

User manual

**CIFX M223090AE-DP\F, CIFX M224290BM-DP\F**  
PC cards PCI Express M.2 2230 A-E and M.2 2242 B-M PROFIBUS DP  
Slave



**Hilscher Gesellschaft für Systemautomation mbH**  
**[www.hilscher.com](http://www.hilscher.com)**

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# 1 Introduction

## 1.1 About the user manual

This user manual for your PC card

- CIFS M223090AE-DP\F PROFIBUS DP or
- CIFS M224290BM-DP\F PROFIBUS DP

informs you about the 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  |
|-------|------------|--|
| 4     | 2022-02-07 | Section <i>Revision or version status of hardware and software</i> [▶ page 9]: Basic card CIFS M223090AE revision 4.<br>Section <i>System Requirements</i> [▶ page 16] note on communication via PCI-Express added.<br>Section <i>Cable connector fieldbus X103 on AIFS-V2-DP</i> [▶ page 31] added.<br>Section <i>PC cards CIFS M223090AE-DP\F, CIFS M224290BM-DP\F</i> [▶ page 35] and AIFS-DP: UKCA added.  |
| 5     | 2024-03-11 | CIFS M223090AE (basic card, hardware revision 5), update.<br>CIFS M224290BM (basic card, hardware revision 2) added.<br><br>Connection of the shielding to earth (ground, pin 1) when connecting the foil cables. Warning of breaking the basic card due to pressure.<br><br>Sections <i>Basic card CIFS M223090AE</i> [▶ page 6] and <i>Detached network interface AIFS-V2-DP</i> [▶ page 8]: Pin 1 and pin 10 indicated.<br>Sections <i>Revision or version status of hardware and software</i> [▶ page 9] and <i>Product software</i> [▶ page 9] updated.<br>Chapter <i>Safety</i> [▶ page 11] updated.<br>Sections <i>Overview installation and firmware download</i> [▶ page 19], <i>Installing the hardware</i> [▶ page 22] and <i>Uninstalling the hardware</i> [▶ page 25] updated.<br>Section <i>Disposal and recycling of waste electronic equipment</i> [▶ page 26] updated.<br>Sections <i>PCI Express M.2 Bus, CIFS M223090AE</i> [▶ page 32] and <i>PCI Express M.2 Bus, CIFS M224290BM</i> [▶ page 33] revised.<br>Section <i>PC cards CIFS M223090AE-DP\F, CIFS M224290BM-DP\F</i> [▶ page 35] updated.<br>Section <i>Dimensions CIFS M223090AE</i> [▶ page 40] and <i>Dimensions AIFS-V2-DP</i> [▶ page 42]: Specification of pin 1 and pin 10. |

Table 1: List of revisions

## 2 Devices and accessories

The PC cards CIFX M223090AE-DP\F and CIFX M224290BM-DP\F are communication interfaces from Hilscher, based on the communication controller netX 90 and consist of the corresponding basic card that is equipped with a detached network interface.

| PC card             | Description of the basic card  | Accessories                                     |
|---------------------|--|---|
| CIFX M223090AE-DP\F | Communication Interface M.2 2230 Key A+E: CIFX M223090AE                                     | Detached network interface Ethernet: AIFX-V2-DP |
|                     | Type (according to the PCI Express M.2 specification):<br>2230 (=22x30 mm),<br>Keys: A and E |   |
|                     | PCI Express slot (3.3 V),<br>for M.2 type 2230-D3, Dual Key A-E<br>(Socket 1 Connectivity)   |   |
| CIFX M224290BM-DP\F | Communication Interface M.2 2242 Key B +M: CIFX M224290BM                                    |   |
|                     | Type (according to the PCI Express M.2 specification):<br>2242 (=22x42 mm),<br>Keys: B and M |   |
|                     | PCI Express slot (3.3 V) ,<br>for M.2 type 2242-D3, Dual key B-M<br>(Socket 1 Connectivity)  |   |

Table 2: PC cards CIFX M223090AE-DP\F, CIFX M224290BM-DP\F

| Product family | Card format and size | netX | Key | Network | Cable |
|----------------|----------------------|------|-----|---------|-------|
| CIFX           | M 2230               | 90   | AE  | -DP     | \F    |
| CIFX           | M 2242               | 90   | BM  | -DP     | \F    |

Table 3: Meaning of the device name

The use refers exclusively to Slave systems. With the loaded PROFIBUS DP slavefirmware, the PC card cifX executes the PROFIBUS DP Slave communication. Data is exchanged between the connected devices and the PC or connecting device via the Dual-Port Memory.

## 2.1 Basic card CIFX M223090AE

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

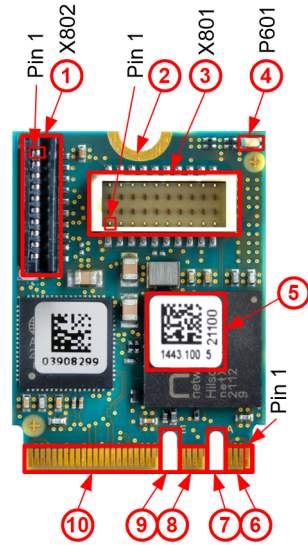


Figure 1: Basic card CIFX M223090AE (Revision 5)

| No.  | Description   |
|------|---|
| (1)  | Cable connector fieldbus (X802, 10 pin)             |
| (2)  | Hole (with ground contact) for mounting the PC card |
| (3)  | Cable connector Ethernet (X801, 20 pin)             |
| (4)  | System LED (yellow/green)                           |
| (5)  | Matrix label  |
| (6)  | PCI Express M.2 bus, pin 1 to pin 7                 |
| (7)  | PCI Express M.2 bus, pin 8 to pin 15 (key A)        |
| (8)  | PCI Express M.2 bus, pin 16 to pin 23               |
| (9)  | PCI Express M.2 bus, pin 24 to pin 31 (key E)       |
| (10) | PCI Express M.2 bus, pin 32 to pin 75               |

Table 4: Legend on the basic card CIFX M223090AE

## 2.2 Basic card CIFX M224290BM

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

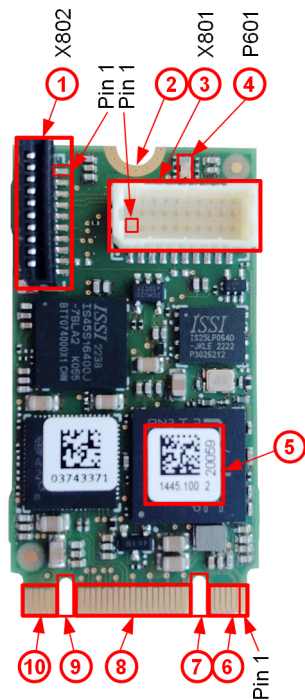


Figure 2: Basic card CIFX M224290BM (Revision 2)

| No.  | Description   |
|------|---|
| (1)  | Cable connector fieldbus (X802, 10-pin)             |
| (2)  | Hole (with ground contact) for mounting the PC card |
| (3)  | Cable connector Ethernet (X801, 20-pin)             |
| (4)  | System LED (yellow/green)                           |
| (5)  | Matrix label  |
| (6)  | PCI Express M.2 bus, pin 1 to pin 11                |
| (7)  | PCI Express M.2 bus, pin 12 to pin 19 (key B)       |
| (8)  | PCI Express M.2 bus, pin 20 to pin 58               |
| (9)  | PCI Express M.2 bus, pin 59 to pin 66 (key M)       |
| (10) | PCI Express M.2 bus, pin 67 to pin 75               |

Table 5: Legend for the basic card CIFX M224290BM

## 2.3 Detached network interface AIFX-V2-DP

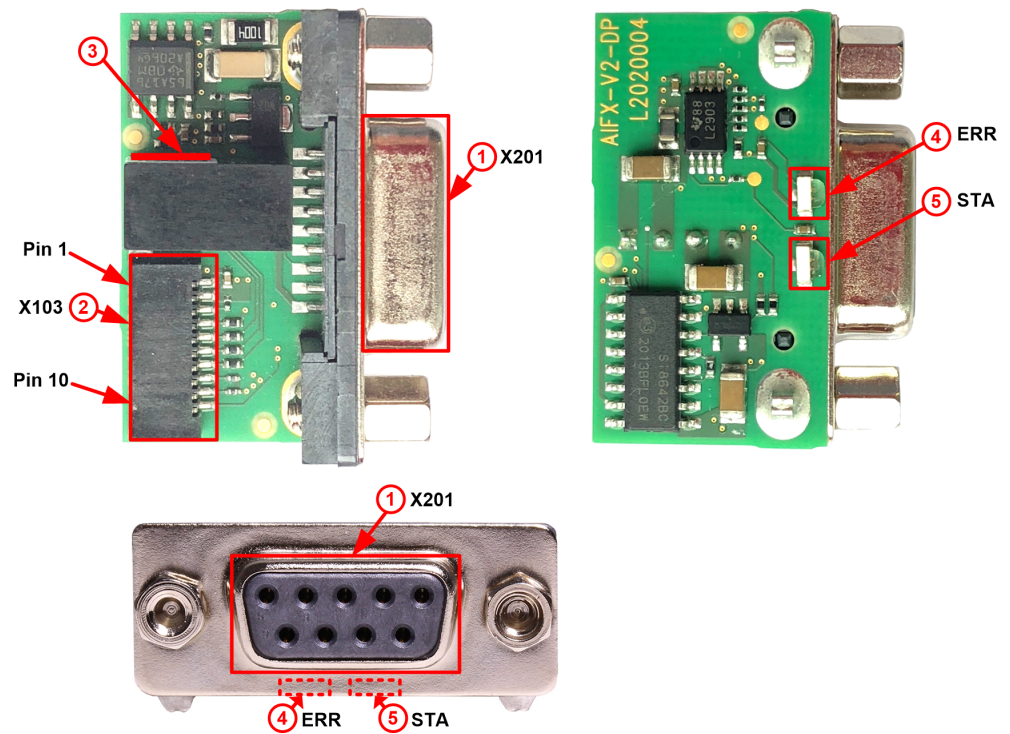


Figure 3: Detached network interface AIFX-V2-DP (Revision 4)

| No. | Description                                   |
|-----|---|
| (1) | PROFIBUS interface, DSub socket (X201)        |
| (2) | Cable connector fieldbus (X103, 10-pin)       |
| (3) | Mini matrix label (on the side of T100)       |
| (4) | <b>ERR</b> : Communication status LED (red)   |
| (5) | <b>STA</b> : Communication status LED (green) |

Table 6: Legend for the detached network interface AIFX-V2-DP



### Important:

Note that the detached network interface PROFIBUS AIFX-V2-DP especially is designed for netX 90-based devices and exclusively works together with them. In contrast, the detached network interface Ethernet AIFX-DP is only suitable for netX 100-based devices.



## 2.4 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.

## 2.5 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 M223090AE-DP\F | Basic card CIFX M223090AE and AIFX-V2-DP              | 1443.401 | -                 |
| CIFX M223090AE      | Communication Interface M.2 2230 key A+E (basic card) | 1443.100 | 5                 |
| CIFX M224290BM-DP\F | Basic card CIFX M224290BM and AIFX-V2-DP              | 1445.401 | -                 |
| CIFX M224290BM      | Communication interface M.2 2242 Key B+M (basic card) | 1445.100 | 2                 |
| AIFX-V2-DP          | Detached network interface PROFIBUS                   | 2801.400 | 4                 |

Table 7: 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 | 1.0           |

Table 8: Driver and software versions

| Protocol          | File name    | Firmware version |
|-------------------|--------------|------------------|
| PROFIBUS DP Slave | X0902001.nxi | V5.2             |

Table 9: 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.

## 2.6 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 4: 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 cards CIFX M223090AE-DP\F and CIFX M224290BM-DP\F, PROFIBUS DP 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 9].

### 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 PCI Express M.2 slot and fasten it.

During *uninstallation* always adhere to the step sequence:

1. First unscrew the basic card and remove it from the PCI Express M.2 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 has 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-DP 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, immunity will no longer be 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

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 M223090AE-DP\F | PCI Express slot (3.3 V), for M.2 type 2230-D3, Dual Key A-E (Socket 1 Connectivity) | +3.3 VDC $\pm$ 5%  | See section <i>PC cards cifX M223090AE-DP\F, CIFX M224290BM-DP\F</i> [▶ page 35]. | PCIe compatible    |
| CIFX M224290BM-DP\F | PCI Express slot (3.3 V), for M.2 type 2242-D3, Dual key B-M (Socket 1 Connectivity) |                    |   |                    |

Table 10: 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  $\pm$ 5%).

(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, CIFX M224290BM and CIFX HPCIE90" (Hilscher DOC-ID DOC220201ERR03EN) and the solutions and workarounds given therein. The reference is listed in the section *References* [▶ page 43] .

#### Mounting the basic card

In order to mount the basic card, the board on which the PCI Express M.2 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 Device Explorer or Communication Studio: Windows® 10



### Component heights

- The component height on the top of the basic cards CIFX M223090AE and CIFX M224290BM 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 M223090AE and CIFX M224290BM complies with the standard specifications.

### Panel dimensioning

#### • Panel cut-outs and holes for mounting AIFX

To mount the detached network interface PROFIBUS, the required panel cut-outs for the communication status LEDs and the PROFIBUS socket connector as well as the holes for mounting the AIFX must be provided on the housing of the PC or connection device.

|                            |   |
|----------------------------|---|
| <b>Panel cut-outs</b>      | The layout for the panel cut-outs must be sufficiently dimensioned for: <ul style="list-style-type: none"> <li>• The PROFIBUS interface, DSub socket connector</li> <li>• The communication LEDs STA and ERR</li> </ul> |
| <b>Drill holes</b>         | 2, at a distance of 25.0 mm   |
| <b>Further information</b> | The dimensions for the required panel cut-outs or the distance between the holes can be taken from the dimension drawing of the AIFX, see section <i>Dimensions AIFX-V2-DP</i> [▶ page 42].                             |

Table 11: Panel cut-outs and holes for AIFX mounting

#### • Front panel width

When dimensioning the front panel, note the width of the front panel specified in section *AIFX-V2-DP* [▶ page 37].

## 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 M223090AE-DP\F or CIFX M224290BM-DP\F requires proper connection of the detached network interface PROFIBUS AIFX-V2-DP to the basic card.   | -  |
| Communication         | <p>A PROFIBUS DP Master device is required for the communication of a PC card (slave).</p> <p>To configure the master device, you need a device description file for the slave used with the name for:</p> <ul style="list-style-type: none"> <li>• PROFIBUS Slave: HIL_0A12.GSD</li> </ul> <p>The settings in the used master must match the settings in the slave.</p> | -  |
| Software installation | <p><b>cifX Device Driver</b> as the driver for the host interface (latest version of the driver).</p> <p><b>Device Explorer</b> as software for downloading or updating the firmware and configuration, as well as for setting the device driver.</p> <p><b>Communication Studio</b> for configuring and diagnosing netX 90-based devices.</p>                           | <p><i>Revision or version status of hardware and software</i> [▶ page 9] and <i>References</i> [▶ page 43] (Driver and software documentation)</p> |
| Firmware download     | <p>The user must select the firmware using the <b>Device Explorer</b> software and download it to the PC card.</p> <p>The firmware contains a communication protocol.</p>  |  |
| Parameter settings    | <p>The PC card must be parameterized using the <b>Communication Studio</b> configuration software.</p>   |  |

Table 12: 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 M223090AE-DP\F or CIFX M224290BM-DP\F:

| Step                                | Description   | See section   |
|-------------------------------------|---|---|
| Downloading installation files      | <ul style="list-style-type: none"> <li>Download the installation files from the Hilscher website for:               <ul style="list-style-type: none"> <li>- cifX Device Driver (atest version)</li> <li>- Device Explorer</li> <li>- Communication Studio</li> </ul> </li> <li>Save the installation files to the local hard disk of your PC.</li> </ul>   | <i>Revision or version status of hardware and software</i> [▶ page 9]                   |
| Install drivers and software        | <ul style="list-style-type: none"> <li>Double-click the appropriate installation file to open the startup menu.</li> <li>Start the installation from the home screen and follow the instructions in the installation menu.</li> </ul>   |   |
| Install hardware                    | <ul style="list-style-type: none"> <li>Take the protective measures and safety precautions for the hardware installation.</li> <li>Plug the cable into the cable connector on the basic card.</li> <li>Open the housing of the PC or connection device.</li> <li>Insert the basic card into the PCI Express M.2 slot and mount the basic card.</li> <li>Mount the detached network interface to the front panel of the PC. Do not exert any unnecessary force on the basic card.</li> <li>Connect the detached network interface to the basic card.</li> <li>Close the housing of the PC or connection device.</li> </ul> | <i>Installing the hardware</i> [▶ page 22]  |
| Firmware and configuration download | <ul style="list-style-type: none"> <li>Download the firmware according to the information in the "Device Explorer" user manual.</li> </ul> <p>The PC card cifX is now ready for operation and has yet to be configured.</p> <ul style="list-style-type: none"> <li>Then download the configuration.</li> </ul>  | <i>Loading firmware and configuration in the device or making an update</i> [▶ page 24] |

Table 13: 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 43].

## 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

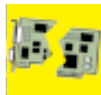
#### **Electrostatically sensitive devices**



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 PCI Express M.2 slot and fasten it.

During *uninstallation* always adhere to the step sequence:

1. First unscrew the basic card and remove it from the PCI Express M.2 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-DP 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, and emission 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 PCI Express M.2 slot and fasten it.

Adhere to the step sequence during *uninstallation*:

1. First unscrew the basic card and remove it from the PCI Express M.2 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-DP 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 M223090AE-DP\F or CIFX M224290BM-DP\F in your PC or connecting device as described below.

### 1. Preparation

Note the requirements and prerequisites described in the sections *System Requirements* [▶ page 16] and *Requirements for operation* [▶ page 18].



#### Important:

Note that the detached network interface PROFIBUS AIFX-V2-DP especially is designed for netX 90-based devices and exclusively works together with them. In contrast, the detached network interface Ethernet AIFX-DP 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 PCI Express M.2 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).

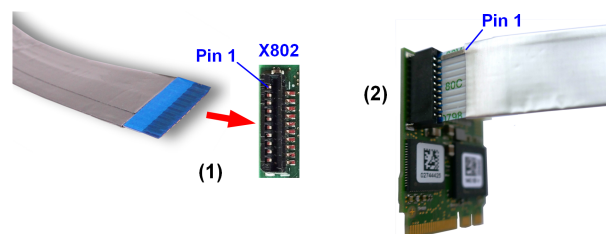


Figure 5: Plug the cable into the cable connector fieldbus on the basic card, example CIFX M223090AE

#### 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 PCI Express M.2 slot.

**NOTICE 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.
- 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.
- Attach the detached network interface PROFIBUS AIFX-V2-DP to the housing panel of the PC or connection device.
- Connect the detached network interface PROFIBUS AIFX-V2-DP to the basic card by plugging the cable (already connected to the basic card) into the cable connector fieldbus X103 on the AIFX-V2-DP.

**NOTICE Pay attention to the polarity**

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

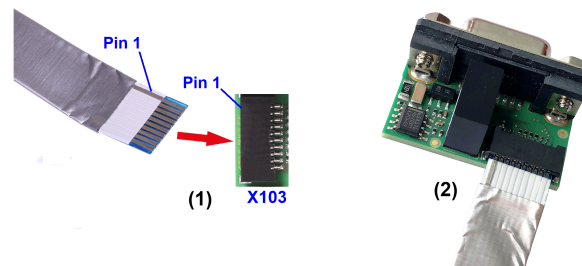


Figure 6: Plug the cable into the cable connector fieldbus X103 on the AIFX-V2-DP

- 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 43].

## 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, ERR, and STA 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 STA LED (green) and ERR LED (red) at the detached network interface PROFIBUS indicate the status of the device communication and may be permanently switched on or off, flash or they blink cyclically or acyclically.

If the SYS LED and the STA 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 M223090AE-DP\F or CIFX M224290BM-DP\F from the PC or connecting 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 PCI Express M.2 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 PCI Express M.2 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 PROFIBUS 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-DP.

## 4.9 Disposal and recycling of waste electronic equipment

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



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### 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.

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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](http://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                  | PROFIBUS DP  |
|----------------------|--|
| System status        | <b>SYS</b><br> Yellow/green |
| Communication status | <b>STA</b><br> Green        |
| Communication status | <b>ERR</b><br> Red          |

Table 14: LEDs PROFIBUS DP

### 5.2 System LED

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











| LED  | Color  | State  | Description   |
|--|--|--|---|
| <b>SYS</b>   | 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)/<br> (green) | Blinking,<br>3x yellow,<br>3x green  | Firmware crash, unrecoverable (an internal exception occurred that cannot be handled) |
|  |  (yellow)/<br> (green) | Blinking, 1 Hz   | Firmware update mode active: The firmware is idle and waiting for the update file.    |
|  |  (yellow)/<br> (green) | Blinking, 4 Hz   | Firmware update mode active: A firmware update is being installed.                    |
|  (gray) | Off  | <ul style="list-style-type: none"> <li>No supply voltage: No supply voltage for the device or hardware defect.</li> <li>During a firmware reset</li> </ul> |   |

Table 15: States of the SYS-LED

| LED state                                | Definition  |
|--|---|
| Blinking                                 | The LED turns on and off in phases.   |
| Blinking,<br>3x yellow,<br>3x green      | The LED turns on and off, with a frequency of approx. 1 Hz: <ul style="list-style-type: none"> <li>3x yellow "On" for 500 ms and "Off" for 500 ms and</li> <li>3x green "On" for 500 ms and "Off" for 500 ms.</li> </ul>  |
| Blinking,<br>yellow/green,<br>1 Hz, 4 Hz | The LED turns on in phases yellow or green, with a frequency of approx.: <ul style="list-style-type: none"> <li>1 Hz: 1 x yellow "On" for 500 ms and 1 x green "On" for 500 ms,</li> <li>4 Hz: 1 x yellow "On" for 125 ms and 1 x green "On" for 125 ms.</li> </ul> |

Table 16: Definitions of the states of the SYS LED

### 5.3 PROFIBUS DP Slave

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








| LED | Color   | State                    | Description  |
|-----|---|--------------------------|--|
| STA | <b>Duo LED red/green</b>  |                          |  |
|     |  (green) | On                       | RUN, cyclic communication  |
|     |  (green) | Flashing, cyclic (2 Hz)  | Master is in CLEAR state.  |
|     |  (off)   | Off                      | ERR LED is off: The device is not switched on or supply voltage is missing.<br>ERR LED flashes or in "on" state: See descriptions ERR LED. |
| ERR | <b>Duo LED red/green</b>  |                          |  |
|     |  (red)   | Flashing, acyclic (1 Hz) | The device is not configured.  |
|     |  (red)   | Flashing, cyclic (2 Hz)  | STOP, no communication, connection error   |
|     |  (red)   | On                       | Wrong PROFIBUS DP configuration  |
|     |  (off)   | Off                      | <b>No error:</b> There is no error, respectively see description for STA LED.  |

Table 17: LED states for the PROFIBUS DP Slave protocol

| LED states               | Definition  |
|--------------------------|---|
| Flashing, acyclic (1 Hz) | The LED turns on and off in irregular intervals, with a frequency of 1 Hz: "on" for 750 ms, followed by "off" for 250 ms. |
| Flashing, cyclic (2 Hz)  | The LED turns on and off with a frequency of 2 Hz: "on" for 250 ms, followed by "off" for 250 ms.                         |

Table 18: LED state definitions for the PROFIBUS DP Slave protocol

## 6 Connectors

### 6.1 PROFIBUS interface

Potential-free RS-485 interface:

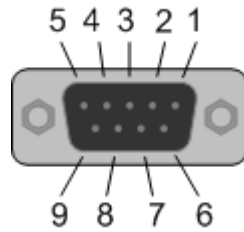


Figure 7: PROFIBUS interface (DSub socket connector, 9 pin), X201

| Connection with DSub socket | Signal    | Description   |
|-----------------------------|-----------|---|
| 3                           | RxD/TxD-P | Receive/transmit data P or connection B on the socket |
| 5                           | DGND      | Data reference potential                              |
| 6                           | VP        | Positive supply voltage                               |
| 8                           | RxD/TxD-N | Receive/transmit data-N or connection A on the plug   |

Table 19: Pin assignment of the PROFIBUS interface, X201

## 6.2 Cable connector fieldbus X802 on the basic card

Pin assignment for cable connector fieldbus X802 (10FMN-BMT-A-TF) on the basic card CIFX M224290BM, 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) | RE LED COM0 (red/green) | Output         |

Table 20: Pin assignment for cable connector fieldbus X802 (10FMN-BMT-A-TF) on CIFX M223090AE or CIFX M224290BM

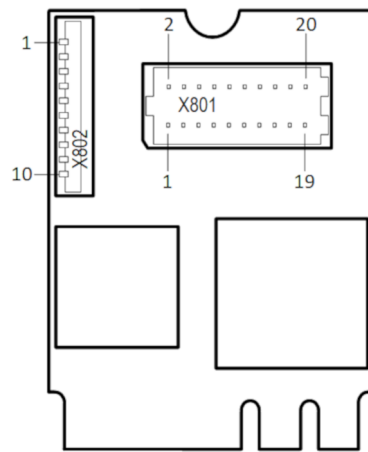


Figure 8: Connector fieldbus X802 (1x10 pins) on CIFX M223090AE

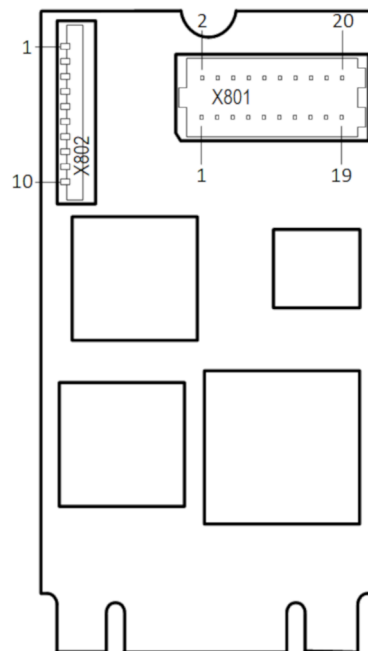


Figure 9: Connector fieldbus X802 (1x10 pins) on CIFX M224290BM

## 6.3 Cable connector fieldbus X103 on AIFX-V2-DP

Pin assignment for cable connector fieldbus X103 on AIFX-V2-DP, 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   | EN_PB        | Enable PROFIBUS         | Input / Output |
| 8   | -            | (not used)              | NC             |
| 9   | RSTOUT#      | Reset out               | Input          |
| 10  | MLED0 (COM0) | RE LED COM0 (red/green) | Input          |

Table 21: Pin assignment for cable connector fieldbus X103 on AIFX-V2-DP

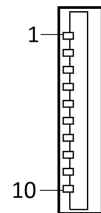


Figure 10: Cable connector fieldbus X103 (1x10 pins) on AIFX-V2-DP

## 6.4 PCI Express M.2 Bus, CIFX M223090AE

The following table applies for pin assignment on the PCI Express M.2 bus of the PC card CIFX M223090AE (basic card).

| Pin   | Name     | Description  | Type   |
|-------|----------|--|--------|
| 1     | GND      | Return current path.   | Power  |
| 2     | 3.3V     | 3.3V power supply  | Power  |
| 3     | NC       | (not used)   | -      |
| 4     | 3.3V     | 3.3V power supply  | Power  |
| 5     | NC       | (not used)   | -      |
| 6     | RESV     | Reserved   | -      |
| 7     | GND      | Return current path.   | Power  |
| 8-15  | -        | KEY A  | -      |
| 16    | NC       | (not used)   | -      |
| 17    | NC       | (not used)   | -      |
| 18    | GND      | Return current path.   | Power  |
| 19-23 | NC       | (not used)   | -      |
| 24-31 | -        | KEY E  | -      |
| 32    | NC       | (not used)   | -      |
| 33    | GND      | Return current path.   | Power  |
| 34    | NC       | (not used)   | -      |
| 35    | PERp0    | PCIe RX differential signal defined by the PCI Express CEM Specification.  | Input  |
| 36    | NC       | (not used)   | -      |
| 37    | PERn0    | PCIe RX differential signal defined by the PCI Express CEM Specification.  | Input  |
| 38    | NC       | (not used)   | -      |
| 39    | GND      | Return current path.   | Power  |
| 40    | SYNC1    | Synchronization pin for real-time systems  | I/O    |
| 41    | PETp0    | PCIe TX differential signal defined by the PCI Express CEM Specification.  | Output |
| 42    | SYNC0    | Synchronization pin for real-time systems  | I/O    |
| 43    | PETn0    | PCIe TX differential signal defined by the PCI Express CEM Specification.  | Output |
| 44    | NC       | (not used)   | -      |
| 45    | GND      | Return current path.   | Power  |
| 46    | NC       | (not used)   | -      |
| 47    | REFCLKp0 | PCIe Reference Clock signals (100 MHz) defined by the PCI Express CEM Specification.   | Input  |
| 48    | NC       | (not used)   | -      |
| 49    | REFCLKn0 | PCIe Reference Clock signals (100 MHz) defined by the PCI Express CEM Specification.   | Input  |
| 50    | NC       | (not used)   | -      |
| 51    | GND      | Return current path.   | Power  |
| 52    | PERST#   | PCIe Reset is a functional reset to the card as defined by the PCI Express Mini CEM Specification.   | Input  |
| 53    | 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    |
| 54    | NC       | (not used)   | -      |
| 55    | 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    |
| 56    | NC       | (not used)   | -      |
| 57    | GND      | Return current path.   | Power  |
| 58-62 | NC       | (not used)   | -      |
| 63    | GND      | Return current path.   | Power  |



| Pin   | Name | Description          | Type  |
|-------|------|----------------------|-------|
| 64-68 | NC   | (not used)           | -     |
| 69    | GND  | Return current path. | Power |
| 70    | NC   | (not used)           | -     |
| 71    | NC   | (not used)           | -     |
| 72    | 3.3V | 3.3V power supply    | Power |
| 73    | NC   | (not used)           | -     |
| 74    | 3.3V | 3.3V power supply    | Power |
| 75    | GND  | Return current path. | Power |

Table 22: Pin assignment PCI Express M.2 bus X201, CIFX M223090AE

## 6.5 PCI Express M.2 Bus, CIFX M224290BM

The following table applies for pin assignment on the PCI Express M.2 bus of the PC card CIFX M224290BM (basic card).

| Pin   | Name     | Description   | Type   |
|-------|----------|---|--------|
| 1     | CONFIG_3 | CONFIG_3 is connected to GND, for Host Interface = SSD-PCIe.  | Output |
| 2     | 3.3V     | 3.3V power supply   | Power  |
| 3     | GND      | Return current path.  | Power  |
| 4     | 3.3V     | 3.3V power supply   | Power  |
| 5-9   | NC       | (not used)  | -      |
| 10    | RESV     | Reserved  | Input  |
| 11    | NC       | (not used)  | -      |
| 12-19 | -        | KEY B   | -      |
| 20    | SYNC0    | Synchronization pin for real-time systems   | I/O    |
| 21    | CONFIG_0 | CONFIG_0 is connected to GND, for Host Interface = SSD-PCIe.  | Output |
| 22    | SYNC1    | Synchronization pin for real-time systems   | I/O    |
| 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 differential signal defined by the PCI Express CEM Specification.   | Output |
| 42    | NC       | (not used)  | -      |
| 43    | PETp0    | PCIe TX differential signal 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 RX differential signal defined by the PCI Express CEM Specification.   | Input  |
| 48    | NC       | (not used)  | -      |
| 49    | PERp0    | PCIe RX differential signal 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. | I/O    |
| 53    | REFCLKN  | PCIe Reference Clock signals (100 MHz) defined by the PCI Express CEM Specification.  | Input  |

| Pin   | Name     | Description  | Type   |
|-------|----------|--|--------|
| 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. | I/O    |
| 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)   | -      |
| 59-66 | -        | KEY M  | -      |
| 67-68 | NC       | (not used)   | -      |
| 69    | CONFIG_1 | CONFIG_1 is connected to GND, for Host Interface = SSD-PCIe.   | Output |
| 70    | 3.3V     | 3.3V power supply  | Power  |
| 71    | GND      | Return current path.   | Power  |
| 72    | 3.3V     | 3.3V power supply  | Power  |
| 73    | GND      | Return current path.   | Power  |
| 74    | 3.3V     | 3.3V power supply  | Power  |
| 75    | CONFIG_2 | CONFIG_2 is connected to GND, for Host Interface = SSD-PCIe.   | Output |

*Table 23: Pin assignment PCI Express M.2 bus X201, CIFX M224290BM*

## 7 Technical data

### 7.1 PC cards CIFX M223090AE-DP\F, CIFX M224290BM-DP\F

| Category                 | Parameter   | Value  |                   |
|--------------------------|---|--|-------------------|
| Part                     |   | Name   | Part number       |
|                          | PC card (basic card with AIFX-V2-DP)  | CIFX M223090AE-DP\F  | 1443.401          |
|                          |   | CIFX M224290BM-DP\F  | 1445.401          |
|                          | Basic card  | CIFX M223090AE   | 1443.100          |
|                          |   | CIFX M224290BM   | 1445.100          |
| Function                 | Communication interface <ul style="list-style-type: none"> <li>• M.2 2230 key A+E (for CIFX M223090AE) or</li> <li>• M.2 2242 key B+M (for CIFX M224290BM),</li> </ul> with PCI Express M.2 interface and PROFIBUS interface.<br>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  | PCI Express M.2, one-lane port   |                   |
|                          | Transmission rate   | 33 MHz   |                   |
|                          | Data access   | DPM  |                   |
|                          | Dual-Port Memory (DPM) data access width  | 32-Bit   |                   |
| PROFIBUS communication   | Supported fieldbus communication system   | PROFIBUS DP Slave  |                   |
| PROFIBUS interface       | Transmission rate   | 9.6 kBit/s, 19.2 kBit/s, 31.25 kBit/s, 45.45 kBit/s, 93.75 kBit/s, 187.5 kBit/s, 500 kBit/s, 1.5 MBit/s, 3 MBit/s, 6 MBit/s, 12 MBit/s   |                   |
|                          | Interface type  | RS 485   |                   |
|                          | Detached network interface PROFIBUS   | <b>Important!</b> Operating the PC card CIFX M223090AE-DP\F or CIFX M224290BM-DP\F requires proper connection of the detached network interface PROFIBUS AIFX-V2-DP to the basic card. |                   |
|                          | Connector AIFX-V2-DP  | Cable connector fieldbus X802 (JST 10FMN-BMT-A-TF, 1.0 mm pitch)   |                   |
| Diagnosis with LEDs      | LEDs  | <b>SYS</b>   | System status     |
| Power supply             | Supply voltage  | +3.3 VDC ±5%   |                   |
|                          | Current consumption at 3.3 V  | 330 mA (maximum)   |                   |
|                          | Connector   | via PCI Express Bus M.2  |                   |
| 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  |
|-------------------------------------|--|--|
| Device                              | Dimensions basic card (L x W x H)                              | CIFX M223090AE: 30 x 22 x 7.0 mm<br>CIFX M224290BM: 42 x 22 x 7.0 mm   |
|                                     | Component heights  | The component height on the top of the basic card CIFX M223090AE or CIFX M224290BM 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.<br><br>The component height on the bottom of the basic card CIFX M223090AE or CIFX M224290BM complies with the standard specifications. |
|                                     | Mounting/installation  | PCI Express slot (3.3 V), for <ul style="list-style-type: none"> <li>M.2-type 2230-D3 (for CIFX M223090AE), Dual key A-E (Socket 1 Connectivity)</li> <li>M.2-type 2242-D3 (for CIFX M224290BM), Dual key B-M (Socket 1 Connectivity)</li> </ul>   |
| 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 24: Technical data CIFX M223090AE-DP\F, CIFX M224290BM-DP\F

## 7.2 PCI identifiers on the PCI Express M.2 bus

The PC card CIFX M223090AE-DP\F is a multifunctional device at the PCI Express M.2 bus and requires two PCI identifiers. The following identifiers are valid:

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

Table 25: PCI identifiers on the PCI Express M.2 bus

### 7.3 AIFX-V2-DP

| Category                 | Parameter                                | Value   |                          |
|--------------------------|--|---|--------------------------|
| Part                     | Name                                     | AIFX-V2-DP  |                          |
|                          | Part number                              | 2801.400  |                          |
|                          | Description                              | Detached network interface PROFIBUS for all netX 90-based devices.<br><b>Important!</b> The detached network interface PROFIBUS AIFX-V2-DP 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)  |                          |
| PROFIBUS interface       | Galvanic isolation                       | isolated  |                          |
|                          | Isolation voltage                        | 1000 VDC (tested for 1 minute)  |                          |
|                          | Connector                                | SubD socket, 9-pin  |                          |
| Diagnosis with LEDs      | LEDs (on the reverse side of the device) | <b>STA</b>  | LED Communication status |
|                          |  | <b>ERR</b>  | LED Communication status |
| 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 14.3 mm, front panel width = 18.5 mm  |                          |
|                          | Mounting/installation                    | On the netX 90-based basic card:<br>Cable connector fieldbus X802.<br>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 26: Technical data AIFX-V2-DP

## 7.4 Communication protocols

### 7.4.1 PROFIBUS DP Slave

| Feature                                   | Description  |
|---|--|
| Maximum number of cyclic input data       | 244 bytes  |
| Maximum number of cyclic output data      | 244 bytes  |
| Maximum number of acyclic read/write data | 240 bytes  |
| Configuration data (maximum)              | 244 bytes  |
| Parameter data (maximum)                  | 237 bytes of application-specific parameters   |
| Key features                              | <ul style="list-style-type: none"> <li>• PROFIBUS DP-V0</li> <li>• PROFIBUS DP-V1 Class 1 and 2</li> <li>• Automatic baud rate detection</li> </ul>  |
| Supported state machines                  | <ul style="list-style-type: none"> <li>• FSPMS (Fieldbus Service Protocol Slave state machine)</li> <li>• MSCY1S (Master to Slave Cyclic state machine)</li> <li>• DMPMS (Data Link Mapping Protocol Slave state machine)</li> <li>• MSAC1S (Master Class1 to Slave Acyclic state machine)</li> <li>• MSAC2S (Master Class2 to Slave Acyclic state machine)</li> <li>• MSRM2S (Master Class2 to Slave Resource Manager state machine)</li> </ul> |
| Acyclic communication                     | <ul style="list-style-type: none"> <li>• DP-V1 Class 1 Read/Write</li> <li>• DP-V1 Class 1 Alarm</li> <li>• DP-V1 Class 2 Read/Write/Data Transport</li> </ul>   |
| Baud rate                                 | 9.6 kBits/s, 19.2 kBits/s, 31.25 kBits/s, 45.45 kBits/s, 93.75 kBits/s, 187.5 kBits/s, 500 kBits/s, 1.5 MBits/s, 3 MBits/s, 6 MBits/s, 12 MBits/s<br>Automatic baud rate detection is supported  |
| Data transport layer                      | PROFIBUS FDL   |
| Restrictions                              | <p>I&amp;M LR services other than ‚Call-REQ/RES‘ are not supported.</p> <p>DP-V2 SSCY1S – ‚Slave to Slave Cyclic Communication State Machine‘ is not implemented.</p> <p>DP-V2 ‚Data Exchange Broadcast‘ is not implemented.</p> <p>DP-V2 ‚Isochrone Mode‘ is not supported.</p> <p>DP-V2 MSCS1S – ‚Master to Slave Clock Synchronization‘ is not supported.</p>   |
| Reference to firmware/stack version       | 5.1  |

Table 27: Technical data PROFIBUS DP Slave

## 8 Dimensions

### 8.1 Tolerances of PCB dimensions

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

$B = [\text{width dimension of printed circuit board in mm}] \pm 0.2 \text{ mm}$

$L = [\text{Length dimension of the PCB in mm}] \text{ mm} \pm 0.2 \text{ mm}$

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  $= 0.8 \text{ mm} \pm 10 \%$ .



**Note:**

The dimensions (L x W x H) given in the chapter *Technical data* [▶ page 35] (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 M223090AE

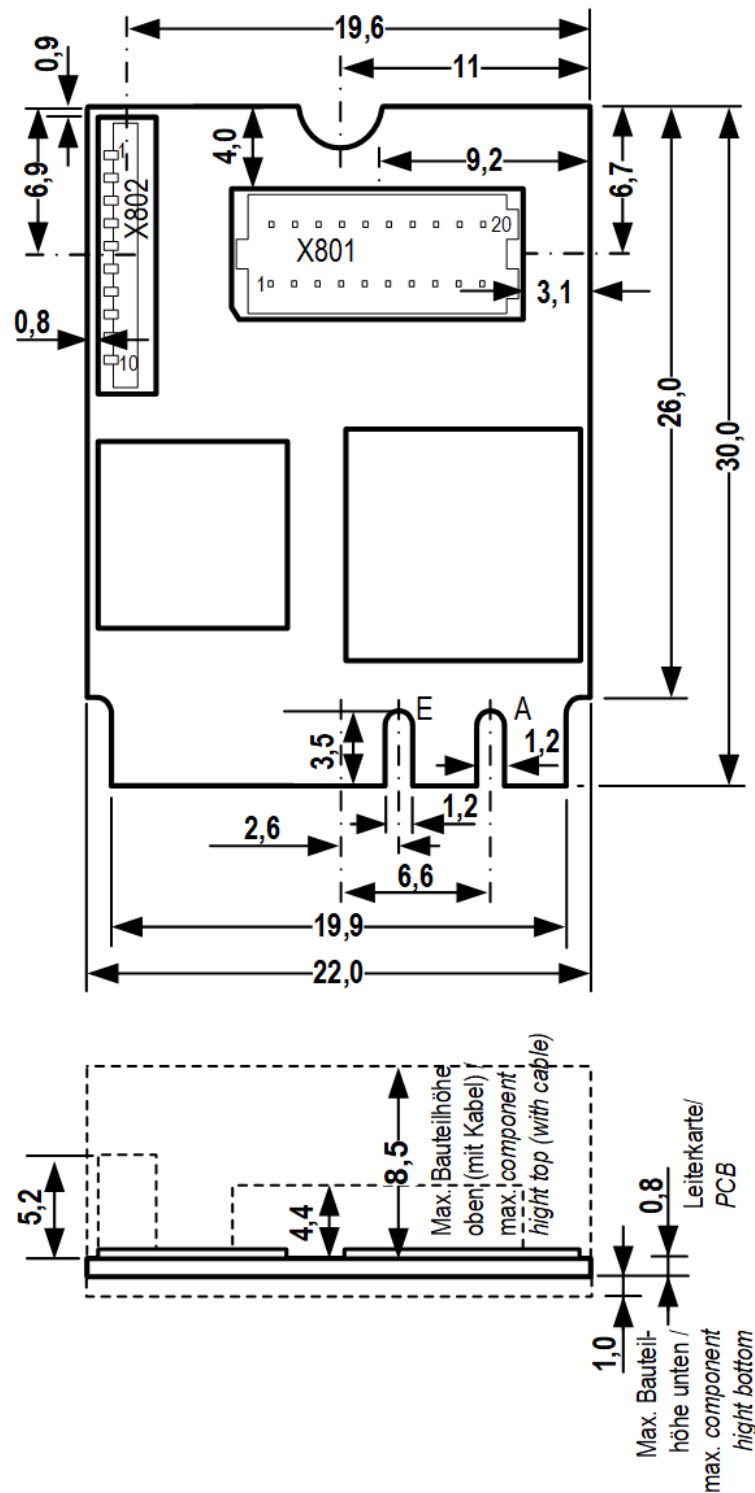


Figure 11: Dimensions CIFX M223090AE (Revision 5)



**Note:**

The height of the component on the top of the basic card M223090AE does not meet the standard specifications. For more information, see section *System Requirements* [▶ page 16].



### 8.3 Dimensions CIFS M224290BM

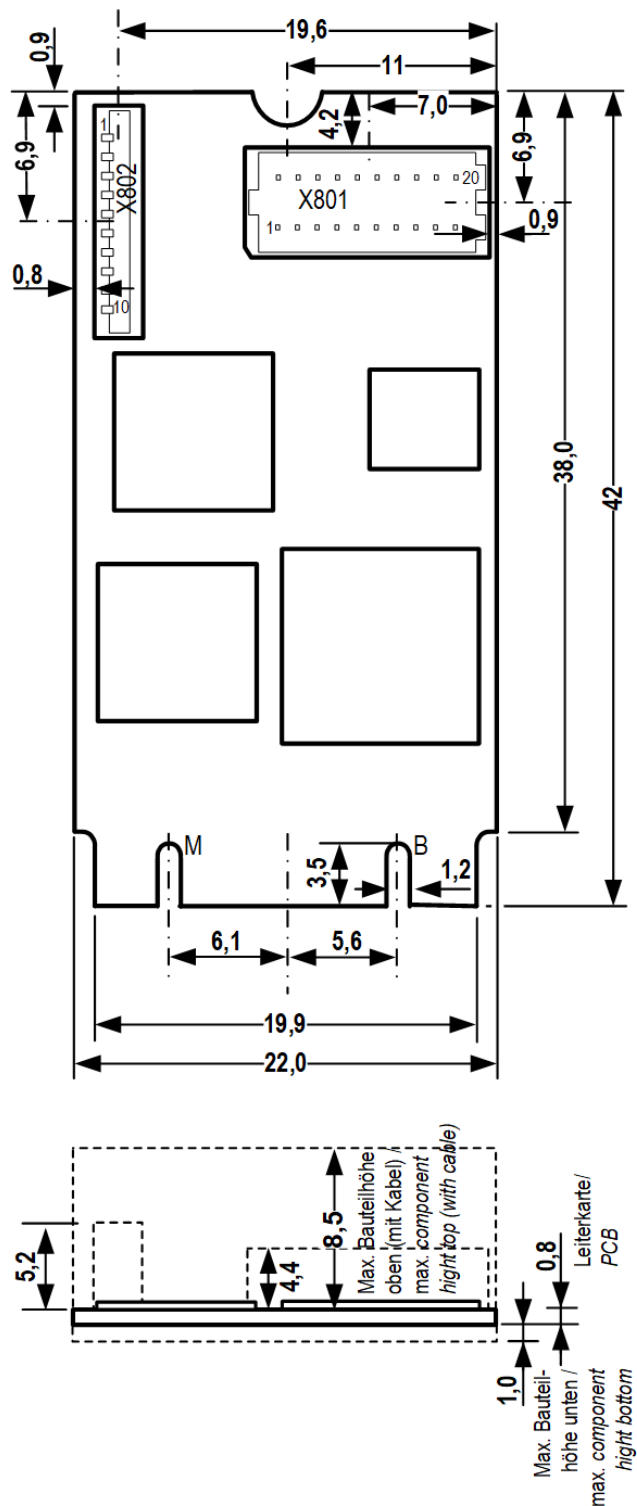


Figure 12: Dimensions CIFS M224290BM (Revision 2)



**Note:**

The height of the component on the top of the basic card M224290BM does not meet the standard specifications. For more information, see section *System Requirements* [▶ page 16].

### 8.4 Dimensions AIFX-V2-DP

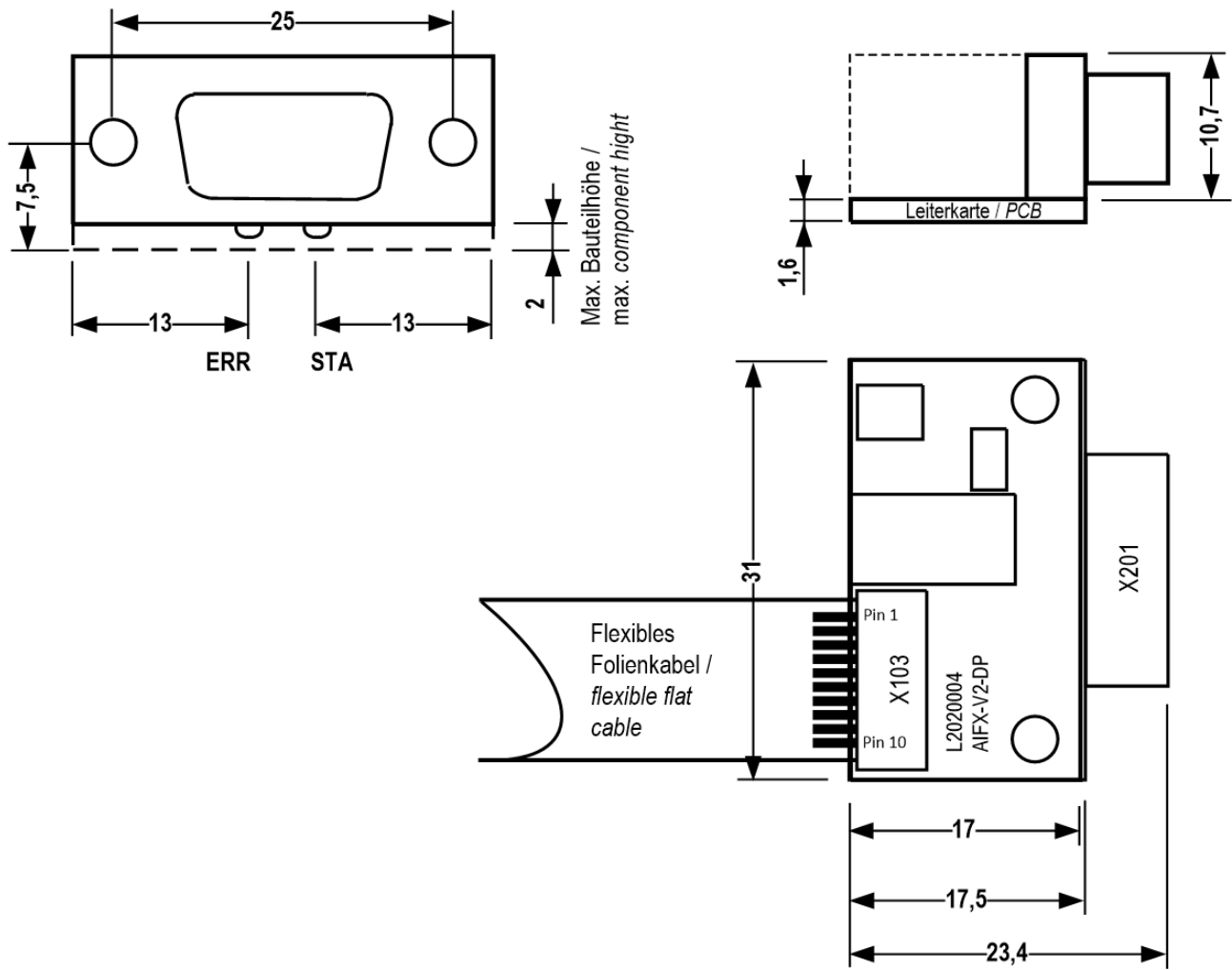


Figure 13: AIFX-V2-DP (Revision 4)

## 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, Version 1.2, English, 2019-06

#### **Protocol API Manuals**

Hilscher Gesellschaft für Systemautomation mbH: Protocol API, PROFIBUS DP Slave V5.2.0, Revision 2, DOC191004API02EN, English, 2022-02.

#### **Documentations on drivers and software**

Hilscher Gesellschaft für Systemautomation mbH: User manual, PC card CIFX M223090AE-DP\F PROFIBUS DP, Hardware description and installation, DOC200301UMxxEN, English, 2020-12

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 device, DOC190302OIxxEN, English, 2020-02

Hilscher Gesellschaft für Systemautomation mbH: Operating instruction manual, Communication Studio, Tool for configuration and diagnosis, 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, CIFS M223090AE, CIFS M224290BM and CIFS 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)<br><b>USA:</b> Warning of Personal Injury<br>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)<br>Danger to life, risk of injury by electric shock  |   |  |
|  | <b>USA:</b> Warning of hazardous voltage! (acc. to ANSI Z535.4)<br>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   |
|----------------|---|
| <b>DANGER</b>  | Indicates a hazardous situation, which if not avoided, will result in death or serious injury.  |
| <b>WARNING</b> | Indicates a hazardous situation, which if not avoided, could result in death or serious injury. |
| <b>CAUTION</b> | Indicates a hazardous situation, which if not avoided, may result in minor or moderate Injury.  |
| <b>NOTICE</b>  | Indicates a property damage message.  |

Table 29: Signal words

## 9.4 Legal notes

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## Glossary

|                           |   |
|---------------------------|---|
| <b>CANopen</b>            | 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. |
| <b>CIFX M223090AE</b>     | Communication interface in M.2 format with A+E key from Hilscher on the basis of the communication controller netX 90   |
| <b>CIFX M224290BM</b>     | Communication interface in M.2 format with B+M key from Hilscher on the basis of the communication controller netX 90   |
| <b>netX</b>               | networX on chip, Hilscher network communication controller. High integrated network controller with optimized system architecture for communication and maximum data transfer.  |
| <b>PROFIBUS</b>           | Process field bus: universal networking standard defined in IEC61158/IEC 61784  |
| <b>PROFIBUS DP</b>        | PROFIBUS Decentralized Peripherals  |
| <b>PROFIBUS DP Master</b> | Device that initiates the data transfer on the bus and which is an active network node, that is authorized and able to send data without external request   |
| <b>PROFIBUS DP Slave</b>  | Peripheral device, such as a IO device or a drive respectively passive participant without bus access authorization, which may only acknowledge received messages or requested by a master, may transmit messages to this one   |
| <b>Slave</b>              | Type of device that is configured by the master and which then performs the communication   |

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