



Keeping an eye on power quality Power quality system with WinPQ visualization software



THE system solution for power quality monitoring, installed fault recorders and energy measurements in high, medium and low voltage grids



Electrical grids are currently undergoing radical change. Active power electronics as used in switching power supplies and inverters are ubiquitous. To achieve CO₂ reduction goals, small, renewable energy generators are being installed everywhere. Big, conventional power plants are disappearing.

Phenomena such as backfeeding, equipment overloads, voltage spikes at feed-in points and asymmetries are part of day-to-day business. This is a problem for highly optimized data centres and industrial controls that are sensitive to short dips in supply, harmonics and transient events. Even the stability of the grid is vulnerable.



The German Federal Court only ruled in 2014 that electricity also falls under the German product liability act. Ergo: Distribution grid operators are liable for damage caused by poor voltage quality.

With the combination of the Class A-certified PQSys family of measuring devices and the fully automated WinPQ server solution, A. Eberle offers a comprehensive voltage quality system that will stand up in court. It enables users to document, evaluate and prove the quality of the voltage at any time. Faults can be detected, the source determined and the cause remedied early.

All of the installed fault recorders and mobile grid analyzers from A. Eberle are supported and can be connected across grid levels, in large numbers, to an SQL database server. Communication over SCADA protocols, such as IEC 61850, Ethernet, 3G/4G and analogue dial-up modems is possible.

The WinPQ software is at its absolute best when it comes to controlling large amounts of data. Automated reporting assistants automatically explore the database and report only the things you need to see. You can receive standards reports and alerts by email or in standard formats such as Comtrade, PQDiff or as a PDF document on the hard disk. It's that easy!

Our fine-tuned hardware and software solution enables you to keep an eye on the voltage quality at all times.



WinPQ System solution for all installed fault recorders, power quality monitoring devices and mobile grid analyzer by A. Eberle Continuous power quality monitoring – from high voltage to the end customer as a system. Intuitive despite a large amount of data.



The philosophy behind the WinPQ system: An 'All-in-one' system overview

Keeping an eye on power quality

Unique: Power quality system with WinPQ visualization software

WinPQ database software

The WinPQ client-server software with database is an intelligent system solution that automatically monitors faults and the grid quality in parallel across several measuring devices. Different device versions are available for different requirements and voltage levels. The evaluation software supports all installed A. Eberle fault recorders. TCP/IP, fibre optics, RS-232, 3G, 4G and analogue modems can be used to communicate with the devices.

In addition, all of the data measured by the mobile grid analyzers can be imported into the database and correlated with the data on the installed devices.

The database is generally installed on a server to guarantee it's always running. The database supports any number of concurrent WinPQ clients.

The principle: Top-down analysis

The WinPQ database analysis software enables you to easily create abstract views of many measurands that have no time correlation: from the measured data's timing diagrams to highly accurate error logs. The system's key features include:

- All devices are read concurrently. This assures the system's fast response time.
- Automatic error log reporting and auto matic creation of power quality reports, also for the control room.
- User-friendly software that enables you to easily monitor the many devices and large amount of data.

WinPQ can be used with the following databases: MySQL, Maria DB, MS SQL and Oracle DB.

Full overview

A click of the mouse is all that is needed to generate an EN 50160 report: with millions of records across the whole measuring area. If a measurement is exceeded, the time behaviour (cyclical data) can be directly displayed.

Timing diagram

Permanently archive several years of cyclical data timing diagrams. Direct link with sampling values if thresholds are exceeded.

Sample values

Highly accurate analysis across the 10 ms TRMS logs and sampling values with up to 40.95 kHz.

Displaying measuring points/system overview

WinPQ offers a number of display options for measuring points. Devices can be arranged in an industry accepted grid plan or several hundred measuring points by voltage level and region. Online measurement data can be displayed directly in the graphic or device tile and configured with threshold monitoring. E Garden in Despensiblynne 🛛 🗮 Ane Arepener USAEB -LKZ 8 8 8 UW-4 8 Kompr. Halle 15 PQStart* - V4.3.0 - 08.12.2016 Halle 54 8 8 8 ebe 🛛 🚟 Binar-En 38.2 Ost 1 =H03+SU01 Ost 2 30 KV-Abgang KKB Überwachung 24V Versorgung Sicherungsüberwachung 230V UL1=16,58 kV 8 8 UW-Ost 20kV UL2 UL2=16,66 kV 1042 UL3=16,74 kV Trenner X USV 88 8 8 0W-ost 8 8 8 8 W-Sud 6,3kV I1 [11=1,2 A Warning Replace Battery LA 124 Warning On Battery
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Data can be selected from the many measured values and messages in all of the device tiles.



Other options: Calculate and display an online measurement. This example displays the cumulative load across all substations in one grid area.

Fault recorder



 $^{\prime\!\!/_2}$ period recorder TRMS average values of all voltages (phase-to-phase and phase-to-ground), currents, active power, reactive power, apparent power and frequency



Oscilloscope recorder with 10 kHz – 40 kHz sampling rate

2/



Extensive analysis options and FFT calculation functions

The devices have several fault recorders with different sampling rates with different levels of detail and recording lengths. There is an extensive menu of trigger criteria for recorders. The duration and pre-event time are user definable.

The devices have the capability of adjusting the recording length independently of the fault duration on the grid.

The WinPQ system can display several error logs from different installed and mobile grid analyzers in a diagram. Messages, PQ events and binary signals can also be displayed and used in other calculations and correlations with measuring data.



Power quality report and statistics

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WinPQ offers an extremely wide range of power quality reports and statistics. There are detailed reports per measuring point and overview reports for a group of devices or voltage level or grid area.

ITIC report examples

The graphic shows all voltage events in a device group over an arbitrary period of time. The error log is accessed from the event.



Voltage dips and swells sorted by date and duration

Voltage dips and swells sorted by time and depth



EN 50160 report examples





Double-clicking on one of the points opens the corresponding error log

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Automatic reporting



The devices automatically send faults to the database as soon as they occur. PDF documents are created automatically and can be sent to email addresses or printers.

The system automatically archives power quality reports and long-term statistics. 3D graphics help keep track of the many devices in a grid area or voltage level.

Alert management

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A separate flow plan can be created for each measuring point: Which fault from which event size should be reported to whom?

Alerts can be reported optically, acoustically or by email and text message. Acknowledge functions, pop-up windows and sound are available to report alerts.





Keeping an eye on power quality





3D and 4D graphics



3D and 4D graphics provide an overview of many stations across several measured values



Analysis of the load profiles of several stations across arbitrary periods. Clicking on a bar opens the timing diagram for this situation or the cumulative frequency analysis (see below).





Voltage and current harmonics reports in accordance with IEC 61000-4-7 up to 9 kHz

View of all voltage or current harmonics 2nd to 50th. Harmonics and frequency bands 2 kHz to 9 kHz in accordance with IEC 61000-4-7 is possible. All measured values are displayed with the corresponding threshold for the specified standard.

4D report



The number of grid events in a voltage level or device group can be displayed over an arbitrary period of time in a four-dimensional overview report.





Heatmap view: Shows standards violations over a large number of measuring points.

Options

Maps



The 'Maps' option displays all of the stations on the map by their geographic coordinates. The maps are available offline. An internet connection is not needed.



Many of the available measured values can be displayed graphically on the map as coloured bars. The graphics or charts can display the current voltage level, load flow and power quality reserves.

Options



Power-generating systems / CosPhi characteristic for feeder

A target CosPhi can be required for powergenerating systems based on the power that is fed-in or sourced. The 'CosPhi characteristic' option in WinPQ can be used to monitor this function and generate a report manually or automatically.



WinPQ App





Selected measurement data and error logs can be sent per WinPQ app. These measurement data can be analyzed and zoomed into on a smartphone. The following data are available in the app:

- Oscilloscope images
- 1/2 interval RMS logs
- Long-term measurement data (load profile, current, voltage, THD, flicker, etc.)
- PQ events



XML data export for Nequal interface



XML data export interface for Switzerland and Austria

Selective email dispatch



The **Selective email dispatch** option enables inbound error logs to be weighted by depth, height and event duration, and then reported and sent by email when the specified threshold is reached. Several weighting levels by duration and depth/height can be configured.



Example: In an industrial plant, equipment fails when the voltage dips to -17 % for a period of 350 ms.

Device configuration

Adding new measuring points has never been so easy. A wizard walks the user through the setup for a new measuring device. All of the background processes needed to install the hardware are also configured automatically.

The software already has pre-defined templates for a high, medium and low-voltage grid, as well as for industrial grids.

The following standards are stored in the software and automatically updated by A. Eberle when necessary:

- EN50160
- IEC61000-2-2
- IEC61000-2-12
- IEC61000-2-4 Class 1, 2, 3
- D-A-CH-CZ Guideline

Bitte wählen Sie den Gerätetyp aus, der in Ihr WinPQ System hinzugefügt werden soll. PowerQuality: PourDA smart PQI-D(A) PQ-Box (PQ-Box 100 / 150 / 200) Netzdynamik: DMR-D DA-Box 2000	1	Geräteauswahl	
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Keeping an eye on power quality





Program	Purpose	Server/ Client	TCP port
MySQL (mysqld.exe)	Database server	Server	3306
PQRS232Server (PQRS232Server.exe)	RS232 conversion software	Server	1701,1702,
PQReport, PQVisu, PQStart (PQReport.exe, PQVisu.exe, PQStart.exe)	Read and display MySQL data	Client	3306
PQPara (PQPara.exe)	Communicate with the devices through the PQRS232 server	Client	1701,1702,
PQManager (PQManager.exe)	Transfer files from the devices to the database	Client	1701,1702,
WuT-Com	Configure COM server	Client	, 8000
PQSmartManager, WinPQSmart (PQSmartManager.exe, WinPQSmartManager.exe)	Access to PQI-D smart devices	Client	5040

WinPQ with database: Recommended system requirements

Operating system:	Windows 10/Windows Server 2016
Processor:	4+ cores
RAM:	8 GB

WinPQ with database: Minimum system requirements

Operating system:	Windows 7; 8; 10/
	Windows Server 2008 - 2016
Processor:	at least 2 cores
Storage:	20 GB + 500 MB per station per year (when using standard profiles)
RAM:	at least 4 GB

User management/Security BDEW (IT security)

User management is becoming increasingly important in medium and large enterprises. Each user can be assigned specific rights and groups. Pre-defined access permissions can be assigned through the rights. All users, passwords, and rights are stored encrypted in a database.

Database maintenance and backup

A number of fully automated backup and maintenance mechanisms are available for operations running many devices. Automatic backups to external hard drives, deletion of repositories in the database after a certain time. Example: Ripple control recorders are stored in the database for only three months and then automatically deleted.

Adding external devices or components

If additional measurement inputs are needed for temperature, light and messages, external devices can be added to the system solution through Modbus TCP/IP, enabling the system to be easily extended by a number of options.

Exporting measurement data

WinPQ offers the following export formats for the manual or automatic export of data: PQDIF • COMTRADE• XML• TXT

WinPQ software versions

WinPQ up to 2 measuring devices MySQL	900.9080
WinPQ up to 2 measuring devices MariaDB	900.9080.10
WinPQ up to 10 measuring devices MySQL	900.9071
WinPQ up to 10 measuring devices MariaDB	900.9071.10
WinPQ up to 100 PQI-D MySQL	900.9079
WinPQ up to 100 PQI-D MariaDB	900.9079.10
WinPQ unlimited number of measuring devices MySQL	900.9077
WinPQ corporate licence MySQL – unlimited number of devices and users	900.9088
WinPQ extension from 2 to 10 measuring devices	900.9072
WinPQ extension from 2 to unlimited number of measuring devices	900.9063
WinPQ extension from 10 to unlimited number of measuring devices	900.9068
WinPQ extension from 10 to corporate licence	900.9069
WinPQ extension from 255 to corporate licence	900.9067
WinPQ extension by another 3 PC clients	900.9065
Software options through licence code	
Power-generating systems (CosPhi characteristic for each plant)	900.9075
Nequal export interface (Switzerland/Austria)	900.9076
Report extension pack (energy/power/3D/4D charts)	900.78.01
Android app for WinPQ	900.78.02
COMTRADE data import pack (import data from third-party systems)	900.78.03
ZFA pack (remote counter reading and evaluation in WinPQ)	900.78.04
Fault-dependent mail dispatch of error logs	900.78.05
Maps – 2D and 3D maps of Germany	900.9052.01
Maps – 2D and 3D maps of Austria	900.9052.02
Maps – 2D and 3D maps of Switzerland	900.9052.03
Maps – 2D and 3D customer-specific maps	900.9052.99
Maintenance/updates	
WinPQ update with mSQL database update	900.9062
WinPQ update without MySQL database update	900.9064
MySQL versions - database update for WinPQ	900.9085
Service contract, BDEW Whitepaper for WinPQ, mSQL database, firmware	900.9086





power quality





A. Eberle offers a variety of installed and mobile fault recorders and grid analyzers.





Branch Office China

A. Eberle China Trading Ltd.

Representative China Room 718, No. 915 Zhenbei Road CN-200333 Putuo District, Shanghai

Phone+86 21 / 62 29 91 23Fax+86 21 / 60 85 30 59

Shuyu.Zheng@a-eberle.de

Branch Office India

A. Eberle Systems Private Ltd.

Representative Asia & Middle East 405-406, I mint Hiranandani meadows next to Gemini building Thane(W)-400610 Mumbai, India Phone +91 22 / 21 73 97-07/08 Fax +91 22 / 21 73 97-10 support-asia@a-eberle.de Head Office A. Eberle GmbH & Co. KG

Frankenstraße 160 90461 Nürnberg/Germany

Phone +49(0)911 628108-0 Fax +49(0)911 628108-99 info@a-eberle.de www.a-eberle.de