

**User manual**  
**CIFX LPCIE90-RE**  
**PC card Low Profile PCI Express Industrial Ethernet Device**



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

DOC250705UM01EN | Revision 2 | English | 2026-03 | Released | Public

# Table of contents

<b>1</b>	<b>Introduction</b>	<b>4</b>
1.1	About the user manual	4
1.2	List of revisions	4
<b>2</b>	<b>Device</b>	<b>5</b>
2.1	PC card cifX	6
2.2	Revision or version status of hardware and software	8
2.3	Product software	9
2.4	Device label with matrix code	9
<b>3</b>	<b>Safety</b>	<b>10</b>
3.1	General note	10
3.2	Personnel qualification	10
3.3	Safety messages	10
3.3.1	Hazardous voltage, electric shock	10
3.3.2	Personal injury, device damage due to hot swap/hot plug	10
3.4	Property damage	11
3.4.1	Excessive supply voltage	11
3.4.2	Excessive signaling voltage	11
3.4.3	Electrostatic sensitive devices	11
3.4.4	Power drop during write and delete accesses in the file system	11
3.4.5	Exceeding the maximum number of permitted write and delete accesses	12
3.5	Information and data security	12
<b>4</b>	<b>Installing the hardware</b>	<b>13</b>
4.1	System Requirements	13
4.2	Requirements for operation	14
4.3	Overview installation and firmware download	15
4.4	Installation warnings	16
4.5	Installing the hardware	17
4.6	Hints for problem solving	18
4.7	Loading firmware and configuration in the device or making an update	19
<b>5</b>	<b>Diagnosis with LEDs</b>	<b>20</b>
5.1	Overview	20
5.2	System LED	21
5.3	EtherCAT SubDevice	22
5.4	EtherNet/IP Adapter	24
5.5	Open Modbus/TCP	26
5.6	POWERLINK Controlled Node	27
5.7	PROFINET IO-Device	29
5.8	Sercos Slave	30
5.9	CC-Link IE Field Basic Slave	32
<b>6</b>	<b>Connectors and switch</b>	<b>33</b>

6.1	Ethernet interface .....	33
6.1.1	Ethernet RJ45 sockets .....	33
6.1.2	Data of the Ethernet connection .....	33
6.1.3	Usability of hubs and switches .....	34
6.2	PCI Express (1 lane) .....	35
6.3	Rotary switch for slot number (card ID).....	36
6.4	SYNC connector, hardware and firmware.....	37
<b>7</b>	<b>Technical data .....</b>	<b>38</b>
7.1	Technical data CIFX LPCIE90-RE .....	38
7.2	PCI identifiers on the PCI Express bus .....	40
7.3	Supported PCI bus commands .....	40
7.4	Technical data of the communication protocols .....	41
<b>8</b>	<b>Removing the hardware .....</b>	<b>42</b>
8.1	Removing the PC card .....	42
8.2	Disposal and recycling of waste electronic equipment.....	43
<b>9</b>	<b>Appendix.....</b>	<b>44</b>
9.1	References.....	44
9.2	Legal notes.....	44
9.3	Registered trademarks.....	48
	<b>Contacts.....</b>	<b>52</b>

# 1 Introduction

## 1.1 About the user manual

This user manual for CIFX LPCIE90-RE (Low Profile PCI Express Industrial Ethernet Device) provides information about:

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

## 1.2 List of revisions

Revision	Date	Changes
1	2026-01-26	Created
2	2026-03-05	Description of slot number adjusted.
		Technical data updated.

*Table 1: List of revisions*

## 2 Device

The PC card CIFX LPCIE90-RE is a Hilscher communication interface based on the netX 90 communication controller.

PC card	Description
CIFX LPCIE90-RE	Low Profile PCI Express Industrial Ethernet Device
	Type (according to the PCI Express Card specification): PCI Express 1x
	PCI Express slot (3.3 V)

Table 2: PC card CIFX LPCIE90-RE

The use refers exclusively to slave systems. Depending on the firmware loaded, the PC card cifX performs the protocol-specific communication.

Data is exchanged between the connected devices and the PC or connecting device via the Dual-Port Memory.

## 2.1 PC card cifX

The elements of the device that are important for installation and operation can be identified by a position number in the following figure.

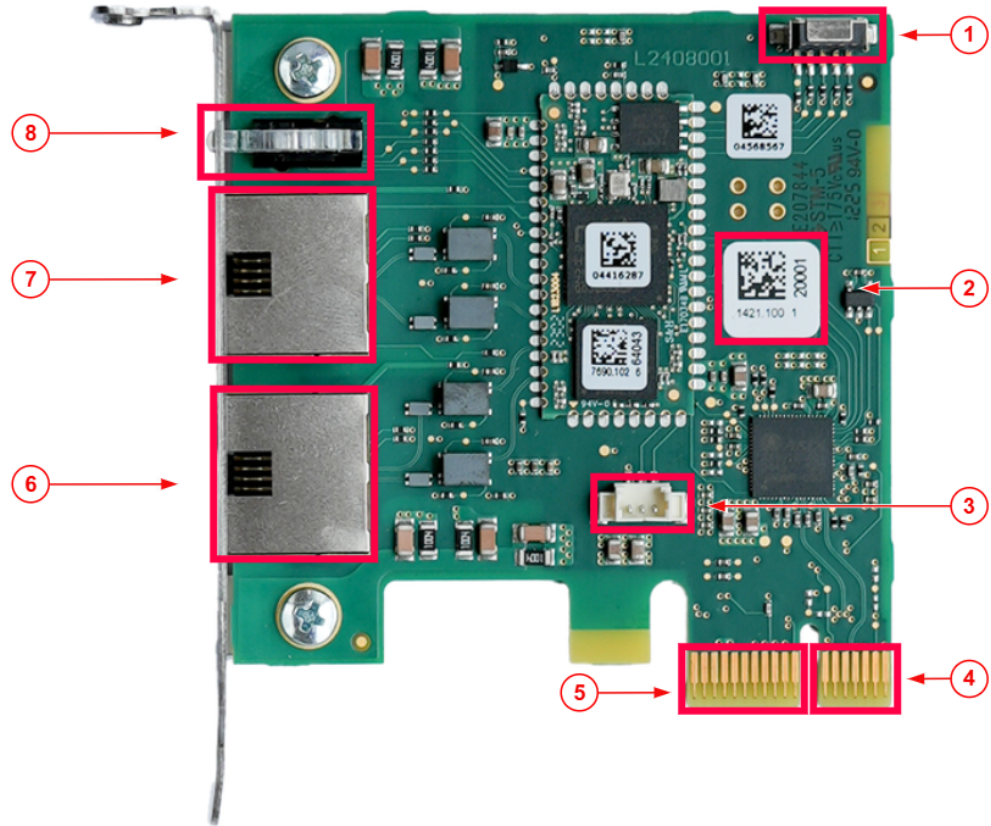


Figure 1: Position numbers of the CIFX LPCIE90-RE PC card

No.	Description
(1)	Rotary switch for slot number (card ID) [▶ page 36]
(2)	Matrix label [▶ page 9]
(3)	SYNC connector [▶ page 37]
(4)	PCI Express bus [▶ page 35] Mechanical key, pin 12 to pin 18 Top: Pin B12 ... pin B18, bottom: Pin A12 ... pin A18
(5)	PCI Express bus 1x [▶ page 35] Connector, pin 1 to pin 11 Top: Pin B1 ... pin B11, bottom: Pin A1 ... pin A11
(6)	Ethernet port channel 1, RJ45
(7)	Ethernet port channel 0, RJ45
(8)	System-LED [▶ page 21] (yellow/green), Communication status 0 and 1 (green/red) (see section <i>Diagnosis with LEDs</i> [▶ page 20] )

Table 3: Position numbers of the CIFX LPCIE90-RE PC card

**Slot cover and LED positions**

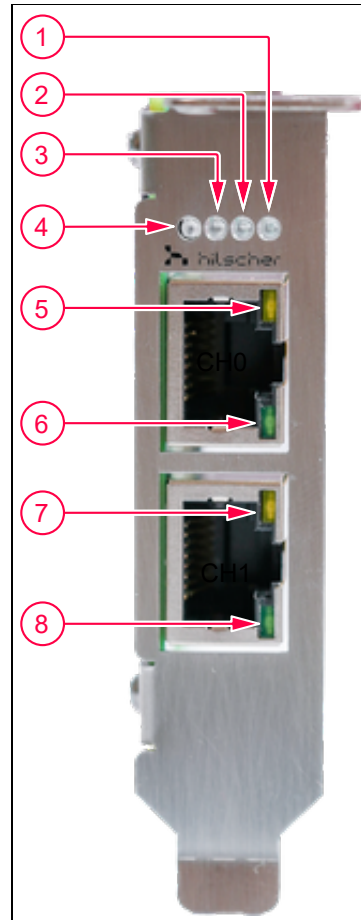


Figure 2: Slot cover and LED positions

No.	Description
(1)	SYS (System LED)
(2)	COM0 (communication status 0)
(3)	COM1 (communication status 1)
(4)	Not used
(5)	Ethernet channel 0 Activity
(6)	Ethernet channel 0 Link
(7)	Ethernet channel 1 Activity
(8)	Ethernet channel 1 Link

Table 4: Legend of the slot cover of the PC card CIFX LPCIE90-RE



**Note:**

The status of the LEDs are described in chapter *Diagnosis with LEDs* [▶ page 20].

## 2.2 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.

Name of device	Description	Part no.	Hardware revision
CIFX LPCIE90-RE	PC card cifX Low Profile PCI Express Industrial Ethernet Device	1421.100	2

Table 5: Hardware revisions

Drivers and software	Name	Version
Device driver	cifX Device Driver	2.3 or higher
Software for downloading the firmware	Device Explorer	1.4
Configuration software	Communication Studio	1.4

Table 6: Versions for drivers and software

The following table lists the supported protocols. The firmware version column indicates the minimum version of the firmware.

Protocol	File name	Firmware version
PROFINET IO-Device	X090D001.nxi	5.7
EtherNet/IP Adapter	X090H001.nxi	5.5
EtherCAT SubDevice	X090F001.nxi	5.5
Open Modbus/TCP	X090L001.nxi	5.3
Sercos Slave	X090J001.nxi	5.2
POWERLINK Controlled Node	X090K001.nxi	5.3
CC-Link IE Field Basic Slave	X090Y001.nxi	5.1

Table 7: Firmware (protocol and file name)

The following table lists the supported protocols with IoT function. The firmware version column indicates the minimum version of the firmware. Note that the firmware consists of two files.

Protocol	File name	Firmware version
PROFINET IO-Device (IoT)	X096D001.nxi and X096D001.nxe	2.4
EtherNet/IP Adapter (IoT)	X096H001.nxi and X096H001.nxe	2.4
Open Modbus/TCP (IoT)	X096L001.nxi and X096L001.nxe	2.4

Table 8: Firmware with IoT function (protocol and file name)



### Note:

Unless otherwise specified, the firmware version in this manual is the same as the stack version.

## 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 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 drawing.

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

The identification label contains the following information:

Position	Description
(1)	Part number
(2)	Hardware revision
(3)	Serial number

Table 9: Identification label



Figure 3: Identification label (example)

## 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 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

### 3.3 Safety messages

#### 3.3.1 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.

#### 3.3.2 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.

## 3.4 Property damage

### 3.4.1 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.

### 3.4.2 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!

### 3.4.3 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.

### 3.4.4 Power drop during write and delete accesses in the file system

The FAT file system in the netX firmware is subject to certain limitations in its operation. Write and delete accesses in the file system (firmware update, configuration download etc.) can destroy the FAT (File Allocation Table) if the accesses cannot be completed if the power drops. Without a proper FAT, a firmware may not be found and cannot be started.

- Make sure that the power supply of the device does not drop during write and delete accesses in the file system (firmware update, configuration download etc.).

### 3.4.5 Exceeding the maximum number of permitted write and delete accesses

This device uses a serial Flash device to store retentive data, such as storing the firmware, saving the configuration, and so on. This device allows a maximum of 100,000 write/delete accesses, which are sufficient for normal operation of the device. However, too frequent write/delete of the device (e.g. changing the configuration or changing the station name) leads to the maximum number of permitted write/delete accesses being exceeded and to damage to the device. 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 will be reached after approximately 69 days.

Avoid exceeding the maximum permitted write/delete accesses of writing too frequently.

## 3.5 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

For installation of the PC card CIFX LPCIE90-RE, a PC or connection device with a PCI Express slot (host interface) is required to mount the PC card.

#### Host interface

PC card	Type	Supply voltage (1)	Current consumption (2)	Signal voltage (3)
CIFX LPCIE90-RE	PCI Express slot (3.3 V)	+3.3 VDC -5% / +9%	See section <i>Technical data</i> [▶ page 38].	PCIe compatible

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 -5% / +9%).

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

#### Operating system

For Device Explorer and Communication Studio: Windows® 10, Windows® 11.

## 4.2 Requirements for operation

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

Requirements	Specification	See section
Communication	<p>For communication of a PC card (device), a controller device is required for the communication system used.</p> <p>To configure the controller device, you need a device description file for the device used with the name for:</p> <ul style="list-style-type: none"> <li>• <b>EtherCAT Slave:</b> Hilscher CIFX RE NETX90 ECS.xml</li> <li>• <b>EtherNet/IP Adapter:</b> HILSCHER CIFX-RE NETX90 EIS V1.1.EDS,</li> <li>• <b>POWERLINK Controlled Node:</b> 00000044_NETX_90 RE PLS.xdd</li> <li>• <b>PROFINET IO-Device:</b> GSDML-V2.35-HILSCHER-CIFX NETX_90 RE PNS-YYYYMMDD.xml.</li> <li>• <b>Open Modbus/TCP:</b> A device description file is not required for Open Modbus/TCP.</li> <li>• <b>SERCOS Slave:</b> SDDML#v3.0#Hilscher#NETX_90_RE-FIXCFG_FSPIO#yyyy-mm-dd.xml</li> <li>• <b>CC-Link IE Field Basic Slave:</b> 0x0352_CIFX RE CCIEBS_1_en.cspp</li> </ul> <p>The settings in the used controller must match the settings in the device.</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>	Revision or version status of hardware and software and References (Driver and software documentation)
Firmware Download	The user must select the firmware using the software and download it to the PC card. The firmware contains a communication protocol.	
Configuration	The PC card must be configured using the <b>Communication Studio</b> 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 the PC card CIFX LPCIE90-RE.

Step	Description	See section
Download 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>	Revision or version status of hardware and software
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>Open the housing of the PC or connecting device.</li> <li>Insert the PC card into the PCI Express slot and attach the PC card. Do not exert unnecessary force on the PC card.</li> <li>Close the housing of the PC or connecting device.</li> </ul>	Installing the hardware
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>	Loading firmware and configuration in the device or making an update

*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.

## 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**

#### **Dangerous electrical voltage!**

#### **Risk of death, risk of injury from electric shock**



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



- First disconnect the power plug of the PC (or connection device), before opening the housing.
- Make sure that the PC (or connection device) is disconnected from the mains voltage.

### *CAUTION*

#### **Personal injury, device damage due to hot swap/hot plug**



The PC card is not designed or intended for a hot-swap or hot-plug connection.

Performing hot-swap or hot-plug may pose a hazard to the PC card, the system platform and the person performing the action.

### *NOTICE*

#### **Electrostatically sensitive devices**



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

### **Installation warnings (USA)**

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

## 4.5 Installing the hardware

Install the CIFX LPCIE90-RE PC card in the PC or connecting device as described below.

### 1. Preparation

Note the requirements and prerequisites described in the sections System Requirements and Requirements for operation.

### 2. 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. 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 connecting device.
- Insert the PC card into the PCI Express slot.
- Close the housing of the PC or connecting device.
- Reconnect the PC or the connection device to the mains.

## 4.6 Hints for problem solving

In case of an error or a malfunction of the PC card cifX CIFX LPCIE90-RE observe the following information for problem solving:

### General

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

### SYS and COM status 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 LEDs COM0 (red/green) and COM1 (red/green) indicate the status of the communication and can be switched on or off permanently or in phases, flash or they blink cyclically or acyclically.

If the SYS LED lights static green and the COM LEDs behave as shown in the table below, the PC card cifX is in the "in operation" state. The PC card is in the state of cyclic communication with the connected controller. The communication between the controller and the PC card is operating normally.

LED	EtherCAT SubDevice	EtherNet/IP Adapter	Open Modbus/TCP	POWERLINK Controlled Node	PROFINET IO-Device	Sercos Slave	CC-Link IE Field Basic Slave
COM 0	RUN ● (green)	MS ● (green)	RUN ● (green)	BS ● (green)	SF ● (off)	S ● (green)	RUN ● (green)
COM 1	ERR ● (off)	NS ● (green)	ERR ● (off)	BE ● (off)	BF ● (off)	● (off)	ERR ● (off)

Table 13: Behavior of the communication status LEDs in the "in operation" status

### Ethernet LEDs

- Check the status of the Ethernet LEDs (LINK or L/A) to see if there is a connection to the Ethernet.

### Cable

- Check whether the pin assignment of the used cable is correct which you have connected from the PC card (device) to the controller.

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.

## 4.7 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.

# 5 Diagnosis with LEDs

## 5.1 Overview



**Note:**

The communication status and Ethernet LEDs on the device are determined by the loaded protocol firmware.

LED		EtherCAT SubDevice	EtherNet/IP Adapter	Open Modbus/TCP	POWERLINK Controlled Node	PROFINET IO-Device	Sercos Slave	CC-Link IE Field Basic Slave
<b>SYS</b> System status ● Yellow ● Green Yellow/green		<b>SYS</b>	<b>SYS</b>	<b>SYS</b>	<b>SYS</b>	<b>SYS</b>	<b>SYS</b>	<b>SYS</b>
<b>COM 0</b> Communication status	● Green	<b>RUN</b> ● Green Green	<b>MS</b> ● Red ● Green Red/green	<b>RUN</b> ● Green Green	<b>BS</b> ● Green Green	<b>SF</b> ● Red Red	<b>S</b> ● Red ● Green ● Orange Red/green/orange	<b>RUN</b> ● Green Green
<b>COM 1</b> Communication status		<b>ERR</b> ● Red Red	<b>NS</b> ● Red ● Green Red/green	<b>ERR</b> ● Red Red	<b>BE</b> ● Red Red	<b>BF</b> ● Red Red	-	<b>ERR</b> ● Red Red
<b>Ethernet Ch 0</b>	● Green	<b>L/A IN</b>	<b>LINK</b>	<b>LINK</b>	<b>LINK</b>	<b>LINK</b>	<b>L/A</b>	<b>L/A</b>
	● Yellow	-	<b>ACT</b>	<b>ACT</b>	<b>RX/TX</b>	<b>RX/TX</b>	-	-
<b>Ethernet Ch 1</b>	● Green	<b>L/A OUT</b>	<b>LINK</b>	<b>LINK</b>	<b>LINK</b>	<b>LINK</b>	<b>L/A</b>	<b>L/A</b>
	● Yellow	-	<b>ACT</b>	<b>ACT</b>	<b>RX/TX</b>	<b>RX/TX</b>	-	-

Table 14: LEDs Real-Time Ethernet systems

Category	LED	Name	Category	LED	Name
System status	SYS	System status	Ethernet	LINK	Link
Communication status	COM	Communication status		ACT	Activity
	RUN	Run		L/A	Link/Activity
	ERR	Error		L/A IN	Link/Activity In
	MS	Module status		L/A OUT	Link/Activity Out
	NS	Network status		RX/TX	Receive/Transmit
	BS	Bus state			
	BE	Bus error		-	-
	SF	System error		-	-
	BF	Bus failure		-	-
	S	Status / error	-	-	

Table 15: LED names

## 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	<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 16: 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: <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, yellow/green, 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 17: Definitions of the states of the SYS LED

### 5.3 EtherCAT SubDevice

For the EtherCAT SubDevice protocol, the communication LEDs **RUN** and **ERR** as well as the Ethernet LED **L/A IN** and **L/A OUT** can be in one of the states described below.

#### Communication status EtherCAT SubDevice

LED	Color	State	Description
<b>RUN</b> Position on the slot cover: (2)	<b>Duo LED red/green</b>		
	● (off)	Off	<b>INIT:</b> The device is in INIT state.
	☀ (green)	Blinking (2.5 Hz)	<b>PRE-OPERATIONAL:</b> The device is in PRE-OPERATIONAL state.
	☀ (green)	Single flash	<b>SAFE-OPERATIONAL:</b> The device is in SAFE-OPERATIONAL state.
	● (green)	On	<b>OPERATIONAL:</b> The device is in the OPERATIONAL state.
<b>ERR</b> Position on the slot cover: (3)	<b>Duo LED red/green</b>		
	● (off)	Off	<b>No error:</b> The EtherCAT communication of the device is in working condition.
	☀ (red)	Blinking (2.5 Hz)	<b>Invalid configuration:</b> General Configuration Error Possible reason: State change commanded by master is impossible due to register or object settings.
	☀ (red)	Single flash	<b>Local error:</b> Application has changed the EtherCAT state autonomously. Possible reason 1: A host watchdog timeout has occurred. Possible reason 2: Synchronization Error, device enters Safe-Operational automatically.
	☀ (red)	Double flash	<b>Application watchdog timeout:</b> An application watchdog timeout has occurred. Possible reason: Sync Manager Watchdog timeout.

Table 18: Communication status EtherCAT SubDevice

LED state	Definition
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).

Table 19: Definition LED states communication status

**Ethernet status EtherCAT SubDevice**





LED	Color	State	Description
L/A IN, L/A OUT Ch0 (6) , Ch1: (8)	<b>LED green</b>		
	 (green)	On	<b>Link:</b> The device is linked to the Ethernet, but does not send/receive Ethernet frames.
	 (green)	Flickering (load dependent)	<b>Activity:</b> The device is linked to the Ethernet and sends/receives Ethernet frames.
	 (off)	Off	The device has no link to the Ethernet.
Ch0 (5) , Ch1: (7)	<b>LED yellow</b>		
	 (off)	Off	This LED is not used.

Table 20: Ethernet status EtherCAT SubDevice

LED state	Definition
Flickering (load dependent)	The LED turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: "On" for approximately 50 ms, followed by "Off" for 50 ms. The LED turns on and off in irregular intervals to indicate low Ethernet activity.

Table 21: Definition LED states Ethernet status

## 5.4 EtherNet/IP Adapter

For the EtherNet/IP Adapter protocol, the communication LEDs **MS** and **NS** as well as the Ethernet LEDs **LINK** and **ACT** can assume the states described below.

### Communication status EtherNet/IP Adapter















LED	Color	Status	Description
<b>MS</b> (Module status) Position on the slot cover: (2)	<b>Duo-LED red/green</b>		
	 (green)	On	<b>Device operational:</b> The device is operating correctly.
	 (green)	Flashing (1 Hz)	<b>Standby:</b> The device has not been configured.
	 (green/red/green)	Flashing fast green/red/green	<b>Self-test:</b> The device performs a self-test after power-on. The following sequence is displayed during the self-test: <ul style="list-style-type: none"> <li>• NS LED off.</li> <li>• MS LED turns green for approx. 250 ms, turns red for approx. 250 ms and turns green again (and holds this status until the test is completed).</li> <li>• NS LED turns green for approx. 250 ms, turns red for approx. 250 ms and then turns off (and holds this status until the test is completed).</li> </ul>
	 (red/green/off)	Flashing sequence red/green/off	<b>Flashing sequence:</b> The flashing sequence is used to visually identify the device. The scanner can start the flashing sequence in Identity object 1 of the device. The MS LED and NS LED perform the flashing sequence simultaneously.
	 (red)	Flashing (1 Hz)	<b>Major recoverable fault:</b> The device has detected a major recoverable fault. E. g., an incorrect or inconsistent configuration can be considered a major recoverable fault.
	 (red)	On	<b>Major unrecoverable fault:</b> The device has detected a major unrecoverable fault.
 (off)	Off	<b>No power:</b> The device is powered off.	
<b>NS</b> (Network status) Position on the slot cover: (3)	<b>Duo-LED red/green</b>		
	 (green)	On	<b>Connected:</b> An IP address is configured, at least one CIP connection (any transport class) is established, and an Exclusive Owner connection has not timed out.
	 (green)	Flashing (1 Hz)	<b>No connections:</b> An IP address is configured, but no CIP connections are established, and an Exclusive Owner connection has not timed out.
	 (green/red/green)	Flashing fast green/red/green	<b>Self-test:</b> The device performs a self-test after power-on. Refer to the description of the MS LED in the self-test status.
	 (red/green/off)	Flashing sequence red/green/off	<b>Flashing sequence:</b> The flashing sequence is used to visually identify the device. The scanner can start the flashing sequence in Identity object 1 of the device. The MS LED and NS LED perform the flashing sequence simultaneously.
	 (red)	Flashing (1 Hz)	<b>Connection timeout:</b> An IP address is configured, and an Exclusive Owner connection for which this device is the target has timed out.  The NS LED returns to steady green only when all timed out Exclusive Owner connections are reestablished.
	 (red)	On	<b>Duplicate IP:</b> The device has detected that its IP address is already in use.
 (off)	Off	<b>Not powered, no IP address:</b> The device does not have an IP address (or is powered off).	

Table 22: Communication status EtherNet/IP Adapter

LED status	Definition
Flashing (1 Hz)	The LED turns on and off with a frequency of 1 Hz: "On" for 500 ms, followed by "Off" for 500 ms.
Flashing fast green/red/green	The MS LED or NS LED turns on green "On" for 250 ms, then red "On" for 250 ms, then green "On" (until the test is completed).
Flashing sequence red/green/off	The MS LED and NS LED each turn red "On" for 500 ms, then green "On" for 500 ms, then "Off" for 500 ms. This flashing sequence is repeated at least 6 times.

Table 23: Definition of LED status of the communication status

### Ethernet status EtherNet/IP Adapter





LED	Color	State	Description
<b>LINK</b> Ch0 (6) , Ch1: (8)	<b>LED green</b>		
	 (green)	On	The device is linked to the Ethernet.
	 (off)	Off	The device has no link to the Ethernet.
<b>ACT</b> Ch0 (5) , Ch1: (7)	<b>LED yellow</b>		
	 (yellow)	Flickering (load dependent)	The device sends/receives Ethernet frames.
	 (off)	Off	The device does not send/receive Ethernet frames.

Table 24: Ethernet status EtherNet/IP Adapter

LED status	Definition
Flickering (load dependent)	The LED turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: "On" for approximately 50 ms, followed by "Off" for 50 ms. The LED turns on and off in irregular intervals to indicate low Ethernet activity.

Table 25: Definition of LED status of the Ethernet status

## 5.5 Open Modbus/TCP

For the OpenModbusTCP protocol, the communication LEDs **RUN** and **ERR** as well as the Ethernet LEDs **LINK** and **ACT** can assume the states described below.

### Communication status Open Modbus/TCP








LED	Color	State	Description
<b>RUN</b> Position on the slot cover: (2)	<b>Duo-LED red/green</b>		
	 (green)	On	<b>Connected:</b> OMB task has communication. At least one TCP connection is established.
	 (green)	Blinking (1 Hz)	<b>Ready, not configured yet:</b> OMB task is ready and not yet configured.
	 (green)	Blinking (5 Hz)	<b>Waiting for Communication:</b> OMB task is configured.
	 (off)	Off	<b>Not Ready:</b> OMB task is not ready.
<b>ERR</b> Position on the slot cover: (3)	<b>Duo-LED red/green</b>		
	 (off)	Off	No communication error
	 (red)	Flashing (2 Hz, 25% on)	System error
	 (red)	On	Communication error active

Table 26: Communication status Open Modbus/TCP

LED status	Definition
Flashing (1 Hz)	The LED turns on and off with a frequency of 1 Hz: "On" for 500 ms, followed by "Off" for 500 ms.
Flashing (5 Hz)	The LED turns on and off with a frequency of 5 Hz: "On" for 100 ms, followed by "Off" for 100 ms.
Flashing (2 Hz, 25% on)	The LED turns on and off with a frequency of 2 Hz: "On" for 125 ms, followed by "Off" for 375 ms.

Table 27: Definition of LED status of the communication status

### Ethernet status Open Modbus/TCP





LED	Color	State	Description
<b>LINK</b> Ch0 (6) , Ch1: (8)	<b>LED green</b>		
	 (green)	On	The device is linked to the Ethernet.
	 (off)	Off	The device has no link to the Ethernet.
<b>ACT</b> Ch0 (5) , Ch1: (7)	<b>LED yellow</b>		
	 (yellow)	Flickering (load dependent)	The device sends/receives Ethernet frames.
	 (off)	Off	The device does not send/receive Ethernet frames.

Table 28: Ethernet status Open Modbus/TCP

LED status	Definition
Flickering (load dependent)	The LED turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: "On" for approximately 50 ms, followed by "Off" for 50 ms. The LED turns on and off in irregular intervals to indicate low Ethernet activity.

Table 29: Definition of LED status of the Ethernet status

## 5.6 POWERLINK Controlled Node

For the POWERLINK Controlled Node protocol, the communication LEDs **BS** (Busstatus) and **BE** (Bus-Error) as well as the Ethernet LED L/A can assume the states described below.

### Communication status POWERLINK Controlled Node










LED	Color	State	Description
<b>BS</b> (Bus status) Position on the slot cover: (2)	<b>Duo LED red/green</b>		
	 (green)	On	Slave is in state <b>Operational</b> state.
	 (green)	Triple flash	Slave is in <b>ReadyToOperate</b> state.
	 (green)	Double flash	Slave is in <b>Pre-Operational 2</b> state.
	 (green)	Single flash	Slave is in <b>Pre-Operational 1</b> state.
	 (green)	Flickering (10 Hz)	Slave is in <b>Basic Ethernet</b> state.
	 (green)	Blinking (2.5 Hz)	Slave is in <b>Stopped</b> state.
	 (off)	Off	Slave initializing
<b>BE</b> (Bus error) Position on the slot cover: (3)	<b>Duo LED red/green</b>		
	 (off)	Off	Slave has no error
	 (red)	On	Slave has detected an error

Table 30: Communication status POWERLINK Controlled Node

LED state	Definition
Triple flash	The LED shows a sequence of three short flashes (each 200 ms), separated by a short "Off" phase (200 ms). The sequence is finished by a long "Off" phase (1,000 ms).
Double flash	The 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).
Single flash	The LED shows one short flash (200 ms) followed by a long "Off" phase (1,000 ms).
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. The red LED and the green LED are switched on alternately.
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. The red LED and the green LED are switched on alternately.

Table 31: Definition of LED states communication status

**Ethernet status POWERLINK Controlled Node**





LED	Color	State	Description
L/A Ch0 (6), Ch1: (8) Ch0 (5), Ch1: (7)	<b>LED green</b>		
	 (green)	On	<b>Link:</b> The device is linked to the Ethernet, but does not send/receive Ethernet frames.
	 (green)	Flickering (load dependent)	<b>Activity:</b> The device is linked to the Ethernet and sends/receives Ethernet frames.
	 (off)	Off	The device has no link to the Ethernet.
	<b>LED yellow</b>		
	 (off)	Off	This LED is not used.

Table 32: Ethernet status POWERLINK Controlled Node

LED state	Definition
Flickering (load dependent)	The LED turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: "On" for approximately 50 ms, followed by "Off" for 50 ms. The LED turns on and off in irregular intervals to indicate low Ethernet activity.

Table 33: Definition of LED state Ethernet status

## 5.7 PROFINET IO-Device

For the PROFINET IO-Device protocol, the communication LEDs **SF** (System failure) and **BF** (Bus error) as well as the Ethernet LEDs **LINK** and **RX/TX** can be in one of the states described below.

### Communication status PROFINET IO-Device

LED	Color	State	Description
<b>SF</b> (System Failure) Position on the slot cover: (2)	<b>Duo LED red/green</b>		
	● (off)	Off	No error
	☀ (red)	Flashing (1 Hz, 3 s)	DCP signal service is initiated via the bus.
	● (red)	On	Watchdog timeout; channel, generic or extended diagnosis present; system error
<b>BF</b> (Bus Failure) Position on the slot cover: (3)	<b>Duo LED red/green</b>		
	● (off)	Off	No error
	☀ (red)	Flashing (2 Hz)	No data exchange
	● (red)	On	No configuration; or low speed physical link; or no physical link

Table 34: Communication status PROFINET IO-Device

LED state	Definition
Flashing (1 Hz, 3 s)	The LED turns on and off for 3 seconds with a frequency of 1 Hz: "On" for 500 ms, followed by "Off" for 500 ms.
Flashing (2 Hz)	The LED turns on and off with a frequency of 2 Hz: "On" for 250 ms, followed by "Off" for 250 ms.

Table 35: Definition LED states communication status

### Ethernet status PROFINET IO-Device

LED	Color	State	Description
<b>LINK</b> Ch0 (6) , Ch1: (8)	<b>LED green</b>		
	● (green)	On	The device is linked to the Ethernet.
	● (off)	Off	The device has no link to the Ethernet.
<b>RX/TX</b> Ch0 (5) , Ch1: (7)	<b>LED yellow</b>		
	☀ (yellow)	Flickering (load dependent)	The device sends/receives Ethernet frames.
	● (off)	Off	The device does not send/receive Ethernet frames.

Table 36: Ethernet status PROFINET IO-Device

LED status	Definition
Flickering (load-dependent)	The LED turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: "On" for approximately 50 ms, followed by "Off" for 50 ms. The LED turns on and off in irregular intervals to indicate low Ethernet activity.

Table 37: Definition of LED status of the Ethernet status

## 5.8 Sercos Slave

For the Sercos Slave protocol, the communication LED **S** as well as the Ethernet LED **L/A** can assume the states described below.

### Communication status Sercos Slave













LED	Color	State	Description
<b>S</b> Position on the slot cover: (2)	<b>Duo-LED red/green</b> (orange = red/green simultaneously)		
	 (green)	On	<b>CP4: Communication phase 4:</b> Normal operation, no error
	 (green)	Flashing (2 Hz)	<b>Loopback:</b> The network state has changed from „fast-forward“ to „loopback“.
	 (green/orange)	Flashing (1 x green/3s)	<b>CP3: Communication phase 3</b>
		(2 x green/3s)	<b>CP2: Communication phase 2</b>
		(1 x green/3s)	<b>CP1: Communication phase 1</b>
	 (orange)	On	<b>CP2: Communication phase 0</b>
	 (orange/green)	Flashing (2 Hz)	<b>HP0: Hot-plug mode</b>
		(1 x orange/3s)	<b>HP1: Hot-plug mode</b>
		(2 x orange/3s)	<b>HP2: Hot-plug mode</b>
	 (orange)	Flashing (2 Hz)	<b>Identification:</b> Invoked by (C-DEV.Bit15 in the Device Control) Or SIP Identification Request
	 (green/red)	Flashing (2 Hz, min. 2s)	<b>MST losses ≥ (S-0-1003/2):</b> The communication warning (S-DEV.Bit 15) is present in the device status.
	 (red/orange)	Flashing (2 Hz)	<b>Application error (C1D):</b> See GDP & FSP Status codes class error.
 (red)	Flashing (2 Hz)	<b>Watchdog error:</b> Application is not running.	
 (red)	On	<b>Communication Error (C1D):</b> Error detected according to Sercos third generation Class 1 Diagnosis, see SCP Status codes class error.	
 (off)	Off	<b>NRT-Mode:</b> (Non Real-Time Mode) No Sercos Communication	
Position on the slot cover: (3)	<b>Duo LED red/green</b>		
	 (off)	Off	This LED is not used.

Table 38: Communication status Sercos Slave

LED state	Definition
Flashing (2 Hz)	The LED turns on and off with a frequency of 2 Hz: <i>one color:</i> "On" for appr. 250 ms, followed by "Off" for appr. 250 ms. <i>two colors:</i> First color for appr. 250 ms, followed by the second color for appr. 250 ms.
Flashing (1 x green/3s)	Flashing green for 250 ms, then orange on for 2 second and 750 ms.
Flashing (2 x green/3s)	Flashing green / orange / green, each for 250 ms, then orange on for 2 seconds and 250 ms.
Flashing (3 x green/3s)	Flashing green / orange / green / orange / green, each for 250 ms, then orange on for 1 second and 750 ms.
Flashing (1 x orange /3s)	Flashing orange for 250 ms, then green on for 2 second an 750 ms.
Flashing (2 x orange /3s)	Flashing orange / green / orange, each for 250 ms, then green on for 2 seconds and 250 ms.

Table 39: Definition of the LED states communication status

**Ethernet status Sercos Slave**





LED	Color	State	Description
L/A Ch0 (6) , Ch1: (8)	<b>LED green</b>		
	 (green)	On	<b>Link:</b> The device is linked to the Ethernet, but does not send/receive Ethernet frames.
	 (green)	Flickering (load dependent)	<b>Activity:</b> The device is linked to the Ethernet and sends/receives Ethernet frames.
	 (off)	Off	The device has no link to the Ethernet.
Ch0 (5) , Ch1: (7)	<b>LED yellow</b>		
	 (off)	Off	This LED is not used.

Table 40: Ethernet status Sercos Slave

LED state	Definition
Flickering (load dependent)	The LED turns on and off with a frequency of approximately 10 Hz to indicate high Ethernet activity: "On" for approximately 50 ms, followed by "Off" for 50 ms. The LED turns on and off in irregular intervals to indicate low Ethernet activity.

Table 41: Definition of the LED state Ethernet status

## 5.9 CC-Link IE Field Basic Slave

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











LED	Color	State	Description
<b>RUN</b> Position on the slot cover: (2)	<b>Duo LED red/green</b>		
	 (green)	On	Station in operation and cyclic transmission in progress.
	 (green)	Blinking (2.5 Hz)	Station in operation and cyclic transmission stopped.
	(green)	Flickering (10 Hz)	Station not configured.
	 (off)	Off	Station is disconnected.
<b>ERR</b> Position on the slot cover: (3)	 (red)	On	Communication error.
	 (red)	Triple Flash	DPM watchdog has expired.
	 (off)	Off	Station is disconnected.
<b>L/A</b> Ch0 (6) , Ch1: (8)	<b>LED green</b>		
	 (green)	On	<b>Link:</b> The station is linked to the Ethernet, but does not send/receive Ethernet frames.
	 (grün)	Flickering (load dependent)	<b>Activity:</b> The station is linked to the Ethernet and sends/receives Ethernet frames.
	 (off)	Off	The station has no link to the Ethernet.
Ch0 (5) , Ch1: (7)	<b>LED yellow</b>		
	 (off)	Off	This LED is not used.

Table 42: LED states for the CC-Link IE Field Basic slave

LED state	Definition
Triple Flash	The LED shows a sequence of three short flashes (each 200 ms), separated by a short "Off" phase (200 ms). The sequence is finished by a long "Off" phase (1,000 ms).
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.
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.
Flickering (load dependent)	The LED turns on and off with a frequency of 10 Hz to indicate high Ethernet activity: "On" for 50 ms followed by "Off" for 50 ms. The LED turns on and off at irregular intervals to indicate low Ethernet activity.

Table 43: LED state definitions for the CC-Link IE Field Basic slave protocol

## 6 Connectors and switch

### 6.1 Ethernet interface

#### 6.1.1 Ethernet RJ45 sockets

##### RJ45 sockets

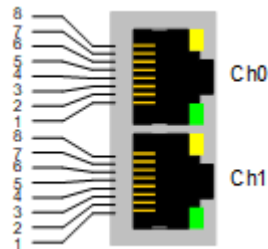


Figure 4: Pin assignment of the RJ45 sockets

The device supports the Auto Crossover function and can therefore switch RX and TX. The following table describes the RJ45 standard pin assignment.

Pin	Signal	Description
1	TX+	Send data positive channel
2	TX-	Send data negative channel
3	RX+	Receive data positive channel
4	Term 1	Bridged and terminated to PE via RC link
5	Term 1	
6	RX-	Receive data negative channel
7	Term 2	Bridged and terminated to PE via RC link
8	Term 2	

Table 44: Pin assignment of the RJ45 sockets



##### Note:

The RJ45 plug must only be used for LAN, not for telecommunication connectors.

#### 6.1.2 Data of the Ethernet connection

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

	100BASE-TX and 10BASE-T
Medium	2 x 2 twisted pair copper cables, CAT5 (100 MBit/s)
Length of cable	Max. 100 m
Transfer rate	10 MBit/s/100 MBit/s

Table 45: Ethernet connection data 100BASE-TX and 10BASE-T

### 6.1.3 Usability of hubs and switches

The use of hubs or switches is prohibited or permitted for the respective communication systems. The following table shows the usability of hubs and switches per communication system:

Communication system	Hub	Switch
CC-Link IE Field Basic Slave	Forbidden	Star topology, with Layer 2 switch (must support 100 Mbit/s, 1 Gbit/s support is optional)
EtherCAT	Forbidden	Only permitted between EtherCAT MainDevice and first EtherCAT SubDevice (100 MBit/s, full duplex)
EtherNet/IP	Allowed	Allowed (10 MBit/s/100 MBit/s, full or half duplex, auto-negotiation)
Open Modbus/TCP	Allowed	Allowed (10 MBit/s/100 MBit/s, full or half duplex, auto-negotiation)
POWERLINK	Allowed	Forbidden
PROFINET IO	Forbidden	Only allowed if the switch supports 'priority tagging' and LLDP (100 MBit/s, full duplex)
Sercos	Forbidden	Forbidden

Table 46: Usability of hubs and switches

## 6.2 PCI Express (1 lane)

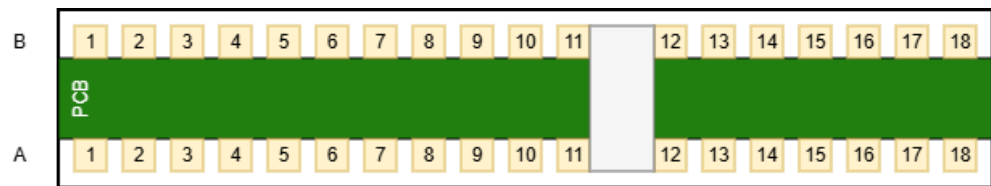


Figure 5: PCI Express (1 lane) pin assignment

The following table describes the pin assignment of the PCI Express (1 lane) of the PC card.

Pin Number	Pin (side B)		Pin (side A)	
	Name	Description	Name	Description
1	n.u.	Not used	PRSNT#1	Hot plug presence detect
2	n.u.	Not used	n.u.	Not used
3	n.u.	Not used	n.u.	Not used
4	GND	Ground	GND	Ground
5	n.u.	Not used	JTAG2	TCK
6	n.u.	Not used	JTAG3	TDI
7	GND	Ground	JTAG4	TDO
8	+3.3 V	+3.3 volts power	JTAG5	TMS
9	JTAG1	+TRST#	+3.3V	Power supply
10	n.u.	Not used	+3.3V	Power supply
11	WAKE#	Link reactivation	PERST#	PCI Express reset signal
Coding pad				
12	RSVD	Reserved	GND	Ground
13	GND	Ground	REFCLK+	Reference Clock
14	HSOp(0)	Transmitter Lane 0 differential pair	REFCLK-	Differential pair
15	HSON(0)		GND	Ground
16	GND	Ground	HSIp(0)	Receiver Lane 0
17	PRSNT#2	Hot plug detection	HSIn(0)	Differential pair
18	GND	Ground	GND	Ground

Table 47: Pin assignment PCI Express (1 lane)

## 6.3 Rotary switch for slot number (card ID)

The rotary switch **Slot number (card ID)** is used by the cifX Device Driver to identify the cifX PC card.



Switch position	Description	Example
0	<p>The cifX Device Driver identifies the cifX PC card based on its device number and serial number.</p> <p>Switch position 0 deactivates the function of the slot number.</p> <p>If you use multiple cifX PC cards in one PC, you can use switch position 0 for multiple PC cards.</p>	 <p>Switch position 0</p>
1 ... 9	<p>The cifX Device Driver identifies the cifX PC card using the slot number set (1 ... 9)</p> <p>If you use multiple cifX PC cards in one PC, make sure that you use a different and unique slot number for each PC card.</p> <p>The Device Explorer software and Communication Studio display the slot number to identify the PC card. The application can use the cifX Device Driver to read the slot number and use it to identify the PC card.</p>	 <p>Switch position 1</p>

Table 48: Rotary switch for slot number (card ID)

### Note for replacing the device (replacement case)

If you are replacing a cifX PC card, set the same slot number on the replacement card as on the previously used PC card.

## 6.4 SYNC connector, hardware and firmware

### Hardware

Information	Description
Sync signals	3.3 V (LVTTTL), maximum load 6 mA
Connector plug	Multipoint connector, 3-pole, 1.25 mm pitch (e.g. type Molex series 51021) and crimp contacts in socket version (e.g. type Molex series 50079/50058). Refer also to the information for pin assignment SYNC connector.
Connection socket	PCB Header 3-pole, pitch 1.25 mm (e.g. Molex 53398-0371 type). Refer also to the information for pin assignment SYNC connector.
Max. cable length	Recommendation: Max. 50 mm <b>NOTICE!</b> Observe the necessary precautions for electrostatic sensitive components for the cable routing

Table 49: SYNC connector

Pin	Signal
1	GND
2	IO_SYNC0
3	IO_SYNC1

Table 50: Pin assignment SYNC connector

### Firmware

The firmware determines the input or output signals. The following table shows the assignment of the Sync signals per protocol.

Protocol	Signal IO_SYNC0 Input/output	Signal IO_SYNC1 Input/output	From firmware version	Remark
EtherCAT SubDevice	SYNC 0 output	SYNC 1 output	-	configurable
Sercos Master	External trigger for starting the bus cycle Input rising edge	-	2.0.8.0	-
Sercos Slave	CON_CLK output	DIV_CLK output	3.0.10.0	configurable

Table 51: Assignment of the SYNC signals per protocol

## 7 Technical data

### 7.1 Technical data CIFX LPCIE90-RE

CIFX LPCIE90-RE	Parameter	Value
Product	Product name	CIFX LPCIE90-RE
	Part number	1421.100
	Brief description	PC card cifX Low Profile PCI Express Industrial Ethernet Device
	Function	Communication Interface with Low Profile PCI Express and Ethernet interface
Communication controller	Type	netX 90
Integrated Memory	RAM	8 MB SDRAM
	FLASH	8 MB + 1 MB
Power supply	Supply voltage	+3.3 V DC $\pm$ 5 %
	Typical current, maximum current	270 mA (at 3.3 V), 270 mA (at 3.3 V)
	Connector	Via PCI Express Bus
	Typical power consumption	900 mW
System interface	Bus type	PCI Express, one-lane port
	Data access	Dual-port memory
	Connector type	PCI Express
	Dual-port memory size	32 KB
	Data width	32 bit
	Transmission rate	2 GBit/s
Communication interface	Communication standard	Ethernet
	Interface type	10BASE-T/100BASE-TX, isolated
	Auto negotiation	Supported
	Auto cross over	Supported
	Connector	2 x RJ45 socket
Displays	LED display	SYS (System status)
		COM 0 (Communication status)
		COM 1 (Communication status)
		Ethernet link status
		Ethernet activity
Operating element	Rotary switch slot number (card ID)	To set the slot number (card ID)
Permitted ambient conditions	Operating temperature range	-20 °C ... +70 °C (air flow during measurement: 0.375 m/s, 50 %)
	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)
	Altitude	0 m ... 2000 m
Device	Dimensions (L x W x H)	79.4 mm x 23.3 mm x 80.5 mm
	Weight	35 g
	Mounting/Installation	PCI Express x1 slot (3.3 V)

CIFX LPCIE90-RE	Parameter	Value
Configuration	Configuration software	Communication Studio
	Download firmware and configuration	Device Explorer
	API	Yes
Conformity	RoHS	Yes
Conformance with EMC directives	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

Table 52: Technical data CIFX LPCIE90-RE

## 7.2 PCI identifiers on the PCI Express bus

The PC card CIFX (L)PCIE90-RE is a multifunction device on the PCI Express 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 53: PCI identifiers on the Mini PCI Express bus

## 7.3 Supported PCI bus commands

The following table lists the PCI bus commands supported by the Hilscher cifX PCI Express and Low Profile PCI Express PC cards.

C/BE3#	C/BE2#	C/BE1#	C/BE0#	Type of bus command	Supported
0	0	0	0	Interrupt acknowledge	no
0	0	0	1	Special Cycle	no
0	0	1	0	I/O Read	<b>Yes</b>
0	0	1	1	I/O Write	<b>Yes</b>
0	1	0	0	Reserved	no
0	1	0	1	Reserved	no
0	1	1	0	Memory Read	<b>Yes</b>
0	1	1	1	Memory Write	<b>Yes</b>
1	0	0	0	Reserved	no
1	0	0	1	Reserved	no
1	0	1	0	Configuration Read	<b>Yes</b>
1	0	1	1	Configuration Write	<b>Yes</b>
1	1	0	0	Memory Read Multiple	no
1	1	0	1	Dual Address Cycle	no
1	1	1	0	Memory Read Line	no
1	1	1	1	Memory Write and Invalidate	no

Table 54: Supported / unsupported PCI bus commands

**C/BE** = Bus Command and Byte Enable Signal of PCI

## 7.4 Technical data of the communication protocols

Communication protocol	Version	URL
CC-Link IE Field Basic Slave	5	<a href="https://hilscher.atlassian.net/wiki/x/hoPqB">https://hilscher.atlassian.net/wiki/x/hoPqB</a>
EtherCAT SubDevice	5	<a href="https://hilscher.atlassian.net/wiki/x/lwBiBw">https://hilscher.atlassian.net/wiki/x/lwBiBw</a>
EtherNet/IP Adapter	5	<a href="https://hilscher.atlassian.net/wiki/x/ygxkBw">https://hilscher.atlassian.net/wiki/x/ygxkBw</a>
Open Modbus/TCP	5	<a href="https://hilscher.atlassian.net/wiki/x/vocRBg">https://hilscher.atlassian.net/wiki/x/vocRBg</a>
POWERLINK Controlled Node	5	<a href="https://hilscher.atlassian.net/wiki/x/YbaBg">https://hilscher.atlassian.net/wiki/x/YbaBg</a>
PROFINET IO-Device	5	<a href="https://hilscher.atlassian.net/wiki/x/wVYBw">https://hilscher.atlassian.net/wiki/x/wVYBw</a>
Sercos Slave	5	<a href="https://hilscher.atlassian.net/wiki/x/ElzMC">https://hilscher.atlassian.net/wiki/x/ElzMC</a>

Table 55: Technical data: Protocols (URLs)

Communication protocol	Version	URL
EtherNet/IP Adapter	2.4	<a href="https://hilscher.atlassian.net/wiki/x/bAScBg">https://hilscher.atlassian.net/wiki/x/bAScBg</a>
Open Modbus/TCP	2.4	
PROFINET IO-Device	2.4	

Table 56: Technical data: Protocols with IoT function (URLs)

## 8 Removing the hardware

### 8.1 Removing the PC card

Removing the PC card CIFX 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.
- If the PC card is screwed to the PC or the connection device, loosen this screw.
- Remove the PC card from the PCI Express slot.
- Close the housing of the PC or connecting device again.
- Reconnect the PC or the connection device to the mains.

## 8.2 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](http://www.hilscher.com).

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

## 9 Appendix

### 9.1 References

#### **Documentation about software**

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, 2025-02.

#### **PCI Express Electromechanical Specification**

PCI-SIG (Special interest Group), PCI Express® Base Specification, Revision 4.0, English, 2017-09

### 9.2 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 uninterrupted 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.

## 9.3 Registered trademarks

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

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

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

EtherNet/IP™ is a trademark of the ODVA (Open DeviceNet Vendor Association, Inc.).

Modbus is a registered trademark of Schneider Electric.

POWERLINK is a registered trademark of B&R, Bernecker + Rainer Industrie-Elektronik Ges.m.b.H, Eggelsberg, Austria.

PROFIBUS® is a registered trademark of PROFIBUS & PROFINET International (PI), Karlsruhe.

PROFINET® is a registered trademark of PROFIBUS & PROFINET International (PI), Karlsruhe.

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

Figure 1:	Position numbers of the CIFX LPCIE90-RE PC card .....	6
Figure 2:	Slot cover and LED positions .....	7
Figure 3:	Identification label (example).....	9
Figure 4:	Pin assignment of the RJ45 sockets .....	33
Figure 5:	PCI Express (1 lane) pin assignment .....	35

## List of tables

Table 1:	List of revisions .....	4
Table 2:	PC card CIFX LPCIE90-RE .....	5
Table 3:	Position numbers of the CIFX LPCIE90-RE PC card .....	6
Table 4:	Legend of the slot cover of the PC card CIFX LPCIE90-RE.....	7
Table 5:	Hardware revisions .....	8
Table 6:	Versions for drivers and software .....	8
Table 7:	Firmware (protocol and file name) .....	8
Table 8:	Firmware with IoT function (protocol and file name).....	8
Table 9:	Identification label .....	9
Table 10:	Host interface requirements.....	13
Table 11:	Requirements for operation .....	14
Table 12:	Overview for installation and firmware download .....	15
Table 13:	Behavior of the communication status LEDs in the “in operation” status .....	18
Table 14:	LEDs Real-Time Ethernet systems.....	20
Table 15:	LED names .....	20
Table 16:	States of the SYS-LED .....	21
Table 17:	Definitions of the states of the SYS LED .....	21
Table 18:	Communication status EtherCAT SubDevice .....	22
Table 19:	Definition LED states communication status .....	22
Table 20:	Ethernet status EtherCAT SubDevice .....	23
Table 21:	Definition LED states Ethernet status .....	23
Table 22:	Communication status EtherNet/IP Adapter .....	24
Table 23:	Definition of LED status of the communication status .....	25
Table 24:	Ethernet status EtherNet/IP Adapter .....	25
Table 25:	Definition of LED status of the Ethernet status .....	25
Table 26:	Communication status Open Modbus/TCP .....	26
Table 27:	Definition of LED status of the communication status .....	26
Table 28:	Ethernet status Open Modbus/TCP .....	26
Table 29:	Definition of LED status of the Ethernet status .....	26
Table 30:	Communication status POWERLINK Controlled Node.....	27
Table 31:	Definition of LED states communication status .....	27
Table 32:	Ethernet status POWERLINK Controlled Node .....	28
Table 33:	Definition of LED state Ethernet status.....	28
Table 34:	Communication status PROFINET IO-Device .....	29
Table 35:	Definition LED states communication status .....	29
Table 36:	Ethernet status PROFINET IO-Device .....	29
Table 37:	Definition of LED status of the Ethernet status .....	29
Table 38:	Communication status Sercos Slave .....	30
Table 39:	Definition of the LED states communication status .....	30
Table 40:	Ethernet status Sercos Slave .....	31

Table 41:	Definition of the LED state Ethernet status.....	31
Table 42:	LED states for the CC-Link IE Field Basic slave.....	32
Table 43:	LED state definitions for theCC-Link IE Field Basic slave protocol .....	32
Table 44:	Pin assignment of the RJ45 sockets.....	33
Table 45:	Ethernet connection data 100BASE-TX and 10BASE-T .....	33
Table 46:	Usability of hubs and switches.....	34
Table 47:	Pin assignment PCI Express (1 lane).....	35
Table 48:	Rotary switch for slot number (card ID) .....	36
Table 49:	SYNC connector .....	37
Table 50:	Pin assignment SYNC connector .....	37
Table 51:	Assignment of the SYNC signals per protocol.....	37
Table 52:	Technical data CIFX LPCIE90-RE.....	38
Table 53:	PCI identifiers on the Mini PCI Express bus .....	40
Table 54:	Supported / unsupported PCI bus commands.....	40
Table 55:	Technical data: Protocols (URLs).....	41
Table 56:	Technical data: Protocols with IoT function (URLs).....	41

# 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](mailto:info@hilscher.com)

### Support

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

## SUBSIDIARIES

### China

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

### Support

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

### India

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

### Support

Phone: +91 020-24243777  
E-mail: [info@hilscher.in](mailto:info@hilscher.in)

### Italy

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

### Support

Phone: +39 02 25007068  
E-mail: [it.support@hilscher.com](mailto:it.support@hilscher.com)

### Japan

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

### Support

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

### Republic of Korea

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

### Support

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

### Austria

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

### Support

Phone: +43 732 931 675-0  
E-mail: [at.support@hilscher.com](mailto:at.support@hilscher.com)

### Switzerland

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

### Support

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

### USA

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

### Support

Phone: +1 630-505-5301  
E-mail: [us.support@hilscher.com](mailto:us.support@hilscher.com)