# Operating manual

Calib-Box and software PQ-Calib
for Power Quality Analyser
PQ-Box 50; PQ-Box 100; PQ-Box 150;
PQ-Box 200 and PQ-Box 300


Ver. 06-2020

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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# Content

# 1. User prompt

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

## 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 responsible for installing and operating the system.

## 1.2 Warnings

▶ **Structure of the warnings**

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

▶ **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. |

## 1.3 Tips

Notes on appropriate use of the device.

## 1.4 Other symbols

### Instructions

Structure of the instructions:

➲ Guidance for an 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.

# 2. Safety information

Please read this section carefully for important safety information.

Do not use the device for any other purpose than for measuring voltage and currents within the specified ranges and categories including the voltage to ground.

| ⚠ DANGER! | **Danger to life due to electric shock!** |
|---|---|
| **If the analyser and calibration equipment is not used according the manual and safety instructions, the protection provided may be impaired.** | |

- Follow the user manuals.
- Keep the user manual with the device.
- Ensure that the device is operated only in a perfect condition.
- Never open the device.
- Ensure that only qualified personnel operate the device.
- Connect the device only as specified.
- Ensure that the device is operated only in the original condition.
- Connect the device only with recommended accessories.
- Ensure that the device is not operated outside the design limits.

  (see chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**)
- Ensure that the original accessories are not operated outside the design limits.
- Do not use the device in environments where explosive gases, dust or fumes occur.
- Check the power supply, measuring voltage and current leads for damage before use.

## 2.1 Meaning of the symbols used on the device

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

# 3. Warranty conditions

The warranty for the Calib-Box and accessories is three years in use, under normal operating conditions.

## 3.1 Cleaning / Maintenance

Cleaning:
The Calib-Box should not be opened for cleaning purposes. Do not use solvents for cleaning nor immerse the device in liquid.
Caution:
Don´t open the Calib-Box under any circumstances! The opening can result in electric shock.
The Calib-Box contains no user-serviceable parts.

Service Address:

A. Eberle GmbH
Frankenstraße 160
D-90461 Nuernberg

# 4. Intended use

| ⚠ DANGER! | **Danger to life due to electric shock!** |
|---|---|

Do not connect the voltage input of the device to the supply network.
Only suitable for connection to a calibrator.

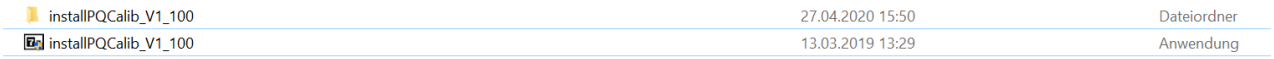
| ⚠ WARNING! | **There is a risk if the device is used in a manner not specified by the manufacturer** |
|---|---|

➲ Before making any connections, please read this manual thoroughly and follow the safety measures described here.

# 5. PQCalib-SW

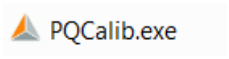
## 5.1 Installation of the PQCalib-SW

Extract the file “installPQ-Calib.exe” to one folder of your choice.




## 5.2 Open PQCalib-SW

To open the Calib-software please activate the PQCalib.exe file.




## 5.3 WinPQ mobil

It is necessary to install the the WinPQ mobil analysis software on the same PC.

You have to connect one PQ-Box with USB connection to install the hardware driver of the device.

The device driver is only included in the WinPQ mobil for communication with PQ-Box 50, PQ-Box 100, PQ-Box 150 PQ-Box 200 and PQ-Box 300.

# 6. Hardware Calib-Box

## 6.1 Operating conditions

- **operating temperature range:** **0°C ...45°C**
- **storage temperature range:** **-10°C ...+60°C**
- **reference conditions:** **23°C ± 2K**
- **IP-class:** **IP20**
- **rated voltage reference voltage input:** **230VAC (50Hz)**

**Input:**

Voltage inputs L1, N from calibrator: L1, N = 230V AC (50Hz)

**DANGER!** **Danger to life due to electric shock!**

The maximum voltage on the input lines (blue, red) must not exceed 230V to earth.

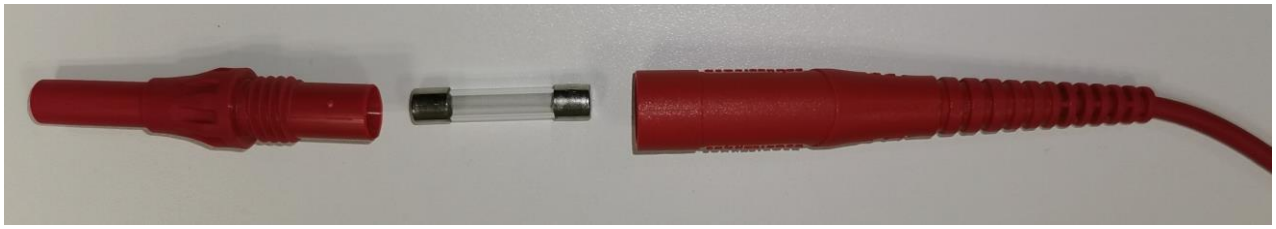
- Make sure that the device is not operated above the rated data

**DANGER!** **Danger to life due to electric shock!**

➲ Connect the high potential to the red line and the low potential to the blue line at the output of the calibrator.

**DANGER!** **Danger to life due to electric shock!**

Do not connect the voltage input of the device to the supply network.
Only suitable for connection to a calibrator.



**WARNING!** **Defect due to short circuit**

➲ Always secure the device against short-circuit with the supplied fuse adapter for test leads.

➲ A fuse with the following values must be used: 80mA FF

- **rated current reference voltage input:** **1,25mA**
- **voltage output L1, L2, L3, N, PE:** **230V (50Hz)**

| ⚠ DANGER! | **Danger to life due to electric shock!** |
|---|---|

Dangerous voltages can be present on all safety banana sockets.

- Make sure that only safety banana plugs are used

- **Current output: L1, L2, L3, N = 100mV (50Hz) for mini clamp input and Rogowski clamp input**

**Maximum voltage of the current inputs to ground = 30 V rms**

| ⚠ WARNING! | **Personal injury and damage to property due to non-observance of the safety regulations** |
|---|---|

➲ **The maximum voltage of the current inputs of PQ-Box is 30 V rms to ground**

The current output signal is coming from a voltage divider from 230V to 100mV output

- **Power supply PQ-Box 150/200/300:** **15V DC**
- **Power supply PQ-Box 50/100:** **100V - 230V AC/DC**

## 6.2 Requirements for calibration equipment

According IEC61000-4-30 class A the PQ-Box have an accuracy of < 0.1% for voltage measurement.

We specify the following accuracy as a minimum for adjustment of PQ-Box.

Reference multimeter = 0,02% or better for AC voltage measurement

(for example: Fluke 8508A)

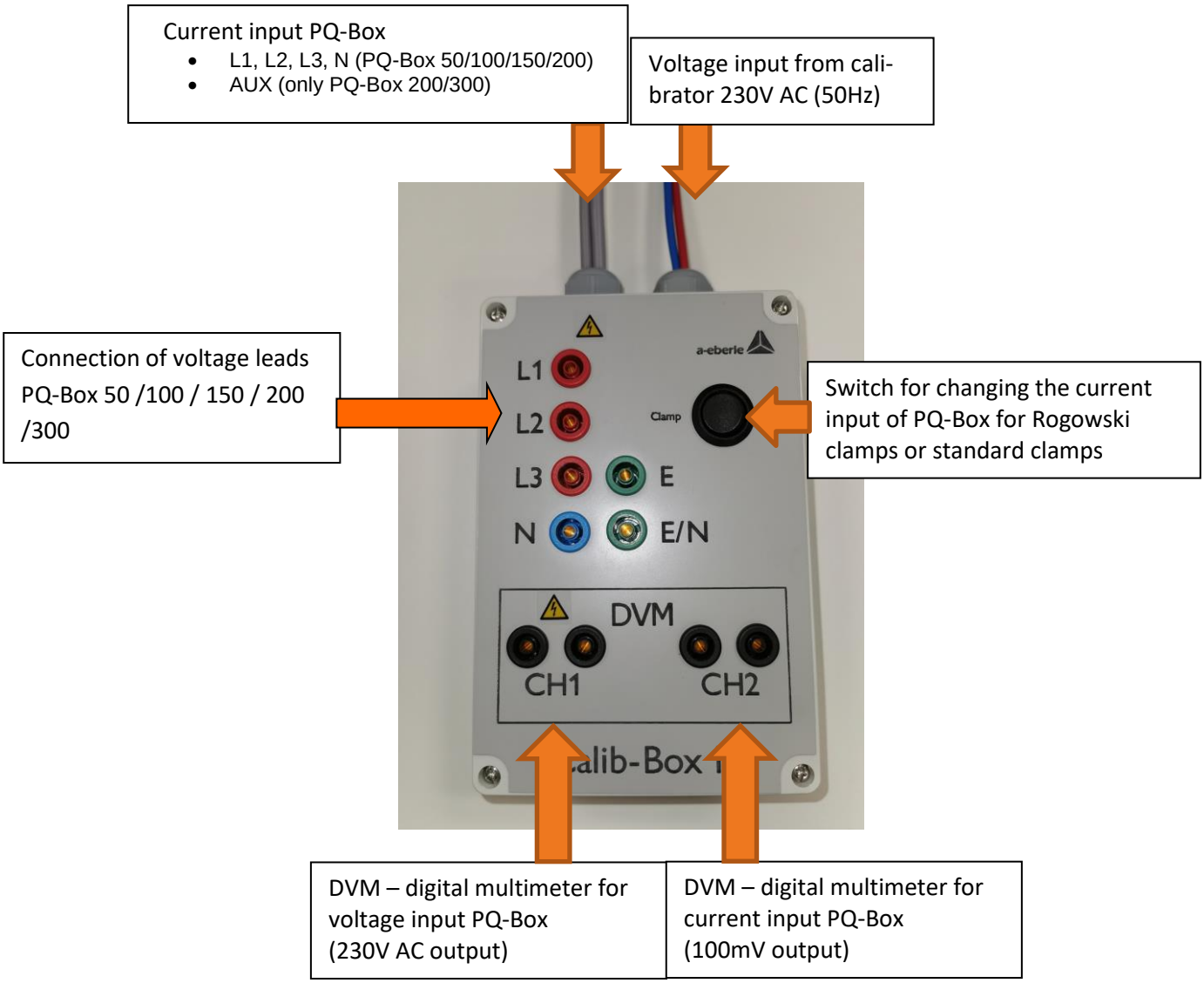
The calibrator has to deliver a sinus signal with 230V (50Hz) and a THD < 0,1%.

## 6.3 Calibration conditions

Appropriate storage time and period to warm up at ambient conditions have to been kept. The PQ-Box should be calibrated with normal operating temperature. Please run the PQ-Box 30 minutes before starting the calibration process.

The ambient conditions should be at a temperature of 23 ±2 °C and a relative humidity of 60 ±10 %.

## 6.4 Overview of the Calib-Box



## 6.5 PQ-Box connection to Calib-Box

- Connect the Calib-Box to the calibrator output with 230V AC (50Hz). Use the red and blue voltage leads.
- Connect Calib-Box to power supply 230V AC and switch the box on.

→ LED “ON” lights

- Connect the power supply to the PQ-Box
- Connect PQ-Box voltage leads to L1, L2, L3, E/N, E

→ Display of PQ Box 150/200/300 show L1, L2, L3 with 230V

- Connect current input adapter from Calib-Box with PQ-Box
- Connect AUX input adapter from Calib-Box with PQ-Box 200/300

(only available for PQ-Box 200 and 300)

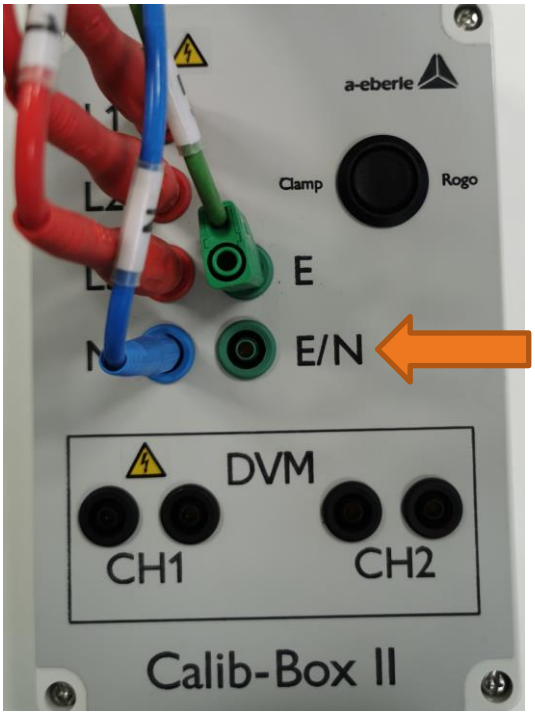
- Connect one or two multimeter to DVM CH1 and DCV CH2

**If you use only one multimeter connect to DVM CH1.**

**During the calibration process you have to change to DVM CH2**

**Connection of voltage leads PQ-Box for calibration**

✋ Change the position of the blue voltage lead from “E/N” to “N” for calibration




All voltage cannels will be calibrated parallel to 230V AC. We measure all four channels L1, L2, L3 and N to earth. In this position the display of the PQ-Box shows 0V.

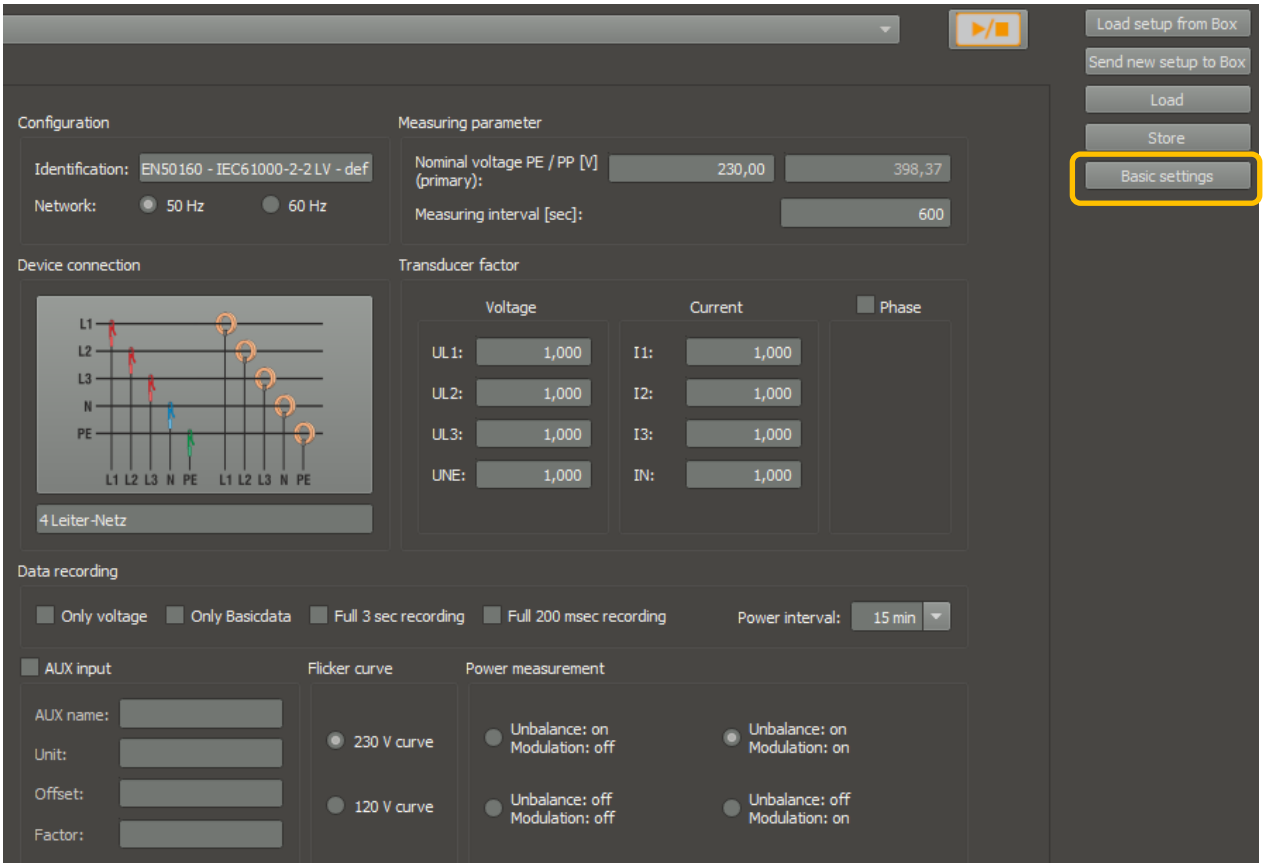
# 7. Software PQCalib

The software PQCalib is designed for an easy calibration and adjustment of PQ-Box 50, PQ-Box 100; PQ-Box 150; PQ-Box 200 and PQ-Box 300.

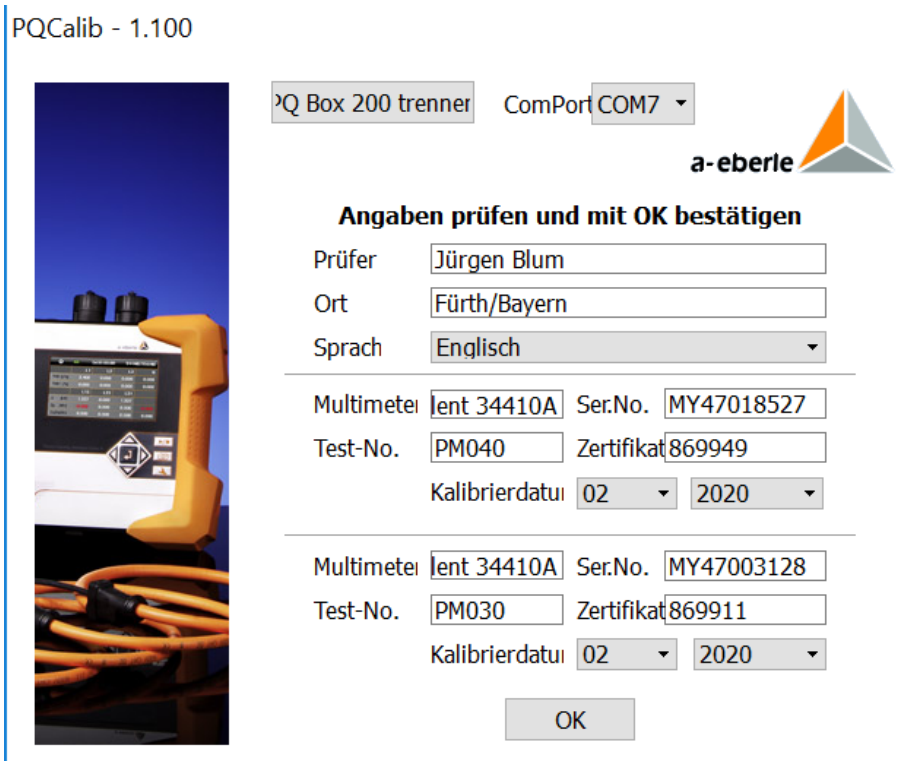
The user can select any calibrator or multimeter. The calibration equipment is not mandatory for the calibration software.

Please note our minimum accuracy for the calibration equipment you are using.

Return the PQ-Box to the default setting before starting the calibration procedure



**Start window of the software PQCalib**




- Fill your name and location
- Chance the language to English
- Fill out the technical data of the used equipment
- Connect PQ-Box with USB cable to the PC
- Select the ComPort, e. g. COM5

(if the PQ box is connected, the correct port will be displayed automatically)

- Press the button Connect PQBox
- Press the button OK

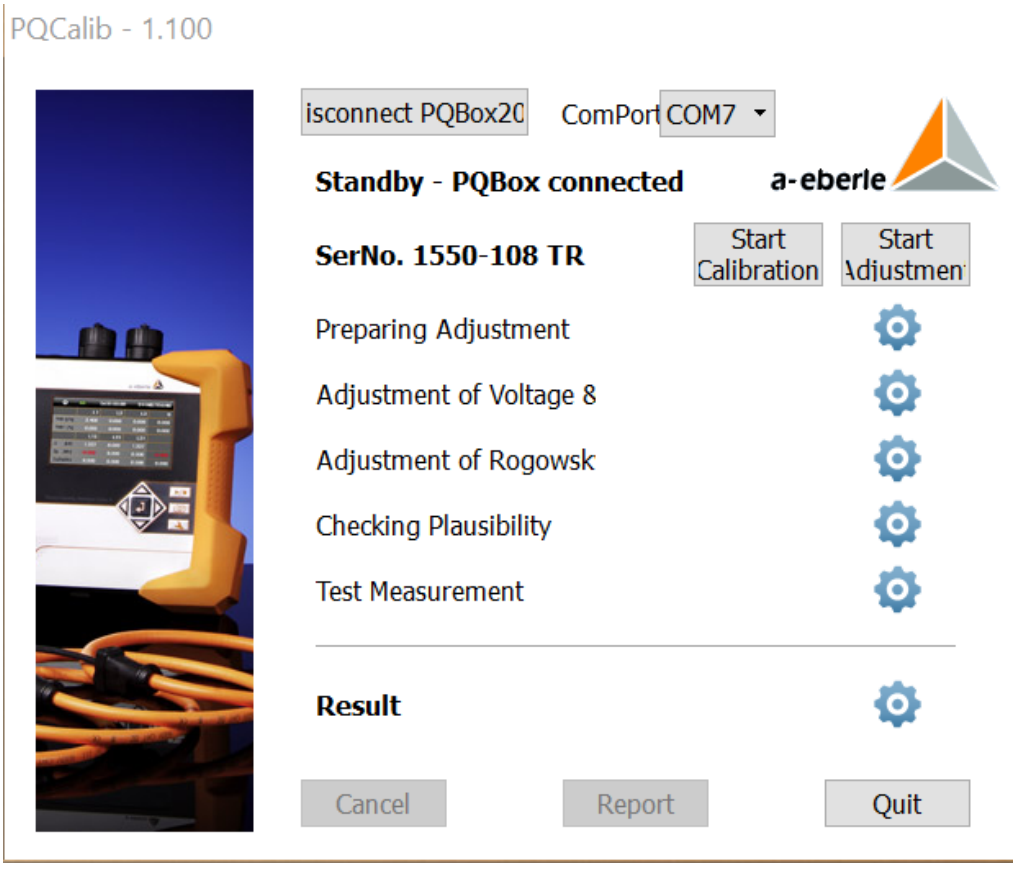
## 7.1 Calibration of PQ-Box

If the PQ-Box is connected, the calibration process can be started.

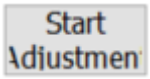
Choose the option “Start Calibration” or “Start Adjustment”

- **Start calibration: here the calibration factors of the PQ box are retained and will be not over-written. This way you get a statement about the measurement error of the connected PQ box.**
- **Start Adjustment: The PQ-Box will be adjusted here.**

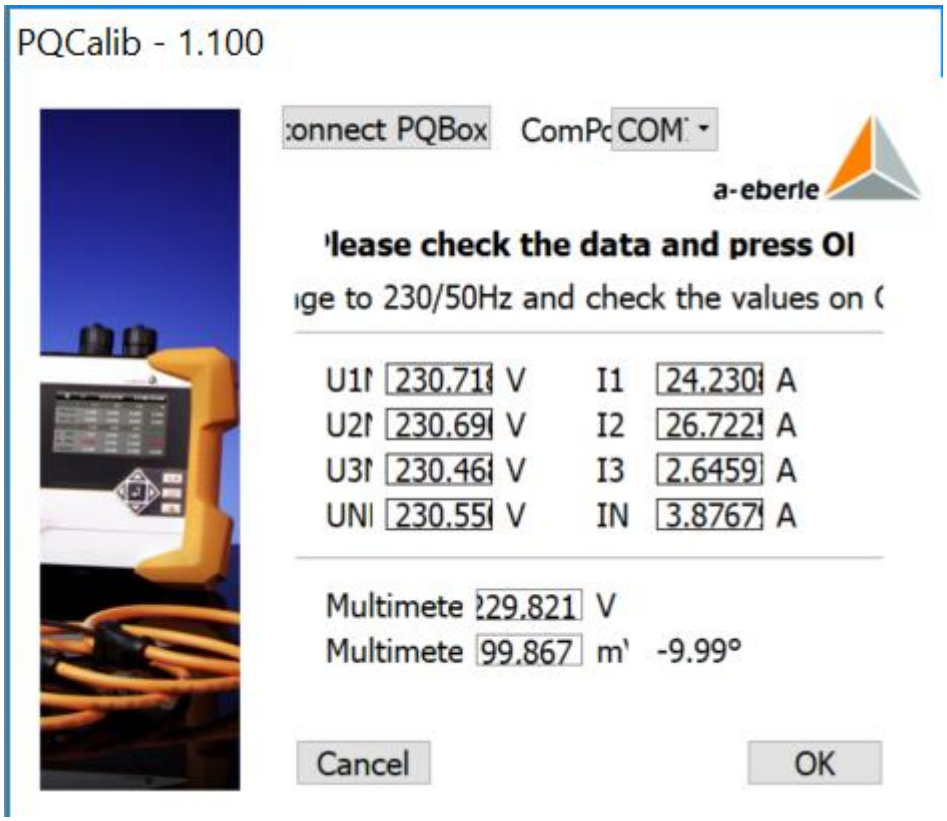
  **Internal calibration factors will be overwritten with new factors.**



## 7.2 Start of PQ Box adjustment

1) press the button 

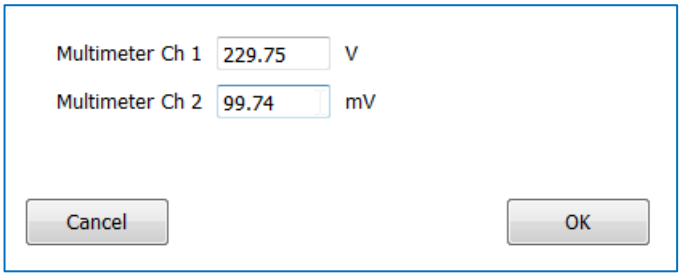

→ the screen with online values of PQ-Box appear




These values do not show the last accuracy of the PQ-Box. These are the measurement values without any calibration factor.

2) Fill out the measurement values from the high accuracy multimeter.

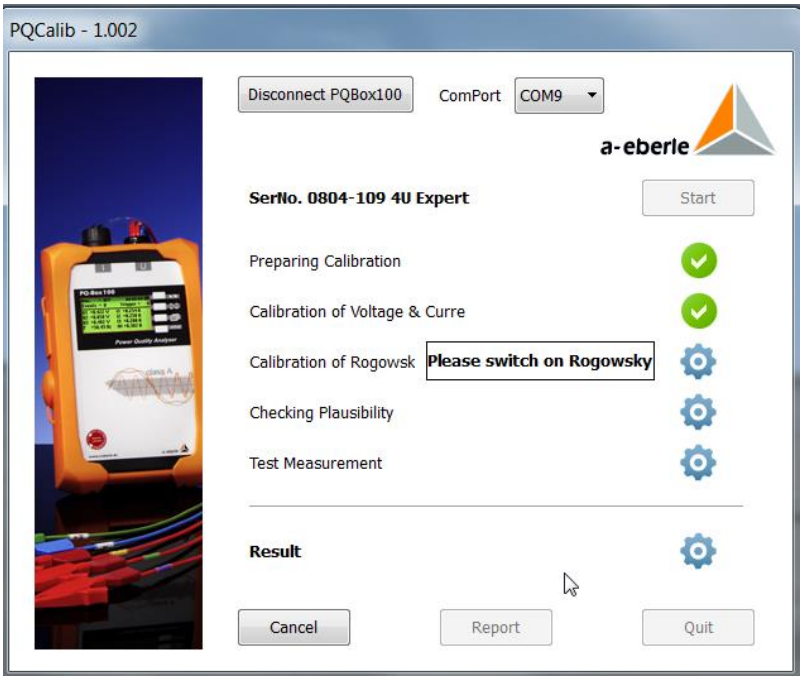
If you use one multimeter, you can change from DVM CH 1 to CH 2.



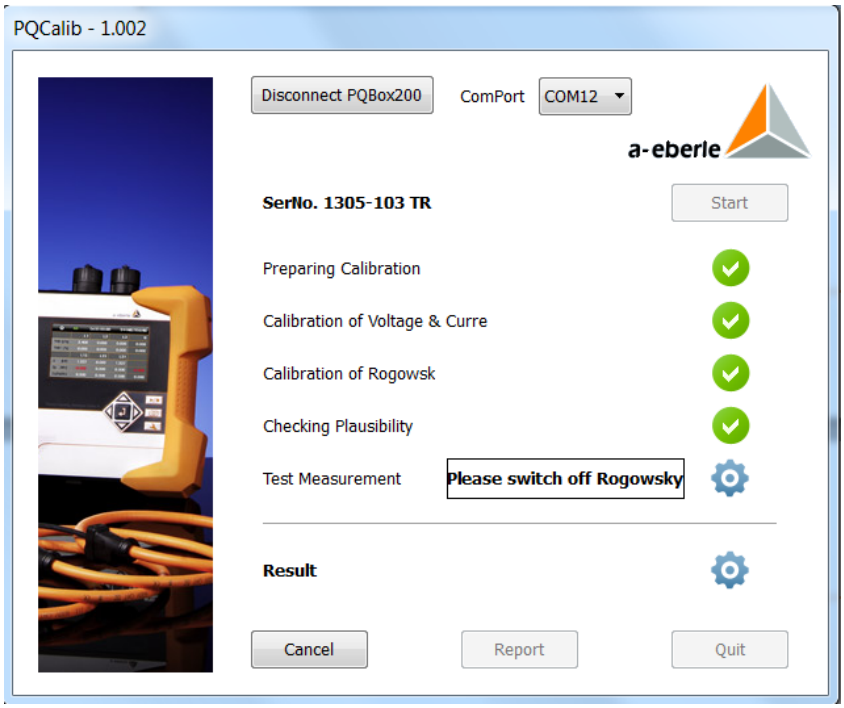

3) Press OK if all values are entered

4) Please switch on Calib-Box from clamp to Rogowski.

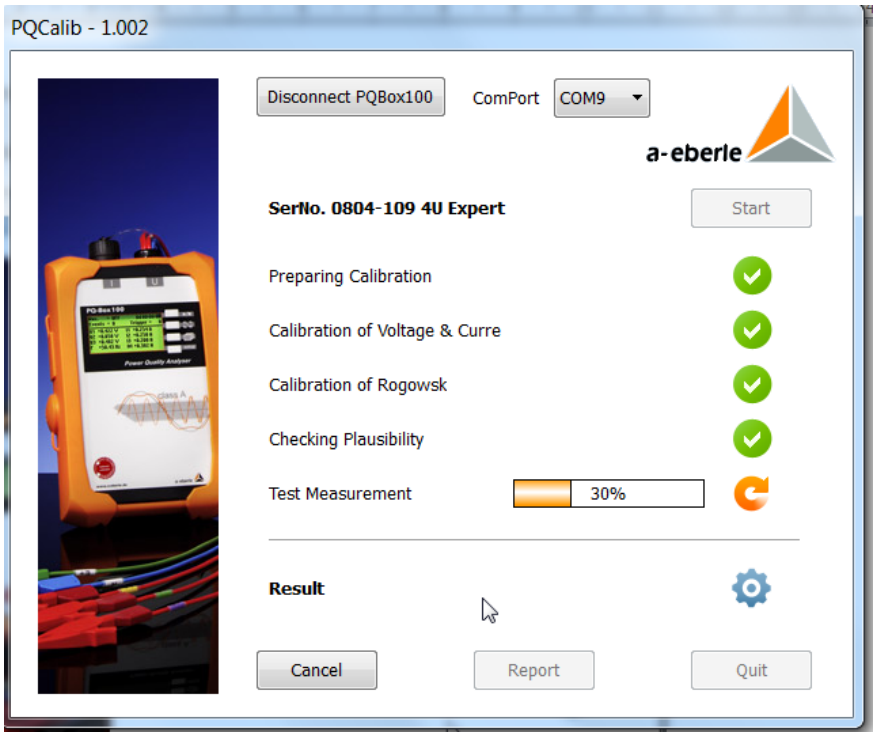
Now additional to the current clamp input of the PQ-Box also the Rogowski input will be adjusted.



5) Switch back the Calib-Box from Rogowski to clamp

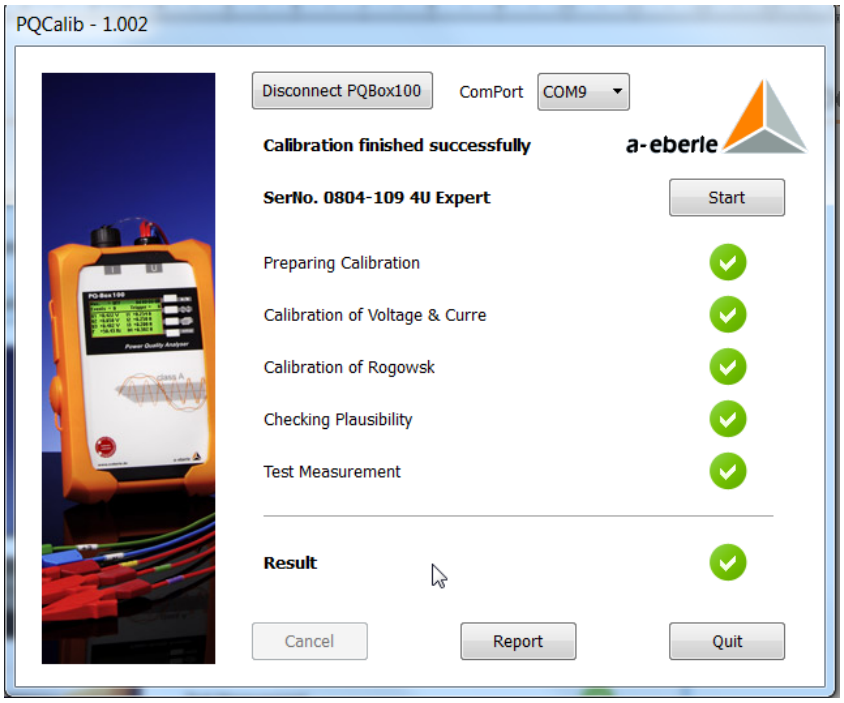



6) The software automatically starts a test measurement to calculate the error of the voltage and current input.



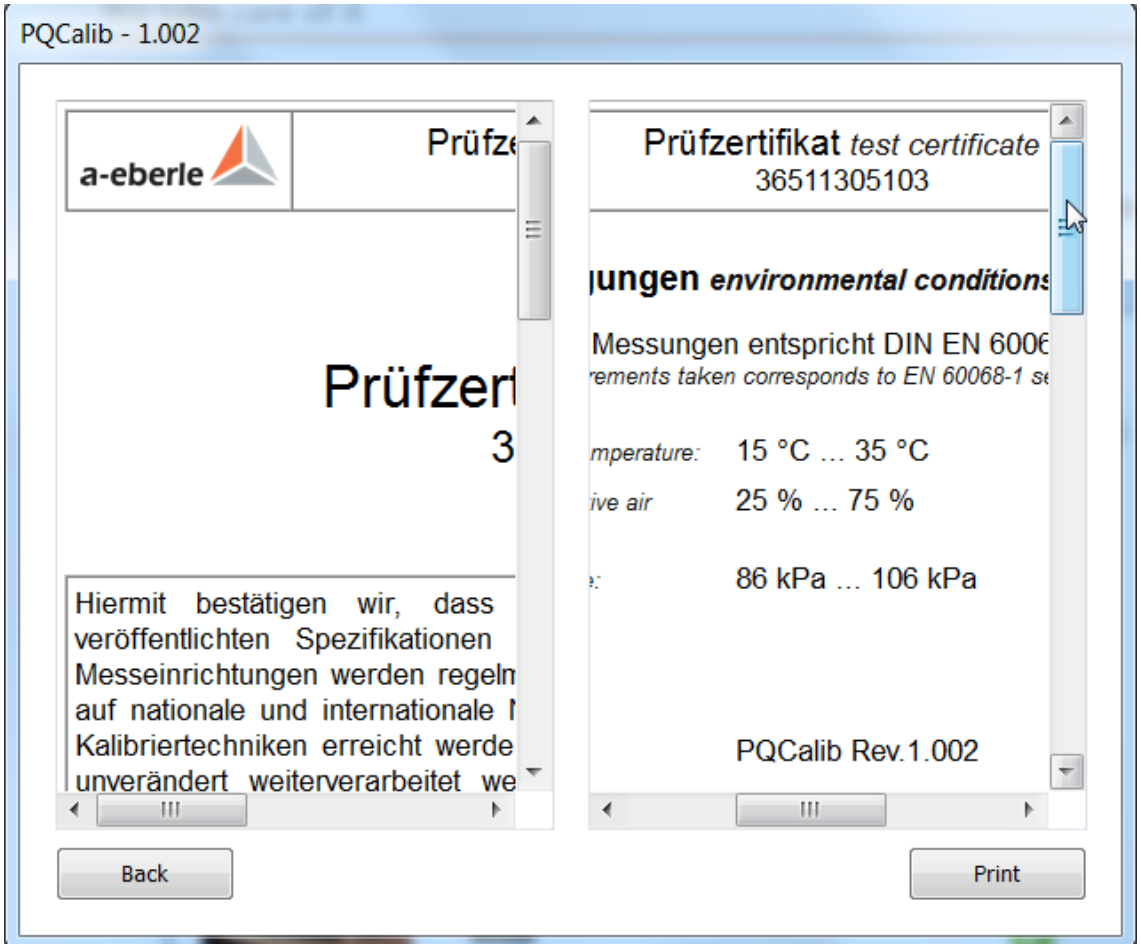
7) If all values are within the specified accuracy, the result shows green.

If one value will be out of the specified accuracy, the result shows a red warning.



8) With the button Report a two page calibration report will be created.

9) This report can be printed or stored as a PDF file.



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Software - Version:

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