



POWER AUTOMATION TECHNOLOGIES

**HV Power hints and tips:  
PQ-Box 100 Power Quality Recorder**

Issue 3d

Dec 10<sup>th</sup> 2008

Updated 3/4W settings (30/6/2011)

General Update 15/8/2013

Single phase setup added 17/10/2013, updated 20-11-2013

3-wire setting information expanded. Power interval updated 3-11-2014

**Selecting 3W or 4W setting?**

The selection of 3-wire system or 4-wire system in the Basic setting configuration (LCD Parameter Net type) has the following effects:

	<b>4-wire setting</b>	<b>3-wire setting</b>
<b>PQ-Box 100 LCD</b>	Line-to-Earth voltages shown	Line-to-Line voltages shown
<b>PQ-Box 100 Software EN50160</b>	EN50160 reports show voltages as Line-to-Earth values	EN50160 reports show voltages as Line-to-Line values
<b>Permanent Recorded Voltage</b> [U eff, U eff max, U eff min, U eff R, THD, Phase angle, Short Term Flicker, Max flicker online output, Long term flicker, Divergence & PWHD]	L-L, L-E and N-E values recorded	
<b>Permanent Recorded Individual Voltage Harmonics</b> [ Even harmonics (H2-H50) Odd harmonics (H1-H490) Interharmonics (IH0-IH49) ]	L-E and N-E values recorded	L-L values recorded
<b>Oscilloscope &amp; 10ms RMS recorder</b> (also see Note 1)	L-L, L-E and N-E values recorded	
<b>Online data</b> Oscilloscope Spectrum Harmonics Inter-Harmonics Direction	L-L, L-E and N-E L-L, L-E and N-E L-E and N-E L-E and N-E Valid	L-L, L-E and N-E L-L, L-E and N-E L-L L-L No reading

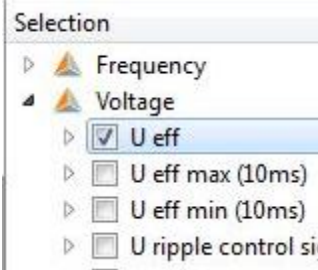
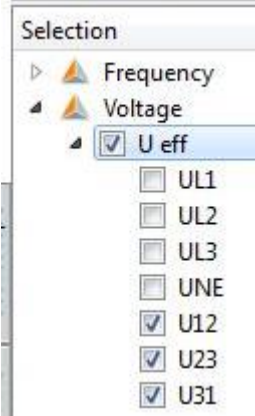
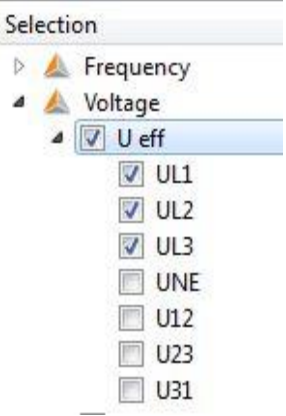
\*Assuming a 4U/4I PQ-Box 100, which is standard unit within NZ.

Note 1)

Oscilloscope and 10ms RMS recorder triggers are set independently for L-E and L-L events, and can be enabled or disabled for both 3-wire and 4-wire setups. By default (Basic Settings) only L-E triggers are enabled, therefore, **if measuring a true 3-wire system you need to turn off L-E triggers and turn on L-L triggers.**

With 4-wire setting, Frequency measurement is obtained from the L1-N connection  
 With 3-wire setting, Frequency measurement is obtained from the L1-E connection

When viewing Permanent data, the default traces displayed will vary depending if 3-wire or 4-wire mode was set. The following shows examples of default voltage traces selected when the PQ-Box 100 is 3-wire and 4-wire setup. The other traces can be selected by mouse selection.

 <p>Expand out the selection to see what default traces are to be displayed</p>	 <p>Default traces shown if PQ-Box 100 setup was 3-wire</p>	 <p>Default traces shown if PQ-Box 100 setup was 4-wire</p>
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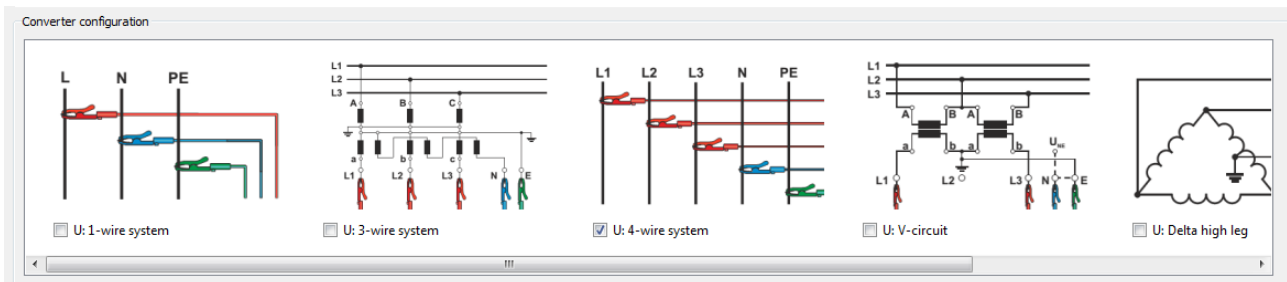
*Example default traces displayed when PQ-Box 100/200 is in 3-wire and 4-wire modes.*

### Single Phase Setup

With single phase input selected, the PQ-Box 100 will ignore voltage/current applied to inputs L2 & L3, and zero values for these channels are shown on the LCD, via online measurements screens and via permanent and other event recordings.

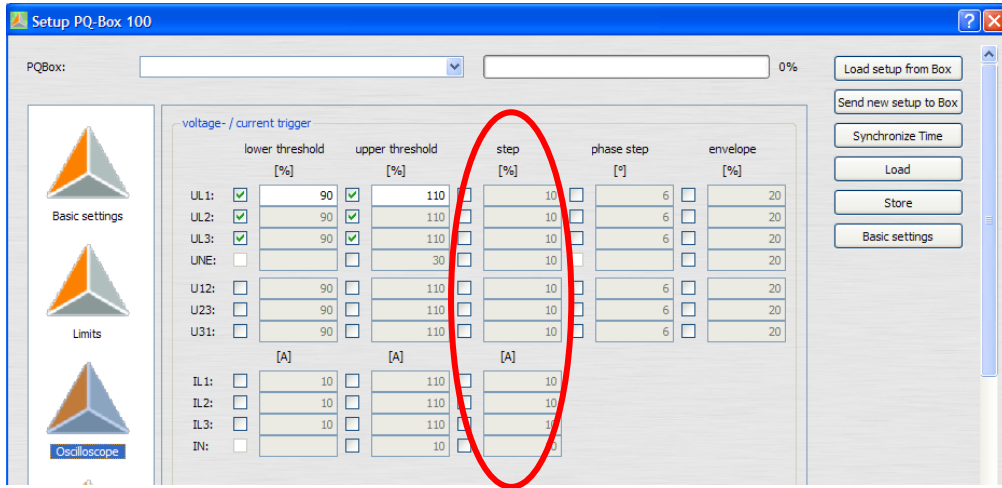
Within the WinPQ mobile software environment, when selecting Permanent Recordings, the selections will default to UL1 channel values only. If L2/L3 channels are selected, the values will be reported as zero values (even if voltage/current was applied).

Refer HV Power hints and tips Issue 12 for further information.



*1-wire, 3-wire, 4-wire, Delta high leg, Split phase systems and V-circuit measurement*

**Voltage trigger setup**



The “step %” voltage and current trigger settings for 10 ms RMS recorder and Oscilloscope are triggers that functions by measuring difference between each successive 10 ms value. For example if the voltage or current between successive 10 ms samples changes by more than the programmed % (of nominal), then a trigger event will occur.

This is a “fast RMS voltage/current” change that compares between two successive 10ms RMS samples. The step% trigger does not operate as a step function such as triggering an event as voltage rises past say each 10 % step above nominal.

The step% function can be set independent of upper and lower thresholds (i.e. upper and lower thresholds do not need to be active for step% to operate)

**What is the upper current range of the 20 A mini-clamps?**

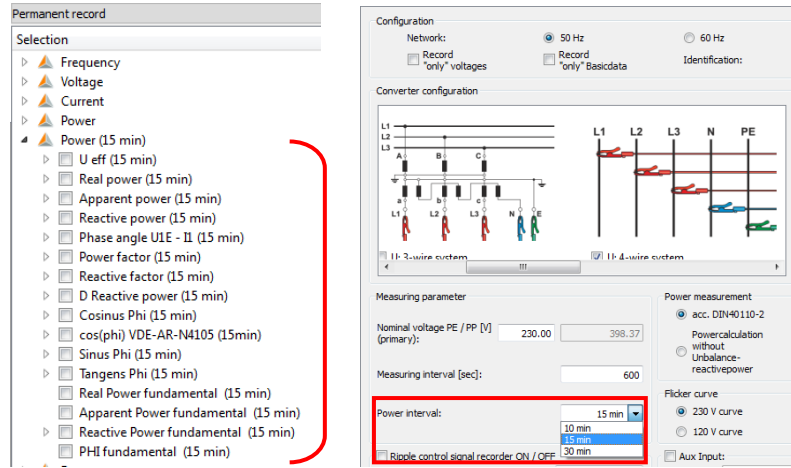
The mini-clamps are rated for measurements from 100 mA to 22 A. Readings of up to 25 A are possible. If the current is above 25 A (40 A peak), current and derived data should not be relied upon - current, phase angle, distortion and derived measurements will have a large error.

Using the mini clamps, the PQ-Box 100, A/D converter upper limit is 40 A (pk), thus any larger current will be measured as 40 Apk. Oscilloscope recordings with this excessive current will show flat tops to sine waves.

In addition to the 1-2560 A Rogowski current clamps, now available are:

- 10 mA to 1 A CT mini clamps (idea for direction checks using line charging currents)
- 200 A clamps
- 5500 A Rogowski clamps (910 mm head length)
- Adaption of old RPM clamps to connect to PQ-Box 100

**10,15 & 30 Minute Power Data**



For use in revenue/metering test applications, an additional data class is available. The “Power interval” can be selected from 10 minute, 15 minute and 30 minutes. This provides the ‘Permanent Recording’ data class of “Power (15 min)”. The data class labels refer to 15 min, even if 10 or 30 minutes is selected.

The intention is to allow the PQ-Box 100 to duplicate power metering/billing, separate from the selected PQ time base.

The Power interval provides a 10/15/30 minute interval time which is independent of the user set interval time (measuring interval). The 10/15/30 minute data class interval is synchronized to the multiple of the hour. For example if the PQ-Box 100 is set with a 10 minute ‘Measuring interval’ and a 15 minute ‘Power interval’ and then started at 12:18 am, the first complete interval for permanent recordings (15 minute data excluded) would cover 12:20 to 12:30. The first complete 15 minute Power data will cover 12:30 to 12:45.

Note that the data class includes a second ‘U eff data’ measurement, thus allowing for example the PQ-Box 100 to capture say both 10 minute (Measuring interval) and 30 minute (Power interval) average data.