KBR
Energy Management

Operating instructions

Power-Quality Evaluation Software
WinPQ lite

You can download the power quality analyser software WinPQlite free of charge on the KBR homepage. The software is available in the download area under the category "Apps, software and GSD files".

System | english

28808_EDEBDA0332-1424-1_EN

In our download centre you will find the appropriate instructions for KBR devices.

https://www.kbr.de/download/operating instructions/

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1. User prompt

The user manual contains all important information for installation, commissioning and operation. Read the instruction manual completely and do not use the product until you have understood the instruction manual.

1.1 Target group

These operating instructions are intended for trained and qualified staff as well as trained and tested operators. The contents of these operating instructions must be made accessible to the persons respon-sible for installing and operating the system.

1.2 Warnings

⚠ SIGNAL WORD	**Type and source of danger!** ➲ Consequences of non-observance ➲ Action to avoid the danger.

1 Types of warnings

Warnings differ according to the type of danger as follows:

⚠ DANGER!	Warns of an imminent danger which, if not avoided, will result in death or serious injury.
⚠ WARNING!	Warns of a potentially dangerous situation that can result in death or serious injuries when not avoided.
⚠ CAUTION!	Warns of a potentially dangerous situation that can result in fairly serious or minor injuries when not avoided.
NOTICE!	Warns of a potentially dangerous situation that if not avoided could result in material or environmental damage.
ℹ	Refers to procedures that do not present a risk of injury or damage to property, but which must be observed to ensure reliable operation of the appliance!

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1.3 Notes

Notes on appropriate use of the device.

1.4 Other symbols

1 Instructions

Structure of the instructions:

Guidance for an action..

➥Indication of an outcome, if necessary.

Lists

Structure of unnumbered lists:

0 ⇨ List level 1

⇨ List level 2

Structure of numbered lists:

1) List level 1

2) List level 1

1. List level 2

2. List level 2

1.5 Applicable documentation

For the safe and correct use of the product, observe the additional documentation that is delivered with the system as well as the relevant standards and laws.

1.6 Keeping

Keep the user manual, including the supplied documentation, readily accessible near the system.

2. Software WinPQ lite

The free WinPQ lite evaluation software has been created exclusively for the Network Analyser multimess D9-PQ smart and multimess F144-PQ and includes the following functions:

- 0 Set-up of the Network Analyser multimess D9-PQ and multimess F144-PQ,
- 0 Online analysis of the measurement data,
- 0 Reading the measurement data from the measuring device,
- 0 Analyse offline measurement data,
- 0 Firmware update multimess D9-PQ and multimess F144-PQ,
- 0 Calibration of the network analysers (optional).

The powerful database and evaluation software WinPQ which is available at an extra charge supports all mobile and permanently installed Network Analysers supplied by KBR GmbH in one system. Measuring data from different devices can be compared to each other. There is a fully automated and permanent connection to all permanently installed devices. Detailed PowerQuality reports and sequence of events recording are automatically created by the system and can be sent via e-mail. There are separate operating and commissioning instructions for the WinPQ software

2.1 Installation of the evaluation software

To start the installation of the evaluation software, download the file free of charge from our homepage in the download area under Apps-Software-GSD-Files. It can be found under the name Power Quality Evaluation Software WinPQlite. If the autostart function is activated, the installation programme will start automatically. Otherwise, navigate to your download area via your file explorer and double-click to start the Setup.exe or WinPQlite_6.4.0.exe file.

The installation corresponds to the usual Windows standard including the uninstallation of the programme system via the "Add or Remove Programs" control panel. The installation location of the programmes (target directory) can be freely selected during installation.

Install the software in a directory in which you also have read and write rights.

The start icon 

(64 bit) is created automatically on your PC's Desktop.

1 Uninstalling the software via the control panel

The components are removed from the PC using Windows Control panel.

Under Software,WinPQ lite entry, use the Remove button to delete the evaluation software.

All parts of the program, including the generated links, are completely removed after a single confirmation.

Before uninstalling the program, the components launched must be closed.

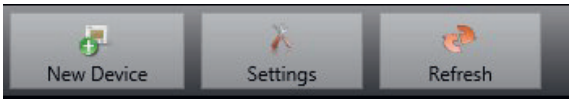
1 Software Update

The evaluation software "WinPQ lite" as well as all updates and current device firmware can be found free of charge on our website in the download area under Apps-Software-GSD-Files.

Please also install the current device firmware on your measuring device to ensure that you can use any new functions.

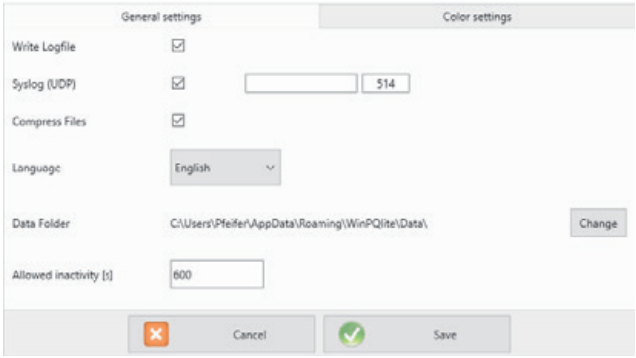
Please also install the current device firmware on your measuring device to ensure that you can use any new functions.

2.2 Basic setting for Software



The following changes are possible under the menu item "Options":

1 General Settings



0 **Write Logfile:** software messages are logged in a file.

0 **Syslog (UDP):** the logbook messages are also transmitted via syslog protocol via the network.

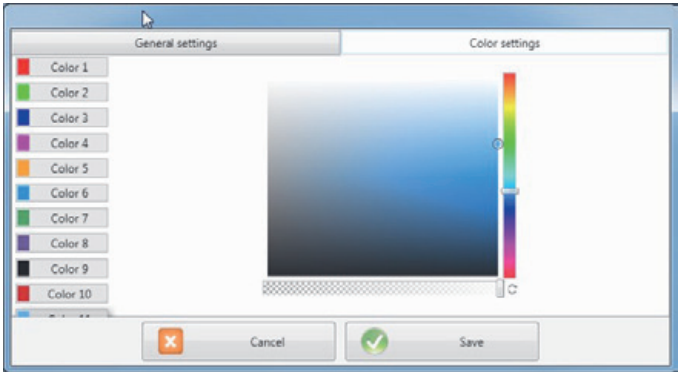
0 **Compress files:** if this option is activated the WinPQlite is zipping the .xml-files of parameterization before sending them to the device. This leads into a faster communication and parameterization.

0 **Language:** software language setting (SW must be restarted after a change)

0 **Data folder:** Folder in which all measurement data are stored. This can be individually adapted to your own folder structure, for example to store the measurement data of the Network analyser on
D:\measurement data\.

0 **Allowed Inactivity:** if this time of inactivity will be reached, the WinPQlite closes open connections with the device. The default-value of allowed inactivity are 10 min=600 s.

1 Colour Settings

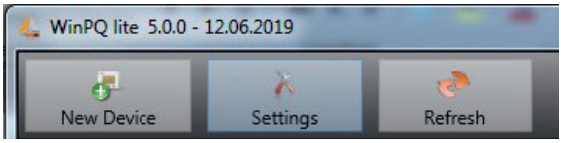


Individual colours can be used to display the measurement data.

The colours are used in the order of the clicked measurement data.

2.3 Create measuring device in the WinPQ lite software

Via the function New device an assistant is called up which creates the measuring devices as a tile on the WinPQ lite Desktop and also completes the commissioning of the device.



All security-relevant system settings for setting up and operating the device and the entire PQ system are described in the separate security documentation for administrators (requirement of the BDEW white paper).

2.3.1 Creating a device tile

Since the KBR GmbH devices with firmware version 2.0 or higher have several modes due to the increased IT security requirements, it is necessary to differentiate when adding encoders to the WinPQ lite software.

Under the following conditions, a device can be created in the WinPQ lite software without further actions:

0 A device with a firmware version lower than V2.0 is present.

0 A device with firmware V2.0 and switched on compatibility mode is present.

0 There is a device with firmware V2.0 and already setup user administration.

If none of the above requirements are met, the measuring device has not yet been fully set up. If the initial start-up has not been carried out by the device wizard, the instructions in chapter 6.3 of the instructions for the measuring device must be followed. If the device is in safety mode, follow the instructions in chapter 2.3.2.

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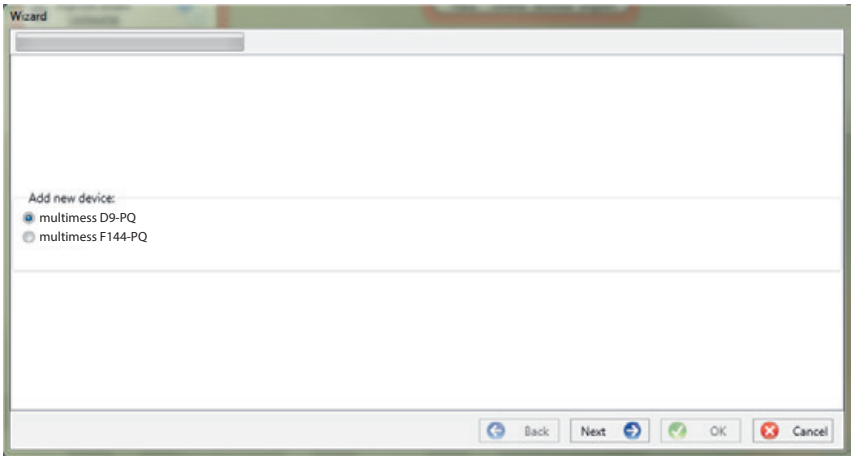
2.3.1.1 Wizard Step 1 - Device Selection



Device Selection

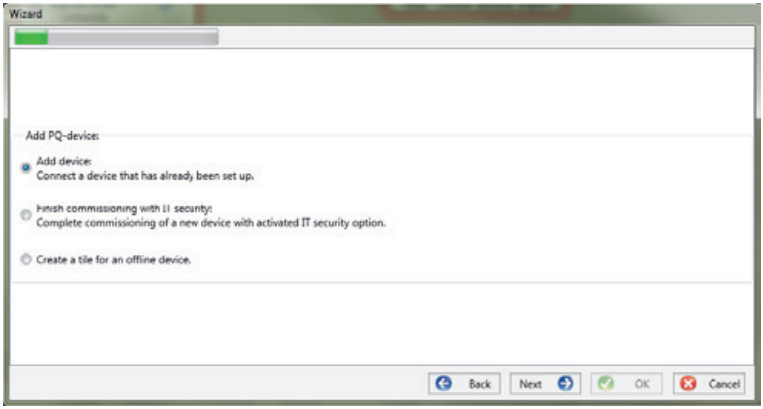
0 multimess D9-PQ
(PQI-DA smart)

0 multimess F144-PQ
(PQI-DE)

2.3.1.2 Wizard Step 2 - Device Setup

Select the device setup: Connect a device that has already been set up.

Please note the necessary prerequisites described at the beginning of this chapter.

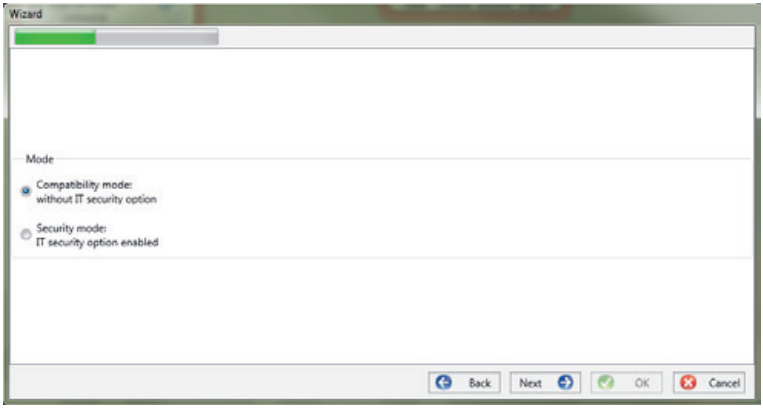


2.3.1.3 Wizard Step 3 - Device Mode

Selection of the procedure for finishing the devices - Security settings:

0 Compatibility moed
The TCP/IP communication to the device is unencrypted.

0 Security mode
The TCP/IP communication de-vice is encrypted using the SSH protocol.



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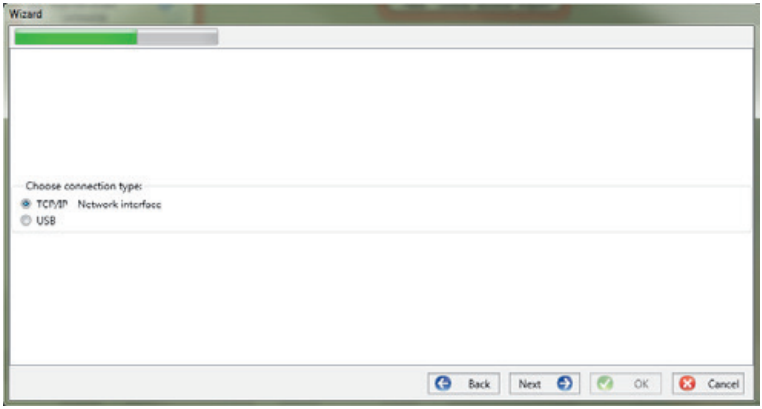
2.3.1.4 Wizard Step 4 - Device Connection

Selection of connection:

The device can be connected via USB or TCP / IP (network) communication.

If the USB interface is used, it must be selected in the following step.

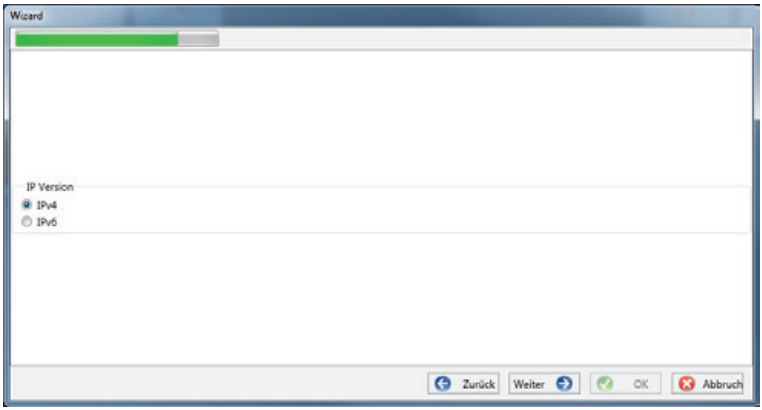


2.3.1.5 Wizard Step 5 - IP Version

Selection of IP version:

A distinction can be made between IPv4 and IPv6. IPv6 is currently only supported via gateways.

The default connection is IPv4.



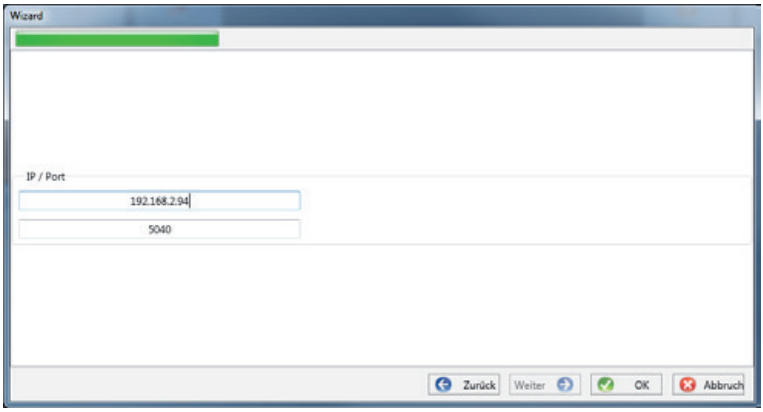
2.3.1.6 Wizard Step 6 - IP Address

IP address of the measuring instrument:

Enter the IPv4 address and the connec-tion port of the encoder.

The default port depends on the selected mode:

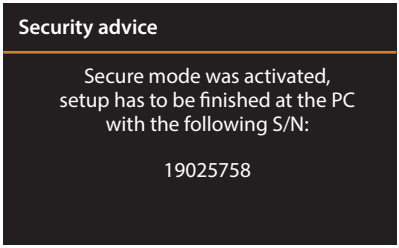
- 0 Security mode: Port 22
- 0 Compatibility mode: Port 5040



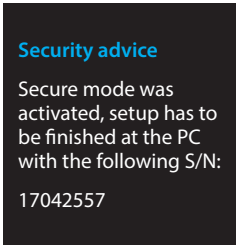
Click „OK" to accept the values and create a tile for this device on the software interface. Any number of devices can be created.

2.3.2 Completing the Instrument Wizard in Secure Mode

If the setup of the meter was performed in Security Mode" (as described in chapter 6.2), the meter will display the following screen after restarting until the setup is complete:



Anzeige
multimess F144-PQ



Anzeige
multimess D9-PQ

At the end of commissioning in security mode, a user database is created on the device in which all infor-mation of users, their roles and the associated rights are stored.

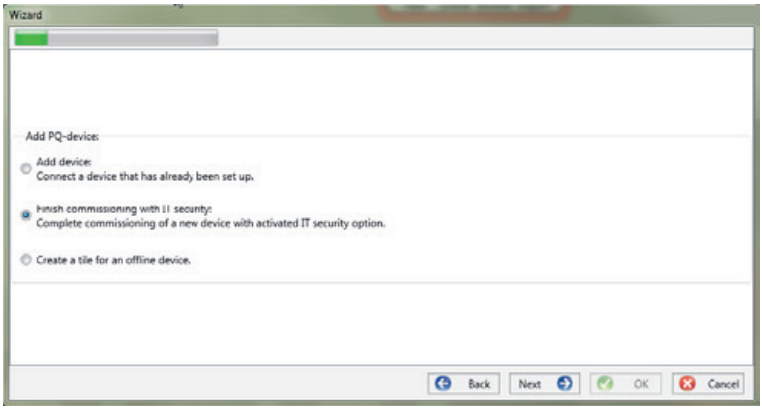
In order to create individual users for the device in this database, it is necessary to execute the commission-ing assistant via the New device button.

The device is selected as described in chapter 2.3.1.1

2.3.2.1 Security Wizard - Completion

Selection to complete all security settings:

„Completion of commissioning with IT security“.

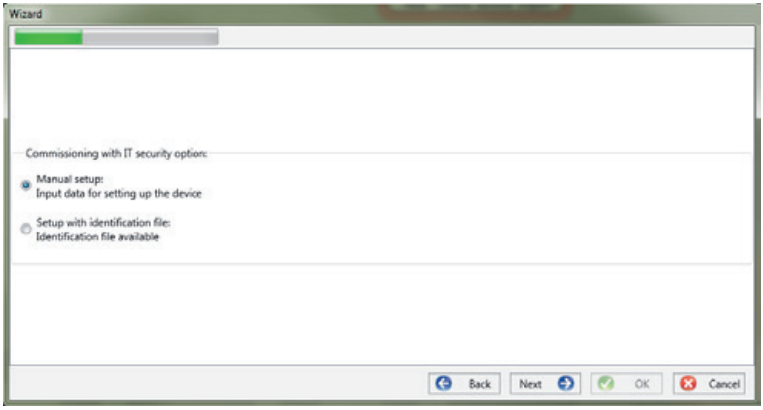


2.3.2.2 Security Wizard - Procedure Selection

Selection of the procedure for com-pleting the devices - Security settings:

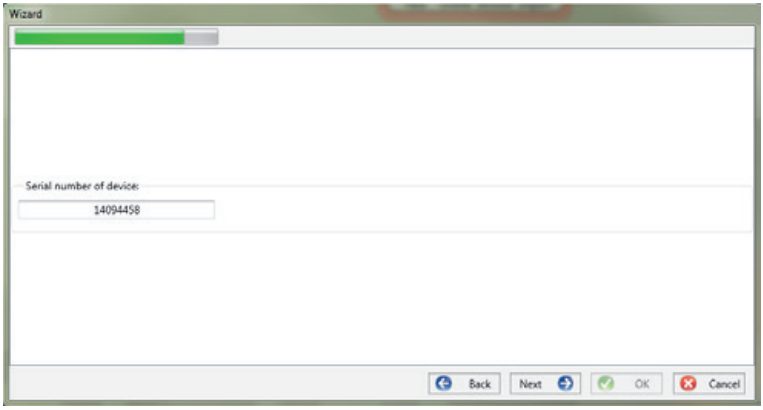
0 Manual setup (see chapter 2.3.2.3)
Manual entry of all data such as IP ad-dress/serial number of the device

0 Identification file (see chapter 2.3.2.4)
Use of an identification file made avail-able by the device.

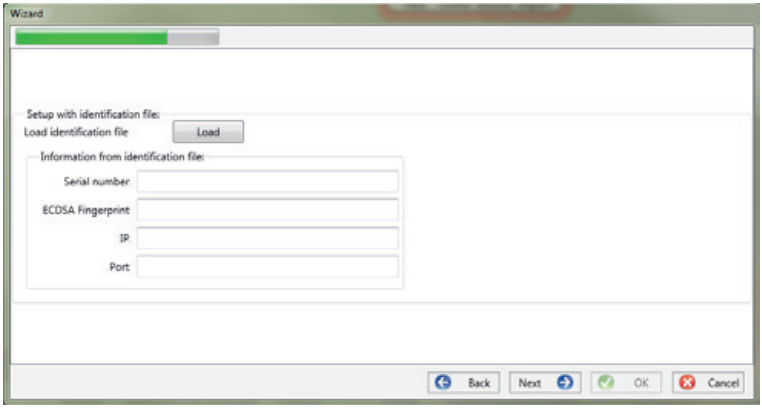


2.3.2.3 Security Wizard – Manual

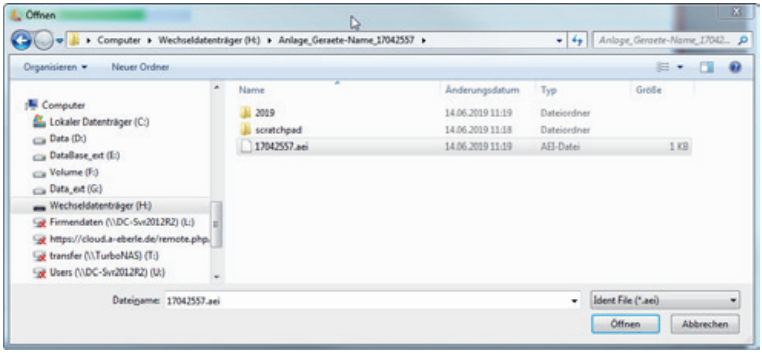
For setup, the serial number of the instrument must be known and entered in the field to establish the first connection via an encrypted connec-tion to the instrument.



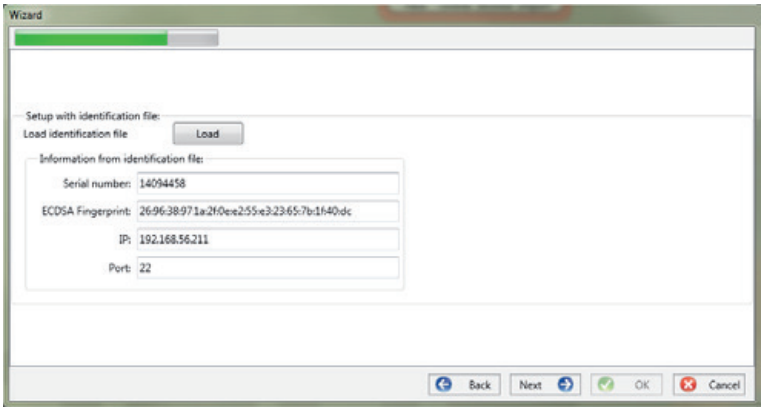
2.3.2.4 Security Wizard - Identification File



If the option Identification file was selected in chapter 2.3.2.2, the *.aei file, which is provided by the instrument via an SD card (see instructions for the measuring device chapter Memory management), must be selected via "Open".



The *.aei file contains all information such as serial number, ECDSA finger-print, IP address and the port parameterized on the encoder. It can be found on the SD card in the main directory of the measuring instrument.

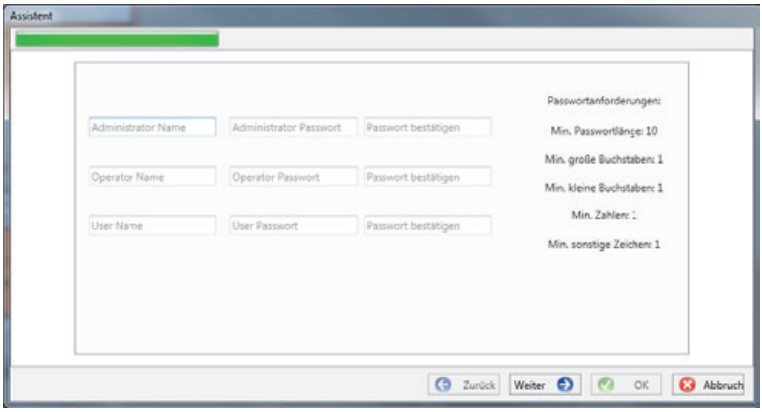


After the file has been selected, all information required for the connection is automatically entered.

In any case, the ECDSA fingerprint must be compared with the fingerprint on the measuring device before clicking Continue in order to uniquely verify the identification!

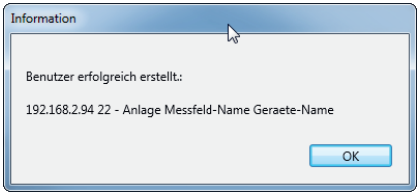
Click „Next“ to download the password guidelines from the meter.

2.3.2.5 Security Wizard - User Setup



For each of the three roles defined (administrator, operator, user), the device requires a user who must be entered together with a password.

Depending on the password policy, a password that complies with the company's IT policy is required.



If all users have been successfully created and transferred to the meter, the following message appears "User successfully created!"

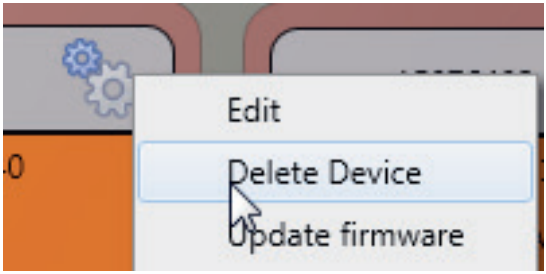
Commissioning in high-security mode is now complete.

The detailed description of rights and roles with specification of rights is listed in the security doc-umentation.

In addition to the three standard users per role, further users can be created in the measuring instrument.

2.3.3 Deleting a device tile

Device tiles can be deleted via the Setup general device menu.

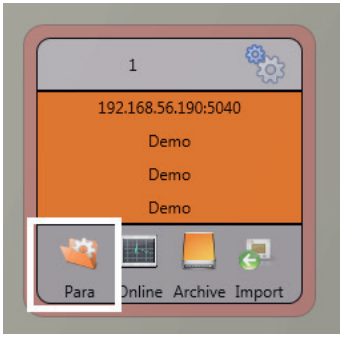


2.4 Device setup

When security mode is switched on, the device can only be parameterised only possible as an administrator after logging in!

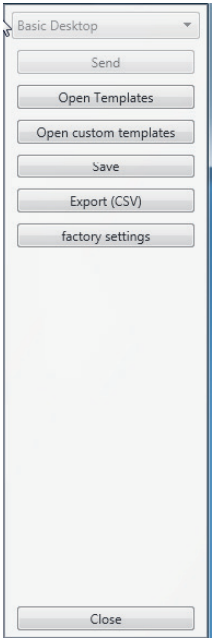
The parameterisation or device setup of the measuring device is started via the Para button on the device tile. Parameterisation can be carried out in a basic or expert view. You can switch between these views using the corresponding selection field in the right-hand main menu of the parameterisation window.

The main menu (see figure below right) is displayed in the right-hand area of the parameterisation window. The parameter menu with the selection of parameter groups is displayed in the left-hand window area (see illustration below right).



2.4.1 Main Menu: Views and functions

The basic view enables application-guided parameterisation of the device, while the classic expert view shows the parameter structure of the device in list form. The corresponding description can be found in chapter 2.5. The service view should only be used for parameterisation with the KBR Service.



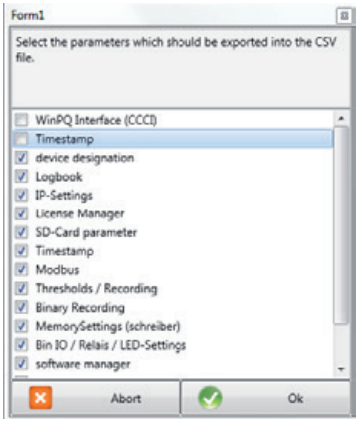
Incorrect parameterisation can lead to malfunctions!

Mit **Senden** werden die in der Oberfläche eingestellten Parameter an das Gerät gesendet. Mit **Vorlage Öffnen** bzw. **Eigene Vorlage Öffnen** können verschiedenen Normvorlagen oder selbst erstellte Vorlagen geladen werden.

- 0 Low voltage network according to EN50160 and trigger settings
- 0 Medium voltage network according to EN50160 and trigger settings
- 0 High voltage network according to EN50160 and trigger settings
- 0 IEEE519 for different voltage levels

Save saves the settings you have made in an XML file.

The Export CSV function can be used to output all or selected device parameters in a CSV file.



Selection dialog for exporting the desired data

36		
37	Frequency	50
38	Frequency ripple signal voltage [Hz]	168
39	Flicker bulb	1
40	Normalized voltage L-L-Sp. [percent from UNOM]	100
41	hysteresis 1/2-Perioden-voltage [percent from UC bzw. UC/	1
42	tolerance band fast voltage change RVC, dd [percent from U	1
43	|dmax|-threshold fast voltage change RVC [% from UC bzw.	6
44	threshold voltage dip (Dip) [percent from UC bzw. UC/1.73]	90
45	threshold voltage swell (threshold) [percent from UC bzw. U	110
46	threshold voltages interruption [percent from UC bzw. UC/1.	5
47	lower threshold 10s- network frequency /Hz	49,5
48	higher threshold 10s-Total network frequency /Hz	50,5
49	lower threshold 10min-voltage [percent from UC bzw. UC/1.	90
50	higher threshold 10min- voltage [percent from UC bzw. UC/1	110
51	threshold 10min-THD [percent]	8
52	threshold 10min-voltages unbalance [percent]	2
53	threshold short time flicker PST	1
54	threshold long time flicker PLT	1
55	threshold 3 Sec -ripple signal voltages [percent from UC bzw.	9
56	Trigger-threshold 200ms-ripple signal voltage recorder [perc	1
57	limit table 10min-voltages harmonic (H2) [percent]	2
58	threshold 10min-voltages harmonic (H3) [percent]	5
59	threshold 10min-voltages harmonic (H4) [percent]	1
60	threshold 10min-voltages harmonic (H5) [percent]	6
61	threshold 10min-voltages harmonic (H6) [percent]	0,5
62	threshold 10min-voltages harmonic (H7) [percent]	5
63	threshold 10min-voltages harmonic (H8) [percent]	0,5
64	threshold 10min-voltages harmonic (H9) [percent]	1,5
65	threshold 10min-voltages harmonic (H10) [percent]	0,5
66	threshold 10min-voltages harmonic (H11) [percent]	3,5

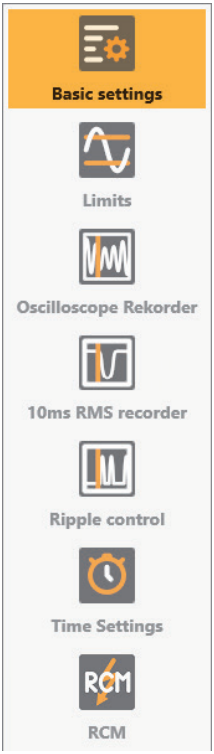
Example of a CSV file in Excel

The "Factory settings" option resets all settings on the device to the factory settings with the exception of the TCP/IP settings and licence settings. After the measuring device has been reset to the factory settings, the the wizard must be carried out again! All measurement data is deleted from the device after the wizard has been run! Close closes the parameterisation is closed. Any changes that have not been saved will be lost!

2.4.2 Parameter Menu: Device parameters and settings

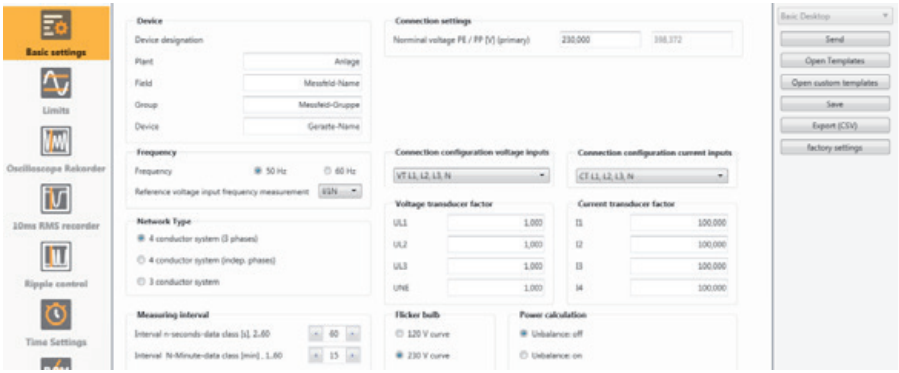
The device parameters and settings are divided into functional groups and can be selected in the left-hand window area (see illustration on the right). These are explained in more detail in the following sections. The various parameters are partly dependent on each other and also on the template loaded or selected when commissioning the device.

Further explanations of the various values as well as the metrological background can be found in chapter 2.5.



2.4.3 Basic Settings

All main settings can be found into the basic settings window.



To provide a clear overview, all parameters are bundled into functional groups.

2.4.3.1 Device

All device identifiers can and should be entered here for a clear assignment of the measuring device. These identifiers are used for the display in the WinPQ lite interface, when copying the data to an SD card (folder name) and also for the unique assignment in the WinPQ database.

2.4.3.2 Anschlusseinstellungen

Nominal voltage (phase to earth) in volts is defined here (primary). The measuring device relates all trigger thresholds or PQ events to the set nominal voltage. The contractually agreed phase-to-phase voltage, e.g. 20400 V, is specified as the nominal voltage in the 3-wire system. In the 4-wire network, the phase-to-earth voltage is specified, e.g. 230 V

2.4.3.3 Netzfrequenz

Selection of the mains frequency and selection of the reference voltage input for the frequency frequency measurement.

2.4.3.4 Netzform

With the 3-wire or 4-wire system setting, the device differentiates between the type of system to be measured. In an insulated 3-wire system, all ratings of the EN 50160 standard are calculated from the phase-to-phase voltages. In a 4-wire system (earthed system), all PowerQuality parameters are determined from the phase-to-earth voltages. In the 4-wire, independent phases, the events are also determined from the phase-to-earth voltages. In addition, the power of the individual phases is calculated independently in the 4-wire system with independent phases.

2.4.3.5 Connection configuration of voltage and current inputs

Select the connection configuration and the voltage transformer factors.

The transformation ratio of the current and voltage transformers to which the power analyser is connected must be entered in the transformer settings.

1 Example:

0 Voltage: primary = 20.000 V; secondary = 100 V
⇨ internal conversion factor knu = 200

0 Current (C30/C31): primary = 100 A; scondary = 5 A
⇨ internal conversion factor kni = 20

For the small signal inputs at the current input with the characteristics C40, C44, C45, the conversion factor kni has to be determined via the following relationships. The numerical values are purely example values, the correct values are to be taken from the data sheets for the specific application.

The conversion factors have to be entered identically on all four phases.

2.4.3.6 Measuring interval

Configuration of the two adjustable recording intervals N-seconds and N-minutes. In addition to the class A measurement intervals, numerous values can be recorded by the PQI-DE at freely adjustable intervals. For example, this can be used for the measurement of maximum power in the 15 minutes interval. The inter-vals are always synchronic to full hours.

2.4.3.7 Flicker-Curve-Lamp model

Selection of the lamp model for a 120 V or 230 V flicker curve. In 120 V systems (mostly South America, America), a different flicker curve is specified than in a 230 V system (Europe, Asia, Africa).

2.4.3.8 Power calculation

Selection of power calculation with or without asymmetry.

The power calculation in the device firmware can run in different measurement functions. The various reactive power types can be switched on or off as required. This has an influence on the calculation of the collective total image power and the apparent power.

0 Unbalance
On: Power calculation according to DIN 40110-Part 2 - with calculation of the Unbalanced reactive power is the factory setting of the device.
This setting is strongly recommended for measurements on the transformer, for example.

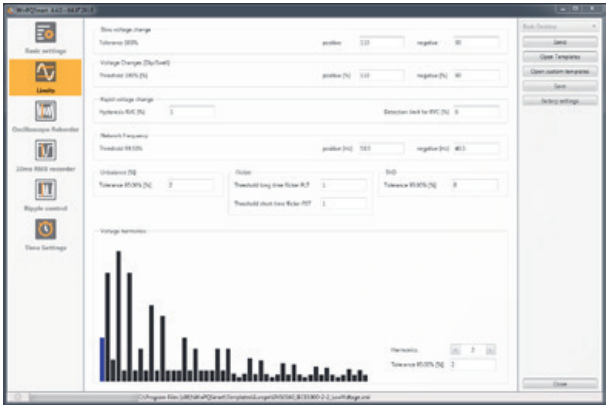
0 Unbalance:
Off: The power calculation is performed without the unbalanced components (single-phase systems).

This setting has an influence on the measured power values of the reactive and reactive and apparent power values in the device display, the online measurement data and the recorded measurement data as well as in the control technology!

2.4.4 Limits

In this menu, all limit values of the currently set standard or loaded standard template are preselected. The compatibility levels can be changed by the user. This setting has a direct influence on the standard reports!

It is recommended to work with standard templates!



For a better overview, all parameters are summarised in functional groups. The various (physical) variables and their calculation are defined and described in the instructions for the measuring device in the Webserver chapter..

1 Voltage changes
Limits for slow voltage changes and fast voltage changes (for details see the respective standard).

1 Frequency
Upper and lower limit value of the permitted frequency deviation in relation to the set grid frequency.

1 Unbalance
Limit value for unbalance.

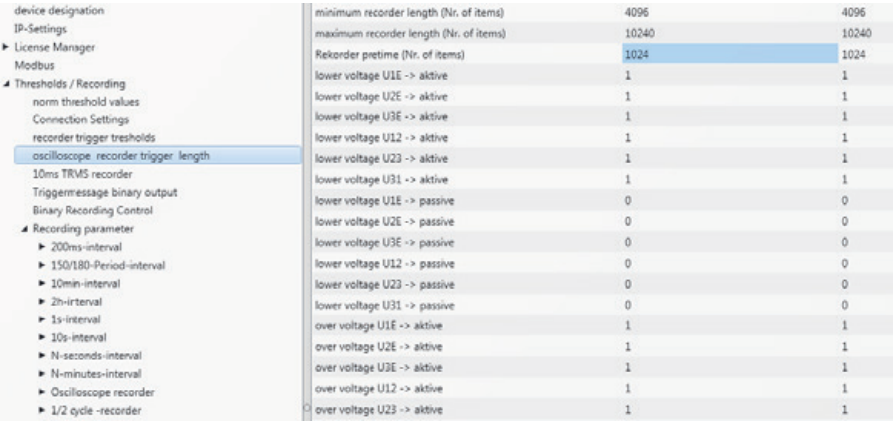
1 Flicker
Limits of long and short-term flicker.

1 THD
Limits of the Total Harmonic Distortion.

1 Voltage harmonics
Limits of voltage harmonics with direct selection.

2.4.5 Oscilloscope Recorder

The trigger conditions and thresholds, i.e. trigger criteria for oscilloscope recorder, as well as other settings of the oscilloscope recorder can be set in this menu. In default configuration, an effective value threshold of +10% and -10% of the nominal voltage is defined.



minimum recorder length (Nr. of items)	4096	4096
maximum recorder length (Nr. of items)	10240	10240
Rekorder pretime (Nr. of items)	1024	1024
lower voltage U1E -> aktive	1	1
lower voltage U2E -> aktive	1	1
lower voltage U3E -> aktive	1	1
lower voltage U12 -> aktive	1	1
lower voltage U23 -> aktive	1	1
lower voltage U31 -> aktive	1	1
lower voltage U1E -> passive	0	0
lower voltage U2E -> passive	0	0
lower voltage U3E -> passive	0	0
lower voltage U12 -> passive	0	0
lower voltage U23 -> passive	0	0
lower voltage U31 -> passive	0	0
over voltage U1E -> aktive	1	1
over voltage U2E -> aktive	1	1
over voltage U3E -> aktive	1	1
over voltage U12 -> aktive	1	1
over voltage U23 -> aktive	1	1

For a clearer overview, all parameters are organized in functional groups. If a field is greyed out and/or not selected, this trigger criterion is not active or cannot be activated. The parameters of the current trigger can be displayed either absolute or as percentage value of the nominal current (setting in the basic configuration).

The trigger thresholds of the oscilloscope and RMS recorder are not completely independent. All common parameters are automatically adjusted in both recorders.

2.4.5.1 Voltage and current trigger

The trigger thresholds refer to the set nominal voltage as a percentage, e.g. 230 V or 400 V in the Basic settings menu item. If the voltage falls below the lower trigger threshold or exceeds the upper trigger threshold, a recorder recording is started, whereby the 10 ms effective values form the basis for the measured value. If the set value (measured value basis 10ms effective values) of the effective value jump and phase jump (in degrees) is violated, the recorder is started. The envelope curve trigger starts a recorder recording in the event of a so-called sine wave violation. The measuring device detects a violation of the envelope of the sine curve at the sampling level (e.g. commutation dips). In practice, a setting in the range of 10 to 25% (of the nominal voltage) is usually recommended.

2.4.5.2 Symmetrical Components Trigger

Starting the recorder when values of symmetrical components are violated (settings of the trigger thresholds analogue to those of voltage and current triggers).).

2.4.5.3 Frequency trigger and frequency jump

Start the recorder if the values fall below or exceed the set mains frequency (basic settings). The ROCOF (Rate of Change of Frequency) is triggered with the frequency jump parameter. Filters are used for internal processing and determination of the ROCOF, which can be optimised for each application in the field. To design these filter coefficients, please contact product support, who will be happy to provide you with the white paper and package for recording the ROCOF. The standard parameters are suitable for detecting ROCOF>0.2Hz/s with a duration of at least 0.25s.

2.4.5.4 Binary Trigger

Starten des Rekorders bei externen Trigger-Befehl (via Software) sowie auf eine fallende bzw. steigende Flanke an Binäreingang 1 bis 8

2.4.5.5 Recorder length and Pre-event time

The recording length is the total recording time for the oscilloscope image in milliseconds. The prehistory is defined as the time that has elapsed before a (trigger) event occurs and is also recorded.

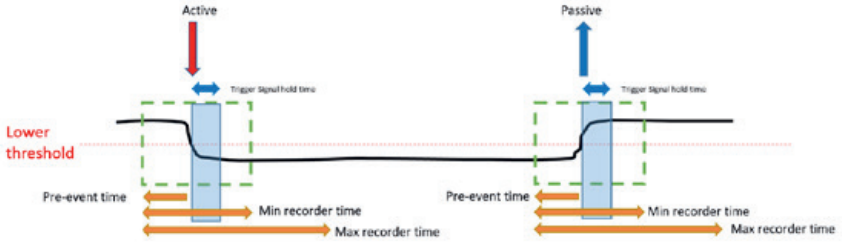
The measuring device has a minimum recording length and a maximum recording length for a fault record. The minimum recording length is extended up to the maximum recording length depending on the trigger condition. This offers the possibility to reduce data in order to record short grid events as well as very long grid events completely with the most efficient file size!

2.4.5.6 Active / Passive trigger:

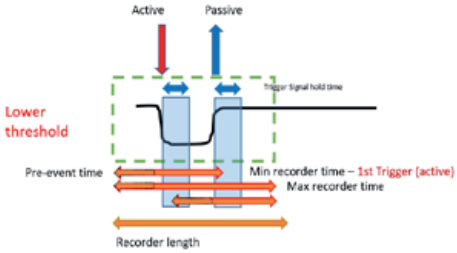
The measuring device has two trigger criteria for each trigger criterion. Active triggering always occurs when, for example, the voltage changes from the permitted state to the unauthorised state. Passive triggering, on the other hand, means that the recorder is triggered from the unauthorised state (e.g. less than 90% of the nominal voltage) to the authorised state.

This feature of the fault recorder makes it possible, for example, to record very long earth faults with an enormous reduction in data. When using active and passive triggering, fault records are recorded both at the beginning and at the end of the grid event with the previous history and the set maximum duration.

Example 1: Single fault with activated " active " and " passive " trigger

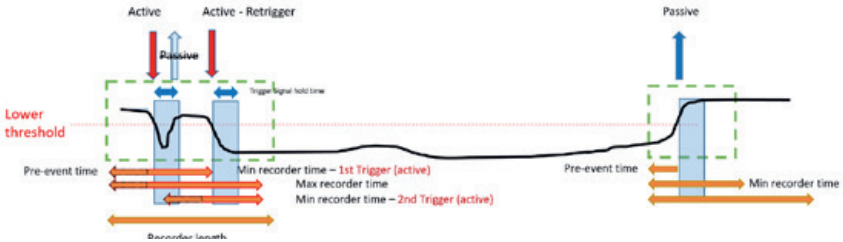


Example 2: Single fault with activated «active» and «passive» trigger & retrigger



If further trigger criteria occur during the minimum recording duration after the holding time of the trigger signal, the recording is extended by the minimum length up to the maximum length. length up to the maximum length.

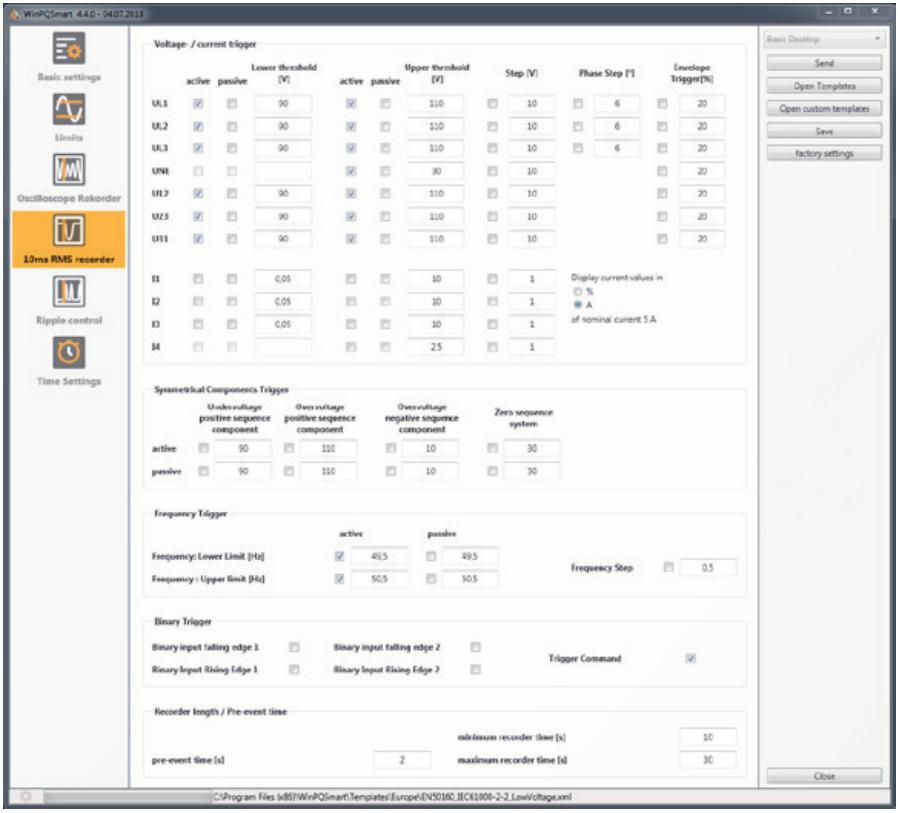
Example 3: double fault with activated «active» and «passive» trig**ger, retrigger com**bined with trigger signal hold time & max time



Info: Passive Trigger is not evaluated during "trigger signal hold time", which can be set up inside Expert mode

2.4.6 RMS Recorder

The trigger conditions and thresholds, i.e. trigger criteria for RMS fault records, as well as other settings for the RMS recorder can be set in this menu item. The default setting is an RMS value threshold of +10 % and -10 % of the nominal voltage.

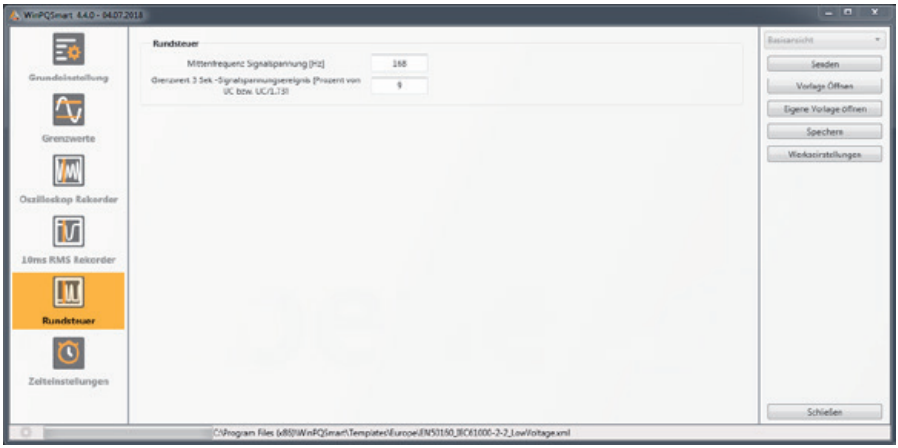


Die Einstellungen verhalten sich analog den Einstellungen des Oszilloskop-Rekorders (siehe vorheriger Abschnitt) und werden an dieser Stelle deswegen nicht noch einmal erläutert. Ist ein Feld grau hinterlegt so ist dieses Trigger-Kriterium nicht aktivierbar. Ein nicht markiertes Feld bedeutet, dass die Trigger Bedingung nicht aktiv ist.

The parameters of the trigger thresholds of the oscilloscope and RMS recorder cannot be set completely independently of each other. All common parameters are automatically adjusted in both recorders.

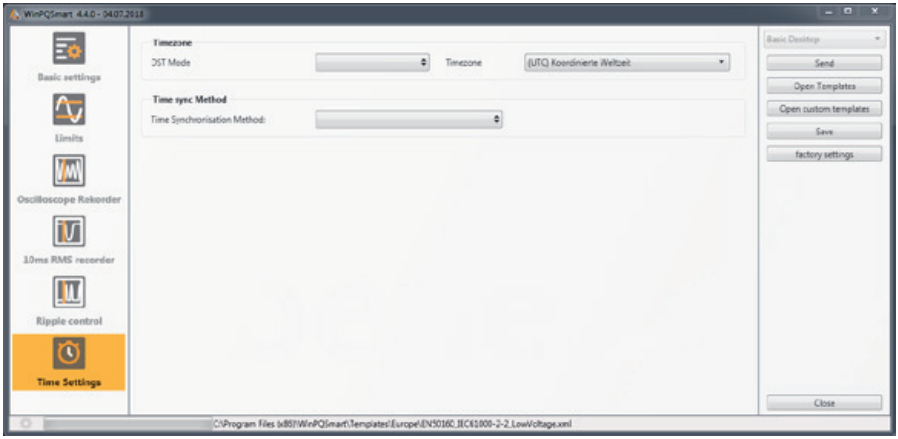
2.4.7 Ripple Control

The parameters centre frequency signal voltage in Hz and the limit value of the signal voltage event as a percentage of the nominal voltage (UC) of the 10/12-period ripple control recording in the long-term data can be set here.



2.4.8 Time settings

In this window, the time settings of the device are parameterized. In the upper area, the time zone and the daylight saving time (DST) can be set.



The time synchronisation method of the measuring device is selected below.
For a highly accurate measurement, an independent time source such as GPS / DCF or NTP is recommended!

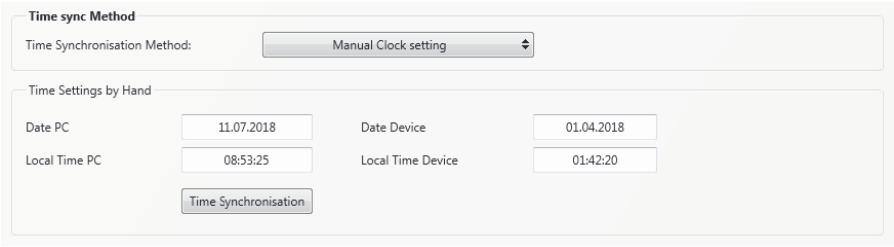
If the connection to the signal of a time synchronisation method fails during the active measurement, the multimess F144-PQ uses its internal oscillator, which has previously been synchronised to the pulse generator. If the connection to the pulse signal is subsequently re-established, the oscillator approaches the time of the pulse signal in the sub-second range (<1sec) in minimal steps. This prevents time jumps in the recording. Any time deviations that occur above 1 second are set to hard.

Depending on the selection, the corresponding settings are displayed.
The necessary set-up steps, e.g. connecting a GPS clock etc., are described in the are described in detail in the instructions for the measuring device in the Time settings chapter.

The following options are available for time synchronisation:

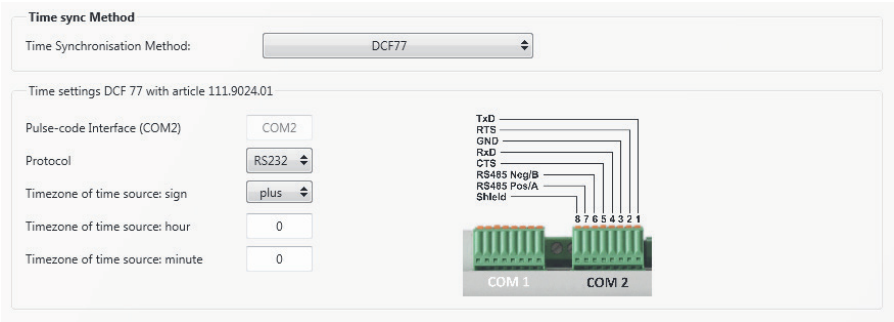
2.4.8.1 Manual Clock Setting

Manual synchronisation of time and date with the computer's local time. After synchronisation, the function is blocked for the current session. The parameterisation interface must be restarted to run it again. The local time of the measuring device is not updated online, but only after the parameterisation has been reloaded.



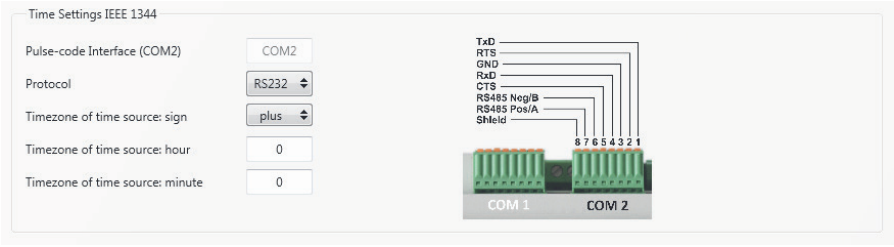
2.4.8.2 DCF77

Settings for synchronization with DCF 77 radio clock.



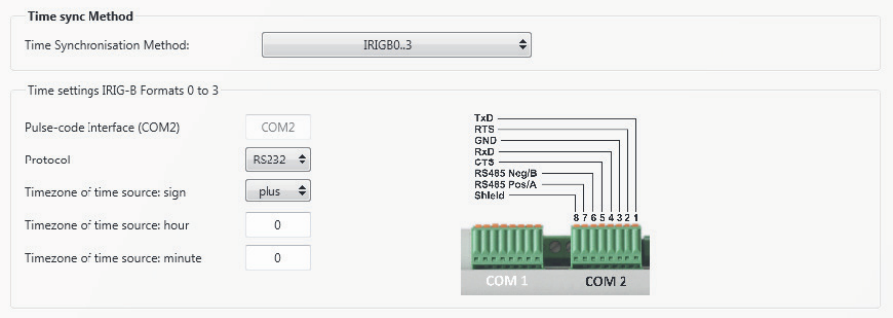
2.4.8.3 IEEE1344

Settings for synchronization according to IEEE1344..



2.4.8.4 IRIGB0..3

Settings after time synchronisation IRIGB formats 0 to 3. This time synchronisation format does not provide any information about the current year! The multimess F144-PQ and multimess D9-PQ measuring devices take the year information year information from the last manual time setting.

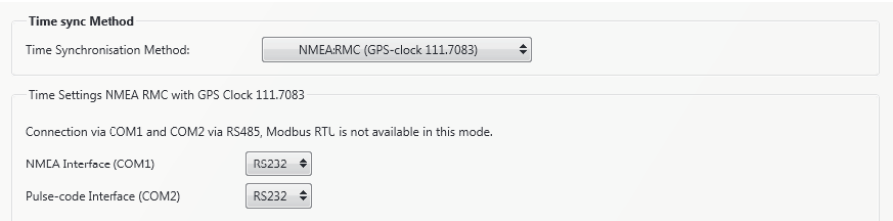


2.4.8.5 IRIGB4..7

Settings after time synchronisation IRIGB formats 4 to 7, cf. IRIGB formats 0 to 3. The year is set here from the time log.

2.4.8.6 NMEA:RMC

Settings for time synchronisation with the GPS clock with NMEA protocol and RMC message format.

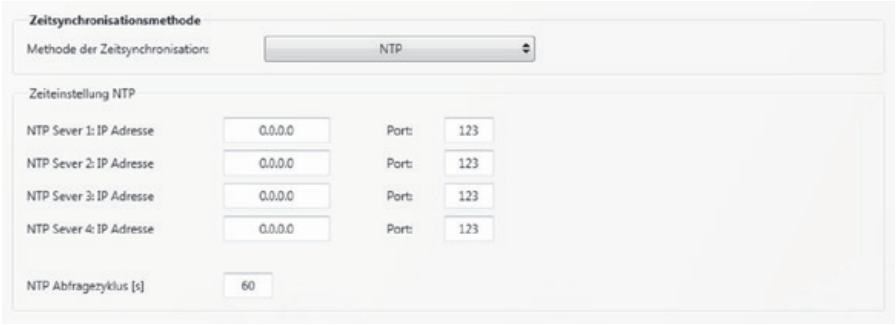


2.4.8.7 NMEA:ZDA

Settings for time synchronisation with the NMEA protocol in message format ZDA, see connection settings NMEA:RMC.

2.4.8.8 NTP

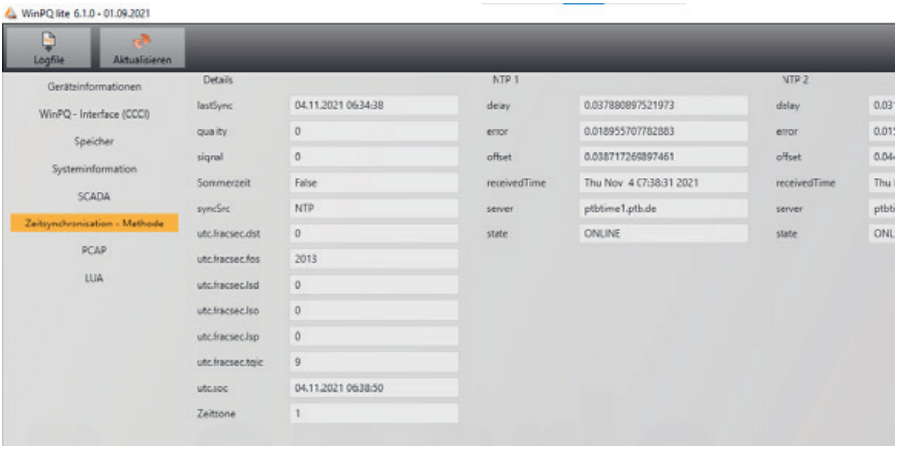
Synchronisation with the Network Time Protocol (NTP). The measuring device supports up to up to four time servers in the network. The device automatically uses the best signal available in the network. It is possible to enter either the IP address of the NTP server or the DNS name of the NTP server. To be able to use DNS, the DNS server must be entered in the DNS server must be entered in the IP settings of the device (supported from firmware V2.6).



Incorrect time settings can lead to errors or problems when recording measurement data! A good quality of the NTP signal must be ensured when using time synchronisation with the NTP protocol! (At least Stratum 8)

The availability of the NTP server, the stratum and the quality of both NTP and the other time synchronisation methods can be checked using the online diagnostics (see chapter 3.2)!

The signal quality and the connection to the server can be checked in the online diagnostics (see device instructions, chapter Web server).



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2.4.9 RCM (Residual Current Measurement), only multimess F144-PQ

The use of residual current measurement is dependent on the D1 licence, which can also be retrofitted.

DIN EN 62020 defines an RCM system that monitors the residual current as a whole. In this case, the RCM system consists of the multimess F144-PQ from KBR and an RCM converter.

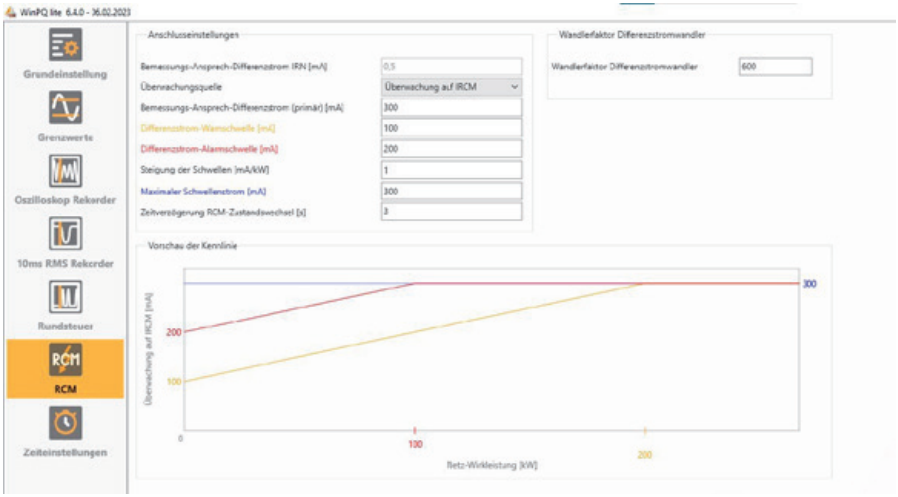
A clear and interactive parameterisation of the RCM input is possible in the RCM menu in the basic view. The display in WinPQlite is only visible once the RCM function has been activated via the device display in accordance with section 6.5.2 of the device manual. The transformer factor residual current transformer must first be defined. The residual current input of the multimess F144-PQ has a rated input current IN of 30mA.
A transformer with a ratio of 600A:1A can therefore measure a maximum residual current IRCM, max of 18A RMS on the multimess F144-PQ:

$$I_{RCM,max} = 30mA * \frac{600A}{1A} = 18A$$

Informative: The specification in the data sheets of the residual current sensors is with 600 A:1A is usually standardised to 1A.

The limit values to be set (residual current warning threshold and residual current alarm threshold) must be entered as absolute values. These refer to the primary rated response residual current of the residual current transformer.

According to DIN EN 62020, the recommended limit values are 150 mA for the warning threshold and 300 mA for the alarm threshold.



Depending on the system situation, it may be necessary to increase the warning and alarm thresholds by a linear factor in order to take account of any leakage currents caused by loads and to avoid false alarms on site. The "Threshold gradient" parameter in [mA/kW] is available for this purpose. If this is assigned the value 0, no gradient is stored. The differential current of the warning/alarm threshold at 0W is selected as the start value of the linear function. Depending on the slope parameter, a linear function is stored as a threshold until the maximum threshold current is reached. Changes to the parameters are visualised directly in the graphic. It is also possible to counteract leakage currents by reducing the frequency resolution (expert settings)

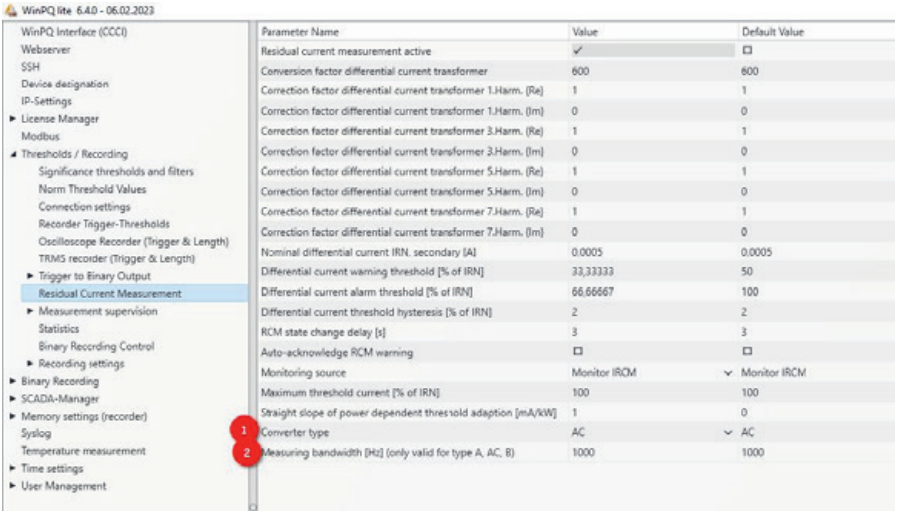
In addition, a time delay for the RCM status change can be parameterised (e.g. change from warning to alarm).

The "Monitoring source" parameter can be used to switch from the measured value "Residual current" (iRCM) to the calculated value "Residual current" (iFCM) for monitoring purposes, in order to trigger the alarm for pure residual currents and not residual currents!

NOTE!	**According to DIN-VDE 62020, only the measured residual current is permit-ted for on-site alarming!**

1 Expert desktop RCM

In the "Expert desktop" area it is possible to specify the connected transducer type (#1). By selecting the transducer type, the overall system consisting of the RCM transducer and the multimess F144-PQmeasures according to the selected type. In addition, a cut-off frequency #2 can be defined depending on the transducer type:



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It must be ensured that the warning and alarm threshold of the residual current in this range is specified as a percentage in relation to the secondary rated response residual current I_{RN}.

0 Typ A:

Type A RCM systems are designed for type A residual currents in accordance with IEC TR 60755 (General requirements for residual current operated protective devices), i.e. they only react as intended to AC residual currents and pulsating DC residual currents of their rated frequency, i.e. the mains frequency. The response thresholds for residual currents with deviating frequencies are not defined. In the case of smooth DC residual currents or AC residual currents of higher frequency, detection is therefore no longer guaranteed with these RCM converters. An excessive DC component in the residual current can even interfere with the detection of the mains frequency AC residual current.

The set cut-off frequency #2 is active here.

0 Typ B:

Many power electronics equipment, such as uninterruptible power supplies, photovoltaic inverters or frequency converters, generate a bipolar square-wave voltage (clocked DC voltage) from smooth DC voltages internally (DC link) or directly as an output voltage, which modulates the sinusoidal output voltage with the desired output frequency by pulse width control. Therefore, in the event of a fault, frequency converters, for example, can cause fault currents with a frequency mixture of the clock frequency, its harmonics and the output frequency in addition to fault currents with mains frequency and smooth DC fault currents. In order to ensure comprehensive detection of residual currents when using this equipment, the RCM systems used for this purpose must also be able to reliably detect smooth DC residual currents and AC residual currents with these frequencies. The standard requires RCM systems of type B to detect up to 1 kHz.
The set cut-off frequency #2 is active here.

0 Typ B+

Type B+ RCM systems differ from type B RCM systems in that they have an extended frequency range. Type B RCM systems are standardised to detect up to 1 kHz. In type B+ RCM systems, the standardised detection of differential alternating currents extends up to 20 kHz.

Here, the set cut-off frequency #2 is not active, but the measured value is always determined from all spectral components up to 20 kHz!

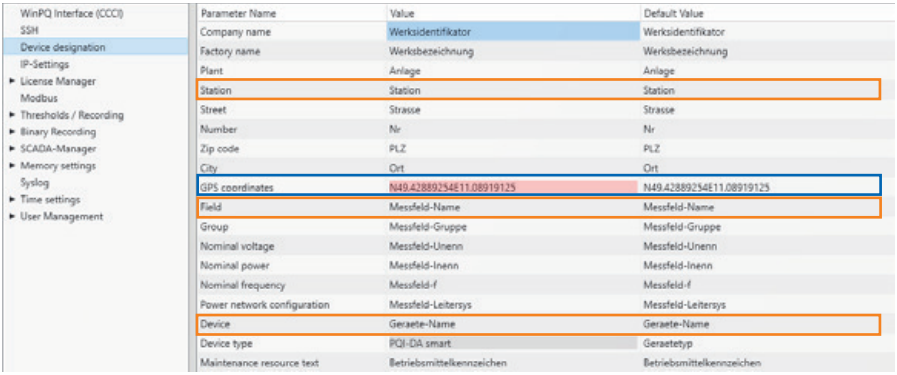
Frequency spectrum of a system with converters with high leakage currents in higher frequency ranges

2.5 Device setup Expert View

To access the advanced settings of the device, such as the parameterisation of data recording or SCADA protocols, the "Expert view" provides a tabular display of the device settings.

2.5.1 Device designations

The description of the device is defined in the "Device names" menu.



The fields marked in orange describe the station tile and all fault records and measurement data in the archive.

The exact position of the measuring device can be entered in the "GPS" field (blue) using the geographical coordinates. To do this, proceed according to the following pattern: The latitude is preceded by N (North) or S (South) depending on the hemisphere. For the longitude, proceed in the same way with E (East) and W (West). The decimal point must be used as the decimal separator; a comma is not accepted by the parameterisation and leads to an incorrect entry!

Table 1: Examples of GPS coordinates

City	Latitude [°]	Longitude [°]	Enter
Berlin	52.5170365	13.3888599	N52.5170365E13.3888599
New York	40.7127281	-74.0060152	N40.7127281W74.0060152
Buenos Aires	-34.6042184	-58.3718455	S34.6042184E58.3718455
Canberra	-35.3075384	149.1245100	S35.3075384E149.1245100

2.5.2 TCP/IP settings

The network settings of the device can be made in the TCP/IP settings section. If the DHCP server is not active, the IP address, the subnet mask and the gateway can be set. The device has Address Conflict Detection (ACD) in accordance with RFC 5227 and RFC 2131, which means that the device queries the network for its parameterised IP address when it is restarted. If it receives a response to such an ARP request, the IP address is not set. If this function is to be deactivated, the parameter "ACD (Address Conflict Detection): Number of packets" must be set to "0".

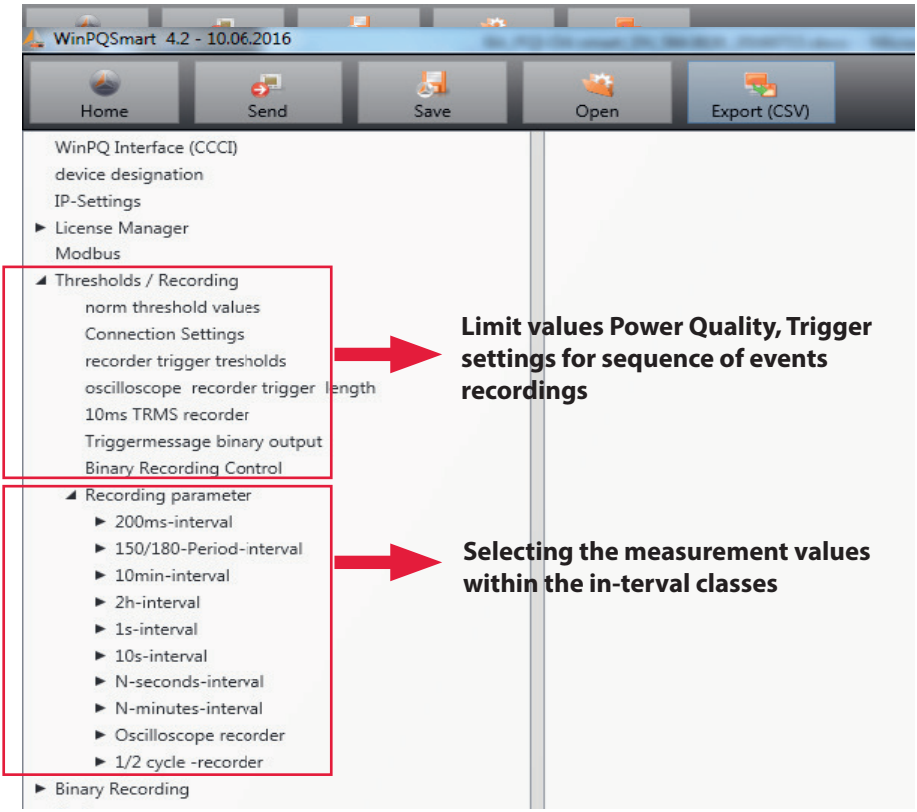
If the IP address is parameterised with WinPQlite to an IP address that already exists in the network, the device does not adopt this after the check. However, there is no feedback to the WinPQlite as to whether the parameterised IP address has been set successfully. In this case, the device remains at the previous parameters.

If an incremental update to V2.10 or newer is installed on a device with a firmware version lower than V2.6, the ACD remains deactivated. However, the ACD is activated immediately on delivery from the factory.

The device also has the option of communicating via the Domain Name Server (DNS). The host name of the device and the IP address of two DNS can be parameterised for this purpose.

2.5.3 Thresholds and Recording

The "Limits / Recording" menu tree contains all parameters for power quality as well as all recording parameters.

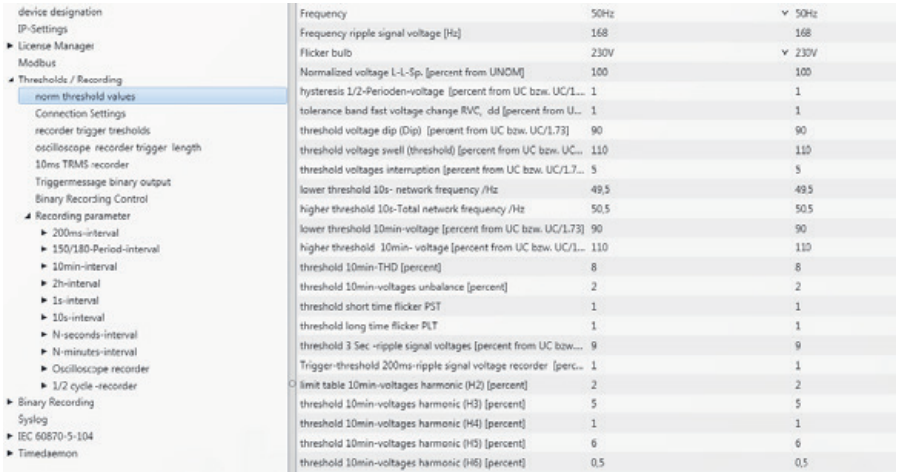


2.5.3.1 Norm thresholds

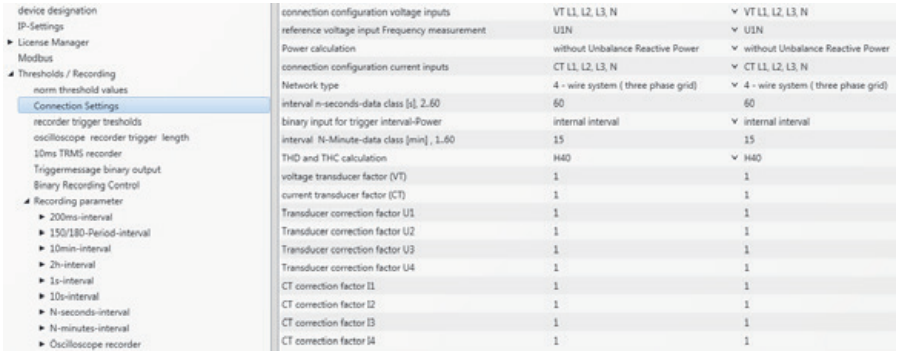
All limit values for a standard evaluation and for power quality events are set in "Standard limit values". The limit values of EN50160 for a low-voltage network are stored in the default setting of the delivery.

0 Value: Limit value in the measuring device - enter change here

0 Factory setting: Default setting on delivery



2.5.3.2 Connection settings



The following basic instrument settings can be made in this menu item:

1 Connection voltage inputs: 1, 2, 3, 4

VT L1, L2, L3, N	V-connection (two voltage transformers)
V-circuit, grounding L1	Grounding L2 = connect VT L1 and VT L3
V-circuit, grounding L2	L2 will be calculated from the device
V-circuit, grounding L3	

1 Reference voltage input for frequency measurement:

Determining the frequency measurement input channel: U1, U2, U3, Une, U12, U23, U31

1 LPower calculation:

0 Simplified power calculation - without calculation of unbalance power

0 According DIN40110-2; with calculation of the unbalance reactive power

1 Connection current inputs:

CT L1, L2, L3, N	Aron connection of current (two CT´s)
CT L2,L3	CT L1, L3 = connect L1 and L3, current
ct's L1, L3	L2 will be calculated from the device
ct's L1, L2	

1 Network connection:

4 - wire system (three phase grid)
4 - wire system (unique independent phases)
3 - wire system

1 Interval "n"-seconds data class:

Adjustable free second interval from 2 seconds to 60 seconds.

1 Binary input for trigger interval of the average power values:

internal interval
synchronised Power values at Binary Input 1
synchronised Power values at Binary Input 2

All power and energy intervals are synchronised to the pulse of the synchronised to the pulse of the binary input.

1 Interval N minutes Data class:

Adjustable free minute interval from one minute to 60 minutes (default setting 15 minutes)

1 Calculation THD / THC of the harmonics:

Calculation of 2nd to 40th harmonic or 2nd to 50th harmonic is adjustable

1 Transformer factor voltage transformer (default setting = 1)

1 Current transformer conversion factor (default setting = 1)

1 Transformer correction factor

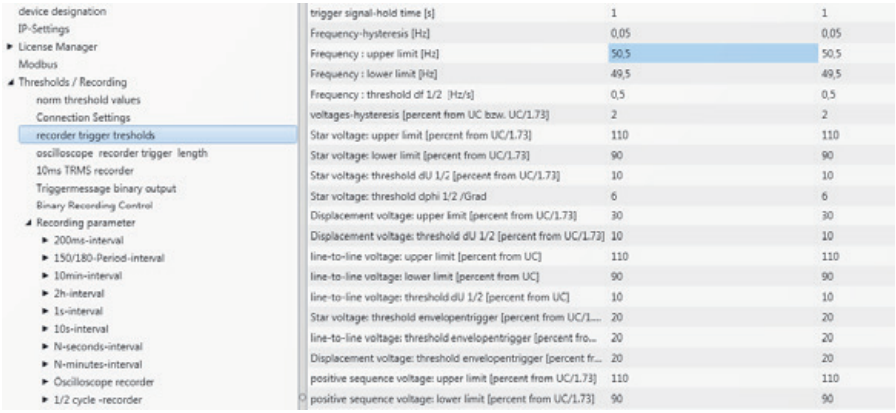
An additional correction value in the range from -2 to 2 can be entered here.
This is multiplied by the voltage and current transformer factor..

Using a current transformer correction factor of "-1",
it is possible to to change the calculated power flow direction using software.

2.5.3.3 Trigger parameter for disturbance recorder

All limit values for triggering fault records are set under "Recorder trigger thresholds"; these limit values can be set independently of the limit values for the power quality events.

Upper and lower trigger thresholds can be set for frequency, voltages, currents and unbalance, currents and unbalance can be set.



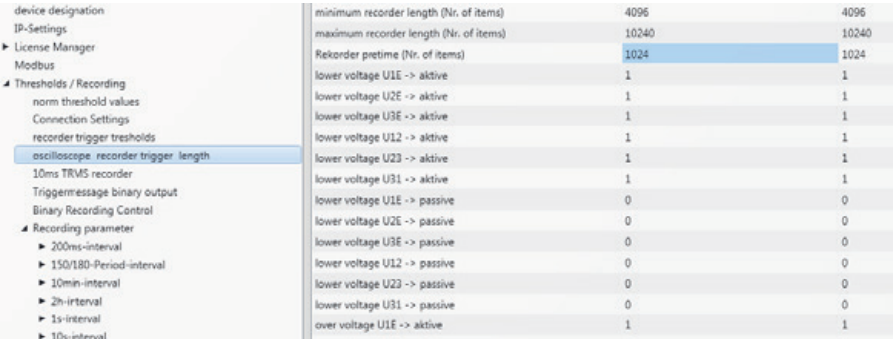
Example:

line-to-line voltage: lower limit [percent from UC]	90
line-to-line voltage: threshold dU 1/2 [percent from UC]	10

If the measured concatenated voltage violates the set limit values of 110% or 90% of the set reference voltage UC, an oscilloscope recorder and/or a ½ period RMS value recorder is triggered.

2.5.3.4 Oscilloscope recorder

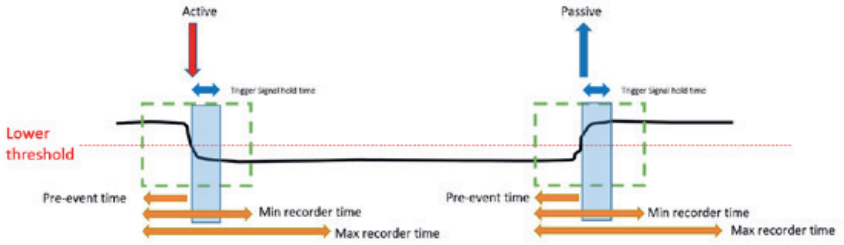
The oscilloscope disturbance recorder is set up under the menu item "Limits/Recording -> Oscilloscope Recorder".



0 Minimum fault record length: Definition of the standard fault record length for the oscilloscope recorder

0 Maximum fault record length: If further trigger criteria occur during the minimum recording duration after the holding time of the trigger signal, the recording is extended by the minimum length up to the maximum length.

0 Prehistory is the period of the fault record before the trigger threshold is reached



0 Active trigger = trigger threshold is exceeded or undershot (start of a fault)

0 Passive trigger = measured value returns to the normal range from outside the trigger threshold (end of a fault)

Sampling frequency: 40690Hz / 10240Hz	40960	40960	10240	40960

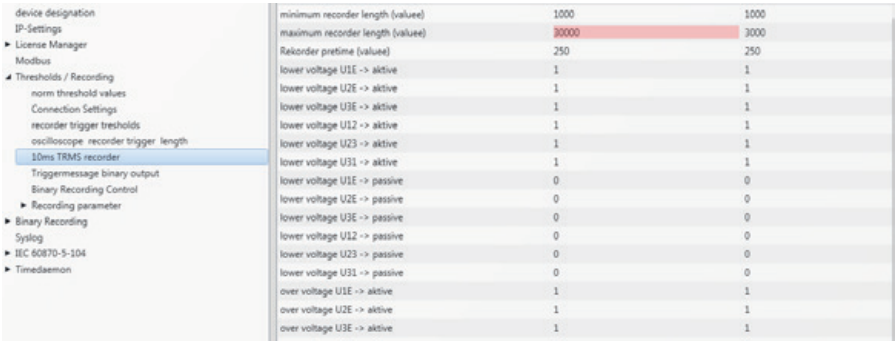
0 Sampling frequency either 10240 Hz or 40960 Hz (40960 Hz only possible with option B1)

The maximum recorder length at 10240 Hz is 16 seconds and 4 seconds at 40960 Hz. at 40960 Hz

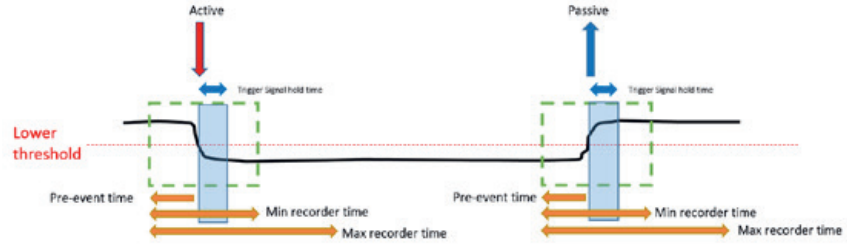
Recording length 20480 means at a sampling rate of 10.24 kHz a recorder length of 2 seconds, or an interference recording length of 50 ms at 40.96 kHz

2.5.3.5 ½ cycle recorder

The ½ period fault record (10 ms at 50 Hz) can be parameterised independently of the oscilloscope recorder.



For an explanation of the trigger conditions, see chapter 2.5.3.4



Example of fault record length

3000 recording points multiplied by 10 ms RMS values results in a fault record length of 30 seconds.

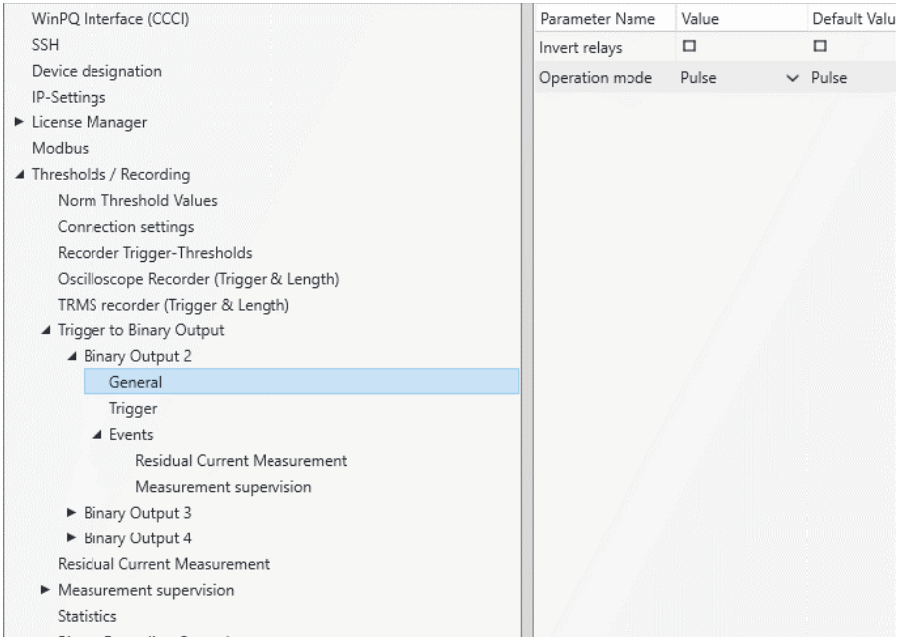
2.5.3.6 Trigger message binary outputs 2 to 4

It is possible to assign all trigger events, the states of the RCM monitoring or the states of the measured value monitoring to binary outputs 2 to 4. In addition, the behaviour of the respective binary outputs can be defined in the General menu. The various parameterisation options are explained below in this chapter.

1 General

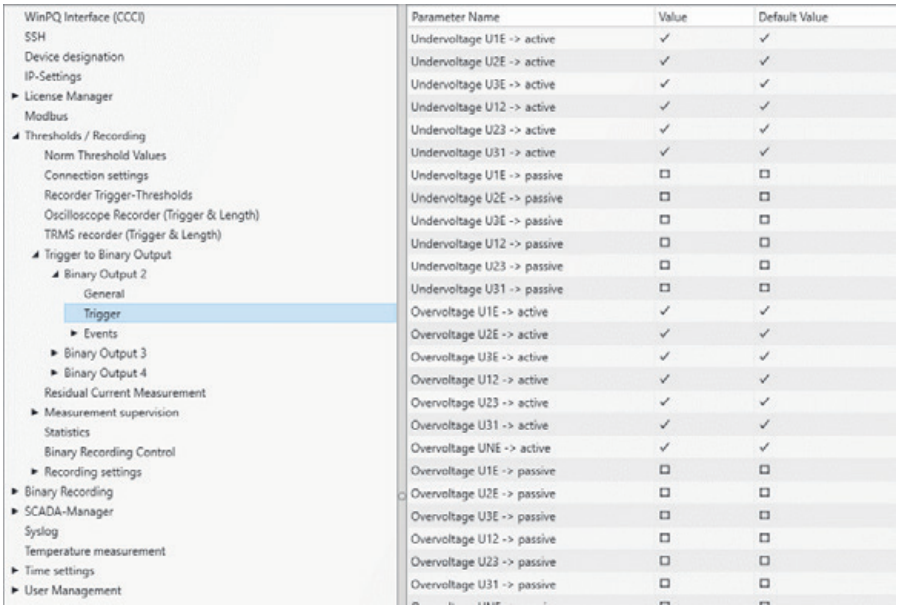
The behaviour of binary outputs 2 to 4 can be defined in the General menu. The relay can be inverted, which results in the following behaviour:

0 Invert relay - The relay behaviour changes from normally open (NO) to normally closed (NC)
0 The following relay behaviour can also be selected:
0 Pulse - Short pulse wipe of the relay of one second.
0 Permanent - The relay remains permanently energised. The permanent mode is used exclusively for the states of residual current measurement and measured value monitoring. The excitations caused by triggers are always are always indicated by a 1 second pulse on the relay.



1 Trigger

In the Trigger menu, trigger events can be defined to which the binary output should react.



Possible trigger events for all phases are:

0 Undervoltage / overvoltage

0 Co-system / counter-system

0 Envelope violation

0 Voltage jump / current jump

0 Phase jump

0 Underfrequency / overfrequency

0 Frequency jump

0 Undercurrent / overcurrent

0 Binary inputs

All trigger events can be set to the start of the fault and the end of the fault (active / passive trigger).

Simultaneous parameterisation of a binary output of trigger events and states is not possible!

When the RCM function is activated (see chapter 6.5.2), the active and passive trigger is also activated in the event of an overcurrent of the residual current IRCM and the residual current IFCM.
It is not possible to deactivate the measured variables, therefore the respective parameterization fields are greyed out (from WinPQ / WinPQlite version 6.0.0).

1 States - Residual current measurement (multimess F144-PQ only)

In the residual current measurement menu, the different monitoring states can be assigned to the binary output. A distinction is made between the following states:

0 Normal

0 Warning

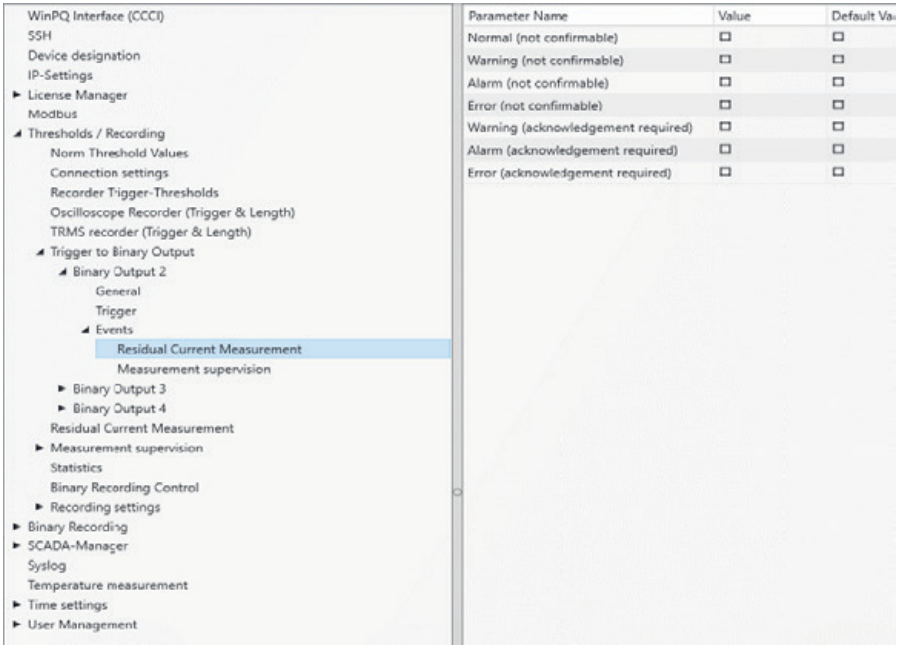
0 Alarm

0 Error

0 A distinction is also made between those requiring acknowledgement and those not requiring acknowledgement.

0 not requiring acknowledgement - The relay remains energized until the status is exited again. is exited again.

0 Requires acknowledgement - The relay remains until the status is acknowledged on the acknowledged on the device display

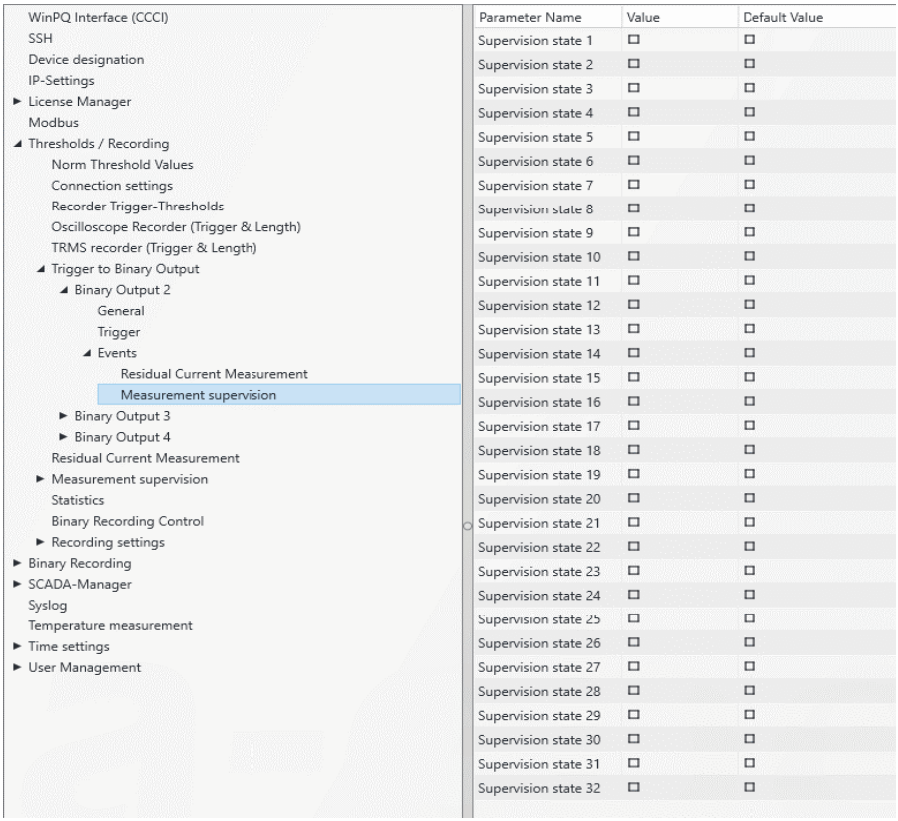


Die Ansteuerung der Relais erfolgt an Hand des definierten Verhaltens mit Eintritt in den festgelegten Zustand.

Simultaneous parameterization of a binary output of trigger events and states is not possible!

1 States - Measured value monitoring

Monitoring states 1 to 32 can be assigned to relays 2 to 4 in the Measured value monitoring menu. The parameterization of the monitoring states is described in chapter 2.11.



The relays are activated on the basis of the defined behavior with entry into the defined state.

Simultaneous parameterization of a binary output of trigger events and states is not possible!!

2.5.3.7 Control of recording via binary inputs

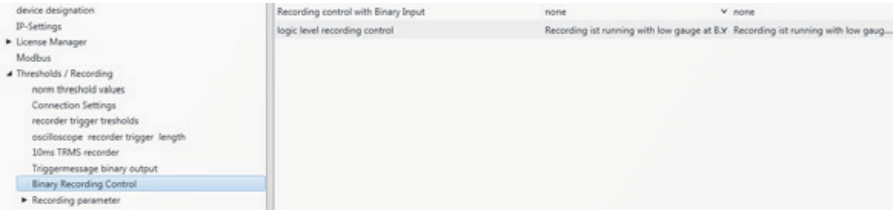
It is possible to control the recording of the measuring device via the input signal of the eight binary inputs.

The following functions can be started or stopped via the digital input:

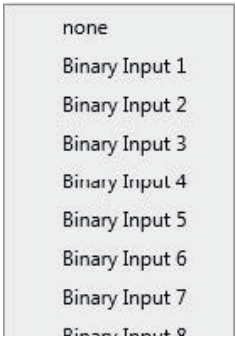
0 All permanent recorder

0 Oscilloscope recorder

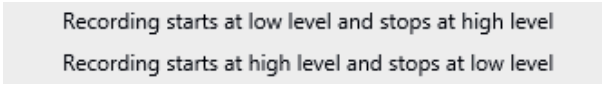
0 ½-cycle RMS recorderr



Recording control can be assigned to one of the eight binary inputs.

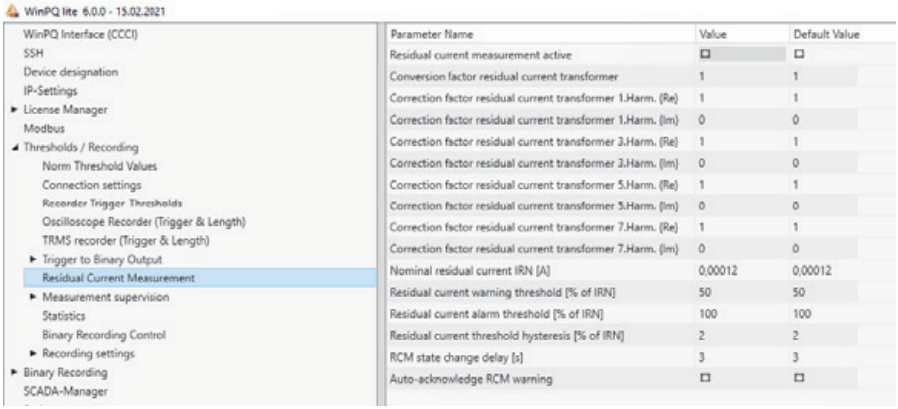


The signal can be negated using the "Logic level recording control" function.



2.5.3.8 Residual current measurement (multimess F144-PQ only)

The residual current measurement menu can be used to set the parameters for residual current monitoring.

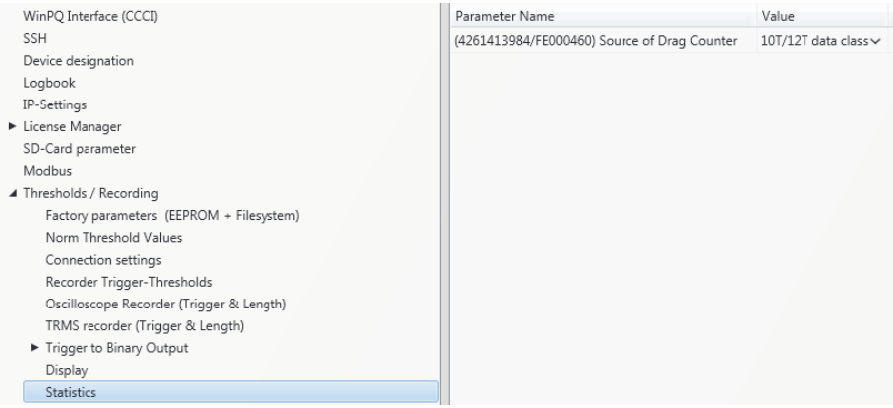


Parameter Name	Value	Default Value
Residual current measurement active	☐	☐
Conversion factor residual current transformer	1	1
Correction factor residual current transformer 1.Harm. (Re)	1	1
Correction factor residual current transformer 1.Harm. (Im)	0	0
Correction factor residual current transformer 3.Harm. (Re)	1	1
Correction factor residual current transformer 3.Harm. (Im)	0	0
Correction factor residual current transformer 5.Harm. (Re)	1	1
Correction factor residual current transformer 5.Harm. (Im)	0	0
Correction factor residual current transformer 7.Harm. (Re)	1	1
Correction factor residual current transformer 7.Harm. (Im)	0	0
Nominal residual current IRN [A]	0,00012	0,00012
Residual current warning threshold [% of IRN]	50	50
Residual current alarm threshold [% of IRN]	100	100
Residual current threshold hysteresis [% of IRN]	2	2
RCM state change delay [s]	3	3
Auto-acknowledge RCM warning	☐	☐

The auto-acknowledgment RCM warning message parameter can be used to automatic reset of the warning message pop-up display can be activated.

2.5.3.9 Statistic

The data class for the extreme values of voltage and current in the device display can be selected via the Statistics menu.



The following data classes are available for this purpose::

0 10/12 periods (200ms interval)

0 1 second intervall

0 10 minutes interval

0 N x minutes interval

It is not necessary to activate the required recording parameters for the respective data class is not necessary!

The extreme values for current and voltage are automatically reset when automatically reset when another data class is selected!

2.5.4 Recording parameters

This is where the selection of measured values within the interval data class for permanent recording. The following interval data classes are available are available (all data classes can record in parallel):

0 10/12 periods (200ms interval)

0 150/180 periods (3 second interval)

0 10 minute interval

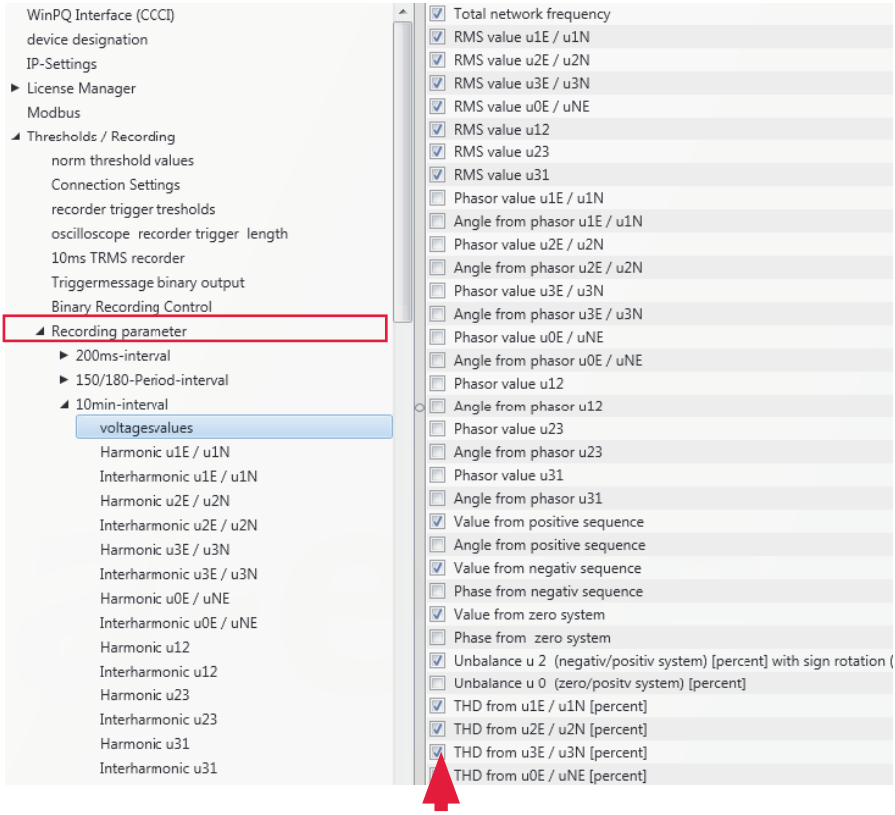
0 2 hour interval

0 1 second interval

0 10 seconds interval

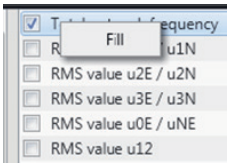
0 N seconds interval (setting range 2 to 60)

0 N minutes interval (setting range 2 to 60 - default setting 15 minutes)



All activated measured values are permanently recorded in this data class.

28808_EDEBDA0332-1424-1_EN



All fields in the list can be filled or deleted using the right mouse button.

When the RCM function is activated (see device instructions chapter 6.5.2), the long-term measurement of the residual current IR, the residual current IFCM and harmonics of the residual current is also activated in the following data classes:

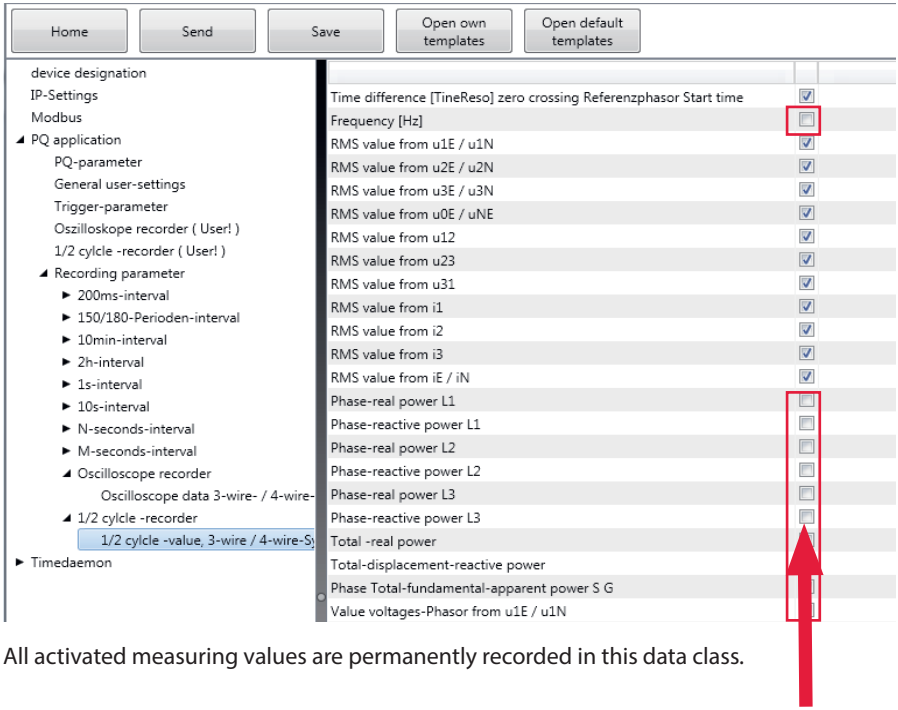
0 150/180 periods (3 second interval)

0 10 minute interval

It is not possible to deactivate the measured variables, therefore the respective parameterization fields are greyed out (from WinPQ / WinPQlite version 6.0.0).

2.5.4.1 Recording parameters - Recorder

For recording the disturbance records (oscilloscope recorder and ½ period RMS recorder), the number of recorded measured values and input channels can be parameterized here..



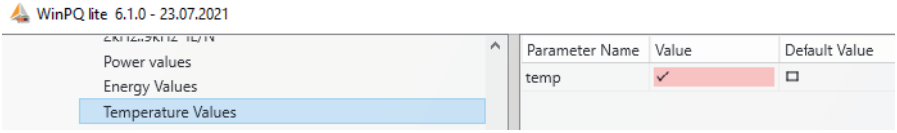
All activated measuring values are permanently recorded in this data class.

Example: In addition to the voltages and currents, the RMS value recorder should also record power and frequency as a 10 ms RMS value. The power values are activated with a tick.

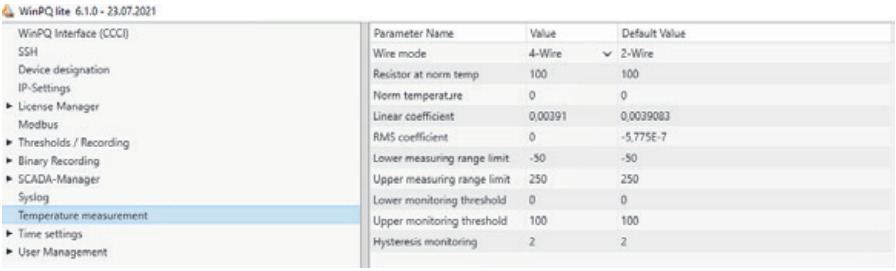
When the RCM function is activated (see device manual chapter 6.5.2 only multimess F144-PQ), the recording of the residual current IRCM and the residual current IFCM in the oscilloscope recorder and half-period recorder is also activated.
It is not possible to deactivate the measured variables, which is why the respective parameterization fields are greyed out (from WinPQ / WinPQlite version 6.0.0).

2.5.5 Parameterization of the temperature measurement (multimess F144-PQ only)

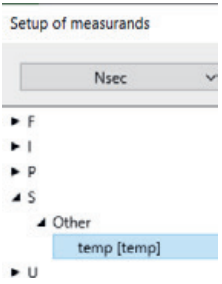
The temperature measurement variables can only be recorded in the two data classes n-seconds and N-minutes. These are deactivated by default and must first be activated by the user in order to use temperature recording.



The properties of the temperature sensor can then be entered in the Temperature measurement tab:



For the connection type, the connection settings from the device manual chapter 5.7.2 (only multimess F144-PQ) must be taken into account. must be taken into account. The other values can be found in the data sheet of the temperature sensor. With the help of the last three fields can be used to generate events when an adjustable adjustable limit value PQ events can be generated.



For the connection type, the connection settings from the device manual chapter 5.7.2 (only multimess F144-PQ) must be taken into account. must be taken into account. The other values can

28808_EDEBDA0332-1424-1_EN

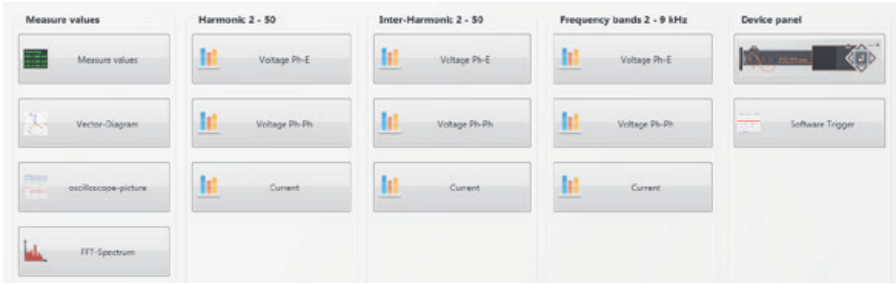
be found in the data sheet of the temperature sensor. With the help of the last three fields can be used to generate events when an adjustable adjustable limit value PQ events can be generated.

The values in the "Value" column are rounded to five decimal places. This is why they are visually different from the factory settings, but contain the identical values!

2.6 Online measurement values

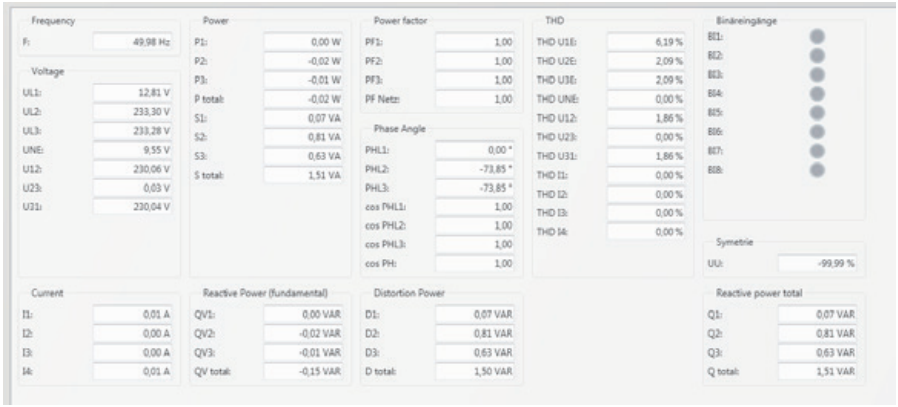
The "Online function offers extensive analysis functions for online measurement values.

Start screen of the online measurement values

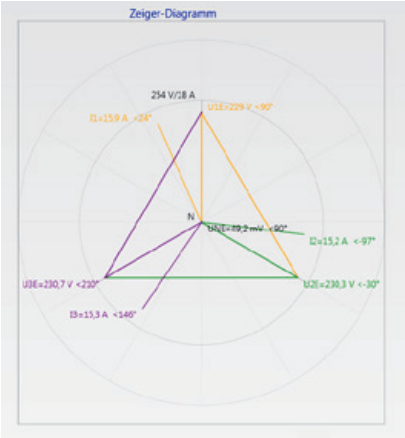


2.6.1 Measurement values

Display of online measurement values for voltages, currents, power and grid frequency.



2.6.2 Vektordiagramm



In the vector diagram, connection faults are easy to detect. All phase voltages and currents are displayed with phase angles..

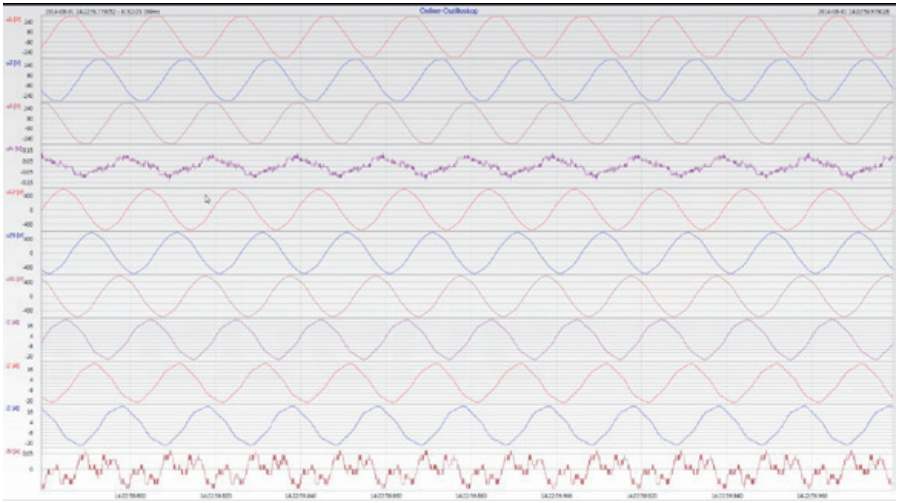
2.6.3 Oscilloscope image

Online oscilloscope (40.96 kHz/ 10.24kHz) for the following channels:

0 Conductor-earth voltages L1, L2, L3, NE

0 Conductor-conductor voltages L12, L23, L31

0 Currents L1, L2, L3, N

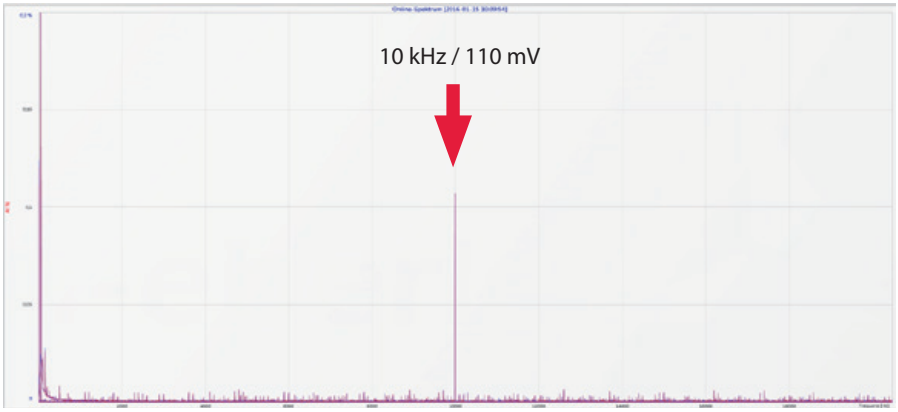


2.6.4 Online spectrum FFT-Analysee

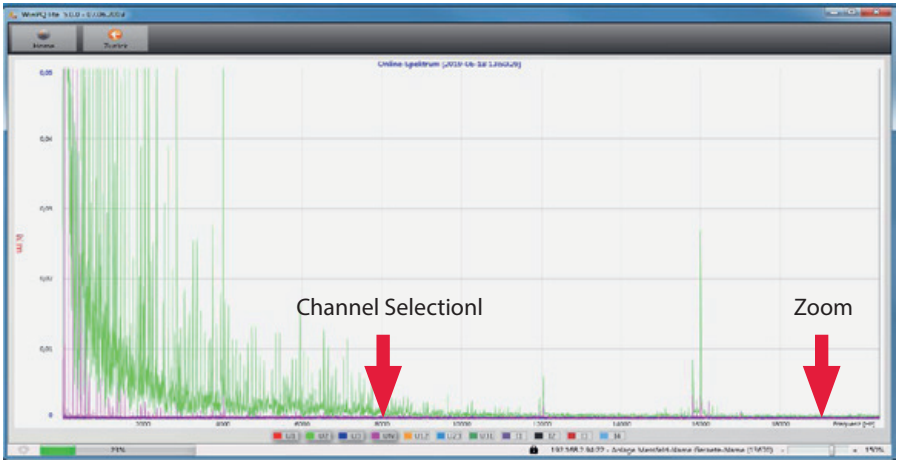
Online-FFT analysis depending on the license of the device

0 Sampling frequency 41.96 kHz = FFT analysis up to 20 kHz

0 Sampling frequency 10.24 kHz = FFT analysis up to 5 kHz



Example: charging device for electrical cars / 10 kHz sampling frequency visible in the FFT analysis.



Using the zoom function it is possible to adjust the scaling of the application.

Using the buttons U1 / U2 ...I4 it is possible to fade in and fade out channels every second during refresh..

2.6.5 Harmonic

From the Harmonics tab page, all of the current and voltage harmonics (2nd to 50th) can be displayed online. The measurement data is calculated by the measuring device in accordance with IEC61000-4-30 Class A Ed. 3 and transferred to the PC.

There are three bar charts available:

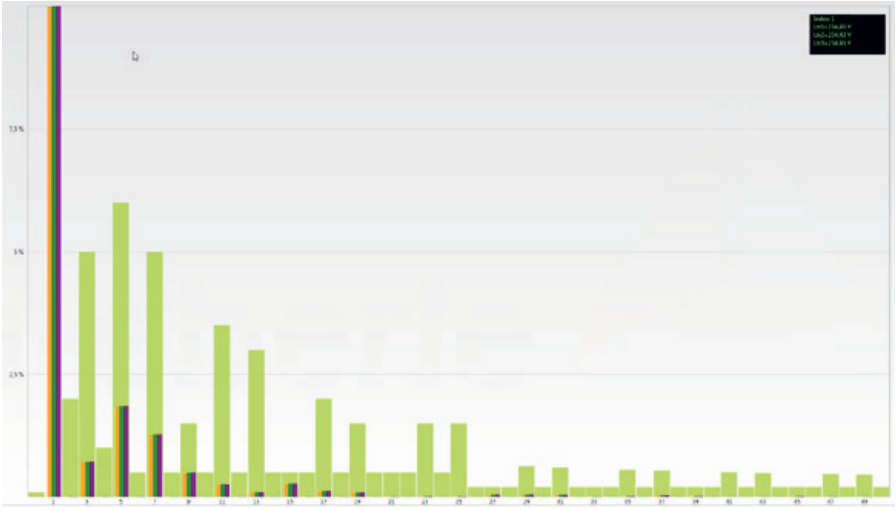
0 Voltage harmonics conductor-earth

0 Voltage harmonics conductor-conductor

0 Current harmonics

As the EN50160 only specifies limits for harmonics up to the 25th ordinal, the compatibility level of IEC61000-2-2 has been stored for the 26th to the 50th harmonics in the basic settings.

Compatibility levels in accordance with EN50160 & IEC61000-2-2 are shown as green limit value bars.



If a harmonic is selected with the mouse pointer, this measurement value is displayed in the field on the top right.

2.6.6 Interharmonic

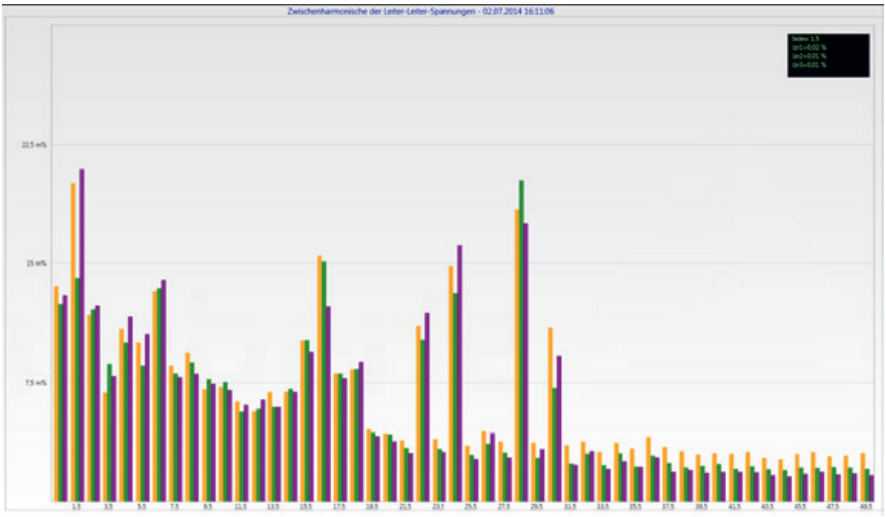
The Interharmonic card is used to display all current and voltage Interharmonic up to 2,500 Hz online. The measurement data is calculated by the measuring device in accordance with IEC61000-4-30 Class A follow-ing the grouping process and transferred to the PC.

There are three bar charts available:

0 Interharmonic voltages line-earth

0 Interharmonic voltages line-earth

0 Interharmonic currents

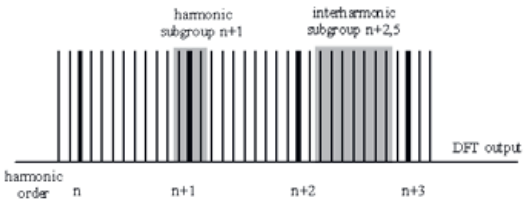


If an Interharmonic is selected with the mouse pointer, this measurement value is displayed in the field on the top right.

1 **Explanation of the grouping process in accordance with the IEC:**

To evaluate the Interharmonic in the grid, subgroups are created. In each case, all of the Interharmonics between two harmonics are combined into one harmonics subgroup.

Example for 50 Hz: Interharmonic H2 includes all frequencies from 110 Hz to 140 Hz.



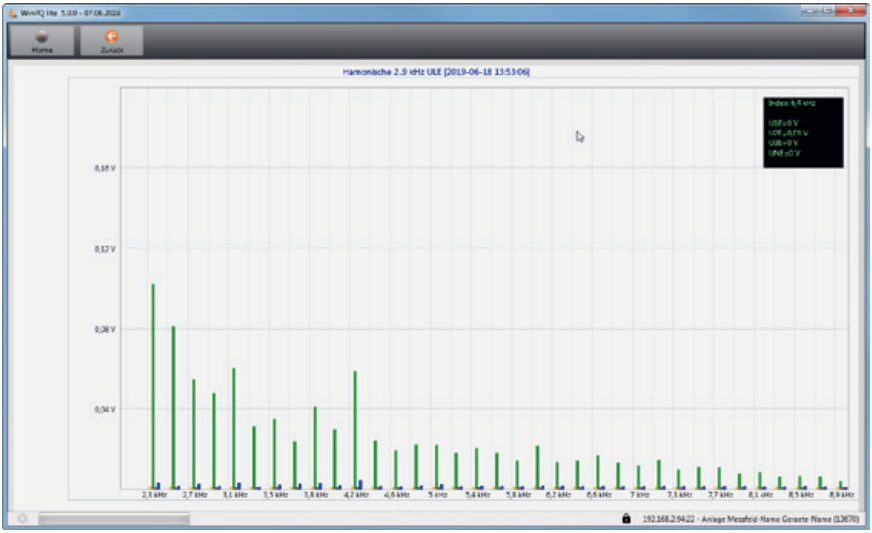
2.6.7 Supraharmonics from 2 kHz to 9 kHz

1 The device characteristic "Supraharmonics from 2kHz to 20 kHz" is a device option

The card 2 to 9kHz is used to display all current and voltage harmonics in 200 Hz groups. Evaluation is in accordance with the IEC61000-4-7 standard.

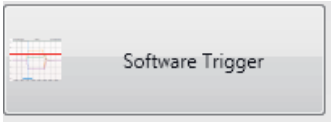
The centre frequency of the corresponding frequency band is stated.

Example: All frequencies from 8,805 Hz to 9,000 Hz are located in the 8.9 kHz band.



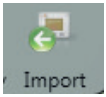
If a frequency band is selected with the mouse pointer, this measurement value is displayed in the field on the top right.

2.6.8 Software trigger

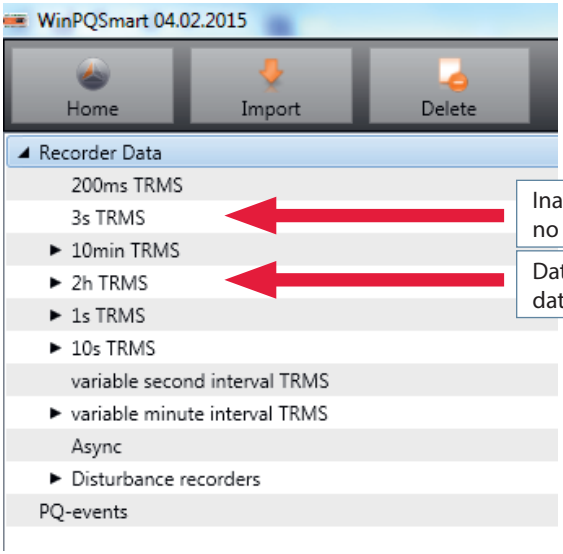


The "Software Trigger" key can be used to trigger the oscilloscope recorder and ½-period RMS recorder manually. The recorder length corresponds with the settings in the setup menu of the device.

2.7 Measurement data import



The Import function can be used to load all measurement data from the measuring device to the PC and to evaluate it there.

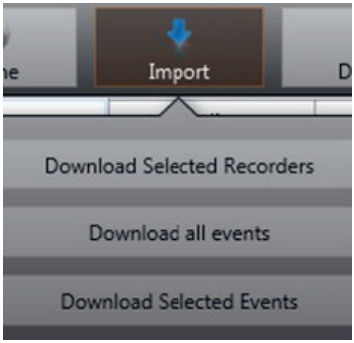


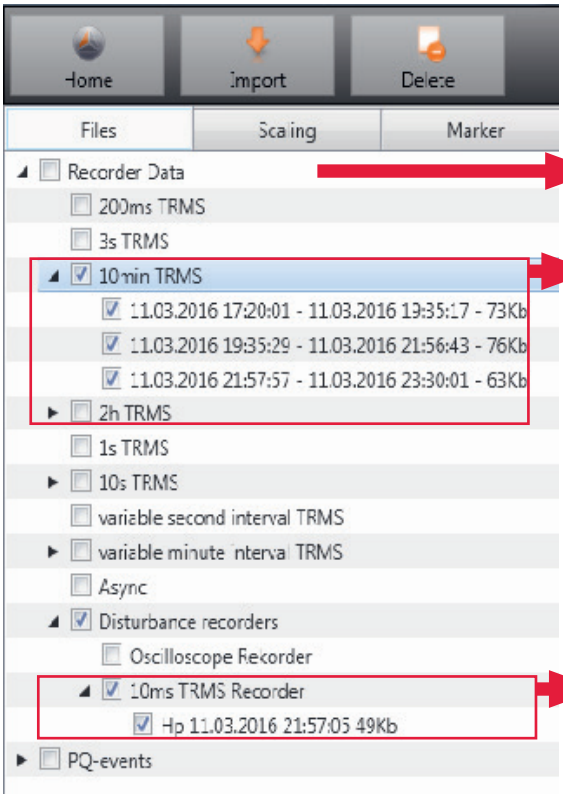
Import of data can be selected to:

0 Only selected data files from the device

0 All events

0 Selected events





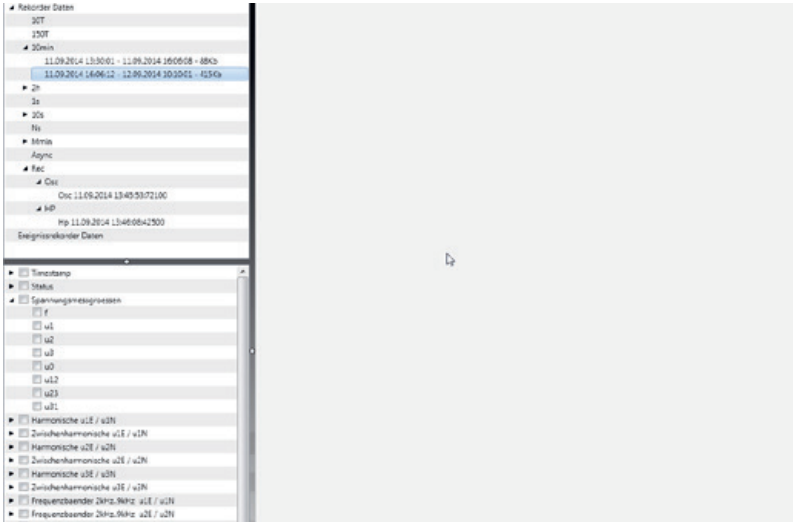
Selecting the main folder "recorder date" will activate all available data for download

Example:
Selection of all 10-minute measurement files (4 permanent recorders available)

Example:
Selection of certain triggered fault records (10 ms RMS recorder)

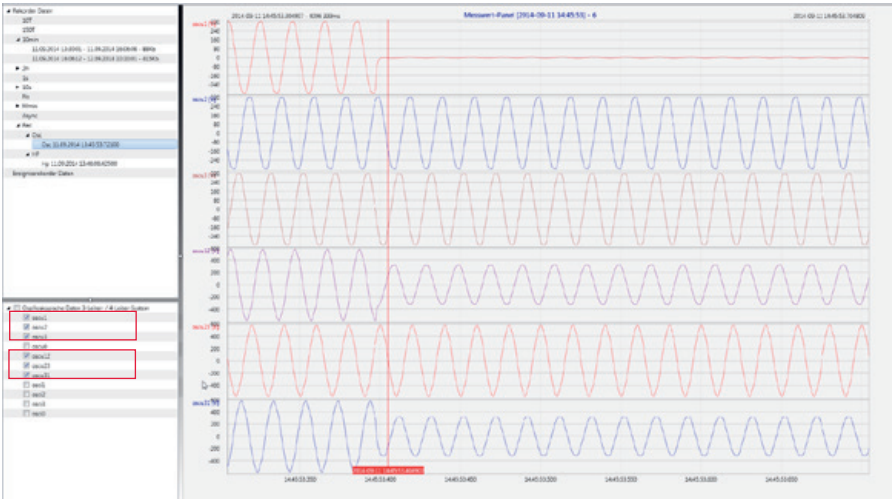
1 Level-time diagram of permanent measuring data

When a file is selected this measurement data is saved on the PC immediately and a selection field with all available measurement data appears in the window.

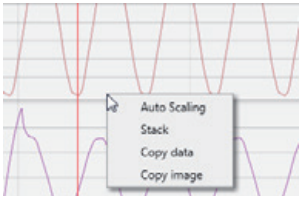


If individual measured values are selected, they appear on the screen as a level-time diagram.

Example: RMS value recorder - selection of voltage, THD L1, L2, L3

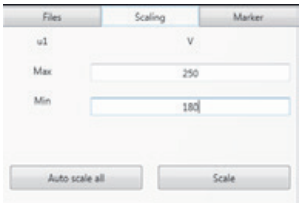


Right-clicking the graphics with the mouse will open the following menu:



1 Functions:

0 **Scaling:** The Y-axis of the measured values can be scaled manually. A menu appears in which the last marked measured value in the graph can be scaled freely or automatically.



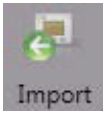
0 **Change display:** This function changes the display of the measurement data. Identical measured values can be grouped or given separate Y-scales.

Example: presentation of voltage L1, L2, L3 in two variants

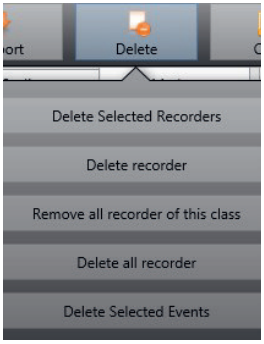
0 **Copy data:** Measurement data is copied to the clipboard and can be processed further, e.g. in MS Excel.

0 **Copy Image:** Copies the level-time diagram to the Windows clipboard and can then be inserted, e.g. in MS Word.

2.8 Delete measurement data device memory

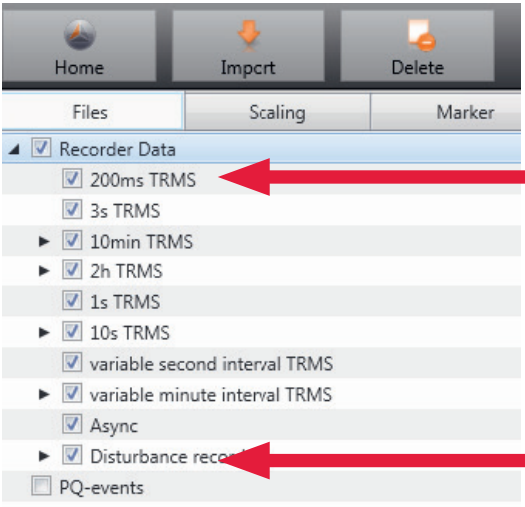


In the main menu, In the main menu, measurement data in the device memory of the meter can be can be deleted.



Delete selected recorders - only deletes selected long-term data and fault records.

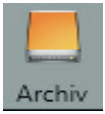
Delete selected events - deletes selected PQ events..



Main folder marks all data classes.

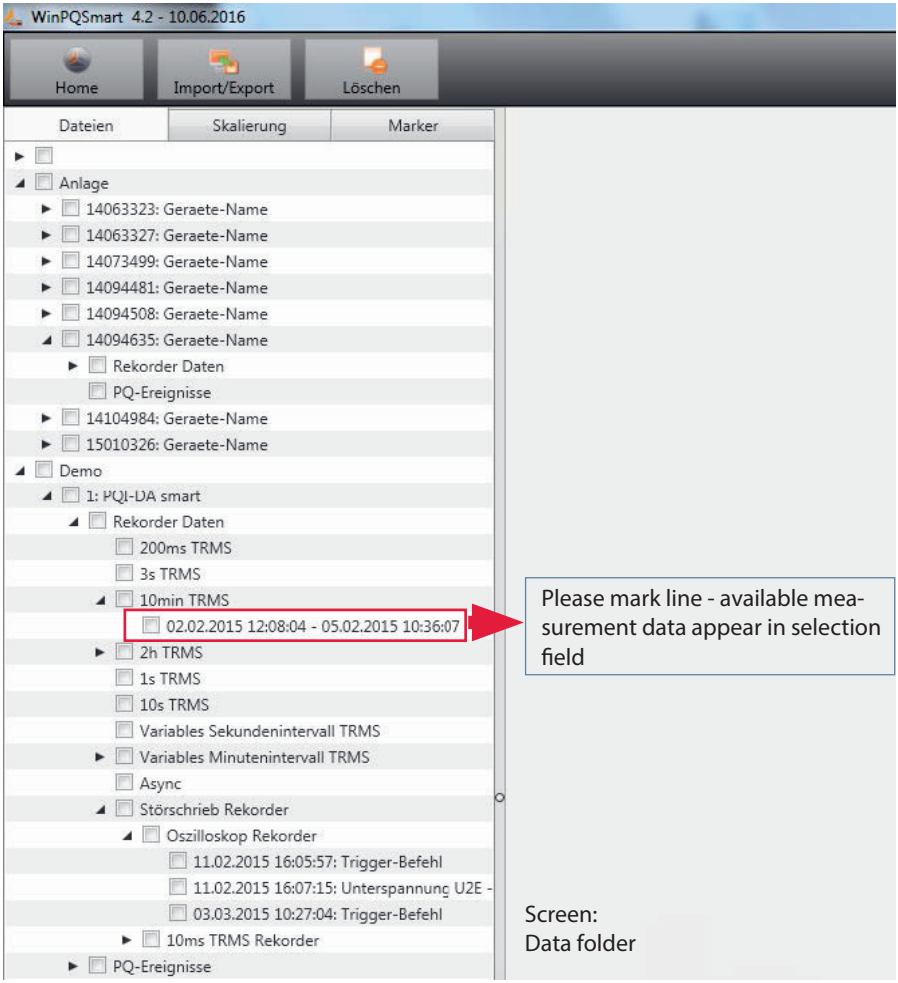
Marking individual measure-ment data files only deletes this selection.

2.9 Evaluating measurement data offline

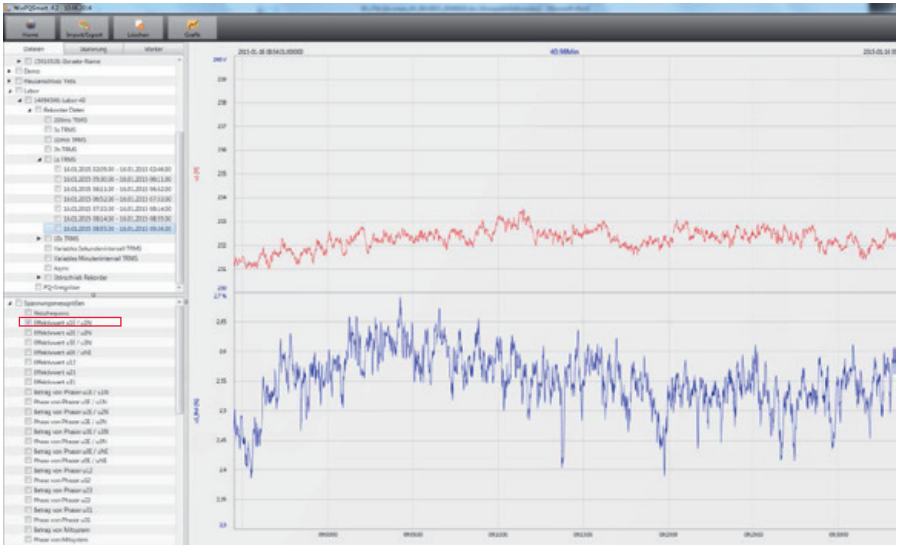


All measurement data from all devices can be evaluated offline using the "Archive" function.

All measurement data selected in the "Import" function is automatically saved on the PC. These can be evaluated offline at any time without a connection to the measuring device.



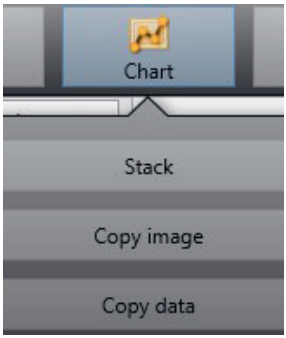
After selecting measured values or measurement channels, the corresponding level-time diagram appears.



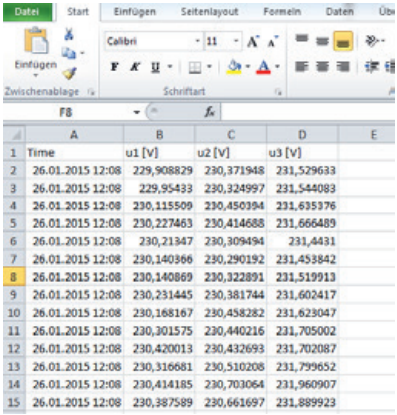
Example: Selection L1 voltage and THD

2.9.1 Edit measurement data

With the icon Chart, the following functions are available:



1 Copy data: Copies all the data displayed in the Windows clipboard

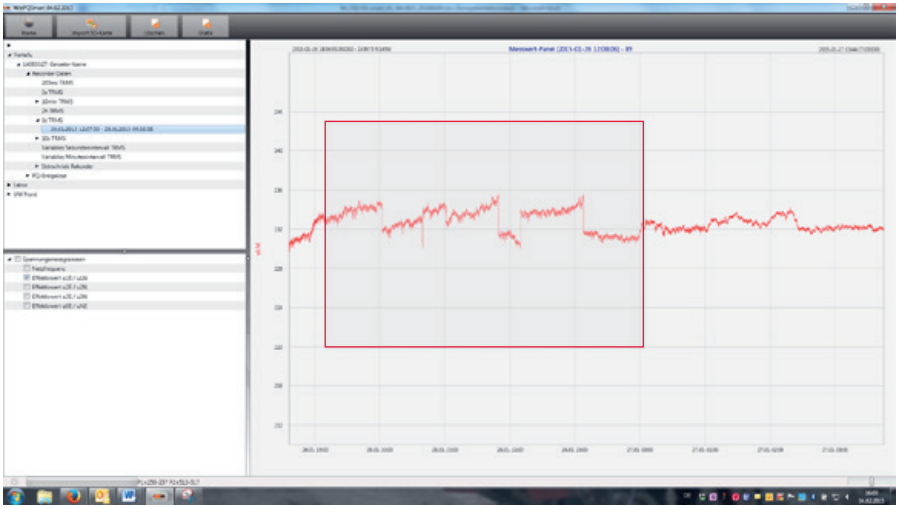


	A	B	C	D	E
1	Time	u1 [V]	u2 [V]	u3 [V]	
2	26.01.2015 12:08	229,908829	230,371948	231,529633	
3	26.01.2015 12:08	229,95433	230,324997	231,544083	
4	26.01.2015 12:08	230,115509	230,450394	231,635376	
5	26.01.2015 12:08	230,227463	230,414688	231,666489	
6	26.01.2015 12:08	230,21347	230,309494	231,4431	
7	26.01.2015 12:08	230,140366	230,290192	231,453842	
8	26.01.2015 12:08	230,140869	230,322891	231,519913	
9	26.01.2015 12:08	230,231445	230,381744	231,602417	
10	26.01.2015 12:08	230,168167	230,458282	231,623047	
11	26.01.2015 12:08	230,301575	230,440216	231,705002	
12	26.01.2015 12:08	230,420013	230,432693	231,702087	
13	26.01.2015 12:08	230,316681	230,510208	231,799652	
14	26.01.2015 12:08	230,414185	230,703064	231,960907	
15	26.01.2015 12:08	230,387589	230,661697	231,889923	

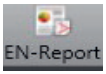
Example:
Measurement values in MS Excel

1 Copy image - photo is copied to the Windows clipboard
1 Zoom function

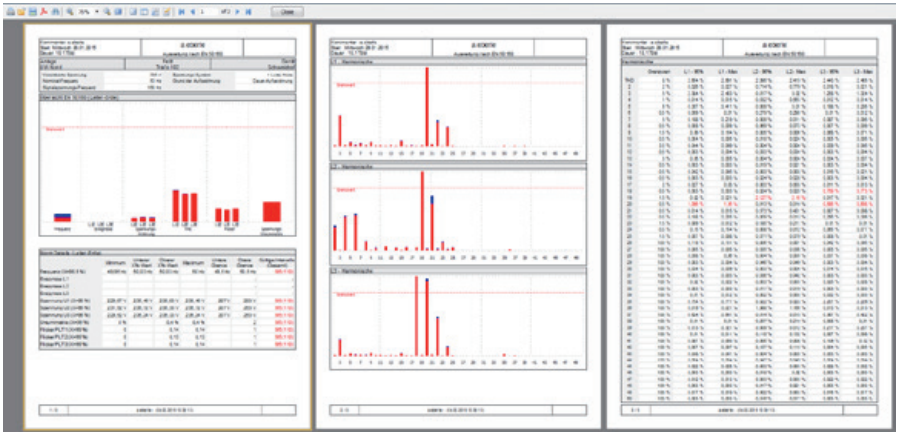
To enlarge an area, drag a window from top left to bottom right with the left mouse button activated. If the window is dragged in the opposite direction, the magnification is reset. It is possible to zoom in and out of the image in several stages.



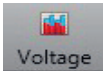
2.9.2 EN50160 Report



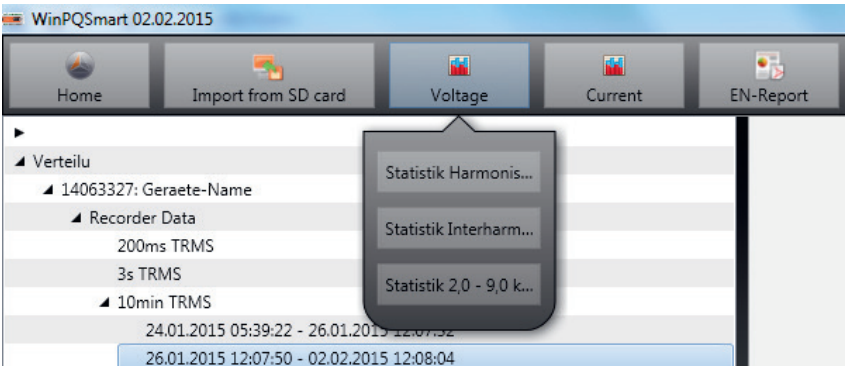
In the 10 minute data class, the EN50160 report is readily available.
If you select one measurement file a multipage report is created.



2.9.3 Voltage harmonics and interharmonics



With the Icon Voltage you can reach the statistics of the voltage harmonics, voltage inter-harmonics and supraharmonics 2 kHz to 9 kHz.



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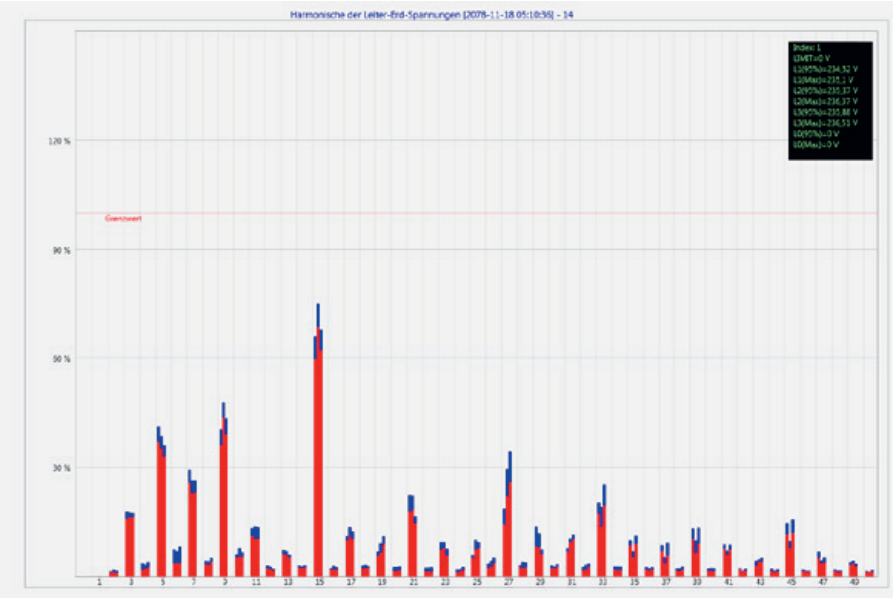
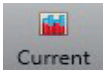
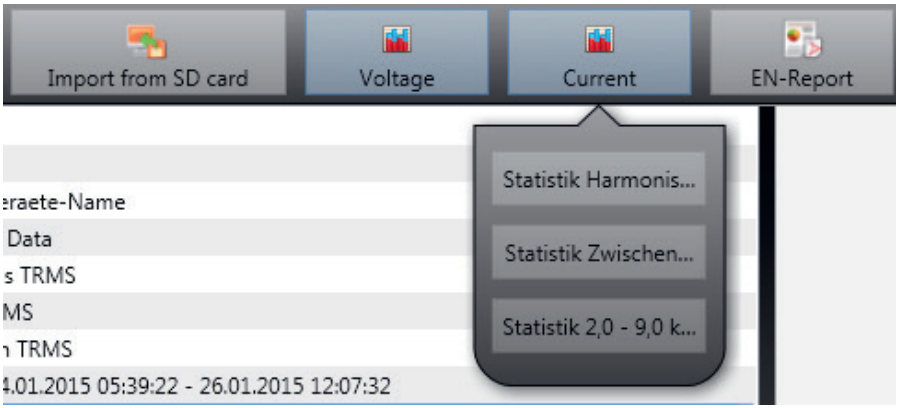


Statistic voltage harmonic - scaled to the corresponding compatibility level of the power quality standard.

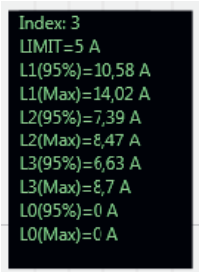
2.9.4 Current harmonics and interharmonics



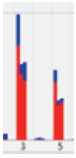
With the Icon Current you can reach the statistics of the current harmonics, current inter-harmonics and supraharmonics 2 kHz to 9 kHz.



Example: Statistic current harmonics 2nd to 50th - scaling in ampere

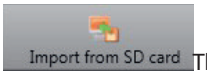


If you select with the cursor a particular harmonic, the corresponding measured values are displayed for these harmonics in the display window.



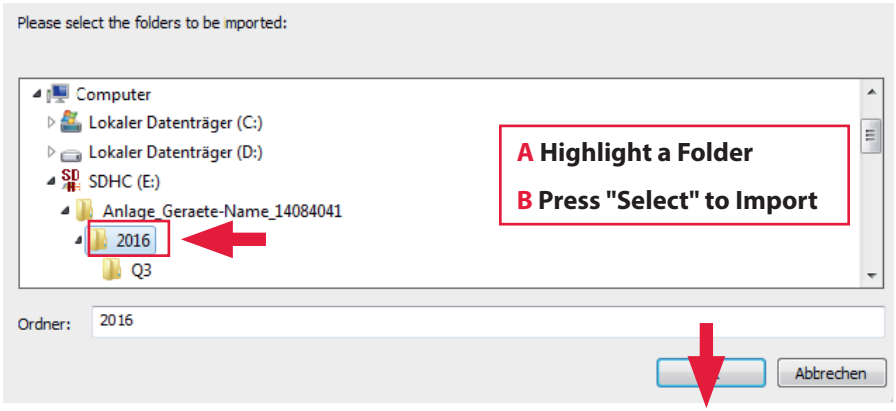
The red bar always shows the 95% values and the blue bar shows the maximum measured value.

2.10 Importing measurement data from an SD card



The function is used to transfer measurement data from the SD memory card to the PC.

The device folder, year or quarter can be selected for the data import.



2.11 Messwertüberwachung

With the measured value monitoring function, it is possible to monitor up to 32 different measured values to individually defined limits. In addition to the pure limit value, it is possible to set the switch-off limit value depending on an individual hysteresis.

Parameter Name	Value	Default Value
Active	✓	☐
Measurement ID	cos phi L1 (I1_cosphi) (...	0
Threshold	0,9	0
Hysteresis [% of threshold]	1	0
Monitor for	Higher than threshold	Higher than threshold

Figure 2: Example for the parameterization to supervise the cos(Phi)

2.11.1 Parameterization of an supervised measurand

To set the measured value monitoring, open the expert view in the parameterization (section 2.4.1). In the Limit values/recording tab, select the Measured value monitoring tab, which contains the 32 monitoring states (see Figure 3). All monitoring states are deactivated by default.

The Active parameter must therefore be set first (1). The measuring devices are capable of recording several thousand different measured values. Measured value IDs are used for clear differentiation. The measured value ID allows the measured value to be clearly assigned in relation to the measured variable and the data class.

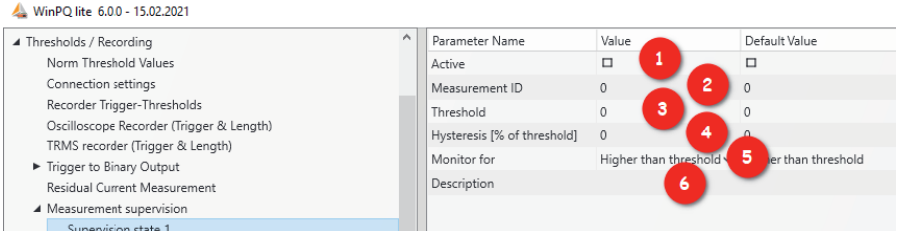


Figure 3: Parameterization of the supervision state

Clicking in the measured value ID field opens another window (2) in which the monitoring variables can be selected. In this setup, you can select all variables that are suitable for measured value monitoring (see Figure 4). To do this, first select the data class in the drop-down menu in the header. Depending on this, the available variables below change. The groups Frequency (F), Current (I), Voltage (U), Power (P) and Other (S) are available for this purpose. It is possible to select the specific measured value directly via the individual groups. Only the measured value IDs can be searched for directly using the search field at the bottom; it is not possible to search for the German names of the measured variables.

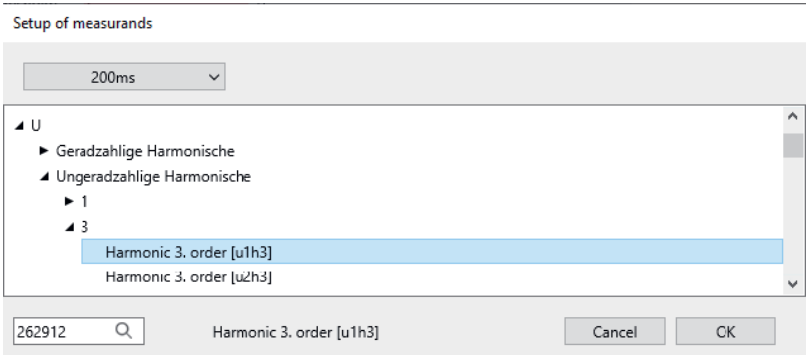


Figure 4: Setup of the measurands

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Once the measured value ID has been selected, a threshold must be defined above/ below which the monitoring status should be reached (3). The corresponding limit value is entered for this purpose. There is no plausibility check of the entered limit value by the software or firmware!

Furthermore, a hysteresis can be defined for each monitoring status, which enables a switch-off limit value that differs from the limit value (4). If 0% is specified for the hysteresis, the monitoring status is exited as soon as the measured variable reaches the limit value again. Depending on whether the limit value is exceeded or undershot, the following relationship results for the switch-off limit value:

0 limit value exceeded: switch-off limit value = limit value * (100% - hysteresis)

0 limit value undercut: switch-off limit value = limit value * (100% + hysteresis)

You can also specify whether the defined limit value should be monitored for overshoot or undershoot (5). The Description field is used to clearly and quickly assign the measured value (6). It is advisable to note at least the measured variable and the data class of the measured value here. This description remains in the parameterization of the device and is not used for further evaluation.

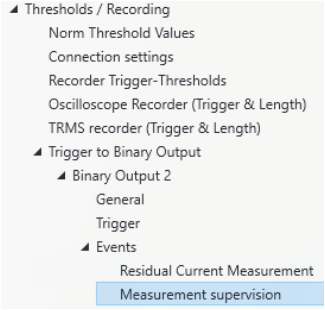
2.11.2 Parameterization of the reaction after exceeding the threshold

Three different actions can be parameterized as direct actions of the device when the limit value of a measured variable is exceeded or not reached. The binary outputs of the device, the oscilloscope recorder and the TRMS recorder can be selected for the direct triggers.

1 Binary outputs:

Binary outputs 2, 3 and 4 can each be triggered either on the oscilloscope/TRMS recorder (Trigger button) or the measured value monitoring (button Statuses ⇨ Measured value monitoring). If the binary output is to be triggered on the states of the measured value monitoring, all check marks in the Value column under Trigger must be removed (see section 2.5.3.6).

Otherwise, an error will occur when parameterizing the device. The monitoring states to which the binary output is to be triggered can now be selected.

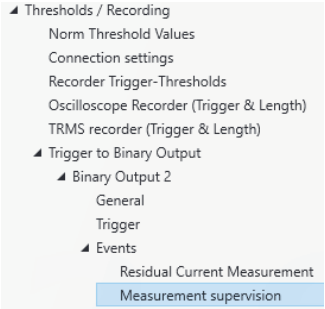


1 Oscilloscope and TRMS recorder:

At the bottom of the list of available events for these recorders are the monitoring states, which can be added individually to the existing triggers.

2.11.3 Evaluation of the supervision states

The states of the measured value monitoring that have been triggered with the oscilloscope and/or TRMS recorder are evaluated in WinPQlite using the Import button in the device view. The fault records triggered by the monitoring states can be found in the Recorder data category in the Fault record recorder group. The display of the fault records and the further evaluation of the detected limit violations are analogous to section 2.7.



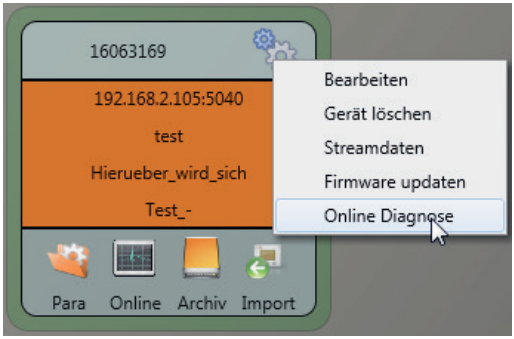
In order to facilitate the evaluation of the fault records and to be able to distinguish the measured value monitoring more easily from the classic fault records, it is possible to export the parameterization limit values/recording (see section 2.4.1).

Furthermore, the monitoring status can be queried with the Modbus. The registers are read-only and output 1 as feedback for the respective monitoring status if the monitoring status is active and 0 if the monitoring status is not active. The data point list and further information on the Modbus protocol can be found in the device manual, chapter 13.1 (Modbus).

To be able to query the monitoring statuses via Modbus, the device must be restarted once after the first status has been parameterized.

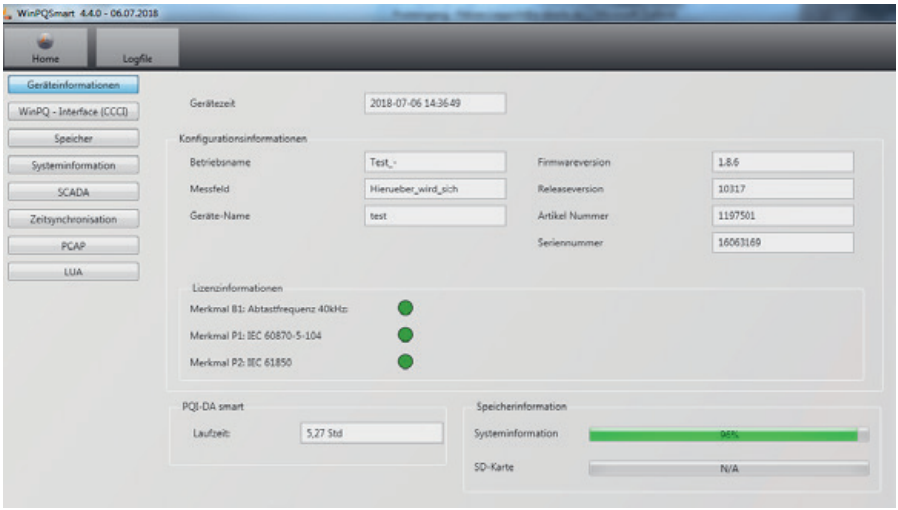
3. Online Diagnostic

With the help of the Online Diagnostic, the most important information of the PQI-DEs can be read out via Streaming. The device status can be seen as well as the complete device properties.



3.1 Device Information

In the Device information part, the device log file can be loaded from the device using the Logfile button.



3.2 Time synchronization method

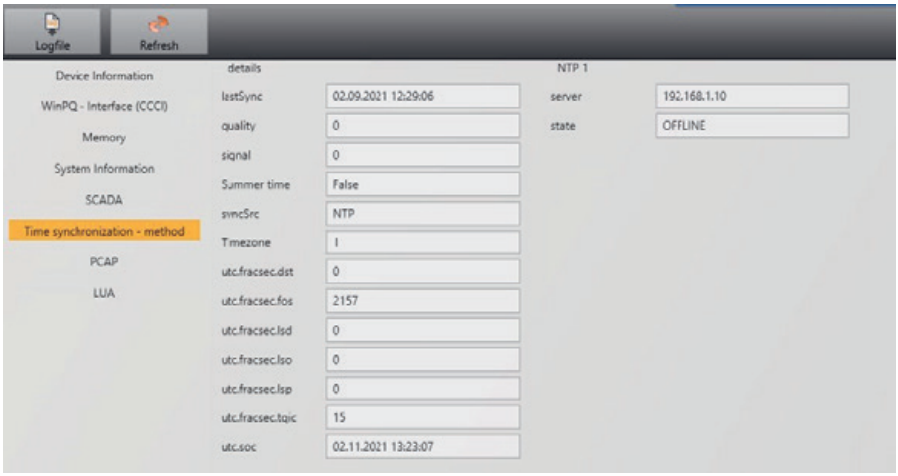
The quality and current status of the time synchronization can be checked in this menu.

Legend for the WinPQlite line names:

- lastSync: Time of the last time setting
- quality: Signal quality
- signal:
  - 0, if no signal is detected
  - Not equal to 0 if a signal is detected and the appropriate protocol is selected
- Sync.Src: Specification of the synchronization protocol
- Utc.fracsec.tqic: Quality of the device time in relation to the time source
  - 15 - Device time not synchronized or deviates more than 10s

from the time source

  - ≤10 - Device time synchronized and deviation from the time source is less than 1s



4. User database and access rights

The measuring device is equipped with a user role and user rights concept including user database, which corresponds to the current IT security guidelines.

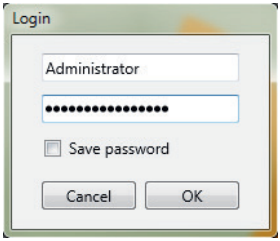
The main functions are:

0 Es kAny number of users can be stored in the device with uniquely identifiable names.

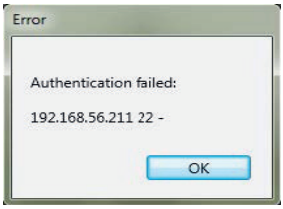
0 The users are to be assigned to a role.

0 The roles (administrator, operator and user) define the rights.

The detailed description of the rights and roles with specification of the rights is listed in the security documentation.



Whenever a function is called from the WinPQ lite software, such as Read parameterization (Para), Online data (Online), Data Explorer (Import), the encoder checks by entering the user name and password whether the user has the required rights for this function.



If the password and or the user name are entered incorrectly or if the user does not have the right to access a function, this is reported back accordingly.

⇨ If incorrect entries are made, the connection to the meter via the SSH tunnel is automatically disconnected!

⇨ The number of failed attempts (factory setting: 3) before a user is locked for a certain time (factory setting: 1 hour) can be set.

⇨ Failed attempts are logged internally and output via Syslog and can also be queried via the user administration.

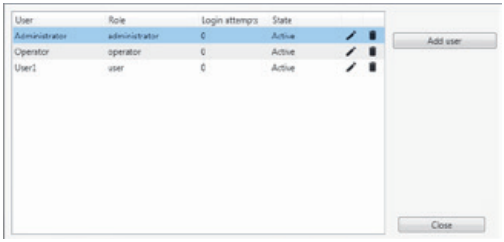
4.1 Adding and editing users

If the measuring device is set up in safety mode (see device instructions chapter 6.3), any number of users can be stored in the measuring device.

During the initial setup, a user was already created for each of the roles "User", "Operator", "Administrator" and, if applicable, "Machine-to-Machine (M2M)" in the measuring device. has been stored. To store additional users or to edit, lock/unlock users that have already been edit, lock/unlock or delete already created users, proceed as follows:

Click on "Edit user" in the device settings.

Enter the user name of the administrator and the corresponding password.



User information is downloaded from the meter and displayed.

Funktionen

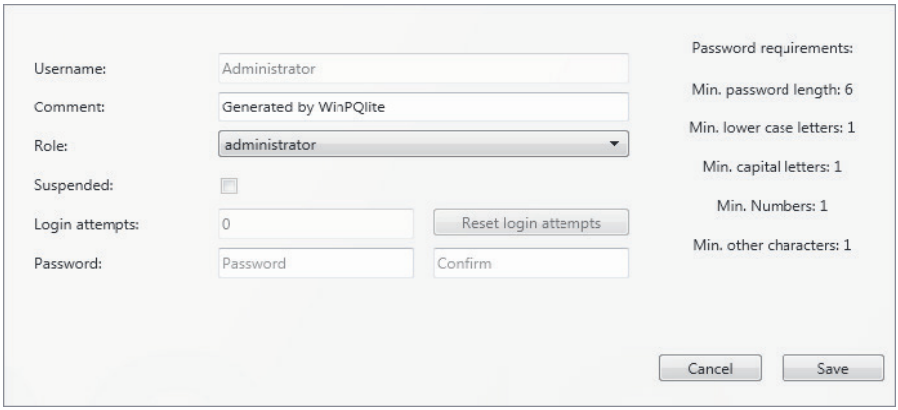
Edit user

Delete user

Add user

Add new user

If clicking on "Edit user" or on "Add user", an input mask for the parameterisation of the user opens.



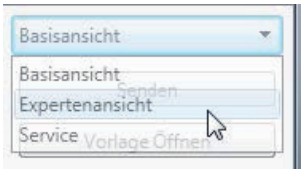
Click on save to transfer the settings to the instrument, store them and activate them from this point on.

4.2 IT security settings and password requirements

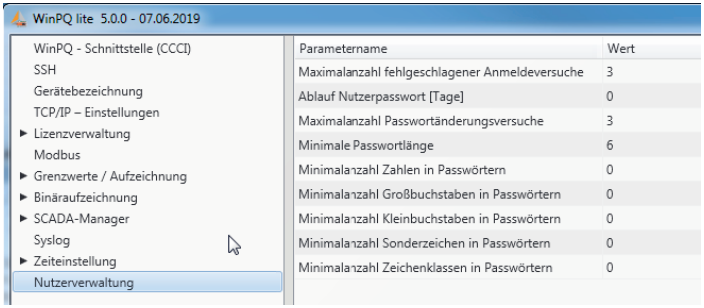
The administrator has the possibility to specify the assignment of passwords via the so-called password policy. Proceed as follows to make the settings:

Click on Para to download the complete instrument parameterization from the measuring instrument.

Enter the user name of the administrator and the associated password, since the policy can only be set by the administrator.



Changing the interface from the basic view to the expert view



In the menu item User administration parameters, the following necessary parameters can be defined in addition to the port guidelines.

- **Maximum number of failed logon attempts:** Number of logon attempts on the device before a us-er can log on to the device again for a configurable time (factory setting: 1 hour). The parameter can be freely set via the SSH console if required for the lockout period.

- **User password expiration [days]:** After the set days have expired, the user can no longer log on to the device without having to change the password.

- **Maximum number of password change attempts:** Number of attempts to change the password on the device.

The password should be as complex as possible!

It is always recommended to adhere to the relevant known and country-specific guidelines!

Germany: It is recommended to adhere to the guidelines for passwords of the Federal Office for Information Security (BSI).

5. Firmware Update

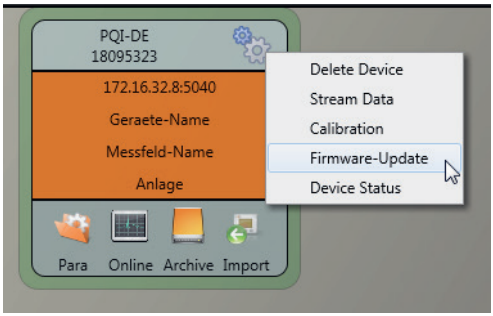
Power Quality devices from KBR are subject to continuous further development. It may therefore be necessary to update a device, e.g. due to changes in standards, new functions or necessary security patches. The latest firmware version can be found under the following link.

https://www.kbr.de/download/apps-software-gsd-dateien/

Administrative rights are required for a firmware update!

The power supply to the device must not be disconnected until the complete restart, which is automatically triggered as part of the update, has been completed!

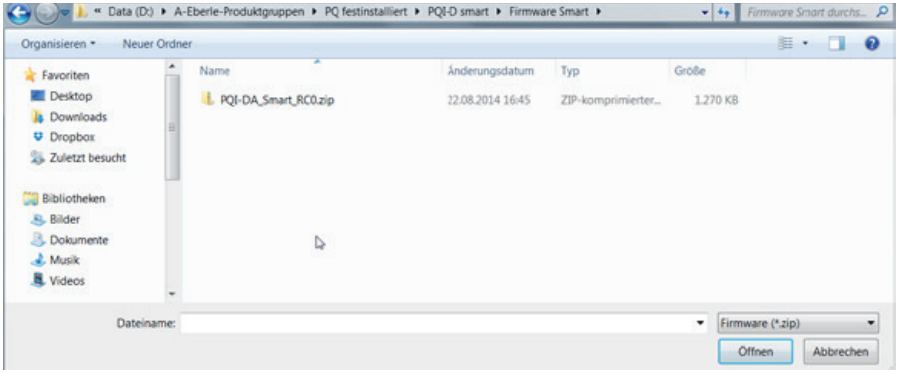
5.1 Firmware Update with WinPQ lite Software



A firmware update for the measuring device can be carried out using the General setup function on the station tile.

0 Select the folder in which the file for the firmware update is located (zip file)

0 This function is used to transfer the firmware to the network analyzer.



After the firmware has been completely transferred to the measuring device, it automatically restarts automatically restarts and installs the new firmware version.

5.2 Ensuring the integrity of firmware updates

Since firmware version 2.12, the firmware update archive and the update procedure are protected by a digital signature including certificate handling.

If a firmware archive has an invalid digital signature, the device interrupts the update process immediately for security reasons..

5.3 Automatic firmware update of many devices

With the help of the WinPQ system software, all measuring devices can be updated easily with just a few clicks and with full clarity and control.

6. Lizenzupdate multimess F144-PQ and multimess D9-PQ

The multimess F144-PQ and multimess D9-PQ network analyzers can be equipped with various options. These options can be activated at any time after purchase using a license code.

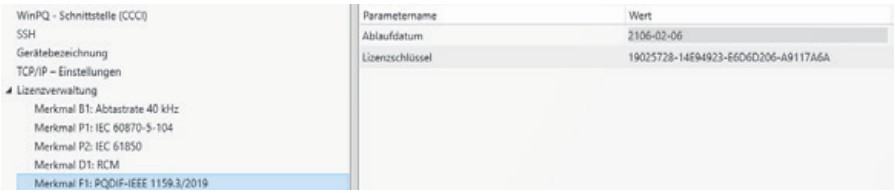
To order an option, the following information is required to create a license code:

0 Serial number of the measuring device

0 Item number of the device

0 Desired option

If you have received a valid license for the connected device, add it to the device parameters.



Example: Upgrading option F1 for multimess F144-PQ

1 **The following options are available:**

0 B1: 40.96 kHz sampling rate (2 kHz to 20 kHz permanent recording)
0 P1: IEC 60870-5-104
0 P2: IEC 61850
0 P3: Modbus master recording
0 D1: RCM (multimess F144-PQ only)
0 F1: PQDIF according to IEEE 1159.3

Licenses should be sent to the device without further adaptation of the parameterization and their acceptance checked in the display/online diagnostics. Only then are individual parameters of the added option available.

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Notes

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