User manual

CIFX M3042100BM-DN\F

PC cards PCI Express M.2 3042 B-M DeviceNet

Hilscher Gesellschaft für Systemautomation mbH
www.hilscher.com

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1 Introduction

1.1 About the user manual

This user manual for your PC card CIFX M3042100BM-DN\F DeviceNet provides information on the following topics:

- Hardware description,
- installation of the hardware and
- firmware download.

Further information on how to download the firmware, as well as descriptions about configuration and diagnosis of your device can be found in separate operating instruction manuals.

1.2 List of revisions

Index	Date	Changes
1	2021-06-29	Document created.
2	2023-03-29	UKCA added, in section *PC-Karte CIFX M3042100BM-DN\F* [▷ page 32], and in section *AIFX-DN* [▷ page 34]. Section *Cable connector fieldbus X1, AIFX-DN* [▷ page 29] added. Section *Disposal and recycling of waste electronic equipment* [▷ page 24] updated.
3	2023-06-23	Basic card CIFX M3042100BM RE of hardware revision 3 added. Section *PCI Express M.2 bus* [▷ page 30] updated (Pin 10: BOOT).

Table 1: List of revisions

2 Devices and accessories

The PC card CIFX M3042100BM-DN\F is a communication interface from Hilscher based on the communication controller netX 100 and consists of a basic card that is equipped with a detached network interface.

PC card	Description of the basic card	Detached network interface
CIFX M3042100BM-DN\F	Communication Interface M.2 3042 Key B+M: CIFX M3042100BM	DeviceNet: AIFX-DN (with CombiCon plug, 5-pin)
	Type (according to the PCI Express M.2 specification): 3042 (=30x42 mm), Keys: B and M	
	PCI Express slot (3.3 V) , for M.2 type 3042-D3, Dual key B-M (Socket 1 Connectivity)	

Table 2: PC card cifX

Product family	Card format and size	netX	Key	Network	Cable
CIFX	M 3042	100	BM	-DN	\F

Table 3: Meaning of the device name

The use refers to Master and Slave systems. With loaded DeviceNet Master firmware, the PC card cifX performs the DeviceNet Master communication, with loaded DeviceNet Slave firmware, the PC card cifX performs the DeviceNet Slave communication. Data is exchanged between the connected devices and the PC or connection device via the Dual-Port Memory.

2.1 Basic card CIFX M3042100BM

In the following illustration with legend you can recognize the device elements significant for installation and operation each by a number.

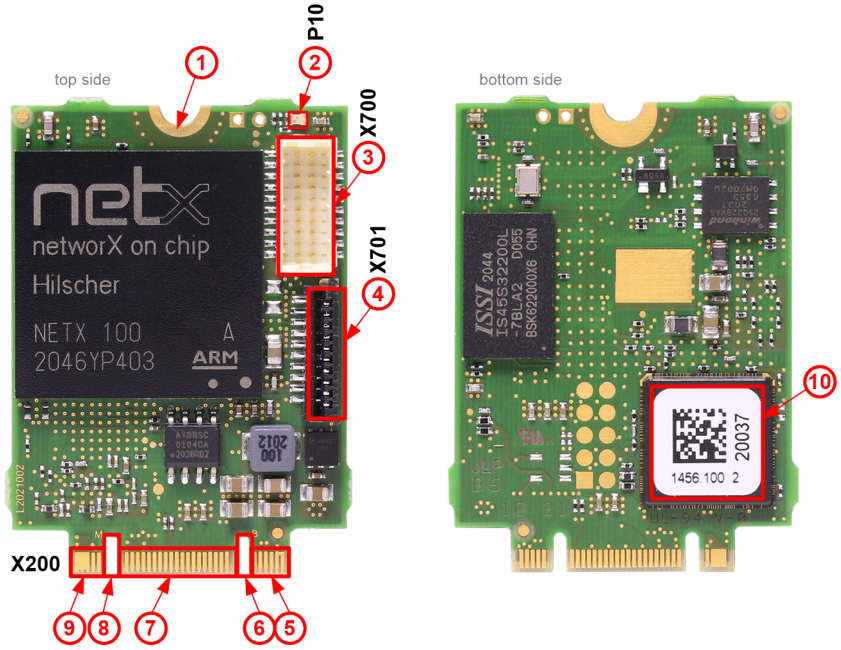

Figure 1: Basic card CIFX M3042100BM

No.	Description
(1)	Hole (with ground contact) for mounting the PC card
(2)	System LED (yellow/green)
(3)	Cable connector Ethernet (X700, 20-pin)
(4)	Cable connector fieldbus (X701, 10-pin)
(5)	PCI Express M.2 bus, pin 1 to pin 11
(6)	PCI Express M.2 bus, pin 12 to pin 19 (key B)
(7)	PCI Express M.2 bus, pin 20 to pin 58
(8)	PCI Express M.2 bus, pin 59 to pin 66 (key M)
(9)	PCI Express M.2 bus, pin 67 to pin 75
(10)	Matrix label

Table 4: Legend for the basic card CIFX M3042100BM

2.2 Detached network interface AIFX-DN

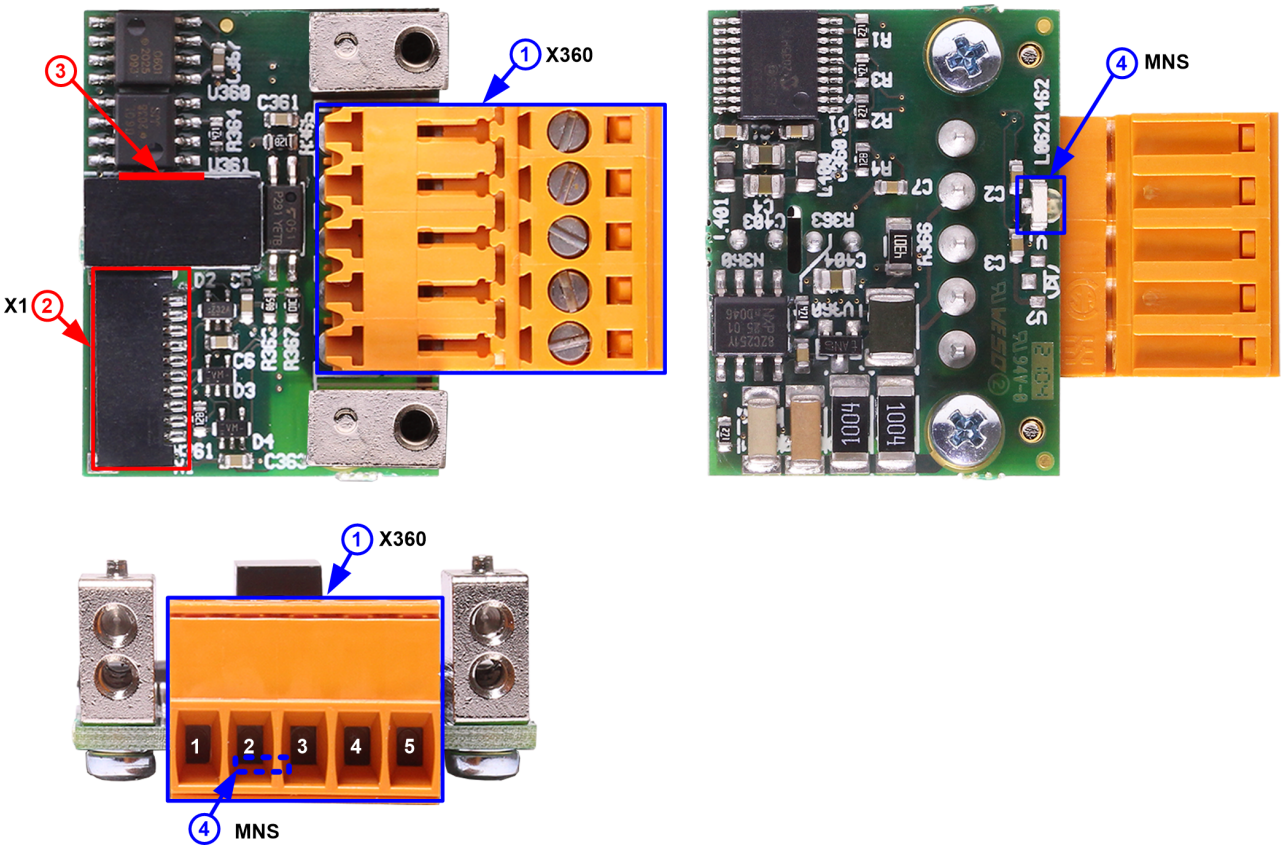

Figure 2: Detached network interface AIFX-DN (Revision 3)

No.	Description
(1)	DeviceNet interface, CombiCon connector (X360, 5-pin)
(2)	Cable connector fieldbus (X1, 10-pin)
(3)	Mini matrix label (on the side of U362)
(4)	**MNS**: LED modul network status (red/green)

Table 5: Legend for the detached network interface AIFX-DN

2.3 Product software

All the information and software you need for your product can be downloaded free of charge at the web-link https://kb.hilscher.com/display/CARDS/.

➢ Select the link for the current release for the Communication Solution DVD.

After the download, you can start commissioning and configuring your device immediately.

➢ Check our website regularly for software updates for your product.

2.4 Revision or version statuses of the hardware and software

The hardware revisions listed below, as well as the driver, software and firmware versions belong together functionally. If a hardware installation is available, the driver and the firmware must be updated according to these specifications.

Device name	Description	Part no.	Hardware revision
CIFX M3043100BM-DN\F	Communication interface M.2 3042 key B+M DeviceNet, CIFX M3043100BM basic card and AIFX-DN	1456.511	-
CIFX M3043100BM	Basic card	1456.100	3
AIFX-DN	Detached network interface DeviceNet	2800.510	3

Table 6: Hardware revisions

Drivers and software	Name	Version
Device driver	cifX Device Driver	2.5
Configuration software	SYCON.net for netX	1.0500
	cifX TCP/IP Server for SYCON.net	2.6
Developer tools	Driver Toolkit	2.6

Table 7: Versions for drivers and software

Protocol	File name	Firmware version
DeviceNet Master	cifxdnm.nxf	2.4
DeviceNet Slave	cifxdns.nxf	2.7

Table 8: Firmware version and file names for permitted protocols

Note:
Unless otherwise stated, the firmware version in this manual is the same as the stack version.

2.5 Device label with matrix code

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

Note:
The position of the device label on your device is indicated in the device overview.

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

The 2D code (Data Matrix Code) contains the following information:

① Part number: 1234.567

② Hardware revision: 1

③ Serial number: 20000

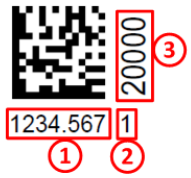

Figure 3: Example 2D label

3 Safety

3.1 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 qualified 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.

3.2 Intended use

With the PC card CIFX M3042100BM-DN\F, DeviceNet Master communication or DeviceNet Slave communication can be implemented if the corresponding firmware is loaded. For the permissible firmware versions, see the section *Revision or version statuses of the hardware and software* [page 8].

3.3 Personnel qualification

The PC card may only be installed, configured, operated or uninstalled 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

3.4 Safety messages

3.4.1 Hazardous voltage, electric shock

Danger to life or risk of injury by electric shock may occur if you open the housing of your PC (or connection device) to install your PC card.

- **Hazardous voltages** are present in the PC (or connection device) for mounting. Always read and observe the safety instructions of the PC manufacturer before installation.
- First disconnect the power plug of the PC (or connection device), before opening the housing.
- Make sure that the power supply is off at the PC (or connection device).
- Only then open the housing and install or remove the PC card.

3.4.2 Personal injury, device damage due to hot swap/hot plug

The PC card is not designed or intended for a hot-swap or hot-plug connection. Performing hot-swap or hot-plug may pose a hazard to the PC card, the system platform and the person performing the action.

3.5 Property damage

3.5.1 Excessive supply voltage

The PC card may only be operated with the prescribed supply voltage, which corresponds to the tolerances specified in this manual. The limits of the permitted range must not be exceeded.

Device damage, malfunctions

- If the supply voltage is above the specified upper limit, this can lead to serious damage to the PC card!
- If the supply voltage is below the specified lower limit, malfunctions of the PC card may occur.

3.5.2 Excessive signaling voltage

All I/O signal pins on the PC card tolerate only the specified signal voltage, as specified in this manual.

Device destruction

Operating your PC card at a signal voltage that exceeds the specified signal voltage can cause serious damage to the PC card!

3.5.3 Electrostatic 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.
- 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.

3.5.4 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 of the device does not drop during write and delete accesses in the file system (firmware update, configuration download etc.).

3.5.5 Exceeding the maximum number of permitted write and delete accesses

This device uses a serial flash chip to store remanent data such as firmware storage, configuration storage, etc. This device allows a maximum of 100,000 write/delete accesses that are sufficient for standard operation of the device. However, writing/deleting the chip excessively (e.g. changing the configuration or changing the name of station) leads to the maximum number of permitted write/delete accesses being exceeded and to device damage. For example, if the configuration is changed once an hour, the maximum number is reached after 11.5 years. If the configuration is changed even more frequently, for example once a minute, the maximum number is reached after approx. 69 days.

Avoid exceeding the maximum permitted write/delete accesses by writing too often.

3.6 Information and data security

Take all usual measures for information and data security, in particular, for PC cards 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 cannot assume any warranty or liability for damage due to neglected security measures or incorrect installation.

4 Installing the hardware

4.1 System requirements

In order to install your PC cards cifX, you need a PC or a connection device with a PCI Express M.2 slot (host interface) for mounting the PC card.

Host interface

PC card	Type	Supply voltage (1)	Power consumption (2)	Signal voltage (3)
CIFX M3042100BM-DN\F	PCI Express slot (3.3 V), for M.2 type 3042-D3, Dual key B-M (Socket 1 Connectivity)	+3.3 VDC ±5%	See section *PC card CIFX M3042100BM-DN \F* [page 32].	PCIe compatible

Table 9: Host interface requirements

Comments:

(1) Required or permissible supply voltage

(2) Typical current consumption at 3.3 V. The typical current consumption depends on the type of PC card. To ensure compatibility between different systems, it is recommended to supply a maximum of 1 A (at +3.3 VDC ±5%).

(3) Required or tolerated signal voltage at the I/O signal pins on the PCIe bus of the PC card

Host system

The basic card CIFX M3042100BM uses a netX 100 chip.

Mounting the basic card

In order to mount the basic card, the board on which the PCI Express slot is located must have a corresponding mounting bolt for screwing the basic card on. The dimension for positioning the mounting bolt can be taken from the dimension drawing for the basic card provided in this manual.

Operating system

For SYCON.net for netX: Windows® 10

Component heights

- The component height on the top of the basic card CIFX M3042100BM exceeds the height of 1.5 mm specified by the standard, because the height of the cable connectors (Ethernet X700, or fieldbus X701), including the cable, is approximately 8.5 mm above the circuit board.
- The component height on the bottom of the basic card CIFX M3042100BM complies with the standard specifications.

Panel dimensioning

- **Panel cut-outs and holes for mounting AIFX**
  To mount the detached network interface DeviceNet, the required panel cut-outs for the communication status LEDs and the DeviceNet plug, as well as the holes for mounting the AIFX, must be available on the housing of the PC or connection device.

Panel cut-outs	The layout for the panel cut-outs must be sufficiently dimensioned for: • The DeviceNet interface, CombiCon plug • The MNS communication LED
Drill holes	2, at a distance of 24.9 mm
Further information	The dimensions for the required panel cut-outs or the distance of the holes can be found in the dimension drawing for the AIFX, see section *Dimensions AIFX-DN* [page 39].

Table 10: Panel cut-outs and holes for mounting AIFX

- **The width of the front panel**
  When dimensioning the front panel, note the width of the front panel specified in section *AIFX-DN* [page 34] .

4.2 Requirements for operation

The following described requirements must be fulfilled when operating the PC card.

Requirements	Specification	See section
Hardware installation	Operating the PC card CIFX M3042100BM-DN\F requires proper connection of the detached network interface DeviceNet AIFX-DN to the basic card.	-
Communication	For communication of a PC card (slave), a master device is required for the communication system used. For communication of a PC card (master), a slave device is required for the communication system used. To configure the master device, you need a device description file for the slave used with the name for: • DeviceNet Slave: `CIFX_DN_DNS.EDS` The settings in the used master must match the settings in the slave.	-
Software installation	**cifX Device Driver** as the driver for the host interface (latest version of the driver). **SYCON.net for netX** for configuring and diagnosing netX 100-based devices, as well as software for downloading or updating the firmware and configuration, and for setting the device driver.	*Revision or version statuses of the hardware and software* [▶ page 8] and *References* [▶ page 41] (Driver and software documentation)
Firmware download	The user must select the firmware using the **SYCON.net for netX** software and download it to the PC card. The firmware contains a communication protocol.	
Parameter settings	The PC card must be parameterized using the **SYCON.net for netX** configuration software.	

Table 11: Requirements for operation

4.3 Overview installation and firmware download

Below you find an overview of the steps to install the hardware, driver and firmware for your PC card CIFX M3042100BM-CO\F:

Step	Description	Further information
Downloading installation files	• Download the installation files from the Hilscher website for: - cifX Device Driver (latest version) - SYCON.net for netX • Save the installation files to the local hard disk of your PC.	*Revision or version statuses of the hardware and software* [page 8]
Install drivers and software	• Double-click the appropriate installation file to open the startup menu. • Start the installation from the home screen and follow the instructions in the installation menu.	
Install hardware	• Take the protective measures and safety precautions for the hardware installation. • Open the housing of the PC or connection device. • Insert the basic card into the PCI Express slot and attach the basic card. • Attach the detached network interface to the front panel of the PC. • Connect the detached network interface to the basic card. • Close the housing of the PC or connection device.	*Install hardware* [page 20]
Firmware and configuration download	• Download the firmware as described in the SYCON.net for netX configuration software operating instruction manual. The PC card cifX is now ready for operation and has yet to be configured. • Then download the configuration.	*Loading or updating the firmware and configuration in the device* [page 21]

Table 12: Overview for installation and firmware download

For detailed descriptions of how to install and operate the software, refer to the relevant operating instruction manual, section *References* [page 41].

4.4 Installation warnings

When installing your device, observe the following warnings on possible personal injury, as well as the warnings on property damage.

WARNING!

Hazardous voltage!
Danger to life, risk of injury by electric shock

Hazardous voltages are present in the PC (or connection device).

- First disconnect the power plug of the PC (or connection device), before you open the housing.
- Make sure that the power supply is off at the PC (or connection device).

CAUTION
Personal injury, device damage due to hot swap/hot plug

The PC card is not designed or intended for a hot-swap or hot-plug connection.
Performing hot-swap or hot-plug may pose a hazard to the PC card, the system platform and the person performing the action.

NOTICE
Electrostatically sensitive devices

To prevent damage to the PC and PC card, make sure the PC card is grounded through the connection plate and PC, and make sure you are grounded when you install or uninstall the PC card.

Installation warnings (USA)

WARNING

Hazardous voltage!
Danger to life, risk of injury by electric shock

Hazardous voltages are present in the PC (or connection device).

- First disconnect the power plug of the PC (or connection device), before you open the housing.
- Make sure that the power supply is off at the PC (or connection device).

CAUTION

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The PC card is not designed or intended for a hot-swap or hot-plug connection.
Performing hot-swap or hot-plug may pose a hazard to the PC card, the system platform and the person performing the action.

NOTICE

Electrostatically sensitive devices

To prevent damage to the PC and PC card, make sure the PC card is grounded through the connection plate and PC, and make sure you are grounded when you install or uninstall the PC card.

4.5 Install hardware

Install the PC card CIFX M3042100BM-DN\F in your PC or connection device as described below.

1. Preparation

Observe the requirements and prerequisites described in the sections *System requirements* [page 14] and *Requirements for operation* [page 16] .

2. Protective measures and safety precautions

WARNING Hazardous voltage! Danger to life, risk of injury by electric shock

- Disconnect the power plug of the PC (or connection device).
- Make sure that the power supply is off at the PC (or connection device).

CAUTION Personal injury, device damage due to hot-plug/hot-swap

- Do not "plug" or "unplug" the PC card during operation.

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

- Make sure that the device is grounded via the endplate and the PC, and make sure that you are discharged when you install/uninstall the device.

NOTICE Device damage due to over torquing of the mounting screw

Do not over torque the screw used to mount the basic card to the board to prevent damage to the printed circuit board.

3. Installation

- Open the housing of the PC or connection device.
- Insert the basic card into the PCI Express slot.
- Screw the basic card onto the board. To do this, use the crescent-shaped hole on the top edge of the basic card. The ground contact via the screw head must be ensured.
- First, attach the detached network interface DeviceNet AIFX-DN to the PC or connection device housing panel.
- Then connect the detached network interface DeviceNet AIFX-DN to the basic card.
- To do this, first plug the cable into the cable connector fieldbus X1 on the AIFX-DN.

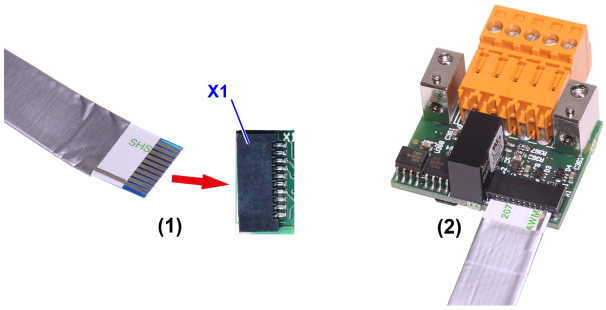

Figure 4: Connecting cable to the detached network interface fieldbus AIFX-DN

➢ Then plug the cable into the cable connector fieldbus X701 on the basic card.

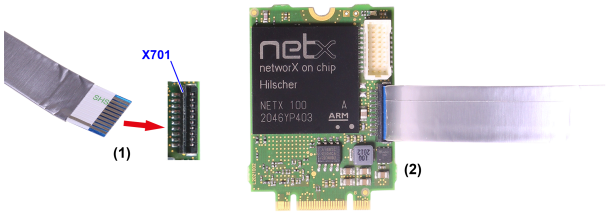

Figure 5: Connecting cable to the basic card, example CIFX M3042100BM

➢ Close the housing of the PC or connection device again.

4.6 Loading or updating the firmware and configuration in the device

➢ Download the firmware from the Hilscher website and save the firmware to your PC's local hard disk.

➢ If necessary, transfer the configuration to the PC. Create the configuration using an appropriate configuration software.

➢ Use **SYCON.net for netX** to load the firmware and configuration into the device, or update the firmware and configuration in your device.

➢ To download the firmware and configuration to your device, or to update, follow the instructions in the "SYCON.net for netX" configuration software operating instruction manual.

For the "SYCON.net for netX" configuration software operating instruction manual, see section *References* [page 41].

4.7 Troubleshooting information

In case of an error or a malfunction of your PC card cifX, observe the following information for problem solving:

General

➢ Verify that the PC card is operating according to the information provided in this user manual.

SYS and MNS LEDs

You can troubleshoot the system by checking the behavior of the LEDs.

- The SYS LED (yellow/green) on the device indicates the general device status and can be switched on, off or blinks.
- The MNS LED (red/green) at the detached network interface DeviceNet indicates the status of the device communication and can be switched on or off permanently or in phases or blinks.

If the SYS LED and the MNS LED are static green, the PC card cifX is in the "in operation" state. The master device is in the data exchange with the connected slave devices. The slave device is in the state of cyclic communication with the connected master device. The communication between the master device and the slave device runs without interference.

Cable

➢ Check that the pin assignment of the cable used to connect the PC card (master) to the slave device or the PC card (slave) to the master device is correct.

For detailed descriptions of the behavior of the LEDs, refer to the chapter on the LEDs in this manual. For information about the device diagnostics and their functions, see the operating instruction manual of the configuration software for your device.

4.8 Uninstall the hardware

Uninstall the PC card CIFX M3042100-DN\F from the PC or connection device as described below.

1. Protective measures and safety precautions

WARNING Hazardous voltage! Danger to life, risk of injury by electric shock

- Disconnect the power plug of the PC (or connection device).
- Make sure that the power supply is off at the PC (or connection device).

CAUTION Personal injury, device damage due to hot-plug/hot-swap

- Do not "plug" or "unplug" the PC card during operation.

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

- Make sure that the device is grounded via the endplate and the PC, and make sure that you are discharged when you install/uninstall the device.

2. Uninstallation

- Open the housing of the PC or connection device.
- Remove the detached network interface fieldbus from the basic card.
- To do this, remove the cable from the cable connector fieldbus X701 on the basic card and from the cable connector fieldbus X1 on the AIFX-DN.
- Loosen the screw that secures the basic card to the board.
- Remove the basic card from the PCI Express slot.
- Remove the detached network interface from the housing cover of the PC or connection device.
- Close the housing of the PC or connection device again.

4.9 Disposal and recycling of waste electronic equipment

Waste electronic equipment must be disposed of properly after the end of use.

Waste electronic equipment

This product must not be disposed of with household waste.

Dispose of this product in accordance with local regulations in your country.

When disposing of the product, observe the following:

- Observe national and local regulations for the disposal of waste electronic equipment and packaging.
- Delete personal data stored in the waste electronic device.
- Dispose of this product in an environmentally friendly manner at a local collection point for waste electronic equipment.
- Dispose of packaging in such a way that a high level of recycling is possible.

Alternatively, you can return our products to us for disposal. The prerequisite is that no additional foreign substances are contained. Before returning, please contact us via the Return Merchandise Authorization (RMA) form on www.hilscher.com.

In Europe, the directive 2012/19/EU waste electrical and electronic equipment applies. Different policies and laws may apply nationally.

5 Diagnosis with LEDs

5.1 Overview

Note:
The communication status LEDs on the device are determined by the loaded protocol firmware.

LED	DeviceNet
System status	**SYS** Yellow/green
Module network status MNS	**MNS** Red/green

Table 13: LEDs DeviceNet

5.2 System LED

The system status LED **SYS** can assume the states described below.

LED	Color	State	Description
SYS	**Duo LED yellow/green**		
	(green)	On	Operating system is running.
	(green/ yellow)	Blinking	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 14: States of the SYS LED, netX 10/50/51/52/100/500-based devices

5.3 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	Description
MNS	**Duo LED red/green**		
	(green)	On	**Device operational AND on-line, connected** Device is online and has established all connections with all Slaves.
	(green)	Flashing (1 Hz)	**Device operational AND on-line** Device is online and has established no connection in the established state. - Configuration missing, incomplete or incorrect.
	(green/red/off)	Flashing green/red/off	**Self-test:** The device performs a self-test after power-on. The MNS LED turns green for approximately 250 ms, then turns red for approximately 250 ms, then turns off.
	(red)	Flashing (1 Hz)	**Minor fault and/or connection time-out** Device is online and has established one or more connections in the established state. It has data exchange with at least one of the configured slaves. Minor or recoverable fault: No data exchange with one of the configured Slaves. One or more Slaves are not connected. Connection timeout. No network power present.
	(red)	On	**Critical fault or critical link failure** Critical connection failure; device has detected a network error: duplicateMAC-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 15: LED states for the DeviceNet Master protocol

LED state	Definition
Flashing (1 Hz)	The LED turns on and off with a frequency of 1 Hz: “On” for 500 ms, followed by “Off” for 500 ms.
Flashing green/red/off	The LED turns on green "On" for 250 ms, then red "On" for 250 ms, then "Off".

Table 16: LED state definitions for the DeviceNet Master protocol

5.4 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	Description
MNS	**Duo LED red/green**		
	● (green)	On	**Device operational AND on-line, connected** Device is online and has established all connections with all Slaves.
	☀ (green)	Flashing (1 Hz)	**Device operational AND on-line** Device is online and has established no connection in the established state. - Configuration missing, incomplete or incorrect.
	☀ ☀ ● (green/red/off)	Flashing green/red/off	**Self-test:** The device performs a self-test after power-on. The MNS LED turns green for approximately 250 ms, then turns red for approximately 250 ms, then turns off.
	☀ (red)	Flashing (1 Hz)	**Minor fault and/or connection time-out** Device has no connection 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 17: LED states for the DeviceNet Slave protocol

LED state	Definition
Flashing (1 Hz)	The LED turns on and off with a frequency of 1 Hz: “On” for 500 ms, followed by “Off” for 500 ms.
Flashing green/red/off	The LED turns on green "On" for 250 ms, then red "On" for 250 ms, then "Off".

Table 18: LED state definitions for the DeviceNet Slave protocol

6 Connectors

6.1 DeviceNet interface

Isolated DeviceNet interface according to ISO 11898:

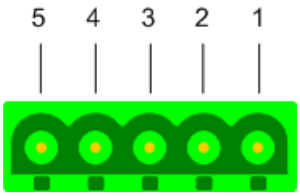

Figure 6: DeviceNet interface (CombiCon plug connector, 5-pin), X200

Connection with CombiCon plug	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 19: Pin assignment of the DeviceNet interface, X200

6.2 Cabel connector fieldbus X701, on CIFX M3042100BM

Pin assignment for cable connector fieldbus X701 (10FMN-BMT-A-TF) on the basic card CIFX M3042100BM, cable 10-pin fieldbus

Pin	Name	Description	Type
1	GND	Ground	Power
2	3V3	3.3V Power	Power
3	I2C_SCL	I2C clock signal	Output
4	I2C_SDA	I2C data signal	Input / Output
5	XM2_TX	Fieldbus transmit	Output
6	XM2_RX	Fieldbus receive	Input
7	XM2_IO0	Fieldbus input output 0	Input / Output
8	XM2_IO1	Fieldbus input output 1	Input / Output
9	RSTOUT#	Reset out	Output
10	-	(not used)	NC

Table 20: Pin assignment for cable connector fieldbus X701 (10FMN-BMT-A-TF), on CIFX M3042100BM

6.3 Cable connector fieldbus X1, AIFX-DN

Pin assignment for cable connector fieldbus X1, AIFX-DN, 10-pin cable

Pin	Name	Description	Type
1	GND	Ground	Power
2	3V3	3.3V Power	Power
3	I2C_SCL	I2C clock signal	Input
4	I2C_SDA	I2C data signal	Input / Output
5	TX	Fieldbus transmit	Input
6	RX	Fieldbus receive	Output
7	PF_DN	Power fail DeviceNet	Input / Output
8	-	(not used)	NC
9	RSTOUT#	Reset out	Input
10	-	(not used)	NC

Table 21: Pin assignment for cable connector fieldbus X1, AIFX-DN

6.4 PCI Express M.2 bus

The following table applies for pin assignment on the PCI Express M.2 bus of the PC card CIFX M3042100BM (basic card).

Pin	Name	Description	Type
1	GND	Return current path.	Power
2	3.3V	3.3V supply	Power
3	GND	Return current path.	Power
4	3.3V	3.3V supply	Power
5	NC	(not used)	-
6	NC	(not used)	-
7	USB_D+	USB data differential pair positive polarity	In / Out
8	NC	(not used)	-
9	USB_D-	USB data differential pair negative polarity	In / Out
10	BOOT	Reserved (vendor defined pin for production purposes only). *In hardware revision 1 and 2 pin 10 is not assigned.*	Input
11	NC	(not used)	-
12-19	-	KEY B	-
20	SYNC0	synchronisation pin for realtime systems	Output
21	GND	Return current path.	Power
22	SYNC1	synchronisation pin for realtime systems	Output
23-26	NC	(not used)	-
27	GND	Return current path.	Power
28-32	NC	(not used)	-
33	GND	Return current path.	Power
34-38	NC	(not used)	-
39	GND	Return current path.	Power
40	NC	(not used)	-
41	PETN0	PCIe TX/RX Differential signals defined by the PCI Express CEM Specification.	Output
42	NC	(not used)	-
43	PETP0	PCIe TX/RX Differential signals defined by the PCI Express CEM Specification.	Output
44	NC	(not used)	-
45	GND	Return current path.	Power
46	NC	(not used)	-
47	PERN0	PCIe TX/RX Differential signals defined by the PCI Express CEM Specification.	Input
48	NC	(not used)	-
49	PERP0	PCIe TX/RX Differential signals defined by the PCI Express CEM Specification.	Input
50	PERST#	PCIe Reset is a functional reset to the card as defined by the PCI Express Mini CEM Specification.	Input
51	GND	Return current path.	Power
52	CLKREQ#	PCIe Clock Request is a reference clock request signal as defined by the PCI Express Mini CEM Specification. This signal is also used by L1PM Substates. Open Drain with pull up on Platform. Active Low.	In / Out
53	REFCLKN	PCIe Reference Clock signals (100 MHz) defined by the PCI Express CEM Specification.	Input
54	PEWAKE#	PCIe WAKE#. Open Drain with pull up on Platform. Active Low when used as PEWAKE#. When the Adapter supports wakeup, this signal is used to request that the system return from a sleep/suspend state to service a function-initiated wake event. When the Adapter supports OBFF mechanism, the PEWAKE#signal is used for OBFF signaling.	In / Out
55	REFCLKP	PCIe Reference Clock signals (100 MHz) defined by the PCI Express CEM Specification.	Input
56	NC	(not used)	-
57	GND	Return current path.	Power
58	NC	(not used)	-

Pin	Name	Description	Type
59-66	-	KEY M	-
67-69	NC	(not used)	-
70	3.3V	3.3V supply	Power
71	GND	Return current path.	Power
72	3.3V	3.3V supply	Power
73	GND	Return current path.	Power
74	3.3V	3.3V supply	Power
75	GND	Return current path.	Power

Table 22: Pin assignment PCI Express M.2 bus X200, CIFX M3042100BM

7 Technical data

7.1 PC card CIFX M3042100BM-DN\F

Category	Parameter	Value	
Part		Name	Part number
	PC card (basic card with AIFX-DN)	CIFX M3042100BM-DN\F	1456.511
	Basic card	CIFX M3042100BM	1456.100
	Function	Communication interface M.2 3042 key B+M, with PCI Express M.2 interface and DeviceNet interface. The use refers to master and slave systems.	
Communication controller	Type	netX 100	
Integrated memory	RAM	8 MB SDRAM	
	Flash	4 MB serial Flash-EPROM	
	Size of the Dual-Port Memory	64 Kbyte	
System interface	Bus type	PCI Express M.2, one-lane port	
	Transmission rate	33 MHz	
	Data access	DPM or DMA (Direct Memory Access)	
	Dual-Port Memory (DPM) data access width	32-Bit	
DeviceNet communication	Supported fieldbus communication systems (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	
	Detached network interface DeviceNet	AIFX-DN **Important!** Operating the PC card CIFX M3042100BM-DN\F requires proper connection of the detached network interface DeviceNet AIFX-DN to the basic card.	
	Connection AIFX-DN	Cable connector fieldbus X701 (JST 10FMN-BMT-A-TF, 1.0 mm pitch)	
Diagnosis with LEDs	LEDs	**SYS**	System status
Power supply	Supply voltage	+3.3 VDC ±5%	
	Current consumption at 3.3 V	650 mA (maximum)	
	Connector	via PCI Express Bus M.2	
Environmental conditions	Operating temperature range*	-20 °C ... +65 °C	-20 °C ... +50 °C
	*Air flow, during measurement:	0.5 m/s	0.0 m/s
	Storage temperature range	-40 °C ... +85 °C	
	Humidity	10% … 95% relative humidity, no condensation permitted	
	Environment	The device must be used only in a pollution degree 2 environment (or better).	
Device	Dimensions (L x W x H)	42 x 30 x 7.0 mm	
	Component heights	The component height on the top of the basic card CIFX M3042100BM exceeds the height of 1.5 mm specified by the standard, because the height of the cable connector fieldbus X701, including the cable, is approximately 8.5 mm above the circuit board. The component height on the bottom of the basic card CIFX M3042100BM complies with the standard specifications.	
	Mounting/installation	PCI Express slot (3.3 V), for M.2 type 3042-D3, Dual key B-M (Socket 1 Connectivity)	

Category	Parameter	Value
EMC Compliance	CE sign	Yes
	UKCA sign	Yes
	Emission	DIN EN 61000-6-3/ BS EN 61000-6-3
	Immunity	DIN EN 61000-6-2/ BS EN 61000-6-2
	Documentation to prove the restriction of hazardous substances	EN 50581 / BS EN 50581
	RoHS	Yes
Configuration and download	Configuration software (including downloading and updating firmware and configuration)	SYCON.net for netX

Table 23: Technical data CIFX M3042100BM-DN\F

7.2 PCI identifier on the PCI Express M.2 bus

The PC card CIFX M3042100BM-DN\F is a multifunction device on the PCI Express M.2 bus and requires two PCI identifiers. The following identifiers apply:

PCI identifier	Value
Vendor ID	0x15CF
Device ID	0x0000
Subsystem vendor ID	0x0000
Subsystem device ID	0x0000

Table 24: PCI identifier on the PCI Express M.2 bus for CIFX M3042100BM

7.3 AIFX-DN

Category	Parameter	Value	
Part	Name	AIFX-DN	
	Part number	2800.510	
	Description	Detached network interface DeviceNet for all netX 100-based devices.	
Interface PC card	Connector	Cable connector fieldbus X1 (JST 10FMN-SMT-A-TF, 1.0 mm pitch)	
DeviceNet interface	Galvanic isolation	isolated	
	Isolation voltage	1000 VDC (tested for 1 minute)	
	Connector	CombiCon plug, 5-pin	
Diagnosis with LEDs	LEDs (on the reverse side of the device)	**MNS**	LED Module network status (red/green)
		Cabel connector fieldbus X1	
Environmental conditions	Operating temperature range*	-20 °C ... +70 °C	-20 °C ... +60 °C
	*Air flow, during measurement	0.5 m/s	0.0 m/s
	Storage temperature range	-40 °C ... +85 °C	
	Humidity	10% … 95% relative humidity, no condensation permitted	
	Environment	The device must be used only in a pollution degree 2 environment (or better).	
Device	Dimensions (L x W x H)	23.7 x 31 x 13.6 mm, front panel width = 18.5 mm	
	Mounting/installation	On the netX 100-based basic card: Cable connector fieldbus X701. Mounting on the housing of the PC or connecting device.	
EMC Compliance	CE sign	Yes	
	UKCA sign	Yes	
	Emission, Immunity	Tested together with the corresponding basic card.	
	RoHS	Yes	

Table 25: Technical data AIFX-DN

7.4 Communication protocols

7.4.1 DeviceNet Master

Parameter	Value
Maximum number of DeviceNet Slaves	63
Maximum number of cyclic input data	5736 bytes
Maximum number of cyclic output data	5760 bytes
Maximum number of cyclic input data per connection	255 bytes/connection
Maximum number of cyclic output data per connection	255 bytes/connection
Maximum number of configuration data	1000 bytes/slave
Acyclic communication	Explicit connection All service codes are supported via API.
Connections	Bit Strobe Change of State Cyclic Poll Explicit Peer-to-Peer Messaging
Functions	Quick Connect Server (Explicit and Poll)
Fragmentation	Explicit and I/O
UCMM	Supported
Objects	Identity object (1, 0x01) Message Router object (2, 0x02) DeviceNet object (3, 0x03) Connection object (4, 0x04) Acknowledge Handler object (43, 0x2B)
Baud rate	125 kBits/s, 250 kBit/s, 500 kBit/s Automatic baud rate detection is not supported.
Data transport layer	CAN frames
Reference to firmware/stack version	V2.4

Table 26: Technical data DeviceNet Master

7.4.2 DeviceNet Slave

Parameter	Value
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 Other services: Max. 248 bytes per request
Connections	Poll Change of State Cyclic Bit Strobe
Explicit messaging	Supported
Fragmentation	Explicit and I/O
UCMM	Not supported
Baud rate	125 kBits/s, 250 kBit/s, 500 kBit/s Automatic baud rate detection is not supported
Data transport layer	CAN frames
Reference to firmware/stack version	V2.7

Table 27: Technical data DeviceNet Slave

8 Dimensions

8.1 Tolerances of PCB dimensions

The manufacturing tolerance of the PCB dimensions shown is ± 0.1 mm per milled PCB edge. For all indicated dimensions of the printed circuit board, a tolerance of ± 0.1 mm (per milled edge) x 2 = ± 0.2 mm results for the length L and for the width B respectively.

B = [width dimension of printed circuit board in mm] ± 0.2 mm

L = [Length dimension of the PCB in mm] mm ± 0.2 mm

The depth T of the PCB depends on the highest component used or the PCB thickness plus the descenders. The thickness of the PCB is = 0.8 mm ± 10 %.

Note:
The dimensions (L x W x H) given in the section *Technical data* [page 32] (or the identical information in the product data sheet or on the Hilscher website) are rounded figures or the respective total measure (for example, including the front panel).

8.2 Dimensions CIFX M3042100BM

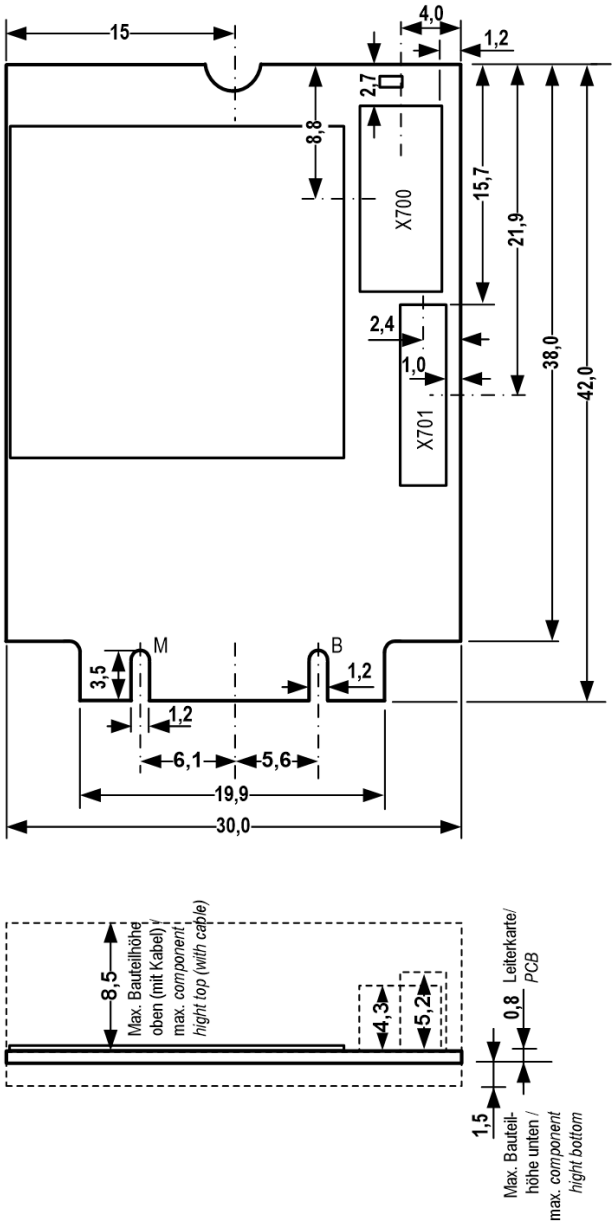

Figure 7: Dimensions CIFX M3042100BM

Note:

The height of the component on the top of the basic card M3042100BM does not meet the standard specifications. For more information, see section *System requirements* [page 14].

8.3 Dimensions AIFX-DN

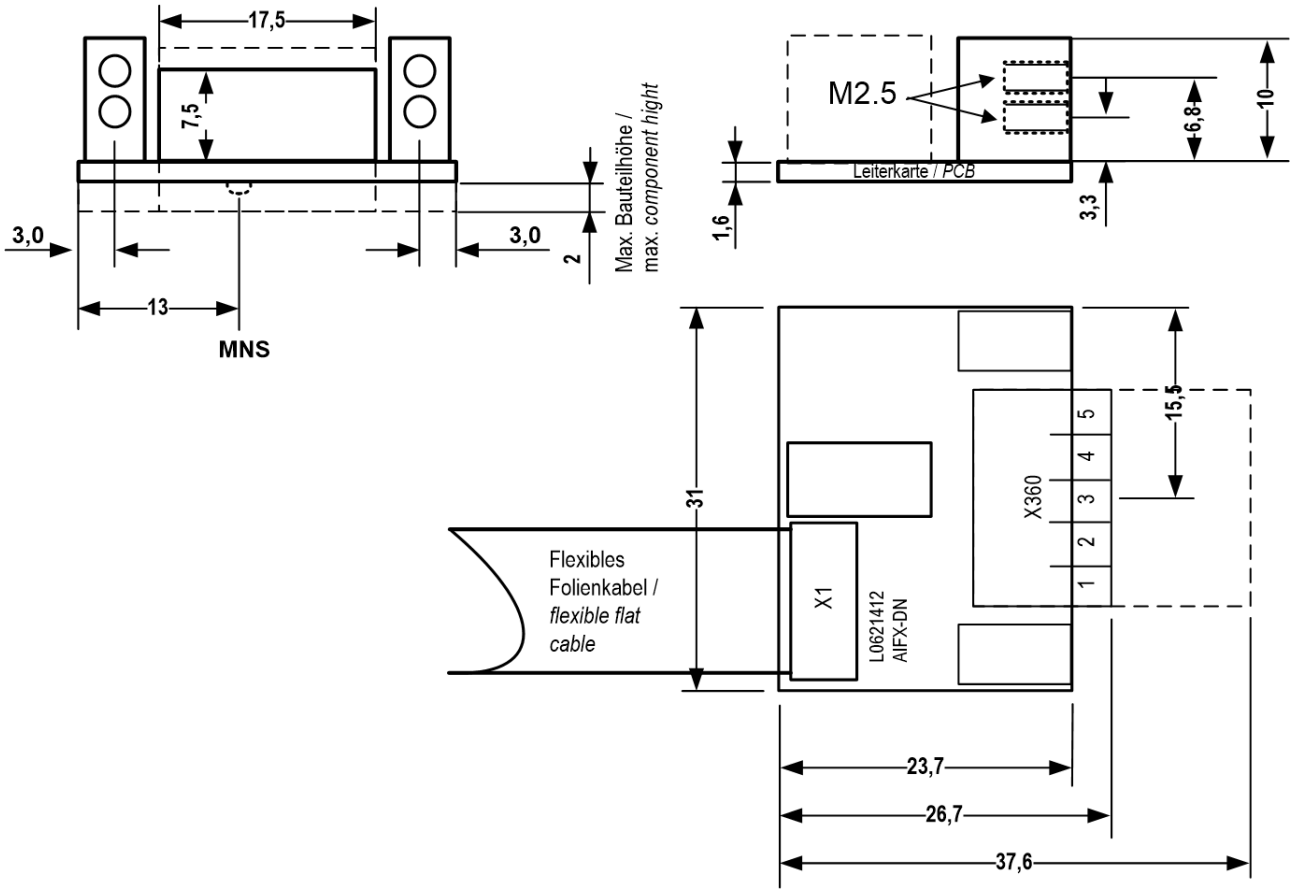

Figure 8: Dimensions AIFX-DN (Revision 3)

9 Appendix

9.1 FCC compliance

Federal Communications Commission (FCC)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

9.2 References

PCI Express M.2 specification

PCI-SIG (Special interest Group), PCI Express M.2 Specification, Revision 3.0, English, 2019-06

Protocol API Manuals

Hilscher Gesellschaft für Systemautomation mbH: Protocol API, DeviceNet-Master V2.4.0, Revision 11, DOC080301API11EN, English, 2016-06.

Hilscher Gesellschaft für Systemautomation mbH: Protocol API, DeviceNet-Slave V2.7.0, Revision 18, DOC060202API18EN, Englisch, 2020-10.

Documentation on drivers and software

Hilscher Gesellschaft für Systemautomation mbH: Operation instruction manual, PC Cards CIFX M3042100BM-DN\F, Hardware Description and Installation, DOC210402UMxxEN, English, 2021-05.

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Hilscher Gesellschaft für Systemautomation mbH: Operation instruction manual, netDevice und netProject, FDT-Container, DOC040401OIxxEN, English, 2018-03.

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Hilscher Gesellschaft für Systemautomation mbH: Operation instruction manual, DTM for Hilscher DeviceNet Slave devices, Configuration of Hilscher Slave devices, DOC091003OIxxEN, English, 2019-04.

Hilscher Gesellschaft für Systemautomation mbH: Operation instruction manual, Generic DTM for DeviceNet Slave devices, Configuration of DeviceNet Slave devices, DOC041201OIxxEN, English, 2019-04.

Hilscher Gesellschaft für Systemautomation mbH: Operation instruction manual, cifX Device Driver, Installation and operation for Windows XP/ Vista/7/8/10, DOC060601OIxxEN, English, 2019-01.

Hilscher Gesellschaft für Systemautomation mbH: Dual-Port Memory Interface Manual, netX Dual-Port Memory Interface, DOC060302DPMxxEN, English, 2020-06.

Safety standards

American National Standards Institute, Inc.: American National Standard, Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials, ANSI Z535.6-2016, English, 2016.

DIN Deutsches Institut für Normung e. v. and VDE Verband der Elektrotechnik Elektronik Informationstechnik e. V.: German standard, Equipment for audio/video, information and communication technology - Part 1: Safety requirements, (IEC 62368-1:2014, modified + Cor.:2015); English version EN 62368-1:2014 + AC:2015, English, 2016-05.

DIN Deutsches Institut für Normung e. v. and VDE Verband der Elektrotechnik Elektronik Informationstechnik e. V.: German standard, Electrostatics - Part 5-1: Protection of electronic components against electrostatic phenomena, General requirements, (IEC 61340-5-1:2016); English version EN 61340-5-1:2016, English, 2017-07.

DIN Deutsches Institut für Normung e. v. und VDE Verband der Elektrotechnik Elektronik Informationstechnik e. V.: German standard, Electrostatics - Part 5-2: Protection of electronic components against electrostatic phenomena, User manual, (IEC TR 61340-5-2:2018), DIN IEC/TR 61340-5-2 (VDE V 0300-5-2), English, 2019-04.

9.3 Conventions in this manual

Instructions for action and results

1. Operate purpose
2. Operate purpose
   - ➢ Instructions for action
   - ↬ Intermediate result
   - ⇨ Final result

Signs and signal words

Sign	Description	Sign	Description
	General note		Important note that must be followed to prevent malfunctions
	Reference on further information (acc. to ISO 7010 M001)		Disconnect the power plug (acc. to ISO 7010 M006)
	Warning of Personal Injury and Property Damage Message (acc. to ISO 7010 W001) **USA**: Warning of Personal Injury As in the scope of the ANSI Z535 Standard (for USA) instructions to a property damage message may not contain a warning triangle, this property damage messages are listed separately for the USA.		
	Warning of hazardous voltage! (acc. to ISO 7010 W012) Danger to life, risk of injury by electric shock		
	**USA**: Warning of hazardous voltage! (acc. to ANSI Z535.4) Danger to life, risk of injury by electric shock		
	Warning of damage due to electrostatic discharge (acc. to IEC 60417-5134)		

Table 28: Signs

Signal word	Description
DANGER	Indicates a hazardous situation, which if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation, which if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation, which if not avoided, may result in minor or moderate Injury.
NOTICE	Indicates a property damage message.

Table 29: Signal words

9.4 Legal notes

Copyright

Important notes

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

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

Costs of support, maintenance, customization and product care

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

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All other brands mentioned are property of their respective owner of the rights. Any company names and product designations provided in this document may be brands (company names or trademarks) of the corresponding owner and may be protected under trademark or patent law.

9.6 Licenses

Bei Verwendung der jeweiligen PC-Karte cifX als Slave, ist für die Firmware als auch für die Konfigurationssoftware SYCON.net keine Lizenz erforderlich.

Lizenzen sind notwendig, wenn die PC-Karte cifX mit

- einer Firmware mit Master-Funktionalität*.

verwendet wird.

* Die Master-Lizenz beinhaltet den Betrieb der PC-Karte cifX als Master sowie die Lizenz für die Konfigurationssoftware SYCON.net für das jeweilige cifX.

List of figures

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Glossary

CAN	Controller Area Network: The CAN specification describes the physical interface, the message structure and the safe transmission of a CAN message. Described are the sending, receiving and a remote request of messages. The CAN message consists (simplified) of a message identifier and 0 to 8 bytes of data. The meaning of the message identifier and the max. 8 bytes of user data as well as the application layer are described in the CANopen standard.
CIFX M3042100BM	Communication interface in M.2 format and B+M key from Hilscher on the basis of the netX 100 communication controller
DeviceNet	Open network standard based on CAN: (1.) Standardization in the European standard EN 50325. Specification and maintenance of the DeviceNet standards incumbent on the ODVA (Open DeviceNet Vendor Association, Inc.). (2.) The application layer of the DeviceNet network consists of the CIP (Common Industrial Protocol). (3.) object-oriented bus system which utilizes the producer/consumer model.
DeviceNet Master	Device that initiates the data exchange at the bus
DeviceNet Slave	Device, which is configured by the master and which then performs the communication
MAC ID	Media Access Control-ID: unique network address of a device on a DeviceNet network to distinguish the device from any other device or slave on this network (valid address range 0 to 63). Use configuration software dialog to adjust.
Master	Type of device that initiates and controls the communication on the bus
netX	networX on chip, Hilscher network communication controller. High integrated network controller with optimized system architecture for communication and maximum data transfer.
Slave	Type of device that is configured by the master and which then performs the communication

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