

**User Manual**

**comX**

**Communication Modules for Real-Time-Ethernet and Fieldbus**



**Hilscher Gesellschaft für Systemautomation mbH**

**[www.hilscher.com](http://www.hilscher.com)**

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# 1 Introduction

## 1.1 About this Manual

This manual contains a description of the communication modules of the comX product family from Hilscher based on the communication controllers netX.

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

This manual contains information about 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. This electronic device is denominated as target system or host system of the comX communication system within the scope of this document.

However, the integration of the comX modules (as *embedded systems*) into their target system („*Host*“) is not topic of this manual. It is described in detail in a separate manual, namely the *comX Design Guide*, for details see section “*Documentation Overview comX*” on page 17.

### 1.1.1 Mandatory read Manual



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**Important!**

Read and understand all instructions before installation of the communication module to avoid injury. First read the **Safety** chapter.

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## 1.1.2 List of Revisions

Index	Date	Chapter	Revision
5	2015-12-07	7.5	New section " <i>Real-Time Ethernet Communication Module COMX 51CN-RE</i> "
		8	New chapter " <i>Evaluation Board COMXEB</i> "
		9	New chapter " <i>Connection to the PC</i> "
		10.3.13	Section <i>LEDs Sercos-Slave</i> updated.
		12	Chapter " <i>Updating the Firmware</i> " completely reworked for new evaluation board COMXEB
		14.1.7	Section " <i>COMX 100CA-DP</i> " in chapter " <i>Technical Data</i> ": Correction of ambient temperature range, value from German version which is corrected, has been adapted.
		14.1.11	New section " <i>COMX 51CN-RE</i> "
6	2017-04-03	14.3	New section " <i>Technical Data Evaluation Board COMXEB</i> "
		1.1.3	Section <i>Reference to Hardware, Software and Firmware</i> updated.
		1.2.1	Section <i>Device Description Files</i> updated.
		1.2.3.1	Section <i>PROFINET IO Controller Firmware Versions V2 and V3</i> added.
		1.2.3.2	Section <i>PROFINET IO-Device Firmware Versions 3.4 and 3.10</i> updated.
		1.2.3.3	Section <i>EtherCAT Master Firmware Versions V3 and V4</i> added.
		1.2.3.4	Section <i>EtherCAT Slave Firmware Versions 2.5 and 4.6</i> updated.
		1.2.3.5	Section <i>EtherCAT Slave Firmware Version 4.6</i> added.
		1.2.3.6	Section <i>POWERLINK Controlled Node V2 and V3</i> added.
		2.6.4	Section <i>Exceeding the maximum number of allowed write/delete accesses</i> added.
		2.6.5	Section <i>Drop of supply voltage during write and delete accesses in the file system</i> added.
		3.4	Section <i>Prerequisites for the Software Installation</i> updated.
		5.2.4	Section <i>Drop of supply voltage during write and delete accesses in the file system</i> added.
		10.3.3	Section <i>LEDs EtherCAT-Master (V4)</i> added.
		10.3.8	Section <i>LEDs POWERLINK Controlled Node</i> updated.
		10.3.10	Section <i>LEDs PROFINET IO-Controller (V3)</i> added.
		10.3.13	Section <i>LEDs Sercos-Slave</i> updated.
		14.4.2	Section <i>EtherCAT Master (V4)</i> added.
		14.4.5	Section <i>EtherNet/IP Adapter</i> updated.
		14.4.6	Section <i>Open Modbus/TCP</i> updated.
		14.4.10	Section <i>PROFINET IO-Controller (V3)</i> added.
		14.4.12	Section <i>PROFINET IO Device (V3.10)</i> updated.
		14.4.14	Section <i>Sercos Slave</i> updated.

### 1.1.3 Reference to Hardware, Software and Firmware



**Remark concerning Software Update:** The hardware revisions mentioned in this section and the versions of firmware, driver and configuration software belong together functionally. The firmware, the driver and the configuration software must be updated according to the specifications of this section at present hardware installation.

An overview on firmware update issues is given in section *Updating the Firmware* on page 152.

#### Hardware

Module	Revision
<b>Real-Time Ethernet Modules (Master/Slave) with netX 100 Processor</b>	
COMX 100CA-RE	Revision 8
COMX 100CN-RE	Revision 2
<b>Real-Time Ethernet Modules (Slave) with netX 51 Processor</b>	
COMX 51CA-RE	Revision 1
COMX 51CN-RE	Revision 1
<b>Real-Time Ethernet Modules (Slave) with netX 50 Processor/Fiber Optic</b>	
COMX 50CA-REFO	Revision 2
<b>Fieldbus Master/Slave Modules with netX 100 Processor</b>	
COMX 100CA-CO	Revision 4
COMX 100CA-DN	Revision 4
COMX 100CA-DP	Revision 4
COMX 100CN-CO	Revision 3
COMX 100CN-DN	Revision 3
COMX 100CN-DP	Revision 3
<b>Fieldbus Slave-Modules with netX 10 Processor</b>	
COMX 10CA-CCS	Revision 2
COMX 10CN-CCS	Revision 2
COMX 10CA-COS	Revision 2
COMX 10CN-COS	Revision 1
COMX 10CA-DNS	Revision 2
COMX 10CN-DNS	Revision 1
COMX 10CA-DPS	Revision 2
COMX 10CN-DPS	Revision 1
<b>Evaluation Board</b>	
COMXEB	Revision 2

Table 1: Reference to Hardware

#### Software

Software	Software Version
SYCON.net	V1.400
cifX Device Driver	V1.3
Toolkit	V1.4

Table 2: Reference to Software

**Firmware**

Firmware	Protocol	Firmware Version	For Hardware
<b>Real-Time Ethernet</b>			
comXecm.nxf	EtherCAT Master	3.0	COMX 100CA-RE, COMX 100CN-RE
comXecm.nxf	EtherCAT Master V4	4.0	
comXecs.nxf	EtherCAT Slave	2.5.34	
comXecs.nxf	EtherCAT Slave V4	4.6	
comXeim.nxf	EtherNet/IP Scanner	2.9	
comXeis.nxf	EtherNet/IP Adapter	2.11	
comXomb.nxf	Open Modbus/TCP	2.6	
comXpls.nxf	POWERLINK Controlled Node	2.1	
comXpnm.nxf	PROFINET IO Controller	2.6	
M020C000.nxf	PROFINET IO Controller	3.2	
comXpns.nxf	PROFINET IO Device V3	3.4	
comXpns.nxf	PROFINET IO Device V3.10	3.10	
comXs3m.nxf	Sercos Master	2.1	
comXs3s.nxf	Sercos Slave	3.4	
comXvrs.nxf	VARAN Client	1.0	
cx50pns.nxf	PROFINET IO Device V3 Fiber Optics	3.4	COMX 50CA-REFO
cx50pns.nxf	PROFINET IO Device V3.5 Fiber Optics	3.10	
M060F000.nxf	EtherCAT Slave V4	4.6	COMX 51CA-RE, COMX 51CN-RE
M060H000.nxf	EtherNet/IP Adapter	2.11	
M060L000.nxf	Open Modbus/TCP	2.6	
cx51pns.nxf	PROFINET IO Device V3.10	3.10	
M060K000.nxf	POWERLINK Controlled Node	3.2	
M060J000.nxf	Sercos Slave	3.4	

Fieldbus			
comXcom.nxf	CANopen Master	2.14	COMX 100CA-CO, COMX 100CN-CO
comXcos.nxf	CANopen Slave	3.7	COMX 100CA-CO, COMX 100CN-CO
comXdnm.nxf	DeviceNet Master	2.4	COMX 100CA-DN COMX 100CN-DN
comXdns.nxf	DeviceNet Slave	2.5	COMX 100CA-DN COMX 100CN-DN
comXdpm.nxf	PROFIBUS DP Master	2.7	COMX 100CA-DP, COMX 100CN-DP
comXdps.nxf	PROFIBUS DP Slave	2.9	COMX 100CA-DP, COMX 100CN-DP
M0203000.nxf	PROFIBUS MPI	2.4	COMX 100CA-DP, COMX 100CN-DP
M0505000.nxf	CANopen Slave	3.7	COMX 10CA-CO, COMX 10CN-CO
M0509000.nxf	CC-Link Slave	2.11	COMX 10CA-CC COMX 10CN-CC
M0507000.nxf	DeviceNet Slave	2.5	COMX 10CA-DN COMX 10CN-DN
M0502000.nxf	PROFIBUS DP Slave	2.9	COMX 10CA-DP, COMX 10CN-DP

Table 3: Reference to Firmware

The following firmware is still available for legacy applications but 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 Product DVD

The **Communication Solutions DVD** for the comX communication modules contains 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 with 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
<b>COMX 100CA-RE, COMX 100CN-RE</b>	
EtherCAT Slave (V2)	Hilscher COMX 100XX RE ECS V2.2.X.xml
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 (V3.4)	GSDML-V2.3-HILSCHER-COMX 100XX-RE PNS-20130806.xml
PROFINET IO-RT-Device (V3.10) netX 100	GSDML-V2.32-HILSCHER-COMX 100XX-RE PNS-xxxxxxx.xml
PROFINET IO-RT-Device (V2) (on request, only for legacy applications)	GSDML-V2.1-HILSCHER-COMX RE PNS-20081210.xml
Sercos Slave (V3)	SDDML#v3.0#Hilscher#COMX_100XX_RE-FIXCFG_FSPIO#2014-01-08.xml (siehe Hinweis)
<b>COMX 51CA-RE, COMX 51CN-RE</b>	
EtherCAT Slave (V4)	Hilscher COMX 51XX RE ECS V4.6.X.xml
EtherNet/IP Adapter (Slave)	HILSCHER COMX 51XX-RE EIS V1.1.EDS
PROFINET IO-RT-Device (V3.10) netX 51	GSDML-V2.32-HILSCHER-COMX 51XX-RE PNS-xxxxxxx.xml
Sercos Slave (V3)	SDDML#v3.0#Hilscher#COMX_51XX_RE-FIXCFG_FSPIO#2014-01-08.xml (siehe Hinweis)
<b>COMX 50CA-REFO</b>	
PROFINET IO-RT-Device (V3.4) Fiber Optic	GSDML-V2.3-HILSCHER-COMX 50XX-REFO PNS-20130806.xml
PROFINET IO-RT-Device (V3.10) netX 50 Fiber Optic	GSDML-V2.32-HILSCHER-COMX 50XX-REFO PNS-xxxxxxx.xml

Table 5: Device Description Files comX Modules Real-Time Ethernet (Slave)



**Note:** If you use a Sercos Master which is using SDDML files for configuration, and one of the defaults for vendor code, device ID, input data size or output data size was changed, then you have to export a new updated SDDML file from SYCON.net and import this SDDML file into the configuration software for the Sercos Master.

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

- 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 50: 0x0352_COMX50XX-CCS_2.11_en.cspp 0x0352_COMX50XX-CCS_2.11_en.csppproj For COMX 10: 0x0352_COMX10XX-CCS_2.11_en.cspp 0x0352_COMX10XX-CCS_2.11_en.csppproj
CANopen Slave	For COMX 10: COMX_10XX-COS COS.eds For COMX 100: COMX_100XX-CO COS.eds
DeviceNet Slave	For COMX 10: COMX_10XX-DNS_DNS.EDS For COMX 100: COMX_100XX-DN_DNS.EDS
PROFIBUS DP Slave	For COMX 10: HIL_0D82.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)**

Furthermore, for the following comX communication modules Real-Time Ethernet (Master) there are device description files available on the product DVD (ZIP file) within the EDS directory:

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)*

These device description files for EtherNet/IP-Master devices are required if an additional Ethernet/IP Master device shall 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 gives information, for which items you can find further information in which manual.



All these documents are available on the Communication Solutions DVD delivered with the device underneath the directory **Documentation**, in 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 PROFINET 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 incompatibilities:

- 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:

	<b>PROFINET IO-Controller V2</b> Directory on the DVD \ File:	<b>PROFINET IO-Controller V3</b> Directory on the DVD \ File:
<b>Firmware</b>	<i>Firmware\COMX\Outdated versions\PNM V2 comXpnm.nxf</i>	<i>Firmware\COMXM020C000.nxf</i>
<b>Header</b>	<i>Examples and API\0. Header\Firmware\PROFINET IO Controller V2</i>	<i>Examples and API\0. Header\Firmware\PROFINET Controller V3</i>
<b>Protocol API</b>	<i>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</i>	<i>Documentation\7. Programming Manuals\EN\3. Protocol API\PROFINET IO Controller V3\ PROFINET IO Controller V3 Protocol API 05 EN.pdf PROFINET IO Controller - Migrating from version 2 to 3 MG 01 EN.pdf</i>

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

### 1.2.3.2 PROFINET IO-Device Firmware Versions 3.4 and 3.10

The PROFINET IO Device firmware was revised and completed and is available in version 3.10 since the first quarter 2017.

Use the PROFINET IO Device firmware in version 3.10 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 3.10, note the following guidelines:

1. Customize your application program according to the Migration Guide **PROFINET IO Device, Migration from V3.4 to V3.7**.



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If you want to change to V3.10, please check in the Migration Guide **PROFINET IO Device, Migration from V3.4 to V3.7** which changes are necessary in the application program in order to use version 3.10.

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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-V2.32-HILSCHER-COMX 50XX-REFO PNS-xxxxxxx.xml*,
  - *GSDML-V2.32-HILSCHER-COMX 51XX-RE PNS-xxxxxxx.xml* or
  - *GSDML-V2.32-HILSCHER-COMX 100XX-RE PNS-xxxxxxx.xml*
3. Update the PROFINET IO Device firmware in your device to version 3.10.

Note also:

- SYCON.net V1.400 can configure the PROFINET IO Device firmware V3.4 as well as V3.10
- netX Configuration Tool V1.0900 can configure the PROFINET IO Device firmware V3.4 as well as V3.10.
- The development of the PROFINET IO Device firmware V3.4 will not be continued, but this firmware version will be delivered furthermore.

On the Communication Solutions DVD, software and manuals relating to both firmware versions V3.4 and V3.10 are available:

	<b>PROFINET IO-Device V3.4</b> Directory on the DVD \ File:	<b>PROFINET IO-Device V3.10</b> Directory on the DVD \ File:
<b>Firmware</b>	<i>Firmware\COMX\Outdated versions\PNS V3.4\comxpns.nxf, cx50pns.nxf</i>	For comX 50: <i>Firmware\COMX\cx50pns.nxf</i>
		For comX 51: <i>Firmware\COMX\cx51pns.nxf</i>
		For comX 100: <i>Firmware\COMX\comxpns.nxf</i>
<b>Header</b>	<i>Examples and API\0. Header\Firmware\PROFINET IO Device V3.4</i>	<i>Examples and API\0. Header\Firmware\PROFINET IO Device V3.10</i>
<b>GSDML</b>	<i>EDS\PROFINET\V3.4.X\GSDML-V2.3-HILSCHER-COMX 50XX-REFO PNS-20130806.xml</i>	<i>EDS\PROFINET\Device\V3.10\GSDML-V2.32-HILSCHER-COMX 50XX-REFO PNS-xxxxxxx.xml</i>
	<i>EDS\PROFINET\V3.4.X\GSDML-V2.3-HILSCHER-COMX 100XX-RE PNS-20130806.xml</i>	<i>EDS\PROFINET\Device\V3.10\GSDML-V2.32-HILSCHER-COMX 51XX-RE PNS-xxxxxxx.xml</i>
	-	<i>EDS\PROFINET\Device\V3.10\GSDML-V2.32-HILSCHER-COMX 51XX-RE PNS-xxxxxxx.xml</i>
<b>Protocol API</b>	<i>Documentation\7. Programming Manuals\EN\3. Protocol API\PROFINET IO Device V3.4\PROFINET IO Device Protocol API 14 EN.pdf</i> <i>TCP IP - Packet Interface API 13 EN.pdf</i>	<i>Documentation\7. Programming Manuals\EN\3. Protocol API\PROFINET IO Device V3.10\PROFINET IO-Device V3.10 Protocol API 15 EN.pdf</i> <i>PROFINET IO Device - Migration from Version 3.4 to 3.7 MG 06 EN.pdf</i>

Table 9: PROFINET IO-Device Firmware Version 3.4 and 3.10

### 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.

On the Communication Solutions DVD, files and manuals referring to firmware V3 and V4, are available as follows:

	<b>EtherCAT Master V3</b> Directory on the DVD \ File:	<b>EtherCAT Master V4</b> Directory on the DVD \ File:
<b>Firmware</b>	<i>Firmware\COMX\Outdated versions\ECM V3\comxecm.nxf</i>	<i>Firmware\COMX\comxecm.nxf</i>
<b>Header</b>	<i>Examples and API\0. Header\Firmware\EtherCAT Master V3</i>	<i>Examples and API\0. Header\Firmware\EtherCAT Master V4</i>
<b>Protocol API</b>	<i>Documentation\7. Programming Manuals\EN\3. Protocol API\EtherCAT Master V3\EtherCAT Master V3 Protocol API 05 EN.pdf</i>	<i>Documentation\7. Programming Manuals\EN\3. Protocol API\EtherCAT Master V4\EtherCAT Master V4 Protocol API 05 EN.pdf</i>

Table 10: EtherCAT Master Firmware V3 and V4 on the Product DVD

#### 1.2.3.4 EtherCAT Slave Firmware Versions 2.5 and 4.6

The EtherCAT Slave firmware was revised and completed and is available in version 4.6 since the first quarter 2017.

Use the EtherCAT Slave firmware in version 4.6 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 4.6, 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 V4.6, 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 4.6.

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 4.6.

Note also:

- SYCON.net V1.400 can configure the EtherCAT Slave firmware V2.5 as well as V4.6 and higher.
- netX Configuration Tool V1.900 can configure the EtherCAT Slave firmware V2.5 as well as V4.6.
- The development of the EtherCAT Slave firmware V2.5 will not be continued, but this firmware version will be delivered furthermore.

On the Communication Solutions DVD, software and manuals relating to both firmware versions V2.5 and V4.6 are available:

	<b>EtherCAT-Slave V2.5</b> Directory on the DVD \ File:	<b>EtherCAT-Slave V4.6</b> Directory on the DVD \ File:
<b>Firmware</b>	<i>Firmware\COMX\Outdated versions\ ECS V2\comxecs.nxf</i>	For COMX 100XX-RE: <i>Firmware\COMX\comxecs.nxf</i>  For COMX 51XX-RE: <i>Firmware\COMX\M060F000.nxf</i>
<b>Header</b>	<i>Examples and API\0. Header\Firmware\EtherCAT Slave V2</i>	<i>Examples and API\0. Header\Firmware\EtherCAT Slave V4</i>
<b>XML</b>	<i>EDS\EtherCAT\Slave\V2\ Hilscher COMX 100XX RE ECS V2.2.X.xml</i>	For COMX 100XX-RE: <i>EDS\EtherCAT\Slave\V4\ Hilscher COMX 100XX RE ECS V4.6.X.xml</i>  For COMX 51XX-RE: <i>EDS\EtherCAT\Slave\V4\ Hilscher COMX 51XX RE ECS V4.6.X.xml</i>
<b>Protocol API</b>	<i>Documentation\7. Programming Manuals\EN\3. Protocol API\EtherCAT Slave V2\ EtherCAT Slave Protocol API 21 EN.pdf</i>	<i>Documentation\7. Programming Manuals\EN\3. Protocol API\EtherCAT Slave V4\ EtherCAT Slave V4 Protocol API 08 EN.pdf</i>  <i>EtherCAT Slave - Migration from Version 2.5 to 4.2 MG 02 EN.pdf</i>  <i>Object Dictionary V3 03 API EN.pdf</i>

Table 11: EtherCAT-Slave Firmware Version 2.5 and 4.6 (Firmware, Header, XML and API)

### 1.2.3.5 EtherCAT Slave Firmware Version 4.6

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 saves the 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.

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 netX51/52 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 V1.400 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.*
4. Update the POWERLINK Controlled Node firmware in your device to V3.



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

	<b>POWERLINK Controlled Node V2</b> Directory on the DVD \ File:	<b>POWERLINK Controlled Node V3</b> Directory on the DVD \ File:
<b>Firmware</b>	-	<i>Firmware\COMXW060K000.nxf (for COMX 51XX-RE)</i>
<b>Header</b>	-	<i>Examples and API\0. Header\Firmware\POWERLINK Controlled Node</i>
<b>XDD</b>	-	<i>EDS\POWERLINK\Slave\00000044_COMX 51XX RE PLS.xdd</i>
<b>Protocol API</b>	<i>Documentation\7. Programming Manuals\EN\3. Protocol API\POWERLINK Controlled Node V2\Powerlink Controlled Node Protocol API 12 EN.pdf</i>	<i>Documentation\7. Programming Manuals\EN\3. Protocol API\POWERLINK Controlled Node V3\Powerlink Controlled Node Protocol V3 API 03 EN.pdf</i>

Table 12: POWERLINK Controlled Node Firmware V2 and V3 on the Product DVD

## 1.3 Ensuring Access Security

The firmware of the protocols

- EtherNet/IP Scanner
- EtherNet/IP Adapter
- Open Modbus/TCP
- PROFINET IO Device
- Sercos Slave

include an integrated web server. The access to the device by the integrated web server via Internet and Intranet brings with it the danger of misuse. You should therefore always protect the access to the device with passwords. Beyond this also restrict access to your network with suitable security mechanisms.



**Important:** In any case change the default password, otherwise you allow everyone the right to execute functions without authorization.

To protect the device from unauthorized access, you can restrict access to authorized users. How you set up an own user authentication is described in manual "Application Note, Functions of the Integrated WebServer" in chapter User Authentication.

## 1.4 Legal Notes

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- 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

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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.

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## 1.6 EtherCAT Disclaimer

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.



To get details and restrictions regarding using the EtherCAT technology refer to the following documents:

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

These documents are available at the ETG homepage [www.ethercat.org](http://www.ethercat.org) or directly over [info@ethercat.org](mailto:info@ethercat.org).

## 1.7 Licenses

If a comX Communication Module is used as a Slave, neither for the firmware nor for the configuration software SYCON.net a license is required.

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.

## 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 Communication Modules described in this user manual 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.

- EtherCAT Master with COMX 100CA-RE/COMX 100CN-RE
- EtherCAT Slave with COMX 100CA-RE/COMX 100CN-RE/COMX 51CA-RE/COMX 51CN-RE
- EtherNet/IP Scanner (Master) with COMX 100CA-RE/COMX 100CN-RE
- EtherNet/IP Adapter (Slave) with COMX 100CA-RE/COMX 100CN-RE/COMX 51CA-RE/COMX 51CN-RE
- Open Modbus/TCP (Server) with COMX 100CA-RE/COMX 100CN-RE/COMX 51CA-RE/COMX 51CN-RE
- Powerlink Controlled Node/Slave with COMX 100CA-RE/COMX 100CN-RE
- PROFINET IO-RT-Controller (Master) with COMX 100CA-RE/COMX 100CN-RE
- PROFINET IO-RT-IRT-Device (Slave) with COMX 100CA-RE/COMX 100CN-RE/COMX 50CA-REFO/COMX 51CA-RE/COMX 51CN-RE
- Sercos-Master with COMX 100CA-RE/COMX 100CN-RE
- Sercos-Slave with COMX 100CA-RE/COMX 100CN-RE/COMX 51CA-RE/COMX 51CN-RE
- VARAN Client (Slave) with COMX 100CA-RE/COMX 100CN-RE
- CANopen Master with COMX 100CA-CO/COMX 100CN-CO
- CANopen Slave with COMX 100CA-CO/COMX 100CN-CO/COMX 10CA-CO/COMX 10CN-CO
- CC-Link Slave with COMX 10CA-CCS/COMX 10CN-CCS
- DeviceNet Master with COMX 100CA-DN/COMX 100CN-DN
- DeviceNet Slave with COMX 100CA-DN/COMX 100CN-DN/COMX 10CA-DN/COMX 10CN-DN
- PROFIBUS DP Master with COMX 100CA-DP/COMX 100CN-DP

- PROFIBUS DP Slave with COMX 100CA-DP/COMX 100CN-DP/COMX 10CA-DP/COMX 10CN-DP
- PROFIBUS MPI with COMX 100CA-DP/COMX 100CN-DP

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 by qualified personnel. 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



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### 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 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  $3.3\text{ V} \pm 5\%$  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 15: Supply Voltage and Signaling Voltage for comX Communication Modules* beginning on page 42. 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. They are highlighted with a specific safety symbol and a signal word according to the degree of endangerment. Inside the safety message the danger is exactly named.
- The **Integrated Safety Messages** within an instruction description are highlighted with a signal word according to the degree of endangerment and possibly by a principle symbol. Inside the safety message the danger is exactly named.






Safety Symbol	USA	Sort of Warning or Principle
		Warning of Personal Injury and Property Damage Message <b>USA:</b> Warning of Personal Injury As in the scope of the ANSI Z535 Standard (for USA) instructions to a property damage message may not contain a warning triangle, this property damage messages are listed separately for the USA.
		Warning of Lethal Electrical Shock
		Warning of Damages by Electrostatic Discharge
		Principle: Disconnect the Power Plug

Table 13: Safety Symbols and Sort of Warning or Principle





Signal Word	Meaning	Meaning (USA)
	Indicates a direct hazard with high risk, which will have as consequence death or grievous bodily harm if it isn't avoided.	Indicates a Hazardous Situation Which if not Avoided, will Result in Death or Serious Injury.
	Indicates a possible hazard with medium risk, which will have as consequence death or (grievous) bodily harm if it isn't avoided.	Indicates a Hazardous Situation Which if not Avoided, could Result in Death or Serious Injury.
	Indicates a minor hazard with medium risk, which could have as consequence simple battery if it isn't avoided.	Indicates a Hazardous Situation Which if not Avoided, may Result in Minor or Moderate Injury.
	Indicates a Property Damage Message.	Indicates a Property Damage Message.
<b>Note</b>	Indicates an important note in the manual.	Indicates an Important Note in the Manual.

Table 14: Signal Words

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 standard, refer to reference safety [S1].

### 2.7.1 References Safety

- [S1] ANSI Z535.6-2006 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 Descriptions and Requirements

### 3.1 Description

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

comX communication modules provide I/O data to the host in a dual-port memory.

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

*Table 3: Reference to Firmware* on page 13 explains for any comX communication module which protocols are applicable.

#### 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 onto the process data within the Dual-Port Memory
- SYCON.net (based on FDT/DTM standard) available as configurator
- comX 10: Address and baudrate switches
- comX 50 CA-REFO:  
Fiber optic interface according to AIDA
- If used as embedded system, SYCON.net can be used if at least one of the interfaces USB and UART is connected to outside of the system.
- For all other cases, a PC adapter card is available for firmware update, configuration and diagnosis, see chapter 8 "*Evaluation Board COMXEB*" on page 93 and section "*Updating the Firmware*" on page 152.

### 3.1.1 Block Diagrams

In the following, the block diagram for the Real-Time Ethernet module COMX 100CA-RE is depicted:

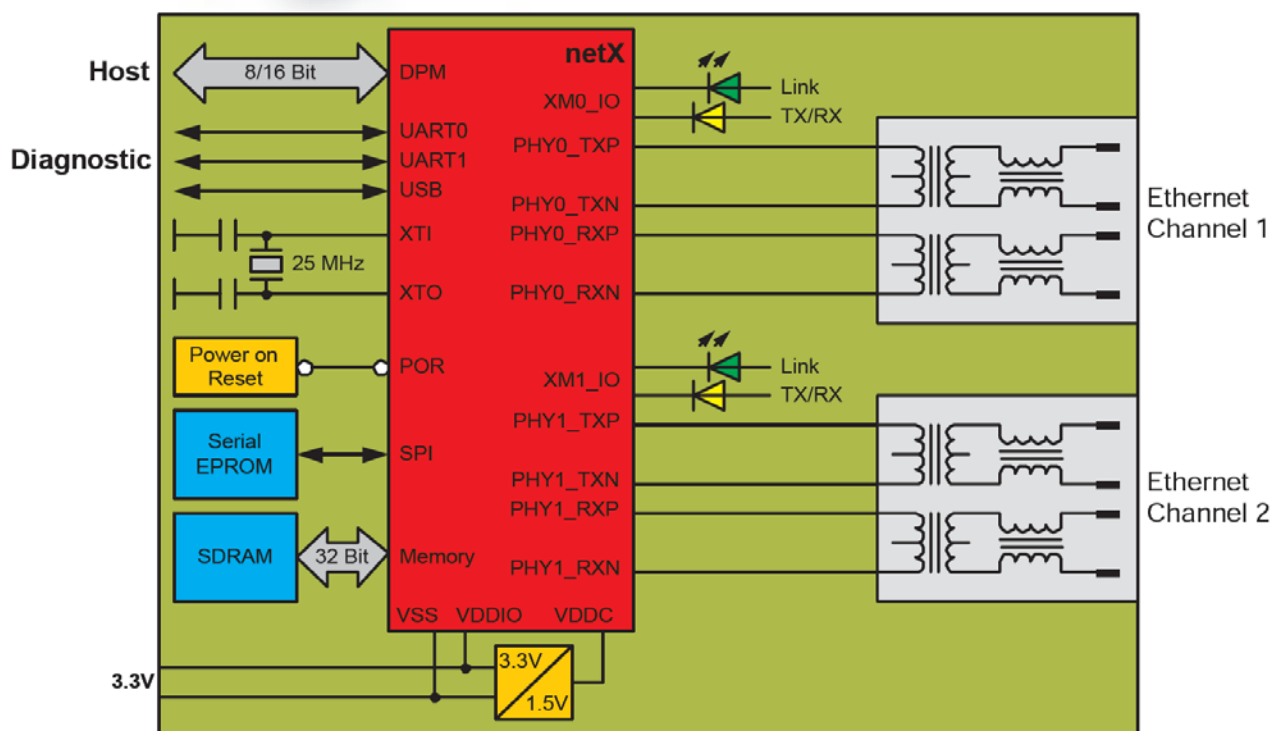


Figure 1: Block Diagram of Real-Time Ethernet Module

Here the corresponding block diagram for the comX Fieldbus Modules:

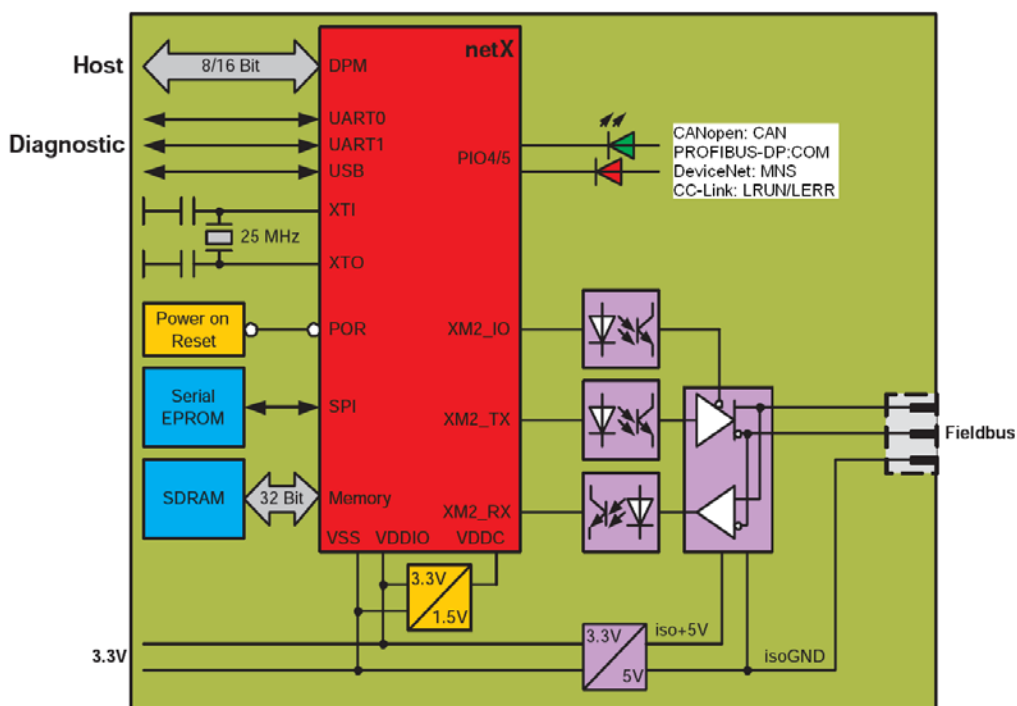


Figure 2: Block Diagram of a Fieldbus Module

### 3.1.2 System Requirements

For a sensible 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, for instance type SAMTEC TFM - 125 - 02 - S - D – A or TFC - 125 - 02 - F - D – A, see [www.samtec.com](http://www.samtec.com))
2. Electrical connection: Pin assignment as described in section Connector X1 in the comX Design Guide.
3. Communication via Dual-Port Memory. Access using the cifX Device Driver or based on a toolkit.
4. Power supply: Via pins in connector X1, see comX Design Guide. The applied supply voltage must always be in the range between  $3,3\text{ V} \pm 5\%$ .

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 topics 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  $3.3\text{ V} \pm 5\%$  must be connected.
3. The module must be loaded with the correct firmware for the communication system/ protocol to be applied on the module.
4. Please 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*").
5. The comX communication module must have been configured correctly,, for instance with the system configurator SYCON.net which is delivered with the comX modules (for more information, see SYCON.net documentation).
6. For the communication with the comX module, either the **cifX Device Driver** or the toolkit must have been installed correctly (at least V1.0.5.x).
7. In order to avoid thermal damage, the allowed temperature range needs to be obeyed. See specifications in section "*Technical Data of COMX Modules*" on page 170.



### 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. On the PC Microsoft Windows® must have been installed (Windows® XP Service Pack 3, Windows® Vista (32 bit), Windows® 7 Service Pack 1 (32 bit), Windows® 7 Service Pack 1 (64 bit) or Windows® 8 (32 oder 64 bit)).
2. The COMXEB must be provided with its power supply (Voltage +24V). This can be done using the power adaptor which is included in the scope of delivery via socket [X932](#) or usingt another power supply connected to the CombiCon connector [X930](#).
3. One of the diagnostic interfaces (USB: [X611](#)/ seriell: [X601](#)) of the evaluation board COMXEB must be connected to the PC, see section 8.3.5 "Diagnostic Interfaces" on page 115.
4. The comX communication module must be mounted correctly in the 50 pin SMT connector of the 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 the 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 (this happens on the COMXEB). Please 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, for instance with the system configurator SYCON.net which is delivered with the comX modules (this happens on the COMXEB ,for more information, see SYCON.net documentation).

### 3.2.3 Remarks on Storage Stability and Contact Reliability of Host-side Connector

For 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), the following applies concerning storage stability and long-term immunity against contact failure:

1. Hilscher only uses 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. In order 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 additionally can be heat-sealed.
  - Alternatively: Controlled storage at a temperature of max. 25°C and 50% relative humidity.

### 3.3 Supply Voltage and Signaling Voltage

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

comX	Supply Voltage	Signaling Voltage
All types	+3.3 V DC $\pm 5\%$	+3.3 V DC $\pm 5\%$

Table 15: Supply Voltage and Signaling 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

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

- PC with 1 GHz processor or higher
- Windows® XP SP3,  
Windows® Vista (32 bit) SP2,  
Windows® 7 (32 bit und 64-Bit) SP1,  
Windows® 8 (32-Bit und 64-Bit),  
Windows® 8.1 (32-Bit und 64-Bit),  
Windows® 10 (32-Bit und 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 another PC,

- the other PC must also comply to these system requirements,
- the device description files of the devices used in the project must be imported to the configuration software SYCON.net on the other PC,
- respectively the DTMs of the devices used in the project must be installed on the other PC.

## 3.5 Prerequisites for Certification

### 3.5.1 PROFINET-IO Certification for IRT and SYNC0 Signal

If you intend to develop a final product to be certified with the official PROFINET-IO certification for IRT, the host base board of your product must provide a SYNC0 signal (2pin connector including GND), for instance in order to allow to connect 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 system connector. The SYNC0 signal has LVTTTL level (3.3 V). A maximum load of 6 mA must not be exceeded.

You should keep the cable length for the sync signals below 50 mm and take into account EMC aspects.

## 4 Getting Started comX Communication Modules

### 4.1 Hardware Installation as Embedded System (Master and Slave)

The following table describes the steps on how to install a comX Communication Module (Master and Slave) as it is typical for many cases.

#	Step	Description	For detailed information see section	Page
1	<b>Preparation</b>	Take all necessary safety precautions for the installation of the comX:		
	Take safety precautions	<p>Carefully read the documentation of the device into which the comX is to be mounted. Especially, obey precisely to the safety rules demanded by the device's manufacturer</p> <p><u>In any case, take care of the following:</u></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;"><b>⚠ WARNING</b></p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p><b>Lethal Electrical Shock caused by parts with more than 50V!</b></p> <p>Disconnect the power plug of the connecting device.</p> <p>Make sure, that the power supply is off at the connecting device.</p> </div> </div> </div>	<i>Electrical Shock Hazard</i>	33
2	<b>Installation Hardware</b>		<i>Hardware Installation, Deinstallation and Replacement</i>	
	Open housing	Now open the housing of the host system if present.	<i>Installing the comX Communication Module in its Target Environment</i>	
	Install comX	<p>Plug in and mount the comX within the host system.</p> <p>If necessary, connect diagnostic connection cable from comX to Diagnosis PC (either via USB- or serial connection).</p>		
	Close housing	Close the housing of the host system if any is present.		
	Plug the connecting cable to the Master or Slave	<p>Plug in the connecting cable from the comX to the Master or Slave.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;"><b>! Important!</b></p> <p>When using Ethernet TCP/UDP-IP, EtherNet/IP or Modbus TCP exclusively use switches or 10/100 MBit/s dual speed hubs and ensure, that the network is operated at a speed of 100 MBit/s or in full duplex mode.</p> </div>	<i>Failure in 10 MBit/s Half Duplex Mode and Workaround</i>	223
		<div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;"><b>➔ Note!</b></p> <p>Use the RJ45 Connector only for LAN connections but not for telecommunication connections!</p> </div>	<i>Ethernet Interface of COMX 100CA-RE</i>	63


#	Step	Description	For detailed information see section	Page
		<p><u>When using PROFINET IO-Controller take care of the following:</u></p>  <p><b>Important hint for cabling!</b></p> <p>Only connect ports with different cross-over settings with each other. Otherwise no connection will be established between the devices. If the port settings of the comX PROFINET IO-Controller have not been set to AUTO, then port 0 will be set to uncrossed and port 1 to crossed.</p>	See according User Manual at <i>Documentation Overview comX</i>	17
	Plug target system to supply voltage	<p>Plug the target system to its supply voltage and switch it on.</p> <p>If a PC has been connected for diagnostic purposes, do the same for the PC.</p>		

Table 16: Steps for the Hardware Installation of a comX Communication Module (Master und Slave)

## 4.2 Configuration of the comX Communication Module (Slave)

The following table describes the steps on how to configure a comX Communication Module (Slave) as it is typical for many cases. The comX Communication Module (Slave) can be configured using the **cifX Test Application**. In many cases, the corresponding DTM in the configuration software **SYCON.net** can be used alternatively.

#	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.	<i>See separate manual "Software Installation and Documentation Overview"</i>	
2 (a)	<b>Download Firmware and Configuration</b>	<b>(a) with the cifX Test Application</b> The cifX Test Application is delivered and installed with the cifX Device Driver .	<i>Updating the Firmware using an Evaluation Board COMXEB and a PC</i>	154
2.1 (a)	<b>cifX Test Application Installation</b>	If not already happened in Step 1, install the <b>cifX Test Application</b> .		
2.2 (a)	Configuration steps comX (Slave)	In the <b>cifX Test Application</b> - select and download the firmware - adjust the device parameters for comX Communication Module (Slave)	<i>Updating the Firmware using an Evaluation Board COMXEB and a PC</i>	154
2 (b)	<b>OR Download Firmware and Configuration, Diagnosis, I/O Data</b>	<b>(b) using SYCON.net</b> Possibly use the corresponding DTM in the configuration software <b>SYCON.net</b> .		
2.1 (b)	Installing SYCON.net	Run the SYCON.net-Setup and follow to the instructions of the installation wizard.	<i>See separate manual "Software Installation and Documentation Overview"</i>	
2.2 (b)	Firmware Download	- Start configuration software <b>SYCON.net</b> , - Create new project /Open existing project, - Insert Slave into configuration, - Select driver and assign device. - Select and download the firmware.	<i>Update the Firmware with SYCON.net Also see corresponding user manual under Documentation Overview comX Device Names in SYCON.net</i>	159
2.3 (b)	Configuration comX (Slave)	- Configure the comX Communication Module (Slave)		17
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,)		51
2.5 (b)	Diagnosis	- Right click on device symbol. - Select context menu entry <b>Diagnosis</b> , - then select <b>Diagnosis &gt; General</b> or <b>Firmware Diagnosis</b> , - or select <b>Diagnosis &gt; Extended Diagnosis</b> .		

2.6 (b)	I/O Monitor	<ul style="list-style-type: none"><li>- Right click on device symbol.</li><li>- Select context menu entry <b>Diagnosis</b>,</li><li>- then <b>Tools &gt; IO Monitor</b>.</li><li>-Check the input or output data.</li></ul>		
------------	-------------	---	--	--

Table 17: Configuration Steps for the comX Communication Module (Slave)



**Important:** SYCON.net cannot be used for the configuration of the CC-Link Slave communication module COMX 50CA-CC.

## 4.3 Configuration of the comX Communication Module (Master)

The following table describes the steps on how to configure a comX Communication Module (Master) as it is typical for many cases. The comX Communication Module (Master) can be configured using 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	<b>Download Firmware and Configuration, Diagnosis, I/O Data</b>	<b>using SYCON.net</b> Possibly use the corresponding DTM in the configuration software <b>SYCON.net</b> . (Alternatively, for this purpose also the usage of the <b>cifX Test Application</b> is possible.)		
2.1	Installing SYCON.net	Run 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	<ul style="list-style-type: none"> <li>- Start configuration software <b>SYCON.net</b>,</li> <li>- Create new project /Open existing project,</li> <li>- Insert Master into configuration,</li> <li>- Select driver and assign device.</li> <li>- Select and download the firmware.</li> </ul>	Update the Firmware with SYCON.net Also see corresponding user manual under <i>Documentation Overview comX Device Names in SYCON.net</i>	159
2.3	Configuration comX (Master)	- Configure the comX (Master).		17
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)		51
2.5	Diagnostic	<ul style="list-style-type: none"> <li>- Right click on device symbol.</li> <li>- Select context menu entry <b>Diagnosis</b>,</li> <li>- then select <b>Diagnosis &gt; General, Firmware or Master Diagnosis</b>,</li> <li>- or select <b>Diagnosis &gt; Extended Diagnosis</b>.</li> </ul>		
2.6	I/O Monitor	<ul style="list-style-type: none"> <li>- Right click on device symbol.</li> <li>- Select context menu entry <b>Diagnosis</b>,</li> <li>- then <b>Tools &gt; IO Monitor</b>.</li> <li>- Check the input or output data.</li> </ul>		

Table 18: Configuration Steps for the comX Communication Module (Master)



## 4.4 Notes for the Configuration of the Master Device

To configure the Master, a device description file is required. Please take into account the following notes during the configuration of the Master Device:

Real-Time Ethernet-System	Notes
<i>EtherCAT Slave</i>	<p>To configure the Master, an XML file (device description file) is required. The settings in the used Master must comply with the settings in the Slave to establish communication. Important parameters are: Vendor ID, Product Code, Serial Number, Revision Number, Output/Input Data Bytes</p> <p>If the XML file <code>Hilscher COMX RE ECS V2.2.X.xml</code> is use/updated, the firmware with the version <b>2.2.x</b> must be use/updated.</p> <p>The loadable firmware supports for the number of cyclic input data and for cyclic output data in total up to 400 bytes. If more than 200 bytes for input data or for output data should be exchanged via EtherCAT, then a customer specific XML file is necessary. Additionally the following formula applies: <math>(\text{number of input bytes} + 3)/4 + (\text{number of output bytes} + 3)/4</math> must be less or equal to 100.</p>
<i>EtherNet/IP-Adapter</i>	To configure the Scanner/Master, an EDS file (device description file) is required. The settings in the used Scanner/Master must comply with the settings in 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.
<i>Powerlink-Controlled-Node/Slave</i>	To configure the Managing Node/Master, an XDD file (device description file) is required. The settings in the used Managing Node/Master must comply with the settings in the Controlled Node/Slave, to establish communication. Important parameters are: Vendor ID, Product Code, Serial Number, Revision Number, Node ID, Output and Input length.
<i>PROFINET IO-Device</i>	<p>To configure the Controller, a GSDML file (device description file) is required. The settings in the used Controller must comply with the settings in the Device to establish communication. Important parameters are: Station Name, Vendor ID, Device ID, Input and Output Data Bytes.</p> <p>Under <b>Name of Station</b>, the name must be typed which was also used in the configuration file of the master of this device. If no name chosen freely is used in the configuration file, then the name from the GSDML file is used.</p>
<i>Sercos Slave</i>	<p>The Sercos Master uses the Sercos address to communicate with the slave. Some Masters verify Device ID, Vendor Code, Input Data Size and Output Data Size and do further communication to 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.</p> <p>The parameters Device ID, Vendor Code, Input Data Size and Output Data Size are part of the SDDML device description file. If for the configuration of the Sercos Master SDDML files are used and a default value of one of these parameters was changed, then a SDDML file must be created in the configuration software via Export SDDML and then used in the configuration of the SERCOS Master.</p>

Fieldbus-System	Notes
<i>PROFIBUS DP Slave</i>	To configure the Master, a GSD file (device description file) is required. The settings in the used Master must comply with the settings in the Slave to establish communication. Important parameters are: Station Address, Ident Number, Baudrate and Config Data (the configuration data for the output and input length).
<i>CANopen Slave</i>	To configure the Master, an EDS file (device description file) is required. The settings in the used Master must comply with the settings in the Slave to establish communication. Important parameters are: Node Address and Baudrate.
<i>DeviceNet Slave</i>	To configure the Master, an EDS file (device description file) is required. The settings in the used Master must comply with the settings in the Slave to establish communication. Important parameters are: MAC ID, Baudrate, Produced Size, Consumed Size, Vendor ID, Product Type, Product Code, Major Rev, Minor Rev.
<i>CC-Link Slave</i>	To configure the Master, a CSP file (device description file) is required. The settings in the used Master must comply with the settings in the Slave to establish communication. Important parameters are: Slave Station Address, Baudrate, Station Type and Vendor Code.

Table 19: Notes for the Configuration of the Master Device



Further information to the device description files can be found under section *Device Description Files* on page 15.

## 4.5 Device Names in SYCON.net

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

The table shows the card type of the comX Communication Interface and which protocol can be used. Furthermore, the table shows, for which protocol which device must be selected from the device catalog to configure the comX Communication Module with SYCON.net.

comX (Module Type)	Protocol	DTM Specific Group	Device Name in SYCON.net
Real-time Ethernet	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	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
	PROFINET IO-RT-Device	Gateway/Stand-Alone Slave	COMX 51XX-RE/PNS
	Sercos-Slave	Gateway/Stand-Alone Slave	COMX 51XX-RE/S3S
	PROFINET IO-RT-Device	Gateway/Stand-Alone Slave	COMX 50XX-REFO/PNS
CANopen	CANopen Master	Master	COMX 100XX-CO/COM
	CANopen Slave	Gateway/Stand-Alone Slave	COMX 100XX-CO/COS COMX 10XX-COS/COS
DeviceNet	DeviceNet Master	Master	COMX 100XX-DN/DNM
	DeviceNet Slave	Gateway/Stand-Alone Slave	COMX 100XX-DN/DNS COMX 10XX-DNS/DNS
PROFIBUS-DP	PROFIBUS DP Master	Master	COMX 100XX-DP/DPM
	PROFIBUS DP Slave	Gateway/Stand-Alone Slave	COMX 100XX-DP/DPS

			COMX 10XX-DPS/DPS
CC-Link	CC-Link Slave	Gateway/Stand-Alone Slave	COMX 10XX-CCS/CCS
XX means CA or CN			

*Table 20: Device Names in SYCON.net by Communication Protocol*

## 4.6 Exchange of comX Communication modules (Master and Slave)

### 4.6.1 Steps for Exchange of Hardware

In the following table the steps for the exchange (in the replacement case) of a comX communication module (Master oder Slave) are described, as they are typical for many cases of application.


#	Step	Description	For detailed information see section	Page
1	Hardware Installation	Deinstall comX communication module to be replaced. Take the required safety precautions.	<i>Decommissioning</i>	60
2	Take safety precautions	<p>Take all necessary safety precautions for the installation of the comX:</p> <p>Carefully read the documentation of the device into which the comX is to be mounted. Especially, obey precisely to the safety rules demanded by the device's manufacturer</p> <p><u>In any case, take care of the following:</u></p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p><b>⚠ WARNING</b></p> <p><b>Lethal Electrical Shock caused by parts with more than 50V!</b></p> <p>Disconnect the power plug of the connecting device.</p> <p>Make sure, that the power supply is off at the connecting device.</p> </div> </div>	<i>Electrical Shock Hazard</i>	33
3	Open housing	Now open the housing of the host system if present. Take care of the host system being not connected to its 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 pull the comX communication module to be exchanged carefully out of the connector(s).	<i>Decommissioning</i>	
6	Plug-in replacement comX	Now carefully plug the replacement comX communication module into the connector(s). Take care of good fitting and contact.		
7	Fix replacement comX	Fix the replacement comX at the front panel of the device using the 2 screws.		
8	Close housing	Close the housing of the host system if any is present.		60
9	Plug target system to supply voltage	Plug the target system to its supply voltage and switch it on.		

Table 21: Steps how to replace the comX Communication modules (Master and Slave)

## 4.6.2 Load Firmware & Configuration into Replacement Module comX (Slave)



**Note:** For comX communication module s 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 on how to download the firmware and the configuration of a comX communication module (Slave) exchange service (replacement case) as it is typical for many cases. The download can be performed for the Slave using the **cifX Test Application** or alternatively the configuration software **SYCON.net** can be used.

#	Step	Description	For detailed information see section	Page
1 (a)	<b>Download Firmware and Configuration</b>	<b>(a) With the cifX Test Application</b> The cifX Test Application is delivered and installed together with the cifX Device Driver.	<i>Updating the Firmware using an Evaluation Board COMXEB and a PC</i>	154
1.1 (a)	Configuration steps comX (Slave)	In the <b>cifX Test Application</b> - select and download the firmware - adjust the device parameters for comX communication module (Slave)	See above	
1 (b)	<b>OR Download Firmware and Configuration</b>	<b>(b) using SYCON.net</b>		
1.1 (b)	Firmware Download	- Start configuration software <b>SYCON.net</b> , - open existing project, - if so, select driver, - assign device. - Select and download the firmware.	<i>Update the Firmware with SYCON.net</i> See corresponding user manual under <i>Documentation and Device Names in SYCON.net</i>	159  17
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,)		51

Table 22: 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 on how to download the firmware and the configuration of a comX Communication Module (Master) exchange service (replacement case) as it is typical for many cases. The download can be performed for the Master using the configuration software **SYCON.net**

#	Step	Description	For detailed information see section	Page
1	<b>Download Firmware and Configuration</b>	<b>using SYCON.net</b>		
1.1	Firmware Download	<ul style="list-style-type: none"> <li>- Start configuration software <b>SYCON.net</b>,</li> <li>- open existing project,</li> <li>- if so, select driver,</li> <li>- assign device.</li> <li>- Select and download the firmware.</li> </ul>	<i>Update the Firmware with SYCON.net</i> See corresponding user manual under <i>Documentation</i>	159
1.2	Download Configuration	<ul style="list-style-type: none"> <li>- Download the configuration to the replacement comX (Master)*</li> </ul> (*EtherCAT-Master, EtherNet/IP-Scanner (Master), PROFINET IO-Controller (Master) , Sercos- Master, PROFIBUS DP-Master, CANopen-Master, DeviceNet-Master)		17

*Table 23: Steps Firmware and Configuration Download Steps comX Communication modules (Master) at Module Exchange (Replacement Case)*

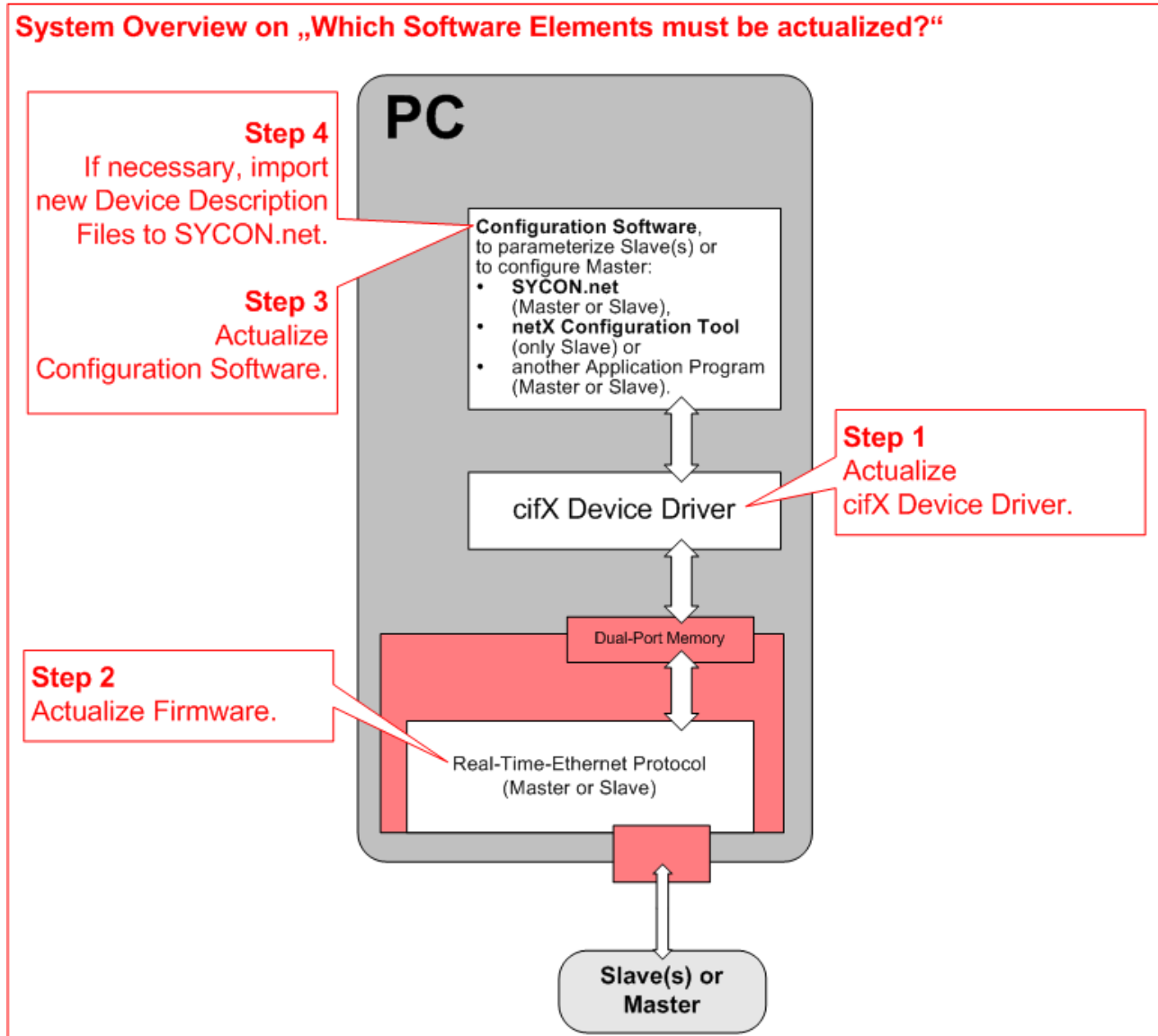
## 4.7 Updating the Firmware, Driver and Software



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

At existing hardware installation the firmware, the driver and the configuration software must be updated according to the versions given in section “*Reference to Hardware, Software and Firmware*” on page 11.

This is illustrated by the following graphic:



For detailed information about firmware update also see chapter *Updating the Firmware* on page 152.



## 5 Hardware Installation, Deinstallation and Replacement

### 5.1 Warning Messages on Personal Injury

Obey to the following safety advices, when installing, deinstalling or replacing the comX Communication Modules described in this manual.

#### 5.1.1 Electrical Shock Hazard



---

**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 provided by the device's manufacturer in the 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.
  - Strictly obey to all safety rules given in the documentation supplied by the manufacturers of this device.!
- 

### 5.2 Property Damage Messages

Obey to the following property damage messages, when installing, deinstalling or replacing the comX Communication Module.

#### 5.2.1 Device Destruction by exceeding allowed Supply Voltage

Adhere for all comX Communication Modules described in this manual the instruction hereafter:



---

**NOTICE****Device Destruction!**

- Use only the mandatory supply voltage to operate the comX Communication Module.
  - Operating the comX with a supply voltage above of the specified range leads to device destruction.
- 

USA:

---

**NOTICE****Device Destruction!**

- Use only the mandatory supply voltage to operate the comX Communication Module.
  - Operating the comX with a supply voltage above of the specified range leads to device destruction.
-

### 5.2.2 Device Destruction by exceeding allowed Signaling Voltage

Adhere for all comX Communication Modules described in this manual the instruction hereafter:



#### NOTICE

##### Device Destruction!

- All I/O signal pins at the comX Communication Module tolerate only a specified signaling voltage!
- Operation the comX with a signaling voltage other than the specified signaling voltage may lead to severe damage to the comX Communication Module!

USA:

#### NOTICE

##### Device Destruction!

- All I/O signal pins at the comX Communication Module tolerate only a specified signaling voltage!
- Operation the comX with a signaling voltage other than the specified signaling voltage may lead to severe damage to the comX Communication Module!

For detailed information on the supply and signaling voltage of the comX Communication Modules described in this manual, refer to section “*Supply Voltage and Signaling Voltage*” on page 41.

### 5.2.3 Electro-statically sensitive Devices

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



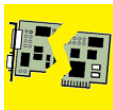
#### NOTICE

##### Electro-statically 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 discharged when you install/ deinstall the comX Communication Module.

## 5.2.4 Drop of supply voltage during write and delete accesses 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

For the installation of the comX communication module into the device into which the comX module is to be integrated (also denominated as “host system” or “target environment”), proceed as follows:

### WARNING

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

### NOTICE

- Adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge described in section 5.2.3 “Electro-statically sensitive Devices” on page 58
- **Step 1:** If necessary, remove the housing of this device. In all cases, strictly adhere to the manuals of this device.
- **Step 2:** Definitely avoid touching open contacts or ends of wires.
- **Step 3:** Plug in the comX communication module carefully but solidly in to 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 had opened the housing of the device in step 1, then close it now. Again strictly adhere to the manuals of this device anyway.
- **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 Ethernet- or Fieldbus (depending on the type of comX communication module).

## 5.4 Decommissioning

In order to avoid personal injury, material and environmental damage strictly obey the rules on putting the comX modules out of service and on disposal given in section “*Decommissioning, Replacement and Disposal*” on page 215.

## 6 Installing the Software

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

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

- 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

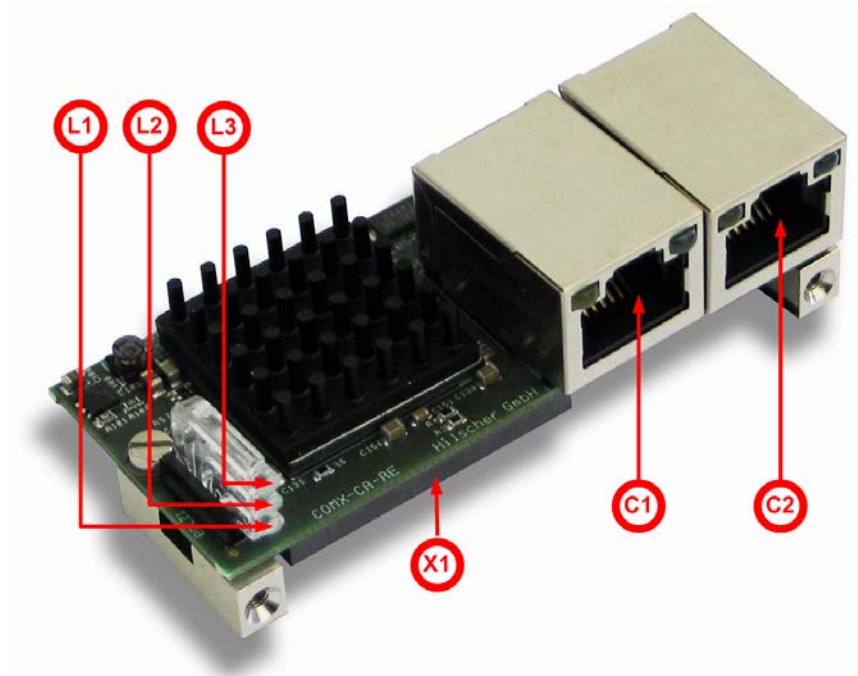


Figure 3: Photo of Communication Module COMX 100CA-RE with Cooler

#### 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

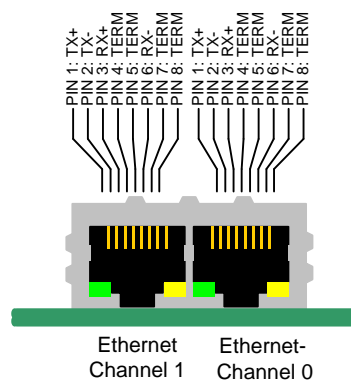


Figure 4: Pinning of Ethernet Interface of COMX 100CA-RE

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 24: Pinning of Ethernet Connector at Channel 0 and Channel 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

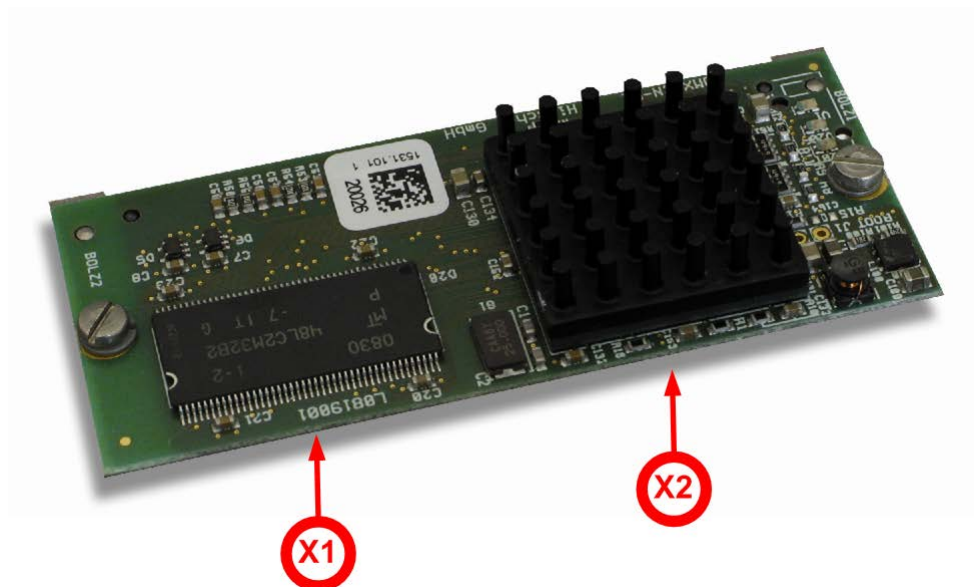


Figure 5: Photo of Communication Module COMX 100CN-RE



**Note:** Please take care of the following: 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)



System Interface



Ethernet Interface

### 7.2.2 Ethernet Interface of COMX 100CN-RE

The pin assignment of the Ethernet interface of the COMX 100CN-RE is described in the comX Design Guide within subsection 3.2.4.



## 7.3 Real-Time Ethernet Communication Module COMX 50CA-REFO with Fiber Optic

### 7.3.1 COMX 50CA-REFO

The COMX 50CA-REFO communication modules conform with the AIDA specifications.

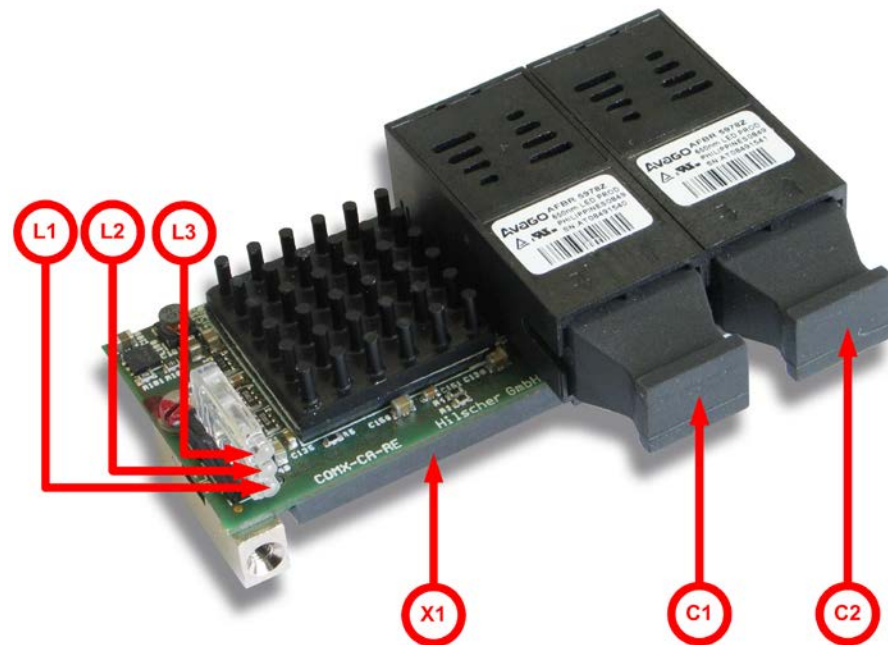


Figure 6: Photo COMX 50CA-REFO

#### 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

#### Optical Connectors of the COMX 50CA-REFO (connected to outside)

- C1** Ethernet Interface Channel 0 (Fiber Optic)
- C2** Ethernet Interface Channel 1 (Fiber Optic)

### **7.3.2 Optical Ethernet Interface of COMX 50CA-REFO**

The COMX 50CA-REFO has 2 optical Ethernet interfaces with Transceivers of type Avago QFBR-5978.

## 7.4 Real-Time Ethernet Communication Module COMX51CA-RE

### 7.4.1 COMX51CA-RE

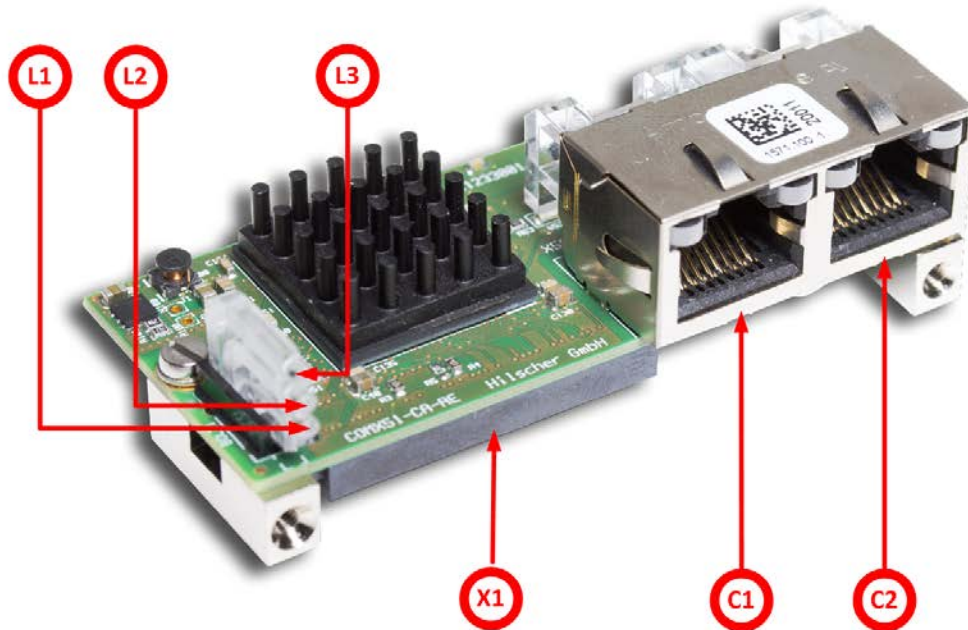


Figure 7: Photo of Communication Module COMX51CA-RE with Cooler

#### 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 outside)

- C1** Ethernet Interface Channel 0
- C2** Ethernet Interface Channel 1

## 7.4.2 Ethernet Interface of COMX51CA-RE

See section *Ethernet Interface of COMX 100CA-RE* on page 63.

## 7.5 Real-Time Ethernet Communication Module COMX 51CN-RE

### 7.5.1 COMX 51CN-RE

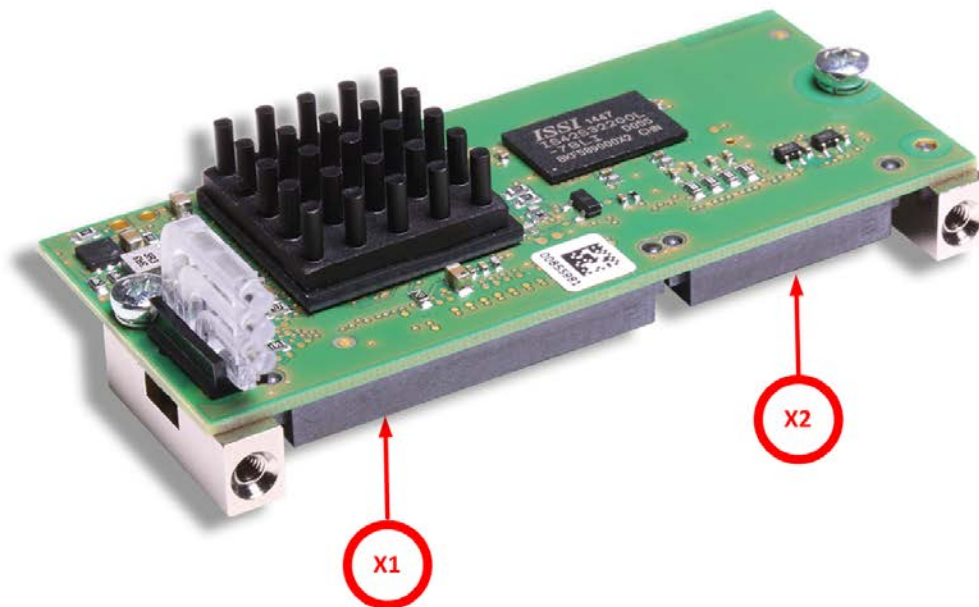




Figure 8: Photo of Communication Module COMX 51CN-RE

#### SMT-Connectors of the COMX51CN-RE (Connection to Host)

-  System Interface
-  Ethernet Interface

### 7.5.2 Ethernet Interface of COMX 51CN-RE

The pin assignment of the Ethernet interface of the COMX 51CN-RE is described in the comX Design Guide within subsection 3.2.4.

## 7.6 CANopen Communication Module COMX 100CA-CO

### 7.6.1 COMX 100CA-CO

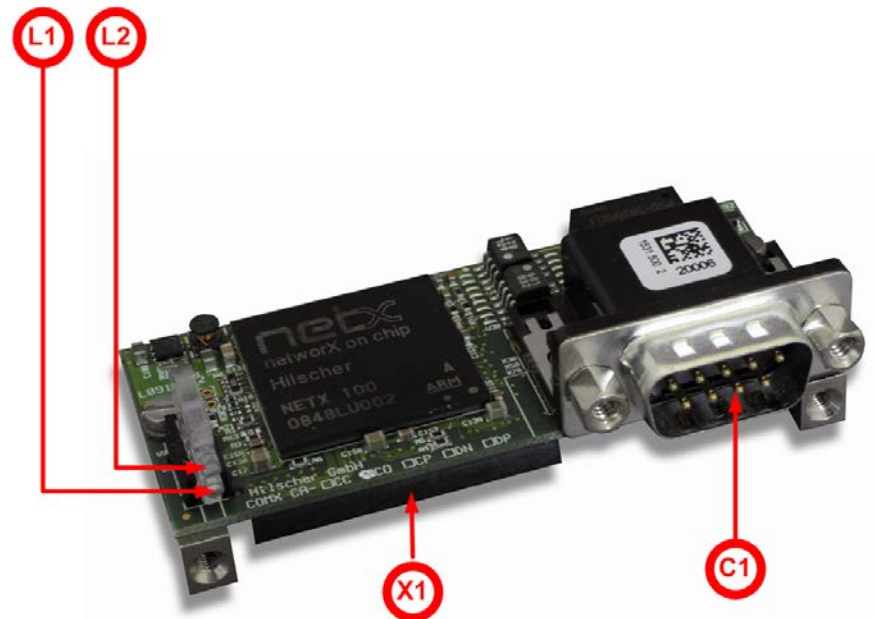


Figure 9: Photo of Communication Module COMX100 CA-CO

#### 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 outside)

- C1** CANopen Interface

## 7.6.2 CANopen Interface of COMX 100CA-CO

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

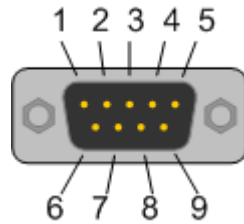


Figure 10: CANopen-Interface (D-Sub-plug, 9-pin) of the COMX 100CA-CO

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 11: Pinning of CANopen Interface of the COMX 100CA-CO

## 7.7 CANopen Communication Module COMX 100CN-CO

### 7.7.1 COMX 100CN-CO

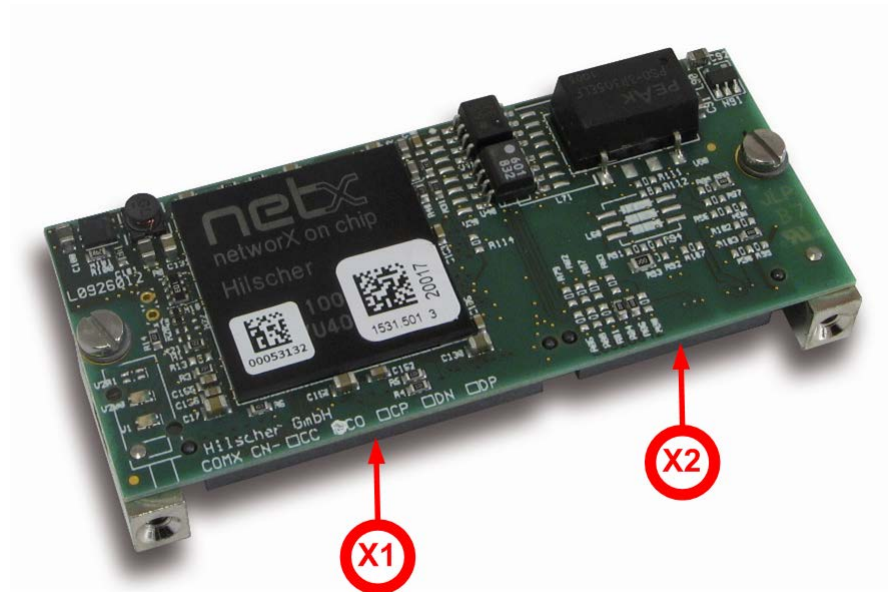




Figure 12: Photo of Communication Module COMX100 CN-CO

#### SMT-Connectors of the COMX 100CN-CO (Connection to Host)

-  System Interface
-  CANopen Interface

### 7.7.2 CANopen Interface of COMX 100CN-CO

The pin assignment of the CANopen interface of the COMX 100CN-CO is described in the comX Design Guide within subsection 3.2.1.



## 7.8 DeviceNet Communication Module COMX 100CA-DN

### 7.8.1 COMX 100CA- DN

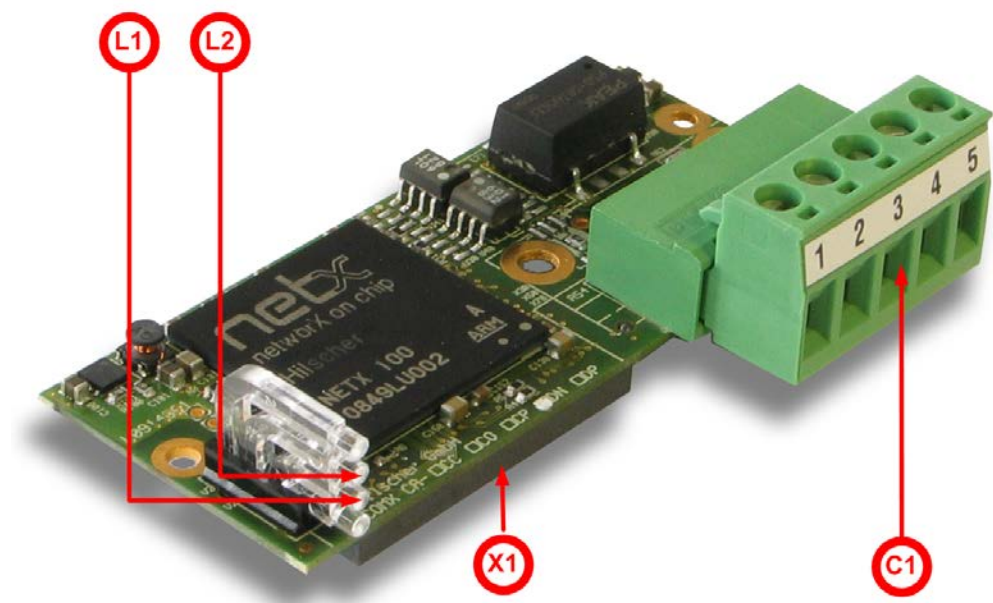


Figure 13: Photo of Communication Module COMX 100CA-DN



**Note:** Please take care of the following: 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 outside)

- C1** DeviceNet Interface

## 7.8.2 DeviceNet Interface of COMX 100CA-DN

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

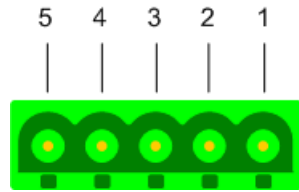


Figure 14: DeviceNet Interface (CombiCon-Plug, 5 pin) of the COMX 100CA-DN

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 25: Pinning of the DeviceNet-Interface of the COMX 100CA-DN

## 7.9 DeviceNet Communication Module COMX 100CN-DN

### 7.9.1 COMX 100CN-DN

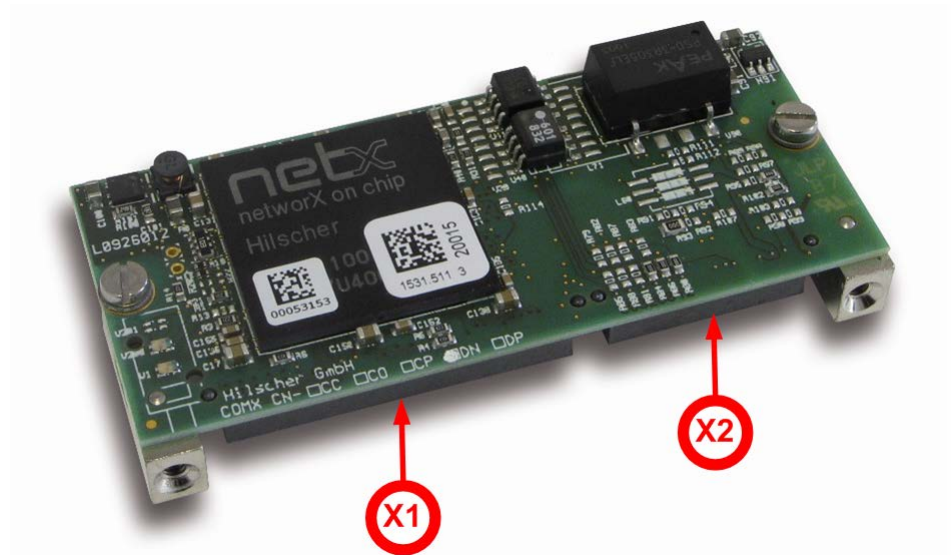


Figure 15: Photo of Communication Module COMX 100CN-DN

#### SMT-Connectors of the COMX 100CN-DN (Connection to Host)



System Interface



DeviceNet -Interface

### 7.9.2 DeviceNet Interface of COMX 100CN-DN

The pin assignment of the DeviceNet interface of the COMX 100CN-DN is described in the comX Design Guide within subsection 3.2.2.

## 7.10 PROFIBUS-DP Communication Module COMX 100CA-DP

### 7.10.1 COMX 100CA-DP

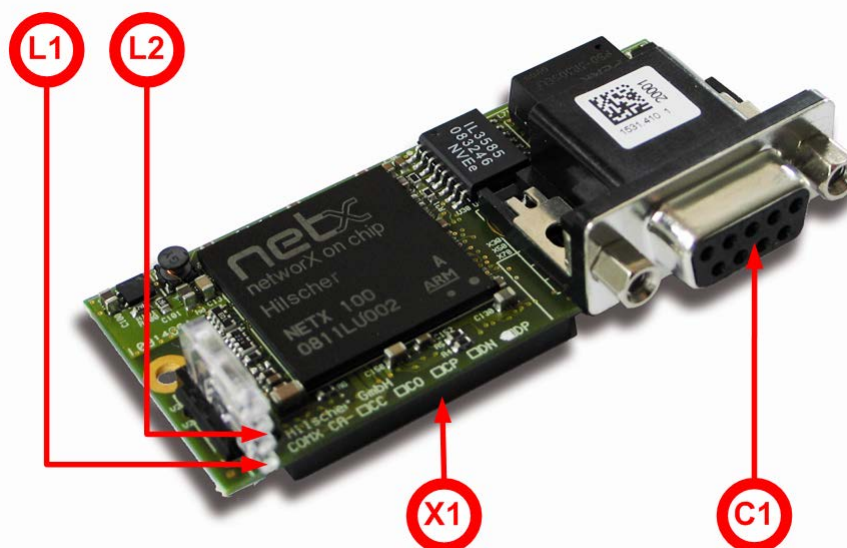


Figure 16: Photo of Communication Module COMX 100CA-DP



**Note:** Please take care of the following: 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 outside)

- C1** PROFIBUS-DP-Interface

### 7.10.2 PROFIBUS-DP Interface of COMX 100CA-DP

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

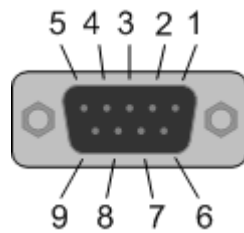


Figure 17: PROFIBUS-DP-Interface(D-Sub plug, female, 9 pin) of the COMX 100CA-DP

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 26: Pinning of the PROFIBUS-DP Interface of the COMX 100CA-DP

## 7.11 PROFIBUS-DP Communication Module COMX 100CN-DP

### 7.11.1 COMX 100CN-DP

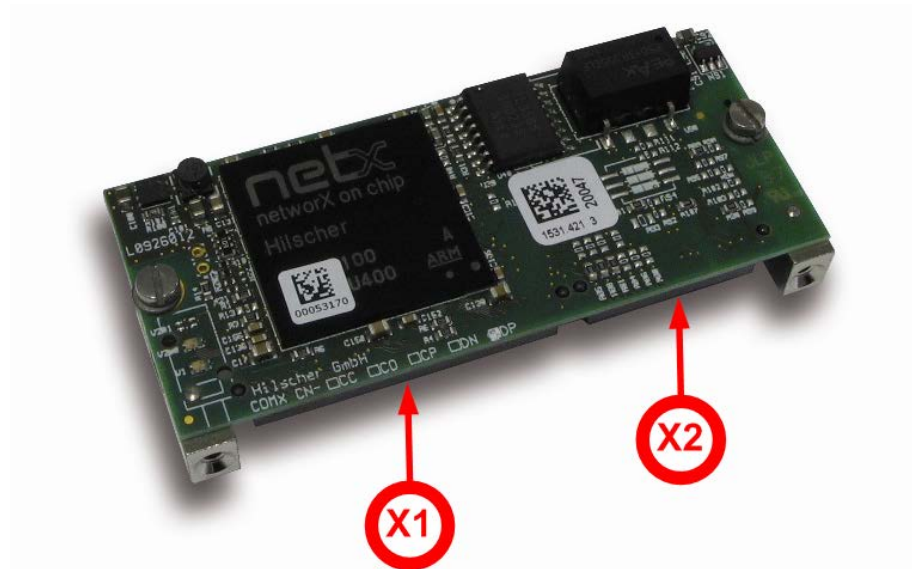


Figure 18: Photo of Communication Module COMX 100CN-DP

#### SMT-Connectors of the COMX 100CN-DP (Connection to Host)



System Interface



PROFIBUS-DP-Interface

### 7.11.2 PROFIBUS-DP Interface of COMX 100CN-DP

The pin assignment of the PROFIBUS-DP interface of the COMX 100CN-DP is described in the comX Design Guide within subsection 3.2.3.

## 7.12 CC-Link Communication Module COMX 10CA-CCS

### 7.12.1 COMX 10CA-CCS

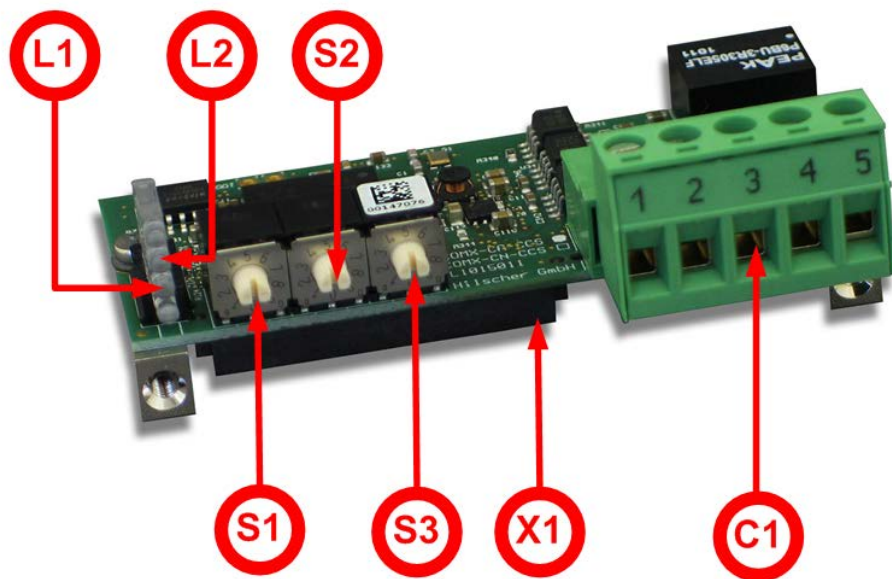


Figure 19: Photo of Communication Module COMX 10CA-CCS

#### LED Displays of COMX 10CA-CCS

- L1** SYS-LED
- L2** COM-LED

#### Address and Baudrate Switches of the COMX 10CA-CCS

- S1** Address Switch 1 for CC-Link Slave Address (x10)
- S2** Address Switch 2 for CC-Link Slave Address (x1)
- S3** Baudrate Switch

#### SMT-Connectors of the COMX 10CA-CCS (Connection to Host)

- X1** System Interface

#### Fieldbus connector of COMX 10CA-CCS (connected to outside)

- C1** CC-Link Interface

7.12.2 Description of the Address and Baudrate Switches

The address and baudrate switches of the COMX 10CA-CCS are described in the comX Design Guide.

7.12.3 CC-Link Interface of COMX 10CA-CCS

The following drawing shows the CC-Link interface (D-Sub-male connector, 9-pole) of the COMX 10CA-CCS:

Isolated RS-485 interface:

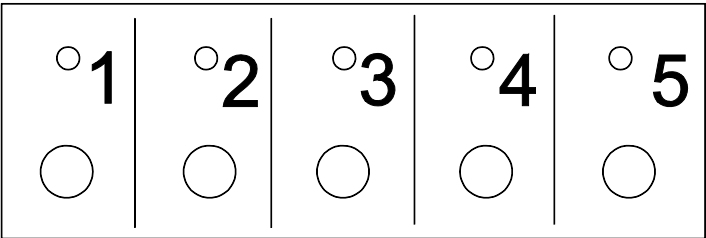


Figure 20: CC-Link Interface (Screw terminal connector, 5 pin)

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 27: CC-Link -Interface of COMX 10CA-CCS



## 7.13 CC-Link Communication Module COMX 10CN-CCS

### 7.13.1 COMX 10CN-CCS

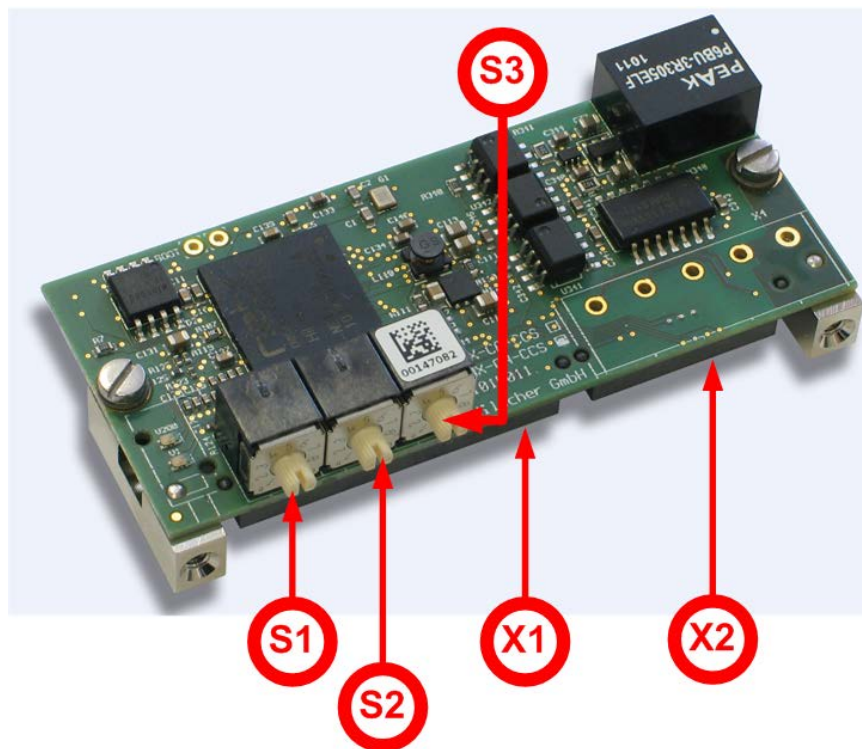


Figure 21: Photo of Communication Module COMX 10CN-CCS

#### SMT-Connectors of the COMX 10CN-CCS (Connection to Host)

- X1** System Interface
- X2** CC-Link Interface

#### Address and Baudrate Switches of the COMX 10CN-CCS

- S1** Address Switch 1 (Address x 10)
- S2** Address Switch 2 (Address x 1)
- S3** Baudrate Switch

### 7.13.2 Description of the Address and Baudrate Switches

The address and baudrate switches of the COMX 10CN-CCS are described in the comX Design Guide.

### 7.13.3 CC-Link Interface of COMX 10CN-CCS

The pin assignment of the CC-Link interface of the COMX 10CN-CCS is described in the comX Design Guide within subsection 3.2.1.

## 7.14 CANopen Communication Module COMX 10CA-COS

### 7.14.1 COMX 10CA-COS

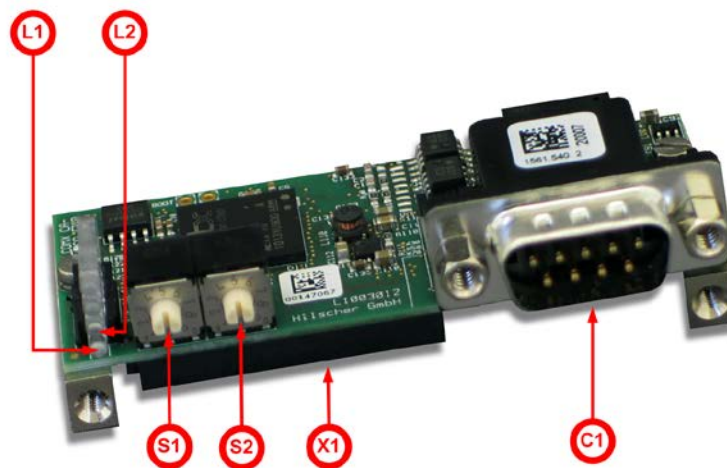


Figure 22: Photo of Communication Module COMX10 CA-COS

#### LED Displays of COMX 10CA-COS

- L1** SYS LED
- L2** COM LED

#### SMT-Connectors of the COMX 10CA-COS (Connection to Host)

- X1** System Interface

#### Fieldbus Connector of COMX 10CA-COS (connected to outside)

- C1** CANopen Interface

#### Address Switches of COMX 10CA-COS

- S1** Address Switch 1
- S2** Address Switch 2

### 7.14.2 Description of the Address Switches

The address and baudrate switches of the COMX 10CA-COS are described in the comX Design Guide.

### 7.14.3 CANopen Interface of COMX 10CA-COS

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

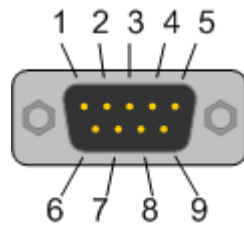


Figure 23: CANopen-Interface (D-Sub-plug, 9-pin) of the COMX 10CA-COS

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 24: Pinning of CANopen Interface of the COMX 10CA-COS

## 7.15 CANopen Communication Module COMX 10CN-COS

### 7.15.1 COMX 10CN-COS

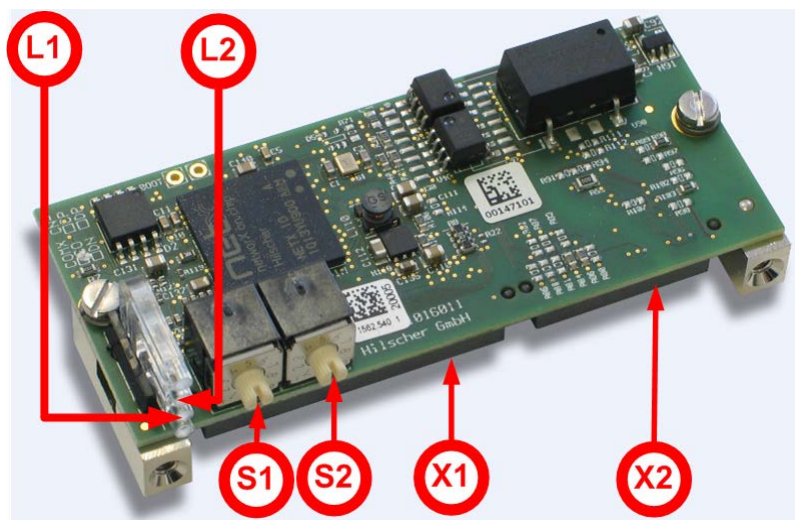


Figure 25: Photo of Communication Module COMX 10CN-COS

#### LED Displays of COMX 10CN-COS

- L1** SYS-LED
- L2** COM-LED

#### SMT-Connectors of the COMX 10CN-COS (Connection to Host)

- X1** System Interface
- X2** CANopen -Interface

#### Address Switches of COMX 10CN-COS

- S1** Address Switch 1
- S2** Address Switch 2

### 7.15.2 Description of the Address Switches

The address switches of the COMX 10CN-COS are described in the comX Design Guide.

### 7.15.3 CANopen Interface of COMX 10CN-COS

The pin assignment of the CANopen interface of the COMX 10CN-COS is described in the comX Design Guide within subsection 3.2.2.

## 7.16 DeviceNet Communication Module COMX 10CA-DNS

### 7.16.1 COMX 10CA-DNS

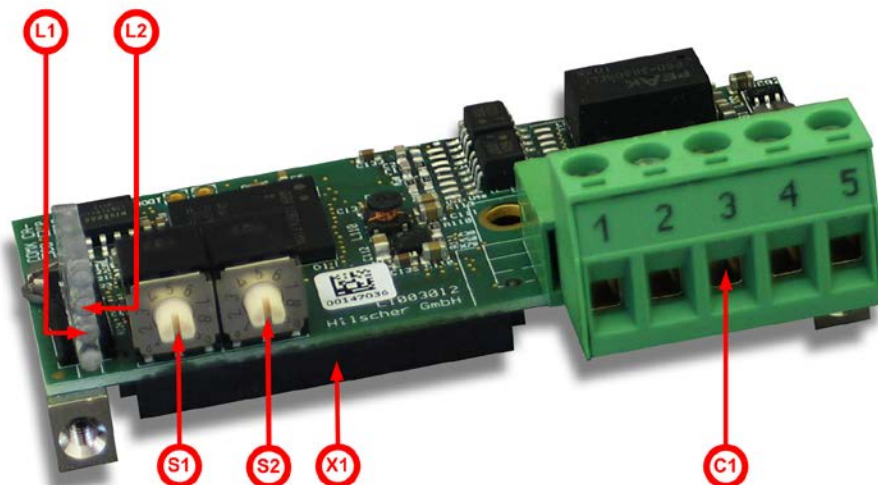


Figure 26: Photo of Communication Module COMX 10CA-DNS

#### LED Displays of COMX 10CA-DNS

- L1** SYS-LED
- L2** COM-LED

#### SMT-Connectors of the COMX 10CA-DNS (Connection to Host)

- X1** System Interface

#### Fieldbus connector COMX 10CA-DNS (connected to outside)

- C1** DeviceNet Interface

#### Address switches of COMX 10CA-DNS

- S1** Address Switch 1
- S2** Address Switch 2

### 7.16.2 Description of the Address Switches

The address switches of the COMX 10CA-DNS are described in the comX Design Guide.

7.16.3 DeviceNet Interface of COMX 10CA-DNS

The following figure shows the DeviceNet interface of the COMX 10CA-DNS (CombiCon plug, 5 pin):

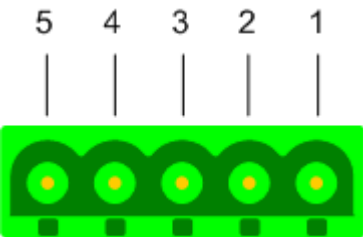


Figure 27: DeviceNet Interface (CombiCon- Pug, 5 pin) of the COMX 10CA-DNS

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 28: Pinning of the DeviceNet-Interface of the COMX 10CA-DNS

## 7.17 DeviceNet Communication Module COMX 10CN-DNS

### 7.17.1 COMX 10CN-DNS

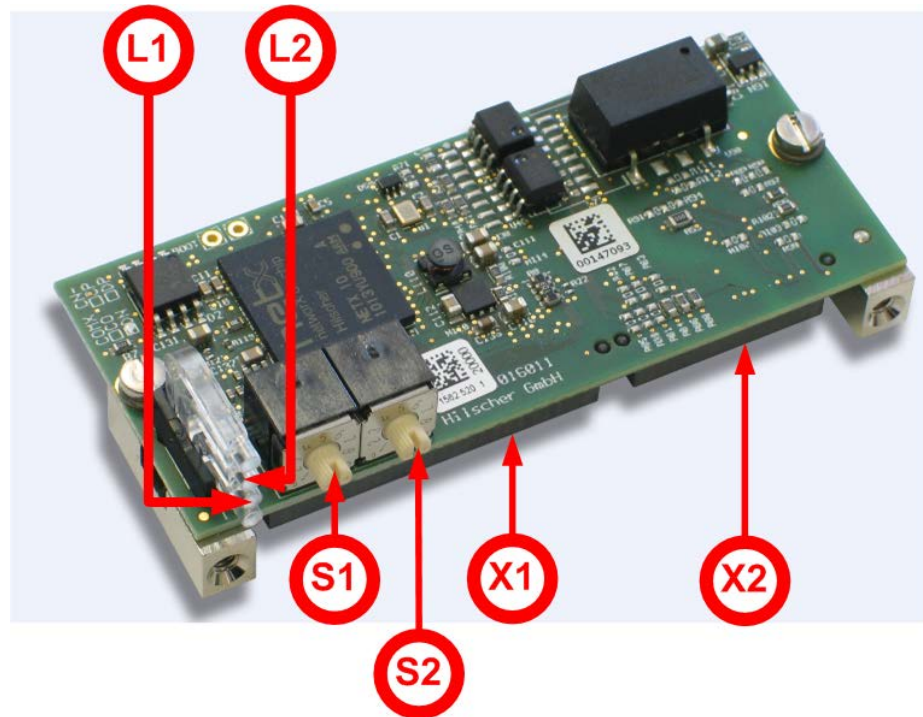


Figure 28: Photo of Communication Module COMX 10CN-DNS

#### LED Displays of COMX 10CN-DNS

- L1** SYS-LED
- L2** COM-LED

#### SMT-Connectors of the COMX 10CN-DNS (Connection to Host)

- X1** System Interface
- X2** DeviceNet Interface

#### Address Switches of COMX 10CN-DNS

- S1** Address switch 1
- S2** Address switch 2

## **7.17.2 Description of the Address Switches**

The address switches of the COMX 10 CN-DNS are described in the comX Design Guide.

## **7.17.3 DeviceNet Interface of COMX 10CN-DNS**

The pin assignment of the DeviceNet interface of the COMX 10CN-DNS is described in the comX Design Guide within subsection 3.2.3.



## 7.18 PROFIBUS-DP Communication Module COMX 10CA-DPS

### 7.18.1 COMX 10CA-DPS

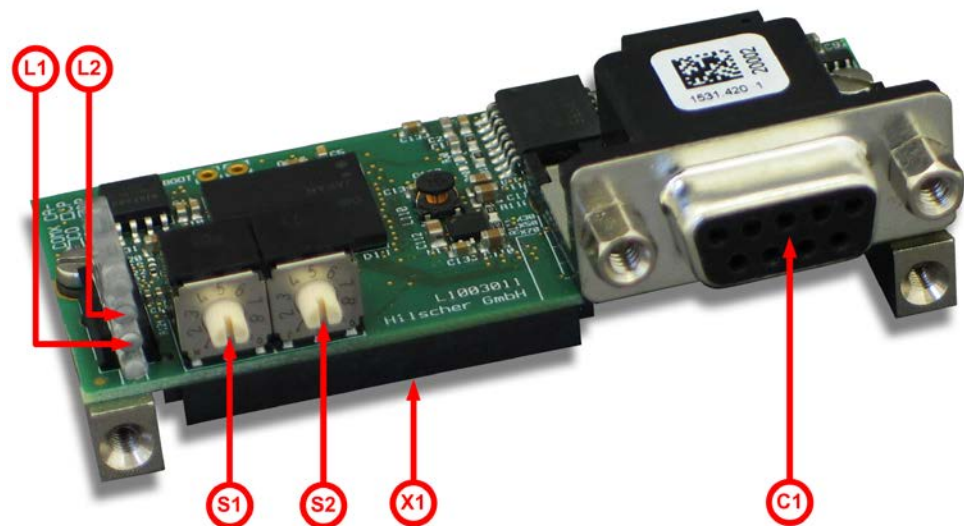


Figure 29: Photo of Communication Module COMX 10CA-DPS

#### LED Displays of COMX 10CA-DPS

- L1** SYS-LED
- L2** COM-LED

#### SMT-Connector of the COMX 10CA-DPS (Connection to Host)

- X1** System Interface

#### Fieldbus connector COMX 10CA-DPS (connected to outside)

- C1** PROFIBUS-DP-Interface

#### Address Switches of COMX 10CA-DPS

- S1** Address switch 1
- S2** Address switch 2

### 7.18.2 Description of the Address Switches

The address switches of the COMX 10 CA-DPS are described in the comX Design Guide.

### 7.18.3 PROFIBUS-DP Interface of COMX 10CA-DPS

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

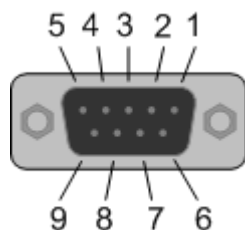


Figure 30: PROFIBUS-DP-Interface (D-Sub plug, female, 9 pin) of the COMX 10CA-DPS

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 29: Pinning of the PROFIBUS-DP Interface of the COMX 10CA-DPS

## 7.19 PROFIBUS-DP Communication Module COMX 10CN-DPS

### 7.19.1 COMX 10CN-DPS

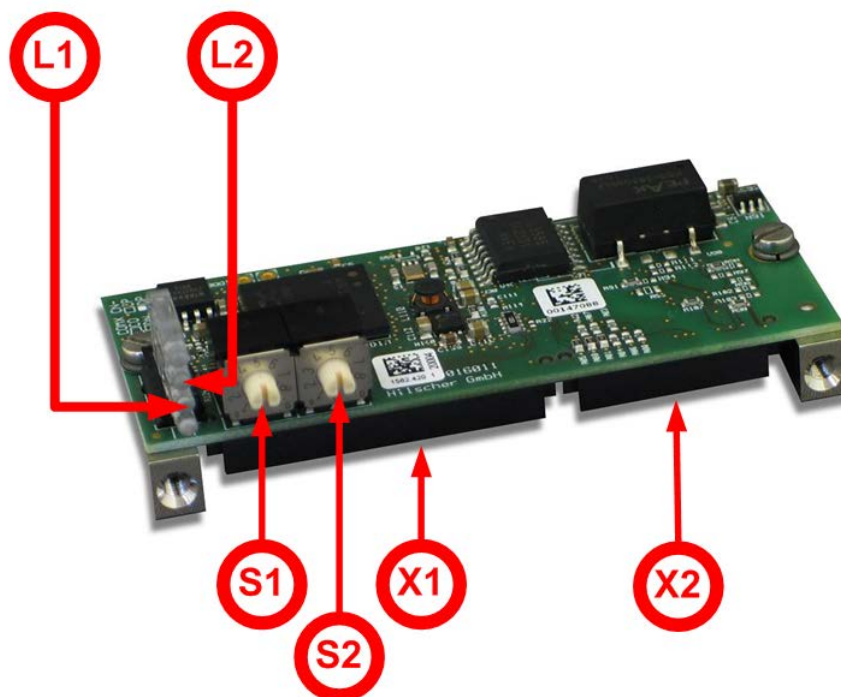


Figure 31: Photo of Communication Module COMX 10CN-DPS

#### LED Displays of COMX 10CN-DPS

- L1** SYS-LED
- L2** COM-LED

#### SMT-Connectors of the COMX 10CN-DPS (Connection to Host)

- X1** System Interface
- X2** PROFIBUS-DP-Interface

#### Address Switches of COMX 10CN-DPS

- S1** Address switch 1
- S2** Address switch 2

## **7.19.2 Description of the Address Switches**

The address switches of the COMX 10 CN-DPS are described in the comX Design Guide.

## **7.19.3 PROFIBUS-DP Interface of COMX 10CN-DPS**

The pin assignment of the PROFIBUS-DP interface of the COMX 10CN-DPS is described in the comX Design Guide within subsection 3.2.3.

## 8 Evaluation Board COMXEB

### 8.1 Purpose

The evaluation board COMXEB allows commissioning and testing of comX modules. Using the 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. You can also use the evaluation board with a mounted comX module in order to develop the application program on a PC and to test it via the host interface.

The evaluation board COMXEB provides all necessary controls, displays and interfaces, see *Figure 32* below. This chapter explains the basic function and describes these controls, displays and interfaces of the evaluation board COMXEB.

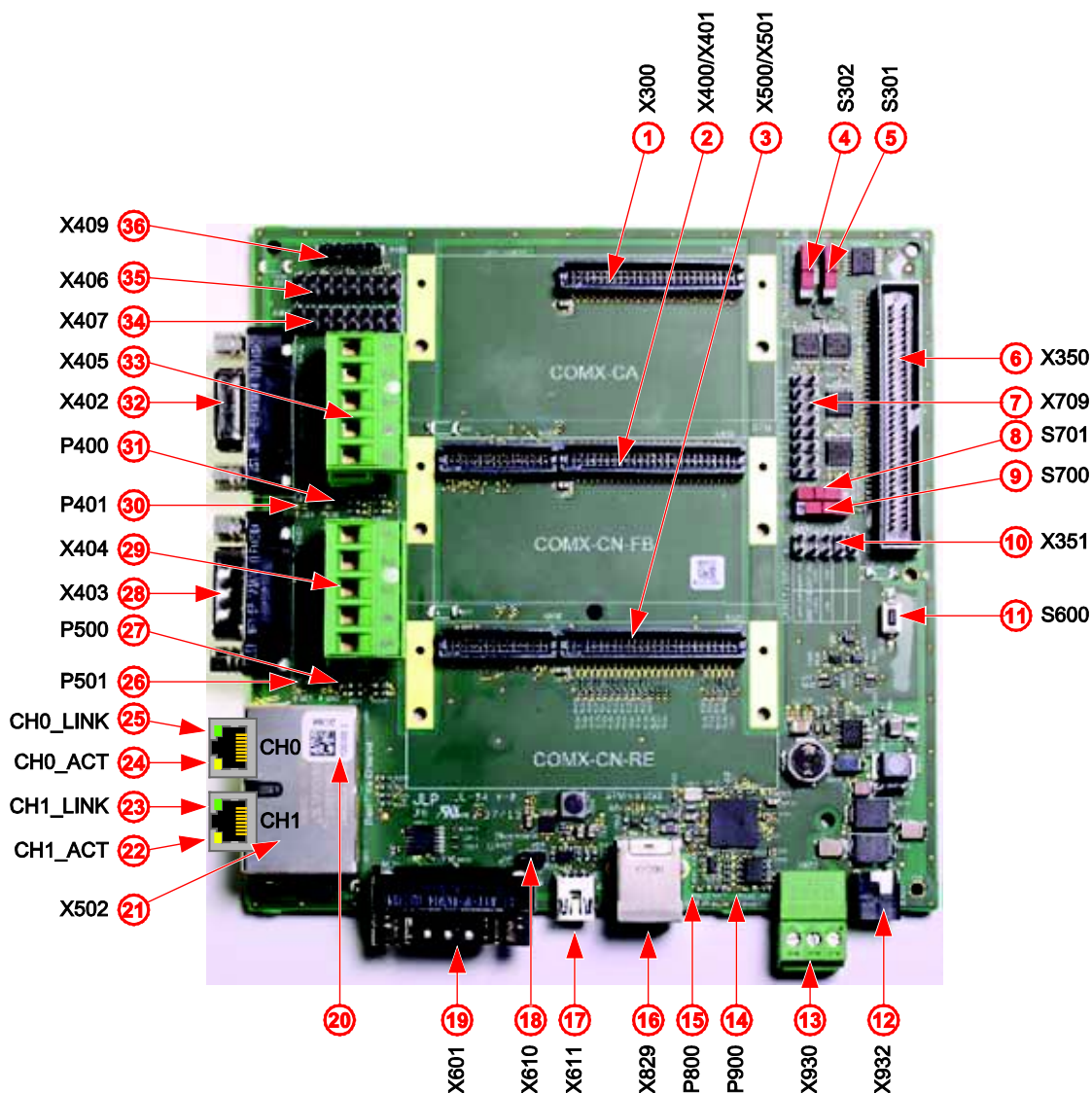


Figure 32: COMXEB

Figure 32 on page 93 shows a photo of the evaluation board COMXEB where all controls, displays and interfaces are marked with a number. The assignment of these numbers to the denominations and descriptions of these elements is given by the following table:

Number	Denomination	Meaning / Description
(1)	<a href="#">X300</a>	Interface COMX CA-Module
(2)	<a href="#">X400/X401</a>	Interface COMX CN Fieldbus modules
(3)	<a href="#">X501/X500</a>	Interface COMX CN Real-Time Ethernet modules
(4)	<a href="#">S302</a>	Host mode selection
(5)	<a href="#">S301</a>	Data width (8/16 Bit) at parallel DPM mode
(6)	<a href="#">X350</a>	Host interface (Parallel Dual-Port-Memory interface, connection via CAB- NXPCA-PCI to NXPCA-PCI)
(7)	<a href="#">X709</a>	SPM interface
(8)	<a href="#">S701</a>	DPM mode
(9)	<a href="#">S702</a>	Selection of SPM connector
(10)	<a href="#">X351</a>	Pin header SYNC/UART1
(11)	<a href="#">S600</a>	Reset pushbutton
(12)	<a href="#">X932</a>	Female pin connector for power supply
(13)	<a href="#">X930</a>	CombiCon female connector for power supply
(14)	<a href="#">P900</a>	Power LED (entire device)
(15)	<a href="#">P800</a>	Power LED of SPM USB interface
(16)	<a href="#">X829</a>	SPM USB interface
(17)	<a href="#">X611</a>	USB diagnostic interface
(18)	<a href="#">X610</a>	Jumper for boot mode
(19)	<a href="#">X601</a>	UART diagnostic interface
(20)	-	Matrix label (see section 17.1 " <a href="#">Matrix Label</a> " in appendix for explanation)
(21)	<a href="#">X502</a>	Real-time Ethernet interface (2 Channels)
(22)	<a href="#">CH1_ACT</a>	Ethernet Activity-LED Channel 1 yellow
(23)	<a href="#">CH1_LINK</a>	Ethernet Link-LED Channel 1 green
(24)	<a href="#">CH0_ACT</a>	Ethernet Activity-LED Channel 0 yellow
(25)	<a href="#">CH0_LINK</a>	Ethernet Link-LED Channel 0 green
(26)	<a href="#">P501</a>	Communication status STA0
(27)	<a href="#">P500</a>	Communication status STA1
(28)	<a href="#">X403</a>	CANopen interface
(29)	<a href="#">X404</a>	DeviceNet interface
(30)	<a href="#">P401</a>	Communication status STA
(31)	<a href="#">P400</a>	LED (unused)
(32)	<a href="#">X402</a>	PROFIBUS interface
(33)	<a href="#">X405</a>	CC-Link interface
(34)	<a href="#">X407</a>	Jumper for AIFX connector
(35)	<a href="#">X406</a>	Jumper for AIFX connector
(36)	<a href="#">X409</a>	AIFX connector

Table 30: Legend to Figure 32

### Assignment of comX modules to the sockets on the COMXEB

The following *Table 31: Assignment of comX modules to the sockets on the COMXEB*: explains, which comX modules can be applied in which socket on the COMXEB:

Socket/ Interface	Module family	Module
Socket <a href="#">X300</a> (1)	comX CA module	COMX 10CA-CCS
		COMX 10CA-COS
		COMX 10CA-DNS
		COMX 10CA-DPS
		COMX 50CA-REFO
		COMX 51CA-RE
		COMX 100CA-RE
		COMX 100CA-CO
		COMX 100CA-DN
		COMX 100CA-DP
Socket <a href="#">X400/X401</a> (2)	comX CN Fieldbus module	COMX 10CN-CCS
		COMX 10CN-COS
		COMX 10CN-DNS
		COMX 10CN-DPS
		COMX 100CN-CO
		COMX 100CN-DN
		COMX 100CN-DP
Socket <a href="#">X500/X501</a> (3)	comX CN-RE module	COMX 51CN-RE
		COMX 100CN-RE

Table 31: Assignment of comX modules to the sockets on the COMXEB:

### Host connection and operation modes

The host connection is usually done via a parallel dual port memory interface ([X350](#) (6)). If comX modules with netX10 or netX51 are used, alternatively a serial dual port memory interface is available.

The following operation modes are available:

*Operation modes with parallel DPM (for all comX module types)*

- DPM 8-bit (see page 122)
- DPM 16bit (see page 122)

*Operation modes with serial DPM (SPI 50 MHz, only for comX 10 and comX 51)*

- SPM via pin header [X709](#) (7) (see page 123)
- SPM via USB Type B interface ([X829](#)) (16) (see page 124)



### Setting the operation modes

Information on setting the modes of operation can be found in section *Controls* on page 96.





## 8.2 Controls



You can find additional information on this topic in section *Setting the slide switches depending on the selection of the host interface* on page 104.



### 8.2.1 Position for 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.

	Choose position <i>Board</i> of switch S302 (4), if the switch settings on the COMXEB shall decide about the selection of DPM or SPM mode ( <a href="#">Slide switch S701 (8)</a> ) and at DPM mode about the selection of 8-Bit mode or 16-Bit mode for DPM access mode ( <a href="#">Slide switch S301 (5)</a> ).
	Choose position <i>Host</i> of switch S302, if the host shall decide about the selection of DPM or SPM mode and at DPM mode about the selection of 8-Bit mode or 16-Bit mode for DPM access. This requires the lines <code>DPM_DIRQ#</code> and <code>DPM_SIRQ#</code> of <a href="#">X350</a> to be connected accordingly at the host.

### 8.2.2 Selection of operation mode (DPM/SPM) - Slide switch (S701)

This slide switch (S701) (8) selects either the DPM or SPM mode of operation if option „*Board-controlled*“ of [slide switch S302 \(4\)](#) has been chosen.

	If the application should use serial dual port memory for the host connection, switch to <i>SPM</i> .
	If the application should use parallel dual port memory for the host connection, switch to <i>DPM</i> .



Otherwise, if the [slide switch S302 \(4\)](#) has been set to option „*Host-controlled*“, the host will decide on its own whether DPM or SPM mode is used.



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

### 8.2.3 Width for data access at parallel DPM mode - Slide switch (S301)

Slide switch S301 (5) allows switching between data access to parallel dual-port memory with a width of 8 bit or 16 bit.

	DPM data access width is 16 bit
	DPM data access width is 8 bit

However, this is only relevant in DPM mode of operation. The DPM mode is set with [slide switch S701 \(8\)](#) and [slide switch S302 \(4\)](#).





**Note:** A power cycle is necessary to switch from 8 bit data width to 16 bit data with 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 the pin header [X709](#) or the USB interface [X829](#).

	SPM signals are connected with the pin header <a href="#">X709</a> (7)
	SPM signals are connected with USB interface <a href="#">X829</a> (16) (via the FTDI chip).

However, this is only relevant in SPM operation mode. The SPM mode is set with [slide switch S701](#) (8) and [slide switch S302](#) (4).

## 8.2.5 Reset pushbutton (S600)

Pressing the pushbutton S600 (11) initiates a reset of the comX module.

## 8.2.6 Boot-Jumper (X610)

The boot jumper X610 (18) should be set if you intend to activate the serial boot mode over USB. 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 (SYS LED on 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 either USB (or UART) and to subsequently execute it.



**Note:** The 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 are used to configure the extension interface [X409](#) (36) for connecting to an AIFX. The AIFX is available as accessory for PROFIBUS, CANopen, DeviceNet and CC-Link.



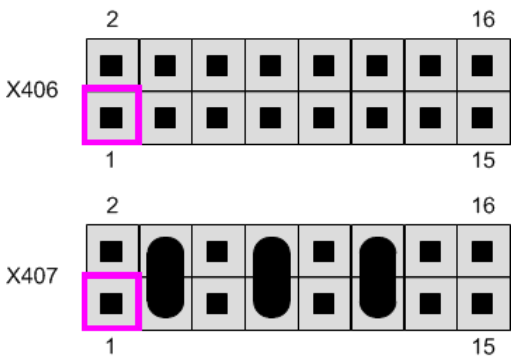
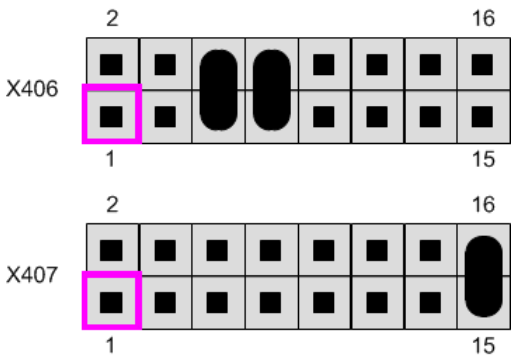
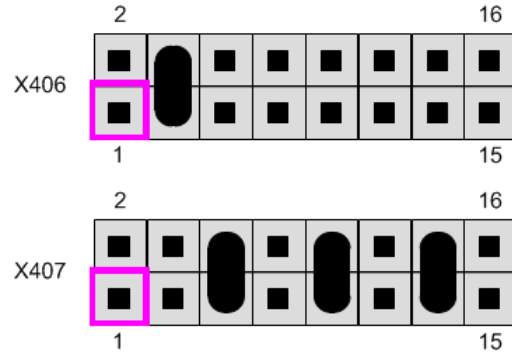
**Important:** Only set the jumpers in case of a comX with TTL signals (COMX-CN... \NIF) being mounted in the COMX interfaces [X400](#) (2) and [X401](#) (2).



### CAUTION

### Short circuit

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

Fieldbus	Jumper	Description
PROFIBUS	 <p>Figure 33: Jumper settings for using X409 as PROFIBUS interface</p>	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).
CANopen/ DeviceNet	 <p>Figure 34: Jumper settings for using X409 as CANopen/ DeviceNet interface</p>	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	 <p>Figure 35: Jumper settings for using X409 as CC-Link interface</p>	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).

Fieldbus	Jumper	Description
Kein AIFX	<div><div><div>216</div><div>X406<div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div></div><div><div>115</div></div></div><div><div>216</div><div>X407<div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div><div><div></div></div></div><div><div>115</div></div></div></div><div>Figure 36: Jumper settings for using X409 without AIFX</div></div></div>	Remove all jumpers both at X406 (35) and at X407 (34) (see Figure 36), if you do not connect to an AIFX at the AIFX interface (36).

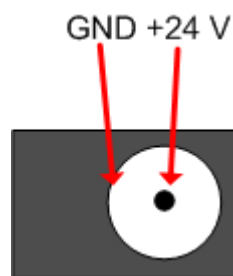
## 8.3 Interfaces and connectors

### 8.3.1 Power supply connectors

#### 8.3.1.1 Socket for Barrel Connector of Power Adaptor X932

The 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  $\pm$  6 V DC.

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



Pin	Description
1	GND
2	+24V DC

Figure 37: Pin assignment power supply socket X932

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

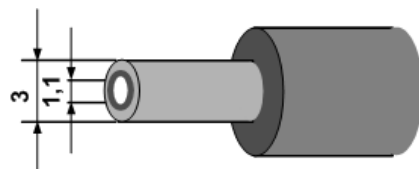


Figure 38: Barrel connector of the power adaptor

#### 8.3.1.2 CombiCon Connector for external Power Supply X930

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


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

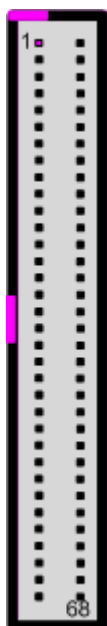
Table 32: Pin assignment of external power supply connector X930

## 8.3.2 Host Interfaces

### 8.3.2.1 Parallel Dual-Port-Memory Interface – Pin header (X350)

Table 33: Pin assignment Host interface X350 shows the pin assignment of the 68 pin dual-port memory 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

Table 33: Pin assignment Host interface X350



Using the DPM over USB interface is described in section *Parallel dual-port memory interface (DPM)* on page 122.

### 8.3.2.2 Serial Dual-Port Memory Interface – USB socket (X829)

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

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 connecting to a host system (i.e. SPI master).

The signals of the serial dual-port memory interface of the evaluation board COMXEB can be routed to the pin header X709 (7) (16-pin) if according 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:

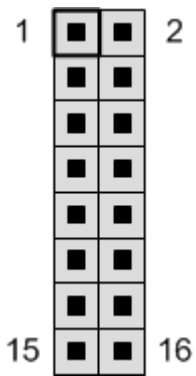
Pin Header X709	Pin	Signal
	1	L_SPM_MISO
	2	+3V3 Output
	3	L_SPM_MOSI
	4	GND
	5	L_SPM_CS#
	6	GND
	7	L_SPM_CLK
	8	GND
	9	L_SPM_DIRQ#
	10	GND
	11	L_SPM_SIRQ#
	12	GND
	13	L_SPM_SIO2
	14	GND
	15	L_SPM_SIO3
	16	GND

Table 34: Pin assignment of pin header X709

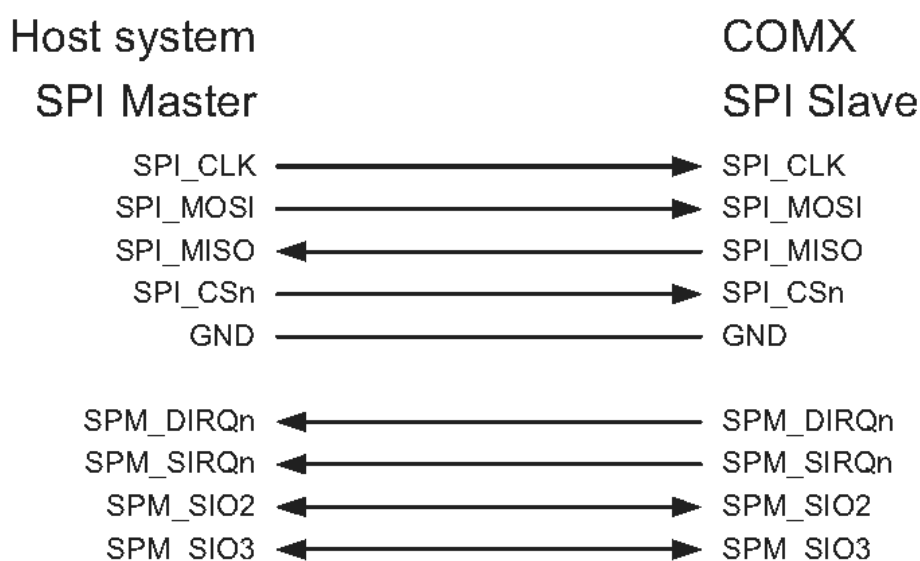


Figure 39: SPI-master-slave-connection

This figure also illustrates the signal directions. At least the signals SPI\_CLK, SPI\_CS#, SPI\_MOSI und SPI\_MISO and GND must be connected.

### 8.3.2.4 Setting the slide switches depending on the selection of the host interface

At any particular time only one of the three host interfaces [X350 \(6\)](#), [X709 \(7\)](#) or [X829 \(16\)](#) can be used. The decision, which one of these will actually be used, depends on the settings of the slide switches [S302](#), [S701](#), [S301](#) and [S700](#).

#### Mode *Board controlled*

For the operation of the host interfaces [X350 \(6\)](#), [X709 \(7\)](#) and [X829 \(16\)](#), the slide switches described in section *Controls* on page 96 must be set according to the following *Table 35: Settings for selecting the host interface* :









Activated host interface	S302	S701	S700	S301
Parallel DPM interface X350 (6)	 Board	DPM 	Setting is not relevant	Selection of 8 or 16 bit mode
Serial DPM interface X709 (7) (Pin header)	 Board	SPM 	X709 	Setting is not relevant
Serial DPM interface X829 (16) (SPM over USB)	 Board	SPM 	X829 	Setting is not relevant

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

#### Mode *Host controlled*

In mode *Host controlled* the firmware of the comX module evaluates the signals DPM\_DIRQn und DPM\_SIRQn of the parallel DPM interface [X350 \(6\)](#).

The selection of the host interface additionally depends from signal DPM\_DIRQn in this mode. Signal DPM\_SIRQn decides, whether the 8 bit or 16 bit mode is selected for the operation of the parallel DPM interface [X350 \(6\)](#), see below.

For the operation of the host interfaces [X350 \(6\)](#), [X709 \(7\)](#) and [X829 \(16\)](#) in mode *Host controlled* the following settings and signals are required, proceed according to the following *Table 36: Settings for selecting the host interface in 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 	Setting is not relevant
Serial DPM interface X829 (16) (SPM over USB)	 Host	0 (serial mode)	X829 	Setting is not relevant

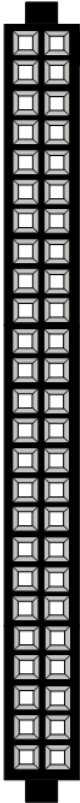
Table 36: Settings for selecting the host interface in mode *Host controlled*



### 8.3.3 COMX Interfaces

#### 8.3.3.1 COMX Interface X300

Table 37: Pin assignment comX-interface X300 shows the pin assignment of the 50 pin interface X300 (1) for connecting to 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 10 at start-up: Host mode selection	DPM_DIRQ#	DPM_DIRQn	COMX 10, COMX 51 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		
50	Power Supply	+3V3		

*Table 37: Pin assignment comX-interface X300*

### 8.3.3.2 COMX Interfaces X400/X401

Table 38: Pin assignment comX-interface X400 shows the pin assignment of the 50 pin interface X400 (2) for connecting to 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		
	12	Power Supply	+3V3		
	13	Transmit Data, Serial line	UART1_TXD		
	14	Receive Data, Serial line	UART1_RXD		
	15	Request to Send, Serial line & SYNC0	UART1_RTS#/ SYNC0		
	16	Clear to Send, Serial line & SYNC1	UART1_CTS#/ SYNC1		
	17	USB positive, Diagnostic line	USB+		
	18	USB negative, Diagnostic line	USB-		
	19	Receive Data, Diagnostic line	UART0_RXD		
	20	Transmit Data, Diagnostic line	UART0_TXD		
	21	Reset, active low	DPM_RESET#		
	22	Busy, active low	DPM_BUSY#		
	23	During operation: Interrupt, active low COMX 10 at start-up: Host mode selection	DPM_DIRQ#		
	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		
50	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 to 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 COMX Interfaces X500/X501


Table 40: Pin assignment comX-interface X501 shows the pin assignment of the 50 pin interface X501 (3) for connecting to 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		
	12	Power Supply	+3V3		
	13	Transmit Data, Serial line	UART1_TXD		
	14	Receive Data, Serial line	UART1_RXD		
	15	SYNC0 & Request to Send, Serial line	SYNC0/ UART1_RTS#		
	16	SYNC1 & Clear to Send, Serial line	SYNC1/ UART1_CTS#		
	17	USB positive, Diagnostic line	USB+		
	18	USB negative, Diagnostic line	USB-		
	19	Receive Data, Diagnostic line	UART0_RXD		
	20	Transmit Data, Diagnostic line	UART0_TXD		
	21	Reset, active low	DPM_RESET#		
	22	Busy, active low	DPM_BUSY#		
	23	During operation: Interrupt, active low COMX 10 at start-up: Host mode selection	DPM_DIRQ#		
	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		
50	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 to 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 following *Table 42* explains the PROFIBUS-DP interface X402 (32) (9-pin D-Sub, female) of the evaluation board COMXEB:

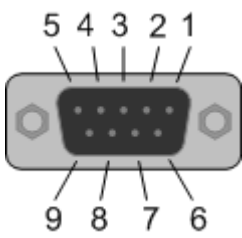
X402	Pin	Signal	Description
	3	DP_RXD_TXD-P	Transmit /receive data-P or pin B at the male connector
	4	DP_CNTR-P	PROFIBUS Control
	5	DP_ISO GND	Data reference potential
	6	DP_VP	Supply voltage +
	8	DP_RXD_TXD-N	Transmit /receive data-N or pin A at the male connector

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

### 8.3.4.2 CANopen Interface X403

The following *Table 43* explains the CANopen interface X403 (28) (9-pin D-Sub, male) of the evaluation board COMXEB:

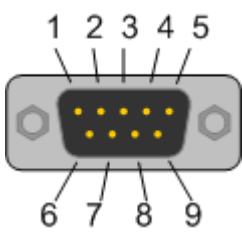
X403	Pin	Signal	Description
	2	CO_L	CAN-Low-line
	3	CO_DN_V-	CAN reference potential
	7	CO_H	CAN-High line

Table 43: Pin assignment of the CANopen interface of COMXEB

### 8.3.4.3 DeviceNet Interface X404

The following *Table 44* explains the DeviceNet interface X404 (29) (5-pin CombiCon male connector) of the evaluation board COMXEB:

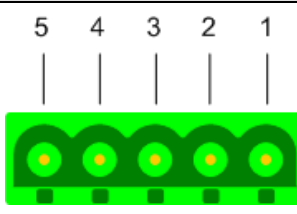
X404	Pin	Signal	Color	Description
	1	CO_DN_V-	Black	Data reference potential of DeviceNet-power supply
	2	DN_CAN_L	Blue	CAN Low-Signal
	3	CO_DRAIN		Shield
	4	DN_CAN_H	White	CAN High-Signal
	5	DN_V+	Red	+24 V DeviceNet power supply

Table 44: Pin assignment of the DeviceNet interface of COMXEB

### 8.3.4.4 CC-Link Interface X405

The following *Table 45* explains the CC-Link interface X405 **(33)** (5-pin CombiCon screw connector) of the evaluation board COMXEB:

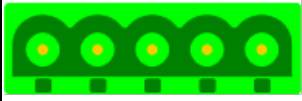
X405	Connection to CombiCon male connector	Signal	Description
	1	CC_DA	Data A
	2	CC_DB	Data B
	3	CC_DG	Data Ground
	4	CC_SLD	Shield
	5	CC_FG	Field Ground

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

### 8.3.4.5 Real-Time Ethernet Interface X502

The following *Table 46* explains the Real-Time Ethernet interface X502 **(21)** (RJ45) of the evaluation board COMXEB:

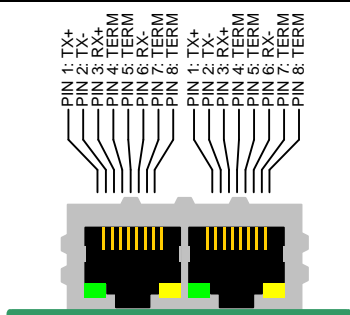
X502	Pin	Signal	Description
	1	TXP0	Transmit data +
	2	TXN0	Transmit data –
	3	RXP0	Receive data +
	4	TERM	Bob Smith termination
	5	TERM	
	6	RXN0	Receive data –
	7	TERM	Bob Smith termination
	8	TERM	

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:

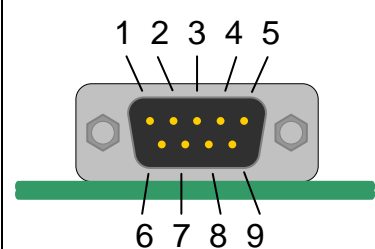
	Pin	Name	Description
	2	RXD	Receive data of comX
	3	TXD	Transmit data of comX
	4	DTR	Return-To-Send signal
	5	GND	Ground via 100 $\Omega$ resistor
	6		

Figure 40: Pin assignment of diagnostic interface connector X601

### 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).

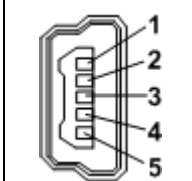
USB Socket	Pin	Signal	Description
	1	VBUS	Power supply of USB Bus (+5 V, external)
	2	D-	Data -
	3	D+	Data +
	4	ID	N.c.
	5	GND	Ground

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 to an AIFX plug-on interface only at VIF modules such as the COMX 100CN-DP\VIF, 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 97.


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 Pin Headers

### 8.3.7.1 SYNC /UART1 - Pin Header(X351)

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

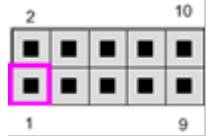
Pin Header X351	Pin	Signal	Description
	1	UART1_TXD	UART 1 Transmit
	2	UART1_RXD	UART 1 Receive
	3	SYNC0/ UART1_RTS#	SYNC0 or UART 1 RTS
	4	SYNC1/ UART1_CTS#	SYNC1 or UART 1 CTS
	5	GND	Ground
	6	+3V3	Supply power +3.3V (output)
	7	-	Not connected
	8	-	Not connected
	9	-	Not connected
	10	-	Not connected

Table 48: Pin assignment of pin header X351

### Items on hardware

Item	Explanation
SYNC signal	3,3 V (LVTTTL), maximum load 6 mA
Connector	<u>SYNC- Connector, X351</u> : Pin header male, 10-pins, pitch spacing 2.54mm
Max. cable length	Recommendation: Max. 50 mm <b>Note:</b> Take EMC into consideration for the cable laying

Tabelle 1: SYNC connector: SYNC signal, connector, max. cable length

### Items on firmware

The firmware determines the input signal or output signal. 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 bus cycle Input Rising edge	-	2.0.8.0	-
Sercos Slave	CON_CLK Output	DIV_CLK Output	3.0.10.0	Configurable

Table 49: Meaning of the SYNC signals for each protocol

## 8.4 LED displays

There are three groups of LEDs at the COMXEB:

[Power-LEDs](#)

[Communication status LEDs](#)

[Ethernet Link/Activity-LEDs](#)

### 8.4.1 Power LEDs

The following *Table 50: Power LEDs of COMXEB* explains the power LEDs of COMXEB:



Denomination of LED	Type	Description
P800 (15)	Single-LED  green	Indicates whether the supply voltage of the FTDI-chip FT2232HQ is present, i.e. 5V available at USB interface <a href="#">X829 (16)</a> .
P900 (14)	Single-LED  green	Indicates whether the power supply of the evaluation board is operational, i.e. whether either <a href="#">X932 (12)</a> or <a href="#">X930 (13)</a> is supplied with 24 V

Table 50: Power LEDs of COMXEB

### 8.4.2 Communication Status LEDs

While COMX-CA modules have own LEDs for displaying the communication status (and other information), the COMX-CN modules use LEDs located on the COMXEB. These are the LEDs P400 (31), P401 (30), P500 (27) and P501 (26).

The following *Table 51: Communication Status LEDs of COMXEB* explains the communication status LEDs of COMXEB:







Denomination	Type	Description
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 channel1 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 51: Communication Status LEDs of COMXEB

The LEDs P401 is only active if a COMX-CN Fieldbus module has been plugged into X400 (2) and X401 (2). The meaning of the blinking codes of all supported Fieldbus systems is described in section 10.2 "LEDs Fieldbus-Systems" on page 125.

The LEDs P500 (27) and P501(26) are only active if a COMX-CN Real-Time Ethernet module has been plugged into **X500 (3)** and **X501 (3)**. The meaning of the blinking codes of all supported Real-Time Ethernet systems is described in section *LEDs Real-Time Ethernet Systems* on page 132.

### 8.4.3 Ethernet Link/Activity–LEDs

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

The following *Table 52: Ethernet Link/Activity–LEDs* explains the communication status LEDs of COMXEB:





Denomination	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 52: Ethernet Link/Activity–LEDs



#### Meaning of the LED signals

Information on the LED signals can be found in section *LEDs Real-Time Ethernet Systems* on page 132. Refer to the appropriate 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 dual-port memory from an external PC
CAB-NXPCA-PCI	4400.000	Ribbon cable	For connecting the COMXEB with the NXPCA-PCI
AIFX-DP	2800.400	PROFIBUS interface	For connecting the COMXEB via <a href="#">X409</a>
AIFX-CO	2800.500	CANopen interface	For connecting the COMXEB via <a href="#">X409</a>
AIFX-DN	2800.510	DeviceNet interface	For connecting the COMXEB via <a href="#">X409</a>
AIFX-CC	2800.730	CC-Link interface	For connecting the COMXEB via <a href="#">X409</a>

Table 53: Accessories for the Evaluation Board COMXEB

## 9 Connection to the PC

### 9.1 Overview

The connection between PC and a COMX module can be accomplished in three different manners which are described in the following.

The following kinds of host connections are possible:

- Parallel DPM
- Serial SPM
- SPM-USB

The following kinds 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 appropriate comX interface for that kind 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 socket [X932](#) (12) of the COMXEB.
5. Then switch on the PC.



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#### Firmware update via USB connection

Section 12.1.2.2 „Set-up B2: Updating the Firmware with SYCON.net via the USB Interface“ on page 156 describes how to perform a firmware update via a USB connection.

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## 9.2.2 Via UART

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

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

1. Plug the comX module into the appropriate comX interface for that kind 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. Then switch on the PC.



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### Firmware update via serial connection

Section 12.1.2.1 „Set-up B1: Updating the Firmware with SYCON.net via the Serial Interface“ on page 155 describes how to perform a firmware update via a serial connection.

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## 9.3 Host connections

### 9.3.1 Parallel dual-port memory interface (DPM)

A host connection via the parallel dual-port memory can be established using the NXPCA-PCI. In order to do so, mount the NXPCA-PCI within a free PCI slot of a PC and connected to the evaluation board COMXEB by the ribbon cable CAB- NXPCA-PCI as shown in Figure 42 below.

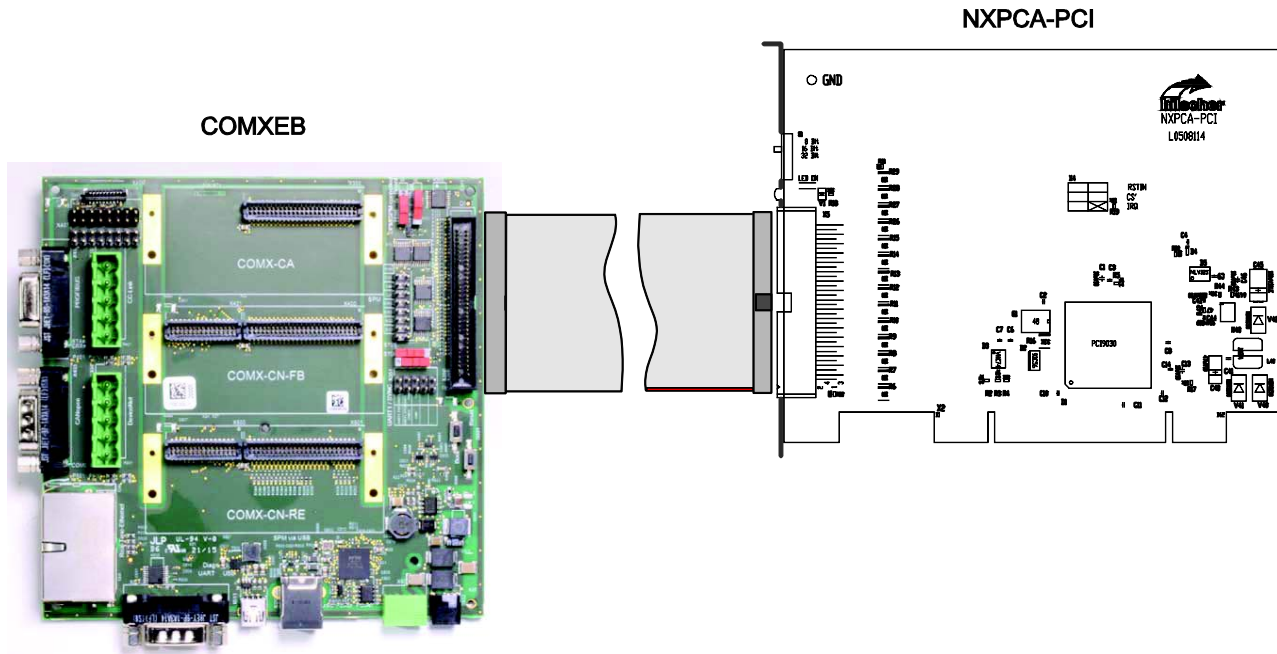


Figure 42: Connection COMXEB <=> NXPCA-PCI (<=> Host) via parallel Dual-Port Memory

A connection from the host to the COMXEB via SPM can be accomplished either via the SPM over USB interface X829 (16) or via pin header X709 (7). When using the SPM over 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 the COMXEB and the host is accomplished via a cable connected to [X709 \(7\)](#) according to the following *Figure 43: Serial host connection via X709*.

COMXEB

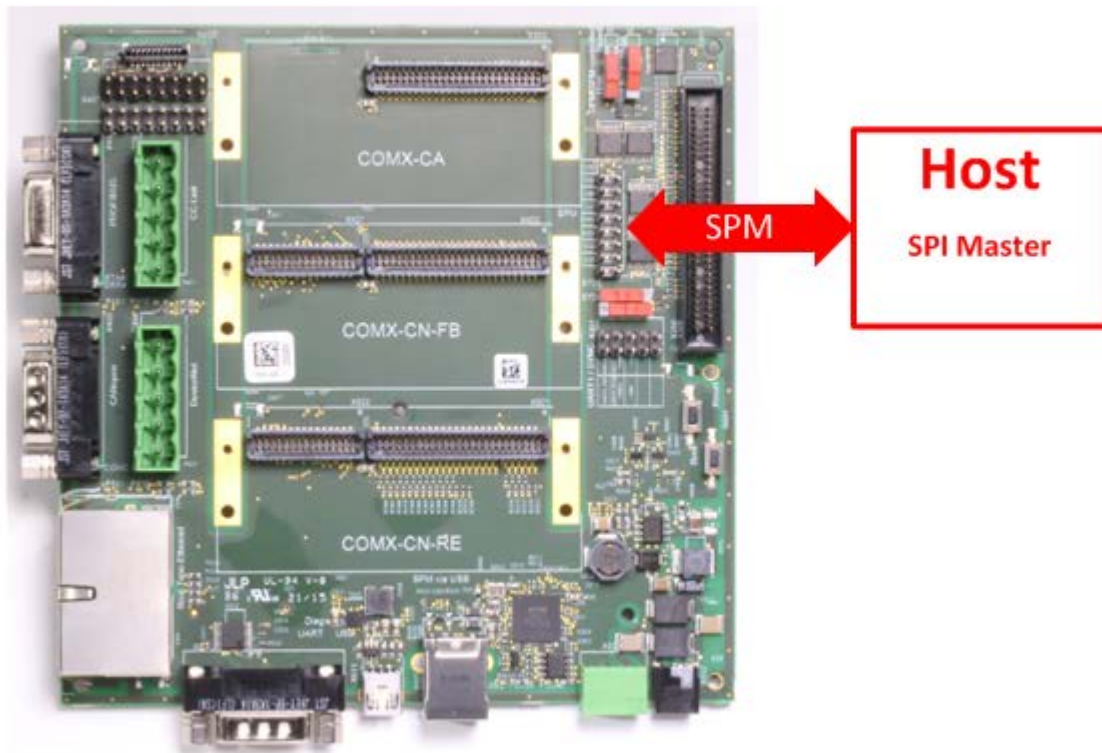


Figure 43: Serial host connection via X709

The connection of each signal is done exactly as depicted in *Figure 39: SPI-master-slave-connection* on page 103.

### 9.3.3 Serial dual-port memory interface over USB (SPM over USB)

Using the SPM over USB-interface [X829 \(16\)](#) a connection to a PC can be established via a usual USB cable (Type A / Type B), see *Figure 44: Serial host connection via the USB connector X829* below.

COMXEB

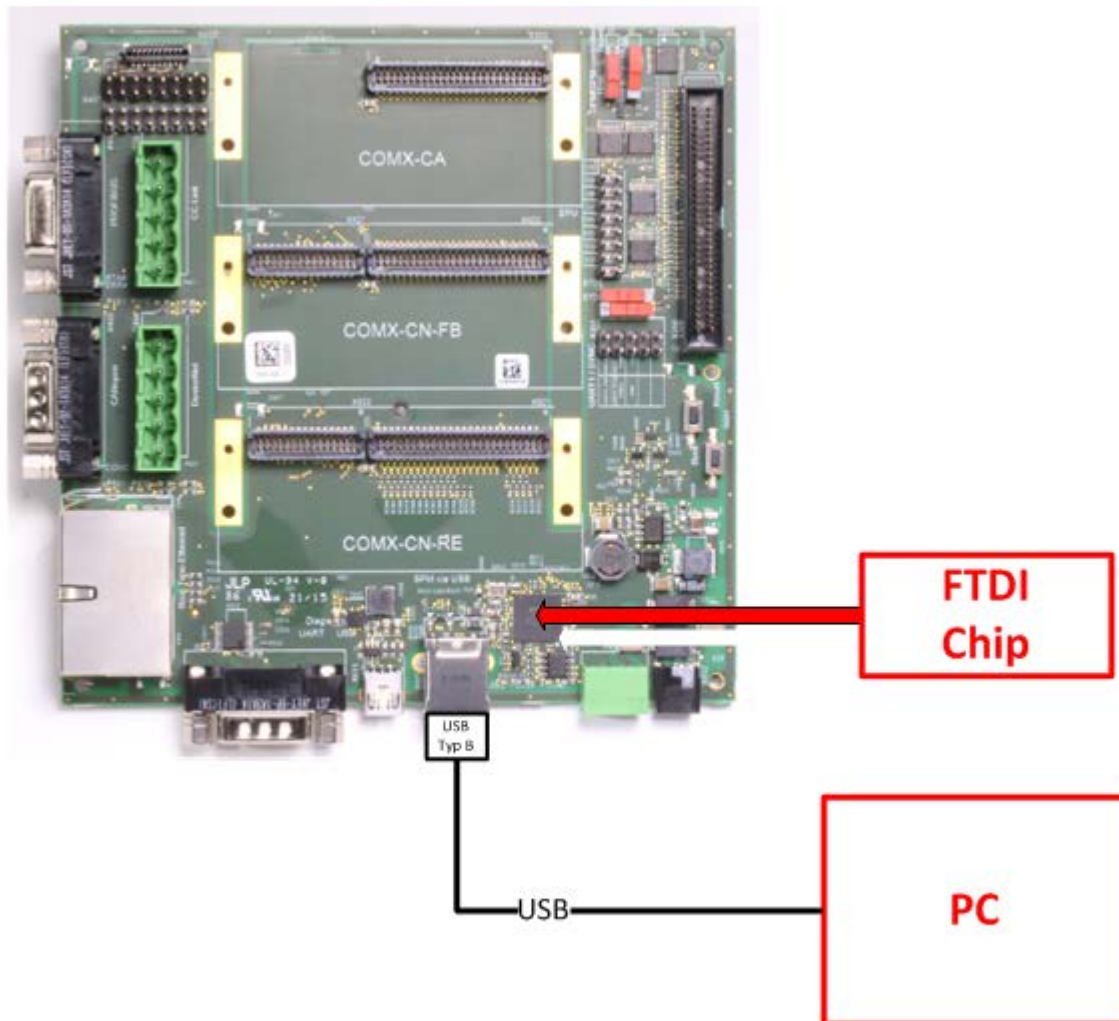


Figure 44: Serial host connection via the USB connector X829

## 10 LEDs

### 10.1 SYS-LED

The following table describes the meaning of the system LED.





LED	Color	State	Meaning
<b>SYS</b> 	<b>Duo LED yellow/green</b>		
	 (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 54: 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 by 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

The subsequent table describes the meaning of the LEDs for the comX PROFIBUS-DP Master communication modules (COMX 100CA-DP/ COMX 100CN-DP) when the firmware of the PROFIBUS DP Master protocol is loaded to the comX communication module.







LED	Color	State	Meaning
<b>COM</b> 	<b>Duo LED red/green</b>		
	 (green)	Flashing acyclic	No configuration or stack error
	 (green)	Flashing cyclic	PROFIBUS is configured, but bus communication is not yet released from the application
	 (green)	On	Communication to all Slaves is established
	 (red)	Flashing cyclic	Communication to at least one Slave is disconnected
	 (red)	On	Communication to one/all Slaves is disconnected

Table 55: LEDs PROFIBUS DP Master

### 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
<b>COM</b>	<b>Duo LED red/green</b>		
	 (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 56: LEDs PROFIBUS DP Slave

## 10.2.4 LEDs PROFIBUS MPI

The subsequent table describes the meaning of the LEDs for the comX communication module when the firmware of the PROFIBUS MPI protocol is loaded to the device.






LED	Color	State	Meaning
<b>COM</b>	<b>Duo LED red/green</b>		
	 (green)	On	Status The device currently holds the PROFIBUS token and is able to transfer telegrams of data.
	 (green)	Blinking (regularly) 5 Hz	Status The device is configured to be a part of the PROFIBUS ring, but it must share the PROFIBUS token with other PROFIBUS-Master devices present on the PROFIBUS ring.
	 (green)	Blinking (regularly) 0.5 Hz	Status Automatic baudrate detection is running
	 (red)	On	Error Communication error at the PROFIBUS.
	 (off)	Off	Status/Error The device has not been integrated into the PROFIBUS ring, i.e. it has not been configured correctly or has a wrong configuration or has not received the PROFIBUS token.

Table 57: LEDs PROFIBUS MPI

## 10.2.5 LEDs CC-Link Slave

The subsequent table describes the meaning of the LEDs for the comX CC-Link Slave communication modules (COMX 100CA-CCS/ COMX 100CN-CCS) when the firmware of the CC-Link Slave protocol is loaded to the comX communication module.








LED	Color	State	Meaning
<b>L RUN</b> 	<b>LED green</b>		
	 (off)	Off	1. Before participating in the network 2. Unable to detect carrier 3. Timeout 4. Resetting hardware
<b>L ERR</b> 	 (green)	On	Receive both refresh and polling signals or just the refresh signal normally, after participating in the network.
	<b>LED red</b>		
	 (off)	Off	1. Normal communication 2. Resetting hardware
	 (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)

Table 58: LEDs CC-Link Slave



## 10.2.6 LEDs CANopen Master

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








LED	Color	State	Meaning
<b>CAN</b> 	Duo LED red/green		
	-	Off	The device is executing a reset
	 (green)	Single flash	<b>STOPPED:</b> The Device is in STOPPED state
	 (green)	Blinking	<b>PREOPERATIONAL:</b> The Device is in the PREOPERATIONAL state
	 (green)	On	<b>OPERATIONAL:</b> The Device is in the OPERATIONAL state
	 (red)	Single flash	<b>Warning Limit reached:</b> 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	<b>Error Control Event:</b> A guard event (NMT Slave or NMT-master) or a heartbeat event (Heartbeat consumer) has occurred.
	 (red)	On	<b>Bus Off:</b> The CAN controller is bus off

Table 59: LEDs CANopen Master

### LED State Definition for CANopen Master for the CAN LED

Indicator state	Definition
On	The indicator is constantly on.
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 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 60: LED State Definition for CANopen Master for the CAN LED



## 10.2.7 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
<b>comX</b>			
<b>CAN</b>	<b>Duo LED red/green</b>		
	 (off)	Off	<b>RESET:</b> The device is executing a reset
	 (green)	Single flash	<b>STOPPED:</b> The device is in STOPPED state
	 (green)	Blinking	<b>PREOPERATIONAL:</b> The device is in the PREOPERATIONAL state
	 (green)	On	<b>OPERATIONAL:</b> The device is in the OPERATIONAL state
	 (red/green)	Flickering (alternatively red / green)	<b>Auto Baud Rate Detection active:</b> The Device is in the Auto Baud Rate Detection mode
	 (red)	Single flash	<b>Warning Limit reached:</b> 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	<b>Error Control Event:</b> A guard event (NMT Slave or NMT-master) or a heartbeat event (Heartbeat consumer) has occurred.
	 (red)	On	<b>Bus Off:</b> The CAN controller is bus off

Table 61: 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 62: LED State Definition for CANopen Slave for the CAN LED

## 10.2.8 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	<b>Device Operational AND On-line, Connected</b> Device is online and has established all connections with all Slaves.
	 (green)	Flashing (1 Hz)	<b>Device Operational AND On-line</b> Device is online and has established no connection in the established state. - Configuration missing, incomplete or incorrect.
	 (green/red/off)	Flashing Green/Red/Off	<b>Selftest after power on:</b> Green on for 250 ms, then red on for 250 ms, then off.
	 (red)	Flashing (1 Hz)	<b>Minor Fault and/or Connection Time-Out</b> 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	<b>Critical Fault or Critical Link Failure</b> Critical connection failure; device has detected a network error: duplicate MAC-ID or severe error in CAN network (CAN-bus off).
	 (off)	Off	<b>Device is not powered</b> - The device may not be powered.  <b>Device is not on-line and/or No Network Power</b> - The device has not completed the Dup_MAC_ID test yet. - The device is powered, but the network power is missing.

Table 63: 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 64: LED State Definition for DeviceNet Master for the MNS LED

## 10.2.9 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	<b>Device Operational AND On-line, Connected</b> Device is online and has established all connections with all Slaves.
	 (green)	Flashing (1 Hz)	<b>Device Operational AND On-line</b> Device is online and has established no connection in the established state. - Configuration missing, incomplete or incorrect.
	 (green/red/off)	Flashing Green/Red/Off	<b>Selftest after power on:</b> Green on for 250 ms, then red on for 250 ms, then off.
	 (red)	Flashing (1 Hz)	<b>Minor Fault and/or Connection Time-Out</b> 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	<b>Critical Fault or Critical Link Failure</b> Critical connection failure; device has detected a network error: duplicate MAC-ID or severe error in CAN network (CAN-bus off).
	 (off)	Off	<b>Device is not powered</b> - The device may not be powered. <b>Device is not on-line and/or No Network Power</b> - The device has not completed the Dup_MAC_ID test yet. - The device is powered, but the network power is missing.

Table 65: 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 66: 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	EtherCAT Master	EtherCAT Slave	EtherNet/IP Scanner/Adapter	Powerlink Controlled Node	Open Modbus/TCP	PROFINET IO Controller/Device	Sercos Master	Sercos Slave	VARAN Client
<b>L2</b> (red/ green Duo- LED)	 (green)	RUN	RUN	MS	BS	RUN	-	STA	S3	RUN
	 (red)	-	-	MS	-	-	BF	-	S3	-
<b>L3</b> (red/ green Duo- LED)	 (green)	-	-	NS	-	-	-	-	-	-
	 (red)	ERR	ERR	NS	BE	ERR	BF	ERR	-	ERR
<b>C1</b> (Ethernet Connectors)	 (green)	LINK	L/A IN	LINK	L/A	LINK	LINK	L/A	L/A	LINK IN
	 (yellow)	ACT	-	ACT	-	ACT	RXTX	-	-	ACT
<b>C2</b> (Ethernet Connectors)	 (green)	-	L/A OUT	LINK	L/A	LINK	LINK	L/A	L/A	LINK OUT
	 (yellow)	-	-	ACT	-	ACT	RXTX	-	-	ACT

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 67: LED Names of individual Real-Time Ethernet Systems

### 10.3.2 LEDs EtherCAT-Master (V3)

The subsequent table describes the meaning of the LEDs for the comX Real-Time Ethernet communication modules (COMX 100CA-RE/ COMX 100CN-RE) when the firmware of the EtherCAT Master protocol is loaded to the comX communication module. This description is valid for stack version V3.0.













LED	Color	State	Meaning
<b>RUN</b> 	<b>Duo LED red/green</b>		
	 (off)	Off	<b>INIT:</b> The device is in state INIT
	 (green)	Blinking	<b>PRE-OPERATIONAL:</b> The device is in PRE-OPERATIONAL state
	 (green)	Flickering	<b>BOOT:</b> Device is in BOOT state
	 (green)	Single Flash	<b>SAFE-OPERATIONAL:</b> The device is in SAFE-OPERATIONAL state
	 (green)	On	<b>OPERATIONAL:</b> The device is in OPERATIONAL state
<b>ERR</b> 	<b>Duo LED red/green</b>		
	 (off)	Off	Master has no errors
	 (red)	On	Master has detected a communication error. The error is indicated in the DPM
<b>LINK/ RJ45 Ch0</b>	<b>LED green</b>		
	 (green)	On	A link is established
	 (off)	Off	No link established
<b>ACT/ RJ45 Ch0</b>	<b>LED yellow</b>		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 68: LEDs EtherCAT Master

#### LED State Definition for EtherCAT Master for the RUN and ERR LEDs

Indicator state	Definition
On	The indicator is constantly on.
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.
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.
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 69: LED State Definition for EtherCAT Master for the RUN and ERR LEDs

### 10.3.3 LEDs EtherCAT-Master (V4)

The subsequent table describes the meaning of the LEDs for the comX Real-Time Ethernet communication modules (COMX 100CA-RE/ COMX 100CN-RE) when the firmware of the EtherCAT Master protocol is loaded to the comX communication module. This description is valid for stack version V4.0.





















LED	Color	State	Meaning
<b>RUN</b> 	<b>Duo LED red/green</b>		
	 (off)	Off	<b>INIT:</b> The device is in state INIT.
	 (green)	Blinking (2,5 Hz)	<b>PRE-OPERATIONAL:</b> The device is in PRE-OPERATIONAL state.
	 (green)	Flickering (10 Hz)	The device is not configured.
	 (green)	Single flash	<b>SAFE-OPERATIONAL:</b> The device is in SAFE-OPERATIONAL state.
	 (green)	On	<b>OPERATIONAL:</b> The device is in OPERATIONAL state.
<b>ERR</b> 	<b>Duo-LED red/green</b>		
	 (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.
<b>LINK</b> Ch0	<b>LED green</b>		
	 (green)	On	<b>Link:</b> The device is linked to the Ethernet, but does not send/receive Ethernet frames.
	 (green)	Flickering (load dependent)	<b>Activity:</b> The device is linked to the Ethernet and sends/receives Ethernet frames.
	 (off)	Off	The device has no link to the Ethernet.
<b>ACT</b> Ch0	<b>LED yellow</b>		
	 (off)	Off	This LED is not used.

Table 70: 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).
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 71: LED state definitions for the EtherCAT Master protocol*

### 10.3.4 LEDs EtherCAT-Slave

The subsequent table describes the meaning of the LEDs for the comX Real-Time Ethernet communication modules (COMX 100CA-RE/ COMX 100CN-RE) when the firmware of the EtherCAT Slave protocol is loaded to the comX communication module.















LED	Color	State	Meaning
<b>RUN</b> 	<b>Duo LED red/green</b>		
	 (off)	Off	<b>INIT:</b> The device is in state INIT
	 (green)	Blinking	<b>PRE-OPERATIONAL:</b> The device is in state PRE-OPERATIONAL
	 (green)	Single Flash	<b>SAFE-OPERATIONAL:</b> The device is in state SAFE-OPERATIONAL
	 (green)	On	<b>OPERATIONAL:</b> The device is in state OPERATIONAL
<b>ERR</b> 	<b>Duo LED red/green</b>		
	 (off)	Off	<b>No error:</b> The EtherCAT communication of the device is in working condition
	 (red)	Blinking	<b>Invalid Configuration:</b> General Configuration Error Possible reason: State change commanded by master is impossible due to register or object settings.
	 (red)	Single Flash	<b>Local Error:</b> 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	<b>Application Watchdog Timeout:</b> An application watchdog timeout has occurred. Possible reason: Sync Manager Watchdog timeout.
<b>L/A IN/</b> RJ45 Ch0  <b>L/A</b> <b>OUT/</b> RJ45 Ch1	<b>LED green</b>		
	 (green)	On	A link is established
	 (green)	Flashing	The device sends/receives Ethernet frames
	 (off)	Off	No link established
RJ45 Ch0  RJ45 Ch1	<b>LED yellow</b>		
	 (yellow)	-	-

Table 72: LEDs EtherCAT Slave



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

Indicator state	Definition
On	The indicator is constantly on.
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 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 73: LED State Definition for EtherCAT Slave for the RUN and ERR LEDs*

### 10.3.5 LEDs EtherNet/IP-Scanner

The subsequent table describes the meaning of the LEDs for the comX Real-Time Ethernet communication modules (COMX-CA-RE/ COMX-CN-RE) when the firmware of the EtherNet/IP Scanner (Master) protocol is loaded to the comX communication module.















LED	Color	State	Meaning
<b>MS</b> 	<b>Duo LED red/green</b>		
	 (green)	On	<b>Device operational:</b> If the device is operating correctly, the module status indicator shall be steady green.
	 (green)	Flashing	<b>Standby:</b> If the device has not been configured, the module status indicator shall be flashing green.
	 (red)	On	<b>Major fault:</b> If the device has detected a non-recoverable major fault, the module status indicator shall be steady red.
	 (red)	Flashing	<b>Minor fault:</b> If the device has detected a recoverable minor fault, the module status indicator shall be flashing red. NOTE: An incorrect or inconsistent configuration would be considered a minor fault.
	 (red/green)	Flashing	<b>Self-test:</b> While the device is performing its power up testing, the module status indicator shall be flashing green/red.
	-	Off	<b>No power:</b> If no power is supplied to the device, the module status indicator shall be steady off.
<b>NS</b> 	<b>Duo LED red/green</b>		
	 (green)	On	<b>Connected:</b> If the device has at least one established connection (even to the Message Router), the network status indicator shall be steady green.
	 (green)	Flashing	<b>No connections:</b> If the device has no established connections, but has obtained an IP address, the network status indicator shall be flashing green.
	 (red)	On	<b>Duplicate IP:</b> If the device has detected that its IP address is already in use, the network status indicator shall be steady red.
	 (red)	Flashing	<b>Connection timeout:</b> If one or more of the connections in which this device is the target has timed out, the network status indicator shall be flashing red. This shall be left only if all timed out connections are reestablished or if the device is reset.
	 (red/green)	Flashing	<b>Self-test:</b> While the device is performing its power up testing, the network status indicator shall be flashing green/red.
	-	Off	<b>Not powered, no IP address:</b> If the device does not have an IP address (or is powered off), the network status indicator shall be steady off.
<b>LINK/RJ45</b> Ch0 & Ch1	<b>LED green</b>		
	 (green)	On	A connection to the Ethernet exists
	-	Off	The device has no connection to the Ethernet
<b>ACT/RJ45</b> Ch0 & Ch1	<b>LED yellow</b>		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 74: LEDs EtherNet/IP Scanner (Master)

### 10.3.6 LEDs EtherNet/IP-Adapter

The subsequent table describes the meaning of the LEDs for the comX Real-Time Ethernet communication modules (COMX-CA-RE/ COMX-CN-RE) when the firmware of the EtherNet/IP Adapter (Slave) protocol is loaded to the comX communication module.















LED	Color	State	Meaning
<b>MS</b> 	<b>Duo LED red/green</b>		
	 (green)	On	<b>Device operational:</b> If the device is operating correctly, the module status indicator shall be steady green.
	 (green)	Flashing	<b>Standby:</b> If the device has not been configured, the module status indicator shall be flashing green.
	 (red)	On	<b>Major fault:</b> If the device has detected a non-recoverable major fault, the module status indicator shall be steady red.
	 (red)	Flashing	<b>Minor fault:</b> If the device has detected a recoverable minor fault, the module status indicator shall be flashing red. NOTE: An incorrect or inconsistent configuration would be considered a minor fault.
	 (red/green)	Flashing	<b>Self-test:</b> While the device is performing its power up testing, the module status indicator shall be flashing green/red.
	-	Off	<b>No power:</b> If no power is supplied to the device, the module status indicator shall be steady off.
<b>NS</b> 	<b>Duo LED red/green</b>		
	 (green)	On	<b>Connected:</b> If the device has at least one established connection (even to the Message Router), the network status indicator shall be steady green.
	 (green)	Flashing	<b>No connections:</b> If the device has no established connections, but has obtained an IP address, the network status indicator shall be flashing green.
	 (red)	On	<b>Duplicate IP:</b> If the device has detected that its IP address is already in use, the network status indicator shall be steady red.
	 (red)	Flashing	<b>Connection timeout:</b> If one or more of the connections in which this device is the target has timed out, the network status indicator shall be flashing red. This shall be left only if all timed out connections are reestablished or if the device is reset.
	 (red/green)	Flashing	<b>Self-test:</b> While the device is performing its power up testing, the network status indicator shall be flashing green/red.
	-	Off	<b>Not powered, no IP address:</b> If the device does not have an IP address (or is powered off), the network status indicator shall be steady off.
<b>LINK/RJ45</b> Ch0 & Ch1	<b>LED green</b>		
	 (green)	On	A connection to the Ethernet exists
	-	Off	The device has no connection to the Ethernet
<b>ACT/RJ45</b> Ch0 & Ch1	<b>LED yellow</b>		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 75: LEDs EtherNet/IP Adapter (Slave)

### 10.3.7 LEDs Open Modbus/TCP

The subsequent table describes the meaning of the LEDs for the comX Real-Time Ethernet communication modules (COMX 100CA-RE/ COMX 100CN-RE) when the firmware of the Open Modbus/TCP protocol is loaded to the comX communication module.













LED	Color	State	Meaning
<b>RUN</b> 	<b>Duo LED red/green</b>		
	 (off)	Off	<b>Not Ready</b> OMB task is not ready
	 (green)	Flashing cyclic with 1Hz	<b>Ready, not configured yet</b> OMB task is ready and not configured yet
	 (green)	Flashing cyclic with 5Hz	<b>Waiting for Communication:</b> OMB task is configured
	 (green)	On	<b>Connected:</b> OMB task has communication – at least one TCP connection is established
<b>ERR</b> 	<b>Duo LED red/green</b>		
	 (off)	Off	No communication error
	 (red)	Flashing cyclic with 2Hz (On/Off Ratio = 25 %)	System error
	 (red)	On	Communication error active
<b>LINK/RJ</b> 45 Ch0 & Ch1	<b>LED green</b>		
	 (green)	On	A connection to the Ethernet exists
	 (off)	Off	The device has no connection to the Ethernet
<b>ACT/RJ</b> 45 Ch0 & Ch1	<b>LED yellow</b>		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 76: LEDs Open Modbus/TCP

### 10.3.8 LEDs POWERLINK Controlled Node

The subsequent table describes the meaning of the LEDs for the comX Real-Time Ethernet communication modules (COMX 100CA-RE/ COMX 100CN-RE) when the firmware of the Powerlink Controlled Node/Slave protocol is loaded to the comX communication module. This description is valid from stack version V2.1 respectively from stack version V3.0.
















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

Table 77: 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 approximately 10 Hz: on for approximately 50 ms, followed by off for 50 ms. Red and green LEDs shall be on alternately.
Blinking (2,5 Hz)	The indicator turns on and off with a frequency of approximately 2.5 Hz: on for approximately 200 ms, followed by off for 200 ms. Red and green LEDs shall be 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 78: LED state definitions for the POWERLINK Controlled Node protocol

### 10.3.9 LEDs PROFINET IO-Controller (V2)

The subsequent table describes the meaning of the LEDs for the comX Real-Time Ethernet communication modules (COMX 100CA-RE/ COMX 100CN-RE) when the firmware of the PROFINET IO Controller protocol is loaded to the comX communication module. This description is valid for stack version V2.












LED	Color	State	Meaning
<b>SF</b> 	<b>Duo LED red/green</b>		
	 (red)	On	<b>(together with BF „red ON“)</b> <b>No valid Master license</b>
	 (red)	Flashing cyclic at 2 Hz	<b>System error:</b> Invalid configuration, Watchdog error or internal error
	 (off)	Off	No error
<b>BF</b> 	<b>Duo LED red/green</b>		
	 (red)	On	<b>No Connection:</b> No Link. or <b>(together with SF „red ON“)</b> <b>No valid Master license</b>
	 (red)	Flashing cyclic at 2 Hz	<b>Configuration fault:</b> not all configured IO-Devices are connected.
	 (off)	Off	No error
<b>LINK/RJ45</b> Ch0 & Ch1	<b>LED green</b>		
	 (green)	On	A connection to the Ethernet exists
	 (off)	Off	The device has no connection to the Ethernet
<b>RX/TX/RJ45</b> Ch0 & Ch1	<b>LED yellow</b>		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 79: LEDs PROFINET IO-RT Controller

### 10.3.10 LEDs PROFINET IO-Controller (V3)

The subsequent table describes the meaning of the LEDs for the comX Real-Time Ethernet communication modules (COMX 100CA-RE/ COMX 100CN-RE) when the firmware of the PROFINET IO-RT Controller protocol is loaded to the comX communication module. This description is valid from stack version V3.0.




















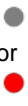















SYS	SF	BF	Meaning
System Status	System Failure	Bus Failure	LED name
yellow/green	<b>COM 0</b> red/green	<b>COM 1</b> red/green	General LED name Colours of the Duo LEDs SYS, SF or BF
<b>Firmware and Configuration</b>			
 Off	 Off	 Off	Power supply for the device is missing or hardware defect.
 On, yellow	 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).
<b>PROFINET communication</b>			
 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.
<b>PROFINET IO Controller operation</b>			
 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 80: PROFINET IO Controller, SYS, COM0 and COM1 LEDs states





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

Table 81: 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 82: PROFINET IO Controller, LEDs states definitions



### 10.3.11 LEDs PROFINET IO-Device

The subsequent table describes the meaning of the LEDs for the comX Real-Time Ethernet communication modules (COMX-CA-RE/ COMX-CN-RE) when the firmware of the PROFINET IO-RT-Device protocol is loaded to the comX communication module.












LED	Color	State	Meaning
<b>SF</b> 	<b>Duo LED red/green</b>		
	 (red)	On	Watchdog timeout; channel, generic or extended diagnosis present; system error
	 (red)	Flashing cyclic at 2 Hz (for 3 sec.)	DCP signal service is initiated via the bus
	 (off)	Off	No error
<b>BF</b> 	<b>Duo LED red/green</b>		
	 (red)	On	No configuration; or low speed physical link; or no physical link
	 (red)	Flashing cyclic at 2 Hz	No data exchange
	 (off)	Off	No error
<b>LINK/RJ45</b> Ch0 & Ch1	<b>LED green</b>		
	 (green)	On	A connection to the Ethernet exists
	 (off)	Off	The device has no connection to the Ethernet
<b>RX/TX/RJ45</b> Ch0 & Ch1	<b>LED yellow</b>		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 83: LEDs PROFINET IO-RT-Device

### 10.3.12 LEDs Sercos-Master

The subsequent table describes the meaning of the LEDs for the comX Real-Time Ethernet communication modules (COMX-CA-RE/ COMX-CN-RE) when the firmware of the Sercos Master protocol is loaded to the comX communication module.





















LED	Color	State	Meaning
<b>STA</b> 	<b>Duo LED red/green</b>		
	 (green)	Blinking	<b>CP0:</b> Communication phase 0
	 (green)	Flickering	Master isn't configured and is in NRT. After a status change this isn't indicated again
	 (green)	Single Flash	<b>CP1:</b> Communication phase 1
	 (green)	Double Flash	<b>CP2:</b> Communication phase 2
	 (green)	Triple Flash	<b>CP3:</b> Communication phase 3
	 (green)	On	<b>CP4:</b> Communication phase 4
	 (off)	Off	<b>NRT:</b> Non Real-time Mode
<b>ERR</b> 	<b>Duo LED red/green</b>		
	 (red)	Blinking	Error in the configuration database.
	 (red)	Flickering	Boot-up was stopped due to an error.
	 (red)	Single Flickering	Channel Init was executed at the Master.
	 (red)	Quadruple Flash	No Master license present in the device
	 (red)	Triple Flash	DPM Watchdog has expired.
	 (red)	Double Flash	Internal Stop of the bus cycle
	 (red)	Single Flash	Bus Sync Error Threshold
	 (off)	Off	No error
<b>L/A/RJ45</b> Ch0 & Ch1	<b>LED green</b>		
	 (green)	On	Link: A connection to the Ethernet exists
	 (green)	Flashing	Activity: The device sends/receives Ethernet frames
	 (off)	Off	The device has no connection to the Ethernet
<b>RJ45</b> Ch0 & Ch1	<b>LED yellow</b>		
	-	-	This LED is not used.

Table 84: LEDs Sercos Master

**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 85: LED State Definition for Sercos Master for the STA and ERR LEDs*

### 10.3.13 LEDs Sercos-Slave

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

















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

Table 86: 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: <i>one color:</i> On for appr. 250 ms, followed by off for appr. 250 ms. <i>two colors:</i> 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 87: LED state definitions for the Sercos Slave protocol*

### 10.3.14 LEDs VARAN Client

The subsequent table describes the meaning of the LEDs for the comX communication module when the firmware of the VARAN Client protocol is loaded into the device.












LED	Color	State	Meaning
<b>RUN</b> 	<b>Duo LED red/green</b>		
	 (off)	Off	Not configured.
	 (green)	Blinking	Configured and communication is inactive.
	 (green)	On	Configured and communication is active.
<b>ERR</b> 	<b>Duo LED red/green</b>		
	 (off)	Off	Configured.
	 (red)	Blinking	Not configured.
	 (red)	On	Communication error occurred.
<b>LINK</b> RJ45 Ch0 & Ch1	<b>LED green</b>		
	 (green)	On	A connection to the Ethernet exists
	 (off)	Off	The device has no connection to the Ethernet
<b>ACT</b> RJ45 Ch0 & Ch1	<b>LED yellow</b>		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 88: LEDs VARAN Client

#### LED State Definition for VARAN Client for the RUN and ERR LEDs

Indicator state	Definition
On	The indicator is constantly on.
Off	The indicator is constantly off.
Blinking	The indicator turns on and off with a frequency of 5 Hz: on for 100 ms, followed by off for 100 ms.

Table 89: LED State Definition for VARAN Client for the RUN and ERR LEDs

# 11 Troubleshooting

In case of any error, please follow the hints given here in order to solve the problem:

## General

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



**Important:** In any case, update older versions of the **cifX Device Driver** to the current version, see *Table 2: Reference to Software..*

Further information on this topic you can find in section “*Prerequisites for the Operation of the comX Communication Modules*” on page 40.

## 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

- Check using the LINK LED status, 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 the 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 which possibility should be considered.

During the construction of the device it must be taken into account, that at least one of the two diagnostic interfaces which are suited for firmware update must be accessible, i.e. connected to the outside.

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) being a sophisticated and powerful diagnostic tool or alternatively via the cifX test application as a lean and compact diagnostic tool which is easy to use.

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

#### 12.1.1 Update the comX-Firmware in built-in State(Embedded System)

For firmware update in built-in state (i.e. as embedded system, the following two solutions are available:



### 12.1.1.1 Set-up A1: Updating the Firmware with SYCON.net via the USB-Interface

This set-up is used for updating the firmware of an embedded system via the USB interface from an external PC.



#### Necessary preconditions:

1. The USB interface of the comX communication module must be leaded through and connected to the outside of the device into which the comX communication module has been built in.
2. SYCON.net has been installed at the PC.

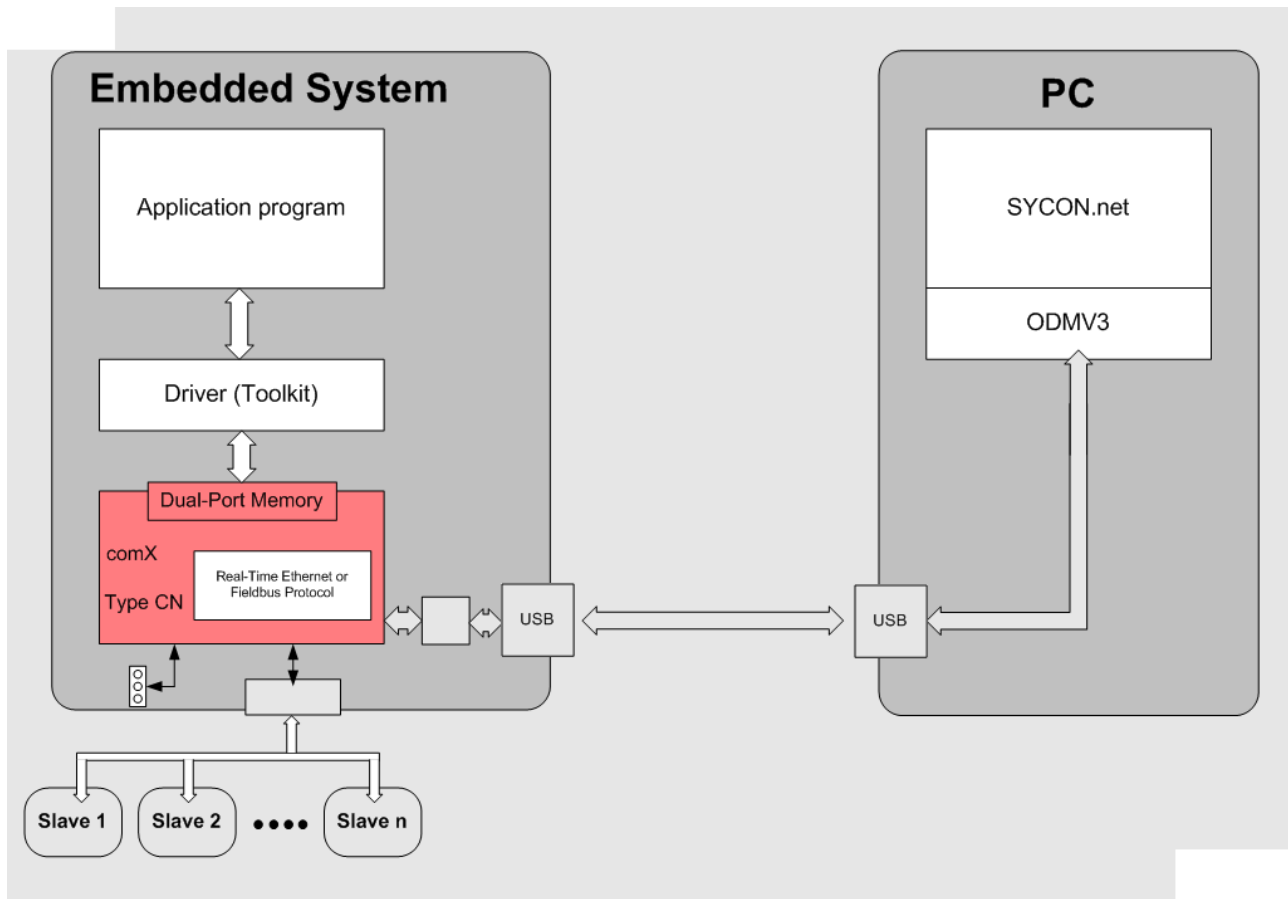


Figure 45: Set-up A1: Updating the Firmware with SYCON.net via the USB-Interface



**Note:** Read in section *Update the Firmware with SYCON.net* on page 159 how you can update the firmware of a comX communication module with SYCON.net.

### 12.1.1.2 Set-up A2: Updating the Firmware with SYCON.net via the Serial Interface

This set-up is used for updating the firmware of an embedded system via the serial interface from an external PC.



#### Necessary preconditions:

1. The serial interface of the comX communication module must be leaded through and connected to the outside of the device into which the comX communication module has been built in.
2. SYCON.net has been installed at the PC.

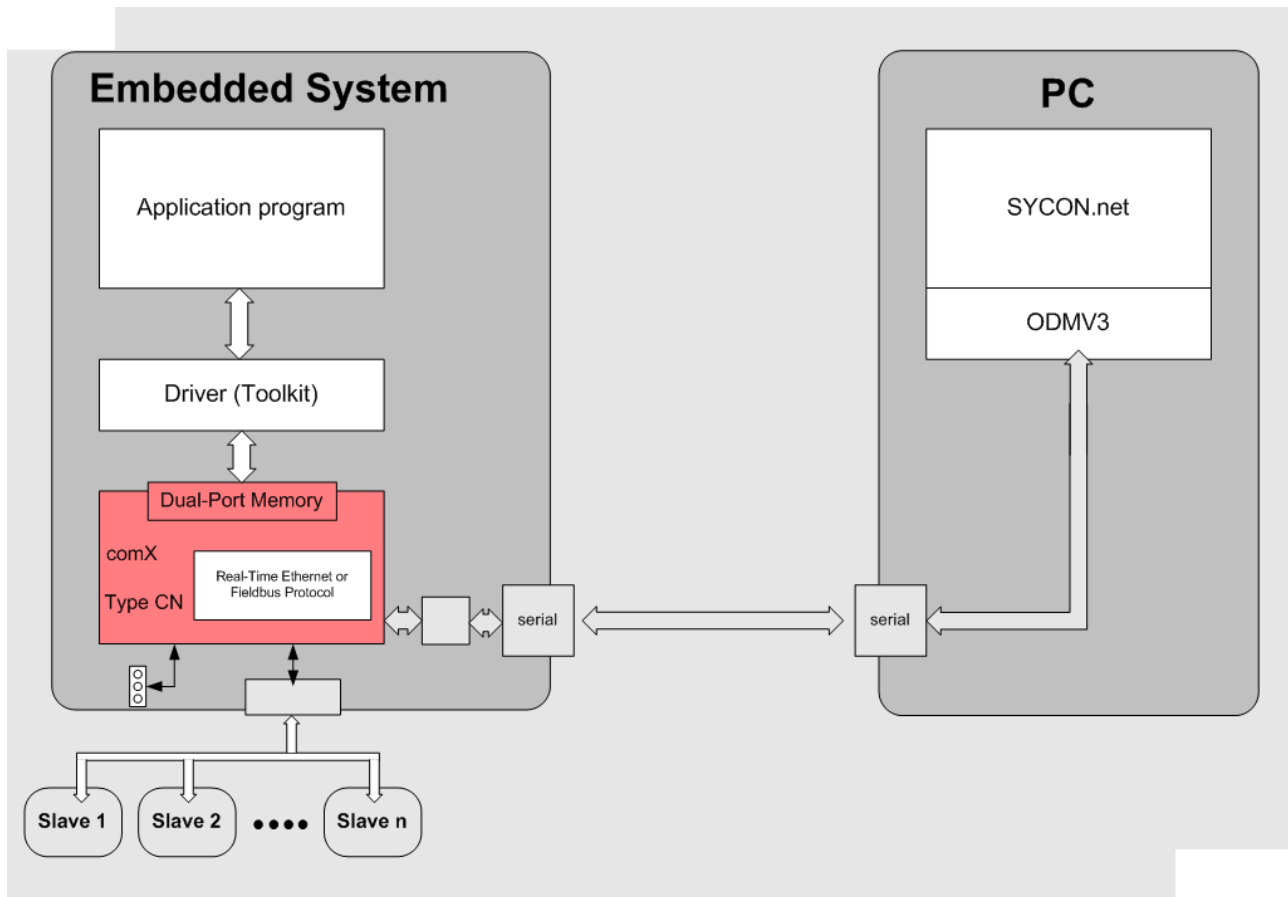


Figure 46: Set-up A2: Updating the Firmware with SYCON.net via the Serial Interface



**Note:** Read in section *Update the Firmware with SYCON.net* on page 159 how you can update the firmware of a comX communication module with SYCON.net.

### 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 available:

### 12.1.2.1 Set-up B1: Updating the Firmware with SYCON.net via the Serial Interface

This set-up is used for updating 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 preconditions:

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 has been installed at the (external) PC.

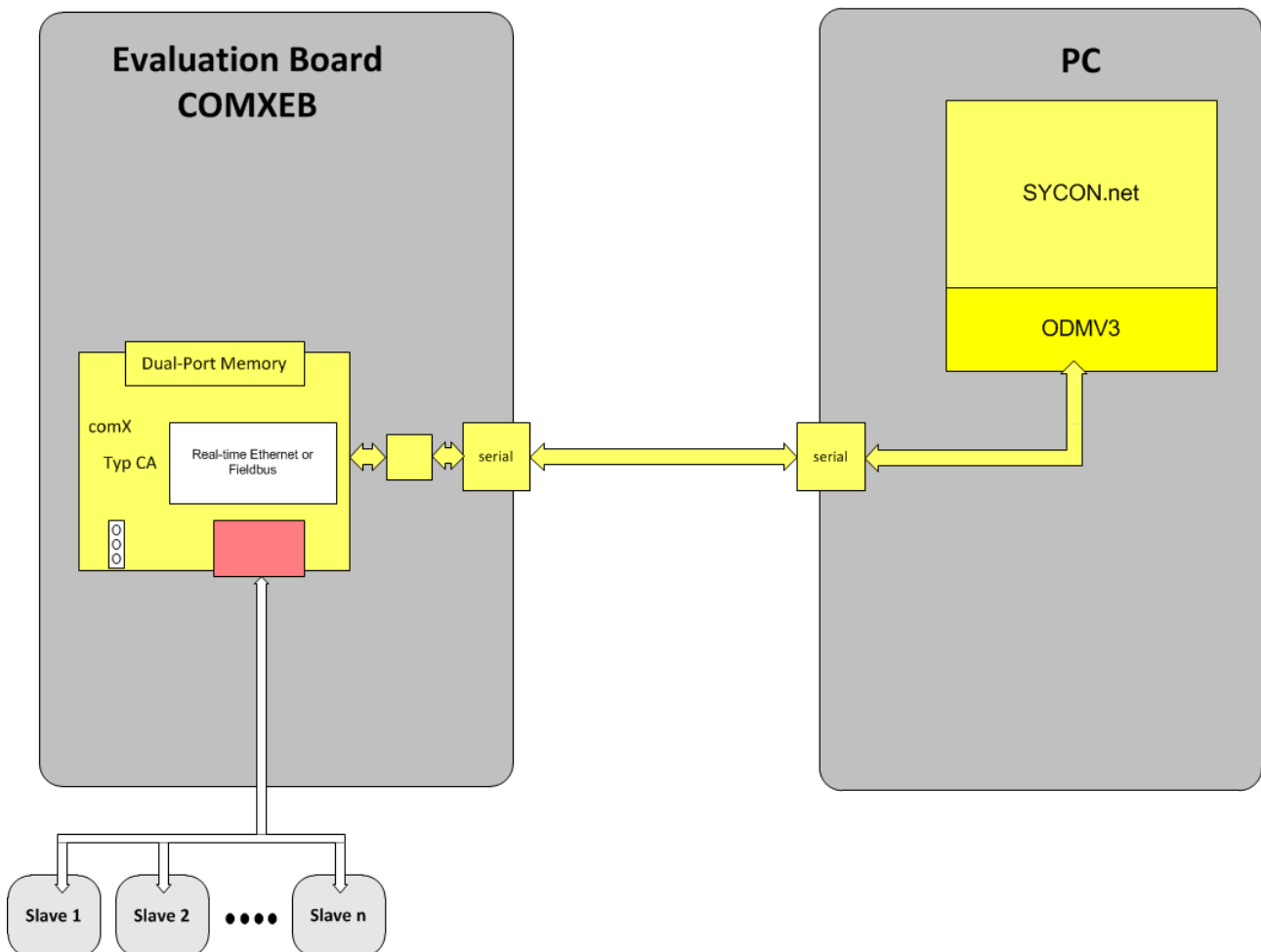


Figure 47: Set-up B1: Firmware update with SYCON.net via the serial interface using evaluation board COMXEB



**Note:** Read in section “Update the Firmware with SYCON.net” on page 159 how you can update the firmware of a comX communication module with SYCON.net.

### 12.1.2.2 Set-up B2: Updating the Firmware with SYCON.net via the USB Interface

This set-up is used for updating 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 preconditions:

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 has been installed at the (external) PC.

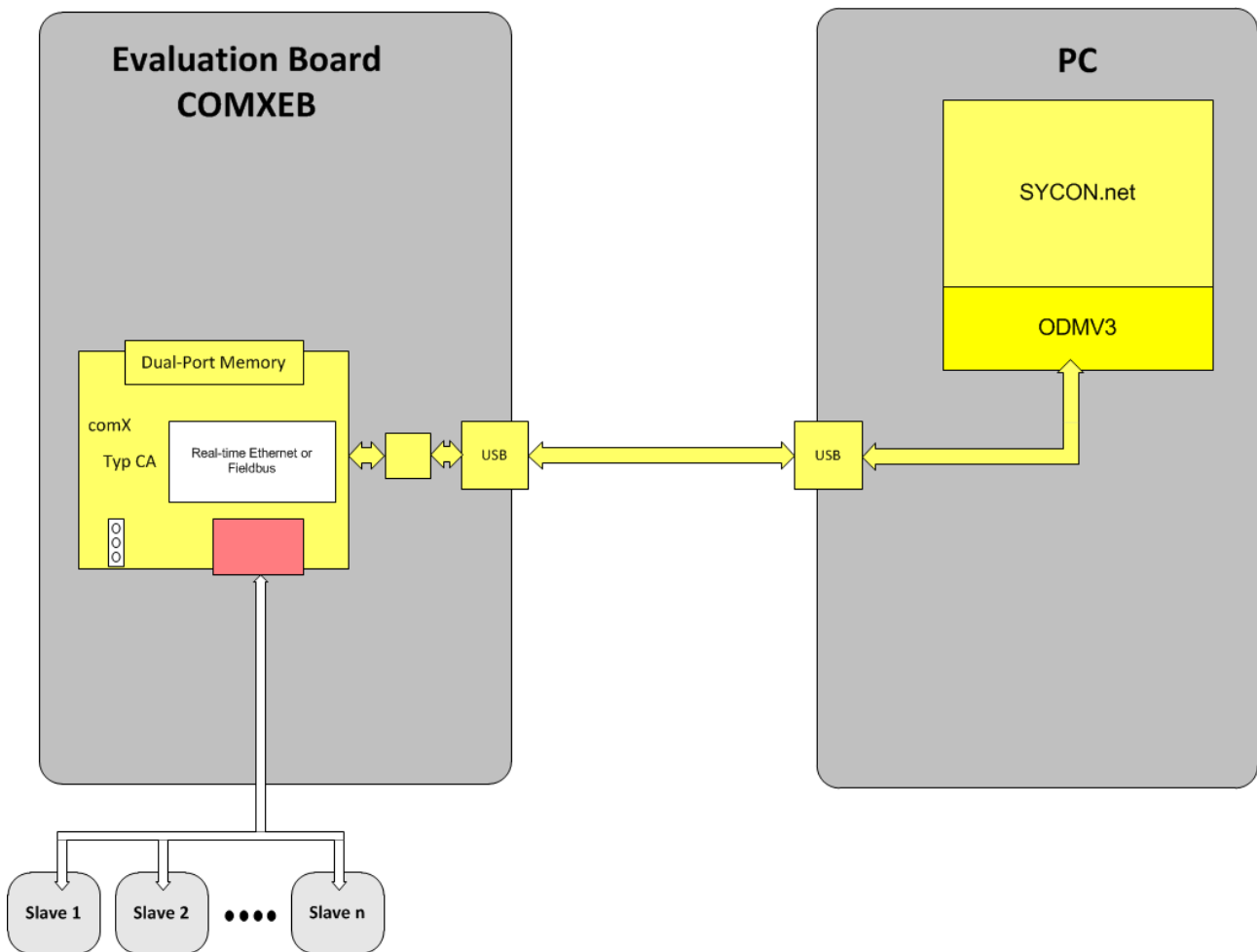


Figure 48: Set-up B2: Firmware update with SYCON.net via the USB interface using evaluation board COMXEB



**Note:** Read in section 12.2 “Update the Firmware with SYCON.net” on page 159 how you can update the firmware of a comX communication module with SYCON.net.

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

This set-up is used for updating 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 preconditions:

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 has been installed at the (external) PC.

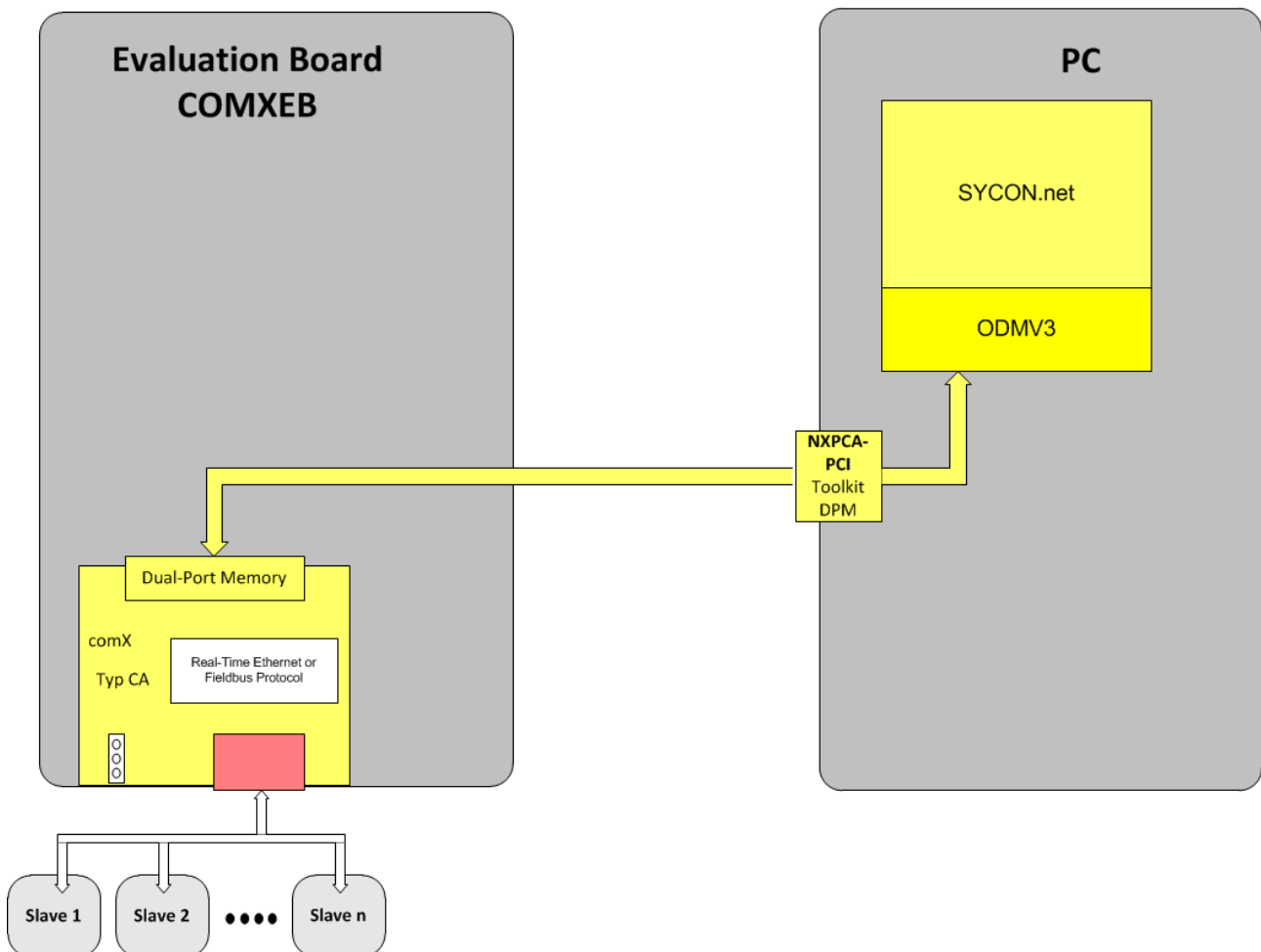


Figure 49: Set-up B3: Firmware update with SYCON.net via the NXPCA-PCI and DPM interface using evaluation board COMXEB

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

This set-up is used for updating 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 preconditions:

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 has been installed at the (external) PC.

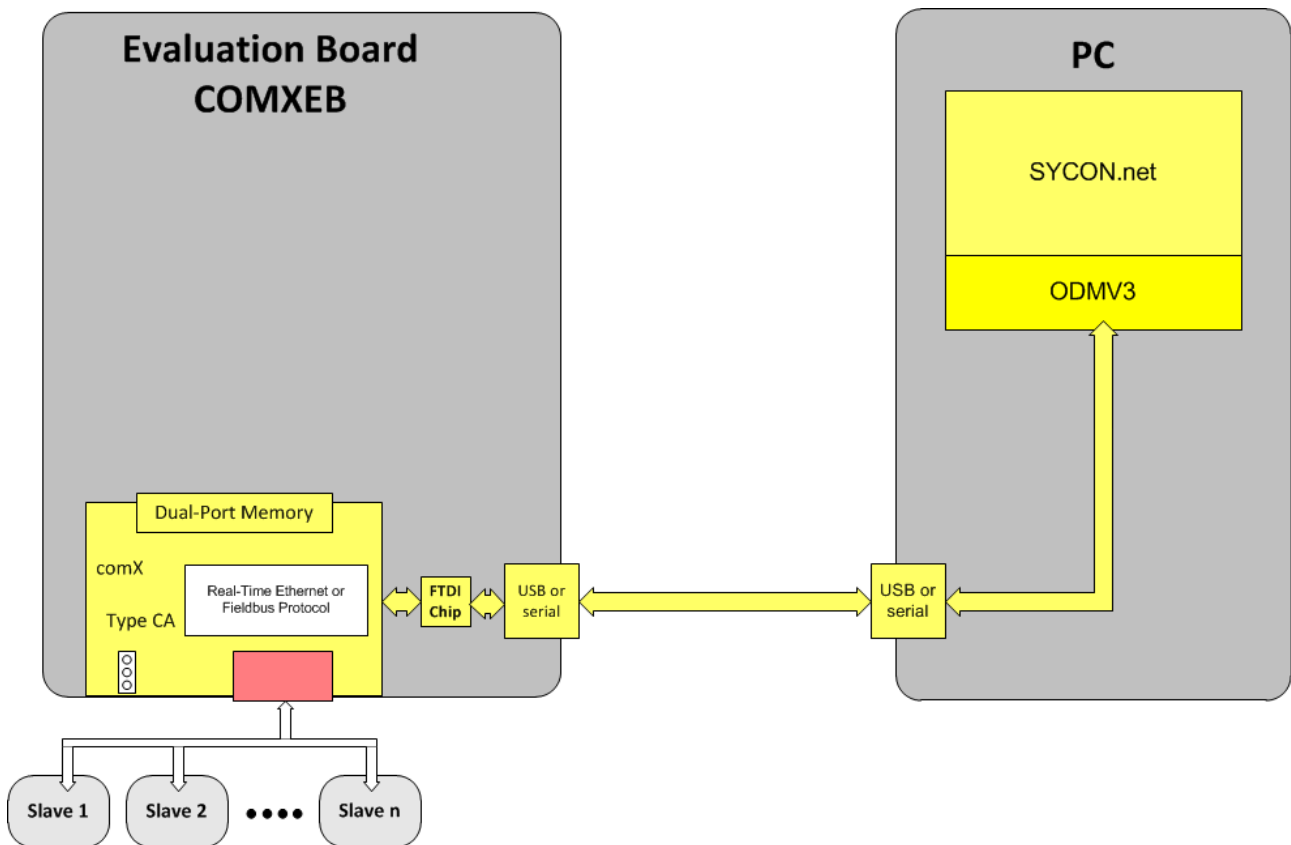


Figure 50: Set-up B4: Updating the Firmware with SYCON.net via SPM over USB

## 12.2 Update the Firmware with SYCON.net

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

This can be accomplished both via a USB connection and via 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 update can also be performed 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 the Firmware with SYCON.net via the Serial Interface*” and “*Set-up B2: Updating the Firmware with SYCON.net via the USB Interface*”. In this case SYCON.net has to be applied in conjunction with the netX Driver.

- In order to start the System Configurator SYCON.net selects the following entry in the Windows starting menu.

**Programs > SYCON.net System Configurator > SYCON.net**

- The System Configurator SYCON.net is opened.

You can 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*.

In order to update the firmware of the comX communication module with SYCON.net, the following three steps are necessary, which have to be performed exactly in the given order:

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

The selection of the driver must be done taking into account the update method to be applied, as described above.

Access from SYCON.net to the comX communication module is done via the netX driver.

- Select the “*netX Driver*” by checking the according **checkbox for “netX Driver”**.



**Note:** This is described in section 3.2.1 “*Selecting the Driver*” of the corresponding SYCON.net DTM Manual.

More valuable information concerning this topic can be found in 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*”.

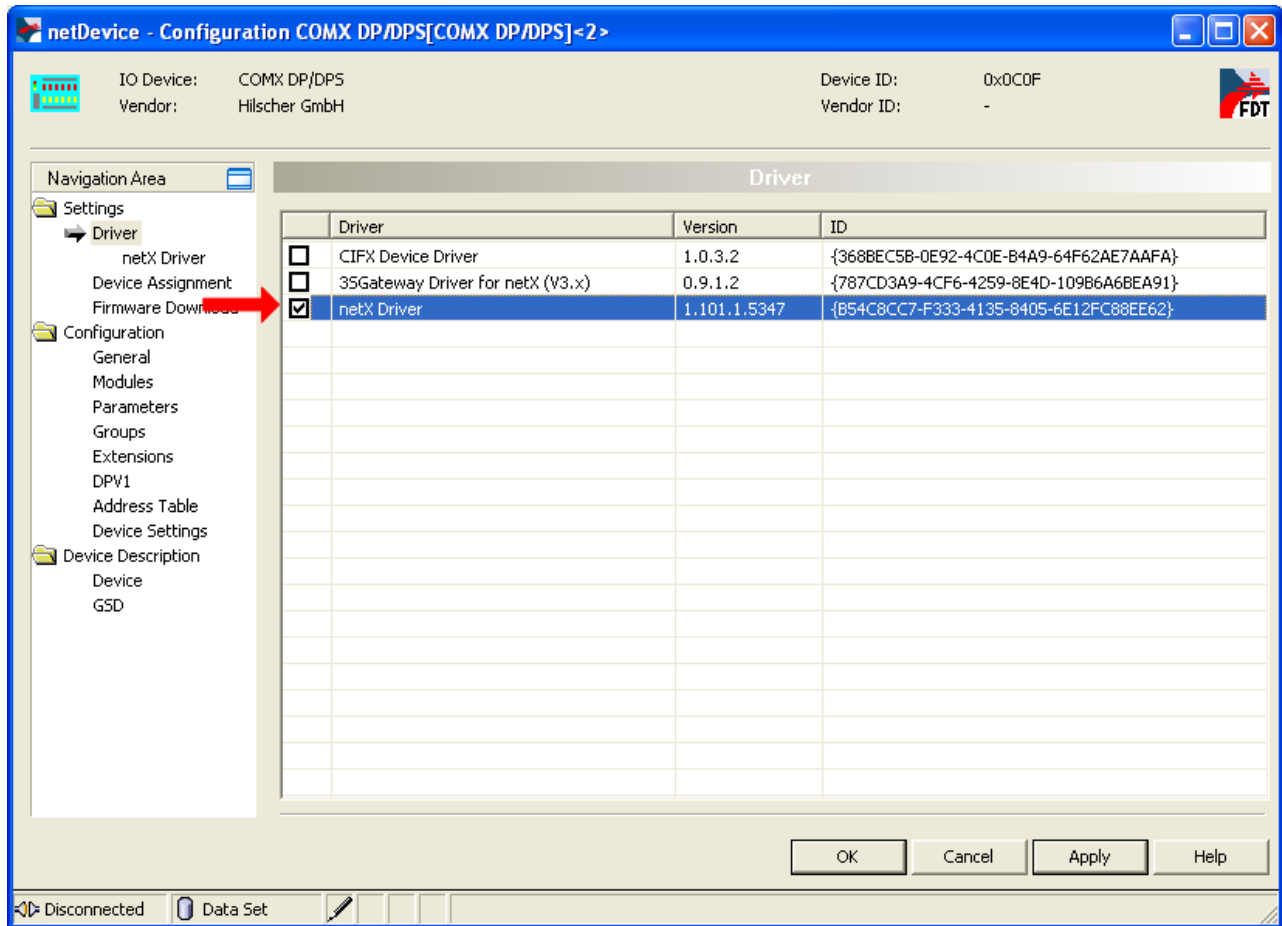


Figure 51: Selection of netX Driver

**Note:**

The selection of the device can be done as explained in section „*Device Assignment*“ of the according SYCON.net DTM manual.

- We recommend only to display the suitable devices when performing the following steps. Select „*Suitable only*“ in the combo box „*Device selection*“.
- In order to start the search process for suitable devices, click at the button „*Search*“ (see *Figure 52: Starting the Search Process for Devices and Selection of Device* on page 161, at the red arrow right on top).
- For the selection of 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 161, at the red arrow in the center part of the figure).



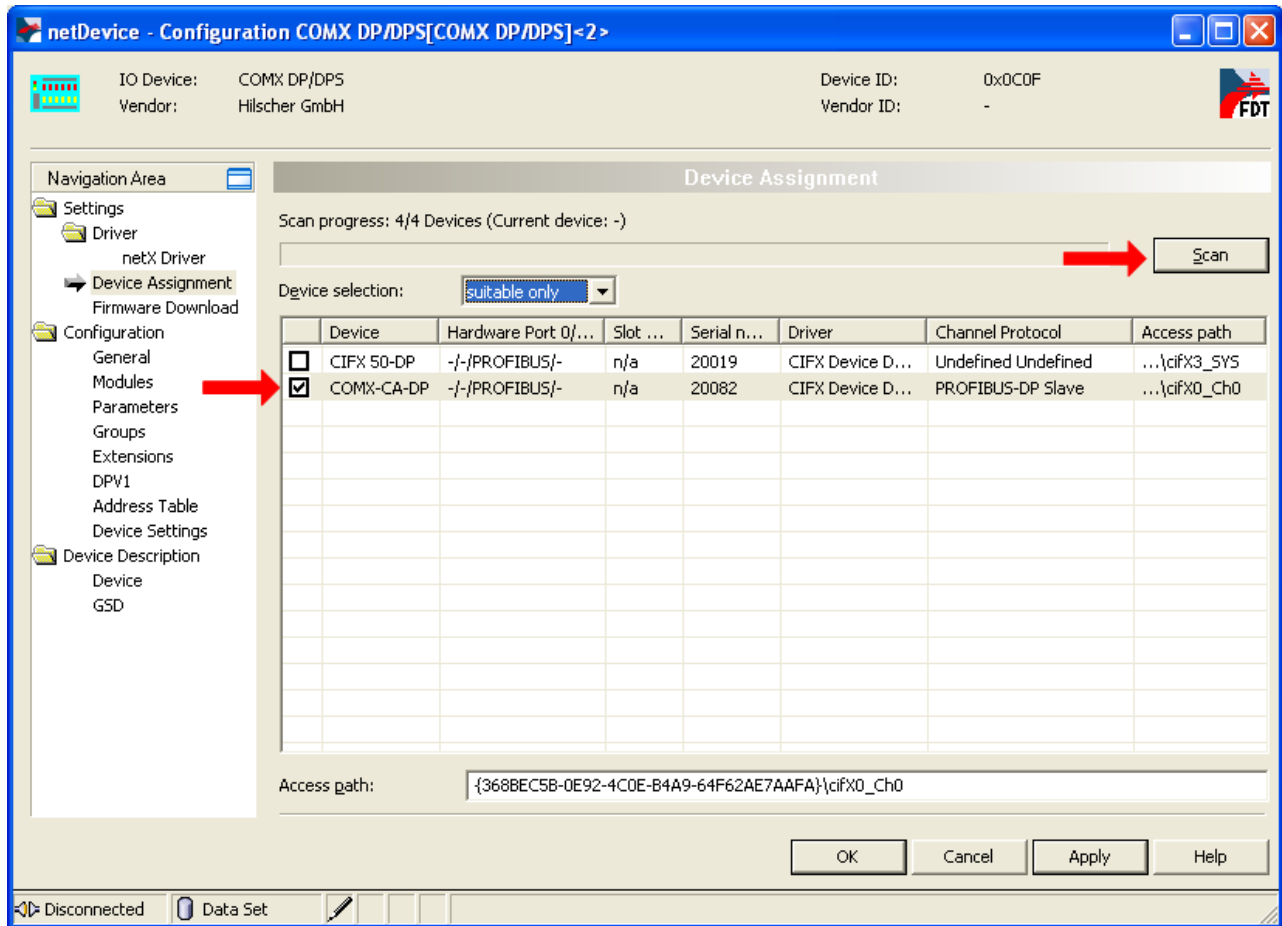


Figure 52: Starting the Search Process for Devices and Selection of Device

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**.
- Open a file selection dialog by clicking at the button „Select“ (Figure 53: Firmware Download with SYCON.net (after Selection of the Firmware), see ① right at the top).
- In this dialog select the firmware file to be loaded.
- Then, the screen should look like this:

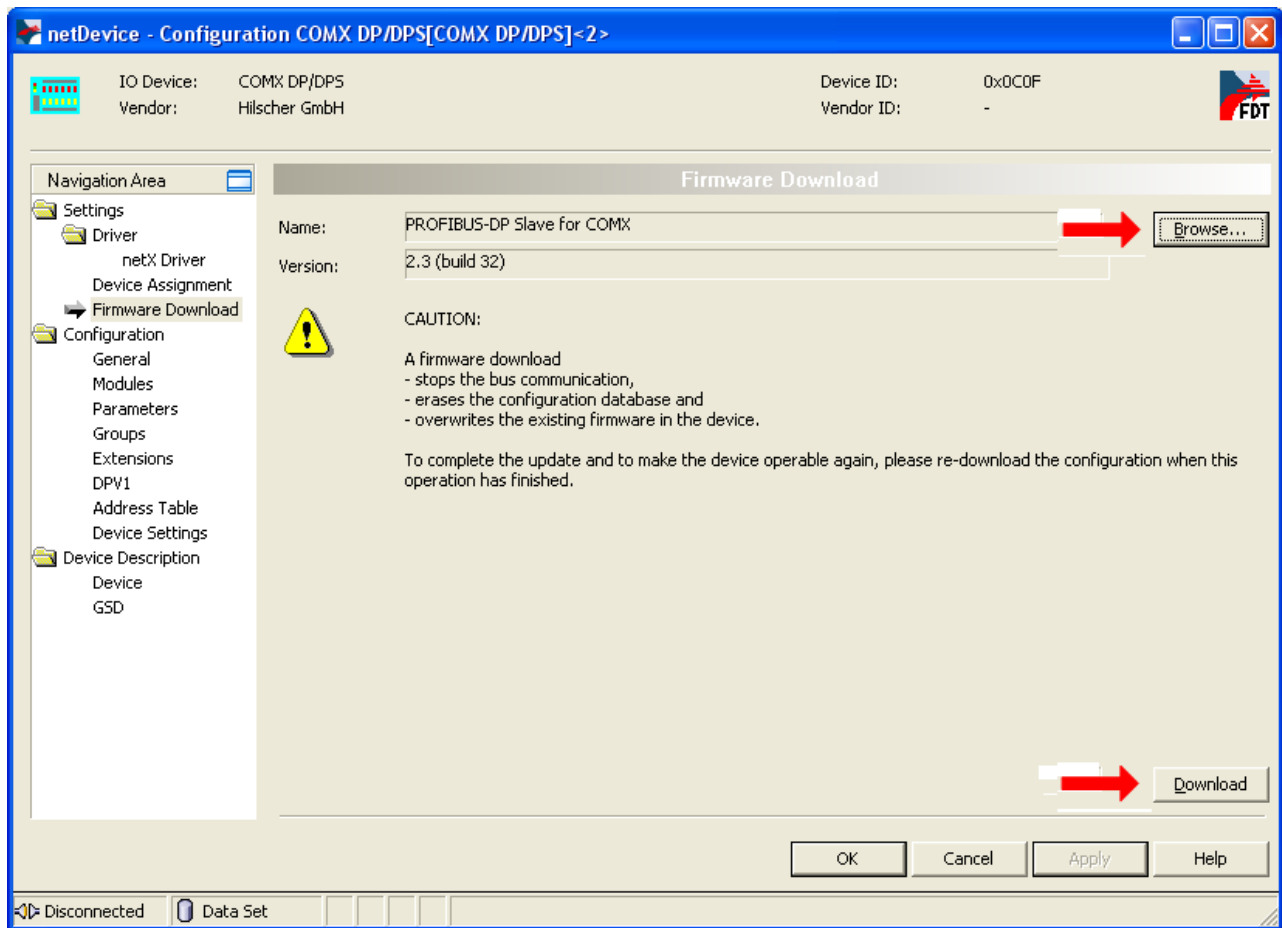


Figure 53: Firmware Download with SYCON.net (after Selection of the Firmware)


- In order to start the firmware update process, click at „Load“ (Figure 53: Firmware Download with SYCON.net (after Selection of the Firmware) see ②).





**Important:** Take care of the warning message issued within the window. A reconstruction of the state prior to starting the firmware update might be impossible.


## 12.2.1 Troubleshooting



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


Problem	<p>The error message</p>  <p>appears.</p>
Explanation 1	The loaded file does not contain firmware for any Hilscher device (neither for comX nor for any other Hilscher device).
Action 1	Load a correct firmware file, see <i>Table 3: Reference to Firmware</i> on page 13!
Explanation 2	At update possibility B1: the adapter card has either only bad contact to the PCI carrier board or no contact at all.
Action 2	Check whether the adapter card is mounted correctly.
Explanation 3	At update possibility B1: the comX communication module has either bad contact to the adapter card or no contact at all.
Action 3	Check whether the comX communication module is mounted correctly.

Problem	<p>The error message</p>  <p>appears.</p>
Explanation 1	The connection to the comX communication module has been lost due to contact problems.
Action 1	Check whether the comX communication module and in case of update possibility B1 the adapter card is mounted correctly.
Explanation 2	<p>At update possibility A1, A2 and B2:</p> <p>The connection to the comX communication module has been lost due to contact problems at the serial or USB connection.</p>
Action 2	At update possibility A1, A2 and B2: Check whether the serial cable or the USB cable has correct contact.

Problem	<p>The error message</p>  <p>appears.</p>
Explanation 1	The connection to the comX communication module has been lost due to contact problems.
Action 1	Check whether the comX communication module and in case of update possibility B1 the adapter card is mounted correctly.
Explanation 2	<p>At update possibility A1, A2 and B2:</p> <p>The connection to the comX communication module has been lost due to contact problems at the serial or USB connection.</p>
Action 2	At update possibility A1, A2 and B2: Check whether the serial cable or the USB cable has correct contact.

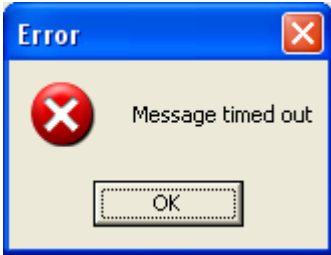
Problem	<p>The error message</p>  <p>appears.</p>
Explanation	The device classes do not match. The selected firmware file contains a Hilscher firmware which is not suited for the comX communication module but for another Hilscher product (in this case for instance a cifX card).
Action	Select a firmware suitable for the comX communication module by clicking at <i>Select</i> and selecting the firmware within the subsequent file selection dialog. See <i>Table 3: Reference to Firmware</i> on page 13. Finally, load this firmware into the comX communication module by clicking at <i>Download</i> .

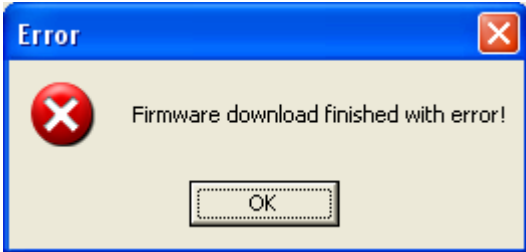
Problem	<p>The error message</p>  <p>appears.</p>
Explanation	<p>The communication classes do not match. Either the firmware file to be loaded is suited for a Master/Scanner/Controller and the installed comX communication module requires a Slave/ Adapter/ Device firmware or firmware file to be loaded is suited for a Slave/ Adapter/ Device and the installed comX communication module requires a Master/Scanner/Controller firmware.</p> <p>If a change from Master to Slave or vice versa is intended and a Master license is present, then click at Yes to perform the intended change. In all other cases click at No.</p>
Action	<p>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.</p>
Problem	<p>The error message</p>  <p>appears.</p>
Explanation	<p>The protocol classes do not match. The selected firmware does not support any protocol suited for the selected comX communication module. This error situation mostly occurs in conjunction with the two error situations discussed directly above, see the illustration.</p>
Action	<p>Use a suitable firmware for a protocol that is supported by your comX communication module.</p> <p>If a change of the Real-Time Ethernet System is intended and you use a comX Real-Time Ethernet Module (such as COMX 100CA-RE, COMX 100CN-RE), click at Yes in order to perform the intended change. In all other cases click at No.</p>

Problem	<p>The error message</p>  <p>appears.</p>
Explanation	The protocol classes do not match. The selected firmware does not support any protocol suited for the selected comX communication module. This error situation mostly occurs in conjunction with the two error situations discussed directly above, see the illustration.
Action	<p>Use a suitable firmware for a protocol that is supported by your comX communication module.</p> <p>If a change of the Real-Time Ethernet System is intended and you use a comX Real-Time Ethernet Module (such as COMX 100CA-RE, COMX 100CN-RE), click at <i>Yes</i> in order to perform the intended change. In all other cases click at <i>No</i>.</p>

Problem	The error message <i>"Invalid Firmware for the assigned device. The hardware options do not match..."</i> appears.
Explanation	The hardware options do not match, i.e. either you use a Real-Time Ethernet-firmware in conjunction with a Fieldbus communication module, or vice versa, a Fieldbus firmware in conjunction with a Real-Time Ethernet communication module.
Action	<p>Click at <i>No</i> and use a firmware suitable for a protocol that is supported by your comX communication module.</p> <p>If the option <i>Yes</i> is clicked at, a non-conforming firmware is loaded and the module will not operate correctly.</p>

Problem	The button <i>Download</i> in screen <i>Firmware Download</i> is grayed out and thus deactivated.
Explanation	There is a (not necessarily permanent) contact problem.
Action	Check whether the comX communication module and the adapter card are mounted correctly and have good electrical contact. Then, click the button <i>Select</i> and again select the firmware file to be loaded using the subsequent file selection dialog. Afterwards, the button <i>Download</i> should not be grayed out anymore.

Problem	<p>The error message</p>  <p>appears.</p>
Explanation	A message timeout has occurred. The connection to the comX communication module has been lost due to contact problems, while the button <i>Select</i> has been clicked..
Action	Check whether the comX communication module and in case of update possibility B1 the adapter card has been mounted correctly.

Problem	<p>The error message</p>  <p>appears.</p>
Explanation	At update possibility A1, A2 and B2: The firmware download has been finished with an error due to the serial or USB connection to the comX communication module having been lost during the firmware download.
Action	At update possibility A1, A2 and B2: Check whether the serial cable or the USB cable has correct contact.

*Table 90: Possible Causes of Errors, their Consequences and necessary Actions for their Removal at Firmware Update with SYCON.net*

If problems should occur at the firmware download, you should also check the following additional topics:

- If you intend to load a Master firmware: is a Master license present and loaded. If not, a Master license has to be purchased at Hilscher and must be loaded.
- Is the switch *Byte/Word* of the PCI carrier board CIF 50-CB-COM-ABC in position „*Word*“? If necessary, switch to „*Word*“!
- Especially for update possibility B1: Check the revision number of the 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 not capable for connecting comX modules.
- Has the System Configurator SYCON.net been installed correctly
- Is the correct device selected within SYCON.net?

## 13 Diagnostic Interfaces

In general, as Diagnostic Interfaces USB and serial interface are available.

### 13.1 Support of Diagnostic Interfaces by comX Firmware

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

Firmware file name	Fieldbus system	Minimum allowed version number of firmware for use of USB or serial interface
COMXCOM.NXF	CANopen Master	From V2.2.5.0
COMXCOS.NXF	CANopen Slave	From V2.4.4.0
M0505000.NXF	CANopen Slave comX10	From V3.0.3.0
M0509000.NXF	CC-Link Slave comX10	From V2.6.1.0
COMXDNS.NXF	DeviceNet Master	From V2.2.7.0
COMXDNS.NXF	DeviceNet Slave	From V2.2.7.0
M0507000.NXF	DeviceNet Slave comX10	From V2.3.5.0
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
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
M0502000.nxf	PROFIBUS DP Slave comX10	From V2.4.1.0
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 91: Firmware Versions with Support for Diagnostic Interface

The following firmwares do 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 Hint concerning the Usage of the Software

The USB interface, the serial interface as well as the cifX Device Driver may only be used exclusively by **one** software, that is

- 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:** Never use the listed software simultaneously, otherwise this will result in communication problems with the device.

If the SYCON.net configuration software was used on the PC, then stop the ODMV3 service before you use one of the other software listed above.

- Therefore, select **Service > Stop** from the context menu of the ODMV3 system tray icon.

## 13.3 Hardware Modification of comX Module for Recognition of comX-Reset at a connected Windows®-Diagnosis PC

The following table indicates at which hardware revision of the comX module the electronic circuit of the USB interface has been changed:

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 50CA-CCS (firmware does not support USB)	3
COMX 100CA-RE	7
COMX 100CN-RE	2

Table 92: First Hardware Version with new USB Interface

This modification was necessary in order to enable 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.

comX 10 modules and comX 51 modules always allow recognition of a comX reset by a Diagnosis PC under Windows®.



**Note:** If you use a comX communication module of a former hardware revision, it is necessary to pull away the USB cable from the USB connector and then plug it again after a reset of the comX communication module (which, for instance occurs after a firmware download)

## 14 Technical Data



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

### 14.1 Technical Data of COMX Modules

#### 14.1.1 COMX 100CA-RE

<b>COMX 100CA-RE</b>	Part number	1531.100
<b>Communication Controller</b>	Type	netX 100/500 Processor
<b>Integrated Memory</b>	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>Ethernet Communication</b>	Ethernet-Standard/ Frame type	IEEE 802.3/ Ethernet II
	Supported Real-Time Ethernet communication standard/ firmware	Determined by loaded firmware.: 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, TCP/IP, VARAN Client (Slave)
<b>Ethernet interface</b>	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)
	<a href="#">Half duplex/full duplex</a>	supported (at 100 MBit/s)
	<a href="#">Auto-Negotiation/Auto-Crossover</a>	(depending on the loaded firmware)
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	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)
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx. 700...750 mA / 2.5 W
<b>Environment</b>	Ambient temperature range (Rev. 8)	Operation: 0°C...+65°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 93: Technical Data COMX 100CA-RE

## 14.1.2 COMX 100CN-RE



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

<b>COMX 100CN-RE</b>	Part number	1531.101
<b>Communication Controller</b>	Type	netX 100/500 Processor
<b>Integrated Memory</b>	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>Ethernet Communication</b>	Ethernet-Standard/ Frame type	IEEE 802.3/ Ethernet II
	Supported Real-Time Ethernet communication standard/ firmware	Determined by loaded firmware.: 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, TCP/IP, VARAN Client (Slave)
<b>Ethernet interface</b>	Hardware	30 Pin SMT connector, female, Grid 1.27 mm, see COMX Design Guide. Fitting to a 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)
	<a href="#">Half duplex/full duplex</a>	supported (at 100 MBit/s)
	<a href="#">Auto-Negotiation/Auto-Crossover</a>	(depending on the loaded firmware)
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status
		COM0, COM1 Communication Status
		TX/RX0, TX/RX1 Ethernet activity status
		LINK0, LINK1 Ethernet link status
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx. 700...750 mA / 2.5 W
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+60°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 94: Technical Data COMX 100CN-RE

### 14.1.3 COMX 100CA-CO

<b>COMX 100CA-CO</b>	Part number	1531.500
<b>Communication Controller</b>	Type	netX 100/500 Processor
<b>Integrated Memory</b>	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>CANopen communication</b>	Supported communication standard	CANopen
<b>CANopen interface</b>	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
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
		CAN Communication status (green: STA, red: ERR)
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx. 450...480 mA / 1.5..1.6 W
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+65°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 95: 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.

## 14.1.4 COMX 100CN-CO

<b>COMX 100CN-CO</b>	Part number	1532.500
<b>Communication Controller</b>	Type	netX 100/500 Processor
<b>Integrated Memory</b>	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>CANopen communication</b>	Supported communication standard	CANopen
<b>CANopen interface</b>	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
	Diagnostic interfaces/ signals	<u>UART</u> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Diagnosis</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
<b>Display</b>		CAN Communication status (green: STA, red: ERR)
	Supply voltage	+3.3 V $\pm$ 5 % DC
<b>Power supply /Current consumption</b>	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 (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
<b>Environment</b>	Humidity range	10 ... 95 % relative humidity (non-condensing)
	Dimensions (L x W x H)	70 x 30 x 21.5 mm
<b>Device</b>	Weight	approx. 35-40 g
	Mounting/Installation	According to comX Design-Guide
	RoHS	yes
	CE Sign	yes
<b>CE Sign</b>	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
	System configurator	SYCON.net
<b>Configuration software</b>		

Table 96: 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.

### 14.1.5 COMX 100CA-DN

<b>COMX 100CA-DN</b>	Part number	1531.510
<b>Communication Controller</b>	Type	netX 100/500 Processor
<b>Integrated Memory</b>	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EEPROM
<b>System interface</b>	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
<b>DeviceNet -Communication</b>	Supported communication standard	DeviceNet
<b>DeviceNet interface</b>	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,
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
		MNS Module Network Status (green: MS, red: NS)
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx. 440...470 mA / 1.5..1.6 W
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+65°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 97: 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.

### 14.1.6 COMX 100CN-DN

<b>COMX 100CA-DN</b>	Part number	1532.510
<b>Communication Controller</b>	Type	netX 100/500 Processor
<b>Integrated Memory</b>	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EEPROM
<b>System interface</b>	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
<b>DeviceNet -Communication</b>	Supported communication standard	DeviceNet
<b>DeviceNet interface</b>	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,
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status
		MNS Module Network Status
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx. 440...470 mA / 1.5..1.6 W
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+65°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 98: 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.



### 14.1.7 COMX 100CA-DP

<b>COMX 100CA-DP</b>	Part number	1531.410
<b>Communication Controller</b>	Type	netX 100/500 Processor
<b>Integrated Memory</b>	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EEPROM
<b>System interface</b>	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
<b>PROFIBUS Communication</b>	Supported Communication Standard/Firmware	PROFIBUS DP
<b>PROFIBUS Interface</b>	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
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
		COM Communication status (green: STA, red: ERR)
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx. 430...460 mA / 1.5..1.6 W
<b>Environment</b>	Ambient temperature range	Operation: -20°C... +70°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 99: Technical Data COMX 100CA-DP



### 14.1.8 COMX 100CN-DP

<b>COMX 100CN-DP</b>	Part number	1532.410
<b>Communication Controller</b>	Type	netX 100/500 Processor
<b>Integrated Memory</b>	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>PROFIBUS Communication</b>	Supported Communication Standard/Firmware	PROFIBUS DP
<b>PROFIBUS Interface</b>	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
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status
		COM Communication Status
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx. 430...460 mA / 1.5..1.6 W
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+65°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 100: 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.

### 14.1.9 COMX 50CA-REFO

<b>COMX 50CA-REFO</b>	Part number	1551.110
<b>Communication Controller</b>	Type	netX 50 Processor
<b>Integrated Memory</b>	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EEPROM
<b>System interface</b>	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
<b>Ethernet Communication</b>	Ethernet-Standard/ Frame type	IEEE 802.3/ Ethernet II
	Supported Real-Time Ethernet communication standard/ firmware	PROFINET IO- Device (Slave))
<b>Optical Ethernet interface</b>	Hardware	2 x fiber optical transceivers Avago AFBR-5978Z with SC-RJ connector.
	Transmission rate	100 MBit/s
	<a href="#">Half duplex/full duplex</a>	supported (at 100 MBit/s)
	Conforms to AIDA standard	yes
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
		COM0, COM1 Communication Status (both green or red,)
		TX/RX0, TX/RX1 Ethernet activity status (yellow)
		LINK0, LINK1 Ethernet link status (green)
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx 950. mA / 3,14 W (at 3,3 V)
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+55°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	Dimensions (L x W x H)	70 x 30 x 21.5 mm
	Weight	approx. g
	Mounting/Installation	According to comX Design-Guide
	RoHS	yes
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 101: Technical Data COMX 50CA-REFO

### 14.1.10 COMX 51CA-RE

<b>COMX 51CA-RE</b>	Part number	1571.100
<b>Communication Controller</b>	Type	netX 51 Processor
<b>Integrated Memory</b>	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EEPROM
<b>System interface</b>	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
<b>SPI interface</b>	SPI Mode	SPI Slave, Mode 3
	CPOL	1
	CPHA	1
<b>Ethernet Communication</b>	Ethernet-Standard/ Frame type	IEEE 802.3/ Ethernet II
	Supported Real-Time Ethernet communication standard/ firmware	Determined by loaded firmware.: EtherCAT Slave, EtherNet/ Adapter(Slave), Open Modbus/TCP, PROFINET IO Device (Slave), Sercos Slave, TCP/IP
<b>Ethernet interface</b>	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)
	<a href="#">Half duplex/full duplex</a>	supported (at 100 MBit/s)
	<a href="#">Auto-Negotiation/Auto-Crossover</a>	(depending on the loaded firmware)
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	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)
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Maximum current/ power at 3,3 V	530...580 mA / max. 1.9 W
<b>Environment</b>	Ambient temperature range (Rev. 1)	Operation: 0°C...+65°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 102: Technical Data COMX 51CA-RE

### 14.1.11 COMX 51CN-RE

<b>COMX 51CN-RE</b>	Part number	1572.100
<b>Communication Controller</b>	Type	netX 51 Processor
<b>Integrated Memory</b>	RAM/ FLASH	8 MB SDRAM, 4 MB SPI-Flash-EEPROM
<b>System interfaces</b>	Type	Parallel or serial (SPI), via Dual Port Memory
<b>Parallel system interface</b>	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
<b>Serial system interface (SPI interface)</b>	SPI Mode	SPI Slave, Mode 3
<b>Ethernet Communication</b>	Ethernet-Standard/ Frame type	IEEE 802.3/ Ethernet II
	Supported Real-Time Ethernet communication standard/ firmware	Determined by loaded firmware.: Determined by loaded firmware.: EtherCAT Slave, EtherNet/ Adapter(Slave), Open Modbus/TCP, PROFINET IO Device (Slave), Sercos Slave
<b>Ethernet interface</b>	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)
	<a href="#">Half duplex/full duplex</a>	(depending on the loaded firmware)
	<a href="#">Auto-Negotiation/Auto-Crossover</a>	(depending on the loaded firmware)
<b>Diagnosis</b>	Type	USB or serial
	Serial diagnostic interface	<a href="#">UART</a> (RXD, TXD)
	USB diagnostic interface	USB (USB+, USB-)
<b>Display</b>	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)
<b>Power supply / Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Maximum current/ power at 3,3 V	550...570 mA / max. 1.9 W
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+70°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 103: Technical Data COMX 51CN-RE

## 14.1.12 COMX 10CA-CCS



**Important:** All data specified here apply for the COMX 10CA-CCS, Revision 1.

<b>COMX 10CA-CCS</b>	Part number	1561.740
<b>Communication Controller</b>	Type	netX 10 Processor
<b>Integrated Memory</b>	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>CC-Link Communication</b>	Supported communication standard	CC-Link Version 2.0 and 1.1 according to CC-Link Standard V.2.00 BAP-05025-J
<b>CC-Link Interface</b>	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
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
		L RUN/L ERR Communication Status (green: L RUN, red: L ERR)
<b>Rotary Switch</b>	Adjustment of Address and Baudrate	2 Rotary Switches for Address and 1 Rotary Switch for Baudrate
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx. 225 mA / 0,75 W (at 3,3 V)
<b>Environment</b>	Ambient temperature range	Operation: 0°C... +55°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 104: Technical Data COMX 10CA-CCS

### 14.1.13 COMX 10CN-CCS



**Important:** All data specified here apply for the COMX 10CN-CCS, Revision 1.

<b>COMX 10CN-CCS</b>	Part number	1562.740
<b>Communication Controller</b>	Type	netX 10 Processor
<b>Integrated Memory</b>	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>CC-Link Communication</b>	Supported communication standard	CC-Link Version 2.0 and 1.1 according to CC-Link Standard V.2.00 BAP-05025-J
<b>CC-Link Interface</b>	Interface type	Potential-free RS-485 interface
	Connector	30-pin SMT connector, female, grid distance 1.27 mm, see COMX Design Guide.
	Transmission rates	156 kBit/s, 625 kBit/s, 2500 kBit/s, 5 MBit/s, 10 MBit/s
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
		L RUN/L ERR Communication Status (green: L RUN, red: L ERR)
<b>Rotary Switch</b>	Adjustment of Address and Baudrate	2 Rotary Switches for Address and 1 Rotary Switch for Baudrate
	Type	Decimal (0-9)
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx. 225 mA / 0,75 W (at 3,3 V)
<b>Environment</b>	Ambient temperature range	Operation: 0°C... +55°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 105: Technical Data COMX 10CN-CCS

## 14.1.14 COMX 10CA-COS



**Important:** All data specified here apply for the COMX 10CA-COS, Revision 2.

<b>COMX 10CA-COS</b>	Part number	1561.540
<b>Communication Controller</b>	Type	netX 10 Processor
<b>Integrated Memory</b>	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>CANopen Communication</b>	Supported communication standard	CANopen
<b>CANopen Interface</b>	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
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
		CAN Communication status (green: STA, red: ERR)
<b>Rotary Switch</b>	Adjustment of Address and Baudrate	2 Rotary Switches for Address
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx.. 250 mA / 0.825 W (at 3,3 V)
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+70°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 106: Technical Data COMX 10CA-COS



The data mentioned under „*Electrical Immunity to Interference and Radio Frequency*“ apply for the communication module COMX 10CA-COS, Revision 1.



## 14.1.15 COMX 10CN-COS



**Important:** All data specified here apply for the COMX 10CN-COS, Revision 1.

<b>COMX 10CN-COS</b>	Part number	1562.540
<b>Communication Controller</b>	Type	netX 10 Processor
<b>Integrated Memory</b>	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>CANopen Communication</b>	Supported communication standard	CANopen
<b>CANopen Interface</b>	Interface type	Potential-free ISO-11898-interface. According to CANopen specification EN 50325/4.
	Connector	30-pin SMT connector, female, grid distance 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
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
		CAN Communication status (green: STA, red: ERR)
<b>Rotary Switch</b>	Adjustment of Address and Baudrate	2 Rotary Switches for Address
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx.. 250 mA / 0.825 W (at 3,3 V)
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+65°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 107: Technical Data COMX 10CN-COS



### 14.1.16 COMX 10CA-DNS



**Important:** All data specified here apply for the COMX 10CA-DNS, Revision 2.

<b>COMX 10CA-DNS</b>	Part number	1561.520
<b>Communication Controller</b>	Type	netX 10 Processor
<b>Integrated Memory</b>	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>DeviceNet Communication</b>	Supported communication standard	DeviceNet
<b>DeviceNet Interface</b>	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,
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
		MNS Module Network Status (green: MS, red: NS)
<b>Rotary Switch</b>	Adjustment of Address and Baudrate	2 Rotary Switches for Address
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx.. 250 mA / 0.825 W (at 3,3 V)
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+70°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 108: Technical Data COMX 10CA-DNS



The data mentioned under „*Electrical Immunity to Interference and Radio Frequency*“ apply for the communication module COMX 10CA-DNS, Revision 1.

## 14.1.17 COMX 10CN-DNS



**Important:** All data specified here apply for the COMX 10CN-DNS, Revision 1.

<b>COMX 10CN-DNS</b>	Part number	1562.520
<b>Communication Controller</b>	Type	netX 10 Processor
<b>Integrated Memory</b>	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>DeviceNet Communication</b>	Supported communication standard	DeviceNet
<b>DeviceNet Interface</b>	Interface type	Potential-free ISO-11898-interface according to DeviceNet specification
	Connector	30-pin SMT connector, female, grid distance 1.27 mm, see COMX Design Guide.
	Transmission rates	125 kBit/s, 250 kBit/s, 500 kBit/s,
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
		MNS Module Network Status (green: MS, red: NS)
<b>Rotary Switch</b>	Adjustment of Address and Baudrate	2 Rotary Switches for Address
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx.. 250 mA / 0.825 W (at 3,3 V)
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+65°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 109: Technical Data COMX 10CN-DNS



The data mentioned under „*Electrical Immunity to Interference and Radio Frequency*“ apply for the communication module COMX 10CN-DNS, Revision 1.

## 14.1.18 COMX 10CA-DPS



**Important:** All data specified here apply for the COMX 10CA-DPS, Revision 2.

<b>COMX 10CA-DPS</b>	Part number	1561.420
<b>Communication Controller</b>	Type	netX 10 Processor
<b>Integrated Memory</b>	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>PROFIBUS Communication</b>	Supported communication standard	PROFIBUS DP
<b>PROFIBUS Interface</b>	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
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
		COM Communication status (green: STA, red: ERR)
<b>Rotary Switch</b>	Adjustment of Address and Baudrate	2 Rotary Switches for Address
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx. 200 mA / 0,66 W (at 3,3 V) max- 1005 mA at bus short circuit
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+70°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 110: Technical Data COMX 10CA-DPS



The data mentioned under „*Electrical Immunity to Interference and Radio Frequency*“ apply for the communication module COMX 10CA-DPS, Revision 1.

## 14.1.19 COMX 10CN-DPS



**Important:** All data specified here apply for the COMX 10CN-DPS, Revision 1.

<b>COMX 10CN-DPS</b>	Part number	1562.420
<b>Communication Controller</b>	Type	netX 10 Processor
<b>Integrated Memory</b>	RAM/ FLASH	- /, 4 MB SPI-Flash-EPROM
<b>System interface</b>	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
<b>PROFIBUS Communication</b>	Supported communication standard	PROFIBUS DP
<b>PROFIBUS Interface</b>	Interface type	Potential free RS-485 Interface
	Connector	30-pin SMT connector, female, grid distance 1.27 mm, see COMX Design Guide.
	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
<b>Diagnosis</b>	Diagnostic interfaces/ signals	<a href="#">UART</a> (RXD, TXD), USB (RX0, TX0, USB+, USB-)
<b>Display</b>	LED Display	SYS System Status (green: RUN, yellow: RDY)
		COM Communication status (green: STA, red: ERR)
<b>Rotary Switch</b>	Adjustment of Address and Baudrate	2 Rotary Switches for Address
<b>Power supply /Current consumption</b>	Supply voltage	+3.3 V $\pm$ 5 % DC
	Typical current/ power at 3,3 V	Approx. 200 mA / 0,66 W (at 3,3 V) max- 1005 mA at bus short circuit
<b>Environment</b>	Ambient temperature range	Operation: -20°C...+65°C, Storage (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	Humidity range	10 ... 95 % relative humidity (non-condensing)
<b>Device</b>	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
<b>CE Sign</b>	CE Sign	yes
	Emission	EN55011:2009 Class A; CISPR 11. Class A
	Immunity	According to IEC/EN 61000-4:1995, see below
<b>Configuration software</b>	System configurator	SYCON.net

Table 111: Technical Data COMX 10CN-DPS

## 14.2 Electrical Immunity to Interference and Radio Frequency

Test	Electrostatic discharge (ESD) according to IEC/EN 61000-4-2:1995		Fast transient interferences (Burst), according to IEC/EN 61000-4-4:1995	Surge voltage, according to IEC/EN 61000-4-5:1995
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 50CA-REFO Rev.1	10 kV Criterion B	6 kV Criterion B	2 kV Criterion B	-
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 10CA-CCS Rev.1	8 kV Criterion B	6 kV Criterion B	2.5 kV Criterion B	1 kV Criterion A
COMX 10CN-CCS Rev.1	8 kV Criterion B	6 kV Criterion B	2.5 kV Criterion B	1 kV Criterion A
COMX 10CA-COS Rev.1	10 kV Criterion B	6 kV Criterion B	2 kV Criterion B	1 kV Criterion A
COMX 10CN-COS Rev.1	10 kV Criterion B	6 kV Criterion B	2 kV Criterion B	1 kV Criterion A
COMX 10CA-DNS Rev.1	8 kV Criterion B	4 kV Criterion B	2 kV Criterion B	0.5 kV Criterion B
COMX 10CN-DNS Rev.1	10 kV Criterion B	6 kV Criterion B	2 kV Criterion B	1 kV Criterion A
COMX 10CA-DPS Rev.1	8 kV Criterion B	6 kV Criterion B	2.2 kV Criterion B	1 kV Criterion B
COMX 10CN- DPS Rev.1	10 kV Criterion B	6 kV Criterion B	2.5 kV Criterion A	1 kV Criterion A

Table 112: Electrical Immunity to Interference and Radio Frequency COMX Modules

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

## 14.3 Technical Data Evaluation Board COMXEB

COMXEB	Parameter	Value
<b>Product</b>	Part number	1530.000
<b>Power supply</b>	Supply voltage (range)	24V DC $\pm$ 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
<b>Host interface</b>	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)
<b>Operating elements</b>	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
<b>LED display</b>	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)
<b>comX interface</b>	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)
<b>PROFIBUS-DP interface</b>	Type	RS-485, potential-free
	Connector	Sub-D, 9-pin, female
<b>CANopen interface</b>	Type	ISO 11898 interface, potential-free

	Connector	Sub-D, 9-pin, male
<b>DeviceNet interface</b>	Type	ISO 11898 interface, potential-free
	Connector	CombiCon, 5-pin
<b>CC-Link interface</b>	Type	RS-485, potential-free
	Connector	CombiCon, 5-pin
<b>Ethernet interface</b>	Type	100 BASE-TX, isolated 10 BASE-T (depending on loaded Firmware)
	Connector	2 x RJ45
<b>Diagnostic interface (for firmware download and configuration)</b>	UART	9 pin D-Sub Plug RS232
	USB	Mini-USB-Socket Type B, 5-pin
<b>Extension interface</b>	For AIFX	Interface 10-pin Connection for AIFX-DP, AIFX-CO, AIFX-DN and AIFX-CC
<b>Interfaces for power supply</b>	Socket for power adaptor in scope of delivery	2-pin
	Socket for external power supply	3-pin, green
<b>Additional pin headers</b>	SYNC/UART1	10-pin
	Jumper fields(2x) for AIFX interface	16-pin
<b>Device</b>	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 (device only): -40°C...+85 °C Storage (device in package): -10°C...+85 °C
	RoHS	yes
<b>Emission and immunity</b>	CE Sign	no (see below)

Table 113: 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.

## 14.4 Technical Data of Communication Protocols

### 14.4.1 EtherCAT Master (V3)

Parameter	Description
Maximum number of EtherCAT slaves	Maximum 200 Slaves. The number of usable slaves depends on the available memory for the configuration file. See 'configuration file' below.
Maximum number of cyclic input data	5760 bytes
Maximum number of cyclic output data	5760 bytes
Minimum bus cycle time	250 µs, depending on the used number of slaves and the used number of cyclic input data and output data. Recommended is a cycle time of 1 ms and higher.
Acyclic communication	CoE (CANopen over EtherCAT) CoE-Upload, CoE-Download Maximum 1500 bytes
Functions	Get OD List Get object description Get entry description Emergency Slave diagnostics
Bus Scan	Supported
Redundancy	Supported, but not at the same time with Distributed Clocks
Distributed Clocks	Supported, but not at the same time with Redundancy
Topology	Line or ring
Baud rate	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Configuration File (ethercat.xml or config.nxd)	COMX 10CA-RE, COMX 100CN-RE: Maximum 2 MByte
Limitations	The size of the bus configuration file is limited by the size of the RAM Disk (1 MByte) or FLASH disk (2 MByte). All CoE Uploads, Downloads and information services must fit in one TLR-Packet. Fragmentation is not supported Distributed Clock and Redundancy cannot be used at the same time.
Reference to firmware/stack version	V3.0

Table 114: Technical Data EtherCAT Master Protocol



## 14.4.2 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	V4.4

Table 115: Technical Data EtherCAT Master Protocol

### 14.4.3 EtherCAT Slave

Parameter	Description COMX 51XX-RE	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	V4.6	V2.5 and V4.6

Table 116: 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 output data length may not exceed 512 bytes, where each length has to be rounded up to the next multiple of 4 for this calculation.

## 14.4.4 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
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	V2.9

Table 117: Technical Data EtherNet/IP Scanner Protocol

## 14.4.5 EtherNet/IP Adapter

Parameter	Beschreibung
Maximale Anzahl Eingangsdaten	504 Bytes
Maximale Anzahl Ausgangsdaten	504 Bytes
E/A-Verbindungstypen (implizit)	1 'Exclusive Owner', 1 'Listen Only', 1 'Input only'
E/A-Verbindungstriggertypen	'Cyclic', minimal 1 ms* 'Application Triggered', minimal 1 ms* 'Change of State', minimal 1 ms* * abhängig von der verwendeten Anzahl an Verbindungen und der verwendeten Anzahl an Ein- und Ausgangsdaten
Explicit Messages	'Connected and unconnected'
Maximale Anzahl Verbindungen	8, 'explicit'- und 'implicit'-Verbindungen
Unconnected Message Manager (UCMM)	Unterstützt
Quick connect	Unterstützt
Vordefinierte Standardobjekte	Identity-Objekt, Message-Router-Objekt, Assembly-Objekt, Connection-Manager, DLR-Objekt, QoS-Objekt, TCP/IP-Objekt, Ethernet-Link-Objekt Time-Sync-Objekt
Reset-Dienste	Identity-Object-Reset-Dienst: Typ 0 und 1
Maximale Anzahl anwenderspezifischer Objekte	20
DLR V2 (Ringtopologie)	Unterstützt
ACD (Address Conflict Detection)	Unterstützt
DHCP	Unterstützt
BOOTP	Unterstützt
Baudrate	10 und 100 MBit/s
Duplex Modus	Half duplex, Full duplex, Auto negotiation
MDI Modus	MDI, MDI-X, Auto-MDIX
Daten-Transport-Layer	Ethernet II, IEEE 802.3
Switch-Funktion	Integriert
Einschränkungen	CIP Sync Dienste nicht implementiert TAGs nicht unterstützt
Bezug auf Firmware/Stack Version	V2.11

Tabelle 2: Technische Daten EtherNet/IP-Adapter-Protokoll

## 14.4.6 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	V2.6

Table 118: Technical Data Open Modbus/TCP Protocol

### 14.4.7 POWERLINKControlled Node (V2)

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
Limitation	No slave to slave communication
Reference to firmware/stack version	V2.1

Table 119: Technical Data POWERLINK Controlled Node Protocol

### 14.4.8 POWERLINKControlled 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
Limitation	No slave to slave communication
Reference to firmware/stack version	V3.2

Table 120: Technical Data POWERLINK Controlled Node Protocol

## 14.4.9 PROFINET IO-Controller (V2)

Parameter	Description
Maximum number of PROFINET IO Devices	128
Maximum number of total cyclic input data	5712 bytes (including IOxS status bytes)
Maximum number of total cyclic output data	5760 bytes (including IOxS status bytes)
Maximum number of cyclic input data	1440 bytes per device (= IOCR data length including IOxS status bytes)
Maximum number of cyclic output data	1440 bytes per device (= IOCR data length including IOxS status bytes)
Acyclic communication	Read/Write Record Limited to 1392 bytes per telegram Limited to 4096 bytes per request
Alarm processing	yes, but requires handling in host application program
Diagnostic data	One 200 byte buffer per IO device
DCP functions via 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)
Supported Protocols	RTC – Real Time Cyclic Protocol, Class 1 RTA – Real Time Acyclic Protocol DCP – Discovery and configuration Protocol CL-RPC – Connectionless Remote Procedure Call
Context management by CL-RPC	Supported
Minimum cycle time	1 ms Different IO-Devices can be configured with different cycle times
Functions	Fast Startup of PROFINET IO Devices supported
Baud rate	100 MBit/s Full-Duplex mode
Data transport layer	Ethernet II, IEEE 802.3
Configuration file	Maximum 1 MByte
Limitations	RT over UDP not supported Multicast communication not supported DHCP is not supported (neither for PROFINET IO-Controller nor for the IO-Devices) Only one IOCR per IO Device NameOfStation of IO Controller CANNOT be set using the DCP SET NameOfStation service but only at start-up while configuring the IO Controller The buffer for IO-Device diagnosis data will be overwritten in case of multiple diagnostic events. Only one (the last) event is stored at the same time. If a single event produces more than 200 bytes of diagnosis data, only the first 200 bytes will be taken care of. The usable (minimum) cycle time depends on the number of used IO Devices, the number of used input and output data. The cycle-time, the number of configured IO Devices and the amount of IO data depend on each other. For example it is not possible due to performance reasons to have 128 IO Devices communication with cycle-time 1ms. The size of the bus configuration file is limited by the size of the RAM Disk (1 MByte) WriteMultiple-Record service is not supported

Parameter	Description
Reference to firmware/stack version	V2.6

Table 121: Technical Data PROFINET IO RT Controller Protocol

### 14.4.10 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	<p>The size of the bus configuration file is limited by the size of the RAM Disk (1 Mbyte)</p> <p>The usable (minimum) cycle time depends on the number of used IO Devices, the number of used input and output data.</p> <p>RT over UDP not supported</p> <p>Multicast communication not supported</p> <p>DHCP is not supported (neither for PROFINET IO Controller nor for IO-Devices)</p> <p>Only one IOCR per IO-Device per direction</p> <p>One instance of DeviceAccess AR can be used at the same time only</p> <p>MRPD is not supported</p> <p>Planning of IRT is not done by the PROFINET IO Controller protocol stack</p> <p>Sync Slave is not supported</p> <p>One fragmented acyclic services can be used at the same time only</p> <p>Multiple MRP Managers are not supported</p> <p>One DCP Service can be used in parallel only</p> <p>Multiple Sync Masters are not supported</p>
Reference to firmware / stack version	V3.2

Table 122: Technical Data PROFINET IO Controller Protocol

#### 14.4.11 PROFINET IO Device (V3.4)

Parameter	Description
Maximum number of cyclic input data	1024 bytes
Maximum number of cyclic output data	1024 bytes
Acyclic communication	Read/Write Record, max. 1024 bytes per telegram
Alarm Types	Process Alarm, Diagnostic Alarm, Return of SubModule Alarm Plug Alarm (implicit), Pull Alarm (implicit)
Supported protocols	<p>RTC – Real Time Cyclic Protocol, Class 1 and 2 (unsynchronized), Class 3 (synchronized)</p> <p>RTA – Real Time Acyclic Protocol</p> <p>DCP – Discovery and configuration Protocol</p> <p>CL-RPC – Connectionless Remote Procedure Call</p> <p>LLDP – Link Layer Discovery Protocol</p> <p>SNMP – Simple Network Management Protocol</p> <p>MRP – MRP Client</p>
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
Identification & Maintenance	Read and write of I&M1-4
Minimum cycle time	<p>1 ms for RTC1 and RTC2</p> <p>250 µs for RTC3</p>
Baud rate	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Limitations	RT over UDP not supported

	<p>Multicast communication not supported</p> <p>Only one device instance is supported</p> <p>DHCP is not supported</p> <p>IRT "flex" (synchronized RT Class 2) is not supported</p> <p>FastStartUp is not supported.</p> <p>Media Redundancy (except MRP client) is not supported</p> <p>Access to the submodule granular status bytes (IOCS) is not supported.</p> <p>The amount of configured IO-data influences the minimum cycle time that can be reached.</p> <p>Supervisor-AR is not supported, Supervisor-DA-AR is supported</p> <p>Only 1 Input-CR and 1 Output-CR are supported</p> <p>Multiple WriteRequests are not supported</p> <p>Using little endian (LSB-MSB) byte order for cyclic process data instead of default big endian (MSB-LSB) byte order may have a negative impact on minimum reachable cycle time</p>
Reference to firmware/stack version	V3.4.x.x

Table 123: Technical Data PROFINET IO RT IRT Device Protocol

## 14.4.12 PROFINET IO Device (V3.10)

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 COMX 50XX-RE: The Stack can handle up to 2 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)
Supported protocols	<p>RTC – Real Time Cyclic Protocol class 1 (unsynchronized), class 3 (synchronized)</p> <p>RTA – Real Time Acyclic Protocol</p> <p>DCP – Discovery and configuration Protocol</p> <p>CL-RPC – Connectionless Remote Procedure Call</p> <p>LLDP – Link Layer Discovery Protocol</p> <p>SNMP – Simple Network Management Protocol</p> <p>MRP – MRP Client</p>
Topology recognition	LLDP, SNMP V1, MIB2, physical device
Identification & Maintenance	Read and write of I&M1-5
Minimum cycle time	<p>1 ms for RT_CLASS_1</p> <p>1 ms for RT_CLASS_3 (COMX 50XX-RE)</p> <p>250 µs for RT_CLASS_3 (COMX 51XX-RE , COMX 100XX-RE)</p>
IRT Support	RT_CLASS_3
Media Redundancy	MRP client is supported
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

Parameter	Description
PROFINET IO specification	2.2 (legacy startup) and V2.3
Limitations	<p>RT over UDP not supported.</p> <p>Multicast communication not supported.</p> <p>Only one device instance is supported.</p> <p>DHCP is not supported.</p> <p>FastStartUp is not supported.</p> <p>The amount of configured IO-data influences the minimum cycle time that can be reached.</p> <p>Only 1 Input-CR and 1 Output-CR per AR are supported.</p> <p>Using little endian (LSB-MSB) byte order for cyclic process data instead of default big endian (MSB-LSB) byte order may have a negative impact on minimum reachable cycle time.</p> <p>System Redundancy (SR-AR) and Configuration-in-Run (CiR) are not supported.</p> <p>Max. 255 submodules can be used simultaneously within one specific Application Relation.</p> <p>SharedInput is not supported.</p> <p>MRPD is not supported.</p> <p>DFP and other HighPerformance-profile related features are not supported.</p> <p>PDEV functionality is only supported for submodules located in slot 0.</p> <p>Submodules can not be configured or used by an AR in subslot 0.</p> <p>DAP and PDEV submodules only supported in slot 0.</p>
Reference to firmware/stack version	V3.10

Table 124: Technical Data PROFINET IO Device Protocol

### 14.4.13 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 125: Technical Data Sercos Master Protocol

## 14.4.14 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 1.3.0
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 Version 1.3
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	V3.4

Table 126: Technical Data Sercos Slave Protocol

### 14.4.15 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	V1.0

Table 127: Technical Data VARAN Client Protocol

## 14.4.16 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 128: Technical Data CANopen Master Protocol

## 14.4.17 CANopen Slave

### 14.4.17.1 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	V3.7

Table 129: Technical Data CANopen Slave Protocol



**14.4.17.2 CANopen Slave COMX 10**

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	V3.7

*Table 130: Technical Data CANopen Slave Protocol*

## 14.4.18 CC-Link Slave

Parameter	Description
<b>Firmware works according to CC-Link Version 2.0:</b>	
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
<b>Firmware works according to CC-Link Version 1.11:</b>	
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	V2.11

Table 131: Technical Data CC-Link-Slave-Protocol

## 14.4.19 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 132: Technical Data DeviceNet Master Protocol

## 14.4.20 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	V2.5

Table 133: Technical Data DeviceNet Slave Protocol

## 14.4.21 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	V2.7

Table 134: Technical Data PROFIBUS DP Master Protocol

## 14.4.22 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	V2.9

Table 135: Technical Data PROFIBUS DP Slave Protocol

### 14.4.23 PROFIBUS MPI

Parameter	Description
Maximum number of MPI connections	126
Maximum number of write data	216 bytes
Maximum number of read data	222 bytes
Functions	MPI Read/Write DB (data block), M (marker), Q (output), C (Counter), T (Timer) MPI Read I (Input) Data type bit to access to DB (data block), M (marker), Q (output) and I (Input, read only) MPI Connect (automatically when first read/write function is used) MPI Disconnect, MPI Disconnect All MPI Get OP Status MPI transparent (expert use only)
Baud rate	Fixed values ranging from 9,6 kBits/s to 12 MBit/s Auto-detection mode is supported
Data transport layer	PROFIBUS FDL
Reference to firmware/stack version	2.4

Table 136: Technical Data PROFIBUS-MPI Protocol

# 15 Decommissioning, Replacement and Disposal

## 15.1 Put the Device out of Operation

For the deinstallation of the comX communication module from the device into which the comX module had been 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 given in the documentation supplied by the manufacturers of this device.!
- Therefore 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 Device**

In order to avoid personal and material damage do not remove this device from a production line without having ensured a secure operation of the production line during and after the removal of the device.

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

- **Step 1:** If necessary, remove the housing of this device. In all cases, strictly adhere to all rules given in the manuals of this device.
- **Step 2:** Definitely avoid touching open contacts or ends of wires.
- **Step 3:** Disconnect the communication cables from the device.
- **Step 4:** Remove the comX communication module carefully from its connector (50 pin SMT connector, male, grid width 1.27 mm, at COMX-CN additionally 30 pin SMT connector, male, grid width 1.27 mm) onto which it had been plugged during mounting.
- **Step 5:** If the comX communication module needs be replaced by another one, then replace it and reconnect the communication cables to the device.
- **Step 6:** If you had opened the housing of the device in step 1, then close it now. Again strictly adhere to all rules given in the manuals of this device anyway.
- **Step 7:** Connect the device with its supply voltage and switch it on again. Adhere of the commissioning rules of the supplier of the device. Check, whether the device behaves normally.

Obey to the subsequent disposal rules.



## 15.2 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.
-

## 16 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 if 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.

### 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 the Wikipedia article

([http://en.wikipedia.org/wiki/Cyclic\\_redundancy\\_check](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. Often these formats are 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 both for office and industrial communication via electrical or optical connections. It has been developed and specified by the Intel, DEC and XEROX. It provides data transmission with collision control and allows various protocols. As Ethernet is not necessarily capable

for real-time application, 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**

Full duplex denominates a telecommunication system between two communication partners which allows simultaneous communication in both directions is called a full-duplex telecommunication system. At such a system, it is possible to transmit data even if currently data are received. Full-duplex is the opposite of [Half duplex](#).

**Function code**

A function code (in the meaning 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**

Half duplex denominates a telecommunication system between two communication partners which does not allow simultaneous, but alternating, communication in both directions is called a half-duplex telecommunication system. At such a system, receiving data inhibits the transmission of data. Half-duplex is the opposite of [Full duplex](#).

**Hub**

A network component connecting multiple communication partners with each other. A hub does not provide own intelligence, thus it does not

**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. There is a variety of different Real-Time Ethernet systems on the market which are incompatible with each other. The most important systems of these are

- EtherCAT
- EtherNet/IP
- Ethernet Powerlink
- Open Modbus/TCP
- PROFINET
- Sercos
- VARAN

**Register**

A register (in the meaning 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. It is titled "*Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2002/95/EC*", adopted in 2003 and was getting 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 in order to decide on its own. For the connected communication partners a switch behaves transparently.

**UART**

UART means Universal Asynchronous Receiver Transmitter. It is a special kind of electronic circuit which is 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.

## 17 Appendix

### 17.1 Matrix Label

A matrix label is glued on the device. It contains 3 items:

1. Part number
2. Hardware Revision
3. Serial number

The figure shows part number 1250.100, hardware revision 3 and serial number 23456.

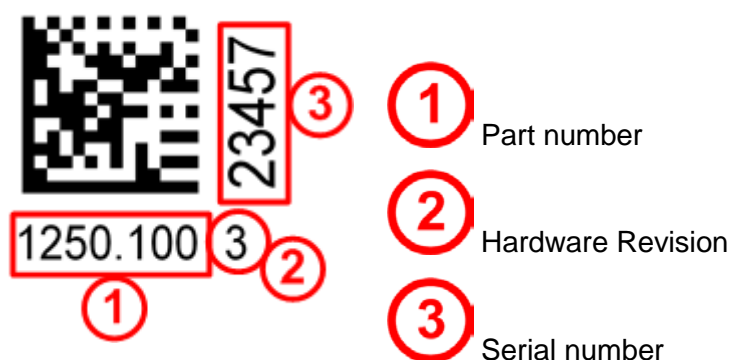


Figure 54: Matrix Label

### 17.2 Wiring Instructions for Fieldbus Systems

You can find detailed instructions for wiring of Fieldbus Systems such as CANopen, CC-Link, DeviceNet and PROFIBUS-DP, for instance concerning termination and requirements on the cables, within a separate manual „*Wiring Instructions*“ (Hilscher-document DOC120208UM01EN).

### 17.3 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 137: EtherNet/IP Adapter/Slave – Instance ID of I/O Data

## 17.4 Use of VARAN Client

In order to use the comX communication module with VARAN, you need a license which you can acquire at the VNO (VARAN Bus-Nutzerorganisation, Bürmooser Straße 10, A-5112 Lamprechtshausen, [info@varan-bus.net](mailto:info@varan-bus.net)) after getting a member of VON.

The license as well as the Vendor ID and the Device ID can be adjusted with the SYCON.net configuration software or with the netX Configuration Tool.

## 17.5 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

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