POWER AUTOMATION TECHNOLOGIES

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

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**WinPQ mobil V3.1.5**
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## Selecting the measuring interval (measurement cycle)

If permanent recording data is to be effectively utilised, it is recommended practice to set the measuring interval to such a length that multiple measuring intervals occur during the intended recording period. However, with the automatic max/min/average recording (see later) and correct use of RMS, Oscilloscope and event triggers, there is little advantage in using excessively short of a measuring interval (as excessive file size can occur).

Note that EN 50160 standard is based on 600 second (10 minute) measuring intervals.

| HV Power recommended measuring intervals: | |
|---|---|
| **Monitoring duration** | **Measuring interval** |
| Less than 12 hours | 1 second* |
| Less than 2 days | 120 seconds |
| Less than 1 week | 600 seconds |
| More than a month | 1800 seconds |

- Pressing of the "Start/record" button does not define the start of the first full interval. The PQ-Box synchronises the start of the measuring interval to multiples of the measuring interval from 00:00 hours. For example if measuring interval is set to 10 minutes and recording is started at 14:03, the first full interval will start at 14:10 (and end at 14:20). This is allows the synchronisation of data from multiple recorders, and for the graphed data to occur on convenient grid intervals. Note that graphical permanent record data may be limited for the initial partial interval and final partial interval.
- Triggered events such as Oscilloscope and RMS events will be faithfully recorded (with correct time stamp), even if they occur during the first partial interval, and incomplete end interval, or even if the total recording is shorter than one full interval.
- Analysis of permanent recording data can be visually difficult if several measuring intervals are not obtained. Use a measuring interval, or recording duration such that typically at least 10 measuring intervals are recorded.

**Flicker measurements will be recorded as zero data values if the measuring interval is set to less than 600 seconds.*



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**File sizes**

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) | |
|---|---|---|---|---|
| | **PQ-Box 100** | **PQ-Box 150/200** | **PQ-Box 100** | **PQ-Box 150/200** |
| 1 sec* | 3 minutes | 2 minutes | 5 hours | 3.25 hours |
| 10 sec* | 30 minutes | 20 minutes | 2 days | 1.25 days |
| 30 sec* | 90 minutes | 1 hour | 6.25 days | 4 days |
| 60 sec | 3 hours | 2 hours | 12.5 days | 8 days |
| 300 sec (5 minutes) | 15 hours | 10 hours | 62 days | 40 days |
| 600 sec (10 minutes) | 1 day 6 hours | 20 hours | 125 days | 80 days |
| 1800 sec (30 minutes) | 3.75 days | 2.5 days | 375 days | 240 days |

Note that additional file space is required for event data (Oscilloscope, RMS recordings and events). Upon starting the PQ-Box will reserve 50 % of available memory for permanent recording and 50 % for event data. It is recommended to ensure selected measuring interval/recording duration does not exceed the 50 % limit or recorded data might be truncated if large numbers of event data is also recorded. Refer Hints and Tips #7 for further information on memory management. Oscilloscope recordings require approx. 250 kb of memory (using 500 ms recording time setting) and RMS recordings require approx. 20 kB of memory (using 3000 ms recorder time setting).

With Version 3.1.5 of WinPQ mobil, 200 ms and 3 seconds data classes can be enabled in the PQ-Box 150 and PQ-Box 200. These new data classes are only intended for measurements of short durations as they produce a very large amount of data:

- The 200 ms data class produces approximately 80 MB per hour
- The 3 s data class produces approximately 5 MB per hour

The speed to download the recorded data depends on the PQ-Box type:

- PQ-Box 100 = 10MB per minute via USB (V2)
- PQ-Box 150 = 125 MB per minute via USB, 37 MB via Ethernet and 244MB via USB disk mode
- PQ-Box 200 = 33 MB per minute via USB, 25 MB via Ethernet. USB disk mode not yet tested

Data cannot be recorded while the PQ-Box 100/150/200 is downloading.

**Flicker measurements will be recorded as zero data values if the measuring interval is set to less than 60 seconds*



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## Max/Min/Average recordings

During recording, the PQ-Box records most permanent recorded values as the RMS average value during the measuring interval. However, additionally during each measuring interval some maximum and minimum values are also recorded:

- Frequency
- Voltage (10 ms value)
- Current (10 ms value)
- Ripple control (maximum 200 ms value)
- Real power, apparent power and reactive power (200 ms value)
- The PQ-Box 150 & 200 also record the 'Max' 200 ms Current and Voltage Harmonic values (H2-H50) during each measurement interval.

*The automatic recording of max/min and average data allows the user to set a relatively long measuring interval, without risk of missing important data. The RMS and oscilloscope triggers should be set appropriately to capture disturbance data.*

## "Free PC memory" and GB memory equipped PQ-Box's

From mid 2008, PQ-Box 100 units shipped from the factory with 1 GB of internal memory (compared to 512 MB) and in 2014, 2 GB units were supplied. PQ-Box 150/200 currently ship with 4 GB memory. This extended memory capability is intended to allow more multiple recordings to be obtained prior to downloads, rather than a single extra long/large data recording. Note that approximately 30 Mb of memory space is reserved and not available for data storage.

To allow the PQ-Box software to operate/analyse/display data, your PC must have free (**and contiguous**) memory sufficient for the entire file. Not all computers have 1/2 GB of free memory available (predominately only Windows Vista and later supports 1-2 GB of free memory).

If recording for extended periods, or in situations where large amounts of data is obtained, it is recommended to periodically stop and start recording to break the file size into more manageable sizes, or use the PQ-Box 150/200 Memory Limitation feature which does this automatically.

## The "Nominal Voltage" setting



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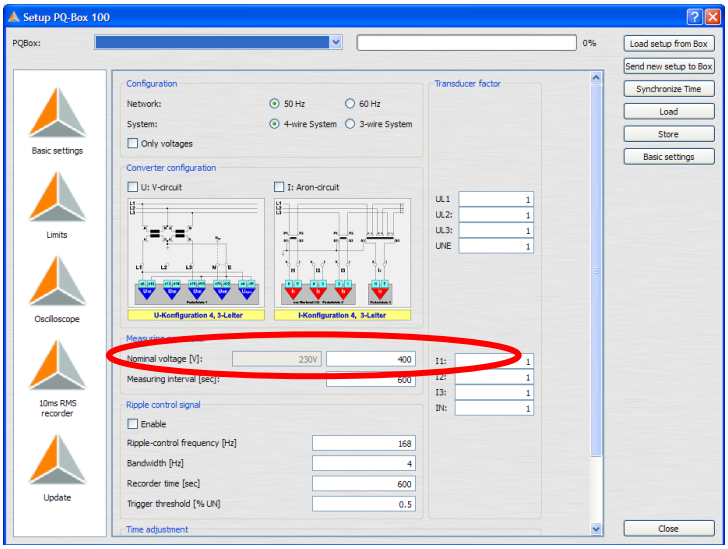


*Screenshot from V1.515 software*

The nominal voltage setting is used to determine the "100 %" values of the voltage limit triggers for Limits, Oscilloscope and 10 ms RMS recorders, and is used as the base value for the Divergence Permanent Recording data.

The nominal voltage setting is either entered as the Line-to-Earth or Line-to-Line **nominal voltage of the primary measurement**. The choice of which is set depends upon the voltage connection type (single phase, 3-wire, 4-wire etc)

For example to connect to an 11 kV (L-L) 3 phase, 4 wire system, via 63.5 V (L-N) PT secondary's:

- Set the PQ-Box to 'U:4-wire system'
- Set the 'Transducer factor' U1, U2, U3 to 100, UNE to 1
- Set the Nominal Voltage to 6350/11000. In the 4-wire configuration it is the Line-to-Earth value that is set, so enter 6350

Nominal Voltage can also be set up directly on PQ-Box 100 via front panel keys and LCD display.

If measuring a single phase voltage, with the 4-wire setting, we recommend connecting all three voltage input leads together, to avoid repeated low voltage events on the other voltage inputs at the end of each measurement interval. If measuring a single phase 230 Vac supply for example, set the nominal voltage to 230/400 V.



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