Manual

Power Quality Analysis Software
WebPQ®

Note: Please note that this user manual may not always reflect the current state of the software version. With software updates, it may happen that the present description is no longer accurate in some points. In this case, please contact us directly or use the current version of the user manual, which you can find on our website www.a-eberle.de.

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Table of Contents

1. User Guidance

The user manual summarizes all important information for installation and operation. Read the user manual completely and only use the product once you have understood the user manual.

1.1. Target Audience

This user manual is intended for trained professionals as well as trained and certified operating personnel. The content of this user manual must be made accessible to the persons responsible for the installation and operation of the system.

1.2. Warnings

- Structure of the warnings

Warnings are structured as follows:

	Type and source of danger!
	Consequences of non-compliance.
Signal word	 Measure to avoid the danger.

- Grading of the warnings

Warnings differ according to the type of danger as follows:

	Warns of an imminent danger that will result in death or serious injury if not avoided.
Danger	

	Warns of a potentially dangerous situation that will result in moderate or minor injury if not avoided.
Warning	

	Warns of an imminent danger that will result in death or serious injury if not avoided.
Caution	

	Warns of a potentially dangerous situation that will result in property or environmental damage if not avoided.
Note	

1.3. Tips

	Tips for proper handling of the software and recommendations.
Note	

1.4. Other Symbols

- **Instructions**

  Structure of the instructions:

   Instruction for an action.

   Result indication if necessary.

- **Lists**

Structure of bulleted lists:

- Level 1
  - Level 2

Structure of numbered lists:

1. Level 1

2. Level 1
    1. Level 2
    2. Level 2

1.5. Applicable Documents

For the safe and correct use of the software, also observe the additionally supplied documents as well as relevant standards and laws.

1.6. Storage

Keep the user manual, including the applicable documents, readily available near the system.

2. Scope of Delivery, Order Features, and System Requirements

2.1. Scope of Delivery

- Installation file
- License agreements
- License file (JSON file)

2.2. Order Features

WebPQ® database software including PostgreSQL database for fully automated processing and evaluation of power quality data in your IT environment! Basic versions always include 3 units – unlimited expansion possible via add-ons.

2.2.1. Functionality

- Automated reading of measurement data from PQI-LV / PQI-DA smart and PQI-DE devices via SSH and CCCI interface
- Web server for visualizing measurement data and disturbance records in level-time diagrams / histograms / bar charts / vector diagrams / ITIC / and more
- Responsive live data display from one or more devices simultaneously
- Automated alarm management in case of disturbances
- Automated reports according to EN50160 and IEC61000-2-2 / IEC61000-2-4 / IEC61000-2-12, switchable to up to 65 standard templates
- Parameterization and management of measuring devices via the web server
- IT security through a comprehensive user rights management system with audit logging, password policies, and more
- Visualization of measurement data from PQI-D and PQI-DA devices
- Integration of WinPQ into WebPQ® to support PQI-Ds
- CSV and Comtrade export functionality

2.2.2. Licenses

License Type	Description	Article Number
WebPQ Basic	incl. 3 units for up to 30 units with basic functionality	L.900.9266.10
WebPQ Professional	incl. 3 units for up to 100 units with professional functionality	L.900.9266.20
WebPQ Enterprise	incl. 3 units for systems > 100 units with enterprise functionality	L.900.9266.30

WebPQ Initial Order - Number of Units

Number of Units	Article Number
10 Units	L.900.9266.1010
30 Units	L.900.9266.1025
50 Units	L.900.9266.2050
100 Units	L.900.9266.2100
500 Units	L.900.9266.3500
1000 Units	L.900.9266.3599

Available WebPQ Add-ons

Add-on Name	Article Number
WebPQ Add-on "Fleet Management"	L.900.9265.32
WebPQ Add-on "Nequal Export"	L.900.9265.34

Additional Units

Number of Units	Article Number
WebPQ Add-on 10 Units	L.900.9266.60
WebPQ Add-on 50 Units	L.900.9266.61
WebPQ Add-on 100 Units	L.900.9266.62

Maintenance Agreements

Maintenance Agreement	Article Number
WebPQ Maintenance Agreement Annual	L.900.9066.10.01
WebPQ Maintenance Agreement One-time	L.900.9066.10.02

2.3. System Requirements

Note: The following pages contain the system requirements for the WebPQ software. Please note that these requirements may not always reflect the current state of the software version. With software updates, it may happen that the present description is no longer accurate in some points. In this case, please contact us directly or use the current version of the system requirements, which you can find on our website www.a-eberle.de.

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2.3.1. Supported Operating Systems & Browsers

- Windows 10 64-bit
- Windows 11
- Windows Server 2016
- Windows Server 2019
- Windows Server 2022
- Windows Server 2025
- WebPQ: Chrome, Firefox, Microsoft Edge, Safari

2.3.2. Supported Database Systems

- PostgreSQL 14.*
- MS-SQL (ab Version 2022)**

*PostgreSQL is supported from WinPQ > 6.2. **Individual order process and license key are necessary! Consultation required.

2.3.2.1. Special Database Settings

2.3.2.1.1. Database Settings / Special Considerations for Microsoft SQL

If WebPQ is to be operated with MS-SQL, the MS-SQL server must be configured to support Mixed-Mode Authentication. This is necessary so that WebPQ can access the database. Alternatively, a Windows user with appropriate permissions can be used for database access. This user must then be stored as a user in the WebPQ service.

2.3.3. Minimum System Requirements

- **CPU:** 4 cores
- **RAM:** 8 GB memory
- **Storage:** two partitions - 20 GB for WebPQ installation and an additional 1 GB per year per connected measuring device (using standard profiles)
- **Network:** Ethernet adapter for communication with TCP/IP PQ devices
- **Display:** Remote desktop connection or monitor with at least 1280 x 1024 pixel resolution
- **Browser:** Chrome, Firefox, Microsoft Edge, Safari
- **SMTP Mail Server:** acces to a mailserver from the application for alerting, notifications, and user management

2.3.4. Recommended System Configuration

- **Hardware:** Server designed for 24/7 operation / Virtual server system (more cost-effective!)
- **CPU:** CPU with 6 or more cores
- **RAM:** 8 GB or more memory
- **Storage:** two partitions - 20 GB for WebPQ installation and an additional 1 GB per year per connected measuring device (using standard profiles) with redundancy and automatic backup
- **Disk:** Solid-state disk for the database on a second partition
- **Network:** Ethernet adapter with high data throughput for communication with TCP/IP devices
- **Display:** Remote desktop connection or monitor with high resolution (e.g., 1920 x 1200 pixels)
- **Browser:** Chrome, Firefox, Microsoft Edge, Safari
- **SMTP Mail Server:** acces to a mailserver from the application for alerting, notifications, and user management

2.3.5. Operation in a Terminal Server Environment

Running WebPQ in a terminal server environment is technically possible, but generally not required, as WebPQ is provided as a web application via an integrated web server. Installation is performed directly on the terminal server; the configuration directory is stored by default in the system folder `%programdata%`.

Administration Notes:

- Initial configuration and administrative adjustments of the WebPQ backend application should only be performed by a user with local administrator rights via remote desktop connection. This ensures that configuration changes are made consistently and securely.
- Access rights to the configuration directory should be assigned restrictively to prevent unauthorized changes by other users.

User Access Model:

- Use of WebPQ (user management, device management, data analysis, and other functions) is exclusively via a web browser. Users do not require direct access to the terminal server or backend application, but connect to the WebPQ web interface over the network.
- The terminal server environment does not affect operation of the web interface. Users can access WebPQ from any supported device (PCs, notebooks, thin clients) with a compatible browser.
- Simultaneous access by multiple users to the web interface is possible, as WebPQ is designed for multi-user operation.
- Access to the web interface is via the web server URL, which is provided to users—this can, if necessary, also be local to the terminal server (e.g., `https://localhost:8443`).

Technical Recommendations:

- The terminal server must have sufficient resources (CPU, RAM, network bandwidth) for running WebPQ and any additional applications.
- Permissions and security settings of the `%programdata%` directory should be reviewed.
- Network configuration and firewall rules must allow access to the WebPQ web server; the path to the web interface should be communicated to users.
- For optimal performance, use the latest browser versions on client devices.

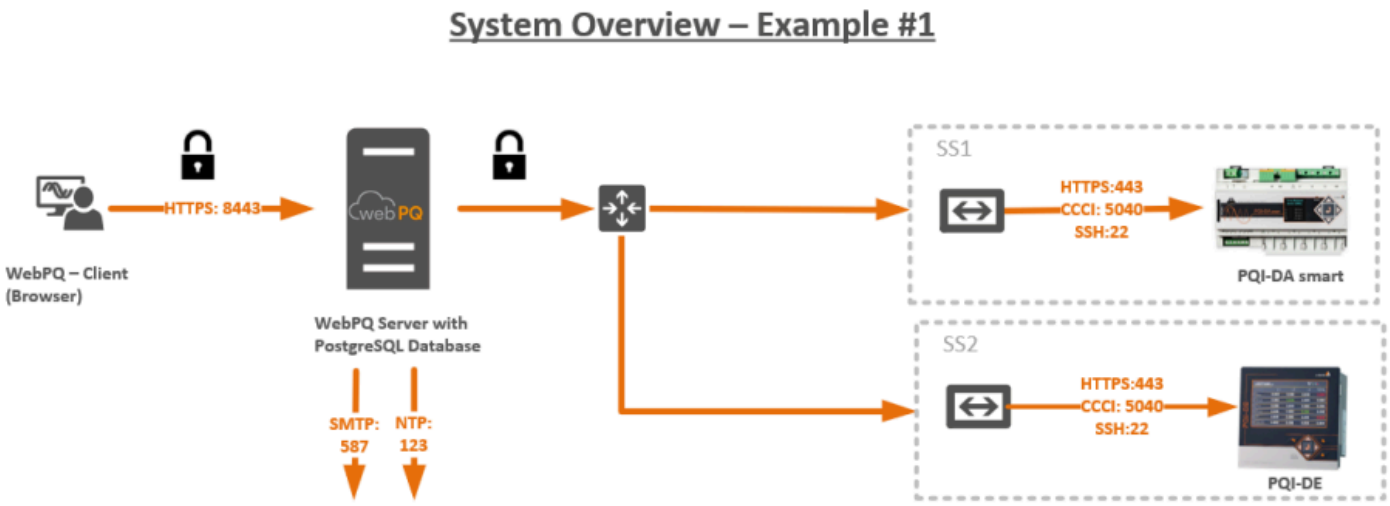
2.3.6. Recommended Tools

- PDF reader
- Installed browser: Chrome, Firefox, Microsoft Edge, Safari
- Database tools such as DBeaver (universal for all supported databases) or PG Admin for PostgreSQL

2.3.7. Recommended Certificates

- for the WebPQ WebServer: SSL certificate for secure communication in PEM format - see Informationen about SSL- Certificates

2.3.8. Typical System Configuration / System Diagram / Terminology



- **WebPQ Server**

  Virtual machine or PC where WebPQ runs as a service along with the database (PostgreSQL).

- **WebPQ Client**

  Host where the actual analysis of measurement data and management of measuring devices takes place via a browser. This host is often found in the office network.

- **SMTP Server**

  Mail server necessary for alerting and functions such as password reset, system messages, and automated alerting.

- **NTP Server**

  NTP server for synchronizing devices and the WebPQ server.

	It is also possible to install the database on another server!
Note	

Required Port Numbers for Communication:

Releases in gateways and firewalls must be configured from row to column (e.g., from the WebPQ Client, port 8443 - HTTPS must be enabled to the server to allow data usage on the client).

	WebPQ Server	WebPQ Client	Database Server	PQI-D (REG-COM)	PQI-DA smart / PQI-DE / PQI-LV	NTP Server	SMTP Server	Webserver of Device PQI-DA smart / PQI-DE / PQI-LV
WebPQ Server	x	x	5432 PostGre, 3306 MySQL	8000 TCP, 1111 TCP	5040 TCP-CCCI, 22 SSH	123 NTP	587 STARTTLS, 465 SSL/TLS	8443 HTTPS
WebPQ Client	8443 HTTPS, 1701 … 170X ParaPQID	x	x	x	x	x	x	x
Database Server	x	x	x	x	x	x	x	x
PQI-D (REG-COM)	x	x	x	x	x	x	x	x
PQI-DA smart / PQI-DE / PQI-LV	x	x	x	x	x	123 NTP	x	x
NTP Server	x	x	x	x	x	x	xx	x
SMTP Server	x	x	x	x	x	x	x	x
Webserver of Device PQI-DA smart / PQI-DE / PQI-LV	x	x	x	x	x	x	x	x

* 1701...170X: Range for specific ports for PQI-Ds, depending on configuration.

Typical Data Volumes in Communication

Connecting a measuring device to the WebPQ database generates approximately 20 MB per week in the standard configuration. Since the readout process is continuous, the data transfer requires a minimum speed of only 200 kbit/s.

2.3.9. Customer Checklist – System Information & Requirements

The following checklist is used to collect system information and requirements for the WebPQ installation to ensure smooth and fast service. Please fill in the relevant fields and send the completed checklist to your contact at A. Eberle.

2.3.9.1. WinPQ Information

- Are you already using WinPQ?
  ☐ Yes ☐ No
- Which WinPQ version are you currently using? _____
- Please provide your WinPQ license number or license details: _____

2.3.9.2. General Database Information

- Which database type are you currently using?
  ☐ MSSQL ☐ MySQL ☐ PostgreSQL ☐ Other: _____
- Which version of the database is in use? _____
- What is the size of your database (in GB)? _____
- Where is your database located?
  ☐ Local ☐ Server ☐ Other: _____
- Do you have a backup routine in place?
  ☐ Yes ☐ No
  If yes, please briefly describe where the backups are stored: _____
- For a smooth process, please create a complete system backup (snapshot/backup) before installation. Please confirm: ☐ Yes ☐ No

2.3.9.3. General Device Information

- How many devices are integrated into the system? _____
- Which device types do you use?
  ☐ PQI-DA Smart
  ☐ PQI-DA DE
  ☐ PQI-DA LV
  ☐ PQI-D
  ☐ PQI-DA
- How many users will work with the system? _____

Note: The sum of devices and users determines the required number of units for WebPQ. If you have any questions, please contact your A. Eberle representative.

- Is an NTP server available? ☐ Yes ☐ No - IP address: _____

2.3.9.4. General Server Information

- Does your server meet the current system requirements for WebPQ? See System Requirements ☐ Yes ☐ No
- Which operating system is installed on the server? _____
- Have the required ports for communication with the WebPQ database and devices been enabled?
  ☐ Yes ☐ No
  If yes, please specify which ports have been enabled: _____
- Is it a physical or virtual server?
  ☐ Physical ☐ Virtual
- What type of hard drive is installed in the server?
  ☐ SATA ☐ SSD
- Is the server joined to a domain? ☐ Yes ☐ No
- Is the server designed for 24/7 operation? ☐ Yes ☐ No
- Is an SMTP server available for alerts and user management? **Recommended function** ☐ Yes ☐ No
  Are the access credentials available? ☐ Yes ☐ No

  Server address: _____
  Port: _____
  Username: _____ (Required for commissioning – please do not provide here!) Password: _____ (Required for commissioning – please do not provide here!) Encryption: ☐ TLS ☐ SSL ☐ None
- Which partitions are available on the server (e.g., C:, D:, etc.)? It is recommended to store the database and temporary files on separate partitions. C: Size: _____ D: Size: _____

2.3.9.5. General Service Information

- Is a server migration planned or desired?
  ☐ Yes ☐ No
- Do you want to integrate new devices into the system?
  ☐ Yes, number _____ ☐ No
- Is remote access via TeamViewer or another tool possible?
  ☐ Yes ☐ No
  Are the access credentials available? ☐ Yes ☐ No

3. Safety Instructions

- Follow the operating manual.
- Always keep the operating manual during installation.
- Ensure that only trained personnel operate the software.
- Ensure that the software is only operated only in its original state.
- Ensure that the software runs in a secure system operation.
- Ensure that the software is regularly backed up.
- Ensure that the latest version of the software is always installed.

	For information on patch management, register on the homepage in the customer center or contact your sales partner!
Note	

4. Intended Use

The product *WebPQ* is exclusively used for the evaluation of Power Quality measurement data and energy measurement data in the power grid at low, medium, and high voltage levels. If the software is used in a manner not specified by the manufacturer, it may potentially cause damage!

5. Installation

The installation of WebPQ is carried out in several steps, including installation, administrative configuration, and initial setup. As of 2025, with WebPQ taking over many functions from WinPQ, various installation options and operating modes are available.

5.1. Installation and Operation of WebPQ as a Standalone Version

This option is suitable if the **basic functions of WebPQ**, which continue to evolve, are sufficient and there are **no special requirements for export formats** or **integration of devices from the classic platform (PQI-D / PQI-DA)**.

5.2. Operating WinPQ Software parallel to WebPQ

- Required if PQI-D or PQI-DA (see illustration in the software) needs to be integrated.
- Required if special reports from WinPQ are needed.
- Required if special exports, such as PQDIF, are necessary.
- Required if PQ Box data needs to be imported into the database.

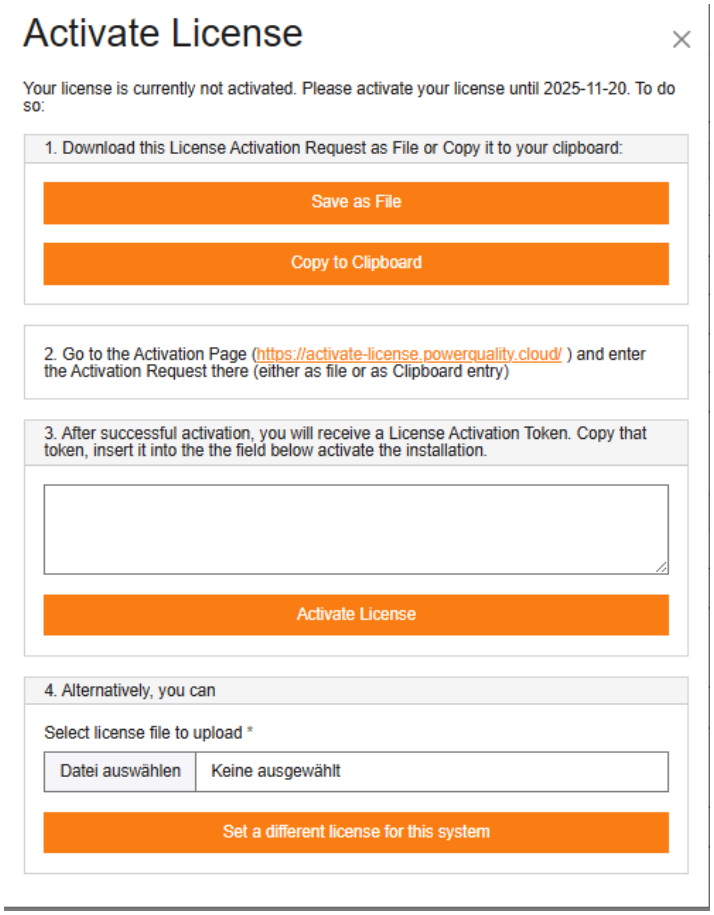
WinPQ software is **always** included in the license and delivery of WebPQ software and can be selected or deselected during installation.

A separate uninstallation assistant is available for uninstalling WinPQ software, which is described here.

	Please make sure to check the compatibility information and versions of the supported databases in the chapter **System Requirements**
Hint	

5.3. Activation of WebPQ via Activation Key

Starting with WebPQ version 2.1 the installation must be activated with an Activation Key. Until activation a notice dialog or the activation window is shown at the top. The software can be used for a maximum of 30 days without activation; within this period the Activation Key must be applied.



The activation file is generated using the hardware ID of the host and is only valid on this host. No direct internet connection is required for activation, but you must transfer a file from the host to another PC with internet access to activate the key at https://activate-license.powerquality.cloud/.

Proceed as follows:

1. Download the file LicenseActivationRequest.json via the button Save to file or copy its content via the button Copy to clipboard.
2. Open https://activate-license.powerquality.cloud/ and submit the activation request (either upload the file or paste the copied content).
3. After successful activation you receive an activation token for the license. Copy this token and paste it into the field to activate the installation, or alternatively use the file selection dialog to choose the activation file you downloaded from the activation page.

If you plan a system migration or the host hardware changes, a new activation is required. Repeat the process described above. For questions contact our support at pqsys-support@a-eberle.de.

5.4. Installation variants

1. **WebPQ Installation with Database (PostgreSQL) - Standard Case**

   The PostgreSQL database is installed directly on the host along with the WebPQ application. This installation type is particularly recommended for small to medium-sized systems (up to 200 devices). The PostgreSQL database is also installed during setup. Individual directory structures can be adjusted during installation.

2. **WebPQ Installation Without Database and Connection to an Existing Database or Installation of a PostgreSQL Database on a Dedicated Server**

   This option is suitable if an existing database infrastructure is to be used or if the PostgreSQL database is installed on a separate server.

3. **WebPQ Installation with Parallel WinPQ Installation with or Without a Database**

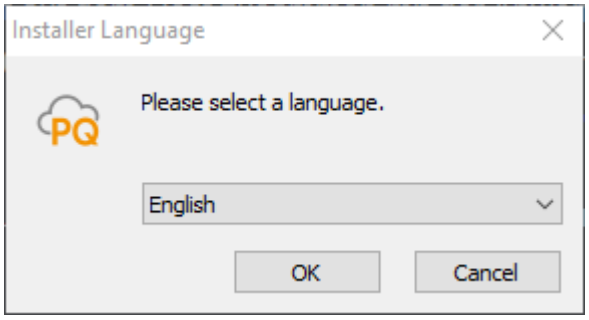
   This installation type should be selected if WinPQ software functions need to be retained. It must be decided which instance (WinPQ or WebPQ) will handle communication with the devices.

5.5. Installation

The WebPQ software is delivered securely via our portal https://software.a-eberle.de using a dedicated one-time access with SHA256 hash sum verification. Please verify the checksum for security purposes.

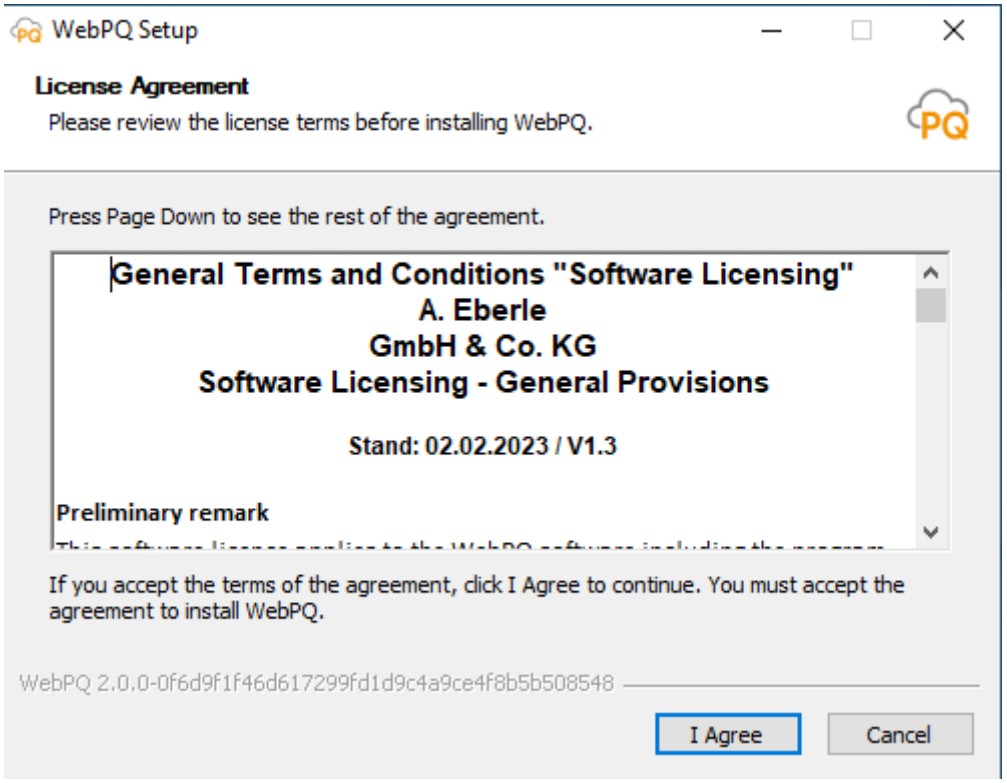
5.5.1. Start and Language Selection

The installation process starts by double-clicking the "WebPQ_Setup_x.y.z.exe" file. The installation must be confirmed in the User Account Control with "YES." Next, a *language selection* for the assistant must be made.



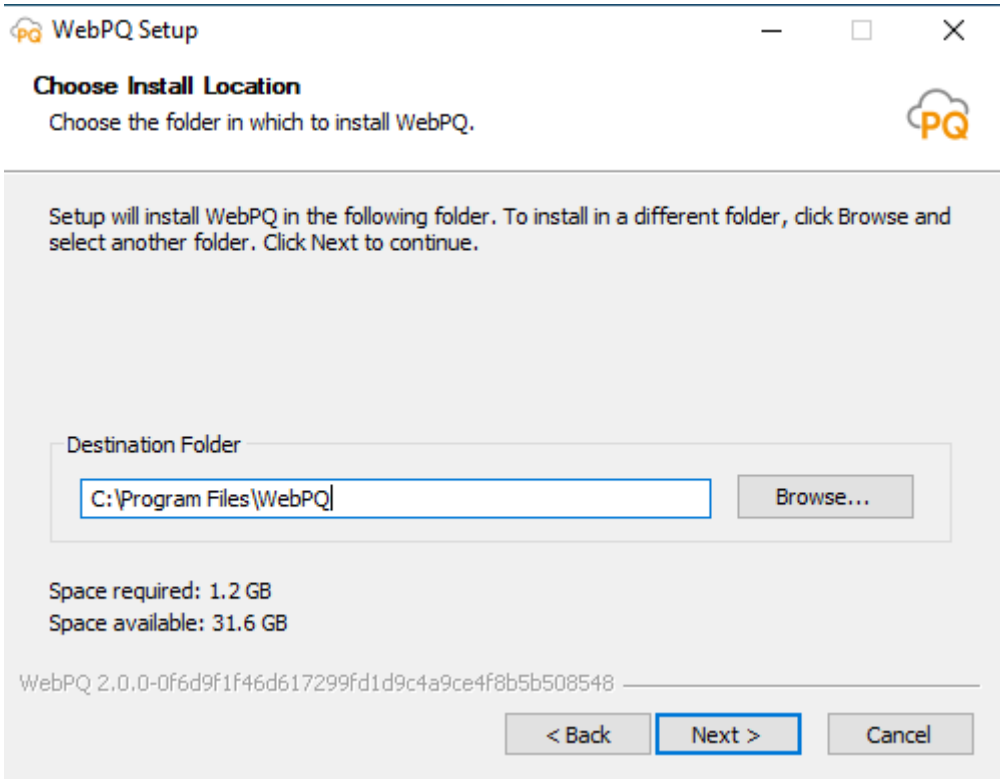
5.5.2. License Agreement

Acceptance of the license terms is required. More details on the terms and maintenance contract can be found in the delivery documents.



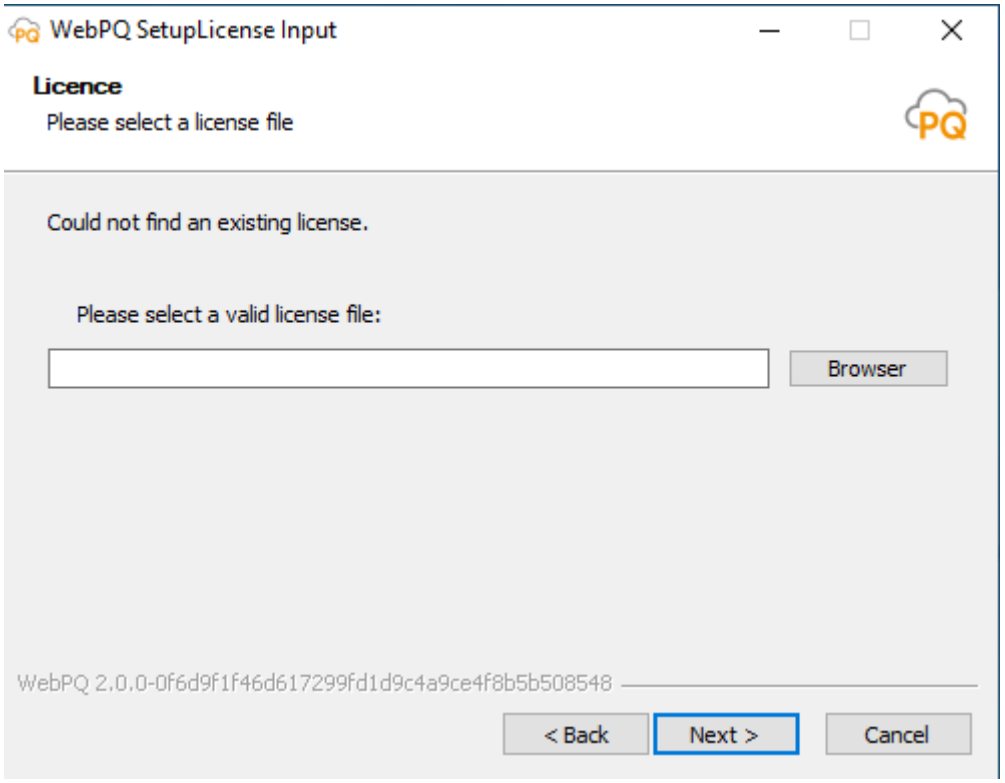
5.5.3. Target Directory

A target directory for installation can be specified. All necessary operational data will be stored in this directory. User-specific data can be found in `%programdata%/aeberle/webpq`.



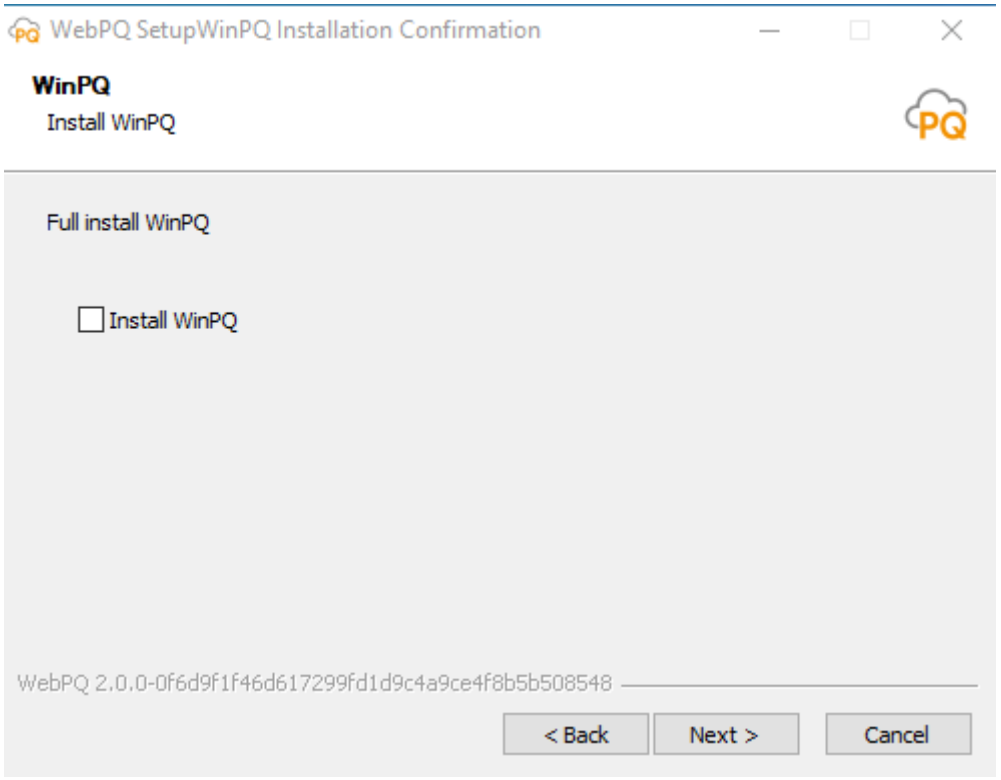
5.5.4. License File

A license file is required for the software to operate. This JSON-format file is provided during initial delivery or with a maintenance contract. The JSON file can be selected via "Browse" and is validated by the assistant. If the file is lost, please contact A. Eberle with your order and customer number.



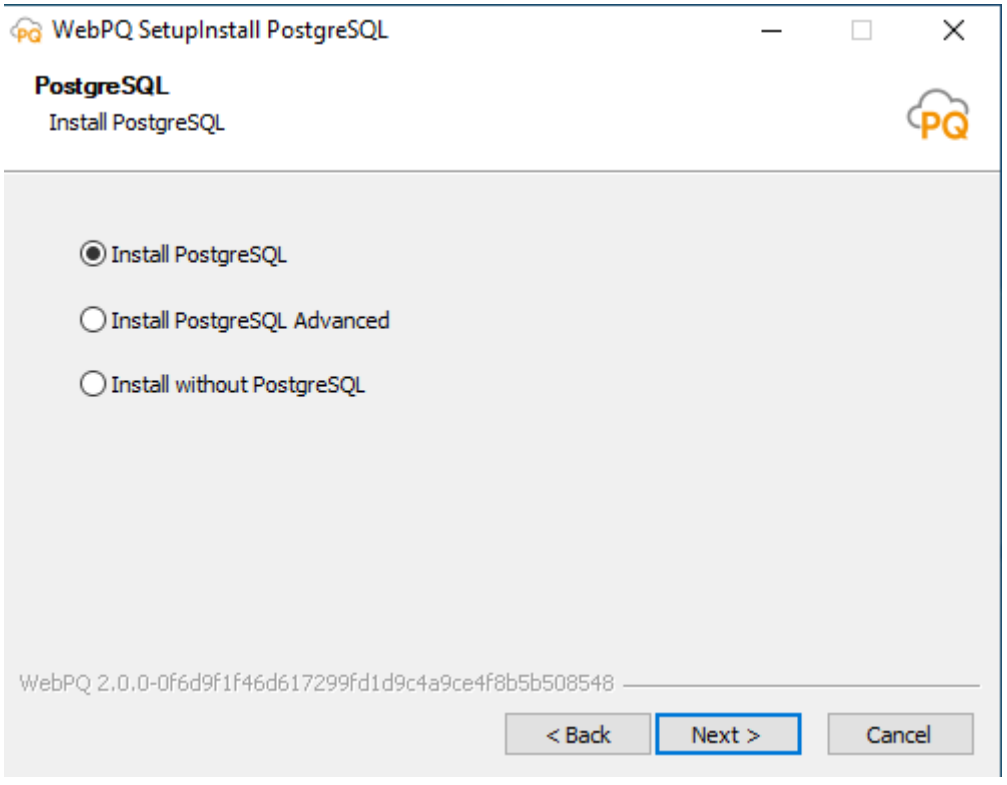
5.5.5. Selecting WinPQ

If the WinPQ software is to be installed, it must be selected here. Information on why this might be necessary can be found under **Operating WinPQ Software Parallel to WebPQ**.



5.5.6. Database Installation

The appropriate mode must be selected based on the Installation Variants.



- **Install PostgreSQL**

In this mode, the following steps are performed:

- The PostgreSQL database is installed with the following default parameters:

Parameter Name	Value
Directory	C:\ProgramFiles\ WebPQDatabase
Port	5432
Database Service Name	WebPQDatabase
WebPQ Server Service Name	WebPQServer
WebPQ Client Service Name	WebPQClient

  - The database is installed with the following default passwords and users:

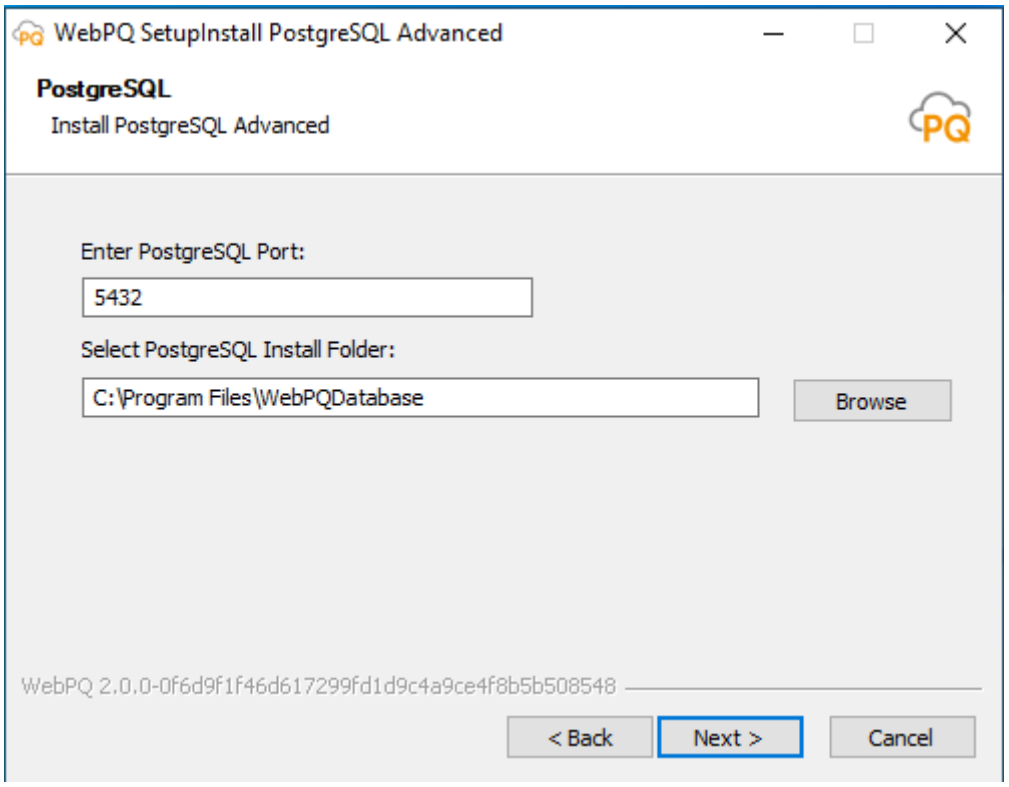
Role	Username	Password
Administrator	PQDBA	admin
User	PQID	PQID

NOTICE	The default passwords should always be changed to avoid significant security risks. It is recommended to use the advanced installation to set custom passwords.
Note	

5.5.6.1. Advanced PostgreSQL Installation (Recommended)

In this mode, PostgreSQL is installed with custom settings:

- Port number for database access
- Target directory for the database (e.g., on another drive like an SSD)
- Custom usernames and passwords for "Database Administrator" and "Database User"



5.5.6.2. Installation Without PostgreSQL

This mode is suitable if an existing database is used, either running on another server or already available on the host. After completing the assistant, the following connection details must be available. Pay attention to case sensitivity in parameter names!

- Database name
- Username with database access
- Password for the database user
- Database schema name

5.6. Initial Setup of WebPQ

The *WebPQ* must be initially set up with an administrator in the application layer and certain basic settings such as global password policies. The initial setup must always be performed when a new database connection to an existing WinPQ database is created in the administrative layer! Normally, the initial setup dialog appears automatically after the installation.

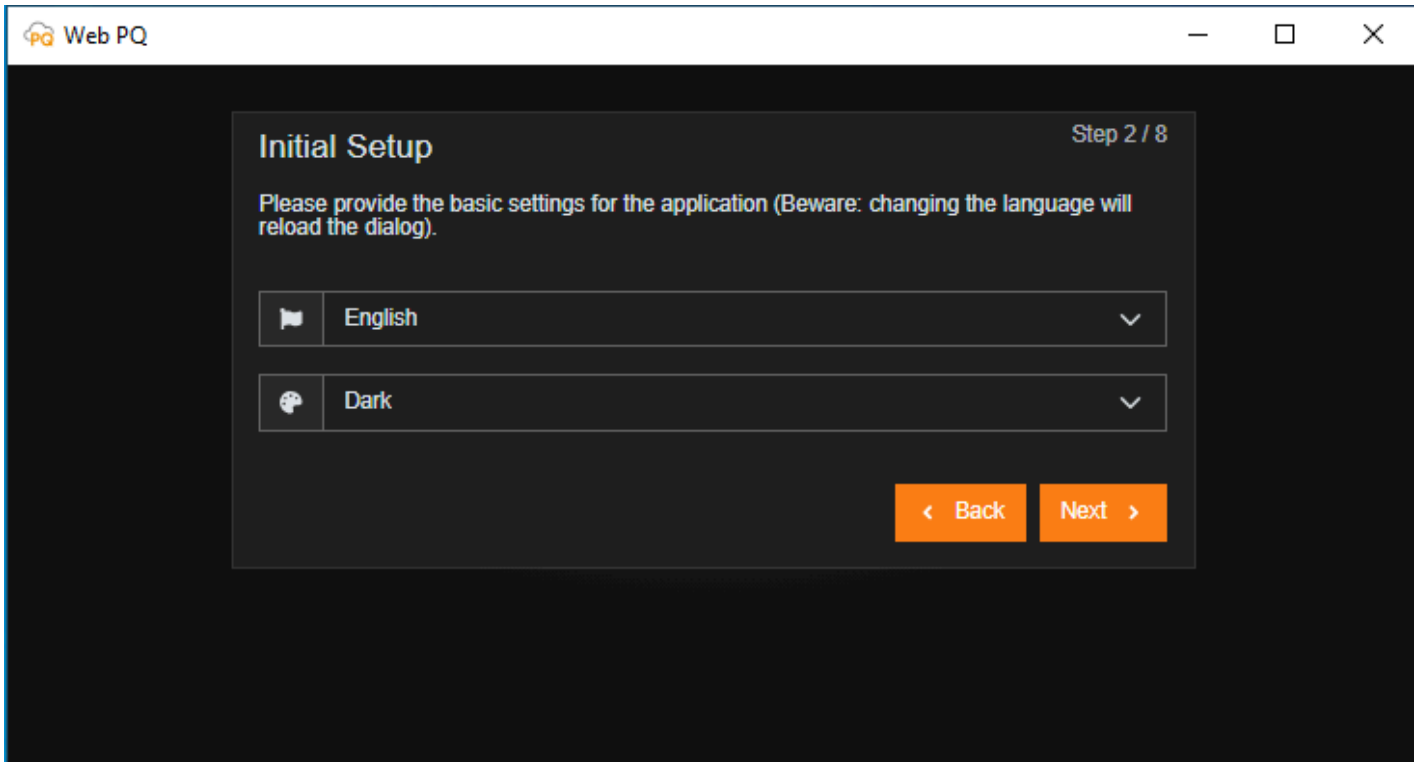
The basic settings are divided into eight areas:

1. Welcome page
2. Language and layout
3. Time zone setting
4. Password policy
5. User identification and data
6. Privacy policy
7. Backup of the encryption key
8. Summary
9. Data adoption

Explanations of the sub-areas:

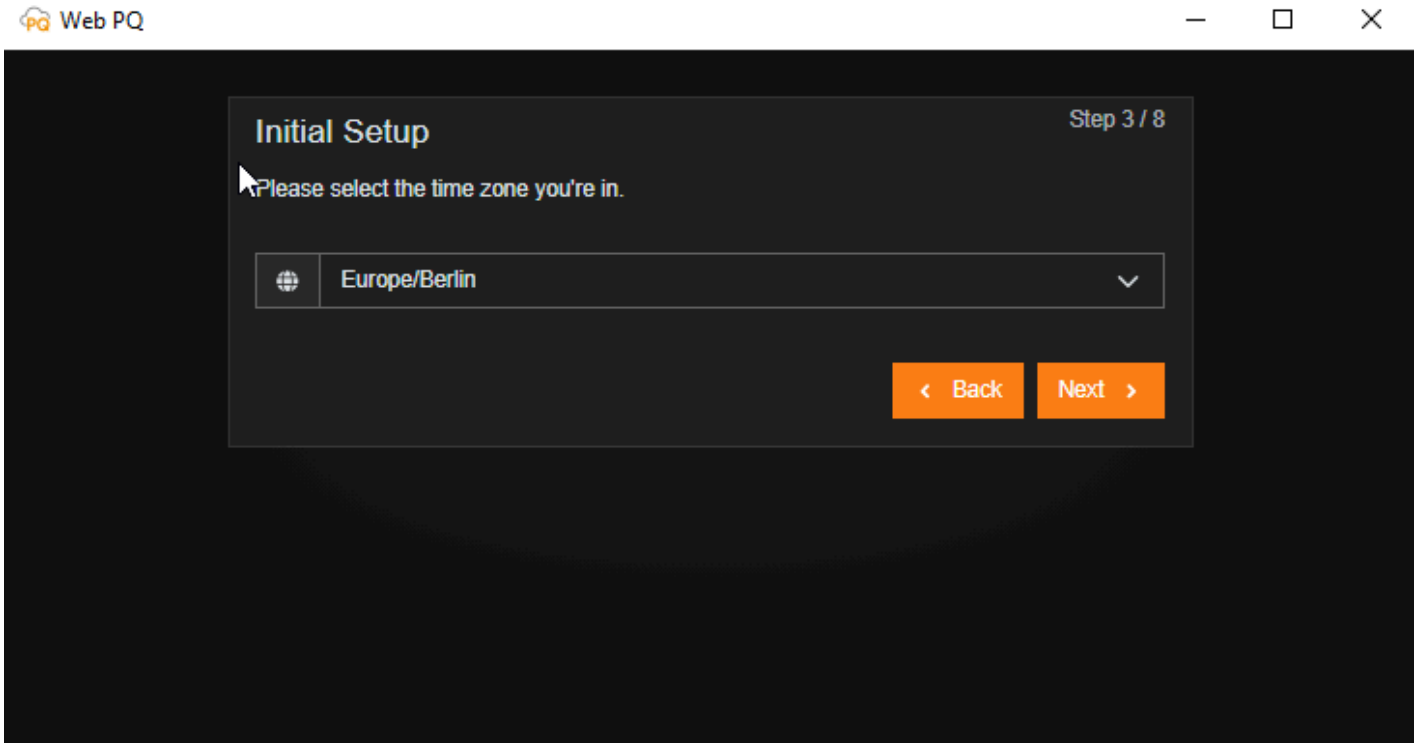
5.6.1. Step 2: Language and Layout

The language and layout are stored in the user account but can be adjusted again after login.



5.6.2. Step 3: User Time Zone

The user's time zone must be set to display times correctly in different time zones. Each measuring point also receives its own individual time zone. The user can choose between different time zone views.

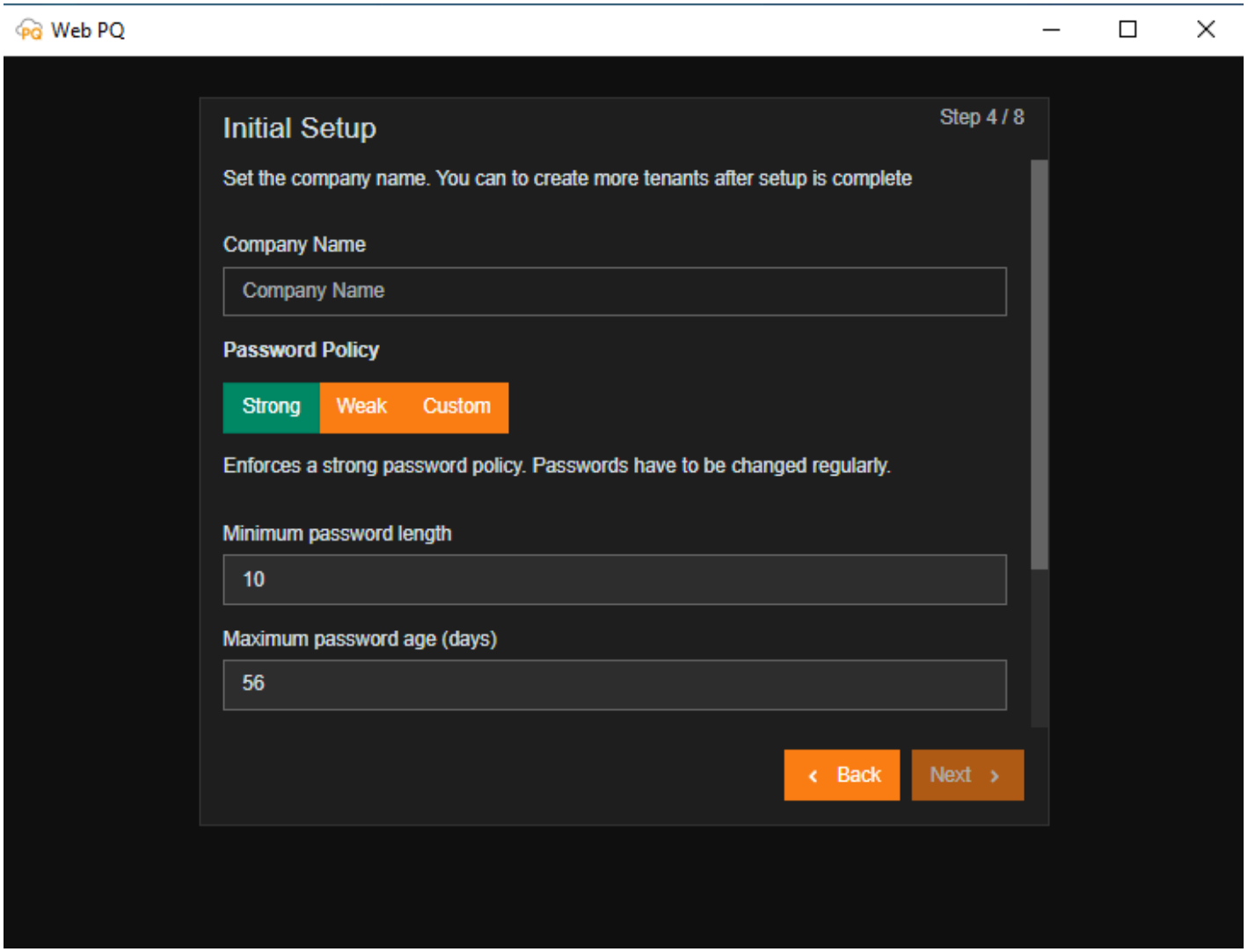


5.6.3. Step 4: Password Policy and Company / Tenant Name 1

In the area of KRITIS, password policies per company are usually set by central IT. The setting here applies to all created passwords within the further administration. The setting can be changed individually afterward. See also: Tenant Settings

The following settings are possible:

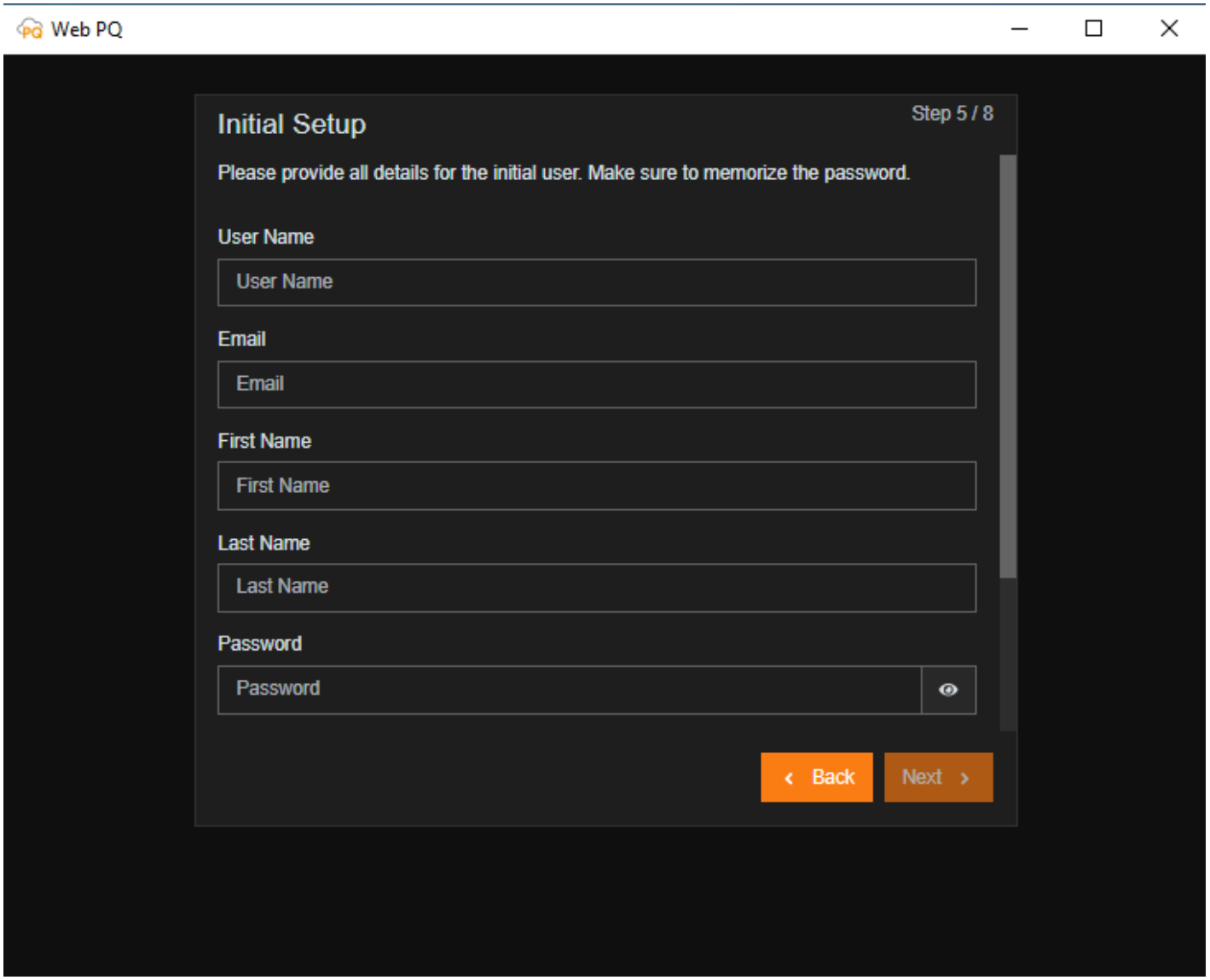
- Minimum password length
- Password expiration time
- Number of lowercase letters
- Number of uppercase letters
- Number of special characters
- Number of digits



1 Tenants are used to isolate resources (users, devices) through administrative rights and data storage. Each resource in WebPQ™ is held by its own tenant. A tenant typically represents a real company or a department/project within a company. Tenants are organized in a tree structure, so a tenant can have sub-tenants, and the sub-tenants can have their own sub-tenants. All administrative tasks can be performed by the administrators of a tenant and by the administrators of all higher-level tenants in the tree structure. Devices and users of sub-tenants are visible and accessible to the owning tenant in addition to the tenant's own devices. Tenant capability is a licensed module in the system.

5.6.4. Step 5: User Identification

Here, the main administrator of the system is defined. The used passwords must be kept secure. Recovery of the root account is only possible with data loss.



NOTICE	The entered administrative password must be kept secure and must not be lost! Recovery without data loss is not possible!
Note	

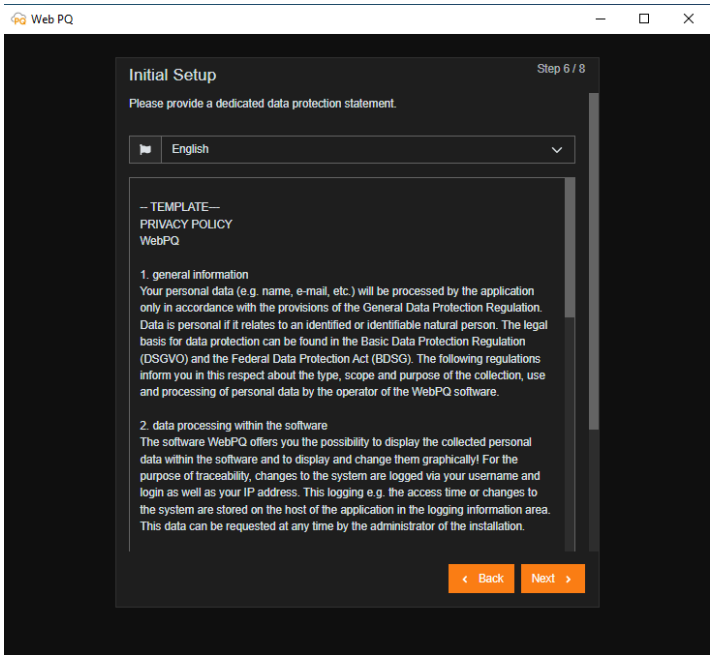
If an SMTP server is configured in the advanced settings, the password can be recovered using the password reset function with the entered email address.

Information on password reset can be found under: Forgot Password

5.6.5. Step 6: Privacy Policy

If you want to create an individual privacy agreement for your employees or customers, you can do so directly here. The software logs the required information automatically on the server as per the requirements, e.g., from the BDEW whitepaper.

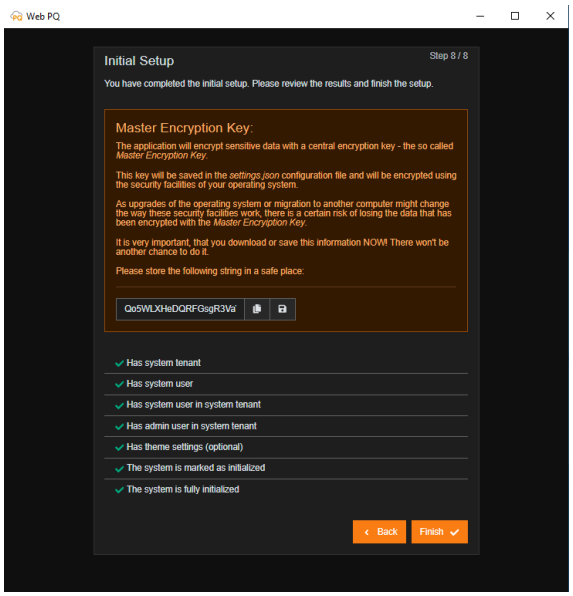
Information on audit logging can be found under: Audit Logging



5.6.6. Step 8: Data Adoption & Backup of the Master Key

The application encrypts sensitive data with a central encryption key using the AES-256-CBC method, known as the Master Encryption Key. This key is stored in the configuration file settings.json and is encrypted with the security functions of your operating system. Since the functionality of these security features may change due to operating system upgrades or migration to another computer, there is a certain risk of losing data encrypted with the Master Encryption Key. It is very important that you download or securely store this information NOW! There will be no further opportunity to do so.

After all data has been entered, it is transferred to the database, and the application is restarted.



5.7. Uninstallation / Removal of the Software

The WebPQ software is usually installed together with a locally running PostgreSQL database. Therefore, both the software and the database must be uninstalled in two separate steps if necessary.

5.7.1. Uninstallation of WebPQ Software

The uninstallation of WebPQ software is done through the Windows built-in uninstallation assistant. This can be accessed either through the Control Panel or by searching in the Windows Start menu.

5.7.2. Uninstallation of the Database

The database must be uninstalled through the Windows Services Management. The "WebPQDatabase" service must be stopped and removed. Then, the database files can be manually deleted.

Follow these steps:

1. Open the Windows Services Management.
2. Stop the "WebPQDatabase" service.
3. Uninstall the "WebPQDatabase" service.
4. Delete the database files in the database installation directory (default: `C:\Program Files\WebPQDatabase`).

Alternatively, the uninstallation can also be done via the command line. Open the command line with administrator rights and enter the following commands:

```
sc stop WebPQDatabase
sc delete WebPQDatabase
```

5.7.3. Deleting Temporary and Exported Files

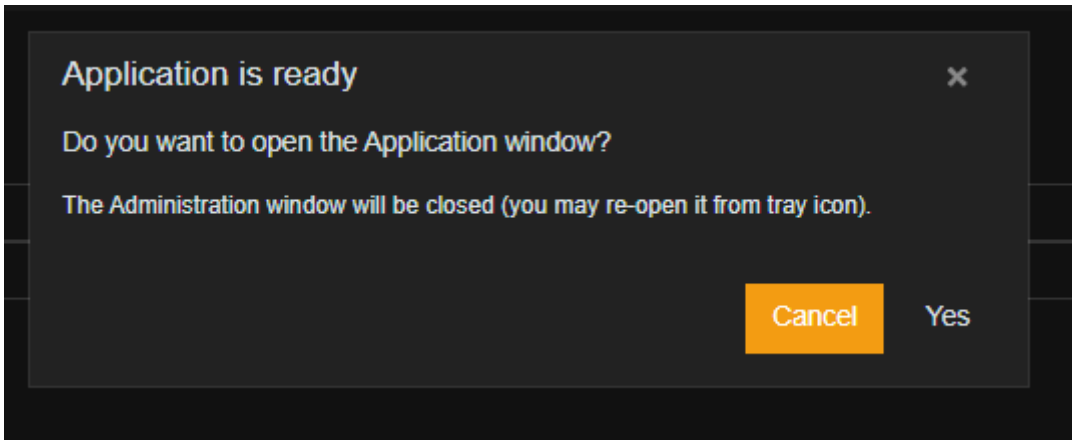
The WebPQ software stores temporary files and exported files in the directory `%programdata%/aeberle/webpq`. These files can be manually deleted after uninstalling the software. However, ensure that no important data is lost. Similarly, files of exports and reports may be stored in directories set within the application. These should also be deleted.

5.8. Administrative Configuration / Backend of the Software

The administrative interface or backend may open with pre-configured connection settings during the initial installation. It can be accessed anytime on the host via the taskbar (next to the clock) by right-clicking the "WebPQ" icon and selecting "Administration."

During the initial setup of the software, usually only the hostname of the database server, the database name, and the username and password of the database need to be configured in the "Database" section. If the database is installed on the same host as the WebPQ software, the default values can usually be retained.

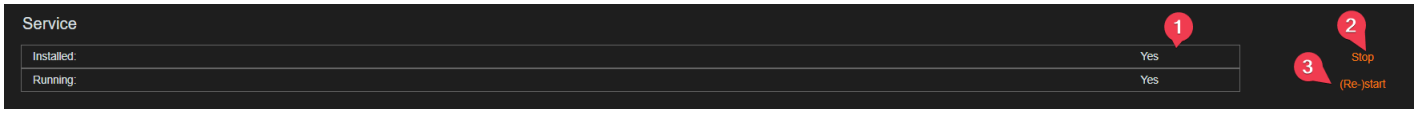
After correctly entering all settings, the processes restart by clicking the "Update" buttons. Then, you will be asked if the application should be started with the embedded web browser. Clicking *"Yes"* opens the frontend in the app.



The administrative interface itself is generally divided into six main areas, which can be accessed by clicking on the name.

5.8.1. Part 1 - Service

In the "Service" section, the user can monitor (#1), restart (#2), and stop (#3) the status of the background services "WebPQService.exe," which runs under the "System" account.



Generally, the service that provides the web server for the clients should be both installed (Installed: YES) and continuously running (Running: YES).

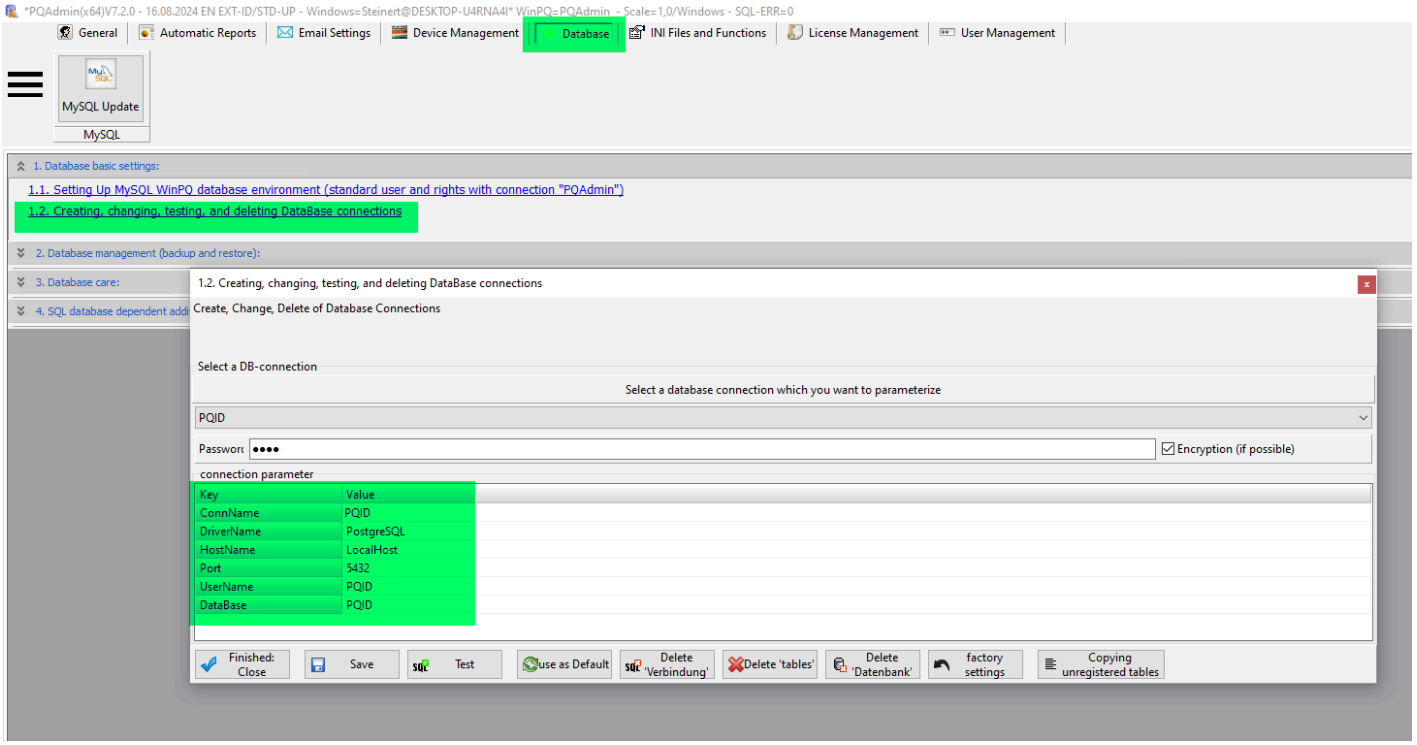
The service starts automatically when the host starts and runs in the background. It is responsible for communication between the clients and the web server.

5.8.2. Part 2 - Processes

The "Processes" section shows the running processes of the software. Here, the processes can be monitored and restarted if necessary.

5.8.3. Part 3 - Database

The settings in the database section are necessary to establish a connection with the database server. The database connection settings can be found in WinPQ under "System Management >> Database" if an existing WinPQ database is to be used for WebPQ.



Parameter	Description
#1 Type	Specifies the type of database used (MySQL / MariaDB, PostgreSQL & MS-SQL) 2
#2 Host	Specifies the IP address / hostname of the server where the database is running
#3 Database Name	Name of the database where the measurement data is stored and where the WebPQ settings are also stored.
#4 Port	Specifies the TCP port under which the database server from #2 is reachable
#5 Username	Username with necessary write permissions on the database specified in #3
#6 Password	Specifies the password for the database connection user. The password is stored encrypted in the Windows Security Storage in the system user. For security reasons, it is not possible to read back the password in the interface! A password should only be entered when necessary changes are made!
#7 Database Schema	WebPQ stores data such as user settings, analyses, and many others in schemas. The default value here is always "public"
#8 SSL	The connection to the database server is generally encrypted (checkbox checked).
#9 Self Signed certificates	The supplied certificates of the databases are by default "self signed." However, these can be replaced by company-specific certificates.
#10 Max parallel data uploads	Sets the maximum number of parallel uploads to the database! By default, 5 is selected here. For large systems with high-performance databases, the number can be increased!
#11 Test connection	Checks if a connection to the database can be established with the entered data (e.g., if ports are open and all entered data is correct for a connection)
#12 Update	Saves the settings and restarts the services and processes if changes are made!

2
Licensed feature for MySQL and MS-SQL - We recommend using the standard PostgreSQL solution in any case.

	For MSSQL databases, the database schema **dbo** should be used.
Note	

For a connection to a WinPQ system installed with its default settings, the following settings should be used.

5.8.3.1. Settings for installation up to WinPQ v6.1*

Parameter	Value
#1 Type	MySQL / MariaDB
#2 Host	localhost
#3 Database Name	PQID
#4 Port	3306
#5 Username	PQID
#6 Password	PQID

5.8.3.2. Settings for installation up to WinPQ v6.2*

Parameter	Value
#1 Type	PostgreSQL
#2 Host	localhost
#3 Database Name	PQID
#4 Port	5432
#5 Username	PQID
#6 Password	PQID
#7 Database Schema	public

	We recommend changing "default passwords" in any case and using appropriate secure passwords according to your company policies! Instructions for changing passwords can be found in the WinPQ user manual.
Note	

5.8.4. Part 4 - Network

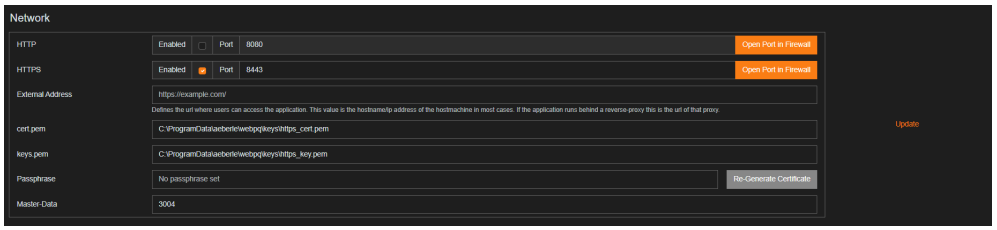
The settings in this section refer to the web server installed on the host (server) in the form of the WebPQ application and the clients (evaluation PCs) that provide the interface.

The default settings are "security by default." For example, the web server on the installed PC is only accessible by clients via HTTPS on port 8443 (#2) by default. The service of an unencrypted connection is disabled by default (HTTP).

To use "HTTPS," i.e., the encrypted connection from the client (evaluation PC) to the web server, without a warning of an unknown certificate in the browser on the client (evaluation PC), it is recommended to store your own certificates protected with a password (#6) in the WebPQ application (#3 & #4).

To store the certificates, they must be in PEM format. More information can be found under PEM Certificates.

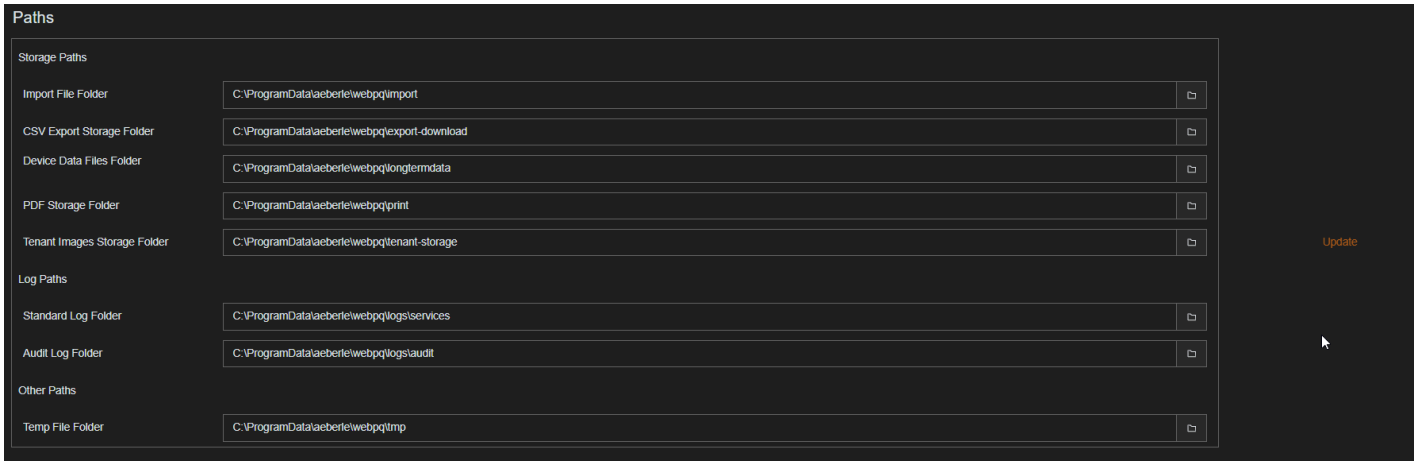
The certificates can be stored at the specified path and selected in the program interface by clicking (#5) on the path.



NOTICE	Using "unencrypted" connections and unknown certificates can lead to "data theft" and "data loss"! We always recommend using the "secure" default configuration (HTTPS)!
Note	

5.8.5. Part 5 - Installation Paths

In this section of the software, all paths where the software stores data are listed. This includes exports of reports in PDF format, data exports in various formats such as CSV and COMTRADE, as well as NEQUAL, log files like the audit log, and temporary files.



5.8.6. Part 6 - Other

This section of the software specifies the path where the settings made in points `#1`, `#2`, `#3`, `#4`, and `#5` are stored (`settings.json`). For example, if you want to set up a new server or plan a migration, this file can be used to transfer the settings from PC A to PC B. Passwords for the database connection and certificates are excluded from this.

6. Operation & Usage

6.1. Accessing the Software Locally or via Client

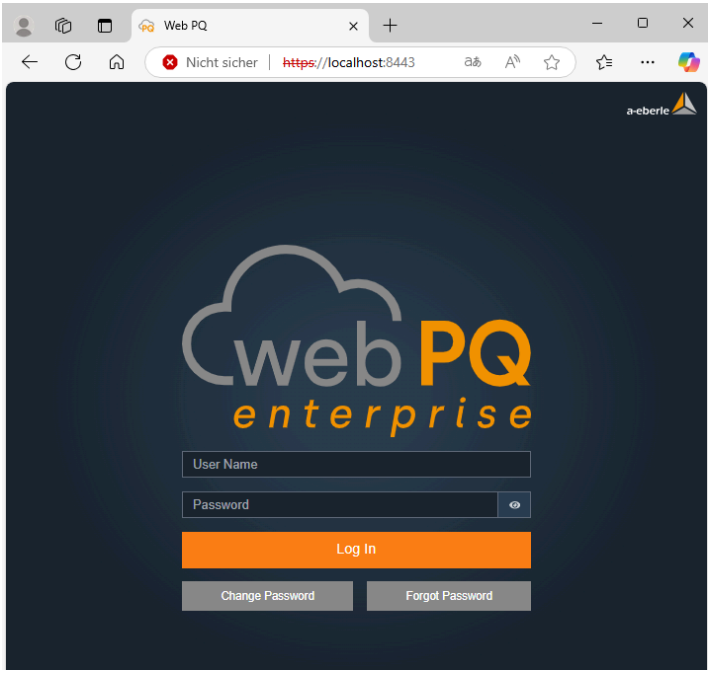
The WebPQ software is opened on workstations via a web browser by accessing a specific link. This link may vary depending on the IT environment and installation. To ensure smooth use of the software, it must be ensured that the port defined in the installation is accessible from the workstation PC and a connection to the server with the installed WebPQ software can be established.

Examples:

Local Installation

If the server on which WebPQ is installed is also the workstation PC, the software can be opened in the browser using the following link.

https://localhost:8443/



Client-Server Architecture

If the WebPQ software is installed on a different PC (server) than the workstation PC (client), the address of the server (in this example, the server has the IP address 10.10.1.20) must be entered.

https://10.10.1.20:8443/

System Login:

Enter the username and password to log in directly to the system!

6.1.1. Change Password

The user can set their login password directly via the `Change Password` function before logging in by entering their username and current password. The password policy set for the tenant must be observed!

6.1.2. Forgot Password

If the system in the local installation has access to an SMTP server / mail server, it is possible to recover the password using the `Forgot Password` function and the email address assigned to the user.

	In case of incorrect login attempts, the user will be blocked for five minutes after five incorrect attempts. The incorrect login attempts are also logged in the system.
Note	

6.2. Software Layout and Functions

- General Layout of the WebPQ Software
  Overview of the user interface and its structure for easy navigation in the software.

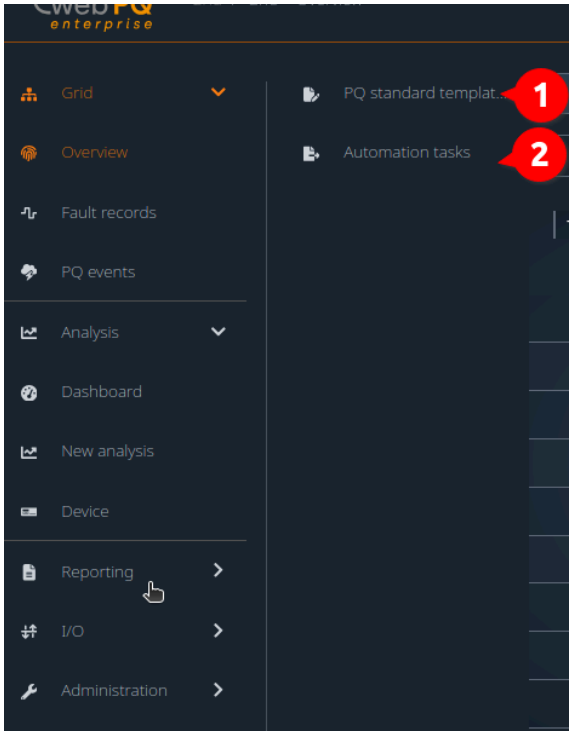
6.2.1. Analysis - Types and Options

The software is divided into the following areas for **PQ and other analyses**:

- Visualization Pages
  Description of the pre-configured dashboards that enable quick and targeted display of PQ measurements.
- Usage in Analysis
  Guide to efficient use of analysis functions, including available tools and settings.
- Analysis Cockpit
  The central analysis tool for creating individual dashboards. More than 20 different analysis types are available to perform customized evaluations.
- Device Analysis
  Detailed & pre-configured analysis functions for individual measuring devices to specifically access their data. A quick and easy way to keep track of individual measuring points.
- Dashboard Analysis
  Individual dashboards can be created via the Analysis Cockpit, which can be directly or automatically converted into scheduled reports. It is possible to create any number of dashboards and flexibly adapt them to different analysis requirements.

6.2.2. Reporting - Types and Options

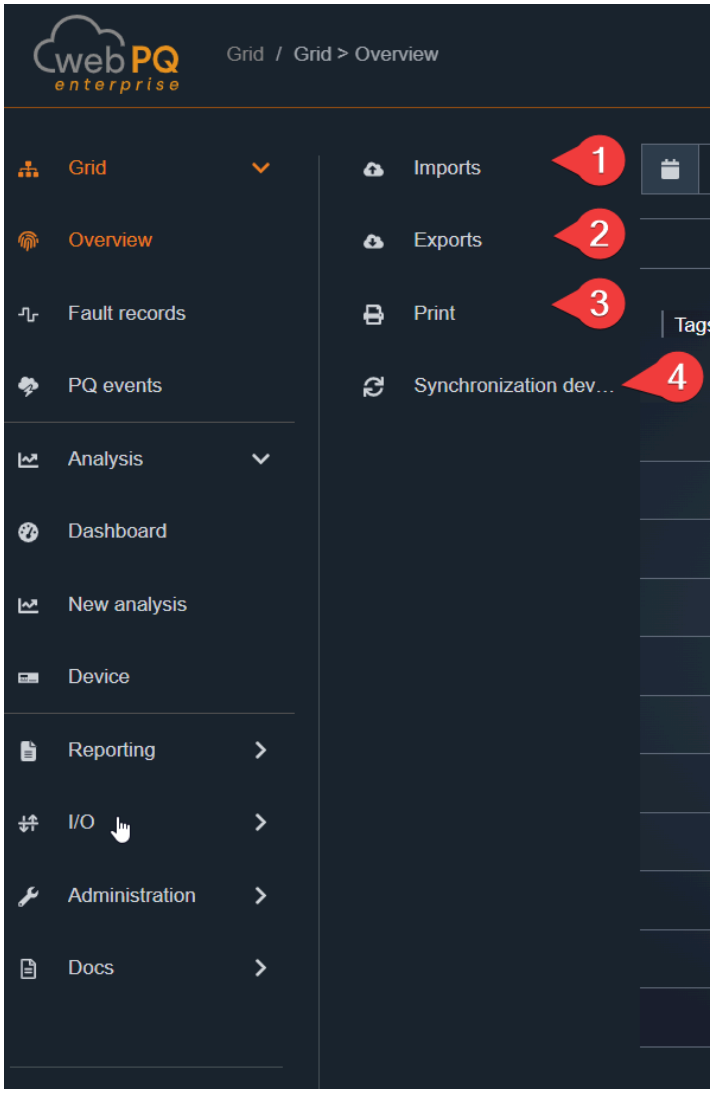
The **"Reporting"** area includes all settings required for creating normative reports (PQ standard templates). It also offers the possibility to define automated tasks (automation tasks) to execute reports and data exports on a scheduled basis.



- **PQ Standard Templates #1**
  Here, all templates for calculating statistical values can be managed. This includes standardized templates such as **EN50160, IEC61000-2-4**, and **IEC61000-2-2**, which are regularly updated by **A. Eberle**. Based on these standard templates, the user can create their own templates and apply them to specific measuring points.
- **Reporting Automation #2** Allows the configuration of automated reports, **email dispatch of reports and disturbance records**, as well as the automatic **data export and import management**. The function links predefined tasks with measuring points and templates to ensure efficient report generation.

6.2.3. Import / Export

The **Import/Export** area includes all interfaces for data and report exchange between the WebPQ platform and external systems. Here, measurement data can be imported, reports and raw data can be exported, and synchronization processes can be monitored. Additionally, functions for manual download of PDF reports as well as CSV and measurement data import are available.



- **Data Import**#1

  Allows manual import of measurement data from the devices **PQI-DA smart, PQI-LV, and PQI-DE** into the WebPQ database.

- **Data Export**#2

  Management of exports in various formats (**CSV, NEQUAL, COMTRADE, PQDIF**), both manually and automatically via **Reporting Automation**.

- **Print & PDF Export**#3

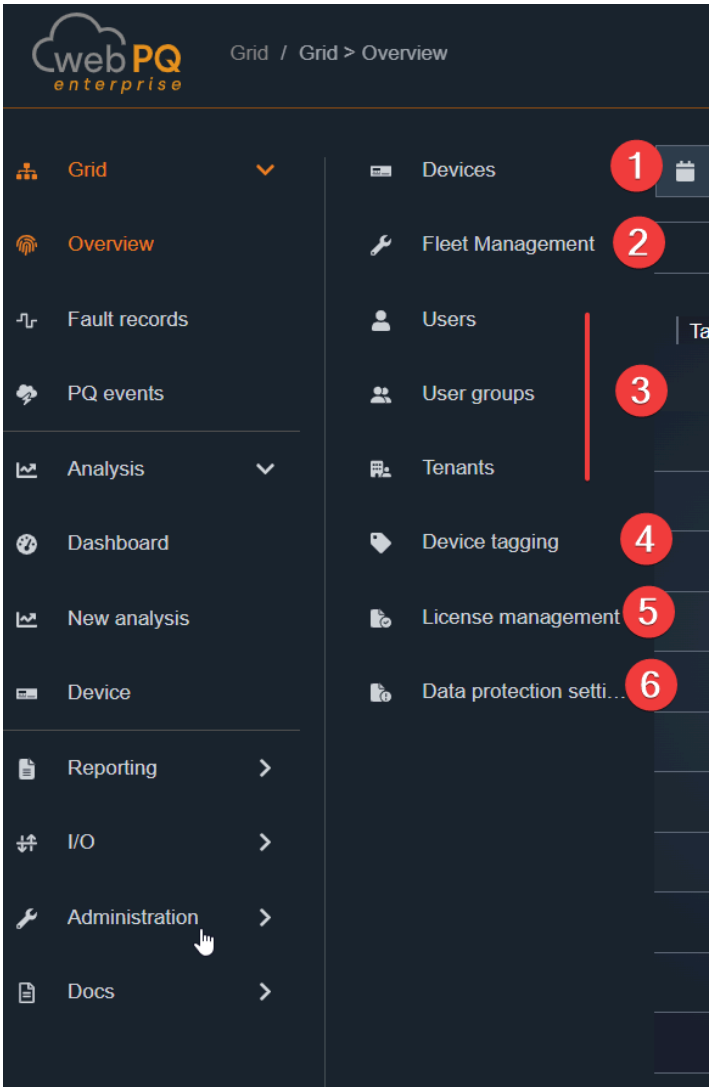
  Generation and provision of PDF reports, either manually or automatically via **Reporting Automation**.

- **Device Synchronization**#4

  Status display of device synchronization. Shows which measuring devices have been synchronized with the WebPQ database, including detailed status information and log files for error analysis.

6.2.4. Settings / Administration

The **Settings** area includes all administrative functions of the software. This includes the configuration of measuring points, user and rights management, and tenant management. Additionally, other central settings are available here, such as device tagging, license management, and – if licensed – fleet management.



- **Devices**#1

  Management and configuration of measuring devices. Here, measuring devices can be viewed, added, administered, and deleted. Additionally, you have access to versioned parameter sets and the ability to read log files. This area also contains measuring point-specific parameters such as NEQUAL and allows access to the device web pages within the WebPQ software.

- **Fleet Management**#2

  Mass management and configuration of measuring devices via the licensable fleet management. It allows simultaneous updating of many measuring devices with new firmware or limit value sets, significantly facilitating the management of large device fleets.

- **Users & Rights**#3

  Management of users, groups, and access rights. In this area, tenant-wide settings such as email server, company name, logos, or password policies can also be configured.

- **Device Tagging**#4

  Management of the hierarchical display of measuring points through categories and tags.

- **License Management**#5

  Overview and management of the software license, including the number of users and measuring points (units).

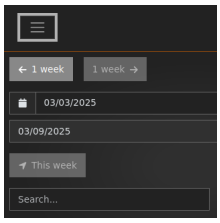
- **Data Protection**#6

  Management of data protection agreements in accordance with GDPR guidelines within your company.

6.3. User Interface of the WebPQ Software

The **WebPQ** application is divided into three main areas:

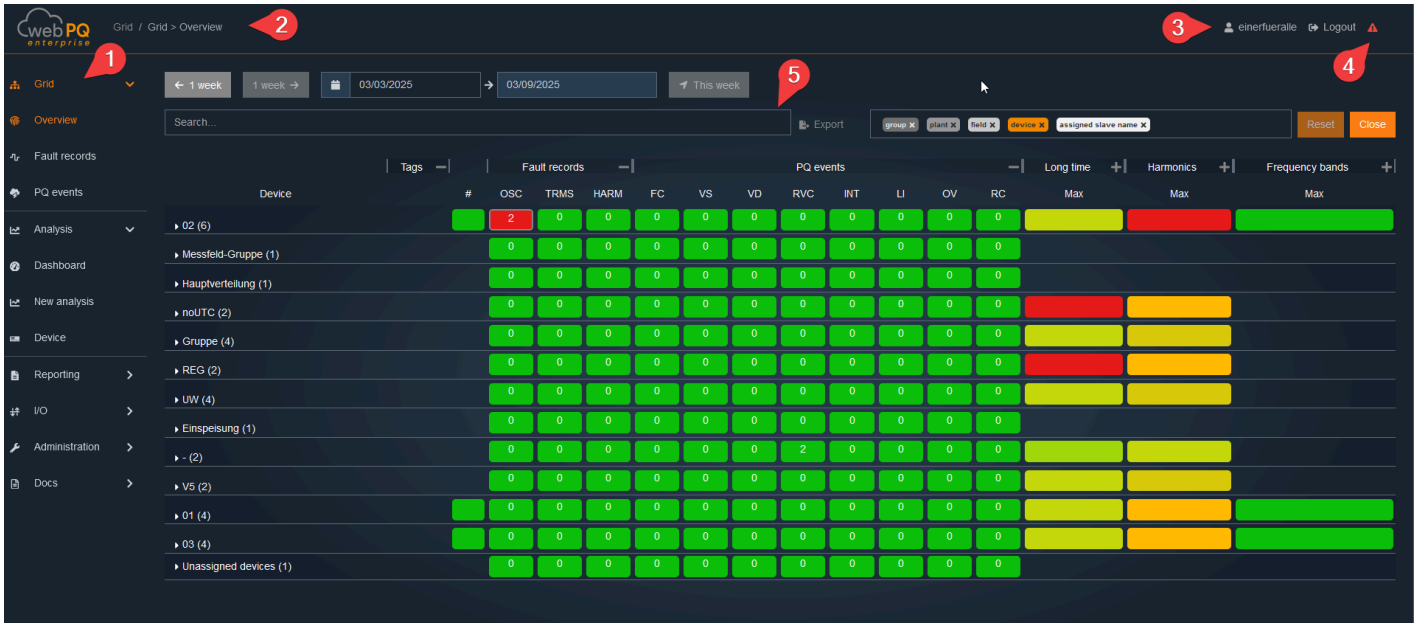
1. **Navigation Bar**: The navigation bar #1 is located on the left side. For smaller screen resolutions, it is moved to the top area. In this case, the navigation can be opened by clicking on the three lines.



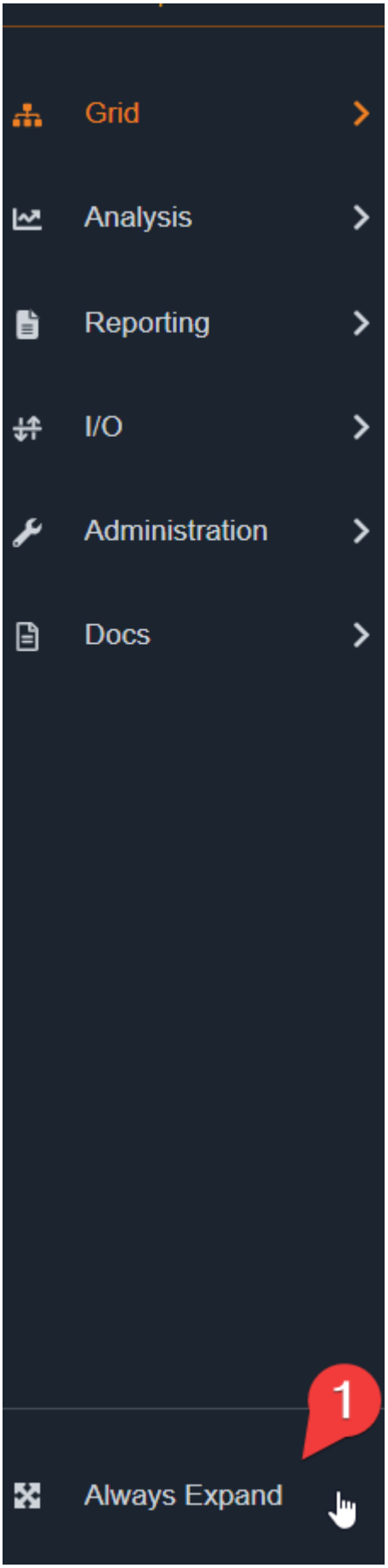
1. **Header** – The header contains important controls and information:
    - **Navigation Bar** (#2): Shows the current position within the application and allows quick navigation.
    - **Account Settings** (#3): Here you can manage personal settings and view user information. See:

      Account Settings
    - **System Status / Syslog** (#4): Provides information about the current state of the application, such as connection status or system messages. See: System Messages / System Status or Logfiles

1. **Workspace**: The central area #5 of the application, where the actual content and functions are displayed and edited. This is where data entry, analysis, and visualization take place.



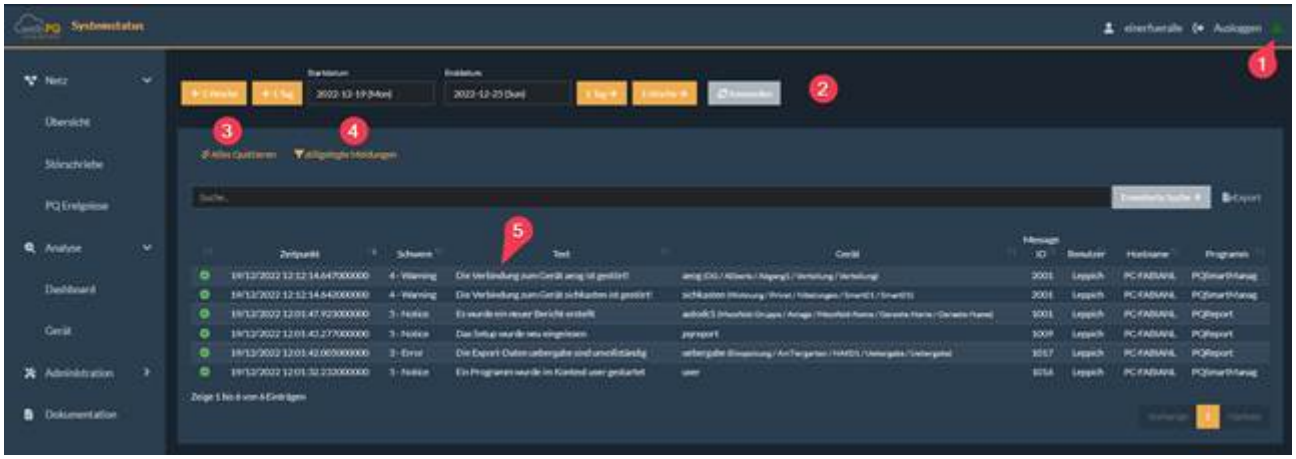
To use the workspace as efficiently as possible, you can reduce the navigation bar to compact buttons. To do this, the Always Expand option #1 must be deactivated. This way, the navigation is only displayed when needed, providing more space for the actual workspace.


Grid
Analysis
Reporting
I/O
Administration
Docs
1
Always Expand

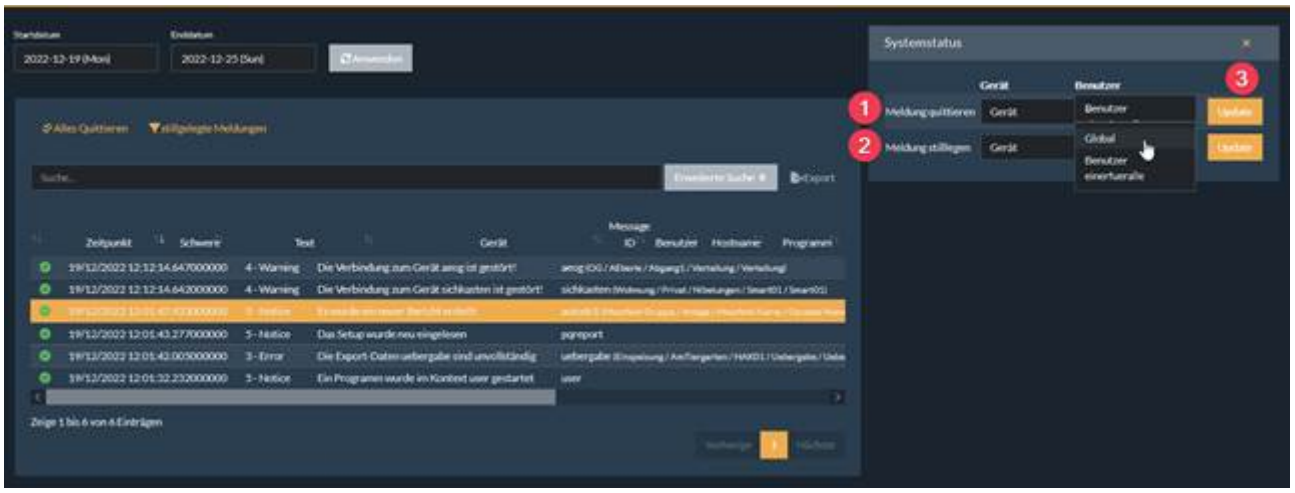
6.3.1. System Messages / System Status

To organize the system with connections to many measuring points and to operate the system in a stable fashion, the software lists all messages centrally and clearly via #**1**.

If the exclamation mark turns red  , new system messages – such as connection interruptions or messages about the battery status of the measuring devices – have occurred. If the exclamation mark is green  , all messages have been acknowledged (#**3**) or no new critical messages have occurred.



All messages can be acknowledged as a whole (#**3**) or individually by clicking on the message as shown in the screenshot below **(#1)** for each device / globally and per user or globally. To do this, select the option under device or user in the dropdown list and confirm this via #**3**.

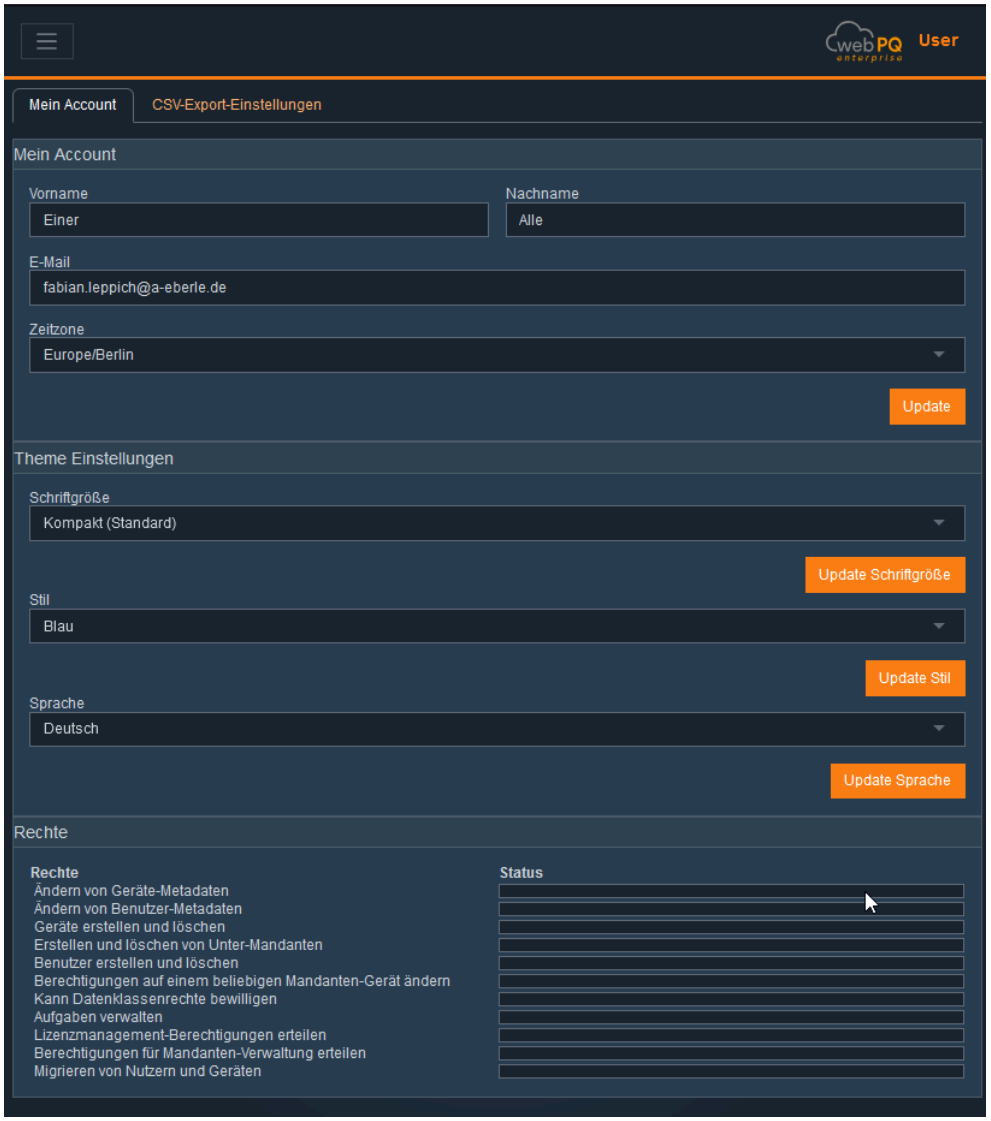


It is also possible to "silence" individual messages. This may be necessary, for example, when shutting down a connection for maintenance purposes. To do this, select function #**2** "Silence Message". This function can also be set per device or globally for the message type per user or for all users. The "silenced messages" button 

allows you to view and reactivate the silenced messages. To do this, simply click on  in the respective row of the message to be reactivated.

6.3.2. Account Settings

Each user can customize individual settings such as **language**, **theme**, and **password** directly in their user profile.
To open the settings, click on your **username** at the top right:



6.3.2.1. My Account

In the **Account Settings** section, personal data such as **name** and **email address** are displayed and can be edited.
The **timezone** can also be configured here, which is important for the correct display of timestamps throughout the software.
Changes are applied immediately after clicking **Save** and apply to all logged-in devices.

Technical Notes:

- Changes to email or password require re-authentication (JWT token is updated).
- The timezone setting affects all time information in reports and notifications.

6.3.2.2. Theme Settings

In the **Theme Settings** section, the appearance of the software can be customized:

- **Font size:** Choose between three predefined sizes (Standard, Large, Extra Large)
- **Color scheme:** Switch between **Blue**, **Black**, or **Light** theme
- **Language:** Select the software language (e.g., German, English)

Technical Notes:

- Theme and language settings are stored locally in the browser and server-side in the user profile.
- Changes to color scheme and font size take effect immediately in the UI (without reloading).
- The language setting controls all UI texts and system notifications.

6.3.2.3. User Permissions

The permissions assigned to the user are displayed here **clearly** and in **read-only mode**.
Typical permissions include **Admin**, **Read**, **Write**, **Device Management**, etc.
Managing and assigning user permissions is only possible in the separate administration area of the software. See also: User and Permission Management

6.4. Visualization Pages

6.4.1. Grid > Overview

The landing page of the **Grid > Overview** software is divided into two areas – a **Heatmap** and a **Tile View**.

6.4.1.1. Grid Overview – Heatmap

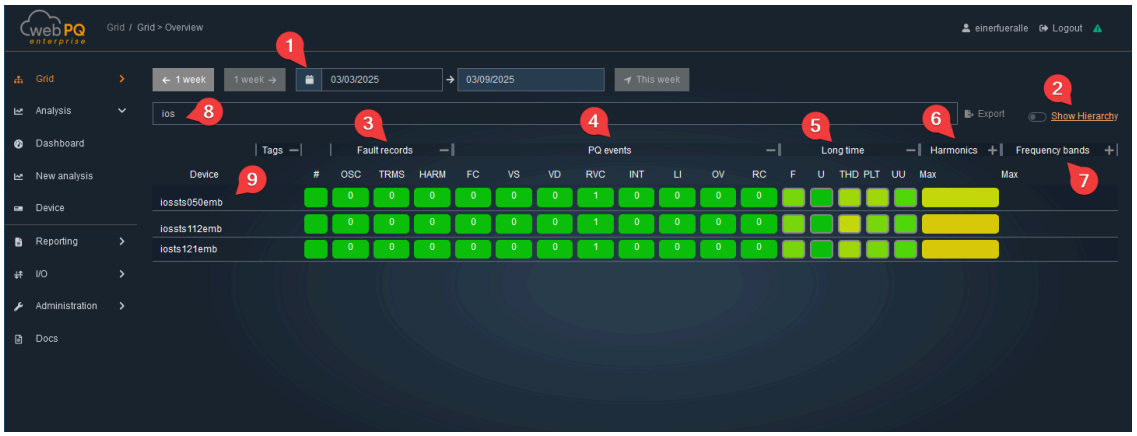
The homepage of the **Grid > Overview** software provides the user with a quick overview "Heatmap" of all devices connected to the **WebPQ** software. This overview spans a selected time period, #1, typically a calendar week. The landing page is automatically updated every 60s to always display the latest disturbances. Using the #2 function, the interface can be sorted into custom hierarchy levels, allowing many measurement points to be displayed hierarchically according to the application. More information can be found under Hierarchy Settings

The devices are sorted by default according to the number of disturbances in the #3 area. Disturbances are color-coded:

- **Red**: Unacknowledged disturbances
- **Green**: Acknowledged disturbances

Clicking on an **OSC or TRMS record** opens the **Analysis Cockpit**.

Subsequently, the button color with the number of records changes from **red** to **green**.



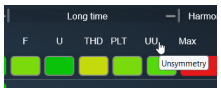
In the **PQ – Events**#4 area, the number of power quality events is listed based on the power quality standard stored and set in the measuring device – e.g., **EN50160** or **IEC61000-2-4**.

Clicking on the **-/+** allows the individual areas to be expanded or collapsed. In the collapsed state, the maximum values of the subordinate measurements are always used for the display.

In the **Long-term Data**#5 area, the statistical data is calculated according to the standard stored in the measuring device. These include:

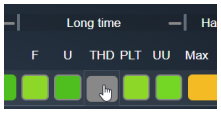
- **Frequency** [F]
- **Voltages** [U]
- **THD** (Total Harmonic Distortion)
- **Flicker** [PLT]
- **Voltage Unbalance** [UU]

When the mouse pointer hovers over an abbreviation, an explanation is displayed via a tooltip.



Clicking on the designation, e.g., **PLT**, sorts the display either from the worst to the best measurement point or vice versa. This function facilitates the identification of the most noticeable measurement points for the respective measurement value.

Clicking on the respective measurement values – e.g., **THD** – opens the **Analysis Cockpit**. This allows the abstract representation of the measurement values to be converted into a temporal representation for detailed analyses.



In the **Harmonics**#6 area, all harmonics from **H2 (100 Hz)** to the **50th harmonic (2500 Hz)** as well as the **Supraharmonics**#7 are listed in relation to the respective limit value. The color scale in the statistical measurements shows the proximity to the limit value:

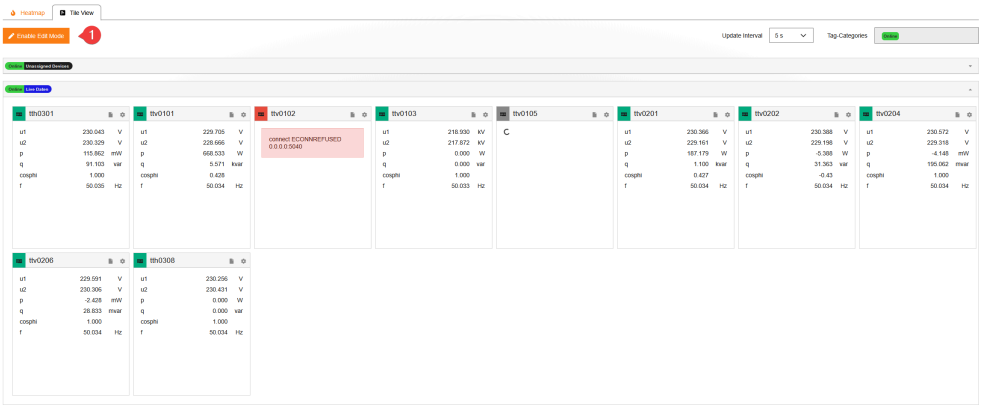
- **Green**: Values well below the limit
- **Yellow/Orange**: Values approaching the limit
- **Red**: Values exceeding the limit

To quickly find a desired measurement point, the name of a measuring device can be entered in the **Search Bar**#8 area. The display is then interactively filtered.

Clicking on a **device name**#9 switches the application from **Grid >> Overview** to the **Analysis >> Device** page.

6.4.1.2. Grid Overview – Tile View

In the second area Grid Overview – Tile View, all devices with their essential live values are displayed within the configured hierarchy levels.



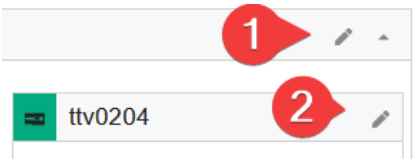
With Enable Edit Mode #1 the tile arrangement can be changed via drag & drop and devices or groups can be assigned to other hierarchy levels. After Save the adjustments are stored persistently and loaded on next access. Changes apply system-wide for all users and can be centrally managed by the administrator.

Via Change Default Displayed Measurements you can define which live data appear in the tiles. All real-time values provided by the measuring device are available. Settings can be made

- globally (all devices),
- per group,
- or per device (#3) in edit mode.

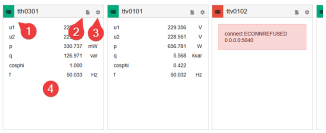
Usage:

- Displayed Data for the Group: Applies to all devices in the group.
- Displayed Data for the Device #3: Individual device configuration.



The refresh interval of the live data is configurable. The hierarchy order can be adjusted using drag & drop in the upper right corner.

A tile contains the following elements in live operation:



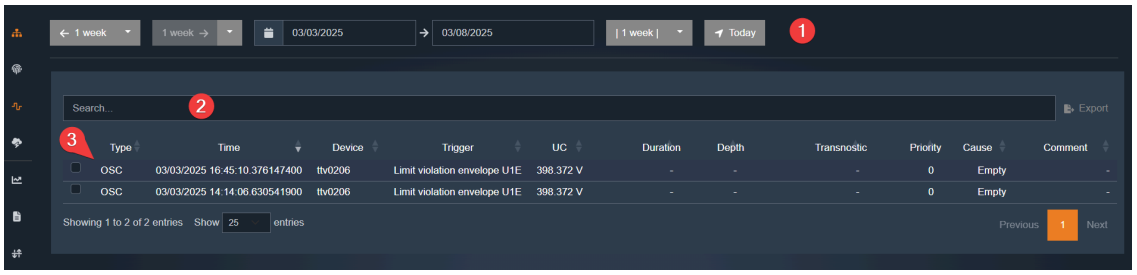
#1 Connection status: Red = no connection, Green = connection active
#2 Link to the Power Quality report (e.g., EN50160, IEC61000-2-4)
#3 Link to device parameterization
#4 Display of the configured live data

6.4.2. Grid > Fault Records

In the **Grid > Fault Records** area, all disturbances within a freely selectable time period #1 are displayed in a list.

The display offers the following functions:

- **Search function**#2 for targeted search of disturbances
- Ability to open fault records via the **OSC** and **TRMS**#3 links in a **Quick View**



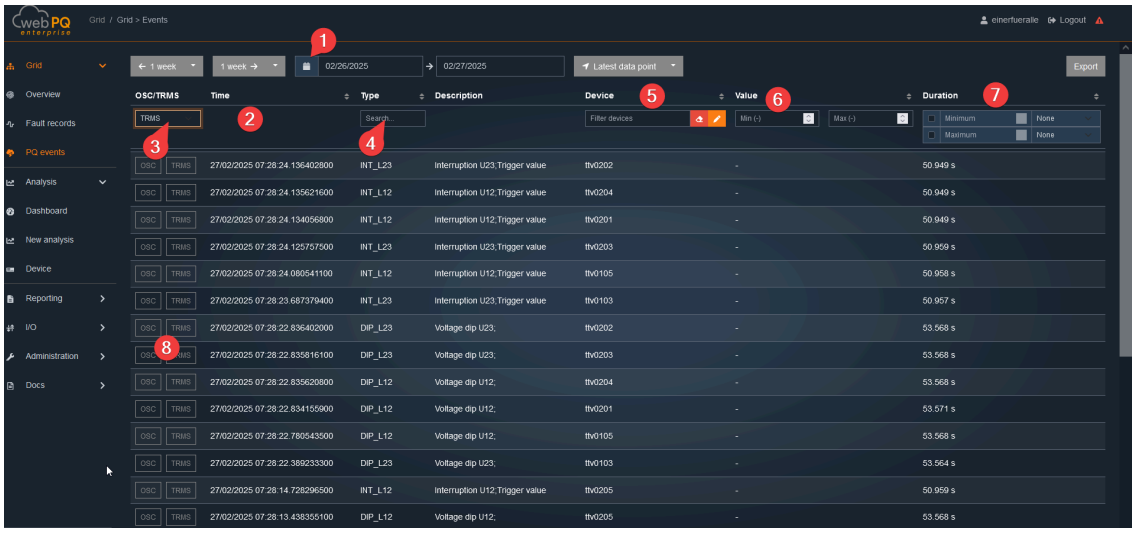
In the #4 area, the user can set individual **filters**. In the shown example, a filter on **duration > 50 ms** is set, displaying only disturbances in this range.

Clicking on **OSC** or **TRMS**#1 opens the **Quick View** window from the right.

For advanced analysis options, setting markers, or describing the disturbance, the **Analysis Cockpit** can be opened via #2.

To view two fault records in parallel, multiple disturbances can be selected via the **selection function**. This allows a direct comparison of multiple measurement points in parallel.

6.4.3. Grid > PQ Events



In the **Grid > PQ Events** area, all **Power Quality Events** (not disturbance records!) within a freely selectable time period #1 are displayed in a table.

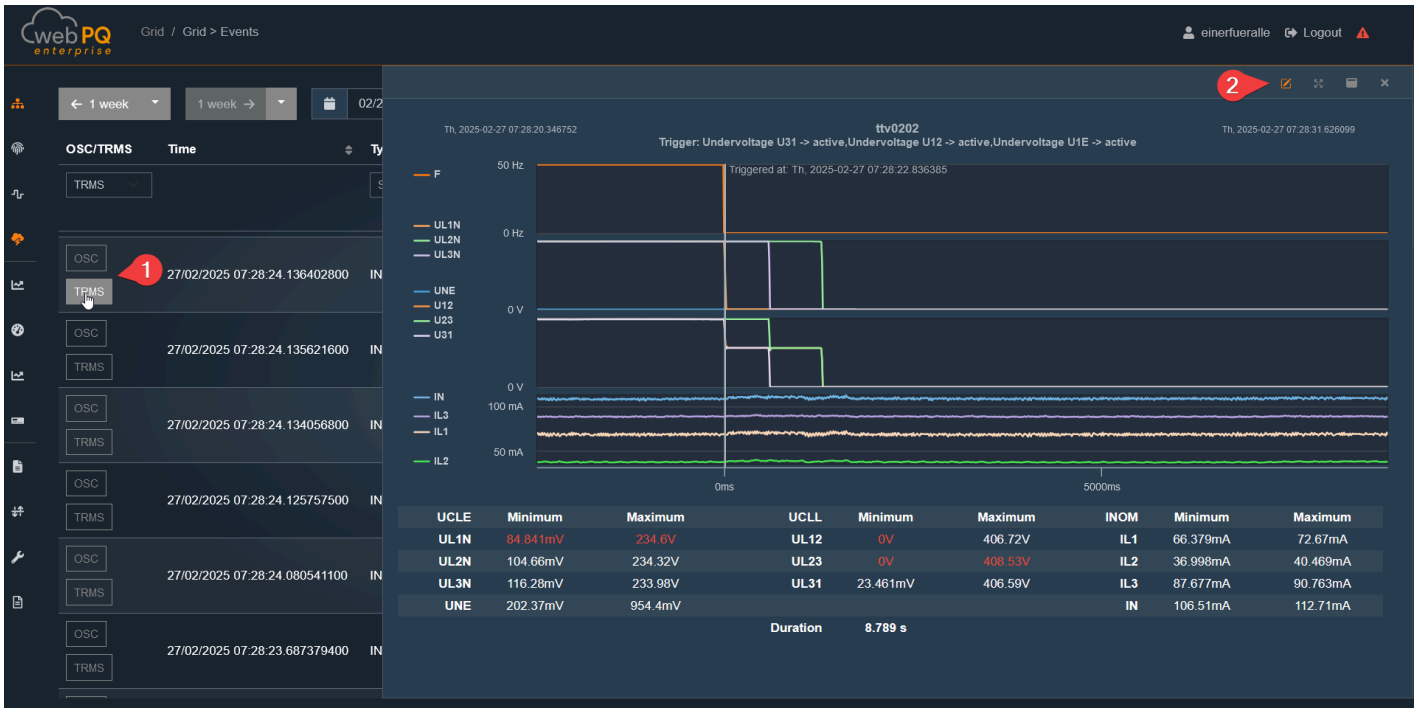
The display offers several **search and filter functions**#2:

- **Filter by disturbance record** (#3): Shows only PQ events where a disturbance record was triggered according to IEC
- **Filter by type** (#4): Allows free text search for the type of event
- **Filter by device** (#5): Convenient device narrowing via device selection
- **Filter by value range** (#6): Setting an upper and lower limit value
- **Filter by duration** (#7): Restriction to events of a certain duration

Additionally, existing **disturbance records** can be opened directly in a **Quick View** via the **OSC** and **TRMS**#8 links.

Clicking on **OSC**#1 opens the **Quick View** window from the right.

For advanced analysis options, setting markers, or describing the disturbance, the **Analysis Cockpit** can be opened via #2.



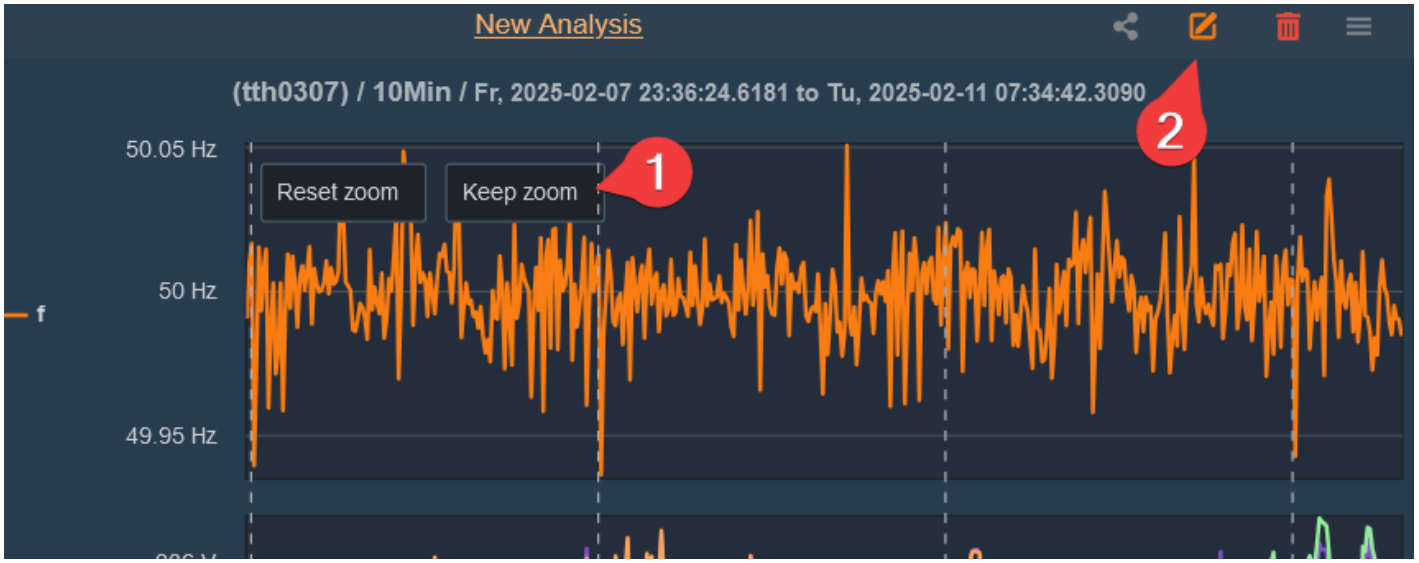
6.4.4. Operation in the Analysis

6.4.4.1. Zooming in the Analysis – Zoom In / Zoom Out

To zoom, use the **left mouse button** or, on a **touch display**, the standard **two-finger zoom gesture**.

- **Zoom In:** Hold down the left mouse button and drag left or right.

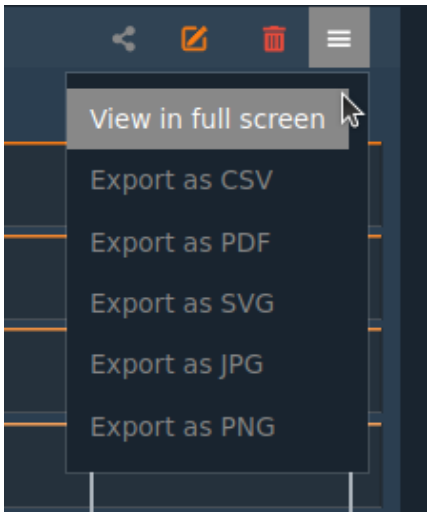
You can save the zoomed area using the **"Keep Zoom"** function #1. To reset the zoom to its original value, use **"Reset Zoom"**.



6.4.4.2. Submenu in the Analysis #2

- **View in Full Screen Mode:** Expands the graphic to fill the entire monitor, which is especially useful for tablets or phones.
- **Export as CSV:** Saves the measurement data as a CSV file.
- **Export as PDF:** The disturbance record is saved as a PDF and can be downloaded from the server via *(Import/Export >> Print)* after creation.
- **Export as JPG / SVG or PNG:** Exports the graphic in various image formats.
- **Export as Comtrade:** Converts the disturbance record into a **Comtrade file**, which is also available on the server via *(Import/Export >> Export)*.
- **Export as PQDIF:** The disturbance record or measurement data (depending on the analysis) is saved as a **PQDIF file** and can also be provided on the server via *(Import/Export >> Export)*.

Note:
Exports, including PDFs, are stored on the server. The storage location is defined in the server settings in the WebPQ backend and can only be changed by the administrator. Installation Paths



6.4.4.3. Show & Hide Measurements on the Y-Axis

By clicking on a **measurement#1**, individual measurements can be selected or deselected. Deselected measurements are automatically moved to the bottom. Measurements are always displayed in order of their **height on the Y-axis**.

6.4.4.4. Analysis Cockpit

The **Analysis Cockpit** can be accessed and opened at any time via the button  .

More information about the **Analysis Cockpit** can be found under **Link**

6.5. Analysis

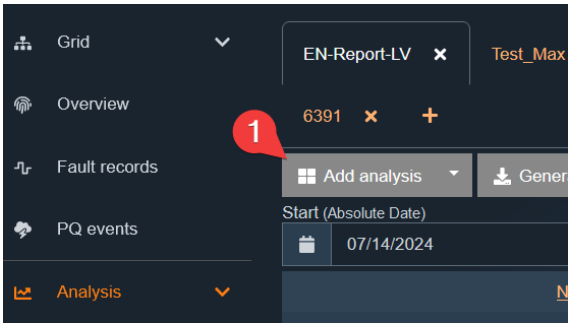
The **Analysis Cockpit** is the central workspace and analysis area, offering various types of analysis, including:

- **Level-time diagrams**
- **Bar charts**
- **Histograms**
- **Pre-configured reports** for creating custom dashboards and reports

6.5.1. Analysis Cockpit

You can open the cockpit in several ways:

- **Via the main menu** under *"Perform Analysis"*
- **Via the analysis dashboard** by selecting *"Add Analysis"*#1
- **By clicking a measurement value** in the statistics under *"Network > Overview"*
- **Via the shortcut**  from any analysis



6.5.1.1. Structure of the Analysis Cockpit

The Analysis Cockpit is divided into two **sections**:

- **Left section:** Configure settings here
- **Right section:** Visualise measurement data here

Key functions in the Analysis Cockpit:

- **Basic settings**#1:
  - Select the **analysis type**
  - Define the **device selection**
  - Set the **evaluation period**Settings
  - Choose the **measurement variables**
- **Analysis evaluation**#2:
  - Set and display **markers**
  - Comment and prioritise **disturbances**
  - Display **limit and extreme values**
- **Analysis layout**#3:
  - **Group** measurement variables
  - **Scale** the display
  - **Select colours** for measurement values
- **Widget settings**#4:
  - Adjust the **size** and **title** of an analysis widget
  - Save the widget to the **analysis dashboard**
- **Save**#5:
  - Permanently save the analysis in the **analysis dashboard**.
  - The dashboard is stored for the user in the database, allowing all created analyses to be recalled and restored.
- **Auto synchronisation**#6:
  - When enabled, changes are immediately shown in the right section
- **Apply**#7:
  - Applies the selected measurement variables and displays them in the right frame
- **Cancel**#8:
  - Closes the Analysis Cockpit without saving data

Note:
The Analysis Cockpit settings are saved in the **browser cache**. This means data is retained even if the analysis is not saved in the dashboard.

6.5.2. Basic analysis settings

6.5.2.1. Analysis settings

Under #1, select the desired analysis type. By default, the **level-time diagram** is pre-selected. Alternatively, other types such as **histograms** or, for **power quality event analysis**, the **ITIC graph** can be chosen as the evaluation type.

With the **time setting**#2, you can open a dialog to configure the analysis period. If an **absolute period** has been defined in the

menu, it can be set either by directly entering the start and end time **under #3** or via the input fields.

In the **device** section #3, select the devices to be evaluated. This can be done by entering the **device ID** or using the **selection list** by clicking #3. The list shows all devices available in the database.

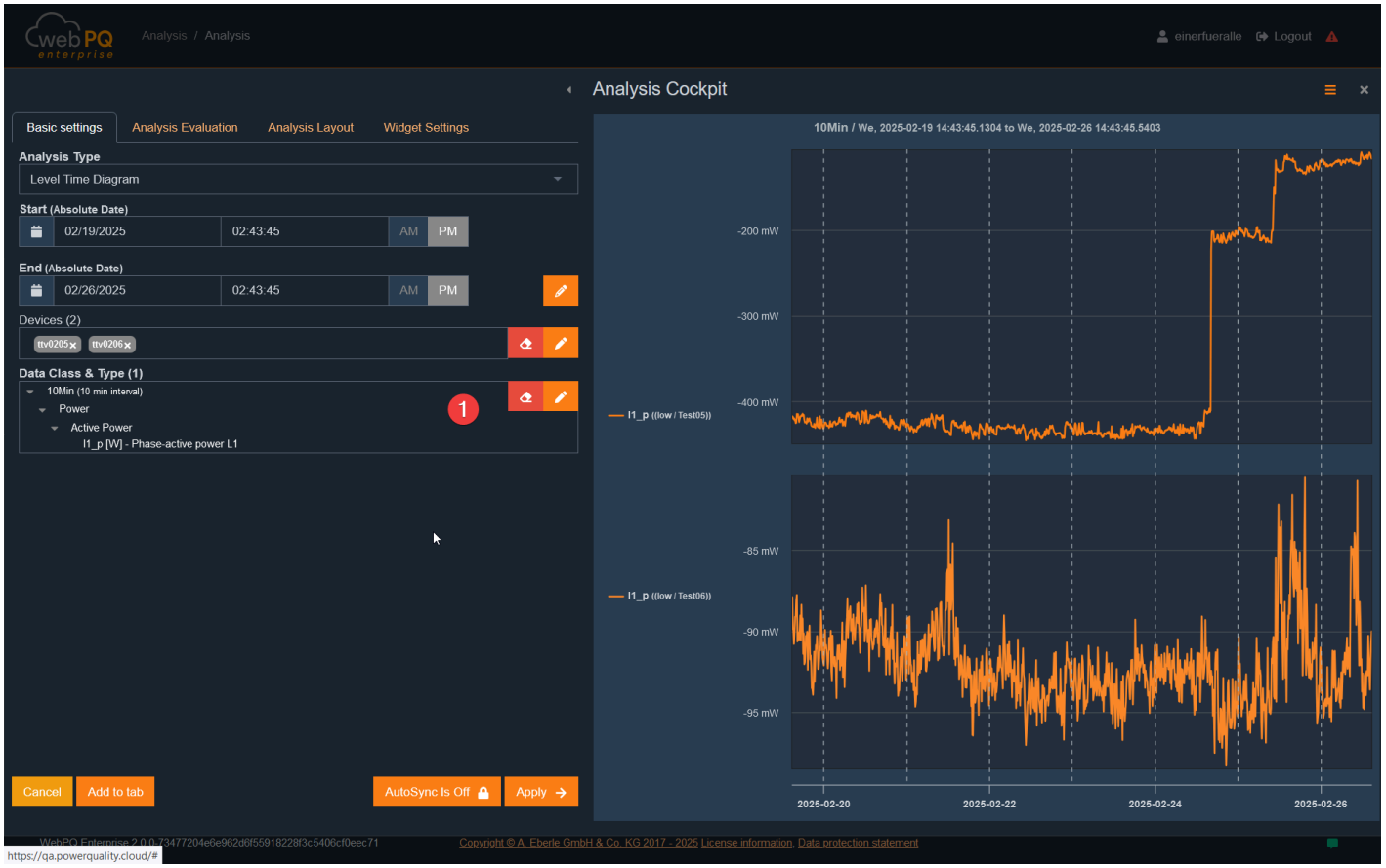
Using the **measurement variable tree**#5, select the measurement values recorded by the chosen devices during the selected period and transferred to the database. The selection can be reset with #4.

Depending on the analysis type, specific parameters must be considered for correct evaluation. These are explained in the following sections.

6.5.2.2. Analysis types

6.5.2.2.1. Level-time diagram

The **level-time diagram** displays selected measurement values as a **line chart** over a defined period. It is ideal for **temporal analysis of measurement values** and their changes.



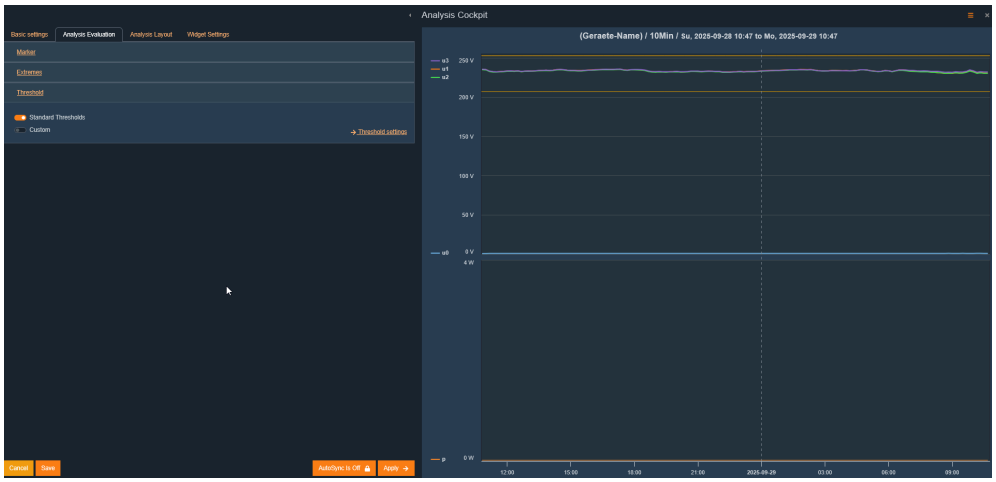
A special feature is the **integration of flagging according to IEC61000-4-30 Class A**. If enabled, **flagging information** is shown directly in the **measurement variable tree #1** within the measurement series.

Measurement variable selection is dynamic: It is based on the **intersection of available data**, restricted by parameters such as **period** and **selected devices**.

See also: Time settings for experts

6.5.2.2.1.1. Displaying Thresholds

In the "Analysis Evaluation" tab, you can display the **thresholds** stored in the measuring device for the selected measurement variables. From version v2.1, alternative threshold sets can also be selected and applied to the measurement data.

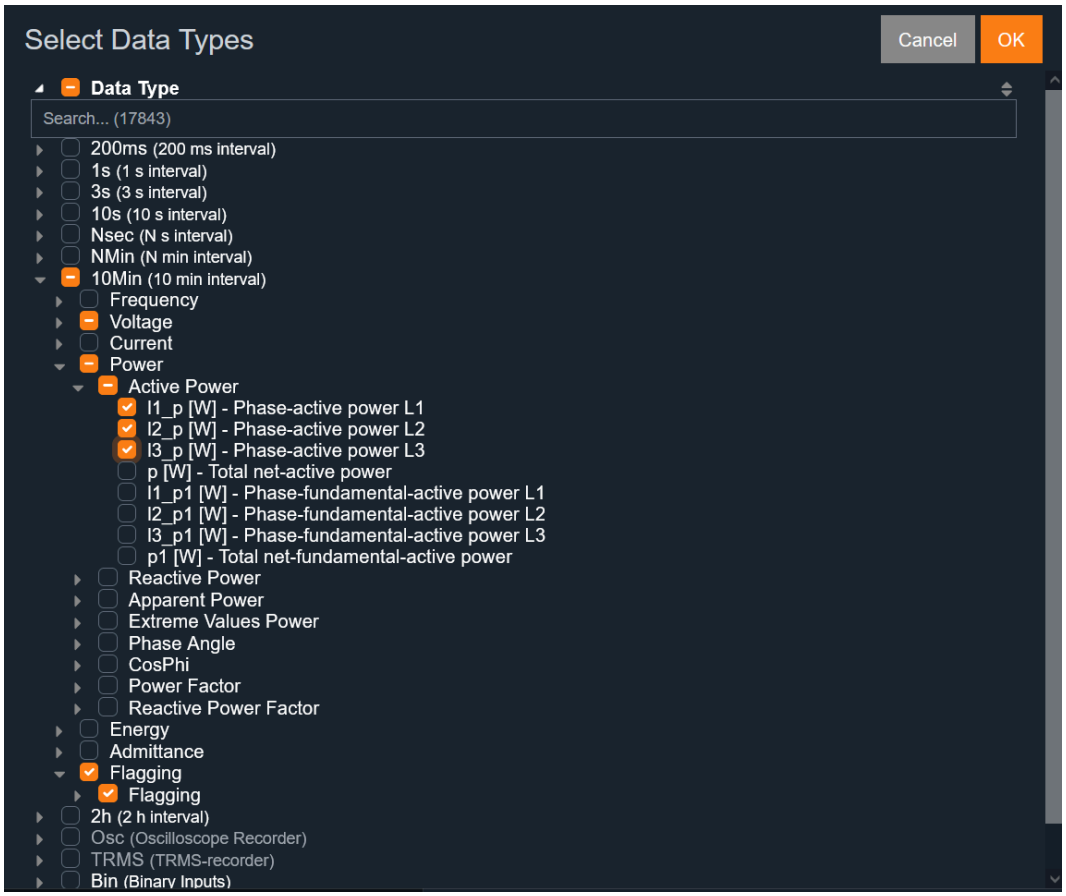


To show thresholds, select either the standard thresholds #1 or the extended threshold sets #2. Thresholds are then automatically displayed in the chart.

Extended threshold sets can be customised and managed in **Reports > PQ Standard Templates**. You can create, edit, or delete threshold sets there.

6.5.2.2.1.2. Display of flagging status

Flagging is visualised as a **normal measurement value** and displayed in the measurement series.



6.5.2.2.1.3. Setting markers for detailed analysis

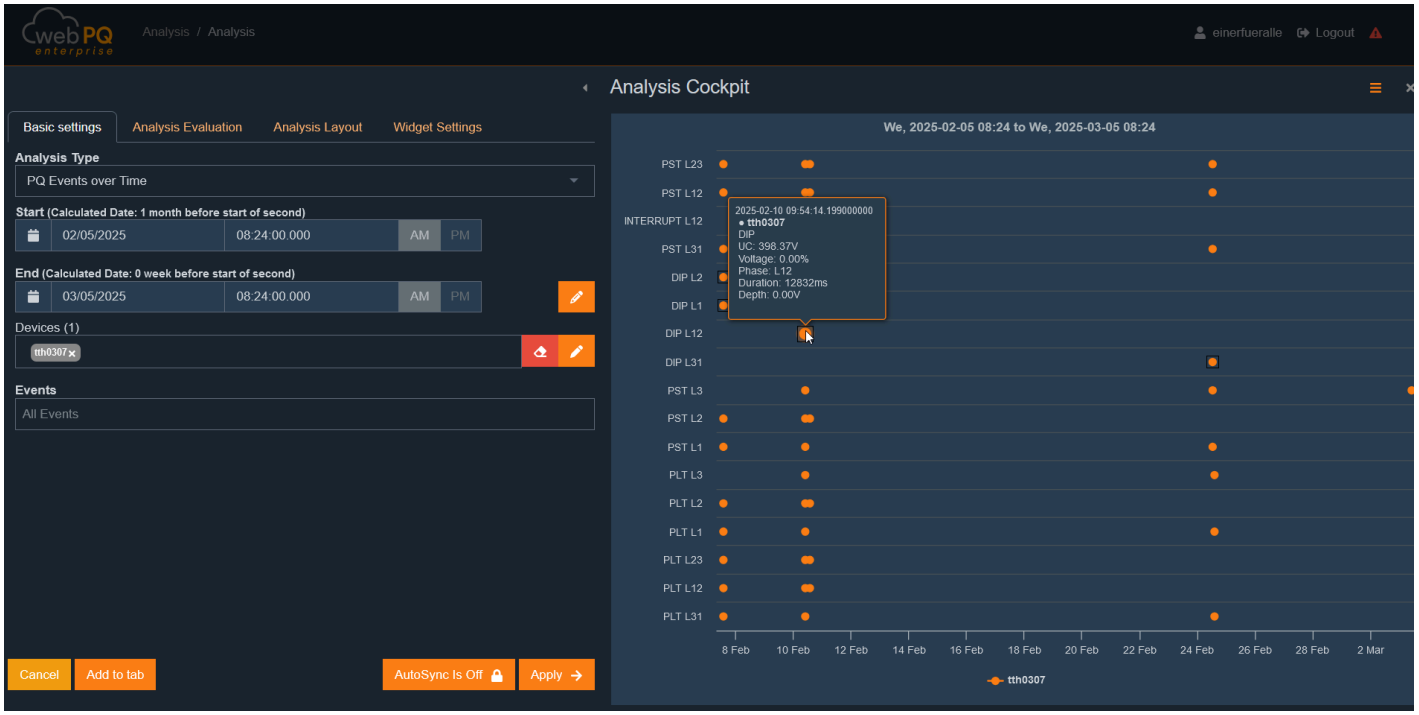
In the **level-time diagram**, up to **two markers** can be set for detailed examination:

1. **Set marker:**
    - A **left-click** on a data point adds a marker.
    - Up to **two markers** can be set at once to compare differences between measurement values.
2. **Remove marker:**
    - Clicking a set marker again removes it.

Marker values are automatically displayed in **analysis evaluation** and can be used for further analyses.

6.5.2.2.2. PQ events over time

The **PQ events over time** diagram visualises recorded and selected **power quality (PQ) events** within the defined time range.

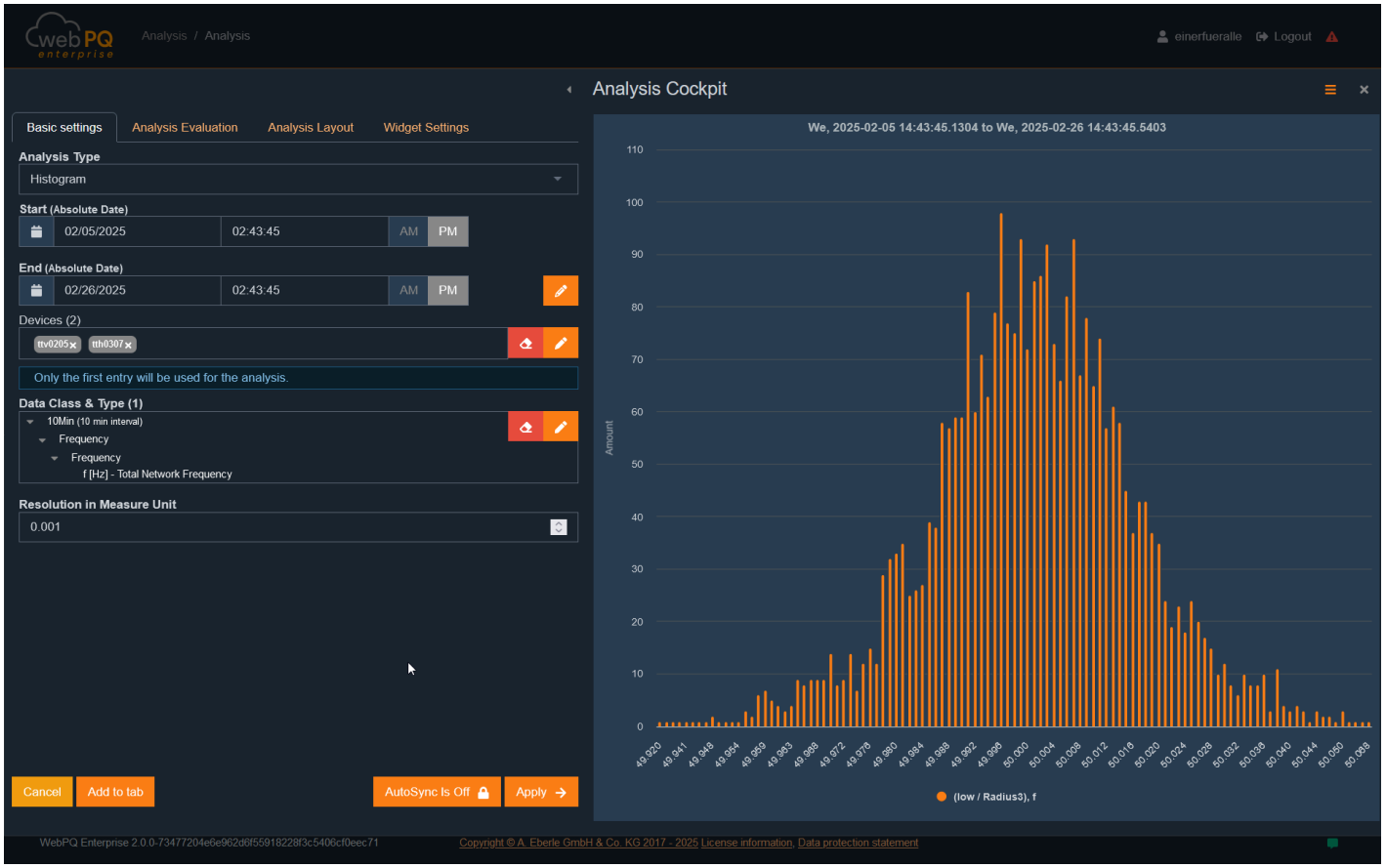


6.5.2.2.2.1. Interactive analysis

- Retrieve detailed information:
  - Hovering the **mouse over an event** displays additional info, such as the **height or depth of the event** or other relevant measurement values.
- Compare multiple PQ events:
  - The temporal view makes it easy to **identify patterns and clusters** of events.
  - Notable events can be further investigated via the **Analysis Cockpit**.

6.5.2.2.3. Histogram

The **histogram** shows the **statistical distribution** of a selected measurement variable within a defined period.



6.5.2.2.3.1. Functions and analysis

- **Select measurement variable:**
  - In this example, **frequency**#1 was chosen.
- **Calculate distribution:**
  - Data was grouped into **10-mHz bins** over the selected period #2 and displayed as a **frequency distribution**.
- **Application areas:**
  - The histogram helps identify **deviations** from expected values.
  - **Unexpected peaks** or **asymmetries** may indicate anomalies or systematic errors.

6.5.2.2.4. Voltage and current harmonics as bar charts

Voltage and current harmonics are displayed as **bar charts** to provide a quick overview of the entire **frequency spectrum** to be monitored.

6.5.2.2.4.1. Display and interpretation

- **Colour-coded bars for quick analysis:**
  - The **red area** of a bar shows the **percentage quantile** set by the standard.
    - For low voltage, this is typically **95% of measurement values per week** for harmonics.
  - The **blue area** represents the **maximum measured value** in the selected period.
- **Interactive detail view:**
  - Clicking a specific harmonic switches from the **bar overview** to a **detailed temporal view**.
- **Switch between voltage and current harmonics:**
  - Via `#1`, switch between **voltage and current view**.
  - The display can be adjusted depending on the measurement variable:

6.5.2.2.4.2. **Visualisation methods**

Voltage:

- **Relative to the fundamental wave [%]** – Used in normative contexts.
- **As absolute value [V]** – Used for troubleshooting.

Current:

- **Relative to nominal current [%]** – Used in **IEEE standards**.
- **Relative to the fundamental wave [%]** – Used in **IEC standards**.
- **As absolute value [A]** – Used for troubleshooting and **filter technologies**.

6.5.2.2.4.3. Dynamic settings

Depending on the selected **visualisation method**, additional **settings are shown or hidden** to optimise analysis.

6.5.2.2.4.4. Application areas

This analysis is useful for:

- **Detecting and evaluating harmonics** that may cause disturbances or power quality issues.
- **Comparing harmonics over different periods** to identify long-term trends.
- **Evaluating compliance with standards**, e.g., **EN 50160 or IEC 61000-2-4**.

6.5.2.2.4.5. **Limits in analysis**

Measuring devices from **A. Eberle GmbH** provide **current limit sets** directly to the database. These limit sets form the **basis** for analyses and reports.

6.5.2.2.4.6. **Dynamic adjustment of limits**

Since **harmonic limits** are **percentage values** based on recorded **aggregation levels**, **alternative limit sets** can be applied to existing data in the UI.

Select limit set:

- Via `#4`, select a specific **limit set** for analysis.
- In **"Reports" > "PQ Standard Templates"**, limit sets can be customised and managed.

Display limits in visualisation:

- When a **limit set** is selected under `#3`, it appears in the **graphical view**.
- Users can see at a glance **whether and to what extent** values exceed limits.

Switch between representations:

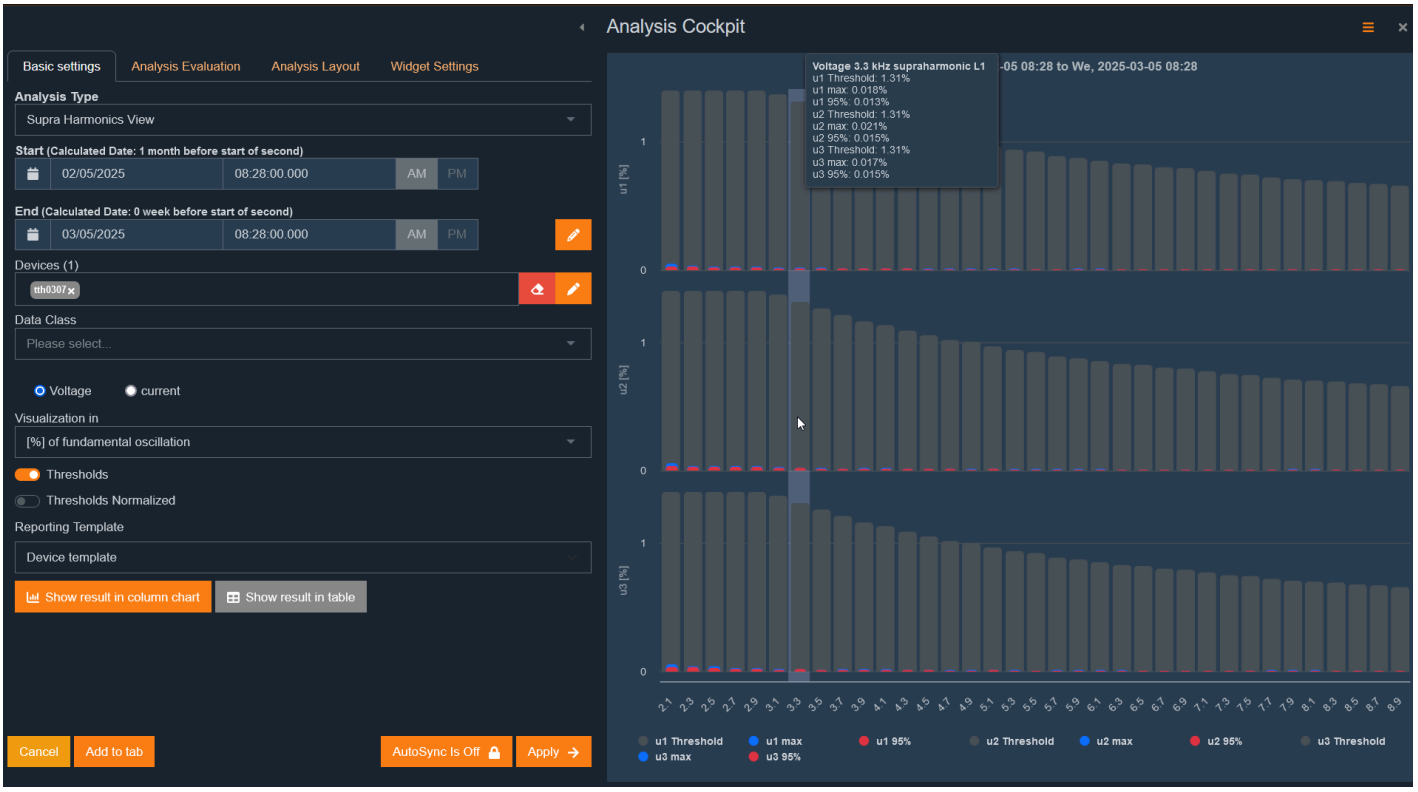
- With `#5` and `#6`, switch between:
  - **Tabular view** (with or without limits)
  - **Bar chart view**.

6.5.2.2.4.7. Application areas for voltage and current harmonic bar chart analysis

- **Evaluate power quality**: Ensure network parameters remain within **standard limits (e.g., EN 50160, IEC 61000-2-4)**.
- **Compare limits**: Apply different limit sets to the same data to analyse various criteria.
- **Detect limit violations**: Identify critical **deviations** indicating disturbances or network problems.

6.5.2.2.5. Supraharmonic analysis

The **"Supraharmonics"** analysis shows – depending on device data – the **supraharmonics** in the context of the selected **standard template** and **time range**.



6.5.2.2.5.1. **Determination of supraharmonics**

Determination follows **IEC 61000-4-7** in **200-Hz frequency bands**.
In the software, **centre frequencies** are always shown.

Example of frequency band division:

- **Centre frequency:***2.3 kHz*
- Includes all **5-Hz spectral lines** from **2205 Hz to 2400 Hz**

Supraharmonics are visualised as **bar charts**.
The display can be adjusted according to **standard requirements and analysis goals**.

6.5.2.2.5.2. **Functionality of analysis**

Supraharmonic analysis has the **same functions** as **harmonic analysis**:

- Switch between visualisation types
- Compare with limits
- Tabular or bar chart view
- Zoom and marker function for detailed analysis

6.5.2.2.5.3. **Application areas for supraharmonic analysis**

- **Detect supraharmonics**: Investigate higher frequency disturbances in the network.
- **Compare with standard limits**: Check if measured supraharmonics are within permissible values.
- **Identify disturbance sources**: Analyse frequency ranges with excessive supraharmonic voltages or currents.
- **Optimise filter solutions**: Evaluate filter effectiveness to reduce disturbances.

6.5.2.2.6. **Interharmonic analysis**

Interharmonic analysis investigates voltage and current components not in an integer ratio to the fundamental frequency.

6.5.2.2.6.1. **Display of interharmonics**

Interharmonics are visualised as **bar charts**.
Various **display types** can be selected:

- Relative to the fundamental wave [%]
- As absolute value [V] or [A]
- Compared to defined limits

This analysis is relevant for evaluating **harmonic distortions** caused by **frequency converters, electronic loads, or nonlinear consumers**.

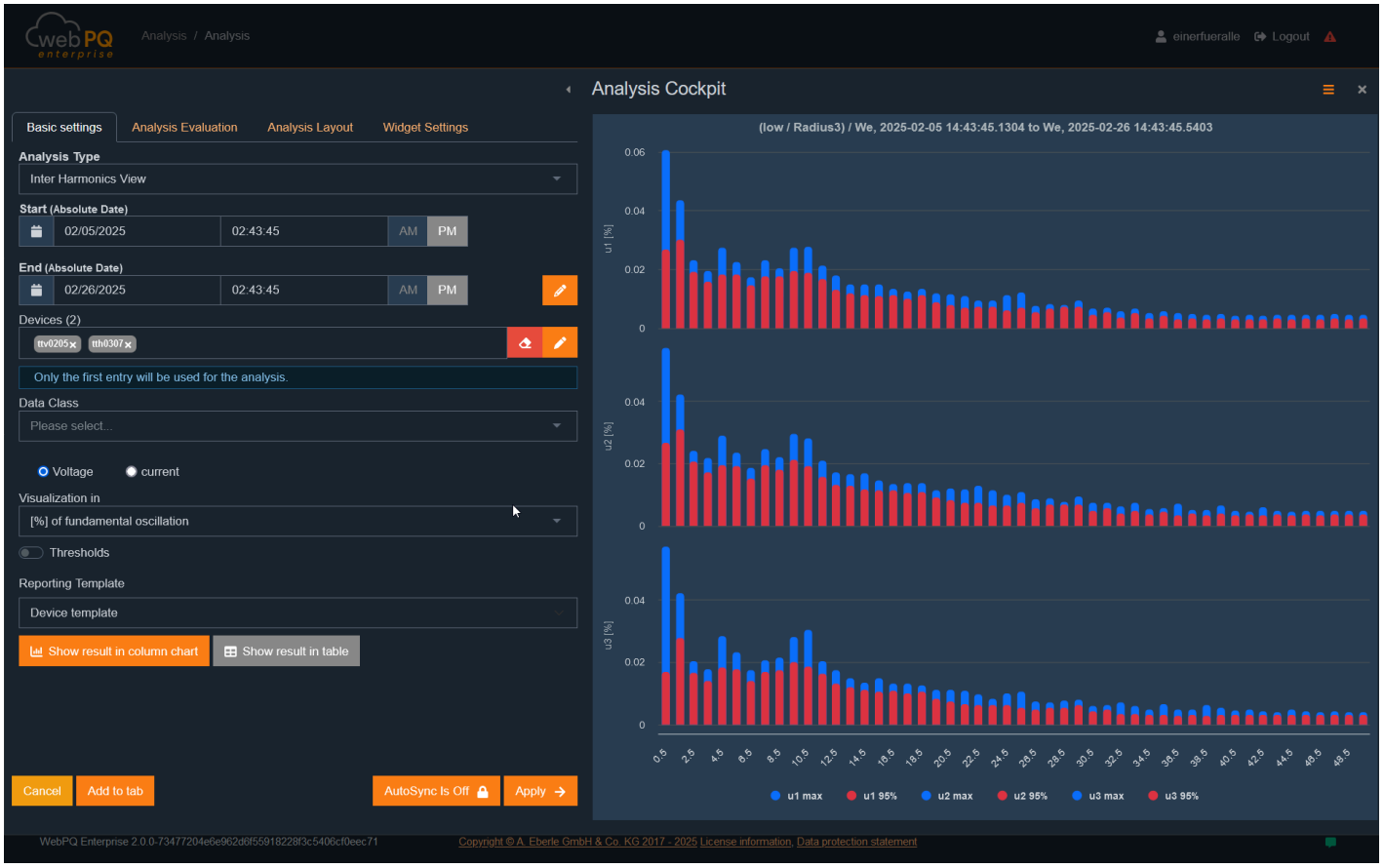
6.5.2.2.6.2. **Functionality of analysis**

Functionality matches **harmonic analysis** and offers:

- Comparison with limits
- Zoom and marker function for detailed analysis
- Switch between visualisation types in the drill-in process

6.5.2.2.6.3. **Application areas for interharmonic analysis**

- Detect nonlinear network loads
- Evaluate network quality according to IEC 61000-4-7
- Identify disturbances from frequency converters and inverters
- Evaluate network resonances and unexpected oscillations



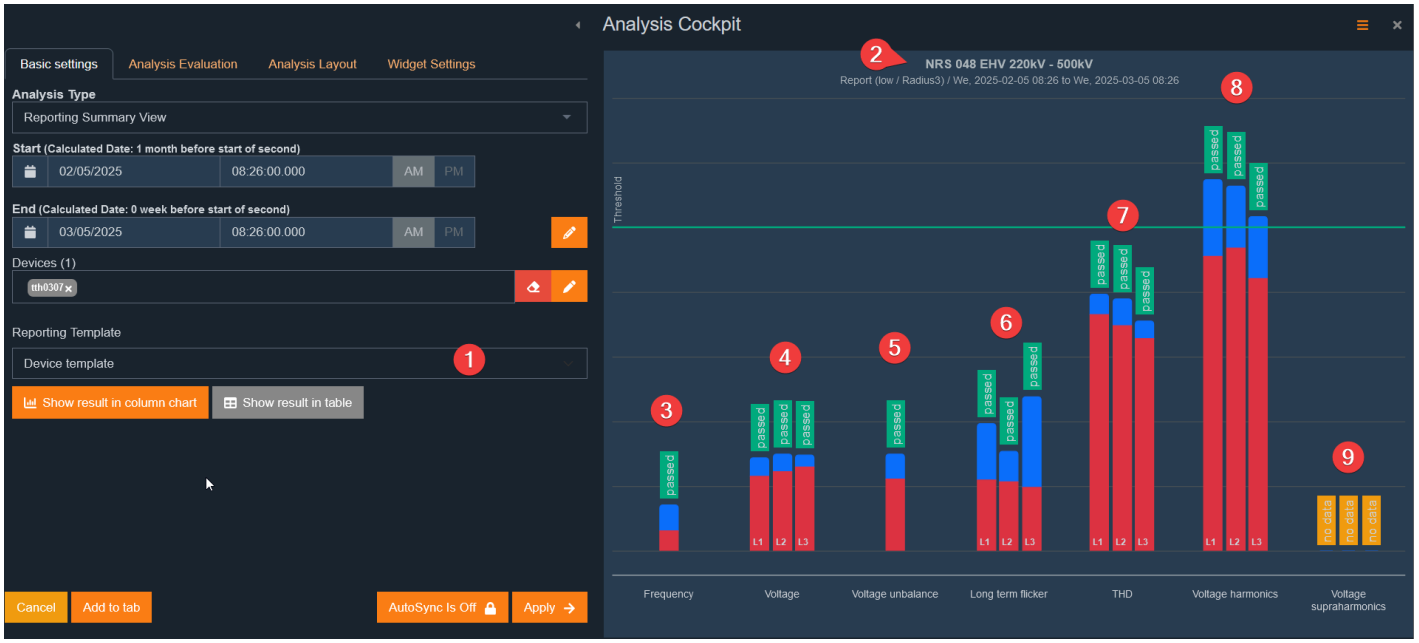
6.5.2.2.7. Normative report - Voltage quality (e.g., EN50160)

The normative report summarises all values required for evaluation according to the set standard templates in a clear analysis.

6.5.2.2.7.1. **Display and functions**

Results are available in two formats:

- **Bar chart** – normalised to the respective measurement variable
- **Tabular report** with detailed values



If no dedicated standard template is assigned to the selected device, the template provided by the device is used automatically.
The title is generated from the stored standard template of the device.

6.5.2.2.7.2. **Adjustment of measurement variables based on the standard template**

Depending on the template, specific measurement variables are included or excluded.

Examples:

- A **current EN50160 template** contains individual harmonics up to H25 and no supraharmonics.
- The **IEC61000-2-2 standard** for low voltage considers supraharmonics.

In the example shown, a combined template of EN50160 and IEC61000-2-2 is active, so supraharmonics are also displayed.

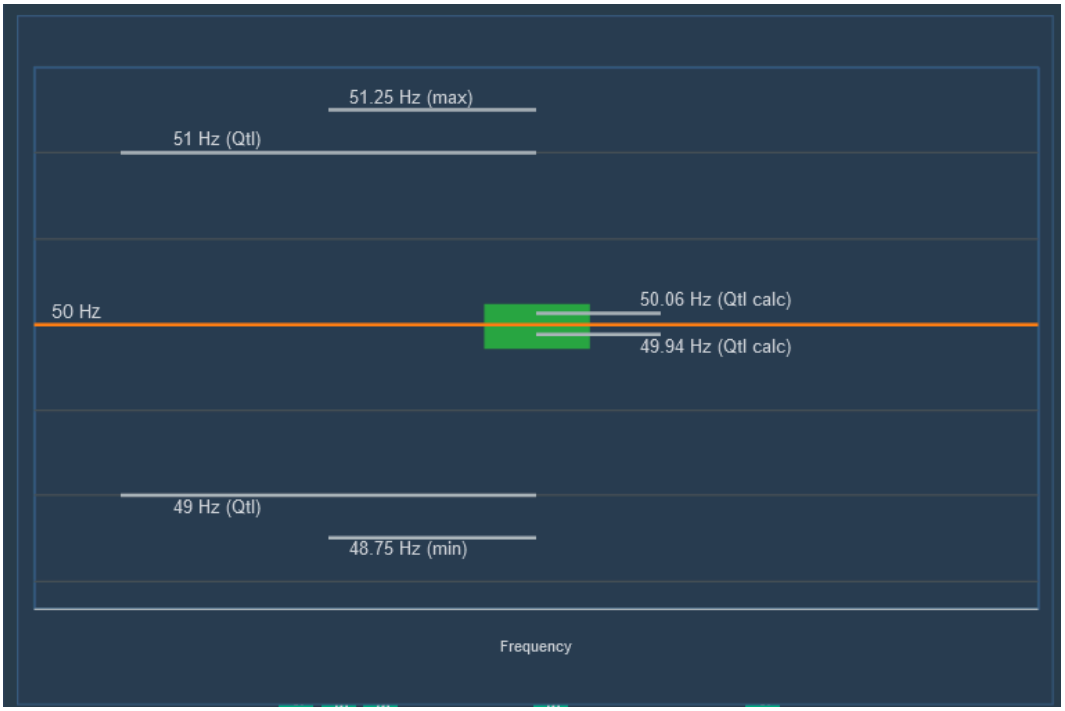
6.5.2.2.7.3. **Evaluated parameters in the normative report**

Various parameters are evaluated according to the set standard template. Each parameter is displayed with its limits.

6.5.2.2.7.4. **Frequency** (#3)

Network frequency must be between **49.5 Hz and 50.5 Hz** according to EN and IEC.

- The **blue bar** shows the maximum deviation from the upper or lower limit relative to the nominal limit.
- The **red bar** shows the **99.5-percentile deviation** of the frequency.



6.5.2.2.7.5. **Voltage** (#4)

Network voltage is evaluated relative to the nominal value.

- Limits are based on the standard (e.g., **±10%** of nominal voltage according to EN50160).
- **Blue marking** shows maximum deviations.
- **Red marking** represents 95% percentile values.

6.5.2.2.7.6. **Unbalance** (#5)

- Evaluates voltage unbalance between three phases.
- Permissible limits depend on network level (e.g., max. **2% in low voltage**).

6.5.2.2.7.7. **Long-term flicker (PLT)** (#6)

- Measures visual voltage fluctuation (flicker).
- Standard limit is usually **PLT ≤ 1** for low voltage networks.

6.5.2.2.7.8. **THD (Total Harmonic Distortion)** (#7)

- **THD** evaluates overall harmonic distortion of network voltage.
- Standard limit depends on voltage level, typically **max. 8%**.

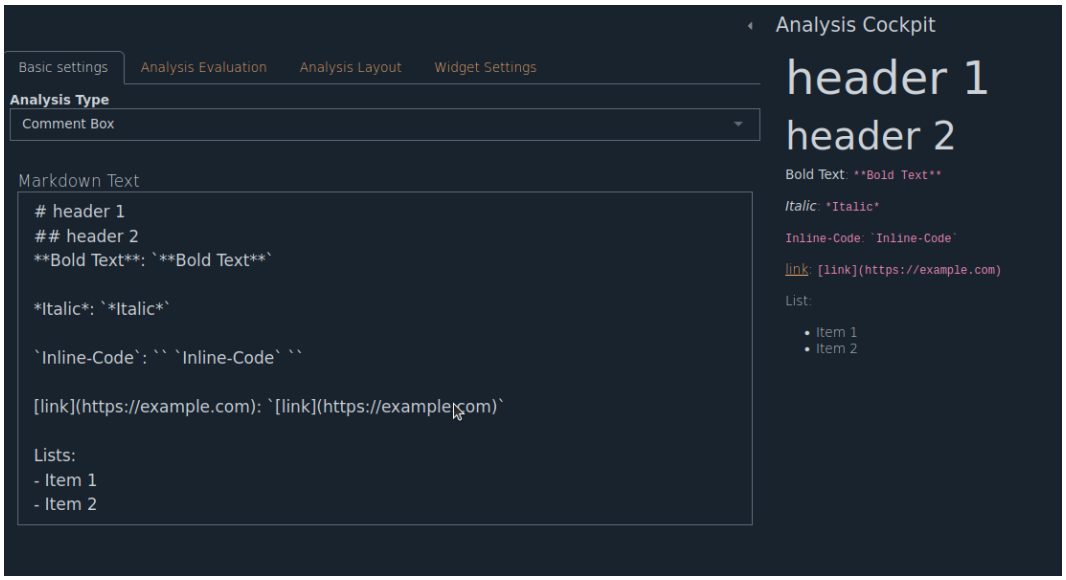
6.5.2.2.7.9. **Individual harmonics (maximum values per phase)** (#8)

- Shows highest values of individual harmonics.
- Maximum value is displayed
- Each harmonic is evaluated according to limits (e.g., **H5 ≤ 6%**).

6.5.2.2.7.10. **Supraharmonics (maximum value per phase)** (#9)

- Shows distortions in the frequency range **> 2 kHz**.
- Evaluation follows **IEC61000-2-2** or other standards.

6.5.2.2.8. Comment box



The **comment box** is used to add extra information or explanations to analyses created in the **dashboard**.

6.5.2.2.8.1. **Functionality**

- Add notes to an analysis.
- Supports simplified **Markdown** for formatted text.
- Comments can be saved, recalled, or edited later.

6.5.2.2.8.2. **Markdown support**

For simple formatting, **Markdown syntax** is used.
Examples:

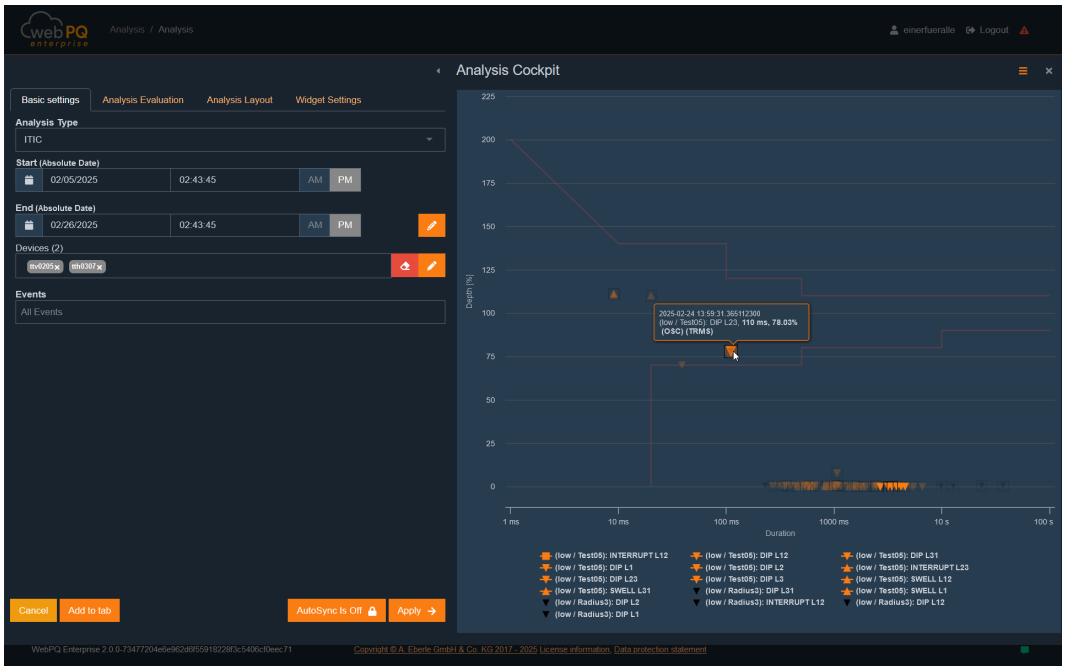
- **Bold Text:**`**Bold Text**` → **Bold Text**
- *Italic:*`*Italic*` → *Italic*
- `Inline code:`Inline code`` → `Inline code`
- link → `[link](https://example.com)`
- Lists:
- `- Item 1`
- `- Item 2`

A full overview of Markdown syntax is available in the Markdown Cheatsheet.

6.5.2.2.8.3. **Application areas**

- Document specific descriptions and labels within an analysis.
- Notes for other users or future evaluations.
- Structure and comment on analysis results.

6.5.2.2.9. ITIC (CBEMA) curve



The **ITIC (CBEMA) curve** describes an AC input voltage typically tolerated by most information technology equipment (**ITE**).

6.5.2.2.9.1. Functionality

- All **PQ events** within the envelope curve should not cause interruption or damage to connected equipment.
- The display is **logarithmic** on the X-axis and in percent on the Y-axis relative to the set **nominal voltage** of the device.
- This allows both **medium voltage and low voltage devices** to be evaluated in parallel.

6.5.2.2.9.2. Analysis settings

- **Multiple measuring points** can be defined.
- An **individual period** can be set.
- Users can select and analyse **specific PQ events**.

6.5.2.2.9.3. Interactive evaluation

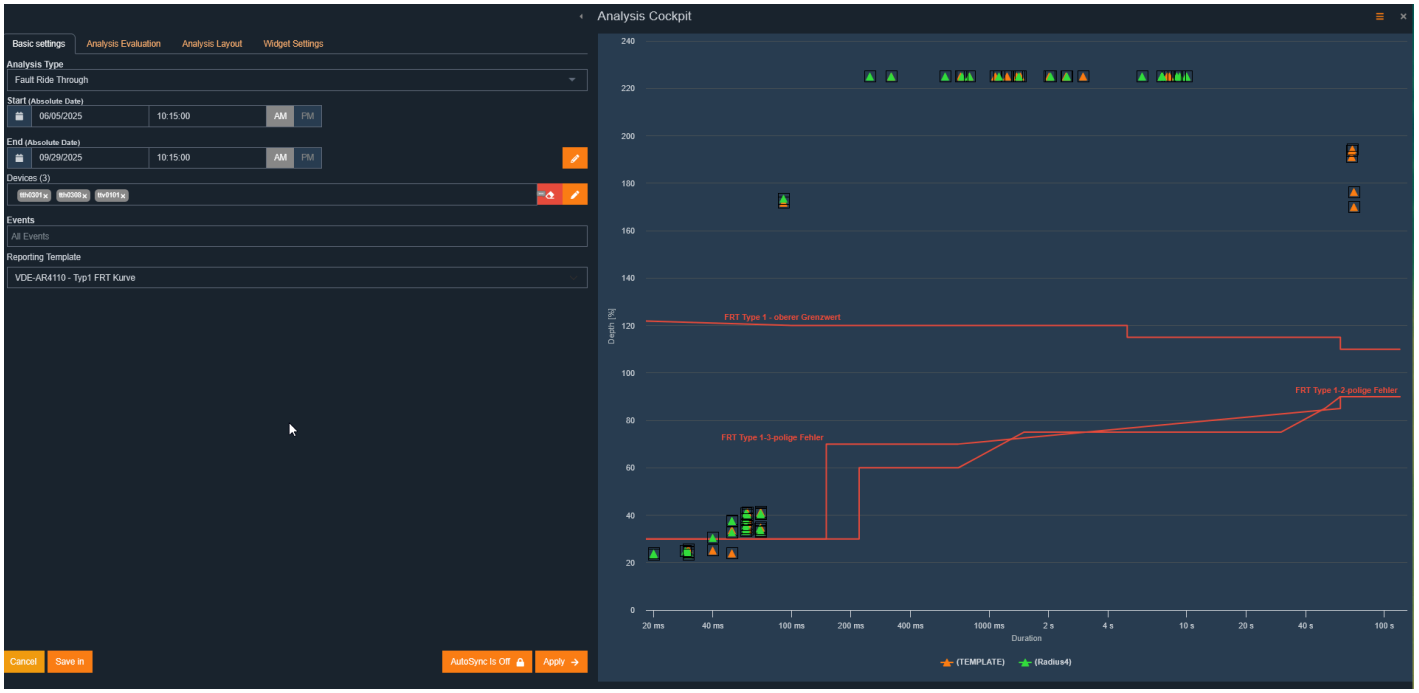
- If a **power quality event** such as a **voltage dip** triggers a **disturbance record**,
  it can be opened and investigated directly by clicking the event.
- This interactive display enables **detailed fault analysis** and **quick problem identification**.

6.5.2.2.10. FRT Curve

6.5.2.2.10.1. General Information about the FRT Curve and Application Areas

The FRT curve (Fault Ride Through) illustrates how generation units such as photovoltaic or wind power plants can continue feeding into the grid during voltage dips. WebPQ enables graphical visualisation and analysis of FRT curve compliance according to country-specific grid codes. In "Report → Standard Templates → FRT Curve", the appropriate FRT curve for different countries and grid levels can be selected or defined. Measured voltage events are plotted against the FRT curve, making it easy to see whether the plant meets requirements. The FRT curve is an important tool for grid operators and plant owners to ensure grid stability and compliance with legal and regulatory requirements.

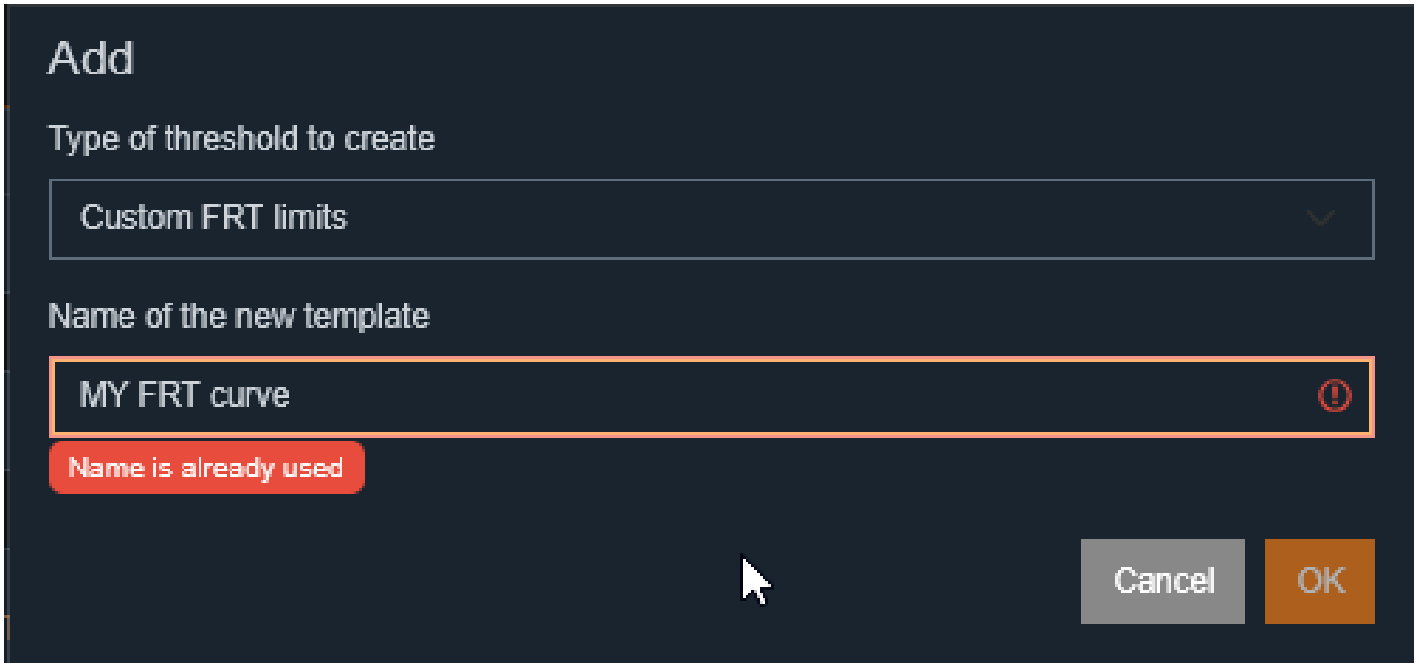
The FRT curve is typically displayed as a percentage of nominal voltage over time. It shows permissible voltage dips and the required duration for which a plant must continue feeding during these dips. The curve starts at 100% of nominal voltage and drops during an event. Depending on the grid code, requirements for depth and duration of the dip vary.



Plotted events are interactive: Clicking an event opens the corresponding disturbance record for detailed analysis.

6.5.2.2.10.2. Adding a Custom FRT Curve

- In "Reports", go to "Standard Templates" and select "+Add"
- Choose "FRT Curve" as the template type
- Assign a name to the template, e.g., "My FRT curve"



- Enter a time point (#1) and a voltage level (#2) to define curve coordinates
- Use "+" to add another coordinate (#3)
- Use the "bin" icon to remove a coordinate (#4)
- Use "+" to add new curves to the chart (+7)
- Save the FRT curve (#6) to store it for future analyses
- Delete the entire FRT curve using "Delete" (#5)

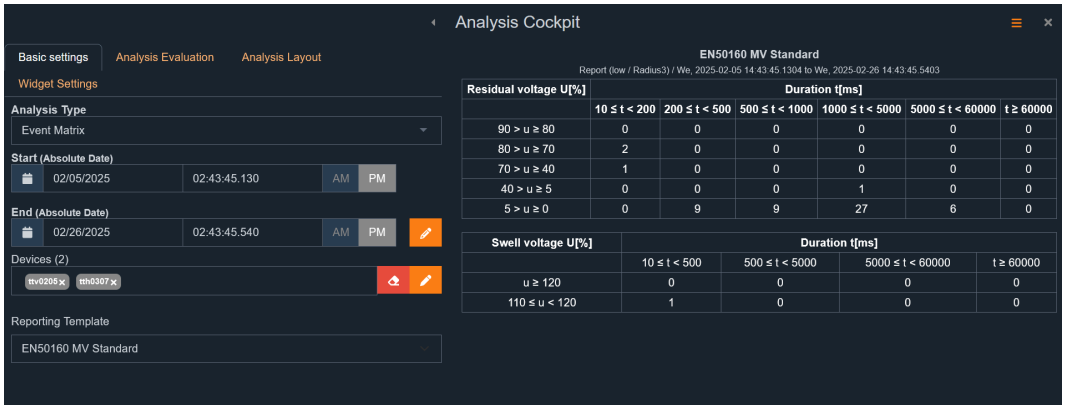
6.5.2.2.10.3. Applying the FRT Curve in Analysis

- Select analysis type **"FRT Curve"** in the Analysis Cockpit under **"Analysis Type"**#1
- Choose measurement points and analysis period #2 and #3
- Select the created FRT curve from the template list #4
- Click **Apply** to start analysis and plot events against the FRT curve #5 ==> Events are displayed in the diagram, showing depth and duration of voltage dips
- Click an event to open the associated disturbance record for detailed analysis #6
- Save the analysis in the Dashboard for later access #7


Basic settings
Analysis Evaluation
Analysis Layout
Widget Settings
Analysis Type
Fault Ride Through
Start (Absolute Date)
09/01/2025
10:26:00
AM
PM
End (Absolute Date)
09/29/2025
10:26:00
AM
PM
Devices (2)
Events
All Events
Reporting Template
VDE-AR4110 - Typ1 FRT Kurve
Cancel
Save
AutoSync: Is Off
Apply
1
2
3
4
5
6
7
Analysis Cockpit
FRT Type 1 - oberer Grenzwert
FRT Type 1-2-polige Fehler
FRT Type 1-3-polige Fehler
Depth [%]
Duration
100 ms
200 ms
400 ms
1000 ms
2 s
4 s
10 s
20 s
40 s
100 s
(high)

6.5.2.2.11. Event matrix

The **PQ event matrix** is based on **EN50160** and correctly assigns power quality events according to the standard by **depth** and **duration**.



6.5.2.2.11.1. Functionality

- For **medium and high voltage devices**, only **line-to-line PQ events** (dips and swells) are considered.
- For **low voltage measurements**, **phase-to-earth PQ events** are used.
- According to **IEC61000-4-30**, these are always network events with a certain **depth and duration**.

6.5.2.2.11.2. Standard-dependent display

Depending on the regional standard, different tabular display forms exist:

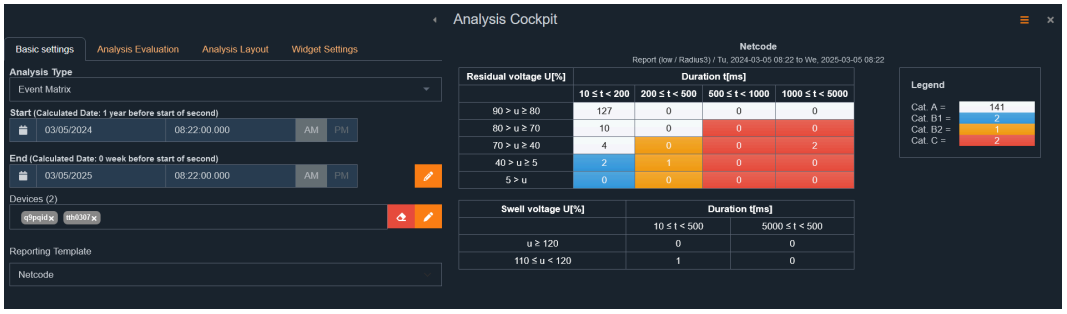
- In **South Africa**, **NRS048** applies.
- In the **Netherlands**, **Netcode** is used.

The correct assignment and display can be selected via the **standard template**. Only the **correct template** needs to be selected.

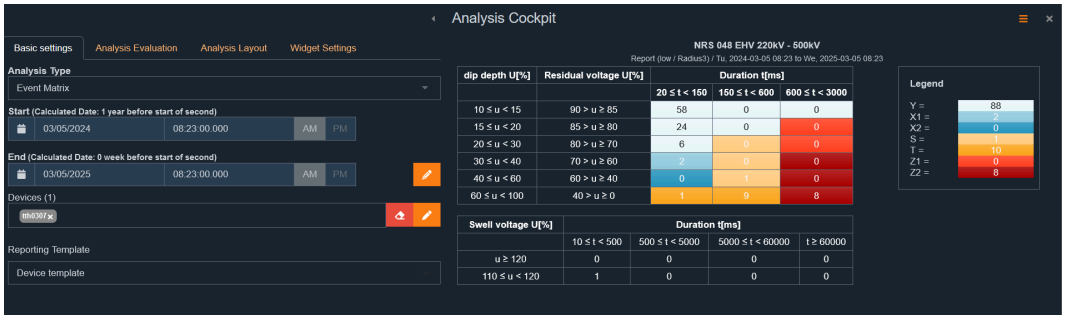
6.5.2.2.11.3. Flexibility of analysis

- The analysis period can be **freely** chosen.
- The analysis can be applied to **one or more measuring points**.

Example: Netcode



Example: NRS048



6.5.2.2.12. Live values

All directly connected device classes of types **PQI-DA smart, PQI-DE or PQI-LV** are **live** retrievable via direct data connection using **TCP/IP** streaming.

Measurement value display can be done in various analysis forms with a good data connection.

Important notes

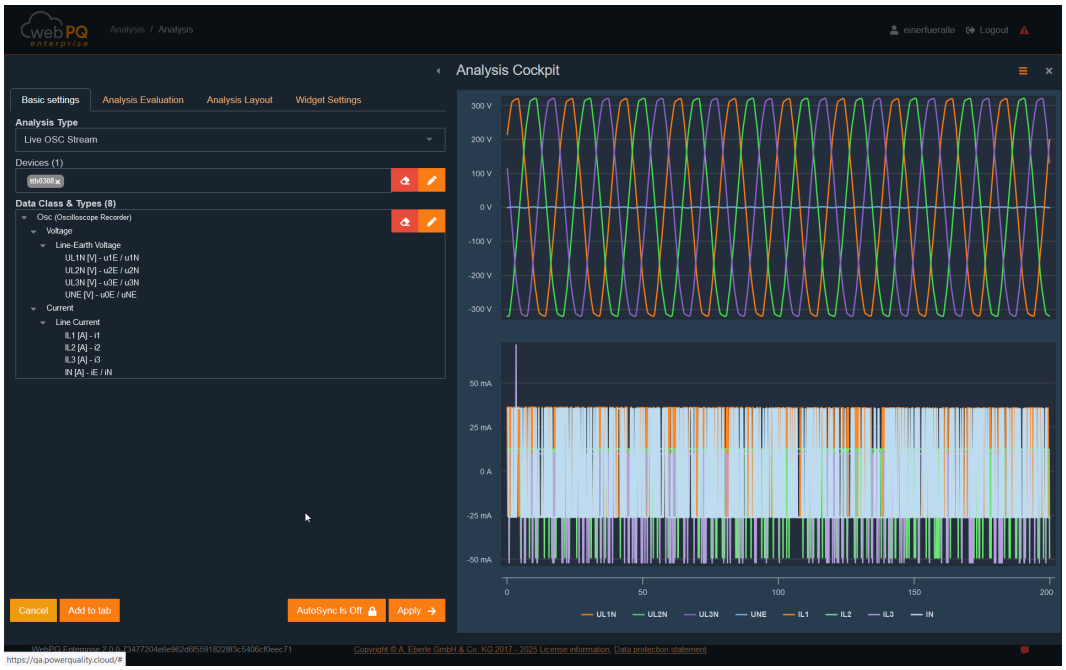
⚠ **High data consumption:** Displaying live values generates **very high data transfer**!

⚠ **Prioritisation of live data:**

- **Live values** have **lower priority** than continuous readout of **disturbance records** and **long-term data**.
- This can cause **delays** in display.
- **Live values do not replace SCADA protocols** such as **IEC60870-5-104 or IEC61850**, which offer real-time capability.

6.5.2.2.12.1. **Live oscilloscope image**

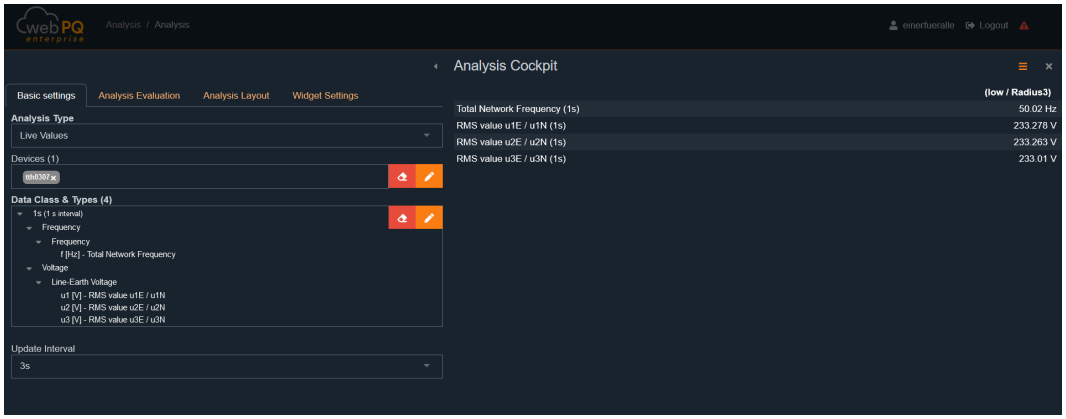
The **oscilloscope image** is **fully** downloaded from the device and displayed in regular quasi-stationary states.



6.5.2.2.12.2. **Live measurement values**

This analysis type is ideal for **parallel comparison of multiple measuring points**.

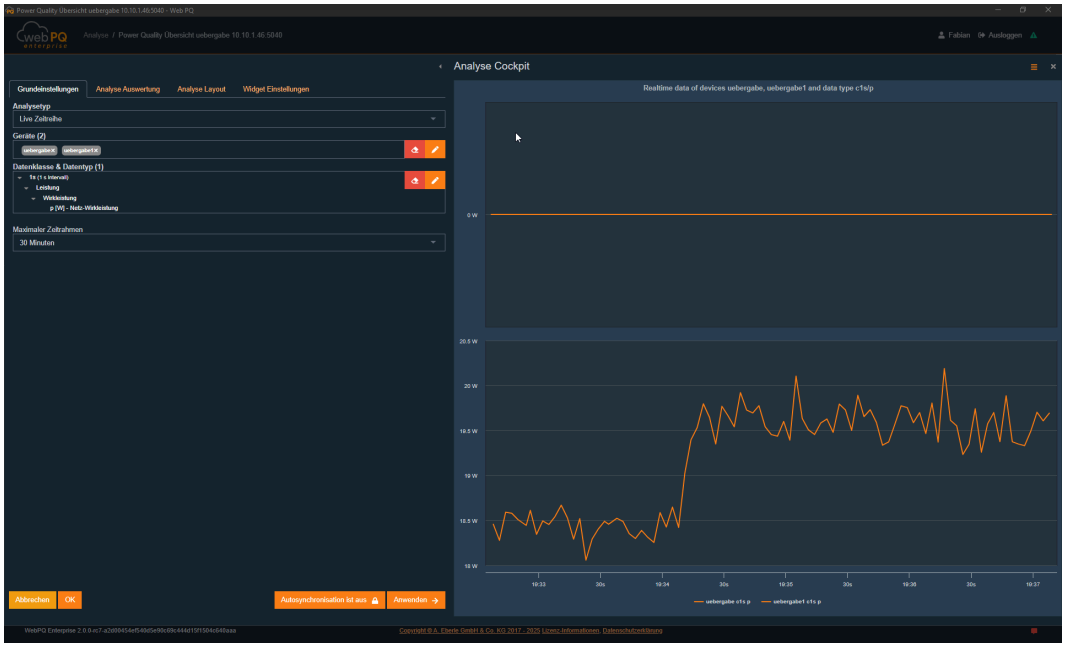
- Any number of measuring points can be displayed with **power in 1s measurement values or other data classes**.



6.5.2.2.12.3. **Live time series**

This analysis type is well suited to **quickly visualise reactions at measuring points to switching actions or direct influences**.

- All measurement values available in **streaming** can be **displayed live from multiple measuring points in parallel**.
- The **maximum time frame** determines how long data is **retained** in the display.



6.5.2.2.12.4. **Live harmonics**

This analysis type shows all **harmonics** relative to the **fundamental wave live**.

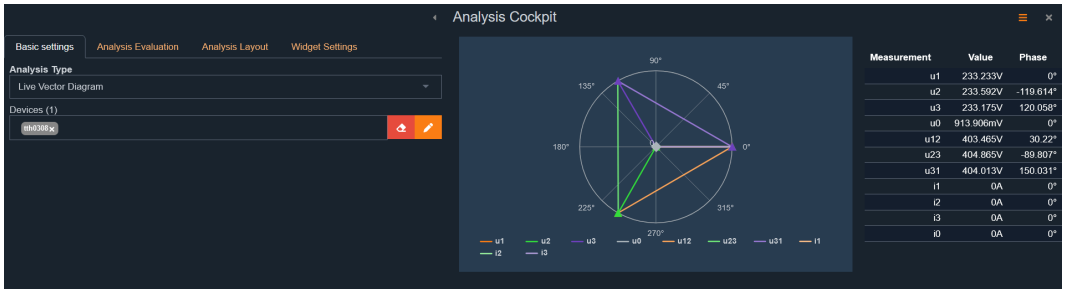
- **Blue bar:** Maximum value since streaming started
- **Red bar:** Current value
- Clicking a harmonic switches to the **live time series** of that harmonic.
- The same settings as in **historical harmonics analysis** are possible:
    - Switch between **current and voltage display**
    - Various **display types** such as relative to the fundamental wave or absolute value can be selected.

6.5.2.2.12.5. **Live interharmonics and harmonics**

This analysis type works identically to **live harmonics analysis**:

- **Blue bar:** Maximum value since streaming started
- **Red bar:** Current value
- Clicking a harmonic leads to the **live time series** of that harmonic.
- Switch between **current and voltage** as well as various **display types**.

6.5.2.2.12.6. **Live vector diagram**



The **vector diagram** (phasor diagram) displays **voltage and current phase angles** in a **three-phase system**.

It is especially useful for **checking device connections**, as wiring errors or unsuitable consumer characteristics can be detected.

What does the vector diagram show?

- **Voltages** and **currents** are displayed as **vectors (phasors)**.
- Each vector shows the **amplitude** (arrow length) and **phase angle** (arrow angle) of an electrical quantity.
- Vectors are displayed for **phase-to-phase** (L-L) and **phase-to-neutral** (L-N).

How to interpret the vector diagram?

1. Phase shift between voltage and current
The phase angle between voltage and current indicates the **load type**:

- **Inductive load (e.g., motor, transformer)**
  - **Current lags** behind voltage.
  - Typical for **inductive consumers** like motors or transformers.
  - Vector diagram: **Current vector lags behind voltage vector**.
- **Capacitive load (e.g., capacitor banks, long cables)**
  - **Current leads** voltage.
  - Typical for **capacitive consumers** like capacitor banks for reactive power compensation.
  - Vector diagram: **Current vector leads voltage vector**.
- **Resistive load (e.g., heating resistors)**
  - Current is **in phase with voltage**.
  - Typical for **heating devices or incandescent lamps**.
  - Vector diagram: **Current and voltage vectors point in the same direction**.

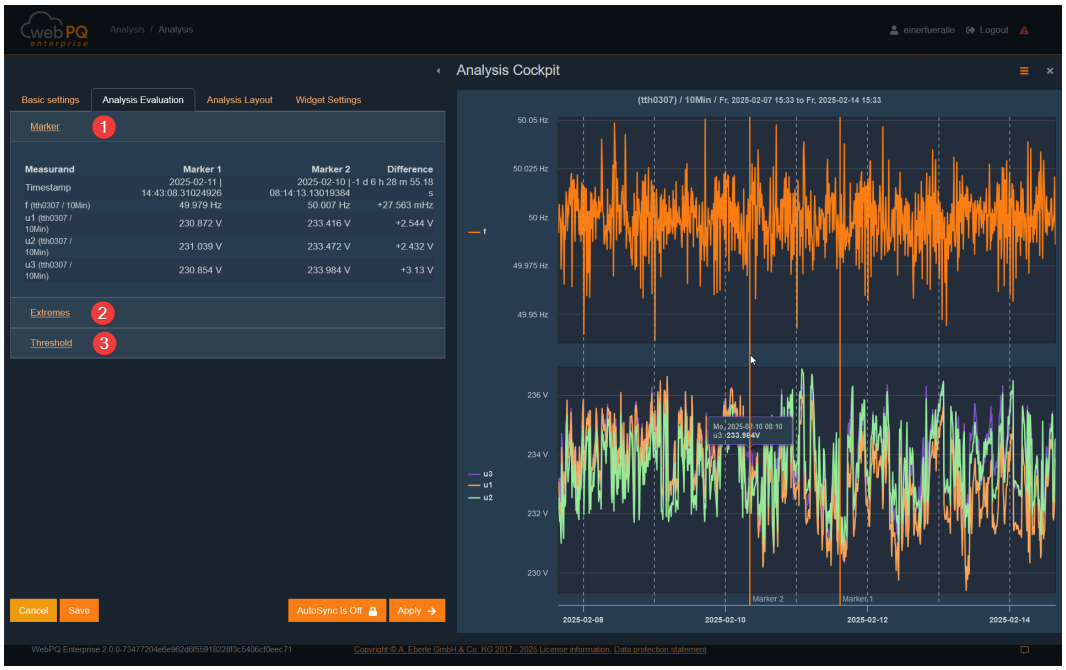
2. Detect wiring or connection errors

- **Reversed phase sequence**
  - If phases are connected incorrectly, vectors appear in an **unusual arrangement**.
  - This can cause problems, e.g., **motor rotation direction errors**.
- **Missing or incorrect neutral conductor**
  - An incorrect or missing neutral can cause **asymmetries in voltages and currents**.

Application areas of the live vector diagram

- **Check phase angle of voltages and currents**
- **Identify load types (inductive, capacitive, resistive)**
- **Diagnose wiring errors or rotation direction problems**
- **Check network quality and asymmetries**

6.5.2.2.13. Analysis evaluation



Analysis evaluation offers various options for detailed examination of analysed measurement values.

6.5.2.2.13.1. Display marker values (#1)

- Markers can be set in various analysis types.
- Markers allow targeted examination of individual measurement points.
- In analysis evaluation, marker values are clearly displayed.

6.5.2.2.13.2. Display extreme values (#2)

- Extreme values of the selected measurement series are displayed:
  - Minimum values
  - Maximum values
  - Average values
- This helps to quickly identify key measurement deviations.

6.5.2.2.13.3. Analyse limit values (#3)

- Limit values stored in measuring devices can be viewed.
- This allows a quick check if values are within permissible limits.
- For disturbance records, trigger conditions are displayed here.

6.5.2.2.13.4. Application areas

- Analyse voltage fluctuations and deviations in real-time.
- Identify critical values for quick fault diagnosis.
- Compare measured values with standard specifications stored in the system.

6.5.2.2.14. Analysis layout

In "Analysis Layout", grouping methods #1, scaling #2, and colours #3 of measurement values can be defined.

Using **"Group by"**, measurement values can be displayed individually:

- Each value is shown in a separate level-time diagram.
- Group by device and data type (unit).
- Group across multiple devices by data type in different diagrams.

Using **"Settings for device names"#4**, device names can be set via tags and categories in analyses.

In the screenshot, an example of a local network station with feeder display. Feeder names are assigned to a device via category **"device"#5**.
Feeders are displayed and labelled in the diagram via **"assigned slave name"#6**.

6.5.2.2.15. Widget settings

Under **"Widget settings"**, you can adjust the **title** and **size** of the widget.
These settings are relevant when the analysis is transferred to the **dashboard** and saved permanently.

6.5.3. Analyze Device

This view offers detailed and pre-configured analysis functions for individual measuring devices to specifically access their data.

The view is divided into three areas:

- **Power Quality Report**#1
- **Historical Data**#2
- **Live Data**#3

As a user, you have the option to switch the measuring device via **#4** and switch between the data weekly.

The Power Quality Report consists of four types of analysis:

1. **Summary of the necessary measured variables** according to the set norm template in a clear bar chart based on the limit values.
2. **Explanation of the EN50160-relevant measured variables.**
3. **List of disturbances recorded by the measuring device.**
4. **List of PQ events in the EN50160 matrix.**

By clicking on the bars, the drill-in procedure opens to display the measurement data in detail.

In the **"Analyse Device"**#2 tab, there are pre-configured *level-time diagrams*, *histograms*, and the *ITIC curve*.

In the **Live Data**#3 area, the user has the option to visualize the live data of the device if the selected measuring device is directly connected.

6.5.4. Analysis > Dashboard

The **Analysis Dashboard**, which can be found in the navigation bar on the left side under "Analysis > Dashboard" #1, is used for the permanent storage of analyses in widgets that were created via the Analysis Cockpit. Using the **Add analysis** function #2, it is possible to open the Analysis Cockpit, define an individual analysis, and transfer it to the Analysis Dashboard.

With the **"Tab settings"** function #3, the time period for all analyses stored in the tab can be changed. For example, in one widget, you can select performance, and in another widget, you can select maximum currents, voltages, and THD (Total Harmonic Distortion). To compare the dependencies of the variables with each other weekly, the time period for all widgets can be adjusted via the Tab Settings. Click on "Tab Settings" and change the time range for the tab and all analyses contained within it.

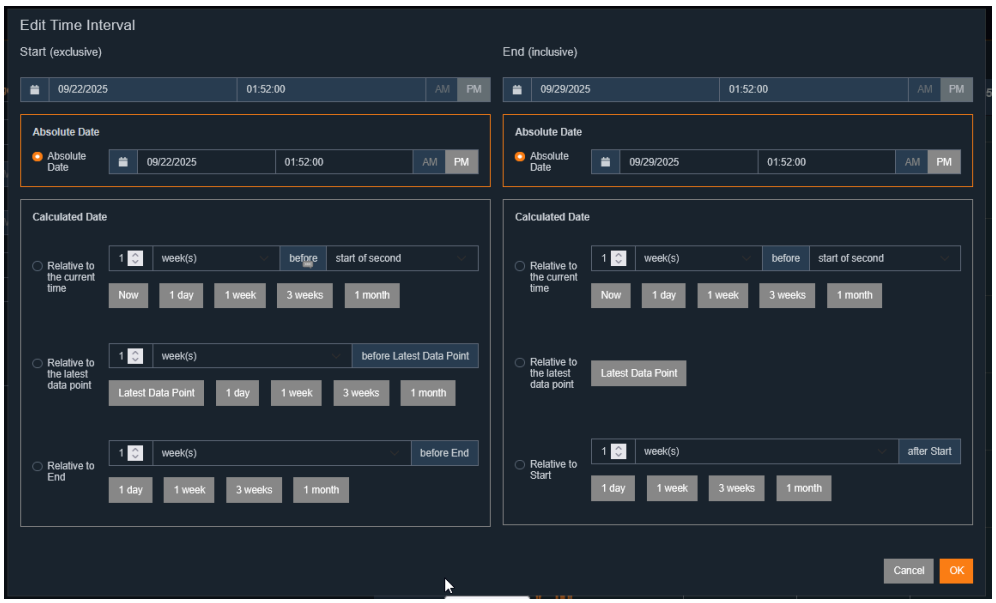
The **"Save Tab"** function #4 saves settings such as window sizes, zoom levels, markers, etc. If changes have been made, the user will be prompted to save or discard the changes when leaving the Analysis Dashboard. Unsaved tabs are marked with a "*", making them easy to find again to complete the saving process.

With the #5 function, tabs can be **duplicated** and saved under a new name. The #6 function deletes the tab directly. However, if a tab is closed via the **X** next to the tab name, it is not deleted but can be displayed again at any time via the tab menu #7 in the tab bar.

The **Tab Menu** opens the tab menu. In the **"Load Saved Tabs"** area, all tabs can be transferred back to the interface from the background storage. To create a new tab, click on **"+ Create New"**. To save the tab copied using function #5 into a new one, use the **"Add Tab"** function and paste the content into the empty field using **CTRL+V**.

6.6. Time Settings in Analysis

The **time setting**#1 in the analysis allows the user to open a dialog window for configuring the analysis period and to define extensive time options relevant for the analysis of equidistant measurement values.



In general, four different modes are available:

- **Absolute period:**
  In this mode, the user can specify a fixed start and end time for the analysis. This is especially useful when a clearly defined time range needs to be examined, such as analyzing measurement data within a specific project or event. Selection is made via a calendar and time dialog, allowing precise input. This enables targeted analysis and comparison of data from the desired time window.

- **Relative period to current time:**
  Here, the user can define a period that dynamically relates to the current time, such as “the last 24 hours” or “the last 7 days.” This mode is particularly practical for ongoing analysis of current events and is ideal for dashboards that should always display the latest data. Using the software’s automation feature, the analysis can be configured to automatically evaluate and report on the current period. This enables dynamic and continuous reporting without manual adjustment of the time range.

- **Relative period to last measurement value:**
  With this option, the user can set a period based on the last available measurement value. This is helpful when the analysis should always be based on the most recent data, regardless of when it was recorded. It is especially beneficial for measurement series that are not recorded continuously but at irregular intervals. For example, analyses can always be performed retrospectively from the last measurement value for a specified period.

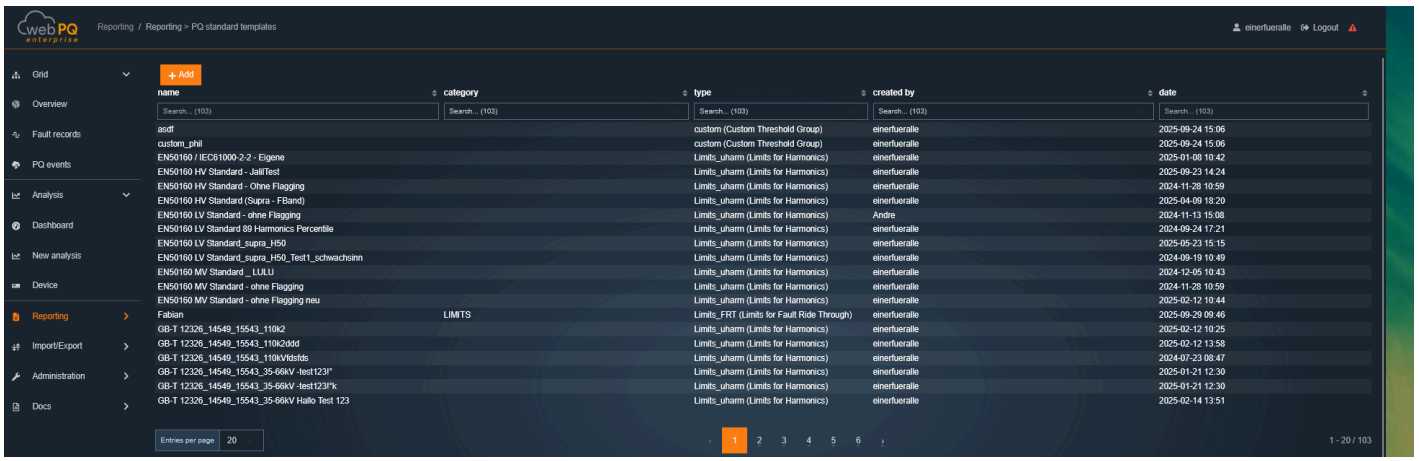
- **Relative to end:**
  In this mode, the period is set relative to the end of the available data. This means the analysis focuses on the last segment of the measurement data, regardless of the current time or last measurement value. This is particularly useful for reviewing data history, such as identifying trends or changes in the last section of data. The user can flexibly determine how far back the analysis should reach, starting from the end of the data series.

6.7. Reporting - PQ Standard Templates

In the menu under **"Templates & Tasks >> Reporting Templates"**, templates for evaluating various power quality parameters are available. These templates are updated and expanded with each software update to stay current. Additionally, you can create your own templates and save them in the list or base them on an existing template.

Each template can be applied to one or more devices to generate reports with the corresponding threshold values. You can also work with threshold sets in analyses and use them as templates, or use threshold sets for event-based monitoring.

1. Using Templates in Analyses and Event-Based Monitoring



Currently, the following standards and threshold sets are supported:

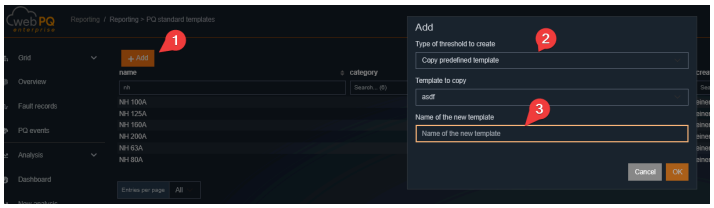
- Customer-specific thresholds – measurement monitoring
- Power quality standards such as EN50160 for low, medium, and high voltage, or IEC61000-2-2
- Fault Ride Through (FRT) curves – for evaluating feed-in systems

To view the thresholds of a template, simply click on the corresponding name of the standard or threshold template. A detail window will open with the relevant information.

Using the **free text search**, you can search for standards or categories such as countries or continents.

Standard templates can be applied directly to devices and individually adapted to customer-specific requirements.

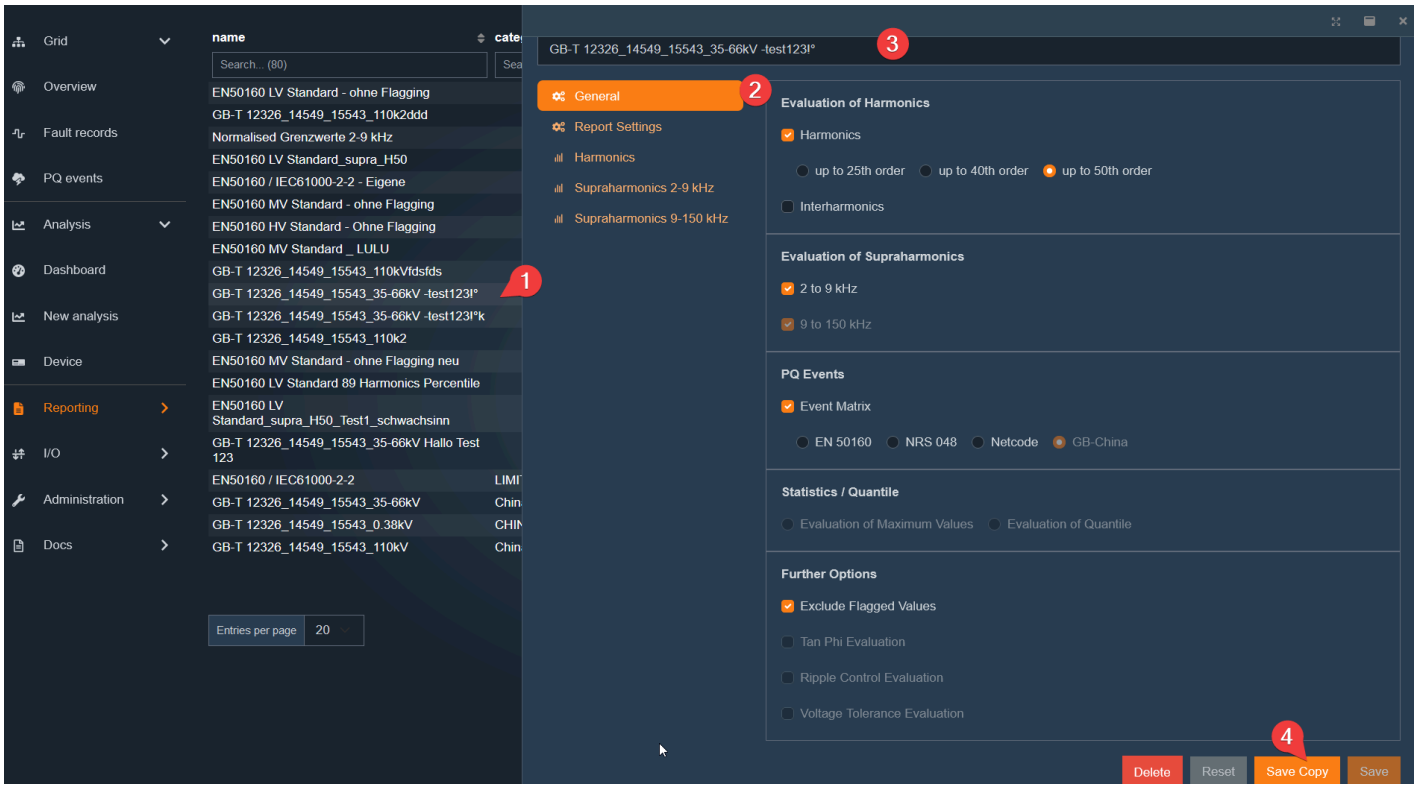
6.7.1. Adding Custom Threshold Sets



Clicking "+ Add" #1 opens a wizard for adding or configuring your own template. You can select the following modes:

- **Copy**: Select and copy an existing template
- **Customer-specific threshold / measurement monitoring**: Create a completely new template for measurement monitoring or as a fully custom template. For example, you can create a threshold set for any parameter. Use cases include monitoring individual harmonics, current values, or other analog measurements such as maximum values for local substations and their fuse sizes in current or power.
- **FRT Curves**: Create your own FRT curves, e.g., for evaluating feed-in systems.

After selecting the mode, you enter the template name and description in the next step #3.

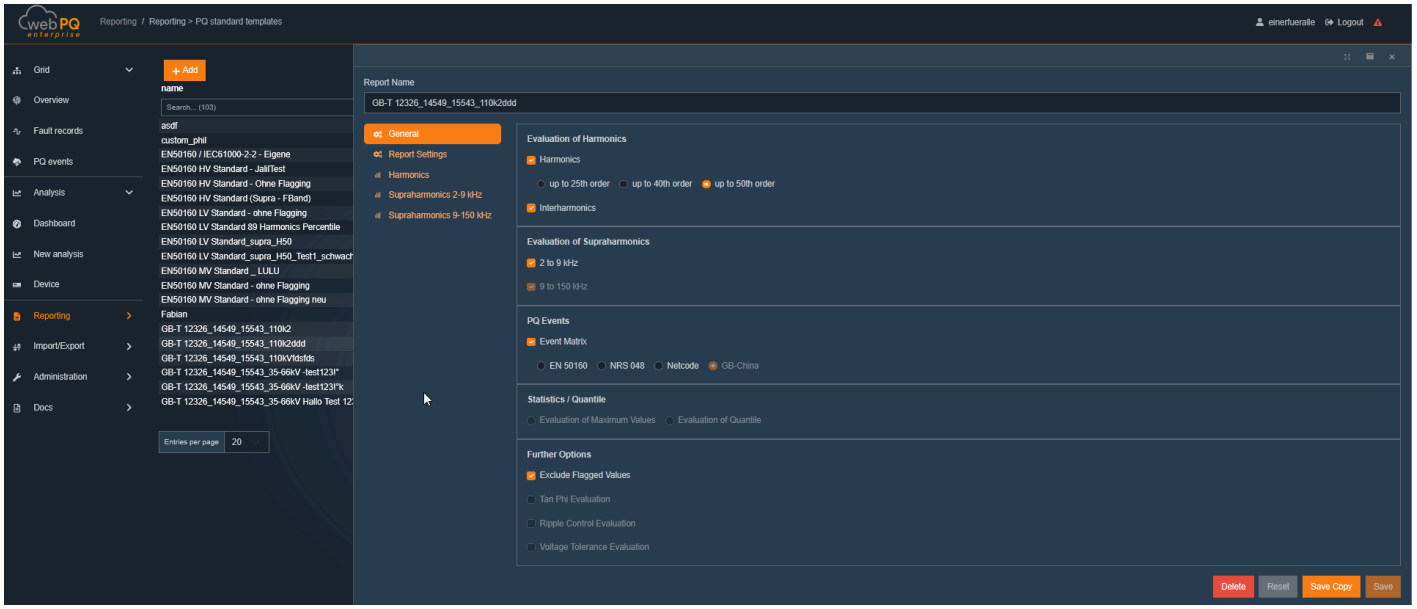


Explanation and usage of the individual sections:

6.8. Power Quality Standards (limits uharm)

This standard template includes the most common power quality parameters and their thresholds. It can be applied to all devices that record power quality data. This is also possible afterwards, even if the measuring device was previously operated with another template. The template can also be used in analyses to display the thresholds in the charts.

The template has the following parameters in the **General** section:



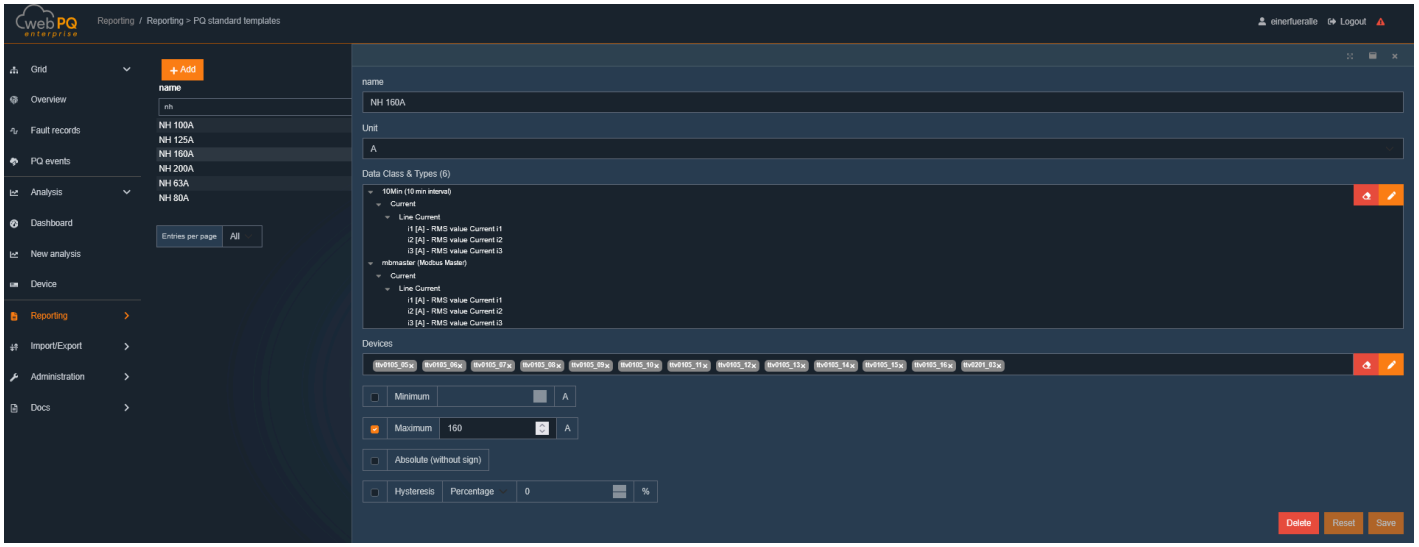
- Harmonics evaluation: Set which harmonics should be included in the report. Either up to the 25th, 40th, or 50th harmonic.
- Supraharmonics evaluation: Set whether supraharmonics should be included in the report (2-9kHz) or beyond.
- PQ Events: Specify which standard to use for ITIC output
    - EN50160
    - NRS048
    - Netcode
- Flagged Events: Set whether flagged measurements should be included in the report or excluded.

6.9. Fault Ride Through (FRT) Curves ()

Configuration in the "Analyses" section FRT Curves.

6.10. Customer-Specific Thresholds – Measurement Monitoring

This feature can be used to work with customer-specific thresholds in analyses or event-based monitoring.



The following parameters can be set:

Name sets the template name to find it in analyses and event-based monitoring of automation tasks. **Unit** sets the unit for the template, e.g., V, A, kW, kVAr, Hz, etc., to which the threshold refers. **Data classes** sets the data class for the template, e.g., "Voltage", "Current", "Power", etc., to facilitate assignment of measurements. Multiple data classes can be selected that match the chosen unit. **Devices** sets which devices the template should be available for. Multiple devices can be selected. **Minimum** lower threshold for triggering **Maximum** upper threshold for triggering **Absolute** sets whether the threshold is considered as an absolute value or with sign **Hysteresis** sets how far the value must fall below or exceed the defined threshold for retriggering

Click **Save** to add the template to the list of available templates and apply it to the relevant devices. Click **Remove** to delete the template.

Thresholds can then be used in analyses – see Thresholds in Analyses – and for event-based monitoring – see Automation Tasks.

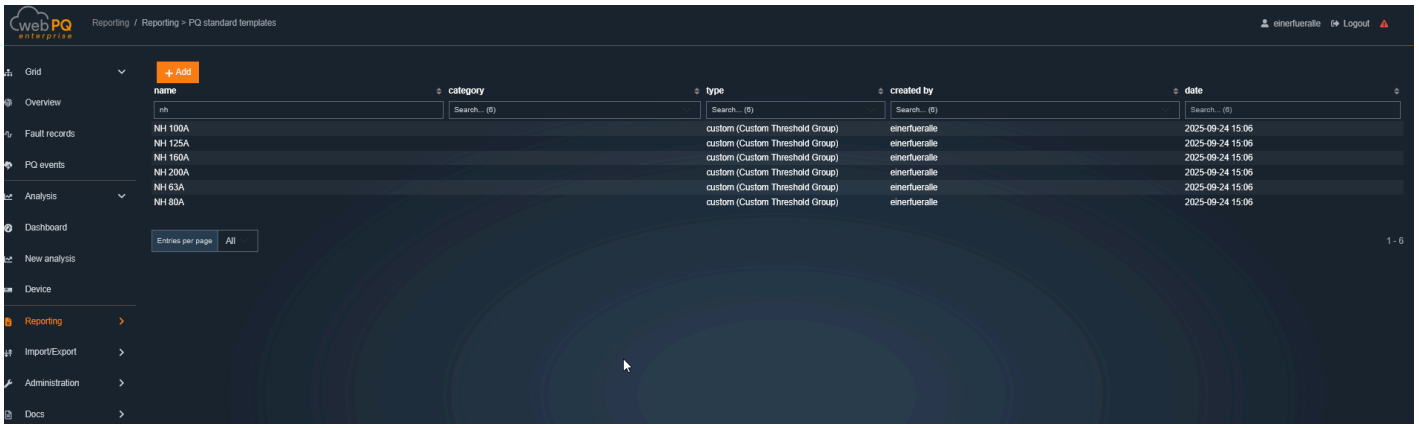
Example Use Case:

As a grid operator, I want to monitor local substations and the feeders of a grid area for compliance with EN50160, and also be notified by the system when the current reaches 90% of the NH fuse rating.

The procedure is as follows:

1. Add several customer-specific threshold templates – e.g., with the name of the fuse size and the definition of the current value at 90% of the NH fuse

- Name: NH Fuse 63A – 90%
- Unit: A
- Data class: Current
- Devices: Select all substations or feeders with an NH Fuse 63A
- Minimum: empty
- Maximum: 56.7 (63A * 0.9)
- Absolute: yes
- Hysteresis: 2 (i.e., when the current drops to 54.7A, the trigger is reset)



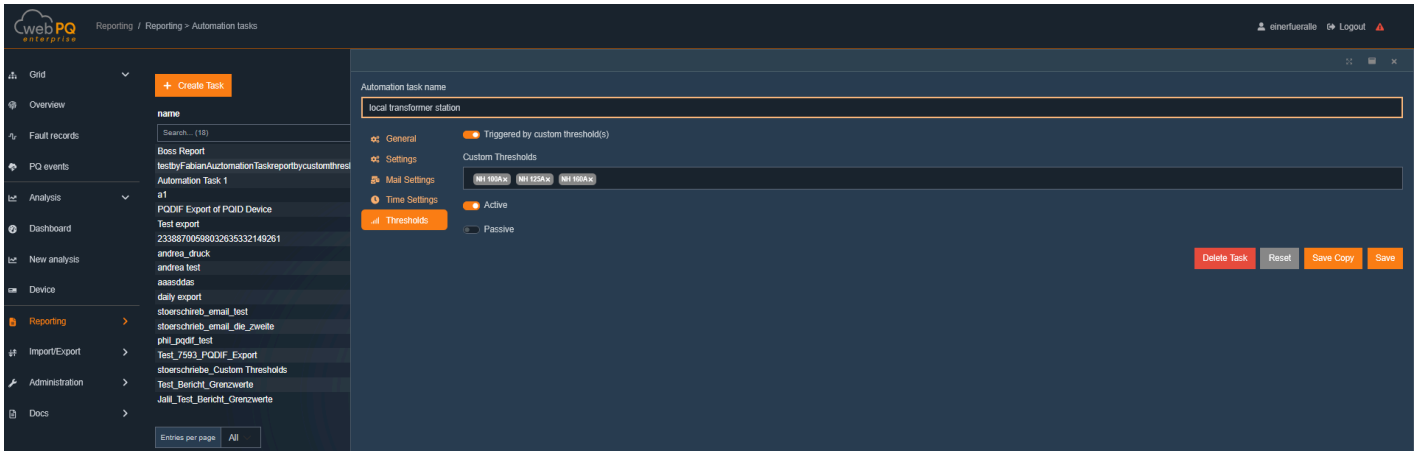
Info: Customer-specific thresholds can also be added in the device settings under the "Thresholds" tab. This allows the template to be applied directly to the device, rather than via device configuration. This is especially useful if the template should only apply to a single device or if you want to control which devices use the template.

1. Create a dashboard for automated reporting with custom analyses and time selection

- Go to Dashboards >> Add New Analysis
- Select the desired analyses and configure them with a calculated period (e.g., last 7 days, last month, etc.)
- Add the analyses to a new dashboard
- Save the dashboard with a meaningful name

1. Add an automated report in Automation Tasks as event-based monitoring

- Go to Templates & Tasks >> Add New Task
- Assign a meaningful name to the task and select the task type "Report"
- Select the desired devices or device groups to apply the task to
- Select the previously created dashboard and configure the recipients
- Set triggers in the "Thresholds" section to be notified when defined thresholds are exceeded



- Save and activate the task to start automated reporting and notifications

1. Result

If the defined thresholds for one or more devices are exceeded, the recipient automatically receives a notification with the freely configured dashboard as a PDF via email.

6.11. Reporting - Automation & Tasks

A central feature of **WebPQ** is the automated, targeted provision of information for various users or applications. For this purpose, the software has a module for task automation.

A key advantage of the software is its ability to regularly and automatically generate compliance reports, such as those according to **EN50160** or **VDE-AR** user guidelines. Additionally, the software can automatically inform affected customers in the event of network disturbances. In many use cases, the software solution also requires the automatic storage and export of measurement data in open file formats. All these settings and tasks can be configured and managed in the **"Tasks"** section.

The main tasks enabled by the software's automation functions are listed below:

1. Fault records This module allows automatic alarm notifications to be sent or fault records to be stored, for example, in the event of power grid disturbances. Notifications can be sent via **email** and include all relevant information about the disturbances. This ensures that users or system administrators are directly and efficiently informed, enabling a quick response to network issues.

2. Reports This function allows standard reports to be created and sent regularly and automatically. Examples include reports according to the **EN50160** standard or other industry standards. These reports can be created in various formats, such as **PDF**. Additionally, the tabs created in the **Analysis Dashboard** can be used as a basis for automated reports. This enables regular, standardized reporting without manual intervention.

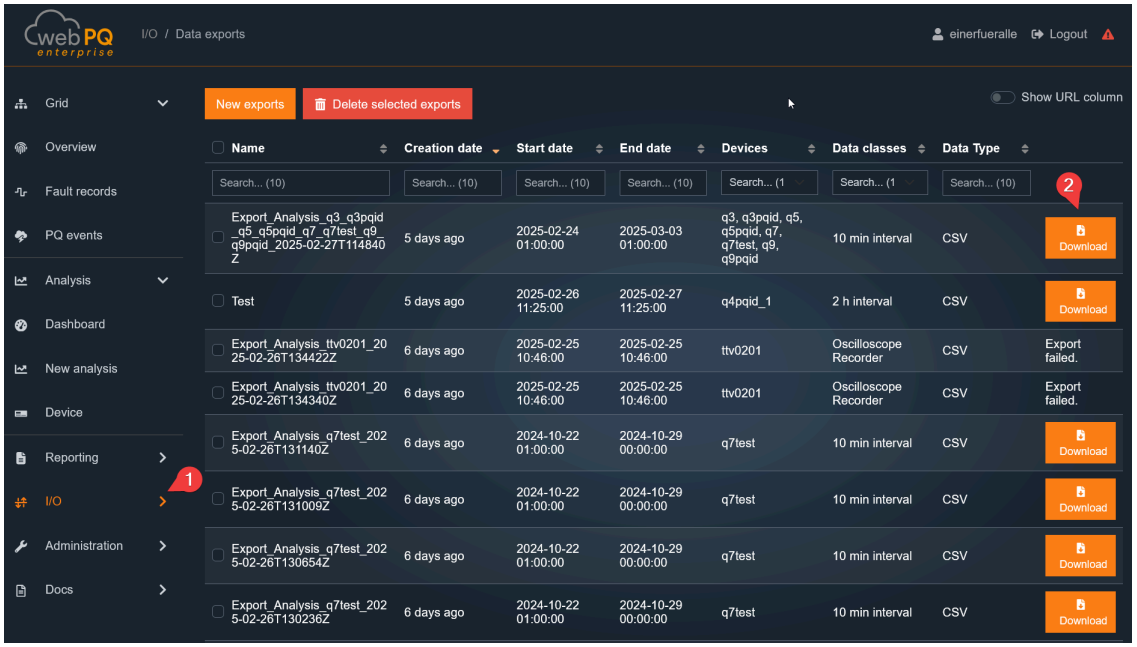
3. Export The export module allows the automatic and regular export of measurement data for one or more devices. The exported data can be stored in open file formats needed for further analysis or archiving. This function ensures that all relevant measurement data is always available in a structured and accessible format without requiring manual exports.

All these tasks and automation processes can be centrally managed in the **"Automation tasks"** section of the software, allowing for easy configuration and regular execution of automated processes.

6.11.1. Backup and Download of Generated Data

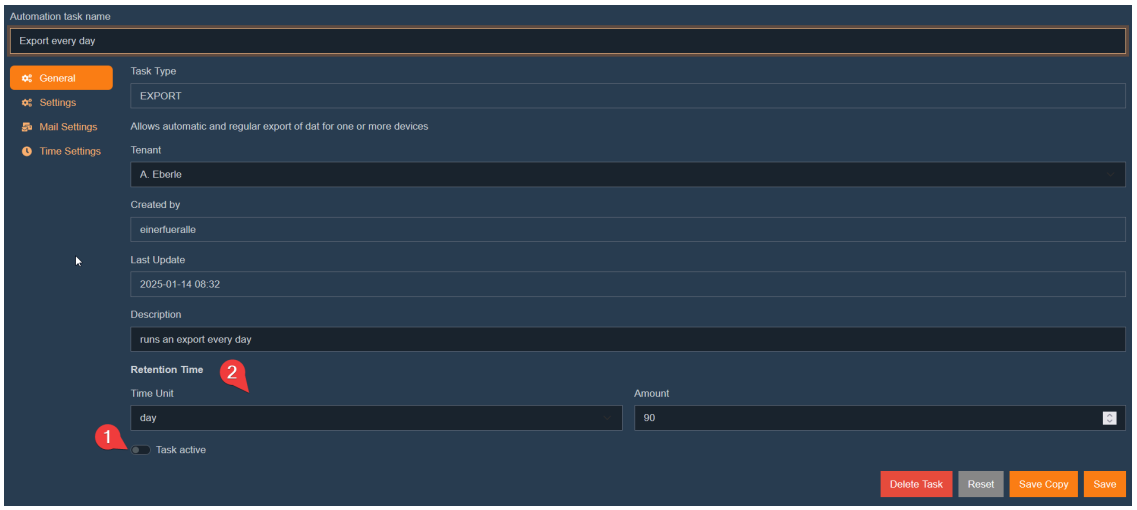
The complete **reports** and **exports** created in the **automation tasks** are stored both in the file system of the **WebPQ server** and in the specified folders that can be configured in the **WebPQ backend**. More information about the backend can be found at Link. These data can be retrieved at any time.

Additionally, the created data is also available in the **"Import / Export"** section under **"Export"** in the **client** and can be downloaded directly via the browser.

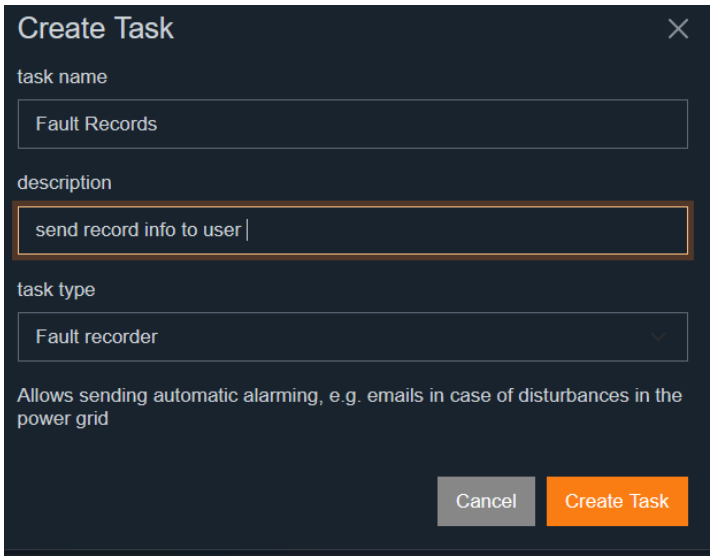


6.11.2. Activation / Deactivation of Tasks

Each task can be **activated** or **deactivated** as needed. This allows flexible control over whether a task should be executed or not.



6.11.3. Creating Tasks

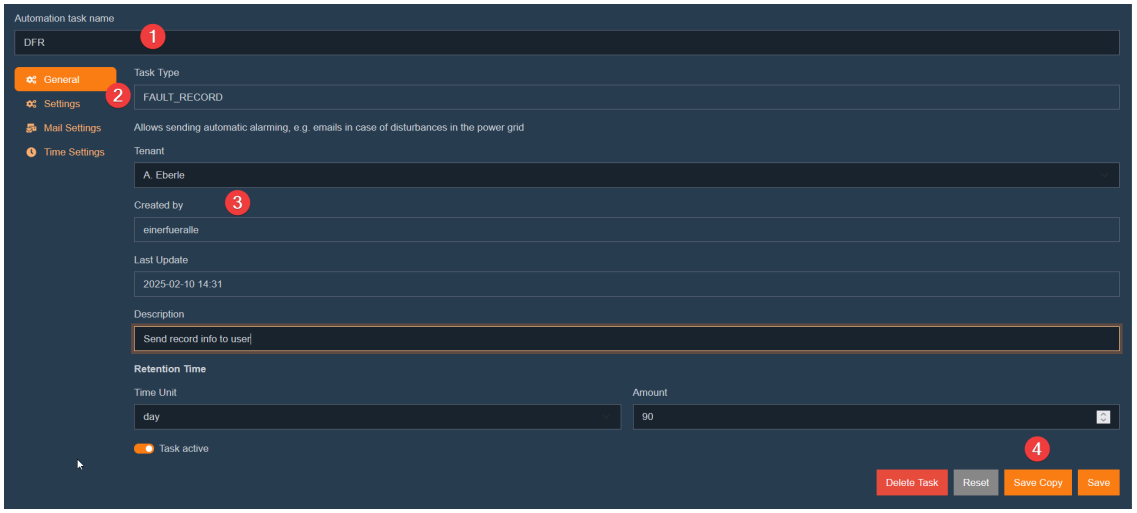


By clicking the **"Add Task"** button, the user can create new tasks. In the first step, the **task name** and a **description** must be specified under which the task will be saved. These details are necessary to uniquely identify and correctly assign the task later.

In the next step, the **type of task** is determined. This type defines how the task will be executed and which specific parameters need to be configured.

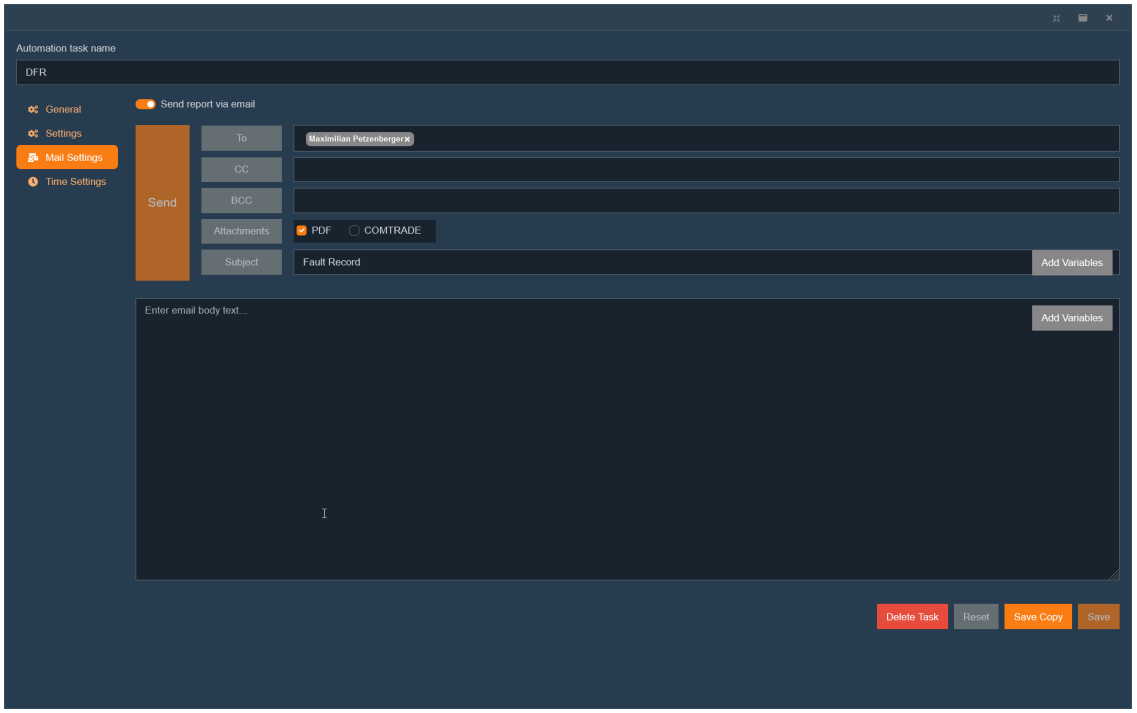
6.11.3.1. Creating a Disturbance Record Task

A commonly used task is the **disturbance record**. This task allows for automatic notification or logging in the event of a disturbance. The disturbance record is usually sent as an **email** to defined recipients as soon as a network disturbance is detected. This ensures that responsible persons are immediately informed, allowing for a quick response.



With **#1**, the **task name** is specified. Under **#2**, settings can be made regarding which **devices** are eligible for sending and which **reporting format** (e.g., **PDF** or **COMTRADE**) should be chosen. Additionally, the **type of record** can be set in the settings, such as **oscillographic** or **TRMS record** (True Root Mean Square), which affects the type of measurement data representation.

In the **email settings**, the **recipients**, **subject**, and **formats** must be specified. It is also possible to include **variables** to create individual **subject lines** or **email texts**. This function offers high flexibility as the content of the emails can be tailored to specific requirements and circumstances.



In the **time settings** section, specific parameters can be set, such as how far back the disturbance record should be considered. This allows defining the period in which disturbances can be processed or analyzed retrospectively and determining how long historical data should be sent.

6.11.3.2. Creating a Report Task

Using the **reporting templates** and the **analysis dashboard**, the **WebPQ** software offers the ability to automatically generate **PDF reports** according to standards from over 65 different templates. These reports can be created for **device groups** or **individual devices**.

In the **automation task settings**, the corresponding **device** and **report template** must be selected. These templates can be customized in the **reporting editor** either according to standard specifications or customer-specific requirements.

For more customized reports, the software offers the ability to create free reports from various types of analysis using the **individually configurable tabs** in the **analysis dashboard**. To do this, simply select the desired **tab** under point **#2**.

In the **time settings** section, specific parameters can be set, such as **frequency**, **day of the week**, and **time** at which the regular report should be generated. This function enables complete automation and scheduling of report generation without manual intervention.

6.11.3.3. Creating an Export Task

Unlike **reports**, the **export task** mainly differs in the **settings**. While the device selection is similar to reports, the **export format** must also be selected here. The export allows measurement data to be stored in various formats.

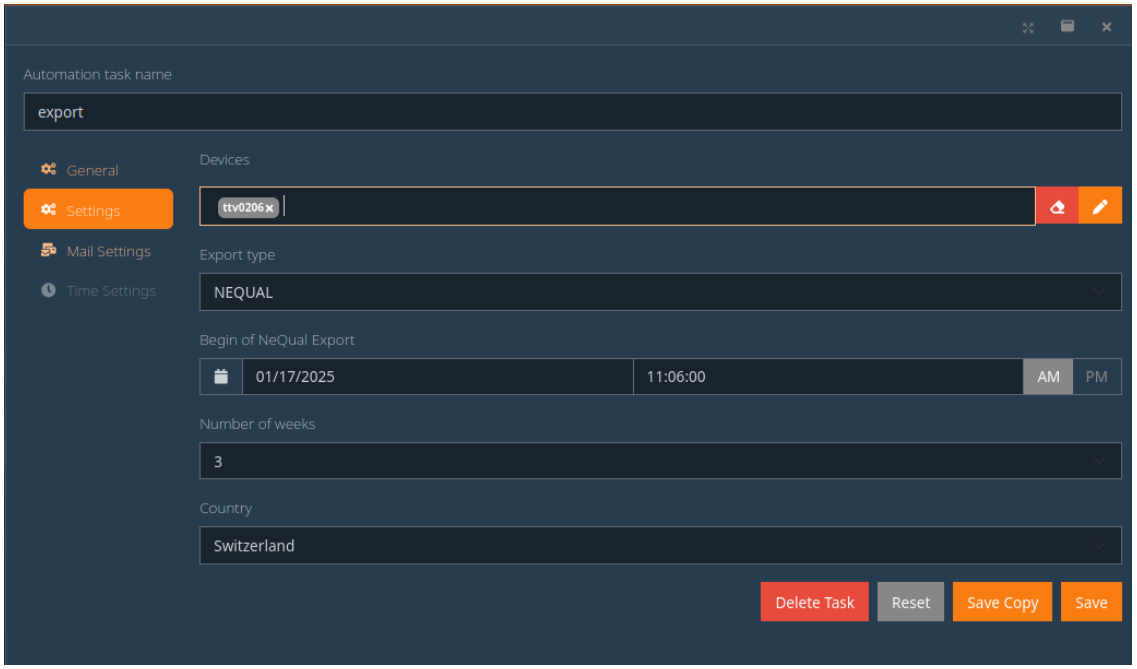
Currently, the following export formats are available:

6.11.3.3.1. **CSV**

For CSV export, after selecting the format, the **data class** or **data points** to be exported must be specified. This provides the flexibility to export only the relevant data in a structured CSV format.

6.11.3.3.2. **NeQual**

For **NeQual export**, the **number of weeks**, the **country**, and the **start time of the export period** must be specified. These settings allow data to be exported for specific periods and geographical regions.



6.12. Import of Measurement Data

6.12.1. General Information

To import measurement data into the **WebPQ** software, various options are available. The **import** can be performed either **manually** via the **client** or **automatically** through direct connection via **TCP/IP**.

A **manual import** is used when there is no direct connection to the measuring device or if such a connection is not desired. Additionally, measurement data from other systems or from end customers can be imported this way.

6.12.2. Manual Import

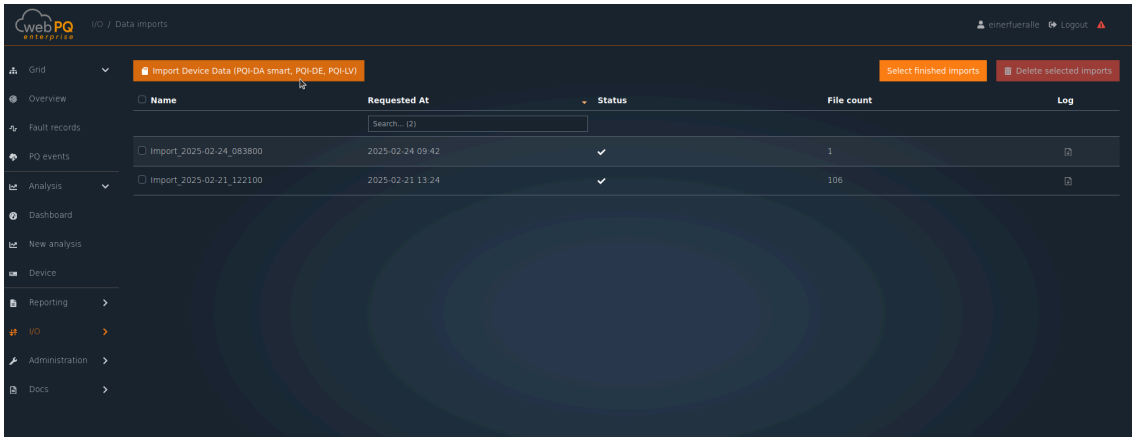
In the `Import / Export >> Import` section, you will find the function for manual import. This allows you to upload data that has been exported, for example, via SD card, WebServer, or **WinPQ Lite**.

6.12.2.1. Import Process

The manual import is carried out in several steps:

6.12.2.2. Step 1: Start the Import Wizard

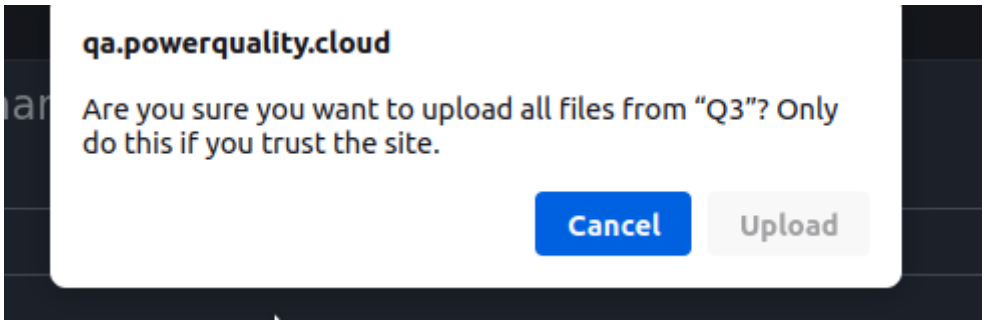
- Click on **"Import data for devices"** (`#1`).
- A wizard will guide you through the import process.



6.12.2.3. Step 2: Select Directory with Measurement Data

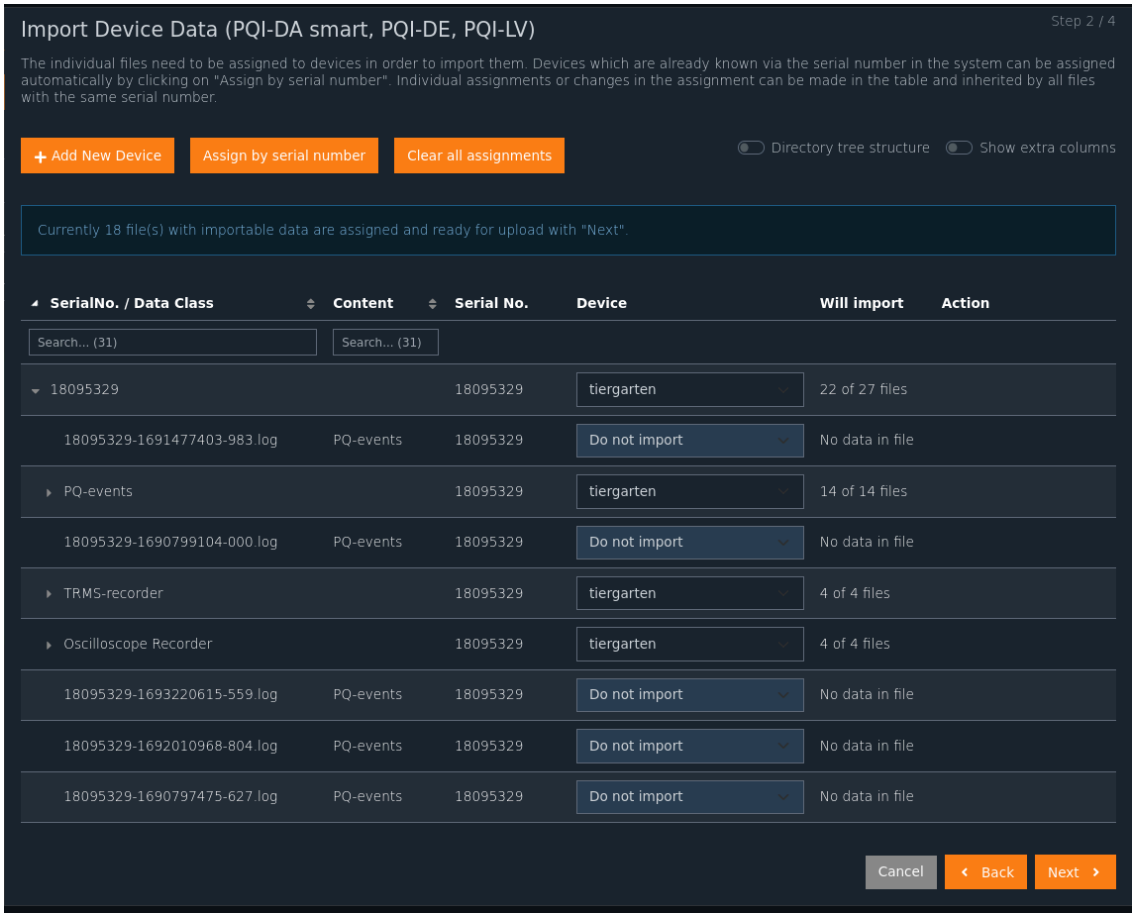
- Click on **"Browse"** to select the directory with the measurement data.
- Confirm the security message regarding the trustworthiness of the application.

Note: You must agree to the security message!



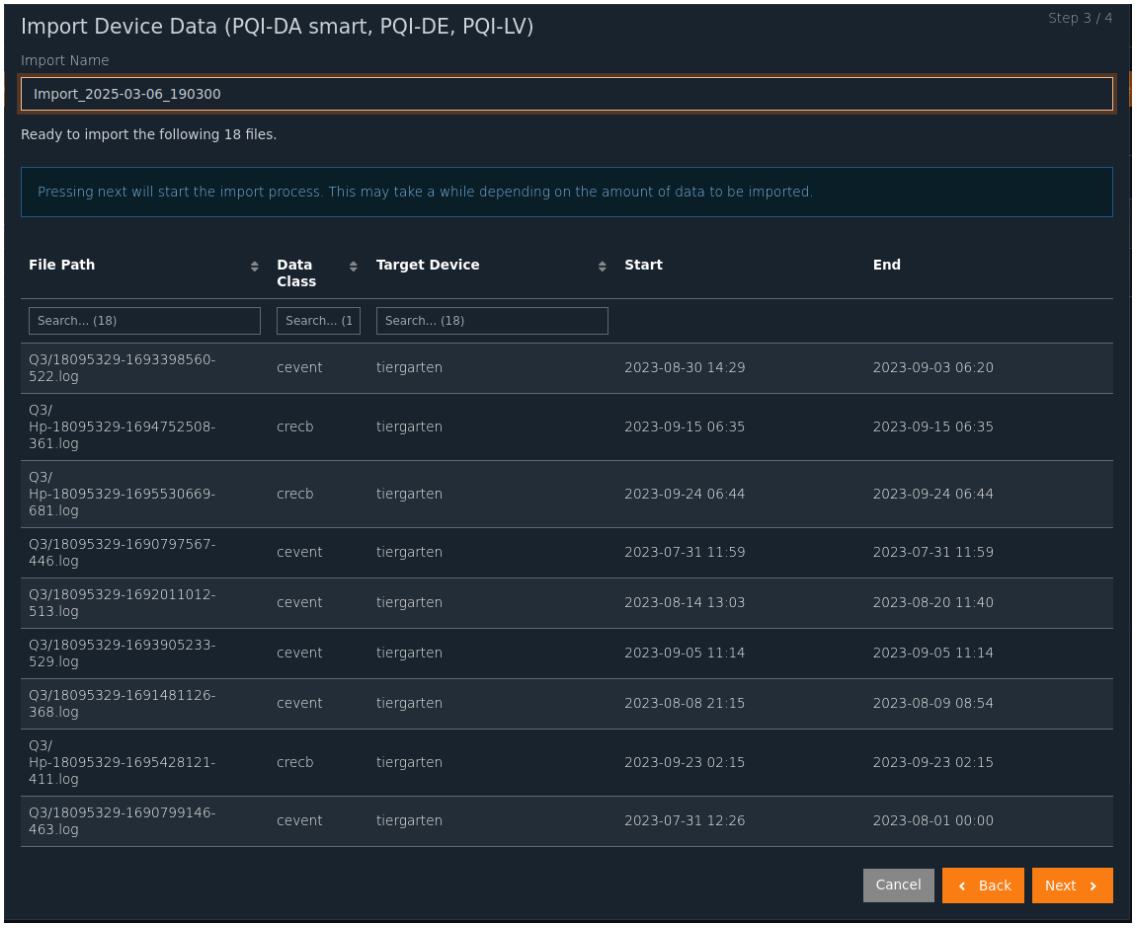
6.12.2.4. Step 3: Assign Measuring Devices

- Files must be assigned to the respective devices.
- Known devices are **automatically** recognized by the serial number.
- Manual assignments or changes can be made in the table.
- If the device does not yet exist, it can be newly created as an **"Offline Device"**.



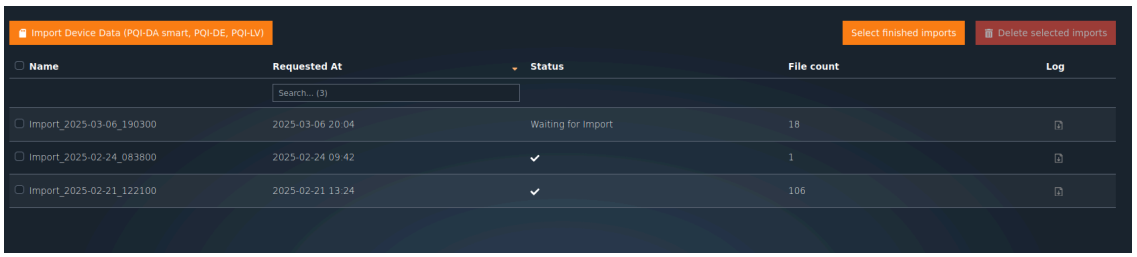
6.12.2.5. Step 4: Upload and Import

- The data is uploaded to the server.
- Subsequently, the automatic import into the database takes place.



6.12.2.6. Step 5: Progress and Verification

- The progress of the import can be viewed in the `Import / Export >> Import` section.
- A **LOG file** is created for each import process to trace the process.



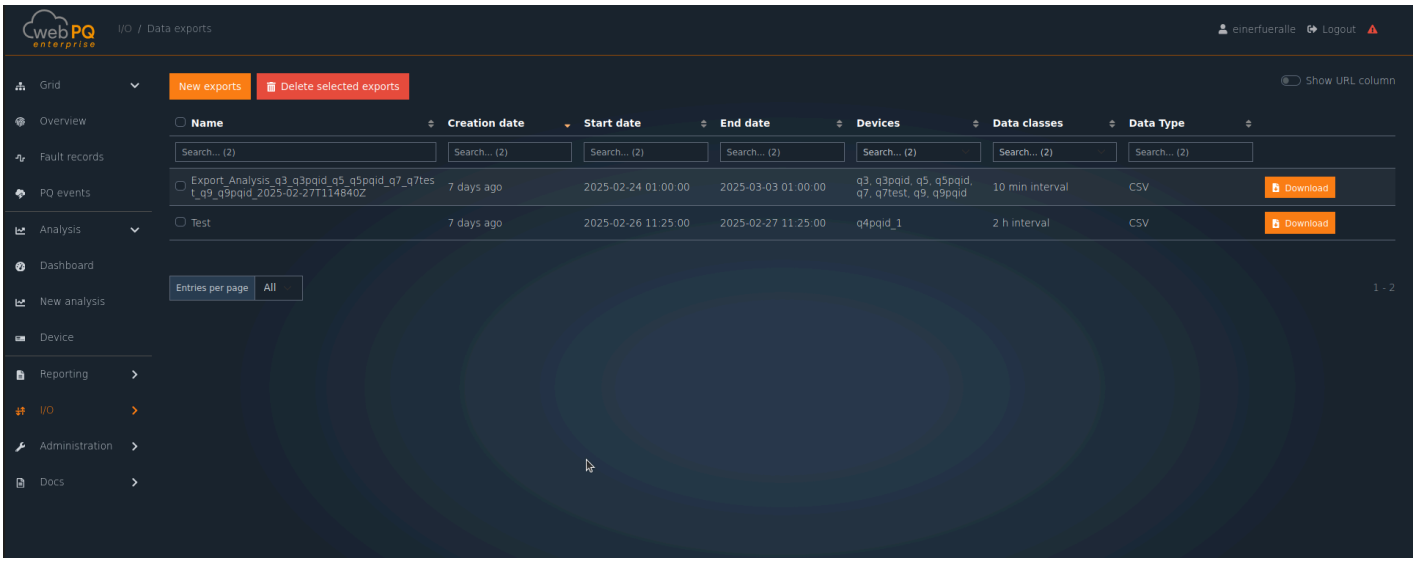
6.13. Export of Measurement Data

6.13.1. General

The **WebPQ** software offers both manual and automated export options for measurement data.

In the `Import / Export > Export` section, you can:

- **Create manual exports**,
- View and download **already created exports**,
- Manage exports from the Automatic Export.



6.13.2. Manual Creation of an Export

A manual export is carried out in several steps:

6.13.2.1. Step 1: Open Export Dialog

- Click on **"New Exports"** to open the export creation dialog.

6.13.2.2. Step 2: Assign Export Name

- Define a meaningful **export name** for later identification.

6.13.2.3. Step 3: Choose Export Format

- Select the desired **export format**:
  - **CSV** (Text-based table format)
  - **Nequal***(license required)*
  - **PQDIF***(Power Quality Data Interchange Format: IEEE 1159)*

Tip: For the formats **PDF** and **Comtrade**, other methods for creating reports and exports are available. For more information, see Export via Burgermenue.

6.13.2.4. Step 4: Select Devices

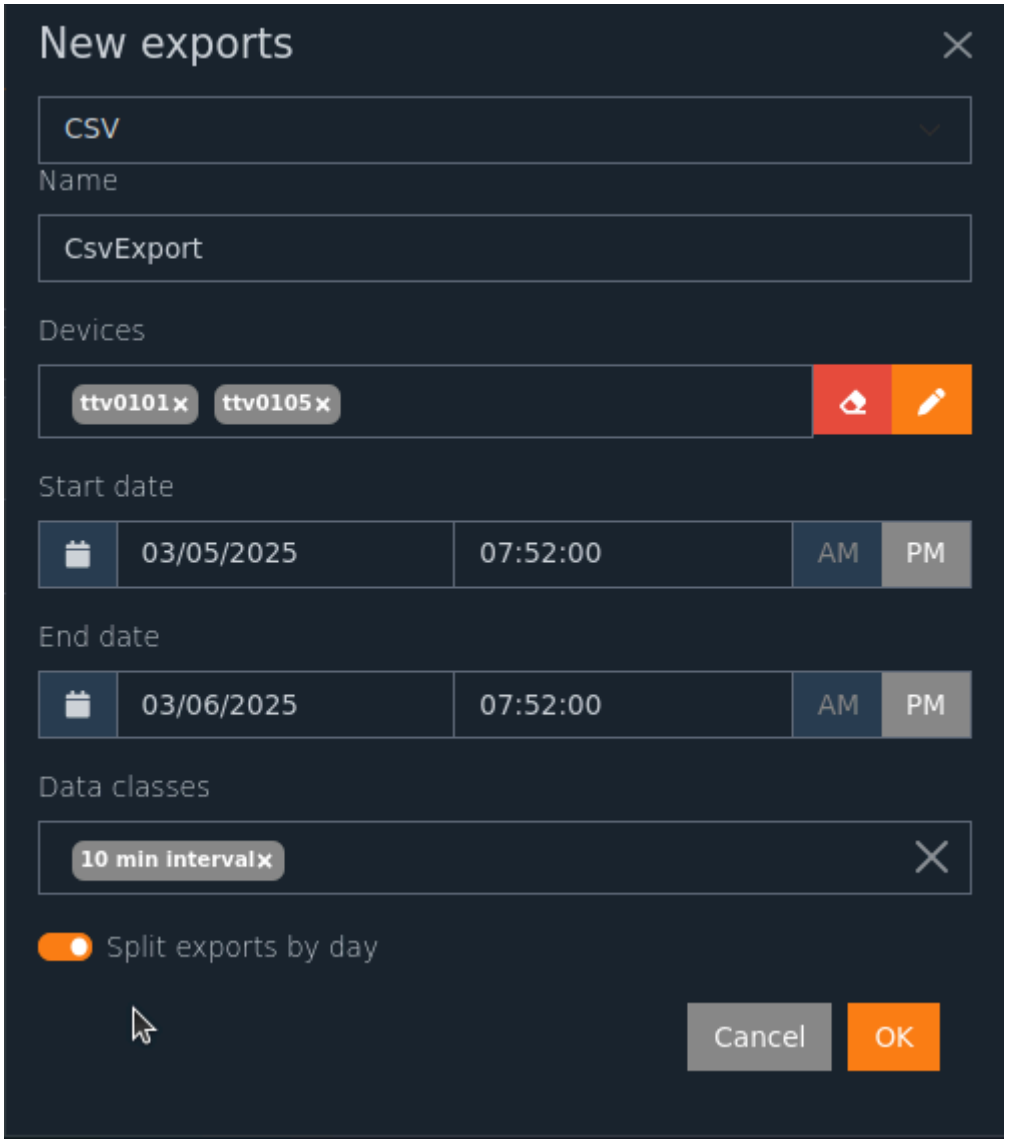
- Select the **measuring devices** for which the export should be created.

6.13.2.5. Step 5: Define Time Period

- Set the desired **export time period**.

6.13.2.6. Step 6: Determine Data Classes

- Select the relevant **data classes** for the export.



6.13.3. Export Process and Management

After all settings have been made, the export is started on the server by **confirming with "OK"**.

6.13.3.1. Export Overview and Download

- The status of all exports is displayed in a table.
- Historical exports are also available in the overview.
- After the export is completed, the data can be downloaded via the **download button**.

6.13.3.2. Note on Server Configuration

- The storage of exports is configured on the server-side.
- It is recommended to choose a **directory with sufficient storage space**.
- Regular **backups of export data** are recommended to avoid data loss.

6.14. Reports and Printing

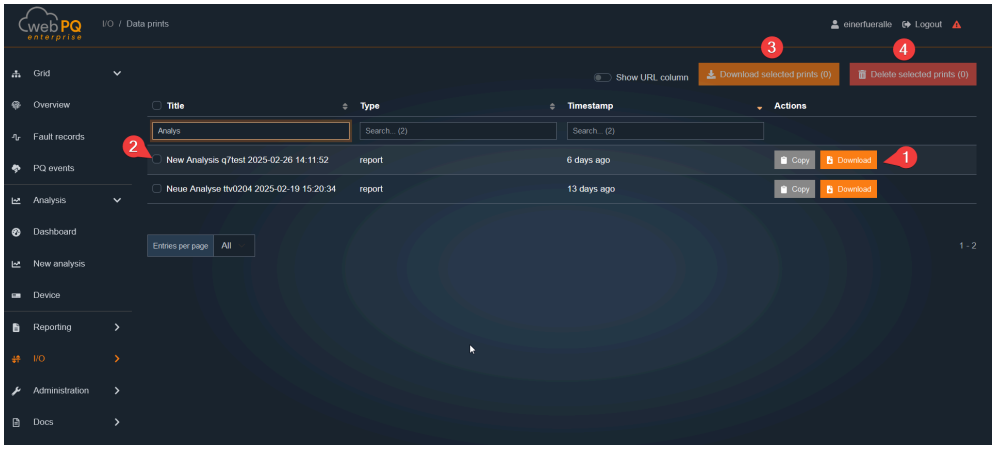
All reports generated by users as PDFs can be found in the **"Import / Export >> Print"** section. Here you can view, download, and manage the reports.

Reports generated through the following functions can be found there:

- Manual creation of a report from the analysis cockpit
- Automatic creation of reports from automation tasks

The PDF files are stored on the server in the directory specified in the WebPQ backend. On the client, the reports are displayed in a table containing the following information:

Title	Type	Time	Actions
Name of the report	Type of report (e.g., automation task)	Time of report creation	Download the report



By downloading the report #1, the user has the option to download the PDF from the server and save it locally.

With #2, the user can select multiple reports. Via #3, the user can either download multiple reports in parallel or delete multiple reports via #4.

6.15. Synchronization Status

Measuring devices that are continuously read out automatically by the database software are displayed in the **"Import / Export"** section under **"Device Synchronization"**.

The exact status of the synchronization is shown there.

The page displays the following information, which can be expanded with details for a measuring device by clicking on #1. Additionally, a hierarchical view can be selected via #2. The table itself contains the following information:

Device Name	Regular Synchronization	Active	Current Error Status
Name of the device, including tag display	Indicates whether the device has been enabled for regular synchronization in the settings	Shows the current status	Displays the current error status

6.15.1. Details of the Synchronization Status

6.15.1.1. Device Synchronization

Device synchronization displays the download status from the device to the server. In addition to the current synchronization status, such as **"Inactive"**, the following information is also shown:

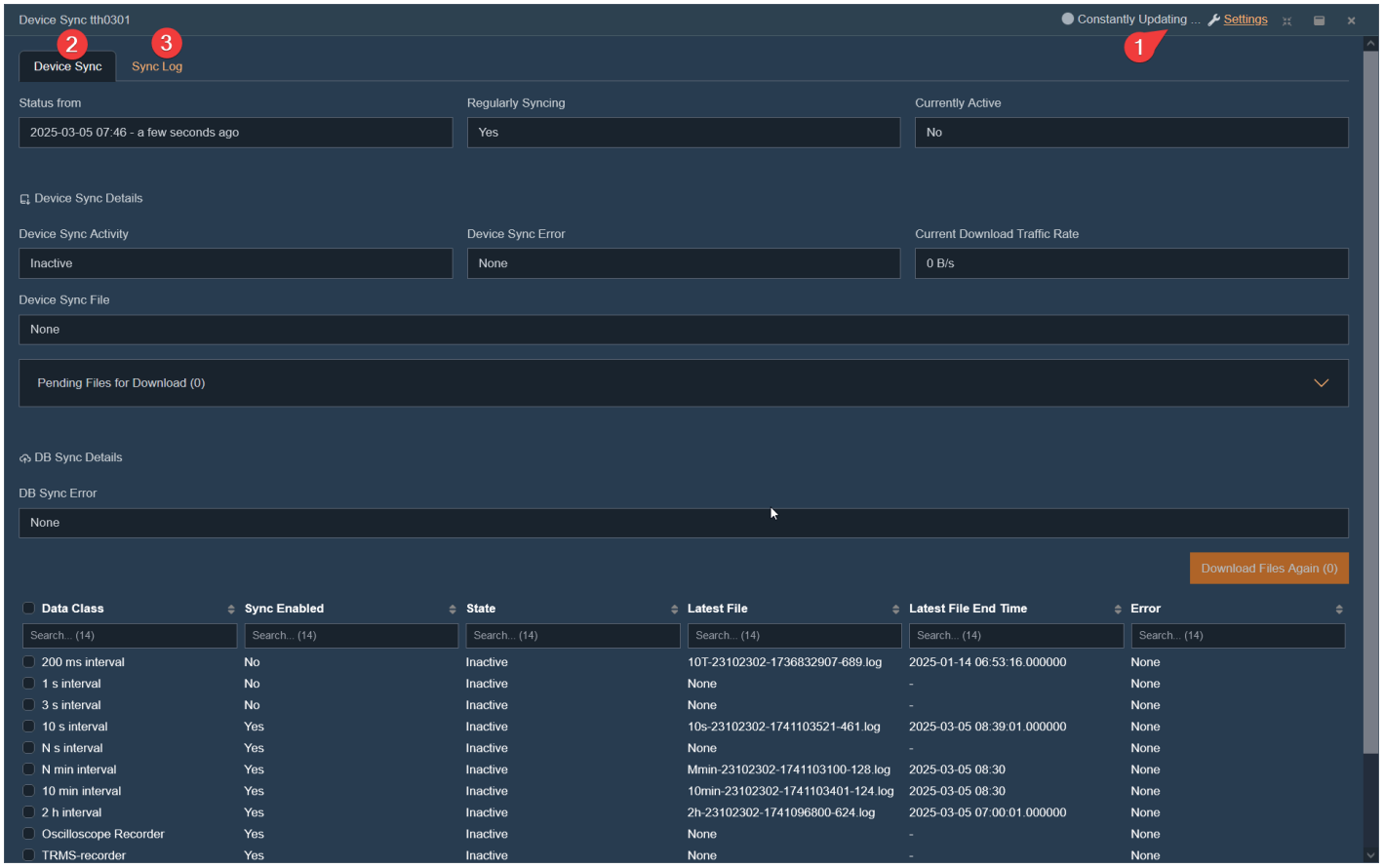
- The **last transmission rate**
- The **current file** being downloaded
- All **pending files to be downloaded**

If, for example, there is a connection issue with the measuring device, this error will be displayed under **"Device Synchronization Error"**.

6.15.1.2. Database Synchronization

Database synchronization shows the upload status from the WebPQ instance to the database. Here, the individual **data classes** are listed, along with the **files** that were last uploaded to the database. The section **"End timestamp for the most recent file"** displays the timestamp recorded as the last measurement point in the most recently uploaded file.

Additionally, users have the option to selectively check data classes to see which data was last uploaded to the database.



If the user wants to change the settings for a measuring point, he can directly switch to the configuration of the measuring point by clicking on **Settings #1**. Additionally, **#3** allows for expanded **logging** to obtain more information. This function is sometimes used in the support area upon request.

6.16. Administration

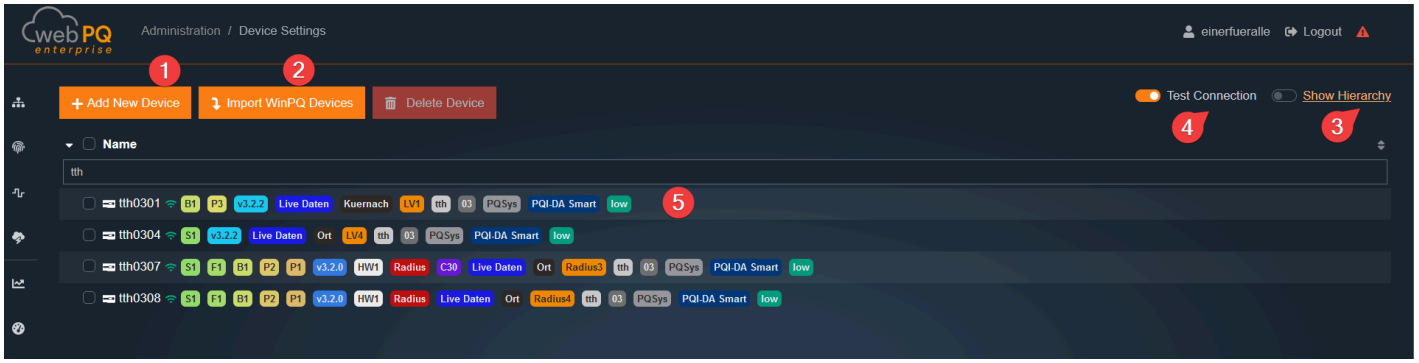
6.16.1. Devices

6.16.1.1. Overview and General Information

Through the **Device Management**, devices can be **viewed, added, managed, and deleted**.

The interface is divided into three sections:

1. **Add and delete devices**
2. **Tabular and hierarchical representation of all existing devices**
3. **Detailed device view**, which is displayed after clicking on a device under `#5`



- **"+ Add new device" `#1`** –
  Creates a new device through a guided wizard.
- **"+ Import from WinPQ" `#2`** –
  Imports **PQI-DA smart, PQI-LV, and PQI-DE** from **WinPQ** into **WebPQ** through a wizard.
- **"Delete device"** –
  Deletes one or more selected devices through a **background job**.
  All measurement data, parameters, and settings are removed from the database.

All functions require the permission **"Create and delete devices"**,
which is configured in the **rights management at the user group level**.

Additional Functions

- **Test connection `#4`** –
  Continuously checks the active connection of all devices.
  - If a connection is present, a **symbol** appears under `#5` directly on the device.
- **Show hierarchy `#5`** –
  - Displays the devices in the **hierarchical structure** of the default settings.
  - The user can **customize categories** individually through **drag & drop**.
  - Changes remain saved for the **duration of the login**.

Operation with WinPQ in parallel mode

When the WebPQ software is operated together with the WinPQ software, the following measuring devices are automatically transferred from WinPQ to WebPQ after installation. An automated synchronization occurs in the background every 60 seconds. These devices are then added to the user group `root_default_users`, `root_default_operators`, `root_default_administrators`, and the root tenant.

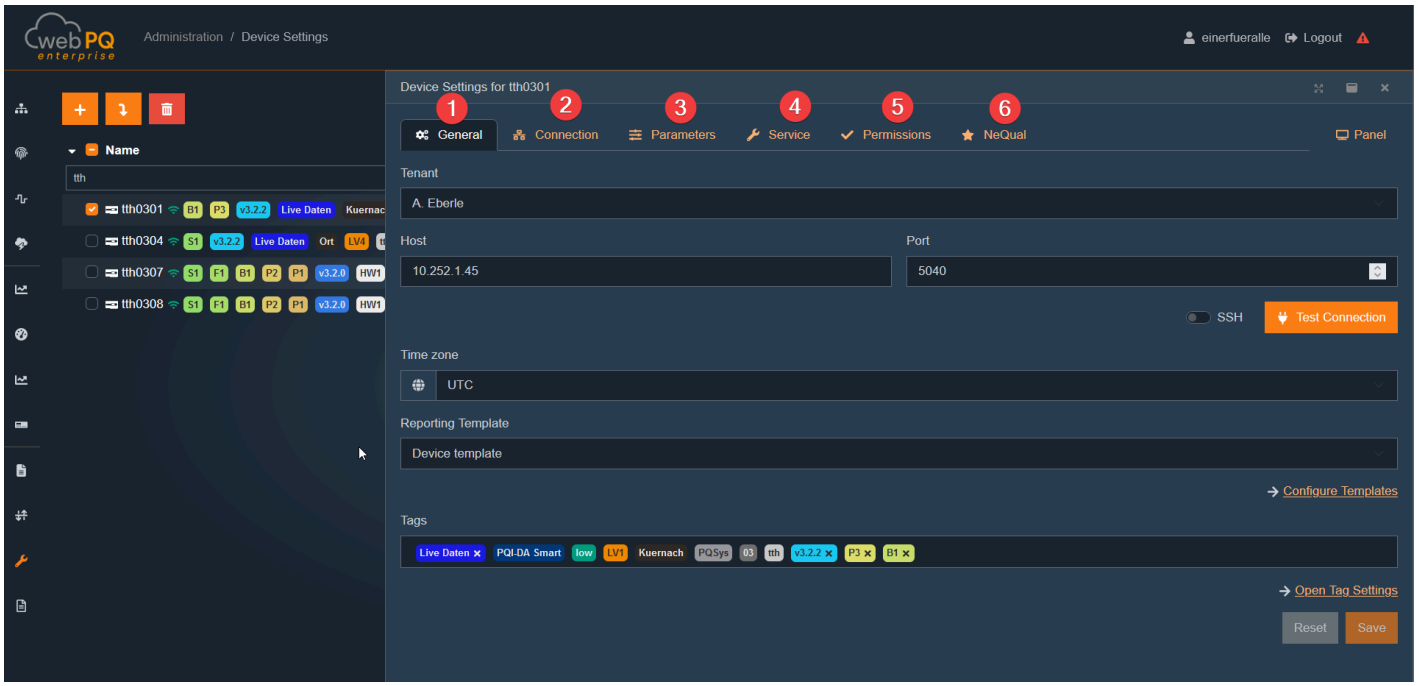
- PQI-DA
- PQI-D UU (Voltage / Voltage)
- PQI-D UI (Voltage / Current)
- PQ-Boxes

For these measuring devices, WebPQ serves as a pure visualization solution based on the measurement data read out and stored in WinPQ via the PQ Manager process.

For the device generations **PQI-LV**, **PQI-DA smart**, and **PQI-DE**, which are used in parallel operation with WinPQ, the process of transferring the communication layer from WinPQ to WebPQ is partially automated. This can be done via the button `+Import from WinPQ`.

6.16.1.2. Detail Window

When the detail window is opened by clicking on one or more selected devices in the selection field, the detailed settings of the devices appear.



General #1
In the **General** section, the most important parameters such as IP address, device time zone, and the assignment of tags and standard templates to the measuring point can be configured.

Connection #2
In the **Connection** section, in addition to the IP address, the settings for the automatic data class readout process can be managed and their activation and deactivation controlled.
When multiple devices are selected in parallel via the device tree, the tabular and searchable representation allows for quick parameterization and comparison of many devices.

Parameter #3
In the **Parameter** section, the measuring device parameters can be individually adjusted. This allows the measuring devices to be centrally parameterized directly via the web interface.
All parameters are historized in the database. Various parameter editors allow the application of parameter templates to devices, editing of individual parameters, and importing and exporting parameters – either directly to the measuring device or to the local file system.

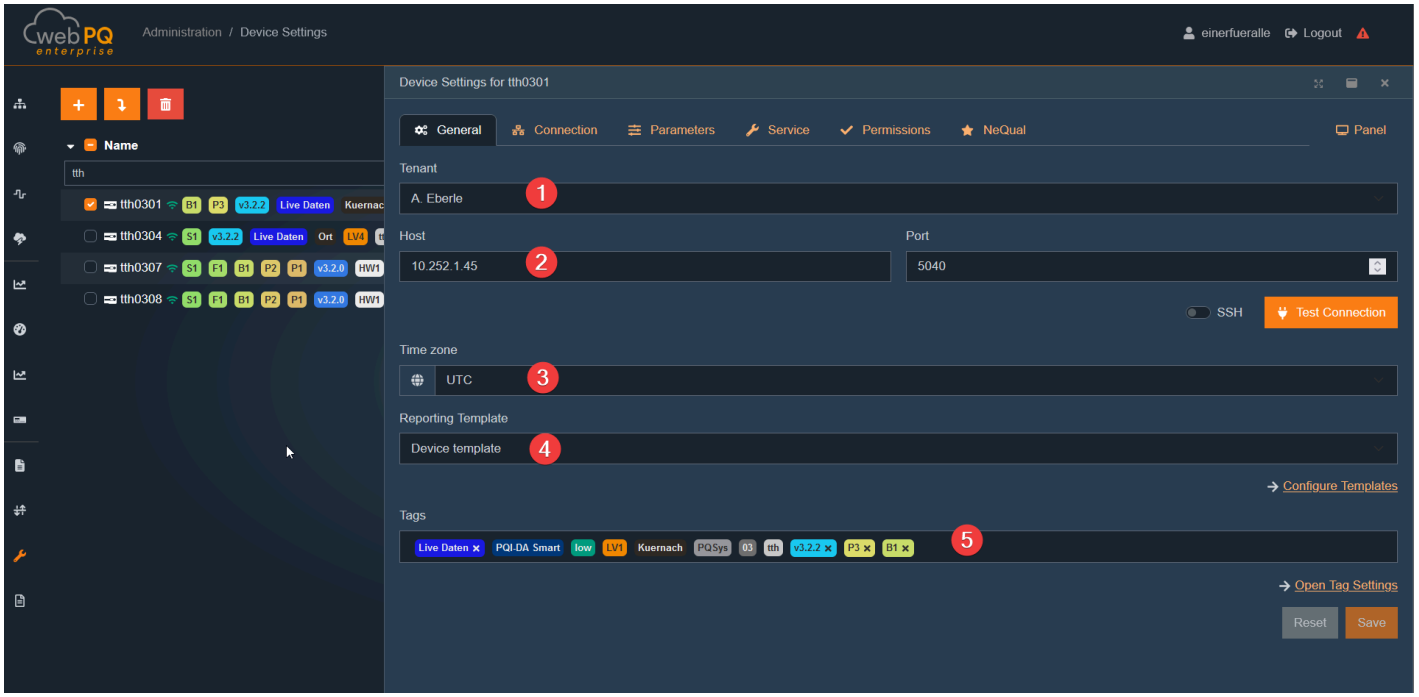
Service #4
In the **Service** section, all functions necessary for device service are summarized. These include, among others:

- Reading device log files and audit log files
- Firmware updates for the devices

Rights #5
In the **Rights** section, the effective permissions of users for the respective devices can be viewed via rights management and group policies.

NeQual #6
If licensed, the **NeQual** section allows the configuration of settings for the NEQUAL export once per measuring point.

6.16.1.3. Device / General

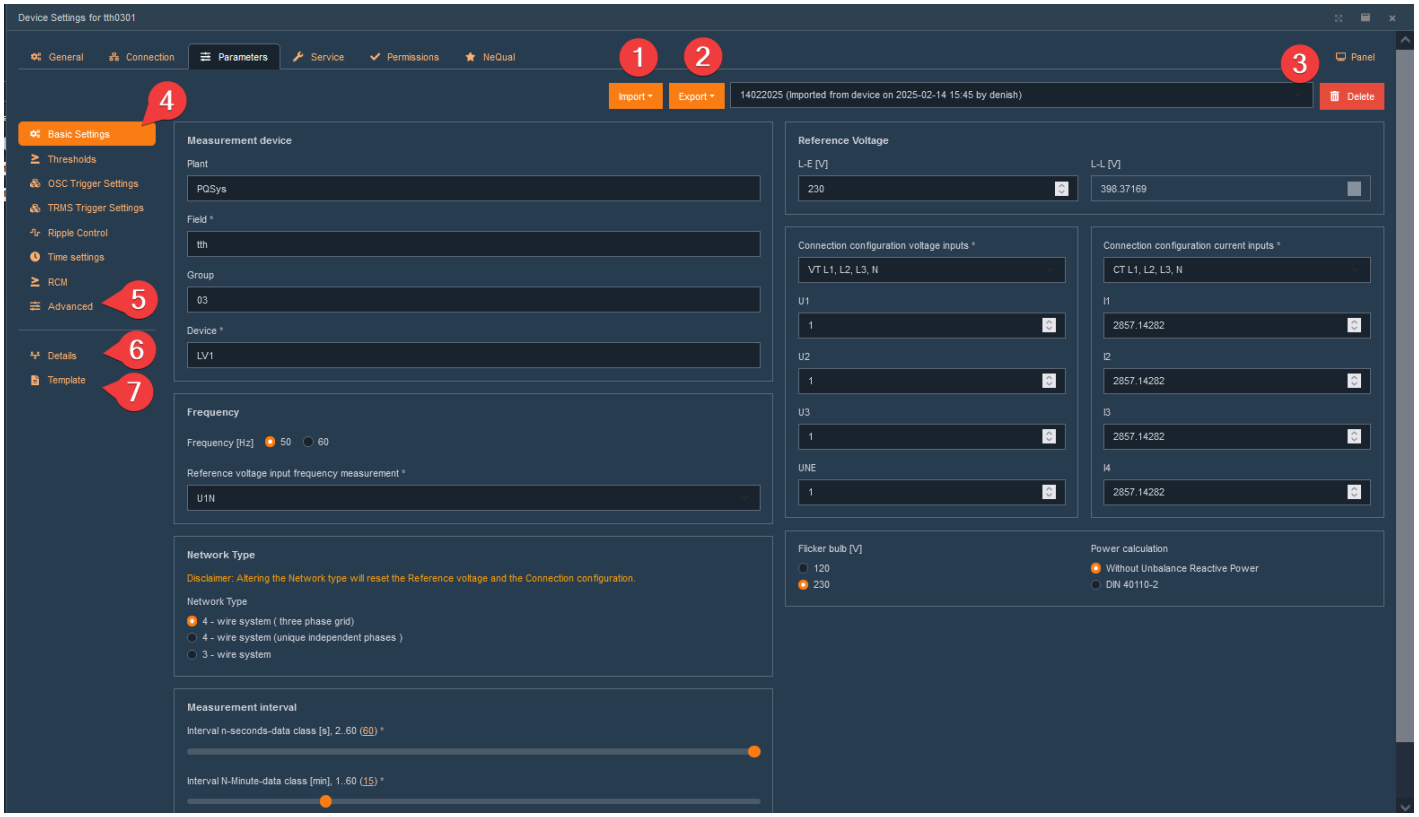


- **#1 Tenant** – Each device can be assigned to its own tenant.
- **#2 Host and Port** – Each device requires an IP address and a port that must be accessible from the WebPQ server.
  - For the devices *PQI-DA smart*, *PQI-DE*, and *PQI-LV*, port **5040** is to be used.
  - If the devices are connected via **SSH** (encrypted), port **22** is to be used.
  - The communication from the server to the device can be tested via *Test connection*.
  - If the test is successful, the button changes from **orange** to **green**.
- **#3 Time Zone** – Each device can be assigned a time zone in the software.
  - All measuring devices deliver the measurement data in **UTC** to the database.
  - Therefore, the respective measuring point must be equipped with the locally valid time zone.
  - This parameter affects all reports and analyses in the system.
- **#4 Standard Templates** – By default, the settings of the measuring device itself are used for the calculation of statistical standard limit values.
  - The standard template is loaded into the database after the first contact with the measuring device.
  - However, the user can also **apply other standard templates to the measuring point**.
  - These standard templates are managed in the *Standard Templates* section and can be accessed via the link.
- **#5 Tags** – After the first reading of the measurement data, each device is automatically equipped with so-called **tags**.
  - Tags are the basis for **labeling and hierarchical representation** in all selection dialogs and tables.
  - Clicking on the area displays **all existing tags** of the tenant.
  - Clicking on a tag assigns it to the device.
  - The *Open tag settings* button leads to the area where **tags and categories can be added**.

6.16.1.4. Device / Connection

- **#1 Multiple Selection** – The user can select multiple devices in parallel.
  - This is particularly advantageous when comparing settings between devices or aligning general device settings.
- **#2 Offline** – Measuring devices that are operated without direct TCP/IP communication (e.g., through manual file imports via SD cards) must be configured as **offline devices**.
  - Offline devices are automatically hidden from the **live displays of measurement values**.
- **#3 Active** – Devices that are to be automatically read out by the system with the set **data classes** must be set as **active** here.
  - If a device is taken out of service and should no longer be read out, the flag can be **deactivated**.
- **#4 Host & Port & SSH** – Specification of the **IP address** and **port** used for communication between the server and the measuring device.
  - Standard ports for the devices **PQI-LV, PQI-DA smart, and PQI-DE**:
    - **Port 5040** for communication via CCCI (default).
    - **Port 22** for encrypted communication via SSH (with user rights management).
    - For SSH connections, the **SSH** option must also be activated in the corresponding column.
- **#5 Data Classes** – Here, the **data classes** are defined that are to be automatically retrieved from the measuring device and stored in the database.
  - **Important:** On the measuring devices themselves, the desired measurement variables in the respective data classes must be activated in the **recording parameters**.
  - For **slave devices** connected to measuring devices via the **P3 feature**, the **mbMaster** must always be activated.

6.16.1.5. Device / Parameter



- **#1 Import** – The import function allows parameter files to be loaded either directly from the device or from the local file system as *XML* or * *.aepq file*.
  - **Read from device**:
    - Establishes a connection to the device and saves the parameterization in the database.
    - If the device has **URM with RBAC** (user management), credentials are required.
  - **Open from file**:
    - The user can select an **XML file** or other supported file formats.
    - If the parameter set contains references to additional files (e.g., certificates for WireGuard or the web server), the user is prompted to add them.
    - A **parameter set** typically consists of the following components:
      - **General parameters** (XML parameter file, depending on the measuring device).
      - **External parameters**, e.g.:
      - IEC61850 ICD file
      - Certificates for the web server
      - Certificates for the WireGuard connection

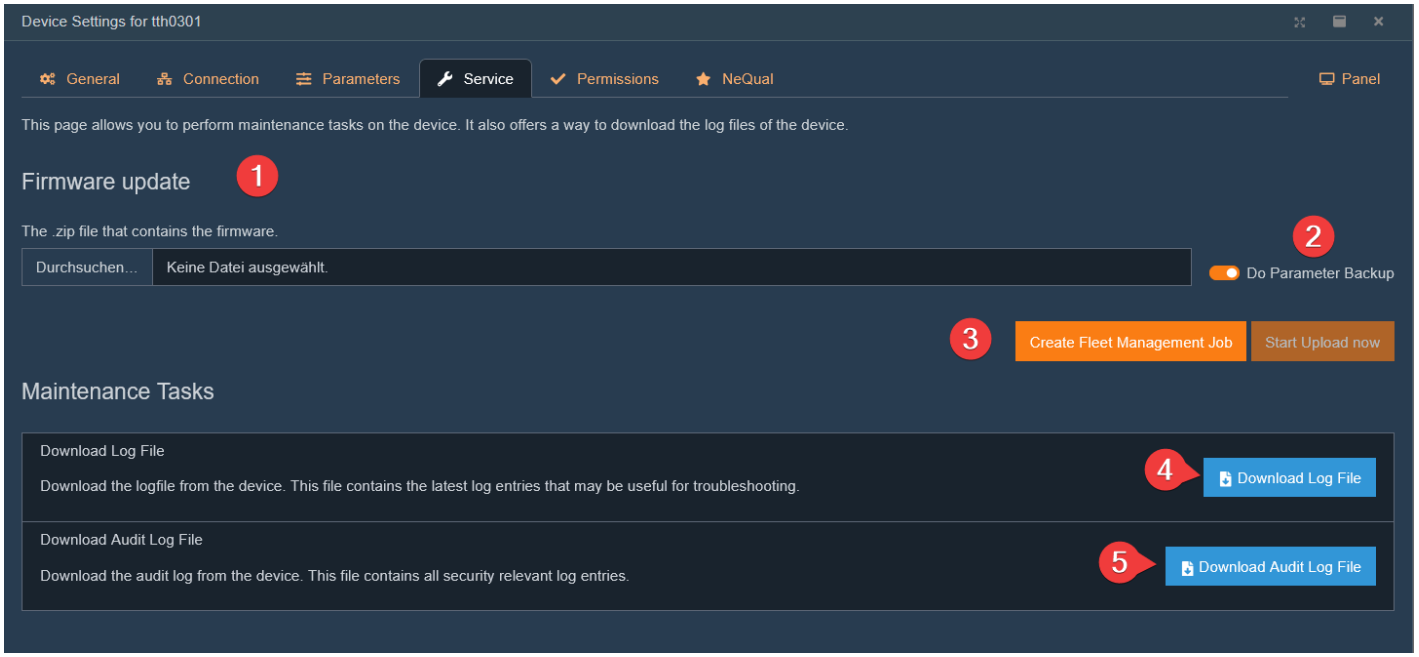
- **#2 Export** – The export function allows parameter files to be sent either to the measuring device or saved in standard formats on the client.
  - **"Send to device"**:
    - The selected parameter template is transferred to the device.
    - Before sending, the current device configuration is loaded to display the **differences between the old and new template**. This ensures that only desired changes are transferred.
  - **"Send to fleet"***(license required)*:
    - Forwards the parameter template to **fleet management**.
    - Opens the dialog for sending to multiple devices.
  - **"Save file"**:
    - Saves the file as a **.aepq file** on the local file system.
  - **"Export as CSV file"**:
    - Creates a CSV file from the parameters.

- **#3 Parameter Historization** – Here, the user can **historically view and compare** imported parameter files.
    - The history includes both **imports from files** and **imports directly from the measuring device**.
    - Each import is logged with **time** and **user** who loaded the file into the database.
    - Each parameter file can also be **historized** manually.
    - Changes to the parameters and their historization are displayed under **#6**.

- **#4 Device Parameter View – simplified** –
  The simplified view of the parameterization offers a **fixed structure** with predefined masks for the most important settings.
  The individual settings can be set directly via the input masks and are divided into the following areas:
    - **Basic settings** – Name and transformer settings of the measuring device
    - **Limit values** – Used for PQ standard evaluation
    - **OSC and TRMS trigger settings** – Settings for limit values and duration of the disturbance recorder
    - **Time settings** – Configuration of time synchronization, e.g., via a central NTP server
    - **Differential current** – Settings for differential current measurement on the PQI-DE device

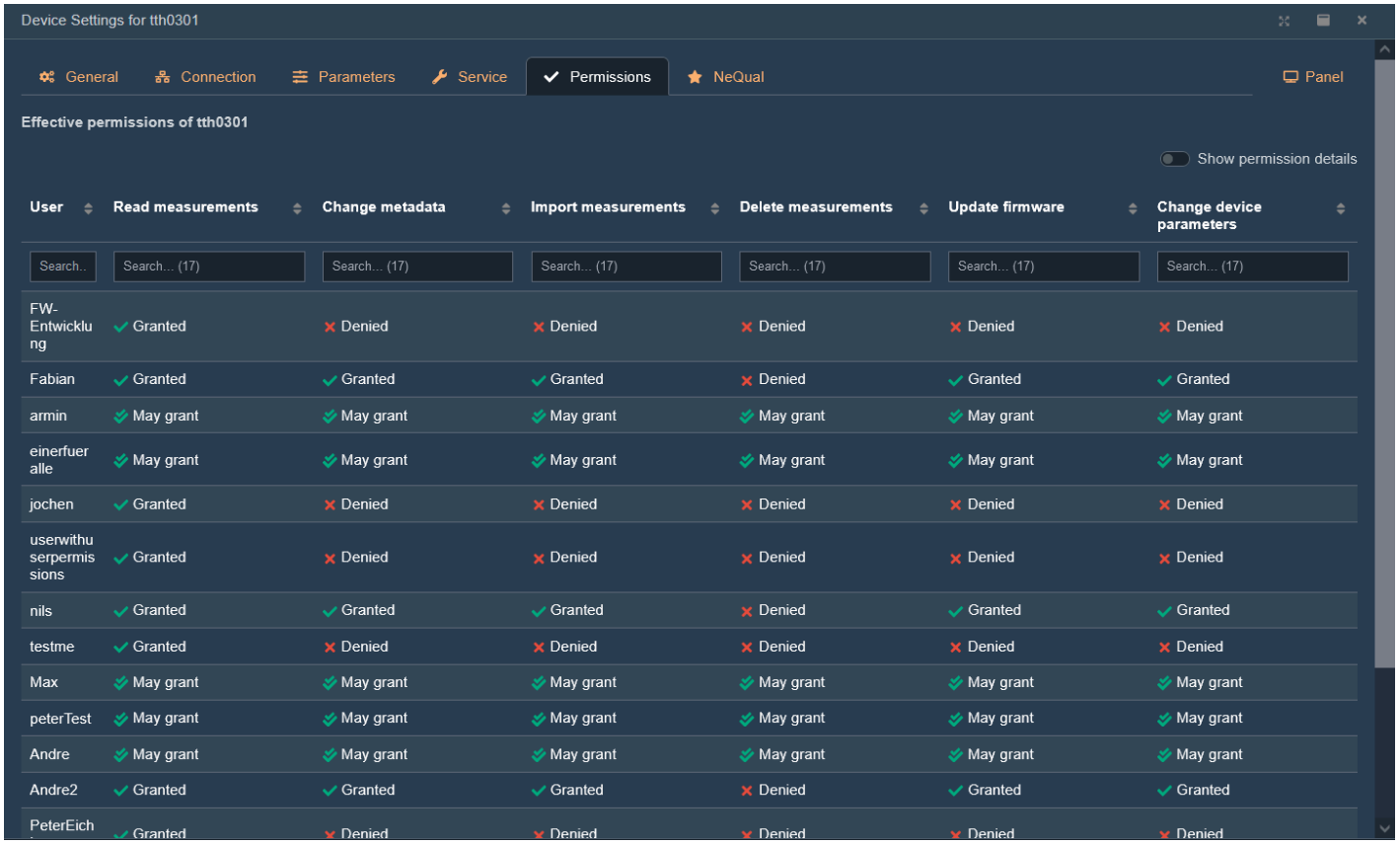
  Note:
  Detailed information on device settings can be found in the respective **user manuals** of the measuring devices.

6.16.1.6. Device / Service



- **#1 Firmware Update** – This function allows the **firmware of the measuring devices to be updated centrally from the server**.
  - Both the **measuring devices** and **WebPQ** require the corresponding **right** for the firmware update.
  - Before the update, the current **parameterization of the device** can be backed up under **#2**.
  - With an existing **Fleet Management license** (*#3*), multiple measuring devices can be **updated in parallel**.
- **#4 Load Debug Log** –
  - Downloads the **debug log** from the device.
  - Contains the latest log entries useful for **troubleshooting and support cases**.
- **#5 Load Audit Log** –
  - Downloads the **audit log** from the device.
  - Contains all security-relevant log entries.

6.16.1.7. Device / Rights



In this **tabular display**, **all users** with rights on the device are shown – including:

- **Assigned rights**
- **Permission details** (viewable via the button)

The **settings for user rights** on devices are made via:

- **User groups**
- **Tenant management**

6.16.1.8. Device / NeQual

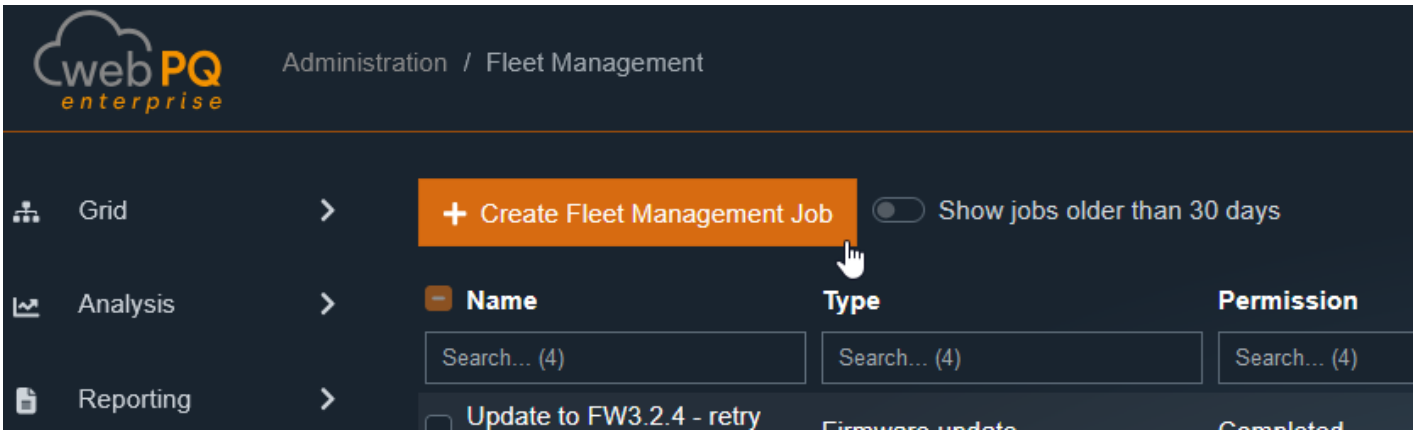
If a **NeQual license** is available, general settings for the **export** must be configured **per measuring point**.

- These settings are **persistently stored in the database** and used for each export (manual or automatic).
- **Mandatory fields** are marked with a `*` and **must be filled out**.

6.16.2. Fleet Management

With **Fleet Management**, many devices can be managed in parallel.
This requires at least **WebPQ Professional with the additional license "Fleet Management"** or **WebPQ Enterprise**, which includes this function by default.

This function significantly facilitates the management of many measuring devices and enables more efficient use of working time. Especially in the area of **patch management** and **security updates**, fleet management offers great advantages.



6.16.2.1. Access and Permissions

Fleet management can be found under **"Settings > Fleet Management"**.
The permission **"Device Management"** is required for use.

6.16.2.2. Functions of Fleet Management

Three central functions are available:

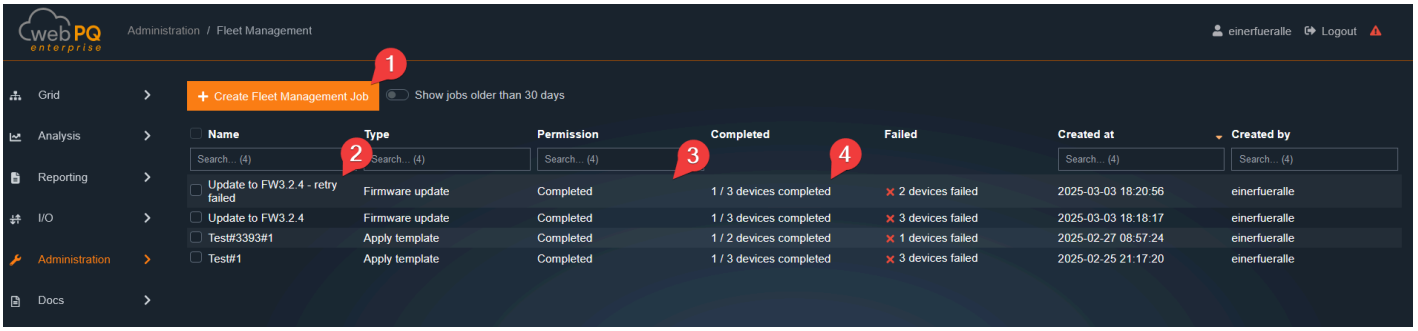
1. **Download the current parameter file**
2. **Transfer an existing power quality standard template to multiple devices**
3. **Firmware update for multiple devices simultaneously**
4. **Send individual parameters to many devices**

The user is guided through the first three functions by a **wizard** that facilitates all necessary steps.
At the end, the task is handed over to the server, which executes it in the **background** depending on the selected devices.

Logging out does not interrupt the job!

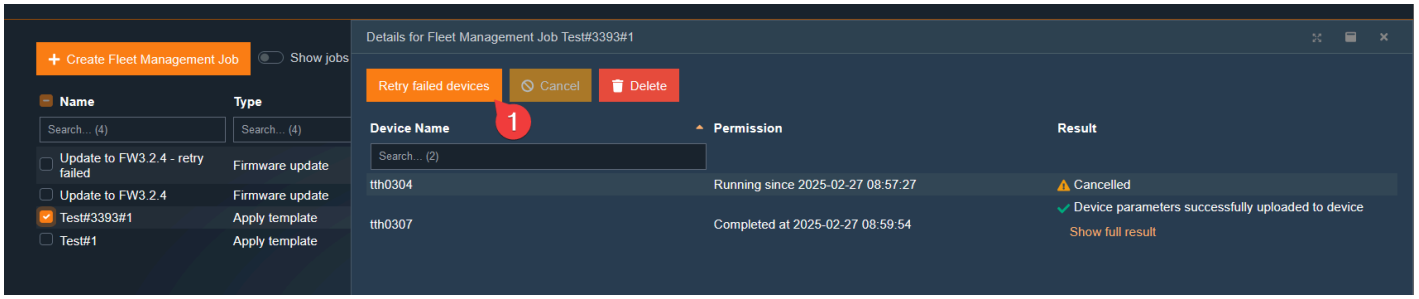
Each task receives a **unique name**, which is then displayed in a clear table with the respective status.

For the fourth option – **"Send individual parameters to many devices"** – access is via a device using the **export function**.
Detailed information can be found under Devices >> Parameterization.



6.16.2.3. Job Management and Error Handling

- By **clicking on a job**, the user can view detailed information about the respective task.
- If a task fails – e.g., due to unreachable devices, individual devices can be **specifically reprocessed**. This can be done by simply repeating the job under #1.


Create Fleet Management Job
Show jobs
Name
Type
Search... (4)
Search... (4)
Update to FW3.2.4 - retry failed
Firmware update
Update to FW3.2.4
Firmware update
Test#3393#1
Apply template
Test#1
Apply template
Details for Fleet Management Job Test#3393#1
Retry failed devices
Cancel
Delete
1
Device Name
Permission
Result
Search... (2)
tth0304
Running since 2025-02-27 08:57:27
Cancelled
tth0307
Completed at 2025-02-27 08:59:54
Device parameters successfully uploaded to device
Show full result

6.16.3. Access Concept with Users and Rights

Access is regulated by users, devices, tenants, device groups, and permissions. Users, devices, and device groups are "owned" by a tenant. Additionally, each user can have permissions for specific devices. They can only interact with objects that belong to their tenant and for which they have the necessary permissions.

Starting with WebPQ V2.1, the WebPQ application will also feature an **LDAP interface** that enables importing and synchronizing users and groups from an LDAP directory (e.g., Microsoft Active Directory). This allows you to centralize user management and enhance security. For more information, see the chapter LDAP Integration.

6.16.3.1. Permissions

Every data access to users, devices, or tenants requires a permission. For example, to read the measurements of a device, the user and the device must be granted the "Read Measurements" permission.

A permission can be valid for all objects within a tenant or only for a single device. To distinguish between these two types of permissions, we call them tenant permissions or device permissions.

Tenant Permissions

- **Change device metadata**:
  Allows changing the description or location of a device. Equivalent to granting the device permission *Change Metadata* for every device in your tenant.
- **Change user metadata**: Change the password or contact information of a user.
- **Create and delete devices**
- **Create and delete sub-tenants**
- **Create and delete users**
- **Migrate users and devices**:
  Changes the owner tenant of a user or device to another sub-tenant of yours.
- **Change permissions on any tenant device**:
  This permission is different from all other permissions a user can have. When granted, the user can grant any device permission of any device in their tenant to any user in their tenant, including themselves.
- **Manage tasks**
- **Grant license management permissions**
- **Grant tenant management permissions**
- **Migrate users and devices**

Device Permissions

- **Read measurements**:
  The most important permission on WebPQ. It is required to perform an analysis of device measurement data.
- **Change metadata**:
  Like the tenant permission *Change device metadata*. Allows changing the description or location of a specific device.
- **Publish measurements**:
  This permission currently has no effect. It will be used in the future to allow services to publish measurement data.
- **Delete measurements**:
  This permission currently has no effect. It will be used in the future to allow the deletion of past measurement data points.
- **Update firmware**:
  This permission is necessary if a user or user group needs to update the firmware on the devices.
- **Parameterize devices**:
  This permission is necessary if a user or user group needs to set parameters on the devices.

Permission States

Sometimes it is not enough to just grant a permission. If you want to grant a permission to your colleague, you must also be authorized to grant this permission to someone else. In this case, the permission must be in the state "can grant" or "fully granted".

The four states in which a user's permission can be are as follows:

- **Denied**:
  The permission is not granted to the user, and they are not allowed to grant it to any other user (including themselves).
- **Granted**:
  The permission is granted to the user. However, they are not allowed to grant it to other users.
- **Can grant**:
  The permission is not granted to the user, but they can change the status of the permission for all users in their tenant, including themselves!
- **Fully granted**:
  The combination of Granted and Can Grant. The permission is granted to the user, and they are also allowed to change the permission status of all users in their tenant.

Device Permissions are Granted in a Three-Tier Model:

- A user can have the permission *Change permissions on any tenant device* in their tenant permission set. This permission allows editing any other permission of any device in the tenant and its sub-tenants.
- A user can be listed in a user group, and this group grants permissions for specific devices.
- A user can have direct permissions for devices.

All permissions are **positive**. This means that if a user is granted a permission on a device by a user group or directly, this permission cannot be revoked by another user group.

6.16.3.2. User Management

6.16.3.2.1. Adding a User

This function requires the "Create Users" permission.

- Go to **Users**. Press "New User" (**#1**) to create a new user. A dialog will appear asking for details.
- Enter an alphanumeric username and assign a password to the user.
- First name, last name, and email must also be entered correctly.
- Select a tenant in the tenant selection.
- Select one or more devices that the user is allowed to see (optional).
- Press "OK" to create the user.

6.16.3.2.2. Changing User Properties

This function requires the "Change User Metadata" permission.

- Go to **Users**. Select the user and edit the desired fields. Press "Update".

6.16.3.2.3. Deleting a User

This function requires the "Create and Delete Users" permission.

- Go to **Users**. Select the user.
- Click on "Delete User" in the upper left corner.

6.16.3.3. User Groups

User groups are used for easy administration of many devices. The WebPQ software has three standard user groups:

- **root_default_users**
- **root_default_operators**
- **root_default_administrators**

6.16.3.3.1. Setting Up a User Group

To use this function, you need the permission to change permissions on any tenant device in your tenant.

- Go to **User Group**.
- Click on "New User Group" (**#1**).
- Enter a name, add users and devices (**#2** and **#3**).
- Select a tenant.
- Adjust the permissions for the devices of the user group and click "Update" (**#4**).
- Press "Update" (**#5**).

6.16.3.4. Tenants

License Required

Tenants are used to isolate resources (users, devices) through administrative rights and data storage. The global settings for tenant management are also defined in the tenant settings. These settings are:

- Password policies for the tenant and sub-tenants
- Email settings for the tenant and sub-tenants
- Report settings for the tenant and sub-tenants

6.16.3.4.1. Creating a New Tenant

This function requires the permission to create and delete sub-tenants.

- Go to **Tenants**. Press "New Tenant" **#1** to create a new tenant.
- Enter the parent name.
- Select your own tenant as the parent tenant.
- Press "OK" to complete the creation of the tenant.

6.16.3.4.2. Deleting a Tenant

This function requires the permission to create and delete sub-tenants.

- Go to **Tenants**. Select a tenant.
- Click on "Delete Tenant" in the lower left corner (**#7**) and confirm the process.

Only tenants without assigned users and devices can be deleted.

6.16.3.4.3. Password Policies

This function requires the permission to change tenant settings.

- Go to **Tenants**. Select a tenant.
- Click on **Password Policies**.
- Enter the desired password policies.
- Click on **Update Tenant**.

Note on Default Password Policies

If the password policies for a tenant are deactivated, the default password policies will automatically apply.
These default values are configured as follows:

- Minimum password length: 20 characters
- At least 6 lowercase letters
- At least 5 uppercase letters
- At least 4 special characters
- At least 3 digits
- No minimum interval for password changes
- Maximum password validity: 3650 days

6.16.3.4.4. Email Settings

This function requires the permission to change tenant settings.

- Go to **Tenants**. Select a tenant.
- Click on **Email Settings**.
- Enter the SMTP server data.
- Select the port and encryption method.
- Enter the login credentials.
- Click on **Update Tenant**.

Using the **Test Email** function, you can send a test email to the specified address.

6.16.3.4.5. Report Settings

This function requires the permission to change tenant settings.

Here, the logos for the reports are globally defined for the tenant.

- Go to **Tenants**. Select a tenant.
- Click on **Report Settings**.
- Choose whether the report should inherit the settings from the parent tenant or use a different logo.
- If you want to use a different logo, you can upload it via "Browse".

6.16.4. LDAP Integration

Note: This feature is available in the Enterprise Edition starting from WebP V2.1.

LDAP integration allows you to import and synchronize users and groups from an LDAP directory (e.g., Microsoft Active Directory). This enables centralized user management and simplifies user administration.

6.16.4.1. How LDAP Integration Works

After enabling LDAP integration, users can log in to WebPQ directly using their LDAP credentials (username and password). Authentication is performed via the connected LDAP server. On first login, users are automatically assigned to the WebPQ group **root_default_users**.

Each LDAP user is counted as a separate unit and is included in the license calculation—licensing for LDAP users is identical to regular users.

Note: Automatic synchronization of LDAP groups is currently not supported. All LDAP users are added exclusively to the **root_default_users** group. Permissions for LDAP users must be assigned manually via groups in the WebPQ application, as the LDAP server cannot manage application-specific permissions.

6.16.4.2. LDAP Configuration

Basic Settings LDAP integration is configured in the WebPQ backend under **Settings > LDAP**. The following settings are available:

- **Enable LDAP**: Activate this option to enable LDAP integration.
- **Host - LDAP Server**: Enter the address of your LDAP server (e.g., ldap.example.com).
- **Port**: Enter your LDAP server's port (default: 389 for unencrypted LDAP, 636 for LDAPS).
- **Use TLS**: Enable this option if your LDAP server uses SSL/TLS for the connection.
- **Ignore certificate errors**: Enable this option if you use self-signed certificates and want to ignore certificate errors.
- **Custom CA certificate (optional)**: Add a custom CA certificate here if your LDAP server uses a certificate not issued by a widely recognized certificate authority.
- **Connect Timeout**: Specify the connection timeout in seconds (default: 10 seconds).
- **Close Client after**: Specify the time in seconds after which the LDAP connection will be closed if no longer needed (default: 300 seconds).

LDAP Search Settings:

- **Bind DN**: Enter the Distinguished Name (DN) of the user used to bind to the LDAP server (e.g., cn=admin,dc=example,dc=com).
- **Password**: Enter the password for the bind user. Leave blank for anonymous binding.
- **Base DN**: Enter the base DN from which the search for users and groups starts (e.g., dc=example,dc=com).
- **Search filter**: Define an LDAP filter to find users, e.g., ((&(objectClass=user)(sAMAccountName={{username}}))).

Note: Some LDAP servers have case-sensitive attribute names. For example, cn and CN may be treated differently. Make sure to write the attributes exactly as they are stored on the LDAP server.

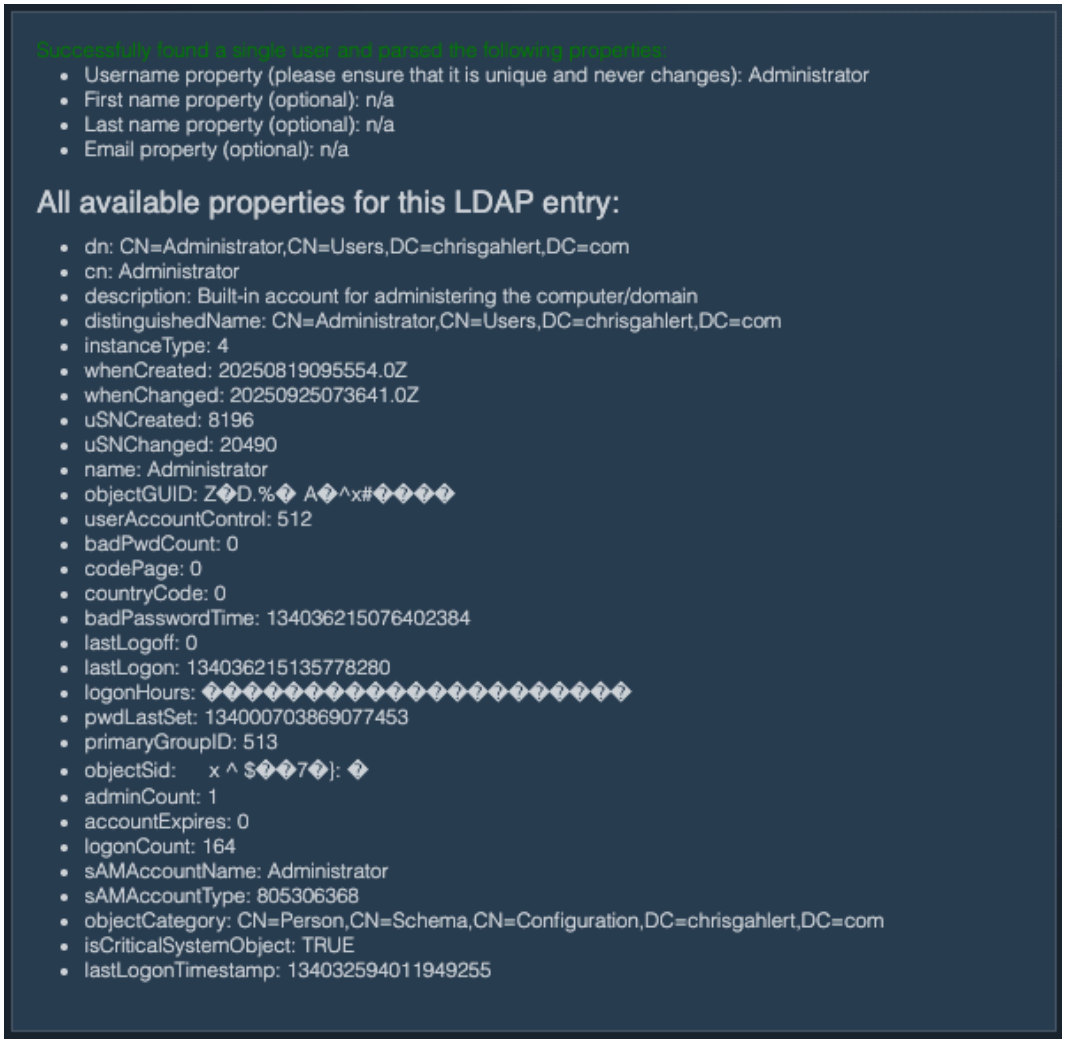
User Properties Mapping: Use the test function below to view all available LDAP properties from your LDAP server.

- **Username Attribute**: Enter the LDAP attribute containing the username (default: uid). **Note**: "sAMAccountName" is recommended for Microsoft Active Directory.
- **First Name Attribute**: Enter the LDAP attribute containing the first name (default: givenName).
- **Last Name Attribute**: Enter the LDAP attribute containing the last name (default: sn).
- **Email Attribute**: Enter the LDAP attribute containing the email address (default: mail).

With **Test Connection**, you can test the connection to the LDAP server and verify if the configuration is correct. With **Save**, the settings are applied.

Test Username (testing only): Enter a username to test the LDAP search.

Test Result: Displays the results of the LDAP search for all parameters. If the user is found, the mapped attributes are shown.


Successfully found a single user and parsed the following properties:
Username property (please ensure that it is unique and never changes): Administrator
First name property (optional): n/a
Last name property (optional): n/a
Email property (optional): n/a
All available properties for this LDAP entry:
dn: CN=Administrator,CN=Users,DC=chrisgahlert,DC=com
cn: Administrator
description: Built-in account for administering the computer/domain
distinguishedName: CN=Administrator,CN=Users,DC=chrisgahlert,DC=com
instanceType: 4
whenCreated: 20250819095554.0Z
whenChanged: 20250925073641.0Z
uSNCreated: 8196
uSNChanged: 20490
name: Administrator
objectGUID: Z�D.%� A�^x#����
userAccountControl: 512
badPwdCount: 0
codePage: 0
countryCode: 0
badPasswordTime: 134036215076402384
lastLogoff: 0
lastLogon: 134036215135778280
logonHours: ��������������������������
pwdLastSet: 134000703869077453
primaryGroupID: 513
objectSid: x ^ $��7�]: �
adminCount: 1
accountExpires: 0
logonCount: 164
sAMAccountName: Administrator
sAMAccountType: 805306368
objectCategory: CN=Person,CN=Schema,CN=Configuration,DC=chrisgahlert,DC=com
isCriticalSystemObject: TRUE
lastLogonTimestamp: 134032594011949255

6.16.5. Device Tagging

6.16.5.1. Tagging Concept in WebPQ

To provide users with a flexible way to organize and classify devices, the WebPQ software features a universal tagging system.

The concept includes the following core components:

- **Categories**: These are divided into **free categories** and **system categories**.
- **Tags**: Tags consist of **system tags** and **free tags**.

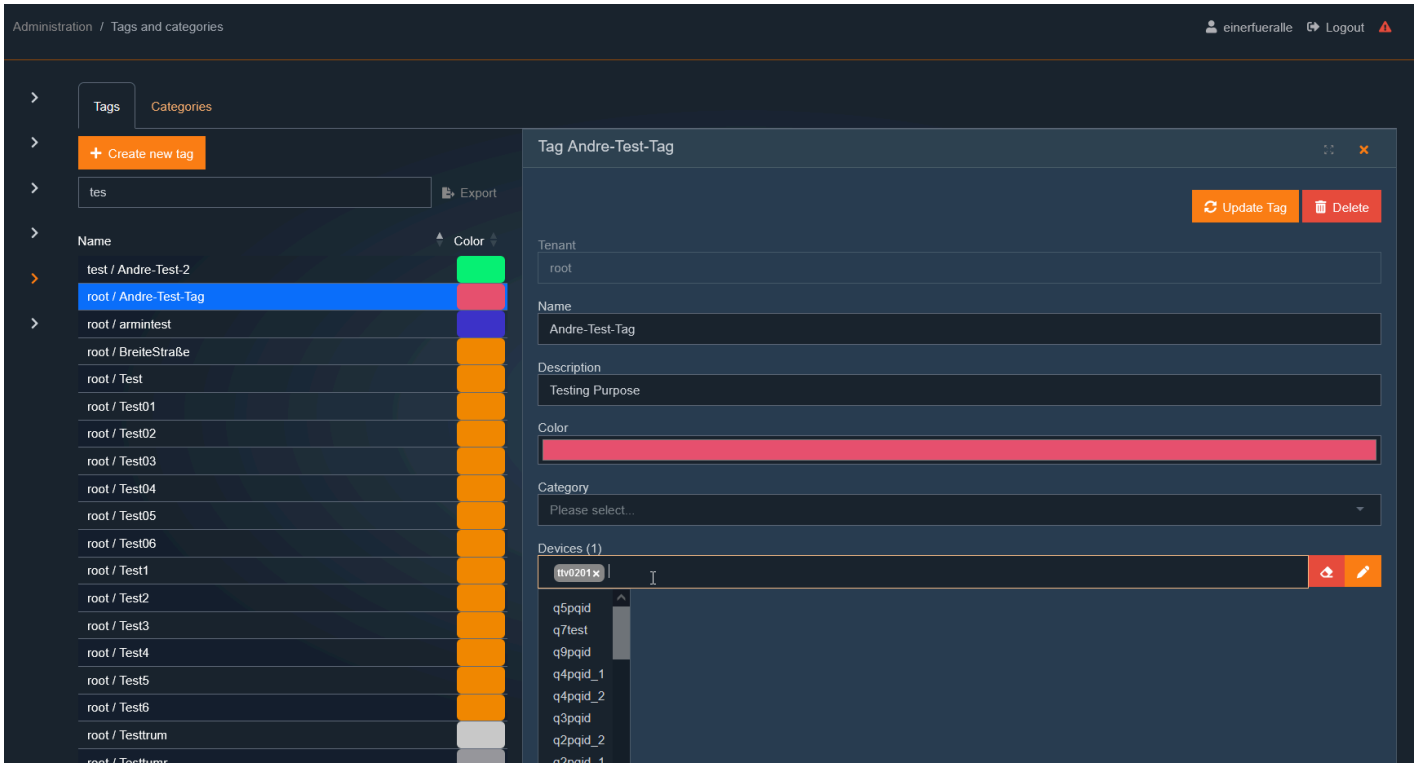
Each tag can be assigned to a category, and each device can receive one or more tags.

6.16.5.2. System Tags and System Categories

System tags and system categories depend on the connected device. An example is the system category **Firmware**, which is specifically used for measuring devices. Each measuring device has a system tag where the firmware version is automatically entered – either at the first contact with the device or after connection.

6.16.5.3. Tagging Settings

The settings for tagging and categories require the permission *Change device metadata* and are located in the menu *Settings >> Device Tagging*.

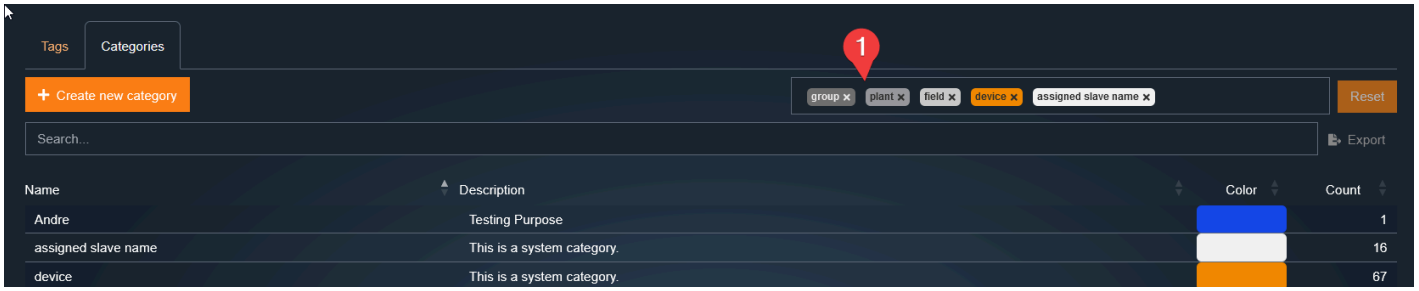


6.16.5.4. Adding a New Category

1. Click on **"+ Create new category"**.
2. Enter a name for the new category, e.g., **"Voltage Level"**.
3. Enter a unique description, e.g., **"Category for defining the voltage level"**.
4. Select the **tenant** for which the category should be available, e.g., **"root"**.
5. Assign a **color** to the category, e.g., **"Black"**.

6.16.5.5. Setting a Standardized Hierarchy of Categories – System-wide

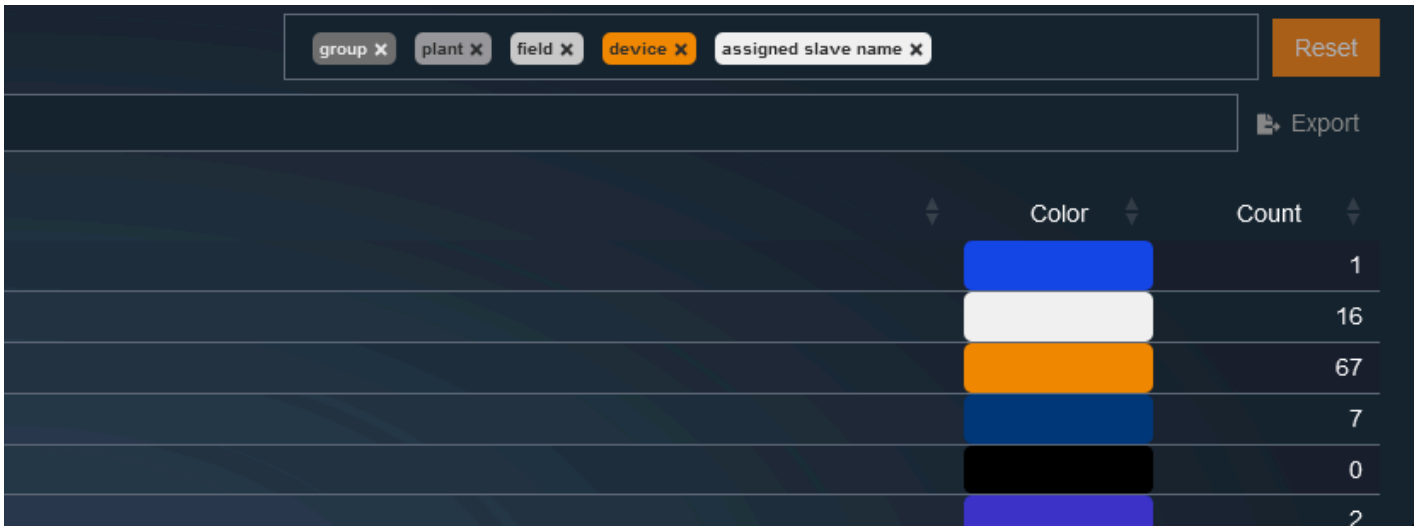
In the **Categories** section, the user can set the system-wide order of the hierarchical listing under **#1**.



Procedure:

1. Click in the field **#1** → All available categories **will be displayed**.
2. **Enter the desired category** in the dialog box.
3. **Select the desired category**.
4. **Remove unnecessary categories** if needed.

Example:



With these settings, all **selection dialogs** would be sorted in the following order:

1. Nominal voltage
2. Device name
3. Associated slaves in Modbus master mode

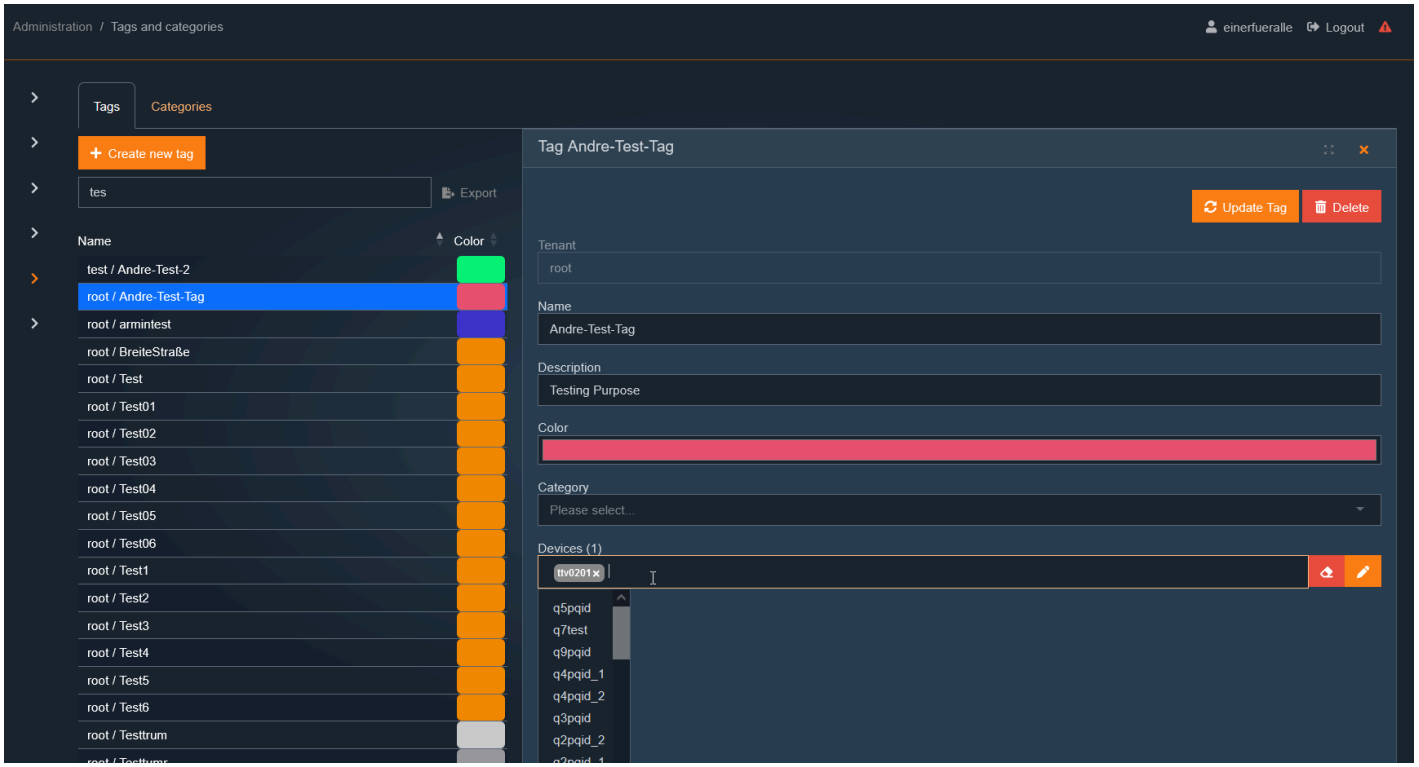
This standardized hierarchy ensures a uniform and logical sorting throughout the application.

6.16.5.6. Adding a New Tag

To add a new tag, follow these steps:

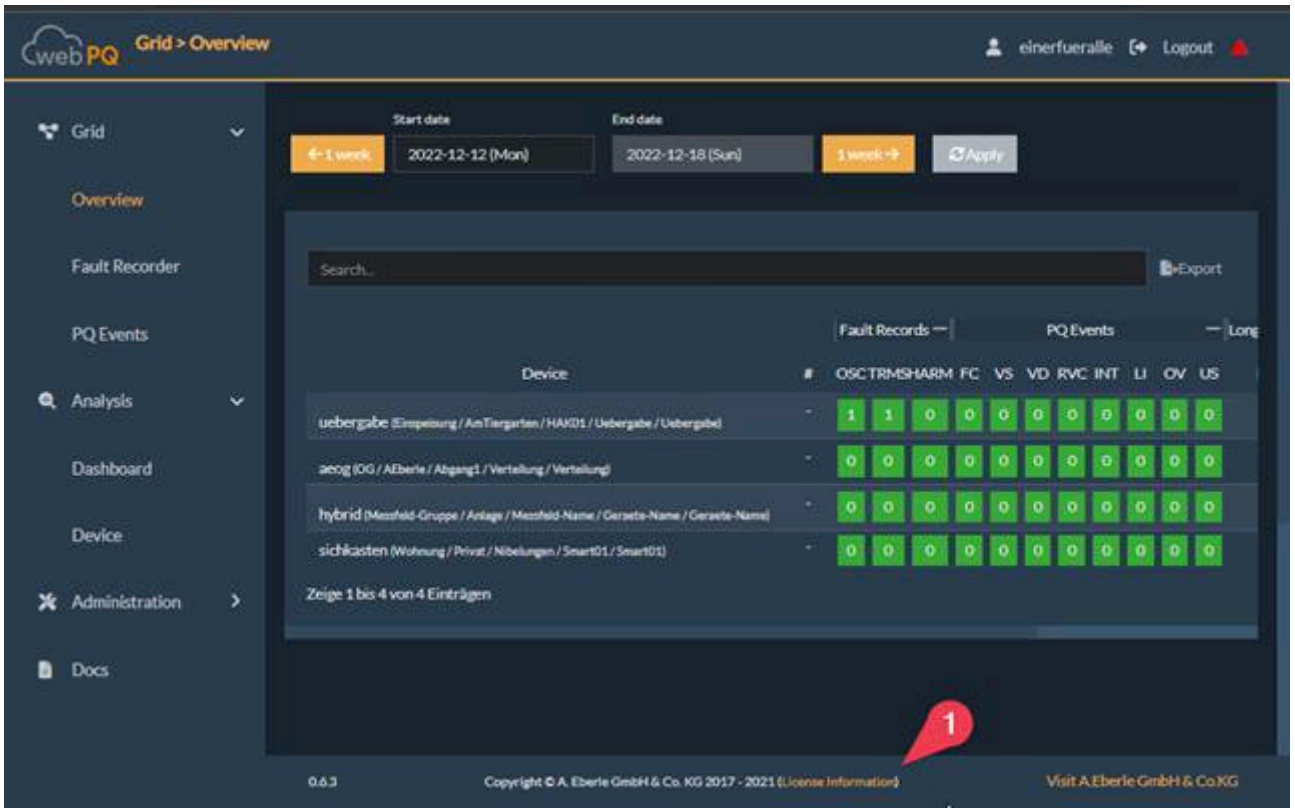
1. Click on **"# Create new tag"**.
2. Enter a name for the new tag, for example, **"11kV"**.
3. Enter a unique description, such as **"All devices with nominal voltage 11kV"**.
4. Select the **tenant** for which the tag should be available, for example, **"root"**.
5. Assign the tag to a **category**, such as **"Voltage Level"**.
6. Assign a **color** to the tag, for example, **"Black"**.

After creating the tag, it can be found in the table and assigned to the corresponding devices by clicking on it. This allows efficient management and classification of devices based on the defined tags.


Administration / Tags and categories
einerfueralle
Logout
Tags
Categories
Create new tag
tes
Export
Name
Color
test / Andre-Test-2
root / Andre-Test-Tag
root / armintest
root / BreiteStraße
root / Test
root / Test01
root / Test02
root / Test03
root / Test04
root / Test05
root / Test06
root / Test1
root / Test2
root / Test3
root / Test4
root / Test5
root / Test6
root / Testtrum
Tag Andre-Test-Tag
Update Tag
Delete
Tenant
root
Name
Andre-Test-Tag
Description
Testing Purpose
Color
Category
Please select...
Devices (1)
ttv0201
q5pqid
q7test
q9pqid
q4pqid_1
q4pqid_2
q3pqid
q2pqid_2

6.16.6. License Information – General

The license information for the software and the components used can be viewed directly in the application in section #1.



6.16.6.1. License Management

The licensing of the **WebPQ** software is done via a license file provided through the portal https://software.a-eberle.de.

The license file contains the **order number** and **customer number** in the file name and is in **JSON format**. It should be carefully stored and secured.

Example:

```
License-WebPQ Basic-2025-12-10T11_40_43.408Z.json
```

→ **WebPQ Basic**, created on **10.12.2025** at **11:40 UTC**

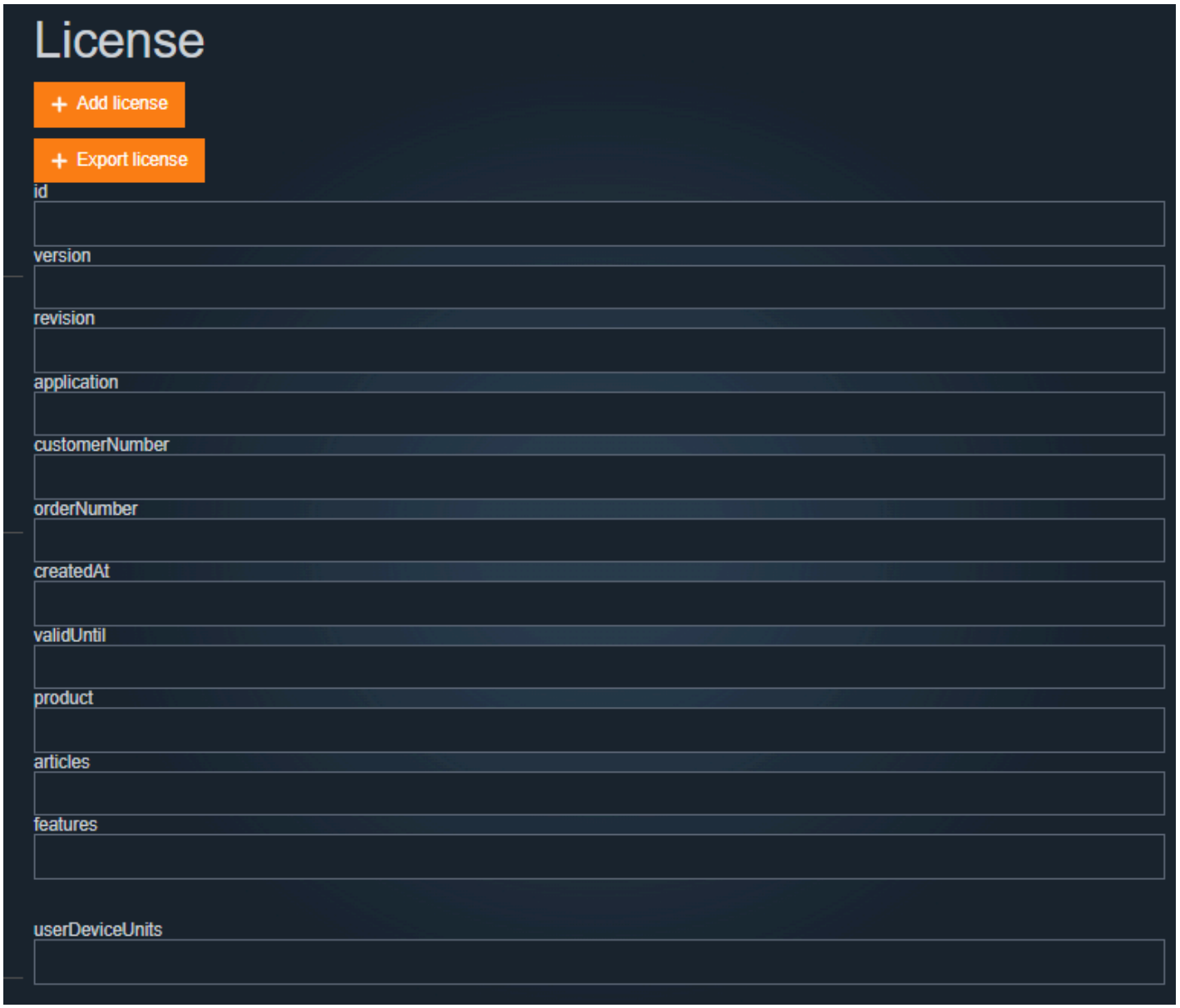
6.16.6.2. Adding a License during an Update

If no valid license is found during a software update, it must be manually added in the **update process**.

More information about the update process

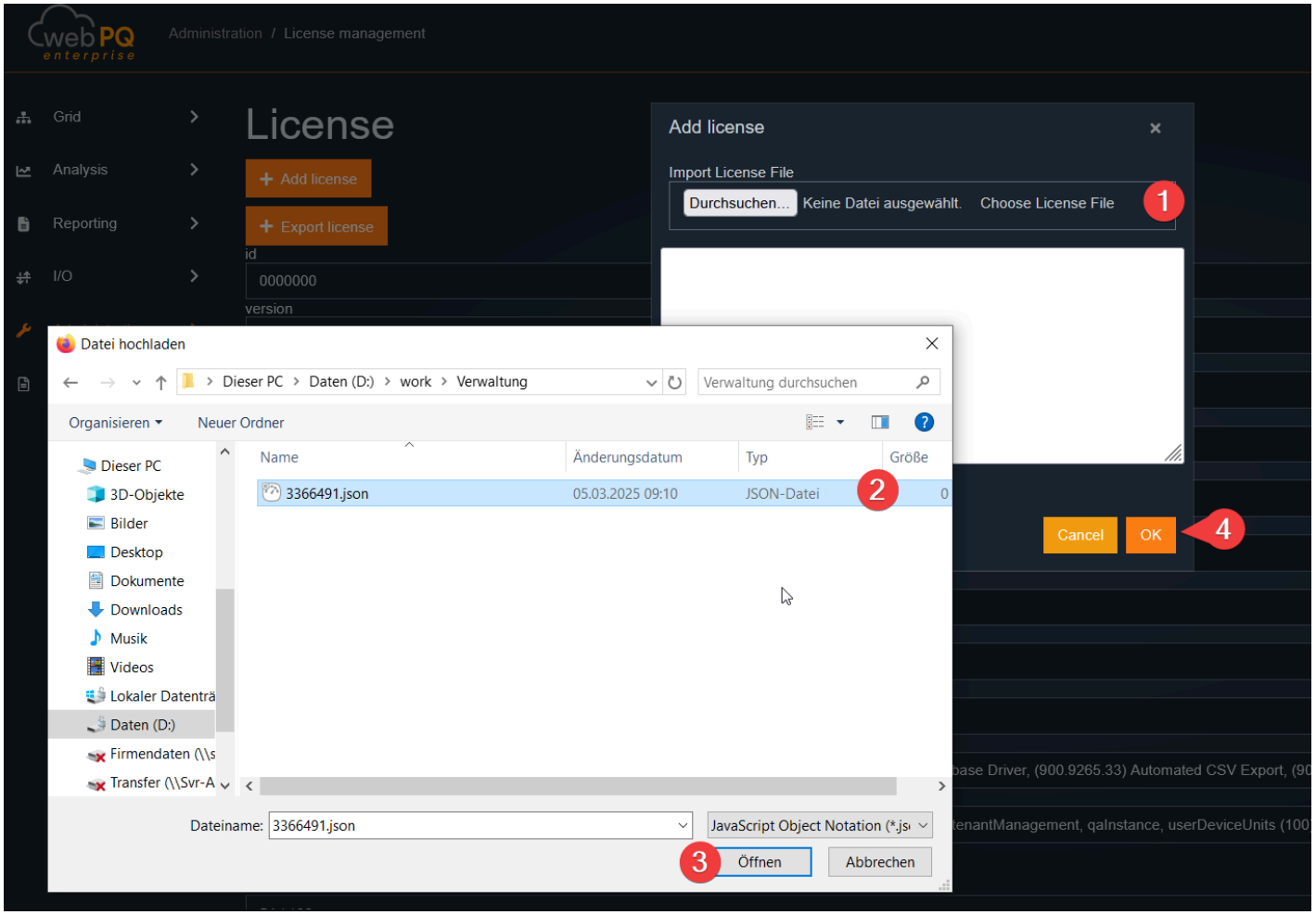
6.16.6.3. Adding a License through the User Interface

In the **License Management** section, a new license file can be uploaded to the system via `+ Add License`.



6.16.7. Procedure:

1. **File selection:** Select the license file via *Browse*#1.
2. **Select file:** Choose the corresponding **JSON file**#2.
3. **Upload file:** Transfer it to the software via *Open*#3.
4. **Confirmation:** The content of the license file is displayed and can be transferred to the software by clicking *"OK"*#4.


Administration / License management
License
Add license
Export license
Grid
Analysis
Reporting
I/O
id
0000000
version
Add license
Import License File
Durchsuchen...
Keine Datei ausgewählt.
Choose License File
1
Cancel
OK
4
Datei hochladen
Dieser PC › Daten (D:) › work › Verwaltung
Verwaltung durchsuchen
Organisieren
Neuer Ordner
Name
Änderungsdatum
Typ
Größe
3366491.json
05.03.2025 09:10
JSON-Datei
2
Dieser PC
3D-Objekte
Bilder
Desktop
Dokumente
Downloads
Musik
Videos
Daten (D:)
Dateiname:
3366491.json
JavaScript Object Notation (*.js
3
Öffnen
Abbrechen


License
Add license
Export license
1
id
0000000
version
v1
revision
1
application
webpq
customerNumber
PQSysTest01
orderNumber
12345
createdAt
2024-10-25T20:01:45.93Z
validUntil
2
2025-10-24T19:59:24.649Z
product
webpqEnterprise
articles
(900.9266.30) WebPQ Enterprise, (internalSetValidityDate) Set Validity Date, (900.9265.02) External Database Driver, (900.9265.33) Automated CSV Export, (900.9265.34) Nequal Export, (900.9265.35) PQDIF Export, (900.9266.310
features
exportCsv, exportXls, exportNequal, exportPqdif, externalDatabaseDriver, fleetManagementMaintenance, tenantManagement, qaInstance, userDeviceUnits (100) [DEFAULTS: fleetManagement, ldapConnection, restApi]
userDeviceUnits
Copyright © A. Eberle GmbH & Co. KG 2017 - 2025 License information, Data protection statement

6.16.7.1. License Validity & Maintenance Contract

The software can be updated **for 12 months** from the date of purchase. After that, a new **maintenance contract** is required for further updates.

Available maintenance contract options:

- **L.900.9066.10.01**
- **L.900.9066.10.02**

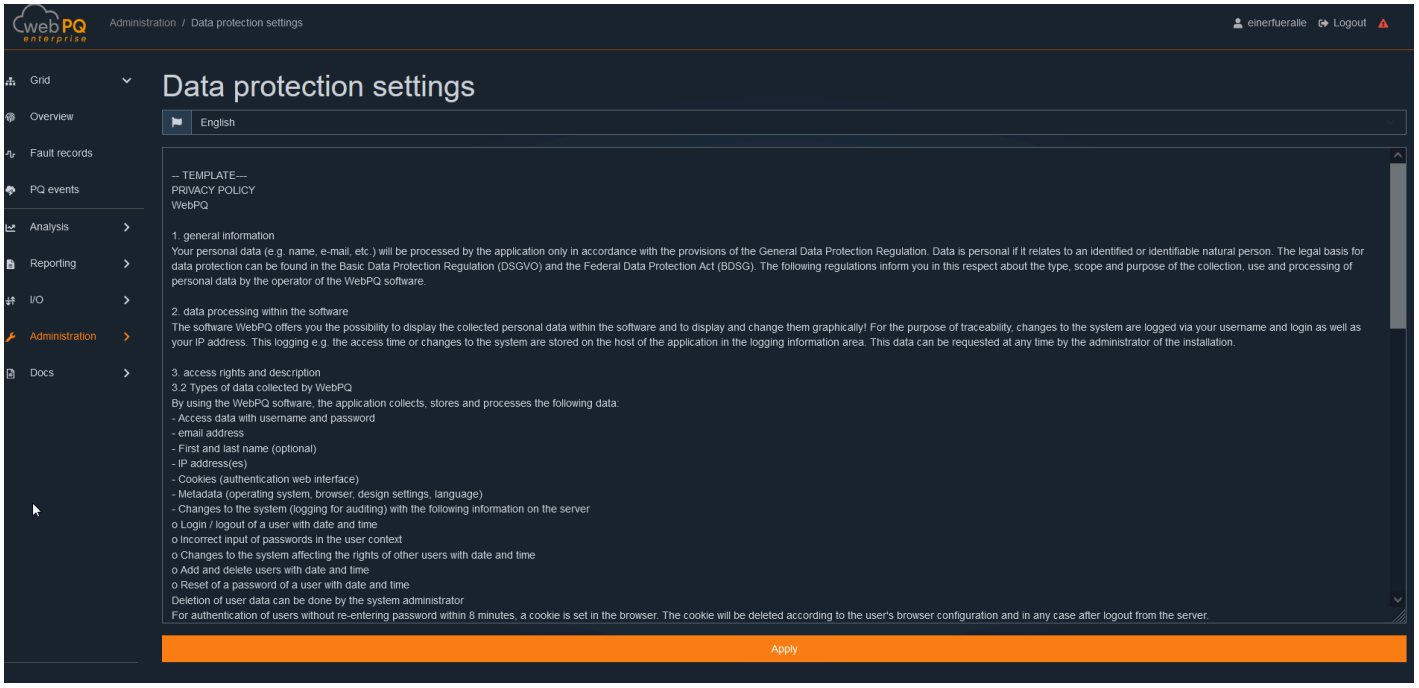
To extend the maintenance contract, the currently stored license file or the **license ID**`#1` (visible in the software) must be submitted to **A. Eberle GmbH**.

6.16.8. Data Protection

6.16.8.1. Overview and General Information

In the **data protection settings**, it is possible to store company-specific **data protection policies** in the software.

The software offers multilingual templates to document the exact circumstances of **data storage and processing** in the system.



Users can **edit the data protection policies in multiple languages** directly in the editor and save them in the system.

After saving, the updated **data protection agreement** is automatically applied as the default.
It is visible both in the **login area** and in the **footer** of the software.

7. Knowledge Base / FAQ

7.1. Working with the Browser

7.1.1. Troubleshooting Connection Issues

The WebPQ application typically loads a large amount of data to provide a comprehensive and detailed display of the content. However, if an error occurs, such as when the connection to the server is interrupted, the browser may not be able to load further data. In such a case, it can be helpful to press the F5 key or the CTRL + R key combination. This will reload the webpage and send a new request to the server, restoring the data connection and reloading the content.

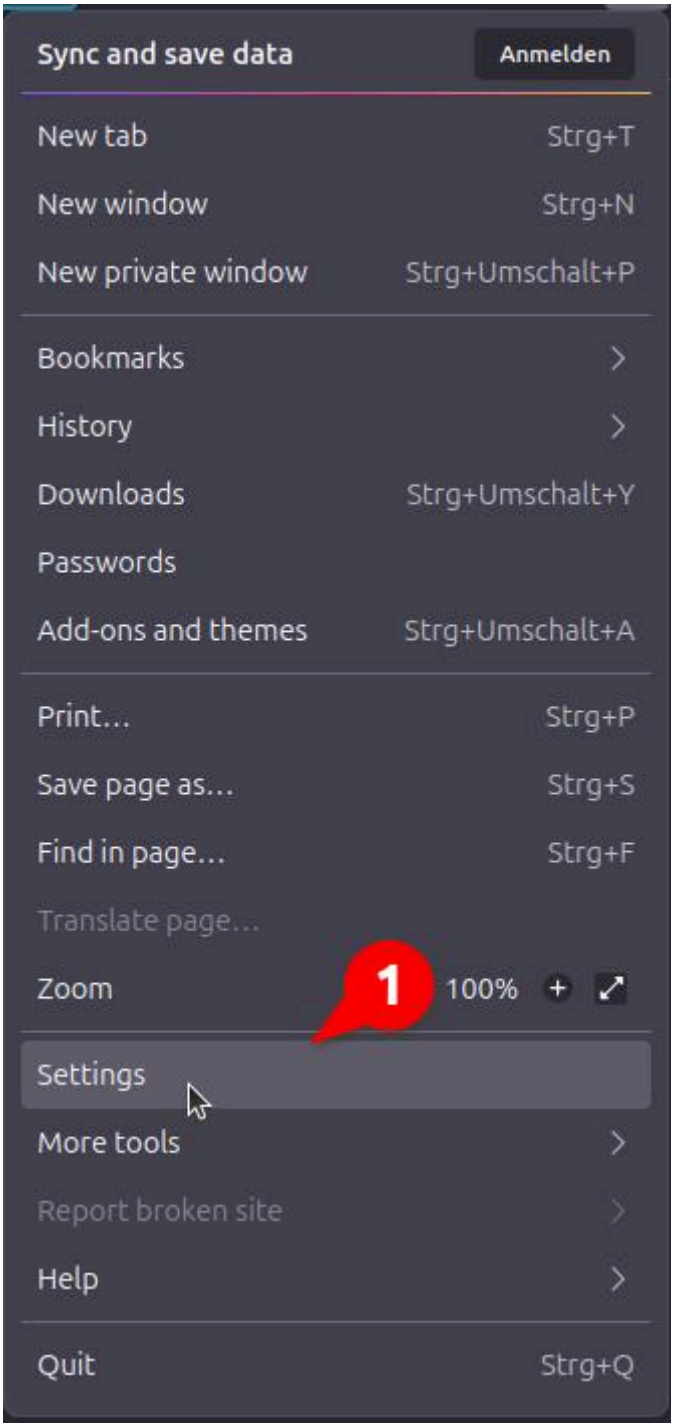
7.1.2. Recommended Browser Settings

7.1.2.1. Caching

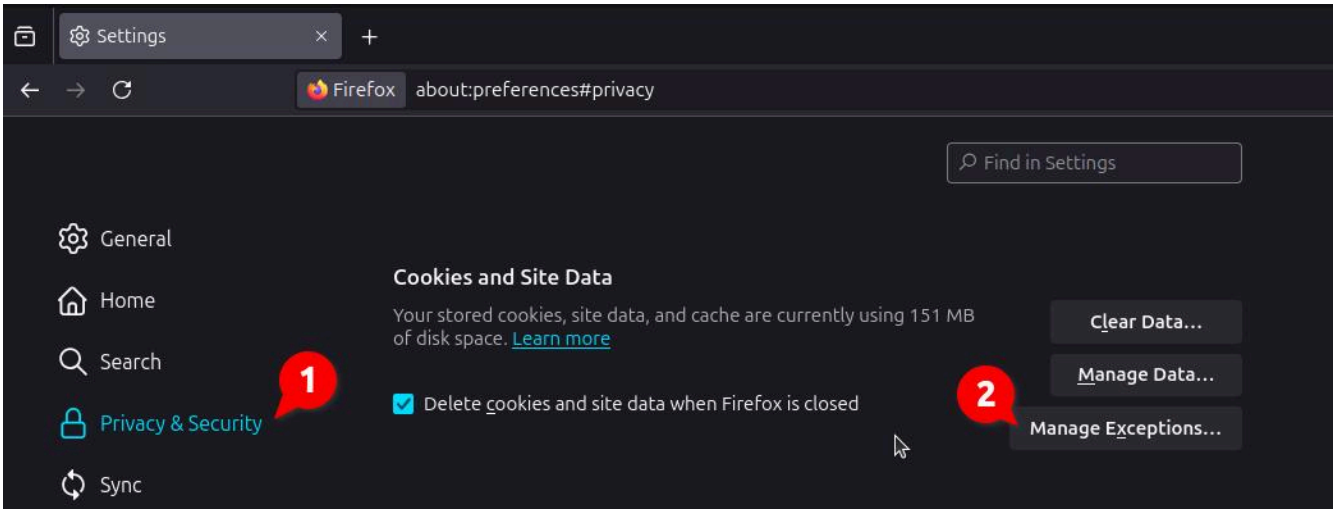
To ensure smooth operation in the browser, cookies should be allowed on the PC being used. The cache should be persistently stored at least for the "WebPQ" application. The WebPQ application stores metadata and customer-specific settings, such as those of the "Analysis Cockpit," locally in the "local storage." This prevents unnecessary data transfers from the server to the client and enables quick analyses. If cookies are deleted after leaving the browser, settings are not persisted and may need to be reconfigured. To prevent this, we recommend setting exceptions in the browser for the application.

Procedure (example using the "Firefox" browser):

1. Open the settings in the browser



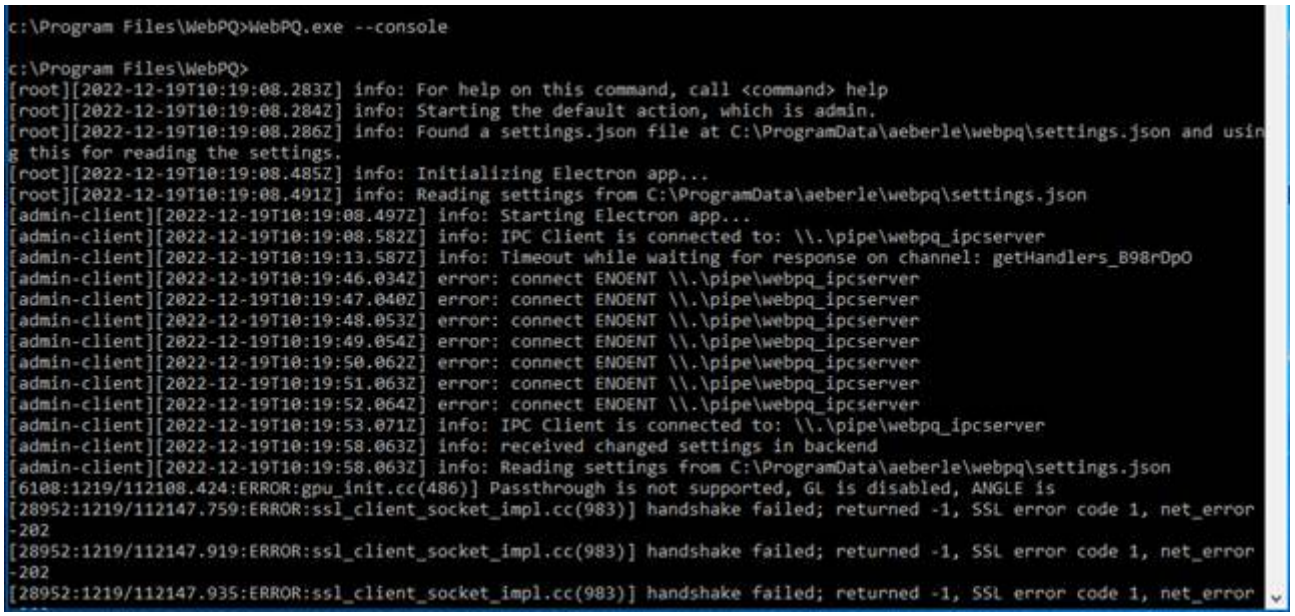
2. Go to the "Privacy & Security" settings



If the checkbox "Delete cookies and site data when Firefox is closed" is checked, the "local storage" will be deleted when the browser is closed, and the above-mentioned case may occur. It is recommended to add an exception for the application (domain).

7.2. WebPQ Service

The WebPQ service can be started via the command line with the `--console` extension. This option displays all log outputs directly in the console instead of being saved in a separate log file. This can be particularly useful for monitoring errors or important system messages in real-time and quickly responding to issues. Administrators or developers can immediately see which processes are running in the background and intervene if necessary.



7.3. Logfiles

The **WebPQ** application logs all events of the various processes by default in the directory specified in the **WebPQ backend**.

7.3.1. Location of logfiles

By default, the log directory can be found under **Windows** here:
`C:\ProgramData\aeberle\webpq\logs`

7.3.2. Types of logfiles

WebPQ distinguishes the following log types:

- **`WebPQService.err.log`**
  → Contains log entries of the **Windows service**
- **Folder `Services`**
  → Contains logs of the various **processes within the application**
- **Folder `audit`**
  → Stores **auditable events**, such as:
  - **User logins** to the system
  - **Incorrect password entries**
  - **Changes to user and rights management**

These audit logs serve **traceability and security** by documenting all relevant changes and activities in the system.

7.3.3. Limiting the number of logfiles

To limit the number of stored logfiles, a **maximum retention period in days** for logging can be set in the system.

7.3.4. Configuration in the `settings.json`

The settings for the **logfile retention period** are located in the `settings.json` file.
By default, **logfiles are stored for 50 days**.

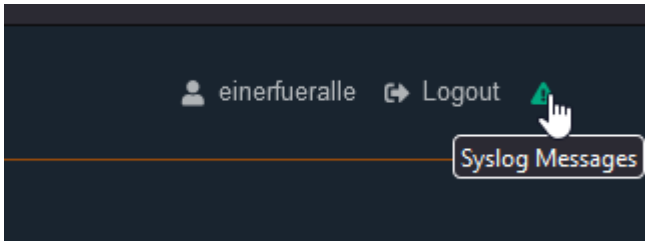
The relevant parameter for limiting is:

```
"pruneLogsAfterDays": 50
```

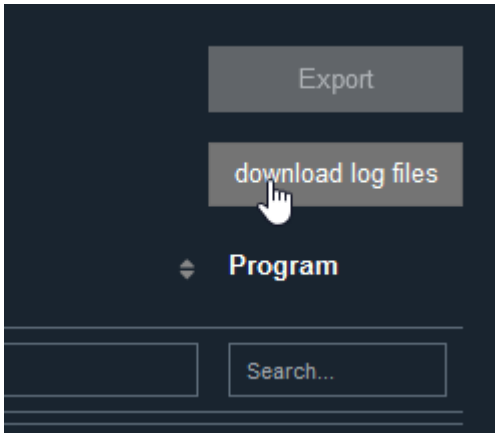
The WebPQ service must be restarted once on the server to activate the setting.

7.3.5. Reading the logfiles

To also access the logfiles **on the client**, there is an option in the **"Syslog"** section to download all logfiles from the system.



By clicking the **"Download Logfiles"** button, all logfiles can be downloaded directly from the system. Additionally, a special logfile with **user-specific information** can be downloaded via the **"Download Audit Logfiles"** button.



	The availability of the "Download Audit Logfiles" button depends on the **user rights**. Depending on the permission, the button may be shown or hidden.
Note	

7.4. Information about the SSL Certificate of the WebPQ Web Server

The application you are using requires certificates and keys in PEM format (Privacy-Enhanced Mail). PEM is a standardized format for storing and transmitting cryptographic data, such as certificates, private keys, and public keys.

What is the PEM format?

The PEM format is a text format that encodes cryptographic data and represents it as Base64-encoded strings. These data are surrounded by "Begin" and "End" markers to denote the different types of cryptographic information.

Example:

A certificate in PEM format looks like this:

```
-----BEGIN CERTIFICATE----- MIIDdzCCAl+gAwIBAgIEU1mW... ...klrjDffKwF2MnPxgt1h0DA== -----END CERTIFICATE-----
```

A private key in PEM format looks like this:

```
-----BEGIN PRIVATE KEY----- MIIEvgIBADANBgkqhkiG9w0BAQEFAASCBKgwggSkAgEAAoIBAQ... ...jJTZMOyPyjxVrM52mf6w== -----END PRIVATE KEY-----
```

Why PEM?

The PEM format is often used because it is easily readable and simple to handle. It allows for easy storage of certificates and keys in a text file that can be used in various applications and servers. How to use certificates and keys in PEM format?

- Provide certificates and keys: Ensure that you have received the appropriate certificates and keys in PEM format. These are usually provided by a Certificate Authority (CA) or your IT security system.
- Embed files: To use the certificates and keys in your application, you need to insert them into the appropriate configuration files or specify the path to the files in the application settings.
- Observe security: Ensure that private keys are stored securely. They should never be placed in insecure areas or made accessible to unauthorized users. The private key can also be protected with a password *passphrase* to provide additional security.

Encryption:

If the key in PEM format is encrypted, a password can be entered in the application to decrypt and use the key.

Example:

An encrypted private key in PEM format might look like this:

```
-----BEGIN ENCRYPTED PRIVATE KEY----- MIIEpAIBAAKCAQEA7JzQ+opZX7bPmnB6BBQ5mQgCvZvXq4bD8+Gm3kmK2b7HLkn7 ... -----END ENCRYPTED PRIVATE KEY-----
```

In this case, the private key is encrypted with a passphrase. When someone tries to access this key, they will be prompted to enter the passphrase to enable decryption.

Common Issues:

- **Incorrect Format:** If the certificate or key is not in the correct PEM format, the application may not accept it. Make sure you have received the files correctly.
- **Invalid or Expired Certificates:** Check the expiration date and validity of the certificate to ensure it is still valid.

If you have any further questions regarding certificates or keys in PEM format, please contact support.

8. Updates

The WebPQ software is continuously developed. Within the **license period of 12 months**, updates are **free of charge** and can be downloaded directly from the homepage
www.a-eberle.de.

It is recommended to always install the **latest version** to close security gaps and take advantage of new features. For **patch management**, A. Eberle GmbH provides a **customer portal**:
https://www.a-eberle.de/news/anmeldung-kundenportal/

8.1. Installation of the Update

The update can be installed directly via the **installation routine**. **Administrative rights** are required for this.

8.1.1. WebPQ Update

To install the update, proceed as follows:

- Download the latest file from the homepage www.a-eberle.de.
- Start the installation routine.
- Follow the instructions of the installation wizard.
- Restart the software to apply the changes.

	Back up your database before each update to avoid data loss!
Note	

8.1.2. Database Backup

If the database is operated via PostgreSQL, you can back up the database as follows:

- Open the **pgAdmin** program.
- Right-click on the database.
- Select **Backup**.
- Choose the storage location and confirm with **OK**.

8.2. Support in Case of Service Issues

If you have problems or questions, please contact A. Eberle Support:

Service Address:

A. Eberle GmbH & Co KG
Frankenstraße 160
D-90461 Nuremberg

Regular updates ensure the security and optimal performance of the software.

9. Product Warranty

A. Eberle guarantees that this product will remain updatable for a period of 12 months from the date of purchase.

The warranty does not cover damages caused by the following:

- Accidents
- Misuse
- Abnormal operating conditions

To claim the warranty, please contact A. Eberle GmbH & Co. KG in Nuremberg.

A. Eberle GmbH & Co. KG Frankenstraße 160
D-90461 Nuremberg
Tel.: +49 (0) 911 / 62 81 08-0 Fax: +49 (0) 911 / 62 81 08 99
E-Mail: info@a-eberle.de

www.a-eberle.de

10. Release Notes

Note: The following pages contain the release notes for the WebPQ software and the REST API. Please note that these release notes may not always reflect the current state of the software version. With software updates, it may happen that the present description is no longer accurate in some points. In this case, please contact us directly or use the latest version of the release notes, which you can find on our website www.a-eberle.de.

Publisher:
A. Eberle GmbH & Co. KG Frankenstraße 160 D-90461 Nürnberg

10.1. WebPQ Releases

10.1.1.1. Recommended Device Firmware

Device Type	DSP / Hardware	Inputs	Firmware Version / Date	Notes
PQI-D(A)	DSP 100 MHz	8 voltage inputs	2.1.03 (02.06.2021)	
PQI-D(A)	DSP 100 MHz	4 current, 4 voltage	3.1.01 (07.05.2014)	
PQI-D(A)	DSP 200 MHz	8 voltage inputs	4.0.07 (10.05.2011)	
PQI-D(A)	DSP 200 MHz	4 current, 4 voltage	5.0.16 (09.04.2014)	
PQI-D(A)	DSP 300 MHz	4 current, 4 voltage	7.0.04 (07.07.2015)	
PQI-DA smart	Gen 1, 2, 3	4 current, 4 voltage	>= 3.4.0	Web server enabled
PQI-DE	Gen 1, 2, 3	4 current, 4 voltage	>= 3.4.0	Web server enabled
PQI-LV	Gen 1, 2, 3	4 current, 4 voltage	>= 3.4.0	Web server enabled

10.1.2. Database Patches

Patches for the deployed PostgreSQL database are provided via a separate update process. You can find the latest patches in the download center under "WinPQ" in the "PostgreSQL Patches" section, as well as in the program directory under /PostgreSQL Update/ in the update folder of the WebPQ installation. The full version of the WebPQ system software always includes the latest database version available at the time of release.

Starting with this update, it is recommended to use **PostgreSQL v14.19**.

10.1.3. WebPQ 2.1.6

News, Features, and Improvements

- [#9383] Device counting routine for license check optimized for UU devices
- [#9293] API license check for REST API optimized
- [#9328] Improvements in measurement values during import with infinity values

10.1.4. WebPQ 2.1.5

Security-related content and adjustments

- [#9281] CVE-2026-2003: PostgreSQL oidvector discloses a few bytes of memorysecurity-fix
- [#9282] CVE-2026-2004: PostgreSQL intarray missing validation of type of input to selectivity estimator executes arbitrary codesecurity-fix
- [#9283] CVE-2026-2005: PostgreSQL pgcrypto heap buffer overflow executes arbitrary codesecurity-fix
- [#9285] CVE-2026-2006: PostgreSQL missing validation of multibyte character length executes arbitrary codesecurity-fix
- [#9286] CVE-2026-2007: PostgreSQL pg_trgm heap buffer overflow writes pattern onto server memorysecurity-fix

10.1.5. WebPQ 2.1.4

News, Features, and Improvements

- [#8927] Fixed creation of custom threshold group automation tasks.
- [#8799] Printing: Fixed pagination.
- [#6357] Automation tasks: Send historical recordings after a device time setting change.
- [#8980] Syslog: Truncate entry strings to valid lengths.
- [#9001] PQSmart: “filelink” parameters can be saved again.
- [#8884] Tag settings: Corrected link target.
- [#9089] Modbus clients: Time zone is no longer required.
- [#9098] Updated language files for China and France as well as German and English
- [#9090] PQI-DA smart Parameter - Transformer factor: Support negative sign.

Security-related content and adjustments

All None critical security issues have been fixed in this release:

- [#8986] Security update: Fixed CVE-2025-65945 and CVE-2025-13466.
- [#9049] Security update: Fixed CVE-2025-15284.
- [#9050] Security update: Fixed CVE-2025-59057, CVE-2026-22029, CVE-2026-21884, CVE-2026-22030, and CVE-2025-68470.
- [#9122] Security update: Fixed CVE-2026-23950.

10.1.6. WebPQ 2.1.3

News, Features, and Improvements

- [#8905] Connections with zeros in IP addresses are processed correctly
- [#8903] Security update: Fixed CVE-2025-12758 (Severity: Low)
- [#8889] Security update: Fixed CVE-2025-66400 (Severity: Low)
- [#8888] Security update: Fixed CVE-2025-64756 (Severity: Low)
- [#8888] Import of event files with invalid data made more robust
- [#8797] Added progress indicator for database migration
- [#8722] Automation tasks: Devices can be selected without a template
- [#8922] Fixed an issue with the article numbers of PQI-DE devices. Parameters are now reliably and correctly stored in the device templates.

10.1.7. WebPQ 2.1.2

News, Features, and Improvements

- [#8725] Improved navigation when leaving the dashboard view (routing)
- [#8733] Optimized migration logic for dashboard widgets
- [#8820] Live data tile view: Improved selection of measurement data after logout/login

Security-related content and adjustments

- [#8838] Security updates: Fixed vulnerabilities CVE-2025-12816, CVE-2025-66031, and CVE-2025-66030

10.1.8. WebPQ 2.1.0 - Major Release

News, Features, and Improvements

- **LDAP Authentication:** WebPQ now supports LDAP authentication, enabling seamless integration with enterprise-wide identity management systems for secure and centralized user access.
- **Microsoft SQL Database Support:** WebPQ now supports Microsoft SQL databases, expanding deployment options and integration into existing IT infrastructures.
- **PQDIf Export (IEEE 1159):** Disturbance records and long-term data can now be exported in PQDIf format according to IEEE 1159—both as an automation task and manually. This ensures compatibility with third-party systems and simplifies data exchange.
- **Custom Thresholds for Monitoring & Automation:** Define your own thresholds for monitoring and automation tasks to enable tailored monitoring and automated responses to specific operational requirements.
- **FRT Curves:** New Fault Ride Through (FRT) curves for analysis and evaluation of grid codes worldwide according to current standards. Includes VDE-AR4110, VDE-AR4120 Type 1 and Type 2, and international grid codes.
- **Live Data Tile View:** A new hierarchical tile view for live data provides an intuitive overview of devices and their status for faster decisions, optimized workflows, and simplified navigation.
- **Syslog Event Log:** Track and audit reading processes via the integrated Syslog event log for greater transparency and compliance in system operations.
- **Optimized Performance for Large Installations:** Significant improvements in reading processes deliver more speed and scalability for large installations.
- **Extended Language Support:** WebPQ now offers comprehensive language updates and supports Spanish, French, Italian, Polish, Dutch, Chinese, and more—for worldwide deployment.
- **Graphical Editor for Parameterization:** A powerful, redesigned graphical editor for device parameters simplifies configuration. Improved support for SCADA, MQTT, P-Sense, and new device templates included.
- **License Activation & Dongle Mechanism:** Enhanced license management with a new activation and dongle mechanism.
- **Numerous Improvements & Bug Fixes:** This major release includes a wide range of optimizations and bug fixes that further increase stability, reliability, and user experience.

Security-related Content and Adjustments

- All libraries have been updated to the latest versions at release to close security gaps and ensure system stability (Electron, backend, frontend).

10.1.9. WebPQ 2.0.11

News, Features, and Improvements

- [#8071] Fixed issue with empty disturbance record PDFs when server time is ahead of device time.
- [#7989] Statistics are now calculated more efficiently to reduce system load.
- [#7902] Automation tasks with a large number of executions can now also be deleted.
- [#7887] Fixed error in connection data when importing WinPQ devices.
- [#7875] Logfiles can now be read correctly again; duplicate EOF markers are ignored.
- [#7866] Connection interruptions are now properly caught and handled.
- [#7814] Fixed error when loading the live level time diagram.
- [#7854] Automation tasks are now retained when upgrading from version 2.0.9 to 2.0.10.
- [#7729] Users can now be deleted even when many executions exist for automation tasks.
- [#7714] Unauthorized users no longer see devices in settings or automation tasks.
- [#7691] Heap dump display has been removed from the user interface.
- [#7773] The disturbance record list now correctly includes Sundays during daylight saving time changes.
- [#7781] The progress bar in the analysis cockpit no longer gets stuck.
- [#7611] The configured COM interface for DCF time signals has been corrected.

10.1.10. WebPQ 2.0.10

News, Features, and Improvements

- [#7696] IEC61000-2-4 standard templates for devices and the system have been updated to the latest version.
- [#7727] Logging improved – logging is now reliably performed even with limited storage.
- [#7679] WebPQ interface languages updated for even easier operation.
- [#7667] “Dirty check” now detects changes to standard templates more reliably.
- [#7672] Windows service prevents duplicate execution in complex system environments.
- [#7680] Reports for devices >150 kV are now generated correctly.
- [#7641] Axis labels in time diagrams in reporting are now clearer.
- [#7664] SSH tunnel with keep-alive for faster response to connection interruptions.
- [#7691] Heap dump function introduced in the backend to diagnose memory issues more easily and quickly.

Security-related content and adjustments

- [#7762] fixes CVE-2025-7338
-

10.1.11. WebPQ 2.0.9

News, Features, and Improvements

- [#7630] Added logging of heap limits for specific Windows systems to monitor system performance.
- [#7575] Improved the display of measurement values for NaN values to allow the display of maximum values.
- [#7499] Improvements in the permission management of automation tasks.
- [#7632] The time zone settings for devices have been made mandatory to ensure consistent time zone processing.

10.1.12. WebPQ 2.0.8

News, Features, and Improvements

- [#7592] The Electron app now uses memory more efficiently to ensure stable and reliable usage.
- [#7536] Statistics calculation is now based on UTC time to provide a consistent time basis.
- [#7416] PQI-D devices are now reliably considered in alarming via automation tasks.
- [#7419] Live values are displayed without restrictions in the latest Firefox browser.

10.1.13. WebPQ 2.0.7

News, Features, and Improvements

- [#7534] The number of database accesses during statistics calculation has been further reduced to improve performance.
- [#7512] Improvements in handling time zones: Data is now processed correctly even for devices without a set time zone.
- [#7539] Statistics calculation now also considers devices in the current week with expired quantiles.
- [#7533] The import of measurement data has been optimized, requiring fewer database accesses.

Security-related content and adjustments

- [#7463] Security update: The Multer component has been updated to version 2.0.1.

10.1.14. WebPQ 2.0.6

News, Features, and Improvements

- [#7314] The performance of statistics calculation during the import of measurement data has been further improved by reducing parallel accesses.
- [#7429] System performance on systems with SATA hard drives has been increased through targeted optimizations.
- [#7435] Managing many measuring devices in the configuration of automation tasks has been simplified and accelerated.
- [#7232] The report sending function has been extended so that reports can now also be sent to recipients outside the system.

10.1.15. WebPQ 2.0.5

News, Features, and Improvements

- [#7314] Optimized data reduction when reading measurement data during import by checking timestamps.
- [#7316] Optimized data point limitation in the display of measurement data.
- [#7276] Updated C runtime DLLs for the installation of the PostgreSQL database.
- [#7215] Installer – improved restrictions for installation in existing system environments.
- [#7242] SSH tunnel error handling optimized for unstable connections.
- [#7162] Optimized REGEX for entering limit values in harmonics.

Security-related content and adjustments

- [#6195] All libraries have been updated.
- [#7328] PostgreSQL connection – SSL settings were not correctly applied (see Security Advisories for details).
- [#7347] Denial of Service due to memory leaks from unclosed streams in Upload Tenant, Import, and Fleet Management – CVE-2025-47935 & CVE-2025-47944 (see Security Advisories for details).

10.1.16. WebPQ 2.0.4

News, Features, and Improvements

- [#7160] Improved export of disturbance records as PDF.
- [#7141] Optimized triggers for PQI-D database tables.
- [#7126] WinPQ device integration – optimization of automatic import.
- [#6334] Increased the number of analyses in reports.

=======

10.1.17. WebPQ 2.0.3

News, Features, and Improvements

- [#7085] Optimization when creating reports – migration is now performed before report generation.
- [#7068] Added migration of existing binary data tables from WinPQ.
- [#7023] Improvements in fleet management – optimized license management.
- [#6984] Adjustment of the greeting text in emails to match the respective license version.
- [#6983] Optimization of routing.
- [#6979] Fixed an issue with duplicate loading of the report preview – the preview is now loaded only once.
- [#6967] Added display of missing harmonic numbers for PQ events.
- [#6900] Fixed an issue with analysis tabs – deleting a single tab now reliably removes the placeholder in the window.
- [#6957] Fixed an issue with printing due to self-signed certificates in connection with images.
- [#6743] Improved device parameter templates – templates that were previously incompatible have been adjusted.
- [#7097] Fixed issues with `recId` as BigInt columns in Creca/Crecb tables from existing WinPQ databases with different DB schemas.
- [#6958] Fixed an error when saving changes without an active SMTP server.
- [#7044] Stabilized the reading of measurement data for devices with poor QoS.

10.1.18. WebPQ 2.0.2

News, Features, and Improvements

- [#6939] Optimized routing for disturbance records from the network overview.
- [#6884] Level-time diagram – X-axis labeling has been optimized.
- [#6880] Added an option to disable the validity check of certificates from external SMTP servers.
- [#6875] Optimized saving of analysis via the dashboard.
- [#6874] Removed the "Show Hierarchy" button in Historical Data Power Quality.
- [#6873] Optimized linking of live data to the Analysis Cockpit for supraharmonics.
- [#6829] Improved dirty check for SMTP configurations.
- [#6897] Enabled parallel upload to the database – parameter activated.

Security-related content and adjustments

- [#6195] All libraries have been updated.

10.1.19. WebPQ 2.0.1

News, Features, and Improvements

- [#6814 / #6804 / #6747 / #6711 / #6494 / #6746 / #6816] Translations and documentations updated
- [#6780] Email is again sent to CC & BCC recipients
- [#6774] The relative time setting is now retained after "reset zoom" in the chart.
- [#6756] The live data display under Analysis/Devices has been improved.
- [#6755] The creation of an SSH device with Radius authentication has been optimized.
- [#6753] The WinPQ Device Wizard now initializes correctly.
- [#6745] The "Compare with other parameter sets" function works again.
- [#6742] Binary inputs are now correctly adapted to the device classes in the live data.
- [#6735] The "Show hierarchy" button is available again in the device dialog.
- [#6718] The pop-up menu associated with the export now works reliably. The disturbance records window has been revised.
- [#6677] The settings for logging on the device synchronization page have been improved.
- [#6614] The device labels in the live displays have been made clearer.
- [#6598] The firmware version is now correctly adopted when reading PQI-DA smart devices.
- [#6597] Improved error messages for exports and printing.
- [#6551] In the date dialog of the analysis, the input of a comma is now allowed.
- [#6499] The manual export now works even after switching from CSV to Nequal and back.
- [#6474] Expired passwords no longer affect exports.
- [#6431] The time zone has been added to the logging during data import.
- [#6400] Improvements in memory handling during parameterization and uploading to the server.

Security-related content and adjustments

- [#6195] All libraries have been updated

10.2. REST API Versions

10.2.1. REST API v 2.0.0

API Changes

The API has been restricted to its public part and adapted to a versioning scheme. As a result, the endpoint paths have changed. See below for each endpoint.

Most endpoints that previously supported POST and GET have been mostly restricted to POST. The endpoints that query measurement data have been changed regarding the start/end dates. The start dates are now exclusive, the end dates are inclusive.

Most error responses now add a 'subCode' field that contains a general problem description such as 'NOT_AUTHORIZED' or 'INVALID_PARAMETER'. This field can be easily checked by the API client to respond accordingly.

Changes per API Endpoint

```
/analytics/rawtimeseries -> /api/v1/analytics/rawtimeseries
```

- **Only POST** instead of POST/GET.
- **Parameters**: The previously optional `timeFormat` parameter has been removed. All times are now always returned as ISO-UTC date strings. `start` is interpreted as exclusive, `end` as inclusive.
- **Response**: The response structure remains as before, the timestamp is an ISO-UTC date string.
- **Runtime Aspects**: The allowed query intervals have been diversified depending on the queried `dataClass` to allow larger intervals for data classes with lower resolution. Further details can be found in the Swagger/OpenAPI description.

/analytics/recordings -> /api/v1/analytics/recordings

- **Only POST**.
- **Parameters**: The previously optional `serverSidePaging` parameter has been removed. Start and end times are interpreted as exclusive/inclusive.
- **Response**: The previous structure `{ result: row[] }` has been flattened – it is now returned as `{ data: row[] }`. In the individual rows (row), the values for `device`, `plant`, `field`, `grouping`, `transnostic` have been removed.
- **Runtime Aspects**: No changes.

/analytics/getpqevents -> /api/v1/analytics/getpqevents

- **Only POST**.
- **Parameters**: The previously optional `serverSidePaging` parameter has been removed.
- **Response**: The previous structure `{ result: row[] }` has been flattened – it is now returned as `{ data: row[] }`. In the individual row, the fields `reca` and `recb` are only included if there is a reference to a disturbance record. Additionally, there is a new field `dataext` (if available) that contains additional data depending on the event type.

/analytics/version -> /api/version

- **GET remains unchanged**.
- **Parameters**: No changes.
- **Response**: No changes.
- **Runtime Aspects**: No changes.

/authenticate/user -> /api/v1/authenticate/user

- **Only POST**.
- **Parameters**: An optional `refresh` parameter has been added, which can be ignored.
- **Response**: No changes.
- **Runtime Aspects**: No changes.

/master-data/user/getuser -> /api/v1/device/getdevices

- This service replaces the functionality of `/master-data/user/getuser` to query the list of available devices. However, the structure is different from before. Here, the user is not queried, but all devices to which the calling user has access. It is important to check whether the entry `userPermissions.readMeasurements.isGranted` is true for a returned device before querying measurement data for that device.
- **Only POST**.
- **Parameters**: None.
- **Response**: `IDeviceV1[]` with `permissions` attribute.
- **Runtime Aspects**: No changes.

10.2.2. REST API 1.0.0

- Initial version