ibaCMC

Condition Monitoring Center

Manual

Issue 1.1

Measurement and Automation Systems

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Certification

The device is certified according to the European standards and directives. This device corresponds to the general safety and health requirements. Further international customary standards and directives have been observed.

Issue	Date	Revision – section / page	Author	Version SW
1.1	30.10.2015	Change of product name		

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1 About this manual

This manual describes the use of the software ibaCMC Condition Monitoring Center.

1.1 Target group

This manual addresses in particular the qualified professionals who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded to as professional if he/she is capable of assessing safety and recognizing possible consequences and risks on the basis of his/her specialist training, knowledge and experience and knowledge of the standard regulations.

1.2 Designations

The following designations are used in this manual:

Action	Designations
Menu command	“Logic diagram” Menu
Call of menu command	“Step 1 – Step 2 – Step 3 – Step x” Example: Select “Logic diagram – Add – New logic diagram” menu
Keys	<Key name> Example: <Alt>; <F1>
Press keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Button name> Example: <OK>; <Cancel>
File names, Paths	“File name“, “Path” Example: “Test.doc“

1.3 Used symbols

If safety instructions or other notes are used in this manual, they mean:

⚠ DANGER

The non-observance of this safety information may result in an imminent risk of death or severe injury:

- By an electric shock!
- Due to the improper handling of software products which are coupled to input and output procedures with control function!

⚠ WARNING

The non-observance of this safety information may result in a potential risk of death or severe injury!

⚠ CAUTION

The non-observance of this safety information may result in a potential risk of injury or material damage!

Note

A note specifies special requirements or actions to be observed.

Important note

Note if some special features must be observed, for example exceptions from the rule.

Tip

Tip or example as a helpful note or insider tip to make the work a little bit easier.

Other Documentation

Reference to additional documentation or further reading.

Example

Configuration and application examples for a better understanding

2 Introduction

The ibaCMC Condition Monitoring Center is a powerful server-based software solution to use condition monitoring applications in combination with ibaCMU-S Condition Monitoring Units (CMU) and to monitor and analyze the corresponding plant components.

The ibaCMC is based on a Microsoft® SQL Server data base system and the Microsoft® Internet Information Server for the application itself.

2.1 Server system requirements

Software:

- ❑ Microsoft® Windows Server® 2012 64 Bit
  - incl. Internet Information Server
  - incl. .NET Framework 4.0
- ❑ Microsoft® SQL Server® 2012
  - incl. SQL Server® Reporting Services
- ❑ Microsoft® licenses required
  - User CAL for every user accessing the ibaCMC both on Microsoft® Windows Server® or Microsoft® SQL Server®
  - Device CAL on SQL Server® for every user connected to the ibaCMC

Hardware:

- ❑ Intel® Core® i7 or Xeon® CPU
- ❑ 8 GB DDR RAM
- ❑ 1 TB SAS hard disk (RAID configuration, if needed)
- ❑ 2 network adapters (if CMUs and office PCs are in different TCPIP subnets)

2.2 Quick start

The following approach is recommended for a new condition monitoring project:

- ❑ Start with creating the required system users and roles (chapter 8.3 “User administration“)
- ❑ Do the plant configuration (chapter 10 “Plant configuration“)
- ❑ Create the CMUs and connect them to the plant (chapter 8.2.1 “CMU configuration“)
- ❑ Define scheduled tasks and get the data from the CMUs (chapter 7.5 “Task scheduler“)
- ❑ Set up the threshold values for alarming and define reports (chapter 7.9 “Level adjustment“ and 7.8 “Report configuration“)
- ❑ Define clean up strategies (chapter 7.6 “Clean-up“)

2.3 Login

To use the ibaCMC, a web browser and a Microsoft® Windows® operating system is needed (Windows® CE, Mac OS® and Linux are not supported).

The following web browsers are currently supported:

- ❑ Microsoft® Internet Explorer® 9.0 and higher
- ❑ Mozilla® Firefox®
- ❑ Google Chrome®

Microsoft® Silverlight® plugin needs to be installed in the web browser. It is recommended updating this plugin to the most recent version (5.1. is the minimum requirement). If you do not know which version is installed on your computer, contact your system administrator.

Open the internet browser and enter the URL of the ibaCMC in the address bar.

ibaCMC uses the secure https protocol. (Example: https://localhost).

After entering the URL, the login screen of the ibaCMC will appear.

Figure 1: Login screen

Before you start, please make sure your browser zoom is set to 100 % to see all ibaCMC windows correctly.

By using the browser full screen mode you can achieve the best working performance. If you use the Microsoft® Internet Explorer®, just press <F11> to switch to full screen mode. To leave the full screen mode, press <F11> again.

If you operate the ibaCMC on a company internal server which does not use an officially registered security certificate, the following message might appear in the browser window:

“There is a problem with this website’s security certificate.”

In this case, click “Continue to this website (not recommended)”.

Enter the user name and password for the ibaCMC and click <OK>. You can also choose the “Keep me signed in” option. The provided user authentication data will be stored by the web browser and will be used automatically when you enter the website the next time.

2.4 User interface

After the successful user authentication, the main screen will show up in the browser window.

Figure 2: ibaCMC start main screen

The most important parts of the main screen are the navigation window on the left, the dock on the bottom and the main desktop area in the middle (showing the iba logo in the background). You can quit the software by clicking the “Exit” button in the dock and selecting “Exit” in the popup menu.

Figure 3: Exit application

The Exit menu also provides additional functionality:

Lock	lock the screen without exiting or closing windows (password required to unlock)
Logout	logout from the system (all open windows will be closed)
About	show information screen below (useful to determine the software version currently installed)

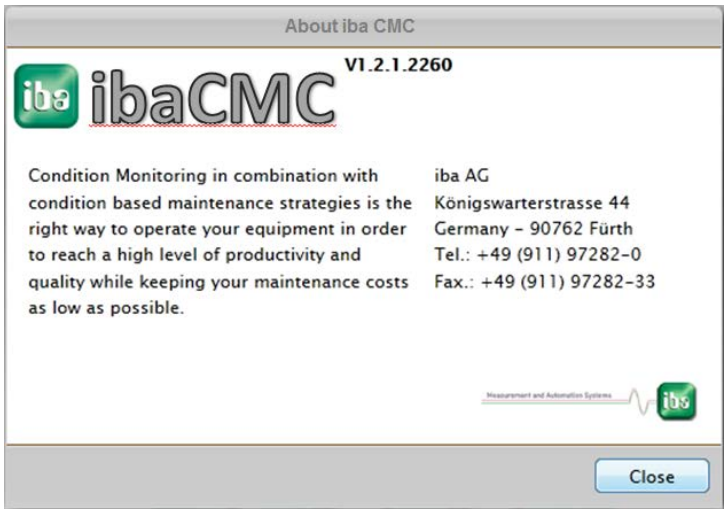


Figure 4: About ibaCMC

2.4.1 Navigation area

The navigation area is used for plant configuration and navigation. In case you need more space for the main desktop area, the navigation area can be minimized by clicking on the small arrow (on the top right corner of the navigation window).

Figure 5: Minimizing the navigation area

The navigation area provides the plant tree, the analysis tree, the notifications list and the plant configurator.

It also contains a path indicator directly above the plant tree which is useful when you have configured large plants because you can use the path indicator for quick navigation.

2.4.2 Dock

The dock is used to select the main applications of the ibaCMC by clicking on the specific icons.

Figure 6: Dock

You can rearrange the icons of the dock by left-clicking on them and dragging them while keeping the mouse button pressed.

Figure 7: Rearranging dock icons

In the dock, you can also switch between different open windows. To switch the window, click on the corresponding icon. The currently open windows are marked with a red shadow in the dock.

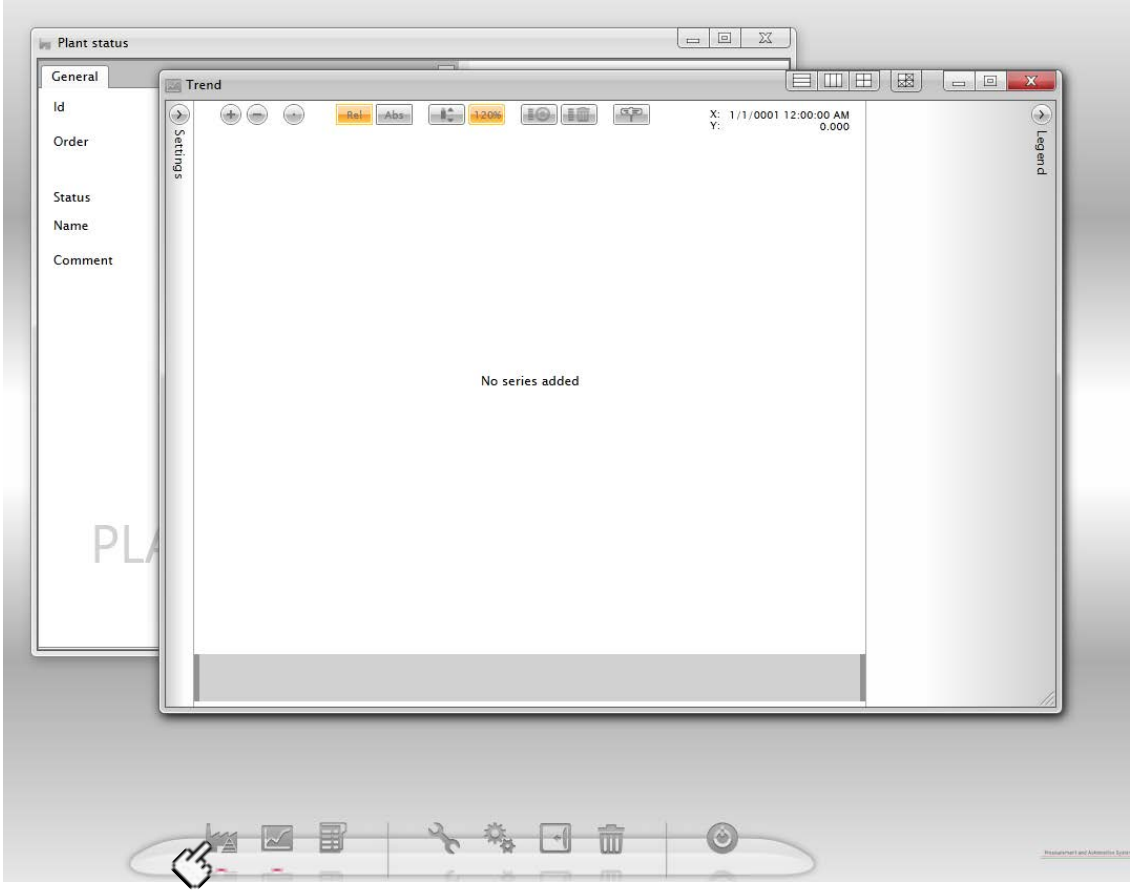


Figure 8: Switching between open windows

2.4.3 Drag & drop

ibaCMC supports drag & drop functionality. If drag & drop operation is allowed in the specific context, you will see a small “+” sign in the top left corner of the small information box near your mouse cursor.

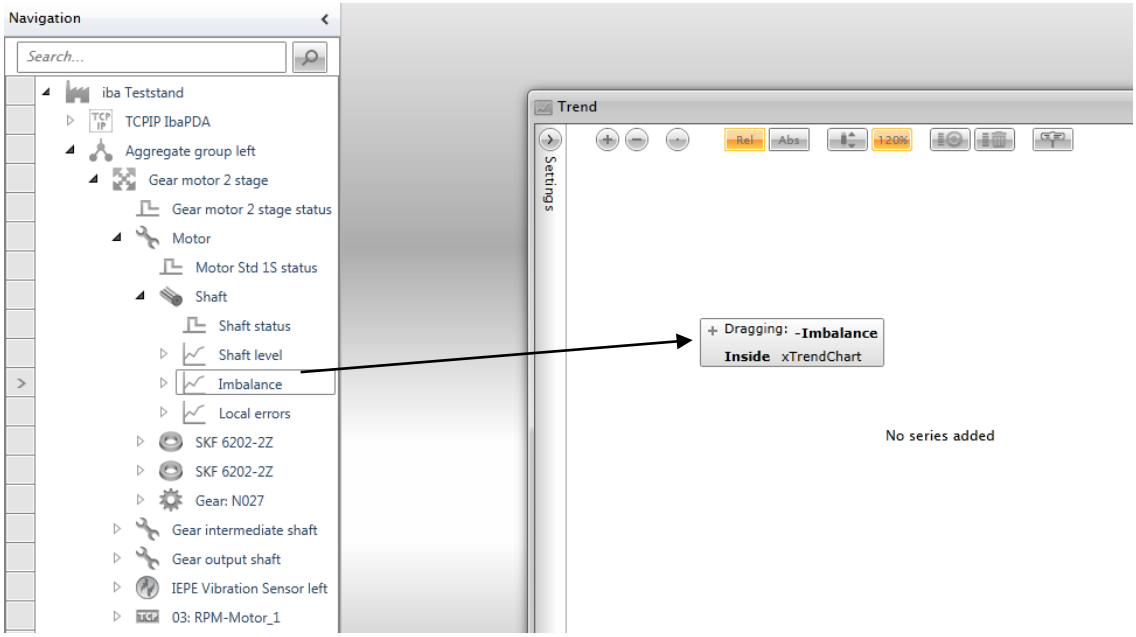


Figure 9: Drag & Drop

In case drag & drop is not allowed, the small red prohibition sign shown below will appear.

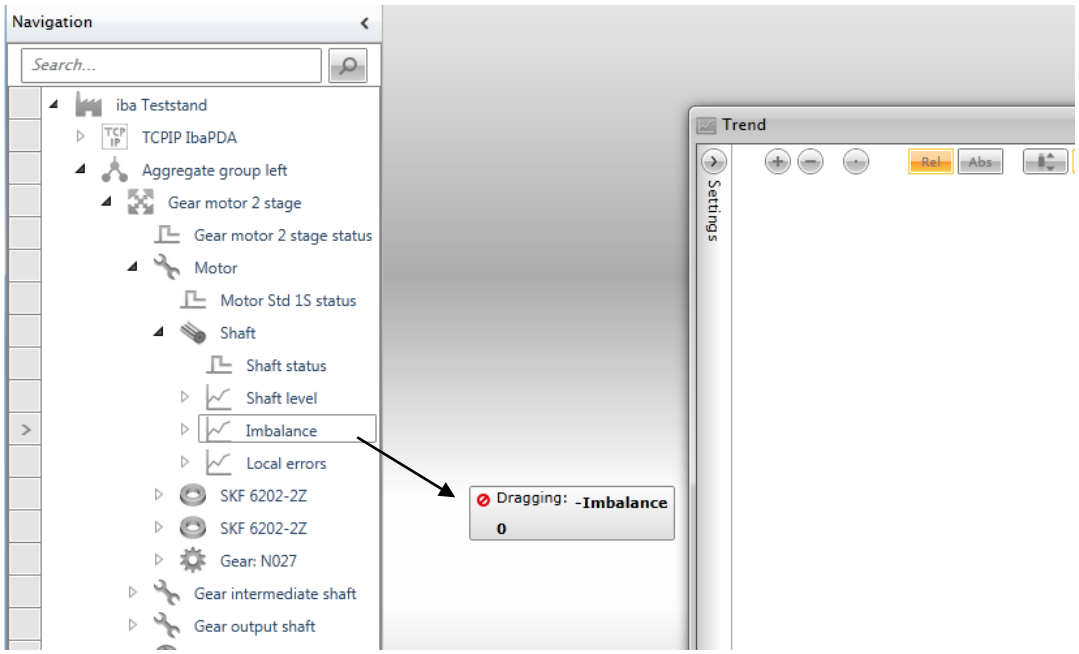


Figure 10: Drop not allowed

3 Plant Status Viewer

The Plant Status Viewer provides a short overview of the plant's current condition. To open the Plant Status Viewer, click on the plant status icon in the dock.

Figure 11: Opening the Plant Status Viewer

To see the current status of a plant, aggregate group, etc., click on the corresponding node within the plant tree on the left.

The general information about the selected plant item (name, comment, stored image) will be indicated. The status will be indicated in color; yellow means warning, light red means alarm and dark red means acute alarm.

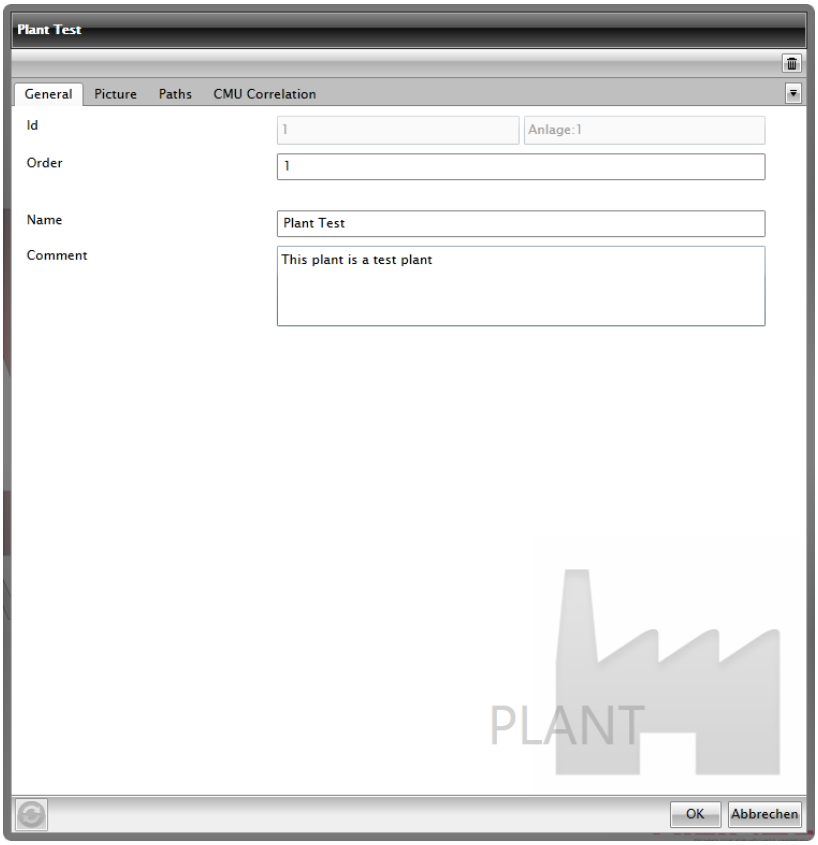


Figure 12: Plant Status Viewer

The current status is displayed by small icons in the plant tree.

The plant has no current status yet (e.g. there are no trend values yet)

The plant has trend values, but no warning or alarm status yet

The aggregate group or its sub-components have reached warning status

The plant or its sub-components have reached alarm status

4 Trend Viewer

The trending functionality is one of the most powerful features in the ibaCMC. The Trend Viewer window will be opened by clicking the corresponding icon in the dock.

Figure 13: Opening the Trend Viewer

An empty Trend Viewer window will be displayed now.

4.1 Adding trends

Drag a trend (virtual trends and status trends) from the plant tree to the Trend Viewer window. You can also drag multiple trends at the same time to the Trend Viewer window, e.g. by pressing and holding the <Shift> or <Ctrl> key.

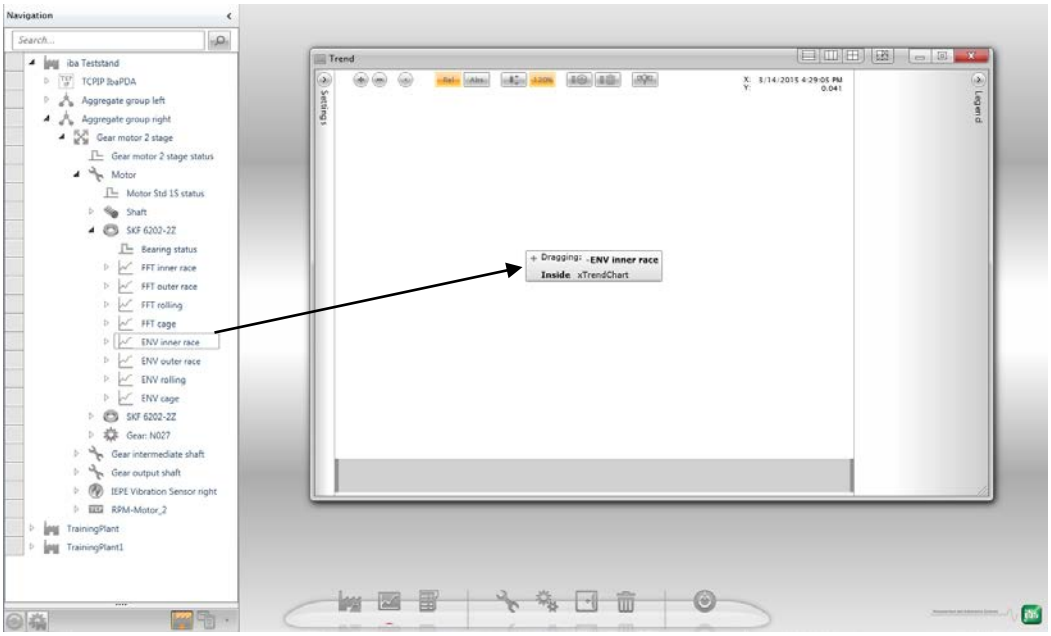


Figure 14: Adding Trends

The trend will then be shown in the trend window.

If a component (e.g. bearing) is dragged in the Trend Viewer window, all related trends will be loaded and shown simultaneously.

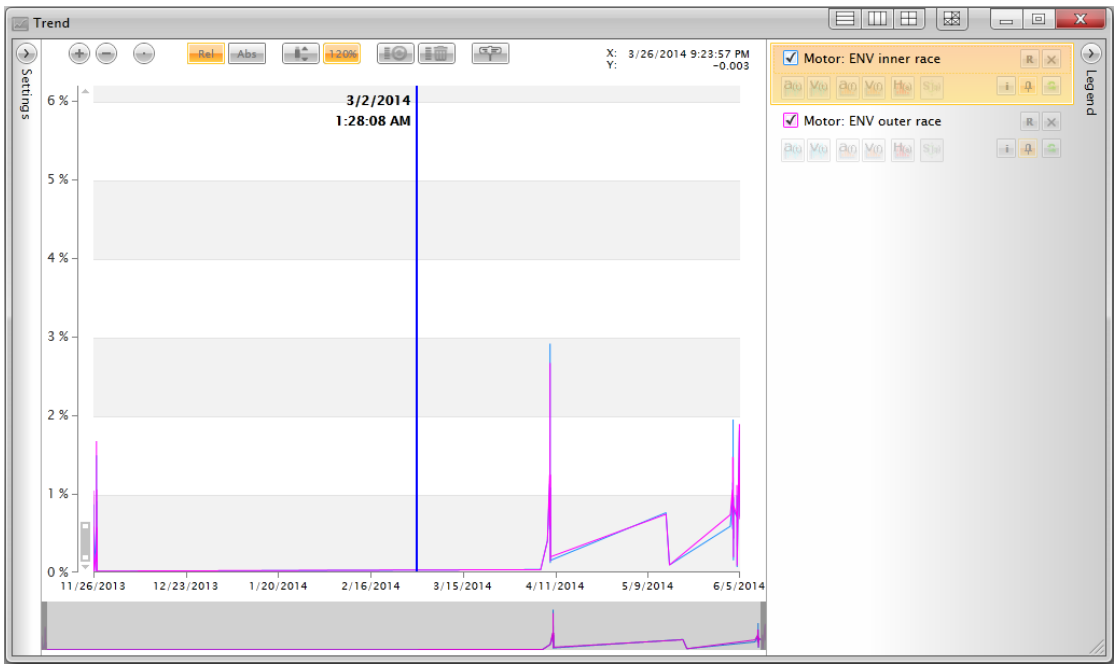


Figure 15: Trend Viewer with trends

For the display you can select between relative Rel (in % of the limit value) and absolute Abs values (in the correspondent unit). The relative display mode is the default setting.

Clicking the button shows the trackball cursor. The trackball cursor shows the trend values at the corresponding cursor position including the time stamp.

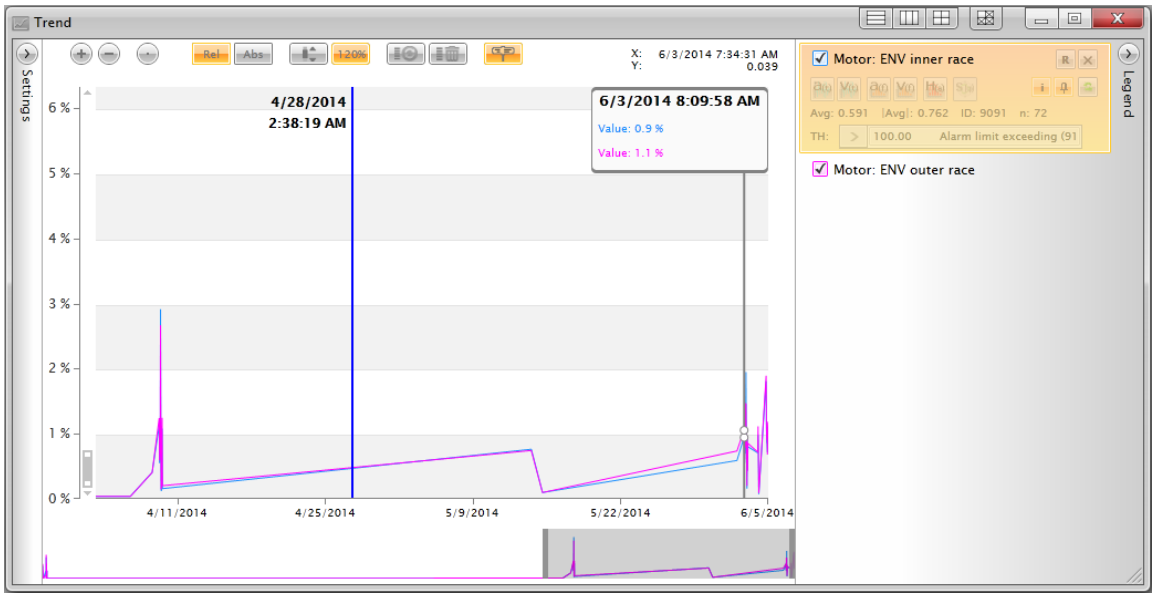


Figure 16: Trend Viewer with trackball cursor

Note

When the trackball cursor is active, the blue standard cursor cannot be used.

4.2 Removing trends

Trends can be removed via their own context in the trend chart legend either by clicking the button or via the context menu which can be reached by right-clicking on the trend name.

By removing the trends, no data is deleted from the database.

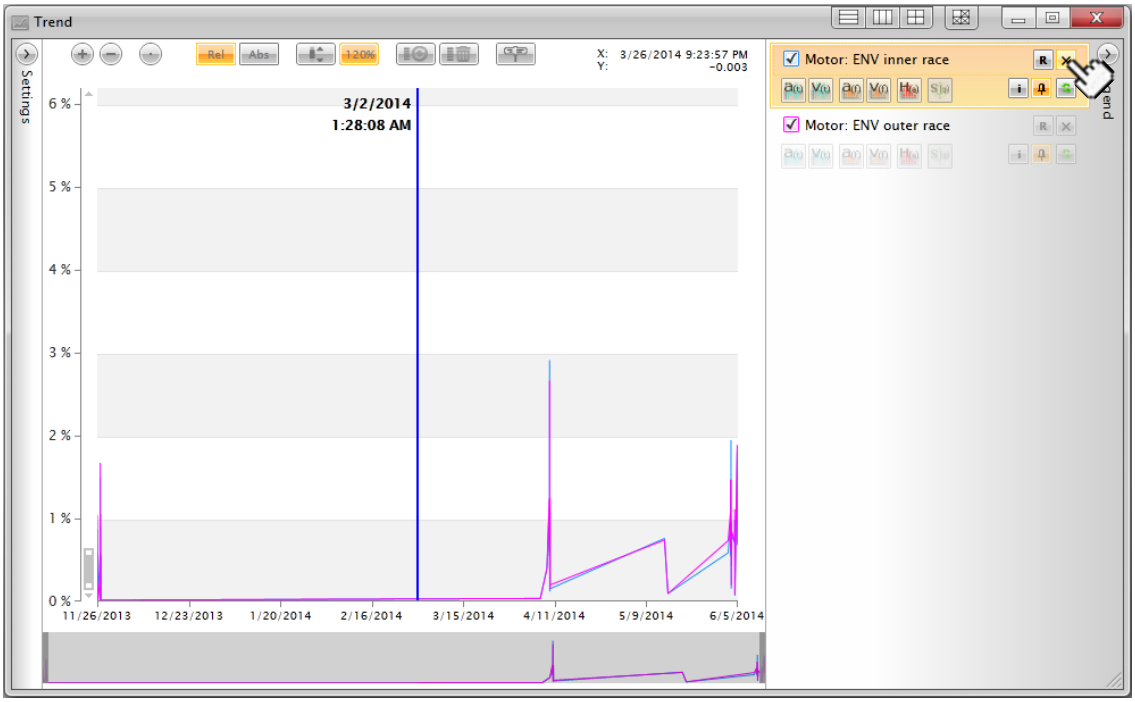


Figure 17: Remove trend

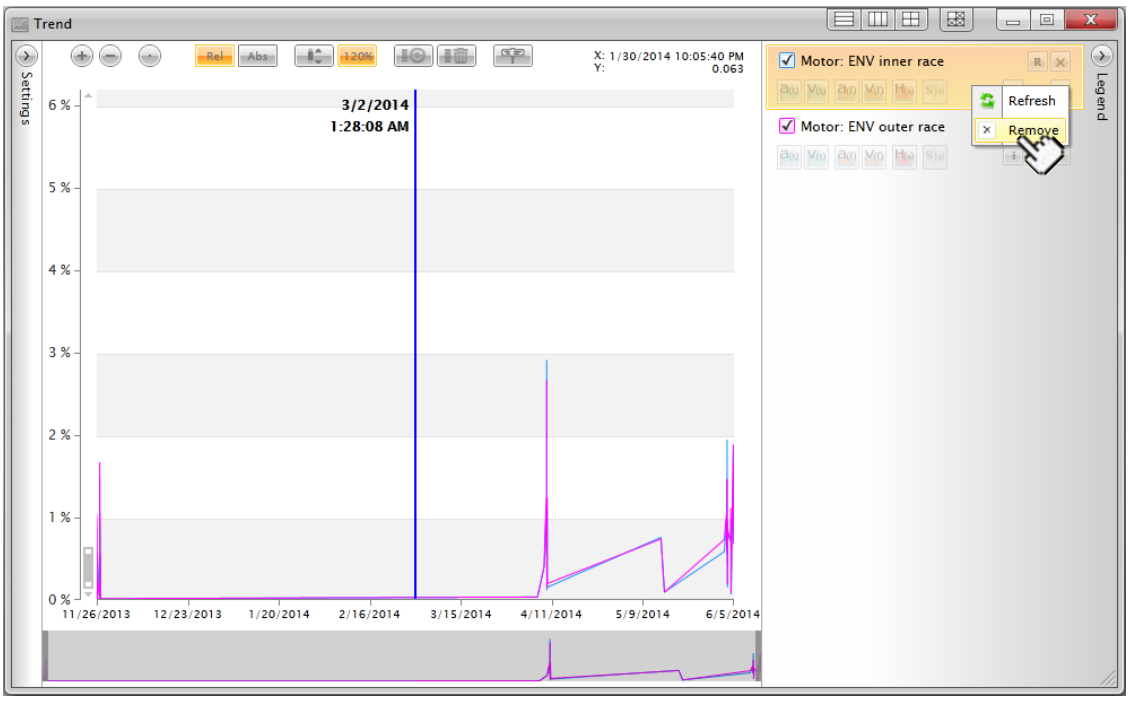


Figure 18: Remove trend via context menu

You can also remove all trends from the Trend Viewer by clicking the button on top of the trend chart.

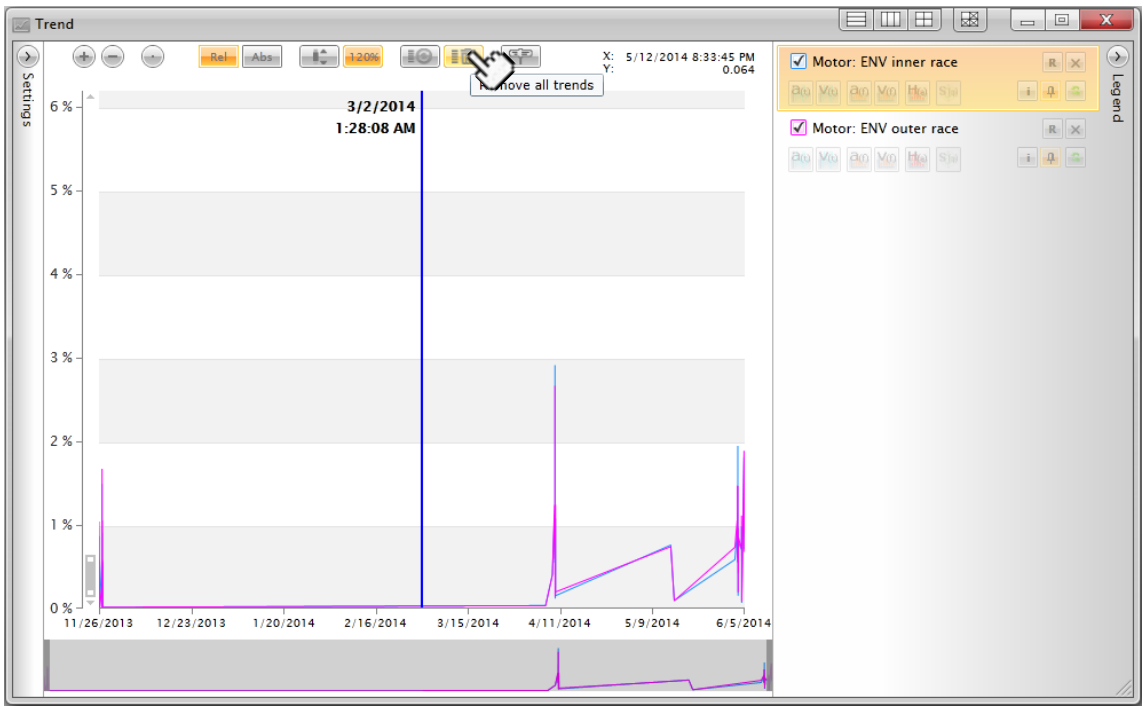


Figure 19: Clear Trend Viewer

4.3 Hiding trends

Trends can also be hidden temporarily. This significantly increases the overview and the trend can be displayed again without a repeated data loading.

To hide the corresponding trend, uncheck the box on the left of the trend name in the legend by left-clicking. If you like to show it again, check the box using the left mouse button and it will be visible.

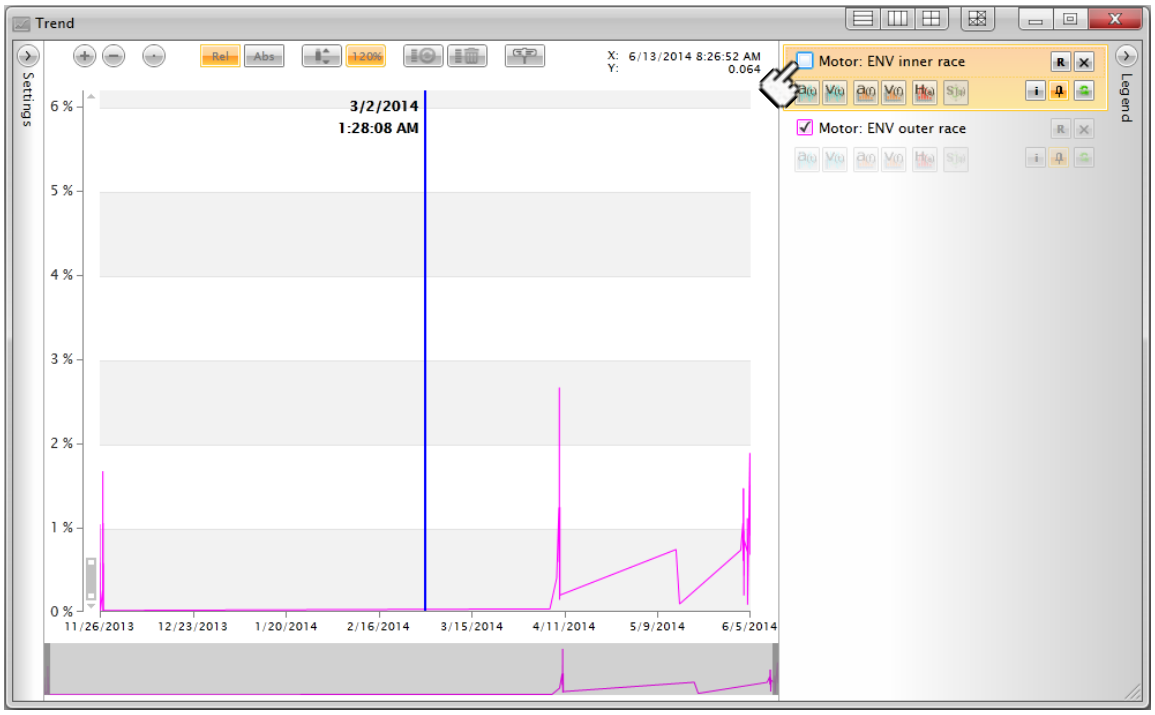


Figure 20: Hide trend

4.4 Zooming and unzooming

The trend chart can be zoomed and unzoomed in several ways.

The first possibility is to use the zoom sliders. Drag the end of the zoom sliders in the desired position keeping the left mouse key depressed.

Figure 21: Using the zoom sliders

You can also use the zoom buttons above the trend chart.

zooms in or zooms out

zooms out again to the full trend (both axes)

only unzooms the Y axis to the full range

sets Y axis on 120 % of the alarm limit value

Note

The button is only visible if the trend chart is in relative display mode. This property can be changed using the “settings” on the left (see chapter 8 “Settings“).

By means of the blue cursor the exact time stamp is displayed for a specified trend value. This is interesting for the manual signal analysis.

As third zoom method, having the left mouse button pressed, you can “drag” a zoom window within the trend chart.

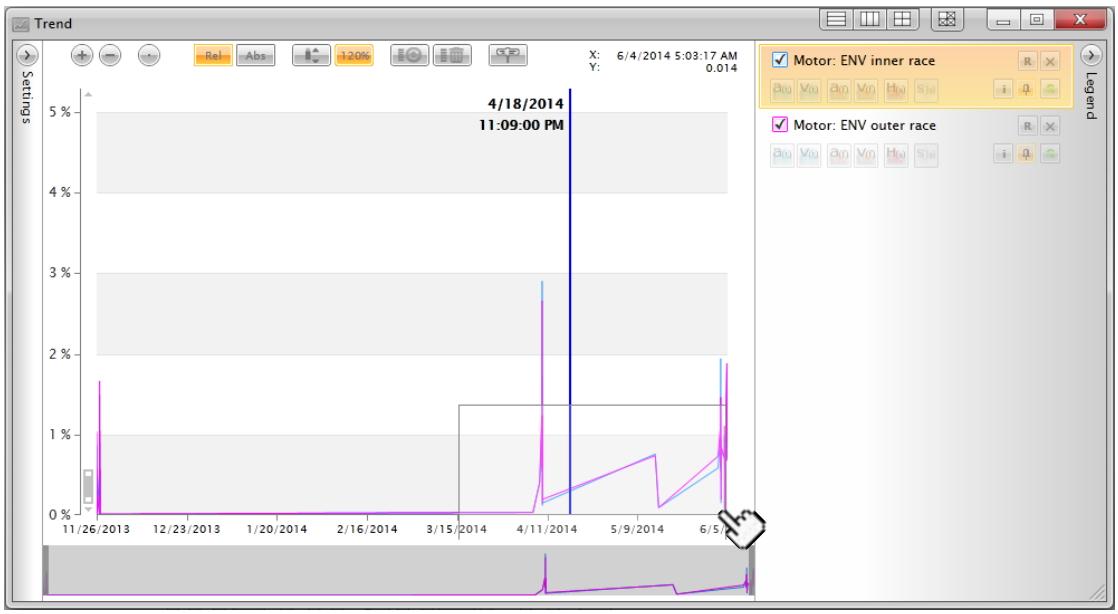


Figure 22: Freely enlarge trend display

4.5 Refreshing the trend viewer

The Trend Viewer is manually refreshed as follows:

- ❑ Click on the button in the legend of a specific trend
- ❑ Select the “Refresh” command in the context menu of a specific trend (see Figure 18: Remove trend via context menu)
- ❑ Click on the button in the Trend Viewer to refresh all trends currently loaded

4.6 Legend

The trend chart legend can be shown optionally. It can be shown or hidden by clicking on the button on the right side of the Trend Viewer window. If a new Trend Viewer window is opened, the legend will be shown by default.

Figure 23: Trend legend

The button functions:

- The view is pinned. Clicking on the again, the pin will be removed and only the trend name will be shown. The legend is only displayed in this mode if you move the mouse over the trend name.
- The raw data trend is shown. This is useful when the virtual trend on display is the result of a correlation calculation with process data. Please note that displaying raw data trends will take more time.
- The trend is removed from the trend chart. The data underlying the trend are not affected by this.

The trend data will be refreshed.

The trend will be hidden and shown again.

The following information on the trend is shown additionally:

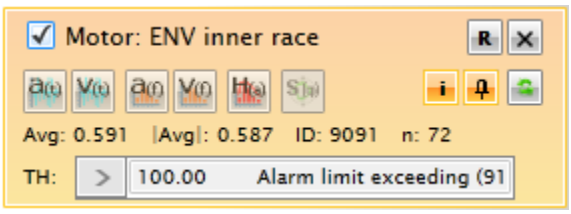


Figure 24: Trend legend details

ID Unique database ID of the displayed trend

n Number of trend values loaded

Avg Average value of all trend values loaded

|Avg| Average value of trend values within the zoomed area

TH Threshold value for the connected status trend (alarm limit exceeding).

This value is also related to the red 100 % line visible in the trend chart if this is in the relative display mode. The threshold value can be edited in this field. The changes will be applied by pressing the <Enter> key. If a status trend (unlike a virtual trend) is displayed in the trend chart, the “TH” field does not exist.

Via the analysis buttons the manual signal analyses are started.

Starts a time signal analysis with the acceleration signal

Starts a time signal analysis with the velocity signal

Starts a spectrum analysis with the acceleration signal

Starts a spectrum analysis with the velocity signal

Starts an envelope spectrum analysis with the acceleration signal

Starts an orbit analysis with the so-called kinetic shaft orbit

4.7 Settings

The “Settings” menu is shown by clicking on the small arrow on the left side of the Trend Viewer window. When opening a new Trend Viewer window, the settings are hidden by default.

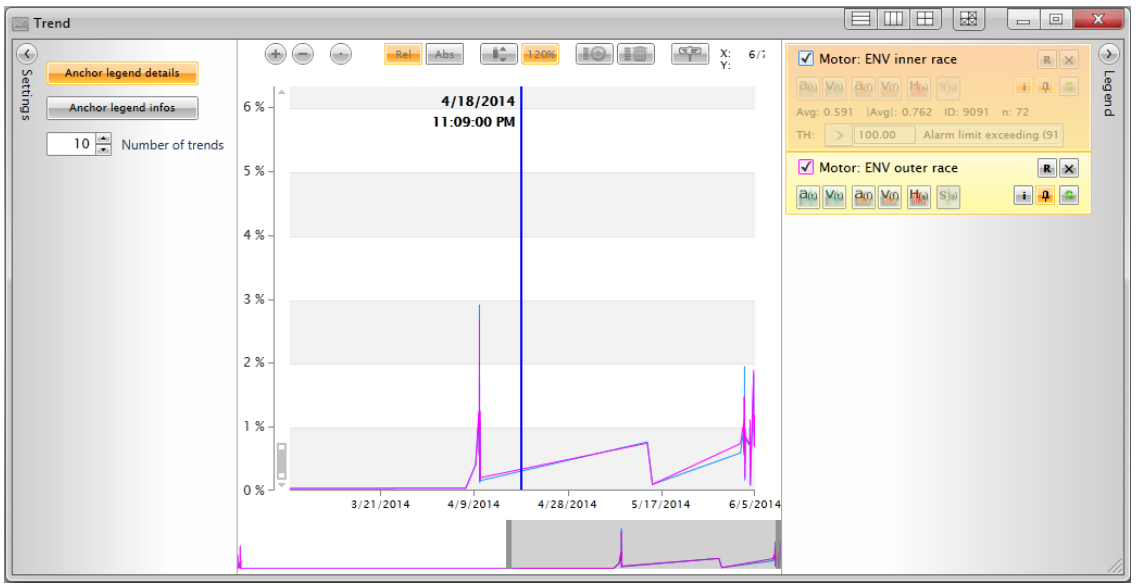


Figure 25: Trend Viewer Settings

Via the buttons <Anchor legend details> and <Anchor legend infos> it can be adjusted if these sections should be displayed by default while adding a trend in the legend. This function complies with using the two buttons and in the trend legend.

How many trends can be loaded simultaneously in the trend view can be adjusted in the “Number of trends” field .

5 Analysis

The ibaCMC provides some tools for manual signal analysis, for example for analyzing raw data of a sensor or an FFT signal.

To initiate the corresponding analysis, the blue cursor must be moved in the trend view to the position with the desired time stamp (e.g. unusually high value in the trend). Please note that the storage capacity of the ibaCMC server is limited and files for analyzing are not available for every timestamp. If the file with the exact timestamp cannot be found, the file which is closest to the timestamp will be opened for the analysis.

The analysis functions can be reached either by using the analysis buttons or via the context menu in the trend legend.

Figure 26: Start time signal analysis

You can open multiple signal analysis windows at the same time. When an analysis window is opened, the plant tree in the navigation area on the left will be automatically switched to the analysis tree and the component, where the selected trend belongs to, will be displayed with its corresponding parameters (e.g. the ball pass frequencies of a bearing).

Tip

Use the button in the window title bar for automatic arrangement.

All signal analysis windows have an auto reload function. If this function is activated the corresponding new data set is automatically reloaded during the displacement of the blue cursor in the trend chart on a new instant of time.

To activate this function, click the AR button in the desired analysis window.

5.1 Time signal analysis

The following figure shows the time signal analysis window. The title bar displays the type of signal (e.g. acceleration or velocity), the name of the sensor (e.g. IEPE Vibration sensor right) and the file name.

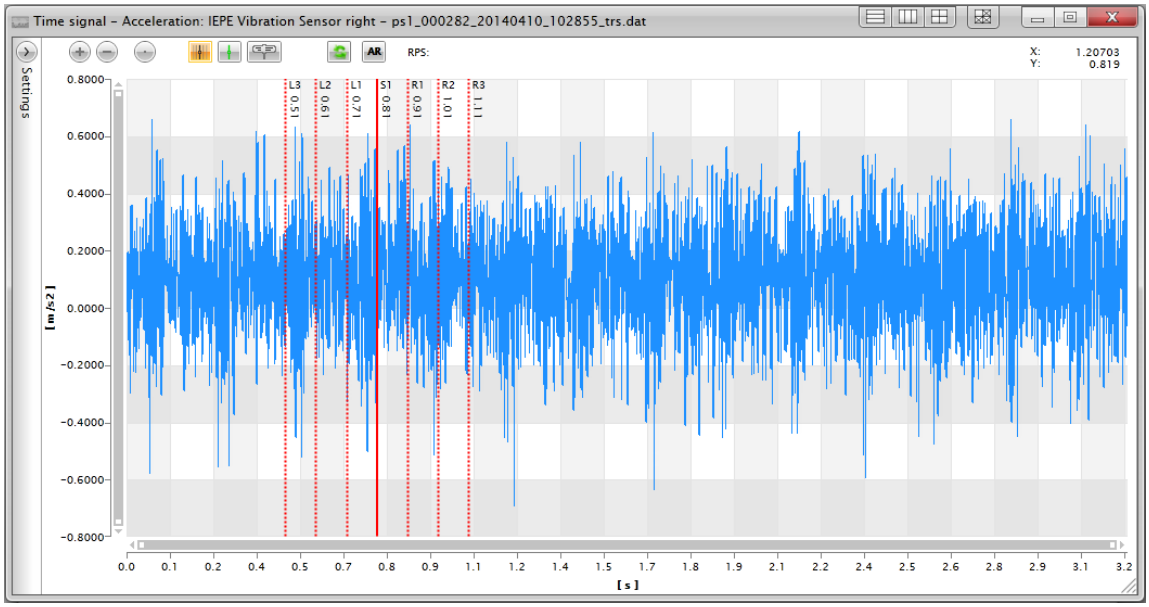


Figure 27: Time signal analysis

The time signal analysis window has the same zooming functions like the Trend Viewer (see chapter 4.4 “Zooming and unzooming“). The X axis unit is set to seconds automatically, the Y axis will show the configured physical unit of the sensor (e.g. m/s^2). The time signal window shows a sideband cursor, whose parameters can be changed in the settings menu on the left. If you displace the red solid line of the cursor by means of the mouse, the dotted sideband lines are automatically displaced simultaneously.

To open the configuration page, click the button in the top left.

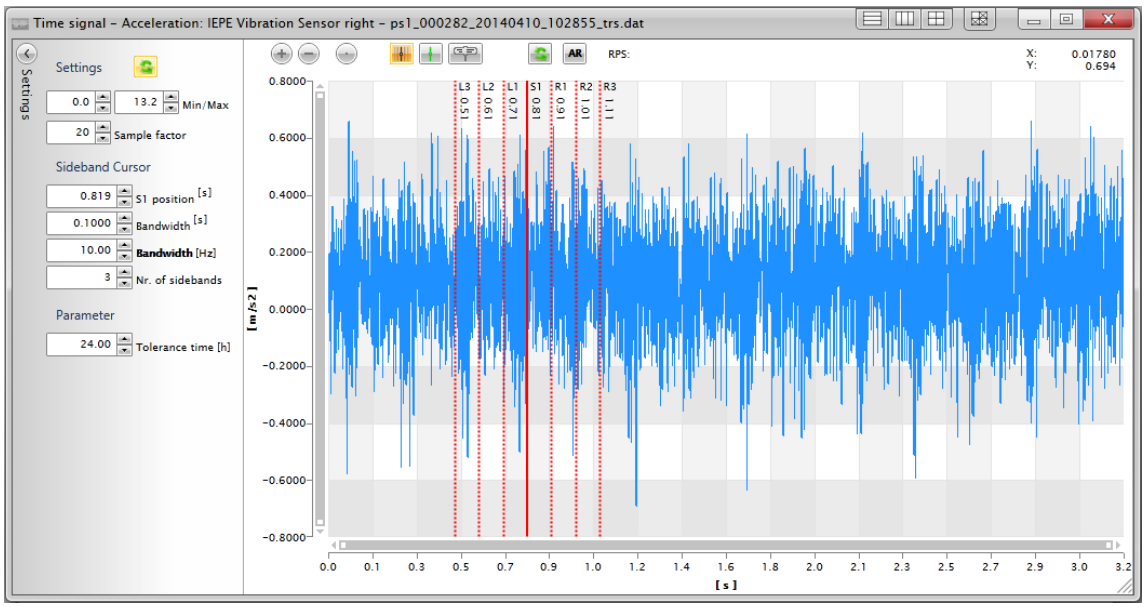


Figure 28: Time signal analysis settings

❑ Min/Max
Range of the visible X axis from Min to Max

❑ Sample factor
You can use this factor to reduce the number of displayed Y values within the X axis range (between Min and Max) and thus reduce the loading time.

Example:
Sample factor = 1….every sample is shown
Sample factor = 10….every tenth sample is shown

❑ Tolerance time [h]
This value provides the timespan where - based on the timestamp of the blue cursor in the trend view - it is searched for available files.

Example:
Tolerance time [h] = 24.00
Timestamp of the cursor in the trend view: 27.05.2014 15:32:38
Files will be searched from 26.05.2014 15:32:38 to 28.05.2014 15:32:38.

Using the button within the configuration page, the time signal view is manually updated when changing the settings (e.g. Min, Max).

5.1.1 Using the sideband cursor

The sideband cursor is available in all analysis views except for the orbit analysis. You can either set the position of the cursor manually (S1 position) using the settings (S1 position) or drag the cursor keeping the left mouse key depressed. You can also set the distance of the sidebands (bandwidth) and the number of sidebands (number of sideband pairs) (compare Figure 28: Time signal analysis settings). The distance of the sidebands will remain the same, when moving the cursor.

5.2 FFT analysis

The FFT analysis is the most popular method for identifying mechanical problems. Error diagnosis of machine components by means of FFT is not the subject-matter of this document, this would significantly go beyond the constraints of this document. However, the following shows a small example.

Example

Simple example of FFT analysis:

There is an imbalance problem at a motor shaft rotating with a current speed of 600 rpm (10 rps). In case of the analysis of the vibration acceleration by means of FFT, a significant peak can be detected in the 10 Hz zone. In case of a motor without unbalance this peak is significantly less distinct.

The FFT analysis can be carried out in the FFT spectrum of the velocity or in the FFT spectrum of the vibration acceleration.

The FFT is displayed in revolution speed orders in the FFT analysis. This means, a 10 in the X-axis does not signify 10 Hz but ten times the revolution frequency which is displayed in the FFT analysis window on the top in the “RPS” field (in the example in Figure 29: FFT analysis the value is 7.95 Hz, therefore the 10 on the X-axis would rather be 79.5 Hz). The display in orders of the revolution speed has been proven as outstanding for the damage diagnosis. The view can be switched in absolute frequency presentation via the N button. The harmonic cursor is automatically set to the highest amplitude value in the FFT with its base line (red drawn through line, labelled with H1).

Via the and buttons you can switch between the harmonics cursor and the sideband cursor.

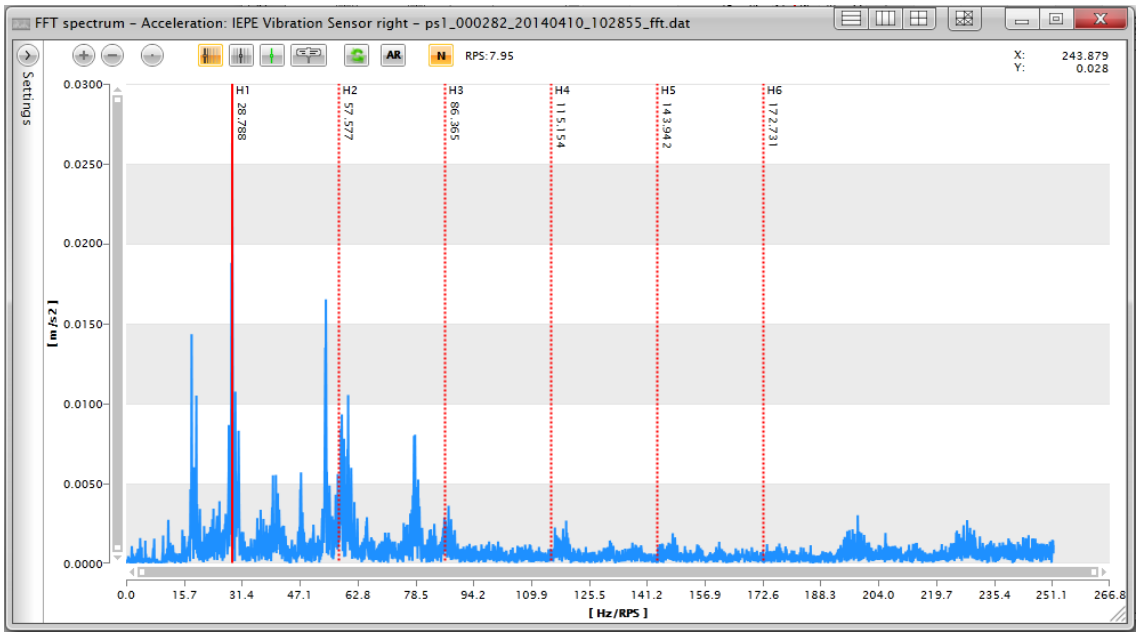


Figure 29: FFT analysis

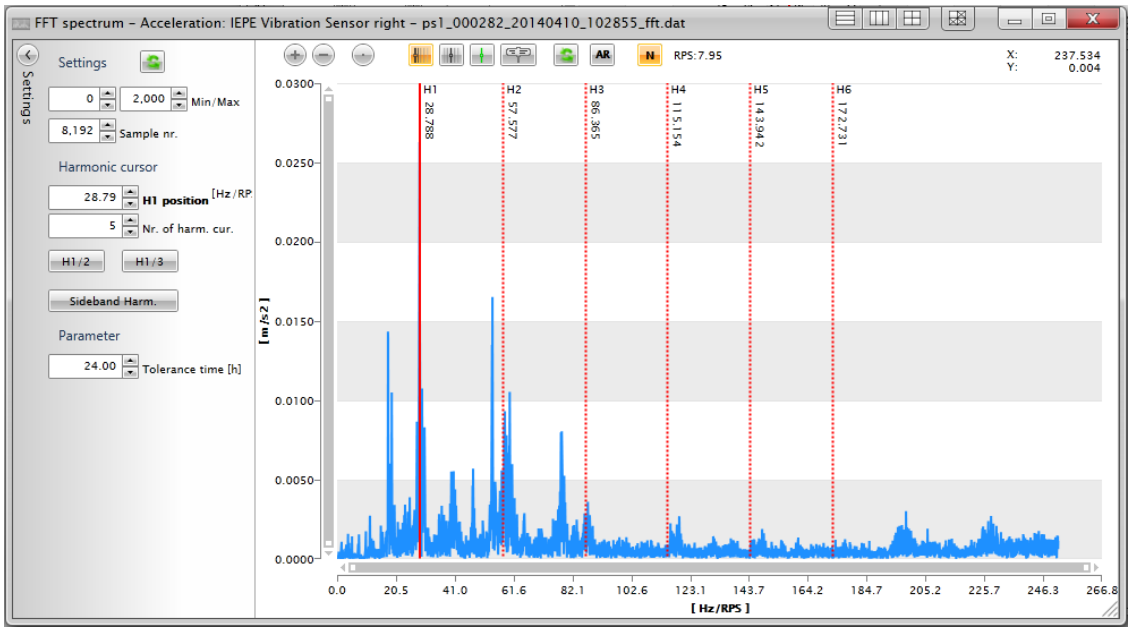


Figure 30: FFT analysis settings

- Min/Max

Range of the visible X-axis from Min to Max

- Samples no.

You can use this value to reduce the number of displayed Y values within the X-axis range (between Min and Max) and thus reduce the loading time.

Example:
Min/Max = 0 / 2000
Number of samples = 200 …every tenth value is shown

- Tolerance time [h]

This value provides the timespan where - based on the timestamp of the blue cursor in the trend view - it is searched for available files.

Example:
Tolerance time [h] = 24.00
Timestamp of the cursor in the trend view: 27.05.2014 15:32:38
Files will be searched from 26.05.2014 15:32:38 to 28.05.2014 15:32:38.

The following paragraph describes setting the parameters of the harmonic cursor. For using the sideband cursor, see chapter 5.1.1 “Using the sideband cursor“.

5.2.1 Using the harmonic cursor

The harmonic cursor is used to identify possible peaks of a base frequency. The existence of harmonics often provides information about the gravity of a mechanical damage or its characteristics.

You can either set the position of the cursor manually (H1 position) using the settings (H1 position) or drag the cursor keeping the left mouse key depressed. Additionally, you can setup the number of the harmonic cursors (“Number of harm. cur.”). With the X1/2 and X1/3 buttons, sub harmonics can be displayed below the basic frequency.

If you want to get more details, additional sideband lines are available for the harmonics which you can activate via the <Sideband Harm.> button. If these sidebands are activated, the settings “Bandwidth” and “Number of sideband harm.” are also available which you know already in similar form from the sideband cursor.

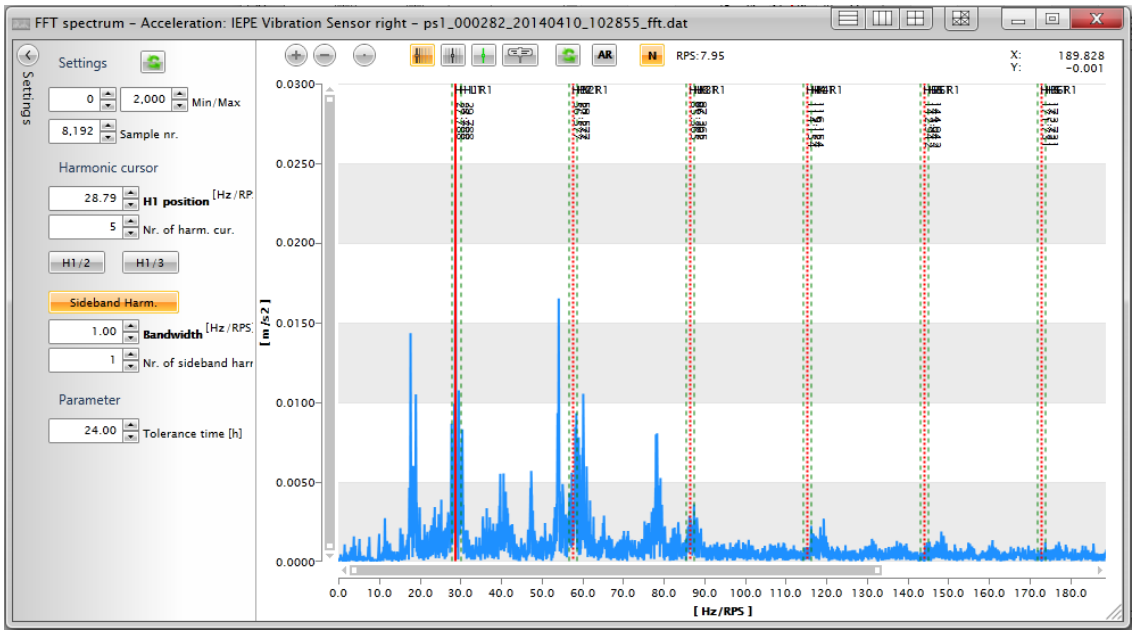


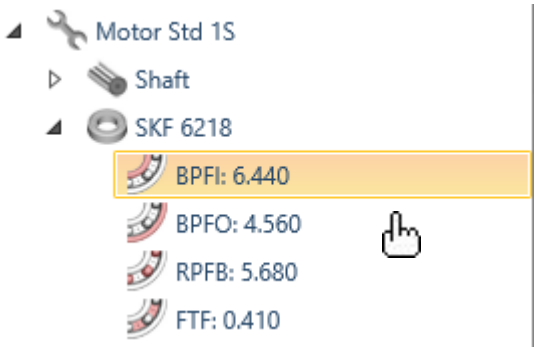
Figure 31: Harmonic cursor with sidebands

In addition to that, you can show the trackball marker using the <Trackball> button which shows the amplitude value of the selected frequency.

Analogous to the sideband cursor, the modifications on the current view are applied within the setting site.

Tip

You can also set the harmonics cursor on a characteristic component frequency (e.g. the BPFO of a roller bearing) by clicking on the corresponding entry in the analysis tree.



Below the analysis tree the characteristic damage frequencies of the components are displayed which are assigned to the selected sensor (whose signal is the base for the FFT view). If you reach one of these frequencies by means of the cursor, this is highlighted in red in the table. Thereby, it can be immediately recognized if an increased amplitude exists in the FFT view.

Name	Ratio				
FAG NU2219E	1,00	9,8370	7,1630	6,2000	0,4210
SKF NU2219E	1,00	9,8400	7,1600	6,2000	0,4210
SKF 22320	0,23	1,9984	1,3945	1,0880	0,0930
FAG 22322ES	0,23	2,0063	1,3865	1,1717	0,0927
Name	Ratio				
FAG NU2219E	1,00	9,8370	7,1630	6,2000	0,4210
SKF NU2219E	1,00	9,8400	7,1600	6,2000	0,4210
SKF 22320	0,23	1,9984	1,3945	1,0880	0,0930
FAG 22322ES	0,23	2,0063	1,3865	1,1717	0,0927

Figure 32: Defect frequencies table

5.3 Envelope analysis

The envelope analysis is the most popular method to analyze bearing faults. Since every bearing shows specific damage frequencies which are referred to the shaft speed (keyword modulation), the envelope analysis is particularly qualified here.

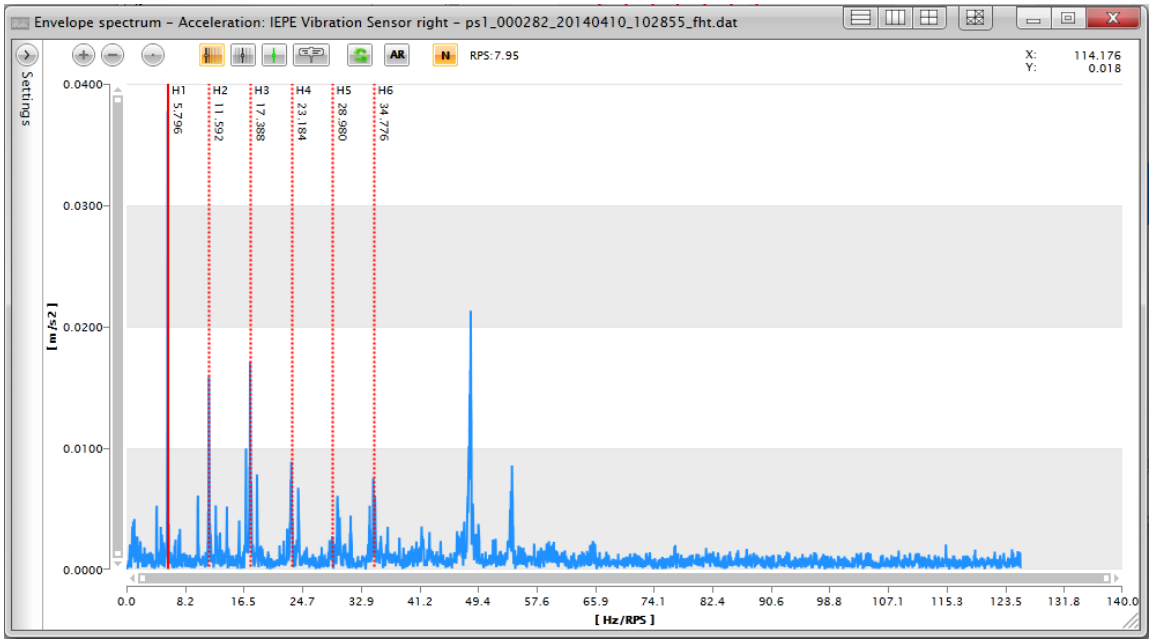


Figure 33: Envelope analysis

The envelope FFT analysis has the same FFT analysis settings which is why we refer to chapter 5.2 “FFT analysis“.

5.4 Orbit analysis

The orbit analysis of shafts is documented in the DIN ISO 7919 standard and is used to analyze sleeve bearings and solitary shafts.

6 Report Viewer

The Report Viewer shows the reports created in the ibaCMC. The reports are created cyclically through scheduled tasks. The reports are available in PDF format after generating. Reports can be selected from already existing templates and are based on the Microsoft SQL Server Reporting Services.

To open the Report Viewer, click on the corresponding icon in the dock and select from the available report types in the menu.

Figure 34: Starting the Report Viewer

6.1 PDF report

Figure 35: Report Menu

When clicking on the PDF icon, the PDF Report Viewer will be started. It shows the available reports and their contents.

Note

To view PDF reports, the user logged in needs the **Report viewer PDF** permission.

The PDF Report Viewer consists of a thumbnail area on the left, the reports list on the right and the details view. If you are familiar with PDF viewers like Adobe® Acrobat Reader®, you will quickly get used to the PDF Report Viewer.

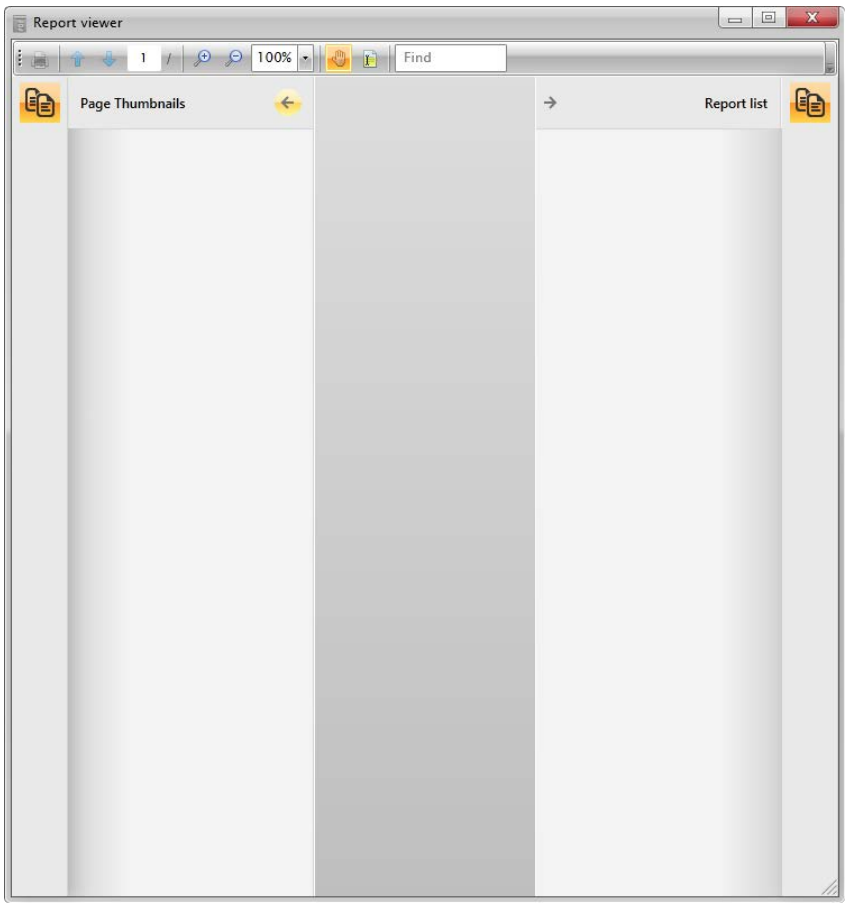


Figure 36: PDF report viewer

You can hide the “Page thumbnails” and “Report list” by clicking the button and show them again by clicking the button.

To add a new report, use, for example, drag & drop to drag it from the Archive (see chapter 7.2 “Archive Viewer “).

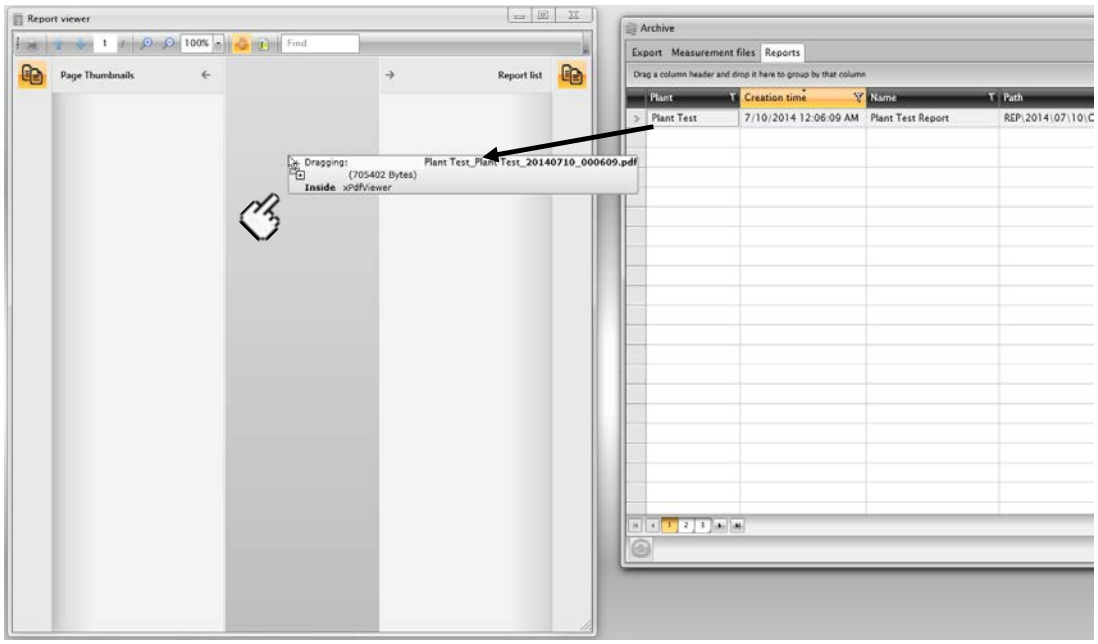


Figure 37: Adding a report from the archive

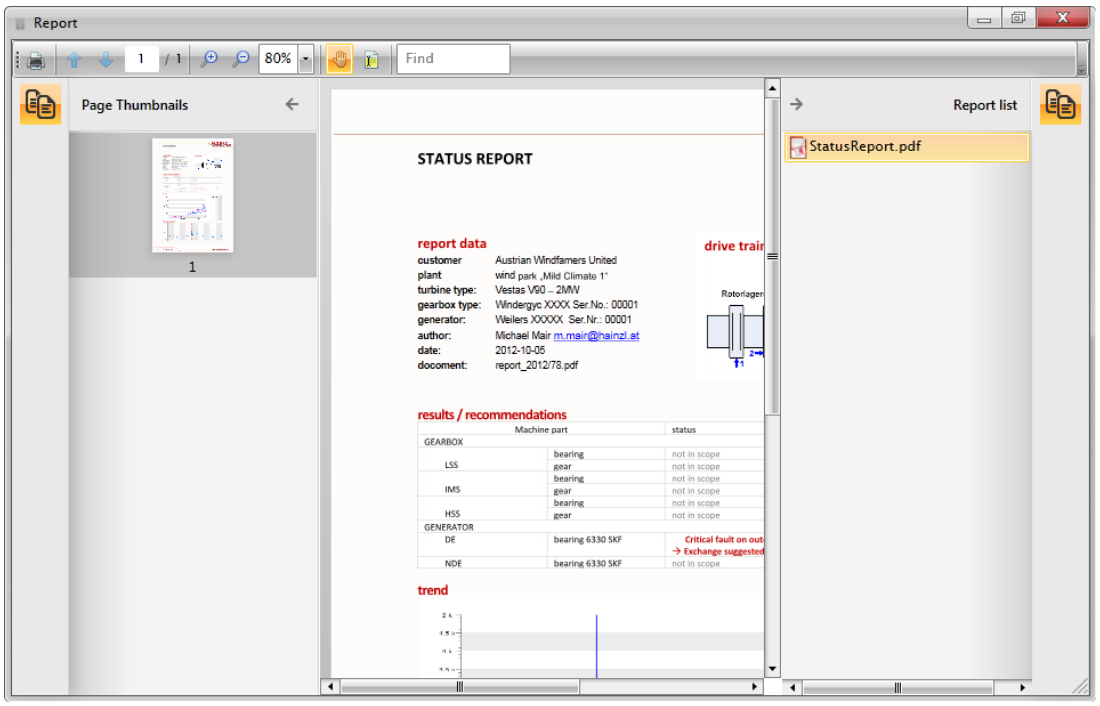


Figure 38: Displayed PDF report

To print a report, click the button in the toolbar and the printer selection dialog of Microsoft® Windows® will be shown.

7 Accessories

The accessories can be reached by clicking on the wrench icon in the dock.

Figure 39: Starting the Accessories Menu

The Accessories menu contains some useful applications which are described in the following chapters.

Figure 40: Accessories Menu

7.1 Logs

The log functions allow a deep insight into the events in the ibaCMC. Therefore they are tied to a special user privilege.

Note

To be able to view system results or create user-defined logs, the logged-in user needs to have the **Logging** right.

The log display is a very good example for many other configuration displays in the ibaCMC. Other applications, e.g. hardware or user configuration, have the same structure. Several operations, e.g. filtering, sorting and modifying, are the same for all applications.

All display and configuration windows have a list view in the upper part, and in the lower part a detail view. The navigation between the individual data sets works equally.

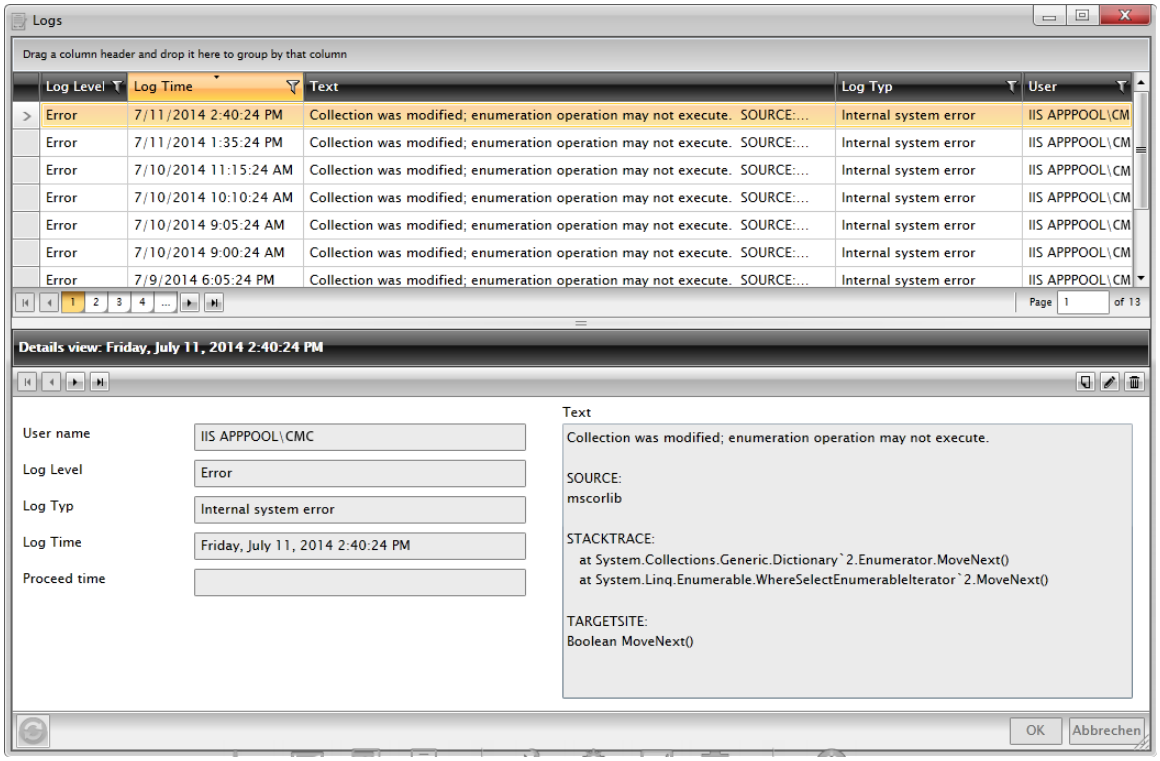


Figure 41: Log Viewer

The log entries are automatically sorted in descending order according to the time stamp that the most recent entries are always shown on top of the list. The currently active entry is displayed by means of a small arrow symbol in the left column and the corresponding details in the detail view.

7.1.1 Navigation through the logs

Over the time, the number of logs may increase to a considerable number. Therefore, they are organized in so-called pages.

You can use the page navigator buttons at the bottom of the list to switch between the pages.

Figure 42: Page navigation buttons

Click on the corresponding number to select a page. You can also use the “move to first”, “move to previous”, “move to next” or “move to last” buttons.

The buttons with “...” jump three pages forward and/or back.

The updated page will be displayed on the right side of the indicator field. Here you can also enter a page number and confirm the entry with the <Enter> button.

Figure 43: Page indicator

Another possibility is the navigation over the buttons in the detail view. Here, it is only possible to navigate within a page between the individual event lines.

Figure 44: Line navigation buttons

7.1.2 Sorting, grouping and filtering

The easiest way to organize the log list is sorting. You can activate the sorting by clicking on the desired column name. If you want to sort the logs by time, just click on the “Log Time” column header. The sorting order will be shown with little arrows pointing upwards or downwards. If you want to change the sorting order or remove the sorting, just click on the column header again.

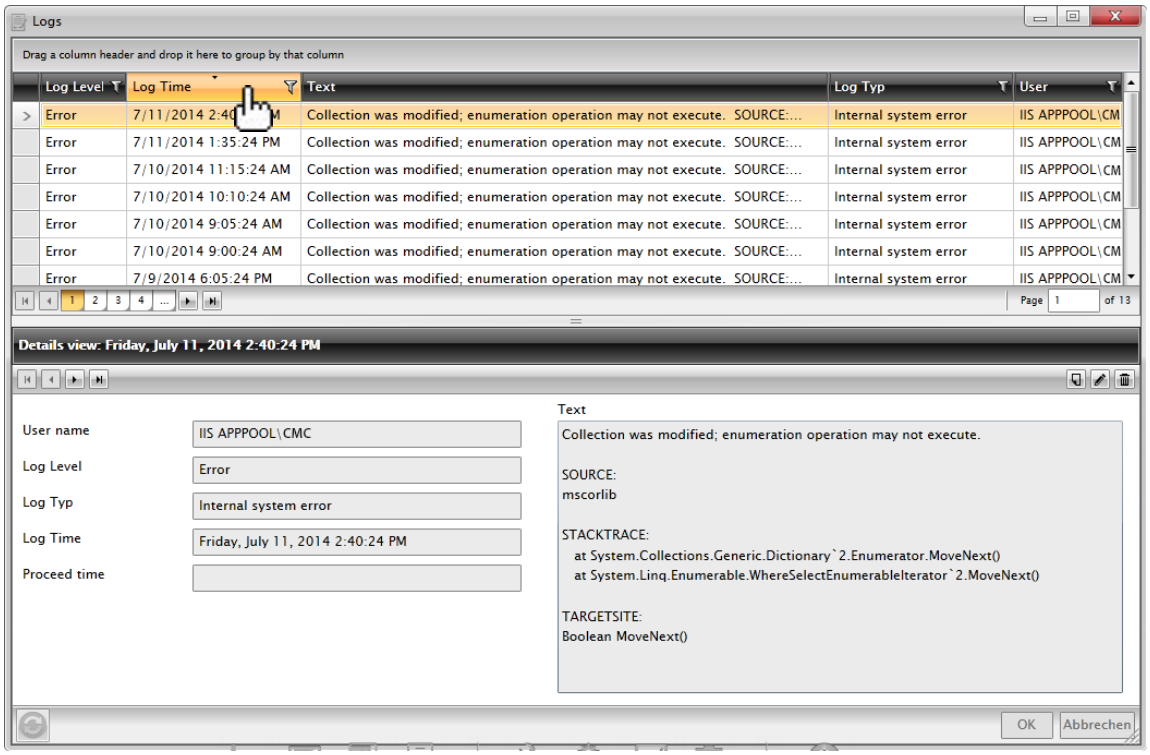


Figure 45: Sorting the log list

Another way of organization is the grouping function. Just drag the column header you want to group by to the bar above.

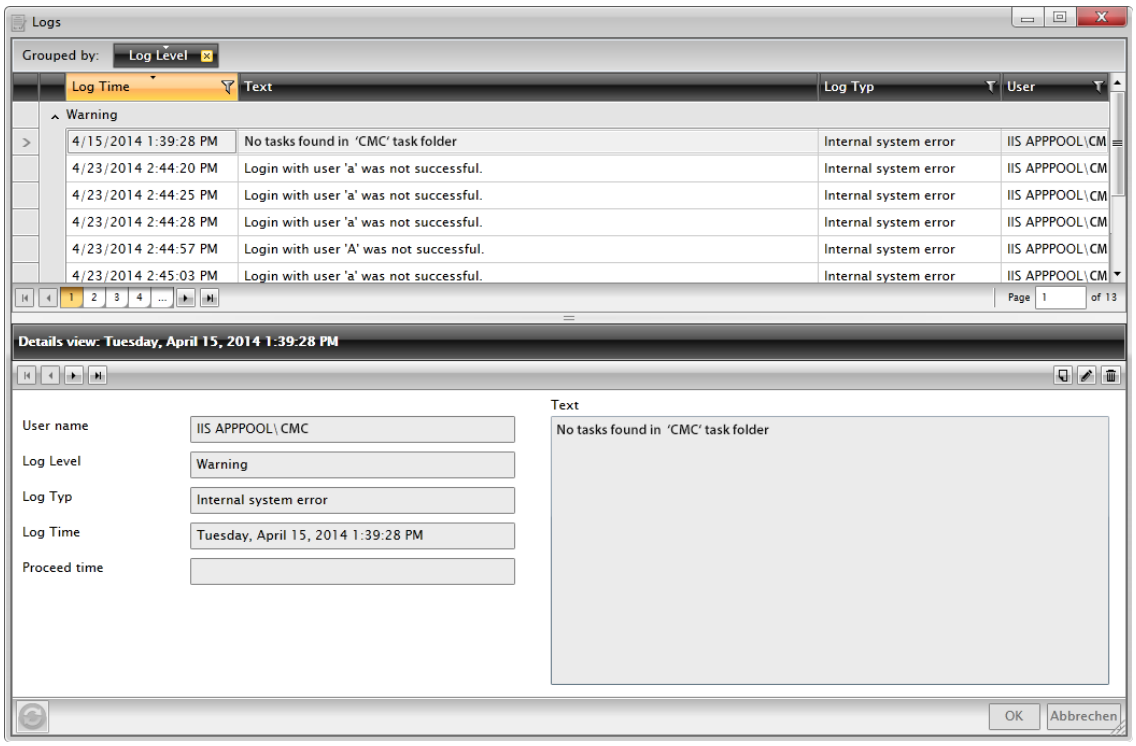


Figure 46: Log list grouped by level

You can drag several columns to the “Grouped by” bar. The grouping order is left to right. Figure 46: Log list grouped by level shows a useful possibility. It is grouped by “Log Level”. If you want to change the grouping order, use drag & drop in the “Grouped by” line. To remove a grouping again, move the mouse pointer to the desired grouping field in the “Grouped by” line and click on the small ✕ button appearing there.

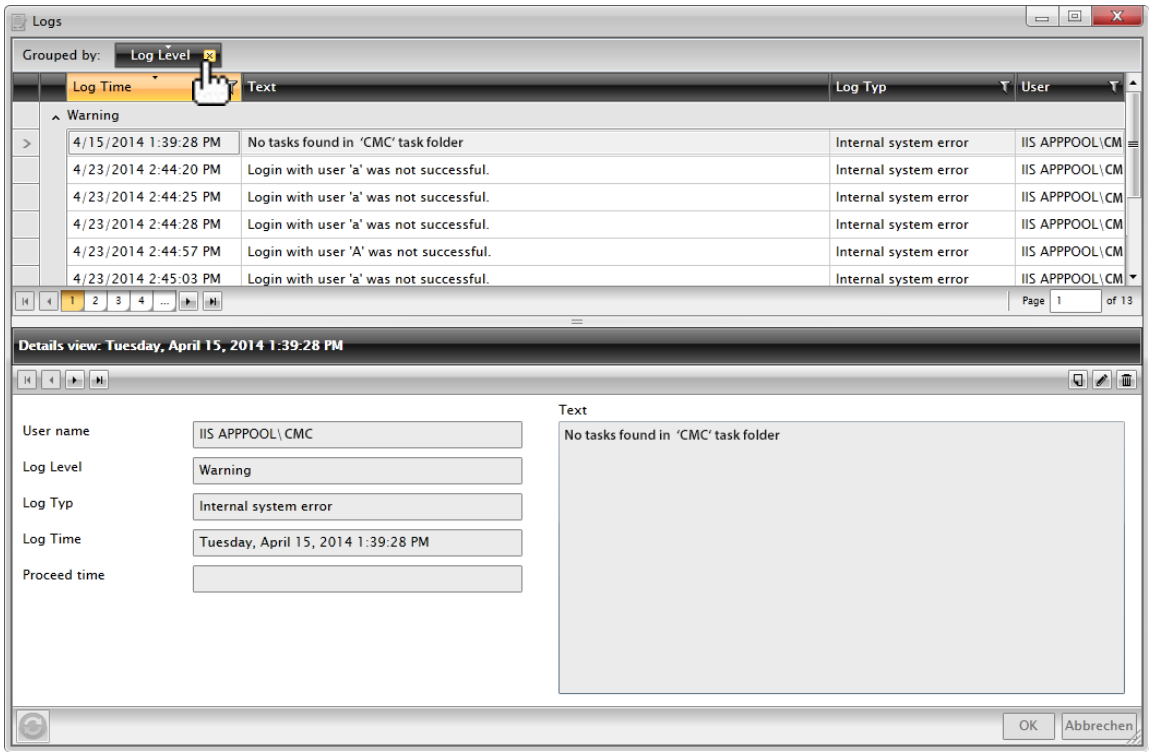


Figure 47: Removing the grouping

The filter function is another means of organization.

The columns that can be filtered show a small icon in the column header. Depending on the data type, it can be filtered by different criteria. In the case of “log level” for example, you can select different values, in the case of “log time” a time period is also possible. By clicking on the <Filter> button, the filter will be activated; by clicking on the <Clear Filter> button, an existing filter will be removed.

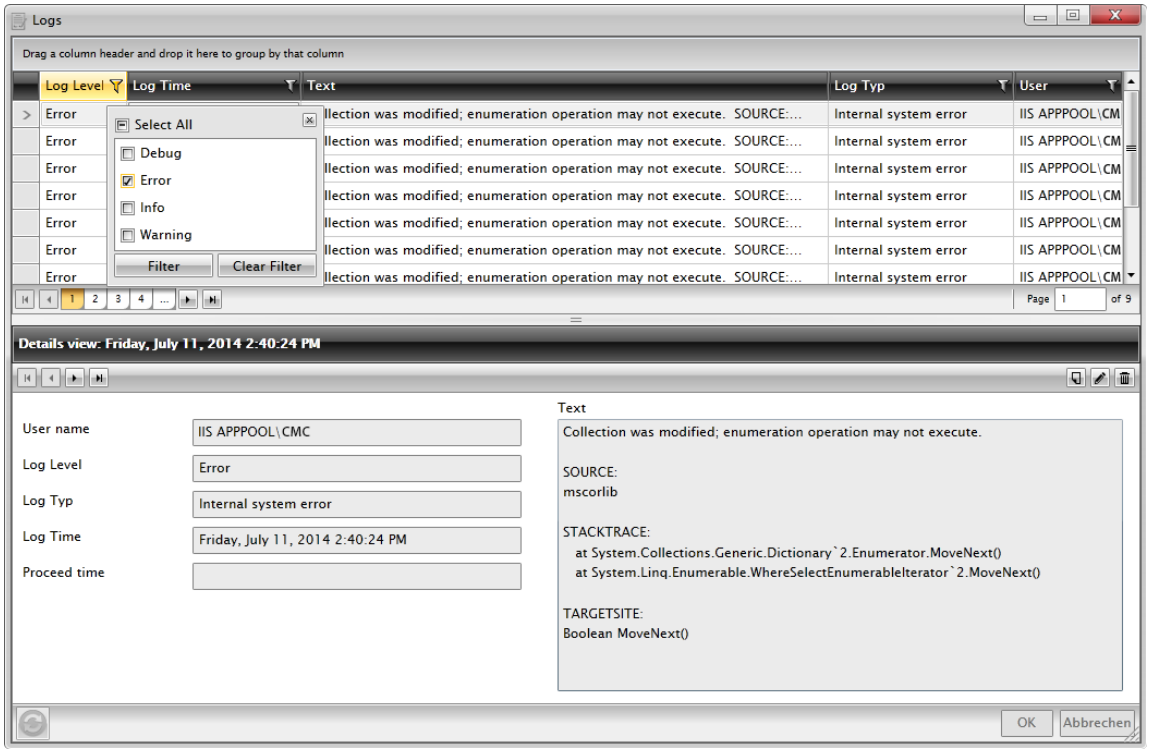


Figure 48: Filtering logs

Columns showing an active filter indicate a yellow icon.

7.1.3 Adding, editing and deleting logs

You can edit existing logs, add new user-defined logs or delete existing logs.

These functions can be reached by clicking in the upper right corner of the detailed view.

Adding a new user-defined log entry.

Edit the currently selected log entry.

Delete the currently selected log entry.

To create a user-defined log, click the button.

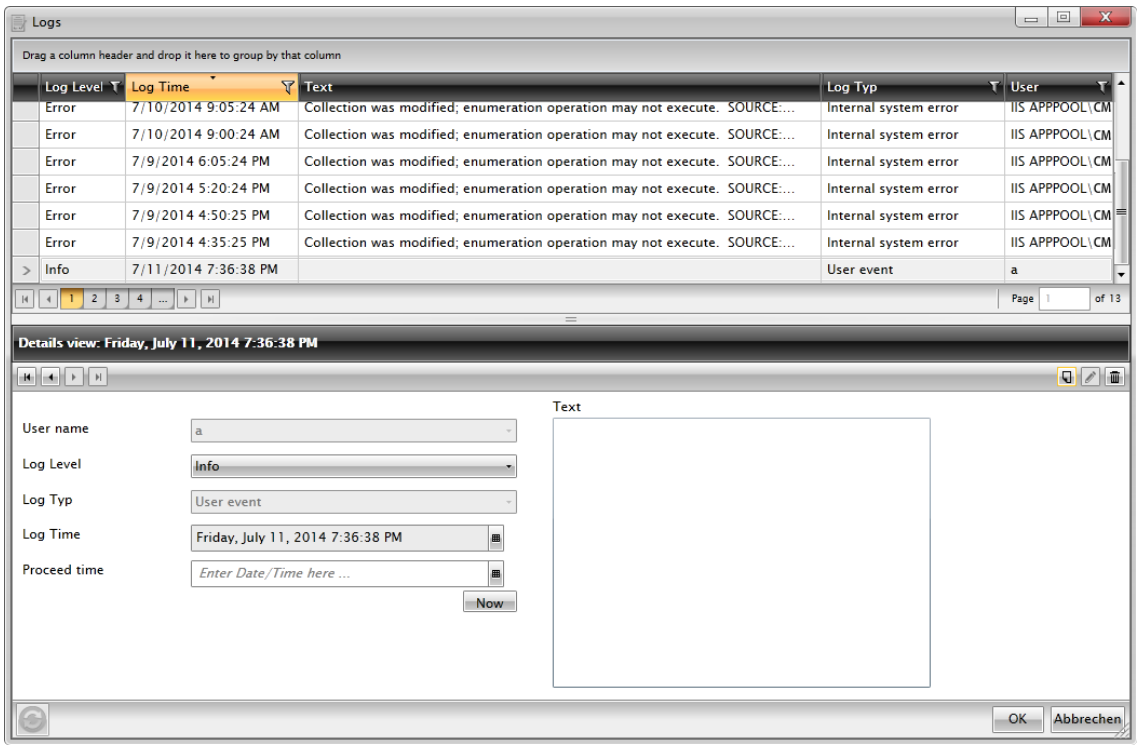


Figure 49: Add a user-defined event log entry

❑ User name

This entry is set automatically to the currently logged in user, it cannot be changed.

❑ Log Level

The default value is Info; it can be changed to other log levels like Debug, Error or Warning.

❑ Log Type

The log type is always “user event” and cannot be changed.

❑ Log Time

This value is set to the current system time. However, you can use the built in calendar to change the time.

❑ Proceed Time

The proceed time can be set with the built in calendar. You can also click the <Now> button, which will fill in the current system time.

❑ Text

Enter any text describing the log.

After having made the settings, click <OK> to permanently apply the settings. By clicking <Cancel>, the values entered will be discarded and no user-defined log will be created.

To edit an existing log, select it from the above list and click on the button in the details view.

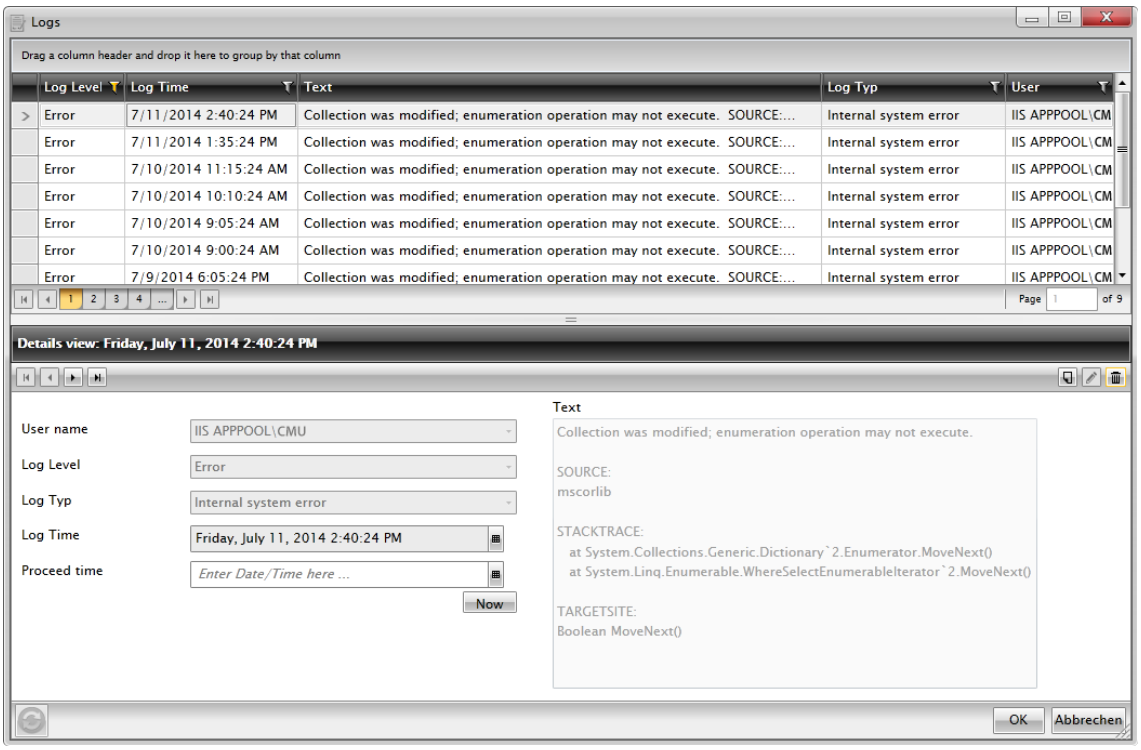


Figure 50: Editing a log

The only log parameter which can be edited is the proceed time. The proceed time can be set with the built in calendar. You can also click the <Now> button, which will fill in the current system time. The changes will be applied by clicking <OK>.

You can delete the existing log entry currently showed in the details view by clicking the button. In addition to that, a confirmation dialog will be displayed which you need to confirm to actually perform the deletion process. Please note that the log will be removed from the database permanently!

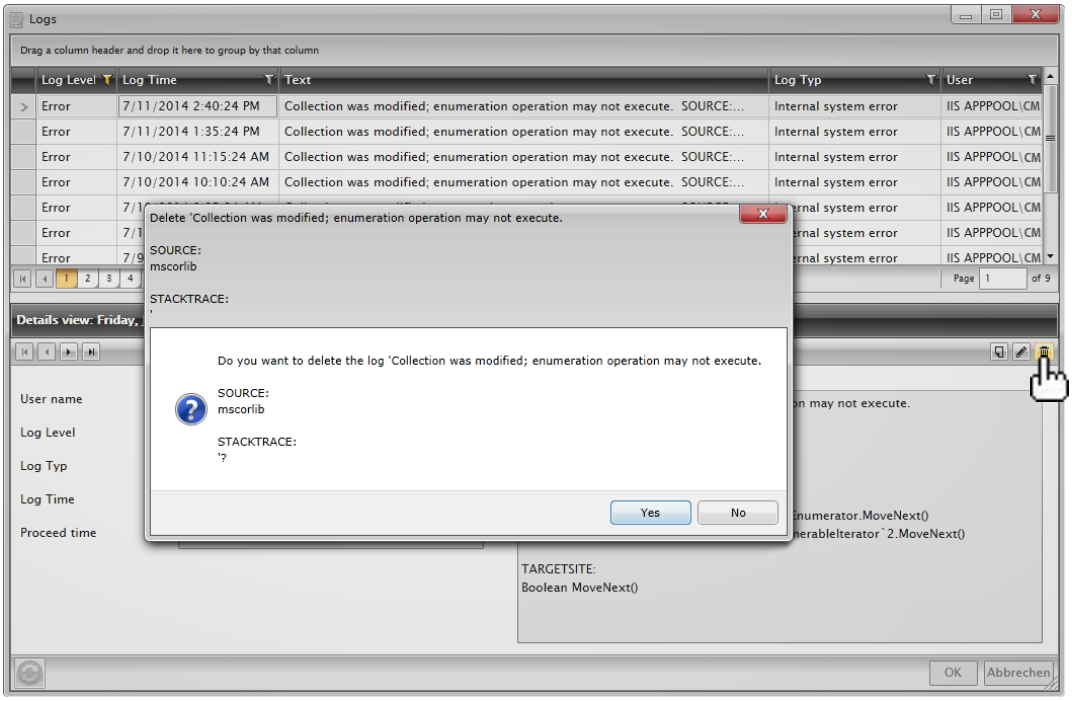


Figure 51: Deleting a log

7.2 Archive Viewer

The archive is the place where you can store raw data of the Condition Monitoring Units, configuration files and created reports and download them to your local PC. The Archive Viewer will be opened by clicking on the archive icon in the “Accessories” menu.

Figure 52: Starting the Archive Viewer

7.2.1 Archived configuration files

The list of configuration files is shown automatically sorted by the creation date. Therefore, the most current files are always at the top of the list.

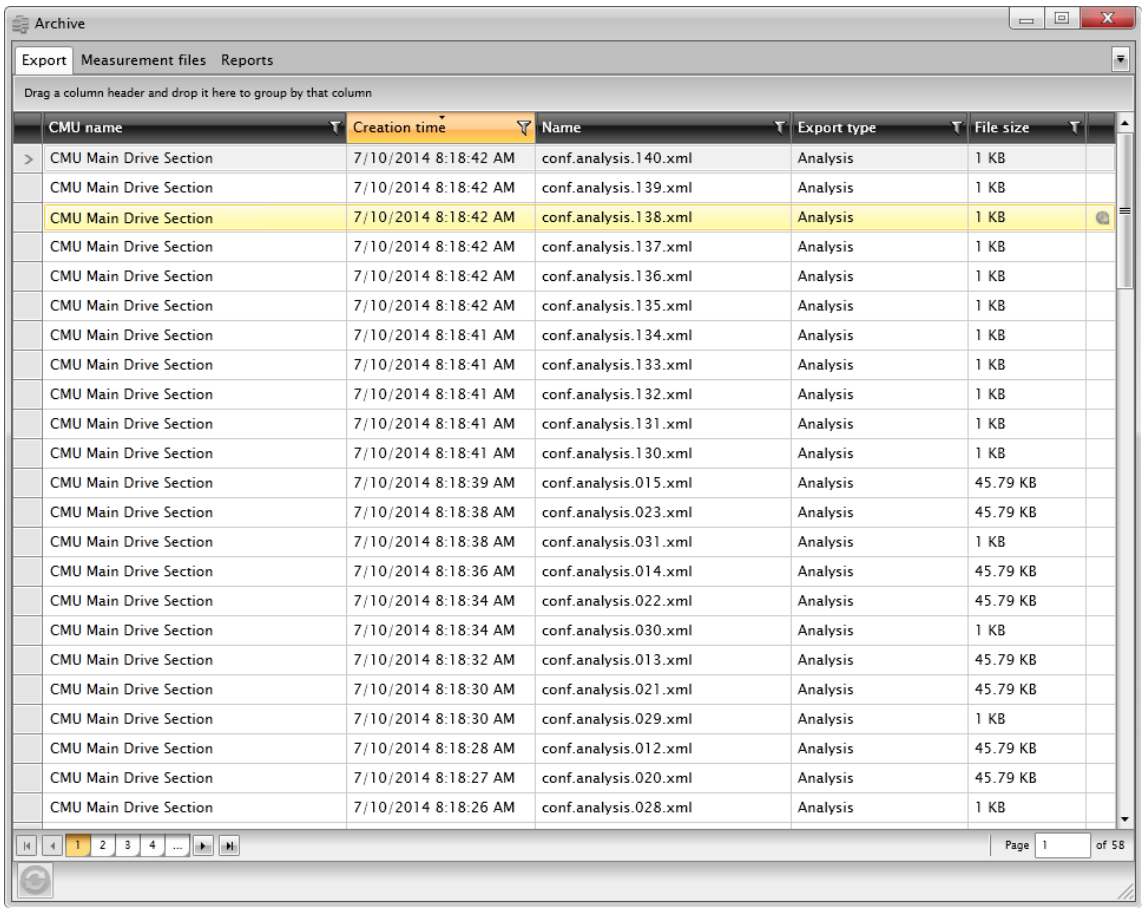


Figure 53: List of archived configuration files

All the log list functions apply to the details list as well. The files can be sorted, grouped and filtered. See chapter 7.1.2 “Sorting, grouping and filtering“ for more information. Also navigating within a particular page works the same way (see Figure 42: Page navigation buttons).

To download a file to your local PC, move the mouse pointer in the corresponding line in the rightmost column. There, the download button appears and the mouse pointer turns into a hand. Click on the button to start the download.

Your web browser might display a security warning that you need to confirm.

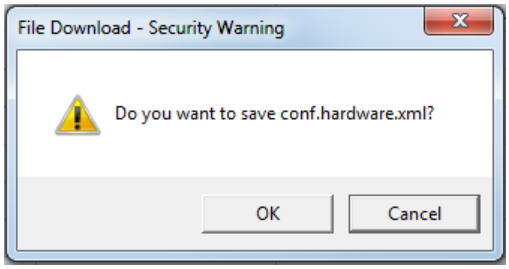


Figure 54: Download security warning

You can then set a desired target directory and the file will be transferred.

Configuration files are saved in XML file format and you can open them with a usual text editor or an XML editor. Examples are Notepad or Microsoft® Internet Explorer® or the free Editor Notepad++ for private use.

7.2.2 Archived measurement files

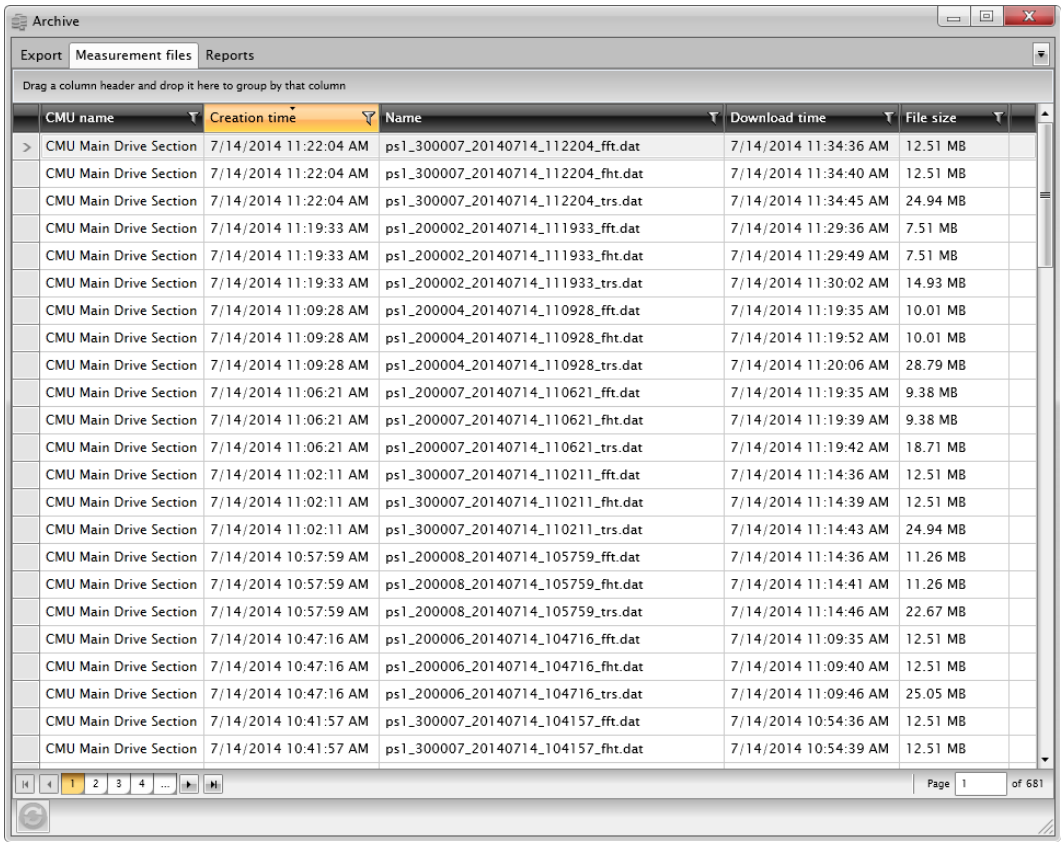


Figure 55: List of archived measured data

The measurement files can be downloaded similar to the configuration files. These files are stored in a binary file format of iba AG. This file format is particularly common in the metal industry where it has proved extremely effective. For viewing and analyzing, you can use the free but very powerful analysis software ibaAnalyzer which is available for you as registered user on the iba website (http://www.iba-ag.com/)

The measurement files contain different data, depending on the filename:

***trs.dat**	These files contain the sensor time signals
***fft.dat**	These files contain FFT signals already calculated
***fht.dat**	These files contain envelope FFT signals already calculated
***aot.dat**	These files contain the sensor time signals of a shaft orbit monitoring (see chapter 5.4 “Orbit analysis“ for more details about orbits)
***fot.dat**	These files contain the FFT of a shaft orbit monitoring

7.2.3 Archived reports

Reports are stored in the archive as PDF files. They can be downloaded similar to the export configuration files and the measurement files. To open the reports, you need a PDF Viewer, e.g. Adobe® Acrobat Reader®.

You can drag the PDF reports from the archive to the Report Viewer integrated in the ibaCMC (see chapter 6.1 “PDF report“).

7.3 Online signal graphics

This function is only available with a future version of the ibaCMC.

7.4 Calculator

The calculator is much like standard calculators, known from the operating system for instance. This is why the functionality is not further explained.

Figure 56: Calculator application

7.5 Task scheduler

The task scheduler can be used to manage cyclic tasks via the Microsoft® Windows® operating system. These tasks are executed at a specific time interval.

Figure 57: Starting the task scheduler

One component used for many tasks is the Web Service Starter of the ibaCMC. You can use any other executable file as well.

The task list contents are similar to those of other list views in the ibaCMC. Therefore, the already known sorting, grouping and filtering functions are available as well (see chapter 7.1.2 “Sorting, grouping and filtering“).

The task list shows some useful information, e.g. the last runtime and the next runtime start of the task.

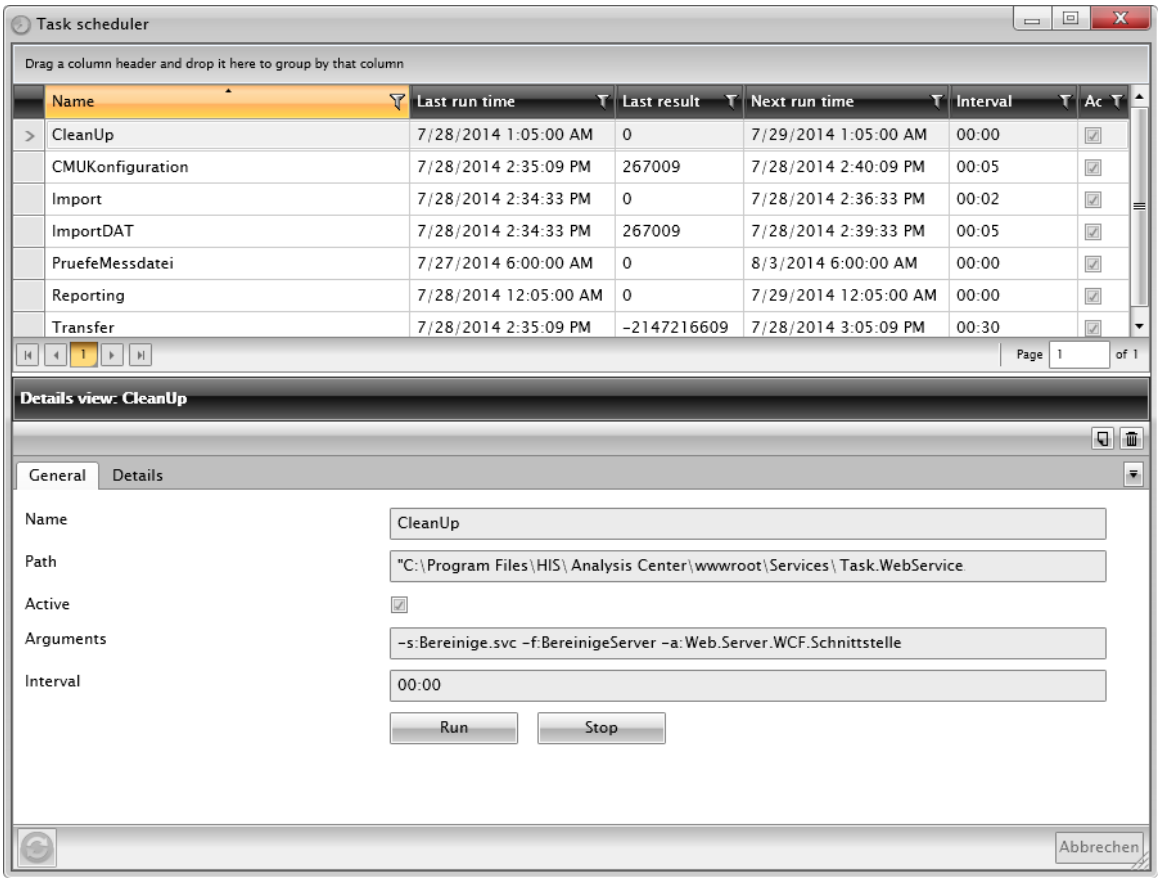


Figure 58: Task Scheduler

7.5.1 Adding and modifying scheduled tasks

To add a new task, click on the button in the top right corner of the details view.

Enter the general parameters in the “General” tab:

❑ Name
Enter a meaningful name for the scheduled task (required).

❑ Path
Enter the complete path to the file to be executed of the scheduled task (required)
If the path contains blank characters, the path needs to be enclosed in quotation marks.

❑ Active
Check this box to activate the task. Only active tasks will be executed. This setting is useful if you want to temporarily deactivate tasks.

❑ Arguments
You can provide command line parameters required from the executable file here (optional).

❑ Interval
The task will be executed when this interval has been elapsed (default is 30 seconds).

Enter the additional parameters in the “Details” tab:

❑ Description
Enter a meaningful name for the scheduled task.

❑ Boot trigger delay
After the operating system (Microsoft® Windows Server®) has started, the task scheduler will wait for this delay before the scheduled task will be launched for the first time (default is 0 seconds)

❑ Execution time limit
If the execution of the scheduled task lasts longer than this time limit, it will be interrupted by the operating system.

You can modify an existing task, by selecting it in the list (the selected row will be displayed in orange color and a small arrow will be shown on the left) and clicking the button in the details view. Any changes need to be applied by clicking <OK>.

7.5.2 Disabling and deleting scheduled tasks

To temporarily disable a scheduled task without deleting it, switch to the edit mode by clicking the button and uncheck the “Active” box. Confirm by clicking <OK>.

If you want to delete a scheduled task permanently, select it from the list and click the button. A confirmation dialog will be displayed where you will have to click on the <Yes> button.

7.6 Clean-up

The clean-up settings are used to exploit the existing memory space best possible and to automatically ensure that space for the latest data is always available. Multiple clean-ups can be configured at the same time. The grouping, sorting, filtering and page navigation functions are available here as well.

Figure 59: Start clean-up editor

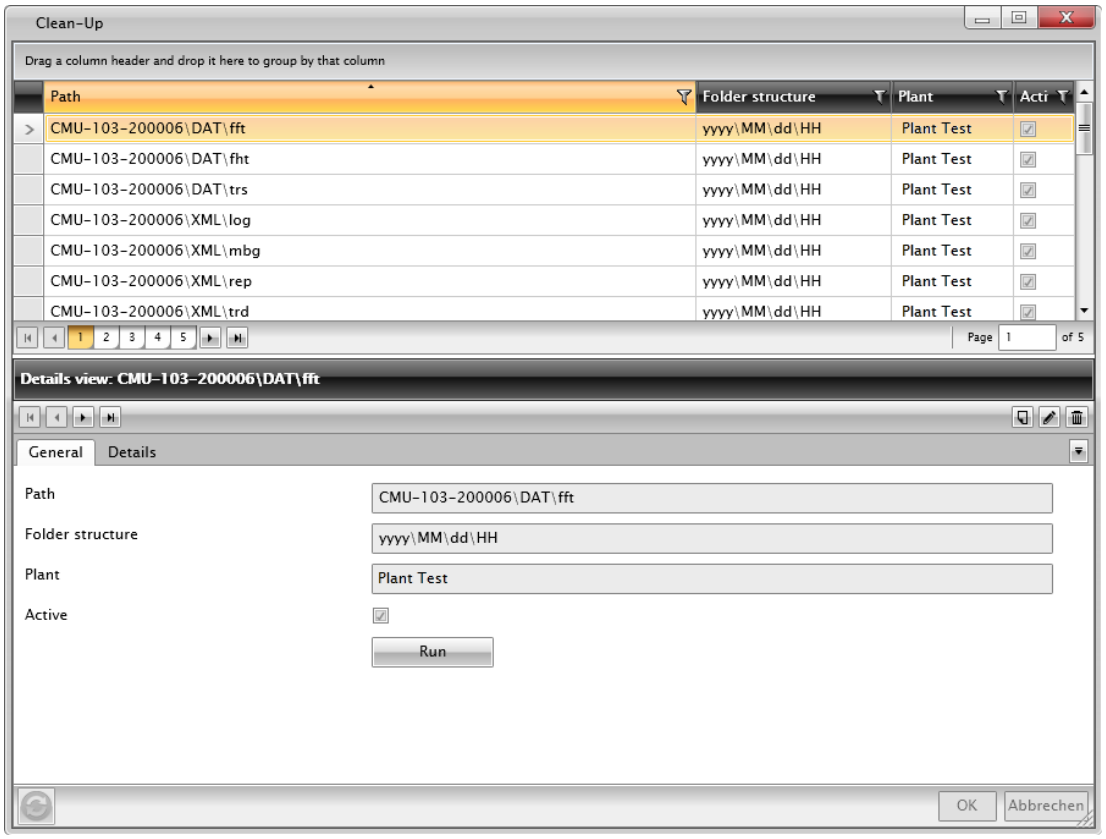


Figure 60: Clean-Up Editor

7.6.1 Adding and modifying clean-ups

To add a new clean up, click on the button in the top right corner of the details view.

The most suitable way is to create the clean up via a plant. Drag the plant from the plant tree to the “Plant” field in the “General” tab.

Additionally enter the following parameters in the “General” tab:

❑ Path

Enter here the path to the target of the clean-up. This path needs to be relative to the configured plant archive, e.g. CMU-103-200006\DAT\fft.

❑ Folder structure

Is applied by the plant configuration, e.g. yyyy\MM\dd\HH.

❑ Plant

Drag the desired plant from the plant tree and drop it to this field.

❑ Active

Check this box to activate the cleanup. Only activated clean ups will be executed. This setting is useful if you want to temporarily deactivate clean ups.

The following figure shows an example of a possible directory structure.

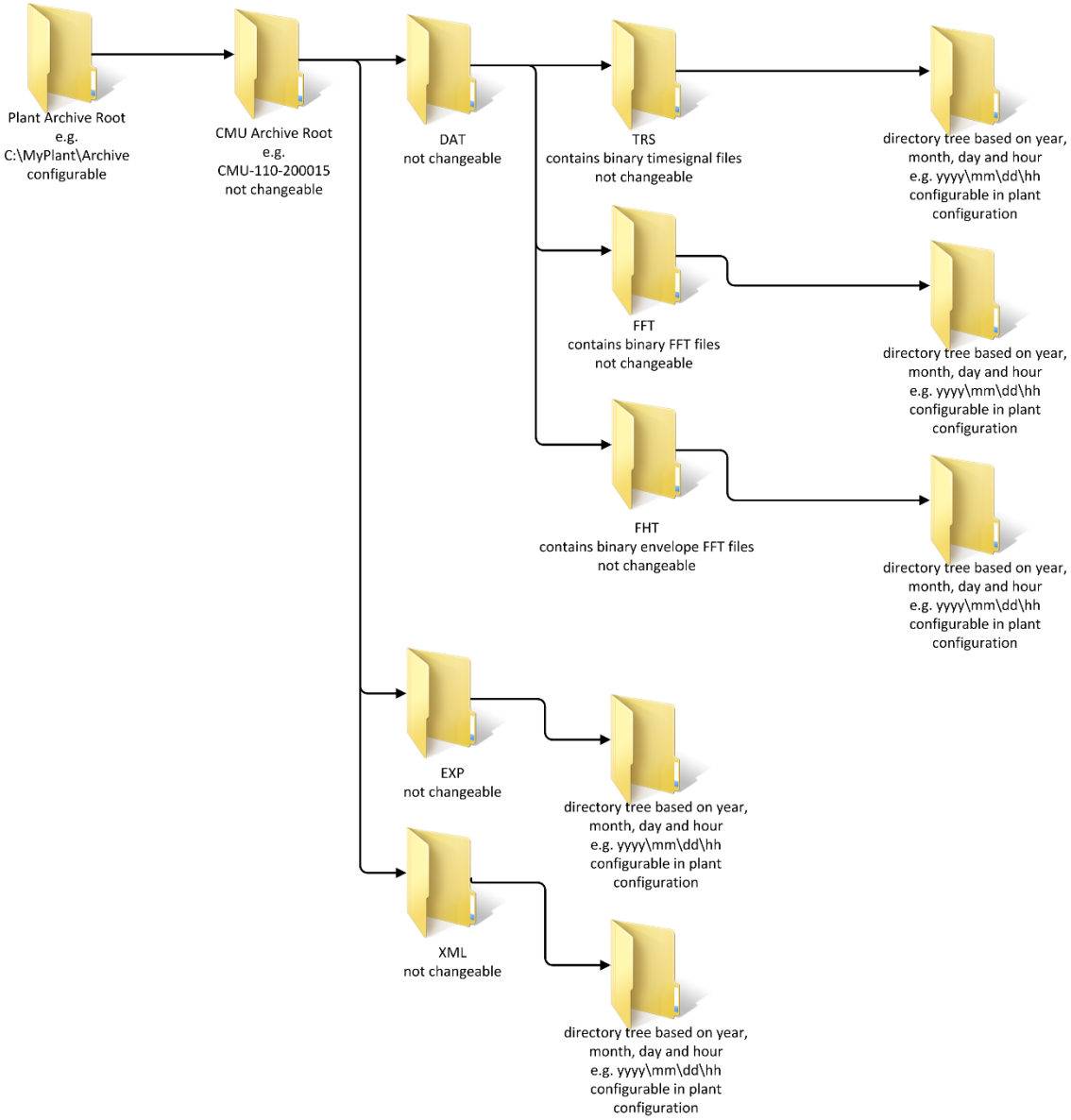


Figure 61: Plant archive structure

Tip

Configure a clean-up for binary time signal files of a specific CMU

1. Drag “MyPlant” from the plant tree to the “Plant” field in the details view of the clean-up (clean up needs to be in edit mode)

2. Enter the path “CMU-110-200015\DAT\TRS” in the “Path” field.

3. Enable the clean-up procedure by checking the “Active” checkbox.

4. Click <OK> to apply the changes.

7.6.2 Time settings

In the “Details” tab, you can configure the time settings for the clean-up.

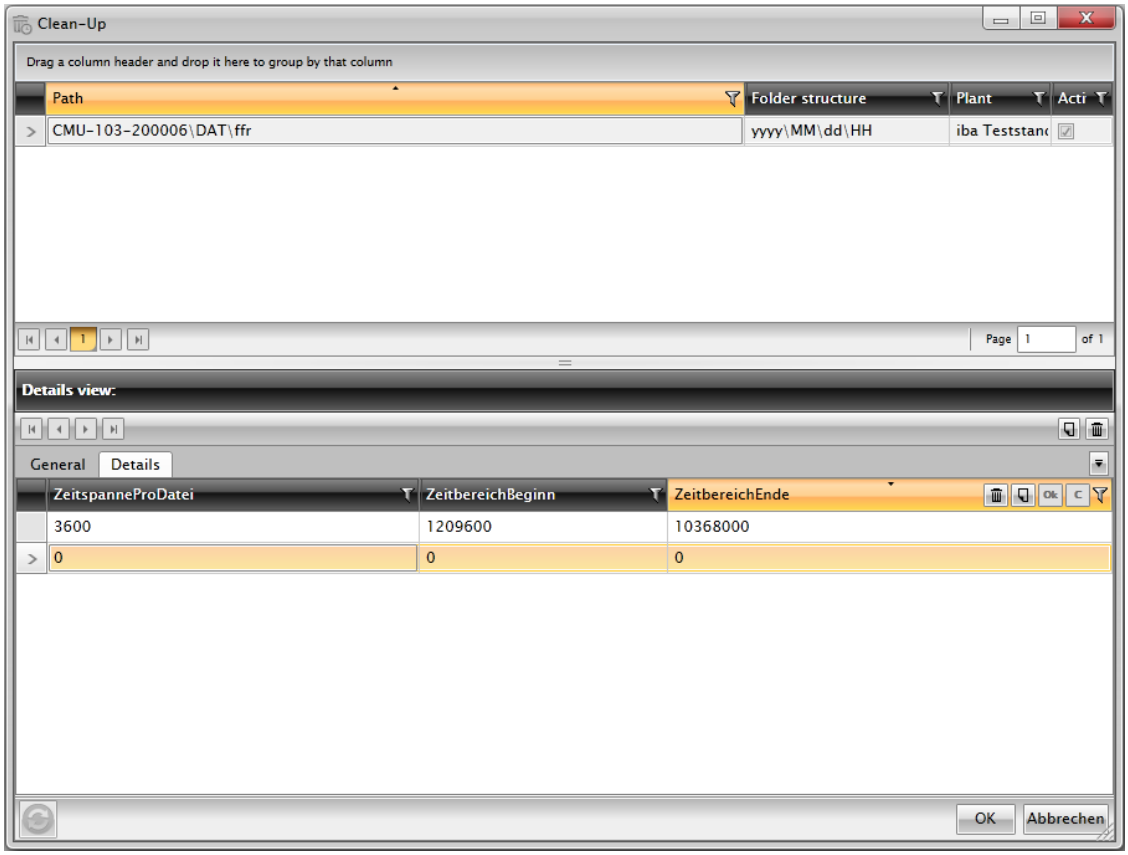


Figure 62: New time setting for clean ups

To edit the time settings, the relevant clean up needs to be in edit mode; for this purpose, click on the button in the details view. By clicking on the button in the header of the list, you can add new time entries.

The following parameters need to be configured:

❑ TimespanPerFile

Within this time span in seconds, at least one file is to remain after the clean-up.

❑ TimeRangeStart

Beginning of the time range in seconds from which TimespanPerFile shall be valid. The value 0 means that the moment where the revision is carried out, will be taken as TimeRangeStart.

❑ TimeRangeEnd

End of the time range in seconds up to which TimespanPerFile shall be valid. The value 0 means that a very high value is set internally (9.223.372.036.854.775.807), which is nearly infinitely in the past.

Example

TimespanPerFile is 3600

TimeRangeStart is 0

TimeRangeEnd is 604800

Within a week in the past, every hour one file shall remain, all other files are deleted.

Apply the data by clicking on the button in the header of the list. To discard your changes, click the button.

To remove an existing time entry, click on the button in the header of the list.

7.6.3 Disabling and deleting clean-ups

To temporarily disable a clean-up without deleting it, switch to edit mode by clicking the button and uncheck the “Active” box. Confirm by clicking <OK>.

If you like to delete a clean-up permanently, select it in the clean-up list and click on the button in the details view. A confirmation dialog will be displayed where you will have to click on the <Yes> button.

7.7 Notifications

You can configure the notifications here. Notifications are triggered by logs which depend on the conditions of status trends.

Figure 63: Starting the notification configuration

Basically, several notifications can be configured; the notification window has the same structure as known from the log and clean up configuration. Only the configuration options differ.

Note

Notifications depend on the user settings!

Only users being members of the selected user group AND having selected the plant for notification in their user profile will be informed.

For more information about this, see chapter 8.4 “User profile“.

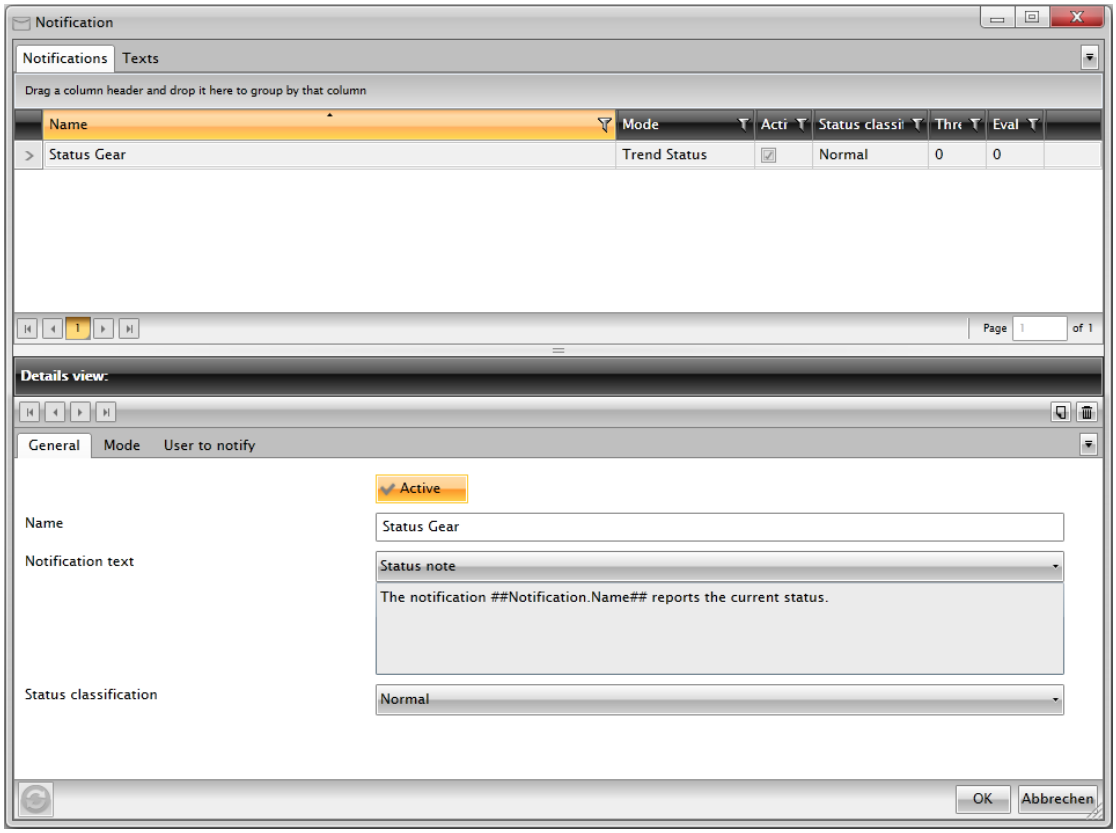


Figure 64: Configuring notifications

7.7.1 Adding and modifying notifications

To add a new notification, click on the button in the upper right corner of the details view.

Enter the following parameters in the “General” tab:

❑ Name
Enter a meaningful name for the notification (required).

❑ Active
Check this box to activate the notification. Only activated notifications will be sent. This setting is useful if you want to temporarily deactivate notifications.

❑ User group
Select the user group which should receive the notification.

❑ Notification text
Choose from the available text templates which text is to be used for the notification.

❑ Status classification
Select the desired status classification from the list (required)

Available settings are:

- Normal
- Warning
- Alarm
- Acute Alarm

Now enter the additional parameters in the “Mode” tab:

First, select the source type for the notification using the buttons <Trend status> or <Status type>. The selected button will be displayed in orange color.

Depending on your selection, you can either drag a specific status trend from the plant tree to the trend status field or you can select a status type from the list.

❑ Trend status / virtual trend status type
Depending on the selected button, either drag a specific status trend from the plant tree to this field or select a status trend from the list

❑ Interface
Select the desired notification interface (e.g. MailNotification)

❑ Threshold
This parameter is linked to the evaluation period parameter.
Enter a number between 0 and 1 indicating the frequency of the permissible occurrence of the status trend or the status type within the evaluation period.

Example

Status classification in the “General” tab was set to “Alarm”

Threshold was set to 0.25

Evaluation period is set to 04:00

In the observation time of 4 hours, the selected status trend (or all trends complying with the selected status type) needs to be in “Alarm” status in 25 % of the occurred cases for the notification to appear.

❑ Evaluation period
Select the number of hours of the observation period (e.g. 14:00 means 14 hours).

Both parameters, “Threshold value” and “Evaluation period”, allow a good control of the triggered notifications.

Note

If the <Status type> button is selected, the status trends of all plants complying with this type will be used. A subset of these status trends can be achieved by selecting the plants in the user profile.

7.7.2 Creating notification texts

To configure notification texts, switch from the “Notifications” tab to the “Texts” tab in the list view window.

The list of the notification texts again has the same structure as all list views before.

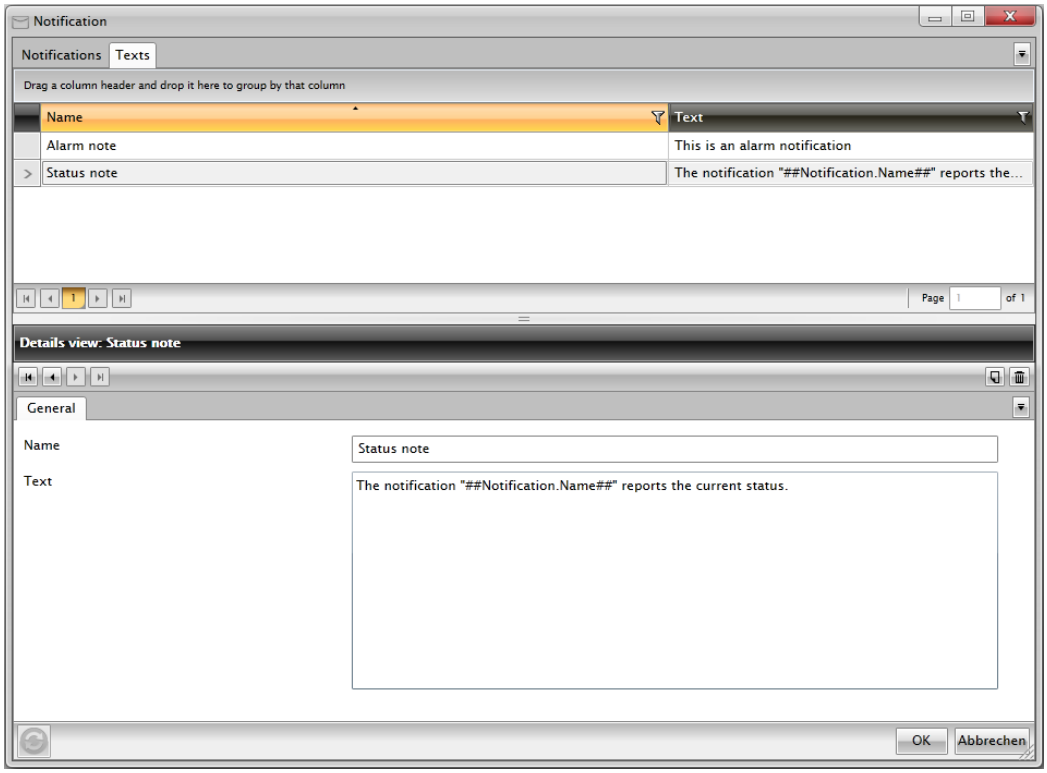


Figure 65: Notification texts

To add a new notification text, click on the button in the upper right corner of the details view.

The following parameters can be edited; however, both need to be entered:

❑ Name
Enter a meaningful name here.

❑ Text
Enter the text for the notification. You can use placeholders within this text which will be filled automatically when creating the notification. Placeholders need to be enclosed in double hash signs (“##“). Example of a useful placeholder is the name of the receiver for instance.

Possible placeholders and their meanings:

##Notification.Name##	Configured *name* of the notification in the “General” tab
##Notification.Id##	Unique ID of the notification assigned in the database
##Receiver.Name##	User name of the receiver configured in the user administration
##Receiver.LastName##	Last name of the receiver configured in the user administration
##Receiver.FirstName##	First name of the receiver configured in the user administration

##Time.ToShortDate-String()##	Date portion of the current system time of the ibaCMC, indicates here for example the date of preparation of the notification.
##Time.ToShortTime-String()##	Time portion of the current system time of the ibaCMC, indicates here, for example, the preparation time of the notification.

To modify an existing notification text, select it from the list and click on in the details view. To delete a notification text, click the button.

7.8 Report configuration

The ibaCMC automatically generates reports based on the Microsoft® SQL Server® Reporting Service. To be able to use a report in the report configuration, the template needs to be created with the Microsoft® SQL Server® Reporting Service Report Manager first. For this purpose, contact your Microsoft® SQL Server® Administrator.

Figure 66: Starting the report configuration

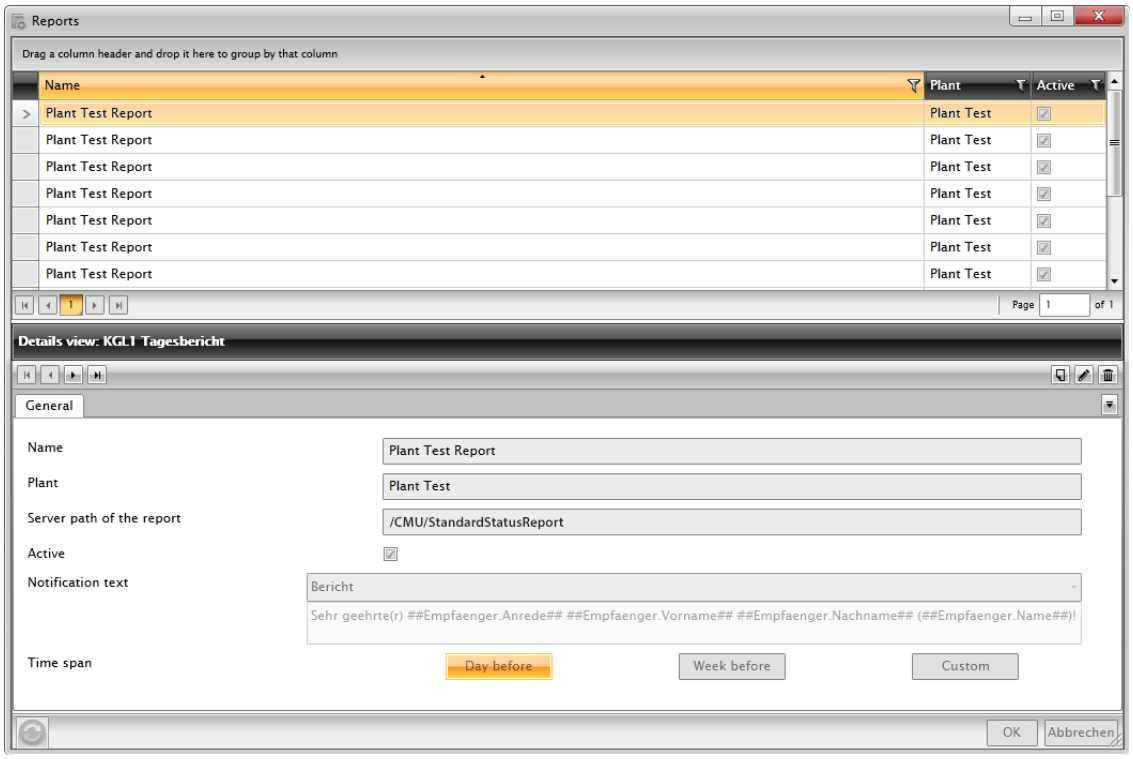


Figure 67: Report configuration

7.8.1 Adding and modifying report configurations

To add a new report configuration, click on the button in the top right corner of the detailed view.

Enter the general parameters in the “General” tab:

❑ Name
Enter a meaningful name for the report configuration (required).

❑ Plant

Drag a plant from the plant tree on the left and drop it here to connect it to the report.

❑ Server path of the report

Enter the relative path of the report on the Microsoft® SQL Server® Reporting Server.

❑ Active

Check this box to activate the report. Only active reports will be generated and sent. This setting is useful if you want to temporarily deactivate reports.

❑ Notification text

You can choose from the available text templates which text is to be used for dispatch of the report. See also chapter 7.7.2 “Creating notification texts“.

❑ Time span

Here, you can select the already predefined periods “previous day” and “previous week” or enter a user-specific time period. If you select the “Custom” button, the following input fields become visible:

From:	hour when the period is to start
To:	hour when the period is to end
Number of days:	number of consecutive days

Example

“From” is set to 2 p.m.

“To” is set to 8 p.m.

“Number of days” is set to 3.

The reporting period starts at 14:00 the first day and ends at 20:00 the third day. The report will be created every day at midnight.

To remove an existing report configuration, click on the button in the top right corner of the detailed view.

7.9 Level adjustment

The level adjustment module is a great tool to setup thresholds for status trends and, consequently, for the notifications based on these trends.

Start the level adjustment by clicking the corresponding icon.

Figure 68: Starting the level adjustment

When the window is loaded, the level list will be empty. To display the dedicated levels, click on the entry in the plant tree on the left.

Note

If you select a high level plant tree item, like the plant itself or an aggregate group, there might be a huge number of related trends massively increasing the loading time. Therefore, you should select smaller items like component groups for level adjustment.

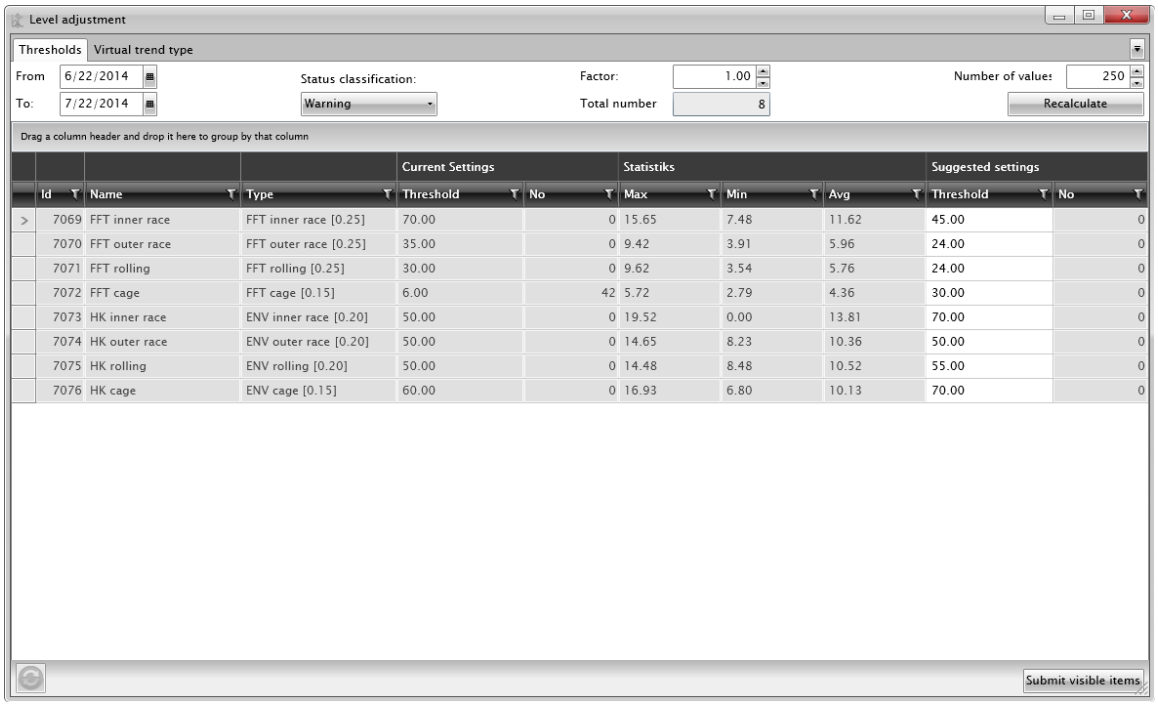


Figure 69: Level adjustment

On the top range of the tab “Thresholds” some parameters can be set.

❑ From

Select the starting date for the time range, which should be used to calculate the new threshold settings. The default value is a month in the past.

❑ To

Select the end date for the time range, which should be used to calculate the new threshold settings. The default value is the current date.

❑ Status classification

Select the status to be used for the number of occurrences in the time “From”, “To”. This value will be displayed in the “No.” columns.

Example

The trend “FFT inner race” reached 20 times the status “Warning” with the threshold value setting 70.00 (given by “From” and “To”). Therefore, the “Current settings” column -> “No.” would be 20.

❑ Factor

This value is used additionally to the value which is given by the type of the virtual trend (see tab “Virtual trend type”) to calculate the proposed new limit value.

Example

For the virtual trend “FFT inner race”, a factor of 0.25 is defined in the “Virtual trend type” tab. Therefore, the newly proposed threshold value would be calculated so that the virtual trend within the monitoring period is in the mean at 25 % of the new threshold value (in Figure 69 this would be for the virtual trend 7069 a new limit value of 45). If you have set a factor of 2.00, the newly proposed limit value would be the double, this means that the average virtual trend would be only 12.5 % of the new limit value.

❑ Total number

Shows the number of detected virtual trends found belonging to the selected plant item. IMPORTANT: If you set a filter in a column of the list, the number of the displayed rows might be smaller than the overall number.

❑ Number of values

Maximum number of virtual trends loaded at the same time.

❑ Recalculate

Use this button to refresh the list if you have changed the above parameters. However, the newly suggested thresholds are not applied to the database yet.

You can also manually edit the values for the proposed new limit values directly in the fields. The new limit values are only adopted if you click on the button <Submit visible items>.

Note

No matter how many virtual trends are loaded in the background, only the values which can be actually seen in the list are applied by clicking the <Submit visible items> button. All other thresholds remain unchanged.

The “Virtual trend type” tab shows the factors set for the virtual trend types. Some virtual trend types are treated more sensitive than other. In case of crest factors, the new limit values for example are thus selected that the virtual trend in the monitoring period would be at 50 % of the new limit value, for virtual trends which are calculated from the envelope curve spectrum for cages of roller bearings, it is only 15 %.

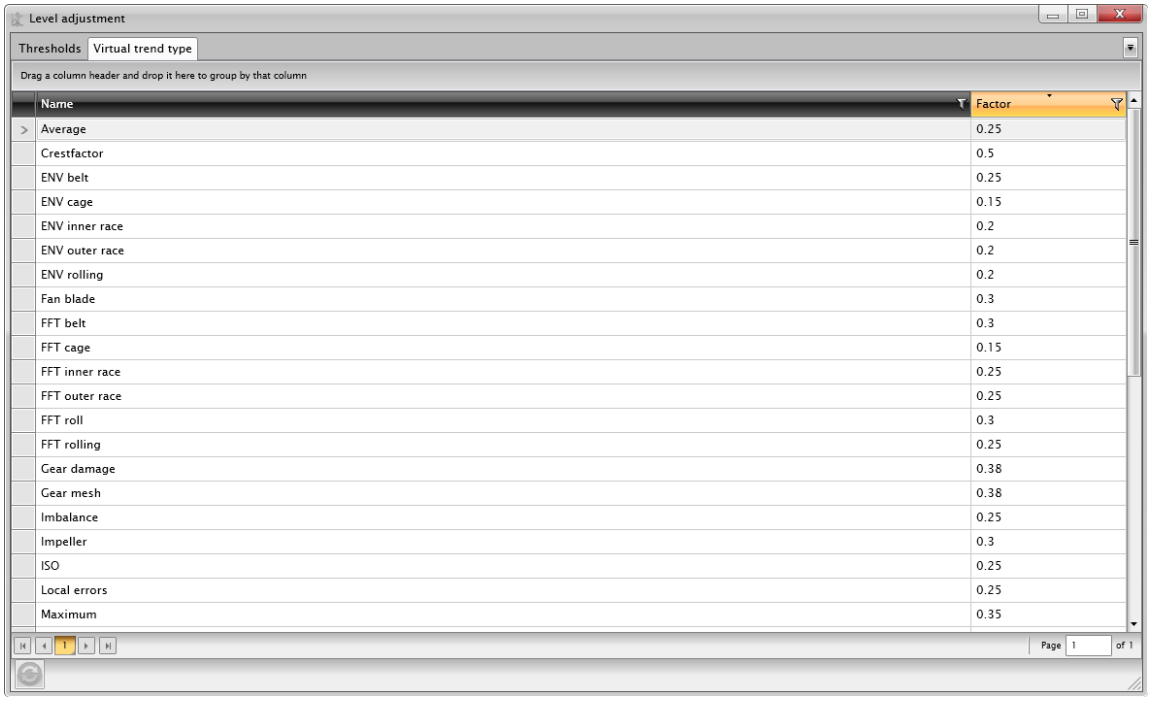


Figure 70: Factors of the virtual trend types

8 Settings

The Settings menu can be opened by clicking on the gears icon in the dock.

Figure 71: Opening the Settings menu

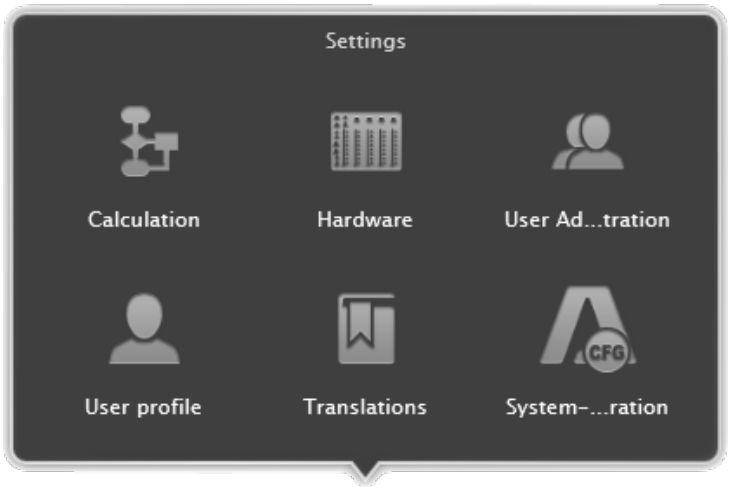


Figure 72: Settings menu

8.1 Calculation

The calculation configuration allows to view and change the calculation settings for virtual trends. The calculation configurator will appear when you click on the calculation icon within the settings menu.

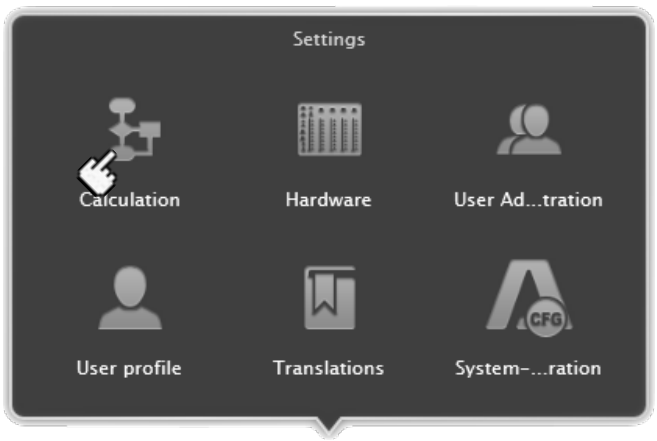


Figure 73: Starting the calculation configuration

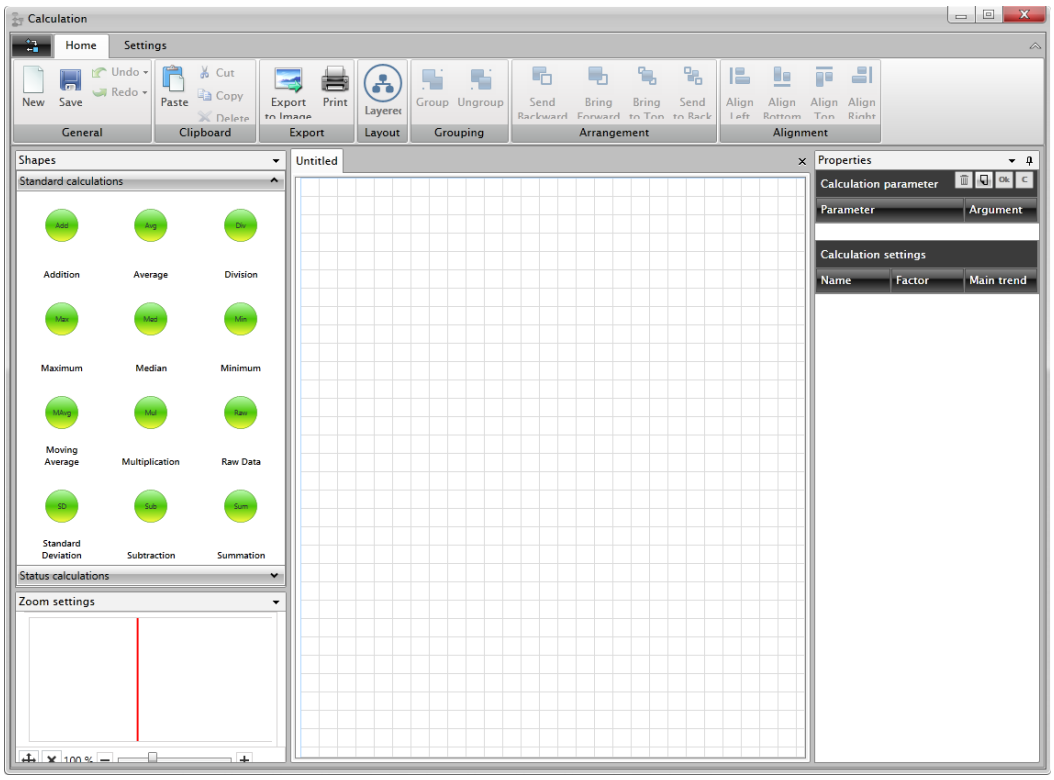


Figure 74: Calculation configurator

Apart from the menu bar and the tool bar, the calculation configurator consists of three main areas, i.e. the shape area on the left, the document area in the middle and the properties area on the right.

8.1.1 Viewing calculations

To view an existing calculation, drag the virtual trend or status trend from the plant tree to the document area.

Virtual trends and status trends can be distinguished in the plant tree based on their icons.

Virtual trends, e.g. the total of amplitudes from an acceleration range.

Status trend, e.g. limit value exceedance

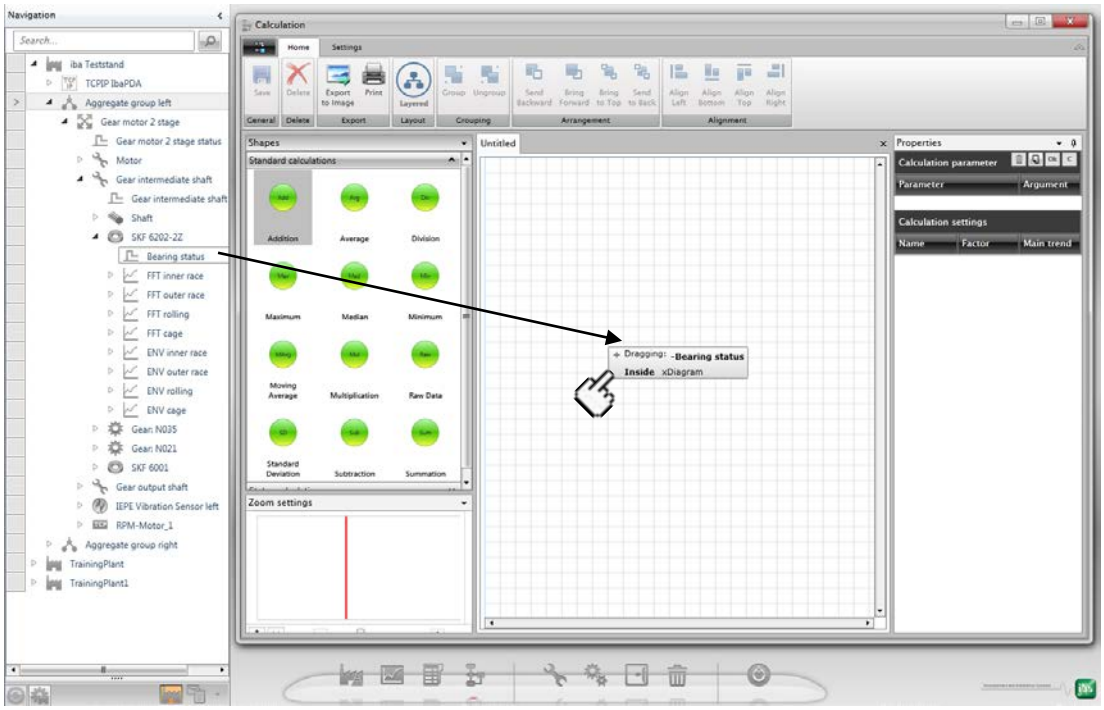


Figure 75: Viewing a trend calculation

The calculation is displayed as tree in the document area.

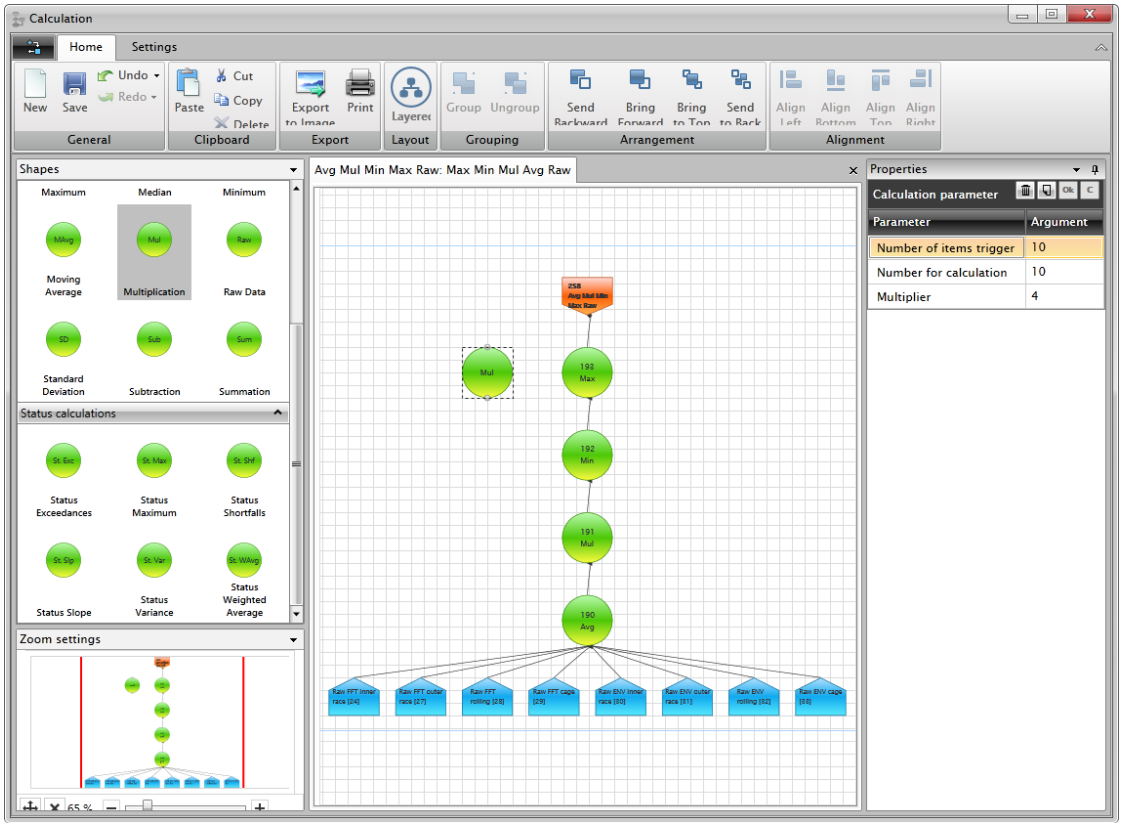


Figure 76: Calculating a status trend

In the calculation editor, a calculation procedure is always presented from the bottom to the top, this means the input parameters are on the very bottom, the calculation method in the center and the result on the very top. The individual calculation parts are displayed by different symbols und connected by lines which show the procedure itself.

Input parameters of virtual trends, e.g. a virtual trend which has been calculated from raw data.

Input parameter status trend, e.g. limit value exceedance

Calculation module, e.g. multiplication, addition, floating average

Output parameter virtual trend

Output parameter status trend

8.1.2 Changing or replacing calculation modules

The calculations are provided one-stage in the updated version of ibaCMC, this means one calculation model can be used per calculation. But you can add additional inputs by dragging a further trend from the plant tree directly on the green symbol of the calculation method.

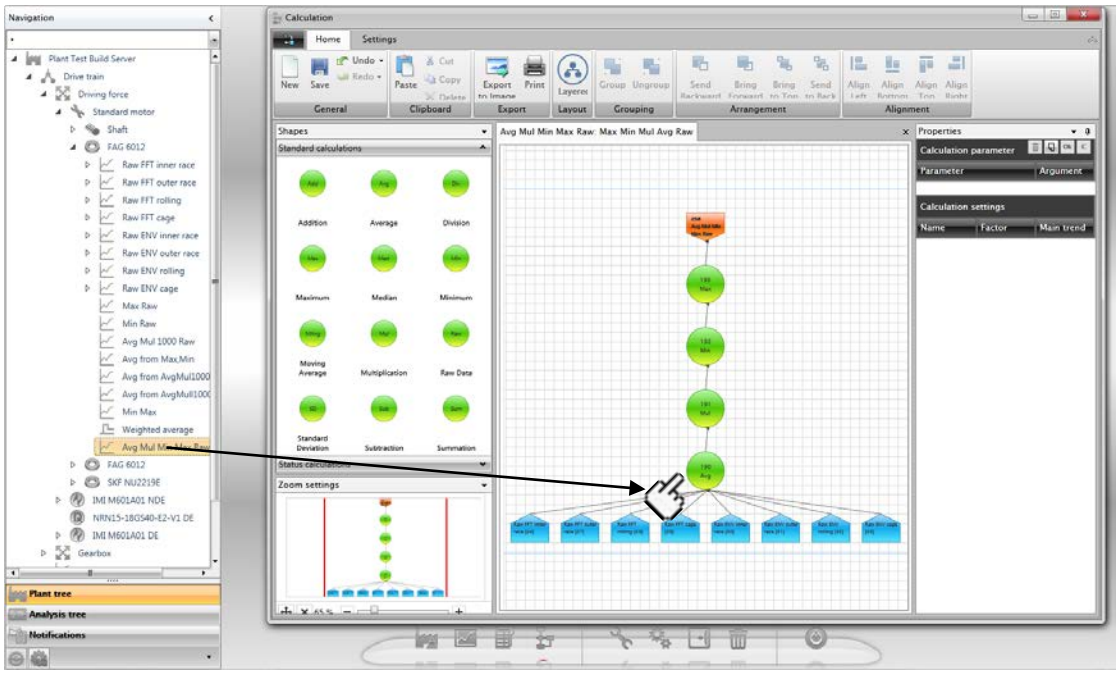


Figure 77: Adding calculations

Here, you can also mix status trends and virtual tends as entries. To remove again an input, mark it by a click with the left mouse button (the input is displayed with dashed line frame if it is marked) and then press the <Delete> button of your keyboard.

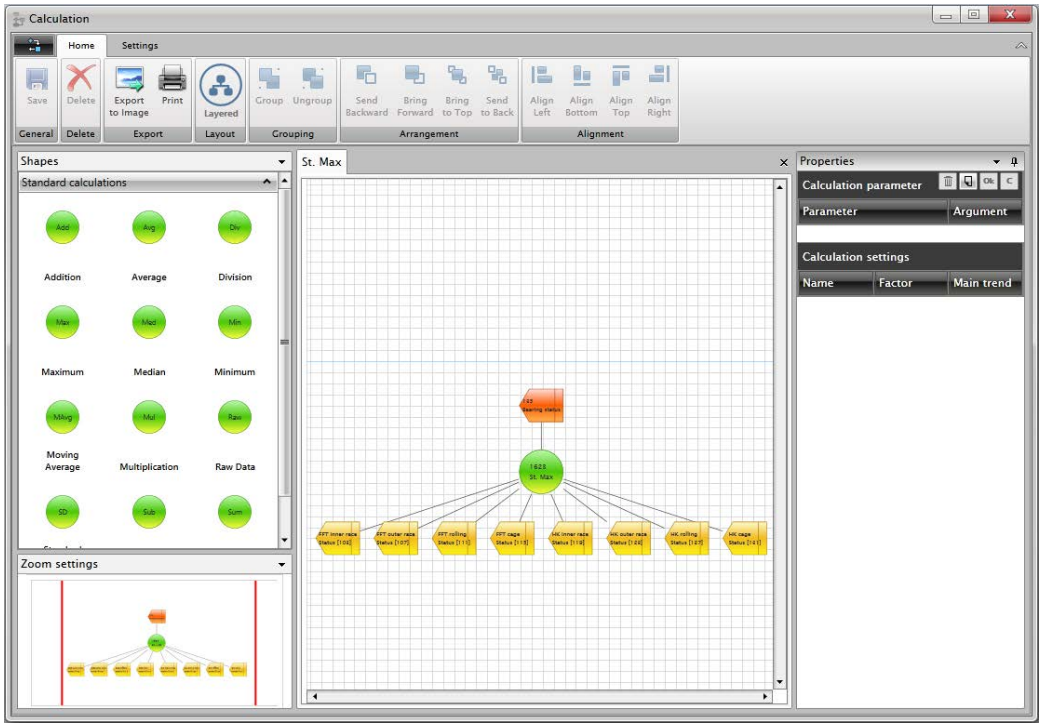


Figure 78: Calculation with added input

You can replace an existing calculation method with another method by means of a similar procedure by drag another module from the calculation library and drop it on the existing one.

8.1.3 Configuring calculation parameters

If a calculation module is selected, the parameters are shown on the right side of the properties area. The number and type of parameters depend on the calculation module.

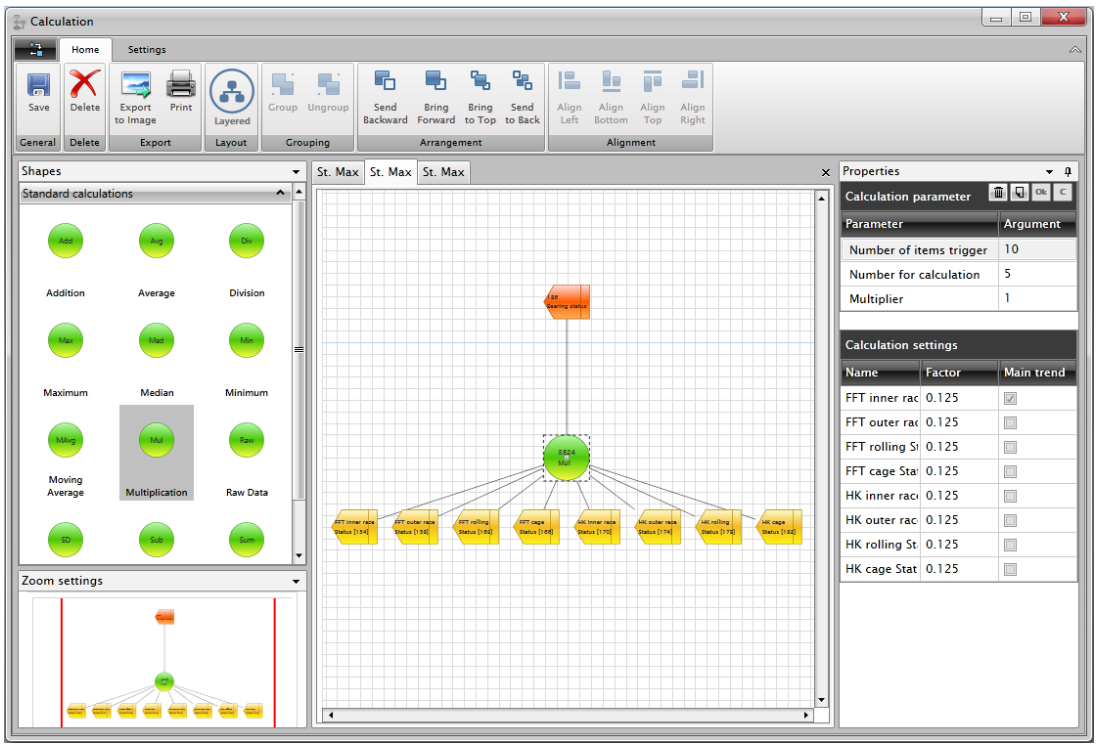


Figure 79: Multiplication module properties

The properties area is divided into calculation parameters and calculation settings.

The following calculation parameters are available for a multiplication module for instance.

- Number of items trigger

The value indicates how many data points have to exist in the input buffer before the calculation starts.

- Number for calculation

Number of data points used for the calculation. These values are averaged before the actual calculation. If you want to deactivate this behavior, set the “Number for calculation” to “1”.

- Multiplier

This value is used for the calculation (e.g. as multiplier for the multiplication)

For the calculation settings, the entries of the calculation module are shown and a weight factor is indicated.

In Figure 79 all eight inputs are equally weighted (with 12.5 %). But you can enter a random weighting factor whereby the total of all factors must be 1.

Meaning of the “Main trend” setting:

If different trends have been defined as input parameter, it cannot be guaranteed that all trends contain data points for the same points in time. Therefore, a trend can be marked via the setting main trend, which specifies the time stamps of the data points. If no values are available for other trends regarding these time stamps, it will be interpolated in the researched value between two neighbored data points in case of virtual trends and in case of status trends the finally valid status value is considered.

8.2 Hardware configuration

To open the hardware configuration, click on the corresponding icon in the Settings menu.

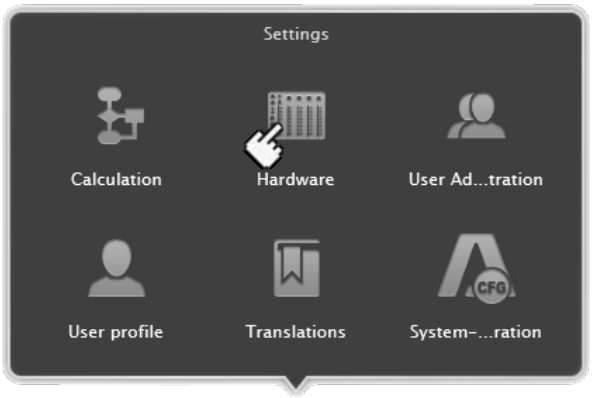


Figure 80: Starting the hardware configuration

The hardware configuration can be used to create new Condition Monitoring Units or to configure existing ones.

The hardware configuration contents are similar to those of other windows in the ibaCMC. Therefore, you can use the same filter, sorting or grouping functions in the CMU list or sensor list, as described in chapter 7.1.2 “Sorting, grouping and filtering“. The different types of data set navigation (see chapter 7.1.1 „Navigation through the logs“) are possible.

You can switch between the tabs (CMU, Sensor, ibaPDA Server) either by clicking on the tab or by using the button.

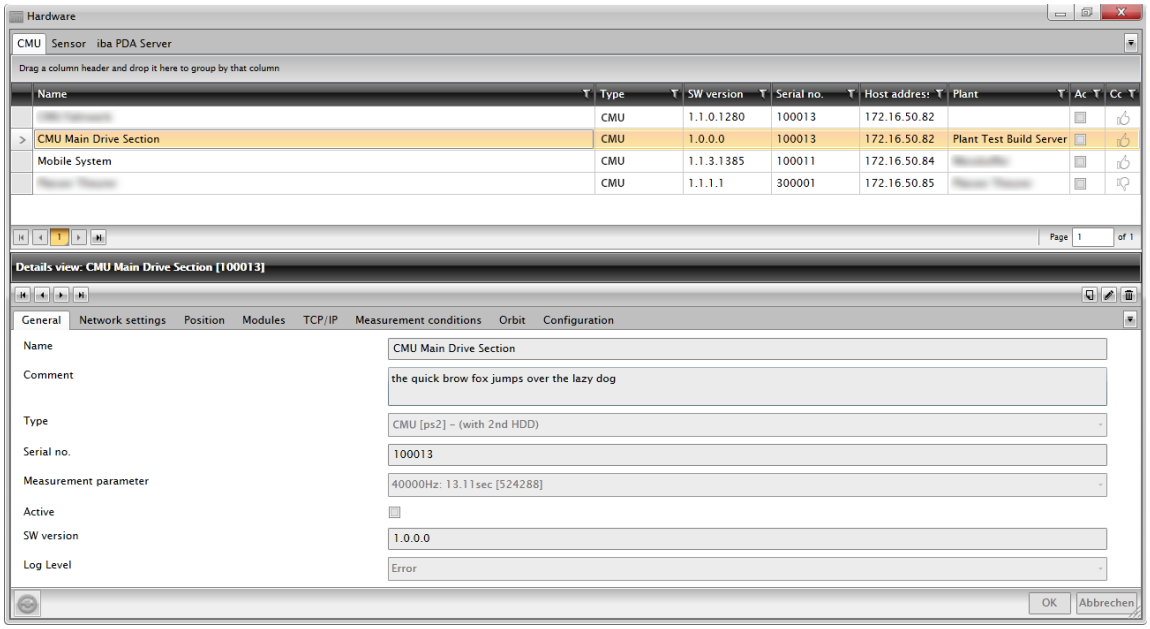


Figure 81: Hardware configuration

8.2.1 CMU configuration

The Condition Monitoring Unit (CMU) is the metrological core of the system. The CMU acquires the raw data of the connected sensors, interchanges data with the automation environment via TCP/IP telegrams, carries out already a great part of the signal analysis and transfers, for example, alarms via digital outputs.

When starting a new configuration, the CMU list in the hardware configuration is still empty (Figure 82 shows a prepared example in the list).

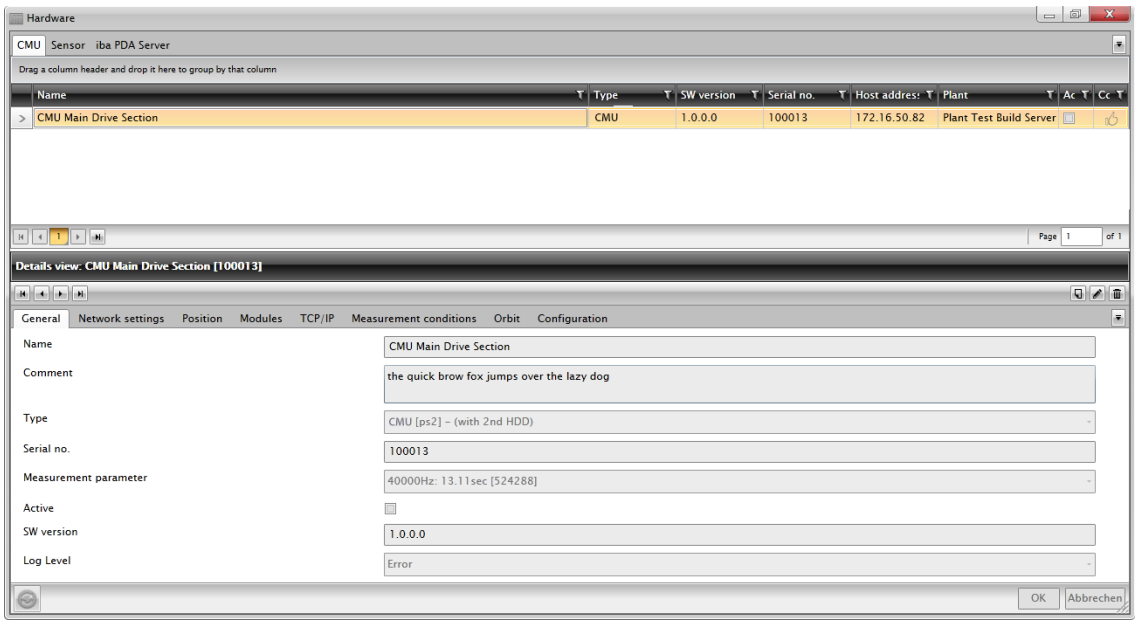


Figure 82: CMU hardware configuration

8.2.1.1 Adding and modifying a CMU

To add a new CMU, click on the button in the upper right corner of the details view. You can also select an existing CMU from the above list and switch with the button to the edit mode to modify configuration details.

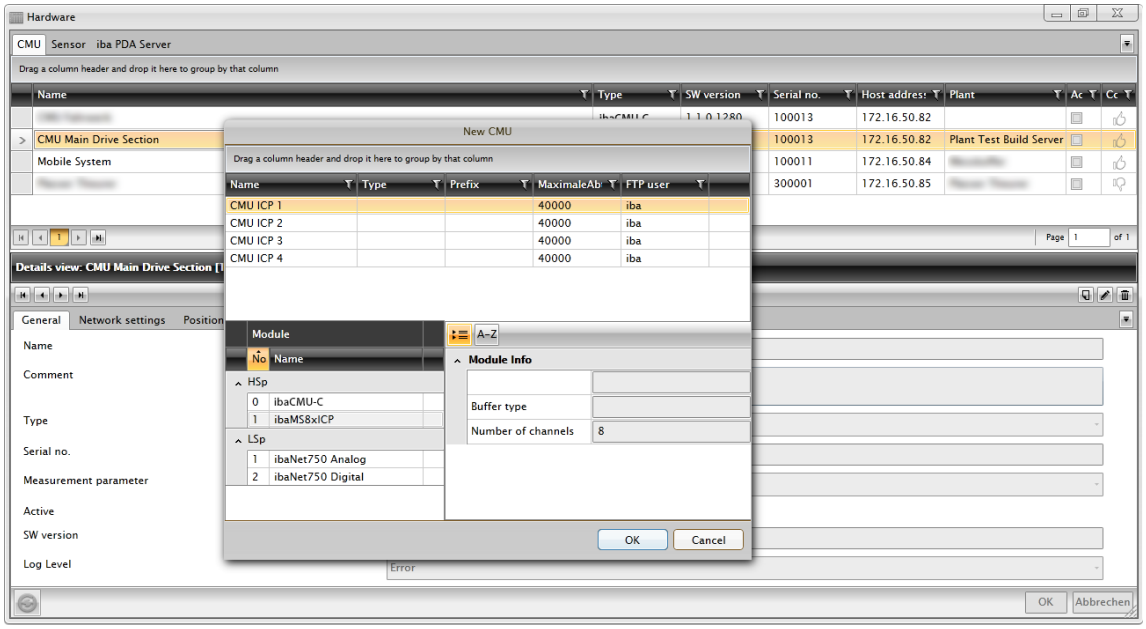


Figure 83: Creating a new CMU

By means of the button, the “New CMU” window opens and you can select from several predefined templates. The difference between the templates is the number of modules for connecting the vibration sensors. This number can also be found in the names of the templates CMU ICP 1 to CMU ICP 4. Choose the template, which is closest to your configuration needs. Confirm with <OK>.

The modules in the lower area of the “New CMU” window do not have to be considered yet; they are required later for the module configuration.

Click <OK> to close the “New CMU” window.

A new entry appears in the CMU list. Red-framed fields and an icon in the left column indicate that some important data still need to be configured. These are described in the following chapters.

After you entered all required data in the different tabs, exit the edit mode by clicking <OK>. If you want to discard the changes, click <Cancel>.

8.2.1.2 General CMU data

The “General” tab in the detailed view shows some general CMU data.

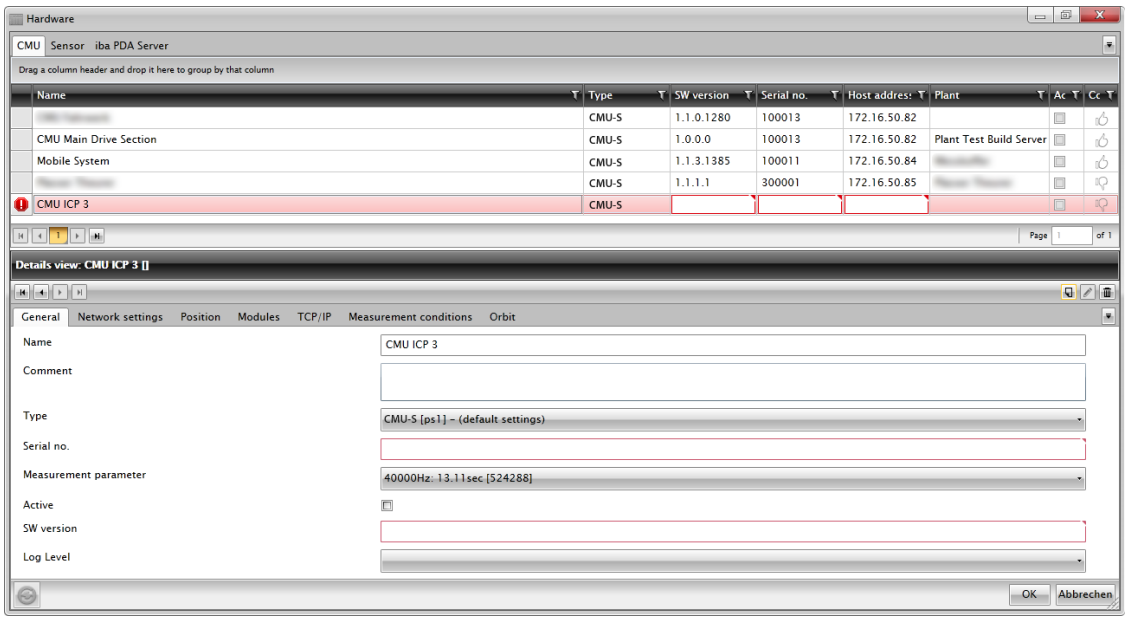


Figure 84: General CMU data

❑ Name

You can change the template name (CMU ICP 1) according to your needs.

❑ Comment

Enter a meaningful comment (optional).

❑ Type

Select the corresponding CMU type from the list (e.g. ibaCMU-S [ps1] – (default settings).

❑ Serial no.

Enter the 6-digit serial number of the CMU. You can find it on the type label on the backside of the device

❑ Measurement parameter

Select your desired sampling rate in Hz in combination with the measurement duration in seconds (e.g. 40000 Hz and 13.11 s). The measurement duration seams slightly strange at the first glance but it can be explained by the fact that the FFT calculation algorithm needs a total number of samples which is a power of 2 (2^n).

❑ Active

Activate or deactivate the CMU. The ibaCMC processes active CMUs only (transfer of the configuration files and collecting of the results).

❑ SW Version

Enter here the CMU software version making a later support request easier for instance. For the software version, go to the local website of the CMU for instance (see also CMU manual).

❑ Log level

You can set Level Debug, Info, Warning, or Alarm. Messages of this level are stored by the CMU and will be imported by the ibaCMC.

❑ Time interval of the measurement conditions [min]

This value specifies the time interval which the parameter “Max. number of measurements/interval of measurement conditions” refers to later. For more details, see chapter 8.2.1.7 “Configuring CMU measurement conditions“. This value needs to be indicated in minutes.

❑ Virtual channels active

This setting is used to activate or deactivate virtual channels (default setting: deactivated).

Virtual channels designate outputs of the CMU via the existing fiber optic interface. Therewith, calculated values can be directly transferred in an existing ibaPDA process data recording system. For more information on ibaPDA, please go to http://www.iba-ag.com.

❑ Trend calculation active

Activate the trend calculation of the CMU (default value: activated)

❑ Status trend calculation active

Activate the status trend calculation of the CMU (default value: activated)

8.2.1.3 Network settings

You can configure the CMU network settings here. The ibaCMC requires an FTP connection to the CMU to be able to upload the configuration files and download the calculation results and raw data.

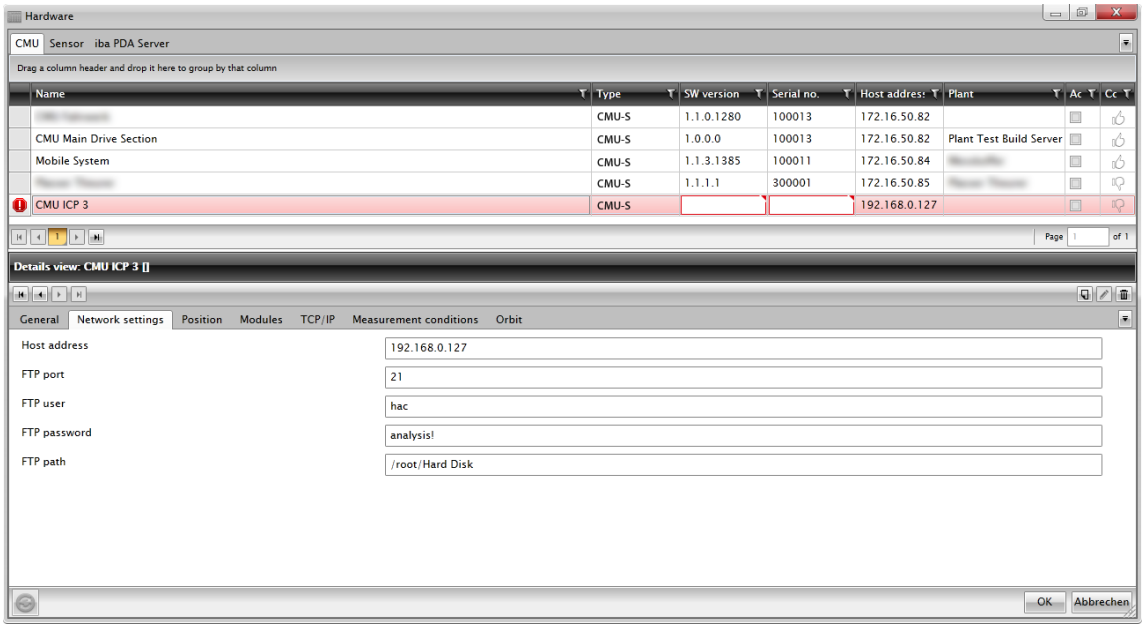


Figure 85: CMU network settings

❑ Host address

Enter the network IP address of the CMU here. This setting needs to comply with the local CMU settings. Information about this can be found in the CMU administrator manual or contact your network administrator.

❑ FTP port

This value is the default FTP port number 21 and must not be changed. With another port number, no FTP connection to the CMU is possible.

❑ FTP user

Default FTP user “hac” is configured in the CMU’s firmware; this value must not be changed.

❑ FTP password

The password “analysis!” is configured for the user “hac” in the CMU’s firmware and must not be changed.

❑ FTP path

This path depends on the selected CMU type in the “General” tab. For the ibaCMU-S, the path “/” needs to be entered.

8.2.1.4 CMU position

This setting is useful for geographically distributed plants, like e.g. for the monitoring of wind farms. The map feature requires an internet connection.

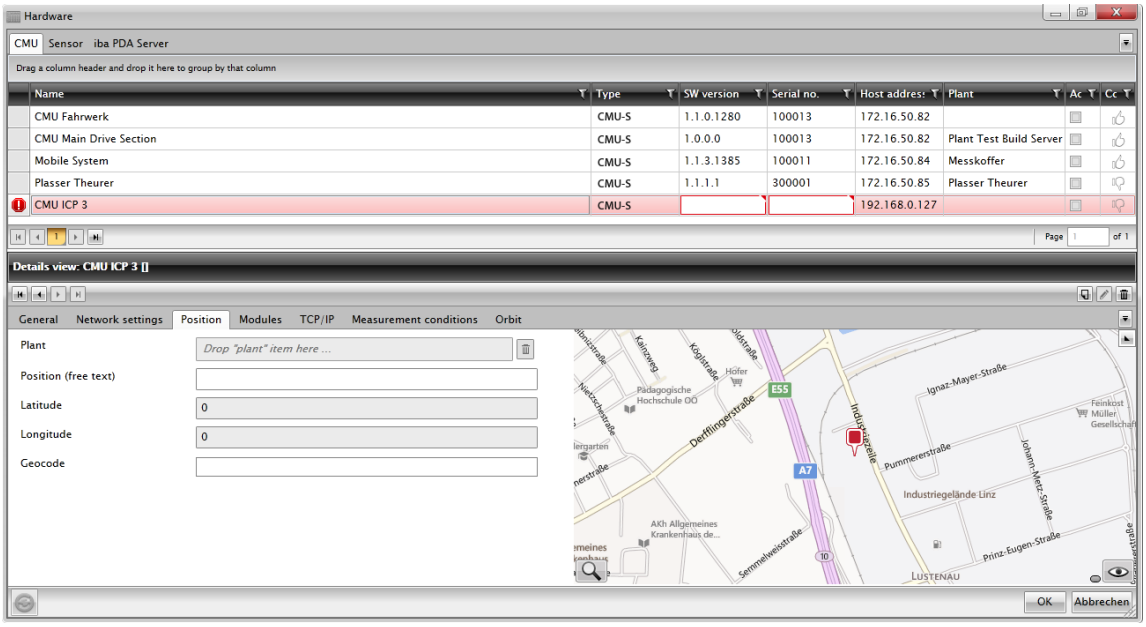


Figure 86: CMU position settings

❑ Plant

Enter here the plant the CMU belongs to. Just drag the relevant plant from the plant tree and drop it in this field.

❑ Position

Here you can enter your selected position designation.

❑ Latitude

Please enter here the desired north or south latitude in degrees. This value is automatically entered when you set the red waypoint icon with the mouse button on the left in the map.

❑ Longitude

Please enter here the desired east or west longitude in degrees. This value is automatically entered when you set the red waypoint icon with the mouse button on the right in the map.

❑ Geocode

This value is automatically entered when you set the red waypoint marker with the mouse button on the right in the card, a possible value could be for example “90762 Fürth, Deutschland”.

8.2.1.5 Module configuration

The module configuration specifies which module types are plugged in the backplane bus of the CMU and where. It is also configured which sensors are connected to which inputs. The sensor assignment establishes the actual connection between the plant configuration and the CMU.

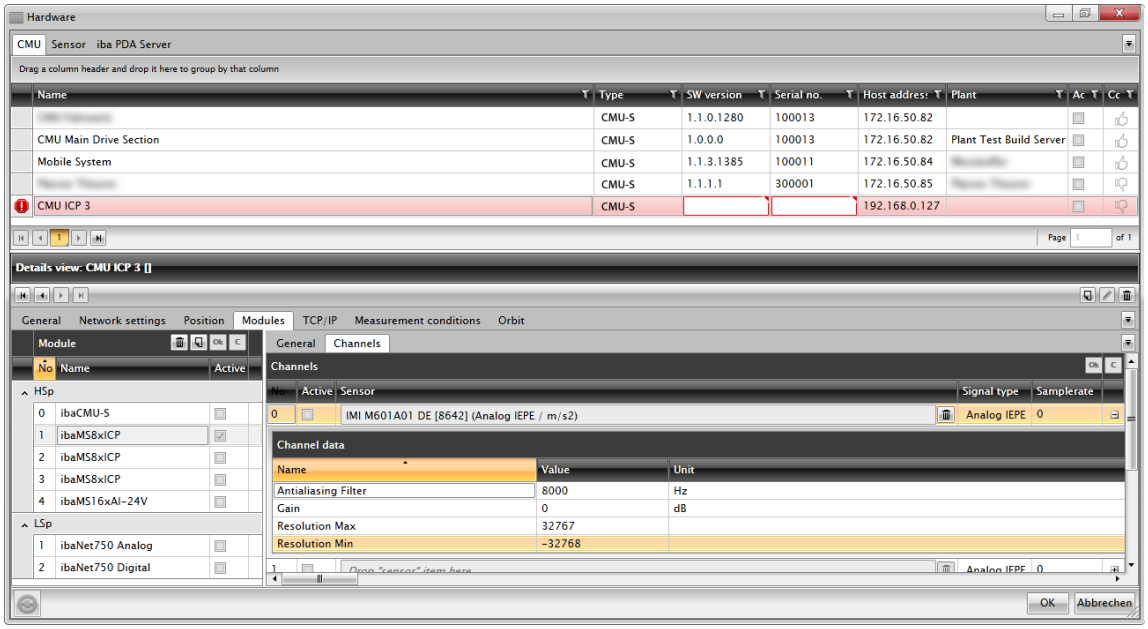


Figure 87: CMU module configuration

On the left side of the details view, you can see the module list grouped in high speed buffer (HSp, e.g. a vibration sensor) modules and low speed buffer (LSp, e.g. a temperature sensor) modules. Hsp modules are always plugged in the backplane bus of the CMU, since only there the high sampling rates up to 40 kHz per channel are possible. The Lsp modules are adjusted on ibaNet750 Analog and ibaNet750 Digital in the CMU templates, whereas these modules are not activated by default. In case of ibaNet750 it is an external fieldbus system which can be coupled to the CMU via fiber optic cables and which is compatible with 750 series of Wago. For more information about ibaNet750, please see (http://www.iba-ag.com/).

To be able to make any changes to the module configuration, the CMU needs to be in edit mode. Click in the upper right corner of the detailed view.

Adding modules

To add a module, click on the button on top of the module list (not to be confused with the button in the top right corner of the details view). A window appears where you can select a new module. Confirm with <OK>.

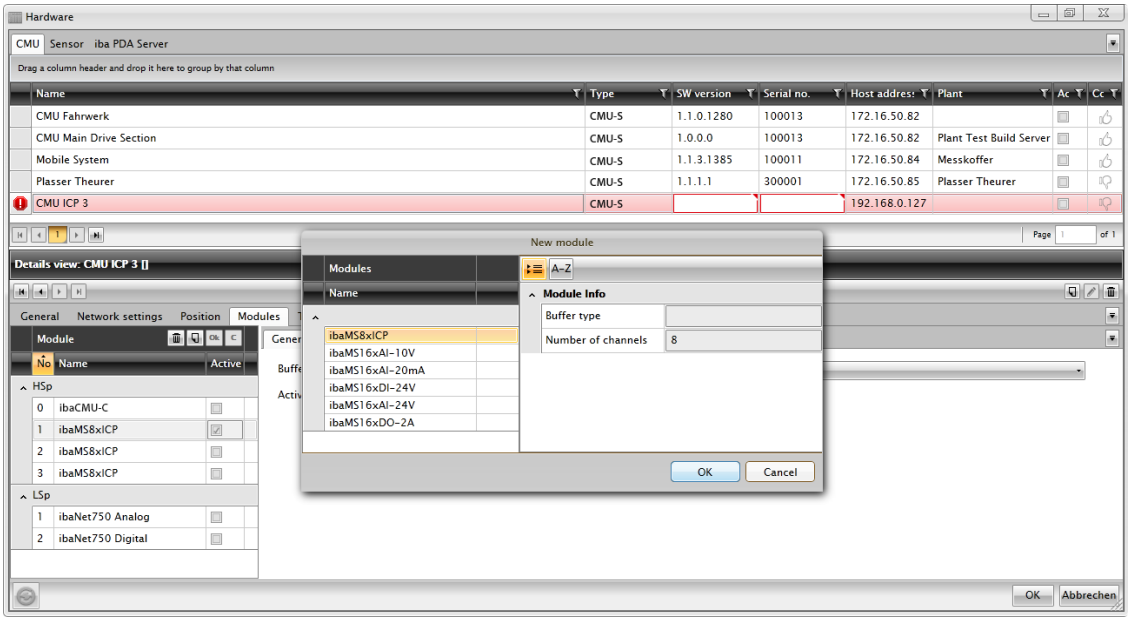


Figure 88: Adding a new module to the CMU

The following modules are currently supported:

Module	Description
ibaMS8xICP	Module with 8 inputs for vibration sensors acc. to IEPE standard (also known as ICP, a trademark of the PCB group Inc.)
ibaMS16xAI-10V	Module with 16 ±10 V inputs
ibaMS16xAI-24V	Module with 16 ±24 V inputs can be used for example for the connection of way sensors acc. to the vortex principle for orbit monitoring.
ibaMS16xAI-20mA	Module with 16 ±20 mA inputs
ibaMS16DI-24V	Module with 16 24 V digital inputs (HTL level)
ibaMS16DO-2A	Module with 16 power outputs e.g. for controlling hydraulic valves.
ibaMS32DO-24V	Module with 32 digital outputs with 24 V level

You can connect a maximum of 4 modules to a CMU. If this number is exceeded, a corresponding message will appear.

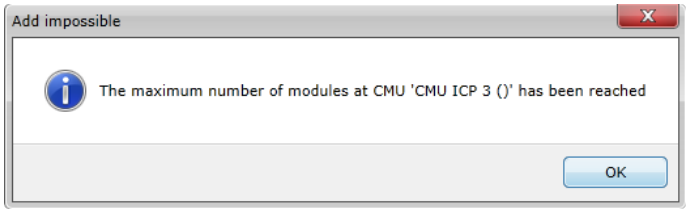


Figure 89: Too many modules at one CMU

Deleting a module

To delete a module, the CMU - as has been the case with adding modules - needs to be in edit mode. Click in the upper right corner of the detailed view.

In the module list on the left, left-click on the module to select the one to be deleted. It will be displayed in yellow color and you can delete the module by clicking the button above the module list.

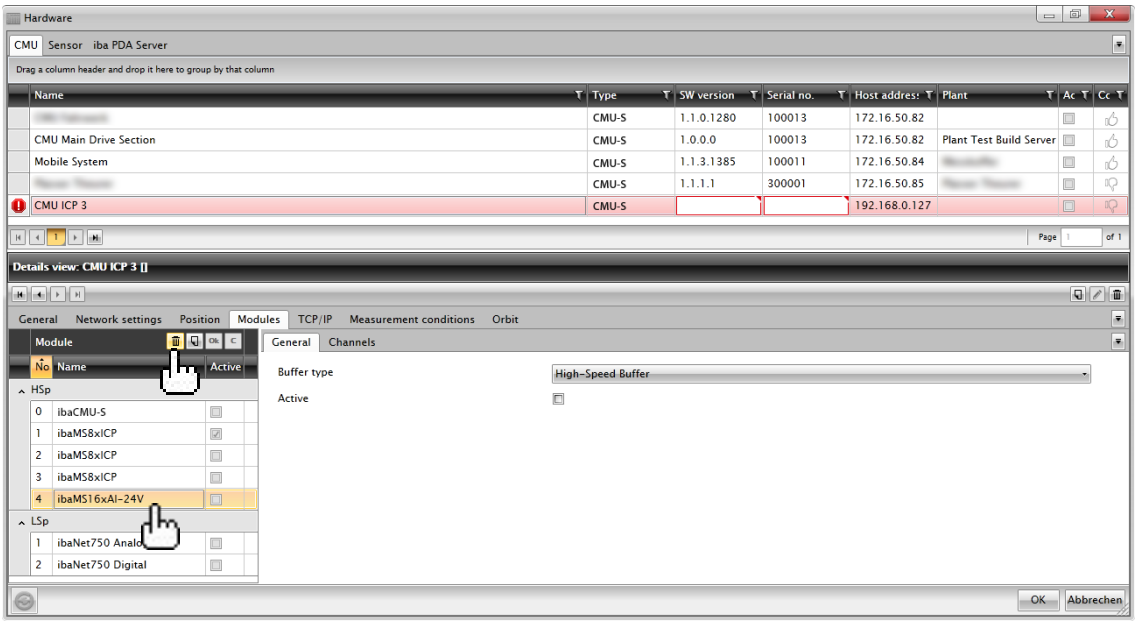


Figure 90: Deleting a CMU module

Editing module parameters

The module parameters are separated into two tabs, the “General” tab and the “Channels” tab. In the "General" tab, you will find the following parameters:

❑ Buffer type

You can choose between high-speed and low-speed buffer. This parameter is preset by the selected module and does not have to be changed.

❑ Active

This setting is used to activate or deactivate the selected module.

The more important settings can be found in the “Channels” tab.

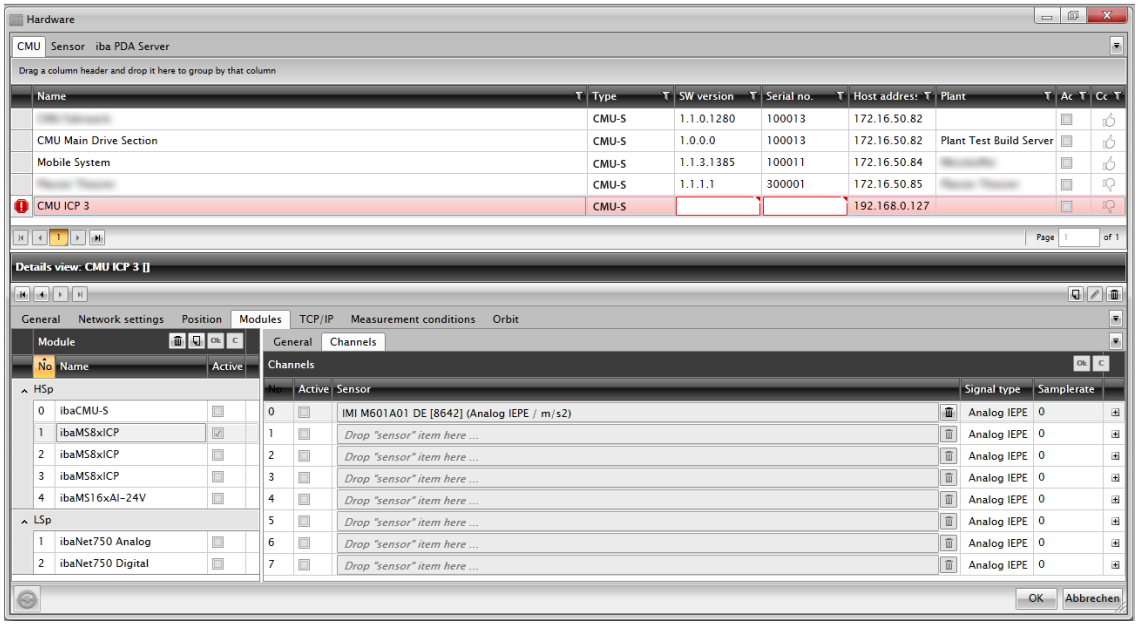


Figure 91: Module channel parameter

When setting the module channels, the connection from the CMU to the plant configuration and the installed sensors is established.

For this purpose, drag the desired sensor from the plant tree to an empty channel. Of course, the sensor needs to be electrically connected to this channel.

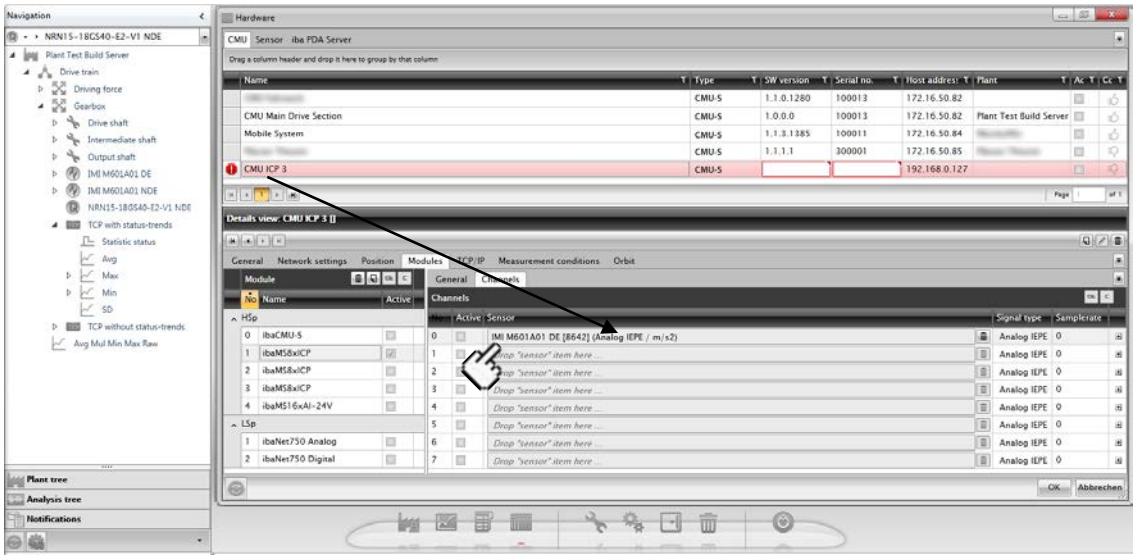


Figure 92: Connect sensor to module channel

The sensor name will then be shown in the list. If you want to undo the connection, click on the button on the right side of the sensor name. This does neither change the sensor nor the plant configuration itself, only the connection between sensor and module channel is removed.

The signal type in the channel list is principally given by the module itself (see “Analogue IEPE” in Figure 92). But it can happen that you connect for example a sensor with a 4-20mA output signal to a module with a ±20mA input.

Depending on the module, you can set some channel parameters. These will be displayed by clicking on the button in the right column of the channel list.

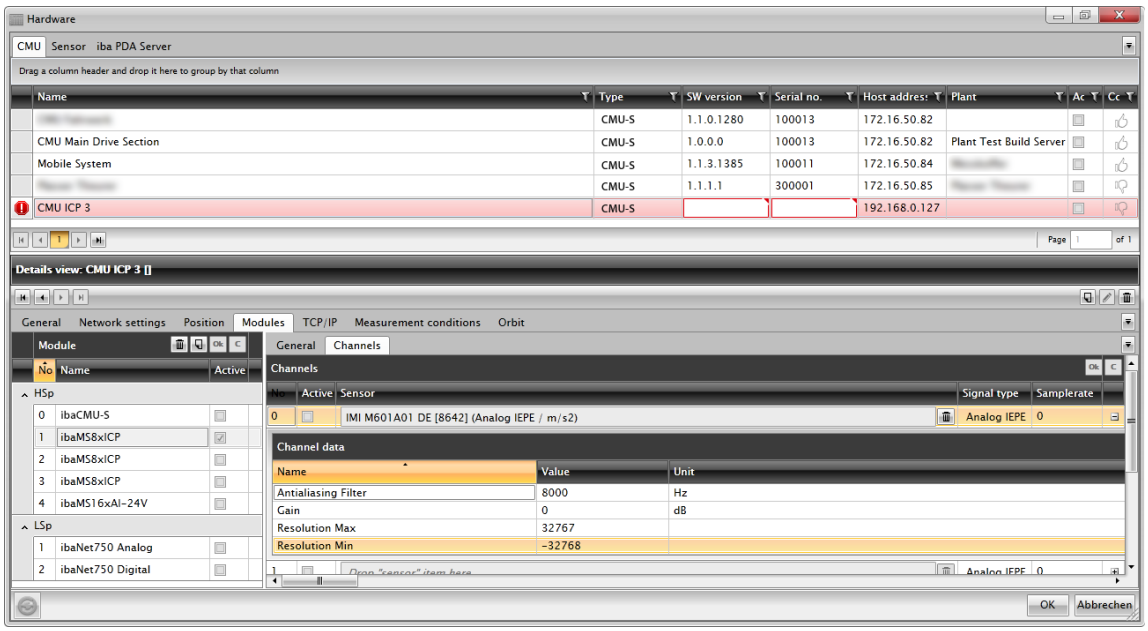


Figure 93: Channel data of a CMU module

❑ Antialiasing Filter

This value is the cut-off frequency for the antialiasing filter. This value is normally set to 0.4 times the selected sample rate. Of course, this parameter needs to be supported by the module hardware. Please refer to the manual of the particular module for details.

❑ Gain

Logarithmical value for the channel enhancement, indicated in dB (e.g. a setting of 20 dB means a linear factor of 10). Of course, this parameter needs to be supported by the module hardware. For details please refer to the manual of the particular module.

❑ Resolution Max

Maximum value at the channel entry in connection with the resolution of the A/D transformer of the module (e.g. 32767 for a 16 bit resolution). This value must not be changed.

❑ Resolution Min

Minimal values at the channel entry in connection with resolution of the A/D transformer of the module (e.g. - 32768 in the event of a 16 bit resolution). This value must not be changed.

To hide the channel data again, click the ⊟ button in the right column of the channel entry.

8.2.1.6 Configuring TCP/IP telegrams

The TCP/IP interface allows the CMU to communicate with external systems (e.g. the automation environment of the plant). This is particularly useful since the automation or a process data recording system like e.g. ibaPDA has already a lot of signals and therefore, no additional sensors have to be mounted.

In case of a new CMU, the telegram list in the details view is still empty.

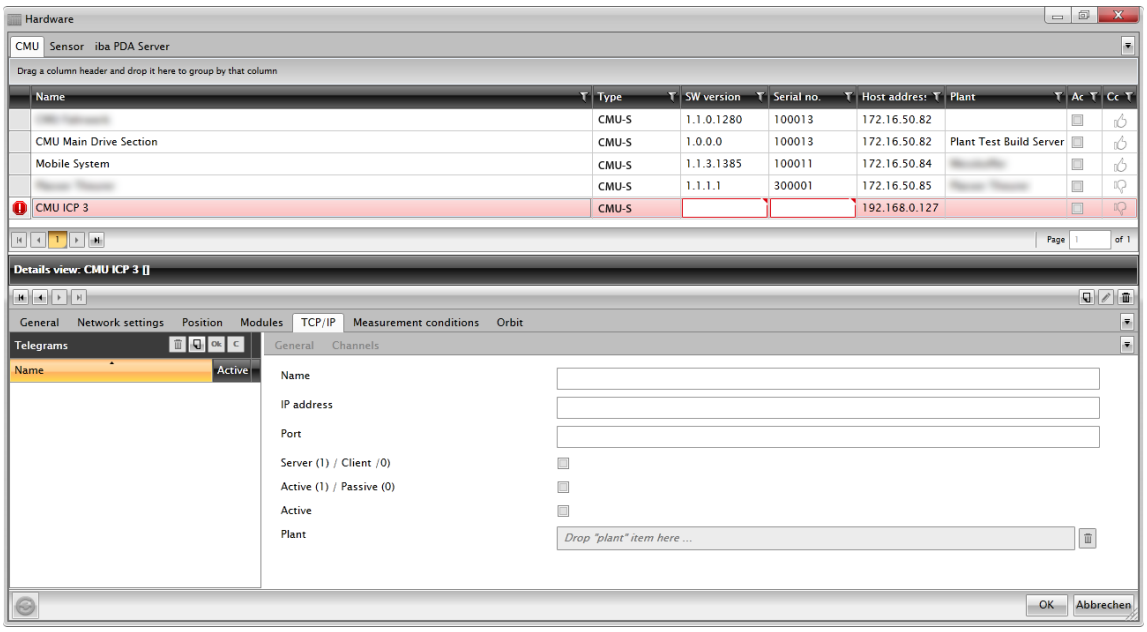


Figure 94: Adding a new TCP/IP telegram

The CMU can receive two telegrams and send another telegram. To create a new telegram, click on the button in the upper area of the telegram list.

Enter the following telegram parameters.

- Name

Enter a name for the telegram, for example ‘Test Telegram’.

- IP address

Enter the IP address of the communication partner. Please note that the IP address needs to be in the same subnet as the IP address of the CMU.

- Port

Enter the number of the port to be used for the communication.

- Server / Client

If this box is checked, the CMU acts as server, otherwise it acts as client. If you want to send the telegram, check the box; uncheck it if you want to receive the telegram.

- Active / Passive

If these check marks are set, the CMU tries to actively start the communication, otherwise please wait for the communication setup by the communication partner.

- Active

Check the box to activate the entire telegram. Only active telegrams will be sent or received.

- Plant

Drag the plant from the plant tree with which the telegram is to be linked and drop it here. To remove the connection, click the button on the right.

Now define data for the telegram. This can be done in the “Channels” tab. When confirming your entry with <OK>, the new telegram also appears in the plant tree at the corresponding plant. If this is not the case, click on the button below the plant tree to manually refresh it.

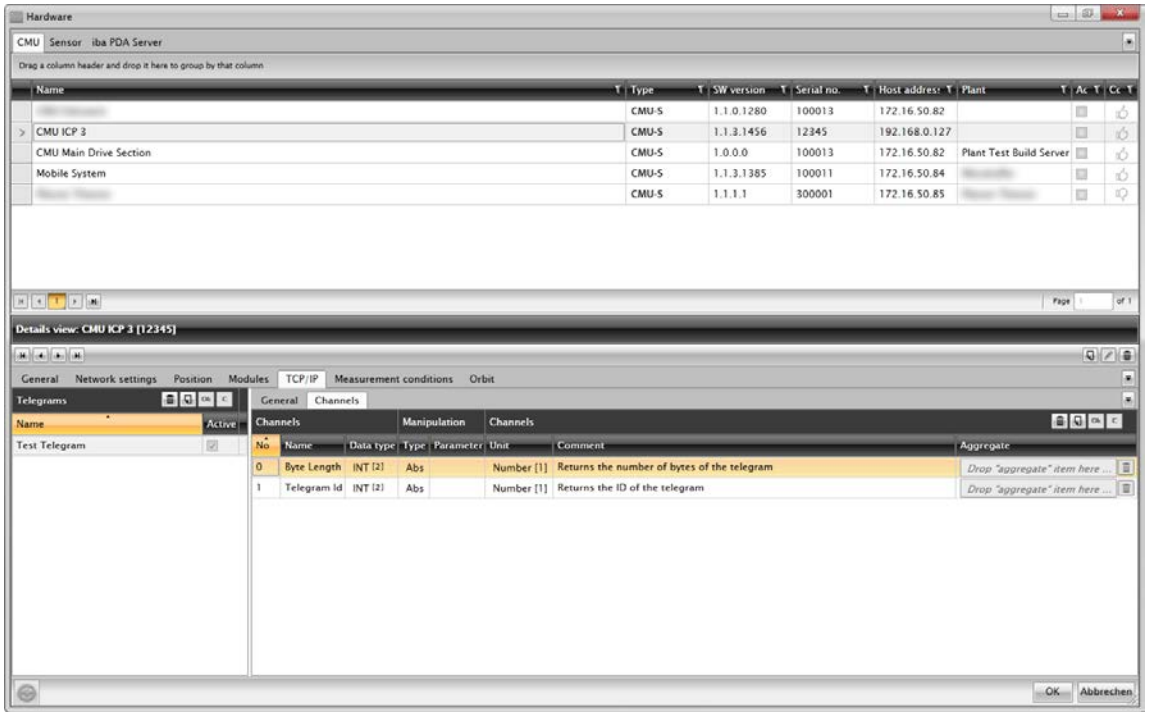


Figure 95: TCP/IP telegram channels

With a new telegram, the both channels “Byte Length“ and “Telegram Id“ already exist. These two channels must be positioned at the beginning of the telegram and must not be removed.

There are two methods to add channels (data values) to a telegram.

Adding channels to a telegram (method 1)

The first method to add data to a TCP/IP telegram is to manually parameterize it in the TCP/IP settings. To create a new channel to the telegram, click on the button in the upper right corner of the channel list.

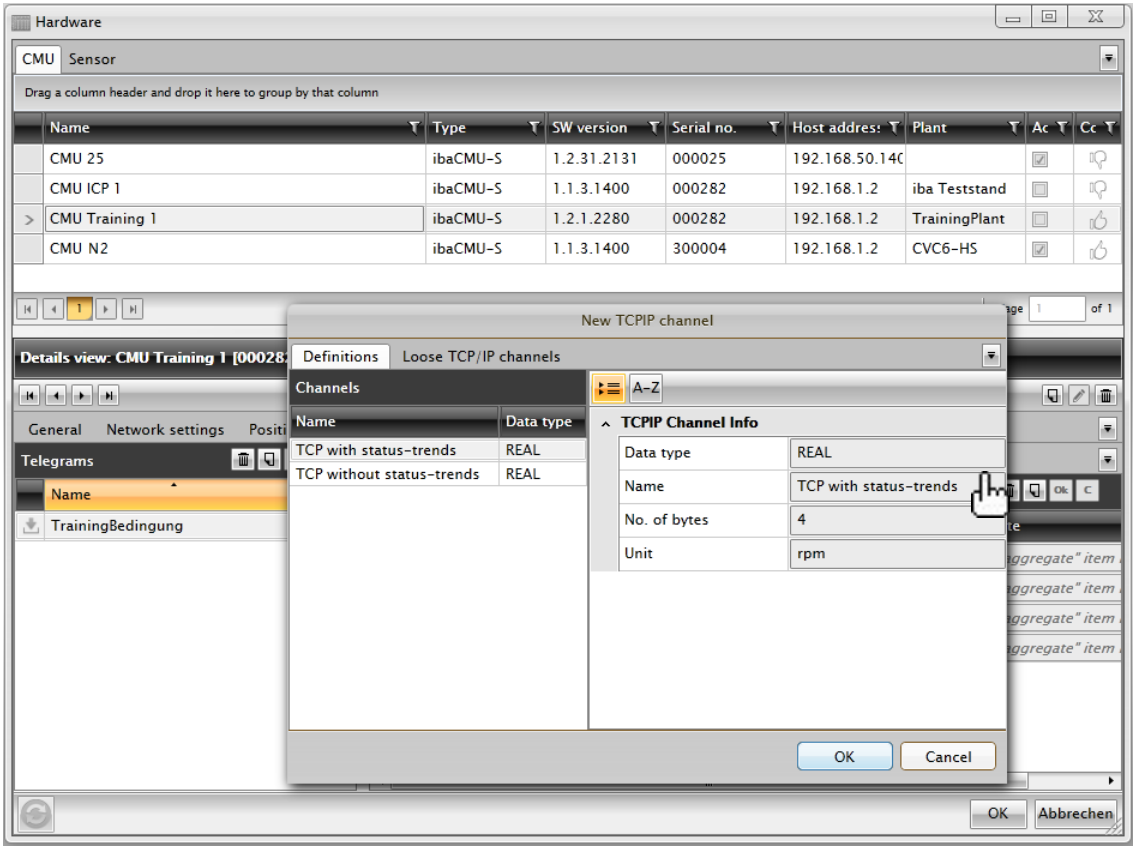


Figure 96: Adding a new TCP/IP channel

In the “New TCPIP channel“ window, you can select the desired channel and confirm with <OK>.

You can principally choose between prepared channel definitions with and without status trends.

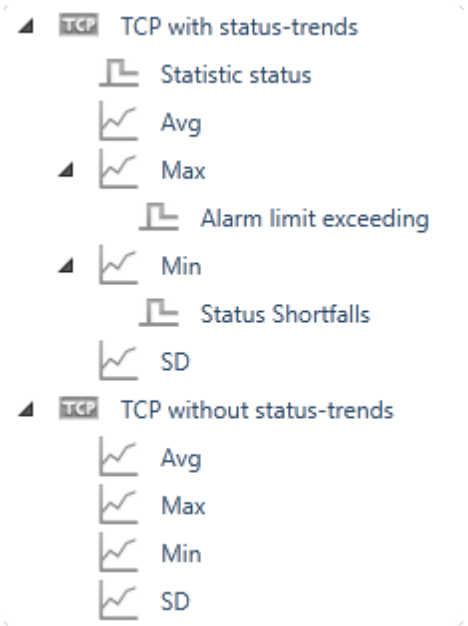


Figure 97: Difference of TCP channel definitions in the plant tree

The above figure shows the difference of both TCP channel definition types in the plant tree.

If you have already recorded TCP channels in the plant configuration at the aggregates before, you could select them in the tab “Loose TCP/IP channels” and assign them to the specific telegram.

Note

Concerning TCP/IP telegrams, it is important that the parameterization of both communication partners, regarding the number of channels and their byte number is carried out identically. Otherwise, the interpretation of the received data cannot be carried out correctly and you will get implausible values.

Adding channels to a telegram (method 2)

The second method to add a TCP channel starts with the plant configuration where you can add a TCP channel to an aggregate.

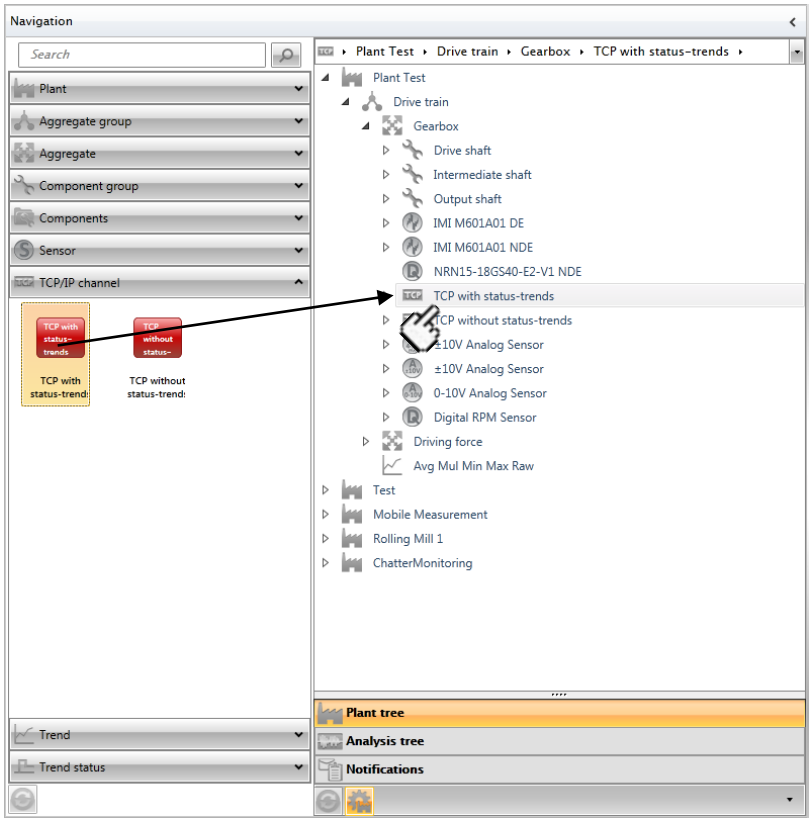


Figure 98: Adding a TCP channel to an aggregate

You can now drag the TCP channel already created to the telegram configuration and drop it there.

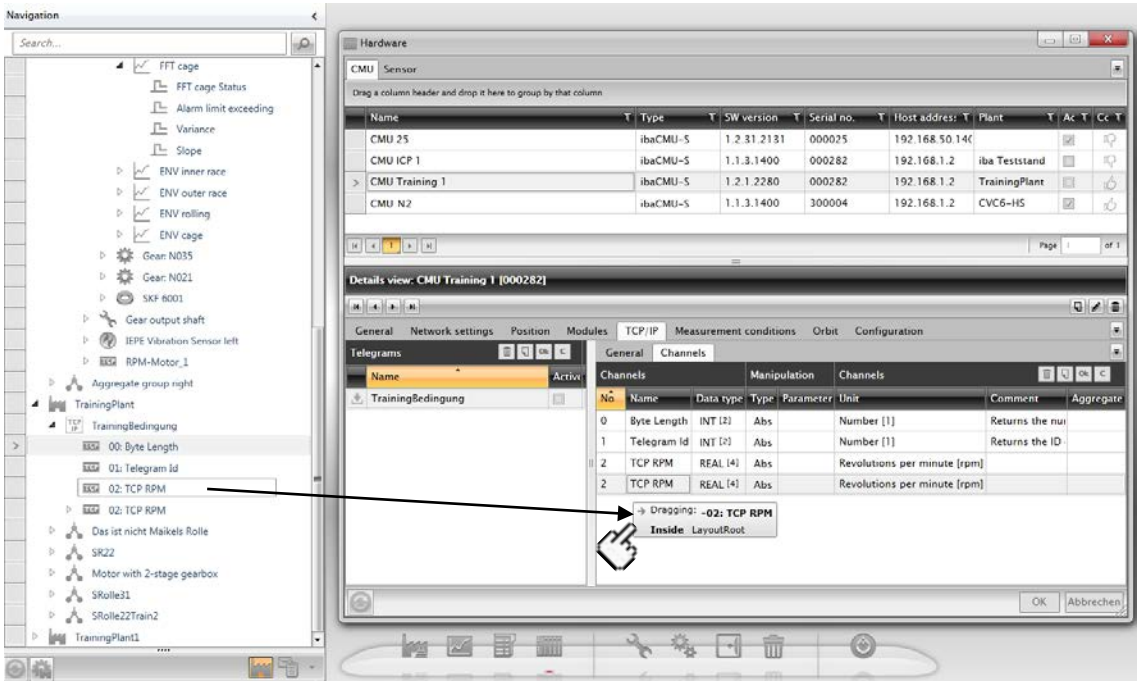


Figure 99: Adding a TCP channel from the plant tree

Configuring channel manipulations

The ibaCMC is able to manipulate the data received via TCP/IP upon receipt. A possible example is a motor which changes its rotational direction and therefore also negative speed values are sent over TCP/IP. If you are only interested in the absolute rpm value, this would be an example for a channel manipulation. Some manipulation types require the entry of a parameter.

The following manipulation functions are supported:

- Abs Calculates the absolute value of the received value, no parameter required
- Add Adds the value indicated as parameter to the received value
- Div Divides the received value by the value indicated as parameter
- Mul Multiplies the received value by the value indicated as parameter
- Sub Subtracts the value indicated as parameter from the received value

8.2.1.7 Configuring CMU measurement conditions

Measurement conditions are used to reduce the data volume, to react to specified operational conditions of the plant and to get comparable data sets at approximately the same loads of the plant. In some cases, it is very difficult to carry out a monitoring and it is also not useful. Example are a strongly variable speed or high eccentricities which are created at the initial pass of a roughing stand.

Measurement conditions also indicate which data shall be written from the CMU into the binary files.

To be able to configure the measurement conditions, the corresponding CMU needs to be in edit mode. Therefore, click in the upper right corner of the details view.

Click on the button in the upper area of the measurement conditions list.

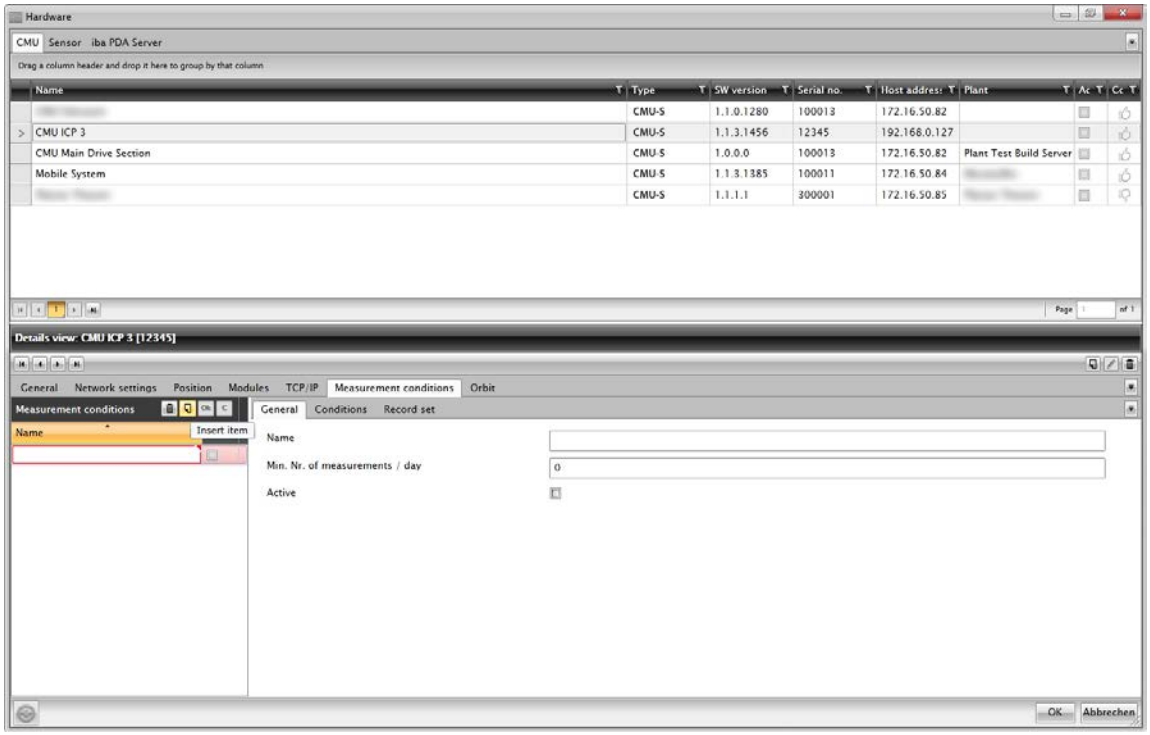


Figure 100: Adding a new measurement condition

Enter the following parameters of the new measurement condition.

❑ Name
Enter a name for the measurement condition.

❑ Max. number of measurements/interval
This parameter is linked to the parameter “Time interval for measurement conditions” of the CMU itself. Enter here how many measurements (raw data files, analysis results) you would like to have in the interval.

❑ Active
Check the box to activate the entire measurement condition. Only active measurement conditions are tested by the CMU.

You can create a maximum of 32 measurement conditions for each CMU; each measurement condition can contain a maximum of 32 test conditions.

Configuring test conditions

To configure test conditions, select the “Conditions” tab of the measurement condition. You can add signals to be checked for certain criteria by clicking on the button in the condition list.

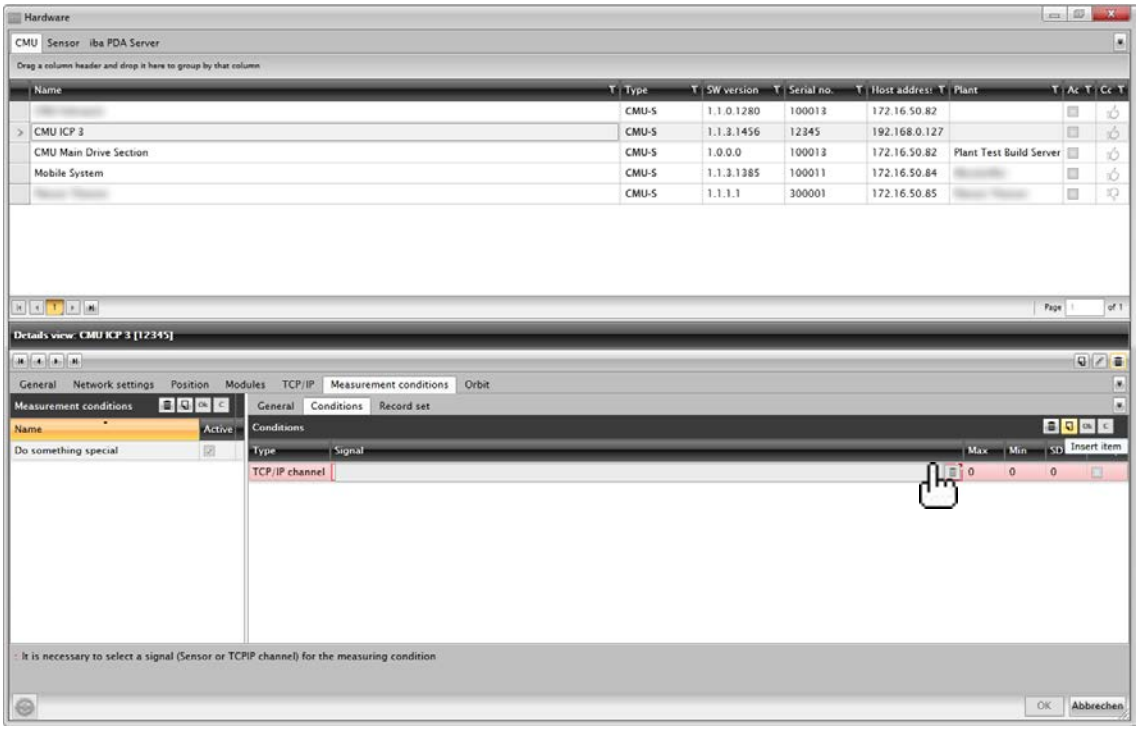


Figure 101: Adding new test conditions

Sensors and TCP/IP channels are generally permissible as signals for test conditions. You can drag a sensor or TCP/IP channel from the plant tree and drop it in the signal field to determine it as signal for the test condition. The type information and signal name with unit are filled in automatically.

To remove the link, without leaving the edit mode of the CMU, please click the button on the right beside the signal name.

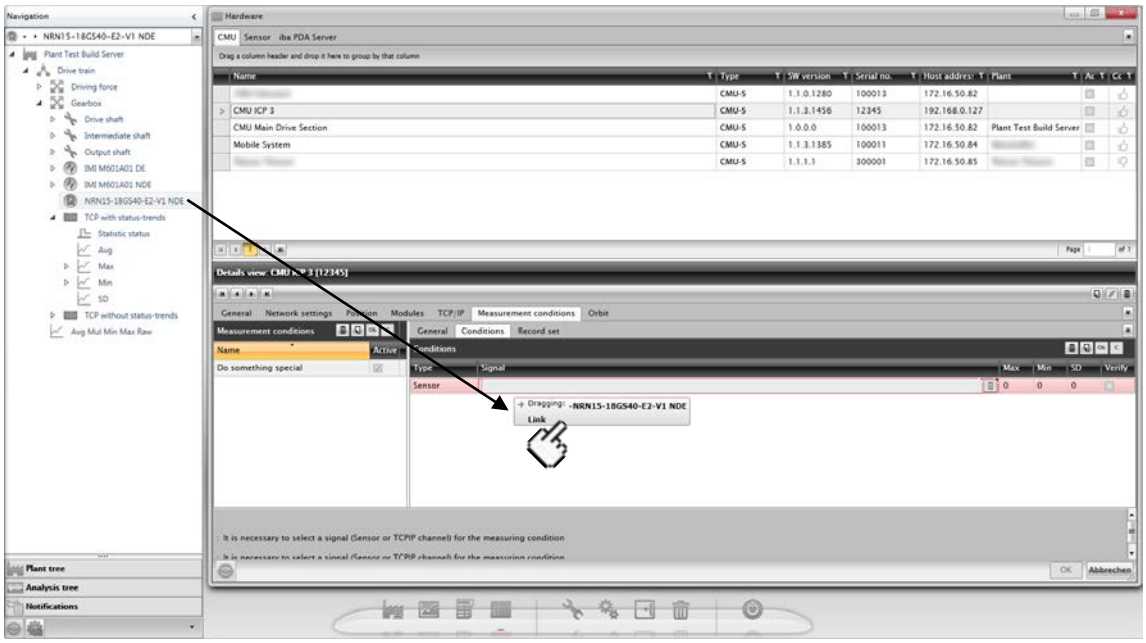


Figure 102: Determining sensor as test signal

Now, only the test parameters are missing.

❑ Max
Maximum value the signal is allowed to have

❑ Min
Minimum value the signal is allowed to have

❑ SD
Maximum standard deviation the signal is allowed to have

❑ Verify
Check this box to activate the test condition. Only activated test conditions are actually tested within the measurement condition. This way, you can specifically deactivate particular test conditions within the measurement condition (e.g. because the sensor acting as signal source is currently defective).

Recording configuration

You can determine by means of recordings which sensor signals are to be stored in binary files. Switch to the "Record set" tab.

To add a sensor or TCP/IP channel to the recording, drag and drop it back to the right in the “sensors for recording” list.

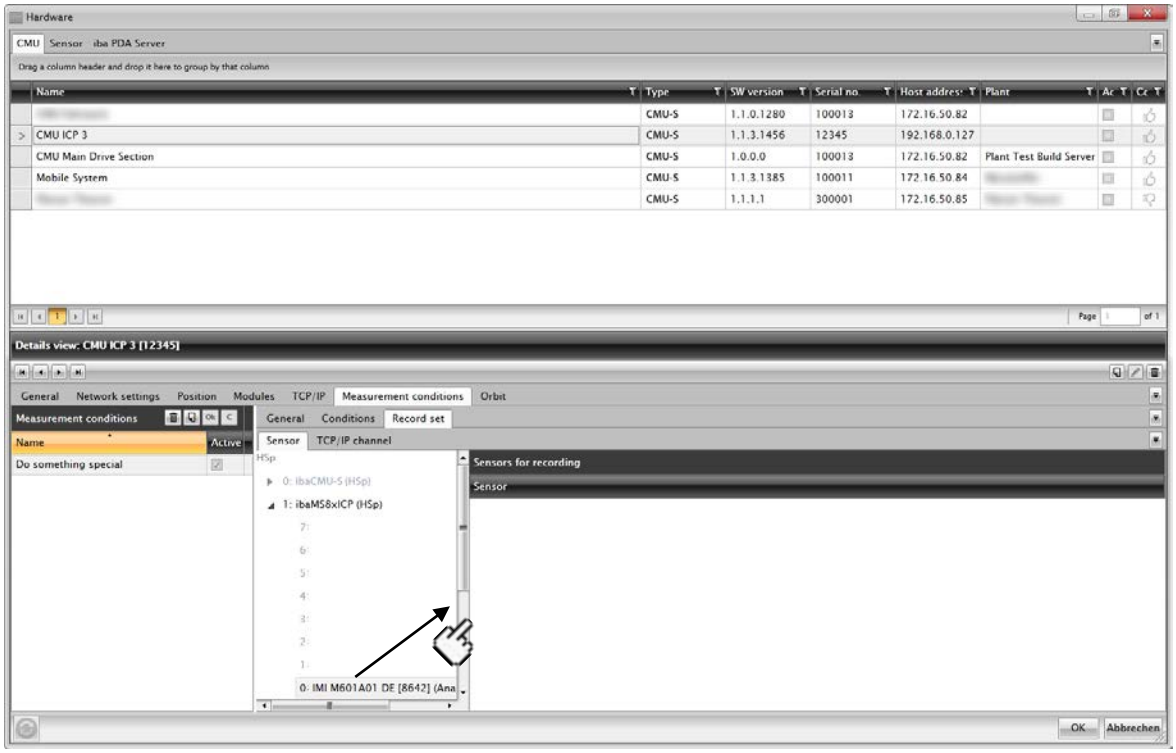


Figure 103: Add sensor to a recording

To remove a sensor or TCP/IP channel from the recording, drag and drop it back to the left in the sensor or the TCP/IP channel list.

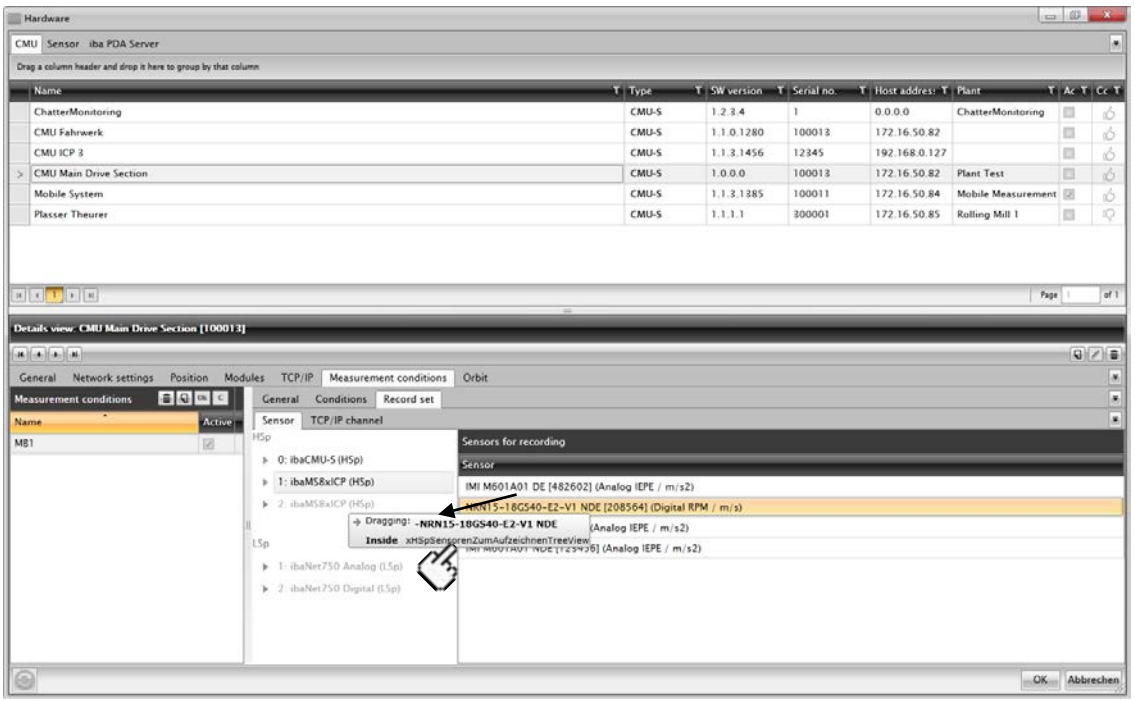


Figure 104: Remove sensor from existing recording

Through elimination neither the sensor nor the plant configuration will be modified, only the connection of the sensor with the measurement condition is eliminated.

8.2.1.8 Configuring the orbit parameters

The orbit monitoring is a convenient method to monitor rotating shafts and roller bearings. It is very well described in the ISO 7919 standard, therefore it has to be referred here to the standard for more details.

Principally, an orbit monitoring (monitoring of a particular bearing) consists of two way sensors arranged together under 90° with high resolution (e.g. sensor acc. to the vortex principle) and a pertinent rotary encoder signal by which a singular rotation of the shaft can be exactly determined. Here, for example the signals of incremental encoders are used, analog rotational sensors are therefore not suitable.

The result is a two-dimensional representation of both limit signals in the polar coordinates over the rotation of the shaft, the so-called kinetic shaft orbit.

To be able to configure orbits, the corresponding CMU needs to be in edit mode. Click in the upper right corner of the details view.

Now click on the button in the upper area of the orbit list.

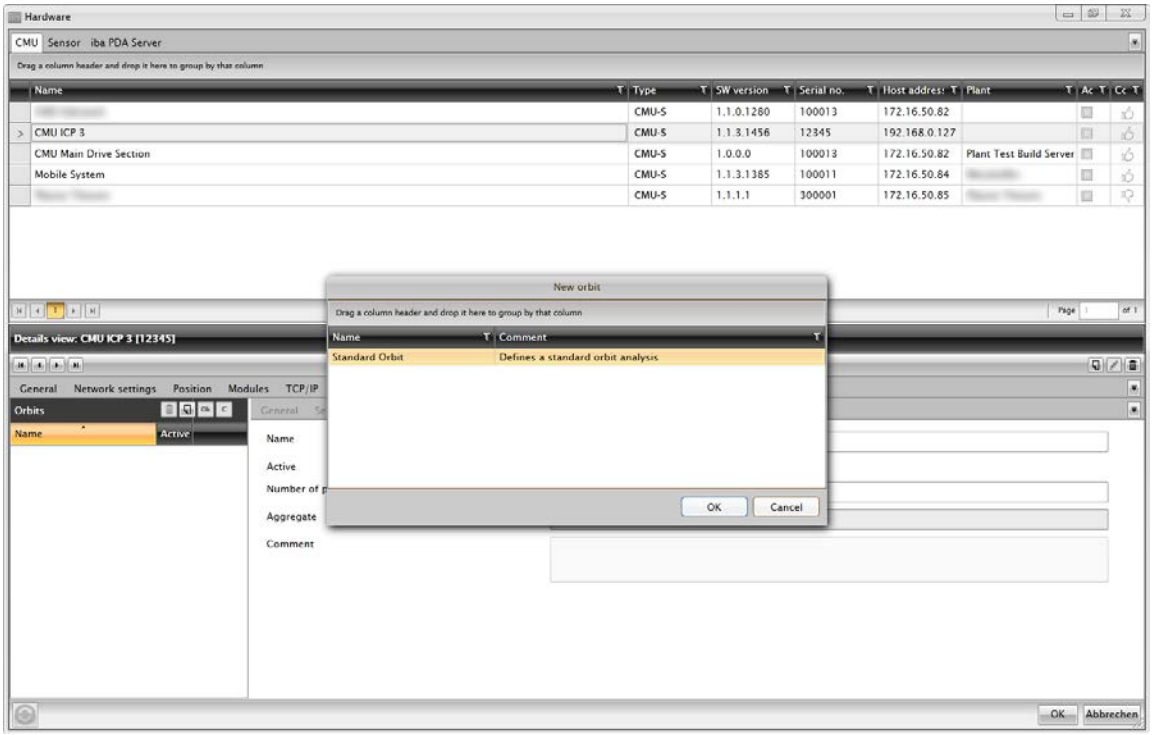


Figure 105: Add new orbit

Select the desired orbit configuration in the selection window and confirm with <OK>.

Note

For the connection of sensors acc. to the vortex principle (e.g. of the manufacturers Brüel & Kjaer und GE Bently Nevada) in many cases you will need an ibaMS16xAI-24V module in the CMU.

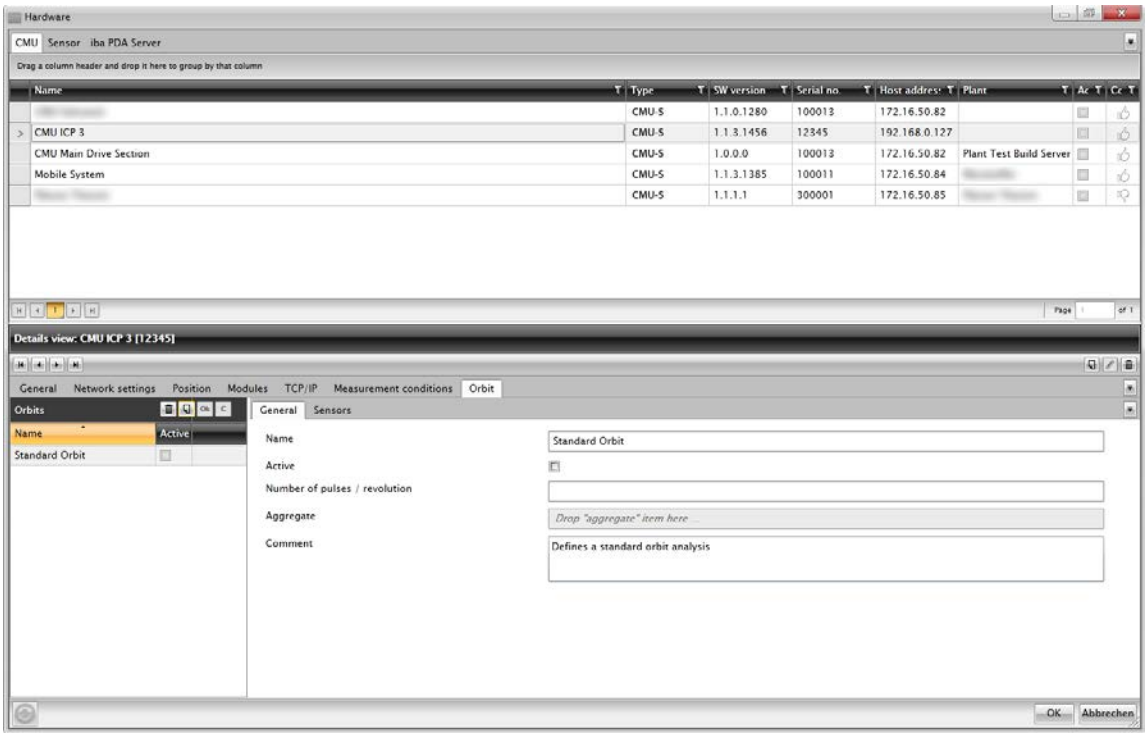


Figure 106: General orbit parameters

Please enter now the general parameters of the orbit monitoring.

❑ Name
Enter an orbit name.

❑ Active
Check the box to activate the orbit. Only active orbits are calculated by the CMU.

❑ Number of pulses / revolution
Enter here the number of the pulses which the used rotary encoder supplies per rotation. In case of a zero track signal, this value would be “1”.

❑ Aggregate
Drag the corresponding aggregate from the plant tree to which the orbit should belong and drop it here. The required sensors also need to be assigned to the aggregate.

❑ Comment
Enter a comment of your choice (optional).

In the “Sensors” tab, the associated sensors are defined.

❑ Horizontal
Place here by drag & drop the horizontal way sensor from the plant tree (mandatory).

❑ Vertical
Place here by drag & drop the vertical way sensor from the plant tree (mandatory).

❑ A-track
Drag and drop a digital sensor from the plant tree which represents the A track signal of a rotary encoder (optional).

❑ B-track
Drag and drop a digital sensor from the plant tree which represents the B track signal of a rotary encoder (optional).

❑ N-track
Drag and drop a digital sensor from the plant tree which represents the N track signal of a rotary encoder (mandatory).

Note on digital signals

To guarantee a correct measuring the following items have to be considered:

- Resolution of the digital encoder.

If the resolution of the rotary encoder is too high and the speed of the shaft is higher, it is possible that the digital signals cannot be measured anymore without fault even with the highest sampling rate for the CMU (40 kHz). In this case, the use of a pulse extension module is useful (this concerns above all the N track signal which supplies only one pulse per rotation, but is only one gap large in the encoder disk).

- Voltage level of the digital rotary encoder outputs.

The logic levels of the digital inputs of the CMU (irrespective if it is an input on the CMU itself or an input of an ibaMS32xDI-24V module) are at 24 V. If you connect only one encoder with 5V TTL outputs, the logic TRUE states are not exactly detected.

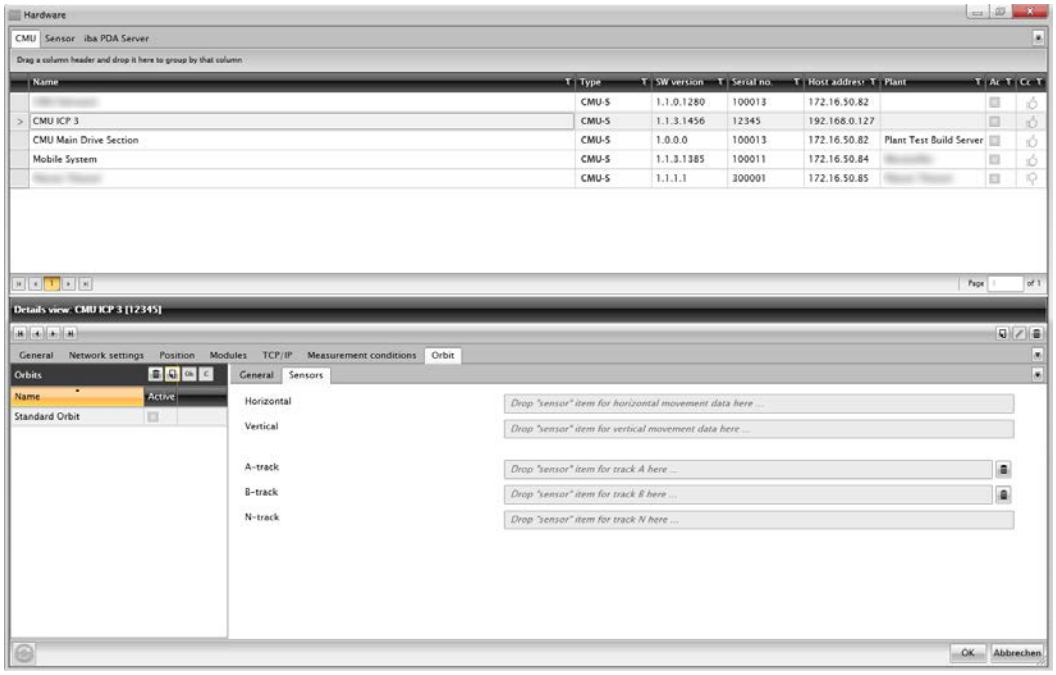


Figure 107: Adding sensors to an orbit

8.2.1.9 Exporting CMU configuration files

This is used to export the configurations created in the ibaCMC (plant configuration, CMU configuration) to the CMU. This can be done via the “Configuration” tab.

Note

If the concerned CMU is in the edit mode (you will recognize it for example when the button on the right on the top in the detail view is highlighted in grey) the tab “configuration” is NOT visible.

In order to carry out the export, the CMU has to be activated and a network connection must exist.

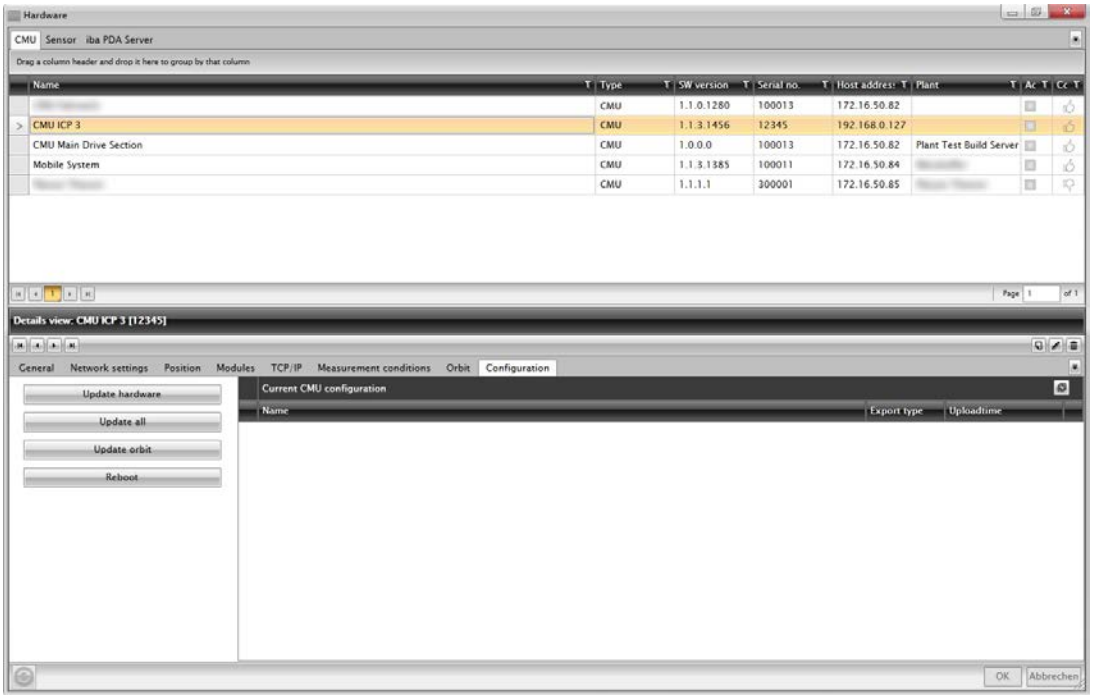


Figure 108: Exporting the CMU configuration

The actual export will be executed using the particular buttons on the left.

❑ <Update hardware>
With this button, only the hardware configuration will be transferred to the CMU. Thereafter, a restart of the CMU is automatically carried out to activate the new configuration.

❑ <Update all>
Both hardware and analysis configuration (orbit excluded) are transferred to the CMU. Thereafter, a restart of the CMU is automatically carried out to activate the new hardware configuration.

❑ <Update orbit>
With this button, only the orbit configuration will be transferred to the CMU. No reboot of the CMU is triggered.

❑ <Reboot>
This button can be used to reboot manually the CMU.

❑ <CMU Info>
With this button, a diagnostics information can be retrieved from the CMU and can be displayed in a window (see the following figure).

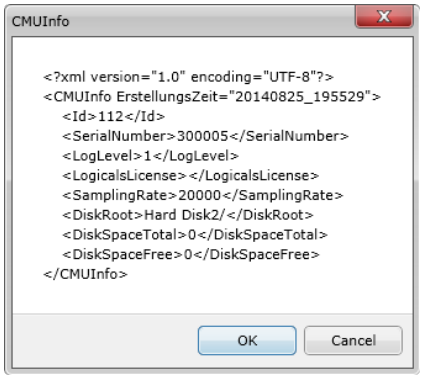


Figure 109: CMU info

After the successful export, the exported data are shown with time stamp in the list “Current CMU configuration”. According to the number of transferred data, it can take some time to update the list. With the button on the right in the upper range of the list a manual update can be carried out.

The state of the export (success, failure) will be displayed on the top in the CMU list in the right column with the symbols and .

The exported configuration data of the ibaCMC are additionally stored (see “EXP” directory in Figure 61: Plant archive structure) and can be downloaded in the data archive via the download function (see chapter 7.2.1 “Archived configuration files“).

8.2.2 Sensor configuration

The hardware sensor configuration shows a list of all sensors configured in the ibaCMC. You will get a clear summary of all configured plants.

All the log list functions apply to the sensor list as well. The sensors can be sorted, grouped and filtered. See chapter 7.1.2 “Sorting, grouping and filtering“ for more information. Navigating within a particular page works the same way (see Figure 42: Page navigation buttons).

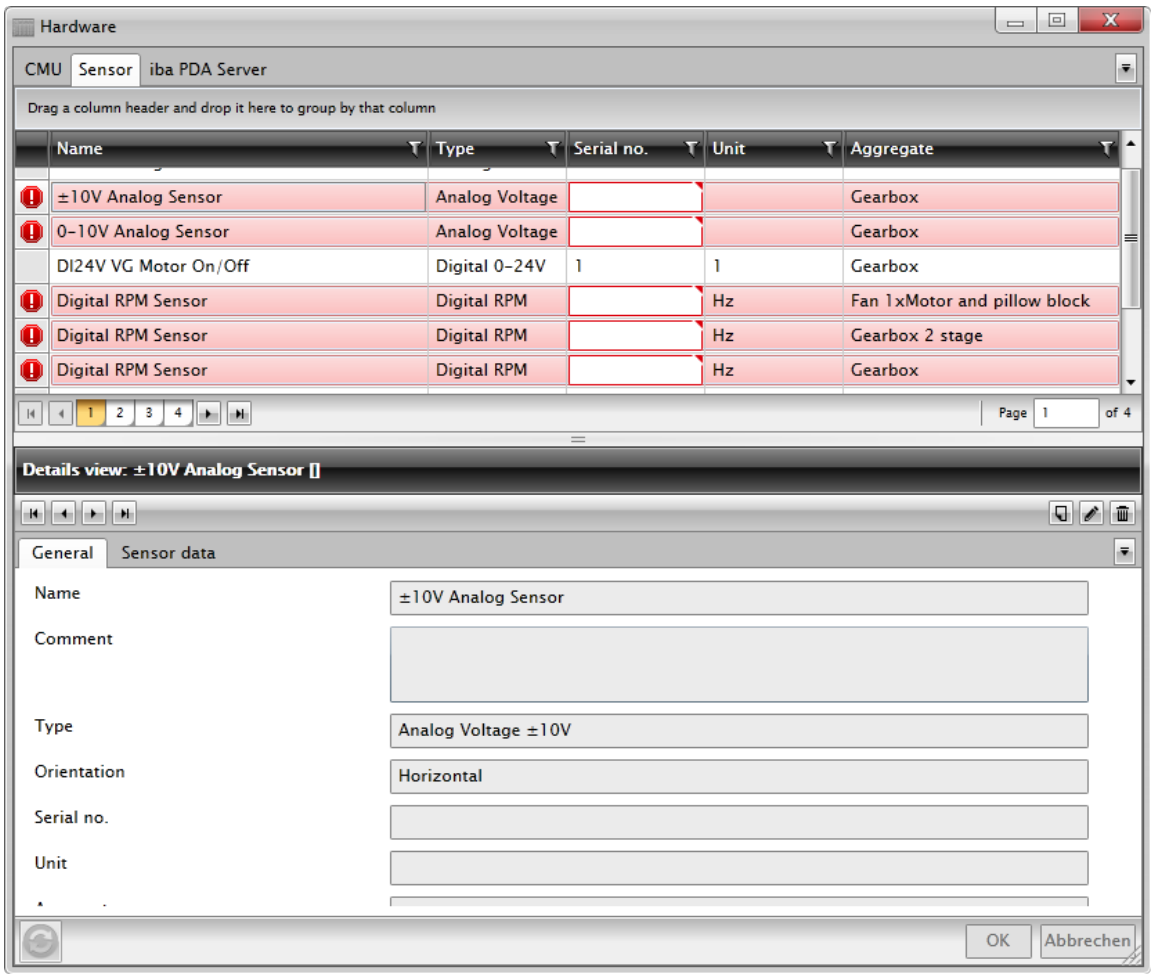


Figure 110: List of configured sensors

8.2.2.1 Adding and editing a sensor

To add a new sensor, click the button in the upper right corner of the details view and the “New sensor” window appears. You can also edit an existing sensor by clicking the button.

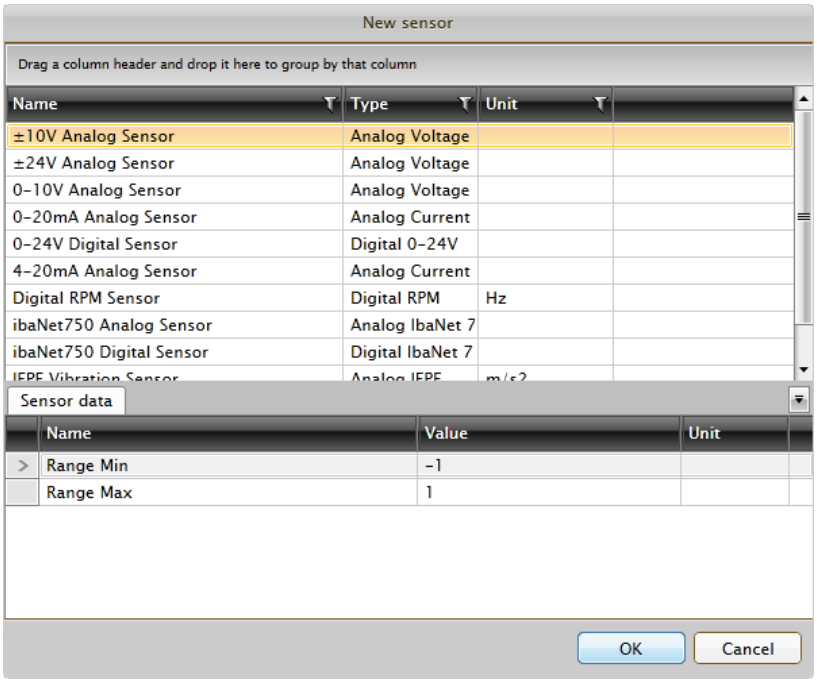


Figure 111: Adding a new sensor

Select the desired sensor from the list and click <OK>.

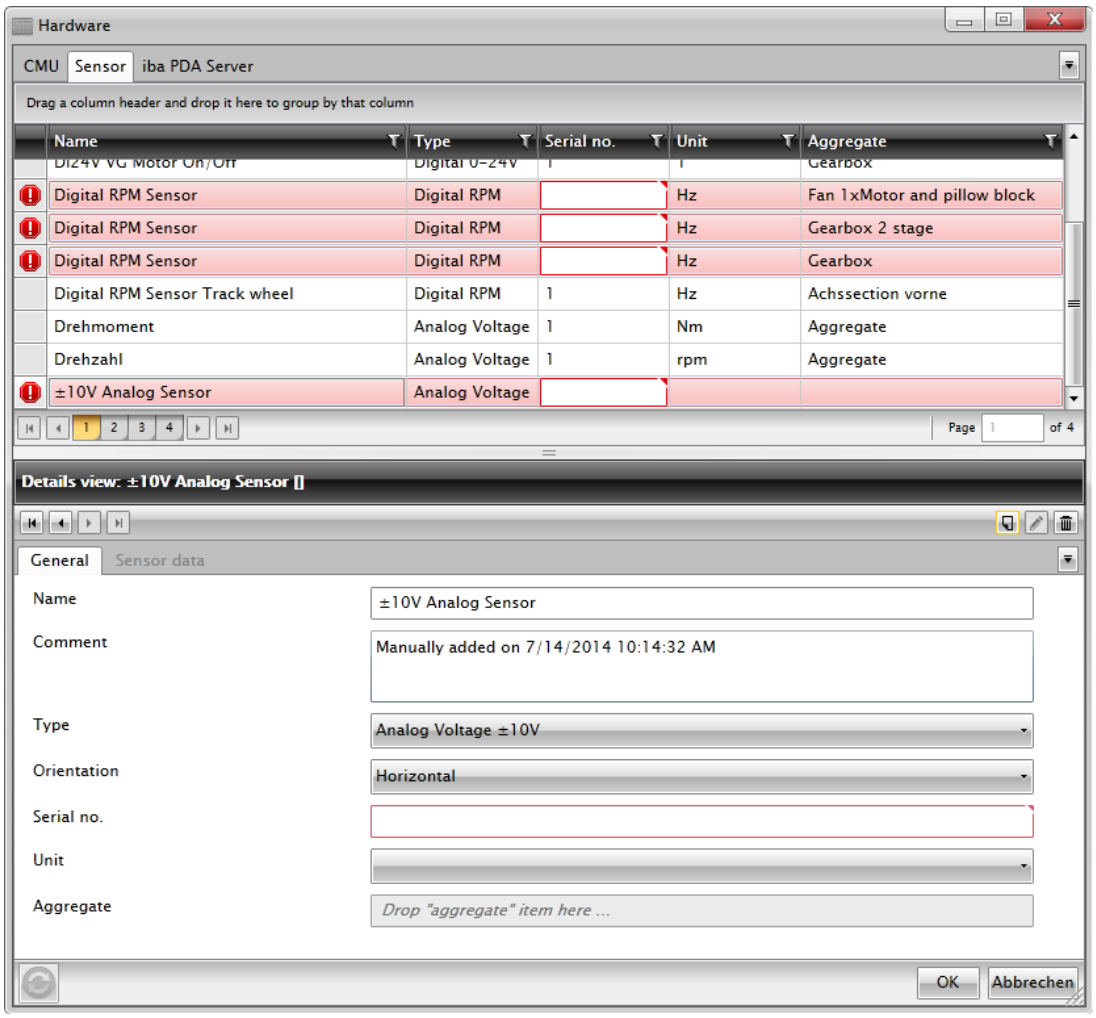


Figure 112: Missing entries for a new sensor

The red symbol in the leftmost column of the sensor list indicates that required parameters are still missing. Furthermore, the corresponding line in the sensor is highlighted in red and the missing data fields are framed in red.

Enter the data in the “General” tab.

❑ Name
Enter a sensor name here.
We recommend to adhere to the name conventions agreed in advance and to eventually use the same designation as in the electronic documentation of the cabling.

❑ Comment
Enter a meaningful comment (optional).

❑ Type
Select the sensor type here. Normally, for a new sensor this value is already correctly recorded.

❑ Orientation
Select the orientation here, this could be interesting for vibration sensors.

❑ Serial no.
Enter the sensor serial number here. It can usually be found on the sensor housing or in the calibration certificate.

❑ Unit
Enter the right physical unit of the measured signal here.

❑ Aggregate
Drag the corresponding aggregate, where the sensor is mounted, from the plant tree and drop it there.

In the “Sensor data” tab, you can configure additional parameters which, however, depend on the sensor type selected. Most of the sensors have the “Range Min” and “Range Max” parameters by default.

❑ Bias voltage
This parameter only exists with vibration sensors and indicates the bias offset voltage of the internal charge amplifier. It is not admittedly used for the scaling of the measured value but serves as diagnosis possibility for the function of the sensor and here, it has more importance as documentation (you will find this value on the calibration certificate of the sensor).

❑ Sensitivity
Sensitivity of the sensor (normally given in the sensor data sheet e.g. in mV/physical unit)

❑ Constant RPM
Set this to “1” if you have a constant speed (e.g. if the motor is not frequency-controlled).

❑ Range Max
Enter here the value in the physical unit which the sensor delivers at maximum output voltage or maximum output current (relevant for analog sensors only).

❑ Range Min
Enter here the value in the physical unit which the sensor delivers at minimum output voltage or minimum output current (relevant for analog sensors only).

❑ Switch flag
Enter here the number of switch flags at the circumference of a shaft if you use for example an inductive proximity switch for the speed measurement.

You can delete an existing sensor by clicking the button in the upper right corner of the details view.

8.2.3 ibaPDA server configuration

This is an optional module which is why this tab might not exist in your system.

The ibaCMC can be connected in this operation mode with an ibaPDA process data acquisition system. Then, the ibaPDA Server overtakes nearly automatically the task of CMU as data source for the Condition Monitoring. For details on the ibaPDA system, contact iba or visit the iba website (http://www.iba-ag.com/).

The ibaPDA server must meet the following requirements:

❑ ibaPDA server software version 6.31.3 or higher

❑ ibaInSpectra Expert license must be available on the ibaPDA server

❑ the depth of the signal groups configured in ibaPDA must not exceed 5

❑ an FTP server must be installed on the ibaPDA server, too

The ibaCMC collects the measuring data (data in “dat” format) from the ibaPDA Server via FTP access and creates automatically the plant tree according to the signal group information stored in the data file. This way, the ibaCMC can be used as data base supported trending tool as complement to the ibaPDA system.

8.2.3.1 Adding and editing an ibaPDA server configuration

To add a new ibaPDA server configuration, click on the button in the upper right corner of the detailed view and a “New sensor” window appears. You can also edit an existing ibaPDA server configuration by clicking on the button.

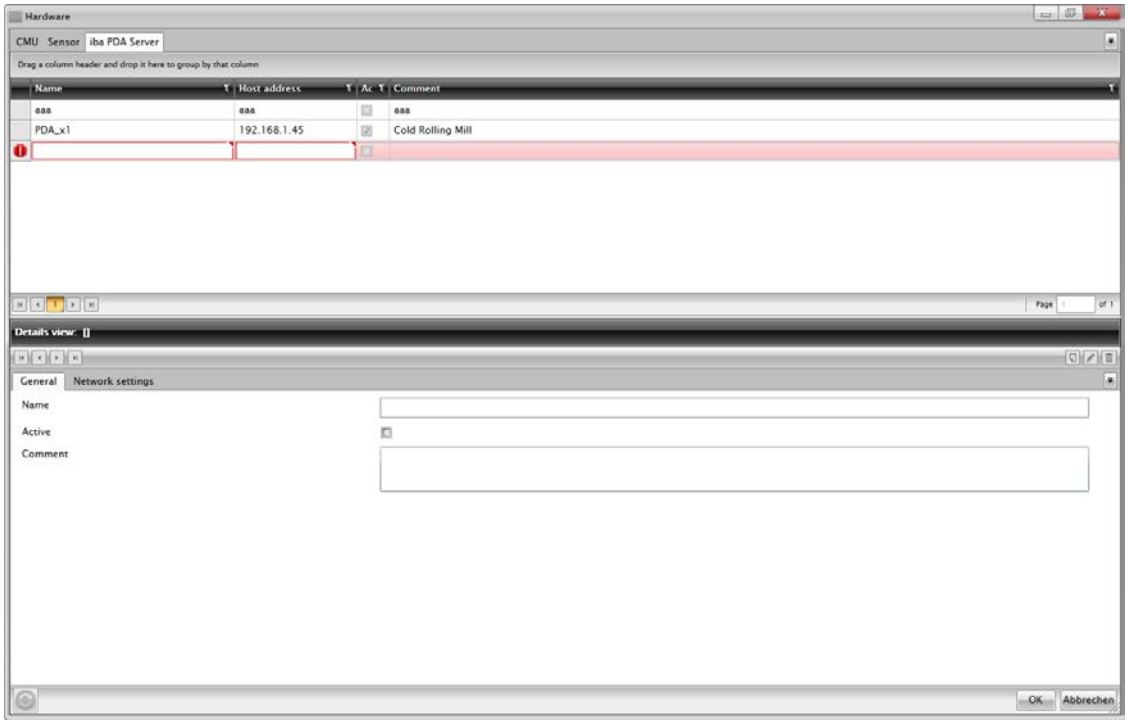


Figure 113: Add new ibaPDA server configuration

Enter the following parameters in the “General” tab:

❑ Name

Enter any name you like for the ibaPDA server configuration.

❑ Active

Check this box to activate the ibaPDA server configuration. Only active configurations will be processed by the ibaCMC. The data acquisition or configuration of the proper ibaPDA server is not concerned.

❑ Comment

Enter a comment. Location or plant affiliation of the ibaPDA server would be a possibility.

Now configure the network interface in the “Network settings” tab:

❑ Host address

Enter the IP address or the network name of the ibaPDA server. If you do not know these data, please contact a network administrator.

❑ FTP port

Please enter here the port number through which the FTP server installed on the ibaPDA server accepts connections (the standard FTP port is 21).

❑ FTP user

Name of the user allowed to connect to the FTP server.

❑ FTP password

Password of the above mentioned user.

❑ FTP path

Enter here the relative path of the home directory of the above mentioned user to the storage place of the iba data files of the ibaPDA server. The ibaCMC assumes that the “dat” directory exists at this storage location where the data are stored.

8.3 User administration

To open the user administration, click on the corresponding icon in the Settings menu.

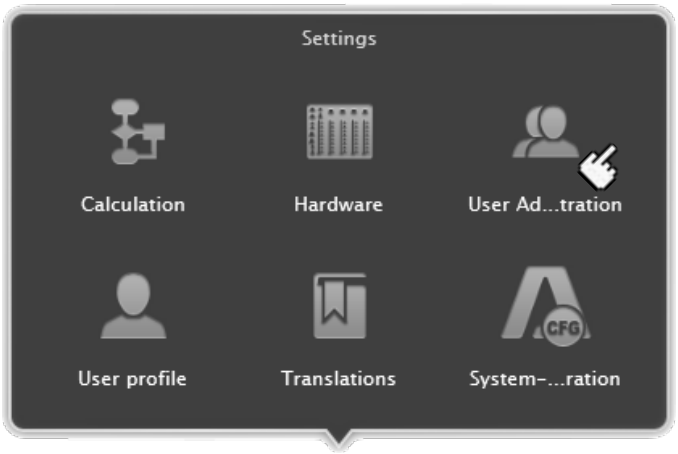


Figure 114: Starting the user administration

The user administration provides service for creating users and user groups (roles) and assigning rights. The permission system in the ibaCMC is role tailored, this means that a user who wants to get a certain permission, has to be member of a group to which this permission has already been granted. A user can also be a member of different groups.

A good proceeding is in case of a new system to consider at first the necessary groups (roles) and to create the users subsequently.

All the log list functions described earlier apply to the user configuration as well. The users can thus be sorted, grouped and filtered. See chapter 7.1.2 “Sorting, grouping and filtering“ for more information. Also navigating within a particular page works the same way (see Figure 42: Page navigation buttons).

8.3.1 Creating and editing users

To create new users or edit existing ones, the user currently logged in the ibaCMC needs to have the “User” right.

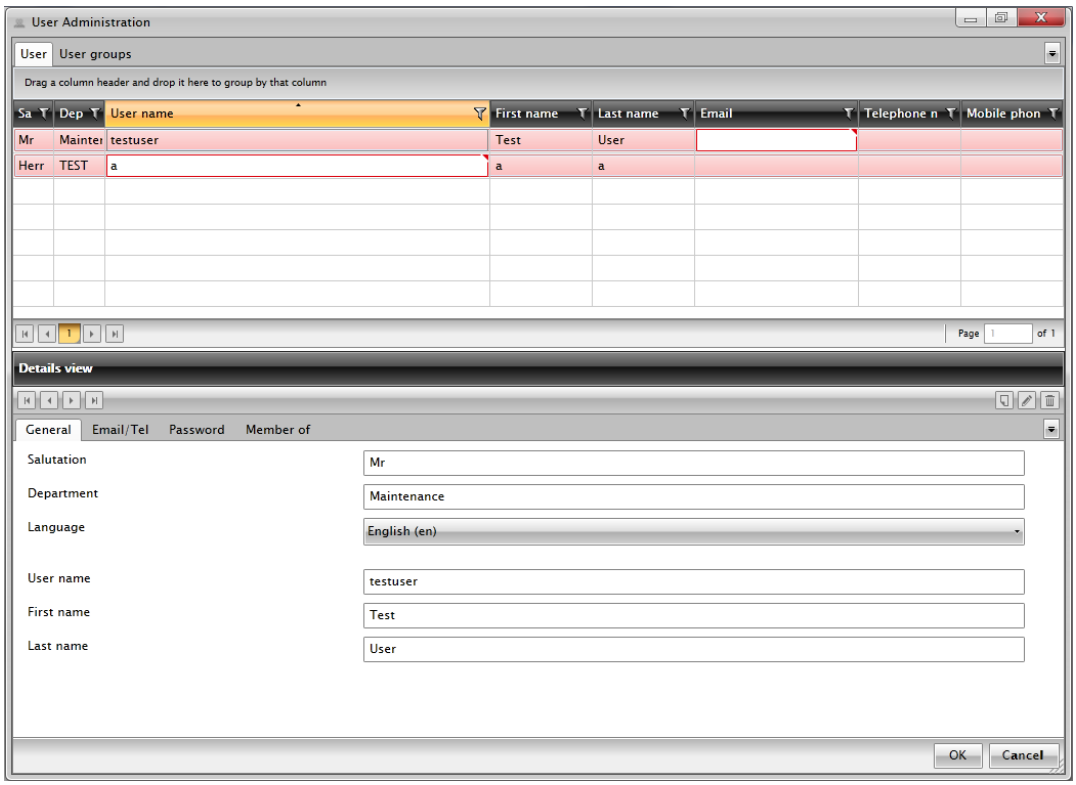


Figure 115: User administration

The buttons for editing the users are in the top right corner of the details view.

Add a new user

Edit the selected user

Delete the selected user

Some user data are liable to the naming conventions or have to be compulsorily entered. Figure 115 indicates for example a violated name convention (details of the violation are displayed while moving the cursor on the symbol in the left column). In this case, the user name is too short.

To add a new user, click on the button in the top right corner of the details view. You can also edit an existing user by clicking on the button.

Enter the user data. Input fields with red frame signify that data which are to be entered compulsorily, are missing or naming conventions are violated.

Change between the particular tabs (General, Email/Tel, Password, Member of) by clicking on the tab name or the push button on the right.

❑ Salutation
Enter the desired form of address.

❑ Department
Enter the department the user belongs to.

❑ Language
Select the language. This will be used for the user interface. Currently, only German and English are supported. Please note that terms entered by the user, e.g. names in the plant configuration, comments, etc., are NOT subject to this language switch.

❑ User name
Enter the login name here (it must be at least 3 characters and no more than 80).

❑ First name
Enter the first name of the user here (this name will be used in notifications and reports).

❑ Last name
Enter the last name of the user here (this name will be used in notifications and reports).

❑ Email
Enter the correct email address of the user here (this email address will also be used to send notifications and reports).

❑ Telephone number
Enter a landline number here (optional).

❑ Mobile phone number
Enter a cell phone number (optional).

❑ Password
Assign a password for login.

❑ Confirm password
This needs to match the password exactly.

Note

The “Password” tab can only be selected if you either create a new user or edit the user you are currently logged in.

8.3.1.1 Assigning group memberships

You can add the active user to different existing groups. The user “inherits” all rights assigned to these groups.

To add group memberships, the user needs to be in edit mode.

In the “Member of” tab, drag the desired group from the “Available user groups” list to the “Member of” list.

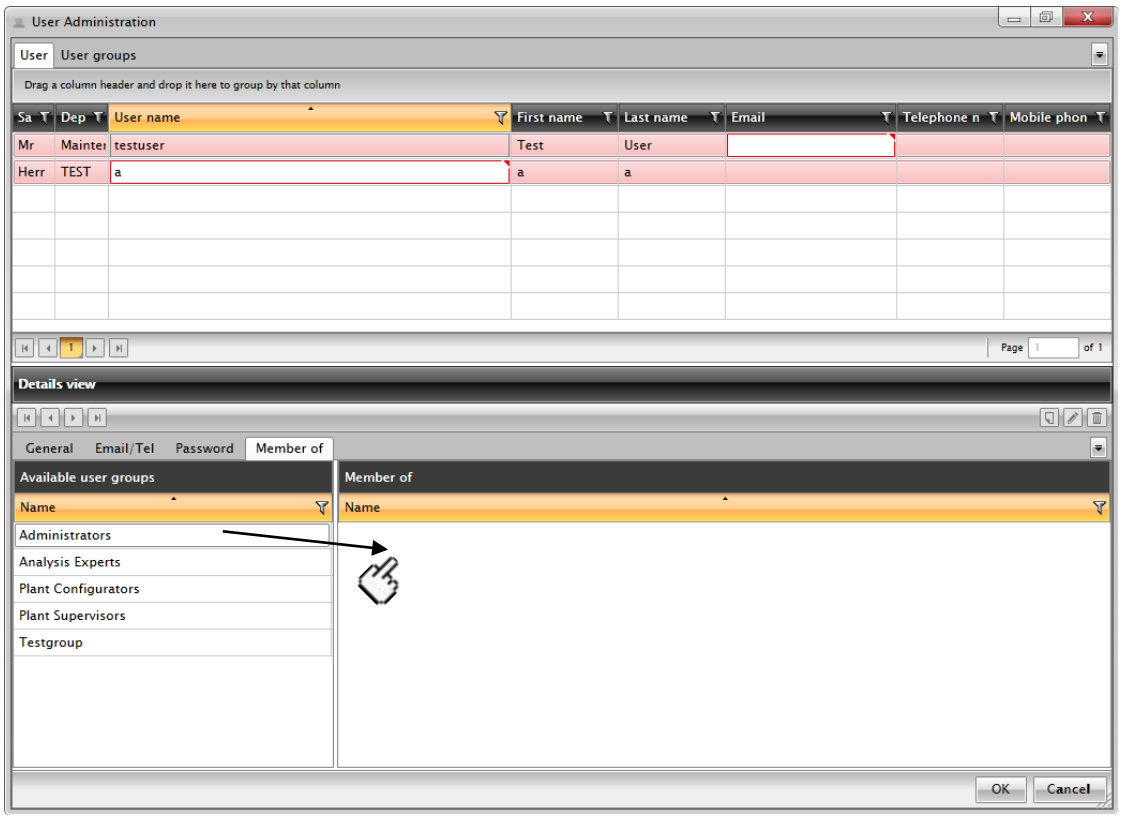


Figure 116: Assigning group memberships

To remove a group membership, drag the group back to the “Available user groups” list.

8.3.2 Creating and editing user groups

To edit user groups, switch to the “User groups” tab in the user administration.

To add a new user group, click on the button in the upper right corner of the details view. You can also edit an existing user group by clicking the button.

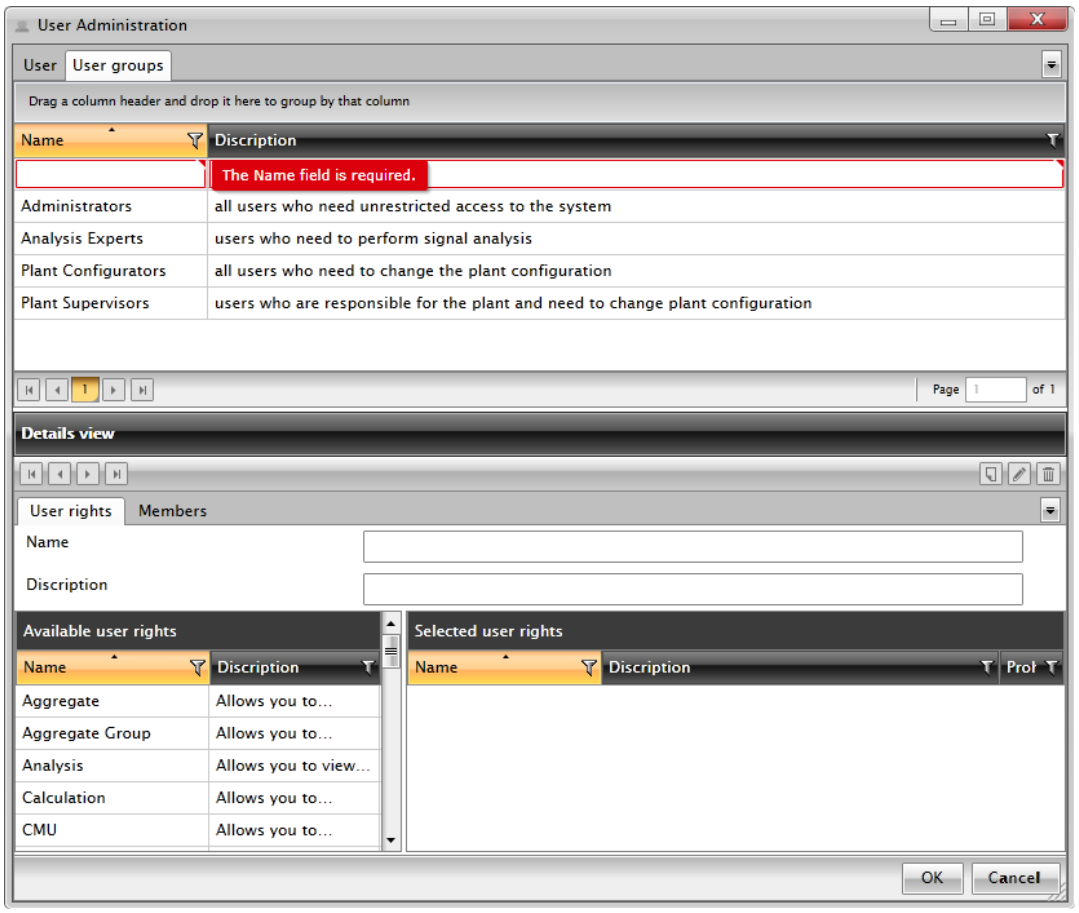


Figure 117: Adding a new user group

Assign a concise name and a description for the new user group. You can then assign rights to the new group by dragging the desired rights from the list of available user rights and dropping it in the list of the selected user rights.

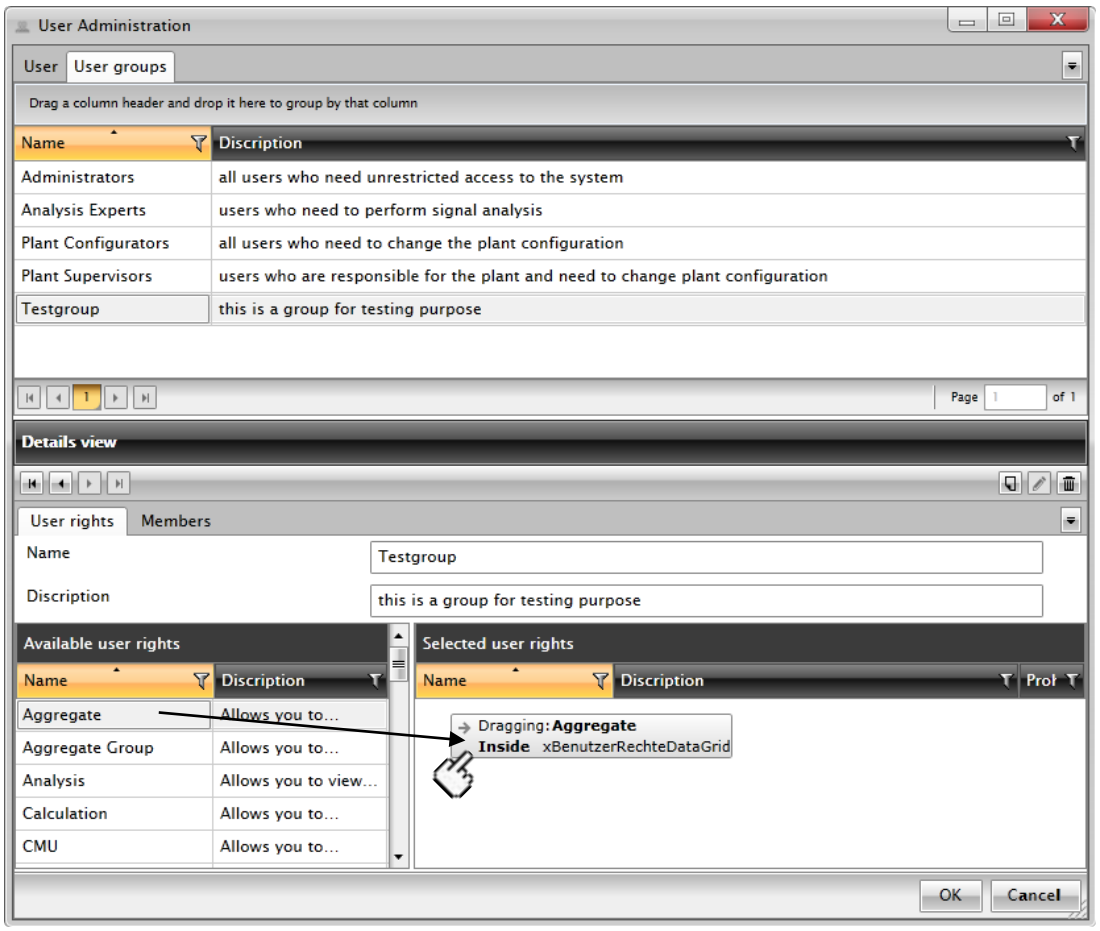


Figure 118: Assigning rights to the user group

The following list gives information about the available user rights:

User Right	Description
Aggregate	Allows to create, edit and delete aggregates in the plant tree
Aggregate Group	Allows to create, edit and delete aggregate groups in the plant tree
Analysis	Allows to use the analysis functions (time signal, spectrum, etc.)
Calculation	Allows to create, edit and delete calculations
CMU	Allows to create, edit and delete CMUs
CMU Data Import	Allows to import CMU data into the communication database
CMU Data Transfer	Allows to transfer CMU data from the communication database to the central database
Component	Allows to create, edit and delete components in the plant tree
Component Group	Allows to create, edit and delete component groups in the plant tree
Database	Allows to do database backups

Export	Allows to view and download export files
Logging	Allows to use logs and to create user events
Measurement File	Allows to view and download measurement files
Notifications	Allows to create, edit and delete notifications
Online	Allows to view the online signal graphics
Plant	Allows to create, edit and delete plants in the plant tree
Plant Configuration	Generally allows to create, edit and delete elements in the plant tree
Plant Tree	Allows to view the plant tree
PDF Reports	Allows to view PDF reports
Sensor	Allows to create, edit and delete sensors in the plant tree
System Configuration	Allows to create, edit and delete system configuration entries
TCPIP	Allows to create, edit and delete TCP/IP telegrams
Translation	Allows to create, edit and delete translations
Trend	Allows to view trends
Units and Dimensions	Allows to create, edit and delete units and dimensions
User	Allows to create, edit and delete users
User Groups	Allows to create, edit and delete user groups
Virtual Trend	Allows to view virtual trends
Virtual Trend Status	Allows to view virtual trend status

To remove a user right, drag the right back to the “Available user rights” list.

In the “Members” tab, you can add already existing users to the new group by dragging them from the “Available users” column to the “Members” column.

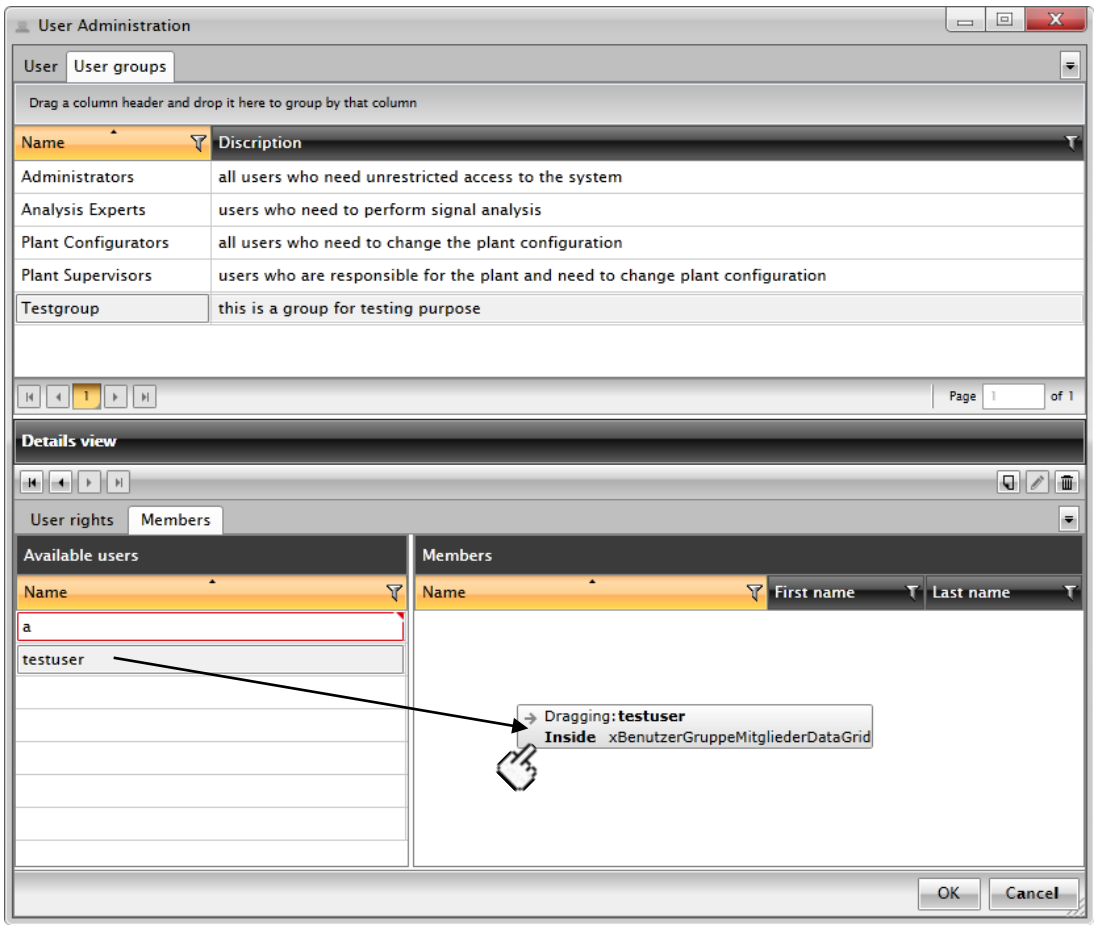


Figure 119: Adding members to the group

To remove a user from the group again, drag him back to the “Available users” list on the left.

After making all settings, click <OK> to apply the settings and to exit the edit mode.

8.4 User profile

To start the user profile editor, click on the corresponding icon in the Settings menu.

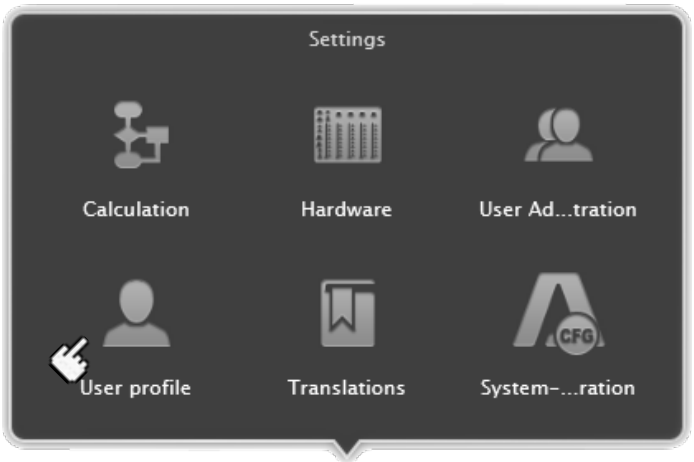


Figure 120: Starting the user profile editor

User profiles are used to create notifications and plant assignments for the user logged in.

Some profile settings are directly taken from the user administration for the currently logged in users. This regards the tabs “General, Email/Tel, Password” and “Member of”.

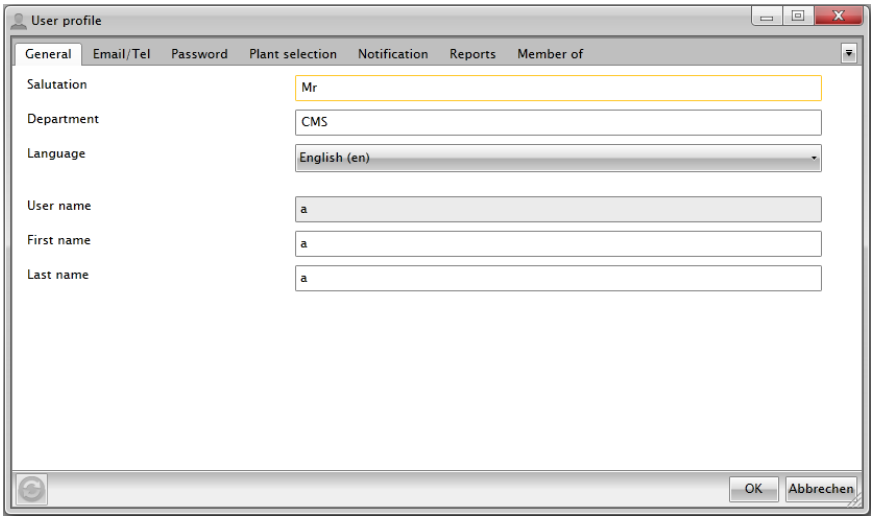


Figure 121: User profile

8.4.1 Assigning plants

In the “Plant selection” tab, you can explicitly assign plants to the user currently logged in. This is particularly useful in case of larger monitoring systems of a complete company site where several systems are monitored but not every user is responsible for all systems. Assign a plant by dragging it from the “Available plants” list and dropping it in the “Selected plants” list. Only the selected plants will be displayed in the plant tree.

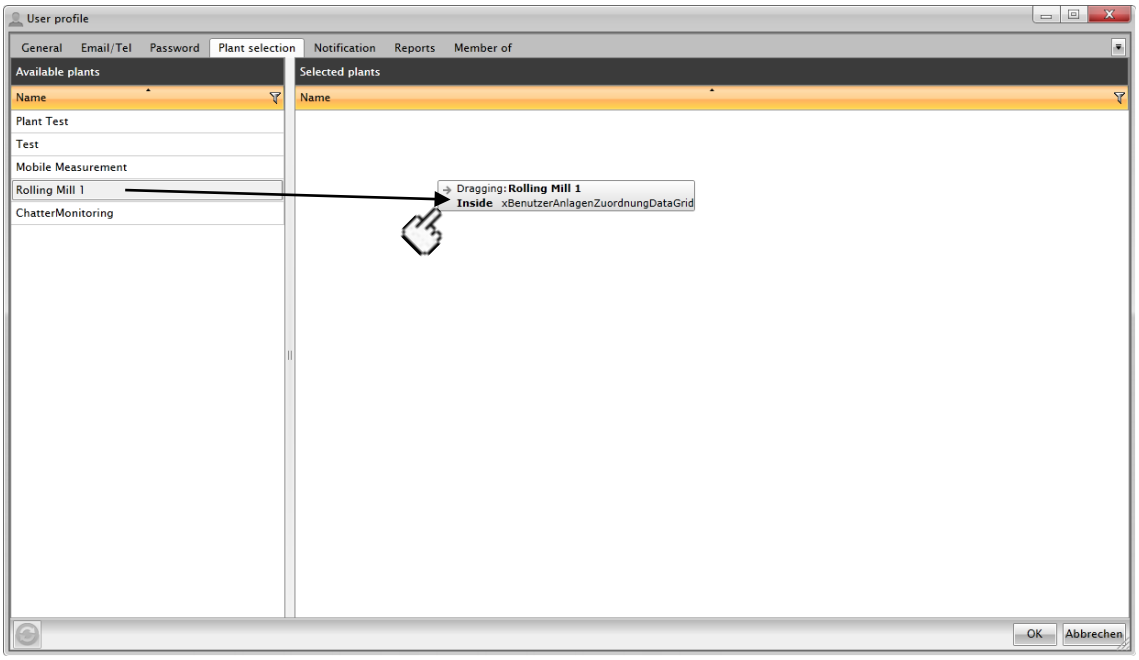


Figure 122: Assigning plants to the logged-in user

If you want to remove a plant, just drag it back to the available plants list on the left.

If the list of the selected plants is completely empty, the plant tree will show all plants for the user logged in, provided that the user has the required rights.

8.4.2 Notification settings

You can set here when to receive notifications.

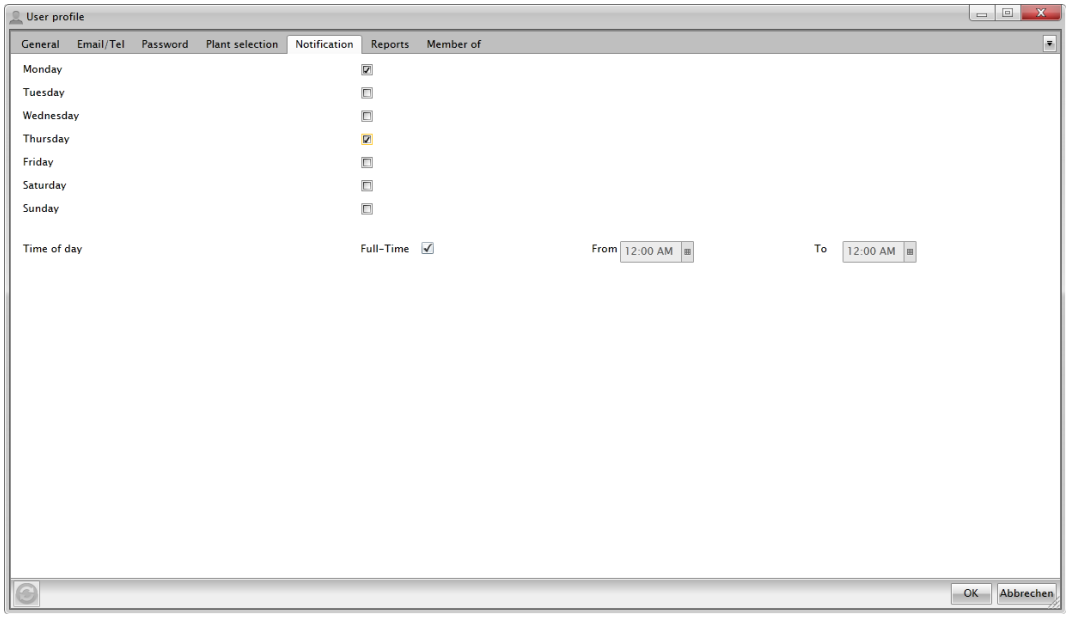


Figure 123: Notification settings

By checking the weekday, you select the days of the week to receive notifications. Additionally, you have the possibility to adjust the message period in the field “Full-Time” on 24 h, or to exactly adjust the period with the “from” and “to” time selection windows in case of not selected check marks.

Notification configuration example

If you want to be notified 8 am to 3 pm on every Monday only, you will have to make the following settings:

- check the Monday checkbox and uncheck all other days
- uncheck the full-time checkbox and set “from” to 8 a.m. and “to” to 3 p.m.

8.4.3 Assigning reports

In the “Reports” tab, you can assign the reports configured in ibaCMC to the user currently logged in. The reports will be e-mailed to this user.

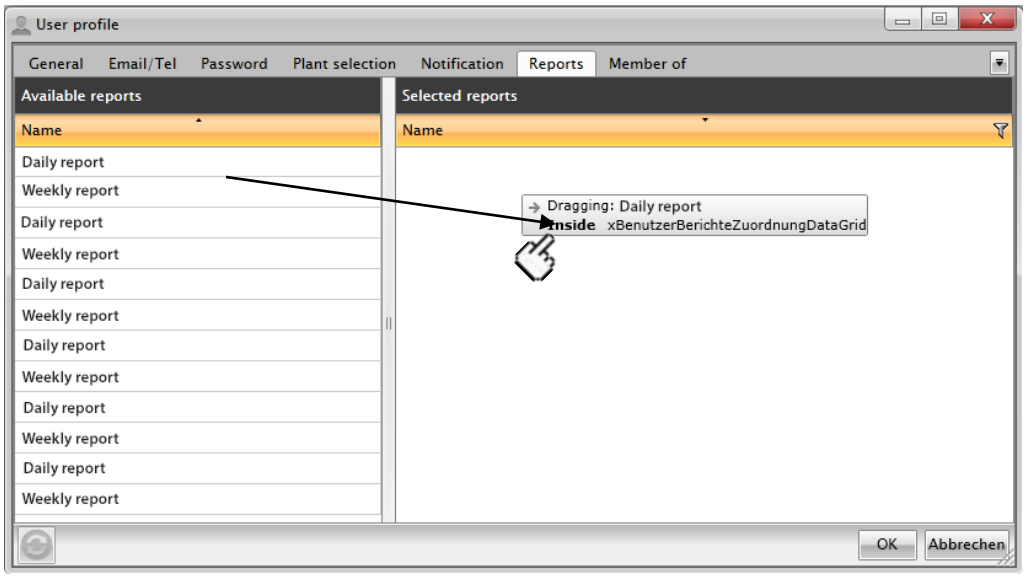


Figure 124: Assigning reports

You can assign reports to the current user by dragging them from the list of available reports to the list of selected reports (drag & drop).

To remove the assignment, drag the report from the list of selected reports back to the available reports list.

For more details on the report configuration, see chapter 7.8 “Report configuration“.

8.5 Translations

The ibaCMC supports a multilingual user interface. The language can be selected in the user administration settings (see chapter 8.3 “User administration“). The translation module can be reached by clicking on the corresponding icon in the settings menu.

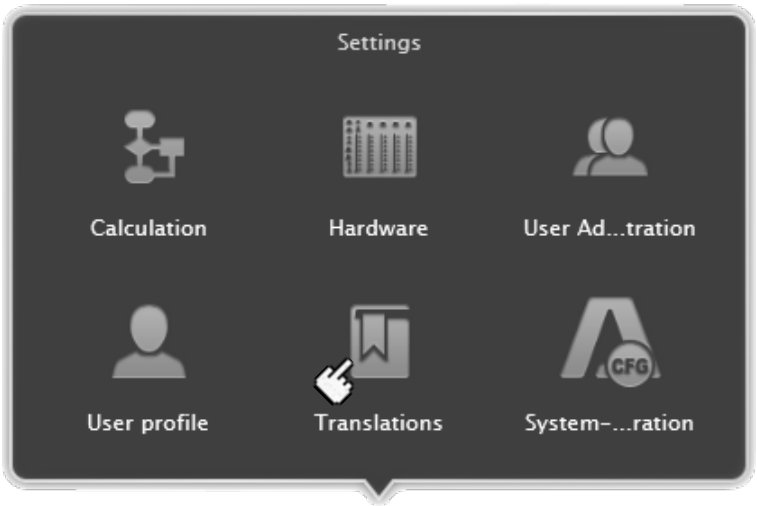


Figure 125: Starting the translation module

The ibaCMC currently supports German and English; there will be more languages available in the future.

All the log list functions described earlier apply to the translations lists as well. The translations can thus be sorted, grouped and filtered. See chapter 7.1.2 “Sorting, grouping and filtering“ for more information. Also navigating within a particular page works the same way (see Figure 42: Page navigation buttons).

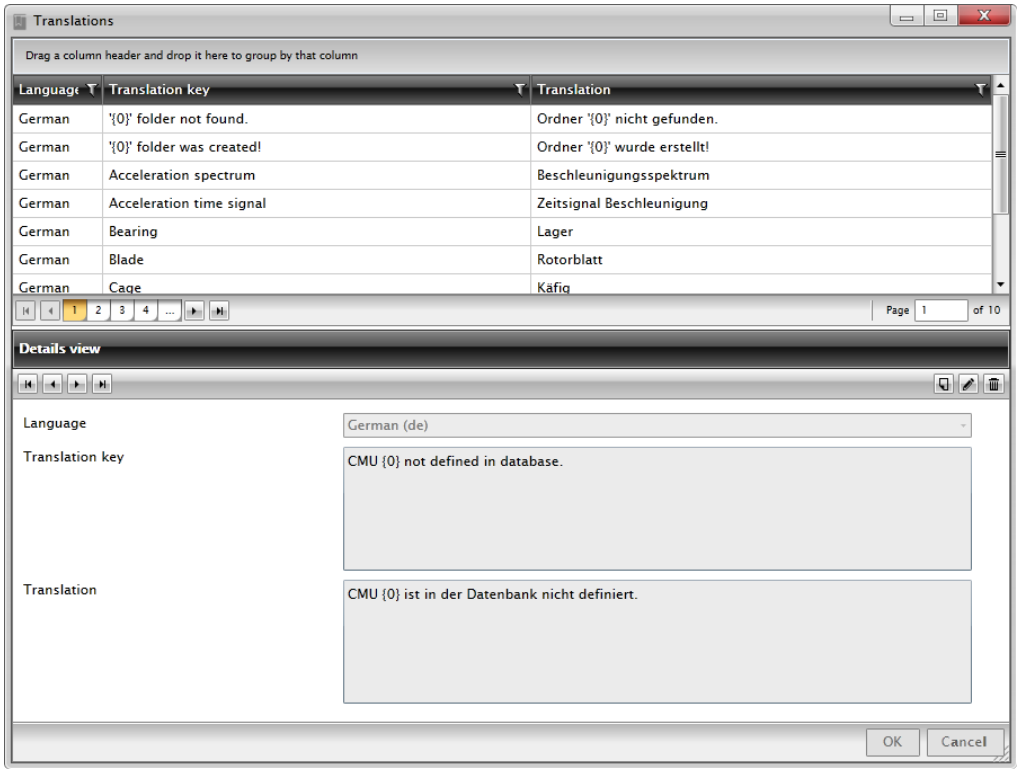


Figure 126: List of translations

The translation key is the value stored internally by the ibaCMC and it is always in English. The translation refers to the language on the left. Error messages often contain placeholders like {0}. These placeholders are automatically filled by the ibaCMC. A translation key can also contain several placeholders. The translation must also contain these placeholders.

8.6 System configuration

The system configuration is only mentioned for the sake of completeness. Users of ibaCMC should not make any changes to avoid unexpected behavior of ibaCMC.

The system configuration is opened by clicking the corresponding icon in the Settings menu.

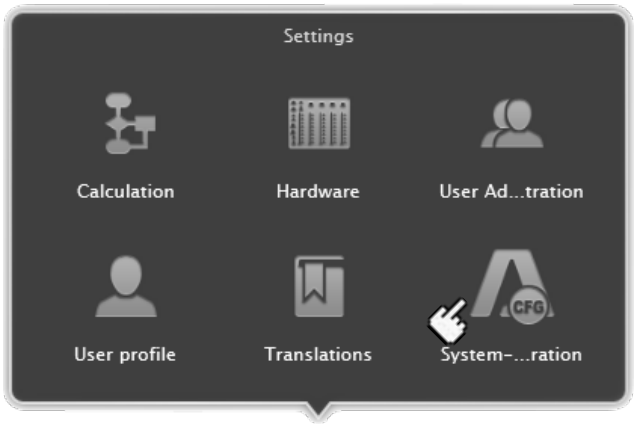


Figure 127: Starting the system configuration

The system configuration is a collection of global variables and settings required by the ibaCMC. The values of the variables can be edited which is, however, not recommended.

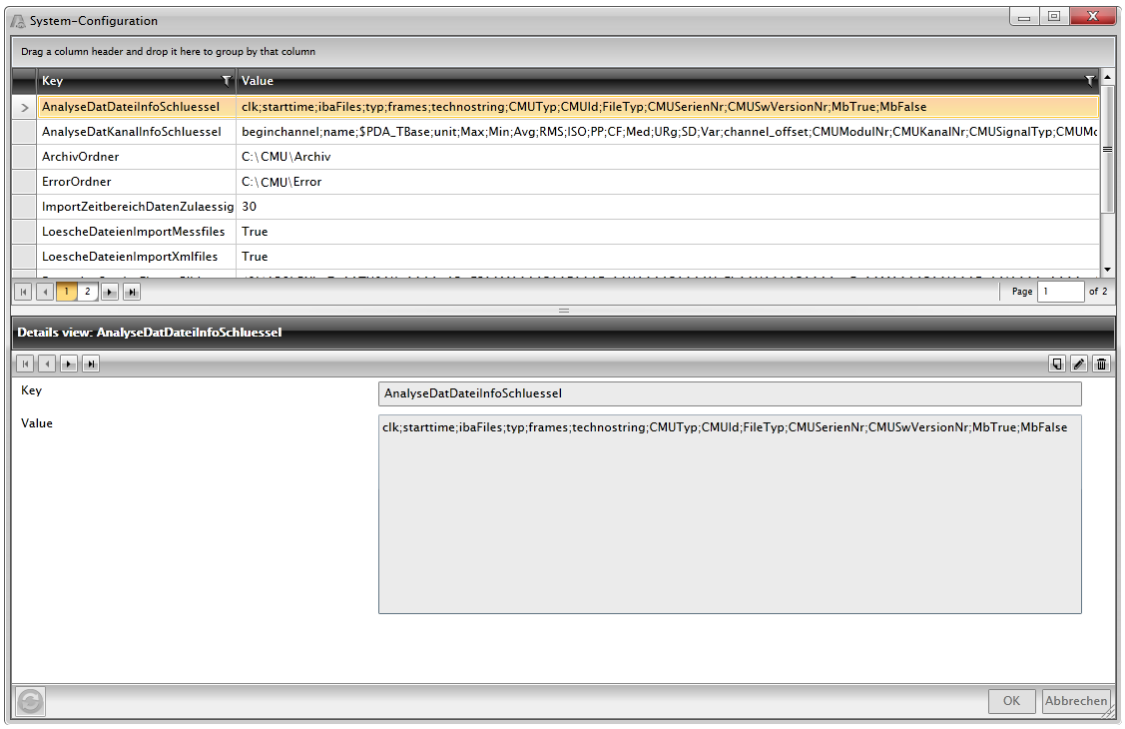


Figure 128: System configuration

Each variable or setting is provided with a short description. In the individual case (e.g. in case of diagnoses), it might be necessary to temporarily modify several parameters. However, only do this upon consultation with your system administrator.

9 Widgets

The widget view provides some additional information on the processes in the ibaCMC. It shows for example which web services of the ibaCMC are currently executed or have been executed. It also shows the Download Center.

The Widgets window will show up on the right hand side by clicking the icon in the dock.

Figure 129: Show widget window

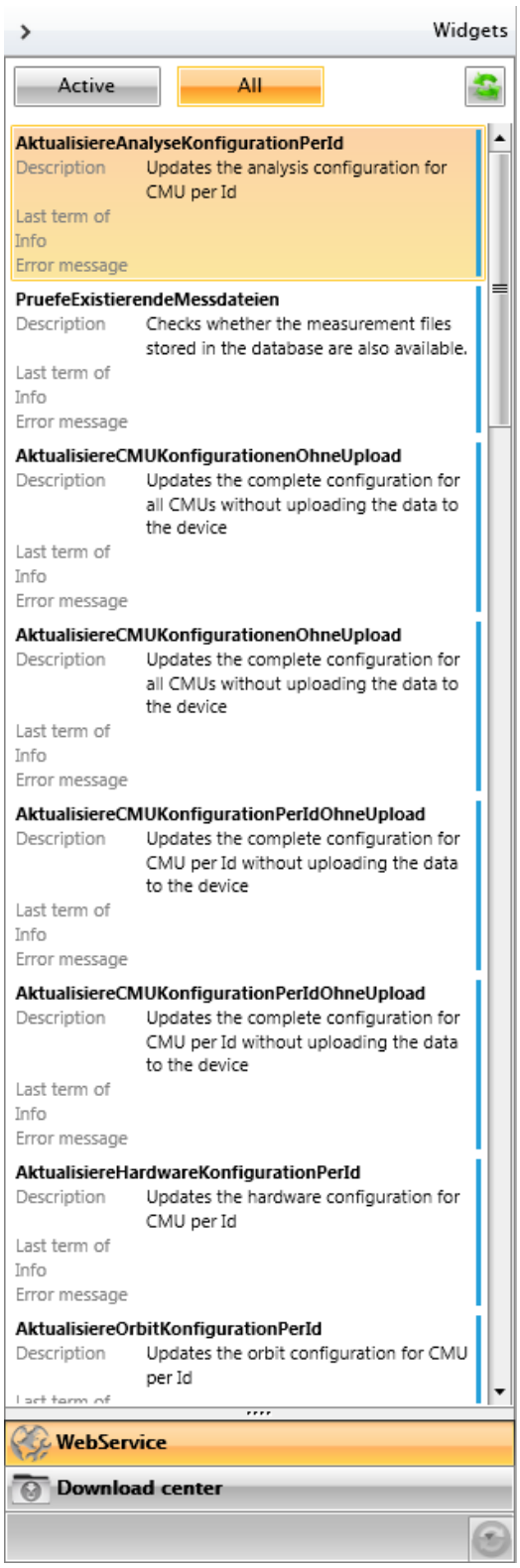


Figure 130: Widget web service view

You can switch between the web service list and the download center at the bottom of the widget window. Both views can be changed over by means of the buttons in the upper range so that they display the currently running or the already completed actions.

You are able to set off a manual update by clicking the button in the web service view.

10 Plant configuration

The plant configuration editor is one of the most important tools within the ibaCMC and the starting point for all activities in many cases.

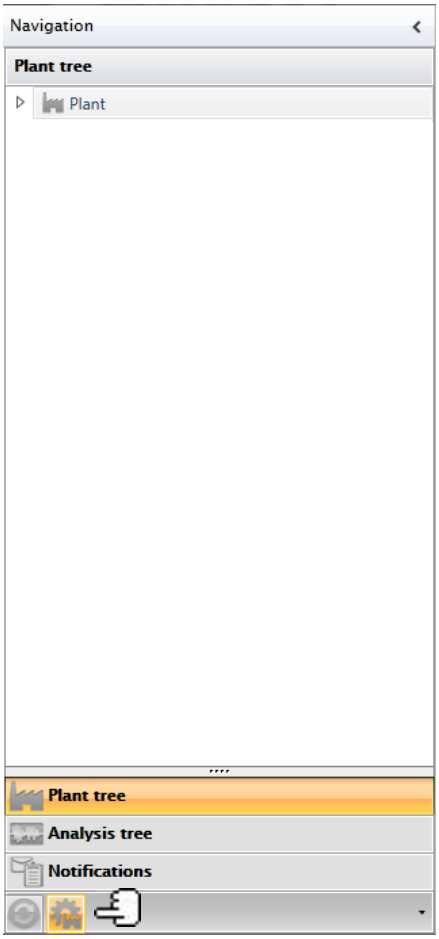


Figure 131: Starting the plant configuration

Start the plant configuration editor by clicking the button at the bottom of the navigation area.

The plant configuration editor is used to display the plant to be monitored with its complete mechanical configuration including the sensors. Therefore, the plant configuration provides the base for monitoring the individual components.

The plant configuration editor consists of three main parts: the plant library on the left, the plant tree in the middle and the details editor on the right.

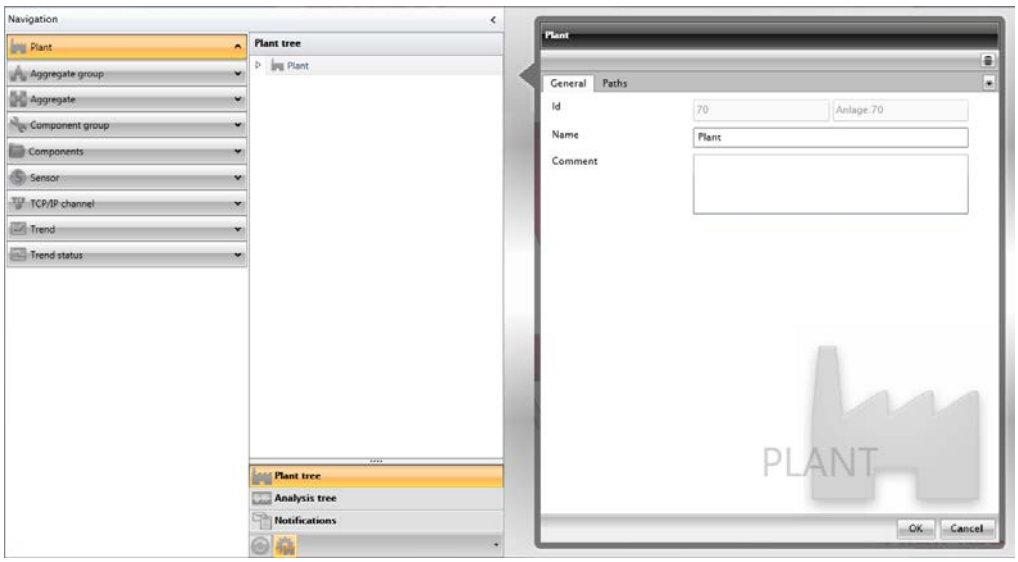


Figure 132: Plant configuration editor

10.1 Defining the plant structure

To create the plant structure, use the library on the left side. From this store, you are able to draw the particular parts in the plant tree and thus you can assemble the plant structure. The individual categories of the library can be tilt up and closed again by clicking on the small arrows on the right side.

Figure 133: Expanding the library category

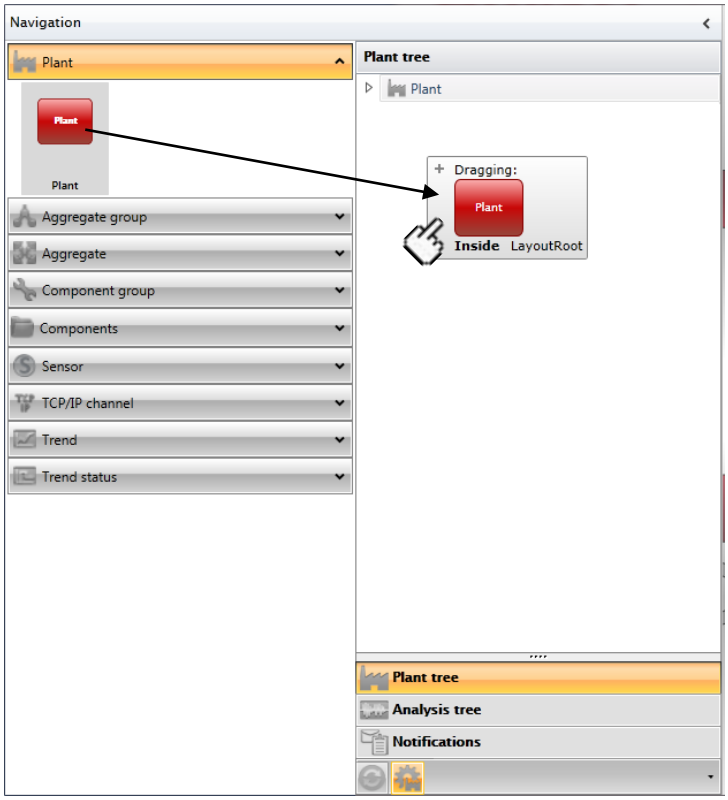


Figure 134: Adding a new plant

Start with a new plant first that you drag from the left side to the plant tree (see above figure).

To be able to completely design your plant, you need to follow the following structure rules:

- the root of a plant tree always has to be a plant
- a plant needs at least one aggregate group
- an aggregate group consists of at least one aggregate
- aggregates consist of at least one component group or a sensor and a shaft
- Component groups consist of at least one component.

Assign at first an aggregate group to the plant.

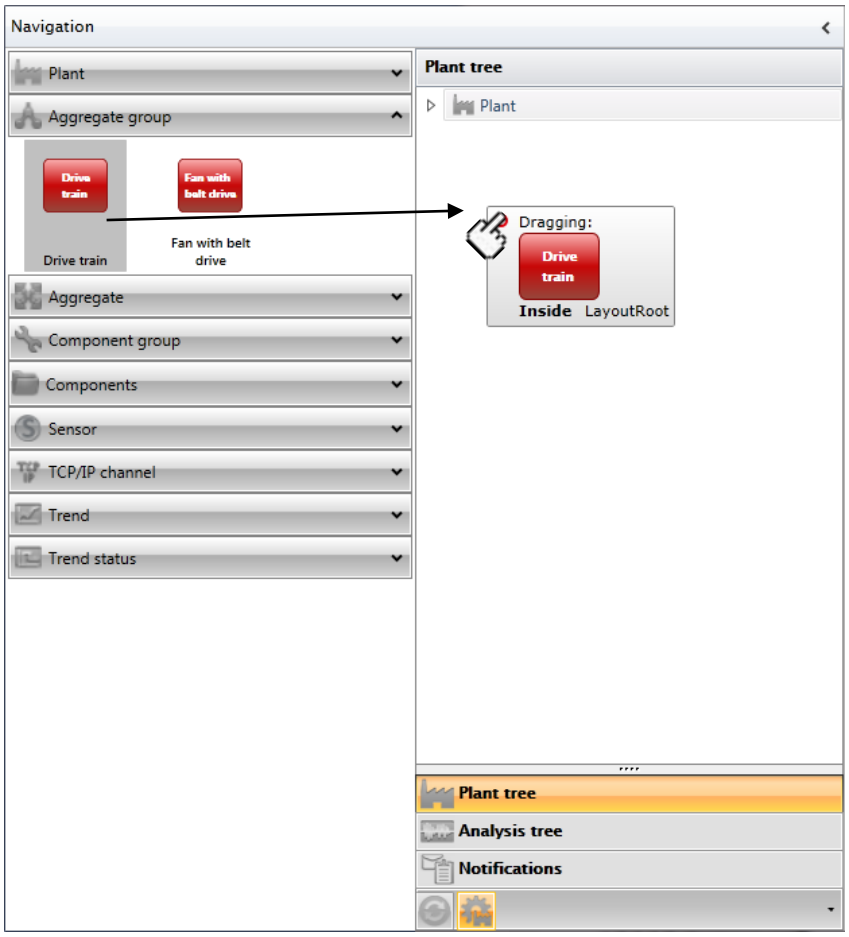
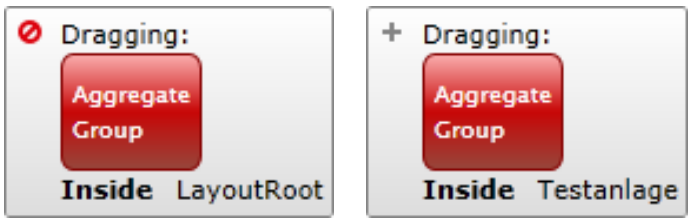


Figure 135: Adding an aggregate group

As it is shown Figure 135, it is not allowed to place an aggregate group on the same level as a plant (breach of the structure rule). In the left upper corner of the new aggregate group a small prohibition sign is shown. If the aggregate group is placed on a permitted position, you will see there a small + symbol.



If you add a more complex aggregate group (e.g. motor with three-stage gear) a short waiting time can occur because a large number of components have to be loaded.

10.1.1 Changing plant properties

You can change the plant properties in the editor window on the right. The properties are assigned to several tabs. Having finished your entries, you have to click on the <OK> button or directly after the entry on the <Enter> button to accept them. If you want to discard the changes, click on the <Cancel> button.

You can also delete the currently selected plant part in the editor window by clicking on the button on the top at the right in the window to confirm the displayed security permissions.

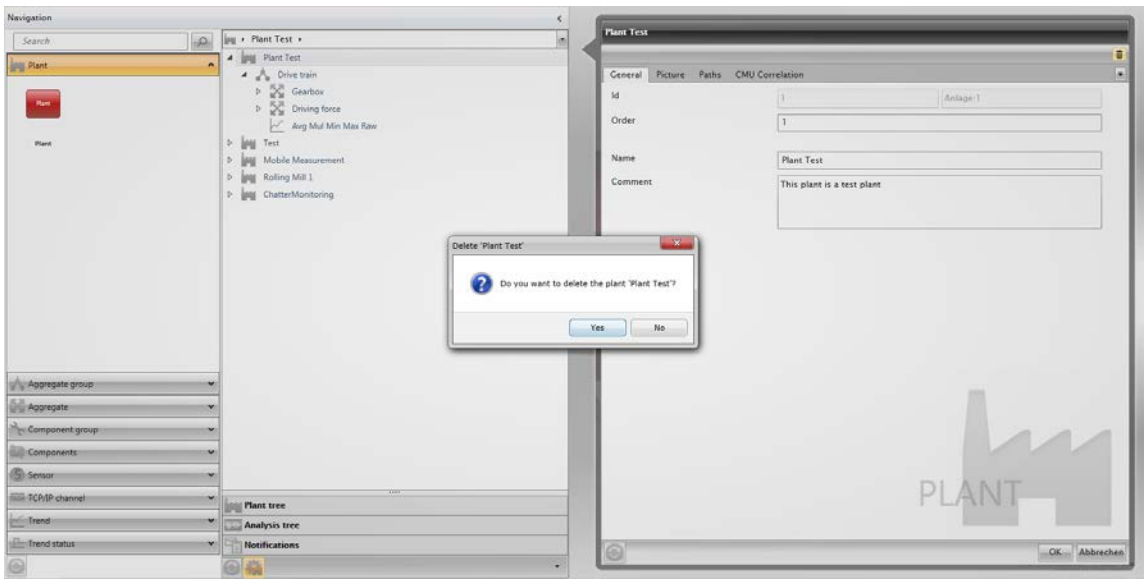


Figure 136: Deleting a plant

10.1.1.1 General parameters

The “General” tab shows some properties that can be changed.

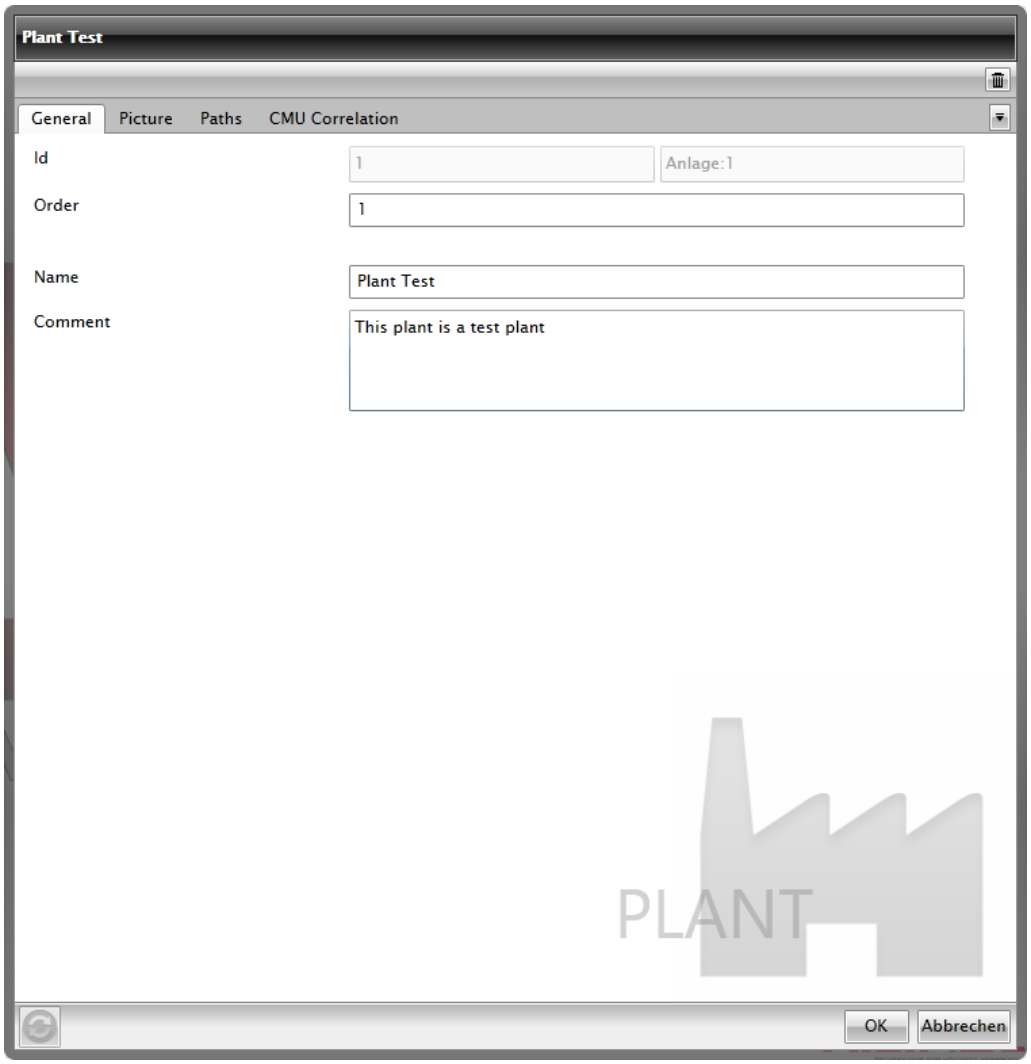


Figure 137: General plant parameters

❑ Id

This value is automatically generated by the database and cannot be changed.

❑ Order

This value gives the display order within the same level of the plant tree. Since the test plant comes second, it has the value 2.

❑ Name

Enter a plant name.

❑ Comment

Enter a meaningful comment.

10.1.1.2 Assigning images

You can assign an image to the plant in the “Image” tab. This image is also shown in the plant status window for instance (see chapter 3 “Plant Status Viewer“ for detailed information). Furthermore, you can assign images to many other components of the plant tree. The approach always remains the same.

Figure 138: Assigning an image to a plant

To add an image, drag it from a Microsoft® Windows® Explorer window to the “Select files to upload” field (not the dashed box containing the text “Drag Items here to Upload”) or click the <Browse> button then showing a file selection dialog.

Currently, the following image file types are supported:

- jpg
- png

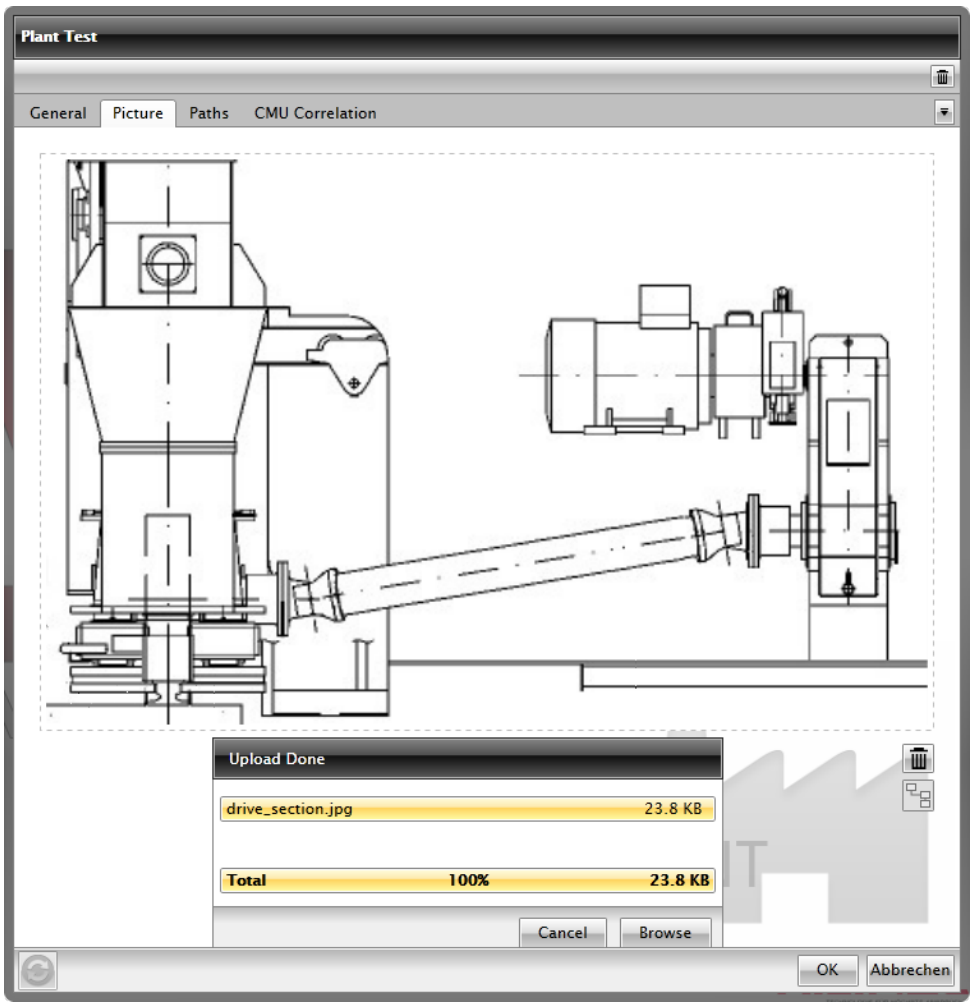


Figure 139: Plant with image

To delete an image, click on the button to the right of the “Select files to upload” box.

10.1.1.3 Setting paths

In the tab “paths” you store archive and error directories of the plant.

❑ Archive folder
Enter the desired path for the file archive of the plant.
Example: C:\AC\Testplant\Archive

❑ Error folder
Enter the desired path for the error archive of the plant.
Example: C:\AC\Testplant\Error

An example for a complete archive directory structure is shown in Figure 61: Plant archive structure.

In the error file which has a similar structure as the archive, for example measuring data are stored where errors occurred during processing. Thus, the fault can be understood later.

10.1.1.4 CMU correlation

The settings in the “CMU Correlation” tab are used for the internal regression calculation. The fundamental idea is that the vibration level on a plant strongly depends on its current load. Therefore, this increase has not always to do with an occurred damage. These undesired dependencies can be attenuated by a regression calculation by acquisition of the current load and by trending through regression the current vibration level on a “virtual” full load state.

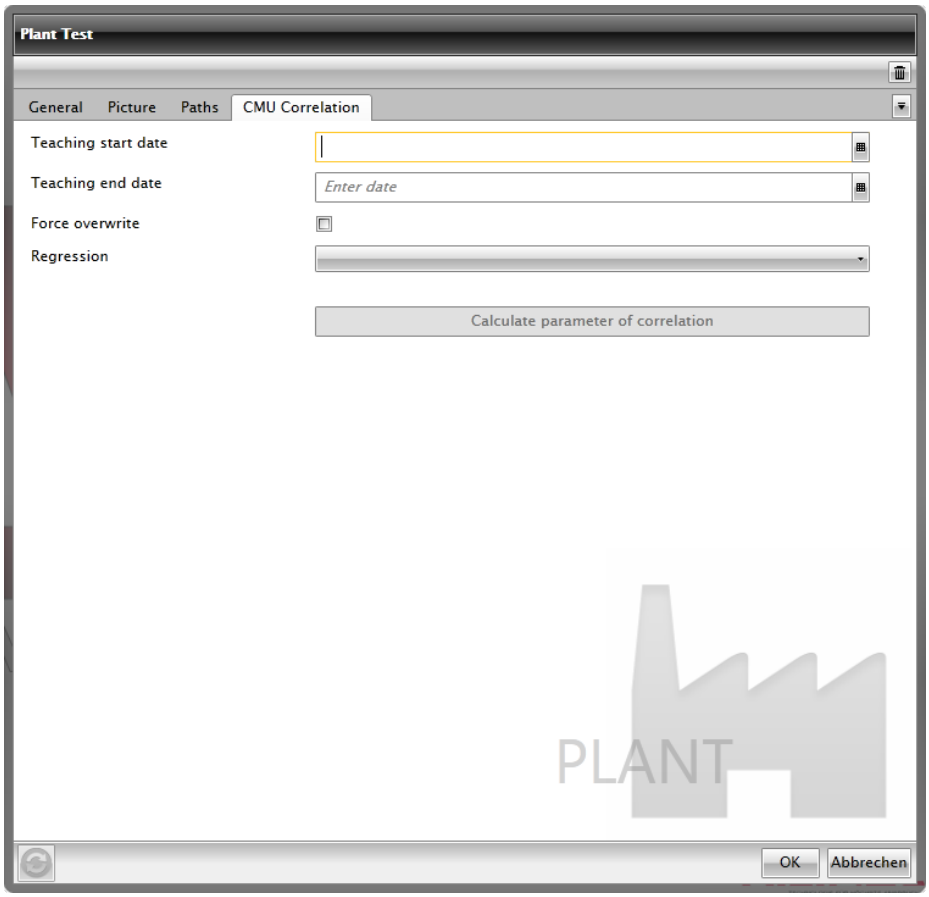


Figure 140: Plant CMU correlation

❑ Teaching start date

Enter here the selected start date of the data set which has to be used for the calculation of the regression coefficient.

❑ Teaching end date

Enter here the selected final date of the data set which has to be used for the calculation of the regression coefficient.

❑ Force overwrite

Hereby you force the Overwrite of the values in the data base.

❑ Regression

Select here the algorithm for the regression calculation, e.g. linear regression.

By clicking the <Calculate parameter of calculation> button, the calculation of the regression coefficients will be started.

The new coefficients are transferred with the analysis configuration files to the CMU which is assigned to this plant.

10.1.2 Adding, editing and deleting aggregate groups

Aggregate groups must always be attached to an enclosure in the plant tree. You can either use an empty template called “Aggregate Group” or a template already containing data, e.g “Motor with 2 stage gearbox”. It is generally always favorable to select the sample which comes as near as possible to the real configuration so that the adaptation expenditure will be as low as possible.

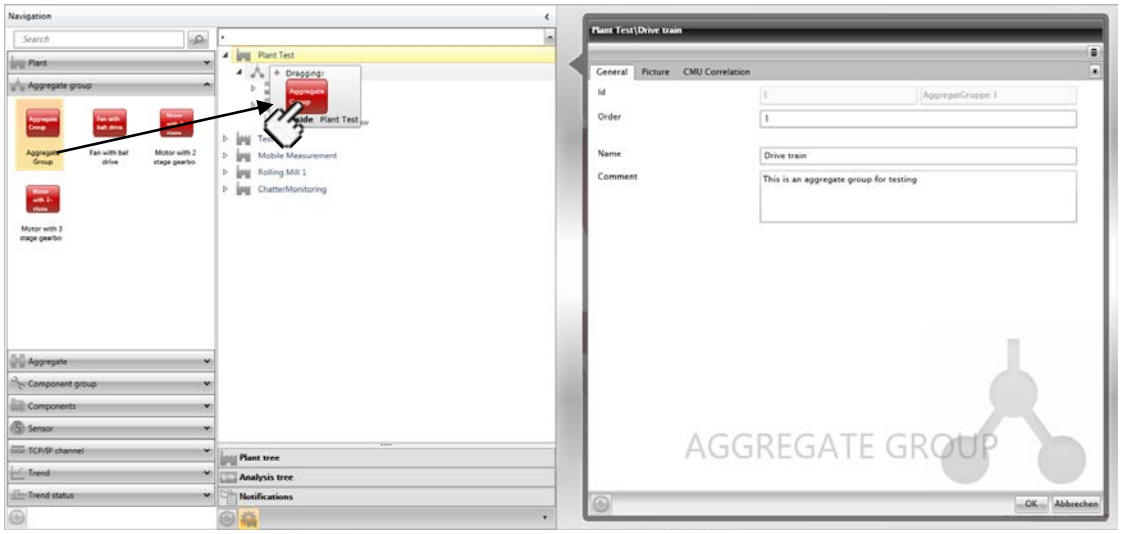


Figure 141: Adding an aggregate group

An aggregate group has the same configurable parameters as a plant, e.g. uploading an image or executing a CMU correlation. However, there are no paths available, these are reserved to plants.

To delete an aggregate group, click on the button in the upper right corner of the details editor.

10.1.3 Adding, editing and deleting aggregates

Aggregates can be appended to aggregate groups, but not directly to plants. An aggregate example is a gearbox or motor. Select an aggregate from the library which comes closest to your real aggregate and drag it by drag & drop to the desired aggregate group.

Aggregates have the same changeable parameters as aggregate groups.

To delete an aggregate, click on the button in the upper right corner of the details editor.

10.1.4 Adding, editing and deleting component groups

In the ibaCMC, components are a group if they have the same revolution speed. An example for a component group is the drive shaft of a gear with the two roller bearings and the pinion of the gearing. Every component group must have at least one shaft.

Select the desired component group from the library and drag it to the target aggregate. If you have already entered a predefined aggregate, the corresponding component groups exist perhaps already.

Contrary to the above described components plant, aggregate group and aggregate, velocity ratios and couplings to neighbored component groups over gearings play a role when component groups are configured.

To delete a component group, click on the button in the upper right corner of the details editor.

10.1.4.1 Defining plant links

By means of plant links, the connection between neighbored components will be established. You can make these settings in the “Plant links” tab. There are two different lists with predecessors and successors.

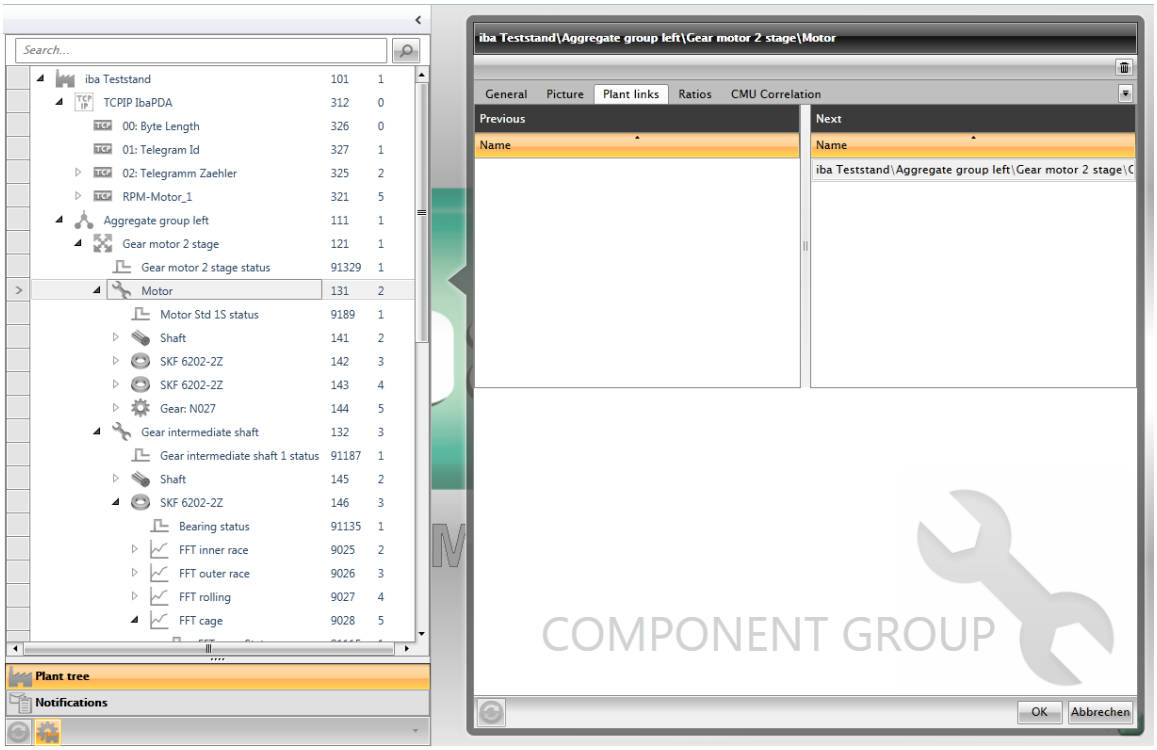


Figure 142: Creating plant links

The above figure shows the “Standard Motor” component. Since the motor is the first component in the drive train its predecessor list is empty. Then, the successor is the drive shaft of the gear (the coupling is preliminarily ignored). Therefore, enter by drag & drop the driving shaft of the gear in the successor list.

Things look different for the gears themselves, since the motor is the predecessor of the drive shaft of the gear and the successor is the following shaft in the gear (e.g. jack shaft or drive shaft). To remove the plant link again, drag it from the list to the remaining details editor window.

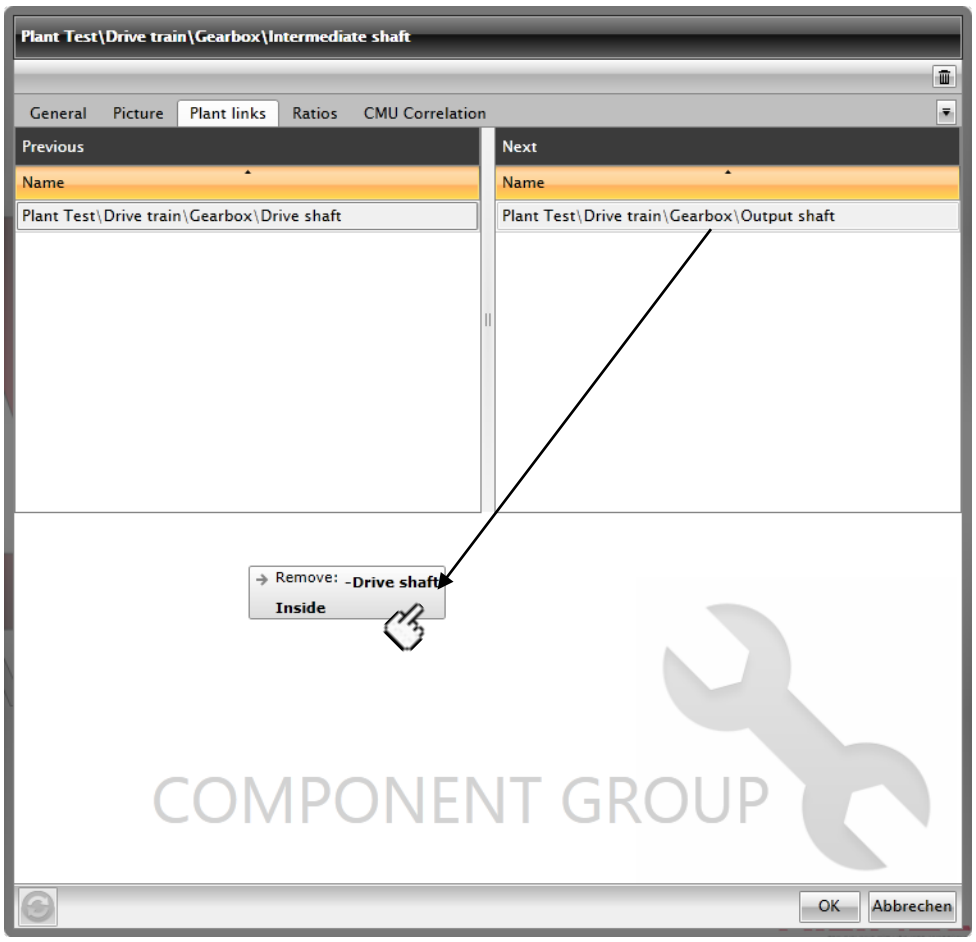


Figure 143: Removing plant links

10.1.4.2 Parameterizing transmission ratios

Since mostly only one speed measurement exists in one drive train, the speed of the other components has to be calculated with transmission ratios.

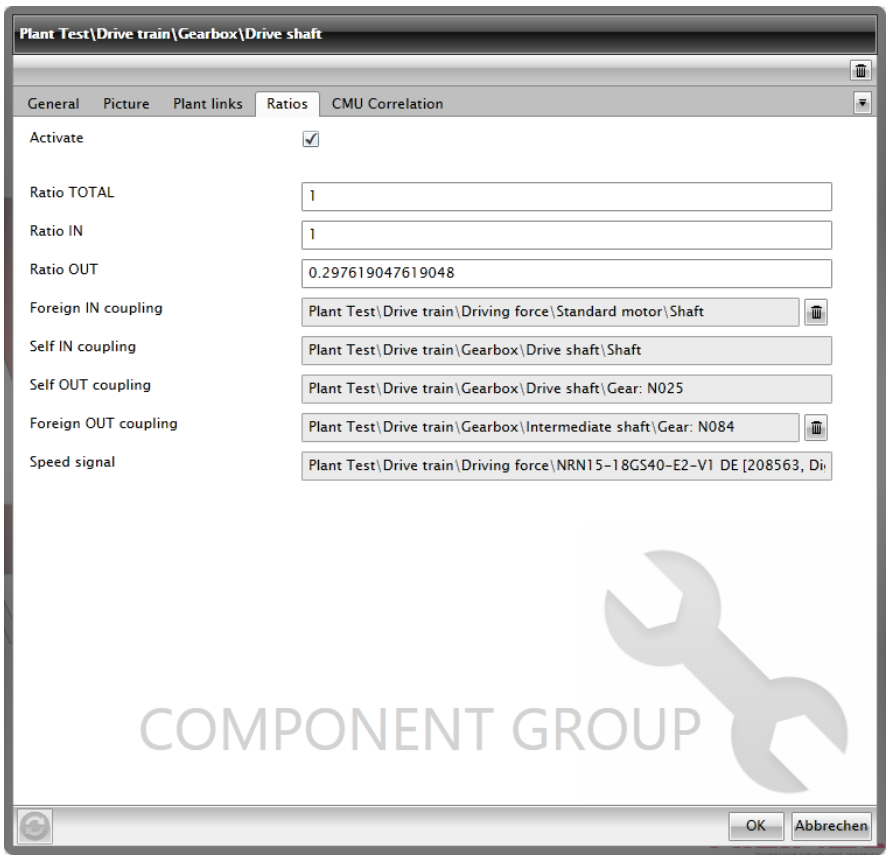


Figure 144: Component group ratios

The settings of the component group ratios are preferably explained on the basis of examples.

A motor which has no transmission can serve here as the most simple example

- ❑ Ratio TOTAL
1 (no transmission ratio)

- ❑ Ratio IN
1 (no transmission ratio)

- ❑ Ratio OUT
1 (no transmission ratio) because the input shaft of the following gearbox has the same speed

- ❑ Foreign IN coupling
empty, since the motor is the first component in the drive train

- ❑ Self IN coupling
the motor’s own shaft

- ❑ Self OUT coupling
the motor’s own shaft

- ❑ Foreign OUT coupling
the motor’s own shaft

- ❑ Speed signal
speed sensor connected to the aggregate, where the “Motors” component group belongs to.

It becomes more complicated in case of an input shaft in the gearbox:

❑ Ratio TOTAL
1 (no transmission ratio) because the motor and the input shaft of the gearbox has the same speed

❑ Ratio IN
1 (no transmission ratio)

❑ Ratio OUT
0.297619047619048 (calculated from the number of teeth of the pinion gear e.g. 25 and the number of teeth on the intermediate shaft e.g. 84)

❑ Foreign IN coupling
the motor shaft

❑ Self IN coupling
the input shaft itself

❑ Self OUT coupling
the pinion gear on the input shaft

❑ Foreign OUT coupling
the gear wheel on the intermediate shaft

❑ Speed signal
speed sensor connected to the aggregate, where the “Input shaft” component group belongs to.

The transmission ratio is automatically recalculated if the component parameters are changed (e.g. the number of teeth of a gear).

10.1.5 Adding, editing and deleting components

Each component group contains individual components. You can add new components to existing component groups by dragging them from the library and drop it in the plant tree. This functionality can also be used to replace existing components. This is particularly useful when you chose a predefined aggregate template. This template contains DUMMY bearings because the exact bearing types of course are not known yet. You can select the right bearing type from the library and drag it on the DUMMY bearing to replace it. All relevant component parameters will be changed automatically.

To delete a component, click on the button in the upper right corner of the details editor.

The following component categories are available in the library.

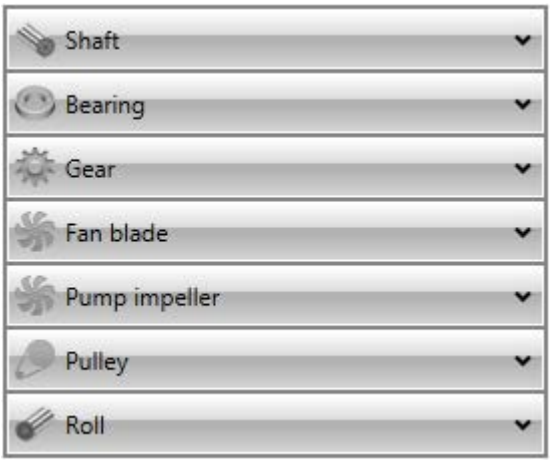


Figure 145: Component categories

The bearing library already contains a lot of different bearings which is why there is a manufacturer filter in the bearing category.

The following parameters of the components in the “General” tab are identical for all components:

❑ Id

This is a unique ID automatically generated by the database and therefore cannot be changed.

❑ Order

This value gives the display order within the same level of the plant tree.

❑ Type

Select the component type. This value is usually preset.

❑ Comment

Enter a meaningful comment here (optional).

❑ Position

The following values can be selected as position:

- centered position
  if the component, e.g. bearing, is located in the middle of the shaft
- doubleside drive end
  if, for example, you have a gearbox with two output shafts
- drive end
  if the component is located where the load is attached (also known as A side in motor terminology)
- not drive end
  if the component is located opposite of the load (also known as B side in motor terminology)
- without drive end
  if there is no load or output shaft (e.g. an impeller without input shaft)

❑ Sensor

Select the sensor which is monitoring this specific component. The drop-down list contains all sensors assigned to the aggregate belonging to the component.

Depending on the component, additional parameters can be defined in the “Parameters” tab. If the parameters are defect frequencies, please note that these values are depending on the shaft revolution frequency and are entered based on a shaft revolution frequency of 1 Hz.

❑ Shaft
Shaft defect frequency
Unbalance defect frequency

❑ Bearing
Usually, you do not need to change the bearing defect frequencies, as they are already part of the bearing library data.

- Cage defect frequency
- Inner race defect frequency
- Outer race defect frequency
- Ring pass defect frequency

❑ Gear
Gear mesh frequency

If you have a gearing with 19 teeth, the value has to be set on 19 Hz. This value will also be displayed in the component name within the plant tree (e.g. N019)

❑ Fan blades
Number of fan blades

❑ Pump impeller
Number of impeller blades

❑ Pulley
- Belt diameter
- Belt forcing frequency
- Belt length

❑ Roll
Roll diameter

10.1.6 Adding, editing and deleting sensors

Each component in the plant configuration needs a sensor to be assigned for monitoring purposes; one sensor can monitor several components. In the plant configuration, the sensor needs to be assigned to an aggregate, since a sensor can monitor several components across component groups.

Sensors are dragged from the library to the corresponding aggregate and dropped there.

To delete a sensor, click on the button in the upper right corner of the details editor. The sensor itself will not be deleted, only the assignment to a particular aggregate will.

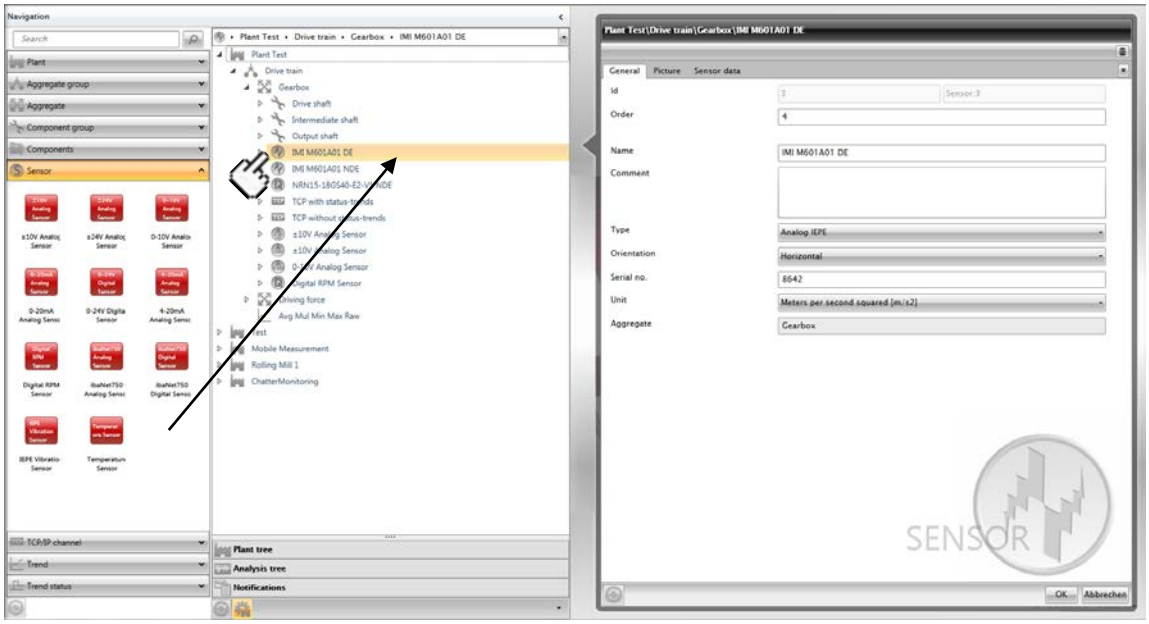


Figure 146: Adding a sensor

The following sensor parameters can be edited in the “General” tab in the details editor:

❑ Id

This is a unique ID automatically generated by the database and therefore cannot be changed.

❑ Order

This value gives the display order within the same level of the plant tree.

❑ Name

Enter a sensor name (e.g. type and manufacturer).

❑ Comment

Enter a meaningful comment here (optional).

❑ Type

Select the appropriate sensor output type.

The following types are available:

- Analog standard
  Select this setting if none of the other analog types apply. In this case, you also need to adjust the “Range Min” and “Range Max” in the “Sensor data” tab.
- Analog Current ±20 mA
  self-explanatory
- Analog Current 0-20 mA
  self-explanatory
- Analog Current 4-20 mA
  self-explanatory
- Analog ibaNet 750
  analog signal coming from an ibaNet750 fieldbus module connected to the CMU via optical fiber cables (e.g. temperature sensors)
- Analog IEPE
  vibration sensor with built in charge amplifier (also known as ICP® or Piezotron® sensors)

- Analog Voltage ±10 V
  self-explanatory
- Analog Voltage ±24 V
  self-explanatory
- Analog Voltage 0-10 V
  self-explanatory
- Digital 0-24 V
  24V HTL digital signal connected to one of the CMU's digital inputs for instance
- Digital ibaNet 750
  digital signal coming from an ibaNet750 fieldbus module via optical fiber cables
- Digital rpm
  digital sensor used for revolution speed measurement (e.g. proximity switch)
- Profibus
  Signal coming via Profibus DP. It is assumed that the signal has already been scaled to the physical unit.
- TCPIP
  Signal coming via TCP/IP telegram. It is assumed that the signal has already been scaled to the physical unit.

❑ Orientation
This parameter is used for vibration sensors only.

❑ Serial no.
Enter the sensor serial number here.

❑ Unit
Select the physical unit of the measured value.

❑ Aggregate
This shows the aggregate connection of the sensor. The value is automatically applied if the sensor in the plant tree is dragged to an aggregate. However, you can drag another aggregate to this field to assign the sensor differently.

An image can be assigned to the sensor in the "Image" tab. This works in the same way as for a plant. Chapter 10.1.1.2 "Assigning images" provides more details on this.

In the "Sensor data" tab, different parameters can be set depending on the sensor type.

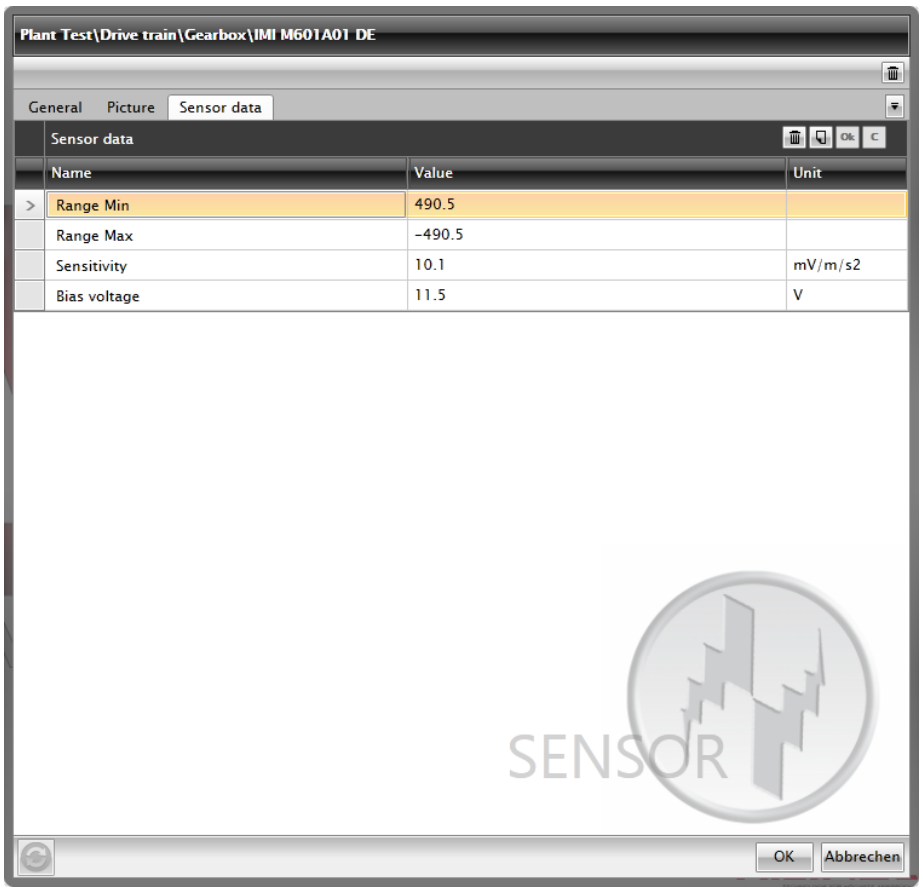


Figure 147: Vibration sensor data

All analog sensor types dispose of “Range Min” and “Range Max” parameters which correspond to the physical value at minimum and maximum output signal level. Normally, you will find the needed values in the datasheet of the sensor or in the calibration certificate of vibration sensors.

Example

An inductive displacement sensor (M18 type of construction) has an output signal level of 4-20 mA. The linear measuring range is between 1 and 5 mm.

Enter value “1” for “Range Min” and “5” for “Range Max”. In addition to that, set the sensor type to “Analog Current 4 – 20 mA” in the “General” tab.

For a vibration sensor, additionally the parameter “sensitivity” and “bias voltage” (see Figure 147) exist, which you can find in the sensor’s calibration certificate.

10.1.7 Adding, editing and deleting TCP/IP channels

Adding the TCP/IP channels via the plant configuration is an alternative to the configuration within the CMU settings (see chapter 8.2.1.6 „Configuring TCP/IP telegrams“).

Data from the automation can be read by means of TCP/IP channels from the automation environment.

For adding a new TCP/IP channel drag it from the library to the desired aggregate (the convention for sensors is also applied for TCP/IP channels). You can choose between

channels with status trends and channels without status trends. The difference is explained in Figure 97: Difference of TCP channel definitions in the plant tree.

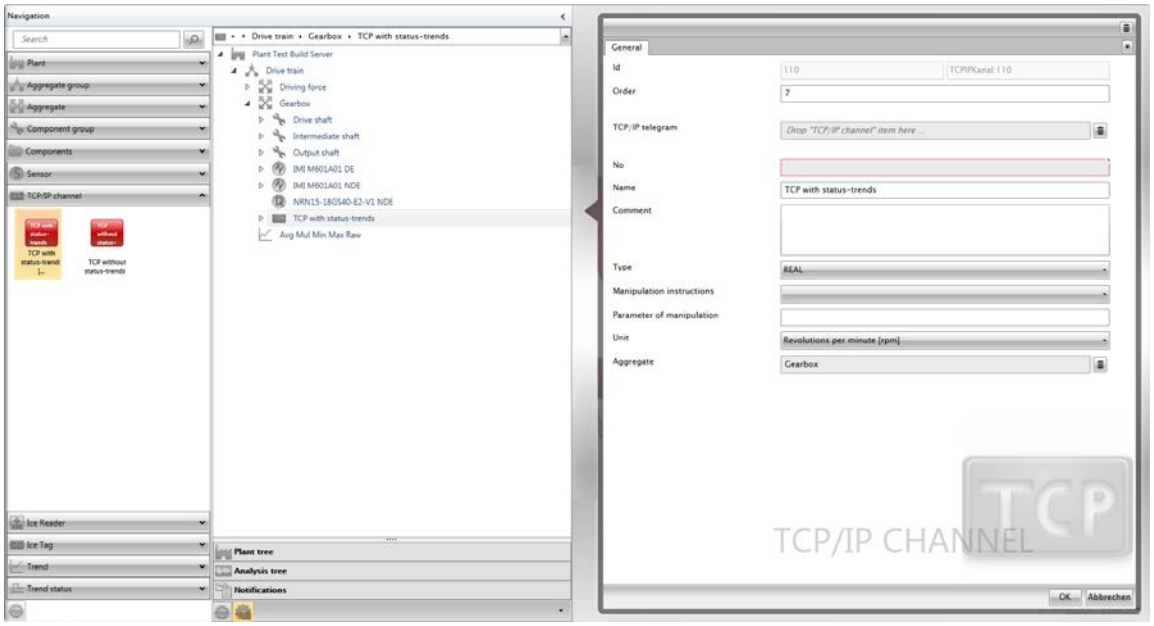


Figure 148: Add TCP/IP channel

The following parameters can be edited in the “General” tab:

❑ Id

This is a unique ID automatically generated by the database and therefore cannot be changed.

❑ Order

This value shows the display order within the same level of the plant tree.

❑ TCP/IP Telegram

You have to link the TCP/IP channel to a TCP/IP telegram created in the CMU hardware configuration. The TCP/IP telegram is visible on the aggregate group level in the plant tree.

❑ Name

Enter a TCP/IP channel name here (e.g. type and manufacturer)

❑ Comment

Enter a meaningful comment here (optional).

❑ Type

Select the appropriate data type from the list (e.g. REAL).

❑ Manipulation instructions

Select the desired manipulation instructions from the list.
Available algorithms are:

- Abs
- Add
- Div
- Mul
- Sub

❑ Parameter of manipulation

Enter the suitable parameter for the manipulation algorithm above. The provision Abs (absolute amount) naturally does not require a parameter.

❑ Unit

Select the physical unit of the TCP/IP channel here.

❑ Aggregate

This shows the aggregate connection of the TCP/IP channel. The value is automatically applied if the channel in the plant tree is dragged to an aggregate. You can also drag another aggregate to this field to assign the TCP/IP channel differently.

10.1.8 Adding, editing and deleting trends

Usually, you do not have to add trends manually, as they are already part of the aggregate, component group and component templates. Nevertheless, manual changes might still be required. You can add trends by dragging a specific trend from the library to the desired plant item. Please note that trends can be added to all components except plants.

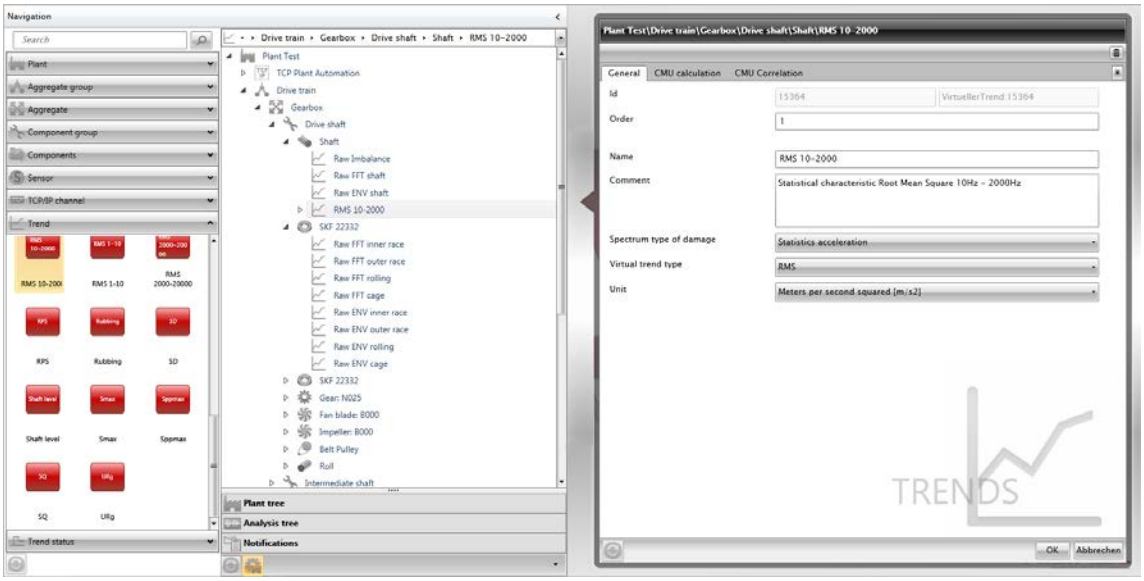


Figure 149: Adding a trend

After adding the trend using drag & drop, its parameters will be automatically set.

However, you can change trend parameters manually.

❑ Id

This is a unique ID automatically generated by the database and therefore cannot be changed.

❑ Order

This value gives the display order within the same level of the plant tree.

❑ Name

Enter a trend name, if you wish.

❑ Comment

Enter a meaningful comment here (optional).

❑ Spectrum type of damage
Select here the desired corresponding damage type.

❑ Virtual trend type
Select the desired trend type here.

❑ Unit
Select the physical unit of the trend here.

10.1.8.1 Parameterize CMU calculations

With some trends, parameters are required for the CMU to calculate the trend. You can set the parameters in the “CMU calculation” tab.

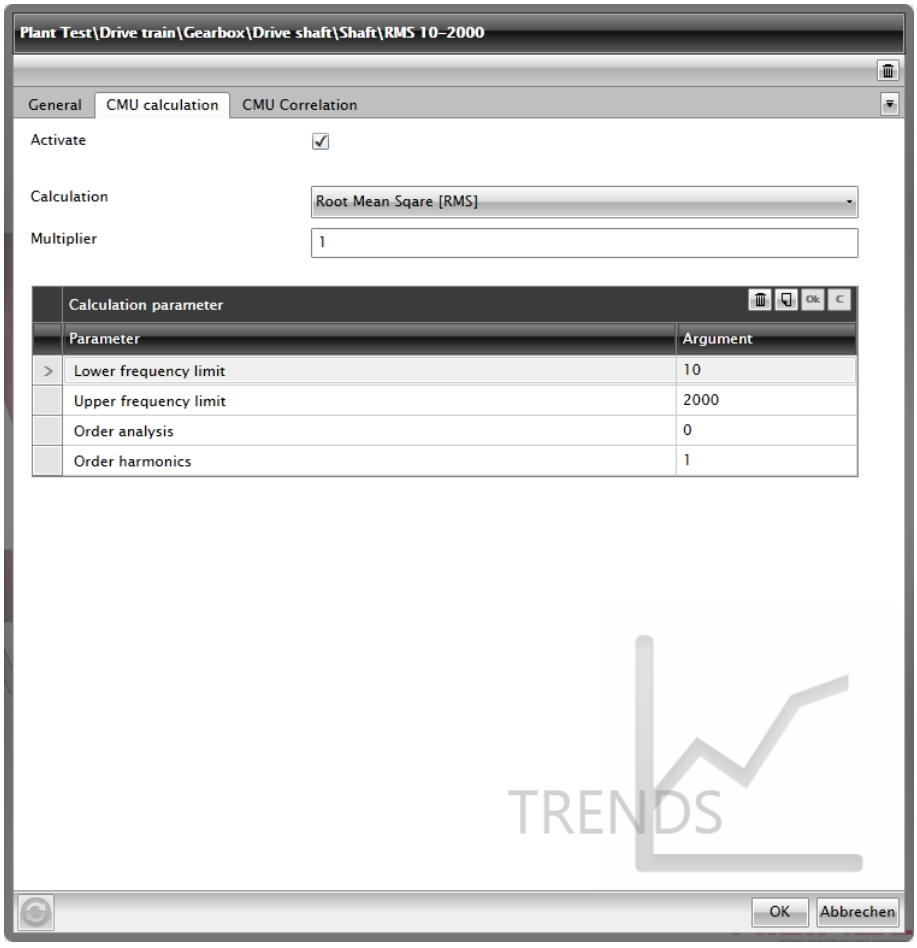


Figure 150: Calculation parameters of a filtered RMS value

The example of a filtered RMS value (see Figure 150) explains the calculation parameters.

❑ Activate
Activate the calculation by checking the box.

❑ Calculation
Select the desired calculation method from the list. If you use a certain trend from the library, this field is already correctly selected.

❑ Multiplier
As an option, you can enter here an additional factor by which the trend value will be multiplied after the original calculation.

❑ Calculation parameters
You can edit the calculation parameters directly in the list. You can also add new parameters by clicking the button or delete existing parameters by clicking the button.

10.1.9 Adding, editing and deleting status trends

Status trends are already part of the library templates for aggregates, component groups and components. If you used these templates to create the plant structure, the appropriate status trends will have been generated automatically, too.

You can add status trends by dragging a specific status trend from the library to the desired plant item. Please note that status trends can be added to all components except for plants.

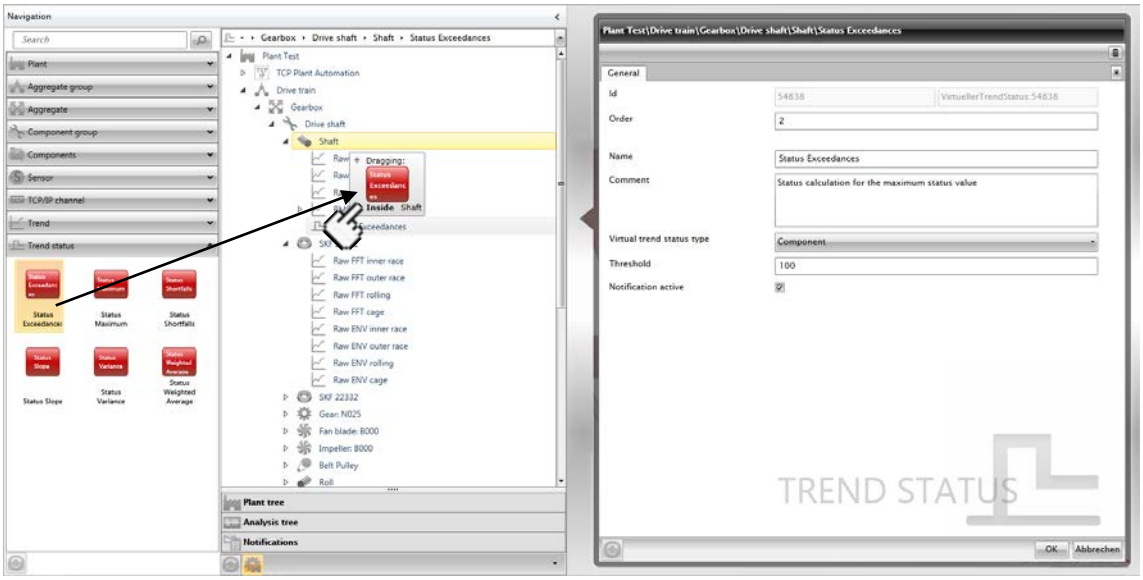


Figure 151: Adding a status trend

Status trends trigger notifications and therefore play an important role in the ibaCMC.

You can change the following parameters in the “General” tab:

❑ Id
This is a unique ID automatically generated by the database and therefore cannot be changed.

❑ Order
This value gives the display order within the same level of the plant tree.

❑ Name
Enter a status trend name if you want to change the proposal.

❑ Comment
Enter a meaningful comment here (optional).

❑ Virtual trend status type
Select the desired trend status type here. This type is already preset in the library templates of components, component groups and aggregates.

❑ Threshold

Enter a threshold value for the alarm condition of the status trend here. The other conditions will be calculated depending on this value.

Warning:	70 % of this threshold value
Acute Alarm:	130 % of this threshold value

❑ Notification active

Check this box if you want this status trend to trigger notifications.
See chapter 7.7 “Notifications“.

11 Teaching

“Teaching” is not yet available in this version of the ibaCMC.

12 FAQ

12.1 Problem with this website's security certificate

If you operate the ibaCMC on an internal server, which does not use a registered security certificate (e.g. from Verisign®), the Microsoft® Internet Explorer® shows the following security warning when calling the ibaCMC URL.

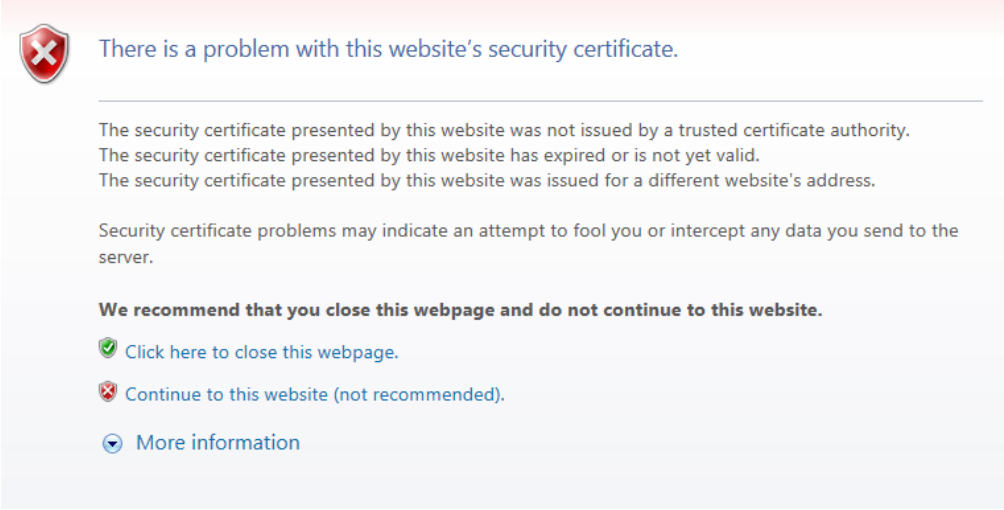


Figure 152: Microsoft Internet Explorer security warning

Click on “Continue to this website (not recommended)” to proceed to the login screen of ibaCMC.

12.2 Plant tree is not displayed

No plant is displayed in the navigation area although it has already been configured.

This might happen when using Microsoft® Internet Explorer® 11. One possible workaround is to add the ibaCMC URL to the compatibility view.

Turning on the Compatibility View

If there is an icon right to the URL in the address bar, the compatibility view has already been activated.

Click on <Compatibility view settings> in the “Tools” menu to add the ibaCMC website in the Microsoft Internet Explorer 11 to the compatibility view. In the appearing window, the URL of the ibaCMC should have been entered already; you can apply it by clicking the <Add> button.

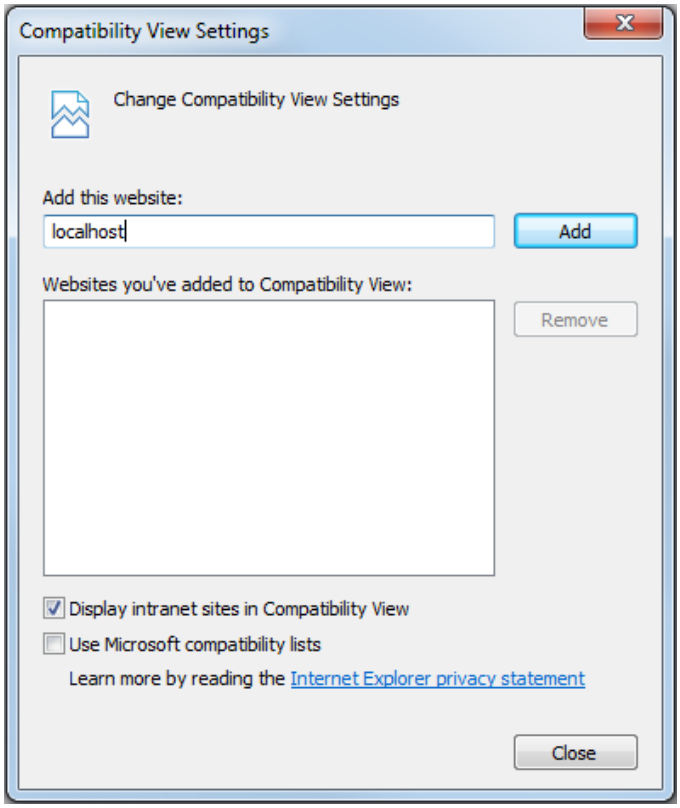


Figure 153: Compatibility view settings

12.3 Microsoft Silverlight plugin installation and configuration

12.3.1 Microsoft Internet Explorer users

The browser will prompt you to download the installation program (Silverlight.exe). Click on <Run> to start the download. When the download is finished, the browser prompts you again to run the installer of the plugin. Please note that administrator rights might be required to install Microsoft® Silverlight® Plugins.

12.3.2 Mozilla Firefox User

The web browser will prompt you to save Silverlight.exe to your local hard disc. Once the download is finished, click <Open> to start the installation. If you use Microsoft® Windows® Vista or Microsoft® Windows® 7, you will be prompted for security permissions. Restart your web browser after the installation.

12.4 Name change does not appear

If, for example, you change the sensor name that is connected to a CMU, you will not yet see the changes in the hardware configuration. Click in the lower left corner of the window and the new name will be displayed.

12.5 Plant cannot be deleted

If you cannot delete a plant, you have to delete the sub-ordinated aggregates first.

12.6 You cannot see all window contents properly

Please set your browser zoom level to 100 %. Your screen resolution should be set to at least 1280x1024 pixels. You can also use your web browser in full screen mode. If you use Microsoft® Internet Explorer®, you can press <F11> to switch to full screen mode. To leave the full screen mode, press the <F11> key again.

13 Support and contact

Support

Phone: +49 911 97282-14

Fax: +49 911 97282-33

E-Mail: support@iba-ag.com

Note

If you require support, specify the serial number (iba-S/N) of the product.

Contact

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