

ENGLISH

Operating Manual

catman[®] Enterprise 9.1 System Documentation Part III

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1 GETTING STARTED

1.1 Introduction

This documentation describes the client part of catman Enterprise, in the following referred to as MD Client. When installing catman Enterprise to work as a client, programs MD Client and MD License client are copied to the computer. The server part of catman Enterprise is described in Part II of this documentation: Operating Manual MD Server. The hardware necessary for working with the MD Server is described in Part I (Operating Manual System Documentation).

The MD License client is necessary for licensing the MD Client, see [Licensing on page 12](#). You may additionally install on a PC with MD Client other catman Enterprise software, e.g. MC Definition List. These programs are described in Part II of this documentation: Operating Manual MD Server.

1.1.1 What does this documentation contain?

This documentation describes how to install and operate the software MD Client.

1.1.2 Notes on the documentation

This documentation is only part of the catman Enterprise documentation. A list of all documents concerning catman Enterprise can be found in Part I (Operating Manual System Documentation), in Chapter B, Section 3, *List of Operating Manuals*.

1.1.2.1 Prerequisites

In the following we assume that you:

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

1.1.2.2 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 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.

1.1.3 Basic layout of this documentation

This chapter contains:

- The conventions used in this documentation
- Introduction into the software MD Client
- The list of operating requirements
- A guide through the installation procedure

Chapter 2, **MD Client Setup on page 17**, contains:

- A description of the administration and user access rights settings
- How to prepare the program for data acquisition

- How to set up the required storage space
- Necessary settings for starting a data acquisition project

Chapter 3, [Defining visualization \(Panels\) on page 37](#), contains:

- Description of how to create visualization objects
- Information on how to configure the visualization objects and how to display data

Chapter 4, [Data acquisition on page 65](#), contains:

- Information on storage and export settings
- How to perform a data acquisition
- Which options are available during and after the test run
- How to set up limits
- A description of the possible actions if a limit is reached

Chapter 5, [Tools on page 73](#), contains:

- How to search for channels
- Information on the database handling
- Introduction to catmanAP (Post Processing)
- Diagnosis options for MD Client
- Troubleshooting tips

Chapter 6, [Using VBScript on page 81](#), contains:

- An introduction to the script editor
- An example of a script procedure

The last chapter contains the [Index on page 87](#).

1.2 What does the MD Client do?

The MD Client software works in combination with software MD Server, usually running on a *different* PC. The MD Server can provide data which is measured by one or more MGCplus or QuantumX/SomatXR signal conditioning devices, i.e. it can work as *remote data server*. Any MD Client may then access all or part of this data provided the proper access rights are defined in Windows. The MD Client is used to further process and visualize the data measured by the MD Server.



Make sure the necessary MD Client license is available, otherwise the program will not run, see [Licensing on page 12](#).

How do you work with MD Client?

1. Make sure that proper access rights are assigned in Windows so that the data server (MD Server) and the necessary folders are visible on the network for the client and accessible for the user in question, see [User administration in MD Client on page 18](#).
2. Check that the server is initialized and acquiring data, otherwise no data will be available in MD Client.
3. Start the program MD Client (use **admin** as user name and **hbm** as password when starting for the first time).
 - ☞ Only password input is case sensitive.
4. Define your storage space, see [Configure database \(active channel number and storage size\) on page 21](#).
5. Specify in your Project setting the data server address. If the port has been changed on MD Server, specify the new setting here as well (default is 2004), see [Project settings on page 20](#).
6. Refer to [Connecting to a data server \(MD Server\) on page 24](#) for an explanation how to connect to MD Server.
7. Define a channel selection for later display or storage: [Pre-select channels on page 25](#).
8. Refer to [Defining visualization \(Panels\) on page 37](#) for an explanation how to define channels for display and how to use the **Channel selector** window ( in the toolbar).
9. Set your data acquisition settings, see [DAQ settings on page 34](#).
10. If required, set thresholds and define actions, see [Limit checking on page 67](#).
11. Start the data acquisition, see [Performing the data acquisition on page 65](#).

During the acquisition you may start and stop the storage of data or assign new channels to the visualization objects. You can also change limit checking settings, export stored data, etc. provided you have the proper access rights. If the acquisition is stopped, you may define new visualization objects or change the project settings.

1.3 Operating requirements

- 👉 How to obtain the required license(s) is described in Part I, Chapter A, Section 3, *Licensing*.

In order to operate MD Client software, you need a PC with the following requirements:

- Intel Pentium 1 GHz or equivalent processor (*minimum*)
- Windows® 10 or Windows® 11 as operating system
 - 👉 Please make sure you use the latest version of your operating system and all recommended updates from Microsoft are installed!
- Microsoft Edge (current version)
- 8 GB or more main memory (RAM)
- Graphics card with a resolution of 1024 x 768 pixel (*minimum*)
- 1 GB free space on your hard disk (*minimum*)
- Microsoft or 100% compatible mouse
- 100 Mbit Ethernet (or faster) interface

The following fonts must be available on the PC:

Arial, Courier, MS Sans Serif, Small Fonts, Tahoma, Times New Roman, Verdana and Wingdings. Usually these fonts are installed with the Windows® operating system.

- ⚠️ All power and screen savers must be deactivated. Please check the system settings for power management concerning hard disk, graphics card, monitor and network card.

- ⚠️ If automatic system backups are made while a data acquisition is running, make sure that all files which are accessed during the measurement are still accessible during the backup process. This includes the internal database file, see [Configure database \(active channel number and storage size\) on page 21](#).

Notes

- We recommend you use a decimal point (e.g. 0.01), not a comma. Please change your Windows system setting accordingly (e.g. **Additional date, time, & regional settings** -> **Change date, time, or number formats** -> **Additional settings** -> **Numbers**. The menus depend on the operating system.).
- Standard user access rights are sufficient for working with MD Client.

1.4 Licensing

 Refer also to <https://www.hbm.com> for our End User License Agreement (EULA).

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 MD Client.

The MD License client is automatically installed together with MD Client. See Part I, Chapter A, Section 3, *Licensing*, for information on how to distribute the necessary licenses.

1.5 Software installation

 See also [Licensing on page 12](#).

 Administrator rights are required for installing the software.

 The installation is configured for all users of the PC. Even so, a separate set of defaults is subsequently created for each user. This means for example that the size of the internal database can be defined separately for each user. We recommend that you close all open programs. You can cancel the installation at any point.

Installing 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 from CD

Insert the CD into your CD-ROM drive. In standard configuration, Windows automatically opens the CD. If you have deactivated this self-starting Windows function, look for the "Start.exe" file in the main directory of the CD and 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 catman Enterprise.

2. Click on **Next** in the following screen, read through the license agreements and 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 folder you have specified and then copies all the files to it.
3. Now choose which part of catman Enterprise shall be installed, here MD Client.
4. If you would like to install MC Definition List or MC Setup together with MD Client, make the required selection here.
5. Click on **Next** and follow the instructions of the installation program.
6. Quit the installation program and close the opening screen after having installed all required components.

Notes

- Together with MD Client catmanAP is installed with a PostProcess license (only catman Analysis mode may be used). There are other licenses available for catmanAP, however, only one catmanAP version may be installed on a PC.
- The MD License manager is necessary for managing and distributing all licenses. We recommend you install this program on a separate PC. It is not necessary to install the MD License manager on the same PC as MD Server or MD Client. The MD License *Client* is always installed if a program requiring a license is installed. The installation is made into the default programs folder into subfolder HBM.
- A TEDS editor and the Sensor database editor are installed automatically with MC Setup.

1.6 Upgrading MD Client

- 👉 We recommend that any older catman Enterprise version is first uninstalled before you install a new *version*.

- ⚠ Before uninstalling, transfer your licenses from an MD License client back to the MD License manager, because the MD License client is also uninstalled during the uninstallation (**Export license**). However, the licenses are retained even after uninstalling.

If you want to retain the settings of your old version as far as possible, you must however, before the uninstallation, copy various files to a (temporary) folder and move them back to the (new) catman Enterprise folders after the installation. If necessary, these

actions must be carried out for each Windows user, because the settings are managed related to the user.

The databases created by MD Server or MD Client will be converted if necessary. A dialog appears where you can choose to update. Otherwise create new databases.

How to proceed

1. Remove and export your licenses to the MD License manager.
2. In the folder for the user logged-in under Windows, find the HBM folder, e.g. "C:\Users\\HBM" or "C:\Users\\Documents\HBM". The folder path was changed with Version 5 of catman Enterprise.
3. Copy the content to a temporary folder of your choice.
4. Proceed in the same way with all the other PC users (administrator rights required).
5. Uninstall all components of catman Enterprise.
6. Install the new version and execute a reboot of Windows.
7. Activate your licenses again.
8. Copy the content from the temporary folder into the HBM folder in the Documents folder for the respective user, e.g. "C:\Users\\Documents\HBM".
9. Start program MD Client.

1.7 Technical support

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

Email support

 support@hbkworld.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 MD CLIENT SETUP

2.1 Introduction

Before starting a data acquisition on the MD Client you have to make some basic settings:

1. Define the user access in MD Client (for client PCs) For some actions it might be necessary to have the appropriate access rights on the data server (in MD Server). See [Administration and access rights on page 18](#).
2. Set the size of the internal database, i.e. the storage space available for data in MD Client. See [Configure database \(active channel number and storage size\) on page 21](#).
3. State the settings for the measurement project, so that the MD Client knows how to find the data server and where the files necessary for setup, limit checking, visualization or VBScript functions are located. See [Project settings on page 20](#).
4. Establish a connection between MD Client and MD Server. See [Connecting to a data server \(MD Server\) on page 24](#).
5. You have to *pre-select* the channels which will be shown later. This reduces the number of channels visible in the **Channel selector** window (available for later display) to the channels important for this client. See [Pre-select channels on page 25](#).
6. If required, you may define additional computations. These computations are evaluated on the client PC only. See [Defining computations on page 28](#).
7. Define the settings for a data acquisition: how often to transfer data, whether and which data to store etc. See [DAQ settings on page 34](#).

If a project is defined once, this series of actions is reduced to loading the project (file) and connecting to the data server. The next time you start the MD Client, data acquisition is just two mouse clicks ahead or can be loaded automatically.



After having designed a layout for your visualization, modify this layout for additional panels or distribute this layout including your channel pre-selection to other MD Clients with CSV files which can be edited in Excel. See [Creating panel\(s\) from a layout descriptor \(CSV\) file on page 40](#).

2.2 Administration and access rights

- ☞ Please observe the recommendations in [Operating requirements on page 11](#) on installed fonts, power management settings and backup programs. See also [Licensing on page 12](#).

The administration comprises two different tasks:

1. The Windows operating system administration with regard to the data server (MD Server) allowing the clients to access the files necessary for operation.
2. The user administration in MD Client restricting user access to certain program parts or settings.

Of course the client PC must be able to connect to the data server via a network, i.e. either it must be on the same Ethernet segment or an appropriate connection via router etc. must have been established.

2.2.1 Access rights for connecting to a data server

As soon as a valid client connects, the PC running the data server (MD Server) transfers the current MC Setup database via TCP/IP. The client stores this copy as a temporary file which is changed as soon as the server sends a new database due to changes.

- ☞ If channel descriptor files are used, all users should have read access to the folder in which the files reside.

2.2.2 User administration in MD Client

- ☞ When starting MD Client for the first time, use the user name **admin** with password **hbm** (only the password input is case sensitive). We recommend that you change this access setting once you start to work with this program by creating a new user with administrative access rights.

Use **MD Client -> User administration** to call up the user administration dialog.

How to proceed

1. Specify the user name, i.e. the name under which the user logs on. This name has no connection to user names used by the Windows operating system.

2. Type in a password. The password may not be changed later. You can only change it by deleting the user and creating a new user with the same name.
3. Define which parts of the software should be accessed.
4. Establish the new user with **Add user**.
5. Create as many new users as necessary.

2.2.2.1 Password restrictions

The password input is case sensitive. There is no minimum length for the password and no checks are made whether the password chosen is appropriate. Please observe the standard rules for choosing passwords, e.g. no names of relatives, no birthday dates, etc.

- ☞ It is recommended that you use a combination of at least eleven letters, digits and symbols which form no complete or meaningful word, e.g. **pa?p12e\$7KD**.

2.2.2.2 Access rights in MD Client

Allow project modification

Permission to change the project settings, e.g. delete a panel file from the project. A panel file can be added, if designing panel files is allowed.

Allow pre-selection edit

Permission to change the list of channels which is shown in the **Channel selector** window (used for configuring the visualization objects).

Allow limit checking edit

Permission to change the limit trip settings.

Allow DAQ settings edit

Permission to change the DAQ settings.

Allow internal database edit

Permission to change values (data) contained in the MD Client internal database.

Allow database export

Permission to export values (data) from the MD Client internal database.

Allow panel design

Permission to create and design new panel layouts.

Allow loading panel files

Permission to load files with panel layouts.

Allow data source changes in DAQ mode

Permission to change the data sources (which channel(s) to display) of visualization objects during data acquisition mode.

Allow VBScript execution

Permission to execute pre-defined VBScripts (specified in the project settings).

Allow VBScript edit

Permission to create and edit VBScripts.

Allow user administration

Permission to change any of the above settings for other users and create new users.

2.3 Project settings

You must enter in the project settings (**Setup** ribbon tab) the MD Server **IP address** (or name) and the **Server listen port**. The *same* port number must be set for the **Server listen port** here and in software MD Server for the **Port for Client-Server connection**. Default is 2004, however, due to firewall settings or system restrictions (ask your system administrator) other ports may be used as well.

 Connecting to the server works only, if MD Server (the data server) is already initialized. Please observe the Windows access rights to the server for the currently logged-in user. The MC Setup database file is then transferred automatically.

The folder used for storing the project file is also the default folder for all other files concerning this project. You may however denote a specific **Data path**. In this case all measurement data is stored into this path, all other files are stored into the project path.

Additionally you may specify a file for the **Channel pre-selection**, a file with the **Limit**

checking settings, **Panel files** and **VBScript** files. Use  and  to sort your panels.

See also [Pre-select channels on page 25](#), [Introduction on page 37](#), [Limit checking on page 67](#), [Using VBScript on page 81](#).

-  When a project is saved, all file types are added *automatically*, if settings have been made since program start. If the files are not already saved, also this will be done automatically; the file name will be compiled from the project name together with the date and current time.

Start with last project: saves you having to load the project used last. You can, however, always load another project afterwards.

2.4 Configure database (active channel number and storage size)

At least a temporary buffer must exist if values are to be saved. Use **Configure database** in the **Setup** ribbon tab to define sufficient space. Create with the dialog the database file and size for temporary data storage. You may export this data to a file during or after the measurement.

See also [Local database storage on page 36](#).

-  It is not required to save data on MD Client, all data saving may also be done on MD Server.

-  MD Client creates a different database for every user logged on to Windows by default. Therefore the settings are not stored according to the MD Client user names but according to their Windows log-in names. Users having the same Windows log-in name must use the same database settings. However, users may choose to share the same database file by creating the file in a folder which is accessible for all users.

In the section to the left of the database configuration dialog you can choose the drive and a folder where the database is to be created. The drives A: or B: are not allowed.

-  Do not use a network drive, as access to the data will be very slow.

The file name does not need to be stated. The database is always created with the file name DB_000.\$_\$.

-  We recommend you use a defragmentation tool for the hard disk in question before creating database files larger than 100 MB. As this storage space is created as a file on the hard disk, we recommend using a fast hard disk.

Define the database layout in the right-hand section of the dialog: Number of channels, maximum depth, format and byte width for each channel. Each channel can be edited individually: Mark the channel(s), enter the desired values and click on **Selected channels** or use **All channels**. In the left section you can see, in the numerical display and in the pie chart, the disk space available on the hard disk as well as the free space and the space needed by the currently set configuration.

2.4.1 Number of channels, channel layout

With **Maximum number of channels**, you define the required number of input, output and computation channels. The maximum number of channels which you can enter here is 20,000. Any channel depth can be chosen as long as there is enough storage capacity on the hard disk.

Refer to [How to calculate the necessary storage size on page 24](#) for information on how to calculate the appropriate number.



Close the entry with  in order to activate a setting immediately.

Auto-size: We recommend not to use this setting for MD Client as it tends to be much slower than with a fixed database layout. Additionally, only up to 600 channels may be used in this case. With this setting a dynamic database is created, which increases in size as long as there is space available on the hard disk.



As this type of database is managed by the operating system, data is not secure if there is a system crash.

The **Maximum length** option serves to define the maximum number of measured values for *each* channel. This data depth is only restricted by the space available on the hard disk for the database file. If you do not want to mark and set up the channels individually, click on **All channels**.

Refer to [How to calculate the necessary storage size on page 24](#) for information on how to calculate the appropriate number.



We recommend to use the same length for all channels. Otherwise make sure that a smaller size does not fill up earlier than the other channels. If a database channel is filled with data, all further values will be lost, e.g. the storage of data is stopped for all channels.

Individual channel formats

The data storage format in the database can be selected. In format **Double** (default) 8 bytes are used for a measured value (double precision), in format **Float** 4 bytes (single precision).

Auto-recover database on program start

When starting, MD Client checks whether a database file which has not been properly closed is present. If yes, MD Client asks whether this database is to be restored except if **Auto-recover database upon program start** is active. This saves you having to answer the dialog.

Operate in circular buffer mode

When you operate in this mode, a fixed size must be used (**Maximum length**). Once the database has been filled with values, the new measurements overwrite the oldest ones. With a size of, for example, 100,000 values per channel there are then always only the last 100,000 values (per channel) available for saving to a file or for export.



The setting is, for example, helpful if you are monitoring at a high sample rate for an event and would like to also save the prehistory over a longer period when the event occurs.

Maximum cache size



When operating in circular buffer mode, the cache size is not relevant.

The presetting of 32 kB (per channel) for the size of the cache is sufficient for all normal application cases. You can use higher settings if you are working with high sample rates. With a size of 32 kB 4096 values are buffered in memory (8 bytes per measurement) before writing these values to disk. This is the maximum number of values which can be lost during a system crash. The cache prevents MD Client from writing to disk too often which would reduce the lifetime of a (conventional) hard disk where mechanical head movement is involved when writing data.



A corresponding amount of memory (RAM) is required, otherwise the transmission of the measured values will be slowed down.

2.4.2 How to calculate the necessary storage size

1. Take the number of channels you want to store including all time channels. The maximum number of channels available is the number of channels defined in the pre-selection list.
2. Add the number of computations you want to make. (They are visible in the Channel pre-selection too.) This is the number of channels you need.
3. Set the appropriate number of values you would like to store as **Maximum (channel) length**.

Example

There are 1,305 active channels on the data server, you wish to save 250 of them plus 9 time channels and define 210 computations. The total number of values to be stored is 500,000. This means that there will be a total of 469 channels and the file size will be around 1.9 GB.

2.5 Connecting to a data server (MD Server)



The data server must have been initialized already. Otherwise no connection can be made. Without a connection, you have only limited access to any data server settings.

If a valid IP address (or name) is specified in the project settings, click on **Connect to server** (**Setup** ribbon tab). As soon as the connection is established, the icon changes and symbol  appears in the status fields on the lower right-hand side.

If no connection can be established, check whether the data server is visible on the client PC network and access is allowed for the currently logged-in user. The connection is only possible as long as the data server software is running and after initialization of the data acquisition on the server. It is not necessary that the data acquisition is running, a connection can also be made in paused state or before starting the acquisition.



After the connection the file path of the MC Setup database (copy for this PC) is displayed in the status line at the bottom of the MD Client window. Additionally a check is made whether the database on the server has been changed. In this case the new database will be copied to the MD Client PC. This enables you to work off-line with MD Client, if a connection has been made once, e.g. for preparing the client PC for further tests.

2.6 Pre-select channels

Why pre-select channels?

As a standard MD Server acquires hundreds if not thousands of channels. Not all of these channels are important for a certain client so the monitoring process is usually narrowed to specific channels. The list of those channels which might be of interest is called *Channel pre-selection*. Only the channels on this pre-selection list are available later for display or storage. An exception are time channels which are always included automatically.



When loading a panel layout descriptor (CSV) file also a channel pre-selection is created for all channels defined for display in graphs. This enables you to load a CSV file into another MD Client which will configure all panels and create the proper channel pre-selection automatically, see [Creating panel\(s\) from a layout descriptor \(CSV\) file on page 40](#).



The dialog is only available after a server connection has been made at least once and if access is authorized for the user logged in.

Use **Channel pre-selection** on the **Setup** ribbon tab to open the dialog.

The system hardware, i.e. available devices and channels, all computations defined on the server and the Function groups are displayed in the section on the top left of the window. As soon as you click on one item containing channels, e.g. on time channels, these channels are displayed on the lower left side.



If *Function groups* have been defined on the server, these are shown here as well. It is very convenient, if channels are grouped according to their relevance for client PCs. In that case just click on the corresponding function group to display the channels.



After changing the pre-selection *all values from all channels* stored so far will be deleted. You are therefore asked whether you would like to export all data beforehand if data exists.

How to pre-select channels

1. On the right side mark either a free channel or—if you want to insert channels between existing ones—mark the channel which should be displayed *after* the already inserted channels.

2. Click on a device or channel group in the upper left side.
3. Then mark the channels in the bottom left-hand side which you would like to use later. You can either click and drag the mouse over the first column (numbering column) or hold the  or  key down while clicking on a channel name to add channels to the selection.
4. Right-click on one of the marked channels and choose **Add to pre-selection** or click on  in the toolbar. You may also drag and drop *single* channels. In this case, a dotted red line indicates where the channel will be inserted. You may also add all channels shown with **Add all to pre-selection** (context or **Edit** menu).



If you want to find certain channels try the search feature: Use % or * as wild cards for several characters and _ or ? as wild cards for single characters. You may use wild cards more than once in the search string as in %nnel??04%. Without any wild card character, an exact match is searched. The results are displayed on the left-hand side of the dialog. The last search result can also be seen under Search results (upper left side).

See also [Finding channels \(search functions\) on page 73](#).

Time channels

All necessary (used) time channels are added to the pre-selection automatically. You may however delete unnecessary time channels. Depending on the DAQ mode you may have one or up to three active time channel types available:

- In **Fast trigger mode** but without having assigned a channel to the fast rate you will have only one time channel type, e.g. no active channels marked SR2 or SR3.
- In **Fast trigger mode** and with having assigned a channel to the fast rate you will have the "Device time stamps ... SR2" but *no time channel from the PC* for the fast channels. In this case it is essential that the devices have the proper time and date values.
- In **Regular DAQ mode** and having assigned channels to all three possible sample rates all possible time channel types are active, i.e. with SR2 and SR3 appended.



Although snapshot time stamps can be added, it is not recommended that you use these channels as pre-selection. These channels are used internally by the program: as soon as snapshot data is stored or displayed, the relevant time data

must be available. This happens, for example, if in the DAQ settings **Store when server broadcasts a snapshot** is activated (see [DAQ settings on page 34](#)).

Which time value is recorded?

- “DAQ time stamps” contain the time starting with the beginning of the data acquisition.
- “DAQ time stamps absolute” contain the time values from the PC clock.
- “Snapshot time stamps” contain the time starting with the beginning of the data acquisition.
- “Snapshot time stamps absolute” contain the time values from the PC clock.
- “QX trigger time stamps” exists only with QuantumX/SomatXR devices when using **Fast trigger mode**. This channel usually records the date and time values of the standard sample rate in NTP time format (NTP Unix). As soon as a fast trigger occurs, the channel contains the date and time values for the fast channels during the trigger time.
- “Device time stamp” channels are created additionally for QuantumX/SomatXR modules or MGCplus devices and contain the time value present in these devices (date and absolute time). They are listed as “Device time stamps MGC” or “Device time stamps QX” in the Time channels list (also for IRIG-B time synchronization). If NTP or PTP time synchronization is used, the NTP time format (NTP Unix) is used for these channels.

Channel information

Click on  to display channel information such as sensor type, unit, excitation voltage and filter setting for the channel selected on the right-hand side. The context menu allows you also to display a *channel descriptor file*, if such a file is available on the server and access is permitted to the folder where this file resides.

Clean-up

Use  (**Clean-up pre-selection**) to reorganize and clean the pre-selection file if you have changed, added, deleted or rearranged many channels. This will reduce the file size and speed up the display of the pre-selection list. Furthermore, all missing channels and computations no longer valid (missing source channels) will be deleted. A log file can be displayed after the clean-up.

2.7 Defining computations

- ☞ QuantumX/SomatXR On-Board computations cannot be used in catman Enterprise.

You may use channels which are results from computations on MD Server or define your own computations in MD Client.

- ☞ Computations are created before (above) the channel selected in the **Channel pre-selection** window list on the right-hand side.

How to proceed

1. Mark the channel on the right-hand side in the **Channel pre-selection** window in which the computation shall be created. The new channel will be inserted before the marked one in a new row.
2. Click on  to call up the computation dialog.
3. Select the required computation tab.
4. Create your computation: either drag & drop a channel into the **Edit computation** field or select one for a strain channel. If you select a channel for **Strain a**, **Strain b** and **Strain c** are filled with the following channels in the Channel selection.
5. Assign a name for the computation and click on **Add**.

The dialog stays open after defining a computation so you can define several computations in one go. Computation channels are displayed with a light orange color as background.

2.7.1 Online computation (Algebra)

This computation type shows you a pocket calculator you may use to define your formula. It is however also possible to type in an equation.

How to proceed

1. Specify name and unit for the new channel.
2. Drag the required channels from the **Argument channels** list to the **Edit computation** field or click on the lower left on the numeric keyboard or the functions on the lower right.
 - ☞ Use brackets to specify the processing sequence when using computations with mixed plus/minus and multiply/divide operators.

Some special functions are available from the drop-down box. Click on **Insert**, do not type in the descriptive text.

3. Click on **Add** to create the computation.

You may then define another computation or close the dialog with **Close**.

2.7.2 Stress analysis, strain gage rosette computations

Use these computations when having strain gage rosettes. It enables you to calculate the principle strains and stresses together with the orientation angle of the main principle strain or stress. You may also calculate the equivalent stress according to von Mises or state the transverse sensitivities.

How to proceed

1. Either use the default setting for the base name (**From strain channels**) which will be used for these computations or specify one.
As default the channel name for grid a of a rosette is used as base name together with a combination of two or three letters or two letters plus a digit to indicate the type of computation (see table below). If you specify a name to be used, to each name first a number (rosette number) and then the above mentioned identification is appended.
2. Select the channels where the rosette grids are measured. When using consecutive channels for grids a, b and c, you need to specify only grid a. The other grid-s/channels are inserted automatically.
3. Specify the type of rosette: 0/45/90° grid angle or 0/60/120° grid angle. If the orientation angle of the principle stress is already known, a 0/90° rosette with two grids only may be used as well. In this case no orientation angle may be computed.
4. Mark the computations the program shall make. Keep in mind that some computations only make sense if a certain rosette type is used (see e.g. previous step).
5. Type in the **Young's modulus** (modulus of elasticity) and the **Poisson's ratio** for the material used in the test. The unit specified at **Young's modulus** determines the output unit.
6. If required, specify the **Transverse sensitivity** of the grids as stated on the package.
7. If you have several rosettes in consecutive channels state the **Number of rosettes** used and the corresponding number of computations will be created.
 Use an appropriate pre-selection to arrange all rosettes in consecutive channels.

8. Click on **Add** to create the computation.

You may then define another computation or close the dialog with **Close**.

Available formulae and abbreviations used for strain gage rosette computations

Abbreviation	Computation
AG	Orientation angle
ES	Equivalent stress according to von Mises
SN1	Principle strain 1: strain in the direction of principle nominal stress 1
SN2	Principle strain 2: strain in the direction of principle nominal stress 2
SNA	Shear strain: strain under 45° to grid a. The angle is evaluated in mathematical positive direction (counter-clockwise)
SNX	Strain X: strain in the direction of the grid a
SNY	Strain Y: strain under 90° to grid a. The angle is evaluated in mathematical positive direction (counter-clockwise)
SS1	Principle nominal stress 1
SS2	Principle nominal stress 2
SSH	Shear stress
SSX	Stress X: stress in the direction of the grid a
SSY	Stress Y: stress under 90° to grid a. The angle is evaluated in mathematical positive direction (counter-clockwise)



It is very important that the order of the grids a-b-c is counter-clockwise (mathematically positive) at the stated grid angles. The formulae used are based on this condition and would otherwise result in false values. With HBM strain gage rosettes the grids are labeled with a, b and c and can be used directly. If rosettes from other manufacturers are used, check the measuring grid arrangement and labeling.

Formula: SG rosette, angle

The following applies to 0°/45°/90° rosettes:

$$\alpha = \frac{1}{2} \operatorname{atan} \left| \frac{2\varepsilon_B - \varepsilon_A - \varepsilon_C}{\varepsilon_A - \varepsilon_C} \right|$$

The following applies for 0°/60°/120° rosettes:

$$\alpha = \frac{1}{2} \operatorname{atan} \left| \frac{\sqrt{3} (\varepsilon_B - \varepsilon_D)}{2\varepsilon_A - \varepsilon_B - \varepsilon_C} \right|$$

👉 The Arcustangens is calculated so that the angle is output in the correct quadrants I to IV.

Formula: SG rosette, reference stress according to von Mises

The following applies to 0°/45°/90° and 0°/60°/120° rosettes:

$$\sigma_v = \sqrt{\sigma_1^2 + \sigma_2^2 - \sigma_1 \sigma_2}$$

Formula: SG rosette, principle strain 1

The following applies to 0°/45°/90° rosettes:

$$\varepsilon_1 = \frac{\varepsilon_A + \varepsilon_C}{2} + \frac{1}{\sqrt{2}} \sqrt{(\varepsilon_A - \varepsilon_B)^2 + (\varepsilon_C - \varepsilon_B)^2}$$

The following applies for 0°/60°/120° rosettes:

$$\varepsilon_1 = \frac{\varepsilon_A + \varepsilon_B + \varepsilon_C}{3} + \frac{1}{\sqrt{3}} \sqrt{\frac{(2\varepsilon_A - \varepsilon_B - \varepsilon_C)^2}{3} + (\varepsilon_B - \varepsilon_C)^2}$$

Formula: SG rosette, principle strain 2

The following applies to 0°/45°/90° rosettes:

$$\varepsilon_2 = \frac{\varepsilon_A + \varepsilon_C}{2} - \frac{1}{\sqrt{2}} \sqrt{(\varepsilon_A - \varepsilon_B)^2 + (\varepsilon_C - \varepsilon_B)^2}$$

The following applies for 0°/60°/120° rosettes:

$$\varepsilon_2 = \frac{\varepsilon_A + \varepsilon_B + \varepsilon_C}{3} - \frac{1}{\sqrt{3}} \sqrt{\frac{(2\varepsilon_A - \varepsilon_B - \varepsilon_C)^2}{3} + (\varepsilon_B - \varepsilon_C)^2}$$

Formula: SG rosette, shear strain

The following applies to 0°/45°/90° rosettes:

$$\gamma = 2\varepsilon_B - \varepsilon_A - \varepsilon_C$$

The following applies for 0°/60°/120° rosettes:

$$\gamma = \frac{2}{\sqrt{3}} (\varepsilon_B - \varepsilon_C)$$

Formula: SG rosette, strain X

The following applies to 0°/45°/90° and 0°/60°/120° rosettes:

$$\varepsilon_x = \varepsilon_A$$

Formula: SG rosette, strain Y

The following applies to 0°/45°/90° rosettes:

$$\varepsilon_y = \varepsilon_C$$

The following applies for 0°/60°/120° rosettes:

$$\varepsilon_y = \frac{2}{3} \left(\varepsilon_B + \varepsilon_C - \frac{\varepsilon_A}{2} \right)$$

Formula: SG rosette, principal nominal stress 1

The following applies to 0°/45°/90° rosettes:

$$\sigma_1 = \frac{E}{1-\nu} \cdot \frac{\varepsilon_A + \varepsilon_C}{2} + \frac{E}{\sqrt{2}(1+\nu)} \cdot \sqrt{(\varepsilon_A - \varepsilon_B)^2 + (\varepsilon_C - \varepsilon_B)^2}$$

The following applies for 0°/60°/120° rosettes:

$$\sigma_1 = \frac{E}{1-\nu} \cdot \frac{\varepsilon_A + \varepsilon_B + \varepsilon_C}{3} + \frac{E}{1+\nu} \cdot \sqrt{\left(\frac{2\varepsilon_A - \varepsilon_B - \varepsilon_C}{3} \right)^2 + \frac{1}{3}(\varepsilon_B - \varepsilon_C)^2}$$

Formula: SG rosette, principal nominal stress 2

The following applies to 0°/45°/90° rosettes:

$$\sigma_2 = \frac{E}{1-\nu} \cdot \frac{\varepsilon_A + \varepsilon_C}{2} - \frac{E}{\sqrt{2}(1+\nu)} \cdot \sqrt{(\varepsilon_A - \varepsilon_B)^2 + (\varepsilon_C - \varepsilon_B)^2}$$

The following applies for 0°/60°/120° rosettes:

$$\sigma_2 = \frac{E}{1-\nu} \cdot \frac{\varepsilon_A + \varepsilon_B + \varepsilon_C}{3} - \frac{E}{1+\nu} \cdot \sqrt{\left(\frac{2\varepsilon_A - \varepsilon_B - \varepsilon_C}{3} \right)^2 + \frac{1}{3}(\varepsilon_B - \varepsilon_C)^2}$$

Formula: SG rosette, shear stress

The following applies to 0°/45°/90° and 0°/60°/120° rosettes:

$$\tau_{xy} = \frac{\sigma_1 - \sigma_2}{2} \sin 2\alpha$$

Formula: SG rosette, stress X

The following applies to 0°/45°/90° rosettes:

$$\sigma_x = \frac{E}{1 - \nu^2} (\epsilon_A + \nu \epsilon_C)$$

The following applies for 0°/60°/120° rosettes:

$$\sigma_x = \frac{E}{1 - \nu^2} \left(\epsilon_A + \nu \frac{2}{3} \left(\epsilon_B + \epsilon_C - \frac{\epsilon_A}{2} \right) \right)$$

Formula: SG rosette, stress Y

The following applies to 0°/45°/90° rosettes:

$$\sigma_y = \frac{E}{1 - \nu^2} (\epsilon_C + \nu \epsilon_A)$$

The following applies for 0°/60°/120° rosettes:

$$\sigma_y = \frac{E}{1 - \nu^2} \left(\frac{2}{3} \left(\epsilon_B + \epsilon_C - \frac{\epsilon_A}{2} \right) + \nu \epsilon_A \right)$$

2.8 DAQ settings



These settings may only be changed, if proper user access rights are defined, see [User administration in MD Client on page 18](#).

The most important setting is the **Data transfer refresh rate**. This is not the data acquisition speed (sample rate): *the sample rate may only be defined on the server*. Here the number of requests for data sent to the server is specified. If the server has new data, these are sent. If the refresh rate is too slow, data might be lost: this depends on the DAQ mode used, on the circular (ring) buffer size setting on the server and the transfer time. On the other hand if the refresh rate is too high, a lot of requests must be handled by the server PC without any data transfer. In any case data is not forwarded twice if the sample rate of the server is slower than the data transfer rate of the client. The actual sample rate of the server is also displayed in one of the status fields at the bottom of the panel

window. It depends therefore on the server PC, the number of active channels, the sample rates used and the number of clients, which setting results in optimum performance.

DAQ mode

1. In **Single point DAQ** mode only one value per request is fetched from the server PC.

The setting is sufficient for slow sample rates (<10 Hz) and if the **Data transfer refresh rate** is set to the same or a higher speed. Otherwise data might be lost.

2. In **Continuous DAQ** mode all (new) data available in the circular buffer of the server PC is fetched.

 The setting is only accessible if circular buffers are used on the server PC.

The **Data transfer refresh rate** must be high enough to read out the buffer before the oldest values in this buffer are overwritten. You may change this value (**Refresh rate**) even during a measurement on the **Test** ribbon tab.

Read timeout: For reading the values from the server PC two retries are used as default, if the server does not deliver the data in the time specified. You may still get the data after a timeout if **Auto retry after read timeout** is active and the read timeout is short enough compared to the time the values are stored in the buffer of the data server (MD Server). On the other hand consider that during snapshots or when the fast rigger mode is active on the server no data is transferred. Set buffer size (on MD Server), **Read timeout** and retries according to your needs.

 If you find that many read timeouts occur in the log file, the server load is too high (see [MD Client diagnosis on page 78](#) for opening the log file). Try one or more points of the following:

- reduce the refresh rates of the clients,
- reduce the number of clients,
- reduce the number of active channels.

Communication log

The communication log might contain information for solving interface problems. This might be necessary if many read timeouts occur or if you contact the HBM Technical support, see Technical support on page 14.

See also [Communication log on page 78](#) (**Diagnosis** ribbon tab).



Using **Enable communication log during test** might slow down performance.

Local database storage

- See also [Configure database \(active channel number and storage size\) on page 21](#), [Database handling, export on page 74](#).

The frame on the right in the **DAQ settings** dialog concerns data storage. Because the database size is (usually) limited it should be specified which values are to be stored and when to clear old data (see also [Number of channels, channel layout on page 22: Auto-size](#)). For example, a **1:10** setting for **Auto storage to local database** stores the first out of 10 values read in from the server into the internal database. Of course all 10 values are displayed, this setting determines only the storage.

You may change this value even during a measurement on the **Test** ribbon tab.

- ⚠ Either use storage of (continuously measured) data or storage of snapshots (Auto storage must be OFF). Both is not possible.

Store when server broadcasts a snapshot stores all snapshots made on the server. It is not important how or why a snapshot was made: manually, as result of a limit check, via a command channel command etc. As soon as a snapshot is made, the server broadcasts this event to all clients thus enabling them to request the data.

Allow manual snapshot enables a user to click on **Manual snapshot** (**Test** ribbon tab, **Test settings** group) during data acquisition and thus store the actual value for all channels.

The **Clear database when server test changed** entry determines whether the database is cleared (emptied), if a new test is started on the server. After that the full data depth is available again for storage.

Specify to **Save database before clearing** for keeping all data stored so far. In this case project and test name are combined and used as file name.

- 👉 Data storage is stopped if the (local) database is full. However, data acquisition and display of data will continue.

Fetch server snapshots upon initializing or test continuation transfers all snapshots already available on the server to the client PC for display (and storage).

3 DEFINING VISUALIZATION (PANELS)

3.1 Introduction

 New panels for visualization may only be designed if proper user access rights are defined, see [User administration in MD Client on page 18](#).

Panels are used to monitor channels during a measurement or view the results of a measurement in e.g. a Post-process graph. You may define as many different panels as necessary. However only *one* panel may be visible at any one time. The panels are browsed through by clicking on the respective tab underneath the ribbon, but you can also select a specific panel from the drop-down list beside **Select panel (Panels group on the Panel ribbon tab in Panel mode)**. Use  and  in the Project dialog to sort your panels as required, see [Project settings on page 20](#).

In Real-time and Post-process graphs all values stored in the internal database are displayed immediately after changing a panel.

Creating panels

You can create panels in different ways which are covered in the following topics:

1. [Creating panel\(s\) interactively on page 38](#).
Create a new panel in **Panel mode**. You may use all available objects and assign channels directly.
2. [Creating panel\(s\) from a panel layout on page 39](#).
Create a (single) panel layout in **Panel layout mode**. Then load this template into several panels and assign the required channels.
3. [Creating panel\(s\) from a layout descriptor \(CSV\) file on page 40](#).
Create a (single) panel layout in **Panel layout mode** and assign dummy channels to the graphs. Then save this panel layout as panel layout descriptor (CSV) file. In the next step edit this file in MS Excel (copy/multiply the required lines to create more panels) and assign the required channels to the available graphs. Channels may be assigned to Real-time and Post-process graphs only. However, all other objects will be copied/multiplied as well. Then let MD Client create all panels and graph/channel assignments defined in this file. The file may combine several panel layouts for several panels each.

This procedure is also recommended, if you want to duplicate panel layouts for several MD Client PCs or if you want to modify a panel layout on several clients together.

- 👉 Panel files are saved automatically by the MD Client. New panels or panels inserted from file are always included into the project file.

If you want to remove a panel from the project, use **Remove** in **Panel mode** (**Panel** group, access rights to change a project are required, see [User administration in MD Client on page 18](#)). Removing a file from a project does not delete the file itself.

- 💡 When starting the program, the project name is the default panel name. If you wish to change that name, save this panel (after configuration) under a different name, import it and remove the original panel.

Background picture for a panel

- 📘 See also [Background picture in a graph on page 47](#).

You can assign a background image or text for the whole panel with **Open** in the **Background picture** group on the ribbon or the context menu on a panel. You may also stretch (scale to the panel size) the image.

- 👉 No new background images can be assigned *during* a measurement.

3.2 Creating panel(s) interactively

How to proceed

1. Make sure you are in **Panel mode**, not in **Panel layout mode** (**Panel** or **Panel layout** group on the **Panel** ribbon tab).
2. Create a **New panel** with **New** in the **Panel** group or click on  +.
3. When creating a new panel, no file name has to be stated. Therefore use **Save -> Save as** (**Panel** group) to save your panel under a meaningful name. As default panels are stored to the Panels sub-folder of the project folder.
4. Choose one of the entries in the **Indication** group. Common objects are directly accessible, find more objects under **Real-time displays**, **Post-process displays** or **Other displays**, see [Available visualization objects on page 43](#).

- 💡 You may use **Duplicate horizontal/vertical** from the object context menu to create copies.

5. Drag the object to the required location on your screen.
6. Position the cursor e.g. over the lower right corner (the cursor icon changes) to resize the object.
7. Assign one or more channels (only graphs, the Spreadsheet and the Client database viewer can display more than one channel) using the Channel selector. Open the Channel selector with  or the context menu of an object. See also [Channel row graph on page 53](#) as here the configuration is different.
8. Create more panels as required.

3.3 Creating panel(s) from a panel layout

Use a panel layout if you want to create multiple panels with several graphs in the same design. If you want to control how the individual channels are assigned to the graphs on several panels, see [Creating panel\(s\) from a layout descriptor \(CSV\) file on page 40](#).

Procedure for creating a panel layout file (template)

1. Switch to **Panel layout mode** (Panel ribbon tab).
The panel layout page is opened.
2. If a layout page has already been made you can delete it and open a new one with **New -> New panel layout**. There is always only one panel layout available.
 -  You can also create a panel layout from an existing panel file with **New -> Create panel layout from panel file**. However, if channels are assigned to the graphs in this panel file, they will not be removed. It may therefore be necessary to delete the original channel assignment with  or the plot legend¹⁾ context menu **Delete all plots**.
3. Create your visualization objects as usual.
Do not assign any channels as this panel will later act as a template for new panels. If channels are assigned, they will be used on every import of this panel layout.
 -  You may use **Duplicate horizontal/vertical** from the context menu to create graph copies.
4. You may configure color, scaling etc. of your graphs as usual.
5. Save your panel layout.

¹⁾ The plot legend (curve legend) displays the color, style and name of a curve. It is located at the top edge of a graph: 

Procedure for creating panels based on a panel layout file

1. Create a new panel with **New -> Create panel from panel layout file** in the **Panel** group.
2. Save your panel (the **Save panel as** dialog is displayed automatically).
3. If you need more panels with the same design, repeat these steps.
4. Assign the channels using the **Channel selector** window as usual.

3.4 Creating panel(s) from a layout descriptor (CSV) file

-  See also [Default plot colors on page 46](#) for specifying the colors which are assigned automatically to the plots, [User defined prediction line on page 70](#).

Use this method if you want to create multiple panels with several graphs and if you want to control, how the individual channels are assigned to the graphs. The first part of the procedure is identical to creating a panel layout, however, no placeholder (dummy) channels are used and there is an additional step to perform: editing a CSV file (comma-separated values) which specifies how many panels with how many graphs and which channel assignments are to be created.



When loading a CSV file also a channel pre-selection is created for all channels defined for display in graphs. This enables you to load a CSV file into another MD Client which will configure all panels and create the proper channel pre-selection.

How to proceed

1. Switch to **Panel layout mode** (**Panel** ribbon tab).
The panel layout page is opened.
2. If a layout page has already been made you can delete it and open a new one with **New -> New panel layout**. There is always only one panel layout available.
 -  You can also create a panel layout from an existing panel file with **New -> Create panel layout from panel file**. However, if channels are assigned to the graphs in this panel file, they will not be removed and replaced by dummy channels automatically. It may therefore be necessary to delete the original channel assignment with  or the plot legend¹⁾ context menu **Delete all**

¹⁾ The plot legend (curve legend) displays the color, style and name of a curve. It is located at the top edge of a graph:  Device_1 CH 0.

plots and use the **Add plot** context menu before multiplying/assigning channels.

3. Create your visualization objects as usual. Channels are assigned to Real-time graphs (CHART), Real-time bar graphs (BCHART), Post-process graphs (GRAPH) and Spreadsheets (TABLE) only. However, all other objects are multiplied as well. If you need several different layouts, perform the whole procedure until step 7 several times each time creating a different panel layout file and a panel layout descriptor file.
 - 💡 You may use **Duplicate horizontal/vertical** from the context menu to create graph copies.
4. Use **Add plot** from the context menu to assign (dummy) channels to your graphs. These channels act as placeholders (dummy channels) for the channels to be assigned in the next step. You may however also assign certain channels using the **Channel selector** window. *These channels are not changed later* when assigning channels to graphs automatically.
5. Configure your graphs as usual (color, scaling etc.).
6. Save your panel layout (**Save -> Save panel layout**). You have to use this file (extension PLF) together with the layout descriptor file from the next step for creating your panels.
7. Use **Save -> Save panel layout descriptor file** to create a CSV file.
8. Open the CSV file, e.g. with Excel. However, a plain text editor may also be used.
 - 👉 You may open several CSV files and copy/merge the required rows until all channels to be created are defined as a row in the CSV file.
9. In the CSV file, the following information is essential: **Channel name, Panel layout file, New panel name, Panel object name, Plot no** and **Chart title**. Fill in or copy the required information into the corresponding columns. The column titles may not be changed; however, unnecessary columns may be deleted (not required, empty columns are not considered). The first column must be the **Channel name** column, the sequence of the other columns is not important. Replace the dummy text (*HBMPlotPlaceHolder_x*) with the real channel name as stated in the Channel pre-selection.
 - ⚠️ Do not change the Panel object name, this is the internal object name of the graph in the related panel layout file.

Column **Panel layout file** is already filled out, it is the path and file name of the layout file saved in step 6. If you merge several CSV files insert the appropriate file and path names.

Specify in column **New panel name** the name of the panel file to be created later. This column and column **Panel layout file** may contain a full path specification (with file extension), a relative path or a file name (with file extension) only. If no full path is given, the base path must be specified in the import dialog in step 12. You may change the **Chart title** which is the graph title available later in MD Client and you may create more plots per graph (up to 32 plots are possible, i.e. number 1 to 32 are allowed in the **Plot no** column).

Optionally you may specify an **X channel name** or a **Formula** (only columns **Channel name** and **Formula** are required). Formulas are written as they appear in the formula editor, see [Online computation \(Algebra\) on page 28](#). If you want to specify a unit for the computation, append the unit with @, e.g. **[channel1]+[channel2]@µm/m**.

You may use columns **x1** to **x32** and **y1** to **y32** for prediction lines, refer to [User defined prediction line on page 70](#).

10. Save the edited CSV file. You may change the name if the original file shall be retained.
11. Go to MD Client and switch to **Panel mode**.
12. Use **New -> Create panels from layout descriptor file** to create the panels, graphs and plots as specified.

A dialog is displayed in which you specify the CSV file. If no paths or only relative paths are given in the CSV file (columns **Panel layout file** and **New panel name**), select the required paths in the dialog.

 If a (full) path is specified in the CSV file, any path chosen in the dialog is ignored.

13. Click on **Start** to open and process the file.
Channels not existing so far are created in the Channel pre-selection. Already existing panels can be retained, you may therefore also import several CSV files. All new panels are created with the file names and relative or absolute paths specified in the CSV file or the path settings in the import dialog.
 -  Activate **Remove all panels from project before start creating new panels** to remove all old or empty panels.

After the process, an error log may be displayed.

-  Channel assignment is made for graphs only, e.g. digital indicators cannot be assigned. However, other objects are also created if a panel layout file contains these objects.

14. We recommend you open the **Channel pre-selection** window and use  (**Clean-up pre-selection**) to reorganize and clean the pre-selection file after creating new panels and channels. Furthermore, all missing channels and computations no longer valid (missing source channels) will be deleted. A log file can be displayed after this clean-up.

3.5 Channel selector window

The **Channel selector** window shows all channels from your pre-selection, see [Pre-select channels on page 25](#). Use the Shift key () to select consecutive channels and drag the channels (still holding the Shift key) to graphs or tables. Use the Ctrl key () to select nonconsecutive channels. Objects capable of showing only a single channel will not change if several channels are dropped.

How to search

Either type in the search criteria or choose from a previous phrase in the drop-down field. Use % or * as wild cards for several characters and _ or ? as wild cards for single characters. You may use wild cards more than once in the search string as in %nnel??04%. Without any wild card character, an exact match is searched.

Click on  to start the search. Use  to show all pre-selected channels again.

 shows you the panel displaying the marked channel.

 **(Clear search list)** clears all previous search terms.

3.6 Available visualization objects

There are different object types available:

- Real-time displays including a [Spreadsheet on page 48](#) object for real-time values,
- a [Post-process graph on page 49](#),
- Other display objects:
 - a [Label \(text or image\) on page 54](#) which can be used for displaying texts or pictures, e.g. company logos,
 - a [Command button on page 54](#) for starting VBScript actions,
 - the [Flex table on page 55](#),

- a [Client database viewer on page 63](#),
- a [Load level visualization on page 63](#),
- a Background picture object (for the whole panel) is available on the ribbon in group **Control**.

How to configure these objects is explained in [Configuration of visualization objects on page 45](#).

Real-time objects

Except with the graph objects and the Spreadsheet, each object may display one channel only. As soon as you assign a new channel from the **Channel selector** window, the old channel assignment is deleted. The Real-time graph displays a certain amount of values only, see [Real-time graph on page 47](#).



The LED may use more than just two different colors.

The graph objects allow various export formats and destinations: to clipboard, file or printer and in Windows metafile format (*.WMF), as bitmap (*.BMP) or JPEG (*.JPG) (context menu **Export graph**). It is even possible to export **Text/Data** which results in a list or table with all or selected values currently displayed.

The Spreadsheet displays the real-time data of a channel (one channel per row).

Post-process objects

The Post-process graph displays the snapshots stored in the internal database, refer to [Post-process graph on page 49](#). For details about the database, see [Configure database \(active channel number and storage size\) on page 21](#). A Post-process graph shows *all* stored data; it is however possible to specify how often an update occurs when working with high data transfer refresh rates.

The object allows various export formats and destinations: to clipboard, file or printer and in Windows metafile format (*.WMF), as bitmap (*.BMP) or JPEG (*.JPG) (context menu **Export graph**). It is even possible to export **Text/Data** which results in a list or table with all or selected values currently displayed.

Other display objects

The Label is used to display headings or comments and images, e.g. company logos.

A Command button may trigger the connected VBScript (**Configure** menu). See [Using VBScript on page 81](#) for details concerning VBScript.

The Flex (flexible) table offers you more possibilities than the Spreadsheet (real-time object): each cell can be configured individually. Up to 20,000 rows and up to 256 columns are available.

The Client database viewer allows you to see the values stored in the internal database in a spreadsheet similar to Excel, refer to [Client database viewer on page 63](#). For details about the database, see [Configure database \(active channel number and storage size\) on page 21](#). Up to 50,000 values per channel may be shown in this object together with channel unit, minimum and maximum.

3.7 Configuration of visualization objects

With the visualization objects you may:

- Move and re-size an object.
- Duplicate objects horizontally or vertically, even fully configured (the next channel in the pre-selection list is used in this case).
- Decide which colors shall be used for graphs or the display of values.
- Change the scaling.
- Set the format for axis numbering, e.g. **0.000** will display three post decimal places.
- Configure the appearance of a Bar indicator or an Analog indicator.
- Display or hide statistics or change the data format in the Digital indicator.



It is not possible to make objects transparent. Therefore we recommend you do not superimpose objects as those in the background will be hidden.

Mark an object and use  **Configure** in the ribbon or context menu to configure each object. Depending on the possible settings this context menu contains the appropriate items. After selecting an entry, the corresponding dialog window is opened. Just specify the settings you require. The configuration may be called up before, after or even during a running data acquisition, if proper access rights are defined, see [User administration in MD Client on page 18](#).



Use menu **Show panel navigator (Panel ribbon tab)** to access objects, to center an object on screen (**Center object**), or to position objects accurately (type in a new position and click on **Change**). The numbers displayed are **TWIPS (TWentieth of an Inch Point, depending on the screen resolution approx. 17 TWIPS are one pixel)**

and refer to the left upper corner of an object. All objects on the current panel are shown, sorted by object types.

For all objects one setting is important: which channel(s) shall be displayed. If the Channel selector window is not yet visible, use the context menu item **Channel selector** from any object or  **Channel selector** in the ribbon to call this window and drag a channel into the object. All other settings are optional.

See also [Channel selector window on page 43](#).

- 👉 Object names (**Name**) are only important if you use VBScript, refer to [Using VBScript on page 81](#). In this case objects are referred to by their names.

Default plot colors

Default plot colors (**Indication** group on the **Panel** ribbon tab) allows you to pre-define the colors used for the plots of a graph. Each time you assign a new channel, the next color from the dialog is used. In every graph the color scheme starts with the first color from the dialog. The setting applies for all users of MD Client.

If you delete plots from the graph, all colors of the currently assigned channels are retained. However, the next plot gets the plot color which is assigned to the corresponding **Plot No.** where the number depends on the number of plots in the graph. Example: If you assigned 10 plots and then delete plots 3 and 4, there are only 8 plots left. Therefore the next two plots get the color for **Plot No. 9** and **Plot No. 10** (which are already used).

Large title font size

This option enlarges the title font size of Digital indicator, Analog indicator and Bar indicator. You have to activate the option before creating these objects. The **Font** context menu of these objects changes only the size of the numbers displayed.

With graphs you can define the size of titles and labels individually with the **Configure** context menu on the **General** tab.

Zooming in a graph

Use   or  to zoom into a graph (horizontal, vertical or rectangle zoom). Click with the left-hand mouse key inside the graph and drag to indicate the zoom section.

Click again on the symbol to return to the original state.  will take you back to

the last zoom states step by step.

Background picture in a graph

All graph objects support a background image in bitmap (*.BMP) format. Click on  in the configuration dialog to select an image. The image is automatically scaled to the

graph size. Use either  or delete the file name (blank field) to remove the image. See also [Background picture for a panel on page 38](#).

👉 No new background images can be assigned *during* a measurement.

3.7.1 Real-time graph

📘 See also [Creating panel\(s\) from a panel layout on page 39](#), [Creating panel\(s\) from a layout descriptor \(CSV\) file on page 40](#), [Default plot colors on page 46](#).

👉 Create a Real-time graph from the **Panel** ribbon tab (**Indication** group).

If an $y(x)$ graph is required instead of an $y(t)$ graph drag the x-channel directly to the x-axis. Drag a time channel to the x-axis or use context menu **Use dt for x axis** to get a $y(t)$ graph again.

👉 If a **Reference x channel** (see MC Setup column description) is defined, this is used as default for the x-axis.

Clicking on a plot legend¹⁾ (left-hand mouse key) leads to a popup menu which lets you configure or delete this plot () or delete all plots (.

Curve fit

You may draw an equalizing plot with  (**Points and Best Fit Line**, linear interpolation) or  to  (**Best Fit Curve** or **Spline**, polynomial interpolation of 2nd to 4th order) in the graph over all values displayed (**Configure plot** dialog).

Control plots

The **Control plots** tab (**Configure** dialog of the graph) allows you to display reference curves or limits. Just specify x and y coordinates (64 max.); a straight line is drawn

¹⁾ The plot legend (curve legend) displays the color, style and name of a curve. It is located at the top edge of a graph:  Device_1 CH 0.

between these points. Up to 8 control plots are possible.

👉 You cannot edit or create new control plots during a measurement.

Prediction line display, Tolerance band

If **Check prediction line** is activated in the **Limit checking** dialog, you may display the prediction line with the **Configure plot** context menu (left-hand mouse key) of the plot legend¹⁾.

Also the display of the **Tolerance band** *around your prediction line* may be activated here. The tolerance band itself is defined in the **Limit checking** dialog.

See also [Limit checking on page 67](#), [Check for certain values in two associated channels \(Prediction line\) on page 69](#) for an explanation of the operation principle.

Notes

- Use the **Default plot colors** option on the **Panel** ribbon tab to pre-define plot colors.
- Use **History buffer size** in the configuration dialog, **General** tab, to specify how many values are visible (x-axis min/max). The maximum number of data shown is 32 000 per channel. A min/max compression occurs for y(t) graphs (a whole-number compression factor is used) if you specify more than 10 000 values; y(x) graphs are never compressed.
- We recommend caution when using autoscaling for the y-axis with the Real-time graph since this might be time-consuming when redrawing the graph. Use a fixed scaling instead.
- If you want to display absolute time values, drag the **DAQ time stamps absolute** or **Device time stamps** (**Channel selector** window) to the x-axis. Then open the **Configure** dialog via the context menu and activate **Date/time** for the **x axis** on the **Axis** tab.
- With **Freeze graph** in the context menu you may freeze the graph temporarily, e.g. the display is paused.

3.7.2 Spreadsheet

📘 See also [Flex table on page 55](#).

👉 Create a Spreadsheet from the **Panel** ribbon tab (**Indication** group).

The Spreadsheet displays the real-time data of a channel (one channel per row). Just drag the required channel(s) to a row. You may select several channels as usual with  or **Ctrl** keys.

- 👉 Values for the Min./Max. pointer display are retrieved from the values this object receives. Depending on the setting at **Refresh rate** (see [DAQ settings on page 34](#)) a maximum of one value per read block (read cycle) is provided for this object. Therefore these values are not identical with the minimum or maximum of the acquired values. Hence this indication is only recommended for low sample rates.

3.7.3 Post-process graph

- 👉 Create a Post-process graph from the **Panel** ribbon tab (**Indication** group).

The Post-process graph is usually displaying snapshot values stored in the database during a measurement. If an $y(x)$ graph is required instead of an $y(t)$ graph drag the required channel directly to the x-axis. Drag a time channel to the x-axis to get the original display again.

- 👉 If a **Reference x channel** (see MC Setup column description) is defined, this is used as default for the x-axis.

Clicking on a plot legend¹⁾ (left-hand mouse key) leads to a popup menu which lets you configure or delete this plot () or delete all plots (.

Curve fit

You may draw an equalizing plot with  (**Points and Best Fit Line**, linear interpolation) or  to  (**Best Fit Curve** or **Spline**, polynomial interpolation of 2nd to 4th order) in the graph over all values displayed (**Configure plot** dialog).

Control plots

The **Control plots** tab (**Configure** dialog of the graph) allows you to display reference curves or limits. Just specify x and y coordinates (64 max.); a straight line is drawn between these points. Up to 8 control plots are possible.

- 👉 You cannot edit or create new control plots during a measurement.

¹⁾ The plot legend (curve legend) displays the color, style and name of a curve. It is located at the top edge of a graph:  Device_1 CH 0.

Prediction line display, Tolerance band

If **Check prediction line** is activated in the **Limit checking** dialog, you may display the prediction line with the **Configure plot** context menu (left-hand mouse key) of the plot legend¹⁾.

Also the display of the **Tolerance band** *around your prediction line* may be activated here. The tolerance band itself is defined in the **Limit checking** dialog.

See also [Limit checking on page 67](#), [Check for certain values in two associated channels \(Prediction line\) on page 69](#) for an explanation of the operation principle.

Notes

- If CPU load is critical at high data acquisition speeds, you may specify that this object is not updated during every scan cycle (**Refresh rate**, **Setup** ribbon tab) but with a lower speed instead: **Configure** context menu, **General** tab, **Update after n storage cycles**.
- If you want to display absolute time values, drag **DAQ time stamps absolute** or **Device time stamps** (**Channel selector** window) to the x-axis. Then open the **Configure** dialog via the context menu and activate **Date/time** for the **x axis** on the **Axes** tab.

3.7.4 Digital indicator

- ☞ Create a Digital indicator from the **Panel** ribbon tab and **Real-time displays** (**Indication** group).

As default the Digital indicator displays minimum (lower left, in blue) and maximum (lower right, in red) values. Use **Hide statistics** from the context menu to suppress this display.

Context menu item **Alarm** allows you to specify certain value ranges which are then used to change the background color (alarm checking must be enabled). It might be necessary to change the background and foreground color of the display to have a good contrast with all alarm colors. When **Use source channel limits** is checked, the values from the **Limit checking** (**Test** or **Panel** ribbon tab) are used. In this case only the colors may be changed in this dialog.

See also [Limit checking on page 67](#).

Notes

- If you want to display absolute time values, drag **DAQ time stamps absolute** or **Device time stamps (Channel selector window)** into the object. Then apply the proper format setting via the **Format output** context menu.
- Values for the Min./Max. pointer display are retrieved from the values this object receives. Depending on the setting at **Refresh rate** (see [DAQ settings on page 34](#)) a maximum of one value per read block (read cycle) is provided for this object. Therefore these values are not identical with the minimum or maximum of the acquired values. Hence this indication is only recommended for low sample rates.

3.7.5 Bar indicator

- 👉 Create a Bar indicator from the **Panel** ribbon tab and **Real-time displays (Indication group)**.

Besides several different appearances with horizontal or vertical bar, it is also possible to use an inverted scale. Axis labels may be displayed left, right or on both sides.

Notes

- With logarithmic scale a proper **Min** value has to be used, e.g. **0.0001**.
- Values for the Min./Max. pointer display are retrieved from the values this object receives. Depending on the setting at **Refresh rate** (see [DAQ settings on page 34](#)) a maximum of one value per read block (read cycle) is provided for this object. Therefore these values are not identical with the minimum or maximum of the acquired values. Hence this indication is only recommended for low sample rates.

3.7.6 Analog indicator

With the Analog indicator several different appearances are available, e.g. dial, knob, horizontal or vertical gauge display with a 90° wide pointer scale. It is also possible to use an inverted scale.

Notes

- With logarithmic scale a proper **Min** value has to be used, e.g. **0.0001**.
- Values for the Min./Max. pointer display are retrieved from the values this object receives. Depending on the setting at **Refresh rate** (see [DAQ settings on page 34](#)) a maximum of one value per read block (read cycle) is provided for this object. Therefore these values are not identical with the minimum or maximum of the acquired values. Hence this indication is only recommended for low sample rates.

3.7.7 LED

- 👉 Create a LED from the **Panel** ribbon tab and **Real-time displays (Indication group)**.

The channel name of the data source is displayed as default, but you may change this any time. Just type in a new caption.

Use **Alarm** from the context menu to set the colors. The **Default color** is used as OFF color.

- 👉 Right-click on the LED, not the text field, to get the context menu.



If **Bit test** is enabled in the **Configure LED status change** dialog you may assign **Default color** and **ON color** to display status information: if the bit specified is set (1), the **ON color** is displayed, otherwise (0) the **Default color**.

3.7.8 Real-time bar graph

- 👉 Create a Real-time bar graph from the **Panel** ribbon tab and **Real-time displays (Indication group)**.

Each column displays another channel, just drag a channel into the graph. New channels are appended as a new bar on the right-hand side. The scale is automatically set to the maximum of all Max. prediction values if these values are available (see MC Setup column description).

Notes

- Left-click on a bar to be able to delete this or all plots or to change the text displayed (**Configure plot**). As default the channel name is used.
- Right-click in the graph if you want to configure, duplicate or export the graph.

- Export via context menu **Export** is only possible with appropriate access rights, see [User administration in MD Client on page 18](#).
- With  **Freeze graph** in the context menu you may freeze the graph temporarily, e.g. the display is paused.

3.7.9 Channel row graph

- ☞ Create a Channel row graph from the **Panel** ribbon tab and **Real-time displays (Indication group)**.

This graph is similar to a Real-time bar graph but enables you to display channel values on the y-axis at *certain* x-axis positions. For each channel to be displayed in a plot, an x position must be specified. All y values of a plot are then connected by a line.

How to proceed

1. Open the channel list with  **Setup plots** in the context menu. The first plot (PLOT_1) is displayed, however no channel is assigned so far.
2. Open the **Channel selector** window (.
3. Drag the required channel(s) to the plot list.
 - ⚠ Drag & drop on the graph itself like with the other graphs does not work in this case.

Use the context menu **Delete selected channels** in the graph or channel list to delete selected channels.

4. If required, modify the text to display (x-axis label) in the **x data label** column. The default x-axis label is the channel name. The labels are displayed in separate lines, if the x-axis values of channels are identical.
5. Assign in the **x Value** column where the current value of each channel shall be displayed in the graph.
6. Use the **Add** button to create more plots.
 - ☞ Up to 6 Plots are possible.
7. Close the channel list to display the data (click  **Setup plots** in the context menu again).

Use  and  to display the previous or next plot in the list, if available. You may assign each plot a different color and use the legend context menu as usual.



Use **Rotate x channel labels** from the context menu to turn the x-axis labels clockwise by 90°, if the texts overlap.

Notes

- Clicking on a plot legend¹⁾ (left-hand mouse key) leads to a popup menu which lets you configure or delete this plot () or delete all plots (.
- As long as the channel list for a plot is displayed, the graph size is restricted in width. The original width is used again, if this list is hidden (click  **Setup plots** in the context menu again).
- With  **Freeze graph** in the context menu you may freeze the graph temporarily, e.g. the display is paused.

3.7.10 Label (text or image)

- 👉 Create a Label from the **Panel** ribbon tab and **Other displays (Indication group)**.

If you specify a picture file, make sure the file is available when opening a panel with this object.

The following file formats are supported: bitmap (BMP), Windows Metafile Format (WMF), Icon file format (ICO), Graphics Interchange Format (GIF) and JPEG (JPG).

3.7.11 Command button

- 👉 Create a Command button from the **Panel** ribbon tab and **Other displays (Indication group)**.

Runs a VBScript procedure. The script must already be in memory (loaded), otherwise no selection is possible.



Include all script procedures necessary into one VBScript project file (*.ESP, Enterprise Script Project). Then specify this file in the project settings (see [Project settings on page 20](#)). This saves you having to load the VBScript manually. See also [Using VBScript on page 81](#), [Custom commands with VBScripts \(custom ribbon tab\) on page 84](#).

¹⁾ The plot legend (curve legend) displays the color, style and name of a curve. It is located at the top edge of a graph:  Device_1 CH 0.

- ☞ You must have appropriate access rights to use VBScript with command buttons, see [User administration in MD Client on page 18](#).

3.7.12 Flex table

- ℹ See also [Spreadsheet on page 48](#).

- ☞ Create a Flex table from the **Panel** ribbon tab and **Other displays (Indication group)**.

The Flex (flexible) table offers you more possibilities than the Spreadsheet: each cell can be configured individually. As many channels and values may be displayed as contained in the database, see [Configure database \(active channel number and storage size\) on page 21](#).

Change column width/row height

You may change the *width* of columns or *height* of rows: Drag the border between two cells in the header row or column.

In order to be able to change *all* rows or columns, click in the field in the upper left corner of the table () to mark the complete table and then move the separator between two cells in the header row or column.

Marking cells

- You mark individual cells by clicking with the mouse.
- You mark several cells with the mouse by clicking and moving the mouse with the left mouse key pressed.
- You mark several cells with the mouse by clicking in the upper left cell and in the lower right cell of the required area while holding down the  key.
- You mark several cells with the arrow keys by pressing the appropriate arrow keys while holding down the  key.

Assigning the value to be displayed

Drag the relevant channel from the **Channel selector** window onto a cell and select the required information from the popup menu.

Field type, formatting (Cell tab)

Using the **Cell** tab, you can define whether a cell is to contain text, a number, an image or a button. For numbers the formatting can also be defined. With a button specify the

desired action using the **Action** tab.

Formula (Cell tab)

With the **Numeric (editable)** cell type you can also enter a formula in the **Formula** field similar as in Excel. Specify the cell references using the column letter and the row number: A1 (first row and column) or C4 (third column and fourth row). You enter cell ranges separated by a colon: A1:B27 for the range of columns A and B from the 1st to the 27th row.



Numbers in formulas must be entered with a decimal point; the decimal comma is not permissible.

Action

This tab allows you to specify a script procedure if your project contains a VBScript. The tab is only accessible if the cell is formatted as button. The procedure is executed when clicking on the button. Please read [Using VBScript on page 81](#) for details.

Formulas available for the Flex table

Parameters written in angled brackets (<>) have to be replaced. Also delete the angled brackets. You may write the formulae with small or capital letters.

☞ In several formulae you can specify a range instead of a single value, e.g. AVERAGE(A1:B25) or MIN(A3:B9).

ABS(<value>)

Calculates the absolute value.

ACOS(<value>)

Calculates the angle for the specified cosine.

ACOSH(<value>)

Calculates the inverse hyperbolic cosine.

ADD(<value1>, <value2>)

Adds two values.

AND(<bool1>, <bool2>, ...)

Returns 1 if all arguments are true, otherwise 0. Up to 30 arguments are possible.

ASIN(<value>)

Calculates the angle for the specified sine.

ASINH(<value>)

Calculates the inverse hyperbolic sine.

ATAN(<value>)

Calculates the angle for the specified tangent.

ATAN2(<x-value>, <y-value>)

Calculates the angle to the specified tangent taking the arithmetic sign into account.

ATANH(<value>)

Calculates the inverse hyperbolic tangent.

AVERAGE(<value1>, <value2>, ...)

Calculates the mean of the arguments. Up to 30 arguments are possible.

CEILING(<value1>, <value2>)

Rounds a number to the nearest largest multiple of <value2>. CEILING(4.65, 2) produces 6, CEILING(-2.78, -1) produces -3.

CHAR(<value>)

Returns the character which corresponds to the numerical value passed in the ANSI code.

CLEAN(<text>)

Removes all non-printable characters from the passed text.

CODE(<text>)

Returns the ANSI code of the first character of the passed text.

COMBIN(<value1>, <value2>)

Calculates the number of possible combinations (<value1> over <value2>)

CONCATENATE(<text1>, <text2>, ...)

Links the passed texts. Up to 30 arguments are possible.

COS(<value>)

Calculates the cosine of the specified angle.

COSH(<value>)

Calculates the hyperbolic cosine of the specified angle.

DATE(<year>, <month>, <day>)

Calculates the date in the serial date/time format (Windows format).

DAY(<Date>

Calculates the day of the month for the specified date.

DEGREES(<value>)

Calculates the angle for the specified radian value.

EVEN(<value>)

Rounds to the nearest even integer (INTEGER). EVEN(5) returns 6, EVEN (-2.5) returns -4.

EXACT(<text1>, <text2>)

Compares two texts and returns 1 if they are identical, otherwise 0. Uppercase/lowercase is not differentiated.

EXP(<value>)

Calculates e^{value} .

FIND(<text1>, <text2>, <value>)

Seeks <text1> in <text2> starting at the position <value>. Returns the start position or 0.

FLOOR(<value1>, <value2>)

Rounds a number to the nearest smallest multiple of <<value2>>. FLOOR(4.65, 2) produces 4, FLOOR(-2.78, -1) produces -2.

HOUR(<<time>>)

Returns the hour for the specified time.

IF(<Condition>, <value1>, <value2>)

Evaluates the condition and returns <value1> if the condition is true, otherwise <value2>.

INT(<value>)

Rounds a number to the nearest integer.

INVERSE(<value>)

Calculates the inverse of the specified number ($1/\text{<value>}$).

ISBLANK(<cell>)

Returns 1 if the cell is blank, otherwise 0. ISBLANK(B1) produces 1, when B1 is blank.

ISEVEN(<value>)

Returns 1 when the specified value is an even number, otherwise 0.

ISNONTEXT(<value>)

Returns 1 when the specified value is not a text, otherwise 0.

ISNUMBER(<value>)

Returns 1 when the specified value is a number, otherwise 0.

ISODD(<value>)

Returns 1 when the specified value is an odd number, otherwise 0.

ISREF(<value>)

Returns 1 when the specified value is a cell reference, otherwise 0.

ISTEXT(<value>)

Returns 1 when the specified value is a text, otherwise 0.

LEFT(<text>, <value>)

Returns the first <value> characters of <text>.

LEN(<text>)

Returns the number of characters in <text>.

LN(<value>)

Calculates the natural logarithm of <value>.

LOG(<value1>, <value2>)

Calculates the logarithm of <value1> to the base of <value2>.

LOG10(<value>)

Calculates the decadal logarithm of <value> (logarithm to the base 10).

LOWER(<text>)

Converts text to lowercase letters.

MAX(<value1>, <value2>, ...)

Calculates the maximum of the arguments. Up to 30 arguments are possible.

MID(<text>, <value1>, <value2>)

Returns <value2> characters from the position <value1> in the <text>.

MIN(<value1>, <value2>, ...)

Calculates the minimum of the arguments. Up to 30 arguments are possible.

MINUTE(<time>)

Returns the minute for the specified time.

MOD(<value1>, <value2>)

Carries out a modulo division. MOD(255, 16) produces 15.

MONTH(<date>)

Returns the month for the specified date.

NEG(<value>)

Inverts the arithmetic sign of the argument

NOT(<value>)

Inverts the logical value of the argument.

NOW()

Returns the date and time in the serial date/time format (Windows format).

ODD(<value>)

Rounds to the nearest odd integer. ODD(4) returns 5, ODD(-2.5) returns -3.

OR(<value1>, <value2>, ...)

Returns 1 if one of the arguments is true, otherwise 0. Up to 30 arguments are possible.

PI()

Returns the number pi.

POWER(<value1>, <value2>)

Calculates $\text{<value1>}^{\text{<value2>}}$.

PRODUCT(<value1>, <value2>, ...)

Calculates the product of all arguments. Up to 30 arguments are possible.

PROPER(<text>)

Converts all first letters of the words in the text to uppercase.

RADIANS(<value>)

Calculates the radian value of the specified angle.

RAND()

Produces a random number between 0 and 1.

REPLACE(<text1>, <value1>, <value2>, <text2>)

Replaces <value2> characters with <text2> in <text1> from position <value1>.

REPT(<text1>, <value>)

Produces a text with <value> repetitions of <text>.

RIGHT(<text>, <value>)

Returns the last <value> characters of <text>.

ROUNDDOWN(<value1>, <value2>)

Rounds <value1> down to <value2> places.

ROUNDUP(<value1>, <value2>)

Rounds <value1> up to <value2> places.

ROUND(<value1>, <value2>)

Rounds <value1> to <value2> places.

SECOND(<time>)

Returns the second for the specified time.

SIGN(<value>)

Returns the arithmetic sign of <value>.

SIN(<value>)

Calculates the sine of the specified angle.

SINH(<value>)

Calculates the hyperbolic sine of the specified angle.

SQRT(<value>)

Calculates the (positive) square root.

SQUARE(<value>)

Calculates the square.

STDEV(<value1>, <value2>, ...)

Calculates the standard deviation of the arguments. Up to 30 arguments are possible. n (n-1) is used.

STDEVP(<value1>, <value2>, ...)

Calculates the standard deviation of the arguments. Up to 30 arguments are possible. n is used.

SUBSTITUTE(<text1>, <text2>, <text3>[, <value>])

Replaces <text2> with <text3> in <text1>. If the text occurs more than once, you can specify with <value> which occurrence is to be replaced. If this is not specified, all occurrences are replaced.

SUM(<value1>, <value2>, ...)

Calculates the sum of the arguments. Up to 30 arguments are possible.

SUMSQ(<value1>, <value2>, ...)

Calculates the sum of square roots of the arguments. Up to 30 arguments are possible.

TAN(<value>)

Calculates the tangent of the specified angle.

TANH(<value>)

Calculates the hyperbolic tangent of the specified angle.

TIME(<hour>, <minute>, <second>)

Returns the time in the serial date/time format (Windows format).

TODAY()

Returns the date and time in the serial date/time format (Windows format).

TRIM(<text>)

Removes all multiple and leading space characters as well as any space characters at the end of the text.

UPPER(<text>)

Converts text to uppercase letters.

VAR(<value1>, <value2>, ...)

Calculates the variance of the arguments. Up to 30 arguments are possible. $n(n-1)$ is used.

VARP(<value1>, <value2>, ...)

Calculates the variance of the arguments. Up to 30 arguments are possible. n is used.

WEEKDAY(<date>, <value>)

Returns the weekday for the specified date. With <value> you specify how the week is to be defined: 1 = from Sunday (1) to Saturday (7), 2 = from Monday (1) to Sunday (7), 3 = from Monday (0) to Sunday (6).

XROOT(<value1>, <value2>)

Calculates $\langle \text{value1} \rangle^{1/\langle \text{value2} \rangle}$

YEAR(<date>)

Returns the year for the specified date.

3.7.13 Client database viewer

- 👉 Create a Client database viewer from the **Panel** ribbon tab and **Post-process displays** (Indication group).

With this object you may display up to 50,000 values per channel in a spreadsheet similar to Excel. You may also display the first rows all the time, even when scrolling through the columns: use **Frozen columns** in the **Configure** dialog. The columns starting from the left-hand side up to the number specified are frozen in this case.

If CPU load is critical at high data acquisition speeds, you may specify that this object is not updated during every scan cycle (**Refresh rate**, **Setup** ribbon tab) but with a lower speed instead: **Configure** context menu, **Update** frame. ⚡ **Update viewer** from the context menu is necessary, if you select **Update: Manually** here.

- 👉 Only values available in the internal database may be displayed, see [Configure database \(active channel number and storage size\) on page 21](#).



This object enables you to export certain channels *during* the measurement: mark the channel in question and use context menu **Export channel data** (access rights to export data are required, see [User administration in MD Client on page 18](#)).

3.7.14 Load level visualization

- 👉 Create a Load level visualization from the **Panel** ribbon tab and **Other displays** (Indication group).

Call the **Configuration** dialog with **Configure** from the context menu. The dialog consists of two tables. Drag from the **Channel selector** window the channels you want to monitor to the left one and specify the 100% value in units of this channel, e.g. **800** for a value of 800 $\mu\text{m}/\text{m}$. On the right table you specify the percentages you would like to change the color together with the color which shall be displayed, if this percentage is exceeded. The table must be filled in consecutive order with lowest (negative) values starting at the top, e.g. **-50, -25, 0, +25, +50**.



You can also specify the 100% value in MC Setup in the **Max. prediction** column.

4 DATA ACQUISITION

4.1 Introduction

- 📘 See also [Database handling, export on page 74](#).

The topics in this section explain how to start the data acquisition and which actions are available during the measurement:

- 🔵 [Performing the data acquisition on page 65](#).
- 🔵 Using the [Limit checking on page 67](#).

The preparation for a data acquisition is covered in:

- 🔵 [Project settings on page 20](#), i.e. which server PC and MC Setup database.
- 🔵 [Connecting to a data server \(MD Server\) on page 24](#).
- 🔵 [DAQ settings on page 34](#).
- 🔵 [Introduction on page 37](#).

If this has already been done, you only need to load the project file which contains the relevant information together with the panel files (visualization) and start the data acquisition.

4.2 Performing the data acquisition



You may only start a data acquisition if the data acquisition is running on the server (MD Server), a connection to the server and an initialization in MD Client has been made.

See [Connecting to a data server \(MD Server\) on page 24](#).

Initialize

Initialize the data acquisition with **Initialize** (**Test** ribbon tab).

When starting the data acquisition, the (internal) database may be cleared (see [Local database storage on page 36](#)) and the values from the last snapshots may be fetched from the server and displayed, see [DAQ settings on page 34](#). The latter may also be done manually with **Fetch server snapshots** (**Test** ribbon tab, **Control** group).

Start the measurement

Start the data acquisition with **Start (Control group)**. You may change the **Refresh rate** or the **Storage factor** at any time, provided you have the proper access rights. Both settings are pre-set in the **DAQ settings** dialog, see [DAQ mode on page 35](#) and [Local database storage on page 36](#).



You may either use continuous storage of all or some data or rely on snapshot data, not both.



When switching to a different panel, the currently available data from the internal database is always displayed in Real-time and Post-process graphs.

Fetch server snapshots



The database is always cleared when server snapshot data is fetched. Define in the **DAQ settings** dialog that the database is saved before clearing if you want to keep data in this case, see [Local database storage on page 36](#).

Snapshot data is normally read in when initializing. However, if the database was cleared manually, use **Fetch server snapshots (Control group)** to read-in again the snapshot data from the server.

You can also manually save actual values from all active channels by clicking on **Manual snapshot (Test ribbon tab, Test settings group)** if no continuous storage is active and **Allow manual snapshot** is activated in the DAQ settings, refer to [DAQ settings on page 34](#). Also with this function the proper access rights must be assigned.

Server-side triggers

Trigger actions defined as MD Client trigger (**Add MD Client/MD Trend trigger** on MD Server) may be fired from any MD Client with this dialog. Select the required trigger and click on **Fire trigger**.

Status panel

Use the **Status panel** menu item (**Test ribbon tab**) to open the **DAQ status** window and check the following status information:

- Status of the MD Server DAQ
- Status of the connection to and initialization of MDS and whether a data acquisition on the client is running
- DAQ mode chosen on MD Server

- Number of snapshots
- Sample rates
- Database used and Test name (after I)

Possible LED states

Server DAQ LED	Explanation
gray	Data acquisition has been paused on MD Server
green	Data acquisition is running on MD Server but stopped on the client
green blinking (heartbeat)	Data acquisition is running on both MD Server and client. The frequency of the blinking is determined by the selected Refresh rate (Test settings group) .
yellow	No data acquisition is running on MD Server (or client)
red	A change has been made on MD Server, a new connection and initialization is required on the client (after initializing MD Server)

Limit checking

Calls up the limit checking dialog where you can see whether and how often a certain limit has been exceeded or undercut. See also [Limit checking on page 67](#).

4.3 Limit checking

👉 See also [Finding channels \(search functions\) on page 73](#).



These settings may only be changed, if proper user access rights are defined, see [User administration in MD Client on page 18](#).

For all channels in the pre-selection list upper and lower limits may be monitored. The values for the limit levels are pre-defined in MC Setup, you may however change these values here (changed values are shown with bold characters). Activate the box in the **Check** column to enable the monitoring. The background color in the fields for upper and lower level indicate whether the limit condition is still fulfilled or whether it has been fulfilled since the start of the acquisition on the client (the color may not be changed, an explanation for the colors is given at the bottom of the dialog). Additionally **Limit exceeded!** will be shown blinking in the main window toolbar on the bottom right-hand side as soon as a limit has been exceeded once.

☞ Limit checking may only be activated if at least either **Upper level** or **Lower level** have an entry unequal to zero and the upper level is higher than the lower level.



Click on the **Limit exceeded!** message displayed in the main toolbar (after having such an event once) to switch to the next panel showing the corresponding channel.

If you move the mouse cursor over a channel in the dialog, a tooltip appears showing information on the limit condition which has occurred last, e.g. **Last limit trip for channel <xx>: Upper limit at <date/time>** and how often the limit occurred: **Current value**.

Check prediction line: enable this field, if the prediction line defined on MD Server shall be monitored in a graph. Additionally enable **Show prediction line** in the plot configuration, see [Real-time graph on page 47](#) or [Post-process graph on page 49](#).

Tolerance %: this entry enables you to display a tolerance band around the prediction line. The tolerance band is drawn as two parallel lines with the width as positive and negative shift, if you activate **Show tolerance band** in the plot configuration, see [Real-time graph on page 47](#) or [Post-process graph on page 49](#). Specify here the width of the tolerance band as a percentage of the **Max. prediction**.

☞ Prediction line checking may only be activated if a x channel is defined for the channel in question in MC Setup.

See also [Check for certain values in two associated channels \(Prediction line\) on page 69](#) for an explanation of the operation principle and [User defined prediction line on page 70](#).

Max. prediction: this value is used as full scale value for the channel. It is derived from the setting in MC Setup. The value stated here is also used as reference for the **Tolerance %**.

VBScript actions

☞ Be careful when assigning a VBScript procedure to a limit check: as no hysteresis is defined, the procedure is run every time the condition is met. If the signal is close to the limit specified, a small noise level triggers the procedure several times.

If you would like to trigger an action on the server, use a VBScript procedure monitoring a limit (`MDCClient.TriggerState`) and a *server-side trigger*.

Options

- **Auto popup:** If a limit is exceeded the dialog pops up (if not already shown).
- **Show enabled channels:** Restricts the display of channels to the activated ones.
- **Show channels exceeding limits:** Displays only channels which are currently exceeding a limit. If you activate additionally **Include once exceeded**, channels having exceeded a limit in the past are displayed too.
- **Reset status:** Resets all indications (background colors) and the status whether a channel has been exceeded in the past.
- If you want to exchange limit check definitions with MD Server, or another MD Client, use  (**Save**). On opening, only definitions from channels available in the pre-selection are imported.

4.3.1 Check for certain values in two associated channels (Prediction line)

- See also [User defined prediction line on page 70](#), [Creating panel\(s\) from a layout descriptor \(CSV\) file on page 40](#).
- 👉 Several settings for this trigger type (reference x channel, max prediction for the x channel) may only be defined on the MD Server PC in MC Setup.

This type of trigger is available for all measurement channels and for computation channels. In contrast to the standard single value trigger (limit checking), this trigger monitors two channels (a data pair) in reference to a straight line through zero. It can be used, for example, with force-strain measurements if a certain strain value is to be monitored depending on the force level applied. As soon as the strain level at a certain force level is exceeded, an event is triggered. Of course, an event may be triggered also if the strain value falls below a certain value depending on the force level.

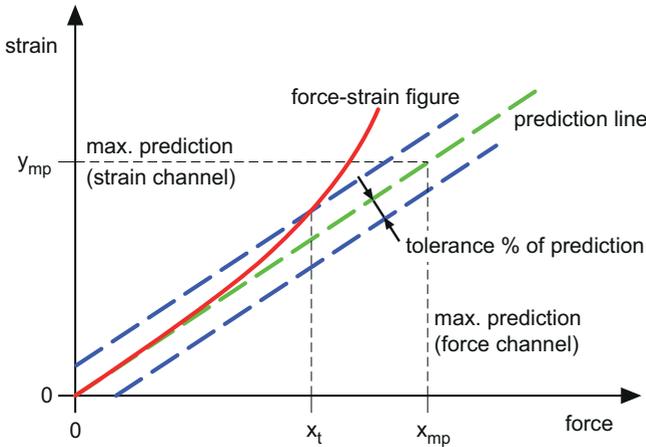


Fig. 4.1 Example of a force-strain measurement with prediction line triggering

The function used is called *Prediction line* and may be pre-defined in MC Setup with columns **Max. prediction**, **Tolerance % of prediction** and **Ref. x channel**. The values for **Tolerance % of prediction** and **Max. prediction** may be changed in MD Client. When using trigger condition **Value > predict. line** for the figure shown above with Max. prediction of the strain channel = y_{mp} and Max. prediction of the force channel = x_{mp} , a trigger is fired at force level x_t . The evaluation is continued (and a trigger is fired if necessary), if values above Max. prediction occur. However curve plots are restricted to the Max. prediction value, there will be no values plotted higher than this.

- ☞ In former versions of catman Enterprise *Max. prediction* was named "100%" or "Physical 100%" and *Tolerance % of prediction* was named "Percent of prediction". Additionally the prediction line had to be entered using slope and offset values, which is now obsolete.

4.3.2 User defined prediction line

- 📘 See also [Check for certain values in two associated channels \(Prediction line\) on page 69](#), [Creating panel\(s\) from a layout descriptor \(CSV\) file on page 40](#).
- ☞ User defined prediction lines can only be defined in CSV files and are created by opening such a layout descriptor file.

In contrast to a standard prediction line which is a straight line through zero, the user defined prediction line may consist of up to 32 value pairs. On the other hand these

prediction lines are only *displayed*, there is no trigger action if values appear above or below these lines.

How to proceed

1. The value pairs have to be typed into a row with the graphic object where the user defined prediction line shall appear. Use one row per prediction line.
Up to 32 user prediction lines are possible, you may however only define as many prediction lines as curves are defined for the graph.
2. Type in the value pairs in columns **x1/y1** up to **x32/y32**.
At least two pairs are required. The entries must use the same number for x and y and start with the first entry, e.g. enter values in **x1, x2** and **x3** as well as in **y1, y2** and **y3**. You may then delete all other columns, in this example columns **x4** to **x32** and **y4** to **y32**.

5 TOOLS

- See also [Using VBScript on page 81](#).

This section contains information about handling and further processing your stored data:

- [Database manager](#), [Database editor](#),
- [Export](#) and conversion of data ([catmanAP](#)),
- [Diagnosis](#) and [troubleshooting](#),
- How to use the [search functions](#).

5.1 Finding channels (search functions)

- See also [Pre-select channels on page 25](#).

The search facility is implemented in several dialogs: The **Channel pre-selection**, the **Channel selector** and the **Limit checking** dialog. With the latter two use  to display all channels again *after* a search has restricted the channels shown to those found in the search. In the **Channel pre-selection** just click on any group.

Type in the search phrase or choose from a previous one if the drop-down field is available. Use % or * as wild cards for several characters and _ or ? as wild cards for single characters. You may use wild cards more than once in the search string as in %nnel??04%. Without any wild card character, an exact match is searched. If the drop-down field has too many entries, click on  (**Clear search list**).

Click on  to start the search.

Notes

- The search is not case-sensitive.
- A separate search database is created for each project.

How to find a panel object displaying a certain channel

In the **Channel selector** and the **Limit checking** dialog mark the required channel and click on . The panel containing a visualization object for the marked channel is shown. If more than one panel exists, a popup dialog for the panels in question lets you choose which panel to display.

Background information, clear search database

To enable a search, a database is working in the background. This database contains all panel objects which have ever been defined. It might therefore be necessary to clear that database after having deleted many objects, especially if you have the impression the search process takes a long time. Use **Clear search database** (**Project** group on the **Setup** ribbon tab) to rebuild this database and include all currently loaded panels.

5.2 Database handling, export



Database editing and exporting data can only be done, if proper user access rights are defined, see [User administration in MD Client on page 18](#).

How to define size of the database is covered in [Configure database \(active channel number and storage size\) on page 21](#). The general data storage settings (which data to store) are defined in **DAQ settings** dialog, refer to [DAQ settings on page 34](#).

Database (channel) manager

Click on **Database manager** (**Tools/script** ribbon tab) to call up the **Database channel manager** window. It shows you all available channels, how many values for each channel are stored, when the last values have been stored (**Modified**) and for computations which type of computation is used. You may also export data to Excel (click on ) or in catman format, either selected or all channels from the **Database channel manager** window. See also Export data below, [Database editor on page 75](#).

If you want to access data, search through or edit data, use the **Database editor** (click on )

Export data

Click on **Export data** (**Setup** ribbon tab, **Database** group) to export data to Excel or in catman format, either selected or all channels. You may also export data from the **Database channel manager** window with .



Excel has to be installed, otherwise no export in Excel format is possible.



After exporting data in catman format you can call up catmanAP (**Open catmanAP project**) and either export into several other formats or perform additional computations, create more visualizations etc.

See also [Open catmanAP project on page 75](#).

Delete all/oldest values

Delete all values deletes *all values from all channels* stored so far.

Delete oldest values allows you to delete rows containing older data, i.e. starting with the first measurements stored to the database. You must specify the number of rows to delete in the subsequent dialog.

Database editor

Call the **Database editor** via **Database manager** (**Tools/script** ribbon tab) and . The **Database editor** enables you to see all stored values in table form. Use the Client data-base viewer to show specific channels from the database on a panel, refer to [Client data-base viewer on page 63](#).

Hide/show columns

Hide marked columns with   shows all columns again.

Find values, channel information

Using  (Find row) you can search through individual channels for certain values.

 (Channel information) shows the traceability data of the selected channel, i.e. all settings concerning the data acquisition like bridge type, excitation voltage, scaling or zero values.

With Σ (Update statistic) you may update the statistical values shown, e.g. after changing values.

Edit values

If you want to change a value, just type in a new one.

5.3 Open catmanAP project

This menu item starts catmanAP in Analysis mode and the **Test Explorer** tab is displayed. The Test Explorer provides an overview of the tests and measurement data stored on your PC. Similarly to the Windows Explorer, it displays the folders on your PC on the left, the tests/files in the selected folder in the center, and the already loaded tests on the right. You use it to specify which tests you want to load for further processing.

How to load a test file

1. Select a folder on the left side in the **Search directories** frame where the structure of all files on the server PC is shown.
The middle section displays all files contained in this folder.
 Set up folders as *Favorites* for quick access: From the folder's context menu choose **Add to favorites**. You can then access folders in the network or deep nested folders with one click.
 2. Select a file and drag it to the right side into frame **Analysis project**.
If necessary the file is converted, e.g. Fast trigger data, to a binary format and loaded.
 3. Switch to tab **Visualization** for display or tab **Computations** for further calculations.
-  catmanAP is a separate program and contains an in-depth online help system. Please refer to this help for further information on catmanAP.

5.3.1 Find files (search functions in catmanAP)

In the middle frame of the Test Explorer you can set various filters so that, for example, only files containing the specified character string, are displayed. As test parameters are not used in catman Enterprise you cannot use this option.

Search sub folders also displays files in sub-folders of the folder selected on the left. In this case the path is displayed below the files.

Display file comments displays the comments in the *.BIN files below the files. Select a file and click on the **Channels** tab at the bottom to display the channels with various information like number of samples, sample rate etc. contained in the file.

Filter by file type

In the selection field in the middle Panel specify which files you want to see in the file selection list. You can use one of the entries here or enter your own file extension, e.g. **.TXT** to only display text files. Specify the file extension **.BAK** to be able to load files which have arisen due to a power failure occurring during periodical saving and where only the backup file T_DATABACKUP.BAK is available.

Use search filters

You can use search filters to search for specific files or test parameters, or to search for specific channels within a file. The search box may contain * or ? as wildcards.

1. Search for files

Enter the character string you are looking for in the search field and press  (Return), or click on . Only files matching the search box criteria are displayed.

If so selected, this also applies to all files in sub-folders.  clears the input field.

2. Search for channels

Select a file on the **File selection** tab. Then open the **Channels** tab to display the channels in the file. Enter the character string you are looking for in the search field and press  (Return), or click on . Only channels containing that character string are then displayed.

 clears the input field.

5.3.2 Load additional tests in catmanAP

The **Use channels automatically** option assigns the *first* test loaded a special role: It then acts as a template. When you load an additional test with the option enabled, catmanAP performs the following actions:

- All the computations you created from the first test by way of the **Algebra**, **Frequency analysis**, **Filter**, **Strain gauge stress analysis**, **Curve operations**, **Interpolation**, **Peak values** or **Class counting** tabs are also generated for the new test if the channel names match.

 Computations using data from multiple tests cannot be generated automatically.

- All the channels (and computations) of the first test already displayed in graph objects and existing in the new loaded test under the same channel name are likewise displayed. You may choose to create new panels for the new data or display the data in the same objects as the first test.



You also get the same functionality when saving a project without references to the test data. When you open this Analysis project and load measurement data into it, they are also computed and displayed if the channel names match.

5.3.3 Remove or delete tests in catmanAP?

When *removing* a test (**Remove test** in the **Analysis project** group) the test plots displayed in graphs may be deleted as well as computations which use these test data. If

you decide not to delete computations and plots, the defined plots will be re-displayed and the computations carried out as soon as you load a new test with matching channel names.

When *deleting* a test, the test with *all measurement data* is deleted from the folder; the deletion must therefore be first confirmed. Deletion is *only* possible via the **Delete test** context menu for the test marked in the test selection (central frame with the **File selection** tab).

5.4 MD Client diagnosis

MD Client log

Open the log file with **Show (MD Client log** group on the **Diagnosis** ribbon tab). This shows events with three levels: information () , warning () and all errors () , which occur during operation, e.g. if a channel defined for a panel object could not be found. It is possible to edit the log messages, add comments and specify an auxiliary file with additional information or data. However the original log level and log message will always be visible together with date and time of the event.

The information given in the **Message** column is useful if problems arise during a test: the cause and history of warnings or errors should point to the problem in question. Start to search for the last user log-in and then check where the problem originated.



Use **Asc** or **Desc** under **Sorting (Edit** group) to sort the entries in ascending or descending order in the **Date/Time** column.

Communication log

Preferably the communication log items are for skilled users. You may however activate logging if communication problems occur, see also [Communication log on page 35](#) in the DAQ settings. In contrast to the option in the **DAQ settings** dialog, you may activate and deactivate the log here only temporarily.

Usually a communication log is used by HBM personnel when solving interface problems. This might be necessary if you contact the HBM Technical support, see [Technical support on page 14](#), otherwise we recommend not to enable **Log communication on/off** as this might slow down performance.

If activated, the communication is logged in a circular buffer (starting after the initialization). Therefore the log may prove helpful for tracking down problems. If the default

setting of 50,000 entries (**Number of lines**) is not enough, increase the size with **Configure log size**.

5.5 Troubleshooting tips

In principle three different error sources are to be checked:

1. Licensing problems
If during start up, when initializing or during the measurement the required license numbers are not found, an error message indicating this is issued. Please check topic [Licensing on page 12](#) whether all settings are made as required.
2. Communication problems
If you cannot connect to the data server, check the Ethernet settings and try again. Check also whether the server PC is visible in the network via Windows. Contact the HBM Technical support, see Technical support on page 14, if none of these hints solve the problem. You may use the communication log entries (**Show, Communication log** group, **Diagnosis** tab) to trace such problems, however, these menu items are for skilled users. Usually these menu items are used by HBM personnel when solving interface problems, otherwise we recommend not to activate the logging.
See also [MD Client diagnosis on page 78](#).
3. Measuring problems
An example would be, if a channel is no longer available, because it was deactivated in MD Server. In this case, the channel shows no longer measured values but instead a high value, i.e. -1,000,000. The value to be shown may be specified in MD Server: **Server options** on the **Setup** ribbon tab, **Signal overflow as** on the **General** tab.
If the **Continuous DAQ** mode is not available, no circular buffers are defined on MD Server.

Try to find out into which category your problem falls and use the appropriate program part to solve it.

6 USING VBSCRIPT

-  See also MD Client VBScript help (“MDClientScriptRef.htm” in folder “MDCIScriptHelp” in the catman Enterprise installation folder).
-  The VBScript engine has been changed in version 5.0 of catman Enterprise. However on loading an older VBScript project the code is converted. Please save the script under a different name after this conversion. We recommend you check the new code whether adjustments have to be made.
-  Access to the script functions requires proper user access rights, see [User administration in MD Client on page 18](#).

The **Script control** group in the **Tools/script** ribbon tab allows you to create or load VBScript code with procedures and functions which are executed at certain events. Only procedures or functions of a loaded script may be executed.

-  A good understanding of VBA is essential when using this feature. It is sufficient if you have already written macros in Word or Excel (recorded macros are not comparable). Otherwise we recommend that basic knowledge is first acquired through appropriate literature, e.g. from Microsoft Press. The VBScript help contains in-depth information about how to write a script and which commands are available.

As soon as a script is loaded, you may e.g. define command buttons which will execute procedures from this script. These are defined with the **Configure** context menu, see [Command button on page 54](#).

It is however not necessary to define buttons, it is also possible to define other starting conditions for procedures from within the VBScript editor.

-  If you specify a script in the project settings, this will be loaded automatically on start up. This saves you having to load the script manually.
-  There is also the possibility to have command buttons on a custom designed tab in the ribbon. This tab is then available with all panels as soon as the script is loaded. See [Custom commands with VBScripts \(custom ribbon tab\) on page 84](#).

6.1 The built-in VBScript editor

The VBScript editor provides you with an interface for editing. On the right-hand side the object library, a code building aid, is displayed. It contains in several categories the most important objects and methods for access to the program:

- catman objects: I/O interface, DB interface and General
- MD Client object
- GUI manager object

In each category you will find several descriptions for certain actions. Double-click on one description to insert the corresponding script command into the code on the center window. If the command uses parameters you must specify those. Parameters are indicated by pointed brackets: **<Parameter>**. Replace the pointed brackets as well.

- ☞ Please observe that not all commands are accessible via one of these categories. The MD Client VBScript help ("MDClientScriptRef.htm" in folder "MDCIScriptHelp" in the catman Enterprise installation folder). explains *all* MD Client commands and their parameters. Additionally the ActiveX reference (catInterface_Help.chm in the installation directory) lists and explains *all* catman commands and parameters.

Basic procedure

1. Create a new function or subroutine via **New (Procedures group)**. A subroutine or function is also called a procedure. You may use more than one code module in a VBScript project, each module consisting of several functions or subroutines.
2. Insert the code necessary to perform a specific action.
3. If required, assign via **Automatic procedure execution (Procedures group)** the execution time point, e.g. **After DAQ start**. Mark the subroutine (procedure) you wish to assign to a certain execution time point, next mark the execution time point, e.g. **After DAQ start**, then click on **Assign**.

General rules

- All variables are just defined with `Dim` (as variant), there is no type declaration necessary.
- Global variables may be defined before the code section (before `Sub xxx`) with `Public`.

You may test the script with  (**Execution group**).

- ☞ Do not forget to save the script project (which includes all script modules)! If this script is necessary for the project, include the VBScript project file into the project settings (**Project settings** in the **Setup** ribbon tab).

6.2 Example (VBScript)

The following VBScript example compares the measured strain with the predicted strain and changes the color of a visualization object accordingly.

Procedure "ControlChannel"

```
Public idxLoad
Public idxStrain

Sub ControlChannel()

Dim BufStrain
Dim BufLoad
Dim UpperPrediction
Dim LowerPrediction

With catman.IO
    If idxFlag <> 1 then
        idxStrain = .GetChannelFromName("Strain")
        idxLoad = .GetChannelFromName("Load")
        idxFlag = 1
    End If

    'Read the most current value from strain and ref. x channel
    (load)

    BufStrain = MVal(idxStrain, -1)
    BufLoad = MVal(idxLoad, -1)

    'Calculate upper and lower prediction level

    UpperPrediction = 985 * BufLoad + 10
    LowerPrediction = 985 * BufLoad - 10

    'Compare measured and predicted strain and switch to cer-
    tain channel if condition is true. Indicate status of
    limit trip level with back color of text label.

    If BufStrain > UpperPrediction then
        MDClient.ShowPanel "UpperTrigger"
        GUIManager.SetBackColor "TriggerLabel", vbRed
    Else
        GUIManager.SetBackColor "TriggerLabel", vbGreen
    End If
```

```

'Compare measured and predicted strain and switch to cer-
tain channel if condition is true. Indicate status of
limit trip level with back color of text label.
If BufStrain < LowerPrediction then
    MDClient.ShowPanel "LowerTrigger"
    GUIManager.SetBackColor "TriggerLabel", vbRed
Else
    GUIManager.SetBackColor "TriggerLabel", vbGreen
End If
End With

End Sub

```

Assign **After DAQ scan** as execution time point via **Automatic procedure execution (Procedures group)**.

6.3 Custom commands with VBScripts (custom ribbon tab)

Procedures which shall be available as soon as a project is loaded may also be accessed from a separate tab in the ribbon: **Custom commands**.

Preparations

First the file "VBCUSTOM.INI" has to be created in folder "C:\ProgramData\HBM\MDServer". Access the hidden folder ProgramData by typing %ProgramData% into the path entry field of a File Explorer window. This file specifies which buttons to use with what script. Make sure the file is in format UTF-8 without BOM (not UTF-8Y).

Creating VBCUSTOM.INI

Use a plain text editor, e.g. MS Notepad, and create the file as text file. The first line must be [VBSCRIPT], the next line specifies how many buttons are defined. After that each button is defined with the procedure or function connected, the caption, image and a tooltip text. The images used *must* reside in a subfolder of the installation folder of catman Enterprise called "BITMAPS". Images must be in icon format (*.ICO).

All functions and procedures must reside in one script which has to be loaded beforehand, e.g. when opening a project. In line FUNCTION_X you specify the corresponding function or procedure name.

Example

```
[VBSCRIPT]

FILECOUNT=2

FUNCTION_1 = MyFunctionNo1
CAPTION_1 = This is No 1
IMAGE_1 = FunctionNo1Picture.ico
TOOLTIP_1 = Start MyFunction No 1

FUNCTION_2 = MyProcedureNo2
CAPTION_2 = This is No 2
IMAGE_2 = ProcedureNo2Picture.ico
TOOLTIP_2 = Start Procedure No 2
```

VBScript for a custom ribbon tab

The functions or procedures are written as usual. Then include the script into the [Project settings on page 20](#). As an example, a script which starts program Notepad from the ribbon is given.

Example

```
Sub StartNotepad()

    Dim objWSH

    Set objWSH = CreateObject ("WScript.Shell")
    objWSH.RUN "Notepad.exe"
    set objWSH = Nothing

End Sub
```

Save the script, include it into the MD Client project and state e.g. `FUNCTION_1 = StartNotepad` in the `VBCUSTOM.INI`.

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