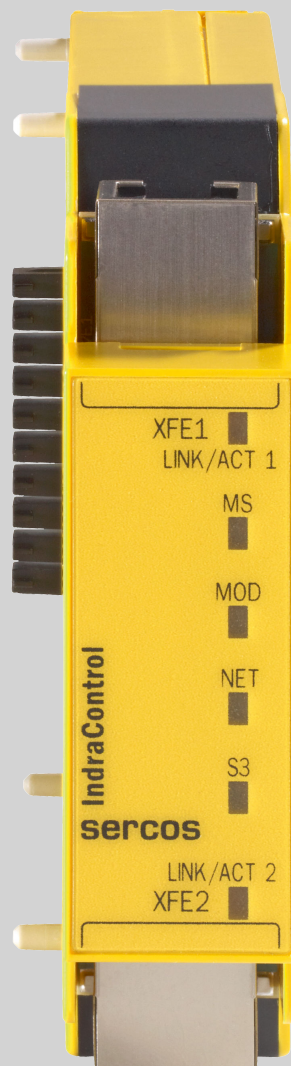


IndraControl SafeLogic compact

Sercos Gateway

Project Planning Manual
R911338436

Edition 06



Title	IndraControl SafeLogic compact Sercos Gateway
Type of Documentation	Project Planning Manual
Document Typecode	DOK-CONTRL-SLC*GW*GS3S-PR06-EN-P
Internal File Reference	RS-9813ab9335d4cdfe0a6846a5007e48bd-6-en-US-3
Change Record	Edition 06, 2019-03 Refer to tab. 1-1 "Change Record" on page 5
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Editorial Department	Engineering Automation Systems Solution Integration PLC, Safety and Hardware MaJu (MaKo, MS/PiaSt)

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1 About this documentation

Editions of this documentation

Edition	Release Date	Notes
01	2013-02	First edition
02	2013-12	Supplements
03	2014-05	Supplements
04	2016-04	Supplements
05	2018-09	Standards used are updated
06	2019-03	Changes in chapter SafeLogic Designer configuration

Tab. 1-1: Change Record

1.1 Scope

This manual describes the project planning for IndraControl SafeLogic compact Sercos Gateway with the type code "SLC-3-GS3S-00300" of the SafeLogic compact control. Information on hardware, configuration and engineering can be found in this manual.

This project planning manual only applies in connection with other SafeLogic compact instructions (see [tab. 1-3 "Related documents, IndraControl SafeLogic compact Mounting Instructions" on page 8](#)).

1.2 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 "Engineering", the target group "commissioning engineer" can execute the activities "parameterizing, programming and configuring" using this documentation.

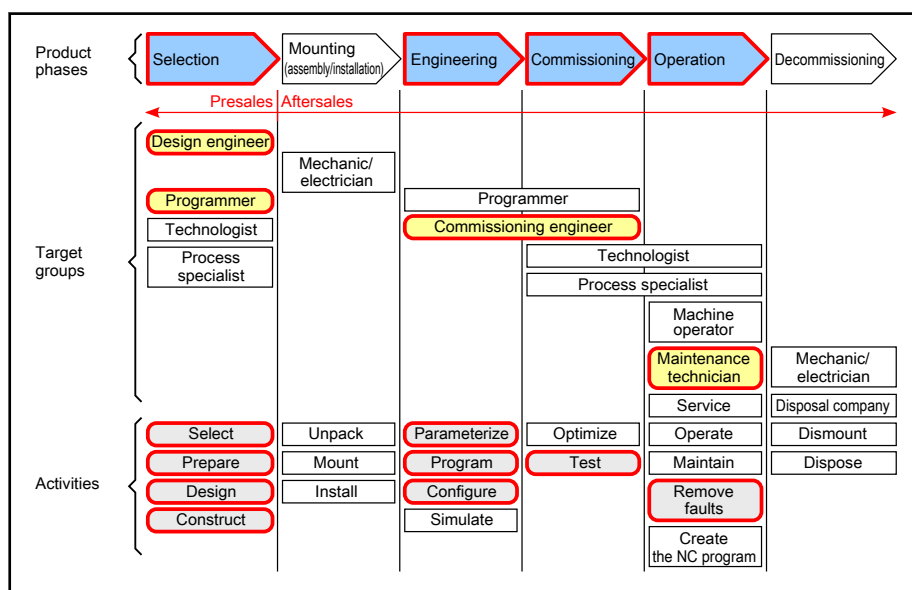


Fig. 1-1: Assigning this documentation to the target groups, product phases and target group activities

About this documentation

1.3 Purpose

This project planning manual instructs the technical personnel of the machine manufacturer and the machine operator regarding the safe configuration, commissioning, diagnostics as well as for operation and maintenance of the SafeLogic compact Sercos Gateways.



This project planning manual does not provide instructions for the machine operation that are integrated in a modular safety control SafeLogic compact and a Sercos Gateway. For information on the operation, refer to the operating instructions of the respective machine.

1.4 Documentation structure

The first part of this document contains important information on intended use and safety instructions to be applied ([chapter 2 "Intended use" on page 11](#) and [chapter 3 "Using safety instructions" on page 13](#)).

[chapter 4 "Sercos Gateway product description" on page 15](#) gives a brief description of the SafeLogic compact Sercos Gateways.

[chapter 5 "Sercos bus configuration" on page 21](#) contains information on the Sercos bus configuration.

[chapter 6 "Commissioning" on page 33](#) contains information on commissioning.

[chapter 7 "SafeLogic Designer configuration" on page 35](#) contains information on the configuration of the SafeLogic Designer.

[chapter 8 "Diagnostics" on page 65](#) contains diagnostic options of the SafeLogic compact Sercos Gateway.

[chapter 9 "Technical data" on page 99](#) contains the technical data of the module.

[chapter 10 "Ordering information and accessories" on page 105](#) contains information on spare parts and accessories.

[chapter 11 "Appendix" on page 107](#) contains descriptions on Sercos and manufacturer-specific drive and control parameters relevant to the SafeLogic compact Sercos Gateway as well as information on the device exchange.

For information on the Bosch Rexroth customer service help desk, refer to [chapter 12 "Service and support" on page 201](#).

1.5 Related documents

For the SafeLogic compact system, the following documentations are available:

About this documentation

Document	Part number, document type	Description
IndraControl SafeLogic compact Designer Software	R911332749 Operating In- structions	This operating instructions provides information on the software configuration as well as on the operation and diagnostics of a SafeLogic compact system with the SafeLogic Designer software for the technical staff of the machine manufacturer
IndraControl SafeLogic compact Hardware	R911332746 Operating In- structions	This operating instruction instructs the technical staff of the machine manufacturer and the machine operator regarding the safe assembly, electrical installation, commissioning as well as the maintenance of the SafeLogic compact Diagnostic Gateway
IndraControl SafeLogic compact Diagnostic Gateways	R911332752 Operating In- structions	Describes the SafeLogic compact Diagnostic Gateways and their functions in detail
IndraControl SafeLogic compact Sercos Gateway	R911338431 Operating In- structions	This operating instruction instructs the technical staff of the machine manufacturer and the machine operator regarding the safe assembly, configuration, electrical installation, commissioning as well as operation and maintenance of the SafeLogic compact Sercos Gateway
Safety controls, network solutions SafeLogic compact	R911332754 Safety instruc- tions	The safety instructions provide information on the initial commissioning and operating of the machine/system to the planners, developers and operators as well as to persons installing protective devices in a machine/system

Tab. 1-2: Required and supplementing documentation

About this documentation

Document	Part number, document type	Description
Sercos gateway SLC-3-GS3S00300	R911339570	These mounting instructions describe the mounting of modules into a SafeLogic compact safety control
Ethernet Gateway Profinet I/O SLC-0-GPNT00300	R911334404	
Profibus Gateway SLC-0-GPRO00300	R911334403	
Motion Control Modules SLC-3-MOC000300	R911343758	
Main modules SLC-3-CPU0 SLC-3-CPU1 SLC-3-CPU3	R911334402	
Extension modules SLC-3-XTDI SLC-3-XTIO SLC-3-XTDS SLC-0-STIO	R911334401	
Relay modules SLC-A-UE410-2RO4 SLC-A-UE410-4RO4	R911334400	
Encoder connection boxes SLC-A-MOC-MFSB-RX SLC-A-MOC-DECB-RX	R911343761	

Tab. 1-3: *Related documents, IndraControl SafeLogic compact Mounting Instructions*

1.6 Terms and abbreviations

Term	Explanation
GS3S	SafeLogic compact Sercos Gateway
CIP	Common Industrial Protocol: standardized industrial communication protocol of the ODVA
CSos	CIP Safety on Sercos: Safe communication via Sercos
CC	Cross Communication: Direct cross communication between Sercos devices
SMP	Sercos messaging protocol: Transmitting data of several applications by means of a multiplex method

About this documentation

Term	Explanation
SDDML	Sercos Device Description Markup Language. It is an XML device description language for Sercos III devices and follows the Sercos III device model
CP4	Sercos communication phase 4: cyclic communication (also labeled BB or P4)

Tab. 1-4: Abbreviations used

1.7 Trademark

Windows 98, Windows NT 4.0, Windows 2000, Windows XP , Windows 7 and Internet Explorer are entered trademarks of the 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 Intended use

The SafeLogic compact Sercos Gateway GS3S can only be operated with a SafeLogic compact system. The firmware version of the connected SafeLogic compact CPUx has to have at least V2.0.0. The version of the configuration software SafeLogic Designer has to be at least 1.4.0.

The SafeLogic compact Sercos Gateway GS3S supports Sercos in the third generation.

The SafeLogic compact Sercos Gateway GS3S does not have any individual power supply.

WARNING

The SafeLogic compact Sercos Gateway GS3S is a Safety component that facilitates the transfer of safety data via Sercos.

Even though the control system was developed, manufactured and tested according to the safety standards and certified by an accredited test institute, using this component does not automatically ensure a functionally safe machine. The machine manufacturer has to perform a risk analysis and take corresponding protective measures to reduce risks and to validate their effect even though it was accredited and developed according to the safety standards. Only a complete implementation of the requirements (such as systematic measures, software requirements, integration of sensors and actuators) according to the applied standards (DIN EN ISO 13849 and DIN EN 62061) can ensure the functional safety.

A SafeLogic compact Sercos Gateway GS3S can only be used by skilled personnel and only at the machine at which the SafeLogic compact Sercos Gateway GS3S has been mounted and initially commissioned by skilled personnel according to the project planning manual.

WARNING

For safety applications, do not use safety data that has been transmitted from the Sercos master to the SafeLogic compact Sercos Gateway GS3S!

By using SafeLogic compact Sercos Gateway GS3S, non-safety related data of the Sercos master can be integrated in the logic editor without compromising the safety function of the SafeLogic compact system. Do not integrate a gateway in a SafeLogic compact system without checking the hazard source by an expert for safety.

WARNING

Comply with the safety instructions and the protective measures for safety for the Sercos Gateway GS3S!

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.

Intended use



- Comply with the specific standards and directives of your country when mounting, installing and using the SafeLogic compact Sercos Gateways GS3S
- The national and international rules and regulations apply to the installation and use as well as commissioning and periodic technical inspection of the modular SafeLogic compact safety control, in particular:
 - Low voltage directive 2014/35/EU
 - Machine directive 2006/42/EC
 - EMC directive 2014/30/EU
 - Provision and use of work equipment directive 2009/104/EC
 - Accident prevention regulations and safety rules
 Inspections are to be carried out by qualified personnel
- This project planning manual does not provide any instructions for the operation of the machine into which the Safety control is or will be integrated. For information on the operation, refer to the operating instructions of the machine

⚠ 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.

2.1 UL/CSA applications

- Use only in a pollution degree 2 environment
- Use suitable connections for a temperature range from 60 °C to 75 °C. The max. operating ambient temperature is 55°C
- The device has to be supplied in this case via a class 2 voltage source or a class 2 transformer according to UL 1310 or UL 1585 in UL applications
- The power supply of the SafeLogic compact Sercos Gateway GS3S has to be executed by a power supply unit with protective separation, protected by a fuse according to UL 248 with max. 100 V. V corresponds to the DC supply voltage with a max. of 42.4 V DC. The UL 508 requirements are thus complied with



The safety functions are not evaluated by UL. The approval is granted according to UL 508, general applications.

3 Using safety instructions

3.1 Structure of the safety instructions

The safety instructions are structured as follows:

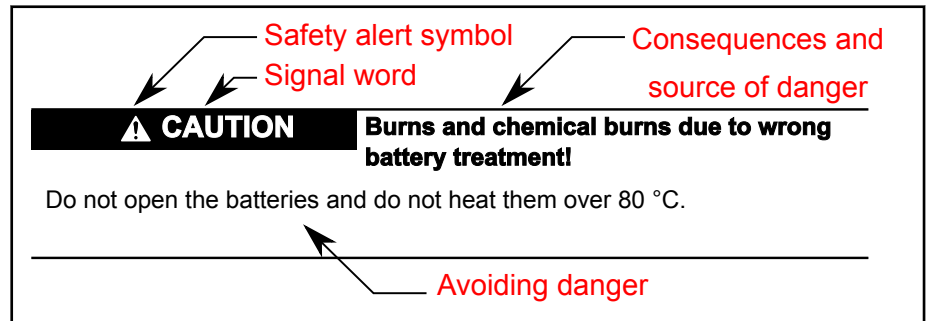


Fig. 3-1: Structure of the safety instructions

3.2 Explaining signal words and safety alert symbol

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

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

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

Using safety instructions

3.3 Symbols used

Pointers are displayed as follows:



This is a note.

Tips are displayed as follows:



This is a tip.

3.4 Explaining the signal alert symbol on the device



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

4 Sercos Gateway product description

4.1 General information

The SafeLogic compact Sercos Gateway (GS3S) is an extension module of the SafeLogic compact system. Based on the Sercos master, the GS3S is a Sercos I/O slave that cyclically communicates input and output data and which can operate Sercos CC communications up to 16 other Sercos devices (CIP Safety on Sercos targets).

The GS3S extends the SafeLogic compact system by the following functionality:

- Communication of safety data between SafeLogic compact and up to 16 CIP Safety on Sercos targets. Moreover, a group generation of the CSOs target is possible on the GS3S. Generating a group simplifies the application program and improves the response times (as the data volume between SafeLogic compact CPU and GS3S is reduced)
- Communication of non-safety data between SafeLogic compact and Sercos master control (analog to other diagnostic gateways)

This includes:

- Cyclic communication of the user-defined operating data and status information (see [chapter 5.3.1 "Configuring cyclic I/O data" on page 22](#))
- Acyclic communication of the SafeLogic compact module diagnostics and system CRCs by reading out the Sercos parameters via the "Sercos service channel" (see [chapter 7.3 "Configuring the operating data to exchange data with the Sercos master" on page 44](#))
- TCP/IP interface to configure and diagnose the SafeLogic compact system using the TCP/IP communication

The SafeLogic compact Sercos Gateway supports Sercos in the third generation.

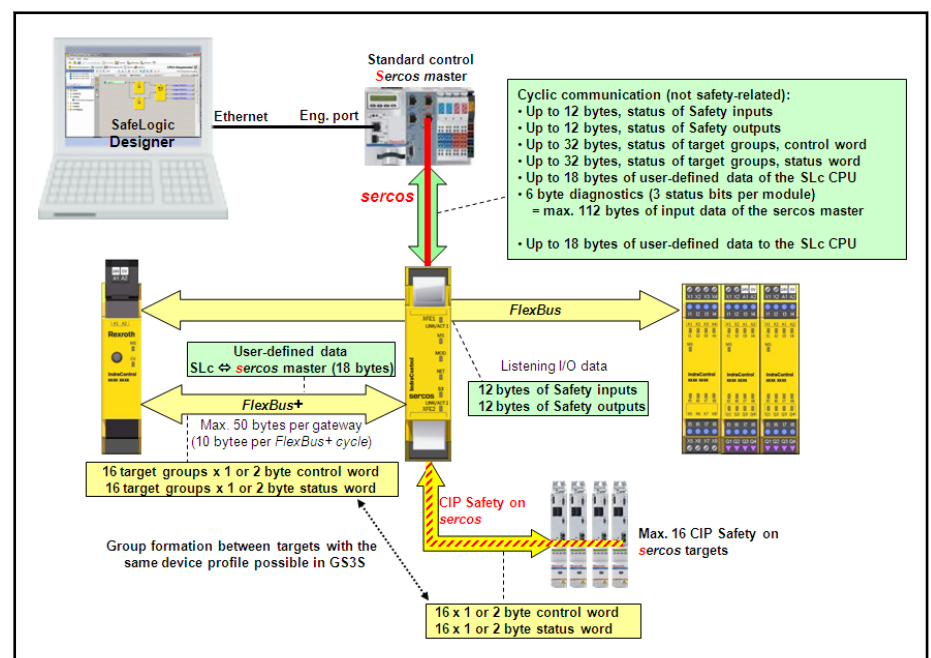


Fig. 4-1: Overview - Communication paths of the Sercos gateway

Sercos Gateway product description

⚠ WARNING**Do not use any Sercos master data for safety applications!**

By using the Sercos gateway, non-safety related data of the Sercos master can be integrated in the logic editor of the SafeLogic compact system without compromising the safety function of the SafeLogic compact system. Do not integrate a gateway in a SafeLogic compact system without checking the hazard source by an expert for safety.



The Sercos Gateway (GS3S) can also be operated as simple diagnostic gateway if no CIP Safety on Sercos targets are configured.

The Sercos gateway is configured using the configuration software SafeLogic Designer on a PC or a notebook which is connected to the SafeLogic CPU via the RS232 interface or to an Ethernet gateway via 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.

The Sercos gateway can only be operated in a SafeLogic compact system. The Sercos gateway does not have 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 rail to DIN EN 60 715.

4.2 Topologies in the Sercos network

Up to two gateways can be operated at a SafeLogic compact CPU in a SafeLogic compact system. Optionally, two GS3S can be used side by side or a GS3S apart from another diagnostic gateway (e.g. Profinet or Profibus).

In case of simultaneous operation of several GS3S in the Sercos network, different topologies can be implemented:

- **SafeLogic compact system with two GS3S in a Sercos network**

If more than 16 CIP Safety on Sercos targets are controlled by a SafeLogic compact CPU, both GS3S can be integrated in a Sercos network

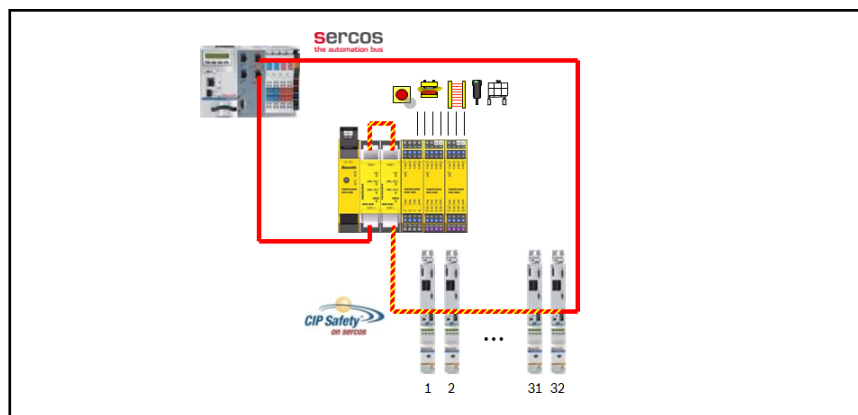


Fig. 4-2: Topology 1 – Two GS3S in a Sercos network

- **SafeLogic compact system with two GS3S in different Sercos networks**

Sercos Gateway product description

If a SafeLogic compact CPU is to control the CIP Safety on Sercos targets from two different Sercos master controls, one GS3S each can be integrated in the Sercos networks of the two Sercos master controls

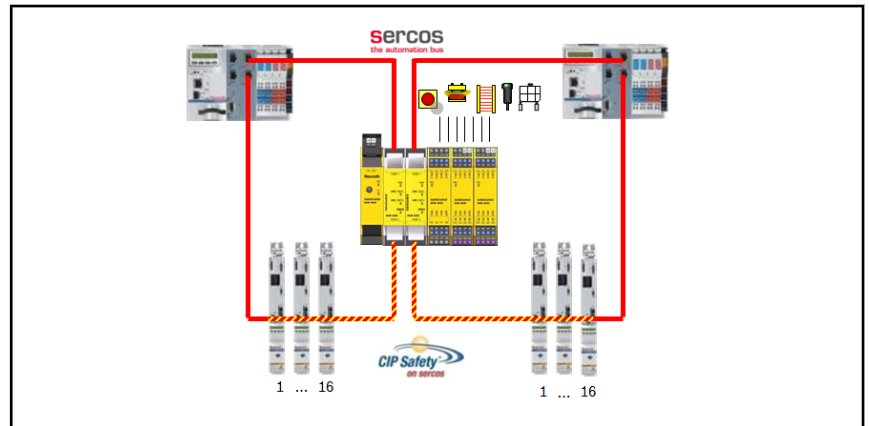


Fig. 4-3: Topology 2 – Two GS3S in different Sercos networks

- **Several SafeLogic compact systems with GS3S in a Sercos network**

To implement modular machine concepts with decentral safety controls, several SafeLogic compact systems can be integrated in a Sercos network. To exchange safety-relevant data between the decentralized safety controls, up to 4 SafeLogic compact CPU1 (or CPU3) can be connected via EFI Link or up to 32 CPU3 can be connected to Flexi Line

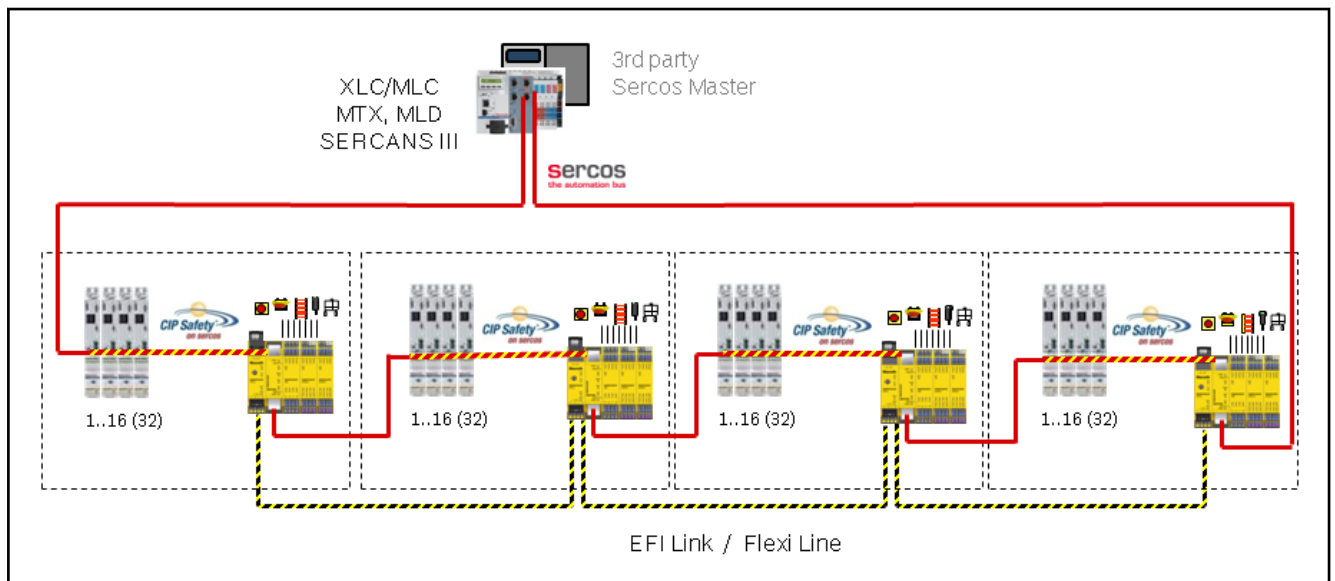


Fig. 4-4: Topology 3 – Several SafeLogic compact systems with GS3S in a Sercos network

- **Several SafeLogic compact systems with GS3S in different machines or machine modules**

To exchange safety-relevant data between the decentralized safety controls, Flexi Line and EFI Link can simultaneously be operated at a SafeLogic compact CPU3

Sercos Gateway product description

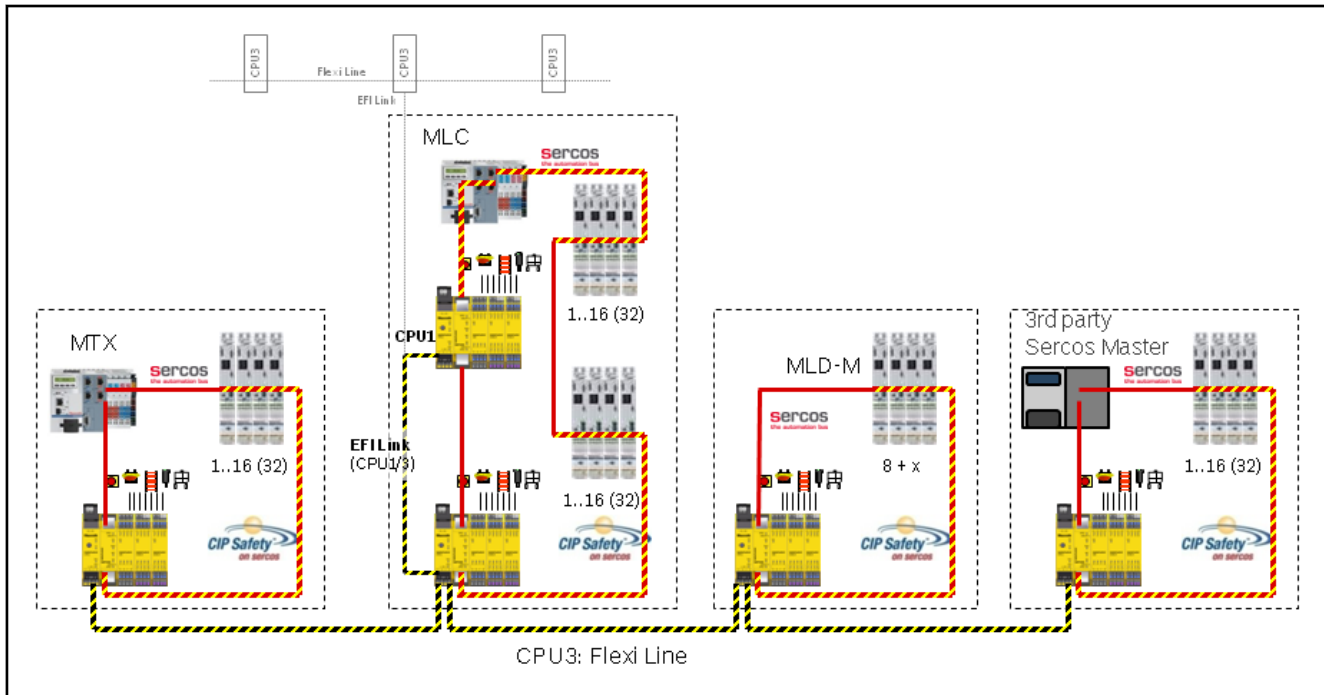


Fig. 4-5: Topology 4 – Several SafeLogic compact systems with GS3S in different machines or machine modules

- Sercos master requirements**

GS3S requires 32 Sercos cross communication connections for 16 CSOs targets and 2 Sercos connections for the master-slave communication. The Sercos master has to support Sercos slave devices with up to 34 Sercos connections. The total number of Sercos connections supported by a Sercos master determines the number of GS3S and CSOs targets operated in a Sercos network.

Up to 16 GS3S and up to 64 CSOs targets are supported in a Sercos network with the Rexroth controls IndraLogic XLC/IndraMotion MLC/MTX 13VRS



Connect GS3S at the same Sercos port of the Sercos master at which the CSOs targets controlled by the gateway are connected to. Otherwise, the time to transmit the CIP Safety telegrams is increased by up to 2 Sercos cycles.

4.3 Supported CIP Safety functionality

4.3.1 Originator

The Sercos Gateway (GS3S) is the originator ("master") of the CIP Safety connections. CIP Safety target connections are established via the originator.

The GS3S does not have any target functionality, i.e., there is no CIP Safety on Sercos (CSOs) cross communication between several GS3S or between another originator.

4.3.2 16 targets

Up to 16 CIP Safety on Sercos targets are supported. For each target, a consumer connection (CIP Safety inputs of the GS3S) and a producer connection (CIP Safety outputs of the GS3S) can be established. Individual connec-

tions (only CIP Safety inputs or only CIP Safety outputs) can also be established.

4.3.3 Short telegram

Connections with 1- or 2-byte user data are supported. The "long telegram" (3..250 byte) is not supported.

4.3.4 Extended format, base format

Corrupt telegrams are also permitted during the network response time ("Extended Format"). Thus, a higher availability can be achieved.

If the connection parameter "Max. fault number" is set to "0" , the "Base format" in which no corrupt telegrams are permitted, is used, see [chapter 7.5.5 "Connection parameters" on page 55](#).

4.3.5 ForwardOpen type 2

The application-specific configuration files of a target (e.g. discrepancy times) are not transmitted when trying to establish a connection. I.e., configuration data has to be configured and saved in the target. CSos targets, e.g. modular CSos I/O that can only be configured by establishing a connection ("ForwardOpen Type 1") are **not** supported.

4.3.6 Single-cast

A CSos target can only be assigned to one GS3S originator. Multi-cast connections are not supported.

4.3.7 SafeLogic Designer

The GS3S can only be configured within a SafeLogic compact system with the SafeLogic Designer. The "SNCT Interface" standardized for CIP Safety is not supported.

4.4 Commissioning CIP Safety on Sercos (CSos)

As different commissioning tools are required to commission CIP Safety on Sercos, the following procedure is recommended:

I. Sercos bus configuration:

Configuring all Sercos devices (GS3S, IndraDrives, other Sercos slaves) using the configuration software of the Sercos master control (e.g. IndraWorks), see [chapter 5.2 "Adding the Sercos Gateway" on page 21](#).

II. Configuring CSos targets:

Configuring the CSos parameters of the targets using the configuration software (e.g. IndraWorks - SI wizard for IndraDrive by Bosch Rexroth).



Please observe the information on CSos parameters "Safety Device ID (SDID)" and "Safety Network Number (SNN)" in [chapter 7.5 "CIP Safety configuration" on page 49](#).

III. Configuring Sercos cross communication (CC):

The Sercos CC communication is configured using the Sercos master control configuration software. The Sercos CC communication can be set up for all CSos-relevant Sercos slaves even if the CIP Safety connections are commissioned successively.

Sercos Gateway product description

This configuration is realized via an application-specific CC configuration dialog for Sercos master control systems of Bosch Rexroth (IndraLogic XLC, IndraMotion MLC, IndraMotion MTX and IndraDrive), see [chapter 5.3.2 "Configuring Sercos cross communication \(CC\) connections"](#) on page 26.

IV. Configuring the CIP Safety originator:

Configuring the CIP Safety connections in the SafeLogic Designer, see [chapter 7.5 "CIP Safety configuration"](#) on page 49.

5 Sercos bus configuration

5.1 General information

Based on the Sercos master, the SafeLogic compact Sercos Gateway (GS3S) is a Sercos I/O slave that cyclically communicates input and output data and which can operate Sercos CC communications up to 16 other Sercos devices (CIP Safety on Sercos targets).

5.1.1 Minimum Sercos cycle time

GS3S supports a minimum Sercos cycle time of 1 ms. If more than 8 CSOs targets are used, 2 ms has to be selected as minimum Sercos cycle time. If a Sercos cycle time is selected that is too low, a switching command error occurs.

5.1.2 Sercos master configuration in IndraWorks

Subsequently, the Sercos configuration of GS3S is described, taking the example of the Bosch Rexroth control system "IndraMotion MLC". The configuration software "IndraWorks Engineering" is used from version 13V04.

5.2 Adding the Sercos Gateway

SafeLogic compact Sercos Gateway is already in the IndraWorks device library. Adding a GS3S to the Sercos node of the IndraMotion MLC is done analogously to the other Sercos devices using one of the following actions:

1. Adding via the context menu of the Sercos node of the IndraMotion MLC in the Project Explorer.
2. Adding via drag&drop of the GS3S from the device library to the Sercos node of the IndraMotion MLC in the Project Explorer.
3. Adding GS3S by Sercos "Scan bus configuration" in the context menu of the Sercos node of IndraMotion MLC in the Project Explorer.

Sercos bus configuration

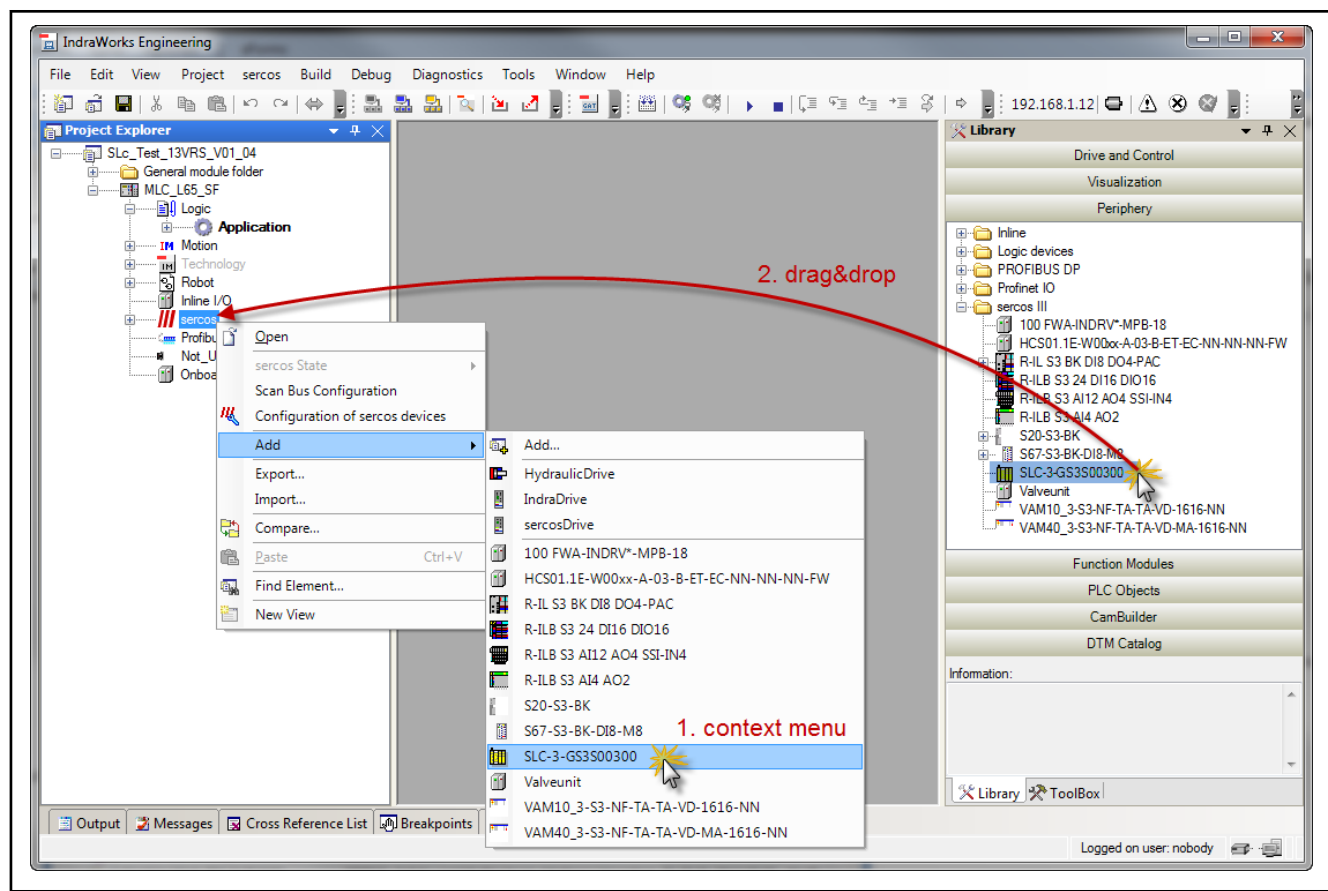


Fig. 5-1: IndraWorks - Adding the Sercos Gateway



For the device description file (SDDML) of the SafeLogic compact Sercos Gateways (SLC-3-GS3S), also refer to the installation directory of the SafeLogic Designer in the "DeviceDescriptions" subfolder.

5.3 Configuring the Sercos Gateway

5.3.1 Configuring cyclic I/O data

The available cyclic I/O data of the SafeLogic compact Sercos Gateway are divided into three slots (0-2).

Sercos bus configuration

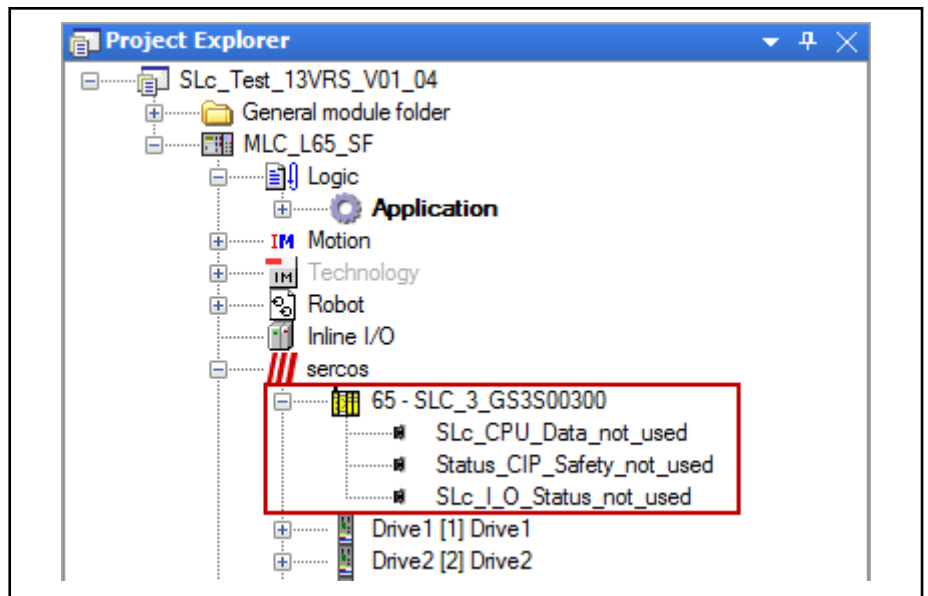


Fig. 5-2: IndraWorks - Slots of cyclic I/O data of the Sercos Gateway

After a SafeLogic compact Sercos Gateway has been created, the three slots of the cyclic I/O data are empty. Consequently, no cyclic I/O data is exchanged.

The cyclic I/O data is configured via "Set Device" in the context menu of the respective GS3S slot below the Sercos node.

Sercos bus configuration

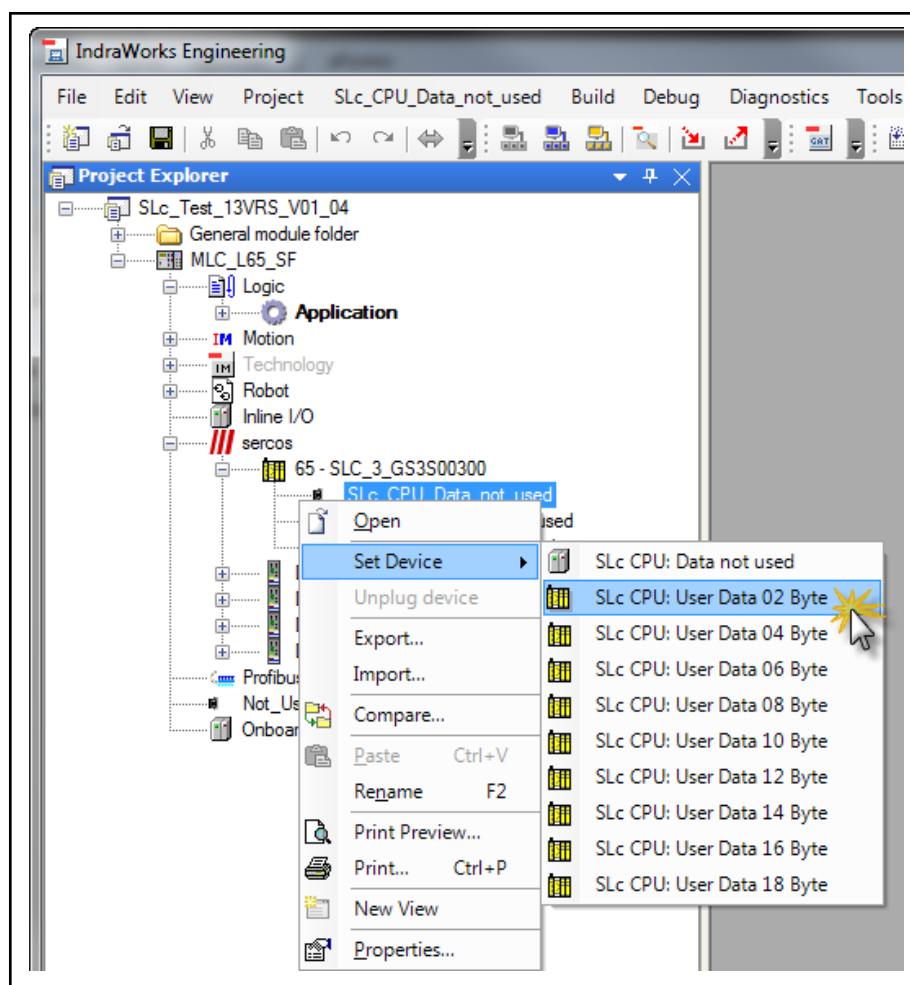


Fig. 5-3: IndraWorks – Configuring cyclic I/O data



Using "Set device" of a logic configuration module, the current configuration of this slot is deleted. This means, if the "User Data" length is for example altered from 02 to 04 bytes, the current I/O mapping (e.g. allocation to PLC variables) is deleted and has to be recreated in the newly set configuration module!

Slot 0: SafeLogic compact CPU data

The following three data areas are summarized in this slot:

- Diagnostic bits of the individual SafeLogic compact modules: (6 byte inputs of the Sercos master):

Each of the max. 15 modules of a SafeLogic compact station has a 4-byte module status information (data set 3). The first three bits ("Operational status", "Internal error" and "External error") of these four bytes of each module are provided cyclically (also refer to [chapter 8.3.2 "Module status" on page 67](#)).



The module status diagnostic bits are updated every 200 ms by the CPU module.

The diagnostic bits of the individual modules are mapped in one word (16 bit) each for "Operational status", "Internal error" and "External error". The bits of the individual words have the following meaning:

Sercos bus configuration

- Bit 0: CPU status
 - Bit 1: I/O module 1 status
 - ...
 - Bit 12: I/O module 12 status
 - Bit 13: Status of the 1st gateway
 - Bit 14: Status of the 2nd gateway
 - Bit 15: No description
 - User-defined data of the SafeLogic compact CPU:
Up to 18 bytes of cyclic input data of the Sercos master can be defined by the user
(see [chapter 7.3.2 "SafeLogic compact ⇒ Sercos master" on page 45](#))
 - User-defined data for the SafeLogic compact CPU: (up to 18 byte outputs of the Sercos master)
(see [chapter 7.3.3 "Sercos master ⇒ SafeLogic compact " on page 47](#))
- Available configuration modules:
- SLc CPU: Data not used (0-byte diagnostics, 0-byte input data, 0-byte output data) [Default]
 - SLc CPU: User data 02 byte (6-byte diagnostics, 2-byte input data, 2-byte output data)
 - ...
 - SLc CPU: Data 18 byte (6-byte diagnostics, 18-byte input data, 18-byte output data)

Slot 1: Status of the CIP safety target groups

In this slot, the status of the CIP safety control word as well as the status of the CIP safety status word of the up to 16 CIP safety target groups is mapped (up to 64 byte input data of the Sercos master)

Available configuration modules:

- Status CIP safety: Not used (0-byte control word) [default]
- Status CIP Safety: Group 01 (2-byte control word, 2-byte status word)
- Status CIP Safety: Group 01-02 (4-byte control word, 4-byte status word)
- ...
- Status CIP Safety: Group 01-16 (32-byte control word, 32-byte status word)

Slot 2: Status of the I/O modules

In this slot, the status of the up to 12 digital I/O modules of the SafeLogic compact station is mapped. The status of the digital inputs is mapped independently from the status of the digital outputs.

- Status of the digital inputs of the up to 12 I/O modules (up to 12 byte input data of the Sercos master)
- Status of the digital outputs of the up to 12 I/O modules (up to 12 byte input data of the Sercos master)

For each I/O module, 1 byte is assigned for the status of the digital inputs and 1 byte for the status of the digital outputs. As the I/O modules SLC-3-XTIO are provided with 4 digital outputs and the SLC-3-XTDI are

Sercos bus configuration

not provided with any digital outputs, only the bits 0 - 3 are assigned or the status byte is set to "0".



As of firmware V2.00, the **I/O modules** are also provided with diagnostic bits in the process data. In dual-channel input elements, the lower-order bit contains the state of the preliminary evaluation of the dual-channel element. This also corresponds to the state of the element in the logic program. The higher-order bit indicates an error in the preliminary evaluation, such as cross-circuit detection. As for all diagnostic bits, the following applies: 0 = Error, 1 = No error.



A **DriveMonitor** module (MOCx) occupies two "slots" of the up to 12 potential extension modules and is provided with 2 bytes I/O data to the CPU module. In the status of this I/O data, the first byte is on the physical position (slot of the MOCx module) and the second byte on the last of the 12 slots or the second to last position for a second MOCx module, etc.

Available configuration modules:

- SLC I/O status: Not used (0-byte input status, 0-byte output status) [default]
- SLC I/O status: Modules 01 (1-byte input status, 1-byte output status)
- SLC I/O status: Modules 01-02 (2-byte input status, 2-byte output status)
- ...
- SLC I/O status: Modules 01-12 (12-byte input status, 12-byte output status)



Configuration changes of the cyclic I/O data are only transmitted to the control upon PLC login. The cyclic I/O data is only applied after a Sercos phase transition from P2 to P4!



If more I/O data is configured for the exchange with the Sercos master than physically available, "0" is assigned to data of the inexistent modules.

5.3.2 Configuring Sercos cross communication (CC) connections

The CIP Safety on Sercos (CSos) communication between the SafeLogic compact Sercos Gateway and the respective target is based on Sercos cross communication (CC) connections.

These CC connections are configured in IndraWorks by assigning the Sercos device (CSos target) to the target number of the SafeLogic compact Gateway.

Sercos Gateway: Assignment target number ↔ Sercos device

The dialog is accessed via the context menu of the Sercos Gateway below the Sercos node in the Project Explorer.

Sercos bus configuration

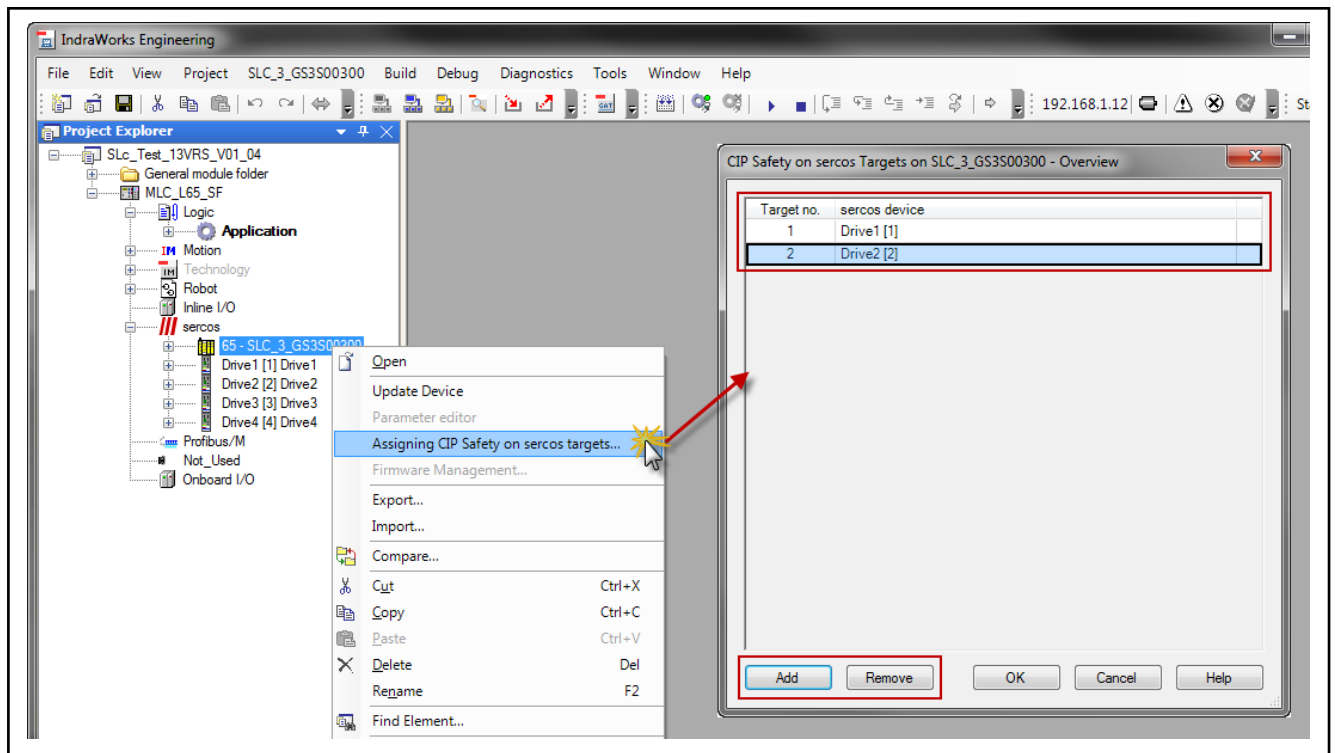


Fig. 5-4: Sercos Gateway - Assignment target number ⇔ Sercos device

The Sercos devices can be added or removed as target or the target number of the devices can be adjusted.

IndraDrive: Assignment target number ⇔ Sercos device

Optionally to the configuration via the context menu of the SafeLogic compact Sercos gateway, the target number can also be assigned at the drive axis.

Open the dialog via the context menu of the drive axis below the Sercos node in the Project Explorer.

Sercos bus configuration

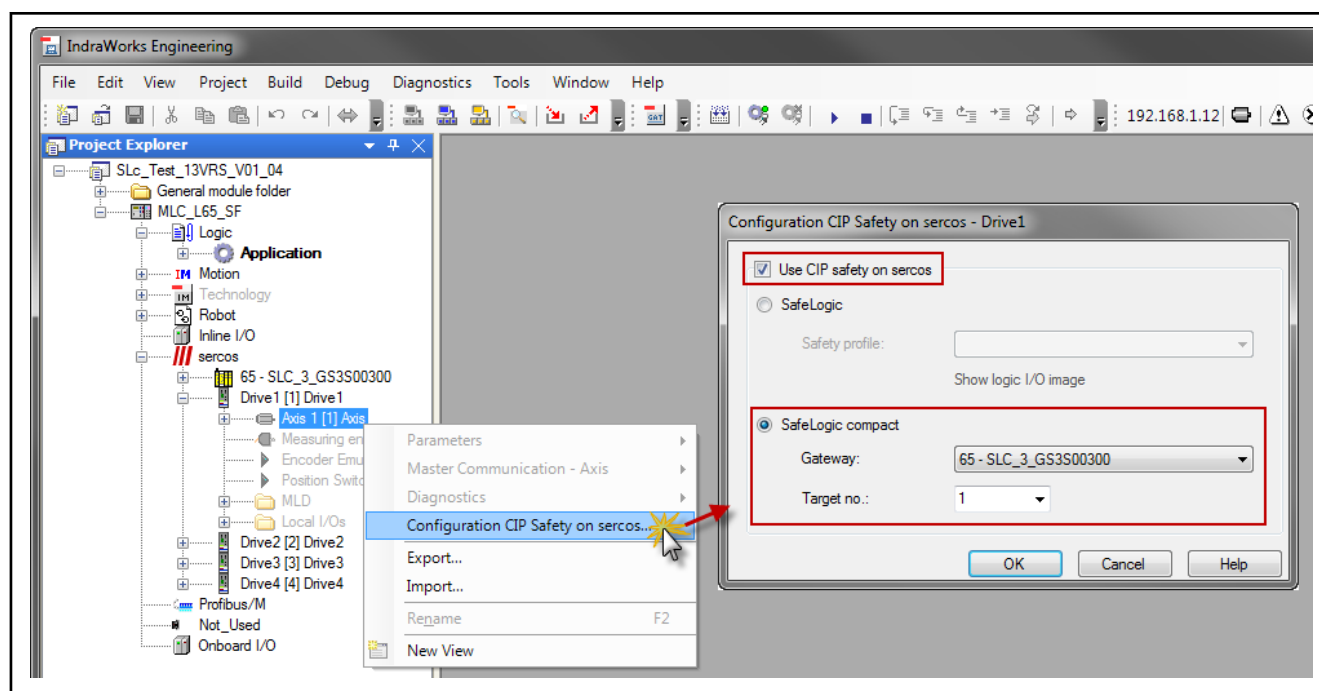


Fig. 5-5: IndraDrive – Assigning target number ↔ Sercos device

The axis can be enabled as target of the SafeLogic compact Sercos Gateway and the target number can be assigned.



To assign the Sercos devices to the target number of the SafeLogic compact Sercos Gateway, ensure that no online connection is established to the control. The PLC has to be logged out.

Both dialogs have a common database. Thus, changes are also applied in the other dialog.

5.4 Changing firmware of the Sercos interface

5.4.1 Basics

The Sercos safety Gateway (GS3S) firmware consists of several components. The firmware consists of two parts (simplified):

- Safety relevant firmware: The firmware does not have to be replaced (hardware exchange required)
- Firmware of the Sercos interface: The firmware can be replaced by the service or the user

A firmware is replaced using the following hardware and software for GS3S:

- Computer with "IndraWorks" software or
- Computer with TFTP client

5.4.2 Preparations and boundary conditions of the firmware replacement

The following preparations have to be made for a firmware replacement:

- It is recommended to back up the parameter values before replacing the firmware
- The 24V power supply voltage cannot be switched off during the firmware replacement

 WARNING

Wait for at least 2 minutes in case of an error and a restart!

If the GS3S is restarted following a failed firmware download, wait for at least 2 minutes until the power supply is disconnected again. Otherwise, the GS3S might go into a disabled state! In that case, the GS3S can only be operated again by contacting the technical service.

- Do not abort the firmware replacement. Always complete the replacement



To replace the firmware, the GS3S has to be either in the Sercos phase 2 or in 0. Thus, it is ensured that the system is in a safe state. An error is issued when trying to download the firmware either in the Sercos phase 3 or 4. When using IndraWorks to replace the firmware, phase switching takes place automatically.



The firmware and hardware versions have to be compatible. During a replacement, the firmware checks whether the firmware to be loaded is compatible. If this is not the case, an error is generated and the replacement is aborted. The hardware version can be taken from parameter [S-0-1300.0.8](#).



After the firmware replacement is completed, check whether the exchanged firmware contains the correct version. When using IndraWorks for replacing the firmware, the current version is displayed prior to the firmware replacement. After the replacement, the new version is displayed.

5.4.3 Replacing firmware using IndraWorks

Before starting to replace the firmware, a control has to be configured with a GS3S in the IndraWorks project. A connection to the control has to be provided as well.



In case of several GS3S in the Sercos network, a unique IP address has to be assigned to each device. The IP address is assigned automatically at a Rexroth control upon operation. The IP settings can be changed in the parameters [S-0-1020](#), [S-0-1021](#) and [S-0-1022](#) or adjusted, if required.



When changing the IP settings, either the device has to be restarted or the command [S-0-1048](#) has to be executed to enable the settings.

1. Connect the GS3S to the computer.
2. Load the firmware.
 1. Call "IndraWorks".
 2. Load or create the project again for the corresponding GS3S.
 3. Switch the project "Online".
 4. Select and highlight GS3S and open the "Firmware management..." in the context menu.

A new window is opened, displaying information on the operating state as well as the on the network settings. Tick the box to gener-

Sercos bus configuration

ate a routing entry. If the firmware is replaced several times with a GS3S, this is only required for the first time. Go to the next dialog by clicking on **Next >>**.

5. The firmware currently available in the GS3S is displayed in the upper part.

Select the new firmware (*.ibf file) in the center part of the dialog and start the firmware download with **Next >>**.

6. The firmware download proceeds automatically and all necessary firmware components are loaded to the GS3S. Subsequently, the system restarts automatically.

WARNING

Damages to the device due to power supply disconnection during the download!

Do not disconnect the voltage supply during firmware change during the subsequent GS3S restart!

In case of damages, the GS3S can only be operated again by contacting the technical service.

7. After the firmware replacement is completed, close the "Firmware management" window.

If an error occurs during the download, restart the GS3S manually and wait for at least 2 minutes.

WARNING

Device is damaged due to an insufficiently short waiting time (< 2 minutes) in case of an error and a subsequent restart!

If the GS3S is restarted following a failed firmware replacement, wait for at least two minutes until the power supply is disconnected again.

If the waiting time is too short, the GS3S might go into a disabled state! In that case, the GS3S can only be operated again by contacting the technical service.

3. Set the machine to an operational state according to the instructions of the machine manufacturer.

4. Check the functions of the GS3S.

5.4.4 Replacing firmware without IndraWorks

Information on the firmware replacement without IndraWorks is available upon request.

5.4.5 Possible issues when replacing firmware

The GS3S can sporadically not be operated anymore if the firmware replacement has not been completed successfully.

The firmware exchange is not completely executed if one of the following situations occurs during the firmware exchange:

- The 24V supply is disconnected
- Connection to GS3S is interrupted (e.g. defective interface cable)
- Exception of the update software/computer

Sercos bus configuration



In any case, wait for at least 2 minutes before disconnecting the 24V supply voltage in order not to cancel a started programming in the GS3S.

6 Commissioning



No commissioning without approval by a qualified person!

Ensure that qualified staff checks, documents and releases the system before the initial commissioning of the system in which the SafeLogic compact system is used.

The SafeLogic compact system is configured using the configuration software SafeLogic Designer either via the RS232 interface of the SLC-3-CPUx module or via the Ethernet interface of a SafeLogic compact Ethernet Gateway. For a detailed description of the configuration, refer to the operating instructions "IndraControl SafeLogic compact Designer Software" (see [chapter 1.5 "Related documents" on page 6](#)).



- For configuration and commissioning, the software SafeLogic Designer from version V1.4.0 is required
 - After the module has been replaced, it is not required to re-configure the SafeLogic compact system as the configuration is saved in the SafeLogic flash drive
-

7 SafeLogic Designer configuration

7.1 First configuration steps

7.1.1 General information

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

7.1.2 Establishing a connection to the SafeLogic compact system

General information

This chapter describes how to set up a connection between the SafeLogic compact system and a PC or notebook.

After the SafeLogic Designer has been started, open the menu to configure the connections via the link **Adjust interface parameters** or via the **Com settings** button.

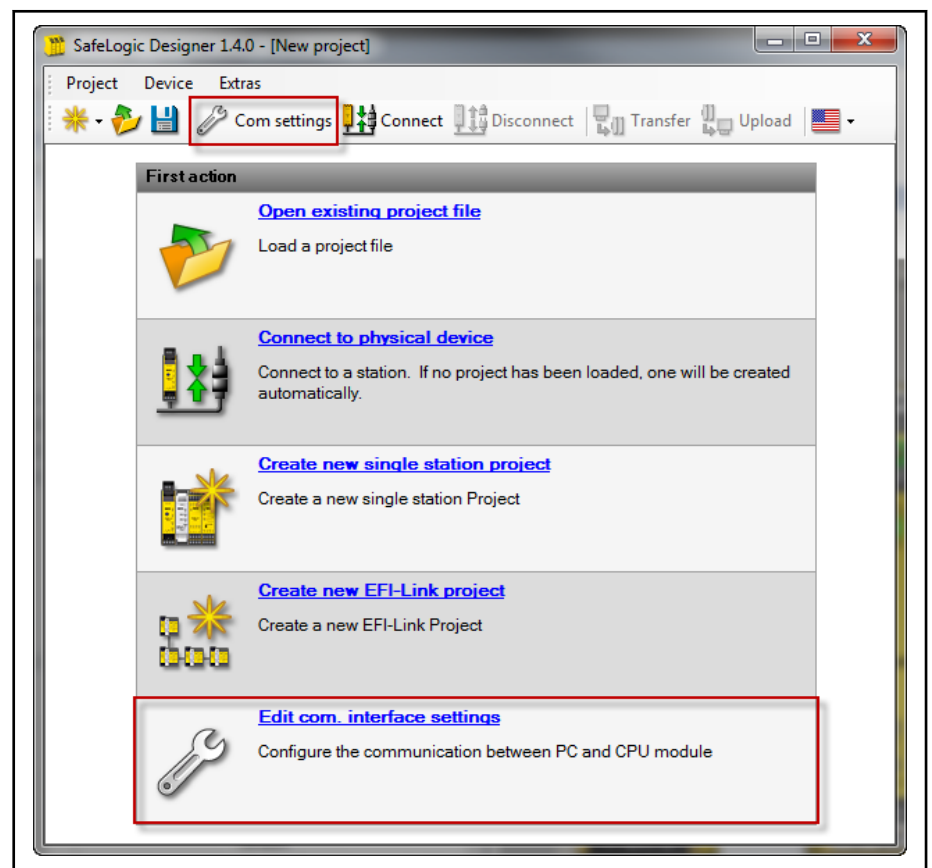


Fig. 7-1: Opening the connection settings

All existing connection profiles are displayed in the dialog window "Connection settings".

SafeLogic Designer configuration

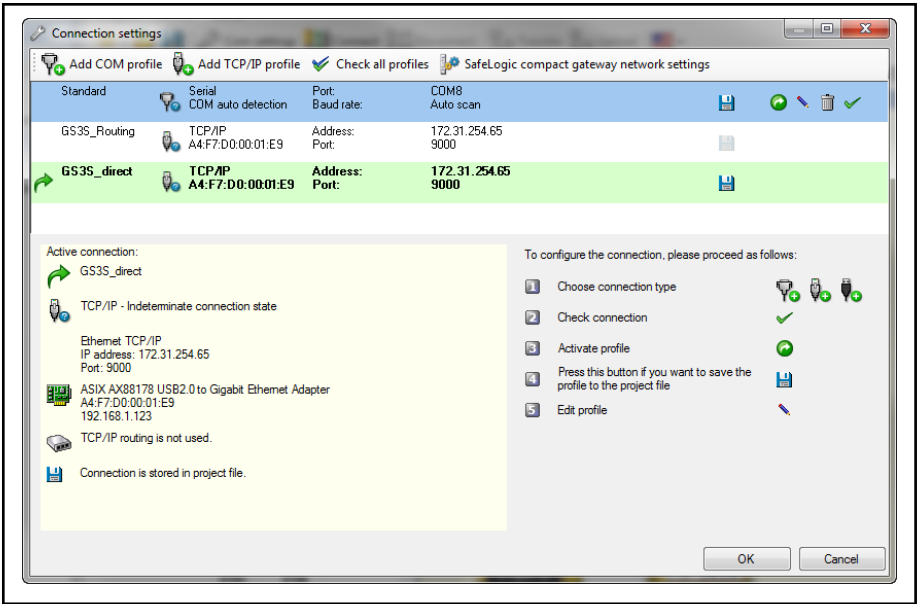


Fig. 7-2: Dialog window "Connection settings"

The currently active profile is highlighted in light green and has bold text. The profile selected for editing is highlighted in blue. An overview on the current settings is displayed in the lower part of the dialog window.

Symbol	Meaning
	Save profile with the current project
	Activate profile
	Edit profile
	Delete profile
	Check profile

Tab. 7-1: Symbols to edit the connection profiles in the "Connection settings" menu

Serial connection

- Open the "Connection settings" menu to configure a serial connection.
1. Connect the serial interface of the PC or notebook to the RS232 interface of the SLC-3-CPUx.
 2. Power up the SafeLogic compact system.
 3. Click on **Add COM profile** to add a new COM profile or select an existing COM profile and click on the symbol  to adjust this profile.

SafeLogic Designer configuration

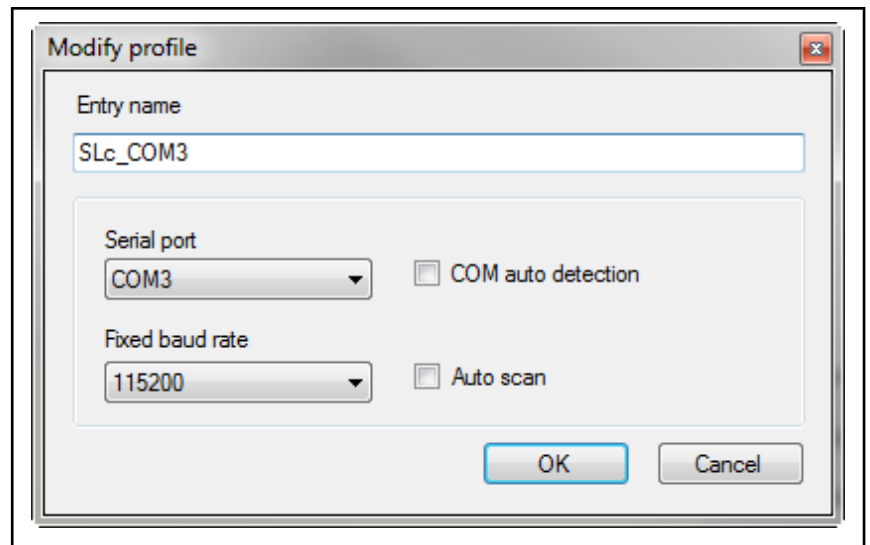


Fig. 7-3: Configuring the COM profile



If the options **COM auto detection** and **Automatically detect baud rate** are enabled, all serial interfaces of the computer are scanned when establishing a connection and the baud rate is set automatically.

4. If required, change the settings and apply the changes with **OK**.

Direct TCP/IP connections

Open the "Connection settings" menu to configure a TCP/IP connection.

1. Connect the Ethernet interface of the PC or notebook to one of the two Sercos interfaces (XFE1/XFE2) of the SafeLogic compact Sercos Gateway.
2. Power up the SafeLogic compact system.
3. Open the "SafeLogic Designer" configuration tool installed on the PC.
4. Click on **Add TCP/IP profile** to add a new TCP/IP profile or select an existing TCP/IP profile and click on the symbol  to adjust this profile.

SafeLogic Designer configuration

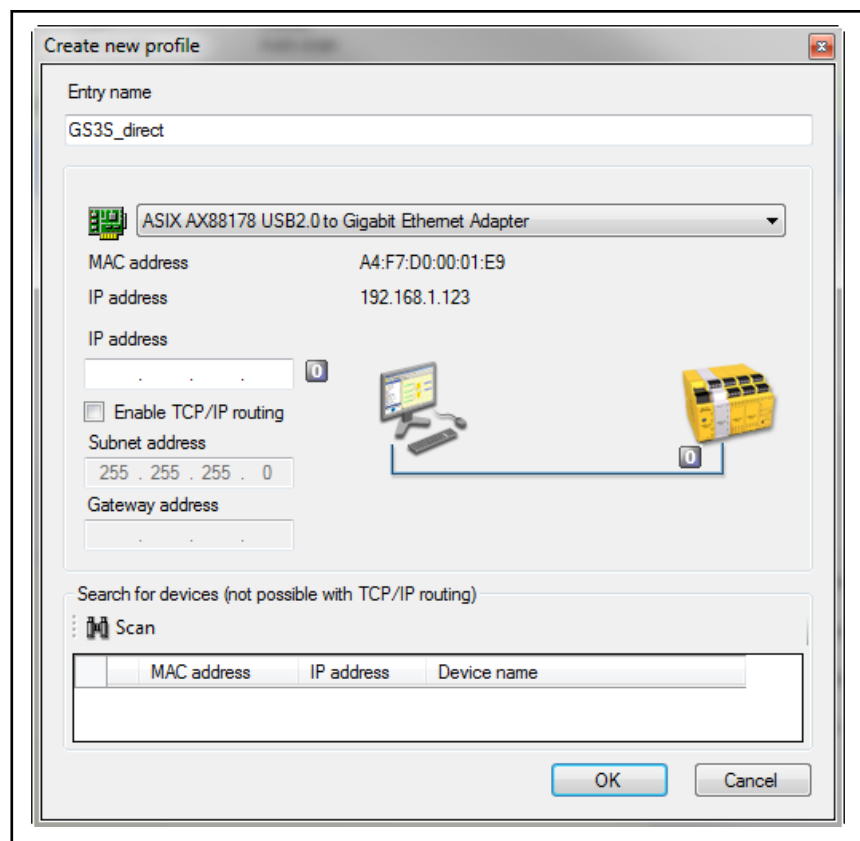


Fig. 7-4: Configuring the TCP/IP profile

5. Enter a profile name.
6. Select the network adapter of the computer to which the SafeLogic compact Sercos Gateway is connected

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



Scanning requirement: The computer has to be directly connected to the Sercos network. The communication parameters of the GS3S have to be already configured by the Sercos master → to ensure a valid IP configuration of all Sercos devices, it is recommended to switch the Sercos bus once to the communication phase CP4 before.

SafeLogic Designer configuration

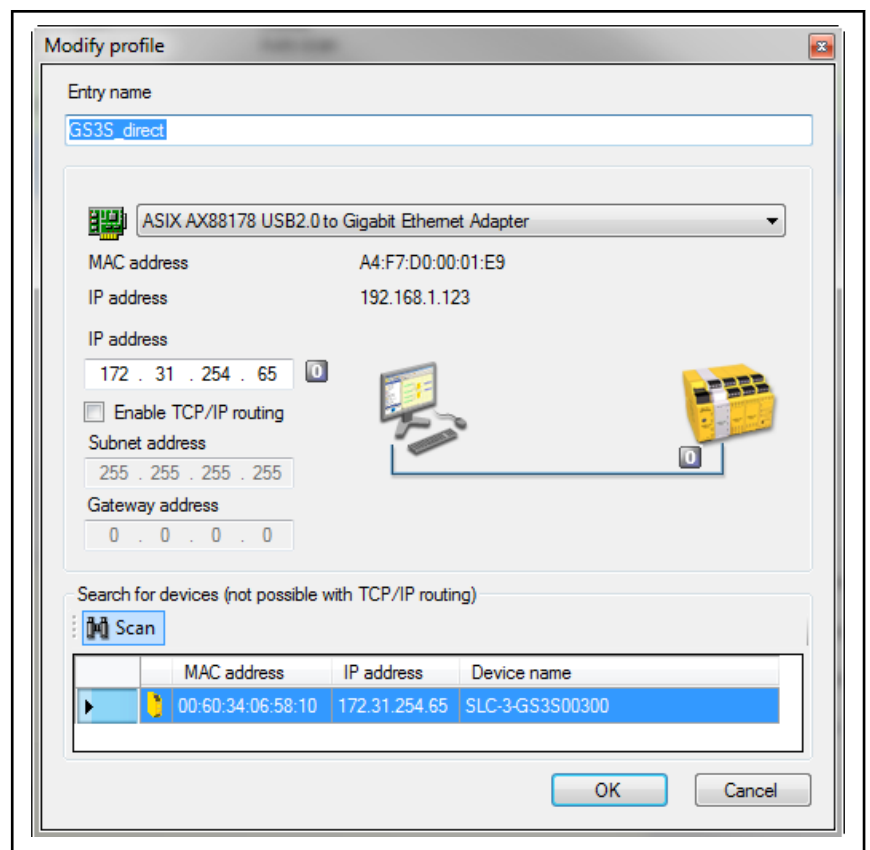


Fig. 7-5: List of gateways found

7. Click on the desired gateway. The IP address of the device is displayed in the "IP address" field.



The IP address of the gateway can also be entered directly. The IP address is assigned by the Sercos master and can be read out in the parameter [S-0-1020](#) (see [chapter "S-0-1020, Master communication engineering via IP: IP address"](#) on page 145).

8. Apply the settings with **OK**. The dialogue is closed and the new profile is displayed in the list.
9. To activate the profile, left-click to select the profile on the symbol  to the right. From now on, the SafeLogic Designer uses this profile.

TCP/IP routing



The Bosch Rexroth control systems IndraLogic XLC / IndraMotion MLC / IndraMotion MTX / IndraDrive MLD-M support the "TCP/IP routing" from the Engineering interface to the Sercos interface of the control. The "TCP/IP routing" facilitates a connection of the SafeLogic Designers to the SafeLogic compact Sercos Gateway via the engineering interface of the Sercos master control.

SafeLogic Designer configuration



The SafeLogic Designer adds the route to the Windows routing table of the computer. **The SafeLogic Designer V1.4 requires administrator rights for this operation.** The SafeLogic Designer has to be executed as administrator under Windows 7. If the SafeLogic Designer DTMs are to be used in the FDT container within IndraWorks, IndraWorks has to be started as administrator.

FDT/DTM is not supported anymore in IndraWorks 15VRS.

To establish a connection of the SafeLogic Designer with the SafeLogic compact Sercos Gateway via the engineering interface of the Sercos master control, select the option "Activate TCP/IP Routing" and enter the IP address of the engineering interface of the Sercos master control under "Gateway address" (field [1]). The IP address of the Sercos gateway is to be entered into the field [0].

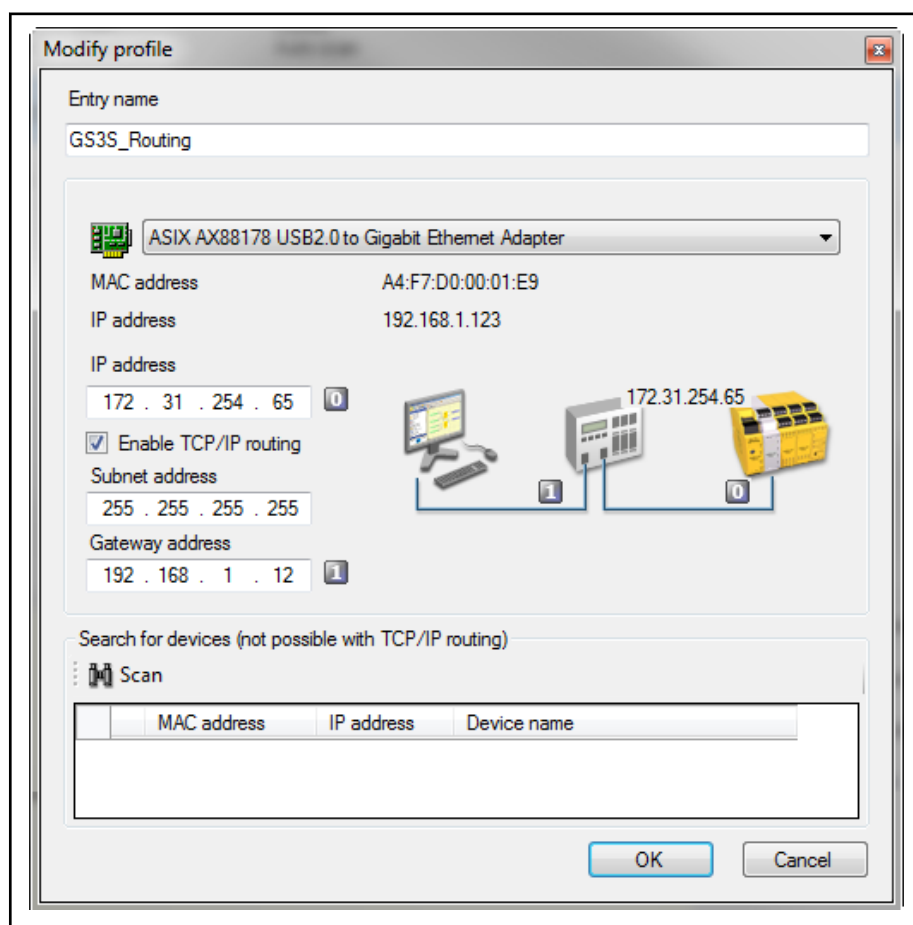


Fig. 7-6: TCP/IP routing

1. Apply the settings with **OK**. The dialogue is closed and the new profile is displayed in the list.
2. To activate the profile, left-click to select the profile on the symbol  to the right. From now on, the SafeLogic Designer uses this profile.

SafeLogic Designer configuration



The IP address of a Sercos device is usually set by the Sercos master. The following default settings are used in Rexroth control systems:

- MLC: 172.31.254.< S3 address > (for C2C, the third byte is the control address)
- MTX: 192.168.143.< S3 address >

The IP address is usually not written before the Sercos communication phase CP2 (or at the transition to CP3). Thus, it is recommended to set the Sercos bus once to CP4 to ensure a valid IP configuration of the Sercos devices. The IP address can then be read out from the Sercos parameter [S-0-1020](#).



When using several Sercos master controls with an identical Sercos bus configuration, the Sercos Gateways require unique IP addresses as otherwise, no unique route can be generated!

The third digit of the IP address can be uniquely assigned for the Bosch Rexroth control systems IndraLogic XLC and IndraMotion MLC using the control address (parameter C-0-0031).

Example:

A SafeLogic compact Sercos Gateway with Sercos address "65" at an IndraMotion MLC with control address "15" is configured with the IP address: 172. 31. 15. 65..



If the IP address of the router (here: of the engineering port of the Sercos master control) is changed during commissioning, multiple routing entries can be created in the routing table of the PC. This may lead to problems as Windows always uses the first routing entry. The routing table of the PC can be seen in the Windows command line via "route print".

If required, old or no longer used routing entries have to be deleted manually. As the SafeLogic Designer does only create volatile routing entries for TCP/IP routing, old entries are also removed by restarting the PC.

7.1.3 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:

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



Depending on the current user level, the user is prompted to log in as "Authorized customer" to be able to import a configuration. For detailed information, refer to the operating instructions "IndraControl SafeLogic compact Designer Software" (refer to [chapter 1.5 "Related documents" on page 6](#)).

3. Once the import is completed, the user is prompted to start the CPU module. Click on **Yes** or **No** to close the dialog window

SafeLogic Designer configuration



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.



For more information, refer to the operating instructions "IndraControl SafeLogic compact Designer Software" (see [chapter 1.5 "Related documents" on page 6](#)).

7.1.4 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".

Only set the configuration to "verified" if the CIP Safety on Sercos configuration has been tested accordingly so that the behavior of the application is as intended.

The configuration (read-only) should only be inhibited in case of a verified application.

3. If the verification has been completed successfully, a report "Read in and Compare" is generated. It includes essential project information. This report can be printed or saved.
4. Either the status "Verified" or the status "Not verified" is displayed in the lower right corner of the SafeLogic Designer and is indicated by a flashing 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"

Exception: When only executing changes that are not safety-relevant, e.g. changing the name or the IP address of the gateway or the port number for a TCP/IP socket connection, the configuration status remains on "Verified".



For more information, refer to the operating instructions "IndraControl SafeLogic compact Designer Software" (see [chapter 1.5 "Related documents" on page 6](#)).

7.1.5 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.

7.2 Creating a Sercos Gateway

A GS3S is added analogously to the other modules in the menu "Hardware configuration" by one of the following actions:

1. Click on the GS3S in the list of available modules
2. Drag the GS3S from the list of the available modules and drop it onto the configuration area.

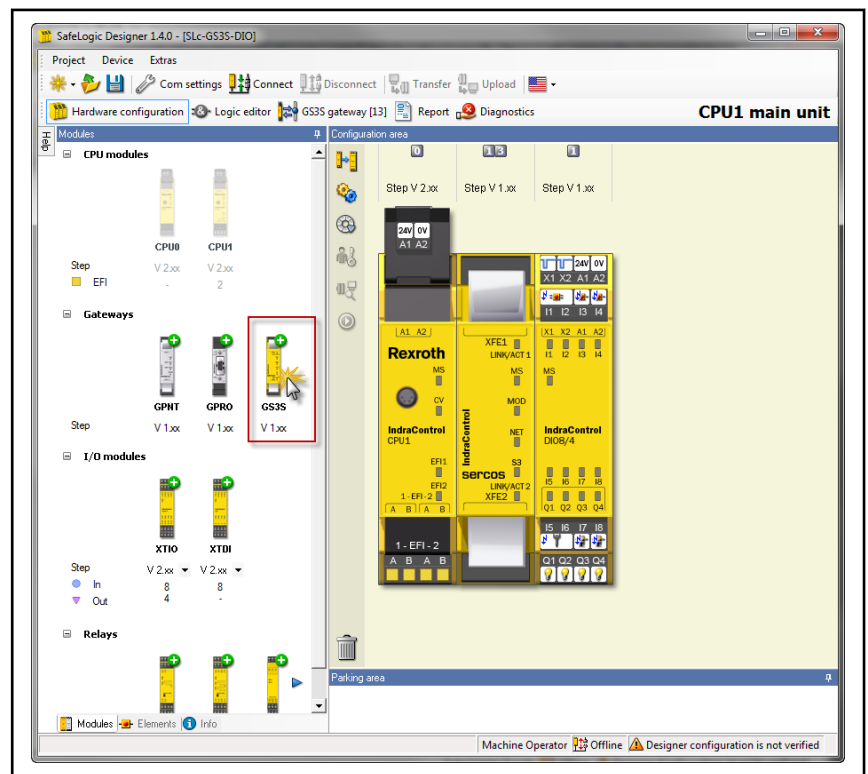


Fig. 7-7: Adding the Sercos Gateway

The dialogs to configure the GS3S can be accessed by double-clicking on the GS3S in the configuration area or on the selection menu of the configured gateways.

7.3 Configuring the operating data to exchange data with the Sercos master

7.3.1 General information

As the diagnostic gateway for Profinet (GPNT) and Profibus (GPRO), the Sercos Gateway (GS3S) allows to exchange non-safety-related operating data cyclically between the SafeLogic compact system and the superordinate field bus master control.

The process image transmitted by the Sercos Gateway to the network consists of operating data (e.g. logic results, input/output states, EFI data) and diagnostic data (e.g. module status, CRCs). This data is divided into 4 data records.

Data set	Content	Size	Configurable
1	Operating data	Max. 18 bytes	Yes
2	CRCs	32 bytes	No
3	Status and diagnostics	60 bytes	No
4	Reserved	60 bytes	No

Tab. 7-2: Content of data record 1-4

Access to data records 1 to 4

The operating data (data record 1) can cyclically be exchanged with the Sercos master control.

The data records 1, 2, 3 and 4 can be read by the master control via acyclic parameter access.

Content of data record 1

In data record 1, up to 18 byte of operating data can be configured with a granularity of 1 byte. The content of data record 1 is not configured as delivered.

Regarding the operating data, the Sercos Gateway differs from the diagnostic gateway as follows:

- Up to **18 bytes of user-defined data** can be transmitted from the **SafeLogic compact system to the Sercos master** (see [chapter 7.3.2 "SafeLogic compact → Sercos master" on page 45](#))
- Up to **18 bytes of user-defined data** can be transmitted from the **Sercos master to the SafeLogic compact system** (see [chapter 7.3.3 "Sercos master → SafeLogic compact" on page 47](#))
- The **states of inputs/outputs** of all connected input/output modules of the SafeLogic compact system are cyclically available in the Sercos Gateway (<10 ms) and can thus be directly transmitted to the Sercos master.
→ This data does not have to be provided in the user-definable data
- The **CIP Safety control or status words** of the configured target groups are known in the Sercos Gateway and can thus be directly transmitted to the Sercos master.
→ This data does not have to be provided in the user-definable data
- The **diagnostic information** (operational status/internal error/external error) of all connected SafeLogic compact modules is cyclically available in the Sercos Gateway (<500 ms) and can thus be directly transmitted to the Sercos master

The Sercos master can access the 18 bytes of the data record 1 as follows:

- Cyclic I/O data (slot 1 "SLC CPU: User data xy byte") (see [chapter 5.3.1 "Configuring cyclic I/O data" on page 22](#)).
- Acyclic parameter access to the Sercos parameter P-0-3692.x.1 (see [chapter "P-0-3692.0.1, Diagnostics of SafeLogic compact modules, data set 1" on page 195](#)).

Contents of data record 2

The data record 2 contains the checksums (CRC) of the configuration of the SafeLogic compact system.

The Sercos master can access the CRCs by acyclic parameter accesses to the Sercos parameter P-0-3692.x.2 (see [chapter "P-0-3692.0.2, Diagnostics of SafeLogic compact modules, data set 2" on page 195](#)).

Contents of data record 3

The data record 3 contains the module status bits of the individual SafeLogic compact modules. 4 bytes per module. For the description of the bits, refer to [chapter 8.3.2 "Module status" on page 67](#).

The Sercos master can access the 4-byte diagnostic data of each SafeLogic compact module via acyclic parameter access to the Sercos parameter P-0-3692.x.3. The "x" of the parameter instance stands for the module address of the respective SafeLogic compact module (see [chapter "P-0-3692.0.3, Diagnostics of SafeLogic compact modules, data set 3" on page 196](#)).

Contents of data record 4

The data record 4 is currently reserved.

The Sercos master can access the reserved data via acyclic parameter access to the Sercos parameter P-0-3692.x.4 (see [chapter "P-0-3692.0.4, Diagnostics of SafeLogic compact modules, data set 4" on page 196](#)).

7.3.2 SafeLogic compact ⇒ Sercos master



Data is always considered from a field bus master perspective, just as for the diagnostic gateways. Thus, the gateway data record of the network is referred to as "input data block".

The user-defined data of the Sercos master is defined in the **CPU ► Sercos** menu.

SafeLogic Designer configuration

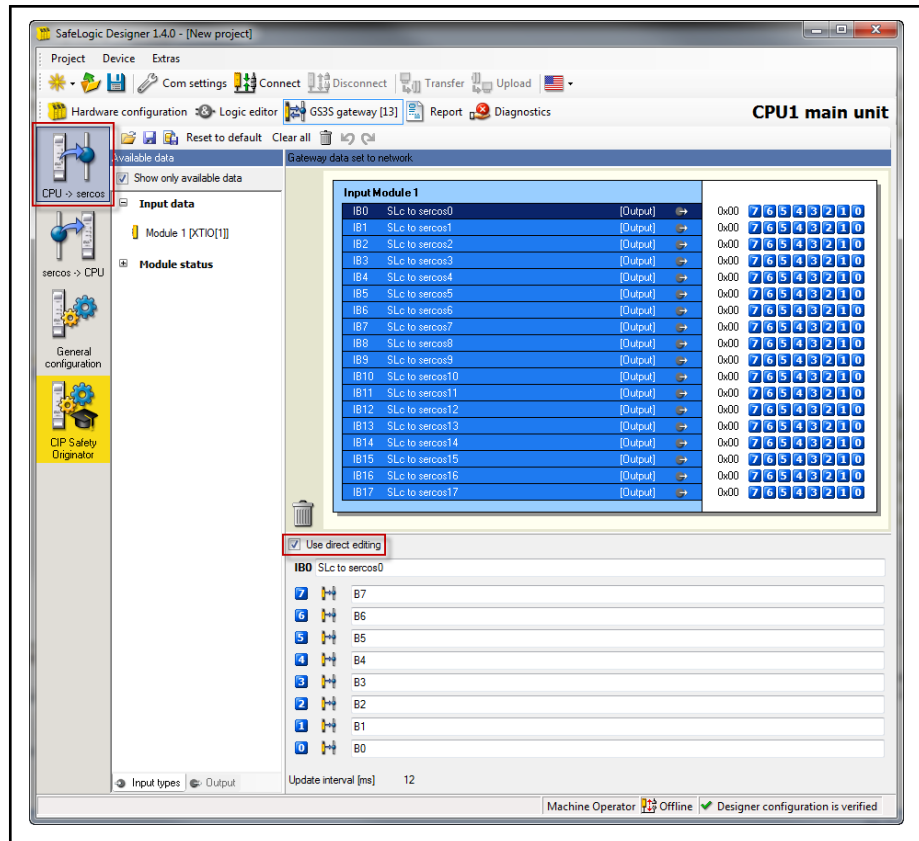


Fig. 7-8: Configuring the user-definable data CPU → Sercos

Up to 18 bytes of operating data can be configured. The data is then to be transmitted from the SafeLogic compact CPU to the Sercos master.

Already declared variables, such as, e.g. logic results, EFI data or process data of a second gateway can be used.

After the option **Use direct editing** has been selected, new variables can be defined and then be used in the logic editor.



The status of the connected I/O modules as well as the CIP Safety group status is not required. The statuses are directly available in the Sercos Gateway.

Toolbar

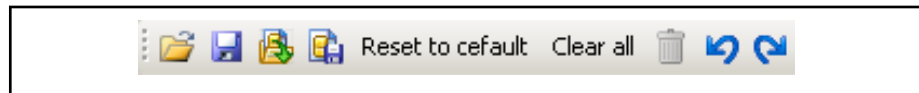


Fig. 7-9: Toolbar for routing configuration

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 a configuration is loaded, all changes made, but not saved, are lost. Undoing this command is not possible
- Using the buttons "Import" and "Export", tag names can be imported/exported as CSV file or in a network-specific format.

SafeLogic Designer configuration



The import button is only available in the routing configuration for the direction "Sercos ⇒ CPU".

- The button **Reset to default** restores the preset routing configuration. This command has to be confirmed. By clicking on **Yes**, all changes made, but not saved, are lost. Undoing this command is not possible
- **Clear all** deletes the configuration, i.e. all assigned bytes in the "Gateway data record" area to the network are deleted. This command has to be confirmed
- The button for "Remove routing" deletes the currently selected byte in the "Gateway data record" area to the network
- Use the buttons "Undo" and "Retry" to undo or restore the changes made to the configuration

7.3.3 Sercos master ⇒ SafeLogic compact



Data is always considered from a field bus master perspective, just as for the diagnostic gateways. Thus, the gateway data record of the network is referred to as "input data block".

The user-defined data of the Sercos master is defined in the **CPU ► Sercos** menu.

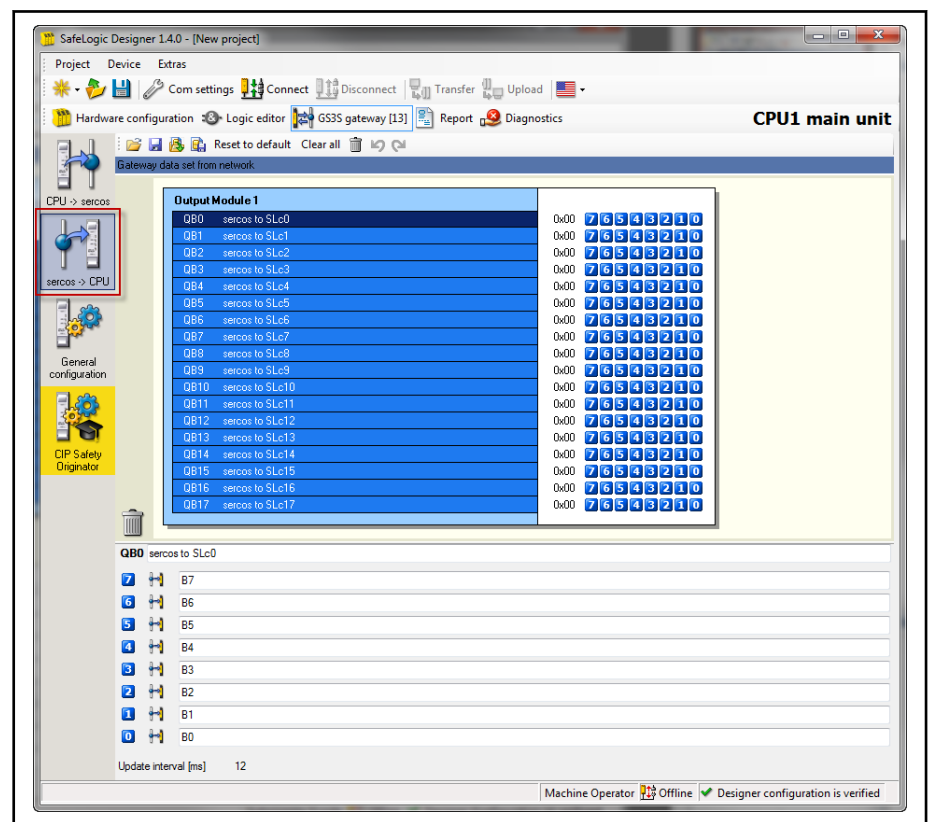


Fig. 7-10: Configuring the user-definable data Sercos → CPU

Up to 18 byte operating data can be configured. The data is then to be transmitted from the Sercos master control to the SafeLogic compact CPU.

⚠ WARNING**Do not use any Sercos master data for safety applications!**

By using the sercos gateway, non-safety related data of the sercos master can be integrated in the logic editor without compromising the safety function of the SafeLogic compact system. Do not integrate a gateway in a SafeLogic compact system without checking the hazard source by an expert for safety.

7.4 Communication parameters of the Sercos Gateway

The GS3S communication parameters are specified by the Sercos master and can only be displayed and not edited in the SafeLogic Designer.

Communication address	Sercos parameters	Example
Sercos address	S-0-1040 (see chapter "S-0-1040, Sercos address" on page 152)	65
IP address	S-0-1020 (see chapter "S-0-1020, Master communication engineering via IP: IP address" on page 145)	172.31.254.65
Subnet mask	S-0-1021 (see chapter "S-0-1021, Master communication engineering via IP: Network mask" on page 146)	255.255.0.0
Default gateway	S-0-1022 (see chapter "S-0-1022, Master communication Engineering via IP: Gateway address" on page 147)	172.31.254.254

Tab. 7-3: GS3S communication parameters

For more information on the GS3S Sercos parameters, please refer to the parameter description in the appendix.

To display the Sercos Gateway communication parameters, open the dialog "General configuration" and click on **Read**.

SafeLogic Designer configuration

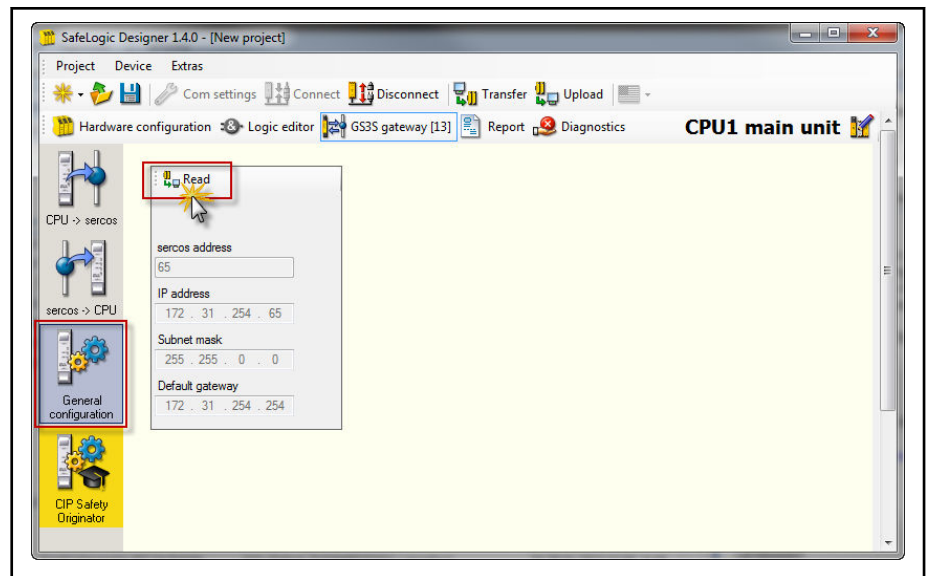


Fig. 7-11: Displaying GS3S communication parameters

7.5 CIP Safety configuration

7.5.1 General information

The CIP Safety configuration is divided into several menus. Click on **CIP Safety Originator** button to go to these menus (see [fig. 7-12 "CIP Safety configuration – Originator and targets"](#) on page 50).

7.5.2 Originator configuration

The CIP Safety Originator is configured in the "Originator configuration" dialog. In this dialog, the targets and device profiles used are specified.

SafeLogic Designer configuration

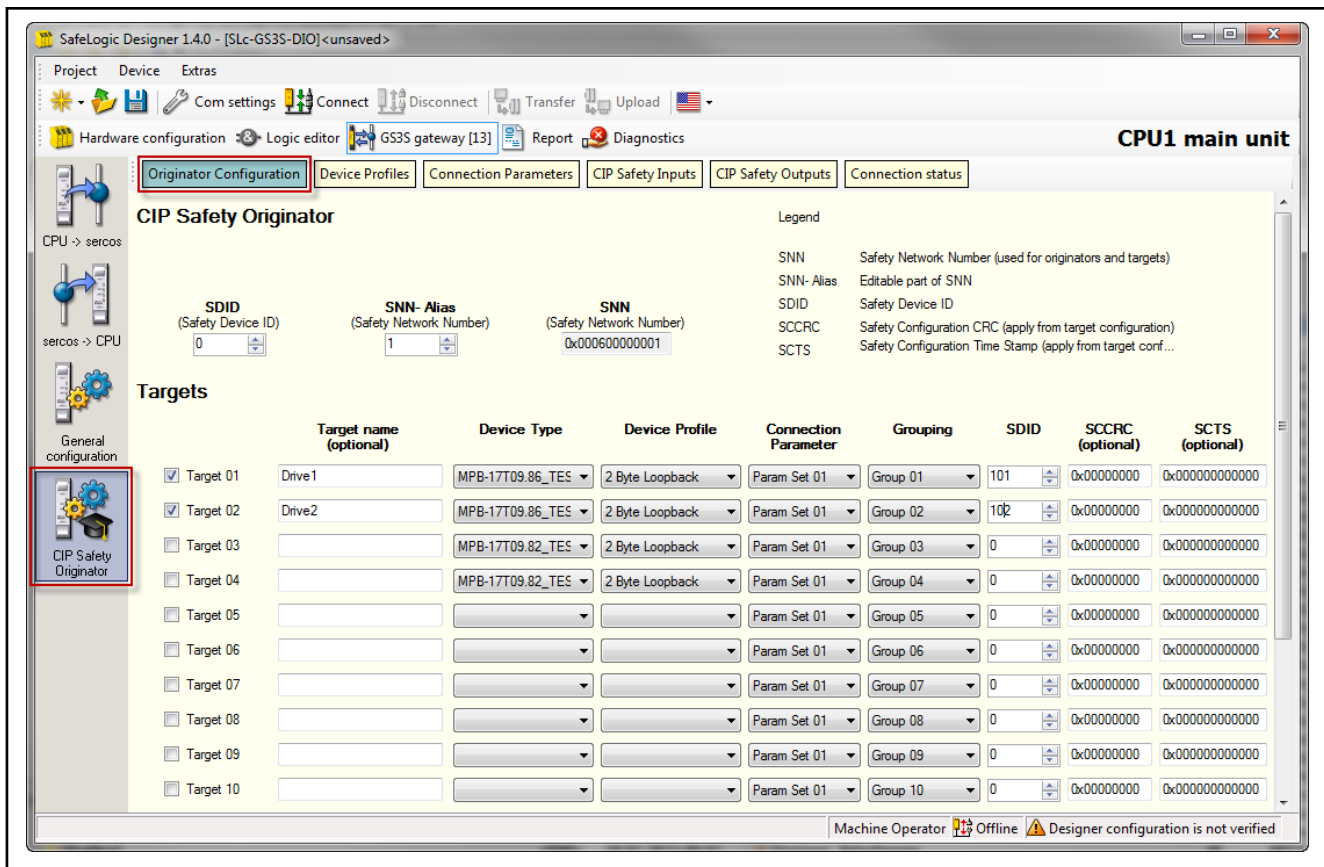


Fig. 7-12: CIP Safety configuration – Originator and targets

The following CIP Safety parameters are set here:

Safety Device ID (SDID)

The SDID is the safe address for the CIP Safety communication. The originator and all targets require different addresses. The user can set any value. However, it is recommended to select a value unequal to the Sercos address. The SDID configured in the SafeLogic Designer has to match the SDID set in the target.

See also [chapter "Target Unique Network Identifier \(TUNID\)" on page 51](#).

Safety Network Number (SNN)

SNN is displayed in CIP "date and time" format. The GS3S only supports "Manual setting", i.e., the "Date" is constantly set to 0x0006 for CSOs and only the "Time" ratio can be freely configured in a value range between 1..9999. The "Time" ratio is labeled as **SNN alias** and has the default value "1". Default is "SNN: 0x000600000001". All targets assigned to a GS3S require the same SNN as the GS3S (CSOs Originator).

The SNN is required for the routing of CIP Safety telegrams in (sub)networks. Routing between Sercos networks (also to other bus systems) is not supported in GS3S. If several GS3S are operated in a Sercos ring, each GS3S requires a unique SNN.



The user is responsible for assigning SDID and SNN!

See also [chapter "Target Unique Network Identifier \(TUNID\)" on page 51](#).

Target Unique Network Identifier (TUNID)

The TUNID is composed of the SDID and the SNN. Only individual values are available in the SafeLogic Designer. The TUNID set in the target can be read out in [S-0-1800.0.19](#) of the target. Each target requires a unique TUNID.

Example:

Composition of TUNID

A TUNID = 0x12 0x34 0x56 0x78 0x00 0x06 0x00 0x00 0x00 0x01

has the SDID = 0x12345678

and the SNN = 0x000600000001

Target no.

The target number is a logic reference to be able to assign a CIP Safety target to a Sercos device. The target number is required in the Sercos cross communication configurator in IndraWorks to be able to assign the Sercos CC connections correctly.

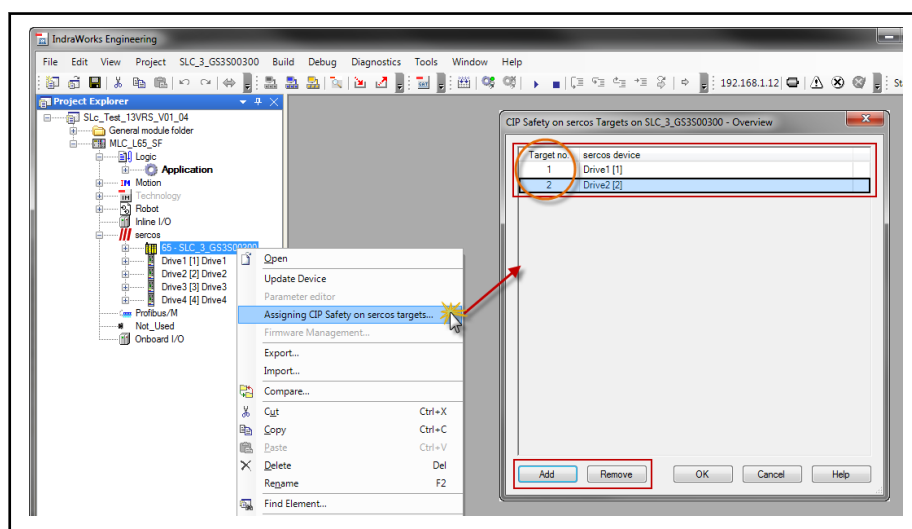


Fig. 7-13: IndraWorks – Assigning the target number to a Sercos device

Target name

The target name is optional and not required for the CIP Safety communication.

Recommendation: Enter the logic name of the Sercos device, e.g. "Drive2".

Device type

The device type and the device profile are information from the device description file of the target (see [chapter 7.5.4 "Device profile" on page 54](#)). The DeviceID of the device description file under "Device type". Each CSos device has a unique CIP Safety Electronic Key (Vendor ID, Device Type, Product Code, Major/Minor Revision). The CIP Safety Electronic Key available in the target can be read out in the [S-0-1801.0.1](#) to [.4](#).

SafeLogic Designer configuration



The "CIP compatibility bit" (= bit 7 in the major revision of a connection configuration) is automatically set for every CIP safety connection in the GS3S from the firmware V 1.02.0. This means, the target can also contain a compatible device version (e.g. higher firmware version due to troubleshooting) and the identical device version from the applied device description file is not required. Compatibility is checked in the target during the CIP Safety connection establishment. For information on the compatibility between target device versions, refer to the target device manufacturer.

Device profile

Use the device profile to select the application data (assembly instances) of the target. Complex targets such as Rexroth IndraDrive can support different profiles, e.g. 1 or 2 byte control/status signals (see [chapter 7.5.4 "Device profile" on page 54](#)).

Connection parameters

Four parameter blocks, which can be configured differently, are available. Using different connection parameters is only recommended if targets have different execution or delay times or if different cycle times are used for Sercos CC connections to the individual targets.

For details, see [chapter 7.5.5 "Connection parameters" on page 55](#).

Group formation

Targets with the same device profile can be summarized in one group. In one group, the same control word is assigned to each target and the status signals of the targets are logically linked using an AND operation. Only the control/status word of the group is visible in the logic program.

WARNING

If binary-coded information is present in the status signals of the targets, data can be falsified by an AND operation. Thus, binary-coded information in the CSos input data may not be used together with the group formation. One group may only consist of one target.

As the groups are processed in the GS3S, the data volume between CPU and GS3S module is reduced to the "FlexBus+". Thus, a faster response time can be achieved.

In the Rexroth drive technology, a group of axes in a hazard area or executing the same safety function at any time are also referred to as (safety) zone.



In the dialogs "CIP Safety inputs/outputs", the relevant variable name of the group for the logic program can be changed at any time (see [chapter 7.5.6 "CIP Safety inputs" on page 59](#) and [chapter 7.5.7 "CIP Safety outputs" on page 60](#)).

Safety Configuration CRC (SCCRC)

The SCCRC is a checksum (CRC) of the application-specific configuration data in the target. Only a value unequal to "0" is verified when establishing the connection in the target. If the SCCRC is entered, the corresponding SCTS has to be entered as well.



If "0" is used in the SCCRC (and SCTS), the user has to ensure that the correct configuration is used in the target.

See also [chapter "Safety Configuration ID \(SCID\)" on page 53](#).

Safety Configuration Time Stamp (SCTS)

The SCTS is the time stamp of the application-specific configuration in the target. The SCTS is displayed in CIP date-and-time format as hexadecimal value. Only a value unequal to "0" is verified when establishing the connection in the target. If the SCTS is entered, the corresponding SCCRC has to be entered as well.

See also [chapter "Safety Configuration ID \(SCID\)" on page 53](#).

Safety Configuration ID (SCID)

The SCID is composed of SCCRC and SCTS. Only individual values are available in the SafeLogic Designer. The value set in the target can be read out from S-0-1800.0.15 of the target.

Example:

Composition of SCID

A SCID = 0x12 0x34 0x56 0x78 0xAA 0xBB 0xCC 0xDD 0xEE 0xFF

has the SCCRC = 0x12345678

and the SCTS = 0xAABBCCDDEEFF

7.5.3 Target identification

The dialog "Target identification" is available from the SafeLogic Designer V1.7.0 and is supported from the GS3S firmware V 1.02.0.

The GS3S can read out configuration data from the CSos targets for diagnostics via the Sercos cross communication (CC) connections. At the beginning of the Sercos communication phase CP4, the "Safety Device ID" (SDID) and "Safety Network Number" (SNN) as well as the "Safety Configuration CRC" (SCCRC) and the "Safety Configuration Time Stamp" (SCTS) are retrieved via CIP services and displayed in this dialog in online status. The "Sercos address" is an optional CIP attribute and is therefore not supported by every CSos target (in this case, the value remains "0").



The following procedure is recommended:

Firstly, configure the CSos targets and set up the Sercos cross communication (CC) connections. Set the Sercos communication phase to CP4 to enable the SafeLogic Designer to display the described diagnostic data in online status for the available targets.

WARNING

The configuration data read out from the targets can be applied to the GS3S Originator configuration. It is the responsibility of the user to verify that the expected configuration data is available for every target (i.e. for every logic target no.). In case of an incorrect assignment, e.g. a target with an unexpected Safety Device ID, the Sercos cross communication (CC) is to be checked and adjusted if necessary (→ in Rexroth IndraWorks "Assignment of targets" at the GS3S).

SafeLogic Designer configuration

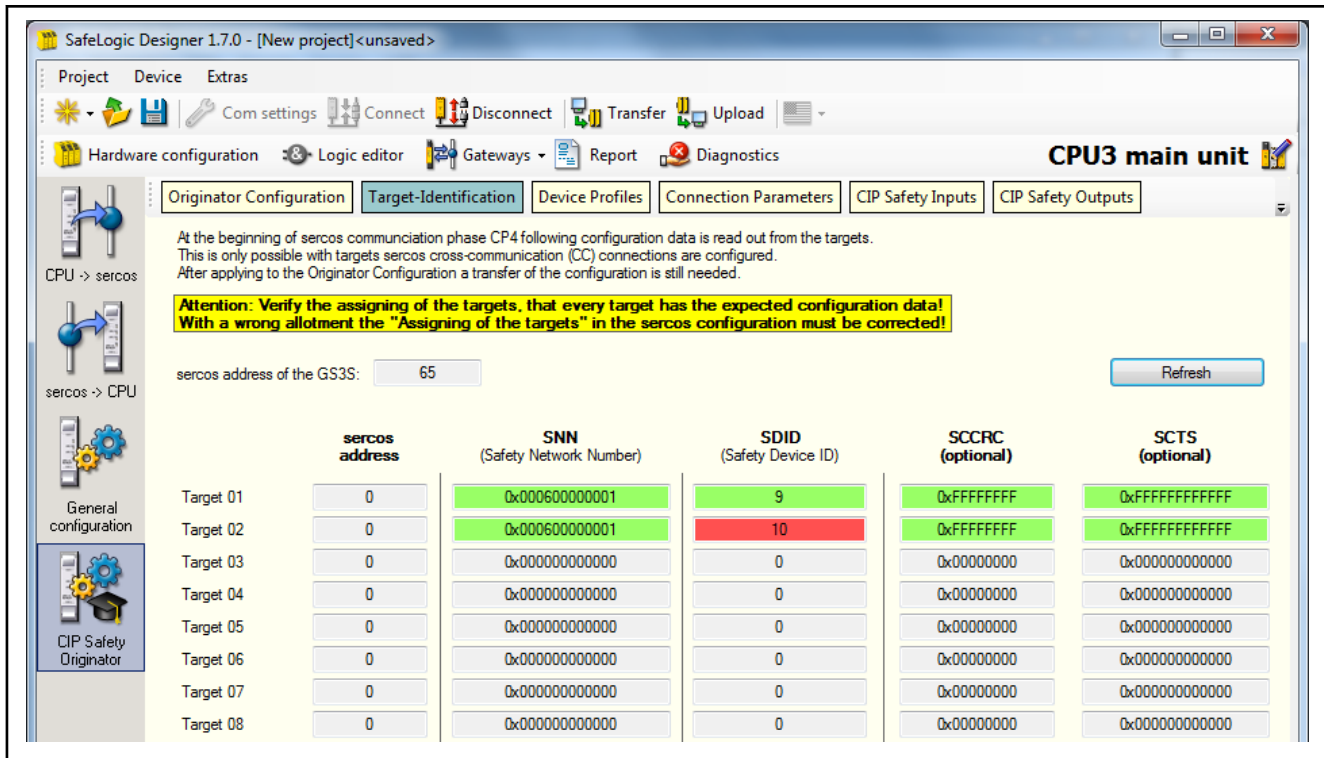


Fig. 7-14: "Target identification" dialog (from the Designer V1.7.0)

7.5.4 Device profile

In the "Device profiles" dialog, device description files (SDDML) of CIP Safety on Sercos targets can be imported into the SafeLogic Designer (or removed). The dialog also displays the available devices and the contents of their supported device profiles.



The device descriptions used applied to a SafeLogic Designer project (SDDML files) **cannot** be implemented into the SafeLogic Designer project file. If a required SDDML is not available in the SafeLogic Designer installation when opening a project (or loading it), a respective error message requiring reinstallation of the SDDML is issued.

From the SafeLogic Designer V1.7.0, it is also possible to create user-defined profiles. This means, a profile consisting of a control assembly and/or a status assembly of the device can be defined manually.

The device type name always consists of the "DeviceID", "SoftwareRevision" and "FileInfo"/Version (FV) from the SDDML (in the SafeLogic Designer V1.4 only the "DeviceID" is displayed).

SafeLogic Designer configuration

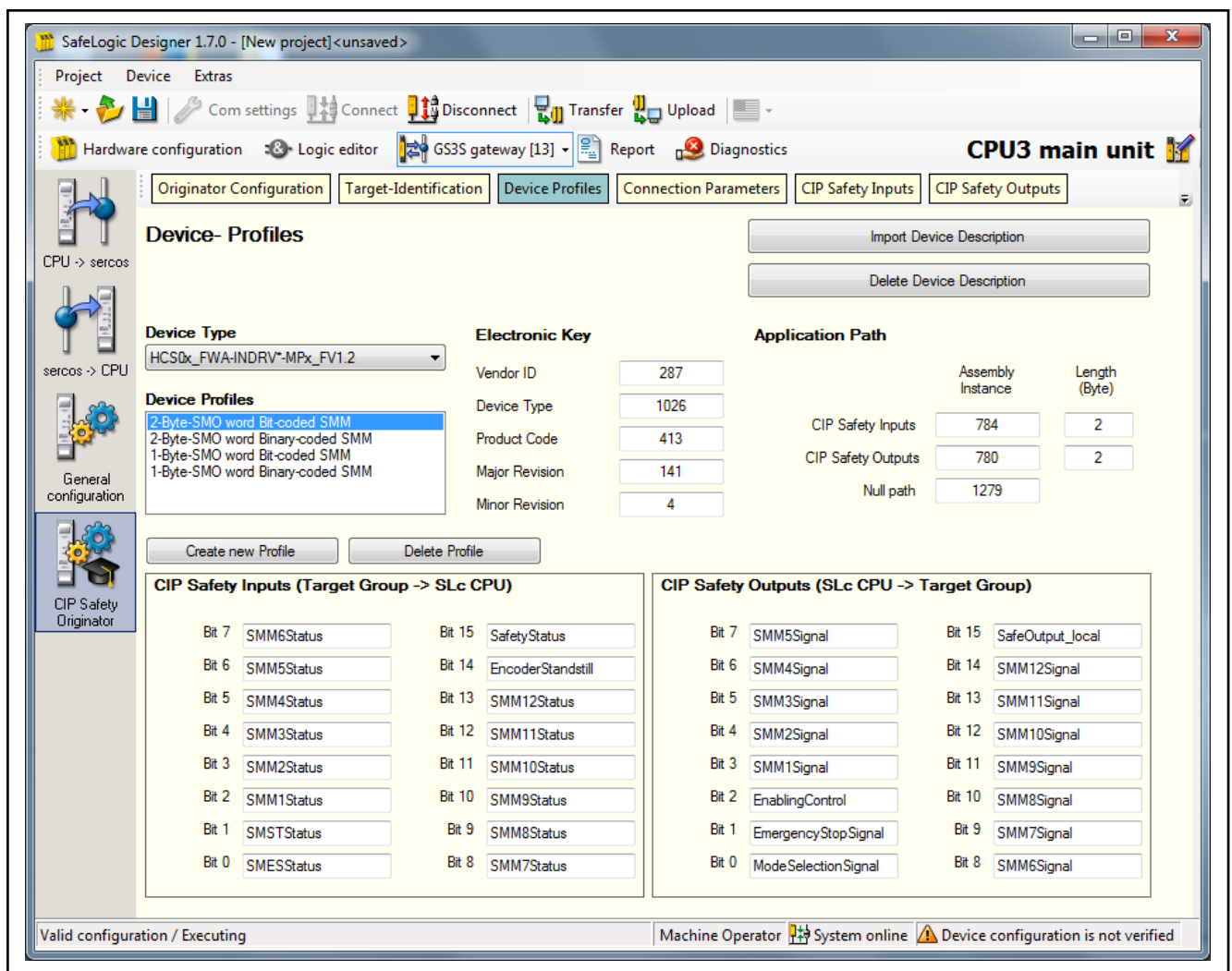


Fig. 7-15: CIP Safety configuration – Device profiles

7.5.5 Connection parameters

Four parameter blocks, which can be configured differently, are available. Using different connection parameters is only recommended if the targets used have different execution times for the CIP Safety telegrams or if different cycle times are used for Sercos CC connections to the individual targets.

SafeLogic Designer configuration

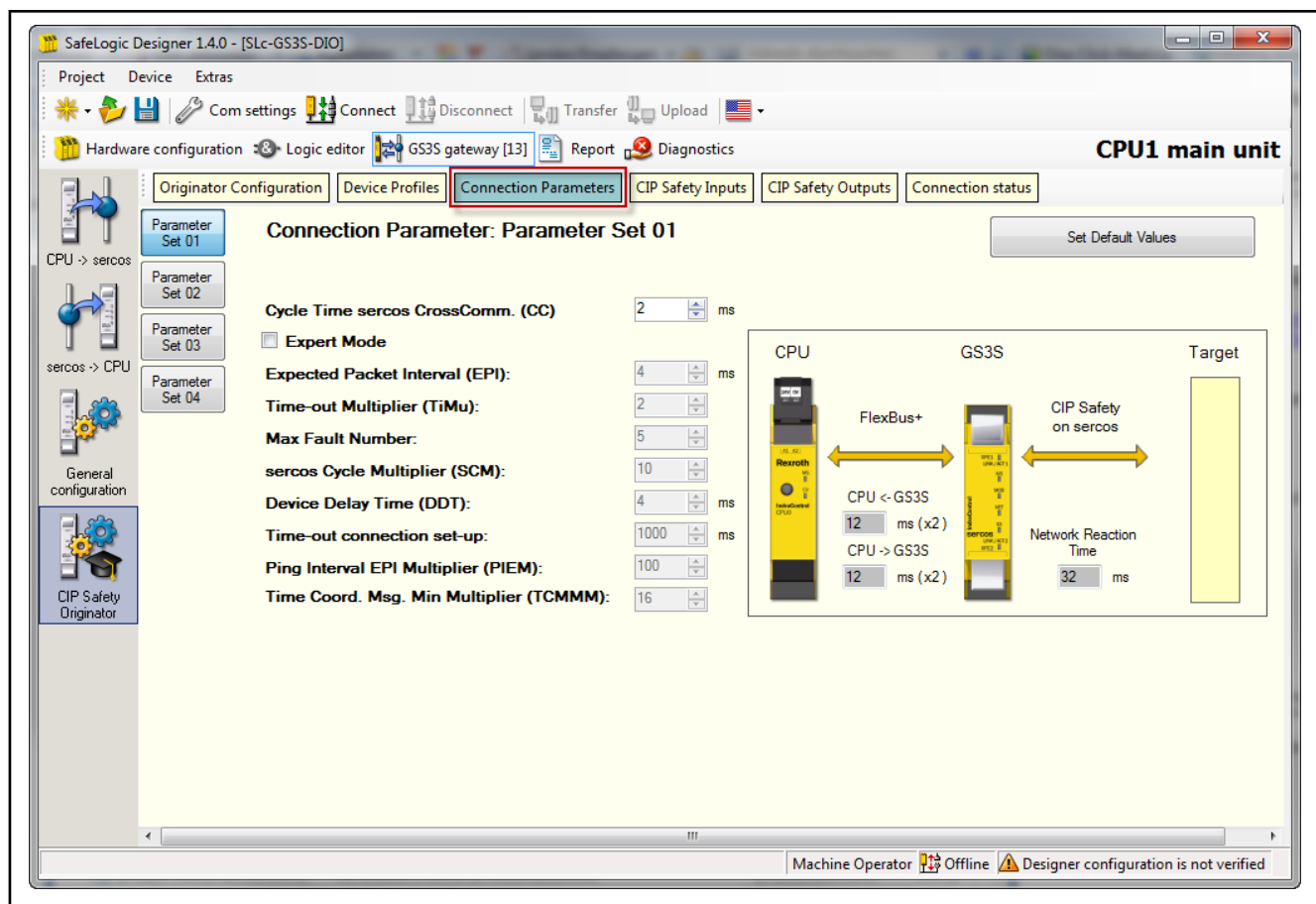


Fig. 7-16: CIP Safety configuration – Connection parameters

In most cases, only the cycle time of the CC connections has to be entered. All other parameters are assigned with recommended default values or are adjusted automatically (as the Expected Packet Interval (EPI)).

If the "Expert Mode" is enabled, all parameters can be manually selected within their limit values.

The resulting network response time is calculated and displayed automatically from the configured parameters. The "network response time" directly influences the total response time of the safety function.

Cycle time Sercos cross communication (CC)

This value is only used for the automatic calculation of the EPI and the network response time. The active cycle time in the Sercos CC connections is configured by the Sercos master and entered into S-0-1050.x.10 (x = Sercos connection instance).

If the value entered into the SafeLogic Designer is smaller than the current cycle time, a CSos network response time is generated that is too short. A CSos network response time that is too short results in errors in the CSos connections (time-out and data-age errors).

Expert mode

The CIP Safety parameters set by the default values result in a "Network Response Time" that is sufficient for most applications. If the time is not sufficient, the "Network Response Time" can be optimized within certain limits in the "Expert" mode.



Please note that the availability of the system can be limited when changing the default values.

Different settings should only be selected when the user is sufficiently familiar with the CIP Safety.

Expected Packet Interval (EPI)

The EPI corresponds to the cycle time of the CIP Safety connections. The minimum EPI depends on the Sercos CC cycle time and the number of configured targets:

1. The EPI has to be twice as large as the cycle time of the Sercos CC connection
(e.g. CC cycle time = 4 ms $\Rightarrow$ min. EPI = 8 ms).
2. In GS3S, four targets each can be executed in a 4 ms time slot (= basic cycle time of the SafeLogic compact system).

This means, the minimum EPI is:

- min. EPI = 4 ms for 1 ... 4 targets
- min. EPI = 8 ms for 5 ... 8 targets
- min. EPI = 12 ms for 9 ... 12 targets
- min. EPI = 16 ms for 13 ... 16 targets

Timeout Multiplier (TiMu)

The TiMu determines the number of CIP Safety telegrams that can be lost before the CIP Safety connection is closed. A TiMu of 1 indicates that no telegram can be lost. In case of an TiMu of 2, 1 telegram can be lost, etc. CIP Safety telegram do not have a consecutive number. The TiMu is added together with EPI as product to the network response.

Max. fault number

Number of corrupt telegrams "-1" that may occur within one hour, i.e. . if the value is "0" or "1", no corrupt telegrams are permitted. A corrupt telegram only directly results in a cancelled connection if the error counter reaches the "Max Fault Number" or if no valid telegram is received within the network response time. The "Max Fault Number" is not included in the calculation of the network response time. Instead, corrupt telegrams have to be considered in the response time via the timeout multiplier.

Sercos Cycle Multiplier (SCM)

As the Safety application and the Sercos data is transmitted asynchronously, several Sercos cycles are required to transmit a CIP Safety telegram. Apart from the data transmission, the transmission time of the time coordination in reversible direction has to be taken into consideration.

The SCM specifies with which factor the Sercos CC connection cycle time is added to the resulting network response time.

Device Delay Time (DDT)

Device-specific delay times. "Worst case scenario": A dead time of up to 4 ms due to a 4 ms basic cycle in the GS3S.

If specific delay times occur in the target when processing CIP Safety telegrams. These delay times have to be added as well.

SafeLogic Designer configuration

Timeout connection setup

Monitoring time when establishing the connection. Within this time, a response has to be sent by the target. Otherwise, an error occurred, e.g. the Sercos CC configuration is incorrect.

Ping Interval EPI Multiplier (PIEM)

A multiple of the EPI is specified in which the interval of a time coordination is to be sent.



In case of a high value, a time drift between the clocks of sender and receiver can increase. In case of a time drift that is too high, the network response time might have to be increased to ensure availability!

Time Coord. Msg. Min. Multiplier (TCMM)

Minimum transmission time for time coordination (specified in intervals of 128 µs).



By means of a TCMM, the "Max Data Age" (= maximum age of data or network response time) can be optimized. In case of a value that is too high, the availability of the CIP Safety connections is compromised considerably and the CIP Safety communication may not be possible anymore!

The TCMM specifies the minimum transmission time of a time coordination message which is then deducted during the calculation of the "Data Age". 1 to 2 Sercos cycles can be specified. For example, GS3S has a minimum Sercos cycle time of 1 ms corresponding approximately to the TCMM default value 16.

Network response time

The CSos network response time is composed of the following parameters:

- **EPI:** Specifies how often CIP Safety telegrams are generated
- **TiMu:** Specifies how many CIP Safety telegrams can be lost
- **Sercos CC cycle time and multiplier:** Transmission time for CIP Safety telegrams (data transmission as well as transmitting the time coordination in reverse direction)
- **Device delay time:** Device-specific delay times

The formula to calculate the network response time is:

$$\text{Network response time} = \text{EPI} * \text{TiMu} + \text{CC} * \text{SCM} + \text{DDT}$$

The CSos response time also takes errors in the sender and receiver of the CIP Safety telegrams into consideration. There are no other delay times in the GS3S.



It is highly recommended to use the defined default values of the CIP Safety connection parameters, i.e. only the Sercos CC cycle time is to be entered. The **Expert mode** parameters should only be changed by advanced users and may compromise the availability of the system.

There are two options to optimize the CSos network response time:

1. Set the **Timeout Multiplier (TiMu)** to 1 (= no CIP Safety telegram must be lost). The default value 2 permits one telegram to fail. In the Sercos

SafeLogic Designer configuration

communication layer, one telegram failure is permitted by default as well ("allowed data losses").

2. Assign a lower value to the **Sercos Cycle Multiplier (SCM)**. For Sercos cycle times of 1 ms or 2 ms, the default value 10 is highly recommended. For Sercos cycle times of 4 ms or higher, the SCM can also be reduced to 8 or 6. Please observe that the sum of "CC * SCM + DDT" has to be greater than the "Max Data Age" of the connections (see [chapter 7.5.8 "Connection status" on page 60](#)). The "Max Data Age" becomes significant if the system has run more than 24 h and the GS3S and the CSOs targets are in different Sercos lines (e.g. Sercos ring break).



The network response time only maps a part of the total response time of the SafeLogic compact system!

For more information on determining the response times of the SafeLogic compact system, please refer to [chapter 7.6 "Response times of GS3S and CIP Safety on Sercos" on page 63](#).

7.5.6 CIP Safety inputs

The "CIP Safety inputs" dialog displays the bit assignment of the CIP Safety inputs of the individual target groups.



The bits are assigned when selecting the respective device profile from the device description file of the target.

The names of the individual CIP Safety input variables as well as the names of groups can be changed.

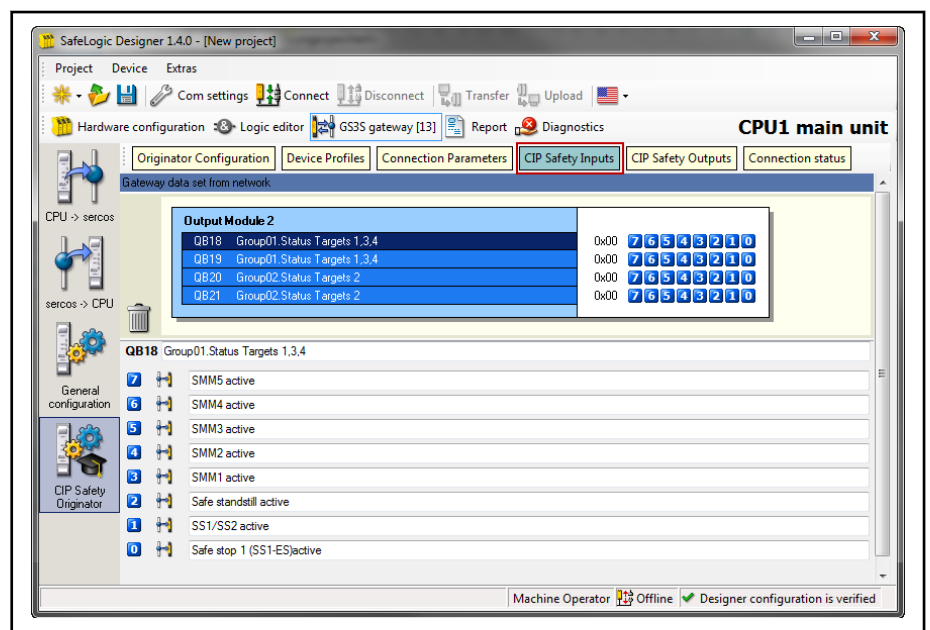


Fig. 7-17: CIP Safety configuration – CIP Safety inputs



The status of the individual bits is displayed in case of an existing online connection.

SafeLogic Designer configuration

7.5.7 CIP Safety outputs

The "CIP Safety outputs" dialog displays the bit assignment of the CIP Safety outputs of the individual target groups.



The bits are assigned when selecting the respective device profile from the device description file of the target.

The names of the individual CIP Safety output variables as well as the names of groups can be changed.

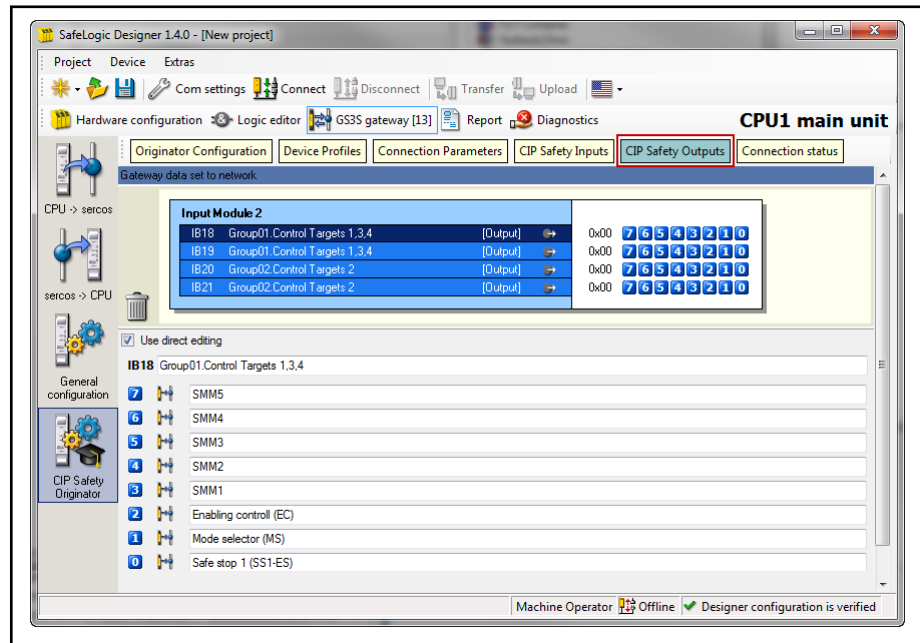


Fig. 7-18: CIP Safety configuration – CIP Safety outputs



The status of the individual bits is displayed in case of an existing online connection.

7.5.8 Connection status

In this dialog, the status of the individual CIP Safety connections can be read out if there is an online connection to the SafeLogic compact system. In this dialog, the "Max Data Age" of the input connections is also displayed. The "Max Data Age" of the output connections can be read out from the S-0-1810.x.01 (with x = connection instance of the control word) of the target.



The "Max Data Age" can be used to optimize the network response time. Only recommended for CIP Safety experts!

From the SafeLogic Designer V1.7.0 and GS3S firmware V1.02.0, an error counter is also displayed for every individual connection. This counter indicates the connection losses of the cyclic CIP Safety communication (since device activation). The total error counter (total of all single connections) can be retrieved in the parameter S-0-1800.0.4 of the GS3S.

SafeLogic Designer configuration

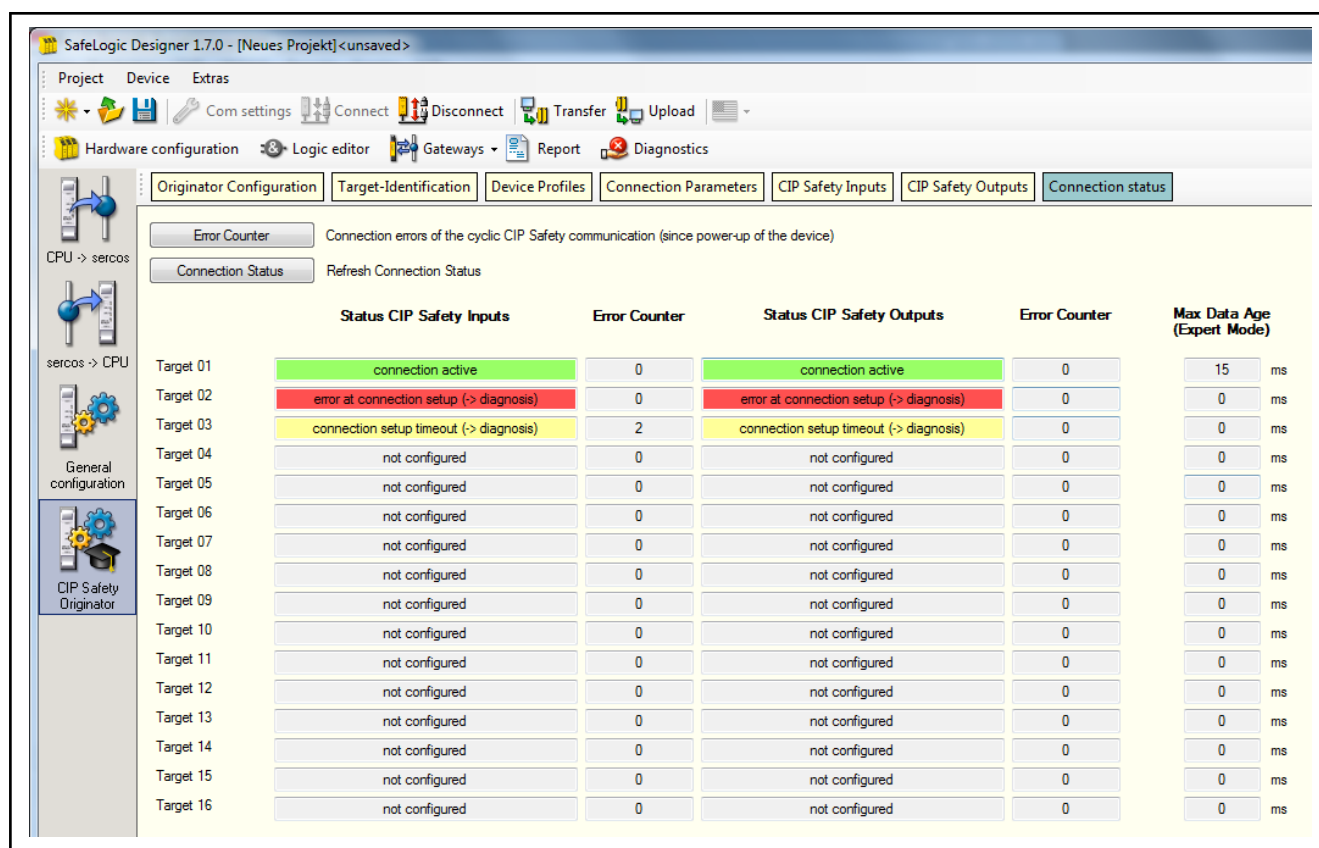


Fig. 7-19: CIP Safety – Connection status

Press "Error counter" or "Connection status" to refresh the display.

Connection status:

- **"Not configured"**: The target has not been configured or activated in the originator configuration. If the "online editing mode" is used in the SafeLogic Designer, note that the configuration still has to be transferred to the device.
- **"Connection configured/Connection was closed"**: If no cyclic Sercos communication is established (Sercos is not in CP4), no CSOs communication is possible and "Connection was closed" is displayed (or after the SafeLogic Designer configuration transfer, "Connection configured" is displayed).
- **"Connection setup, timeout"**: The Sercos CC configuration is missing or incorrectly set up; refer to the IndraWorks Sercos configuration => Context menu of the Sercos Gateway (SLC-3-GS3S) => "Assignment of the CIP Safety on Sercos targets": It has to be checked whether all required Sercos devices (e.g. drives) have been selected and the assignment of the "Target no." corresponds to the originator configuration in the SafeLogic Designer. If multiple GS3S are used in the Sercos ring, it has to be verified that the right GS3S has been configured.
- **"Error while establishing a connection"**: For a detailed diagnostic message, refer to the log (SafeLogic Designer => "Diagnostics")
 - Example: Different "Safety Device ID" (SDID). In the originator configuration in the SafeLogic Designer, the same SDID is to be set as in the target device (e.g. for Rexroth IndraDrive, the SafeMotion commissioning dialogs are to be used).

SafeLogic Designer configuration

- **Attention:** This kind of error may also occur due to an incorrect Sercos CC configuration → in this case, the same steps are to be carried out as for a "timeout" error (refer to the previous section "Connection setup timeout")
- **"Connection active":** The CIP Safety on Sercos connection is in cyclic communication. Note the following: Valid data is only exchanged if the SafeLogic compact application (CPU/main module) is in "Run" as well.

**Identification of a specific GS3S module**

If multiple GS3S modules are used in one Sercos ring, there are various options to clearly identify a specific module:

1. SafeLogic Designer GS3S-DTM => General configuration => the Sercos address of this GS3S module can be read out.
2. IndraWorks Sercos configuration => in the context menu of the Sercos master node, the "Sercos configuration" menu => in the control configuration, the "Visual device identification" option is available via right-click on a specific device. After selecting this option, the S3 LED of the specific device is flashing in orange at 1 Hz.

7.5.9 Start-up behavior and restart inhibit

GS3S always establishes the CIP Safety on Sercos connections automatically. I.e., the CSos connections are automatically established when reaching Sercos phase CP4 (CSos connections can only be active in CP4). The CSos connections are also automatically established after a connection error/cancelled connection.

Following inhibits regarding the restart can be implemented into the logic program:

CIP Safety input connections (status data)

In case of an inactive connection or in case of a cancelled connection upon an error, the input data is set to "0". I.e., invalid input data act like a safety requirement and a restart inhibit can be implemented in the logic program using the "Reset" function block.

CIP Safety output connections (control data)

In case of an inactive or incorrect connection, the target device independently changes to the safe state¹⁾. The GS3S detects an incorrect output connection if the target does not send any time synchronization telegram anymore. If a configured output connection is inactive, the output status bit is set to "0" during the GS3S module diagnostics. This "status output data" bit can also be used in the logic program to inhibit output data (see following figure).

¹⁾ An error in the CIP Safety output connection is normally reset in the target (e.g. for Rexroth IndraDrive via Sercos mechanisms). Inhibiting the output connection in GS3S could be avoided

SafeLogic Designer configuration

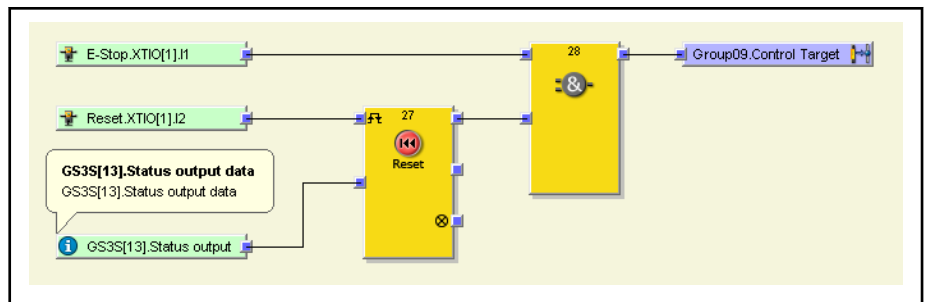


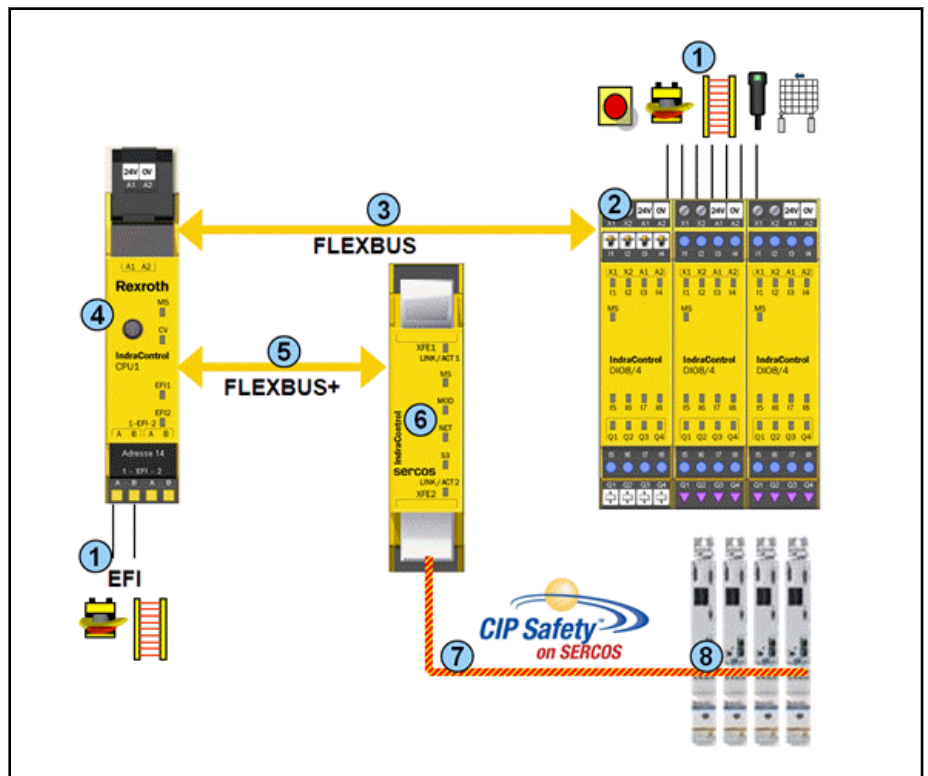
Fig. 7-20: Restart inhibit for output connections



In case of a complex target such as Rexroth IndraDrive, not all individual control signals (8-16 bits) have to be inhibited, but only the operating mode with the highest priority (e.g. SafeStop1 E-Stop).

7.6 Response times of GS3S and CIP Safety on Sercos

To calculate the system response time, all paths in the SafeLogic compact system have to be taken into consideration.



- (1) Sensors / EFI
- (2) Digital inputs/outputs
- (3) FLEXBUS
- (4) Logic execution time
- (5) FLEXBUS +
- (6) GS3S execution time
- (7) CIP Safety on Sercos, network response time
- (8) Response time in the target device

Fig. 7-21: Response times of a SafeLogic compact systems with Sercos Gateway

SafeLogic Designer configuration

The response times of the digital input/outputs (incl. sensors and EFI) as well as the logic execution times are explained in detail in a calculation table in the instructions "IndraControl SafeLogic compact Hardware" (see [chapter 1.5 "Related documents" on page 6](#)).

The following path segments are relevant to the GS3S and CIP Safety on Sercos:

- For response times of the data CPU module ↔ GS3S, twice the update rate of the FLEXBUS+ applies ⑤.
- The execution times of the GS3S ⑥ are already in the "worst case" response times of the FLEXBUS+ and CSos network response times. Other delay times do not occur. The values for FLEXBUS+ update rates and CSos network response times are specified in the GS3S connection parameter dialog or the SafeLogic Designer report.
- Error in sender and receiver of the CIP Safety telegrams are also taken into consideration in the CSos network response time ⑦.
- The response times in the CSos target device have to be taken into consideration for the system response time. The response times are specified in the user documentation of the target device ⑧.

8 Diagnostics

8.1 General information

The SafeLogic compact Sercos Gateway is both a Sercos I/O device and a SafeLogic compact module. Thus, the SafeLogic compact Sercos Gateway also provides different diagnostic options:

- State display via the LEDs of the GS3S
- Display of the status bits of the GS3S and reading out of the diagnostic memory in the SafeLogic Designer
- Reading out of the Sercos diagnostics of the GS3S via Sercos master

The GS3S consists of several communication units. One unit communicates with the SLC CPU, another one communicates with the Sercos bus and both communicate with each other. If an error occurs in the safety-relevant part of the GS3S during restart, SafeLogic Designer is able to diagnose this. See also [chapter 11.2.3 "SafeLogic compact station diagnostics" on page 112](#).

8.2 LED diagnostics

8.2.1 Display elements



In SafeLogic Designer, only 1 Hz blink codes can be displayed in online status. Therefore, SafeLogic Designer displays more complex blink codes in a simplified way. The device display has priority.

In general, the LED displays only serve diagnostic purposes and provide no reliable information.

LED		Meaning
LINK/ACT 1	○ Off	No Ethernet connection
LINK/ACT 2	● Green	Ethernet connection is active, no data transfer
	◡●◡ Green/orange	Ethernet connection is active, data transfer takes place (refer to the following information)
MS	○ Off	No operating voltage or no communication with CPU module
	● Green	"RUN"
	◡●◡ Red	1 Hz: Configuration required or configuration in progress 2 Hz: Safety-relevant error, cause: Error detection by firmware of the GS3S
	◡●◡ Green	"STOP"
	● Red	Safety-relevant error, cause: Communication with CPU
	◡●◡ Red/green	"RUN", a non-safety-relevant error is present

Diagnostics

LED		Meaning
MOD	○ Off	No operating voltage
	⇒●⇐ Red/green	Self-test
	⇒●⇐ Green	No configuration or application is in "STOP"
	● Green	Operating state - Application is in "RUN"
	⇒●⇐ Red	Recoverable error (e.g. configuration error)
	● Red	Unrecoverable error, module may have to be replaced (critical fault)
NET	○ Off	No operating voltage
	⇒●⇐ Green	A connection to the Sercos connection is established, but no cyclic CIP Safety communication takes place
	● Green	Cyclic CIP Safety communication (for at least one connection)
	⇒●⇐ Red	One or several CIP Safety connections report an error in the cyclic communication (e.g. timeout, CRC)
	● Red	No communication possible (e.g. Sercos bus is not in CP4)
S3	○ Off	No Sercos communication, NRT mode
	● Orange	Communication phase 0
	⇒●⇐ Orange/green	1x green, then orange: Communication phase 1 2x green, then orange: Communication phase 2 3x green, then orange: Communication phase 3 Alternating between green/orange: Hotplug (HP0) 1x orange, then green: Hotplug (HP1) 2x orange, then green: Hotplug (HP2)
	● Green	Communication phase 4
	⇒●⇐ Green	Fast forward ⇒ Loopback (= redundancy loss in a ring topology)
	⇒●⇐ Red/orange	Application error
	⇒●⇐ Red, green	Telegrams are lost (MST Losses / 2 (min. 2 sec))
	● Red	Communication error (C1D)
	⇒●⇐ Orange	Identification
	⇒●⇐ Red	Watchdog error (Timeout during monitoring of the cyclical process data)

Tab. 8-1: Meaning of the LED displays of the GS3S

Explanation of the symbols:

- ○ means that the LED is off
- ● means that the LED is permanently on in red, green or orange
- ☯ means that the LED flashes in red, green, orange or in combinations of these colors



If the GS3S does not start or no Sercos connection is established, take the following steps for further diagnostics:

1. Remove both Ethernet connectors (XFE1/2).
2. Restart GS3S and watch the LINK/ACT1/2 LED. The LEDs MA, MOD and NET may be illuminated differently, they are unimportant however:
 - First, the green LED LINK/ACT 1 is illuminated
 - Then, the orange LED LINK/ACT 1 is illuminated
 - Finally, all LINK/ACT 1/2 LEDs go out
3. If this sequence is not shown, if no LINK/ACT 1/2 LED is on, or if one of the LINK/ACT 1/2 LEDs flashes, there is a hardware problem. Please consult the Bosch Rexroth service.

8.3 SafeLogic Designer – Diagnostics of the GS3S

8.3.1 General information

To receive detailed diagnostic information of the GS3S and its CIP Safety connections, establish an online connection with SafeLogic Designer to the SafeLogic compact system. Once the online connection is established, the status bits of the individual CIP Safety connections of the GS3S can be displayed and the content of the diagnostic memory of the SafeLogic compact CPU can be read out.

8.3.2 Module status

Each SafeLogic compact module provides 4 bytes module status information that is summarized in data record 3.

Diagnostics

Byte	Bit	I/O modules XTxx ¹⁾	CPU modules CPUx	Sercos Gateway GS3S
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 The operating state is controlled by the CPU module. Only if the CPU module is in "Run", the GS3S can be in "Run" as well. The operating state is independent from the network communication
	1	Internal error: Internal tests failed 1 = No error 0 = Error	Internal error: Internal tests failed 1 = No error 0 = Error	Internal error: Internal tests failed 1 = No error 0 = error → There is an internal error in the module. The process data is invalid
	2	External error: Combination of the bits 0.5..3.7 1 = No error 0 = Error	Power supply not in permitted range or error in EFI communication 1 = No error 0 = Error	External error/communication error: Summary of bit 0.5 .. 2.7 ¹⁾ 1 = No error 0 = error → Sercos or at least one configured CIP Safety connections is not in cyclic communication
	3	Reserved	Reserved	Reserved
	4	Configuration is incompatible or invalid 1 = Valid configuration 0 = Invalid or unknown configuration	Configuration of a module in the system is incompatible or invalid 1 = Valid configuration 0 = Invalid or unknown configuration	Configuration is incompatible or invalid 1 = Valid configuration 0 = Invalid or unknown configuration
	5	Output power supply not in the permitted range 1 = Power supply ok 0 = Power supply not in the permitted range	Power supply not in the permitted range 1 = Power supply ok 0 = Power supply not in the permitted range	Input data status 1 = Valid network communication 0 = Invalid or no communication The input status (= data from network to GS3S) depends on the Sercos communication phase
	6	Control logic timeout for the Fast Shut Off output 1 = No error 0 = Timeout, as the control signal of the CPU logic did not switch off within 1 s	Communication error at EFI1 1 = No error 0 = Error	Output data status 1 = Valid network communication 0 = Invalid or no communication The output status indicates the status of the CIP Safety output connections. Only if all configured CIP Safety output connections are active, the status is set to "1". If one of the output connections is faulty or if the network communication is inactive, the status is set to "0". This implements output data locking in case of errors (see chapter 7.5.9 "Start-up behavior and restart inhibit" on page 62)
7	7	Monitoring the output load (over current), only XTDS	Communication error at EFI2 1 = No error 0 = Error	Sercos communication status 1 = Sercos in phase 4 (CP4 → cyclical data exchange active) 0 = Any other state

¹⁾ In the GS3S firmware V 1.01 and V 1.02, there is the summary of bit 1.0 .. 2.7

Diagnostics

Byte	Bit	I/O modules XTxx ¹⁾	CPU modules CPUx	Sercos Gateway GS3S
1	0	Input 1-2 dual channel input evaluation error 1 = No error 0 = Error	EFI Link stations in the system 1 = All found 0 = One or more missing	Target 1: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	1	Error in the two-channel evaluation of input 3-4 1 = No error 0 = Error	EFI Link stations suspended 1 = None 0 = One or more	Target 2: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	2	Error in the two-channel evaluation of input 5-6 1 = No error 0 = Error	Flexi Line status 1 = No error 0 = Flexi Line teach required and/or communication error to predecessor or successor	Target 3: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	3	Error in the two-channel evaluation of input 7-8 1 = No error 0 = Error	Reserved	Target 4: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	4	Reserved		Target 5: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	5	Reserved		Target 6: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	6	Reserved		Target 7: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	7	Reserved		Target 8: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state

Diagnostics

Byte	Bit	I/O modules XTxx ¹⁾	CPU modules CPUx	Sercos Gateway GS3S
2	0	Error of the external test signal at input 1 1 = No error 0 = Error	Reserved	Target 9: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	1	Error of the external test signal at input 2 1 = No error 0 = Error		Target 10: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	2	Error of the external test signal at input 4 1 = No error 0 = Error		Target 11: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	3	Error of the external test signal at input 4 1 = No error 0 = Error		Target 12: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	4	Error of the external test signal at input 5 1 = No error 0 = Error		Target 13: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	5	Error of the external test signal at input 6 1 = No error 0 = Error		Target 14: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	6	Error of the external test signal at input 7 1 = No error 0 = Error		Target 15: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state
	7	Error of the external test signal at input 8 1 = No error 0 = Error		Target 16: CIP Safety connection status 1 = Configured connection active (input connection and output connection) or no connection configured 0 = Any other state

Byte	Bit	I/O modules XTxx ¹⁾	CPU modules CPUx	Sercos Gateway GS3S
3	0	Error: Short circuit after High at output 1 1 = No error 0 = Error	Reserved	Reserved
	1	Error: Short circuit after Low at output 1 1 = No error 0 = Error		
	2	Error: Short circuit after High at output 2 1 = No error 0 = Error		
	3	Error: Short circuit after Low at output 2 1 = No error 0 = Error		
	4	Error: Short circuit after High at output 3 1 = No error 0 = Error		
	5	Error: Short circuit after Low at output 3 1 = No error 0 = Error		
	6	Error: Short circuit after High at output 4 1 = No error 0 = Error		
	7	Error: Short circuit after Low at output 4 1 = No error 0 = Error		

¹⁾ The module status bits for SLC-3-XTIO and SLC-3-XTDI only completely supported in firmware version V1.13 or higher

Tab. 8-2: *Meaning of the module status bits*



- Reserved (for future use) = static 1 (no status change)
- If no module exists, all values including the reserved values are set to logic 1
- New extension modules, e.g. the drive monitor (MOC0) are provided with individual module status bits. For a detailed description of the diagnostics of all modules, refer to the "IndraControl SafeLogic compact Diagnostic Gateway" documentation.

Refer to [chapter 1.5 "Related documents" on page 6](#))

These status information can be displayed in SafeLogic Designer and read out in Sercos master via acyclic parameter access to the parameter P-0-3692.x.3 (see [chapter "P-0-3692.0.3, Diagnostics of SafeLogic compact modules, data set 3" on page 196](#)).

In the SafeLogic Designer, open the display of module status bits via the GS3S context menu in the configuration area of the hardware configuration.

Diagnostics

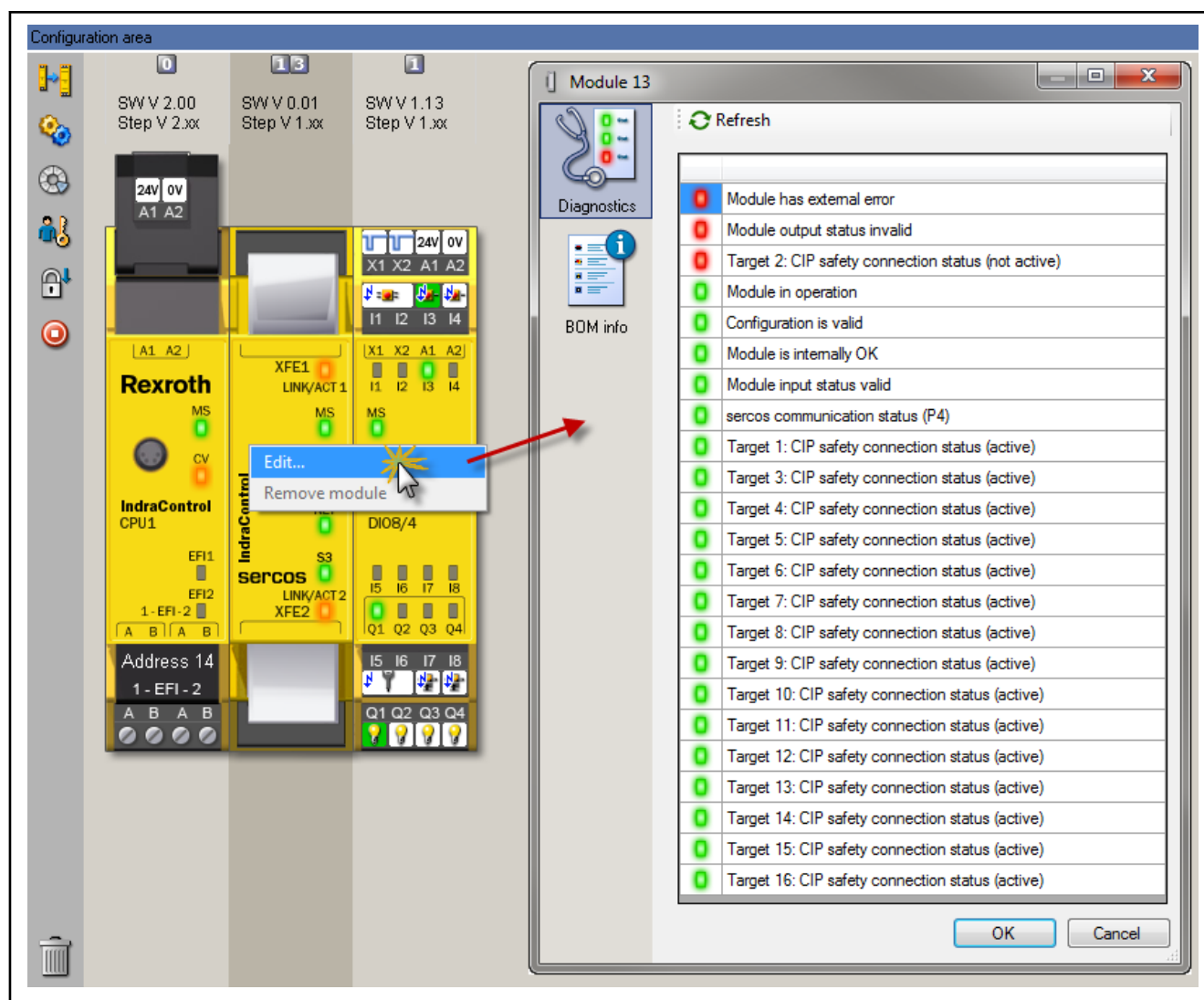


Fig. 8-1: Display GS3S module status

8.3.3 GS3S error codes

The diagnostics of the individual SafeLogic compact modules are read out by the CPU and stored to the diagnostic memory. In the SafeLogic Designer, it is possible to read out the contents of the diagnostic memory when an online connection is established.

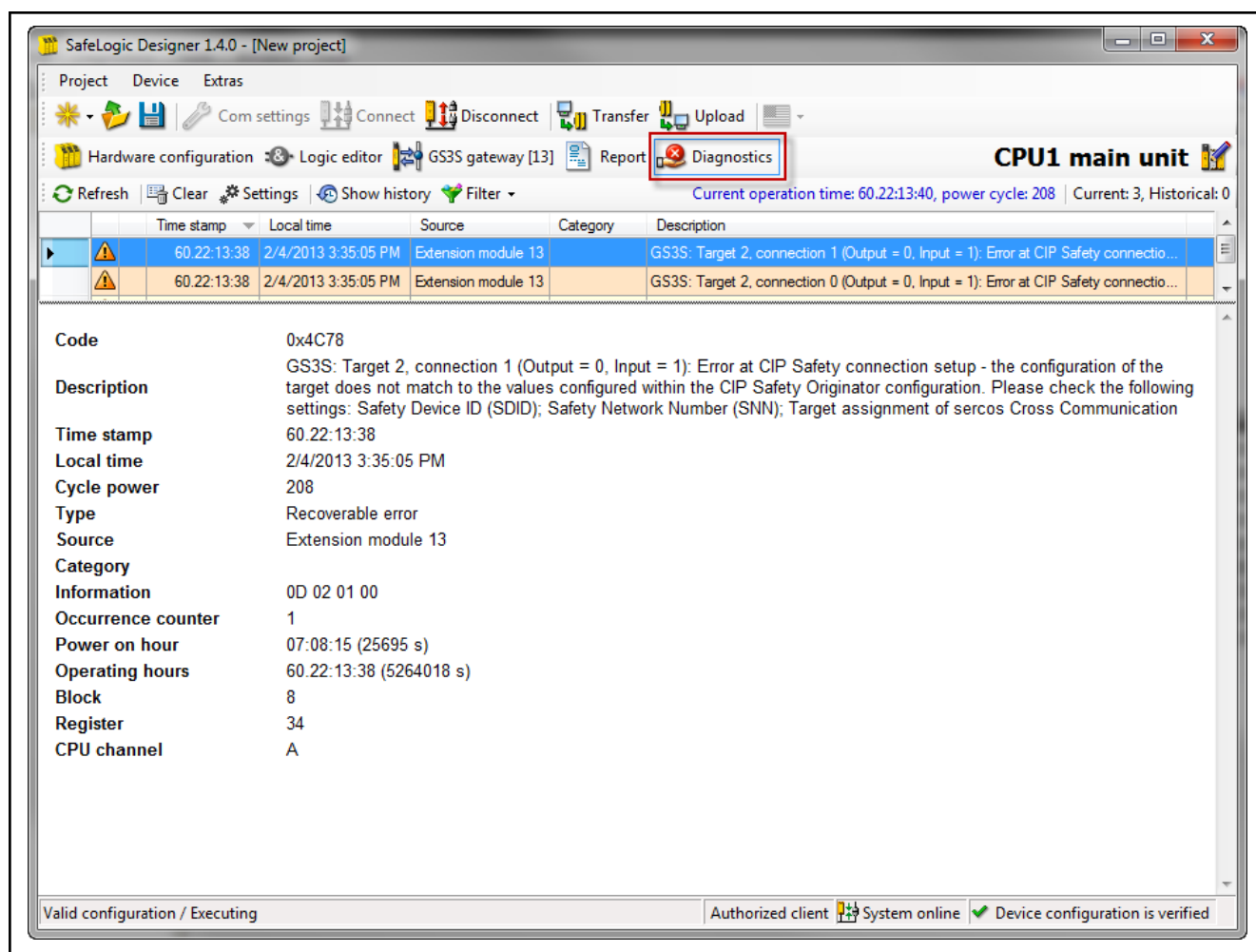


Fig. 8-2: SafeLogic Designer – Displaying diagnostics

The GS3S can write the following error codes to the diagnostic memory:

Error code	Meaning	Remedy
0xC1xx	Fatal error in Flexbus+ driver	Restart the SafeLogic compact system.
0xC2xx	Fatal error in the Flexbus+ adaptation	If the error remains, replace the device
0xC3xx	Fatal error in the Flexbus+ application	
0xC4xx	Fatal error during initialization	
0xC5xx	Fatal error detected during internal test routines	
0xC6xx	Fatal error in the hardware adaptation	
0xC7xx	Fatal error in the watchdog	
0xCAxx	Fatal error in the CIP Safety application	
0xCBxx	Fatal error in the CIP Safety stack	
0xCDxx	Fatal error in the Sercos interface (FPGA)	
0xCFxx	Fatal error during I/O status monitoring	
0xD0xx	Fatal error during group generation	
0x43xx	Internal error during the configuration of the Safe- Logic compact system	Reload the configuration

Diagnostics

Error code	Meaning	Remedy
0x0Axx	Error in the CIP Safety application	Error in the cyclic CSos communication (for details on further measures, refer to diagnostics in SafeLogic Designer)
0x0Bxx	Error in CIP Safety on Sercos stack	
0x4Axx	Error in the CIP Safety application	Configuration error (for details on further measures, refer to diagnostics in SafeLogic Designer)
0x4Bxx	Error in CIP Safety on Sercos stack	
0x4Cxx	Error during the CIP Safety connection establishment	Restart the SafeLogic compact system
0x50xx	Error during the group generation	
0x4Exx	Error in TCP/IP routing (e.g. Ethernet communication with SafeLogic Designer)	
0x4Fxx	Error during the I/O status monitoring	

Tab. 8-3: GS3S error codes

If it is not possible to repair an error with the information provided in this chapter, please consult your responsible Bosch Rexroth service.

8.4 Sercos diagnostics

8.4.1 Brief description

Parameters involved for diagnostics

The device provides several diagnostic options that can basically be divided into two groups:

1. Detection and display of the current state according to internal priority-dependent diagnostics
2. Common messages for several state messages.

Additionally, there are parameters for all important operating data whose values may be transmitted via the master communication (Sercos).

Parameters involved

- [S-0-0030](#), Manufacturer version
- [S-0-0095](#), Diagnostic message
- [S-0-0375](#), Diagnostic numbers list
- [S-0-0390](#), Diagnostic message number
- [S-0-1500.0.32](#), I/O diagnostic message
- [P-0-0478](#), Logbook event
- [P-0-0479](#), Logbook time stamp



For more detailed information on the parameters, see the appendix (see [chapter 11.4 "Parameter description" on page 130](#)).

Plain text diagnostics

The plain text diagnostics contains the diagnostic number and the diagnostic text. The plain text diagnostics can be read out using the parameter "[S-0-0095](#), Diagnostic message" and can be directly displayed on a user interface as a language-related description of a device state.

The plain text diagnostics is switched to the selected language using the parameter "S-0-0265, Language selection".

Language selection

Use the parameter "S-0-0265, Language selection" to select the language of the diagnostic texts.

See also [chapter "S-0-0265, Language selection" on page 136](#).

List of diagnostic numbers

In the parameter "S-0-0375, Diagnostic numbers list", the 50 diagnostic numbers most recently displayed are stored in chronological order. Whenever the content of "S-0-0390, Diagnostic message number" is changed, its old content is stored in S-0-0375. When the parameter S-0-0375 is read out, the first element of the parameter contains the most recently applied diagnostic number, the second element contains the diagnostic number applied from parameter S-0-0390 before, etc.

Diagnostic number

The diagnostic number only contains the diagnostic number without the diagnostic text. The diagnostic number can be read out using the parameter "S-0-0390, Diagnostic message number" and can therefore be used in a user interface as a language-independent way to determine and display the device state.

8.4.2 State diagnostics

A0000 Communication phase 0

Communication establishment via Sercos interface between master and slaves is divided into four communication phases:

- Communication phases 0 and 1 to detect the bus devices.
- In communication phase 2, the time and data structure of the protocols are prepared for the communication phases 3 and 4.

Phase startup takes place in ascending order. The communication phase is specified by the master. By switching into communication phase 4, initialization is completed and connection of power is enabled.

If the phase switch up is interrupted, this is indicated by the state display remaining in the already reached communication phase.

If the diagnostics "A0000 communication phase 0" is active, the bus device remains in phase 0 and waits for the master to switch from communication phase 0 to 1.

A0000 - Attributes

Diagnostic no.:

A0000

A0001 Communication phase 1

Communication establishment via Sercos interface between master and slaves is divided into four communication phases:

- Communication phases 0 and 1 to detect the bus devices.
- In communication phase 2, the time and data structure of the protocols are prepared for the communication phases 3 and 4.

Phase startup takes place in ascending order. The communication phase is specified by the master. By switching to communication phase 4, initialization is completed and cyclic data transfer is enabled.

If the phase switch up is interrupted, this is indicated by the state display remaining in the already reached communication phase.

Diagnostics

If the diagnostics "A0001 communication phase 1" is active, the bus device is in phase 1. Switching from phase 1 to phase 2 was not yet triggered by the master.

A0001 - Attributes

Diagnostic no.:

A0001

A0002 Communication phase 2

Communication phase 2 means that the bus device is in parameterization mode. Many parameters that can be written on in this mode can no longer be written on in communication phase 4 (operating mode).

In communication phase 2,

- the communication parameters are usually transmitted from the master to the bus device and
- if necessary, the functions "Load device parameters" and "Save device parameters" are executed

To reach the communication phase 2, the master sets "communication phase 2". Another option to switch to the communication phase 2, is executing the command "P-0-4023, C0400 switching to comm. phase 2".

Communication phase 3

Before it is possible to switch to communication phase 3, the command "S-0-0127, C0100 communication phase 3 transition check" has to be executed. During the switching preparation, the bus device checks, among others, the validity of the parameters required for communication phase 3.

After the switching of the preparation command was executed successfully, the bus device is switched to communication phase 3 by the master or switches to phase 3 independently.

A0002 - Attributes

Diagnostic no.:

A0002

A0003 Communication phase 3

Communication phase 3 means that the bus device is in *limited* parameterization mode. Like in the parameterization mode (phase 2), many parameters that can be written on in this mode, can no longer be written on in communication phase 4 (operating mode). It cannot be written to communication parameters in phase 3.

To reach the communication phase 3, the master sets "communication phase 3". Another option to switch to the communication phase 3, is executing the command "S-0-0127, C0100 Communication phase 3 transition check".

Communication phase 4

Before it is possible to switch to communication phase 4, the command "S-0-0128, C0200 Communication phase 4 transition check" has to be executed. During the switching preparation, the bus device checks, among others, the validity of the parameters required for communication phase 4.

After the switching of the preparation command was executed successfully, the bus device is switched to communication phase 4 by the master or switches to phase 4 independently.

A0003 - Attributes

Diagnostic no.:

A0003

A0008 NRT mode

The bus device is in NRT mode.

The bus device automatically switches to NRT mode if the following conditions are met:

- After the bus device is switched on.
- If the wrong communication phase is specified.

- Explanation** The NRT mode may only be exited via communication phase 0.
- The Sercos communication state machine distinguishes between two types of communication phases:
1. Communication phases *with* IP telegrams *without* Sercos telegrams (NRT mode).
 2. Communication phases *with* IP telegrams *and* Sercos telegrams (communication phase 0 to 4).

A0008 - Attributes Diagnostic no.: A0008

A0012 In operation

- Explanation** The diagnostics "A0012 in operation" indicates that the device is in communication phase 4 and receives cyclic and valid data from the Sercos master.

A0012 - Attributes Diagnostic no.: A0012

A0013 ready for operation

- Explanation** The diagnostics "A0013 ready for operation" indicates that the device is in communication phase 4 and receives cyclic data from the Sercos master, but that this data is still labeled as invalid by the master (see also description of [S-0-1500.0.1](#)).

A0013 - Attributes Diagnostic no.: A0013

A0050 Parameterization level 1 active

The bus device is in the operating state "parameterization level 1". Although the master communication is in the communication phase 4, the bus device can be parameterized like in communication phase 3.

See also [chapter "S-0-0420, C0400 Activate parameterization level command"](#) on page 138.

A0050 - Attributes Diagnostic no.: A0050

8.4.3 Error messages

Fatal system errors (F9xxx)

Behavior in case of a fatal system error

If a fatal system error is present, there is a serious problem with the device (e.g. Watchdog error, processor exception, etc.) that makes normal operation of the device impossible. The firmware of the device can no longer run due to a hardware or firmware error; clearing errors is also no longer possible.

In this case, the device automatically reacts as follows:

- Behavior of the device**
- The two LINK/ACT LEDs at both ports flash with a frequency of approx. 1 Hz.
 - Communication at the Sercos bus is set.

Commissioning steps Following a fatal system error, the device may only be recommissioned after the following steps:

1. Switch off the 24 V power supply and switch it on again to restart the device (incl. boot process and initialization).
2. Restart the device in operating mode.



If fatal system errors occur repeatedly, contact the Bosch Rexroth service, as the device can no longer be operated in this case.

Diagnostics

F9001 Error during internal function call

The device was switched off by the firmware.

Cause	Remedy
Unknown cause	Switch off the 24 V supply voltage and switch it on again. If the error is still present, replace the device.
An error occurred in the firmware (general software error)	Please contact the Bosch Rexroth service.

F9001 - Attributes

Diagnostic no.: F9001

F9002 Error during internal RTOS function call

Cause	Remedy
An error occurred in the firmware (general software error). The device was switched off by the firmware	Switch off the device and switch it on again. If the processor error is still displayed, please contact the Bosch Rexroth service.

F9002 - Attributes

Diagnostic no.: F9002

F9003 Watchdog

Cause	Remedy
The runtime monitoring by the firmware responded (general firmware error). The device was switched off by the firmware	Switch off the device and switch it on again. If the processor error is still displayed, please contact the Bosch Rexroth service.

F9003 - Attributes

Diagnostic no.: F9003

F9005 Processor exception

Cause	Remedy
A fatal processor error occurred. The device was switched off by the firmware (no communication)	Switch off the device and switch it on again. If the processor error is still displayed, please contact the Bosch Rexroth service.

F9005 - Attributes

Display: F9005
Diagnostic no.: F9005
Diagnostic no. from 18VRS: F9005

Fatal errors (F8xxx)**Behavior in case of fatal errors (F8xxx)**

There are two types of fatal errors (F8 errors):

- Fatal errors during the initialization (e.g. F8118, F8120, etc.)
- Fatal errors during the operation (e.g. F8060, F8022, etc.)

**Fatal errors during the initialization
 (initialization errors)**

Fatal initialization errors cannot be cleared, they require a restart of the device

Fatal errors during the operation

If a fatal error occurs during operation, the device can no longer be operated.

Commissioning steps

Following a fatal error, the device can only be recommissioned after the following was carried out:

1. Clear the error message with the clear error command (see "S-0-0099, C0500 reset state class 1") (for this purpose, it could be necessary to switch to parameterization mode or to switch off the device).
2. Determine and eliminate the error cause. This error cause might require the replacement of an entire component (e.g. CPU or I/O module).
3. The device has to return to the operating mode.



If fatal system errors occur repeatedly, contact the Bosch Rexroth service, as the device can no longer be operated in this case.

F8100 Error during initialization of parameter handling

When the device is initialized, its proper operation is checked. In this process, an error was detected.

Cause	Remedy
This error occurs once when the device is started for the first time after updating the firmware	Restore the device to the operational state according to the instructions. The device can only be set to the operating mode after the operating voltage was once switched off and then back on again
Unsuitable firmware is used, i.e. hardware and firmware do not match	Select the suitable firmware according to the functional description or version and release notes
Hardware fault on the device	Switch off the device and then on again. If the error remains, please contact the Bosch Rexroth service and replace the device if necessary

F8100 - Attributes

Diagnostic no.:

F8100

F8118 Illegal combination of hardware and firmware

The hardware is incompatible with the firmware used.

Cause	Remedy
Unsuitable firmware	Use firmware that matches the hardware
Unsuitable hardware	Use hardware that matches the firmware

F8118 - Attributes

Diagnostic no.:

F8118

F8120 Illegal combination of hardware and firmware

The hardware is incompatible to the firmware used.

Cause	Remedy
Unsuitable firmware	Use firmware that matches the hardware
Unsuitable hardware	Use hardware that matches the firmware

Diagnostics

F8120 - Attributes Diagnostic no.: F8120

F8122 Defective hardware

An error occurred during the initialization of the hardware.

Cause	Remedy
The hardware is defective	Replace the hardware. Use a compatible hardware configuration

F8122 - Attributes Diagnostic no.: F8122

F8128 Error during communication between processors

An error occurred while initializing the communication between the various processors.

Cause	Remedy
Incorrect or faulty firmware	Replace the firmware
Defective hardware	Replace the hardware

F8128 - Attributes Diagnostic no.: F8128

Interface errors (F4xxx)**Behavior in case of interface errors**

Commissioning steps The device can only be recommissioned if the following conditions are met:

1. The error reaction is completed, i.e. the device has completely processed the error.
2. The error message was cleared with the clear error command (see "S-0-0099, C0500 Reset state class 1").
3. The error cause has been eliminated.
4. The device has returned to the operating mode.

F4001 Sync telegram failure

Sercos master communication The Master Synchronisation Telegram (MST) has not been received by the bus device for several consecutive Sercos cycles. The number of permitted failures is set in [S-0-1003](#).

Cause	Remedy
Differing Sercos cycle times in master and slave	Check the Sercos cycle times in master and slave and adjust them if necessary
Interference in the Sercos interface (general)	Replace the hardware

F4001 - Attributes Diagnostic no.: F4001

F4002 RTD telegram failure

Sercos master communication A consumer connection violates the selected monitoring criterion.

	Cause	Remedy
	Cycle-synchronous monitoring was set for a connection and the NewData bit of the connection does not toggle in the pre-set cycle	The producer of the connection (can be the bus master or another slave) does not operate correctly
	Too many telegrams are canceled due to malfunctions	Check the bus line and connectors
F4002 - Attributes	Diagnostic no.:	F4002
	F4003 Deactivation of invalid comm. phase	
	The Sercos master module specified an invalid communication phase (phase > 4).	
	Cause	Remedy
	Error in the Sercos master module of the control	The error can only be recovered after consulting the control manufacturer
F4003 - Attributes	Diagnostic no.:	F4003
	F4004 Error during phase switch-up	
	During phase switch-up, the specified order was not observed.	
	Cause	Remedy
	Error in the Sercos master module of the control	The error can only be recovered after consulting the control manufacturer
F4004 - Attributes	Diagnostic no.:	F4004
	F4005 Error during phase switch-down	
	When switching down from a communication phase, the system did not switch to the communication phase 0.	
	Cause	Remedy
	Error in the Sercos master module of the control	The error can only be recovered after consulting the control manufacturer
F4005 - Attributes	Diagnostic no.:	F4005
	F4006 Phase switching without ready signal	
	The Sercos master tried a phase switching without waiting for the ready signal of the device.	
	Cause	Remedy
	Error in the Sercos master module of the control	The error can only be recovered after consulting the control manufacturer
F4006 - Attributes	Diagnostic no.:	F4006
	F4017 S-III: Incorrect procedure during phase switching	
	Error in the Sercos master module of the control. The Sercos master tried a phase switching and the slave detected an incorrect sequence.	

Diagnostics

Cause	Remedy
-------	--------

There is a timeout in the slave during phase switching (the individual switching steps took too long)

- or -

the master changed phases without prior notification (new phase in MST without set CPS bit)

- or -

The slave was added when Sercos was already in a higher phase

The error can only be recovered after consulting the control manufacturer

F4017 - Attributes

Diagnostic no.:

F4017

F4020 SIII: Cable break (L+F acc. to NRT)

The Sercos topology was changed from "Loop-back with Forward" (LF) to "NRT mode".



A change in the topology is also displayed in "[S-0-1045](#), Device status word (S-Dev)" and at the interface LEDs.

Cause	Remedy
-------	--------

Both Sercos cables were pulled simultaneously

Reconnect the Sercos cables and start the new phase startup by the master

There is a cable break (defective cable)

Replace the cables and start a new phase startup by the master

F4020 - Attributes

Diagnostic no.:

F4020

Non-fatal errors (F2xxx)

Behavior in case of non-fatal errors

Commissioning steps

The device can only be recommissioned if the following conditions are met:

1. The error reaction is completed, i.e. the device has completely processed the error.
2. The error message was cleared with the clear error command (see "[S-0-0099](#), C0500 Reset state class 1").
3. The error cause has been eliminated.
4. The device has returned to operating mode.

F2009 Load PL default values of the parameters

When the firmware is replaced (firmware update), the non-volatile memory (internal memory) is automatically analyzed and an error was detected in this process.



If the command "[S-0-0262](#), C07_x Load default values command" is executed, the error F2009 is automatically cleared.

During the preparations to switch to communication phases 3 and 4, the operating data (parameter values) is then checked. Parameters with invalid operating data (usually only all new parameters) are output in the parameters

"S-0-0021, IDN list of invalid operating data phase 2" or "S-0-0022, IDN list of invalid operating data phase 3".

NOTICE

Material damage may be caused by an unintentional overwriting of parameters!

Save the current parameter block before loading the parameter default values with the "Clear errors" command.

Cause	Remedy
The device is started with the new firmware for the first time or a version update was carried out, changing the number of resident parameters	By clearing the error, all parameter values are deleted and assigned with initial values (default values) - or - the error is cleared by executing command "S-0-0099, C0500 Reset state class 1". Parameters that can be read out from the memory keep their most recently saved value. Default values are assigned to all (new) parameters that cannot be read out and they are marked as invalid
The parameter memory (programming module or internal memory) is defective. Thus, the error F2009 occurs repeatedly	Check the hardware and replace it if required

F2009 - Attributes

Diagnostic no.:

F2009

F2091 Error for tests

This error is required for tests of conformity.

F2091 - Attributes

Diagnostic no.:

F2091

F2093 Critical error: The Safety application was stopped and all outputs are disabled

The SafeLogic compact control detected a critical error and went into the safe state. All outputs are disabled, the safe communication CIP Safety on Sercos to the targets is stopped.

In case of error, the "MS" module status LED of the modules is "red", i.e. the module, which detected the error, flashes in "red" with 2 Hz, all other modules are statically "red". A detailed error message can be retrieved in the diagnostic log in the designer (if necessary "Show history").



If a TCP/IP communication protocol is used via the Sercos Gateway, it is then interrupted in case of a critical error. The TCP/IP communication can only be established again via a restart (voltage reset).

Diagnostics

Cause		Remedy
Sporadically occurring failure (EMC interference)		Switch off and on the SafeLogic compact control. Check the EMC effects.
Defective or incorrect cabling		Check and correct the cabling
Defective hardware		If the error occurs multiple times, replace the respective hardware module
F2093 - Attributes	Diagnostic no.:	F2093
F2100 Incorrect access to the fixed data memory		
An error occurred while accessing the fixed data memory (flash/internal memory).		
Cause		Remedy
Sporadically occurring failure (firmware error)		Clear the error and contact the Bosch Rexroth service to update the firmware.
Defective hardware		If the error occurs repeatedly, replace the hardware
F2100 - Attributes	Diagnostic no.:	F2100
F2190 Incorrect Ethernet configuration		
During initialization of the bus device, the parameterization of the interfaces for Ethernet communication is checked. In this process, an error was detected.		
Cause		Remedy
The parameter configuration is invalid for the Ethernet communication (TCP/IP): IP and gateway address are not located within the same IP network - or - IP address and gateway address are identical		Set the parameters for the Ethernet communication (TCP/IP) to valid values: • S-0-1020, Master communication engineering via IP: IP address • S-0-1021, Master communication engineering via IP: Network mask • S-0-1022, Master communication engineering via IP: Gateway address
The internal configuration of the IP stack was invalidly terminated due to memory problems		Due to a hardware problem, the hardware has to be replaced
F2190 - Attributes	Diagnostic no.:	F2190

8.4.4 Warnings (Exxxx)

General information



A warning cannot be cleared. Warnings are deleted automatically when the cause was eliminated.

Category E4xxx warnings

E4001 Sync telegram failure

The **Master Synchronisation Telegram (MST)** has not been received by the bus device for several consecutive Sercos cycles. The number of permitted failures is set in [S-0-1003](#).



The reaction to the failure of cyclic communication can be configured as warning or error in "P-0-4088, Master communication, device configuration" .

Cause	Remedy
Differing Sercos cycle times in master and slave	Check the Sercos cycle times in master and slave and adjust them if necessary
Interference in the Sercos interface (general)	Replace the hardware

E4001 - Attributes

Dagnostic no.:

E4001

E4002 RTD telegram failure



The reaction to the failure of cyclical communication can be configured as a warning or error in "P-0-4088, master communication, device configuration" .

A consumer connection violates the selected monitoring criterion.

Cause	Remedy
Cycle-synchronous monitoring was set for a connection and the NewData bit of the connection does not toggle in the pre-set cycle	The producer of the connection (can be the bus master or another slave) does not operate correctly
Too many telegrams are canceled due to malfunctions	Check the bus line and connectors

E4002 - Attributes

Dagnostic no.:

E4002

E4005 No command value specification via master communication

The master communication interface does not specify any command values.



Dangerous movements! Danger to life, risk of injury, serious injury or material damage due to automatic restart after bus failure!

In case of a bus failure (message "E4005"), there has to be an error reaction in the control to prevent automatic restart when the bus was restored. Therefore, in case of a bus failure, the bits "outputs inactive" (bit 15 in parameter "[S-0-1500.0.1](#), I/O control word") have to be reset in the control.

Sercos

Parameter "P-0-4088, Master communication, device configuration" defines that - in case of communication failure - no device error reaction is to be initiated, but that this warning is to be displayed.

Diagnostics

Cause	Remedy
The Sercos master module specified an invalid communication phase (phase > 4) (see also F4003)	The cause may only be repaired after consulting the control manufacturer
When switching down from a communication phase, the system did not switch to the communication phase 0 (error in the Sercos master module of the control) (see also F4005)	The cause may only be repaired after consulting the control manufacturer

E4005 - Attributes

Diagnostic no.:

E4005

E4007 Consumer connection failed

A consumer connection violates the selected monitoring criterion.

Cause	Remedy
Cycle-synchronous monitoring was set for a consumer connection and the New-Data bit of the connection does not toggle in the preset cycle	The producer of the connection (may be the bus master or another slave) does not work correctly
Too many telegrams are canceled due to malfunctions	Check the bus line and connectors

E4007 - Attributes

Diagnostic no.:

E4007

E4010 Slave not scanned or address 0

While initializing the Sercos ring in communication phase 1, the Sercos master has to address each slave that is to participate in the phase startup. Slaves that are not addressed or are provided with the device address 0 issue warning E4010. It is not possible to communicate with these slaves in higher communication phases. The slaves only operate in repeater mode.

Cause	Remedy
Slave was not scanned in phase 1 or address 0 is set	Set the correct slave address
Slave was deactivated by the control	Check the Sercos master configuration

E4010 - Attributes

Diagnostic no.:

E4010

E4020 SIII: Ring break (FF to LF)

The Sercos ring was interrupted. The Sercos topology was changed from "Fast Forward" (FF) to "Loop-back with Forward" (LF).



A change in the topology is also displayed in "[S-0-1045](#), Device status word (S-Dev)" and at the interface LEDs.

Diagnostics

Cause	Remedy
The master changed the topology via the device control word (C-Dev) (S-0-1044) - or - A neighboring slave changed its topology	Initiate ring repair by the master
One of the two Sercos cables was pulled	Reconnect the Sercos cables and start the ring repair by the master
There is a cable break (defective cable)	Replace cable and start ring repair by the master

E4020 - Attributes

Diagnostic no.:

E4020

Category E2xxx warnings

E2090 Warning in I/O functionality, see S-0-1500.0.32

An error occurred within the entire SafeLogic compact system. The error is displayed by this warning. For more detailed information, refer to the parameter [S-0-1500.0.32](#).

Cause	Remedy
Diagnostics in the device There is a diagnostics in the gateway. See parameter S-0-1500.0.32 for a more detailed diagnostics in the SafeLogic Designer	Eliminate the cause (e.g. repair short circuit at the input)

E2090 - Attributes

Diagnostic no.:

E2090

E2092 Internal synchronization error

The NC cycle time informs the device on the intervals when new cyclic command values are received and have to be processed. Warning E2092 is generated if the parameterized processing cycle ("S-0-0001, NC cycle time") deviates from the effective processing cycle of the cyclic command values.

Cause	Remedy
Master communication can be synchronized (Sercos) In a cycle-synchronous consumer connection, the producer has to send new data to the consumer at a specified time. The producer signals this to the consumer by toggling bit 1 (NewData bit) of "S-0-1050.x.8, Sercos connection: Control word C-Con". This bit was not operated by the consumer at the time $T_{P_{cyc}}$	The producer of the cycle-synchronous consumer connection has to operate the NewData bit at the time $T_{P_{cyc}}$

E2092 - Attributes

Diagnostic no.:

E2092

E2093 At least one configured CIP Safety connection is not active, see Designer Diagnostics

At least one of the configured CIP Safety connections is not active in the Sercos phase 4. As the CIP Safety connections can only be established in the cyclic operation, the connections are only checked in the Sercos phase 4.

Diagnostics

Cause	Remedy
Diagnostics in the device At least one configured CIP Safety connection is not active	Determine the exact cause in the designer (e.g. faulty or missing CC connection, incorrect SDID, etc.) and eliminate the error

E2093 - Attributes

Diagnostic no.:

E2093

8.4.5 Command diagnostics

Commands

C0100 Preparation to switch from phase 2 to 3

The command "S-0-0127, C0100 Communication phase 3 transition check" is active.

C0100 - Attributes

Diagnostic no.:

C0100

C0200 Exit parameterization level command

The command "S-0-0422, C0200 Exit parameterization level command" is active.

C0200 - Attributes

Diagnostic no.:

C0200

C0400 Activate parameterization level 1 command

Parameter "S-0-0420, C0400 Activate parameterization level 1 command" started the command to switch into parameterization mode.

C0400 - Attributes

Diagnostic no.:

C0400

C0500 Reset state class 1, reset error

The command to clear errors ("S-0-0099, C0500 Reset state class 1") was activated. All device-internal errors are cleared.



An error may only be cleared after it was corrected! A new error message is generated if the errors are still reported after deletion.

NOTICE

The internal memory (flash) can be damaged due to too frequent write access!

When this command is executed, it is written to the internal memory (flash). As each flash memory only allows a limited number of write access before its cells are destroyed, ensure that write access is not carried out too often.

C0500 - Attributes

Diagnostic no.:

C0500

C0750 Load default values command (factory settings)

By executing the command "C0750 Load default values command (factory settings)", the parameters saved to non-volatile memory are reset to the factory settings.

The command is started with parameter "S-0-0262, C07_x Load default values command".

NOTICE

Damage to the internal memory (flash) caused by too many write accesses!

During the execution of this command, data are written to the internal memory (flash). This memory, however, only allows a limited number of write accesses. For this reason, you should make sure that such write accesses are not carried out too often (a maximum of approx. 100,000 writing cycles).

C0750 - Attributes

Diagnostic no.:

C0750

C5300 SYNC delay measurement command

The command "S-0-1024, C5300 SYNC delay measurement command" is active.

C5300 - Attributes

Diagnostic no.:

C5300

C6100 Activate IP settings command

The command "S-0-1048, C6100 Activate IP settings command" was started. First of all, the settings of all available parameters for the IP communication of the device are checked for plausible and modified values.

Interface	IP address	Network mask	Gateway address
Engineering using IP (master communication)	S-0-1020	S-0-1021	S-0-1022

Tab. 8-4: Parameters for the IP configuration

If modifications were made, the IP communication is cancelled via the respective interface. The new settings are activated and communication is started with the new settings.



Before executing this command, terminate the IP communication between the interfaces and the IP client. Otherwise, error messages can result in the respective clients due to the lack of communication.

C6100 - Attributes

Diagnostic no.:

C6100

C6400 Reboot command

The command to restart the device ("S-0-1350, C6400 Reboot command") was activated.



This command cannot be interrupted. While the command is being executed, the parameters to be saved are stored and the Sercos bus is interrupted ("S3" LED goes out).

NOTICE

The device is damaged if the device is switched off during copying!

When this command is executed, the system first checks if any firmware loaded previously has to be activated. If this is the case, the firmware is copied internally to another location. If the device is switched off during the copying, the device can become useless. Thus, wait at least for two minutes after activating the command before switching off the device.

Diagnostics

C6400 - Attributes

Diagnostic no.:

C6400

Command errors

Clearing command errors



A command error cannot be eliminated by "Clear errors", but by terminating the respective command.

C0101 Incomplete parameter block (-> S-0-0021)

When the command "S-0-0127, C0100 Communication phase 3 transition check" is executed, the available parameters are checked (e.g. validity) in addition to the initialization of internal variables. An error was detected.

Cause	Remedy
Data block elements required in the communication phase 3 are missing or invalid	Write the permissible operating date to the concerned parameters (find the concerned parameters in the list "S-0-0021, IDN list of invalid operating data for phase 2")
Internal data memory defective	Please contact the Bosch Rexroth service.

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0101 - Attributes

Diagnostic no.:

C0101

C0102 Parameter limit value error (-> S-0-0021)

When the command "S-0-0127, C0100 Communication phase 3 transition check" is executed, the limit values (minimum and maximum value) of certain parameters are checked. An error was detected.

Cause	Remedy
The parameter values required in communication phase 3 are outside their permissible value range (minimum or maximum value)	Write the permissible values to the parameters (see minimum and maximum value) (find the concerned parameters in the list "S-0-0021, IDN list of invalid operating data for phase 2")

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0102 - Attributes

Diagnostic no.:

C0102

C0103 Parameter conversion error (-> S-0-0021)

When the command "S-0-0127, C0100 Communication phase 3 transition check" is executed, the internal parameter formats are checked to ensure internal processing. An error was detected.

Cause	Remedy
Parameter values required in communication phase 3 cannot be processed	Write the permissible values to the parameters (find the concerned parameters in the list "S-0-0021, IDN list of invalid operating data for phase 2")

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0103 - Attributes

Diagnostic no.:

C0103

C0108 Time slot parameter > Sercos cycle time

When the command "S-0-0127, C0100 Communication phase 3 transition check" is executed, the timing settings for Sercos communication are checked. An error was detected.

Cause	Remedy
At least one of the following time slot parameters is incorrect:	Correct the respective time slot parameter(s).
S-0-1006, Transmission time of the drive telegram (t1)	Consult the machine manufacturer or the system programmer.
S-0-1007, Measurement time of actual values (t4)	The incorrect parameter is displayed in S-0-0021
S-0-1017, NRT transmission time	



The control manufacturer sets the times of the time slot parameters which are specified by Sercos.

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0108 - Attributes

Diagnostic no.:

C0108

C0109 Unsuitable telegram offset

An error was detected while executing command "S-0-0127, C0100 Communication phase 3 transition check".

Cause	Remedy
At least one of the parameterized telegram offsets does not meet the following criteria:	Check the offsets in the following parameters:
Telegram offset is outside the telegram	S-0-1009, Device control (C-Dev) telegram assignment
Telegram offset and length is outside the telegram	S-0-1011, Device status (S-Dev) telegram assignment
Telegram offset is in a prohibited area (e.g. Hotplug field)	S-0-1013, SVC offset in MDT
Telegram offset and length of several parameters overlap	S-0-1014, SVC offset in AT
Telegram offset does not meet 16 bit alignment	S-0-1050.x.3, Sercos connection: Telegram assignment
	Information: The control manufacturer specifies the telegram offset. The incorrect parameter is displayed in S-0-0021

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0109 - Attributes

Diagnostic no.:

C0109

Diagnostics

C0112 TNcyc (S-0-0001) or TScyc (S-0-0002) is incorrect

An error regarding the Sercos timing settings was detected while executing command "S-0-0127, C0100 Communication phase 3 transition check".

Cause	Remedy
The parameters "S-0-0001, NC cycle time (TNcyc)" and/or "S-0-1002, Sercos cycle time (TScyc)" are set incorrectly	Correct "S-0-0001, NC cycle time (TNcyc)" and "S-0-1002, Sercos cycle time (TScyc)" Allowed settings are 1 ms or integral multiples of 1 ms



The control manufacturer is responsible to determine the parameters S-0-0001 and S-0-1002 and it is specified by the Sercos interface.

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0112 - Attributes

Diagnostic no.:

C0112

C0170 config. ID numbers not configurable for connection

Cause	Remedy
During the configuration of the sercos connections ("S-0-1050.x.6, sercos connection: configuration list"), an invalid ID number was parameterized	Permissible ID numbers in consumer connections : All ID numbers from "S-0-0188, List of config. data in cycl. command value data channel" Permissible ID numbers in producer connections : All ID numbers from "S-0-0187, List of config. data in cycl. actual value data channel"

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0170 - Attributes

Diagnostic no.: C0170

C0171 Maximum length for connections exceeded

Cause	Remedy
The permitted connection length was exceeded in the configuration of the Sercos connections, i.e. the total length of all configured ID numbers in "S-0-1050.x.6, Sercos connection: Configuration list" exceeds the value in "S-0-1050.x.4, Sercos connection: Max. connection length"	Reduce the number of ID numbers in "S-0-1050.x.6, Sercos connection: Configuration list"

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0171 - Attributes

Diagnostic no.: C0171

C0172 Delay measurement (S-0-1024) not executed

A check performed while executing command "S-0-0127, C0100 Communication phase 3 transition check", reported that the delay measurement with useful measured values was not carried out correctly.

Cause	Remedy
The command "S-0-0127, C0100 Communication phase 3 transition check" was not executed or aborted with errors	Execute the command "S-0-1024, C5300 SYNC delay measurement command" and then restart the command "S-0-0127, C0100 Communication phase 3 transition check"

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0172 - Attributes Diagnostic no.: C0172

C0173 Connections (number) not configurable

Cause	Remedy
The parameterized connections in S-0-1050 cannot be realized, as the Sercos FPGA resources are exceeded	Better arrange the slave connections in the telegram (one after another). Can only be repaired by the bus master or configurator

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0173 - Attributes Diagnostic no.: C0173

C0174 Connection configuration not permitted

Cause	Remedy
A configuration was set for a Sercos connection that is not supported by the bus device	"S-0-1050.x.1, Sercos connection: Configuration" in all Sercos III connections and compare them to the permitted configurations in the parameter description
A connection class was assigned too often to the Sercos connections	"S-0-1050.x.7, Sercos connection: Connection class" in all Sercos connections and compare it to the permitted maximum assignment "S-0-1060.x.3, Sercos connection type: Max. configurable"

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0174 - Attributes Diagnostic no.: C0174

Diagnostics

C0175 Producer cycle time of a connection incorrect

Cause	Remedy
A producer cycle time was set for a Sercos connection that is not supported by the bus device	"S-0-1050.x.10, Sercos connection: Producer cycle time" in all Sercos connections and compare them to the permitted producer cycle times in the parameter description

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0175 - Attributes Diagnostic no.: C0175

C0199 Sercos cycle time too small, from 9 targets on at least 2 ms

When the command "S-0-0127, C0100 Communication phase 3 transition check" is executed, the timing settings for Sercos communication are checked. An error was detected.

Cause	Remedy
The number of the configured targets is incompatible with the Sercos cycle time	With a Sercos cycle time of 1 ms, up to 8 targets can be operated. If more targets are configured, select a Sercos cycle time of at least 2 ms

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0199 - Attributes Diagnostic no.: C0199

C0201 Incomplete parameter block (-> S-0-0423)

When the command "S-0-0422, C0200 Exit parameterization level command" is executed, the available parameters are checked (e.g. validity) in addition to the initialization of internal variables. An error was detected during this check.

Cause	Remedy
Data block elements required in the operating mode are missing or invalid	Write the permissible operating data to the concerned parameters (find the concerned parameters in the list "S-0-0423, IDN list of invalid data of the parameterization levels")

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0201 - Attributes Diagnostic no.: C0201

C0202 Parameter limit value error (-> S-0-0423)

When the command "S-0-0422, C0200 Exit parameterization level command" is executed, the limit values (minimum and maximum value) of certain parameters are checked. An error was detected during this check.

Cause	Remedy
-------	--------

Parameter values required in operating mode are outside their permissible value range (minimum or maximum value)

Write the permissible values to the parameters (see minimum and maximum value) (find the concerned parameters in the list "S-0-0423, IDN list of invalid data of the parameterization levels")

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0202 - Attributes Diagnostic no.: C0202

C0203 Parameter conversion error (-> S-0-0423)

When the command "S-0-0422, C0200 Exit parameterization level command" is executed, the internal parameter formats are checked to ensure the internal processing. An error was detected during this check.

Cause	Remedy
-------	--------

Parameter values required in operating mode cannot be processed

Write the permissible values to the parameters (find the concerned parameters in the list "S-0-0423, IDN list of invalid data of the parameterization levels")

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0203 - Attributes Diagnostic no.: C0203

C0212 Invalid data (-> S-0-0423)

While executing the command "S-0-0422, C0200 Exit parameterization level command", an error occurred during the initialization of certain data from the flash memory. The parameters concerned are entered into the list "S-0-0423, IDN list of invalid data of the parameterization levels".

Cause	Remedy
-------	--------

Read error due to defective hardware

If errors are still present after switching off and back on, replace the hardware or contact the Bosch Rexroth service.

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0212 - Attributes Diagnostic no.: C0212

C0251 Master communication synchronization error

When the command "S-0-0422, C0200 Exit parameterization level command" is executed, the system checks if the device is synchronized with the Sercos bus interface. Synchronization has to be completed when the command ends. If this is not the case, this error message is generated.

Cause	Remedy
-------	--------

Defective hardware

Replace the hardware

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0251 - Attributes Diagnostic no.: C0251

Diagnostics

C0298 Parameterization level cannot be exited

The command "S-0-0422, C0200 Exit parameterization level command " was started but cannot be executed.

Cause	Remedy
It was tried to switch to the operating mode during a firmware download	Wait until the firmware download is finished before switching to the operating mode
It was tried to switch to the operating mode after a boot error (F81xx error)	1. Terminate command 2. Clear boot error (F81xx error) 3. Eliminate the cause 4. Reboot the device

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0298 - Attributes

Diagnostic no.: C0298

C0751 Parameter default value incorrect (-> S-0-0423)

The command "C0750 Load defaults procedure command (factory settings)" was started. An error occurred when a default value was written.



The faulty parameter is recorded in the parameter "S-0-0423, IDN-list of invalid data for parameterization levels".

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0751 - Attributes

Diagnostic no.: C0751

C0752 Locked with password

An error occurred while executing the command "C0750 Load default values command (factory settings)".

Cause	Remedy
Parameter "S-0-0267, Password" provided the device parameters with write protection. The diagnostics C0752 indicates that the command C0750 was started without removing the write protection first	Remove the write protection by entering the password. Restart the command

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C0752 - Attributes

Diagnostic no.: C0752

C5301 Delay measurement failed

An error occurred while executing the command "S-0-1024, C5300 SYNC delay measurement command" or the command could not be started.

Diagnostics

Cause	Remedy
-------	--------

The parameterization for command execution is incomplete. The measurement cannot be started

Enter a valid value into "S-0-1015, Ring delay"

The measurement was unsuitable, as the deviations in the measured values were too large

Repeat the measurement

The measurement was unsuitable, as the topology changed during measurement

Repeat measurement

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C5301 - Attributes

Diagnostic no.:

C5301

C6101 Incorrect IP settings

While executing command "S-0-1048, C6100 Activate IP settings command", the user settings are checked.

Cause	Remedy
-------	--------

The settings for IP address, network mask, and gateway address of one or several interfaces do not match

Correct the IP communication settings for the interfaces concerned and restart the command "S-0-1048, C6100 Activate IP settings command"

For information on how to eliminate command errors, refer to [chapter "Clearing command errors" on page 90](#).

C6101 - Attributes

Diagnostic no.: C6101

8.4.6 CSAL Safety diagnostics

The parameters [P-0-3691.0.1](#) and [P-0-3691.0.2](#) contain diagnostic numbers that only refer to non-safety-relevant CIP Safety communication (CIP Safety Application Layer - CSAL). If critical errors occur, these errors are reported via SLC-CPU and displayed in the SafeLogic Designer. Refer to this table for a more detailed diagnostics of critical and non-critical errors.

Error code	Cause	Debugging
0x1607, 0x160A, 0x170C, 0x170D, 0x170E, 0x1806 - 0x180A, 0x1912 - 0x1915, 0x1918 - 0x191D, 0x1927, 0x1C0A, 0x1C0B, 0x1D0E, 0x1E07, 0xD501 - 0xD505, 0xD601 - 0xD606, 0xD701 - 0xD70B, 0xD801 - 0xD805, 0xD901 - 0xD905, 0xD910, 0xD911, 0xDB01 - 0xDB09, 0xDC01 - 0xDC09, 0xDD01 - 0xDD0A, 0xDE01 - 0xDE07, 0xDF01, 0xDF02	Invalid internal state	Switch off the device and switch it on again. Contact Bosch Rexroth service if the problem persists
0x1608, 0x1609, 0x170F, 0x1710 - 0x1715, 0x180D - 0x180F, 0x1810 - 0x1812, 0x1916, 0x1917, 0x1E08 - 0x1E0D	Invalid or not supported access to the CIP object	Check the CIP access parameters
0x180B, 0x180C	Timeout occurred	Check the Sercos connections

Diagnostics

Error code	Cause	Debugging
0x1813 - 0x1820, 0x1A01 - 0x1A0E, 0x1C0C - 0x1C18,	CIP Safety telegram error	Check the Safety settings of the other connection devices
0x191E - 0x1926, 0x1D0B - 0x1D0D	CIP Safety state error	This error can occur when CIP Safety connections are established or disconnected and is usually cleared by the gateway itself. If the error occurs frequently, contact customer support
0x1F04 - 0x1F031	Faulty internal communication	The communication between the processors is faulty. Switch off the device and switch it on again. Contact Bosch Rexroth service if the problem persists
0xD906 - 0xD90F, 0xDB0A - 0xDB14	Faulty CIP Safety communication with the Sercos bus	Check the Sercos connections

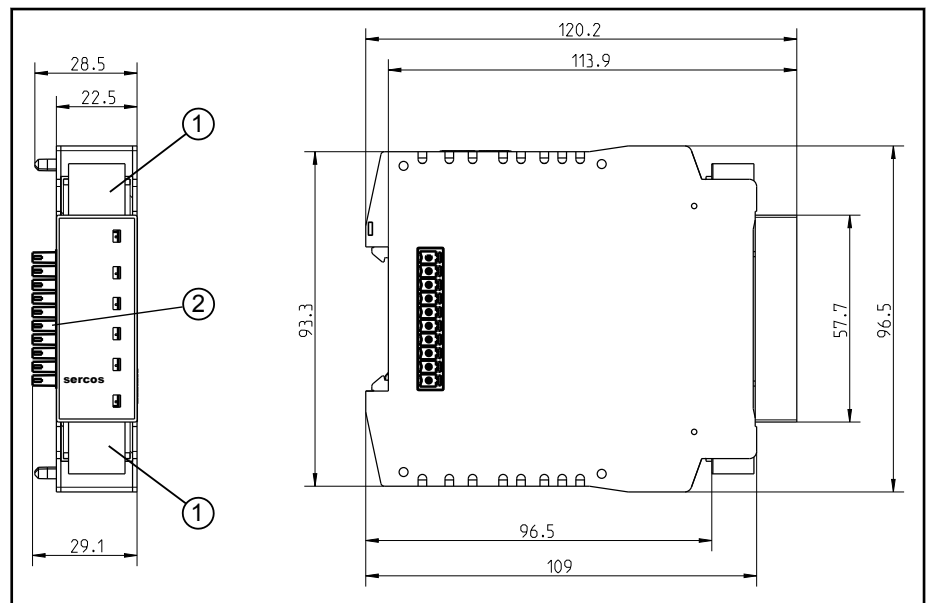
Tab. 8-5: CSAL Safety diagnostics

9 Technical data

9.1 Dimensions and weight

Dimensions (W × H × D)	Ca. 22.5 × 96.5 × 120.2 mm
Weight (without packaging)	Ca. 130 g

9.2 Housing dimensions



1 Sercos connections
 2 Module bus connector

Fig. 9-1: Dimensioned drawing – SafeLogic compact Sercos Gateway (mm)

9.3 Field bus

Field bus	Sercos in the third generation
Number	2
Connection method	RJ45 socket
Transfer rate	100 MBit/s (100Base-TX)
MAC address	Saved on electronic type plate (can be read out via the configuration tool)

9.4 Interfaces

SafeLogic compact Sercos Gateway has the following interfaces:

- 10-pin socket strip on the left side of the housing:
Incoming internal communication interface of the SafeLogic compact bus system with 24 V power supply from the CPU module
- 10-pin connection strip on the right side of the housing:
Internal communication interface of the SafeLogic compact bus system. The 24 V voltage supply of the CPU module is also used to supply subsequent modules

Technical data

- Front:
2 Sercos interfaces outgoing lines upwards or downwards (labeled XFE1 or XFE2)

For a detailed description of the LED display, refer to [chapter 8.2 "LED diagnostics" on page 65](#).

9.5 Power supply

The module bus connector supplies the SafeLogic compact Sercos Gateway with power.

Supply voltage	24 V DC (16.8 V....24 V....30 V DC)
Nominal current	Typ. 110 mA (if nominal current is 24 V)
Power consumption	Max. 2.7 W
Type of supply voltage	PELV or SELV (provided via SLC-3-CPU). The power supply unit requirements are described in the instruction "IndraControl SafeLogic compact Hardware" (see chapter 1.5 "Related documents" on page 6)

9.6 Safety-related characteristic parameters

Safety integrity level SIL	SIL 3 (IEC 61508)
Safety integrity claim limit (SIL)	SIL CL3 (EN 62061)
Category	Category 4 (DIN EN ISO 13849-1)
Performance level PL	PL e (DIN EN ISO 13849-1)
PFH (average frequency of a dangerous failure per hour)	0.4×10^{-9} 1/h
PFD _{avg} (average probability of a dangerous failure in case of request)	3.5×10^{-5}
Hardware error tolerance (HFT)	1
Service life T _M	20 years (DIN EN ISO 13849) The date of manufacturing is printed on the type plate: FD: Year/calendar week
MTTF _d (mean time to failure)	2,500 years
DC _{avg} (average diagnostic coverage)	99% ± high
Protection class	III (EN 61140)
Degree of protection	IP 20 (EN 60529)
Degree of pollution	2 (EN 61131-2)

9.7 Ambient conditions

Climatic ambient conditions and characteristics		
	In operation	Storage and transport
Ambient temperature T_U	-25 to +55 °C	-40 to +70 °C
Relative humidity	10 % to 95 %, non-condensing	10 % to 95 %, non-condensing
Climatic conditions	55 °C, 95 % relative air humidity (EN 61131-2)	-
Operating height	Max. 2000 m above sea level (80 kPa)	Max. 3000 m above seal level (70 kPa)
Mechanic ambient conditions and characteristics		
Mounting position	Vertical mounting on rail to DIN EN 60715	-
Vibration resistance	10 Hz - 500 Hz/3 g (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)	
Free fall	-	With product packaging, the height of fall is 300 mm. With shipping packaging, the height of fall is 1000 mm. Acc. to DIN EN 60068-2-32, method 1
Electromagnetic operating conditions and characteristics		
EMC	Class A (EN 61000-6-2, EN 55011)	-

Tab. 9-1: Overview on all ambient conditions

9.8 Standards used

The SafeLogic compact Sercos Gateway has been developed according to the following DIN EN standards.

Technical data

General standards

Standard	
IEC 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2016); German version FprEN 60204-1:2014 Draft
DIN EN 61131-1	Programmable controllers - Part 1: General information (IEC 61131-1:2003); German version EN 61131-1:2003
DIN EN 61131-2	Programmable controllers - Part 2: Equipment requirements and tests (IEC 61131-2:2007) German version EN 61131-2:2007 and corrections till 2009
DIN EN 61000-6-2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments (IEC 61000-6-2:2005); German version EN 61000-6-2:2005 with corrections until 2011
DIN EN 61000-6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Electromagnetic emission for industrial environments (IEC 61000-6-4:2006 + A1:2010); German version EN 61000-6-4:2007 + A1:2011

Tab. 9-2: General standards

Safety standards

Standard	
DIN EN 61508-1	Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 1: General requirements (IEC 61508-1:2010); German version EN 61508-1:2010
DIN EN 61508-2	Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 2: Requirements on the safety-related electric/electronic/programmable electronic systems (IEC 61508-2:2010); German version EN 61508-3:2010
DIN EN 61508-3	Functional safety of electrical/electronic/programmable electronic safety-related systems - Part 3: Software requirements (IEC 61508-3:2010); German version EN 61508-3:2010

Technical data

Standard	
DIN EN 62061	Safety of machinery Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005 and corrections till 2015) German version EN 62061:2005 and corrections till 2015
DIN EN 61326-3-1	Electrical equipment for measurement, control, and laboratory use - EMC requirements - Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (Functional safety) - General industrial applications (IEC 61326-3-1:2008); German version EN 61326-3-1:2008 with corrections until 2009
DIN EN 61131-6	Programmable controllers - Part 6: Functional safety (IEC 61131-6:2012) German version EN 61131-6:2012
DIN EN ISO 13849-1	Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2015); German version EN ISO 13849-1:2015
DIN EN ISO 13849-2	Safety of machinery - Safety-related parts of control systems - Part 2: Validation (ISO 13849-2:2012); German version EN ISO 13849-2:2012

Tab. 9-3: Safety standards

9.9 CE marking

9.9.1 Declaration of conformity



The SafeLogic compact Sercos Gateway corresponds to the safety component of the:

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

9.10 UL/CSA certification

The SafeLogic compact Sercos Gateway corresponds to:

Technical data

UL/CSA



UL 508 (Industrial Control Equipment)

C22.2 No. 14-95 (CSA)

UL file no. E210730

Tab. 9-4: UL/CSA certification

10 Ordering information and accessories

10.1 Ordering data

Type code	Product description	Part number
SLC-3-GS3S00300	SafeLogic compact Sercos Gateway GS3S	R911172765

10.2 Spare parts and accessories

10.2.1 Spare parts

There are no spare parts available for the SafeLogic compact Sercos Gateway GS3S.

The SafeLogic compact Sercos Gateway GS3S is not subject to any wear.

10.2.2 Accessories

For more ordering data (accessories), refer to the product catalog. Go to www.boschrexroth.com/electrics.

11 Appendix

11.1 Device exchange

The Designer configuration data is stored in the memory plug of the CPU module. Like all other extension modules of the SafeLogic compact system, the Sercos Gateway (GS3S) receives its configuration data from the memory plug upon system startup.

Configuration data that is not safety-relevant (Sercos address and IP configuration) is automatically stored by the GS3S in the memory plug of the CPU module as well. I.e., the GS3S itself does not store any configuration data.

In case of a device exchange, the new GS3S module receives the complete configuration data (designer configuration data as well as Sercos address and IP configuration) from the memory plug of the CPU module. *No* configuration has to be made.

11.2 Application information

11.2.1 Controlling the Rexroth IndraDrive safety technology

Via the safe communication "CIP Safety on Sercos", the GS3S controls the safe operation modes of the safety engineering integrated in the Rexroth IndraDrive. The safety functions to be controlled depend on the drive configuration.



In the following, example logic circuits for the SafeLogic compact application are shown to control the IndraDrive safety functions. The CSOs control signals of the IndraDrive are taken from the MPx-18 device description file (SDDML) and can change in later versions.

In the SafeLogic Designer, all control and status signals of an SDDML version are displayed under "Device profiles". For the control/status signals, refer to the "Rexroth IndraDrive Integrated Safety Engineering" user documentation.

The following examples use the following safety inputs in the logic program:

Input	Function
E-Stop 1	E-Stop request
E-Stop 2	
Light Curtain 1	Safe operating stop request, a safe motion is <i>not</i> permitted
Light Curtain 2	
Safety Switch 1	Switching to safe operation (safe operating stop) to activate a safe motion by pressing the jog button
Safety Switch 2	
Enabling Switch Forward	Jog buttons for "Forward"/"Backward" activating a safe motion
Enabling Switch Backward	

Tab. 11-1: Safety inputs for the following examples

SafeStop1 (E-STOP)

A "SafeStop1" (SS1) request, e.g. an "E-Stop", usually has to be acknowledged (reset) to enable the deactivation of the safety function and to allow the restart. For this purpose, the "Reset" function block can be used in the

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SafeLogic compact logic program. This function block obtains an internal AND operation for up to seven safety requests. The enabling output can be directly switched to the "EmergencyStopSignal" IndraDrive CSos control bit (activation with FALSE).



In IndraDrive, this special mode is called "special mode emergency stop" (SMES).

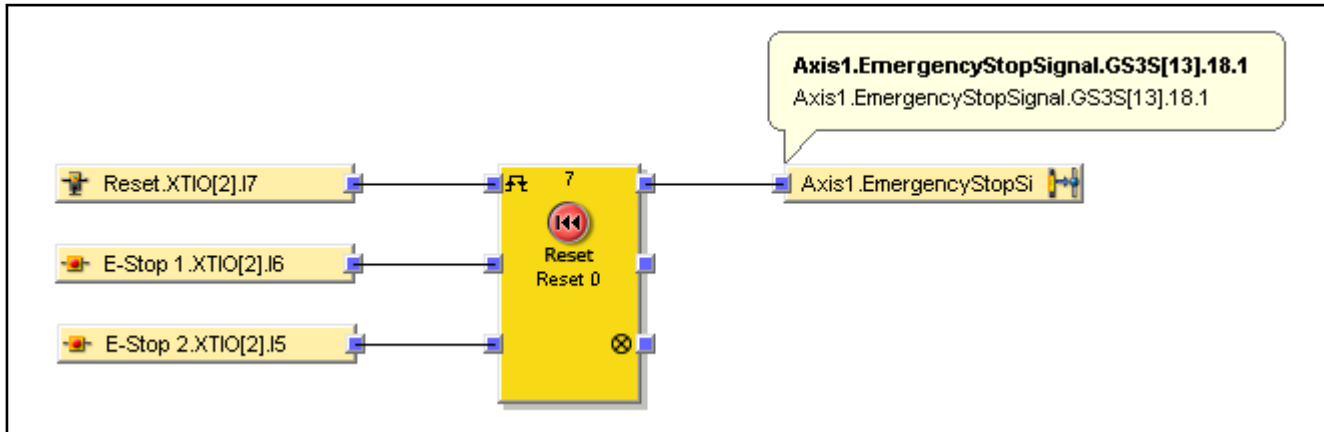


Fig. 11-1: Example use of the "Reset" function block to control an "EmergencyStop" selection

SafeStop2 (safe operating stop)

For a "SafeStop2" (SS2, safe operating stop) request, observe that the "ModeSelectionSignal" IndraDrive CSos control bit (operation mode selection) can be used to select various special modes.



Safe standstill ("special mode safe standstill": SMST) can either be configured as safe operating stop (→ **SMST2** with transfer function SS2) or as Safe Torque Off (→ **SMST1** with transfer function SS1).

In the following, SS2 (or SMST2) is assumed.

Operation mode selection ("ModeSelectionSignal") is also required to enable a safe motion ("special mode safe motion": SMM). This means, all requirements regarding SS2 and SMM are to be applied to the "ModeSelectionSignal" control bit via an AND operation (activation with FALSE). At the same time, all signals of an SS2 request not permitting any safe motion are summarized in one "SafeStop2 Request". This logic result is subsequently used to block the activation of an SMM.

The following figure illustrates two "Light Curtain" signals requesting SMSTx as well as two "Safety Switches" whose selection also activates SMSTx and additionally enables a safe motion (illustrated in the next section).

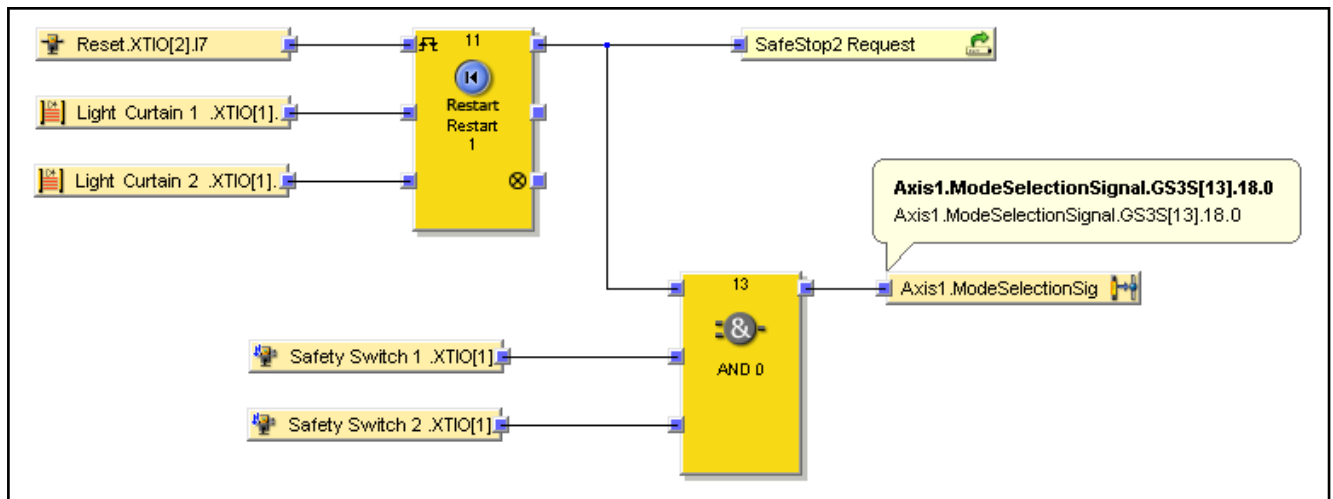


Fig. 11-2: Exemplary logic circuit for a "SafeStop2" selection

Safe motion (SMM)

The IndraDrive supports several safe motions (SMM = "special mode safe motion"). For example, in MPx-18, up to 16 SMM are possible and can be individually configured (e.g. "safely-limited velocity" and optionally "safe direction of motion").

In the following example, there are two "Enabling switch forward/backward" jog buttons. Their selection can be switched to the "SMMxSignal" CSos control bits via the "User mode switch" function block (operation mode selection switch). Thus, a "one-out-of-N" selection can be ensured for bit-coded control signals, as simultaneous selection of multiple SMM signals in IndraDrive is not permitted. For binary-coded SMM signals, a "one-out-of-N" setting can also be configured with the "binary coder" function block.

At the same time, the selection of one of these jog buttons (OR operation) has to set the "EnablingControl" control bit as well. The control bit "EnablingControl" (selection with TRUE) may only be set if no "SafeStop2 Request" is active. Thus, an AND operation with "SafeStop2 Request" (selection with FALSE) is required (refer to the previous section).

Activation of a safe motion with "EnablingControl" is only possible if the "ModeSelectionSignal" operation mode selection is controlled (activation with FALSE) as described in the previous section with the safety switches "Safety Switch 1/2".

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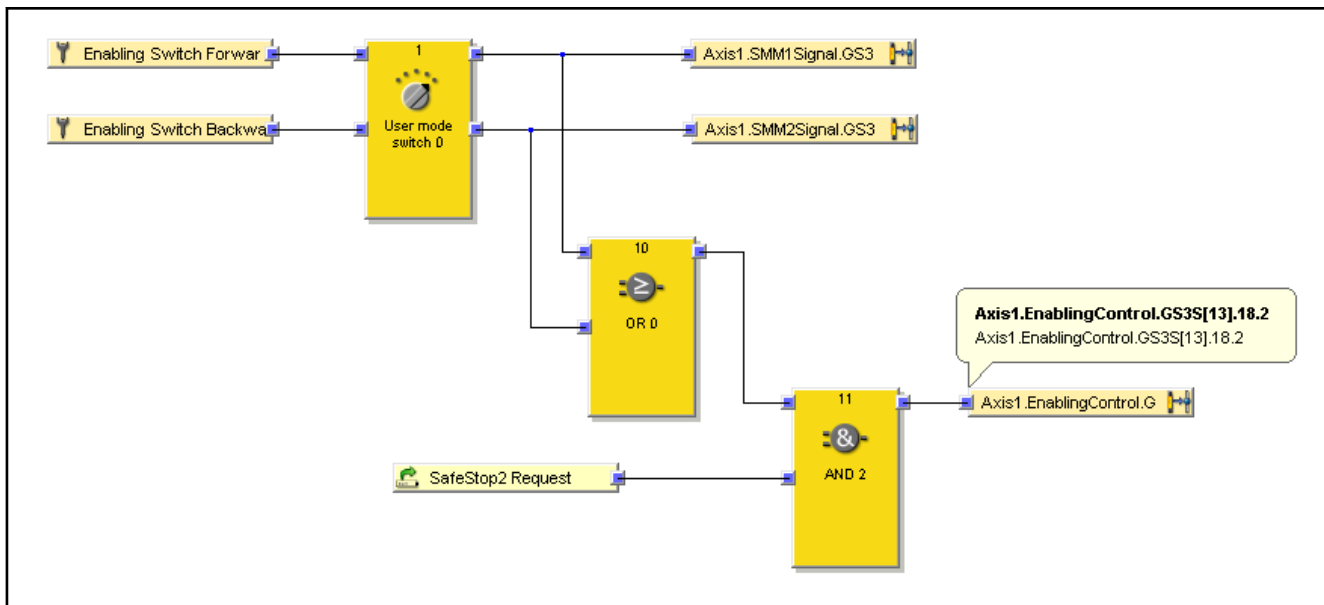


Fig. 11-3: Exemplary logic circuit for a "SafeMotion" selection

**Binary-coded control and status signals**

The IndraDrive provides various CSOs profiles with binary- or bit-coded ("one-out-of-N") status and control signals. Binary coding enables the control of more safe motions (SMMx).

In the SafeLogic compact logic editor, binary coders and decoders with various coding modes are available (e.g. one-out-of-N, priority).

**Binary-coded CSOs input data**

For the group generation of CSOs targets in GS3S, the status signals are operated by AND. This can corrupt binary-coded information in the CSOs input data. Thus, for binary-coded status signals, a CSOs group may only consist of one target!

11.2.2 Binary coder/decoder

To code or decode binary information, the logic program of the CPU module provides the following function blocks:

- **Binary coder:** To convert 8 bits to 3 bits of binary code
- **Binary decoder:** To convert up to 5 binary bits to a bit-coded ("one-out-of-N") code. For 4 and 5 binary bits, a parallel switching of 2 or 4 function blocks is required, as a function block has a maximum of 8 inputs or outputs

For a description of these function blocks, refer to the "IndraControl SafeLogic compact Designer Software" instructions (part no. [R911332749](#)) or to the context menu of the function block directly in the logic editor of the SafeLogic Designer.

In the following, two example logic circuits are illustrated to binarily code 16 bits or decode 6 binary bits.

Binary coding of 16 bits

The following figure illustrates coding of 16 bit-coded "SMMx" information as 4 binary bits. A locking, that only one "SMMx" bit may be activated, is **not** yet provided. If required, add it!

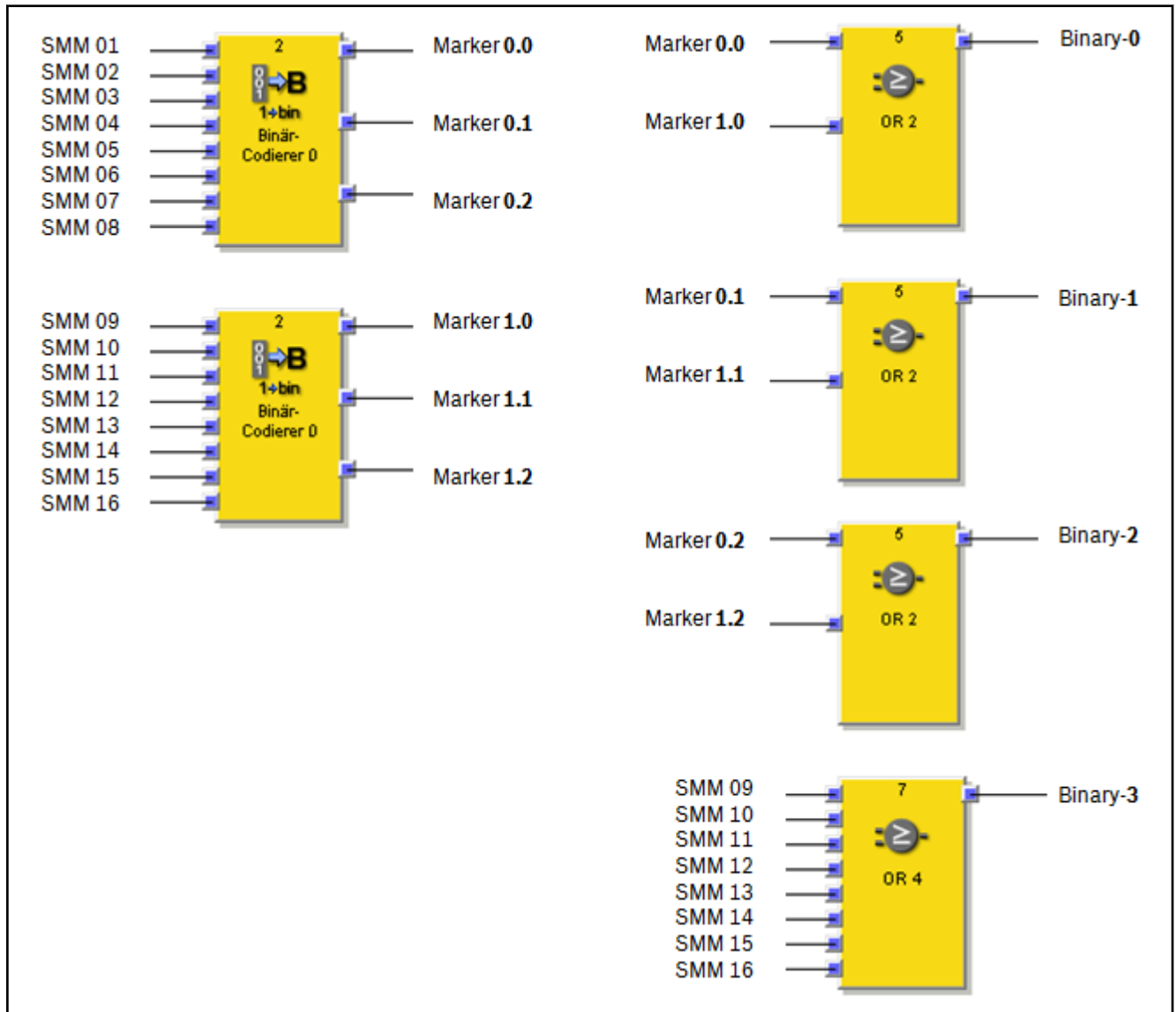


Fig. 11-4: Exemplary logic circuit for binary coding of 16 bits (attention: No locking in this example if multiple "SMMx" bits are selected)



When controlling the Rexroth IndraDrive safety technology, locking can be implemented as follows for example:

If an active bit is present (2 OR + AND) in the example circuit above for SMM 01-08 as well as for SMM 09-16 (2 OR + AND), the control signal "EnablingControl" of the IndraDrive safety technology may not be set.

Decoding 6 binary bits

To convert 6 binary bits into a bit-coded ("one-out-of-N") information, nine function blocks are required in total. A 3-bit decoder ("FB 0") is used for the preliminary evaluation and has to be set with the value "range" 0..7. 4-bit de-

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coders with the value ("range") 8..15 is used for the other eight function blocks.

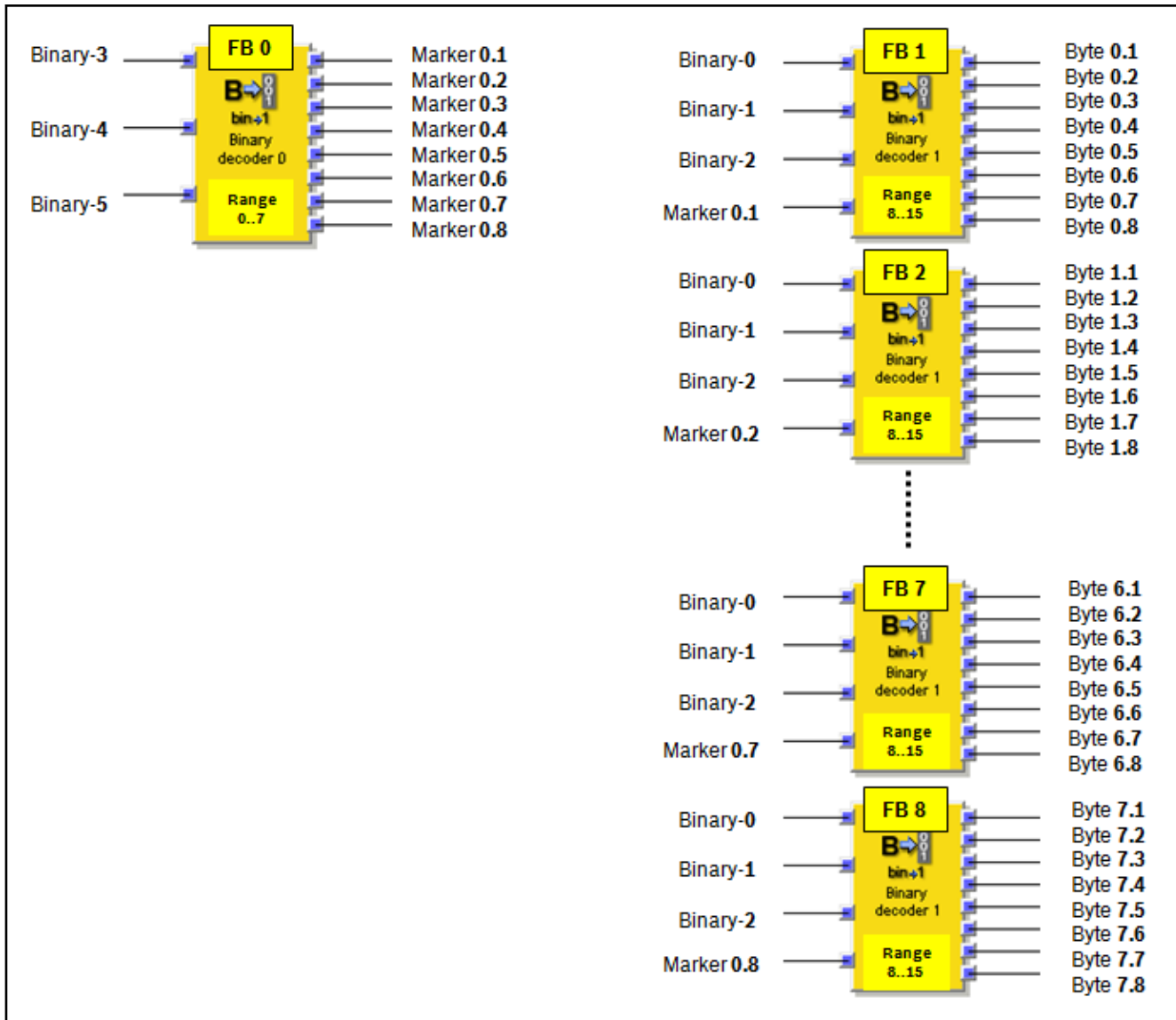


Fig. 11-5: Decoding exemplary logic circuit by 6 binary bits

11.2.3 SafeLogic compact station diagnostics

Module status

A SafeLogic compact station consists of up to 15 modules: 1 CPU module, up to 2 gateways, up to 12 extension modules (I/O modules, drive monitor).

Each module provides a 4-byte diagnostics that can be read out via Sercos using the P-parameters. For a description of the module status diagnostic bits and the P-parameters of the GS3S, refer to [chapter 8.3.2 "Module status" on page 67](#).

The first three bits of this module diagnostics (operating state, internal/external error) can also be configured in the cyclic I/O data to the Sercos master, refer to [chapter 5.3.1 "Configuring cyclic I/O data" on page 22](#).

From the SafeLogic Designer V1.7 and CPUx FW 3.00 (and higher), the module status diagnostic bits can also be used in the logic editor of the CPU

module. I.e. this also enables routing to the freely configurable cyclic data of a gateway.



The module status diagnostic data is updated every 200 ms by the CPU module.

I/O modules

As of firmware V2.00, the I/O modules are also provided with further diagnostic bits in the process data. In dual-channel input elements, the lower-order bit contains the state of the preliminary evaluation of the dual-channel element. This also corresponds to the state of the element in the logic program. The higher-order bit indicates an error in the preliminary evaluation, such as cross-circuit detection. As for all diagnostic bits, the following applies: 0 = Error, 1 = No error.

Sercos Gateway

The GS3S differs in several points from the other gateway modules.

The other diagnostic gateways, e.g. Profinet, are generally provided with 50 freely configurable byte I/Os (e.g. for I/O module status, logic results).

The GS3S is also provided with 18 freely configurable byte I/Os (e.g. for logic results). The status of the I/O or extension modules (12 + 12 bytes) is already recorded in GS3S on the backplane bus. These are directly available for reading for the Sercos bus, i.e. no transfer via the CPU module logics is required. Analogously, the status of the CSOs I/Os (32 + 32 bytes) in the GS3S is also directly provided to the Sercos master. The cyclic Sercos data also includes the above mentioned 6-byte module status diagnostics (operating state, internal/external error for each module).

The Sercos master can cyclically read up to 112 bytes from the GS3S and transmit 18 bytes of freely configurable data to the GS3S. For a graphic overview, refer to [fig. 4-1 "Overview - Communication paths of the Sercos gateway" on page 15](#). The minimum Sercos cycle time 1 ms (or 2 ms at 9 and more CSOs targets) while the minimum Profinet refresh rate at the GPNT gateway, for example, is 64 ms.



The TCP/IP socket interface of the other Ethernet gateways (e.g. Profinet, refer to the "IndraControl SafeLogic compact Diagnostic Gateways" instructions, see [chapter 1.5 "Related documents" on page 6](#)) is not supported by GS3S.

11.2.4 Retrieving diagnostics of the SafeLogic compact station via Sercos

A SafeLogic compact station consists of up to 15 modules¹⁾. Each module provides a 4-byte diagnostics. For a detailed description of these module status diagnostic bits, refer to the diagnostic gateway documentation "IndraControl SafeLogic compact Diagnostic Gateway", part no. [R911332752](#).

The first three bits in the 4-byte module status are identical for each module:

- Bit 0: "**Operational status**" (module is in RUN)
- Bit 1: "**Internal error**" (e.g. error in case of hardware self test)
- Bit 2: "**External error**" (collective bit for all external errors)

¹⁾ 1 CPU module, up to 2 gateways, up to 12 extension modules (I/O modules, Drive Monitor (2 "slots" assigned))



There is a diagnostic example program "SLc_GS3S_Diag" as GAT plugin that can also be used without Gat with XLC, MLC, MTX or MLD.

The GAT plug-ins are installed with IndraWorks (with 'x' = Number of IndraWorks installation):

```
C:\ProgramData\Rexroth\IndraWorks\'x'\GatWizard\Plugins
```

GAT plugins consist of the following components:

- An *.iwx file that can be imported below an application,
- A brief documentation (*.pdf, mainly in English)
- A configuration file *Config.txt, only required by the GAT Wizard

For further information, refer to the GAT manual.

Diagnostics in the cyclic Sercos communication

These three bits of all modules are also available in the cyclic Sercos communication of the GS3S on slot 0 under "Diag". They are summarized as one word each. The following applies:

- Bit 0: CPU module
- Bit 1..12: Extension module (I/O module or Drive Monitor)
- Bit 13..14: Gateways 1 and 2

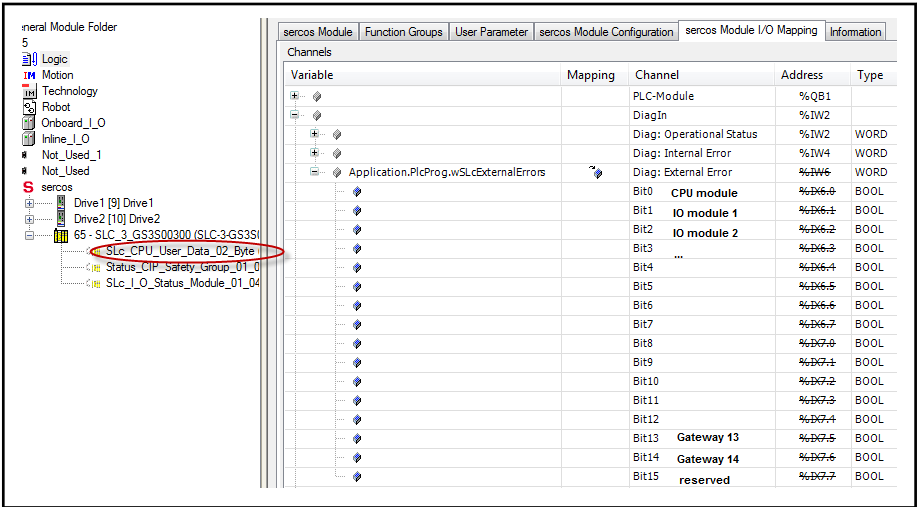


Fig. 11-6: Diagnostics in the cyclic Sercos communication



Applies as for all diagnostic bits: 0 = Error, 1 = No error.



From the firmware V2.00, the **I/O modules** are provided with more diagnostic bits in the process data (→ slot 2 in the cyclic Sercos communication of the GS3S). For two-channel input elements, the lower-order bit contains the state of the preliminary evaluation of the two-channel element. The lower-order bit corresponds to the element state in the logic program. The higher-order bit indicates an error in the preliminary evaluation, such as "cross-circuit detection". As for all diagnostic bits, the following applies: 0 = Error, 1 = No error.

Resetting the error:

Resetting an error while preliminarily evaluating a two-channel element (discrepancy error/timeout or sequence error), the "inactive" state has to be reached, i.e. both channels have to assume a signal state at which the input reached the safe state (0/"low") depending on the evaluation logic (equivalent/antivalent).

Retrieving diagnostics acyclically via Sercos

The complete 4-byte module status diagnostics can be retrieved via the parameter **P-0-3692.SI.3** of the GS3S. The following applies:

- SI = 0: CPU module
- SI = 1..12: Extension module (I/O module or drive monitor)
- SI = 13..14: Gateways 1 and 2

Reading this 4-byte module status is useful when the "External error" collective bit (see [chapter "Diagnostics in the cyclic Sercos communication" on page 114](#)) indicates an error. To retrieve the parameter, a standard Sercos "ReadParameter" function block can be used.

Program:

```
fbIL_SIIReadParameter (
    Execute:= boExe,
    Done=> boDone,
    Active=> boActive,
    Error=> boError,
    ErrorID=> rErrID,
    ErrorIdent=> rErrIdent,
    BusMaster:= IL_BUSMASTER.IL_BUSMASTER_0,
    SercosAdr:= 65,
    Idn:= IL_SIIElementsToIdn (
        ParamType:= IL_P_PARAM,
        Set:= 0,
        Nbr:= 3692,
        StructInst:= 13, // = Gateway 1
        StructElem:= 3),
    Timeout:= T#2S,
    Value=> ,
    Attribute=> );

prSLC_DIAG_GS3S13 := ADR(fbIL_SIIReadParameter.Value);
```

The retrieved 4-byte module status can be assigned in a simple structural definition.

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prSLC_DIAG_GS3S13	POINTER TO SLC_DIAG_GS3S	16#086D5A98
prSLC_DIAG_GS3S13^	SLC_DIAG_GS3S	
OperationStatus	BOOL	TRUE
InternalError	BOOL	TRUE
ExternalError	BOOL	FALSE
Reserved03	BOOL	TRUE
ConfigurationStatus	BOOL	TRUE
ModuleInputStatus	BOOL	TRUE
ModuleOutputStatus	BOOL	TRUE
SercosInCP4	BOOL	TRUE
Target01active	BOOL	FALSE
Target02active	BOOL	TRUE
Target03active	BOOL	TRUE

Fig. 11-7: Example on the SLC_DIAG_GS3S structure

The following exemplary structures can be used (copy the code from the documentation and create it as new data type STRUCT in the PLC project).

SLC_DIAG_GS3S

Program:

```

TYPE SLC_DIAG_GS3S :
STRUCT
// Byte 0
OperationStatus      : BIT; // 0.0
InternalError         : BIT; // 0.1
ExternalError         : BIT; // 0.2: Summary of Bits 1.0 to 2.7
Reserved03            : BIT; // 0.3
ConfigurationStatus   : BIT; // 0.4
ModuleInputStatus     : BIT; // 0.5: Sercos in CP4
ModuleOutputStatus    : BIT; // 0.6: All CIP Safety output connect. active
SercosInCP4           : BIT; // 0.7
// Byte 1
Target01active        : BIT; // 1.0
Target02active        : BIT; // 1.1
Target03active        : BIT; // 1.2
Target04active        : BIT; // 1.3
Target05active        : BIT; // 1.4
Target06active        : BIT; // 1.5
Target07active        : BIT; // 1.6
Target08active        : BIT; // 1.7
// Byte 2
Target09active        : BIT; // 2.0
Target10active        : BIT; // 2.1
Target11active        : BIT; // 2.2
Target12active        : BIT; // 2.3
Target13active        : BIT; // 2.4
Target14active        : BIT; // 2.5
Target15active        : BIT; // 2.6
Target16active        : BIT; // 2.7
// Byte 3
Reserved30            : BIT; // 3.0
Reserved31            : BIT; // 3.1
Reserved32            : BIT; // 3.2
Reserved33            : BIT; // 3.3
Reserved34            : BIT; // 3.4
Reserved35            : BIT; // 3.5
Reserved36            : BIT; // 3.6
Reserved37            : BIT; // 3.7
END_STRUCT
END_TYPE

```

SLC_DIAG_XTxx

Program:

```

TYPE SLC_DIAG_XTXX : // XTDI, XTIO, XTDS
STRUCT

```

```
// Byte 0
OperationStatus      : BIT; // 0.0
InternalError        : BIT; // 0.1
ExternalError        : BIT; // 0.2: Summary of Bits 0.5 to 3.7
Reserved03           : BIT; // 0.3
ConfigurationStatus  : BIT; // 0.4
PowerSupplyOutputs   : BIT; // 0.5: XTIO, XTDS
FastShutOffOutput    : BIT; // 0.6: XTIO
OutputOverCurrent    : BIT; // 0.7: XTDS
// Byte 1
DualChannelInput12   : BIT; // 1.0
DualChannelInput34   : BIT; // 1.1
DualChannelInput56   : BIT; // 1.2
DualChannelInput78   : BIT; // 1.3
Reserved14           : BIT; // 1.4
Reserved15           : BIT; // 1.5
Reserved16           : BIT; // 1.6
Reserved17           : BIT; // 1.7
// Byte 2
TestSignalInput1     : BIT; // 2.0
TestSignalInput2     : BIT; // 2.1
TestSignalInput3     : BIT; // 2.2
TestSignalInput4     : BIT; // 2.3
TestSignalInput5     : BIT; // 2.4
TestSignalInput6     : BIT; // 2.5
TestSignalInput7     : BIT; // 2.6
TestSignalInput8     : BIT; // 2.7
// Byte 3
Output1StuckAtHigh   : BIT; // 3.0: XTIO
Output1StuckAtLow    : BIT; // 3.1: XTIO
Output2StuckAtHigh   : BIT; // 3.2: XTIO
Output2StuckAtLow    : BIT; // 3.3: XTIO
Output3StuckAtHigh   : BIT; // 3.4: XTIO
Output3StuckAtLow    : BIT; // 3.5: XTIO
Output4StuckAtHigh   : BIT; // 3.6: XTIO
Output4StuckAtLow    : BIT; // 3.7: XTIO
END_STRUCT
END_TYPE
```

SLC_DIAG_STIO

Program:

```
TYPE SLC_DIAG_STIO :
STRUCT
// Byte 0
OperationStatus      : BIT; // 0.0
InternalError        : BIT; // 0.1
ExternalError        : BIT; // 0.2: Summary of Bits 0.5 to 3.7
Reserved03           : BIT; // 0.3
ConfigurationStatus  : BIT; // 0.4
PowerSupplyOutputs   : BIT; // 0.5
Reserved06           : BIT; // 0.6
OutputOverCurrent    : BIT; // 0.7
// Byte 1
Reserved10           : BIT; // 1.0
Reserved11           : BIT; // 1.1
Reserved12           : BIT; // 1.2
Reserved13           : BIT; // 1.3
Reserved14           : BIT; // 1.4
Reserved15           : BIT; // 1.5
Reserved16           : BIT; // 1.6
Reserved17           : BIT; // 1.7
// Byte 2
Reserved20           : BIT; // 2.0
Reserved21           : BIT; // 2.1
Reserved22           : BIT; // 2.2
Reserved23           : BIT; // 2.3
Reserved24           : BIT; // 2.4
Reserved25           : BIT; // 2.5
Reserved26           : BIT; // 2.6
Reserved27           : BIT; // 2.7
// Byte 3
Reserved30           : BIT; // 3.0
Reserved31           : BIT; // 3.1
Reserved32           : BIT; // 3.2
Reserved33           : BIT; // 3.3
Reserved34           : BIT; // 3.4
Reserved35           : BIT; // 3.5
Reserved36           : BIT; // 3.6
Reserved37           : BIT; // 3.7
```

Appendix

END_STRUCT
END_TYPE

SLC_DIAG_CPUX

Program:

```

TYPE SLC_DIAG_CPUX :
STRUCT
  // Byte 0
  OperationStatus      : BIT; // 0.0
  InternalError        : BIT; // 0.1
  ExternalError        : BIT; // 0.2: Summary bits 0.5-0.7 (bytes 1-3 not incl.)
  Reserved03           : BIT; // 0.3
  ConfigurationStatus  : BIT; // 0.4
  PowerSupply          : BIT; // 0.5
  EFI1                 : BIT; // 0.6
  EFI2                 : BIT; // 0.7
  // Byte 1
  EFILinkStationsFound : BIT; // 1.0: One or more are missing
  EFILinkStationsSuspended : BIT; // 1.1: One or several suspended
  FlexiLineStatus      : BIT; // 1.2: comm. error to predecess. or success.
                        //      (and/or Flexi Line Teach required)
  Reserved13           : BIT; // 1.3
  Reserved14           : BIT; // 1.4
  Reserved15           : BIT; // 1.5
  Reserved16           : BIT; // 1.6
  Reserved17           : BIT; // 1.7
  // Byte 2
  Reserved20           : BIT; // 2.0
  Reserved21           : BIT; // 2.1
  Reserved22           : BIT; // 2.2
  Reserved23           : BIT; // 2.3
  Reserved24           : BIT; // 2.4
  Reserved25           : BIT; // 2.5
  Reserved26           : BIT; // 2.6
  Reserved27           : BIT; // 2.7
  // Byte 3
  Reserved30           : BIT; // 3.0
  Reserved31           : BIT; // 3.1
  Reserved32           : BIT; // 3.2
  Reserved33           : BIT; // 3.3
  Reserved34           : BIT; // 3.4
  Reserved35           : BIT; // 3.5
  Reserved36           : BIT; // 3.6
  Reserved37           : BIT; // 3.7
END_STRUCT
END_TYPE

```

SLC_DIAG_MOCX

Program:

```

TYPE SLC_DIAG_MOCX :
STRUCT
  // Byte 0
  OperationStatus      : BIT; // 0.0
  InternalError        : BIT; // 0.1
  ExternalError        : BIT; // 0.2: Summary of Bits 0.5 to 3.7
  Reserved03           : BIT; // 0.3
  ConfigurationStatus  : BIT; // 0.4
  Encoder1             : BIT; // 0.5
  Encoder2             : BIT; // 0.6
  Reserved07           : BIT; // 0.7
  // Byte 1
  Reserved10           : BIT; // 1.0
  Reserved11           : BIT; // 1.1
  Reserved12           : BIT; // 1.2
  Reserved13           : BIT; // 1.3
  UserStatusBit1       : BIT; // 1.4
  UserStatusBit2       : BIT; // 1.5
  UserStatusBit3       : BIT; // 1.6
  UserStatusBit4       : BIT; // 1.7
  // Byte 2
  Reserved20           : BIT; // 2.0
  Reserved21           : BIT; // 2.1
  Reserved22           : BIT; // 2.2
  Reserved23           : BIT; // 2.3
  Reserved24           : BIT; // 2.4
  Reserved25           : BIT; // 2.5
  Reserved26           : BIT; // 2.6

```

```
Reserved27      : BIT; // 2.7
// Byte 3
Reserved30      : BIT; // 3.0
Reserved31      : BIT; // 3.1
Reserved32      : BIT; // 3.2
Reserved33      : BIT; // 3.3
Reserved34      : BIT; // 3.4
Reserved35      : BIT; // 3.5
Reserved36      : BIT; // 3.6
Reserved37      : BIT; // 3.7
END_STRUCT
END_TYPE
```

11.2.5 Notes on the TCP/IP communication with GS3S

IP configuration of a Sercos device

The IP configuration of a Sercos device is set using the following S-parameters:

- **S-0-1020**: IP address
- **S-0-1021**: Subnet mask
- **S-0-1022**: Standard gateway

Observe the following:

- Normally, the Sercos master enables the IP configuration of the slaves automatically, e.g.:
 - **XLC/MLC**: 172.31.254.<SIII addr> (the third byte can also be configured as "control address")
 - **MTX**: 192.168.143.<SIII address>
 - **MLD-M/CCD mode**: Among others, this function is not yet supported in the MPx-18
- The standard gateway should be provided with the IP address of the Sercos master, e.g. XLC/MLC: 172.31.254.254.
- When configuring or changing the IP configuration manually in the S-parameters, restart the device (switch off and on) or execute the Sercos command **S-0-1048**.
- Normally, the Sercos master writes the IP configuration only in the communication phase CP2 (when reaching or exiting CP2). Thus, it is recommended to switch the Sercos bus once in CP4 to obtain a valid IP configuration in all devices.

TCP/IP communication designer

Direct TCP/IP connections

If the engineering PC is provided with a direct IP connection in the Sercos network, only the IP address of the SLC Sercos Gateway has to be set in the designer communication settings in the TCP/IP profile. A TCP/IP routing is not required. The "Scan" function of the designer dialog can be used to search for SLC Ethernet gateways in the network.



Select the correct Ethernet adapter or network card in the TCP/IP profile settings of the designer.

TCP/IP routing

Normally, there is no direct connection to the Sercos network, but the engineering PC is connected to the engineering port of the Sercos master control (e.g. Rexroth CML or XM control). Enable "TCP/IP routing" in TCP/IP profile settings of the designer instead. Then, the designer creates a routing entry

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on the engineering PC. In the example [fig. 11-8 "Designer TCP/IP profile configuration settings" on page 120](#), the Sercos Gateway is provided with the IP address 172.31.254.65 (field [0]) and the Sercos master control (here as "gateway" for the TCP/IP communication) is provided with the IP address 192.168.1.12 (field [1]).

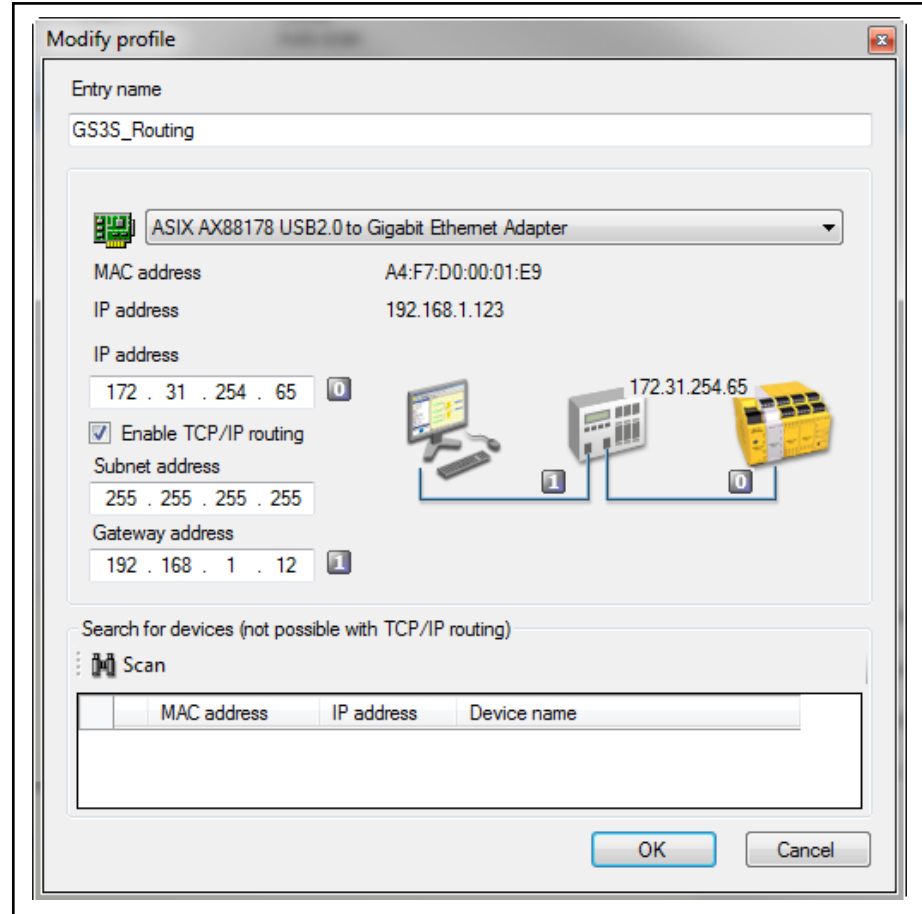


Fig. 11-8: Designer TCP/IP profile configuration settings



Select the correct Ethernet adapter or network card in the TCP/IP profile settings of the designer.

Possible problems during TCP/IP routing

Windows always uses the first routing entry in the routing table of the PC. If there are multiple routing entries for the same target IP address, problems can result, as only the first entry is used. The routing table of the PC can be viewed in the Windows command line with "route print". Remove entries that are not required anymore or incorrect using the command "route delete" (administrator rights are required, i.e. start the command line "as administrator"). The command "route help" indicates the examples and syntax specifications. Entries created by the designer are also removed when restarting the PC, as these entries were not entered as persistent entries.

```
C:\Windows\system32>route print

=====
Interface List
13...00 1c f1 09 85 f8 .....ASIX AX88178 USB2.0 to Gigabit Ethernet Adapter
12...00 24 d7 ba 04 1c .....Intel(R) Centrino(R) Ultimate-N 6300 AGN
11...f0 de f1 6b 0c ab .....Intel(R) 82579LM Gigabit Network Connection
1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination        Netmask          Gateway           Interface        Metric
0.0.0.0                    0.0.0.0          On-link          192.168.0.20      276
0.0.0.0                    0.0.0.0          10.52.144.1      10.52.144.160    10
10.52.144.0                255.255.252.0    On-link          10.52.144.160    266
10.52.144.160              255.255.255.255  On-link          10.52.144.160    266
10.52.147.255              255.255.255.255  On-link          10.52.144.160    266
127.0.0.0                  255.0.0.0        On-link          127.0.0.1         306
127.0.0.1                  255.255.255.255  On-link          127.0.0.1         306
127.255.255.255            255.255.255.255  On-link          127.0.0.1         306
172.31.254.65              255.255.255.255  192.168.0.15     192.168.0.20     40
192.168.0.0                255.255.0.0      On-link          192.168.0.20      276
=====
```

Fig. 11-9: Example of a PC routing table

Remote diagnostics

Basics

In case of a remote diagnostics via internet (e.g. VPN), one or multiple routers are normally between the engineering PC and the Sercos master control or the Sercos gateway. The target IP address of the TCP/IP communication of the designer remains the IP address of the Sercos Gateway. Apart from the engineering PC, all routers require a corresponding routing entry to reach the target IP address via the next "hop" (node).

In the example [fig. 11-10 "Exemplary network representation for remote diagnostics" on page 121](#), the engineering PC requires a routing entry to reach the target IP address (here 172.31.x.y) via the IP address of "Router 1". "Router 1" requires a routing entry for telegrams to reach with the target IP address via "Router 2", etc. Normally, the Sercos master creates its routing table in the Sercos network automatically (XLC/MLC/MTX).

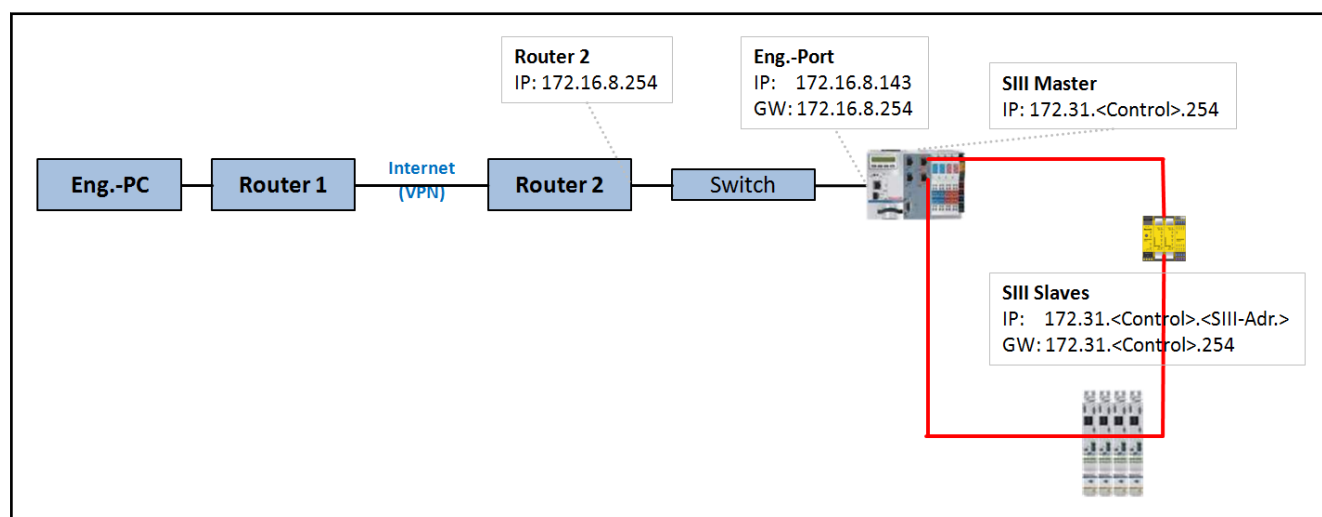


Fig. 11-10: Exemplary network representation for remote diagnostics

On the way back, the Sercos device uses the standard gateway ([S-0-1022](#)), which should be the IP address of the Sercos master slave. The control uses the standard gateway of the Engineering port, which should be the IP address of the connected router (in this example "Router 2"). For testing options of the IP configuration, refer to [chapter "Testing options and troubleshooting" on page 122](#).

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Alternative: "Bridging" for XLC/MLC

For the XLC/MLC, a "bridge" can alternatively be enabled between the engineering port and the Sercos network. Thus, the engineering port is part of the Sercos network and no TCP/IP routing to the Sercos network is required. The engineering port is then provided with the IP address of the Sercos master (172.31.<Control>.254), i.e. only the <Control> address can be set.

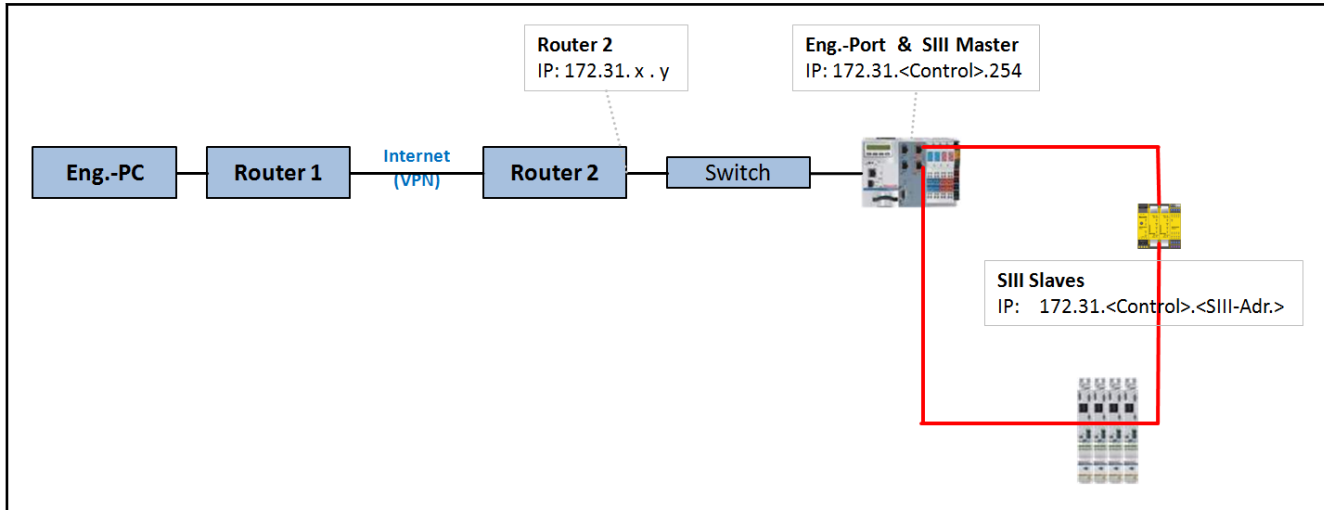


Fig. 11-11: Network representation with "bridging" in XLC/MLC

Alternative: Sercos netSwitch

Another option is a Sercos netSwitch (part no. R911328254). This switch connects a standard Ether network to a Sercos network and no TCP/IP routing is required via the Sercos master control.

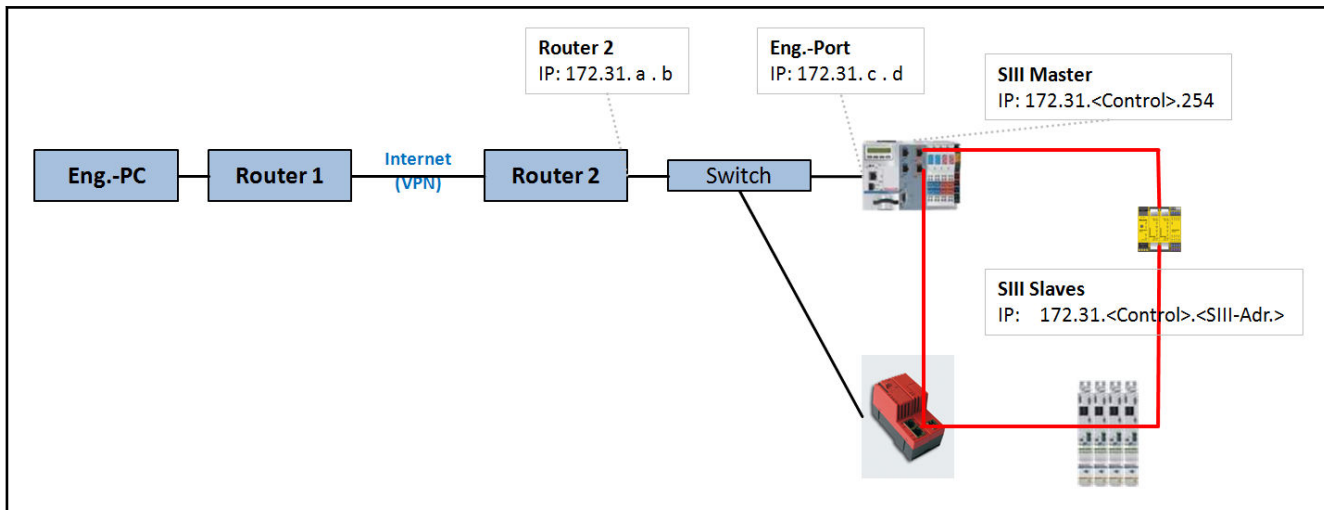


Fig. 11-12: Network representation with Sercos netSwitch

Testing options and troubleshooting

The TCP/IP configuration of a network can be tested irrespective of the designer communication. The following steps are recommended:

1. Check the IP configuration of the Sercos device: [S-0-1020](#), [S-0-1021](#), [S-0-1022](#). If the Sercos master does not support the automatic IP configuration or if incorrect settings are present, make these settings manually if required.

2. To especially test the IP routing settings, use the following commands in the command line:
 - **"ping"** <IP address>: Checks whether a device can be reached in an IP network²⁾
 - **"tracert"** <IP address>: Determines all nodes, e.g. routers running through an IP telegram. This checks whether the intended path and the correct device respond
 - **"Port test"** (normally not required): The designer uses the TCP port 9000. This cannot be changed. To test that this TCP port is enabled on the complete path (e.g. PC firewall, router), free programs and scripts are available. Search for example for the following in a search machine in the internet: "Windows PowerShell script: Test port"
3. Additional settings:
 - **"AddOnTimeout"**: The standard timeout of the designer communication is 1,000 ms.



An additional timeout can also be set. This setting is not documented in the official project planning instruction of the designer, as a greater timeout slows down working with the designer, e.g. while "scanning" the modules.

- Designer installation directory: "SafeLogic compact communication \ CommDTM \ RK512CommServer.config"
- Set "AddOnTimeout value" to >5,000< ms for example, save the file and restart the designer

- **Firewall settings:** Firewalls cannot only block TCP ports, but also block the TCP/IP communication of individual programs for example. I.e. check that the designer communication is not blocked, e.g. the firewall could be partially disabled to check for possible restrictions.

4. Known problems with the designer V1.7.0

With the designer V1.7.0, problems occurred in the remote diagnostics as well as in a local network if the TCP/IP routing functionality of the designer is enabled (i.e. if the designer creates the routing entry on the engineering PC).

If the tests described in the previous sections were successful, but there are still different types of problems with the TCP/IP communication of the designer (timeout, etc.), disable the TCP/IP routing function in the communication profile of the designer and restart the designer. Then, create a routing entry manually in the PC routing table (enter "route add" into the command line ³⁾ Administration rights required) or using other tools.

²⁾ The Sercos Gateway responds to the "ping" irrespective of the status of the safety application. If there is a "critical error" in the SLC station, a designer TCP/IP communication is not possible.
If an SLC module detects a critical error (LED "MS" flashes red 2 Hz), all modules of the SLC station go into a safe state (for other modules, LED "MS" is statically red). The SLC station has to be switched off and on. For the error cause, go to the diagnostics "Show history" in the designer. If a critical error occurs multiple times, replace the module

³⁾ For the syntax help, enter "route help".

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An IP configuration example for remote diagnostics with the designer V1.7.0 is shown in the following:

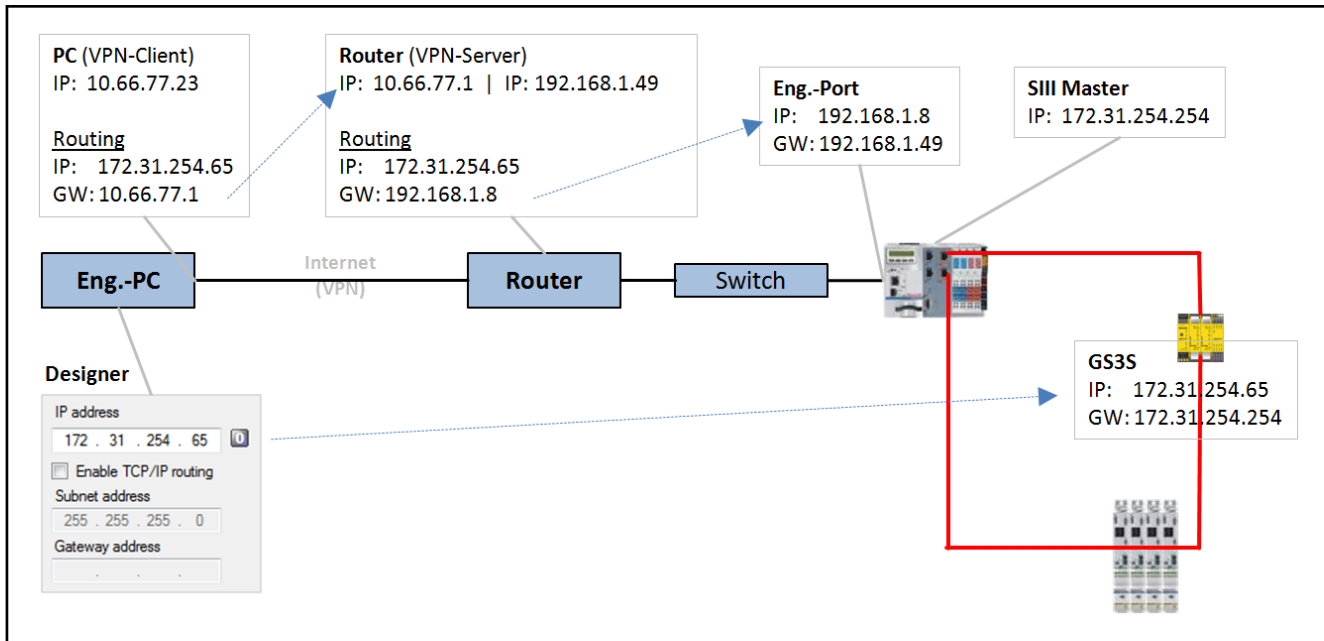


Fig. 11-13: IP configuration example for remote diagnostics with the designer V1.7.0

11.3 3rd party Sercos master configuration description

11.3.1 General information

Under the following conditions, the SafeLogic compact Sercos Gateway (GS3S) can be operated at every Sercos master control complying with the Sercos standard:

- The GS3S is a standard Sercos I/O slave according to Sercos specification V1.1.2 with extensions from V1.3
- The GS3S is a standardized CIP Safety on Sercos (CSos) originator [volume 5 edition 2.6]. For the CIP Safety communication, note that only the selected functions are supported. For example, only connections with 1 byte or 2 bytes of user data are supported and the configuration data of CSos targets cannot be transferred, refer to [chapter 4.3 "Supported CIP Safety functionality" on page 18](#)

The following chapters describe the basic configuration steps and requirements to use the GS3S with third-party Sercos systems.

The GS3S can also be used as "diagnostic gateway". This means, only the master-slave communication would be used and that the configuration of the Sercos cross communication (CC) connections for CIP Safety on Sercos is not required.

11.3.2 Configuring the master-slave communication

For the configuration of the master-slave communication, it is recommended to use the device description file (SDDML) of the GS3S. For this file, go to the installation folder of the SafeLogic Designer in the "Device-Descriptions" sub-folder.

For manual configuration, note that the required container length for the different I/O data has to be written into the GS3S in the Sercos communication

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phase CP2. For the input and output data (MDT/AT) from the view of the Sercos master, refer to the tables [tab. 11-2 "Process data to GS3S \(MDT\)" on page 125](#) and [tab. 11-3 "Process data from GS3S \(AT\)" on page 125](#). This diagnostic data can only be configured in the Sercos connection instances (S-0-1050) 0 and 1 of the GS3S.

Function group Type	Function group S-parameters	Container length P-parameters	Container length Value range (bytes)	Description
I/O control	S-0-1500.0.1	-	(2)	I/O control has to be available at any time
PLC modules	S-0-1512.0.5	P-0-3690.7.1 (or P-0-3694.0.1 ¹)	0...18	User data to SLC CPU module

¹ From GS3S Sercos FW 01V06 (refer to [S-0-0030](#))

Tab. 11-2: Process data to GS3S (MDT)

Function group Type	Function group S-parameters	Container length P-parameters	Container length Value range (bytes)	Description
I/O status	S-0-1500.0.2	-	(2)	IO status word has to be always available
PLC modules	S-0-1512.0.17	P-0-3690.1.1 (or P-0-3694.0.1 ^{1,2})	0/2/4/6	SLC station diagnostics
PLC modules	S-0-1512.0.9	P-0-3690.6.1 (or P-0-3694.0.1 ¹)	0...18	User data from SLC CPU module
Digital inputs	S-0-1503.1.9	P-0-3690.4.1 (or P-0-3694.1.1 ¹)	0/2/4/ ... /32	Status GS3S CSos group status word
Digital inputs	S-0-1503.1.9	P-0-3690.5.1 (or P-0-3694.1.1 ¹)	0/2/4/ ... /32	Status GS3S CSos group control word
Safety output	S-0-1510.2.9	P-0-3690.3.1 (or P-0-3694.2.1 ¹)	0...12	SLC IO module output status
Safety input	S-0-1511.2.9	P-0-3690.2.1 (or P-0-3694.2.1 ¹)	0...12	SLC IO module input status

¹ From the GS3S Sercos FW 01V06 (refer to [S-0-0030](#))

² If [P-0-3694.0.1](#) > 0, the diagnostic data is 6 bytes, otherwise 0 byte

Tab. 11-3: Process data from GS3S (AT)

Master slave communication can either be synchronous or asynchronous. The connection can either be configured "via the length" or via the "IDN". For the configuration "via the length", the data is stored in the order specified in the tables [tab. 11-2 "Process data to GS3S \(MDT\)" on page 125](#) and [tab. 11-3 "Process data from GS3S \(AT\)" on page 125](#).

11.3.3 Configuring the CSAL and Sercos CC connections

Sercos configuration basics for CIP Safety

Sercos Messaging Protocol (SMP)

To transfer CIP Safety telegrams deterministically via Sercos, the Sercos Messaging Protocol (SMP) is applied. In one SMP container, multiple channels (here: CIP communication connections) can be tunneled, i.e. these con-

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nections are uncoupled from the Sercos transfer layer and controlled by a superordinate application (here: Safety). These individual connections are configured in an SMP container via sessions. Prioritization is also possible. SMP can also be applied to transfer telegrams by means of fragmentation. These are longer than the SMP container (for CIP Safety, e.g. for acyclic messages at connection/disconnection).

One SMP container S-0-1101.x (with x = instance) is defined by the following parameters:

- S-0-1101.x.1 SMP container data
- S-0-1101.x.2 List of session identifiers
- S-0-1101.x.3 List of session priorities

CIP Safety requires bidirectional communication between originator and target device. Besides the actual data transmission, time coordination telegrams have to be cyclically transferred in reverse direction. SMP containers only enable mono-directional communication, two SMP containers are required for a CIP Safety connection (forward and reverse direction). In both containers, two sessions are required: One session for cyclic and one for acyclic CIP Safety telegrams. It is also possible to transfer multiple CIP Safety connections within one SMP container. In this case, additional sessions are respectively required. It is generally defined that sessions for cyclic CIP Safety telegrams are assigned priority 1 and sessions for acyclic telegrams (e.g. connection/disconnection) the lower priority 2.

CIP Safety Adaption Layer (CSAL)

The configuration of an SMP container regarding session IDs and priorities is realized by the application using the container. For CSOs, the CIP Safety Adaption Layer (CSAL) has to be configured. For every CIP Safety connection, an S-0-1830.x instance is required:

- S-0-1830.x.01 Cyclic SMP container (out)
- S-0-1830.x.02 Cyclic SMP session ID (out)
- S-0-1830.x.03 List of cyclic SMP containers (in)
- S-0-1830.x.04 List of cyclic SMP session IDs (in)
- S-0-1830.x.05 List of UCM SMP containers (in)
- S-0-1830.x.06 List of UCM SMP session IDs (in)
- S-0-1830.x.07 List of UCM SMP containers (out)
- S-0-1830.x.08 List of UCM SMP session IDs (out)

(with UCM: UnConnected Message = acyclic telegram)

At both Sercos devices (CSOs originator and target), *identical* session IDs have to be set for a CIP Safety connection. Otherwise, no valid communication is possible. On the other hand, the instances of the SMP containers S-0-1101.x and the CSAL configuration S-0-1830.y are device-specific. This means, different instances may be selected for the originator and the target device. [fig. 11-14 "CSAL configuration in GS3S" on page 127](#) illustrates a section of the CSAL configuration in GS3S (with TCM: Time Coordination Message). CIP Safety connections for Safety Control/Status use the same two SMP containers so that 4 session IDs are used in these two SMP containers. The complete configuration for GS3S is described in the following chapters.

CSAL configuration in GS3S

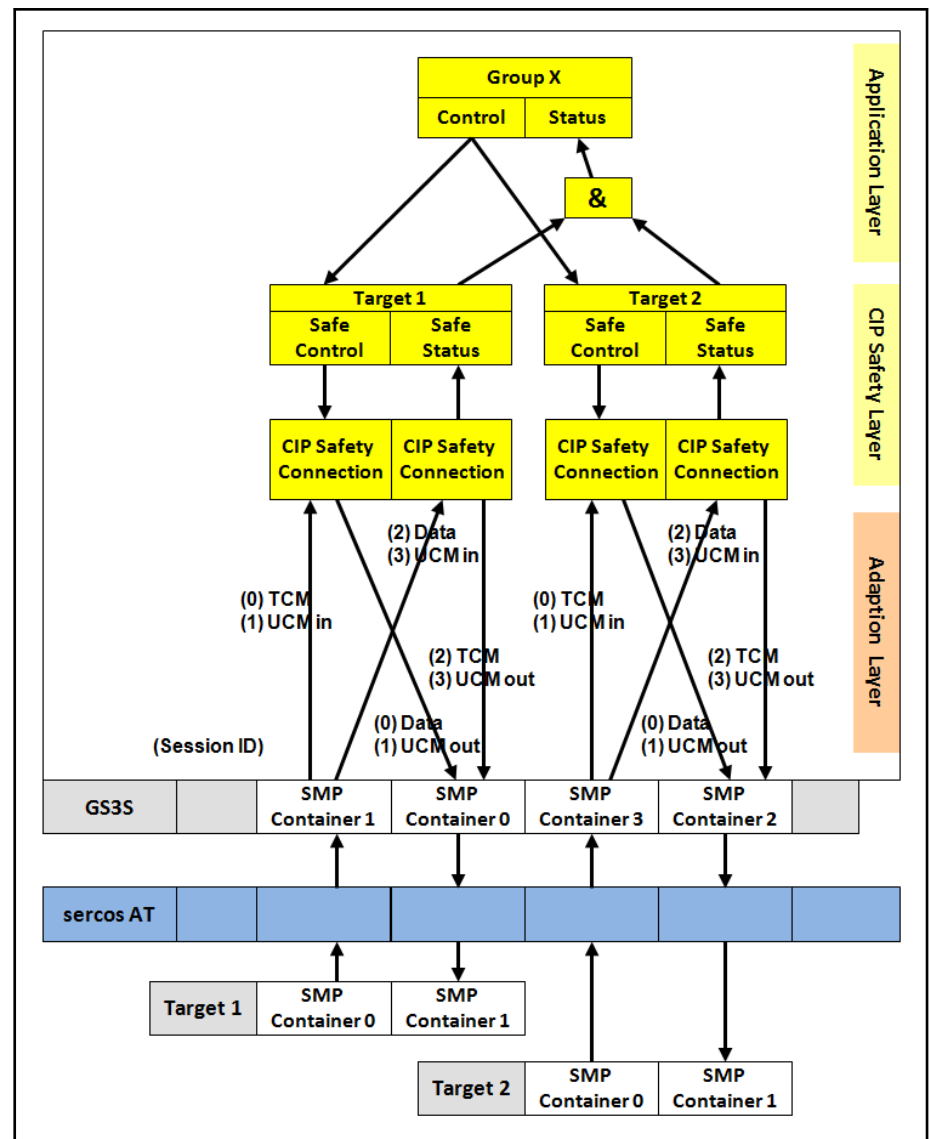


Fig. 11-14: CSAL configuration in GS3S

Configuring CSAL and SMP

GS3S as CSOs originator determines the required CSAL and SMP configuration. For this purpose, several parts of this configuration data have been realized *hard-coded* for simplification and the CSAL and SMP configuration are respectively to be implemented identically for CSOs target configuration.

SMP configuration

The SMP containers S-0-1101.x in GS3S have a min./max. length of 10 bytes. This way, the cyclic CIP Safety telegrams can be transferred in a Sercos cycle (unfragmented) (2 byte Safety user data contain an 8 byte CIP Safety telegram and a 2 byte SMP header is required). For SMP containers used in the CSOs targets, the lengths have to be set to 10 bytes respectively. This means, the parameters S-0-1101.x.1 in the target have to be assigned the length of 10 bytes on Sercos phase transition CP2 ⇒ CP3.

Appendix

CSAL configuration

In GS3S, a hard-coded CSAL configuration is used. This means, the S-0-1830 instances and S-0-1101 SMP container instances are permanently assigned to a Safety connection (refer to [chapter "Configuring Sercos CC connections" on page 129](#)). In the CSos targets, any instances of these parameters could be used (only the session IDs have to be identical). In the following, the CSAL and SMP configurations are listed that are also used in Rexroth control systems.

Summary of target configuration data

The following configuration data is to be written in every CSos target on Sercos phase transition CP2 ⇒ CP3:

SMP container

S-0-1101.0.1 SMP container data	= 10 bytes length
S-0-1101.1.1 SMP container data	= 10 bytes length

Safety Connection 1: (control word/consumer)

S-0-1830.0.1 Cyclic SMP container (out)	= [S-0-1101.0.1]
S-0-1830.0.2 Cyclic SMP session ID (out)	= [0]
S-0-1830.0.3 List of cyclic SMP containers (in)	= [S-0-1101.1.1]
S-0-1830.0.4 List of cyclic SMP session IDs (in)	= [0]
S-0-1830.0.5 List of UCM SMP containers (in)	= [S-0-1101.1.1]
S-0-1830.0.6 List of UCM SMP session IDs (in)	= [1]
S-0-1830.0.7 List of UCM SMP containers (out)	= [S-0-1101.0.1]
S-0-1830.0.8 List of UCM SMP session IDs (out)	= [1]

Safety Connection 2: (status word/producer)

S-0-1830.1.1 Cyclic SMP container (out)	= [S-0-1101.0.1]
S-0-1830.1.2 Cyclic SMP session ID (out)	= [2]
S-0-1830.1.3 List of cyclic SMP containers (in)	= [S-0-1101.1.1]
S-0-1830.1.4 List of cyclic SMP session IDs (in)	= [2]
S-0-1830.1.5 List of UCM SMP containers (in)	= [S-0-1101.1.1]
S-0-1830.1.6 List of UCM SMP session IDs (in)	= [3]
S-0-1830.1.7 List of UCM SMP containers (out)	= [S-0-1101.0.1]
S-0-1830.1.8 List of UCM SMP session IDs (out)	= [3]

- [S-0-1101.0.2](#) List of session identifiers = [0; 1; 2; 3]
- [S-0-1101.0.3](#) List of session priorities = [1; 2; 1; 2]
- S-0-1101.1.2 List of session identifiers = [0; 1; 2; 3]
- S-0-1101.1.3 List of session priorities = [1; 2; 1; 2]

Regarding SMP session IDs and priorities, the following configuration results in the S-0-1101.x.2/3 (automatically created by the CSAL; "read only"):

Configuring Sercos CC connections

The SMP containers for CSos communication could also be configured in the master-slave connections in GS3S (if the Sercos master was a CSos target). In the following, only the standard case is observed. Namely that the CSos targets are also Sercos slaves. E.g. Sercos CC connections are set up for the CSos communication.

The following applies:

- For the **Sercos connection instances (S-0-1050.x)**: In GS3S, 32 Sercos CC connections are possible (for the 16 CSos targets respectively with Sercos producer and consumer connection); for CC connections, the Sercos connection instances (S-0-1050.x) x = 2 to 33 can be used in GS3S (the instances 0 and 1 are reserved for MDT/AT communication with the Sercos master)
- For **Sercos connection configuration (S-0-1050.x.y)**, the following settings are to be applied:
 - S-0-1050.x.01 Connection setup: Producer = 0xC002, Consumer = 0x8002 ("configured by master", "variable configuration of IDNs", "asynchronous operation without watchdog")
 - S-0-1050.x.06 Configuration list: SMP container instances S-0-1101.y.1 according to the following description
 - S-0-1050.x.07 Assigned connection capability: Producer = 5, Consumer = 4
 - S-0-1050.x.10 Producer cycle time: A minimum cycle time of 1ms can be set. For 9 or more CSos targets, the minimum cycle time is 2ms
 - S-0-1050.x.11 Allowed data losses: 1 (not relevant as "asynchronous operation without watchdog")

SMP container ↔ target no. Assignment

As already mentioned, GS3S uses a hard-coded SMP configuration. This means that the SMP container instances in GS3S are permanently assigned to a target no. (regarding target no. also refer to [chapter "Target no." on page 51](#)). SMP container instances 0 and 1 are used for target no. 1, instances 2 and 3 for target no. 2 ... up to instances 30 and 31 for target no. 16. In this process, SMP container instances 0/2/ ... /30 are always used for transmission (→ Sercos Producer connection) and instances 1/3/ ... /31 for receiving (→ Sercos Consumer connection).

Overview on Sercos CC connection configuration

GS3S (with TN = target no.)		Target (identical for all targets)	
Producer ⇒		⇒ Consumer	
S-0-1050.x.1 Connection setup	0xC002	S-0-1050.y.1 Connection setup	0x8002
S-0-1050.x.6 Configuration list	S-0-1101.SI.1	S-0-1050.y.6 Configuration list	S-0-1101.1.1
[with SI = (TN - 1) * 2]			
S-0-1050.x.7 Assigned connection capability	0x0005	S-0-1050.y.7 Assigned connection capability	0x0004
Consumer ⇐		⇐ Producer	
S-0-1050.x.1 Connection setup	0x8002	S-0-1050.y.1 Connection setup	0xC002

Appendix

GS3S (with TN = target no.)		Target (identical for all targets)	
S-0-1050.x.6 Configuration list	S-0-1101.SI.1	S-0-1050.y.6 Configuration list	S-0-1101.0.1
[with SI = (TN * 2) - 1]			
S-0-1050.x.7 Assigned connection capability	0x0004	S-0-1050.y.7 Assigned connection capability	0x0005

11.3.4 Summary of the requests to the Sercos master

- On a Sercos slave, up to 34 Sercos connections have to be available (for GS3S: 2 master/slave + 32 Sercos CC connections). This is also a request to the Sercos master. Up to 34 connections should be configurable in one slave
- The number of GS3S or total number of CSos targets in the Sercos ring depends on the maximum number of possible Sercos connections of the master
- As minimum Sercos cycle time, 1ms can be set in GS3S. For 9 or more CSos targets, the minimum cycle time is 2ms (applies for all 34 connections)
- The Sercos cross communication (CC) connection configuration has to be stored in the Sercos master and written to the slaves during bus startup
- The configuration data relevant for CSos (refer to [chapter "Summary of target configuration data" on page 128](#)) have to be written to the CSos targets during bus startup (CP2 ⇒ CP3)

11.4 Parameter description

11.4.1 S-parameters

S-0-0000, Dummy parameter

Function This parameter is used as placeholder. The parameter has no function. It can be cyclically written to the parameter and cyclically read.

Possible applications:

- S-0-0370, Fill configuration list MDT data container with placeholders
- Measure dead time for reading and writing via the bus
- etc.

S-0-0000 - Attributes

Function:	Par	Editable:	++	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	AT + MDT	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-0014, Interface status

Function This parameter contains important status bits concerning master communication and communication phases.

Structure

Bit	Name, function
2-0	Communication phase
3	Double MST failure
4	Double MDT failure

Bit	Name, function
5	Invalid phase (phase > 4)
6	Error during phase switch-up (order)
7	Error during phase switch-down (not to phase 0)
8	Phase switching without ready signal
9-11	Reserved
12	Sercos: Incorrect sequence during phase switching, timeout during phase switching
13	Sercos: Incorrect sequence during phase switching, phase specification without phase switching
15-9	Reserved

Tab. 11-4: Relevant bits of the S-0-0014, Interface status

Use Current communication phase

The current communication phase (binary coded) can be read out from the three lower bits (0, 1, 2):

- 010b: Bus device is in phase 2 (parameterization mode)
- 011b: Bus device is in phase 3 (parameterization mode)
- 100b: Bus device is in phase 4 (operating mode)

Communication error bits after the Sercos interface

If a master communication interface error occurs in Sercos,

- one of the bits 3-15 is set to "S-0-0014, Interface status" (bit in 4... 15 = 1 => Error present)



The communication error bits are only deleted by the bus device when the respective interface error is no longer reported and the command "S-0-0099, C0500 Reset state class 1" was started.

S-0-0014 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-0015, Telegram type parameter

Function In Sercos II, this parameter was used to choose between various telegram types. In Sercos III, this is done by configuring the telegram accordingly. This parameter now only indicates the service channel length.

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Structure	Bit	Name, function
	0-7	Reserved
	9-8	MDT service channel data width: 00: 2 bytes information (Sercos II) 01: 4 bytes information (Sercos II and Sercos III) 10: 6 bytes info 11: 8 bytes information
	11-10	AT service channel data width: 00: 2 bytes information (Sercos II) 01: 4 bytes information (Sercos II and Sercos III) 10: 6 bytes info 11: 8 bytes information

Tab. 11-5: S-0-0015, Telegram type parameter

S-0-0015 - Attributes	Function:	Par	Editable:	P2	Data l.:	2 bytes
	Memory:	PARAM_SP	Validity test:	P2->P3	Format:	BIN
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	--- / ---		0		

S-0-0017, IDN List of all operating data

Function This list contains the ID numbers (IDN) of all operating data available in the bus device.

S-0-0017 - Attributes	Function:	Par	Editable:	--	Data l.:	4 bytes var.
	Memory:	--	Validity test:	--	Format:	IDN
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	--- / ---		---		

S-0-0018, IDN list of operating data, communication phase 2

Function The IDN list contains the ID numbers of all parameters that are checked by the bus device during the transition check command for phase 3. Only if the data of the listed ID numbers are correct, the transition check command can be acknowledged and switching to communication phase 3 can be permitted.

S-0-0018 - Attributes	Function:	Par	Editable:	--	Data l.:	4 bytes var.
	Memory:	--	Validity test:	--	Format:	IDN
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	--- / ---		---		

S-0-0019, IDN list of operating data, communication phase 3

Function The IDN list contains the ID numbers of all parameters that are checked by the bus device during the transition check command for phase 4. Only if the data of the listed ID numbers are correct, the transition check command can be acknowledged and switching to communication phase 4 can be permitted.

S-0-0019 - Attributes	Function:	Par	Editable:	--	Data l.:	4 bytes var.
	Memory:	--	Validity test:	--	Format:	IDN
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	--- / ---		---		

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-0021, IDN list of invalid operating data for phase 2

Function The bus device checks if all communication parameters are complete and correct before switching from phase 2 to phase 3 according to command "S-0-0127, C0100 Communication phase 3" transition check.

Use If the bus device determines one or several ID numbers to be invalid, it writes the required and/or invalid operating data to this IDN list. The bus device displays this with the failure message "C0101 Incomplete parameter block (-> S-0-0021)". In case of other error messages, the respective parameters are also written to "S-0-0021".

S-0-0021 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes var.
Memory:	--	Validity test:	--	Format:	IDN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-0022, IDN list of invalid operating data for phase 3

Function Before switching from phase 3 to phase 4 according to command "S-0-0128, C5200 Communication phase 4" transition check, the bus device checks the parameters for the following:

- Parameter validity
- Parameter inside possible input range
- "Compatibility" with other parameters

Use If a parameter fails the check, the bus device writes the respective operating data to this IDN list.

The bus device then acknowledges the transition command with the following messages:

- C0201 Incomplete parameter block (->S-0-0423) or
- C0202 Parameter limit value error (->S-0-0423) or
- C0203 Parameter conversion error (->S-0-0423) or
- C0242 Multiple configuration of a parameter (->S-0-0423)

S-0-0022 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes var.
Memory:	--	Validity test:	--	Format:	IDN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-0025, IDN list of all commands

Function The date of the IDN list contains the ID numbers of all commands available in the bus device.

S-0-0025 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes var.
Memory:	--	Validity test:	--	Format:	IDN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-0030, Manufacturer version

Function This parameter contains the firmware version as text (ASCII format).

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S-0-0030 - Attributes

Function:	Par	Editable:	--	Data I.:	1 byte var.
Memory:	--	Validity test:	--	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-0095, Diagnostics

Function This parameter contains the currently relevant operating state of the bus device in text form. The text is preceded by the respective content from parameter "S-0-0390, Diagnostic number".

Example: "A0002 Communication phase 2"

S-0-0095 - Attributes

Function:	Par	Editable:	--	Data I.:	1 byte var.
Memory:	--	Validity test:	--	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-0099, C0500 Reset state class 1

Function With this parameter the command to reset error messages is started. When the causes for the error are eliminated, all error messages reported are deleted and the bus device switches to operating state.

NOTICE

The internal memory (flash) may be damaged by too frequent write access!

When this parameter command is executed, the internal memory (flash) is written to. As each flash memory only allows a limited number of write access before its cells are destroyed, take care that write access is not carried out too often.

S-0-0099 - Attributes

Function:	Cmd	Editable:	++	Data I.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-0127, C0100 Communication phase 3 transition check

Function When the command "S-0-0127" is executed, all interface parameters are checked for validity.

Use If there are invalid interface parameters:

- The bus device terminates the command with an error message and
- The invalid parameters are entered into parameter "S-0-0021, IDN list of invalid operating data for phase 2"

It is possible to switch from parameterization mode to operating mode with the following commands:

- S-0-0127, C0100 Communication phase 3 transition check
- S-0-0128, C5200 Communication phase 4 transition check

S-0-0127 - Attributes

Function:	Cmd	Editable:	P234	Data I.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-0128, C5200 Communication phase 4 transition check

Function When the command "S-0-0128" is executed, all parameters are checked for validity and any limit value violations.

Use If there are invalid parameters or limit value violations, the bus device terminates the command with an error message and enters the invalid parameters into "S-0-0022, IDN list of invalid operating data for phase 3".

It is possible to switch from parameterization mode to operating mode with the following commands:

- S-0-0127, C0100 Communication phase 3 transition check
- S-0-0128, C5200 Communication phase 4 transition check

S-0-0128 - Attributes

Function:	Cmd	Editable:	++	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-0142, Application type

Function A descriptive name (text) for the bus device can be stored in this parameter.



The parameter has no impact on the function.

The following applies:

- The UTF-8 encoding can be used to write to this parameter
- Size in number of bytes: 40
- One UTF-8 character may be between 1 and 3 bytes
- Depending on the UTF-8 characters used, the number of characters that may be entered decreases

S-0-0142 - Attributes

Function:	Par	Editable:	++	Data l.:	1 byte var.
Memory:	PARAM_SP	Validity test:	PM->OM	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	Refer to the text

S-0-0187, List of config. data in cycl. actual value data channel

Function This list contains the ID numbers of parameters and/or operating data that may be configured in the actual value telegram.

Also refer to the parameter description:

"S-0-0016, Config. list of drive telegram"

"S-0-1050.x.6, Sercos connection: Configuration list"

S-0-0187 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes var.
Memory:	--	Validity test:	--	Format:	IDN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

Appendix

S-0-0188, List of config. data in cycl. command value data channel

Function This list contains the ID numbers of parameters and/or operating data that may be configured in the command value telegram.

Also refer to the parameter description:

"S-0-0024, Config. list of master data telegram"

"S-0-1050.x.6, Sercos connection: Configuration list"

S-0-0188 - Attributes	Function:	Par	Editable:	--	Data l.:	4 bytes var.
	Memory:	--	Validity test:	--	Format:	IDN
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:			Min./max.	default	
	GS3S:			--- / ---	---	

S-0-0262, C07_x Load default values command

Function The "C07_x Load default values command" loads default parameter values.

Use Default values stored in the firmware are loaded (firmware-specific default values for non-volatile parameters).

NOTICE

The internal memory (flash) can be damaged due to too frequent write access!

When this parameter command is executed, the internal memory (flash) is written to. As each flash memory only allows a limited number of write access before its cells are destroyed, take care that write access is not carried out too often.

S-0-0262 - Attributes	Function:	Cmd	Editable:	++	Data l.:	2 bytes
	Memory:	--	Validity test:	--	Format:	BIN
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:			Min./max.	default	
	GS3S:			--- / ---	---	

S-0-0265, Language selection

Function The bus device contains all parameter names, units and diagnostic/error messages in several languages. This parameter sets the language in which the texts are displayed:

- 0: German
- 1: English

S-0-0265 - Attributes	Function:	Par	Editable:	++	Data l.:	2 bytes
	Memory:	PARAM_SP	Validity test:	PM->OM	Format:	DEC_OV
	Unit:	--	Extr. v. test:	+	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:			Min./max.	default	
	GS3S:			0 / see text	0	

S-0-0267, Password

Function A customer password can be activated using this parameter.

Use The password serves to protect the values of the parameters contained in "S-0-0279, IDN list of password protected operating data" from unintentional or unauthorized changes. The default password is "007". With the password the parameters may be written to (initial state).



Bosch Rexroth reserves the right to use a master password. In this context, the parameter additionally serves to unlock customer support functions (P-0-4064, Password level).

The following applies:

- The UTF-8 encoding can be used to write to this parameter
- Size in number of bytes: 32
- One UTF-8 character may be between 1 and 3 bytes
- Depending on the UTF-8 characters used, the number of characters that can be entered decreases

S-0-0267 - Attributes

Function:	Par	Editable:	++	Data l.:	1 byte var.
Memory:	PARAM_SP	Validity test:	PM->OM	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		Refer to the text	

S-0-0279, IDN list of password-protected operating data

Function The values of the parameters contained in this list may be protected from unintentional or unauthorized changes by a customer password ("S-0-0267, Password"). By default, this parameter contains an empty list. This list may be created user-specifically by entering IDNs as required.

S-0-0279 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes var.
Memory:	PARAM_SP	Validity test:	PM->OM	Format:	IDN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		Refer to the text	

S-0-0326, Parameter checksum

Function When reading out this parameter, the checksum of all parameter values is created whose ID numbers are listed in parameter "S-0-0327, IDN list of the checksum parameters".

S-0-0326 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-0327, IDN list of checksum parameters

Function The ID numbers of parameters, whose checksum is to be generated are entered in this parameter. Checksum creation is started by reading out parameter "S-0-0326, Parameter checksum". No ID numbers are entered into "S-0-0327" by default.

S-0-0327 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes var.
Memory:	PARAM_SP	Validity test:	PM->OM	Format:	IDN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		Refer to the text	

S-0-0375, List of diagnostic numbers

Function The GS3S enters any changes to parameter "S-0-0390, Diagnostic number" into this list. The list is implemented as ring memory. Up to 50 diagnostic

Appendix

numbers can fit. When the list is read, the first element of the parameter indicates the diagnostic number most recently displayed.



The list in "P-0-0105, List of time stamps and diagnostic numbers" corresponds to parameter "S-0-0375".

S-0-0375 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes var.
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-0390, Diagnostic numbers

Function The diagnostic number is stored in this parameter.

Example:

Diagnostics (in the parameter S-0-0095): "A0012 Communication phase 2".

Diagnostic number (in the parameter S-0-0390): "A0012(hex)".

S-0-0390 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	AT	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-0420, C0400 Activate parameterization level command

Function Starting this command takes the bus device to "parameterization level 1".

S-0-0420 - Attributes

Function:	Cmd	Editable:	++	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-0422, C0200 Exit parameterization level command

Function Starting this command takes the bus device from "parameterization level 1" to operating mode. The device-specific parameter conversions and initializations are carried out.

S-0-0422 - Attributes

Function:	Cmd	Editable:	++	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-0423, IDN list of invalid data of the parameterization levels

Function By starting command "C0200 Exit parameterization level command" the device parameters are checked and converted. If an error occurs in this process, the parameters concerned are listed in this list. It is used by other commands to display faulty parameters.

S-0-0423 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes var.
Memory:	--	Validity test:	--	Format:	IDN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-0424, Parameterization level status

Function Status parameters to display the current parameterization level:

0: Operating mode

1: Parameterization mode, parameterization level 1 is active

S-0-0424 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	AT	Combi. test:	--	Block-dep.:	--
Input limits:					
GS3S:		Min./max.		default	
		--- / ---		---	

S-0-1000, SCP type and version

Function This parameter identifies a bus slave. The parameter consists of a 16 bit list with every element describing a package and its version. For the meaning of the ID, refer to the Sercos standard.

Structure

Bit	Name, function
3-0	Version: 0: Not a standardized version 1-3: version of the SCP class
7-4	Reserved
15-8	Function package/classes: 0x00: Reserved 0x02: SCP_VarCFG 0x03: SCP_Sync 0x05: SCP_Diag 0x08: SCP_SMP 0x0D: SCP_SIP 0x0F: SCP_CAP 0x18: SCP_NRTPC

Tab. 11-6: S-0-1000, SCP type and version

S-0-1000 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes var.
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:					
GS3S:		Min./max.		default	
		--- / ---		---	

S-0-1002, Sercos cycle time (tScyc)

Function The communication cycle time of the Sercos interface indicates in what time intervals the cyclic data, i.e. the process data (MDT and AT) is transmitted.

Use During the parameterization, observe the following:

- Input is set to 1 ms to 65 ms in 1 ms steps
- The "Sercos cycle time (tScyc)" has to be transmitted in communication phase 2 from the master to the slave and has to be active in both from communication phase 3 onward

S-0-1002 - Attributes

Function:	Par	Editable:	P2	Data l.:	4 bytes
Memory:	-	Validity test:	P2->P3	Format:	DEC_OV

Appendix

Unit:	us	Extr. v. test:	+	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		1000.000 / 65000.000		2000.000	

S-0-1003, MST failures allowed

Function This is the number of allowed MST telegram failures (synchronization telegram) that may occur consecutively in phases 3 and 4 without the bus device triggering an F4001 error.

S-0-1003 - Attributes	Function:	Par	Editable:	P2	Data l.:	4 bytes
	Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:		Min./max.		default	
	GS3S:		---	---	1	

S-0-1005, Minimum time between t4 and t1 (t5)

Function The time required in the bus device from the start of actual value detection to the start of AT0.



The master reads this value in phase 2 to set the "measurement time of actual values (T4)" (S-0-1007) for all bus devices accordingly.

Use The bus device has to specify this value in such a way that the next drive telegram (AT) transmits the applicable actual values to the control.

S-0-1005 - Attributes	Function:	Par	Editable:	--	Data l.:	4 bytes
	Memory:	--	Validity test:	--	Format:	DEC_OV
	Unit:	us	Extr. v. test:	--	No. of dec.:	3
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:		Min./max.		default	
	GS3S:		---	---	---	

S-0-1006, Transmission time of the drive telegram (t1)

Function This parameter specifies when the master sends its drive telegram in communication phases 3 and 4 related to the MST telegram.

S-0-1006 - Attributes	Function:	Par	Editable:	P2	Data l.:	4 bytes
	Memory:	PARAM_SP	Validity test:	P2->P3	Format:	DEC_OV
	Unit:	us	Extr. v. test:	+	No. of dec.:	3
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:		Min./max.		default	
	GS3S:		0,000 / 65000,000		100.000	

S-0-1007, Measurement time of actual values (t4)

Function Measurement time of actual values specified by the master following the end of the master synchronization telegram. The master specifies the same measurement time of actual values for all bus devices that are coordinated with each other. The specification of the measurement time ensures synchronization of actual value detection with the concerned bus devices.



The bus device activates the measurement time of the actual values in communication phase 3.

Use The master has to set the measurement time of actual values smaller than or equal to the difference between the "Sercos cycle time" (S-0-1002) and the queried "minimum time of actual value detection" (S-0-1005).

S-0-1007 - Attributes

Function:	Par	Editable:	P2	Data l.:	4 bytes
Memory:	PARAM_SP	Validity test:	P2->P3	Format:	DEC_OV
Unit:	us	Extr. v. test:	--	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		500.000	

S-0-1008, Time command value valid MDT (t3)

Function The time for "command value valid" indicates when the bus device may access the new command values following the end of the master synchronization telegram. The master specifies the same measurement time for "command value valid" for all bus devices that are coordinated with each other.



This parameter is still available for reasons of conformity. However, the GS3S no longer uses and processes it.

S-0-1008 - Attributes

Function:	Par	Editable:	P2	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	us	Extr. v. test:	--	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1009, Device control (C-Dev) telegram assignment

Function The telegram assignment indicates the MDT telegram (telegram number) and the position (telegram offset) of the device control word (C-Dev).

Structure

Bit	Name, function
10-0	Telegram offset in bytes
15-12	MDT telegram number:
	0: MDT0
	1: MDT1
	2: MDT2
	3: MDT3

Tab. 11-7: S-0-1009: Device control (C-Dev) telegram assignment

S-0-1009 - Attributes

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1010, MDT Lengths

Function This list parameter contains the MDT length of all four possible master data telegrams.



The lengths are required for the initialization of the Sercos communication.

Structure

The list parameter is structured as follows:



Fig. 11-15: S-0-1010: MDT lengths

Use Observe the following during the parameterization:

- Always specify all four lengths
- Non-existing MDT telegrams are labeled with the length = "0"

S-0-1010 - Attributes

Function:	Par	Editable:	P2	Data I.:	2 bytes var.
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	Byte	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		Refer to the text	

S-0-1011, Device status (S-Dev) telegram assignment

Function The telegram assignment indicates the AT telegram (telegram number) and the position (telegram offset) of the device status word (S-Dev).

Bit	Name, function
10-0	Telegram offset in bytes
15-12	AT telegram number: 0: AT0 1: AT1 2: AT2 3: AT3

Tab. 11-8: S-0-1011, Device status (S-Dev) telegram assignment

S-0-1011 - Attributes

Function:	Par	Editable:	P2	Data I.:	2 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1012, AT lengths

Function This parameter contains the AT lengths of all four possible drive telegrams.



The lengths are required for the initialization of the Sercos communication.

Structure The list parameter is structured as follows:

Function:	Par	Editable:	P2	Data l.:	2 bytes var.
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	Byte	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		Refer to the text	

Bit	Name, function
11-0	MDT SVC offset in bytes
13, 12	MDT telegram number: 00: MDT0 01: MDT1

Function:	Par	Editable:	P2	Data I.:	2 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		8	

Bit	Name, function
11-0	AT SVC offset in bytes
13, 12	AT telegram number: 00: AT0 01: AT1

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Appendix

Input limits:	Min./max.	default
GS3S:	--- / ---	8

S-0-1015, Ring delay

Function The master determines the ring delay time (S-0-1015) in phase 2 and transmits it to the slaves. With this delay, the slaves can calculate their sync time for the P and S channel, using their delay counters. For this purpose, the master has to execute command "S-0-1024, C5300 Sercos: Execute command SYNC delay measurement".



The command "S-0-1024, C5300 Sercos: SYNC delay measurement command" has to be executed in phase 2 prior to command "S-0-, C0100 Communication phase 3" transition check.

S-0-1015 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	us	Extr. v. test:	--	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1016, Slave delay (P/S)

Function After the master has transmitted the entire ring delay (S-0-1015) to the slaves, the slaves can determine SYNCCNT-P/S. With these two delay times (P in the first element and S in the second element), the master determines the physical order of the slaves in the ring or line.

S-0-1016 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes var.
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	us	Extr. v. test:	--	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1017, NRT transmission time

Function This parameter "S-0-1017" serves to define the time window of the NRT channel in Sercos.

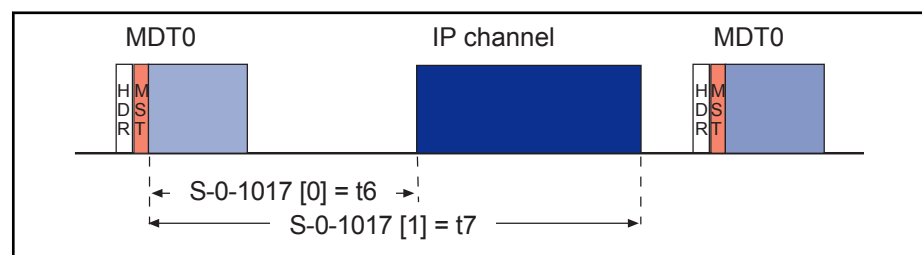


Fig. 11-17: Sercos: NRT transmission time

Structure The list parameter "S-0-1017" is structured up as follows:

- First element: Start (t6) of the NRT channel
- Second element: End (t7) of the NRT channel

Use Observe the following during the parameterization:

- $t7 - t6 \geq 125 \mu s$, minimum length of the NRT channel
- $t6 = t7 = 0 \rightarrow$ NRT channel switched off

S-0-1017 - Attributes

Function:	Par	Editable:	P2	Data l.:	4 bytes var.
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	us	Extr. v. test:	--	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	Refer to the text

S-0-1019, Master communication engineering via IP: MAC address

Function "S-0-1019" contains the MAC address of the Sercos interface that is required in connection with Ethernet communication. The MAC address (Media Access Control) is used for unique identification in the network.

Structure The MAC address is designed as a list parameter with the following structure:

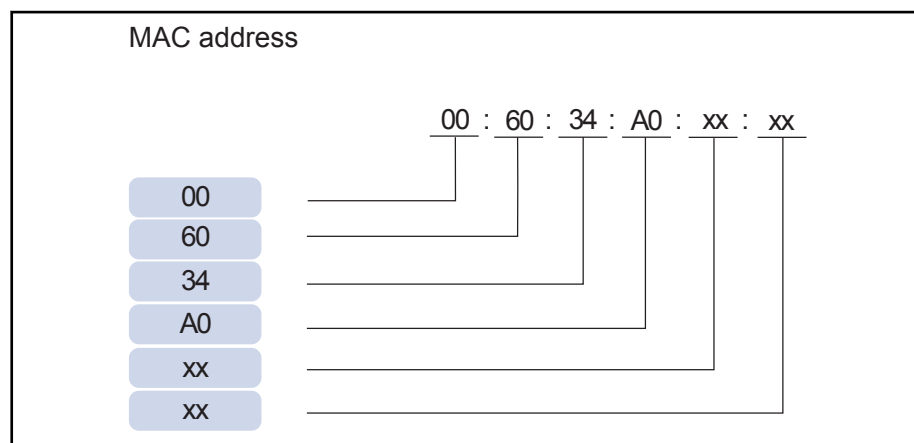


Fig. 11-18: S-0-1019, Master communication engineering via IP: MAC address

Use



The MAC address is dedicated to the hardware and cannot be changed!

S-0-1019 - Attributes

Function:	Par	Editable:	P2(+MP)	Data I.:	1 byte var.
Memory:	I2C_OPM_SP	Validity test:	P2->P3	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1020, Master communication engineering via IP: IP address

Function "S-0-1020" contains the IP address of the Sercos interface. With this address the device can be reached in the network via IP communication.



Changes to the parameter are only applied after:

- The 24 V power supply is switched on again
- The command "C6100 Activate IP settings command" is executed

Structure The IP address is designed as a list parameter with the following structure:

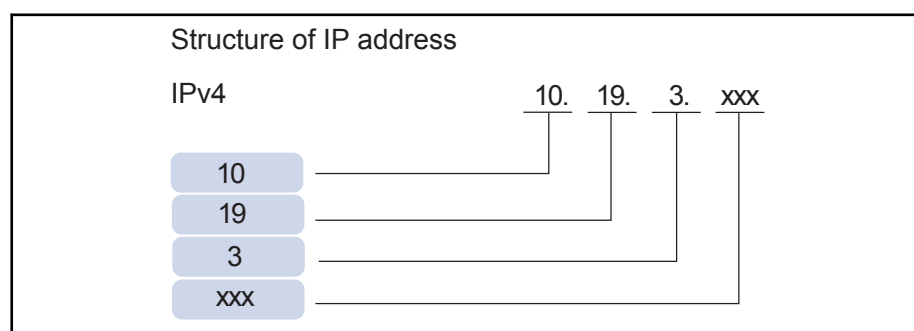


Fig. 11-19: S-0-1020, Master communication engineering via IP: IP address

Appendix

Use



The IP address has to be set application-specifically. Setting may be made via the communication interface.

Also refer to the parameter description:

"S-0-1021, Engineering via IP: Network mask"

"S-0-1022, Engineering via IP: Gateway address"

S-0-1020 - Attributes

Function:	Par	Editable:	++	Data l.:	1 byte var.
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	Refer to the text

S-0-1021, Master communication engineering via IP: Network mask

Function

"S-0-1021" contains the network mask of the Sercos interface that is required for engineering via IP which is necessary in connection with IP communication. Each IP address (Internet protocol) is divided into a network and a device section. The network mask is used to differentiate between the network and the device section.



Changes to the parameter only become valid after:

- The 24 V power supply is switched on again
- The command "C6100 Activate IP settings command" is executed

Structure

The network mask is designed as a list parameter with the following structure:

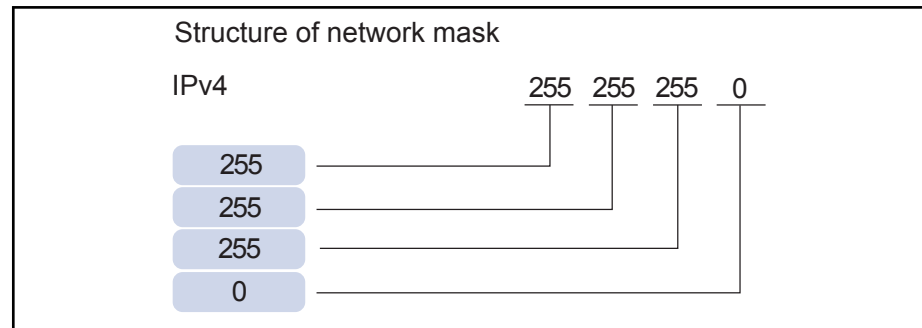


Fig. 11-20: S-0-1021, Master communication engineering via IP: Network mask

Use



The network mask has to be set application-specifically. Setting can be made via the communication interfaces.

Also refer to the parameter description:

"S-0-1020, Engineering via IP: IP address"

"S-0-1022, Engineering via IP: Gateway address"

S-0-1021 - Attributes

Function:	Par	Editable:	++	Data l.:	1 byte var.
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	Refer to the text

S-0-1022, Master communication Engineering via IP: Gateway address

Function "S-0-1022" contains the gateway address of the IP device on the Sercos interface that is required for engineering via IP which is necessary in connection with IP communication.

If the communication device wants to send an IP package (Internet Protocol), the network sections of the source IP address and the target IP address are compared to each other. If the addresses do not match, the IP package is sent to the gateway IP address.



Changes to the parameter only become valid after:

- The 24 V power supply is switched on again
- The command "C6100 Activate IP settings command" is executed

Structure The gateway address is designed as a list parameter with the following structure:

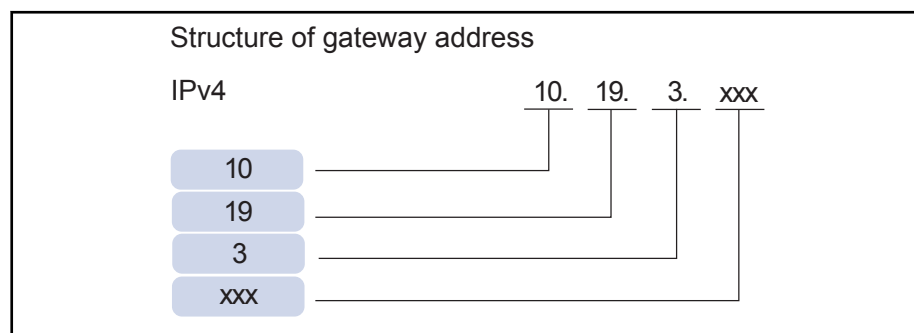


Fig. 11-21: S-0-1022, Master communication engineering via IP: Gateway address

Use



The gateway address has to be set application-specifically. Setting may be carried out via the communication interfaces.

Also refer to the parameter description:

[S-0-1020](#), Engineering via IP: IP address"

[S-0-1021](#), Engineering via IP: Network mask"

S-0-1022 - Attributes

Function:	Par	Editable:	++	Data I.:	1 byte var.
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	Refer to the text

S-0-1023, SYNC jitter

Function This parameter "S-0-1023" sets the maximum possible jitter of the control synchronization clock.



It is used to adjust the monitoring in the Sercos slaves to the possibilities of the Sercos master.

S-0-1023 - Attributes

Function:	Par	Editable:	P2	Data I.:	4 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	us	Extr. v. test:	+	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Appendix

Input limits:	Min./max.	default
GS3S:	0,200 / 50,000	1.000

S-0-1024, C5300 SYNC delay measurement command

Function The command is required to measure the delays between the two ports.

Before the command can be started, the slave requires a suitable value for "S-0-1015, ring delay". The delay measurement is required for cycle synchronous operation in phases 3 and 4 and has therefore to be carried out prior to the transition command "S-0-0127, C0100 Communication phase 3 transition check".

S-0-1024 - Attributes

Function:	Cmd	Editable:	++	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1026, Hardware ID

Function This parameter contains the Sercos-specific hardware ID in text form (ASCII format):

- FPGA version and revision
- GPCC version and revision

Structure The parameter content has to be interpreted as follows:

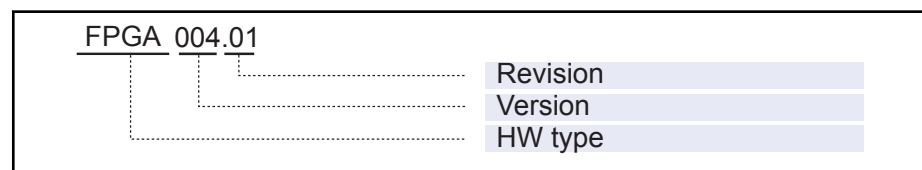


Fig. 11-22: Structure and content of "S-0-1026, hardware ID"

S-0-1026 - Attributes

Function:	Par	Editable:	--	Data l.:	1 byte var.
Memory:	--	Validity test:	--	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1027.0.1, Requested MTU

Function This parameter "S-0-1027.0.1" defines what MTU the slave is to use.

The Maximum Transmission Unit (MTU) describes the maximum package size in bytes that can be transmitted via a network without fragmenting the data package.



Currently, the effective MTU is set to 1500 bytes in the GS3S.

Use By using the smaller MTU the last Ethernet transmission time can be moved closer to the end of the NRT channel. This way, the NRT time slot can be used more efficiently or Ethernet communication can take place with small Sercos cycle times.

The currently effective MTU is displayed in parameter "S-0-1027.0.2, Effective MTU".

Observe the following during parameterization:

- Due to protocol definitions, the minimum effective MTU is 576 bytes up to communication phase 2

- The smaller the selected MTU, the larger the Ethernet protocol overhead compared to the user data transmitted
- Ethernet communication may be interrupted when the MTU is changed



If the requested MTU is set to less than 576 bytes, the effective MTU has to be changed during phase startup.

Due to this change, the established Ethernet communication connection may be interrupted and it may not be possible to re-establish it.

In this case, all Ethernet connections have to be disconnected prior to phase switching and may only be re-established after the phase startup was successful.

S-0-1027.0.1 - Attributes

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	+	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		46 / 1500		1500	

S-0-1027.0.2, Effective MTU

Function This parameter "S-0-1027.0.2" indicates the MTU currently used in the GS3S.

The Maximum Transmission Unit (MTU) describes the maximum package size in bytes that can be transmitted via a network without fragmenting the data package.



Currently the effective MTU is fixed at 1500 bytes in the GS3S.

S-0-1027.0.2 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1028, Error counter MST-P/S

Function The MST error counter counts all invalid MSTs in phases 3 and 4 and stops at $2^{16}-1$.



In case of strong transmission interferences the value 65535 is reached after some time. The counter is only reset when the phase switches from phase 2 -> phase 3.

Interpretation of the parameter content

Observe the following when interpreting the error counter:

- The error counter is increased only once per communication cycle, this is independent from the number of failed MST telegrams
- The error counter is deleted with the first MST in phase 3

S-0-1028 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	AT	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1031, Signal assignment TSx

Function	This parameter applies different measurement signals to the test pins of the Sercos FPGA. This parameter serves diagnostic purposes only.				
S-0-1031 - Attributes	Function:	Par	Editable:	++	Data I.: 2 bytes
	Memory:	--	Validity test:	--	Format: BIN
	Unit:	--	Extr. v. test:	--	No. of dec.: 0
	Cyclic:	--	Combi. test:	--	Block-dep.: --
	Input limits:		Min./max.		default
	GS3S:		--- / ---		---

S-0-1034, PHY error counter of port 1 and port 2

Function

The parameter is the image of a Sercos FPGA register "SercosErrorCount" in which all incorrect telegrams of the PHYs are displayed related to the port.

The error counters stop at a maximum of 65535. The error register is not automatically deleted in the FPGA. Deletion is only carried out by writing to the parameter.

Structure

Bit	Name, function
15-0	Error counter of port 1
31-16	Error counter of port 2

Tab. 11-11:

S-0-1034, PHY error counter of port 1 and port 2

S-0-1034 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1035.0.0, Error counter of port 1 and port 2

Function

The parameter is the image of the Sercos FPGA register "SercosErrorCount" in which all incorrect telegrams (e.g. FCS errors) are displayed related to the port.

The error counters stop at a maximum of 65535. The error register is not automatically deleted in the FPGA. Deletion is only carried out by writing to the parameter.

Structure

Bit	Name, function
15-0	Error counter of port 1
31-16	Error counter of port 2

Tab. 11-12: S-0-1035.0.0, Error counter of port 1 and port 2

S-0-1035.0.0 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1035.0.1, Error counter P&S

Function	This parameter contains all incorrect telegrams (e.g. FCS errors) and displays them related to the port.
-----------------	--

Appendix

In a ring topology, the low-order word contains the error counter for P telegrams and the high-order word contains the error counter for S telegrams. In a line topology, the low-order word contains the error counter of the port that is closer to the master and the high-order word contains the error counter of the port that is further away. In a line topology with S telegrams, the low-order word contains the error counter of the port that is further away from the master and the high-order word contains the error counter of the port that is closer to the master.

The error counters stop at a maximum of 65535. The error register is only deleted when the parameter is written to.

Structure

Bit	Name, function
15-0	Error counter (see text)
31-16	Error counter (see text)

Tab. 11-13: S-0-1035.0.1, Error counter P&S

S-0-1035.0.1 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1036, Interframe gap

Function

The slave needs this parameter in Sercos to determine the end of the telegram blocks (MDT and AT block). The master determines the value in phase 2 and transmits it to the slaves.

S-0-1036 - Attributes

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	Byte	Extr. v. test:	+	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		12 / 1000		---	

S-0-1037, slave jitter

Function

The master requires this parameter to determine parameter "S-0-1036, Interframe gap". The master reads it in phase 2. The value depends on the hardware or the FPGA and is 40 ns for the GS3S.

S-0-1037 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	ns	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1039, Host name

Function

This parameter contains a unique host name for a device. The device can be identified via this name. The host name is used with "Engineering via IP" and NRT for IP assignment via DHCP to uniquely identify the device.

S-0-1039 - Attributes

Function:	Par	Editable:	++	Data l.:	1 byte var.
Memory:	PARAM_SP	Validity test:	--	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		Refer to the text	

Appendix

S-0-1040, Sercos address

Function The Sercos address can be set using this parameter.

The address entered is applied immediately.

S-0-1040 - Attributes

Function:	Par	Editable:	PM	Data l.:	2 bytes
Memory:	FIX_IDN_SP	Validity test:	PM->OM	Format:	DEC_OV
Unit:	--	Extr. v. test:	+	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	1 / 250	Refer to the text

S-0-1041, Time command value valid AT (t9)

Function The time for command value valid AT indicates when the bus device may access the new command values following the end of the master synchronization telegram. The master specifies the same measurement time for "command value valid" for all bus devices that are coordinated with each other.



This parameter is still available for reasons of conformity. However, the GS3S no longer uses and processes it.

S-0-1041 - Attributes

Function:	Par	Editable:	P2	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	us	Extr. v. test:	--	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1042, Topology index

Function This parameter indicates the topology index of the slave. The topology index corresponds to the physical order of slaves in the network. This makes it possible to carry out troubleshooting and diagnostics with external commissioning and monitoring tools. This parameter is derived from the sequence counter that the slave receives in CP0. During CP0 the slave has to set this parameter to the sequence counter in the high word and the low word to "0".

The following has to be observed for an interrupted ring:

- The highest-order bit of the sequence counter may not be masked
- Slaves connected to the second port of the master have an inverse order compared to the slaves connected to the first port

Bit	Description
31-16	Sequence counter determined in CP0 or HP1
15-0	Only used for hotplug devices, HP1 parameter

Tab. 11-14: Meaning of the bits in S-0-1042

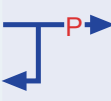
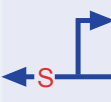
S-0-1042 - Attributes

Function:	Par	Editable:	-	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	-	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1044, Device control word (C-Dev)

Function This parameter displays the internal device control word. The parameter is transmitted cyclically by the master from Sercos phase 1 and may be read out for diagnostic purposes.

Structure	Bit	Name, function
	11	Status of the physical topology (master view, for NRT function): 0: Physical ring interrupted 1: Physical ring closed
	13-12	Command topology:
	00	Fast forward at both ports 
	01	Loopback and Forward for P-telegram 
	10	Loopback and Forward for S-telegram 
	11	Reserved (NRT) 
	14	Topology handshake of the master: 0->1 or 1->0: Slave is to apply new target topology of bit 13-12
	15	Identification bit: Slave displays the state of this bit via LED. This function is used for the remote address assignment

Tab. 11-15: S-0-1044, Device control word (C-Dev)

S-0-1044 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1045, Device status word (S-Dev)

Function This parameter displays the internal device status word. The parameter is transmitted cyclically by the slave from Sercos phase 1 onward and may be read out for diagnostic purposes.

Structure	Bit	Name, function
	1	Current error 0: Cannot be deleted 1: Can be deleted
	4	Parameterization level: 1: Parameterization level 1 active at sub-device
	5	Change bit commands

Appendix

Bit	Name, function
6	Sub-device/device warning (C2D): The bit is automatically reset when the cause of the warning is eliminated
7	Sub-error/device error (C1D): - Slave remains in current phase - Connection data is continued to be copied - Service channel possible - Deletion via S-0-0099
8	Bit 8 Bus-Slave-Valid: 0: Data from Sercos telegrams is not processed by the slave 1: Data from Sercos telegrams is processed by the slave
9	Err-Con (connection error): 1: Consumer reports error in a connection
11, 10	Status at the inactive port (for hotplug/redundancy): Bit 13/12 = 01 or 10: 00: "Fast forward" on both ports 01: "Loopback and Forward" for P-telegram 10: "Loopback and Forward" for S-telegram 11: NRT mode Bit 13/12 = 00 or 11: Always 00
13, 12	Actual topology: 00: Fast forward at both ports 01: Loopback and Forward for P-telegram 10: Loopback and Forward for S-telegram 11: NRT mode
14	Topology handshake of the slave: 0->1 or 1->0: Slave applied target topology. Bit 13/12 displays the result of the attempted application
15	Communication warning interface (Warn-IF): Number of the permitted MST failures exceeded half of the value in "S-0-1003"

Tab. 11-16: S-0-1045, Device status word (S-Dev)

S-0-1045 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.	default		
GS3S:		---	---		

S-0-1047, Maximum consumer processing time

Function This parameter describes the maximum processing time for consumer data. The parameter describes the time that has to pass between the end of the MDT telegram block (with MS connections) or the AT telegram block (with CC connections) and the activation time "S-0-1007" for the consumer connection values to be processed in the same cycle.

This parameter complements parameter "S-0-1005, Minimum time between t4 and t1 (t5)" which indicates the same for producer connections.

S-0-1047 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	us	Extr. v. test:	--	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.	default		
GS3S:		---	---		

S-0-1048, C6100 Activate IP settings command

Function This command activates the user IP settings (IP address, network mask and Standard gateway) of the available devices.



The settings prior to a change of the IP settings remain active until the command is executed.

Use When the command is executed, the communication of all devices (hardware that may be used for IP communication, such as a network card in a PC) whose settings were changed is aborted. When the command is completed successfully, IP communication is started with the new settings.

S-0-1048 - Attributes

Function:	Cmd	Editable:	++	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.	default		
GS3S:		---	---		

S-0-1050.0.1, Sercos connection: Configuration

Function This parameter contains the configuration data of a connection, consisting of:

- Activate configuration
- Connection type
- Configuration source
- Configuration type
- Cycle generation (producer)
- Monitoring mechanism (consumer)

Appendix

Structure	Bit	Name, function	Comment
	2-0	Monitoring mechanism (consumer): 00: Cycle-synchronous operation 01: Asynchronous operation (with watchdog) 10: Asynchronous operation (without watchdog) 11: Reserved	The GS3S only supports "00"
	3	Cycle generation (producer): 0: Cycle-synchronous 1: Asynchronous	
	5-4	Configuration type: 00: Configuration list with EIDNs (SE-6 relevant) 01: Container without content specification (SE-5 relevant) 10: Telegram type parameter FSP-Drive (S-0-0015 relevant) 11: Reserved	The GS3S does not support the variants "10" and "11"
	13-12	Configuration source: 00: Bus master 01: Not bus master 10: Not bus master 11: Not bus master	
	14	Connection type: 0: Consumer 1: Producer	
	15	Configuration activation: 0: Slave does not have to evaluate/consider the configuration 1: Slave has to evaluate/consider the configuration	

Tab. 11-17: S-0-1050.x.1, Sercos connection: Configuration

S-0-1050.0.1 - Attributes

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		0	

S-0-1050.0.2, Sercos connection: Connection number

Function This parameter serves to clearly identify the connection affiliation. The bus master requires this parameter to identify the telegram offset, for example.

Rules:

1. Producer and consumer of a connection have the same connection number
2. A slave may not have identical connection numbers in its connections
3. MA-AT and MS-MDT also have differing connection numbers in a slave

S-0-1050.0.2 - Attributes

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		0	

S-0-1050.0.3, Sercos connection: Telegram assignment

Function The telegram assignment indicates the telegram (MDT or AT, telegram number) and the position (telegram offset) of the connection. The telegram offset points to the control word (C-Con) of the connection.

Structure

Bit	Name, function
10-0	Telegram offset in bytes
11	Telegram type: 0: AT 1: MDT
15-12	Telegram number: 0: MDT0/AT0 1: MDT1/AT1 2: MDT2/AT2 3: MDT3/AT3

Tab. 11-18: S-0-1050.x.3, Sercos connection: Telegram assignment

S-0-1050.0.3 - Attributes

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		0	

S-0-1050.0.4, Sercos connection: Max. connection length

Function With this parameter, the slave notifies the master of the number of bytes the slave allows for this connection. 2 bytes for the connection control word "C-Con" are included.

S-0-1050.0.4 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1050.0.4, Sercos connection: Current connection length

Function With this parameter, the slave notifies the master of the number of bytes currently required for this connection. 2 bytes for the connection control word "C-Con" are included.

The date of this parameter is provided by the slave for all adjustable configuration types ("S-0-1050.x.1, Sercos connection: configuration") and is always updated after "S-1050.x. 6, Sercos connection: configuration list".

S-0-1050.0.5 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Appendix

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1050.0.6, Sercos connection: Configuration list

- Function** This parameter contains the ID numbers (4 bytes) that are cyclically transmitted in this connection. Its content is only applied in the configuration type 00: Configuration applied with EIDNs ("S-1050.x.1, Sercos connection: configuration").
- In this configuration type, the slave derives parameter "S-0-1050.x.5, Sercos connection: Current connection length" from the content of this parameter.

S-0-1050.0.6 - Attributes

Function:	Par	Editable:	P2	Data l.:	4 bytes var.
Memory:	PARAM_SP	Validity test:	--	Format:	IDN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	Refer to the text

S-0-1050.0.7 Sercos connection: Connection class

- Function** With this parameter a connection type (S-0-1060) is assigned to a connection.
- Use** During the parameterization, observe the following:
- It is assigned via the SI of the parameter "S-0-1060".
 - If the parameter value is "-1", no assignment is carried out and the default settings are applicable
 - When the value is written, the parameters "S-0-1050.x.1, Sercos connection: Configuration" and "S-0-1050.x.4, Sercos connection: Max. connection length" are adjusted according to the selection
 - The command "S-0-0127, C0100 Communication phase 3 transition check" checks if the value "S-0-1060.x.3, Sercos connection type: Max. configurable" is exceeded. If the value is exceeded, error code "C0174 connection configuration not permitted" is returned. In parameter "S-0-0021, IDN list of invalid operating data for phase 2" the respective parameter "S-0-1060.x.3" is then executed

S-0-1050.0.7 - Attributes

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_MV
Unit:	--	Extr. v. test:	+	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	-1 / 5	---

S-0-1050.0.8, Sercos connection: Control word C-Con

- Function** This parameter contains the image of the connection control word (C-Con). This is true for producer and consumer connections.

Structure

Bit	Name, function
0	ProducerReady: 0: Producer does not yet enter any valid command values 1: Producer enters valid command values, slave can apply the command values from bit 1 by toggling
1	NewData bit: Edge indicates that there is new data in the connection

Bit	Name, function
2	CC-DataFieldDelay: 1: CC producer data is offset in relation to the Sercos cycle, as it was copied via the bus master. The consumer is to preferably extract data from the port where the bit is 0
3	ProducerSynchronized: 0: PLL of the producer is not synchronized to the ring cycle 1: PLL of the producer is synchronized to the ring cycle
6	Real-time bit 1
7	Real-time bit 2

Tab. 11-19: S-0-1050.x.8, Sercos connection: Control word C-Con

S-0-1050.0.8 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1050.0.9, Sercos connection: State

Function This parameter always indicates the current state of each connection. The displayed value (state) of the connection state machine depends on the connection type (producer, consumer).

Structure

Value	Name	Comment
0	ini	The state is automatically reached upon restart, the connection error bit in S-Dev is deleted
1	prepare	State of an active connection if the connection check returned no errors in the command "S-0-0127"
2	ready	Connection is started - ProducerReady is sent with 1 - NewData does not toggle yet. Currently, the state cannot be identified in IndraDrive
3	producin	NewData toggles as specified - Valid process data is transmitted
4	stoppin	Stop bit is set - state of the remaining bits in "C-Con" and state of the process data is arbitrary. Currently, this state is not implemented in IndraDrive

Tab. 11-20: S-0-1050.x.9, Value encoding in producer connections

Structure

Value	Name	Comment
0	ini	The state is automatically reached upon restart, the connection error bit in S-Dev is deleted
1	prepare	State of an active connection if the connection check returned no errors in the command "S-0-0127"
2	waiting	Waiting for "NewData", no process data extracted
3	consuming	Process data is extracted, connection monitoring is active

Appendix

Value	Name	Comment
4	stopped	No process data is extracted. Connection monitoring is not active. Currently, this state is not implemented in IndraDrive
5	warning	No process data is extracted. Connection monitoring is active
7	error	No process data is extracted. The connection error bit is set in S-Dev. This state remains active until the command "S-0-0127, C0100 Communication phase 3 transition check" is executed

Tab. 11-21: S-0-1050.x.9, Value encoding in consumer connections

S-0-1050.0.9 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1050.0.10, Sercos connection: Producer cycle time

Function This parameter indicates the cycle time within which the producer updates the data in the cyclic connection. In addition, the NewData bit in the connection control word is toggled. The consumer of the connection uses the time as monitoring time to detect failures. The number of failures is displayed in "S-0-1050.x.12, Sercos connection: Error counter for data loss".



The producer cycle time has to be equal to "S-0-1002, Sercos cycle time (tScyc)".

In an MS-MDT connection it may also be a multiple of the Sercos cycle time (S-0-1002).

S-0-1050.0.10 - Attributes

Function:	Par	Editable:	P2	Data l.:	4 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	us	Extr. v. test:	--	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		1000.000	

S-0-1050.0.11, Sercos connection: Producer failures allowed

Function This parameter indicates the number of producer failures allowed before a connection is considered interrupted, the consumer stops reading data and the bus master sets the bit "Err-Con" in the device status word (S-Dev, S-IF).

S-0-1050.0.11 - Attributes

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		2	

S-0-1050.0.12, Sercos connection: Error counter for data loss

Function The parameter indicates the number of producer failures the consumer already detected. The counter stops at a maximum of 65535 and has no overflow. The reset is executed by the rising edge of ProducerReady in the connection control word (C-Con).

S-0-1050.0.12 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1051, Sercos connection: Image of the connection configuration

Function This parameter contains the current configurations of all connections. This parameter consists of a list with "S-0-1050.x.1, Sercos connection: Configuration" of all connections in ascending order. This provides the bus master (or configurator) with a simple overview of the number of possible connections (= list length) and the connections already occupied by the bus master or other configuration sources.

S-0-1051 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes var.
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1060.0.1, Sercos connection type: Default configuration

Function This parameter contains the default configuration data of a connection that is automatically applied via parameter "S-0-1050.x.7, Sercos connection: Connection class" during assignment. The following is replaced:

- Connection type
- Configuration source
- Configuration type
- Cycle generation (producer)
- Monitoring mechanism (consumer)

S-0-1060.0.1 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1060.0.2, Sercos connection type: Configuration mask

Function This parameter contains the configuration mask of the bits that may be modified to differ from the default configuration in parameter "S-0-1060.x.1, Sercos connection type: Default configuration" and in the parameter "S-0-1050.x.1, Sercos connection: Configuration".

The meaning of the individual bits is explained in the description of parameter "S-0-1050.x.1, Sercos connection: Configuration".

S-0-1060.0.2 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1060.0.3, Sercos connection type: Max. configurable

Function This parameter indicates how many times this connection type may be assigned to connections.

Appendix

The assignment mechanism and error reaction are described in parameter "S-0-1050.x.7, Sercos connection: Connection class".

S-0-1060.0.3 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1060.0.4, Sercos connection type: Max. connection length

Function This parameter indicates the maximum connection length permissible with this connection type.

When a connection type is assigned to a connection, the value is automatically transferred to parameter "S-0-1050.x.4, Sercos connection: max. connection length" of this connection via parameter "S-0-1050.x.7, Sercos connection: connection class".

S-0-1060.0.4 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1060.0.6, Sercos connection type: Configurable EIDNs

Function This parameter indicates all configurable ID numbers (S-0-1050.x.6) that may be parameterized in a connection if this connection type was selected in the connection type assignment (S-0-1050.x.7).

The assignment mechanism and error reaction are described in parameter "S-0-1050.x.7, Sercos connection: Connection class".

S-0-1060.0.6 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes var.
Memory:	--	Validity test:	--	Format:	IDN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1060.0.7, Sercos connection type: Min. processing time

Function This parameter indicates the minimum processing time a connection needs if this connection type was selected in the connection type assignment (S-0-1050.x.7). While the parameters "S-0-1005, Minimum time between t4 and t1 (t5)" and "S-0-1047, Maximum consumer processing time" display the maximum values of the processing times of all connections, this parameter indicates the connection type-specific value that is always smaller than or equal to these general values.

The assignment mechanism and error reaction are described in parameter "S-0-1050.x.7, Sercos connection: Connection class".

S-0-1060.0.7 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	us	Extr. v. test:	--	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	--- / ---	---

S-0-1060.0.10, Sercos connection type: Min. producer cycle time

Function This parameter indicates the smallest producer cycle time permitted in a connection of this connection type in parameter "S-0-1050.x.10, Sercos connection: Producer cycle time".

The assignment mechanism and error reaction are described in parameter "S-0-1050.x.7, Sercos connection: Connection class".

S-0-1060.0.10 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	us	Extr. v. test:	--	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1061, Maximum ScycCnt

Function In Sercos, this parameter indicates the maximum value of the counter in the MDT0 telegram. The counter is evaluated by the hardware and ensures that a synchronization time "S-0-1007, Measurement time of actual values (t4)" larger than "S-0-1002, Sercos cycle time (tScyc)" is possible in cycle-synchronous connections.

S-0-1061 - Attributes

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		0 / 16383		0	

S-0-1099.0.1, Test IDN for conformance testing - Configuration

Function This parameter is required for Sercos conformance testing and is used for internal tests. The function is provided by the Sercos specification.

S-0-1099.0.1 - Attributes

Function:	Par	Editable:	++	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1099.0.2, Test IDN for conformance testing

Function This parameter is required for Sercos conformance testing and is used for internal tests. The function is provided by the Sercos specification.

S-0-1099.0.2 - Attributes

Function:	Par	Editable:	++	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	AT + MDT	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1100.0.1, Diagnostic counter of SMP fragments sent

Function This parameter counts the SMP fragments sent since the control voltage was applied. The counter is automatically reset to "0" when it reaches $2^{32}-1$.

S-0-1100.0.1 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

Appendix

S-0-1100.0.2, Diagnostic counter of SMP fragments received

Function This parameter counts the SMP fragments received since the control voltage was applied. The counter is automatically reset to "0" when it reaches $2^{32}-1$.

S-0-1100.0.2 - Attributes	Function:	Par	Editable:	--	Data l.:	4 bytes
	Memory:	--	Validity test:	--	Format:	DEC_OV
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	--- / ---		---		

S-0-1100.0.3, Diagnostic counter of incorrect SMP fragments

Function This parameter indicates the number of received SMP fragments that were rejected by the SMP stack because the fragment header did not correspond to the expectations of the receiver.

The following possible reasons are:

- Invalid session ID
- Incorrect sequence of the sequence counter
- Incorrect sequence of the FOS/LOS bits

The counter is automatically reset to "0" when it reaches $2^{32}-1$.

S-0-1100.0.3 - Attributes	Function:	Par	Editable:	--	Data l.:	4 bytes
	Memory:	--	Validity test:	--	Format:	DEC_OV
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	--- / ---		---		

S-0-1101.0.1 SMP container: Data

Function This parameter contains the SMP fragments transmitted by a SMP container.

S-0-1101.0.1 - Attributes	Function:	Par	Editable:	--	Data l.:	1 byte var.
	Memory:	--	Validity test:	--	Format:	HEX
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	AT + MDT	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	--- / ---		---		

S-0-1101.0.2, List of session identifiers

Function This parameter contains a list of all session identifiers that are currently implemented for a SMP container.

An SMP session is defined by a session identifier and a priority level. These values are stored in parameters "S-0-1101.x.2 List of session identifiers" and "S-0-1101.000.003 List of session priorities". Entries with the same list index define one SMP session.

S-0-1101.0.2 - Attributes	Function:	Par	Editable:	P2	Data l.:	2 bytes var.
	Memory:	PARAM_SP	Validity test:	--	Format:	HEX
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	--- / ---		Refer to the text		

S-0-1101.0.3, List of session priorities

Function This parameter contains a list of all session priorities that are currently implemented for a SMP container.

An SMP session is defined by a session identifier and a priority level. These values are stored in parameters "S-0-1101.x.2 list of session identifiers" and

"S-0-1101.000.003 list of session priorities". Entries with the same list index define one SMP session.

The top priority level is 0, the lowest priority level is 3.

S-0-1101.0.3 - Attributes

Function:	Par	Editable:	P2	Data l.:	2 bytes var.
Memory:	PARAM_SP	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		0 / 3		Refer to the text	

S-0-1300.0.1, Component name

Function This parameter displays a general type name of the Sercos device component that is represented by the instance of the electronic name plate. Regardless of the language selected, this name is in English.

The parameter is used to identify the instance of the electronic name plate.

S-0-1300.0.1 - Attributes

Function:	Par	Editable:	--	Data l.:	1 byte var.
Memory:	--	Validity test:	--	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1300.0.3, Manufacturer code

Function This parameter contains the Sercos-specific manufacturer code.

The Sercos device is identified by the following codes:

- Manufacturer code (S-0-1300.0.3) and
- Manufacturer device ID (S-0-1300.0.5)

Use When "going online" (system startup), this is used to verify if the configuration carried out offline (based on a device description file) is "valid", i.e. was carried out on the basis of the actual device properties.

S-0-1300.0.3 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1300.0.4, Device name

Function This parameter indicates the component name according to the manufacturer-specific type code, e.g. "SLC-3-GS3S00300". This parameter is used to display the component name in the engineering tool.

S-0-1300.0.4 - Attributes

Function:	Par	Editable:	--	Data l.:	1 byte var.
Memory:	--	Validity test:	--	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1300.0.5, Manufacturer device ID

Function This parameter contains the Sercos-specific manufacturer device ID.

The Sercos device is identified by the following codes:

- Manufacturer code (S-0-1300.0.3) and
- Manufacturer device ID (S-0-1300.0.5)

Appendix

Structure *Example:*

R911172765

Use When "going online" (system startup), this is used to verify if the configuration carried out offline based on a device description file is "valid", i.e. was carried out on the basis of the actual device properties!

S-0-1300.0.5 - Attributes	Function:	Par	Editable:	--	Data I.:	1 byte var.
	Memory:	--	Validity test:	--	Format:	ASCII
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:		Min./max.		default	
	GS3S:		--- / ---		---	

S-0-1300.0.8, Hardware version

Function This parameter contains the hardware change index of the component, e.g. "01.03". The parameter displays diagnostic and service purposes.

S-0-1300.0.8 - Attributes	Function:	Par	Editable:	--	Data I.:	1 byte var.
	Memory:	--	Validity test:	--	Format:	ASCII
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:		Min./max.		default	
	GS3S:		--- / ---		---	

S-0-1300.0.9, Software version

Function This parameter contains the version of the operating firmware of the device, e.g. "FWA-GS3S**-SLC*-1T76.09-MS". The parameter is used to display diagnostic and service purposes.

Structure The GS3S firmware consists of safety-relevant and not safety-relevant firmware. Both components are combined in this parameter. The versions of the two firmware components are always identical. However, the releases may differ. In the preceding example the release is "76". The release number is the larger of the two numbers of the safety-relevant and not safety-relevant firmware.

Parameter [S-0-0030](#) additionally contains the software version of the not safety-relevant firmware.

S-0-1300.0.9 - Attributes	Function:	Par	Editable:	--	Data I.:	1 byte var.
	Memory:	--	Validity test:	--	Format:	ASCII
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:		Min./max.		default	
	GS3S:		--- / ---		---	

S-0-1300.0.11, Ordering number

Function This parameter displays the order number of the component, e.g. "911327662". The ordering number is used for service purposes.

S-0-1300.0.11 - Attributes	Function:	Par	Editable:	--	Data I.:	1 byte var.
	Memory:	--	Validity test:	--	Format:	ASCII
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:		Min./max.		default	
	GS3S:		--- / ---		---	

S-0-1300.0.12, Serial number

Function This parameter displays the serial number of the component, e.g. "7260887123456". The serial number is used for diagnostic and service purposes.

S-0-1300.0.12 - Attributes

Function:	Par	Editable:	--	Data l.:	1 byte var.
Memory:	--	Validity test:	--	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1300.0.13, Manufacturing date

Function The manufacturing date of the assembly is stored in this parameter. The manufacturing date has the following format: "YYYY-MM-DDTHH:MM:SSZ". For example: "2012-10-20T16:35:11Z". For the GS3S, the time is always set to "00:00:00". For the GS3S, the preceding example would therefore be as follows: "2012-10-20T00:00:00Z"

The parameter is used for diagnostic and service purposes.

S-0-1300.0.13 - Attributes

Function:	Par	Editable:	--	Data l.:	1 byte var.
Memory:	--	Validity test:	--	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1300.0.20, Operating hours

Function This parameter indicates the operating hours of the component.
 The parameter is used for diagnostic and service purposes.

S-0-1300.0.20 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1301, GDP classes

Function Indicates the implemented classes of the generic device functions of a Sercos device.

Use Serves to determine what Sercos functions are available regarding diagnostics, identification, initialization, and parameter management. The GS3S meets the requirements of GDP "Basic".

S-0-1301 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1302.0.1, FSP type

Function This parameter indicates an instance of S-0-1302,x.1 for each resource in a sub-device. The instance shows in what FSP the resource is specified. Currently, only the resources "I/O", "Drive" and "Encoder" are specified in Sercos FSPs. The GS3S corresponds to the FSP type "I/O".

S-0-1302.0.1 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX

Appendix

Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1302.0.2, Function groups

Function This parameter lists the function groups available in the device. Regarding an I/O device this parameter contains the list of the contained I/O function groups as IDNs. In this context, the structure instance (SI) corresponds to the slot number IDN of the device and the structure element (SE) is always "0". If there are several function groups within one slot, the function groups are listed individually.

S-0-1302.0.2 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes IDN variables
Memory:	--	Validity test:	--	Format:	IDN
Unit:	--	Extr. v. test:	--	No. of dec.:	-
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1305.0.2, System time (fine)

Function This parameter contains the lower 32 bits of the current Sercos time in "IEC 61588" format. The time is sent by the master from phase 3 onward in the "MDT0 telegram" and continued independently by the slave FPGA until a new transmission is received.

S-0-1305.0.2 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	us	Extr. v. test:	--	No. of dec.:	3
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1350, C6400 Reboot command

Function This command initiates a device restart.
The command to restart the device ([S-0-1350](#), C6400 Reboot command) was activated.



This command cannot be interrupted. While the command is being executed, the parameters to be saved are stored and the Sercos bus is interrupted ("S3" LED goes out).

NOTICE**Risk of damage to the GS3S!**

When this command is executed, the system first checks if any firmware loaded previously has to be activated. If this is the case, the firmware is copied internally to another location. If the GS3S is turned off during the copying process, the GS3S may become useless. For this reason, wait at least 2 minutes after activating the command before turning the GS3S off.

Use In the firmware there are activities that require turning the device off and back on. The reboot command can be used for this purpose.

A may be rebooted after the following activities:

- Firmware download

The engineering software "IndraWorks" automatically offers the "reboot" command after the above mentioned activities were carried out.

S-0-1350 - Attributes

Function:	Cmd	Editable:	PM	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1399.0.1, Test IDN for diagnostic event

Function This parameter is required for testing purposes.

S-0-1399.0.1 - Attributes

Function:	Par	Editable:	PM	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1500.0.1, I/O control word

Function Structure This parameter is the control word for I/O data.

Bit	Value	Description	Comment
15	0	Outputs inactive	Substitute values are active
	1	Outputs active	-
14-0	-	Reserved	-

Tab. 11-22: Structure of the I/O control word

S-0-1500.0.1 - Attributes

Function:	Par	Editable:	PM, OM	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BINARY
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	MDT	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1500.0.2, I/O status word

Function Structure This parameter is the status word for I/O data.

Bit	Value	Description	Comment
15	0	Outputs inactive	Substitute values are active
	1	Outputs active	This bit is set if the corresponding bit 15 is set in S-0-1500.0.1 and the outputs were activated successfully
14	0	Inputs invalid	This bit is reset if the device cannot generate any valid input data
	1	Inputs valid	The input data generated is valid
13	0	No error	-
	1	Errors	There is an error. Clear it with S-0-0099
12	0	No warning	-
	1	Warning	There is a warning; it is deleted automatically when it is no longer reported

Appendix

Bit	Value	Description	Comment
11	0	No information	-
	1	Info	There is an information; it is deleted automatically when it is no longer reported
0-10	Reserved	-	-

Tab. 11-23: Structure of the I/O status word

S-0-1500.0.2 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BINARY
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	AT	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1500.0.3, List of module IDs

Function This parameter contains the module IDs of the modules connected. The module type codes are manufacturer-specific and have to match the configured module IDs.

S-0-1500.0.3, List of module IDs

Function:	Par	Editable:	--	Data l.:	8 bytes var.
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1500.0.5, Container output data

Function The process data include a configured container with output data. This process data consists of process output data PDOOUT and diagnostic output data DIAGOUT. "S-0-1050.x.05", which is read by the master and the mapping rules determine the length of the container output data. The data mapping is carried out according to the order of the entries in "S-0-1302.0.02".

Connection configuration

- As SPCP_FixCFG, container output data is a fixed component of the "consumer connection"
- As SPCP_VarCFG, container output data may not have more than one "consumer connection". For this purpose, the container output data are mapped to the connection data of "S-0-1050.x.06". If the length is configured (S-0-1050.x.01; bit 5-4 = 01), the container output data are a fixed component of the "consumer connection"

Mapping rules

- Bits, bytes, words, and double words are mapped in bytes (starting with bit 0, little endian)

S-0-1500.0.5, Container output data

Function:	Par	Editable:	--	Data l.:	1 byte var.
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1500.0.9, Container input data

Function This parameter includes a configured container for process input data PDIN and diagnostic input data DIAGIN. "S-0-1050.x.05", which is read by the master and the mapping rules determine the length of the container input data. The data mapping is carried out according to the order of the entries in "S-0-1302.0.02".

Connection configuration

- As SPCP_FixCFG, container input data are a fixed component of the "producer connection"
- As SPCP_VarCFG, the container input data can be configured in one (or several) "producer connections". For this purpose, the container input data is mapped to the connection data of "S-0-1050.x.06". If the length is configured (S-0-1050.x.01; bit 5-4 = 01), the container input data is a fixed component of the "producer connection"

Mapping rules

- Bits, bytes, words, and double words are mapped in bytes (starting with bit 0, little endian)

S-0-1500.0.9, Container input data

Function:	Par	Editable:	--	Data I.:	1 byte var.
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

S-0-1500.0.23, Local bus cycle time

Function This parameter contains the cycle time of the local bus within a modular I/O station.

S-0-1500.0.23, Local bus cycle time

Function:	Par	Editable:	--	Data I.:	4 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	us	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		4000	

S-0-1500.0.32, I/O diagnostic message

Function This IDN contains diagnostic messages that consist of an I/O status code, a diagnostic class, and a local identifier. The diagnostic message of a device with the highest priority is displayed. A new diagnostic message with equal priority overwrites the saved diagnostic message (this does not apply if error C1D is reported).

Structure

Bit	Name, function	Comment
7-0	Channel number	Channel triggering the diagnostic message. A channel number between 1 and 8 indicates a specific channel of the function group (channel-related diagnostic events, e.g. cable break). Channel number 0 indicates the function group itself (function group related diagnostic messages, e.g. "sub-bus error timeout"). The channel number is only available with errors in the I/O modules and indicates the respective input/output in the I/O modules
15-8	Sub-bus slave index	Sub-bus slave that triggered the diagnostic message (see I/O_FG.x.25 Slave Index). Not used in the SafeLogic compact (= 0)

Appendix

Bit	Name, function	Comment
23-16	Slot number	Slot number of the module that the function group is assigned to (structure instance). The slot number of the CPU is 0. The I/O modules have slot numbers 1-12 and the gateways have slot numbers 13 and 14. Even if not all I/O modules are equipped, the slot numbers of the gateways is 13 and 14
39-24	I/O function group	I/O function group that triggered the diagnostic message, e.g. "1503 - digital output"
55-40	Status code	Either defined by TWG_I/O or by the manufacturer (see bit 63)
59-56	Diagnostic class, see "S-0-0390"	Diagnostic class of the diagnostic message: 1111: Error (F) 1110: Warning (E) 1100: Command status (C) 1010: Message (A), see "S-0-0390"
62-60	Reserved	-
63	Interpretation of the status code	Status codes are defined by TWG_I/O
	0: Standard I/O status code	Status codes are defined by the manufacturer
	1: Manufacturer-specific status code	

Tab. 11-24: Structure of S-0-1500.0.32



The GS3S uses the channel and slot number to localize the exact error location. The slot number indicates the module concerned. Slot 0 corresponds to the CPU module, slots 1-12 correspond to the I/O modules 1-12, and slot 13 and 14 to gateway 1 and 2.

The channel number is only used for I/O modules and indicates the input/output of the respective module.

S-0-1500.0.32, I/O diagnostic message

Function:	Par	Editable:	--	Data l.:	8 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		--	

S-0-1503.1.1, Name of the function group

Function This IDN contains the name of the function group. This name may be changed, but is not saved permanently.

S-0-1503.1.1, Name of the function group

Function:	Par	Editable:	++	Data l.:	1 byte var.
Memory:	-	Validity test:	--	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		0/56 letters		"Group status"	

S-0-1503.1.2, Configuration of the function group

Function With this parameter, the Sercos master configures the function group. If data is missing for a function group (e.g. DIAGOUT), changing the respective bit has no effect.

Structure

Bit	Name, function	Comment
0	PDOUT	0: PDOUT data is included in the container of the output data (S-0-1500.x.5) 1: PDOUT data is NOT included in the container of the output data (S-0-1500.x.5)
1	PDIN	0: PDIN data is included in the container of the input data (S-0-1500.x.9) 1: PDIN data is NOT included in the container of the input data (S-0-1500.x.9)
2	Reserved	-
3	DIAGOUT	0: DIAGOUT data is included in the container of the output data (S-0-1500.x.5) 1: DIAGOUT data is NOT included in the container of the output data (S-0-1500.x.5)
4	DIAGIN	0: DIAGIN data is included in the container of the input data (S-0-1500.x.9) 1: DIAGIN data is NOT included in the container of the input data (S-0-1500.x.9)
5	Reserved	-
6	Substitute values	This bit defines the output behavior if the I/O control bit 15 (S-0-1500.x.1) changes its state from "1" to "0" or if no more cyclic data is transmitted (CP0 or NRT). 0: The outputs are set to "0" 1: The outputs keep their most recent value (freeze)
7	Virtual	This bit indicates whether the function group is physically present or was replaced by a placeholder. Writing the bit has no consequences. 0: Physically present 1: Virtual
8-15	Reserved	-

Tab. 11-25: Structure of S-0-1503.1.2

S-0-1503.1.2, Configuration of the function group

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	-	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		-	

S-0-1503.1.7, Number of channels PDIN

Function This parameter contains the number of "Process Data INput" (PDIN) data.

S-0-1503.1.7, Number of channels PDIN

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	-	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--

Appendix

Input limits:	Min./max.	default
GS3S:	- / -	--

S-0-1503.1.8. Channel width PDIN

Function This parameter contains the width of the "Process Data INput" (PDIN) data in bits.

S-0-1503.1.8, Channel width PDIN	Function:	Par	Editable:	--	Data l.:	2 bytes
	Memory:	-	Validity test:	--	Format:	DEC_OV
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Comb. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	- / -	--

S-0-1503.1.9. PDIN

Function This parameter contains the data of the "Process Data INput" (PDIN).

S-0-1503.1.9, PDIN	Function:	Par	Editable:	--	Data I.:	2 bytes var.
	Memory:	-	Validity test:	--	Format:	HEX
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	- / -	--

S-0-1510.2.1, Name of the function group

Function This IDN contains the name of the function group. This name may be changed, but is not saved permanently.

S-0-1510.2.1 Name of the function group	Function:	Par	Editable:	++	Data l.:	1 byte var.
	Memory:	-	Validity test:	--	Format:	ASCII
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--

Input limits:	Min./max.	default
GS3S:	0/56 letters	"Safety OUT Data"

S-0-1510.2.2, Configuration of the function group

Function With this parameter, the Sercos master configures the function group. If data is missing for a function group (e.g. DIAGOUT), changing the respective bit has no effect.

Bit	Name, function	Comment
0	PDOUT	0: PDOUT data is included in the container of the output data (S-0-1500.x.5) 1: PDOUT data is NOT included in the container of the output data (S-0-1500.x.5)
1	PDIN	0: PDIN data is included in the container of the input data (S-0-1500.x.9) 1: PDIN data is NOT included in the container of the input data (S-0-1500.x.9)
2	Reserved	-
3	DIAGOUT	0: DIAGOUT data is included in the container of the output data (S-0-1500.x.5) 1: DIAGOUT data is NOT included in the container of the output data (S-0-1500.x.5)

Bit	Name, function	Comment
4	DIAGIN	0: DIAGIN data is included in the container of the input data (S-0-1500.x.9) 1: DIAGIN data is NOT included in the container of the input data (S-0-1500.x.9)
5	Reserved	-
6	Substitute values	This bit defines the output behavior if the I/O control bit 15 (S-0-1500.x.1) changes its state from "1" to "0" or if no more cyclic data is transmitted (CP0 or NRT). 0: The outputs are set to "0" 1: The outputs keep their most recent value (freeze)
7	Virtual	This bit indicates whether the function group is physically present or was replaced by a placeholder. Writing the bit has no consequences. 0: Physically present 1: Virtual
8-15	Reserved	-

Tab. 11-26: Structure of S-0-1510.2.2

S-0-1510.2.2, Configuration of the function group

Function:	Par	Editable:	P2	Data I.:	2 bytes
Memory:	-	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		-	

S-0-1510.2.7, Number of channels PDIN

Function This parameter contains the number of "Process Data INput" (PDIN) data.

S-0-1510.2.7, Number of channels PDIN

Function:	Par	Editable:	--	Data I.:	2 bytes
Memory:	-	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		--	

S-0-1510.2.8, Channel width PDIN

Function This parameter contains the width of the "Process Data INput" (PDIN) data in bits.

S-0-1510.2.8, Channel width PDIN

Function:	Par	Editable:	--	Data I.:	2 bytes
Memory:	-	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		--	

S-0-1510.2.9, PDIN

Function This parameter contains the data of the "Process Data INput" (PDIN).

S-0-1510.2.9, PDIN

Function:	Par	Editable:	--	Data I.:	1 byte var.
Memory:	-	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		--	

Appendix

S-0-1511.2.1, Name of the function group

Function This IDN contains the name of the function group. This name can be changed, but is not saved remanently.

S-0-1511.2.1, Name of the function group

Function:	Par	Editable:	++	Data l.:	1 byte var.
Memory:	-	Validity test:	--	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		0/56 letters		"Safety IN Data"	

S-0-1511.2.2, Configuration of the function group

Function With this parameter, the Sercos master configures the function group. If data is missing for a function group (e.g. DIAGOUT), changing the respective bit has no effect.

Structure

Bit	Name, function	Comment
0	PDOOUT	0: PDOOUT data is included in the container of the output data (S-0-1500.x.5) 1: PDOOUT data is NOT included in the container of the output data (S-0-1500.x.5)
1	PDIN	0: PDIN data is included in the container of the input data (S-0-1500.x.9) 1: PDIN data is NOT included in the container of the input data (S-0-1500.x.9)
2	Reserved	-
3	DIAGOUT	0: DIAGOUT data is included in the container of the output data (S-0-1500.x.5) 1: DIAGOUT data is NOT included in the container of the output data (S-0-1500.x.5)
4	DIAGIN	0: DIAGIN data is included in the container of the input data (S-0-1500.x.9) 1: DIAGIN data is NOT included in the container of the input data (S-0-1500.x.9)
5	Reserved	-
6	Substitute values	This bit defines the output behavior if the I/O control bit 15 (S-0-1500.x.1) changes its state from "1" to "0" or if no more cyclic data is transmitted (CP0 or NRT). 0: The outputs are set to "0" 1: The outputs keep their most recent value (freeze)
7	Virtual	This bit indicates whether the function group is physically present or was replaced by a placeholder. Writing the bit has no consequences. 0: Physically present 1: Virtual
8-15	Reserved	-

Tab. 11-27: Structure of S-0-1511.2.2

S-0-1511.2.2, Configuration of the function group

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	-	Validity test:	--	Format:	BIN

Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		-	

S-0-1511.2.7, Number of channels PDIN

Function This parameter contains the number of "Process Data INput" (PDIN) data.

S-0-1511.2.7, Number of channels PDIN

Function:	Par	Editable:	--	Data I.:	2 bytes
Memory:	-	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		--	

S-0-1511.2.8, Channel width PDIN

Function This parameter contains the width of the "Process Data INput" (PDIN) data in bits.

S-0-1511.2.8, Channel width PDIN

Function:	Par	Editable:	--	Data I.:	2 bytes
Memory:	-	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		--	

S-0-1511.2.9, PDIN

Function This parameter contains the data of the "Process Data INput" (PDIN).

S-0-1511.2.9, PDIN

Function:	Par	Editable:	--	Data I.:	1 byte var.
Memory:	-	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		--	

S-0-1512.0.1, Name of the function group

Function This IDN contains the name of the function group. This name may be changed, but is not saved permanently.

S-0-1512.0.1, Name of the function group

Function:	Par	Editable:	++	Data I.:	1 byte var.
Memory:	-	Validity test:	--	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		0/56 letters		"PLC Data"	

S-0-1512.0.2, Configuration of the function group

Function With this parameter, the Sercos master configures the function group. If data is missing for a function group (e.g. DIAGOUT), changing the respective bit has no effect.

Appendix

Structure	Bit	Name, function	Comment
	0	PDOUT	0: PDOUT data is included in the container of the output data (S-0-1500.x.5) 1: PDOUT data is NOT included in the container of the output data (S-0-1500.x.5)
	1	PDIN	0: PDIN data is included in the container of the input data (S-0-1500.x.9) 1: PDIN data is NOT included in the container of the input data (S-0-1500.x.9)
	2	Reserved	-
	3	DIAGOUT	0: DIAGOUT data is included in the container of the output data (S-0-1500.x.5) 1: DIAGOUT data is NOT included in the container of the output data (S-0-1500.x.5)
	4	DIAGIN	0: DIAGIN data is included in the container of the input data (S-0-1500.x.9) 1: DIAGIN data is NOT included in the container of the input data (S-0-1500.x.9)
	5	Reserved	-
	6	Substitute values	This bit defines the output behavior if the I/O control bit 15 (S-0-1500.x.1) changes its state from "1" to "0" or if no more cyclic data is transmitted (CP0 or NRT). 0: The outputs are set to "0" 1: The outputs keep their most recent value (freeze)
	7	Virtual	This bit indicates whether the function group is physically present or was replaced by a placeholder. Writing the bit has no consequences. 0: Physically present 1: Virtual
	8-15	Reserved	-

Tab. 11-28: Structure of S-0-1512.0.2

S-0-1512.0.2, Configuration of the function group

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	-	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		-	

S-0-1512.0.3, Number of channels PDOUT

Function This parameter contains the number of "Process Data OUTput" (PDOUT) data.

S-0-1512.0.3, Number of channels PDOUT

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	-	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		--	

S-0-1512.0.4, Channel width PDOUT

Function	This parameter contains the width of the "Process Data OUTput" (PDOUT) data in bits.			
S-0-1512.0.4, Channel width PDOUT	Function: Par	Editable: --	Data I.: 2 bytes	
	Memory: -	Validity test: --	Format: DEC_OV	
	Unit: --	Extr. v. test: --	No. of dec.: 0	
	Cyclic: --	Combi. test: --	Block-dep.: --	
Input limits:		Min./max.	default	
GS3S:		- / -	--	

S-0-1512.0.5, PDOUT

Function	This parameter contains the data of the "Process Data OUTput" (PDOUT).			
S-0-1512.0.5, PDOUT	Function: Par	Editable: --	Data I.: 1 byte var.	
	Memory: -	Validity test: --	Format: HEX	
	Unit: --	Extr. v. test: --	No. of dec.: 0	
	Cyclic: --	Combi. test: --	Block-dep.: --	
Input limits:		Min./max.	default	
GS3S:		- / -	--	

S-0-1512.0.7, Number of channels PDIN

Function	This parameter contains the number of "Process Data INput" (PDIN) data.			
S-0-1512.0.7, Number of channels PDIN	Function: Par	Editable: --	Data I.: 2 bytes	
	Memory: -	Validity test: --	Format: DEC_OV	
	Unit: --	Extr. v. test: --	No. of dec.: 0	
	Cyclic: --	Combi. test: --	Block-dep.: --	
Input limits:		Min./max.	default	
GS3S:		- / -	--	

S-0-1512.0.8, Channel width PDIN

Function	This parameter contains the width of the "Process Data INput" (PDIN) data in bits.			
S-0-1512.0.8, Channel width PDIN	Function: Par	Editable: --	Data I.: 2 bytes	
	Memory: -	Validity test: --	Format: DEC_OV	
	Unit: --	Extr. v. test: --	No. of dec.: 0	
	Cyclic: --	Combi. test: --	Block-dep.: --	
Input limits:		Min./max.	default	
GS3S:		- / -	--	

S-0-1512.0.9, PDIN

Function	This parameter contains the data of the "Process Data INput" (PDIN).			
S-0-1512.0.9, PDIN	Function: Par	Editable: --	Data I.: 1 byte var.	
	Memory: -	Validity test: --	Format: HEX	
	Unit: --	Extr. v. test: --	No. of dec.: 0	
	Cyclic: --	Combi. test: --	Block-dep.: --	
Input limits:		Min./max.	default	
GS3S:		- / -	--	

S-0-1512.0.15, Number of channels DIAGIN

Function	This parameter contains the number of "DIAGnosis Data INput" (DIAGIN) data.			
S-0-1512.0.15, Number of channels DIAGIN	Function: Par	Editable: --	Data I.: 2 bytes	
	Memory: -	Validity test: --	Format: DEC_OV	
	Unit: --	Extr. v. test: --	No. of dec.: 0	
	Cyclic: --	Combi. test: --	Block-dep.: --	
Input limits:		Min./max.	default	
GS3S:		- / -	--	

Appendix

S-0-1512.0.16, Channel width DIAGIN

Function This parameter contains the width of the "DIAGnosis Data INput" (DIAGIN) data in bits.

S-0-1512.0.16, Channel width DIAGIN	Function:	Par	Editable:	--	Data l.:	2 bytes
	Memory:	-	Validity test:	--	Format:	DEC_OV
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	- / -		--		

S-0-1512.0.17, DIAGIN

Function This parameter contains the data of the "DIAGnosis Data INput" (DIAGIN).

S-0-1512.0.17, DIAGIN	Function:	Par	Editable:	--	Data l.:	2 bytes var.
	Memory:	-	Validity test:	--	Format:	HEX
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	- / -		--		

S-0-1599.0.1, Test IDN IO for localization

Function This parameter is only required for the Sercos conformance test and is not important for practical operation.

S-0-1599.0.1, Test IDN IO for localization	Function:	Par	Editable:	P4	Data l.:	8 bytes
	Memory:	--	Validity test:	--	Format:	HEX
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	- / -		--		

S-0-1800.0.4 SV Safety connection fault count

Function This parameter contains the error counter of the Safety device. The parameter corresponds to class attribute 8 of the CIP Safety Validator Object (see also CIP Safety specification, volume 5). The counter is incremented every time a CIP Safety connection detects an error. In case of an overflow, the counter restarts at 0.

S-0-1800.0.4, SV Safety connection fault count	Function:	Par	Editable:	--	Data l.:	2 bytes
	Memory:	--	Validity test:	--	Format:	DEC_OV
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	- / -		--		

S-0-1800.0.10 SSO device status

Function This parameter contains the status of the Safety device. The parameter corresponds to attribute 11 of the CIP Safety Supervisor Object (see also CIP Safety specification, volume 5).

S-0-1800.0.10 SSO device status	Function:	Par	Editable:	--	Data l.:	2 bytes
	Memory:	--	Validity test:	--	Format:	DEC_OV
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	- / -		--		

S-0-1800.0.19 SSO target UNID

Function This parameter contains the "target UNID" of the Safety device. The parameter corresponds to attribute 27 of the CIP Safety Supervisor Object (see also CIP Safety specification, volume 5).

S-0-1800.0.10 SSO device status

Function:	Par	Editable:	--	Data l.:	1 byte var.
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.	default		
GS3S:		- / -	--		

S-0-1801.0.1, CIP vendor ID

Function This parameter contains attribute 1 of the CIP Identity Object (vendor ID). Refer to the CIP specification volume 1, chapter 5.

S-0-1801.0.1, CIP vendor ID

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.	default		
GS3S:		- / -	--		

S-0-1801.0.2, CIP device type

Function This parameter contains attribute 2 of the CIP Identity Object (device type). Refer to the CIP specification volume 1, chapter 5.

S-0-1801.0.2, CIP device type

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.	default		
GS3S:		- / -	--		

S-0-1801.0.3, CIP product code

Function This parameter contains attribute 3 of the CIP Identity Object (product code). Refer to the CIP specification volume 1, chapter 5.

S-0-1801.0.3, CIP product code

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.	default		
GS3S:		- / -	--		

S-0-1801.0.4, CIP revision

Function This parameter contains attribute 4 of the CIP Identity Object (revision). Refer to the CIP specification volume 1, chapter 5.

S-0-1801.0.4, CIP revision

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.	default		
GS3S:		- / -	--		

S-0-1801.0.5, CIP status

Function This parameter contains attribute 5 of the CIP Identity Object (status). Refer to the CIP specification volume 1, chapter 5.

S-0-1801.0.5, CIP status

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX

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Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		--	

S-0-1801.0.6, CIP serial number

Function This parameter contains attribute 6 of the CIP Identity Object (serial number). Refer to the CIP specification volume 1, chapter 5.

S-0-1801.0.6, CIP serial number	Function:	Par	Editable:	--	Data I.:	4 bytes
	Memory:	--	Validity test:	--	Format:	HEX
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:		Min./max.		default	
	GS3S:		- / -		--	

S-0-1801.0.7, CIP product name

Function This parameter contains attribute 7 of the CIP Identity Object (product name). Also refer to the CIP specification volume 1, chapter 5.

S-0-1801.0.7, CIP product name	Function:	Par	Editable:	--	Data I.:	1 byte var.
	Memory:	--	Validity test:	--	Format:	ASCII
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:		Min./max.		default	
	GS3S:		- / -		--	

S-0-1830.0.1, Cyclic SMP container (out)

Function This parameter specifies the Sercos SMP container to be used for cyclic output data of the CIP Safety on Sercos connection.

S-0-1830.0.1, Cyclic SMP container (out)	Function:	Par	Editable:	--	Data I.:	4 bytes
	Memory:	--	Validity test:	--	Format:	IDN
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:		Min./max.		default	
	GS3S:		- / -		--	

S-0-1830.0.2, Cyclic SMP session ID (out)

Function This parameter specifies the Sercos SMP session to be used for cyclic output data of the CIP Safety on Sercos connection.

S-0-1830.0.2, Cyclic SMP session ID (out)	Function:	Par	Editable:	--	Data I.:	2 bytes
	Memory:	--	Validity test:	--	Format:	DEC_OV
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:		Min./max.		default	
	GS3S:		- / -		--	

S-0-1830.0.3, List of cyclic SMP containers (in)

Function This parameter specifies the Sercos SMP containers to be used for cyclic input data of the CIP Safety on Sercos connection.

S-0-1830.0.3, List of cyclic SMP containers (in)	Function:	Par	Editable:	--	Data I.:	4 bytes var.
	Memory:	--	Validity test:	--	Format:	IDN
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:		Min./max.		default	
	GS3S:		- / -		--	

S-0-1830.0.4, List of cyclic SMP session IDs (in)

Function	This parameter specifies the Sercos SMP sessions to be used for cyclic input data of the CIP Safety on Sercos connection.			
S-0-1830.0.4, List of cyclic SMP session IDs (in)	Function: Par	Editable: --	Data I.: 2 bytes var.	
	Memory: --	Validity test: --	Format: DEC_OV	
	Unit: --	Extr. v. test: --	No. of dec.: 0	
	Cyclic: --	Combi. test: --	Block-dep.: --	
	Input limits:	Min./max.	default	
	GS3S:	- / -	--	

S-0-1830.0.5 List of UCM SMP containers (in)

Function	This parameter specifies the Sercos SMP containers to be used for acyclic input data of the CIP Safety on Sercos connection.			
S-0-1830.0.5 List of UCM SMP containers (in)	Function: Par	Editable: --	Data I.: 4 bytes var.	
	Memory: --	Validity test: --	Format: IDN	
	Unit: --	Extr. v. test: --	No. of dec.: 0	
	Cyclic: --	Combi. test: --	Block-dep.: --	
	Input limits:	Min./max.	default	
	GS3S:	- / -	--	

S-0-1830.0.6 List of UCM SMP session IDs (in)

Function	This parameter specifies the Sercos SMP sessions to be used for acyclic input data of the CIP Safety on Sercos connection.			
S-0-1830.0.6 List of UCM SMP session IDs (in)	Function: Par	Editable: --	Data I.: 2 bytes var.	
	Memory: --	Validity test: --	Format: DEC_OV	
	Unit: --	Extr. v. test: --	No. of dec.: 0	
	Cyclic: --	Combi. test: --	Block-dep.: --	
	Input limits:	Min./max.	default	
	GS3S:	- / -	--	

S-0-1830.0.7 List of UCM SMP containers (out)

Function	This parameter specifies the Sercos SMP containers to be used for acyclic output data of the CIP Safety on Sercos connection.			
S-0-1830.0.7 List of UCM SMP containers (out)	Function: Par	Editable: --	Data I.: 4 bytes var.	
	Memory: --	Validity test: --	Format: IDN	
	Unit: --	Extr. v. test: --	No. of dec.: 0	
	Cyclic: --	Combi. test: --	Block-dep.: --	
	Input limits:	Min./max.	default	
	GS3S:	- / -	--	

S-0-1830.0.8 List of UCM SMP session IDs (out)

Function	This parameter specifies the Sercos SMP sessions to be used for acyclic output data of the CIP Safety on Sercos connection.			
S-0-1830.0.8 List of UCM SMP session IDs (out)	Function: Par	Editable: --	Data I.: 2 bytes var.	
	Memory: --	Validity test: --	Format: DEC_OV	
	Unit: --	Extr. v. test: --	No. of dec.: 0	
	Cyclic: --	Combi. test: --	Block-dep.: --	
	Input limits:	Min./max.	default	
	GS3S:	- / -	--	

S-0-1830.0.9 List of consumer numbers

Function	In this parameter, a "1" is entered for all producing connections and a "0" for all consuming connections.			
S-0-1830.0.9 List of consumer numbers	Function: Par	Editable: --	Data I.: 2 bytes var.	
	Memory: --	Validity test: --	Format: DEC_OV	

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Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		- / -		--	

11.4.2 P-parameters

P-0-0003, Parameter buffering status

Function This parameter returns status information on pending memory processes of the GS3S. While one of these bits is set, parameter changes in the respective storage area are not completed yet. If the GS3S is turned off in this state, parameters are lost as a result.

Structure

Bit	Name, function
0	Data backup in PARAM_SP active: 0: No backup active 1: Data backup active
1	Data backup in ON_BOARD_SP active: 0: No backup active 1: Data backup active
8	Error while saving in PARAM_SP: 0: All data backups were free of errors 1: A data backup caused an error
9	Error while saving in ON_BOARD_SP: 0: all data backups were free of errors 1: A data backup caused an error

Tab. 11-29: P-0-0003, Parameter buffering status

P-0-0003 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0013, List of all IDNs that do not match the default value

Function This parameter contains a list of ID numbers of the parameters whose date differs from the default value.

P-0-0013 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes var.
Memory:	--	Validity test:	--	Format:	IDN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0105, List of time stamps and diagnostic numbers

Function This parameter lists the diagnostics change times. Every time "S-0-0390 Diagnostic number" is changed, the respective time (value from "P-0-0190, Operating hours") is recorded. The most recent change time is recorded in the first line of the list. Any existing entries are moved down by one line. The list can contain up to 50 entries. With every additional entry, the oldest entry is deleted.



The list in "S-0-0375, List of diagnostic numbers" corresponds to parameter "P-0-0105". Here, the diagnostic number corresponding to the point in time is entered in the same line.



The error diagnostic numbers and the respective time of the error event are only transferred to S-0-0375 and P-0105 when the error message is deleted!

P-0-0105 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes var.
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	s	Extr. v. test:	--	No. of dec.:	1
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0189, Debug output: IDN list of the most recently saved parameters

Function The parameter ID numbers of the most recently saved parameters are stored in this parameter.



This parameter is only to be used for debugging purposes.

P-0-0189 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	IDN
Unit:	--	Extr. v. test:	--	No. of dec.:	--
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0190, Operating hours

Function This parameter indicates the operating time of the device. This parameter therefore displays the entire switch-on time of the control electronics since the device was delivered. If an error occurs, the content of this parameter at that time is saved in the first position in parameter "P-0-0193, Operating hours error memory".



The value is displayed in seconds and it is saved in the device!

P-0-0190 - Attributes

Function:	Par	Editable:	++(+MP)	Data l.:	4 bytes
Memory:	RETAIN_GER-AET	Validity test:	PM->OM	Format:	DEC_OV
Unit:	s	Extr. v. test:	--	No. of dec.:	1
Cyclic:	AT	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0192, Diagnostic numbers error memory

Function If the device detects an error, this error is displayed in various ways. Additionally, the error history is stored in this parameter.

Use For more detailed diagnostics, the following is stored:

- The diagnostic number is displayed at the display and stored in parameter "S-0-0390, Diagnostic number"
- The plain diagnostic text in the parameter "S-0-0095, Diagnostics"

The diagnostic number belonging to the error stored in "S-0-0390, Diagnostic number" is also stored in parameter "P-0-0192, Diagnostic numbers error memory". This parameter is designed as a stack and contains the diagnostic

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numbers of the 50 most recent errors in chronological order. The latest error is in the first position.

Parameter "P-0-0193, Operating hours error memory" contains the status of parameter "P-0-0190, Operating hours" at the time of error detection in the same order.



The parameter is saved to the device.

P-0-0192 - Attributes

Function:	Par	Editable:	++(+MP)	Data l.:	4 bytes var.
Memory:	ON_BOARD_S P	Validity test:	PM->OM	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0193, Operating hours error memory

Function If the device detects an error, this error is displayed in various ways. Additionally, the history of error detection times is stored in this parameter.

Use For more detailed diagnostics, the following is stored:

- The diagnostic number is displayed at the display and stored in parameter "S-0-0390, Diagnostic number"
- The plain text diagnostics in the parameter "S-0-00950095, Diagnostics"

The status of parameter "P-0-0190, Operating hours" at the time of error detection is stored in parameter "P-0-0193, Operating hours error memory". This parameter is designed as a stack and contains the operating hour counter values of the 50 most recent errors in chronological order. The error counter value of the error that occurred the most recently is in the first position.

Parameter "P-0-0192, Diagnostic number error memory" contains the diagnostic number belonging to the error according to parameter "S-0-0390, Diagnostic number" in the same order.



The parameter is saved to the device.

P-0-0193 - Attributes

Function:	Par	Editable:	++(+MP)	Data l.:	4 bytes var.
Memory:	ON_BOARD_S P	Validity test:	PM->OM	Format:	DEC_OV
Unit:	s	Extr. v. test:	--	No. of dec.:	1
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0196, Additional information firmware

Function The build date and build time of the firmware may be read out as text from this parameter.

P-0-0196 - Attributes

Function:	Par	Editable:	--	Data l.:	1 byte var.
Memory:	--	Validity test:	--	Format:	ASCII
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0197, System time

Function "P-0-0197" contains the system time of the device with a 100 ns resolution.

Structure Parameter "P-0-0197, System time" is a 64 bit value implemented as a list with two 4 byte elements.

Element	Word	Content
1	Low word	System time (fine)
2	High word	System time (rough)

Tab. 11-30: Structure of P-0-0197, System time

Use Observe the following during parameterization and/or interpretation of the parameter:

- The system time counter is activated when the second element of "P-0-0197" is written to, i.e. the counter keeps the value "0" until the counter is written to by the control. Afterward, the device operates the counter every 2 ms
- The parameter is not resident when the supply voltage is turned off. This means, the parameter is deleted after a restart
- The parameter contains the system time in Windows File Time format (elapsed time in 100 ns steps since 01.01.1601)

P-0-0197 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes var.
Memory:	PARAM_SP	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
MPB:		--- / ---		---	
MPC:		--- / ---		---	
MPE:		--- / ---		---	
MPM:		--- / ---		---	

P-0-0320, Exception data

Function This parameter contains information on the processor system that lead to an exception. The data is saved permanently when an exception occurs and may be evaluated after the control voltage is turned on. The data is not prepared, i.e. the data can only be evaluated with the respective information from the MAP files and, if need be, from the LST files with the analysis tool by Rexroth. At the same time, the exception is included in the error and log analysis.

P-0-0320 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes var.
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0470, Block patch: Block selection

Function This parameter serves advanced diagnostics together with parameter "P-0-0471".

P-0-0470 - Attributes

Function:	Par	Editable:	++	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0471, block patch: Block data

Function This parameter serves advanced diagnostics together with parameter "P-0-0471".

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P-0-0471 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes var.
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0478, Log event

Function This parameter displays a code for advanced diagnostics. These values can only be interpreted by Bosch Rexroth to diagnose internal states.

Use Depending on internal states, the GS3S automatically enters data into this parameter. The entry time is stored in "P-0-0479, Log time stamp".



The value of this parameter displayed can only be interpreted with firmware internal knowledge! This parameter can therefore not be used by the user! The parameter is write-protected and cannot be changed!

P-0-0478 - Attributes

Function:	Par	Editable:	++(+MP)	Data l.:	4 bytes var.
Memory:	ON_BOARD_S	Validity test:	PM->OM	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0479, Log time stamp

Function This parameter displays the time of the latest entry in "P-0-0478, Log event". The value of "P-0-0190, Operating hours" is stored at the same time in parameter "P-0-0478".



This parameter can therefore not be used by the user! The parameter is write-protected and cannot be changed!

P-0-0479 - Attributes

Function:	Par	Editable:	++(+MP)	Data l.:	4 bytes var.
Memory:	ON_BOARD_S	Validity test:	PM->OM	Format:	DEC_OV
Unit:	s	Extr. v. test:	--	No. of dec.:	1
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-0480, Patch function 1, source pointer

Function This parameter is used to select a device-internal memory cell. This memory cell can be read out or written to via patch function 1.



Developers use the patch function to diagnose internal signal states or internal data. It cannot be used by the customer! Therefore, only developers know the values of this parameter (memory addresses)!

P-0-0480 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes
Memory:	PARAM_SP	Validity test:	PM->OM	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		Refer to the text	

P-0-0481, Patch function 1, attribute

Function This parameter configures access to and output of the device internal memory address selected in "P-0-0480, Patch function 1, source pointer".

Structure

Bit	Name, function
2, 1, 0	Source date type: 0: INT4 1: INT2 2: INT1 3: FLOAT8 4: FLOAT4
6, 5, 4	Source date output format: 0: BIN 1: Signed DEC 2: Unsigned DEC 3: HEX 4: FLOAT 5: BOOL

Tab. 11-31: Relevant bits of the parameter P-0-0481



Developers use the patch function to diagnose internal signal states or internal data. It cannot be used by the customer!

P-0-0481 - Attributes

Function:	Par	Editable:	++	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	PM->OM	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		48	

P-0-0482, Patch function 1, Bit mask

Function This parameter defines a bit mask that concerns the output of the value in the device-internal memory cell selected in "P-0-0480, Patch function 1, source pointer". This parameter depends on "P-0-0481, Patch function 1, attribute". The parameter is only active in certain configuration combinations.



Developers use the patch function to diagnose firmware-internal signal states and/or data; it cannot be used by the customer!

P-0-0482 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes
Memory:	PARAM_SP	Validity test:	PM->OM	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		0xFFFFFFFF	

P-0-0483, Patch function 1, exponent

Function This parameter defines an exponent that concerns the output of the value in the device-internal memory cell selected in "P-0-0480, Patch function 1, source pointer". This parameter depends on "P-0-0481, Patch function 1, attribute". The parameter is only active in certain configuration combinations.

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Developers use the patch function to diagnose internal signal states or data. It cannot be used by the customer!

P-0-0483 - Attributes

Function:	Par	Editable:	++	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	PM->OM	Format:	DEC_MV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		-32 / 32		0	

P-0-0485, Patch function 1, display

Function This parameter reads out the content of a device-internal memory cell or writes a value to it. Any additional definitions or configurations are given in the additional parameters concerning the patch function.



Developers use the patch function to diagnose firmware-internal signal states and/or data; it cannot be used by the customer! As unqualified writing to this parameter may impair the device function, this parameter is write-protected!

P-0-0485 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	+	No. of dec.:	0
Cyclic:	AT + MDT	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		0 / 10000		---	

P-0-0486, Patch function 2, source pointer

Function This parameter is used to select a device-internal memory cell. This memory cell can be read out or written to via patch function 2.



Developers use the patch function to diagnose internal signal states or data. It cannot be used by the customer! Therefore, only developers know the values of this parameter (memory addresses)!

P-0-0486 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes
Memory:	PARAM_SP	Validity test:	PM->OM	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		Refer to the text	

P-0-0487, Patch function 2, attribute

Function This parameter configures access to and output of the device-internal memory address selected in "P-0-0486, Patch function 2, source pointer".

Structure	Bit	Name, function
	0, 1, 2	Source date type: 0: INT4 1: INT2 2: INT1 3: FLOAT8 4: FLOAT4
	4, 5, 6	Source date output format: 0: BIN 1: Signed DEC 2: Unsigned DEC 3: HEX 4: FLOAT 5: BOOL

Tab. 11-32: Relevant bits of the parameter P-0-0487



Developers use the patch function to diagnose internal signal states and/or internal data; it cannot be used by the customer!

P-0-0487 - Attributes

Function:	Par	Editable:	++	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	PM->OM	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		48	

P-0-0488, Patch function 2, Bit mask

Function This parameter defines a bit mask that concerns the output of the value in the device-internal memory cell selected in "P-0-0486, Patch function 2, source pointer". This parameter depends on "P-0-0487, Patch function 2, attribute". The parameter is only active in specific configuration combinations.



Developers use the patch function to diagnose internal signal states and/or data; it cannot be used by the customer!

P-0-0488 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes
Memory:	PARAM_SP	Validity test:	PM->OM	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		0xFFFFFFFF	

P-0-0489, Patch function 2, exponent

Function This parameter defines an exponent that concerns the output of the value in the device internal memory cell selected in "P-0-0486, Patch function 2, source pointer". This parameter depends on "P-0-0487, Patch function 2, attribute". The parameter is only active in certain configuration combinations.



Developers use the patch function to diagnose firmware-internal signal states or data. It cannot be used by the customer!

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P-0-0489 - Attributes

Function:	Par	Editable:	++	Data l.:	2 bytes
Memory:	PARAM_SP	Validity test:	PM->OM	Format:	DEC_MV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:					
GS3S:		Min./max.		default	
		-32 / 32		0	

P-0-0491, Patch function 2, display

Function This parameter reads out the content of a device-internal memory cell or writes a value to it. Any additional definitions and/or configurations are contained in the additional parameters concerning the patch function.

Also refer to the "Functional Description"



Developers use the patch function to diagnose firmware-internal signal states and/or data; it cannot be used by the customer! As unqualified writing to this parameter may impair the device function, this parameter is write-protected!

P-0-0491 - Attributes

Function:	Par	Editable:	++	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	+	No. of dec.:	0
Cyclic:	AT + MDT	Combi. test:	--	Block-dep.:	--
Input limits:					
GS3S:		Min./max.		default	
		0 / 10000		---	

P-0-1044, Master communication engineering via IP: IP communication status

Function The status information on the current state of device IP communication be read out via parameter "P-0-1044". This parameter contains general information on IP communication and device dependent information.

Structure The general status information of IP communication are primarily contained in the first 8 bits of parameter "P-0-1044". The bits 8 to 31 contain the device-dependent information.

The individual bits of the parameter have the following meaning:

Bit	Name, function
1, 0	Internal memory state TCP/IP stack: 00: No internal memory problems 01: Internal memory full 10: Internal memory filled intermittently
3, 2	Reserved
6, 4	Standard gateway information: 000: Not set 001: From master communication engineering via IP (S-0-1022)
7	Reserved
9, 8	Setting device gateway information: 00: No gateway information set 01: Active gateway information set manually 10: Active gateway information generated automatically

Appendix

Bit	Name, function
11, 10	Device gateway information status: 00: Gateway information not used 01: Read gateway address active 10: Read gateway address not activated yet
12	Device network mask status: 0: Read network mask active 1: Read network mask not activated yet
15, 13	Reserved
17, 16	Setting the device IP address: 00: No IP address set 01: Active IP address set manually 10: Active IP address set automatically
20, 18	IP address status: 000: No IP address available for activation 001: Read IP address active 010: Read IP address not activated yet 100: "Duplicate IP address", address not active
21	Reserved
22	Plausibility of the device IP settings: 0: IP settings plausible 1: IP settings not plausible (address and gateway located in different networks)
23	IP communication status: 0: IP communication possible 1: No IP communication possible (resources lacking)
25, 24	Status FPGA Rx Buffer Port1: 00: FPGA Rx buffer port 1 has unused capacities 01: FPGA Rx buffer port 1 temporarily at full capacity 10: FPGA Rx buffer port 1 permanently at full capacity
27, 26	Status FPGA Rx buffer port 2: 00: FPGA Rx buffer port 2 has unused capacities 01: FPGA Rx buffer port 2 temporarily at full capacity 10: FPGA Rx buffer port 2 permanently at full capacity

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Bit	Name, function
29, 28	Status FPGA Tx buffer port 1: 00: FPGA Tx buffer port 1 has unused capacities 01: FPGA Tx buffer port 1 temporarily at full capacity 10: FPGA Tx buffer port 1 permanently at full capacity
31, 30	Status FPGA Tx buffer port 2: 00: FPGA Tx buffer port 2 has unused capacities 01: FPGA Tx buffer port 2 temporarily at full capacity 10: FPGA Tx buffer port 2 permanently at full capacity

Tab. 11-33: P-0-1044, IP communication status information master communication engineering via IP

P-0-1044 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	BIN
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-3690.1.1, Module length

Function This parameter contains the module length of the individual modules (parameter instances 1 to 7 correspond to modules 1 to 7). This parameter determines the number of data displayed in the parameters of the individual slots. This parameter does not need to be set if Bosch Rexroth Sercos masters are used as setting is carried out automatically. The following table shows how the individual modules are distributed to the slots available as well as permissible values. The lengths are indicated in bytes. However, the individual modules may also contain words. In that case, permissible values are only even numbered values.

Slot 1 contains two different modules that are both included in one parameter (S-0-1503.0.9). The data sequence therefore determines that group status information is transmitted first and group control information next.

If the cyclic data transmission from or to the Sercos master is not executed via an IDN list (S-0-1050.x.1, bit 4 and 5 = 01), the following data sequence is applied, if applicable:

MDT data: I/O control word (S-0-1500.0.1), "User Data" to the SLc (S-0-1512.0.5).

AT data: I/O status word (S-0-1500.0.2), diagnostic data (S-0-1512.0.17), "User Data" from the SLc (S-0-1512.0.9), "SLc CIP status" (S-0-1503.1.9), "SLc CIP control" (S-0-1503.1.9), "SLc I/O status" (inputs) (S-0-1511.2.9), "SLc I/O status" (outputs), (S-0-1510.2.9).

Parameters	Module/slot assignment/concerned parameter	Permitted values
P-0-3690.1.1	Diagnostic data length; slot 0 ("SLc CPU"), S-0-1512.0.17	0, 2, 4, 6
P-0-3690.2.1	Safety input data length; slot 2 ("SLc I/O status"), S-0-1511.2.9	0, 1, 2, ..., 12
P-0-3690.3.1	Safety output data length; slot 2 ("SLc I/O status"), S-0-1510.2.9	0, 1, 2, ..., 12

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Parameters	Module/slot assignment/concerned parameter	Permitted values
P-0-3690.4.1	Group status information length; slot 1 ("SLc CIP status"), S-0-1503.0.9	0, 2, 4, ..., 32
P-0-3690.5.1	Group control information length; slot 1 ("SLc CIP control"), S-0-1503.0.9	0, 2, 4, ..., 32
P-0-3690.6.1	"User Data" length (data from the SLc CPU to the Sercos master); slot 0 ("SLc CPU"), S-0-1512.0.9	0, 2, 4, ..., 18
P-0-3690.7.1	"User Data" length (data from the Sercos master to the SLc CPU); slot 0 ("SLc CPU"), S-0-1512.0.5	0, 2, 4, ..., 18

Tab. 11-34: Module lengths and their meaning

P-0-3690.1.1 - Attributes

Function:	Par	Editable:	P2	Data l.:	2 bytes
Memory:	--	Validity test:	+	Format:	DEC_OV
Unit:	--	Extr. v. test:	+	No. of dec.:	0
Cyclic:	--	Combi. test:	+	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		---		---	

P-0-3691.0.1, CSAL Safety error code

Function This parameter contains the CSAL error code. The parameter is used for communications diagnostics with CIP services.

P-0-3691.0.1 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		---		---	

P-0-3691.0.2, CSAL advanced error code

Function This parameter contains the advanced CSAL error code. The parameter is used for communications diagnostics with CIP services.

P-0-3691.0.2 - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		---		---	

P-0-3692.0.1, Diagnostics of SafeLogic compact modules, data set 1

Function This parameter contains data set 1 ("UserData") of the SafeLogic compact system. The instance number of the parameter corresponds to one word of the ("UserData").

P-0-3692.0.1 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		---		---	

P-0-3692.0.2, Diagnostics of SafeLogic compact modules, data set 2

Function This parameter contains data set 2 "CRC Data" of the SafeLogic compact system.

Appendix

Meaning	Respective parameter
CRC of the entire project	P-0-3692.0.2
System CRC	P-0-3692.1.2
Reserved	P-0-3692.2.2
Configuration verifies CRC	P-0-3692.3.2
Reserved	P-0-3692.4.2 to P-0-3692.7.2

Tab. 11-35: Assignment of modules and parameter numbers

[P-0-3692.0.2](#) - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		---		---	

P-0-3692.0.3, Diagnostics of SafeLogic compact modules, data set 3

Function This parameter contains data set 3 "Diagnostic Data" of the SafeLogic compact system. The instance number of the parameter corresponds to the module counting of the SafeLogic compact system. For the detailed meaning of the individual diagnostic bits, refer to [chapter 8.3.2 "Module status" on page 67](#).

SafeLogic compact module	Number	Respective parameter
CPU	0	P-0-3692.0.3
I/O module 1	1	P-0-3692.1.3
I/O module 2	2	P-0-3692.2.3
...	3 ...11	P-0-3692.3.3 to P-0-3692.11.3
I/O module 12	12	P-0-3692.12.3
Gateway 1	13	P-0-3692.13.3
Gateway 2	14	P-0-3692.14.3

Tab. 11-36: Assignment of modules and parameter numbers

[P-0-3692.0.3](#) - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		---		---	

P-0-3692.0.4, Diagnostics of SafeLogic compact modules, data set 4

Function This parameter contains data set 4 of the SafeLogic compact system. This data set is currently reserved. Each parameter instance corresponds to 4 bytes of the reserved data.

[P-0-3692.0.4](#) - Attributes

Function:	Par	Editable:	--	Data l.:	4 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		---		---	

P-0-3692.0.5 Module IDs

Function These parameters are only included from the Sercos firmware FWA-GS3S**-SLCN-1V12 (see [S-0-1300.0.9](#)).

This parameter contains the module ID of each individual module connected to the SafeLogic compact control. The parameter instance 0 corresponds to the CPU, instances 1 to 12 correspond to the connected extension modules and the instances 13 and 14 correspond to the gateway modules. Unavailable modules obtain the value 0.

The IDs of the individual modules are provided with the following values:

Module type	Name	Module ID
CPU0	Main module	0x3700 (0x3700 is still displayed in the old firmware versions)
CPU1	Main module, 2x EFI	0x3701 (0x3700 is still displayed in the old firmware versions)
CPU3	Main module, 2x EFI, Flexi Line	0x3703 (0x3700 is still displayed in the old firmware versions)
XTIO	Input/output module, 8 safe inputs, 4 safe outputs	0x3706
XTDI	Input module, 8 safe inputs	0x3704
XTDS	Input/output module, 8 safe inputs, 4 or 6 unsafe outputs	0x3705
STIO	Input/output extension 6 or 8 unsafe inputs, 8 or 6 unsafe outputs, dual level spring clamp terminals	0x0720
MOC0	Drive monitor, velocity	0x3724
MOC1	Drive monitor, velocity and position	0x3721
GPNT	Profinet I/O gateway	0x070C
GPRO	Profibus Gateway	0x0707
GS3S	Sercos Gateway	0x3715

Tab. 11-37: Module IDs of the SafeLogic compact modules

P-0-3692.0.5 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		---		---	

P-0-3694.0.1, Module length

Function This parameter contains the module length of the individual slots (parameter instances 0 to 2 correspond to slots 0 to 2). This parameter determines the number of data displayed in the parameters of the individual slots. This parameter does not need to be set if Bosch Rexroth Sercos masters are used as setting is carried out automatically. The following table shows how the individual modules are distributed to the slots available as well as permissible

Appendix

values. The lengths are indicated in bytes. However, the individual modules may also contain words. In that case, permissible values are only even numbered values.



The parameters P-0-3694.x.1 are similar to the parameters P-0-3690.x.1. The difference is that there are seven instances for P-0-3690.x.1 specifying the length of the individual modules defining the 3 slots. For parameters P-0-3694.x.1, there are only 3 instances to which the slots 1 to 3 are directly assigned.

Slot 1 contains two different modules that are both included in one parameter (S-0-1503.0.9). The data sequence therefore determines that group status information is transmitted first and group control information next.

If the cyclic data transmission from or to the Sercos master is not executed via an IDN list (S-0-1050.x.1, bit 4 and 5 = 01), the following data sequence is applied, if applicable:

MDT data: I/O control word (S-0-1500.0.1), "User Data" to the SLc (S-0-1512.0.5).

AT data: I/O status word (S-0-1500.0.2), diagnostic data (S-0-1512.0.17), "User Data" from the SLc (S-0-1512.0.9), "SLc CIP status" (S-0-1503.1.9), "SLc CIP control" (S-0-1503.1.9), "SLc I/O status" (inputs) (S-0-1511.2.9), "SLc I/O status" (outputs), (S-0-1510.2.9).

Parameters	Slot assignment/concerned parameter	Permitted values
P-0-3694.0.1	Slot 0 (all listed data has the length specified in the parameter): "User Data" length (data from the SLc CPU to the Sercos master); "SLc CPU", S-0-1512.0.9 "User Data" length (data from the Sercos master to the SLc CPU); "SLc CPU", S-0-1512.0.5 - If P-0-3694.0.1 > 0, the length of the diagnostic data = 6 bytes, otherwise 0 bytes (no diagnostic data); "SLc CPU", S-0-1512.0.17	0, 2, 4, ..., 18
P-0-3694.1.1	Slot 1 (all listed data has the length specified in the parameter): - Group status information length; "SLc CIP status", S-0-1503.0.9 - Group control information length; "SLc CIP control", S-0-1503.0.9	0, 2, 4, ..., 32
P-0-3694.2.1	Slot 2 (all listed data has the length specified in the parameter): - Safety input data length; slot 2 ("SLc I/O status"), S-0-1511.2.9 - Safety output data length; slot 2 ("SLc I/O status"), S-0-1510.2.9	0, 1, 2, ..., 12

Tab. 11-38: Module lengths and their meaning

P-0-3694.0.1 - Attributes

Function:	Par	Editable:	P2	Data I.:	2 bytes
Memory:	--	Validity test:	+	Format:	DEC_OV

Unit:	--	Extr. v. test:	+	No. of dec.:	0
Cyclic:	--	Combi. test:	+	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		---		---	

P-0-3696.0.1, Gateway module address

Function This parameter contains the gateway module address. The valid values can be 13 or 14. Thus, an assignment between the Sercos address and the module address are possible.

P-0-3696.0.1 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes
Memory:	--	Validity test:	--	Format:	DEC_OV
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		---		---	

P-0-4029, SCSB module diagnostics

Function Parameter to read out master communication settings and states (with Sercos interface).



This parameter concerns developers only! The parameter is of no concern to users!

P-0-4029 - Attributes

Function:	Par	Editable:	--	Data l.:	2 bytes var.
Memory:	--	Validity test:	--	Format:	HEX
Unit:	--	Extr. v. test:	--	No. of dec.:	0
Cyclic:	--	Combi. test:	--	Block-dep.:	--
Input limits:		Min./max.		default	
GS3S:		--- / ---		---	

P-0-4064, Password level

Function With this parameter the user and/or service employee may obtain information on the password protection. All passwords stated in the table are entered via "S-0-0267, Password".

Structure

Content of P-0-4064	Content of S-0-0267	Description	Parameter according to S-0-0279	Administration parameters	Other parameters
0	"007"	No password set	S, L	L	S, L
1	"\$\$\$"	Customer password set, but disabled	S, L	L	S, L
2	"****"	Customer password set and enabled	L	L	S, L
3	"\$\$\$"	Control password entered	S, L	L	S, L

S Write access

L Read access

Tab. 11-39: Overview on password levels



"Administration parameters" are for example error memory (e.g. P-0-0192, ...), etc.

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P-0-4064 - Attributes	Function:	Par	Editable:	--	Data l.:	2 bytes
	Memory:	--	Validity test:	--	Format:	DEC_OV
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	--- / ---		---		

P-0-4089.0.127, Master communication: Master debug

Function This parameter is used to commission Sercos master communications. This parameter can be used to turn off individual monitoring activities during debug operation.

P-0-4089.0.127 - Attributes	Function:	Par	Editable:	P2	Data l.:	2 bytes
	Memory:	--	Validity test:	--	Format:	BIN
	Unit:	--	Extr. v. test:	--	No. of dec.:	0
	Cyclic:	--	Combi. test:	--	Block-dep.:	--
	Input limits:	Min./max.		default		
	GS3S:	--- / ---		---		

12 Service and support

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E-mail: service.svc@boschrexroth.de
Internet: <http://www.boschrexroth.com>

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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

Bosch Rexroth AG

Electric Drives and Controls

P.O. Box 13 57

97803 Lohr, Germany

Bgm.-Dr.-Nebel-Str. 2

97816 Lohr, Germany

Phone +49 9352 18 0

Fax +49 9352 18 8400

www.boschrexroth.com/electrics



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