

NEW LOW-COST, HIGH-PRECISION POWER QUALITY, ENERGY & ENVIRONMENT MONITORING

PQube[®] 3



coming soon...



Power Quality Class A
Energy Revenue Grade Class 0.2s Accuracy
Additional AC, DC and Environment sensor channels
World smallest & most advanced PMU Micro SynchroPhasor



General

- Three-phase, single-phase and split-phase monitoring 69~480V L-N, 100~960V L-L, 50/60/400Hz.
- Self-configuration*—auto-detects single-phase and multi phase voltage, nominal voltage, nominal frequency.
- Four analog inputs, one digital input, one relay output.
- Optional (up to two) advanced environmental probes.
- Direct connect to 100~690V—no PTs required.
- Powers from 24 VAC, 24~48VDC, POE (Power over Ethernet) or 100~240 VAC with PM1 plug-in module.
- 10 seconds of super-capacitor back up power.
- Optional UPS plug-in module with 30 minutes of backup power.
- Automatic data storage on internal 8GB + removable 8GB micro-SD card (mirrored memory).
- Color touch screen display, can be operated with safety gloves on!
- DIN-rail or optional panel mount bracket.

Power Quality Monitoring Class A

- Certified Class A IEC 61000-4-30 Ed2 (Ed3*).
- High-speed 512* -samples-per-cycle recording.
- Power quality disturbances recorded with waveforms and RMS graphs.
- Voltage sags, swells and interruptions; over-frequency and under-frequency events, time-triggered snapshots.
- Voltage THD, current TDD and current THD; voltage and current unbalance; VARs (fundamental and Budeanu); VAR-hr accumulator; flicker (Pinst, PST, PLT).
- Voltage and current harmonics and interharmonics—up to the 63rd, with statistics*.
- Daily, weekly*, monthly* trends. Cumulative probability, histograms*, and more.
- Rapid Voltage changes (RVC).

Above and beyond Class A

- Waveshape change triggers and recording.
- 1 Mhz high frequency impulse detection and recording (up to 4Mhz on a single channel*).
- 2kHz-150kHz frequency band measurements.



PQube 3 rear terminals
(PQube 3-PQ- E08N)

Energy (Revenue Class 0.2s Accuracy)

- Available with PSL custom high-precision current transformers to meet the requirements of IEC 62053-22 Class 0.2s and ANSI C12.20 Class 0.2.
- Watts, VA, VARs, True Power Factor, watt-hours, VA-hours, VAR-hours.
- Bi-directional power - received and delivered*
- Peak averages—single-cycle, 1-minute , 15-minute, and at user-selected intervals.
- CT ratios support from 1:1 up to 1:50000; PT ratios support up to 1:10000 (6,900,000) volts.
- Daily, weekly*, monthly* trends; load duration curves.
- Energy accumulators—daily, weekly, monthly.

Environmental Monitoring

- Optional (up to two) Advanced temperature-humidity-atmospheric pressure-acceleration probes PLUS:
 - port for solar irradiance (W/m²) probe
 - port for K-Type thermocouple

Communication (Embedded Ethernet)

- Embedded Ethernet port
- 2 USB 1.0 ports, 1 USB 2.0 port for data transfer to thumb drives.
- Direct remote access to built-in web server—NO SOFTWARE REQUIRED.
- Instant email notification after a power quality disturbance or end of trend interval. Free email account.
- Access to the data files through FTP.
- Real time meters with Modbus-TCP and SNMP(v2 and v3).
- NTP for clock synchronization
- Secure encrypted communication with HTTPS
- IEC 61850*
- CQube3™ Software to manage a fleet of PQubes (coming soon).

* coming soon with a firmware upgrade

Actual size



PQube 3 front terminals

Power Supply Modules



PM1 Power Management module (Part Number PM1)

- Powers the PQube in the voltage range from 100V~240VAC 50/60 Hz or 120~300VDC
- Provides 24VDC output for accessories (up to 10W).
Note: PQube3 powers from 24VAC, 24VDC~48VDC, POE without additional modules and contains an embedded 10s super-capacitor backup power

UPS1 Power Storage module (Part Number UPS1)

- Provides up to 30mins of backup power (for PQube 3 and its accessories when using PM1 module)
- UPS operation and Charging LED indicators

Environment and Advanced Environment Sensors



ENV1 EnviroSensor™ (Part number ENV1)

Temperature/Humidity/barometric pressure

- Monitors ambient temperature and humidity, and barometric pressure
- Temperature/Humidity event triggers
- Use one sensor for local ambient temperature/humidity, and the other for detection of clogged filters, failed fans.. using up to 10-meter extension cables.
- Temperature accuracy: Typical: $\pm 0.5^{\circ}\text{C}$
- Humidity accuracy: Typical: $\pm 4.5\%\text{RH}$ (20~80% R.H.)

ENV2 Advanced EnviroSensor™ (Part number ENV2)

Temperature/Humidity/barometric pressure

Acceleration X-Y-Z, Thermocouple, solar irradiance sensor

- ENV1 EnviroSensor™ benefits PLUS
 - 3 axis X-Y-Z accelerometer (reports in m/s^2)
 - port for K-type thermocouple input
 - port for Solar irradiance Sensor input (reports light illumination in W/m^2)

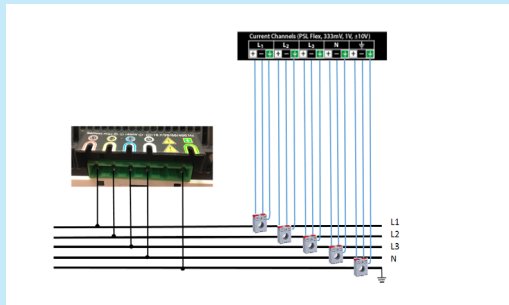
Micro Synchrophasor (micro PMU)



- Only the PQube 3 can measure millidegree phase shifts needed for distribution applications
- Developed by the U.S. ARPA-E program for diagnosing on Smart Grid and Distributed Generation stability
- Contact PSL for availability and more information

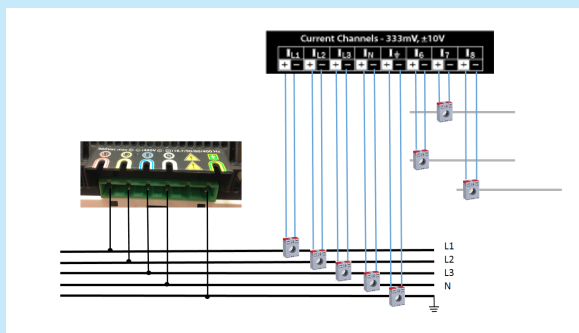
PQube 3 - 5 Current Channels - model PQUBE 3-PQ-E05S

- 5 current channels with shield grounding terminals for superior noise protection.
- Choose from a wide variety of precision PSL current sensors: 5A, 20A, 50A, 100A, 200A or higher- output 333mV
Additional ranges for sensor outputs: 1V, 3.333V or Rogowsky coil *
- Adds Class 0.5/Class 0.2 Energy metering (Class 0.2 with PSL high precision current sensors)
- Measured channels: I_{L1} , I_{L2} , I_{L3} , I_N , I_{GND}



PQube 3 - 8 Current Channels - model PQUBE 3-PQ-E08N

- 8 currents channels = 5 current channels for a 3 phase load + 3 single phase loads
- Choose from a wide variety of precision PSL current sensors: 5A, 20A, 50A, 100A, 200A or higher- output 333mV
Additional ranges for sensor outputs: 3.333V or Rogowsky coil *
- Adds Class 0.5/Class 0.2 Energy metering (Class 0.2 with PSL high precision current sensors)
- Measured channels: I_{L1} , I_{L2} , I_{L3} , I_N , I_{GND} and 3 independent channels I_6 , I_7 , I_8



PQube File Formats

Your PQube 3 provides data in several useful formats.

- Events, trends, and statistics as universal .GIF formats and .CSV data files
- Text, XML and HTML summaries
- PQDIF files (IEEE standard for power quality data files)

Each graph and chart is labeled in your choice of two languages (35 languages total*).

All graphs are generated by your PQube 3, without software, and can be viewed in a browser or opened in any picture viewer. They are included in event notification emails as simple .GIF file attachments, and can be forwarded to a third party, such as a facility engineer or utility company.

* coming soon with a firmware upgrade

PQube®
Power Standards Lab

PQube B-5 - Bldg 90 - Bldg Main Service
LBNL Bldg 90 Energy Monitoring Project
Environmental Energy Technologies Division - BTD

No software required!

Status

Meters

Events

Trends/Statistics

Commands

Network

PQube Information

Location: Bldg 90 - Bldg Main Service
 PQube ID: PQube B-5
 Note 1: LBNL Bldg 90 Energy Monitoring Project
 Note 2: Environmental Energy Technologies Division - BTD
 PQube Serial Number: P002944
 Model Number: PQube 01-0000
 Firmware Version: 1.4.14 #2552
 IP Address: 128.3.13.217

Configuration

Power Configuration: Wye/Star
 Nominal Line-to-Neutral Voltage: 277V
 Nominal Line-to-Line Voltage: 480V
 Nominal Frequency: 60Hz
 Current Transformer Ratio: 18000:5

PQube Time

Date: 2011/10/27
 Day of Week: Thursday
 Time: T 10:33:48 PST

Data from the PSL PQube® by www.PowerStandards.com

The PQube web interface access screen. From here, you can check your PQube status, access the meters, view events, and send commands. Each PQube can be labeled with a unique name and location, making it easy to monitor multiple PQubes.

An overview of a PQube meters screen. Meters refresh every second.

PQube®
Power Standards Lab

No software required!

Status

Meters

Events

Trends/Statistics

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Network

Meters

Meter	Value	
L1-N	283.77V	
L2-N	283.21V	
L3-N	284.08V	
N-E	0.95V	
L1-L2	490.71V	
L2-L3	491.42V	
L3-L1	491.90V	
L1 Amp	282.8A	
L2 Amp	270.4A	
L3 Amp	282.3A	
N Amp	0.01A	
Frequency	60.009Hz	
Voltage THD	4.6%	
RMS Flicker	P _{inst}	0.1
	P _{ST}	0.2
	P _L T	0.2
IEC Zero Sequence V	0.0%	
IEC Negative Sequence I	2.1%	
TH1 Probe 2		24.8deg C
		30.3% RH
L1-N Voltage Fundamental	283.45V	0deg
L2-N Voltage Fundamental	282.90V	-120deg
L3-N Voltage Fundamental	283.77V	120deg
L1 Current Fundamental	263.5A	1deg
L2 Current Fundamental	259.6A	-119deg
L3 Current Fundamental	272.9A	120deg
User Counter <small>(since 2010/04/02)</small>		0

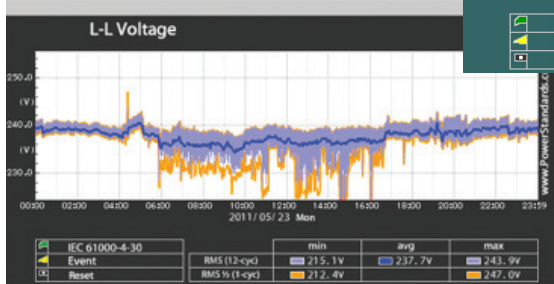
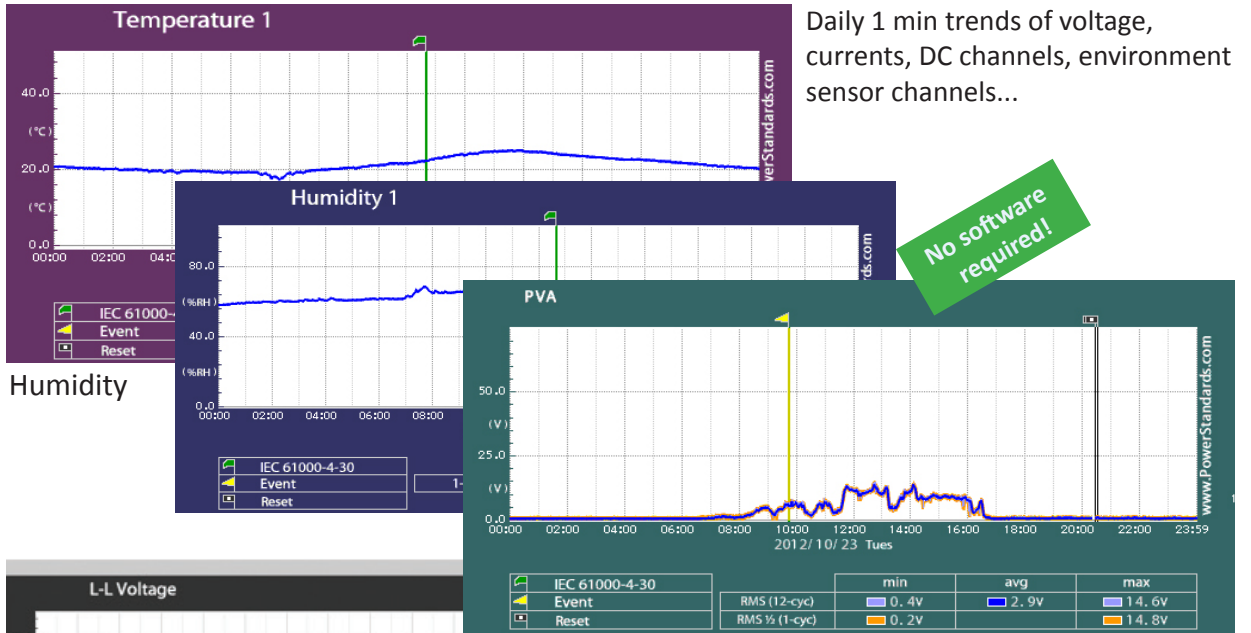
Energy

Meter	Value	
Power	226.27kW	
Apparent Power	237.29kVA	
Reactive Power	71.47kVAR	
True Power Factor	0.95	
Energy <small>(since 2010/04/02)</small>	2.370GWh	
Apparent Energy <small>(since 2010/04/02)</small>	2.472GVAh	
Carbon <small>(since 2010/04/02)</small>	768.145Mg	
Carbon Rate	73.33kg/h	
Peak RMS Current <small>(since 2010/04/02)</small>	1 cycle	2098.3Arms
	1 minute	695.6Arms
	15 minute	670.9Arms
Peak Power <small>(since 2010/04/02)</small>	1 cycle	797.38kW
	1 minute	559.68kW
	15 minute	537.35kW
Peak Apparent Power <small>(since 2010/04/02)</small>	1 cycle	869.82kVA
	1 minute	564.90kVA
	15 minute	544.49kVA

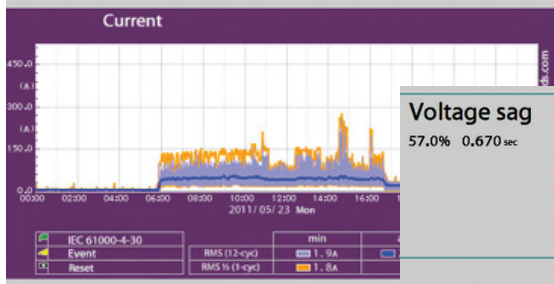
Harmonic H7

Meter	Value	
L1 Harmonic H7	7.76V	154deg
	35.1A	239deg
L2 Harmonic H7	7.13V	36deg
	34.1A	121deg

Great PQube graphs ...



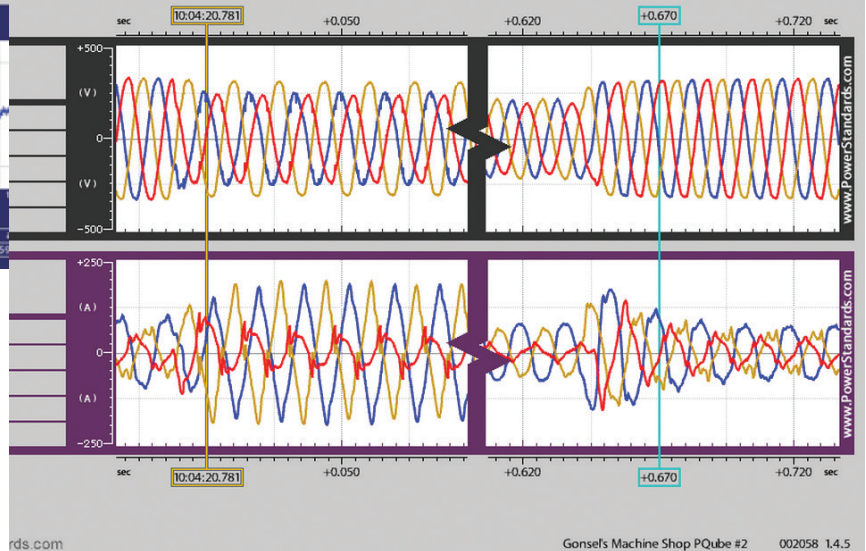
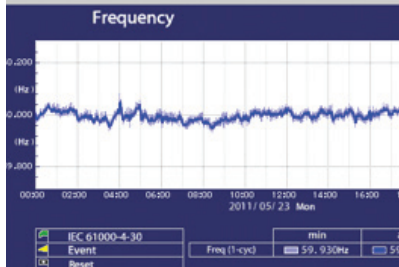
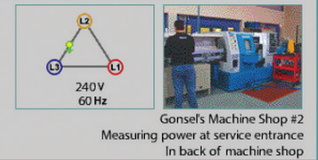
DC



Waveform capture of voltages and currents triggered by events such as dips, swells or transients.

Voltage sag

57.0% 0.670 sec



PQube 3 - General views



PQube 3 with plug-in Sync Module, Power supply and UPS



Touch screen display -
Micro SD and high speed USB port

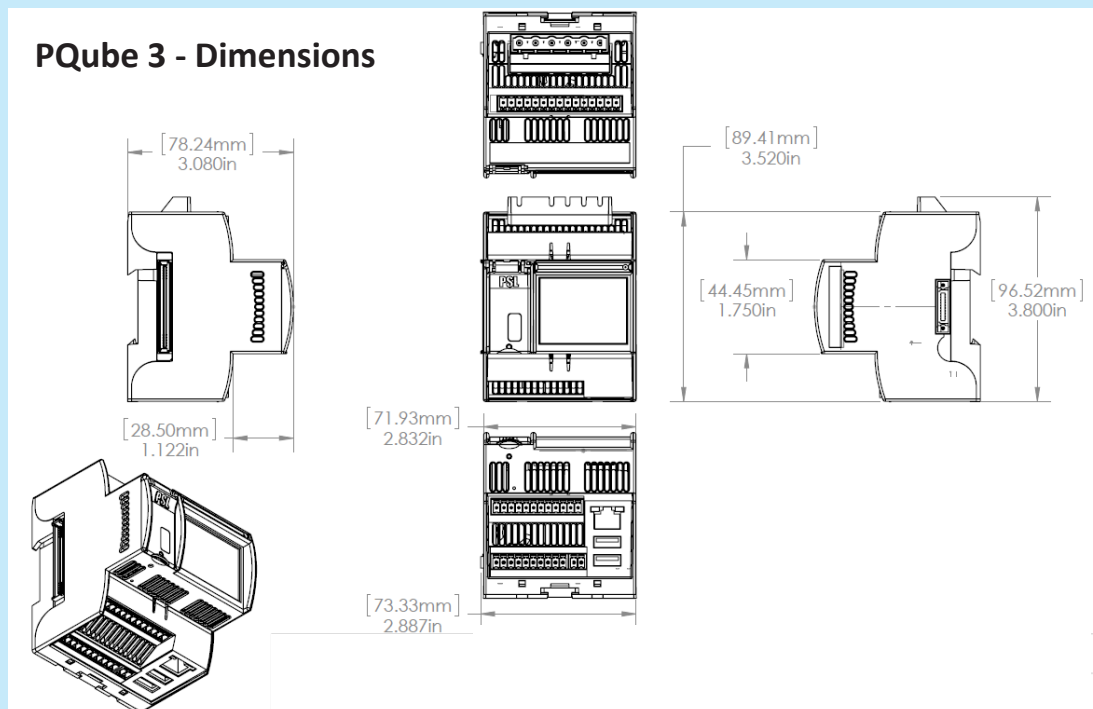


Analog inputs and relay output terminals



AC voltage and AC current terminals

PQube 3 - Dimensions





Schedule
Contract GS24F0066M

Our company: www.PowersSensorsLtd.com
The PQube page: www.PQube.com
Our authorized distributors: www.PQube.com/distributors
Our customers: www.PQube.com/customers

Test-drive a PQube at map.PQube.com

