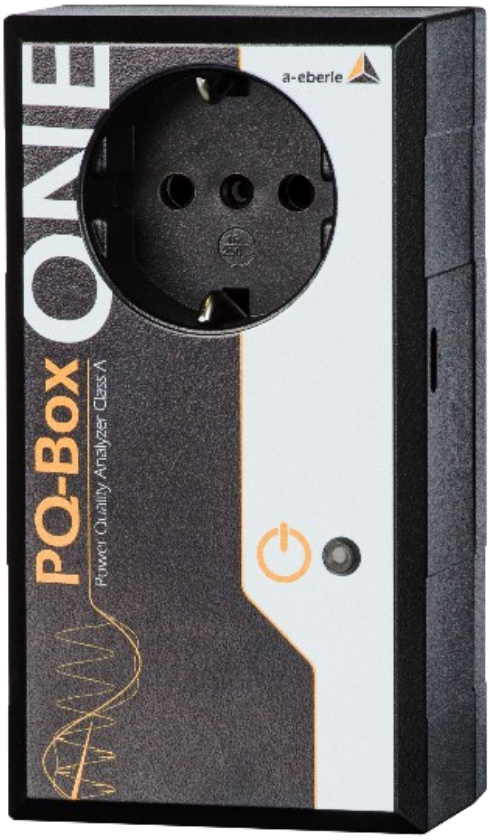
Operating Manual

Network Analyser
PQ-Box ONE



Available user manuals:

- Operating manual PQ-Box ONE Hardware (this print version)
- Operating manual WinPQ mobil Software (available as PDF download from our homepage via www.a-eberle.de or via WinPQ mobil software --> Help)

GB

Note:

Please note that this operating manual cannot describe the latest version of the device in all cases. For example, if you download a more recent firmware version from the internet, the following description may no longer be accurate in every point.

In this case, either contact us directly or refer to the most recent version of the operating manual, available on our website (www.a-eberle.de).

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Furthermore, **A. Eberle GmbH & Co. KG** does not assume responsibility for any damage or losses resulting from defective devices or from devices altered by the user.

Table of Contents

1. User Guidance

1.1 Target group

The User Manual is intended for skilled technicians as well trained and certified operators.

The contents of this User Manual must be accessible to people tasked with the installation and operation of the system.

1.2 Warnings

Structure of the warnings

Warnings are structured as follows:

⚠ SIGNAL WORD	**Nature and source of danger.** Consequences of non-compliance. ● Actions to avoid the danger.

Types of warnings

Warnings are distinguished by the type of danger they are warning against:

⚠ DANGER!	Warns of imminent danger that can result in death or serious injuries if not avoided.
⚠ 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.

1.3 Tips

Tips on the appropriate device use and recommendations.

1.4 Other Symbols

Instructions

Structure of instructions:

✋ Guidance for action.

→ Indication of an outcome, if necessary.

Lists

Structure of unnumbered lists:

- 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.

1.7 Updated documentation

The most recent versions of the documents can be obtained at https://www.a-eberle.de/de/downloads

2. Safety Instructions

2.1 Safety instructions

- Observe the operating instructions.
- The operator undertakes to refer to these operating instructions as soon as he comes across the symbol
- Always keep the operating instructions with the appliance.
- Ensure that the appliance is only operated when it is in perfect working order.
- Before opening the housing, disconnect the device from the mains voltage.
- Only connect the appliance to power sockets.
- Ensure that the device is only operated in its original condition.
- Only operate the device with recommended accessories.
- Ensure that the appliance is not operated above the rated data. (See technical data of the device including the power supply unit)
- Ensure that the original accessories are not operated above the rated data.
- Do not operate the device in environments where explosive gases, dust or vapours are present.
- Only use commercially available cleaning agents to clean the device.
- The interface (USB) may only be connected to devices that comply with the Low Voltage Directive and only have safety extra-low voltage applied to the corresponding interfaces.

⚠ **DANGER!**	**Danger to life due to electric shock!** If the device is used in a way not specified by the equipment producer, the device protection will be impaired. Observe safety instructions

2.2 Meaning of the symbols used on the device

Nature and source of danger! Read the safety instructions inside the manual!

USB-interface

CE marking guarantees compliance with the European directives and regulations regarding EMC

The device is comprehensively protected by double or reinforced insulation.

IP30

Protection against dust 3X

No protection against water X0

AC voltage

CAT II

Category II = Measurements exclusively on sockets

2.3 Declaration of Conformity

Hereby, A. Eberle GmbH & Co. KG declares that the radio equipment type PQ-Box ONE is compliant with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address:
https://www.a-eberle.de/en/company-profile/certificates

3. Scope of Delivery/Order Codes PQ-Box ONE

3.1 Scope of Delivery

- PQ-Box ONE
- User Manual Hardware (Manual for software electronic only)
- USB-C cable

Performance		
PQ-Box ONE		
Statistics according to EN 50160/IEC 61000-2-2/IEC 61000-2-4	x	
PQ-events	x	
Recording free interval (1 sec…30 min):		
Voltage: min. max. average	x	
Current: min. max. average	x	
Power: P, Q, S, PF, cos phi, sin phi, tan phi	x	
Distortion power D	x	
Energy: P, Q, P+, P-, Q+, Q-	x	
Flicker according to IEC 61000-4-15 (2010) (Pst, Plt, Ps5)	x	
Voltage harmonics mean and 200ms extreme values	up to 50th	
Voltage harmonics 200 Hz frequency bands – 2 kHz to 9 kHz	x	
Current harmonics mean and 200ms extreme values	up to 50th	
Current harmonics 200 Hz frequency bands 2 kHz to 9 kHz	x	
Phase angle of current and voltage harmonics	x	
Active, reactive, and apparent power of harmonics	x	
THD voltage, current; PWHD, PHC	x	
FFT spectrum of voltage and current	DC to 10 kHz	
Ripple control signal	x	
Frequency: min. max. average	x	
Power / Energy Interval		
10/15/30 min interval – Voltage, P, Q, S, D, cos phi, sin phi …	x	
Online mode:		
Oscilloscope recorder	x	
Half-cycle RMS recorder	x	
Voltage & current harmonics, inter harmonics	x	
FFT spectrum of voltage and current	DC to 10 kHz	
Direction of harmonics	x	
Trigger options:		
Half-cycle RMS recorder (U, I, P, Q, S, frequency)	x	
Oscilloscope recorder (U, I)	x	
Frequency trigger (level deviation, df/dt)	x	
Phase shift trigger	x	
Envelope trigger	x	
Interval trigger	x	
Automatic trigger	x	

3.3 Technical data

PQ Box ONE	
2 voltage channels: Maximum input voltage Input Impedance:	L1-E, N-E 300 V AC L-N 1,2 MΩ
Current channel:	16 A AC continuous load 50 A peak maximum measuring range 100 A peak maximum load capacity
Sampling frequency:	20.48 kHz at 50 Hz/60 Hz
Synchronization to fundamental frequency:	45 Hz to 65 Hz
Measuring interval:	freely adjustable from 1 sec. to 30 minutes
Data memory:	1 GB
Interfaces:	WLAN/Wi-Fi, USB-C
Time synchronization:	NTP via WLAN/Wi-Fi
Dimensions:	125 x 67 x 50 mm
Weight:	0,25 kg
Degree of Protection:	IP 30
IEC 61000-4-30 Ed. 4:	Class A
Inaccuracy:	< 0,1%
Insulation class voltage channels:	CAT II / 300V
Insulation test:	Impulse voltage = 6 kV 5 sec = 2,5 kV RMS
A/D converter:	16 Bit
Climate / temperature proof:	Operation: -10° ….50°C Storage: -20°….70°C
Power supply voltage:	88 V…300 V AC 300V CAT II

Electromagnetic compatibility (EMC)	
CE-Conformity ● Interference immunity – EN 61326 – EN 61000-6-2 ● Emitted interference – EN 61326 – EN 61000-6-4 – EN 61000-6-3	
ESD – IEC 61000-4-2 – IEC 60 255-22-2	4 kV / 8 kV
Electromagnetic fields – IEC 61000-4-3 – IEC 60 255-22-3	10 V/m
Burst – IEC 61000-4-4 – IEC 60 255-22-4	2 kV
Surge – IEC 61000-4-5	1 kV
HF conducted disturb. – IEC 61000-4-6	10 V, 150 kHz ... 80 MHz
Voltage dips – IEC 61000-4-11	100 % 1min
● Housing at distance of 10 m	30...230 MHz, 40dB/30dB 230...1000 MHz, 47dB/37dB
● AC power supply	0,15...0,5 MHz, 79 dB 0,5...5 MHz, 73 dB 5...30 MHz, 73 dB

Measurement quantity	Error limits according to IEC 61000-4-30, Class A
Fundamental oscillation: r.m.s	±0.1% of U_{din} over 10% … 150% of U_{din}
Fundamental oscillation: Phase	± 0.15° over 50% … 150% of U_{din} over f_{nom} ±15%
2nd ... 50th harmonic	±5% of display over U_m = 1% ~ 16% of U_{din} ±0.05% of U_{din} over U_m < 1% of U_{din}
2nd .... 49th interharmonics	±5% of display over U_m = 1% ~ 16% of U_{din} ±0.05% of U_{din} over U_m < 1% of U_{din}
Frequency	± 5mHz over f_{nom} ±15% (f_{nom} = 50 Hz / 60 Hz)
Flicker, Pst, Plt	±5% of display over 0.02% ~ 20% of ΔU / U
Dip residual voltage	±0.2% of U_{din} over 10% ~ 100% of U_{din}
Dip duration	±20 ms over 10% ~ 100% of U_{din}
Swell residual voltage	±0.2% of U_{din} over 100% ~ 150% of U_{din}
Swell duration	±20 ms over 100% ~ 150% of U_{din}
Interruption duration	±20 ms over 1% ~ 100% of U_{din}
Ripple control voltage	±5% of display over U_m = 3% ~ 15% of U_{din} ±0.15% of U_{din} over U_m = 1% ~ 3% of U_{din}

4. Use of the product

The product is intended exclusively for measuring the voltage quality at power sockets and evaluating the currents and power ratings of consumers at this socket. The device is not approved for continuous loads > 16 A.
If the device is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.

✋ Observe safety instructions
✋ Ensure that the device is not operated beyond its rated data

5. Description

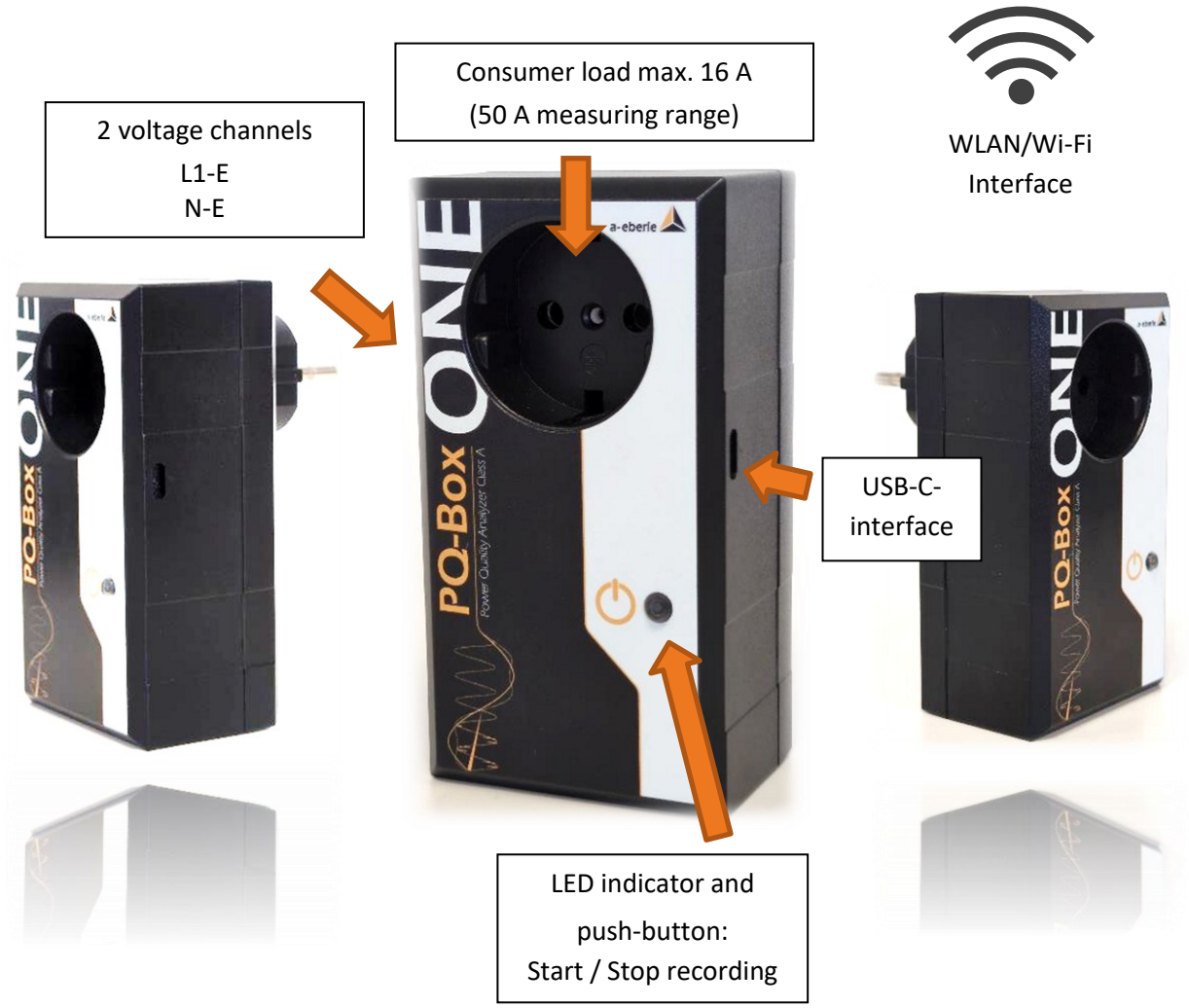
The PQ-Box ONE network analyser is only suitable for analyses in low-voltage networks at power sockets. The device meets all requirements of the IEC 61000-4-30 Ed. 4 Class A measuring device standard.

Functions:

- Load analysis and energy measurement
- Fault detection
- Evaluating power quality according to EN50160, IEC61000-2-2 /2-4 and others
- Oscilloscope and Half-cycle recorder
- Automatic phase detection
- Ripple Control Frequency Analysis

6. Hardware PQ-Box ONE

6.1 Overview



⚠ **Danger!**	**Danger to life due to electric shock!** The maximum voltage must not exceed 300 V AC to earth. ✋ Ensure that the device is not operated beyond its rated data.

⚠ **Attention!**	**Damage to measurement inputs due to overvoltage** ✋ Do not connect the device to a maximum AC voltage of more than 300 V AC.

⚠ **Attention!**	**Damage to power supply due to overvoltage or undervoltage** ✋ Only supply the device with a continuous voltage between 88 V and 300 V AC. ✋ The device can briefly bridge mains power failures thanks to a built-in power cap.

6.2 LED indicator and push button

Press the push button to start or stop recording. Various measurements can be recorded consecutively without having to read out the device beforehand. The LED indicates the various states of the PQ-Box as shown below:

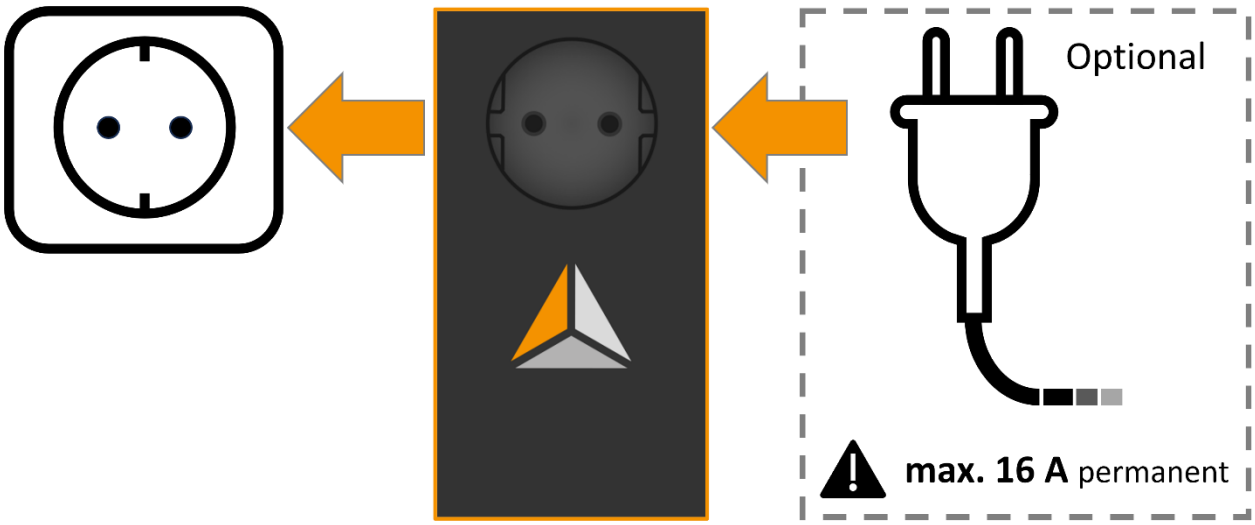
LED status and description

○	Off	Device is turned off.
●	Steady green	Ready for operation.
◐	Flashing green	Recording.
●	Steady orange	Memory full! Recording stopped.
●	Steady red	Error.

6.3 Bridging power supply interruptions

The PQ-Box ONE is equipped with a maintenance-free power cap for bridging short power interruptions. This buffer continues to supply the device for 30 seconds in the event of a power failure. During a power interruption, the last fault record is stored in the device's memory. In the event of longer interruptions and when the power returns, the PQ Box starts up automatically and continues the measurement. For subsequent evaluation on a PC, a measurement file is generated which shows the power interruption.

6.4 Connecting loads to the PQ-Box ONE



6.5 Memory management

To prevent the recorder data from filling the entire memory and thus stopping long-term recording in the event of an overly sensitive or incorrectly set trigger level, the PQ-Box limits the maximum available memory for all interference signals to 300 MB at the start of the recording.

6.6 Storage requirements

Storage requirements for long-term measurement data:
Example PQ-Box ONE:

- Measuring interval of 1s generates approx. 10 MB data per hour
- Measuring interval of 10min generates approx. 6 MB data per week

Events and fault records must be added to this amount of data. The amount of data is dependent on the occurrence of these events and the trigger settings of the measuring device.

6.7 Wi-Fi access point – IP address

The name of the Wi-Fi hotspot shown in the network for the PQ-Box ONE is:

„PQBoxONEAP_*serial-number*“, Example: „SSID: PQBoxONEAP_2504-204“

To establish a connection with the PQ Box, the WPA2 key must be entered on the PC. This corresponds to the serial number of the device.

(Example: „SSID: PQBoxONEAP_2504-204“, the password is ‘2504-204’)

The IP address of the PQ-Box ONE access point is preconfigured as 172.168.2.4 and cannot be changed.

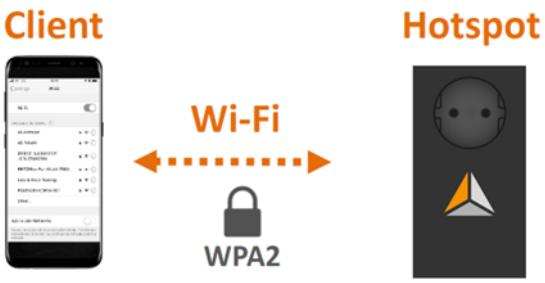
7. PQ-Box App

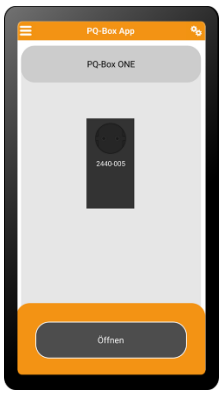
Using the free PQ-Box App for Android or iOS operating systems, all measurement values can be displayed on various types of mobile phones or tablets. The PQ-Box App provides information about the correct connection of voltage leads and current clamps and displays live-data of voltage, current, THD, power, and many more variables.

The PQ-Box App allows the user to configure and parameterize the PQ-Box ONE with basic settings, like measuring interval, nominal voltage, GPS location, or power frequency.

7.1 Connecting to PQ-Box ONE

The PQ-Box acts as a Wi-Fi access point. The SSID and password for a WPA2 connection is located on the type plate of the network analyser. (Example: ‘SSID: PQBoxONEAP_2504-204’, the password here would be ‘2504-204’).





Only one device (mobile phone or notebook) can connect to the PQ-Box at a time.

8. Maintenance / Cleaning

8.1 Maintenance

This unit is maintenance-free for customers.

⚠ **Danger!!**	**Danger to life due to electric shock!** Do not open the unit. Maintenance of the equipment can only be carried out by A-Eberle.

For service, contact A-Eberle.

Service address:

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

Cleaning the label fields

Use a soft, slightly damp, lint-free cloth. Do not use window cleaners, household cleaners, sprays, solvents, alcohol-based cleaners, ammonia solutions or abrasive cleaners for cleaning.

9. Calibration

We recommend a calibration interval of three years for the PQ-Box ONE network analyser to maintain the accuracy required by IEC 61000-4-30 for Class A measuring devices. The devices are adjusted and calibrated at the premises of A. Eberle GmbH & Co. KG.

10. Disposal

To dispose of the device and its accessories, send all components to A-Eberle.

11. Product warranty

- A-Eberle guarantees that this product will remain free of defects in material and workmanship for a period of three years from the date of purchase.
- For accessories like current clamps and the battery the period is one year.
- This warranty does not cover damage caused by accident, misuse or abnormal operating conditions.

To obtain service during the warranty period, please contact A-Eberle GmbH & Co KG in Nuremberg. The detailed conditions for the warranty can be found in our terms and conditions:

https://www.a-eberle.de/agbs

PQ-Box ONE
Information

WinPQ mobil
Software

Video-Tutorials
PQ-Box & WinPQ mobil

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