User Manual

comX

Communication Modules for Real-Time-Ethernet and Fieldbus

Hilscher Gesellschaft für Systemautomation mbH

www.hilscher.com

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1 Introduction

1.1 About this manual

This manual describes the communication modules of the Hilscher comX product family based on the netX communication controllers.

The comX product family consists of the comX Real-Time Ethernet modules with an electrical Ethernet interface (RE types) and comX Fieldbus Master-modules (into which also a slave firmware of the matching communication system may be downloaded).

This manual contains information on the installation, configuration, commissioning, and use of the modules.

The comX communication modules for Real-Time Ethernet and Fieldbus have been designed as part (”Embedded System“) of an electronic device or system. In this document, this electronic device is called target system or host system of the comX communication system.

However, the integration of the comX modules (as *embedded systems*) into their target system (”*Host*“) is not the topic of this manual. The integration is described in detail in a separate manual, the *comX Design Guide*. For details, see section “*Documentation overview comX*” on page 16.

1.1.1 Obligation to read and understand the manual

Important!
Before the installation of the communication module you must have read and understood all instructions to avoid injury and damage.
First, read the **Safety** chapter.

1.1.2 List of revisions

Index	Date	Chapter	Revision
7	2017-08-30	1.1.3	Section *Reference to hardware, software and firmware*: M020K000.nxf added.
		1.2.3.6	Section *POWERLINK controlled node V2 and V3* expanded for COMX 100XX-RE.
			Removed LED description and technical data for PROFIBUS MPI as this protocol is no longer supported
8	2018-12-18	All	COMX 50CA-REFO removed due to discontinuation
		1.1.3	Section Reference to Hardware, Software and Firmware: Added COMX 51CA-CCIES to *Table 1: Reference to hardware*, M020Y000.nxf, added M060Y000.nxf and M020X000.nxf to *Table 3: Reference to firmware*
		1.2.3	Section *Important changes*: updated
		4.5	*Table 16: Device names in SYCON.net by communication protocol* adapted.
		10.3	*Table 68: LED names of individual Real-Time Ethernet systems* adapted.
		13.1	*Table 105: Firmware versions with support for diagnostic interfaces* added.
		14	Section *IOT communication* added.
		15.1.1, 15.1.2 15.1.9	Section *COMX 100CA-RE*, *COMX 100CN-RE*, *COMX 51CA-RE* and *COMX 51CN-RE* updated for new protocol CC.Link IE Field Basic
		15.4.1	Section *CC-Link IE Field Basic* added.
		15.4.4	Section *EtherNet/IP Scanner* updated.
		15.4.10	Section *PROFINET IO Device (V3.14)* updated.
		15.4.13	Section *Sercos Slave* updated.
9	2020-11-27		COMX 10CA-DPS, -DNS, -COS, -CCS replaced by COMX 52CA-DPS, -DNS, -COS, -CCS
			COMX 10CN-DPS, -DNS, -COS, -CCS) removed
			COMX 51CA-CCIES removed
10	2021-02-19		COMX 52CN-DPS, -DNS, -COS added (Replacement for former COMX 10CN-DPS, -DNS, -COS)
		1.1.3	Section Reference to hardware, software and firmware updated
		1.2.3	Section *Important changes*: updated
		4.5	*Table 16: Device names in SYCON.net by communication protocol* adapted.
		13.1	*Table 105: Firmware versions with support for diagnostic interfaces* adapted.
11	2021-08-11	7.19 15.1.10	COMX 51CA-RE\R with rotary switches added (supporting EtherCAT Slave stack V4.9 and Semiconductor Device Profile, Part 1 (ETG 5003))
		15.1.12	COMX52CA-CCS: Added specifications of required current and power and temperature range to section *Technical data of COMX modules*
			LED description and technical data for PROFIBUS MPI removed (Protocol is no longer supported)
			Review of English translation
12	2022-03-31		COMX52CN-CCS added

1.1.3 Reference to hardware, software and firmware

Remark concerning software update: The hardware revisions listed in this section and the versions of firmware, driver and configuration software functionally belong together. With existing hardware installation, firmware, driver and configuration software have to be updated according to the specifications of this section.

For an overview of firmware update issues, see section *Updating* the firmware on page 157.

Hardware

Module	Revision
Real-Time Ethernet modules (master/slave) with netX 100 processor	
COMX 100CA-RE	8
COMX 100CN-RE	2
Real-Time Ethernet modules (slave) with netX 51 processor	
COMX 51CA-RE	2
COMX 51CA-RE\R (with rotary switches, EtherCAT Slave only)	1
COMX 51CN-RE	2
Fieldbus Master/Slave modules with netX 100 processor	
COMX 100CA-CO	4
COMX 100CA-DN	4
COMX 100CA-DP	4
COMX 100CN-CO	3
COMX 100CN-DN	3
COMX 100CN-DP	4
Fieldbus Slave-modules with netX 52 processor	
COMX 52CA-CCS	1
COMX 52CA-COS	2
COMX 52CA-DNS	2
COMX 52CA-DPS	2
COMX 52CN-CCS	2
COMX 52CN-COS	1
COMX 52CN-DNS	1
COMX 52CN-DPS	1
Evaluation board	
COMXEB	2

Table 1: Reference to hardware

Software

Software	Software version
SYCON.net	V1.500
cifX Device Driver	V2.5.1.0
Toolkit	V2.6.0.0

Table 2: Reference to software

Firmware

Firmware	Protocol	Firmware version	For hardware
Real-Time Ethernet			
M020Y000.nxf	CC-Link IE Field Basic	1.2	COMX 100CA-RE, COMX 100CN-RE
comXecm.nxf	EtherCAT Master V4	4.5	
comXecs.nxf	EtherCAT Slave	2.5.34	
comXecs.nxf	EtherCAT Slave V4	4.9	
comXeim.nxf	EtherNet/IP Scanner	2.11	
comXeis.nxf	EtherNet/IP Adapter	2.14	
comXomb.nxf	Open Modbus/TCP	2.7	
M020K000.nxf	POWERLINK Controlled Node	3.5	
M020C000.nxf	PROFINET IO Controller	3.3	
M020D000.nxf	PROFINET IO Device V3.10	3.14	
M020D000.nxf	PROFINET IO Device V4	4.5	
comXs3m.nxf	Sercos Master	2.1	
comXs3s.nxf	Sercos Slave	3.5	
comXvrs.nxf	VARAN Client	1.1	
M060Y000.nxf	CC-Link IE Field Basic	1.2	COMX 51CA-RE , COMX 51CN-RE
M060F000.nxf	EtherCAT Slave V4	4.9	
M060H000.nxf	EtherNet/IP Adapter	2.14	
M060L000.nxf	Open Modbus/TCP	2.7	
M060K000.nxf	POWERLINK Controlled Node	3.5	
M060D000.nxf	PROFINET IO Device	3.14	
M060J000.nxf	Sercos Slave	3.5	
M160F000.nxf	EtherCAT Slave V4	4.9	COMX 51CA-RE\R
IoT firmware			
M066H000.nxf	IoT Firmware EtherNet/IP Adapter	1.0.	COMX 51CA-RE , COMX 51CN-RE
M066D000.nxf	IoT Firmware PROFINET IO Device	1.0.	

Fieldbus			
comXcom.nxf	CANopen Master	2.14	COMX 100CA-CO, COMX 100CN-CO
comXcos.nxf	CANopen Slave	3.8	COMX 100CA-CO, COMX 100CN-CO
M0206000.nxf	DeviceNet Master	2.4	COMX 100CA-DN COMX 100CN-DN
comXdns.nxf	DeviceNet Slave	2.7	COMX 100CA-DN COMX 100CN-DN
comXdpm.nxf	PROFIBUS DP Master	2.8	COMX 100CA-DP, COMX 100CN-DP
comXdps.nxf	PROFIBUS DP Slave	2.11	COMX 100CA-DP, COMX 100CN-DP
M0705000.nxf	CANopen Slave	3.8	COMX 52CA-COS, COMX 52CN-COS
M0709000.nxf	CC-Link Slave	2.13/ 2.14	COMX 52CA-CCS COMX 52CN-CCS
M0707000.nxf	DeviceNet Slave	2.7	COMX 52CA-DNS COMX 52CN-DNS
M0702000.nxf	PROFIBUS DP Slave	2.11	COMX 52CA-DPS COMX 52CN-DPS

Table 3: Reference to firmware

The following firmware is still available for legacy applications but the development of this firmware has been discontinued:

Firmware	Protocol	Firmware version	For hardware
comXpns.nxf	PROFINET IO Device V2	2.1.45	COMX 100CA-RE, COMX 100CN-RE
comXecm.nxf	EtherCAT Master	3.0	COMX 100CA-RE, COMX 100CN-RE
comXpnm.nxf	PROFINET IO Controller	2.6	COMX 100CA-RE, COMX 100CN-RE

Table 4: Reference to old firmware still available for legacy applications

1.1.4 Conventions in this manual

Operation instructions, a result of an operation step or notes are marked as follows:

Operation Instructions:

➢ <instruction>

or

1. <instruction>
2. <instruction>

Results:

<result>

Notes:

Important: <important note>

Note: <note>

<note, where to find further information>

1.2 Contents of the product DVD

The **Communication Solutions DVD** for the comX communication modules provides installation information, the required configuration software, drivers, documentation and further tools for your comX communication module.

You can download this product DVD as a ZIP file from the website http://www.hilscher.com (under Products, directly next to the information on your product).

1.2.1 Device description files

The product DVD (ZIP file) **EDS** directory includes the device description files for the following kinds of comX Real-Time Ethernet Slave modules:

Device description files comX modules Real-Time Ethernet (Slave)

Real-Time Ethernet	Name / extension
COMX 100CA-RE, COMX 100CN-RE	
CC-Link IE Field Basic	0x0352_COMX 100XX-RE CCIEBS_1_en.cspp
EtherCAT Slave (V4)	Hilscher COMX 100XX RE ECS V4.6.X.xml
EtherNet/IP Adapter (Slave)	HILSCHER COMX 100XX-RE EIS V1.1.EDS
Powerlink Controlled Node / Slave	00000044_COMX 100XX RE PLS.xdd
PROFINET IO-RT-Device (V3.14) netX 100	GSDML-V2.35-HILSCHER-COMX 100XX-RE PNS-xxxxxxxx.xml
PROFINET IO-RT-Device (V4.5) netX 100	GSDML-V2.35-HILSCHER-COMX 100XX-RE PNS-xxxxxxxx.xml
Sercos Slave (V3)	SDDML#v3.0#Hilscher#COMX_100XX_RE-FIXCFG_FSPIO#2017-06-28.xml (see note)
COMX 51CA-RE, COMX 51CN-RE	
CC-Link IE Field Basic	0x0352_COMX 51XX-RE CCIEBS_1_en.cspps
EtherCAT Slave (V4)	Hilscher COMX 51XX RE ECS V4.6.X.xml
EtherNet/IP Adapter (Slave)	HILSCHER COMX 51XX-RE EIS V1.1.EDS
Powerlink Controlled Node / Slave	00000044_COMX 51XX RE PLS.xdd
PROFINET IO-RT-Device (V3.14) netX 51	GSDML-V2.35-HILSCHER-COMX 51XX-RE PNS-xxxxxxxx.xml
PROFINET IO-RT-Device (V4.5) netX 51	GSDML-V2.35-HILSCHER-COMX 51XX-RE PNS-xxxxxxxx.xml
Sercos Slave (V3)	SDDML#v3.0#Hilscher#COMX_51XX_RE-FIXCFG_FSPIO#2017-06-28.xml (see note)
COMX 51CA-RE\R	
EtherCAT Slave (V4) with address selection via rotary switches	Hilscher COMX 51XX RE Rotary ECS V4.6.X.xml

Table 5: Device description files comX modules Real-Time Ethernet (Slave)

Note: If you use a Sercos Master, which uses SDDML files for configuration, and if one of the defaults for vendor code, device ID, input data size or output data size has been changed, you have to export a new updated SDDML file from SYCON.net and import it into the configuration software for the Sercos Master.

The device description file is required to configure the used Real-Time Ethernet Master:

- CC-Link IE Field Basic
- EtherCAT Master
- EtherNet/IP scanner,
- POWERLINK managing node,
- PROFINET IO Controller,
- Sercos Master.

Device description files for comX modules Fieldbus (Slave)

Fieldbus	Name / extension

CC-Link Slave	For COMX 52 (Firmware V2.13)
	`0x0352_COMX52-CCS_2.11_en.cspp`
	`0x0352_COMX52-CCS_2.11_en.cppproj`
	For COMX 52 (Firmware V2.14)
	`0x0352_COMX52-CCS_2.14_en.cspp`
	`COMX52-CCS.cppproj`

CANopen Slave	For COMX 52: `COMX 52XX-COS COS.eds` For COMX 100: `COMX 100XX-CO COS.eds`
DeviceNet Slave	For COMX 52: `COMX_52XX-DNS_DNS.EDS` For COMX 100: `COMX_100XX-DN_DNS.EDS`
PROFIBUS DP Slave	For COMX 52: `HIL_1163.GSD` For COMX 100: `HIL_0C0F.GSD`

Table 6: Device description files comX modules Fieldbus (Slave)

The device description file is required to configure the used

- CC-Link Master
- CANopen Master
- DeviceNet Master
- PROFIBUS-DP Master

Device description files comX modules Real-Time Ethernet (master)

Moreover, in the EDS directory of the product DVD (ZIP file) there are device description files for the following comX communication modules Real-Time Ethernet (Master):

Real-Time Ethernet	Name / extension
EtherNet/IP Scanner (Master)	`HILSCHER COMX 100XX-RE EIM V1.0.eds`

Table 7: Device description files comX modules Real-Time Ethernet (Master)

The device description files for EtherNet/IP-Master devices are required if an additional Ethernet/IP Master device is to communicate with a Hilscher-Ethernet/IP Master device via Ethernet/IP.

The Real-Time Ethernet system Open Modbus/TCP does not use device description files.

1.2.2 Documentation overview comX

The following documentation overview tells you in which manual you can find more information on which contents.

On the Communication Solutions DVD delivered with the device, underneath the directory **Documentation**, you will find all these documents in the Adobe Acrobat® Reader format (PDF).

1.2.3 Important changes

1.2.3.1 PROFINET IO Controller firmware versions V2 and V3

The PROFINET IO-Controller firmware has been revised and completed and is available in version V3 since the first quarter of 2017.

Upgrading the PROFINET IO-Controller firmware from V2 to V3 is recommended. Use the PROFINET IO-Controller firmware V3 for a new installation when creating or developing your application program for the first time.

The development of the PROFINET IO-Controller firmware V2 will not be continued. But this firmware version is still maintained and will be delivered furthermore.

The PROFINET IO-Controller V3 implements several new features, which are not available in the PROFNET IO-Controller V2:

- IRT operating mode
- Optimized process data performance
- Automatic name assignment
- Automatic alarm acknowledgement
- MRP Client and Manager for media redundancy
- Requirements PROFINET Specification 2.3: e. g. Advanced Startup, MultipleInterfaceMode, network load requirements.

The process data handling in PROFINET IO-Controller V3 (process data image structure and process data timing) was reworked to achieve the required performance improvement and to support synchronized applications.

Removed features and incompatibilites:

- PROFINET IO-Controller V3 does neither support swapping of IO data nor automatic IOPS handling.
- The configuration parameters have been extended to meet the IRT configuration requirements. The structure of the configuration database has been changed. Therefore, the PROFINET IO-Controller V3 can not be configured with a configuration database of the PROFINET IO-Controller V2 and vice versa.
- The configuration API of PROFINET IO-Controller V2 are not supported by PROFINET IO-Controller V3. The new configuration API of PROFINET IO-Controller V3 is to be used.
- The PROFINET IO-Controller V3 does not support process data in little endian format. This feature was rarely used and has been removed for better performance.

If you want to change in an existing system from the PROFINET IO-Controller firmware V2 to V3, note the following guidelines:

1. Customize your application program according to the Migration Guide **PROFINET IO Controller Migrating from version 2 to 3.**

If you want to change to V4.2, please check in the Migration Guide **PROFINET IO Controller Migrating from version 2 to 3** which changes are necessary in the application program in order to use version 4.2.

2. If you upgrade to the PROFINET IO-Controller firmware V3, you can not reuse the existing SYCON.net project of the PROFINET IO-Controller firmware V2. Create a new configuration. For the PROFINET IO-Controller firmware V3 for configuration, you need SYCON.net from version 1.400, which contains new configuration dialogs (PROFINET IO IRT-Controller DTM).
3. Update the PROFINET IO controller firmware in your device to Version 3.

On the Communication Solutions DVD, files and manuals referring to firmware V2 and V3, are available as follows:

	PROFINET IO-Controller V2 Directory on the DVD \ File:	**PROFINET IO-Controller V3** Directory on the DVD \ File:
Firmware	*Firmware\COMX\Outdated versions\PNM V2 comXpnm.nxf*	*Firmware\COMX\M020C000.nxf*
Header	*Examples and API\0. Header\Firmware\PROFINET IO Controller V2*	*Examples and API\0. Header\Firmware\PROFINET Controller V3*
Protocol API	*Documentation\7. Programming Manuals\EN\3. Protocol API\PROFINET IO Controller\ PROFINET IO Controller Protocol API 19 EN.pdf,* *Ethernet Protocol API.pdf,* *TCP IP - Packet Interface API 12 EN.pdf*	*Documentation\7. Programming Manuals\EN\3. Protocol API\PROFINET IO Controller V3\ PROFINET IO Controller V3 Protocol API 07 EN.pdf* *PROFINET IO Controller - Migrating from version 2 to 3 MG 01 EN.pdf*

Table 8: PROFINET IO-Controller Firmware V2 and V3 on the Product DVD

1.2.3.2 PROFINET IO-Device firmware versions V3.4 and V3.13/3.14

The PROFINET IO Device firmware was revised and completed and is available in version 3.13 since the fourth quarter 2018. Meanwhile also the only slightly changed version 3.14 has been published.

Use the PROFINET IO Device firmware in version 3.13/V3.14 for a new installation, when you create or develop your application program for the first time.

If you want to change in an existing system from the PROFINET IO Device firmware version 3.4 to the version 3.13/V3.14, note the following guidelines:

1. Customize your application program according to the Migration Guide **PROFINET IO Device, Migration from V3.x to V3.13.**

If you want to change to V3.13, please check in the Migration Guide **PROFINET IO Device, Migration from V3.x to V3.13** which changes are necessary in the application program in order to use version 3.13.

2. Adjust the configuration of your PROFINET IO Controller device. Use the new GSDML files in the configuration software of the PROFINET IO Controller for this:
   - GSDML-V2.35-HILSCHER-COMX 51XX-RE PNS-xxxxxxxx.xml or
   - GSDML-V2.35-HILSCHER-COMX 100XX-RE PNS-xxxxxxxx.xml.
3. Update the PROFINET IO Device firmware in your device to version 3.13/V3.14.

Note also:

- SYCON.net V1.500 can configure the PROFINET IO Device firmware V3.4 as well as V3.13/V3.14
- The development of the PROFINET IO Device firmware V3.4 will not be continued, but this firmware version will be delivered furthermore.

1.2.3.3 EtherCAT Master firmware versions V3 and V4

The EtherCAT Master firmware has been revised and completed and is available in version V4 since the first quarter of 2017.

Upgrading the EtherCAT Master firmware from V3 to V4 is recommended. Use the EtherCAT Master firmware V4 for a new installation when creating or developing your application program for the first time, as well as in existing systems.

The reasons for upgrading are as follows:

- The development of the EtherCAT Master firmware V3 will not be continued. But this firmware version will be delivered furthermore.
- Due to the software design, the EtherCAT Master firmware V3 has considerable performance limitations on Hilscher products.
- Compared to the EtherCAT Master firmware V3, the EtherCAT Master firmware V4 has major improvements, while keeping the backward compatibility to the firmware V3 as much as possible. Due to the improvements, there are advantages in device certification.

Performance improvement and new functions with EtherCAT Master firmware V4:

- General performance improvement up to five times
- Improvements in network and individual Slave control, Slave diagnostics
- Support of CoE, SoE, EoE, FoE, ExtSync
- Support of redundancy in different, even complex topologies, including DC and DC resynchronization and hot-connect.
- Troubleshooting improvement.

If you want to change in an existing system from the EtherCAT Master firmware V3 to V4, you need to upgrade the EtherCAT Master firmware in your device to V4.

With SYCON.net, you can configure both the EtherCAT Master firmware V3 as well as the EtherCAT Master firmware V4. When you upgrade to the EtherCAT Master firmware V4, you can continue to use the existing SYCON.net project.

1.2.3.4 EtherCAT Slave firmware versions V2.5 and V4.9

The EtherCAT Slave firmware was revised and completed and is available in version 4.9.

Use the EtherCAT Slave firmware in version 4.9 for a new installation, when you create or develop your application program for the first time.

If you want to change in an existing system from the EtherCAT Slave firmware version 2.5 to the version 4.9, note the following guidelines:

1. Customize your application program according to the Migration Guide **EtherCAT Slave, Migration from V2.5 to V4.2.**

If you want to change to V4.8, please check in the Migration Guide **EtherCAT Slave, Migration from V2.5 to V4.2** which changes are necessary in the application program in order to use version 4.9.

2. Adjust the configuration of your EtherCAT Master device. Use the new XML file in the configuration software of the EtherCAT Master for this: *Hilscher COMX 100XX RE ECS V4.6.X.xml.*
3. Update the EtherCAT Slave firmware in your device to version 4.9.

Note also:

- SYCON.net V1.500 can configure the EtherCAT Slave firmware V2.5 as well as V4.9 and higher.
- The development of the EtherCAT Slave firmware V2.5 will not be continued, but this firmware version will be delivered furthermore.

1.2.3.5 EtherCAT Slave firmware version V4.9

In the past, the application had to use several packets in order to set Station Alias Address. Now the EtherCAT Slave firmware executes the Station Alias Address handling. Starting with version 4.6, the firmware savest he Station Alias Address (Second Station Address) non volatile and afterwards the firmware sets it to the ESC register. As a result, the application does not have to handle the Station Alias Address anymore compared to earlier EtherCAT Slave firmware versions.

1.2.3.6 POWERLINK controlled node V2 and V3

The POWERLINK Controlled Node firmware has been revised and completed and is available for COMX 51CA-RE and COMX 51CN-RE in version V3 since the first quarter of 2017 as well as for COMX 100CA-RE and COMX 100CN-RE in version V3 since the third quarter of 2017.

Do not use the POWERLINK Controlled Node V2.x for new applications. For a new installation when creating or developing your application program for the first time, use the POWERLINK Controlled Node firmware V3. Already existing applications based on V2.x do not need to be upgraded.

The reasons for upgrading are as follows:

- The development of the POWERLINK Controlled Node firmware V2 will not be continued.
- Performance improvements
- IPV4 support according to EPSG specification
- Multiple ASnd

POWERLINK Controlled Node V3 is developed to fulfill the following requirements:

- Support of netX 51/52-based and netX 100/500-based products. netX50 based products are not supported.
- Optimization of the internal stack structure to improve performance and less memory space requirement.
- POWERLINK Controlled Node V3 uses the object dictionary V3 component, to achieve a common base with other Hilscher stacks.
- Applications, which used configuration database (*inibatch.nxd*) or configuration API of POWERLINK Controlled Node V2, can be easily migrated to V3 because these configuration mechanisms are supported also for V3.

If you want to change in an existing system from the POWERLINK Controlled Node firmware V2 to V3, note the following guidelines:

1. Using the same configuration project, SYCON.net V1.500 can configure the POWERLINK Controlled Node firmware V2 as well as V3.
2. If the application program uses the API for object dictionary V2, the application program must be adapted and the API for object dictionary V3 must be used. The API of the object dictionary was changed incompatible from V2 to V3 and may require additional effort if these services are used.
3. Adjust the configuration of your POWERLINK Managing Node device. Use the new updated XDD file in the configuration software of the POWERLINK Managing Node for this:
   00000044_COMX 51XX RE PLS.xdd. or
   00000044_COMX 100XX RE PLS.xdd.
4. Update the POWERLINK Controlled Node firmware in your device to V3.

1.3 Ensuring access security

The firmware of the protocols

- CC-Link IE Field Basic
- EtherNet/IP Scanner
- EtherNet/IP Adapter
- Open Modbus/TCP
- PROFINET IO Device
- Sercos Slave

includes an integrated web server. The Internet or intranet access to the device, made possible by the integrated web server, involves the risk of misuse. You should therefore always protect the access to the device with passwords. In addition, you should use suitable security measures to protect access to your network.

Important: Always change the default password, otherwise you will grant anyone the right to execute functions without authorization.

To protect the device from unauthorized access, you can restrict access to authorized users. For information on how to set up your own user authentication, see manual "Application Note, Functions of the Integrated WebServer", chapter User Authentication.

1.4 Legal notes

Important notes

Utmost care was/is given in the preparation of the documentation at hand consisting of a user's manual, operating manual and any other document type and accompanying texts. However, errors cannot be ruled out. Therefore, we cannot assume any guarantee or legal responsibility for erroneous information or liability of any kind. You are hereby made aware that descriptions found in the user's manual, the accompanying texts and the documentation neither represent a guarantee nor any indication on proper use as stipulated in the agreement or a promised attribute. It cannot be ruled out that the user's manual, the accompanying texts and the documentation do not completely match the described attributes, standards or any other data for the delivered product. A warranty or guarantee with respect to the correctness or accuracy of the information is not assumed.

We reserve the right to modify our products and the specifications for such as well as the corresponding documentation in the form of a user's manual, operating manual and/or any other document types and accompanying texts at any time and without notice without being required to notify of said modification. Changes shall be taken into account in future manuals and do not represent an obligation of any kind, in particular there shall be no right to have delivered documents revised. The manual delivered with the product shall apply.

Under no circumstances shall Hilscher Gesellschaft für Systemautomation mbH be liable for direct, indirect, ancillary or subsequent damage, or for any loss of income, which may arise after use of the information contained herein.

Liability disclaimer

The hardware and/or software was created and tested by Hilscher Gesellschaft für Systemautomation mbH with utmost care and is made available as is. No warranty can be assumed for the performance or flawlessness of the hardware and/or software under all application

conditions and scenarios and the work results achieved by the user when using the hardware and/or software. Liability for any damage that may have occurred as a result of using the hardware and/or software or the corresponding documents shall be limited to an event involving willful intent or a grossly negligent violation of a fundamental contractual obligation. However, the right to assert damages due to a violation of a fundamental contractual obligation shall be limited to contract-typical foreseeable damage.

It is hereby expressly agreed upon in particular that any use or utilization of the hardware and/or software in connection with

- Flight control systems in aviation and aerospace;
- Nuclear fusion processes in nuclear power plants;
- Medical devices used for life support and
- Vehicle control systems used in passenger transport

shall be excluded. Use of the hardware and/or software in any of the following areas is strictly prohibited:

- For military purposes or in weaponry;
- For designing, engineering, maintaining or operating nuclear systems;
- In flight safety systems, aviation and flight telecommunications systems;
- In life-support systems;
- In systems in which any malfunction in the hardware and/or software may result in physical injuries or fatalities.

You are hereby made aware that the hardware and/or software was not created for use in hazardous environments, which require fail-safe control mechanisms. Use of the hardware and/or software in this kind of environment shall be at your own risk; any liability for damage or loss due to impermissible use shall be excluded.

Warranty

Hilscher Gesellschaft für Systemautomation mbH hereby guarantees that the software shall run without errors in accordance with the requirements listed in the specifications and that there were no defects on the date of acceptance. The warranty period shall be 12 months commencing as of the date of acceptance or purchase (with express declaration or implied, by customer's conclusive behavior, e.g. putting into operation permanently).

The warranty obligation for equipment (hardware) we produce is 36 months, calculated as of the date of delivery ex works. The aforementioned provisions shall not apply if longer warranty periods are mandatory by law pursuant to Section 438 (1.2) BGB, Section 479 (1) BGB and Section 634a (1) BGB [Bürgerliches Gesetzbuch; German Civil Code] If, despite of all due care taken, the delivered product should have a defect, which already existed at the time of the transfer of risk, it shall be at our discretion to either repair the product or to deliver a replacement product, subject to timely notification of defect.

The warranty obligation shall not apply if the notification of defect is not asserted promptly, if the purchaser or third party has tampered with the products, if the defect is the result of natural wear, was caused by unfavorable operating conditions or is due to violations against our operating regulations or against rules of good electrical engineering

practice, or if our request to return the defective object is not promptly complied with.

Costs of support, maintenance, customization and product care

Please be advised that any subsequent improvement shall only be free of charge if a defect is found. Any form of technical support, maintenance and customization is not a warranty service, but instead shall be charged extra.

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1.6 EtherCAT disclaimer

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To get information on the use and restrictions of the EtherCAT technology, use the following documents:

- EtherCAT Marking rules
- EtherCAT Conformance Test Policy
- EtherCAT Vendor ID Policy

These documents are available on the ETG homepage www.ethercat.org or directly via info@ethercat.org.

1.7 Licenses

If a comX communication module is used as a slave, no license is required for the firmware or the configuration software SYCON.net.

Licenses are required, if the comX communication module is used with a firmware with master functionality*.

* The master license includes the comX communication module operating as master and the license for the configuration software SYCON.net for the respective comX module.

2 Safety

2.1 General note

The user manual, the accompanying texts and the documentation are written for the use of the products by educated personnel. When using the products, all Safety Instructions, Property Damage Messages and all valid legal regulations have to be obeyed. Technical knowledge is presumed. The user has to assure that all legal regulations are obeyed.

2.2 Intended use

2.2.1 Intended use of comX communication modules

The comX modules provide an interface from the device into which the module is integrated (“Target system”) to one of the networks mentioned below. Depending from the chosen model and the loaded firmware, the Real-Time Ethernet or Fieldbus systems listed in the following table can be realized using the respective comX communication modules.

Assignment of Real-Time Ethernet protocols to the comX communication modules	
Real-Time Ethernet protocol	**Supported comX modules**
CC-Link IE Field Basic Slave	COMX 100CA-RE/COMX 100CN-RE/ COMX 51CA-RE/COMX 51CN-RE
EtherCAT Master	COMX 100CA-RE/COMX 100CN-RE
EtherCAT Slave	COMX 100CA-RE/COMX 100CN-RE/ COMX 51CA-RE/COMX 51CA-RE\R/ COMX 51CN-RE
EtherNet/IP Scanner (Master)	COMX 100CA-RE/COMX 100CN-RE
EtherNet/IP Adapter (Slave)	COMX 100CA-RE/COMX 100CN-RE/ COMX 51CA-RE/COMX 51CN-RE
Open Modbus/TCP (Server)	COMX 100CA-RE/COMX 100CN-RE/ COMX 51CA-RE/COMX 51CN-RE
Powerlink Controlled Node/Slave	COMX 100CA-RE/COMX 100CN-RE
PROFINET IO-RT-Controller (Master)	COMX 100CA-RE/COMX 100CN-RE
PROFINET IO-RT-IRT-Device (Slave)	COMX 100CA-RE/COMX 100CN-RE/ COMX 51CA-RE/COMX 51CN-RE
Sercos-Master	COMX 100CA-RE/COMX 100CN-RE
Sercos-Slave	COMX 100CA-RE/COMX 100CN-RE/ COMX 51CA-RE/COMX 51CN-RE
VARAN Client (Slave)	COMX 100CA-RE/COMX 100CN-RE
Assignment of Fieldbus protocols to the comX communication modules	
Fieldbus protocol	**Supported comX modules**
CANopen Master	COMX 100CA-CO/COMX 100CN-CO
CANopen Slave	COMX 100CA-CO/COMX 100CN- CO/ COMX 52CA-COS/ COMX 52CN-COS
CC-Link Slave	COMX 52CA-CCS/ COMX 52CN-CCS
DeviceNet Master	COMX 100CA-DN/COMX 100CN-DN
DeviceNet Slave	COMX 100CA-DN/COMX 100 CN-DN/ COMX 52CA-DNS/ COMX 52CN-DNS
PROFIBUS DP Master	COMX 100CA-DP/COMX 100CN-DP
PROFIBUS DP Slave	COMX 100CA-DP/COMX 100CN-DP/ COMX 52CA-DPS/ COMX 52CN-DPS

The comX communication module may only be operated as part of a communication system as described in this document and in the comX Design Guide. It has been exclusively designed for creating connections to such networks. Typically, the comX communication module is integrated within a device.

2.3 Personnel qualification

The comX communication module must only be installed, configured and removed. Job-specific technical skills for people professionally working with electricity must be present concerning the following topics:

- Safety and health at work
- Mounting and connecting of electrical equipment
- Measurement and Analysis of electrical functions and systems
- Evaluation of the safety of electrical systems and equipment
- Installing and Configuring IT systems

2.4 Commitment to read and understand the manual

Important!

- To avoid personal injury and to avoid property damage to your system or to your communication module, you must read and understand all instructions in the booklet and all accompanying texts to your communication module, before installing and operating your communication module.
- First read the safety chapter.

2.5 Safety Instructions to avoid personal injury

To ensure your own personal safety and to avoid personal injury, you necessarily must read, understand and follow the following and all other safety instructions in this manual, before you install and operate your communication module.

2.5.1 Electrical shock hazard

The danger of a lethal electrical shock caused by parts with more than 50V may occur, if you open the device to install the comX communication module.

- Hazardous Voltage may be present inside the device, into which the comX communication module is integrated.
- Strictly obey to all safety rules provided by the device's manufacturer in the documentation!
- First disconnect the power plug of the device.
- Make sure, that the power supply is off at the device.
- Open the housing and install or remove the comX communication module only after disconnecting power.

An electrical shock is the result of a current flowing through the human body. The resulting effect depends on the intensity and duration of the current and on its path through the body. Currents in the range of approximately ½ mA can cause effects in persons with good health, and indirectly cause injuries resulting from startle responses. Higher currents can cause more direct effects, such as burns, muscle spasms, or ventricular fibrillation.

In dry conditions permanent voltages up to approximately 42.4 V peak or 60 V DC are not considered as dangerous, if the contact area is equivalent to a human hand.

Reference Safety [S2]

2.6 Safety instructions to avoid property damage

To avoid property damage respectively device destruction to the comX communication module and to the system into which the comX is integrated, you necessarily must read, understand and follow the following and all other property damage messages in this manual, before you install and operate your communication module.

2.6.1 Device destruction by exceeding allowed supply voltage

For all comX communication modules described in this manual adhere to the instruction hereafter:

- The comX communication module must not be operated with a supply voltage of 5V! Exclusively use the mandatory supply voltage of 3,3 V ± 5 % as specified. Operation of the comX communication module at a voltage above the allowed range (i.e. more than 3,3 V + 5 %) can cause either severe damage to the comX module or even device destruction.

- The comX communication module must only be operated with the specified supply voltage. Take care of not exceeding the limits of the allowed voltage range for the supply voltage.

A supply voltage below the allowed range may cause malfunction of the comX module. The allowed range is given by the tolerances specified in the manual.

The specifications for the mandatory supply voltage for the comX modules described in this manual can be found in chapter *Technical data of COMX modules* beginning on page 130 and in Table 13: Supply Voltage and Signaling Voltage for comX communication modules beginning on page 35. For each type of device the necessary and allowed supply voltage, including the tolerance.

2.6.2 Device destruction by exceeding allowed signal voltage

For all comX communication modules described in this manual, take care of the following notice:

- All I/O signal pins at the comX communication module tolerate only the specified signal voltage.
- Operation of the comX communication module at signal voltages significantly exceeding the specified maximum signal voltage of 3.3 V ± 5 % may cause severe damage or device destruction.

The specifications for the maximum signal voltage of the comX modules described in this manual can be found in *Table 11: Supply voltage and signal voltage for comX communication modules* beginning on page 40. The signal voltage is equal to the supply voltage.

2.6.3 Electro-statically sensitive devices

Adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge.

This equipment is sensitive to electrostatic discharge, which cause internal damage and affect normal operation. Follow guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wrist strap.
- Do not touch connectors or pins on the cifX Communication Interface.
- Do not touch circuit components inside the equipment.
- If available, use a static-safe workstation.

When not in use, store the equipment in appropriate static-safe packaging.

Reference Safety [2]

2.6.4 Exceeding the maximum number of allowed write/delete accesses

This device uses a serial Flash chip for storing remanent data, such as firmware, configuration, etc. This chip allows a maximum of 100 000 write/delete accesses which is sufficient for a standard device operation. Writing/deleting the chip excessively (e.g. in order to change configuration or name of station) will exceed the maximum number of allowed write/delete accesses and, thus, result in damage to the device. If, e.g., the configuration is changed every hour, the maximum number will be reached after 11.5 years. If, e.g., it is changed every minute, the maximum number will already be reached after approx. 69 days.

Avoid exceeding the maximum number of allowed write/delete accesses by excessive writing.

2.6.5 Drop of supply voltage during write and delete accesses in the file system

The FAT file system in the netX firmware is subject to certain limitations in its operation. Write and delete accesses in the file system (firmware update, configuration download etc.) can destroy the FAT (File Allocation Table) if the accesses cannot be completed if the supply voltage drops. Without a proper FAT, a firmware may not be found and cannot be started.

Make sure, that the supply voltage of the device does not drop during write and delete accesses in the file system (firmware update, configuration download etc.).

2.7 Labeling of safety messages

- The **Section Safety Messages** at the beginning of a chapter are pinpointed particularly and highlighted by a signal word according to the degree of endangerment. The type of danger is specified by the safety message text and optionally by a specific safety sign.
- The **Integrated Safety Messages** within an instruction description are highlighted with a signal word according to the degree of endangerment. The type of danger is specified by the safety message text.

Signal Word	Meaning (International)	Meaning (USA)
DANGER	Indicates a direct hazard with high risk, which will have a consequence of death or grievous bodily harm if it is not avoided.	Indicates a hazardous situation which if not avoided, will result in death or serious injury.
WARNING	Indicates a possible hazard with medium risk, which will have a consequence of death or (grievous) bodily harm if it is not avoided.	Indicates a hazardous situation which if not avoided, could result in death or serious injury.
CAUTION	Indicates a minor hazard with medium risk, which could have a consequence of minor or moderate bodily harm if it is not avoided.	Indicates a hazardous situation which if not avoided, may result in minor or moderate Injury.

Safety Sign	USA	Warning or Principle
		Warning of lethal electrical shock
		Principle: Disconnect the power plug

Table 9: Signal Words and Safety Signs in Safety Messages on Personal Injury

Signal Word	Meaning (International and USA)
NOTICE	Indicates a property damage message.
Safety Sign	**Warning or Principle**
	Warning on damages by electrostatic discharge
-	Example: Warning of device destruction due to exceedingly high supply voltage

Table 10: Signal Words and Safety Signs in Safety Messages on Property Damage

In this document, all Safety Instructions and Safety Messages are designed according both to the international used safety conventions as well as to the ANSI Z535.6 standard, refer to safety reference [S1].

2.7.1 References safety

[S1] ANSI Z535.6-2011 American National Standard for Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials

[S2] IEC 60950-1, Information technology equipment - Safety - Part 1: General requirements, (IEC 60950-1:2005, modified); German Edition EN 60950-1:2006

[S3] EN 61340-5-1 and EN 61340-5-2 as well as IEC 61340-5-1 and IEC 61340-5-2

3 Description and requirements

3.1 Description

The products of the comX family are communication modules for Real-Time Ethernet and Fieldbus for integration into host systems.

comX communication modules provide I/O data to the host in a DPM.

Each Real-Time Ethernet protocol has special requirements to the communication technology, such as switch or hub functionality. The comX communication module covers these requirements for the respective protocols.

Table 3: Reference to firmware on page 13 explains which comX communication modules support which protocols.

Highlights

- 2-Port Ethernet with switch and hub for line topology
- System-/Status-/Link- and Activity-LEDs
- Host interface with 8- or 16-bit data width
- USB- and UART diagnostic interface
- Direct access to the process data within the DPM
- SYCON.net (based on FDT/DTM standard) available as configurator
- comX 52: Address and baud rate switches
- comX 51CA-RE\R: Address switches (hexadecimal)
- If you use comX as an embedded system, you have to implement at least one external diagnostic interface (UART or USB) in your device to enable the use of SYCON.net.
- For all other cases, a PC adapter card is available for firmware update, configuration, and diagnosis, see chapter 8 ”Evaluation board COMXEB” on page 90 and section „*Updating the firmware*“ on page 157.

3.1.1 Block diagrams

The following block diagram shows the Real-Time Ethernet module COMX 100CA-RE:

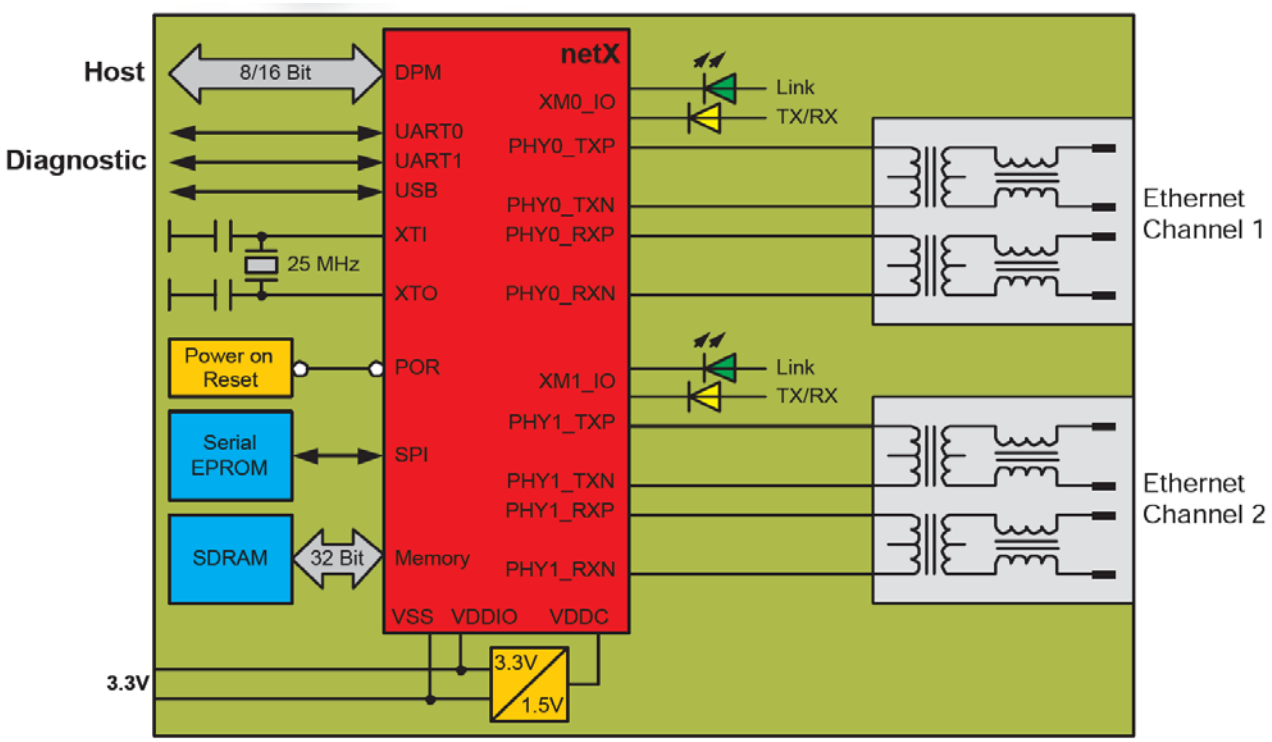


Figure 1: Block diagram of Real-Time Ethernet module

Below, the corresponding block diagram for comX Fieldbus modules:

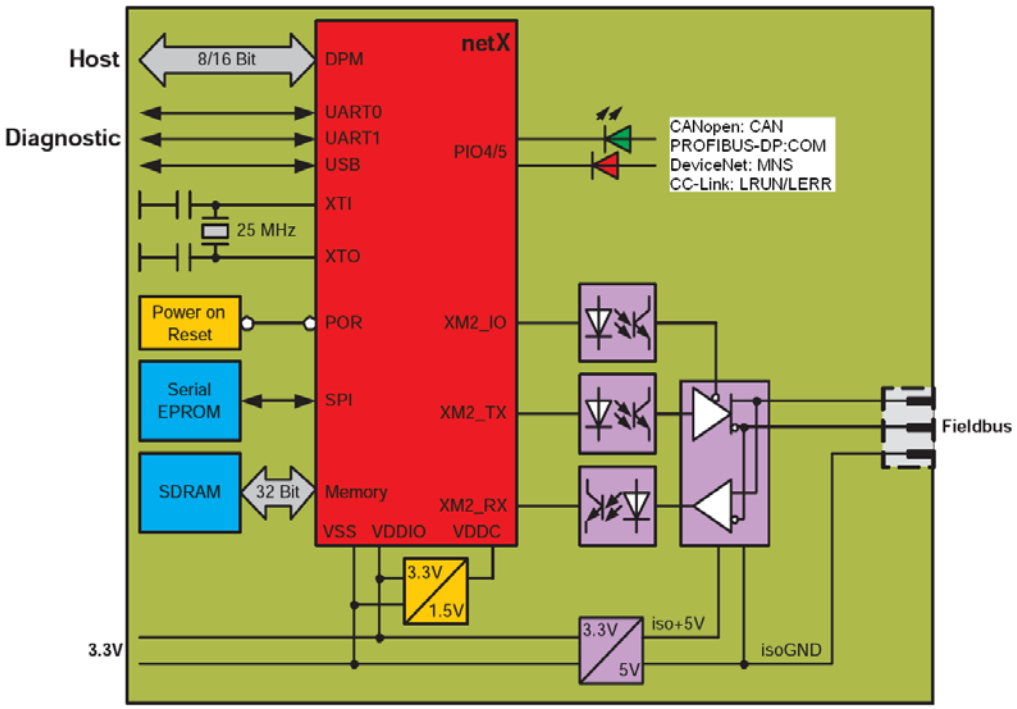


Figure 2: Block diagram of a Fieldbus module

3.1.2 System requirements

For a useful application of the communication modules of the comX family, the following conditions must be fulfilled:

At the target system:

1. Mechanical connection: 50-pin SMT connector (male, grid distance 1.27 mm, e.g. type SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A, see www.samtec.com)
2. Electrical connection: Pin assignment as described in section Connector X1 in the comX Design Guide.
3. Communication via DPM. Access via cifX Device Driver or based on a toolkit.
4. Power supply: Via pins in connector X1, see comX Design Guide. The supply voltage applied must always range between 3.3 V ± 5 %.

At the communication system connected to the comX module (i.e. either Real-Time Ethernet or. Fieldbus):

1. A Master of the communication system fitting to the respective type of comX module and the loaded firmware, if a Slave firmware has been loaded.
2. A Slave of the communication system fitting to the respective type of comX module and the loaded firmware, if a Master firmware has been loaded.

Concerning items 2 and 4, also see the pin assignments provided by the comX Design Guide in chapter 3.

3.2 Prerequisites for the operation of the comX communication modules

3.2.1 Prerequisites for the operation as embedded system

The following prerequisites must be fulfilled for the operation of the comX communication modules as embedded system

1. The comX communication modules must be mounted correctly in the 50-pin SMT connector of the host system (when using comX modules of the CN series: This is additionally valid for the 30-pin SMT connector of the host system). The connector must be connected according to the specifications given in the comX Design Guide.
2. A suitable supply voltage in the voltage range 3.3 V ± 5% must be connected.
3. The module must be loaded with the correct firmware for the communication system or protocol to be applied on the module. Find out the correct firmware for the applied system to be installed on your communication module using the reference table (*Table 3: Reference to firmware* on page 13 within section 1.1.3 "*Reference to hardware, software and firmware*").
4. The comX communication module must have been configured correctly, e.g. with the system configurator SYCON.net which is delivered with the comX modules (for more information, see SYCON.net documentation).
5. For communication with the comX module, the **cifX Device Driver** (at least V1.0.5.x) must have been installed correctly or the toolkit.
6. To avoid thermal damage, observe the allowed temperature range. See specifications in section "*Technical data of COMX modules"* on page 177.

3.2.2 Prerequisites for the operation with evaluation board COMXEB

The following prerequisites must be fulfilled for the operation of the comX communication modules with evaluation board COMXEB together with a connected PC.

1. Microsoft Windows® must be installed on the PC (Windows® 7 Service Pack 1 (32-bit), Windows® 7 Service Pack 1 (64-bit), Windows® 8 (32 or 64-bit), Windows® 8.1 (32 or 64-bit) or Windows® 10 (32 or 64-bit)).
2. The COMXEB must be supplied with power (+24V) using the power adaptor included within the delivery via socket X932 or using another power supply connected to CombiCon connector X930.
3. One of the diagnostic interfaces (USB: X611/ serial: X601) of the evaluation board COMXEB must be connected to the PC, see section 8.3.5”*Diagnostic interfaces*” on page 112.
4. The comX communication module must be mounted correctly in the 50-pin SMT connector of evaluation board COMXEB X300, X400 or X501 (when using comX modules of the CN series: This is additionally valid for the 30-pin SMT connector of host system X401/X500).
5. The module must be loaded with the correct firmware for the communication system/ protocol to be applied on the module (firmware is uploaded using the evaluation board COMXEB).

   Find out the correct firmware for the applied system to be installed on your communication module using the reference table (*Table 3: Reference to firmware* on page 13 within section 1.1.3 "*Reference to hardware, software and firmware*“).
6. The comX communication module must have been configured correctly, e.g. with the system configurator SYCON.net delivered with the comX modules (Configuration is done using the evaluation board COMXEB. For more information, see SYCON.net documentation).

3.2.3 Remarks on storage stability and contact reliability of the host-side connector

The following applies to the host-side connectors used in the comX communication modules (Samtec Types SFC-115-T2-L-D-A-K-TR and SFC-125-T2-L-D-A-K-TR), with regard to storage stability and long-term immunity against contact failure:

1. Hilscher uses only highly reliable connectors in the comX modules. The supplier of the connector warrants a minimum expected storage time of 5 years without any loss of spring tension when the connectors have been mounted. According to its general terms and conditions, Hilscher assures this warranted storage time to you.
2. To preserve the spring tension and to improve the immunity against contact failure of the host-side connectors, the following storage conditions are recommended:
   - Storage in dry package such as ESD bags which can additionally be heat-sealed.
   - Controlled storage at a temperature of max. 25°C and 50% relative humidity (alternatively).

3.3 Supply voltage and signal voltage

The following table provides the required and permissible supply voltage for each of the devices as well as the required or tolerated signal voltage for the I/O signal pins:

comX	Supply voltage	Signal voltage
All types	+3.3 V DC ±5 %	+3.3 V DC ±5 %

Table 11: Supply voltage and signal voltage for comX communication modules

The typical current depends on the type of comX module. For detailed values on current consumption, see section "*Technical data of COMX modules*".

3.4 Prerequisites for the software installation

3.4.1 Prerequisites for the system configurator SYCON.net

- PC with 1 GHz processor or higher
- Windows® 7 (32-Bit and 64-Bit) SP1,
  Windows® 8 (32-Bit and 64-Bit),
  Windows® 8.1 (32-Bit and 64-Bit),
  Windows® 10 (32-Bit and 64-Bit)
- Administrator privilege required for installation
- Microsoft .NET Framework 4.0
- Internet Explorer 5.5 or higher
- Free disk space: min. 400 MByte
- RAM: min. 512 MByte, recommended 1024 MByte
- Graphic resolution: min. 1024 x 768 pixel
- Keyboard and Mouse
- USB, serial or Ethernet interface
- Restriction: Touch screen is not supported.

Note: If the project file is used on a further PC,

- this PC must also comply with the above system requirements,
- the device description files of the devices used in the project must be imported into the configuration software SYCON.net on the new PC,
- and the DTMs of the devices used in the project must also be installed on that further PC.

In order to download the product DVD, you need an Internet access.

3.5 Prerequisites for certification

3.5.1 PROFINET-IO certification for IRT and SYNC0 signal

If you intend to develop a final product that will receive the official PROFINET-IO certification for IRT, the host base board of your product must provide a SYNC0 signal (2-pin connector including GND), e.g., to allow the connection of an oscilloscope there.

For this purpose, the communication modules COMX provide the SYNC0 signal line *Request to Send, Serial line & SYNC0*, which is located at pin #15 of the system connector. The SYNC0 signal has LVTTL level (3.3 V). A max. load of 6 mA must not be exceeded.

Keep the cable for the sync signals shorter than 50 mm. Take EMC aspects into account.

4 Getting started – comX communication modules

4.1 Hardware installation as embedded system (master and slave)

The following table describes the steps (typical for many application cases) to install a comX communication module (master and slave).

#	Step	Description	For detailed information see section	Page
1	**Preparation**	Take all necessary safety precautions for the comX installation:		
	Take safety precautions	Carefully read the documentation of the device into which the comX is to be installed. Strictly observe the safety instructions of the device manufacturer for working on the open device. Always observe the following safety instruction: **⚠ WARNING**  **Lethal electrical shock caused by live parts of more than 50V!** Disconnect the power plug of the connecting device. Make sure that the power supply is off at the connecting device.	*Electrical shock hazard*	31
2	**Installing the hardware**	Install the comX into the device.	*Hardware installation, deinstallation, and* replacement	
	Open the housing	Open the housing of the host system (if there is a housing). Make sure that the host system is NOT connected to the supply voltage.	*Installing the comX communication module in its target environment*	
	Install comX	Plug in and mount the comX within the host system. If required, connect the diagnostic connection cable from the comX to the Diagnosis PC (via USB or serial connection).		
	Close the housing	Close the housing of the host system (if there is a housing).		
	Plug in the connecting cable to the master or slave	Plug in the connecting cable from the comX to the master or slave. **Important!** When you work with Ethernet TCP/UDP-IP, EtherNet/IP or Modbus TCP, use switches or 10/100 MBit/s dual speed hubs only. Make sure that the network is operated at a speed of 100 MBit/s or in full duplex mode.	*Failure in 10 MBit/s half-duplex mode and workaround*	*229*
		Note! Use the RJ45 connector only for LAN connections, not for telecommunication connections!	*Ethernet interface of COMX* 100CA-RE	*59*

#	Step	Description	For detailed information see section	Page
		When using PROFINET IO-Controller, always observe the following note:  **Important hint for cabling!** Only connect ports with different cross-over settings to each other. Otherwise, no connection will be established between the devices. If the port settings of the comX PROFINET IO-Controller are not set to AUTO, port0 will be set to uncrossed and port1 to crossed.	See the corresponding user manual under *Documentation overview comX*	16
	Plug target system to supply voltage	Plug the target system or the PC used for diagnosis to its supply voltage and switch it on.		

Table 12: Steps for the hardware installation of a comX communication module (master and slave)

4.2 Configuration of comX communication module (slave)

The following table describes the steps (typical for many application cases) to configure a comX communication module (slave). To configure the comX communication module (slave), you can use the **cifX test application**. In many cases, you can alternatively use the corresponding DTM in the **SYCON.net** configuration software.

#	Step	Description	For detailed information see section	Page
1	Driver installation	Install the required driver(s) (cifX device driver, USB driver…). For a serial connection, no special driver is required.	*See separate manual "Software Installation and Documentation Overview "*	
2 (a)	**Download firmware and configuration**	**(a) with the cifX test application** cifX test application and cifX device driver are delivered and installed together.	*Updating the firmware using an evaluation board COMXEB and a* PC	159
2.1 (a)	**cifX test application** installation	If not already done in step 1, install the **cifX test application**.		
2.2 (a)	Configuration steps comX (slave)	In the **cifX test application** - select and download the firmware - adjust the device parameters for comX communication module (slave)	*Updating the firmware using an evaluation board COMXEB and a* PC	159
2 (b)	OR **Download firmware and configuration, diagnosis, I/O data**	**(b) using SYCON.net** If necessary, use the corresponding DTM in the configuration software **SYCON.net.**		
2.1 (b)	Installing SYCON.net	Execute the SYCON.net-setup and follow to the instructions of the installation wizard.	*See separate manual "Software Installation and Documentation Overview "*	
2.2 (b)	Firmware download	- Start configuration software **SYCON.net**, - Create new project /Open existing project, - Insert slave device into configuration, - Select driver and assign device. - Select and download the firmware.	*Updating the* firmware with SYCON.net Also see corresponding user manual under *Documentation overview comX* *Device names in SYCON.net*	164 *16* *48*
2.3 (b)	Configuration comX (slave)	- Configure the comX communication module (slave)		
2.4 (b)	Download configuration	- Download the configuration to the comX (slave)*. (*EtherCAT-Slave, EtherNet/IP-Adapter (Slave), Open-Modbus/TCP (Slave), Powerlink-Controlled-Node/Slave, PROFINET IO-Device (Slave), Sercos-Slave, PROFIBUS DP-Slave, CANopen-Slave, DeviceNet-Slave,)		
2.5 (b)	Diagnosis	- Right-click the device symbol. - Select context menu entry **Diagnosis**, - then select **Diagnosis > General** or **Firmware Diagnosis**, - or select **Diagnosis > Extended Diagnosis**.		
2.6 (b)	I/O monitor	- Right-click the device symbol. - Select context menu entry **Diagnosis**, - then **Tools > IO Monitor**. - Check the input or output data.		

Table 13: Configuration steps for the comX communication module (slave)

4.3 Configuration of comX communication module (master)

The following table describes the steps (typical for many application cases) to configure a comX communication module (master). To configure the comX communication module (master), you can use the configuration software **SYCON.net**.

#	Step	Description	For detailed information see section	Page
1	Driver installation	Install the required driver(s) (cifX device driver, USB driver …). For a serial connection no special driver is required.	*See separate manual "Software Installation and Documentation Overview "*	
2	**Download firmware and configuration, diagnosis, I/O data**	**using SYCON.net** If necessary, use the corresponding DTM in the configuration software **SYCON.net.** (Alternatively, you can also the use the **cifX test application**.)		
2.1	Installing SYCON.net	Execute the SYCON.net-setup and follow to the instructions of the installation wizard.	*See separate manual "Software Installation and Documentation Overview "*	
2.2	Firmware download	- Start configuration software **SYCON.net**, - Create new project /Open existing project, - Insert master device into configuration, - Select driver and assign device. - Select and download the firmware.	*Updating the* firmware with SYCON.net Also see corresponding user manual under *Documentation overview comX* *Device names in SYCON.net*	164 *16* *48*
2.3	Configuration comX (master)	- Configure the comX (master).		
2.4	Download configuration	- Download the configuration to the comX (master)* (*EtherCAT-Master, EtherNet/IP-Scanner (Master), PROFINET IO-Controller (Master) , Sercos- Master, PROFIBUS DP-Master, CANopen-Master, DeviceNet-Master)		
2.5	Diagnosis	- Right-click the device symbol. - Select context menu entry **Diagnosis**, - then select **Diagnosis > General**, **Firmware** or **Master Diagnosis**, - or select **Diagnosis > Extended Diagnosis**.		
2.6	I/O monitor	- Right-click the device symbol. - Select context menu entry **Diagnosis**, - then **Tools > IO Monitor**. - Check the input or output data.		

Table 14: Configuration steps for the comX communication module (master)

4.4 Notes for the configuration of the master device

To configure the master, you need a device description file. Observe the following notes when you configure the master device:

Real-Time Ethernet-System	Notes
EtherCAT Slave	To configure the master, you need an XML file (device description file). The settings of the master used, must correspond to those of the slave to establish communication. Important parameters are: Vendor ID, Product Code, Serial Number, Revision Number, Output/Input Data Bytes
	If the XML file `Hilscher COMX RE ECS V2.2.X.xml` is used/updated, the firmware with version *2.**2**.x* must be used/updated.
	The loadable firmware supports max. 400 bytes as upper limit for the sum of the sizes of cyclic input and output data. To exchange more than 200 bytes for input or output data via EtherCAT, you need a customer-specific XML file. Additionally, the following formula applies: (number of input bytes + 3)/4 + (number of output bytes + 3)/4 must be less or equal to 100.
EtherNet/IP-Adapter	To configure the scanner/master, you need a device description file (EDS). The settings of the scanner/master used, must correspond to those of the adapter/slave to establish communication. Important parameters are Input, Output Data Bytes, Vendor ID, Product Type, Product Code, Major Rev, Minor Rev, IP Address, and Netmask.
Powerlink-Controlled-Node/Slave	To configure the managing node/master, you need a device description file (XDD). The settings of the managing node/master used, must correspond to those of the controlled node/slave, to establish communication. Important parameters are: Vendor ID, Product Code, Serial Number, Revision Number, Node ID, Output/Input Length.
PROFINET IO-Device	To configure the Controller, you need a device description file (GSDML). The settings of the Controller used, must correspond to those of the Device to establish communication. Important parameters are: Station Name, Vendor ID, Device ID, Input/Output Data Bytes. Under **Name of Station**, the same name has to be entered that was used in the configuration file of the master of this device. If no freely chosen name is used in the configuration file, the name from the GSDML file will be used.
Sercos Slave	The Sercos Master uses the Sercos address to communicate with the slave. Some masters verify Device ID, Vendor Code, Input/Output Data Size and continue communication with the slave only if all these values match. Therefore, the master reads these parameters from the slave and compares them with the configuration stored in the master. The parameters Device ID, Vendor Code, Input/Output Data Size are part of the SDDML device description file. If the Sercos Master is configured using SDDML files and a default value of one of these parameters was changed, an SDDML file must be created in the configuration software via Export SDDML and then used in the configuration of the Sercos Master.

Fieldbus system	Note
PROFIBUS DP Slave	To configure the master, you need a device description file (GSD). The settings in the master used, must correspond to those of the slave to establish communication. Important parameters are: Station Address, Ident Number, Baud rate and Config Data (the configuration data for the Output/Input Length).
CANopen Slave	To configure the master, you need a device description file (EDS). The settings in the master used, must correspond to those of the slave to establish communication. Important parameters are: Node Address and Baud rate.
DeviceNet Slave	To configure the master, you need a device description file (EDS). The settings in the master used, must correspond to those of the slave to establish communication. Important parameters are: MAC ID, Baud rate, Produced Size, Consumed Size, Vendor ID, Product Type, Product Code, Major Rev, Minor Rev.
CC-Link Slave	To configure the master, you need a device description file (CSP). The settings in the master used, must correspond to those of the slave to establish communication. Important parameters are: Slave Station Address, Baud rate, Station Type and Vendor Code.

Table 15: Notes for the configuration of the master device

For further information on the device description files, see section *Device description files* on page 15.

4.5 Device names in SYCON.net

The following table contains the device names displayed for the separate communication protocols in the SYCON.net configuration software.

The table shows the card type of the comX communication interface and the applicable protocol(s). Moreover, the table shows which device has to be selected from the device catalog for which protocol in order to configure the comX communication module with SYCON.net.

comX (module type)	Protocol	DTM-specific group	Device name in SYCON.net
Real-time Ethernet	CC-Link IE Field Basic	Slave	COMX 100XX-RE/CCIBS
	EtherCAT Master	Master	COMX 100XX-RE/ECM
	EtherCAT Slave	Gateway/Stand-Alone Slave	COMX 100XX-RE/ECS
	EtherNet/IP Scanner (Master)	Master	COMX 100XX-RE/EIM
	EtherNet/IP Adapter (Slave)	Gateway/Stand-Alone Slave	COMX 100XX-RE/EIS
	Open-Modbus/TCP	Gateway/Stand-Alone Slave	COMX 100XX-RE/OMB
	Powerlink-Controlled-Node/Slave	Gateway/Stand-Alone Slave	COMX 100XX-RE/PLS
	PROFINET IO-RT-Controller	Master	COMX 100XX-RE/PNM
	PROFINET IO-RT-Device	Gateway/Stand-Alone Slave	COMX 100XX-RE/PNS
	Sercos-Master	Master	COMX 100XX-RE/S3M
	Sercos-Slave	Gateway/Stand-Alone Slave	COMX 100XX-RE/S3S
Real-time Ethernet	CC-Link IE Field Basic	Slave	COMX 51XX-RE/CCIBS
	EtherCAT Slave	Gateway/Stand-Alone Slave	COMX 51XX-RE/ECS
	EtherNet/IP Adapter (Slave)	Gateway/Stand-Alone Slave	COMX 51XX-RE/EIS
	Open-Modbus/TCP	Gateway/Stand-Alone Slave	COMX 51XX-RE/OMB
	Powerlink-Controlled-Node/Slave	Gateway/Stand-Alone Slave	COMX 51XX-RE/PLS
	PROFINET IO-RT-Device	Gateway/Stand-Alone Slave	COMX 51XX-RE/PNS
	Sercos-Slave	Gateway/Stand-Alone Slave	COMX 51XX-RE/S3S
CANopen	CANopen Master	Master	COMX 100XX-CO/COM
	CANopen Slave	Gateway/Stand-Alone Slave	COMX 100XX-CO/COS COMX 52XX-COS/COS
DeviceNet	DeviceNet Master	Master	COMX 100XX-DN/DNM
	DeviceNet Slave	Gateway/Stand-	COMX 100XX-DN/DNS

		Alone Slave	COMX 52XX-DNS/DNS
PROFIBUS-DP	PROFIBUS DP Master	Master	COMX 100XX-DP/DPM
	PROFIBUS DP Slave	Gateway/Stand-Alone Slave	COMX 100XX-DP/DPS COMX 52XX-DPS/DPS
CC-Link	CC-Link Slave	Gateway/Stand-Alone Slave	COMX 52XX-CCS/CCS
XX means CA or CN			

Table 16: Device names in SYCON.net by communication protocol

4.6 Exchange of comX communication modules (master and slave)

4.6.1 Steps for exchanging the hardware

The following table describes the steps (typical for many application cases) to exchange (replacement case) a comX communication module (master or slave).

#	Step	Description	For detailed information see section	Page
1	**Hardware installation**	Decommission the comX communication module to be replaced. Take all necessary safety precautions	*Decommissioning*	*56*
2	Take safety precautions	Take all necessary safety precautions for the installation of the comX: Carefully read the documentation of the device into which the comX is to be installed. Strictly observe the safety instructions of the device manufacturer. Always observe the following safety instruction:  **WARNING** **Lethal electrical shock caused by live parts of more than 50V!** Disconnect the power plug of the connecting device. Make sure that the power supply is off at the connecting device.	*Electrical shock hazard*	31
3	Open the housing	Open the housing of the host system (if there is a housing). Make sure that the host system is NOT connected to the supply voltage as long as the case is open.		
4	Remove screws fixing the comX	First, remove both screws used for fixing the comX at the front panel of the device.		
5	Remove comX	Then, carefully pull the comX communication module to be exchanged out of the connector(s).	*Decommissioning*	
6	Plug-in replacement comX	Now, carefully plug the replacement comX module into the connector(s). Ensure good fit and contact!		
7	Fix replacement comX	Fix the replacement comX at the front panel of the device using the 2 screws.		
8	Close the housing	Close the housing of the host system (if there is a housing).		*56*
9	Plug target system to supply voltage	Plug the target system to the supply voltage and switch it on.		

Table 17: Steps to replace the comX communication modules (master and slave)

4.6.2 Load firmware & configuration into replacement module comX (slave)

Note: For comX communication modules *without* **Rotary Switch Slot Number (Module ID)** in terms of a device exchange service (replacement case), you must manually download the same firmware and configuration into the replacement cifX as into the preceding cifX communication interface.

The following table describes the steps (typical for many application cases) to download the firmware and configuration of a comX communication module (slave) exchange service (replacement case). To perform the download for the slave, you can use the **cifX test application** or, alternatively, the configuration software **SYCON.net**.

No.	Step	Description	For detailed information, see section	Page
1 (a)	**Download firmware and configuration**	**(a) with the cifX test application** cifX test application and cifX device driver are delivered and installed together.	*Updating the firmware using an evaluation board COMXEB and a* PC	159
1.1 (a)	Configuration steps comX (slave)	In the **cifX test application** - select and download the firmware - adjust the device parameters for comX communication module (slave)	See above	
1 (b)	OR **Download firmware and configuration**	**(b) using SYCON.net**		
1.1 (b)	Firmware download	- Start configuration software **SYCON.net**, - open existing project, - if so, select driver, - assign device. - Select and download the firmware.	*Updating the* firmware with SYCON.net See corresponding user manual under *Documentation* and *Device names in* SYCON.net	164 16 48
1.2 (b)	Download configuration	- Download the configuration to the comX (Slave)*. (*EtherCAT-Slave, EtherNet/IP-Adapter (Slave), Open-Modbus/TCP (Slave), Powerlink-Controlled-Node/Slave, PROFINET IO-Device (Slave), Sercos-Slave, PROFIBUS DP-Slave, CANopen-Slave, DeviceNet-Slave,)		

Table 18: Firmware and configuration download steps comX communication modules (slave) at module exchange (replacement case)

4.6.3 Load firmware & configuration into replacement module comX (Master)

The following table describes the steps (typical for many application cases) to download the firmware and configuration of a comX communication module (master) exchange service (replacement case). To perform the download for the master, you can use the configuration software **SYCON.net**.

No.	Step	Description	For detailed information see section	Page
1	**Download firmware and configuration**	**using SYCON.net**		
1.1	Firmware download	- Start configuration software **SYCON.net**, - open existing project, - if so, select driver, - assign device. - Select and download the firmware.	*Updating the* firmware with SYCON.net See corresponding user manual under *Documentation*	164 16
1.2	Download configuration	- Download the configuration to the replacement comX (Master)* (*EtherCAT-Master, EtherNet/IP-Scanner (Master), PROFINET IO-Controller (Master) , Sercos- Master, PROFIBUS DP-Master, CANopen-Master, DeviceNet-Master)		

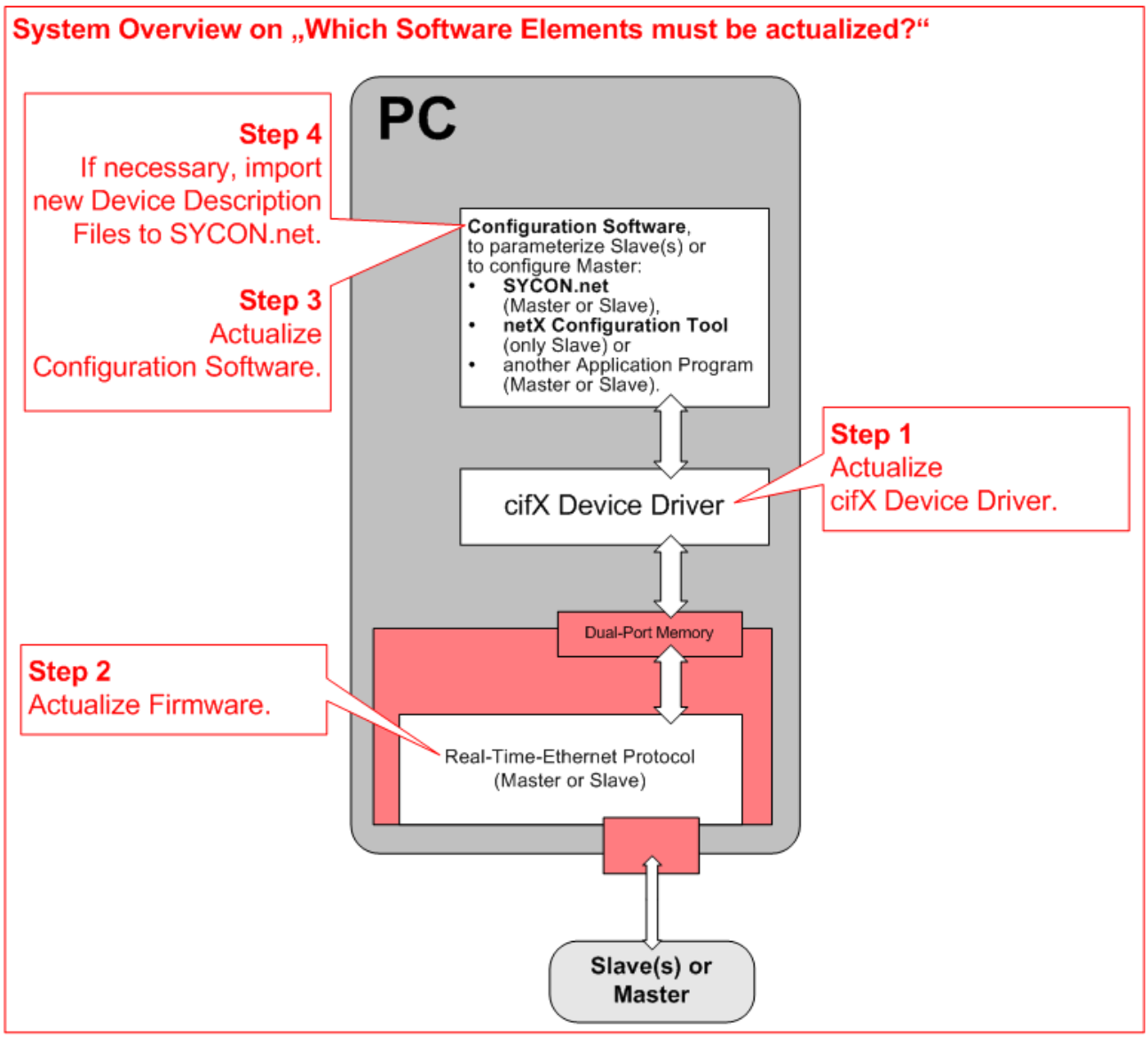
Table 19: Steps firmware and configuration download comX communication module (master) at module exchange (replacement case)

4.7 Updating firmware, driver, and software

Note: As a prerequisite for the software update, the project files, configuration files, and firmware files have to be saved.

If a hardware installation exists, firmware, driver, and configuration software must be updated according to the information given in section “*Reference to hardware, software and firmware”* on page 11.

The following diagram gives an overview:



For detailed information on the firmware update, see chapter *Updating the firmware* on page 157.

Note: For the COMX 51CA-RE\R with rotary switches for address selection, the netX Configuration Tool is not available.

5 Hardware installation, deinstallation, and replacement

5.1 Warning messages on personal injury

Always observe the following safety instructions when you install, uninstall or replace the comX communication modules described in this manual:

5.1.1 Electrical shock hazard

⚠ WARNING

Lethal electrical shock caused by live parts of more than 50V!

- HAZARDOUS VOLTAGE may exist inside the device into which the comX communication module is to be integrated.
- Strictly observe all safety instructions of the device manufacturer's documentation!
- Therefore, first disconnect the power plug of the device.
- Make sure that the power supply is off at the device.
- Open the housing and install or remove the comX communication module only after disconnecting power.

5.2 Property damage warnings

Observe the following property damage warnings when you install, uninstall or replace the comX communication module.

5.2.1 Device destruction by exceeding the allowed supply voltage

For all comX communication modules, observe the following instructions of this manual:

NOTICE

Device destruction!

- To operate the comX communication module, use the mandatory supply voltage only. Operating the comX with a supply voltage above the specified range will result in device destruction.

USA:

NOTICE

Device destruction!

- To operate the comX communication module, use the mandatory supply voltage only. Operating the comX with a supply voltage above the specified range will result in device destruction.

5.2.2 Device destruction by exceeding the allowed signal voltage

For all comX communication modules, observe the following instructions of this manual:

NOTICE

Device destruction!

- All I/O signal pins of the comX communication module tolerate only a specified signal voltage! Operating the comX at a signal voltage other than the specified one, may cause severe damage to the comX communication module!

USA:

NOTICE

Device destruction!

- All I/O signal pins of the comX communication module tolerate only a specified signal voltage! Operating the comX at a signal voltage other than the specified one, may cause severe damage to the comX communication module!

For detailed information on the supply and signal voltage of the comX communication modules described in this manual, see section "*Supply voltage and signal voltage"* on page 39.

5.2.3 Electrostatically sensitive devices

Observe the precautions for components being vulnerable to electrostatic discharge.

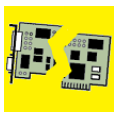
NOTICE

Electrostatically sensitive devices

- To prevent damage to the device and the comX communication module, make sure that the comX is grounded via the endplate and the PC and make sure that you are correctly grounded when you install/uninstall the comX communication module.

5.2.4 Supply voltage drop during write and delete access operations in the file system

NOTICE



Drop of supply voltage during write and delete accesses in the file system

The FAT file system in the netX firmware is subject to certain limitations in its operation. Write and delete accesses in the file system (firmware update, configuration download etc.) can destroy the FAT (File Allocation Table) if the accesses cannot be completed if the supply voltage drops. Without a proper FAT, a firmware may not be found and cannot be started.

➢ Make sure, that the supply voltage of the device does not drop during write and delete accesses in the file system (firmware update, configuration download etc.).

5.3 Installing the comX communication module in its target environment

To install the comX communication module into its “target environment”, also called “the host system” or simply “the device”, proceed as follows:

⚠ WARNING

- Hazardous voltage may be present inside the device, into which the comX communication module is integrated.
- Strictly observe all safety instructions of the device manufacturer.
- Plug off the device into which the comX module is to be integrated!
- Make sure that this device is disconnected from the supply voltage and dead, before you continue.

NOTICE

- Observe the safety precautions for components that are vulnerable to electrostatic discharge described in section 5.2.3“Electrostatically sensitive devices” on page 55

➢ **Step 1**: If necessary, remove the housing of this device.
Strictly observe all safety instructions of the device manufacturer.

➢ **Step 2**: Always avoid touching open contacts or wire ends.

➢ **Step 3**: Plug in the comX communication module carefully but firmly into its connector (50-pin SMT connector, male, grid width 1.27 mm, at COMX-CN modules, additionally 30-pin SMT connector, male, grid width 1.27 mm).

➢ **Step 4**: If you opened the housing of the device in step 1, close it now. Strictly observe all safety instructions of the device manufacturer.

➢ **Step 5**: Connect the device with its supply voltage and switch it on again. Check whether the device behaves normally.

➢ **Step 6**: If this is the case, connect the device to the corresponding communication partner (master in case of slave module, slave in case of master module) via an Ethernet or Fieldbus connection (depending on the type of comX communication module).

5.4 Decommissioning

To avoid personal injury as well as damage to material or environment, strictly follow the rules on putting the comX modules out of service and the rules on disposal specified in section “*Decommissioning, replacement and disposal*” on page 221.

6 Installing the software

The installation of the software delivered with the device on the Communication Solutions DVD (configuration software, drivers, and tools) is the subject of a separate manual “*comX*”, which is also contained on that DVD.

There you will find descriptions of the installation of the following software under Windows® 7, 8, 8.1, and 10:

- cifX device driver
- SYCON.net
- netX configuration tool
- USB driver

7 Device photos (position of switches, LEDs and interfaces)

7.1 Real-Time Ethernet communication module COMX 100CA-RE

7.1.1 COMX 100CA-RE

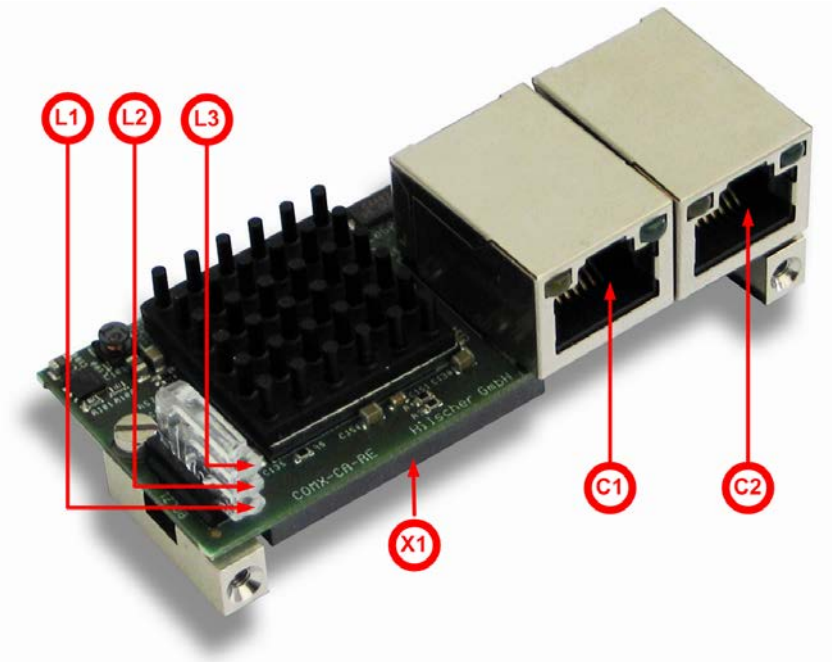


Figure 3: Photo of communication module COMX 100CA-RE with cooler

LED displays of COMX 100CA-RE

L1 SYS LED

L2 COM0 LED

L3 COM1 LED

SMT-connectors of the COMX 100CA-RE (connection to host)

X1 System interface

Connectors of the COMX 100CA-RE (connected to outside)

C1 Ethernet interface channel 0

C2 Ethernet interface channel 1

7.1.2 Ethernet interface of COMX 100CA-RE

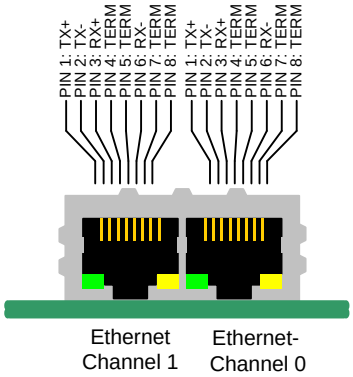


Figure 4: Pinning of Ethernet interface of COMX 100CA-RE

Pin	Signal	Description
1	TX+	Transmit data positive
2	TX–	Transmit data negative
3	RX+	Receive data positive
4	TERM	Connected and terminated to PE via RC combination*
5	TERM	
6	RX –	Receive data negative
7	TERM	Connected and terminated to PE via RC combination*
8	TERM	
		* Bob Smith termination

Table 20: Pinning of Ethernet connector at channel 0 and 1

The Ethernet interfaces of the comX communication modules provide the Auto-Crossover feature.

For a schematic diagram of the Ethernet interface of COMX 100CA-RE, refer to the comX Design Guide.

7.2 Real-Time Ethernet communication module COMX 100CN-RE

7.2.1 COMX 100CN-RE

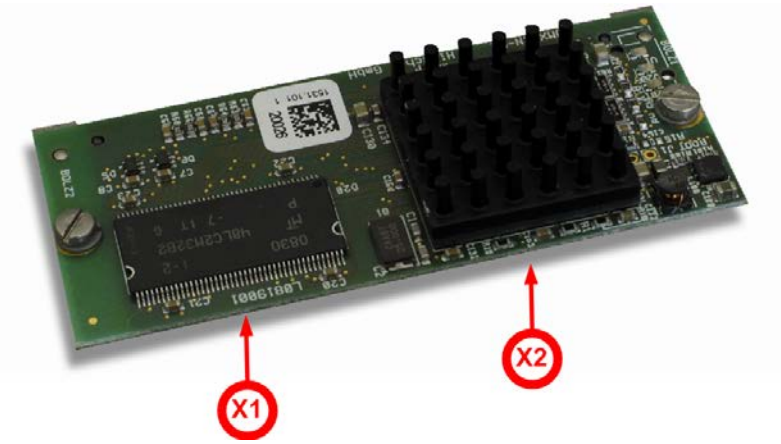


Figure 5: Photo of communication module COMX 100CN-RE

Note: The figure above shows the COMX 100CN-RE communication module without the metal blocks required for mounting!

SMT connectors of the COMX 100CN-RE (connection to host)

X1 System interface

X2 Ethernet interface

7.2.2 Ethernet interface of COMX 100CN-RE

For a description of the pin assignment of the Ethernet interface of the COMX 100CN-RE, see comX Design Guide, subsection 3.2.4.

7.3 Real-Time Ethernet communication module COMX51CA-RE

7.3.1 COMX51CA-RE

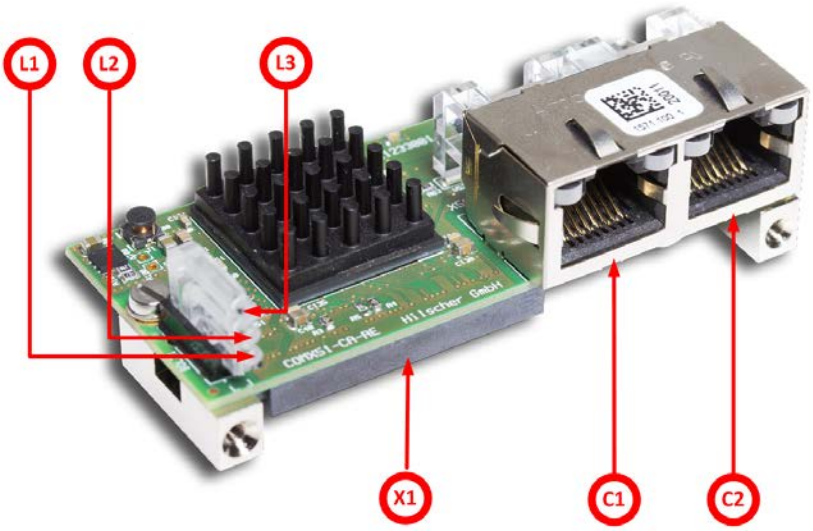


Figure 6: Photo of communication module COMX51CA-RE with cooler

LED displays of COMX51CA-RE

L1 SYS LED

L2 COM0 LED

L3 COM1 LED

SMT connectors of the COMX51CA-RE (connection to host)

X1 System interface

Connectors of the COMX51CA-RE (connected to Real-time Ethernet)

C1 Ethernet interface channel 0

C2 Ethernet interface channel 1

7.3.2 Ethernet interface of COMX51CA-RE

See section *Ethernet interface of COMX 100CA-RE* on page 59.

7.4 Real-Time Ethernet communication module COMX 51CN-RE

7.4.1 COMX 51CN-RE

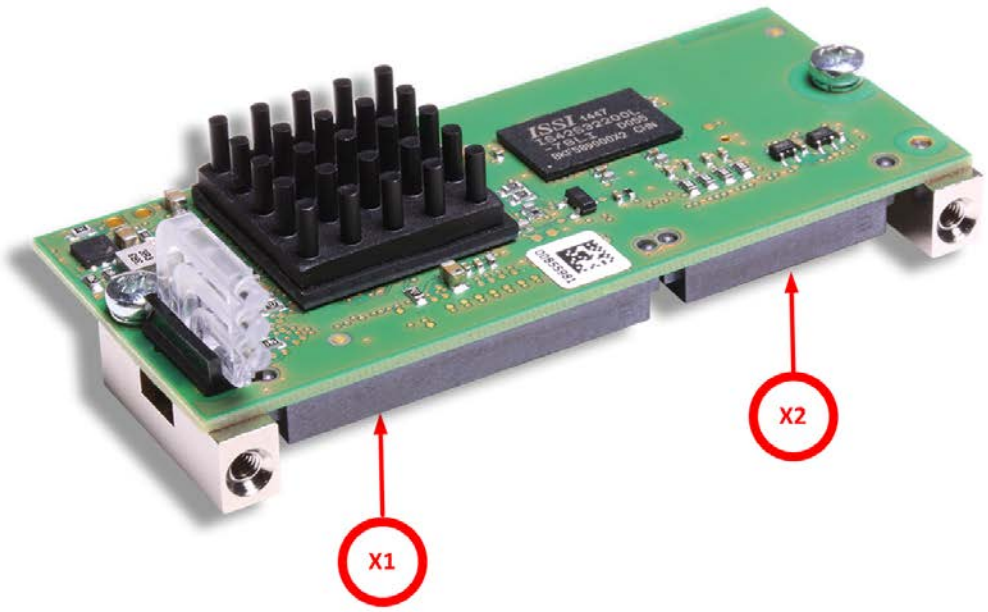


Figure 7: Photo of communication module COMX 51CN-RE

SMT connectors of the COMX51CN-RE (Connection to Host)

X1	System interface
X2	Ethernet interface

7.4.2 Ethernet interface of COMX 51CN-RE

For a description of the pin assignment of the Ethernet interface of the COMX 51CN-RE, see comX Design Guide, subsection 3.2.4.

7.5 CANopen communication module COMX 100CA-CO

7.5.1 COMX 100CA-CO

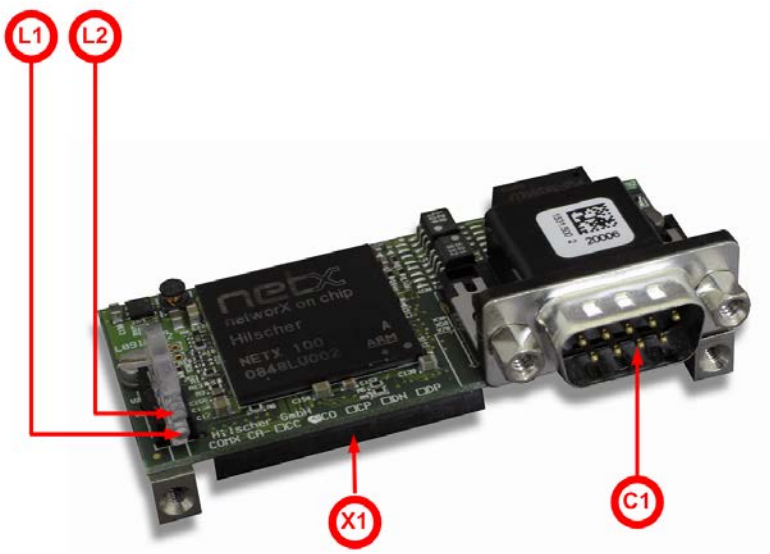


Figure 8: Photo of communication module COMX100 CA-CO

LED displays of COMX 100CA-CO

L1 SYS LED

L2 COM LED

SMT connectors of the COMX 100CA-CO (connection to host)

X1 System interface

Fieldbus connector of COMX 100CA-CO (connected to Fieldbus)

C1 CANopen interface

7.5.2 CANopen interface of COMX 100CA-CO

The following figure shows the CANopen interface (D-Sub plug, male, 9 pin)

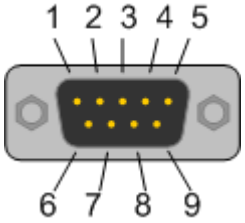


Figure 9: CANopen-interface (D-Sub-plug, 9-pin) of the COMX 100CA-CO

Connection with D-Sub-Plug	Signal	Description
2	CAN_L	CAN-Low bus line
3	CAN_GND	CAN reference potential
7	CAN_H	CAN-High bus line

Figure 10: Pinning of CANopen interface of the COMX 100CA-CO

7.6 CANopen communication module COMX 100CN-CO

7.6.1 COMX 100CN-CO

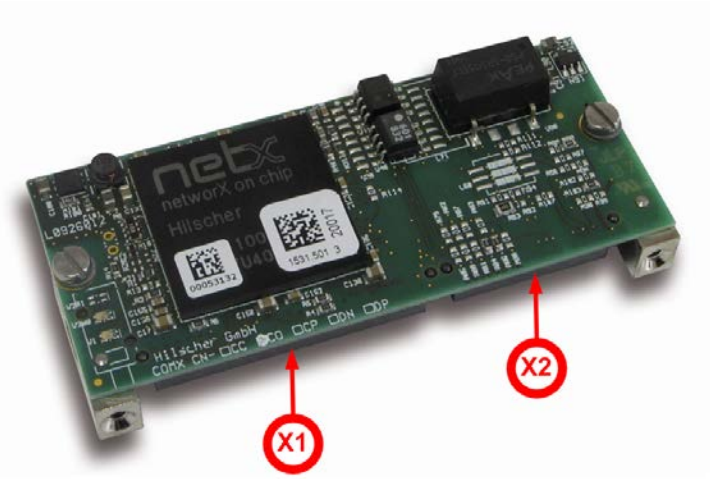


Figure 11: Photo of communication module COMX100 CN-CO

SMT connectors of the COMX 100CN-CO (connection to host)

X1	System interface
X2	CANopen interface

7.6.2 CANopen interface of COMX 100CN-CO

For a description of the pin assignment of the CANopen interface of the COMX 100CN-CO, see comX Design Guide, subsection 3.2.1.

7.7 DeviceNet communication module COMX 100CA-DN

7.7.1 COMX 100CA-DN

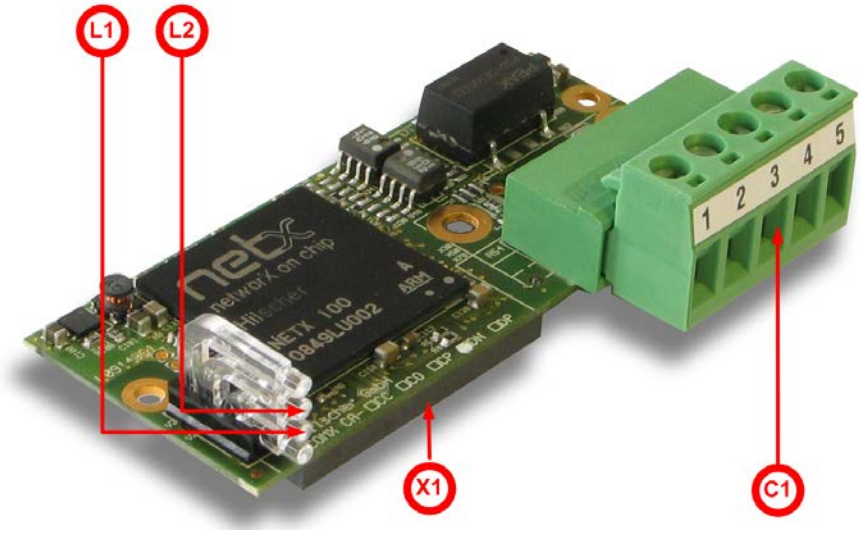


Figure 12: Photo of communication module COMX 100CA-DN

Note: The figure above shows the COMX 100CA-DN communication module without the metal blocks required for mounting!

LED displays of COMX 100CA-DN

L1 SYS-LED

L2 COM-LED

SMT connectors of the COMX 100CA-DN (connection to host)

X1 System interface

Fieldbus connector COMX 100CA-DN (connected to Fieldbus)

C1 DeviceNet interface

7.7.2 DeviceNet interface of COMX 100CA-DN

The following figure shows the DeviceNet interface of the COMX 100CA-DN (CombiCon plug, 5 pin):

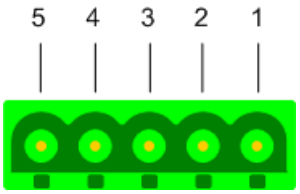


Figure 13: DeviceNet interface (CombiCon-plug, 5 pin) of the COMX 100CA-DN

Connection with CombiCon plug	Signal	Color	Description
1	V-	Black	Data reference potential of the DeviceNet power supply
2	CAN_L	Blue	CAN Low signal
3	Drain		Shield
4	CAN_H	White	CAN High signal
5	V+	Red	+24 V DeviceNet supply voltage

Table 21: Pinning of the DeviceNet-interface of the COMX 100CA-DN

7.8 DeviceNet communication module COMX 100CN-DN

7.8.1 COMX 100CN-DN

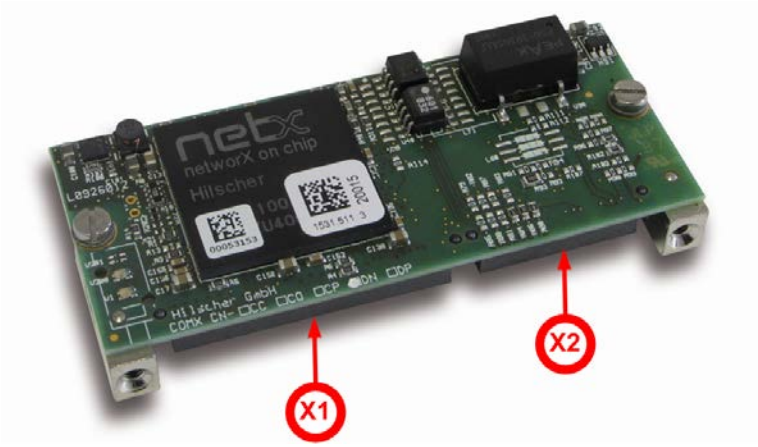


Figure 14: Photo of communication module COMX 100CN-DN

SMT connectors of the COMX 100CN-DN (connection to host)

X1 System Interface

X2 DeviceNet interface

7.8.2 DeviceNet interface of COMX 100CN-DN

For a description of the pin assignment of the DeviceNet interface of the COMX 100CN-DN, see comX Design Guide, subsection 3.2.2.

7.9 PROFIBUS-DP communication module COMX 100CA-DP

7.9.1 COMX 100CA-DP

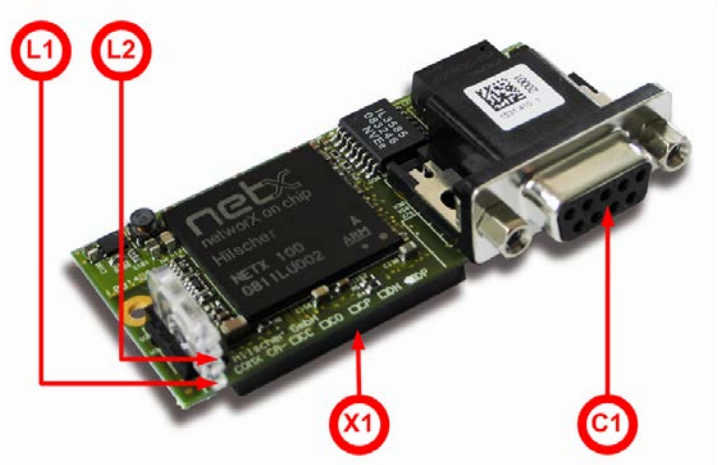


Figure 15: Photo of communication module COMX 100CA-DP

Note: The figure above shows the COMX 100CA-DP communication module without the metal blocks required for mounting!

LED Displays of COMX 100CA-DP

L1 SYS-LED

L2 COM-LED

SMT connector of the COMX 100CA-DP (connection to host)

X1 System interface

Fieldbus connector COMX 100CA-DP (connected to Fieldbus)

C1 PROFIBUS-DP-interface

7.9.2 PROFIBUS-DP interface of COMX 100CA-DP

The following figure shows the PROFIBUS-DP interface (D-Sub plug, female, 9 pin)

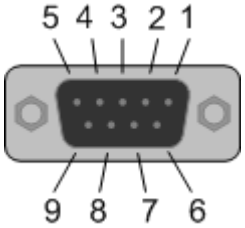


Figure 16: PROFIBUS-DP-interface (D-Sub plug, female, 9 pin) of the COMX 100CA-DP

Connection with D-Sub-Plug	Signal	Description
3	RxD/TxD-P	Receive-/Send data-P (Line B at plug)
5	DGND	Data reference potential
6	VP	Power supply (positive)
8	RxD/TxD-N	Receive-/Send data--N (Line A at plug)

Table 22: Pinning of the PROFIBUS-DP interface of the COMX 100CA-DP

7.10 PROFIBUS-DP communication module COMX 100CN-DP

7.10.1 COMX 100CN-DP

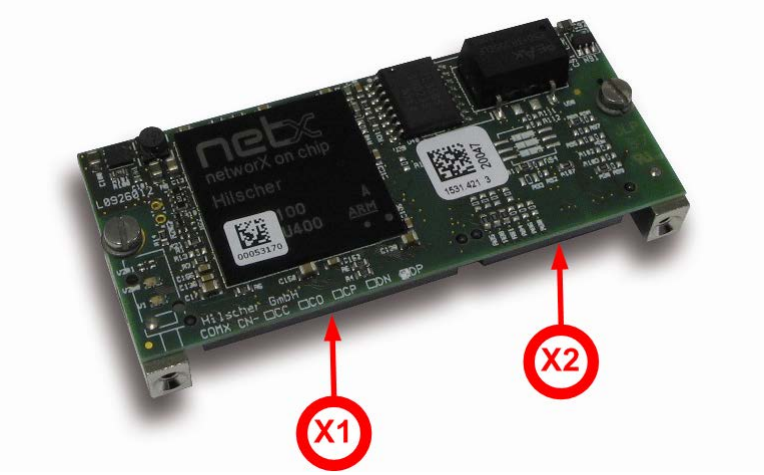


Figure 17: Photo of communication module COMX 100CN-DP

SMT connectors of the COMX 100CN-DP (connection to Host)

X1	System interface
X2	PROFIBUS-DP-interface

7.10.2 PROFIBUS-DP interface of COMX 100CN-DP

For a description of the pin assignment of the PROFIBUS-DP interface of the COMX 100CN-DP, see comX Design Guide, subsection 3.2.3.

7.11 CC-Link communication module COMX 52CA-CCS

7.11.1 COMX 52CA-CCS

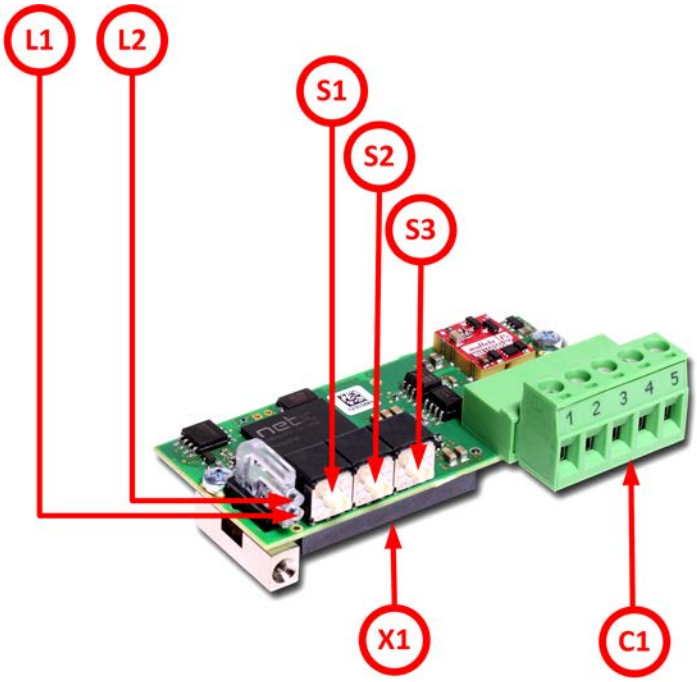


Figure 18: Photo of communication module COMX 52CA-CCS

LED Displays of COMX 52CA-CCS

L1 SYS-LED

L2 COM-LED

Address and baud rate switches of the COMX 52CA-CCS

S1 Address switch 1 for CC-Link Slave address (x10)

S2 Address switch 2 for CC-Link Slave address (x1)

S3 Baud rate switch

SMT connectors of the COMX 52CA-CCS (connection to Host)

X1 System interface

Fieldbus connector of COMX 52CA-CCS (connected to Fieldbus)

C1 CC-Link interface

7.11.2 Description of the address and baud rate switches

For a description of the address and baud rate switches of the COMX 52CA-CCS, see comX Design Guide.

7.11.3 CC-Link interface of COMX 52CA-CCS

The following drawing shows the CC-Link interface (D-Sub-male connector, 9-pole) of the COMX 52CA-CCS:

Isolated RS-485 interface:

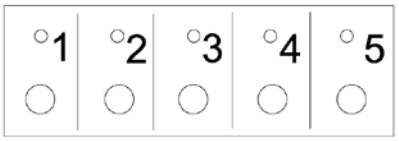


Figure 19: CC-Link interface (screw terminal connector, 5 pin)

Connection with Screw terminal Connector	Signal	**Description**
1	DA	Data A
2	DB	Data B
3	DG	Data Ground
4	SLD	Shield
5	FG	Field Ground

Table 23: CC-Link -interface of COMX 52CA-CCS

7.12 CANopen communication module COMX 52CA-COS

7.12.1 COMX 52CA-COS

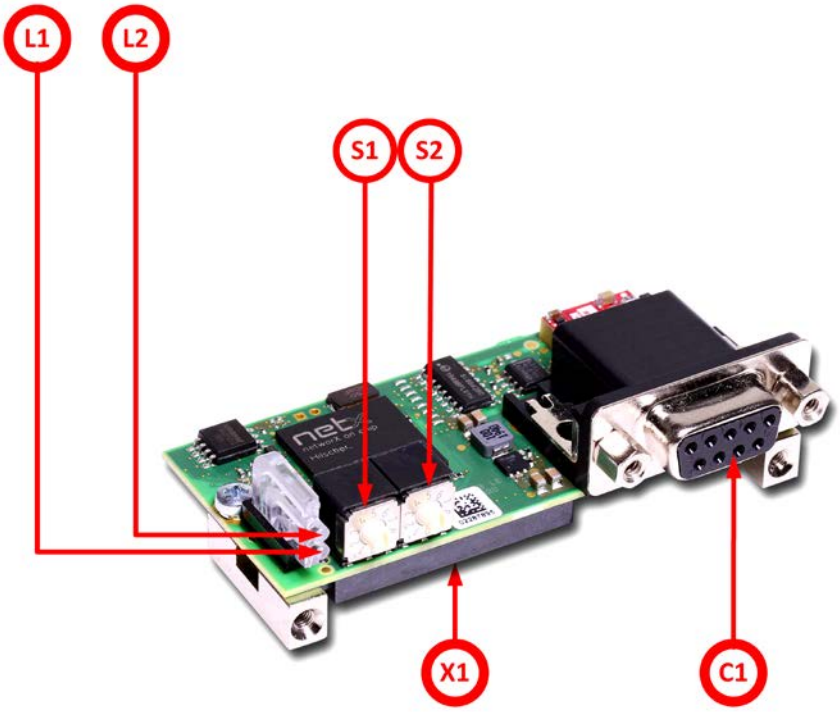


Figure 20. Photo of communication module COMX 52CA-COS

LED displays of COMX 52CA-COS

L1 SYS LED

L2 COM LED

SMT connectors of the COMX 52CA-COS (connection to Host)

X1 System interface

Fieldbus connector of COMX 52CA-COS (connected to Fieldbus)

C1 CANopen interface

Address switches of COMX 52CA-COS

S1 Address switch 1

S2 Address switch 2

7.12.2 Description of the address switches

For a description of the address and baud rate switches of the COMX 52CA-COS, see comX Design Guide.

7.12.3 CANopen interface of COMX 52CA-COS

The following figure shows the CANopen interface (D-Sub plug, male, 9 pin)

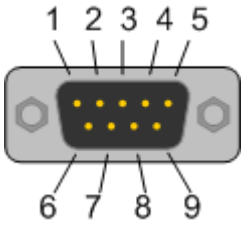


Figure 21: CANopen-interface (D-Sub-plug, 9-pin) of the COMX 52CA-COS

Connection with D-Sub-Plug	Signal	Description
2	CAN_L	CAN-Low bus line
3	CAN_GND	CAN reference potential
7	CAN_H	CAN-High bus line

Figure 22: Pinning of CANopen interface of the COMX 52CA-COS

7.13 DeviceNet communication module COMX 52CA-DNS

7.13.1 COMX 52CA-DNS

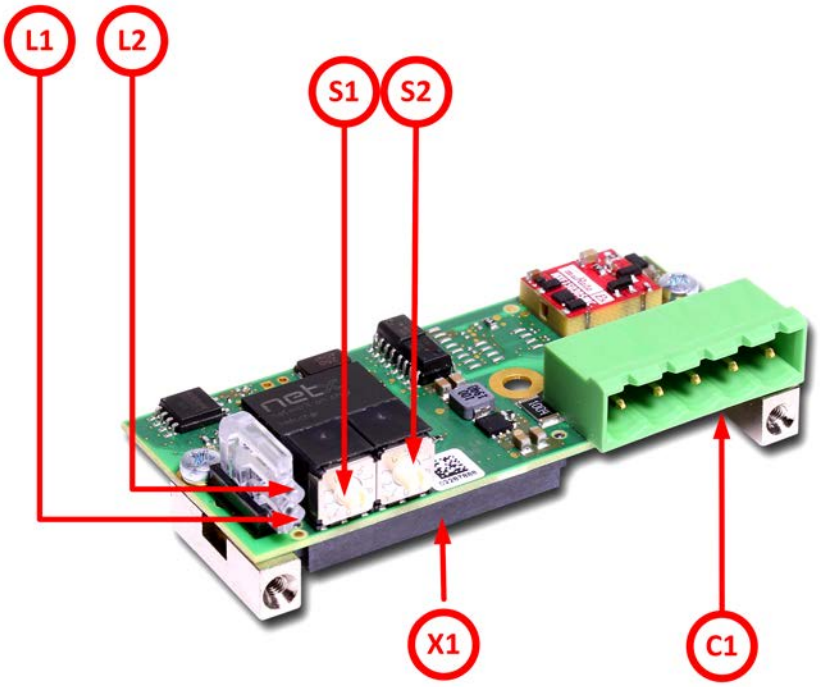


Figure 23: Photo of communication module COMX 52CA-DNS

LED displays of COMX 52CA-DNS

L1 SYS-LED

L2 COM-LED

SMT connectors of the COMX 52CA-DNS (connection to Host)

X1 System interface

Fieldbus connector COMX 52CA-DNS (connected to Fieldbus)

C1 DeviceNet interface

Address switches of COMX 52CA-DNS

S1 Address switch 1

S2 Address switch 2

7.13.2 Description of the address switches

For a description of the address switches of the COMX 52CA-DNS, see comX Design Guide.

7.13.3 DeviceNet interface of COMX 52CA-DNS

The following figure shows the DeviceNet interface of the COMX 52CA-DNS (CombiCon plug, 5 pin):

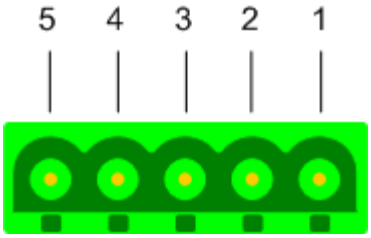


Figure 24: DeviceNet interface (CombiCon- Plug, 5 pin) of the COMX 52CA-DNS

Connection with CombiCon plug	Signal	Color	Description
1	V-	Black	Data reference potential of the DeviceNet power supply
2	CAN_L	Blue	CAN Low signal
3	Drain		Shield
4	CAN_H	White	CAN High signal
5	V+	Red	+24 V DeviceNet supply voltage

Table 24: Pinning of the DeviceNet-interface of the COMX 52CA-DNS

7.14 PROFIBUS-DP communication module COMX 52CA-DPS

7.14.1 COMX 52CA-DPS

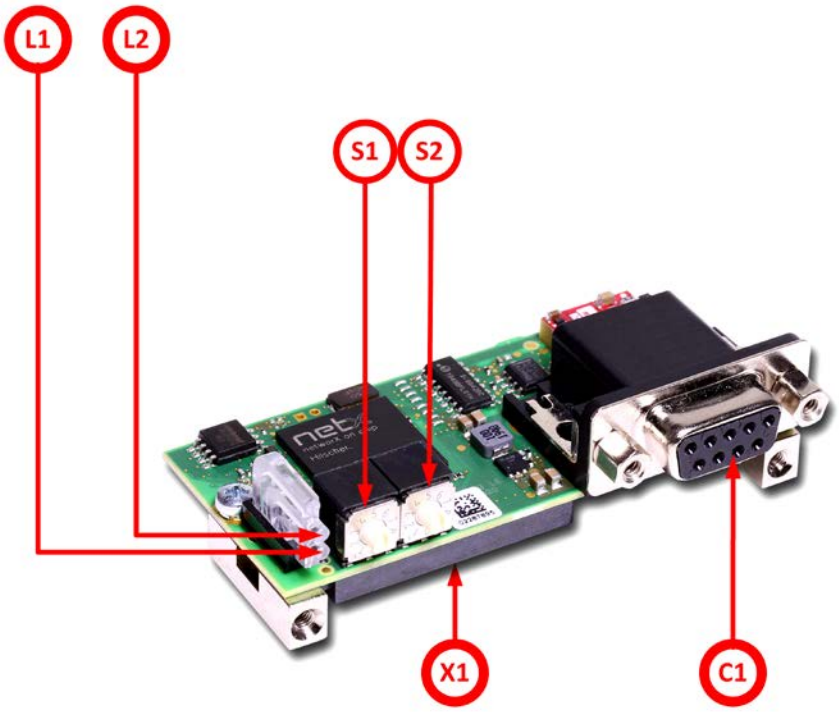


Figure 25: Photo of communication module COMX 52CA-DPS

LED displays of COMX 52CA-DPS

L1 SYS-LED

L2 COM-LED

SMT connector of the COMX 52CA-DPS (connection to Host)

X1 System interface

Fieldbus connector COMX 52CA-DPS (connected to Fieldbus)

C1 PROFIBUS-DP-interface

Address switches of COMX 52CA-DPS

S1 Address switch 1

S2 Address switch 2

7.14.2 Description of the address switches

For a description of the address switches of the COMX 52 CA-DPS, see comX Design Guide.

7.14.3 PROFIBUS-DP interface of COMX 52CA-DPS

The following figure shows the PROFIBUS-DP interface (D-Sub plug, female, 9 pin)

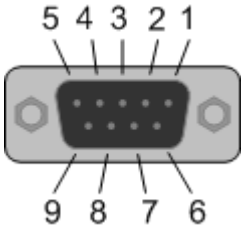


Figure 26: PROFIBUS-DP-interface (D-Sub plug, female, 9 pin) of the COMX 52CA-DPS

Connection with D-Sub-Plug	Signal	Description
3	RxD/TxD-P	Receive-/Send data-P (Line B at plug)
5	DGND	Data reference potential
6	VP	Power supply (positive)
8	RxD/TxD-N	Receive-/Send data--N (Line A at plug)

Table 25: Pinning of the PROFIBUS-DP interface of the COMX 52CA-DPS

7.15 CC-Link communication module COMX 52CN-CCS

7.15.1 COMX 52CN-CCS

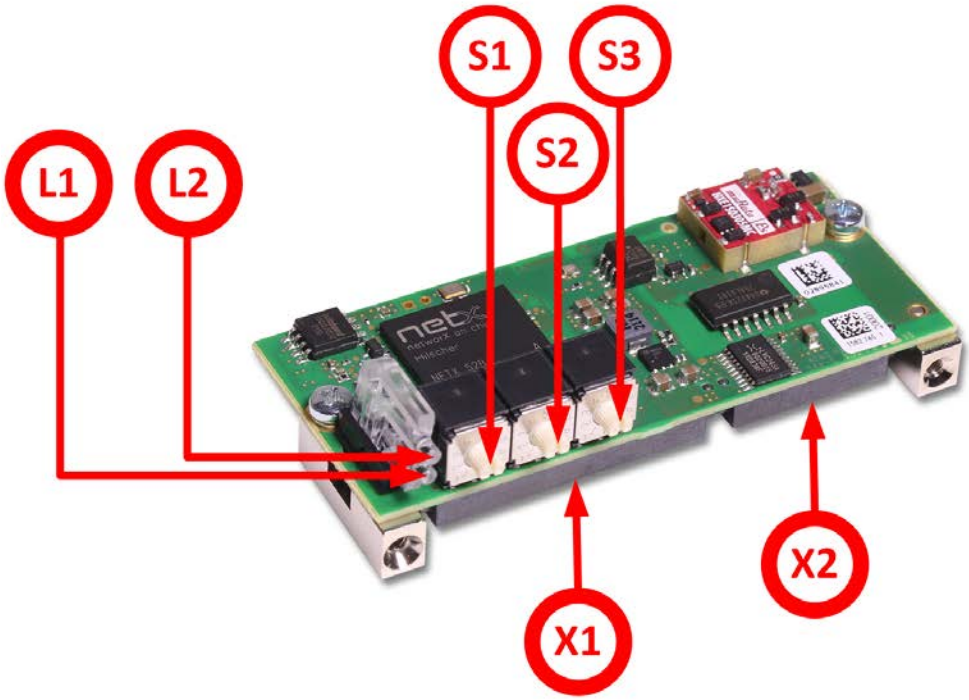


Figure 27: Photo of communication module COMX 52CN-CCS

LED Displays of COMX 52CN-CCS

L1 SYS-LED

L2 COM-LED

Address and baud rate switches of the COMX 52CN-CCS

S1 Address switch 1 for CC-Link Slave address (x10)

S2 Address switch 2 for CC-Link Slave address (x1)

S3 Baud rate switch

SMT connectors of the COMX 52CN-CCS (connection to Host)

X1 System interface

X2 CC-Link interface

7.15.2 Description of the address switches

For a description of the address switches of the COMX 52CN-CCS, see comX Design Guide.

7.15.3 CC-Link interface of COMX 52CN-CCS

For a description of the pin assignment of the CC-Link interface of the COMX 52CN-CCS, see comX Design Guide, subsection 3.1.6.

7.16 CANopen communication module COMX 52CN-COS

7.16.1 COMX 52CN-COS

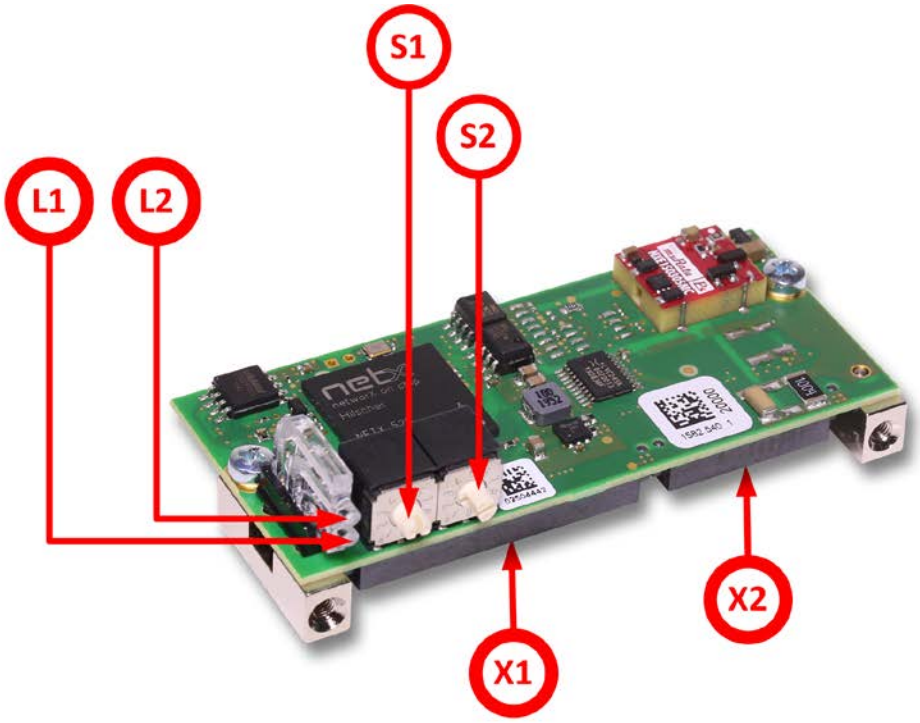


Figure 28: Photo of communication module COMX 52CN-COS

LED displays of COMX 52CN-COS

L1 SYS-LED

L2 COM-LED

SMT connectors of the COMX 52CN-COS (connection to Host)

X1 System interface

X2 CANopen interface

Address switches of COMX 52CN-COS

S1 Address switch 1

S2 Address switch 2

7.16.2 Description of the address switches

For a description of the address switches of the COMX 52CN-COS, see comX Design Guide.

7.16.3 CANopen interface of COMX 52CN-COS

For a description of the pin assignment of the CANopen interface of the COMX 52CN-COS, see comX Design Guide, subsection 3.1.6.

7.17 DeviceNet communication module COMX 52CN-DNS

7.17.1 COMX 52CN-DNS

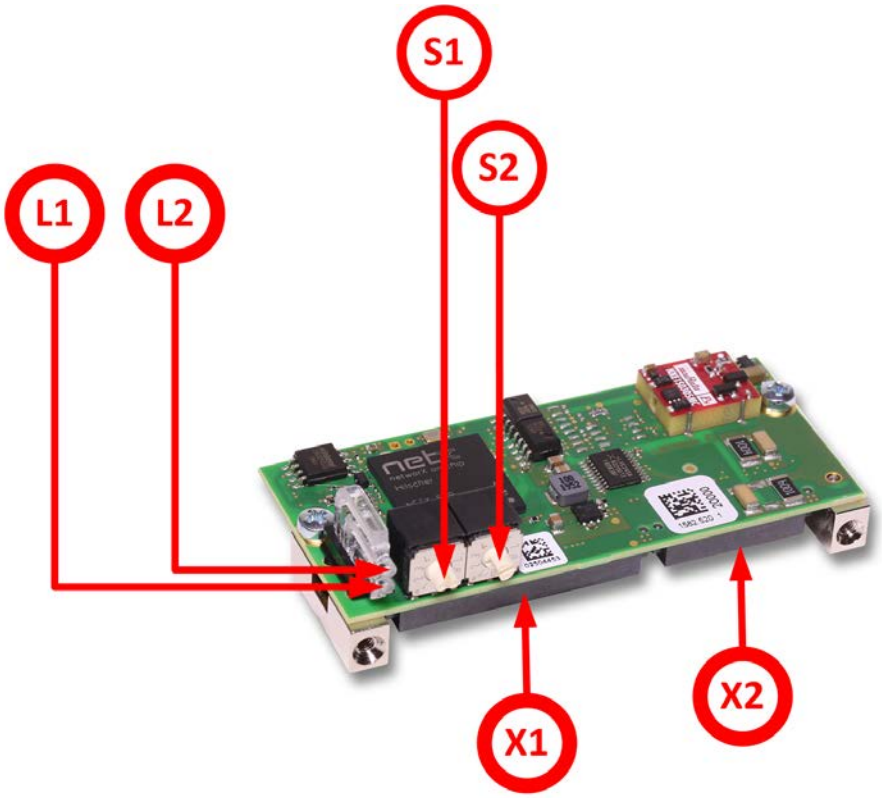


Figure 29: Photo of communication module COMX 52CN-DNS

LED displays of COMX 52CN-DNS

L1 SYS-LED

L2 COM-LED

SMT connectors of the COMX 52CN-DNS (connection to Host)

X1 System interface

X2 DeviceNet interface

Address switches of COMX 52CN-DNS

S1 Address switch 1

S2 Address switch 2

7.17.2 Description of the address switches

For a description of the address switches of the COMX 52CN-DNS, see comX Design Guide.

7.17.3 DeviceNet interface of COMX 52CN-DNS

For a description of the pin assignment of the DeviceNet interface of the COMX 52CN-DNS, see comX Design Guide, subsection 3.1.6.

7.18 PROFIBUS-DP communication module COMX 52CN-DPS

7.18.1 COMX 52CN-DPS

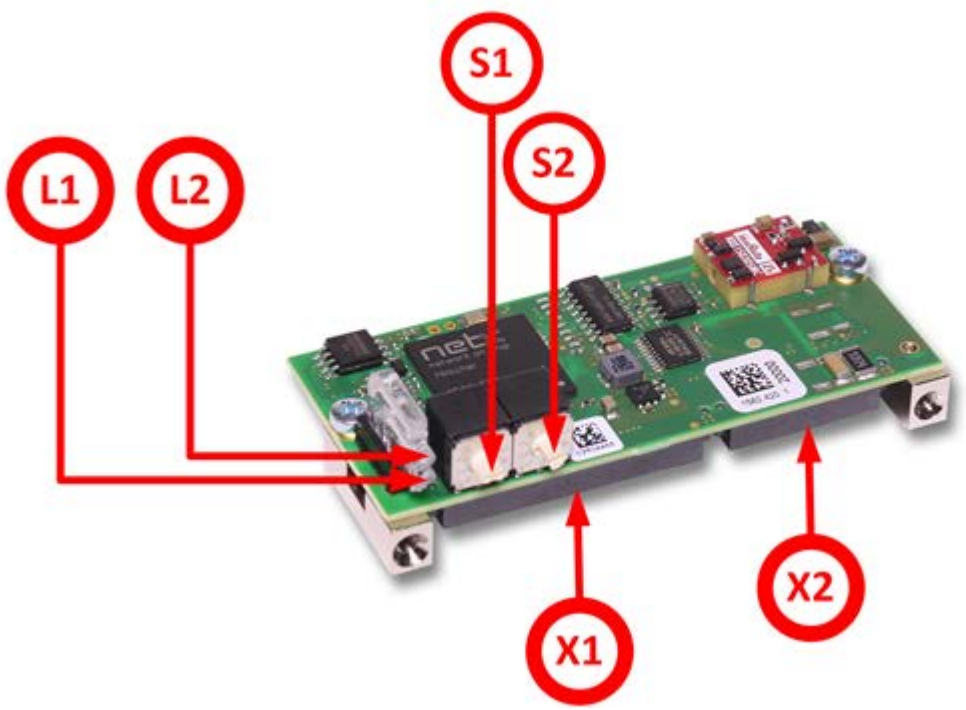


Figure 30: Photo of communication module COMX 52CN-DPS

LED displays of COMX 52CN-DPS

L1 SYS-LED

L2 COM-LED

SMT connectors of the COMX 52CN-DPS (Connection to host)

X1 System interface

X2 PROFIBUS-DP interface

Address switches of COMX 52CN-DPS

S1 Address switch 1

S2 Address switch 2

7.18.2 Description of the address switches

For a description of the address switches of the COMX 52 CN-DPS, see comX Design Guide.

7.18.3 PROFIBUS-DP interface of COMX 52CN-DPS

For a description of the pin assignment of the PROFIBUS-DP interface of the COMX 52CN-DPS, see comX Design Guide, subsection 3.1.6.

7.19 Real-Time Ethernet communication module COMX51CA-RE\R

7.19.1 COMX51CA-RE\R

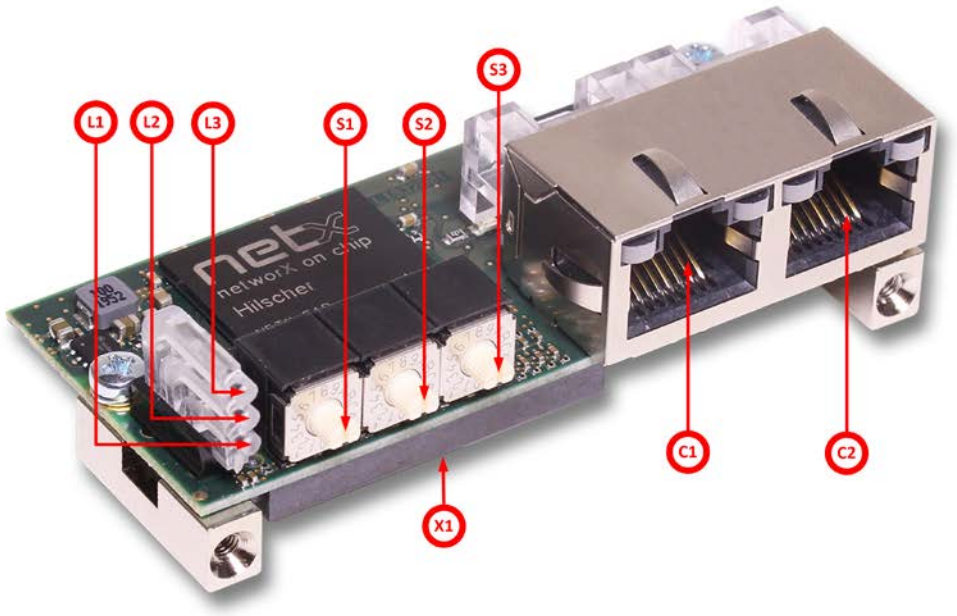


Figure 31: Photo of communication module COMX51CA-RE\R

LED displays of the COMX51CA-RE\R

L1 SYS LED

L2 COM0 LED

L3 COM1 LED

SMT connectors of the COMX51CA-RE\R (connection to host)

X1 System interface

Address switches of the COMX51CA-RE\R

S1 Rotary switch X100 for EtherCAT Slave address selection

S2 Rotary switch X10 for EtherCAT Slave address selection

S3 Rotary switch X1 for EtherCAT Slave address selection

Connectors of the COMX51CA-RE\R (connected to Real-time Ethernet)

Ethernet interface channel 0

Ethernet interface channel 1

7.19.2 Ethernet interface of COMX51CA-RE\R

See section *Ethernet interface of COMX 100CA-RE* on page 59.

8 Evaluation board COMXEB

8.1 Purpose

The evaluation board COMXEB allows the commissioning and testing of comX modules. With an evaluation board, you can connect a comX module to a PC or network via a host interface or diagnostic interface.

The COMXEB eases commissioning as you can configure the comX, load firmware into it, perform function tests, and diagnosis. For this purpose, it provides all necessary controls, displays, and interfaces, see *Figure 32* below.

Moreover, you can use the evaluation board with a mounted comX module to develop the application program on a PC and to test it via the host interface.

This chapter explains the basic function and describes the controls, displays, and interfaces of the evaluation board COMXEB.

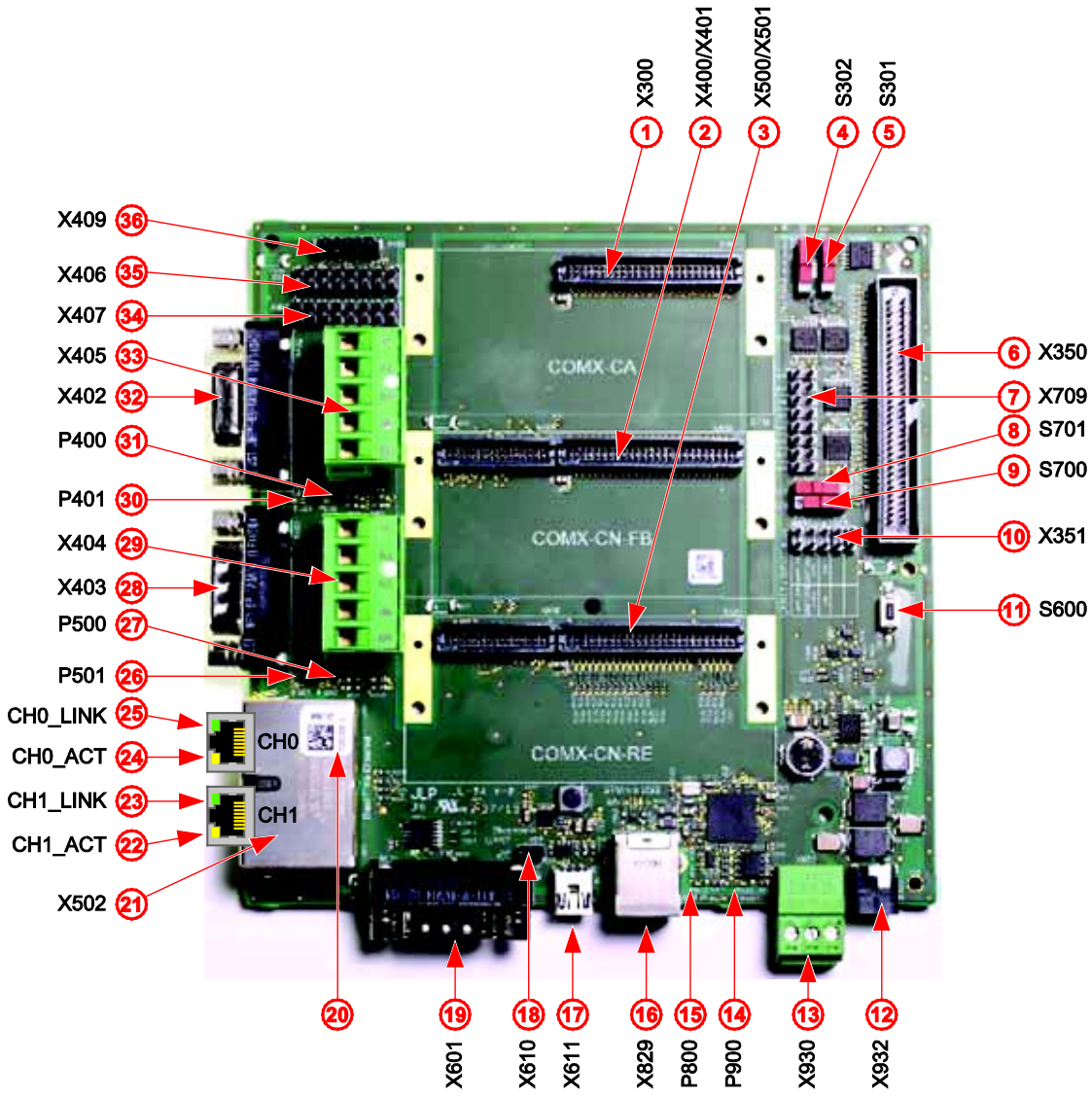


Figure 32: Evaluation board COMXEB

Figure 32 on page 90 shows a photo of the evaluation board COMXEB. All controls, displays, and interfaces are marked with a number. Table 26 explains the assignment of these numbers to the denominations and descriptions of these elements.

Number	Denomination	Meaning / Description	Page
(1)	X300	Interface for COMX CA modules	102
(2)	X400/X401	Interface COMX CN Fieldbus modules	104
(3)	X501/X500	Interface COMX CN Real-Time Ethernet modules	104
(4)	S302	Host mode selection	93
(5)	S301	Set Data width (8/16 Bit) for parallel DPM mode	94
(6)	X350	Host interface (Parallel dual-port memory interface, connection via CAB-NXPCA-PCI to NXPCA-PCI)	98
(7)	X709	SPM interface (as pin header)	100
(8)	S701	Selection of host operation mode (DPM/SPM)	93
(9)	S702	Selection of SPM connector	94
(10)	X351	Pin header SYNC/UART1	113
(11)	S600	Reset on	94
(12)	X932	Pin connector for external power supply (female)	97
(13)	X930	Common connector for alternative power supply (female)	97
(14)	P900	Power LED (entire COMXEB)	115
(15)	P800	Power LED of SPM USB interface	112
(16)	X829	SPM over USB interface	99
(17)	X611	USB diagnostic interface	112
(18)	X610	Jumper for boot mode	95
(19)	X601	RS-232 diagnostic interface (UART)	112
(20)	-	Matrix label (see section 18.1 “Matrix Label” in appendix for explanation	228
(21)	X502	Real-time Ethernet interface (2 Channels)	111
(22)	CH1_ACT	Ethernet Activity LED Channel 1 yellow	116
(23)	CH1_LINK	Ethernet Link LED Channel 1 green	116
(24)	CH0_ACT	Ethernet Activity LED Channel 0 yellow	116
(25)	CH0_LINK	Ethernet Link LED Channel 0 green	116
(26)	P501	Communication status STA0 (only for COMX-CN-RE modules)	115
(27)	P500	Communication status STA1 (only for COMX-CN-RE modules)	115
(28)	X403	CANopen interface	110
(29)	X404	DeviceNet interface	110
(30)	P401	Communication status STA	115
(31)	P400	LED (unused)	115
(32)	X402	PROFIBUS interface	110
(33)	X405	CC-Link interface	111
(34)	X407	Jumper for AIFX connector	95
(35)	X406	Jumper for AIFX connector	95
(36)	X409	AIFX connector	113

Table 26: Legend to COMXEB (Figure 32)

Assignment of comX modules to the sockets on the COMXEB

Table 27 explains which comX modules can be used in which socket on the COMXEB:

Socket/ interface	Module family	Module
Socket X300 **(1)**	comX CA module	COMX 52CA-CCS
		COMX 52CA-COS
		COMX 52CA-DNS
		COMX 52CA-DPS
		COMX 51CA-RE
		COMX 51CA-RE\R
		COMX 100CA-RE
		COMX 100CA-CO
		COMX 100CA-DN
		COMX 100CA-DP
Socket X400/X401 **(2)**	comX CN Fieldbus module	COMX 52CN-CCS
		COMX 52CN-COS
		COMX 52CN-DNS
		COMX 52CN-DPS
		COMX 100CN-CO
		COMX 100CN-DN
		COMX 100CN-DP
Socket X500/X501 **(3)**	comX CN-RE module	COMX 51CN-RE
		COMX 100CN-RE

Table 27: Assignment of comX modules to the sockets on the COMXEB:

Host connection and operating modes

The host connection is usually accomplished via a parallel DPM interface (X350 **(6)**). If comX modules with netX 51 or netX 52 are used, a serial DPM interface is alternatively available.

The following operating modes are available:

- Operating modes with parallel DPM (for all comX module types)
  - DPM 8-bit (see page 118)
  - DPM 16-bit (see page 118)
- Operating modes with serial DPM (SPI 50 MHz, only for comX 51 and comX 52)
  - SPM via pin header X709 **(7)** (see page 119)
  - SPM via USB type B interface X829 **(16)** (see page 120)

Setting the operating modes

For information on setting the operating modes, see section *Controls* on page 93.

8.2 Controls

For more information on this topic, see section *Setting the slide switches depending on the host interface selection* on page 101.

8.2.1 Board or host-controlled host mode selection – slide switch (S302)

The setting of slide switch S302 **(4)** decides between *host-controlled* and *board-controlled* mode of operation of the COMXEB.

Position of switch	Description
	Host mode option **Board-controlled** Set the slide switch S302 **(4)**, to position *Board* if you set the host mode with Slide switch S701 **(8)** and - if necessary - the data width for DPM (8/16-bit) with Slide switch S301 **(5)** on the COMXEB.
	Host mode option **Host-controlled** With slide switch S302 at the COMXEB, you determine which interface the comX uses for its communication with the host (DPM or SPM) and (if you choose the DPM interface) also its data width (8 or 16 bit). To set which host interface (DPM or SPM) is used, set switch S302 to "Board" on the COMXEB board. You can then use slide switch S701 on the COMXEB to select the desired host interface (DPM or SPM). When using the DPM interface, you can also set the data width (8 or 16 bits) with slide switch S301. When using the SPM interface, each byte is transmitted individually, i.e. the data width cannot be set here. To set (at the host) which host interface (DPM or SPM) is used, set switch S302 to "Host". The true selection of the used host interface is then made with the switch at the NXPCA-PCI. When using the DPM interface, you can additionally set the data width (8 or 16 bit) by another comX signal. When using the SPM interface, this signal will not be not be evaluated. This requires the correct connection of the lines `DPM_DIRQ#` and `DPM_SIRQ#` of X350 to the host.

Table 28: Position for host mode selection- slide switch (S302)

8.2.2 Selection of host mode (DPM/SPM) – slide switch (S701)

This slide switch (S701) **(8)** selects the operating mode DPM or SPM if the option *Board-controlled* of slide switch S302 **(4)** has been chosen.

Position of switch	Description
	SPM mode of operation - serial dual port memory If the application uses serial DPM for host connection, switch to *SPM*.
	**DPM mode of operation - parallel dual port memory** If the application uses parallel DPM for host connection, switch to *DPM*.

Table 29: Selection of operating mode (DPM/SPM) - slide switch (S701)

Otherwise, if the slide switch S302 **(4)** has been set to option *Host-controlled,* the host will evaluate whether DPM or SPM mode is used.

Note: The selection of the DPM or SPM mode will get valid if the comX module is reset.

8.2.3 Data access width with parallel DPM mode – slide switch (S301)

Slide switch S301 **(5)** allows switching between data access to parallel DPM with a width of 8 or 16 bit.

Position of switch	Description
	DPM data access width: 16 bit
	DPM data access width: 8 bit

Table 30: Data access width with parallel DPM mode - slide switch (S301)

- However, this is relevant only in the DPM mode which is set with slide switch S701 **(8)** and slide switch S302 **(4)**.

Note: A power cycle is necessary to switch from 8 to 16-bit data width and vice versa because the data width is read and set during start-up only.

8.2.4 Selection of serial interface – slide switch (S700)

Slide switch S700 **(9)** alternatively activates pin header X709 or USB interface X829.

Position of switch	Description
	SPM signals are connected with pin header X709 **(7)**
	SPM signals are connected to USB interface X829 **(16)** (via FTDI chip).

Table 31: Selection of serial interface - slide switch (S700)

- However, this is relevant only in the SPM mode which is set with slide switch S701 **(8)** and slide switch S302 **(4)**.

8.2.5 Reset push button (S600)

Pressing the push button S600 **(11)** initiates a reset of the comX module.

8.2.6 Boot jumper (X610)

If you intend to activate the serial boot mode via USB, set boot jumper X610 **(18)**. The start-up behavior is as follows:

- When boot jumper X610 **(18)** is open, the comX module starts the firmware directly.
- When boot jumper X610 **(18)** is set, the comX module stays in the serial boot mode. The SYS LED on the comX communication module is blinking yellow. In this mode, the comX is able to load a new code such as a second-stage boot loader via USB (or UART) and to execute it thereafter.

Note: Boot jumper X610 **(18)** does not have any effect if no device is connected to the USB diagnosis connector X611.

8.2.7 Configuration of AIFX interface – jumpers (X406 and X407)

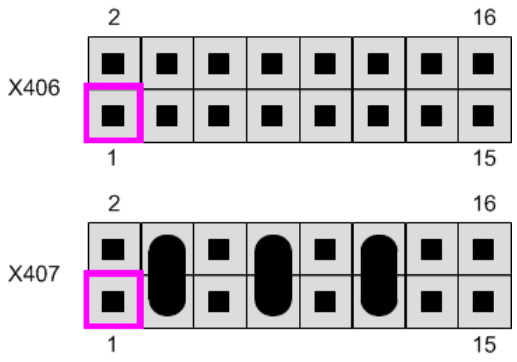
These jumpers serve to configure extension interface X409 **(36)** for connection to an AIFX which is available as accessory for PROFIBUS, CANopen, DeviceNet, and CC-Link.

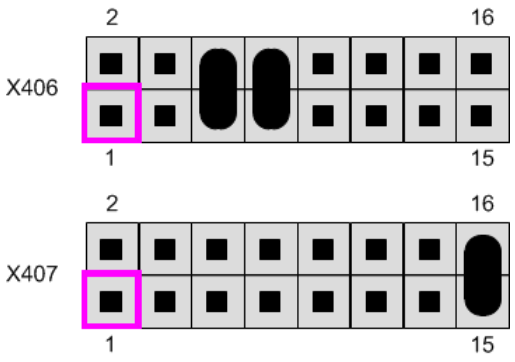
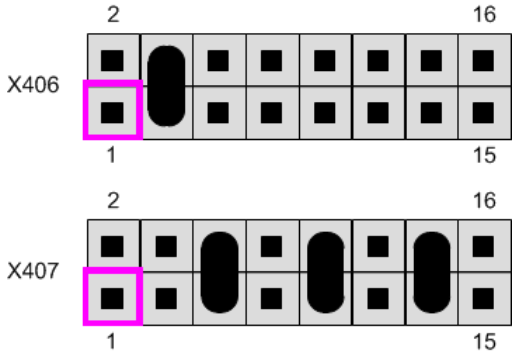
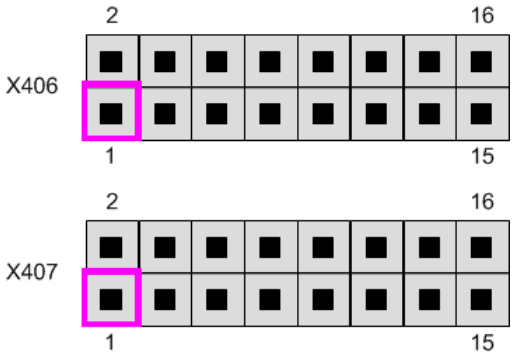
Important: Set the jumpers only in case of a comX with TTL signals (COMX-CN... \NIF) mounted in COMX interfaces X400 **(2)** and X401 **(2)**.

CAUTION

Short circuit

Never set a jumper between positions 1 and 2 of jumper field X406 **(35)** or X407 **(34)**!

Fieldbus	Jumper	Description
PROFIBUS	 *Figure 33:Jumper settings for using X409 as a PROFIBUS interface*	Set the jumpers X406 **(35)** and X407 **(34)** according to *Figure 33* if you want to use an AIFX-DP at the AIFX interface X409 **(36)**.

Fieldbus	Jumper	Description
CANopen/ DeviceNet	 *Figure 34: Jumper settings for using X409 as a CANopen/ DeviceNet interface*	Set the jumpers X406 **(35)** and X407 **(34)** according to *Figure 34* if you want to use an AIFX-CO or an AIFX-DN at the AIFX interface X409 **(36)**.
CC-Link	 *Figure 35: Jumper settings for using X409 as a CC-Link interface*	Set the jumpers X406 **(35)** and X407 **(34)** according to *Figure 35* if you want to use an AIFX-CC at the AIFX interface X409 **(36)**.
No AIFX	 *Figure 36: Jumper settings for using X409 without AIFX*	Remove all jumpers from X406 **(35)** and X407 **(34)** (see *Figure 36*), if you do not connect to an AIFX at the AIFX interface **(36)**.

8.3 Interfaces and connectors

8.3.1 Power supply connectors

8.3.1.1 Socket for barrel connector of power adaptor X932

Evaluation board COMXEB must be supplied with DC in the voltage range between 18 V and 30 V. Usually, this is done by an adaptor whose barrel connector has to be put into socket X932 **(12)**. The typical supply voltage of that adaptor is 24 V DC ± 6 V DC.

The power consumed mainly depends on the type of the comX module used. For more details, see the comX Design Guide.

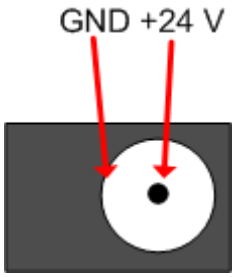
X932	Pin	Name
	1	GND
	2	+24 V DC

Figure 37: Pin assignment of power supply socket X932

The corresponding barrel connector of the power adaptor looks like that:

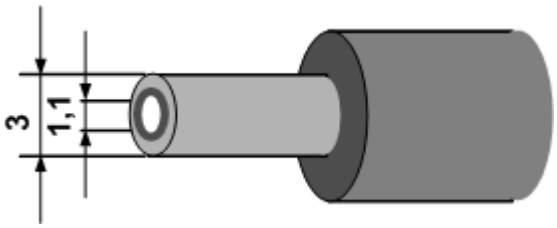


Figure 38: Barrel connector of the power adaptor

8.3.1.2 CombiCon connector for external power supply X930

Alternatively, external power supply of the COMXEB is possible via the green CombiCon connector X930 **(13)** (3-pin).

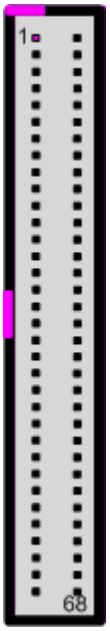
X930	Pin	Name
	1	GND
	2	+24 V DC
	3	FE

Table 32: Pin assignment of CombiCon connector X930 for external power supply

8.3.2 Host interfaces

8.3.2.1 Parallel DPM interface – pin header X350

Table 33: Pin assignment host interface X350 shows the pin assignment of the 68-pin DPM interface X350 **(6)**.

X350	Pin	Signal
	1	
	2	GND
	3	
	4	
	5	GND
	6	
	7	RES_DPM_IN#
	8	
	9	
	10	
	11	DPM_DIRQ#
	12	DPM_BUSY#
	13	GND
	14	DPM_RD#
	15	
	16	DPM_WR#
	17	GND
	18	DPM_SIRQ#
	19	DPM_BHE#
	20	GND
	21	
	22	
	23	
	24	DPM_CS#
	25	GND
	26	
	27	
	28	
	29	
	30	
	31	
	32	
	33	GND
	34	
	35	
	36	DPM_A13
	37	DPM_A12
	38	DPM_A11
	39	DPM_A10
	40	DPM_A09
	41	DPM_A08
	42	DPM_A07

	43	DPM_A06
	44	DPM_A05
	45	DPM_A04
	46	DPM_A03
	47	DPM_A02
	48	DPM_A01
	49	DPM_A00
	50	GND
	51	IN_DPM_D15
	52	IN_DPM_D14
	53	IN_DPM_D13
	54	IN_DPM_D12
	55	IN_DPM_D11
	56	IN_DPM_D10
	57	IN_DPM_D09
	58	IN_DPM_D08
	59	DPM_D07
	60	DPM_D06
	61	DPM_D05
	62	DPM_D04
	63	DPM_D03
	64	DPM_D02
	65	DPM_D01
	66	DPM_D00
	67	-
	68	-

Table 33: Pin assignment host interface X350

For a description of the use of the DPM via USB interface, see section *Parallel dual-port memory interface (DPM)* on page 118.

8.3.2.2 Serial DPM interface – USB socket (X829)

The USB interface X829 **(16)** for accessing the serial dual-port memory is implemented as a USB socket of type B on the evaluation board COMXEB.

This interface is currently not supported; it is reserved for future applications.

8.3.2.3 SPM interface – pin header X709

The SPI interface provides signals for connection to a host system (i.e. SPI master).

The signals of the serial DPM interface of the evaluation board COMXEB can be routed to pin header X709 **(7)** (16-pin) if corresponding settings are made at switches S700 **(9)** (Switch SPM to pin header, FTDI chip will not be used) and S701 **(8)** (SPM mode).

The pin assignment of pin header X709 **(7)** is as follows:

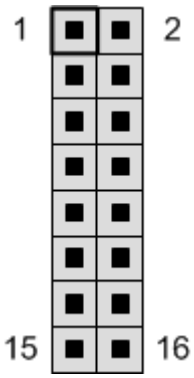
X709	Pin	Signal	Comment
	1	SPM_MISO	required
	2	+3V3	output voltage
	3	SPM_MOSI	required
	4	GND	required
	5	SPM_CSn	required
	6	GND	required
	7	SPM_CLK	required
	8	GND	required
	9	SPM_DIRQn	optional
	10	GND	required
	11	SPM_SIRQn	optional
	12	GND	required
	13	SPM_SIO2	reserved
	14	GND	required
	15	SPM_SIO3	reserved
	16	GND	required

Table 34: Pin assignment of SPM interface – pin header X709

The SPI connection should work like this:

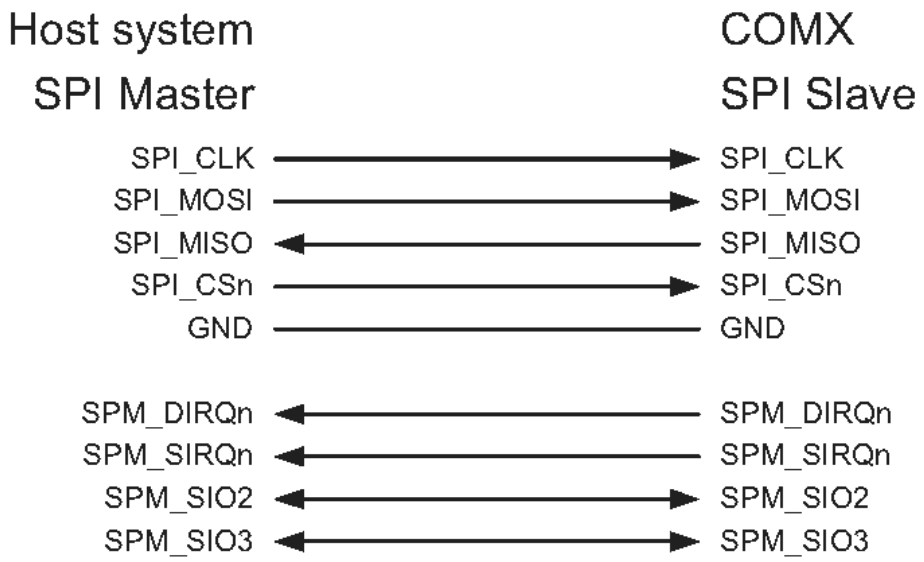


Figure 39: SPI-master-slave-connection

This figure also illustrates the directions of the individual signals. At least, connect the signals `SPI_CLK`, `SPI_CSn`, `SPI_MOSI`, `SPI_MISO`, and `GND` within your design.

8.3.2.4 Setting the slide switches depending on the host interface selection

Only one of the three host interfaces X350 **(6)**, X709 **(7)** or X829 **(16)** can be used synchronously. The selection of the host interface to be used depends on the settings of the slide switches S302, S701, S301 and S700.

Mode *Board-controlled*

For the operation of host interfaces X350 **(6)**, X709 **(7)**, and X829 **(16)**, the slide switches described in section *Controls* on page 93 must be set according to *Table 35: Settings for selecting the host interface*

Activated host interface	S302	S701	S700	S301
Parallel DPM interface X350 **(6)** 8-bit mode	 Board	DPM 	Setting is not relevant	 8-bit
Parallel DPM interface X350 **(6)** 16-bit mode	 Board	DPM 	Setting is not relevant	 16-bit
Serial DPM interface X709 **(7)** (pin header)	 Board	SPM 	X709 	Setting is not relevant
Serial DPM interface X829 **(16)** (SPM via USB)	 Board	SPM 	X829 	Setting is not relevant

*Table 35: Settings for selecting the host interface in mode **Board-controlled***

Mode *Host-controlled*

In the mode *Host-controlled*, the firmware of the comX module evaluates the signals `DPM_DIRQn` and `DPM_SIRQn` of the parallel DPM interface X350 **(6)**.

The selection of the host interface additionally depends on signal `DPM_DIRQn` in this mode. Signal `DPM_SIRQn` determines whether the 8 or 16-bit mode is selected for operating the parallel DPM interface X350 **(6)**, see below.

For operating host interfaces X350 **(6)**, X709 **(7)**, and X829 **(16)** in the mode *Host-controlled*, the following settings and signals are required. Proceed according to *Table 36: Settings for selecting the host interface in the **mode** **Host-controlled***:

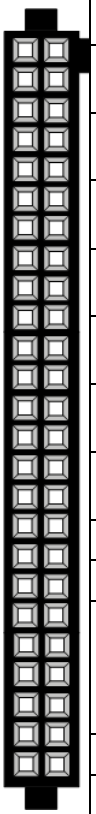
Activated host interface	S302	Signal DPM_DIRQ	S700	Signal DPM_SIRQ
Parallel DPM interface X350 **(6)**	 Host	1 (parallel mode, default)	Setting is not relevant	Selection of 8 or 16-bit mode: `DPM_SIRQ=1` selects the 8-bit mode `DPM_SIRQ=0` selects the 16-bit mode
Serial DPM interface X709 **(7)** (pin header)	 Host	0 (serial mode)	X709 	Signal is not relevant
Serial DPM interface X829 **(16)** (SPM via USB)	 Host	0 (serial mode)	X829 	Signal is not relevant

*Table 36: Settings for selecting the host interface in the mode **Host-controlled***

8.3.3 COMX interfaces

8.3.3.1 Interface for COMX CA fieldbus modules – pin header (X300)

Table 37: Pin assignment comX interface X300 shows the pin assignment of the 50-pin interface X300 **(1)** for connecting all comX-CA communication modules.

X300	Pin	Signal (parallel mode)	Symbol (parallel mode)	Signal (serial mode)	Symbol (serial mode)
	1	Word interface, active low	DPM_SIRQ#	reserved	
	2	Bus high enable, active low	DPM_BHE#	reserved	
	3	Data line 15	DPM_D15	reserved	
	4	Data line 14	DPM_D14	reserved	
	5	Data line 13	DPM_D13	SPM_SIRQ#	SPM_SIRQ#
	6	Data line 12	DPM_D12	SPM_DIRQ#–	SPM_DIRQ#
	7	Data line 11	DPM_D11	Clock	SPM_CLK
	8	Data line 10	DPM_D10	Chip select, active low	SPM_CS#
	9	Data line 9	DPM_D9	Master Out Slave In	SPM_MOSI
	10	Data line 8	DPM_D8	Master In Slave Out	SPM_MISO
	11	Ground	GND	Ground	GND
	12	Power supply	+3V3	Power supply	+3V3
	13	Transmit data, serial line	UART1_TXD	Transmit data, serial line	UART1_TXD
	14	Receive data, serial line	UART1_RXD	Receive data, serial line	UART1_RXD
	15	Request to Send, serial line & SYNC0	UART1_RTS#/ SYNC0	Request to Send, serial line & SYNC0	UART1_RTSn/ SYNC0
	16	Clear to Send, serial line & SYNC1	UART1_CTS#/ SYNC1	Clear to Send, serial line & SYNC1	UART1_CTSn/ SYNC1
	17	USB positive, diagnostic line	USB+	USB positive, diagnostic line	USB+
	18	USB negative, diagnostic line	USB-	USB negative, diagnostic line	USB-
	19	Receive data, diagnostic line	UART0_RXD	Receive data, diagnostic line	UART0_RXD
	20	Transmit data, diagnostic line	UART0_TXD	Transmit data, diagnostic line	UART0_TXD
	21	Reset, active low	DPM_RESET#	Reset, active low	DPM_RESETn
	22	Busy, active low	DPM_BUSY#	-	-
	23	During operation: Interrupt, active low COMX 51, COMX 52 at start-up: Host mode selection	DPM_DIRQ#	DPM_DIRQn	COMX 51, COMX 52 at start-up: Host mode selection
	24	Read, active low	DPM_RD#		
	25	Write, active low	DPM_WR#		
	26	Chip select, active low	DPM_CS#		
	27	Address line 13	DPM_A13		
	28	Address line 12	DPM_A12		
	29	Address line 11	DPM_A11		
	30	Address line 10	DPM_A10		
	31	Address line 9	DPM_A9		

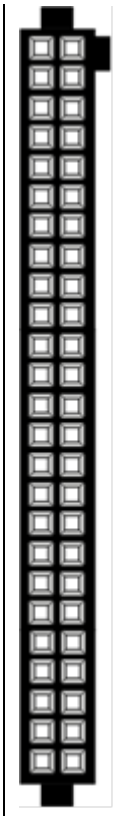
	32	Address line 8	DPM_A8		
	33	Address line 7	DPM_A7		
	34	Address line 6	DPM_A6		
	35	Address line 5	DPM_A5		
	36	Address line 4	DPM_A4		
	37	Address line 3	DPM_A3		
	38	Address line 2	DPM_A2		
	39	Address line 1	DPM_A1		
	40	Address line 0	DPM_A0		
	41	Data line 7	DPM_D7		
	42	Data line 6	DPM_D6		
	43	Data line 5	DPM_D5		
	44	Data line 4	DPM_D4		
	45	Data line 3	DPM_D3		
	46	Data line 2	DPM_D2		
	47	Data line 1	DPM_D1		
	48	Data line 0	DPM_D0		
	49	Ground	GND	Ground	GND
	50	Power supply	+3V3	Power supply	+3V3

Table 37: Pin assignment comX interface X300

8.3.3.2 Interfaces for COMX CN fieldbus modules – pin header (X400/X401)

Table 38: Pin assignment comX-interface X400 shows the pin assignment of the 50-pin interface X400 **(2)** for connecting all comX-CN communication modules for Fieldbus systems.

X400	Pin	Signal (parallel mode)	Symbol (parallel mode)	Signal (serial mode)	Symbol (serial mode)
	1	Word Interface, active low	DPM_SIRQ#	reserved	
	2	Bus high enable, active low	DPM_BHE#	reserved	
	3	Data line 15	DPM_D15	reserved	
	4	Data line 14	DPM_D14	reserved	
	5	Data line 13	DPM_D13	SPM_SIRQ#	SPM_SIRQ#
	6	Data line 12	DPM_D12	SPM_DIRQ#	SPM_DIRQ#
	7	Data line 11	DPM_D11	Clock	SPM_CLK
	8	Data line 10	DPM_D10 SPM_CS#	Chip select, active low	
	9	Data line 9	DPM_D9	Master Out Slave In	SPM_MOSI
	10	Data line 8	DPM_D8	Master In Slave Out	SPM_MISO
	11	Ground	GND	Ground	GND
	12	Power supply	+3V3	Power supply	+3V3
	13	Transmit data, serial line	UART1_TXD	Transmit data, serial line	UART1_TXD
	14	Receive data, serial line	UART1_RXD	Receive data, serial line	UART1_RXD
	15	Request to Send, serial & SYNC0	UART1_RTS#/ SYNC0	Request to Send, serial & SYNC0	UART1_RTS#/ SYNC0
	16	Clear to Send, serial & SYNC1	UART1_CTS#/ SYNC1	Clear to Send, serial & SYNC1	UART1_CTS#/ SYNC1
	17	USB positive, diagnostic line	USB+	USB positive, diagnostic line	USB+
	18	USB negative, diagnostic line	USB-	USB negative, diagnostic line	USB-
	19	Receive data, diagnostic line	UART0_RXD	Receive data, diagnostic line	UART0_RXD
	20	Transmit data, diagnostic line	UART0_TXD	Transmit data, diagnostic line	UART0_TXD
	21	Reset, active low	DPM_RESET#	Reset, active low	DPM_RESET#
	22	Busy, active low	DPM_BUSY#		
	23	During operation: Interrupt, active low COMX 51, COMX 52 at start-up: Host mode selection	DPM_DIRQ#	COMX 51, COMX 52 at start-up: Host mode selection	DPM_DIRQn
	24	Read, active low	DPM_RD#		
	25	Write, active low	DPM_WR#		
	26	Chip select, active low	DPM_CS#		
	27	Address line 13	DPM_A13		
	28	Address line 12	DPM_A12		
	29	Address line 11	DPM_A11		
	30	Address line 10	DPM_A10		
	31	Address line 9	DPM_A9		
	32	Address line 8	DPM_A8		



33	Address line 7	DPM_A7		
34	Address line 6	DPM_A6		
35	Address line 5	DPM_A5		
36	Address line 4	DPM_A4		
37	Address line 3	DPM_A3		
38	Address line 2	DPM_A2		
39	Address line 1	DPM_A1		
40	Address line 0	DPM_A0		
41	Data line 7	DPM_D7		
42	Data line 6	DPM_D6		
43	Data line 5	DPM_D5		
44	Data line 4	DPM_D4		
45	Data line 3	DPM_D3		
46	Data line 2	DPM_D2		
47	Data line 1	DPM_D1		
48	Data line 0	DPM_D0		
49	Ground	GND	Ground	GND
50	Power Supply	+3V3	Power Supply	+3V3

Table 38: Pin assignment comX-interface X400

Table 39: Pin assignment comX-interface X401 shows the pin assignment of the 30-pin interface X401 **(2)** for connecting all comX-CN communication modules for Fieldbus systems.

X401	Pin	Signal	Symbol
	1	PROFIBUS, receive data	DP_RX
	2	CC-Link receive driver enable, active low	*CC_RDE#*
	3	PROFIBUS, transmit data	DP_TX
	4	CC-Link, transmission period signal	*CC_SDGATON*
	5	PROFIBUS, enable bus driver	DP_EN
	6	CC-Link, transmission data	*CC_SD*
	7	*CAN, receive data (CANopen/DeviceNet)*	*CO_RX/DN_RX*
	8	CC-Link, received data (channel 1)	*CC_RD*
	9	*CAN, Transmit data (CANopen/DeviceNet)*	*CO_TX/DN_TX*
	10		STA2#
	11	*CAN, power fail*	CAN_PF
	12		ERR2#
	13	COM-LED, STA, cathode green LED	STA#
	14	SYS-LED, RUN, cathode green LED	RUN#
	15	COM-LED, ERR, cathode red LED	ERR#
	16	SYS-LED, RDY, cathode yellow LED	RDY#
	17	Ground	GND
	18	Power supply (+3.3 V)	+3V3
	19	Peripheral IO	PIO
	20	Do not use – required for isolation	
	21	Do not use – required for isolation	
	22	PROFIBUS reference potential	DP_ISOGND
	23	PROFIBUS control CAN_H bus line	DP_CNTR-P CO_H
	24		
	25	PROFIBUS receive / send data -N	DP_RXD_TXD-N
	26	PROFIBUS, receive / send data-P CANopen, CAN ground DeviceNet, reference potential CC-Link, data A	DP_RXD_TXD-P CO_DN_V- CO_DN_V- CC_DA
	27	DeviceNet, CAN Low signal CC-Link, data B	DN_CAN_L CC_DB
	28	DeviceNet, drain CC-Link, data ground	CO_DRAIN CC_DG
	29	PROFIBUS, Positive power supply CANopen, CAN_L bus line DeviceNet, CAN High signal CC-Link, function ground	DP_VP CO_L DN_CAN_H CC_FG
	30	DeviceNet +24V power supply CC-Link, shield	DN_V+ CC_SLD

Table 39: Pin assignment comX-interface X401

8.3.3.3 Interfaces for COMX CN communication modules for Real-Time Ethernet – pin header X500/X501

Table 40: Pin assignment comX-interface X501 shows the pin assignment of the 50-pin interface X501 **(3)** for connecting all comX-CN communication modules for Real-Time Ethernet.

X501	Pin	Signal (parallel mode)	Symbol (parallel mode)	Signal (serial mode)	Symbol (serial mode)
	1	Word Interface, active low	DPM_SIRQ#	reserved	
	2	Bus high enable, active low	DPM_BHE#	reserved	
	3	Data line 15	DPM_D15	reserved	
	4	Data line 14	DPM_D14	reserved	
	5	Data line 13	DPM_D13	SPM_SIRQ#–	SPM_SIRQ#
	6	Data line 12	DPM_D12	SPM_DIRQ#–	SPM_DIRQ#
	7	Data line 11	DPM_D11	Clock	SPM_CLK
	8	Data line 10	DPM_D10	Chip select, active low	SPM_CS#
	9	Data line 9	DPM_D9	Master Out Slave In	SPM_MOSI
	10	Data line 8	DPM_D8	Master In Slave Out	SPM_MISO
	11	Ground	GND	Ground	GND
	12	Power supply	+3V3	Power supply	+3V3
	13	Transmit data, serial line	UART1_TXD	Transmit data, serial line	UART1_TXD
	14	Receive data, serial line	UART1_RXD	Receive data, serial line	UART1_RXD
	15	SYNC0 & Request to Send, serial line	SYNC0/ UART1_RTS#	SYNC0 & Request to Send, serial line	SYNC0/ UART1_RTS#
	16	SYNC1 & Clear to Send, serial line	SYNC1/ UART1_CTS#	SYNC1 & Clear to Send, serial line	SYNC1/ UART1_CTS#
	17	USB positive, diagnostic line	USB+	USB positive, diagnostic line	USB+
	18	USB negative, diagnostic line	USB-	USB negative, diagnostic line	USB-
	19	Receive data, Diagnostic line	UART0_RXD	Receive data, diagnostic line	UART0_RXD
	20	Transmit data, diagnostic line	UART0_TXD	Transmit data, diagnostic line	UART0_TXD
	21	Reset, active low	DPM_RESET#	Reset, active low	DPM_RESET#
	22	Busy, active low	DPM_BUSY#		
	23	During operation: Interrupt, active low COMX 51, COMX 52 at start-up: Host mode selection	DPM_DIRQ#	COMX 51, COMX 52 at start-up: Host mode selection	DPM_DIRQn
	24	Read, active low	DPM_RD#		
	25	Write, active low	DPM_WR#		
	26	Chip select, active low	DPM_CS#		
	27	Address line 13	DPM_A13		
	28	Address line 12	DPM_A12		
	29	Address line 11	DPM_A11		
	30	Address line 10	DPM_A10		

	31	Address line 9	DPM_A9		
	32	Address line 8	DPM_A8		
	33	Address line 7	DPM_A7		
	34	Address line 6	DPM_A6		
	35	Address line 5	DPM_A5		
	36	Address line 4	DPM_A4		
	37	Address line 3	DPM_A3		
	38	Address line 2	DPM_A2		
	39	Address line 1	DPM_A1		
	40	Address line 0	DPM_A0		
	41	Data line 7	DPM_D7		
	42	Data line 6	DPM_D6		
	43	Data line 5	DPM_D5		
	44	Data line 4	DPM_D4		
	45	Data line 3	DPM_D3		
	46	Data line 2	DPM_D2		
	47	Data line 1	DPM_D1		
	48	Data line 0	DPM_D0		
	49	Ground	GND	Ground	GND
	50	Power Supply	+3V3	Power Supply	+3V3

Table 40: Pin assignment comX-interface X501

Table 41: Pin assignment comX-interface X500 shows the pin assignment of the 30-pin interface X500 **(3)** for connecting all comX-CN communication modules for Real-Time Ethernet.

X500	Pin	Signal	Symbol
	1	Link-LED channel 0 cathode green, active low	CH0_LINK#
	2	TX/RX-LED channel 0 cathode yellow, active low	CH0_TXRX#
	3	Link-LED channel 1 cathode green, active low	CH1_LINK#
	4	TX/RX-LED channel 1 cathode yellow, active low	CH1_TXRX#
	5	Transmit data positive channel 0	PHY0_TXP
	6	Transmit data negative channel 0	PHY0_TXN
	7	Transmit center tap channel 0	PHY0_TXCT
	8	Ground	GND
	9	Receive data positive channel 0	PHY0_RXP
	10	Receive data negative channel 0	PHY0_RXN
	11	Receive center tap channel 0	PHY0_RXCT
	12	Ground	GND
	13	Transmit data positive channel 1	PHY1_TXP
	14	Transmit data negative channel 1	PHY1_TXN
	15	Transmit center tap channel 1	PHY1_TXCT
	16	Ground	GND
	17	Receive data positive channel 1	PHY1_RXP
	18	Receive data negative channel 1	PHY1_RXN
	19	Receive center tap channel 1	PHY1_RXCT
	20	Ground	GND
	21	Status-LED channel 0 cathode red, active low	STA0_CR#
	22	Status-LED channel 0 cathode green, active low	STA0_CG#
	23	Status-LED channel 1 cathode red, active low	STA1_CR#
	24	Status-LED channel 1 cathode green, active low	STA1_CG#
	25	SYS-LED, RDY, cathode yellow LED, active low	RDY#
	26	SYS-LED, RUN, cathode green LED, active low	RUN#
	27	Peripheral IO	PIO
	28	-	
	29	-	
	30	-	

Table 41: Pin assignment comX-interface X500

8.3.4 Communication interfaces

8.3.4.1 PROFIBUS-DP interface X402

The figure in Table 42 shows the PROFIBUS-DP interface X402 **(32)** (9-pin D-Sub, female) of the evaluation board COMXEB. The table itself explains the individual signals:

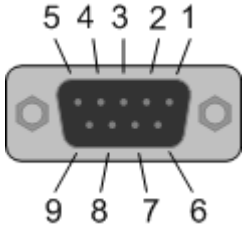
X402	Pin	Signal	Description
	3	DP_RXD_TXD-P	Transmit /receive data-P or pin B at the male connector
	4	DP_CNTR-P	PROFIBUS control
	5	DP_ISOGND	Data reference potential
	6	DP_VP	Supply voltage +
	8	DP_RXD_TXD-N	Transmit /receive data-N or pin A at the male connector

Table 42: Pin assignment of the PROFIBUS-DP interface of COMXEB

8.3.4.2 CANopen interface X403

The figure in Table 43 shows the CANopen interface X403 **(28)** (9-pin D-Sub, male) of the evaluation board COMXEB. The table itself explains the individual signals:

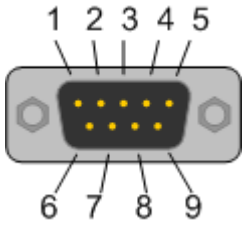
X403	Pin	Signal	Description
	2	CO_L	CAN-Low-line
	3	CO_DN_V-	CAN reference potential
	7	CO_H	CAN-High line

Table 43: Pin assignment of the CANopen interface of COMXEB

8.3.4.3 DeviceNet interface X404

The figure in Table 44 shows the DeviceNet interface X404 **(29)** (5-pin CombiCon male connector) of the evaluation board COMXEB. The table itself explains the individual signals:

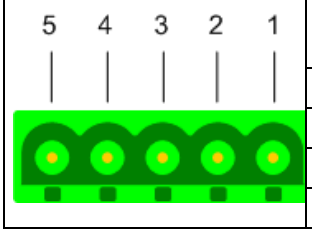
X404	Pin	Signal	Color	Description
	1	CO_DN_V-	Black	Data reference potential of DeviceNet-power supply
	2	DN_CAN_L	Blue	CAN Low-signal
	3	CO_DRAIN		Shield
	4	DN_CAN_H	White	CAN High-signal
	5	DN_V+	Red	+24 V DeviceNet power supply

Table 44: Pin assignment of the DeviceNet interface of COMXEB

8.3.4.4 CC-Link interface X405

The figure in Table 45 shows the CC-Link interface X405 **(33)** (5-pin CombiCon screw connector) of the evaluation board COMXEB. The table itself explains the individual signals:

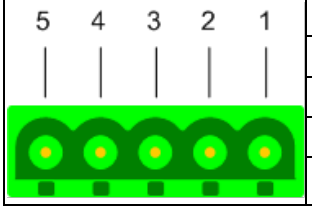
X405	Connection to CombiCon male connector	Signal	Description
	1	CC_DA	Data A
	2	CC_DB	Data B
	3	CC_DG	Data Ground
	4	CC_SLD	Shield
	5	CC_FG	Field Ground

Table 45: Pin assignment of the CC-Link interface X405 of the COMXEB

8.3.4.5 Real-Time Ethernet interface X502

The figure in Table 46 shows the Real-Time Ethernet interface X502 **(21)** (RJ45) of the evaluation board COMXEB. The table itself explains the individual signals:

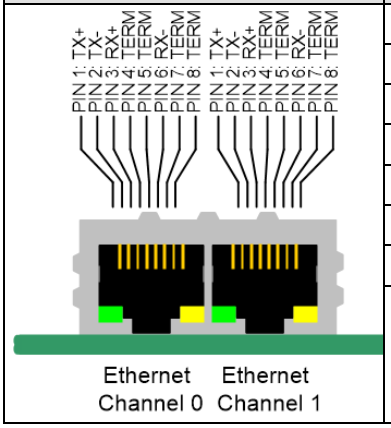
X502	Pin	Signal	Description
	1	TXP0	Transmit data +
	2	TXN0	Transmit data –
	3	RXP0	Receive data +
	4	TERM	Bob Smith termination
	5	TERM	
	6	RXN0	Receive data –
	7	TERM	Bob Smith termination
	8	TERM	

Table 46: Pin assignment of Ethernet connector at channel 0 (channel 1 accordingly)

The Ethernet lines of the COMXEB provide Auto-Crossover-functionality.

8.3.5 Diagnostic interfaces

8.3.5.1 RS-232 Diagnostic interface – DSub plug (X601)

The UART diagnostic interface X601 **(19)** of the evaluation board COMXEB has been implemented as a DSub male connector (9-pin).

The following table explains the pin assignment of the connector:

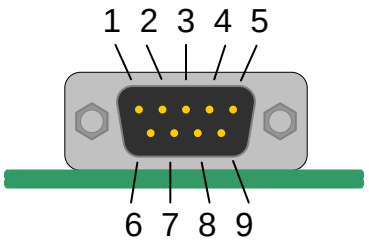
X601	Pin	Name	Description
	2	RXD	Receive data of comX
	3	TXD	Transmit data of comX
	4	DTR	Return-To-Send signal
	5	GND	Ground via 100 Ω resistor

Figure 40: Pin assignment of UART diagnostic interface connector X601 (according to RS-232)

8.3.5.2 USB Diagnostic interface - USB Mini-B connector (X611)

The diagnostic interface X611 **(17)** of the evaluation board COMXEB is implemented as a USB socket of type Mini-B (5-pin).

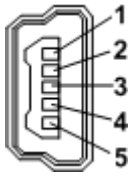
USB Socket	Pin	Signal	Description
	1	VBUS	Power supply of USB Bus (+5 V, external)
	2	D-	Data -
	3	D+	Data +
	4	ID	N.c.
	5	GND	Ground

Figure 41: Pin assignment of Mini-B USB socket X611 (5-pin)

8.3.6 Extension interfaces

8.3.6.1 AIFX interface (X409)

The COMXEB provides an additional 10-pin interface X409 **(36)** for connecting all an AIFX plug-on interface only at \NIF modules such as the COMX 100CN-DP\NIF, for example.

Note: This interface has to be configured according to the fieldbus system supported by the mounted comX Fieldbus module via the jumpers X406 **(35)** and X407 **(34)**. Also, see *Configuration of AIFX interface – jumpers (X406 and X407)* on page 95.

X409	Pin	Signal	Description
	1	GND	Ground
	2	+3V3	Supply power +3.3V (output)
	3	-	
	4	-	
	5	TX	Transmit
	6	RX	Receive
	7	EN_PB/ DN_PF	CANopen/ DeviceNet power fail
	8	CC_RDEn	CC-Link RDE signal (active low)
	9	GND	Ground
	10	-	

Table 47: Pin assignment of interface X409

8.3.7 SYNC /UART1 - pin header(X351)

Pin header X351 **(10)** provides the synchronization signals SYNC0 and SYNC1 depending on the firmware used for Real-time Ethernet (EtherCAT Slave, PROFINET IO Device, and Sercos Master/Slave). These signals are located on lines of the netX, which UART1 might also use. However, the standard firmware does not support UART1.

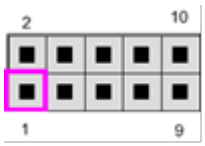
X351	Pin	Signal	Description
	1	UART1_TXD	UART 1 Transmit
	2	UART1_RXD	UART 1 Receive
	3	SYNC0/ UART1_RTS#	SYNC0 or UART 1 RTS
	4	SYNC1/ UART1_CTS#	SYNC1 or UART 1 CTS
	5	GND	Ground
	6	+3V3	Supply power +3.3V (output)
	7	-	Not connected
	8	-	Not connected
	9	-	Not connected
	10	-	Not connected

Table 48: Pin assignment of SYNC/UART1 pin header X351

Hardware details

Detail	Explanation
SYNC signal	3.3 V (LVTTL), max. load 6 mA
Connector	SYNC-Connector, X351: Pin header male, 10-pins, pitch spacing 2.54mm
Max. cable length	Recommendation: Max. 50 mm **Note:** Take EMC into consideration for the cable laying

Table 49: SYNC connector: SYNC signal, connector, and max. cable length

Firmware details

The firmware determines the input signals or output signals. The following table shows the meaning of the SYNC signals for each protocol.

Protocol	Signal IO_SYNC0 input/output	Signal IO_SYNC1 Input/output	From firmware version	Remarks
EtherCAT Slave	SYNC 0 output	SYNC 1 output	-	Configurable
Sercos Master	External trigger to start the bus cycle Input Rising edge	-	2.0.8.0	-
Sercos Slave	CON_CLK output	DIV_CLK output	3.0.10.0	Configurable

Table 50: Meaning of the SYNC signals for each protocol

8.4 LED displays

There are three groups of LEDs at the COMXEB:

1. Power-LEDs
2. Communication status LEDs
3. Ethernet Link/Activity–LEDs

8.4.1 Power LEDs

Table 51: Power LEDs of COMXEB explains the power LEDs of COMXEB:

Designation of LED	Type	Description
P800 **(15)**	Single-LED green	Indicates whether the FTDI-chip FT2232HQ is supplied with power, i.e. whether 5V is applied to USB interface X829 **(16)**.
P900 **(14)**	Single-LED green	Indicates whether the evaluation board is supplied with power, i.e. whether 24V is applied to X932 **(12)** or X930 **(13)**.

Table 51: Power LEDs of COMXEB

8.4.2 Communication status LEDs

While COMX-CA modules have their own LEDs to display communication status and other information, COMX-CN modules use the LEDs P400 **(31)**, P401 **(30)**, P500 **(27)**, and P501 **(26)** located on the COMXEB.

Table 52: Communication status LEDs of COMXEB explains the communication status LEDs of COMXEB:

Designation of LED	Type	Function
P400 **(31)**		not used
P401 **(30)**	Duo LED (green/ red)	Indicates the communication status signals STA (pin #13) and ERR (pin #15) of the COMX-CN Fieldbus module. STA is displayed in green, ERR in red.
P500 **(27)**	Duo LED (green/ red)	Indicates the communication status signals STA1_CG (pin #24) and STA1_CR (pin #23) of channel 1 of the COMX-CN- RE module. STA1_CG is displayed in green, STA1_CR in red.
P501 **(26)**	Duo LED (green/ red)	Indicates the communication status signals STA0_CG (pin #22) and STA0_CR (pin #21) of channel 0 of the COMX-CN- RE module. STA0_CG is displayed in green, STA0_CR in red.

Table 52: Communication status LEDs of COMXEB

The LEDs P401 **(30)** is active only if a COMX-CN Fieldbus module has been plugged into X400 **(2)** and X401 **(2)**. For the meaning of the blinking codes of all supported Fieldbus systems, see section *LEDs fieldbus systems* on page 121.

The LEDs P500 (27) and P501(26) are active only if a COMX-CN Real-Time Ethernet module has been plugged into **X500** (3) and **X501** (3).

Section *LEDs Real-Time Ethernet Systems* on page 128 describes the meaning of the blinking codes of all supported Real-Time Ethernet systems.

8.4.3 Ethernet Link/Activity-LEDs

These LEDs are active only if a COMX-CN-RE module has been plugged into the comX interfaces X500 **(3)** and X501 **(3)**. They are directly located at the RJ45 (X502) of the corresponding Ethernet communication channel.

Table 53 explains the communication status LEDs of COMXEB:

Designation of LED	Type	Description
CH0_LINK **(25)**	green	This LED displays the Ethernet link status of channel 0 of the Ethernet interface.
CH0_ACT **(24)**	yellow	This LED displays the Ethernet activity status of channel 0 of the Ethernet interface.
CH1_LINK **(23)**	green	This LED displays the Ethernet link status of channel 1 of the Ethernet interface.
CH1_ACT **(22)**	yellow	This LED displays the Ethernet activity status of channel 1 of the Ethernet interface.

Table 53: Ethernet Link/Activity–LEDs

Meaning of the LED signals

For information on the LED signals, see section *LEDs Real-Time Ethernet Systems* on page 128. Refer to the corresponding subsection for the currently used real-time Ethernet system.

8.5 Accessories

For the evaluation board COMXEB, the following accessories are available:

Accessory	Article number	Description	Purpose
NXPCA-PCI	7902.100	PCI card	Allows access to the parallel DPM from an external PC
CAB-NXPCA-PCI	4400.000	Ribbon cable	For connecting the COMXEB with the NXPCA-PCI
AIFX-DP	2800.400	PROFIBUS-DP interface	For connecting the COMXEB via X409
AIFX-CO	2800.500	CANopen interface	For connecting the COMXEB via X409
AIFX-DN	2800.510	DeviceNet interface	For connecting the COMXEB via X409
AIFX-CC	2800.730	CC-Link interface	For connecting the COMXEB via X409

Table 54: Accessories for the evaluation board COMXEB

9 Connection to the PC

9.1 Overview

This chapter describes three different ways to establish a connection between a PC and a COMX module.

The following types of host connections are possible:

- Parallel DPM
- Serial SPM
- SPM USB

The following types of diagnostic connections between a PC and a COMX module are possible:

- Serial connection via UART diagnostic interface X601 **(19)**
- Via the USB diagnostic interface X611 **(17)**

9.2 Diagnostic connections

9.2.1 Via USB

In order to operate a comX module via a USB connection at a PC, proceed as follows:

1. Plug the comX module into the corresponding comX interface for that type of module:
   - comX-CA module into X300 **(1)**
   - comX-CN Fieldbus module into X400/X401 **(2)**
   - comX-CN-RE module into X500/X501 **(3)**
2. Connect the USB diagnostic interface X611 **(17)** with a serial port of your PC via a USB cable.
3. Create other connections (such as Host, Fieldbus, Real-time Ethernet connections) for your test, if necessary,
4. Supply the COMXEB with power. Use the power supply delivered with the device and connect it to the socket X932 **(12)** of COMXEB.
5. Only thereafter, switch on the PC.

Firmware update via USB connection

For details on how to perform a firmware update via a USB connection, see section 12.1.2.2 „*Set-up B2: Updating* “ on page 161.

9.2.2 Via UART (RS-232 connection)

The firmware must be capable of UART and configured for the use of UART, e.g. with SYCON.net.

To operate a comX module via a serial connection at a PC, proceed as follows:

1. Plug the comX module into the corresponding comX interface for that type of module:

- comX-CA module into X300 **(1)**
- comX-CN Fieldbus module into X400/X401 **(2)**
- comX-CN-RE module into X500/X501 **(3)**

2. Connect the UART diagnostic interface X601 **(19)** with a serial port of your PC via a SubD cable (9 pin).
3. Create other connections (such as Host, Fieldbus, Real-time Ethernet connections) for your test, if necessary,
4. Supply the COMXEB with power. Use the power supply delivered with the device and connect it to socket X932 **(12)** of the COMXEB.
5. Only thereafter, switch on the PC.

Firmware update via serial connection

For details on how to perform a firmware update via a serial connection, see section 12.1.2.1 „*Set-up B1: Updating* “ on page 160.

9.3 Host connections

9.3.1 Parallel dual-port memory interface (DPM)

To establish a host connection via the parallel DPM, use the NXPCA-PCI. For this purpose, mount the NXPCA-PCI in a free PCI slot of a PC and use ribbon cable CAB- NXPCA-PCI to connect it to the evaluation board COMXEB, see Figure 42.

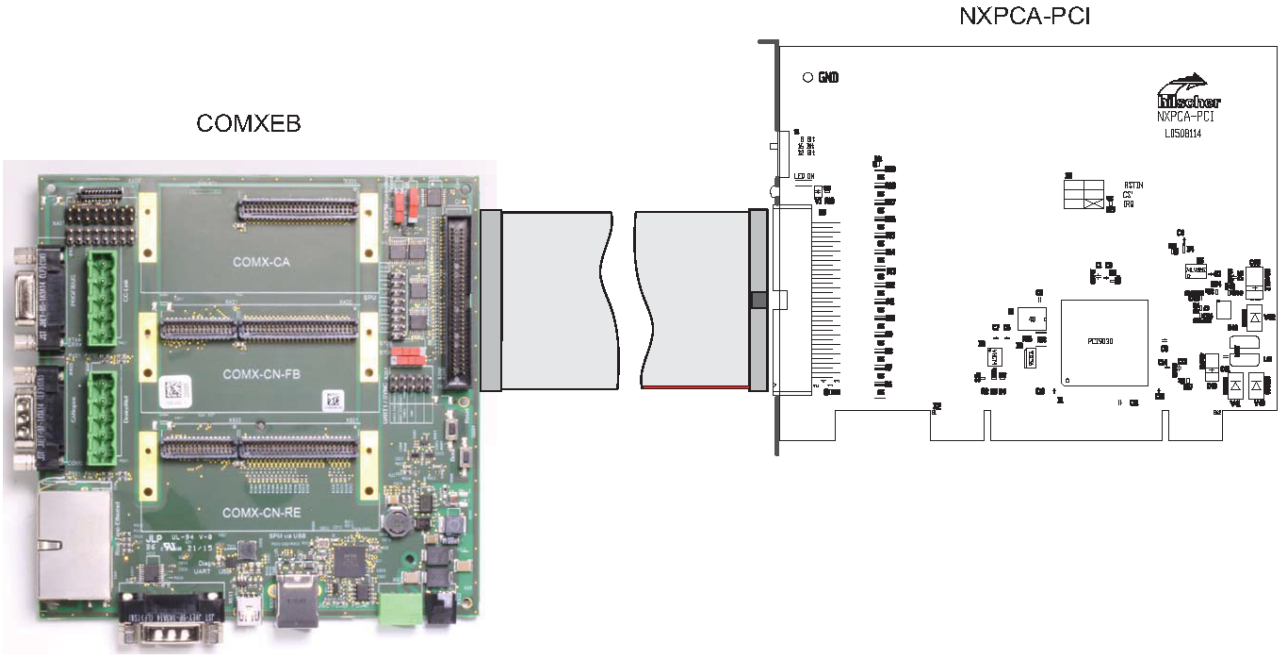


Figure 42: Connection COMXEB <=> NXPCA-PCI (<=> Host) via parallel Dual-Port Memory

A connection from the host to the COMXEB via SPM can be made using the SPM via USB interface X829 **(16)** or via pin header X709 **(7)**. When using the SPM via USB interface X829 **(16)**, a usual USB cable can be used for the connection

9.3.2 Serial dual-port memory interface (SPM)

The connection between COMXEB and host is made via a cable connected to X709 **(7)** according to Figure 43.

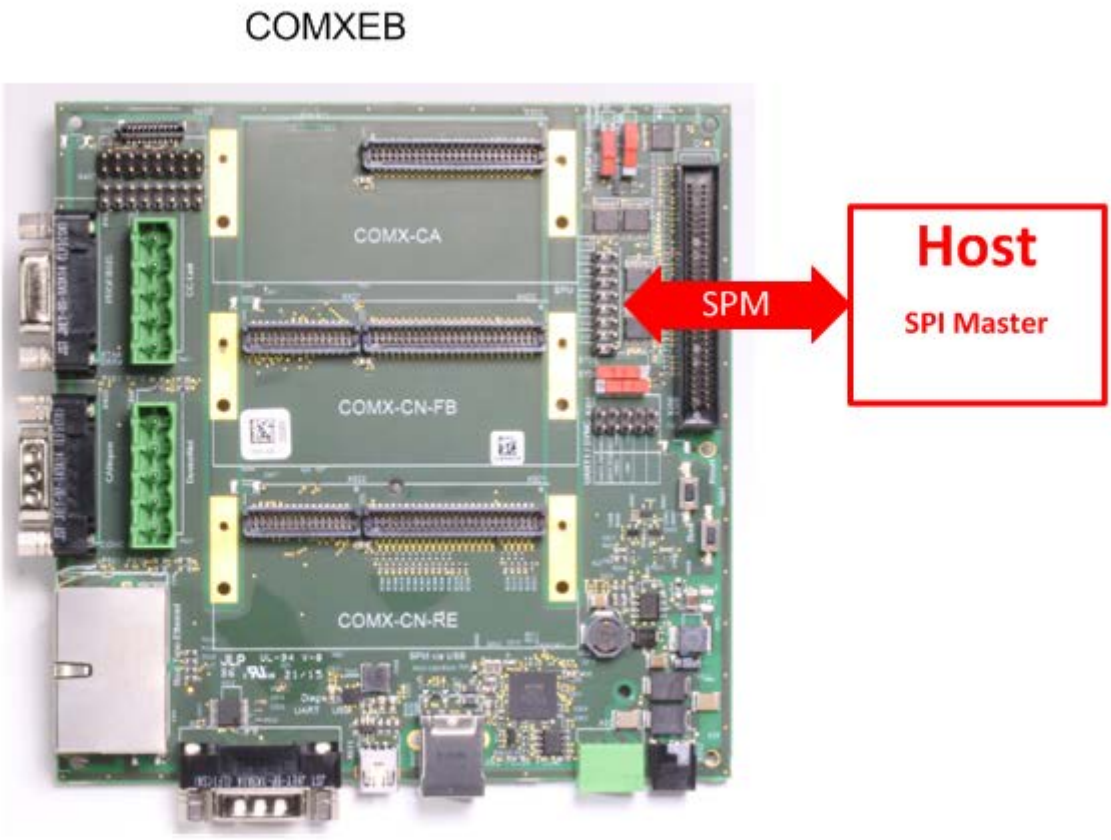


Figure 43: Serial host connection via X709

The connection of each signal is made exactly as shown in Figure 39 on page 100.

9.3.3 Serial dual-port memory interface via USB (SPM via USB)

Using the SPM via USB interface X829 **(16)**, a connection to a PC can be established with a usual USB cable (type A / type B), see Figure 44.

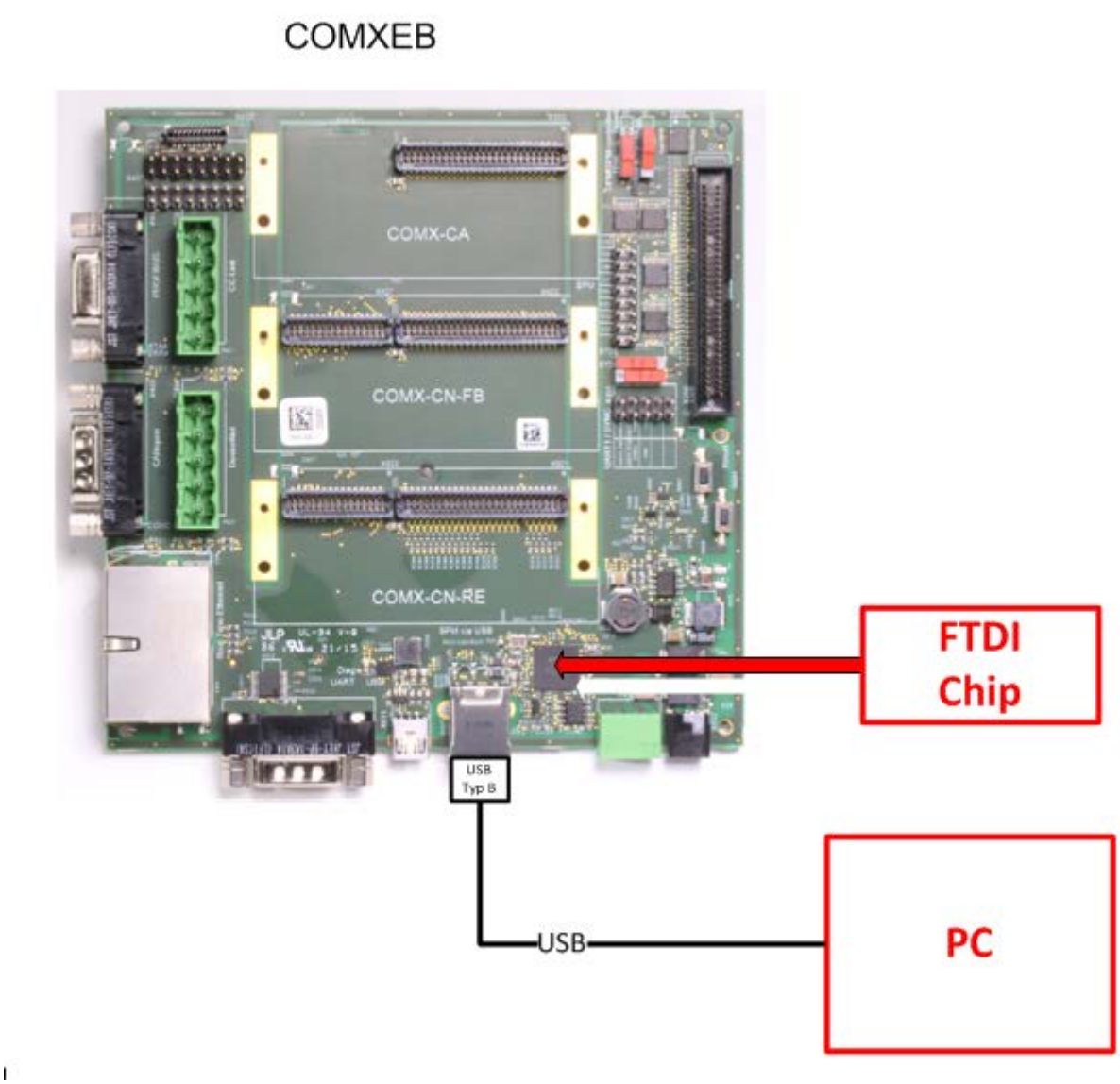


Figure 44: Serial host connection via USB interface X829

10 LEDs

10.1 SYS-LED

The following table describes the meaning of the system LED.

LED	Color	State	Meaning
SYS 	**Duo LED yellow/green**		
	(green)	On	Operating System running
	(green/yellow)	Blinking green/yellow	Second Stage Boot loader is waiting for firmware
	(yellow)	On	Second Stage Boot loader missing; contact technical support
	-	Off	Power supply for the device is missing or hardware defect

Table 55: System LED

The SYS-LED is located at the left edge of the COMX 100CA-RE on the left hand side of the netX Processor and is denominated as „L1“ within the context of the preceding section.

At the COMX 100CN-RE, there are no LEDs at the communication module itself but the LED signals are connected outside (at connector X2).

10.2 LEDs fieldbus systems

10.2.1 LED names of individual fieldbus systems

LED	PROFIBUS DP-	CANopen	CC-Link	DeviceNet
System status ((yellow)/ (green)) 	SYS	SYS	SYS	SYS
Communication status 	COM (red / green)	CAN (red / green)	LRUN (green) LERR (red)	MNS (red / green)

LED	Name	Meaning
System Status	SYS	System
Communication Status	COM	Communication Status
	CAN	CANopen Status
	LRUN/LERR	Run/Error
	MNS	Module Network Status

10.2.2 LEDs PROFIBUS-DP Master

For the PROFIBUS DP Master protocol, the communication status LED **COM** can assume the states described below. This description is valid from stack version V2.6.

LED	Color	State	Meaning
COM	**Duo LED red/green**		
	(green)	On	Communication to all Slaves is established.
	(green)	Flashing (5 Hz)	PROFIBUS is configured, but bus communication is not yet released from the application.
	(green)	Flashing acyclic	No configuration or faulty configuration
	(red)	Flashing (5 Hz)	Communication to at least one Slave is disconnected.
	(red)	On	Communication to all Slaves is disconnected or another serious error has occurred. Redundant Mode: The active Master was not found.
	(off)	Off	Device is not switched on or network power is missing.

Table 56: LED states for the PROFIBUS DP Master protocol

LED State	Definition
Flashing (5 Hz)	The indicator turns on and off with a frequency of 5 Hz: "on" for 100 ms, followed by "off" for 100 ms.
Flashing acyclic	The indicator turns on and off in irregular intervals.

Table 57: LED state definitions for the PROFIBUS DP Master protocol

10.2.3 LEDs PROFIBUS-DP Slave

The subsequent table describes the meaning of the LEDs for the comX PROFIBUS-DP Slave communication modules (COMX CA-DP/ COMX CN-DP) when the firmware of the PROFIBUS DP Slave protocol is loaded to the comX communication module.

LED	Color	State	Meaning
COM	**Duo LED red/green**		
	(green)	On	RUN, cyclic communication
	(red)	On	Wrong configuration at PROFIBUS DP slave.
	(red)	Flashing cyclic	STOP, no communication, connection error
	(red)	Flashing acyclic	not configured

Table 58: LEDs PROFIBUS DP Slave

10.2.4 LEDs CC-Link Slave

For the CC-Link Slave protocol, the communication status LEDs L-RUN and L-ERR can assume the states described below. This description is valid from stack version V2.9.

LED	Color	State	Meaning
L RUN	**LED green**		
	(green)	On	After participating in the network, the device receives both refresh and polling signals or just the refresh signal normally.
	(off)	Off	1. Before participating in the network 2. Unable to detect carrier 3. Timeout 4. Resetting hardware
L **ERR**	**LED red**		
	(red)	Blinking	The switch setting has been changed from the setting at the reset cancellation (blinks for 0.4 sec.).
	(red)	On	1. CRC error 2. Address parameter error (0,65 or greater is set including the number of occupied stations) 3. Baud rate switch setting error during cancellation of reset (5 or greater)
	(off)	Off	1. Normal communication 2. Resetting hardware

Table 59: LED states for the CC-Link Slave protocol

10.2.5 LEDs CANopen Master

For the CANopen Master protocol, the communication status LED **CAN** can assume the states described below. This description is valid from stack version V2.11.

LED	Color	State	Meaning
CAN	**Duo-LED red/green**		
	(green)	On	**OPERATIONAL:** The device is in the OPERATIONAL state.
	(green)	Blinking (2,5 Hz)	**PREOPERATIONAL:** The device is in the PREOPERATIONAL state.
	(green)	Single flash	**STOPPED**: The device is in STOPPED state.
	(red)	Single flash	**Warning Limit reached**: At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames).
	(red)	Double flash	**Error Control Event**: A guard event (NMT Slave or NMT Master) or a heartbeat event (Heartbeat consumer) has occurred.
	(red)	On	**Bus Off**: The CAN controller is in bus OFF state.
	(aus)	Off	**RESET:** The device is executing a reset or the device has no configuration.

Table 60: LED states for the CANopen Master protocol

LED state	Definition
Blinking (2,5 Hz)	The indicator turns on and off with a frequency of 2,5 Hz: “on” for 200 ms, followed by “off” for 200 ms.
Single flash	The indicator shows one short flash (200 ms) followed by a long “off“ phase (1,000 ms).
Double flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short “off” phase (200 ms). The sequence is finished by a long “off “phase (1,000 ms).

Table 61: LED state definitions for the CANopen Master protocol

10.2.6 LEDs CANopen Slave

The subsequent table describes the meaning of the LEDs for the comX CANopen Slave communication modules (COMX-CA-CO/ COMX-CN-COS) when the firmware of the CANopen Slave protocol is loaded to the comX communication module.

LED	Color	State	Meaning
comX			
CAN	**Duo LED red/green**		
	(off)	Off	**RESET:** The device is executing a reset
	(green)	Single flash	**STOPPED:** The device is in STOPPED state
	(green)	Blinking	**PREOPERATIONAL:** The device is in the PREOPERATIONAL state
	(green)	On	**OPERATIONAL:** The device is in the OPERATIONAL state
	(red/green)	Flickering (alternatively red / green)	**Auto Baud Rate Detection active:** The Device is in the Auto Baud Rate Detection mode
	(red)	Single flash	**Warning Limit reached:** At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames).
	(red)	Double flash	**Error Control Event:** A guard event (NMT Slave or NMT-master) or a heartbeat event (Heartbeat consumer) has occurred.
	(red)	On	**Bus Off:** The CAN controller is bus off

Table 62: LEDs CANopen Slave – 1 Communication Status LED (current Hardware Revision)

LED State Definition for CANopen Slave for the CAN LED

Indicator state	Definition
On	The indicator is constantly on.
Off	The indicator is constantly off.
Flickering	The indicator turns on and off with a frequency of 10 Hz: on for 50 ms, followed by off for 50 ms.
Blinking	The indicator turns on and off with a frequency of 2,5 Hz: on for 200 ms, followed by off for 200 ms.
Single Flash	The indicator shows one short flash (200 ms) followed by a long off phase (1,000 ms).
Double Flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).

Table 63: LED State Definition for CANopen Slave for the CAN LED

10.2.7 LEDs DeviceNet Master

The subsequent table describes the meaning of the LEDs for the fieldbus when the firmware of the DeviceNet Master protocol is loaded to the device.

LED	Color	State	Meaning
MNS	**Duo LED red/green**		
	(green)	On	**Device Operational AND On-line, Connected** Device is online and has established all connections with all Slaves.
	(green)	Flashing (1 Hz)	**Device Operational AND On-line** Device is online and has established no connection in the established state. - Configuration missing, incomplete or incorrect.
	(green/red/off)	Flashing Green/Red/Off	**Selftest after power on:** Green on for 250 ms, then red on for 250 ms, then off.
	(red)	Flashing (1 Hz)	**Minor Fault and/or Connection Time-Out** Device is online and has established one or more connections in the established state. It has data exchange with at least one of the configured Slaves. Minor or recoverable fault: No data exchange with one of the configured Slaves. One or more Slaves are not connected. Connection timeout
	(red)	On	**Critical Fault orCritical Link Failure** Critical connection failure; device has detected a network error: duplicate MAC-ID or severe error in CAN network (CAN-bus off).
	(off)	Off	**Device is not powered** - The device may not be powered. **Device is not on-line and/or No Network Power** - The device has not completed the Dup_MAC_ID test yet. - The device is powered, but the network power is missing.

Table 64: LEDs DeviceNet Master

LED State Definition for DeviceNet Master for the MNS LED

Indicator state	Definition
On	The indicator is constantly on.
Off	The indicator is constantly off.
Flashing (1 Hz) green	The indicator turns on and off with a frequency of appr. 1 Hz: on for appr. 500 ms, followed by off for appr. 500 ms.
Flashing (1 Hz) red	The indicator turns on and off with a frequency of appr. 1 Hz: on for appr. 500 ms, followed by off for appr. 500 ms.

Table 65: LED State Definition for DeviceNet Master for the MNS LED

10.2.8 LEDs DeviceNet Slave

The subsequent table describes the meaning of the LEDs for the fieldbus when the firmware of the DeviceNet Slave protocol is loaded to the device.

LED	Color	State	Meaning
MNS	**Duo LED red/green**		
	 (green)	On	**Device Operational AND On-line, Connected** Device is online and has established all connections with all Slaves.
	 (green)	Flashing (1 Hz)	**Device Operational AND On-line** Device is online and has established no connection in the established state. - Configuration missing, incomplete or incorrect.
	 (green/red/off)	Flashing Green/Red/Off	**Selftest after power on:** Green on for 250 ms, then red on for 250 ms, then off.
	 (red)	Flashing (1 Hz)	**Minor Fault and/or Connection Time-Out** Device is online and has established one or more connections in the established state. It has data exchange with at least one of the configured Slaves. Minor or recoverable fault: No data exchange with one of the configured Slaves. One or more Slaves are not connected. Connection timeout
	 (red)	On	**Critical Fault orCritical Link Failure** Critical connection failure; device has detected a network error: duplicate MAC-ID or severe error in CAN network (CAN-bus off).
	 (off)	Off	**Device is not powered** - The device may not be powered. **Device is not on-line and/or No Network Power** - The device has not completed the Dup_MAC_ID test yet. - The device is powered, but the network power is missing.

Table 66: LEDs DeviceNet Slave

LED State Definition for DeviceNet Slave for the MNS LED

Indicator state	Definition
On	The indicator is constantly on.
Off	The indicator is constantly off.
Flashing (1 Hz) green	The indicator turns on and off with a frequency of appr. 1 Hz: on for appr. 500 ms, followed by off for appr. 500 ms.
Flashing (1 Hz) red	The indicator turns on and off with a frequency of appr. 1 Hz: on for appr. 500 ms, followed by off for appr. 500 ms.

Table 67: LED State Definition for DeviceNet Slave for the MNS LED

10.3 LEDs Real-Time Ethernet Systems

10.3.1 LED names of individual Real-Time Ethernet systems

Note: Depending on the loaded COMX 100CA-RE/COMX 100CN-RE firmware the LEDs of the COMX 100CA-RE/COMX 100CN-RE communication modules are configured as follows.

comX	Color of LED	CC-Link IE Field Basic	EtherCAT Master	EtherCAT Slave	EtherNet/IP Scanner/ Adapter	Powerlink Controlled Node	Open Modbus/TCP	PROFINET IO Controller/ Device	Sercos Master	Sercos Slave	VARAN Client
L2 (red/ green Duo-LED)	(green)	RUN	RUN	RUN	MS	BS	RUN	-	STA	S3	RUN
	(red)	-	-	-	MS	-	-	BF	-	S3	-
L3 (red/green Duo-LED)	(green)	-	-	-	NS	-	-	-	-	-	-
	(red)	ERR	ERR	ERR	NS	BE	ERR	BF	ERR	-	ERR
C1 (Ethernet Connectors)	(green)	LINK	LINK	L/A IN	LINK	L/A	LINK	LINK	L/A	L/A	LINK IN
	(yellow)	-	ACT	-	ACT	-	ACT	RX TX	-	-	ACT
C2 (Ethernet Connectors)	(green)	-	-	L/A OUT	LINK	L/A	LINK	LINK	L/A	L/A	LINK OUT
	(yellow)	-	-	-	ACT	-	ACT	RX TX	-	-	ACT

Table 68: LED names of individual Real-Time Ethernet systems

LED	Name	Meaning
Communication Status	RUN	Run
	ERR	Error
	STA	Status
	SF	System Error
	BF	Bus Error
	MS	Module Status
	NS	Network Status
	BS	Bus Status
	BE	Bus Error
	S3	Sercos Status/Error
RJ45	LINK, L	Link
	ACT, A	Activity
	L/A	Link/Activity
	L/A IN	Link/Activity Input
	L/A OUT	Link/Activity Output

Table 69: LED names of individual Real-Time Ethernet systems

10.3.2 LEDs CC-Link IE Field Basic Slave

The subsequent table describes the meaning of the LEDs for the comX Real-Time Ethernet communication modules when the firmware of the CC-Link IE Field Basic Slave protocol is loaded to the comX communication module. This description is valid for stack version V1.1.

LED	Color	State	Meaning
RUN (Run) 	**Duo LED red/green**		
	(green)	On	Station in operation and cyclic transmission in progress.
	(green)	Blinking (2.5 Hz)	Station in operation and cyclic transmission stopped.
	(green)	Flickering (10 Hz)	Station not configured.
	(off)	Off	Station is disconnected.
ERR (Error) 	(red)	On	Communication error.
	(red)	Triple Flash	DPM watchdog has expired.
	(off)	Off	Station is disconnected.
L/A Ch0 & Ch1	**LED green**		
	(green)	On	**Link:** The station is linked to the Ethernet, but does not send/receive Ethernet frames.
	(green)	Flickering (load dependent)	**Activity:** The station is linked to the Ethernet and sends/receives Ethernet frames.
	(off)	Off	The station has no link to the Ethernet.
Ch0 & Ch1	**LED yellow**		
	(off)	Off	This LED is not used.

Table 70: LED states for the CC-Link IE Field Basic Slave

LED State	Definition
Triple Flash	The indicator shows a sequence of three short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Blinking (2.5 Hz)	The indicator turns on and off with a frequency of 2.5 Hz: “on” for 200 ms, followed by “off” for 200 ms.
Flickering (10 Hz)	The indicator turns on and off with a frequency of 10 Hz: “on” for 50 ms, followed by “off” for 50 ms.
Flickering (load dependent)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 71: LED state definitions for theCC-Link IE Field Basic Slave protocol

10.3.3 LEDs EtherCAT-Master (V3)

For the EtherCAT Master protocol running on the comX Real-Time Ethernet communication modules (COMX 100CA-RE/ COMX 100CN-RE/ COMX 51CA-RE/ COMX 51CN-RE), the communication LEDs **RUN** and **ERR** as well as the Ethernet LEDs **LINK** and **ACT** can assume the states described below. This description is valid from stack version V3.0.

LED	Color	State	Meaning
RUN General name: **COM 0**	**Duo LED red/green**		
	(off)	Off	**INIT**: The device is in state INIT.
	(green)	Blinking (2,5 Hz)	**PRE-OPERATIONAL**: The device is in PRE-OPERATIONAL state.
	(green)	Flickering (10 Hz)	**BOOT**: Device is in Boot mode.
	(green)	Single flash	**SAFE-OPERATIONAL**: The device is in SAFE-OPERATIONAL state.
	(green)	On	**OPERATIONAL**: The device is in OPERATIONAL state.
ERR General name: **COM 1**	**Duo-LED red/green**		
	(off)	Off	Master has no errors.
	(red)	On	Master has detected a communication error. The error is indicated in the DPM.
LINK Ch0	**LED green**		
	(green)	On	The device is linked to the Ethernet.
	(off)	Off	The device has no link to the Ethernet.
ACT Ch0	**LED yellow**		
	(yellow)	Flickering (load dependant)	The device sends/receives Ethernet frames.
	(off)	Off	The device does not send/receive Ethernet frames.

Table 72: LED states for the EtherCAT Master protocol

LED State	Definition
Blinking (2,5 Hz)	The indicator turns on and off with a frequency of 2,5 Hz: “on” for 200 ms, followed by “off” for 200 ms.
Flickering (10 Hz)	The indicator turns on and off with a frequency of 10 Hz: “on” for 50 ms, followed by “off” for 50 ms.
Single flash	The indicator shows one short flash (200 ms) followed by a long “off“ phase (1,000 ms).
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 73: LED state definitions for the EtherCAT Master protocol

10.3.4 LEDs EtherCAT-Master (V4)

For the EtherCAT Master protocol, the communication LEDs **RUN** and **ERR** as well as the Ethernet LEDs **LINK** and **ACT** can assume the states described below. This description is valid from stack version V4.0.

LED	Color	State	Meaning
RUN General name: **COM 0**	**Duo LED red/green**		
	(off)	Off	**INIT**: The device is in state INIT.
	(green)	Blinking (2,5 Hz)	**PRE-OPERATIONAL**: The device is in PRE-OPERATIONAL state.
	(green)	Flickering (10 Hz)	The device is not configured.
	(green)	Single flash	**SAFE-OPERATIONAL**: The device is in SAFE-OPERATIONAL state.
	(green)	On	**OPERATIONAL**: The device is in OPERATIONAL state.
ERR General name: **COM 1**	**Duo-LED red/green**		
	(off)	Off	Master has no errors.
	(red)	Single flash	Bus Sync error threshold
	(red)	Double flash	Internal Stop of the bus cycle
	(red)	Triple Flash	DPM watchdog has expired.
	(red)	Quadruple Flash	No Master license present in the device.
	(red)	Blinking (2,5 Hz)	Error in the configuration database.
	(red)	Single Flickering	Channel Init was executed at the Master. Remarks: Transient error so can happen to be not visible at all.
	(red)	Double Flickering	Slave is missing. Unconfigured Slave No matching mandatory slave list No bus connected
	(red)	Flickering (10 Hz)	Boot-up was stopped due to an error.
LINK Ch0	**LED green**		
	(green)	On	**Link:** The device is linked to the Ethernet, but does not send/receive Ethernet frames.
	(green)	Flickering (load dependent)	**Activity:** The device is linked to the Ethernet and sends/receives Ethernet frames.
	(off)	Off	The device has no link to the Ethernet.
ACT Ch0	**LED yellow**		
	(off)	Off	This LED is not used.

Table 74: LED states for the EtherCAT Master protocol

LED State	Definition
Single flash	The indicator shows one short flash (200 ms) followed by a long “off“ phase (1,000 ms).
Double flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Triple Flash	The indicator shows a sequence of three short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).

LED State	Definition
Quadruple Flash	The indicator shows a sequence of four short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Blinking (2,5 Hz)	The indicator turns on and off with a frequency of 2,5 Hz: “on” for 200 ms, followed by “off” for 200 ms.
Single Flickering	The indicator is switched on and off once: 'on' for 50 ms, followed by 'off' for 500 ms.
Double Flickering	The indicator is switched on and off and on once: 'on' / 'off' / 'on' each for approximately 50 ms, followed by 'off' for 500 ms.
Flickering (10 Hz)	The indicator turns on and off with a frequency of 10 Hz: “on” for 50 ms, followed by “off” for 50 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 75: LED state definitions for the EtherCAT Master protocol

LED State	Definition
Single flash	The indicator shows one short flash (200 ms) followed by a long “off“ phase (1,000 ms).
Double flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Triple Flash	The indicator shows a sequence of three short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Quadruple Flash	The indicator shows a sequence of four short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Blinking (2,5 Hz)	The indicator turns on and off with a frequency of 2,5 Hz: “on” for 200 ms, followed by “off” for 200 ms.
Single Flickering	The indicator is switched on and off once: 'on' for 50 ms, followed by 'off' for 500 ms.
Double Flickering	The indicator is switched on and off and on once: 'on' / 'off' / 'on' each for approximately 50 ms, followed by 'off' for 500 ms.
Flickering (10 Hz)	The indicator turns on and off with a frequency of 10 Hz: “on” for 50 ms, followed by “off” for 50 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 76: LED state definitions for the EtherCAT Master protocol

10.3.5 LEDs EtherCAT-Slave

The subsequent table describes the meaning of the communication LEDs **RUN** and **ERR** as well as the Ethernet-LED **L/A IN** or **L/A OUT** for the comX Real-Time Ethernet communication modules (COMX 100CA-RE/ COMX 100CN-RE/ COMX 51CA-RE/ COMX 51CA-RE\R/ COMX 51CN-RE) when the firmware of the EtherCAT Slave protocol is loaded to the comX communication module. This description is valid from stack version V2.5 (V2).

LED	Color	State	Meaning
RUN General name: **COM 0**	**Duo LED red/green**		
	(off)	Off	**INIT**: The device is in state INIT.
	(green)	Blinking (2,5 Hz)	**PRE-OPERATIONAL**: The device is in PRE-OPERATIONAL state.
	(green)	Single flash	**SAFE-OPERATIONAL**: The device is in SAFE-OPERATIONAL state.
	(green)	On	**OPERATIONAL**: The device is in OPERATIONAL state.
ERR General name: **COM 1**	**Duo-LED red/green**		
	(off)	Off	**No error:** The EtherCAT communication of the device is in working condition.
	(red)	Blinking (2,5 Hz)	**Invalid configuration:** General Configuration Error Possible reason: State change commanded by master is impossible due to register or object settings.
	(red)	Single Flash	**Local error:** Slave device application has changed the EtherCAT state autonomously. Possible reason 1: A host watchdog timeout has occurred. Possible reason 2: Synchronization Error, device enters Safe-Operational automatically.
	(red)	Double Flash	**Application watchdog timeout:** An application watchdog timeout has occurred. Possible reason: Sync Manager Watchdog timeout.
L/A IN or **L/A OUT**	**LED green**		
	(green)	On	**Link:** The device is linked to the Ethernet, but does not send/receive Ethernet frames.
	(green)	Flickering (load dependant)	**Activity:** The device is linked to the Ethernet and sends/receives Ethernet frames.
	(off)	Off	The device has no link to the Ethernet.
	LED yellow		
	(off)	Off	This LED is not used.

Table 77: LEDs EtherCAT Slave

LED State Definition for EtherCAT Slave for the RUN and ERR LEDs

Blinking (2,5 Hz)	The indicator turns on and off with a frequency of 2,5 Hz: “on” for 200 ms, followed by “off” for 200 ms.
Single flash	The indicator shows one short flash (200 ms) followed by a long “off“ phase (1,000 ms).
Double flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 78: LED State Definition for EtherCAT Slave for the RUN and ERR LEDs

10.3.6 LEDs EtherNet/IP Scanner

For the EtherNet/IP Scanner protocol, the communication LEDs **MS** and **NS** as well as the Ethernet LEDs **LINK** and **ACT** can assume the states described below. This description is valid from stack version V2.6.

LED	Color	State	Meaning
MS (Module status) General name: **COM 0**	**Duo-LED red/green**		
	(green)	On	**Device operational**: The device is operating correctly.
	(green)	Flashing (1 Hz)	**Standby**: The device has not been configured.
		Flashing (green/red/ green)	**Self-test**: The device is performing its power-up testing. The module status indicator test sequence occurs before the network status indicator test sequence, according to the following sequence: • Network status LED off. • Module status LED turns green for approximately 250 ms, turns red for approximately 250 ms, and again turns green (and holds that state until the power-up test has completed). • Network status LED turns green for approximately 250 ms, turns red for approximately 250 ms, and then turns off (and holds that state until the power-up test has completed).
	(red)	Blinking (1 Hz)	**Major recoverable fault:** The device has detected a major recoverable fault. E.g., an incorrect or inconsistent configuration can be considered a major recoverable fault.
	(red)	On	**Major unrecoverable fault:** The device has detected a major unrecoverable fault.
	(Off)	Off	**No power**: The device is powered off.
NS (Network-status) General name:: **COM 1**	**Duo-LED red/green**		
	(green)	On	**Connected**: An IP address is configured, at least one CIP connection (any transport class) is established, and an Exclusive Owner connection has not timed out.
	(green)	Flashing (1 Hz)	**No connections**: An IP address is configured, but no CIP connections are established, and an Exclusive Owner connection has not timed out.
		Flashing (green/red/ off)	**Self-test**: The device is performing its power-up testing. Refer to description for module status LED self-test.
	(red)	Blinking (1 Hz)	**Connection timeout**: An IP address is configured, and an Exclusive Owner connection for which this device is the target has timed out. The network status indicator returns to steady green only when all timed out Exclusive Owner connections are reestablished.
	(red)	On	**Duplicate IP**: The device has detected that its IP address is already in use.
	(Off)	Off	**Not powered, no IP address**: The device does not have an IP address (or is powered off).

LED	Color	State	Meaning
LINK Ch0 & Ch1	**LED green**		
	(green)	On	The device is linked to the Ethernet.
	(Off)	Off	The device has no link to the Ethernet.
ACT Ch0 & Ch1	**LED yellow**		
	(yellow)	Flickering (load de-pendant)	The device sends/receives Ethernet frames.
	(Off)	Off	The device does not send/receive Ethernet frames.

Table 79: LED states for the EtherNet/IP Scanner protocol

LED state	Definition
Blinking (1 Hz)	The indicator turns on and off with a frequency of 1 Hz: “on” for 500 ms, followed by “off” for 500 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 80: LED state definitions for the EtherNet/IP Scanner protocol

10.3.7 LEDs EtherNet/IP Adapter (V2)

For the EtherNet/IP Adapter protocol, the communication LEDs **MS** and **NS** as well as the Ethernet LEDs **LINK** and **ACT** can assume the states described below. This description is valid from stack version V2.7 (V2) or from V3.0.

LED	Color	State	Meaning
MS (Module status) General name: **COM 0**	**Duo-LED red/green**		
	(green)	On	**Device operational**: The device is operating correctly.
	(green)	Flashing (1 Hz)	**Standby**: The device has not been configured.
		Flashing (green/red/ green)	**Self-test**: The device is performing its power-up testing. The module status indicator test sequence occurs before the network status indicator test sequence, according to the following sequence: • Network status LED off. • Module status LED turns green for approximately 250 ms, turns red for approximately 250 ms, and again turns green (and holds that state until the power-up test has completed). • Network status LED turns green for approximately 250 ms, turns red for approximately 250 ms, and then turns off (and holds that state until the power-up test has completed).
	(red)	Blinking (1 Hz)	**Major recoverable fault:** The device has detected a major recoverable fault. E.g., an incorrect or inconsistent configuration can be considered a major recoverable fault.
	(red)	On	**Major unrecoverable fault:** The device has detected a major unrecoverable fault.
	(Off)	Off	**No power**: The device is powered off.
NS (Network-status) General name:: **COM 1**	**Duo-LED red/green**		
	(green)	On	**Connected**: An IP address is configured, at least one CIP connection (any transport class) is established, and an Exclusive Owner connection has not timed out.
	(green)	Flashing (1 Hz)	**No connections**: An IP address is configured, but no CIP connections are established, and an Exclusive Owner connection has not timed out.
		Flashing (green/red/ off)	**Self-test**: The device is performing its power-up testing. Refer to description for module status LED self-test.
	(red)	Blinking (1 Hz)	**Connection timeout**: An IP address is configured, and an Exclusive Owner connection for which this device is the target has timed out. The network status indicator returns to steady green only when all timed out Exclusive Owner connections are reestablished.
	(red)	On	**Duplicate IP**: The device has detected that its IP address is already in use.
	(Off)	Off	**Not powered, no IP address**: The device does not have an IP address (or is powered off).

LED	Color	State	Meaning
LINK Ch0 & Ch1	**LED green**		
	(green)	On	The device is linked to the Ethernet.
	(Off)	Off	The device has no link to the Ethernet.
ACT Ch0 & Ch1	**LED yellow**		
	(yellow)	Flickering (load de-pendant)	The device sends/receives Ethernet frames.
	(Off)	Off	The device does not send/receive Ethernet frames.

Table 81: LED states for the EtherNet/IP Adapter protocol

LED state	Definition
Blinking (1 Hz)	The indicator turns on and off with a frequency of 1 Hz: “on” for 500 ms, followed by “off” for 500 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 82: LED state definitions for the EtherNet/IP Adapter protocol

10.3.8 LEDs EtherNet/IP Adapter (V3)

For the EtherNet/IP Adapter protocol, the communication LEDs **MS** and **NS** as well as the Ethernet LEDs LINK and ACT can assume the states described below. This description is valid from stack version V3.6 (V3).

LED	Color	State	Meaning
MS (Module status) General name: **COM 0**	**Duo-LED red/green**		
	(green)	On	**Device operational:** The device is operating correctly.
	(green)	Flashing (1 Hz)	**Standby**: The device has not been configured.
	(green/red/green)	Flashing fast green/red/green	**Self-test**: The device performs a self-test after power-on. The following sequence is displayed during the self-test: • NS-LED off. • MS-LED turns green for approximately 250 ms, turns red for approximately 250 ms, and again turns green (and holds that state until the power-up test has completed). • NS-LED turns green for approximately 250 ms, turns red for approximately 250 ms, and then turns off (and holds that state until the power-up test has completed).
	(red/green/off)	Flashing sequence red/green/off	**Flashing sequence:** The flashing sequence is used to visually identify the device. The scanner can start the flashing sequence in Identity object 1 of the device. The MS LED and NS LED perform the flashing sequence simultaneously.
	(red)	Flashing (1 Hz)	**Major recoverable fault**: The device has detected a major recoverable fault. E.g., an incorrect or inconsistent configuration can be considered a major recoverable fault.
	(red)	On	**Major unrecoverable fault:** The device has detected a major unrecoverable fault.
	(off)	Off	**No power:** The device is powered off.
NS (Network-status) General name:: **COM 1**	**Duo-LED red/green**		
	(green)	On	**Connected**: An IP address is configured, at least one CIP connection (any transport class) is established, and an Exclusive Owner connection has not timed out.
	(green)	Flashing (1 Hz)	**No connections**: An IP address is configured, but no CIP connections are established, and an Exclusive Owner connection has not timed out.
	(green/red/green)	Flashing fast green/red/green	**Self-test: The** device performs a self-test after power-on. Refer to the description of the MS LED in the self-test status.
	(red/green/off)	Flashing sequence red/green/off	**Flashing** sequence: The flashing sequence is used to visually identify the device. The scanner can start the flashing sequence in Identity object 1 of the device. The MS LED and NS LED perform the flashing sequence simultaneously.
	(red)	Flashing (1 Hz)	**Connection timeout**: An IP address is configured, and an Exclusive Owner connection for which this device is the target has timed out. The NS LED returns to steady green only when all timed out Exclusive Owner connections are reestablished.
	(red)	On	**Duplicate IP**: The device has detected that its IP address is already in use.
	(off)	Off	**Not powered, no IP address:** The device does not have an IP address (or is powered off).
LINK Ch0 & Ch1	LED grün		
	(green)	On	**The device is linked to the** Ethernet.

LED	Color	State	Meaning
	(off)	Off	**The device has no link to** the Ethernet.
ACT Ch0 & Ch1	LED gelb		
	(yellow)	Flickering (load de-pendant)	**The device sends/receives Ethernet frames.**
	(aus)	Off	**The device does not send/receive** Ethernet frames.

Tabelle 1: LED states for the EtherNet/IP Adapter protocol

LED state	Definition
Flashing (1 Hz)	The LED turns on and off with a frequency of 1 Hz: “On” for 500 ms, followed by “Off” for 500 ms.
Flashing fast green/red/green	The MS LED or NS LED turns on green "On" for 250 ms, then red "On" for 250 ms, then green "On" (until the test is completed).
Flashing sequence red/green/off	The MS LED and NS LED each turn red "On" for 500 ms, then green "On" for 500 ms, then "Off" for 500 ms. This flashing sequence is repeated at least 6 times.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Tabelle 2: LED state definitions for the EtherNet/IP Adapter protocol

10.3.9 LEDs Open Modbus/TCP

For the OpenModbusTCP protocol, the communication LEDs **RUN** and **ERR** as well as the Ethernet LEDs **LINK** and **ACT** can assume the states described below. This description is valid from stack version V2.5.

LED	Color	State	Meaning
RUN General name: COM 0	**Duo-LED red/green**		
	(green)	On	**Connected**: OMB task has communication. At least one TCP connection is established.
	(green)	Flashing (1 Hz)	**Ready, not yet configured:** OMB task is ready and not yet configured.
	(green)	Flashing (5 Hz)	**Waiting for Communication:** OMB task is configured.
	(off)	Off	**Not Ready**: OMB task is not ready.
ERR General name: COM 1	**Duo-LED red/green**		
	(off)	Off	No communication error
	(red)	Flashing (2 Hz, 25% on)	System error
	(red)	On	Communication error active
LINK Ch0 & Ch1	**LED green**		
	(green)	On	The device is linked to the Ethernet.
	(off)	Off	The device has no link to the Ethernet.
ACT Ch0 & Ch1	**LED yellow**		
	(yellow)	Flicker-ing (load depen-dant)	The device sends/receives Ethernet frames.
	(off)	Off	The device does not send/receive Ethernet frames.

Table 83: LED states for the OpenModbusTCP protocol

LED state	Definition
Flashing (1 Hz)	The indicator turns on and off with a frequency of 1 Hz: “on” for 500 ms, followed by “off” for 500 ms.
Flashing (2 Hz, 25% on)	The indicator turns on and off with a frequency of 2 Hz: “on” for 125 ms, followed by “off” for 375 ms.
Flashing (5 Hz)	The indicator turns on and off with a frequency of 5 Hz: “on” for 100 ms, followed by “off” for 100 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 84: LED state definitions for the OpenModbusTCP protocol

10.3.10 LEDs POWERLINK controlled node

For the POWERLINK Controlled Node protocol, the communication LEDs **BS** (Bus Status) and **BE** (Bus Error) as well as the Ethernet LED **L/A** can assume the states described below. This description is valid from stack version V2.1 respectively from stack version V3.0.

LED	Color	State	Meaning
BS (Bus Status) General name: **COM 0**	**Duo LED red/green**		
	(green)	On	Slave is in **'Operational'** state
	(green)	Triple Flash	Slave is in **‚ReadyToOperate'** state
	(green)	Double flash	Slave is in **‚Pre-Operational 2'** state
	(green)	Single flash	Slave is in **‚Pre-Operational 1'** state
	(green)	Flickering (10 Hz)	Slave is in **‚Basic Ethernet'** state
	(green)	Blinking (2,5 Hz)	Slave is in **‚Stopped'** state
	(off)	Off	Slave initializing
BE (Bus Error) General name: **COM 1**	**Duo LED red/green**		
	(off)	Off	Slave has no error
	(red)	On	Slave has detected an error
L/A Ch0 & Ch1	**LED green**		
	(green)	On	**Link:** The device is linked to the Ethernet, but does not send/receive Ethernet frames.
	(green)	Flickering (load dependant)	**Activity:** The device is linked to the Ethernet and sends/receives Ethernet frames.
	(off)	Off	The device has no link to the Ethernet.
Ch0 & Ch1	**LED yellow**		
	(off)	Off	This LED is not used.

Table 85: LED states for the POWERLINK Controlled Node protocol

LED state	Definition
Triple Flash	The indicator shows a sequence of three short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Double flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Single flash	The indicator shows one short flash (200 ms) followed by a long "off" phase (1,000 ms).
Flickering (10 Hz)	The indicator turns on and off with a frequency of 10 Hz: "on" for 50 ms, followed by off for 50 ms. The red LED and the green LED are switched on alternately.
Blinking (2,5 Hz)	The indicator turns on and off phase with a frequency of 2.5 Hz: on for 200 ms, followed by off for 200 ms. The red LED and the green LED are switched on alternately.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 86: LED state definitions for the POWERLINK Controlled Node protocol

10.3.11 LEDs PROFINET IO-Controller (V2)

For the PROFINET IO-Controller protocol, the communication LEDs **SF** (system failure) and **BF** (bus failure) as well as the Ethernet LEDs **LINK** and **RX/TX** can assume the states described below. This description is valid from stack version V2.6.

LED	Color	State	Meaning
SF (System Failure) General name: **COM 0**	**Duo LED red/green**		
	(off)	Off	**No error**
	(red)	Flashing (1 Hz, 3 s)	**DCP signal service** is initiated via the bus.
	(red)	Flashing (2 Hz)	**System error:** Invalid configuration, Watchdog error or internal error
	(red)	On (*together with SF „red ON*)	**No valid Master license**
BF (Bus Failure) General name: **COM 1**	**Duo LED red/green**		
	(off)	Off	**No error**
	(red)	Flashing (2 Hz)	**Configuration fault:** Not all configured IO-Devices are connected.
	(red)	On (*together with SF „red ON")*	**No valid Master license**
	(red)	On (*together with SF „red OFF")*	**No Connection:** No Link.
LINK Ch0 & Ch1	**LED green**		
	(green)	On	The device is linked to the Ethernet.
	(off)	Off	The device has no link to the Ethernet.
RX/TX Ch0 & Ch1	**LED yellow**		
	(gelb)	Flickering (load de-pendant)	The device sends/receives Ethernet frames.
	(off)	Off	The device does not send/receive Ethernet frames.

Table 87: LED states for the PROFINET IO-Controller protocol

LED state	Definition
Flashing (1 Hz, 3 s)	The indicator turns on and off for 3 seconds with a frequency of 1 Hz: “on” for 500 ms, followed by “off” for 500 ms.
Flashing (2 Hz)	The indicator turns on and off with a frequency of 2 Hz: “on” for 250 ms, followed by “off” for 250 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 88: LED state definitions for the PROFINET IO-Controller protocol

10.3.12 LEDs PROFINET IO-Controller (V3)

For the PROFINET IO Controller protocol, the system status LED **SYS**, the communication LEDs **SF** (system failure) and **BF** (bus failure), as well as the Ethernet LEDs **LINK** and **RX/TX** can assume the states described below. This description is valid from stack version V3.0.

SYS	**SF**	**BF**	**Meaning**
Systen Status	System Failure	Bus Failure	LED name
	COM 0	**COM 1**	General LED name
yellow/green	red/green	red/green	Colours of the Duo LEDs SYS, SF or BF
Firmware and Configuration			
Off	Off	Off	Power supply for the device is missing or hardware defect.
On, yellow	Off	Off	No second stage bootloader found in Flash memory.
Flashing, green/yellow, cyclic	Off	Off	No firmware file found in Flash file system.
On, green	On, red	Off	PROFINET IO Controller is not configured.
On, green	Off	On, red	No Ethernet port has a link. E.g., no cable connected to any of the Ethernet ports.
On, green	Off	Flashing, red, 2 Hz	PROFINET IO Controller is not online (Bus is switched to Off).
PROFINET communication			
On, green	Off or On, red	Flashing, red, 1 Hz	Not all configured devices are in data exchange.
On, green	On, red	-	One IO Device connected to the PROFINET IO Controller reports a problem.
On, green	Off	Off	All devices are in data exchange and no problem has been reported by any device.
PROFINET IO Controller operation			
On, green	Flashing, red, 1 Hz, 3 s	Off	A PROFINET DCP Set Signal has been received.
On, green	Flashing, red, 2 Hz	Flashing, red, 2 Hz	The PROFINET IO Controller has detected an address conflict. Another device in the network is using the same Name of Station or IP address as the PROFINET IO Controller. Or Watchdog error
On, green	On, red	On, red	No valid Master license

Table 89: PROFINET IO Controller, SYS, COM0 and COM1 LEDs states

LED	Color	State	Meaning
LINK Ch0 & Ch1	**LED green**		
	(green)	On	The device is linked to the Ethernet.
	(off)	Off	The device has no link to the Ethernet.
RX/TX Ch0 & Ch1	**LED yellow**		
	(gelb)	Flickering (load dependent)	The device sends/receives Ethernet frames.
	(off)	Off	The device does not send/receive Ethernet frames.

Table 90: PROFINET IO Controller, Ethernet LEDs states

LED state	Definition
Flashing (1 Hz, 3 s)	The indicator turns on and off for 3 seconds with a frequency of 1 Hz: “on” for 500 ms, followed by “off” for 500 ms.
Flashing (1 Hz)	The indicator turns on and off with a frequency of 1 Hz: “on” for 500 ms, followed by “off” for 500 ms.
Flashing (2 Hz)	The indicator turns on and off with a frequency of 2 Hz: “on” for 250 ms, followed by “off” for 250 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 91: PROFINET IO Controller, LEDs states definitions

LED	Color	State	Meaning
LINK Ch0 & Ch1	**LED green**		
	(green)	On	The device is linked to the Ethernet.
	(off)	Off	The device has no link to the Ethernet.
RX/TX Ch0 & Ch1	**LED yellow**		
	(gelb)	Flickering (load dependent)	The device sends/receives Ethernet frames.
	(off)	Off	The device does not send/receive Ethernet frames.

Table 92: PROFINET IO-Controller, Ethernet LEDs states

LED state	Definition
Flashing (1 Hz, 3 s)	The indicator turns on and off for 3 seconds with a frequency of 1 Hz: “on” for 500 ms, followed by “off” for 500 ms.
Flashing (1 Hz)	The indicator turns on and off with a frequency of 1 Hz: “on” for 500 ms, followed by “off” for 500 ms.
Flashing (2 Hz)	The indicator turns on and off with a frequency of 2 Hz: “on” for 250 ms, followed by “off” for 250 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 93: PROFINET IO-Controller, LEDs states definitions

10.3.13 LEDs PROFINET IO-Device

For the PROFINET IO-Device protocol, the communication LEDs **SF** (System Failure) and **BF** (Bus Failure) as well as the Ethernet LEDs **LINK** and **RX/TX** can assume the states described below. This description is valid from stack version V3.x (V3).

LED	Color	State	Meaning
SF (System Failure) General name: **COM 0**	**Duo LED red/green**		
	(off)	Off	No error
	(red)	Flashing (1 Hz, 3 s)	DCP signal service is initiated via the bus.
	(red)	On	Watchdog timeout; channel, generic or extended diagnosis present; system error
BF (Bus Failure) General name: **COM 1**	**Duo LED red/green**		
	(off)	Off	No error
	(red)	Flashing (2 Hz)	No data exchange
	(red)	On	No configuration; or low speed physical link; or no physical link
LINK Ch0 & Ch1	**LED green**		
	(green)	On	The device is linked to the Ethernet.
	(off)	Off	The device has no link to the Ethernet.
RX/TX Ch0 & Ch1	**LED yellow**		
	(gelb)	Flickering (load de-pendant)	The device sends/receives Ethernet frames.
	(off)	Off	The device does not send/receive Ethernet frames.

Table 94: LED states for the PROFINET IO-Device protocol

LED state	Definition
Flashing (1 Hz, 3 s)	The indicator turns on and off for 3 seconds with a frequency of 1 Hz: “on” for 500 ms, followed by “off” for 500 ms.
Flashing (2 Hz)	The indicator turns on and off with a frequency of 2 Hz: “on” for 250 ms, followed by “off” for 250 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 95: LED state definitions for the PROFINET IO-Device protocol

10.3.14 LEDs Sercos-Master

For the Sercos Master protocol running on the communication modules (COMX 100CA-RE/ COMX 100CN-RE/ COMX 51CA-RE/ COMX 51CN-RE), the communication LEDs **STA** and **ERR** as well as the Ethernet LED **L/A** can assume the states described below. This description is valid from stack version V2.1.

LED	Color	State	Meaning
STA General name: **COM 0**	**Duo LED red/green**		
	(green)	On	**CP4: Communication phase 4**
	(green)	Triple Flash	**CP3: Communication phase 3**
	(green)	Double flash	**CP2: Communication phase 2**
	(green)	Single flash	**CP1: Communication phase 1**
	(green)	Blinking (2,5 Hz)	**CP0: Communication phase 0**
	(green)	Flickering (10 Hz)	**Master is not configured and is in NRT.** After a status change this isn't indicated again
	(off)	Off	**NRT:** Non Real-Time Mode
ERR General name: **COM 1**	**Duo LED red/green**		
	(red)	Single flash	Bus Sync error threshold
	(red)	Double flash	Internal Stop of the bus cycle
	(red)	Triple Flash	DPM watchdog has expired.
	(red)	Quadruple Flash	No Master license present in the device.
	(red)	Blinking (2,5 Hz)	Error in the configuration database.
	(red)	Single Flickering	Channel Init was executed at the Master.
	(red)	Double Flickering	Slave is missing.
	(red)	Flickering (10 Hz)	Boot-up was stopped due to an error.
	(off)	Off	No error
L/A Ch0 & Ch1	**LED green**		
	(green)	On	**Link:** The device is linked to the Ethernet, but does not send/receive Ethernet frames.
	(green)	Flickering (load dependant)	**Activity:** The device is linked to the Ethernet and sends/receives Ethernet frames.
	(off)	Off	The device has no link to the Ethernet.
Ch0 & Ch1	**LED yellow**		
	(off)	Off	This LED is not used.

Table 96: LED states for the Sercos Master protocol

LED state	Definition
Single flash	The indicator shows one short flash (200 ms) followed by a long “off“ phase (1,000 ms).
Double flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Triple Flash	The indicator shows a sequence of three short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Quadruple Flash	The indicator shows a sequence of four short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Blinking (2,5 Hz)	The indicator turns on and off with a frequency of 2,5 Hz: “on” for 200 ms, followed by “off” for 200 ms.
Single Flickering	The indicator is switched on and off once: 'on' for 50 ms, followed by 'off' for 500 ms.
Double Flickering	The indicator is switched on and off and on once: 'on' / 'off' / 'on' each for approximately 50 ms, followed by 'off' for 500 ms.
Flickering (10 Hz)	The indicator turns on and off with a frequency of 10 Hz: 'on' for 50 ms, followed by 'off' for 50 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: 'on' for approximately 50 ms, followed by 'off' for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 97: LED state definitions for the Sercos Master protocol

LED state definition for Sercos Master for the STA and ERR LEDs

Indicator state	Definition
Off	The indicator is constantly off.
Blinking	The indicator turns on and off with a frequency of 2,5 Hz: on for 200 ms, followed by off for 200 ms.
Single Flickering	The indicator turns on and off with a frequency of approximately 10 Hz: on for approximately 50 ms, followed by off for 50 ms.
Flickering	The indicator turns on and off once: on for approximately 50 ms, followed by off for 50 ms.
Single Flash	The indicator shows one short flash (200 ms) followed by a long off phase (1,000 ms).
Double Flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Triple Flash	The indicator shows a sequence of three short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Quadruple Flash	The indicator shows a sequence of four short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).

Table 98: LED state definition for Sercos Master for the STA and ERR LEDs

10.3.15 LEDs Sercos-Slave

For the Sercos Slave protocol running on the communication modules (COMX 100CA-RE/ COMX 100CN-RE/ COMX 51CA-RE/ COMX 51CN-RE), the communication LED **S** as well as the Ethernet LED **L/A** can assume the states described below. This description is valid from stack version V3.1.

LED	Color	State	Meaning
S General name: **COM 0**	**Duo LED red/green** (orange = red/green simultaneously)		
	(green)	On	**CP4: Communication phase 4:**Normal operation, no error
	(green)	Flashing (2 Hz)	**Loopback:** The network state has changed from „fast-forward“ to „loopback“.
	(green/orange)	Flashing (3 x green/3s)	**CP3: Communication phase 3**
		(2 x green/3s)	**CP2: Communication phase 2**
		(1 x green/3s)	**CP1: Communication phase 1**
	(orange)	On	**CP0: Communication phase 0**
	(orange)	Flashing (2 Hz)	**Identification:** Invoked by (C-DEV.Bit15 in the Device Control) Or SIP Identification Request
	(green/red)	Flashing (2 Hz, min. 2s)	**MST losses ≥ (S-0-1003/2):** The communication warning (S-DEV.Bit 15) is present in the Device Status.
	(red/orange)	Flashing (2 Hz)	**Application error (C1D):** See GDP & FSP Status codes class error.
	(red)	On	**Communication Error (C1D):** Error detected according to Sercos third generation Class 1 Diagnosis, see SCP Status codes class error.
	(off)	Off	**NRT-Mode:** (Non Real-Time Mode) No Sercos Communication
General name: **COM 1**	**Duo LED red/green**		
	(off)	Off	This LED is not used.
L/A Ch0 & Ch1	LED green		
	(green)	On	**Link:** The device is linked to the Ethernet, but does not send/receive Ethernet frames.
	(green)	Flickering (load dependant)	**Activity:** The device is linked to the Ethernet and sends/receives Ethernet frames.
	(off)	Off	The device has no link to the Ethernet.
Ch0 & Ch1	LED yellow		
	(off)	Off	This LED is not used.

Table 99: LED state definitions for the Sercos Slave protocol

LED state	Definition
Flashing (2 Hz)	The indicator turns on and off with a frequency of 2 Hz: *one color:* On for appr. 250 ms, followed by off for appr. 250 ms. *two colors:* First color for appr. 250 ms, followed by the second color for appr. 250 ms.
Flashing (1 x green/3s)	Flashing green for 250 ms, then orange on for 2 second and 750 ms.
(2 x green/3s)	Flashing green / orange / green, each for 250 ms, then orange on for 2 seconds and 250 ms.
(3 x green/3s)	Flashing green / orange / green / orange / green, each for 250 ms, then orange on for 1 second and 750 ms.
(1 x orange/3s)	Flashing orange for 250 ms, then green on for 2 second an 750 ms.
(2 x orange/3s)	Flashing orange / green / orange, each for 250 ms, then green on for 2 seconds and 250 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: "on" for approximately 50 ms, followed by "off" for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 100: LED state definitions for the Sercos Slave protocol

LED state	Definition
Flashing (2 Hz)	The indicator turns on and off with a frequency of 2 Hz: *one color:* On for appr. 250 ms, followed by off for appr. 250 ms. *two colors:* First color for appr. 250 ms, followed by the second color for appr. 250 ms.
Flashing (1 x green/3s)	Flashing green for 250 ms, then orange on for 2 second and 750 ms.
(2 x green/3s)	Flashing green / orange / green, each for 250 ms, then orange on for 2 seconds and 250 ms.
(3 x green/3s)	Flashing green / orange / green / orange / green, each for 250 ms, then orange on for 1 second and 750 ms.
(1 x orange/3s)	Flashing orange for 250 ms, then green on for 2 second an 750 ms.
(2 x orange/3s)	Flashing orange / green / orange, each for 250 ms, then green on for 2 seconds and 250 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: "on" for approximately 50 ms, followed by "off" for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 101: LED state definitions for the Sercos Slave protocol

10.3.16 LEDs VARAN Client

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For the VARAN Client protocol running on the communication modules (COMX 100CA-RE/ COMX 100CN-RE/ COMX 51CA-RE/ COMX 51CN-RE), the communication LEDs **RUN** and **ERR** as well as the Ethernet LEDs **LINK IN** and **LINK OUT** or **ACT IN** and **ACT OUT** can assume the states described below. This description is valid from stack version V1.0.

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LED	Color	State	Meaning
RUN General name: **COM 0**	**Duo-LED red/green**		
	(green)	On	Configured and communication is active.
	(green)	Blinking (5 Hz)	Configured and communication is inactive.
	(off)	Off	Not configured.
ERR General name: **COM 1**	**Duo-LED red/green**		
	(off)	Off	Configured.
	(red)	Blinking (5 Hz)	Not configured.
	(red)	On	Communication error occurred.
LINK IN Ch0 & **LINK OUT** Ch1	**LED green**		
	(green)	On	The device is linked to the Ethernet.
	(off)	Off	The device has no link to the Ethernet.
ACT IN Ch0 & **ACT OUT** Ch1	**LED yellow**		
	(yellow)	Flickering (load dependant)	The device sends/receives Ethernet frames.
	(off)	Off	The device does not send/receive Ethernet frames.

Table 102: LED-Zustände für das VARAN-Client-Protokoll

LED state	Definition
Blinking (5 Hz)	The indicator turns on and off with a frequency of 5 Hz: “on” for 100 ms, followed by “off” for 100 ms.
Flickering (load dependant)	The indicator turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: on for approximately 50 ms, followed by off for 50 ms. The indicator turns on and off in irregular intervals to indicate low Ethernet activity.

Table 103: Definitionen der LED-Zustände für das VARAN-Client-Protokoll

11 Trouble-shooting

In case of any error, observe the following trouble-shooting instructions:

General

- Check whether the requirements for operating the comX communication module are fulfilled:

Important: Be sure to update older versions of the **cifX Device Driver** to the current version, see Table 2 on page 11.

For more information on this matter, see section *Prerequisites for the operation of the comX communication* modules on page 38.

SYS-LED

- Check the status of the SYS LED. A solid green SYS LED indicates that the firmware of the comX communication module is operational.

LINK-LED

- Use the LINK LED status to check whether a connection to the Ethernet has been established successfully. Depending on the environment of the comX communication module, proceed as follows:
- If the comX communication module is mounted in its target environment: Check signals LINK0 at pin 1 for channel 0 and LINK1 at pin 3 for channel 1, respectively.

Mounting

- Check that the comX communication module is mounted correctly in the socket.

Configuration

- Check the configuration in the master and slave device. The configuration has to match.

12 Updating the firmware

12.1 Possibilities of firmware update

This section introduces the various possibilities of firmware update for the COMX-C communication modules and explains when to consider which possibility.

During the construction of the device, take into account that at least one of the two diagnostic interfaces being suitable for firmware update, must be routed through.

This not only enables an easy way for the firmware update, but also provides extensive diagnosis possibilities via the configuration software SYCON.net (see sections *„Diagnosis“* and *„Extended Diagnosis“* of the SYCON.net DTM manuals) as a sophisticated and powerful diagnostic tool or, alternatively, via the cifX test application as a lean and compact diagnostic tool that is easy to use.

If neither the serial nor the USB interface is available at the device, a firmware update can be performed only by removing the comX communication module from the device and by connecting it to a PC by help of an evaluation board (*COMXEB*, Hilscher part number 1530.000)

12.1.1 Updating the comX-firmware in built-in state (embedded system)

For updating the firmware while the comX module is built-in (i.e. as an embedded system), the following two solutions are possible:

12.1.1.1 Set-up A1: Updating the firmware with SYCON.net via the USB-interface

This set-up serves to update the firmware of an embedded system via the USB interface from an external PC.

Necessary prerequisites:

1. The USB interface of the comX communication module must be routed through.
2. SYCON.net is installed on the PC.

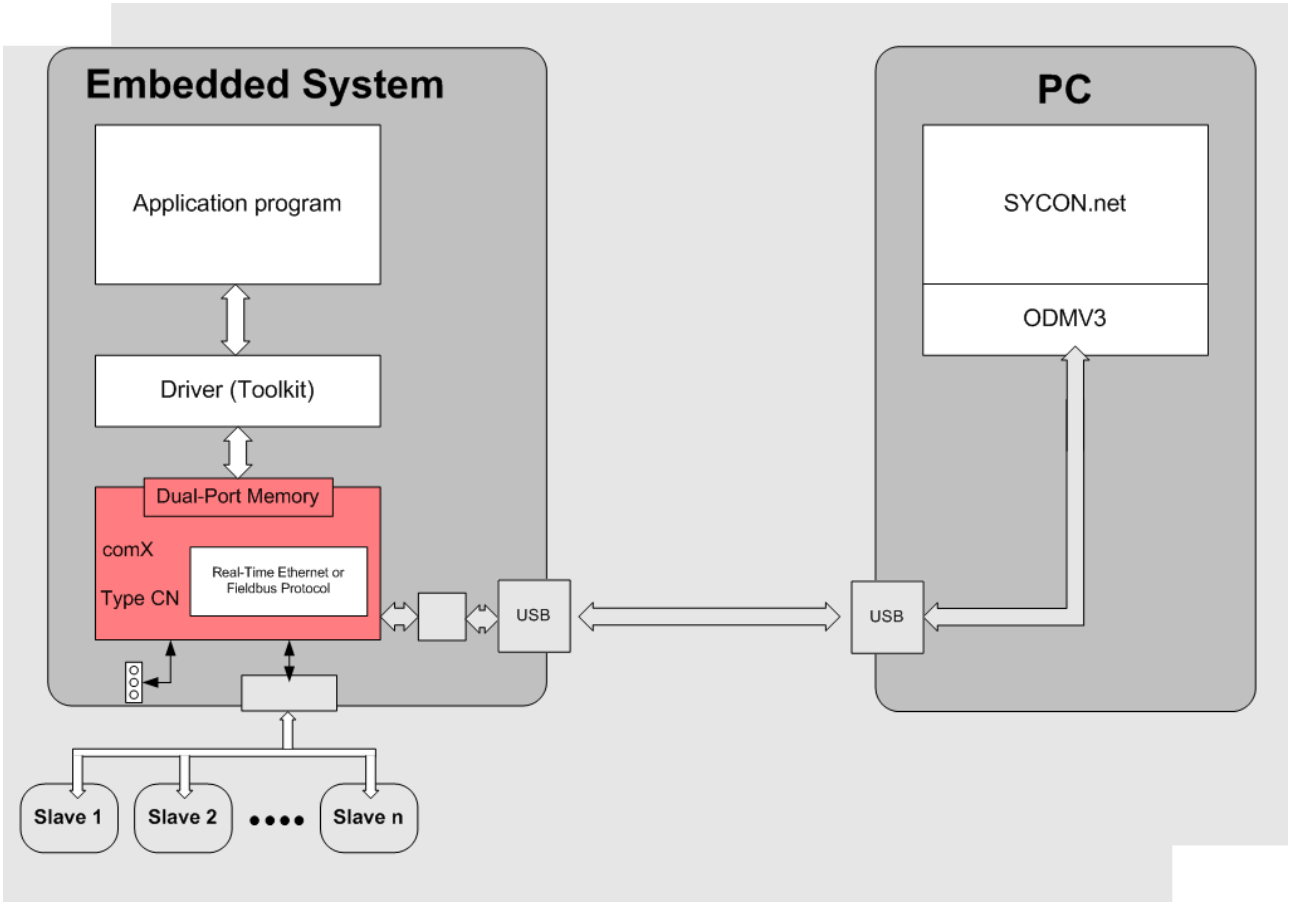


Figure 45: Set-up A1: Updating the firmware with SYCON.net via the USB-interface

Note: For details on how to update the firmware of a comX communication module with SYCON.net, see section *Updating the firmware with SYCON.net* on page 164.

12.1.1.2 Set-up A2: Updating the firmware with SYCON.net via the serial interface

This set-up serves to update the firmware of an embedded system via the serial interface from an external PC.

Necessary prerequistes:

1. The serial interface of the comX communication module must be routed through.
2. SYCON.net is installed on the PC.

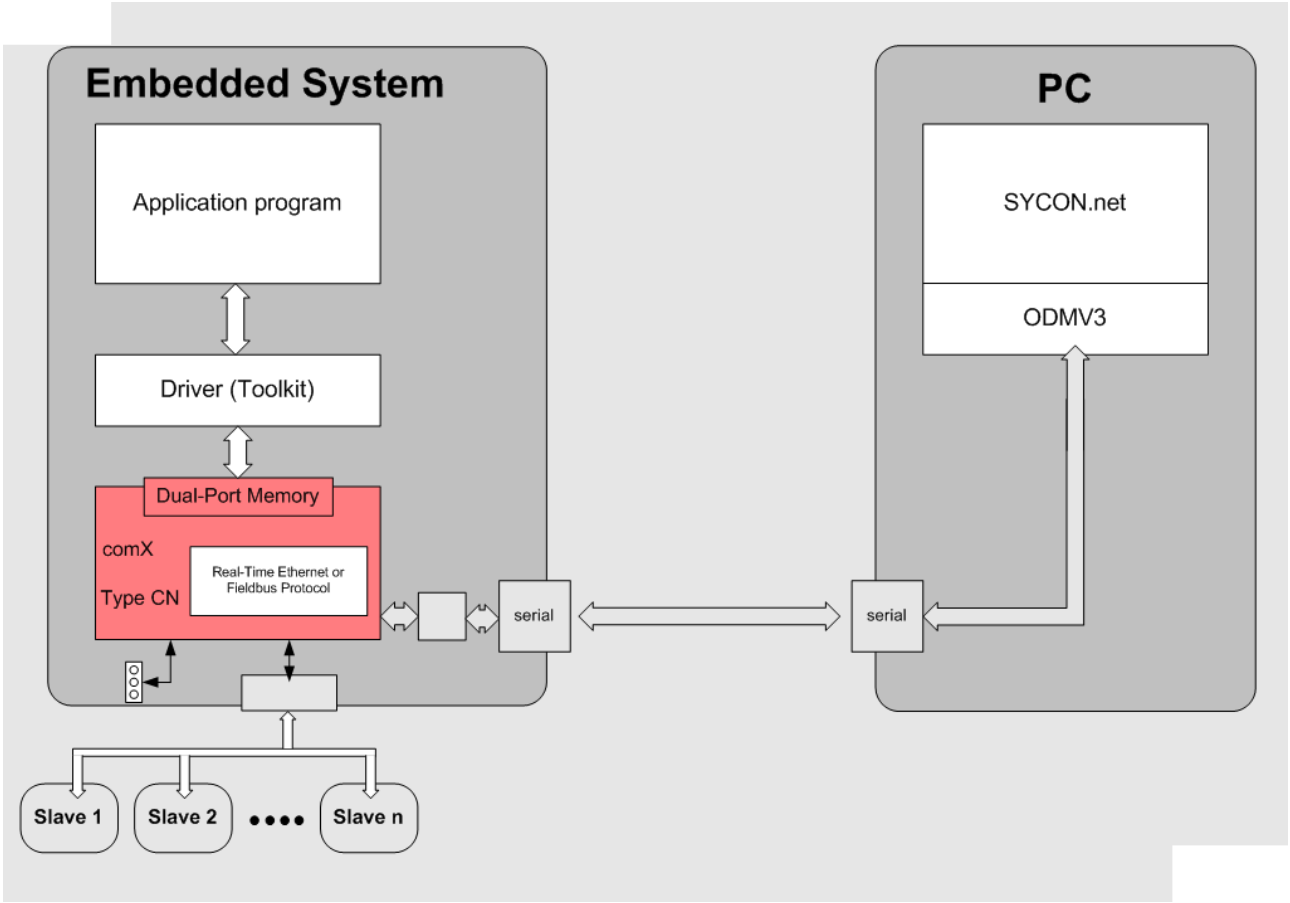


Figure 46: Set-up A2: Updating the firmware with SYCON.net via the serial interface

Note: For details on how to update the firmware of a comX communication module with SYCON.net, see section *Updating the firmware with SYCON.net* on page 164.

12.1.2 Updating the firmware using an evaluation board COMXEB and a PC

For firmware update of comX communication modules connected to a PC via the evaluation board COMXEB, the following solutions are possible:

12.1.2.1 Set-up B1: Updating the firmware with SYCON.net via the serial interface

This set-up serves to update the firmware of a comX communication modules connected to a PC via the evaluation board COMXEB (see above) using SYCON.net via the serial interface.

Necessary prerequistes:

1. The comX communication module is plugged into the appropriate module socket of the evaluation board *COMXEB*.
2. A serial connection has been established between evaluation board (diagnostic interface X601) and (external) PC.
3. SYCON.net is installed on the (external) PC.

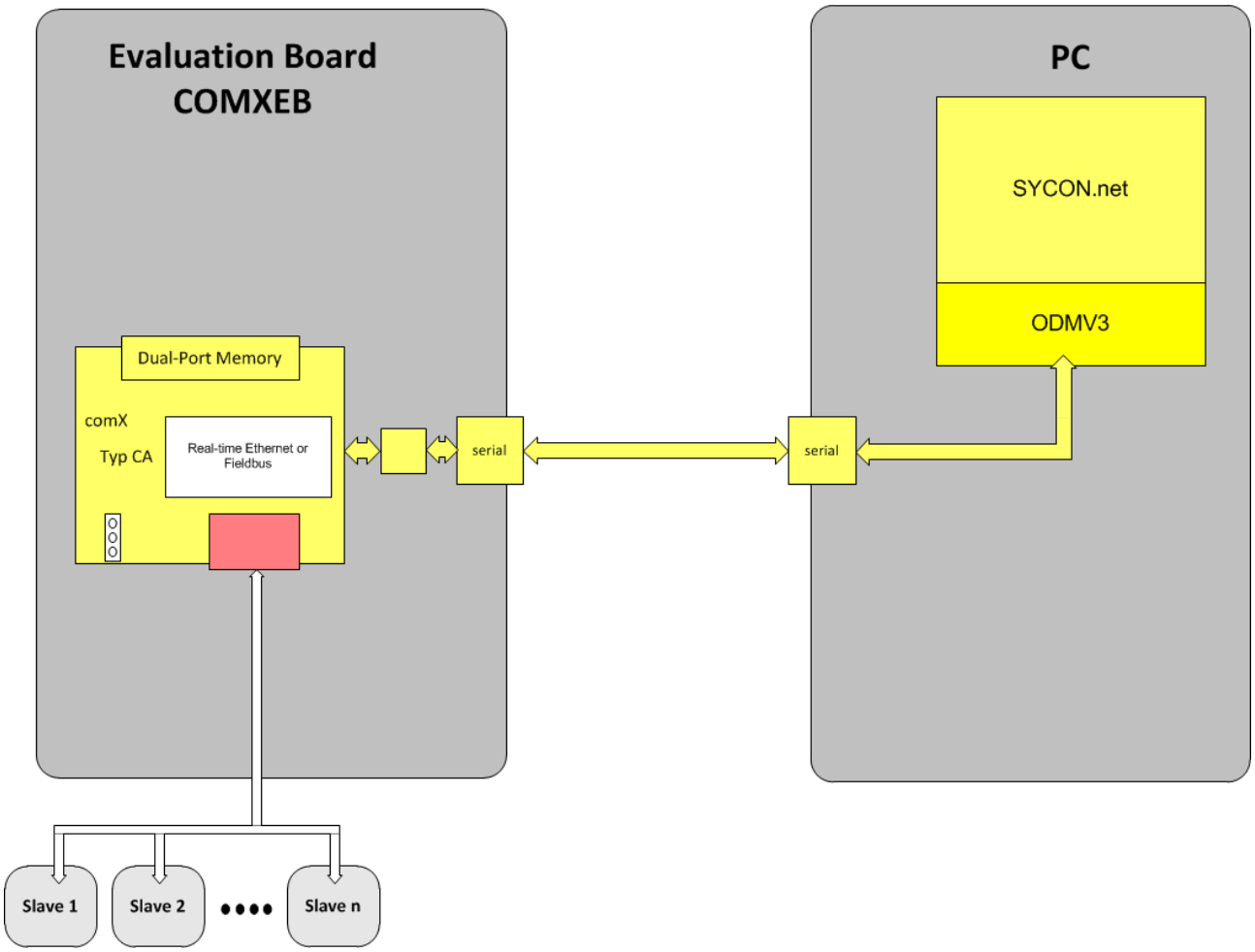


Figure 47: Set-up B1: Firmware update with SYCON.net via the serial interface using evaluation board COMXEB

Note: For details on how to update the firmware of a comX communication module with SYCON.net, see section *Updating the firmware with SYCON.net* on page 164.

12.1.2.2 Set-up B2: Updating the firmware with SYCON.net via the serial interface

This set-up serves to update the firmware of a comX communication module connected to a PC via the evaluation board COMXEB (see above) using SYCON.net via a USB interface.

Necessary prerequistes:

1. The comX communication module is plugged into the appropriate module socket of the evaluation board *COMXEB*.
2. A USB connection has been established between the evaluation board (Mini-USB interface X611) and the (external) PC.
3. SYCON.net is installed on the (external) PC.

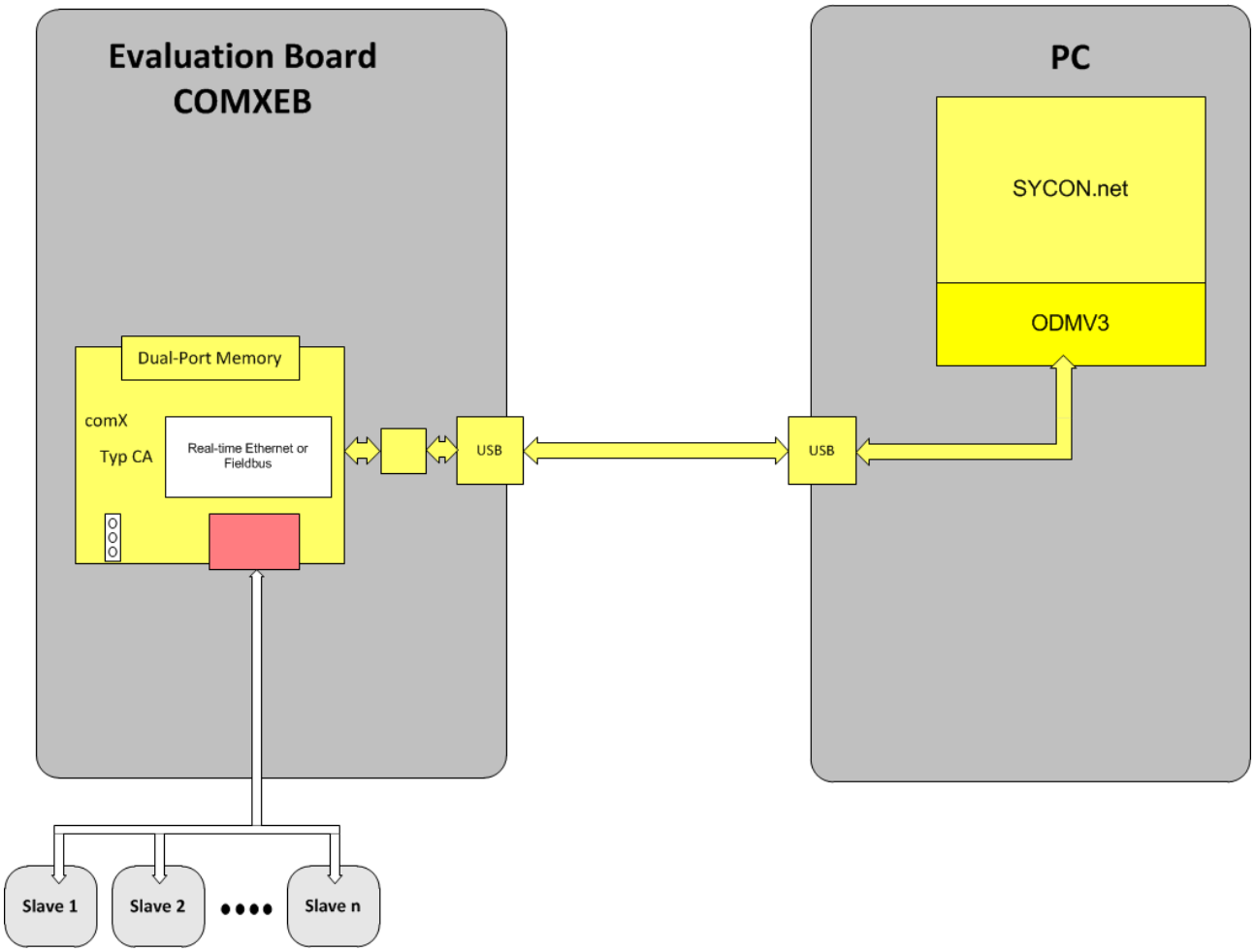


Figure 48: Set-up B2: Firmware update with SYCON.net via the USB interface using evaluation board COMXEB

Note: For details on how to update the firmware of a comX communication module with SYCON.net, see section *Updating the firmware with SYCON.net* on page 164.

12.1.2.3 Set-up B3: Updating the firmware with SYCON.net via NXPCA-PCI and DPM

This set-up serves to update the firmware of a comX communication module connected to a PC via the evaluation board COMXEB (see above) using SYCON.net via NXPCA-PCI and a DPM interface.

Necessary prerequistes:

1. The comX communication module is plugged into the appropriate module socket of the evaluation board *COMXEB*.
2. A ribbon cable connection has been established between the evaluation board (Host interface X350) and the (external) PC.
3. SYCON.net is installed on the (external) PC.

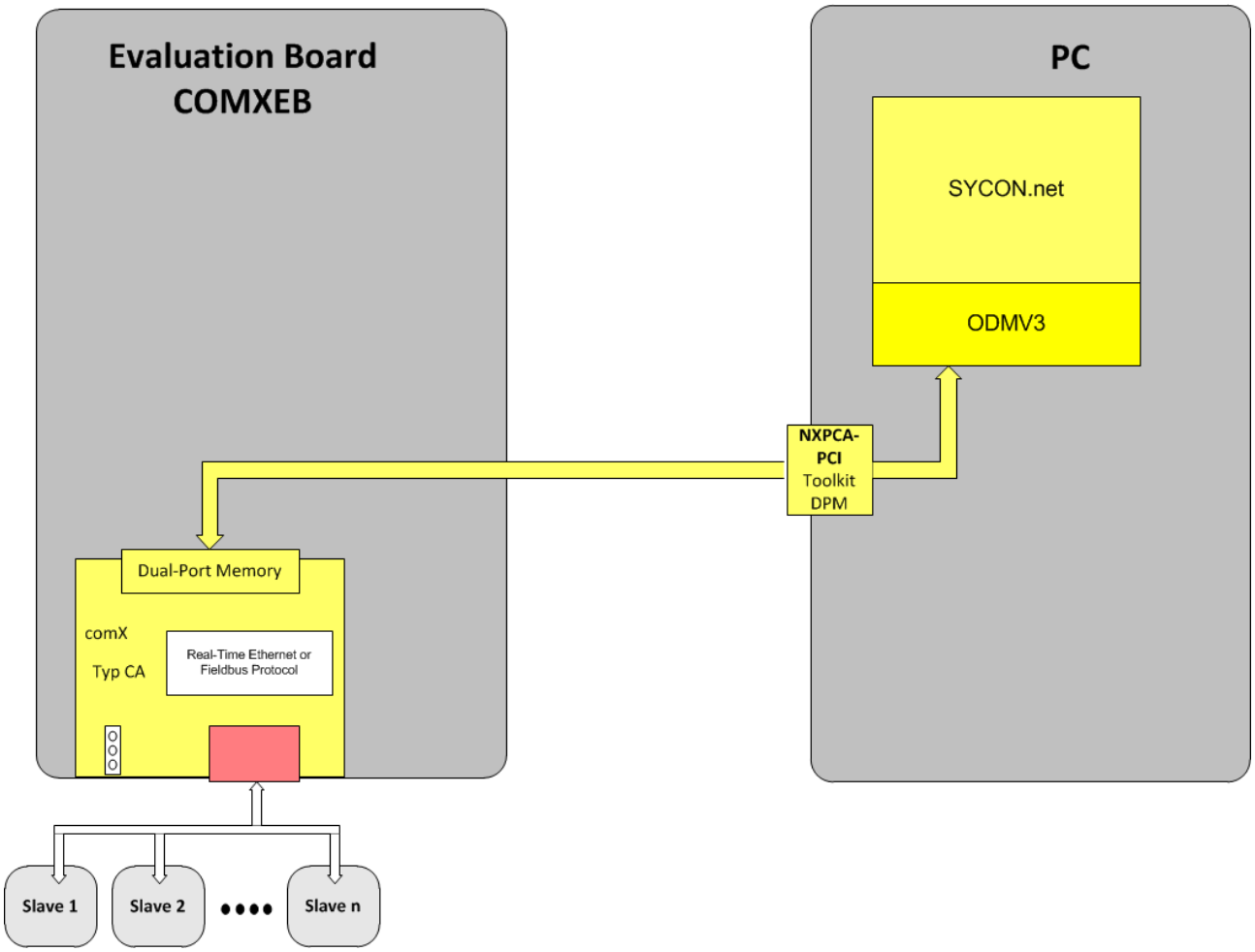


Figure 49: Set-up B3: Firmware update with SYCON.net via the NXPCA-PCI and DPM interface using evaluation board COMXEB

12.1.2.4 Set-up B4: Updating the firmware with SYCON.net via SPM over USB

This set-up serves to update the firmware of a comX communication module connected to a PC via the evaluation board COMXEB (see above) using SYCON.net via SPM over USB.

Necessary prerequistes:

1. The comX communication module is plugged into the appropriate module socket of the evaluation board *COMXEB*.
2. A USB connection has been established between the evaluation board (Host interface X829 **(16)**) and the (external) PC.
3. SYCON.net is installed on the (external) PC.

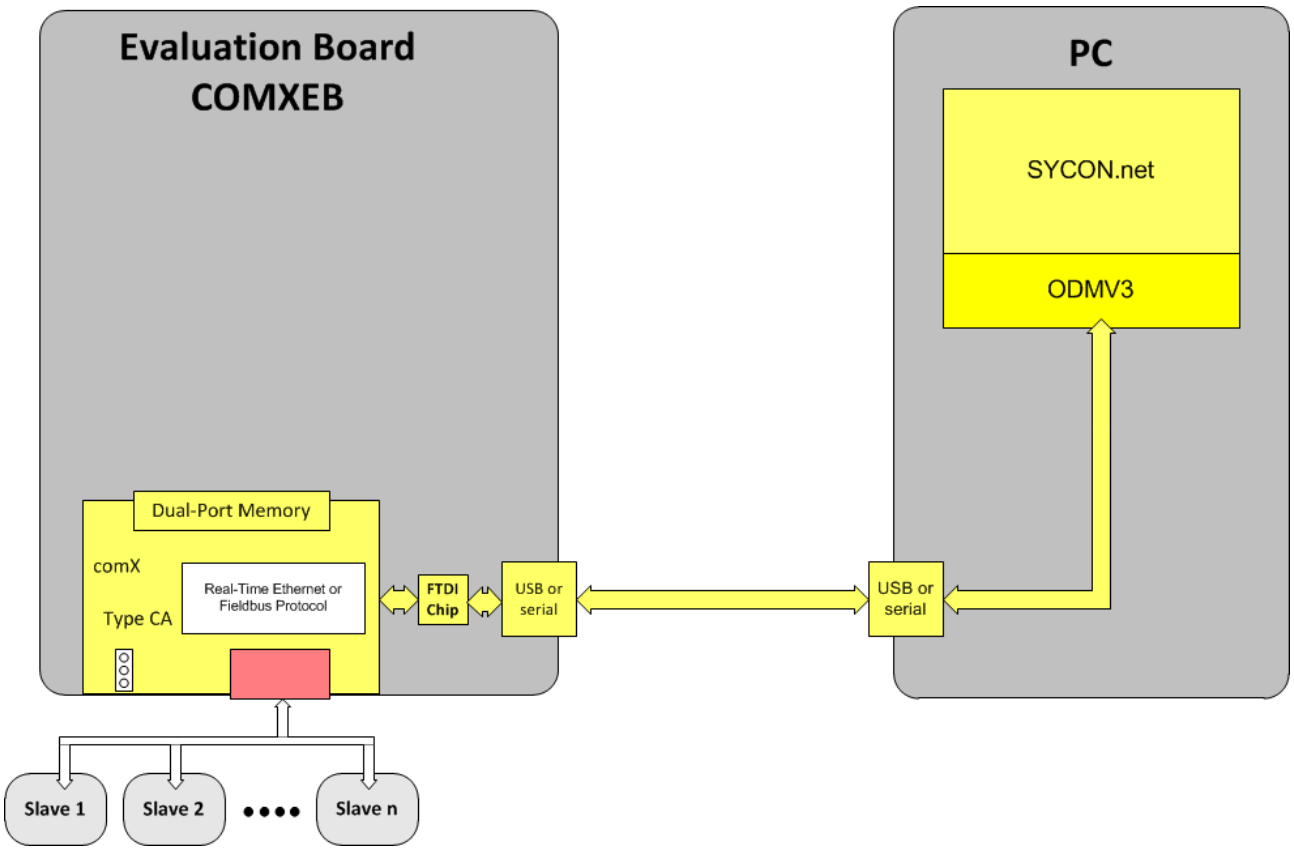


Figure 50: Set-up B4: Updating the firmware with SYCON.net via SPM over USB

12.2 Updating the firmware with SYCON.net

For comX communication modules being used as embedded systems that are already mounted into their target environment, this is the only possibility to perform a firmware update. In order to be able to access the comX module, SYCON.net has to be used together with the netX driver.

This can be done via a USB and a serial connection. This complies with the update possibilities described in sections *Set-up A1: Updating the firmware with SYCON.net via the USB-interface* and *Set-up A2: Updating the firmware with SYCON.net via the serial interface*.

A firmware can also be updated via a serial or USB interface at a comX communication module connected to a PC via an evaluation board. This complies with the update possibilities described in sections "*Set-up B1: Updating* " and "*Set-up B2: Updating* ". In this case, SYCON.net has to be used together with the netX driver.

➢ To start the system configurator SYCON.net, select the following entry in the Windows starting menu.

Programs > SYCON.net System Configurator > SYCON.net

➢ The System Configurator SYCON.net will be opened.

You will find a detailed description of the update process in the manual of the DTM of the Fieldbus or Real-Time Ethernet communication system of your choice, see topic *User Manual SYCON.net*.

To update the firmware of the comX communication module using SYCON.net, the following three steps are required and have to be performed exactly in the following order:

1. Creation project
2. Device assignment (Create the connection to the comX communication module). This includes the:
   - Selection of the correct driver
   - Selection of the comX communication module to be used.
3. Performing the main part of the firmware update

For selecting the driver, the update method to be applied, as described above, has to be taken into account.

SYCON.net accesses the comX communication module via the netX driver.

➢ Select the *netX Driver* by checking the corresponding **checkbox for *netX Driver*.**

Note: For a description, see section 3.2.1 *Selecting the Driver* of the corresponding SYCON.net DTM Manual.

For more useful information on this matter, see section 3.2.4 *netX Driver* of the SYCON.net DTM manual. The necessary adjustment of interfacing parameters is explained in section 3.2.4.2 *Driver parameters for netX Driver - USB/RS232 Connection*.

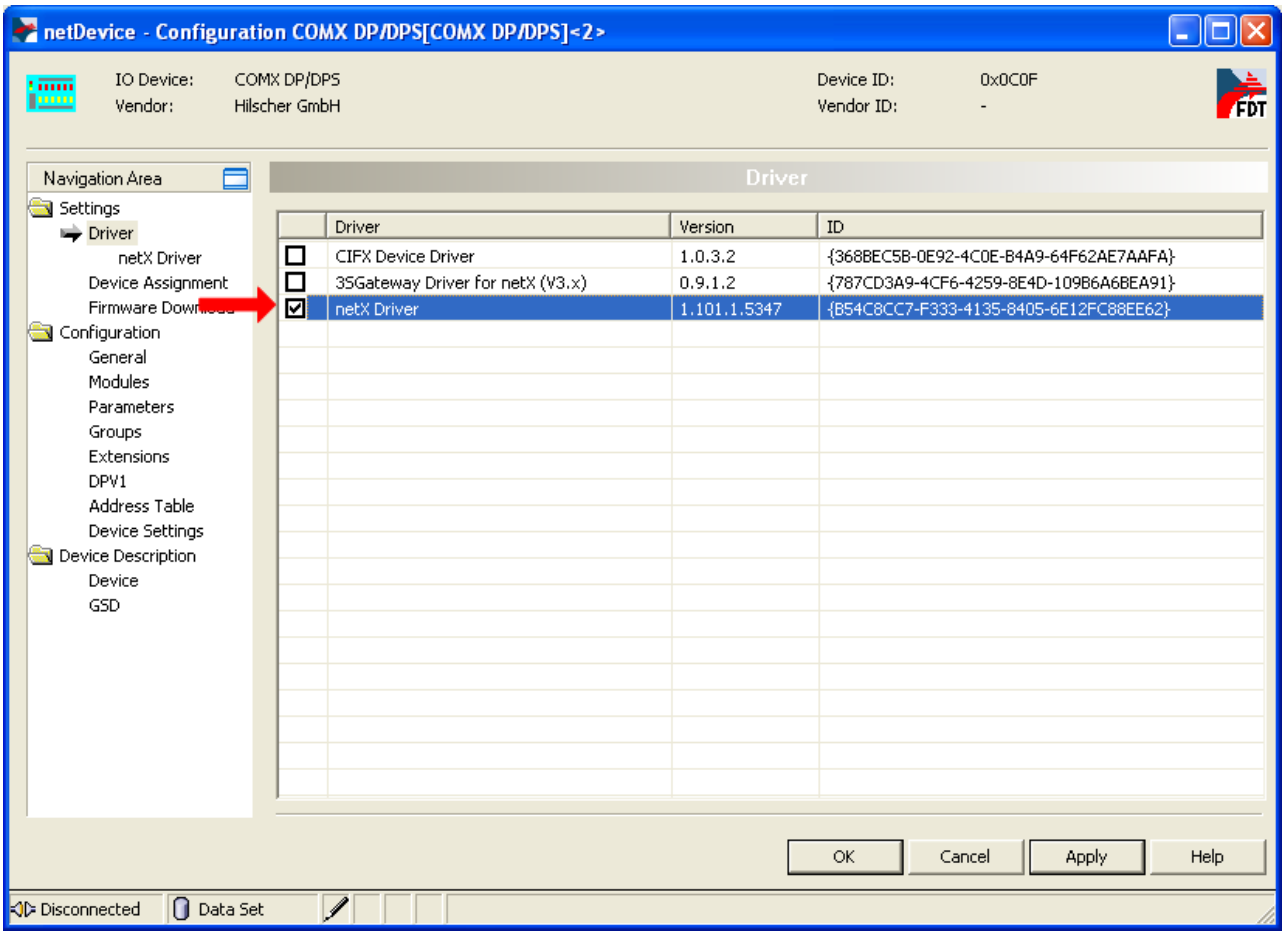


Figure 51: Selection of netX driver

Note:

Select the device as explained in section *Device Assignment* of the corresponding SYCON.net DTM manual.

- We recommend displaying only the suitable devices when performing the following steps. Select *Suitable only* in the combo box *Device selection*.
- To start the search process for suitable devices, click the button *Search* (see *Figure 52: Starting the search process for devices and selection of device* on page 166, red arrow, top, right).
- To select the device, check the checkbox of the comX communication module whose firmware is to be updated (also see *Figure 52: Starting the search process for devices and selection of device* on page 166, red arrow, center).

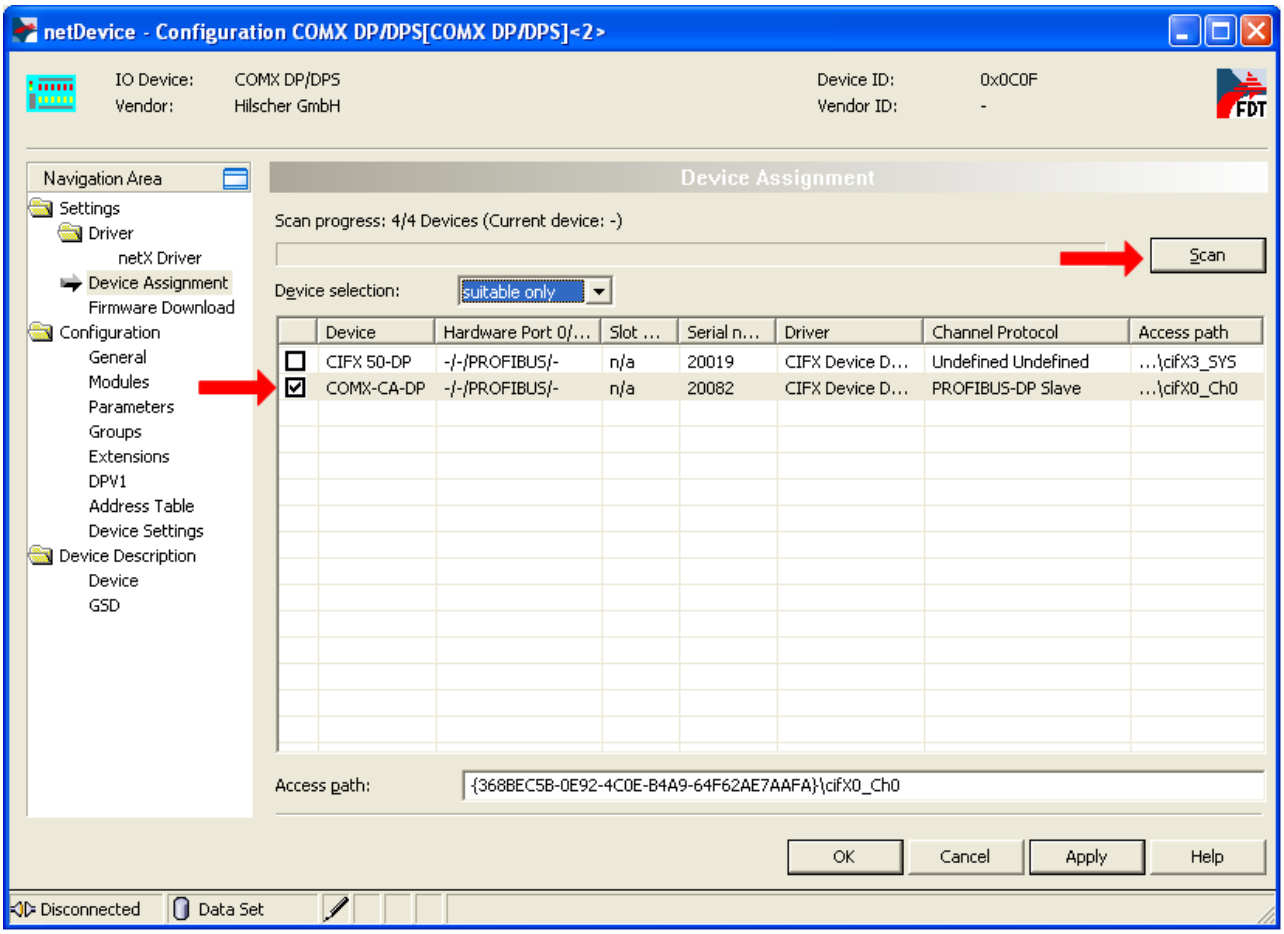


Figure 52: Starting the search process for devices and selection of device

The main part of the firmware update is described in section 3.4 *Firmware Download* of the respective SYCON.net DTM Manual. Proceed as follows:

- In the navigation area, select **Settings>Firmware Download**.
- Click the button *Select* to open a file selection dialog (*Figure 53: Firmware download with SYCON.net (after the firmware selection)*, see ① top, right).
- In this dialog, select the firmware file to be loaded.

Then, the screen should look like this:

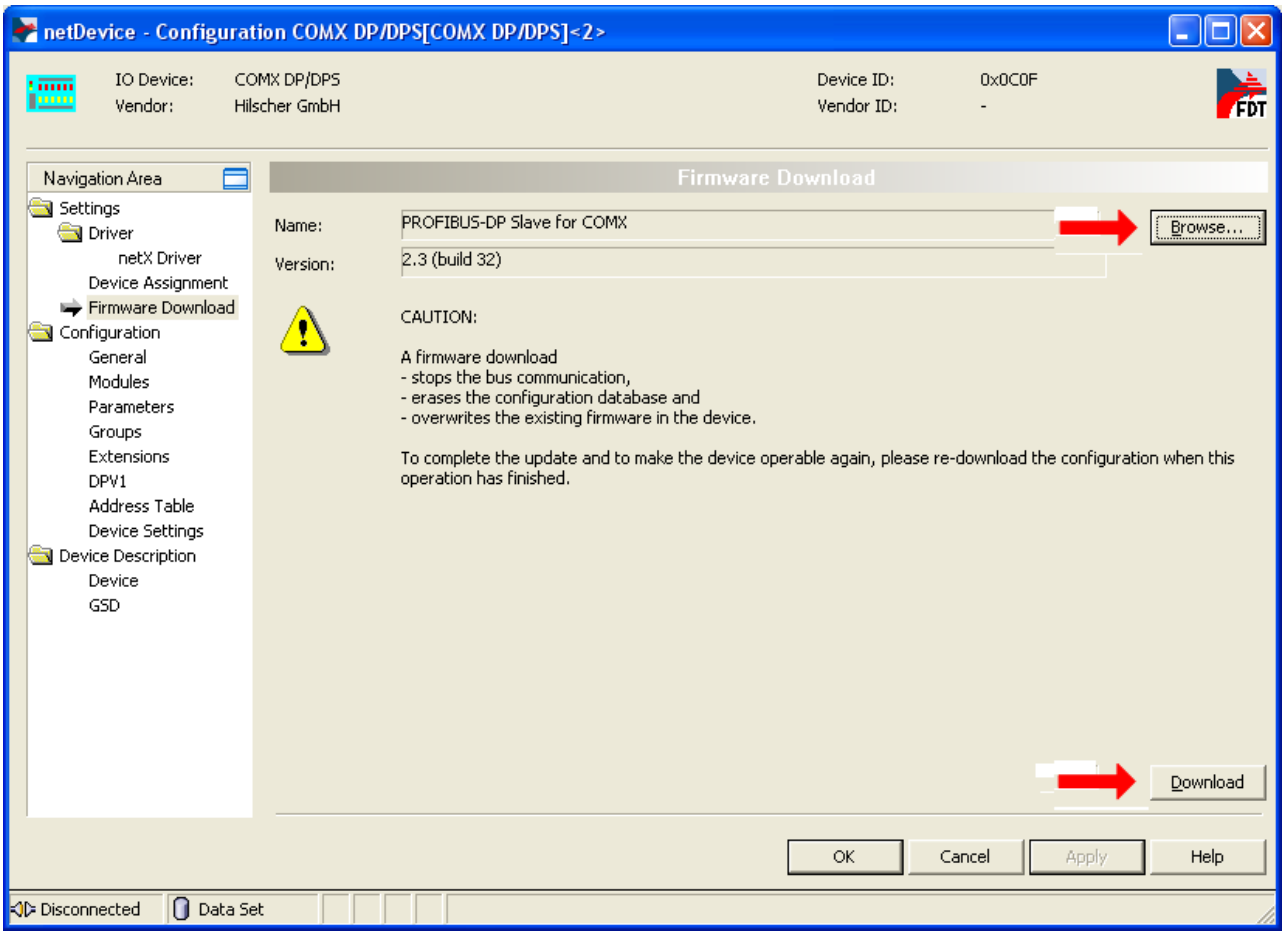


Figure 53: Firmware download with SYCON.net (after the firmware selection)

- To start the firmware update process, click *Load* (*Figure 53: Firmware download with SYCON.net (after the firmware selection)*, see ②).

Important: Pay attention to the warning message in the window! Restoring the state before starting the firmware update is often impossible.

12.2.1 Trouble-shooting

The following table lists some known error situations, explains their causes and shows possible ways to solve the respective problem.

Problem	The error message  appears.
Cause 1	The loaded file does not contain firmware for any Hilscher device (neither for comX nor for any other Hilscher device).
Remedy 1	Load a correct firmware file. See *Table 3: Reference to firmware* on page 13.
Cause 2	In case of update possibility B1: The contact of the adapter card to the PCI carrier board is bad or there is no contact at all.
Remedy 2	Check whether the adapter card is mounted correctly.
Cause 3	In case of update possibility B1: The contact of the comX communication module to the adapter card is bad or there is no contact at all.
Remedy 3	Check whether the comX communication module is mounted correctly.

Problem	The error message  appears.
Cause 1	The connection to the comX communication module has been lost due to contact problems.
Remedy 1	Check whether the comX communication module and (in case of update possibility B1) the adapter card are mounted correctly.
Cause 2	In case of update possibility A1, A2, and B2: The connection to the comX communication module has been lost due to contact problems at the serial or USB connection.
Remedy 2	In case of update possibility A1, A2, and B2: Check the serial cable or the USB cable for correct contact.

Problem	The error message  appears.
Cause 1	The connection to the comX communication module has been lost due to contact problems.
Remedy 1	Check whether the comX communication module and (in case of update possibility B1) the adapter card are mounted correctly.
Cause 2	In case of update possibility A1, A2, and B2: The connection to the comX communication module has been lost due to contact problems at the serial or USB connection.
Remedy 2	In case of update possibility A1, A2, and B2: Check the serial cable or the USB cable for correct contact.

Problem	The error message  appears.
Cause	The device classes do not match. The selected firmware file contains a Hilscher firmware which is not suitable for the comX communication module but for another Hilscher product (e.g. a cifX card).
Remedy	Click *Select* and use the following file selection dialog to select a firmware suitable for the comX communication module. See Table 3 on page 13. Finally, click *Download* to load this firmware into the comX communication module.

Problem	The error message  appears.
Cause	The communication classes do not match. Either the firmware file to be loaded is suitable for a master/scanner/controller and the installed comX communication module needs a slave/adapter/device firmware or the firmware file to be loaded is suitable for a slave/adapter/device and the installed comX communication module needs a master/scanner/controller firmware. If a change from master to slave or vice versa is intended and a master license is available, click Yes to perform the intended change. In any other case, click *No*.
Remedy	Use a firmware of the correct type for your comX communication module, i.e. a master firmware for a master module and a slave firmware for a slave module.
Problem	The error message  appears.
Cause	The protocol classes do not match. The selected firmware does not support any protocol suitable for the selected comX communication module. This error situation mostly occurs together with the two aforementioned situations (see ill.).
Remedy	Use a firmware that supports a protocol that is suitable for your comX communication module. If you intend to change the Real-Time Ethernet system and use a comX Real-Time Ethernet module (such as COMX 100CA-RE, COMX 100CN-RE), click *Yes* to perform the intended change. In any other case, click *No*.
Problem	The error message

	 appears.
Cause	The protocol classes do not match. The selected firmware does not support any protocol suitable for the selected comX communication module. This error situation mostly occurs together with the two aforementioned situations (see figure).
Remedy	Use a firmware that supports a protocol that is suitable for your comX communication module. If you intend to change the Real-Time Ethernet system and use a comX Real-Time Ethernet module (such as COMX 100CA-RE, COMX 100CN-RE), click *Yes* to perform the intended change. In any other case, click *No*.

Problem	The error message *"Invalid Firmware for the assigned device. The hardware options do not match…"* appears.
Cause	The hardware options do not match, i.e. either you are using use a Real-Time Ethernet firmware together with a Fieldbus communication module, or vice versa, a Fieldbus firmware together with a Real-Time Ethernet communication module.
Remedy	Click *No* and use a firmware that supports a protocol that is suitable for your comX communication module. If you click *Yes*, an unsuitable firmware will be loaded and the module will not work correctly.

Problem	The button *Download* in the screen mask *Firmware Download* is grayed out and thus deactivated.
Cause	There is a (temorary) contact problem.
Remedy	Check whether comX communication module and adapter card are mounted and connected correctly and have good electrical contact. Then, reselect the firmware file to be loaded using the button "Select" and the following file selection dialog. Thereafter, the button *Download* should not be grayed out anymore.

Problem	The error message  appears.
Cause	A message timeout has occurred. The connection to the comX communication module has been lost due to contact problems, while button *Select* was clicked.
Remedy	Check whether comX communication module and (in case of update possibility B1) adapter card have been mounted correctly.

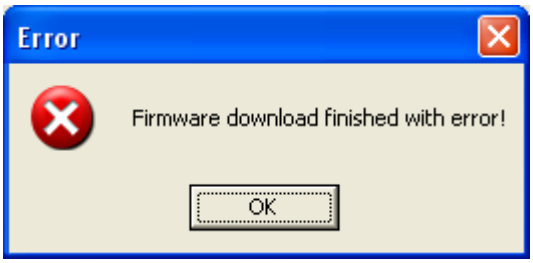
Problem	The error message  appears.
Cause	In case of update possibility A1, A2, and B2: The firmware download was finished with an error because the serial or USB connection to the comX communication module was lost during the firmware download.
Remedy	In case of update possibility A1, A2, and B2: Check whether the serial or USB cable has good contact.

Table 104: Possible error causes, their effects and suitable remedies when updating the firmware with SYCON.net

In case of problems with the firmware download, also check the following points:

- If you intend to load a master firmware: Is a master license available and loaded? If not, you have to purchase and load a Hilscher master license.
- Is the switch *Byte/Word* of PCI carrier board CIF 50-CB-COM-ABC in the position *Word*? If necessary, switch to *Word*!
- Especially for update possibility B1: Check the revision number of PCI carrier board CIF 50-CB-COM-ABC. This revision number must be greater or equal to 5. Revisions 1 to 4 of the PCI carrier board are incapable of connecting comX modules.
- Is system configurator SYCON.net installed correctly?
- Is the correct device selected in SYCON.net?

13 Diagnostic interfaces

The USB and serial interface are available as diagnostic interfaces.

13.1 Support of diagnostic interfaces by comX firmware

The following table indicates from which firmware version onward the firmware supports the diagnostic interface.

Firmware file name	Fieldbus system	Required minimum firmware version for the use of the USB or serial interface
COMXCOM.NXF	CANopen master	from V2.2.5.0
COMXCOS.NXF	CANopen slave	from V2.4.4.0
M0705000.NXF	CANopen slave comX52	from V3.8.0
M0709000.NXF	CC-Link slave comX52	from V2.13.0
M060Y000.NXF	CC-Link IE field basic comX51	from V1.1.0.0
M020Y000.NXF	CC-Link IE field basic comX100	from V1.1.0.0
M0206000.NXF	DeviceNet master	from V2.4.0
COMXDNS.NXF	DeviceNet master (old)	from V2.2.7.0
COMXDNS.NXF	DeviceNet slave	from V2.2.7.0
M0707000.NXF	DeviceNet slave comX52	from V2.7.0
COMXECM.NXF	EtherCAT master	from V2.4.4.0
COMXECS.NXF	EtherCAT slave	from V2.5.13.0
M060F000.NXF	EtherCAT slave V4 comX51	from V 4.2.11.x
M160F000.NXF	EtherCAT slave V4 comX51	from V 4.9
COMXEIM.NXF	EtherNet/IP scanner	from V2.2.4.1
COMXEIS.NXF	EtherNet/IP adapter	from V2.3.4.1
M060H000.NXF	EtherNet/IP adapter comX51	from V 2.7.13.x
COMXOMB.NXF	Open Modbus/TCP	from V2.3.2.1
M060L000.NXF	Open Modbus/TCP comX51	from V 2.5.11.x
COMXPLS.NXF	POWERLINK controlled node	from V2.1.22.0
COMXDPM.NXF	PROFIBUS-DP master	from V2.3.22.0
COMXDPS.NXF	PROFIBUS-DP slave	from V2.3.31.0
M0702000.NXF	PROFIBUS DP slave comX52	from V2.11.0
M0203000.NXF	PROFIBUS MPI	from V2.4.2.0
COMXPNM.NXF	PROFINET IO Controller	from V2.4.10.0
COMXPNS.NXF	PROFINET IO Device	from V3.4.9.0
CX51PNS.NXF	PROFINET IO Device comX51	from V3.5.26.x
COMXS3M.NXF	Sercos master	from V2.0.14.0
COMXS3S.NXF	Sercos slave	from V3.0.13.0
M060J000.NXF	Sercos slave	from V3.1.19.x

Table 105: Firmware versions with support for diagnostic interfaces

The following older firmware does not provide any support of diagnostic interfaces (USB or serial interface):

- CC-Link Slave
- PROFINET IO Device V2 (however, PROFINET IO Device from V3.4.9.0 contains the required support)

13.2 Note concerning the use of the software

No matter which of the five programs mentioned below you want to use for USB-interface, serial interface, and cifX driver, never use two or more at the same time. Always use only one program:

- the SYCON.net configuration software (with integrated ODM V3) or
- the netX Configuration Tool or
- the cifX Test Application or
- the cifX Driver Setup Utility or
- the application program

Important: To avoid communication problems with the device, never use the listed software simultaneously.

After using the SYCON.net configuration software on the PC, stop the ODMV3 service before you use one of the other programs listed above.

➢ For this purpose, select **Service > Stop** from the context menu of the ODMV3 system tray icon.

13.3 Hardware modification of comX module for recognizing the comX reset at a connected Windows®-Diagnosis PC

The following table indicates from which hardware revision of the comX module the electronic circuit the USB interface was modified:

Communication module	Hardware revision
COMX 100CA-CO	4
COMX 100CN-CO	3
COMX 100CA-DN	4
COMX 100CN-DN	3
COMX 100CA-DP	4
COMX 100CN-DP	3
COMX 100CA-RE	7
COMX 100CN-RE	2

Table 106: First Hardware Version with new USB Interface

This modification was necessary to enable the recognition of a comX reset by a Diagnosis PC running Microsoft Windows®. Windows® closes the USB driver and automatically restarts it, when the comX executes a reset and is then again ready to communicate over USB.

comX51 modules and comX52 modules always allow recognizing a comX reset by a Diagnosis PC under Windows®.

Note: If you use a comX communication module of a previous hardware revision, it is necessary to pull off the USB cable from the USB connector and to plug it in again after a reset of the comX communication module (e.g., after a firmware download)

14 IOT communication

14.1 Loadable firmware with IOT communication

- The loadable firmware for comX communication modules has been extended and the protocols OPC UA and MQTT for IOT communication have been added.

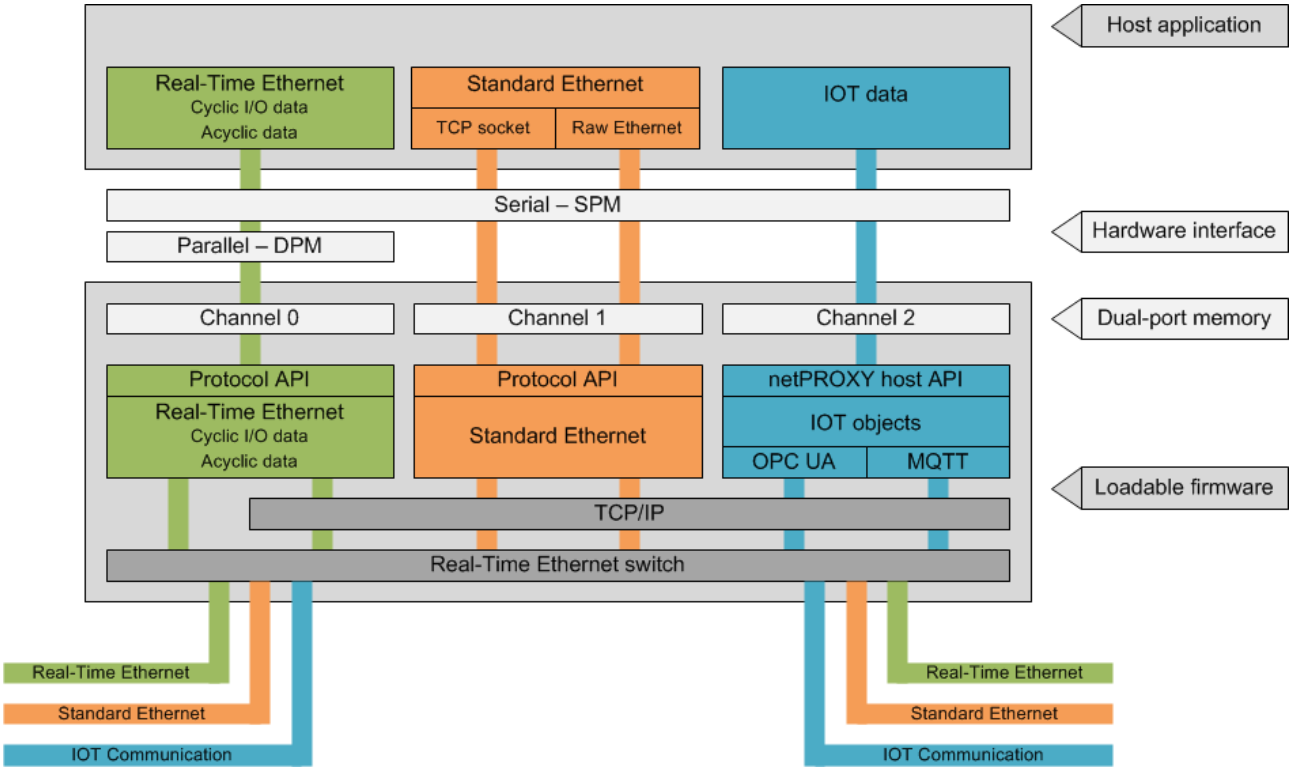


Figure 54: Loadable firmware with IOT communication

For PROFINET IO-Device and EtherNet/IP Adapter, loadable firmware with additional IOT communication is available. A host application already developed can use the cyclic or acyclic communication of the Real-Time Ethernet protocol using the same API.

If the host application also is to support IOT communication with the OPC UA or MQTT protocols, the use of this extended loadable firmware is required. In addition, an integrated WebServer can be used.

The IOT functions OPC UA or MQTT can be configured or the webserver can be added with the help of netX Studio Engineering Tool. This extension is based on netPROXY. For the necessary configuration steps, see the Operating instruction manual, netX Studio Engineering Tool, IOT Configuration.

netPROXY object model

netPROXY is an object-oriented data model and provides a protocol-independent application program interface (API) for accessing the objects.

The netPROXY object model allows mapping device properties to objects. Each object and thus the device properties defined in the object can be identified via an ID. For each object, the user can determine how to access the object and how to process the object data.

On the top level the netPROXY object model includes the object ID, followed by the instance ID and the element ID. Together, these 3 levels characterize an object. The instance ID specifies the occurrence frequency of each object. The element ID contains the actual value of the device property defined in the object. Several objects are combined into a group via a group ID.

14.2 Prerequisites

You have to meet the following requirements to use IOT communication in addition to Real-Time Ethernet communication.

- The use of the SPM is a prerequisite for the host application to use the IOT communication interface.
- Second Stage Boot Loader V1.5 or higher has to be used in the COMX 51XX-RE.
- Use the firmware with IOT communication in the COMX 51XX-RE: M066D000.nxf (PROFINET IO-Device with IOT communication) or M066H000.nxf (EtherNet/IP adapter with IOT communication).
- Use the SYCON.net or API to configure the PROFINET IO-Device or EtherNet/IP adapter.
- Create the IoT configuration with the netX Studio Engineering Tool.
- Load the IOT configuration files from the host application (`HIL_FILE_DOWNLOAD_DATA_REQ`) for channel 2 (`HIL_COMM_CHANNEL_2`) into the comX communication module.
- Initialize all firmware components using a power cycle.

14.3 Requirements to the host application

The firmware is designed for

- simultaneous use of Real-Time Ethernet (e.g. PROFINET), OPC UA **or** MQTT (OPC UA and MQTT must not be used at the same time),
- and the integrated webserver.

Moreover, the firmware is designed for

- 8 objects with 16 elements for a total of 64 bytes user data and
- an update time of 500 ms (or longer times) of the objects by the application and communication.

15 Technical data

Note: All technical data in this section are subject to change without any further notice.

15.1 Technical data of COMX modules

15.1.1 COMX 100CA-RE

COMX 100CA-RE	Part number	1531.100
Communication controller	Type	netX 100/500 processor
Integrated memory	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB
	Width for DPM data access	8/16 Bit
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or …F - D – A
Ethernet communication	Ethernet standard/ frame type	IEEE 802.3/ Ethernet II
	Supported Real-Time Ethernet communication standard/ firmware	Determined by loaded firmware: CC-Link IE Field Basic, EtherCAT Master/Slave, EtherNet/IP Scanner (Master)/ Adapter(Slave), Open Modbus/TCP, Powerlink Controlled Node (Slave), PROFINET_IO-Controller (Master)/ Device (Slave), Sercos Master/ Slave, VARAN Client (Slave)
Ethernet interface	Hardware	2 * RJ45 socket, potential free
	Transmission rate	100 MBit/s, 10 MBit/s (depending on the firmware)
	Interface type	100 BASE-TX, isolated, 10 BASE-T (depending on the loaded firmware)
	Half duplex/full duplex	supported (at 100 MBit/s)
	Auto-Negotiation/Auto-Crossover	(depending on the loaded firmware)
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		COM0, COM1 Communication Status (both green or red, depending on loaded firmware) TX/RX0, TX/RX1 Ethernet Activity Status (yellow) LINK0, LINK1 Ethernet Link Status (green)
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 700…750 mA / 2.5 W
Environment	Ambient temperature range (Rev. 8)	Operation: 0°C...+65°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 107: Technical Data COMX 100CA-RE

15.1.2 COMX 100CN-RE

Important: All data specified here apply for the COMX 100CN-RE, Revision 2.

COMX 100CN-RE	Part number	1531.101
Communication controller	Type	netX 100/500 processor
Integrated memory	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB
	Width for DPM data access	8/16 Bit
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
Ethernet communication	Ethernet standard/ frame type	IEEE 802.3/ Ethernet II
	Supported Real-Time Ethernet communication standard/ firmware	Determined by loaded firmware: CC-Link IE Field Basic, EtherCAT Master/Slave, EtherNet/IP Scanner (Master)/ Adapter(Slave), Open Modbus/TCP, Powerlink Controlled Node (Slave), PROFINET_IO-Controller (Master)/ Device (Slave), Sercos Master/ Slave, VARAN Client (Slave)
Ethernet interface	Hardware	30 Pin SMT connector, female, Grid 1.27 mm, see COMX Design Guide. Fitting to an RJ45 module with transformer, LED and termination, such as ERNI 203313 or Pulse J0864D628ANL
	Transmission rate	100 MBit/s, 10 MBit/s (depending on the loaded firmware)
	Interface type	100 BASE-TX, isolated, 10 BASE-T (depending on the loaded firmware)
	Half duplex/full duplex	supported (at 100 MBit/s)
	Auto-Negotiation/Auto-Crossover	(depending on the loaded firmware)
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status
		COM0, COM1 Communication Status
		TX/RX0, TX/RX1 Ethernet Activity Status
		LINK0, LINK1 Ethernet Link Status
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 700…750 mA / 2.5 W
Environment	Ambient temperature range	Operation: -20°C...+60°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 108: Technical Data COMX 100CN-RE

15.1.3 COMX 100CA-CO

COMX 100CA-CO	Part number	1531.500
Communication controller	Type	netX 100/500 processor
Integrated memory	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB
	Width for DPM data access	8/16 Bit
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
CANopen communication	Supported communication standard	CANopen
CANopen interface	Interface type	Potential-free ISO-11898 interface. According to CANopen specification EN 50325/4.
	Connector	DSub plug, male, 9-pin
	Transmission rates	10 kBit/s, 20 kBit/s, 50 kBit/s, 100 kBit/s, 125 kBit/s, 250 kBit/s, 500 kBit/s, 800 kBit/s, 1 MBit/s
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		CAN Communication status (green: STA, red: ERR)
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 450…480 mA / 1.5..1.6 W
Environment	Ambient temperature range	Operation: -20°C...+65°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 109: Technical Data COMX 100CA-CO

Important: The data mentioned under *„Electrical Immunity to Interference and Radio Frequency“* apply for the communication module COMX 100CA-CO, Revision 2.

15.1.4 COMX 100CN-CO

COMX 100CN-CO	Part number	1532.500
Communication controller	Type	netX 100/500 processor
Integrated memory	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB
	Width for DPM data access	8/16 Bit
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
CANopen communication	Supported communication standard	CANopen
CANopen interface	Interface type	Potential-free ISO-11898 interface according to CANopen specification EN 50325/4.
	Connector	30 Pin SMT connector, female, pin grid 1.27 mm, see COMX Design Guide.
	Transmission rates	10 kBit/s, 20 kBit/s, 50 kBit/s, 100 kBit/s, 125 kBit/s, 250 kBit/s, 500 kBit/s, 800 kBit/s, 1 MBit/s
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		CAN Communication status (green: STA, red: ERR)
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 450…480 mA / 1.5..1.6 W
	Ambient temperature range	Operation: -20°C...+65°C, Storage: -40°C…+85 °C
Environment	Humidity range	10 … 95 % relative humidity (non-condensing)
	Dimensions (L x W x H)	70 x 30 x 21.5 mm
Device	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	CE Sign	yes
	UKCA	yes
CE Sign	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 110: Technical Data COMX 100CN-CO

Important: The data mentioned under *„Electrical Immunity to Interference and Radio Frequency“* apply for the communication module COMX 100CN-CO, Revision 1.

15.1.5 COMX 100CA-DN

COMX 100CA-DN	Part number	1531.510
Communication controller	Type	netX 100/500 processor
Integrated memory	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB
	Width for DPM data access	8/16 Bit
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
DeviceNet communication	Supported communication standard	DeviceNet
DeviceNet interface	Interface type	Potential-free ISO-11898 interface according to DeviceNet specification
	Connector	CombiCon connector, 5-pin
	Transmission rate	125 kBit/s, 250 kBit/s, 500 kBit/s,
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		MNS Module Network Status (green: MS, red: NS)
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 440…470 mA / 1.5..1.6 W
Environment	Ambient temperature range	Operation: -20°C...+65°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 111: Technical Data COMX 100CA-DN

The data mentioned under *„Electrical Immunity to Interference and Radio Frequency“* apply for the communication module COMX 100CA-DN, Revision 2.

15.1.6 COMX 100CN-DN

COMX 100CA-DN	Part number	1532.510
Communication controller	Type	netX 100/500 processor
Integrated memory	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
System interface	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
	Size of dual-port memory	16 KB
	Width for DPM data access	8/16 Bit
DeviceNet communication	Supported communication standard	DeviceNet
DeviceNet interface	Interface type	Potential-free ISO-11898 interface according to DeviceNet specification
	Connector	30 Pin SMT connector, female, pin grid 1.27 mm, see COMX Design Guide.
	Transmission rate	125 kBit/s, 250 kBit/s, 500 kBit/s,
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status
		MNS Module Network Status
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 440…470 mA / 1.5..1.6 W
Environment	Ambient temperature range	Operation: -20°C...+65°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 112: Technical Data COMX 100CN-DN

The data mentioned under *„Electrical Immunity to Interference and Radio Frequency“* apply for the communication module COMX 100CN-DN, Revision 1.

15.1.7 COMX 100CA-DP

COMX 100CA-DP	Part number	1531.410
Communication controller	Type	netX 100/500 processor
Integrated memory	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB
	Width for DPM data access	8/16 Bit
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
PROFIBUS communication	Supported Communication Standard/Firmware	PROFIBUS DP
PROFIBUS Interface	Interface type	Potential free RS-485 Interface
	Connector	DSub connector, female, 9-pin
	Transmission rate	9,6 kBit/s, 19,2 kBit/s, 31,25 kBit/s, 45,45 kBit/s, 93,75 kBit/s, 187,5 kBit/s, 500 kBit/s, 1,5 MBit/s, 3 MBit/s, 6 MBit/s,12 MBit/s
	Auto-Detection	yes
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		COM Communication status (green: STA, red: ERR)
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 430…460 mA / 1.5..1.6 W
Environment	Ambient temperature range	Operation: -20C°... +70°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 113: Technical Data COMX 100CA-DP

15.1.8 COMX 100CN-DP

COMX 100CN-DP	Part number	1532.410
Communication controller	Type	netX 100/500 processor
Integrated memory	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB
	Width for DPM data access	8/16 Bit
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
PROFIBUS communication	Supported Communication Standard/Firmware	PROFIBUS DP
PROFIBUS Interface	Interface type	Potential free RS-485 Interface
	Connector	30-pin SMT connector, female, grid distance 1.27 mm, see COMX Design Guide.
	Transmission rate	9,6 kBit/s, 19,2 kBit/s, 31,25 kBit/s, 45,45 kBit/s, 93,75 kBit/s, 187,5 kBit/s, 500 kBit/s, 1,5 MBit/s, 3 MBit/s, 6 MBit/s,12 MBit/s
	Auto-Detection	yes
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status
		COM Communication Status
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 430…460 mA / 1.5..1.6 W
Environment	Ambient temperature range	Operation: -20°C...+65°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 114: Technical Data COMX 100CN-DP

The data mentioned under *„Electrical Immunity to Interference and Radio Frequency“* apply for the communication module COMX 100CN-DP, Revision 1.

15.1.9 COMX 51CA-RE

COMX 51CA-RE	Part number	1571.100
Communication controller	Type	netX 51 processor
Integrated memory	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB
	Width for DPM data access	8/16 Bit
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
SPI interface	SPI Mode	SPI Slave, Mode 3
	CPOL	1
	CPHA	1
Ethernet communication	Ethernet standard/ frame type	IEEE 802.3/ Ethernet II
	Supported Real-Time Ethernet communication standard/ firmware	Determined by loaded firmware: CC-Link IE Field Basic, EtherCAT Slave, EtherNet/ Adapter(Slave), Open Modbus/TCP, PROFINET IO Device (Slave), Sercos Slave, TCP/IP
Ethernet interface	Hardware	2 * RJ45 socket, potential free
	Transmission rate	100 MBit/s, 10 MBit/s (depending on the firmware)
	Interface type	100 BASE-TX, isolated, 10 BASE-T (depending on the loaded firmware)
	Half duplex/full duplex	supported (at 100 MBit/s)
	Auto-Negotiation/Auto-Crossover	(depending on the loaded firmware)
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		COM0, COM1 Communication Status (both green or red, depending on loaded firmware)
		TX/RX0, TX/RX1 Ethernet Activity Status (yellow)
		LINK0, LINK1 Ethernet Link Status (green)
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Maximum current/ power at 3,3 V	530…580 mA / max. 1.9 W
Environment	Ambient temperature range (Rev. 1)	Operation: 0°C...+65°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 115: Technical Data COMX 51CA-RE

15.1.10 COMX 51CA-RE\R

COMX 51CA-RE\R/ECS	Part number	1571.101
Communication controller	Type	netX 51 processor
Integrated memory	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB
	Width for DPM data access	8/16 Bit
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
SPI interface	SPI Mode	SPI Slave, Mode 3
	CPOL	1
	CPHA	1
Ethernet communication	Ethernet standard/ frame type	IEEE 802.3/ Ethernet II
	Supported Real-Time Ethernet communication standard/ firmware	EtherCAT Slave
Ethernet interface	Hardware	2 * RJ45 socket, potential free
	Transmission rate	100 MBit/s, 10 MBit/s (depending on the firmware)
	Interface type	100 BASE-TX, isolated, 10 BASE-T (depending on the loaded firmware)
	Half duplex/full duplex	supported (at 100 MBit/s)
	Auto-Negotiation/Auto-Crossover	(depending on the loaded firmware)
	Adress selection	Selection of device address (1…4095) via 3 hexadecimal rotary switches, according to ETG5003 and ETG1020
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		COM0, COM1 Communication Status (both green or red, depending on loaded firmware)
		TX/RX0, TX/RX1 Ethernet Activity Status (yellow)
		LINK0, LINK1 Ethernet Link Status (green)
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Maximum current/ power at 3,3 V	450 mA … 500 mA / max. 1.65 W
Environment	Ambient temperature range	Operation: -25°C … +70°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 116: Technical Data COMX 51CA-RE\R

15.1.11 COMX 51CN-RE

COMX 51CN-RE	Part number	1572.100
Communication controller	Type	netX 51 processor
Integrated memory	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
System interfaces	Type	Parallel or serial (SPI), via Dual Port Memory
Parallel system interface	Size of dual-port memory	16 KB
	Width for DPM data access	8/16 Bit, switchable
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
Serial system interface (SPI interface)	SPI Mode	SPI Slave, Mode 3
Ethernet communication	Ethernet standard/ frame type	IEEE 802.3/ Ethernet II
	Supported Real-Time Ethernet communication standard/ firmware	Determined by loaded firmware: CC-Link IE Field Basic, EtherCAT Slave, EtherNet/ Adapter(Slave), Open Modbus/TCP, PROFINET IO Device (Slave), Sercos Slave
Ethernet interface	Hardware	30 Pin SMT connector, female, Grid 1.27 mm, see COMX Design Guide.
	Transmission rate	100 MBit/s, 10 MBit/s (depending on the firmware)
	Interface type	100 BASE-TX, isolated, 10 BASE-T (depending on the loaded firmware)
	Half duplex/full duplex	(depending on the loaded firmware)
	Auto-Negotiation/Auto-Crossover	(depending on the loaded firmware)
Diagnosis	Type	USB or serial
	Serial diagnostic interface	UART (RXD, TXD)
	USB diagnostic interface	USB (USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		COM0, COM1 Communication Status (both green or red, depending on loaded firmware)
		ACT0, ACT1 Ethernet Activity Status (yellow)
		LINK0, LINK1 Ethernet Link Status (green)
Power supply / Current consumption	Supply voltage	+3.3 V ± 5 % DC
	Maximum current/ power at 3,3 V	550…570 mA / max. 1.9 W
Environment	Ambient temperature range	Operation: -20°C...+70°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70.1 mm x 31.5 mm x 16 mm
	Weight	approx. 22 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 117: Technical Data COMX 51CN-RE

15.1.12 COMX 52CA-CCS

Important: All data specified here apply for the COMX 52CA-CCS, Revision 1.

COMX 52CA-CCS	Part number	1581.740
Communication controller	Type	netX 52 processor
Integrated memory	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB (14 address lines), where 8 KB used by firmware (13 address lines, lowest 8 KB)
	Width for DPM data access	8/16 Bit (switchable)
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
CC-Link communication	Supported communication standard	CC-Link Version 2.0 and 1.1 according to CC-Link Standard V.2.00 BAP-05025-J
CC-Link Interface	Interface type	Potential-free RS-485 interface
	Connector	5-pole screw connector (RIACON Type 166)
	Transmission rates	156 kBit/s, 625 kBit/s, 2500 kBit/s, 5 MBit/s, 10 MBit/s
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		L RUN/L ERR Communication Status (green: L RUN, red: L ERR)
Rotary switch	Adjustment of Address and Baud rate	2 rotary switches for address and 1 rotary switch for baud rate
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 400 mA (typ.) / approx. 450 mA (max.) / max. 1.5 W
Environment	Ambient temperature range	Operation: 0°C...+55°C, Storage: -40°C…+85°C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 118: Technical Data COMX 52CA-CCS

15.1.13 COMX 52CA-COS

Important: The data mentioned under *„Electrical Immunity to Interference and Radio Frequency“* apply for the communication module COMX 52CA-COS, Revision 1. All other data specified here apply for the COMX 52CA-COS, Revision 2.

COMX 52CA-COS	Part number	1581.540
Communication controller	Type	netX 52 processor
Integrated memory	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB (14 address lines), where 8 KB used by firmware (13 address lines, lowest 8 KB)
	Width for DPM data access	8/16 Bit (switchable)
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
CANopen communication	Supported communication standard	CANopen
CANopen Interface	Interface type	Potential-free ISO-11898 interface according to CANopen specification EN 50325/4.
	Connector	DSub plug, male, 9-pin
	Transmission rates	10 kBit/s, 20 kBit/s, 50 kBit/s, 100 kBit/s, 125 kBit/s, 250 kBit/s, 500 kBit/s, 800 kBit/s, 1 MBit/s
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		CAN Communication status (green: STA, red: ERR)
Rotary switch	Adjustment of Address and Baud rate	2 rotary switches for address
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 370 mA (typ.) / approx. 400 mA (max.) / approx. 1.25 W
Environment	Ambient temperature range	Operation: -20°C...+70°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 119: Technical Data COMX 52CA-COS

15.1.14 COMX 52CA-DNS

Important: The data mentioned under *„Electrical Immunity to Interference and Radio Frequency“* apply for the communication module COMX 52CA-COS, Revision 1. All other data specified here apply for the COMX 52CA-COS, Revision 2.

COMX 52CA-DNS	Part number	1581.520
Communication controller	Type	netX 52 processor
Integrated memory	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB (14 address lines), where 8 KB used by firmware (13 address lines, lowest 8 KB)
	Width for DPM data access	8/16 Bit (switchable)
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
DeviceNet communication	Supported communication standard	DeviceNet
DeviceNet Interface	Interface type	Potential-free ISO-11898 interface according to DeviceNet specification
	Connector	CombiCon connector, 5-pin
	Transmission rates	125 kBit/s, 250 kBit/s, 500 kBit/s,
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		MNS Module Network Status (green: MS, red: NS)
Rotary switch	Adjustment of Address and Baud rate	2 rotary switches for address
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 400 mA (typ.) / approx. 440 mA (max.) / approx. 1.3 W
Environment	Ambient temperature range	Operation: -20°C...+70°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 120: Technical Data COMX 52CA-DNS

15.1.15 COMX 52CA-DPS

Important: The data mentioned under *„Electrical Immunity to Interference and Radio Frequency“* apply for the communication module COMX 52CA-DPS, Revision 1.

COMX 52CA-DPS	Part number	1581.420
Communication controller	Type	netX 52 processor
Integrated memory	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB (14 address lines), where 8 KB used by firmware (13 address lines, lowest 8 KB)
	Width for DPM data access	8/16 Bit (switchable)
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
PROFIBUS communication	Supported communication standard	PROFIBUS DP
PROFIBUS interface	Interface type	Potential free RS-485 Interface
	Connector	DSub connector, female, 9-pin
	Transmission rates	9,6 kBit/s, 19,2 kBit/s, 31,25 kBit/s, 45,45 kBit/s, 93,75 kBit/s, 187,5 kBit/s, 500 kBit/s, 1,5 MBit/s, 3 MBit/s, 6 MBit/s,12 MBit/s
	Auto detection	yes
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		COM Communication status (green: STA, red: ERR)
Rotary switch	Adjustment of address and baud rate	2 rotary switches for address
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 400 mA (typ.) / approx. 440 mA (max.) / approx. 1.35 W
Environment	Ambient temperature range	Operation: -20°C...+70°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 121: Technical Data COMX 52CA-DPS

15.1.16 COMX 52CN-CCS

Important: All data specified here apply for the COMX 52CN-CCS, Revision 2.

COMX 52CN-CCS	Part number	1582.740
Communication controller	Type	netX 52 processor
Integrated memory	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB (14 address lines), where 8 KB used by firmware (13 address lines, lowest 8 KB)
	Width for DPM data access	8/16 Bit (switchable)
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
CC-Link communication	Supported communication standard	CC-Link Version 2.0 and 1.1 according to CC-Link Standard V.2.00 BAP-05025-J
CC-Link Interface	Interface type	Potential-free RS-485 interface
	Connector	5-pole screw connector (RIACON Type 166)
	Transmission rates	156 kBit/s, 625 kBit/s, 2500 kBit/s, 5 MBit/s, 10 MBit/s
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		L RUN/L ERR Communication Status (green: L RUN, red: L ERR)
Rotary switch	Adjustment of Address and Baud rate	2 rotary switches for address and 1 rotary switch for baud rate
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical / maximum current/ power at 3,3 V	approx. 400 mA (typ.) / approx. 450 mA (max.) / approx. 1.5 W
Environment	Ambient temperature range	Operation: 0°C...+55°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 122: Technical Data COMX 52CN-CCS

15.1.17 COMX 52CN-COS

Important: All data specified here apply for the COMX 52CN-COS, Revision 1.

COMX 52CN-COS	Part number	1582.540
Communication controller	Type	netX 52 processor
Integrated memory	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB (14 address lines), where 8 KB used by firmware (13 address lines, lowest 8 KB)
	Width for DPM data access	8/16 Bit (switchable)
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
CANopen communication	Supported communication standard	CANopen
CANopen Interface	Interface type	Potential-free ISO-11898 interface according to CANopen specification EN 50325/4.
	Connector	DSub plug, male, 9-pin
	Transmission rates	10 kBit/s, 20 kBit/s, 50 kBit/s, 100 kBit/s, 125 kBit/s, 250 kBit/s, 500 kBit/s, 800 kBit/s, 1 MBit/s
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		CAN Communication status (green: STA, red: ERR)
Rotary switch	Adjustment of Address and Baud rate	2 rotary switches for address
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 380 mA (typ.) / approx. 400 mA (max.) / approx. 1,3W
Environment	Ambient temperature range	Operation: -20°C...+70°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 123: Technical Data COMX 52CN-COS

15.1.18 COMX 52CN-DNS

Important: All data specified here apply for the COMX 52CN-DNS, Revision 1.

COMX 52CN-DNS	Part number	1582.520
Communication controller	Type	netX 52 processor
Integrated memory	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB (14 address lines), where 8 KB used by firmware (13 address lines, lowest 8 KB)
	Width for DPM data access	8/16 Bit (switchable)
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
DeviceNet communication	Supported communication standard	DeviceNet
DeviceNet Interface	Interface type	Potential-free ISO-11898 interface according to DeviceNet specification
	Connector	CombiCon connector, 5-pin
	Transmission rates	125 kBit/s, 250 kBit/s, 500 kBit/s,
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		MNS Module Network Status (green: MS, red: NS)
Rotary switch	Adjustment of Address and Baud rate	2 rotary switches for address
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3,3 V	approx. 410 mA (typ.) / approx. 430 mA (max.) / approx. 1,35 W
Environment	Ambient temperature range	Operation: -20°C...+70°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 124: Technical Data COMX 52CN-DNS

15.1.19 COMX 52CN-DPS

Important: All data specified here apply for the COMX 52CN-DPS, Revision 1.

COMX 52CN-DPS	Part number	1582.420
Communication controller	Type	netX 52 processor
Integrated memory	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
System interface	Size of dual-port memory	16 KB (14 address lines), where 8 KB used by firmware (13 address lines, lowest 8 KB)
	Width for DPM data access	8/16 Bit (switchable)
	Type	50 Pin SMT connector, female
	Pin distance (Grid)	1.27 mm
	Corresponding male connector	SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A
PROFIBUS communication	Supported communication standard	PROFIBUS DP
PROFIBUS interface	Interface type	Potential free RS-485 Interface
	Connector	DSub connector, female, 9-pin
	Transmission rates	9,6 kBit/s, 19,2 kBit/s, 31,25 kBit/s, 45,45 kBit/s, 93,75 kBit/s, 187,5 kBit/s, 500 kBit/s, 1,5 MBit/s, 3 MBit/s, 6 MBit/s,12 MBit/s
	Auto detection	yes
Diagnosis	Diagnostic interfaces/ signals	UART (RXD, TXD), USB (RX0, TX0, USB+, USB-)
Display	LED display	SYS System Status (green: RUN, yellow: RDY)
		COM Communication status (green: STA, red: ERR)
Rotary switch	Adjustment of Address and Baud rate	2 rotary switches for address
Power supply / current consumption	Supply voltage	+3.3 V ± 5 % DC
	Typical current/ power at 3.3 V	approx. 400 mA (typ.) / approx. 440 mA (max.) / approx. 1.35 W In case of short-circuit of the 5V Profibus power supply the consumed current increases by approx. 70 mA.
Environment	Ambient temperature range	Operation: -20°C...+70°C, Storage: -40°C…+85 °C
	Humidity range	10 … 95 % relative humidity (non-condensing)
Device	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. 35-40 g
	Mounting/ installation	according to comX Design Guide
	RoHS	yes
	UKCA	yes
CE Sign	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	according to IEC/EN 61000-4, see below
Configuration software	System configurator	SYCON.net

Table 125: Technical Data COMX 52CN-DPS

15.2 Electrical immunity to interference and radio frequency

Test	**Electrostatic discharge (ESD) according to DIN EN 61000-4-2:2009-12**		**Fast transient interferences (Burst), according to DIN EN 61000-4-4:2013-04**	**Surge voltage, according to DIN EN 61000-4-5:2019-03**
Method **Module/Revision**	Air discharge method	Contact discharge method	Communication and data lines	Communication and data lines
COMX 100CA-RE Rev. 3	8 kV Criterion B	4 kV Criterion B	2 kV Criterion B	1 kV Criterion A
COMX 100CN-RE Rev. 1	8 kV Criterion A	4 kV Criterion B	2 kV Criterion B	1 kV Criterion B
COMX 100CA-CO Rev.2	10 kV Criterion A	6 kV Criterion A	2 kV Criterion A	1 kV Criterion A
COMX 100CN-CO Rev.1	10 kV Criterion B	6 kV Criterion B	2 kV Criterion A	1 kV Criterion A
COMX 100CA-DN Rev.2	8 kV Criterion B	4 kV Criterion B	2 kV Criterion B	0.6 kV Criterion B
COMX 100CN-DN Rev.1	10 kV Criterion B	6 kV Criterion B	2 kV Criterion B	0.5 kV Criterion B
COMX 100CA-DP Rev.2	10 kV Criterion A	6 kV Criterion A	2 kV Criterion A	1 kV Criterion A
COMX 100CN-DP Rev.1	10 kV Criterion B	6 kV Criterion B	2 kV Criterion A	1 kV Criterion A
COMX 51CA-RE Rev.1	8 kV Criterion A	6 kV Criterion B	2.2 kV Criterion B	1 kV Criterion A
COMX 51CN-RE Rev.1	8 kV Criterion A	6 kV Criterion A	2.2 kV Criterion B	1 kV Criterion A
COMX 51CA-RE\R Rev.1		6 kV Criterion A	2 kV Criterion A	1 kV Criterion A
COMX 52CA-CCS Rev. 2	-	6 kV Criterion A	2 kV Criterion A	1 kV Criterion A
COMX 52CA-COS Rev.1	8 kV Criterion A	6 kV Criterion A	2 kV Criterion A	1 kV Criterion A
COMX 52CA-DNS Rev.1	-	6 kV Criterion A	2.2 kV Criterion A	1 kV Criterion A
COMX 52CA-DPS Rev.1	8 kV Criterion A	6 kV Criterion A	2.2 kV Criterion A	1 kV Criterion A
COMX 52CN-CCS Rev. 2	-	6 kV Criterion A	2 kV Criterion A	1 kV Criterion A
COMX 52CN-COS Rev.1	-	6 kV Criterion A	2 kV Criterion A	1 kV Criterion A
COMX 52CN-DNS Rev.1	8 kV Criterion B	6 kV Criterion A	2 kV Criterion A	1 kV Criterion A
COMX 52CN-DPS Rev.1	-	6 kV Criterion A	2 kV Criterion A	1 kV Criterion A

Table 126: Electrical Immunity to Interference and Radio Frequency COMX Modules

The criteria are specified according to the definition given in EN 61131-2:2007.

15.3 Technical data evaluation board COMXEB

COMXEB	Parameter	Value
Product	Part number	1530.000
Power supply	Supply voltage (range)	24V DC ± 6V DC
	Typical current/ power consumption at 24 V	Depends mainly on used comX module
	Power adaptor	Type TPS54360 Connection via socket
	Socket for power adaptor	2-pin
	Alternative power connector	CombiCon, 3-pin
Host interface	Dual-port memory	Connector 68-pin Pin distance 0.635 mm
	SPM	Pin header, 16-pin
	SPM over USB	USB, Type B, 5-pin (currently not supported)
Operating elements	Switches	4 slide switches Switching host-controlled/ board-controlled access Switching DPM/SPM Switching 8 bit/16 bit Switching SPM over pin header or USB
	Buttons	Reset
	Jumper fields for AIFX interface	2x, each 16-pin For configuration
	Jumper for boot mode	2-pin
LED display	Power supply	+3.3 V: 1 LED green 5 V USB/FTDI Chip: 1 LED green
	Communication status	STA/ERR Duo-LED green / red STA2/ERR2 Duo-LED green/ red (not used) STA_CG/ STA1_CR Duo-LED green / red STA0_CG/ STA0_CR Duo-LED green / red
	Ethernet Link/Activity	CH0_LINK (green)/CH0_ACT (yellow) CH1_LINK (green)/CH1_ACT (yellow)
comX interface	Suited for COMX-CA	Connector 50-pin Pin distance 1.27 mm (male)
	Suited for COMX-CN-Fieldbus	Connector 50-pin Pin distance 1.27 mm (male) Connector 30-pin Pin distance 1.27 mm (male)
	Suited for COMX-CN-Real-time Ethernet	Connector 50-pin Pin distance 1.27 mm (male) Connector 30-pin Pin distance 1.27 mm (male)
PROFIBUS-DP interface	Type	RS-485, potential-free
	Connector	Sub-D, 9-pin, female
CANopen interface	Type	ISO 11898 interface, potential-free

	Connector	Sub-D, 9-pin, male
DeviceNet interface	Type	ISO 11898 interface, potential-free
	Connector	CombiCon, 5-pin
CC-Link interface	Type	RS-485, potential-free
	Connector	CombiCon, 5-pin
Ethernet interface	Type	100 BASE-TX, isolated 10 BASE-T (depending on loaded Firmware)
	Connector	2 x RJ45
Diagnostic interface (for firmware download and configuration)	UART	9 pin D-Sub Plug RS232
	USB	Mini-USB-Socket Type B, 5-pin
Extension interface	For AIFX	Interface 10-pin Connection for AIFX-DP, AIFX-CO, AIFX-DN and AIFX-CC
Interfaces for power supply	Socket for power adaptor in scope of delivery	2-pin
	Socket for external power supply	3-pin, green
Additional pin headers	SYNC/UART1	10-pin
	Jumper fields(2x) for AIFX interface	16-pin
Device	Dimensions (L x B x H)	138 x 135 x 19 mm (Height measured without comX, with plastic feet)
	Weight	approx. 153 g
	Operating temperature range	Operation: -20°C... +70°C
	Storage temperature range	Storage: -40°C…+85 °C Storage (device in package): -10°C…+85 °C
	RoHS	yes
Emission and immunity	CE Sign	no (see below)

Table 127: Technical Data Evaluation Board COMXEB

Important: The device is only designed for testing purposes and not intended for use in industrial production facilities. Therefore it does not have any CE sign.

15.4 Technical data of communication protocols

15.4.1 CC-Link IE Field Basic Slave

Parameter	Description
Maximum number of cyclic input data	RY data: 128 bytes (1024 bits) RWw data: 512 words (16 bit)
Maximum number of cyclic output data	RX data: 128 bytes (1024 bits) RWr data: 512 words (16 bit)
Occupied stations	1 … 16 (1 station has 64 bits RY data, 32 words RWw data, 64 bits RX data, and 32 words RWr data.)
Acyclic communication	SLMP Server and Client
Data transport layer	Ethernet II, IEEE 802.3
Baud rate	100 MBit/s
Reference to firmware / stack version	V1.1
Ports	
Cyclic data	61450 (UDP)
Discovery and SLMP Server	61451 (UDP)
SLMP Parameter	45237 (UDP)
SLMP Communication	20000 (UDP)

Table 128: Technical data CC-Link IE Field Basic Slave protocol

15.4.2 EtherCAT Master (V4)

Parameter	Description
Maximum number of EtherCAT slaves	Maximum of 388 slaves, if RCX_GET_SLAVE_HANDLES_REQ service is used for determining number of slaves. The number of usable slaves depends on several parameters: the available memory for the configuration file (see 'configuration file' below), used cycle time, frame propagation time.
Maximum number of cyclic input data	Appr. 4600 bytes, if no LRW command (Logical Read Write) is used for process data
Maximum number of cyclic output data	Appr. 4600 bytes, if no LRW command (Logical Read Write) is used for process data
Acyclic communication	CoE (CANopen over EtherCAT): SDO, SDOINFO, Emergency FoE (File Access over EtherCAT) SoE (Servo Drive Profile over EtherCAT) Configurable with SYCON.net: CoE If the file ETHERCAT.XML contains the appropriate configuration information (e.g. created with "EtherCAT Configurator"), following functions can be used: CoE, SoE
Mailbox protocols	CoE, FoE, SoE
Functions	Distributed Clocks Redundancy Slave diagnostics Bus scan
Minimum bus cycle time	250 µs, depending on the used number of slaves and the used number of cyclic input data and output data.
Topology	Line or ring
Slave station address range	1 – 14335
Data transport layer	Ethernet II, IEEE 802.3, 100 MBit/s, full-duplex
Configuration file (ETHERCAT.XML or CONFIG.NXD)	Maximum 1 MByte (CONFIG.NXD), maximum 3 MByte (ETHERCAT.XML)
Synchronization via ExtSync	Supported (not configurable with SYCON.net)
ENI Slave-to-Slave copy infos	Supported (not configurable with SYCON.net)
Hot Connect	Supported (not configurable with SYCON.net)
Limitations	The size of the bus configuration file is limited by the size of the RAM disk (1 MByte) or Flash disk (3 MByte). Store-and-forward switches cannot be used within network topology due to hard receive timing model RCX_GET_SLAVE_HANDLES_REQ can only communicate up to 388 slaves. Process data is restricted by the dual-port memory to 5760 bytes.
Reference to firmware / stack version	V4.5

Table 129: Technical Data EtherCAT Master Protocol

15.4.3 EtherCAT Slave

Parameter	Description COMX 51XX-RE COMX 51CA-RE\R	Description COMX 100XX-RE
Maximum number of cyclic input data	1024 bytes	256* bytes
Maximum number of cyclic output data	1024 bytes	256* bytes
Acyclic communication	SDO SDO Master-Slave SDO Slave-Slave (depending on Master capability)	SDO SDO Master-Slave SDO Slave-Slave (depending on Master capability)
Type	Complex Slave	Complex Slave
Functions	Emergency	Emergency
FMMUs	8	3
SYNC Manager	4	4
Distributed Clocks (DC)	Supported, 32 Bit	Supported, 32 Bit
Baud rate	100 MBit/s	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3	Ethernet II, IEEE 802.3
Limitation	LRW is not supported	LRW is not supported
Reference to firmware/stack version	V4.9	V2.5 and V4.9

Table 130: Technical Data EtherCAT Slave Protocol

Note for COMX 100XX-RE: * The loadable firmware supports for the number of cyclic input data and for cyclic output data in total up to 512 bytes. If more than 256 bytes for input data or for output data shall be exchanged via EtherCAT, then a customer specific XML file is necessary. Additionally the following formula applies: The sum of the input data length and the ouput data length may not exceed 512 bytes, where each length has to be rounded up to the next multiple of 4 for this calculation.

15.4.4 EtherNet/IP Scanner

Parameter	Description
Maximum number of EtherNet/IP connections	64 connections for implicit and explicit
Maximum number of total cyclic input data	5712 bytes
Maximum number of total cyclic output data	5760 bytes
Maximum number of cyclic input data	504 bytes per slave per telegram
Maximum number of cyclic output data	504 bytes per slave per telegram
IO Connection type	Cyclic, minimum 1 ms (depending on used number of connections and used number of input and output data)
Maximum number of unscheduled data	1400 bytes per telegram
UCMM, Class 3	Supported
Explicit Messages, Client and Server Services	Get_Attribute_Single/All Set_Attribute_Single/All
Quick connect	Supported
Predefined standard objects	Identity Object Message Route Object Assembly Object Connection Manager Ethernet Link Object TCP/IP Object DLR Object QoS Object
Maximal number of user specific objects	20
Network scan	Supported
Topology	Tree, Line, Ring
DLR (Device Level Ring)	Beacon based ’Ring Node’
ACD (Address Conflict Detection)	Supported
DHCP	Supported
BOOTP	Supported
Baud rates	10 and 100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Switch function	Integrated
Limitations	CIP Sync Services are not implemented TAGs are not supported
Reference to firmware/stack version	V2.11

Table 131: Technical Data EtherNet/IP Scanner Protocol

15.4.5 EtherNet/IP Adapter

Parameter	Description
Maximum number of input data	504 bytes
Maximum number of output data	504 bytes
IO connection types (implicit)	1 exclusive owner, 1 listen only, 1 input only
IO Connection trigger types	Cyclic, minimum 1 ms* Application Triggered, minimum 1 ms* Change Of State, minimum 1 ms* * depending on number of connections and number of input and output data
Explicit Messages	Connected and unconnected
Maximum number of connections	8, explicit and implicit connections
Unconnected Message Manager (UCMM)	Supported
Quick connect	Supported
Predefined standard objects	Identity Object Message Route Object Assembly Object Connection Manager DLR Object QoS Object TCP/IP Object Ethernet Link Object Time Sync Object
Reset services	Identity Object Reset Service of Type 0 and 1
Maximum number of user specific objects	20
DLR V2 (ring topology)	Supported
ACD (Address Conflict Detection)	Supported
DHCP	Supported
BOOTP	Supported
Baud rates	10 and 100 MBit/s
Duplex modes	Half duplex, Full duplex, Auto negotiation
MDI modes	MDI, MDI-X, Auto-MDIX
Data transport layer	Ethernet II, IEEE 802.3
Switch function	Integrated
Limitations	CIP Sync Services are not implemented TAGs are not supported
Reference to firmware/stack version	V2.14

Table 132: Technical Data EtherNet/IP Adapter Protocol

15.4.6 EtherNet/IP-Adapter (V3)

Parameter	Description
Maximum number of input data	504 bytes per assembly instance
Maximum number of output data	504 bytes per assembly instance
Maximum number of assembly instances	10
IO connection types (implicit)	1 exclusive owner, 1 listen only, 1 input only
IO Connection trigger types	Cyclic, minimum 1 ms* Application Triggered, minimum 1 ms* Change Of State, minimum 1 ms* * depending on number of connections and number of input and output data
Explicit Messages	Connected and unconnected
Unconnected Message Manager (UCMM)	Supported
Max. number of connections	Class 1: 5 Class 3: 8 UCMM: 8
Explicit messages connections	10
Implicit message connections	5
Maximum number of assembly instances	10
Predefined standard objects	Identity Object (0x01) Message Route Object (0x02) Assembly Object (0x04) Connection Manager (0x06) DLR Object (0x47) QoS Object (0x48) TCP/IP Object (0xF5) Ethernet Link Object (0xF6)
Maximum number of user specific objects	20
Supported features	TCP/IP, UDP/IP DHCP BOOTP Device Level Ring (DLR) - Media Redundancy Address Conflict Detection (ACD) Quality of Service CIP Reset services - Identity Object Reset Service (Type 0 and 1)
Reset services	Identity Object Reset Service of Type 0 and 1
Ethernet interface	10 and 100 MBit/s
Duplex modes	Half duplex, Full duplex, Auto negotiation
Switch function	Integrated
MDI modes	MDI, MDI-X, Auto-MDIX
Data transport layer	Ethernet II, IEEE 802.3
Limitations	TAGs are not supported
	Connection type “Null Forward Open” is not supported
	CIP Motion is not supported
	CIP Safety is not supported
Reference to firmware/stack version	V3.6.x.x

Table 133: Technical Data EtherNet/IP Adapter (Slave) Protocol

* depending on number of connections and number of input and output data

15.4.7 Open Modbus/TCP

Parameter	Description
Maximum number of input data	2880 Registers
Maximum number of output data	2880 Registers
Acyclic communication	Read/Write Register: - Maximum 125 Registers per Read Telegram (FC 3, 4, 23), - Maximum 121 Registers per Write Telegram (FC 23), - Maximum 123 Registers per Write Telegram (FC 16) Read/Write Coil: - Maximum 2000 Coils per Read Telegram (FC 1, 2), - Maximum 1968 Coils per Write Telegram (FC 15)
Modbus Function Codes	1, 2, 3, 4, 5, 6, 7, 15, 16, 23*, 43 * Function Code 23 can be used via the packet API, but not with the Command Table.
Protocol Mode	Message Mode (Client Mode): - Client (using the Command Table: The data is stored in the I/O process data image) - Client (using the packet API: The I/O process data image is not used) - Server (using the packet API: The I/O process data image is not used) I/O Mode (Server Mode): - Server (only) (The data is stored in the I/O process data image)
Command table (Configuration API only)	Max. 16 servers configurable Max. 256 commands
Baud rates	10 and 100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Reference to firmware/stack version	V2.7

Table 134: Technical Data Open Modbus/TCP Protocol

15.4.8 POWERLINK controlled node (V3)

Parameter	Description
Maximum number of cyclic input data	1490 bytes
Maximum number of cyclic output data	1490 bytes
Acyclic data transfer	SDO Upload/Download
Functions	SDO over ASND and UDP
Baud rate	100 MBit/s, half-duplex
Data transport layer	Ethernet II, IEEE 802.3
Ethernet POWERLINK version	V 2

Parameter	Description
Limitation	No slave to slave communication
Reference to firmware/stack version	V3.5

Table 135: Technical Data POWERLINK Controlled Node Protocol

15.4.9 PROFINET IO-Controller (V3)

Parameter	Description
Maximum number of ARs (Application Relation)	128 for RT communication 64 for IRT communication
Maximum number of cyclic input data	5652 bytes, including provider and consumer status
Maximum number of cyclic output data	5700 bytes, including provider and consumer status
Send clock	1 ms, 2 ms, 4 ms for RT mode 250 µs, 500 µs, 1 ms, 2 ms, 4 ms for IRT mode
Performance limits of ARs	Max. 8 ARs, if a send clock < 500 µs Max. 16 ARs, if a send clock < 1 ms Max. 64 ARs, if a send clock < 2 ms
Maximum number of submodules	2048
Maximum amount of data per IOCR	1440 bytes
Number of IOCRs per AR	1 Input IOCR 1 Output IOCR
Maximum amount of data for acyclic read/write record access	65536 bytes
Maximum amount of record data per AR	16384 bytes
Alarm processing (configurable)	Stack processes alarms automatically Applikation processes alarms
Maximum number of ARVendorBlock	256
Maximum size of ARVendorBlockData	512 bytes
Device Access AR CMI Timeout	20 s
Functions	Automatic Name Assignment Media Redundancy Client Media Redundancy Manager (requires license)
DCP function API	Name Assignment IO-Devices (DCP SET NameOfStation) Set IO-Devices IP (DCP SET IP) Signal IO-Device (DCP SET SIGNAL) Reset IO-Device to factory settings (DCP Reset FactorySettings) Bus scan (DCP IDENTIFY ALL) DCP GET
PROFINET specification	Implemented according to V2.3 ED2 MU3 Legacy Startup supported according to PROFINET specification V2.2

Parameter	Description
Limitations	The size of the bus configuration file is limited by the size of the RAM Disk (1 Mbyte) The usable (minimum) cycle time depends on the number of used IO Devices, the number of used input and output data. RT over UDP not supported Multicast communication not supported DHCP is not supported (neither for PROFINET IO Controller nor for IO-Devices) Only one IOCR per IO-Device per direction One instance of DeviceAccess AR can be used at the same time only MRPD is not supported Planning of IRT is not done by the PROFINET IO Controller protocol stack Sync Slave is not supported One fragmented acyclic services can be used at the same time only Multiple MRP Managers are not supported One DCP Service can be used in parallel only Multiple Sync Masters are not supported
Reference to firmware / stack version	V3.3

Table 136: Technical Data PROFINET IO Controller Protocol

15.4.10 PROFINET IO Device (V3.14)

Parameter	Description
Maximum number of cyclic input data	1440 bytes
Maximum number of cyclic output data	1440 bytes
Maximum number of submodules	255 submodules per Application Relation at the same time, 1000 submodules can be configured
Multiple Application Relations (AR)	COMX 51XX-RE, COMX 100XX-RE: The Stack can handle up to 8 IO-ARs, one Supervisor AR and one Supervisor-DA AR at the same time
Acyclic communication	Read/Write Record, max. 8 KB (fragmented)
Alarm types	Process Alarm, Diagnostic Alarm, Return of SubModule Alarm, Plug Alarm (implicit), Pull Alarm (implicit), Update Alarm, Status Alarm, Isochronous Problem Alarm, Upload and Retrieval Notification Alarm
Supported protocols	RTC – Real Time Cyclic Protocol class 1 (unsynchronized), class 3 (synchronized) RTA – Real Time Acyclic Protocol DCP – Discovery and configuration Protocol CL-RPC – Connectionless Remote Procedure Call LLDP – Link Layer Discovery Protocol SNMP – Simple Network Management Protocol MRP – MRP Client
Topology recognition	LLDP, SNMP V1, MIB2, physical device
Identification & Maintenance	Read and write of I&M0-5, Read of I&M5
Minimum cycle time	1 ms for RT_CLASS_1 250 µs for RT_CLASS_3 (COMX 51XX-RE , COMX 100XX-RE)
IRT Support	RT_CLASS_3
Media Redundancy	MRP client is supported

Parameter	Description
Asset Management	Max. 199 assets
PROFIenergy	PROFIenergy ASE implementation with one PE entity per submodule
Additional features	DCP, VLAN- and priority tagging, Shared Device (max. 1 RTC3 AR)
Baud rate	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
PROFINET IO specification	2.2 (legacy startup) and V2.3
Limitations	RT over UDP not supported. Multicast communication not supported. Only one device instance is supported. DHCP is not supported. FastStartUp is not supported. The amount of configured IO-data influences the minimum cycle time that can be reached. Only 1 Input-CR and 1 Output-CR per AR are supported. Using little endian (LSB-MSB) byte order for cyclic process data instead of default big endian (MSB-LSB) byte order may have an negative impact on minimum reachable cycle time. System Redundancy (SR-AR) and Configuration-in-Run (CiR) are not supported. Max. 255 submodules can be used simultaneously within one specific Application Relation. SharedInput is not supported. MRPD is not supported. DFP and other HighPerformance-profile related features are not supported. PDEV functionality is only supported for submodules located in slot 0. Submodules cannot be configured or used by an AR in subslot 0. DAP and PDEV submodules only supported in slot 0. Only one IO Supervisor AR is supported in parallel.
Reference to firmware/stack version	V3.14

Table 137: Technical Data PROFINET IO Device Protocol

15.4.11 PROFINET IO Device (V4)

Parameter	Description
Maximum number of cyclic input data	512 bytes
Maximum number of cyclic output data	512 bytes
Supported protocols	RTC – Real Time Cyclic Protocol, Class 1 (unsynchronized) RTA – Real Time Acyclic Protocol DCP – Discovery and configuration Protocol CL-RPC – Connectionless Remote Procedure Call LLDP – Link Layer Discovery Protocol SNMP – Simple Network Management Protocol
Used Protocols (subset)	UDP, IP, ARP, ICMP (Ping)
Topology recognition	LLDP, SNMP V1, MIB2, physical device
VLAN- and priority tagging	yes
Context Management by CL-RPC	Supported
Minimum cycle time	10 ms
Baud rate	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Limitations	No acyclic user data transfer RT over UDP not supported Multicast communication not supported Only one device instance is supported DHCP is not supported RT Classes 2 and 3 are not supported FastStartUp is not supported Media Redundancy is not supported Access to the submodule granular status bytes (IOPS & IOCS) is not supported The amount of configured IO-data influences the minimum cycle time that can be reached. Supervisor-AR is not supported, Supervisor-DA-AR is supported Only 1 Input-CR and 1 Output-CR are supported Multiple WriteRequests are not supported
Reference to stack version	V4.5

Table 138: Technical Data PROFINET IO Device Protocol V4

15.4.12 Sercos Master

Parameter	Description
Maximum number of cyclic input data	5760 bytes (including Connection Control per Connection)
Maximum number of cyclic output data	5760 bytes (including Connection Control per Connection)
Maximum number of configured slave devices	511
Minimum cycle time	250 µs
Acyclic communication	Service channel: Read/Write/Commands
Functions	Bus Scan
Communication phases	NRT, CP0, CP1, CP2, CP3, CP4
Topology	Line and double ring
Redundancy	supported
Hot-Plug	supported
Cross Communication	supported, but only if the master is configured by the host application program by packets.
Baud rate	100 MBit/s, full duplex
Data transport layer	Ethernet II, IEEE 802.3
Auto crossover	supported
Supported Sercos version	Communication Specification Version 1.3
TCP/IP stack	integrated
Limitation	NRT channel not usable via the API.
Reference to firmware/stack version	V2.1

Table 139: Technical Data Sercos Master Protocol

15.4.13 Sercos Slave

Parameter	Description
COMX 51XX-RE: Maximum number of cyclic produced data	284 bytes (including Connection Control and IO Status)
COMX 51XX-RE: Maximum number of cyclic consumed data	276 bytes (including Connection Control and IO Status)
COMX 100XX-RE: Maximum number of cyclic produced data	132 bytes (including Connection Control and IO Status)
COMX 100XX-RE: Maximum number of cyclic consumed data	124 bytes (including Connection Control and IO Status)
Maximum number of slave devices	8
Sercos addresses	1 … 511
Minimum cycle time	250 µs
Topology	Line and ring
Communication phases	NRT, CP0, CP1, CP2, CP3, CP4, HP0, HP1, HP2
Descriptors for connections (including Connection Control and IO Status/Control)	Max. 64
Acyclic Communication (Service Channel)	Read/Write/Standard Commands
Cross Communication (CC)	Supported
Baud rate	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Supported Sercos version	Communication Specification Version 1.1.2 and 1.3.1
Supported Sercos Communication Profiles	SCP_FixCFG Version 1.1.1 SCP_VarCFG Version 1.1.1 SCP_VarCFG Version 1.1.3 SCP_HP Version 1.1.1 SCP_SysTime Version1.3
Supported User SCP Profiles	SCP_WD Version 1.1.1 SCP_Diag Version 1.1.1 SCP_RTB Version 1.1.1 SCP_Mux Version 1.1.1 SCP_Sig 1.1.1 SCP_ExtMuX 1.1.2 SCP_RTBListProd 1.3 SCP_RTBListCons 1.3 SCP_RTBWordProd 1.3 SCP_RTBWordCons 1.3 SCP_OvSBasic 1.3 SCP_WDCon 1.3
Supported FSP profiles	FSP_IO FSP_Drive FSP_Encoder
SCP Sync	Supported
S/IP	Supported
Identification LED	Supported
Storage location of object dictionary	mixed mode
Limitations	Max. 2 connections: 1 for consumer and 1 for producer Modifications of the Service-Channel Object Dictionary will be volatile after reset (if it resides on device) NRT Channel only forwarding
Reference to firmware/stack version	V3.5

Table 140: Technical Data Sercos Slave Protocol

15.4.14 VARAN Client

Parameter	Description
Maximum number of cyclic input data	128 bytes
Maximum number of cyclic output data	128 bytes
Memory Area	Read Memory Area 1, Write Memory Area 1, Read Memory Area 2, Write Memory Area 2
Functions	Memory Read Memory Write
Integrated 2 port splitter for daisy chain topology	Supported
Baud rate	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
VARAN protocol version	1.1.1.0
Limitations	Integrated EMAC for IP data exchange with client application not supported SPI single commands (optional feature) not supported
Reference to firmware/stack version	V1.1

Table 141: Technical Data VARAN Client Protocol

15.4.15 CANopen Master

Parameter	Description
Maximum number of CANopen nodes	126
Maximum number of cyclic input data	3584 bytes
Maximum number of cyclic output data	3584 bytes
Maximum number of receive PDOs	512
Maximum number of transmit PDOs	512
Exchange of process data	Via PDO transfer: - synchronized, - remotely requested and - event driven (change of date)
Acyclic communication	SDO Upload/Download, max. 512 bytes per request
Functions	Emergency message (consumer and producer) Node guarding / life guarding, heartbeat PDO mapping NMT Master SYNC protocol (producer) Simple boot-up process, reading object 1000H for identification
Baud rates	10 kBits/s, 20 kBits/s, 50 kBits/s, 100 kBits/s, 125 kBits/s, 250 kBits/s, 500 kBits/s, 800 kBits/s, 1 MBits/s
CAN layer 2 access	Send/receive via API supported (11 bit/29 bit)
Data transport layer	CAN Frames
CAN Frame type for CANopen	11 Bit
Reference to version	V2.14

Table 142: Technical Data CANopen Master Protocol

15.4.16 CANopen Slave

15.4.16.1 CANopen Slave COMX 100

Parameter	Description
Maximum number of cyclic input data	512 bytes
Maximum number of cyclic output data	512 bytes
Maximum number of receive PDOs	64
Maximum number of transmit PDOs	64
Exchange of process data	Via PDO transfer - synchronized, - remotely requested and - event driven (change of date, event timer) On request of the host application program by packet
Acyclic communication	SDO upload/download (server only) Emergency message (producer) Timestamp (producer/consumer)
Functions	Node guarding / life guarding Heartbeat: 1 producer, max. 64 consumer PDO mapping NMT Slave SYNC protocol (consumer) Error behaviour (configurable): - in state operational: change to state pre-operational - in any state: no state change - in state operational or pre-operational: change to state stopped
Baud rates	10 kBits/s, 20 kBits/s, 50 kBits/s, 100 kBits/s, 125 kBits/s, 250 kBits/s, 500 kBits/s, 800 kBits/s, 1 MBits/s Auto baudrate detection is supported
CAN layer 2 access	Send/receive via API supported (11 bit/29 bit)
Data transport layer	CAN Frames
CAN Frame type for CANopen	11 Bit
Reference to firmware/stack version	V3.8

Table 143: Technical Data CANopen Slave Protocol

15.4.16.2 CANopen Slave COMX 52

Parameter	Description
Maximum number of cyclic input data	64 bytes
Maximum number of cyclic output data	64 bytes
Maximum number of receive PDOs	8
Maximum number of transmit PDOs	8
Exchange of process data	Via PDO transfer - synchronized, - remotely requested and - event driven (change of date, event timer) On request of the host application program by packet
Acyclic communication	SDO upload/download (server only) Emergency message (producer) Timestamp (producer/consumer)
Functions	Node guarding / life guarding Heartbeat: 1 producer, max. 4 consumer PDO mapping NMT Slave SYNC protocol (consumer) Error behaviour (configurable): - in state operational: change to state pre-operational - in any state: no state change - in state operational or pre-operational: change to state stopped
Baud rates	10 kBits/s, 20 kBits/s, 50 kBits/s, 100 kBits/s, 125 kBits/s, 250 kBits/s, 500 kBits/s, 800 kBits/s, 1 MBits/s Auto baudrate detection is supported
CAN layer 2 access	Send/receive via API supported (11 bit/29 bit)
Data transport layer	CAN Frames
CAN Frame type for CANopen	11 Bit
Reference to firmware/stack version	V3.8

Table 144: Technical Data CANopen Slave Protocol

15.4.17 CC-Link Slave

Parameter	Description
Firmware works according to CC-Link Version 2.0:	
Station Types	Remote Device Station (up to 4 occupied stations)
Maximum input data	368 bytes
Maximum output data	368 bytes
Input data remote device station	112 bytes (RY) and 256 bytes (RWw)
Output data remote device station	112 bytes (RX) and 256 bytes (RWr)
Extension cycles	1, 2, 4, 8
Baud rates	156 kBit/s, 625 kBit/s, 2500 kBit/s, 5 MBit/s, 10 MBit/s
Limitation	Intelligent Device Station not supported
Firmware works according to CC-Link Version 1.11:	
Station Types	Remote I/O station, Remote device station' (up to 4 occupied stations)
Maximum input data	48 bytes
Maximum output data	48 bytes
Input data remote I/O station	4 bytes (RY)
Output data remote I/O station	4 bytes (RX)
Input data remote device station	4 bytes (RY) and 8 bytes (RWw) per occupied station
Output data remote device station	4 bytes (RX) and 8 bytes (RWr) per occupied station
Baud rates	156 kBit/s, 625 kBit/s, 2500 kBit/s, 5 MBit/s, 10 MBit/s
Firmware	
Reference to firmware/stack version	V2.13

Table 145: Technical Data CC-Link-Slave-Protocol

15.4.18 DeviceNet Master

Parameter	Description
Maximum number of DeviceNet slaves	63
Maximum number of total cyclic input data	3584 bytes
Maximum number of total cyclic output data	3584 bytes
Maximum number of cyclic input data	255 bytes/connection
Maximum number of cyclic output data	255 bytes/connection
Maximum Configuration data	1000 bytes/slave
Acyclic communication	Explicit connection All service codes are supported
Connections	Bit Strobe Change of State Cyclic Poll Explicit Peer-to-Peer Messaging
Function	Quick Connect
Fragmentation	Explicit and I/O
UCMM	Supported
Objects	Identity Object (Class Code 0x01) Message Router Object (Class Code 0x02) DeviceNet Object (Class Code 0x03) Connection Object (Class Code 0x05) Acknowledge Handler Object (Class Code 0x06)
Baud rates	125 kBits/s, 250 kBit/s, 500 kBit/s Auto baudrate detection is not supported
Data transport layer	CAN frames
Reference to firmware/stack version	V2.4

Table 146: Technical Data DeviceNet Master Protocol

15.4.19 DeviceNet Slave

Parameter	Description
Maximum number of cyclic input data	255 bytes
Maximum number of cyclic output data	255 bytes
Acyclic communication	Get_Attribute_Single/All Max. 240 bytes per request Set_Attribute_Single/All Max. 240 bytes per request
Connections	Poll Change-of-state Cyclic Bit-strobe
Explicit messaging	Supported
Fragmentation	Explicit and I/O
UCMM	Not supported
Baud rates	125 kBits/s, 250 kBit/s, 500 kBit/s Auto baudrate detection is not supported
Data transport layer	CAN frames
Reference to firmware/stack version	V2.7

Table 147: Technical Data DeviceNet Slave Protocol

15.4.20 PROFIBUS DP Master

Parameter	Description
Maximum number of PROFIBUS DP slaves	125 (DPV0/DPV1)
Maximum number of total cyclic input data	5712 bytes
Maximum number of total cyclic output data	5760 bytes
Maximum number of cyclic input data	244 bytes per slave
Maximum number of cyclic output data	244 bytes per slave
Configuration data	Max. 244 bytes per slave
Parameterization data per slave	7 bytes standard parameter per slave Max. 237 bytes application specific parameters per slave
Acyclic communication	DPV1 class 1 read, write DPV1 class 1 alarm DPV1 class 2 initiate, read, write, data transport, abort
Maximum number of acyclic read/write	240 bytes per slave and telegram
Functions	Configuration in Run (CiR), requires host application program support Timestamp (Master functionality)
Redundancy	Supported, requires host application program support
Baud rate	9,6 kBits/s, 19,2 kBits/s, 31,25 kBits/s, 45,45 kBits/s 93,75 kBits/s, 187,5 kBits/s, 500 kBits/s, 1, 5 MBits/s, 3 MBits/s, 6 MBits/s, 12 MBit/s Auto baud rate detection is not supported
Data transport layer	PROFIBUS FDL
Limitations	DPV2 isochronous mode and slave slave communication are not supported. The redundancy function can not be used, if the master is configured by the host application program by packets.
Reference to firmware/stack version	V2.8

Table 148: Technical Data PROFIBUS DP Master Protocol

15.4.21 PROFIBUS DP Slave

Parameter	Description
Maximum number of cyclic input data	244 bytes
Maximum number of cyclic output data	244 bytes
Maximum number of acyclic data (read/write)	240 bytes/telegram
Maximum number of modules	24
Configuration data	Max. 244 bytes
Parameter data	237 bytes application specific parameters
Acyclic communication	DP V1 Class 1 Read/Write DP V1 Class 1 Alarm DP V1 Class 2 Read/Write/Data Transport
Baud rate	9,6 kBits/s, 19,2 kBits/s, 31,25 kBits/s, 45,45 kBits/s 93,75 kBits/s, 187,5 kBits/s, 500 kBits/s, 1, 5 MBits/s, 3 MBits/s, 6 MBits/s, 12 MBit/s Auto baudrate detection is supported
Data transport layer	PROFIBUS FDL
Limitations	SSCY1S – Slave to slave communication state machine not implemented Data exchange broadcast not implemented I&M LR services other than Call-REQ/RES are not supported yet
Reference to firmware/stack version	V2.11

Table 149: Technical Data PROFIBUS DP Slave Protocol

16 Decommissioning, replacement and disposal

16.1 Putting the device out of operation

To deinstall the comX communication module from the device into which the comX module was integrated (also called “host system” or “target environment”), proceed as follows:

⚠ WARNING

Lethal electrical shock caused by parts with more than 50V!

- Hazardous Voltage may be present inside the device, into which the comX communication module is integrated.
- Strictly obey to all safety rules privided in the documentation supplied by the manufacturers of this device!
- First disconnect the power plug of the device into which the comX module had been integrated.
- Make sure, that this device is separated from the supply voltage and free of current, before you continue.

⚠ WARNING

Consequences of removal of the device

To avoid personal injury and damage to material, do not remove this device from a plant without having ensured a safe operation of the plant during and after the removal of the device.

Now, you are ready to remove or replace the comX communication module.

- **Step 1**: If necessary, remove the housing of this device. Strictly observe all instructions of the manual of this device.
- **Step 2**: NEVER touch open contacts or wire ends.
- **Step 3**: Disconnect the communication cables from the device.
- **Step 4**: Carefully remove the comX communication module from its connector (50-pin SMT connector, male, grid width 1.27 mm; with COMX-CN, an additional 30-pin SMT connector, male, grid width 1.27 mm) onto which it was plugged during mounting.
- **Step 5**: If the comX communication module requires exchanging, replace it and reconnect the communication cables to the device.
- **Step 6**: If you opened the housing of the device in step 1, close it now. Strictly observe all instructions of the manual of this device.
- **Step 7**: Reconnect the device to its supply voltage and switch it on again. Observe the device manufacturer’s commissioning instructions. Check whether the device behaves normally.

Observe the instructions on the disposal of waste electronic equipment!

16.2 Disposal of waste electronic equipment

According to the European Directive 2002/96/EG “Waste Electrical and Electronic Equipment (WEEE)”, waste electronic equipment may not be disposed of as household waste. As a consumer, you are legally obliged to dispose of all waste electronic equipment according to national and local regulations.

Waste Electronic Equipment

- This product must not be treated as household waste.
- This product must be disposed of at a designated waste electronic equipment collecting point.

17 Glossary

AIDA

Automatisierungs-Initiative deutscher Automobilhersteller

AIDA is a joined initiative of the German automotive industry founded by Audi, BMW, Daimler-Chrysler and Volkswagen. AIDA conforming products are based on PROFINET.

Auto-Crossover

Auto-Crossover is a feature of an interface: An interface with Auto-Crossover capability will automatically detect and correct whether the data lines have been exchanged vice versa.

Auto-Negotiation

Auto-Negotiation is a feature of an interface: An interface with Auto-Negotiation will automatically determine a set of correct communication parameters.

Baud rate

Data transmission speed of a communication channel or interface.

CC-Link IE Field

Communication system for industrial Ethernet designed and developed by Mitsubishi Electric Corporation, Tokyo, Japan, for high data throughput based on Gigabit

CC-Link IE Field Master

Station in the CC-Link IE Field network controlling parameters and managing cyclic communication

CC-Link IE Field Slave

Station in the CC-Link IE Field network communicating with a master station

CC-Link IE Field Basic

Communication system for Industrial Ethernet designed and developed by Mitsubishi Electric Corporation, Tokyo, Japan, providing CC-Link IE Field at a speed of 100 Mbit/s based on TCP/IP

CC-Link IE Field Basic Master

Station in the CC-Link IE Field Basic network controlling parameters and managing cyclic communication

CC-Link IE Field Basic Slave

Station in the CC-Link IE Field Basic network communicating with a master station

CRC

Cyclic Redundancy Check

A mathematic procedure for calculating checksums based on polynomial division in order to detect data transmission errors. For a more detailed description, see: http://en.wikipedia.org/wiki/Cyclic_redundancy_check.

DDF

Device Description File.

Device Description File

A file containing configuration information about a device being a part of a network that can be read out by masters for system configuration. Device Description Files use various formats, which depend on the communication system. These formats are often based on XML such as EDS files or GSDML files. Contains configuration information

EDS file

A special kind of Device Description File used by Ethernet.

EtherCAT

A communication system for industrial Ethernet designed and developed by Beckhoff Automation GmbH.

Ethernet

A networking technology used for office and industrial communication (via electrical or optical connections) developed and specified by Intel, DEC and XEROX. It provides data transmission with collision control and allows various protocols. Since Ethernet is not necessarily real-time-application-capable, various real-time extensions have been developed, see Real-Time Ethernet.

EtherNet/IP

A communication system for industrial Ethernet designed and developed by Rockwell. It partly uses the CIP (Common Industrial Protocol).

Ethernet Powerlink

A communication system for industrial Ethernet designed and developed by B&R. It partly uses CANopen technologies.

Full duplex

A telecommunication system between two communication partners that enables simultaneous communication in both directions is called a full-duplex telecommunication system. Such a system allows transmitting data even if data is currently received. Full duplex is the opposite of Half duplex.

Function code

A function code (as defined by Modbus terminology) is a standardized method to access (i.e. read or write) coils or registers via Modbus.

GSD file

A special kind of Device Description File used by PROFIBUS (GSD = General Station Description).

GSDML file

A special kind of XML-based Device Description File used by PROFINET. (GSDML = General Station Description Markup Language).

Half duplex

A telecommunication system between two communication partners that does not allow a simultaneous, only an alternating communication in both directions, is called a half duplex telecommunication system. Any attempt to use this system for receiving and transmitting data simultaneously, will result in a mutual blockade. Half duplex is the opposite of Full duplex.

Hub

A network component connecting multiple communication partners with each other. Hubs have no "intelligence" of their own. They do not analyze data traffic. Hubs forward data packets to all communication partners without selection. Hubs serve to set up a star topology.

Industrial Ethernet

See Real-Time Ethernet

netX

networX on chip, next generation of communication controllers.

Object Dictionary

An object dictionary is a storage area for device parameter data structures. It is accessed in standardized manner.

Open Modbus/TCP

A communication system for Industrial Ethernet designed and developed by Schneider Automation and maintained by the Modbus-IDA organization based on the Modbus protocols for serial communication.

PROFINET

A communication system for Industrial Ethernet designed and developed by PROFIBUS International. It uses some mechanisms similar to those of the PROFIBUS field bus.

Real-Time Ethernet

Real-Time Ethernet (Industrial Ethernet) is an extension of the Ethernet networking technology for industrial purposes with very good Real-Time features and performance. On the market, you find a variety of different Real-Time Ethernet systems that are incompatible with each other. The most important systems are

- CC-Link IE Field
- CC-Link IE Field Basic
- EtherCAT
- EtherNet/IP
- Ethernet Powerlink
- Open Modbus/TCP

- PROFINET
- Sercos
- VARAN

Register

A register (as defined by Modbus terminology) is a 16-bit wide storage area for data which can be accessed and addressed as a unit by some of the Modbus Function Codes.

RJ45

A connector type often used for Ethernet connection. It has been standardized by the Federal Communications Commission of the USA (FCC).

RoHS

Restriction of Hazardous Substances

This abbreviation denominates the directive of the European Union on the use of 6 hazardous substances in electronic products. Its name is *"Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2002/95/EC",* adopted in 2003 and became effective on 1 July 2006.

RS232

An interfacing standard for serial communication on data lines defined by EIA (Electronic Industries Alliance) in *ANSI/EIA/TIA-232-F-1997.*

RS485

An interfacing standard for differential serial communication on data lines defined by EIA (Electronic Industries Alliance) in *ANSI/TIA/EIA-485-A-1998*

Sercos

A communication system for Industrial Ethernet designed and developed by Bosch-Rexroth GmbH and supported by Sercos International.

Switch

A network component connecting multiple communication partners (or even entire branches of a network) with each other. A switch is an intelligent network component which analyzes network traffic and makes its own decisions. For the connected communication partners, a switch behaves transparently.

UART

UART means Universal Asynchronous Receiver Transmitter. It is a special kind of electronic circuit used for transmitting data serially with a fixed frame consisting of one start bit, five to nine data bits, an optional parity bit for the detection of transmission errors and one stop bit. Working asynchronously, it does not use an explicit clock signal.

VARAN

Versatile Automation Random Access Network

A communication system for industrial Ethernet designed and developed by the Austrian automation company SIGMATEK.

XDD file

A special kind of Device Description file used by Ethernet Powerlink

XML

XML means Extended Markup Language. It is a symbolic language for structuring data systematically. XML is standard maintained by the W3C (World-wide web consortium). Device Description Files often use XML-based formats for storing the device-related data appropriately.

18 Appendix

18.1 Matrix label

The matrix label on the device contains:

1. Part number
2. Hardware revision
3. Serial number

The figure shows part number 1250.100, hardware revision 3 and serial number 23456.

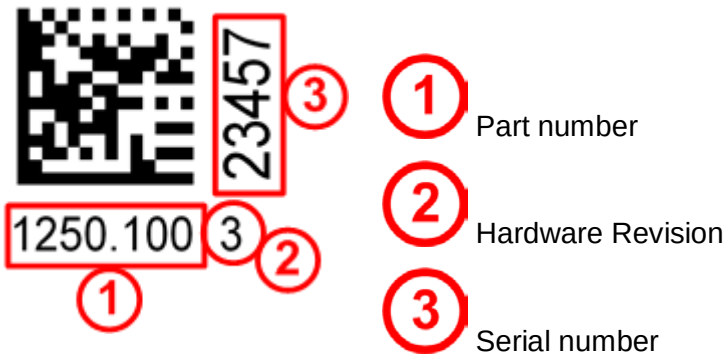


Figure 55: Matrix label

18.2 Wiring instructions for fieldbus systems

You will find detailed instructions on the wiring of Fieldbus Systems (CANopen, CC-Link, DeviceNet, and PROFIBUS-DP), e.g. concerning termination and requirements on the cables, in a separate manual: ”*Wiring Instructions*“ (Hilscher-document DOC120208UM01EN).

18.3 EtherNet/IP adapter/slave – instance ID of I/O data

I/O data	Instance ID	Remark
Consumed I/O data	100	I/O data: EtherNet/IP scanner/master → EtherNet/IP Adapter/Slave.
Produced I/O data	101	I/O data: EtherNet/IP adapter/slave → EtherNet/IP scanner/master.

Table 150: EtherNet/IP adapter/slave – instance ID of I/O data

18.4 Use of VARAN Client

In order to use the comX communication module with VARAN, you need a license. You can acquire this license at the VNO (VARAN Bus-Nutzerorganisation, Bürmooser Straße 10, A-5112 Lamprechtshausen, info@varan-bus.net) after becoming a member of VNO.

The license as well as the Vendor ID and Device ID can be set with the SYCON.net configuration software or the netX Configuration Tool.

18.5 Failure in 10 MBit/s half-duplex mode and workaround

Important: The failure described here only affects older **COMX 100CA-RE** modules with serial numbers up to **21557** and **COMX 100CN-RE** with serial numbers up to **20529.**

Affected Hardware

Hardware with the communication controller netX 50, netX 100 or netX 500; netX/Internal PHYs.

When can this Failure occur?

When using standard Ethernet communication with 10 MBit/s half duplex mode, the PHY gets stuck in case of network collisions. Then no further network communication is possible. Only device power cycling allows Ethernet communication again.

This problem can only occur with Ethernet TCP/UDP IP, EtherNet/IP or Modbus TCP protocols when using hubs at 10 MBit/s. The issue described above is not applicable for protocols which use 100 MBit/s or full duplex mode.

Solution **/ Workaround:**

Do not use 10 MBit/s-only hubs. Use either switches or 10/100 MBit/s Dual Speed hubs, to make sure the netX Ethernet ports are connected with 100 MBit/s or in full duplex mode.

This erratum is fixed with all components of the ‘Y’ charge (9 digit charge number shows ‘Y’ at position 5 (nnnnYnnnn).

Reference

“Summary of 10BT problem on EthernetPHY”,
RenesasElectronics Europe, April 27, 2010

18.6 References

References: Protocol API manuals
• AS-Interface Master Protocol API Manual, Revision 5, Hilscher GmbH 2016
• CANopen Master Protocol API Manual, Revision 16, Hilscher GmbH 2016
• CANopen Slave Protocol API Manual (V3), Revision 7, Hilscher GmbH 2020
• CC-Link IE Field Slave Protocol API, Revision 1, Hilscher GmbH 2018
• CC-Link IE Field-Basic Slave Protocol API, Revision 4, Hilscher GmbH 2021
• CC-Link Slave Protocol API Manual, Revision 12, Hilscher GmbH 2020
• DeviceNet Master Protocol API Manual, Revision 11, Hilscher GmbH 2016
• DeviceNet Slave Protocol API Manual, Revision 18, Hilscher GmbH 2020
• EtherCAT Master Protocol API Manual (V4), Revision 6, Hilscher GmbH 2020
• EtherCAT Master Protocol API Manual (V3), Revision 5, Hilscher GmbH 2013
• EtherCAT Slave Protocol API Manual (V4), Revision 12, Hilscher GmbH 2021
• EtherCAT Slave Protocol API Manual (V2), Revision 21, Hilscher GmbH 2013
• EtherNetIP Scanner Protocol API Manual, Revision 15, Hilscher GmbH 2020
• EtherNetIP Adapter Protocol API Manual (V2), Revision 22, Hilscher GmbH 2021
EtherNetIP Adapter Protocol API Manual (V3), Revision 8, Hilscher GmbH 2021
• Open Modbus/TCP Protocol API Manual, Revision 11, Hilscher GmbH 2018
• POWERLINK-Controlled-Node/Slave Protocol API Manual (V3), Revision 10, Hilscher GmbH 2021
• POWERLINK-Controlled-Node/Slave Protocol API Manual (V2), Revision 13, Hilscher GmbH 2015
• PROFIBUS DP-Master Protocol API Manual, Revision 22, Hilscher GmbH 2017
• PROFIBUS DP-Slave Protocol API Manual, Revision 20, Hilscher GmbH 2020
• PROFINET IO-Controller Protocol API Manual (V3), Revision 8, Hilscher GmbH 2021
• PROFINET IO-Controller Protocol API Manual (V2), Revision 19, Hilscher GmbH 2015
• PROFINET IO-Device Protocol API Manual (V4/V5), Revision 5, Hilscher GmbH 2021
• PROFINET IO-Device Protocol API Manual (V3), Revision 19, Hilscher GmbH 2019
• Sercos Master Protocol API Manual, Revision 11, Hilscher GmbH 2013
• Sercos Slave Protocol API Manual (V3), Revision 18, Hilscher GmbH 2021
• VARAN Client Protocol API Manual, Revision 4, Hilscher GmbH 2021

Table 151: References: Protocol API manuals

18.7 List of figures

18.8 List of tables

18.9 Contacts

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