



POWER AUTOMATION TECHNOLOGIES

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

Issue 7b

July 5th 2010

Memory management section updated 20/8/2010

General update 15/8/2013

Measuring DC with PQ-Box 100

The PQ-Box 100 is capable of measuring dc voltages, as it measures and displays True RMS values. Measurements in the range of 0 to 400 V dc are possible with high accuracy and precision. Note that PQ-Box 100 is not capable of displaying the polarity (+ or – ve) of the measurement and many of the PQ-Box 100 measurements will not be applicable (or erroneous) when measuring on DC systems (e.g. power factor etc).

Voltages to be measured should be connected between L and Earth terminals, with the Neutral connected to Earth terminal (the PQ-Box 100 measures L-E and N-E voltages and calculates the L-N values).

With MCU version 1.11 and DSP-Version 1.216, to display readings on the PQ-Box 100 LCD, the “NET” type should be selected to 4 conductor (so the LCD shows U1N, U2N, U3N, rather than U12, U23, U31). While the LCD shows U1N, U2N, U3N titles, the values are actually U1E, U2E, U3 values. The WinPQ Mobil software should be used in the online measurement mode if N-E voltages are required.

If permanent recorded measurements are desired, then it is recommended to select in the setup:

Network = 50 Hz
System = 4-wire system
Only Voltages = Checked
Nominal Voltage = set to nominal dc voltage x 1.7 (Nominal voltage is the expected Ph-Ph voltage on three phase systems, so enter dc voltage x 1.7)

If measuring low voltage DC systems (e.g. 12, 24, or 48 V), depending upon application, it may be appropriate to widen the default Limits, Oscilloscope and 10ms RMS Recorder settings. These settings are based upon a percentage of the (Basic settings) Nominal Voltage, and if the nominal voltage is low, then small voltage changes in the nominal voltage may trigger events. For example, with 24 V nominal setting, a 90 % setting will trigger on a 2.4 V change.

With permanent recording, expect many events to be reported including, “slow voltage event” and “Infraction THD” etc.

Remember that with pre-July 2010 manufactured versions of the PQ-Box 100, the Auxiliary inputs can also be connected to dc voltages in the range of 100-260 V dc, but if voltage is to be below this for any period of time, an alternative source in the range of 100-260 V dc or 100-440 V ac should be used.

Testing your PQ-Box 100 Battery Life

We recommend testing PQ-Box 100 battery capacity every 6 months. If insufficient capacity remains, contact HV Power, who can replace the rechargeable battery.

- 1) Power the PQ-Box 100 via Auxiliary supply for approximately 1 hour
- 2) Start the PQ-Box 100 recording
- 3) Remove auxiliary supply and measure the time the PQ-Box 100 remains operating
- 4) If operating time is less than 15 seconds, contact HV Power to replace battery

*Note that if the PQ-Box 100 is **not recording**, and auxiliary power is removed, then PQ-Box 100 will turn off after a few seconds.*

The PQ-Box 100 internal rechargeable battery provides approximately 20 seconds of operating time if the PQ-Box 100 is recording and the auxiliary power is removed. This allows the PQ-Box 100 to record short term power interruptions, even if powered off the measuring circuit.

If power is interrupted for more than 20 seconds, the PQ-Box 100 will shut down. When power is reapplied, the PQ-Box 100 will automatically begin recording again (after approx 20 seconds delay).

The battery capacity is sufficient to permit several interruptions over a short period. The PQ-Box 100 needs to be powered from the auxiliary source for 4 hours to permit a full recharge.

LCD Displayed Current Readings

The LCD displayed current readings of the PQ-Box 100 automatically display as zero values if the reading is below a minimum threshold. This reduces likelihood of flicker of digits if CT clamps are not connected, and display of values substantially below minimum CT specifications. Note that permanently recorded values (including online, RMS and Oscilloscope values) are NOT adjusted.

The thresholds are:

- 20A mini clamp < 10 mA
- 2560A Rogowski clamp < 1 A

Other clamps will be similarly affected with appropriate scaling factors taken into account (e.g. 5300 A Rogowski's, which require scaling factor of x2, lower reading cut off will be < 2 A).



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Memory Management

In addition to the Auto-Trigger function for Oscilloscope and RMS events, the PQ-Box 100 has additional functions to manage memory.

1) Memory Allocation

Upon the starting of any measurement, 50 % of the free remaining memory is reserved for permanent recording. The balance is reserved for event data (events/oscilloscope/RMS recorder). Thus if excessive events are captured filling their allocated memory portion, permanent recording can still occur.

In this case the LCD display showing the number of records will indicate an asterisk behind the event count. The asterisk indicates means that a memory limit for events was reached and recording of these event types were halted.

e.g. Number of Oscilloscope Records = 1034*

Note that if the Permanent Recording fills its allocated 50 % of the available space, but event recording has not filled the other 50 %, then permanent recording will continue using (sharing) the remaining memory.

If the PQ-Box 100 permanent recording continues till all memory is “full”, the recorder will close the measurement and “Memory Full” will be shown on the LCD.

2) Automatic Deletion of old files

If there are multiple measurement files stored in the PQ-Box, and less than 75 % of memory remains, upon starting another measurement, the PQ-Box 100 will automatically delete the oldest measurement files (in order of date) till at least 25 % of the total memory is free.

However, if there is only one file, and this exceeds the 75 % threshold, it will not be deleted.

A “Memory Full” warning will be shown in the LCD display

As reported in Hints and Tips # 5, PQ-Box 100 memory can be cleared by front panel key combination:

- Press and hold 2nd and 4th keys (Manual Trigger & Setup), as power is applied to PQ-Box 100 to clear PQ-Box 100 memory. Hold the keys until PQ-Box 100 prompts for a further confirmation key press to delete memory.

Accepting the prompt clears all recorded data from PQ-Box 100 memory. Deleted data cannot be recovered. Clearing memory does not affect setup parameters. Memory can be deleted during either Aux or USB power up.

This document was written referencing features of PQ-Box 100 firmware Boot 1.100, MCU 1.119, DSP 1.220 and PC software WinPQ mobil 1.515. Features and functionality may differ with other versions.