Operating Manual

CX22B-R
SomatXR Rugged DAQ

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1   SAFETY INSTRUCTIONS

Intended use

The module and the transducers connected to it must only be used for measurements and directly related control and regulation tasks. Use for any purpose other than the above is deemed improper use.

In the interests of safety, the module must only be used as described in the operating manual. When the module is in use, it is essential to comply with the applicable legal and safety requirements for the relevant application. The same applies to the use of accessories.

Before starting up the module for the first time, you must first run a project planning and risk analysis that takes into account all the safety aspects of automation technology. This particularly concerns personal and machine protection.

Additional safety precautions must be taken in plants where malfunctions could cause major damage, loss of data or even personal injury. If an error occurs, these precautions ensure that safe operating conditions are established.

This can be achieved, for example, through mechanical interlocking, fault messages, limit value switches, and similar things.

Safety requirements

> *Notice*
>
> *Do not connect the module directly to the mains power supply. The permissible supply voltage range is 10 … 30 V_{DC}. Before FireWire connections are changed around, disconnect the entire system from the power supply to prevent damage to the module.*

The supply voltage connection as well as the signal and sense leads must be installed in such a way that electromagnetic interference does not adversely affect device functionality (recommendation: HBK "Greenline Shielding Design", download from www.hbm.com or www.hbkworld.com).

Automation equipment and devices must be covered over in such a way that adequate protection or locking against unintentional actuation is provided (e.g. access checks, password protection, etc.).

In the case of devices that run in a network, the network design must be such that errors in individual nodes can be detected and remedied.

Safety precautions must be taken both in terms of hardware and software, so that a line break or other interruptions to signal transmission, e.g. via the bus interfaces, do not cause undefined states or loss of data in the automation device.

Conditions at the installation site

For all modules:

- Observe the maximum permissible ambient temperatures specified in the technical data.
- Make sure that the device is exposed to as little direct sunlight as possible in hot operating environments.

Maintenance and cleaning

The modules are maintenance-free. Note the following points when cleaning the housing:

- Before cleaning, disconnect the module from all connections.
- Clean the housing with a soft, slightly damp (not wet!) cloth. You should never use solvents, as they could damage the label on the front panel, and damage the display.
- Do not subject the device to high water pressure while cleaning.

The following modules include a battery to buffer the memory contents, and guarantee uninterrupted operation of the time base:

- CX22B-R: BR2330A/FAN (soldered)

Only trained and qualified personnel authorized by HBK may change batteries.

General dangers of failing to follow the safety instructions

The module is a state of the art device and as such is fail-safe. The module may give rise to residual dangers if it is inappropriately installed and operated by untrained personnel. Any person instructed to carry out installation, start-up, maintenance or repair of the module must have read and understood the operating manual and in particular the technical safety instructions.

Residual dangers

The scope of supply and performance of the module covers only a small area of measurement technology. In addition, planners, installers and operators should plan, implement and manage the safety features of the test and measuring equipment in such a way as to minimize residual dangers. Existing regulations must be complied with at all times. The residual dangers associated with test and measuring equipment must be indicated. After making settings and carrying out activities that are password-protected, you must make sure that any controls that may be connected remain in safe condition until the switching performance of the module has been tested.

Product liability

In the following cases, the protection provided for the device may be adversely affected. Liability for equipment functionality passes to the operator when:

- The device is not used in accordance with the operating manual.
- The device is used outside the field of application described in this chapter.

- The operator makes unauthorized changes to the device.

Working safely

Error messages should not be confirmed until after the cause of the error is removed and there is no further danger.

The devices comply with the EMC standards EN61326-1/EN61326-2-x. The standards applied contain definitions of limit values and test levels for multiple environments.

In terms of emission (EME), the requirements for industrial environments (Class A) and household/laboratory environments (Class B) must be met. The standard here references to CISPR 11:2009+A1:2010.

Regarding immunity to interference, requirements for controlled electro-magnetic environments (lowest requirements), general environments and industrial environments (highest requirement) must be met.

SomatXR modules listed in the declaration of conformity meet the requirements for:
- Emission: Class A
- Immunity to interference: Industrial environment

The SomatXR series and the individual modules are designed essentially for use in an industrial environment. When used in residential and commercial applications, additional measures may be necessary to limit emission.

Conversions and modifications

The module must not be modified in its design or safety features without our express consent. Any modifications made shall exclude liability on our part for resulting damage.

In particular, any repair or soldering work on motherboard, or replacement of components, is prohibited. When exchanging complete modules, use only genuine parts from HBK.

The module is delivered from the factory with a fixed hardware and software configuration. Changes may only be made within the options documented in the instructions.

Qualified personnel

Qualified persons means persons entrusted with the installation, fitting, commissioning and operation of the product who possess the appropriate qualifications for their function. This module may only be used by qualified personnel in accordance with the specifications and in compliance with the safety requirements and regulations.

This includes people who meet at least one of the three following criteria:
- The safety concepts of automation technology are assumed to be known. The project personnel must be familiar with these concepts.

- The personnel operating the automation equipment must have been instructed in the handling of the machines, and be familiar with use of the modules and of the technologies described in this documentation.
- The commissioning engineers and service technicians must have successfully completed training that qualifies them to repair automation systems. They are also authorized to commission, ground and label circuits and equipment in accordance with safety engineering standards.

It is also essential to comply with the legal regulations and safety rules applicable to the application concerned during use. The same applies to the use of accessories.

2   MARKINGS USED

2.1   Markings used in this document

Important instructions for your safety are highlighted. Following these instructions is essential in order to prevent accidents and damage to property.

Symbol	Meaning
Notice	This marking draws your attention to a situation in which failure to comply with safety requirements *could* lead to property damage.
Important	This marking draws your attention to *important* information about the product or about handling the product.
Tip	This marking indicates tips for use or other information that is useful to you.
Information	This marking draws your attention to information about the product or about handling the product.
Emphasis *See …*	Italics are used to emphasize and highlight text and identify references to sections of the manual, diagrams, or external documents and files.
Device -> New	Bold text indicates menu items, as well as dialog and window headings in the program environment. Arrows between menu items indicate the sequence in which the menus and sub-menus are called up
Sample rate	Bold text in italics indicates inputs and input fields in the user interfaces.

2.2   Symbols on the device

Caution

Indicates that care must be taken when operating the device, and the instructions in the operating manual must be followed when using the module.

Warning of hot surfaces

Indicates that the marked item may be hot, and should not be touched without taking precautions.

CE mark

By the CE mark the manufacturer indicates that the product complies with the requirements of the relevant EC directives.

The NTX001 international medical power supply unit has other markings on it such as VDE, UL, PSE (Japan). The electromagnetic compatibility of the unit has been tested according to IEC 61326.

UKCA mark

By the UKCA mark the manufacturer indicates that the product complies with the requirements of the relevant UK regulations.

Marking in accordance with the requirements of SJ/T 11364-2014 and SJ/T 11363-2006 ("China RoHS-2")

Marking for products containing hazardous substances in quantities above the maximum concentrations.

Statutory waste disposal marking

In accordance with national and local environmental protection and material recovery and recycling regulations, old devices that can no longer be used must be disposed of separately and not with normal household garbage.

Electrostatically sensitive components

Components marked with this symbol can be damaged beyond repair by electrostatic discharge. Please observe the handling instructions for electrostatic sensitive devices.

Connection to functional ground

You can use this connection to integrate the module into your functional grounding, where necessary, so that interference currents are diverted and no interfering signals are fed in.

3   INTRODUCTION

3.1   SomatXR DAQ

The SomatXR series is a rugged data acquisition system of modular design that is universally applicable for measurements of any kind. The modules in this family can be combined and intelligently interconnected specific to the measurement task. Distributed operation makes it possible to position individual modules close to the measuring points, resulting in short sense leads.

The SomatXR series includes the following MX modules:

- *MX840B-R universal module*: Eight (8) universal inputs for connecting more than 16 transducer technologies, including one port for acquiring CAN messages.

- *MX1615B-R bridge module*: 16 individually configurable inputs, including for strain gage transducers, standardized voltages, ohmic resistances or resistance-based measurements.

- *MX1601B-R standard module*: 16 configurable inputs for DC voltage sources (60 V, 10 V, 100 mV), DC current sources (20 mA) or current-fed piezoelectric transducers (IEPE).

- *MX1609KB-R thermocouple module* and *MX1609TB-R thermocouple module*: 16 thermocouples of type K (Ni-CrNi) or 16 thermocouples of type T (Cu-CuNi) for temperature measurements.

- *MX411B-R high dynamic range universal module*: Four (4) inputs including strain gage and inductive bridges, standardized voltage (10 V) and DC (20 mA) sources, or current-fed piezoelectric (IEPE, ICP®) and piezoresistive transducers.

- *MX460B-R frequency/counter module*: Up to four (4) digital inputs for measuring digital pulses up to 1 MHz (speed, torque, angular position, displacement, PWM in general). CX23-R/eDAQXR support is limited in the following respects. Mathematical functions are not supported. Interactive zeroing of the "crankshaft" sensors is not possible/supported.

- *MX471C-R CAN-FD modules*: Four (4) independent CAN/CAN-FD bus nodes, galvanically isolated from each other and from the power supply. The module can also be used as a FireWire-to-Ethernet gateway to connect multiple FireWire-inter-connected SomatXR modules to a PC via Ethernet.

The SomatXR series includes the following MX modules that are no longer available:

- *MX471B-R CAN module*: Four (4) independent CAN bus nodes, galvanically isolated from each other and from the power supply.

- *MX590B-R pressure sensing module*: Up to five (5) pressure inputs for direct acquisition of relative and absolute pressures using TEDS technology for each connection.

i **Information**

You will find details of the MX modules in the separate MX Module operating manual.

The SomatXR series includes the following CX modules:

- *CX22B-R data recorder*: The CX22B-R comes with the pre-installed catman® Easy software package for test parameterization, visualization, and data analysis in the field. The acquired test data is stored on the integrated solid state drive (SSD).
- *CX27C-R Industrial Ethernet Gateway*: The gateway is used to integrate other SomatXR modules into the fieldbuses, such as EtherCAT® or Profinet. The module can also be used as a FireWire-to-Ethernet gateway in order to connect multiple SomatXR modules to a PC.

i **Information**

For details on the CX27C-R, refer to the separate CX27C-R operating manual.
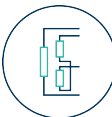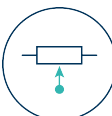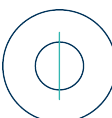
3.2 Overview of modules and transducers
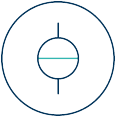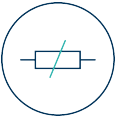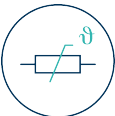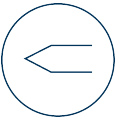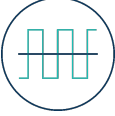
i **Information**

The modules highlighted in gray in the following table are no longer available.

Transducer		MX840B-R	MX1615B-R	MX1601B-R	MX1609KB-R MX1609TB-R	MX411B-R	MX460B-R	MX471B-R	MX471C-R	MX590B-R	Circuit diagram
	Strain gage full bridge, 6-wire configuration	●	●			●					69
	Strain gage half bridge, 5-wire configuration	●	●			●					69

Transducer		MX840B-R	MX1615B-R	MX1601B-R	MX1609KB-R MX1609TB-R	MX411B-R	MX460B-R	MX471B-R	MX471C-R	MX590B-R	Circuit diagram
	Strain gage quarter bridge, 3- or 4-wire configuration	●[1] 3-wire only	●			●[1] 3-wire only					69
	Inductive full bridge	●				●					73
	Inductive half bridge	●				●					73
	LVDT (linear variable differential transformer)	●									73
	Piezoresistive transducer	●				●					76
	Potentiometer	●	●								77
	Voltage, 60 V, 10 V, 100 mV	●	● 60 V only	●		● 10 V only					78
	Current-fed piezoelectric transducer (IEPE, ICP®)	●[2]		●[2]		●[2]					80

Transducer		MX840B-R	MX1615B-R	MX1601B-R	MX1609KB-R MX1609TB-R	MX411B-R	MX460B-R	MX471B-R	MX471C-R	MX590B-R	Circuit diagram
	Current, 20 mA	●		●		●					82
	Resistance or resistance-based measurements	●	●								84
	Resistance thermometer PT100 or PT1000	●	● PT100 only								84
	Thermocouple	●3)			● Type K or T						86
	Frequency/ pulse counter (timer, TTL)	● Channels 5-8					●				88
	Incremental encoder (timer, TTL)	● Channels 5-8					●				88
	Torque/ rotational speed	● Channels 5-8					●				88
	Passive inductive encoder						●				99

Transducer		MX840B-R	MX1615B-R	MX1601B-R	MX1609KB-R MX1609TB-R	MX411B-R	MX460B-R	MX471B-R	MX471C-R	MX590B-R	Circuit diagram
	Pulse width modulation						●				100
	Crank wheel sensor						●				105
	SSI protocol	● Channels 5-8									98
	CAN bus	● Channel 1						●4)	●4)		102
	CAN-FD bus								●4)		102
	Absolute pressure sensor (gas/liquid)									●	104
	Relative pressure sensor (gas/liquid)									●	104

1) Use quarter bridge adapter 1-SCM-R-SG1000-2, 1-SCM-R-SG120-2 or 1-SCM-R-SG350-2.
2) ODU 14-pin to BNC 1-KAB430-0.3 adapter can optionally be used.
3) Adapters 1-SCM-R-TCK-2 for type K, 1-SCM-R-TCE-2 for type E, 1-SCM-R-TCT-2 for type T, and 1-SCM-R-TCJ-2 for type J.
4) Includes support for CCP/XCP-on-CAN (not in conjunction with CX23-R).

3.3   About the documentation

The SomatXR documentation includes:

- Printed Quick Start Guide.
- SomatXR series operating manuals in PDF format.
- Various data sheets for SomatXR modules and accessories.
- Various mounting instructions (in PDF format) for cables, adapters and connectors.
- Comprehensive online help and user-friendly search options available after installing the Windows PC software (e.g. MX Assistant, catman®EASY).

These documents can be found:

- In the QuantumX/SomatXR system package at www.hbm.com/start.
- On your PC's hard disk, after installing the MX Assistant.
- Updated versions are always available at www.hbm.com or www.hbkworld.com.

3.4   Data Recorder CX22

All SomatXR MX modules can be combined with MX modules from the QuantumX series (MX...) and QuantumX-P series (MX...-P) and can be connected to the CX22 data recorder and the CX27 Ethernet and EtherCAT gateways.

The Data Recorder has an integrated WLAN adapter. An antenna can be screwed on via the standardized SMA socket (RF coax type). A bendable antenna is included with the product.

All measurement technology settings are implemented using pre-installed catman®EASY, which has an extensive online Help.

This manual shows you:

- How to start up the Data Recorder.
- What can be connected and what to look out for.
- How to start your first measurement and DAQ jobs and how to get to the measurement data.

The device is a SomatXR module with the Windows 10 IoT Enterprise 2019 LTSC operating system and pre-installed software (DAQ software catman Easy and additional tools - MX-Assistent, HBM Device Manager, CX22 Shell, VNC Viewer). Most of the software functionality is described in the data sheet.

Features of the data recorder

- Low voltage connection
- Configurable Ethernet ports for data communication with an operating PC
- Two FireWire ports
    - For an optional power supply (refer to data sheet)
    - For internal measurement data transmission

- Status LEDs indicating the current module status
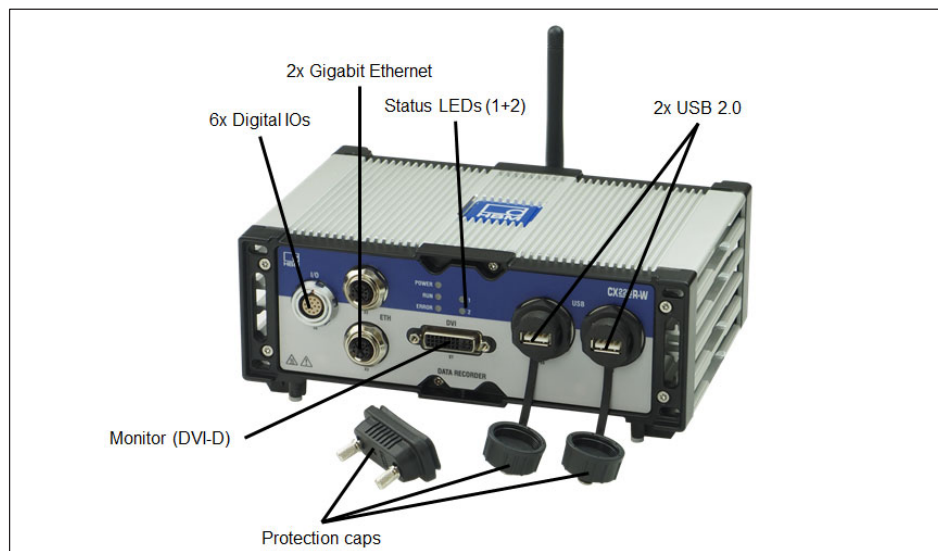
Fig. 3.1   CX22B-R connections on the front
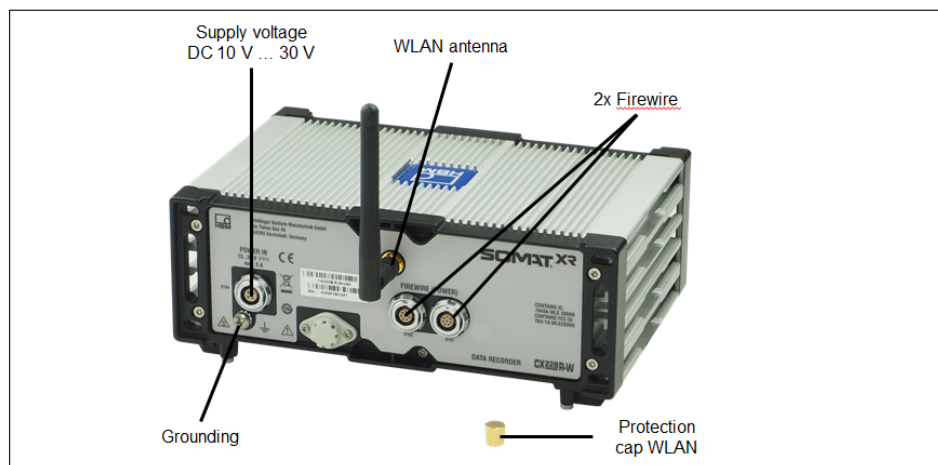
Fig. 3.2   CX22B-R connections on the back

4   SETTING UP A SYSTEM

There are various ways of setting up a SomatXR system. This manual provides a detailed description of a system that uses the CX22 data recorder. Other types of system – and mechanical mounting of the modules – are described in the respective SomatXR manuals.

4.1   Connection of MX modules

The simplest way to connect measurement modules to the CX22B-R Data Recorder is via FireWire, or alternatively via Ethernet.

FireWire has the following advantages:

- Voltage supply, time synchronization, data communication and real time in one cable and thus little effort and low cost
- Every module has 2 FireWire connections, so flexible topologies are possible: star, line or even hybrids with an appropriate hub, also supplied with power via FireWire.

Ethernet has the following advantages

- The components used are readily available on the market
- Up to 100 m line lengths to the module
- Synchronization via NTP or PTPv2 (IEEE1588:2008) when using an appropriate switch
- Wireless connection of modules via WLAN

Notice

The SomatXR system is not hot pluggable, i.e. additional modules cannot be installed in the system while it is in operation. To add new modules to a FireWire network, you must first disconnect the system from the power supply. Non-compliance can result in damage to the modules.

4.2   Ground connection and grounding

Lay the signal and data leads separately from current-carrying power lines. Cable ducts made of sheet metal with an internal partition are ideal.

If there are differences in potential in or to the connected measurement system, you must install a potential equalization line (recommended value: highly flexible stranded wire, line cross-section 10 mm^2).

4.3   Voltage supply

Apply a supply voltage of DC 10 - 30 V to connector X104 *(see Fig. 5.1)*. Use a voltage supply with sufficient power, in case the MX modules connected to the CX22B-R or de-

vices such as GPS sensors, cameras or external storage directly connected to the unit also need to be supplied with power.

The DC voltage supply must be a SELV voltage supply, meeting the requirements of IEC / EN / DIN EN 609501. The supply voltage must be protected by an adequate DC fuse (e.g. LITTELFUSE KLKD 6, LFPHV001) with a maximum current of 5 A.

HBK offers the NTX003-2 power supply for laboratory or general steady-state operation. On the primary side, this provides a selection of international connector types and 24 V and 120 watts on the secondary side. A CX22B-R and at least two additional MX modules can be supplied in this way. See the respective module data sheets for precise details of performance.

The data recorder can also be supplied with voltage by a (FireWire) module network. The maximum current in a FireWire connection is limited to 1.5 A and therefore so is the power that can be fed to the connected modules.

> **! Important**
>
> *The data recorder hosts a small buffer battery. This battery keeps date and time during power interruptions. The battery shall only be replaced by HBK service.*

4.4   Communication with the Data Recorder

You can work with the Data Recorder in the following way:

- Directly connected peripherals
    - Monitor or touchscreen (DVI)
    - Mouse and keyboard to USB
- Access via a PC or tablet by means of a "remote desktop connection" (standard in Windows)
    - Direct connection via an Ethernet patch cable
    - Wireless connection (WLAN)
    - In a network (LAN)
    - Remote access via an Internet connection and a mobile services provider using a mobile services gateway

4.5   USB 2.0 interfaces

Devices such as a keyboard, mouse, monitor, printer, as well as GPS sensors or external storage medium such as a USB flash drive, can be connected.

Tips for use are available for the connection of GPS sensors via USB.

> **i Information**
>
> *If you have to install device drivers, please note Section 12.*

4.6 Digital inputs and outputs

Three inputs and three outputs are available at connector X6 (ODU 14 pin). The inputs and outputs are TTL-compatible (-0.5 to 5.5V).

Inputs

The level for the inputs is 5 volts in the open state (HIGH), as it is pulled up to HIGH by a pull-up resistor (active LOW). The maximum LOW level is 0.7 volts and the minimum HIGH level is 4 volts.

Outputs

The level for the outputs is 5 volts (HIGH), when the corresponding output is set, otherwise 0 volts (LOW). The line lengths at the outputs must not exceed 3 m. Maximum output current is 1 mA.

💡 **Tip**

*At the start of a DAQ job, outputs are reset to LOW if in catman$^{®}$EASY, in the options for the CX22B-R (system group), you activate the setting **Reset all CX22B-R digital outputs at the start of a DAQ job**.*

4.7 LED displays
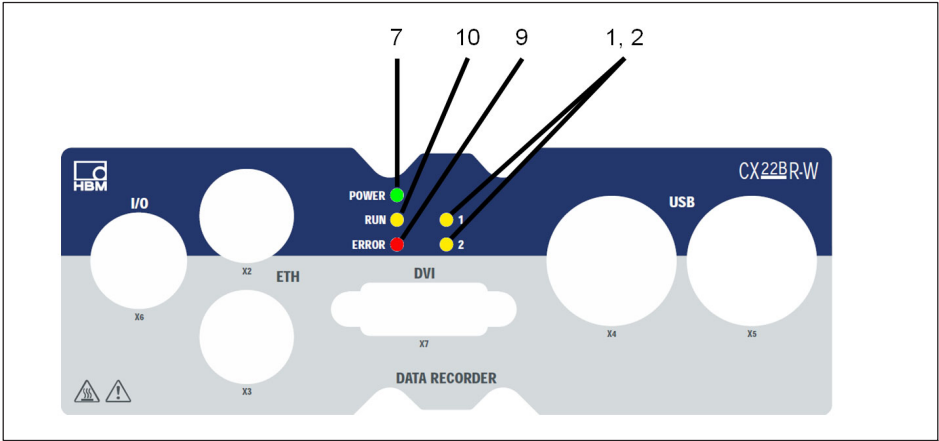
Fig. 4.1   Position of the LEDs

LED	Function
1, 2	Operating condition status
7	POWER = Module LED
9	ERROR LED
10	RUN = RECORDING LED
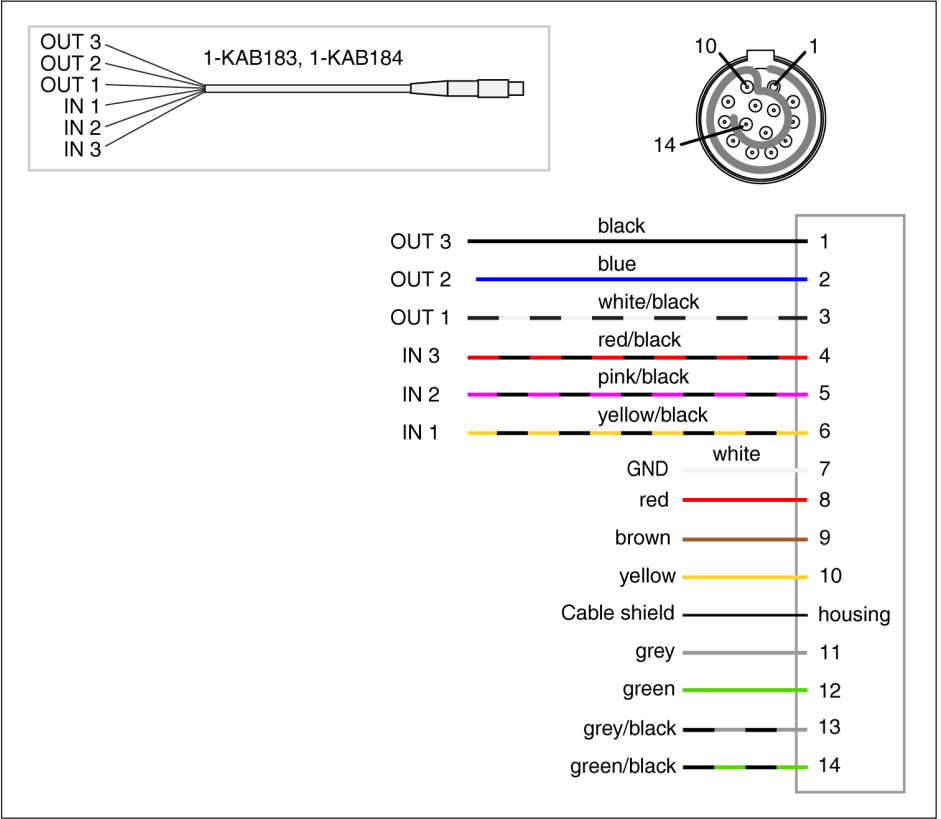
Fig. 4.2   Pin assignment digital In - and Output

Module LED

The module LED *(see Fig. 3.1 on Page 17)* lights up *green* when the CX22B-R power supply is present. The module requires approx. 1 minute after switch-on before the boot process is complete.

Status LEDs for the operating status

The "RUN" LED

shows continuously *yellow* when measurement data are being recorded. If a start trigger was set, the LED flashes yellow while waiting for the trigger event.

The "ERROR" LED

lights up *red* if the software detects an error, e.g. when no connection could be set up to the devices at the start of the project. The LED flashes if the available free memory drops below 1 GByte.

The state status LED can be redirected to the digital output in the catman options. All Status LEDs can also be triggered via **Limit values and events** in catman® EASY. To do this select **Set digital output: CX22B-R digital output** in the **Configure limit value and event monitoring** dialog and enter the required LED in **Bit/Condition**.

5   CONNECTING MEASUREMENT MODULES

The simplest way to connect SomatXR or QuantumX modules to the Data Recorder is via FireWire. Connect cable 1-KAB272-x to any of the Data Recorder's connections and the other end to connection X102 of the nearest measurement module.

Then keep threading: connection X102 to X101 of the second measurement module, etc. Bear in mind that the maximum current via FireWire is 1.5 A. As a general rule, voltage must be supplied after 3 modules. You can also connect measurement modules to the second FireWire connection X102 of the CX22B-R.

In the configuration shown below, the module supply voltage is looped through via FireWire. The power consumption of a module is explained in the data sheet.

You can connect up to 12 modules to the CX22B-R Data Recorder via FireWire, with a supply feed required for at least every 3rd module. The supply voltages must have approximately the same voltage level. The general SomatXR MX modules operating manual contains more detailed data on this.

Notice

When modules are installed in a vehicle, we recommend connecting to a separate battery or integrating a UPS (e.g. UPX002). If the voltage dips and modules are not buffered, measurement will be discontinued.

! Important

If you are already using SomatXR modules and wish to connect them to a CX22B-R data recorder, please update the device firmware. catman®Easy automatically checks the firmware and prompts you to update it if necessary. The associated firmware package is supplied with the data recorder and is located in the sub-directory C:\Programme (x86)\HBM\catmanEasy_EN\Firmware\QuantumX-B\. Alternatively, you can always download the latest firmware from www.hbm.com/start.
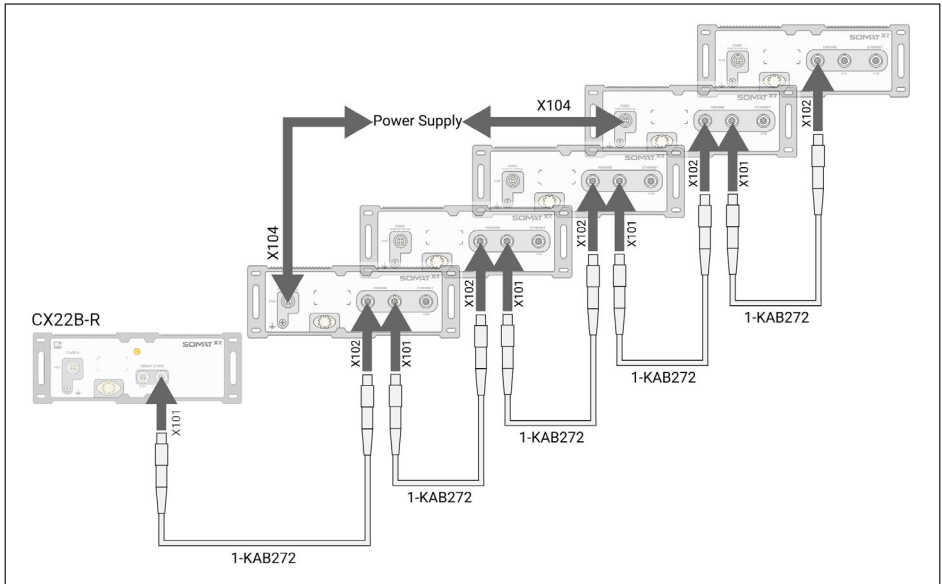
Fig. 5.1   Connecting MX modules to the CX22B-R via FireWire

Alternatively, you can connect all MX modules to the CX22B-R via Ethernet. If you have more than two modules you will also require an Ethernet switch. For synchronization a PTPv2 capable Ethernet switch is required.
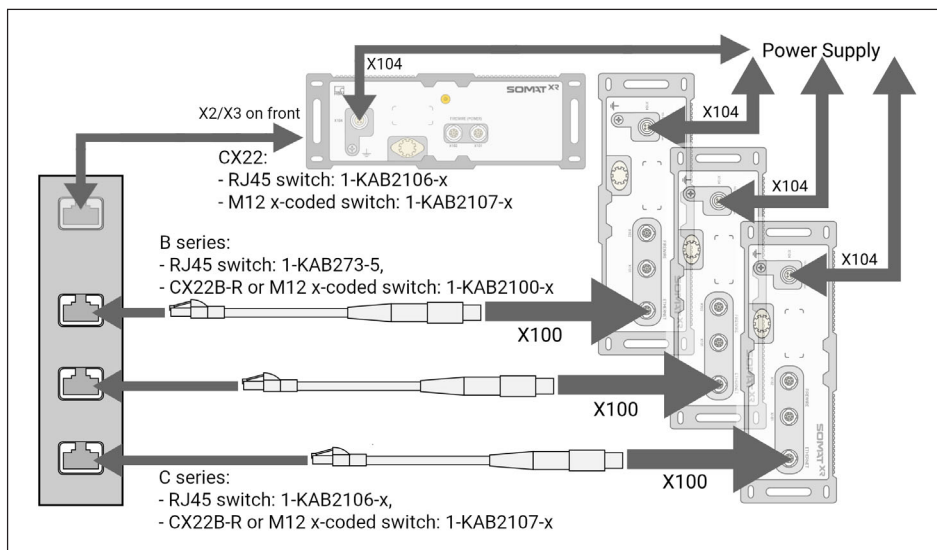
Fig. 5.2   Connecting MX modules to the CX22B-R via Ethernet

6 OPERATING THE DATA RECORDER

6.1 Operation with monitor and keyboard/mouse

This type of operation is the simplest. It does not require any configuration, but you will need a monitor with digital input (DVI) and a mouse and keyboard with USB connection.

Connect the mouse and keyboard to the USB sockets of the CX22B-R. The monitor is connected to the DVI socket with a commercially available DVI monitor cable (see Fig. 3.1 on Page 17 for all connections). Connection via VGA is not possible, not even with a DVI/VGA adapter plug, as the leads required for VGA are not assigned.

Switch on the power supply and wait until the boot process is complete and the module is ready.

! **Important**

The CX22B-R factory setting for input language (keyboard layout) is EN (English). If you connect a keyboard with a different layout, you should select **Exit to Windows** *in the start screen and then press Shift and Alt, or change the input language via the language bar in the task bar.*
If necessary, use the Windows control panel ("Regional and Language Options") to set the **Location** *to your country. The setting influences the digit settings and the time, for example.*

The keyboard settings are also changed with the change of the language settings in the shell. Other settings can be done via the Data Recorder start screen.

Initial start-up

The pre-installed catman®Easy software comes with 12 months of maintenance, during which time it can be updated free of charge. To install an update, you must first register with HBK. To do this, simply send us the registration file created during initial start-up. This contains the software license number and the device serial number.

You can do this later at any time via the catman® software.

6.2 Operation via a PC

In this case, the CX22B-R Data Recorder is connected to the PC via network. There are different variants, depending on your PC/network configuration, and the procedure used to set up the connection depends on the variant:

- The CX22B-R and PC are connected directly via an Ethernet cable.
- The CX22B-R Data Recorder is connected to an Ethernet network (the network configuration is usually assigned automatically via DHCP, *D*ynamic *H*ost *C*onfiguration *P*rotocol).

  For a detailed description, see *Section 6.2.2, Page 29* .

- The CX22B-RW Data Recorder is connected via WLAN (the CX22B-R is connected to a hotspot or the PC is connected via the mobile hotspot of the CX22B-R)

! **Important**

Wait approx. 1 minute after switching on the CX22B-R before setting up a connection so that the boot process is complete and the module is ready. Otherwise you may receive an error message that the device could not be found.

To make it easier to set up a connection when the CX22B-R settings are unknown, use the *HBM Device Manager*, which is part of the system software and is also available to download from www.hbm.com/start.

You can also set up a direct remote desktop connection (standard program of the Windows operating system). You need to know the IP address of the device to do so. The factory settings of the device is DHCP. So you must use the "HBM Device Manager" software for the initial start-up at least, or work with the direct peripherals.

6.2.1 A direct Ethernet line between PC and Data Recorder

▶ Connect your PC and CX22B-R via an Ethernet cable, category CAT5e or higher.

▶ Install the *HBM Device Manager* program, which can be found on www.hbm.com/start

▶ Launch the *HBM Device Manager* program on the PC:

▶ Click on **Find devices**.

▶ Select the CX22B Data Recorder from the list, the current address, UUID and firmware version of the device is also displayed.
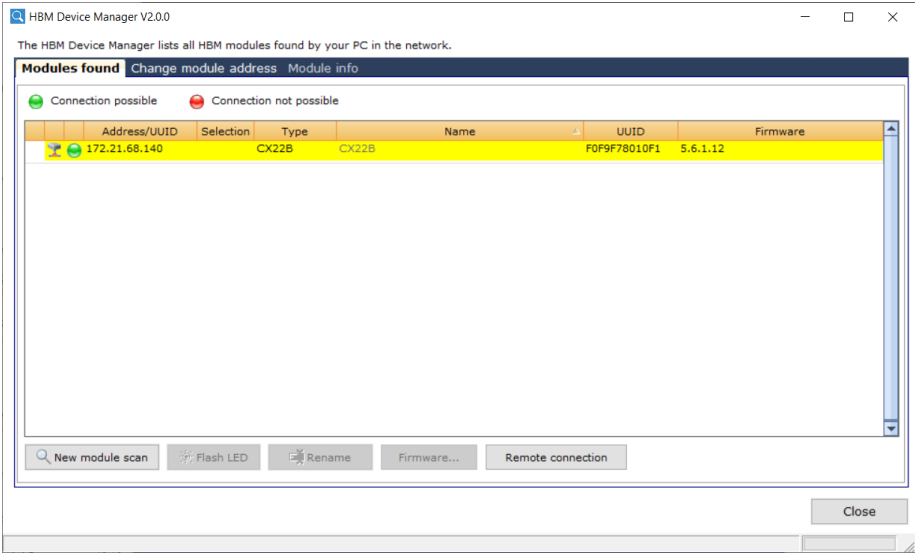
Fig. 6.1   Display of the found modules and whether connection is possible

The IP addresses and subnet masks of the interfaces of your PC and the found modules are displayed In the **Change module address** section. Depending on the configuration of your PC, you can adopt the CX22B-R settings. The simplest setting is *DHCP/APIPA*. Suitable IP addresses are automatically attributed between the two devices and you can start working immediately.

Alternatively, you can use static addresses for both devices. In this case, you can change the CX22B-R address, for example. The latter is described below.

▶ Select the CX22B-R from the list.

▶ In the **Change module address**, field, enter the required IP address and subnet mask.

Example for IP address and subnet mask

IP address of the PC: 192.168.0.1/ subnet mask 255.255.255.0.

Possible combination:
IP address of the PC: 192.168.0.2 / subnet 255.255.255.0

▶ Click on **Apply settings** and wait until the new address is shown at the top. A green circle indicates that a connection is possible.

▶ Select the CX22B-R once again in the list at the top and then click on **Remote connection**.

i   **Information**

On changing to the Windows 10 operating system, we recommend using the Ultra VNC Viewer, which comes with the CX22 pre-installed and is also installed on the PC together with the HBM Device Manager V2.1.0. Alternatively, you can use the Remote Desktop app, which is installed on every Windows PC as standard. However, this app can cause the DAQ job to be canceled when you access the CX22. Therefore, below we only describe use of the Ultra VNC Viewer.

▶ The connection to the CX22B-R data recorder is now established, and the login request is displayed. Enter the password and confirm with **Log On**.
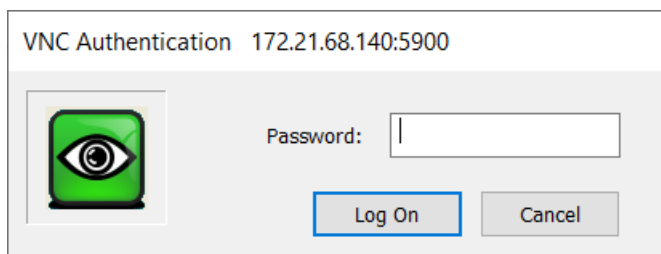
Fig. 6.2   Screen for authenticating the remote computer

The following applies in the factory settings:

User name: *HBMCX22*
Password: *hbm*

6.2.2   Connection via a network

The settings for the CX22B-R Data Recorder again depend on your network configuration. Please contact your network administrator to obtain the correct settings.

▶ Install the "HBM Device Manager" program.

▶ Launch the program on your PC**.**

▶ Click on **Find modules**.

All the QuantumX and SomatXR modules, including the Data Recorders, will appear in the list.

The IP addresses and subnet masks of the PC interfaces are displayed in the **Settings of my computer** section on the left.

▶ In the **Change module address** section, uncheck the **Automatic address assignment (DHCP)** checkbox Please note the specifications of your network administrator.

▶ Click on **Apply settings** and do a rescan. The red circle should change into green into green and thereby indicate that a connection is possible.

▶ Select the CX22B-R once again in the list at the top and then click on **Remote connection**.

For the next steps, please proceed as in the previous Section.

6.2.3   Connection via WLAN

The connection via WLAN can be implemented in two different ways:

• You can set up a direct wireless connection to the CX22B-R from your PC or tablet using the Windows mobile hotspot function.

• You can integrate the CX22B-R into an existing wireless network. This requires a configured *Access Point* and information regarding the SSD and password.

Setting up the CX22B-R for mobile hotspot operation

▶ Enable the mobile hotspot in the **WiFi** tab and configure it using the **Setup mobile hotspot** button (link to the appropriate Windows settings).
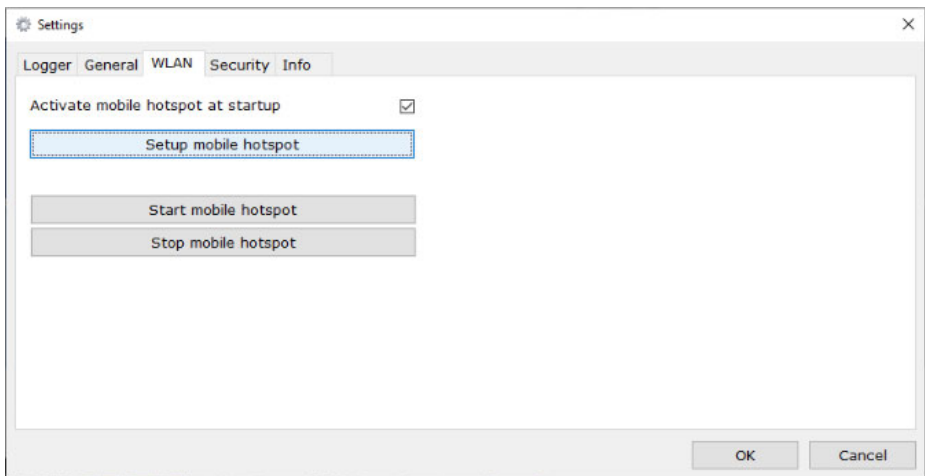
▶ Check the box so that the mobile hotspot is enabled when the CX22-B-R is booted.

You can enter settings such as the SSID and password via the setup button in the relevant Windows menu (if you don't have an internet connection, this is only possible if you enable the mobile hotspot manually beforehand).

Default SSID: CX22
Default password: hbmhbmhbm
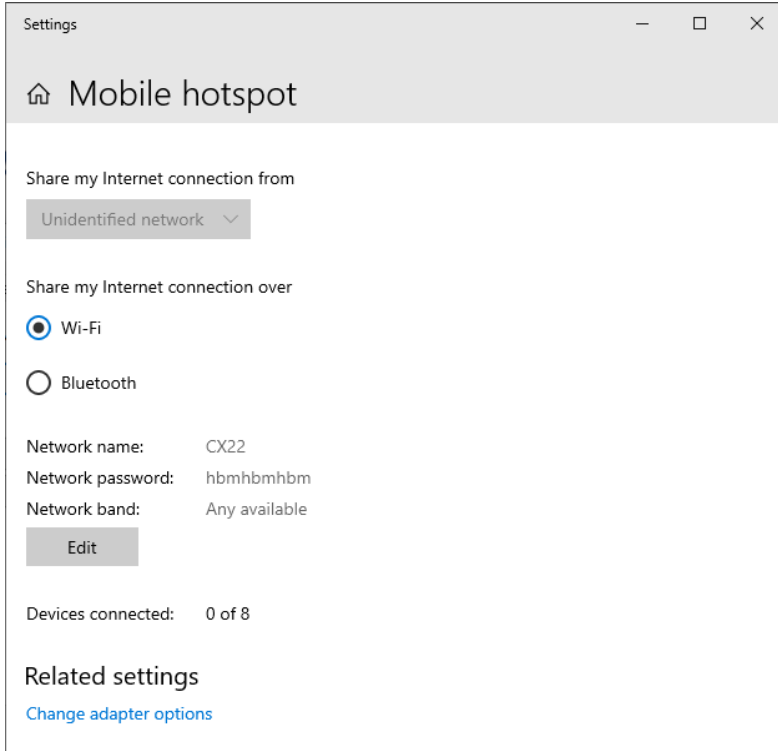
The Start and Stop button is used to manually control the mobile hotspot.

▶ After successful setup, disconnect the networking cable and find the wireless network of the CX22B-R via your PC in order to connect to it.

▶ Now establish a remote connection to the data recorder, e.g. using the *HBM Device Manager*.

Configuring the CX22B-R for an Access Point

▶ To set up the wireless connection, you must first create access to the CX22B-R. This is done conventionally with a monitor and keyboard or remotely via the LAN cable.

▶ Switch to Windows and click the little internet access pictogram at the bottom right in the task bar.

▶ Connect to the network and if necessary, enter the network key. We recommend that you always work with encryption and never use unsecured networks. Check Connect automatically if you want the CX22B-R to connect to this network when it is in range.
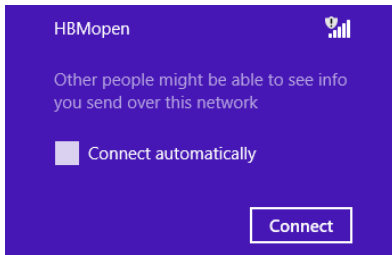
Tip

If setting up the connection with the hosted network takes too long, you can also assign static IP addresses for the CX22B-R and PC. The connection will then be set up faster.

6.2.4   Connection via a tablet

Apple computers, smartphones or tablet PCs can also set up a connection to the CX22B-R. This is on condition that a suitable program is installed on the particular device.

For Intel-based Macs, use the Microsoft "Remote Desktop Connection Client" program (available as a free download from the Microsoft website).

For other operating systems, there are numerous programs for setting up a remote desktop connection to a Windows PC, such as the *Remote Desktop for Mobiles RDM+* program for BlackBerry, Android or iPad.

6.3   Detecting and resolving connection problems

If the CX22B-R does not appear in the HBM Device Manager list, or the setup of the remote desktop connection is canceled, there are several possible causes.

Check the following points and then repeat the search:

• Has the CX22B-R been switched on for at least 1 minute and is the module LED is green.

• Is the Ethernet switch working properly?

   If you cannot check if the switch works properly because you are not operating any other devices on the switch, try to set up a direct connection between the PC and the CX22B-R.

• Have you waited long enough for the PC to specify its address?

   If the PC is set to use DHCP and an alternative configuration, it will take some time before the PC switch to the alternative configuration. In the meantime, the CX22B-R cannot be found by a device scan.

- Could your firewall be responsible for blocking the UDP scan?

  Try deactivating your firewall or add an exception for the following UDP ports: 31416 & 31417
- Could your antivirus program be responsible for blocking the UDP scan?

  Try deactivating your antivirus protection to locate the cause. If the CX22B-R can then be found, read your antivirus program documentation to discover how to enable individual programs to access the network
  (local subnet). You must enable the same ports as those described under the firewall.
- If a WLAN is also active in your PC, you must test whether the module can be found when you temporarily switch off the WLAN (just for the search period). With some WLAN configurations, problems can occur across all interfaces during a scan.
- If your PC has several Ethernet interfaces, try deactivating all the other Ethernet interfaces.
- If the HBM Device Manager cannot find the CX22B-R and you know its IP address or its device name, try settings up the remote desktop connection manually by specifying the IP address or the device name.
- If you are using the CX22B-R in a larger network, contact your network administrator. There are a series of options in managed networks to limit or completely prevent data transmission between the individual nodes.

6.4   Using Ethernet and WLAN in parallel

With the CX22B-R Data Recorder, you can connect modules via Ethernet and also connect your PC to the CX22B-R via Ethernet. But you can also connect the modules via Ethernet and your PC to the CX22B-R via WLAN. The following combinations are possible, in addition to connecting the modules via FireWire:

- Connect PC to CX22B-R via Ethernet, connect modules via the WLAN hub.
- Connect PC to CX22B-R via Ethernet, also connect modules via Ethernet (switch or hub required).
- Connect PC to CX22B-R via WLAN (hosted network connection also possible), connect modules via Ethernet (switch or hub required).
- Integrate the CX22B-R in the WLAN network, connect PC (and modules) via the (Ethernet) network.
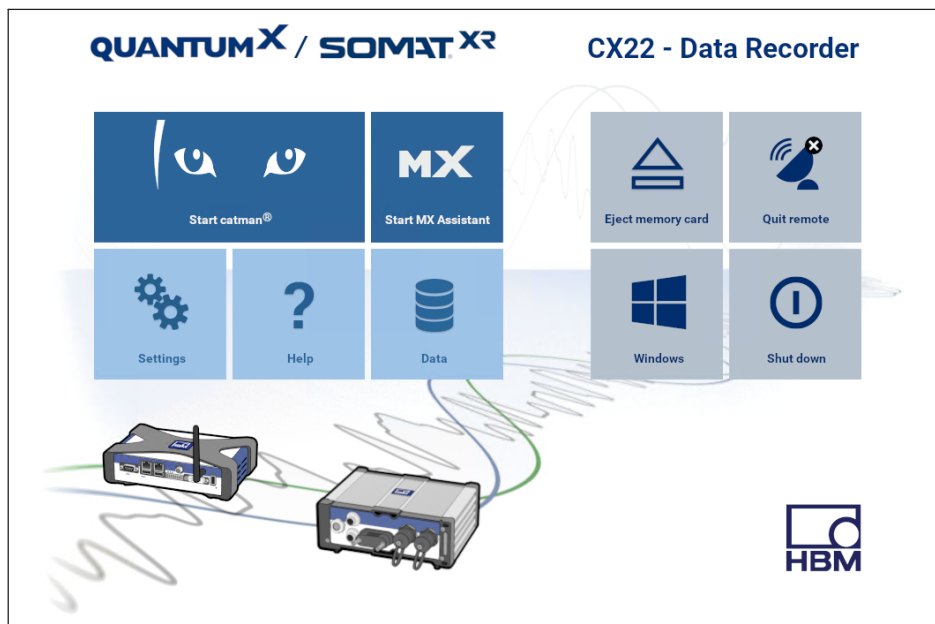
Fig. 7.1   Start screen of the CX22B-R Data Recorder

In the CX22B-R start screen (CX22Shell), you can:

- Launch the catman® EASY program.
- Launch the MX Assistant program
- Change important CX22B-R settings: **Settings**.
    - Logger: Switch to unattended mode
    - General: Change device name and language, enable gateway functionality
    - WiFi: Configure and enable WiFi
    - Security: Change password
    - Info: View hardware info (ID, serial number, firmware version)
- Switch to the Windows desktop **Windows**.
- Shut down the CX22B-R Data Recorder: **Shut down**.

    This switches off the CX22B-R. Interrupt the power supply for approx. 5 seconds, to switch it back on again.
- Open the directory with the SomatXR system documentation: **Help**.

- Open the default directory with the measurement data: **Data**.

  You can specify which folder should be opened in the Settings in the General tab (Data folder).

Return to the start screen

If you have used **Windows** to exit the start screen, you can recall it via the *CX22Shell* (shortcuts on the desktop and in the taskbar). The link brings the start screen to the top.

8   THE FIRST DAQ JOB WITH CATMAN®EASY

Launch catman®EASY in the start screen.

▶ Run a device scan

▶ Select the required devices.

8.1   Creating a DAQ job

A DAQ project contains all the settings for the devices, transducers (sensors) and calculations used, how the measurement is to be carried out, and which data should be visualized online and saved.

Setting up DAQ channels

If you are not using transducers with TEDS (*T*ransducer *E*lectronic *D*ata *S*heet) assign the connected sensors (transducers) to the channels: find your sensors in the sensor list **Sensor database** component window), then drag&drop each sensor to the channel to which it is connected. Set up your sensors in the sensor database, as required.

Assign unique channel names

You can generate channel names with sequential numbering or accept the sensor designation via the **Rename** context menu. In catman®EASY, each channel is identified by its name, so you must use meaningful names where possible.

▶ Mark the channels to be set to zero and run a zero balance (**zero balance**, group **zero balance**).

▶ Deactivate any unused channels (group **Channel**, **Active** Deactivate channels without sensors).

▶ Define calculations − if required − : **Generate** in the group **Calculation channels**.

▶ Activate **Live-Display *(DAQ channels** , tab **General** group), to display continuous measured values and check that all channels are working correctly.

Set up the DAQ job

▶ Select your measurement conditions: sample rate(s), measurement start and stop.

▶ Select **Measurement start** via **Trigger** and **Digital input** for **Trigger mode**, so that you can use the digital inputs of the CX22B-R

	Start		Stop	
Pre-Trigger				**Post-Trigger**

Fig. 8.1   Starting and stopping measurement with a trigger. All the measured values between start and stop, as well as those in the pre-trigger and post-trigger periods are recorded

▶ Click on **Data storage** (**Settings** group) and specify the settings for saving the data after or during measurement. We recommend using the **Automatically at end of job** setting for **data storage**. Otherwise a monitor must be connected during measurement in order to save the data.

▶ Generate visualization – if a monitor is connected.

▶ Save your DAQ project: **File menu** –**> Save** –**> Project**.

▶ Start your DAQ project via **Start** in the **Measurement** group.

If you have not generated a visualization you will be asked if one of the default settings for visualization should be used.

▶ Click on **Measure without display**, if a monitor is not connected during measurement.

CX22B-R measurement mode is activated. If you have defined a start trigger, this will be waited for, if not, measurement will start. The "RUN" LED flashes while waiting for the start trigger and glows continuously as soon as measurement starts.

❗ Important

The "ERROR" LED lights up if there is an error in catman®EASY, e.g. if the connection to the devices at project start cannot be set up or if the DAQ job cannot be started. The "ERROR" LED flashes if the available free memory drops below 1 GByte.

💡 Tip

More information about catman ®EASY can be found in the catman ®EASY online Help.

General default settings, data storage and directories

You should also consider whether the default directories should be changed, and how to proceed with the sensor database.

Procedure for directories

▶ In the catman®EASY start window, click on **Additional options**.

▶ Use **System** –**> Folders** to specify the default directories for your data and images.

The settings are only used the first time the data or images are saved, after this, cat-man®EASY always retains the last folder used.

Sensor database

The sensor database is an easy way to adjust the measuring chain to the sensor being used. You only need to enter the characteristic values of a sensor once. When it is done, you can assign the sensor to the channel to which it is connected. The device is then set to the characteristic values of this transducer.

In the default setting (condition at the time of delivery) catman uses the English sensor database. But you can switch this to a German or French language database.

The data are identical, it is just the sensor group names that are in the respective lan-guages.

Procedure for modifying the sensor database

▶ In catman®EASY, use the **Sensor database** context tab and the **File** menu to load the relevant sensor database from the installation directory "C:\Program Files (x86)\HBM\catmanEasy_DE\" or "C:\Program Files (x86)\HBM\catmanEasy_FR\".

▶ Save this sensor database under a different name to drive D, and open it again. cat-man® EASY will automatically save the new path and file name and use it the next time the program is launched.

If you want to keep the English version, merely save it under a different name to drive D.

Use a different name if possible, as a sensor database called HBM_SensorDatabase.sdb could be overwritten when the system is updated (although you will be asked whether this should happen). Import a new sensor database to your sensor database to incorpo-rate new sensors, as required. A description of this can be found in the catman®EASY online help for the sensor database.

8.2 Transferring data/files to the PC

There are several ways for you to transfer the measurement data acquired by the CX22B-R Data Recorder to your PC:

1. Via a USB flash drive, e.g. a USB memory stick:

   Plug the USB flash drive into one of the CX22B-R's USB interfaces and connect the keyboard and monitor. In the start screen, click on **Windows** and use the operating system (Windows Explorer) to copy the files to an USB memory stick..

2. Data exchange via the clipboard:

   Click the **Open File Transfer ...** icon in the Ultra VNC Viewer menu. This opens a window in which you can transfer files from the PC (local machine) to the data recorder (remote machine), and the other way round.
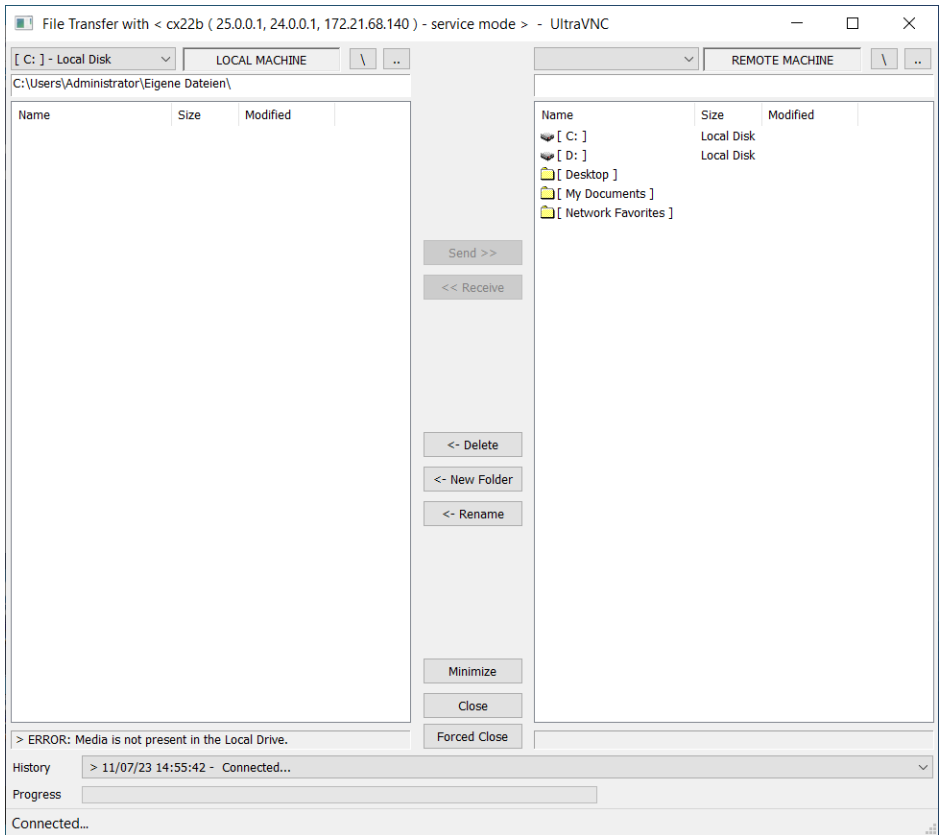
8.3 Data analysis

There are basically two ways to evaluate the measured data:

- On the CX22B-R (for example via remote desktop):

  To do this, start an evaluation project in catman®EASY or switch from measurement mode to evaluation mode.

- On your PC:

  To do this, you can use catman®EASY/AP, catman®Post Process or GlyphWorks from HBK, for example. The recorded file formats can basically be converted into any other format, such as MAT, ASCII and many others. If binary files (BIN) have been recorded, there are also import filters for programs such as GlyphWorks, FAMOS and others.

8.4   Monitoring functionality

Since catman[5.0 a new module for monitoring applications is introduced, which might be helpful as well for other applications. The key features of this module are explained below.

❗ Important

All these functions are not included in catman[Easy, which comes with the CX22B-R. They need an additional EasyMonitoring license or a catman®AP license.

- Parallel data recorders

A data recorder is similar to a DAQ job in that is has its own start/stop conditions, storage file and other settings. But while ordinary DAQ jobs can not run in parallel, recorders can do this! A good example for the use of recorders is the monitoring of a railway bridge, where each of two tracks should be monitored separately.

A data recorder always belongs to a normal DAQ job. This DAQ job is the "parent" or "base" job for the recorders. Each base job can have a subset of up to 15 data recorders where each recorder runs a separate and independent data storage process based upon individual start/stop trigger conditions. It has its own set of channels to be recorded and individual sample rates including downsampling. Recordings can be repeated, i.e. after one recording the recorder starts again waiting for a trigger. Each recorder generates its own data file and also supports FTP upload.

If a base job containing recorders is launched (i.e. when you click the green arrow symbol) the recorder objects are created and put into "Waiting for start trigger" state. To view the recorder statuses. A separate window, called the "Recorder console" will be shown.

- (S)FTP upload

Data files generated after a DAQ job can be automatically uploaded to an FTP server. SFTP with authentication and data encryption is supported. The FTP upload runs asynchronously in the background so it does not block further DAQ jobs. If a DAQ job contains video captures the video files can also be uploaded. FTP configuration is part of the DAQ job settings in the register tab "Remote data storage".

For more information about this module, please see the knowledge base of catman.

9 UNATTENDED TEST (LOGGER)

Settings must be made in two areas to configure the CX22B-R for an unattended test:

- You must create a DAQ project in catman®Easy with the necessary settings for unattended measurement.
- You need to make sure that when the CX22B-R is switched on, catman®Easy launches, a DAQ project is loaded, and the DAQ job is started. You can carry out these settings via the shell.

As usual, measurement can be started and stopped immediately, or via a trigger.
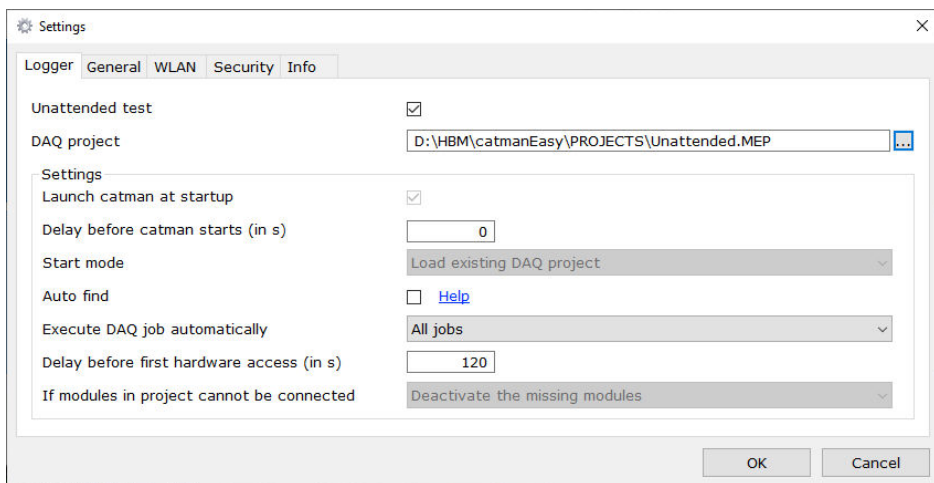
Procedure

▶ Configure your DAQ project as described in *Section 8.1*. Go to the **DAQ Job** tab, select a suitable setting for starting and ending data logging, and press the **Unattended Test** button.

▶ Save the DAQ project and exit catman completely.

▶ Open the shell and go to **Settings**.

▶ In the **Logger** tab, select **Unattended Test** and the stored **DAQ project**. If necessary, you can easily adapt other **Settings** that are not grayed out to suit your test.

This project will then start automatically the next time the CX22B-R is switched on. If the power supply is interrupted during measurement, the project will be reloaded and measurement continued when the power supply is restored. The restart of the measurement (boot of the CX22B-R inclusive) can take more than 3 minutes, depending on the number of connected devices and channels.

‼ Important

In unattended tests, the data is saved in Fast Stream storage mode. In this mode, the temporary measurement data memory is not used; instead the data is copied directly to the final test file. This enables maximum performance; however, there are some restrictions, which you should please read about in the catman documentation.

10   SAVING DATA ON THE DATA RECORDER

10.1   Disk partitions layout

The internal SSD of the CX22B-R is split in 2 partitions.:

- First partition (C:\): it is used for the operating system (WindowsXP embedded) and catman®EASY, and is protected against (unintentional) change (UWF: https://docs.microsoft.com/en-us/windows-hardware/customize/enterprise/unified-write-filter)
- Second partition (D:\): it is where the catman settings are stored. This is also where the projects and measurement data are stored per default.
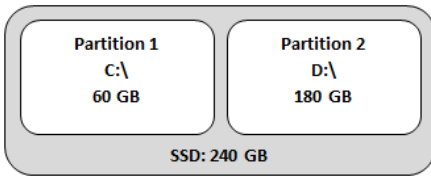
Fig. 10.1   Disk partition layout

10.2   Disk performance

Maximum cumulative recording rate (data storage)		
Internal SSD		
Dynamic temporary database[1]	MS/s	4
Static temporary database[2]	MS/s	> 5
In FastStream mode[)	MS/s	> 5

[1] Test conditions: 14 modules (FireWire), 56 DAQ channels, 8 bytes per measured value, 2 data rate groups, no visualization objects
[2] Test conditions: 14 modules (FireWire), 56 DAQ channels, 8 bytes per measured value, 1 data rate group, no visualization objects

As a rough guideline, data throughput should be calculated in MByte/s. A signal (sample) can be calculated with 8 bytes. You can also experimentally check wether the selected configuration is working. Diagnostic options are available via the lower status bar in catman®. It is possible to gain an overview of processor and memory utilization during data acquisition.

10.3 Networked recording and Cyber security

If you incorporate the data recorder in public networks such as the internet, we recommend protecting the device and therefore the Windows operating system from internet hazards.

Here are a few recommended measures:

- Please talk to the IT experts at your company to obtain the latest cybersecurity recommendations
- Change the default login credentials (login, password)
- Install regular Windows updates
- Install antivirus software
- Back up measurement data regularly
- Separate the different networks with VLANs and the hardware firewall using suitable routers

11 OPERATING THE CX22B-R AS GATEWAY

11.1 Description

Gateway mode provides the option of connecting the SomatXR and QuantumX modules that are connected via FireWire to other network adapters of the CX22B-R (e.g. Ethernet or WiFi). In this mode, the CX22B-R behaves like a CX27C or MX471C, i.e. several modules that are connected via FireWire can be routed from the CX22 to the PC via an Ethernet cable.

![Important icon] **Important**

When the CX22B-R is in gateway mode, it cannot be used as a recorder.

11.2 Activate/deactivate gateway mode

To enable/disable gateway mode, go to the shell settings of the CX22B-R in **Settings** in the **General** tab. Check or uncheck the "Enable gateway functionality" box to enable or disable this option.

11.3 Connect to a MX module behind a CX22B-R

To connect to a module being routed by a CX22B-R, look for this module in the catman's® device manager module list. The modules routed by the CX22B-R are displayed as child elements of the CX22B-R. Unlike the CX27, you can select modules individually.
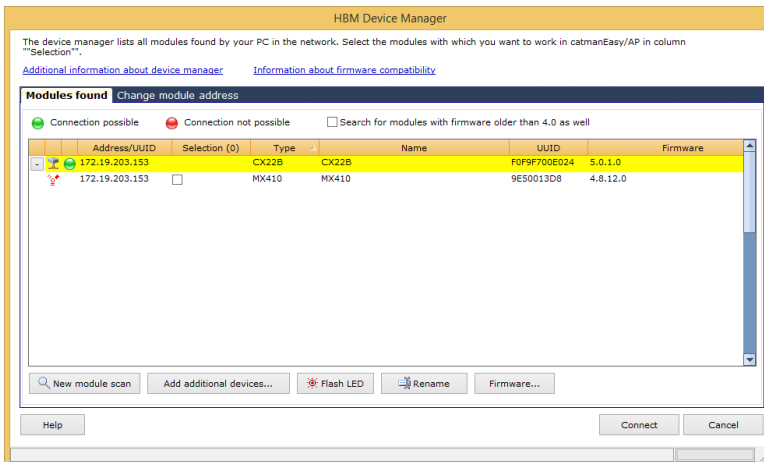
> **!** **Important**

You can connect only one time simultaneously to a MX module being routed by the CX22B-R.

11.4   Performances

The CX22B-R can route up to 3MS/s.

The following table shows the different tests we made to benchmark the performances of the gateway mode in the CX22B-R:

Maximum cumulative data througput (gateway mode)		
LAN (Gigabit)[1]	MS/s	> 3
WLAN interface (adhoc)[2]	MS/s	> 0.2

[1] Test conditions: 12 modules (FireWire), 48 DAQ channels
[2] Test conditions: 14 modules (FireWire), 108 DAQ channels

12   SYSTEM SETTINGS AND UPDATE/RECOVERY

12.1   Installing drivers

Drivers, e.g. for USB peripherals, can be installed at any time, as long as no test is active.

Although the installation of other software packages is also possible in principle, we do not recommend this on a large scale, in order not to endanger the stability of the CX22B-R Data Recorder. If additional software is installed, the functionality of the CX22B-R Data Recorder can no longer be guaranteed and HBK can no longer provide support for any error or failure.

In practice, drivers have already been successfully installed and operated for the following terminal equipment: touchscreen (plus touch keyboard), camera (e.g. Logitech), GPS (Navilock), FTP service (TurboFTP with AutoStart and transfer of DAQ files to a central cloud server, Winscp, GoodSync, allwaysync, watchDirectory Professional).
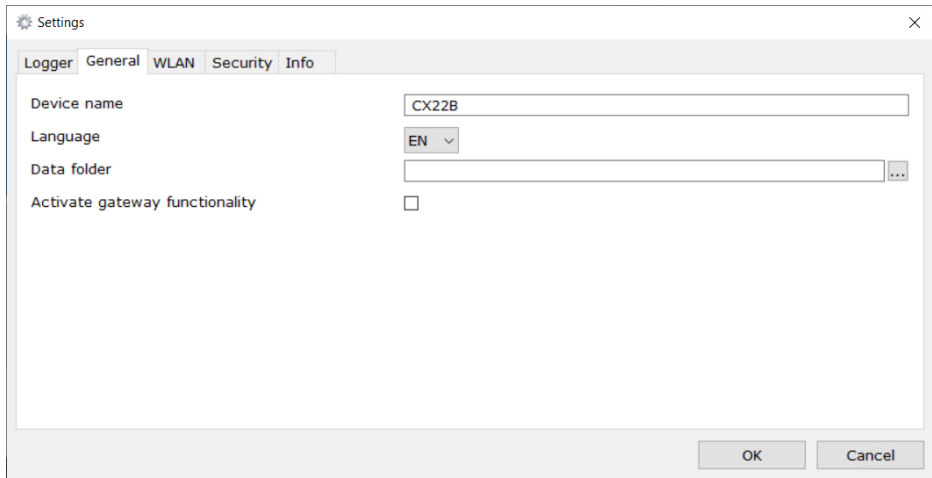
💡 Tip

Should you be prompted to insert the Windows CD when you are installing a driver, let Windows search for the files it needs in the directory
C:\Windows\System32\drivers.

12.2   Changing system settings (Settings)

In the start screen, click on **Settings** and go to the appropriate tab to change the settings.

The following settings can be changed:

- Configure the data recorder for an unattended test (**Logger** tab - *see Section 9 on page 41.*)
- Device name (**General** tab)

  This name is displayed in the network, for example.

- Password (**Security** tab)

  This is the password of the HBMCX22. It is the password needed to establish a Remote Desktop connection.

 Important

Store the password safely after changing it. If you lose it you will need to restore the system to obtain access to the CX22B-R again.

- The language version of catman®EASY (**language of the DAQ software**, **the operating system and keyboard input**, **General** tab)

  Select **EN** for the English interface, **DE** for the German interface and **FR** for the French interface version of catman®EASY.

- Data folder: enter the storage location (**General** tab). This memory is opened when you click on the "Data" button on the start screen.

- Enable the mobile hotspot so that a direct WiFi connection is possible when the CX22B-R is booted (**WiFi** tab). You can also configure, start and stop the mobile hotspot manually here. You can find details on the mobile hotspot in *section 6.2.3, page 30.*

- The **Info** tab contains information on the CX22B-R hardware (ID), the device serial number, and the versions of the image, the shell, and the installed catman® software.

Settings					×
Logger	General	WLAN	Security	**Info**	

Hardware ID:	111
Serial number:	F0F9F78010F1
Image version:	5.6.3.2 B
Shell version:	5.6.3.2
Catman version:	5.6.3.2

OK   Cancel

12.3   Updating the software

You can update catman®EASY only, or enable additional function packages such as Easy-Math and EasyScript or a full catman®AP at any time, if you have the relevant license key available.

You can also update the MX Assistant software at any time.

HBK also recommends always keeping the operating system, antivirus software and firewall up to date.

▶ To do this, go to the Windows operating system and, in **Settings**, check in **Windows Updates** and **Windows Security** to see whether updates are available.

You will need to be connected to the internet to do this.

12.4   System restoration (Recovery)

If the changes you have made to the system result in the system becoming inoperable, you can restore the delivery condition of the system.

You have the option of installing a recovery image from the internal eMMC memory. If you boot the data recorder from the eMMC memory, two recovery options are offered. Option 1 only overwrites Partition C: the operating system and the installed programs. Option 2 also overwrites Partition D: this generally contains the measurement data and DAQ projects. Therefore, it is vital you download the measurement data and DAQ projects from the data recorder before proceeding. Please also contact our Support (https://www.hbkworld.com/de/services-support) before you run recovery.

13 FCC (USA) AND CI (CANADA) STATEMENT

! **Important**

This equipment has been tested and complies with the limits for a Class A digital device, pursuant to part 15 of the FCC and CAN ICES-3 (A)/NMB-3(A) 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 or her own expense.

Additionally, this digital device need to be used exclusively as industrial or commercial test equipment and is exempted from FCC respectively ICES rules, pursuant to part 15, §103 of the FCC rules and ICES-003, chapter 4. Connection of equipment, changes or modifications not expressly authorized by HBK (e.g. by this product manual) may cause additional interference and could void the users authority to operate the CX22B-R.

*The **data recorder CX22B-R** comes along with an integrated wireless LAN module supporting the IEEE-Standards 802.11a/b/g/n. This module conforms to **CE**, **FCC** and **IC standards**.The module used depends on the year of manufacture. However, on the back of the module you can see which of the two following modules is installed, as the FCC and IC numbers are printed here.*

The following modules have been installed since the launch:
- Up until 2023/24
 Compex WLE200NX
 FCC ID: TKE4-10-WLE200NX
 IC ID: 7849A-WLE200NX
- From 2023/24
 Sparklan WPEQ-262ACNI(BT)
 FCC ID: RYK-WPEQ262ACNIBT
 IC ID: 6158A-EQ262ACNIBT

The wireless module has been tested and verified that it covers the regulations according to part 15C and 15E of the FCC standard and the Canadian regulations RSS-210. These regulations guarantee adequate protection against interference and noise in commercial and industrial areas. This device generates and uses energy in the radio frequency range and can radiate those, if not used in other ways than described in this documentation can cause harmful interferences for communication. Operation of this device in residential areas can cause harmful interferences. In this case the user is obliged clearing off the radio transmission interference at own cost.
The European conformity declaration is available for download on hbm.com or

hbkworld.com *for our HBM webpage:*

Every connection of equipment, changes or modifications not expressly authorized by HBK may cause additional interference and could void the user's authority to operate the CX22B-R. This is particularly applicable when replacing the antenna. The wireless LAN module is in accordance with the regulations of FCC in non-controlled environment. During operation the minimum distance between device and persons shall be 20 cm (~ 8 inches).

14   WASTE DISPOSAL AND ENVIRONMENTAL PROTECTION

All electrical and electronic products must be disposed of as hazardous waste. The correct disposal of old equipment prevents ecological damage and health hazards.

Statutory waste disposal mark

The electrical and electronic devices that bear this symbol are subject to the European waste electrical and electronic equipment directive 2002/96/EC. The symbol indicates that, in accordance with national and local environmental protection and material recovery and recycling regulations, old devices that can no longer be used must be disposed of separately and not with normal household garbage.

If you need more information about disposal, please contact your local authorities or the dealer from whom you purchased the product.

As waste disposal regulations may differ from country to country, we ask that you contact your supplier to determine what type of disposal or recycling is legally applicable in your country.

Packaging

The original packaging of HBK devices is made from recyclable material and can be sent for recycling. For ecological reasons, empty packaging should not be returned to us.

Environmental protection

The product will comply with general hazardous substances limits for at least 20 years, and will be ecologically safe to use during this period, as well as recyclable. This is documented by the alongside symbol.

Statutory mark of compliance with emission limits in the electronic equipment supplied to China.

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