empowering communication

User manual

CIFX HPCIE90-CO\F

PC card Half-Mini PCI Express CANopen Slave

Hilscher Gesellschaft für Systemautomation mbH
www.hilscher.com

Table of contents

1   Introduction

1.1   About the user manual

This user manual for your PC card CIFX HPCIE90-CO\F CANopen 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	22-03-10	All sections created.
2	24-01-22	Hardware revision update: basic card CIFX HPCIE90 (revision 4). Connection of the shielding to earth (ground, pin 1) when connecting the foil cables. Warning of breaking the basic card due to pressure. Sections *Basic card CIFX HPCIE90* [▷ page 6] and *Detached network interface AIFX-V2-CO* [▷ page 7]: Pin 1 and pin 10 indicated. Sections *Revision or version status of hardware and software* [▷ page 8] and *Product software* [▷ page 7] updated. Chapter *Safety* [▷ page 9] updated. Sections *Overview installation and firmware download* [▷ page 17], *Installing the hardware* [▷ page 14] and *Uninstalling the hardware* [▷ page 24] updated. Section *Disposal and recycling of waste electronic equipment* [▷ page 25] updated. Section *PC card CIFX HPCIE90-CO\F* [▷ page 32] updated. Section *Dimensions CIFX HPCIE90* [▷ page 37] and *Dimensions AIFX-V2-CO* [▷ page 38]: Specification of pin 1 and pin 10.

Table 1: List of revisions

2 Devices and accessories

The PC card CIFX HPCIE90-CO\F is a communication interface from Hilscher based on the communication controller netX 90 and consists of a basic card that is equipped with a detached network interface.

PC card	Description of the basic card	Accessories
CIFX HPCIE90-CO\F	Communication Interface Mini PCIe half-size: CIFX HPCIE90	Remote network interface CANopen: AIFX-V2-CO
	Type (according to the PCI Express Mini Card specification): PCI Express half-Mini Card (H2)	
	Mini PCI Express slot (3.3 V)	

Table 2: PC card CIFX HPCIE90-CO\F

Product family	Card format and type	netX	Network	Cable
CIFX	HPCIE	90	CO	\F

Table 3: Meaning of the device name

The use refers exclusively to Slave systems. With the loaded CANopen slavefirmware, the PC card cifX executes the CANopen 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 HPCIE90

In the following illustration with legend you can recognize the device elements significant for installation and operation each by a number.
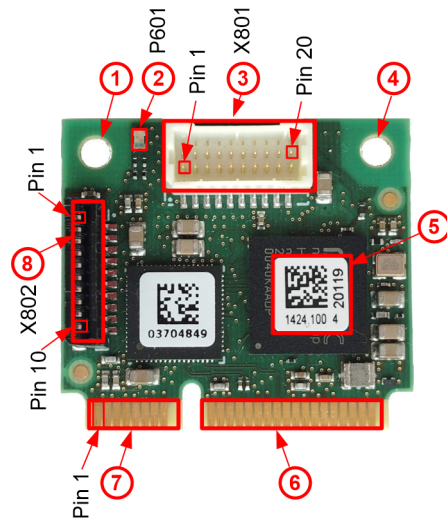
Figure 1: Basic card CIFX HPCIE90 (Revision 4)

No.	Description
(1), (4)	Holes for mounting the PC card
(2)	System LED (yellow/green)
(3)	Cable connector Ethernet (X801, 20-pin)
(5)	Matrix label
(6)	Mini PCI Express bus, pin 17 to pin 52 (top: Pin 17 … 51, bottom: Pin 18 … pin 52)
(7)	Mini PCI Express bus, pin 1 to pin 16 (top: Pin 1 … 15, bottom: Pin 2 … pin 16)
(8)	Cable connector fieldbus (X802, 10-pin)

Table 4: Legend for the basic card CIFX HPCIE90

2.2   Detached network interface AIFX-V2-CO
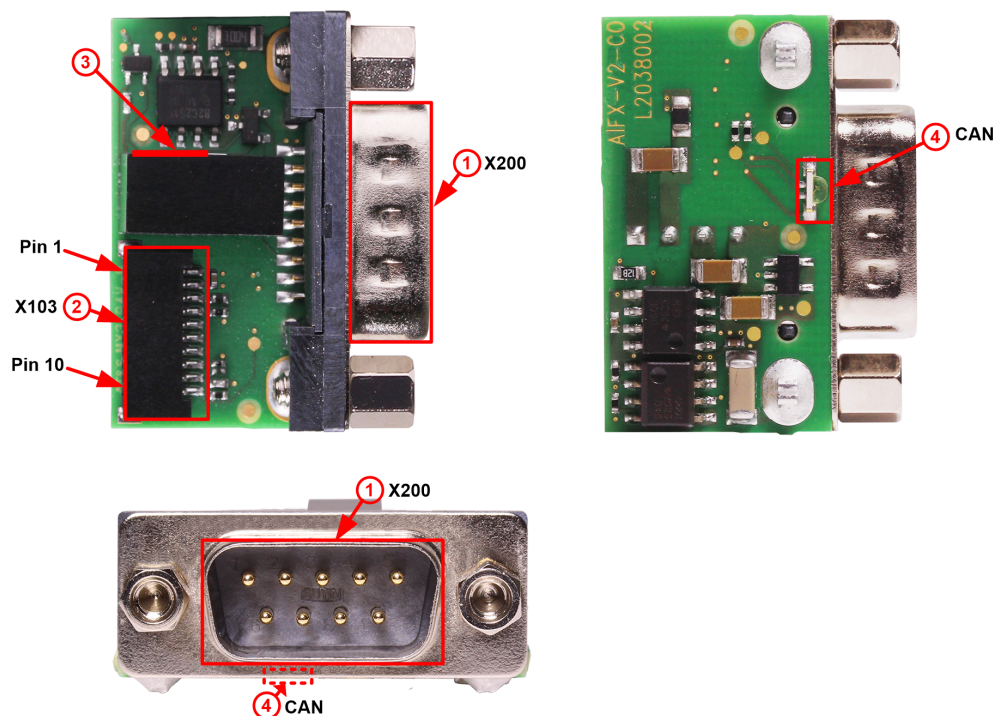
Figure 2: Detached network interface AIFX-V2-CO (Revision 2)

No.	Description
(1)	CANopen interface, DSub pug (X200)
(2)	Cable connector fieldbus (X103, 10-pin)
(3)	Mini matrix label (on the side of T100)
(4)	**CAN**: Communication status LED (red/green)

Table 5: Legend for the detached network interface AIFX-V2-CO

> **!** **Important:**
>
> Note that the detached network interface CANopen AIFX-V2-CO especially is designed for netX 90-based devices and exclusively works together with them. In contrast, the detached network interface Ethernet AIFX-CO is only suitable for netX 100-based devices.

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://hilscher.atlassian.net/wiki/spaces/CARDS/overview.

➢ Select the link for the current release for the Download Package Communication Solution 90.

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 status of 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 HPCIE90-CO\F	Basic card CIFX HPCIE90 and AIFX-V2-CO	1424.501	-
CIFX HPCIE90	Communication Interface Mini PCIe half-size (basic card)	1424.100	4
AIFX-V2-CO	Detached network interface CANopen	2801.500	3

Table 6: Hardware revisions

Driver and software	Name	Version
Device driver	cifX Device Driver	2.3 or higher
Software to download the firmware	Device Explorer	1.3
Configuration software	Communication Studio	1.4

Table 7: Driver and software versions

Protocol	File name	Firmware version
CANopen Slave	X0905001.nxi	V5.2

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 HPCIE90-CO\F, CANopen Slave communication can be implemented if the corresponding firmware is loaded. For the permissible firmware versions, see the section *Revision or version status of 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 Fracture of the basic card

Do not exert any unnecessary force to the basic card, to prevent the circuit board from breaking.

During *installation* always adhere to the step sequence:
1. First plug the cable into the cable connector on the basic card.
2. Then insert the basic card into the Mini PCI Express slot and fasten it.

During *uninstallation* always adhere to the step sequence:
1. First unscrew the basic card and remove it from the Mini PCI Express slot.
2. Then pull the cable out of the cable connector on the basic card.

3.5.5 Immunity and emission

The flat ribbon cable contains a shield to reduce emission and increase immunity. The shield of the ribbon cable must be connected to ground (pin 1) of the connector of the detached network interface AIFX-V2-CO and on the basic card. When connecting the flat ribbon cable, a wrong connection is possible. Only if the shield of the ribbon cable is connected correctly, will immunity and emission be optimal. If the shield of the flat ribbon cable is not connected correctly, the immunity is no longer guaranteed, and emission will be possible.

3.5.6 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.).

3.5.7 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

To install your cifX PC cards, you need a PC or a connection device with a Mini PCI Express slot (host interface) for mounting the PC card.

Host interface

PC card	Type	Supply voltage (1)	Power consumption (2)	Signal voltage (3)
CIFX HPCIE90-CO\F	Mini PCI Express slot (3.3 V)	+3.3 VDC -5% / +9%	See section *PC card CIFX HPCIE90-CO \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% / +9%).

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

Host system

For communication via PCI Express, the host system may only use the standard mode with a length of 5 bits for identification (tag field length). In the extended mode, i.e. at lengths of 8 bits for identification of the PCI-Express communication, communication errors occur. Note the errata "CIFX M223090AE and CIFX HPCIE90" (Hilscher DOC-ID DOC220201ERR02EN) and the solutions and workarounds given therein. The reference is listed in the section *References* [▶ page 39] .

Mounting the basic card

In order to attach the basic card, the board on which the Mini PCI Express slot is located must have a mounting option. This can consist of two snap hooks or a clip for snapping the basic card into place or two holes for screwing the basic card onto the board. The dimensions for the positioning of the snap hooks, clip or screw holes can be found in the dimension drawing for the basic card provided in this manual.

Operating system

For Device Explorer or Communication Studio: Windows® 10

Component heights

- The component height on the top of the basic card CIFX HPCIE90 exceeds the height of 1.5 mm specified by the standard, because the height of the cable connectors (Ethernet X801, or fieldbus X802), including the cable, is approximately 8.5 mm above the circuit board.

- The component height on the bottom of the basic card CIFX HPCIE90 complies with the standard specifications.

Panel dimensioning

- **Panel cut-outs and holes for mounting AIFX**
  To mount the detached network interface CANopen, the required panel cut-outs for the communication status LEDs and the CANopen 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 CANopen interface, DSub plug • The CAN communication LED
Drill holes	2, at a distance of 25.0 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-V2-CO* [▶ page 38].

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-V2-CO* [▶ 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 HPCIE90-CO\F requires proper connection of the detached network interface CANopen AIFX-V2-CO to the basic card.	-
Communication	A CANopen Master device is required for the communication of a PC card (slave). To configure the master device, you need a device description file for the slave used with the name for: • CANopen Slave: `NETX 90 COS COS.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). **Device Explorer** as software for downloading or updating the firmware and configuration, as well as for setting the device driver. **Communication Studio** for configuring and diagnosing netX 90-based devices.	*Revision or version status of hardware and software* [▶ page 8] and *References* [▶ page 39] (Driver and software documentation)
Firmware download	The user must select the firmware using the **Device Explorer** software and download it to the PC card. The firmware contains a communication protocol.	
Parameter settings	The PC card must be parameterized using the **Communication Studio** 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 HPCIE90-CO\F:

Step	Description	See section
Downloading installation files	• Download the installation files from the Hilscher website for: - cifX Device Driver (atest version) - Device Explorer - Communication Studio • Save the installation files to the local hard disk of your PC.	*Revision or version status of 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. • Plug the cable into the cable connector on the basic card. Pay attention to the polarity. • Open the housing of the PC or connection device. • Insert the basic card into the Mini PCI Express slot and mount the basic card. • Mount 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.	*Installing the hardware* [▶ page 20]
Firmware and configuration download	• Download the firmware according to the information in the "Device Explorer" user manual. The PC card cifX is now ready for operation and has yet to be configured. • Then download the configuration.	*Loading firmware and configuration in the device or making an update* [▶ page 22]

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 39].

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.
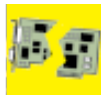
NOTICE
Electrostatically sensitive devices

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.

NOTICE
Fracture of the basic card due to mechanical pressure

Do not exert any unnecessary force to the basic card, to prevent the circuit board from breaking.

During *installation* always adhere to the step sequence:
1. First plug the cable into the cable connector on the basic card.
2. Then insert the basic card into the Mini PCI Express slot and fasten it.

During *uninstallation* always adhere to the step sequence:
1. First unscrew the basic card and remove it from the Mini PCI Express slot.
2. Then pull the cable out of the cable connector on the basic card.

NOTICE
Immunity and emission

When connecting the ribbon cable to the detached network interface AIFX-V2-CO and the basic card, the shield of the flat ribbon cable must on both sides be connected to ground (pin 1) of the connector. If the shield of the flat ribbon cable is not connected correctly, immunity will no longer be guaranteed, andemission will be possible.

Installation warnings (USA)

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.

NOTICE

Fracture of the basic card due to mechanical pressure

Do not exert any unnecessary force to the basic card, to prevent the circuit board from breaking.

Adhere to the step sequence during *installation*:
1. First plug the cable into the cable connector on the basic card.
2. Then insert the basic card into the Mini PCI Express slot and fasten it.

Adhere to the step sequence during *uninstallation*:
1. First unscrew the basic card and remove it from the Mini PCI Express slot.
2. Then pull the cable out of the cable connector on the basic card.

NOTICE

Immunity and emission

When connecting the detached network interface AIFX-V2-CO to the basic card, the shield must be connected to ground (pin 1). Only if the shield is connected correctly, the immunity and emission will be optimal.

4.5   Installing the hardware

Install the PC card CIFX HPCIE90-CO\F in your PC or connection device as described below.

1. Preparation

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

! **Important:**
Note that the detached network interface CANopen AIFX-V2-CO especially is designed for netX 90-based devices and exclusively works together with them. In contrast, the detached network interface Ethernet AIFX-CO is only suitable for netX 100-based devices.

2. General protective measures and safety precautions

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

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

NOTICE Electrostatic sensitive components

➢ 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.

3. Connect cable

NOTICE Fracture of the basic card due to mechanical pressure

➢ Do not exert any unnecessary force to the basic card, to prevent the circuit board from breaking.
During *installation* always adhere to the step sequence:
1. First plug the cable into the cable connector on the basic card.
2. Then insert the basic card into the Mini PCI Express slot and fasten it.

➢ First, plug the cable into the cable connector fieldbus X802 on the basic card.

NOTICE Pay attention to the polarity

➢ When plugging the cable into the cable connector fieldbus on the basic card, the shield must be connected to ground (pin 1).
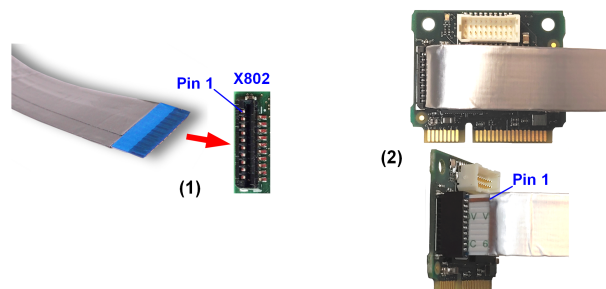

Figure 4: Plug the cable into the cable connector fieldbus on the basic card, example CIFX HPCIE90

4. Installation

⚠ **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).

➢ Open the housing of the PC or connection device.

NOTICE **Fracture of the basic card due to mechanical pressure**

➢ Do not exert any unnecessary force to the basic card, to prevent the circuit board from breaking.

➢ Insert the basic card into the Mini PCI Express slot.

NOTICE **Over torquing of the mounting screws**

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

➢ Screw the basic card onto the board. To do this, use the two holes in the upper part of the basic card.

➢ Attach the detached network interface CANopen AIFX-V2-CO to the housing panel of the PC or connection device.

➢ Connect the detached network interface CANopen AIFX-V2-CO to the basic card by plugging the cable (already connected to the basic card) into the cable connector fieldbus X103 on the AIFX-V2-CO.

NOTICE **Pay attention to the polarity**

➢ When plugging the cable into the cable connector fieldbus X103 on the AIFX-V2-CO, the shield must be connected to ground (pin 1).
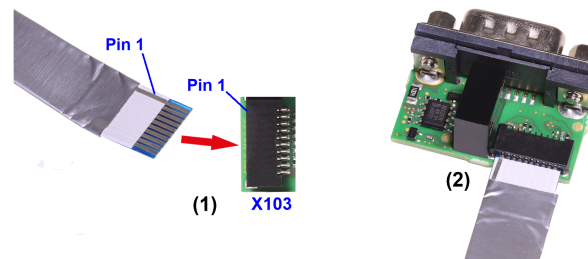

Figure 5: Plug the cable into the cable connector fieldbus X103 on the AIFX-V2-CO

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

4.6   Loading firmware and configuration in the device or making an update

➢ Download the firmware from the Hilscher website and save the firmware on the local hard disk of your PC.

➢ If necessary, transfer the configuration to the PC. You create the configuration using a suitable configuration software.

➢ Use **Device Explorer** to load the firmware and configuration into the device or update the firmware and configuration in your device.

➢ When downloading the firmware and configuration to your device or when performing an update, follow the instructions in the "Device Explorer" operating instruction manual.

For the "Device Explorer" operating instruction manual, see section *References* [▶ page 39].

4.7   Hints for problem solving

In case of an error or malfunction during operation of your PC card cifX, observe the following troubleshooting instructions:

General

➢ Check that the requirements for operation of the PC card are met according to the information provided in this user manual.

SYS and CAN 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 CAN LED (red/green) at the detached network interface CANopen 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 CAN LED are static green, the PC card cifX is in the "in operation" state. 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 (Slave) to the Master device is correct.

Detailed descriptions of the behavior of the LEDs can be found in the chapter on LEDs in this manual. Information about the device diagnostics and its functions can be found in the user manual of the configuration software for your device.

4.8   Uninstalling the hardware

Uninstall the PC card CIFX HPCIE90-CO\F from the PC or connection device as described below.

1. Protective measures and safety precautions

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

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

NOTICE **Electrostatic sensitive components**

➢ 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

⚠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).

➢ Open the housing of the PC or connection device.

NOTICE **Fracture of the basic card due to mechanical pressure**

➢ Do not exert any unnecessary force to the basic card, to prevent the circuit board from breaking.
During *uninstallation* always adhere to the step sequence:
1. First unscrew the basic card and remove it from the Mini PCI Express slot.
2. Then pull the cable out of the cable connector on the basic card.

➢ Loosen the screw that secures the basic card to the board.

➢ Remove the basic card from the Mini 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.

➢ Demount the detached network interface CANopen from the basic card.

➢ Therefore pull the cable out of the cable connector fieldbus X802 (on the basic card), as well as out of the cable connector fieldbus X103 on the AIFX-V2-CO.

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

LED	CANopen
System status	**SYS** 🟡 🟢 Yellow/ green
Communication status	**CAN** 🔴 🟢 Red/green

Table 13: LEDs CANopen

5.2 System LED

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

LED	Color	State	Description
SYS	Duo-LED: yellow RDY / green RUN		
	🟢 (green)	On	The firmware is running.
	🟢 (green)	Blinking	During the formatting of the file system
	🟡 (yellow)	On	A system error has occurred.
	(yellow)/ (green)	Blinking, 3x yellow, 3x green	Firmware crash, unrecoverable (an internal exception occurred that cannot be handled)
	(yellow)/ (green)	Blinking, 1 Hz	Firmware update mode active: The firmware is idle and waiting for the update file.
	(yellow)/ (green)	Blinking, 4 Hz	Firmware update mode active: A firmware update is being installed.
	⚫ (gray)	Off	• No supply voltage: No supply voltage for the device or hardware defect. • During a firmware reset

Table 14: States of the SYS-LED

LED state	Definition
Blinking	The LED turns on and off in phases.
Blinking, 3x yellow, 3x green	The LED turns on and off, with a frequency of approx. 1 Hz: • 3x yellow "On" for 500 ms and "Off" for 500 ms and • 3x green "On" for 500 ms and "Off" for 500 ms.
Blinking, yellow/green, 1 Hz, 4 Hz	The LED turns on in phases yellow or green, with a frequency of approx.: • 1 Hz: 1 x yellow "On" for 500 ms and 1 x green "On" for 500 ms, • 4 Hz: 1 x yellow "On" for 125 ms and 1 x green "On" for 125 ms.

Table 15: Definitions of the states of the SYS LED

5.3 CANopen Slave

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	Description
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 16: States of the CAN LED for the CANopen Slave protocol

LED state	Definition
Flickering (10 Hz)	The LED 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 LED turns on and off with a frequency of 2.5 Hz: "On" for 200 ms, followed by "Off" for 200 ms.
Single flash	The LED shows one short flash (200 ms) followed by a long "Off" phase (1,000 ms).
Double flash	The LED 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). The LED turns on and off in irregular intervals to indicate low Ethernet activity.

Table 17: LED state definitions for the CANopen Slave protocol

6 Connectors

6.1 CANopen interface

Isolated CANopen interface according to ISO 11898:
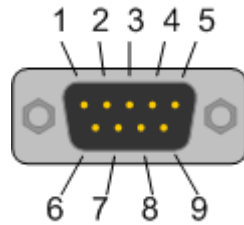
Figure 6: CANopen interface (DSub plug connector, 9-pin), X200

Connection with DSub plug	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 18: Pin assignment of the CANopen interface, X200

6.2   Cabel connector fieldbus X802 on CIFX HPCIE90

Pin assignment for cable connector fieldbus X802 (10FMN-BMT-A-TF) on the basic card CIFX HPCIE90, 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	XM0_TX	Fieldbus transmit	Output
6	XM0_RX	Fieldbus receive	Input
7	XM0_IO0	Fieldbus input output 0	Input / Output
8	XM0_IO1	Fieldbus input output 1	Input / Output
9	RSTOUT#	Reset out	Output
10	MLED0 (COM0)	LED COM0 (red/green)	Output

Table 19: Pin assignment for cable connector fieldbus X802 (10FMN-BMT-A-TF) on CIFX HPCIE90

Figure 7: Connector fieldbus X802 (1x10 pins) on CIFX HPCIE90

6.3 Cable connector fieldbus X103 on AIFX-V2-CO

Pin assignment for cable connector fieldbus X103 on AIFX-V2-CO, 10-pin cable

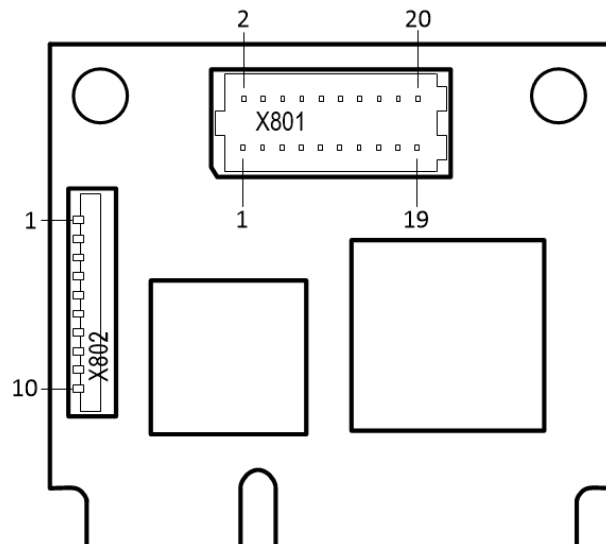| Pin	Name	Description	Type
1	GND	Ground	Power
2	3V3	3.3V Power	Power
3	I2C_SCL	I2C clock signal	Input
4	I2C_SDA	I2C data signal	Input / Output
5	TX	Fieldbus transmit	Input
6	RX	Fieldbus receive	Output
7	-	(not used)	NC
8	-	(not used)	NC
9	RSTOUT#	Reset out	Input
10	MLED0 (COM0)	RE LED COM0 (red/green)	Input

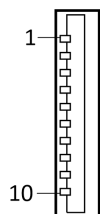*Table 20: Pin assignment for cable connector fieldbus X103 on AIFX-V2-CO*

Figure 8: Cable connector fieldbus X103 (1x10 pins) on AIFX-V2-CO

6.4 Mini PCI Express Bus (H2)

The following table applies for pin assignment on the Mini PCI Express (H2) bus of the PC card CIFX HPCIE90 (basic card).

Pin	Name	Description	Type
1	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.	I/O
2	3.3Vaux	3.3V auxiliary supply	Power
3	NC	(not used)	-
4	GND	Return current path.	Power
5	NC	(not used)	-
6	1.5V	1.5V supply	Power
7	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.	I/O
8	NC	(not used)	-
9	GND	Return current path.	Power
10	NC	(not used)	-
11	REFCLKN	PCIe Reference Clock signals (100 MHz) defined by the PCI Express CEM Specification.	Input
12	NC	(not used)	-
13	REFCLKP	PCIe Reference Clock signals (100 MHz) defined by the PCI Express CEM Specification.	Input
14	NC	(not used)	-
15	GND	Return current path.	Power

Pin	Name	Description	Type
16	NC	(not used)	-
17	NC	(not used)	-
18	GND	Return current path.	Power
19	NC	(not used)	-
20	NC	(not used)	-
21	GND	Return current path.	Power
22	PERST#	PCIe Reset is a functional reset to the card as defined by the PCI Express Mini CEM Specification.	Input
23	PERn0	PCIe TX/RX Differential signals defined by the PCI Express CEM Specification.	Input
24	3.3Vaux	3.3V auxiliary supply	Power
25	PERp0	PCIe TX/RX Differential signals defined by the PCI Express CEM Specification.	Input
26	GND	Return current path.	Power
27	GND	Return current path.	Power
28	1.5V	1.5V supply	Power
29	GND	Return current path.	Power
30	NC	(not used)	-
31	PETn0	PCIe TX/RX Differential signals defined by the PCI Express CEM Specification.	Output
32	NC	(not used)	-
33	PETp0	PCIe TX/RX Differential signals defined by the PCI Express CEM Specification.	Output
34	GND	Return current path.	Power
35	GND	Return current path.	Power
36	NC	(not used)	-
37	GND	Return current path.	Power
38	NC	(not used)	-
39	3.3Vaux	3.3V auxiliary supply	Power
40	GND	Return current path.	Power
41	3.3Vaux	3.3V auxiliary supply	Power
42	LED_WWAN	LED WWAN	Output
43	GND	Return current path.	Power
44	LED_WLAN	SYNC1: syncronisation pin for realtime systems	Output
45	NC	(not used)	-
46	LED_WPAN	SYNC0: syncronisation pin for realtime systems	Output
47	NC	(not used)	-
48	1.5V	1.5V supply	Power
49	NC	(not used)	-
50	GND	Return current path.	Power
51	NC	(not used)	-
52	3.3Vaux	3.3V auxiliary supply	Power

Table 21: Pin assignment Mini PCI Express (H2) bus X201, CIFX HPCIE90

7   Technical data

7.1   PC card CIFX HPCIE90-CO\F

Category	Parameter	Value	
Part		Name	Part number
	PC card (basic card with AIFX-V2-CO)	CIFX HPCIE90-CO\F	1424.501
	Basic card	CIFX HPCIE90	1424.100
	Function	Communication Interface Mini PCIe half-size , with Mini PCI Express interface and CANopen interface. The use refers exclusively to slave systems.	
Communication controller	Type	netX 90	
Integrated memory	RAM	8 MB SDRAM	
	Flash	8 MB + 1 MB	
	Size of the Dual-Port Memory	64 Kbyte	
System interface	Bus type	Mini PCI Express (H2), one-lane port	
	Transmission rate	33 MHz	
	Data access	DPM	
	Dual-Port Memory (DPM) data access width	32-Bit	
CANopen communication	Supported fieldbus communication system	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	
	Detached network interface CANopen	AIFX-V2-CO	
		Important! Operating the PC card CIFX HPCIE90-CO\F requires proper connection of the detached network interface CANopen AIFX-V2-CO to the basic card.	
	Connector AIFX-V2-CO	Cable connector fieldbus X802 (JST 10FMN-BMT-A-TF, 1.0 mm pitch)	
Diagnosis with LEDs	LEDs	**SYS**	System status
Power supply	Supply voltage	+3.3 VDC -5% / +9%	
	Current consumption at 3.3 V	330 mA (maximum)	
	Connector	Via Mini PCI Express slot	
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).	

Category	Parameter	Value
Basic card CIFX HPCIE90	Dimensions (L x W x H)	26.8 x 30 x 7.5 mm
	Component heights	The component height on the top of the basic card CIFX HPCIE90 exceeds the height of 1.5 mm specified by the standard, because the height of the cable connectors (Ethernet X801, or fieldbus X802), including the cable, is approximately 8.5 mm above the circuit board. The component height on the bottom of the basic card CIFX HPCIE90 complies with the standard specifications.
	Weight	3.27 g
	Mounting/installation	Mini PCI Express slot (3.3 V)
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
Firmware and configuration download	Software to download and update the firmware and configuration	Device Explorer
Configuration	Configuration software	Communication Studio

Table 22: Technical data CIFX HPCIE90-CO\F

7.2   PCI identifiers on the Mini PCI Express bus

The PC card CIFX HPCIE90-CO\F is a multifunction device on the Mini PCI Express (H2) bus and requires two PCI identifiers. The following identifiers apply:

PCI identifier	Value
Vendor ID	0x15CF
Device ID	0x0090
Subsystem vendor ID	0x15CF
Subsystem device ID	0x6001 (Flash-based device, SPM) 0x1002 (interrupt source, SPM)

Table 23: PCI identifiers on the Mini PCI Express bus

7.3 AIFX-V2-CO

Category	Parameter	Value	
Part	Name	AIFX-V2-CO	
	Part number	2801.500	
	Description	Detached network interface CANopen for all netX 90-based devices.	
		Important! The detached network interface CANopen AIFX-V2-CO works exclusively together with netX 90 based devices.	
Interface PC card	Connector	Cable connector fieldbus X103 (JST 10FMN-SMT-A-TF, 1.0 mm pitch)	
CANopen interface	Galvanic isolation	isolated	
	Isolation voltage	1000 VDC (tested for 1 minute)	
	Connector	SubD plug, 9-pin	
Diagnosis with LEDs	LEDs (on the reverse side of the device)	**CAN**	Communication status LED (Duo LED)
Power supply	Connector	Cabel connector fieldbus X103	
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)	17 x 31 x 15.6 mm, front panel width = 18.5 mm	
	Mounting/installation	On the netX 90-based basic card: Cable connector fieldbus X802. Mounting to the housing of the PC or connection device.	
EMC Compliance	CE sign	Yes	
	UKCA sign	Yes	
	Emission, Immunity	Tested together with the corresponding basic card.	
	RoHS	Yes	

Table 24: Technical data AIFX-V2-CO

7.4   Communication protocols

7.4.1   CANopen Slave

Parameter	Value
Maximum number of cyclic input data	128 bytes (Default)
Maximum number of cyclic output data	128 bytes (Default)
Maximum number of receive PDOs	16 (Default)
Maximum number of transmit PDOs	16 (Default)
Exchange of process data	Via PDO transfer • synchronized, • remotely requested, and • event driven (change of date, event timer) On request by host application program via packet
Acyclic communication	SDO upload/download (Server only) Emergency Message (Producer) Timestamp (Producer/Consumer)
Functions	Node Guarding / Life Guarding Heartbeat: 1 Producer, max. 8 Consumer PDO Mapping NMT Slave SYNC protocol (Consumer) Behaviour in case of error in state "operational" (configurable): • Change to "pre-operational" • No state change • Change to "stopped"
Baud rate	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 Automatic baud rate detection is supported.
Data transport layer	CAN frames
CAN frame type for CANopen	11 bit
Reference to firmware/stack version	5.1

Table 25: Technical data CANopen 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 = 1.0 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).
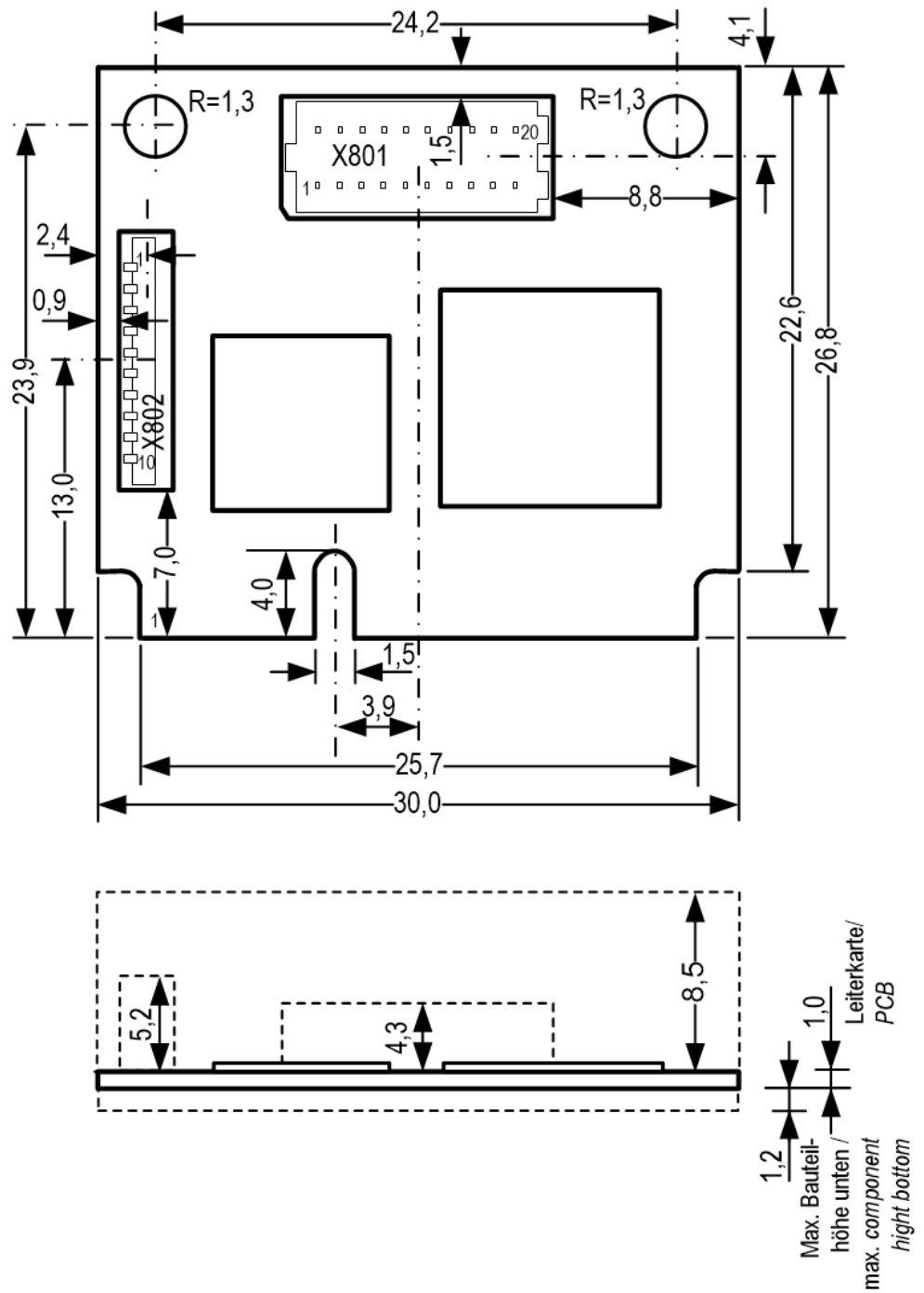
8.2   Dimensions CIFX HPCIE90

Figure 9: Dimensions CIFX HPCIE90 (Revision 4)

Note:

The height of the component on the top of the basic card HPCIE90 does not meet the standard.specifications. For more information, see section *System Requirements* [▶ page 14].
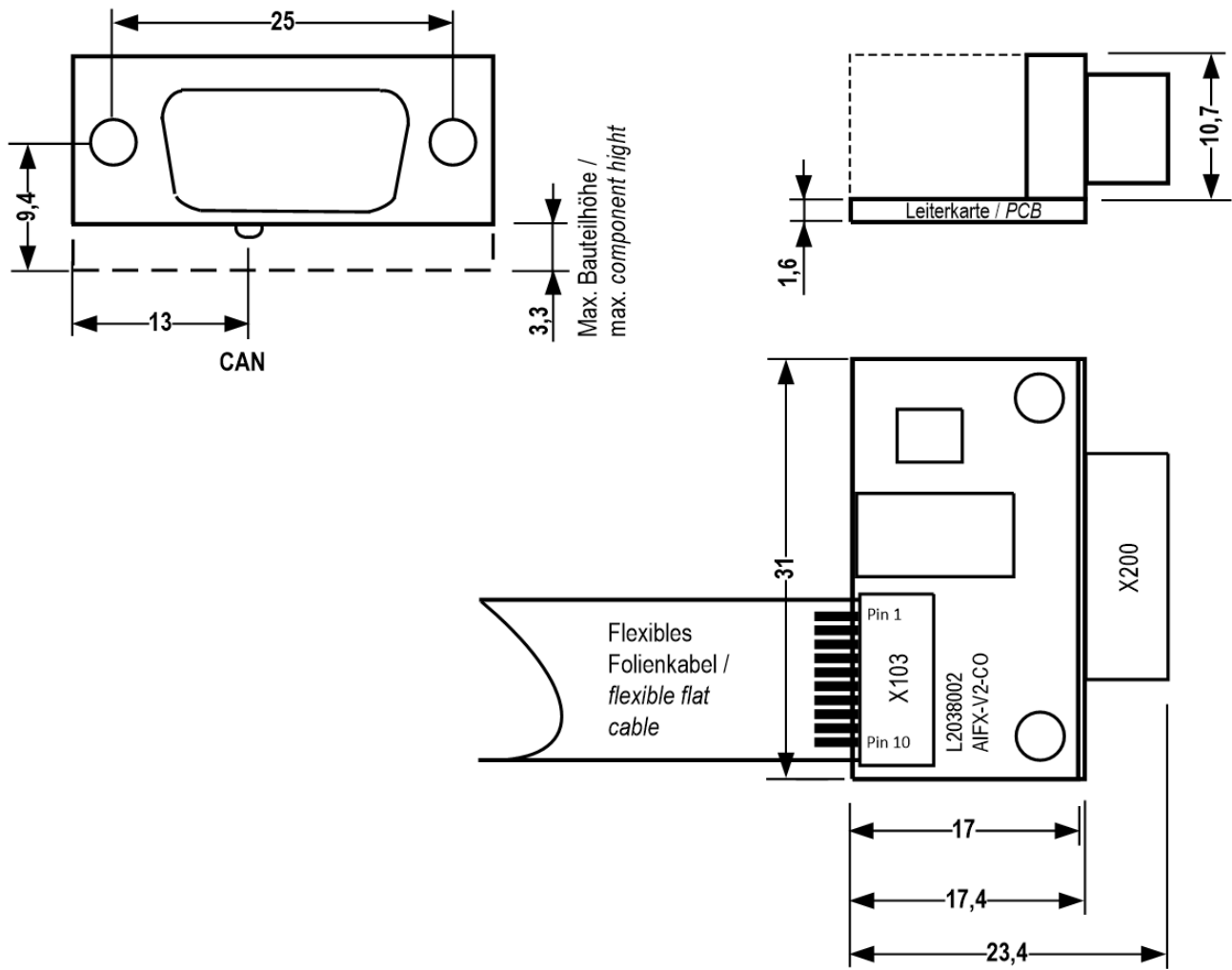
8.3   Dimensions AIFX-V2-CO

Figure 10: AIFX-V2-CO (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 Mini Card Electromechanical Specification

PCI-SIG (Special interest Group), PCI Express Mini Card Electromechanical Specification, Revision 2.1, English, 2016-09

Protocol API manuals

Hilscher Gesellschaft für Systemautomation mbH: Protocol API, CANopen Slave V5.1.0, Revision 1, DOC210403API01EN, English, 2021-04.

Documentation on drivers and software

Hilscher Gesellschaft für Systemautomation mbH: User manual, PC cards CIFX HPCIE90-CO\F CANopen, Hardware description and installation, DOC210401UMxxEN, English, 2021-xx.

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

Hilscher Gesellschaft für Systemautomation mbH: Operating instruction manual, Device Explorer, Download firmware to the device, DOC190302OIxxEN, English, 2021-02.

Hilscher Gesellschaft für Systemautomation mbH: Operating instruction manual, Communication Studio, Tool for Configuration and Diagnostics, DOC190501OIxxEN, English, 2020-02.

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.

Errata for ASIX Ax99100

Hilscher Gesellschaft für Systemautomation mbH: Errata, CIFX M223090AE, CIFX M224290BM and CIFX HPCIE90, Errata, DOC220201ERR03EN, English, 2022-03.

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 26: 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 27: Signal words

CIFX HPCIE90-CO\F | Hardware description and installation
DOC210804UM02EN | Revision 2 | English | 2024-01 | Released | Public

© Hilscher 2022 - 2024

9.4 Legal notes

Copyright

© Hilscher Gesellschaft für Systemautomation mbH

All rights reserved.

The images, photographs and texts in the accompanying materials (in the form of a user's manual, operator's manual, Statement of Work document and all other document types, support texts, documentation, etc.) are protected by German and international copyright and by international trade and protective provisions. Without the prior written consent, you do not have permission to duplicate them either in full or in part using technical or mechanical methods (print, photocopy or any other method), to edit them using electronic systems or to transfer them. You are not permitted to make changes to copyright notices, markings, trademarks or ownership declarations. Illustrations are provided without taking the patent situation into account. Any company names and product designations provided in this document may be brands or trademarks by the corresponding owner and may be protected under trademark, brand or patent law. Any form of further use shall require the express consent from the relevant owner of the rights.

Important notes

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

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

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

Liability disclaimer

The hardware and/or software was created and tested by Hilscher Gesellschaft für Systemautomation mbH with utmost care and is made available as is. No warranty can be assumed for the performance or flawlessness of the hardware and/or software under all application conditions and scenarios and the work results achieved by the user when using the hardware and/or software. Liability for any damage that may have occurred as a result of using the hardware and/or software or the corresponding documents shall be limited to an event involving willful intent or a grossly negligent violation of a fundamental contractual obligation. However, the right to assert damages due to a violation of a fundamental contractual obligation shall be limited to contract-typical foreseeable damage.

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

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

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

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

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

Warranty

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

The warranty obligation for equipment (hardware) we produce is 36 months, calculated as of the date of delivery ex works. The aforementioned provisions shall not apply if longer warranty periods are mandatory by law pursuant to Section 438 (1.2) BGB, Section 479 (1) BGB and Section 634a (1) BGB [Bürgerliches Gesetzbuch; German Civil Code] If, despite of all due care taken, the delivered product should have a defect, which already

existed at the time of the transfer of risk, it shall be at our discretion to either repair the product or to deliver a replacement product, subject to timely notification of defect.

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

Costs of support, maintenance, customization and product care

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

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.

It cannot be guaranteed that patents and/or ownership privileges have not been infringed upon or violated or that the products are free from third-party influence. No additional guarantees or promises shall be made as to whether the product is market current, free from deficiency in title, or can be integrated or is usable for specific purposes, unless such guarantees or promises are required under existing law and cannot be restricted.

Confidentiality

The customer hereby expressly acknowledges that this document contains trade secrets, information protected by copyright and other patent and ownership privileges as well as any related rights of Hilscher Gesellschaft für Systemautomation mbH. The customer agrees to treat as confidential all of the information made available to customer by Hilscher Gesellschaft für Systemautomation mbH and rights, which were disclosed by Hilscher Gesellschaft für Systemautomation mbH and that were made accessible as well as the terms and conditions of this agreement itself.

The parties hereby agree to one another that the information that each party receives from the other party respectively is and shall remain the intellectual property of said other party, unless provided for otherwise in a contractual agreement.

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.

Export provisions

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.

9.5   Registered trademarks

Windows® 10 is a registered trademark of the Microsoft Corporation.

Adobe-Acrobat® is a registered trademark of the Adobe Systems Incorporated.

CANopen® is a registered trademark of CAN in AUTOMATION - International Users and Manufacturers Group e.V (CiA), Nürnberg.

PCI™, PCI Express® and PCIe® or MINI PCI™ are trademarks or registered trademarks of the Peripheral Component Interconnect Special Interest Group (PCI-SIG).

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.

List of figures

List of tables

Glossary

CANopen	Open standard based on CAN. The standard describes (specifies) the meaning of the message identifier and of the 0 to 8 bytes of user data. The different meanings are: (1.) A standard application layer defined by the CIA (CAN in automation) specifications DS 301. (2.) A network concept and defines which data is to be transmitted with which services and what the data mean on the respective device classes. (3.) Provides functions for the network initialization, the network guarding and the network configuration. (4.) Offers a large flexibility.
CANopen Master	Device that initiates the data exchange at the bus
CANopen Slave	Device, which is configured by the Master and which then performs the communication
cifX	Communication InterFace based on netX
CIFX HPCIE90	Communication interface half-Mini PCI-Express from Hilscher based on the communication controller netX 90
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

Contacts

HEADQUARTER

Germany

Hilscher Gesellschaft für
Systemautomation mbH
Rheinstraße 15
65795 Hattersheim
Phone: +49 (0) 6190 9907-0
Fax: +49 (0) 6190 9907-50
E-mail: info@hilscher.com

Support

Phone: +49 (0) 6190 9907-990
E-mail: hotline@hilscher.com

SUBSIDIARIES

China

Hilscher Systemautomation (Shanghai) Co. Ltd.
200010 Shanghai
Phone: +86 (0) 21-6355-5161
E-mail: info@hilscher.cn

Support

Phone: +86 (0) 21-6355-5161
E-mail: cn.support@hilscher.com

France

Hilscher France S.a.r.l.
69800 Saint Priest
Phone: +33 (0) 4 72 37 98 40
E-mail: info@hilscher.fr

Support

Phone: +33 (0) 4 72 37 98 40
E-mail: fr.support@hilscher.com

India

Hilscher India Pvt. Ltd.
Pune, Delhi, Mumbai, Bangalore
Phone: +91 8888 750 777
E-mail: info@hilscher.in

Support

Phone: +91 020-24243777
E-mail: info@hilscher.in

Italy

Hilscher Italia S.r.l.
20090 Vimodrone (MI)
Phone: +39 02 25007068
E-mail: info@hilscher.it

Support

Phone: +39 02 25007068
E-mail: it.support@hilscher.com

Japan

Hilscher Japan KK
Tokyo, 160-0022
Phone: +81 (0) 3-5362-0521
E-mail: info@hilscher.jp

Support

Phone: +81 (0) 3-5362-0521
E-mail: jp.support@hilscher.com

Republic of Korea

Hilscher Korea Inc.
13494, Seongnam, Gyeonggi
Phone: +82 (0) 31-739-8361
E-mail: info@hilscher.kr

Support

Phone: +82 (0) 31-739-8363
E-mail: kr.support@hilscher.com

Austria

Hilscher Austria GmbH
4020 Linz
Phone: +43 732 931 675-0
E-mail: sales.at@hilscher.com

Support

Phone: +43 732 931 675-0
E-mail: at.support@hilscher.com

Switzerland

Hilscher Swiss GmbH
4500 Solothurn
Phone: +41 (0) 32 623 6633
E-mail: info@hilscher.ch

Support

Phone: +41 (0) 32 623 6633
E-mail: support.swiss@hilscher.com

USA

Hilscher North America, Inc.
Lisle, IL 60532
Phone: +1 630-505-5301
E-mail: info@hilscher.us

Support

Phone: +1 630-505-5301
E-mail: us.support@hilscher.com