

ibaCMC

Condition Monitoring Center

Manual

Issue 3.9

Measurement Systems for Industry and Energy

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The current version is available for download on our website www.iba-ag.com and can be found in the iba help center docs.iba-ag.com.

Version	Date	Revision	Author	Version SW
3.9	11-2026	Reports in HTML format + easier configuration; Copy/paste in plant tree; signal analysis: multiple y-axes; trend analysis: tooltip cursor + group trends by trend filter; reset status in alarm list; logbook attachments; validation of CMU configuration before export; email to all; operation when database is lost; manual migration ibaCMU-S/ibaDAQ to ibaM-DAQ	rm	3.9.0

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1 About this documentation

This documentation describes the functioning and applications of the iba **C**ondition **M**onitoring **C**enter *ibaCMC* for monitoring and analysis of the condition of plants and machinery based on vibration data.

1.1 Target group and previous knowledge

This documentation is aimed at trained professionals who are familiar with the subject of vibration measurement in plants and engineering and will be performing the condition analyses based on vibration measurements.

For configuration of the analyses and interpretation of the results, we recommend certification in compliance with ISO 18436-3.

1.2 Notations

In this manual, the following notations are used:

Action	Notation
Menu command	Menu *Logic diagram*
Calling the menu command	*Step 1 – Step 2 – Step 3 – Step x* Example: Select the menu *Logic diagram – Add – New function block*.
Keys	<Key name> Example: <Alt>; <F1>
Press the keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Key name> Example: <OK>; <Cancel>
Filenames, paths	`Filename`, `Path` Example: `Test.docx`

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!

Observe the specified measures.

Warning!



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

Observe the specified measures.

Caution!



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

Observe the specified measures.

Note



A note specifies special requirements or actions to be observed.

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.

2 Introduction

ibaCMC is a web-based software solution for online condition monitoring and has the following features:

Configuration of condition monitoring units (CMU)

A condition monitoring unit (CMU) can acquire and analyze the signals from up to 32 vibration sensors in parallel. Signal acquisition for these vibration sensors is realized using IEPE modules. Up to 4 of these modules can be connected to the CMU and each module can measure up to 8 vibration sensors, resulting in the total of 32.

The measurement conditions, analyses, sensor assignment, measurement configuration, and communication protocols for the CMUs can be conveniently configured using *ibaCMC*.

The calculation results, data files and the CMU logs are imported cyclically by *ibaCMC* and are then available for further analysis.

This enables the configuration and subsequent analysis to be designed using one tool.

Data storage and trending

The results of the calculations are permanently saved in a database. Long-term storage enables trends to be identified using the trend analysis window. The raw data is saved on a file server as DAT files and is available directly in the web client for subsequent detailed analyses.

Time signal and spectrum analysis

In the trend analysis window, specific times can be analyzed in greater detail using high resolution time signals, FFT spectra, and envelope curve spectra. Damage patterns or anomalies in the signals can be identified in a separate analysis window using harmonics and sideband markers. The kinematic data for the components used is displayed in a table, enabling any damage to be identified in detail (e.g. to differentiate between inner and outer race damage on a bearing).

Dashboard

A dashboard provides you with a clear view of relevant characteristic values using tiles. A user can create a dashboard for their own use only or share it with other users by linking it to a plant tree item. Shared dashboards are indicated in the plant tree by a dashboard icon to the left of the plant tree icon.

Status reports

The system provides the user with a configured report log in the form of an HTML report that can be downloaded and sent by email. The report provides an overview of status violations, sensor defects, and the measurement rate of the CMUs. The observation period and the transmission cycle can be configured.

Email notifications

It is possible to set alarms for specific items that result in email notification. There are 3 different alarm levels with the following default values:

- Warning 70% of limit,
- Alarm 100% of limit
- Acute alarm 150% of limit

The repeat rate of the notifications can be set. The content of the email is specified using editable templates.

Logbook

The logbook acts as the central tool for comments and documentation for analysts and plant operators. Different log types and status settings allow categorization of entries to provided a better overview. The log chart below the trend analysis chart shows the chronological sequence of the log entries on a timeline. This enables relationships between documented changes to a plant (e.g. bearing change, bearing lubrication, etc.) and significant jumps in trends to be identified.

Alarm list

The alarm list is a special view for showing all open alarms regarding specific plan tree components. In the alarm list you may acknowledge alarms and add comments.

3 Operation information

The iba Condition Monitoring System (CMS) with *ibaCMC* is suitable for the following areas of application:

- Metal producing industry
- Wind energy installations
- Power stations
- General machinery (e.g. paper or cement machines)

Note



The CMS is **not** suitable for the following applications:

- Railway applications
- Passenger transportation
- Other vehicles
- ATEX applications
- Safety-related applications

4 System requirements

With the standard architecture, *ibaCMC* comprises an application server for hosting the web application and a database server for storing the trend and log data.

Note

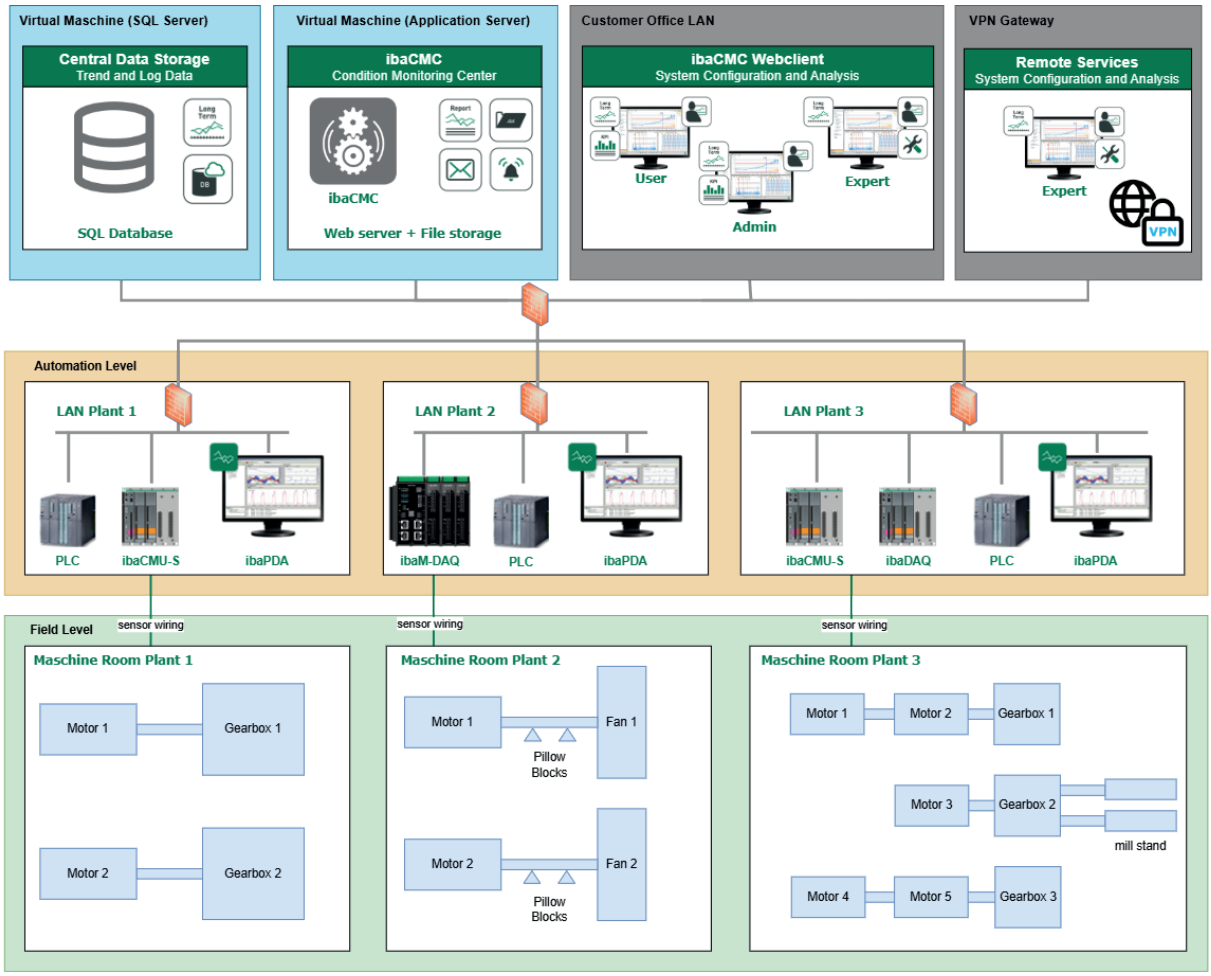
Recommended installation

To allow better maintenance, for smaller systems we recommend installing the application and database server together on a single VM.

For larger systems or specific customer requirements, the installation and the architecture should be clarified during the course of the project.

4.1 System overview

The following overview shows the default *ibaCMC* architecture.



4.2 Application server

The application server comprises the following components:

- *ibaCMC*
- Data archive (data files, reports)

Software

- Operating system: Microsoft© Windows Server© 2016 or higher (language English or German)

Hardware

- CPU: 4 cores (Intel© Core™ i7 or Xeon© CPU) (min. 2 GHz)
- RAM: 8 GB (recommended 16 GB)
- 128 GB Solid State Disk (SSD) for operating system
- 1 TB HDD hard disk for data archive (with expansion option)

Data archive size

The required size for the data archive depends on the following factors:

- Number of CMUs and sensors
- Sampling rate and measurement time
- Measurement interval
- Clean up strategy (“thinning out measurement data”, e.g. after a period of 1 month only 1 measurement per hour is retained on the server)

The structure of the data archive can look different depending on the company and the number of plants.

The following configurations are common:

- One hard disk per plant
- One hard disk for all plants

4.3 Database server

The database server comprises the following components:

- MSSQL database
- Reporting Service

Software

- Operating system: Microsoft© Windows Server© 2016 or higher (language English or German)
- Microsoft© SQL Server Express© or Standard 2016 or higher
- SQL Server© Reporting Services 2016 or higher

Hardware

- CPU: 4 cores (Intel© Core™ i7 or Xeon© CPU) (min. 2 GHz)
- RAM: 8 GB (recommended 16 GB)
- 128 GB Solid State Disk (SSD) for operating system
- 256 GB Solid State Disk (SSD) for MSSQL database (with expansion option)
- 1 TB HDD MSSQL database backups (with expansion option)

4.4 More servers and recommendations

- External SMTP e-mail server (for e-mail notifications)
- Monitor(s) with a minimum resolution of 1280x1024

4.5 Licensing

Licensing of the *ibaCMC* features is carried out using the WIBU system. The WIBU system uses what are known as license containers. A license container can be a USB dongle or a soft license.

When using *ibaCMC* on a VM, the soft license is recommended. A USB dongle can also be connected to a VM using a USB dongle server in the network.

The license containers are managed from the WIBU CodeMeter Runtime application. This application is installed automatically if you install *ibaCMC* and CodeMeter Runtime is not already installed on the computer.

To activate a soft license, it is beneficial if the computer is connected to the Internet. If you are unable to connect the computer to the Internet, contact iba Support.

Other documentation



You can find a detailed description of how to install and use CodeMeter Runtime in the “WIBU CodeMeter for iba users” manual.

Available licenses

Order no.	Product name	Description
30.100000	ibaCMC	Basic license for up to two plants with any number of components and signals. (Number of signals is limited by the acquisition systems.)
30.100001	ibaCMC-One-Plant	Extension license for an additional plant with any number of components and signals
30.100003	ibaPDA-CMS-One-Sensor	Extension license for ibaPDA (e.g. on ibaDAQ) to establish a connection to ibaCMC. One license is required for each sensor, requesting InSpectra calculations for component monitoring, such as shafts, bearings , gears etc. Additionally, there is an OPC UA client license included for up to 2 OPC UA client connections. The connections can be used for receiving process data from an ibaPDA system (license OPC UA-Server+ required) or other OPC UA servers or CM devices. At least one license is required to establish a connection to ibaCMC.
30.100020	ibaCMC-8-EUP	Extension of software maintenance and support by 1 year for a system with up to 8 sensors.
30.100021	ibaCMC-16-EUP	Extension of software maintenance and support by 1 year for a system with up to 16 sensors.

Order no.	Product name	Description
30.100022	ibaCMC-24-EUP	Extension of software maintenance and support by 1 year for a system with up to 24 sensors.
30.100023	ibaCMC-32-EUP	Extension of software maintenance and support by 1 year for a system with up to 32 sensors.
30.100024	ibaCMC-48-EUP	Extension of software maintenance and support by 1 year for a system with up to 48 sensors.
30.100025	ibaCMC-64-EUP	Extension of software maintenance and support by 1 year for a system with up to 64 sensors.
30.100026	ibaCMC-80-EUP	Extension of software maintenance and support by 1 year for a system with up to 80 sensors.
30.100027	ibaCMC-104-EUP	Extension of software maintenance and support by 1 year for a system with up to 104 sensors.
30.100028	ibaCMC-128-EUP	Extension of software maintenance and support by 1 year for a system with up to 128 sensors.
30.100029	ibaCMC-160-EUP	Extension of software maintenance and support by 1 year for a system with up to 160 sensors.
30.100030	ibaCMC-192-EUP	Extension of software maintenance and support by 1 year for a system with up to 192 sensors.
30.100031	ibaCMC-240-EUP	Extension of software maintenance and support by 1 year for a system with up to 240 sensors.
30.100032	ibaCMC-320-EUP	Extension of software maintenance and support by 1 year for a system with up to 320 sensors.
30.100033	ibaCMC-400-EUP	Extension of software maintenance and support by 1 year for a system with up to 400 sensors.
30.100034	ibaCMC-512-EUP	Extension of software maintenance and support by 1 year for a system with up to 512 sensors.
30.100035	ibaCMC-720-EUP	Extension of software maintenance and support by 1 year for a system with up to 720 sensors.
30.100036	ibaCMC-unlimited-EUP	Extension of software maintenance and support by 1 year for a system with more than 720 sensors.

Table 1: Available ibaCMC licenses

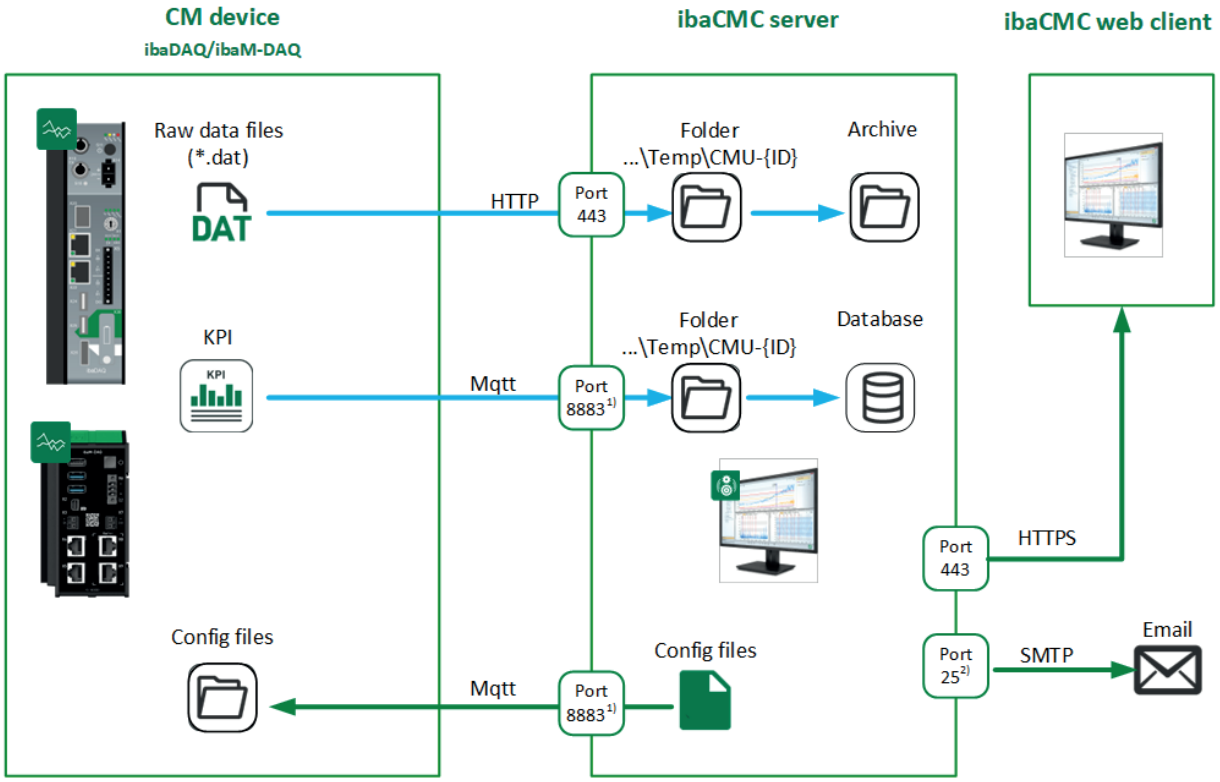
Note

Extending software maintenance and support (EUP)
For *ibaCMC*, the licensing of software maintenance and support refers to the number of licensed sensors.

- Basis is the total number of licensed sensors of all devices, which are connected with *ibaCMC*.
  Example: If you have a system consisting of 3 devices with 60 sensors in total, you will need a license *ibaCMC-64-EUP*.
- If you want to extend software maintenance and support by another year, generate the EUP info file and send it to the iba support or your local iba sales partner.
- For the CMU device (*ibaDAQ* or *ibaM-DAQ*) you just have to consider the common EUP license according to the *ibaPDA* basic license. The license *ibaPDA-CMC-One-Sensor-EUP* ist not required anymore.
- The former license products *ibaCMC-EUP*, *ibaCMC-One-Plant-EUP* and *ibaCMU-S-One-Sensor-EUP* were discontinued with *ibaCMC* v3.8.0.

4.6 Data exchange and ports

The following figure shows the essential data exchange between *ibaCMC* and the CM device (CMU). Further below, you'll find information about the ports opened and used by *ibaCMC.*



[1] Default port: 8883 (TLS), alternative port: 1883 (unsave)

[2] Default port: 25, alternative port: 465 (TLS)

Ports opened by ibaCMC

Interface	Port / Port range	Protocol	Purpose	Configurable
MQTT Broker	1883 8883 (default)	TCP TCP	Communication with ibaP-DA	yes (TLS)
Traces	16461	UDP	Debug traces	yes
Web interface	80 443	HTTP HTTPS	Connecting a web browser with ibaCMC web client	yes
Email	25 (deault) 465	TCP TCP		yes (TLS)

Table 2: Ports opened by ibaCMC

Configuration and modification of ports by editing `appsettings.json` file.

5 System setup - First steps

The following steps explain how to install and start the system.

Note



Before you start the *ibaCMC* installation, first set up a database. During the installation routine you will be prompted to specify the database so that *ibaCMC* can establish a connection to it. Without this database, the installation routine cannot be completed.

You can find information on setting up the database in chapter ↗ *Preparing the database, page 186*.

5.1 Installation and program start

Install the *ibaCMC* software on the computer on which the *ibaCMC* service is to be started (application server). Make sure that the computer has sufficient disk space.

You can find the file in the …\01_iba_Software\ibaCMC directory on the "iba Software & Manuals" data storage medium.

1. Run the file ibaCMC_Server_Setup_vx.y.z.exe and follow the instructions in the Installation Wizard.

   Note

   At the start of the installation process, you can open the version history using the *View version history* link. Read through the information about the changes and system requirements. Make sure that the new software version meets your project requirements.

2. Accept the license agreement.
3. Select the installation directory.
4. Check your license information, if necessary.
5. The WIBU CodeMeter Runtime software is installed, if it was not already.
6. Select the user account.
   - Local system account (default)
     This account is sufficient if the server process works only on the local computer and does not need any other special user-related rights.
   - Custom user
     Select this option if the server process requires other special user-specific rights. The user account entered here must have these rights (Windows User Management).
7. Select the system language and the unit system.

Note:

This setting can only be made at the first installation and cannot be changed later.

8. In this step you make the settings for the network communication over HTTPS protocol of the *ibaCMC* server. You can enter an IP address and set the HTTPS port (default: 443) for the server, if needed. If the PC on which the *ibaCMC* service is operated is connected to multiple networks, you can specify here the IP address to be used to access *ibaCMC*.
When you click on <Next>, the dialog for configuration of the TLS certificate for a secure communication follows. This means that the configuration of the certificate is part of the installation process and should not be done in the `appsettings.json` file.
9. TLS certificate
Configure a TLS certificate here to ensure secure communication between the *ibaCMC* server and other communication partners, such as web browsers and *ibaPDA*.
You have the following options:
   - Self-signed certificate (default)
   A self-signed certificate is created and used. You can set the validity period. The default value is 5 years, but you can also select 2 years or enter a duration in days using the "Custom" setting.
   - Certificate file (PFX File)
   If you want to use your own certificate, you must provide the PFX file and enter the path to the certificate and the password here. iba AG recommends storing the certificate in the folder `…\ProgramData\iba\ibaCMC\Server\ca`.
   - Windows Certificate Store:
   In this setting, you can reference an existing certificate in the Windows Certificate Store to use it for the web server. Here, you can still choose which certificate store to use (personal/public) and specify the storage path.
   For a detailed description of certificate management in *ibaCMC*, see ↗ *Certificate management in ibaCMC, page 182*.
10. Make the database connection settings and click on <Test> to test the connection to the database. If you are using an SQL Express server, enter the host name in the SQL Host field as follows: <sql-server-hostname>\SQLEXPRESS.

Note:

At the first installation, the database and the user must be created on the SQL server in advance. You can find information about this under ↗ *Preparing the database, page 186*.

If there is already a database, enter the connection data for the existing database here. Any necessary database updates are carried out by the installer (only possible from *ibaCMC* V1.6.x onwards).

11. A desktop shortcut for opening *ibaCMC* with the default browser can be created on the desktop (optional).

12. Start the installation process with <Install>.
13. Select whether you want to open *ibaCMC* with the current default browser and complete the installation with <Finish>.

ibaCMC is installed as a service in Windows, and set up so that it is started automatically after installation and after every system start (boot routine).

After installation, the *ibaCMC* icon appears on the right in the info section of the taskbar .

You can operate the basic functions of the *ibaCMC* service using the *ibaCMC Status* program, which is automatically installed along with the service.

You open the *ibaCMC Status* program in one of the following ways:

- Double clicking on the *ibaCMC* icon in the info section of the taskbar
- Using the context menu for the *ibaCMC* icon (right click - Status)
- Using the Start menu ... *ibaCMC* - *ibaCMC Status*

5.2 Logging in using the web client

After installation, you can access *ibaCMC* using a web browser:

ibaCMC provides you with a configuration and operator interface for your web browser. In order to be able to use all the display modes and features in the correct form, the use of a modern web browser is recommended, e.g. Google Chrome, Mozilla Firefox, or Microsoft Edge.

To access the *ibaCMC* server, you require the server IP address. If you are logged in on the computer on which the server application is installed, the localhost address is sufficient.

1. Open `https://localhost:<Port>`, or `https://[FQDN (FullQualifiedDomainName)]:<Port>` in your browser.
2. Use the following access data for the initial login.

User	Password
admin	Admin#1

Note

Changing this password after installation is recommended. This makes unauthorized use of the system more difficult.

Note

By default after login the user can login for 7 days without reenter the user credentials. If the user is working on the system and the session is about to expire, a message pops up 15 minutes before the expiration, giving the user the opportunity to continue the session or to logout.

5.3 ibaCMC Status app

After installing *ibaCMC*, a corresponding icon appears in the info area of the taskbar:



The icon shows the current status of the application and provides a context menu, e.g. for controlling service activities. The following options can be selected:

Open in Browser	Opens the current default browser with the URL of the local *ibaCMC* service
Start Service - Stop Service - Restart Service	Start, stop, or restart the *ibaCMC* service
Open Log/Configuration Folder	Open the Windows file explorer at ... ProgramData\iba\ibaCMC\Server
Support	List of iba subsidiaries and partners worldwide
Save information for iba support...	Compile application-specific information, e.g. log and configuration files as a Zip file for inquiries to iba Support.
Version history	*ibaCMC* version history
Help	Start the online help
Exit	Exit *ibaCMC* Status

The *ibaCMC Status* app can be started manually from the Windows Start menu.

5.4 E-mail settings

In order to be able to send e-mails using *ibaCMC*, a connection to an available SMTP mail server has to be configured. The SMTP server connection configuration is part of the *System settings*, *General* area, *Mail (SMTP)* tab. The settings are stored in the file `appsettings.json`.

SMTP setup under System settings

You can set up the following parameters here:

Sender
Enter here the e-mail address which should be used as sender address. Optionally, you can have the plant name added automatically as a suffix.

SMTP server
Here, enter the IP address or the host name of the SMTP server and the port number for outgoing mails.

- Port number 25 (default): unsecure connection
- Port number 587: secure connection

Select *TLS* under *Security*, if you want to enable an encrypted e-mail transmission.

If an authentication is required for login to the SMTP-Server, then select the setting *Required* under *Authentication*. Enter the required information for *Domain*, *User name* and *Password* in the respective fields.

If you select *None* authentication, the login to the SMTP server will be executed without user credentials.

Use the <Send test email> button to verify your settings.

SMTP settings in the file appsettings.json

The SMTP settings are stored as a JSON string in the file `appsettings.json` as follows:

```
"Smtp": {
  "Host": "<smtp-host>",
  "Port": <smtp-port>,
  "From": "<smtp-from> ",
  "NetworkCredential": {
 "Domain": "",
 "User": "",
  "Password": ""
   },
  "UseDefaultCredentials": true,
  "EnableSsl": false
}
```

Meaning of parameters:

Parameter	Meaning
Host	SMTP server address
Port	SMTP port ■ Unsecured connection: 25 (default) ■ Secure connection: 587 (default)
From	Mail sender address, e.g. iba Monitoring <ibacms@iba-ag.com>
NetworkCredential	Domain: User domain; entry not mandatory; can be done in combination with user name User: User for SMTP server login entry: [Domain\]Name Password: Password for SMTP server login
UseDefaultCredentials	true: Log on to SMTP server without Log on data (domain, user, password) false: Log on to SMTP server with the log on data given under "NetworkCredential"
EnableSsl	false: Unsecured connection true: Secure connection

You can configure the SMTP settings also by editing this file. Then, restarting the *ibaCMC* service is necessary for the settings to be applied. If you do the SMTP setup in the *System settings*, a restart is not required.

5.5 Configure report

The generation of reports is an essential feature of *ibaCMC*. Therefore, the configuration of a report is part of the system configuration.

Reports are primarily used for status reports, which are stored in the system and optionally can be sent via e-mail.

In order to use the reporting feature some setup tasks involving the database are required. You'll find detailed information about setting up reports under ↗ *Reporting, page 172*.

6 Migration

Between version v1.8.x and version v3.0.0, the database structure, folder structures, data import process, and status calculation have all changed considerably.

Note



Migration only has to be performed with existing systems. New customers can start immediately with version v3.x.x and do not have to perform a migration.

For existing systems, parallel operation of v1.8.x and v2.0.0 beta.x has been provided. In this parallel operation, all back end tasks are still performed by the *ibaCMC* v1.8.x version, but the new front end can already be used.

To enable a gradual changeover to version v3.0.0, there is a plant by plant migration process.

Once all plants have been migrated, the image and log migration can be performed.

Note



We recommend that the migration process is supported by an iba employee. In case of questions, contact iba Support.

6.1 Plant migration

The first step in migration is plant migration. This enables plants to be migrated step by step to version v3.

After migration, the plant is no longer visible in v1.8.x.

To be able to perform the migration, log into the system as an administrator.

Note



Performing a database backup before starting the migration is recommended.

Carry out the following steps to start the plant migration process:

1. Select the plant to be migrated and open the configuration view.
2. Go to the *Migration* tab.
3. Go through the checklist and follow the instructions.
4. Once you have followed the instructions, click on the <Apply> button for each.
5. Make sure that you have access to an up to date database backup and then check the *An up to date database backup has been created and archived* checkbox.
6. The <Start migration> button is then enabled and the plant is set to migration mode.

To start the migration, switch to the system settings under *Migration > 1. Plant data migration* and start the migration by clicking on the <Start migration> button.

The progress of the migration can be seen in the plant configuration under *Migration*.

Once all plants have been migrated, you can continue with the log migration, see chapter ↗ *Log migration, page 28*.

6.2 Log migration

Once all plants have been migrated, migration of the logs is enabled. This can be started by selecting *System settings > Migration > 2. Log migration*.

Once all logs have been migrated, complete the migration with the final step *Image migration*, see chapter ↗ *Image migration, page 28*.

6.3 Image migration

As the directory structure for the images has changed, they have to be migrated from version v1.8.x to the new v3.0.0 structure.

To do this, follow the instructions under *System settings > Migration > 3. Image migration directory*.

After the image migration, check whether the images are displayed in the plant tree configuration.

6.4 Database clean up

After migration, there is a separate database clean up step. As this task requires a substantial amount of processing capacity and uses up database resources, the process can be started at any time. Depending on the size of the configured plants or the number of trends and data points, the process can then take a long time.

Therefore, we commend starting the process at the end of work and, if it is not finished, terminating it again at the beginning of work. This can be repeated several times and the process then continues the clean up.

To stop or start the clean up process:

1. Open the task scheduler.
2. Here, you can start/enable and disable the *Clean Up Server* task in the *Command* column.

7 Plant configuration

The plant configuration is one of the central features and, in many cases, the starting point for all activities. It is opened by selecting *Asset configuration* in the menu.

Once the *Asset configuration* tab has been opened, the plant tree is set to configuration mode, and the function of the component library (configuration definitions) is available.

You will find the component library in the upper field of the plant tree, indicated by the following icon:

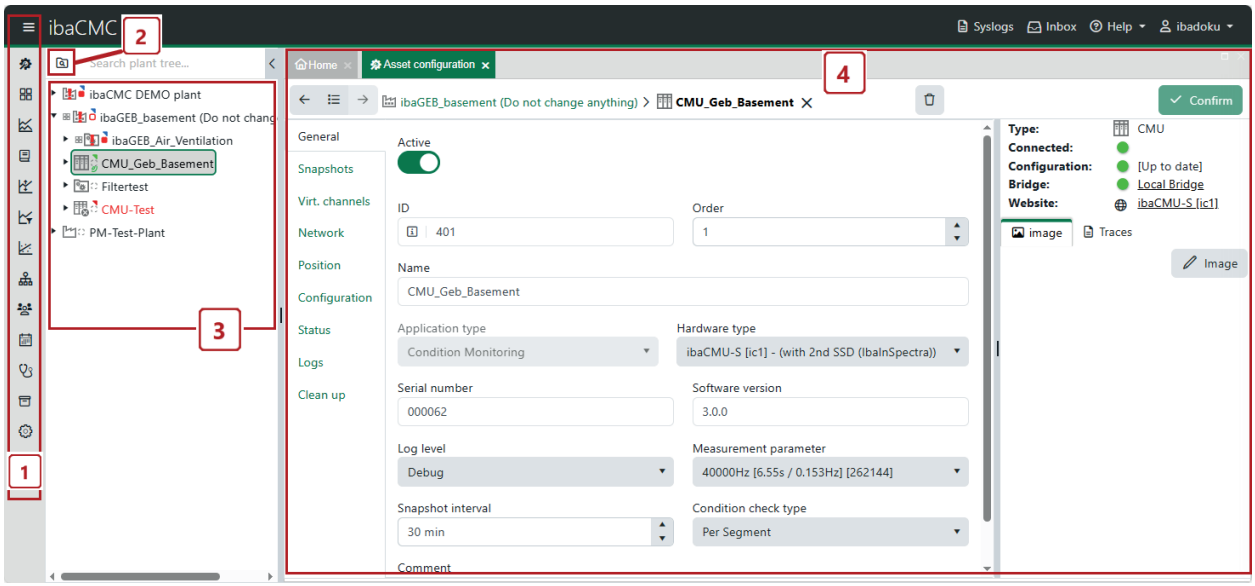


Note

If a user is logged in who does not have the right to carry out plant configuration due to their group memberships, the <Plant configurator> button is not displayed.

The asset configuration is used to map the plant to be monitored, including its entire mechanical configuration through to the sensors. The plant configuration thus also provides the basis for monitoring of the individual components.

The asset configuration essentially consists of three sections - the **plant tree**, the **detail editor**, and the **component library (configuration definitions)**, which can be shown or hidden using a button at the top of the plant tree. The following image shows the breakdown of functionalities.



1	Menu bar
2	Component library (configuration definitions)
3	Plant tree
4	Detail window

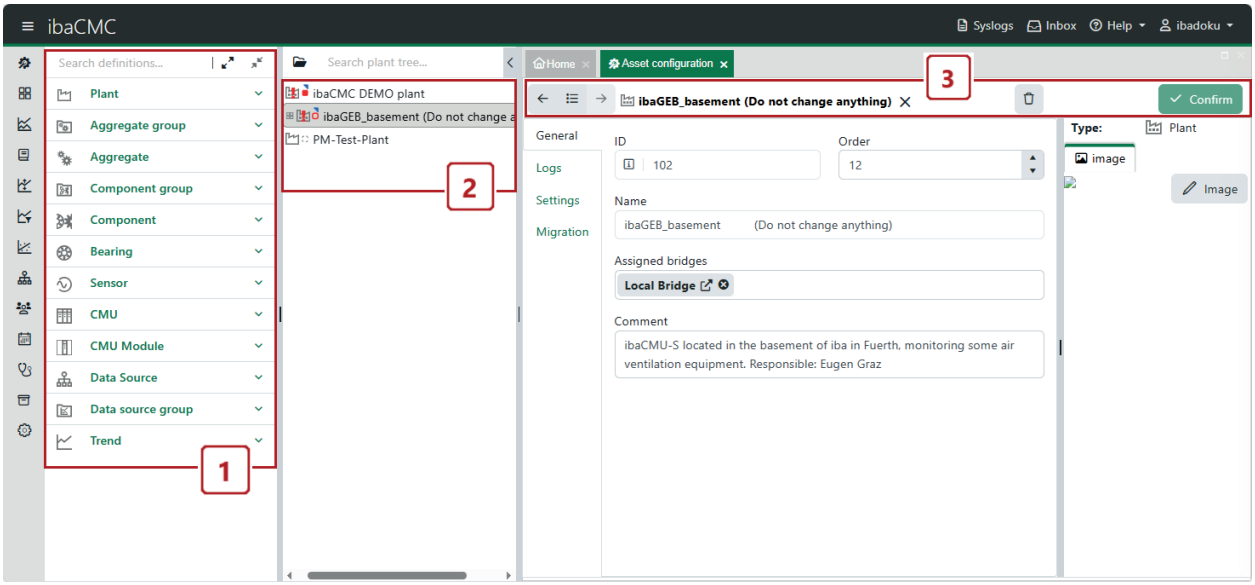
If an item has been opened in the detail editor, a toolbar appears above the detail editor. This contains the path for the item, along with buttons that can be used to perform available operations.

The basic operations **Apply** and **Delete** can be performed for every item and are therefore displayed in the toolbar for every item.

All changes are only saved after clicking on the <Apply> button.

Defining the plant structure

You create the plant structure by dragging elements from the component library to the plant tree (drag & drop).



1	Component library (donfiguration efinitions)
2	Plant tree
3	Toolbar for detail editor

For initial configuration (blank plant tree), a plant can also be created using the “+ Plant” button on the *Plant configuration* tab.

Note

To completely structure a plant, the following structure rules must be followed.

- The root of a plant tree must always be a plant.
- A plant requires at least one aggregate group.
- An aggregate group contains at least one aggregate.
- Aggregates contain at least one component group or one sensor.
- Component groups contain at least one component (e.g. shaft).

Components from the component library can be dragged onto or next to an item in the plant tree. Whether this operation is compliant or valid is illustrated by the mouse symbol and the color marking of the target item.

The library also contains templates, which contain pre-defined sub-components to speed up the creation process.

Note: If a template such as an aggregate group, for example, is inserted (e.g. motor with three-stage gearbox), there may be a short waiting time as a large number of sub-components have to be loaded.

Plants can be deleted, but only if no CMU has been assigned yet. To enable the plant to be deleted, all CMU assignments must be removed first. To delete a plant, click on the <Delete> button (trash icon) in the top right corner of the detail editor.

Context menu in plant tree

The plant tree offers a context menu with the following commands:

	Open dashboard		Only available if the item is already assigned a dashboard. The corresponding dashboard opens.
	Edit CM-Device		Only available after clicking on a sensor, which is connected to a CM-Device. The asset configuration of the respective CM-Device opens. For sensors, which are not connected, the menu item is shown grayed out
+	Add item		Available after clicking on an ibaPDA-based CM-Device, ibaM-DAQ type, to add more modules.
		Process signal module	Opens a dialog for the formal creation of a new module for process signals. When done, you can see the module in the plant tree and continue to edit it in the asset configuration.
	Edit		Loads the item into the asset configuration for editing or opens the asset configuration with this item.
	Reset status		Resets the status of a signal or trend. Only available if the type of status change for the plant is set to "Manual reset".
	Component Condition		Enable and select indication, if a logbook entry with a component status has been assigned to the respective plant tree item. See also chapter Icon legend↗ *Icon legend*, page 108, Other statuses
	Copy		Offers different copy options depending on the item
		Copy name	Applicable to all items
		Copy path	Applicable to all items except plant
		Copy plant tree item	Applicable to all items except plant and shaft
	Paste		Pastes the copied item to the intended location with consideration of the item type.

	Refresh	Refreshes the display of the item in the plant tree
	Delete	Deletes the item in the plant tree, provided that all conditions for deletion are met and that no links to other components, sensors and CM devices exist anymore.
	Id:...	Shows the ID of the item. A mouse click on this entry copies the ID to the clipboard.

7.1 Editing an asset

There are 3 ways to edit an asset or to open the configuration screen:

1. Drag the plant tree item to the plant configuration tab using drag & drop.
2. Right clicking on the plant tree item opens a context menu. Click on “Edit” in this menu.
3. Right click twice on the plant tree item.

In the *Plant configuration* screen, the various settings for an item are grouped on tabs. You can change the settings here.

When you have completed your entries, you can save them using the <Apply> button in the toolbar. If you do not want to apply the changes, you can simply close the configuration screen (without saving) or edit a different item.

The currently selected plant item can be deleted in the configuration screen by clicking on the delete button (trash can icon). To delete, confirm the subsequent confirmation prompt.

7.2 Copy and paste assets

If you have already created and configured aggregates or aggregate groups in the plant tree, you can use the context menu to copy these elements and paste them elsewhere.

This makes it easier for you to create identical or similar structures and configurations without having to configure them entirely by hand.

The copy function is limited to the following elements:

- Aggregate groups
- Aggregates
- Component groups
- Components
- Sensors
- Trends

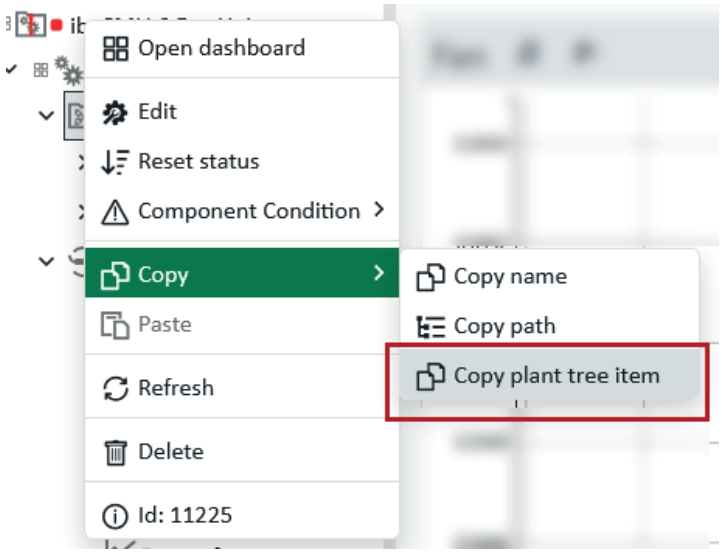
The following cannot be copied:

- Plants
- Shafts
- Process signals
- TCP/IP telegrams
- CMUs and modules
- microCMUs
- Trend filter assignments

The elements listed can be copied and pasted into the same or a different plant. Links to the source system are not carried over when pasting into a different plant and must be re-established there.

When copying hierarchically organized elements, such as aggregate groups, all child elements are copied as well, but without connections to the CM devices.

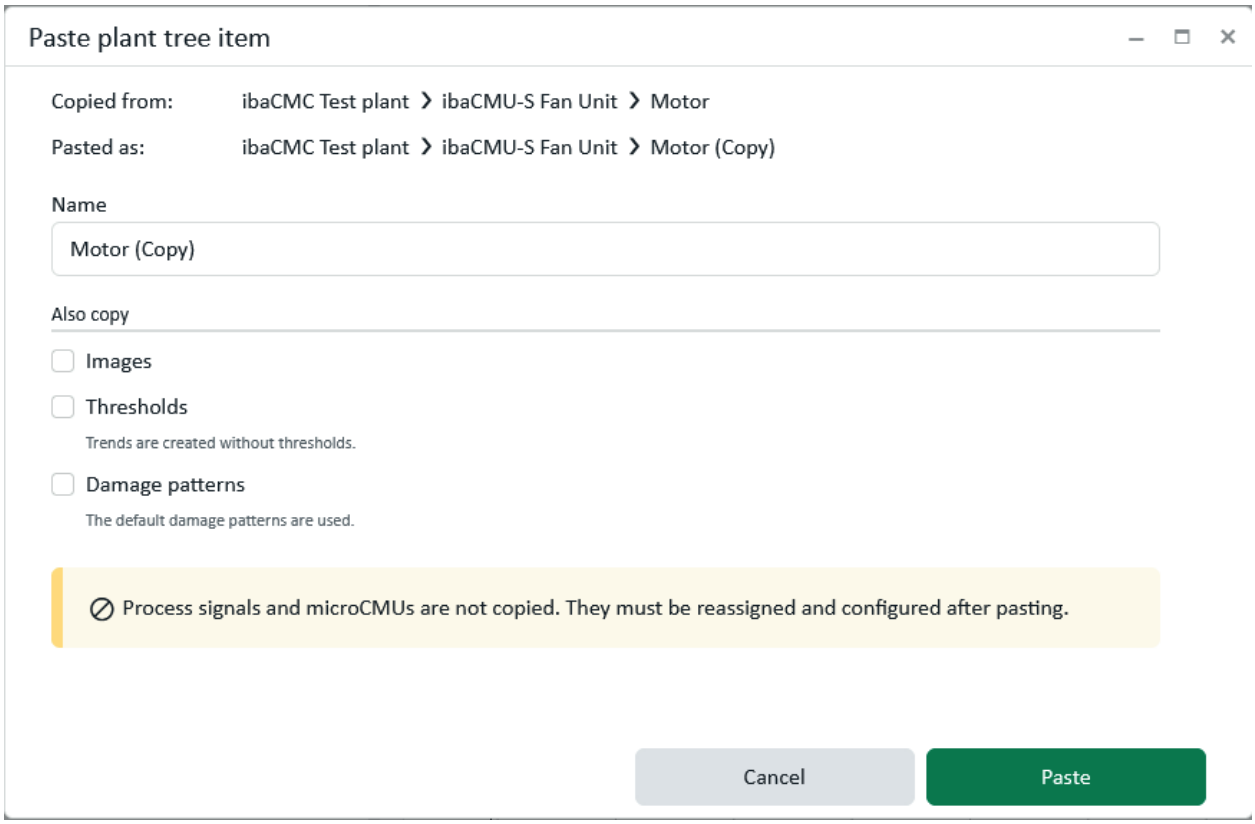
An element can only be copied if the command *Copy plant tree item* appears in the context menu of the selected element.



Once you have copied a plant tree item, you can insert it at the same hierarchical level or the next higher one. Use the context menu for this as well.

Right-click either on the same element you copied earlier or on an adjacent element at the same hierarchical level if you want to paste the copy within the group or level. Click on other groups if you want to paste the copy there.

When you paste an element, the *Paste plant tree item* dialog box opens, which contains additional information and options.



In the upper section, the dialog box shows the plant path from which the element was copied and where it will be pasted.

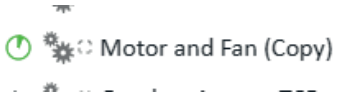
You can rename the element right in the *Name* field.

Under *Also copy*, the following options are available; they are disabled by default, but you can enable them if needed:

- Images: Images that are present in the source are included in the copy.
- Threshold values: The threshold values from the source are copied.
- Damage patterns: The damage patterns from the source are copied.

Finally, a note is provided in case there are any elements that cannot be copied.

Depending on the size of the item being copied, the copying process may take a few seconds. The current copy process is indicated by a green icon in the file tree.

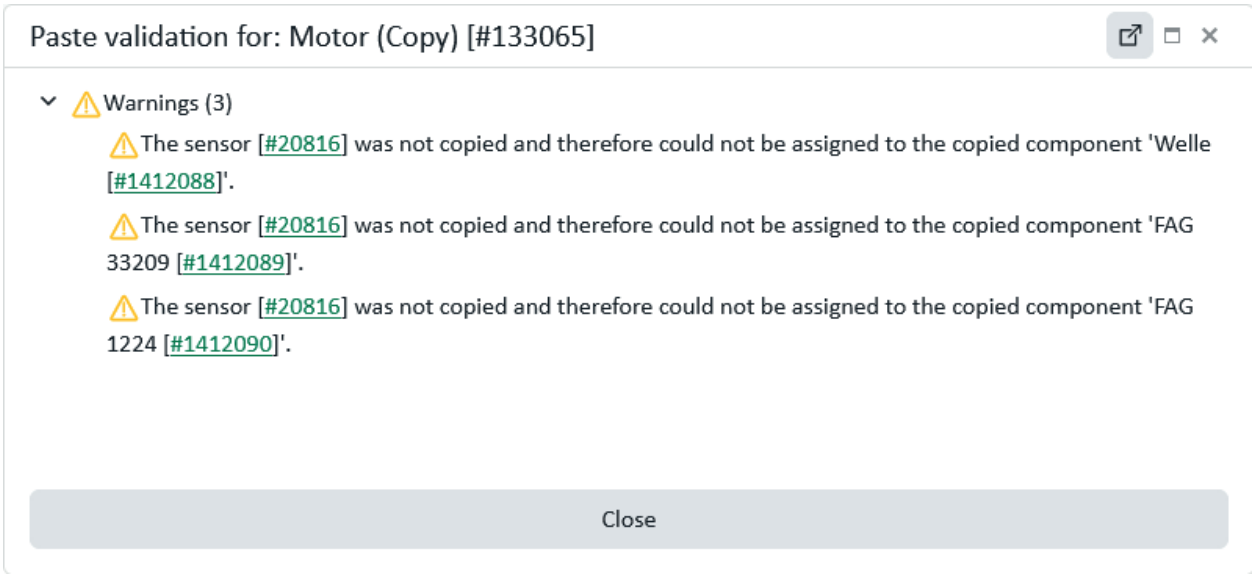


If you open the item that is currently being copied in the asset configuration, a progress bar will appear. As long as the progress bar is displayed, you can cancel the copy process by clicking <Cancel>. As a safety measure, a confirmation prompt will appear that you must confirm before the process is actually canceled.

If an error occurs during copying, an error message appears and the copied item is highlighted in red in the plant tree.

The error is also displayed in the asset configuration, and additional instructions may be provided. In most cases, you will be prompted to manually delete the asset tree item and try again.

If some settings could not be applied during pasting, this will be displayed at the end in a dialog titled *Paste validation for...* .



The messages in this dialog box highlight the specific issues and provide links to the asset configuration of the affected components, allowing you to jump directly to the asset configuration and make adjustments.

7.3 Plant

The plants selected for your own user account under *User profile - Selection - Plant selection* are displayed in the plant tree. The changes only take effect after saving.

Plant selection
The following information applies to the plants selected under *User profile - Selection - Plant selection*:

- They are visible in the plant tree.
- The associated notifications defined are sent.
- The associated reports defined are sent.

> **Note:**
>
> If no plant is entered in the plant selection, all available plants are displayed but no notifications for these plants are sent.

A plant is added under *User profile - Selection - Plant selection* using a drop-down menu. The changes only take effect after saving.

Information for plants created in the ibaCMC system

Display of plants in ibaCMC

The following steps are necessary to display the plants in *ibaCMC*:

1. Log into *ibaCMC* as an administrator
2. Open the user groups in the user administration
3. In the relevant user group, add and save the plant under *Selection*.
4. The added plant should now be displayed in the plant tree

General tab

The *General* tab is available in all assets and shows some properties, which can be changed. There are additional parameters for each asset type.

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

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

Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

Comment
The Comment field is used to enter comments about an asset. The input field can be enlarged by dragging (bottom right).

Logs tab

All logs associated with the plant are displayed here.

Monitoring tab

On this tab you can set p the monitoring of thresholds and limits for trends.

Aggregation method
The aggregation method determines the calculation method of the value which is used for status monitoring. You have the choice between moving average and moving median. Only if this calculated value exceeds a threshold or limit, it will trigger a status change or alarm.

Aggregation intervall
The aggregation interval specifies the time frame, the data are taken from for calculation.

Type of status change
By this setting you determine whether the reset of a status indication should be done automatically or manually.

If set to *Automatic reset*, the status will be refreshed automatically when it changed. This means, for instance, that a status change from "Warning" to "Alarm" or from "Alarm" to "Warning" will also be shown automatically in the status display.

If set to *Manual reset*, only the status changes in direction "critical" will be shown automatically. If the status changes toward "normal" status, the higher level status will be maintained (peak hold).

For example, if a status was "Alarm" but the trend value meanwhile has fallen on a lower level which rather corresponds to the "Warning" status, the "Alarm" status still remains.

After reviewing the alarm you can manually reset the status of all plant items in the context menu of the plant tree (*Reset status*).

If you want to reset single status, go to the alarm list and open the three-dot menu at the end of the respective row. There, you'll find also the *Reset status* command. See also ↗ *Alarm list, page 151*.

Outdated after...
Use this setting to define a timeout for the status monitoring of trends. The timeout specifies the time after which the trend status is set on "outdated", if no more data was received in the selcted timespan.

An empty icon indicates the outdated status in the plant tree.

You can also disable the function.

Settings tab

Right click to call up *Plant - Edit - Settings*.

Paths
Here you can configure the paths for the plant archive and the error folder.

Archive folder

Enter the desired path for the plant data archive here. Example: C:\AC\Test plant\Archive

Error folder

Enter the desired path for the plant error folder here. Example: C:\AC\Test plant\Error

For example, the error folder is used to store data files in which an error occurred during processing. The data files are thus retained and can be processed again by moving them to the Temp folder after resolving the error.

CMU device status check (for not migrated plants only)
Set the time here after which a warning or an error is to be generated if a device can no longer be accessed via the network.

Setting	Description
Warning from [h]	If a device cannot be accessed for longer than the set time period, it is listed as **Warning** in the statistics.
Error from [h]	If a device cannot be accessed for longer than the set time period, it is listed as **Alarm** in the statistics.

Measurement rate for snapshots (for not migrated plants only)

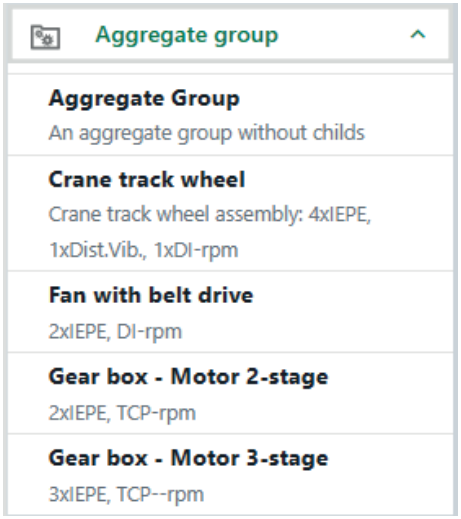
- Warning at: Set the snapshot rate above which a warning is to be displayed in the system statistics.
- Time range: Set the time range to be included in the check.

Setting	Description
Warning from [%]	If a snapshot falls below the specified snapshot rate, it is listed as **Warning**.
Time range [day(s)]	Time period used for calculation of the snapshot rate.

7.4 Aggregate group

Aggregate groups must be added to the plant tree below a plant in the hierarchy.

The following figure shows an extract from the available items in the aggregate group from the component library.



You can either use a blank template called **Aggregate Group** or one that already contains data, e.g. **Gearbox - Motor 2 stage**. In general, it is always advantageous to select the template that is as close as possible to the actual configuration to keep the amount of adjustment required to a minimum.

Settings for an aggregate group in the detail window

General

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

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

Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

Comment
The Comment field is used to enter comments about an asset. The input field can be enlarged by dragging (bottom right).

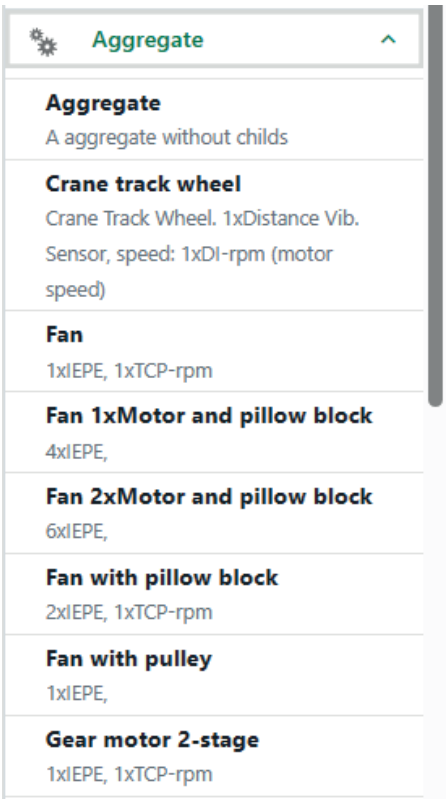
7.5 Aggregate

An aggregate must be added below an aggregate group in the hierarchy.

A subsequent move of an aggregate into another aggregate group of the same plant is still possible.

Examples of an aggregate would be a gearbox or a motor. After a selection an aggregate from the library, which is as close as possible to the actual aggregate, it can be dragged to the relevant aggregate group in the plant tree using drag & drop.

Extract from the component library for aggregates:



Settings for an aggregate in the detail window

General

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

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

Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

Comment
The Comment field is used to enter comments about an asset. The input field can be enlarged by dragging (bottom right).

7.6 Component group

In the system components are classed as a component group if they have the same shaft speed. An example of a component group would be the motor shaft of a gearbox with 2 roller bearings and a pinion on the toothing. Each component group must contain one single shaft.

If a pre-defined aggregate has been inserted, it is possible that component groups may already exist.

In contrast to a *Plant*, *Aggregate group*, and *Aggregate*, component groups have transmission ratios and couplings to adjacent component groups, which are described below.

In addition, component groups can be assigned trend filters, see also ↗ *Trend filter, page 150*.

Settings for a component group in the detail window

General

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

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

Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

Comment
The Comment field is used to enter comments about an asset. The input field can be enlarged by dragging (bottom right).

Trend filter
The trend filter can be assigned to a component group here.

See also ↗ *Trend filter, page 150*

Plant links
To open, right click on *Component group - Edit - Plant links*

A plant link describes the links between a component group and those preceding and following it. To create a plant link, simply drag the relevant component group to the field provided.

Click on <Apply> to apply the change.

Example: 1 x motor and 1 x gearbox (1 stage)
Motor

- Motor NDE (Previous: None // Next: Motor DE)
- Motor DE (Previous: Motor NDE // Next: Gearbox input shaft)

Gearbox (1 stage)

- Gearbox input shaft (Previous: Motor DE // Next: Gearbox output shaft)
- Gearbox output shaft (Previous: Gearbox input shaft // Next: None)

Ratios

Since it is often the case that only one speed measurement exists in a powertrain, the shaft speeds of the other component groups have to be calculated using transmission ratios.

The ratio configuration can be carried out on the *Ratios* tab in the module configuration.

> **Note:**
>
> The transmission ratios are automatically recalculated if component parameters are changed (e.g. the number of teeth on a gear). It is also possible to trigger the calculation manually using the <Calculate> button.

The setting for the transmission ratios is explained below using a practical example. This involves coupling a motor with a 1-stage gearbox.

Ratio settings using motor example (no transmission ratio)

Motor NDE (Not Driven End = fan side of motor)

Ratio TOTAL	**1 (no transmission ratio)**
Ratio IN	1 (no transmission ratio)
Ratio OUT	1 (no transmission ratio) because the motor shaft of the subsequent gearbox is rotating at the same shaft speed
Foreign IN coupling	Blank as this is the beginning of the powertrain
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	Motor speed sensor / Motor TCP speed information

Motor DE (Driven End = drive side of motor)

Ratio TOTAL	**1 (no transmission ratio)**
Ratio IN	1 (no transmission ratio)
Ratio OUT	1 (no transmission ratio) because the motor shaft of the subsequent gearbox is rotating at the same shaft speed
Foreign IN coupling	The motor's own shaft
Self IN coupling	The motor's own shaft
Self OUT coupling	The motor's own shaft
Foreign OUT coupling	Gearbox input shaft
Speed signal	Motor speed sensor / Motor TCP speed information

Key gearbox data

- 1-stage
- Input shaft pinion 21 teeth
- Output shaft gear 42 teeth

Gearbox input shaft

Ratio TOTAL	**1 (no transmission ratio), as the motor and the gearbox motor shaft are rotating at the same shaft speed**
Ratio IN	1 (no transmission ratio)
Ratio OUT	0.5 (calculated from number of teeth on pinion and gear: 21/42 = 0.5)
Foreign IN coupling	Motor shaft
Self IN coupling	Own motor shaft
Self OUT coupling	Pinion on motor shaft or input shaft (21 teeth)
Foreign OUT coupling	Gear on driven shaft or output shaft (42 teeth)
Speed signal	Motor speed sensor / Motor TCP speed information

Gearbox output shaft

Ratio TOTAL	**0.5 (calculated from number of teeth on pinion and gear: 21/42 = 0.5)**
Ratio IN	0.5 (no transmission ratio)
Ratio OUT	1 (no transmission ratio)
Foreign IN coupling	Input shaft pinion (21 teeth)
Self IN coupling	Output shaft gear (42 teeth)
Self OUT coupling	Own driven shaft
Foreign OUT coupling	None / component group in next aggregate (if applicable)
Speed signal	Motor speed sensor / Motor TCP speed information

7.7 Component

Each component group is made up of individual components. New components can be added to existing component groups by dragging them from the library to the plant tree using drag & drop. The same function can also be used to replace existing components. This is particularly useful if you have used a pre-defined aggregate template, for example.

The templates contain dummy roller bearings, as the precise bearing types are not yet known. To replace the dummy, the correct bearing is selected from the library and dragged to the dummy bearing. All relevant component parameters are then automatically changed.

The bearings are displayed separately from the remaining components in the library.

The system provides templates containing pre-defined characteristic values for the following components:

- Gear
- Roller bearing
- Fan
- Coupling
- Pump impeller
- Pulley
- Rotor blade
- Roll
- Stator/Rotor (electric motor); Note: Only supported to ensure back compatibility with existing configurations; component can no longer be created as a new item.

Settings for a component in the detail window

General tab

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

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

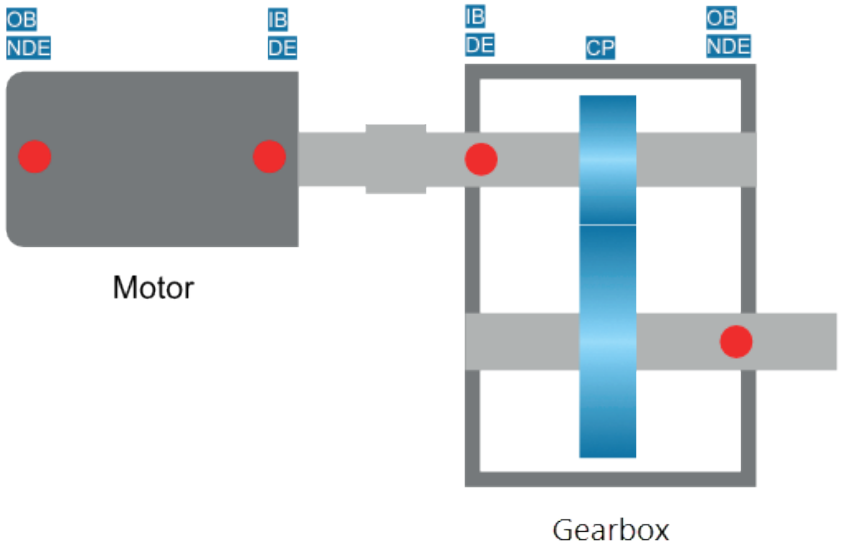
Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

Comment
The Comment field is used to enter comments about an asset. The input field can be enlarged by dragging (bottom right).

Position
Specifies the position of a component on the shaft.

The following positions are possible:

- **Centered position [CP]:** Indicates the location of a component (e.g. bearing) in the center of the shaft.
- **Doubleside drive end [DDE]:** Indicates a component or system, which has two drive or non-drive ends, e.g. a garbox with two output shafts.
- **Drive end [DE] / Inboard [IB]:** Indicates the side where the load is tapped or applied. For motors this is referred to as A-side. For gearboxes it is the side of the input shaft, which applies the load to the gearbox.
- **Non drive end [NDE] / Outboard [OB]:** Indicates the opposite side to the load. For motors this is referred to as B-side. For gearboxes this is the side where the load leaves the gearbox.
- **Without drive end [WDE]:** Indicates a variant without input or ouput shaft, e.g. a pully or impeller with no motor shaft.



Sensor
Here, you can select the sensor that will be used to monitor this component.

The dropdown list contains all sensors assigned to the higher-level aggregate.

List of trends belonging to the individual components:

Component	Trend
Bearing	FFT inner race (FFT = Fast Fourier Transformation for detection of frequency components)
	FFT outer race
	FFT rolling
	FFT cage
	ENV inner race (ENV = Envelope; envelope curve analysis)
	ENV outer race
	ENV rolling
	ENV cage

Component	Trend
Coupling	FFT coupling
Fan blade	Fan blade
Gear	Gear mesh (tooth engagement frequency)
	Gear damage
	Gear wear
Pulley	FFT belt
	ENV belt
Pump impeller	Impeller
Roll	FFT roll
	Roll imbalance
Rotor blade	Rotor blade
Shaft	Shaft level
	Imbalance
	Local errors
Stator/Rotor[1)]	Stator defect
	Rotor defect conductor bars
	Rotor defect operating frequency

Parameters

Different values can be set under *Parameters* depending on the component.

Below is a list of setting options for each component, along with the calculated frequencies:

Component	Parameter [unit]	Comment
Gear	Number of teeth [-]	
	Tooth engagement frequency [Hz]	Read only
Stator/Rotor[2)]	Motor slip [-]	Entry 0-1 => 1 is 100%
	Number of pole pairs [-]	
	Number of rotor bars [-]	
	Power line frequency [Hz]	
	Operating frequency [Hz]	Read only
	Bar pass frequency [Hz]	Read only
	Motor slip frequency [Hz]	Read only

[1)] Only supported in existing configurations; component can no longer be added as new item.

[2)] Only supported in existing configurations; component can no longer be added as new item.

Component	Parameter [unit]	Comment
Bearing	Inner race defect frequency [Hz]	Read only
	Outer race defect frequency [Hz]	Read only
	Ball defect frequency [Hz]	Read only
	Cage defect frequency [Hz]	Read only
Fan	Number of fan blades [-]	
	Fan blade pass frequency [Hz]	Read only
Coupling	Number of claws [-]	
	Coupling element pass frequency [Hz]	Read only
Pump blades	Number of pump blades [-]	
	Pump blade pass frequency [Hz]	Read only
Pulley	Belt diameter [m]	
	Belt length [m]	
	Pulley frequency [Hz]	Read only
Rotor blade	Number of rotor blades [-]	
	Rotor blade pass frequency [Hz]	Read only
Roll	Roll diameter [m]	
	Roll frequency [Hz]	Read only

Plant links
Shows the shaft on which the component is located.

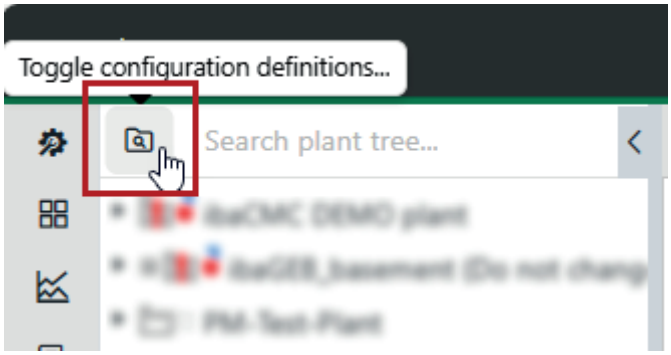
7.8 Roller bearings

In the delivery state, the software contains a comprehensive library of bearings. If you require bearings that are not included in the database supplied, you can create them as user-specific bearings.

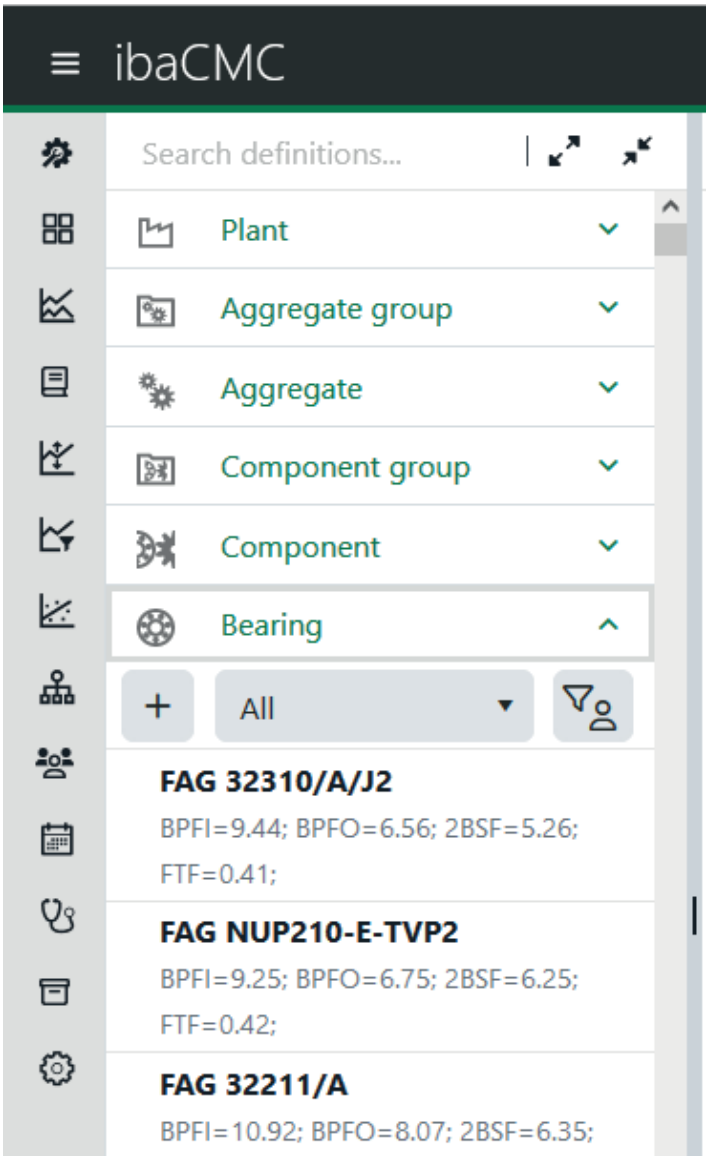
7.8.1 Bearing library

The bearing library provides a comprehensive collection of roller bearings from different manufacturers.

You access the bearing library using the symbol for the *Definitions* in the top left of the search bar.



If you then expand the *Bearing* section, you will see the bearing types.



The drop down field can be used to filter by manufacturer or to display all manufacturers.

The search at the top in the *Browse definitions* field allows you to search by bearing types. Simply enter the search text. The search identifies character strings, which means that you can enter incomplete names. Wildcards are not supported. The list of bearings is automatically updated according to your entry.

Moving the mouse over a bearing displays a small tree icon. Clicking on that icon opens a window containing a list showing where the bearing has already been used in the configuration.

If there is an entry and you then click on the bearing icon in the *Path* column, the position of the use in the plant tree is displayed.

7.8.2 Creating and editing user-specific roller bearings

Creating a new roller bearing

The following steps are required to create a user-specific roller bearing.

1. Open the *plant configuration*
2. Open the *component library*
3. Open the *Bearing* area
4. Clicking on the <+> button opens a wizard, which guides you through creating the bearing.

Note



If you do not know the rollover frequencies but you do know the dimensions of the bearing, you can determine the rollover frequencies using the <Calculate bearing frequencies> button.

Displaying/filtering roller bearings (user-specific)
If you only want user-specific roller bearings to be displayed, the following steps are necessary.

1. Open the *plant configuration*
2. Open the *component library*
3. Open the *Bearing* area.
4. Click on the button with the filter symbol and filter by user-specific roller bearings

Editing roller bearings (user-specific)
The following steps are required to edit a user-specific roller bearing already created.

1. Open the *plant configuration*
2. Open the *component library*
3. Open the *Bearing* area.
4. Click on the filter button and filter by user-specific roller bearings
5. Use the mouse to select the relevant bearing, click on the small Edit icon and edit the entries

Deleting roller bearings (user-specific)
The following steps are required to delete a user-specific roller bearing.

1. Open the *plant configuration*
2. Open the *component library*
3. Open the *Bearing* area.
4. Click on the filter button and filter by user-specific roller bearings
5. Use the mouse to select the relevant bearing and click on the small Delete icon (trash can symbol)

Note



If you delete a user-specific component that is used in the plant tree, an error message is generated.

In this case, the component has to be removed from the plant tree first. You can then delete it from the function block library.

7.9 Trends

Trends are signals calculated from sensor raw data, e.g. RMS or ISO value of signals that come from data sources (e.g. TCP/IP). Trends do not have to be added manually as they are already included in the templates for aggregates, component groups, and components.

In the plant tree, different trends are created below an IEPE sensor depending on the template. For example, if an additional calculation is to be performed here, a new trend can be dragged from the library to the sensor. This enables you to make your work easier by using the templates, but you still have the flexibility to be able to perform custom calculations.

Note



With the *ibaCMU-S* device, only 5 selective frequency characteristic values per sensor can be calculated.

Recommendation: Only create trends for sensors.

If you have added the trend using drag & drop, its parameters are set automatically.

7.9.1 General

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

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

Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

Comment
The Comment field is used to enter comments about an asset. The input field can be enlarged by dragging (bottom right).

Signal type
The signal type specifies the signal from which the trend value is calculated. The following signal types are available:

- Time signal
- Velocity time signal
- Acceleration time signal
- Orbit time signal
- Velocity spectrum
- Acceleration spectrum
- Orbit spectrum Displacement spectrum
- Envelope spectrum

Virtual trend type

The virtual trend type is a fixed setting for a trend and cannot subsequently be changed. This setting is used later in the limit setting to enable automatic calculation of the limit to be performed.

The following virtual trend types are available:

- Average
- Crest factor
- ENV belt
- ENV cage
- ENV inner race
- ENV outer race
- EVN rolling
- Fan blade
- FFT belt
- FFT cage
- FFT inner race
- FFT outer race
- FFT roll
- FFT rolling
- Gear damage
- Gear mesh
- Gear wear
- Imbalance
- Impeller
- ISO
- Local errors
- Maximum
- Median
- Minimum
- Misalignment
- Peak to peak
- RMS
- RMS * Peak
- Roll imbalance

- Rotor blade
- RPS
- Standard deviation
- Used range

Note



The RMS * Peak (formerly K(t)) trend will no longer be generated for the sensor definitions IEPE Vibration Sensor (Regular) and IEPE Vibration Sensor (Extended) in migrated plants.

Unit
Select the physical unit for the trend here.

Limits

Icon	Description
↑	Limit exceeded; can be switched to value below limit by clicking on the arrow.
↓	Value below limit; can be switched to limit exceeded by clicking on the arrow.
Warn-ing	Limit for warning
Alarm	Limit for alarm
Critical	Limit for critical state (acute alarm)
	Notification/reporting for the trend enabled. Notification/reporting for the trend can be disabled by clicking on the icon.
	Notification/reporting for the trend disabled. Te bell being disabled, the status calculation will be disabled too and the status will be set "undefined". Notification/reporting for the trend can be enabled by clicking on the icon.
	Delete limit monitoring

Example status change for exceeding limit
Status increase: Current status is normal and hysteresis is 5. If 5 values exceed the warning limit for an extended time, the status changes to Warning.

Status reduction: Current status is Warning and hysteresis is 5. If 5 values are below the warning limit for an extended time, the status changes to normal.

Creating/editing limits
By default, no limits are set for a trend. For alarms to be generated in the system, a limit must be set for the trend.

Limits not to be exceeded or fallen below can be set.

An alarm is triggered when the average or median value, evaluated over the aggregation interval, exceeds or undercuts the threshold. You set the aggregation method (moving average or

moving median) and the size of the aggregation interval in the plant configuration on the *Monitoring* tab.

Creating a limit not to be exceeded or fallen below for a trend:

1. Open the configuration panel for the trend in the plant tree
2. On the *General* tab, a limit not to be exceeded can be added by clicking on the + icon under *Limits*.
3. Clicking on the arrow switches between not to be exceeded and fallen below.
4. The limits can be edited in the W (Warning), A (Alarm) and C (Acute alarm / Critical) fields.

7.9.2 Logs

For a description of the logs, see ↗ *Logbook, page 155*

7.9.3 CMU calculations

Some bandpass-filtered characteristics require parameters to enable the trend to be calculated by the CMU. These parameters can be defined on the *CMU calculations* tab.

> **Calculation example for a filtered RMS value**
> For an RMS 10-2000 the “Lower frequency limit” is set to 10 Hz and the “Upper frequency limit” to 2000 Hz under *Parameters*. This gives a characteristic value for activity in this frequency range for monitoring.

Enable
Switch to enable (green) or disable (gray) the calculation.

Calculation
If you have used a particular trend from the library, this field is pre-selected. This setting can not then be changed.

Predefined calculation methods for selection include:

- Average [Avg]
- Crest factor [CF]
- ISO [ISO]
- K(t)
- Maximum [Max]
- Median [Med]
- Minimum [Min]
- Peak to peak [PP]
- Effective value [RMS]

Multiplier
An optional additional factor can be specified here, by which the trend value is multiplied after the actual calculation.

Parameters

Note:

Fixed parameters are assigned for the trend and can be changed if required. When changing existing trends, the trend history with the previous settings will remain unchanged and not recalculated. The trend name is not adjusted in case of changing parameters. It should be adjusted manually to match the settings again.

Overview of calculation parameters:

- Lower frequency limit
- Order analysis
- Order harmonics
- Upper Frequency limit

Note



For the RMS trends you can enter 0 Hz as Upper frequency limit.

In case of an ibaCMU-S half the sampling rate will be exported for Upper frequency limit which corresponds to the maximum frequency (fmax) in the spectrum.

In case of an ibaDAQ 0 Hz will be exported. ibaPDA then generates a high-pass-filter with Lower frequency limit.

Damage pattern calculation for components
Multiple virtual trends are calculated for each component. A predefined damage pattern is used as the basis for calculation of these trends, e. g. FFT inner race, ENV outer race etc. Calculation and configuration of the damage pattern is described here using the example of “Envelope curve inner race” (ENV inner race).

The relevant damage pattern calculation and also the calculation type (average, min, max, etc.) are displayed in the CMU calculation section on the *ENV inner race harmonics* and *ENV inner race sidebands* tabs. For example, this means that the average for all harmonics is calculated and used to plot the trend. The multiplier enables the harmonics, for example, to be given greater weighting than the sidebands.

The *Damage patterns* <Edit> button opens a listing of the harmonics of the component's defect frequency or the sidebands of these harmonics.

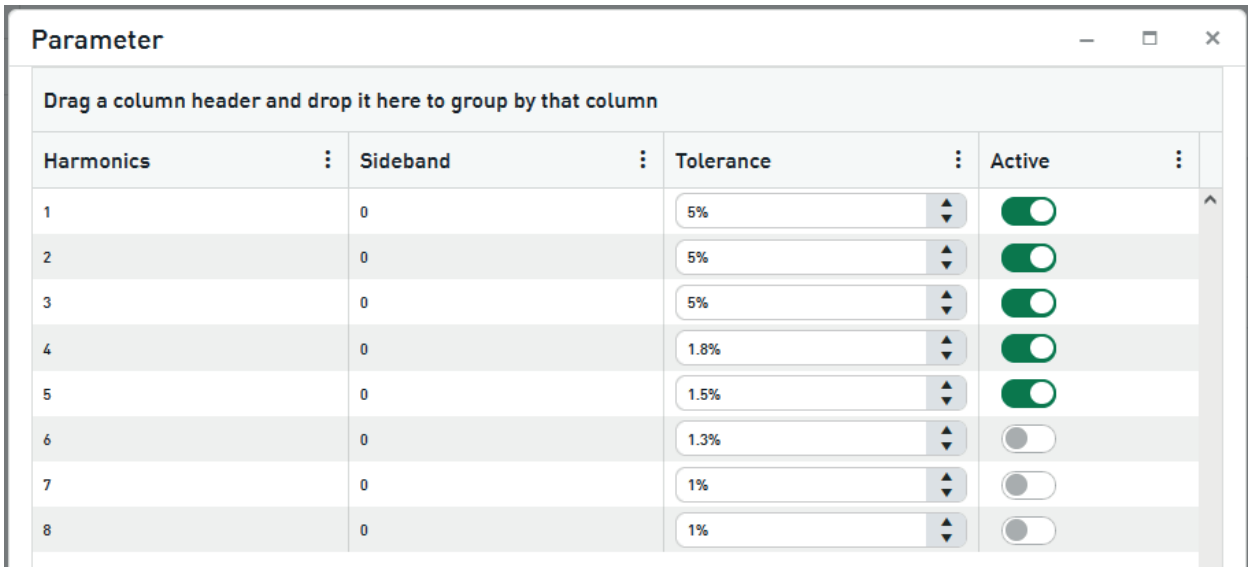
On the *ENV inner race harmonics* tab you can use this dialog to set up tolerances for the 1st to 8th harmonics in order to define a band width to be searched for the calculated value, e. g. the maximum.

On the *ENV inner race sidebands* tab you can use this dialog to enable or disable up to 8 sidebands for each of the 1st to 8th harmonics. Furthermore, you can set the band width to be searched for the maximum by specifying the tolerance.

The *Tolerance* entry applies as a symmetrical value given in percent to the left and to the right of the damage frequency (bandwidth = 2 * tolerance).

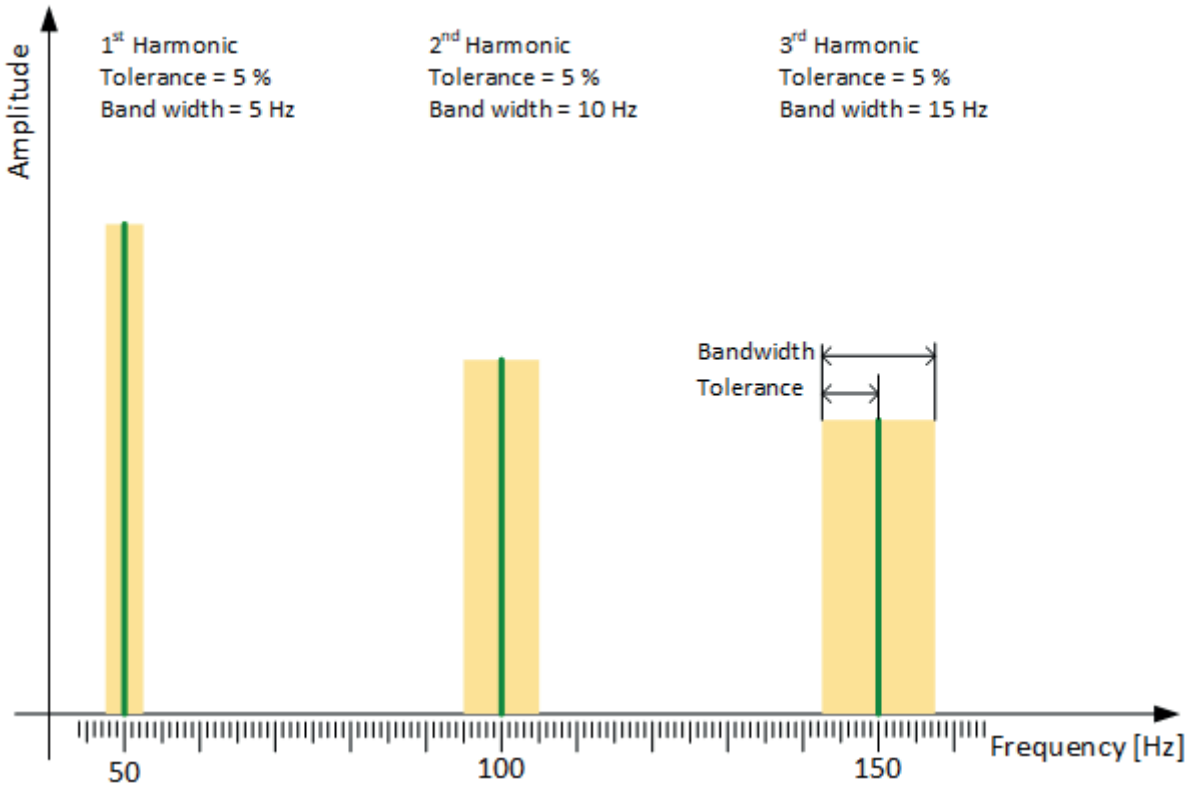
Example:

If the defect frequency is 50 Hz and the band width is set to 0.1 (10 % of the defect frequency), you should enter 5 % for tolerance. The frequency range from 47.5 Hz to 52.5 Hz will be considered (band width = 5 Hz).



In this example the tolerance is 5 % for the fundamental and the next two harmonics. Consequently, the band width in Hz increases by rising frequencies.

If you want to get a comparable precision, i. e. a similar band width like for the fundamental even for the higher harmonics, then you have to decrease the tolerances for higher frequencies.



Note

After damage pattern calculations have been changed, a configuration log entry is written with details of the time, user, and changes for the respective trend.

The changes only become active when the CMU configuration is loaded onto the device.

CMU correlation

Correlation is usually calculated using the correlation app. The values calculated there are also displayed here.

For more information about the correlation settings, see ↗ *Correlation settings, page 102*

7.10 Data source groups

Data source groups are used for grouping the trends that come under them.

For a microCMU, these data source groups are created automatically when synchronizing.

General

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

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

Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

Comment
The Comment field is used to enter comments about an asset. The input field can be enlarged by dragging (bottom right).

Aggregate
Here you can specify an aggregate under which the data source groups will be displayed.

7.11 Data source

In addition to vibration-based condition monitoring using iba hardware, in *ibaCMC* hydraulic condition monitoring based on the microCMU is also possible. This microCMU is integrated into *ibaCMC* as a data source.

The available options are:

- Unit Fluid Monitoring (UFM), e.g. for oil level monitoring, particle monitoring, and wear monitoring
- Rotary distributor leakage monitoring (RDM)
- Cylinder leakage monitoring (CLM)

To add a data source to the plant tree, an aggregate group must first be created. The relevant data source, e.g. UFM, can then be dragged to it.

General

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

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

Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

Comment
The Comment field is used to enter comments about an asset. The input field can be enlarged by dragging (bottom right).

Type
Shows the data source type, taken from the data source (e.g. UFM, CLM, RDM)

Host address
Enter the IP address of the data source here.

FTP port, Path, User, Password
The FTP settings for the microCMU cannot be edited using the button, they are only displayed.

Ignore/check measurement condition
The <Ignore measurement condition> button sets whether data is imported from the microCMU and used to create a trend if the measurement condition is not active.

- *Ignore measurement condition:* Data is always recorded even if the measurement condition is not active.
- *Check measurement condition:* Data is only recorded if the measurement condition for the microCMU is met.

Configuration
Once the IP address entry has been confirmed with <OK>, the connection can be checked.

- *Try connection:* Checks the network connection to the microCMU. If the connection is successful, you can continue with synchronization.
- *Synchronize configuration:* If the configuration on the microCMU has been changed, this button enables it to be synchronized in *ibaCMC*.
- *Unlink:* Cancels the connection between the microCMU and the server. No more data is imported.

Logs
The logs generated by the data source are displayed here.

7.12 Sensor

Every component in the plant configuration must be assigned a sensor for monitoring, but one sensor can monitor multiple components. The sensor must be assigned to an aggregate in the plant configuration. This enables the sensor to monitor multiple components and component groups.

Sensors are dragged to the relevant aggregate from the library using drag & drop.

The following sensor parameters can be viewed in the editing window. This is opened by right-clicking on the sensor and selecting *Edit*. It is important to make sure that the sensor is selected directly in the aggregate group in the plant tree and not in the module where it is linked.

7.12.1 General

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

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

Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

Comment
The Comment field is used to enter comments about an asset. The input field can be enlarged by dragging (bottom right).

Type
Select the corresponding type for the sensor output. For IEPE sensors, the type cannot be changed.

The following sensor types exist:

- Analog Standard: Select this setting if none of the other analog types is applicable. In this case, you will have to adjust the Range Min and Range Max values on the *Sensor data* tab, e.g. Min and Max values for a distance sensor.
- Analog Current ±20mA
- Analog Current 0-20mA
- Analog Current 4-20mA
- Analog ibaNET 750: Analog signal read by a central unit for distributed I/O like ibaNet750-BM or ibaNet750-BM-D using fiber optics (e.g. temperature signal).
- Analog IEPE: Vibration sensor with integrated charge amplifier (also known as ICP or Piezo sensors)
- Analog Voltage ±10V
- Analog Voltage ±24V
- Analog Voltage 0-10V

- Digital 0-24V: 24V HTL level digital signal, e.g. connected to one of the digital inputs on the CMU.
- Digital ibaNET 750: Digital signal read by an ibaNET750 field bus coupler using fiber optics.
- Digital rpm: Digital sensor used for speed measurement (e.g. inductive proximity switch).

Orientation
The following options are possible here:

- Axial
- Horizontal
- Radial
- Vertical

> **Note:**
>
> This parameter is only relevant for vibration sensors.

Serial number
Enter the serial number of the sensor here.

Aggregate
This field shows the aggregate association of the sensor. The value is automatically adopted when the sensor is dragged to an aggregate in the plant tree. It is NOT possible to assign the sensor to a different aggregate.

Trend filter
If a sensor is to be assigned to a trend filter, the trend filter group has to have been created first.

See also chapter ↗ *Filtered trends, page 117*.

Sensor check
If the sensor check is enabled, the sensor is checked for sensor defects. The parameters for the sensor check can be set in the sensor data.

Sensor data
On the *Sensor data* tab, you can configure additional parameters, which depend on the type of sensor selected. By default, most sensors have the Range Min and Range Max parameters, corresponding to the physical value at the minimum and maximum output signal level. The required values can normally be found on the data sheet for the sensor or in the calibration certificate for vibration sensors.

Example
Let us assume that an inductive displacement sensor (M18 size) is selected and has an output signal level of 4-20 mA. Its linear measurement range is between 1 mm and 5 mm. Therefore, “1” should be entered for Range Min and “5” for Range Max. In addition, the sensor type has to be set to *Analog Current 4-20 mA* on the *General* tab. A vibration sensor is different as the *Sensitivity* and *Bias voltage* parameters also exist. You can find these in the sensor’s calibration certificate.

Overview of sensor parameters

Sensitivity
The *Sensitivity* parameter specifies the sensitivity of the sensor in the unit [mV / Unit]. The sensitivity of the sensor is specified in the data sheet or the calibration certificate supplied by the sensor manufacturer.

Note



Assigning a calibration certificate

To obtain the most accurate possible characteristic values from the sensor, we recommend assigning the sensitivity from the calibration certificate. The calibration certificate is normally enclosed with the sensor. In exceptional cases, the certificate has to be requested from the sensor supplier.

Constant RPM
Select this parameter for an aggregate with a fixed shaft speed, e.g. if the motor is not frequency regulated (no frequency inverter). The fixed shaft speed value is specified in revolutions per minute [rpm]. To assign the constant shaft speed to a component group, drag the vibration sensor (*Analog IEPE* type) to the speed sensor field for the component group (tab: *Ratios*).

Range Max
Value in the physical unit that the sensor supplies at maximum output voltage or maximum output current (only relevant for analog sensors)

Range Min
Value in the physical unit that the sensor supplies at minimum output voltage or minimum output current (only relevant for analog sensors)

After entering the value for *Sensitivity* (see above), the values for *Range Max* and *Range Min* are set automatically. However, you can still change them manually if necessary.

Switch flag
Number of switch flags on the circumference of a shaft, e.g. if using an inductive proximity switch for speed measurement.

Check Max
This value is specified as a factor 0-1 (= 0-100%) of Range Max. If this value is exceeded, the sensor is no longer calculated. This prevents bad data being calculated due to a sensor defect.

Typical values:

- IEPE sensor: 0.95
- PT100: 849 (850 = cable break)

Check Min
This value is specified as a factor 0-1 (= 0-100%) of Range Min. If the value falls below this, the sensor is no longer calculated. This prevents bad data being calculated due to a sensor defect.

Typical values:

- IEPE sensor: 0.95

Check Velocity Ratio
This value is specified as the quotient of the maximum to the minimum speed occurring and can only be used with IEPE sensors. If the value is reached or exceeded, this sensor is no longer calculated. This can prevent bad data being calculated due to transient overmodulation or oscillation.

Typical value: 7

Suppress DC enabled
Enabling this option causes the removal of the constant component (average) when processing signals for calculation of RMS, filtered RMS and crest factor in *ibaPDA*. The activation does not affect the raw signal of the sensor.

7.12.2 Logs

All logs associated with the sensor are displayed here.

7.12.3 Resampling

With significantly fluctuating shaft speeds, it is useful to enable resampling for IEPE sensors. The calculations are then speed based rather than time-dependent. This enables damage to be detected more effectively in the FFT and in the envelope curve, and improves the analysis. To enable resampling, switch to editing mode and click on the *Enable* switch.

General settings for resampling

Enable
You can use this switch to enable (green) and disable (red) resampling.

Speed signal
Enter the speed sensor to be used for resampling the time signal.

Calculation
Only “Time based resampling” can be selected here.

Multiplier
Not used for the calculation.

Parameters
Opens the settings for the resampling calculation parameters:

Time delay
This value is specified in ms. Default value: 250 ms

If a TCP/IP channel is used as the speed signal, this value can be used to take into account the time delay caused by TCP/IP communication. Various time delays always occur between speed

acquisition and receipt of telegrams, and this value compensates for them. As a result, the IEPE signal and the speed signal are synchronous.

Time window MAvg (moving average)
This value is specified in ms. Default value: 500 ms

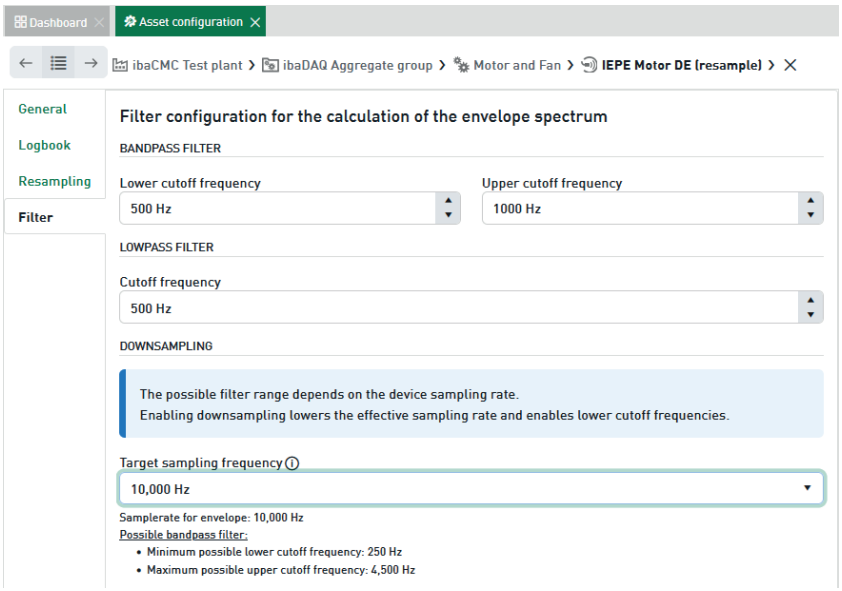
The speed signal is smoothed using a moving average. It is averaged over a time slot of e.g. 500 ms.

7.12.4 Filters

In the *Sensor* area of the plant configuration, the *Filters* tab appears for IEPE sensors. For each IEPE sensor, the bandpass filter required for the envelope spectrum can be set.

Bandpass and Lowpass filter for envelope spectrum
The bandpass filter is specified in Hz, if the sensor is assigned to a CMU. If the sensor is not assigned to a CMU or to a module, the filter cutoff frequencies are specified in percent. These filters are defined relative (as a percentage) to the sampling rate and change when the sampling rate is changed.

In case of the *ibaPDA*-based CMU *ibaDAQ* or *ibaM-DAQ* you can set up the bandpass filter individually for each sensor.



Note

For the lower and upper filter frequency there is a limit of 2.5 % to 45 % of the sample rate of the *ibaDAQ*. This will be checked when changing the filter frequencies, changing the sample rate or assigning the sensor to a CMU module.

- Cutoff frequency settings
  The lower and upper cutoff frequencies of the bandpass filter (BP) can be configured individually. By default, the cutoff frequency of the lowpass filter matches the lower cutoff frequency of the bandpass filter. If the lower BP cutoff frequency changes, the cutoff frequency of the lowpass filter does not follow automatically.

- Downsampling option
  This option was created to enable the monitoring of low running machines as well as fast signals in the same CM device. By means of the downsampling you can select a different sampling rate for the envelope spectrum, in order to define lower filter frequencies.

The correct bandpass filter is the most important setting for calculation of the envelope spectra. An incorrect bandpass filter prevents damage from being detected.

Note



A change to these filters can prevent damage detection. Only a vibration expert should change these filters.

8 CMU



The Condition Monitoring Unit (CMU) is the measurement and analysis hardware for condition monitoring applications based on vibration measurement. Several modules can be connected to a CMU. These include modules for reading digital signals, analog signals, and vibration sensors. The TCP/IP communication protocol is used to exchange process data (e.g. shaft speed, weight, torque, etc.) with the automation environment (e.g. PLC).

Based on the sensor and process data, characteristic value calculations are performed (RMS, ISO, frequency band characteristic value, etc.). These characteristic values can be transmitted to the automation environment using TCP/IP telegrams, analog outputs, or digital outputs.

Different CMU types are supported:

- *ibaCMU-S*
- *ibaDAQ*.
- *ibaM-DAQ*

Note

Meanwhile, *ibaCMU-S* is part of iba's legacy products and does not fulfill all security requirements of modern communication.

ibaCMU-S is using an unencrypted FTP connection to communicate with *ibaCMC*. This is a potential security risk which you should consider.

For an encrypted communication please use CMUs like *ibaDAQ* or *ibaM-DAQ*.

In contrast to *ibaCMU-S* the CMU *ibaDAQ* and *ibaM-DAQ* are based on the standard software *ibaPDA*. As a device *ibaDAQ* belongs to the iba Modular System and sits on the first slot (left) of the backplane. Beside the *ibaCMC*-specific data processing in terms of vibration analysis, the different software architecture of *ibaDAQ* provides for the use of more features, which are part of *ibaPDA*. Such features may be for example additional calculations with the integrated expression builder and generation of virtual signals, comprehensive diagnostics, visualization of actual data, creation of additional data stores and many more.

The CMU *ibaM-DAQ* is part of the ibaMAQ System and provides the same advantages like *ibaDAQ* with regard to *ibaPDA* features. This system too can be extended by input modules for IEPE sensors and other analog and digital signals.

The basic principle of data exchange and configuration applies to all CMU types, i.e. *ibaDAQ* as well as *ibaM-DAQ* is to be configured by *ibaCMC* and sends computed values and snapshot files with raw data back to *ibaCMC*.

Status information

At the top right of the plant configuration detail panel, various status information relating to the CMU is displayed. Chapter ↗ *Icon legend, page 108* describes the icons used here.

Name	ibaCMU-S	ibaDAQ ibaM-DAQ	Description
Connection status	X	X	Green: CMU is accessible Gray: CMU is not accessible
Configuration status	X	X	Green: The configuration on the CMU and the configuration in the ibaCMC match and there are no errors. Yellow: The configuration on the CMU is not up to date and needs to be updated, the CMU configuration is being created and uploaded, or no CMU configuration has been created yet. Red: The CMU is reporting an error in the configuration. Gray: The CMU is inactive.
iba website	X	--	Link to configuration website. Only works if the CMU can be accessed from the browser and there is a network connection.

8.1 General

CM-Device GUID (available for ibaDAQ only)
In this field you'll find the unique GUID for the CM-device *ibaDAQ*. The GUID is generated automatically by *ibaCMC*, as soon as you add a new *ibaDAQ* node to the plant tree. The GUID is needed by *ibaCMC* to grant a clear assignment of the settings and the devices.

The GUID must be entered on the other side too, i.e. in the corresponding *ibaDAQ* device. You can do this in *ibaPDA*, I/O Manager - *General* - *ibaCMC*. If you use *ibaPDA*-Client on the same computer as for the *ibaCMC* configuration you can copy the GUID to the clipboard and paste it in the I/O Manager.

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

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

Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

Comment
The Comment field is used to enter comments about an asset. The input field can be enlarged by dragging (bottom right).

Active
If this checkbox is selected, the configuration can be downloaded, and characteristic value calculations and files are imported.

Application type
Available application types:

Type	ibaCMU-S	ibaDAQ ibaM-DAQ	Description
Condition Monitoring	X	--	For Condition Monitoring applications with output of virtual channels to *ibaPDA*
Condition Monitoring and Process Monitoring	--	X	For Condition Monitoring applications and for process data processing applications

Hardware type
The hardware type can be selected here.

Several types are available for selection for *ibaCMU-S* and similar CMUs:

- ibaCMU-S [ic1] - (with 2nd SSD)
- Haicmon CMU [hc1] - (with 2nd SSD)
- ibaPADU-S-IT-16 [ps1] - (default settings)
- ibaPADU-S-IT-16 [ps2] - (with 2nd HDD)
- ibaPADU-S-IT-16 [ps3] - (with 2nd SSD)

There is only one hardware type permitted for *ibaDAQ*:

- ibaDAQ [id2] - (ibaPDA with CMS module)

The migration from *ibaCMU-S* (or comparable) to *ibaDAQ* is supported by a wizard, which executes multiple tasks automatically.

For more information about migrating *ibaCMU-S* to *ibaDAQ*, see ↗ *CMU migration, page 202*.

Serial no.
The 6-digit serial number of the CMU, which can be found on a sticker on the rear of the CMU device.

Software version
The CMU software version.

Log level
The levels *Debug*, *Info*, *Warning*, or *Alarm* are available. Only messages from this or a higher level are then generated by the CMU and displayed in the log view.

Import task interval
Choose from this drop-down list the desired interval for importing data from the CMU to *ibaCMC*.

- ibaCMU-S: Data (DAT files and XML files) are imported via FTP.
- ibaDAQ/ibaM-DAQ: Move received data from the temporary folder to the archive (DAT files) or database (indicators).

The selection is coded as Crontab.

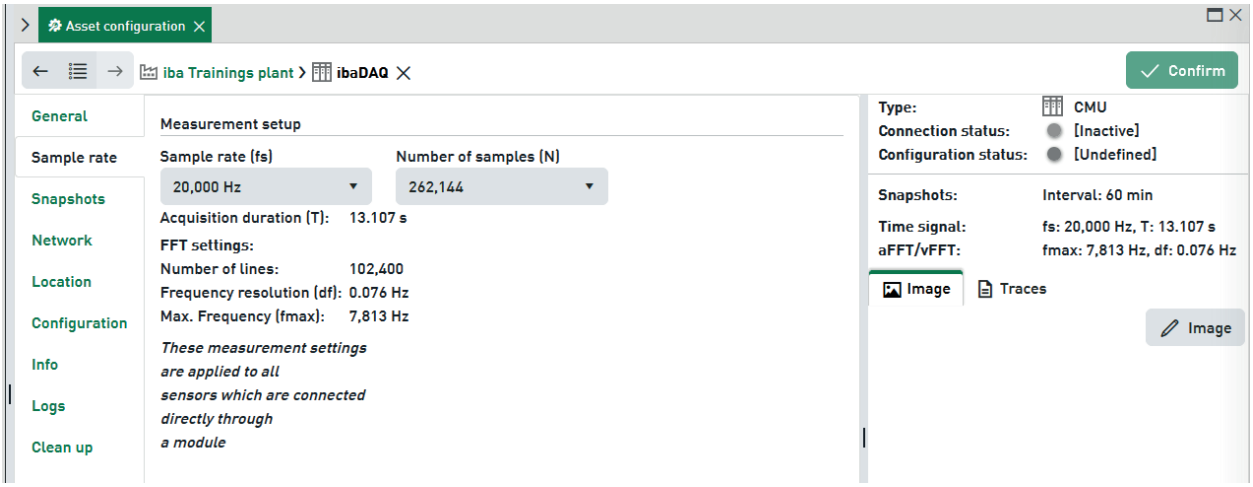
For more information about Crontab, see .↗ *Task scheduler, page 180*

8.2 Sample rate

The *Sample rate* tab has two drop down fields to set up the following:

- Sample rate
- Number of samples

Below and on the right side you'll find information about the spectrum and the time signal.



8.3 Snapshots

Snapshots are used for measurements under **comparable operating conditions** and to reduce fluctuations in the signals. In some cases, monitoring under identical conditions is difficult to achieve or is not expedient. Examples of this would be significantly changing speed ranges, high impacts that occur during the initial pass on a roughing stand, and much more. Which sensors or shaft speeds are to be saved by the CMU is also specified in the snapshots.

After every change to the snapshot configuration, load the CMU configuration to the device so that the changes take effect.

Creating a snapshot
To create a new snapshot for the CMU:

1. In the CMU configuration, go to the *Snapshots* tab and click on *+ Add*.
2. Click on the new snapshot in the list to open the configuration.

3. Under *Signals* select the sensors to be recorded in this snapshot.
4. Use drag & drop to drag TCP channels, speed sensors, or IEPE sensors into the *Conditions* table.
5. Enter the *Min*, *Max* and *SD* and enable the trigger condition by enabling *Check*.
6. Under *General* enter a descriptive name for the snapshot and specify the number of measurements/interval.
7. If you want to enable the clean up of the snapshot files, simply switch on the *Active* switch in the the *Clean up* tab.

Snapshot interval
Specify here the temporal interval for the creation of snapshots. The parameter *Max. no. of measurements* / *Snapshot interval* will subsequently relate to this value. The value is specified in minutes. Defalut value: 60 min.

Check condition type
The following table describes the options for speed processing with snapshots:

Selection	Description
Per segment	The trigger condition is checked for each segment. The time period of a segment is the measurement time / 10. If the trigger condition is not met within the first segment, the segment counter is reset to 1 and the check starts again. For the trigger condition to be valid, all 10 segments in turn must have a valid trigger condition.
Total	The trigger condition is checked for validity at the end of the measurement time.

Enabling / disabling snapshot recording
To enable a snapshot recording, click on the checkbox for enabling or disabling the snapshots in the *Active* column in the snapshot table.

Signals
On the *Signals* tab, you can specify which sensor signals are to be saved in the data file. To add a sensor or a TCP/IP channel to a recording, the relevant sensors are selected using the adjacent checkbox.

Removing does not change the sensor or the plant configuration. It only removes the sensor's connection to the snapshot.

Conditions

Trigger conditions are configured on the *Conditions* tab. Here, signals and process parameters can be added, which are checked for the criteria Min, Max and SD.

Sensors and TCP/IP channels are permitted as signals for trigger conditions. To enable a sensor or a TCP/IP channel to be set as a trigger condition, drag the sensor or TCP channel from the plant tree directly to the table using drag & drop. Multiple trigger conditions are permitted, and are then linked by a logical AND, i.e. all configured trigger conditions must be met for the measurement condition to be met. To undo the link, use the Delete icon.

For Min, Max and SD the unit of the TCP/IP channel or sensor will be displayed in the input field.

Exception: In case of a digital rps sensor, which is connected to an ibaCMU-S, the unit *rps* is always shown and applied, despite the unit set on the sensor.

Overview of check parameters:

Max
Maximum value. If this value is exceeded during the measurement time, the trigger condition is not valid. If the value is 0, checking of the Max value is disabled.

Min
Minimum value. If the value falls below this during the measurement time, the trigger condition is not valid. If the value is 0, checking of the Min value is disabled.

SD
Maximum value for the standard deviation. If this value is exceeded during the measurement time, the trigger condition is not valid. If the value is 0, checking of the SD value is disabled.

Check
Check this box to enable the trigger condition. Only enabled trigger conditions are actually checked in the snapshot. This enables you to selectively disable individual trigger conditions (e.g. because a sensor is currently faulty).

The trigger parameters within a trigger condition always have a logic AND link. For the entire trigger condition to be met, the Max, Min, and SD conditions must be met simultaneously. If a parameter is set to “0”, it is not checked, which corresponds to disabling it.

Trigger parameters for IEPE sensors:

With IEPE sensors, the check is carried out in a slightly different way than for speed sensors or TCP channels.

Measurement Condition OK = (MaxPeak <= LimitMax) AND (MaxPeak >= LimitMin) AND (RMS >= LimitStd)

MaxPeak = Max (Abs(Min), Abs(Max))

General

The following settings can be configured under *General*:

Name
Enter a name for the snapshot.

Max. no. of measurements / interval
This parameter is linked to the *Snapshot interval* for the CMU itself. Specify how many measurements you want per interval.

Note:

You can create a maximum of 32 snapshots per CMU, and each snapshot can contain a maximum of 32 trigger conditions.

Note



The following applies to ibaCMU-S devices:

Rule of thumb for calculation of the analysis time

Assumptions: Recording time = 13.1 s and sampling rate = 20 kHz. This results in one snapshot per sensor of approx. 30 s.

$$Analysis\ Time = \frac{Active\ Sensors * Number\ of\ Measurements\ per\ Interval}{2} + 5\,\text{min}\ (Overhead)$$

Reserve time = Snapshot interval - analysis time

Maintaining a reserve time of at least 5 min is recommended. If this is not the case, it is possible that it will not be possible to process all snapshots.

Clean up

ibaPDA-based CM devices generate snapshot-specific DAT-files. You can enable and configure the clean up, i.e. the deletion of these files here.

The *Clean up* tab for those devices covers two different file locations.

IBAPDA FILE ARCHIVE

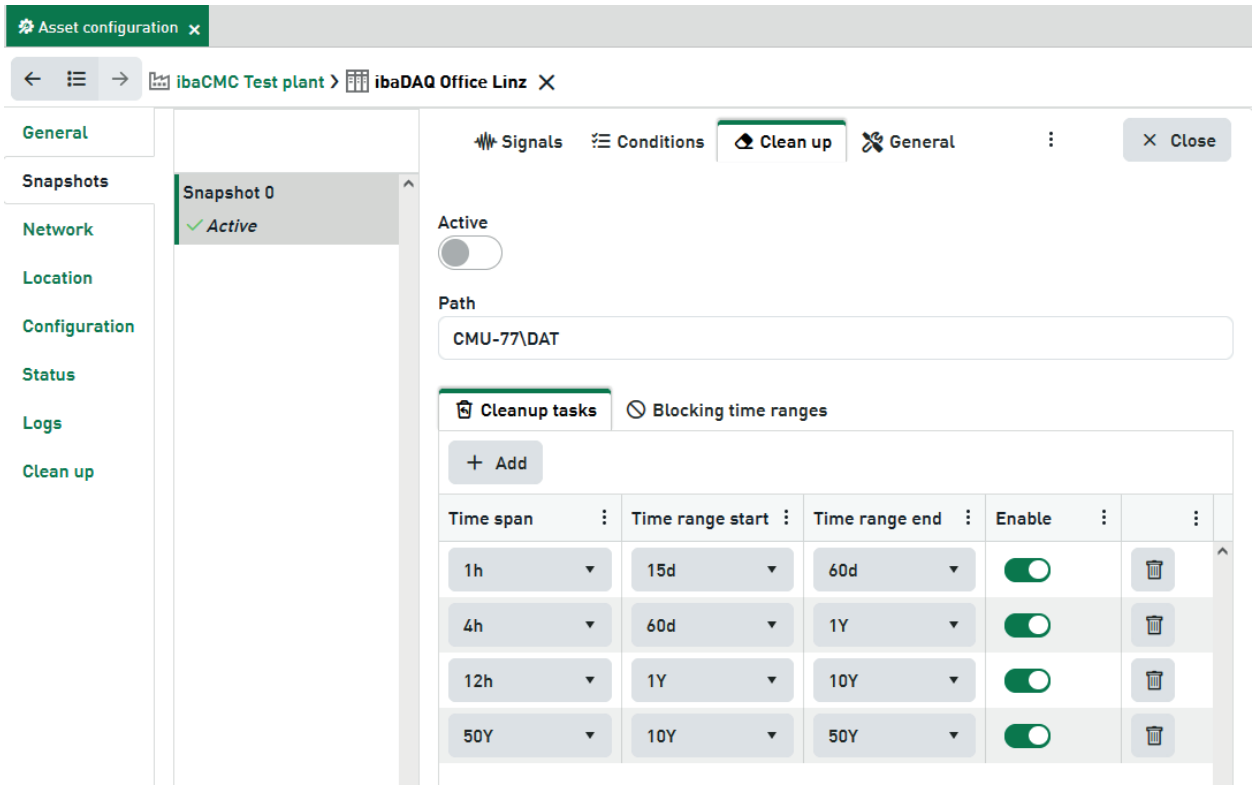
The *Disk quota limit* setting refers to the file storage location on the device (e.g. ibaDAQ). The DAT files generated by *ibaPDA* are stored there before they are transferred or copied to the *ibaCMC* server. The local data storage in the device serves as a buffer in case the transfer to *ibaCMC* is not possible.

Basically, you can limit the available storage size for data files on the device. Enter an appropriate value, given in MB, into the field *Disk quota limit*. When the limit is reached, *ibaPDA* will delete the oldest DAT files and indicator files. Changes are only applied after the upload of the configuration to *ibaPDA*.

IBACMC FILE ARCHIVE

The settings made here refer to the file storage on the *ibaCMC* server, the so called *Archive*.

The clean up is enabled by default. A few clean up tasks are preconfigured. If you don't want to use the clean up feature, just disable the *Active* switch.



If needed, you can enable or disable several clean up tasks and set up the time spans and time ranges. By clicking on the <Add> button you can add more time spans and ranges.

Time span
Exactly one file will be kept within this time span.

Time range
The time range limits the validity of the time span.

Time range start: Begin of the time range in the past relative to the actual date.

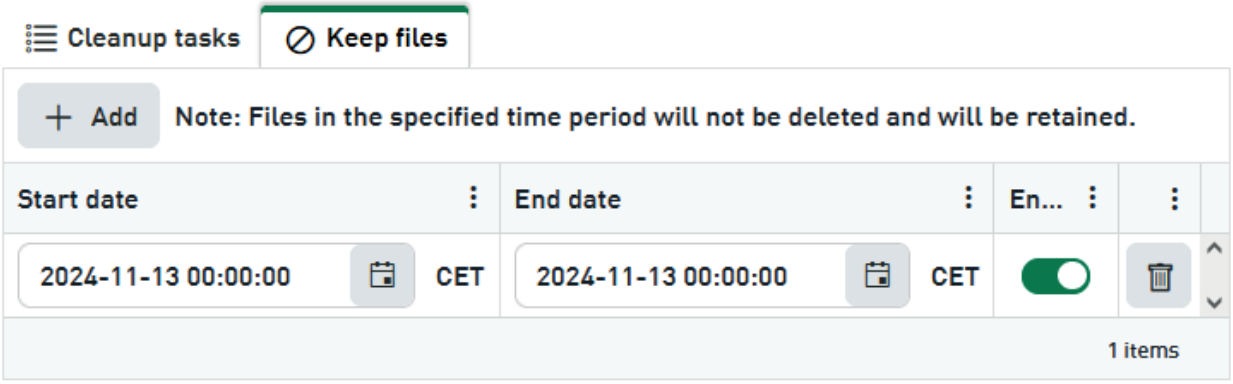
Time range end: End of the time range in the past relative to the actual date.

> **Example: Clean up tasks**
> 1. task: Time span = 1h, time range start = 15d, time range end = 60d
>
> 2. task: Time span = 4h, time range start = 60d, time range end = 1Y
>
> If you enable the first task, then all files will be deleted that are older than 15 days except for one file per hour.
>
> Following, the second clean up task provides for a further dying applied to files which are older than 60 days up to one year, keeping one file per 4 hours.
>
> If you do not configure another following task the files will be kept according to the latest clean up task. This means, that one file every 4 hours will be kept after 60 days, if you enable only the first two tasks.

Enable
Enabling/disabling of a time range/clean up task

Delete
Delete single tasks in the list

“Keep files” tab
In the tab *Keep files* you can configure fixed absolute time ranges where no files should be deleted.



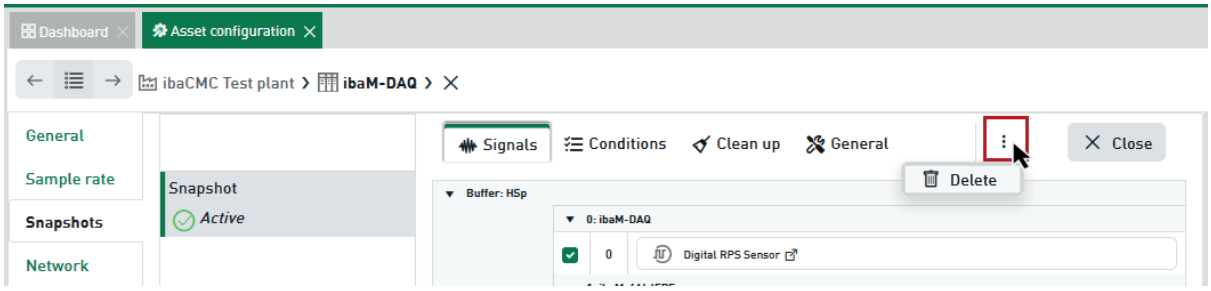
Use the date picker to set up start date and end date. Thus, you can protect time ranges from being cleaned up as long as the time range is enabled here.

Once, you don’t want this protection anymore, just disable the time range or delete it from the list.

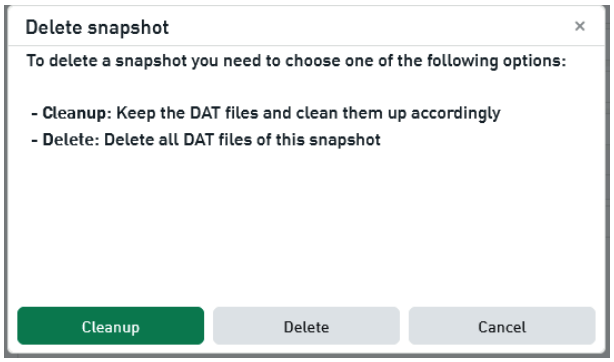
Remove a snapshot

If you want to remove a snapshot follow the steps:

1. Open the detail view of a snapshot.
2. Click on the three-dot menu and then on *Delete*.



3. A message dialog opens where you can decide how the DAT files of this snapshot should be handled.



8.4 Output of virtual trends

This feature is not supported by *ibaDAQ*.

Virtual trends can be output using virtual channels, telegrams, or digital outputs. Note that the virtual trend type impacts the type of calculation on the CMU and thus has an influence on the possible output. The table below shows an overview of the different virtual trends and calculation types on the CMU.

Statistical level and level from time signal		
Virtual trends	**Calculation time**	**Update time**
Min, Max, AVG, Peak to Peak, Crest factor, RMS, URg	Always calculated for each incoming data buffer (regardless of the measurement condition)	Measurement time/10 (e.g. 1.31 s for default measurement time of 13.1 s)
RMS 1-10, RMS 10-2000	Only calculated if values are required for an output	
RMS 2000-20000, Med, SD, K(t), ISO, ISO 3-1000, ISO 10-1000		

Damage level from frequency range

- Calculation time: Calculation only after a valid measurement (trigger condition must be met over the entire measurement time)
- Update time: One value after each snapshot

Virtual trends

- Shaft
- Local error
- Imbalance
- Shaft level
- Bearing
- FFT/ENV inner race
- FFT/ENV outer race
- FFT/ENV rolling
- FFT/ENV cage
- Gear
- Gear mesh
- Gear damage
- Gear wear

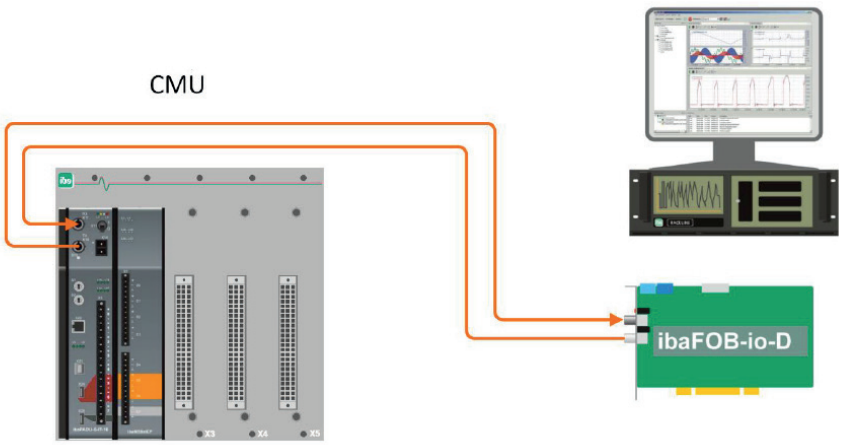
- Fan
- Fan blade
- Belt pulley
- FFT belt
- ENV belt
- Roll
- FFT roll
- Roll imbalance

Note

Calculation of output characteristic values takes a lot of processing power. When using 4 modules, the sampling rate must be reduced to 10 kHz. With 3 modules, 20 kHz is possible.

8.5 Virtual channels (available for ibaCMU-S only)

Virtual channels are used to transmit virtual trends to an *ibaPDA* process data acquisition system using the fiber optic connection on the CMU. Alternatively, the signals can be forwarded to an external output terminal (e.g. WAGO I/O terminals, series 750) using an *ibaNet750-BM-D* module. Trend values or limit violations (status) can be output.



Note that the switch S1 on the CMU hardware must be set to “1” if this connection is used. Further information can be found in the CMU manual.

The virtual channels must be enabled before configuration can be carried out. In addition, the cycle time for writing the virtual channels has to be specified. This is set to **1000 ms** by default.

For further details on configuration and output of virtual trends using a CMU module, see ↗ *Channels, page 100*.

8.6 Using ibaPDA process signals

The integration of process signals facilitates the use of any *ibaPDA* signal, which is acquired by CM devices such as *ibaDAQ* or *ibaM-DAQ* via the available *ibaPDA* interfaces in *ibaCMC*.

These signals can be used in *ibaCMC* for purposes as follows:

- Recording in snapshots
- Acting as trigger signals for snapshots
- Serving as a speed signal for component monitoring and order resampling
- Acting as a filter signal for trend filters
- Trending and monitoring of statistical indicators, such as average, minimum, maximum and standard deviation

Special modules have to be configured in *ibaCMC* to use the process signals, automatically creating a corresponding virtual module in *ibaPDA* for each.

Only analog and digital signals are permitted. Digital signals are automatically converted in analog values 0/1. Text signals are not permitted.

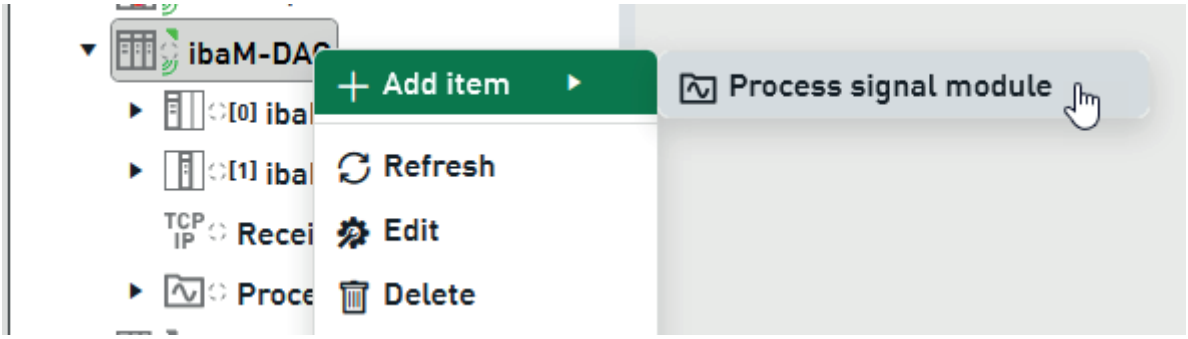
To use the process signals, the following steps are required:

1. Add a process signal module.
2. Add process signals to this module.
3. Configure process signals in ibaCMC.

8.6.1 Add a process signal module

Process signal modules serve for linking *ibaPDA* signals to *ibaCMC*. Here, you define the process signals and assign them to the source signals from *ibaPDA*.

To add a process signal module make a right-click on the CM device (*ibaDAQ* or *ibaM-DAQ*) in the plant tree and select *Add item - Process signal module*.



A dialog window *Add process signal module* opens for entering *Name* and *Timebase*. Enter a module name and define the timebase for sampling the signals in the module.

This timebase should be equal or higher than the timebase used by *ibaPDA* for sampling the signals. Default is 10 ms.

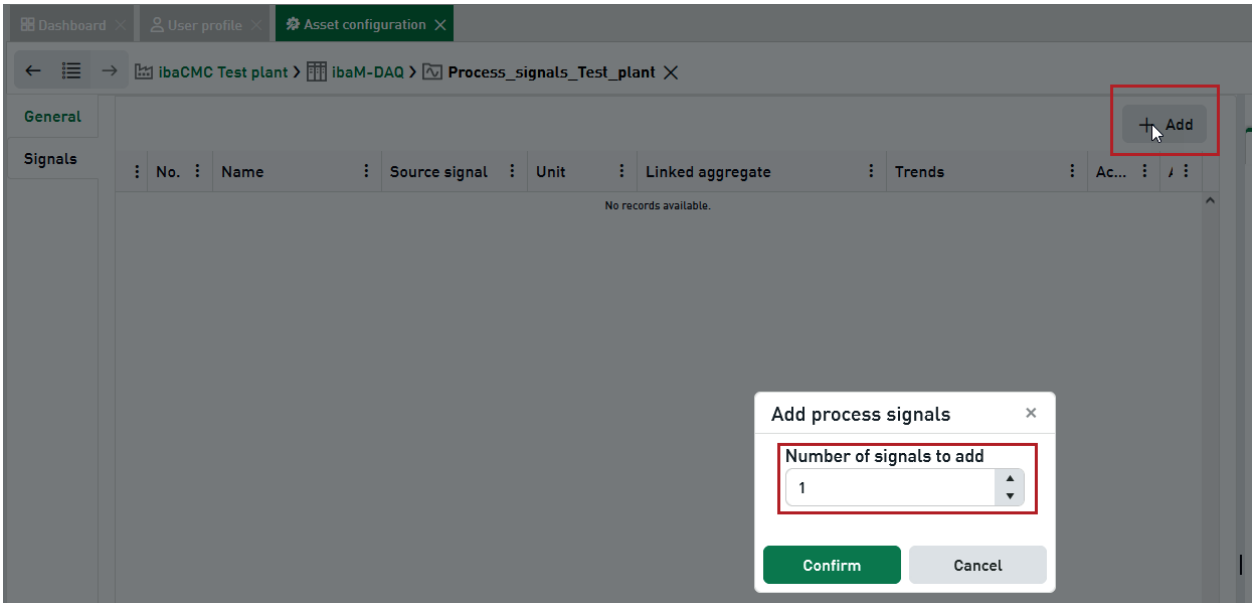
After the module has been created, it opens for further configuration in the asset configuration.

General tab
On this tab you'll find the common information like ID, order name and comment. Furthermore, you can enable and disable the module here.

Signals tab
On this tab you configure the process signals, which is described in the following chapter.

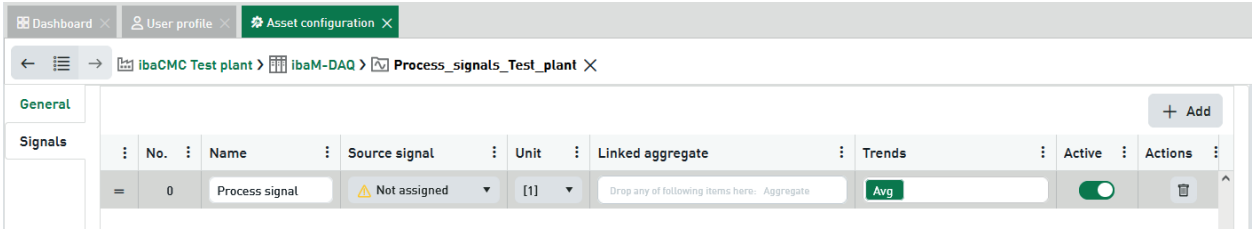
8.6.2 Add process signals to a module

Go to the *Signals* tab and click on the <+ Add> button.



Then enter the required number of process signals and confirm.

The new process signals will be listed in a table. They are not configured yet and not assigned to a source signal.



Remove process signals
You can remove process signals at any time by clicking on the trash bin button at the end of the row.

Enable process signals
You can enable or disable any process signal individually by using the switch in the *Active* column.

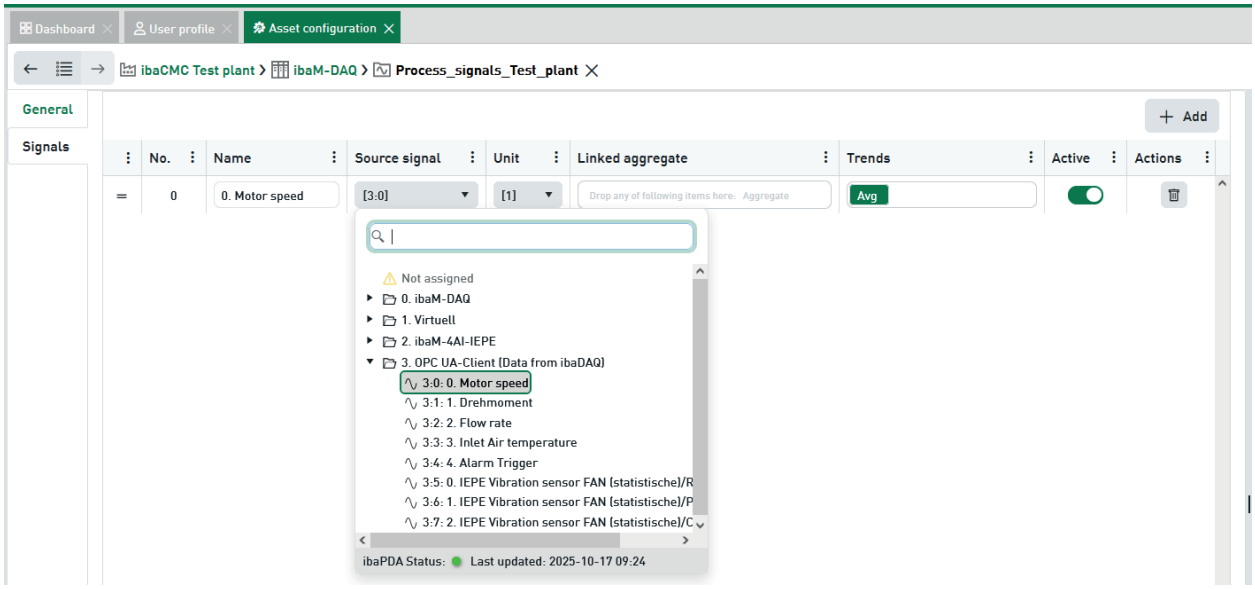
8.6.3 Configure process signals

After the process signals have been created, they still need to be configured.

The essential bit is the assignment of source signals from *ibaPDA* to each process signal.

Click in the *Source signal* column.

A selection window opens, where all configured *ibaPDA* signals are listed. They are listed in the same manner like in the I/O Manger signal tree of *ibaPDA*.



Note

For being able to show a list of source signals, *ibaCMC* must establish a connection to *ibaPDA*. When connecting the first time, the source signal list will be transmitted from *ibaPDA* to *ibaCMC* and stored there in the database. If the connection to *ibaPDA* is interrupted, the last saved version of the list will be shown. If there is an active connection to *ibaPDA*, then each change of the *ibaPDA* configuration will be adopted by *ibaCMC*.

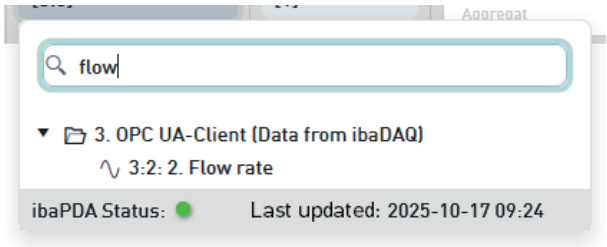
The lower end of the source signal window indicates the *ibaPDA* status and the date of the last synchronization.

Select the desired source signal.

The name of the source signal will be used as name of the process signal, unless you have already entered a name for the process signal. You can change it at any time. If you have already entered or edited the process signal name, it won't be overwritten by the source signal name anymore.

The search bar on top of the signal tree helps to find certain signals. Just enter the signal name or a part of it and the list will only show signals with names containing the search string.

Example: Searching for the signal *Flow rate*

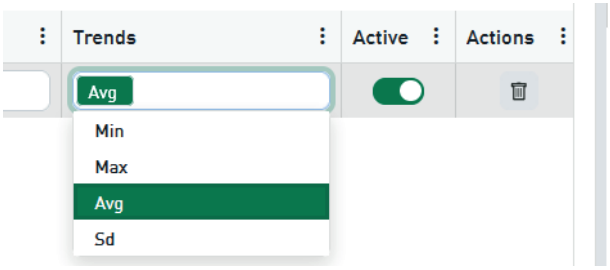


If the I/O configuration, i.e. the signal tree changes on *ibaPDA* side, the source signal tree in *ibaCMC* will change accordingly. You just have to open the process signal module in the asset configuration again.

If needed, you can select a physical unit.

If you want a process signal to be placed under an aggregate in the plant tree, then drag the desired aggregate from the plant tree into the *Linked aggregate* column.

The average trend is pre-configured by default for each process signal. However, you can add more trends, such as minimum, maximum and standard deviation in the trend column.



8.7 Network

The network settings for the CMU can be set here. If you are using an ibaCMU-S, *ibaCMC* requires an FTP connection to the CMU to be able to upload the configuration text files and download the calculation results, including raw data. No FTP-connection is required with *ibaDAQ*.

Note

Meanwhile, *ibaCMU-S* is part of iba's legacy products and does not fulfill all security requirements of modern communication.

ibaCMU-S is using an unencrypted FTP connection to communicate with *ibaCMC*. This is a potential security risk which you should consider.

For an encrypted communication please use CMUs like *ibaDAQ* or *ibaM-DAQ*.

FTP connection settings (not available for ibaDAQ)

Data connection (online/offline)
In general:

If the data connection is *online*, the configuration will be uploaded to the device. If the connection is *offline*, the configuration can be created but not uploaded to the device. However, you can download the configuration as a ZIP file.

To ibaCMU-S applies:

By switching to *online* the folder `Hard Disk2\cmd` on the CMU is scanned for file `CMUInfo.xml`. Switching to online is possible if the file exists and if the device is accessible via FTP. If any precondition is not fulfilled, an error message pops up and the switch will be set to *offline* automatically. In *offline* state no trend or raw data will be retrieved from the device and no diagnostics will be performed on the device.

Host address
The network IP address of the CMU. This setting must match the local CMU settings. Depending on the CMU type, the setting method differs:

- For an *ibaCMU-S* CMU type enter the IP address here, in order to establish a connection to the device.
- For an *ibaDAQ* CMU type the IP address is filled in automatically after *ibaPDA* has established a connection to *ibaCMC*. It is not possible to change the IP address here. This must be done on the *ibaDAQ* device.

In case of questions concerning the IP address, consult the CMU administrator manual or your network administrator for more information.

FTP port
This value is the default FTP port number 21 and **must not** be changed. With a different port number, an FTP connection to the CMU is not possible.

FTP user
The FTP user depends on the CMU hardware type. This value is set automatically by the system. The values **may not be changed**.

FTP password
The FTP password depends on the CMU hardware type. This value is set automatically by the system. The values **may not** be changed.

FTP path
The FTP path depends on the CMU hardware type. This value is set automatically by the system. The values **may not** be changed.

More network settings (for all CMUs)

TCP/IP telegram
For each CMU, 2 send and 2 receive telegrams can be created. The <+> icon can be used to create a new telegram. Follow the instructions in the wizard.

To edit an existing telegram, double-click on the icon after the telegram name.

Further details can be found in chapters ↗ *TCPIP telegram, page 84* and ↗ *TCPIP channel, page 85*.

8.7.1 TCPIP telegram

The TCP/IP interface allows the CMU to communicate with external systems (e.g. the plant automation environment). Data can be sent or received using this interface. For example, this enables calculated values from the system to be used in an *ibaPDA* process data recording for process diagnostics purposes.

On a new CMU, the telegram slots in the detail view are empty and first have to be created by the user.

The CMU is capable of receiving two telegrams and sending two telegrams. To create a new telegram, see ↗ *Network, page 82*.

Note



With TCP/IP telegrams, it is important that both communication partners have identical parameterization in terms of the number of channels and the associated number of bytes. Otherwise, the received data cannot be correctly interpreted and you will obtain implausible values.

8.7.1.1 General

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

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

Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

Comment
The Comment field is used to enter comments about an asset. The input field can be enlarged by dragging (bottom right).

Comment on the name: Enter a name for the telegram, e.g. ‘Test telegram’

Enable
You can use this switch to enable (green) and disable (red) the telegram.

Communication mode
Here you can specify whether you want to create a receive or a send telegram. A maximum of 2 receive and 2 send telegrams are permitted. For an output, “Send” should be set here.

Connection mode
Here you can set whether the CMU will actively set up the connection or wait as a passive subscriber until the communication partner sets up the connection. In the case of a send telegram, the *Passive* setting is recommended.

Byte order
You can choose between *Big endian* and *Little endian*.

IP address
Enter the IP address for the communication partner. Note that this IP address must be located in the same subnet as the IP address of the CMU. The IP address only has to be specified for active connection setup.

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

Cycle time
The cycle time is fixed at 20 ms and cannot be changed.

Update mode (Send telegram only)
You can choose between *After snapshot* and *Cyclic.*

After snapshot means that the values in a send telegram are updated after a snapshot was taken.

Cyclic instead means, that statistical values like RMS, Peak-to-Peak, Crest factor and vRMS 3-1000 are updated cyclically, based on the transmission cycle time of the telegram.

Constraints:

- *Cyclic* cannot be applied to component based trends. These can only be updated after a snapshot.
- ibaCMU-S supports *Cyclic* only.
- ibaDAQ and ibaM-DAQ support both modes.

Aggregate group
The telegram can be linked here using drag & drop. To remove the link, click on the Delete button.

8.7.2 TCPIP channel

TCP/IP channels can be used to import data from the automation environment. TCP/IP channels are added exclusively on the *Network* tab in the plant configuration for the CMU.

To add a new TCP/IP channel, click on the plus symbol for the free slot and adjust the required settings in the new window that opens. Finally, confirm the settings.

8.7.2.1 General

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

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

Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

Comment
The Comment field is used to enter comments about an asset. The input field can be enlarged by dragging (bottom right).

Data type
List of data types (e.g. REAL). It is important to compare this arrangement for the sender and receiver and to make sure that they are the same.

Unit
The physical unit for the TCP/IP channel.

Aggregate
This field shows the aggregate association of the TCP/IP channel. The value is automatically adopted when the channel is dragged to an aggregate in the plant tree. However, you can drag a different aggregate into this field to assign the TCP/IP channel to that aggregate.

Channel manipulation (manipulation of telegram values x)
The CMU is able to manipulate data received via TCP/IP after receipt. A possible example would be a motor, which changes its rotational direction during operation, resulting in negative speed values being sent via TCP/IP. If you are only interested in the absolute speed value, channel manipulation is very useful. Some manipulation rules require entry of a parameter.

The following manipulation rules are supported for receipt telegrams:

Rule	Description
Abs	Calculates the absolute value of the received value. The Abs function can be used in two different ways. If an additional manipulation parameter “p” is not specified, or the specified manipulation parameter is equal to “0”, the absolute value of the received TCP/IP channel is calculated in the normal way. If a manipulation parameter greater than “0” is specified, the value of the received TCP/IP channel is first multiplied by this parameter and the absolute value is then calculated.
Add	Adds the value specified as the manipulation parameter to the received value.
Div	Divides the received value by the value specified as the manipulation parameter.
Mul	Multiplies the received value by the value specified as the manipulation parameter.
Sub	Subtracts the value specified as the manipulation parameter from the received value.

Manipulation parameters
A suitable parameter for the above manipulation rule can be entered here. The rule *Abs* (absolute value) naturally requires no parameter.

TCP/IP telegram
This field shows the TCP/IP telegram to which this TCP/IP channel is linked. Information on configuration of the link can be found at

8.7.2.2 Linking to a TCP/IP telegram

A TCP/IP channel must be linked to a TCP/IP telegram. The TCP/IP telegram is shown in the plant tree as an item below a CMU.

Configuration information
Two different methods exist for adding TCP/IP channels to a telegram.

Adding channels to a telegram (method 1)
The first way of adding data to a TCP/IP telegram is to configure it manually in the TCP/IP settings. A new channel can be added using the <+ Channel> button in the toolbar. In the configuration window that opens, one or more new channels can then be added. It is also possible to select channels from the list of unlinked channels (if any exist) and add them.

Note



With TCP/IP telegrams, it is important that both communication partners have identical parameterization in terms of the number of channels and the associated number of bytes. Otherwise, the received data cannot be correctly interpreted and you will obtain implausible values.

Adding channels to a telegram (method 2)
The second method of adding a TCP/IP channel starts with the plant configuration, where a TCP/IP channel can be added to an aggregate from the library. The selected TCP item is simply dragged to the aggregate. A TCP/IP channel must be linked to a TCP/IP telegram. The TCP/IP telegram is shown in the plant tree as an item below a CMU.

8.8 Location

This setting is primarily useful for geographically distributed plants, for example monitoring of wind parks. A map function is not available.

Location
Position description or location of CMU

Latitude
Latitude north or south in degrees

Longitude
Longitude east or west in degrees

8.9 Configuration

The functionality of this area is designed to transfer the configurations (plant configuration, CMU configuration) created in *ibaCMC* to the CMU. This can be done using the *Configuration* tab.

Note:

When transferring the configuration, it is essential to ensure that the CMU is switched on and there is a network connection.

The *Export config* drop-down menu in the toolbar can be used to select which configuration is to be transferred to the CMU.

Hardware
This button is used to transfer only the hardware configuration to the CMU. An automatic CMU restart is then triggered so that the new configuration will take effect.

This option is only available for *ibaCMU-S*.

Snapshot
This button is used to transfer only the snapshot configuration to the CMU. The CMU is not re-started.

This option is only available for *ibaCMU-S*.

Entire configuration
Both the hardware and the analysis configuration (excluding orbit) are transferred to the CMU. An automatic CMU restart is then triggered so that the new hardware configuration will take effect.

After the successful export, the exported files are displayed in a list with a time stamp. Depending on the number of files transferred, it can take a while to refresh this list.

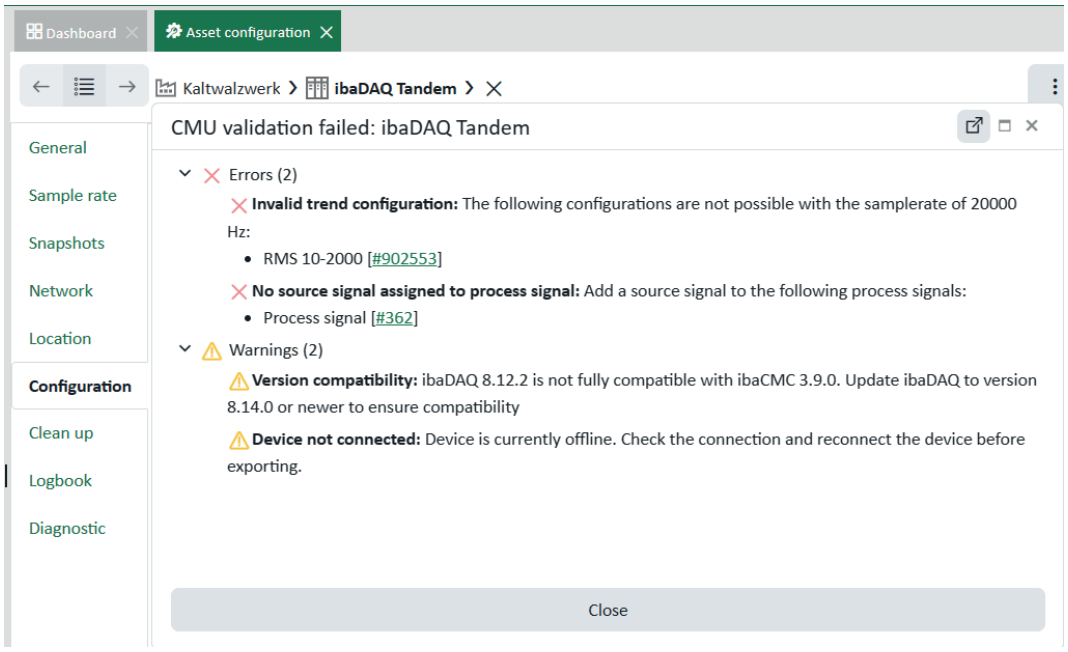
The exported configuration text files are also stored in the *ibaCMC* archive and can be downloaded using the file archive download function, see also chapter ↗ *Archive, page 179*.

Validation of the configuration before export

Before a configuration is exported, the system performs a validation check. The result of the validation is displayed in a window. The system distinguishes between warnings and errors, each with different options for action.

No warnings or errors	The export starts after the validation.
If there are warnings, the warnings are shown in a dialog.	As long as there are no errors, you can start the export and upload with the <Export anyway> button.
If there are errors, the errors are shown in the dialog. Next to each error there is a link leading to the plant tree element which is affected.	Errors must be fixed before you can resume the export.

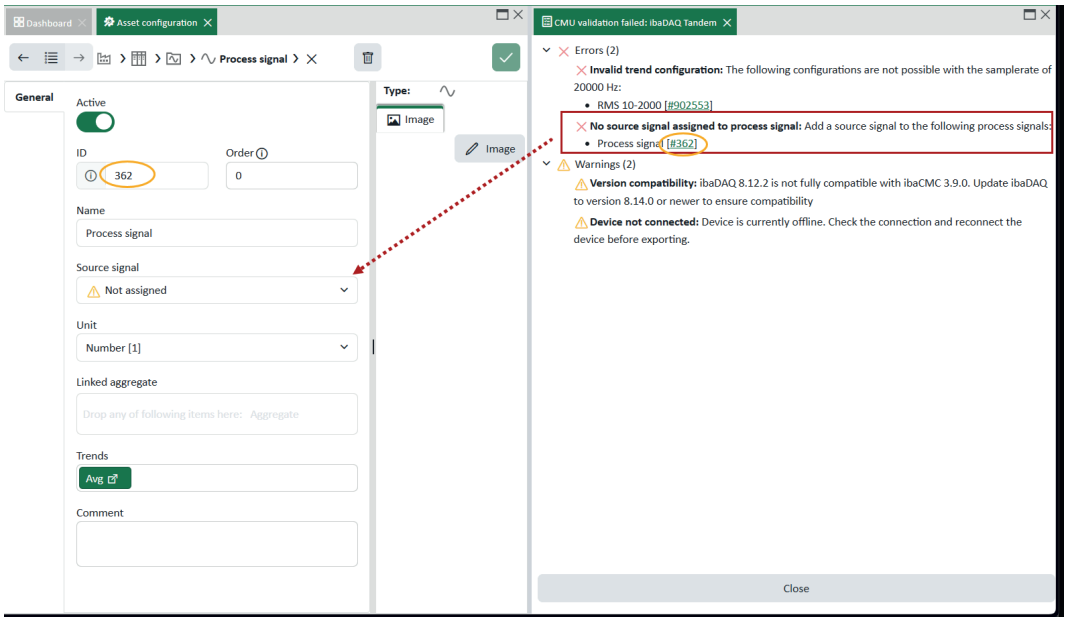
The following figure shows, for example, a case where warnings and erros occured.



To avoid having to constantly switch between the list of results in the validation dialog and the asset configuration while resolving errors, you can open the validation dialog in a separate tab and position it next to the asset configuration window. Just click on the "Open as ibaCMC tab" button in the caption of the validation dialog.

This way, you can address one error after the other. Clicking on a link loads the corresponding plant tree element into the asset configuration.

The following figure shows, for example, the validation results next to the asset configuration on th right side.



Possible warnings

Message	Action
Version compatibility	Update the software of the device at least to the specified version or newer.
Device not connected	Check if the device is accessible from the server.

Possible errors

Message	Action
Invalid trend configuration	Open the trend in the asset configuration and select the *Calculations* tab. Click on the <Edit> button under Parameter. Make sure that the following rules are fulfilled. Nyquist frequency ibaCMU-S: Sample frequency / 2 ibaPDA: Sample frequency / 2,56 Lower frequency limit < Nyquist frequency Upper frequency limit < Nyquist frequency Lower frequency limit < Upper frequency limit
No source signal assigned to process signal	Assign a source signal to the process signal.
Speed signals not included in snapshot recordings	Take the speed signal from the error list and add it to the corresponding snapshot.
Missing speed signal assignment	Assign a speed signal to the component group.

8.10 Logbook

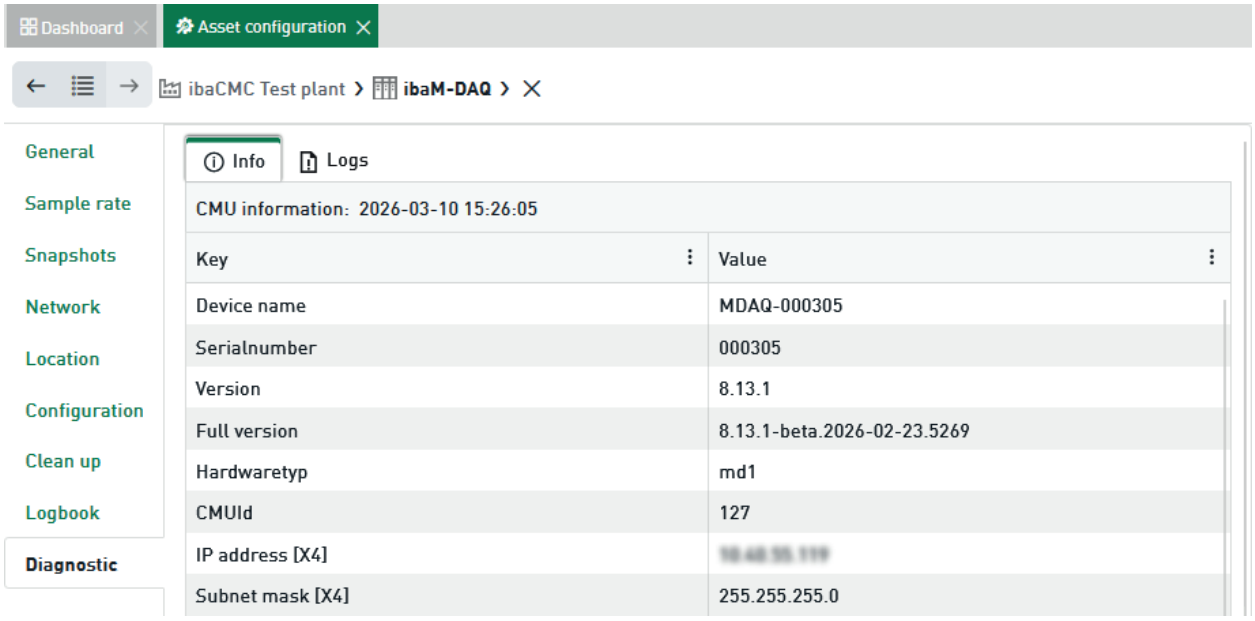
The *Logbook* tab in the CMU configuration dialog contains all CMU-specific logbook entries.

By means of the filter row, you can filter the entries by level, date and/or text.

8.11 Diagnostic

The *Diagnostic* tab displays important status information for the CMU and log messages.

Info tab



The table contents depend on the CMU type and may be different.

The table below shows the status items of an *ibaCMU-S* as an example.

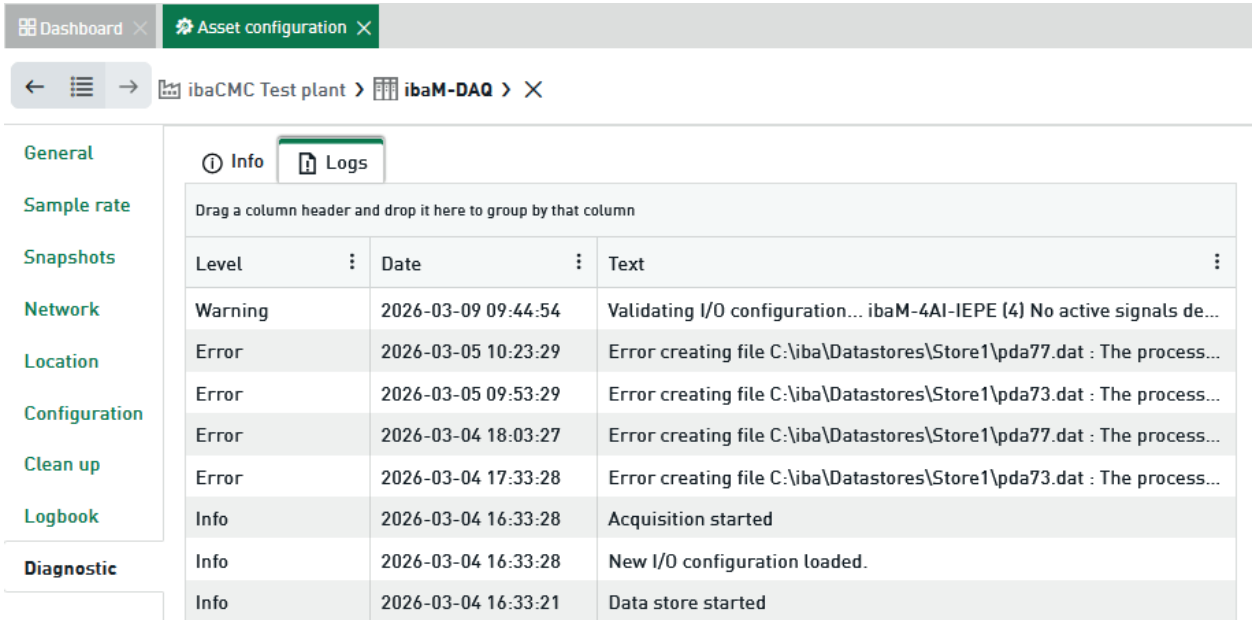
Key	Value (example)
Device name	The name of the device, e.g. CMU-S-00062
SerialNumber	The serial number can be found on the device type label.
CMUId	The CMUId is assigned by the database for each individual CMU.
License Sensors Interface	Specifies whether the sensor license is valid (valid/invalid).
Version	CMU version
Firmware version	CMU firmware version
Last calculation	Time of the last calculation
Product name	Name of the product
Hardware type	Short form of the hardware type, e.g. ic1
Assembly date	Device production date
Last application update	Software release date
Log level	The log level is set in the CMU hardware configuration and is important for displaying events. Possible log levels: 1 ... Error 2 ... Warning 3 ... Info 4 ... Debug
Sensor defects	A list of the buffer indexes (BIs) containing a sensor defect is displayed here.
Hard disk directory	Path for the device file archive

Key	Value (example)
Total disk space	Total space on the disk in MB
Free disk space	Free memory on the disk in MB
Sampling rate	The sampling rate
IP address	IP address of the CMU
Subnet mask	255.255.255.0
Default gateway	Default gateway for the CMU
Module name 1st slot, 2nd slot, ...	Name of the module in the relevant slot
Fiber optic	Fiber optic connection status
S1, S2 button	Position of relevant rotary switch
Configuration	valid - Configuration is OK not valid - Error in the configuration
SW configuration and plugged HW	Shows whether the software configuration and the connected hardware are compatible
conf.hardware creation time	Creation time of the hardware configuration text file conf. hardware
ibaCMC version in conf.hardware	ibaCMC version in the hardware configuration text file
conf.measuringcondition.xml creation time	Creation time of the measuring condition configuration file
ibaCMC version in conf.measuringcondition.xml	ibaCMC version in the measuring condition configuration file
Telegram 1, Telegram 2	Connection status of the telegrams (connected/not connected/disabled)
License DAT file	Shows whether the license for writing DAT files is valid.
License DAT file no. channels	Shows the number of valid channels for this license.
License RTS	Shows whether the license for the RTS (runtime system) is valid.
Development version	Version of the development environment
RTS version	Version of the RTS
License application	Shows whether the license for the application is valid
License no. IEPE channels	Number of licensed IEPE channels
License no. AI channels	Number of licensed analog inputs
License no. DO channels	Number of licensed digital outputs
License ibaNet750	Shows whether the license for ibaNet750 is valid
License virt. channels	Shows whether the license for virtual channels is valid

Logs tab

All logs or messages generated by the CMU are displayed here. These logs can support you in troubleshooting.

By means of the filter row, you can filter the entries by level, date and/or text.



8.12 Clean up

The settings for file management on the hard disk can be found on the *Clean up* tab.

Clean ups are intended to make the best possible use of the available disk space and to automatically ensure that sufficient space is always available for the most recent data. This clean up task is performed daily.

There is a preset clean up for the respective data types. These entries cannot be deleted and apply to all measurement conditions for which no specific clean up settings have been made. Therefore, no measurement condition can be selected in these preset clean ups.

Various settings can be made for cleaning up the file archive in the “Clean up task” table.

The *Time range start* and *Time range end* columns define the time range for which the data is to be thinned out. The *Time span* parameter specifies the intervals that the files should cover after the clean up (data file/time span). Any number of time ranges can be defined here. The clean up uses these time ranges to thin out the data. The time ranges are considered relative to the server time, e.g. "15d" means current server time minus 15 days.

To enable specific scenarios to be easily excluded from the clean up, it is possible to define blocked time ranges. They are not cleaned up and all data is retained.

Parameter overview:

Parameter	Description
Active	Only clean ups that are enabled will be performed. This setting is useful if you need to temporarily disable clean ups.
Path	The path to the clean up target is specified here. This path must be specified relative to the configured plant archive, e.g. CMU-103-200006\DAT\fft
Hard disk monitoring	Checks the freely available storage capacity. If this reaches a critical level, the oldest data is deleted until the storage capacity is back within a normal range.
Clean ups	This table contains the settings for the time spans for the clean ups and the time ranges that are not to be cleaned up. The “blocked time ranges” can be configured as required and are not included in the clean up.

The option of setting “blocked time ranges” is not available for *ibaCMC* V1.8.x plants.

Details of the clean up function:
The server cleans up all CMUs in turn. Starting from the current server time and working backwards into the past, it goes through them in the specified increments (time spans) and always retains only the most recent file from the relevant time span. The creation time of the file, which the CMU flags with the relevant local time, is taken as the reference. To ensure that the set time span (file/time span) is always achieved, it is possible that the next file chronologically after a blocked time range will be retained, and the set time interval from this file to the next will be temporarily shortened. The reason for this is that all files during these increments that fall within a blocked time range are ignored. It is thus possible that the most recent file in the time increment is in the blocked time range. As a result, the most recent file from this set is the one that follows directly after that time range.

8.13 Connect a CMU (ibaDAQ) and load the configuration

Learn how to establish a connection between *ibaCMC* and *ibaDAQ* and how to load the configuration into the device.

Please note, that the computer you are working on to do this configuration should have a network connection to the *ibaDAQ* device and that the *ibaPDA* client app should be installed. Best way is to do the configuration on the *ibaCMC* computer.

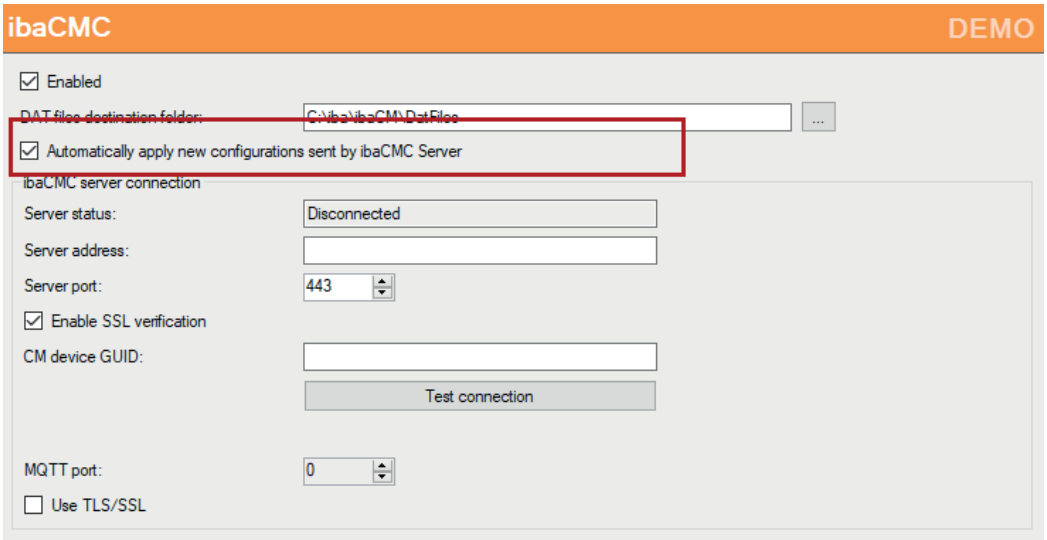
Establish the connection

1. Open the plant configuration in *ibaCMC* and drag the desired *ibaDAQ* CMU into the plant configuration window.
2. Select the *General* tab and click on the copy-icon at the end of the CM device GUID field. Thus, the GUID is copied to the clipboard.
3. Start *ibaPDA* client on the computer and connect to the *ibaPDA* server on the *ibaDAQ* device.
4. Open the I/O Manager and navigate to *General* - *ibaCMC*. Please note, that the *ibaCMC* node is only visible if the *ibaCMS-One-Sensor* license is enabled in *ibaPDA* on the device.
5. Enter the following data in the area *ibaCMC server connection:*
   - Server address (of the ibaCMC server) like `https://IP address or host name`
   - Server port (default 443)
   - CM device GUID (paste from clipboard)
6. Click on the <Test connection> button and *ibaPDA* will establish the connection to *ibaCMC*. If the connection has been established successfully you will get a corresponding message.

Load the configuration

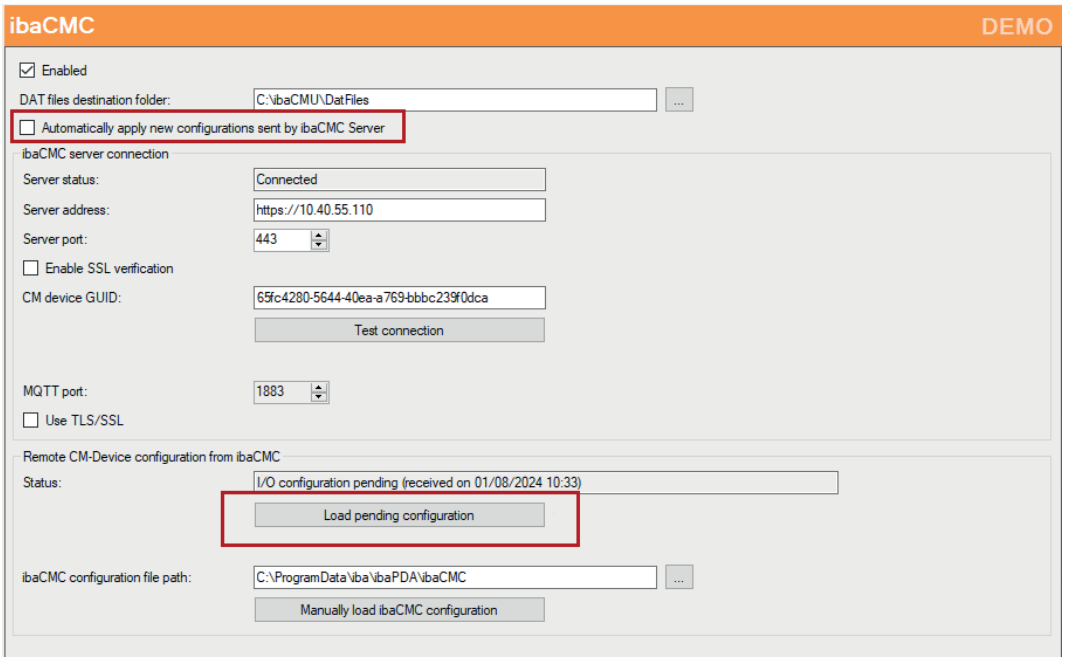
ibaPDA offers an automatic and a manual method to load a configuration, which was created by *ibaCMC*, into the device.

In the I/O Manger of *ibaPDA*, node *ibaCMC*, there is the option *Automatically apply new configurations sent by ibaCMC Server*.



If you enable this option, the pending configuration will be automatically applied in the device when the configuration is downloaded from *ibaCMC* to *ibaPDA*. No interaction is required in *ibaPDA*.

If you disable this option, the button <Load pending configuration> in the *Remote CM-Device configuration from ibaCMC* area below will become available, in case there is a configuration still pending. The configuration will only be loaded, if you press this button first, followed by <OK> or <Apply>.



Load the configuration manually

In case the *ibaCMC* system is not available, e. g. during maintenance or commissioning, you can load the configuration file manually. To do so, select the appropriate path in the field *ibaCMC configuration file path*, where the configuration file is stored and click <Manually load ibaCMC configuration>.

Description of the other settings

- Enabled: Enables the connection to *ibaCMC*
- DAT files destination folder: Intermediate storage for DAT snapshot files and indicator files
- Server status: *ibaPDA* is connected/not connected to *ibaCMC*
- Server address: Address of the *ibaCMC* server. Here, you can enter the host name or the IP address; entry form: `https://IP address or host name`
- Server port: *ibaCMC* server port
- Enable SSL verification: Enables the verification of the SSL certificate
- CM-Device GUID: CM-Device GUID of the device. You find this in *ibaCMC*, in the CMU configuration, *General* tab.
- MQTT port: Specifies the port used for MQTT; automatically set
- Use TLS/SSL: Specifies whether SSL is enabled; automatically set

Note



The port of the *ibaCMC* server and the MQTT port on the *ibaCMC* server must be allowed in the firewall!

9 CMU module

The CMU module is displayed below a CMU node in the plant tree. Allocation of sensors creates the link between the plant configuration and the CMU.

Next to the module, you can see whether it is a HSp (high speed, e.g. a vibration sensor) or an LSp module (low speed, e.g. a temperature sensor). HSp modules are always plugged into the backplane bus on the CMU as this is the only place that the high sampling rates up to 40 kHz per channel are possible. The LSp modules are set to ibaNet750 Analog and ibaNet750 Digital in the CMU templates, and these modules are not enabled by default. The ibaNet750 device is an external fieldbus system, which can be connected to the CMU using fiber optics and is compatible with the WAGO 750/753 I/O system. Further information about ibaNet750 can be found on the iba website (http://www.iba-ag.com/).

Note:

You can connect a maximum of 4 modules (in addition to the central unit) to a CMU of type *ibaCMU-S* or *ibaDAQ*.

You can connect up to 15 modules to a CMU of type *ibaM-DAQ*.

9.1 General

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

Slot index
This value indicates the position on the backplane bus. Slot index 0 would be the position of the CMU, slot index 1 the position of the first measuring module etc.

Name
The name of the asset (e.g. plant, aggregate group, aggregate, etc.) can be changed here.

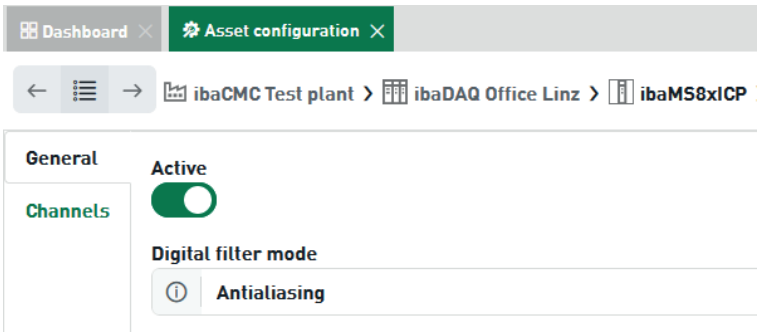
Active
You can use this setting to enable or disable the selected module.

Buffer type
The buffer type high speed (**HSp**) or low speed (**LSp**) is displayed here. This parameter cannot be changed.

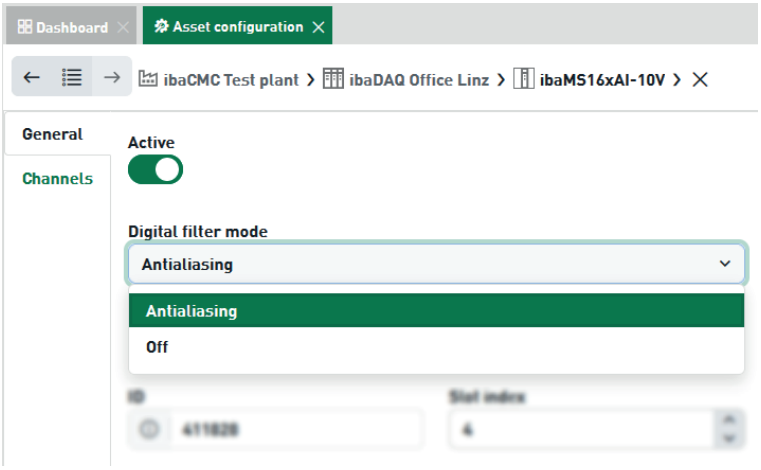
Digital filter mode/Antialiasing filter type
Some CMU modules with analog inputs or ICP inputs come with antialiasing filters.

For some older CMU modules, the antialiasing filters are build in without the option to modify or disable them. For others, the antialiasing filter can be switched off. For more recent modules, you can select different filter types, but you cannot switch off the filter or modify its values.

If the antialiasing filter or digital filter mode are fixed, this fact is indicated by a labeling as info field, e.g. like for the *ibaMS8xICP* module.



A drop-down list is available, in case the filter can be switched off or the filter type can be altered, like for the *ibaMS16xAI-10V* module.



The following table gives an overview:

Module	Antialiasing filter	Switch on/off	Selection	Filter values
ibaCMU-S, ibaDAQ				
ibaMS-8xICP	yes	no	no	33 %
ibaMS8xIEPE	yes (permanently built into the module, not configurable)	no	no	see manual
ibaMS16xAI-10V	yes	yes no (ibaCMU-S)	no	-
ibaMS16xAI-20mA	yes	yes no (ibaCMU-S)	no	-
ibaMS16xAI-24V	yes	yes no (ibaCMU-S)	no	-
ibaM-DAQ				
ibaM-4AI-IEPE	yes	no	Butterworth 2nd order or Eliptic/Cauer	-

9.2 Channels

The channel settings for the modules create the connection from the CMU to the plant configuration and the installed sensors.

ibaDAQ/ibaM-DAQ
You can set the debounce time for the digital inputs on the processor modules *ibaDAQ* and *ibaM-DAQ*. The default debounce time value is 5000 µs.

Input modules
Drag the relevant sensor from the plant tree to an empty channel to assign it.

> **Note:**
>
> For this functionality to be available, the sensor must be electrically connected to this channel.

The sensor name is then displayed in the list. The link can be removed by clicking on the Delete icon. The signal type in the channel list is defined by the module itself. Depending on the module, further parameters can be set. To edit the channel parameters, open the channel directly below the module in the plant tree. They can be adjusted under *Channel data*. For the ICP module, a change to the hardware gain can be made directly in the channel list.

The following information can be seen by expanding the row in the table:

Antialiasing Filter
The antialiasing filter is displayed in % (fixed setting at 33%). The value cannot be changed and is always specified as a percentage of the set sampling rate.

Gain
Logarithmic value for the channel gain in dB (e.g. a setting of 20 dB means a linear factor of 10). Of course, the module hardware must also support this parameter. Details can be found in the manual for the relevant module.

Resolution Max
Maximum value at the channel input combined with the resolution of the AD converter for the module (e.g. 32767 for 16 bit resolution). This value cannot be changed.

Resolution Min
Minimum value at the channel input combined with the resolution of the AD converter for the module (e.g. -32768 for 16 bit resolution). This value cannot be changed.

Output via DO Module
With a digital output module (DO), it is possible to output a virtual trend directly with “High” = Limit exceeded or “Low” = Limit not exceeded. To do this, select a module with digital outputs, e.g. *ibaMS32xDO-24V*. The selected trends are listed in the *Trends* column.

Note:

Entire items, for example a bearing or a sensor, can be dragged in from the plant tree using drag & drop to add their trends.

If multiple virtual trends are dragged in, the states are linked to the digital output using a logic OR, i.e. as soon as a limit is exceeded in one of the virtual trends, the digital output is switched.

9.3 Supported modules

The following table shows the supported modules and the associated central units.

Module	ibaCMU-S	ibaDAQ	ibaM-DAQ	Remark
ibaMS8xICP	x	x	x	Module with 8 inputs for ICP vibration sensors complying with the IEPE standard (trademark of PCB Group Inc.) Module discontinued; replacement: ibaMS8xIEPE
ibaMS8xIEPE	x	x	-	Module with 8 IEPE inputs for vibration sensors
ibaMS16xAI-10V	x	x	-	Module with 16 ±10V inputs
ibaMS16xAI-24V	x	x	-	Module with 16 ±24 V inputs, e.g. can be used for connection of displacement sensors operating on the eddy-current principle for orbit monitoring, or for distance sensors.
ibaMS16x-AI-20mA	x	x	-	Module with 16 ±20 mA inputs
ibaMS16xDI-24V	-	x	-	Module with 16 24 V digital inputs (HTL level)
ibaMS32xDO-24V	x	-	-	Module with 32 digital outputs with 24 V level
ibaM-4AI-IEPE	-	-	x	Module in the ibaMAQ System with 4 IEPE inputs for vibration sensors

10 Correlation settings

The correlation module provides valuable support in highlighting correlations between vibration values and process parameters in virtual trends. This is especially useful where the vibration characteristic values for the plant depend on a process parameter but there is no link to damage. As soon as a component is dragged to the relevant workspace in the correlation window, all trends available under this component are loaded.

Note:

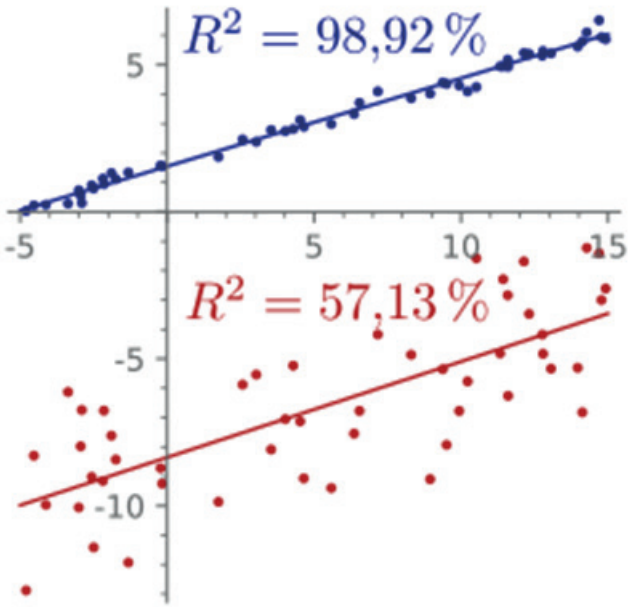
If a component from a high level, e.g. a plant or an aggregate group, is selected, the number of associated trends can be very high, which significantly increases the loading time. If the predefined number of trends is exceeded, loading is aborted. In this case, you can either increase the value or choose a component from a lower level, e.g. a component group.

Filter parameters

The entries are displayed, based on the filter parameters. The parameters are listed below.

From	The start date for the time range to be used for calculation of the new correlation settings. The default value is one month in the past.
To	The end date for the time range to be used for calculation of the new correlation settings. The default value is the current date.
Regression	This refers to the regression method. In the current version, only “Linear regression” can be selected.
Correlation signal	A sensor can be dragged to this field from the plant. The trends that can be correlated are then listed below it. Selectable correlation signals: ■ IEPE sensor ■ Digital RPS sensor ■ TCP channel
Max. number of trends	The maximum number of virtual trends that are simultaneously loaded. It may be necessary to increase this value if you have selected a larger plant unit, e.g. an aggregate.
Total number	Shows the number of virtual trends found for the selected plant component. Note: If a filter is set in one of the columns in the list, the number of rows displayed may be lower than the total number.
Force overwrite	Clicking on this button replaces the old values with the new ones.

Meaning of regression parameters for linear regression

P1	Slope of the regression line determined
P2	Maximum value of the correlation signal in the calculation period. The virtual trends are converted to this value.
R^2 (R2)	This parameter is referred to as the coefficient of determination and is between 0 and 1. Higher values indicate a higher linear relationship and show a higher “quality” of regression.  *Source: https://commons.wikimedia.org/* At values above 0.5 the regression can bring an improvement in the trend values (especially for trends calculated from the envelope curve such as roller bearing trends), while at values below 0.5 the correlation should not be used.

The *pP1*, *pP2*, and *pR^2* columns show the correlation values from earlier calculations, if they have been performed. If the calculated parameters are unsatisfactory, they can be edited manually. To do this, select the checkbox in the *Custom* column. Clicking on the <Submit all> button permanently saves the new values. The <Remove all> button excludes these values from the correlation calculation. This operation does not delete the trends themselves.

No matter how many virtual trends are loaded in the background, the <Submit visible items> button only applies the values that are actually visible in the list. All other limits remain unchanged.

The *Virtual trend type* tab shows all trend types for which the correlation is possible. The trend types that are checked are recommended for the correlation.

Side note: How does correlation work?

Let us assume that the trend calculation for a vibration sensor (e.g. an RMS value) depends to a great extent on the motor speed. In this case, the RMS level increases with an increasing motor speed and, conversely, the RMS value falls as the motor speed reduces.

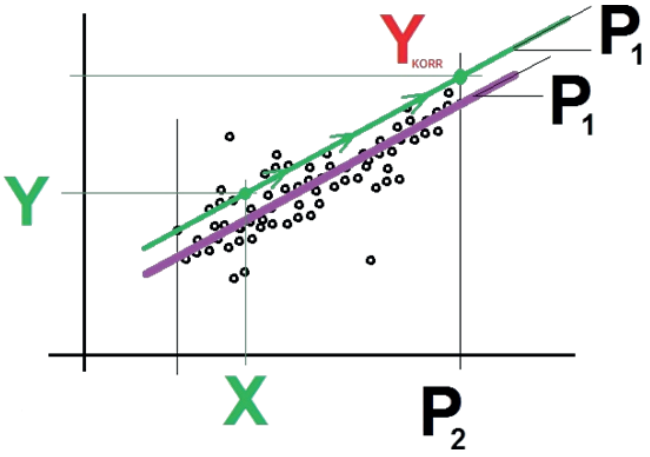
This situation means that a higher RMS level cannot automatically be attributed to a mechanical problem. To standardize the RMS value with the motor speed, we can use CMU correlation.

Linked to the above example, we can assume two signals:

- The motor speed (also known as the *independent* variable in the static term or the X value)
- The RMS value (also known as the *dependent* variable in the static term or the Y value)

Based on these two values, we can now calculate a line that best represents the data points.

This line is plotted in purple in the figure below. The calculation provides the parameter *P1*, which specifies the slope of the line, and the parameter *P2*, which corresponds to the highest measured motor speed in the data points, as well as the value *R2*, which indicates how well the line represents the data points.



For the correlation process, the CMU starts with a new calculation of the vibration signal and the motor speed. These new values are *X* and *Y*. The CMU then makes the following calculation:

$$Y_{KORR} = Y + P_1 (P_2 - X)$$

The calculation results in a shift in the originally calculated RMS value to a higher RMS value *YCORR* at a higher motor speed *P2*. In principle, this simulates measurement at a higher shaft speed.

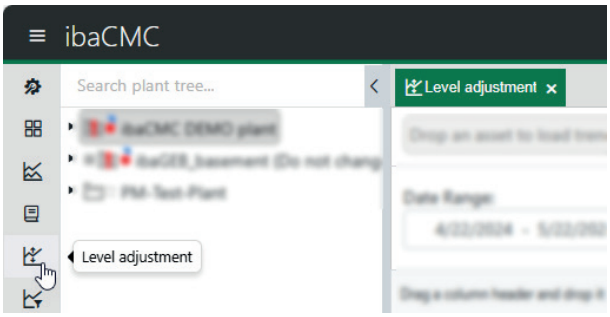
The correlation principle means that the RMS trend is slightly smoother (less variance) as it no longer depends so much on the motor speed.

11 Level adjustment

The “Level adjustment” tool is used to calculate limits based on the trend values. The suggested values can be adjusted by the user before saving. Limit adjustment is primarily useful if a large number of limits have to be adjusted, for example after system startup.

To obtain good suggested limits, it is crucial to set the correct period for the selected data.

To open limit adjustment, click on the corresponding icon in the menu bar:



Level adjustment tool

The limits are displayed, based on the filter parameters.

Period selection (date range)

- Start (From -): The start date for the time range to be used for calculation of the new limit settings. The default value is one month in the past.
- End (- To): The end date for the time range to be used for calculation of the new limit settings. The default value is the current date.
- Status classification: To calculate the **Warning**, **Alarm** and **Critical** classifications, the number of upper or lower limit violations in the From-To period is used.

The number of limit violations is shown in the *Qty.* column.

Classification	Description
Warning	The warning limit is used for calculation of the number of upper or lower limit violations.
Alarm	The alarm limit is used for calculation of the number of upper or lower limit violations.
Critical	The critical limit is used for calculation of the number of upper or lower limit violations.

Warning
The **Warning** classification is selected.

With a limit setting of 220.00, the trend displayed in the list, e.g. FFT inner race, reached the *Warning* status 20 times in the observation period (given by *From* and *To*). A value of 20 would then be displayed in the *Current limits -> Qty.* column.

Threshold type
The limit type **Upper limit** (value exceeds limit) and **Lower limit** (value falls below limit) is selected here.

The buttons next to the *Limit type* dropdown list are described below:

Buttons	Description
	Enables the filter for the selected limit type
	Enables automatic creation of limits if none exist. Click on <Calculate> and then <Submit visible items> to create the limits.

Note

The buttons are only displayed for migrated trends.

Factor
The factor is multiplied by each suggested limit as soon as you click on the <Calculate> button.

In addition to the factor, the virtual trend type is used to calculate the suggested limit.

Max. number of trends
The maximum number of virtual trends that are simultaneously loaded in the list.

Virtual trend type

The virtual trend type shows the set factors for the virtual trend types. Some virtual trend types are handled more sensitively than others.

Example - Crest factor
For crest factors, new limits are suggested such that the virtual trend would be at 50% of the new limit in the observation period, compared to only 15% for virtual trends calculated from the envelope curve spectrum for roller bearing cages.

Operation

The plant tree component for adjustment can be dragged to the limit adjustment tool using drag & drop.

Tip



If an entry from a high level, e.g. a plant or an aggregate group, is selected, the number of associated trends can be very high, which significantly increases the loading time. Therefore, we recommend selecting smaller plant items, e.g. component groups.

If data has been loaded successfully, the values for the suggested new limits can be edited directly in the relevant fields.

Note



For migrated trends, in addition to the limits settings for the hysteresis and the notifications can also be made.

Calculation

If changes have been made to the filter parameters, the <Calculate> button can be used to update the list. The new suggested limits are not yet transferred to the database.

Save

The new limits are only adopted when you click on <Apply limits>. Only the values actually visible in the list are adopted. All other limits remain unchanged.

12 Icon legend

The icon legend provides an overview of the plant tree icons used and the status icons in the plant tree.

For documentation purposes, the icon is used as a placeholder for the plant tree icons. The corresponding icons for the plant items appear instead of these placeholder icons in the software interface.

Plant tree status
In the plant tree, different statuses are displayed for the relevant items.

Plant status

Icon	Meaning
	The status is undefined. This status is shown either if no data is available yet, if no limit value has been set for the trend, if the notification bell is disabled or if no status could be determined.
	No data received within the timeout period ("outdated after..."). This status can also occur in conjunction with normal status, alert, alarm, or acute alarm.
	Normal status. No limits exceeded or undershot.
	Alert status. Alert limit exceeded.
	Alarm status. Alarm limit exceeded.
	Acute alarm status. Acute alarm limit exceeded.
	Sensor defect status. Only displayed for IEPE or ICP sensors.

Data source status (CMU and microCMU)
The data source status displayed for data sources and CMUs is described below.

Icon	Meaning
	Connection status OK
	Connection status Not OK; connection to ibaCMC interrupted
	Connection status not defined; device is "inactive

CMU configuration status

Icon	Meaning
	The configuration on the CMU and the configuration in the *ibaCMC* match and there are no errors.
	The configuration on the CMU is not up to date and needs to be updated, the CMU configuration is being created and uploaded, or no CMU configuration has been created yet.
	The CMU is reporting an error in the configuration.
	The CMU is inactive.

Other statuses

Icon	Meaning
	A linked dashboard is available. This can be opened by drag & drop on the dashboard component.
	Indicates that a log book entry with the component status *Info* has been assigned for this plant tree item. Activation/selection via context menu in plant tree.
	Indicates that a log book entry with the component status *Alert* has been assigned for this plant tree item. Activation/selection via context menu in plant tree.
	Indicates that a log book entry with the component status *Alarm* has been assigned for this plant tree item. Activation/selection via context menu in plant tree.

Plant tree items

Icon	Meaning
	Plant (displayed for non-migrated plants)
	Plant, migrated to V3.x
	Aggregate group
	Aggregate
	Component group

Icon	Meaning
	Component folder
	CMU, status “Offline”
	CMU
	CMU module
	CMU module channel
	Data source/CM devices
	Data source group
	MicroCMU
	Fan blade
	Coupling
	Bearing
	Orbit
	Pump impeller
	Belt
	Pulley
	Rotor
	Stator
	Rotor blade
	Analog sensor
	Digital sensor

Icon	Meaning
	Vibration sensor/IEPE sensor
	TCP/IP channel
	TCP/IP telegram
	Trend with trend filter
	Trend
	Virtual status trend
	Roller
	Shaft
	Gearbox

13 Dashboard

The dashboard can display freely configurable tiles, which contain various process data for the system. It is used as an initial starting point for subsequent detailed analyses.

Function overview

- Create user-specific dashboards
- Copy, delete, and edit existing dashboards
- Import/export function for existing dashboards
- Link dashboards with plant tree items
- Full screen mode
- Time range filter for all tiles in the dashboard

Tiles

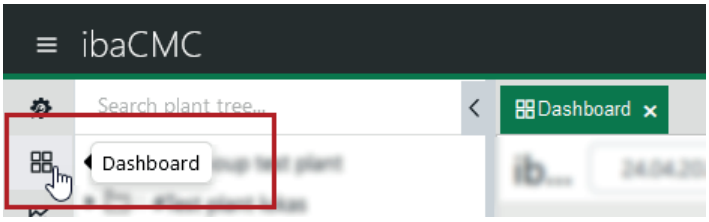
The following tile types are available:

- Line chart
- System status

13.1 Dashboard operation

In order to be able to use the dashboard, it has to first be opened using the menu. When the user logs in, the dashboard is opened by default.

Click on the icon or the menu command for the dashboard:

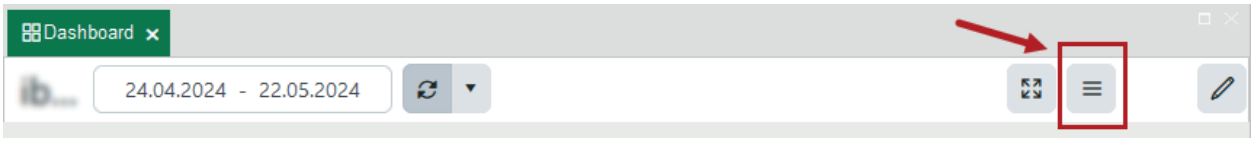


Dashboard toolbar

Icon	Description
Text1 > Text2 > ...	Name of the dashboard. The name is specified when creating the dashboard. For greater clarity, enter a unique and descriptive name based on the plant tree, e.g. Aggregate group > Aggregate.
11/24/2023 - 5/22/2024	Current start and end time for the values to display on the tiles. The time range is set when creating the dashboard and applies to all tiles in the dashboard. The field provides a date selection function. Open the date selection by clicking on the field and select a different date or a different period.

Icon	Description
	Refresh interval; here you can select whether or not the display is to be refreshed automatically. The refresh intervals 5 s, 30 s, 1 min, 5 min, and 10 min are available. The time range is set when creating the dashboard but the refresh time is not.
	Switch to full screen mode Full screen mode active; click to exit full screen mode
	Open dashboard management
	Edit current dashboard

Create user-specific dashboards
Open dashboard management using the button in the toolbar in the dashboard window.



All dashboards created are listed here.

The 3 dots button to the right of each dashboard gives you the options for copying, editing, or deleting the dashboard.

You can use the <+ Add> button to create a new dashboard.

In the resulting dialog box, enter a name for the dashboard and select a period from which you subsequently want the values to be displayed on the tiles.

You also have to link the new dashboard to a plant tree item. To do this, drag the relevant plant tree item into the corresponding field using drag & drop.

Then click on <Apply> to complete creation of the dashboard.

Switch to dashboard editing mode (button with pen symbol) to add widgets and make further settings.

Adding tiles
If you click on the <+ Tile> button in the toolbar, a dialog box opens containing the settings for the tile to be created. It is important to select the type here. The settings such as name or unit can be adjusted later.

For a description of the tiles, see chapter ↗ *Tiles, page 114*.

Specifying the time range
A basic time range is already defined when creating the dashboard. However, you can adjust the period at any time using the date selection function in the time range field, either spontaneously in view mode or in the dashboard settings.

Deleting tiles from the dashboard
You can delete all or individual tiles. In editing mode you can use the <Delete all> button to remove all tiles from the dashboard.

To remove individual tiles, click on the 3 dots to the right of the tile and then select <Delete>.

Changing the settings
You can use the <Settings> button to open the dialog box containing the dashboard settings. Here, you can change the name of the dashboard, the default time range or interval, and the linked plant tree item.

In order to change the default time range, enter the time range by using these short forms:

- 1d = 1 day
- 1w = 1 week
- 1M = 1 month

You can even combine those entries, e.g. "3M 2w 6d" for 3 months + 2 weeks + 6 days.

Note

Linked dashboards are indicated by a small dashboard symbol in the plant tree. To open the linked dashboard, simply drag the plant tree item to a free area of the dashboard.

Alternatively, you can open a dashboard through the context menu (right click) on the plant tree item.

Importing/exporting dashboard layouts
You can select the <Options> button to use the export and import function. This enables to share dashboards with other users, based on JSON files.

After running an export, you receive a JSON file containing all settings for the current dashboard, the tiles it includes and their arrangement.

To import this kind of JSON file, first create a blank dashboard or select an existing one, switch to editing mode and then run the import. A new dashboard is then added, which is assigned all the properties from the JSON file.

13.2 Tiles

Line chart

The line chart shows trend data from the plant tree in the selected time range of the dashboard.

Operation

- Zoom: To zoom in, an area of the chart can be selected. Double clicking on the chart resets the zoom.
- Show/hide trends: Clicking on a trend name allows it to be shown in or hidden from the chart. Double clicking allows all other trends in the chart to be shown or hidden. This only happens if the selected trend was already shown, otherwise only it is shown.

- Change trend color: Clicking on the colored square next to the trend name opens a selection field in which a new color can be selected. If the new color is already assigned, the relevant trends change color.
- Open a trend analysis: Clicking on the trend analysis icon opens a new trend analysis for the trends included in the line chart. If a trend analysis is already open, it is extended to include the new trends. The trend colors are also transferred. If a color is already assigned, it is replaced with a new color.

System status screen

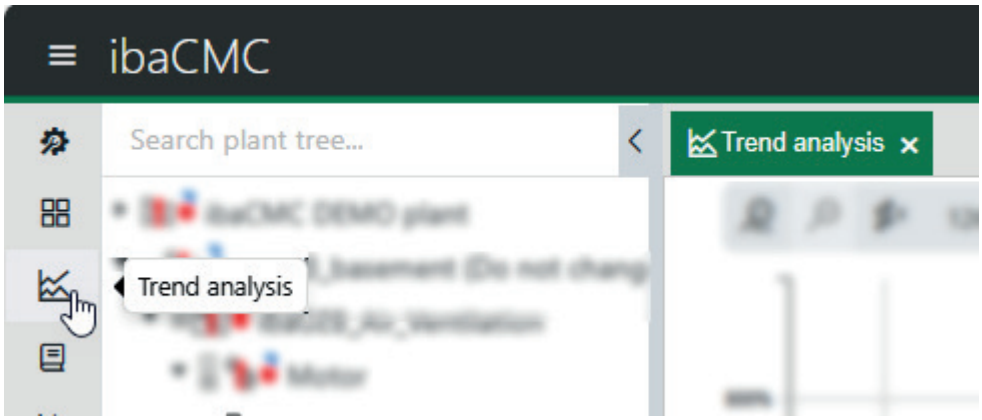
The system status screen shows an overview of the current state of the system. The following status information is displayed:

Type	Description
CMU connection status (number)	■ Info: Inactive, Offline ■ Warning: Not accessible for 3h (default: 3h) ■ Error: NOT accessible for 24h (default: 24h)
Sensors (number)	■ Error: Sensor defects
Connection status of data sources (number)	■ Info: NOT synchronized ■ Warning: NOT accessible for 3h (default: 3h) ■ Error: NOT accessible for 24h (default: 24h)
Proportion of measuring conditions (number of measuring conditions)	■ Warning: Proportion < 0.1% ■ Error: Proportion = 0%
Proportion of measuring conditions (number of measuring conditions)	■ Warning: NOT calculated for 1 day (default: 1 day) ■ Error: NOT calculated for 7 days (default: 7 days)

14 Trend analysis

In the trend analysis, the user can analyze different trends. Trends can be dragged from the plant tree (virtual trends and status trends) to the trend view using drag & drop, as well as plant tree items if trends are located directly below them, as is the case for sensors and components. The trend data for the time interval that has been set is displayed. The trend analysis provides both an absolute and a relative representation of trend data. For an explanation of the differences between the absolute and relative views, see ↗ *Absolute and relative view, page 116*. The relative view shows how significantly the trend data differs from the alarm limit. For further information about limit settings, see section ↗ *Limits, page 117*.

To open a trend analysis, click on the corresponding icon in the menu:



14.1 Absolute and relative view

From a user perspective, there are slight differences between the absolute and relative view. Both views contain limit curves plotted in the chart. They indicate the limits for the selected trend. In the absolute view, the limit curves can be moved, and the assigned limit can be changed and saved. In the relative view, they are fixed characteristic values. The alarm value is used as the basis and is always 100%. The other limits are plotted as a factor of the alarm value (warning 70%, acute alarm 150%).

Relative view
The relative view shows the trends as a percentage of the limit. The alarm limit is used as the limit. If the trend value is equal to the alarm limit, the display in the relative view is 100%.

If a trend has no limit value assigned, there will be no curve in the chart of the relative view. In this case, you have to switch to the absolute view or you should define a limit value for the trend.

Absolute view
In the absolute view, the raw values and the unit are displayed. Here, the user can move the limit curves. The limit curves are always the limits for the selected trend. The selected trend is indicated by a blue line. Moving the line changes the limit for the trend. Of course, this can also be done by manually entering the value. The fields can be seen when a trend is expanded.

In the absolute view you can configure multiple Y-axes. Hence, signals with different physical units or significant different value levels can be represented together in one trend chart.

14.2 Limits

Every trend has no, 3, or 6 limits. If a trend has limits, the *Warning*, *Alarm* and *Critical alarm* can be for exceeding (upper) or falling below (lower) the set limits. These limits are used for alarms. They can be viewed by expanding the trend in the legend.

When assigning the limits, the *Alarm* value (solid red line) is used as the base value (100%) and the other two values are set as follows, if the 3 limits are linked to fixed factors:

- The *Warning* value (solid orange line) corresponds to 70% of the alarm value.
- The *Critical alarm* value (dark red dotted line) corresponds to 250% of the alarm value.

After separating the linking of the 3 alarm values, they can be freely defined by entering each limit manually. Whether or not there is a dependency with a fixed factor can be seen by the symbol of two rings, one inside the other. If this symbol is crossed out, there can be a different factor.

There are two ways to change the limits in the trend analysis.

1. Manually entering the new value in the text field
2. Moving the line in the absolute view

A trend without measurement ranges can have no, 1 or 2 limit settings. Here, the type of limit can be changed by clicking on the arrow symbol. Limit settings are upper limit, which has to be exceeded (arrow upwards), and lower limit, which the value has to fall below (arrow downwards). The trash can icon can be used to delete limits and the + icon to add them. Trends with measurement ranges can have 0 to n x 2 limits, where n is the number of set measurement ranges.

14.3 Filtered trends

A trend can have multiple filter areas. Different limit settings can be assigned for each filter area.

If trend filters are defined in a trend, they are visualized in groups. When the trend is expanded, it therefore looks different than trends with no filter. Trends with filters have a separate section for each filter area. These sections can be shown or hidden and contain the data for the filtered trend. This means that there can be several trend lines with the same color. Selecting the *Combine signals* checkbox, which can be found by clicking on the button with three dots, enables the original trend line with no filters to be displayed.

14.4 Toolbar and features

The trend analysis provides a number of features for analyzing trend data.

Analysis mode
Analysis mode is automatically enabled when loading a trend. You can identify that analysis mode is enabled by the fact that the cursor automatically snaps onto the trend. If a data point from a trend is selected by right clicking, a dialog box for selecting the signal analysis opens for this time stamp. Analysis mode can be enabled for all trends or explicitly for one trend in the legend. Selecting a trend prevents an incorrect trend or sensor from being selected for the

subsequent signal analysis. In this mode, the data point from the selected trend closest to the mouse position is always selected for the subsequent signal analysis.

Right clicking on a data point opens a dialog box containing the following options:

- Create a log book entry
- Open the signal analysis window.

You can find more information about signal analysis in chapter ↗ *Signal analysis, page 131*.

Zoom
By default, the X-Y zoom is enabled. The <Zoom out all> button can be used to reset the zoom. The <Zoom out> button is used to zoom out gradually. If you hold the <Shift> key depressed while zooming with the mouse, the zoom works only in X-direction. Y-scale and Y-position will not change. The time range of the trend in total remains unchanged. The navigation pane below shows the position of the zoom frame.

If you press the <Ctrl> key whil zooming with the mouse, the time range of the trend will be adjusted to the x-range of the zoomed area. If you only want to zoom in x-direction, press also the <Shift> key when zooming.

The <Y Autoscale> button scales the data in the visible area on the Y-axis only, depending on the trend data.

Trend analysis controls:

	Zoom out all, only active in zoomed view
	Zoom out one step, only active in zoomed view
	Auto scaling in Y-axis
Rel	Show relative view
Abs	Show absolute view
	Refresh display
	Create screenshot of display
A	Show legend in chart
	Enable/disable data point tooltip
	Download dataset as CSV file
	Add tile to dashboard
	Show/hide all trends
	Expand/collapse all items in trend legend
	Remove all

R	Show/hide raw data of all trends in the trend analysis legend The state of the raw data mode is also saved when removing trends from the trend analysis legend. When you add a trend again, the information is still available.
	Drop-down menu for changing the aggregation setings for the trend view
	Opens a dropdown list with the option of combining the signals and display options in the legend: ■ Combine signals (only relevant for trends with trend filter) ■ Group by unit ■ Metadata (show signal id, text and value/unit in trend legend) ■ Path for plant item (path inside the plant) ■ Full path (path with plant name)
	Turn on editing mode
	Apply change
	Discard change, cancel

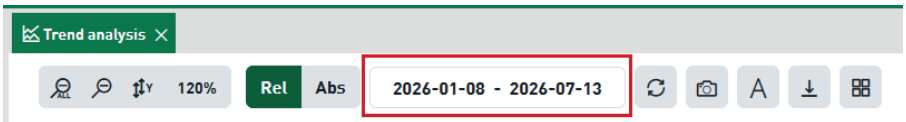
Show/hide trends
Clicking on the eye symbol allows the associated trend to be shown in or hidden from the chart. Double clicking allows all other trends in the chart to be shown or hidden. All trends are only shown if the selected trend was already shown, otherwise only that trend is shown.

Adding a tile with open trends to the dashboard
Clicking on the dashboard icon adds a tile for the trends open in the trend analysis to the currently open dashboard.

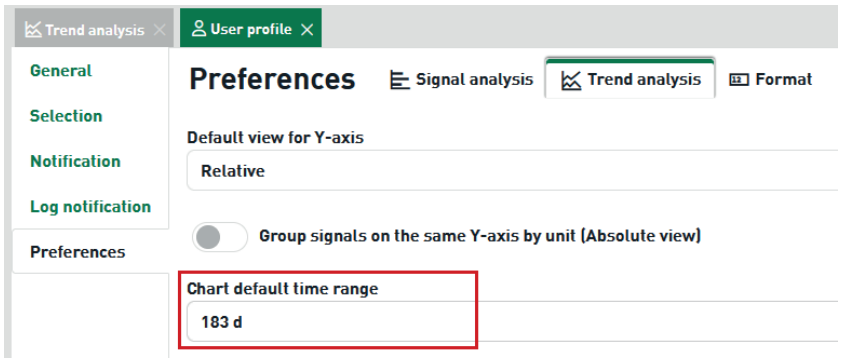
Creating a trend chart screenshot
Clicking on the camera icon creates a screenshot of the trend chart. The Copy icon copies the screenshot to the clipboard and it can then be pasted into the log book, for example.

14.5 Select a time range

When you open the trend analysis, the default time range is used as the basis for scaling the X-axis. The currently displayed time range is shown in the trend analysis toolbar.



This default time range is a user-specific setting that you can configure in your user profile, on the *Preferences* tab.



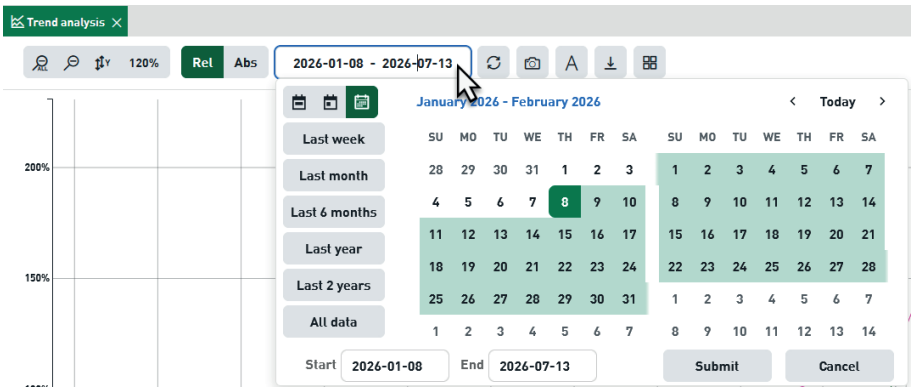
When you open the trend analysis, the start and end dates of the displayed time range are calculated based on the current date, going back in time:

Start Date = Current Date - Default Time Range

Adjust the time range

To change the time range for the trend analysis, click in the time range field.

An advanced dialog box opens for setting the time range.



By default, the dialog box opens in the monthly view, displaying two months. If you want to select longer time periods, you can use the icon buttons in the upper-left corner to switch to a yearly or decade view.

To select a specific time period, you have two options:

1. Selecting with the mouse:
   First, click the start date on the calendar, and then click the end date. The selected time range between these two days is highlighted in green.
2. Entering the Date:
   Enter the start date in the *Start* field and the end date in the *End* field. The color highlighting in the calendar will be updated accordingly.

However, you can also select one of the predefined time ranges. To do so, simply click the button you want. The available options are:

- Last week
- Last month
- Last 6 months

- Last year
- Last 2 years

The time periods always extend from the current date into the past.

The button <All data> is only available if at least one trend has been loaded. When you click on <All data>, the system searches for the oldest data point in the loaded trends and sets its date as the start date. The current date is entered as the end date.

After selecting the time period, click on <Apply>. The dialog box closes, and the time period is now plotted on the X-axis. For the preset time ranges and <All data>, a double-click is also sufficient to apply the time range and close the dialog box.

The newly selected time range remains valid as long as the trend analysis is open. If you close the *Trend analysis* tab and reopen it, the default time range (as specified in your user profile) will be restored.

If no data is available for a selected time range, an error message will be displayed.

Special considerations when making a selection by <All data>
If you add additional trends after selecting the time period for <All data>, the current time range remains unchanged, even if the new trends include older data. The time range is adjusted only after you click <All data> again.

With trend filters, the filter signal is used to determine the time range instead of the filtered trend. This means that if the filter signal has been recorded for longer than the trend of a sensor or component to which the filter is applied, then the start date for the trend analysis is the oldest data point in the filter signal, not the one in the trend.

14.6 Y-axes in trend analysis

When you open a trend analysis, there is always one Y-axis on the left side of the graph.

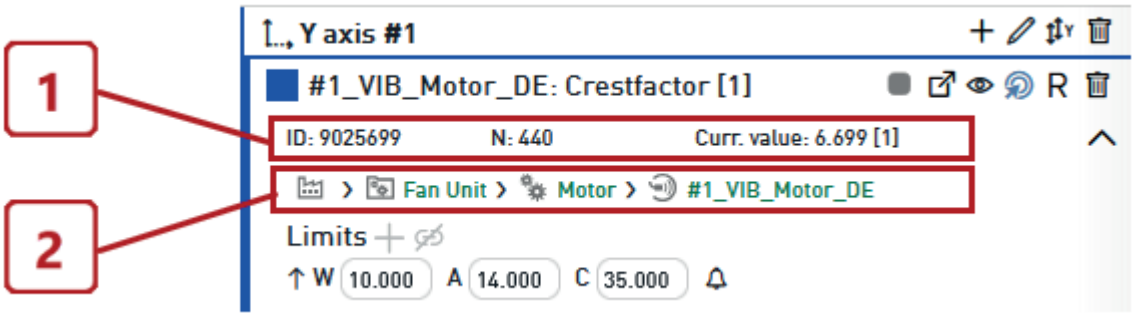
Basically, the trend analysis has two types of Y-axes:

- Y-axis in relative view, values given in percentage (%)
- Y-axis in absolute view, values given in signal units

All signals you drag & drop from the plant tree into the trend graph are listed in the trend legend on the right side below the first Y-axis.

Trend legend

The trend legend provides information and functions for each signal in the trend graph.



Beside the color code and the signal name there are still the limits, provided the limits are defined.

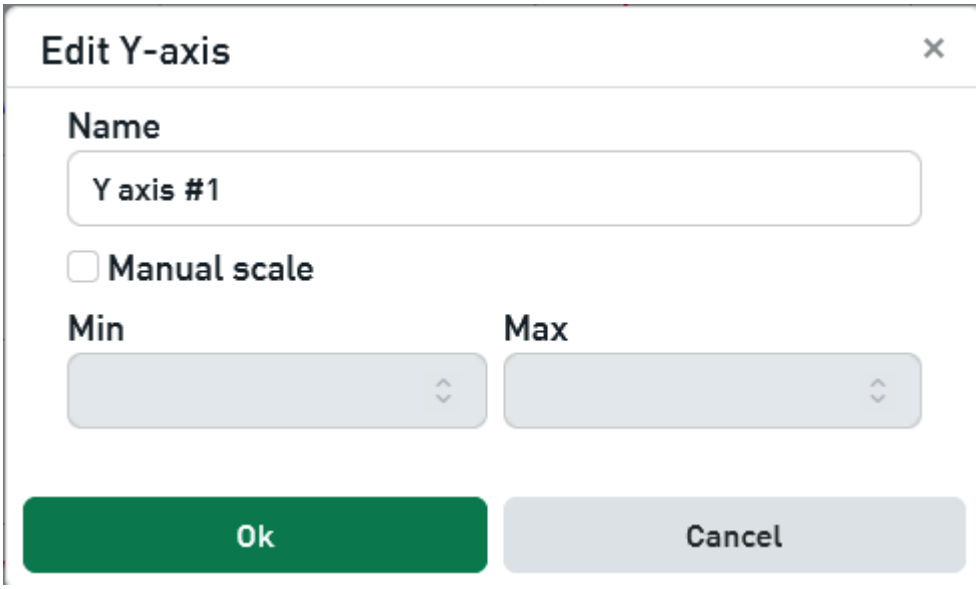
Optionally, if you open the three-dot menu in the toolbar of the trend view, you can show or hide metadata of the signal (1) and the plant path (2) of the corresponding component.

A little toolbar provides different functions referring to the signal. Check the tooltips to understand the functions.

Edit Y-axis

You can rename a Y-axis and configure a manual scale.

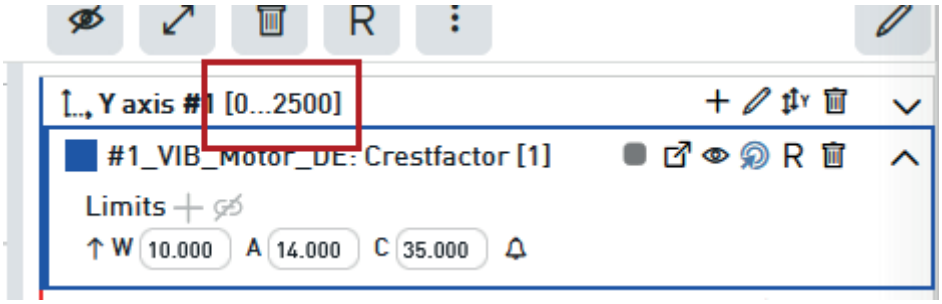
Click on the pen symbol in the trend legend to edit the Y-axis.



Name
Enter a meaningful name for the Y-axis in the *Name* field.

Manual scale:
The manual scale is disabled by default. If you want to set up a manual scale then enable the option *Manual scale* and enter the lower scale value in the *Min* field and the upper scale value in the *Max* field (given in signal units).

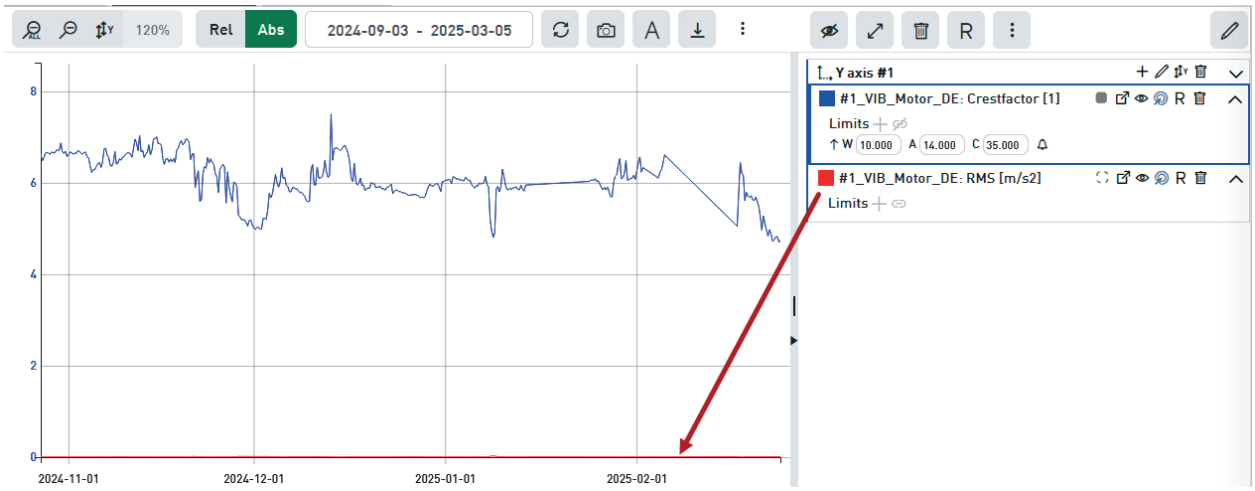
If a Y-axis has a manual scale, the value range is indicated in the trend legend.



Multiple Y-axes

If you want to display signals of different units or significantly different value levels together in one graph you may get problems.

The following figure shows two different signals with different units and value ranges which do not fit together.

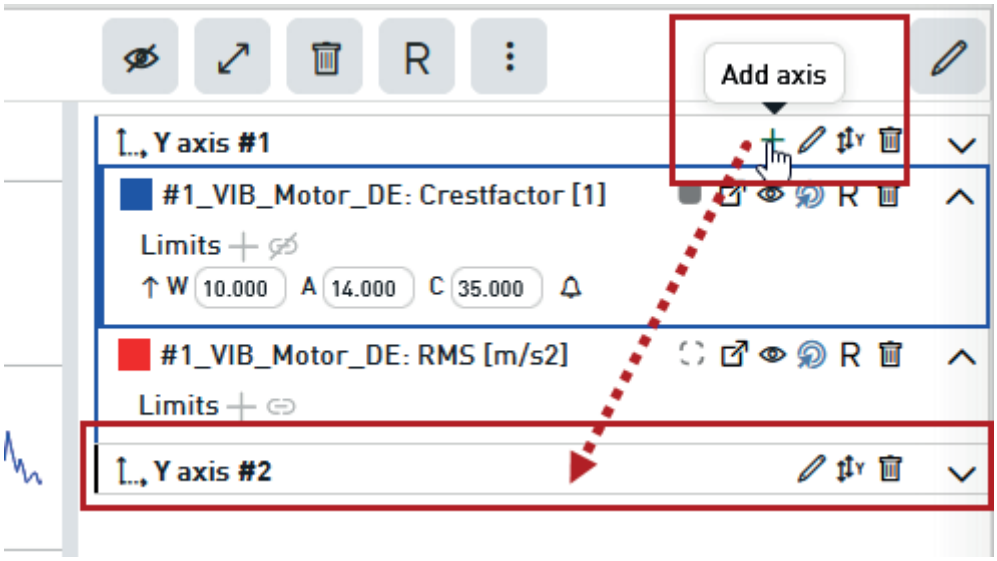


The value level of the red trend is extremely lower than the blue one and hence not useful.

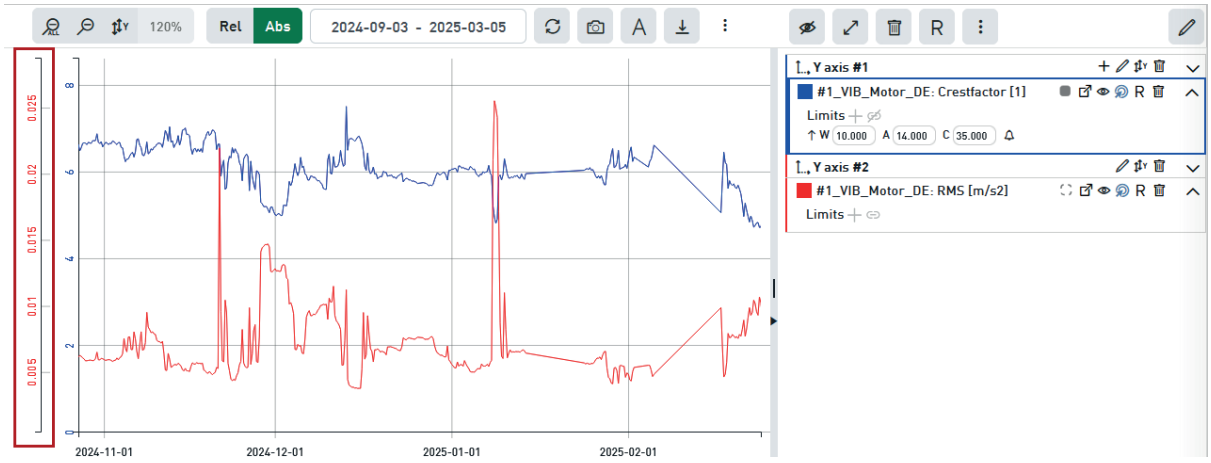
Therefore, it is possible to define multiple Y-axes in the absolute view, in order to provide for each signal a scale that fits for an optimal representation.

You add another Y-axis as follows

1. Click on the plus symbol in the trend legend of the topmost Y-axis.



2. Below the last signal there appears a new line for a second Y-axis (#2).
3. Now drag & drop a signal from the Y-axis #1 below the line of Y-axis #2. Of course, you can also drag other signals from the plant tree into the trend graph. All further signals will be automatically assigned to the lower Y-axis (here #2).



4. Then adjust the scaling of the new Y-axis either by turning the mouse wheel on the Y-scale or by executing autoscale in the trend legend of the Y-axis.

Add signals

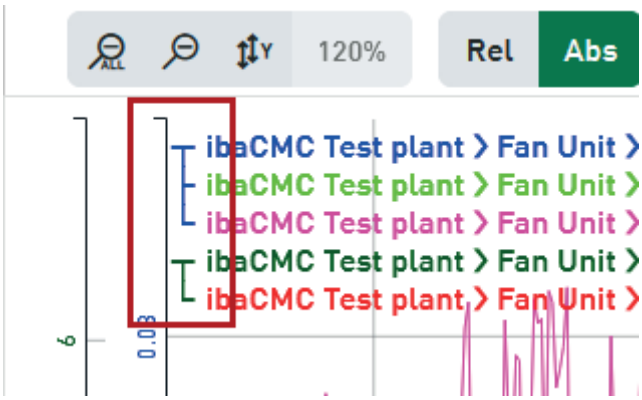
If you add signals out of the plant tree to the trend graph the signals will always be assigned to the lowest Y-axis.

If you want to assign a signal to one of the upper Y-axes, move it in the trend legend to the desired Y-axis **after the addition**.

Y-axes in signal legend

If you have assigned multiple signals to different Y-axes, the signal legend will indicate this fact.

The grouping of signals is indicated in front of the signal names by a connecting line.



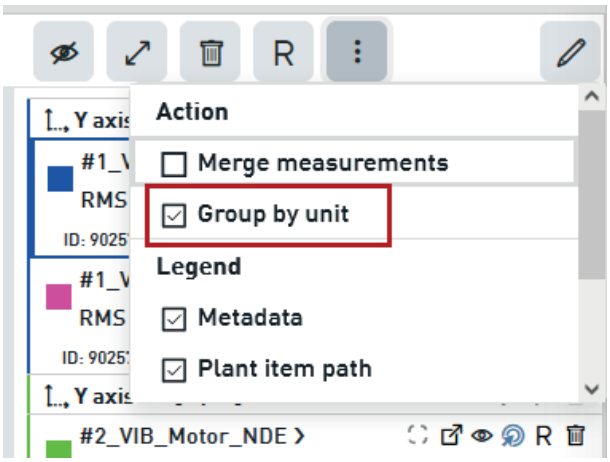
The line has the same color like the first signal on the corresponding Y-axis. The order of the signals corresponds to the order in the trend legend.

14.7 Group trends by unit

You can collect different trends with the same unit, put them into a group and display them on the same Y-axis.

This applies to the absolute view only. The relative view has one single Y-axis (%) anyway.

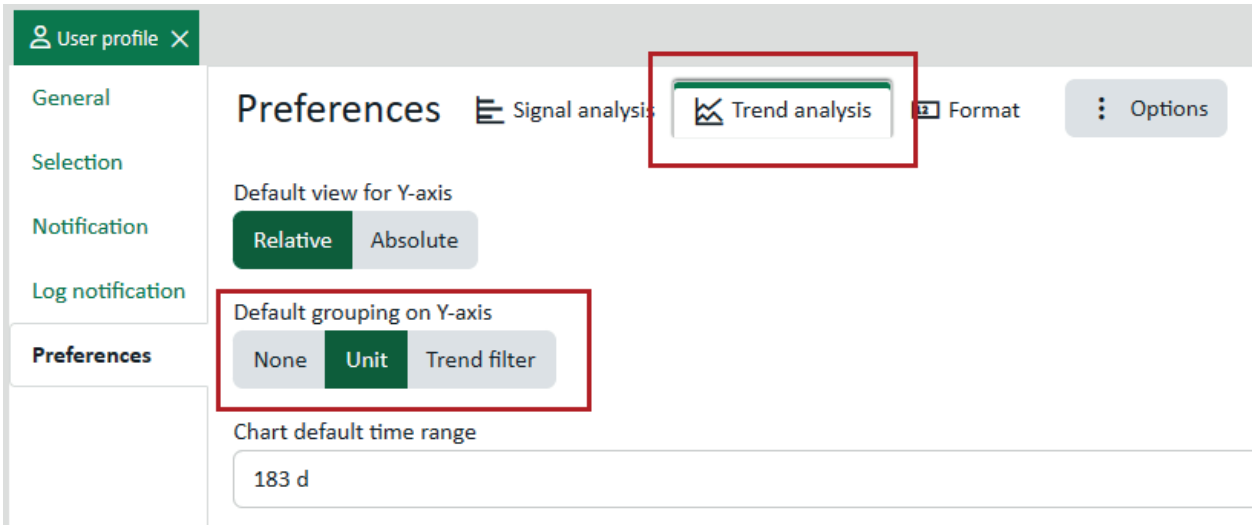
In order to enable the grouping, click on the three-dot-menu in the legend of the trend analysis and select *Group by unit*.



If you add more trends after, there will be either a new Y-axis or the trend will be put on an existing Y-axis with the same unit.

If *Group by unit* is enabled, you cannot move trends from one Y-axis to another.

The setting *Group by unit* is also available in the user profile, under *Preferences - Trend analysis*, to be set as a default setting:

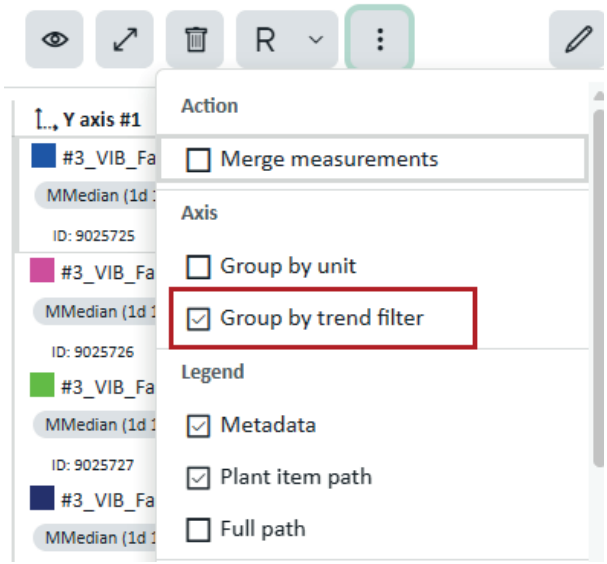


14.8 Group trends by trend filter

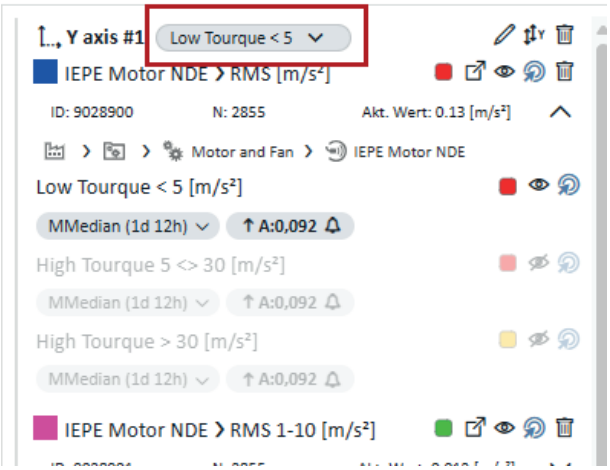
You can collect different trends with the same trend filter, put them into a group and display them on the same Y-axis.

This applies to both the absolute view and the relative view.

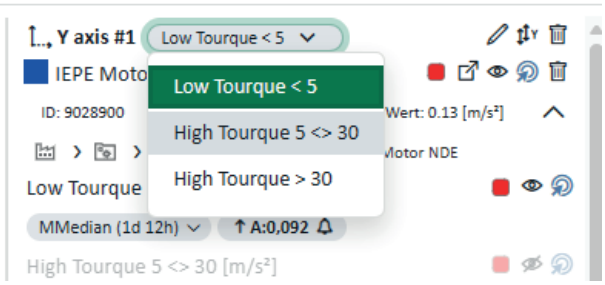
In order to enable the grouping, click on the three-dot-menu in the legend of the trend analysis and select *Group by trend filter*.



Provided that a trend filter is assigned to a trend in the display, the loaded trend filter range is shown next to the Y-axis label.



If multiple trend filter ranges have been defined, you can load a different filter range using a drop-down list.

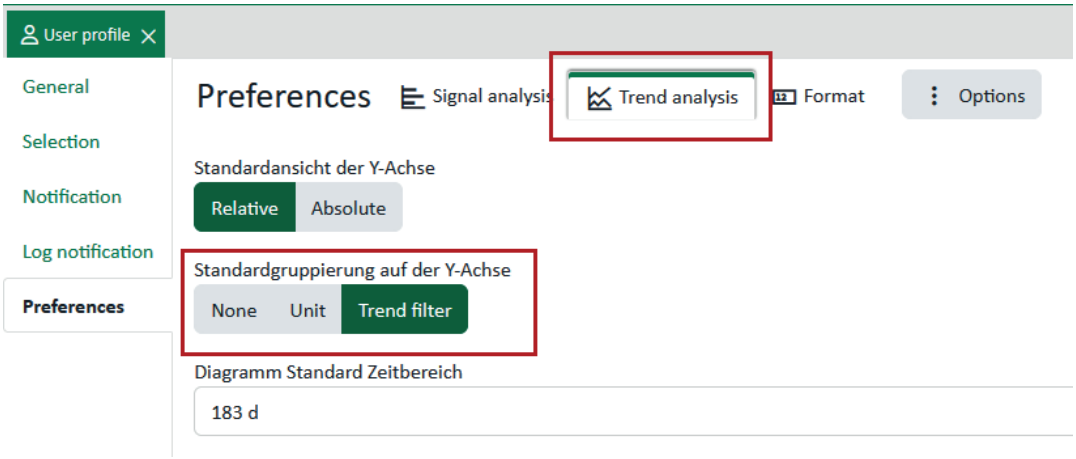


When you add a new trend to the trend analysis that is assigned to the same trend filter, it is automatically assigned to the same Y-axis. The display will then automatically update based on the selected filter range.

If a newly added trend is assigned to a different trend filter, a new Y-axis is automatically opened.

If *Group by trend filter* is enabled, you cannot move trends from one Y-axis to another.

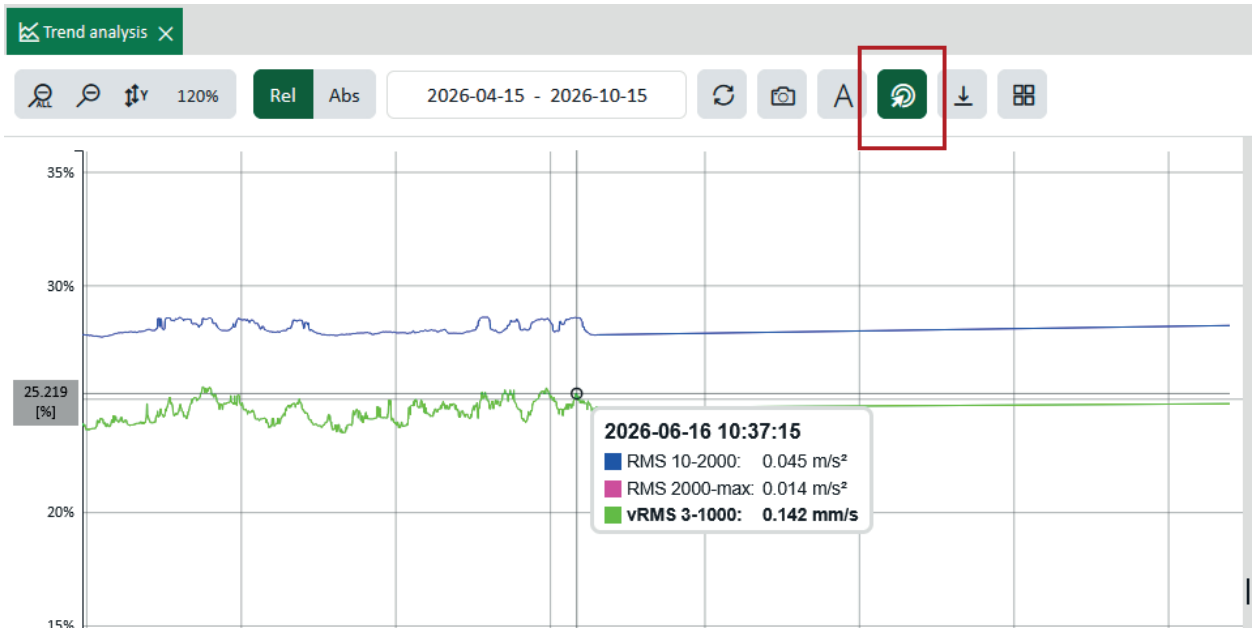
This setting is also available in the user profile, under *Preferences* - *Trend analysis*, to be set as a default setting:



14.9 Tooltip cursor

In the trend analysis, you can enable a tooltip that displays the current value of a data point of the trend line when the mouse pointer hovers over it.

Enable or disable this feature with the button in the toolbar:



When enabled, the tooltip displays the date, time, and measured value of a data point on a trend line. It follows the crosshairs, which always snap to the data point closest to the mouse pointer. If multiple trend lines are open in the analysis, their values are also displayed at the same position on the x-axis.

The trend that the mouse pointer is pointing at (crosshairs) is highlighted in bold in the tooltip.

The tooltip works in both relative and absolute views, although the tooltip always displays the absolute values.

14.10 Navigation area

The navigation area is located below the trend chart. It can be used to navigate in the trends or, in the log book, to navigate by entries or events.

Trend navigation
The preview not only provides the user with an overview of their position in the trend chart. It can also be used to zoom with the following features:

- Moving the preview box
- Move the preview box lines to enlarge/reduce the area
- Double click in a free area to position the preview box there

To switch to trend navigation, click on the icon next to the navigation area: 

Log book navigation
The log book navigation contains a scatter chart showing all events for one or multiple plant tree items. All trend events can initially be found in the first line and are also stored in the color of the trend. If a plant tree item is dragged to the navigation area, a separate line is displayed. The time span corresponds to that of the trend chart and can be adjusted or zoomed in the navigation area. Clicking on the dots shows a small preview. From there, the symbols on the far right can be used to open an event table.

To switch to log book navigation, click on the icon next to the navigation area: 

15 Signal analysis

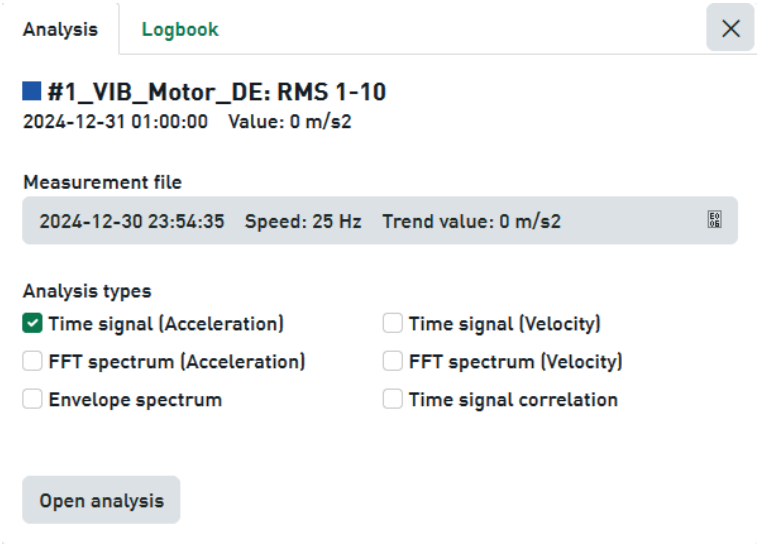
Signal analysis is opened in a separate browser window from the trend analysis. In this window, raw data such as time signals and spectra can be investigated for patterns using different markers and tools. The kinematics table provides support in identifying the components' defect frequencies in the chart using markers. The trend chart always shows the trend from which the analysis was opened. Moving the cursor enables a different analysis time to be selected. In addition, different analysis types are available for the signal analysis.

In order to compare the analyses of a signal at different points in time you can open multiple signal analyses in the same browser window.

Open a signal analysis

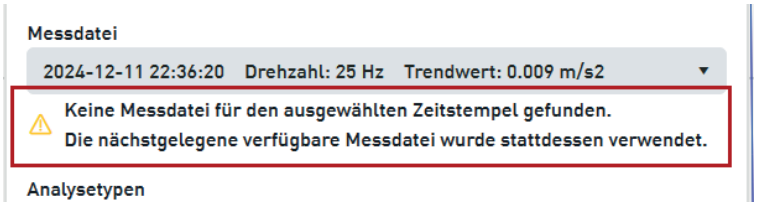
To open a signal analysis:

1. First of all, you must have opened a trend analysis in which one or more signal trends are displayed.
2. Right click on the required signal. A dialog box then opens, showing various information including the signal name. Here you can verify whether you have got the correct signal.

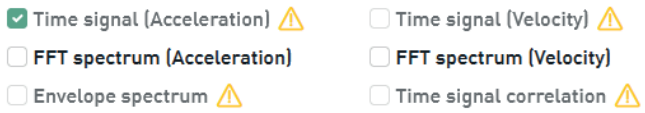


3. The field *Measurement file* shows the data file which is linked to the data point in the trend graph, providing start date and time of the file and some other information. If the data file is not the right one you may select another one from the drop-down list, provided there are other files available.

   If no data file matches the data point you've selected, the nearest available file will be loaded. The dialog will provide a corresponding message:



4. The *Analysis type* area offers a preselection of suitable analysis types. This preselection is based on the trend type. For instance, the analysis type *Time signal (Acceleration)* is selected for an RMS trend, because the calculation of the RMS characteristic value is done on the time signal. In case of envelope characteristics, e. g. ENV Inner race, the *Time signal (Acceleration)*and the *Envelope spectrum* are preselected. If needed, you can preselect more or other analysis types here. However, you can also select the analysis types later in the signal analysis. Analysis types may be not available (greyed out) and marked with a warning symbol if there is no suitable data .



5. Click on <Open analysis>.
   The signal analysis opens in a new browser window of your default browser.

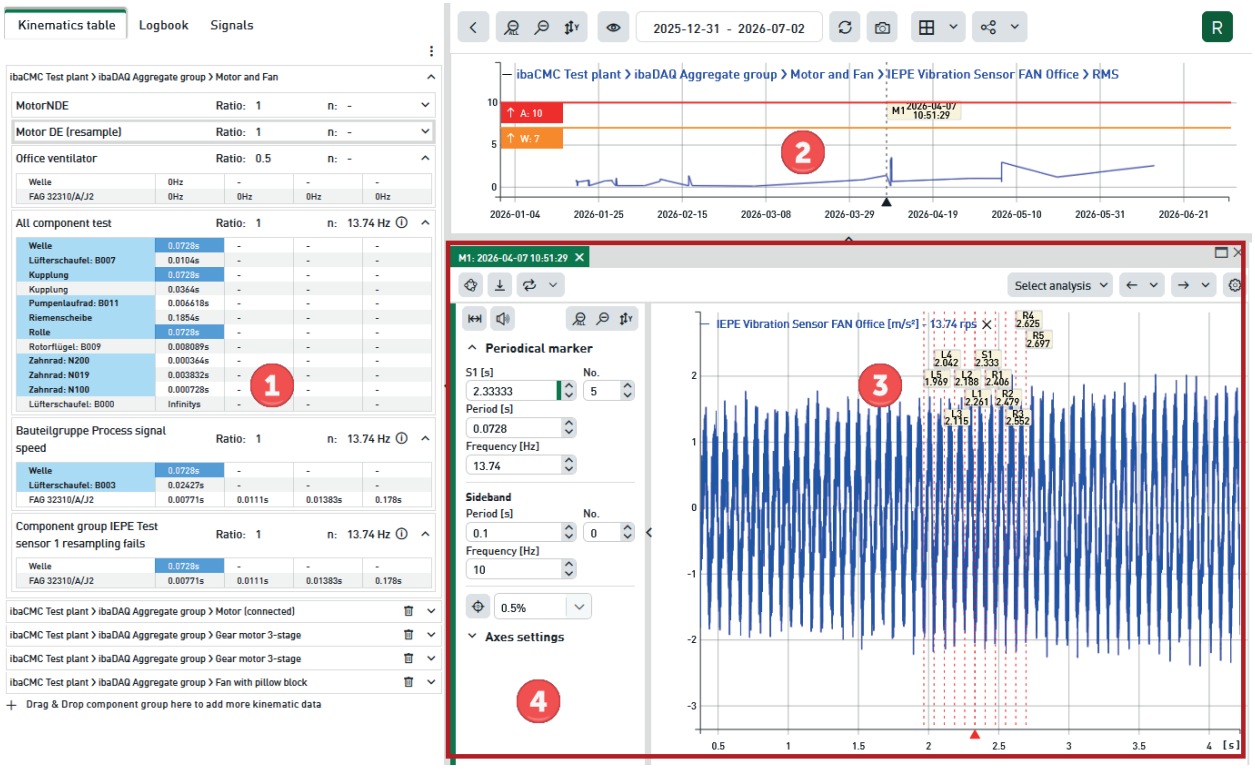
Tip



If you hold <Ctrl>+<Shift> depressed while clicking on <Open analysis>, the signal analysis opens in a new tab of the same browser window. The operation inside the signal analysis is the same in both cases.

15.1 Signal analysis - Overview

The signal analysis window is divided into various sections.



1	*Kinematics table* tab for displaying the components and their damage frequencies *Logbook* tab for displaying related logbook entries *Signals* tab for selecting other signals from aggregate groups of the same plant and data file
2	Trend graph as in the trend analysis from which this signal analysis was opened. The trend is shown over the entire time interval defined for that trend. If needed, you can show or hide the threshold levels as lines. The black marker shows the position or the time to which the signal analysis below relates. You can move the marker to study different times. Each move of the marker will update the data in the signal analysis.
3	Display area for the signal analysis, showing the selected analysis type. Above the chart is a toolbar containing different functions for the signal analysis.
4	Area with settings for periodical markers, harmonic markers, axes and frequency bands (depending on analysis type).

The red frame in the figure above encompasses a so called tile which contains the signal analysis and which can be recognized by a green tab with the data filename. You can create multiple tiles and arrange them side by side or one above the other in order to compare different points in time.

Signal analysis controls

Trend graph toolbar

<	Show/hide kinematic grid
	Zoom out all, only active in zoomed view
	Zoom out one step, only active in zoomed view
	Auto scaling in Y-axis
	Show/hide threshold level lines
Time span	Time span covered by the loaded data file (date from... to); same operation like in trend analysis
	Refresh display
	Make a screnshot
	Layout of the tiles in the signal analysis window (tile view, row view or column view)
	Share or save current analysis
R	Enable (green) or disable (grey) raw data mode of the trend in the signal analysis

Toolbar of the tile

	Toggle speed normalization
	Download DAT or MP3 file
	Synchronize chart settings and selection of synchronisation options
Select Analysis	Selection of analysis types
	Load previous file; use the drop-down list for other files to select
	Load next file; use the drop-down list for other files to select
	various analysis settings for RPS signal and drill-down tolerance time

Toolbar by analysis type

	Zoom out all, only active in zoomed view
	Zoom out one step, only active in zoomed view
	Auto scaling in Y-axis
	Show/hide difference marker
	Show/hide audio marker (time signal acceleration ony)
	Show/hide cursor marker

Logbook tab toolbar

	Sort entries A sub-menu opens for selecting columns and sort order.
	Selection of entry types to be displayed
	Filter entries A dialog opens for configuring the filter criteria.
	Create logbook entry The dialog *Add new logbook* entry opens.

Signals tab toolbar

	Group signals by module
	Group signals by aggregate

15.2 Analysis options

The signal analysis provides different analysis types:

- Time signal - Acceleration
- Time signal - Velocity
- Time signal correlation
- FFT spectrum - Acceleration
- FFT spectrum - Velocity
- Envelope spectrum - Acceleration

You can add or remove the different analysis types individually.

To add an analysis type:

1. Click on the drop-down arrow near the <Select analysis> button in the signal analysis tile. This will open a list with the available analysis types.
2. Check the requested analysis type. You can remove selected analysis types here as well.

Some of the analysis options are described in the following chapters.

15.2.1 Time signal analysis

The time signal analysis displays the raw time signal from the sensor in such a way as it was imported and sampled by the module.

For vibration signals, in addition to the acceleration signal it is also possible to display a speed signal.

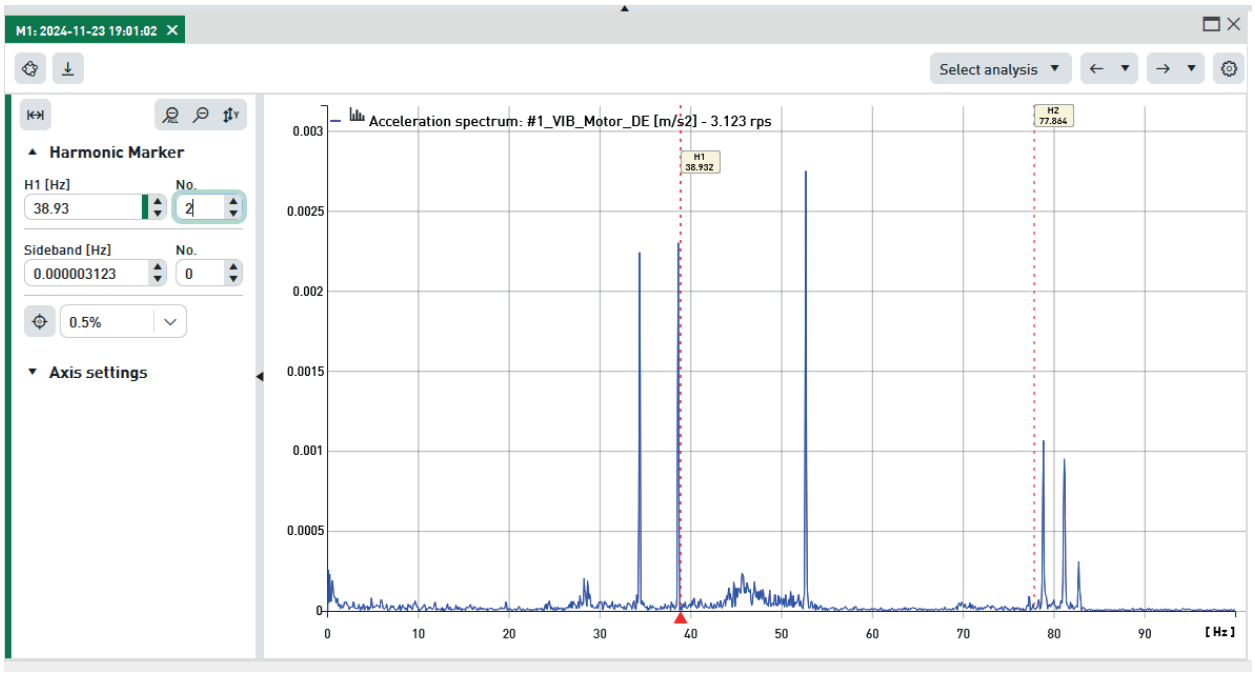
Sideband markers are available for the analysis.

It is also possible to play back the time signal as an audio playback.

You can find more information about this in chapter ↗ *Audio analysis, page 137*.

15.2.2 FFT analysis

FFT (Fast Fourier Transformation) analysis is a frequently used method of identifying mechanical problems. Diagnosing faults on machine components using FFT is not covered by this document, as it goes significantly beyond the document’s scope. The following figure shows an example of an FFT analysis.



Easy example of FFT analysis
Let us assume there is an imbalance problem on a motor shaft, which rotates at 600 revolutions/minute (= 10 revolutions/second). Analysis of the vibration acceleration using FFT enables a significant peak to be detected around 10 Hz. On a motor with no imbalance, this peak would be much less pronounced.

The FFT analysis can be performed both in the FFT spectrum for the vibration velocity and in the FFT spectrum for the vibration acceleration. In the FFT analysis, the FFT is displayed in orders of the shaft speed. Thus, at a rotation frequency of 10 Hz the 5th order represents a frequency of 50 Hz. The order on the X-axis must always be multiplied by the rotation frequency to obtain the actual frequency.

Representation using orders of the shaft speed has proven very effective for damage diagnosis, as it enables harmonic or rotation frequency to be identified very easily.

15.2.3 Audio analysis

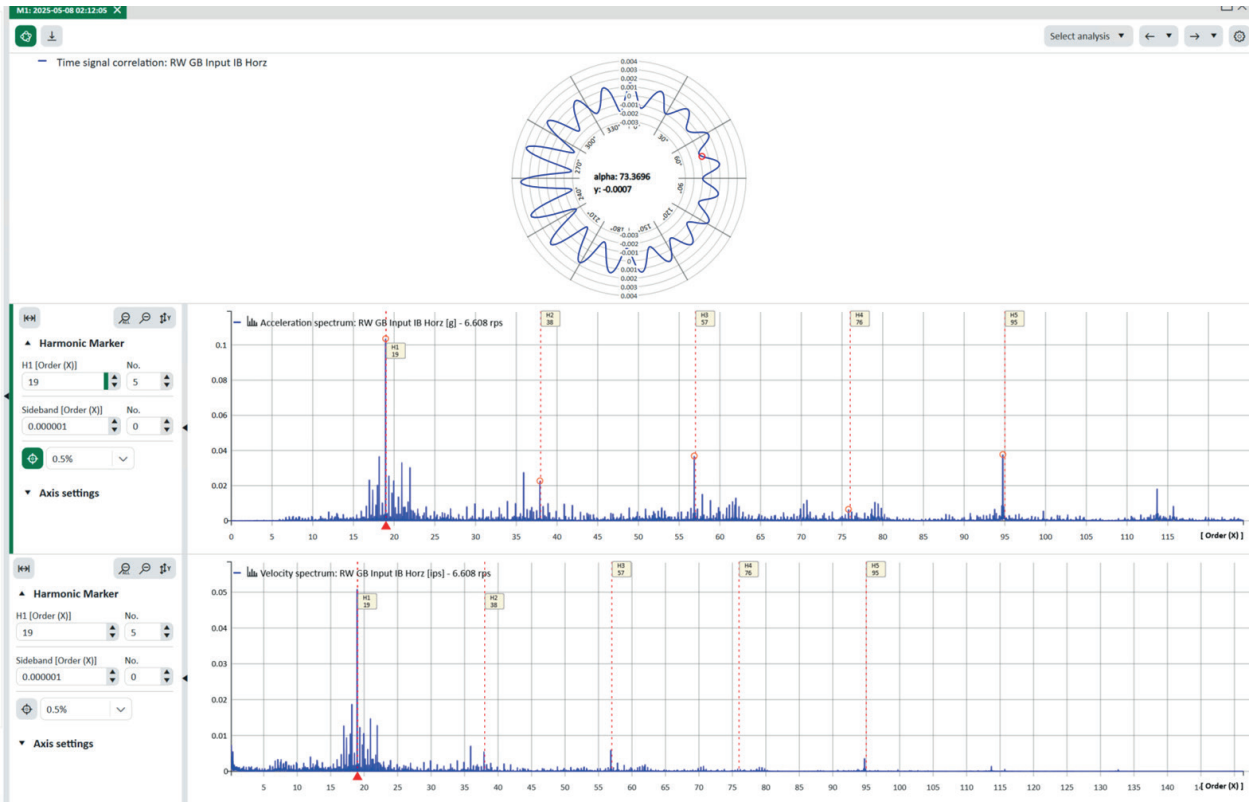
If a time signal (often referred to as a raw signal as it comes directly from the sensor) is open, audio playback is possible using the audio analysis function. This enables an additional sensory organ to be used to detect damage. Experienced maintenance engineers can identify irregularities or damage from the sound. The audio analysis can be switched on and off directly in the time signal chart.

The Play and Stop buttons can be used to start and stop playback of the audio signal.

15.2.4 Time signal correlation

Time signal correlation involves correlating the vibration velocity signal with the shaft speed and representing it as a circle in a chart. This enables periodically occurring damage to be detected and localized. Using the example of a gearbox, each tooth can be identified at the circumference of the circle. Depending on how much energy is behind it, the amplitude either increases

or decreases. If there is damage to a tooth and it produces higher vibrations, the amplitude of the tooth increases and we can assume that the relevant tooth is damaged. The following figure shows an example of time signal correlation. The average value of the rotational speed which is stored in the DAT file in the *Info* channel under RPS will be taken for speed (rps).



15.3 Analysis settings

This chapter describes the specific settings foreac analysis type.

15.3.1 Axis settings

Settings	Description
X-Min[s]	Minimum visible range of the X-axis
X-Max[s]	Maximum visible range of the X-axis
Y-Min[]	Minimum visible range of the Y-axis
Y-Max[]	Maximum visible range of the Y-axis
Tolerance time	Specifies the time range to be searched for data files. The starting time depends on the analysis time cursor in the trend chart.

There is another X-axis setting in the *Periodical marker* area:

X marker tolerance
This value specifies the X-axis tolerance as a percentage of the marker position, where the cursor marker is to be displayed. This only applies if cursor marker is activated. You may enter a value by yourself or you select a value from the selection list.

15.3.2 Analysis markers

Periodical marker

Periodical markers are available for the following analysis types:

- Time signal (Acceleration)
- Time signal (Velocity)

Periodical markers are used to detect periodical characteristics in a time signal. In addition to the periodical main marker, which you can position on the X-axis by mouse or value input, you can enable multiple markers with a specified distance (period). Moreover, you can add sidebands for each periodical marker. The periodical marker is drawn as a dotted red line with a red triangle at the X-axis.

Settings	Description
S1 [s]	Position of the periodical main marker on the X-axis [s]
No.	Number of additional periodical markers with distance *Period* to the left and to the right side of the main marker
Period [s]	Temporal interval between the periodical markers
Period [X]	Interval between the periodical markers in terms of order
Frequency [Hz]	Inverse period value

Tip



When you click on the fields for *Period* or *Frequency* and then click on one of the detected defect frequencies in the kinematic grid, then the periodical markers will position according to this period or frequency.

Harmonic marker

Harmonic markers are available for the following analysis types:

- FFT spectrum (Acceleration)
- FFT spectrum (Velocity)
- Envelope spectrum

The harmonic marker is used to identify possible harmonics (multiples) of a fundamental frequency. The presence of harmonics often provides information about the nature of mechanical damage or its characteristics. The harmonic marker is only available in the spectrum view and cannot be disabled. The position of the marker can either be entered manually under *H1 position* or moved directly to the desired position using the left mouse button. Additional sideband lines can also be used if necessary. The harmonic marker is drawn as a dotted red line with a red triangle at the X-axis.

Settings	Description
H1 position	*Time signal*: Position of the sideband cursor in the X-axis in seconds [s] *Spectrum*: Position of the first harmonic marker on the X-axis [Hz/order]
Number of harmonic markers	Number of harmonics or multiples of the frequency of H1 (fundamental frequency)

Sidebands

The sidebands are available in the time signal analysis and in the spectrum analysis. The position of the symmetrical sideband lines can be determined by specifying the distance (period or frequency) in relation to the periodical or harmonic marker. Alternatively, you can move the sidebands with the mouse. The distance between the sidebands remains unchanged if you move the marker.

At least one periodical marker (No. ≥1] must be enabled in the time signal analysis, because sidebands in a time signal are only linked to periodical markers.

Sidebands are drawn as dotted green lines.

Settings	Description
Time signal Period [s] / frequency [Hz]	Distance of sidebands to the periodical marker or between each other, given in seconds [s] or Hertz [Hz]
Spectrum Frequency [Hz]	Distance of sidebands to the harmonicarker or between each other, given in Hertz [Hz] Distance between the individual sidebands in seconds [s]
No.	Number of sidebands displayed to the left and right of the periodical or harmonic marker

Difference marker

If the difference marker is turned on, a new *Difference marker* tab is displayed in the settings. The position of the marker can either be entered manually under *D1 position* or moved directly to the desired position using the left mouse button.The difference marker is drawn as a dotted green line with a green triangle at the X-axis.

Settings	Description
D1 position	Position of the difference cursor in the X-axis in seconds [s/Hz/order]
Difference	Distance between the sideband and difference cursor in seconds [s]
1/Diff	The frequency [Hz] is calculated from the reciprocal of the difference.

15.3.3 Frequency bands

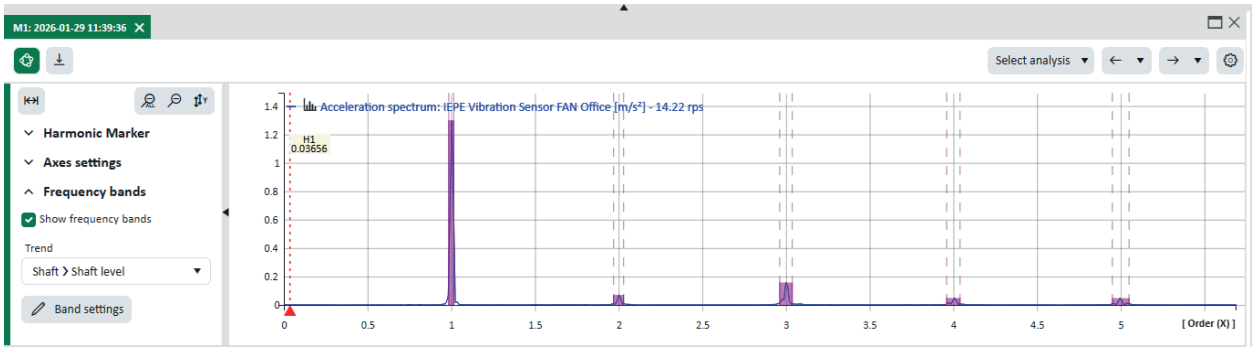
In the FFT-based analyses

- FFT spectrum (Accelerartion)
- FFT spectrum (Velocity)
- Envelope spectrum

you can enable the display of frequency bands in the trend graph.

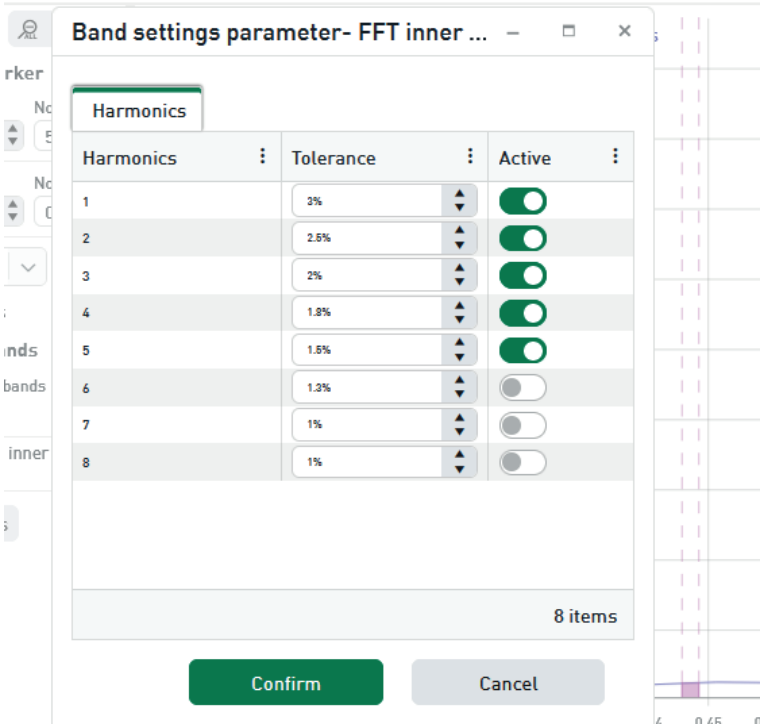
Therefore, check the option *Show frequency bands*.

The frequency bands defined for the trend are drawn as dotted lines. The range inside the bands will be filled with color up to the measured value.



In the field *Trend* you can select the trend whose frequency bands should be displayed from a drop-down list.

Click the <Band settings> button to open the dialog for configuring the frequency bands for the selected trend. You can adjust and save the band settings directly in the dialog. However, the changes will not take effect until the CMU configuration has been uploaded.



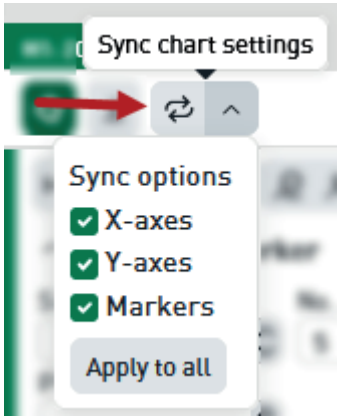
15.3.4 Synchronization of axes and markers

If you have multiple analysis graphs open in a signal analysis, you can synchronize the settings for the x- and y-axes as well as the markers. This is especially helpful when you want to compare signals from multiple sensors or monitor the progression of damage over a longer period of time.

Synchronization means:

- Settings or changes made to one x-axis are automatically applied to other x-axes in the same domain (time or spectrum).
- Settings or changes made to one y-axis are automatically applied to other y-axes with the same unit.
- The positions of markers in one chart are automatically synchronized with other charts in the same domain (time or spectrum).
- When zooming in on a chart, the zoom factor is applied to the other chart in the same domain (time or spectrum).

You can enable synchronization using a button on the signal analysis toolbar:



By clicking the button, you can enable (green) or disable (gray) synchronization.

In the drop-down list associated with the button, you can select which items you want to synchronize.

If you have multiple tiles open in a signal analysis, you can apply the synchronization settings to all tiles by clicking <Apply to all>.

15.3.5 Comparing multiple signals in an analysis

If you open a signal analysis from within a trend analysis, only the selected signal will be analyzed in that window.

However, it may be useful to compare other signals from the same measurement file or the same time period, such as the signal from another sensor.

If you want to add more signals to the analysis, select the *Signals* tab on the left side, in the kinematics table area.

Signals tab

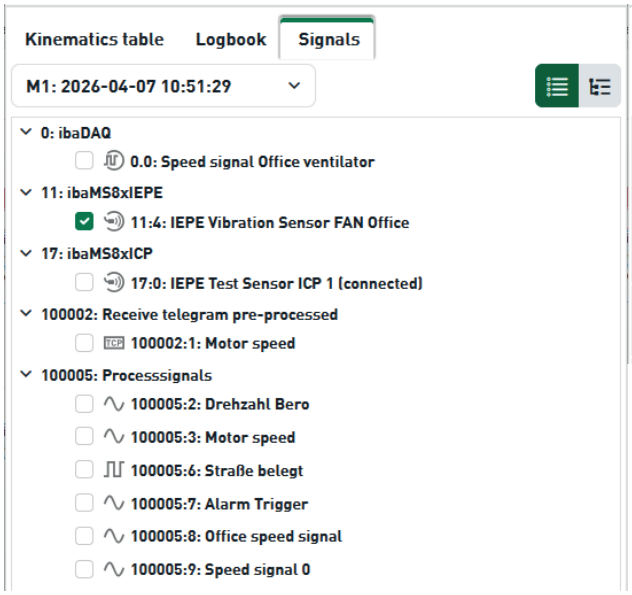
This tab lists all the signals contained in the measurement file on which the trend analysis is based. The main signal for which the signal analysis was opened is highlighted in bold.

On the left side of the tab's toolbar is a field that displays the marker position M1 in the trend view. This marker position indicates the point in time from which the measurement file whose data is currently being displayed originates.

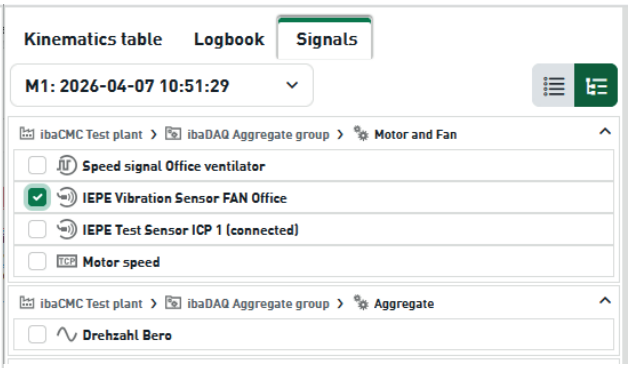
If you load the previous or next measurement file from the analysis tile's toolbar, the position of the M1 marker will also change. The same applies when you move the M1 marker in the trend view. A change in the marker's position immediately causes the new data to be loaded and the trend graphs to be updated.

Using the other two buttons on the toolbar, you can display the signals in the tab in two different ways:

Signals grouped by module



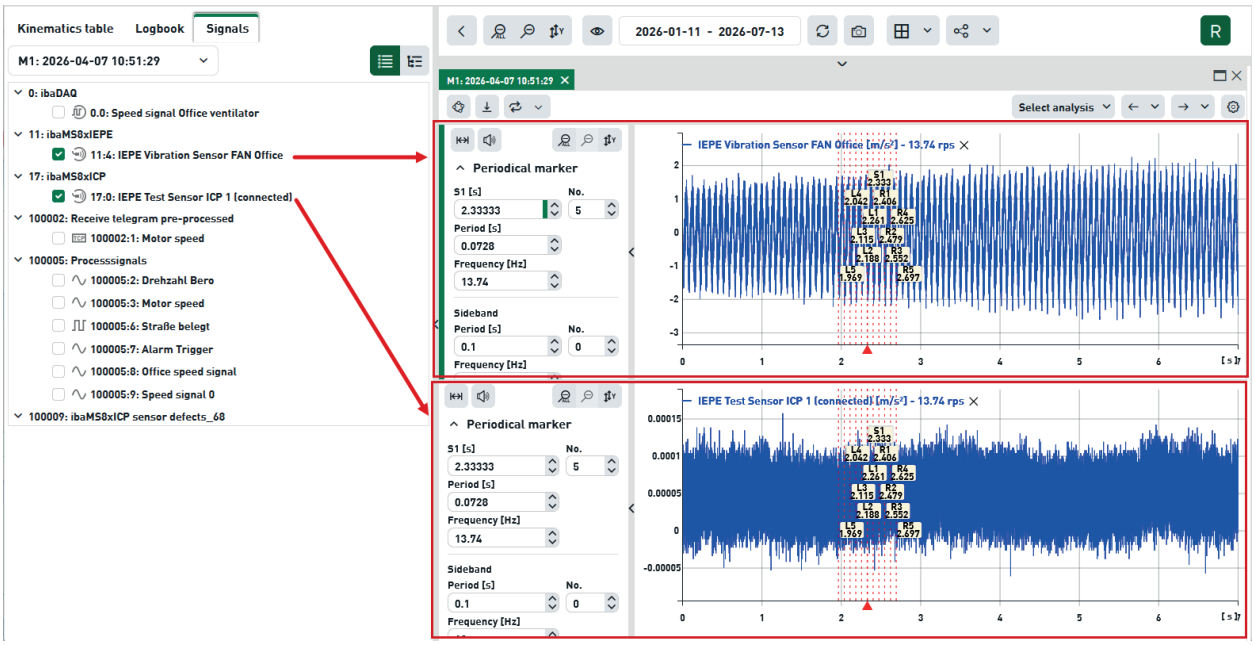
Signals grouped by aggregates



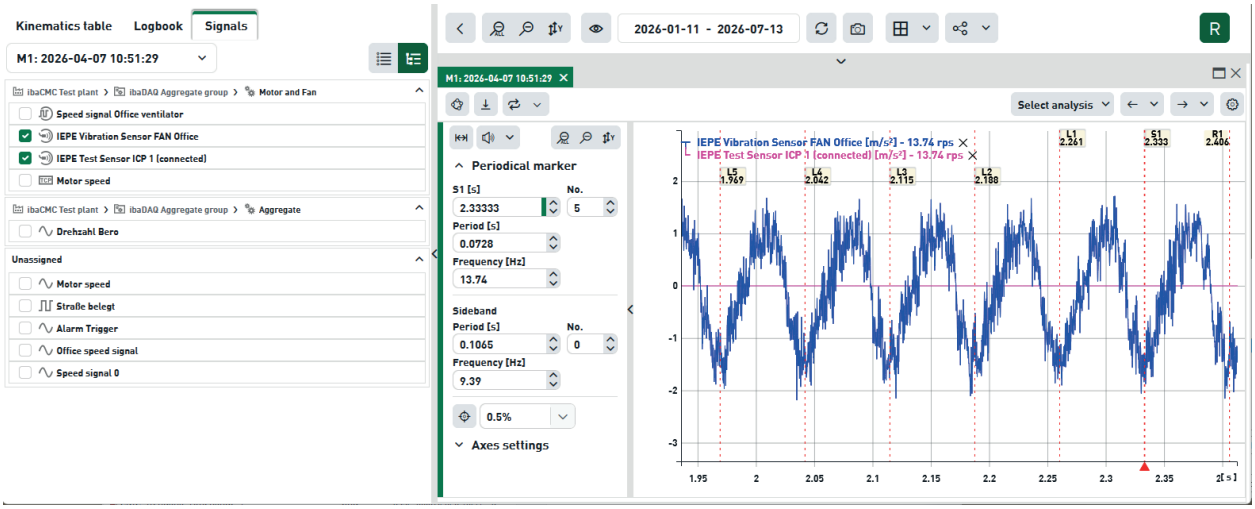
To add more signals for analysis, you have two options:

- Select a signal by checking the box in the signal list.
  If you check the box next to the desired signal, a chart for that signal—with its own axis and marker settings based on the selected analysis types—will be added below the main signal.
- Drag and drop a signal into the existing chart.
  You can use drag and drop with the mouse to drag a signal from the signal list into the chart of an already open signal. A tooltip that appears when you move the signal indicates when you can drop it. The color of the curve is adjusted automatically. The curve is overlaid on the y-axis of the existing graph and scaled accordingly.
  This method is useful when you want to compare or superimpose similar signals that have the same physical unit and a similar signal level.

The following figure shows an example with two sensor signals, selected by checking the boxes in the signal list.



The following figure shows the example using the same signals with the drag-and-drop method. For better visualization, the image has been heavily zoomed in along the X-axis.



If you have selected multiple analysis types, such as time signal and FFT spectrum, a graph will be created for each analysis type when you add another signal. The charts are organized by analysis type. This means that the time-signal trends are listed one below the other first, followed by the FFT spectra, and so on. This ensures that similar trends are grouped together, making it easier to compare them.

When you add a signal to a chart using drag-and-drop, its curves are automatically plotted in the other analysis types.

Removing Signals

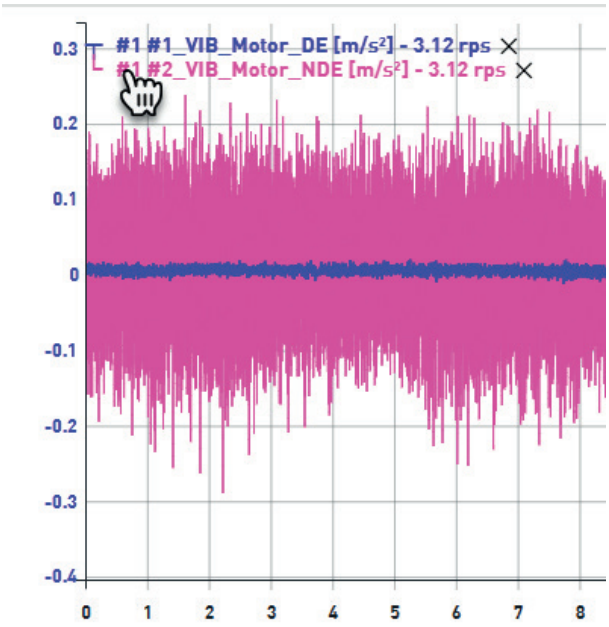
To remove any signals you've selected, simply uncheck the box in the signal list. Alternatively, you can also click the "X" in the trend legend to remove a signal.

Creating separate or shared y-axes

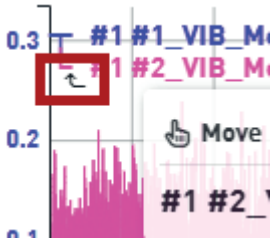
By default, any signal you drag and drop into a graph is placed on the y-axis of the existing signal. When the orders of magnitude or value ranges differ significantly, or when the physical units are different, this makes the graphs difficult to read. In such cases, it is helpful to use separate y-axes so that each signal can have its own y-axis.

To plot signals on separate y-axes when they are already on the graph, follow these steps:

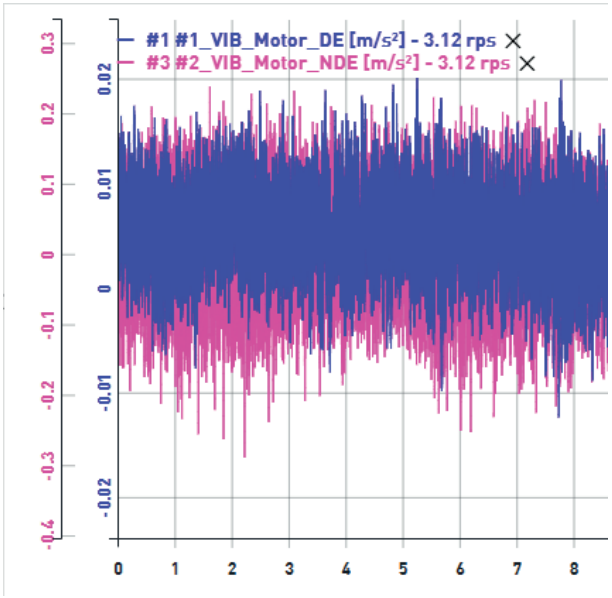
1. In the chart, position the mouse pointer over the legend for the signal you want to move to a different y-axis. The mouse pointer will change to a hand icon once the signal has been selected.



2. Click the left mouse button and then drag the signal down a bit, for example, until the small gray arrow disappears. A label showing the signal name will also appear, attached to the mouse pointer.



3. When the small gray arrow disappeared, release the mouse button, and the signal will have its own y-axis.



Similarly, you can also overlay separate signals onto a shared y-axis. Drag the signal you want to overlay onto the y-axis of another signal by its legend onto the legend of the target signal until the small gray arrow reappears. Also note whether the arrow points toward the target signal from below or from above, as this allows you to control whether the signal is plotted above or below it.

The order of the signals from top to bottom determines whether they are displayed in the foreground or background. The topmost signal is always displayed in the foreground. If a signal is obscured by another, you can bring the obscured signal to the foreground by changing the order (again using drag-and-drop). This applies to both shared and separate y-axes.

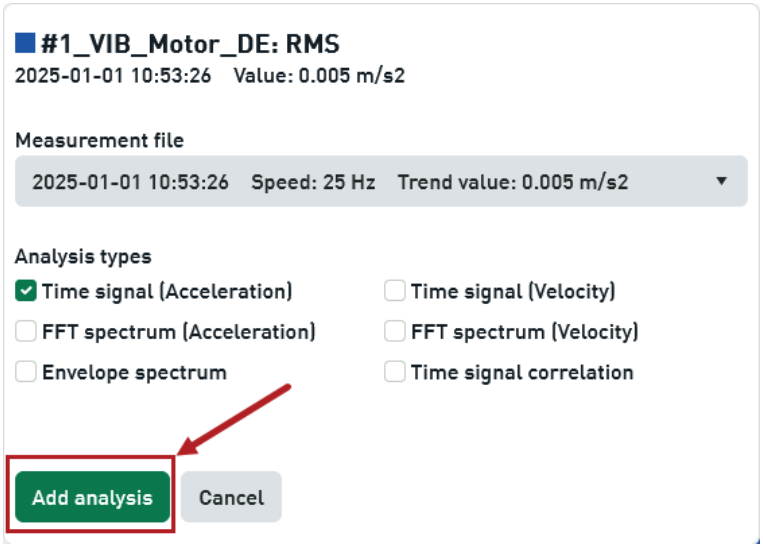
15.3.6 Compare multiple signal analyses

The signal analysis window offers to open more than one so called tiles. Each tile contains the analysis of the signal at a specific point in time.

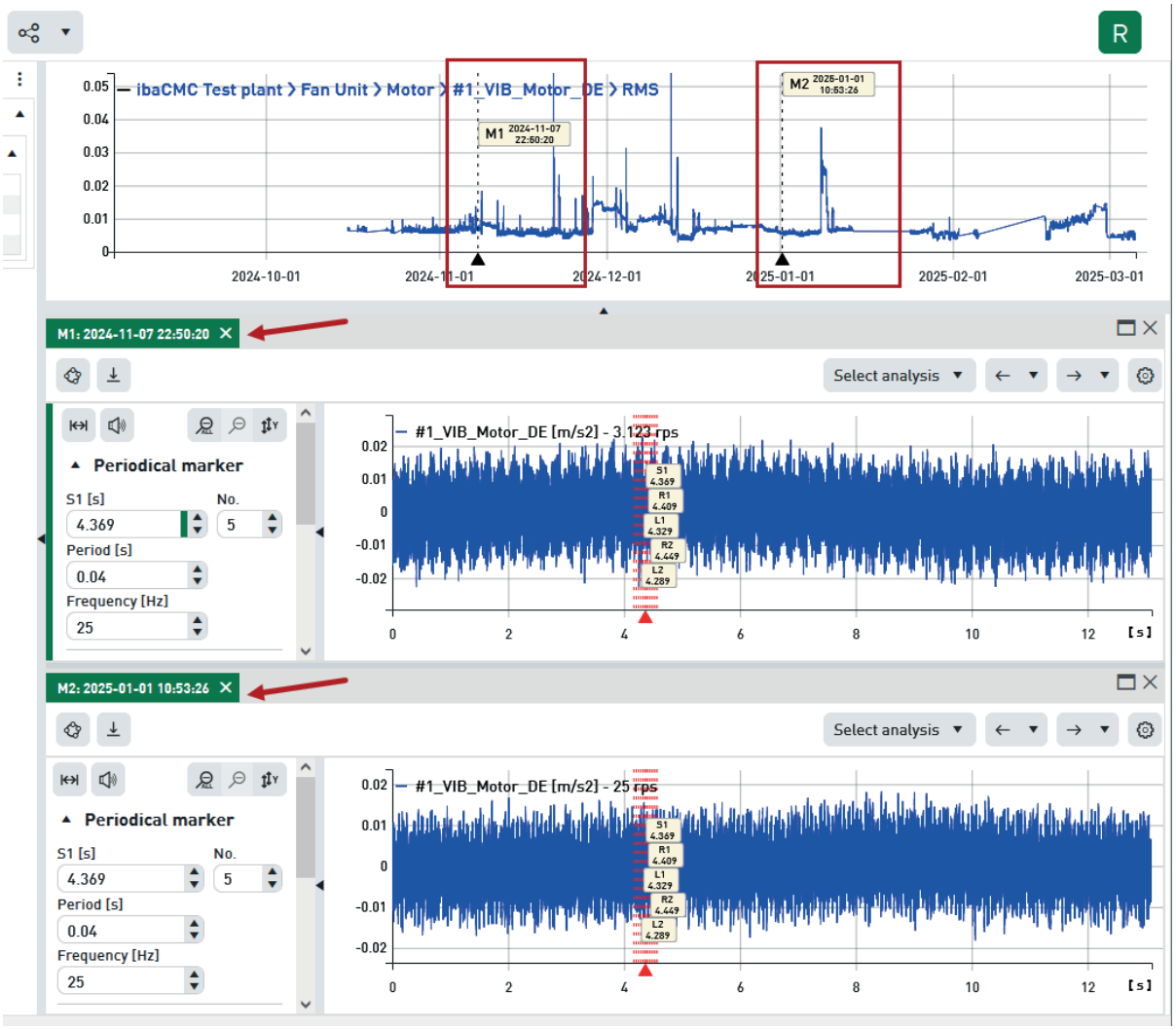
Hence, you can examine variations of the time signal or spectrum over a longer period of time.

To open another tile follow these steps:

1. Make a right-click in the upper trend graph at the X-position you'd like to analyse. The well-known dialog box like for opening an analysis opens, but this time it is for adding an analysis.



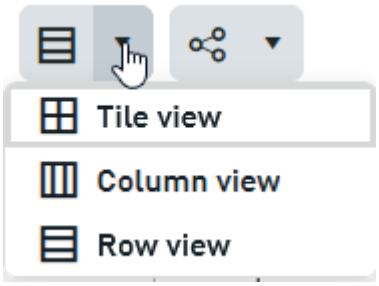
2. Click on <Add analysis>. A new tile appears in the signal analysis window which shows the same analysis at a different point in time. Furthermore, there is another black marker in the upper trend graph.



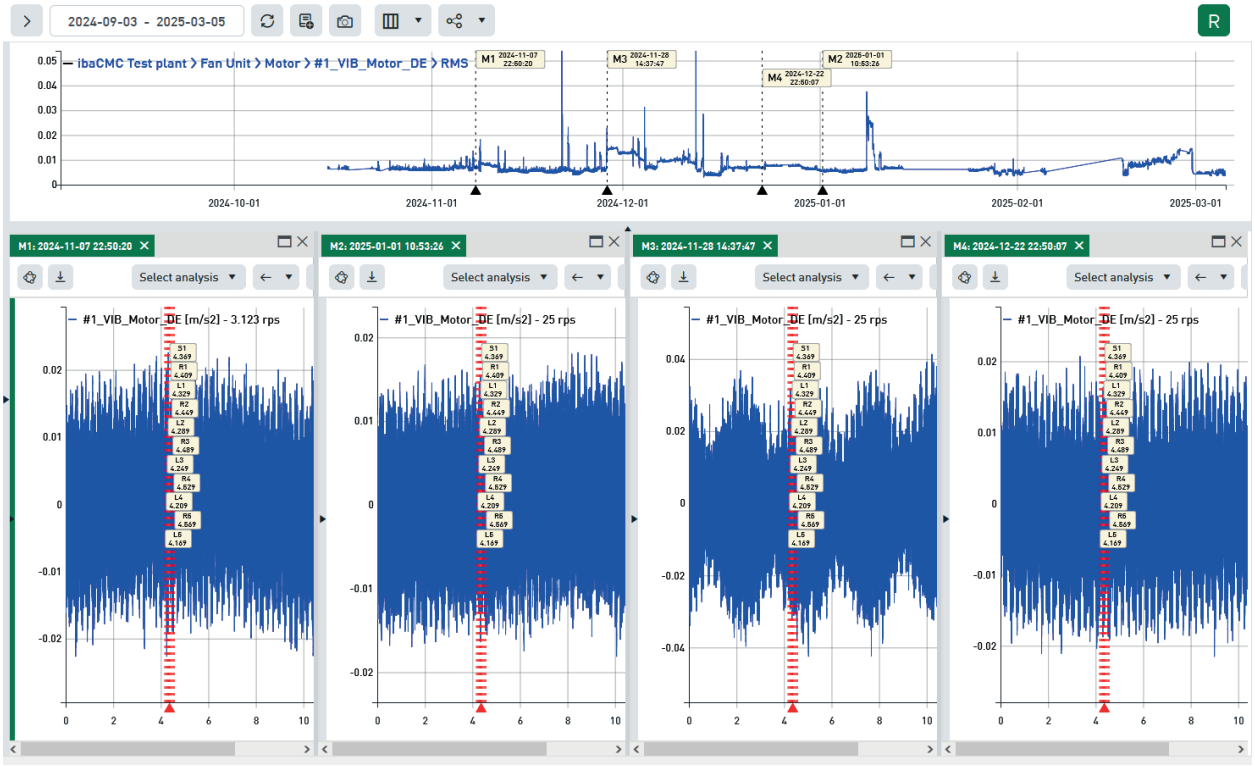
You may add more tiles this way:

- In tile view up to 6 tiles
- In row or column view up to 4 tiles

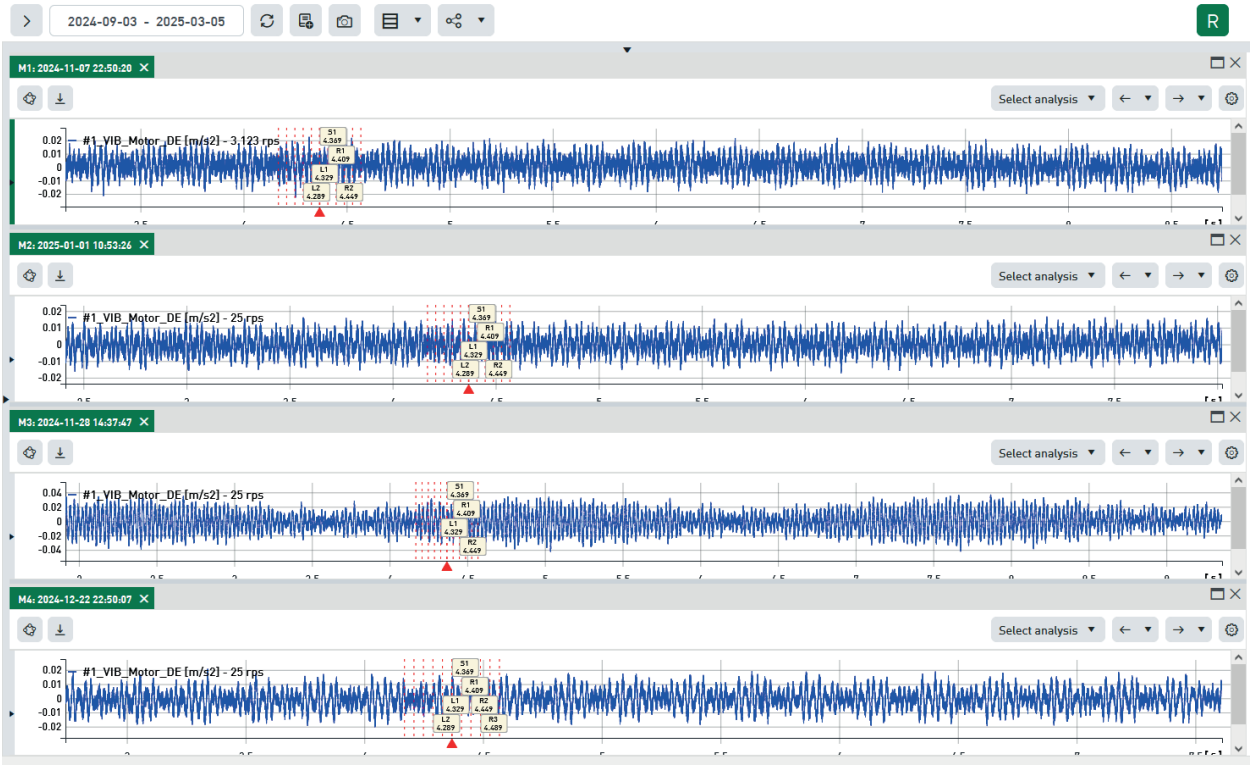
Use the layout menu to control the automatic arrangement of the tiles.



Example for column view



Example for row view



You can also change the tile arrangement with the mouse at any time by drag & drop on the tab. A shaded area indicates where the tile will dock.

15.3.7 Kinematic table and aggregates

If you open a trend, then only the aggregates of the same aggregate group will be loaded into the kinematic table, provided they fulfill the following condition:

- The speed signal of the corresponding component group is monitored by the same CMU, where the trend was opened.

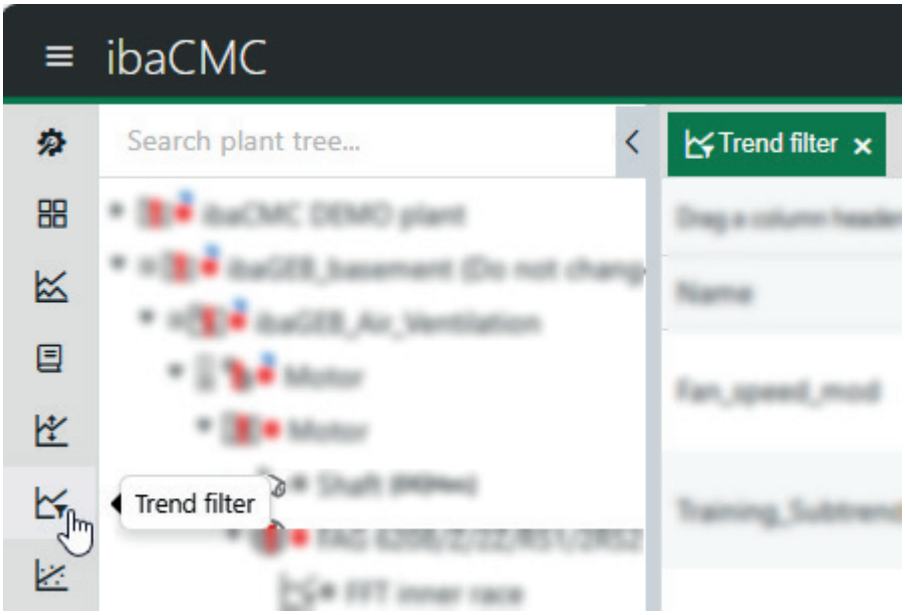
For the loaded aggregates further rules apply:

- Aggregates will be extended automatically in the table, if an associated trend was opened.
- All other loaded aggregates remain hidden. You can remove them from the table, if needed.
- All hidden aggregates in the table can be extended manually, if needed.

16 Trend filter

On plants that operate in two or more different operating modes, e.g. rolling and calibration, it can be useful to use trend filters. A trend filter enables filter areas to be defined that filter the trend based on a filter signal. For example, the filter signal can output the value 1 for calibration mode and 2 for rolling mode. The advantage is that this enables different limits to be set for a characteristic value for the different filter areas.

To obtain an overview of the available trend filters and to define new trend filters, open the trend filter view by clicking on the corresponding icon in the menu bar:



Filter signal
The filter signal can be a sensor or a TCP/IP channel. This signal is used as the input signal for the filter areas.

> **Note:**
>
> For TCP channels and AI or DI sensors, the AVG trend is used. For IEPE or ICP sensors, the peak-to-peak trend is used as the filter signal.

Filter areas
At least two filter areas are required. The first filter area runs from minus infinity to the set value. All subsequent areas have the maximum value of the previous set filter area as their minimum. Filter areas can be ignored so that no data is acquired in those areas.

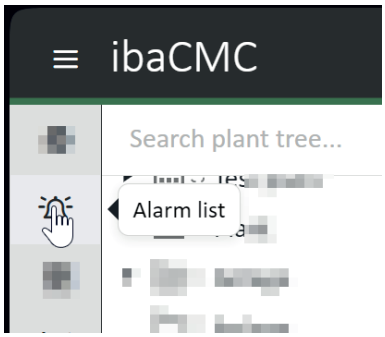
Default filter area
One filter area must be selected as the default. This is used by default when loading the trend.

Assignment
After definition, the trend filter can be assigned to one or more components/sensors. After assignment of the trend filter, the trends for the components/sensors have multiple filtered trends in the trend analysis.

17 Alarm list

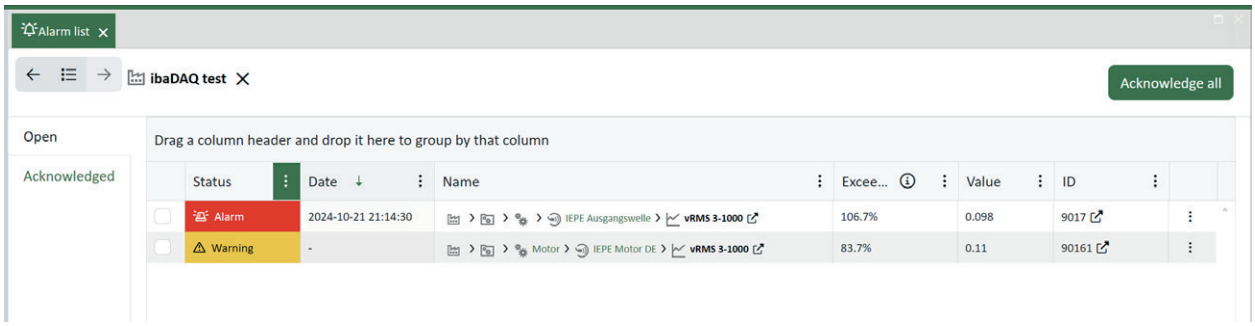
The alarm list is a view which shows all open alarms of specific plant tree items.

Open the alarm list by clicking on the corresponding button in the menu bar.



Simply drag & drop the desired plant tree item into the alarm list in order to see the open alarms (*Open* tab).

In the alarm list, you can acknowledge all alarms at once or individually and add comments. The acknowledged alarms together with the comments are shown in the *Acknowledged* tab.



The figure above shows warnings and alarms of different plant tree items.

List of open alarms

The table has columns and functions as follows:

Alarm selection
Here, you can select specific alarms to either acknowledge them or open the trend analysis of the corresponding item.

Status
This is the alarm status (warning, alarm, critical alarm) As long as the conditions for an alarm status persist, the status is maintained even if you acknowledge the alarm.

Name
This is path and name of the plant tree item.

Exceedance value
This column shows the percentage by which the corresponding threshold value was exceeded or undershot. The undershoot value can be shown in a separate column if needed. This column can be enabled through the context menu of the corresponding column.

Value
This is the trend value which tripped the alarm.

ID
This the ID of the trend. By clicking on the icon you get to the trend in the plant tree.

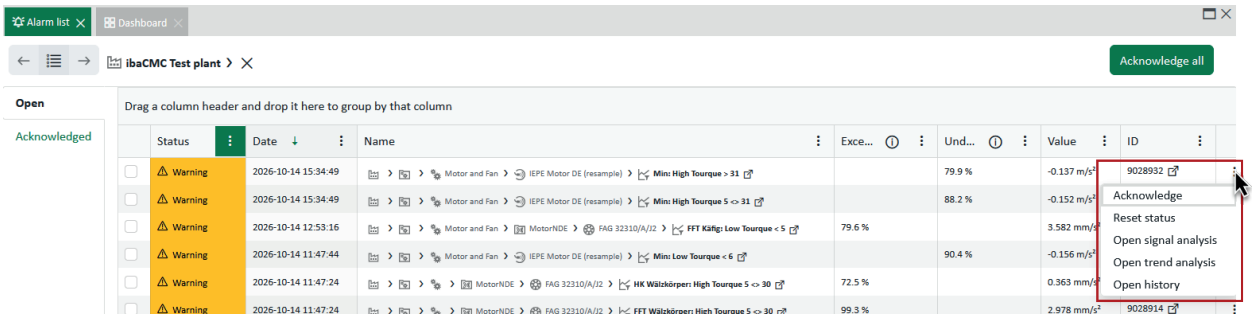
Acknowledge alarms
By clicking on the button <Acknowledge all> above the alarm list you can acknowledge all alarms at once. The alarms are then moved to the *Acknowledged* tab.

If you only want to acknowledge a few alarms, check them in the first column and then click on the button <Acknowledge selected> that then appears.



Furthermore, another button <Open trend analysis> appears, if you have checked one or more rows. When you click on this button, a trend analysis opens, containing the corresponding trends.

If you want to acknowledge single alarms, open the context menu at the end in the alarm row and choose *Acknowledge*.

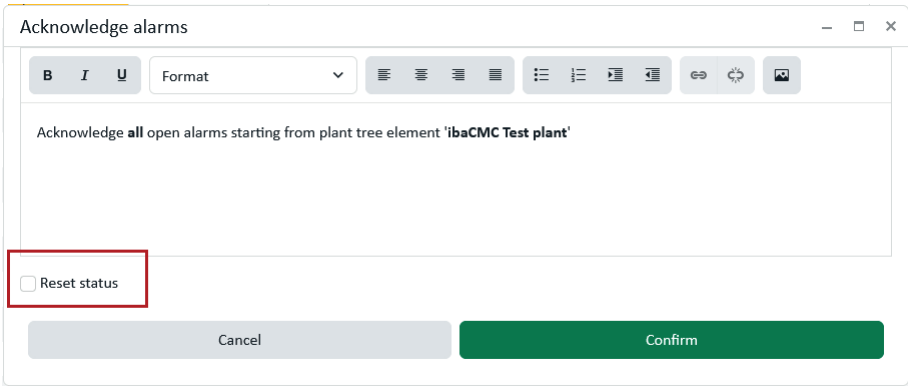


Moreover, you can use this context menu to jump to the corresponding signal analysis or trend analysis or to open the alarm history.

If “Manual Reset” is selected for *Type of status change* under *Monitoring* in the plant configuration, the Reset Status command will also appear in the context menu.

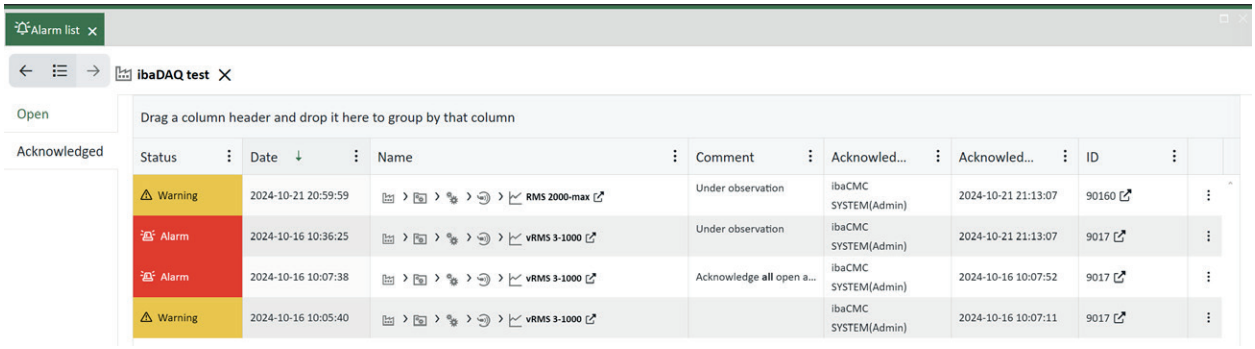
You can then use this command not only to acknowledge a message, but also to reset the status to its current state. For example, if there are currently neither warnings nor alarms pending, the status changes to “Normal.”

You also have the option to reset the status when you click <Acknowledge all>. In the subsequent dialog box for entering a message and providing final confirmation, you can enable this option, provided that “Manual Reset” is selected.



Acknowledged alarms

If you acknowledge alarms, they are moved to the *Acknowledge* tab.



The table has columns and functions as follows

Status
This is the status at the time of acknowledgement. The status will not be changed anymore.

Date
This is date and time of the alarm occurrence (tripping).

Comment
This is the comment which has been entered when acknowledging the alarm. The comments are linked to the logbook where they can be seen as well.

Once made, comments can only be edited later in the logbook view.

Acknowledge by
This is the name of the user who has acknowledged.

Acknowledge date
This is the date of acknowledgement

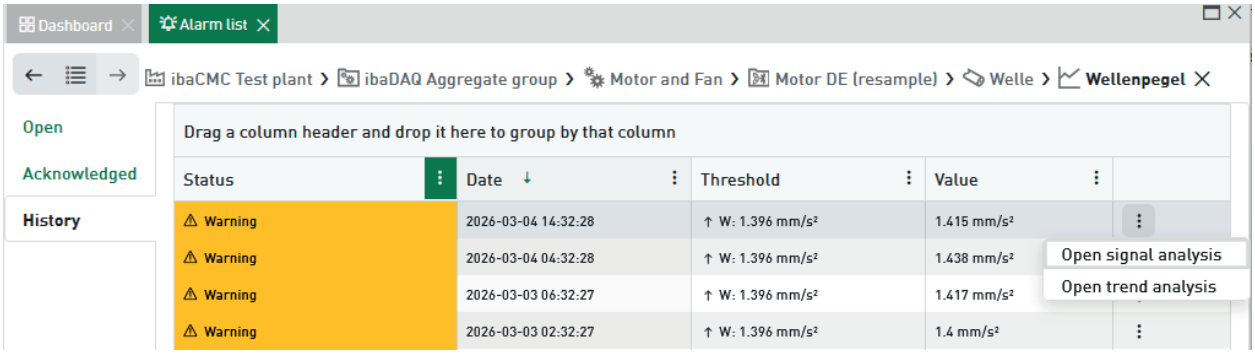
ID
This the ID of the trend. By clicking on the icon you get to the trend in the plant tree.

Alarm history

For each current alarm in the alarm list, you can view its alarm history.

To open the alarm history, click on the three-dot menu at the right end of the alarm row and select *Open history*.

You will get a tabular view with all previous alarms of this specific component in a *History* tab.



This tab is only available if you open the history as described above or if you draw a single trend from the plant tree into the *alarm list* window.

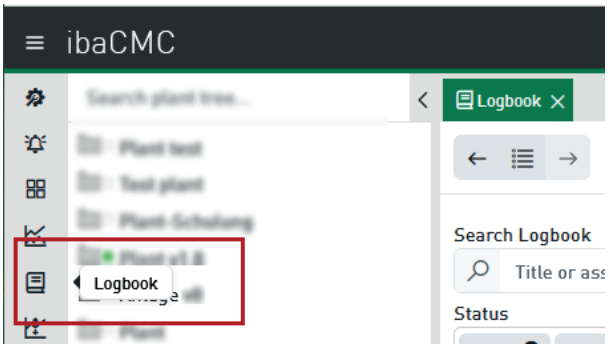
The table shows the alarms with their status, date, configured threshold value and actual signal value.

By using the three-dot menu at the end of the row you can open the corresponding trend or signal analysis.

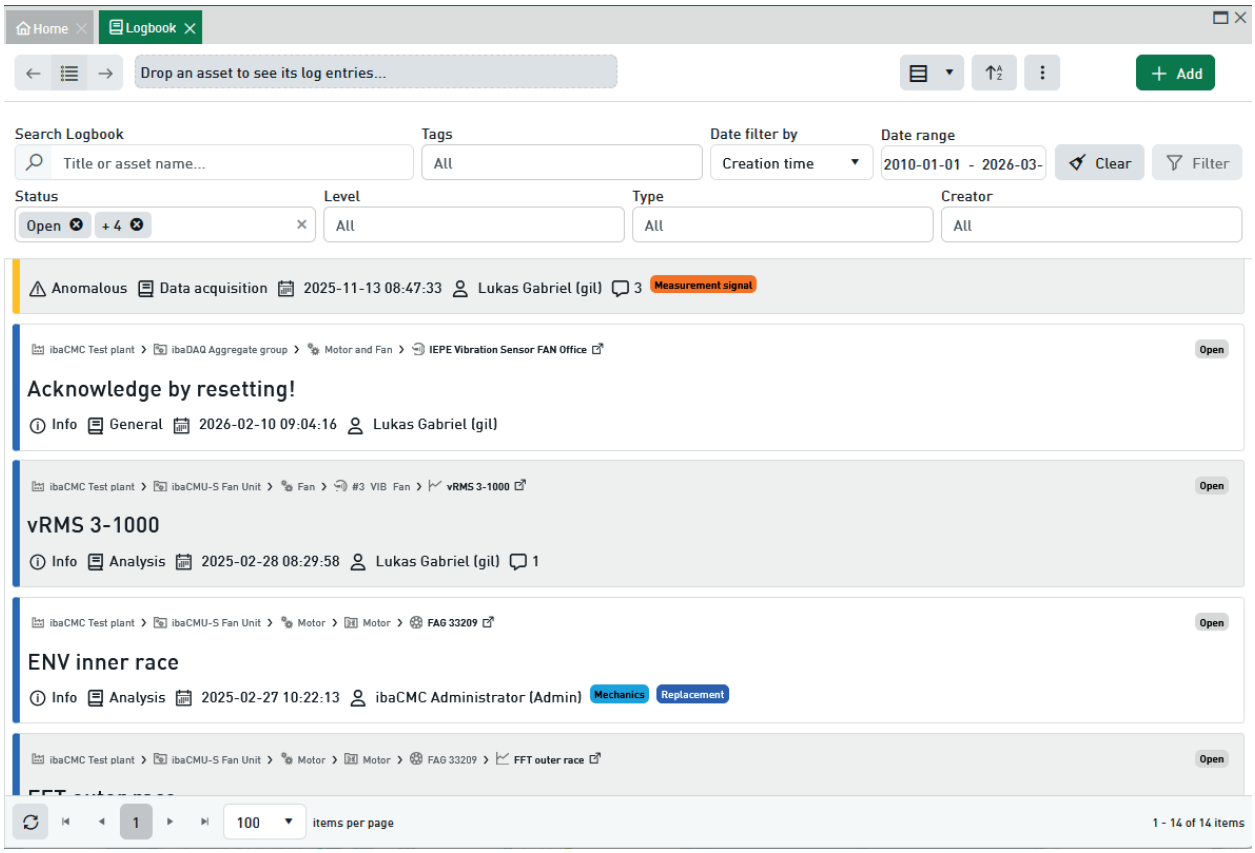
18 Logbook

The logbook contains all events triggered by items in the plant tree (e.g., configuration changes) as well as entries that were created manually.

To open the logbook, click the corresponding icon in the menu:



When you open the logbook, *ibaCMC* displays all logbook entries with the status “open” by default.



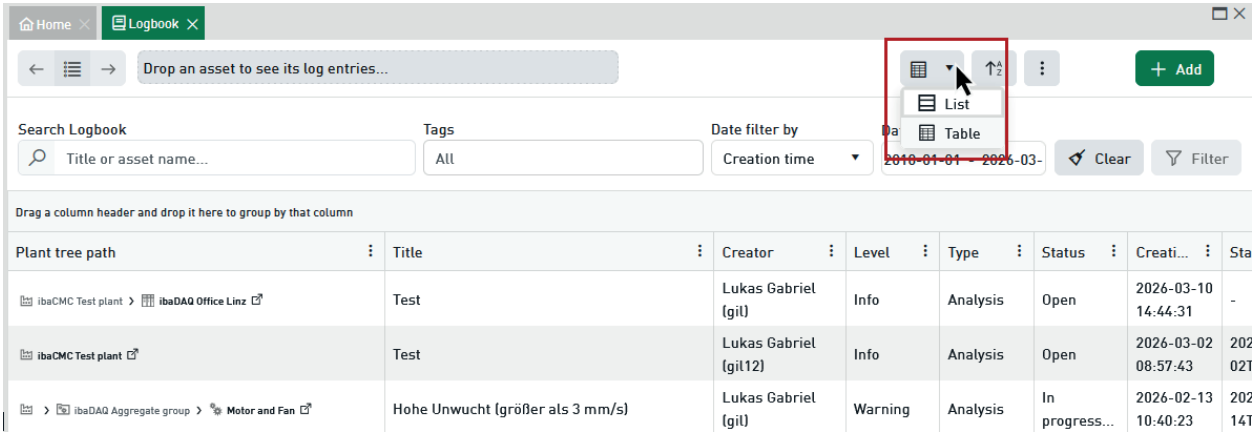
By default, the display is in list format. Each logbook entry has a colored bar on the left that indicates the level:

- Blue = Info
- Yellow = Anomalous
- Red = Critical

Beside the title, more information is included, such as

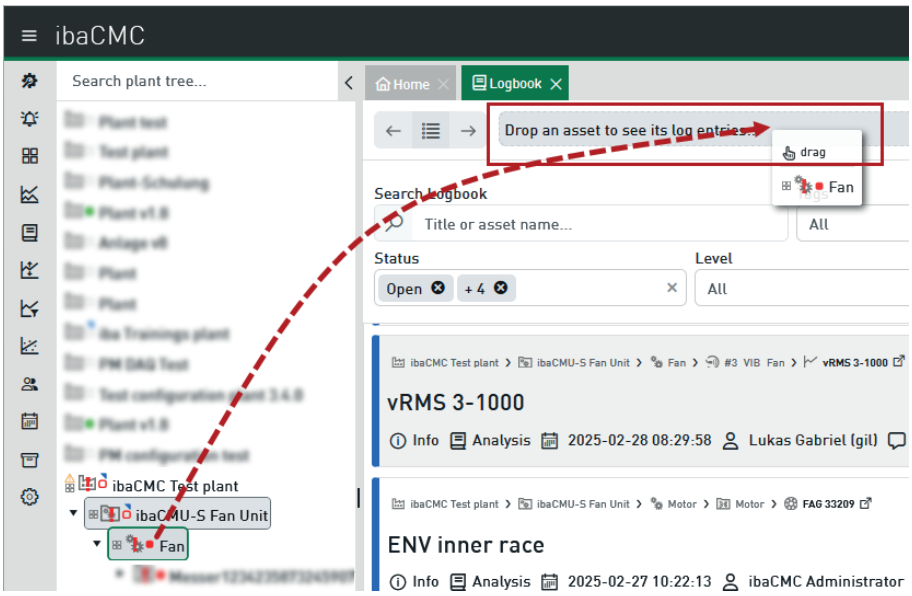
- Plant path
- Type
- Date
- User name
- Tag
- Status

The list can be filtered by criteria such as *status*, *level*, *type*, and *creator*. A search function based on title or asset name is also available to help you find specific entries. If desired, you can switch the view to table format by clicking the icon in the header.



To filter data in the table view, you can use the familiar functions in the column headers.

To load the log entries for a plant tree item, you can drag and drop it onto the corresponding field in the header. In the following example, the “Fan” component group is selected.



After that, only log entries associated with the selected item will be displayed. By default, child items are also displayed. If you do not want this, you can turn it off.

You also have the option to select child or parent items for display. To do this, click the three-dot menu in the header and choose whether you want to display the log entries for child and/or parent items alongside the selected item.

18.1 Logbook entries

Logbook entries are time based events. They can be generated manually or automatically.

Note



To enable system events to be viewed and custom events to be created, the logged in user must have logging privileges.

A log can contain multiple comments, e.g. created by different users.

Log level
Events are linked to a log level, which provides information about the severity of an event. The log level also enables you to filter very effectively to find the most important messages. The following log levels are used for the events:

ID	Level	Description
1	Info	Information messages that do not indicate abnormal behavior.
2	Anomalous	Warning (information), indicates an abnormal state. No immediate action is required.
3	Critical	Highest level of severity; these events should definitely be followed up

Log types
Log types are helpful for grouping related log messages. iba AG recommends using the following log types according to the description:

Log types	Description
Analysis	Logs regarding data analysis, e.g. if you found anomalies you want to document
Data acquisition	Logs regarding data acquisition, e. g. sensor defect, interfering signal, no signal etc.
General	Logs without specific relation, e.g. system was updated
Maintenance measure	Logs regarding maintenance actions, such as motor changed, bearing oiled, oil changed

Log status
The status can be used to document the processing of an entry.

Log status	Description
Open	Each new entry gets automatically the status "open".
Planned	The entry was noted, and a course of action was planned.
In progress	Somebody is working on the issue.

Log status	Description
Under observation	Observing the root cause of the entry/analyzing the problem
Recommendation given	The issue of the entry was analyzed and a recommendation for further actions was given to the operator
Done	Problem solved/issue closed; no further action required

Tags
You can use tags to categorize and label log entries by topic, for example. A single entry can be assigned multiple tags. There are some predefined tags that you cannot modify. However, you can define your own additional tags in the system settings.

Tag name	Recommended use
CM-System	Issues regarding the CM-system
Lubrication	Events, actions, issues regarding the lubrication
Measurement signal	Issues or actions regarding sensors and signal quality
Mechanics	Mechnical issues like imbalance, bad alignment etc.
Replacement	A component, component group or aggregate was replaced
Trend	In case of increasing, decreasing or instable trends of indicators
Wear	Wear or defects of mechanical components
Test	For testing purposes

18.2 Detail view/event table

For each logbook entry there is a detail view.

You have the following choices to access the detail view:

- Logbook window: Click the entry in the list or table
- Signal analysis: Click the entry in the *Logbook* tab

In the detail view, the list of log entries continues to appear on the left side in condensed form (if the browser window is large enough). The right side displays the details for the selected entry.

In the detail view, you will find all the information about the entry, as well as its change history and—if available—notes.

Here, you can also make changes to the entry. To do so, click the button with the pencil icon in the header bar.

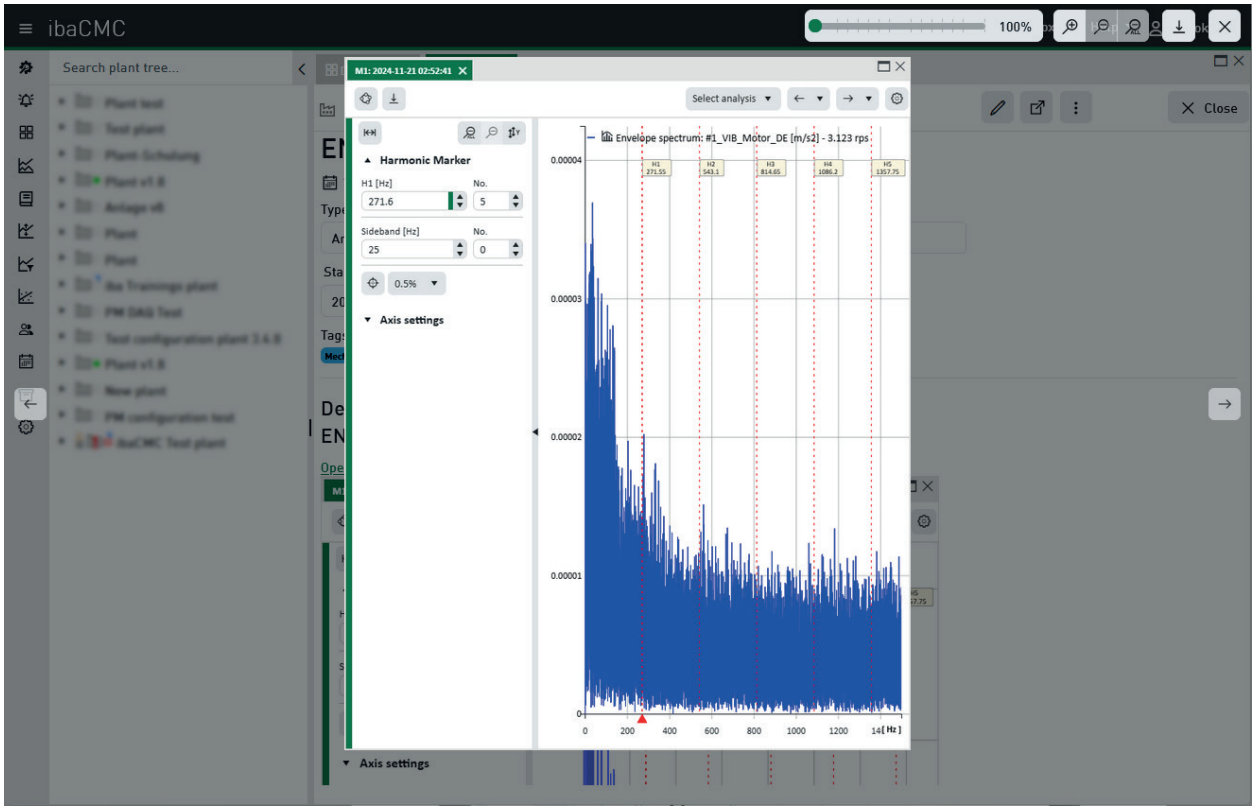
You can now edit all the information, such as changing the status or adding to the description. When you exit the dialog by clicking <Confirm>, the change will be saved in the history.

If there are already notes in the logbook entry, you can also edit or delete them individually.

Logbook entries ceated by signal analysis
When a log entry is created based on the signal analysis, the active tiles from the signal analysis are also saved as an image file. In addition, a link to the relevant analysis is embedded in the log entry above the graph.

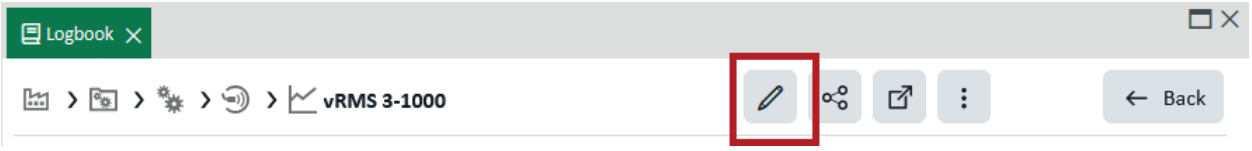
A built-in image viewer helps you view the embedded image. Click on the image in the entry, and it will be displayed enlarged in the image viewer. From there, you can zoom in further and download the image.

If there are multiple images in the entry, you can use the arrow keys and buttons to switch between them.

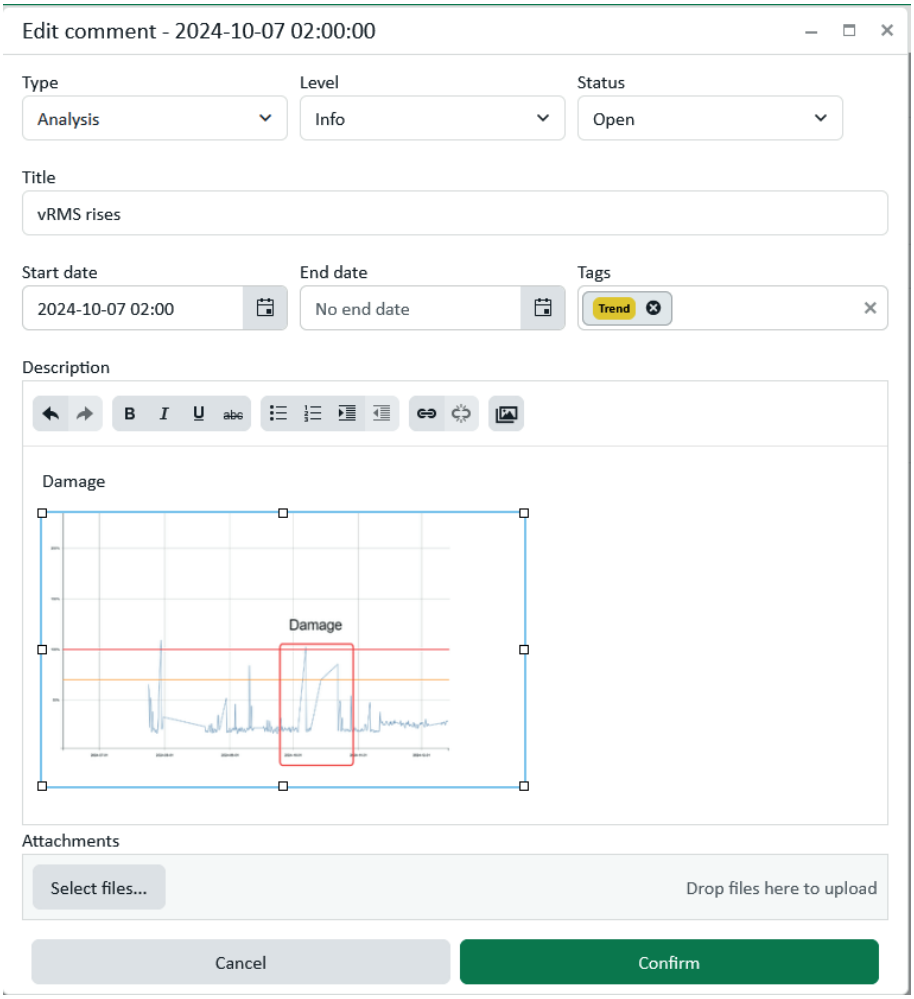


18.3 Edit logbook entry

To edit a logbook entry, click the button with the pencil icon at the top of the toolbar in the entry's detail view.



The *Edit Comment* dialog box opens, and you can now change all the information.



Type, Level, Status, Tags etc.
You can change these settings using the drop-down lists in the fields or the calendar feature.

Description
In the *Description* section, you can add or remove text or images. Several tools are available for formatting text.

Attachments
You can also add additional files as attachments to the logbook entry. The following file types are supported:

- PDF files (.pdf)
- Graphics (.jpg, .jpeg, .png, .gif, .bmp, .webp)
- Word files (.doc, .docx)
- Excel files (.xls, .xlsx)
- PowerPoint presentations (.ppt, .pptx)
- Text files (.txt)

- Archive files (.zip, .7z)
- Sound files (.mp3, .wav)
- Web pages (.http)
- Emails (.eml, .msg)
- ibaAnalyzer analysis files (.pdo)

You can drag and drop files into the field or click the <Select files...> button to browse for them in your file system.

If you exit the dialog by clicking <Confirm>, the change will be saved in the history.

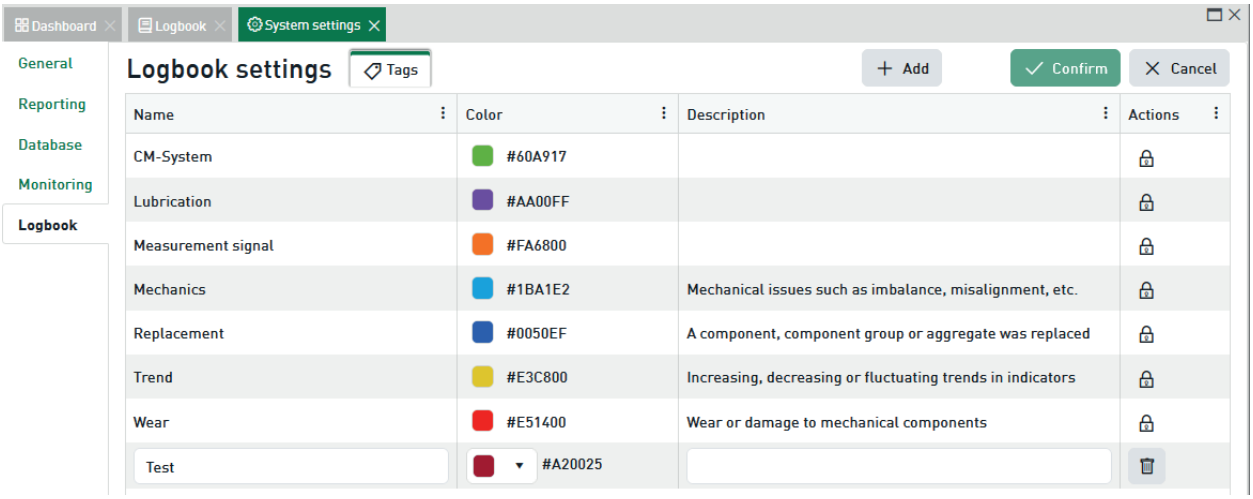
If there are already notes in the logbook entry, you can also edit or delete them individually.

Updates are applied immediately for all users; manually refreshing the view is normally not necessary.

18.4 Logbook settings

In the *System settings*, under the *Logbook* tab, you can configure custom settings.

Available are the settings of the tags.



A number of tags have already been predefined. You cannot change the name, color, or description of these tags, nor can you delete the tags themselves. You can tell this by the lock icon in the *Actions* column.

To add a new tag, click <+ Add> in the header. A new row will open where you can enter a name and description and select a color.

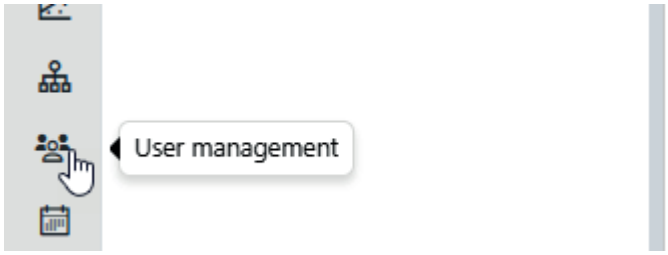
19 User administration

In user administration, the users and user groups (roles) are created and rights are assigned. The rights system is role-based. This means that for a user to be granted a particular right that user must be a member of a group that already has the relevant right. A user can be a member of different groups. In a new system, we recommend defining the required groups (roles) first and then creating the users.

Note:

To create new users/user groups or edit existing ones, the logged in user must have these user rights.

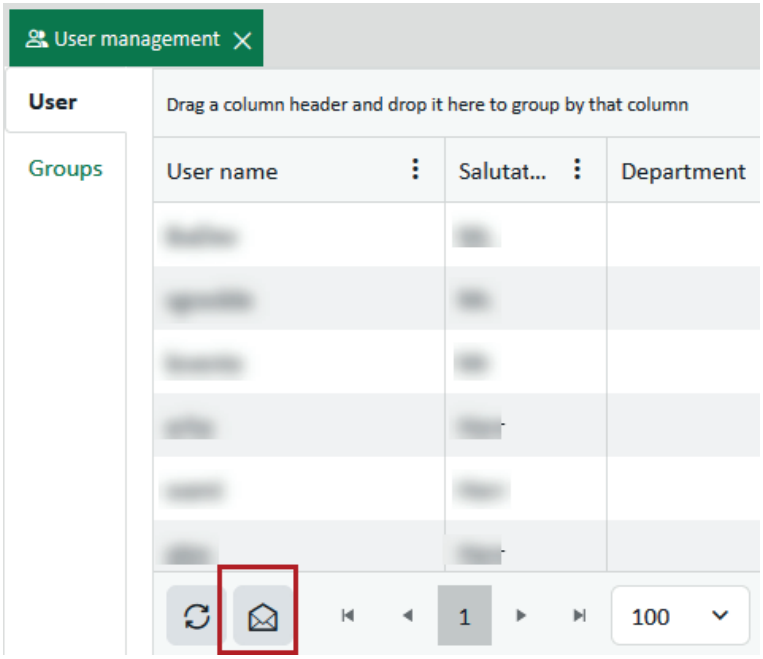
To open user administration, click on the corresponding icon in the menu bar.



19.1 User

On this tab, all configured users are listed in tabular form. You can add, edit, or remove users here.

At the bottom of the table, you'll find several buttons and controls for viewing the data, as well as a button for sending an email. To use the email function, an email client must be installed on your computer.



When you click the email button, the default email program on your computer opens, and all users visible in the table are added as recipients. This allows you to send a message to all users—for example, to notify them of a planned outage prior to an update.

When you click on a row, you'll be taken to the detailed view for that user. Here, you can make all the necessary entries, which are described below.

General

The *General* tab is used to configure the general user data.

Property	Description
Salutation	Enter the relevant salutation here.
Department	Enter the department to which the user belongs.
Language	Select the language in which the user interface will be displayed for the user. English and German are currently supported. Note that terms entered by the user, e.g. names in the plant configuration, comments, etc. ARE NOT subject to this language conversion.
User name	Enter a login name here (must be between 3 and 80 characters long).
First name/Last name	Enter the first name / last name of the user here (this name is also used for notifications and reports).
E-mail	Enter the user's correct e-mail address here (this address is used for sending notifications and reports).
Telephone/Mobile phone number	Enter a land line / mobile phone number here (optional).
Assigned user groups	This field cannot be edited and shows which groups the user is assigned to. These groups specify which privileges the user has and which plants they have access to (more details under Groups).
Set password	Assign a login password here.
Appearance	The font size displayed can be set here: Small, medium, normal, large, and very large

Selection

The following settings can also be configured by the user themselves in their profile.

Property	Description
Plant selection	The plants to be displayed to the user in the plant tree can be selected here. The available plants depend on the user group of which this user is a member. If the user is a member of multiple groups, multiple plants are available. If no plant is selected here, all plants to which the user has access are displayed in the plant tree.
Report selection	Here, you can select the reports to be generated as HTML files and sent by e-mail.

Notification

In the *Notification days* field, select the days on which you want to receive notifications. The period of the notification can then be selected and the notification can be configured.

Predefined notifications can be selected in the table. By defining a classification level (Normal, Warning, Alarm, Critical alarm), you can specify the status from which the notification is to be sent.

Predefined notifications can be selected in the table. By defining a classification level (Warning, Alarm, Critical alarm), you can specify the status from which the notification is to be sent.

The status for a notification is sent immediately when it occurs.

The interval can be used to select how often sending of the notification is repeated.

The template specifies which notification template is to be used. The default template is selected here by default.

Log notification

Here you can select which log notifications are to be sent by e-mail.

You can choose between different types. The level can also be selected for each type.

19.2 Groups

In the *Groups* area, user groups can be created, edited, or deleted.

The *Administrator* user group is the only one that cannot be edited or deleted, and has all rights.

The user groups are designed to combine different access rights.

<Add> creates a new group, while clicking on the group name enables the group to be edited.

General:

The rights that the members of the group have are assigned here. If a right is disabled, the function or the menu item is not displayed.

If the *Read only* field is enabled, the user can view the relevant function but cannot edit it.

Since a user can be part of multiple groups, and thus has the combined set of access rights, it is possible to strictly prohibit a right. This revokes that right from members of the group, although the user may possibly be part of another group that has the right.

During parallel operation, some fields are grayed out. These fields have no influence on this system until it has been migrated to the *ibaCMC* v3.0.0 version.

Overview of rights:

Right	Description
Aggregate	Allows aggregates to be viewed, created, edited, and deleted in the plant tree
Aggregate Group	Allows aggregate groups to be viewed, created, edited, and deleted in the plant tree

Right	Description
Analysis	Allows the analysis functions (time signal, spectrum, etc.) to be used
Calculation	Allows calculations to be created, edited, and deleted
CMU	Allows CMUs to be created, edited, and deleted
CMU Data Import	Allows CMU data to be imported into the communication database
CMU Data Transfer	Allows CMU data to be transferred from the communication database to the central database
Component	Allows components to be viewed, created, edited, and deleted in the plant tree
Component Group	Allows component groups to be viewed, created, edited, and deleted in the plant tree
Correlation	Allows trend correlations to be created and edited
Dashboard	Allows dashboards to be created, edited, and deleted
Data Sources	Allows data sources to be created, edited, and deleted
Database	Allows database backups to be performed
Export	Allows export files to be viewed and downloaded
Level Adjustment	Allows limits for trends to be created, edited, and deleted
Logging	Allows events to be viewed, and also allows user events to be created
Measurement File	Allows data files to be viewed and downloaded
Notifications	Allows notifications to be created, edited, and deleted
Online	Allows online signal displays to be viewed
Plant	Allows plants to be viewed, created, edited, and deleted in the plant tree
Plant Configuration	Allows generally components to be viewed, created, edited, and deleted in the plant tree
Plant Tree	Allows the plant tree to be viewed
Reports	Allows reports to be created, edited, and deleted
Reports PDF	Allows PDF reports to be viewed
Sensor	Allows sensors to be viewed, created, edited, and deleted in the plant tree
System Configuration	Allows entries in the system configuration to be created, edited, and deleted
TCPIP	Allows TCP/IP telegrams to be viewed, created, edited, and deleted
Translation	Allows translations to be created, edited, and deleted
Trend Analysis	Allows trends to be viewed in the trend viewer
Units and Dimensions	Allows units to be created, edited, and deleted
User	Allows users to be created, edited, and deleted
User Groups	Allows user groups to be created, edited, and deleted
Virtual Trend	Allows virtual trends to be viewed
Virtual Trend Status	Allows status trends to be viewed

Selection:

The plants and users in this group are managed under Selection.

Selection	Description
Plant selection	The plants to which members are to be given access are selected here. If no selection is made here, the users cannot view any plants or access their data.
Members	Users can be added to or removed from this group here. (If the users' rights are changed while they are logged in, the rights take effect on the next action by the user (if necessary the user is logged out)).

19.3 User profile

The name of the logged in user is displayed in the top right of the browser. The user profile for the logged in user can be opened using the drop-down menu.

Click on a user name to open the user profile and edit the data for the logged in account.

19.3.1 General

The following parameters can be configured on the *General* tab:

Parameter	Description
User name	Shows the user name on the account. This is specified once when it is created and cannot subsequently be changed.
Salutation	Form of address or title
First name	First name of the account holder
Last name	Last name of the account holder
Department	Information about a department can be defined here. This is optional.
Language	The language that is displayed when this account is logged in.
E-mail	The e-mail address that is used, e.g. for sending notifications.
Phone number	The user's phone number
Mobile number	The user's mobile number
Assigned user groups	The user groups of which this account is a member.
Set password	The password can be set or changed here.
Appearance	The font size displayed can be set here: Small, medium, normal, large, or very large.

19.3.2 Selection

Configurations concerning the plant view or the reports can be made here.

Selection	Description
Plant selection	Selection of the plants displayed in the plant tree. If no plant is defined, all plants for which this account has authorization are displayed.
Report selection	The template for the report is selected, which is to be used for notification of a report.
Expand on start	Here you can select which plant tree item is to be opened when you log into the application.

19.3.3 Notification

The details for the notifications can be defined in the *Notification* area.

Notification	Description
Start and end of notification	Specifies the time span in which notifications can occur. If a notification occurs outside this time span, the system waits until the start time before sending the notification.
Notification days	The days on which a notification is sent.

ibaCMC v1 notifications
Only *ibaCMC* v1 notifications are displayed here. They can be enabled and disabled here. A level can be defined for each notification.

It is not possible to create *ibaCMC* v1 notifications in *ibaCMC* v3. To do this, you have to switch to the *ibaCMC* v1 web client.

19.3.4 Log notification

Depending on the log type and log level, the user can configure a notification. In other words, log book entries about damage, analyses, or CMU configuration errors for example can be sent by users as a notification. This keeps the user up to date at all times and enables them to respond promptly to any faults with the plant.

The following log types are available:

Type	Description
Analysis	Log book entries of Analysis type
Configuration	Log book entries of Configuration type
Data acquisition	Log book entries of Data acquisition type
Monitoring status	Log book entries or system messages of Monitoring status type
System	System messages, sent by the system
Client	System messages, sent by the web client
Component condition	Log book entries of Component condition type

19.3.5 Preferences

In this area, default values (presets) can be specified, which will be automatically used by the different tools.

The *Options > Delete entries* button resets all settings made to the default settings. The further options *Import* and *Export* can be used to export the user settings made as a json file and re-import this file.

Signal analysis
In this section, default values can be set for the signal analysis.

The following options can be selected for the analysis window:

Option	Description
Start with collapsed kinematics table	If this option is enabled, the kinematics table is collapsed in the analysis when it is started.
Start with collapsed analysis settings	If this option is enabled, the analysis settings are collapsed in the analysis when it is started.
Start with collapsed trend view	If this option is enabled, the trend view remains collapsed in the analysis when it is started.

Default start settings for signal analysis chart

You can make the start settings for the analysis chart here.

For *FFT spectrum - Acceleration, FFT spectrum - Velocity* and *Envelope spectrum - Acceleration ENV* the following start settings can be made:

Setting	Description
Start with	**Order:** Order spectrum is loaded when starting. **Frequency:** Frequency spectrum is loaded when starting.
Hz / %	Select whether x-Min and x-Max is specified in % of the sampling rate of the DAT file or absolute in Hz.
x-Min	Setting for the minimum value of the x-axis scaling
x-Max	Setting for the maximum value of the x-axis scaling
Auto scale x	**Active:** The maximum scaling is restricted to the content of the DAT file. **Inactive:** The settings for x-Min and x-Max are applied without restriction.

Trend analysis
Start settings for the trend analysis can be made here.

Setting	Description
Rel/Abs	Default setting for Y-axis in trend analysis: relative or absolute representation
Chart default time range	Default time range to be loaded in the trend analysis. Specified in days.
Select color palette	You can choose between *ibaCMC* v2, *ibaCMC* v1 and custom color palette. The custom color palette can be individually defined. The 3 dots can be used to export and import color palettes.

Format
The date and number formatting for the system can be adjusted here. The settings are shown in a preview.

After changing the date format, the browser must be reloaded so that the changed date settings will be applied correctly.

19.4 Inbox

The inbox is used to quickly send notifications to logged in users. For various processes that a user has started, the system sends short messages showing the progress of the process, and success or error messages. There are also processes that require a response from the user in order to be completed.

The inbox also enables users to send messages to one another.

> **Note:**
>
> Messages are not retained when the server is restarted.

The inbox is divided into categories.

- Configuration
- Personal

Configuration
Contains all messages relating to creation or updating of data structures.

Personal
Personal messages explicitly addressed to the relevant user.

20 System

The system settings are a collection of global variables and settings that the system requires. These settings are split over various tabs to improve clarity.

20.1 System settings

General system settings are made on the *General* tab.

Base URL
The base URL under which the web application is opened in the browser.

The URL quoted in alarm messages usually refers to "localhost". In order to make the web client accessible by other computers in the network, replace "localhost" by the real computer name. You can change this setting in the file `appsettings.json`. After the modification, restart the *ibaCMC* service to make the changes come into effect.

Server host IPv4
Specifies the IPv4 address of the server host and overwrites the 'LocalHostIPv4' system info property. Use this address if the application is unable to determine the IP address using the interface name from `appsettings.json` [default: '255.255.255.255']. This IP address is also used for connections to *ibaDAQ*/*ibaM-DAQ* (*ibaPDA*).

System language
This language setting only affects the predefined assets in the component library. The language of the user interface is set in the user profile.

First day of week
Defines the day that will be used as the start of the week. This is crucial for the weekly report, which is created and send on the first day of the week. [Possible values: Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday]

Note



If the weekly report is done manually and the current day is not the same as the first day of week, no report is created. The first day of week can be temporarily changed for testing purposes.

System paths
The System paths area displays the paths for the Archive, Error, and Temp folders. The Error and Archive folders are normally set under Plant configuration > Plant > Paths. The system paths are only used if no path is specified there.

Archive folder
Defines the storage location for the archive folder. [Default: C:...\Archive]

Error folder
Defines the storage location for the Error folder. [Default: C:...\Error]

Temporary folder
Defines the storage location for the temporary folder. The temporary folder is used to temporarily store the new data. [Default: C:...\Temp]

MQTT broker
Settings for the local MQTT broker can be made here.

You can choose whether communication via the MQTT broker should be encrypted (TLS) or unencrypted.

If you enable TLS encryption using the toggle switch, unencrypted communication running on another port will be disabled. Switching in the other direction works accordingly. Both ports cannot be opened at the same time.

The ports have the following default numbers:

- TLS: Port 8883
- Unencrypted: Port 1883

If needed, you may adjust the port numbers.

If you choose the unencrypted option, a message will appear warning you that the connection may be insecure.

If TLS is enabled, the same certificate is used for both MQTT and the web server. Currently, it is not possible to configure different certificates.

If the certificate has to be changed, we recommend doing this directly using the `appsettings.json` file in the ProgramData folder or running the installer again and changing the certificate there.

For more information about updating or replacing a certificate see

In both cases, you can optionally enable the “Traces” diagnostic feature to track the MQTT connections.

After the change, the *ibaCMC* service has to be restarted.

Mail (SMTP)
On this tab you can set up the SMTP server (outgoing mail server), which is used for automated outgoing e-mails if needed. You can check the function by clicking on the <Send test email> button.

Info
The content of the system info table is displayed here. Information such as the database version, system language, etc. can be found.

20.2 Reporting

Settings for the status report, which is sent by mail, are made on the *Reporting* tab

The *Reports* sub-tab (selected by default) shows a tabular overview of all configured reports and a detailed view on the settings of each report.

The *Settings* sub-tab provides settings for basic report properties, that apply to all reports.

Note



Since version v3.9 the report configuration has been simplified significantly. Setting up a special SQL Server report service is no longer required and you may uninstall such a service, unless it is required for other purposes. Reports created before persist when updating to v3.9.

A standard template which is the same for all reports and which cannot be changed is used as report template.

Reports

All configured reports are displayed here in a list. You can use the switch in the first table column to enable or disable a report. Disabled reports will not be sent by mail, even if they are assigned to the user profile. Also, no tasks are created in the task scheduler.

Click on a report in the table to open the detail view. In the detail view you can read and edit the report configuration, if necessary.

For information about the settings, see ↗ *Add or edit a report, page 173*.

Settings

On this tab you can set up the basic report properties, that apply to all reports.

Header
Defines the header information for the reports.

Image / Company logo
A header image for the reports can be selected here. JPG and PNG files are permitted. An image in JPEG format with 150 px * 50 px resolution is recommended for best results. The image is saved as a “base64” string.

20.2.1 Add or edit a report

Before you add a new report, you should first configure the basic settings for the header and the default image or logo in the *Reporting* tab, under the *Settings* subtab. See ↗ *Settings, page 173*

To add and configure a new report, click the <+ Add> button in the report overview. This opens the configuration dialog, where you can now configure the following settings:

Name
Give the report a descriptive name.

Plant
The plant for which the report is to be created is assigned here. Drag the desired plant from the plant tree and drop it here in this field.

Report template name
Here, the "Asset Condition Report" template, which is supplied by iba AG, is selected by default. This template cannot be adapted.

Classification
At this point select the classification. You use the classification to determine the error status at which messages appear in a report. For example, if you set the classification on "Alarm", then the status "Alarm" and "Critical" will be considered only.

Report trigger settings
The trigger settings determine when a report is generated and sent. You can choose from a list of predefined intervals or define your own interval (user-defined).

Reporting period
Set up here the time period to be used for the report by entering start time, duration and end time.

Setting	Description
Start time on first day	Specifies the start time on the first day of the reporting period.
Number of days	Specifies the number of days to be used as the analysis period, starting from the creation date.
End time on last day	Specifies the end time on the last day of the reporting period.

Finally, save the settings by clicking on <Confirm>.

If you want to change the settings for an existing report, open the report's detail view. There you'll find the same settings as described above.

20.3 Database

On the *Database* tab, you can make settings for backups and clean ups in the database.

MSSQL
Observe the read and write privileges for the database settings.

Activate automatic backup
Enables automatic backup of the databases depending on the “Database” task.

Path
Specifies the path to the backup folder. Read and write privileges are required.

> **Note:**
>
> The database backup is saved on the database server. This means that the path refers to the database server. The folder is not created automatically.

Activate automatic clean up
Enables automatic clean up of databases depending on the “Clean up” task.

DB size limitation
Defines the maximum size of a database MB. Only active if *Activate automatic clean up* is enabled.

Threshold of DB size limit
If the database size exceeds the database size limitation percentage, the database is cleaned up. Only active if *Activate automatic clean up* is enabled.

20.4 Monitoring

Import

Import - Time range permissible
Defines the time interval in days in which new data can be read. Data that is older than this period is no longer read and is moved to the error folder. [Default: 100 days]

Bearing: Create additional trends in the spectrum
Specifies whether or not the “FFT level” is to be created. If this property is disabled, not all FFT levels for the bearing will be created. If the property is enabled, the “FFT level” is used in addition to the envelope curve level. Possible values: disabled, enabled [default: enabled]

Gear dam: Create additional trend in envelope spectrum
Specifies whether or not the “Gear damage levels” are to be created. If the property is disabled, the “Gear damage level” trend is not created when creating the gear. If the property is enabled, in addition to the “Gear mesh level” in the spectrum a “Gear damage level” is created in the envelope curve spectrum. Possible values: disabled, enabled [default: enabled]

File info key
Returns the names of the properties to be read from a DAT file and saved in the database. It is not mandatory for the property name to occur in every DAT file.

Channel info key
Returns the names of the properties to be read from a channel in a DAT file and saved in the database. The property name does not have to appear in every channel in the DAT file.

Disk

Receive e-mails
Enables e-mail notifications for disk monitoring.

Disk monitoring alarm threshold
Specifies the percentage limit for the alarm range which is used in the drive cleanup. Possible values: 85% - 95%

Disk monitoring warning threshold
Specifies the percentage limit for the warning range which is used in the drive cleanup. This value is calculated from the alarm threshold.

Warning threshold = Alarm threshold - 10%

Notification group

In the notification group, multiple trends can be combined into a single group. This notification group can then be used in the notification configuration in the user profile.

Depending on the selected level in the user profile, a notification is sent as soon as a trend from the group reaches or exceeds the set level.

Template

Under *Templates* you can create custom templates for the email notification.

Use the <+ Add> button to create a new template, which can then be modified.

20.5 Logbook

In this tab you can create and edit tags for logbook entries.

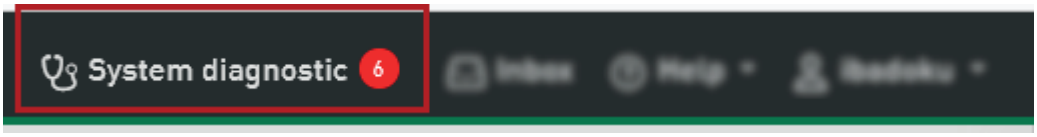
For more information see ↗ *Logbook settings*, page 161.

20.6 Diagnostics

Diagnostics is used to obtain a rapid overview of the state of the measurement hardware and the analysis server.

System diagnostics tab

You get the *Systems diagnostic* tab by clicking on the corresponding button in the toolar.

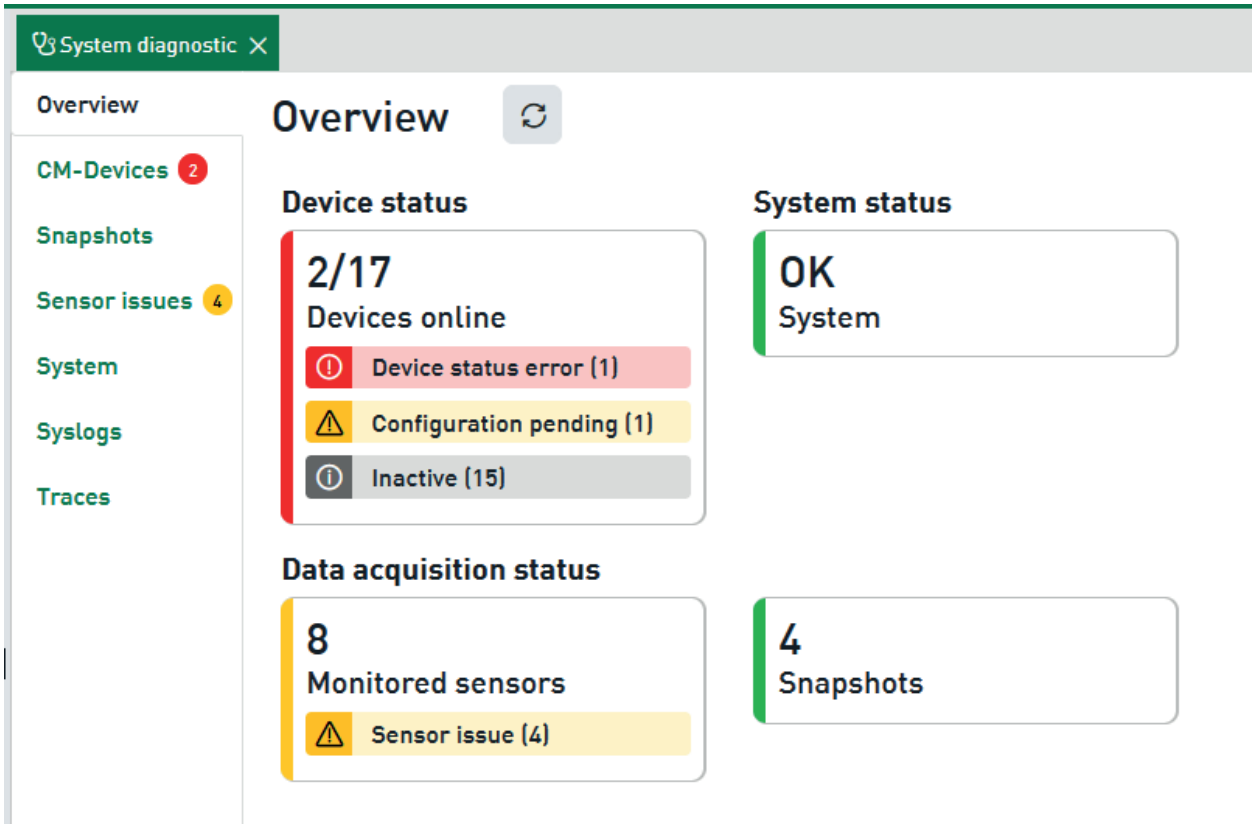


The button indicates the number of warnings (yellow) or errors (red). If errors and warnings are existing, the errors will be indicated. A tooltip on hover breaks down the messages.

The tab opens with an overview, showing the major status information. Furthermore, there are subordinated tabs providing more detailed information about the different areas.

Overview

The overview consists of different tiles showing status information about the devices, the system and the data acquisition. If a tile shows status messages, you'll get more detailed information by clicking on the message.



CM-Devices

In this tab you'll find the CM-Devices, as selected in the user profile and visible in the plant tree, listed in a table with selected information about status, serial number, IP address, software version etc.

If needed you may filter the table by CM-Device types or plants.

If you click in a row, the view will switch to detailed view on the corresponding device.

In the *Info* tab you see information which is cyclically refreshed by the device. A red row indicates that there is a device error which should be fixed. Examples for such critical device errors are *TCP telegram not connected*, *data acquisition stopped* or *license invalid*.

In the *Logs* tab you'll find the recent logs sent by the device. These logs can be filtered by level, date and text.

Snapshots

In the *Snapshots* tab you can see an overview of the statistics of the snapshots.

It shows how many measurements are planned, how many were successful and the success rate.

If the success rate falls below the warning threshold configured for the plant, a yellow badge is shown for these success rates. The success rate is always calculated by dividing the actual measurements by the total possible measurements.

The considered time range can be configured per plant.

Default setting: 1 week, starttime 0:00 h, endtime 23:59 h.

Sensor issues

All vibration sensors that have a sensor defect are listed here.

A sensor defect is detected automatically when using ibaMS8xIEPE modules and is output directly by the module. If the older ibaMS8xICP modules are being used, a sensor defect is output if the effective signal drops below 0.05% of the measurement range.

Example
If a +-50 g sensor is used, it has a measurement range of +-500 m/s².

0.05 % of 500 m/s² is 0.25 m/s². If a sensor is not connected, only signal noise is received at the input, which is in the range of 0.05 m/s². This is well below the limit of 0.25 m/s² and a sensor defect is output.

System

This tab shows system-relevant information, such as MQTT broker status, settings, folders, access rights and the disk space consumption of the archive folders. Furthermore, errors caused by expired cerficates for secure communication are indicated here.

Syslog

The *Syslog* tab shows the progression of system events. An event is made up of a level, the time, and a description. The level reflects the significance of the event. The following types exist:

- Error
- Warning
- Info
- Debug

The list is sorted in descending order by date, i.e. the most recent entries are at the top. Clicking on an event opens the detail view showing the entire text. Clicking on <x Close> takes you back to the list view.

Traces

Traces are temporarily saved event records. The record starts after opening the Traces tab and is deleted again when exiting. Trace logs are created in real time and thus allow easy observation of recently triggered events.

New trace logs are added to the list at the bottom. Automatic scrolling is enabled by default. This functionality can be disabled if required. To better emphasize the events you are looking for, you can enter a search text. Trace logs containing that text are marked in color.

20.7 Archive

The archive is used to store the raw data from the Condition Monitoring Units, the configuration text files and the generated reports, and they can be downloaded from the archive to the local PC. You can download the files by clicking on their name.

Archived configuration text files
The *Export* tab contains an overview list of the configuration text files. This list is automatically sorted by the creation time. The most recent files are always at the top of the list.

Archived data files
The *Files* tab contains an overview list of the data files. These files are saved in the DAT file format and can also be analyzed using the free *ibaAnalyzer* analysis software.

The data files have different content depending on the file name.

*trs.dat	Contain the time signals for the sensors
*fft.dat	Contain pre-calculated FFT signals
*fht.dat	Contain pre-calculated envelope curve FFT signals
*aot.dat	Contain time signals from the sensors in shaft orbit monitoring
*fot.dat	Contain the FFTs for shaft orbit monitoring

Archived reports
The *Reports* tab contains reports in PDF format. They can be downloaded in the same way as the configuration and data files. In order to be able to view the reports, you require a standard PDF viewer such as Adobe Acrobat Reader©.

20.8 Task scheduler

Here, you will find a list of tasks that are performed at defined intervals. The interval is defined using a 'Crontab'.

The tasks are divided into different categories or tabs as follows:

- CM-Device tasks: These tasks will be created per device, e. g. in oder to import data.
- Report tasks: These tasks will be created for each configured and enabled report and they control the report generation.
- System tasks: These tasks are supplied for the general system.

CM-Devices

Name	Description	Interval
CMU Task {CMU name} {CMU ID} {CMU IP address}	Downloads the XML and DAT files from the CMU + diagnostics	Default: Every minute
MicroCMU Task {Application name} {microCMU ID} @ {microCMU IP address}	Queries the trend data via REST API and saves it to the database	Default: Every minute

Report tasks:

Name	Description	Interval
Report task: {report name}	Execution of the configured report (report must be enabled)	Default: Daily at midnight

System tasks:

Name	Description	Interval
Update Check	Checks whether new software versions are available. Only functions if there is an active Internet connection.	Default: Daily at 6:00 AM
Send log notifications	Sends the log notifications that the user has set under *Profile > Log notification*.	Default: Daily at 6:00 AM
Refresh Plant Tree Status	Recalculates the plant tree status for all items.	Default: Every hour
Notification Worker	Checks whether an interval for a status violation notification has been reached. If so, a notification is sent.	Default: Every 10min
Deadman Worker	Checks whether a trend has Deadman status. If so, it is set to Deadman status.	Default: Every minute
Clean Up Server	Performs the clean up for CMUs (DAT and XML file archive), hard disk memory, and database.	Default: Daily at 2:00 AM
Clean Up Plant Tree Status Trends	Deletes status trends no longer required from the plant tree. This should be performed manually after migration.	To be performed manually
Check application folders	Checks access to the archive folder and sets the status in the diagnostics.	Default: Every minute

Adjusting the schedule for the tasks
You can adjust the default schedule (trigger mode) set for the tasks in different areas.

- System tasks: Edit the file `appsettings.json` on the application server. The tasks are listed under the *TaskScheduler* node. Each task contains a Schedule property, which can be adjusted. The schedule is specified in Cron format, which is explained below.
- CM-Devices: Setup is part of the CMU configuration, *General* tab - *Import task interval*. You can choose out of pre-configured intervals.
- Report task: Setup is part of the configuration dialog of each report under *System settings* – *Reporting* tab – *Reports* tab. You can choose out of pre-configured intervals.

Crontab
Crontab is a method of specifying intervals, which is widely used in programming. A *Crontab* has five adjustable values.

1. Minutes (0 - 59)
2. Hours (0 - 23)
3. Day of the month (1 - 31)
4. Month (1 - 12)
5. Day of the week (0 - 6)

You can use these values to define intervals (e.g. */1) or specific times. You can find a useful tool for the *Crontab* settings undercrontab.guru.

Examples:

Minute	Hour	Day of the month	Month	Day of the week	Explanation
*	*	*	*	*	Every minute
*/5	*	*	*	*	Every 5 minutes
0	*	*	*	*	Every full hour
5	*	*	*	*	Five minutes after every full hour (10:05, 11:05)
0	0	*	*	*	Daily at midnight
45	2	*	*	0	Every Sunday at 2:45 AM

21 Appendix

The appendix includes specific information about setup and configuration of *ibaCMC*, e.g. about the configuration text file `appsettings.json`. If you make changes to the configuration text files specified below or to the service settings, it is necessary to restart the *ibaCMC* service to make the changes effective.

21.1 General

Configuration text file in JSON format
`C:\ProgramData\iba\ibaCMC\Server\appsettings.json`

The `appsettings.json` configuration file contains some essential settings, such as:

- URL
- Port number
- Log level project file
- SSL certificate (broker, web server)
- Database connection settings
- MQTT broker settings
- SMTP connection settings
- Report server connection settings
- Task settings (e. g. schedule)

21.2 Certificate management in ibaCMC

Certificates for secure communication can be configured during the installation of *ibaCMC*. A special dialog box allows you to select a certificate.

For installation information, see ↗ *Installation and program start*, page 20.

Selecting the certificate
The selected certificate is then applied to both the web server and device communication when encrypted or TLS communication is enabled. In both cases, the same certificate is used.

The following certificate options are available:

- Self-signed certificate (default)
  A self-signed certificate is created and used. You can set the validity period. The default value is 5 years, but you can also select 2 years or enter a duration in days using the *Custom* setting.
- Certificate file (PFX file)
  Select this option if you want to use your own certificate. If you want to use your own certificate, you must provide the PFX file and enter the path to the certificate and the password here. iba AG recommends storing the certificate in the folder `…\ProgramData\iba\ibaCMC\Server\ca`.

- Windows Certificate Store:
  In this setting, you can reference an existing certificate in the Windows Certificate Store to use it for the web server. You can still choose which certificate store to use (personal/public) and where the storage path is located.

Device communication (MQTT)
You can configure the port and communication mode for communication between *ibaPDA* devices and ibaCMC. Encrypted communication is provided by default. If the systems involved are on an isolated network without an Internet connection, you can also use unencrypted communication.

Note



In unencrypted communication, the transmitted data is not protected and could be read by attackers. The plant operator should be explicitly informed of this risk!

Notification about expired certificates
Usually, certificates have a limited validity period. If the validity of a certificate expires and a communication is no longer possible, related error messages will be posted in the system diagnostics (overview and *System* tab).

21.2.1 Renew or replace a certificate

In this chapter, you'll learn how to update or replace selected certificates.

Note



If encrypted communication is enabled, the *ibaPDA* devices must then trust the certificate again.

Self-signed certificates

1. Stop the ibaCMC service.
2. In the `C:\ProgramData\iba\ibaCMC\Server\ca` folder, delete the `certificate.pfx` file or rename it.
3. Start the ibaCMC service.

After the restart, a new certificate named `certificate.pfx` will be generated automatically if a file with that name does not already exist in the folder. The validity period of this new certificate is the same as the period previously defined in the installer.

Certificate file (*.pfx)

1. Stop the ibaCMC service.
2. Copy the new PFX file to the same folder on the server where the currently used certificate is stored. iba AG recommend choosing the following path: `C:\ProgramData\iba\ibaCMC\Server\ca`
3. Start the ibaCMC service.

If the name of the new certificate differs from the existing one, copy the new PFX file to the folder where the current certificate is stored, e. g. `C:\ProgramData\iba\ibaCMC\Server\ca`, and then restart the installation process to update the path to the new certificate there.

Windows Certificate Store

1. Stop the ibaCMC service.
2. Update the certificate in the Windows Certificate Store.
3. Start the ibaCMC service.

If the certificate issuer has changed, restart the installation process to update the certificate issuer.

21.2.2 Windows Certificate Store - matching priority

In this chapter, you will find information about searching the Windows certificate store and the rules used to verify and prioritize search results.

When a search term is entered, each certificate is checked according to the rules in the order listed below. The first rule that yields a match determines the result. Search results are case-insensitive, and spaces before and after the search term are removed or ignored.

An explanation of the abbreviations used can be found after the table.

The examples listed below are based on certificates that have the following properties:

- **Subject**: CN = web.example.com, O = iba AG, C = DE
- **Issuer**: CN = iba Root CA, O = iba AG, C = DE
- **SAN**: DNS = web.example.com, IP = 192.168.1.10

Matching rules
From highest priority (top) to lowest priority (bottom)

Prio | Rule	Description	Example search term
1 | Exact Subject	The Subject/CN string is exactly equal to the search term.	CN=web.example.com, O=iba AG, C=DE
2 | Subject contains	The Subject/CN contains the search term.	web.example.com

Prio | Rule	Description	Example search term
3 | Exact Distiguished Name	The Subject matches the search term parsed as a full DN. Catches DNs identical in content but formatted differently (e.g. spacing) than the raw Subject string.	CN=web.example.com,O=iba AG,C=DE (no spaces after commas)
4 | Semantic Distinguished Name	The Subject matches the search term as a semantically equivalent DN, tolerating differences such as RDN order.	C=DE, O=iba AG, CN=web.example.com (components reversed)
5 | Issuer	The Issuer contains the search term.	iba Root CA
6 | Subject Alternative Names (SAN)	A SAN entry (DNS, IP, Email, or UPN) contains the search term.	192.168.1.10
7 | No match	None of the above rules apply; the certificate is not matched.	unknown.host.local

Key to Abbreviations

CN – Common Name: The "main name" in a certificate's subject field, usually the hostname or domain (e.g., web.example.com). In the case of web server certificates, it identifies the server.

DN – Distinguished Name: The complete, unique name of a certificate subject, composed of several components (RDNs). Example: CN=web.example.com, O=iba AG, C=DE. So the CN is only a part of the DN.

RDN – Relative Distinguished Name: A single component within a DN, such as CN=web.example.com or O=iba AG. Several RDNs together make up the DN.

CA – Certificate Authority: The entity that issues and signs certificates. With a self-signed certificate, the issuer is the certificate itself; with a PFX file provided by the customer, there is usually a real CA. (In your setup, CA is also the name of the subfolder in ProgramData where the certificate is stored.)

SAN – Subject Alternative Name: Additional names or addresses for which the certificate is also valid, in addition to the CN. Types: DNS (host names), IP (IP addresses), email, UPN (User Principal Name). Modern browsers primarily check the SAN entries, not the CN anymore.

O – Owner/Issuer: Owner or issuer of the certificate

C – Country of the issue; for example, C = DE for Germany

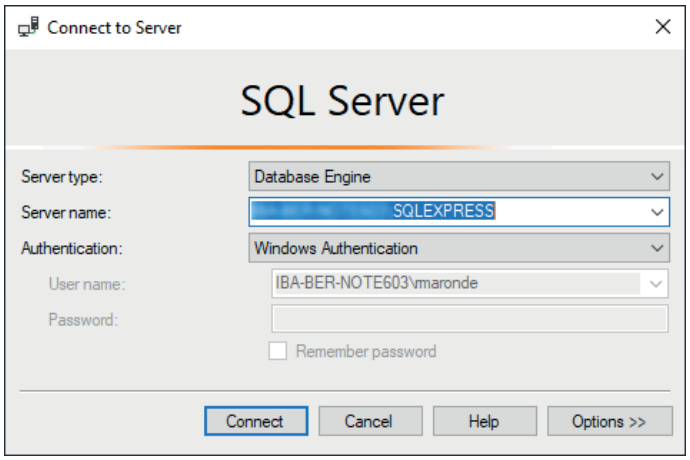
21.3 Preparing the database

Before installing *ibaCMC*, check whether a database is available. If you are installing *ibaCMC* for the first time and no database is available yet, two databases have to be created on the SQL server before the *ibaCMC* installer is run.

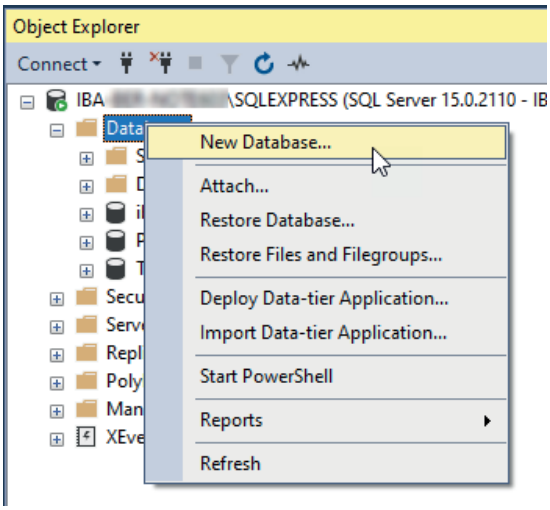
To do this:

Creating a database

1. Log on to the SQL server as a user with *sysadmin*- and *dbcreator* rights.

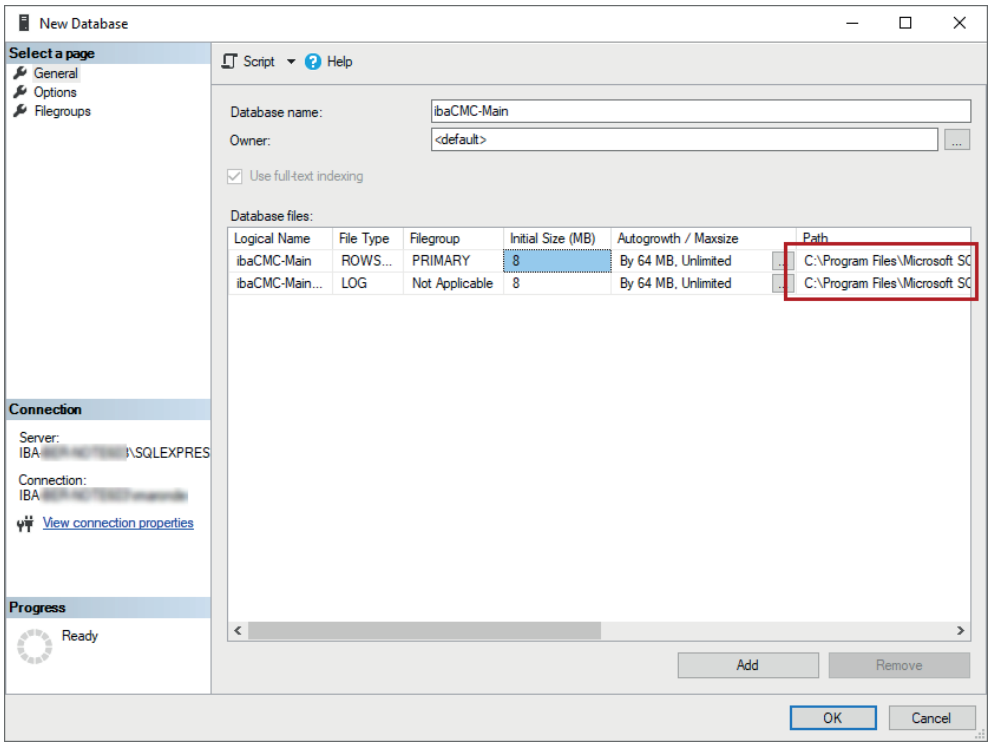


2. Select the database folder, right click to open the context menu and select *New database...*



3. Create two empty databases. The following names are recommended:
   - ibaCMC-Main
   - ibaCMC-Comm
4. When creating the database, also specify the path for database storage.

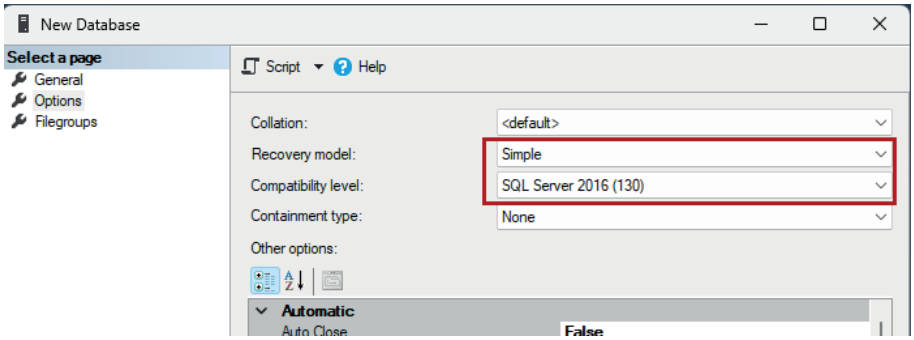
   As the disk space for the database will increase when the system has been running for a long time and with larger configurations, we recommend saving it on a dedicated hard disk rather than on the C drive.



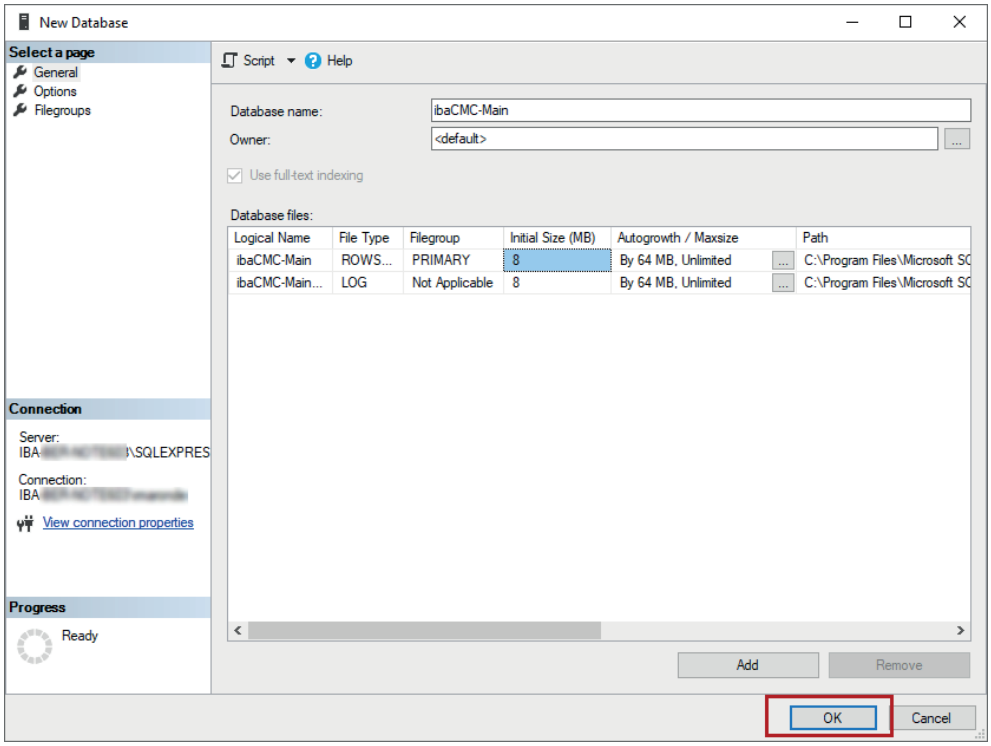
5. Select the *Options* page and check the settings.

   The following settings are recommended by iba AG:

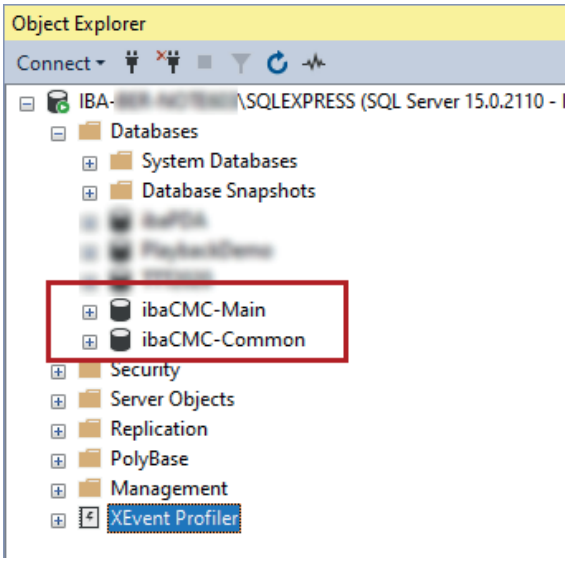
   - Recovery model: Simple, unless your IT department has different requests
   - Compatibility level: SQL Server 2016 (130)
   - All other settings may be untouched, unless your IT department has different requests



6. Finally, complete the installation by clicking on <OK>.



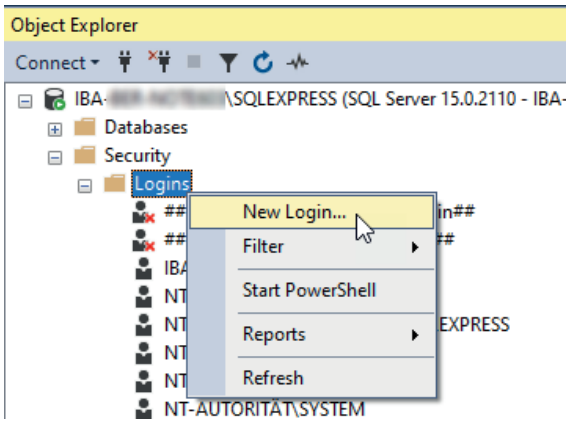
→ The two databases should now be displayed in the object explorer.



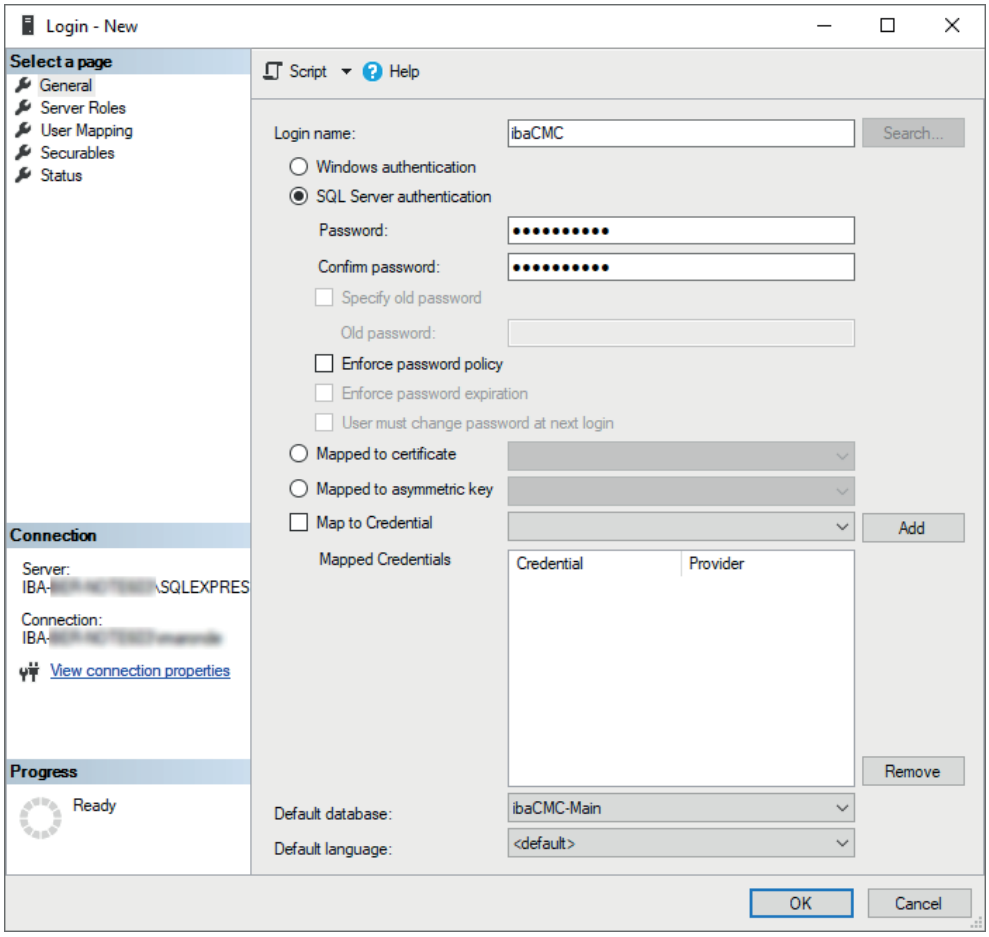
Creating a database user

To enable the *ibaCMC* application to access the database, an SQL server user with *db_owner* rights is required. To create this user follow these steps:

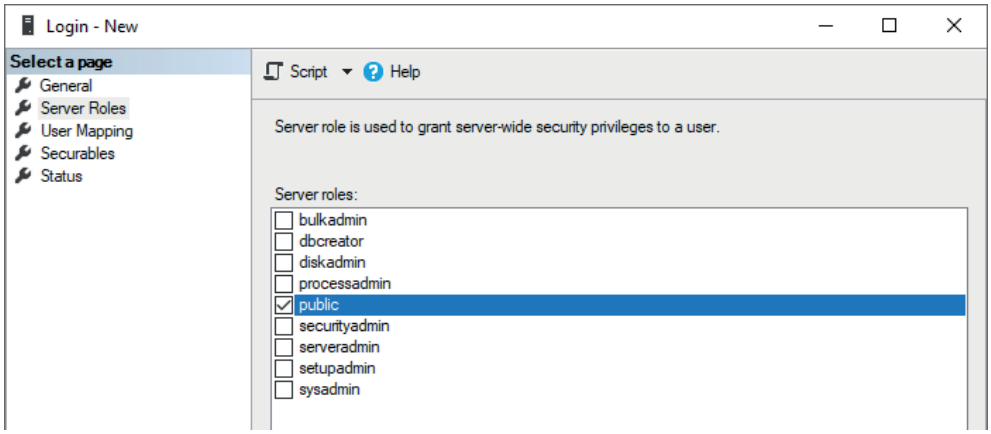
1. Select the *Login* folder under the *Security* folder. Right click to open the context menu and select *New login...*.



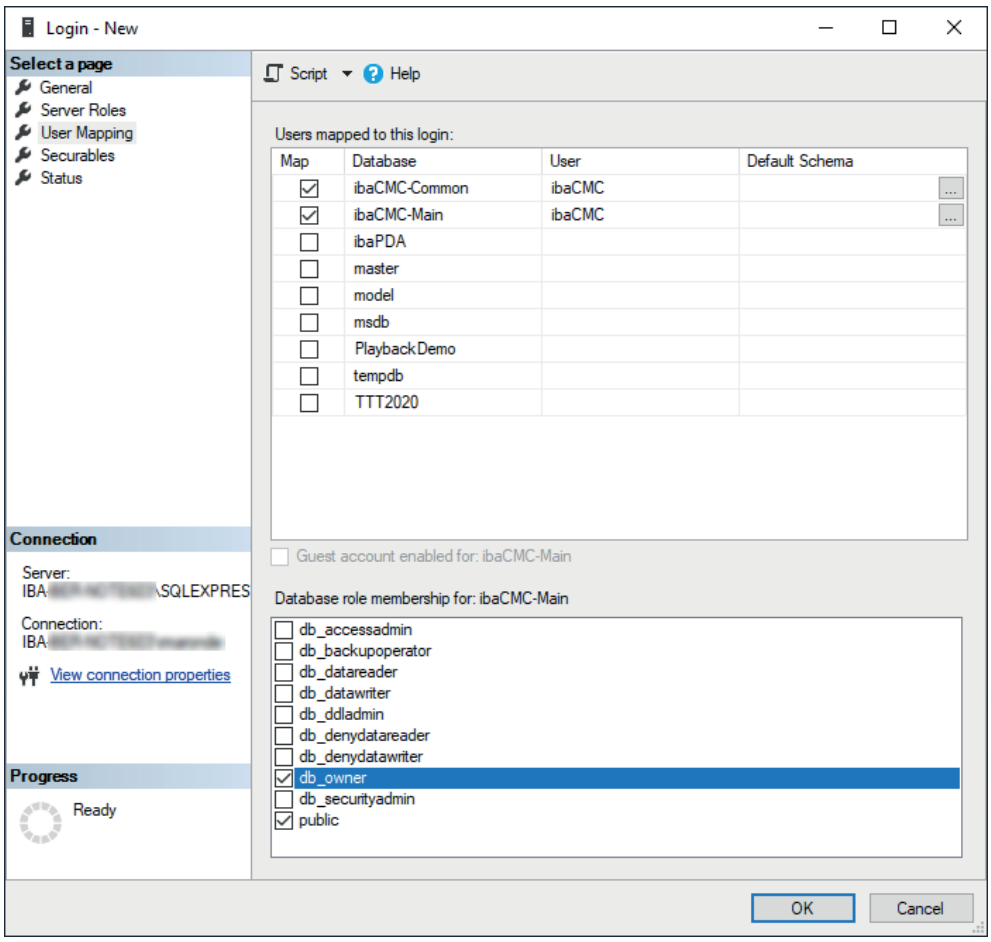
2. Make the following settings under General:
   - Login name: ibaCMC (default)
   - SQL Server authentication
     Password: Analysis1! (default)
   - Enforce password policy: disabled (default)
   - Default database: ibaCMC-Main (default)



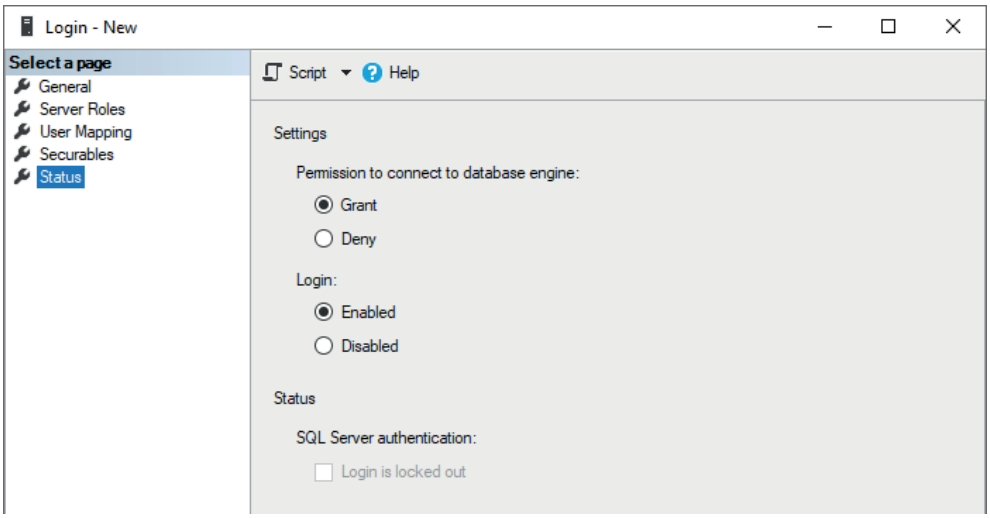
3. In the *Server roles* dialog box, select *public* (usually the default setting).



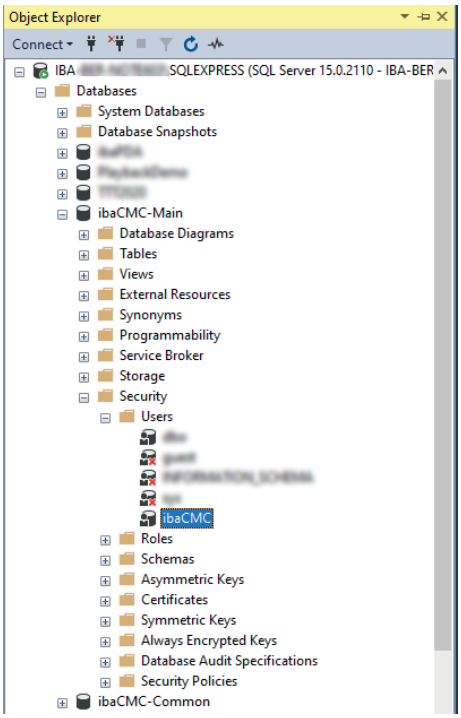
4. In the *User assignment* dialog box, assign the *db_owner* database role to the *ibaCMC-Main* and *ibaCMC-Comm* databases created.



5. Make the following settings in the *Status* dialog box:



6. Click on <OK> to create the user. Check under Users in the object explorer to make sure that the user has been created correctly.

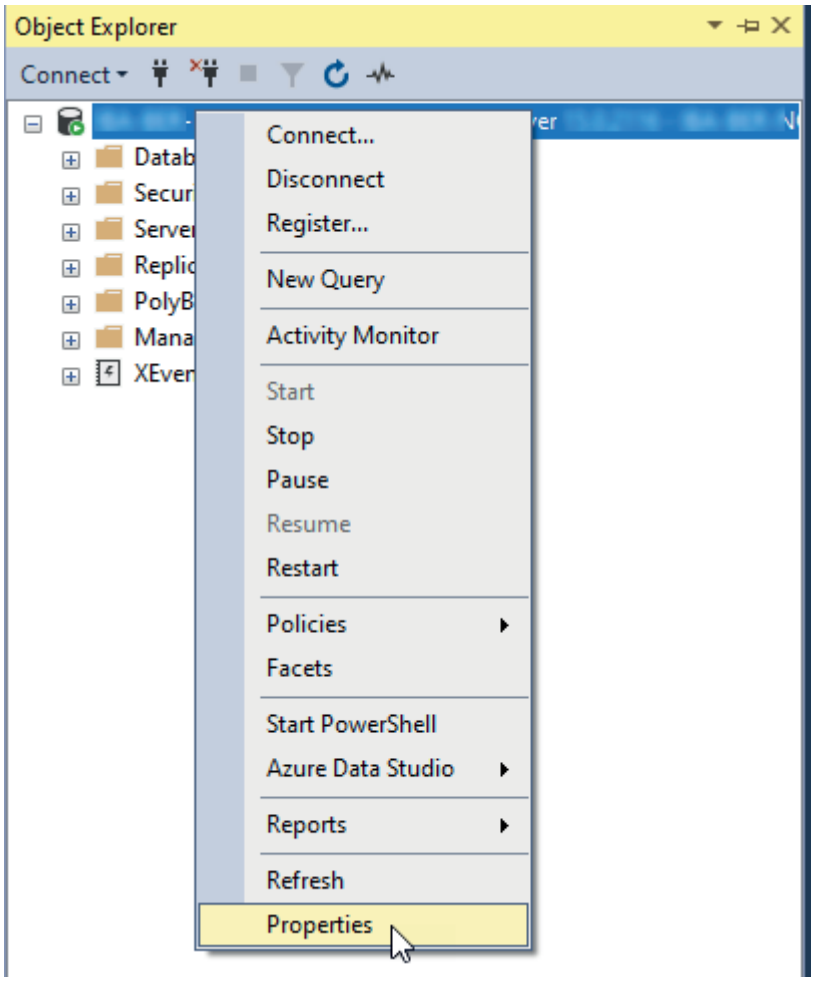


Adapting the server authentication

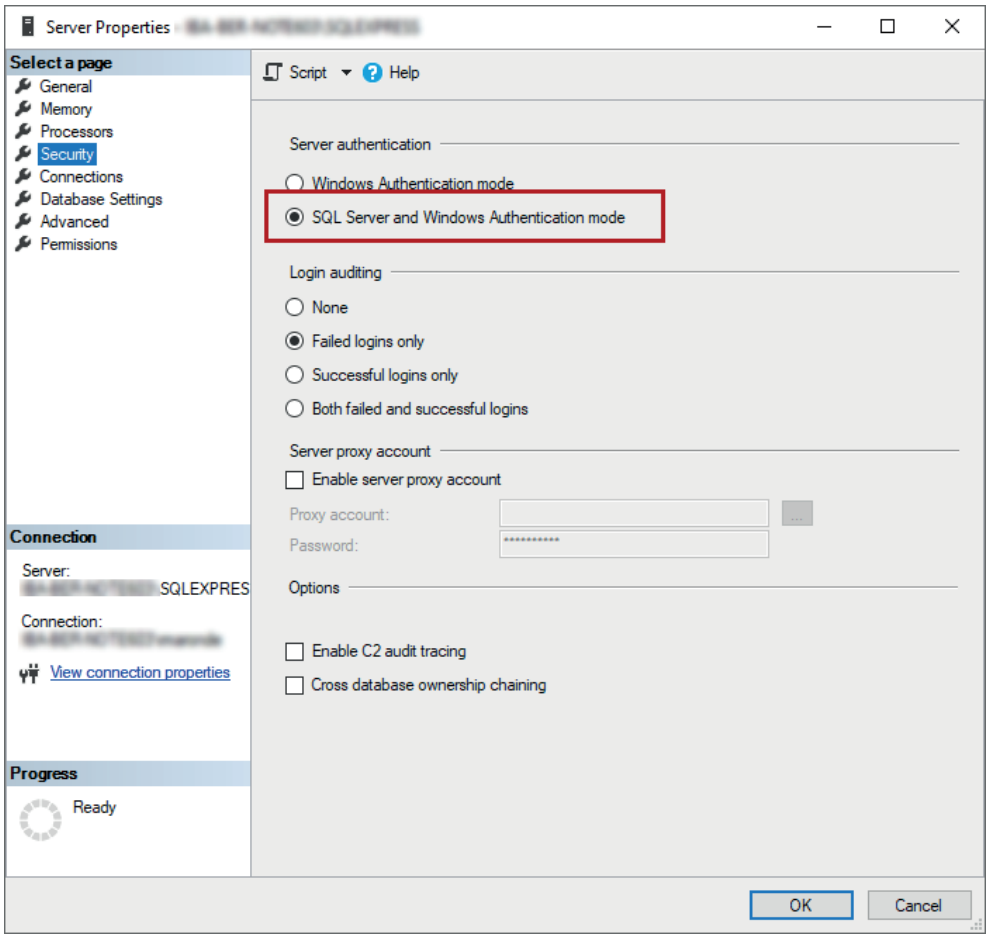
For an SQL user, such as the recently created user <ibaCMC>, to be able to login to the SQL server you should enable the SQL Server and Windows authentication mode. After the change the SQL Server needs to be restarted.

Please follow these steps:

1. Select *Properties* in the context menu of the SQL Server in the object explorer.

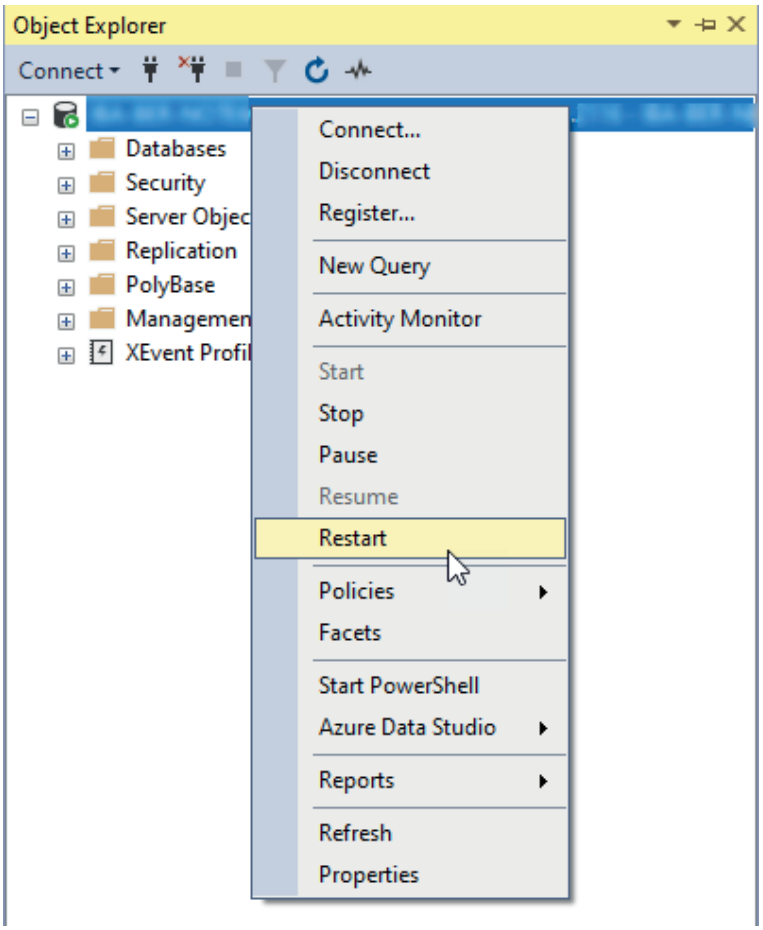


2. Select the option *SQL Server and Windows Authentication mode*.



3. Close the dialog with <OK>.

4. Select *Restart* in the context menu of the SQL Server in the object explorer.



21.4 Configuration of the database connection

You configure the database connection in the configuration text file `appsettings.json`.

Extract from the JSON file:

```
"ConnectionStrings": {
"Main": "Server=<db-host>;Database=<db-name-main-database>;User=<db-username>;-
Password=<db-password>;MultipleActiveResultSets=True;Enlist=True;",
"Comm": "Server=<db-host>;Database=<db-name-comm-database>;User=<db-username>;-
Password=<db-password>;MultipleActiveResultSets=True;Enlist=True;"
},
```

Meaning of parameters

Parameter	Meaning
db-host	Server address of the MS SQL server
db-name-main-database	Database name of the main database
db-name-comm-database	Database name of the comm database
db-username	SQL user name for access to the database
db-password	SQL user password for access to the database

21.5 System behavior without database connection

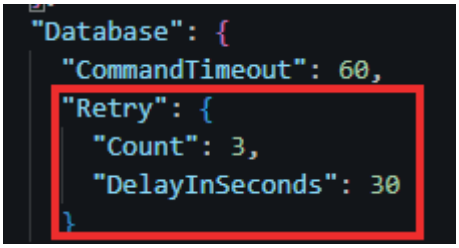
For *ibaCMC* to work, a connection to the SQL database must be established.

There are various scenarios in which access to the SQL database is either impossible or disrupted.

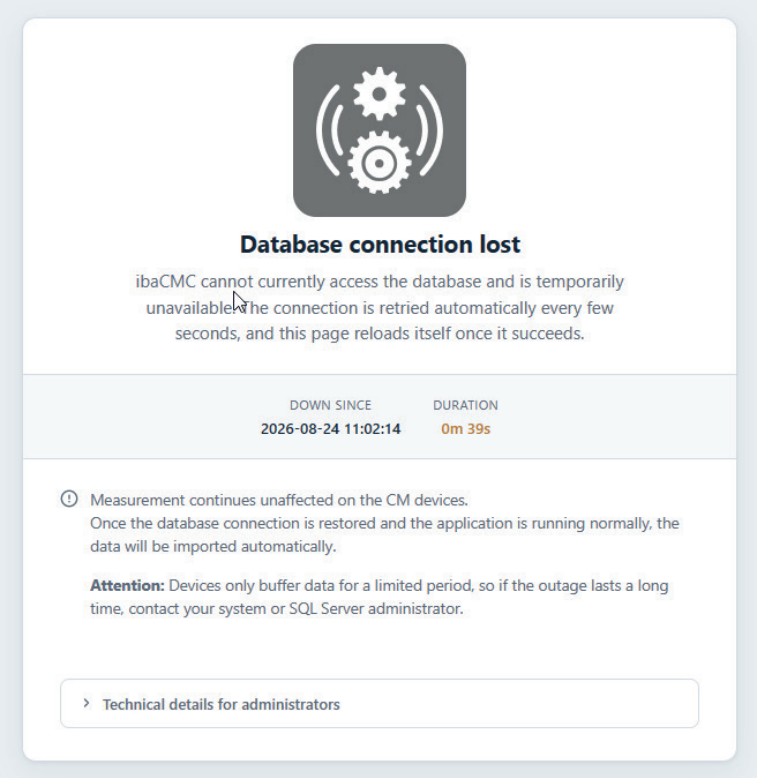
The database is already unavailable at the launch of ibaCMC
If a database connection cannot be established when *ibaCMC* starts, the application — that is, the *ibaCMC* service — will be terminated.

The database will be available at launch and will go down later
In this case, the application starts normally.

If the database becomes temporarily unavailable later on, or if it is shut down—for example, due to scheduled maintenance on the SQL Server — the ibaCMC service will continue to run for the time being. If the database is unavailable, the *ibaCMC*service repeats database queries as often and at the intervals specified for the "Retry" parameter in the `appsettings.json` file.



If the database is still unavailable after that, *ibaCMC* switches to a special mode. Although the system continues to attempt to reestablish the database connection at regular intervals, the web client is no longer accessible. Instead of the web client, a page with a message appears. It contains additional information for administrators.



In addition, in this mode, the MQTT broker is offline, which means that devices cannot send their data to the *ibaCMC* server.

Once the database connection has been restored, the *ibaCMC* service will automatically restart in normal mode.

Troubleshooting Tips

If the "Database connection lost" page appears:

- Check the database connection

21.6 Open source licenses

The sources for the open source licenses used can be selected directly using *ibaCMC* and are stored in the following file:

`C:\Program Files\iba\ibaCMC\Server\wwwroot\third-party-licenses.txt`

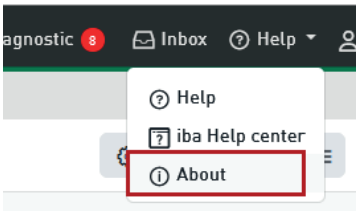
21.7 Refresh Browser – Empty cache and reload

ibaCMC is a web service whose presentation level is accessible and visualized by web browsers. After an update of the *ibaCMC* service or if several users are working on a dashboard view at the same time, you can initially load the program and the views by clearing the browser cache. Clearing the cache is especially useful if expected functions are not achieved after an update or if different views on different end devices result for the same dashboard view.

Using the key combination <Ctrl> + <F5>, you can clear the browser cache.

21.8 License Overview

If you open the help menu in the caption of *ibaCMC* and select *About*, you get information about the licenses of your *ibaCMC* installation.



Moreover, there is the *Device licenses* tab.

This tab lists the license information for all CMUs and CMU modules from the system tree in tabular form.

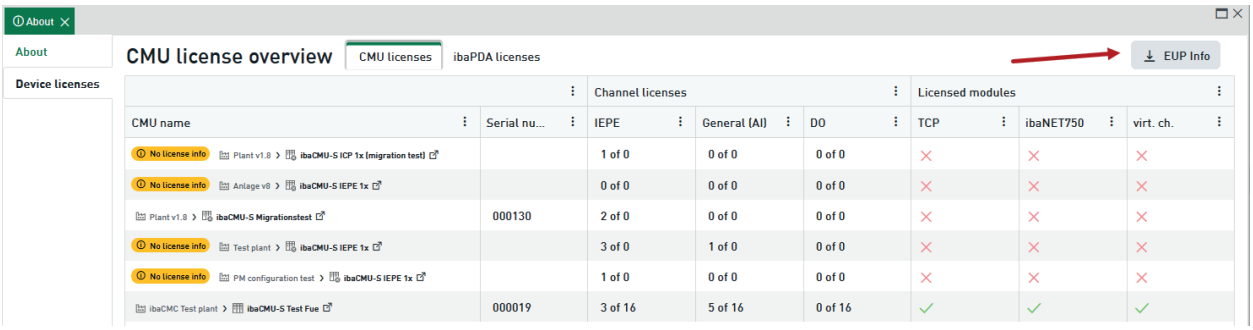
The information is spread across two subsequent registers:

- CMU licenses, ibaCMU-S with modules only
- ibaPDA licenses, ibaDAQ, and ibaM-DAQ with modules

CMU licenses

This tab contains information about the older *ibaCMU-S* models. Their licensing differs from that of the newer CMU models, *ibaDAQ* and *ibaM-DAQ*.

Licensing information is generally not available for CMU modules, since licensing is handled within the CMUs.



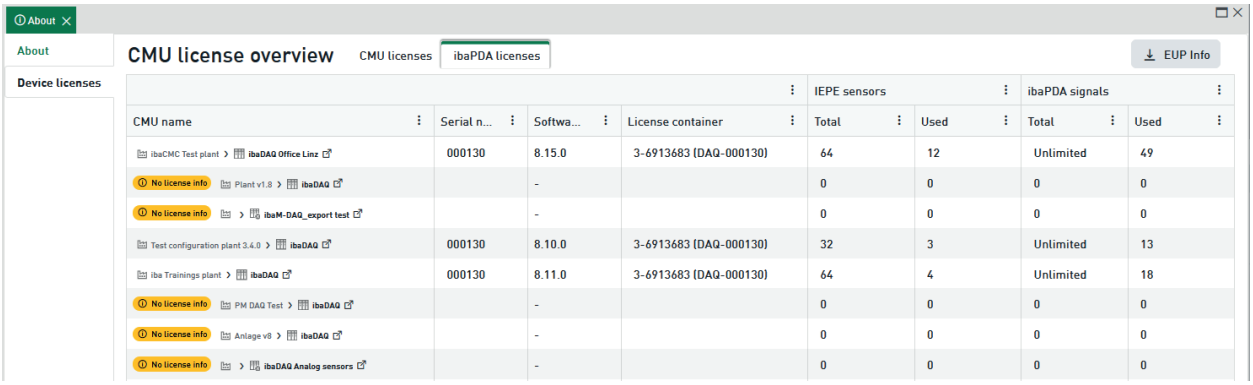
In addition to the CMU serial numbers, you'll find more information here about the available and used licenses.

In the *Channel licenses* columns, you will find information on how many channels (IEPE, General (AI), or DO) are configured or in use out of the total number of licensed channels.

In the *Licensed Modules* columns, you can see whether modules such as TCP, ibaNet750, or Virtual Channels are licensed (green check mark) or not (red X).

ibaPDA licenses

This tab contains licensing information for *ibaPDA*-based CMUs such as *ibaDAQ* and *ibaM-DAQ*.



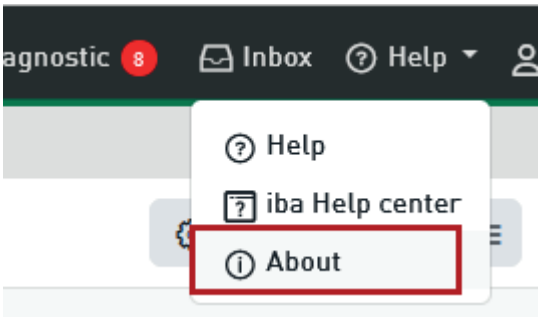
In addition to the CMU serial numbers, you will find information here about the installed *ibaPDA* version and the license container ID.

In the *IEPE Sensors* columns, you can see the total number of IEPE sensors permitted under the license, and next to that, the number actually in use.

Accordingly, the *ibaPDA signals* columns show the number of licensed signals and the number of signals actually in use.

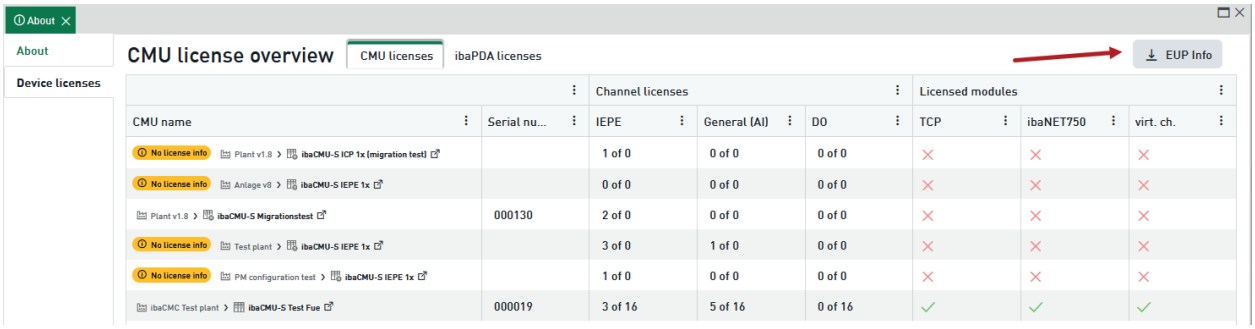
21.9 EUP Info file

If you open the help menu in the caption of *ibaCMC* and select *About*, you get information about the licenses of your *ibaCMC* installation.



Moreover, there is the *Device licenses* tab.

In this tab, you'll find detailed information about the licenses of the CMU devices in your plant tree.



According to our license policy, a regular extension of the update and support period (EUP) is required, if you want to get future software updates and/or consult our support.

In order to collect the license information in case of a prolongation of the period or an extension of the system and to ease the process as much as possible there is the EUP Info file.

By using the <EUP Info> button above the table you can trigger the generation and download of this file.

The following scheme applies to the filename:

`yyyymmdd_EUP-Info-ibaCMC_customername.zip`

The EUP Info file consolidates all the essential information about licensed and used sensors in the ibaCMS, allowing the iba sales team to generate an offer quickly.

After download, please send the file together with your enquiry to the iba support or the regional iba office.

21.10 Setting up the log level

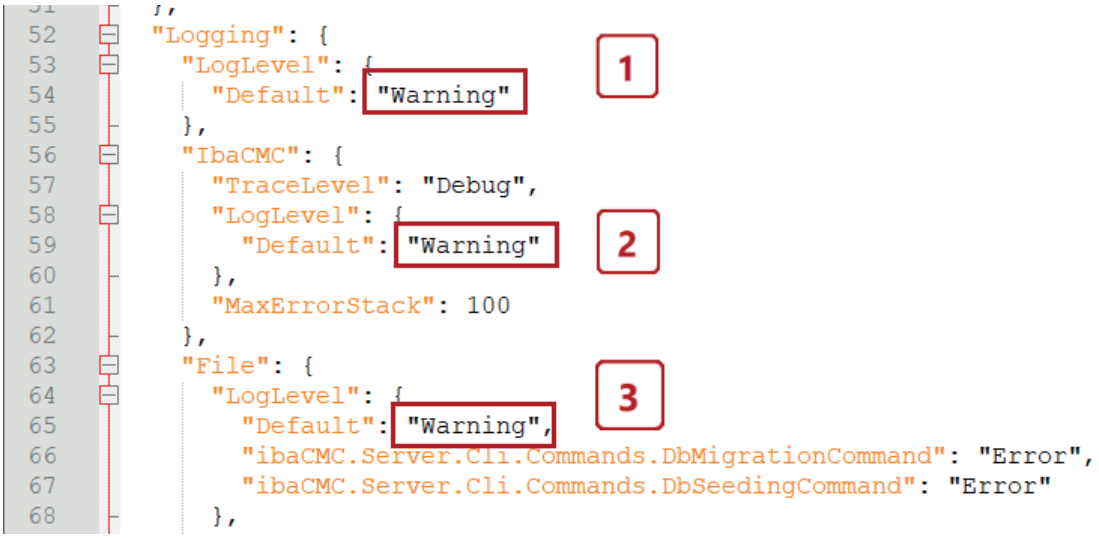
Events supposed to be logged in a logbook have a log level assigned.

For more information about logbook entries see ↗ *Logbook entries*, page 157.

Basically, all events are displayed and recorded in the system, no matter whether they are simple information, warnings or errors. Thus, the log files which are written to the folder C:\ProgramData\iba\ibaCMC\Server\logs can reach a significant size.

You can set a threshold for logbook entries being written into the file.

Therefore, just edit the file
`C:\ProgramData\iba\ibaCMC\Server\appsettings.json`



No.	Parameter	Meaning
1	Logging > LogLevel > Default	Default log level to be applied if the entries ibaCMC > LogLevel > Default or File > Loglevel > Default are missing or not defined in the file `appsettings.json`.
2	ibaCMC > LogLevel > Default	This log level determines which logbook entries should be written into the *Logtable* database. These entries can be seen on the web-interface under *Syslogs*.
3	File > Loglevel > Default	This log level determines which log entries should be written to the logfile. The logfiles are stored in the path `C:\ProgramData\iba\ibaCMC\Server\logs`.

Possible values for all three parameters are “Warning” or “Error”.

If you set “Warning” as default log level for “File”, then only logbook entries with level “Warning” or higher will be written to the logfile.

The new settings are applied after restart.

21.11 CMU migration

In this chapter you will learn what to consider when migrating from a CMU type *ibaCMU-S* to a CMU type *ibaDAQ* or *ibaM-DAQ* and what needs to be done to create the required prerequisites for a migration.

Migration from ibaCMU-S to ibaDAQ
The migration from *ibaCMU-S* to *ibaDAQ* is supported by a migration wizard.

You can find more information about this in the next section.

Migration from ibaCMU-S to ibaM-DAQ
There is no wizard available for the migration from *ibaCMU-S* to *ibaM-DAQ*. You must perform this migration completely manually, i.e. you should create a new device in *ibaCMC* and rewire all sensors and configure the required TCP telegrams and snapshots.

21.11.1 Migration from ibaCMU-S to ibaDAQ with migration wizard

Follow these steps to start the wizard:

1. Select the CMU (*ibaCMU-S*) you want to migrate in the plant tree of *ibaCMC*.
2. Open the configuration page.
3. Change the hardware type to *ibaDAQ*.

→ Subsequently, the migration wizard opens.

Before performing the migration, the wizard checks some prerequisites.

If one of the required prerequisites is not fulfilled, the wizard shows an error message in the first step.

General notes on migration

- Basically, a migration to a CMU type *ibaDAQ* is possible for CMU types *ibaCMU-S*, *Haic-mon-CMU* and *ibaPaduS-IT16*. The following explanations focus on type *ibaCMU-S*.
- The migration to *ibaDAQ* should be performed in place on the CMU element (*ibaCMU-S*), i. e. no new CMU device will be created.
- A completed migration cannot be reversed.

Note



For safety reasons, iba AG recommends backing up the database before starting the migration so that you can revert to an earlier configuration if necessary.

Wizard features

The migration wizard executes the following tasks:

- Update the internal buffer index of the input channels so that DAT files created by *ibaCMU-S* can still be opened after the migration.

- Transform DAT file cleanup to snapshot-specific cleanup. The settings for DAT file cleanup are applied to all snapshots.
- Transfer the BP filter settings of the sensors to the new structure.
- Set configuration flag to pending
- Set up MQTT topics for connection with *ibaPDA*
- Change hardware type to *ibaDAQ*
- Write log entry when migration is completed

The current configuration of snapshots, TCP telegrams and module configuration will be preserved.

Limits of ibaDAQ compared to ibaCMU-S

- *ibaDAQ* has only two digital inputs instead of eight on *ibaCMU-S*.
- *ibaDAQ* cannot stream raw data directly to an *ibaPDA* system over fiber optic cable.
- *ibaDAQ* does not support directly *ibaNet750* modules, which were configured by *ibaCMC*. However, connecting these modules is still possible via *ibaPDA*.

Prerequisites for a migration from ibaCMU-S to ibaDAQ

- Only the first two digital inputs are configured on *ibaCMU-S* and used in *ibaCMC*.
- No virtual channels are configured.
- No fiber optic raw data stream to another *ibaPDA* system is configured.
- *ibaNet750* is not configured and no sensor is connected via an *ibaNet750* module.

Recommended workflow for migration

1. Start the migration process and check for compatibility issues.
2. If compatibility issues occur, fix them first in the *ibaCMC* configuration before continuing the migration.
3. Replace the *ibaCMU-S* device by an *ibaDAQ* device, commission the *ibaDAQ* device and connect it to the network in order to establish a connection with *ibaCMC*.
4. Launch the migration wizard and proceed with the migration by clicking “Start CMU Migration” in the final step of the wizard. If the migration is successful, you should see the message “Migration successful.” Then click <Confirm> to complete the migration.
5. Now, connect the *ibaDAQ* device to *ibaCMC*.
6. After the connection to *ibaCMC* has been established, load the *ibaCMC* configuration onto the *ibaDAQ* device.
7. Finally, check if everything works (TCP telegrams, signal quality etc.) and check if data is imported in *ibaCMC*.

In chapter ↗ *Notes on preparation for migration, page 204* you’ll find tips and guidelines in case that the prerequisites for migration are not fulfilled.

21.11.2 Notes on preparation for migration

Certain conditions must be met for a successful migration, which are sometimes not met in practice.

The following sections provide step-by-step instructions for three typical cases to help you prepare for migration.

21.11.2.1 More than 2 DI sensors are configured on an ibaCMU-S device

If more than 2 DI sensors on an *ibaCMU-S* device are used, there are three optional proceedings possible for migrating to *ibaDAQ*. Be sure to save the current *ibaCMC* configuration before making any changes. Note down the DI-RPS sensors which are currently connected to *ibaCMU-S*, e.g. by means of a screenshot of the current configuration.

Option 1: Add another ibaMS16xDI-24V module and rewire sensors

Prerequisite: At least one free slot is available on the backplane of *ibaCMU-S*.

Proceeding (before migration)

1. Unlink the DI-RPS sensors, which are connected to the *ibaCMU-S* module.

   The first two sensors may remain connected to the *ibaCMU-S* if you plan to use the first two digital inputs on the *ibaDAQ* device for the same purpose.

2. Continue the migration.

Proceeding (after migration)

1. Add a hardware module *ibaMS16xDI 24V* to *ibaDAQ* in *ibaCMC*.
2. Connect the digital sensors with the new module.
3. Assemble the additional hardware module device and connect the digital sensors as configured in *ibaCMC*.
4. Update the snapshot settings in *ibaCMC* to grant the correct recording of the sensors.
5. Finally, load the configuration onto the *ibaDAQ* device.

Option 2: Keep first two DI-sensors on the module, get more speed information via TCP receive telegram from ibaPDA

In the following, it is assumed that *ibaPDA* is the data source of process data.

Prerequisites:

- One license *ibaPDA-Interface-Generic-TCP* is enabled for both *ibaDAQ* and *ibaPDA*.
- *ibaDAQ* and *ibaPDA* are connected via network.

Proceeding

1. Configure or extend a TCP receive telegram by the required speed signals in *ibaCMC*.
2. Replace the DI-RPS sensors in the component groups by TCP channels.

   Do not remove the DI-RPS sensors from the configuration in order to preserve the formerly recorded speed data.

3. To make sure that the correct speed signal is used for the condition and for recording, update the snapshot settings in *ibaCMC*.
4. Disconnect the DI-RPS sensors, which are supposed to be transferred to TCP telegrams, from the *ibaCMU-S* device.
5. Connect the DI-RPS sensors, which are still needed, with the *ibaDAQ*.
6. Configure the TCP telegram with the required data in *ibaPDA*.
7. Continue the migration, see ↗ *Migration from ibaCMU-S to ibaDAQ with migration wizard, page 202*.

Note



Check again the TCP connection in *ibaPDA* on the *ibaDAQ* device after the migration.

Option 3: Keep first two DI-sensors on the module, get speed information by process signal integration via an ibaPDA interface

Prerequisites:

- An interface to an external system is available on *ibaDAQ*, which transmits the speed signals. This could be any of the available *ibaPDA* interfaces (e.g. OPC UA).
- A license for the corresponding *ibaPDA* interface is enabled.

  Note: The license *ibaCMS-One-Sensor* already contains 2 OPC UA client interfaces, which can transmit process data from an *ibaPDA* system via its integrated OPC UA server.
- All DI-RPS sensors, which are supposed to be replaced by process signals, are disconnected from *ibaCMU-S*. The first two sensors can remain connected for further use in *ibaDAQ*.

Proceeding (after migration)

1. Configure a new process signal module in *ibaCMC* below *ibaDAQ*.
2. Replace the DI-RPS sensors in the component groups by process signals.
3. To make sure that the correct speed signal is used for the condition and for recording, update the snapshot settings in *ibaCMC*.
4. Disconnect all DI-RPS sensors from the *ibaCMU-S* module and replace the module by the *ibaDAQ* module.
5. Connect the DI-RPS sensors to be kept to the *ibaDAQ*.
6. Configure a timebase of 50 ms in *ibaPDA* for the transmission of the speed signals via the integrated OPC UA server.
7. Configure the OPC UA client on *ibaDAQ* and select the required signals from the OPC UA server.

Note



After the migration is completed, check the connection of the *ibaPDA* interface and make sure that the recording is triggered.

21.11.2.2 Virtual channels or raw data streams are configured

You can send calculated indicators over a fiber optic link (FO-link) from *ibaCMU-S* to an *ibaPDA* system by means of virtual channels. Because *ibaPDA* runs on the *ibaDAQ* device and because two *ibaPDA* systems cannot exchange data via an FO-link, this feature is not supported anymore on the *ibaDAQ* devices.

Streaming raw data from *ibaDAQ* to another *ibaPDA* system is also not supported.

If you don't need indicators in the *ibaPDA* system, just remove all virtual channels from the *ibaCMU-S* device, disable the module for virtual channels and continue the migration.

If you still need this feature after migration, to be able to send indicators to an *ibaPDA* system, you can use the TCP send telegram as an alternative.

Below, the required steps are described, to reconfigure virtual channels of ibaCMU-S to a TCP send telegram. It is assumed that *ibaPDA* is the source of process signals.

Prerequisites:

- One license *ibaPDA-Interface-Generic-TCP* is enabled for both *ibaDAQ* and the process data *ibaPDA* system.
- *ibaDAQ* and *ibaPDA* are connected via network.
- Not more than 64 channels were transmitted by the *Virtual channels* module.
- A free TCP send telegram is still available.

Proceeding

1. Add a TCP send telegram to *ibaCMU-S*.
2. Create the channel structure of the send telegram.
3. Transfer the trends formerly transmitted via virtual channels to the new TCP channels.
4. Remove all channels from the *Virtual channels* module.
5. Disable the module in the CMU configuration.
6. Disconnect the fiber optic cable between *ibaCMU-S* and *ibaPDA*.
7. Change the configuration in *ibaPDA*:
   a) Remove the current *ibaCMU-S* connection.
   b) Configure a TCP receive telegram.
   c) Create the same channel structure in the telegram as it was defined in the *ibaCMC* send telegram.
8. Continue the migration.

Note

After migration and successfully uploading the configuration, check the telegram connection between *ibaDAQ* and *ibaPDA*.

21.11.2.3 An ibaNet750 input module is connected via FO-link with ibaCMU-S

It is still possible to read values from an ibaNet750 input module with *ibaDAQ* and *ibaPDA*. But you cannot configure it over *ibaCMC* directly.

Until now, analog or digital sensors were used in *ibaCMC* and then linked to an ibaNet750 module in the CMU configuration. After the migration, these sensors cannot be used anymore. But they can remain in the system in order to keep the old data.

You can use process signals to get new data from modules in *ibaCMC*. You can link these signals with an aggregate which is similar to the previously used sensors.

Note

Save the *ibaPDA* project separately, because user-defined *ibaPDA* configurations are not saved in *ibaCMC*. In case of a hardware failure the configuration might get lost.

Proceeding

1. First of all, note down the following information:
   - Sensors, which are connected to an *ibaNet750-32xAI* or *ibaNet750-32xDI* in *ibaCMC*, and the aggregates which they were connected with.
   - Scaling settings of the sensors (range min, range max).

     You may do this later, because the sensors will not be removed after migration.
   - Which sensor was recorded by which snapshot or for which status?
2. Cut the connection between the sensors and the ibaNet750 modules in *ibaCMU-S*.
3. Unplug the *ibaCMU-S* module from the backplane and replace it by an *ibaDAQ* device.
4. Connect the ibaNet750 module with *ibaDAQ* via fiber optic cable.
5. Configure the module in *ibaPDA*.

   Set up the scaling of the sensors and give them a meaningful name.
6. Connect *ibaPDA* with *ibaCMC*.

7. Execute the following steps on *ibaDAQ* after migration:
   a) Add a process signal module to *ibaDAQ*.
   b) Add the required process signals.
   c) Assign the signals of the ibaNet750 module in *ibaPDA* to the process signals in *ibaCMC*.

      Prerequisites: *ibaPDA* is connected with *ibaCMC*, ibaNet750 is connected with *ibaPDA* and ibaNet750 is set up and configured.
   d) Connect the aggregates with the process signals.
   e) Define the threshold values for the trends of a process signal if you want to monitor the trends.
   f) Add the process signals in the snapshot settings to make sure that they are recorded as well.

21.11.3 Migration from ibaCMU-S to ibaM-DAQ (manually)

There is no wizard available for migrating ibaCMU-s or ibaDAQ CMUs to a new ibaM-DAQ CMU. You must perform the migration manually.

The steps required to do this are described below.

Step 1: Configure a new ibaM-DAQ device

- Add a new *ibaM-DAQ* device from the component library to the plant that contains the existing *ibaCMU-S/ibaDAQ* device.
- Add the required number of *ibaM-4AI-IEPE* modules so that all sensors from the old modules can be rewired to the new module.

Note

The *ibaM-4AI-IEPE* modules now have only 4 inputs per module instead of 8. The pin assignment has also changed. The *ibaM-4AI-IEPE* module has two GND inputs. Be sure to rewire the sensors according to the new pin assignment.

More information about the device:ibaM-4AI-IEPE Pin Assignment

Step 2: Rewiring IEPE Sensors

- Take screenshots of the current snapshot configuration and conditions.
- Delete all snapshots from *ibaCMU-S/ibaDAQ* and confirm the changes.
- Connect the *ibaCMU-S/ibaDAQ* sensors to the new *ibaM-4AI-IEPE* module in the correct order.
- Make sure that the "IEPE 1 Hz" or "IEPE 0.1 Hz" mode is taken over from the previous module configuration.

Step 3: Rewiring TCP/IP receive telegrams and channels

To preserve the historical record of process data and continue to display the correct data in the kinematics grid, the TCP/IP telegrams must be rerouted from *ibaCMU-S/ibaDAQ* to *ibaM-DAQ* .

To do this:

- Create a new TCP/IP receive telegram in *ibaM-DAQ* and copy the connection settings from the TCP/IP receive telegram in *ibaCMU-S/ibaDAQ*.
- Open the first channel of the TCP/IP telegram from *ibaCMU-S/ibaDAQ* in the plant configuration.
- Assign the newly created telegram from *ibaM-DAQ* to this channel by drag and drop and confirm the changes.
- Repeat this process for all TCP/IP channels.
- If multiple TCP/IP receive telegrams are configured, repeat this step for all TCP/IP receive telegrams.

Step 4: Configure Snapshot settings

Configure the snapshots on *ibaM-DAQ* using the screenshots and settings from *ibaCMU-S/ibaDAQ*.

Be sure to apply the cleanup strategy as well.

Step 5: Create new TCP outbound telegrams (optional)

If TCP/IP outgoing telegrams are configured on *the ibaCMU-S/ibaDAQ* , they must be reconfigured on *the ibaM-DAQ* if they are still needed.

To do this:

- Create a new TCP/IP send telegram in *ibaM-DAQ* and copy the connection settings and the number of channels from the TCP/IP send telegram in *ibaCMU-S/ibaDAQ*.
- Copy the channel names, data types, units, and trends from the other telegram. This is a manual step.
- Repeat this process for all TCP/IP channels and TCP/IP send telegrams.

Step 6: Check other configured interfaces (optional)

Connections to *ibaNET-750* devices or links via ibaNet-FO in general cannot be migrated one-to-one.

The *ibaNET-750* devices can be connected via an additional *ibaM-FO-2IO* module attached to the *ibaM-DAQ* device.

If the input channels of the *ibaNET-750* device were used, the process signals in *ibaCMC* could be configured so that the data is fed back into *ibaCMC*.

Output channels must be configured in *ibaPDA*. There is no configuration option for this in *ibaCMC*.

Also, for virtual channels, which may be configured on an *ibaCMU-S* device, there is no simple way to migrate. Virtual channels are not supported at all by *ibaPDA* or *ibaM-DAQ*.

If you already have an *ibaDAQ* with configured process signals, it is currently not possible to manually migrate these process signals.

The process signals must be reconfigured on the *ibaM-DAQ* side. If they are used as speed signals for component groups, the assignment of the speed signals within the component group must also be changed to the new signal.

This will clear the historical speed record. So the kinematics grid no longer displays old data. You will now only see the speed readings from more recent measurements.

For more information, please contact our Support.

Step 7: Commissioning and Final Testing

In the final step, complete the setup and verify that everything is working properly again with the new hardware.

To do this:

- Connect the new *ibaM-DAQ*device to *ibaCMC*.
- Upload the configuration to the device.
- Open *ibaPDA* on the *ibaM-DAQ* device and verify that the TCP/IP telegram connection is working properly and that the received data is correct.
- Let the device run for a while and check whether snapshots are being triggered and transmitted to *ibaCMC* . To do this, open the trend analysis for the KPI values of the connected sensors and review the most recently received measurements.
- Review the calculated KPIs in the Trend analysis and the raw data in the *Signal analysis* window. Also, check to see if the kinematics grid shows the correct values for the defect frequency.

22 Support and contact

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You can find the contact information for our regional offices or representatives on our website:

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Note

If you need support for software products, please state the number of the license container. For hardware products, please have the serial number of the device ready.

Product Security Incident Response Team (PSIRT)

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