

10 Reasons to Choose a Latest-Generation PQ-Box

01. Higher Sampling Rate of the Power Quality Analyzer - Troubleshooting in Frequency Ranges up to 170 kHz

New power electronic loads and energy generators cause grid disturbances at increasingly higher frequencies. The switching frequency of these loads and generators depends on their power rating. In the > 30 kW to MW range, the switching frequency is approximately 2.5 kHz to 8 kHz. At power levels up to approximately 30 kW, the switching frequency is significantly higher. For example, solar inverters typically have switching frequencies between 16 kHz and 18 kHz, while EV charging stations generate disturbances between 10 kHz and 80 kHz. According to the Nyquist-Shannon sampling theorem, a power quality analyzer must sample at least twice as fast as the frequency to be captured. This means that, for example, an instrument must sample voltages and currents at a minimum of 40 kHz to detect disturbances caused by a solar inverter.

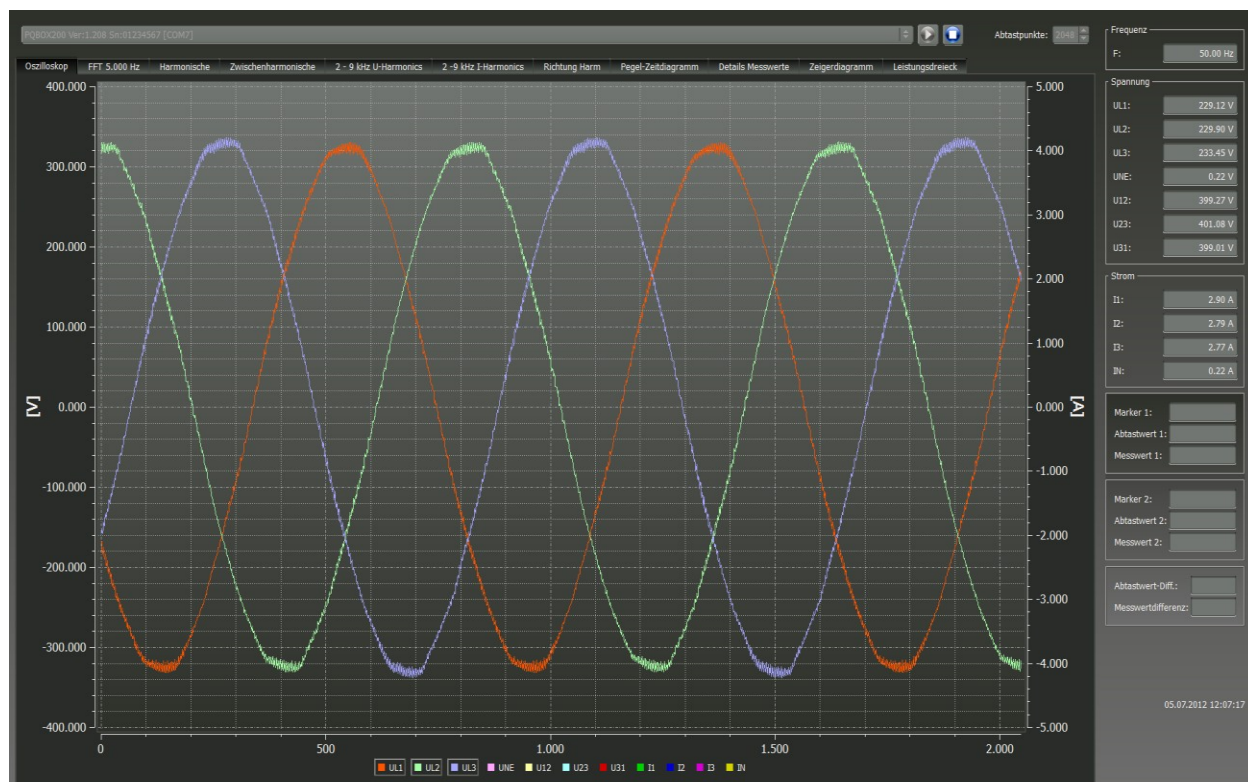


Figure 1: Example of grid disturbances from a solar installation measured with a PQ-Box 200 (40 kHz)

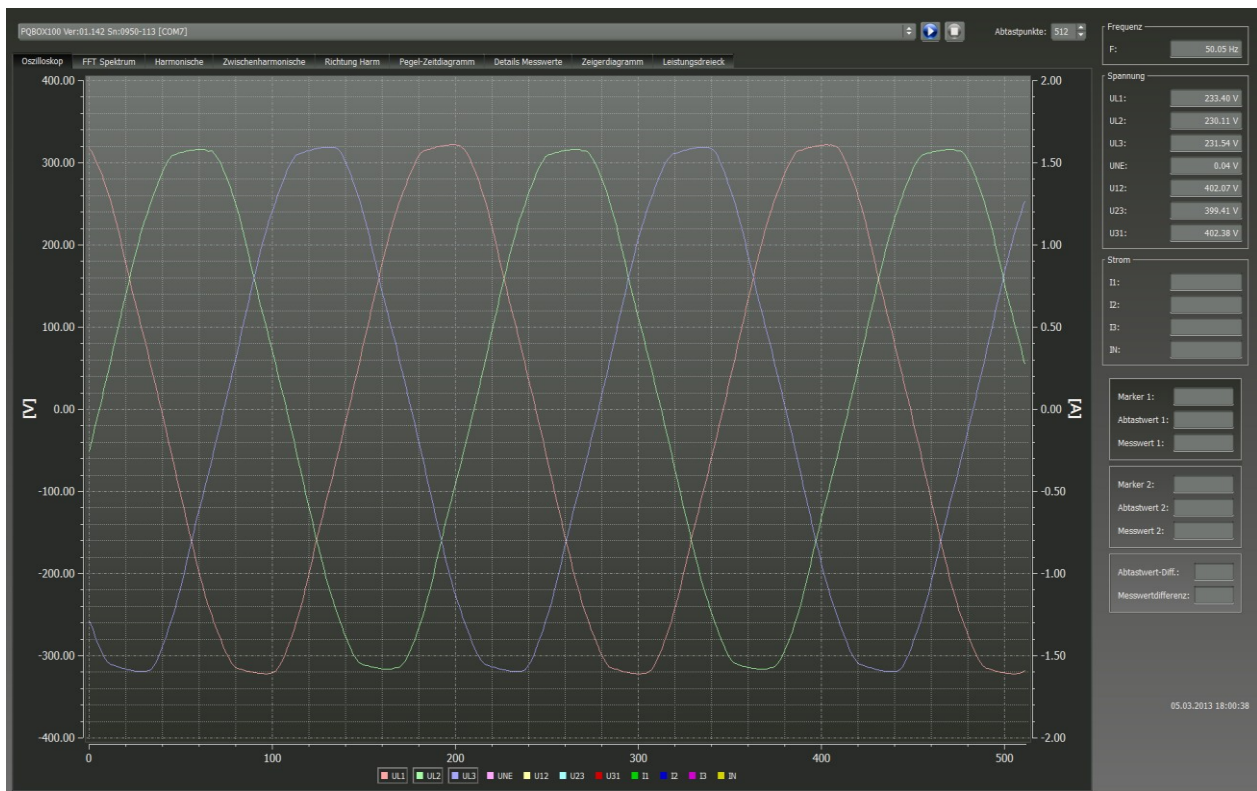


Figure 2: PQ-Box 100 (10 kHz) at the same measurement point - the old PQ-Box 100 cannot detect the disturbance signal.

As a result, grid disturbances in the frequency range from 2 kHz to 150 kHz are continuously increasing due to the growing use of power electronics. Power quality standards for public and industrial grids already specify limit values up to 150 kHz, for example IEC 61000-2-2 for public low-voltage grids and IEC 61000-2-4 for industrial grids.

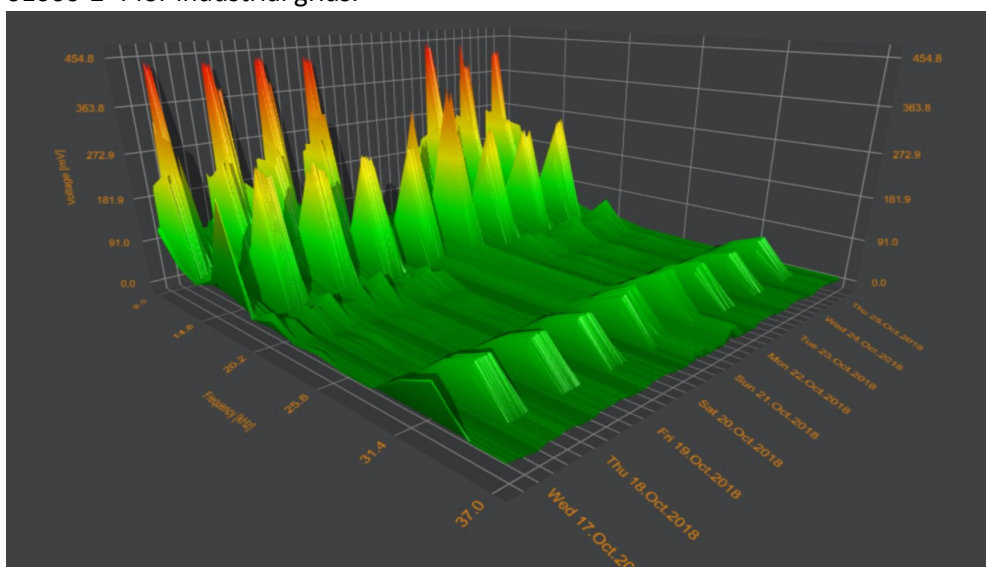


Figure 3: FFT spectrum of the PQ-Box 300 – one week 3D- visualization of supraharmonics up to 300 kHz

02. Standards-Compliant Measurement According to IEC 61000-4-7 from 2 kHz to 9 kHz

The frequency range covered by compatibility levels has been extended in many current standards. For example, the application guidelines VDE AR 4100, 4110 and 4120 for connecting customer installations to low-, medium- and high-voltage grids now include limit values up to 9 kHz for voltages and currents. The latest generation of A. Eberle PQ-Boxes can provide these measured values in compliance with the relevant standards. The current D/A/CH/CZ guideline also includes limit values up to 9 kHz.

With the current version of the WinPQ mobil power quality analysis software, users can create complete measurement reports "at the touch of a button" using pre-installed standards-based evaluation templates in accordance with common standards and guidelines.

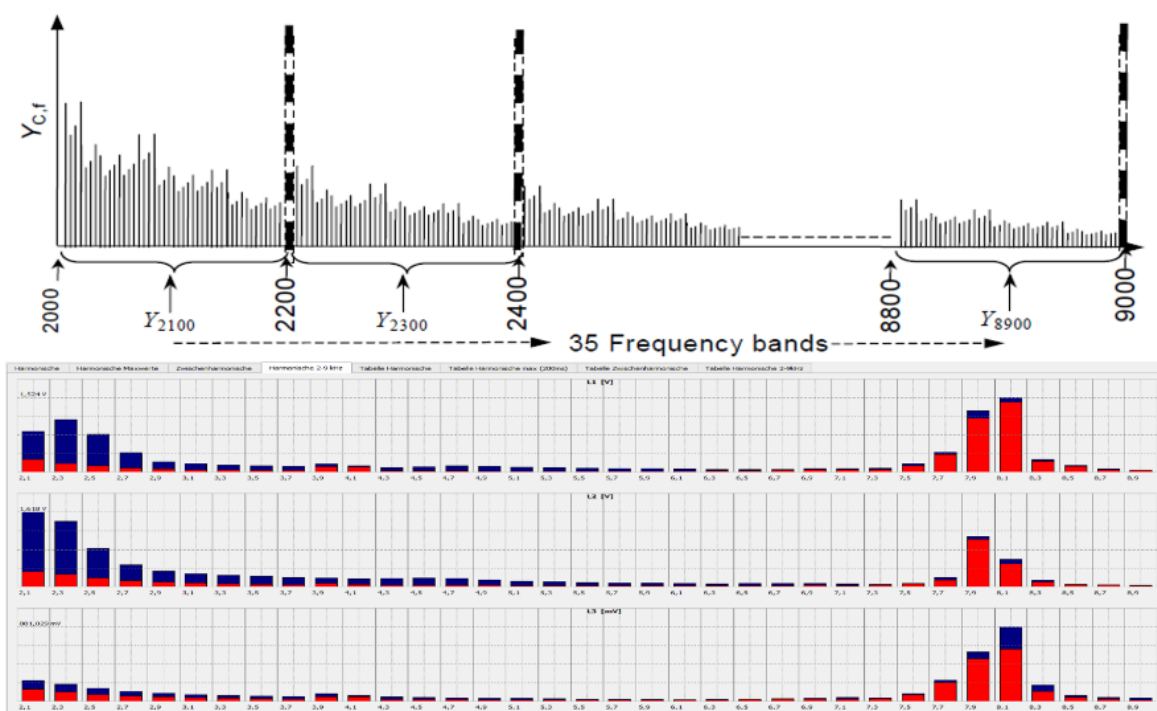


Figure 4: Grouping method for voltage and current harmonics from 2 kHz to 9 kHz according to the standard, using the WinPQ mobil power quality analysis software

03. Changes to IEC 61000-4-30

The current measurement standard IEC 61000-4-30 Ed. 4 (2026 edition) has been significantly expanded in scope. The PQ-Box 100 and older devices from other manufacturers were developed according to an earlier edition, while the latest generation of devices (PQ-Box 50/150/200/300) already fully complies with the latest Edition 4 requirements for Class A reference measuring instruments. This prepares you well for future requirements and ensures that your device meets the current standard requirements.

04. Wider Selection of Measured Values

While the PQ-Box 100 was already able to record many different measured values continuously and in parallel, the latest generation of devices calculates more than 2,700 measured values with the PQ-Box 150 and up to 10,000 measured values with the PQ-Box 300 in parallel during each measurement. These include, for example, active and reactive power for all harmonics as well as their phase angles and direction, helping to identify the sources of these disturbances. In addition, the devices cover the supraharmonic frequency range up to 150 kHz. Older devices from other manufacturers as well as the PQ-Box 100 are unable to detect many of today's disturbance phenomena.

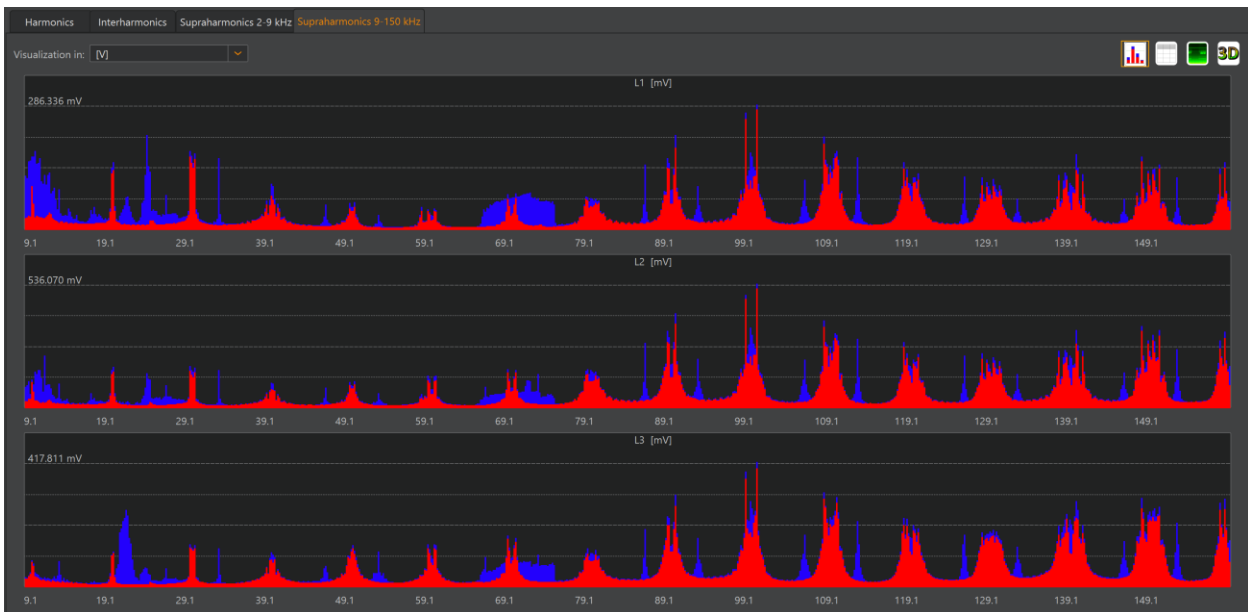


Figure 5: Detection of supraharmonics up to 150 kHz in 200 Hz bands (PQ-Box 300)

05. Significantly Expanded Technical Specifications

- **Battery:** PQ-Box 100: approximately 30 seconds vs. PQ-Box 150: 4 hours. The extended battery runtime provides backup during power failures and supply interruptions.
- **Memory:** The storage capacity for measurement data has been expanded to 32 GB as standard for the PQ-Box 150/200/300.
- **Display:** On the PQ-Box 150/200/300, a graphical color display replaces the monochrome display used on the PQ-Box 100 and older devices from other manufacturers. A phasor diagram or oscilloscope view, for example, can be displayed directly on the device. This makes it easy for users to identify possible PQ-Box connection errors. Device parameterization using the larger display and operating buttons is also easier and more user-friendly than with a PQ-Box 100 or devices from earlier generations.
- **Password protection:** The PQ-Box can be protected by password against unauthorized use.

06. Communication Options with a PQ-Box

Do you want to know remotely how your measurement is progressing? Have enough events already occurred? Can the measuring device already be removed from the measurement site? With a PQ-Box, this is possible in combination with a 4G/5G wireless modem connected via the interface of the power quality analyzer.

Connection with the PQ-Box - Examples

Complex Networks & VPN

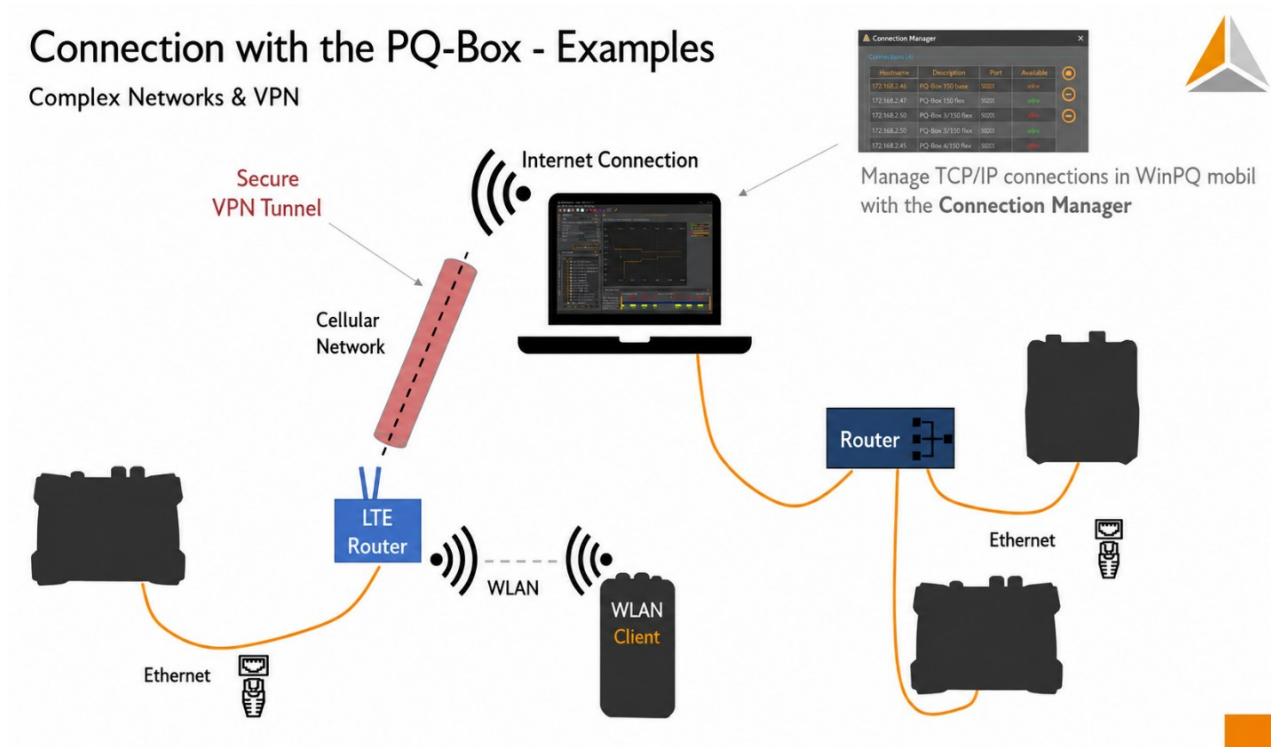


Figure 6: Overview of all PQ-Box-to-PC communication options

WLAN Interface

All devices of the latest PQ-Box generation feature a WLAN interface. This allows the measuring devices to be operated wirelessly via a PC or smartphone. For example, a PQ-Box can be operated in a locked room or outdoors at a pole-mounted substation without having to establish a cable connection.

07. PQ-Box App

A free app for Android and iOS is also available, allowing you to parameterize your PQ-Box and display extensive live measurement data on any smartphone.

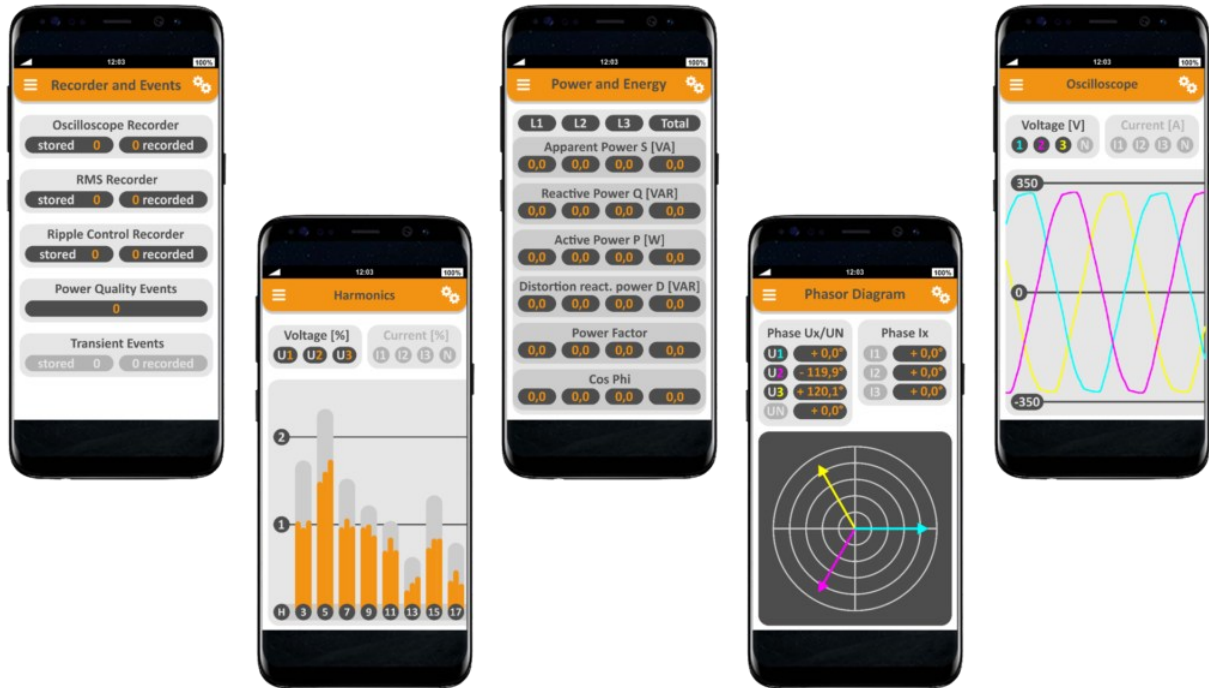


Figure 7: Overview of the extensive functions of the free PQ-Box App for Android and iOS

08. Flexibler AUX-Eingang bzw. ein 5. Stromeingang

A flexibly configurable additional AUX input, or a 5th current input, greatly expands the range of applications for the PQ-Box. For example, a temperature sensor can be connected to any PQ-Box 200 or PQ-Box 300 to record the temperature in a switch cabinet or at a transformer alongside the power quality measurement. Another application may require measuring residual current at an RCD or simultaneously recording PE conductor current on a grounding strap. A trigger threshold can also be set for the 5th measurement input, or the measured value can be captured using the high-speed recorders in the event of a disturbance.



Figure 8: Measurement of residual current at an RCD, including analysis of the fundamental component and supraharmonic currents

09. Measuring Fast Switching Transients

Fast switching transients are not uncommon in industrial applications. Capturing these extremely fast events requires a high sampling frequency combined with a very large measuring range. Our PQ-Box 200 is specifically designed for this purpose, sampling signals at 4 MHz and providing a measuring range of +5 kV/-5 kV.

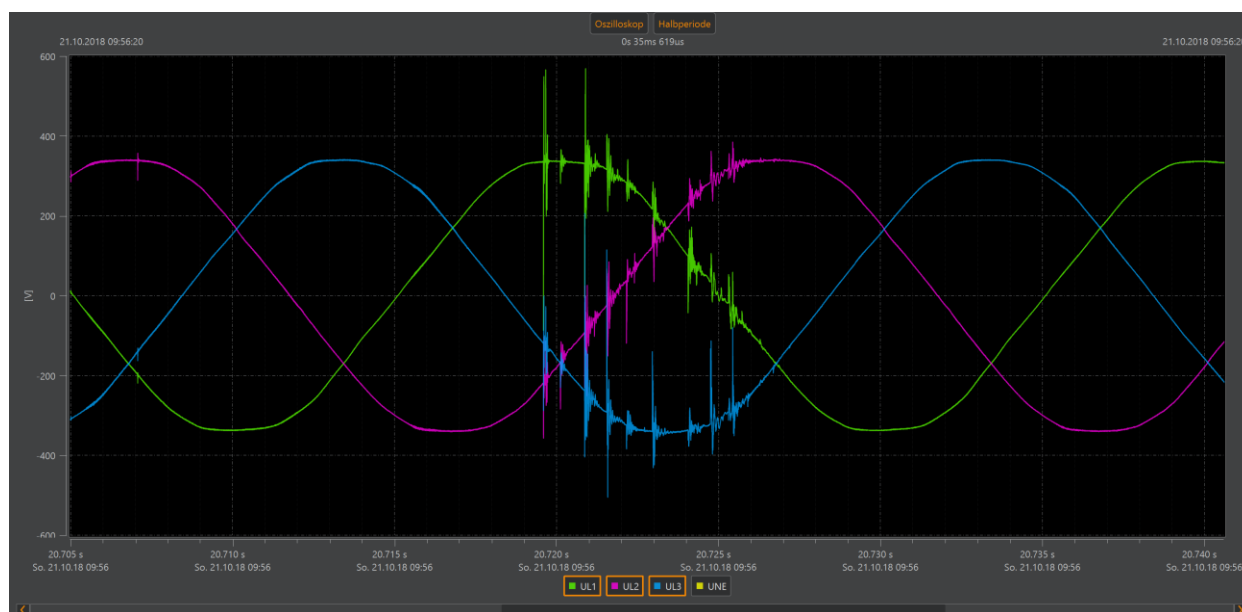


Figure 9: Fast switching transients in an industrial installation, measured with a PQ-Box 200

10. Intuitive Operation & Analysis Software for a Smooth Transition

The user interface of the PQ-Box 150, PQ-Box 200 and PQ-Box 300 has a consistent design. Intuitive menu navigation enables users to get started quickly and makes it easier both to switch between different PQ-Box models and to transition from measuring devices made by other manufacturers.

In addition, WinPQ mobil provides powerful and user-friendly analysis software for convenient evaluation, visualization and documentation of measurement data.