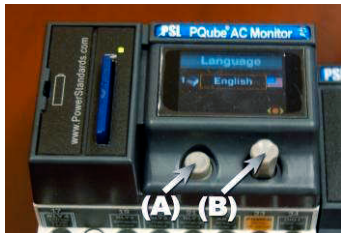


# User Guide

## Using Your PQube

### Your PQube's Display and User Interface

#### Joystick and button



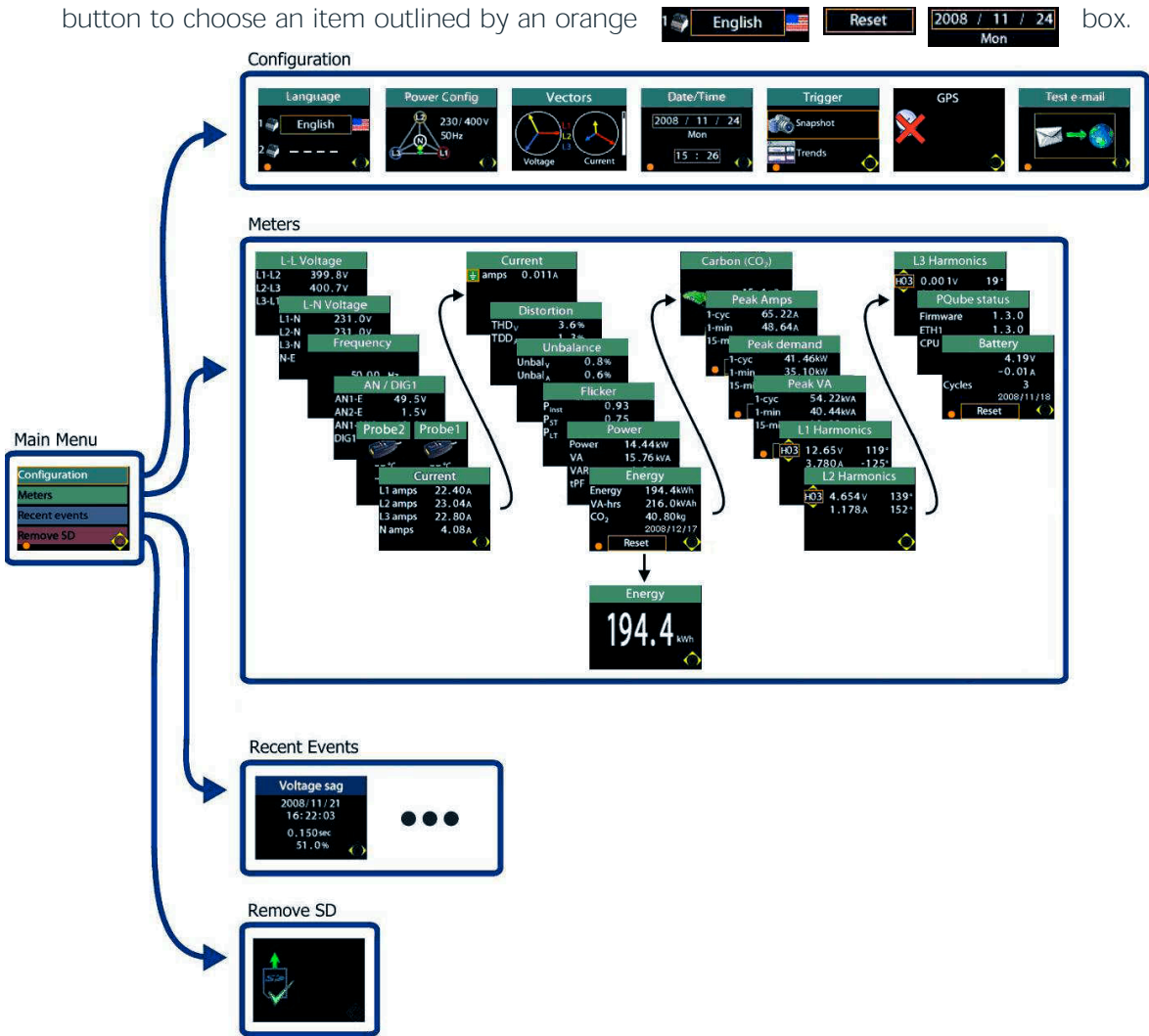
Use the joystick (B) on the front of your PQube to navigate through the displays.

Gently push down on the joystick (B) like a button to return to the Main Menu. Click the button (A) to make a selection.

To force your PQube to reset, hold the button (A) down for 10 seconds.

#### The PQube Display

Use the joystick on the front of your PQube to navigate through these screens. Use the select button to choose an item outlined by an orange box.



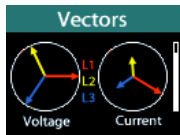
## Configuration



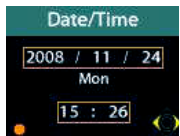
**Language:** Language 1 sets your PQube's main language, which is used for all of these screens and the GIF output graphs. Language 2, if you choose one, sets the second language on GIF output graphs. This can be useful if you expect to discuss these graphs with an engineer who reads another language.



**Power configuration:** This screen shows you the power configuration that your PQube is using. If your PQube is hunting for the correct power configuration, this screen will cycle through the various possible configurations until your PQube locks onto the correct configuration. Your PQube knows roughly 1,000 different possible power configurations used around the world, and can identify the correct configuration approximately 10 seconds after power has been applied to the terminals.



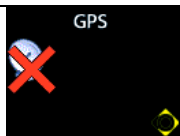
**Vectors:** Use this screen to verify that your voltage and current inputs are wired up correctly. Full scale voltage is determined by the nominal voltage found when the PQube locks onto the power configuration. The vertical bar on the right represents the largest phase magnitude of current. Its range is from zero amps to the value specified by the Max\_Current\_of\_Interest\_in\_Amps tag in the **Setup.ini** file. (By default, it is set to the value shown on your current module, multiplied by the current transformer ratio specified in the **Setup.ini** tag Current\_Transformer\_Ratio).



**Date/time:** Set your PQube's internal clock-calendar. Your PQube will automatically set the correct day of week. If you have an ETH1 Ethernet Module, and you have enabled SNTP in your **Setup.ini** file, your PQube will automatically set its clock-calendar to UTC.



**Trigger:** Use this screen to trigger Snapshot files of your power, or to trigger Daily Trend and Statistics files. Use the joystick to choose, and press the Select button to begin generating the files. Snapshots will take about 5 minutes, and trends will take longer, depending on how much data you have recorded..



**GPS:** If your PQube is equipped with GPS hardware, use this screen to view the number of GPS satellites that are visible, and your latitude and longitude.



**Test e-mail:** Press the select button to send a test e-mail. If your e-mail succeeds, you will get a green check mark. If your e-mail does not go through, you will see a red X with an error message. See [Sending a test e-mail from your PQube \(page 30\)](#) for more information.

## Meters

L-N Voltage	
L1-N	231.0V
L2-N	231.0V
L3-N	230.9V
N-E	1.6V

**L-L voltage meters, L-N voltage meters:** These are line-to-line, line-to-neutral, and neutral-to-earth true-RMS voltmeters. Different meters will show on these screens, depending on your power configuration. (For example, if the power configuration is “delta”, there will not be any L-N meters, because there is no neutral conductor.) If you have set a potential transformer ratio in your **Setup.ini** file, then these meters will use that ratio, so these meters will sometimes show their values in kilovolts or even megavolts.

L-L Voltage	
L1-L2	399.8V
L2-L3	400.7V
L3-L1	400.9V

Frequency	
	50.00 Hz

**Frequency:** This is a frequency meter. It is phase-locked to either L1-E or L2-E, depending on which channel has the best signal. It measures frequency by timing the zero-crossings, with a 5-pole analog low-pass filter and a 64-cycle digital low-pass filter.

AN / DIG1	
AN1-E	49.5V
AN2-E	1.5V
AN1-AN2	48.0V
DIG1	1.0

**AN/DIG1:** The AN meters show the RMS voltage (equivalent to DC voltage for DC signals) for the AN1 screw terminal to earth, AN2 screw terminal to earth, and AN1-to-AN2 differential voltage. The DIG1 meter shows the average value of the DIG1 digital input screw terminal with respect to earth, averaged over one cycle – useful when the DIG1 signal is changing rapidly, because it will show the duty cycle of the DIG1 signal.

Probe2	Probe1
-- °C	23 °C
-- %RH	48 %RH

**Probe2 / Probe 1:** These meters show the temperature and humidity of the two TH1 temperature-humidity probes. If one or both probes are not plugged in, the meters will show “--”.

Current	
L1 amps	22.40A
L2 amps	23.04A
L3 amps	22.80A
N amps	4.08A

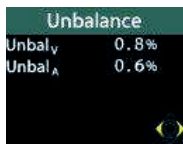
**Current:** These meters show the true-RMS current. They only appear if you have plugged in an optional XCT4 current transformer interface module, or a CT4 current sensing module. If you have set a current transformer ratio in your **Setup.ini** file, then these meters will use that ratio, so these meters will sometimes show their values in kilo-amps or even mega-amps. Different meters will show on this screen, depending on your power configuration. (For example, if the power configuration is “delta”, this screen will not show a neutral current meter, because there is no neutral conductor in delta power.)

Current	
amps	0.011A

**Current:** This screen is a continuation of the previous screen above. It shows the true-RMS current on the earth conductor. You can choose in your **Setup.ini** file to calculate net current from phase and neutral current; or you can measure it with a CT, either on the earth conductor or with a net-current CT.

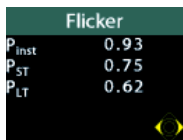
Distortion	
THD <sub>V</sub>	3.6%
TDD <sub>A</sub>	1.3%

**Distortion:** These meters show the Total Harmonic Distortion (THD) of the voltage and Total Demand Distortion (IEEE 519 TDD) of the current (if you have an optional current sensing module installed).



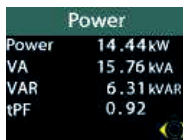
Unbalance	
Unbal <sub>V</sub>	0.8%
Unbal <sub>A</sub>	0.6%

**Unbalance:** These meters show the voltage unbalance and the current unbalance (if you have an optional current sensing module installed). You choose in your **Setup.ini** file whether your PQube calculates unbalance using the ANSI C84.1 method, or the IEC method, or the GB method.



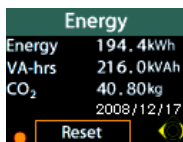
Flicker	
P <sub>inst</sub>	0.93
P <sub>ST</sub>	0.75
P <sub>LT</sub>	0.62

**Flicker:** These meters show you RMS flicker. P<sub>inst</sub> is the average absolute difference between U<sub>RMS½</sub> and 1-second RMS, in percent of nominal, multiplied by scaling factor for improved compatibility with Incandescent Flicker in IEC 61000-4-15. P<sub>ST</sub> is the mean value of P<sub>inst</sub> over previous 10 minutes, synchronized to real-time clock. P<sub>LT</sub> is the mean value of P<sub>inst</sub> over previous 2 hours, synchronized to real-time clock.



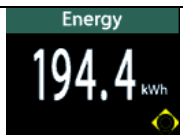
Power	
Power	14.44 kW
VA	15.76 kVA
VAR	6.31 kVAR
tPF	0.92

**Power:** These are the true power readings, and they correctly handle harmonics (distorted voltages and distorted currents). If you have set a current transformer ratio and/or potential transformer ratio in your **Setup.ini** file, then these meters will use those ratios, so these meters can show their values in kilowatts, megawatts, or even gigawatts.



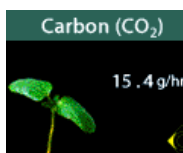
Energy	
Energy	194.4 kWh
VA-hrs	216.0 kVAh
CO <sub>2</sub>	40.80 kg
	2008/12/17

**Energy:** These three meters show the total energy, apparent energy, and carbon since the last reset of these meters. You can reset these meters by holding down the select button for 3 seconds. The date of the last reset will appear on the screen. You can reset these meters by holding down the select button for 3 seconds. The date of the last reset will appear on the screen.



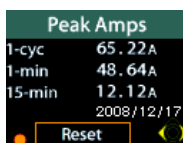
Energy	
194.4 kWh	

**Energy:** Access this screen by moving the joystick down from the Energy screen above. Here, you can view energy in large digits specified in ANSI C12.20.



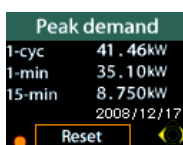
Carbon (CO <sub>2</sub> )	
	15.4 g/hr

**Carbon:** This meter shows the intensity of carbon dioxide output, based roughly from the EPA's measurements for typical California, USA values. You may edit these values in the **Setup.ini** file as necessary.



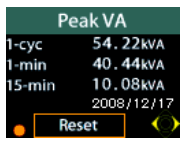
Peak Amps	
1-cyc	65.22 A
1-min	48.64 A
15-min	12.12 A
	2008/12/17

**Peak amps:** These three meters show the cycle-by-cycle highest RMS amps; the 1-minute interval with the highest RMS amps; and the N-minute interval with the highest RMS amps. (The highest RMS amps value is determined by looking at the highest among all of the active phase conductors. It excludes the neutral conductor.) The N-minute reading is usually set to 15 minutes, but you can set it to a value between 3 minutes and 60 minutes in your **Setup.ini** file. The 1-minute and N-minute readings are automatically synchronized to your PQube's real time clock. **These readings can be useful for evaluating inrush current and circuit breaker settings, and for sizing power conditioning devices such as UPS and voltage regulating transformers.** You can reset these meters by holding down the select button for 3 seconds. The date of the last reset will appear on the screen.

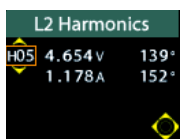


Peak demand	
1-cyc	41.46 kW
1-min	35.10 kW
15-min	8.750 kW
	2008/12/17

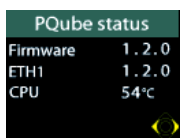
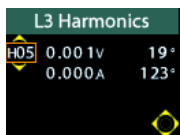
**Peak demand:** These three meters show the cycle-by-cycle highest kilowatt reading; the 1-minute interval with the highest RMS kilowatt reading; and the N-minute interval with the highest kilowatt reading. The N-minute reading is usually set to 15 minutes, but you can set it to a value between 3 minutes and 60 minutes in your **Setup.ini** file. The 1-minute and N-minute readings are **automatically synchronized to your PQube's real time clock.** You can reset these meters by holding down the select button for 3 seconds. The date of the last reset will appear on the screen.



**Peak VA:** These three meters show the cycle-by-cycle highest volt-amp reading; the 1-minute interval with the highest RMS volt-amp reading; and the N-minute interval with the highest volt-amp reading. The N-minute reading is usually set to 15 minutes, but you can set it to a value between 3 minutes and 60 minutes in your **Setup.ini** file. The 1-minute and N-minute readings are automatically synchronized to your PQube's real time clock. You can reset these meters by holding down the select button for 3 seconds. The date of the last reset will appear on the screen.



**L1, L2, L3 Harmonics:** Use these screens to view the magnitude and angle of every harmonic up to the 50<sup>th</sup> for both voltage and current. Select one harmonic at a time. The selected harmonic on one channel will also appear on the other channels. (Harmonic values up to the 63<sup>rd</sup> are recorded in your PQube's CSV files.)



**PQube Status:** This screen shows you the release version of your PQube's firmware and the release version of your ETH1 Ethernet Module's firmware if it is installed. It also shows you the temperature of the hottest CPU inside your PQube. A temperature lower than 80°C is typical. (needs new picture) (delete temperature text)(explain PQube model number)



**Battery:** Your PQube's battery voltage will typically be between 3.3V and 4.2 volts. Positive current shows that your PQube is charging its battery; negative current shows that your PQube is taking power from its battery. Cycle count shows the number of times your PQube has taken power from this battery. You can reset the cycle count by holding down the select button for 3 seconds. The date shows the last time the cycle count was reset.

### Recent Events



Your PQube displays the 6 most recent events. (Your PQube stores up to 40,000 events on its SD card, depending on the size of the SD card and the type of events.)

### Remove SD Card



You can safely remove the SD memory card from your PQube when you see this screen with a green check mark. Remove the SD card by pressing it down gently, then let it pop up. Your PQube will automatically reset when you re-insert a SD card.