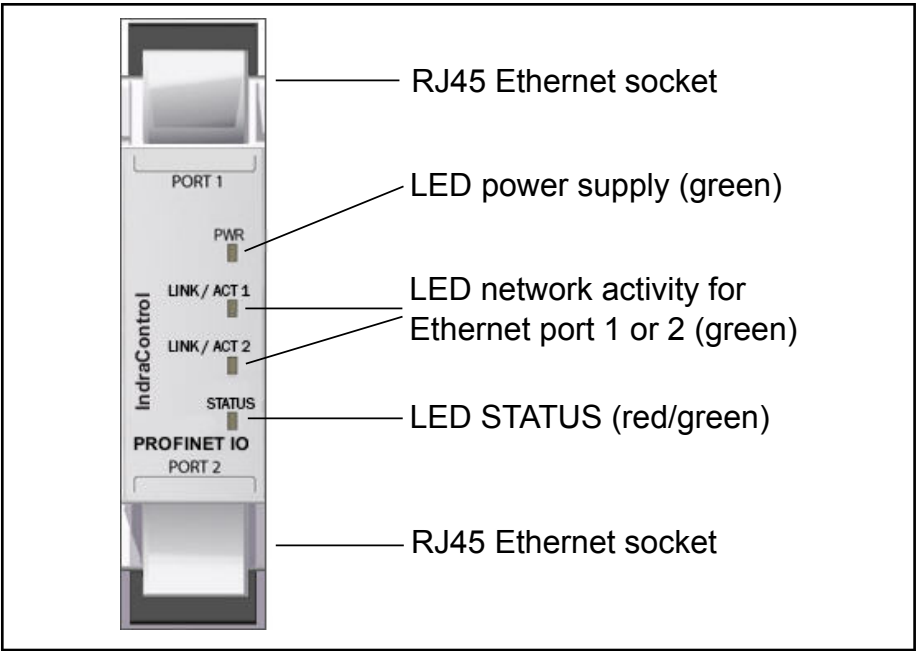


Fig. 5-18: SLC-0-GPNT interfaces and elements

LED		Meaning
PWR	○	No power supply
	● Green	Power supply switched on
LINK/ACT 1 LINK/ACT 2	○	No Ethernet connection
	● Green	Ethernet connection is active, no data transfer
	⬮● Green	EtherNet connection active, data transmission
STATUS	○	Power-up
	● Green	Executing (live process data from/to CPU)
	⬮● Green	1 Hz: Stop 2 Hz: Profinet master requested LED flashing for physical device identification
	⬮● Red	1 Hz: Configuring/configuration required 2 Hz: Critical fault on gateway
	● Red	Critical fault on another module
	⬮● Red/green	Executing, but EtherNet communication not established or faulty

Tab. 5-12: LED display description of SLC-0-GPNT

Explanation of the symbols:

- signifies that the LED is off.
- signifies that the LED continuously flashes in red or green.
- ◐ signifies that the LED continuously blinks in red or green.



The error fixing is described in [chapter 5.2.7 "Diagnostics and Elimination of Errors" on page 70](#).

Power-up Sequence

On power up, the following LED test sequence is performed:

- LED STATUS ○ Off for 6 s
- LED STATUS ● Red for 0.25 s
- LED STATUS ● Green for 0.25 s
- LED STATUS ○ Off

5.2.2 Basic Configuration — Assigning a Device Name and IP Address

Configuration and diagnostic of the SLC-0-GPNT may be performed via the SafeLogic Designer tool as well as with the Profinet IO network programming tool.

Configuration via Profinet IO

In the out-of-the-box configuration, each Profinet IO field device, e.g. the SLC-0-GPNT has a MAC address and a symbolic name stored.



- The symbolic name for the gateway is SLC-0-GPNT
- This name is used by the I/O controller (i.e. PLC) to assign the IP address to the field device
- If the IP address is also used for other EtherNet communications like TCP/IP or configuration over EtherNet, remember that the PLC can change the IP address so these can be interrupted

Address assignment is performed in two steps:

1. Assign a unique plant specific name to the gateway by using either the network configuration tool, e.g. SafeLogic Designer.
2. Using the plant specific (unique) name, the I/O controller (i.e. PLC) can now assign the IP address to the gateway before system boot.



The SLC-0-GPNT MAC address is printed on the device type label (example: 00:06:77:02:00:A7).

Setting the Device Name via SafeLogic Designer

1. Open the SafeLogic Designer and load the hardware configuration including the Profinet IO gateway. Ensure your project is offline.
2. Click on the **GPNT Gateway** button over the main window and select the SLC-0-GPNT or double click the SLC-0-GPNT in the hardware configuration view to open the gateway configuration dialog.
3. Click on **Gateway configuration** in the left menu. The following dialog is displayed:

3. Enable the checkbox. As soon as the configuration is transmitted, the LED flashes permanently in "green" even if there is no active PROFINET IO communication.

5.2.3 Profinet Configuration of the Gateway – How the Data is Transferred

The following steps need to be taken in order to configure the communication between PLC and gateway.



This document does not cover the creation of the Profinet IO network or the rest of the automation system project in the network configuration tool. It is assumed the Profinet project has already been set up in the configuration program, e.g. Rexroth IndraWorks. Examples refer to configurations performed with Rexroth IndraWorks manager.

Step 1: Installing the Device Master File (GSDML File)

Before the SLC-0-GPNT can be used as device in the network configuration tool, e.g. Rexroth IndraWorks, for the first time, the generic station description (GSDML) of the gateway must be installed into the hardware catalogue of the tool.

1. The GSDML file can be found in the installation directory of the SafeLogic Designer in the "DeviceDescriptions" subfolder
2. Follow the instructions in the online help or in the user manual of the Profinet network configuration tool to install device files

When using Rexroth IndraWorks, the gateway is displayed in the device library under **Peripherals ► ProfinetIO ► Interfaces ► SLC-0-GPNT**.

Step 2: Add the gateway to the project

In order to have the SafeLogic compact system data available in the PLC process image, the gateway must be added to the hardware configuration first. The procedure associated with this depends on the hardware configuration program of the PLC being used. On this topic, please also read the documentation for the corresponding program.

The example below shows how to add the gateway to a Rexroth IndraWorks project.

When using Rexroth IndraWorks, the gateway is displayed in the device library under **Peripherals ► ProfinetIO ► Interfaces ► SLC-0-GPNT**.

1. Drag & drop the device into the Profibus IO network



In the GSDML device description file, there are two interface descriptions: **v1.0** and **v2.1** (= different scheme versions).

In v2.1, additional interface and port descriptions are available, for example for topology configuration.

Note: PROFINET topology configuration is not yet supported by Rexroth IndraWorks.

EtherNet gateway

Example:

Example:

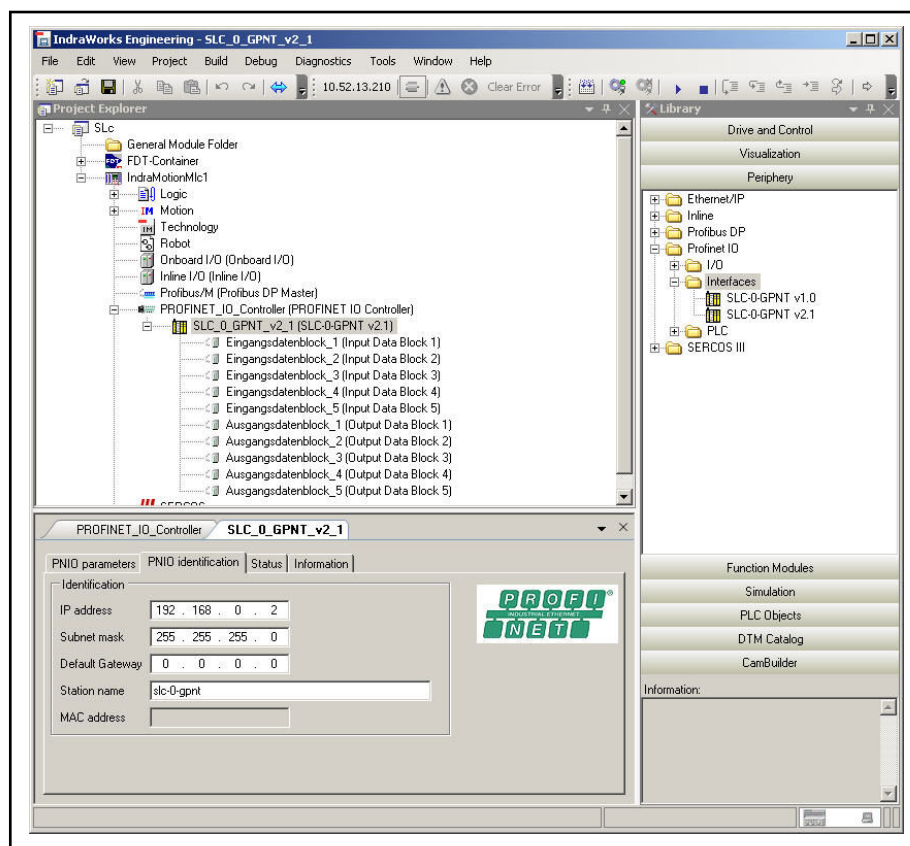


Fig. 5-20: Profinet IO gateway in Rexroth IndraWorks

After adding the device to the automation network, it is required to configure which of the cyclic data sets will be used and where they will be addressed in the memory. For details refer to [chapter 5.2.4 "Profinet Configuration of the Gateway – Which Data is Transferred"](#) on page 61.

Step 3 Configure the properties of the gateway

1. Double click on the gateway hardware symbol in the Project Explorer.
2. Configuring the update time (reduction ratio) of the cyclic I/O data exchange. Click on the "PNIO parameter" tab.

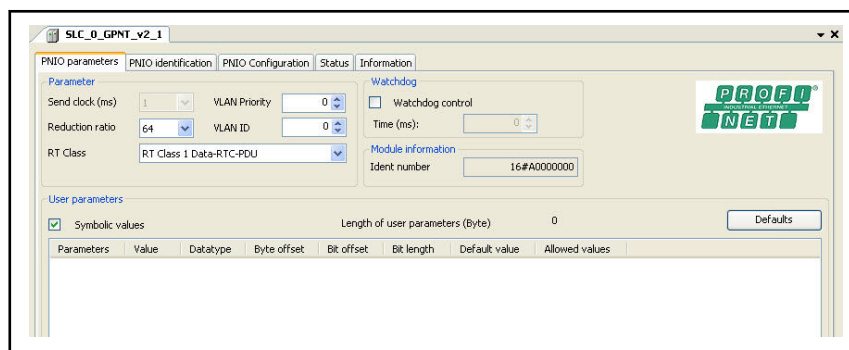


Fig. 5-21: Configure the update time of the SLC-0-GPNT

Step 4: Assign the device name

In order for the PLC to communicate with the SLC-0-GPNT, the PLC software and the gateway must agree on the name of the gateway.

Specify the Profinet IO device name of the gateway

1. Double click on the gateway hardware symbol in the Project Explorer.
2. Select the "PNIO identification" tab.
3. Enter the desired device name:

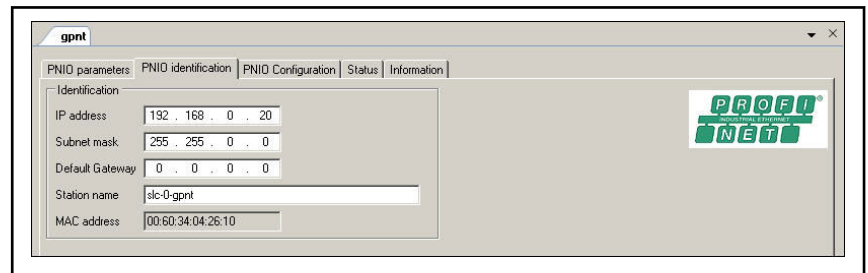


Fig. 5-22: SLC-0-GPNT properties dialog



The device name format shall apply to the Profinet standard specification.

Assigning a Device Name to the Gateway

1. Select the dialog "Search Devices" in the Profinet IO Controller context menu. The "Search Devices" dialog is opened and the found Profinet devices are displayed.
2. From the Assign device name dialog, find and select the diagnostic gateway SLC-0-GPNT that you wish to assign the device name to in the list.
3. Click on the **Assign Name** button

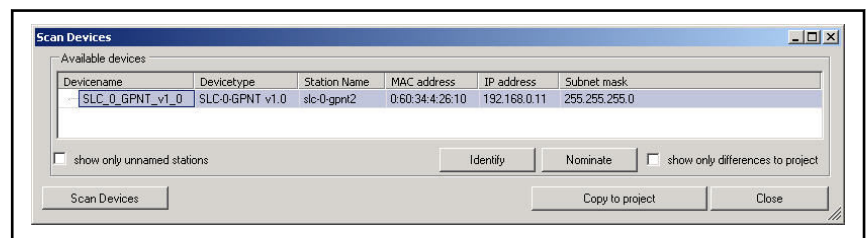


Fig. 5-23: SLC-0-GPNT dialog Assign Device Name

5.2.4 Profinet Configuration of the Gateway – Which Data is Transferred

Cyclic Data

The physical SafeLogic compact I/O modules are not represented as typical hardware modules in the Profinet IO hardware catalog. Instead, the data available from the SafeLogic compact system has been organized into data blocks. Each data block represents one "virtual hardware" module in the Profinet IO hardware catalog. The GSDML of the Profinet IO gateway supports ten (10) slots (see [fig. 5-24 "SLC-0-GPNT configuration" on page 63](#)) where the modules can be placed. This allows each data block to be mapped once.

EtherNet gateway

Process Data of the SafeLogic compact System to the PLC

The SLC-0-GPNT provides 5 input data blocks (virtual I/O device modules) containing the process image. These input data blocks must be projected in a Profinet configurator in natural order (1, 2, 3, 4, 5). No other sequence is possible.



- Depending on the type of PLC used, further modules may be displayed (e.g. "Universal module"). These modules are not needed and can be ignored
- The input data blocks 14 contain 12 bytes each, input data block 5 contains 2 bytes
- The contents of the input data blocks are freely selectable, but are preconfigured in the SafeLogic Designer configuration software (see table below)

	Data block 1	Data block 2	Data block 3	Data block 4	Data block 5
	Input data	Input data	Input data	Input data	Input data
Byte 0	Input values module 1	Output values module 1	Logic result 1	Not assigned	Not assigned
Byte 1	Input values module 2	Output values module 2	Logic result 2	Not assigned	Not assigned
Byte 2	Input values module 3	Output values module 3	Logic result 3	Not assigned	Not available
Byte 3	Input values module 4	Output values module 4	Logic result 4	Not assigned	
Byte 4	Input values module 5	Output values module 5	Gateway direct output values 0	Not assigned	
Byte 5	Input values module 6	Output values module 6	Gateway direct output values 1	Not assigned	
Byte 6	Input values module 7	Output values module 7	Gateway direct output values 2	Not assigned	
Byte 7	Input values module 8	Output values module 8	Gateway direct output values 3	Not assigned	
Byte 8	Input values module 9	Output values module 9	Not assigned	Not assigned	
Byte 9	Input values module 10	Output values module 10	Not assigned	Not assigned	
Byte 10	Input values module 11	Output values module 11	Not assigned	Not assigned	
Byte 11	Input values module 12	Output values module 12	Not assigned	Not assigned	
Length	12 bytes	12 bytes	12 bytes	12 bytes	2 bytes

Tab. 5-13: Preset content of the input data block 1–5 of SLC-0-GPNT



For detailed information about the process image content, please refer to [chapter 3.3 "Data transmitted into the network \(network input data sets\)"](#) on page 14.



Information about how to configure the process image can be found under [chapter 7 "Layout and content of the process mapping"](#) on page 91.

Data from the PLC to the SafeLogic compact CPU

There are 5 output data blocks with 10 bytes each.

EtherNet gateway

The content of these data blocks can be used as input in the logic editor or can be routed via a second gateway into another network. In order to have the desired bits available for routing or in the logic editor, tag names have to be defined for each bit that shall be used. Bits without a tag name will not be available.



For detailed information how to define and customize the content and tag names of the input and output data please refer to [chapter 7 "Layout and content of the process mapping" on page 91](#) and the operating instructions "Rexroth IndraControl SafeLogic compact Designer Software", see [chapter 1.4 "SafeLogic compact operating instructions and assembly instructions" on page 6](#)).

Profinet IO configurator settings

1. On the slots of the SLC-0-GPNT gateway, the data blocks can be selected using "Set Devices", refer to the following figure:

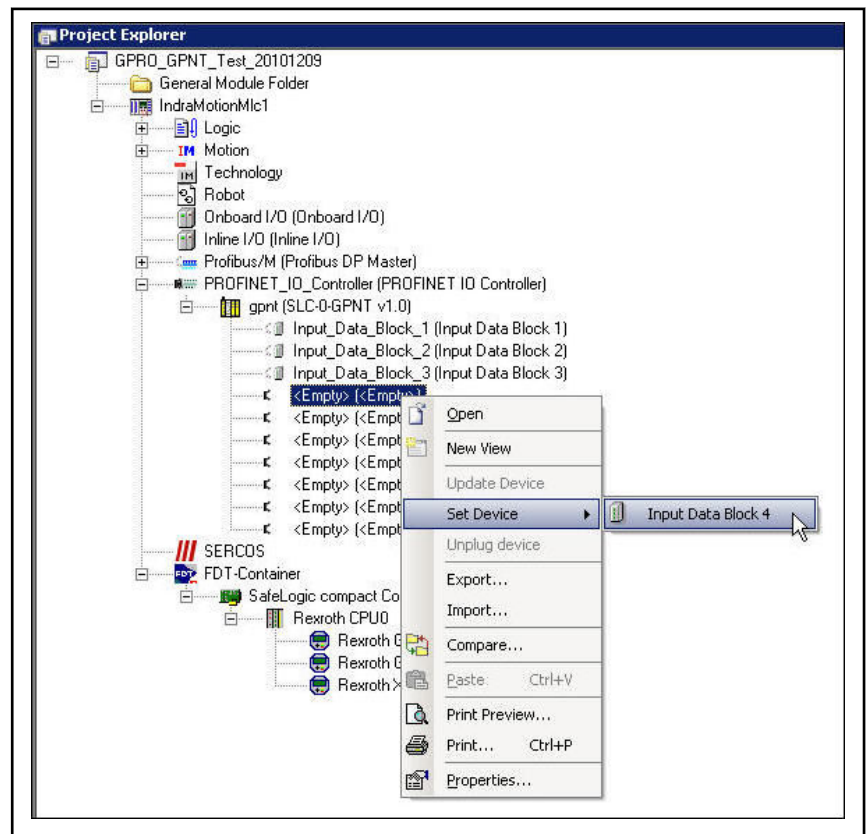


Fig. 5-24: SLC-0-GPNT configuration



Each input data block can only be placed into the slot of the same number. Example: Input data block 4 can only be mapped into slot 4.

Acyclic Data and Alarms

Read Data

SafeLogic compact system diagnostic data is available as data record to be read by the PLC. There are three data sets (2, 3 and 4) providing diagnostic information:

EtherNet gateway

- Data Set 2 contains the system CRCs
- Data Set 3 contains the individual module status with four (4) bytes per module
- Data Set 4 is currently filled with reserved values

The format of the data sets is as specified in the tables below

To access the acyclic data sets, a record read must be performed on the appropriate address (Slot 0, SubSlot 1) as shown in the following table:

	Data set 2	Data set 3	Data set 4
Address	1200–1231	1300–1359	1400–1459
Size in bytes	32 bytes	60 bytes	60 bytes

Tab. 5-14: Address for data set 2, 3 and 4

Data set 1 is mapped into the cyclic transferred Profinet modules of the device. The content may be defined by the user.



For details refer to [chapter 7 "Layout and content of the process mapping "](#) on page 91.

EtherNet gateway

	Data set 2	Data set 3	Data set 4
Byte 0	Total checksum	Module status module 0	Reserved
...			
Byte 3			
Byte 4	SafeLogic compact checksum	Status module 1	
...			
Byte 7			
Byte 8	CPU0 and CPU1: Reserved	Status module 2	
...			
Byte 11	CPU3: ACR checksum		
Byte 12	Reserved	Status module 3	
...			
Byte 15			
Byte 16		Status module 4	
...			
Byte 19			
Byte 20		Status module 5	
...			
Byte 23			
Byte 24		Status module 6	
...			
Byte 27			
Byte 28		Status module 7	
...			
Byte 31			
Byte ...		...	
Byte 49		...	
Byte ...		...	
Byte 56		Status module 14	
...		Module 13 and 14 are always the gateways	
Byte 59			
Length	32 Bytes	60 bytes	60 bytes

Tab. 5-15: Preset content of the input data block 2-4 of SLC-0-GPNT

To interpret the module status bit in data set 3, see [tab. 3-7 "Meaning of module status bits for SLC-3-XTDI, SLC-3-XTIO, SLC-3-CPUx and diagnostic gateways"](#) on page 21.

I&M information

SLC-0-GPNT supports the I&M information defined in the PROFINET specification. The following I&M information can be read out from the device:

I&M field	Size	Value
Manufacturer ID	2 bytes	287
Order ID	20 Bytes	R911172290 (must be filled with spaces)
Serial Number	16 Bytes	Read-out from I2C
Hardware Revision	4 bytes	Read-out from I2C

EtherNet gateway

I&M field	Size	Value
Software Revision	4 bytes	Read-out from firmware
Revision Counter	2 bytes	0
Profile ID	2 bytes	Generic device
Profile Specific Device	2 bytes	Generic device
IM Version	2 bytes	1.1
IM Supported	2 bytes	0

Tab. 5-16: Address for data set 2, 3 and 4

Alarms

Acyclic reading of alarms is enabled by the Profinet IO alarm infrastructure. If an error occurs in one of the SafeLogic compact modules, the Profinet IO gateway transfers the respective diagnostic alarm into the network.



- All alarms are output to module 0
- The subslot number indicates the SafeLogic compact module that has caused the alarm:
 - 0 = CPU
 - 1 = XT module 1
 - 2 = XT module 2
 - ...
 - 13 = Gateway 1
 - 14 = Gateway 2
- The reason for the alarm is being identified by an error text message from the GSDML file. Up to 32 different error messages per SafeLogic compact module type are possible
- For the possible causes for an alarm please refer to [tab. 5-17 "Profinet IO error types" on page 67](#)
- The same diagnostic information is available through a record read to data set 3

The following table indicates the Profinet IO error types (as defined by the GSDML) with respective error messages:

- 0 = Error
- 1 = No error

EtherNet gateway

Error type (dec)	Message	
	Error cause	Error definition
0100	CPU	Reserved
0101		Internal error: Internal tests failed
0102		Power supply not in permitted range or error in EFI communication
0103		Reserved
0104		Configuration of a module in the system is incompatible or invalid
0105		Power supply not in the permitted range
0106		Communication error at EFI1
0107		Communication error at EFI2
0108		EFI link stations in the system 1 = All found 0 = One or more missing
0109		SafeLogic compact stations suspended 1 = None 0 = One or more

EtherNet gateway

Error type (dec)	Message	
	Error cause	Error definition
0200	XTDI/XTIO	Operating state "Run"
0201		Internal tests
0202		Grouping of the bit 0205 to 0207
0203		Reserved
0204		Configuration of this module is valid
0205		Current supply of the outputs
0206		Fast-Shut-Off output
0207		Reserved
0208		Dual channel evaluation of input 1-2
0209		Dual-channel evaluation of input 3-4
0210		Dual-channel evaluation of input 5-6
0211		Dual-channel evaluation of input 7-8
0212		Reserved
0213		Reserved
0214		Reserved
0215		Reserved
0216		External test signal Input 1
0217		External test signal Input 2
0218		External test signal Input 3
0219		External test signal Input 4
0220		External test signal Input 5
0221		External test signal Input 6
0222		External test signal Input 7
0223		External test signal Input 8
0224		short circuit after High at output 1
0225		short circuit after Low at output 1
0226		Short circuit after High at output 2
0227		Short circuit after Low at output 2
0228		Short circuit after High at output 3
0229		Short circuit after Low at output 3
0230		Short circuit after High at output 4
0231		Short circuit after Low at output 4
0300	Profibus gateway	Operating state "Run"
0301		internal tests
0302		Summary of bits 0305 to 0307 (external error)
0303		Reserved
0304		Configuration of this module is valid
0305		Communication from network
0306		Communication to network
0307...0331		Reserved

EtherNet gateway

Error type (dec)	Message	
	Error cause	Error definition
0800	Profinet gateway	Operating state "Run"
0801		internal tests
0802		Summary of bits 0805 to 0807 (external error)
0803		Reserved
0804		Configuration of this module is valid
0805		Communication from network
0806		Communication to network
0807...0831		Reserved
0F00	Sercos III gateway	Operating state "Run"
0F01		internal tests
0F02		Summary of bits 0F05 to 0F07 (external error)
0F03		Reserved
0F04		Configuration of this module is valid
0F05		Communication from network
0F06		Communication to network
0F07... 0F031		Reserved
1000...1F31	Further gateways	Reserved
2000	STIO	Operating state "Run"
2001		Internal tests
2002		Grouping of the bit 2005 to 2007
2003		Reserved
2004		Configuration of this module is valid
2005		Current supply of the outputs
2006		Reserved
2007		Monitoring the output load (over current)
2008 ... 2031		Reserved
2100	MOCx	Operating state "Run"
2101		Internal tests
2102		Grouping of the bit 2105 to 2107
2103		Reserved
2104		Configuration of this module is valid
2105		Encoder 1
2106		Encoder 2
2107		Reserved
2108...2111		Reserved
2112		User-defined status bit 1
2113		User-defined status bit 2
2114		User-defined status bit 3
2115		User-defined status bit 4
2116...2131		Reserved

EtherNet gateway

Error type (dec)	Message	
	Error cause	Error definition
2200	XTDS	Operating state "Run"
2201		Internal tests
2202		Grouping of the bit 2205 to 2207
2203		Reserved
2204		Configuration of this module is valid
2205		Current supply of the outputs
2206		Reserved
2207		Monitoring the output load (over current)
2208		Dual-channel evaluation Input 1–2
2209		Dual-channel evaluation Input 3–4
2210		Dual-channel evaluation Input 5–6
2211		Dual-channel evaluation Input 7–8
2212...2215		Reserved
2216		External test signal Input 1
2217		External test signal Input 2
2218		External test signal Input 3
2219		External test signal Input 4
2220		External test signal Input 5
2221		External test signal Input 6
2222		External test signal Input 7
2223		External test signal Input 8
2224...2231		Reserved
2300...3F31	Further modules	Reserved

Tab. 5-17: Profinet IO error types

5.2.5 TCP/IP Configuration Interface

Refer to [chapter 5.1.1 "TCP/IP Configuration Interface"](#) on page 35.

5.2.6 EtherNet TCP/IP-Socket Interface

Refer to [chapter 5.1.2 "EtherNet TCP/IP-Socket Interface"](#) on page 40.

5.2.7 Diagnostics and Elimination of Errors



Further information on diagnostics of the SafeLogic compact system can be found in the instruction "Rexroth IndraControl SafeLogic compact Designer Software" (see [chapter 1.4 "SafeLogic compact operating instructions and assembly instructions"](#) on page 6).

EtherNet gateway

Errors	Possible cause	Possible remedy
The SafeLogic Designer cannot establish a connection to the diagnostic gateway	SLC-0-GPNT has no power supply SLC-0-GPNT is not in the same physical network as the PC The PC is configured to another subnet mask in the TCP/IP settings SLC-0-GPNT has already been configured once and has a fixed set IP address or an IP address assigned by a DHCP server that is not identified	Connect the power supply Check the EtherNet wiring and network settings on the PC and correct the settings if necessary. Set the subnet mask on the PC to 255.255.0.0 (factory setting of the SLC-0-GPNT) Check the communication settings in the SafeLogic Designer
SLC-0-GPNT does not supply any data LED PWR  green LED LINK/ACT  /  green LED STATUS  Red/green	SLC-0-GPNT is configured for data transfer to PLC, but EtherNet communication has not been established or is faulty Duplicate IP address detected. Another device on the network has the same IP address Incorrectly formatted Profinet device name	Minimum one EtherNet connection needs to be established. Set up EtherNet connection on PLC side, check EtherNet wiring, check EtherNet connection settings on PLC and in the SafeLogic Designer. If no EtherNet communication is required, disable the EtherNet connections/PLC interfaces on the SLC-0-GPNT Adjust IP address and switch off the device and switch it on again Adjust the device name between the Profinet master and SLC-0-GPNT
SLC-0-GPNT does not supply any data LED PWR  green LED LINK/ACT  /  green LED STATUS  Red (1 Hz)	Configuration required Configuration download is not completed	Configure the SLC-0-GPNT and download the configuration to the device Wait until the configuration download has been completed
SLC-0-GPNT does not supply any data LED PWR  green LED LINK/ACT  /  green LED STATUS  Green (1 Hz)	No data set was activated The SafeLogic compact system is in "Stop" state	Activate at least one data set Start CPU (change to "Run" mode)
SLC-0-GPNT does not supply any data LED PWR  green LED LINK/ACT  /  green LED STATUS  Green (2 Hz)	Profinet master requested LED flashing for physical device identification	Stop flashing by means of IndraWorks Engineering or by disabling and enabling the voltage supply of the SafeLogic compact system
SLC-0-GPNT functioned correctly after configuration, but suddenly no longer supplies data LED PWR  green LED LINK/ACT  /  green LED STATUS  Red/green	SLC-0-GPNT is operated in "Slave" mode, the IP address is assigned from a DHCP server. After the SLC-0-GPNT or the DHCP server has been restarted, a different IP address that is unknown to the PLC has been assigned to the SLC-0-GPNT	Either assign a fixed IP address to the SLC-0-GPNT, or reserve a fixed IP address for the SLC-0-GPNT in the DHCP server (manual assignment by means of the MAC address of the SLC-0-GPNT)

EtherNet gateway

Errors	Possible cause	Possible remedy
The SLC-0-GPNT/SafeLogic compact system is in state "Critical Error"	Das SLC-0-GPNT is not correctly connected to the other SafeLogic compact modules. Module connecting plug is soiled or damaged	Plug the SLC-0-GPNT in correctly Clean the connecting socket/plug Repower the system
LED PWR ● green		
LED LINK/ACT ➤● Green	Other SafeLogic compact module has internal critical error	Check the other SafeLogic compact modules
LED STATUS ● Red		
The SLC-0-GPNT is in state "Critical Error"	SLC-0-GPNT internal device error CPU firmware version does not support diagnostic gateways	Switch off the power supply of the SafeLogic compact system and switch it on again Check the diagnostic messages with SafeLogic Designer Use a CPU with the required firmware version (see chapter 2.2 "Intended use" on page 9) If the error cannot be fixed, replace the gateway
LED PWR ● green		
LED LINK/ACT ● / ➤● green		
LED STATUS ➤● Red (2 Hz)		

Tab. 5-18: Elimination of errors in SLC-0-GPNT

Explanation of the symbols:

- signifies that the LED is off.
- signifies that the LED continuously flashes in red or green.
- signifies that the LED continuously blinks in red or green.

6 Field bus gateways

6.1 Profibus DP gateway

The diagnostic gateway SLC-0-GPRO can be used for Profibus DP.

6.1.1 Interfaces and Operation

Operating and display elements

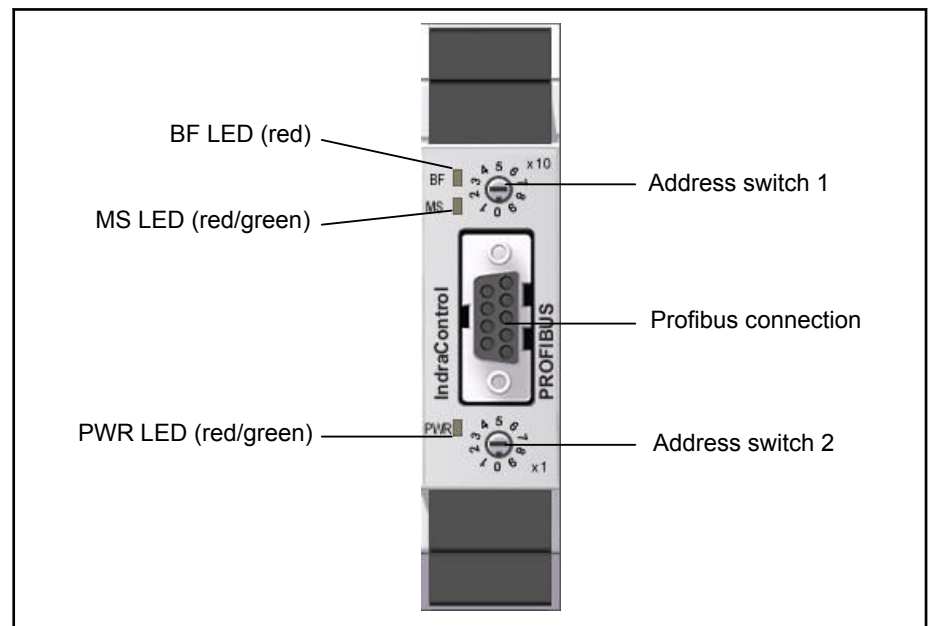


Fig. 6-1: SLC-0-GPRO control and display elements

LED	Meaning
BF	Connection to DP master established
● Red	No bus connection: Field bus cable break, address error or master is not (or no longer) writing to the bus
MS	○ Power up, waiting for bus off
● Green	Executing
⦿ Green	Stop
⦿ Red/green	Executing, but there is an error at the gateway
⦿ Red	1 Hz: Configuration required or in progress 2 Hz: Critical fault on gateway
● Red	Critical fault on another module
PWR	○ No power supply
● Green	Power supply switched on, no error
● Red	Critical fault

Tab. 6-1: LED display description of SLC-0-GPRO

Field bus gateways

Explanation of the symbols:

- signifies that the LED is off.
- signifies that the LED continuously flashes in red or green.
- ⦿ signifies that the LED continuously blinks in red or green.

Switch	Function
× 10	Address switch 1 10 position rotary switch for setting the module address (tens)
× 1	Address switch 2 10 position rotary switch for setting the module address (ones)

Tab. 6-2: Address switch of SLC-0-GPRO

Setting the Profibus DP address by means of the hardware address switches

1. Set the Profibus DP address at the hardware address switches on the device front. Then switch the SafeLogic compact system off and back on again.

Setting the Profibus DP address in the SafeLogic Designer software

1. Set the two hardware address switches on the device front to "00".
2. Open the SafeLogic Designer and load the hardware configuration including the Profibus DP gateway. Ensure your project is offline.
3. Click on the **GPRO Gateway** button over the main window and select the SLC-0-GPRO or double click the SLC-0-GPRO in the hardware configuration view to open the gateway configuration dialog.
4. Click on **Gateway configuration** in the left menu. The following dialog is displayed:

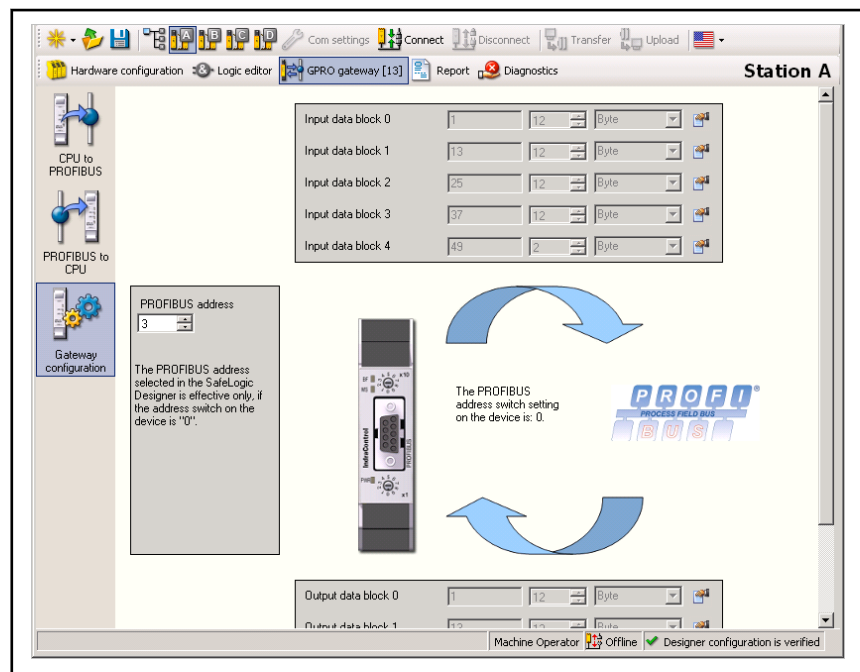


Fig. 6-2: Setting the Profibus address of SLC-0-GPRO

5. Select the Profibus address in the "Profibus address" field.
6. Click **Connect** to go "online" and download the configuration to the SafeLogic compact system.



- The address that can be set via the hardware address switch ranges from 1 ... 99
- The address that can be set via the SafeLogic Designer software ranges from 3 ... 125
- The Profibus master cannot overwrite the address
- A modified address setting only becomes effective after switching off and switching on the SafeLogic compact system
- In "online" mode, you can read the address set on the Profibus DP gateway by clicking on the **Read** button over the "Profibus address" field

Pin assignment

The connection to the Profibus DP field bus is made using a 9-pin DSub socket.

	Pin	Description
	1	NC
	2	NC
	3	RxD/TxD-P
	4	CNTR-P
	5	GND-EXT
	6	+5V-EXT
	7	NC
	8	RxD/TxD-N
	9	CNTR-N (GND-EXT)
	SHLD	Shielding

Tab. 6-3: Pin assignment of Sub-D female and male connector for SLC-0-GPRO

Bus cable

The bus topology for Profibus DP is a linear structure comprising a screened, twisted 2-core cable with active bus termination at both ends. The possible bus lengths are 100 m at 12 MBit/s up to 1,200 m at 94 KBit/s.

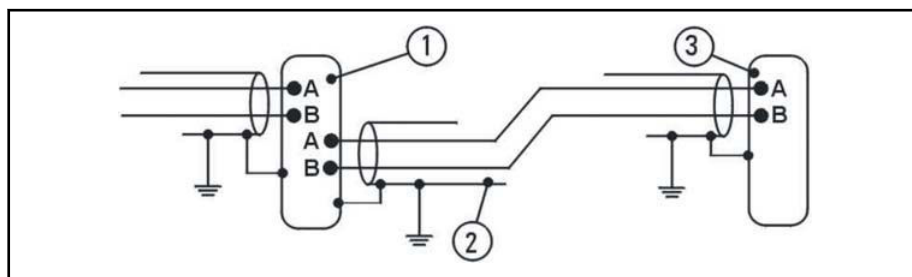


Fig. 6-3: Bus cable SLC-0-GPRO

Position	Description
1	Profibus device

Field bus gateways

- 2 Shielded bus cable
- 3 Profibus termination (with integrated terminating resistors)

Tab. 6-4: Explanation of the SLC-0-GPRO bus cable

Line parameters

The properties of the bus cable are specified in EN 50 170 as cable type A.

Property	Value
Impedance	135-165 Ω (at a frequency of 3-20 MHz)
Capacitance per unit length	< 30 pF/m
Loop resistance	$\leq$ 110 Ω /km
Core diameter	> 0.64 mm
Wire cross-section	> 0.34 mm ²

Tab. 6-5: SLC-0-GPRO cable parameter

With these cable parameters, the following maximum physical sizes are possible for a bus segment:

Baud rate (Kbit/s)	Max. cable length (m)
9.6	1200
19.2	1200
93.75	1200
187.5	1000
500	400
1500	200
12000	100

Tab. 6-6: SLC-0-GPRO maximum cable lengths

Data transfer rate

The data transmission rate is set automatically.

The maximum baud rate is 12 MBit/s.

6.1.2 Project planning and configuration

GSD files

In the normal case the SLC-0-GPRO is used on a DP master that looks up the device characteristics in the GSD file.

The GSD files and the device icon for integration into a PLC with Profibus support can be found here:

- In the SafeLogic Designer program folder on your hard disc (default installation directory: "C:\Programme\Rexroth\SafeLogic compact\DeviceDescriptions\")
- On the installation data carrier in the "DeviceDescriptions" directory

For integration, two GSD files are available:

1. Model name "SLC-0-GPRO":

Field bus gateways

When using the Profibus gateway with firmware version V1.29.0, GSD "RX010151.GSD" has to be used. This GSD supports standard DP-V0 diagnostics.

2. Model name "SLC-0-GPRO_DPV1":

When using the Profibus gateway with firmware version V1.32.0 or higher, GSD "RX020151.GSD" should be used. In addition to standard DP-V0 diagnostics, this GSD offers DP-V1 functionality. Here, only reading of I&M0 data is supported. This can be triggered by a class 1 or class 2 master.



- The Profibus gateway with firmware version V1.32.0 or higher is also supported by GSD "RX010151.GSD", however, it only offers DP-V0 diagnostics
- The firmware version of the used Profibus gateway can be retrieved from the type label ("Firmware" field) or read out using the Designer software

Operating Data Transferred by SLC-0-GPRO Profibus DP

The SLC-0-GPRO GSD file provides input/output data blocks (virtual I/O device modules) containing the operating data. These 5 blocks must be projected in a DP configurator in natural order (1, 2, 3, 4, 5). No other sequence is possible.

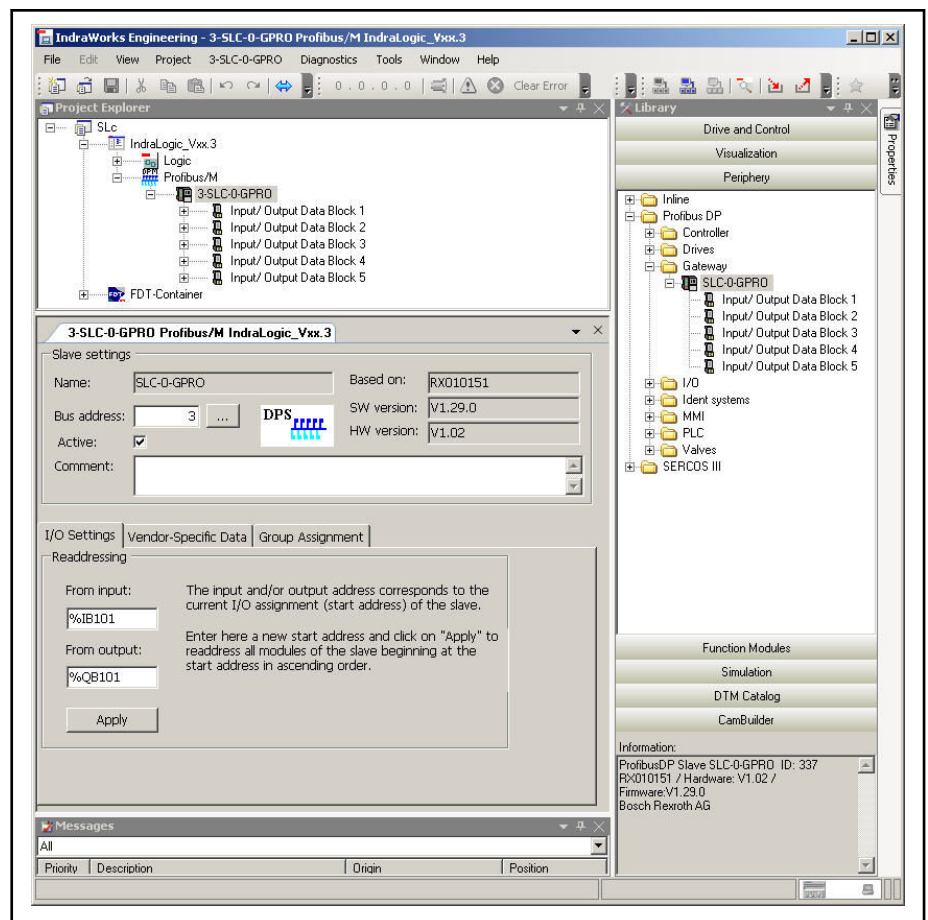


Fig. 6-4: Example for a Profibus DP configuration in Rexroth IndraWorks

Field bus gateways



- Depending on the type of PLC used, further modules may be displayed (e.g. "Universal module"). These modules are not needed and can be ignored
- The data blocks 1-4 contain 12 bytes each, data block 5 contains 2 bytes
- The contents of the input data blocks are freely selectable, but are preconfigured in the SafeLogic Designer (see table below)

	Data block 1	Data block 2	Data block 3	Data block 4	Data block 5
	Input data	Input data	Input data	Input data	Input data
Byte 0	Input values module 1	Output values module 1	Logic result 1	Not assigned	Not assigned
Byte 1	Input values module 2	Output values module 2	Logic result 2	Not assigned	Not assigned
Byte 2	Input values module 3	Output values module 3	Logic result 3	Not assigned	Not available
Byte 3	Input values module 4	Output values module 4	Logic result 4	Not assigned	
Byte 4	Input values module 5	Output values module 5	Gateway direct output values 0	Not assigned	
Byte 5	Input values module 6	Output values module 6	Gateway direct output values 1	Not assigned	
Byte 6	Input values module 7	Output values module 7	Gateway direct output values 2	Not assigned	
Byte 7	Input values module 8	Output values module 8	Gateway direct output values 3	Not assigned	
Byte 8	Input values module 9	Output values module 9	Not assigned	Not assigned	
Byte 9	Input values module 10	Output values module 10	Not assigned	Not assigned	
Byte 10	Input values module 11	Output values module 11	Not assigned	Not assigned	
Byte 11	Input values module 12	Output values module 12	Not assigned	Not assigned	
Length	12 bytes	12 bytes	12 bytes	12 bytes	2 bytes

Tab. 6-7: Preset content of the input data block 1–5 of SLC-0-GPRO



For detailed information about the process image content, please refer to [chapter 3.3 "Data transmitted into the network \(network input data sets\)"](#) on page 14.

Setting the start address for data blocks

1. Open the SafeLogic Designer and load the hardware configuration including the Profibus DP gateway. Ensure your project is offline.
2. Click on the **GPRO Gateway** button over the main window and select the SLC-0-GPRO or double click the SLC-0-GPRO in the hardware configuration view to open the gateway configuration dialog.
3. Click on **Gateway configuration** in the left menu. The following dialog is displayed:

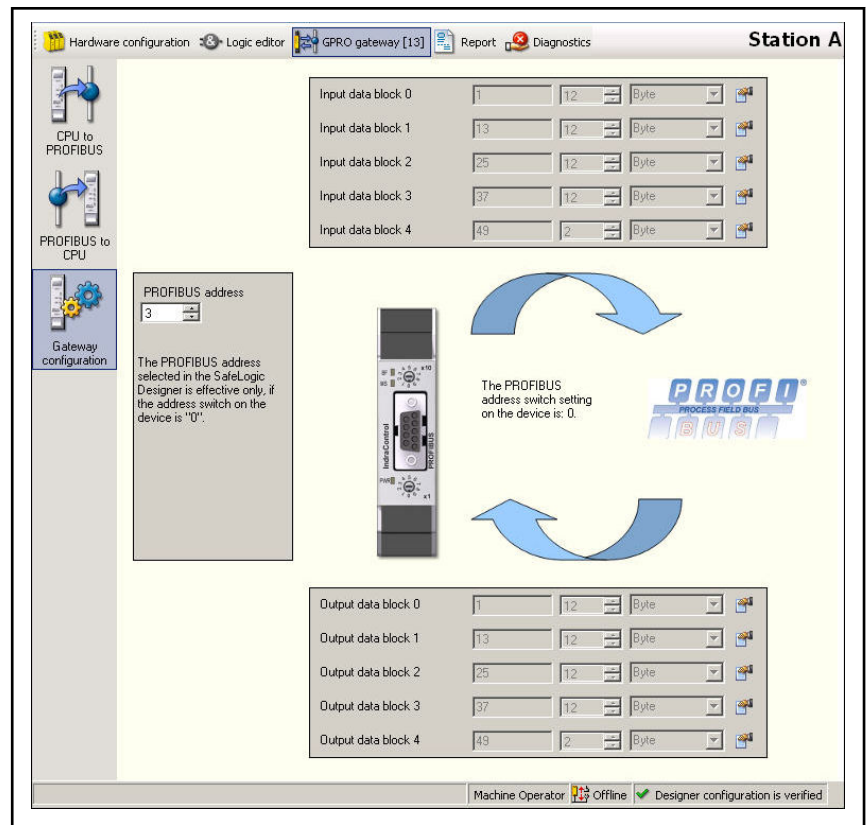


Fig. 6-5: Configuration dialog window for the Profinet DP gateway

4. Click on the button to the right of the data block for which you want to change the start address. The following dialog is displayed:

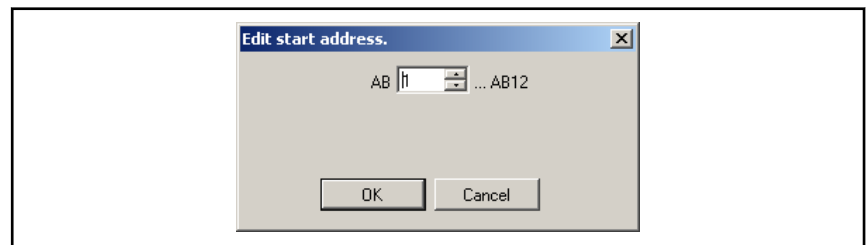


Fig. 6-6: Edit data block start address

5. Type in the desired new start address or use the arrows to change the address. The address set will be checked automatically for plausibility, i.e. it is not possible to configure data blocks with overlapping address ranges.
6. Click **OK** to accept the new start address.



For further information on process image configuration, refer to [chapter 7 "Layout and content of the process mapping "](#) on page 91.

6.1.3 Profibus Configuration of the Gateway – How the Data is Transferred

The following steps need to be taken in order to configure the communication between PLC and gateway.

Field bus gateways



This document does not cover the creation of the Profibus DP network or the rest of the automation system project in the network configuration tool. It is assumed the Profibus project has already been set up in the configuration program, e.g. Rexroth IndraWorks. Examples refer to configurations performed with Rexroth IndraWorks manager.

Step 1: Install the Device Master File (GSD)

Before the SLC-0-GPRO can be used as device in the network configuration tool, e.g. Rexroth IndraWorks, for the first time, the generic station description (GSD) of the gateway must be installed into the hardware catalogue of the tool.

When using Rexroth IndraWorks, the gateway is displayed in the device library under **Peripherals ► Profibus DP ► Interfaces ► SLC-0-GPRO**.

Step 2: Add the gateway to the project

In order to have the SafeLogic compact system data available in the PLC process image, the gateway must be added to the hardware configuration first. The procedure associated with this depends on the hardware configuration program of the PLC being used. On this topic, please also read the documentation for the corresponding program.

The example below shows how to add the gateway to a Rexroth IndraWorks project.

When using Rexroth IndraWorks, the gateway is displayed in the device library under **Peripherals ► Profibus DP ► Interfaces ► SLC-0-GPRO**.

1. Drag & drop the device into the Profibus network.

Field bus gateways

Example:

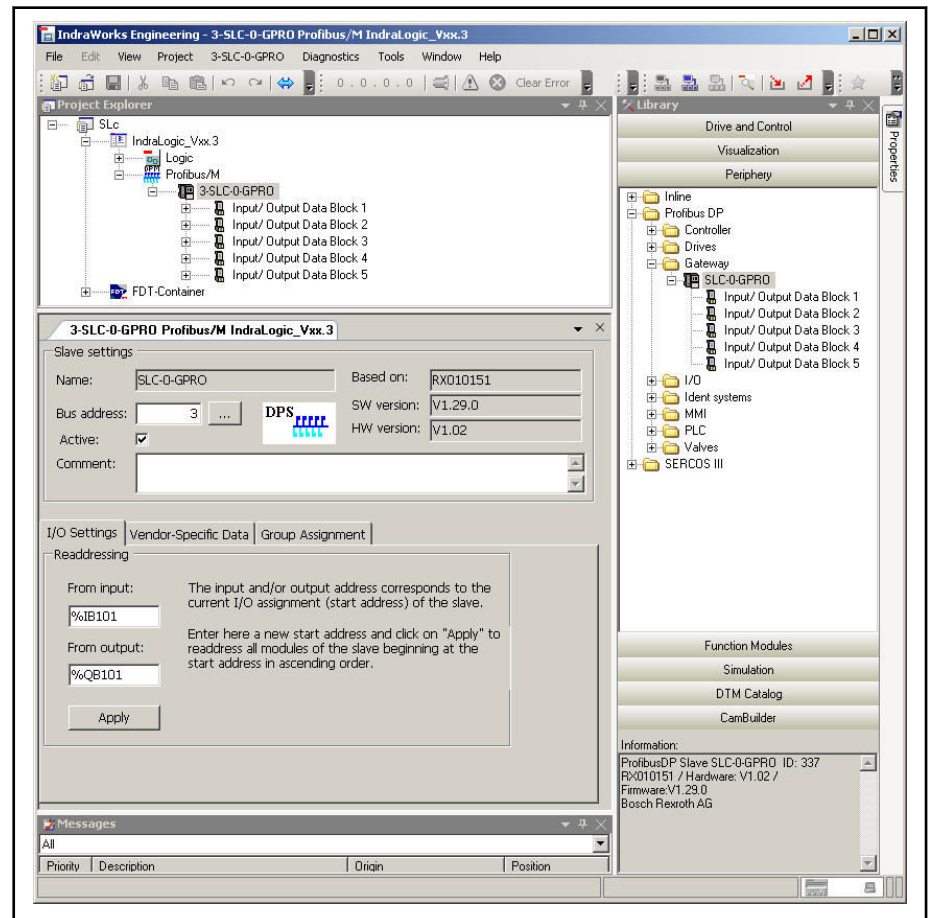


Fig. 6-7: Profibus DP gateway in "library overview"

Diagnostic data SLC-0-GPRO Profibus DP

With SLC-0-GPRO, diagnostics data are available via Profibus standard DP-V0 diagnostics:

- Standard diagnostics (6 bytes)
- Device related diagnostics: Status messages or manufacturer specific messages

Each SafeLogic compact module supports a unique module ID. Based on this ID the gateway determines the manufacturer specific diagnostics number. This way it is possible to retrieve module specific diagnostics texts from the GSD file. The content of the diagnostics message is shown in [tab. 6-8 "Content of Profibus diagnostic messages" on page 82](#).

Field bus gateways

Octet	Content	Comment
7	0x09	Header
8	Refer to tab. 6-9 "SafeLogic compact module numbers" on page 82	Module number
9	0	Profibus slot number of the module. The Profibus gateway supports five slots, which do not represent the physical slots, thus all messages are to be tied to slot 0 (gateway itself)
10 (Bit 0...2)	000, 001 or 010	000 = all errors going, 001 = error coming, 010 = error going
10 (Bit 3...7)	00000...11111	Alarm sequence number, will be incremented for each state change of octet 10 Bit 0...2 (error coming/going) ¹⁾
11	0 ... 14	Position of the SafeLogic compact module causing the diagnostic message: 0 = CPU 1 = XT module 1 ... 13 = Gateway 1 14 = Gateway 2 (relay modules are not counted)
12 ... 15	Variable	4 bytes module specific diagnostics data. Refer to tab. 6-10 "Profibus error messages" on page 83

Tab. 6-8: Content of Profibus diagnostic messages

The following table lists the module numbers for the SafeLogic compact system.

Module number	Module number (hex)	Module
161	A1	SafeLogic compact main module SLC-3-CPUx
162	A2	Extension modules SLC-3-XTDI or SLC-3-XTIO
163	A3	Profibus gateway SLC-0-GPRO
168	A8	Profinet IO gateway SLC-0-GPNT
175	AF	Sercos III gateway
192	C0	Extension module SLC-0-STIO

¹⁾ Only available with Profibus gateway firmware version V1.29.0 in connection with Device Master File "RX010151.GSD". In case of firmware version 1.32 or higher, these bits are always 0

Field bus gateways

Module number	Module number (hex)	Module
193	C1	Drive monitor SLC-3-MOCx
194	C2	Extension module SLC-3-XTDS

Tab. 6-9: SafeLogic compact module numbers

The following table matches the module specific diagnostics data (as defined by the GSD) to the appropriate error message:

- 0 = Error
- 1 = No error

Module number (dec)	Diagnostic bit (Octet Bit)	Error cause	Error message
1	12.0	CPU	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of SafeLogic compact system
	12.5		Power supply
	12.6		EFI1
	12.7		EFI2
	13.0		Flexi Link stations in the system 1 = All found 0 = One or more missing
	13.1		Flexi Link stations suspended 1 = None 0 = One or more
	13.2 ... 15.7		Reserved

Field bus gateways

Module number (dec)	Diagnostic bit (Octet Bit)	Error cause	Error message
2	12.0	XTDI/XTIO	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Current supply of the outputs
	12.6		Fast-Shut-Off output
	12.7		Reserved
	13.0		Dual-channel evaluation of input 1–2
	13.1		Dual-channel evaluation of input 3–4
	13.2		Dual-channel evaluation of input 5–6
	13.3		Dual-channel evaluation of input 7–8
	13.4		Reserved
	13.5		Reserved
	13.6		Reserved
	13.7		Reserved
	14.0		External test signal Input 1
	14.1		External test signal Input 2
	14.2		External test signal Input 3
	14.3		External test signal Input 4
	14.4		External test signal Input 5
	14.5		External test signal Input 6
	14.6		External test signal Input 7
	14.7		External test signal Input 8
	15.0		Short circuit after High at output 1
	15.1		Short circuit after Low at output 1
	15.2		Short circuit after High at output 2
	15.3		Short circuit after Low at output 2
	15.4		Short circuit after High at output 3
	15.5		Short circuit after Low at output 3
	15.6		Short circuit after High at output 4
	15.7		Short circuit after Low at output 4
3	12.0	Profibus Gateway	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Communication from network
	12.6		Communication to network
	12.7 ... 15.7		Reserved

Field bus gateways

Module number (dec)	Diagnostic bit (Octet Bit)	Error cause	Error message
4	12.0	CANopen gateway ¹⁾	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Communication from network
	12.6		Communication to network
	12.7 ... 15.7		Reserved
5	12.0	DeviceNet gateway ¹⁾	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Communication from network
	12.6		Communication to network
	12.7 ... 15.7		Reserved
6	12.0	Modbus gateway ¹⁾	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit "12.5 to 12.7"
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Communication from network
	12.6		Communication to network
	12.5 ... 15.7		Reserved
7	12.0	EtherNet/IP gateway ¹⁾	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Communication from network
	12.6		Communication to network
	12.5 ... 15.7		Reserved
8	12.0	Profinet gateway	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Communication from network
	12.6		Communication to network
	12.5 ... 15.7		Reserved

Field bus gateways

Module number (dec)	Diagnostic bit (Octet Bit)	Error cause	Error message
0C	12.0	CC-Link gateway ¹⁾	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Communication from network
	12.6		Communication to network
	12.7 ... 15.7		Reserved
0F	12.0	Sercos III gateway	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit "12.5 to 12.7"
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Communication from network
	12.6		Communication to network
	12.7 ... 15.7		Reserved
10	12.0	EtherCAT gateway ¹⁾	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Communication from network
	12.6		Communication to network
	12.7 ... 15.7		Reserved
20	12.0	STIO	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Current supply of the outputs
	12.6		Reserved
	12.7		Monitoring the output load (over current)
	13.0 ... 15.7		Reserved

Field bus gateways

Module number (dec)	Diagnostic bit (Octet Bit)	Error cause	Error message
21	12.0	MOCx	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Encoder 1
	12.6		Encoder 2
	12.7		Reserved
	13.0 ... 13.3		Reserved
	13.4		User-defined status bit 1
	13.5		User-defined status bit 2
	13.6		User-defined status bit 3
	13.7		User-defined status bit 4
	14.0 ... 15.7		Reserved
22	12.0	XTDS	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5		Current supply of the outputs
	12.6		Reserved
	12.7		Monitoring the output load (over current)
	13.0		Dual-channel evaluation Input 1–2
	13.1		Dual-channel evaluation Input 3–4
	13.2		Dual-channel evaluation Input 5–6
	13.3		Dual-channel evaluation Input 7–8
	13.4..13.7		Reserved
	14.0		External test signal Input 1
	14.1		External test signal Input 2
	14.2		External test signal Input 3
	14.3		External test signal Input 4
	14.4		External test signal Input 5
	14.5		External test signal Input 6
	14.6		External test signal Input 7
	14.7		External test signal Input 8
	15.0..15.7		Reserved
23...3F	12.0	Other module	Operating state "Run"
	12.1		Internal tests
	12.2		Grouping of the bit 12.5 to 12.7
	12.3		Reserved
	12.4		Configuration of this module is valid
	12.5 ... 15.7		Reserved

¹⁾ FLEXI soft gateway company SICK

Tab. 6-10: Profibus error messages

Field bus gateways

DP-V1 functionality: I&M0 data SLC-0-GPRO Profibus DP

With SLC-0-GPRO as of firmware version V1.32.0, I&M0 data is available via Profibus DP-V1 functionality. This data serves for clear identification of the Profibus gateway as field device:

Name	Meaning	Bytes	Data type	Value
Header	Reserved area	10	Manufacturer-dependent	–
Manufacturer_ID	Manufacturer ID	2	Unsigned16	0x11F
Order_ID	Manufacturer-specific order number	20	VisibleString	R911172287
Serial_number	Serial number	16	VisibleString	e.g. 12407006
Hardware_revision	Hardware version	2	Unsigned16	e.g. 0x01, 0x03 → V1.03
Software_revision	Firmware Revision	4	VisibleString (1) Unsigned8(3)	e.g. V1.32.0
Revision_counter	Revision counter	2	Unsigned16	e.g. 0
Profile_ID	Profile ID	2	Unsigned16	0xF600: Generic device
Profile_specific_type	Device class	2	OctetString	0x04: Communication module
IM_Version	Supported - IM version	2	Unsigned8	e.g. 0x01, 0x02 → V1.2
IM_supported	Supported I&M data	2	OctetString	0 → only I&M0 data

Tab. 6-11: Structure of I&M0 data

General procedure for reading out of I&M0 data:

- Acyclic services enable reading of I&M0 data (IM index 65000 or 0xFD8E)
- Sending of DPV1 request to the respective slave. This request occurs due to transmission of the request telegram (bytes 0x08, 0x00, 0xFD, 0xE8) with the index 255 to the respective slave. To do so, use the "IL_DPV1Write" function block from the "RIL_Profibus_DP" library
- Followed by reading of I&M0 data with the "IL_DPV1Read" function block from the "RIL_Profibus_DP" library with the index 255 of the respective slave



The read data must be processed. In addition to the information provided in table [tab. 6-11 "Structure of I&M0 data" on page 88](#), this data includes the request telegram as repetition. Also observe the Big Endian format. Strings may need to be terminated.

6.1.4 Diagnostics and Elimination of Errors



Further information on diagnostics of the SafeLogic compact system can be found in the instruction "Rexroth IndraControl SafeLogic compact Designer Software" (see [chapter 1.4 "SafeLogic compact operating instructions and assembly instructions" on page 6](#)).

Errors	Possible cause	Possible remedy
The SafeLogic Designer cannot establish a connection to the diagnostic gateway	SLC-0-GPRO has no power supply	Connect the power supply Check the communication settings in the SafeLogic Designer
SLC-0-GPRO does not supply any data LED PWR ● green LED BF ○ off LED MS ➤●◀ Red (1 Hz)	Configuration required Configuration download is not completed	Configure the SLC-0-GPRO and download the configuration to the device Wait until the configuration download has been completed
SLC-0-GPRO does not supply any data LED PWR ● green LED BF ○ off LED MS ● Green	No data set activated	Activate at least one data set
SLC-0-GPRO does not supply any data LED PWR ● green LED BF ○ Off/ ● Red LED MS ➤●◀ Green (1 Hz)	SLC-0-GPRO is in "Stop" state	CPU/application is stopped. Start CPU (change to "Run" mode)
SLC-0-GPRO does not supply any data. LED PWR ● green LED BF ○ off LED MS ● Green	Profibus master is in "Stop" mode	Set the Profile master to "Run" mode
SLC-0-GPRO functioned correctly after configuration, but suddenly no longer supplies data LED PWR ● green LED BF ● Red LED MS ➤●◀ Red/green	The Profibus hardware address of SLC-0-GPRO was changed Profibus cable is disconnected	Check Profibus address setting at hardware Check the Profibus line Check the Profibus master

Field bus gateways

Errors	Possible cause	Possible remedy
SLC-0-GPRO is in state "Critical Error"	Internal device error at SLC-0-GPRO	Switch off the power supply of the SafeLogic compact system and switch it on again
LED PWR ● green	CPU firmware version does not support diagnostic gateways	Check the diagnostic messages with SafeLogic Designer
LED BF ● Red		Use a CPU with the required firmware version (see chapter 2.2 "Intended use" on page 9)
LED MS ⤵●⤵ Red (2 Hz)		If the error cannot be fixed, replace the gateway
The SLC-0-GPRO/SafeLogic compact system is in state "Critical Error"	Das SLC-0-GPRO is not plugged properly into the other SafeLogic compact modules	Plug the SLC-0-GPRO in correctly
LED PWR ● Red	Module connecting plug is soiled or damaged	Clean the connecting socket/plug
LED BF ○ off	Other SafeLogic compact module has internal critical error	Repower the system
LED MS ● Red		Check the other SafeLogic compact modules

Tab. 6-12: Elimination of errors in SLC-0-GPRO

Explanation of the symbols:

- signifies that the LED is off.
- signifies that the LED continuously flashes in red or green.
- ⤵●⤵ signifies that the LED continuously blinks in red or green.

7 Layout and content of the process mapping

7.1 Routing

The process mapping transmitted by the diagnostic gateways into the network consists of the operating data (e.g. logic results, input and output states) and the diagnostics data (e.g. module status, CRCs). This data is divided into 4 data records.

Data set	Content	Size	Configurable
1	Operating data	Max 50 bytes	Yes
2	Checksums	32 bytes	No
3	Status and diagnostics	60 bytes	No
4	Reserved	60 bytes	No

Tab. 7-1: Content of data records 1-4

The operating data in data set 1 are organized into one or several data blocks, depending on the network protocol. For detailed information about the modularization of the data sent into the network please see [tab. 7-2 "Preselected configuration for operating data transmitted to the network" on page 91](#) and read the chapter on the related gateway.

The content of data set 1 is preconfigured upon delivery but can be configured with a granularity of 1 byte (see [chapter 7.2 "Default Settings for Operating Data " on page 91](#) and [chapter 7.3 "Configuring the Operating Data \(CPU after Network\)" on page 92](#)).

The diagnostic data in data sets 2-4 depend on the network protocol used and are described in the chapter on the related gateway.

7.2 Default Settings for Operating Data

In the delivery status, the operating data are pre-configured. Depending on the gateway used, these data are subdivided in several data blocks.

The following table gives an overview which bytes are assigned to the default configuration and how the data are modularized for the different gateways.

Byte	Profinet IO, Profibus DP	
	Default assignment	Input data block
0	Inputs module 1	#1
1	Inputs module 2	(12 bytes)
2	Inputs module 3	
3	Inputs module 4	
4	Inputs module 5	
5	Inputs module 6	
6	Inputs module 7	
7	Inputs module 8	
8	Inputs module 9	
9	Inputs module 10	
10	Inputs module 11	
11	Inputs module 12	

Layout and content of the process mapping

Byte	Profinet IO, Profibus DP	
	Default assignment	Input data block
12	Outputs module 1	#2
13	Outputs module 2	(12 bytes)
14	Outputs module 3	
15	Outputs module 4	
16	Outputs module 5	
17	Outputs module 6	
18	Outputs module 7	
19	Outputs module 8	
20	Outputs module 9	
21	Outputs module 10	
22	Outputs module 11	
23	Outputs module 12	
24	Logic result 0	#3
25	Logic result 1	(12 bytes)
26	Logic result 2	
27	Logic result 3	
28	Gateway direct output values 0	
29	Gateway direct output values 1	
30	Gateway direct output values 2	
31	Gateway direct output values 3	
32–35	Not assigned	
36–47	Not assigned	#4 (12 bytes)
48–49	Not assigned	#5 (2 bytes)

Tab. 7-2: Preselected configuration for operating data transmitted to the network

The default byte assignment can be freely customized as will be described in the following section.

7.3 Configuring the Operating Data (CPU after Network)

This section outlines briefly how you can customize the operational data transmitted by the diagnostic gateway to the network.



Detailed information can be found in the instruction "Rexroth IndraControl SafeLogic compact Designer Software" (see [chapter 1.4 "SafeLogic compact operating instructions and assembly instructions" on page 6](#)).

In the delivery status, the data routing configuration of the diagnostic gateways is shown in the gateway configuration dialog.

1. Click on the **GPRO Gateway** button over the main window and select the respective gateway or double click the desired gateway in the hardware configuration view to open the gateway configuration dialog.
2. Click on the "CPU to <Network>" tab in the left menu to display the routing configuration dialog.

Layout and content of the process mapping

The default setting is as follows (example for Profibus DP):

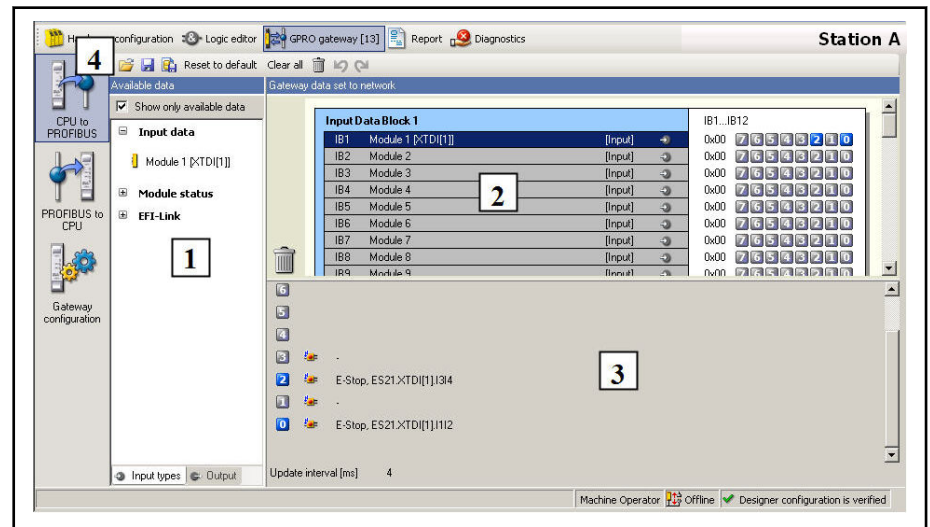


Fig. 7-1: Preselected configuration for operating data transmitted to the network

Basically this dialog is divided into three areas: Available data [1], Gateway data [2] and Tag names [3]. The toolbar [4] can be found in the upper left corner of the dialog.

7.3.1 The toolbar

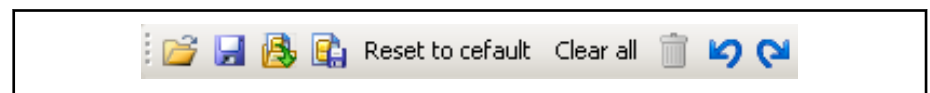


Fig. 7-2: Toolbar for routing configuration

The toolbar contains interfaces for the following actions (from left to right):

- The buttons for "Loading the user-specific configuration" and for "Saving the user configuration" allow to open and/or save a configuration including the tag names used in the XML format. If you load a configuration, all previously made changes that have not been saved will be lost. You cannot undo this action
- The "Import" and "Export" buttons enable import and export of the used tag names as CSV (comma separated values) file or in a network specific file format. This enables import and use of the assigned tag names in a PLC program



The Import button is only available for the "Network to gateway" routing configuration.

- The button **Reset to default** restores the preset routing configuration. You will be prompted for confirmation. If you click on **Yes**, all unsaved changes previously made will be lost. You cannot undo this action
- **Clear all** deletes the configuration, i.e. all assigned bytes in the "Gateway data record area to the network" are deleted. You are prompted to confirm this command
- The button for "Remove routing" deletes the currently selected byte in the "Gateway data record area to the network"
- The "Undo" and "Redo" buttons allow you to undo or redo changes you have made to the configuration

Layout and content of the process mapping

7.3.2 The "Available Data" Tabs

This area offers all sources from which data may be routed into the network. The area is divided into two views containing the available "input and output data". You can switch between these views using the file cards at the bottom.

- The "Input" view contains the input values for the connected SafeLogic compact modules and EFI devices. If your SafeLogic compact system contains a second gateway, the input data of this gateway (i.e. data received from the network the second gateway is connected to) will be available here as well
- The "Output" view offers the output values for the connected SafeLogic compact modules and EFI devices as well as the Logic results from the logic editor

All sources supported by the current configuration are displayed in black:

- Connected SafeLogic compact modules
- Connected EFI devices
- Configured logic results¹⁾
- Gateway input data available from another gateway in the system

Currently not configured sources are indicated in gray. Activating the "Show only available data" checkbox in the upper left corner hides the unused sources.

Sources that offer "live" data are marked with a little icon next to the text.

Adding data byte to routing table

1. Drag and drop an element (i.e. byte) from the "Available data" area to a free slot in the "Gateway data area". If the desired position is not free, you have to clear it first by deleting the byte currently assigned to it or moving it to a different position in the table.



It is possible to use the same byte several times in the routing table.

7.3.3 "Gateway Data Set to the Network"

This area contains the routing table. This pane indicates the current content of the diagnostic gateway's input data modules. Bytes and bits highlighted blue will hold "live" data from the system since the hardware configuration does support the source. Bytes highlighted grey actually do not have data associated with them since the hardware configuration does not support the sources.

Deleting data byte from routing table

1. Drag and drop the byte you want to delete to the trashcan icon in the bottom left corner of the "Gateway data area to the network"
or
Left-click on the byte to be deleted. Then, click on the **Delete routing** button in the toolbar
or

¹⁾ In the default configuration, only the first logic result byte (logic result 0) is active and available. You can enable more output bits for logic results in the logic editor (see operating instructions "Rexroth IndraControl SafeLogic compact Designer Software", see [chapter 1.4 "SafeLogic compact operating instructions and assembly instructions" on page 6](#))

Layout and content of the process mapping

To call the context menu, right-click on the respective byte. Select the **Remove routing** command.

Moving data byte in routing table

Drag and drop the byte you want to move to the desired position. If the position is not free, you will have to clear it first by deleting or moving the byte currently assigned to it.

7.3.4 "Tag Names"

This area shows the tag names associated with each bit of the byte currently selected in the "Available data" or the "Gateway input data to the network". You can enter these tag names in the logic editor and in the hardware configuration dialog (e.g. for extension modules).

In the Tag names area of the "CPU to Network" configuration dialog, it is not possible to edit tag names, with the exception of the gateway direct outputs (see the following section).

7.3.5 Direct Gateway Output Values

It is possible to write values directly from the logic editor into a gateway. In the default process mapping, four bytes are reserved for these gateway direct output values which can be found in the logic editor in the Outputs file card.

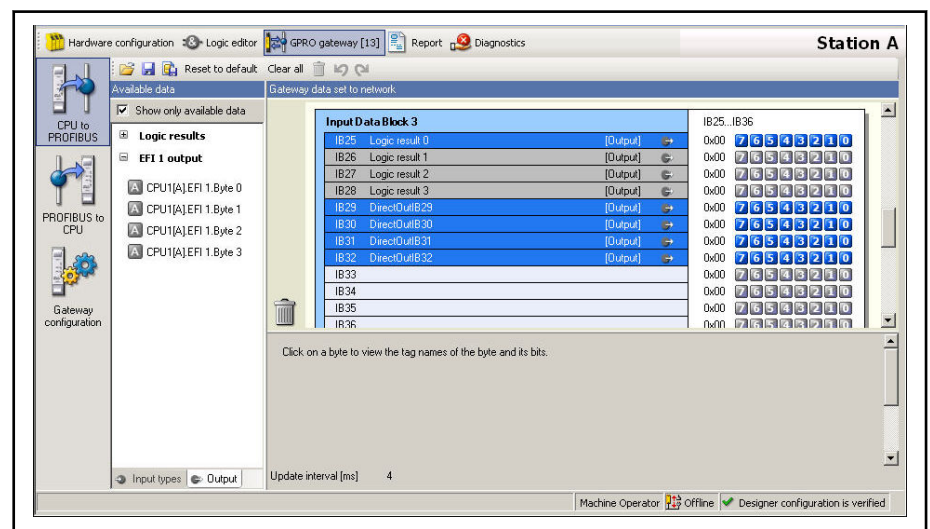


Fig. 7-3: Gateway direct output values in the process mapping (basic setting)

If required, you can configure any byte as gateway direct output value. In order to do this, you need to assign tag names for the bits you want to use.

Configuration of additional gateway direct output values

1. Click on a free byte in the "Gateway data" area to select the byte.
2. Activate the Use "Direct editing" checkbox in the upper left corner of the Tag names area. You will now be able to edit the tag names for this byte.
3. If desired, enter a tag name for the selected byte.
4. Enter tag names for the individual bits of the selected byte that you want to use as gateway direct output values.

Layout and content of the process mapping

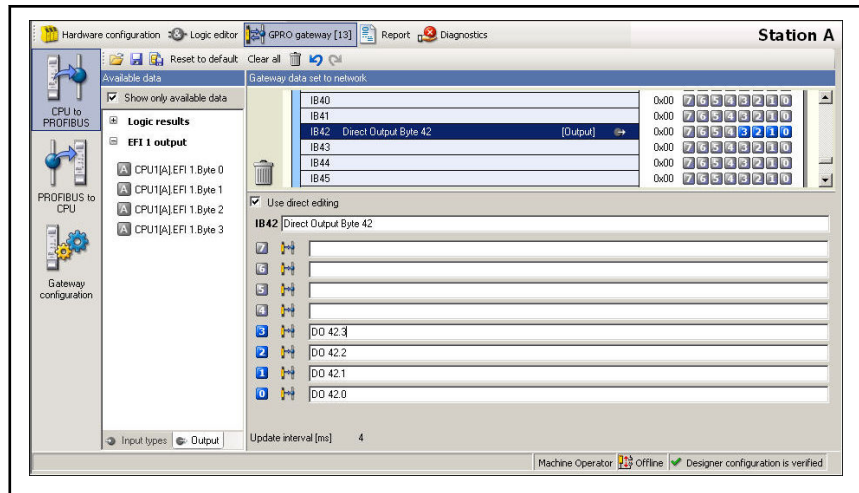


Fig. 7-4: Configuration of additional direct gateway output values in the process mapping

All bits of the selected byte with a tag name will now appear in the logic editor in the "Outputs" tab.



You can edit the predefined gateway direct output values in the same way.

7.3.6 Tag Names for Incoming Data (Network to CPU)

In order to enable incoming data bits:

1. Click on "<Network> to CPU" in the left menu. The following dialog is displayed:

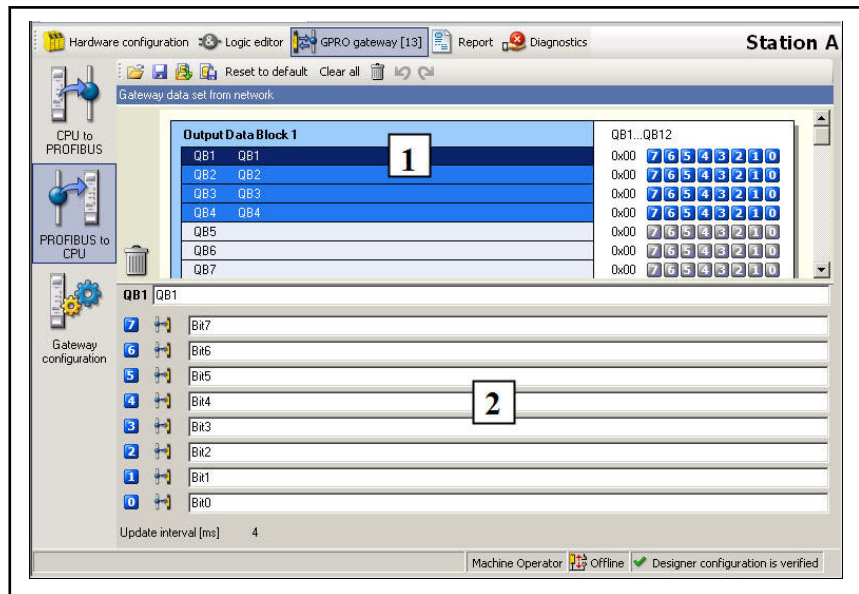


Fig. 7-5: Dialog window "Profibus to CPU" of SLC-0-GPRO

Basically this dialog is divided into two areas: "Gateway data set of network" [1] and "tag names" [2]:

The "Gateway data set to the network" shows the current configuration of the output modules.

The "Tag names" area shows the tag names associated to the byte selected in the "Gateway data set" area.

Layout and content of the process mapping

2. Select a byte in the "Gateway data set to network" area.
3. For each bit of the selected byte that you wish to use, enter a tag name in the "Tag names" area.

Each bit you enter a tag name for here will be available within the logic editor or for the process mapping of a second gateway.

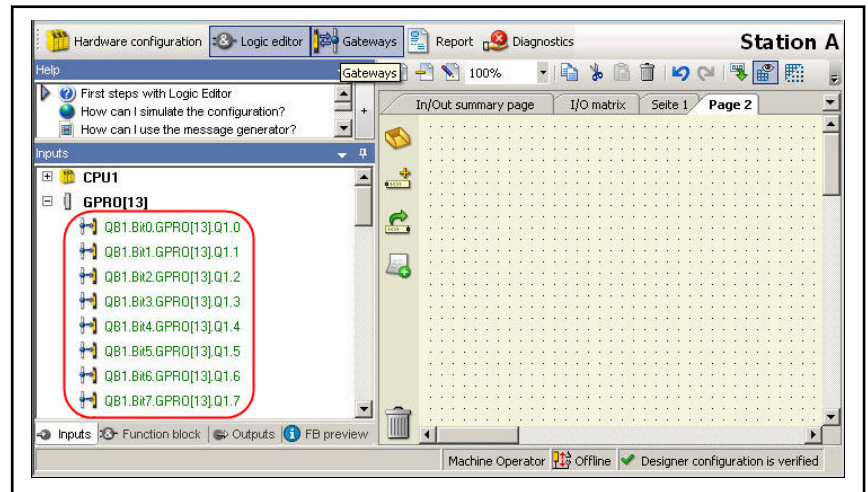


Fig. 7-6: Tag names of incoming bits in the logic editor of SLC-3-CPUx

7.3.7 Saving and Loading of a Configuration

The buttons for "Loading of user-specific configuration" and "Saving of user configuration" (see [chapter 7.3.1 "The toolbar" on page 93](#)), the configuration can be saved in XML format and loaded. If you load a configuration, all previously made changes that have not been saved will be lost. You cannot undo this action.

7.3.8 Importing and Exporting a Configuration

The "Import" and "Export" (see [chapter 7.3.1 "The toolbar" on page 93](#)) buttons enable import and export of a configuration including the used tag names as CSV (comma separated values) file or in a network specific file format. This enables import of tag names used in a SafeLogic compact project to a PLC program and vice versa.

If you import a configuration, all previously made changes that have not been saved will be lost. You cannot undo this action.



The "Import" button (see [chapter 7.3.1 "The toolbar" on page 93](#)) is only available for the "Network to gateway" routing configuration.

7.4 Online Monitoring of Operating Data

When the SafeLogic compact system is online and running, you can monitor the operating data online in the gateway configuration window.

1. Click on the **Gateways** button over the main window and select the respective gateway or double click the desired gateway in the hardware configuration view to open the gateway configuration dialog.
2. Click on the "CPU to <Network>" or the "<Network> to CPU" tab in the left menu to display the routing view for the input or output data you want to monitor.

Layout and content of the process mapping

For both directions, "CPU to Network" as well as "Network to CPU", inactive bits are displayed grey while active bits are highlighted green:

Input Data Block 2 IB13...IB24			
IB13	Module 1 [XTIO[1]]	[Output]	→
IB14	Module 2 [XTIO[2]]	[Output]	→
IB15	Module 3	[Output]	→

0x01 7 6 5 4 3 2 1 0
0x05 7 6 5 4 3 2 1 0
0x00 7 6 5 4 3 2 1 0

Fig. 7-7: Active and inactive bits in the online process mapping

In "CPU to Network" view, bits that are deactivated due to an error are indicated in red. This could be the case e.g. for the outputs of an SLC-3-XTIO module if the power supply of this module is faulty:

Input Data Block 2 IB13...IB24			
IB13	Module 1 [XTIO[1]]	[Output]	→
IB14	Module 2 [XTIO[2]]	[Output]	→
IB15	Module 3	[Output]	→

0x00 7 6 5 4 3 2 1 0
0x05 7 6 5 4 3 2 1 0
0x00 7 6 5 4 3 2 1 0

Fig. 7-8: Inactive network input bits as results of an error.

In the "Network to CPU" view, bits that have no tag name assigned (so that the bits cannot be used in the logic editor) but which are included in the process mapping that the diagnostic gateway receives from the PLC, are highlighted yellow:

Set #1			
W0.LB [Low Byte]			
W0.HB (High Byte)			
W6.LB [Low Byte]			

OutDataSet1
0x01 7 6 5 4 3 2 1 0
0x00 7 6 5 4 3 2 1 0
0x00 7 6 5 4 3 2 1 0

Fig. 7-9: Network output bits without assigned tag names in the online process mapping



The diagnostic gateways always reflect the actual physical status of the inputs and outputs on the connected modules and devices. This means that even when Force mode is active and inputs that are physically "Low" are forced "High" (or vice versa) the actual physical status of these inputs will be transmitted to the PLC instead of the (virtual) forced status. If, however, as a result of forcing of one or several inputs, one or several outputs change their status, the changed status of these outputs will be transmitted to the PLC since the actual physical status of the outputs on the devices has changed.

8 Technical data

8.1 Technical gateway data

8.1.1 Profibus DP

Interface	Minimum	Typical	Maximum
Field bus	Profibus-DP-V0/DP-V1		
Interface level	RS-485		
Connection method	9-pin D-Sub socket		
Slave address (set via rotary switches)	0		99
Slave address (set via SafeLogic Designer) ¹⁾	3		125
Baud rate (automatic adjustment)			12 MBaud
Baud rate (kBit/s with standard cable)			Max. cable length
9.6/19.2/93.75			1200 m
187.5			1000 m
500			400 m
1500			200 m
12000			100 m

Tab. 8-1: Technical data SLC-0-GPRO



For cable parameters, see [chapter 6.1 "Profibus DP gateway" on page 73](#).

8.1.2 Profinet I/O

Interface	
Field bus	Profinet I/O
Integrated switch	3-port layer-2 managed switch with Auto-MDI-X for automatic detection of crossed EtherNet cable
Connection method	RJ-45 socket
Transfer rate	10 MBit/s (10Base-T) or 100 MBit/s (100Base-TX), Autosensing
Update rate (heartbeat rate)	Can be configured from 40 ... 65 535 ms
"Change of state (COS)" update rate	40 ms
Profinet refresh rate	64 ms

¹⁾ In order to set the slave address via software, the hardware setting for the address must be "00"

Technical data

Interface	
Addressing	IP: 192.168.250.250
factory setting	Subnet mask: 255.255.0.0
	Default gateway: 0.0.0.0
MAC address	Printed on type plate, example: 00:06:77:02:00:A7

Tab. 8-2: Technical data SLC-0-GPNT

8.2 Supply circuit

These technical specifications apply to all gateways.

Supply circuit (e.g. via FLEXBUS+)	Minimum	Typical	Maximum
Supply voltage	16.8 V DC	24 V DC	30 V DC
Power consumption			
SLC-0-GPRO	–	–	1.6 W
SLC-0-GPNT	–	–	2.4 W

Tab. 8-3: Technical specifications, supply circuit

8.3 General technical data

These technical specifications apply to all gateways.

8.3.1 Terminals

Field bus	Refer to chapter 8.1 "Technical gateway data" on page 99
FLEXBUS+	10-pin connector for internal safety bus (plug)

Tab. 8-4: Terminals

8.3.2 Climatic conditions

Ambient operating temperature T_A	–25 to +55 °C
Storage temperature	–25 to +70 °C
Relative humidity	10 % to 95 %, non-condensing
Climatic conditions (EN 61 1312)	860 to 1060 hPa
Air pressure in operation	

Tab. 8-5: Climatic conditions

8.3.3 Mechanical strength

Vibration resistance	10-500 Hz/3g (EN 60 068-2-6)
Shock resistance	
Continuous shock	10 g, 16 ms (EN 60 068-2-29)
Single shock	30 g, 11 ms (EN 60 068-2-27)

Tab. 8-6: Mechanical strength

8.3.4 Electrical safety

Degree of protection	IP 20 (EN 60 529)
Protection class	III (DIN EN 61 140)
Electromagnetic compatibility	Class A (EN 61 000-6-2/EN 55 011)

Tab. 8-7: Electrical safety

8.3.5 Housing and material

Housing	
Material	Polycarbonate
Type	Device for control cabinet installation
Degree of protection	IP 20 (EN 60 529)
Color, gateways	

Light grey

Weight	
SLC-0-GPNT	125 g (±10 %)
SLC-0-GPRO	150 g (±10 %)

FLEXBUS+ connection (internal bus)

Number of poles	10
Gateways	1 plug left, 1 socket right

Top-hat rail	Mounting rail according to EN 60 715 (DIN mounting rail)
--------------	--

Tab. 8-8: Housing and material

Technical data

8.4 Dimensioned drawings

8.4.1 Dimensioned drawing SLC-0-GPNT

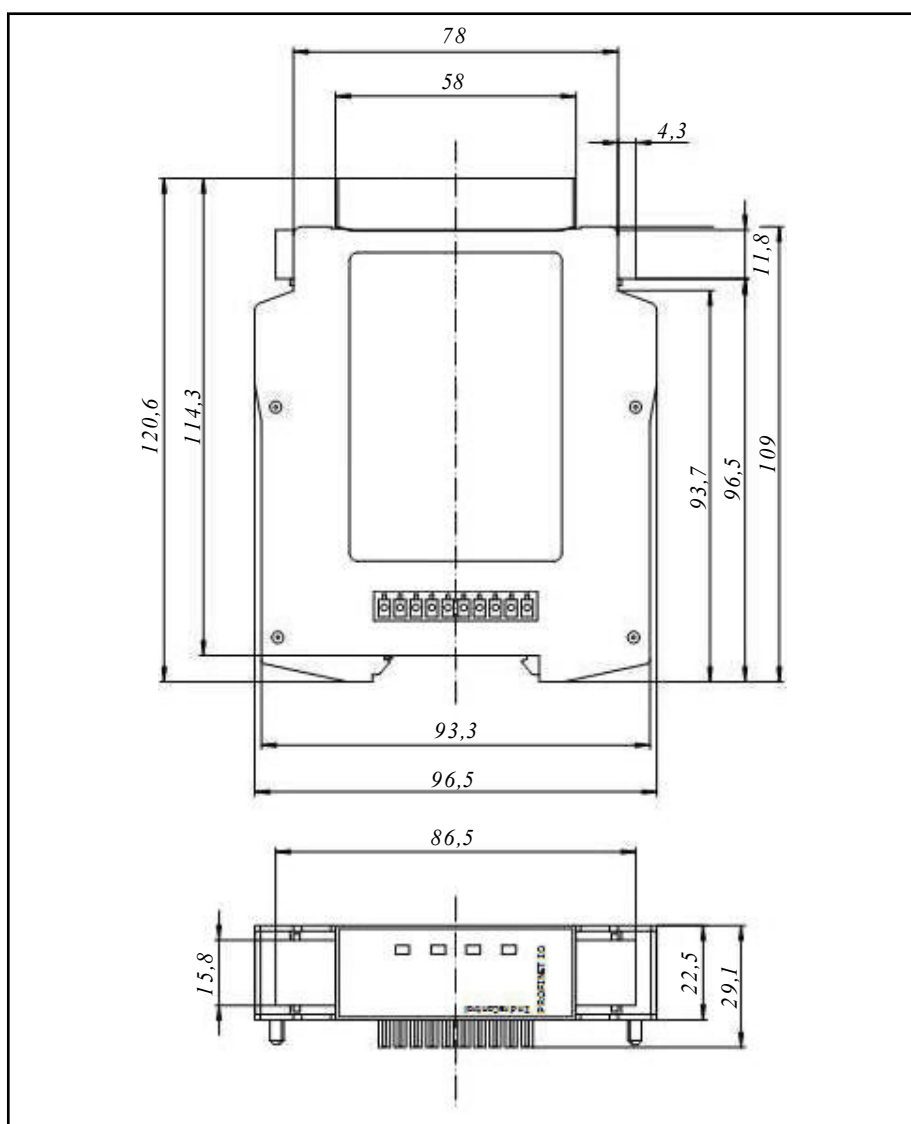


Fig. 8-1: Dimensioned drawing SLC-0-GPNT (mm)

8.4.2 Dimensioned drawing SLC-0-GPRO

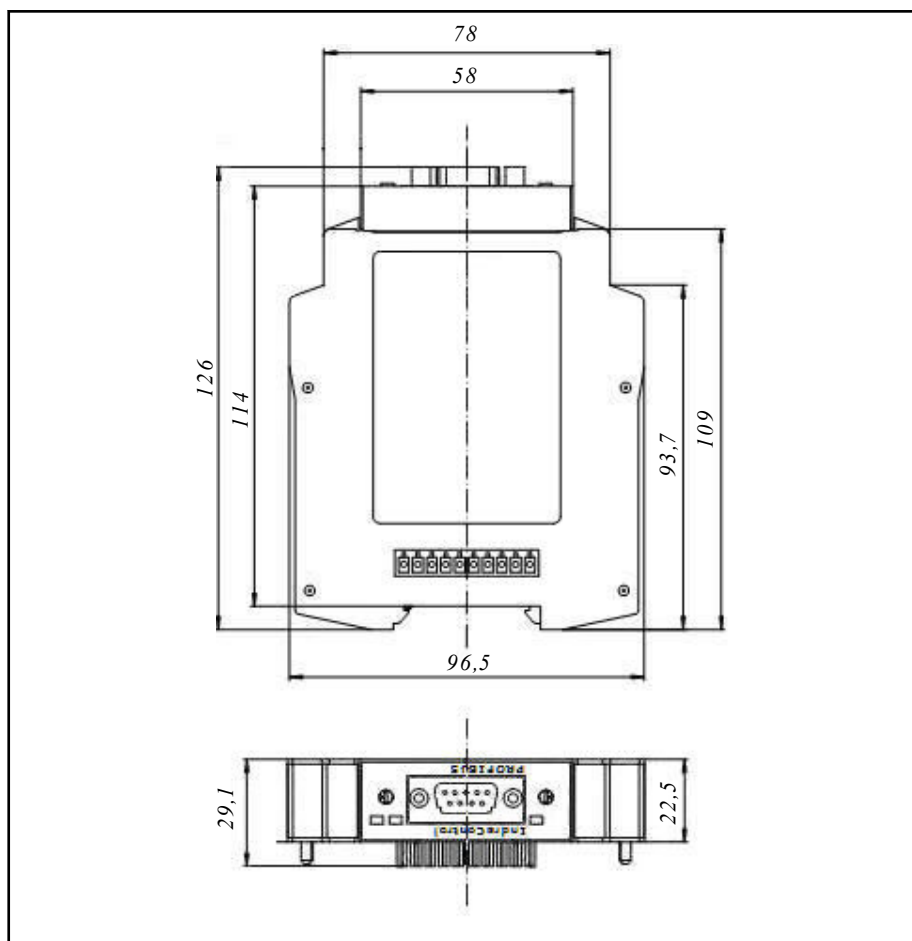


Fig. 8-2: Dimensioned drawing SLC-0-GPRO (mm)

8.5 Ordering information diagnostic gateways

Type	Gateway	Part number
SLC-0-GPNT	Profinet I/O	R911172290
SLC-0-GPRO	Profibus DP	R911172287

Tab. 8-9: Ordering information diagnostic gateways

9 Annex

9.1 EC Declaration of Conformity



EC declaration of conformity - original

Doc. No.: TC-30125-003
 Date: 2014-02-13

☐ in accordance with Machinery Directive 2006/42/EC
☐ in accordance with Low Voltage Directive 2006/95/EC
☒ in accordance with EMC Directive 2004/108/EC
☐ in accordance with Pressure Equipment Directive 97/23/EC
☐ in accordance with ATEX Directive 94/9/EC
☐ in accordance with RoHS Directive 2011/65/EC

The manufacturer

Bosch Rexroth AG
 Bgm.-Dr.-Nebel-Str. 2
 97816 Lohr am Main / Germany

hereby declares that the product below

Name: SafeLogic Compact - Field bus Gateways
 Function: Field bus Gateways
 Type: SLC-0-G*
 Trade name: Field bus Gateways
 Year of construction: as of 2011

was developed, designed and manufactured in compliance with the above-mentioned EU directive.

Harmonized Standards applied:

Standard:	Title:	Edition: (german translation)
EN 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments	2006
EN 55011	Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement	2009+A1:2010

The individual below is authorized to compile the relevant technical files:

Name: Bosch Rexroth AG
 Address: Bgm.-Dr.-Nebel-Str. 2, D-97816 Lohr am Main

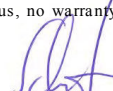
Further explanations:

An EMC-compliant component installation in the system or the machine is the prerequisite for a compliance with the EMC directive. Please refer to the Rexroth documentation of the respective product for limit values and standards to be complied with. The assembly and installation conditions described in this documentation have to be complied with. The tests have been carried out at an installation in accordance with the system, on a test site that complies with the standard. The Rexroth components are intended for installation in an end product. The test results of the installation in accordance with the system cannot always be applied to the installed condition in the end product. Thus, no warranty of EMC properties of the end product is given in this declaration.

Name: Bosch Rexroth AG
 Address: Bgm.-Dr.-Nebel-Str. 2, D-97816 Lohr am Main

Lohr am Main
city

2014-02-13
date

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 Dr. Thomas Bürger (DC-IA/EAS)
 Vice President Engineering Automation
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We reserve the right to make changes to the content of the Declaration of Conformity. Current issue on request.

Page 1 / 1

Fig. 9-1: Declaration of conformity for the SafeLogic compact Profibus and Profinet Gateway

10 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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Notes

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