User Manual

PC Cards cifX PC/104 (CIFX 104)

Installation, Operation and Hardware Description

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1 Introduction

1.1 About the User Manual

This user manual provides descriptions of the **installation**, **operation** and **hardware** of the PC cards cifX *PC/104* under Windows® XP, Windows® Vista, Windows® 7 and Windows® 8, as listed subsequently.

PC Cards cifX PC/104 (CIFX 104) inclusively the AIFX Assembly Interfaces[1]:

- Ethernet (AIFX-RE)
- PROFIBUS (AIFX-DP)
- CANopen (AIFX-CO)
- DeviceNet (AIFX-DN)
- CC-Link (AIFX-CC)
- Diagnose (AIFX-DIAG)

for the Real-Time Ethernet systems:

- CC-Link IE Field Basic
- EtherCAT
- EtherNet/IP
- Open-Modbus/TCP
- POWERLINK
- PROFINET IO
- Sercos
- VARAN

for the fieldbus systems:

- PROFIBUS DP
- PROFIBUS MPI
- CANopen
- DeviceNet
- CC-Link

For information about the **Installation of the Software** refer to the User Manual „Software Installation for PC cards cifX“ [DOC120207UMXXEN]. For information about the **Wiring of the Protocol Interface** refer to the „Wiring Instructions“ [DOC120208UMXXEN].
The **devices described in this manual** are listed in the sections *PC Cards cifX with integrated Interfaces* (page 37) and *PC Cards cifX with AIFX Assembly Interfaces* (page 37).
The devices are described in detail in the chapters *Hardware Installation and Uninstalling* (page 70), *LED Descriptions* (page 78), *Device Connections and Switches* (page 114) and *Technical Data* (page 125).

You can download the latest edition of a manual from the website www.hilscher.com under **Support** > **Downloads** > **Manuals** or under **Products** directly with the information about your product.

[1] The AIFX Assembly Interface is also named as „Detached Network Interface“.

1.1.1 List of Revisions

Index	Date	Chapter	Revisions
48	17-09-01	1.2.3.7 10.2.9	Section *POWERLINK Controlled Node Firmware Versions 2 and 3* added. Section Technical Data *POWERLINK Controlled Node/Slav2 (V3)* added.
49	18-03-22	All, 2, 4.1, 10.1	Safety communication in the document revised in general. Storage temperature range updated: -40 °C ... +85 °C Chapter *Safety* completed. Section *Warnings* moved and changed. Section *Technical Data PC Cards cifX*: Description "Maximum current at 5 V (typical) [*value*]" changed to "Current at 5 V [*value*] (maximum)".
50	18-08-15	All 8.9, 8.10	CC-Link IE Field Basic Slave added Sections *EtherNet/IP Scanner (Master)* and *EtherNet/IP Adapter (Slave)* updated.

Table 1: List of Revisions

1.1.2 Notes on Hardware, Firmware, Software and Driver Versions

Note on Software Update: The hardware revisions and the versions for the firmware, the driver or the configuration software listed in this section functionally belong together. For existing hardware installation the firmware, the driver and the configuration software must be updated according to the details listed in this section.
For the software upgrade system overview refer to section *Update for Firmware, Driver and Software* on page 51.

1.1.2.1 Hardware: PC Cards cifX, AIFX Assembly Interfaces

PC Card cifX, AIFX	Part No.	Hardware Revision	USB from HW Rev.
CIFX 104-RE	1278.100	2	1
CIFX 104-RE-R	1279.100	2	1
CIFX 104-RE\F[1]	1278.101	2	1[6]
CIFX 104-RE-R\F[1]	1279.101	2	1[6]
CIFX 104-DP	1278.410	2	1
CIFX 104-DP-R	1279.410	2	1
CIFX 104-DP\F[2]	1278.411	2	1[6]
CIFX 104-DP-R\F[2]	1279.411	2	1[6]
CIFX 104-CO	1278.500	2	1
CIFX 104-CO-R	1279.500	2	1
CIFX 104-CO\F[3]	1278.501	2	1[6]
CIFX 104-CO-R\F[3]	1279.501	2	1[6]
CIFX 104-DN	1278.510	2	1
CIFX 104-DN-R	1279.510	2	1
CIFX 104-DN\F[4]	1278.511	2	1[6]
CIFX 104-DN-R\F[4]	1279.511	2	1[6]
CIFX 104-CC\F[5]	1278.741	2	1[6]
AIFX-RE	2800.100	2	-
AIFX-DP	2800.400	2	-
AIFX-CO	2800.500	2	-
AIFX-DN	2800.510	3	-
AIFX-CC	2800.730	2	-
AIFX-DIAG	2800.000	2	-

[1] inclusively Ethernet Assembly Interface (AIFX-RE)

[2] inclusively PROFIBUS Assembly Interface (AIFX-DP)

[3] inclusively CANopen Assembly Interface (AIFX-CO)

[4] inclusively DeviceNet Assembly Interface (AIFX-DN)

[5] inclusively CC-Link Assembly Interface (AIFX-CC)

[6] only when using the Diagnostic Assembly Interface (AIFX-DIAG)

Table 2: Reference on Hardware PC Cards cifX, AIFX Assembly Interfaces

1.1.2.2 Driver and Software

Driver and Software		Version
SYCON.net	`SYCONnet netX setup.exe`	1.0400
netX Configuration Tool-Setup	`netXConfigurationUtility_Setup.exe`	1.0900
cifX Device Driver	`cifX Device Driver Setup.exe`	1.3
Toolkit		1.4
cifX TCP/IP Server for SYCON.net	`cifX TCP Server.exe`	V2.3
US Driver	USB Driver of Windows®	5.1.2600.x

Table 3: Reference on Driver and Software

1.1.2.3 Firmware

Protocol	Firmware File	Firmware Version*	Minimum Version of the Firmware for USB Support	Minimum Version of the Firmware for PC Cards cifX PC/104
CANopen Master	CIFXCOM.NXF	2.14	from 2.5.2.0	from 2.4.5.0
CANopen Slave	CIFXCOS.NXF	3.7	from 2.4.4.0	from 2.4.2.0
CC-Link Slave	CIFXCCS.NXF	2.11	-	-
CC-Link IE Field Basic Slave	C020Y000.NXF	1.1	-	
DeviceNet Master	CIFXDNM.NXF	2.4	from 2.2.7.0	from 2.2.4.0
DeviceNet Slave	CIFXDNS.NXF	2.5	from 2.2.7.0	from 2.2.5.0
EtherCAT Master	CIFXECM.NXF	4.3 (V4)	from 2.4.4.0	from 2.4.3.0
EtherCAT Master	CIFXECM.NXF	3.0 (V3)**	from 2.4.4.0	from 2.4.3.0
EtherCAT Slave	CIFXECS.NXF	4.5 (V4)	from 2.5.13.0	from 2.5.10.0
EtherCAT Slave	CIFXECS.NXF	2.5 (V2)**	from 2.5.13.0	from 2.5.10.0
EtherNet/IP Scanner	CIFXEIM.NXF	2.9	from 2.2.4.1	from 2.2.2.0
EtherNet/IP Adapter	CIFXEIS.NXF	2.11	from 2.3.4.1	from 2.2.3.0
Open-Modbus/TCP	CIFXOMB.NXF	2.6	from 2.3.2.1	from 2.3.1.0
POWERLINK Controlled Node	CIFXPLS.NXF	2.1	from 2.1.22.0	from 2.1.19.0
PROFIBUS DP Master	CIFXDPM.NXF	2.7	from 2.3.22.0	from 2.3.21.0
PROFIBUS DP Slave	CIFXDPS.NXF	2.9	from 2.3.30.0	from 2.3.30.0
PROFIBUS MPI-Gerät	CIFXMPI.NXF	2.4	from 2.4.1.2	from 2.4.4.1
PROFINET IO-Controller	C010C000.NXF	3.2 (V3)	from 2.4.10.0	from 2.4.10.0
PROFINET IO-Controller	CIFXPNM.NXF	2.7 (V2)**	from 2.4.10.0	from 2.4.10.0
PROFINET IO-Device	CIFXPNS.NXF	3.10 (V3)	from 3.4.9.0	from 3.4.7.0
PROFINET IO-Device	CIFXPNS.NXF	3.4 (V3)**	from 3.4.9.0	from 3.4.7.0
Sercos Master	CIFXS3M.NXF	2.1	from 2.0.14.0	from 2.0.12.0
Sercos Slave	CIFXS3S.NXF	3.4	from 3.0.13.0	from 3.0.10.0
VARAN-Client	CIFXVRS.NXF	1.1	from 1.0.3.0	from 1.0.3.0

*Table 4: Reference on Firmware, **Outdated versions*

**Note: ***Unless otherwise indicated, in this manual data to the firmware version correspond to the stack version.

The downloadable cifX firmware runs on PC cards cifX *PC/104*. The firmware automatically detects whether it is running on a PC cards cifX *PC-104*. Precedent cifX firmware is only applicable to PC cards cifX *PC/104*.

If a precedent cifX firmware (without PC/104 recognition) is loaded in a PC Card cifX PC/104, the cifX will get defective and must be sent to the service! For the PC cards cifX *PC/104* only cifX firmware from the minimum versions may be used as listed in section *Hardware: PC Cards cifX, AIFX Assembly Interfaces* on page 10.

1.1.3 Conventions in this Manual

Notes, operation instructions and results of operation steps are marked as follows:

Notes

Important: <important note you must follow to avoid malfunction>

Note: <general note>

<note, where to find further information>

Operation Instructions

1. <instruction>
2. <instruction>

or

➢ <instruction>

Results

<result>

Safety Messages

The labeling of safety messages is explained in the chapter *Safety*.

1.1.4 Used Terminology

PC Card cifX	Communication Interfaces of the cifX family of Hilscher based on the netX technology.
CIFX 104-RE	Example for the product name for a PC card cifX Real-Time Ethernet.
CIFX 104-XX	Example (‘XX’ replaces ‘RE’, ‘DP’, ‘CO’, ‘DN’ or ‘CC’)
CIFX 104-FB\F	Example (‘FB’ replaces ‘DP’, ‘CO’, ‘DN’ or ‘CC’)

For further terminology to the PC cards cifX, its installation, configuration and operation refer to section *Glossary* on page 186.

1.2 Contents of the Product DVD

On the **Communication Solutions DVD** you will find these installation instructions about the software installation and the necessary configuration software, the documentation, the drivers and software for your PC card cifX, and additional auxiliary tools. 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 Installation Guide, Documentation Overview

The installation guide **Software Installation and Documentation Overview** on the Communication Solutions DVD are in the directory *Documentation\0. Installation and Overview*. The installation guide includes:

- An overview on the **Content of the Communication Solutions DVD** (in the section *What is on the Communication Solutions DVD?*)
- Overviews listing the available **Documentations** for PC cards cifX (in chapter *PC Cards cifX, Software and Documentation*).

1.2.2 What's New

All current version information for hardware and software described in this manual are provided in the folder *\Documentation\What's New - Communication Solutions DVD RL XX EN.pdf* on the Communication Solutions DVD.

1.2.3 Important Changes

1.2.3.1 DeviceNet Master - SYCON.net and Firmware

The DeviceNet Master firmware from V2.3.11.0 and the DeviceNet Master DTM from V1.360 support the network scan function. If in the device a firmware version V2.3.10.0 or earlier is used then a firmware update to V2.3.11.0 or higher must be done, in order to use the **network scan** function.

1.2.3.2 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:

	EtherCAT Master V3 Directory on the DVD \ File:	**EtherCAT Master V4** Directory on the DVD \ File:
Firmware	*Firmware\CIFX\Outdated versions\ECM V3\ cifxecm.nxf*	*Firmware\CIFX\cifxecm.nxf*
Header	*Examples and API\0. Header\Firmware\EtherCAT Master V3*	*Examples and API\0. Header\Firmware\EtherCAT Master V4*
Protocol API	*Documentation\7. Programming Manuals\EN\ 3. Protocol API\EtherCAT Master V3\EtherCAT Master V3 Protocol API 05 EN.pdf*	*Documentation\7. Programming Manuals\EN\3. Protocol API\EtherCAT Master V4\EtherCAT Master V4 Protocol API 05 EN.pdf*

Table 5: EtherCAT Master Firmware V3 and V4 on the Product DVD

1.2.3.3 PROFINET IO-Controller Firmware Versions V2 and V3

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

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

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

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

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

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

Removed features and incompatibilites:

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

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

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

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

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

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

	PROFINET IO-Controller V2 Directory on the DVD \ File:	**PROFINET IO-Controller V3** Directory on the DVD \ File:
Firmware	*Firmware\CIFX\Outdated versions\PNM V2\ cifxpnm.nxf*	*Firmware\CIFX\C010C000.nxf*
Header	*Examples and API\0. Header\Firmware\PROFINET IO Controller V2*	*Examples and API\0. Header\Firmware\PROFINET Controller V3*
Protocol API	*Documentation\7. Programming Manuals\EN\3. Protocol API\PROFINET IO Controller\ PROFINET IO Controller Protocol API 19 EN.pdf, Ethernet Protocol API.pdf, TCP IP - Packet Interface API 12 EN.pdf*	*Documentation\7. Programming Manuals\EN\3. Protocol API\PROFINET IO Controller V3\ PROFINET IO Controller V3 Protocol API 05 EN.pdf PROFINET IO Controller - Migrating from version 2 to 3 MG 01 EN.pdf*

Table 6: PROFINET IO-Controller Firmware V2 and V3 on the Product DVD

1.2.3.4 EtherCAT Slave Firmware Versions 2.5 and 4.2

The EtherCAT Slave firmware was revised and completed and is available in version 4.2 since the third quarter 2013.

Use the EtherCAT Slave firmware in version 4.2 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 4.2, 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 V4.2, 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 4.2.

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 CIFX RE ECS V4.2.X.xml.*
3. Update the EtherCAT Slave firmware in your device to version 4.2.

Note also:

- SYCON.net V1.360.x.x can configure the EtherCAT Slave firmware V2.5 as well as V4.2.10.0 and higher.
- netX Configuration Tool V1.0510.x.x can configure the EtherCAT Slave firmware V2.5 as well as V4.2.
- 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 V4.2 are available:

	EtherCAT-Slave V2.5 Directory on the DVD \ File:	**EtherCAT-Slave V4.2** Directory on the DVD \ File:
Firmware	*Firmware\CIFX\cifxecs.nxf*	*Firmware\CIFX\ECS V4.X\cifxecs.nxf*
Header	*Examples and API\0. Header\Firmware\EtherCAT Slave V2.5.X*	*Examples and API\0. Header\Firmware\EtherCAT Slave V4.2.X*
XML	*EDS\EtherCAT\Slave\V2.X\Hilscher CIFX RE ECS V2.2.X.xml*	*EDS\EtherCAT\Slave\V4.X\Hilscher CIFX RE ECS V4.2.X.xml*
Protocol API	*Documentation\7. Programming Manuals\EN\3. Protocol API\EtherCAT Slave V2\EtherCAT Slave Protocol API 21 EN.pdf*	*Documentation\7. Programming Manuals\EN\3. Protocol API\EtherCAT Slave V4\EtherCAT Slave V4 Protocol API 03 EN.pdf* *EtherCAT Slave - Migration from Version 2.5 to 4.2 MG 02 EN.pdf* *Object Dictionary V3 03 API EN.pdf*

Table 7: EtherCAT-Slave Firmware Version 2.5 and 4.2, Header, XML and Protocol API Manual

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 savest he Station Alias Address (Second Station Address) non volatile and afterwards the firmware sets it to the ESC register. As a result, the application does not have to handle the Station Alias Address anymore compared to earlier EtherCAT Slave firmware versions.

1.2.3.6 PROFINET IO-Device Firmware Versions 3.4 and 3.5

The PROFINET IO Device firmware was revised and completed and is available in version 3.5 since the third quarter 2013.

Use the PROFINET IO Device firmware in version 3.5 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 3.5, note the following guidelines:

1. Customize your application program according to the Migration Guide **PROFINET IO Device, Migration from V3.4 to V3.5**.

If you want to change to V3.5, please check in the Migration Guide **PROFINET IO Device, Migration from V3.4 to V3.5** which changes are necessary in the application program in order to use version 3.5.

2. Adjust the configuration of your PROFINET IO Controller device. Use the new GSDML file in the configuration software of the PROFINET IO Controller for this:
   GSDML-V2.3-HILSCHER-CIFX RE PNS-20130301.xml.
3. Update the PROFINET IO Device firmware in your device to version 3.5.

Note also:

- SYCON.net V1.360.x.x can configure the PROFINET IO Device firmware V3.4 as well as V3.5
- netX Configuration Tool V1.0510.x.x can configure the PROFINET IO Device firmware V3.4 as well as V3.5.
- 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 V3.5 are available:

	PROFINET IO-Device V3.4 Directory on the DVD \ File:	**PROFINET IO-Device V3.5** Directory on the DVD \ File:
Firmware	*Firmware\CIFX\cifxpns.nxf*	*Firmware\CIFX\PNS V3.5.X\cifxpns.nxf*
Header	*Examples and API\0. Header\Firmware\PROFINET IO Device V3.4.X*	*Examples and API\0. Header\Firmware\PROFINET IO Device V3.5.X*
GSDML	*EDS\PROFINET\V3.4.X\GSDML-V2.3-HILSCHER-CIFX RE PNS-20130225.xml*	*EDS\PROFINET\V3.5.X\GSDML-V2.3-HILSCHER-CIFX RE PNS-20130301.xml*
Protocol API	*Documentation\7. Programming Manuals\EN\3. Protocol API\PROFINET IO Device V3.4\PROFINET IO Device Protocol API 13 EN.pdf* *TCP IP - Packet Interface API 13 EN.pdf*	*Documentation\7. Programming Manuals\EN\3. Protocol API\PROFINET IO Device V3.5\PROFINET IO Device V3.5 Protocol API 06 EN.pdf* *PROFINET IO Device - Migration from Version 3.4 to 3.5 MG 03 EN.pdf*

Table 8: PROFINET IO-Device Firmware Version 3.4 and 3.5, Header, GSDML and Protocol API Manual

1.2.3.7 POWERLINK Controlled Node Firmware Versions 2 and 3

The POWERLINK Controlled Node firmware has been revised and completed and is available in version V3 since the third quarter of 2017.

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

The reasons for upgrading are as follows:

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

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

- Support of netX 100-based products.
- 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_CIFX 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:

	POWERLINK Controlled Node V2 Directory on the DVD \ File:	**POWERLINK Controlled Node V3** Directory on the DVD \ File:
Firmware	*Firmware\CIFX\Outdated versions\PLS V2\ cifxpls.nxf*	*Firmware\CIFX\ C010K000.nxf*
Header	*Examples and API\0. Header\Firmware\ POWERLINK Controlled Node V2\netX 100 based*	*Examples and API\0. Header\Firmware\ POWERLINK Controlled Node V3*
XDD	*EDS\POWERLINK\Slave\V2\ 00000044_CIFX RE PLS.xdd*	*EDS\POWERLINK\Slave\V3\ 00000044_CIFX RE PLS.xdd*
Protocol API	*Documentation\7. Programming Manuals\EN\ 3. Protocol API\POWERLINK Controlled Node V2\ Powerlink Controlled Node Protocol API 12 EN.pdf*	*Documentation\7. Programming Manuals\EN\ 3. Protocol API\POWERLINK Controlled Node V3\ POWERLINK Controlled Node V3 Protocol API 05 EN.pdf*

Table 9: POWERLINK Controlled Node Firmware V2 and V3 on the Product DVD

1.2.4 Device Description Files cifX

The Communication Solutions DVD **EDS** directory includes the device description files for the PC cards cifX. The device description file is required to configure the used Master device. The systems Open Modbus/TCP, PROFIBUS MPI and VARAN do not use device description files.

PC Cards cifX	System	File Name of the Device Description File
CIFX 104-RE CIFX 104-RE-R CIFX 104-RE\F CIFX 104-RE-R\F	CC-Link IE Field Basic Slave	-
	EtherCAT Slave	For the EtherCAT Slave Firmware V2.5: *Hilscher CIFX RE ECS V2.2.X.xml* (or with extension DDF)
		For the EtherCAT Slave Firmware with V4.6 the *Hilscher CIFX RE ECS V4.6.X.xml* is provided.
	 **Note!** If the XML file *Hilscher CIFX RE ECS V2.**2**.X.xml* is used/re-installed, the firmware must be used/re-installed at the Version *2.**5**.x*.	
	EtherNet/IP Adapter (Slave)	*HILSCHER CIFX-RE EIS V1.1.EDS*
	EtherNet/IP Scanner (Master)	*HILSCHER CIFX-RE EIM V1.0.eds*
	 **Note!** The description files for the EtherNet/IP Master device is needed, when an additional EtherNet/IP Master device shall communicate to a Hilscher EtherNet/IP Master device via EtherNet/IP.	
	POWERLINK-Controlled-Node/Slave	*00000044_CIFX RE PLS.xdd*
	PROFINET IO-Device	For the PROFINET IO Device Firmware V3.4: *GSDML-V2.3-HILSCHER-CIFX RE PNS-20130806.xml*
		For the PROFINET IO Device Firmware with V3.10 the *GSDML-V2.32-HILSCHER-CIFX RE PNS-20160502.xml* is provided.
	Sercos Slave	*SDDML#v3.0#Hilscher#CIFX_RE-FIXCFG_FSPIO#2014-01-08.xml,* *SDDML#v3.0#Hilscher#CIFX_RE-VARCFG_FSPDRIVE#2014-01-08.xml*
	 **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.	

PC Cards cifX	System	File Name of the Device Description File
CIFX 104-DP CIFX 104-DP-R CIFX 104-DP\F CIFX 104-DP-R\F	PROFIBUS DP Slave	*HIL_0B69.GSD*
CIFX 104-CO CIFX 104-CO-R CIFX 104-CO\F CIFX 104-CO-R\F	CANopen-Slave	*CIFX CO COS.eds*
CIFX 104-DN CIFX 104-DN-R CIFX 104-DN\F CIFX 104-DN-R\F	DeviceNet Slave	*CIFX_DN_DNS.EDS*
CIFX 104-CC\F	CC-Link Slave	*0x0352_CIFX-CCS_2.11_en.cspp,* *CIFX\0x0352_CIFX-CCS_2.11_en.csppproj*

Table 10: Device Description Files for PC Cards cifX

1.3 Legal Notes

Copyright

Important notes

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

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

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

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

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

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

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

Costs of support, maintenance, customization and product care

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

Additional guarantees

Although the hardware and software was developed and tested in-depth with greatest care, Hilscher Gesellschaft für Systemautomation mbH shall not assume any guarantee for the suitability thereof for any purpose that was not confirmed in writing. No guarantee can be granted whereby the hardware and software satisfies your requirements, or the use of the hardware and/or software is uninterruptable or the hardware and/or software is fault-free.

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The customer must not allow any third party to become knowledgeable of this expertise and shall only provide knowledge thereof to authorized users as appropriate and necessary. Companies associated with the customer shall not be deemed third parties. The customer must obligate authorized users to confidentiality. The customer should only use the confidential information in connection with the performances specified in this agreement.

The customer must not use this confidential information to his own advantage or for his own purposes or rather to the advantage or for the purpose of a third party, nor must it be used for commercial purposes and this confidential information must only be used to the extent provided for in this agreement or otherwise to the extent as expressly authorized by the disclosing party in written form. The customer has the right, subject to the obligation to confidentiality, to disclose the terms and conditions of this agreement directly to his legal and financial consultants as would be required for the customer's normal business operation.

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The delivered product (including technical data) is subject to the legal export and/or import laws as well as any associated regulations of various countries, especially such laws applicable in Germany and in the United States. The products / hardware / software must not be exported into such countries for which export is prohibited under US American export control laws and its supplementary provisions. You hereby agree to strictly follow the regulations and to yourself be responsible for observing them. You are hereby made aware that you may be required to obtain governmental approval to export, reexport or import the product.

1.4 Registered Trademarks

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Linux is a registered trademark of Linus Torvalds.

QNX is a registered trademark of QNX Software Systems, Ltd.

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CC-Link and CC-Link IE Field are registered trademarks of Mitsubishi Electric Corporation, Tokyo, Japan.

DeviceNet™ and EtherNet/IP™ are trademarks of ODVA (Open DeviceNet Vendor Association, Inc).

EtherCAT® is a registered trademark and a patented technology of Beckhoff Automation GmbH, Verl, Germany, formerly Elektro Beckhoff GmbH.

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PC/104™ is a trademark of the PC/104 Consortium (pc104.org).

All other mentioned trademarks are property of their respective legal owners.

1.4.1 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 or directly over info@ethercat.org.

A summary over Vendor ID, Conformance test, Membership and Network Logo can be found within the appendix section of this document under section *EtherCAT Summary over Vendor ID, Conformance test, Membership and Network Logo* on page 181.

1.4.2 Obligation to read and understand the Manual

Important!

- To avoid personal injury and to avoid property damage to your system or to your PC card, you must read and understand all instructions in the manual and all accompanying texts to your PC card, before installing and operating your PC card.
- First read the **Safety Instructions** in the safety chapter.
- Obey to all **Safety Messages** in the manual.
- Keep the product DVD as ZIP file providing the product manuals.

1.5 Licenses

If a PC card cifX is used as a Slave, neither for the firmware nor for the configuration software SYCON.net a license is required.

Licenses will be required if the PC card cifX is used with

- a firmware with master functionality*.

* The master license includes the PC card cifX operating as master and the license for the configuration software SYCON.net for the respective cifX.

1.5.1 License Note about VARAN Client

In order to use the PC card cifX with VARAN, you need a licence which you can acquire at the VNO (VARAN Bus-Nutzerorganisation, Bürmooser Straße 10, A-5112 Lamprechtshausen, info@varan-bus.net) after getting a member of VON.

The licence 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.

2 Safety

2.1 General Note

The documentation in the form of a user manual, an operating instruction manual or other manual types, as well as the accompanying texts have been created for the use of the products by educated personnel. When using the products, all Safety Messages, Integrated Safety Messages, Property Damage Messages and all valid legal regulations must be obeyed. Technical knowledge is presumed. The user has to assure that all legal regulations are obeyed.

2.2 Intended Use

The **PC Cards cifX** described in this user manual are PC cards for the Real-Time Ethernet or fieldbus communication. Depending from the loaded firmware, the Real-Time Ethernet or fieldbus systems listed in the following table can be realized using the respective PC card cifX.

PC Cards cifX	Real-Time Ethernet System
CIFX 104-RE CIFX 104-RE-R CIFX 104-RE\F CIFX 104-RE-R\F	CC-Link IE Field Basic Slave
	EtherCAT Master, EtherCAT Slave
	EtherNet/IP Scanner (Master), EtherNet/IP Adapter (Slave)
	Open-Modbus/TCP
	POWERLINK Controlled Node/Slave
	PROFINET IO-Controller (Master), PROFINET IO-Device (Slave)
	Sercos Master, Sercos Slave
	VARAN Client (Slave)

PC Cards cifX	Fieldbus System
CIFX 104-DP CIFX 104-DP-R CIFX 104-DP\F CIFX 104-DP-R\F	PROFIBUS DP Master, PROFIBUS DP Slave, PROFIBUS MPI Device
CIFX 104-CO CIFX 104-CO-R CIFX 104-CO\F CIFX 104-CO-R\F	CANopen Master, CANopen Slave
CIFX 104-DN CIFX 104-DN-R CIFX 104-DN\F CIFX 104-DN-R\F	DeviceNet Master, DeviceNet Slave
CIFX 104-CC\F	CC-Link slave

Table 11: PC Cards cifX and the Real-Time Ethernet or Fieldbus Systems realized thereby

The **AIFX Assembly Interfaces** are each attached to the respective basic card for the PC card cifX via a cable connector (label „\F“). Thereby the PC card cifX is equipped with a Real-Time Ethernet or fieldbus interface and in addition with a diagnostic interface.

AIFX	PC Cards cifX with AIFX Assembly Interface
AIFX-RE, AIFX-DIAG	CIFX 104-RE\F, CIFX 104-RE-R\F
AIFX-DP, AIFX-DIAG	CIFX 104-DP\F, CIFX 104-DP-R\F
AIFX-CO, AIFX-DIAG	CIFX 104-CO\F, CIFX 104-CO-R\F
AIFX-DN, AIFX-DIAG	CIFX 104-DN\F, CIFX 104-DN-R\F
AIFX-CC, AIFX-DIAG	CIFX 104-CC\F

Table 12: PC Cards cifX with AIFX Assembly Interface

2.3 Personnel Qualification

The PC Card cifX 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 Safety Instructions

To ensure your own personal safety and to avoid personal injury, you necessarily must read, understand, and comply with the safety instructions and safety messages in this manual before you install and operate your PC card cifX.

For cases if both, personal injury as well as property damage (damage of equipment or device) may occur together, you find the safety instructions in this section.

2.4.1 Electrical Shock Hazard

The danger of a lethal electrical shock caused by parts with more than 50V may occur if you open the PC cabinet to install the PC Card cifX.

- HAZARDOUS VOLTAGE is present inside of the PC or of the connecting device, into which the PC Card cifX is integrated. Strictly obey to all safety rules provided by the device's manufacturer in the documentation!
- First disconnect the power plug of the PC or of the connecting device, before you open the cabinet.
- Make sure, that the power supply is off at the PC or at the connecting device.
- Open the PC cabinet and install or remove the PC Card cifX 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 are not considered as dangerous if the contact area is equivalent to the size of a human hand.

Reference Safety [S2]

2.4.2 Communication Stop during Firmware Update or Configuration Download

If you want to perform either a firmware update (as a download) or a configuration download, both via the corresponding Master DTM in SYCON.net, be aware of the following:

- Together with the firmware download, an automated reset to the device is performed that will interrupt all network communication and all established connections will drop.
- If you download the configuration during bus operation, the communication between master and slaves is stopped.

Possible faulty System Operation

- An unpredictable and unexpected behavior of machines and plant components may cause personal injury and property damage.

➢ Stop the application program, before starting the firmware update or before downloading the configuration.

➢ Make sure that your equipment operates under conditions that prevent personal injury or property damage. All network devices should be placed in a fail-safe mode, before starting the firmware update or before downloading a configuration.

Loss of Device Parameters, Overwriting of Firmware

- Both the firmware download and the configuration download erase the configuration data base. The firmware download overwrites the existing firmware in the network device.

➢ To complete the firmware update and to make the device operable again, re-load the configuration after the firmware update has been finished.

For devices with Ethernet technology

- Device parameters that have been saved volatile, e. g. as the temporarily set IP address parameters, are getting lost during the reset.

➢ In order to prevent loss of configuration data, make sure that your project configuration data are saved non-volatile, before you initiate a firmware update or download the configuration.

2.4.3 Mismatching System Configuration

Mismatching system configuration loaded into the device could result in faulty data mapping in the application program and thus unexpected equipment operation may cause personal injury or damage of equipment.

➢ In the device use only a configuration suitable for the system.

2.5 Property Damage

To avoid system damage and device damage to the PC card cifX, you necessarily must read, understand, and comply with the safety instructions and safety messages in this manual before you install and operate the PC card cifX.

2.5.1 Exceeding allowed Supply Voltage

To avoid device damage due to high supply voltage to your PC card cifX, you must observe the following instructions. These instructions apply to all PC cards cifX described in this manual.

The PC card cifX may only be operated with the specified supply voltage. Make sure that the limits of the allowed range for the supply voltage are not exceeded. A supply voltage above the upper limit can cause severe damage to the PC card cifX! A supply voltage below the lower limit can cause malfunction in the PC card cifX. The allowed range for the supply voltage is defined by the tolerances specified in this manual.

The data on the mandatory supply voltage for the PC cards cifX described in this manual you find in the *Power Supply and Host* Interface on page 39. There the required and permitted supply voltage is provided by device type inclusively the permitted tolerance range.

2.5.2 Exceeding allowed Signaling Voltage

To avoid device damage due to high signal voltage to your PC card cifX, you must observe the following instructions. These instructions apply to all PC cards cifX described in this manual.

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

The data on the mandatory signaling voltage for the PC cards cifX described in this manual you find in the section *Power Supply and Host Interface* on page 39. There the required and permitted signaling voltage is provided by device type.

2.5.3 Electrostatically sensitive Devices

This equipment is sensitive to electrostatic discharge, which cause internal damage and affect normal operation. Therefore adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge if you install or replace your device. Follow the guidelines listed hereafter when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on the PC Card cifX.
- 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 [S3]

2.5.4 Power Disconnect while downloading Firmware or Configuration

If during the process of downloading a firmware or configuration

- the power supply to a PC with the software application is interrupted,
- or the power supply to the PC card cifX is interrupted,
- or a reset to the PC card cifX is performed,

this may lead to the following consequences:

Loss of Device Parameters, Firmware Corruption

- The firmware download or the configuration download will be interrupted and remains incomplete.
- The firmware or the configuration database will be corrupted and device parameters will be lost.
- Device damage may occur as the PC card cifX cannot be rebooted.

Whether these consequences occur depends on when the power disconnect occurs during the download.

➢ During configuration download process, do not interrupt the power supply to the PC, or to the PC card cifX and do not perform a reset!

Otherwise you might be forced to return your PC card cifX for repair.

Power Drop 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 power drops. Without a proper FAT, a firmware may not be found and cannot be started.

Make sure that the power supply to the device is not interrupted during write and delete accesses in the file system (firmware update, configuration download, etc.).

2.5.5 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.

2.5.6 Invalid Firmware

Loading invalid firmware files could render your device unusable.

- Only download firmware files to your PC Card cifX that are valid for this device.

Otherwise you may be forced to return your device for repair.

2.5.7 Information and Data Security

Take all usual measures for information and data security, in particular for PC Cards cifX with Ethernet technology. Hilscher explicitly points out that a device with access to a public network (Internet) must be installed behind a firewall or only be accessible via a secure connection such as an encrypted VPN connection. Otherwise the integrity of the device, its data, the application or system section is not safeguarded.

Hilscher can assume no warranty and no liability for damages due to neglected security measures or incorrect installation.

2.6 Labeling of Safety Messages

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

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

Table 13: Signal Words

Safety Sign	USA	Warning or Principle
		Warning of lethal electrical shock
		Principle: Disconnect the power plug
		Warning on damages by electrostatic discharge
		Warning of device damage, for example due to exceedingly high supply voltage or exceedingly high signaling voltage.
		Warning of device damage, for example due to power disconnect during firmware update or configuration download, exceeding the maximum number of allowed write/delete accesses or due to invalid or non-authorized firmware.

Table 14: Safety Signs

Note: The ANSI Z535.6 standard specifies in section 4.8: "Messages about hazards that could result in both, physical injury and property damage are considered safety messages, not property damage messages." Thus depending of the type of danger and its consequences, warning messages marked by a signal word DANGER, WARNING or CAUTION may include both, messages on physical injury and property damage.

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

2.7 References Safety

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

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

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

3 Descriptions and Requirements

3.1 Description

The PC cards cifX are communication interfaces of the cifX product family of Hilscher on the basis of the communication controller netX 100 for the Real-Time Ethernet or fieldbus communication. Depending of the loaded firmware, the protocol specific PC card cifX proceeds the communication of the corresponding Real-Time Ethernet or fieldbus system.

The used Real-Time Ethernet systems are:

- CC-Link IE Field Basic Slave
- EtherCAT Master
- EtherCAT Slave
- EtherNet/IP Scanner (Master)
- EtherNet/IP Adapter (Slave)
- Open-Modbus/TCP
- POWERLINK-Controlled-Node/Slave
- PROFINET IO-Controller (Master)
- PROFINET IO-Device (Slave)
- Sercos Master
- Sercos Slave
- VARAN Client (Slave)

The used fieldbus systems are:

- PROFIBUS DP Master
- PROFIBUS DP Slave
- PROFIBUS MPI Device
- CANopen Master
- CANopen Slave
- DeviceNet Master
- DeviceNet Slave
- CC-Link Slave

The PC card cifX handles the complete data exchange between the connected Ethernet or fieldbus devices and the PC. The data exchange is proceeded via dual-port memory.

3.2 PC Cards cifX with integrated Interfaces

The PC cards PC/104 CIFX 104-XX and CIFX 104-XX-R provide integrated Ethernet, fieldbus or diagnostic interfaces.

3.2.1 PC Cards PC/104: CIFX 104-XX, CIFX 104-XX-R

PC Card cifX	Description
PC Cards PCI-104 with integrated Ethernet, fieldbus or diagnostic interface	
Real-Time Ethernet	
CIFX 104-RE	Real-Time Ethernet Master or Slave
CIFX 104-RE-R	Real-Time Ethernet Master or Slave (connectors at the left side)
PROFIBUS	
CIFX 104-DP	PROFIBUS DP Master or Slave and PROFIBUS MPI Device
CIFX 104-DP-R	PROFIBUS DP Master or Slave and PROFIBUS MPI Device (connectors at the left side)
CANopen	
CIFX 104-CO	CANopen Master or Slave
CIFX 104-CO-R	CANopen Master or Slave (connectors at the left side)
DeviceNet	
CIFX 104-DN	DeviceNet Master or Slave
CIFX 104-DN-R	DeviceNet Master or Slave (connectors at the left side)

Table 15: PC Cards PC/104: CIFX 104-XX and CIFX 104-XX-R

3.3 PC Cards cifX with AIFX Assembly Interfaces

3.3.1 The Label „\F“ in the Device Name

The PC cards cifX including the label “**\F**” in its device name are composed of a basic card and an assembly interface AIFX.

- The basic cards CIFX 104-RE\F and CIFX 104-RE-R\F are equipped with a **Cable Connector Ethernet**, to connect the Ethernet assembly interface (AIFX-RE).
- The basic cards CIFX 104-FB\F and CIFX 104-FB-R\F are equipped with a **Cable Connector Fieldbus**, to connect the PROFIBUS assembly interface (AIFX-DP), CANopen (AIFX-CO), DeviceNet (AIFX-DN) or CC-Link (AIFX-CC*), (*only for CIFX 104-FB\F; Note: ‘FB’ stands for ‚Fieldbus’.)
- The basic cards CIFX 104-RE\F, CIFX 104-RE-R\F, CIFX 104-FB\F and CIFX 104-FB-R\F are additionally equipped with a **Cable Connector DIAG**, to optionally connect the diagnostic assembly interface (AIFX-DIAG).

Important! Operating the PC cards cifX PC/104 with AIFX assembly interface (label “**\F**” in the device name) requires proper connection of the Ethernet (AIFX-RE), PROFIBUS (AIFX-DP), CANopen (AIFX-CO), DeviceNet (AIFX-DN) or CC-Link (AIFX-CC) assembly interface to the basic card!

3.3.2 PC Cards PC/104: CIFX 104-XX\F, CIFX 104-XX-R\F

PC Card cifX	Description
PC Cards PC/104 with AIFX Assembly Interfaces	
Real-Time Ethernet	
CIFX 104-RE\F	**Real-Time Ethernet Master or Slave** - Basic card CIFX 104-RE\F and - Ethernet assembly interface (AIFX-RE).
CIFX 104-RE-R\F	**Real-Time Ethernet Master or Slave** (connectors at the left side) - Basic card CIFX 104-RE-R\F and - Ethernet assembly interface (AIFX-RE).
PROFIBUS	
CIFX 104-DP\F	**PROFIBUS DP Master or Slave or PROFIBUS MPI Device** - Basic card CIFX 104-FB\F and - PROFIBUS assembly interface (AIFX-DP).
CIFX 104-DP-R\F	**PROFIBUS DP Master or Slave or PROFIBUS MPI Device** (connectors at the left side) - Basic card CIFX 104-FB-R\F and - PROFIBUS assembly interface (AIFX-DP).
CANopen	
CIFX 104-CO\F	**CANopen Master or Slave** - Basic card CIFX 104-FB\F and - CANopen assembly interface (AIFX-CO).
CIFX 104-CO-R\F	**CANopen Master or Slave** (connectors at the left side) - Basic card CIFX 104-FB-R\F and - CANopen assembly interface (AIFX-CO).
DeviceNet	
CIFX 104-DN\F	**DeviceNet Master or Slave** - Basic card CIFX 104-FB\F and - DeviceNet assembly interface (AIFX-DN).
CIFX 104-DN-R\F	**DeviceNet Master or Slave** (connectors at the left side) - Basic card CIFX 104-FB-R\F and - DeviceNet assembly interface (AIFX-DN).
CC-Link	
CIFX 104-CC\F	**CC-Link Slave** - Basic card CIFX 104-FB\F and - CC-Link assembly interface (AIFX-CC).

Table 16: PC Cards PC/104: CIFX 104-XX\F, CIFX 104-XX-R\F

3.3.3 AIFX Assembly Interfaces

AIFX	Description	For the PC Cards cifX
AIFX-RE	Ethernet Assembly Interface (with Ethernet interface)	CIFX 104-RE\F, CIFX 104-RE-R\F
AIFX-DP	PROFIBUS Assembly Interface (with PROFIBUS interface)	CIFX 104-DP\F, CIFX 104-DP-R\F
AIFX-CO	CANopen Assembly Interface (with CANopen interface)	CIFX 104-CO\F, CIFX 104-CO-R\F
AIFX-DN	DeviceNet Assembly Interface (with DeviceNet interface)	CIFX 104-DN\F, CIFX 104-DN-R\F
AIFX-CC	CC-Link Assembly Interface (with CC-Link interface)	CIFX 104-CC\F
AIFX-DIAG (optional)	Diagnostic Assembly Interface (with diagnostic interface)	CIFX 104-RE\F, CIFX 104-RE-R\F CIFX 104-DP\F, CIFX 104-DP-R\F, CIFX 104-CO\F, CIFX 104-CO-R\F, CIFX 104-DN\F, CIFX 104-DN-R\F, CIFX 104-CC\F

Table 17: AIFX Assembly Interfaces for PC Cards cifX with Cable Connector

3.4 System Requirements

3.4.1 Slot for the PC Cards cifX PC/104

PC with slot (5 V) for PC cards cifX *PC/104*:

PC Cards cifX		Bus [Pins]	Slot
CIFX 104-RE CIFX 104-RE-R CIFX 104-RE\F CIFX 104-RE-R\F CIFX 104-DP CIFX 104-DP-R CIFX 104-DP\F CIFX 104-DP-R\F	CIFX 104-CO CIFX 104-CO-R CIFX 104-CO\F CIFX 104-CO-R\F CIFX 104-DN CIFX 104-DN-R CIFX 104-DN\F CIFX 104-DN-R\F CIFX 104-CC\F	104	**PC/104 Slot** (5 V)

Table 18: Slot for the PC Cards cifX PC/104

3.4.2 Power Supply and Host Interface

For the power supply and the host interface used for the PC cards cifX *PC/104* you must observe the following requirements:

PC Cards cifX		Supply Voltage	Signaling Voltage Host Interface	Host Interface (PCI slot)
CIFX 104-RE CIFX 104-RE-R CIFX 104-RE\F CIFX 104-RE-R\F CIFX 104-DP CIFX 104-DP-R CIFX 104-DP\F CIFX 104-DP-R\F	CIFX 104-CO CIFX 104-CO-R CIFX 104-CO\F CIFX 104-CO-R\F CIFX 104-DN CIFX 104-DN-R CIFX 104-DN\F CIFX 104-DN-R\F CIFX 104-CC\F	+5 V dc ±5 %/ Typ. 500 mA	5 V Input compatible, 5 V TTL Output compatible (Uout ≥ 2,4 V @6 mA)	PC/104

Table 19: Requirements Power Supply and Host Interface for PC Cards cifX PC/104

The data in the *Table 19* above have the following meaning:

Supply Voltage
The required and permissible supply voltage at the PC cards cifX *PC/104*

Signaling Voltage Host Interface
The required or tolerated signaling voltage at the I/O signal pins at the PC/104 bus of the PC cards cifX *PC/104*

Host Interface (PCI slot) Type of the host interface

3.4.3 Panel Cutout for Installing AIFX

In order to connect the AIFX assembly interface to a PC card cifX **PC/104** with cable connector Ethernet or fieldbus (labeling „\F“), make sure that **the front plate of the PC cabinet** has an appropriate cutout and holes for fastening the AIFX.

PC Card cifX	Panel Cutout
PC/104	at the front plate of the PC cabinet

Table 20: Panel Cutout at the at the front plate of the PC cabinet

The panel cutout must be dimensioned sufficiently large for the interface, display or control elements placed on the AIFX. Partial standard cutouts can be used.

PC Cards cifX	AIFX	Panel Cutout and Holes	
CIFX 104-RE\F CIFX 104-RE-R\F	AIFX-RE	Required Cutout	for two RJ45 Sockets **Important!** The panel cutout layout must also cover the LEDs COM 0 and COM1 at the AIFX-RE.
		Standard cutout	D-Sub-15
		Holes	2, distance between the holes 37,3 mm
		Further Information	In the data sheet *MOD JACK – MJIM* [2], as well as in section *Ethernet - AIFX-RE* on page 64.
CIFX 104-DP\F CIFX 104-DP-R\F	AIFX-DP	Required Cutout	for Dsub female Connector, 9 pin
		Standard cutout	D-Sub-9
		Holes	2, distance between the holes 25 mm
		Further Information	in section *PROFIBUS - AIFX-DP* on page 65.
CIFX 104-CO\F CIFX 104-CO-R\F	AIFX-CO	Required Cutout	for D-Sub male Connector, 9 pin
		Standard cutout	D-Sub-9
		Holes	2, distance between the holes 25 mm
		Further Information	in section *CANopen - AIFX-CO* on page 66.
CIFX 104-DN\F CIFX 104-DN-R\F	AIFX-DN	Required Cutout	for CombiCon male Connector, 5 pin
		Standard cutout	D-Sub-9
		Holes	2x2, distance between the holes 24,94 mm
		Further Information	in section *DeviceNet - AIFX-DN* on page 67.
CIFX 104-CC\F	AIFX-CC	Required Cutout	for CombiCon male Connector, 5 pin
		Standard cutout	CombiCon male Connector
		Holes	2x2, distance between the holes 24,96 mm
		Further Information	in section *CC-Link - AIFX-CC* on page 68.
CIFX 104-RE\F CIFX 104-RE-R\F CIFX 104-DP\F CIFX 104-DP-R\F CIFX 104-CO\F CIFX 104-CO-R\F CIFX 104-DN\F CIFX 104-DN-R\F	AIFX-DIAG	Required Cutout	for the light channels, the rotary switch and the Mini B USB plug
		Standard cutout	-
		Holes	2, distance between the holes 47,1 mm
		Further Information	in section *Diagnostic - AIFX-DIAG* on page 69.

Table 21: Required Panel Cutout and Holes for AIFX

3.4.4 System Requirements cifX PC/104 (ISA)

Note: To operate a **PC Card cifX PC/104 (ISA)** in a PC, the PC has to provide a free ISA memory area of 16 Kbyte in the memory range C0000 to FBFFF. If the PC card cifX should be operated with interrupt, then the PC must provide additionally a free ISA interrupt.

3.5 Requirements for Operation of the PC Cards cifX

Operating the PC cards cifX properly, the following described requirements must be fulfilled.

Protocols	CC-Link IE Field Basic Slave, EtherCAT Slave, EtherCAT Master, EtherNet/IP Adapter (Slave), EtherNet/IP Scanner (Master), Open-Modbus/TCP, POWERLINK-Controlled-Node/Slave, PROFINET IO Device (Slave), PROFINET IO Controller (Master)	Sercos Slave, Sercos Master, VARAN Client (Slave)	PROFIBUS DP Slave, PROFIBUS DP Master, PROFIBUS MPI Device, CANopen Slave, CANopen Master, DeviceNet Slave, DeviceNet Master, CC-Link Slave
Software Installation	1. Driver for the Host Interface Host Interfaces: PC/104 • The device driver **cifX Device Driver** must be installed (from V1.0). If you install the device into a PC, in general Windows® will be available as operating system. In this case the cifX Device Driver must be installed to communicate to the device and to exchange data via the dual-port memory,. **Important!** Upgrade older versions of the **cifX Device Driver** necessarily on the current version indicated in section *Driver and Software* on page 10. OR • If Windows® is not available as operating system, an own driver must be developed using the cifX Driver Toolkit and this driver must be installed. • For the operating systems Linux, Windows® CE, VxWorks, QNX and IntervalZero RTX ™ you can buy Device Driver at the company Hilscher Gesellschaft für Systemautomation mbH http://www.hilscher.com/. 2. The configuration software **SYCON.net** or alternatively the simple Slave configuration tool **netX Configuration Tool** must be installed or another application program by which the PC card cifX (Slave) can be parameterized.		
How to use the Software	On how to use the software for the configuration, the firmware download and for the diagnosis, note the following notice: **Important!** 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 ODMV3) or - the **netX Configuration Tool** or - the **cifX Test Application** or - the **cifX Driver Setup Utility** or - the application program. 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.		
Firmware Download	3. Using the configuration software **SYCON.net** or for the Slave alternatively the Slave configuration tool **netX Configuration Tool**, the user must select and download the firmware to the PC card cifX.		
Parameter Setting	4. The PC card cifX must be parameterized using one of the following options: • Configuration Software **SYCON.net** • alternatively Slave configuration tool **netX Configuration Tool** (only Slave) • Application program (programming required)		
Communication	5. For the communication of a PC card cifX (Slave) a Master device for the respective communication system is required. For the communication of a PC card cifX (Master) a Slave device for the respective communication system is required.		
Hardware Installation	**Important!** 1.) Operating the PC cards cifX with **Cable Connector Ethernet** or with the **Cable Connector Fieldbus** (label "**\F**" in its device name) requires proper connection of the Ethernet (AIFX-RE), PROFIBUS (AIFX-DP), CANopen (AIFX-CO), DeviceNet (AIFX-DN) or CC-Link (AIFX-CC) assembly interface to the basic card! 2.) The USB cable must not be connected to the PC card cifX when booting the host PC!		
Environmental Conditions	Due to a plug element from ERNI the lower limit of the operating temperature for all PC cards cifX Real-Time Ethernet is 0 °C. This applies to all hardware revisions of the PC card cifX Real-Time Ethernet.		

Table 22: Requirements to operate PC Cards cifX properly

3.6 Prerequisites for Certification

3.6.1 PROFINET IO Certification for IRT and SYNC0 Signal

3.6.1.1 Providing SYNC0 Signal at SYNC Connector of the PC Card cifX

Note: A PROFINET IO certification for PROFINET IRT requires (mandatory) that your PC card cifX offers the synchronization signal (SYNC0), in order to allow e. g. connecting an oscilloscope. Therefore the SYNC connector of your PC card cifX must be accessible.

Information about where the SYNC connector is placed on your PC card cifX, you can find in the chapter *Device Drawings* on page 52.

4 Getting Started

4.1 Warnings

When installing, uninstalling or replacing the PC card cifX, obey to the following safety messages on **personal injury** respectively on **personal injury** that may occur together **with property damage**.

WARNING

Lethal Electrical Shock caused by parts with more than 50V!

HAZARDOUS VOLTAGE inside of the PC or of the connecting device.

- Strictly obey to all safety rules provided by the device's manufacturer in the documentation!
- First disconnect the power plug of the PC or of the connecting device, before you open the cabinet.
- Make sure, that the power supply is off at the PC or at the connecting device.
- Open the PC cabinet and install or remove the PC card cifX only after disconnecting power.

WARNING

Communication Stop caused by Firmware or Configuration Download

Initiating a firmware or configuration dowload process during bus operation will stop the communication and a subsequent plant stop may cause unpredictable and unexpected behavior of machines and plant components, possibly resulting in personal injury and damage to your equipment.

The firmware download overwrites the existing firmware. The communication stop may cause loss of device parameters and possible device damage may occur.

- Stop the application program, before you start the firmware or configuration dowload.
- Make sure that all network devices are placed in a fail-safe condition.

WARNING

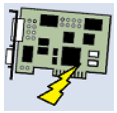
Mismatching System Configuration

Mismatching system configuration loaded into the device could result in faulty data mapping in the application program and thus unexpected equipment operation may cause personal injury or damage of equipment.

- In the device use only a configuration suitable for the system.

Obey to the following **property damage** messages, when installing, uninstalling or replacing the PC card cifX.

NOTICE

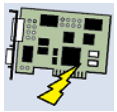


Exceeding allowed Supply Voltage

Operating the PC card cifX with a supply voltage above of the specified range leads to device damage.

➢ Use only the permissible supply voltage to operate the PC card cifX.

NOTICE



Exceeding allowed Signaling Voltage!

All I/O signal pins at the PC card cifX tolerate only the specified signaling voltage! Operating the PC card cifX with a signaling voltage other than the specified signaling voltage may lead to severe damage to the PC card cifX!

➢ For the operation of the PC card cifX use only the specified signaling voltage.

For further information on the allowed supply and signaling voltage refer to section *Power Supply and Host Interface* on page 39.

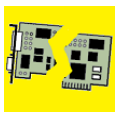
NOTICE

Electrostatically sensitive Devices

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

➢ To prevent damage to the PC and the PC card cifX, make sure, that the PC card cifX is grounded via the endplate and the PC and make sure, that you are discharged when you install/uninstall the PC card cifX.

NOTICE

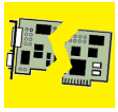


Power Disconnect while dowloading Firmware or Configuration

If the power supply to the PC or device is interrupted while the firmware or configuration is being downloaded, the download will be aborted, the firmware may be corrupted, the device parameters may be lost, and the device may be damaged.

➢ During firmware or configuration download process do not interrupt the power supply to the PC, or to the device and do not perform a reset to the device!

NOTICE



Invalid Firmware

Loading invalid firmware files could render your device unusable.

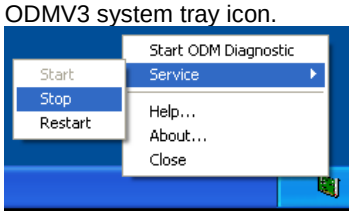
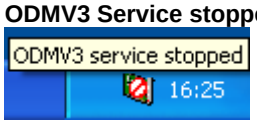
➢ Only proceed with a firmware version valid for your device.

4.2 Installation and Configuration PC Card cifX PC/104

The following table describes the steps for the software and hardware installation and for the configuration of a PC card cifX PC/104 (Master and Slave) Real-Time Ethernet and fieldbus as it is typical for many cases. The Slave device can be configured using the corresponding Slave DTM in the configuration software **SYCON.net**. Alternatively, you can also use the simple Slave configuration tool **netX Configuration Tool**. The Master device can be configured using the corresponding Master DTM in the configuration software **SYCON.net**.

#	Step	Description	For detailed information see manual / section	Page
1	**Installing Driver and Software**			
1.1	Installing **cifX Device Driver**	- Download the Communication Solutions DVD as ZIP file to the local hard disk of your PC. - Unzip the ZIP file. - Double-click the **.exe* file in the root directory of the DVD to open the autostart menu. - Follow to the instructions of the installation wizard, to install the driver.	*Refer to User Manual Software Installation for the PC Cards cifX*	
1.2	**Installing USB Driver** Depending by device type / features	Only for PC Cards cifX PC/104: equipped with an USB interface or with the diagnostic assembly interface (AIFX-DIAG).		
1.3	Reserve **Memory Range / Interrupt** at the operating system.	Reserve for the PC card cifX the memory range and if necessary one interrupt at the operating system.		
1.4	Installing SYCON.net	For PC Cards cifX Master or Slave: Run the SYCON.net-Setup and follow to the instructions of the installation wizard.		
1.5	Installing **netX Configuration Tool**	For PC Cards cifX Slave: Start the **netX Configuration Tool setup** program to install the **netX Configuration Tool**.		
2	**Preparing Hardware Installation**			
2.1	Take precautions on Electrostatically sensitive Devices	**NOTICE** **Electrostatically sensitive Devices** Make sure, that the PC card cifX is grounded via the endplate and the PC and make sure, that you are discharged when you install/ uninstall the PC Card cifX.	*Electrostatically sensitive Devices*	*32*
2.2	Set **Starting Address** and **Interrupt**		*cifX PC/104: Set Starting Address and Interrupt*	71
2.3	Set **Data Bus Width**.	Depending by the target system (motherboard) if so, set a **Data Bus Width** of 8 bit or 16 bit. (Default jumper setting 16 Bit)	*Device Drawings*	*52*
3	**Hardware Installation**	Installing cifX. Take required safety precautions.	*Hardware Installation and Uninstalling*	70

#	Step	Description	For detailed information see manual / section	Page
3.1	Take safety precautions	**WARNING** **Lethal Electrical Shock caused by parts with more than 50V!** Disconnect the power plug of the PC or of the connecting device. Make sure, that the power supply is off at the PC or at the connecting device.	*Electrical Shock Hazard*	29
3.2	Open cabinet	Now open the cabinet of the PC or of the connecting device.	*Installing PC Cards cifX PC/104*	73
3.3	Installing cifX	Plug in and mount the PC card cifX.		
3.4	If so, plug module	(a) Install the first PC/104 module on the mainboard. (b) Install any other PC/104 module on the respective underlying PC/104 module.		
3.5	Connect AIFX (only for PC Cards cifX PC/104 with label "\F" in its device name and with Cable Connector Ethernet X4 or Fieldbus X3)	**Important!** Operating the PC cards cifX with AIFX assembly interface requires proper connection of the AIFX-RE, AIFX-DP, AIFX-CO, AIFX-DN or AIFX-CC assembly interface to the basic card! If so, connect an Ethernet (AIFX-RE), PROFIBUS (AIFX-DP), CANopen (AIFX-CO), DeviceNet (AIFX-DN) or CC-Link (AIFX-CC) assembly interface. If so, additionally connect an diagnostic assembly interface (AIFX-DIAG). To the basic card of each PC card cifX first connect the AIFX-RE, AIFX-DP, AIFX-CO, AIFX-DN, AIFX-CC or AIFX-DIAG assembly interface to the PC card cifX and check if the connector is plugged in correctly. Only then plug another PC/104 module.	*The Label „\F" in the Device Name*	37
3.6	Close cabinet	Close the cabinet of the PC or connecting device.		
3.7	Plug the connecting cable to the Master or Slave	Note for all PC Cards cifX Real-Time Ethernet: **Note!** The RJ45 socket is only for use in LAN, not for telecommunication circuits.	*Ethernet Interface*	114
		Note for PC Cards cifX PROFINET IO Controller: **Important for Hardware Wiring!** Connect only ports with each other, which have different cross-over settings. Otherwise a connection between the devices can not be established. If the port settings of the PC card cifX PROFINET IO controller are not set to AUTO, then Port0 is switched uncrossed and Port1 crossed. Plug in the connecting cable from the PC card cifX to the PC card Master or Slave.	*See corresponding user manual*	
3.8	Connect the PC to the power / switch on.	Connect the PC or the connecting device to the power supply and switch it on.		

#	Step	Description	For detailed information see manual / section	Page
4	**Notice on how to use the Software**	Use only **one** Software.		
4.1	For the configuration, the firmware download and for the diagnosis, note:	**Important!** To avoid communication problems with the device, use the USB interface, the serial interface as well as the cifX Device Driver exclusively with **one** software, that is **SYCON.net** or **netX Configuration Tool**.	*Requirements for Operation of the PC Cards cifX*	*41*
5	**Configuring Slave using SYCON.net**	**Download Firmware and Configuration** Use the corresponding Slave DTM in the configuration software **SYCON.net**.		
5.1	Firmware Download	- Start configuration software **SYCON.net**, - Create new project /Open existing project, - Insert Slave into configuration, - Select driver and assign device. - Select and download the firmware.	*See corresponding user manual* *Device Names in SYCON.net*	50
	Firmware Slave:	CC-Link IE Field Basic Slave, EtherCAT Slave, EtherNet/IP Adapter, Open-Modbus/TCP, POWERLINK-Controlled-Node/Slave, PROFINET IO Device, Sercos Slave, VARAN Client, PROFIBUS DP Slave, PROFIBUS MPI Device, CANopen Slave, DeviceNet Slave, CC-Link Slave		
5.2	Configuration cifX (Slave)	-Configure the PC card cifX (Slave).		
5.3	Download Configuration	- Download the configuration to the PC card cifX (Slave)		
6	OR **Configuring Slave using netX Configuration Tool**	**Download Firmware and Configuration**		
6.1	Downloading Firmware and Configuration (Slave)	If SYCON.net was already used on the PC, stop the ODMV3 service. Therefore, select **Service > Stop** from the context menu of the ODMV3 system tray icon.  The ODMV3 system tray icon changes to **ODMV3 Service stopped**.  In the **netX Configuration Tool**: - select the Firmware protocol, - Set the PC card cifX (Slave) parameters. - Select **Apply**. The selected firmware and the configuration are downloaded to the replacement card cifX. The configuration is saved to the hard disk of the PC.	*Requirements for Operation of the PC Cards cifX* *See Operating Instruction Manual netX Configuration Tool for cifX, comX and netJACK*	*41*
7	**Configuring Master using SYCON.net**	**Download Firmware and Configuration** Use the corresponding Master DTM in the configuration software **SYCON.net**.		

#	Step	Description	For detailed information see manual / section	Page
7.1	Firmware Download	- Start configuration software **SYCON.net**, - Create new project /Open existing project, - Insert Master into configuration, - Select driver and assign device. - Select and download the firmware.	*See corresponding user manual* *Device Names in SYCON.net*	50
	Firmware Master:	EtherCAT Master, PROFIBUS DP Master, EtherNet/IP Scanner, CANopen Master, PROFINET IO Controller, DeviceNet Master		
7.2	Configuration cifX (Master)	- Configure the PC card cifX (Master).	*Notes for the Configuration of the Master Device*	*49*
7.3	Download Configuration	- Download the configuration to the PC card cifX (Master).		
8	**Diagnosis by SYCON.net** (Slave and Master)	**Diagnosis, I/O Data** Use the corresponding Slave or Master DTM in the configuration software **SYCON.net**.		
8.1	Diagnosis Steps (Master and Slave)	- In netDevice rightclick on device symbol. - Select context menu entry **Diagnosis**, - then select **Diagnosis > General** or **Firmware Diagnosis**, - or select **Diagnosis > Extended Diagnosis**.	*See corresponding user manual*	
8.2	I/O Monitor	- In netDevice rightclick on device symbol. - Select context menu entry **Diagnosis**, - then **Tools > IO Monitor**. -Check the input or output data.		
9	OR **Slave Diagnosis by netX Configuration Tool** (only Slave)	**Diagnosis**		
9.1	Diagnosis Steps (Slave)	If SYCON.net was already used on the PC, stop the ODMV3 service. Therefore, select **Service > Stop** from the context menu of the ODMV3 system tray icon. In the **netX Configuration Tool**: - In the navigation area click on **Diagnostic**, - click in the **Diagnostic** pane to **Start**, to start the communication to the Master device and to run the diagnosis. - click on **Extended**, to run the extended diagnosis.	*See Operating Instruction Manual netX Configuration Tool for cifX, comX and netJACK*	

Table 23: Steps for the Software and Hardware Installation, the Configuration and for the Diagnosis of a PC Card cifX PC/104 (Master and Slave)

4.3 Note on Exchange Service (Replacement Case)

For the exchange service (replacement case) of a PC card cifX (Master and Slave) obey to the following note.

Important! For PC cards cifX in terms of a device exchange service (replacement case) you must manually download the same firmware and configuration into the replacement card cifX, as into the preceding cifX.

4.4 Notes for the Configuration of the Master Device

To configure the Master, a device description file is required. Please note the following notes for the configuration of the Master Device:

System	Note
CC-Link IE Field Basic Slave	The settings in the used Master must comply with the settings in the Slave to establish communication. Important parameters are: Slave Station Address, Input and output data, , vendor code, model type, occupied stations.
EtherCAT Slave	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 and Input Data Bytes.
	If the XML file *Hilscher CIFX RE ECS V2.**2**.X.xml* is use/updated, the firmware with the version *2.**2**.x* must be use/updated.
	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 EtharCAT, then a customer specific XML file is necessary. Additionally the following formular applies: (number of input bytes + 3)/4 + (number of output bytes + 3)/4 must be less or equal to 100.
EtherNet/IP Adapter	To configure the Scanner/Master, 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.
POWERLINK-Controlled-Node/Slave	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.
PROFINET IO Device	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. Under Name of Station, 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.
Sercos Slave	The Sercos Master uses the Sercos address to communicate with the slave. Some Masters will verify Device ID, Vendor Code, Input Data Size and Output Data Size and will do further communication to the Slave only if all these values match. Therefor the Master reads these parameters from the Slave and compares them with the configuration stored in the Master. The parameters Device ID, Vendor Code, Input 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.
PROFIBUS DP Slave	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).
CANopen Slave	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.

System	Note
DeviceNet Slave	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.
CC-Link Slave	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 24: Notes for the Configuration of the Master Device

Further information to the device description files you find under section on *Device Description Files cifX* page 22.

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 PC card cifX 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 PC card cifX with SYCON.net.

PC Cards cifX	Protocol	DTM Specific Group	Device Name in SYCON.net
CIFX 104-RE, CIFX 104-RE-R CIFX 104-RE\F CIFX 104-RE-R\F	CC-Link IE Field Basic Slave	Gateway/Stand-Alone Slave	CiFX RE/CCIEBS
	EtherCAT Master	Master	CIFX RE/ECM
	EtherCAT Slave	Gateway/Stand-Alone Slave	CIFX RE/ECS
	EtherNet/IP Scanner (Master)	Master	CIFX RE/EIM
	EtherNet/IP Adapter (Slave)	Gateway/Stand-Alone Slave	CIFX RE/EIS
	Open-Modbus/TCP	Gateway/Stand-Alone Slave	CIFX RE/OMB
	POWERLINK-Controlled-Node/Slave	Gateway/Stand-Alone Slave	CIFX RE/PLS
	PROFINET IO-Controller	Master	CIFX RE/PNM
	PROFINET IO-Device	Gateway/Stand-Alone Slave	CIFX RE/PNS
	Sercos Master	Master	CIFX RE/S3M
	Sercos Slave	Gateway/Stand-Alone Slave	CIFX RE/S3S
	VARAN Client (Slave)	Gateway/Stand-Alone Slave	CIFX RE/VRS
CIFX 104-DP CIFX 104-DP-R CIFX 104-DP\F CIFX 104-DP-R\F	PROFIBUS DP Master	Master	CIFX DP/DPM
	PROFIBUS DP Slave	Gateway/ Stand-Alone Slave	CIFX DP/DPS
	PROFIBUS MPI Device	Gateway/ Stand-Alone Slave	CIFX DP/MPI
CIFX 104-CO CIFX 104-CO-R CIFX 104-CO\F CIFX 104-CO-R\F	CANopen Master	Master	CIFX CO/COM
	CANopen Slave	Gateway/ Stand-Alone Slave	CIFX CO/COS
CIFX 104-DN CIFX 104-DN-R CIFX 104-DN\F CIFX 104-DN-R\F	DeviceNet Master	Master	CIFX DN/DNM
	DeviceNet Slave	Gateway/ Stand-Alone Slave	CIFX DN/DNS
CIFX 104-CC\F	CC-Link Slave	Gateway/Stand-Alone Slave	CIFX CC/CCS

Table 25: Device Names in SYCON.net by Communication Protocol

4.6 Update for Firmware, Driver and Software

Note: As a pre-requirement for the software update the project files, the configuration files and firmware files are 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 *Notes on Hardware, Firmware, Software and Driver* on page 10. The following graphic gives an overview:

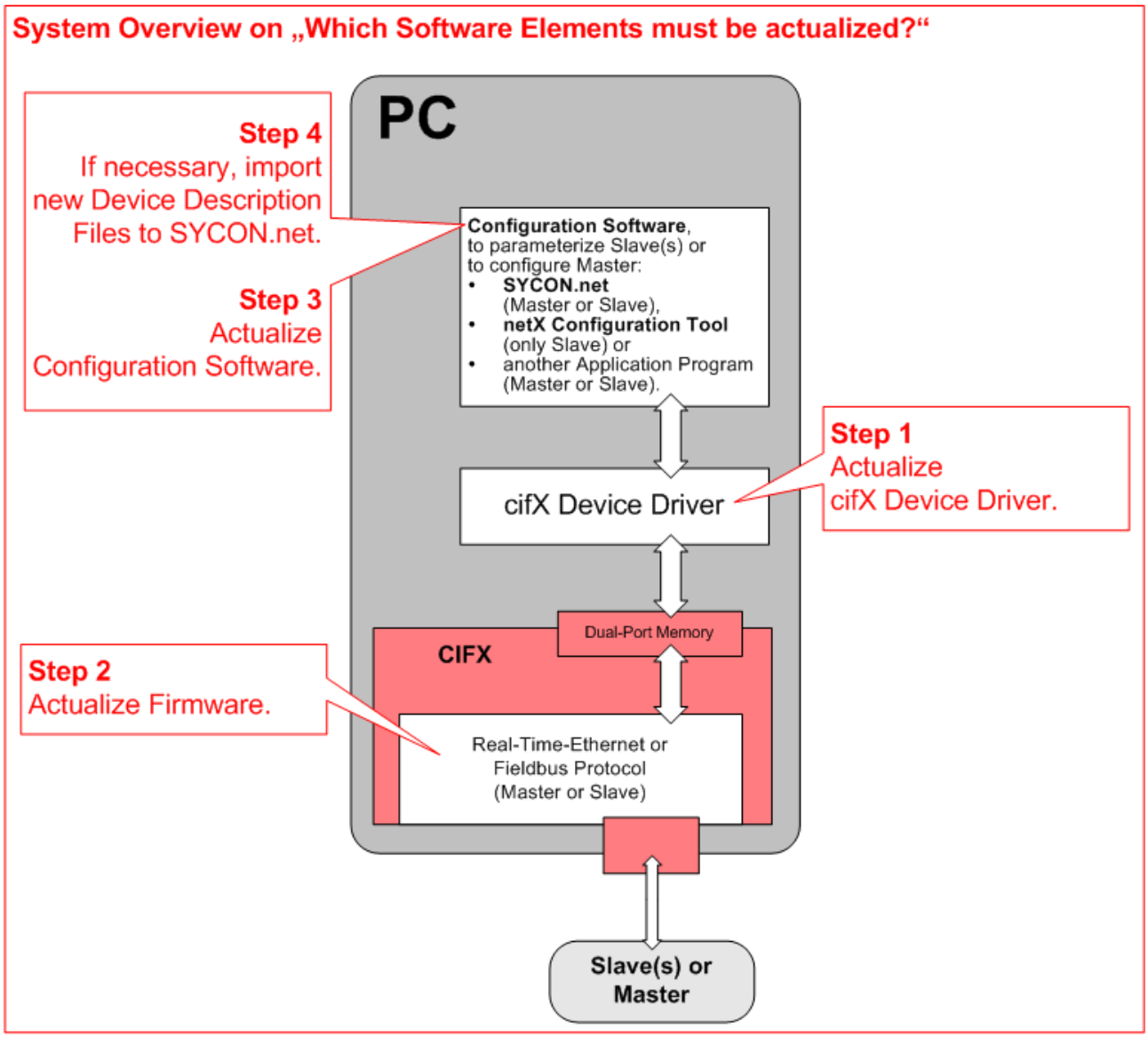


Figure 1: System Overview cifX to update Firmware, Driver and Software

Note the specific details for devices with **PC/104 bus** in section *Firmware* on page 11.

5 Device Drawings

5.1 PC-Karten cifX PC/104

5.1.1 CIFX 104-RE

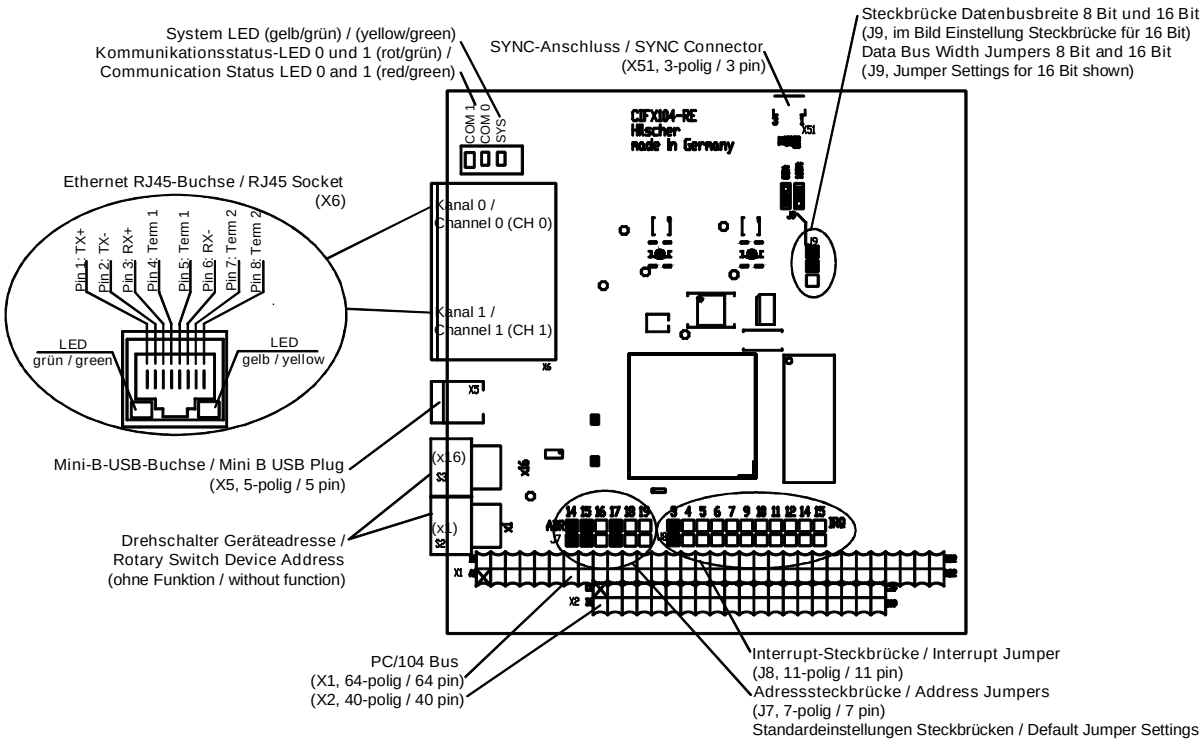


*Figure 2: CIFX 104-RE**

Note:

- *Device supports **Auto Crossover** Function.
- With loaded **EtherCAT Master** firmware only the RJ45 channel 0 can be used, channel 1 is deactivated. Beginning with the EtherCAT Master firmware version 3 channel 1 can be reactivated if redundancy is activated.
- For **Open Modbus/TCP** with V2.3.4.0 and higher both Rj45channels can be used.
- In **Interrupt Mode** (IRQ = Interrupt Request) exactly one jumper must be set. If no jumper is set, the PC card cifX works in **Polling Mode**. For further details refer to *Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory* on page 71.

- The meaning of the **LEDs** depends from the loaded firmware. See chapter *LED Descriptions* beginning from page 78.
- For the pin assignment of the **PCI/104** bus X1/X2 refer to section *Pin Assignment for PC/104 Bus* on page 123.
- For the pin assignment of the **SYNC** Connector refer to section *Pin Assignment SYNC Connector, X51* on page 121.
- For further information on the **Mini-B USB** Connector refer to section *Mini-B USB Connector (5 Pin)* on page 118.

5.1.2 CIFX 104-RE-R

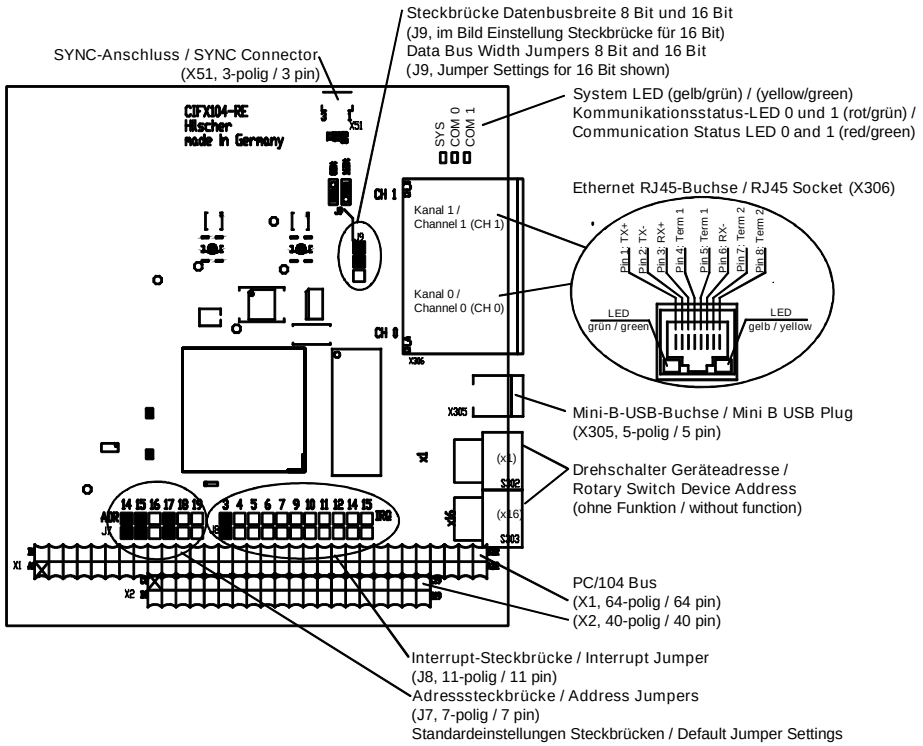


*Figure 3: CIFX 104-RE-R**

Note:

- *Device supports **Auto Crossover** Function.
- With loaded **EtherCAT Master** firmware only the RJ45 channel 0 can be used, channel 1 is deactivated. Beginning with the EtherCAT Master firmware version 3 channel 1 can be reactivated if redundancy is activated.
- For **Open Modbus/TCP** with V2.3.4.0 and higher both Rj45channels can be used.
- In **Interrupt Mode** (IRQ = Interrupt Request) exactly one jumper must be set. If no jumper is set, the PC card cifX works in **Polling Mode**. For further details refer to *Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory* on page 71.

- The meaning of the **LEDs** depends from the loaded firmware. See chapter *LED Descriptions* beginning from page 78.
- For the pin assignment of the **PCI/104** bus X1/X2 refer to section *Pin Assignment for PC/104 Bus* on page 123.
- For the pin assignment of the **SYNC** Connector refer to section *Pin Assignment SYNC Connector, X51* on page 121.
- For further information on the **Mini-B USB** Connector refer to section *Mini-B USB Connector (5 Pin)* on page 118.

5.1.3 CIFX 104-RE\F

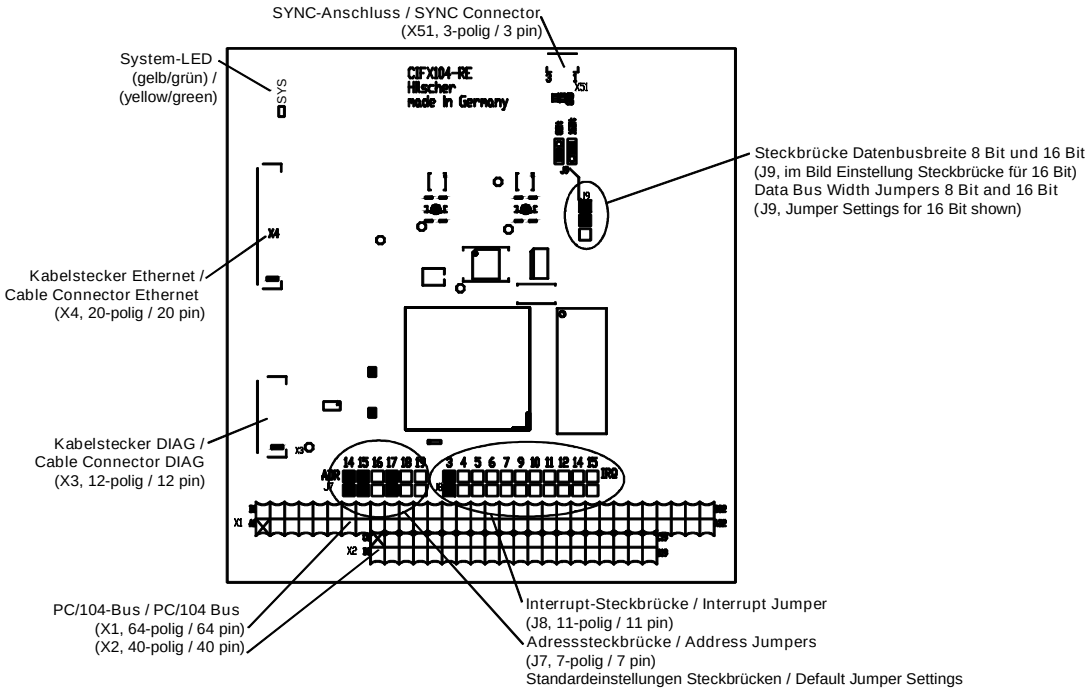


Figure 4: Basic Card for CIFX 104-RE\F

Note:

- If the assembly inter face diagnostic **AIFX-DIAG** is connected to the basic card for the PC card CIFX 104-RE\F or CIFX 104-RE-R\F, the **Mini-B USB** connector on the AIFX-DIAG can be used beginning with the hardware revision 5 of the PC card cifX.
- In **Interrupt Mode** (IRQ = Interrupt Request) exactly one jumper must be set. If no jumper is set, the PC card cifX works in **Polling Mode**. For further details refer to *Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory* on page 71.

- For the pin assignment of the **PCI/104** bus X1/X2 refer to section *Pin Assignment for PC/104 Bus* on page 123.
- For the pin assignment of the **SYNC** Connector refer to section *Pin Assignment SYNC Connector, X51* on page 121.

5.1.4 CIFX 104-RE-R\F

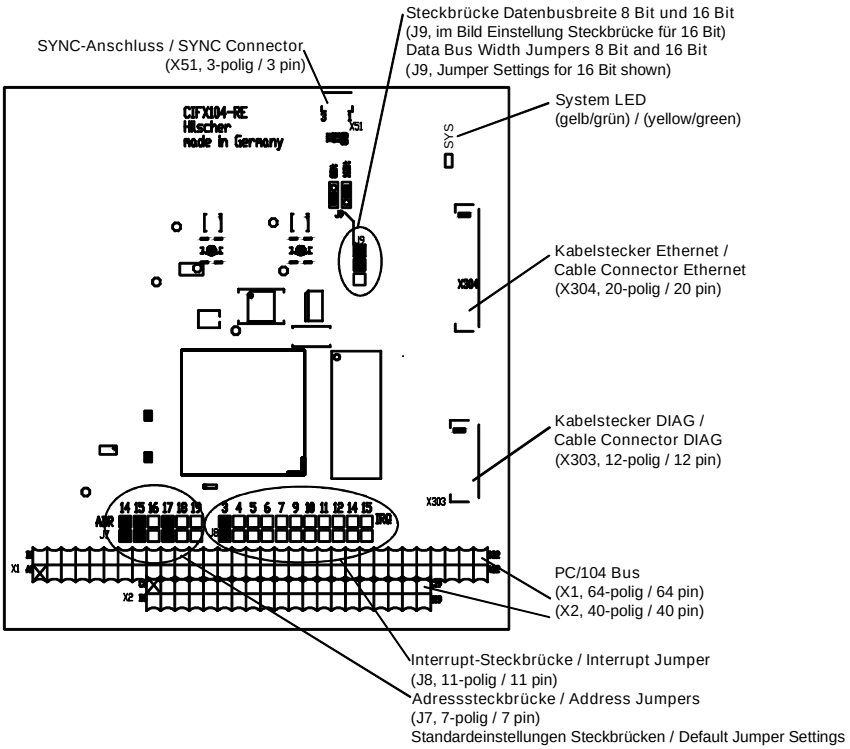


Figure 5: Basic Card for CIFX 104-RE-R\F

Note:

- If the assembly inter face diagnostic **AIFX-DIAG** is connected to the basic card for the PC card CIFX 104-RE\F or CIFX 104-RE-R\F, the **Mini-B USB** connector on the AIFX-DIAG can be used beginning with the hardware revision 5 of the PC card cifX.
- In **Interrupt Mode** (IRQ = Interrupt Request) exactly one jumper must be set. If no jumper is set, the PC card cifX works in **Polling Mode**. For further details refer to *Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory* on page 71.

- For the pin assignment of the **PCI/104** bus X1/X2 refer to section *Pin Assignment for PC/104 Bus* on page 123.
- For the pin assignment of the **SYNC** Connector refer to section *Pin Assignment SYNC Connector, X51* on page 121.

5.1.5 CIFX 104-DP

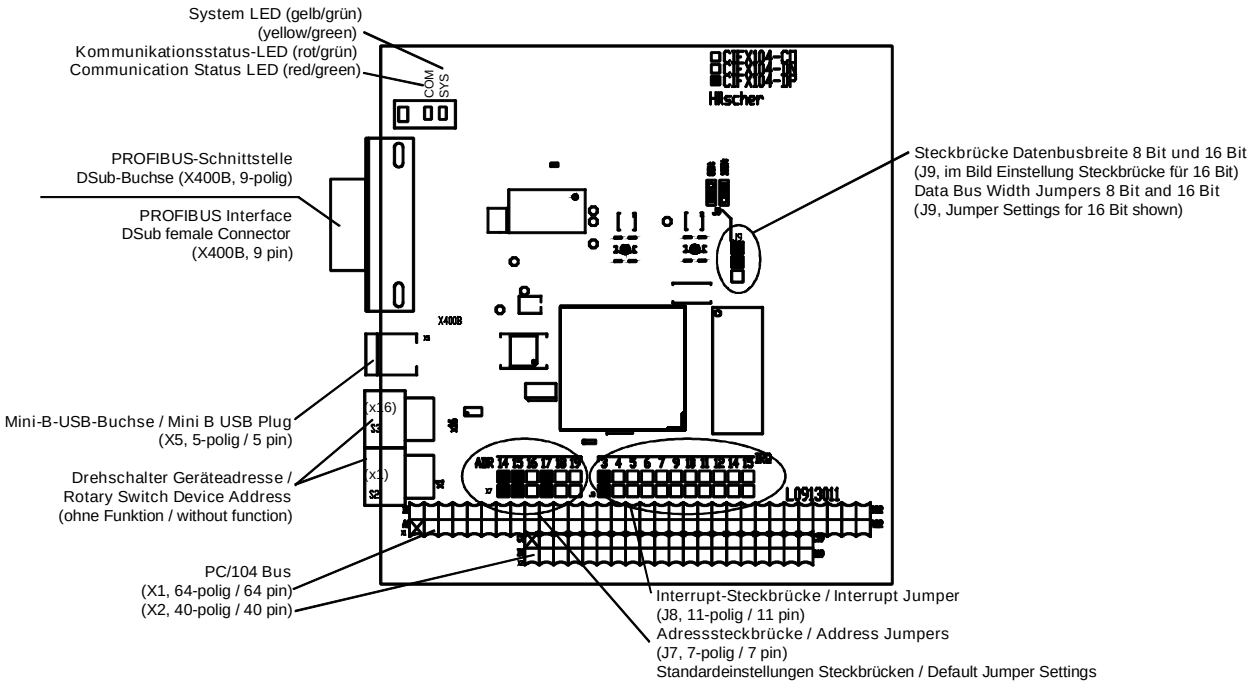


Figure 6: CIFX 104-DP

Note:

- In **Interrupt Mode** (IRQ = Interrupt Request) exactly one jumper must be set. If no jumper is set, the PC card cifX works in **Polling Mode**. For further details refer to *Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory* on page 71.

- For the pin assignment of the **PCI/104** bus X1/X2 refer to section *Pin Assignment for PC/104 Bus* on page 123.
- For further information on the **Mini-B USB** Connector refer to section *Mini-B USB Connector (5 Pin)* on page 118.

5.1.6 CIFX 104-DP-R

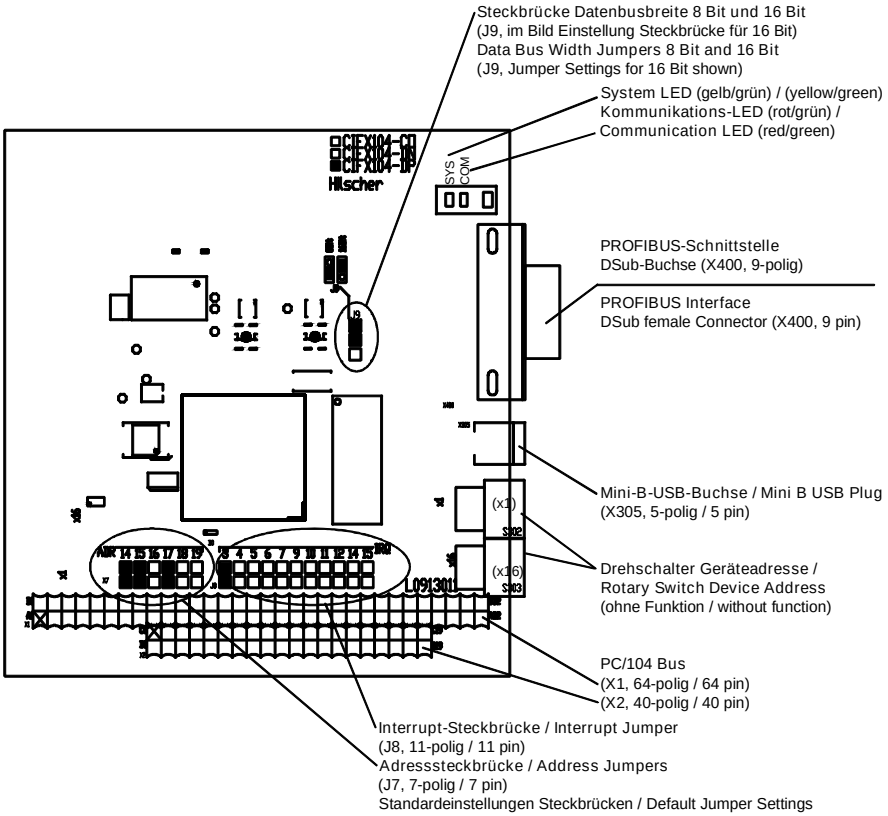


Figure 7: CIFX 104-DP-R

Note:

- In **Interrupt Mode** (IRQ = Interrupt Request) exactly one jumper must be set. If no jumper is set, the PC card cifX works in **Polling Mode**. For further details refer to *Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory* on page 71.

- For the pin assignment of the **PCI/104** bus X1/X2 refer to section *Pin Assignment for PC/104 Bus* on page 123.
- For further information on the **Mini-B USB** Connector refer to section *Mini-B USB Connector (5 Pin)* on page 118.

5.1.7 CIFX 104-CO

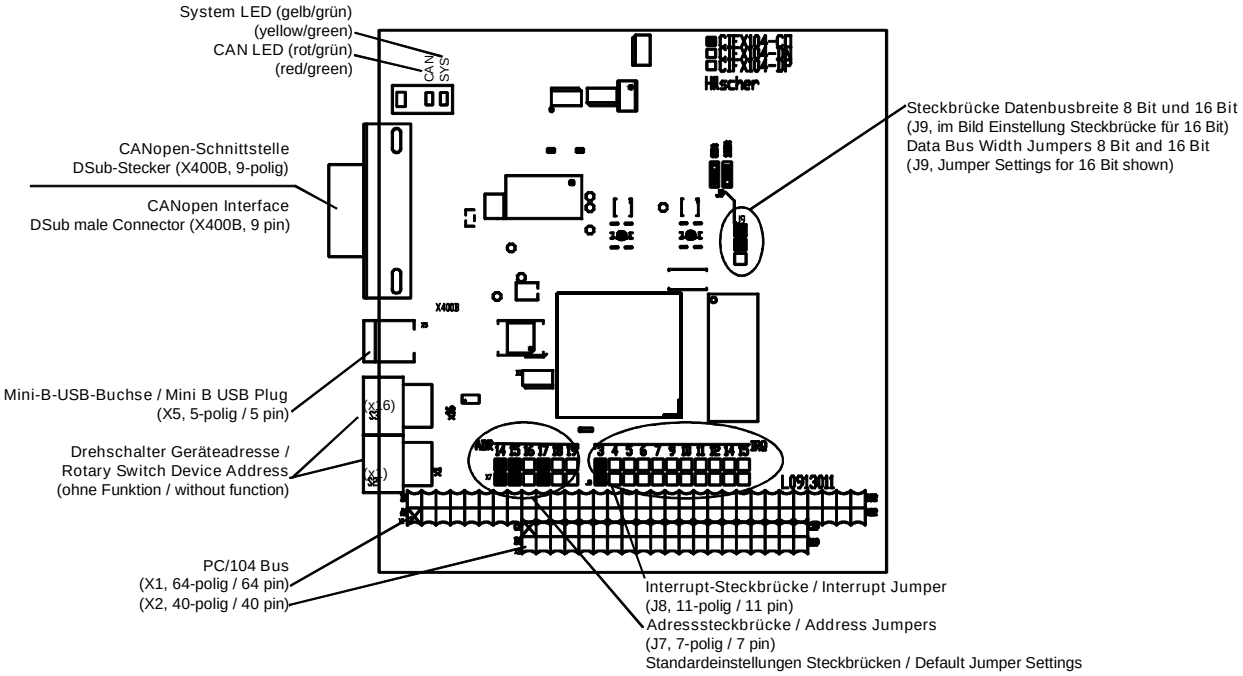


Figure 8: CIFX 104-CO

Note:

- In **Interrupt Mode** (IRQ = Interrupt Request) exactly one jumper must be set. If no jumper is set, the PC card cifX works in **Polling Mode**. For further details refer to *Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory* on page 71.

- For the pin assignment of the **PCI/104** bus X1/X2 refer to section *Pin Assignment for PC/104 Bus* on page 123.
- For further information on the **Mini-B USB** Connector refer to section *Mini-B USB Connector (5 Pin)* on page 118.

5.1.8 CIFX 104-CO-R

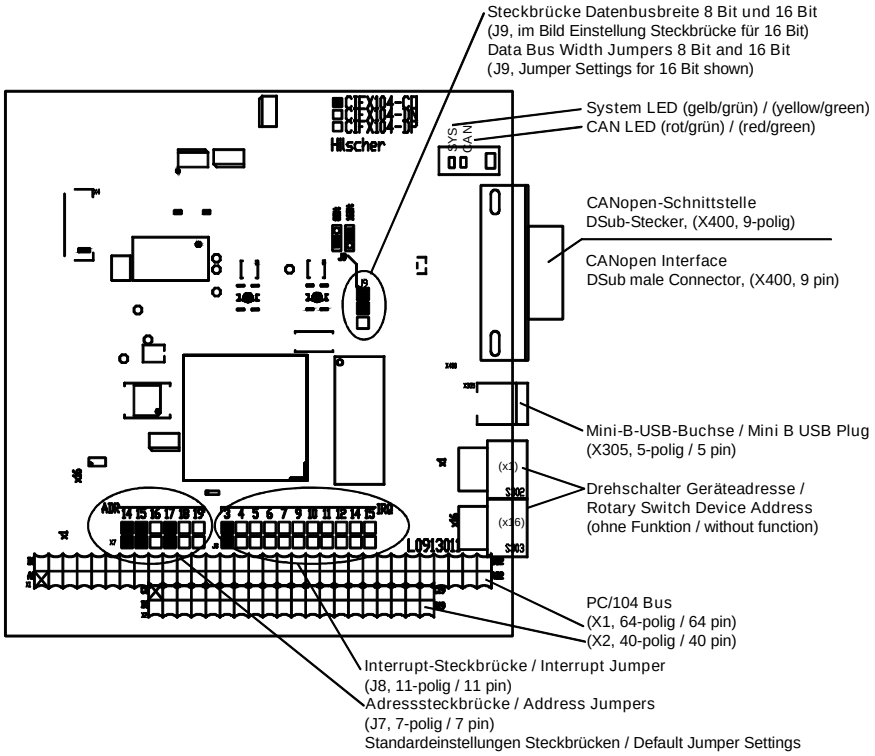


Figure 9: CIFX 104-CO-R

Note:

- In **Interrupt Mode** (IRQ = Interrupt Request) exactly one jumper must be set. If no jumper is set, the PC card cifX works in **Polling Mode**. For further details refer to *Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory* on page 71.

- For the pin assignment of the **PCI/104** bus X1/X2 refer to section *Pin Assignment for PC/104 Bus* on page 123.
- For further information on the **Mini-B USB** Connector refer to section *Mini-B USB Connector (5 Pin)* on page 118.

5.1.9 CIFX 104-DN

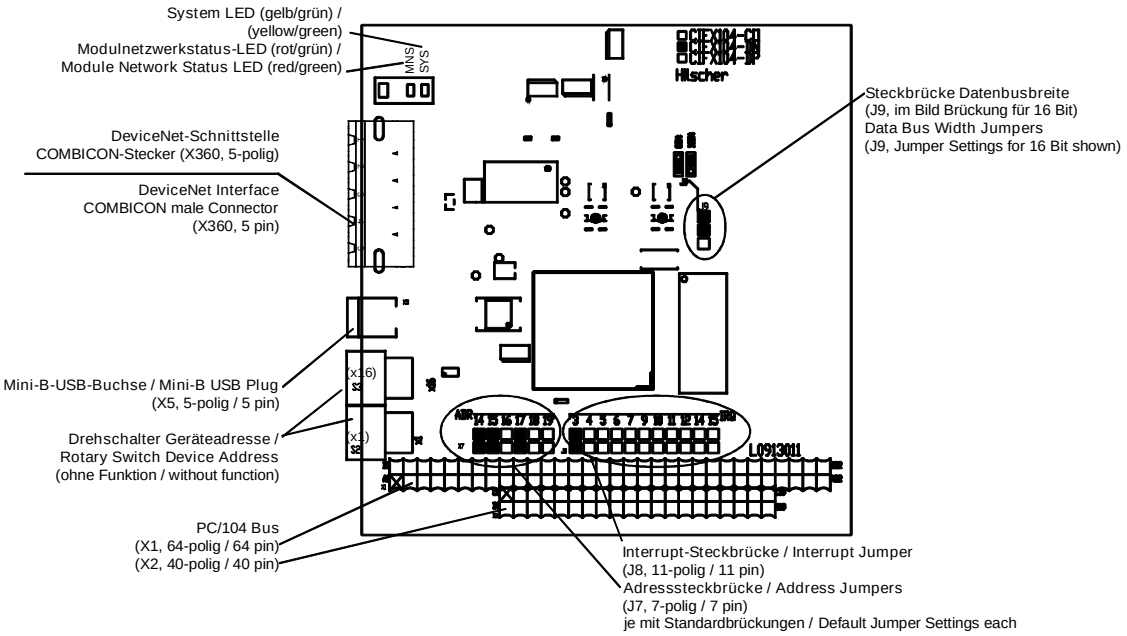


Figure 10: CIFX 104-DN

Note:

- In **Interrupt Mode** (IRQ = Interrupt Request) exactly one jumper must be set. If no jumper is set, the PC card cifX works in **Polling Mode**. For further details refer to *Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory* on page 71.

- For the pin assignment of the **PCI/104** bus X1/X2 refer to section *Pin Assignment for PC/104 Bus* on page 123.
- For further information on the **Mini-B USB** Connector refer to section *Mini-B USB Connector (5 Pin)* on page 118.

5.1.10 CIFX 104-DN-R

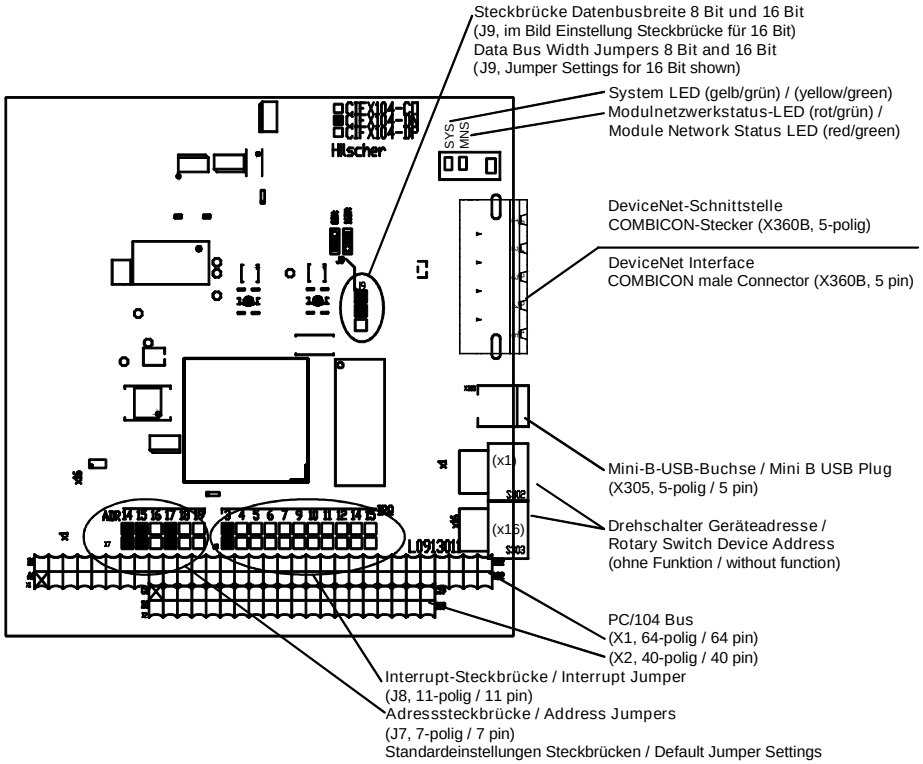


Figure 11: CIFX 104-DN-R

Note:

- In **Interrupt Mode** (IRQ = Interrupt Request) exactly one jumper must be set. If no jumper is set, the PC card cifX works in **Polling Mode**. For further details refer to *Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory* on page 71.

- For the pin assignment of the **PCI/104** bus X1/X2 refer to section *Pin Assignment for PC/104 Bus* on page 123.
- For further information on the **Mini-B USB** Connector refer to section *Mini-B USB Connector (5 Pin)* on page 118.

5.1.11 CIFX 104-DP\F, CIFX 104-CO\F, CIFX 104-DN\F, CIFX 104-CC\F

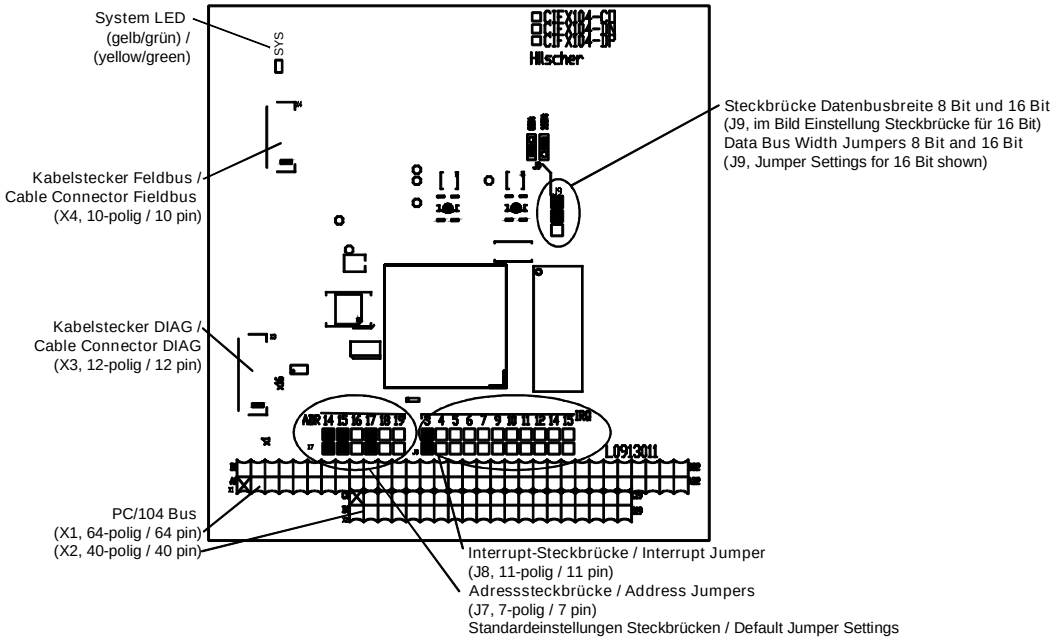


Figure 12: Basic Card CIFX 104-FB\F for CIFX 104-DP\F, CIFX 104-CO\F, CIFX 104-DN\F, CIFX 104-CC\F

Note: In **Interrupt Mode** (IRQ = Interrupt Request) exactly one jumper must be set. If no jumper is set, the PC card cifX works in **Polling Mode**. For further details refer to *Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory* on page 71.

5.1.12 CIFX 104-DP-R\F, CIFX 104-CO-R\F, CIFX 104-DN-R\F

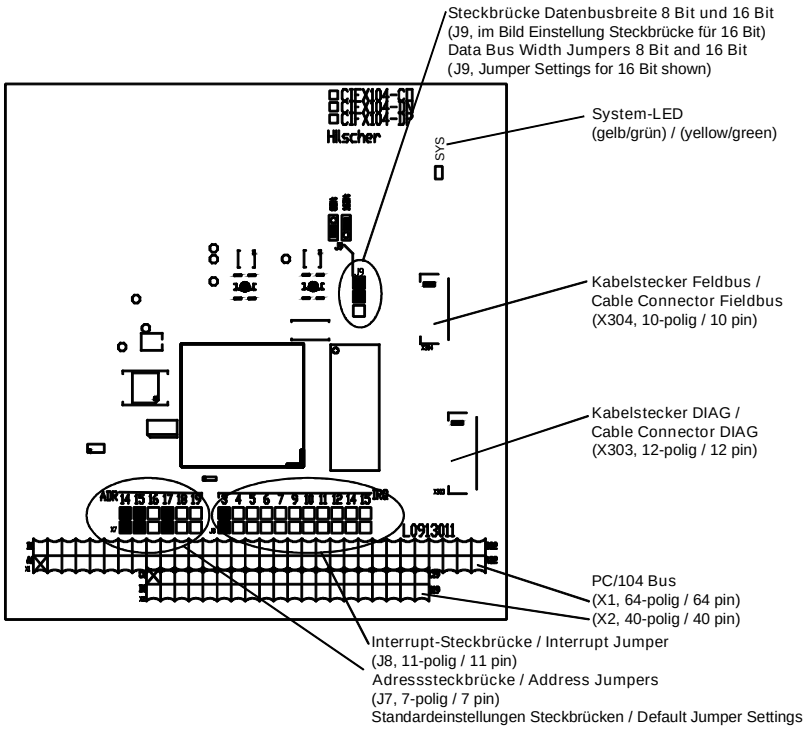


Figure 13: Basic Card CIFX 104-FB-R\F for CIFX 104-DP-R\F, CIFX 104-CO-R\F, CIFX 104-DN-R\F

Note: In **Interrupt Mode** (IRQ = Interrupt Request) exactly one jumper must be set. If no jumper is set, the PC card cifX works in **Polling Mode**. For further details refer to *Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory* on page 71.

5.1.13 Reverse Side CIFX 104-XX (all Basic Cards and Variants)

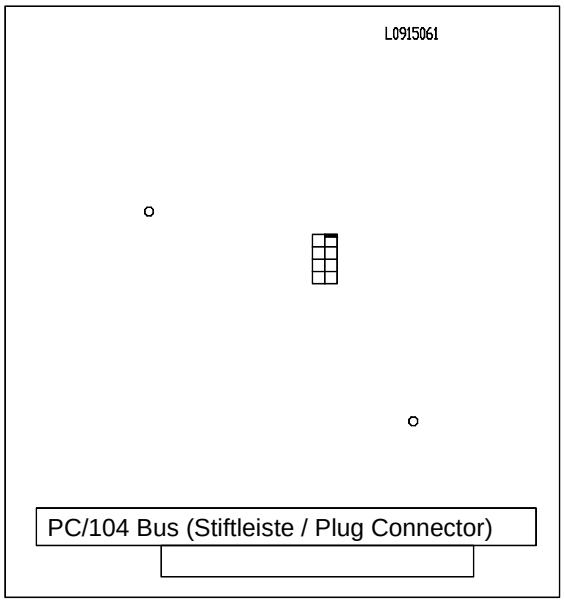


Figure 14: Reverse Side CIFX 104-XX (all Basic Cards and Variants)

5.2 AIFX Assembly Interfaces

5.2.1 Ethernet - AIFX-RE

Only for CIFX 104-RE\F, CIFX 104-RE-R\F.

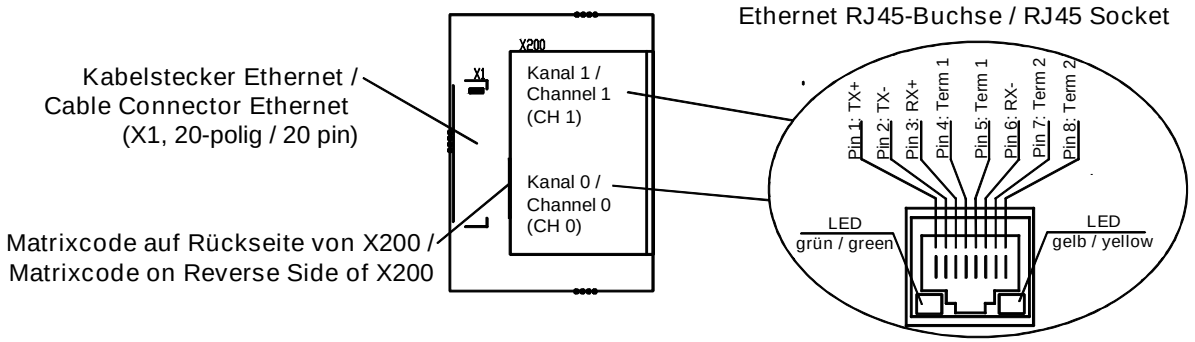
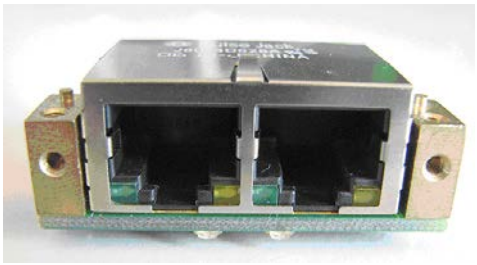
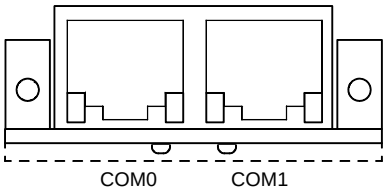


*Figure 15: Ethernet Assembly Interface (AIFX-RE)**

Note: *Assembled device supports Auto Crossover Function. Note also: With loaded EtherCAT Master firmware only the RJ45 channel 0 can be used, channel 1 is deactivated. Beginning with the EtherCAT Master firmware version 3 channel 1 can be reactivated if redundancy is activated. For Open Modbus/TCP with V2.3.4.0 and higher both RJ 45 channels can be used.





COM0: Kommunikationsstatus-LED 0 (rot/grün) / Communication Status LED 0 (red/green)

COM1: Kommunikationsstatus-LED 1 (rot/grün) / Communication Status LED 1 (red/green)

Figure 16: Front Side and LED Display Ethernet Assembly Interface (AIFX-RE)

The meaning of the **LEDs COM0** and **COM1** at the reverse side of the AIFX-RE and the meaning of the green and yellow LEDs at RJ45Ch0 and RJ45Ch1 corresponds to the description in chapter *LED Descriptions* beginning from page 78.

5.2.2 PROFIBUS - AIFX-DP

Only for CIFX 104-DP\F, CIFX 104-DP-R\F.

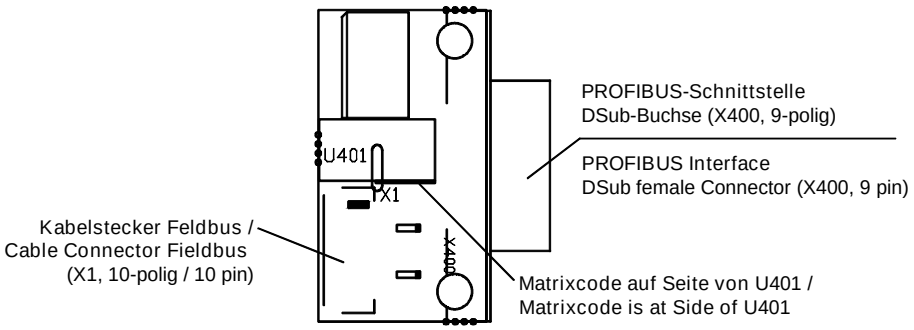


Figure 17: PROFIBUS Assembly Interface (AIFX-DP)

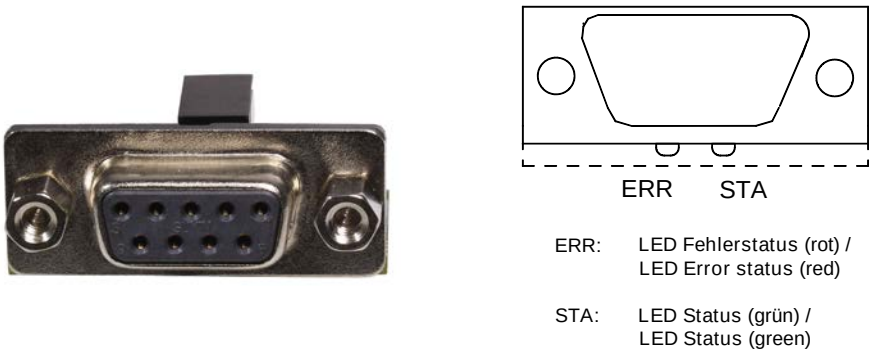


Figure 18: Front Side and LED Display PROFIBUS Assembly Interface (AIFX-DP)

The meaning of the **LEDs ERR** and **STA** at the reverse side of the AIFX-DP corresponds to the description in chapter *LED Descriptions* beginning from page 78.

5.2.3 CANopen - AIFX-CO

Only for CIFX 104-CO\F, CIFX 104-CO-R\F.

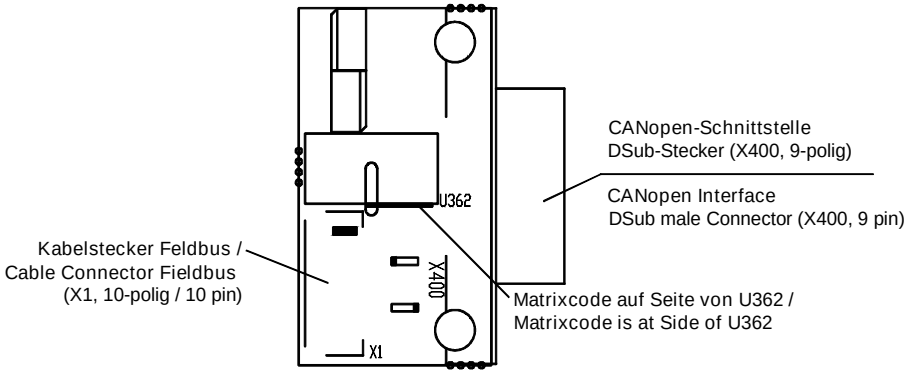


Figure 19: CANopen Assembly Interface (AIFX-CO)

Figure 20: Front Side and LED Display Assembly Interface (AIFX-CO)

The meaning of the **LEDs ERR** and **RUN** at the reverse side of the AIFX-CO corresponds to the description in chapter *LED Descriptions* beginning from page 78.

5.2.4 DeviceNet - AIFX-DN

Only for CIFX 104-DN\F, CIFX 104-DN-R\F.

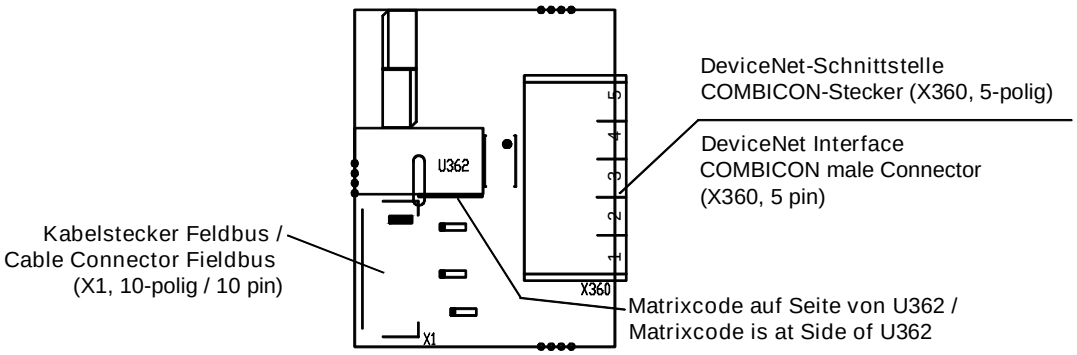
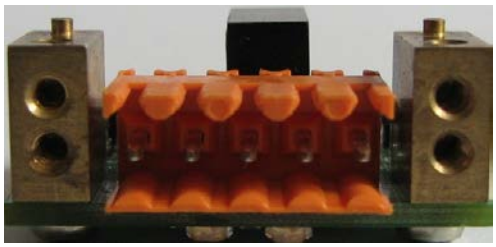
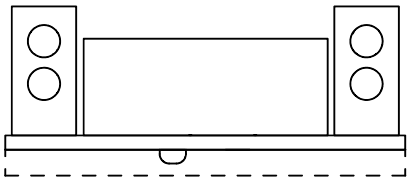


Figure 21: DeviceNet Assembly Interface (AIFX-DN)





MNS

MNS: LED Modulnetzwerkstatus (rot) /
LED Module Network status (red)

Figure 22: Front Side and LED Display DeviceNet Assembly Interface (AIFX-DN)

The meaning of the **LED MNS** at the reverse side of the AIFX-DN corresponds to the description in chapter *LED Descriptions* beginning from page 78.

5.2.5 CC-Link - AIFX-CC

Only for CIFX 104-CC\F.

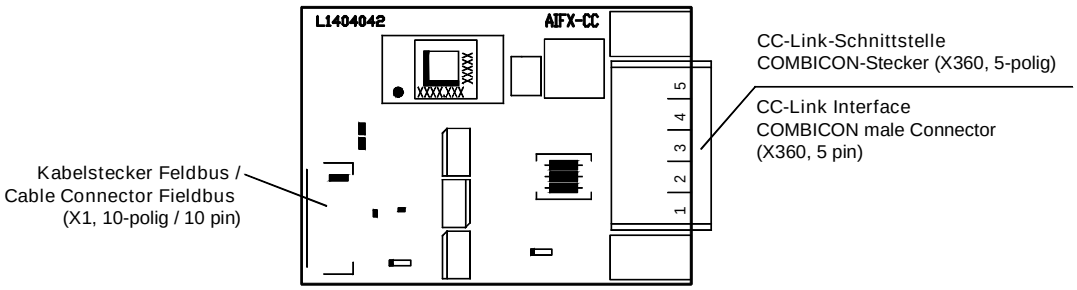


Figure 23: CC-Link Assembly Interface (AIFX-CC)

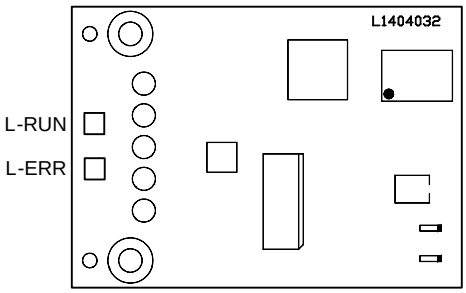
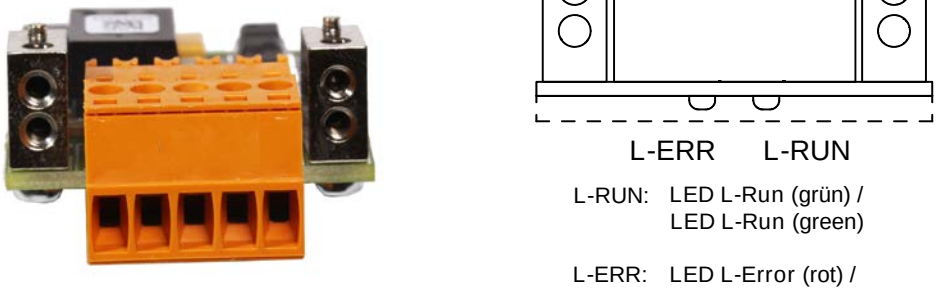


Figure 24: Reverse Side CC-Link Assembly Interface (AIFX-CC) with Matrix Label



L-RUN: LED L-Run (grün) / LED L-Run (green)

L-ERR: LED L-Error (rot) / LED L-Error (red)

Figure 25: Front Side and LED Display CC-Link Assembly Interface (AIFX-CC)

The meaning of the **LEDs L-RUN** and **L-ERR** aat the reverse side of the AIFX-CC corresponds to the description in chapter *LED Descriptions* beginning from page 78.

5.2.6 Diagnostic - AIFX-DIAG

Only for CIFX 104-RE\F, CIFX 104-RE-R\F, CIFX 104-DP\F, CIFX 104-DP-R\F, CIFX 104-CO\F, CIFX 104-CO-R\F, CIFX 104-DN\F, CIFX 104-DN-R\F, CIFX 104-CC\F.

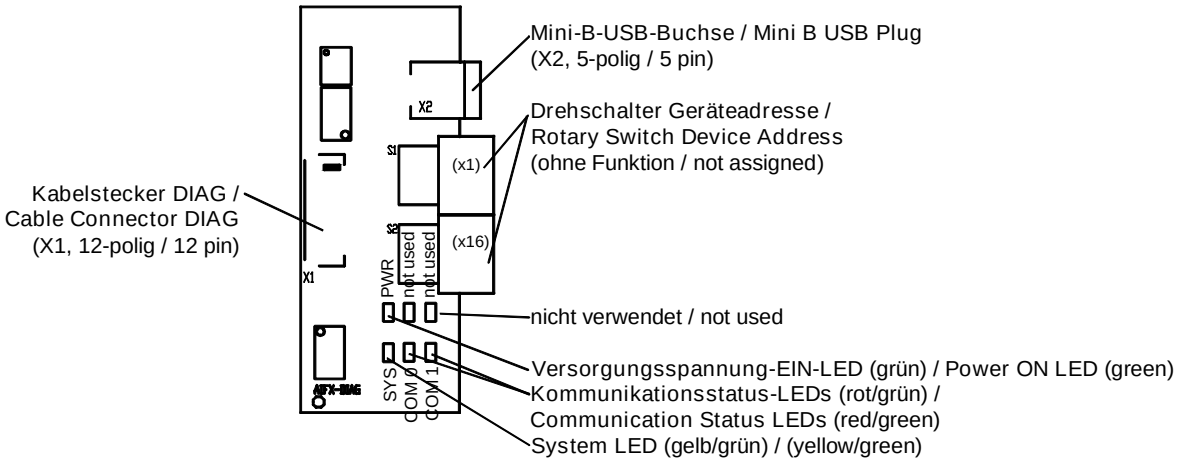
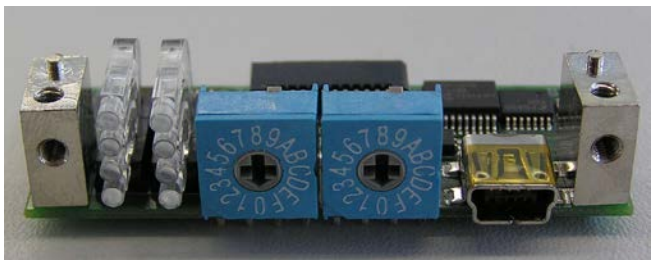
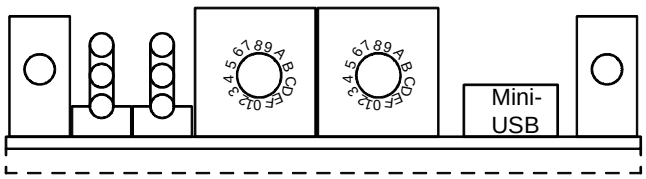
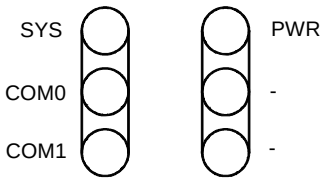


Figure 26: Diagnostic Assembly Interface (AIFX-DIAG)

The meaning of the **LEDs** at the **AIFX-DAIG** corresponds to the descriptions in chapter *LED Descriptions* beginning from page 78. For further information on the **Mini-B USB** Connector refer to section *Mini-B USB Connector (5 Pin)* on page118.





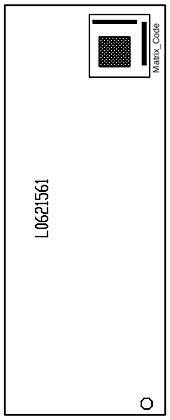


SYS: System LED (gelb/grün) / (yellow/green)

PWR: Versorgungsspannung-EIN-LED (grün) / Power ON LED (green)

COM0: Kommunikationsstatus-LED 0 (rot/grün) / Communication Status LED 0 (red/green)

COM1: Kommunikationsstatus-LED 1 (rot/grün) / Communication Status LED 1 (red/green)



Reverse Side with Matrix Label

Figure 27: Front Side, LED Display and Reverse Side Diagnostic Assembly Interface (AIFX-DIAG)

6 Hardware Installation and Uninstalling

To install / uninstall the PC cards cifX **PC/104**

- CIFX 104-RE
- CIFX 104-RE-R
- CIFX 104-RE\F
- CIFX 104-RE-R\F
- CIFX 104-DP
- CIFX 104-DP-R
- CIFX 104-DP\F
- CIFX 104-DP-R\F
- CIFX 104-CO
- CIFX 104-CO-R
- CIFX 104-CO\F
- CIFX 104-CO-R\F
- CIFX 104-DN
- CIFX 104-DN-R
- CIFX 104-DN\F
- CIFX 104-DN-R\F
- CIFX 104-CC\F

handle as described in the sections hereafter. The device drawing of your PC card cifX gives information on the manual control elements of your device.

For the installation, uninstalling and replacement of the PC card cifX **adhere to the necessary safety precautions** given in the safety chapter and in section *Warnings* on page 43 and check any notes in the overview given *Getting Started* on page 43.

6.1 cifX PC/104: Set Starting Address and Interrupt

To set the starting address and or an interrupt (or polling) for **PC Cards cifX PC/104**, proceed as follows:

1. Check the memory area of the PC.

Important! Make sure that the configured memory areas and interrupts of the PC are not used by another PC component.

In order to identify and prevent such errors:

- Start the **Device Manager**.
- Select **menu View > Resources by type**.
- The used **Memory** respectively the **interrupt (IRQ) resources** are shown.
- Search for a free memory area:

The possible memory areas of 16 KByte are:

- C0000 … C3FFF (hex),
- D0000 … D3FFF (hex),
- E0000 … E3FFF (hex) or
- F0000 … F3FFF (hex).

The PC card cifX PC/104 can be used in poll mode or in interrupt mode.

- If the PC card cifX shall be used in interrupt mode, then search for a free interrupt:

Possible interrupts are 3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15

2. Configure the start address of the PC card cifX PC/104 (*Hardware*).

Note: Please note that the PC card cifX PC/104 requires a free memory area of 16 KByte. Possible are the following areas:
- C0000 … C3FFF (hex),
- D0000 … D3FFF (hex),
- E0000 … E3FFF (hex) or
- F0000 … F3FFF (hex).

Address	A19	A18	A17	A16	A15	A14
C0000			X	X	X	X
D0000			X		X	X
E0000				X	X	X
F0000					X	X

Default Addresse D0000

Interrupt	3	…	12	14	15
15					X
14				X	
12			X		
…					
3	X				

(X = Jumper closed)

Polling	No jumper is set.

Table 26: Starting Address and Interrupt for 16 KByte Dual-Port Memory

For more see next page.

3. If you are using the interrupt mode, set up a free interrupt on the PC card cifX PC/104 (*Hardware*).

For polling operation mode interrupt jumpers are not required.

Note: The default setting is address D0000 and no interrupt (**Basis Configuration 0**). To change the address select **Basis Configuration 1**. The interrupt and the address can be changed under **Basis Configuration 2**.

Note: On some PCs it is not possible to find a free ISA memory area between C0000–FBFFF or a free ISA interrupt in the Device Manager. This is Windows®(*) ACPI (Advanced Configuration and Power Management Interface) depending. Please check at first if your PC is ACPI compatible and you are using the latest BIOS version for your mainboard. Are there still problems to find available ISA resources, you can try to run Windows®(*) in "Standard PC" mode (ACPI disabled). Therefore the ACPI-HAL of Windows®(*) must be replaced with the STANDARD-PC-HAL or Windows®(*) must be installed new. Please contact Microsoft how to change the Windows®(*) XP-HAL, because this can make your installation unusable.

(*) Windows® XP

4. Reserve **Memory Range / Interrupt** at the *operating system*.

➢ Reserve for the PC cards cifX PC/104 the memory range and if necessary one interrupt at the operating system.

For further information refer to **User Manual Software Installation for the PC Cards cifX** on the Communication Solutions DVD.

6.2 Installing PC Cards cifX PC/104 (PC/104 Modules)

Note: For PC cards cifX PC/104 with AIFX assembly interface first install the basic card. Then connect the AIFX assembly interface to the basic card.

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

NOTICE

Electrostatically sensitive Devices

➢ To prevent damage to the PC and the PC card cifX, make sure, that the PC card cifX is grounded via the endplate and the PC and make sure, that you are discharged when you install/uninstall the PC card cifX.

2. Configure starting address, interrupt and data bus width of the PC card cifX PC/104

➢ Configure the start address of the PC card cifX PC/104.

➢ If you are using the interrupt mode, set up a free interrupt on the PC card cifX PC/104.

For polling operation mode interrupt jumpers are not required.

Note: Several PC/104 modules can be plugged one upon the other. For each PC card CIFX 104-RE\F you must define a free memory area of 16 KByte.

For further information on the starting address and or an interrupt (or polling) refer to section *cifX PC/104: Set Starting Address and Interrupt* on page 71.

➢ Depending by the target system (motherboard) if so, set at the PC card cifX PC/104 a **Data Bus Width** of 8 bit or 16 bit.

By default the jumper is set for a data bus width of 16 Bit (refer to chapter *Device Drawings* on page 52.

3. Take safety precautions.

WARNING

Lethal Electrical Shock caused by parts with more than 50V!

➢ Disconnect the power plug of the PC or of the connecting device.

➢ Make sure, that the power supply is off at the PC or at the connecting device.

4. Open cabinet.

➢ Open the cabinet of the PC or of the connecting device.

Note: If several PC/104 modules shall be put together in a stack:
(a) Install the first PC/104 module on the mainboard.
(b) Only for the basic cards CIFX 104-RE\F and CIFX 104-RE-R\F or the basic cards CIFX 104-FB\F and CIFX 104-FB-R\F: Connect the AIFX-RE, AIFX-DP, AIFX-CO, AIFX-DN, AIFX-CC assembly interface or AIFX-DIAG to the basic card for the first PC/104 module.
(c) Connect any other PC/104 module on the respective underlying PC/104 module.

5. Install PC card cifX **PC/104**.

➢ Plug the PC card cifX into a free PC/104 slot (or if so, to the underlying PC/104 module).

➢ Fix the PC card cifX using 4 spacing bolts and screws intended to the mainboard (or if so, to the underlying PC/104 module). The scope of delivery does not include spacing bolts and screws.

Connect AIFX Assembly Interface

Only for the basic cards CIFX 104-RE\F and CIFX 104-RE-R\F or the basic cards CIFX 104-FB\F and CIFX 104-FB-R\F:

Note: First connect the AIFX-RE, AIFX-DP, AIFX-CO, AIFX-DN or AIFX-CC assembly interface to each basic card PC/104, before plugging another PC/104 module. Just so you can check exactly whether the AIFX is properly connected to the basic card.

Important! Operating the PC cards CIFX 104-XX\F or CIFX 104-XX-R\F requires proper connection of the Ethernet (AIFX-RE), PROFIBUS (AIFX-DP), CANopen (AIFX-CO), DeviceNet (AIFX-DN) or CC-Link (AIFX-CC) assembly interface to the basic card!

6. Connect the Ethernet assembly interface (AIFX-RE) to the basic card.

- Connect the **cable connector Ethernet X1** on the AIFX-RE with the cable.
- Connect the **cable connector Ethernet X4** (or X304) on the basic card CIFX 104-RE\F or CIFX 104-RE-R\F with the cable.

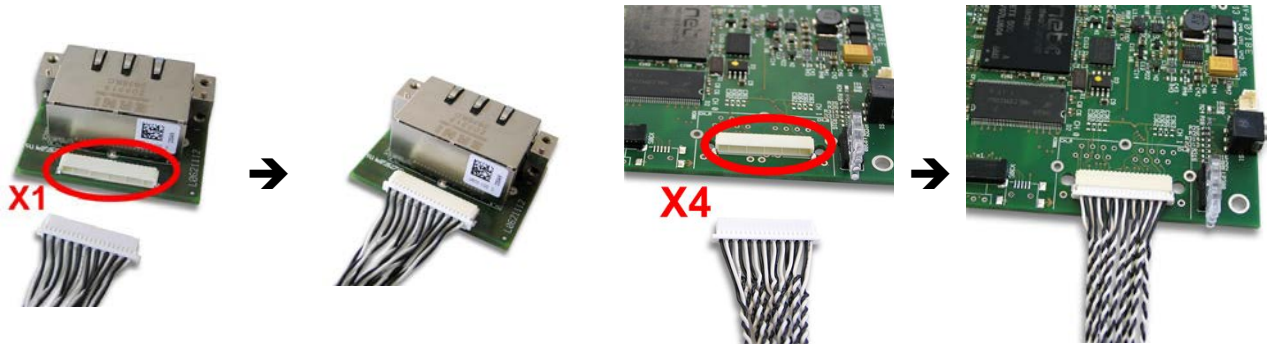


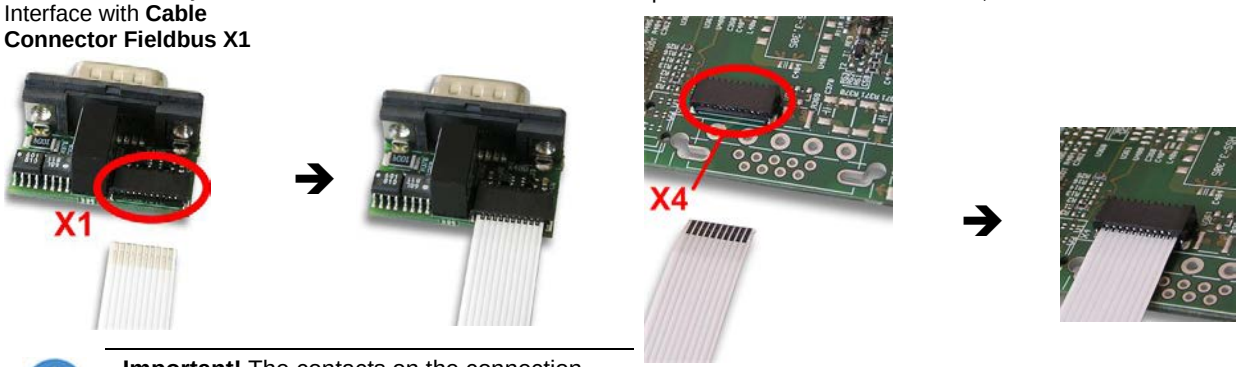
Figure 28: Connecting the Ethernet Assembly Interface (AIFX-RE) to the Basic Card CIFX 104-RE\F (Example)

7. Or connect the PROFIBUS (AIFX-DP), CANopen (AIFX-CO), DeviceNet (AIFX-DN) or CC-Link (AIFX-CC) assembly interface to the basic card.

- Connect the **cable connector fieldbus X1** on the assembly interface with the cable.
- Connect the **cable connector fieldbus X4** (or X304) on the PC card CIFX 104-FB\F or CIFX 104-FB-R\F Feldbus with the cable.

AIFX-CO Assembly Interface with **Cable Connector Fieldbus X1**

Example basic card **CIFX 104-CO-R\F**, **Cable Connector Fieldbus X4**



Important! The contacts on the connection cable must face up!

Figure 29: Connecting the CANopen Assembly Interface (AIFX-CO) to the Basic Card 104-FB-R\F (Example)

- Install the AIFX-RE, AIFX-DP, AIFX-CO, AIFX-DN or AIFX-CC assembly interface at the front plate of the PC cabinet.

Connect AIFX-DIAG

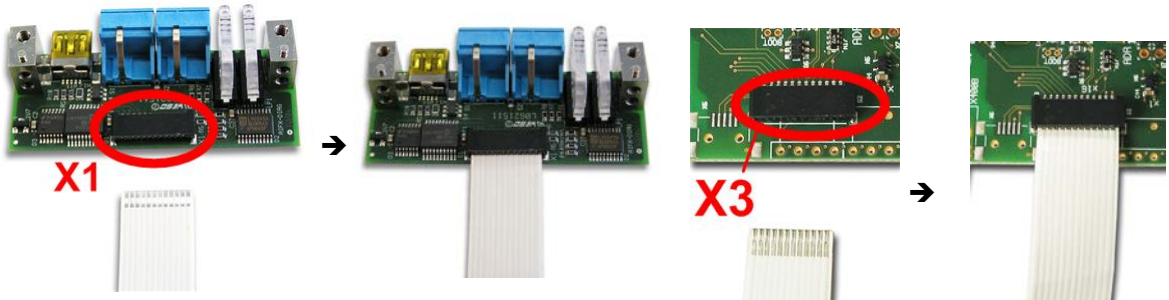
Only for the basic cards CIFX 104-RE\F and CIFX 104-RE-R\F or the basic cards CIFX 104-FB\F and CIFX 104-FB-R\F:

8. If so, connect the diagnostic assembly interface (AIFX-DIAG):

➢ Connect the **cable connector DIAG X1** on the diagnostic assembly interface (AIFX-DIAG) with the cable.

➢ Connect the **cable connector DIAG X3** (or X303) on the PC card cifX with the cable.

➢ Install the assembly interface AIFX-DIAG at the front plate of the PC cabinet).



Important! The contacts on the connection cable must face up!

Figure 30: Connecting the Diagnostic Assembly Interface (AIFX-DIAG) to the Basic Card CIFX 104-FB-R\F (Example)

After this:

9. Close cabinet.

➢ Close the cabinet of the PC or connecting device.

10. Plug the connecting cable to the Master or Slave.

➢ For the PC cards cifX Real-Time Ethernet note:

Note: The RJ45 socket is only for use in LAN, not for telecommuni-cation circuits. For further information refer to section *Ethernet Interface* on page 114.

➢ Plug the connecting cable from the PC card cifX to the PC card Master or Slave.

11. Connect the PC or the connecting device to the power supply and switch it on.

➢ Connect the PC or the connecting device to the power supply.

➢ Switch on the PC or the connecting device.

6.3 Uninstalling PC Cards cifX PC/104

1. Take safety precautions.

WARNING

Lethal Electrical Shock caused by parts with more than 50V!

- Disconnect the power plug of the PC or of the connecting device.
- Make sure, that the power supply is off at the PC or at the connecting device.

NOTICE

Electrostatically sensitive Devices

- To prevent damage to the PC and the PC card cifX, make sure, that the PC card cifX is grounded via the endplate and the PC and make sure, that you are discharged when you install/uninstall the PC card cifX.

2. Remove the connecting cable to the Master or Slave.

- Remove the connecting cable between the PC card cifX to be replaced and the PC card Master or Slave.

3. Open cabinet.

- Open the cabinet of the PC or of the connecting device.

Note: If a PC card CIFX 104-XX\F or CIFX 104-XX-R\F shall be uninstalled from a stack of PC/104 modules:
(a) Remove all PC/104 modules above from the PC card cifX and the PC card cifX. For each PC card cifX first remove the AIFX assembly interfaces from the basic cards.
(b) Reinstall the removed PC/104 modules.

Uninstall AIFX Assembly Interfaces

Only for PC cards PC/104 with AIFX Assembly Interface CIFX 104-XX\F and CIFX 104-XX-R\F:

4. Uninstall the Ethernet assembly interface (AIFX-RE), PROFIBUS (AIFX-DP), CANopen (AIFX-CO), DeviceNet (AIFX-DN) and diagnostic (AIFX-DIAG):

- Remove the AIFX assembly interfaces from the front plate of the PC cabinet.
- Disconnect the cables from the PC card cifX PC/104; cable connector Ethernet X4 (or X304) or cable connector fieldbus X4 (or X304) and cable connector DIAG X3 (or X303).

Remove PC Card cifX

5. Remove PC card cifX **PC/104**.

- Loosen the four fastening screws of the PC card cifX.
- Remove the PC card cifX.

After this:

6. Close cabinet.

- Close the cabinet of the PC or connecting device.

7 Troubleshooting

7.1 Instructions for Problem Solving

In case of any error, follow the instructions for problem solving given here:

General

- Check the PC card cifX operating requirements according to the requirements given in the section *Requirements for Operation* on page 41.

SYS and COM Status LEDs

Troubleshooting of the system is done by examining the LEDs behaviour. The PC cards cifX have depending by card type two or three bicolor status LEDs, which inform the user about the communication state of the device.

- The **SYS** LED shows the common system status of the device. It can be yellow or green ON or it can blink green/yellow.
- The **COM** LEDs display the status of the Real-Time Ethernet or fieldbus communication. Depending by protocol and state, the LEDs can be ON or flash cyclic or acyclic in green or red (or orange).

If the LED SYS is solid green and the LED COM or COM0 is static green, the PC card cifX is in operational state, the Master is in data exchange with the connected Slaves and the communication is running without fault. The meaning of the LEDs is described in chapter *LED Descriptions* beginning from page 78.

LINK-LED (for PC cards cifX Real-Time Ethernet)

- Check using the LINK LED's status whether a connection to the Ethernet is established. Therefore use the description on the LINK LED in the chapter *LED Descriptions* beginning from page 78.

Cable

- Check that the pin assignment of the cable is correct. This means, the cable by which you connect the PC card cifX to the PC card Master or Slave.

Configuration

- Check the configuration in the Master device and the Slave device. The configuration has to match.

Diagnosis

Via **Online > Diagnosis** (for SYCON.net) or **netX Configuration Tool > Diagnostics** (for netX Configuration Tool) the diagnostic information of the device is shown. The shown diagnostic information depends on the used protocol.

Further information about the device diagnosis and its functions you find in the operating instruction manual of the corresponding Real-Time Ethernet or fieldbus system.

8 LED Descriptions

8.1 Overview LEDs Real-Time Ethernet Systems

Note: The meaning of the communication status LEDs and of the Ethernet LEDs at the device is defined by the loaded firmware of the predocol.

LED Naming in the Device Drawing		EtherCAT Master	EtherCAT Slave	EtherNet/IP	Open-Modbus/TCP	POWERLINK	PROFINET IO	Sercos Master	Sercos Slave	VARAN	CC-Link IE Field Basic
SYS (System Status) (yellow/green)		**SYS**	**SYS**	**SYS**	**SYS**	**SYS**	**SYS**	**SYS**	**SYS**	**SYS**	**SYS**
COM 0 (Communication Status)		**RUN** (green)	**RUN** (green)	**MS** (red/green)	**RUN** (green)	**BS** (green)	**SF** (red)	**STA** (green)	**S** (red/green/orange)	**RUN** (green)	**RUN** (green)
COM 1 (Communication Status)		**ERR** (red)	**ERR** (red)	**NS** (red/green)	**ERR** (red)	**BE** (red)	**BF** (red)	**ERR** (red)	-	**ERR** (red)	**ERR** (red)
Ethernet Ch0	(green)	**LINK**	**L/A IN**	**LINK**	**LINK**	**L/A**	**LINK**	**L/A**	**L/A**	**LINK IN**	**L/A**
	(yellow)	**ACT**	-	**ACT**	**ACT**	-	**RX/TX**	-	-	**ACT IN**	-
Ethernet Ch1	(green)	-	**L/A OUT**	**LINK**	**LINK**	**L/A**	**LINK**	**L/A**	**L/A**	**LINK OUT**	**L/A**
	(yellow)	-	-	**ACT**	**ACT**	-	**RX/TX**	-	-	**ACT OUT**	-

Table 27: Overview LEDs Real-Time Ethernet Systems

LED	Name	Meaning
System Status	SYS	System Status
Kommunikations-status	COM	Communication Status
	RUN	Run
	ERR	Error
	STA	Status
	MS	Module Status
	NS	Network Status
	BS	Bus Status
	BE	Bus Error
	SF	System Failure
	BF	Bus Failure
	S	Status / Error

LED	Name	Meaning
Ethernet	LINK, L	Link
	ACT, A	Activity
	L/A	Link/Activity
	L/A IN	Link/Activity Input
	L/A OUT	Link/Activity Output
	LINK IN	Link Input
	LINK OUT	Link Output
	ACT IN	Activity Input
	ACT OUT	Activity Output
	RX/TX	Receive/Transmit

Table 28: LED Names

8.2 Overview LEDs Fieldbus Systems

LED	**PROFIBUS DP** (1 Duo LED)	**PROFIBUS MPI** (1 Duo LED)	**CANopen** (1 Duo LED)	**DeviceNet** (1 Duo LED)	**CC-Link (Slave)** (2 LEDs)
System Status (gelb/green)	**SYS**	**SYS**	**SYS**	**SYS**	**SYS**
Communication Status	**COM** (red/green)	**COM** (green)	**CAN** (red/green)	**MNS** (red/green)	**L RUN** (green) **L ERR** (red)

Table 29: Overview LEDs by Fieldbus System for 1 Channel Devices

LED	Name	Meaning
System Status	SYS	System Status
Communication Status	COM	Communication Status
	CAN	CANopen Status
	MNS	Module Network Status
	L RUN / L ERR	Status Run / Status Error

Table 30: LED Names

8.3 System LED

The System Status LED **SYS** can assume the states described below.

LED	Color	State	Meaning
SYS	**Duo LED yellow/green**		
	(green)	On	Operating System running
	(green/yellow)	Blinking, cyclic	Second stage bootloader is waiting for firmware.
	(yellow)	On	Bootloader netX (= romloader) is waiting for second stage bootloader.
	(off)	Off	Power supply for the device is missing or hardware defect.

Table 31: System Status LED States

8.4 Power On LED

The power On LED **PWR** can assume the states described below.

LED	Color	State	Meaning
PWR	**LED green**		
	(green)	On	Power supply for the device on.
	(off)	Off	Power supply for the device is missing.

Table 32: Power On LED States

8.5 CC-Link IE Field Basic Slave

For the CC-Link IE Field Basic Slave protocol, the communication LED **RUN/ERR** as well as the Ethernet LED **L/A** can assume the states described below.

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

Table 33: LED states for the CC-Link IE Field Basic Slave

8.6 EtherCAT Master V3

For the EtherCAT Master protocol, the communication LEDs **RUN** and **ERR** as well as the Ethernet LEDs **LINK** and **ACT** can assume the states described below. This description is valid from stack version V3.0.

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

Table 34: LED states for the EtherCAT Master protocol

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

Table 35: LED state definitions for the EtherCAT Master protocol

8.7 EtherCAT Master V4

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

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

Table 36: LED states for the EtherCAT Master protocol

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

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

Table 37: LED state definitions for the EtherCAT Master protocol

8.8 EtherCAT Slave

For the EtherCAT Slave protocol, the communication LEDs **RUN** and **ERR** as well as the Ethernet-LED **L/A IN** or **L/A OUT** can assume the states described below. This description is valid from stack version V2.5 (V2).

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

Table 38: LED states for the EtherCAT Slave protocol

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

Table 39: LED state definitions for the EtherCAT Slave protocol

8.9 EtherNet/IP Scanner (Master)

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

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

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

Table 40: LED states for the EtherNet/IP Scanner protocol

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

Table 41: LED state definitions for the EtherNet/IP Scanner protocol

8.10 EtherNet/IP Adapter (Slave)

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

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

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

Table 42: LED states for the EtherNet/IP Adapter protocol

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

Table 43: LED state definitions for the EtherNet/IP Adapter protocol

8.11 Open Modbus/TCP

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

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

Table 44: LED states for the OpenModbusTCP protocol

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

Table 45: LED state definitions for the OpenModbusTCP protocol

8.12 POWERLINK-Controlled-Node/Slave V2, V3

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

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

Table 46: LED states for the POWERLINK Controlled Node protocol

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

Table 47: LED state definitions for the POWERLINK Controlled Node protocol

8.13 PROFINET IO-Controller V2

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

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

Table 48: LED states for the PROFINET IO-Controller protocol

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

Table 49: LED state definitions for the PROFINET IO-Controller protocol

8.14 PROFINET IO Controller V3

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

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

Table 50: PROFINET IO Controller, SYS, COM0 and COM1 LEDs states

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

Table 51: 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 52: PROFINET IO Controller, LEDs states definitions

8.15 PROFINET IO-Device

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

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

Table 53: LED states for the PROFINET IO-Device protocol

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

Table 54: LED state definitions for the PROFINET IO-Device protocol

8.16 Sercos Master

For the Sercos Master protocol, the communication LEDs **STA** and **ERR** as well as the Ethernet LED **L/A** can assume the states described below. This description is valid from stack version V2.1.

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

Table 55: LED states for the Sercos Master protocol

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

Table 56: LED state definitions for the Sercos Master protocol

8.17 Sercos Slave

For the Sercos Slave protocol, the communication LED **S** as well as the Ethernet LED **L/A** can assume the states described below. This description is valid from stack version V3.2.

LED	Color	State	Meaning
S General name: **COM 0**	**Duo LED red/green** (orange = red/green simultaneously)		
	(green)	On	**CP4: Communication phase 4:**Normal operation, no error
	(green)	Blinking (2 Hz)	**Loopback:** The network state has changed from „fast-forward“ to „loopback“.
	(green/orange)	Flashing (3 x green/3s)	**CP3: Communication phase 3**
		(2 x green/3s)	**CP2: Communication phase 2**
		(1 x green/3s)	**CP1: Communication phase 1**
	(orange)	On	**CP0: Communication phase 0**
	(orange/green)	Blinking (2 Hz)	**HP0:** Hot-plug mode
		(1 x orange/3s)	**HP1:** Hot-plug mode
		(2 x orange/3s)	**HP2:** Hot-plug mode
	(orange)	Flashing (2 Hz)	**Identification:** Invoked by (C-DEV.Bit15 in the Device Control) Or SIP Identification Request
	(green/red)	Flashing (2 Hz, min. 2s)	**MST losses ≥ (S-0-1003/2):** The communication warning (S-DEV.Bit 15) is present in the Device Status.
	(red/orange)	Flashing (2 Hz)	**Application error (C1D):** See GDP & FSP Status codes class error.
	(red)	Flashing (2 Hz)	**Watchdog error:** Application is not running
	(red)	On	**Communication Error (C1D):** Error detected according to Sercos third generation Class 1 Diagnosis, see SCP Status codes class error.
	(off)	Off	**NRT-Mode:** (Non Real-Time Mode) No Sercos Communication
General name: **COM 1**	**Duo LED red/green**		
	(off)	Off	This LED is not used.
L/A Ch0 & Ch1	LED green		
	(green)	On	**Link:** The device is linked to the Ethernet, but does not send/receive Ethernet frames.
	(green)	Flickering (load dependant)	**Activity:** The device is linked to the Ethernet and sends/receives Ethernet frames.
	(off)	Off	The device has no link to the Ethernet.
Ch0 & Ch1	LED yellow		
	(off)	Off	This LED is not used.

Table 57: LED state definitions for the Sercos Slave protocol

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

Table 58: LED state definitions for the Sercos Slave protocol

8.18 VARAN Client (Slave)

For the VARAN Client protocol, the communication LEDs **RUN** and **ERR** as well as the Ethernet LEDs **LINK IN** and **LINK OUT** or **ACT IN** and **ACT OUT** can assume the states described below. This description is valid from stack version V1.0.

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

Table 59: LED-Zustände für das VARAN-Client-Protokoll

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

Table 60: Definitionen der LED-Zustände für das VARAN-Client-Protokoll

8.19 PROFIBUS DP Master

8.19.1 1 Communication Status LED

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

LED	Color	State	Meaning
cifX with 1 Communication Status LED (current Hardware Revision)			
COM	**Duo LED red/green**		
	(green)	On	Communication to all Slaves is established.
	(green)	Flashing (5 Hz)	PROFIBUS is configured, but bus communication is not yet released from the application.
	(green)	Flashing acyclic	No configuration or faulty configuration
	(red)	Flashing (5 Hz)	Communication to at least one Slave is disconnected.
	(red)	On	Communication to all Slaves is disconnected or another serious error has occurred. Redundant Mode: The active Master was not found.
	(off)	Off	Device is not switched on or network power is missing.

Table 61: LED states for the PROFIBUS DP Master protocol – 1 Communication Status LED (current Hardware Revision)

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

Table 62: LED state definitions for the PROFIBUS DP Master protocol

8.19.2 2 Communication Status LEDs

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

LED	Color	State	Meaning
cifX with 2 Communication Status LEDs (AIFX-DP is connected or for prior Hardware Revisions)			
STA	**LED green**		
	(green)	On	Communication to all Slaves is established.
	(green)	Flashing (5 Hz)	PROFIBUS is configured, but bus communication is not yet released from the application.
	(green)	Flashing acyclic	No configuration or faulty configuration
	(off)	Off	*LED red is off:* Device is not switched on or network power is missing. *LED red is flashing or "on":* Refer to description LED red.
ERR	**LED red**		
	(off)	Off	Refer to description for LED green.
	(red)	Flashing (5 Hz)	Communication to at least one Slave is disconnected.
	(off)	On	Communication to all Slaves is disconnected or another serious error has occurred. Redundant Mode: The active Master was not found.

Table 63: LED states for the PROFIBUS DP Master protocol – 2 Communication Status LEDs (AIFX-DP connected or prior Hardware Revision)

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

Table 64: LED state definitions for the PROFIBUS DP Master protocol

8.20 PROFIBUS DP Slave

8.20.1 1 Communication Status LED

For the PROFIBUS DP Slave protocol, the communication status LED **COM** can assume the states described below. This description is valid from stack version V2.7.

LED	Color	State	Meaning
cifX with 1 Communication Status LED (current Hardware Revision)			
COM	**Duo LED red/green**		
	(green)	On	RUN, cyclic communication
	(green)	Flashing, cyclic (2 Hz)	Master is in CLEAR state.
	(red)	Flashing, acyclic (1 Hz)	Device is not configured.
	(red)	Flashing, cyclic (2 Hz)	STOP, no communication, connection error
	(red)	On	Wrong configuration at PROFIBUS DP Slave.
	(off)	Off	Device is not switched on or power is missing. During firmware download process.

Table 65: LED states for the PROFIBUS DP Slave protocol – 1 Communication Status LED (current Hardware Revision)

LED State	Definition
Flashing, acyclic (1 Hz)	The indicator turns on and off in irregular intervals, with a frequency of 1 Hz: “on” for 750 ms, followed by “off” for 250 ms.
Flashing, cyclic (2 Hz)	The indicator turns on and off with a frequency of 2 Hz: “on” for 250 ms, followed by “off” for 250 ms.

Table 66: LED state definitions for the PROFIBUS DP Slave protocol

8.20.2 2 Communication Status LEDs

For the PROFIBUS DP Slave protocol, the communication status LEDs **STA** and **ERR** can assume the states described below. This description is valid from stack version V2.7.

LED	Color	State	Meaning
cifX with 2 Communication Status LEDs (AIFX-DP is connected or for prior Hardware Revisions)			
STA	**LED green**		
	(green)	On	RUN, cyclic communication
	(green)	Flashing, cyclic (2 Hz)	Master is in CLEAR state.
	(off)	Off	*LED red is off:* Device is not switched on or network power is missing. *LED red is flashing or on:* Refer to description LED red.
ERR	**LED red**		
	(off)	Off	Refer to description for LED green.
	(red)	Flashing, acyclic (1 Hz)	Device is not configured.
	(red)	Flashing, cyclic (2 Hz)	STOP, no communication, connection error
	(red)	On	Wrong configuration at PROFIBUS DP Slave.

Table 67: LED states for the PROFIBUS DP Slave protocol – 2 Communication Status LEDs (AIFX-DP connected or prior Hardware Revision)

LED State	Definition
Flashing, acyclic (1 Hz)	The indicator turns on and off in irregular intervals, with a frequency of 1 Hz: “on” for 750 ms, followed by “off” for 250 ms.
Flashing, cyclic (2 Hz)	The indicator turns on and off with a frequency of 2 Hz: “on” for 250 ms, followed by “off” for 250 ms.

Table 68: LED state definitions for the PROFIBUS DP Slave protocol

8.21 PROFIBUS MPI Device

8.21.1 1 Communication Status LED

For the PROFIBUS MPI protocol, the communication status LED **COM** can assume the states described below. This description is valid from stack version V2.4.

LED	Color	State	Meaning
cifX with 1 Communication Status LED			
COM	**Duo LED red/green**		
	(green)	On	**Status:** The device currently holds the PROFIBUS token and is able to transfer telegrams of data.
	(green)	Blinking (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 (0.5 Hz)	**Status:** Automatic baudrate detection is running
	(off)	Off	**Status**: 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 69: LED states for the PROFIBUS MPI protocol – 1 Communication Status LED

LED State	Definition
Blinking (5 Hz)	The indicator turns on and off with a frequency of appr. 5 Hz: “on” for appr. 100 ms, followed by “off” for appr. 100 ms.
Blinking (0.5 Hz)	The indicator turns on and off with a frequency of appr. 0.5 Hz: “on” for appr. 1000 ms, followed by “off” for appr. 1000 ms.

Table 70: LED state definitions for the PROFIBUS MPI protocol

8.21.2 2 Communication Status LEDs

For the PROFIBUS MPI protocol, the communication status LEDs **STA** and **ERR** can assume the states described below. This description is valid from stack version V2.4.

LED	Color	State	Meaning
cifX with 2 Communication Status LEDs (AIFX-DP is connected)			
STA	**LED green**		
	(green)	On	**Status:** The device currently holds the PROFIBUS token and is able to transfer telegrams of data.
	(green)	Blinking (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 (0.5 Hz)	**Status:** Automatic baudrate detection is running
	(off)	Off	**Status**: 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.
ERR	**LED red**		
	(off)	Off	This LED is not used.

Table 71: LED states for the PROFIBUS MPI protocol – 2 Communication Status LEDs (AIFX-DP connected)

LED State	Definition
Blinking (5 Hz)	The indicator turns on and off with a frequency of appr. 5 Hz: “on” for appr. 100 ms, followed by “off” for appr. 100 ms.
Blinking (0.5 Hz)	The indicator turns on and off with a frequency of appr. 0.5 Hz: “on” for appr. 1000 ms, followed by “off” for appr. 1000 ms.

Table 72: LED state definitions for the PROFIBUS MPI protocol

8.22 CANopen Master

8.22.1 1 Communication Status LED

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

LED	Color	State	Meaning
cifX with 1 Communication Status LED (current Hardware Revision)			
CAN	**Duo-LED red/green**		
	(green)	On	**OPERATIONAL:** The device is in the OPERATIONAL state.
	(green)	Blinking (2,5 Hz)	**PREOPERATIONAL:** The device is in the PREOPERATIONAL state.
	(green)	Single flash	**STOPPED**: The device is in STOPPED state.
	(red)	Single flash	**Warning Limit reached**: At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames).
	(red)	Double flash	**Error Control Event**: A guard event (NMT Slave or NMT Master) or a heartbeat event (Heartbeat consumer) has occurred.
	(red)	On	**Bus Off**: The CAN controller is in bus OFF state.
	(off)	Off	**RESET:** The device is executing a reset or the device has no configuration.

Table 73: LED states for the CANopen Master protocol – 1 Communication Status LED (current Hardware Revision)

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

Table 74: LED state definitions for the CANopen Master protocol

8.22.2 2 Communication Status LEDs

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

LED	Color	State	Meaning
cifX with 2 Communication Status LEDs (AIFX-CO is connected or for prior Hardware Revisions)			
RUN	**LED green**		
	(green)	On	**OPERATIONAL:** The device is in the OPERATIONAL state.
	(green)	Blinking (2,5 Hz)	**PREOPERATIONAL:** The device is in the PREOPERATIONAL state.
	(green)	Single flash	**STOPPED**: The device is in STOPPED state.
	(off)	Off	*LED red is off:* **RESET:** The device is executing a reset or the device has no configuration. *LED red is flashing or "on":* Refer to description LED red.
ERR	**LED red**		
	(off)	Off	Refer to description LED green.
	(red)	Single flash	**Warning Limit reached**: At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames).
	(red)	Double flash	**Error Control Event**: A guard event (NMT Slave or NMT Master) or a heartbeat event (Heartbeat consumer) has occurred.
	(red)	On	**Bus Off**: The CAN controller is in bus OFF state.

Table 75: LED states for the CANopen Master protocol – – 2 Communication Status LEDs (AIFX-CO connected or prior Hardware Revision)

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

Table 76: LED state definitions for the CANopen Master protocol

8.23 CANopen Slave

8.23.1 1 Communication Status LED

For the CANopen Slave protocol, the communication status LED **CAN** can assume the states described below. This description is valid from stack version V3.4.

LED	Color	State	Meaning
cifX with 1 Communication Status LED (current Hardware Revision)			
CAN	**Duo LED red/green**		
	(green)	On	**OPERATIONAL:** The device is in the OPERATIONAL state.
	(green)	Blinking (2.5 Hz)	**PREOPERATIONAL:** The device is in the PREOPERATIONAL state.
	(green)	Single flash	**STOPPED:** The device is in STOPPED state.
	(red/green)	Flickering (10 Hz)	**Auto Baud Rate Detection active:** The Device is in the auto baud rate detection mode.
	(red)	Single flash	**Warning Limit reached**: At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames).
	(red)	Double flash	**Error Control Event**: A guard event (NMT Slave or NMT Master) or a heartbeat event (Heartbeat consumer) has occurred.
	(red)	On	**Bus Off**: The CAN controller is in bus OFF state.
	(off)	Off	**RESET:** The device is executing a reset or the device has no configuration.

Table 77: States of the CAN LED for the CANopen Slave protocol – 1 Communication Status LED (current Hardware Revision)

LED State	Definition
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.
Blinking (2.5 Hz)	The indicator turns on and off with a frequency of 2,5 Hz: “on” for 200 ms, followed by “off” for 200 ms.
Single Flash	The indicator shows one short flash (200 ms) followed by a long “off” phase (1,000 ms).
Double Flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long “off” phase (1,000 ms).

Table 78: LED state definitions for the CANopen Slave protocol

8.23.2 2 Communication Status LEDs

For the CANopen Slave protocol, the communication status LEDs **RUN** and **ERR** can assume the states described below. This description is valid from stack version V3.4.

LED	Color	State	Meaning
cifX with 2 Communication Status LEDs (AIFX-CO is connected or for prior Hardware Revisions)			
RUN	**LED green**		
	(green)	On	**OPERATIONAL:** The device is in the OPERATIONAL state.
	(green)	Blinking (2.5 Hz)	**PREOPERATIONAL:** The device is in the PREOPERATIONAL state.
	(green)	Single flash	**STOPPED:** The device is in STOPPED state.
	(green)	Flickering (10 Hz, alternatively with ERR LED)	**Auto Baud Rate Detection active:** The Device is in the auto baud rate detection mode.
	(off)	Off	*LED red is off:* **RESET:** The device is executing a reset or the device has no configuration. *LED red is flickering, flashes or "on":* Refer to description LED red.
ERR	**LED red**		
	(off)	Off	Refer to description LED green.
	(red)	Flickering (10 Hz, alternatively with RUN LED)	**Auto Baud Rate Detection active:** The Device is in the auto baud rate detection mode.
	(red)	Single flash	**Warning Limit reached**: At least one of the error counters of the CAN controller has reached or exceeded the warning level (too many error frames).
	(red)	Double flash	**Error Control Event**: A guard event (NMT Slave or NMT Master) or a heartbeat event (Heartbeat consumer) has occurred.
	(red)	On	**Bus Off**: The CAN controller is in bus OFF state.

Table 79: States of the CAN LED for the CANopen Slave protocol – 2 Communication Status LEDs (AIFX-CO connected or prior Hardware Revision)

LED State	Definition
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.
Blinking (2.5 Hz)	The indicator turns on and off with a frequency of 2,5 Hz: "on" for 200 ms, followed by "off" for 200 ms.
Single Flash	The indicator shows one short flash (200 ms) followed by a long "off" phase (1,000 ms).
Double Flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long "off" phase (1,000 ms).

Table 80: LED state definitions for the CANopen Slave protocol

8.24 DeviceNet Master

For the DeviceNet Master protocol, the communication status LED **MNS** can assume the states described below. This description is valid from stack version V2.3.

LED	Color	State	Meaning
MNS	**Duo LED red/green**		
	(green)	On	**Device operational AND on-line, connected** Device is online and has established all connections with all Slaves.
	(green)	Flashing (1 Hz)	**Device operational AND on-line** Device is online and has established no connection in the established state. - Configuration missing, incomplete or incorrect.
	(green/red/ Off)	Flashing (2Hz) Green/Red/Off	**Self test after power on**
	(red)	Flashing (1 Hz)	**Minor fault and/or connection time-out** Device is online and has established one or more connections in the established state. It has data exchange with at least one of the configured Slaves. Minor or recoverable fault: No data exchange with one of the configured Slaves. One or more Slaves are not connected. Connection timeout Minor or recoverable fault: No data exchange with one of the configured Slaves. One or more Slaves are not connected. Connection timeout. No network power present.
	(red)	On	**Critical fault or critical link failure** Critical connection failure; device has detected a network error: duplicate MAC-ID or severe error in CAN network (CAN-bus off).
	(off)	Off	**Device is not powered** - The device may not be powered. **Device is not on-line and/or no network power** - The device has not yet completed the Dup_MAC_ID test. - The device is powered, but the network power is missing.

Table 81: LED states for the DeviceNet Master protocol

LED state	Definition
Flashing (1 Hz)	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 (2 Hz) green/red/off	The indicator turns on green on for 250 ms, then red on for 250 ms, then off.

Table 82: LED state definitions for the DeviceNet Master protocol

8.25 DeviceNet Slave

For the DeviceNet Slave protocol, the communication status LED **MNS** can assume the states described below. This description is valid from stack version V2.3.

LED	Color	State	Meaning
MNS	**Duo LED red/green**		
	(green)	On	**Device operational AND on-line, connected** Device is online and has established all connections with all Slaves.
	(green)	Flashing (1 Hz)	**Device operational AND on-line** Device is online and has established no connection in the established state. - Configuration missing, incomplete or incorrect.
	(green/red/ Off)	Flashing (2Hz) Green/Red/Off	**Self test after power on**
	(red)	Flashing (1 Hz)	**Minor fault and/or connection time-out** Device has no connectin to the Master. Minor or recoverable fault: No data exchange with the Master. Connection timeout. No network power present.
	(red)	On	**Critical fault or critical link failure** Critical connection failure; device has detected a network error: duplicate MAC-ID or severe error in CAN network (CAN-bus off).
	(off)	Off	**Device is not powered** - The device may not be powered. **Device is not on-line and/or no network power** - The device has not yet completed the Dup_MAC_ID test. - The device is powered, but the network power is missing.

Table 83: LED states for the DeviceNet Slave protocol

LED state	Definition
Flashing (1 Hz)	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 (2 Hz) green/red/off	The indicator turns on green on for 250 ms, then red on for 250 ms, then off.

Table 84: LED state definitions for the DeviceNet Slave protocol

8.26 CC-Link Slave

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

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

Table 85: LED states for the CC-Link Slave protocol

9 Device Connections and Switches

9.1 Ethernet Interface

For the Ethernet interface use RJ45 plugs and twisted pair cable of category 5 (CAT5) or higher, which consists of 4 twisted cores and has a maximum transmission rate of 100 MBit/s (CAT5).

9.1.1 Ethernet Pin Assignment at the RJ45 Socket

Note: The device supports the **Auto Crossover** function. Due to this fact RX and TX can be switched. The following figure shows the RJ45 standard pin assignment.

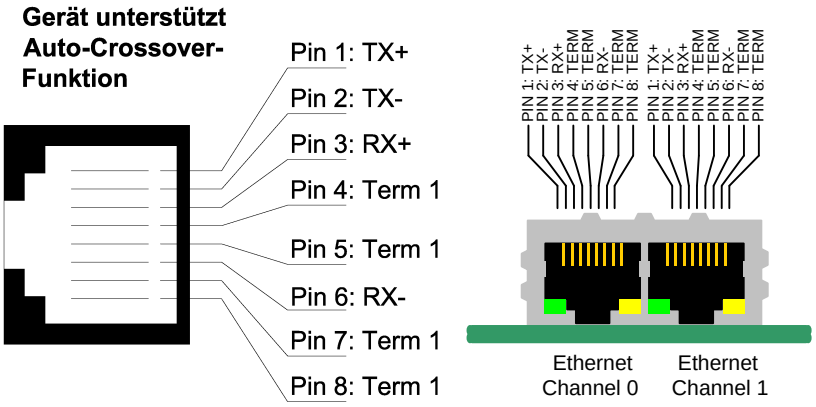


Figure 31: Ethernet Pin Assignment at the RJ45 Socket for cifX or AIFX

Pin	Signal	Meaning
1	TX+	Transmit Data +
2	TX–	Transmit Data –
3	RX+	Receive Data +
4	Term 1	Connected to each other and terminated to PE through RC circuit*
5	Term 1	
6	RX–	Receive Data –
7	Term 2	Connected to each other and terminated to PE through RC circuit*
8	Term 2	
		* Bob Smith Termination

Table 86: Ethernet Pin Assignment at the RJ45 Socket for cifX or AIFX

Further Notes:
(1) The RJ45 socket is only for use in LAN, not for telecommunication circuits.
(2) With loaded EtherCAT Master firmware only the RJ45 channel 0 can be used, channel 1 is deactivated. Beginning with the EtherCAT Master firmware version 3 channel 1 can be reactivated if redundancy is activated. For the Open Modbus/TCP firmware with V2.3.4.0 and higher both RJ45 RJ45channels can be used.

9.1.2 Ethernet Connection Data

Medium	2 x 2 Twisted-Pair copper cable, CAT5 (100 MBit/s)
Length of cable	Max. 100 m
Transmission rate	10 MBit/s/100 MBit/s

Table 87: Ethernet Connection Data

9.1.3 Use of Hubs and Switches

For the corresponding communication systems, the use of hubs and/or switches is either forbidden or allowed. The following table shows the acceptable use of hubs and switches by each communication system:

Communication System	Hub	Switch
EtherCAT	forbidden	only allowed between EtherCAT Master and first EtherCAT Slave (100 MBit/s, Full Duplex)
EtherNet/IP	allowed	allowed (10 MBit/s/100 MBit/s, Full or Half Duplex, Auto-Negotiation)
Open Modbus/TCP	allowed	allowed (10 MBit/s/100 MBit/s, Full or Half Duplex, Auto-Negotiation)
POWELINK	allowed	forbidden
PROFINET IO	forbidden	Only allowed if the switch supports ‚Priority Tagging' and LLDP (100 MBit/s, Full Duplex)
Sercos	forbidden	forbidden
VARAN*	forbidden	forbidden

Table 88: Use of Hubs and Switches

*Instead of hubs and switches VARAN uses splitter. [3]

9.2 PROFIBUS Interface

Isolated RS-485 interface:

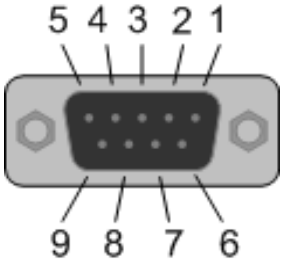


Figure 32: PROFIBUS Interface (DSub female connector, 9 pin), X400

Connection with DSub female connector	Signal	Meaning
3	RxD/TxD-P	Receive/Send Data-P respectively connection B plug
5	DGND	Reference potential
6	VP	Positive supply voltage
8	RxD/TxD-N	Receive/Send Data-N respectively connection A plug

Table 89: PROFIBUS Interface, X400

9.3 CANopen Interface

Isolated ISO 11898 interface:

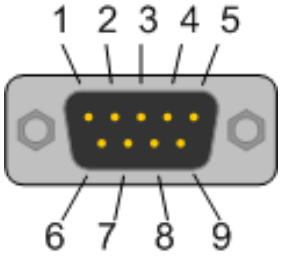


Figure 33: CANopen Interface (DSub male connector, 9 pin), X400

Connection with DSub male connector	Signal	Description
2	CAN_L	CAN_Low Bus Line
3	CAN_GND	CAN Ground
7	CAN_H	CAN High Bus Line
1, 4, 5, 6, 8, 9		**Do not connect!**

Table 90: CANopen Interface, X400

9.4 DeviceNet Interface

Isolated ISO 11898 interface:

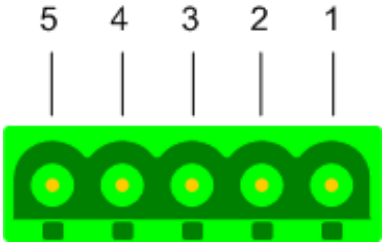


Figure 34: DeviceNet Interface (CombiCon male Connector, 5 pin), X360

Connection with CombiCon male connector	Signal	Color	Description
1	V-	Black	Reference potential DeviceNet supply voltage
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 91: DeviceNet Interface, X360

9.5 CC-Link Interface

Isolated RS-485 interface:

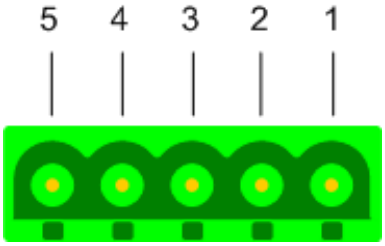


Figure 35: CC-Link Interface (CombiCon male Connector, 5 pin)

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

Table 92: CC-Link Interface

9.6 Mini-B USB Connector (5 Pin)

Important! When booting the host PC the USB cable must be connected to the PC card cifX!

The host PC does not boot when a USB cable is connected to the PC card cifX installed in the PC.

The Mini-B USB connector is provided for the following PC cards cifX:
CIFX 104-RE, CIFX 104-DP, CIFX 104-CO, CIFX 104-DN,
CIFX 104-RE-R, CIFX 104-DP-R, CIFX 104-CO-R, CIFX 104-DN-R

In addition a Mini-B USB connector will be available for the following PC cards cifX if the AIFX-DIAG is connected to the PC card cifX:
CIFX 104-RE\F*, CIFX 104-DP\F, CIFX 104-CO\F, CIFX 104-DN\F,
CIFX 104-CC\F,
CIFX 104-RE-R\F*, CIFX 104-DP-R\F, CIFX 104-CO-R\F, CIFX 104-DN-R\F

Note! *From the hardware revision 5 of the PC cards CIFX 104-RE\F and CIFX 104-RE-R\F if the diagnostic **AIFX-DIAG** assembly interface is connected, the **Mini-B USB** connector on the AIFX-DIAG can be used.

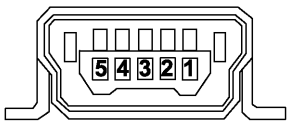


Figure 36: Mini-B USB Connector (5 Pin)

Pin	Name	Description
1	USB_EXT	USB Bus Power (+5 V dc, supplied externally)
2	D-	Data -
3	D+	Data +
4	ID	Not connected
5	GND	Ground

Table 93: Pin Assignment Mini-B USB Connector

9.7 Rotary Switch Device Address

The **Rotary Switch Device Address** at the PC cards
CIFX 104-RE, CIFX 104-RE-R, CIFX 104-RE\F, CIFX 104-RE-R\F,
CIFX 104-DP, CIFX 104-DP-R, CIFX 104-DP\F, CIFX 104-DP-R\F,
CIFX 104-CO, CIFX 104-CO-R, CIFX 104-CO\F, CIFX 104-CO-R\F,
CIFX 104-DN, CIFX 104-DN-R, CIFX 104-DN\F, CIFX 104-DN-R\F,
CIFX 104-CC\F
currently is unassigned. The Slave address setting is done via the configuration software.

9.8 Cable Connector

9.8.1 Pin Assignment for Cable Connector Ethernet

Only for CIFX 104-RE\F (X304), CIFX 104-RE-R\F (X4).

Pin Assignment for Cable Connector Ethernet X4 or X304 – Cable 20 pin Ethernet and Status LEDs:

Pin	Signal
1	GND
2	+3V3 Analog
3	STA0_green (*RE LED COM 0*)
4	STA0_red (*RE LED COM 0*)
5	XM0_TX
6	STA1_green (*RE LED COM 1*)
7	CH0_LINKn
8	CH0_ACTIVITY
9	AIFINIT
10	STA1_red (*RE LED COM 1*)
11	CH0_TXP
12	CH0_TXN
13	CH0_RXP
14	CH0_RXN
15	CH1_TXP
16	CH1_TXN
17	CH1_RXP
18	CH1_RXN
19	CH1_LINKn
20	CH1_ACTIVITY

Table 94: Pin Assignment for Cable Connector Ethernet X4 or X304

Cable Connector Ethernet:

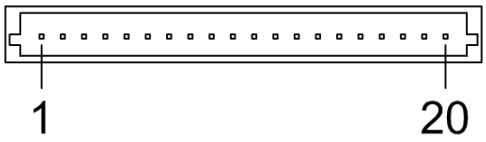


Figure 37: 1x20 Pins for CIFX 104-RE\F, CIFX 104-RE-R\F

9.8.2 Pin Assignment for Cable Connector Fieldbus X3, X304, X4

Only for
CIFX 104-DP\F, CIFX 104-CO\F, CIFX 104-DN\F, CIFX 104-CC\F: (X304);
CIFX 104-DP-R\F, CIFX 104-CO-R\F, CIFX 104-DN-R\F: (X4).

Pin Assignment for Cable connector Fieldbus X3, X304 or X4,
Cable 10 pin Fieldbus:

Pin	Signal
1	GND
2	+3V3 Analog
3	I2C_CLK/PIO 4
4	I2C_DATA/ PIO 5
5	XMAC2_TX
6	XMAC2_RX
7	XMAC2_IO0
8	XMAC2_IO1
9	/RSTOUT
10	(not used)

Table 95: Pin Assignment for Cable connector Fieldbus X3, X304 or X4

9.8.3 Pin Assignment for Cable Connector DIAG

Only for CIFX 104-RE\F (X303), CIFX 104-RE-R\F (X3),
CIFX 104-DP\F, CIFX 104-CO\F, CIFX 104-DN\F, CIFX 104-CC\F: (X303)

Pin Assignment for Cable connector DIAG X3 or X303 -
Cable 12 pin USB + Status LEDs

Pin	Signal (Feldbus)	Signal (Ethernet)
1	GND	GND
2	+3V3	+3V3
3	STA2 (*FB LED COM 0*)	STA2 (*not used*)
4	STA3 (*FB LED COM 1*)	STA3 (*not used*)
5	USB_POS	USB_POS
6	USB_NEG	USB_NEG
7	RDYn	RDYn
8	RUNn	RUNn
9	STA0_green (*not used*)	STA0_green (*RE LED COM 0*)
10	STA0_red (*not used*)	STA0_red (*RE LED COM 0*)
11	STA1_green (*not used*)	STA1_green (*RE LED COM 1*)
12	STA1_red (*not used*)	STA1_red (*RE LED COM 1*)

Table 96: Pin Assignment for Cable connector DIAG X3 or X303

9.9 SYNC Connector (Pin-Assignment, Hardware/Firmware)

9.9.1 Pin Assignment SYNC Connector, X51 (CIFX 80 90 104C)

Only for CIFX 104-RE, CIFX 104-RE-R, CIFX 104-RE\F, CIFX 104-RE-R\F.

Pin	Signal
1	GND
2	IO_SYNC0
3	IO_SYNC1

Table 97: Pin Assignment for SYNC Connector, X51

9.9.2 Items on Hardware

Item	Explanation
SYNC Signal	3.3 V (LVTTL), maximum load 6 mA
Connector	SYNC connector, X51 (for the PC cards cifX, as indicated under section *Pin Assignment SYNC Connector, X51* on page 121.) Female connector, 3 pin, pitch spacing 1.25 mm (for example, the type Molex series 51021) and female crimp contacts in design (e. g. type Molex series 50079/50058)
Max. Cable Length	Recommendation: Max. 50 mm **Note**: Take EMC into consideration for the cable laying

Table 98: SYNC Connector: SYNC Signal, Connector, Max. Cable Length

9.9.3 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 99: Meaning of the SYNC Signals for each Protocol

9.10 Pin Assignment at the PC/104 Bus

9.10.1 Overview

For the PC cards cifX *PC/104* the table below gives an overview about the pin assignment at the PC/104 bus.

cifX	Hardware Revision	PC/104 Bus [Pins]	Pin Assignment at the PC/104 Bus		PC/104 Specification
			according to the standard	Compare Section, page	
CIFX 104-RE CIFX 104-RE-R CIFX 104-RE\F CIFX 104-RE-R\F CIFX 104-DP CIFX 104-DP-R CIFX 104-DP\F CIFX 104-DP-R\F CIFX 104-CO CIFX 104-CO-R CIFX 104-CO\F CIFX 104-CO-R\F CIFX 104-DN CIFX 104-DN-R CIFX 104-DN\F CIFX 104-DN-R\F CIFX 104-CC\F	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	104	*yes*	*Pin Assignment for PC/104 Bus*, 123	[bus spec 8]

Table 100: Pin Assignment at the PC/104 Bus

9.10.2 Reference PC/104 Specification

No.	Specification	Revision	Version	De	www
[bus spec 8]	PC/104 Specification		2.6	October 13, 2008	pcisig.com, pc104.org

Table 101: Reference PC/104 Specification

9.10.3 Pin Assignment for PC/104 Bus

Only for:
CIFX 104-RE, CIFX 104-RE-R ,
CIFX 104-RE\F, CIFX 104-RE-R\F

The used control signals of the PC/104 bus are given in the tables below.

Pin Assignment for PC/104-Bus, X1

Pin (X1)	A	B
1		GND
2	SD7	RESET
3	SD6	+5V
4	SD5	IRQ9
5	SD4	
6	SD3	
7	SD2	
8	SD1	
9	SD0	
10	IOCHRDY	GND [2]
11	AEN	SMEMW
12	SA19	SMEMR
13	SA18	
14	SA17	
15	SA16	
16	SA15	
17	SA14	
18	SA13	
19	SA12	
20	SA11	
21	SA10	IRQ7
22	SA9	IRQ6
23	SA8	IRQ5
24	SA7	IRQ4
25	SA6	IRQ3
26	SA5	
27	SA4	
28	SA3	
29	SA2	+5V
30	SA1	
31	SA0	GND
32	GND	GND

Table 102: Pin Assignment for PC/104-Bus, X1 (Control Signals used on the 8 Bit Connector)

[2] Differs from the standard [bus spec 9, page B-2].

Important: Avoid dual-port memory access errors

It is mandatory that the host CPU always uses the IOCHNRDY (pin A10) signal, otherwise these results in wrong data read from the dual-port memory or dual-port memory write accesses are being ignored.

- The maximum value for accesses can not be specified.

- For maximum performance, the IOCHNRDY signal must always be evaluated by the host CPU.

- If you use a host CPU that can not use the IOCHNRDY (A10) signal, then contact our technical support.

Pin Assignment for PC/104-Bus, X2

Pin (X2)	C	D
0	GND	GND
1	SBHE	MEMCS16
2		
3		IRQ10
4		IRQ11
5		IRQ12
6		IRQ15
7		IRQ14
8		
9		
10		
11	SD8	
12	SD9	
13	SD10	
14	SD11	
15	SD12	
16	SD13	+5V
17	SD14	
18	SD15	GND
19		GND

Table 103: Pin Assignment for PC/104-Bus, X2 (Used Control Signals on the Expansion Connector)

The pin assignment described in *Table 102* and *Table 103* originates from the standard [bus spec 8, page B-2] (refer to section *Reference PC/104 Specification* on page 122).

10 Technical Data

10.1 Technical Data PC Cards cifX

Note: All technical data are temporarily and can be altered without notice.

10.1.1 CIFX 104-RE, CIFX 104-RE-R

CIFX 104-RE, CIFX 104-RE-R	Parameter	Value	
Part	Name	CIFX 104-RE	CIFX 104-RE-R
	Part No.	1278.100	1279.100
	Description	PC Card cifX PC/104 for Real-Time Ethernet Master or Slave; (for CIFX 104-RE-R connectors at the right side)	
	Function	Communication Interface with PC/104 and Ethernet interface	
Communication Controller	Type	netX 100 processor	
Integrated Memory	RAM	8 MB SDRAM	
	FLASH	4 MB serial Flash EPROM	
	Size of the Dual-Port Memory	16 KByte	
System Interface	Bus Type	PC/104, according to [bus spec 8], refer to section *Overview*, page 122.	
	Transmission Rate	33 MHz	
	Data Access	DPM	
	Width for the data access to the Dual-Port Memory (DPM)	8 Bit or 16 Bit	
Ethernet Communication	Supported Real-Time Ethernet communication systems (determined by the loaded firmware)	CC-Link IE Field Basic Slave	
		EtherCAT Master, EtherCAT Slave	
		EtherNet/IP Scanner (Master), EtherNet/IP Adapter (Slave)	
		Open Modbus/TCP	
		POWERLINK Controlled Node/Slave	
		PROFINET IO-Controller (Master), PROFINET IO-Device (Slave)	
		Sercos Master, Sercos Slave	
		VARAN Client (Slave)	
	Ethernet Frame Types	Ethernet II	
Ethernet interface	Transmission Rate	100 MBit/s, 10 MBit/s (depending on loaded firmware)	
	Interface Type	100 BASE-TX, 10 BASE-T (depending on loaded firmware), refer to section *Ethernet Interface*, page 114.	
	Galvanic Isolation	isolated	
	Isolation Voltage	1000 VDC (tested for 1 minute)	
	Half duplex/Full duplex	depending on loaded firmware, supported (at 100 MBit/s)	
	Auto-Negotiation	depending on loaded firmware	
	Auto-Crossover	depending on loaded firmware	
	Connector	2* RJ45 Socket	
	Channel 0 and 1	With loaded EtherCAT Master firmware only the RJ45	

CIFX 104-RE, CIFX 104-RE-R	Parameter	Value
		channel 0 can be used, channel 1 is deactivated. Beginning with the EtherCAT Master firmware version 3 channel 1 can be reactivated if redundancy is activated. For Open Modbus/TCP with V2.3.4.0 and higher both RJ45 channels can be used.
Diagnosis Interface	USB Interface	Mini B USB Plug (5 pin), refer to section *Mini-B USB Connector (5 Pin)*, page 118.
Display	LED Display	**SYS** System Status LED The meaning of the following LEDs depends on the loaded firmware: **COM 0** LED Communication Status 0 (duo LED) **COM 1** LED Communication Status 1 (duo LED) **LED yellow** / **LED green** at RJ45Ch0 and RJ45Ch1, for Ethernet Link status, Ethernet Activity status and additional status Refer to chapter *LED Descriptions*, page 78.
Power supply	Supply Voltage	+5 V dc ±5 %, refer to section *Power Supply and Host Interface*, page 39.
	Current at 5 V	500 mA (maximum)
	Connector	Via PC/104 Bus
Operation	Rotary Switch Device Address	Is currently unassigned. Refer to section *Rotary Switch Device Address* on page 118.
Environmental Conditions	Operating temperature range*	0 °C ... +70 °C
	*Air flow during measurment	0,5m/s
	Storage temperature range	-40 °C ... +85 °C
	Humidity	10 … 95% relative humidity, no condensation permitted
Device	Dimensions (L x W x H)	97 x 91 x 24.3 mm
	Mounting/Installation	PC/104 Slot (5 V), refer to section *Slot for the PC Cards cifX PC/104*, page 39.
	RoHS	Yes
CE Sign	CE Sign	Yes
	Emission	EN 55011:2009 + A1:2010, CISPR 11:2009, Class A (Radio disturbance characteristics - Limits and methods of measurement)
	Immunity	EN 61000-4-2:2009 (Electrostatic discharge test) EN 61000-4-3:2006 + A1:2008 + A2:2010 (Radiated, radio-frequency, electromagnetic field test) EN 61000-4-4:2004 + A1:2010 (Burst Electrical fast transients/burst test) EN 61000-4-5:2006 (Surge test) EN 61000-4-6:2009 (to conducted disturbances, induced by radio- frequency fields) EN 61000-4-8:2010 (power frequency magnetic field test) EN 61000-6-2:2005 + B1:2011 (for industrial environments)
Configuration	Configuration Software Master and Slave	SYCON.net
	Configuration Software Slave	netX Configuration Tool

Table 104: Technical Data CIFX 104-RE, CIFX 104-RE-R

10.1.2 CIFX 104-RE\F, CIFX 104-RE-R\F

CIFX 104-RE\F, CIFX 104-RE-R\F	Parameter	Value	
Part	Name	CIFX 104-RE\F	CIFX 104-RE-R\F
	Part No.	1278.101	1279.101
	Description	PC Card cifX PC/104 for Real-Time Ethernet Master or Slave composed of: - Basic card CIFX 104-RE\F or CIFX 104-RE-R\F* with cable connector Ethernet X4 (X304) and cable connector DIAG X3 (X303) (*connectors at the right side) - Ethernet assembly interface (AIFX-RE) and - diagnostic assembly interface (AIFX-DIAG).	
	Function	Communication Interface with PC/104 and Ethernet interface	
Communication Controller	Type	netX 100 processor	
Integrated Memory	RAM	8 MB SDRAM	
	FLASH	4 MB serial Flash EPROM	
	Size of the Dual-Port Memory	16 KByte	
System Interface	Bus Type	PC/104, according to [bus spec 8], refer to section *Overview*, page 122.	
	Transmission Rate	33 MHz	
	Data Access	DPM	
	Width for the data access to the Dual-Port Memory (DPM)	8 Bit or 16 Bit	
Ethernet Communication	Supported Real-Time Ethernet communication systems (determined by the loaded firmware)	CC-Link IE Field Basic Slave	
		EtherCAT Master, EtherCAT Slave	
		EtherNet/IP Scanner (Master), EtherNet/IP Adapter (Slave)	
		Open Modbus/TCP	
		POWERLINK Controlled Node/Slave	
		PROFINET IO-Controller (Master), PROFINET IO-Device (Slave)	
		Sercos Master, Sercos Slave	
		VARAN Client (Slave)	
	Ethernet Frame Types	Ethernet II	
Ethernet interface	Transmission Rate	100 MBit/s, 10 MBit/s (depending on loaded firmware)	
	Interface Type	100 BASE-TX, 10 BASE-T (depending on loaded firmware), refer to section *Ethernet Interface*, page 114.	
	Half duplex/Full duplex	depending on loaded firmware, supported (at 100 MBit/s)	
	Auto-Negotiation	depending on loaded firmware	
	Auto-Crossover	depending on loaded firmware	
	Ethernet Assembly Interface	AIFX-RE, refer to section *AIFX-RE*, page 139. **Important!** Operating the PC cards CIFX 104-RE\F or CIFX 104-RE-R\F requires proper connection of the Ethernet assembly interface (AIFX-RE) to the basic card!	
	Connector AIFX-RE	Cable Connector Ethernet X4 (X304) (JST SM20B-SRSS-TB(LF)(SN), Pitch 1,0 mm)	
	Channel 0 and 1	With loaded EtherCAT Master firmware only the RJ45 channel 0 can be used, channel 1 is deactivated. Beginning with the EtherCAT Master firmware version 3	

CIFX 104-RE\F, CIFX 104-RE-R\F	Parameter	Value
		channel 1 can be reactivated if redundancy is activated. For Open Modbus/TCP with V2.3.4.0 and higher both RJ45 channels can be used.
Diagnosis Interface	Diagnostic Assembly Interface	AIFX-DIAG, refer to section *AIFX-DIAG*, page 144. **Note:** If the diagnostic **AIFX-DIAG** assembly interface is connected to the PC card CIFX 104-RE\F or CIFX 104-RE-R\F, the **Mini-B USB** connector on the AIFX-DIAG can be used beginning with the hardware revision 5 of the PC card cifX.
	Connector AIFX-DIAG	Cable Connector DIAG X3 (X303) (JST 12FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
Display	LED Display	**SYS** System Status LED
		For LEDs at AIFX-RE, refer to section *AIFX-RE*, page 139.
Power supply	Supply Voltage	+5 V dc ±5 %, refer to section *Power Supply and Host Interface*, page 39.
	Current at 5 V	500 mA (maximum)
	Connector	Via PC/104 Bus
Environmental Conditions	Operating temperature range*	0 °C ... +70 °C
	*Air flow during measurment	0,5m/s
	Storage temperature range	-40 °C ... +85 °C
	Humidity	10 … 95% relative humidity, no condensation permitted
Device	Dimensions (L x W x H)	97 x 91 x 24.3 mm
	Mounting/Installation	PC/104 Slot (5 V), refer to section *Slot for the PC Cards cifX PC/104*, page 39.
	RoHS	Yes
CE Sign	CE Sign	Yes
	Emission	EN 55011:2009 + A1:2010, CISPR 11:2009, Class A (Radio disturbance characteristics - Limits and methods of measurement)
	Immunity	EN 61000-4-2:2009 (Electrostatic discharge test) EN 61000-4-3:2006 + A1:2008 + A2:2010 (Radiated, radio-frequency, electromagnetic field test) EN 61000-4-4:2004 + A1:2010 (Burst Electrical fast transients/burst test) EN 61000-4-5:2006 (Surge test) EN 61000-4-6:2009 (to conducted disturbances, induced by radio- frequency fields) EN 61000-4-8:2010 (power frequency magnetic field test) EN 61000-6-2:2005 + B1:2011 (for industrial environments)
Configuration	Configuration Software Master and Slave	SYCON.net
	Configuration Software Slave	netX Configuration Tool

Table 105: Technical Data CIFX 104-RE\F, CIFX 104-RE-R\F

10.1.3 CIFX 104-DP, CIFX 104-DP-R

CIFX 104-DP, CIFX 104-DP-R	Parameter	Value	
Part	Name	CIFX 104-DP	CIFX 104-DP-R
	Part No.	1278.410	1279.410
	Description	PC Card cifX PC/104 PROFIBUS DP Master or Slave and PROFIBUS MPI Device; (for CIFX 104-DP-R connectors at the right side)	
	Function	Communication Interface with PC/104 and fieldbus interface PROFIBUS	
Communication Controller	Type	netX 100 processor	
Integrated Memory	RAM	8 MB SDRAM	
	FLASH	4 MB serial Flash EPROM	
	Size of the Dual-Port Memory	16 KByte	
System Interface	Bus Type	PC/104, according to [bus spec 8], refer to section *Overview*, page 122.	
	Transmission Rate	33 MHz	
	Data Access	DPM	
	Width for the data access to the Dual-Port Memory (DPM)	8 Bit or 16 Bit	
PROFIBUS Communication	Supported communication standard/ protocol (determined by the loaded firmware)	PROFIBUS DP Master, PROFIBUS DP Slave, PROFIBUS MPI Device	
PROFIBUS Interface	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	
	Interface Type	RS 485, refer to section *PROFIBUS Interface*, page 116.	
	Galvanic Isolation	isolated	
	Isolation Voltage	1000 VDC (tested for 1 minute)	
	Connector	DSub female Connector, 9 pin	
Diagnosis Interface	USB Interface	Mini B USB Plug (5 pin), refer to section *Mini-B USB Connector (5 Pin)*, page 118.	
Display	LED Display	**SYS** System Status LED **COM 0** LED Communication Status 0 (duo LED) The meaning of the COM LED depends on the loaded firmware. Refer to chapter *LED Descriptions*, page 78.	
Power supply	Supply Voltage	+5 V dc ±5 %, refer to section *Power Supply and Host Interface*, page 39.	
	Current at 5 V	500 mA (maximum)	
	Connector	Via PC/104 Bus	
Operation	Rotary Switch Device Address	Is currently unassigned. Refer to section *Rotary Switch Device Address* on page 118.	
Environmental Conditions	Operating temperature range*	-20 °C ... +70 °C	
	*Air flow during measurment	0,5m/s	
	Storage temperature range	-40 °C ... +85 °C	
	Humidity	10 … 95% relative humidity, no condensation permitted	
Device	Dimensions (L x W x H)	97 x 91 x 24.3 mm	
	Mounting/Installation	PC/104 Slot (5 V), refer to section *Slot for the PC Cards cifX PC/104*, page 39.	
	RoHS	Yes	

CIFX 104-DP, CIFX 104-DP-R	Parameter	Value
CE Sign	CE Sign	Yes
	Emission	EN 55011:2009 + A1:2010, CISPR 11:2009, Class A (Radio disturbance characteristics - Limits and methods of measurement)
	Immunity	EN 61000-4-2:2009 (Electrostatic discharge test) EN 61000-4-3:2006 + A1:2008 + A2:2010 (Radiated, radio-frequency, electromagnetic field test) EN 61000-4-4:2004 + A1:2010 (Burst Electrical fast transients/burst test) EN 61000-4-5:2006 (Surge test) EN 61000-4-6:2009 (to conducted disturbances, induced by radio- frequency fields) EN 61000-4-8:2010 (power frequency magnetic field test) EN 61000-6-2:2005 + B1:2011 (for industrial environments)
Configuration	Configuration Software Master and Slave	SYCON.net
	Configuration Software Slave	netX Configuration Tool

Table 106: Technical Data CIFX 104-DP, CIFX 104-DP-R

10.1.4 CIFX 104-DP\F, CIFX 104-DP-R\F

CIFX 104-DP\F, CIFX 104-DP-R\F	Parameter	Wert	
Part	Name	CIFX 104-DP\F	CIFX 104-DP-R\F
	Part No.	1278.411	1279.411
	Description	PC Card cifX PC/104 PROFIBUS DP Master or Slave and PROFIBUS MPI Device composed of: - Basic card CIFX 104-FB\F or CIFX 104-FB-R\F* with cable connector Fieldbus X4 (X304) and cable connector DIAG X3 (X303) (*connectors at the right side) - PROFIBUS assembly interface (AIFX-DP) and - diagnostic assembly interface (AIFX-DIAG).	
	Function	Communication Interface with PC/104 and fieldbus interface PROFIBUS	
Communication Controller	Type	netX 100 processor	
Integrated Memory	RAM	8 MB SDRAM	
	FLASH	4 MB serial Flash EPROM	
	Size of the Dual-Port Memory	16 KByte	
System Interface	Bus Type	PC/104, according to [bus spec 8], refer to section *Overview*, page 122.	
	Transmission Rate	33 MHz	
	Data Access	DPM	
	Width for the data access to the Dual-Port Memory (DPM)	8 Bit or 16 Bit	
PROFIBUS Communication	Supported communication standard/ protocol (determined by the loaded firmware)	PROFIBUS DP Master, PROFIBUS DP Slave, PROFIBUS MPI Device	
PROFIBUS Interface	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	
	Interface Type	RS 485, refer to section *PROFIBUS Interface* page 116.	

CIFX 104-DP\F, CIFX 104-DP-R\F	Parameter	Wert
	PROFIBUS Assembly Interface	AIFX-DP, refer to section *AIFX-DP* page 140. **Important!** Operating the PC cards CIFX 104-DP\F or CIFX 104-DP-R\F requires proper connection of the PROFIBUS assembly interface (AIFX-DP) to the basic card!
	Connector AIFX-DP	Cable Connector Fieldbus X4 (X304) (JST 10FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
Diagnosis Interface	Diagnostic Assembly Interface	AIFX-DIAG, refer to section *AIFX-DIAG*, page 144.
	Connector AIFX-DIAG	Cable Connector DIAG X3 (X303) (JST 12FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
Display	LED Display	**SYS** System Status LED
		For LEDs at AIFX-DP, refer to section *AIFX-DP* page 140.
Power supply	Supply Voltage	+5 V dc ±5 %, refer to section *Power Supply and Host Interface*, page 39.
	Current at 5 V	500 mA (maximum)
	Connector	Via PC/104 Bus
Environmental Conditions	Operating temperature range*	-20 °C ... +70 °C
	*Air flow during measurment	0,5m/s
	Storage temperature range	-40 °C ... +85 °C
	Humidity	10 … 95% relative humidity, no condensation permitted
Device	Dimensions (L x W x H)	97 x 91 x 24.3 mm
	Mounting/Installation	PC/104 Slot (5 V), refer to section *Slot for the PC Cards cifX PC/104*, page 39.
	RoHS	Yes
CE Sign	CE Sign	Yes
	Emission	EN 55011:2009 + A1:2010, CISPR 11:2009, Class A (Radio disturbance characteristics - Limits and methods of measurement)
	Immunity	EN 61000-4-2:2009 (Electrostatic discharge test) EN 61000-4-3:2006 + A1:2008 + A2:2010 (Radiated, radio-frequency, electromagnetic field test) EN 61000-4-4:2004 + A1:2010 (Burst Electrical fast transients/burst test) EN 61000-4-5:2006 (Surge test) EN 61000-4-6:2009 (to conducted disturbances, induced by radio- frequency fields) EN 61000-4-8:2010 (power frequency magnetic field test) EN 61000-6-2:2005 + B1:2011 (for industrial environments)
Configuration	Configuration Software Master and Slave	SYCON.net
	Configuration Software Slave	netX Configuration Tool

Table 107: Technical Data CIFX 104-DP\F, CIFX 104-DP-R\F

10.1.5 CIFX 104-CO, CIFX 104-CO-R

CIFX 104-CO, CIFX 104-CO-R	Parameter	Value	
Part	Name	CIFX 104-CO	CIFX 104-CO-R
	Part No.	1278.500	1279.500
	Description	PC Card cifX PC/104 CANopen Master or Slave; (for CIFX 104-CO-R connectors at the right side)	
	Function	Communication Interface with PC/104 and fieldbus interface CANopen	
Communication Controller	Type	netX 100 processor	
Integrated Memory	RAM	8 MB SDRAM	
	FLASH	4 MB serial Flash EPROM	
	Size of the Dual-Port Memory	16 KByte	
System Interface	Bus Type	PC/104, according to [bus spec 8], refer to section *Overview*, page 122.	
	Transmission Rate	33 MHz	
	Data Access	DPM	
	Width for the data access to the Dual-Port Memory (DPM)	8 Bit or 16 Bit	
CANopen Communication	Supported communication standard/ protocol (determined by the loaded firmware)	CANopen Master, CANopen Slave	
CANopen Interface	Transmission Rate	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	
	Interface Type	ISO-11898, refer to section *CANopen Interface*, page 116.	
	Galvanic Isolation	isolated (optically isolated)	
	Isolation Voltage	1000 VDC (tested for 1 minute)	
	Connector	DSub male Connector, 9 pin	
Diagnosis Interface	USB Interface	Mini B USB Plug (5 pin), refer to section *Mini-B USB Connector (5 Pin)*, page 118.	
Display	LED Display	**SYS** System Status LED **CAN** CANopen Status (duo LED) The meaning of the CAN LED is depending on loaded firmware. Refer to chapter *LED Descriptions*, page 78.	
Power supply	Supply Voltage	+5 V dc ±5 %, refer to section *Power Supply and Host Interface*, page 39.	
	Current at 5 V	500 mA (maximum)	
	Connector	Via PC/104 Bus	
Operation	Rotary Switch Device Address	Is currently unassigned. Refer to section *Rotary Switch Device Address* on page 118.	
Environmental Conditions	Operating temperature range*	-20 °C ... +70 °C	
	*Air flow during measurment	0,5m/s	
	Storage temperature range	-40 °C ... +85 °C	
	Humidity	10 … 95% relative humidity, no condensation permitted	
Device	Dimensions (L x W x H)	97 x 91 x 24.3 mm	
	Mounting/Installation	PC/104 Slot (5 V), refer to section *Slot for the PC Cards cifX PC/104*, page 39.	
	RoHS	Yes	
CE Sign	CE Sign	Yes	

CIFX 104-CO, CIFX 104-CO-R	Parameter	Value
	Emission	EN 55011:2009 + A1:2010, CISPR 11:2009, Class A (Radio disturbance characteristics - Limits and methods of measurement)
	Immunity	EN 61000-4-2:2009 (Electrostatic discharge test) EN 61000-4-3:2006 + A1:2008 + A2:2010 (Radiated, radio-frequency, electromagnetic field test) EN 61000-4-4:2004 + A1:2010 (Burst Electrical fast transients/burst test) EN 61000-4-5:2006 (Surge test) EN 61000-4-6:2009 (to conducted disturbances, induced by radio- frequency fields) EN 61000-4-8:2010 (power frequency magnetic field test) EN 61000-6-2:2005 + B1:2011 (for industrial environments)
Configuration	Configuration Software Master and Slave	SYCON.net
	Configuration Software Slave	netX Configuration Tool

Table 108: Technical Data CIFX 104-CO, CIFX 104-CO-R

10.1.6 CIFX 104-CO\F, CIFX 104-CO-R\F

CIFX 104-CO\F, CIFX 104-CO-R\F	Parameter	Value	
Part	Name	CIFX 104-CO\F	CIFX 104-CO-R\F
	Part No.	1278.501	1279.501
	Description	PC Card cifX PC/104 CANopen Master or Slave composed of: - Basic card CIFX 104-FB\F or CIFX 104-FB-R\F* with cable connector Fieldbus X4 (X304) and cable connector DIAG X3 (X303) (*connectors at the right side) - CANopen assembly interface (AIFX-CO) and - diagnostic assembly interface (AIFX-DIAG).	
	Function	Communication Interface with PC/104 and fieldbus interface CANopen	
Communication Controller	Type	netX 100 processor	
Integrated Memory	RAM	8 MB SDRAM	
	FLASH	4 MB serial Flash EPROM	
	Size of the Dual-Port Memory	16 KByte	
System Interface	Bus Type	PC/104, according to [bus spec 8], refer to section *Overview*, page 122.	
	Transmission Rate	33 MHz	
	Data Access	DPM	
	Width for the data access to the Dual-Port Memory (DPM)	8 Bit or 16 Bit	
CANopen Communication	Supported communication standard/ protocol (determined by the loaded firmware)	CANopen Master, CANopen Slave	
CANopen Interface	Transmission Rate	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	
	Interface Type	ISO-11898, refer to section *CANopen Interface*, page 116.	
	CANopen Assembly Interface	AIFX-CO, refer to section *AIFX-CO*, page 141. **Important!** Operating the PC cards CIFX 104-CO\F or CIFX 104-	

CIFX 104-CO\F, CIFX 104-CO-R\F	Parameter	Value
		CO-R\F requires proper connection of the CANopen assembly interface (AIFX-CO) to the basic card!
	Connector AIFX-CO	Cable Connector Fieldbus X4 (X304) (JST 10FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
Diagnosis Interface	Diagnostic Assembly Interface	AIFX-DIAG, refer to section *AIFX-DIAG*, page 144.
	Connector AIFX-DIAG	Cable Connector DIAG X3 (X303) (JST 12FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
Display	LED Display	**SYS** System Status LED
		For LEDs at AIFX-CO, refer to section *AIFX-CO*, p. 141.
Power supply	Supply Voltage	+5 V dc ±5 %, refer to section *Power Supply and Host Interface*, page 39.
	Current at 5 V	500 mA (maximum)
	Connector	Via PC/104 Bus
Environmental Conditions	Operating temperature range*	-20 °C ... +70 °C
	*Air flow during measurment	0,5m/s
	Storage temperature range	-40 °C ... +85 °C
	Humidity	10 … 95% relative humidity, no condensation permitted
Device	Dimensions (L x W x H)	97 x 91 x 24.3 mm
	Mounting/Installation	PC/104 Slot (5 V), refer to section *Slot for the PC Cards cifX PC/104*, page 39.
	RoHS	Yes
CE Sign	CE Sign	Yes
	Emission	EN 55011:2009 + A1:2010, CISPR 11:2009, Class A (Radio disturbance characteristics - Limits and methods of measurement)
	Immunity	EN 61000-4-2:2009 (Electrostatic discharge test) EN 61000-4-3:2006 + A1:2008 + A2:2010 (Radiated, radio-frequency, electromagnetic field test) EN 61000-4-4:2004 + A1:2010 (Burst Electrical fast transients/burst test) EN 61000-4-5:2006 (Surge test) EN 61000-4-6:2009 (to conducted disturbances, induced by radio- frequency fields) EN 61000-4-8:2010 (power frequency magnetic field test) EN 61000-6-2:2005 + B1:2011 (for industrial environments)
Configuration	Configuration Software Master and Slave	SYCON.net
	Configuration Software Slave	netX Configuration Tool

Table 109: Technical Data CIFX 104-CO\F, CIFX 104-CO-R\F

10.1.7 CIFX 104-DN, CIFX 104-DN-R

CIFX 104-DN, CIFX 104-DN-R	Parameter	Value	
Part	Name	CIFX 104-DN	CIFX 104-DN-R
	Part No.	1278.510	1279.510
	Description	PC Card cifX PC/104 DeviceNet Master or Slave; (for CIFX 104-DN-R connectors at the right side)	
	Function	Communication Interface with PC/104 and fieldbus interface DeviceNet	
Communication Controller	Type	netX 100 processor	
Integrated Memory	RAM	8 MB SDRAM	
	FLASH	4 MB serial Flash EPROM	
	Size of the Dual-Port Memory	16 KByte	
System Interface	Bus Type	PC/104, according to [bus spec 8], refer to section *Overview*, page 122.	
	Transmission Rate	33 MHz	
	Data Access	DPM	
	Width for the data access to the Dual-Port Memory (DPM)	8 Bit or 16 Bit	
DeviceNet Communication	Supported communication standard/ protocol (determined by the loaded firmware)	DeviceNet Master, DeviceNet Slave	
DeviceNet Interface	Transmission Rate	125 kBit/s, 250 kBit/s, 500 kBit/s	
	Interface Type	ISO-11898 according to DeviceNet specification, refer to section *DeviceNet Interface*, page 117.	
	Galvanic Isolation	isolated (optically isolated)	
	Isolation Voltage	1000 VDC (tested for 1 minute)	
	Connector	CombiCon male Connector, 5-polig	
Diagnosis Interface	USB Interface	Mini B USB Plug (5 pin), refer to section *Mini-B USB Connector (5 Pin)*, page 118.	
Display	LED Display	**SYS** System Status LED **MNS** Module network status (duo LED) The meaning of the MNS LED is depending on loaded firmware. Refer to chapter *LED Descriptions*, page 78.	
Power supply	Supply Voltage	+5 V dc ±5 %, refer to section *Power Supply and Host Interface*, page 39.	
	Current at 5 V	500 mA (maximum)	
	Connector	Via PC/104 Bus	
Operation	Rotary Switch Device Address	Is currently unassigned. Refer to section *Rotary Switch Device Address* on page 118.	
Environmental Conditions	Operating temperature range*	-20 °C ... +70 °C	
	*Air flow during measurment	0,5m/s	
	Storage temperature range	-40 °C ... +85 °C	
	Humidity	10 … 95% relative humidity, no condensation permitted	
Device	Dimensions (L x W x H)	97 x 91 x 24.3 mm	
	Mounting/Installation	PC/104 Slot (5 V), refer to section *Slot for the PC Cards cifX PC/104*, page 39.	
	RoHS	Yes	
CE Sign	CE Sign	Yes	

CIFX 104-DN, CIFX 104-DN-R	Parameter	Value
	Emission	EN 55011:2009 + A1:2010, CISPR 11:2009, Class A (Radio disturbance characteristics - Limits and methods of measurement)
	Immunity	EN 61000-4-2:2009 (Electrostatic discharge test) EN 61000-4-3:2006 + A1:2008 + A2:2010 (Radiated, radio-frequency, electromagnetic field test) EN 61000-4-4:2004 + A1:2010 (Burst Electrical fast transients/burst test) EN 61000-4-5:2006 (Surge test) EN 61000-4-6:2009 (to conducted disturbances, induced by radio- frequency fields) EN 61000-4-8:2010 (power frequency magnetic field test) EN 61000-6-2:2005 + B1:2011 (for industrial environments)
Configuration	Configuration Software Master and Slave	SYCON.net
	Configuration Software Slave	netX Configuration Tool

Table 110: Technical Data CIFX 104-DN, CIFX 104-DN-R

10.1.8 CIFX 104-DN\F, CIFX 104-DN-R\F

CIFX 104-DN\F, CIFX 104-DN-R\F	Parameter	Value	
Part	Name	CIFX 104-DN\F	CIFX 104-DN-R\F
	Part No.	1278.511	1279.511
	Description	PC Card cifX PC/104 DeviceNet Master or Slave composed of: - Basic card CIFX 104-FB\F or CIFX 104-FB-R\F* with cable connector Fieldbus X4 (X304) and cable connector DIAG X3 (X303) (*connectors at the right side) - DeviceNet assembly interface (AIFX-DN)and - diagnostic assembly interface (AIFX-DIAG).	
	Function	Communication Interface with PC/104 and fieldbus interface DeviceNet	
Communication Controller	Type	netX 100 processor	
Integrated Memory	RAM	8 MB SDRAM	
	FLASH	4 MB serial Flash EPROM	
	Size of the Dual-Port Memory	16 KByte	
System Interface	Bus Type	PC/104, according to [bus spec 8], refer to section *Overview*, page 122.	
	Transmission Rate	33 MHz	
	Data Access	DPM	
	Width for the data access to the Dual-Port Memory (DPM)	8 Bit or 16 Bit	
DeviceNet Communication	Supported communication standard/ protocol (determined by the loaded firmware)	DeviceNet Master, DeviceNet Slave	
DeviceNet Interface	Transmission Rate	125 kBit/s, 250 kBit/s, 500 kBit/s	
	Interface Type	ISO-11898 according to DeviceNet specification, refer to section *DeviceNet Interface*, page 117.	
	DeviceNet Assembly Interface	AIFX-DN, refer to section *AIFX-DN,* page 142. **Important!** Operating the PC cards CIFX 104-DN\F or CIFX 104-	

CIFX 104-DN\F, CIFX 104-DN-R\F	Parameter	Value
		DN-R\F requires proper connection of the DeviceNet assembly interface (AIFX-DN) to the basic card!
	Connector AIFX-DN	Cable Connector Fieldbus X4 (X304) (JST 10FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
Diagnosis Interface	Diagnostic Assembly Interface	AIFX-DIAG, refer to section *AIFX-DIAG*, page 144.
	Connector AIFX-DIAG	Cable Connector DIAG X3 (X303) (JST 12FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
Display	LED Display	**SYS** System Status LED
		For LED at AIFX-DN, refer to section *AIFX-DN,* p. 142.
Power supply	Supply Voltage	+5 V dc ±5 %, refer to section *Power Supply and Host Interface*, page 39.
	Current at 5 V	500 mA (maximum)
	Connector	Via PC/104 Bus
Environmental Conditions	Operating temperature range*	-20 °C ... +70 °C
	*Air flow during measurment	0,5m/s
	Storage temperature range	-40 °C ... +85 °C
	Humidity	10 … 95% relative humidity, no condensation permitted
Device	Dimensions (L x W x H)	97 x 91 x 24.3 mm
	Mounting/Installation	PC/104 Slot (5 V), refer to section *Slot for the PC Cards cifX PC/104*, page 39.
	RoHS	Yes
CE Sign	CE Sign	Yes
	Emission	EN 55011:2009 + A1:2010, CISPR 11:2009, Class A (Radio disturbance characteristics - Limits and methods of measurement)
	Immunity	EN 61000-4-2:2009 (Electrostatic discharge test) EN 61000-4-3:2006 + A1:2008 + A2:2010 (Radiated, radio-frequency, electromagnetic field test) EN 61000-4-4:2004 + A1:2010 (Burst Electrical fast transients/burst test) EN 61000-4-5:2006 (Surge test) EN 61000-4-6:2009 (to conducted disturbances, induced by radio- frequency fields) EN 61000-4-8:2010 (power frequency magnetic field test) EN 61000-6-2:2005 + B1:2011 (for industrial environments)
Configuration	Configuration Software Master and Slave	SYCON.net
	Configuration Software Slave	netX Configuration Tool

Table 111: Technical Data CIFX104C-DN\F, CIFX 104-DN-R\F

10.1.9 CIFX 104-CC\F

CIFX 104-CC\F	Parameter	Value
Part	Name	CIFX 104-CC\F
	Part No.	1278.741
	Description	PC Card cifX PC/104 CC-Link Slave composed of: - Basic card CIFX 104-FB\F with cable connector Fieldbus X4 and cable connector DIAG X3, - CC-Link assembly interface (AIFX-CC) and - diagnostic assembly interface (AIFX-DIAG).

CIFX 104-CC\F	Parameter	Value
	Function	Communication Interface with PC/104 and fieldbus interface CC-Link
Communication Controller	Type	netX 100 processor
Integrated Memory	RAM	8 MB SDRAM
	FLASH	4 MB serial Flash EPROM
	Size of the Dual-Port Memory	16 KByte
System Interface	Bus Type	PC/104, according to [bus spec 8], refer to section *Overview*, page 122.
	Transmission Rate	33 MHz
	Data Access	DPM
	Width for the data access to the Dual-Port Memory (DPM)	8 Bit or 16 Bit
CC-Link Communication	Supported communication standard/ protocol (determined by the loaded firmware)	CC-Link Slave
CC-Link Interface	Transmission Rate	156 kBit/s, 625 kBit/s, 2500 kBit/s, 5 MBit/s, 10 MBit/s
	Interface Type	RS-485, refer to section *CC-Link Interface*, page 117.
	CC-Link Assembly Interface	AIFX-CC, refer to section *AIFX-CC* page 143. **Important!** Operating the PC cards CIFX 104-CC\F requires proper connection of the CC-Link assembly interface (AIFX-CC) to the basic card!
	Connector AIFX-CC	Cable Connector Fieldbus X4 (JST 10FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
Diagnosis Interface	Diagnostic Assembly Interface	AIFX-DIAG, refer to section *AIFX-DIAG*, page 144.
	Connector AIFX-DIAG	Cable Connector DIAG X3 (JST 12FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
Display	LED Display	**SYS** System Status LED
		For LEDs at AIFX-CC, refer to section *AIFX-CC* page 143.
Power supply	Supply Voltage	+5 V dc ±5 %, refer to section *Power Supply and Host Interface*, page 39.
	Current at 5 V	500 mA (maximum)
	Connector	Via PC/104 Bus
Environmental Conditions	Operating temperature range*	0 °C ... +60 °C
	*Air flow during measurment	0,5m/s
	Storage temperature range	-40 °C ... +85 °C
	Humidity	10 … 95% relative humidity, no condensation permitted
Device	Dimensions (L x W x H)	97 x 91 x 24.3 mm
	Mounting/Installation	PC/104 Slot (5 V), refer to section *Slot for the PC Cards cifX PC/104*, page 39.
	RoHS	Yes
CE Sign	CE Sign	Yes
	Emission	EN 55011:2009 + A1:2010, CISPR 11:2009, Class A (Radio disturbance characteristics - Limits and methods of measurement)
	Immunity	EN 61000-4-2:2009 (Electrostatic discharge test) EN 61000-4-3:2006 + A1:2008 + A2:2010 (Radiated, radio-frequency, electromagnetic field test) EN 61000-4-4:2004 + A1:2010 (Burst Electrical fast transients/burst test) EN 61000-4-5:2006 (Surge test)

CIFX 104-CC\F	Parameter	Value
		EN 61000-4-6:2009 (to conducted disturbances, induced by radio- frequency fields) EN 61000-4-8:2010 (power frequency magnetic field test) EN 61000-6-2:2005 + B1:2011 (for industrial environments)
Configuration	Configuration Software	SYCON.net or netX Configuration Tool

Table 112: Technical Data CIFX104C-CC\F

10.1.10 AIFX-RE

AIFX-RE	Parameter	Value
Part	Name	AIFX-RE
	Part No.	2800.100
	Description	Ethernet assembly interface (with Ethernet interface) for the PC cards CIFX 104-RE\F, CIFX 104-RE-R\F
Interface PC Card cifX	Connector	Cable Connector Ethernet X1 (JST SM20B-SRSS-TB(LF)(SN), Pitch 1.0 mm)
Ethernet Interface	Galvanic Isolation	isolated
	Isolation Voltage	1000 VDC (tested for 1 minute)
	Connector	2* RJ45 Socket
Display	LED Display (on the reverse side of the device)	The meaning of the following LEDs depends on the loaded firmware:: **COM 0** LED Communication Status 0 (duo LED) **COM 1** LED Communication Status 1 (duo LED) **LED yellow** / **LED green** at RJ45Ch0 and RJ45Ch1, for Ethernet Link status, Ethernet Activity status and additional status Refer to chapter *LED Descriptions*, page 78.
Power supply	Connector	Cable Connector Ethernet X1
Environmental Conditions	Operating temperature range*	0 °C ... +70 °C
	*Air flow during measurment	0,5m/s
	Storage temperature range	-40 °C ... +85 °C
	Humidity	10 … 95% relative humidity, no condensation permitted
	Environment	For UL compliant usage: The device must be used in a pollution degree 2 environment.
Device	Dimensions (L x W x H)	30,7 x 42,3 x 18,5 mm (H = width of the front panel)
	Mounting/Installation	At the basic cards CIFX 104-RE\F, CIFX 104-RE-R\F: Cable Connector Ethernet X4 (X304)
	RoHS	Yes
CE Sign	CE Sign	Yes
	Emission, Immunity	Tested together with the corresponding basic card cifX.
UL Certification	The device is certified according to UL 508	UL-File-Nr. E221530

Table 113: Technical Data AIFX-RE

10.1.11 AIFX-DP

AIFX-DP	Parameter	Value
Part	Name	AIFX-DP
	Part No.	2800.400
	Description	PROFIBUS assembly interface (with PROFIBUS interface) for the PC cards CIFX 104-DP\F, CIFX 104-DP-R\F
Interface PC Card cifX	Connector	Cable Connector Fieldbus X1 (JST 10FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
PROFIBUS Interface	Galvanic Isolation	isolated
	Isolation Voltage	1000 VDC (tested for 1 minute)
	Connector	DSub female Connector, 9 pin
Display	LED Display (on the reverse side of the device)	The meaning of the following LEDs depends on the loaded firmware: **ERR** LED Error status (red) **STA** LED Status (green) For PROFIBUS MPI the STA LED is not used. Refer to chapter *LED Descriptions*, page 78.
Power supply	Connector	Cable Connector Fieldbus X1
Environmental Conditions	Operating temperature range*	-20 °C ... +70 °C
	*Air flow during measurment	0,5m/s
	Storage temperature range	-40 °C ... +85 °C
	Humidity	10 … 95% relative humidity, no condensation permitted
	Environment	For UL compliant usage: The device must be used in a pollution degree 2 environment.
Device	Dimensions (L x W x H)	17 x 31 x 18,5 mm (H = width of the front panel)
	Mounting/Installation	At the basic cards CIFX 104-FB\F, CIFX 104-FB-R\F: Cable Connector Fieldbus X4 (X304)
	RoHS	Yes
CE Sign	CE Sign	Yes
	Emission, Immunity	Tested together with the corresponding basic card cifX.
UL Certification	The device is certified according to UL 508	UL-File-Nr. E221530

Table 114: Technical Data AIFX-DP

10.1.12 AIFX-CO

AIFX-CO	Parameter	Value
Part	Name	AIFX-CO
	Part No.	2800.500
	Description	CANopen assembly interface (with CANopen interface) for the PC cards CIFX 104-CO\F, CIFX 104-CO-R\F
Interface PC Card cifX	Connector	Cable Connector Fieldbus X1 (JST 10FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
CANopen Interface	Galvanic Isolation	isolated (optically isolated)
	Isolation Voltage	1000 VDC (tested for 1 minute)
	Connector	DSub male Connector, 9 pin
Display	LED Display (on the reverse side of the device)	The meaning of the following LEDs depends on the loaded firmware:: **ERR** LED Error status (red) **RUN** LED Run (green) Refer to chapter *LED Descriptions*, page 78.
Power supply	Connector	Cable Connector Fieldbus X1
Environmental Conditions	Operating temperature range*	-20 °C ... +70 °C
	*Air flow during measurment	0,5m/s
	Storage temperature range	-40 °C ... +85 °C
	Humidity	10 … 95% relative humidity, no condensation permitted
	Environment	For UL compliant usage: The device must be used in a pollution degree 2 environment.
Device	Dimensions (L x W x H)	17 x 31 x 18,5 mm (H = width of the front panel)
	Mounting/Installation	At the basic cards CIFX 104-FB\F, CIFX 104-FB-R\F: Cable Connector Fieldbus X4 (X304)
	RoHS	Yes
CE Sign	CE Sign	Yes
	Emission, Immunity	Tested together with the corresponding basic card cifX..
UL Certification	The device is certified according to UL 508	UL-File-Nr. E221530

Table 115: Technical Data AIFX-CO

10.1.13 AIFX-DN

AIFX-DN	Parameter	Value
Part	Name	AIFX-DN
	Part No.	2800.510
	Description	DeviceNet assembly interface (with DeviceNet interface) for the PC cards CIFX 104-DN\F, CIFX 104-DN-R\F
Interface PC Card cifX	Connector	Cable Connector Fieldbus X1 (JST 10FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
DeviceNet Interface	Galvanic Isolation	isolated (optically isolated)
	Isolation Voltage	1000 VDC (tested for 1 minute)
	Connector	CombiCon male Connector, 5-polig
Display	LED Display (on the reverse side of the device)	**MNS** Module network status (duo LED) The meaning of the MNS LED is depending on loaded firmware. Refer to chapter *LED Descriptions*, page 78.
Power supply	Connector	Cable Connector Fieldbus X1
Environmental Conditions	Operating temperature range*	-20 °C ... +70 °C
	*Air flow during measurment	0,5m/s
	Storage temperature range	-40 °C ... +85 °C
	Humidity	10 … 95% relative humidity, no condensation permitted
	Environment	For UL compliant usage: The device must be used in a pollution degree 2 environment.
Device	Dimensions (L x W x H)	23,7 x 31 x 18,5 mm (L = 23,7, without CombiCon male Connector; H = width of the front panel)
	Mounting/Installation	At the basic cards CIFX 104-FB\F, CIFX 104-FB-R\F: Cable Connector Fieldbus X4 (X304)
	RoHS	Yes
CE Sign	CE Sign	Yes
	Emission, Immunity	Tested together with the corresponding basic card cifX..
UL Certification	The device is certified according to UL 508	UL-File-Nr. E221530

Table 116: Technical Data AIFX-DN

10.1.14 AIFX-CC

AIFX-CC	Parameter	Value
Part	Name	AIFX-CC
	Part No.	2800.730
	Description	CC-Link assembly interface (with CC-Link interface) for the PC card CIFX 104-CC\F
Interface PC Card cifX	Connector	Cable Connector Fieldbus X1 (JST 10FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
CC-Link Interface	Galvanic Isolation	isolated (optically isolated)
	Isolation Voltage	1000 VDC (tested for 1 minute)
	Connector	CombiCon male Connector, 5-polig
Display	LED Display (on the reverse side of the device)	**L RUN** LED L Run (Duo-LED) **L ERR** LED L Error (Duo-LED) Refer to chapter *LED Descriptions*, page 78.
Power supply	Connector	Cable Connector Fieldbus X1
Environmental Conditions	Operating temperature range*	0 °C ... +60 °C
	*Air flow during measurment	0,5m/s
	Storage temperature range	-40 °C ... +85 °C
	Humidity	10 … 95% relative humidity, no condensation permitted
Device	Dimensions (L x W x H)	43,2 x 31 x 18,5 mm (L = 43,2, without CombiCon male Connector; H = width of the front panel)
	Mounting/Installation	At the basic card CIFX 104-FB\F: Cable Connector Fieldbus X4 (X304)
	RoHS	Yes
CE Sign	CE Sign	Yes
	Emission, Immunity	Tested together with the corresponding basic card cifX.

Table 117: Technical Data AIFX-CC

10.1.15 AIFX-DIAG

AIFX-DIAG	Parameter	Value
Part	Name	AIFX-DIAG
	Part No.	2800.000
	Description	Diagnostic assembly interface (with diagnostic interface) for the PC cards CIFX 104-RE\F, CIFX 104-RE-R\F CIFX 104-DP\F, CIFX 104-DP-R\F, CIFX 104-CO\F, CIFX 104-CO-R\F, CIFX 104-DN\F, CIFX 104-DN-R\F, CIFX 104-CC\F
Schnittstelle PC-Karte cifX	Connector	Cable Connector DIAG X1 (JST 12FMN-SMT-A-TF(LF)(SN), Pitch 1,0 mm)
Diagnosis Interface	USB Interface	Mini B USB Plug (5 pin), refer to section *Mini-B USB Connector (5 Pin)*, page 118.
Display	LED Display	**PWR** Supply Voltage ON LED **SYS** System Status LED The meaning of the following LEDs depends on the loaded firmware:: **COM 0** LED Communication Status 0 (duo LED) **COM 1** LED Communication Status 1 (duo LED) Refer to chapter *LED Descriptions*, page 78.
Power supply	Connector	Kabelstecker DIAG X1
Operation	Rotary Switch Device Address	Is currently unassigned. Refer to section *Rotary Switch Device Address* on page 118.
Environmental Conditions	Operating temperature range*	-20 °C ... +70 °C
	*Air flow during measurment	0,5m/s
	Storage temperature range	-40 °C ... +85 °C
	Humidity	10 … 95% relative humidity, no condensation permitted
	Environment	For UL compliant usage: The device must be used in a pollution degree 2 environment.
Device	Dimensions (L x W x H)	20,5 x 52,7 x 18,5 mm (H = width of the front panel)
	Mounting/Installation	For the basic cards: CIFX 104-RE\F, CIFX 104-RE-R\F, CIFX 104-FB\F, CIFX 104-FB-R\F Cable Connector DIAG X3 (X303)
	RoHS	Yes
CE Sign	CE Sign	Yes
	Emission, Immunity	Tested together with the corresponding basic card cifX..
UL Certification	The device is certified according to UL 508	UL-File-Nr. E221530

Table 118: Technical Data AIFX-DIAG

10.2 Technical Data of the Communication Protocols

10.2.1 CC-Link IE Field Basic Slave

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

Table 119: Technical data CC-Link IE Field Basic Slave protocol

10.2.2 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)	PC cards PCI, PCI Express, PCI Express Low Profile, Mini PCI, Compact PCI, Mini PCI Express, PCI-104 Real-Time Ethernet: Maximum 1 MByte PC cards PC/104 Real-Time Ethernet: 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 Distubuted Clock and Redundancy can not be used at the same time.
Reference to firmware/stack version	V3.0

Table 120: Technical Data EtherCAT Master Protocol

10.2.3 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) EoE (Ethernet 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, EoE
Mailbox protocols	CoE, EoE, 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)
EoE (Ethernet over EtherCAT)	Via NDIS
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 121: Technical Data EtherCAT Master Protocol

10.2.4 EtherCAT Slave

Parameter	Description
Maximum number of cyclic input data	256* bytes
Maximum number of cyclic output data	256* bytes
Acyclic communication	SDO SDO Master-Slave SDO Slave-Slave (depending on Master capability)
Type	Complex Slave
Functions	Emergency
FMMUs	3
SYNC Manager	4
Distributed Clocks (DC)	Supported, 32 Bit
Baud rate	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Limitation	LRW is not supported
Reference to firmware/stack version	V2.5 and V4.6

Table 122: Technical Data EtherCAT Slave Protocol

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

10.2.5 EtherNet/IP Scanner (Master)

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 123: Technical Data EtherNet/IP Scanner Protocol

10.2.6 EtherNet/IP Adapter (Slave)

Parameter	Description
Maximum number of input data	504 bytes
Maximum number of output data	504 bytes
IO connection types (implicit)	1 exclusive owner, 1 listen only, 1 input only
IO Connection trigger types	Cyclic, minimum 1 ms* Application Triggered, minimum 1 ms* Change Of State, minimum 1 ms* * depending on number of connections and number of input and output data
Explicit Messages	Connected and unconnected
Maximum number of connections	8, explicit and implicit connections
Unconnected Message Manager (UCMM)	Supported
Quick connect	Supported
Predefined standard objects	Identity Object Message Route Object Assembly Object Connection Manager DLR Object QoS Object TCP/IP Object Ethernet Link Object Time Sync Object
Reset services	Identity Object Reset Service of Type 0 and 1
Maximum number of user specific objects	20
DLR V2 (ring topology)	Supported
ACD (Address Conflict Detection)	Supported
DHCP	Supported
BOOTP	Supported
Baud rates	10 and 100 MBit/s
Duplex modes	Half duplex, Full duplex, Auto negotiation
MDI modes	MDI, MDI-X, Auto-MDIX
Data transport layer	Ethernet II, IEEE 802.3
Switch function	Integrated
Limitations	CIP Sync Services are not implemented TAGs are not supported
Reference to firmware/stack version	V2.11

Table 124: Technical Data EtherNet/IP Adapter Protocol

10.2.7 Open Modbus/TCP

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

Table 125: Technical Data Open Modbus/TCP Protocol

10.2.8 POWERLINK Controlled Node/Slav2 (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 126: Technical Data POWERLINK Controlled Node Protocol

10.2.9 POWERLINK Controlled Node/Slav2 (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	V3.3

Table 127: Technical Data POWERLINK Controlled Node Protocol

10.2.10 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 128: Technical Data PROFINET IO RT Controller Protocol

10.2.11 PROFINET IO-Controller (V3)

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

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

Table 129: Technical Data PROFINET IO Controller Protocol

10.2.12 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	RTC – Real Time Cyclic Protocol, Class 1 and 2 (unsynchronized), Class 3 (synchronized) RTA – Real Time Acyclic Protocol DCP – Discovery and configuration Protocol CL-RPC – Connectionless Remote Procedure Call LLDP – Link Layer Discovery Protocol SNMP – Simple Network Management Protocol MRP – MRP Client
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	1 ms for RTC1 and RTC2 250 µs for RTC3
Baud rate	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Limitations	RT over UDP not supported Multicast communication not supported Only one device instance is supported

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

Table 130: Technical Data PROFINET IO RT IRT Device Protocol

10.2.13 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)	The Stack can handle up to 8 IO-ARs, one Supervisor AR and one Supervisor-DA AR at the same time
Acyclic communication	Read/Write Record, max. 8 KB (fragmented)
Alarm Types	Process Alarm, Diagnostic Alarm, Return of SubModule Alarm, Plug Alarm (implicit), Pull Alarm (implicit)
Supported protocols	RTC – Real Time Cyclic Protocol, class 1 (unsynchronized), class 3 (synchronized) RTA – Real Time Acyclic Protocol DCP – Discovery and configuration Protocol CL-RPC – Connectionless Remote Procedure Call LLDP – Link Layer Discovery Protocol SNMP – Simple Network Management Protocol MRP – MRP Client
Topology recognition	LLDP, SNMP V1, MIB2, physical device
Identification & Maintenance	Read and write of I&M1-5
Minimum cycle time	1 ms for RT_CLASS_1 250 µs for RT_CLASS_3
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
PROFINET IO specification	V2.2 (legacy startup) and V2.3
Limitations	RT over UDP not supported. Multicast communication not supported. Only one device instance is supported. DHCP is not supported. FastStartUp is not supported.

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

Table 131: Technical Data PROFINET IO RT IRT Device Protocol

10.2.14 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
NRT channel	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
Reference to firmware/stack version	V2.1

Table 132: Technical Data Sercos Master Protocol

10.2.15 Sercos Slave

Parameter	Description
Maximum number of cyclic produced data	132 bytes (including Connection Control and IO Status)
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 Version1.3
Supported User SCP Profiles	SCP_WD Version 1.1.1 SCP_Diag Version 1.1.1 SCP_RTB Version 1.1.1 SCP_Mux Version 1.1.1 SCP_Sig 1.1.1 SCP_ExtMuX 1.1.2 SCP_RTBListProd 1.3 SCP_RTBListCons 1.3 SCP_RTBWordProd 1.3 SCP_RTBWordCons 1.3 SCP_OvSBasic 1.3 SCP_WDCon 1.3
Supported FSP profiles	FSP_IO FSP_Drive FSP_Encoder
SCP Sync	Supported
SCP_NRT	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)
Reference to firmware/stack version	V3.4

Table 133: Technical Data Sercos Slave Protocol

10.2.16 VARAN Client (Slave)

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
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 Memory area 2 is not supported.
Reference to firmware/stack version	V1.0.x.x

Table 134: Technical Data VARAN Client Protocol

10.2.17 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	V2.6.x.x

Table 135: Technical Data PROFIBUS DP Master Protocol

10.2.18 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	V2.7.x.x

Table 136: Technical Data PROFIBUS DP Slave Protocol

10.2.19 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.x.x

Table 137: Technical Data PROFIBUS-MPI Protocol

10.2.20 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	V2.11.x.x

Table 138: Technical Data CANopen Master Protocol

10.2.21 CANopen Slave

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	V3.6.x.x

Table 139: Technical Data CANopen Slave Protocol

10.2.22 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	V2.3.x.x

Table 140: Technical Data DeviceNet Master Protocol

10.2.23 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	V2.3.x.x

Table 141: Technical Data DeviceNet Slave Protocol

10.2.24 CC Link Slave

Parameter	Description
Firmware works according to CC-Link Version 2.0:	
Station Types	Remote Device Station (up to 4 occupied stations)
Maximum input data	368 bytes
Maximum output data	368 bytes
Input data remote device station	112 bytes (RY) and 256 bytes (RWw)
Output data remote device station	112 bytes (RX) and 256 bytes (RWr)
Extension cycles	1, 2, 4, 8
Baud rates	156 kBit/s, 625 kBit/s, 2500 kBit/s, 5 MBit/s, 10 MBit/s
Limitation	Intelligent Device Station not supported
Firmware works according to CC-Link Version 1.11:	
Station Types	Remote I/O station, Remote device station' (up to 4 occupied stations)
Maximum input data	48 bytes
Maximum output data	48 bytes
Input data remote I/O station	4 bytes (RY)
Output data remote I/O station	4 bytes (RX)
Input data remote device station	4 bytes (RY) and 8 bytes (RWw) per occupied station
Output data remote device station	4 bytes (RX) and 8 bytes (RWr) per occupied station
Baud rates	156 kBit/s, 625 kBit/s, 2500 kBit/s, 5 MBit/s, 10 MBit/s
Firmware	
Reference to firmware/stack version	V2.9.x.x

Table 142: Technical Data CC-Link-Slave Protocol

11 Annex

11.1 Device Label with Barcode

You can identify your device by means of the device label.

Note: The position of the device label on your device can be seen from the device drawing.

The device label consists of a bar code and the information contained therein in plain text.

The bar code (EAN 39) contains the following information:

① Part number: 1234.567

② Hardware revision: 1

③ Serial number: 20002

④ Security code: X

Figure 38: Example Barcode Label (EAN 39)

11.2 Tolerances of the shown Card Dimensions

The manufacturing tolerance of the printed circuit boards of the PC card cifX is ± 0.1 mm per milled PCB edge. For all dimensions of the PCB indicated on the drawings (in the section *Dimensioning PC Cards cifX PC-104* from page 170) thus results for the length L and the width W, a tolerance of ± 0.1 mm (per milled edge) x 2 = ± 0.2 mm.

W = [*width of the board in mm*] ± 0.2 mm

L = [*length of the board in mm*] ± 0.2 mm

The depth T of the PCB depends on the highest part used or the circuit board plus the descenders. The thickness of the PCB is = 1.6 mm ± 10%.

Note: The dimensions (L x W x D) specified in section *Technical Data PC Cards cifX* on page 125 (and also the identical values in the data sheet cifX and on the 'Hilscher Site') are rounded and unified for the type of card.

11.3 Dimensioning PC Cards cifX PC-104

11.3.1 CIFX 104-RE

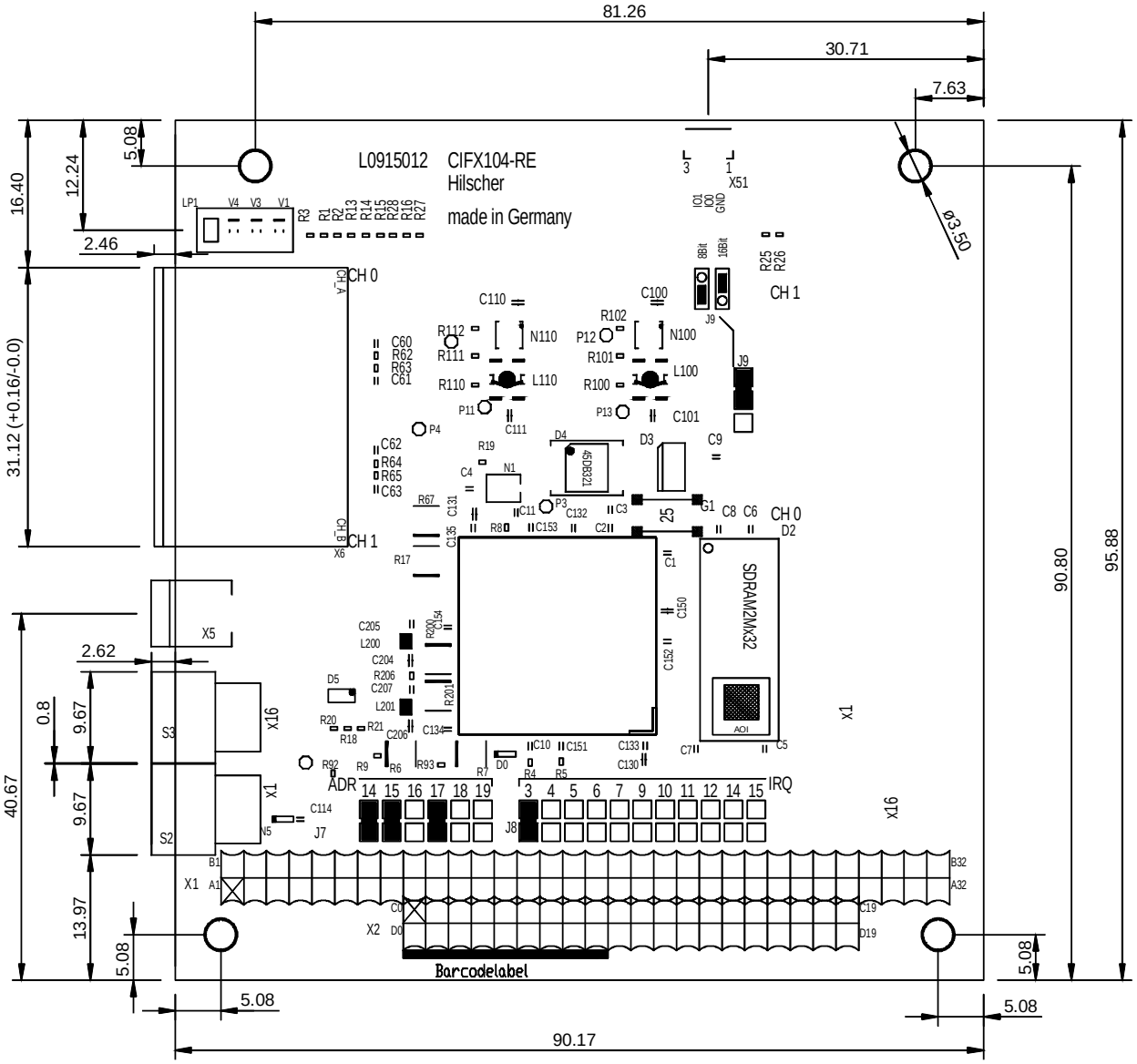


Figure 39: Dimensions CIFX 104-RE

11.3.2 CIFX 104-RE\F

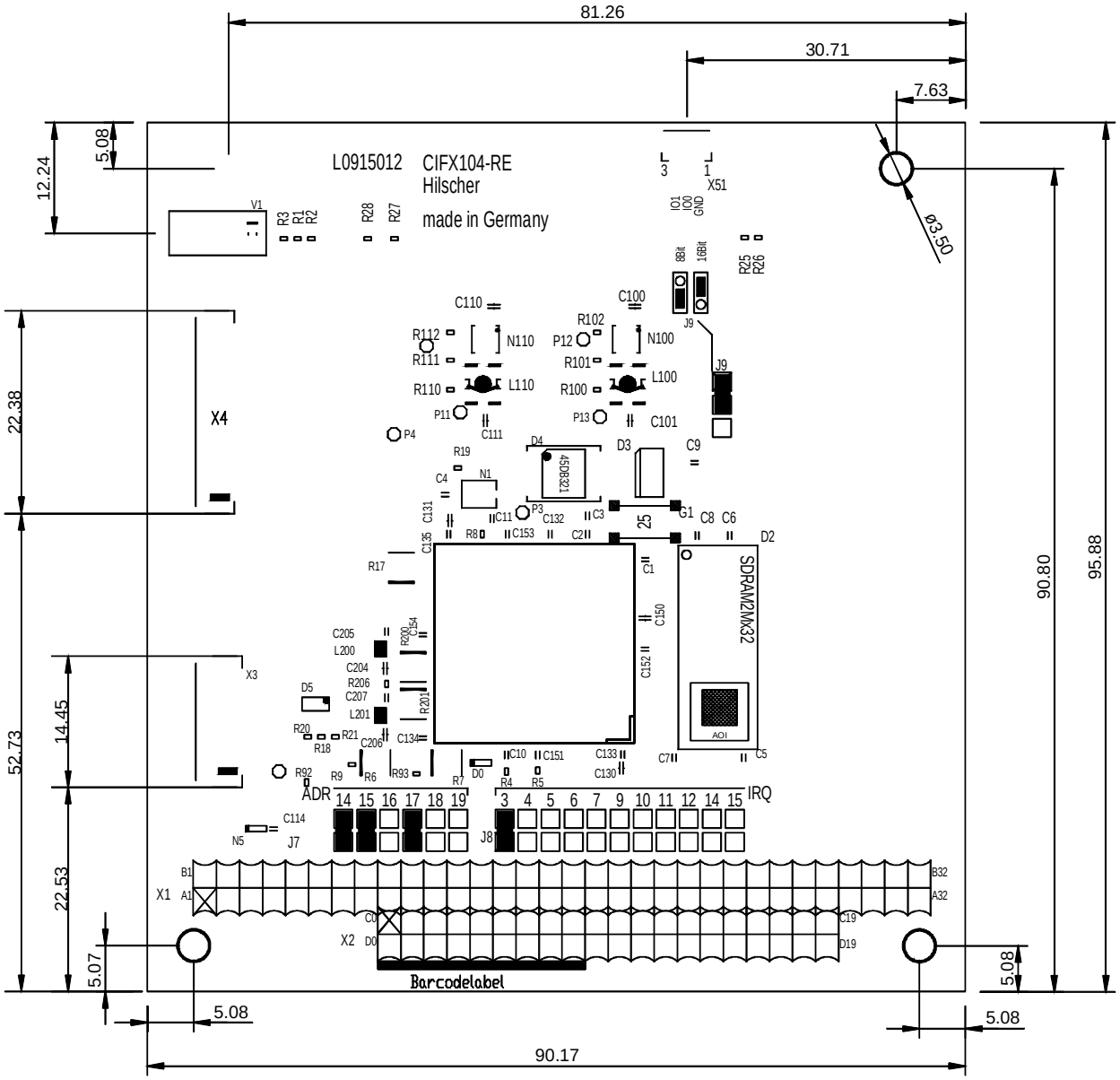


Figure 40: Dimensions CIFX 104-RE\F

11.3.3 CIFX 104-DP

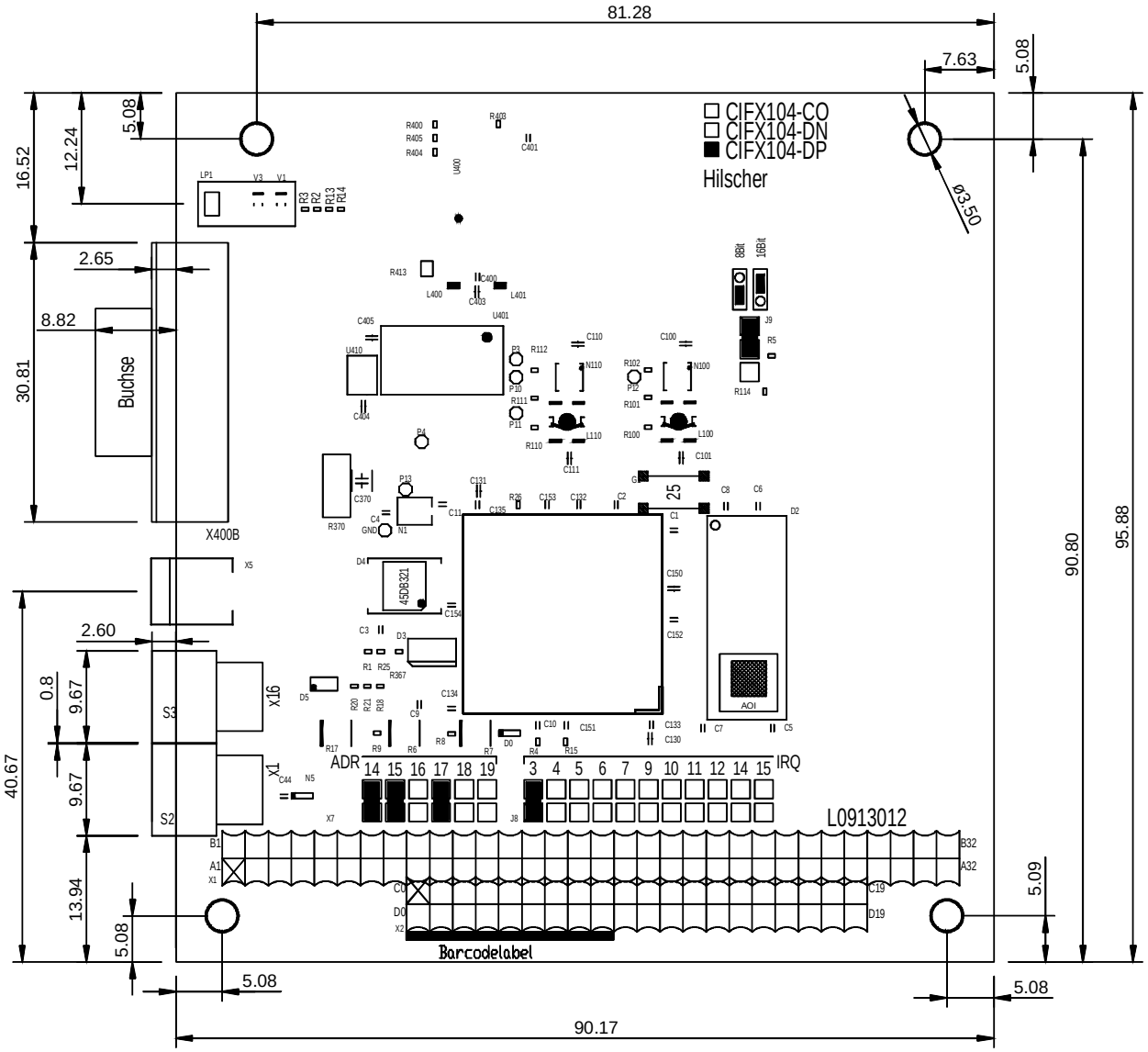


Figure 41: Dimensions CIFX 104-DP

11.3.4 CIFX 104-CO

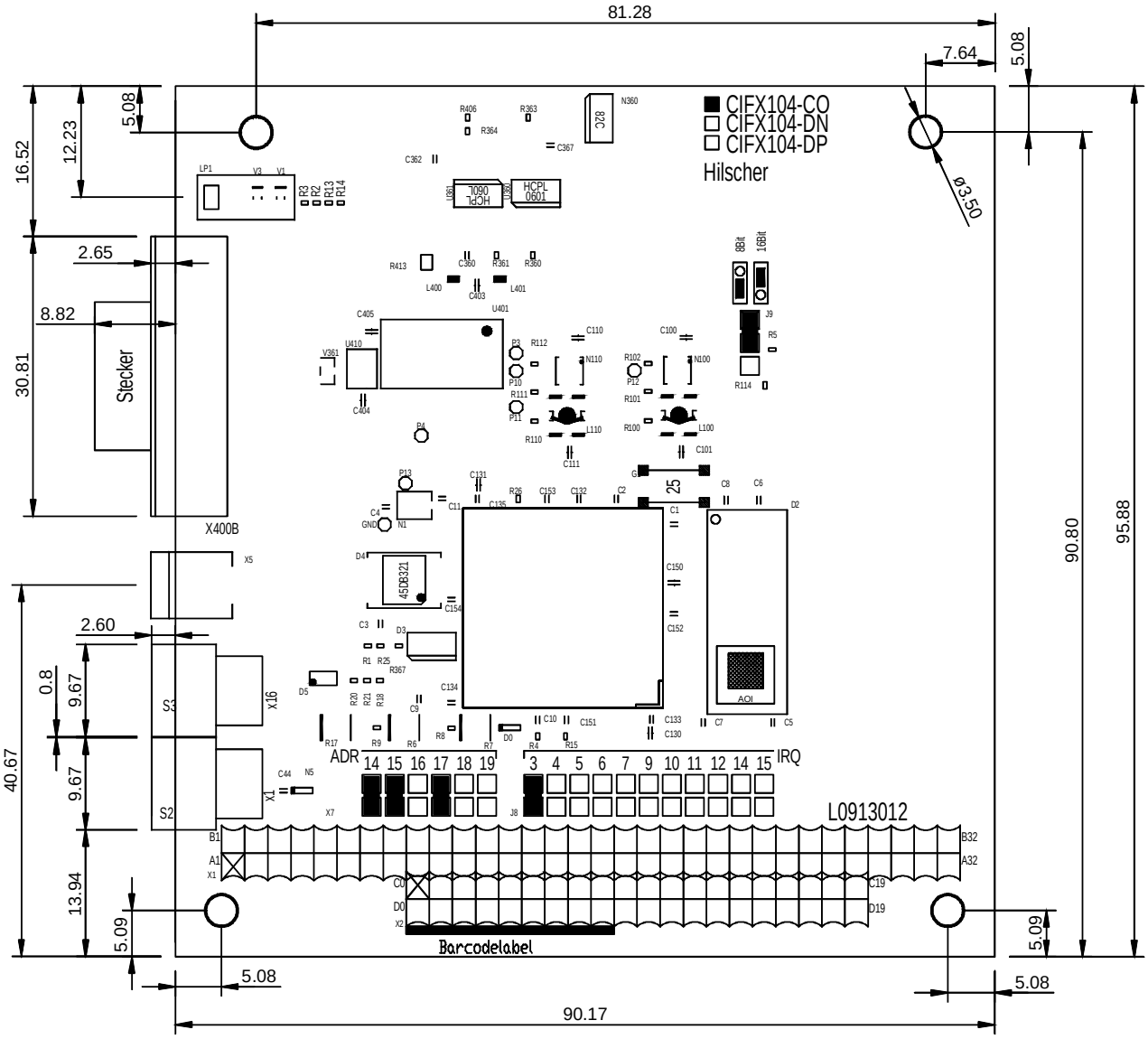


Figure 42: Dimensions CIFX 104-CO

11.3.5 CIFX 104-DN

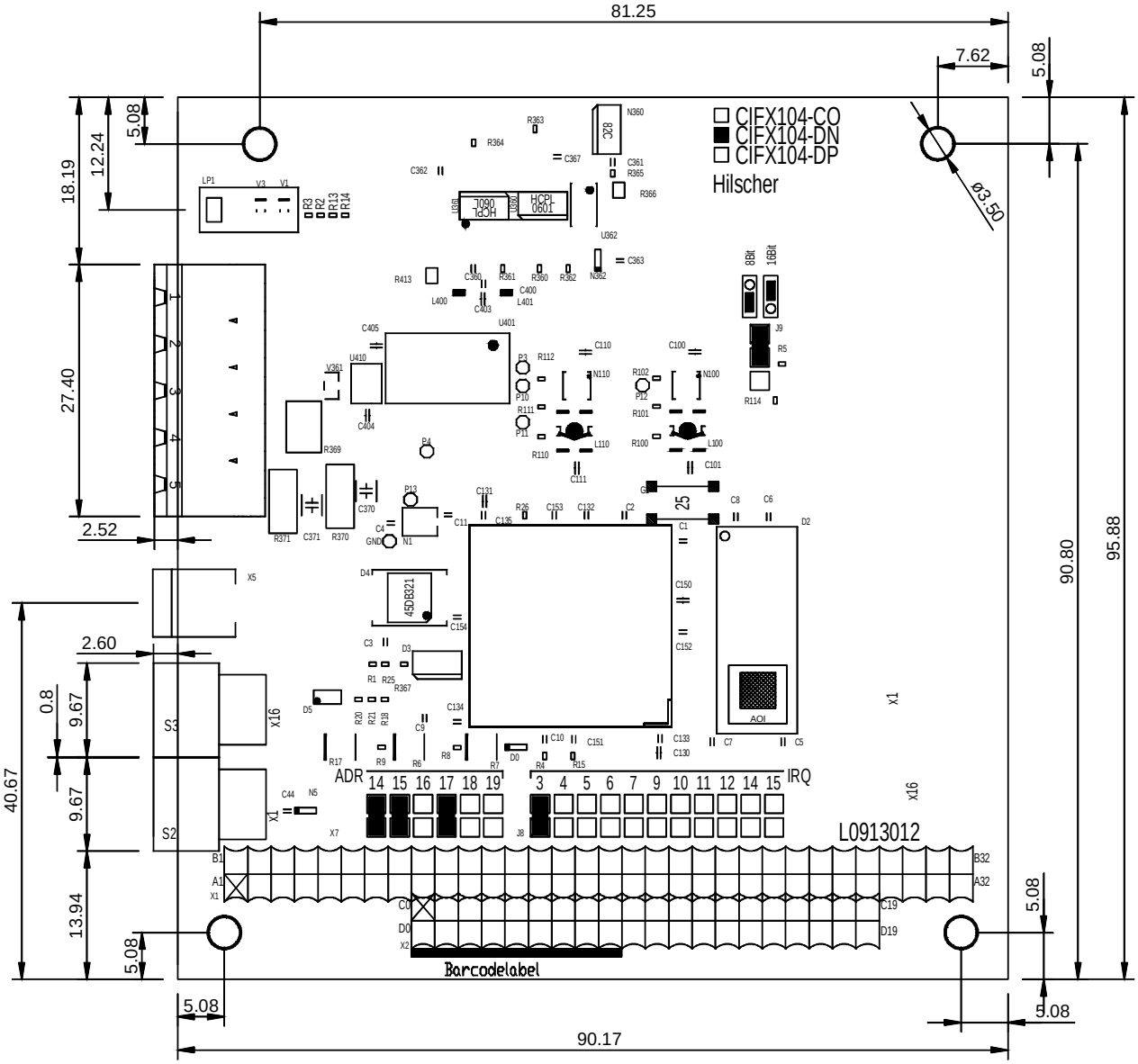


Figure 43: Dimensions CIFX 104-DN

11.3.6 CIFX 104-FB\F

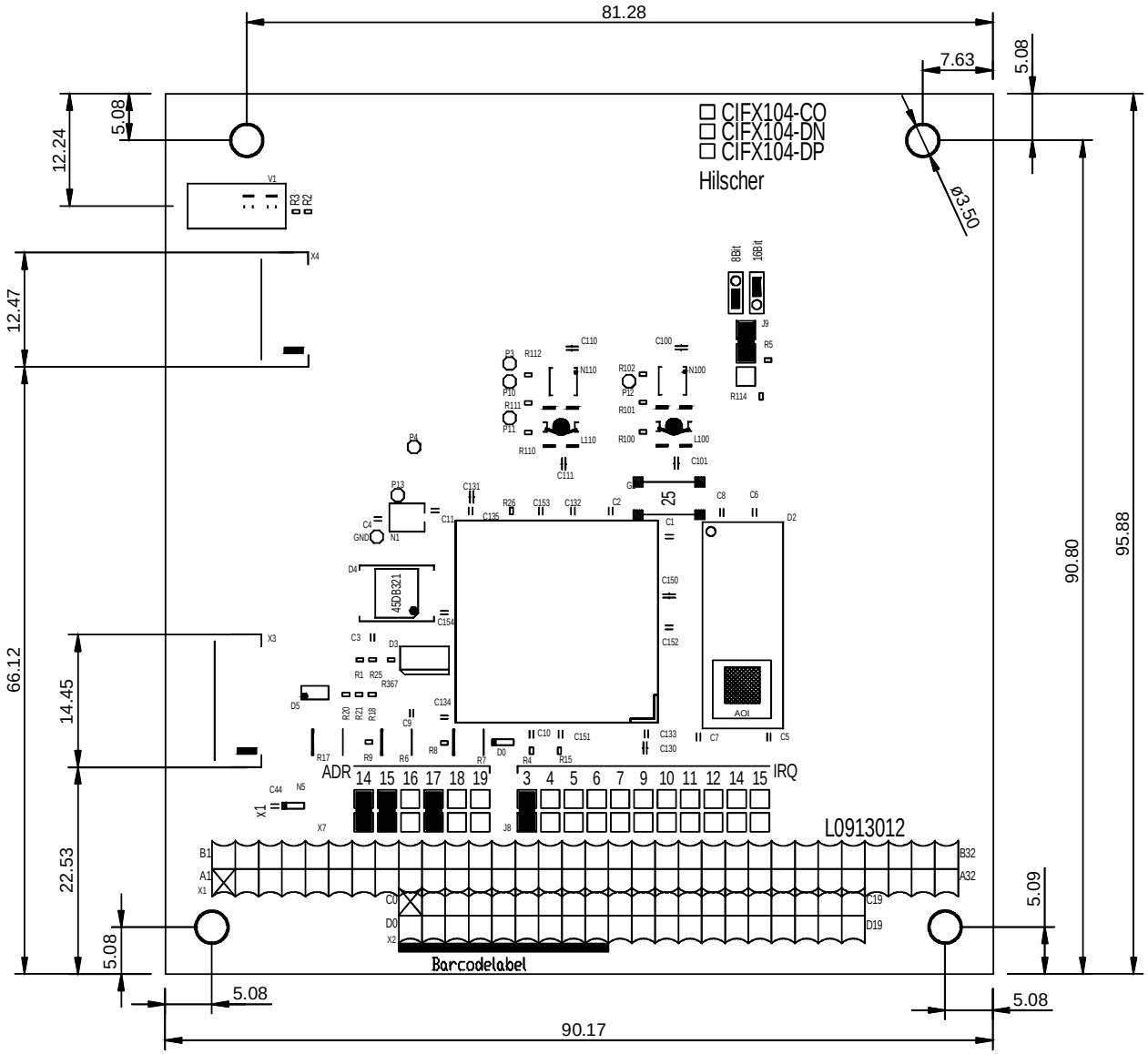


Figure 44: Dimensions CIFX 104-FB\F

11.4 Dimensioning AIFX Assembly Interfaces

11.4.1 Ethernet - AIFX-RE

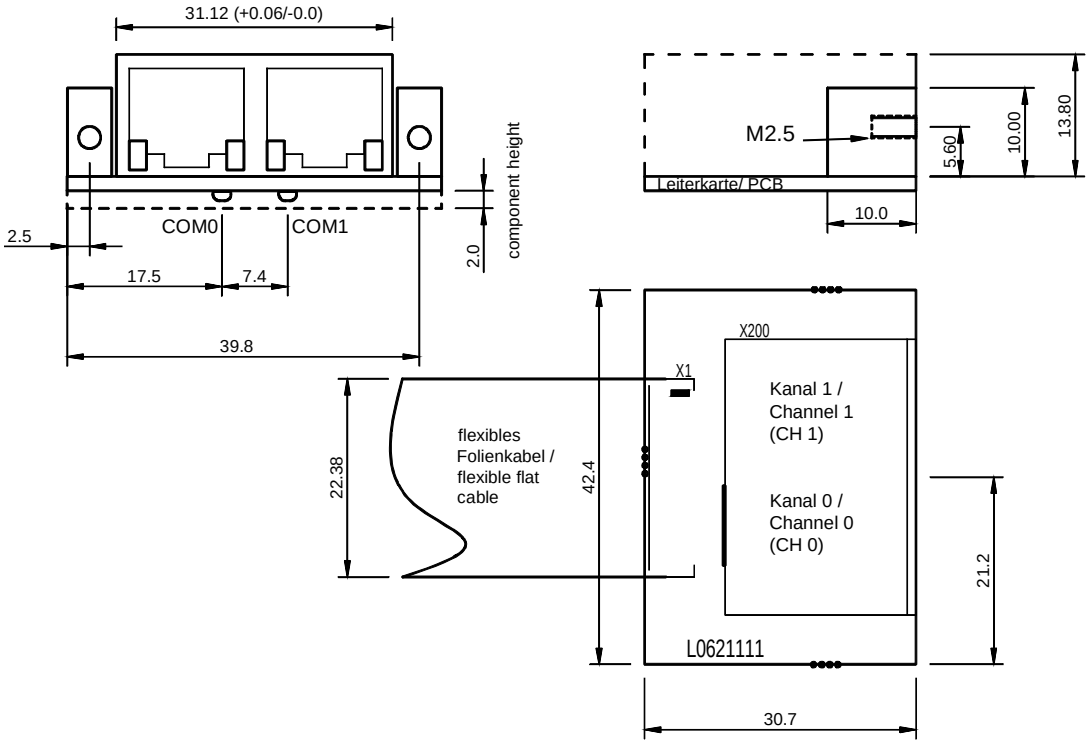


Figure 45: Dimensioning Ethernet Assembly Interface (AIFX-RE)

11.4.2 PROFIBUS - AIFX-DP

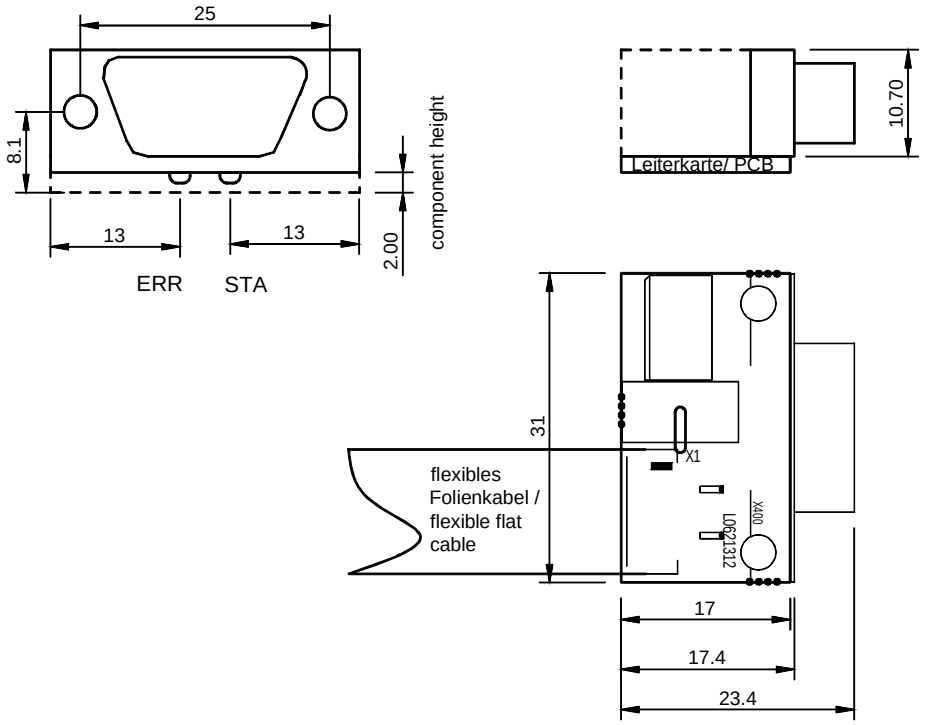


Figure 46: Dimensioning PROFIBUS Assembly Interface (AIFX-DP)

11.4.3 CANopen - AIFX-CO

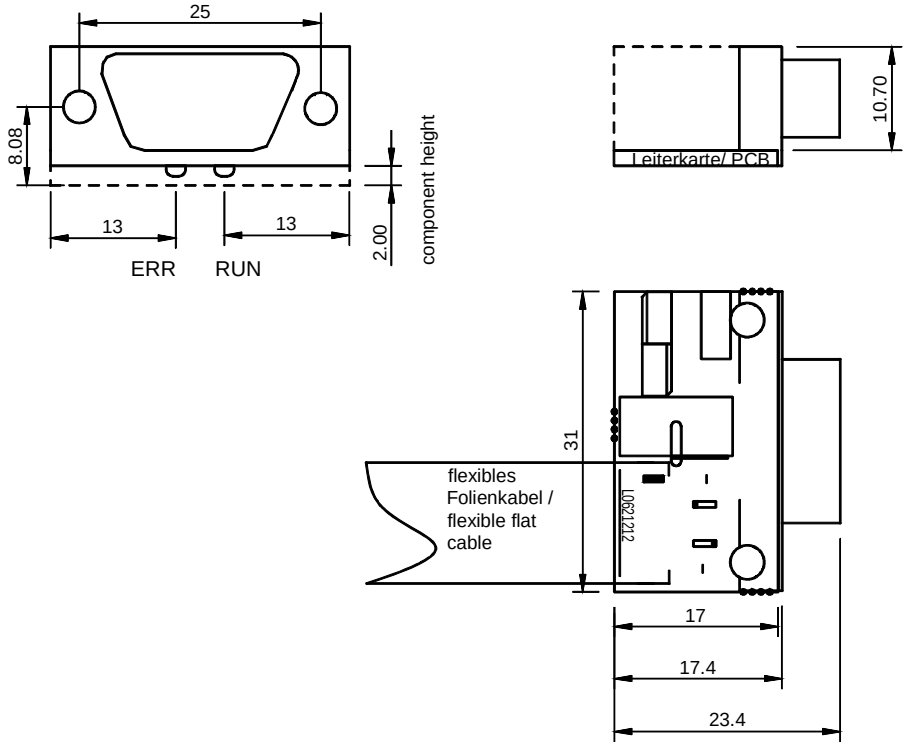


Figure 47: Dimensioning CANopen Assembly Interface (AIFX-CO)

11.4.4 DeviceNet - AIFX-DN

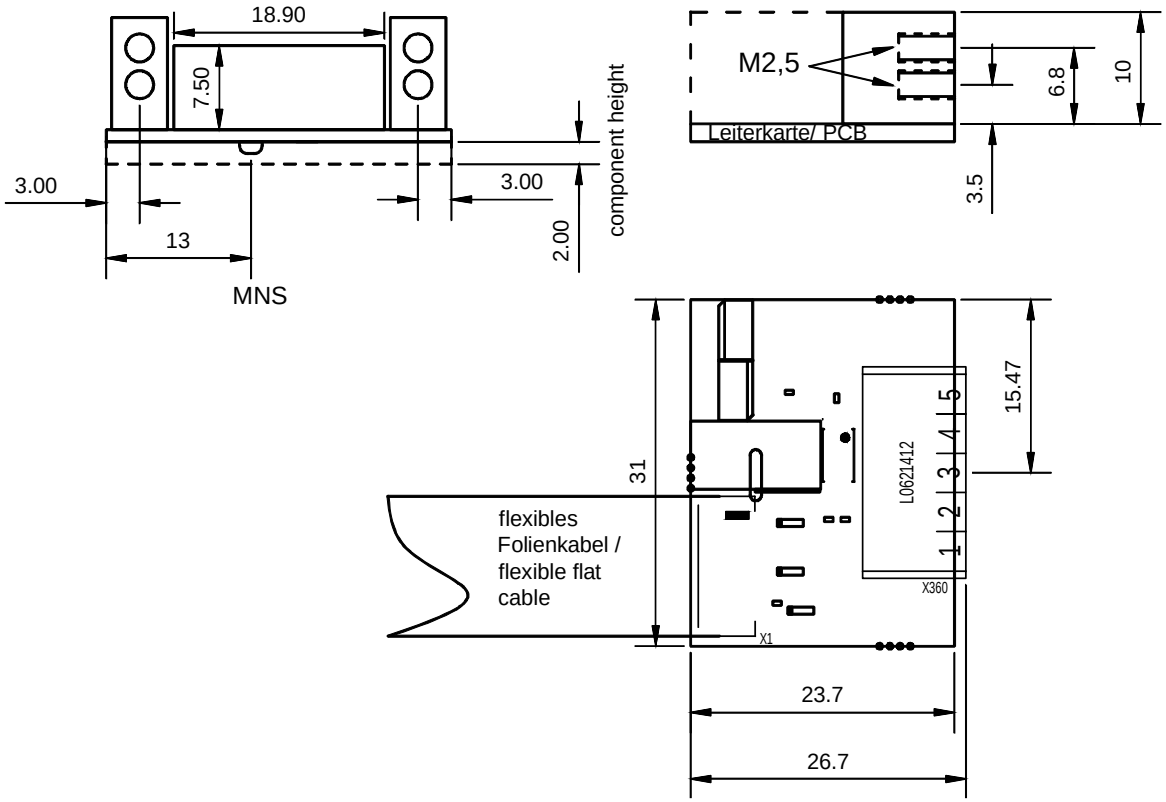


Figure 48: Dimensioning DeviceNet Assembly Interface (AIFX-DN)

11.4.5 CC-Link - AIFX-CC

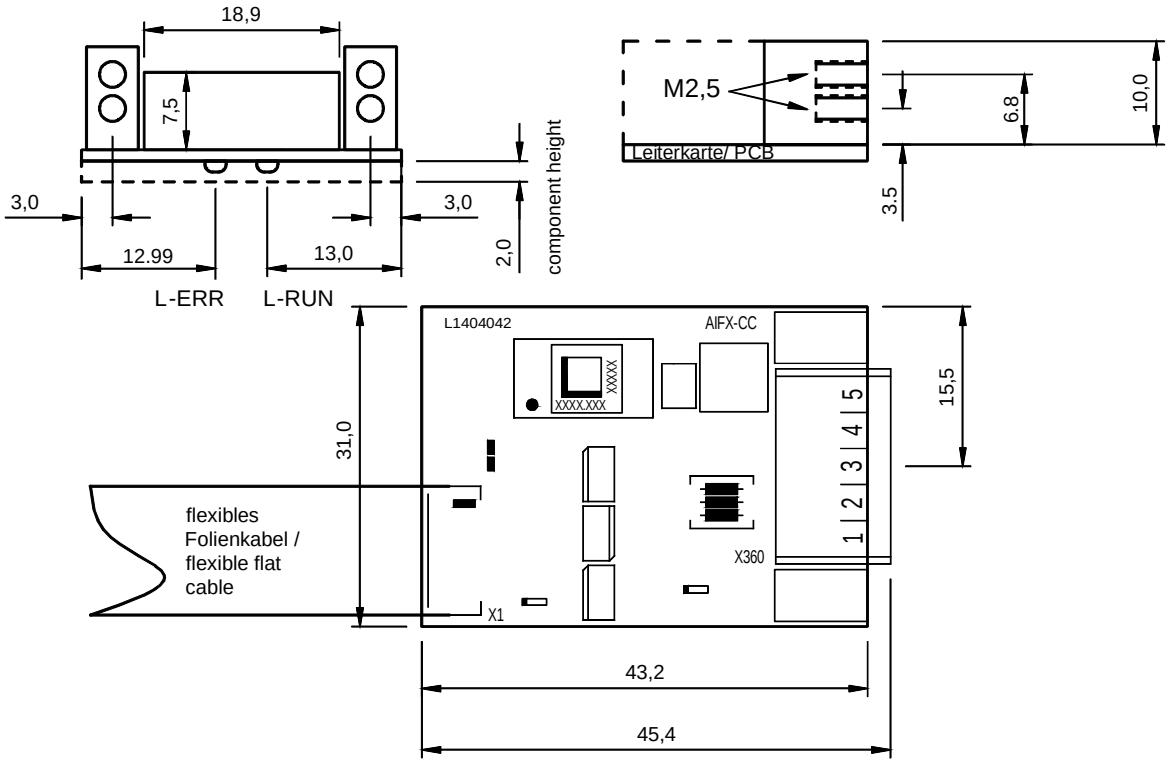


Figure 49: Dimensioning CC-Link Assembly Interface (AIFX-CC)

11.4.6 Diagnose - AIFX-DIAG

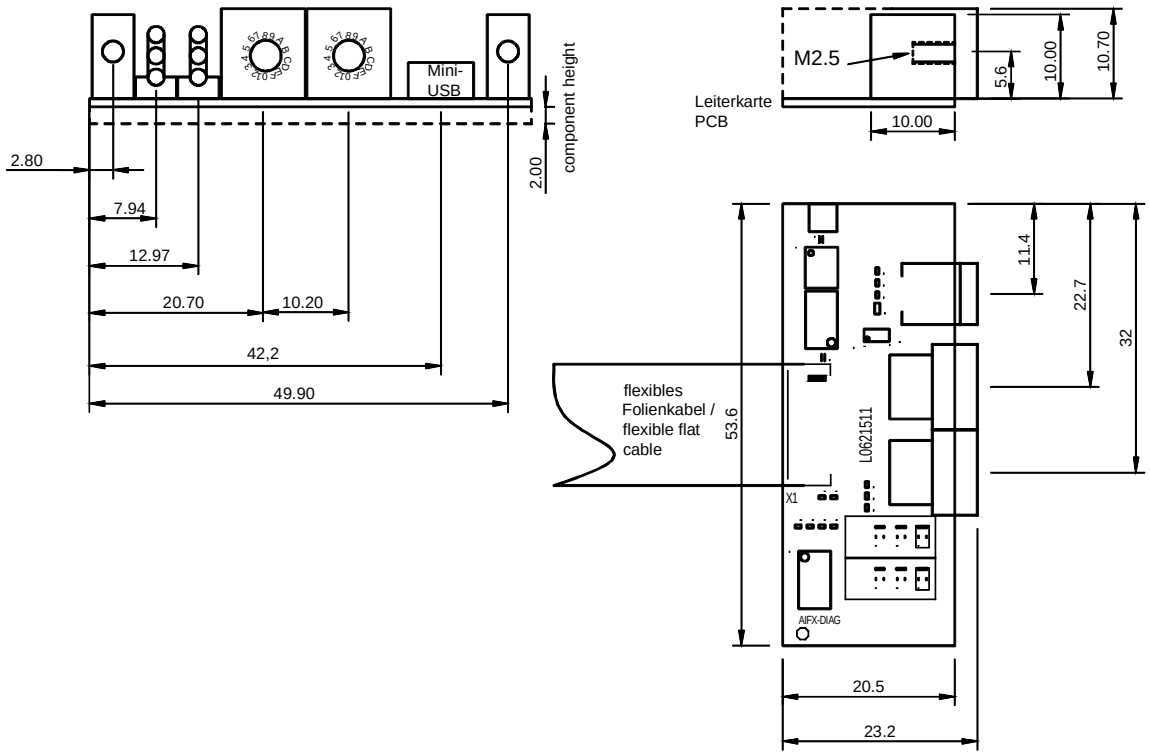


Figure 50: Dimensioning Diagnostic Assembly Interface (AIFX-DIAG)

11.5 Notes on earlier Hardeware Revisions

11.5.1 Failure in 10 MBit/s Half Duplex Mode and Workaround

The note is only valid for the PC cards cifX up to serial numbers indicated:

PC Cars cifX	Part No	up to Serial Number
CIFX 104-RE\F	1278.101	20003

NOTICE

Failure of the Network Communication

- Do not operate hardware with the communication controllers netX 50, netX100 or netX 500 with the protocols Ethernet TCP/UDP/IP, EtherNet/IP or Modbus TCP at 10 MBit/s in half-duplex mode, otherwise failure of the network communication can occur.
- Use only switches or 10/100 MBit/s dual-speed hubs and ensure that the network operates at 100 MBit/s and in full-duplex mode.

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

11.6 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.

11.7 References

[1] THE CIP NETWORKS LIBRARY, Volume 6, CompoNet Adaptation of CIP, Edition 1.4 November 2008

[2] Data sheet MOD JACK – MJIM:
https://www.erni-x-press.com/de/downloads/zeichnungen/203313.pdf

[3] Design - Specification for VARAN Rev. 0.76, section 5.1.4 VARAN Splitter

References Protocol API Manuals
• CANopen Master Protocol API Manual, Revision 14, Hilscher GmbH 2013
• CANopen Slave Protocol API Manual (V3), Revision 5, Hilscher GmbH 2013
• DeviceNet Master Protocol API Manual, Revision 10, Hilscher GmbH 2013
• DeviceNet Slave Protocol API Manual, Revision 13, Hilscher GmbH 2013
• EtherCAT Master Protocol API Manual (V3), Revision 5, Hilscher GmbH 2013
• EtherCAT Slave Protocol API Manual, Revision 3 (V4), Hilscher GmbH 2013
• EtherCAT Slave Protocol API Manual, Revision 21 (V2), Hilscher GmbH 2013
• EtherNetIP Scanner Protocol API Manual, Revision 13, Hilscher GmbH 2013
• EtherNetIP Adapter Protocol API Manual, Revision 12, Hilscher GmbH 2013
• Open Modbus/TCP Protocol API Manual, Revision 8, Hilscher GmbH 2013
• POWERLINK Controlled Node/Slave Protocol API Manual, Revision 12, Hilscher GmbH 2013
• PROFIBUS DP Master Protocol API Manual, Revision 18, Hilscher GmbH 2013
• PROFIBUS DP Slave Protocol API Manual, Revision 15, Hilscher GmbH 2013
• PROFIBUS MPI Protocol API Manual, Revision 4, Hilscher GmbH 2011
• PROFINET IO-Controller Protocol API Manual, Revision 18, Hilscher GmbH 2013
• PROFINET IO-Device Protocol API Manual (V3.4), Revision 13, Hilscher GmbH 2013
• PROFINET IO-Device Protocol API Manual (V3.5), Revision 6, Hilscher GmbH 2013
• Sercos Master Protocol API Manual, Revision 11, Hilscher GmbH 2013
• Sercos Slave Protocol API Manual (V3), Revision 12, Hilscher GmbH 2013
• VARAN Client Protocol API Manual, Revision 3, Hilscher GmbH 2013

Table 143: References Protocol API Manuals

References referring to the safety issues are listed separately in section *References Safety* on page 35.

References referring to the Standard Bus Specifications for PC/104 are listed separately *Reference PC/104 Specification* on page 122.

11.8 EtherCAT Summary over Vendor ID, Conformance test, Membership and Network Logo

11.8.1 Vendor ID

The communication interface product is shipped with Hilscher's secondary vendor ID, which has to be replaced by the Vendor ID of the company shipping end products with the integrated communication interface. End Users or Integrators may use the communication interface product without further modification if they re-distribute the interface product (e.g. PCI Interface card products) only as part of a machine or machine line or as spare part for such a machine. In case of questions, contact Hilscher and/or your nearest ETG representative. The ETG Vendor-ID policies apply.

11.8.2 Conformance

EtherCAT Devices have to conform to the EtherCAT specifications. The EtherCAT Conformance Test Policies apply, which can be obtained from the EtherCAT Technology Group (ETG, www.ethercat.org).

Hilscher range of embedded network interface products are conformance tested for network compliance. This simplifies conformance testing of the end product and can be used as a reference for the end product as a statement of network conformance (when used with standard operational settings). It must however be clearly stated in the product documentation that this applies to the network interface and not to the complete product.

Conformance Certificates can be obtained by passing the conformance test in an official EtherCAT Conformance Test lab. Conformance Certificates are not mandatory, but may be required by the end user.

11.8.3 Certified Product vs. Certified Network Interface

The EtherCAT implementation may in certain cases allow one to modify the behavior of the EtherCAT network interface device in ways which are not in line with EtherCAT conformance requirements. For example, certain communication parameters are set by a software stack, in which case the actual software implementation in the device application determines whether or not the network interface can pass the EtherCAT conformance test. In such cases, conformance test of the end product must be passed to ensure that the implementation does not affect network compliance.

Generally, implementations of this kind require in-depth knowledge in the operating fundamentals of EtherCAT. To find out whether or not a certain type of implementation can pass conformance testing and requires such testing, contact EtherCAT Technology Group ("ETG", www.ethercat.org) and/or your nearest EtherCAT conformance test centre. EtherCAT may allow the combination of an untested end product with a conformant network interface. Although this may in some cases make it possible to sell the end product without having to perform network conformance tests, this approach is generally not endorsed by Hilscher. In case of questions, contact Hilscher and/or your nearest ETG representative.

11.8.4 Membership and Network Logo

Generally, membership in the network organization and a valid Vendor-ID are prerequisites in order to be able to test the end product for conformance. This also applies to the use of the EtherCAT name and logo, which is covered by the ETG marking rules.

Vendor ID Policy accepted by ETG Board of Directors, November 5, 2008

11.9 List of Figures

11.10 List of Tables

11.11 Glossary

10-Base T

Standard for communication on Ethernet over twisted pair lines with RJ45 connectors and a Baud rate of 10 MBit/s (according to the IEEE 802.3 specification).

100-Base TX

Standard for communication on Ethernet over unshielded twisted pair lines with RJ45 connectors and a baud rate of 100 MBit/s according to the IEEE 802. specification

AIFX

Assembly **I**nter**F**ace based on net**X**

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.

Boot loader

Program loading the firmware into the memory of a device in order to be executed.

CC-Link IE Field

Extremely fast Industrial Ethernet communication system developed by Mitsubishi Electric Corporation, Tokyo, Japan, for high data throughput based on Gigabit

CC-Link IE Field Basic

Communication system for Industrial Ethernet designed and developed by Mitsubishi Electric Corporation, Tokyo, Japan, providing CC-Link IE Field with a speed of 100 Mbit/s based on TCP/IP

CC-Link IE Field Master

Station in the CC-Link IE Field network controlling parameters and managing cyclic communication

CC-Link IE Field Slave

Station in the CC-Link IE Field network communicating with a master station

Ch0, Ch1 …

Within the configuration software SYCON.net the communication channels are named ‚Ch0', Ch1' ….

For the Real-Time-Ethernet devices cifX, comX and netJACK and the Real-Time Ethernet protocols used with it, the following shall apply:

'Ch0' in SYCON.net: Both ports of the Ethernet RJ45 connector CH0 and CH1 are assigned always to channel 0 in SYCON.net.

'Ch1' in SYCON.net: Depending on the firmware channel 1 in SYCON.net can be used as an additional communication channel.

CH0, CH1 (Ch0, Ch1)

Names for the ports of an Ethernet RJ45 socket with two Ethernet channels.

CH0 stands for Ethernet channel 0.

CH1 stands for Ethernet channel 1.

cifX

Communication **I**nter**F**ace based on net**X**

cifX TCP/IP Server

cifX TCP Server.exe

Program for the remote diagnostics via Ethernet.

Name: **cifX TCP/IP Server for SYCON.net**

User Interface: **TCP/IP Server for cifX**

Coil

A coil is a single bit in the memory that can be accessed using Modbus: read or write access with FC 1, 5, 15. Depending on the used Modbus function code a single coil or several coils lying in succession can be accessed.

CSP

electronic device data sheet, required for each CC-Link device

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.

DHCP

Dynamic Host Configuration Protocol

This is a protocol simplifying the configuration of IP networks by automatically assigning IP addresses.

Discrete Input

A "Discrete Input" (as defined in the Modbus terminology) is a single bit in the memory which can be accessed using Modbus (read with FC 2).

DP

Decentral Periphery

DPM

Dual-Port Memory

EDS

Electronic Data Sheet

EDS file

A special kind of Device Description File used for example by EtherNet/IP.

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.

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.

FDL

Fieldbus Data Link defines the PROFIBUS communication on layer 2, identical for DP and FMS

Firmware

Software running inside a device providing the basic functionality of this device. It can be updated by a firmware download.

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 will be possible to transmit data even if currently data are received. Full-duplex is the opposite of Half_duplex.

Function code

A function code (FC) is a standardized method to access, i. e. read or write on coils (Bits) or registers via Modbus.

Modbus function codes are elements of Modbus request/reply telegrams.

GSD

Generic Station Description, Device description file

GSD file

A special kind of Device Description File used by PROFIBUS (GSD = Generic Station Description).

GSDML

Generic Station Description Markup Language

XML based device description file.

GSDML file

A special kind of XML-based Device Description File used by PROFINET.

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 analyze the data traffic and sends received data to all connected communication partners. A hub can be used for setting up a star topology.

Industrial Ethernet

See Real-Time Ethernet

IP

Internet Protocol.

IP belongs to the TCP/IP family of protocols and is defined in RFC791. It is based on layer 3 of the ISO/OSI 7 layer model of networking.

It is a connectionless protocol, i.e. you do not need to open a connection to a computer before sending an IP data packet to it. Therefore IP is not able to guarantee that the IP data packets really arrive at the recipient. On IP level neither the correctness of data nor the consistence and completeness are checked.

IP defines special addressing mechanisms, see IP Address.

IP Address

Address within IP (the Internet Protocol, part of TCP/IP).

An IP address is an address identifying a device or a computer within a network using the IP protocol. IP addresses are defined as a 32 bit number. Usually, for ease of notation the IP address is divided into four 8 bit numbers which are represented in decimal notation and separated by points:

a.b.c.d

where a.b.c.d are each integer values between 0 and 255.

Example: 192.168.30.15

However, not all combinations are allowed, some are reserved for special purposes.

The IP address 0.0.0.0 is defined as invalid.

MAC-ID

MAC = Media Access Control

Definition for Ethernet:

A MAC-ID is on delivery a unique (physical) Ethernet address of the device.

MAC-IDs are defined as a 48 bit number. Usually, for ease of notation the MAC-ID address is divided into six 8 bit numbers which are represented in hexadecimal notation and separated by “minus”-signs (-):

A-B-C-D-E-F

where A-B-C-D-E-F are each integer values between 0 and 255.

Example: 00-02-A2-20-91-18

Definition for DeviceNet: The MAC-ID is the network address of the device. The network address of a device serves to distinguish itself on a DeviceNet fieldbus system from any other device or Slave on this network. This should be a unique number for each device. A valid MAC-ID address is within a range of 0 to 63 and can be re-entered and changed in the MAC-ID box in the Device Configuration Dialog.

Master

Type of device that initiates and controls the communication on the bus

Modbus Data Model

The data model distinguishes four basic types of data areas:

• Discrete Inputs (inputs) = FC 2 (Read)

• coils (outputs) = FC 1, 5, 15 (Write and Read back)

• Input register (input data) = FC 4 (Read)

• Holding register (output data) = FC 3, 6, 16, 23 (Write and Read back).

It should be noted, however, that depending on the device manufacturer and device type:

• the data area in the device may be present or not,

• and two data areas can be combined into one data region. For example, discrete inputs and input registers can be a common data area, which can be accessed with read-FC 2 and FC 4.

• Further FC 1 and FC 3 are used instead of reading back the inputs to read the outputs.

MPI

Multi Point Interface

The MPI is a proprietary interface of the SIMATIC® S7® series of PLCs. It is compatible to PROFIBUS and based on RS-485. It usually works with a transmission rate of 187.5 kBaud.

netX

networX on chip, Hilscher network communication controllers

netX Configuration Tool

The netX Configuration Tool allows users to operate cifX or netX based devices in different networks. Its graphical user interface serves as a configuration tool for the installation, configuration and diagnosis of the devices.

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.

PCB

Printed Circuit Board, (printed = machine-made) circuit board

PC Card cifX

Communication Interfaces of the cifX product family of Hilscher on the basis of the communication controller netX 100:

for the Real-Time Ethernet systems

- EtherCAT
- EtherNet/IP
- Open-Modbus/TCP
- POWERLINK
- PROFINET IO
- Sercos
- VARAN

and for the fieldbus systems

- PROFIBUS DP
- PROFIBUS MPI
- CANopen
- DeviceNet
- CC-Link

as Communication Interface netX with PCI Bus

- PCI (CIFX50),
- PCI Express (CIFX 50E),
- Low Profile PCI Express (CIFX 70E, CIFX 100EH-RE\CUBE*),
- Compact PCI (CIFX80),
- Mini PCI (CIFX90),
- Mini PCI Express (CIFX 90E),
- PC/104 (CIFX 104)

and as Communication Interface netX with PC/104 (ISA Bus)

- PC/104 (CIFX 104).

*only Real-Time Ethernet

PROFINET

A communication system for Industrial Ethernet designed and developed by PROFIBUS & PROFINET International (PI). It uses some mechanisms similar to those of the PROFIBUS field bus.

PROFINET IO Controller

A PROFINET control unit responsible for the defined run-up of an I/O subsystem and the cyclic or acyclic data exchange.

PROFINET IO Device

A PROFINET field device that cyclically receives output data from its IO-Controller and responds with its input data.

RE

RE stands for Real-Time Ethernet

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 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.

Depending on the used Modbus function code a single register or multiple registers sequentially located can be accessed.

Modbus differs Input Registers (FC 4) and Holding Registers (FC 3, 6, 16, 23).

Remanent

Remanent memory holds its data even after power-off, for instance flash memory is remanent. It is also called non-volatile memory.

RJ45

A connector type often used for Ethernet connection. It has been standardized by the Federal Communications Commission of the USA (FCC).

Slave

Type of device that is configured by the Master and which then performs the communication

Sercos

A communication system for industrial Ethernet designed and developed by Bosch-Rexroth 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.

SYCON.net

FDT/DTM based configuration and diagnosis software by Hilscher

SYNC

Synchronization cycle of the master

TCP/IP

Transport Control Protocol/Internet Protocol connection-orientated, secure transfer protocol as basis for the Internet-protocols

UCMM

Unconnected Message Manager

VARAN

Versatile **A**utomation **R**andom **A**ccess **N**etwork

A communication system for industrial Ethernet based on the DIAS-BUS developed by Sigmatek. The system is supported by the VARAN-BUS-NUTZERORGANISATION (VNO).

Watchdog Timer

A watchdog timer provides an internal supervision mechanism of a communication system. It supervises that an important event happens within a given timeframe (the watchdog time which can be adjusted accordingly, for instance by a parameter in the warmstart message) and causes an alarm otherwise (usually this is accomplished by changing the operational state of the communication system to a more safe state).

X1, X2, X3, X4 …

serve as position names on the circuit board but can also have other or extended meanings

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.

虹科简介

虹科电子科技有限公司（前身是宏科）成立于 1995 年，总部位于中国南方经济和文化中心-广州。目前在上海、北京、台湾、香港、美国硅谷设有分公司，在西安、成都设有办事处，苏州、韩国、日本办事处已经在积极筹备中。

同时，为了实现本地服务，特在以下工业城市设立销售代表：沈阳，天津，南京，合肥，杭州，武汉，深圳，郑州，重庆，青岛。

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虹科是一家在工业自动化领域，特别是工业总线通讯行业经验超过 10 年的高科技公司。虹科工业通讯事业部与世界知名的工业通讯专家【PEAK-System，Hilscher，Kunbus，frenzel + berg】等深度合作，提供业内顶尖水平的工业总线协议软硬件产品及解决方案，协议类型包含【CAN、CANopen、Modbus、EtherCAT、Profibus、Profinet、Ethernet/IP，CC-Link】等，产品类型包含芯片、核心板，PC 板卡、协议转换网关，总线型 IO 模块，总线记录仪，协议抓包及故障诊断工具等。虹科工业通讯以客户需求为导向，以技术能力为基础，为国内企业提供最适合的产品和最满意的服务。

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- 通讯协议网关（CO,ECAT,DP,PN,DN,EIP,Modbus,CC,IO-Link 等多种协议）
- 通讯协议嵌入式模块（CO,ECAT,PN,EIP,Modbus,CC-Link 等多种协议）
- 通讯协议 IO 模块（CO,ECAT 等多种协议）

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