

Measure. Regulate. Across all Grids.



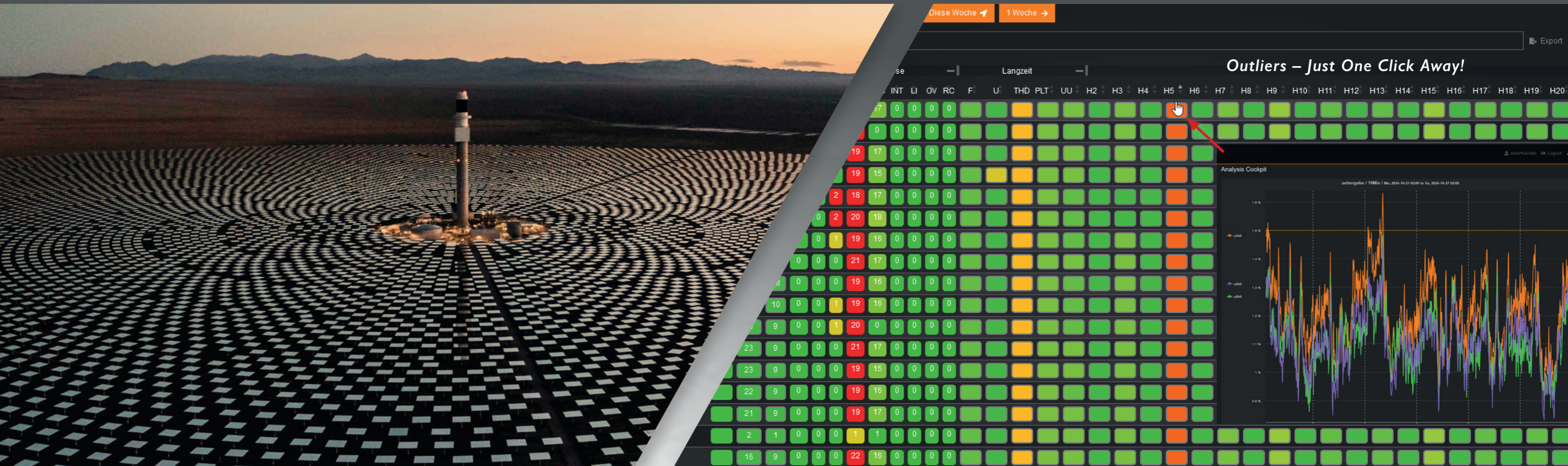
Power Quality Systems

Solutions for Continuous Energy Monitoring and Power Quality Analysis in Public & Industrial Energy Networks

Keeping an eye on supply quality and grid faults in times of change and the associated complex challenges – at every voltage level.

With the power quality grid analyzers of the »PQSys« family and the »WebPQ®« analysis software, you always have the necessary overview you need to bring transparency to your network.

Discover the Future of Power Quality



Why measure power quality?

The power quality analysis measures the quality of the power supply and creates security of supply in public and industrial energy networks.

The security and sustainability of the electrical energy supply system is a system-critical factor for the infrastructure of modern societies and companies. The performance of this system is both a basic prerequisite for the successful

transformation of energy generation to renewable energy sources and the basis for the production reliability and thus efficiency of large industrial and production plants.

The path to a successful energy transition – grid quality is a basic requirement

In order to achieve CO₂ neutrality, the energy supply system is undergoing the biggest transformation in its history. On the one hand, this is taking place through the increased integration of decentralised and highly fluctuating energy generation solutions such as photovoltaics, wind and hydropower, flanked by storage solutions to regulate volatility. However, the consumer side of the energy system is also developing rapidly towards greater efficiency and the switch to renewable energy sources and thus more and more heat pumps, e-charging stations & upcoming innovations of completely new technologies in the grids. Unforeseen outages and problems in electricity supply systems can have serious consequences

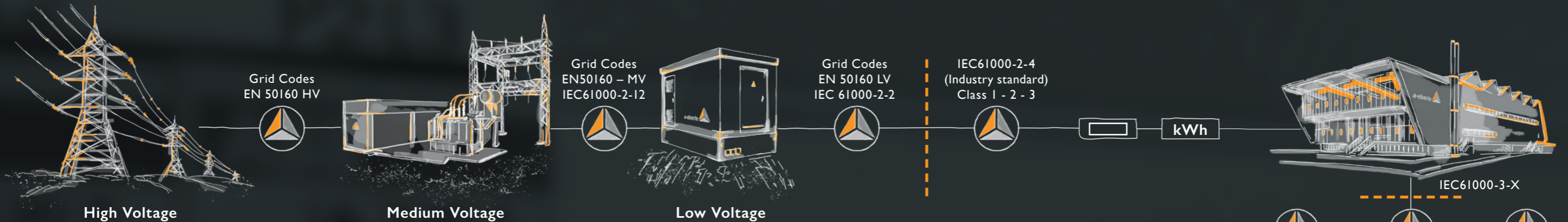
for property and economic activity. It is therefore essential to understand and constantly monitor electricity supply systems as the backbone of modern society. The electricity supply must be made safer, more stable and more efficient through continuous monitoring in order to be able to actively regulate the grids with the measurement data obtained. To achieve this, our grids must be transparent and measurable. Monitoring the most important grid parameters in accordance with EN50160 for voltage quality or standards such as IEC61000-2-2, as well as monitoring in accordance with the relevant grid codes (or connection guidelines) can make an important contribution to this.

Power quality measurement – measuring, recognising and counteracting trends and preventing interactions

The power quality measurement provides information about the electrical parameters of a power supply system such as voltage, current, frequency, power factor, harmonics and supraharmonics and many other variables such as flicker level. A. Eberle offers a system solution consisting of power quality measuring devices for all voltage levels and the high-quality analysis software »WebPQ«.

Challenges in the grid such as voltage fluctuations, over- or undervoltages, harmonics and the various types of reactive power and load flows can thus be reliably recorded and evaluated. The goal is to analyse phenomena that lead to malfunctions and failures of devices and systems as well as the efficiency and service life of consumers and producers at an early stage to be able to initiate countermeasures in good time.





Internal Influences

Protection and monitoring combined with fire and personal protection (RCM)

External Influences

Fault recording and power quality in accordance with EN50160
Monitoring with tomorrows Class A measurement technology

All PQ devices are devices in accordance with IEC 61000-4-30 Class A Ed. 3 for reproducible measurement results.

Continuous Power Quality Monitoring

The continuous monitoring of supply quality allows trends to be recognised at an early stage. This allows countermeasures to be taken in good time – before failures occur.

A continuous monitoring system, consisting of the core applications "power quality" and "fault recording", offers many advantages over purely event-based measurement only when faults occur.

Thanks to continuous monitoring, trends are recognised at an early stage and can be rectified before failures or damage

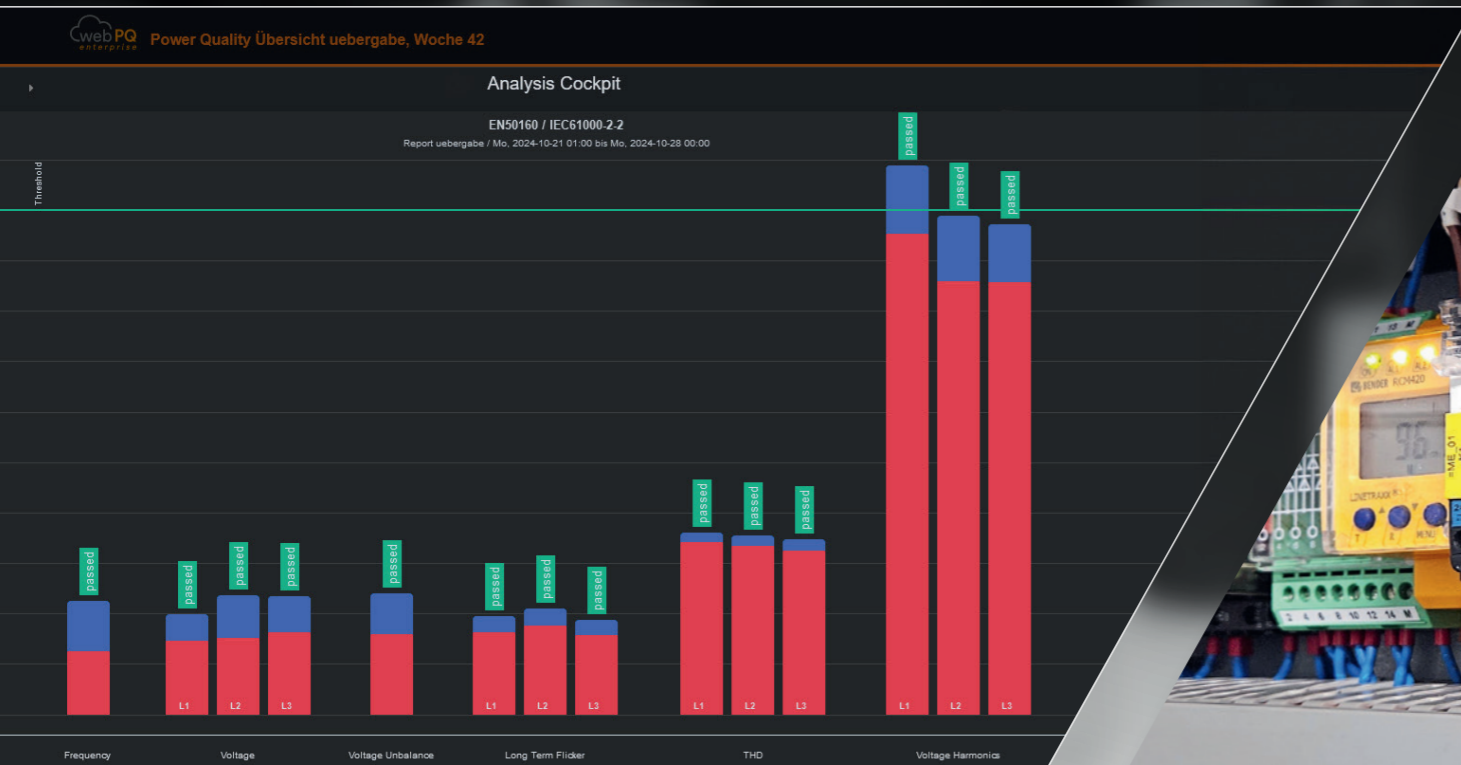
occur. In the event of a fault, however, our power quality solution acts as a "black box" in your energy system and provides the necessary data to get to the bottom of the cause of the fault. In addition, »PQSys« supports energy optimisation and efficiency by making disruptive effects caused by reactive power and harmonics visible. Optimising energy efficiency leads to lower energy costs.

In addition to the benefits of early detection, a continuous monitoring system also offers advantages in terms of compliance with regulations and standards. Our »PQSys« power quality analysis system, for example, is able to analyse all relevant standards and regulations for power quality fully automatically:

- EN51060
- IEC61000-2-2
- IEC61000-2-4
- IEC61000-2-12
- IEEE519
- DACH-CZ
- NRS048
- Netcode
- National Grid Codes > 65 standards

A continuous monitoring system for power quality in the energy supply is essential to ensure the stability, reliability and efficiency of the supply. Measurement and automatic analysis is an integral part of safety and makes a decisive contribution to identifying, solving and preventing faults in the grid supply.

With our »PQSys« system solution, we offer you a proven and very user-friendly solution for analysing the grid, consisting of high-quality hardware and software. Keep an eye on your power quality quickly and reliably at all times.



»PQSys« – Overview

First-Class Precision Measuring Instruments – Innovation and Quality Combined!

»PQI-LV« – Transparency in low voltage

- Measurement value acquisition with maximum accuracy (< 0.1 %) in accordance with IEC61000-4-30 - Class A Ed. 3 for low voltage in public & industrial networks. Applications such as transformer stations, LVDC and for machine monitoring.
- Measurement and recording of up to 16 feeders with »I-Sense« technology and open for the integration of intelligent strip-type fuse switch disconnectors.
- Ideal as a retrofit solution, as current measurement via sensors using Rogowski coils and inductive sensors (330 mV). For simple, fast and safe integration.
- Simple commissioning via Plug & Play – with guided assistants.



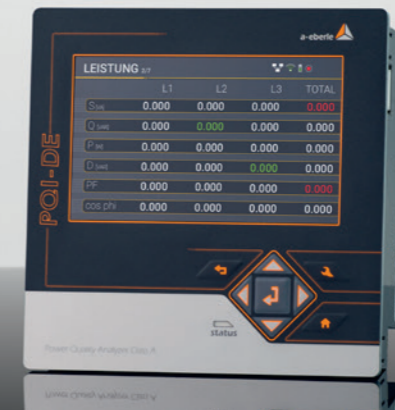
»PQI-DA smart« – The all-rounder

- Measurement value acquisition for PQ applications according to IEC61000 -4-30 - Class A Ed. 3 with highest accuracy of < 0,1 %.
- Powerful fault recording with detection of transients up to 24 µs and a duration of up to 6 minutes.
- Simple installation via Plug & Play thanks to guided wizard without standardisation knowledge.
- Free evaluation software »WinPQ lite«.
- Security by design according to BDEW white paper with user rights management and auditable logging.



»PQI-DE« – The black box solution

- Highly accurate long-term measured value logging in accordance with IEC61000 -4-30 - Class A Ed. 3. Measured value logs up to 144 weeks – seamlessly recorded.
- Residual current measurement (RCM) up to 40.96 kHz according to IEC 62020.
- On-site display and analyses directly on the large 5" display.
- Sensor inputs for current and voltage measurement on 3.25 V sensors.
- Designed for monitoring the VDE connection guidelines (VDE- AR4105..4120 - Appendix F) and other grid codes.



»WebPQ®«

The central database solution for all fault recorders, power quality monitoring devices and mobile grid analysers from A. Eberle. Permanent power quality monitoring – from high voltage to the depths of the grid in one system. Intuitive operation and fast navigation for analysing your measurement data.

- Simultaneous parallel reading of all devices. This ensures a fast system response time.
- Automatic reporting for fault records and power quality reports with measuring point principle.
- Drill-in evaluation process – recognise trends with a click of the mouse.

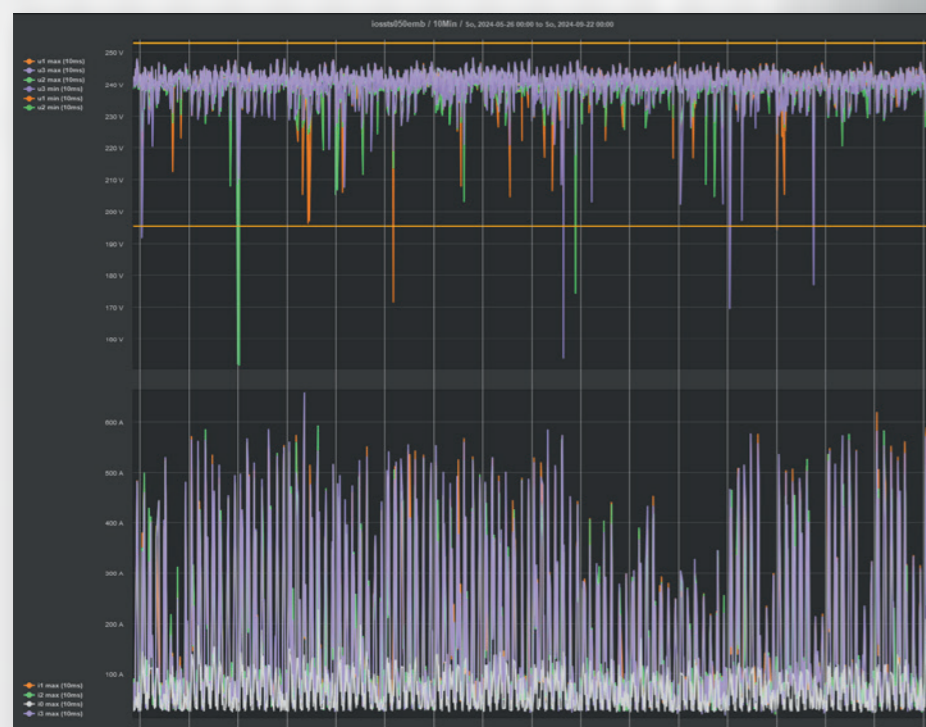
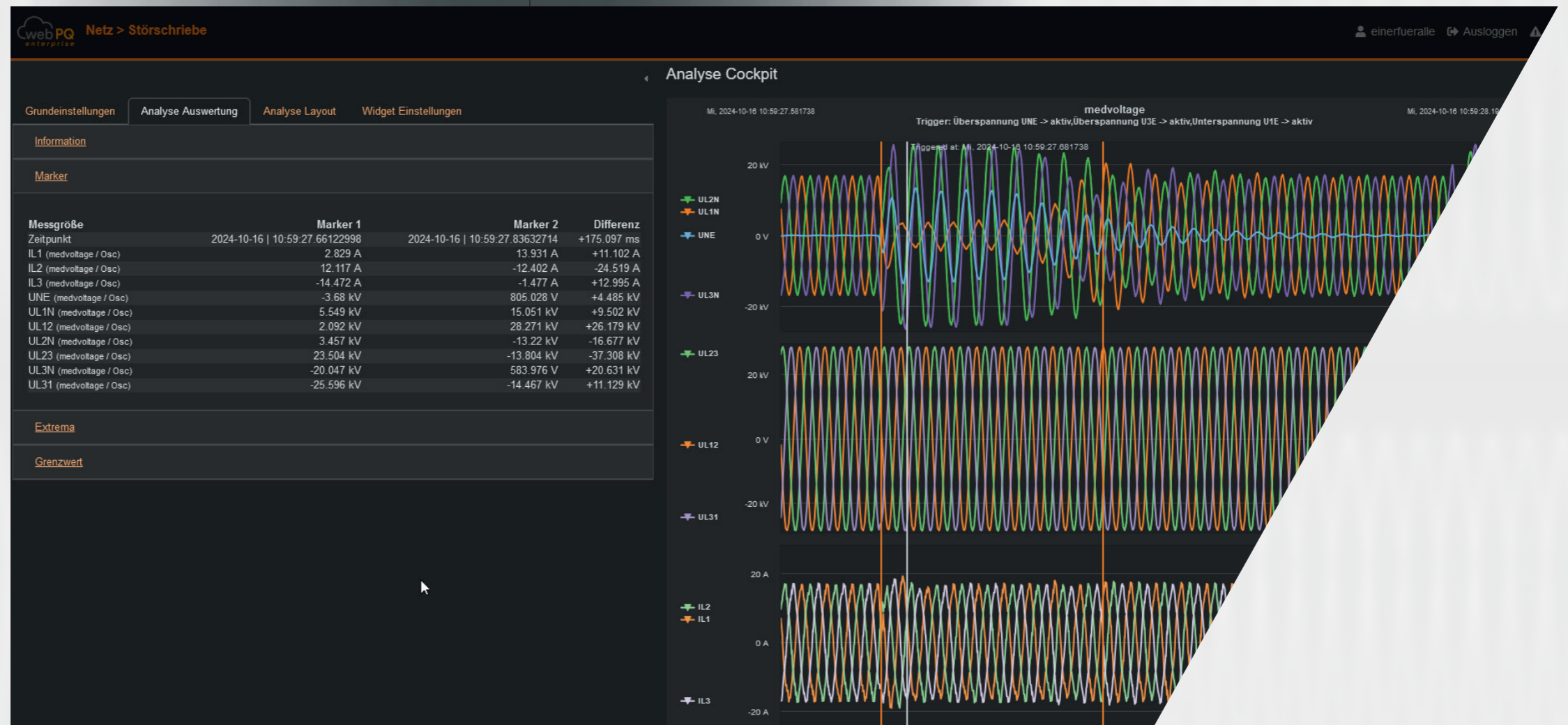


Continuous Measured Value Acquisition and Monitoring

- Data recording and visualisation in 7 intervals (200 ms to 30 min) e.g. 10 min - statistical evaluation (load analyses / fault detection (10 ms extreme values) or 200 ms values for transformer stage monitoring or 3 s for "very fast Harmonic" analysis according to IEC61000-2-4).
- Up to 32 freely adjustable alarm values across all measured value classes with adjustable alarms via binary outputs and SCADA protocols with maximum fast triggering (< 10 ms possible).
- High-precision frequency measurement < 0.1 mHz (PQI-DE) and actual value return of measured variables for controlling systems - e.g. EZA controllers.

Interference Recording & Transient Recorder

- Over 60 different trigger types for triggering oscilloscope and 10 ms measured values such as transient trigger, voltage trigger per phase, frequency trigger, binary trigger and many more.
- Recording of up to 160 s samples and 6 minutes TRMS measured values of voltage, current, power, reactive power and phase angles.
- Spectral analysis of current and voltage from DC up to 20 kHz.
- Available as Comtrade-Files via WebServer for Blackbox application.



Interfaces – Openness as the Key to a Wide Range of Applications

- IEC60870-5-104 – Telecontrol protocol for transmitting measurement data to your SCADA system
- IEC61850
- Modbus Master on IEC60870-5-104 Gateway: Storage of measurement data in the measuring device with parallel transmission to your SCADA system via IEC104
- Modbus RTU to Modbus TCP Gateway
- MQTT *
- REST API via HTTPS

Security in Your Critical Infrastructure

- Integrated User Rights Management (URM) with Role Based Access Control (RBAC) and centralised administration option via RADIUS
- Audit logging for logging events in the system
- Signed firmware updates to ensure the integrity of the updates
- Encrypted data transmission

* as of v3.4



IEC61000-2-4
VDE-AR 4110
 DACH-CZ
 IEC61000-2-12
IEC61000-2-2
 EN50160
 IEEE519
NRS048
NETCODE
Grid Codes
Paragraph §14a



Blackbox - Application in Machines and Processes

Thanks to the built-in intelligent memory, the measuring devices are able to provide assistance in the event of a fault and simplify fault diagnosis. For this purpose, the measuring devices are installed directly in machines, high-tech processes and vulnerable systems. In the event of anomalies in the energy system, you can get to the bottom of past events in a targeted manner. This leads to more protection against potential faults and recourse claims and saves time and costs for time-consuming reconstructions of faults that have occurred – especially if these faults are otherwise difficult to reconstruct without stored measurement data in the black box.

Areas of application:

Emergency power systems (EPS), battery storage, data centres, the semiconductor industry and many other possible applications.

Solutions for the Digital Local Substation – For Maximum Openness and Transparency

Monitoring the local network station

- Power quality & fault writing
- Supraharmonics

Measured value transmission as RTU for §14a

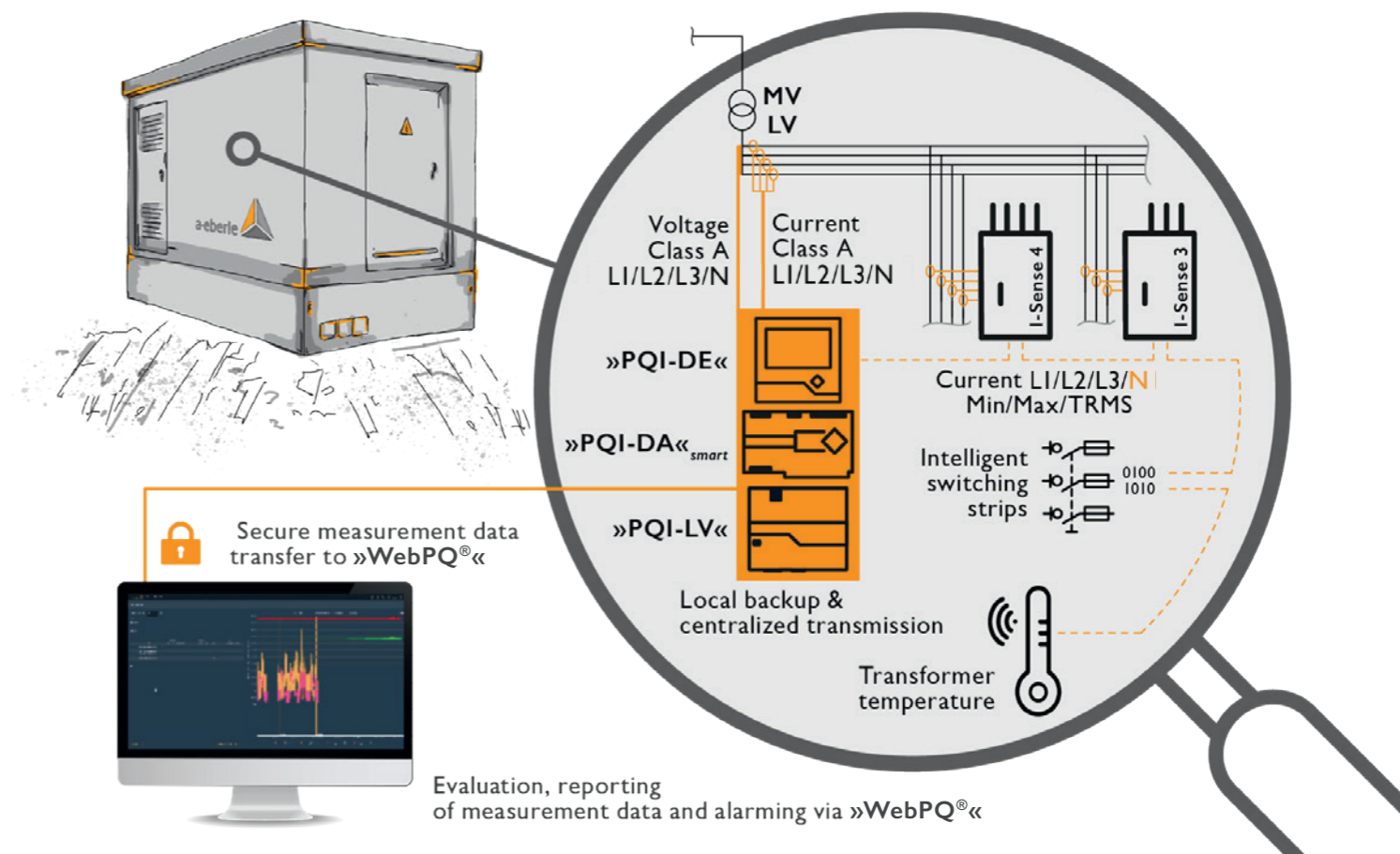
- §14a – 1 min Average values via IEC60870 -5-104 or MQTT *
- Transparency and automation in the grid
- Solution compatible with »I-Sense« feeder measurement technology

Compliance Monitoring – e.g. According to EN50160

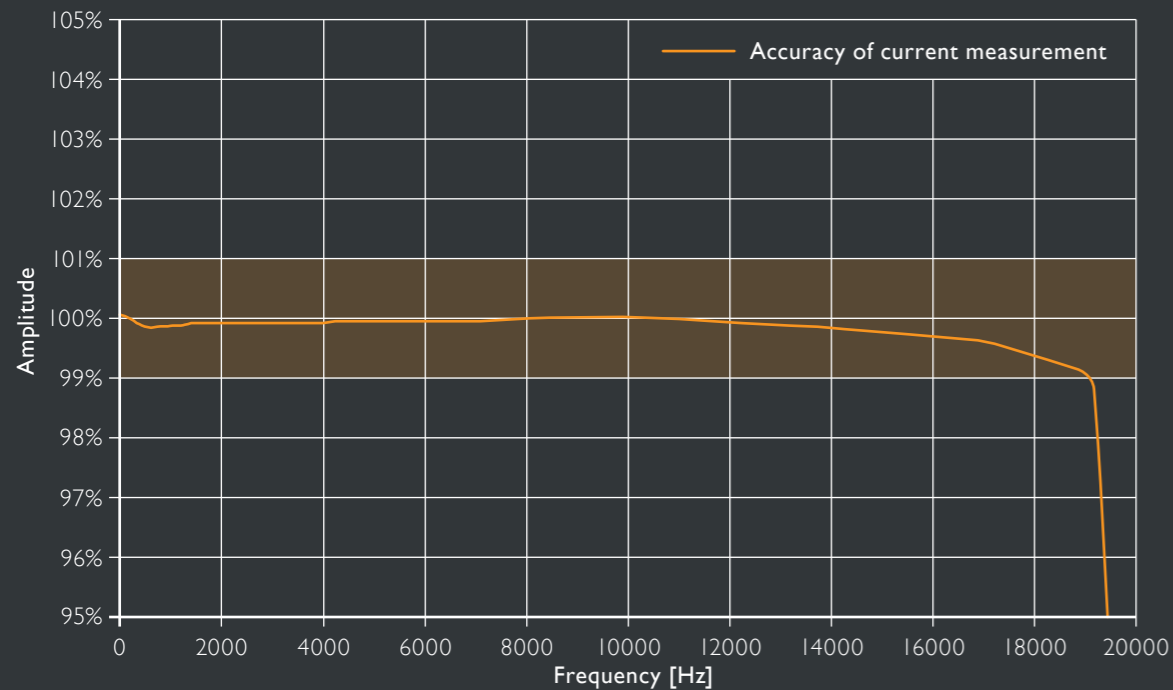
Regardless of whether it is monitoring according to standard norms or an individual contractual agreement at your grid connection point – the measuring devices are open and freely configurable for any type of system monitoring. And the best thing about it: A. Eberle always offers the appropriate and maintained templates in the area of standardization. With the »WebPQ« analysis software, it is also possible to roll out templates to many devices in parallel via a fleet update - this saves time, money and creates security.

Energy Monitoring & Management With Added Value

Do you have an energy management system in accordance with DIN50001? No problem! The highly accurate measurement data can be easily and quickly integrated into your existing system via standard interfaces such as Modbus TCP. The accuracy of the energy measurement has been confirmed several times by external DAKKS-accredited institutes. The PQ measuring device can often also serve as a gateway solution in this application – e.g. from Modbus RTU to Modbus TCP or from Modbus RTU to IEC60870 -5-104, thus replacing classic RTU technology.



Measuring transducers are the foundation for meaningful and highly accurate measurement results. With measuring technology from A.Eberle, you will find the right solution for your requirements and voltage level.



Accuracy of a rogowski coil in combination with the PQI-DE measuring device



LPCT (Low Power Current Transformer) – current measurement in the retrofit sector and when it needs to be particularly fast and efficient

Rogowski coils: Simple, safe and time-efficient installation. Highly accurate up to the range of high frequency bands. Our power quality product portfolio offers the right solution for applications with a wide range of current levels, even for limited installation spaces and retrofits – Highly accurate up to 20 kHz.

Mini current clamps: The secondary circuit of the measurement is not in your inventory? No problem! With customised adaptations, such measurements are easily possible using mini current clamps or inductive current transformers.

Current measurement in the transformer or protection circuit

You have the choice – high-precision measurements in the measuring circuit or maximum reliable measurements in the short-range measuring circuit. Short-circuit current range up to $100 \times I_{nominal}$ for the fault recorder application in the protective circuit. Both variants can be customised and are available to suit your transformer and application for the »PQI-DE« and »PQI-DA smart« measuring devices.

Voltage measurement via RC divider for high voltage

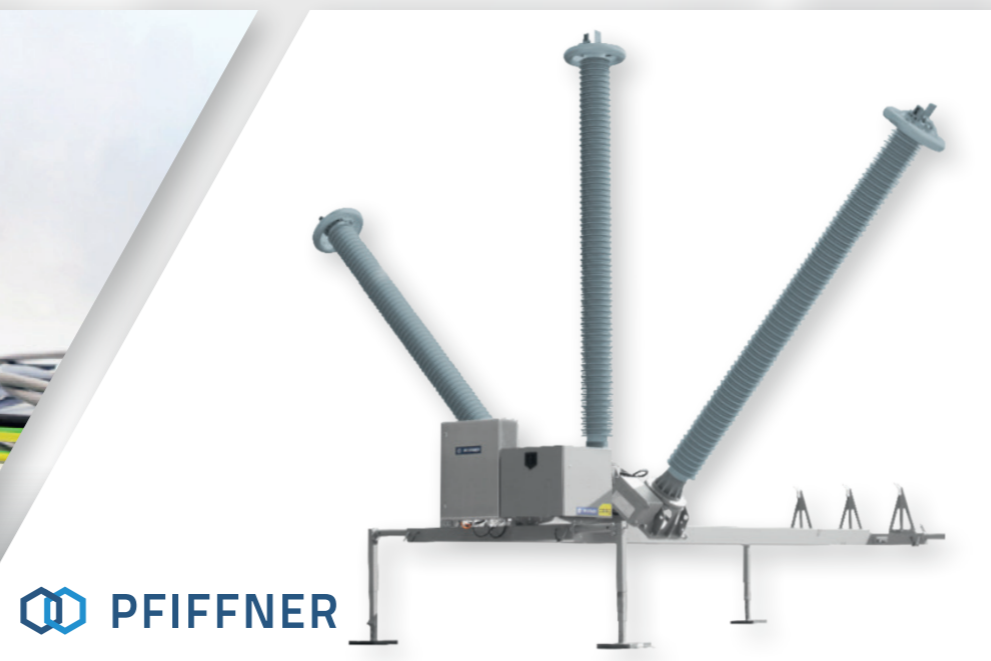
Voltage measurement via an RC divider for high voltage offers high accuracy, a wide frequency spectrum, low heat generation and good insulation capability with simple implementation. With the »PQI-DE«, which can be specially adapted to RC dividers from Pfiffner Messwandler, we offer the perfect tool for highly accurate measurement results.

Voltage measurement via LPVTs (Low Power Voltage Transducers) in the medium voltage range

With the help of the »PQI-DE«, voltage measurement can also be carried out using the innovative LPVT sensor technology. This offers many advantages:

- no eddy current and hysteresis losses,
- no saturation effects,
- high measurement dynamics,
- and in PQ measurement technology, they are particularly suitable for supraharmonic measurement.

They are also easy to install and ideal for a wide range of applications.





Platform-independent

Device-independent

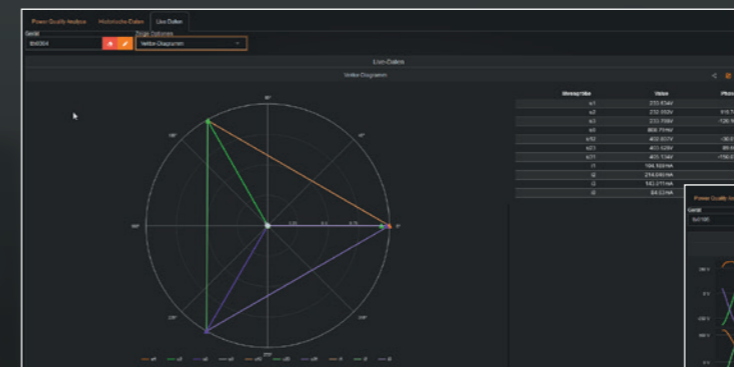
Future-proof

The database solution for all permanently installed fault recorders, power quality monitoring devices and mobile network analysers from A. Eberle.

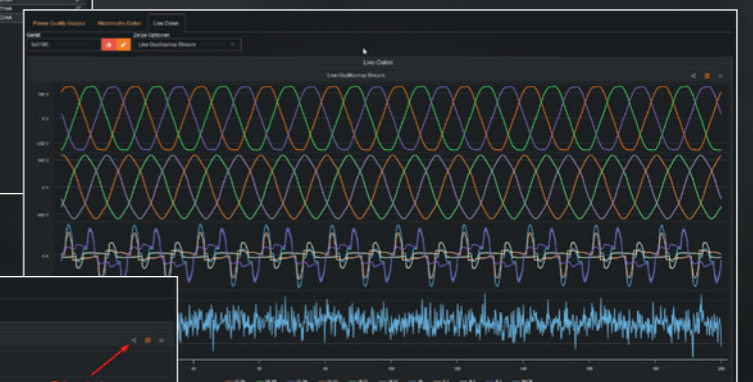
- Simultaneous, parallel readout of all measuring points. This guarantees a fast system response time.
- Automatic fleet and measuring point reporting and alerting for fault records and power quality reports.
- Drill-in evaluation method – recognise trends with a click of the mouse.
- Over 60 well-maintained standard templates on board – applicable to all connected measuring devices.
- Freely configurable dashboards with overlay options for measurement data and fault records from various measuring points.
- Live level-time diagrams, live online measured values and live display of harmonics.
- Fleet management in the area of versionable parameterisation and firmware updates.
- Freely configurable hierarchy levels and display forms for scaled measuring point monitoring.
- Freely configurable Grid Overview Dashboard – recognise faults in the grid at a glance.
- REST API – open for data exchange with your company.

Secure system integration

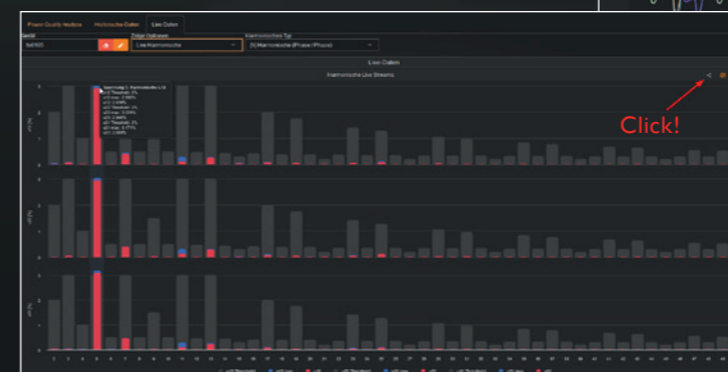
The scalable system with full server-client functionality in conjunction with defined, highly secure interfaces ensures very high flexibility in integration into your network!



Live vector diagram



Live oscilloscope – direct and simple fault detection



Live harmonics – Share your analyses directly with your colleagues!





Security and access management

- **Maximum security:** User rights management (URM) with role-based access control and rights management (RBAC) offer flexible access control
- **Encrypted communication:** HTTPS with certificate management
- **Simple integration:** Seamless connection to LDAP systems *
- **Full transparency:** Audit logs for every access and every change



Automated monitoring

- **Automatic status reports:** Regular individual reports and limit value warnings
- **Immediate alarm in the event of faults:** Notification of network or system errors



Open and flexible data management

- **REST API:** Open for versatile applications and customizations
- **Data export:** Manual or automatic in formats such as CSV, XML, Comtrade and PQDIF
- **Data import:** Seamless processing of CSV, Comtrade and PQDIF *
- **Compatibility:** Easy integration of measurement data from mobile devices



Optimized analysis and reports

- **Fleet analysis:** Recognize disruptions and trends with one click
- **Customized reports:** Create reports from over 60 standards & grid codes
- **Fast fault detection:** Efficient problem solving



Efficient device and fleet management

- **Device management:** Hierarchical and flexible via categorization & tagging
- **Fleet Management:** Simultaneous rollout of templates & firmware
- **Template management:** Simple administration with versionable parameters
- **Over-the-air update:** Firmware patches for more security and time savings

* higher versions



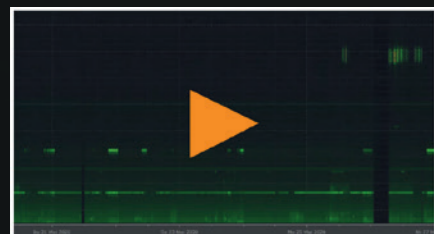
»WebPQ« – Versions

Customised to Your Individual Requirements!



	webPQ basic	webPQ professional	webPQ enterprise
WinPQ + WinPQ updates included	Yes	Yes	Yes
Maximum number of units in this version	30 pieces (33)	100 pieces (103)	from 101 pieces
Third-party database operator (MYSQL v5 / MSSQL / Azure SQL)	No	Yes * (add-on)	Yes * (add-on)
Multi-client capability	–	–	Yes * (add-on)
Fleet management (parameterisation & firmware)	–	Yes	Yes
Export interfaces	CSV Comtrade NeQUAL (add-on) PQDIF * (add-on)	CSV Comtrade NeQUAL (add-on) PQDIF * (add-on)	CSV Comtrade NeQUAL (add-on) PQDIF *
Import interfaces	–	CSV * (add-on) Comtrade * (add-on)	CSV * (add-on) Comtrade * (add-on) PQDIF * (add-on)
REST API	–	Yes	Yes
Connection to central AD system – LDAP	–	–	Yes *
QA instance	–	–	(add-on)
Basic software incl. 3 units (2 users + 1 device) and PostgreSQL DB	L. 900.9266.10	L. 900.9266.20	L. 900.922.30
External database operator (MYSQL v5 / MSSQL)	–	L. 900.9265.02	L. 900.9265.02
Up to 10 units		L. 900.9266.1010	
Up to 30 units		L. 900.9266.1025	
Up to 50 units	–	L. 900.9266.2050	
Up to 100 units	–	L. 900.9266.2100	
Up to 500 units	–	–	L. 900.9266.3500
Up to 1.000 units	–	–	L. 900.9266.3999
Upgrades from version to version (change of main licences)	–	L. 900.9066.21	L. 900.9066.31
The annual maintenance agreement for »WebPQ« is valid for 12 months and includes all updates and upgrades of the software during this period. Automatic renewal.		L. 900.9066.10.01	
The one-time maintenance agreement for »WebPQ« is valid for a period of 12 months and includes all updates and upgrades of the software within this period. Any missed updates will be recalculated according to the number of months with the latest sales prices.		L. 900.9066.10.02	
* >v2.1			



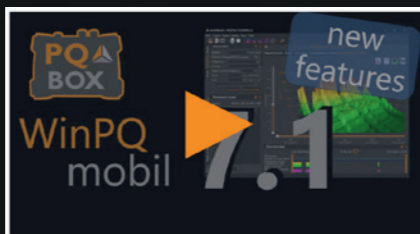


General Knowledge

Harmonics

Harmonics are waves whose frequencies are an integer multiple higher or lower than those of the fundamental oscillations. They arise due to non-linear loads in the grid when the electrical voltage is distorted due to various influencing factors. Learn more about harmonics in this article!

CONTINUE READING



Training Video

»PQMobil« Training Video 6: Presentation of WinPQ mobile 7.1

In this video we introduce you to all the new features & functions of the latest version of the analysis software »WinPQ mobil 7.1« for our portable power quality analysers. Enjoy the video and the new possibilities with your PQ-Box from A. Eberle.

CONTINUE READING



General Knowledge

Voltage Monitoring

Find out everything you need to know about voltage monitoring in this article. What is voltage monitoring, why is voltage monitoring essential for both energy supply companies and industrial companies and how is it implemented in compliance with standards?

CONTINUE READING



General Knowledge

Reactive power – definition, calculation and measurement

The key role of reactive power in electrical engineering: definition, calculation, measurement and the differences to active power and apparent power. Find out how reactive power influences the efficiency of electricity grids and shapes energy transmission.

CONTINUE READING



General Knowledge

What is apparent power and how is it calculated?

This article addresses the question of what apparent power is and how to calculate it. An understanding of apparent power is crucial for the correct dimensioning of inverters and therefore for the optimum efficiency and performance of photovoltaic systems.

CONTINUE READING



General Knowledge

Ready for the smart grid of the future?

All information about smart grids/intelligent power grids, the technology behind them, advantages, disadvantages, challenges and current distribution.

CONTINUE READING

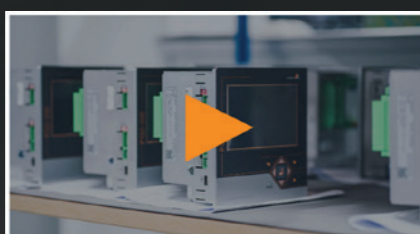


General Knowledge

What Is Load Profile Measurement/Power Measurement?

This article explains the definition and difference between load profile measurement (RLM), power measurement and measuring the standard load profile. These are important methods for accurately recording energy consumption in commercial, large industrial plant as well as in the public energy grid.

CONTINUE READING

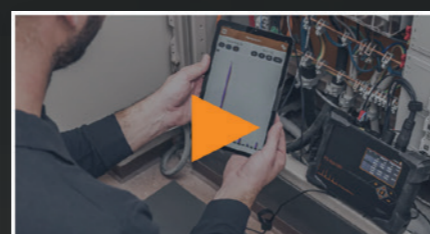


General Knowledge

Residual current

In this article, you will learn about residual current measurement & residual current monitoring and why it is important to measure residual current.

CONTINUE READING



General Knowledge

Power Quality

Good power quality is characterized by the fact that the mains voltage actually arriving at the consumer matches the mains voltage promised by the utility company.

CONTINUE READING

Knowledge
Measurement & Regulation Techn

You can find technical articles, videos and application reports on the subject of network analysis and power quality in our extensive knowledge database at www.a-eberle.de/en/knowledge



Do you have any questions about our power quality solutions or other enquiries?

Simply visit the following link or scan the QR code and click on "Product enquiry":
www.a-eberle.de/PQSys

If you would like to make an appointment to see our solutions, simply contact us by e-mail at sales@a-eberle.de.

We look forward to hearing from you!

