

ENGLISH

Operating Manual

catman[®] Enterprise 9.1

System Documentation Part I

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1.1 Introduction

The MD Server system consists of two main (hardware) parts:

1. One or more MGCplus racks or backplanes with QuantumX modules (signal conditioning devices). In a system configured by HBM, these are built into one or more cabinets together with an uninterruptible power supply.
2. A server PC with software catman Enterprise to set up the system and run a measurement, i. e. perform a test.

The documentation about catman Enterprise is divided into several parts:

1. This part as an introduction to the system and description of the hardware and licensing system used.
2. The catman Enterprise MD Server 9.0 (software) Operating Manual.
3. The catman Enterprise MD Client 9.0 (software) Operating Manual.
4. Other optional programs in consecutive parts.

The server PC with software MD Server collects the measured data from the MGCplus or QuantumX/SomatXR signal conditioning devices. Programs MC Definition List and MC Setup are used for the setup of the system. The data may be pre-processed on the server. Software MD Export is used to search through and export data. The catman Enterprise MD Server 9.0 Operating Manual (Part II of this documentation) includes the description of these programs.

The client PCs use software MD Client to access, further process and visualize the measured data. The Operating Manual for catman Enterprise MD Client 9.0 is Part III of this documentation.

 All Operating Manuals concerning software contain also a description of the relevant installation procedure.

You may download the latest versions of these documents from the HBM website. Look for [HBM downloads](#) -> **catman Enterprise**.

Please keep all documentation for further reference.

1.1.1 What does this documentation contain?

This part of the documentation contains information about:

- The typographical conventions used
- Safety notes
- Licensing information
- Technical support contact addresses
- A description of the hardware components supplied with the server part of catman Enterprise
- General product data where this is not included in other operating manuals
- List of the operating manuals which cover the different system components
- System maintenance
- Converting, mounting and dismounting the hardware

1.1.2 Notes on the documentation

This manual assumes that you:

- are familiar with your Windows® operating system,
- know how to use online help files.

1.1.3 Typographical conventions

- ☞ Unless specified otherwise, all references point to chapters in the same part of a documentation.

For the sake of clear, unambiguous labeling and better legibility, we use the following conventions in this manual:

- ⚠ We have flagged important paragraphs with this caution symbol.

- ☞ This symbol points to a significant detail or specific characteristic.

- 💡 This symbol marks a tip or an interesting feature.

This marking is used to highlight individual terms in the text. Your **input**, all **push buttons**, **control boxes**, the names of **input fields** etc. are also marked. The **menus**, **commands**, **dialog fields** and **boxes** as well as **register tabs** used in the program are likewise marked. Window or dialog titles and the names of Panel objects start with a capital letter.

<user name>: This type of bracket is used to mark a parameter, in this case the user name, which is inserted or has to be filled in instead.

Text in blue color indicates a link. In a PDF you can click on the text to go to the relevant section, in a printed manual check the page specified.

This symbol means more information is available in the online help.

We hope that these markings will allow you to quickly identify the topics or menus referred to and enable you to find your way round the program.

How to get help on a specific topic in the online help?

Type your search phrase into the **Find in this help** field and press RETURN. As an alternative check the **Index** tab in the help.

1.2 Safety instructions



Before you open or unplug a device inside a cabinet, make sure the whole system is switched off.

Keep all documentation concerning catman Enterprise for further reference. You may download the latest versions from the HBM website. Look for [HBM downloads](#) -> **catman Enterprise**.

Use in accordance with the regulations

The MD Server system and its signal conditioning devices MGCplus or QuantumX/SomatXR are to be used exclusively for measurement tasks and directly related control tasks. Its use for any additional purpose shall be deemed to be not in accordance with the regulations.

The MD Server system may only be installed and used by qualified personnel strictly in accordance with the specifications and the safety rules and regulations stated in the Operating Manuals. Observe the appropriate legal and safety regulations for the application concerned during use. The same applies to the use of accessories.

Qualified personnel

Qualified personnel means persons entrusted with the installation, assembly, commissioning or operation of the product who possess the appropriate qualifications for their function. Maintenance and repair work on an open device with the power on must only be carried out by trained personnel who are aware of the dangers involved.

Conditions on site

Cabinets and signal conditioning devices must be protected from moisture or atmospheric influences such as rain, snow, etc. Make sure that the ventilation slots on the top

are free so that a free air flow is possible. Please check also for temperature and humidity restrictions.

Electrical hazards

Any mains plug must only be inserted in a socket with a protection switch (Protection class I).

Before opening a MGCplus device or reconfiguring a QuantumX/SomatXR system switch it off and pull the mains plug out of the socket. Never pull the mains plug from the socket by the mains cable.

Do not operate any device if the mains cable is damaged.

If a MGCplus amplifier module (front side) or a connector plate (rear side) is removed from a signal conditioning device MGCplus, the slot must be closed with a blank plate.

Working safely

Error messages must only be acknowledged when the cause of the error has been removed and no further danger exists.

Conversions and modifications

Modifications which affect the design and safety of the MD Server may not be made without our express agreement. Any modification shall exclude all liability on our part for any damage resulting therefrom.

In particular, any repair or soldering work on motherboards is prohibited. When replacing complete modules, use only original parts from HBM or the respective component manufacturer.

Residual dangers

The MD Server system consists of state-of-the-art devices and is safe to operate. If inappropriately installed and operated by untrained personnel, residual dangers may arise. Any person instructed to carry out installation, commissioning, maintenance or repair of the devices must have read and understood the appropriate Operating Manuals and in particular the technical safety instructions.

The scope of supply and list of components provided with the system only cover part of the scope of measurement technology. In addition, measurement procedure planners, installers and operators should plan, implement and respond to the safety engineering considerations of measurement technology in such a way as to minimize residual dangers. Existing regulations on the subject to be measured must be observed. Reference must be made to residual dangers connected with measurement technology.

1.3 Licensing

- ☞ Refer also to www.hbm.com for our End User License Agreement (EULA) and to topics [How do you work with the MD License manager? on page 11](#) and [When do you need the MD License client? on page 17](#).

Licensing takes place using the MD License manager and the MD License client. The MD License manager is used to manage the existing licenses, the MD License client is required to run the following programs:

1. MD Server (connected to the MGCplus or QuantumX/SomatXR signal conditioning devices)
2. MD Client
3. MD Trend (optional software)
 - ☞ All other programs, e.g. MC Definition List or MC Setup, which are included in catman Enterprise, do not need any licensing.

An additional license is required for each MGCplus or QuantumX/SomatXR signal conditioning device (except for CX27), for devices for optical strain measurements and for every other external device operating together with MD Server. For all external devices the license is necessary to be able to communicate with the device driver software. The license is therefore displayed in the Software group in MD License manager.

No data acquisition is started if one of the required licenses is not found. If a device license is missing you may change the hardware configuration, e.g. switch off the devices without license and skip these devices in the SYNC chain, see [Re-configuring or re-organizing the MD Server system on page 45](#).

You may install the MD License manager on the same PC as catman Enterprise or on a separate PC and manage the license distribution from this PC.

- ☞ The MD License client is automatically installed together with any software requiring a license.

Licenses for MGCplus or QuantumX/SomatXR

The required licenses for HBM devices may be transferred to the devices. This facilitates operation with changing device configurations and more than one MD Server license. The transfer is done with the MD Server software, i.e. the required licenses must first be transferred from the MD License manager to an MD Server instance, see [Transferring licenses to/from MGCplus and QuantumX/SomatXR on page 15](#).

- ☞ With QuantumX it is possible to transfer licenses to modules of type B or C only, e.g. MX840B, MX1601B or MX471C, or to SomatXR modules.

1.3.1 MD License manager installation

- ☞ Refer also to www.hbm.com for our End User License Agreement (EULA).

You may install the MD License manager on the same PC as catman Enterprise or on a separate PC and manage the license distribution from this PC (recommended method).



Administrator rights are required for installing the software.

- ☞ The *MD License client* is automatically installed with every software requiring a license from the MD License manager. There is no separate installation necessary.

Installing the MD License manager from ZIP file download

Open the **Properties** context menu and **Unblock** the file after downloading from the HBM website. Then unzip it and open the "Start.exe" file in the resulting folder to get the opening screen.

Installing the MD License manager from CD

Put the CD in the CD-ROM drive of your PC. In standard configuration, Windows automatically opens the CD. If you have deactivated this self-starting Windows function or if you downloaded the installation, look for file "Start.exe" in the main (root) directory. Double-click on its icon to get the opening screen.

Further installation procedure

1. Choose in the following screen the program you would like to install, here **Install MD License Manager**.
2. Click on **Next** in the following screen and read through the license agreements
3. Select in the following screen the folder in which you want the program to be installed: either confirm the suggested target folder or click on **Browse** and choose which one you want. If necessary, "Start.exe" creates the directory you have specified and then copies all the files to it.
4. Click on **Next**, select in the following screens the required options and follow the instructions of the installation program.
5. Quit the installation program after having installed the MD License manager.

1.3.2 How do you work with the MD License manager?

The MD License manager program is the central authority which manages your catman Enterprise licenses. You may use:

1. **A single installation from which all other licenses are distributed.**
This is the preferred method, if all software requiring a license is located in the same building or company location.
2. **Several installations, each managing a part of all available licenses.**
This is a good solution if licenses have to be made available at different locations. Although you can distribute licenses via email, it might be more convenient if decisions about license distribution are made at the location where the licenses are needed. You can use these installations to distribute their licenses to other PCs at the same location. If necessary, you can always move licenses from one location to another via email.

You may install the MD License manager on the same PC as catman Enterprise or on a separate PC and manage the license distribution from this PC. The MD License manager is installed from the catman Enterprise download or your catman Enterprise CD.

Licenses which have already been distributed but which should be transferred to another PC, must first be given back to the MD License manager *that originally issued them*. These licenses may then be transferred to another PC.



It is not possible to transfer licenses directly from one MD License client to another.

Before removing the MD License manager software from a PC, set up another PC as MD License manager PC and transfer all licenses back, see [Transferring licenses between MD License managers on page 14](#). Otherwise your licenses are lost.

1.3.2.1 Setting up a PC for license management

How to proceed

1. Install the MD License manager from the catman Enterprise download or your catman Enterprise CD.
2. Start the MD License manager.
3. Create a file, which contains a unique ID number derived from some hardware on this PC: **Transfer -> Request new licenses from HBM.**

4. Send this file via email to HBM: customsystems@hbkworld.com. Please include the order and customer numbers in your email and use "Enterprise license request" as subject. HBM adds the required number of licenses to the information about your PC, encrypts the file and sends it back to you.
5. Import this file into the MD License manager: **Transfer -> Import new licenses from HBM.**

Now you are ready to distribute licenses. However, up till now you are only able to transfer licenses to other MD License managers, not to PCs using licensed software. To transfer licenses to PCs, the PCs involved must be registered in the MD License manager, see [Setting up PCs for using licensed software on page 12](#), and [Transferring licenses to MD License clients on page 13](#).



If you want to exchange or modify a PC that has the MD License manager installed, you must first transfer all licenses back to the MD License manager. Then transfer those licenses to an MD License manager on another PC, see [Transferring licenses between MD License managers on page 14](#). You may then register all other PCs and reassign the licenses as before. Otherwise you will not be able to make any more changes to distributed licenses and all undistributed licenses will be lost.

1.3.2.2 Setting up PCs for using licensed software

- 👉 The MD License client is automatically installed together with any software requiring a license.

How to proceed

1. Start the MD License *client*.
2. Create a file which contains a unique ID number derived from some hardware on this PC: **Transfer -> Create PC registration.**
3. Copy this file to the PC where the MD License manager is installed.
4. Start the MD License *manager* on that PC.
5. Import the PC registration file from the PC which requires licenses: **Transfer -> Import PC registration.**

- 👉 The registration file is deleted after the import.

The PC requiring licenses is now *registered* and may receive licenses, see [Transferring licenses to MD License clients on page 13](#).

1.3.2.3 Transferring licenses to MD License clients

Once a PC is registered in the MD License manager ([Setting up PCs for using licensed software on page 12](#)) licenses may be assigned to this PC.

How to proceed

1. Start the MD License *manager*.
2. Choose which license type you want to distribute.
Double-click on Software licenses to see the available types, e. g. MD Server and MD Client licenses or licenses for external devices () . With HBM device licenses () , MGCplus or QuantumX/SomatXR licenses may be available. The numbers right to the entry indicate how many licenses have already been transferred (number on the left) and how many licenses have been issued to this manager, e. g. by HBM (number on the right).
3. Choose the PC to which the license(s) shall be distributed.
If you click on the license type you want to distribute, the details about the licenses already assigned will be displayed on the right-hand side: number of the licenses, computer name and comment.
Click on an empty line and use the context menu (right-click) to enter one of the registered PCs.
4. After having assigned all licenses, export a license file: **Transfer -> Export license**. The numbers of available and distributed licenses are updated after this file has been exported.
5. Copy the file to the PC where you want to distribute one of the licenses contained in it.
6. Start the MD License *client* on that PC.
7. Import the license file just copied: **Transfer -> Import license**.
8. The MD License client extracts all licenses for this PC from the license file and displays the assigned licenses.
 The file is changed if licenses are left for other PCs, otherwise it will be deleted.
9. Repeat steps 5 to 8 with the (modified) file if the file included licenses for other PCs. The file will be deleted as soon as all licenses contained in it are transferred.

1.3.2.4 Transferring licenses between MD License managers

The following assumes that

- PC1 has an MD License manager installed, which has licenses that are not yet distributed (still available)
- PC2 has an MD License manager installed, which should receive some of the undistributed licenses from PC1

After the transfer, PC2 can distribute licenses to other MD License clients.

- ☞ Clients may have licenses from different MD License managers.

How to proceed



You must first create a license request file. This file must be created on PC2 (to where the licenses will be transferred).

1. Start the MD License manager on PC2 and choose **Transfer -> Request licenses from MD License manager**.
A license request file is created containing a unique ID number derived from some hardware on this PC.
2. Copy that file to PC1.
3. Start the MD License manager on PC1.
4. Choose **Transfer -> Export licenses to MD License manager**.
5. In the following dialog, specify the license request file.
6. Then choose which and how many licenses should be exported: use the right mouse key (context menu) to define the number of licenses.
It is not possible to type in a number as the possible values depend on the number of available licenses.
7. Export the licenses.
The license data together with unique information about PC2 is encrypted into the license request file.
8. Copy the file (back) to PC2.
9. Start the MD License manager on PC2 and choose **Transfer -> Import licenses from MD License manager**.
10. The new licenses are imported, displayed and may be distributed as usual.
 - ☞ The file will be deleted after the new licenses have been successfully imported.

If you want to transfer a license back, repeat the procedure but switch PC1 and PC2, i.e. create a request file on PC1, copy that file to PC2, etc.

- 👉 If you want to transfer *all* licenses from one MD License manager to another one, these licenses must first be given back.

1.3.2.5 Transferring licenses to/from MGCplus and QuantumX/SomatXR

Usually the required licenses for HBM devices are handled by the MD Server software and therefore transferred to the PC running the MD Server software. However the licenses may also be transferred permanently to the MGCplus devices or QuantumX/SomatXR modules. This facilitates operation with changing device configurations and more than one MD Server license. The transfer is done with the MD Server software, i.e. the required licenses must first be transferred from the MD License manager to an MD Server instance.

- 👉 With QuantumX it is possible to transfer licenses to modules of type B or C only, e.g. MX840B, MX1601B or MX471C, or to SomatXR modules.

Transferring licenses to MGCplus and QuantumX/SomatXR

1. Transfer the required licenses for all devices to a PC which has program MD Server installed.
Refer to [Transferring licenses to MD License clients on page 13](#).
2. Connect all relevant devices to this PC.
 - 👉 It is not possible to select which devices receive a license. All connected devices will get a license if enough licenses are available.
3. Start program MD Server and scan the new system (**Settings -> New scan**).
4. Download the licenses to the connected devices with **Tools -> Transfer MGCplus and MX licenses**.

If more licenses are available than devices connected, these are retained on the PC running MD Server, each device or module gets only one license.

If more devices or modules are connected than licenses are available, the devices or modules with the highest IP addresses will get no license. Please note that no data acquisition is started if the required licenses are not found.

- 👉 You may specify that every time the measurement is initialized, any available licenses are distributed to the connected devices, if required.

Retrieving licenses from MGCplus and QuantumX/SomatXR

1. Connect all devices or modules where the license shall be retrieved to the PC from which the licenses were transferred.
 - 👉 It is not possible to select from which devices or module a license is retrieved. The licenses from all connected devices will be removed.
2. Start MD Server and scan the new system (**Settings -> New scan**).
3. Retrieve the licenses from the connected devices or modules with **Tools -> Retrieve MGCplus and MX licenses**.
4. You may then use the MD License client to transfer these licenses back to the MD License manager, see [Removing client licenses from a PC on page 16](#).

If a device or module connected has no license, nothing is retrieved. Only the number of licenses which has been transferred from this MD Server installation may be retrieved. If more licenses are found than transferred originally, these surplus licenses will remain in the devices or modules.

1.3.2.6 Removing client licenses from a PC



If you remove licenses from an MD License client, you must transfer these licenses back to the MD License manager *that originally issued them*. Otherwise these licenses are lost.

How to proceed

1. Start the MD License client.
2. Go to the **Remove** column and the row corresponding to the type of license you want to remove. Type in or choose from the context menu the number of licenses you want to remove.
3. Export these licenses with **Transfer -> Export license**.
4. Copy the file just created to the PC, which contains the MD License manager that originally issued the licenses.
5. Import the licenses into the MD License manager with **Transfer -> Import license**.
 - 👉 The file will be deleted after the licenses have been successfully imported.

1.3.3 When do you need the MD License client?

The MD License client is the program required on those computers using the following software:

1. MD Server (connected to the MGCplus or QuantumX/SomatXR signal conditioning devices)
2. MD Client
3. MD Trend (optional software)
 - ☞ All other programs, e.g. MC Definition List or MC Setup, which are included in catman Enterprise do not need any licensing.

The MD License client is automatically installed together with any software requiring a license.

 Distributed licenses which should be transferred to another PC must first be given back to the MD License manager *that originally issued them*. These licenses may then be transferred to another PC.

The Procedures section in [How do you work with the MD License manager? on page 11](#), shows how to use MD License manager *and* MD License client.

Procedures required for a client PC

- [Setting up PCs for using licensed software on page 12.](#)
- [Transferring licenses to MD License clients on page 13.](#)
- [Removing client licenses from a PC on page 16.](#)

The **Assigned** column in the table in the MD License client shows how many licenses have been assigned and the **License manager PC** column shows where each one originates from.

1.4 Technical support

Should your installation not run perfectly or if you have a problem with catman Enterprise, please contact our Technical support in Darmstadt or your local representative.

Email support

 support@hbkworl.com

Telephone support

Telephone support is available on workdays from 9:00 to 17:00 hours Central European Time.

+49 6151 803-0



Extended support is available through a service contract.

HBM in the Internet



<https://www.hbm.com>

HBM Support and Sales International



<https://www.hbm.com/en/contact/worldwide-contacts/>

2 SYSTEM OVERVIEW

This part describes the hardware layout and configuration of a measurement system and what to do if you want to change that configuration.

2.1 System components

A typical MD Server system comprises two main hardware parts:

1. One or more cabinets each with signal conditioning devices, an Ethernet switch and an uninterruptible power supply unit (UPS).
2. A server PC with software to set up the system and run a measurement, i.e. perform a test. An Ethernet switch and a UPS are also positioned at the server PC location.

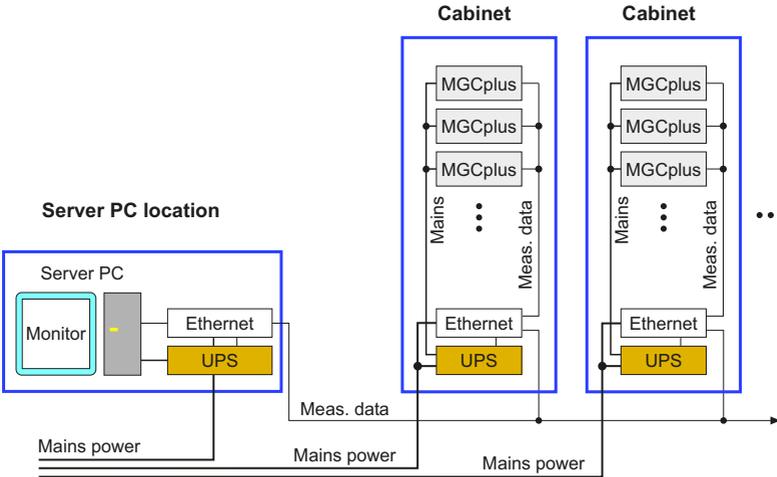


Fig. 2.1 Typical system design with MGCplus.

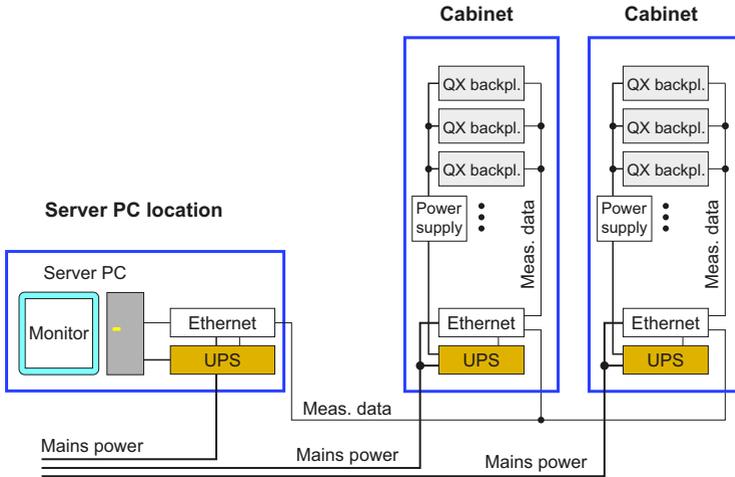


Fig. 2.2 Typical system design with QuantumX.

👉 Cabinets are not essential for operation. In systems fully configured by HBM these are used to provide save operating conditions for the signal conditioning devices. Depending on the system ordered, cabinets or UPS units may not be available. In this case, the signal conditioning devices are supplied as separate units and may be grouped or mounted as required.

For a minimal system, only the server PC, one Ethernet switch and one signal conditioning device MGCplus or QuantumX/SomatXR are mandatory. All other components are optional. However, the following topics describe the two main parts of a *typical* system, their components and the basic function in general. If some of these components are not available in your particular system, just skip the corresponding information. If your system contains more than one MGCplus device or QuantumX module, we nevertheless recommend you read the topics about cabinets, because these devices have to operate together regardless of being used inside a cabinet or not. With MGCplus, the leader cabinet settings apply. With SomatXR the QuantumX description applies with the exception that no backplanes are possible with these modules.

A detailed description of each *component* can be found in the Operating Manuals of the corresponding hardware.

2.1.1 Cabinet(s) with signal conditioning devices

One or more cabinets with signal conditioning devices are used, depending on the number of channels necessary. Although these cabinets have identical components, with MGCplus there is always one special cabinet: the leader cabinet. This cabinet contains the leader MGCplus which is used to synchronize all other devices in other cabinets. This is not the case with QuantumX/SomatXR, here several cabinets are synchronized by software or with PTP.

MGCplus cabinets

The leader MGCplus in a cabinet is called *SYNC leader* and starts the conversion of all A/D converters at the same time. As a side effect all carrier frequency amplifiers are synchronized as well, if this type of amplifier is used. Topic [Standard MGCplus cabinet on page 23](#) describes the standard cabinet with the general configuration and topic [Leader MGCplus cabinet on page 28](#) the additional settings or conditions which apply for a leader cabinet (with MGCplus always one leader cabinet is required).

For a measurement with several devices another type of leader MGCplus is used: the *trigger leader*. This device starts the data acquisition on all other devices. (The trigger leader is also the NTP leader device, if NTP time channels are used.) The trigger leader is not necessarily also the SYNC leader. The SYNC leader is defined by the hardware setup, the trigger leader is defined by software, i.e. catman Enterprise, when starting the data acquisition.



If the trigger leader is not working properly the data acquisition stops. If one of the other devices is not working properly, this device is deactivated for the further data acquisition.



If your system consists of MGCplus devices with CP52 only, you should use PTP instead of NTP time synchronization.

QuantumX cabinets and SomatXR systems

Several QuantumX/SomatXR modules are usually configured together with a CX27 module which synchronizes the modules (and carrier frequency amplifiers) and receives all data via FireWire. The output is then made via Ethernet from this CX27 for all connected modules. Topic [Standard QuantumX cabinet on page 26](#) describes the general configuration.

Usually QuantumX modules are used in cabinets. SomatXR modules are ruggedized versions of QuantumX modules and usually not built into cabinets. They are often used in

smaller systems and just mounted together or distributed over a larger area outside in the field. Power supply, synchronization, setup and measurement procedure are however identical to systems with QuantumX modules. Please refer to the corresponding system design for QuantumX and skip the mounting in backplanes or the enclosure in cabinets for protection purposes. This is not necessary with this type of module, they have IP65/IP67 protection, an extended temperature range (-40 ... +80°C) and high shock resistance of up to 75 g. The main difference is the connection, here mostly 14 pin ODU plug-ins are used.

For a measurement with several cabinets or if the distance between the CX27 modules does not allow for a connection with SYNC cables, these CX27 or QuantumX modules may be synchronized via NTP (**N**etwork **T**ime **P**rotocol). An NTP time server is required in this case.

A better alternative with newer QuantumX (with letter B or C in their name) and SomatXR modules is PTP (**P**recision **T**ime **P**rotocol). In this case also the carrier frequency amplifiers are synchronized. This requires however special Ethernet switches capable of handling PTPv2 signals. Use the **Tools/Script** ribbon tab and **Set synchronization settings** in MD Server to switch to the appropriate timing mode and server.



If the hardware synchronization is not working properly even on one of the QuantumX/SomatXR modules the data acquisition stops because measurements are not synchronized any more. Use an **NTP service failed** trigger to check for proper working.

Mixed systems (MGCplus and QuantumX/SomatXR)

First configure both systems according to the above descriptions. You should then synchronize at least all carrier frequency amplifiers: Connect one of the CX27 devices SYNC OUT socket with the SYNC leader MGCplus CP42/CP52 SYNC IN (remove any termination plug in this case). Without CX27 no synchronization of the carrier frequency amplifiers is possible. This may be acceptable as long as sensor cables from both systems are not routed close to each other.

In order to synchronize the measurement, we recommend you use PTP synchronization. This is possible with newer QuantumX (with letter B or C in their name) and SomatXR modules and with MGCplus devices with CP52. However, it is enough if only the SYNC leader MGCplus is equipped with a CP52, all sync follower MGCplus devices may use CP42 modules as long as they are connected to the leader MGCplus.

- ☞ If NTP or PTP synchronization is not working properly, the measurements are not synchronized any more. Use an **NTP service failed** trigger to check for proper working.

2.1.1.1 Standard MGCplus cabinet

A typical cabinet contains several components:

- One or more signal conditioning devices MGCplus
- One manageable Ethernet switch
- One uninterruptible power supply (UPS)
- A temperature-controlled ventilation system

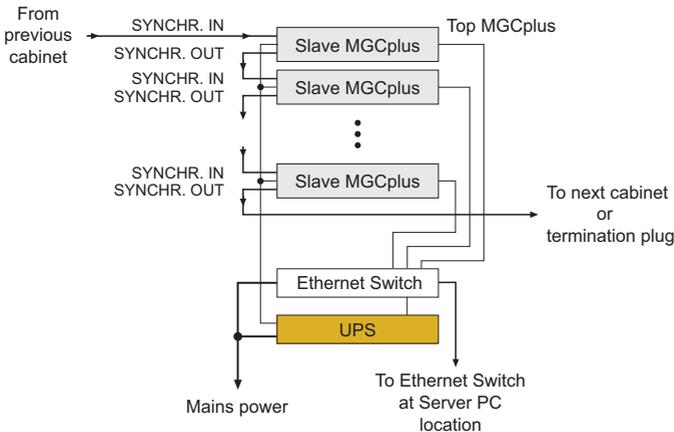


Fig. 2.3 Block diagram of a standard MGCplus cabinet.

In every cabinet the top MGCplus is the first one, and has the lowest Ethernet address. The ex-works setting for the Ethernet address range is 172.16.1.xxx with the subnet mask 255.255.255.0.

Each device has its Ethernet address shown with a label on the AB22A or the BL12A, the connection plate for ABX22A.



Fig. 2.4 Ethernet address label on BL12A (example).

We recommend you set all Ethernet interfaces to the recommended settings with **Set TCP/IP settings** on the **Tools/Script** ribbon tab (see MD Server documentation, MD Server tools).

Every MGCplus is connected to the manageable Ethernet switch located at the bottom of the cabinet above the UPS. This Ethernet switch is in turn connected to the Ethernet switch of the server PC (last outlet of Ethernet switch in cabinet).

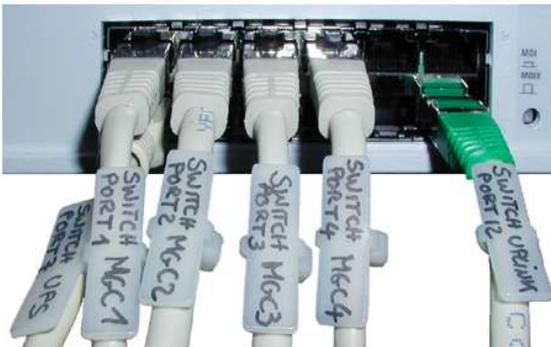


Fig. 2.5 Ethernet switch of cabinet (typical example).

If only one cabinet is used, the Ethernet switch may be connected directly to the server PC.

The UPS is also connected to the Ethernet switch of the cabinet in order to be able to communicate with the device for retrieving warning messages, switching the system on or off and maintenance purposes. The UPS should be switched on permanently.

All MGCplus devices must be synchronized (data acquisition and carrier frequencies). In order to perform synchronization, a synchronization cable must connect all devices: the first (top) device gets the signal from a previous cabinet (SYNC IN). A connection has to be made from the SYNC OUT socket to the next device (SYNC IN) and so on. The last device in the cabinet has either a termination plug or goes to a subsequent cabinet. All synchronization cables in the cabinet are marked with IN or OUT for the corresponding sockets. Synchronization errors can be seen in the **DAQ status** window on the **Sync monitor** tab and in the project log if **Enable MGCplus SYNC monitoring** is active on the **General options** tab in the **Server options** dialog (**Setup** ribbon tab).

 If the total cable length of all synchronization cables is less than 15 m, the termination plugs may be omitted.

For longer distances than 100 m between cabinets use the SY42 plug-in card at MGCplus with CP42 which allows for up to 1000 m. Enable then the **SY42 synchronization** on MD Server. Use PTP time synchronization if you have a MGCplus with CP52.

The temperature controller for each cabinet is located at the right upper corner (seen from the front) and has to be set to 25°C. If this temperature is reached, the fans in the top of the cabinet are started.



Fig. 2.6 Temperature controller.

2.1.1.2 Standard QuantumX cabinet

A typical cabinet contains several components:

- One or more 19" rack (5HE) backplanes with up to 8 QuantumX modules and one CX27.
If more QuantumX modules are used, a second backplane can be connected to the same CX27, so for two backplanes one CX27 is required. In this case up to 17 QuantumX modules may be used in the two backplanes. The modules are usually mounted starting from the right-hand side with the CX27 as last module. This is however not mandatory, empty slots are also allowed between modules. A maximum of 6 QuantumX backplanes may be mounted in one cabinet.
 - ☞ Only analog input and CAN bus channels are supported with QuantumX/SomatXR modules, no hardware computation channels (math channels).
- One or more PULSE power supplies (mounted on DIN rails) for the QuantumX modules.
- One manageable Ethernet switch.
- One uninterruptible power supply (UPS).
- A temperature-controlled ventilation system.

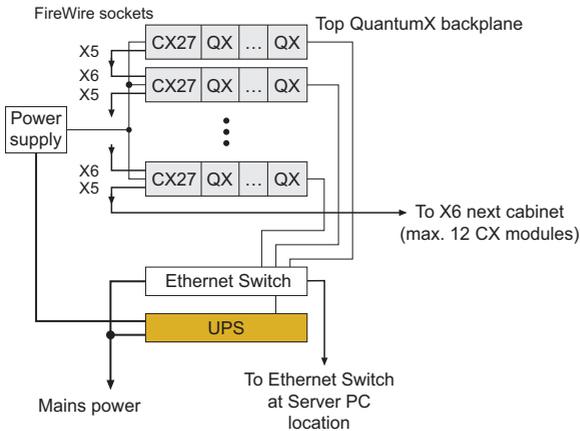


Fig. 2.7 Block diagram of a standard QuantumX cabinet.

In every cabinet the top CX27 is the first one, and has the lowest Ethernet address. The ex-works setting for the Ethernet address range is 172.16.2.xxx with the subnet mask 255.255.255.0.

Each CX27 module has its Ethernet address shown with a label on the front (top right-hand corner).

Every CX27 is connected to the manageable Ethernet switch located at the bottom of the cabinet above the UPS. This Ethernet switch is in turn connected to the Ethernet switch of the server PC (last outlet of Ethernet switch in cabinet). If only one cabinet is used, the Ethernet switch may be connected directly to the server PC.

 Decimal sample-rate domains are not supported by MD Server.

The UPS is also connected to the Ethernet switch of the cabinet in order to be able to communicate with the device for retrieving warning messages, switching the system on or off and maintenance purposes. The UPS should be switched on permanently.

All QuantumX/SomatXR modules must be synchronized (data acquisition and carrier frequencies). This is done automatically for all modules in a backplane. However, also the backplanes have to be synchronized: A connection has to be made from the front FIREWIRE X5 socket of each CX27 to the next lower CX27 FIREWIRE X6 socket and so on. You can connect a maximum of 12 modules in series with each other.

As an alternative for distributed modules, PTP synchronization may be used if SomatXR or QuantumX modules of type B or C only, e.g. MX840B, MX1601B or MX471C are used.

Use NTP otherwise. An NTP time server or PTPv2 capable Ethernet switch is required in these cases, see MD Server documentation.



If the synchronization is not working properly the data acquisition stops.



The cable length of a synchronization cable between two CX27 is restricted to 5 m. Use PTP synchronization otherwise.

The temperature controller for each cabinet is located at the right upper corner (seen from the front) and has to be set to 25°C. If this temperature is reached, the fans in the top of the cabinet are started.



Fig. 2.8 Temperature controller.

2.1.1.3 Leader MGCplus cabinet

The only difference between a leader MGCplus cabinet and a standard MGCplus cabinet is the leader MGCplus used in this cabinet as *SYNC leader* (usually the first, i.e. topmost device). All hardware synchronization (e.g. A/D converter, carrier frequencies) is derived from this device.

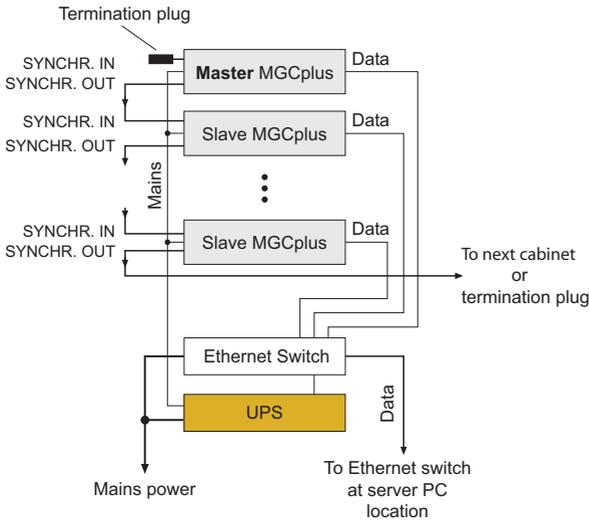


Fig. 2.9 Block diagram of a leader MGCplus cabinet.

Ex-works the topmost MGCplus in the first cabinet is configured as SYNC leader and has Ethernet address 172.16.1.101, all others have higher addresses (last number changes). The top MGCplus is the only device which has no synchronization cable at the SYNC IN socket. Instead, a termination plug should be used.

- 👉 If the total cable length of all synchronization cables is less than 15 m, the termination plugs may be omitted. As soon as a termination plug is used, *both* sides of the synchronization chain must use it.

Synchronization errors can be seen in the **DAQ status** window on the **Sync monitor** tab and in the project log if **Enable MGCplus SYNC monitoring** is active on the **General options** tab in the **Server options** dialog (**Setup** ribbon tab).

The MGCplus in the lowest mounting position is the last one in a cabinet. It has either no plug in the SYNC OUT socket, a termination plug or a cable which goes to a subsequent standard cabinet.

- ⚠️ The MGCplus cannot use both NTP and IRIG B time channels in one housing. If an IRIG B plug-in module is found, the NTP time synchronization is disabled for this particular MGCplus. However, the hardware synchronization takes care of synchronizing the IRIG B time channels with the NTP time channels. Additionally, devices using IRIG B may not be used as trigger leader. We therefore recommend

using an IRIG B plug-in in the device with the highest address (usually the last one of all cabinets).

- 👉 It is possible to switch off the data acquisition synchronization (no *trigger* leader), see **Disable MGCplus synchronization** in topic General options (see MD Server documentation). This does however not disable the hardware synchronization, the A/D converters and carrier frequencies are still synchronized in this case.

2.1.2 Server PC and accessories

At the server PC location the following hardware is installed:

- the server PC itself,
 - a manageable Ethernet switch, summing up all Ethernet switches from the cabinets,
 - an UPS for server PC and Ethernet switch.
- 👉 If only one cabinet is used, this Ethernet switch may be connected directly to the server PC and with MGCplus the cabinet must be a leader cabinet.

In addition to other optional hard- or software, the following parts are built into a standard server PC:

1. Two Ethernet ports.
One is connected to the Ethernet switch which sums up the data from the cabinets, the other one is connected to a second Ethernet segment, e.g. an office Ethernet, in order to distribute the measurement data to client PCs. The Ethernet address for the server PC in the segment with the signal conditioning devices is ex-works 172.16.1.100 with MGCplus and 172.16.2.100 with QuantumX/SomatXR. As protocol only TCP/IP is used, no data or printer sharing is used for this segment. The address for the other Ethernet port depends on your Ethernet network and may be chosen freely. Data or printer sharing as well as additional protocols may be necessary for the second network connection. Please check with your system administrator.
In a system configured by HBM, these ports are named according to their task, e.g. "HBM_Devices" for the connection with the cabinets or "MOOG" for a connection to a MOOG control system.
2. A RAID10 mass storage.
See the PC Operating Manual for a description of PC hard- and software.

The whole system including the cabinets may be switched off or on from the server PC location. Switching on is done automatically by the software via an internal command to the UPS devices as soon as you start MD Server. Dialog **UPS manager (UPS manager** on the **Diagnosis** ribbon tab) provides a button for switching off or on all UPS outputs from the server PC, see also UPS manager (MD Server documentation).

If no UPS is available, you have to switch on or off the signal conditioning devices manually.

The server PC itself may be switched on or off at any time. It is not dependent on the signal conditioning devices. The UPS units should be switched on permanently.

Several programs are installed on the server PC:

- Microsoft Windows® Server 2016 or 2019 operating system
 - ☞ A server operating system is installed as default. You may however also use Microsoft Windows® 10 as operating system.
- MD License client, see [When do you need the MD License client? on page 17](#).
- MD Server (see MD Server documentation).
- MC Setup with MC Definition List and MC Import (see MD Server documentation).
- MD Export (see MD Server documentation).

These programs are installed together. However, you may install MC Setup (including MC Definition List and MC Import) on a separate PC for preparing your channel configuration.

2.1.3 Optical strain measurement

With the appropriate license, you may use the following devices for optical strain measurement with MD Server:

- FS22 BraggMETERS DI or Interrogators DI from HBM,
- an ARAMIS camera system from GOM GmbH (requires controller hard- and software from GOM).

You can set up and carry out measurements in the same way as with MGCplus or QuantumX/SomatXR. However, note the maximum sample rate of the device(s) used.

- ☞ Using these devices together with MGCplus or QuantumX/SomatXR, or both, requires an NTP time server for synchronization, see [Installing the NTP time server/client \(MD Server documentation\)](#). You will find an in depth description of the configuration of the HBM devices for optical strain measurement and the necessary computations in the MD Server documentation.

How to proceed with FS22 BraggMETERs or Interrogators

1. Ensure that your device is correctly configured and all connected sensors are recognized.
 2. Define the computation that must be carried out in order to obtain the strain for the measured wavelengths.
 3. Carry out a zero balance for the *computation* channels.
-  FS22 BraggMETERs require TCP ports 3500 and 3365.

Setting up the Ethernet address for Interrogators of type DI

1. Connect a monitor and via USB a commercial PC keyboard to the device.
2. Connect the device to the mains power adapter.
3. Then switch on the device from the power switch on the device. While the system is booting, you have approx. 15 seconds time to select **Instrument Conf.** using the cursor keys. Then press .
4. Assign a static address in the following screen display.
If a DHCP server is available in your network, you can also specify to assign the address (dynamically) from the server. We recommend however the use of static IP addresses. Contact your network administrator: he may use the MAC address (see label on device) to ensure a static address.

How to proceed with an ARAMIS system from GOM

1. Create or load a project in the GOM Testing Controller.
2. Activate option **SCPI Interface (Tracking Settings)** in the deformation tracking dialog.
3. Choose a sample rate for the deformation tracking. The sample rate must be one of the sample rates also available in catman Enterprise.
4. Start the deformation tracking.



Do not stop deformation tracking while MD Server is measuring. Otherwise you have to re-initialize MD Server.



catman Enterprise communicates exclusively with the PC running the ARAMIS software (GOM Testing Controller).

Notes

- The maximum sample rate of BraggMETERs and Interrogators depends on the model and lies between 1 Hz and 1 kHz. When operating together with other

devices the last value measured will be repeatedly recorded until new values are available from the device, if the sample rate is too high.

- Zero balancing is not available for BraggMETER, Interrogator or ARAMIS (GOM) channels. The zero balancing is carried out exclusively via the computation channels.
- NTP synchronization with BraggMETERs has been improved starting with catman Enterprise 7.2. You may need a newer firmware for your module to benefit from this. However, newer firmware may not be available for all older hardware modules.

2.1.4 Additional external devices

With the appropriate license you may use other devices together with HBM equipment. During a system scan in MC Setup specify in frame **External devices** those devices for your measurement project, if DLL drivers exist, e.g. a MOOG control system or an AIM ARINC-429 device.

- 👉 Only devices are shown in the list for which a license exists, see [Licensing on page 9](#).

With devices connected via Ethernet specify the appropriate address. Depending on the device used, it might be necessary to specify a configuration file which is to be loaded on initialization. For example with ARINC-429 boards, a *.PDI file has to be loaded (use the board configuration utility to create the file) and an *.INI file has to be present in the same directory. In case of doubt, please contact the HBM Technical support, see Technical support on page 17 for information on the necessary drivers and files.

Refer also to [Avionics buses on page 34](#) and the documentation in MD Server topics "Using AIM modules" and "MOOG control system".

- 👉 The documentation on DLL DAQ Drivers ("Drivers/DLLDriver/DAQ drivers.doc" in the catman Enterprise installation folder) shows how to write such a driver in a high-level programming language. Further information may also be found in Integration of non-HBM Systems ("Infos/Integration of nonHBM Systems.doc" in the catman Enterprise installation folder).

Settings which have to be made after the setup in MD Server

1. Specify in MD Server, which *time format* is used (**NTP**, **PTP** or **IRIG B**).
2. Specify in the **Server options** on tab **Hybrid systems** (**Setup** ribbon tab) which *synchronization procedure* shall be used.

Zeroing channels from external devices

Usually zeroing is done by the MGCplus or QuantumX/SomatXR signal conditioning devices. If you would like to use this function for external devices too, define a *Software scaling* for all channels from these devices requiring a zeroing. Use **0/0** (first row), **1/1** (second row) as scaling and repeat the unit in the **Unit** row in the **Linearization table**. Then a standard zero operation also sets these channels to zero.

2.1.4.1 Avionics buses

- ✎ Using a system with an avionics bus like ARINC-429 or MIL-STD-1553B together with MGCplus or QuantumX/SomatXR, or both, requires at least an IRIG B time server for synchronization.

Prerequisites

- AIM ANET module for ARINC-429 or MIL-STD-1553B avionics bus
- AIM software PBA.pro version 2.76 or higher
- AIM board software package (BSP) version 11.0.1 or higher
- IRIG B timer server

As time server e.g. a TICRO 100 system with OMTC 100 may be used for supplying IRIG B time to the Avionics modules and PTP or NTP time to the HBM devices. You may however also use IRIG B for the HBM devices. With MGCplus you have to use a ML01B plug-in card in special version for IRIG B synchronization, for QuantumX/SomatXR aMX840 or MX440 module is required.

See also catman Enterprise System Documentation Part II, MD Server, chapter "Installing software for Avionics buses".

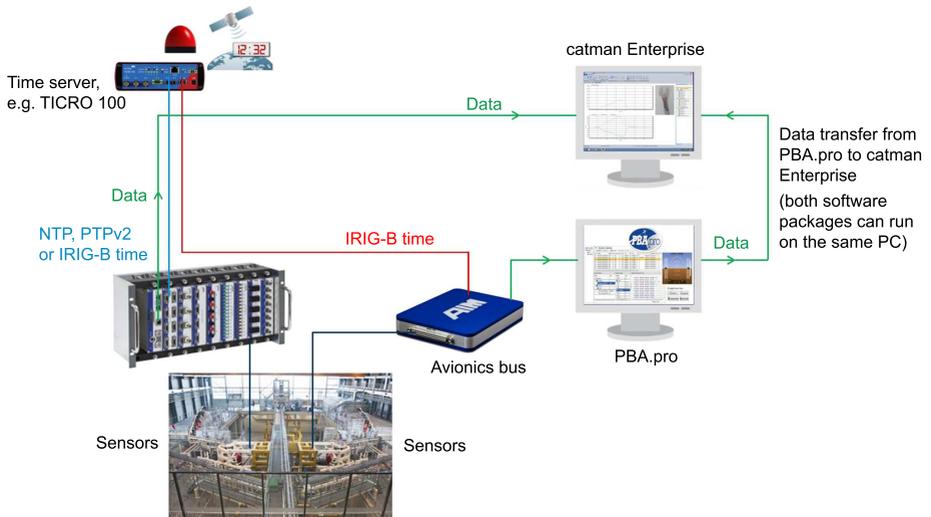


Fig. 2.10 System topology for a QuantumX system with Avionics bus.

2.1.4.2 MOOG control system (MOOG CS)

- Using a MOOG control system together with MGCplus or QuantumX/SomatXR, or both, requires an NTP time server for synchronization, see Installing the NTP time server/client (MD Server documentation).

You may connect a MOOG CS either via Ethernet or—with MGCplus—via CAN bus. It is even possible to forward data from MD Server to the MOOG control system. The data is output after each read block, i.e. with approximately 10 Hz, see also MD Server documentation for read blocks.

- ⚠ Please check the channel names in your MOOG CS system before connecting: channel names containing certain characters are not only not imported (and present), the import of further channels is also terminated. The following characters are not allowed: colon (:), period (.) and angled brackets (< >).

2.2 General technical data

| | | |
|---|----|-------------|
| Nominal temperature range | °C | -10 ... +45 |
| Permissible relative humidity (non-condensing) | | |
| at 31 °C | % | 80 |
| at 40 °C reducing linearly to minimum | % | 5 |

Table 2.1 Specifications for all components

| | | |
|-------------------------------|---|------|
| Mains power supply | | |
| Nominal input voltage | V | 230 |
| Max. power consumption | | |
| MGCplus (per device) | W | 300 |
| QuantumX/SomatXR (per module) | W | 12 |
| Ethernet switch | W | 230 |
| UPS (at maximum load) | W | 3450 |

Table 2.2 Specifications for cabinets

| | | |
|------------------------|---|------|
| Mains power supply | | |
| Nominal input voltage | V | 230 |
| Max. power consumption | | |
| Server PC | W | 1380 |
| Ethernet switch | W | 230 |
| UPS (at maximum load) | W | 3450 |

Table 2.3 Specifications for server PC location

2.3 List of Operating Manuals

1. This Operating Manual, catman Enterprise 9.0, A01122
2. MD Server Operating Manual, A00871
3. MD Client Operating Manual, A00901

4. Ethernet switch Management Guide (optional hardware)
5. Ethernet switch Quick Installation Guide (optional hardware)
6. UPS (**U**ninterruptible **P**ower **S**upply) from ABB or Liebert (optional hardware)
7. MD Trend Operating Manual, B1189 (optional software)

Depending on the hardware used one or more of the following manuals are included:

1. MGCplus Operating Manual, A00534
2. MGCplus Measuring Amplifier System, Data Sheet, B00554
3. Measuring electronics CANHEAD, Operating Manual, A01185
4. Measuring electronics CANHEAD, Data Sheet, B01183
5. QuantumX Operating Manual, A3031
6. QuantumX Quick Start Guide A2361
7. QuantumX MX1615B, Data Sheet, B03899
8. QuantumX MX1616B, Data Sheet, B4555
9. QuantumX MX1601B, Data Sheet, B3882
10. QuantumX MX1609KB, Data Sheet, B03885
11. QuantumX MX1609TB, Data Sheet, B03887
12. QuantumX MX840B, Data Sheet, B3816
13. QuantumX MX440B, Data Sheet, B3890
14. QuantumX MX410B, Data Sheet, B3889
15. QuantumX MX809B, Data Sheet, B04332
16. QuantumX MX430B, Data Sheet, B04130
17. QuantumX MX403B, Data Sheet, B3613
18. QuantumX MX471B, Data Sheet, B03894
19. QuantumX MX460B, Data Sheet, B03943
20. QuantumX MX878B, Data Sheet, B3896
21. QuantumX MX879B, Data Sheet, B3897
22. QuantumX CX27B, Data Sheet, B03881
23. QuantumX CX27C, Data Sheet, B04761
24. SomatXR MX1615B-R, Data Sheet, B3759
25. SomatXR MX1601B-R, Data Sheet, B4019
26. SomatXR MX1609KB-R, Data Sheet, B3761
27. SomatXR MX840B-R, Data Sheet, B4309
28. SomatXR MX411B-R, Data Sheet, B4307
29. SomatXR MX471B-R, Data Sheet, B4305
30. SomatXR MX460B-R, Data Sheet, B4526
31. SomatXR EX23-R, Data Sheet, B4141
32. FS22 Industrial BraggMETER DI, Operating Manual, A4248

33. FS22 Industrial BraggMETER DI, Quick Start Guide, A4609
34. FS22 Industrial BraggMETER DI, Data Sheet, B4202

You may download the latest versions of these documents from the HBM website: [HBM downloads](#).

3 MAINTENANCE

3.1 Introduction

This Chapter describes the points to consider for maintenance and how to expand or re-organize the MD Server system. This covers disassembling and re-assembling of the cabinets as well as adding or removing MGCplus devices or QuantumX backplanes inside a cabinet (complete system change).

Information on how to *exchange* a channel with a different type, on how to increase the number of channels for a signal conditioning device MGCplus or on how to add or remove QuantumX modules from a backplane or distributed system can be found in Part II of this documentation (Operating Manual catman Enterprise MD Server 9.0), Chapter C, MC Setup.

- 👉 Do not forget to increase the number of license keys for MGCplus devices, QuantumX/SomatXR modules or other external devices accordingly, when adding devices to a system. As an alternative you may store the licenses in the devices themselves (MGCplus, SomatXR and QuantumX modules of type B or C only, e.g. MX840B, MX1601B or MX471C), see [Transferring licenses to/from MGCplus and QuantumX/SomatXR on page 15](#).

3.2 Maintenance checks

What to do

Apart from the UPS the MD Server system is maintenance-free, however sensors and amplifiers might have to be re-calibrated.

- 👉 Maintenance for the UPS is explained in the UPS Operating Manual. Usually a two year service interval is necessary.

Re-calibration

Depending on the usage amplifiers (and sensors) have to be re-calibrated from time to time. The calibration interval usually ranges from one to three years.

Cleaning

Please note the following points when cleaning the housing of a device or cabinet:

- End program MD Server.
- Switch off the mains power before carrying out any cleaning.
- Clean MGCplus or QuantumX/SomatXR housings with a soft, slightly damp (not wet!) cloth. On no account use solvents, since these may damage the labeling on the front panel.
- When cleaning, ensure that no liquid gets into a device, module or any connector, plug-in or socket (SomatXR modules are protected according to IP65/IP67, however, check the protection of other equipment like Ethernet switches or power supplies).

3.3 Expanding the MD Server system

i See also [Licensing on page 9](#).

In principle, there are two possibilities to expand the system hardware:

1. Adding more MGCplus signal conditioning devices or QuantumX/SomatXR backplanes in one or more cabinets.
2. Adding one or more cabinets.

Both options have advantages and disadvantages which are explained in the following. After the change a *system scan* has to be performed in MC Setup.

👉 Do not forget to increase the number of license keys for MGCplus devices, QuantumX/SomatXR modules or other external devices accordingly, when adding devices to a system. As an alternative you may store the MGCplus or QuantumX/SomatXR licenses in the devices themselves, see [Transferring licenses to/from MGCplus and QuantumX/SomatXR on page 15](#).

3.3.1 Adding signal conditioning devices MGCplus

⚠ Please observe the [Safety instructions on page 7](#)! The following procedure must only be performed by trained and qualified personnel.

The advantage of this solution is that just the new MGCplus devices have to be bought and mounted into the cabinet(s). The drawback is that all Ethernet addresses in the cabinets after the one which has been changed must also be changed. As this has to be done manually for every MGCplus, still some work has to be done.

How to proceed

1. Switch off all cabinets. If no cabinets are used, switch off all signal conditioning devices MGCplus.
 2. Remove the plug from the SYNC OUT socket at the last MGCplus of the cabinet to be changed. This plug is either a termination plug or goes to a subsequent cabinet.
 3. Insert and mount the new MGCplus under the last MGCplus in this cabinet.
 4. Connect the SYNC IN socket of this MGCplus with the SYNC OUT socket of the one above.
 5. Connect the mains power cable to the new MGCplus.
 6. Connect system earth to the new MGCplus (yellow/green cable).
 7. Connect the Ethernet interface of the new MGCplus to the Ethernet switch in the cabinet.
Refer to MD Server tools, **Set TCP/IP settings** and Changing the IP address (MX module or CP52 in MC Setup, both topics are covered in the MD Server documentation).
 8. Connect the plug you removed in step 2 to the SYNC OUT socket of the new MGCplus.
 9. Switch on the cabinets (or all MGCplus, see step 1).
 10. You may stop here when using a MGCplus with CP52. On the other hand, you can use fixed IP addresses with CP52 too, see tip below.
If the MGCplus is using a CP42 and has no AB22A, connect an ABX22A mobile display to the BL12A (blank plate with socket) on the front of the new MGCplus.
 11. Go to the interface setup (**System** menu) and set the new Ethernet address. We recommend you write this address on a label on the BL12A or AB22A (not necessary with an MGCplus using CP52, see tip below).
 12. You may then remove the ABX22A, switch on all signal conditioning devices and close the cabinet.
-  If the total cable length of all synchronization cables is less than 15 m, the termination plugs may be omitted. As soon as a termination plug is used, *both* sides of the synchronization chain must use it.
-  Do not forget to change the Ethernet addresses in subsequent cabinets.
-  To change the address on an MGCplus with CP52 CPU (interface) module, use the **HBM Device Manager** (available during System scan). You may also use program MGCplus Assistant and start the **HBM Device Manager** from there.
With CP42, you can use the AB22A (manual operation). If your system has no AB22A or ABX22A, you might also change the Ethernet address from a PC.

Connect the CP42 of the MGCplus in question to a PC via USB and start program MGCplus Assistant. Then right-click in the spreadsheet on the first line with the device symbol and identification and choose **System** or use menu **System -> CP -> Settings**. The (new) Ethernet address may then be stated on the **Communication** tab.

3.3.2 Adding QuantumX backplanes

 Please observe the [Safety instructions on page 7!](#) The following procedure must only be performed by trained and qualified personnel.

The advantage of this solution is that just the new backplane and the required QuantumX modules have to be bought and mounted into the cabinet(s). However, the power supply has to be checked whether it is still sufficient for the additional modules or whether another or bigger power supply unit has to be installed.

 If you add new QuantumX/SomatXR modules to an older system it might be necessary to update the firmware of all older modules. All modules should use the same firmware version.

How to proceed

1. Switch off all cabinets. If no cabinets are used, switch off all power supplies for your QuantumX modules.
2. Insert and mount the new backplane under the last backplane in this cabinet. If already all backplanes on one side are mounted, you may use the rear side of a cabinet to mount more backplanes.
3. If required mount a new or additional power supply inside the cabinet on the side of the 19" racks mounting frame (HBM uses DIN rails for mounting PULSE power supplies).
4. Connect the power plug of the power supply to the UPS if a new power supply was mounted.
5. Connect the power supply output to the QuantumX backplane (POWER socket on the front).
6. Insert the CX27 module on the left-hand side into the backplane. One CX27 may be used for two backplanes with up to 14 modules in total. If one CX27 is already installed, connect this backplane with the new one via the FIREWIRE X1/X2 sockets on the backplanes (left side above the fuses). Refer to the QuantumX Operating Manual for details on mounting modules.

7. Mount all other QuantumX modules into the backplane. We recommend starting on the right-hand side. Free slots are allowed, a maximum of 14 modules may be connected to one CX27.
8. Connect the front FIREWIRE X5 socket of each CX27 to the next lower CX27 FIREWIRE X6 socket and so on.
9. Connect system earth to the QuantumX backplane (yellow/green cable, earth connection on the left side of the backplane underneath the fuses).
10. Connect the Ethernet interface of the new CX27 to the Ethernet switch in the cabinet.
11. Switch on the cabinets.

 We recommend you set the Ethernet address of the new CX27 (static address). In factory setting, DHCP is used. Use MC Setup, start a new scan and click on **HBM device manager** in the **Scan system** dialog. This allows for setting a static address on a QuantumX/SomatXR module regardless of the original setting. As an alternative you may use DHCP if your network administrator uses the MAC address (see label on device bottom) to ensure a static address.

3.3.3 Adding one or more cabinets

When adding a new cabinet, you may order a pre-configured cabinet from HBM. This solution is definitely the least time-consuming one. Of course, it is also possible to do all these settings yourself.

When using more than one cabinet with QuantumX/SomatXR, usually an NTP time server or PTP time has to be used for synchronization as the length of the synchronization cable is restricted to 5 m.

Adding a pre-configured cabinet

 Please observe the [Safety instructions on page 7!](#) The following procedure must only be performed by trained and qualified personnel.

1. Position or mount the new cabinet on an appropriate location.
2. Switch off all UPS devices (optional devices).
3. Switch off the mains power which supplies the cabinets.
4. Connect the cabinet mains power to the mains power of your factory. A separate 16 A fuse is required, it is not allowed to connect the mains power to a mains power line of another cabinet.

5. MGCplus only:
 - Remove in the last old cabinet from the last MGCplus the termination plug at the SYNC OUT socket.
 - Insert this termination plug into the last MGCplus of the new cabinet at the SYNC OUT socket.
 - Connect the synchronization cable from the new cabinet (this cable comes from the first MGCplus, SYNC IN socket) to the socket SYNC OUT from step 5.

If the total cable length of all synchronization cables is less than 15 m, the termination plugs may be omitted. As soon as a termination plug is used, *both* sides of the synchronization chain must use it.

6. Connect the Ethernet cable from the new cabinet to the Ethernet switch at the server PC location.
7. You may now switch on mains power and UPS devices again.

👉 Cabinets with QuantumX/SomatXR do not require synchronization cables between cabinets, here the synchronization takes place via an NTP or PTP time server. If you add new QuantumX/SomatXR modules to an older system it might be necessary to update the firmware of all older modules. All modules should use the same firmware version.

Configuring a cabinet

If you want to configure the new cabinet yourself, the procedure is the same as when re-configuring the system. Therefore this topic is covered in topic [Configuring a new standard cabinet on page 46](#).

The rest of the procedure is as described in [Adding a pre-configured cabinet on page 43](#).

3.3.4 Adding single QuantumX/SomatXR modules (without backplane)

When using only a few QuantumX/SomatXR modules you have several options:

1. Using FireWire and directly connect these modules to the server PC.
This requires a FireWire interface in the server PC, see MD Server documentation.
2. Using an Ethernet switch and connect several modules via the switch to the server PC.

This requires one Ethernet port per module. Also here, a FireWire connection should be made in order to synchronize the modules. Otherwise an NTP time server or PTP time has to be used.

3. Using a CX27 for up to 14 modules and connect the CX27 via Ethernet to the server PC.
4. Using several CX27 for summing up several QuantumX/SomatXR modules and transferring the data over Ethernet switches to the server PC.
For synchronization this requires either a connection between these CX27 modules as described for cabinets with backplanes, see [Adding QuantumX backplanes on page 42](#), or an NTP or PTP time server.

 If you add new QuantumX/SomatXR modules to an older system it might be necessary to update the firmware of all older modules. All modules should use the same firmware version.

As soon as a CX27 is used, you connect the QuantumX/SomatXR modules via FireWire with the CX27, either by using a backplane (QuantumX only) or by using the FireWire connectors at the back side of your modules as described in the QuantumX or SomatXR Operating Manual.

 Without a backplane, make sure a power supply cable is attached on every third module: Only three modules may be supplied from one connector through the FireWire cabling.

3.4 Re-configuring or re-organizing the MD Server system

 See also [Licensing on page 9](#).

Of course, it is possible to re-configure the system according to your needs. You may remove or add more signal conditioning devices or remove or add cabinets to the system. Basically the only point to observe is that a working system must consist of three parts:

1. One or more signal conditioning devices MGCplus or QuantumX/SomatXR.
2. A server PC together with a manageable Ethernet switch.
3. The licenses for hardware (MGCplus, QuantumX/SomatXR or other external devices) and software (server and clients).

When using more than one MGCplus or QuantumX, the signal conditioning devices are usually built into a cabinet together with an Ethernet switch and a UPS (uninterruptible

power supply). In this case each cabinet must be configured as described in [Configuring a new standard cabinet on page 46](#).

With MGCplus signal conditioning devices, *one* cabinet must be set up to be a *leader* cabinet with the *leader* MGCplus, see [Changes necessary for a MGCplus leader cabinet on page 47](#). All other MGCplus cabinets are follower (standard) cabinets. If only one MGCplus is used, this must operate as leader. Please refer to the appropriate cabinet topic even if no cabinets are utilized or if some of the optional devices are not used.



Make sure that every UPS has its own mains power connection with the proper fuse (standard is 16A), voltage and current configuration. Check details with the UPS Operating Manual.

With MGCplus check that all Ethernet switches have their Ethernet ports set to 100 MBit full duplex and no auto negotiation. Use **Set TCP/IP settings (Tools/Script ribbon tab)** in MD Server to set the MGCplus devices accordingly.

To add a signal conditioning device MGCplus, please refer to [Adding signal conditioning devices MGCplus on page 40](#). To add a backplane with QuantumX modules, please refer to [Adding QuantumX backplanes on page 42](#). To add single QuantumX/SomatXR modules, please refer to [Adding single QuantumX/SomatXR modules \(without backplane\) on page 44](#).



If you add a MGCplus device or QuantumX/SomatXR module, make sure the required license key is available, otherwise MD Server will not initialize *any* device.

To remove a MGCplus device or QuantumX backplane, check the lists provided in the above topics and perform the steps in reverse order; just make sure the synchronization chain is not broken. You may even leave the device or backplane in the cabinet: skip it in the synchronization chain and switch off or remove the corresponding power supply.

3.4.1 Configuring a new standard cabinet

With MGCplus one leader cabinet is required. Additional cabinets are standard or follower cabinets. With QuantumX/SomatXR all cabinets are standard cabinets.

Principle procedure for MGCplus (follower cabinet)

1. Mount all necessary devices with their synchronization cables as well as the Ethernet and mains connections.
Make sure the UPS supplies the signal conditioning devices as described in System components, [Standard MGCplus cabinet on page 23](#). There the wiring

diagram and the connections between signal conditioning devices and other units are shown.

2. Connect the UPS Ethernet interface to the Ethernet switch in order to have access to the UPS from the server PC.
3. Set the Ethernet switch ports connected to the MGCplus devices to 100 MBit full duplex and no auto negotiation.
4. Use the **Tools/Script** (see MD Server documentation) ribbon tab in MD Server and **Set TCP/IP settings** to set the MGCplus devices accordingly.
5. Connect all MGCplus Ethernet ports to the Ethernet switch.

Principle procedure for QuantumX

1. Mount all necessary backplanes and QuantumX modules in these backplanes together with the required CX27 modules.
2. Mount the power supply for the QuantumX, the UPS and the Ethernet switch.
3. Make sure the UPS supplies the power supply for the QuantumX signal conditioning devices as described in System components, [Standard QuantumX cabinet on page 26](#). There the wiring diagram and the connections between backplanes and other units are shown.
4. Connect the UPS Ethernet interface to the Ethernet switch in order to have access to the UPS from the server PC.
5. Connect the CX27 Ethernet port(s) to the Ethernet switch.

3.4.2 Changes necessary for a MGCplus leader cabinet

There is only one thing to do to convert a standard (follower) cabinet to a leader cabinet: The first signal conditioning device MGCplus must get a termination plug in the SYNC IN socket and the last one in the SYNC OUT socket. If the total cable length of all synchronization cables is less than 15 m, the termination plugs may be omitted. As soon as a termination plug is used, *both* sides of the synchronization chain must use it.



The MGCplus cannot use both NTP and IRIG B time channels in one housing. If an IRIG B plug-in module is found, the NTP time synchronization is disabled for this particular MGCplus. However, the hardware synchronization takes care of synchronizing the IRIG B time channels with the NTP time channels. Devices using IRIG B may not be used as trigger leader. We therefore recommend using an IRIG B plug-in in the device with the highest address (usually the last one of all cabinets).

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