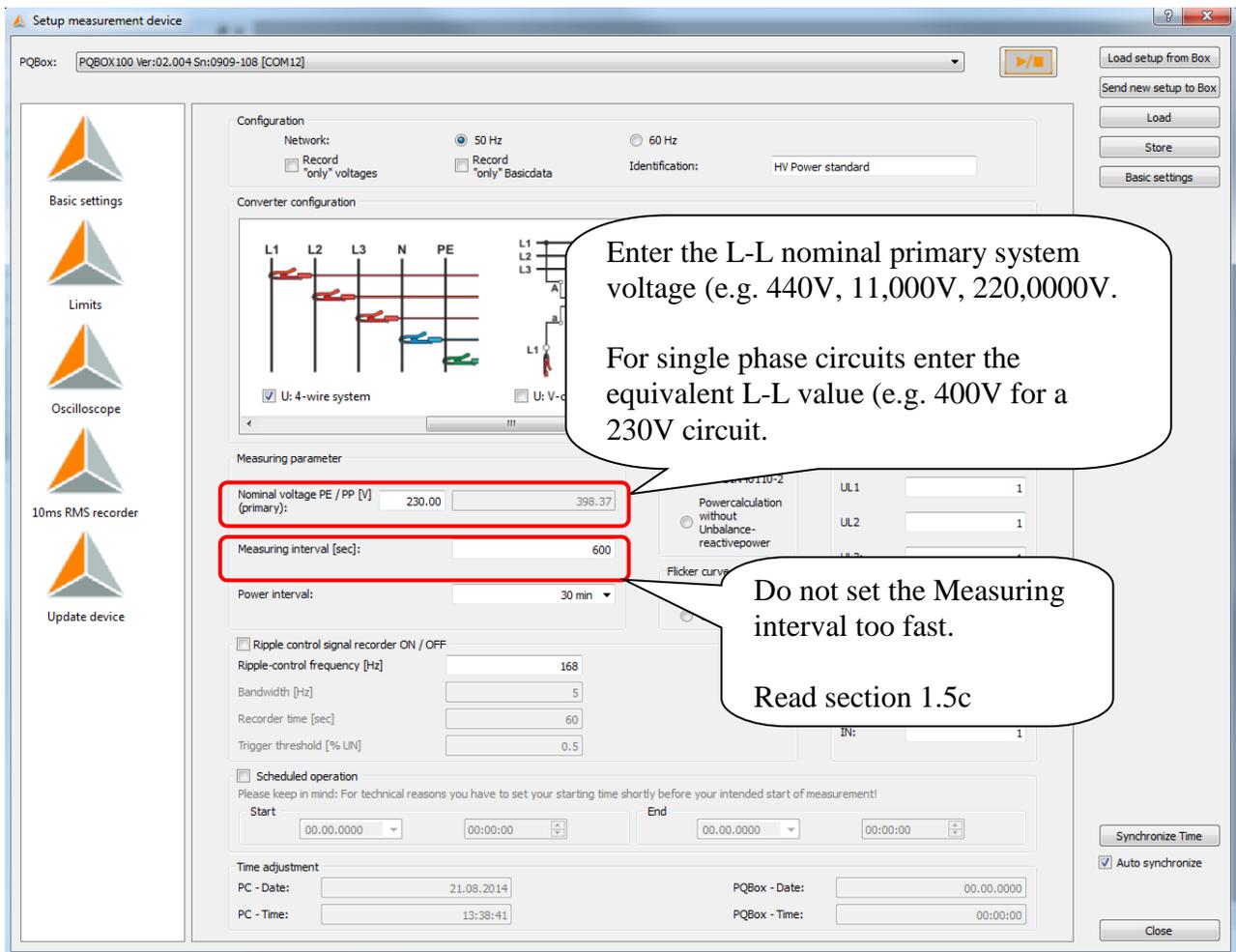


PQ-Box 100 – Quick Start Instructions

These instructions are provided for the purpose on providing a quick start to PQ-Box 100 installation and operation. Please refer to the user handbook for full details.

Please avoid these two errors:



The screenshot shows the 'Setup measurement device' window. Two callouts point to specific settings:

- Callout 1:** Points to the 'Nominal voltage PE / PP [V] (primary):' field, which is set to 230.00. The text says: "Enter the L-L nominal primary system voltage (e.g. 440V, 11,000V, 220,000V). For single phase circuits enter the equivalent L-L value (e.g. 400V for a 230V circuit)." The field is highlighted with a red box.
- Callout 2:** Points to the 'Measuring interval [sec]:' field, which is set to 600. The text says: "Do not set the Measuring interval too fast. Read section 1.5c". The field is highlighted with a red box.



Check the LCD before leaving site:

- 1) Are the voltages and currents showing correct primary values (i.e. correct CT & VT ratios have been set)?
- 2) Are power values correct? Check for + vs - (correct VT/CT phasing and polarity)?
- 3) Is the device recording?

This quick start describes:

Section 1) Using WinPQ mobil software and laptop to set the PQ-Box 100 parameters (preferred)

Section 2) Setting unit up using LCD display only

Section 3) Decommissioning

1 Setup of PQ-Box 100 using USB connection to PC

This guide assumes that WinPQ mobil has been correctly installed on PC, and PQ-Box 100 has compatible firmware.

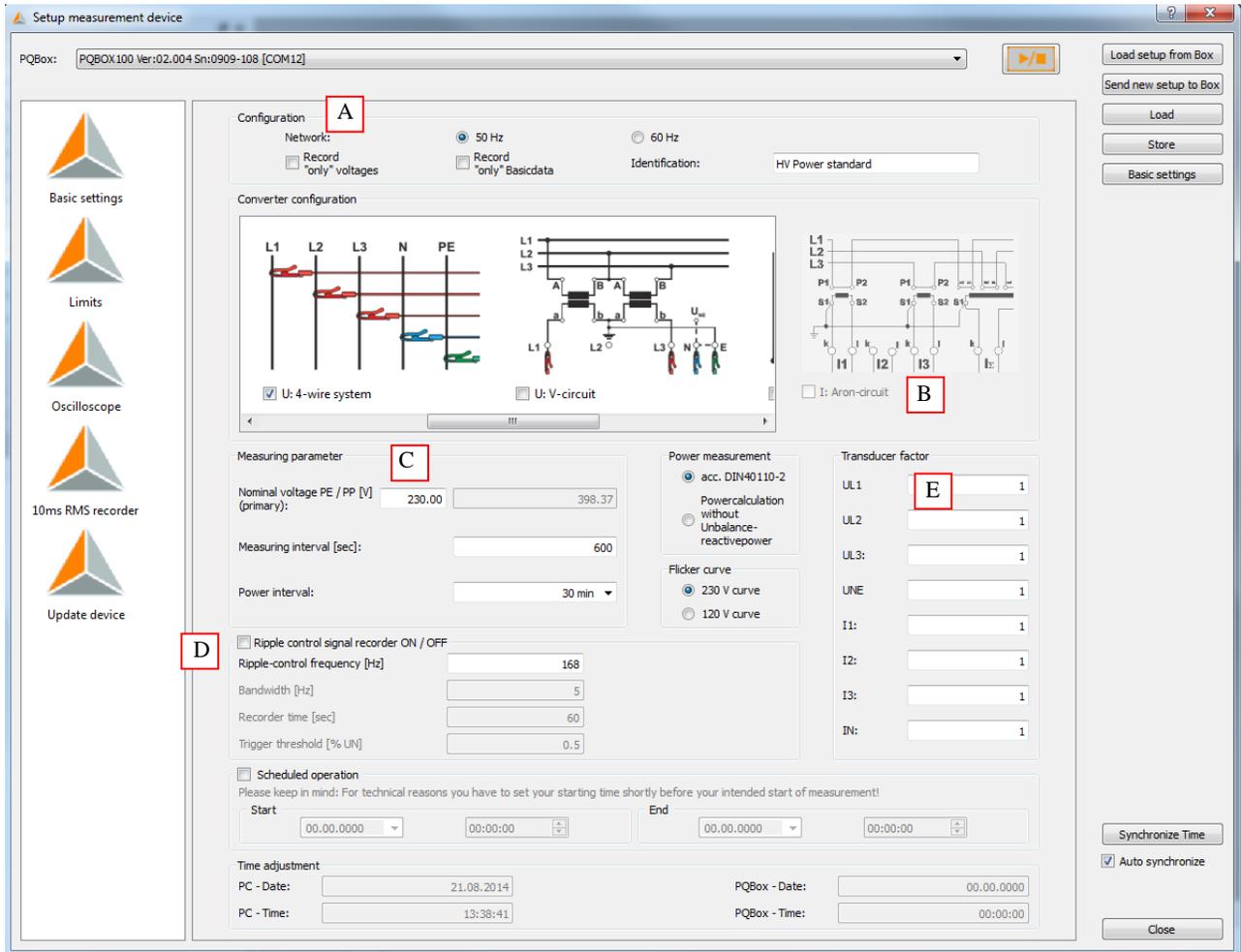
These instructions detail powering the PQ-Box 100 from external source, and using laptop to setup the PQ-Box 100 and to also display online measurements (phasor diagram) to confirm correct VT/CT connection.

- 1.1 On site connect PQ-Box 100 power supply cables (the two black leads labelled “Aux/Supply”) to a suitable voltage source (100-280 Vac or 140-220 Vdc). The supply leads do not have any polarity.

The supply leads can be connected to the measuring circuit (if voltage range is suitable). However, if power outage of more than 20 seconds occurs, the PQ-Box 100 will shut down. Approx 20 seconds after return of power the PQ-Box 100 will commence recording again.

- 1.2 The PQ-Box 100 will now boot up. Wait approx 20 seconds until the main LCD measurement screen shows before connecting USB cable to PQ-Box 100. Also ensure computer is fully booted up before connecting USB cable. *Do not rush making USB connections, otherwise connection problems may occur.* Follow the PC instructions if USB drivers need to be installed.
- 1.3 Check free memory reported on the PQ-Box 100 LCD screen. For PQ-Box 100 with no data stored, approx 970 MB should be reported (488 MB for earlier PQ-Box 100’s). Download data from the PQ-Box 100 or delete as required. Confirm sufficient memory will be available for intended recording period (Refer 1.5c).
- 1.4 Using the PC software, open the Setup PQ-Box 100 screen (Main menu: Data/PQ-Box Configuration).

Select “Load setup from Box” if you want to see and update current PQ-Box 100 settings. Alternatively click on “Basic settings” to select default values (this will set default parameters for advanced Limit, Oscilloscope and 10ms RMS recorder)- note that the new values will need to be uploaded back to the PQ-Box 100 (i.e. “Send new setup to Box”).



1.5 Enter correct settings for:

A) Configuration:

Select appropriate frequency and do not check the other two boxes

B) Converter configuration:

Select the appropriate system type. Scroll to see more selection

(For three phase systems, 4-Wire will cause PQ-Box 100 LCD to show L-E voltages & 3-wire will show L-L voltages)

C) Measuring parameter:

Nominal Voltage:

The Nominal Voltage setting should be the nominal (target) **primary** system voltage. *For example 11,000 or 33,000. However, to set these values, the L-N value must be entered, i.e. 6350 or 19052 respectively.*

Normally you would not enter secondary VT values (63.5/110V).

This setting also relates to Transducer Factor settings.

If a single phase voltage is being measured (e.g. 230 Vac), set Nominal Voltage to the 230 Vac and ignore the display L-L value.

Measuring Interval:

Please request “HV Power hints and tips: PQ-Box 100 Power Quality Recorder, Issue 1” for detailed description of selection of Measuring Interval (referred to as Measurement Cycle on the PQ-Box 100 LCD).

*The measuring interval is the number of seconds over which permanent recording data (long term line graphs) is averaged. This setting does not influence the high speed oscilloscope or high speed RMS recorder functions. The PQ-Box 100 measures most “permanent recording” measurements each ½ cycle, and the average of each of these values is recorded at the end of each measurement interval. The maximum and minimum ½ cycle values (of voltage and current) are also recorded at the end of **each** measurement interval, therefore there is little advantage in selecting a shorter measuring interval. A shorter duration creates larger data files.*

Normally a 600 second setting is used (10 minutes) to conform with EN 50160 reporting.

HV Power recommended measuring interval:	
Monitoring duration	Measuring Cycle
Less than 12 hours	1 second*
Less than 2 days	120 seconds
Less than 1 week	600 seconds
*Flicker measurements will be recorded as zero data values if the measuring interval is set to less than 60 seconds.	

For very short tests, to obtain easy to view graphs, make sure the PQ-Box 100 records for at least 10 measuring intervals.

It is recommended that measuring interval is set such that permanent recording only takes approx. 50 % of available memory. *This allows sufficient room for a large amount of “event data”. Oscilloscope and RMS “event” recordings each require approx 100 kb of memory (assuming 50 ms and 1000 ms of pre-trigger time respectively, and 500 and 3000 ms of recorder time).*

As a guide to the memory requirements for permanent recorded data (only):

Measuring interval	Time to generate 1 MB data (approx)	Time to generate 100 MB data (approx)
1 sec	3 minutes	5 hours
10 sec	30 minutes	2 days
30 sec	90 minutes	6.25 days
60 sec	3 hours	12.5 days
300 sec (5 minutes)	15 hours	62 days
600 sec (10 minutes)	1 day 6 hours	125 days

D) Ripple Control Signal

Enter the frequency of the ripple control signal. The other settings only apply to PQ-Box 100’s with additional Ripple Control Monitoring functionality enable, and default values should generally be used.

E) Transducer factor

Assuming VT/PT/CVTs are in circuit and the PQ-Box 100 is connected to the secondary circuits, the transducer conversion factor (knu) is the ratio of primary to secondary voltage, e.g. 33 kV / 110 V = 300.

In most cases the “UNE” setting will be 1, as Neutral to Ground VT's are not normally used.

Assuming intermediate CTs are being used, the current conversion factor (kni) is the ratio of primary to secondary current, e.g. 600 A / 5A = 120.

Note that if

- 20/200A Switchable clamps (111.7004) are being used on 200A setting, the CT factor should be set to 10
- 5300A Rogowski clamps are being used, a correction factor of X2 must be applied to the current conversion factor.

- 1.6 Check the Limits, Oscilloscope, 10ms RMS recorder screens for desired setup, and then “Send new setup to box”. Default “Basic settings” are fine.



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- 1.7 Assuming PC time is correct, press “Synchronize time”.
Note that reported PQ-Box 100 time on the PC Setup screen, is that of when a setting file is uploaded or downloaded, it does not otherwise update.
- 1.8 Connect the PQ-Box 100 voltage leads to the measurement source Using appropriate care and precautions, connect in order, the green earth lead, neutral (blue) and then the 3 red leads to the circuit to be measured. (Do not connect to measuring circuit if it is greater than 690 V L-L, 400 V L-N/E).

If neutral connection does not exist, then connect the PQ-Box 100 (blue) neutral lead to the PQ-Box 100 (green) earth lead. (or vice versa)

Confirm all voltages displayed on the PQ-Box 100 LCD are the correct primary values.

Connect the supplied clamp CT’s to the “I” terminal on the PQ-Box 100 and then connect one-by-one to the measuring circuit.

Ensure the current readings on the PQ-Box 100 LCD are correct primary values. To confirm correct polarity/phasing either:

- A) Use the PC online measurement functions (Main menu Data/Online) to display “Details” tab, and confirm correct primary voltage, current and power values are being measured. Use the phasor diagram “U/I/Phase” to confirm correct direction of CT clamps etc.
 - B) Use the PQ-Box 100 page button (third button from top) and toggle through the LCD screen measurements. Play close attention to +/- signs on power readings, as these can be used to identify if a CT connection is reversed.
- 1.9 Disconnect USB cable from PQ-Box 100.
 - 1.10 Press the PQ-Box 100 [PLAY/STOP] button to start recording.
 - 1.11 Check that:
 - Rec. = ON (this may take 2-3 seconds to update).
 - The recorder elapse timer at the top right hand corner of the LCD screen starts.
 - The LCD voltages and currents on the device keep refreshing every few seconds.
 - 1.12 Use the page button to scroll to LCD screen showing number of events. Press the Manual trigger button (second button from top) for 1 second. The “Oscilloscope Rec” and “RMS Recorder” count should increment to 1 (this may take 2-3 seconds to update). This “manual trigger” takes an oscillograph snap shot of the “as connected” condition. If the number of events increases rapidly, it is recommended to check connections and settings (especially nominal voltage setting). You may need to download data to PC, review and upload more appropriate trigger settings.
 - 1.13 The PQ-Box 100 front panel keys may be locked by pressing the 4th key [Setup] > 5 seconds. Repeat to unlock.

2 Setup of PQ-Box 100 without PC

The PQ-Box 100 LCD and front panel keys can be used to alter Network Type, VT and CT ratios and Measurement Interval settings. If the other settings of the PQ-Box 100 are known to be acceptable, then the front panel controls can be used to adapt the PQ-Box 100 to a given application.

By using the LCD only, you do not have ability to view advanced trigger and limit settings as last set by PC upload. If you are not aware of the last settings, then the PQ-Box should be connected to a PC to determine these, and potentially download new or default settings if required.

- 2.1 Refer and follow instructions 1.1 to 1.3 to power up PQ-Box 100.
- 2.2 Using the bottom button (SETUP) to enter the setup menu. (If the PQ-Box 100 is left for several seconds, the LCD display will automatically return to main menu).
- 2.3 Select “Parameterization” by pressing the top key (PLAY/STOP).
- 2.4 Select “Nominal Voltage” by pressing the (PLAY/STOP) key.
- 2.5 Enter the PRIMARY nominal voltage (voltage phase-to-phase of the primary circuit (e.g. 11,000 or 33,000) using the “up” and “down” selections, once levels are satisfactory – select “OK”.

If measuring a single phase circuit, or connecting to a single phase, enter the equivalent primary phase-to-phase value. For example if connecting to 1ph 230 V, enter 400 V.

- 2.6 Select “Measurement Cycle”. Enter the measuring interval using the “up” and “down” selections, and select “OK” when satisfactory. Refer section 1.5c for recommended values.
- 2.7 Select “Browse”, then select “Voltage Converter L”. The transducer conversion factor (knu) is the ratio of primary to secondary voltage, e.g. $33 \text{ kV} / 110 \text{ V} = 300$. Set the Line voltage ratio, and then select “OK”.

In most cases the “Voltage Converter N” setting will be 1, as Neutral to Ground VT's are not normally used.

- 2.8 Select “Browse”, then select “Current Converter L”. The conversion factor (kni) is the ratio of primary to secondary current, e.g. $600 \text{ A} / 5 \text{ A} = 120$. Set the ratio, and then select “OK”.

Select “Current Converter N”. The conversion factor (kni) is the ratio of primary to secondary current, e.g. $600 \text{ A} / 5 \text{ A} = 120$. Set the ratio, and then select “OK”.



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- 2.9 Select “Browse”, Select “Net Type”, and then “Browse” to “1 conductor” (single phase), “3 conductors” (three phase no neutral) or “4 conductors” (3 phase + neutral). If in doubt, select 4 conductors.
- 2.10 Select “Back” twice. The PQ-Box 100 may “configure”, then select “Setup”, “Setup” and set correct data/time (24 hour format). Select “Back” until you are back to the main display.
- 2.11 Connecting the instrument to live source following instructions 1.8 to 1.13

3 Decommissioning

- 3.1 Press the Manual trigger button for 1 second (second button from top) to trigger an Oscillograph snapshot of the end of recording condition. Wait approx. 60 seconds before next step.
- 3.2 Press the [START / STOP] key to stop recording.
- 3.3 Wait and check that : a) Rec. = OFF.

Do not immediately disconnect supply power, as the PQ-Box 100 should be left on till the “closing measurement” screen disappears.

- 3.4 Disconnect the PQ-Box 100 voltage leads from the measuring source.
- 3.5 Disconnect the PQ-Box 100 CT clamps from measuring circuit.
- 3.6 Disconnect the CT clamps from the PQ-Box 100 connector.
- 3.7 Disconnect the PQ-Box 100 supply leads.
- 3.8 Connect laptop and download data if required. Do not delete data from PQ-Box 100, till downloaded data has first been opened with WinPQ mobil software and verified.