PSL
Power Sensors Ltd
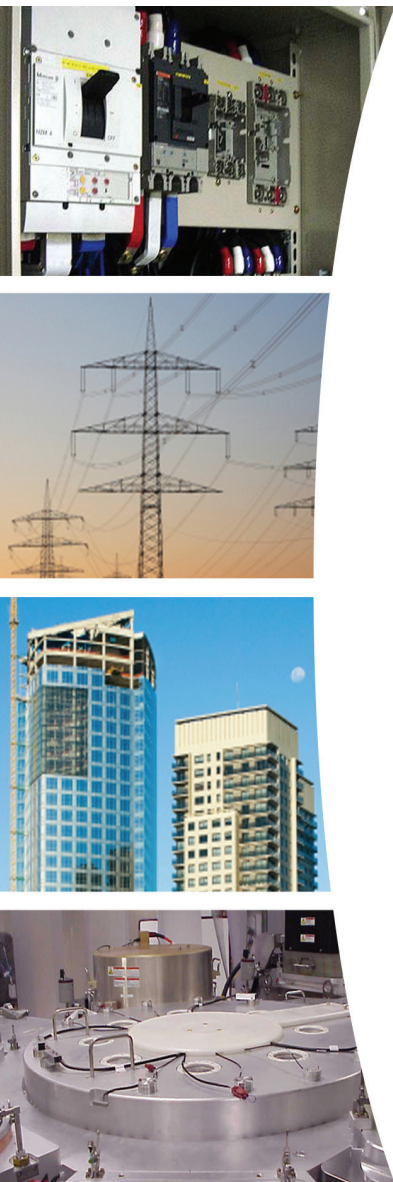A Division of Power Standards Lab

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

PQube® 3

POWER QUALITY CLASS A

ENERGY REVENUE GRADE CLASS 0.2S ACCURACY

ADDITIONAL AC, DC, AND ENVIRONMENT SENSOR CHANNELS

WORLD'S SMALLEST & MOST ADVANCED PMU MICRO SYNCHROPHASOR

MADE IN USA · FC · CE · c(UL)us LISTED E220936 · RoHS

General

- Three-phase, single-phase and split-phase monitoring 69~480V L-N, 100~960V L-L, 50/60/400Hz. No PTs required.
- 8 current channels.
- 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.
- Powers from 24 VAC, 24~48VDC, PoE (Power over Ethernet) or 100~240 VAC with PM1 plug-in module.
- Optional UPS plug-in module with 30 minutes of backup power.
- Data storage on internal 8GB solid state memory
- Removable 8GB micro-SD card and USB (optional), with lockable cover for restricted access.
- Color touch screen display, can be operated with safety gloves on!
- DIN-rail or optional panel mount.

Power Quality Monitoring Class A Ed 3

- Certified Class A IEC 61000-4-30 Ed 3.
- High-speed 512-samples-per-cycle recording.
- Power quality disturbance recording with waveform and RMS graph output.
- 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; 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.

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:
  - two ports for solar irradiance (W/m^2) probe, K-Type thermocouple, etc...
- Analog inputs— suitable for flow, RPM, fluid, pressure, etc...

Communication (Embedded Ethernet)

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

* coming soon with a firmware upgrade

Actual Size

PQube 3 Rear Terminals
(PQube 3-PQ- E08N)

PQube 3 Front Terminals

PQube 3 Brochure 1.3

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Power Supply Modules

PM1 Power Management module (Part Number PM1)
- Powers the PQube 3 in the voltage range from 100V~240VAC 50/60 Hz or 120~300VDC
- Optional 24VDC output for accessories (up to 10W).

  Note: PQube 3 powers from 24VAC, 24VDC~48VDC, or PoE (Power over Ethernet) without additional modules

UPS1 Power Storage module (Part Number UPS1)
- Configurable battery backup up to 30 mins— allows backup optimization for multiple outage situations
- Includes backup of optional PM1 outputs
- UPS operation and Charging LED indicators

Environment and Advanced Environment Sensors

ENV1 EnviroSensor™ (Part number ENV1)
- Monitors ambient temperature, humidity, and barometric pressure
- Temperature/Humidity event triggers
- Use sensors for local/remote ambient temperature/humidity and detection of clogged filters, failed fans.. using up to 10-meter extension cables.
- Temperature accuracy: Typical: ± 0.5ºC
- Humidity accuracy: Typical: ± 5%RH (20~80% R.H.)

ENV2 Advanced EnviroSensor™ (Part number ENV2)

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)

PQube 3 ™ connects Environment Sensors through 2 of its USB connectors

GPS Time Synchronization / Micro Synchrophasor (μPMU)
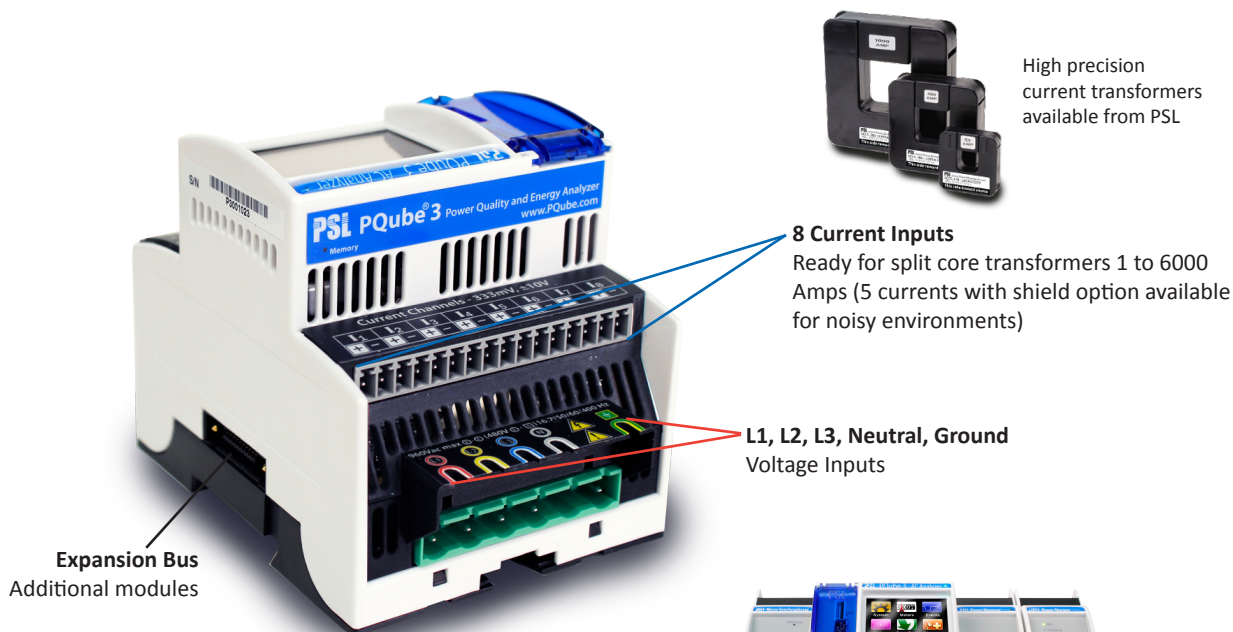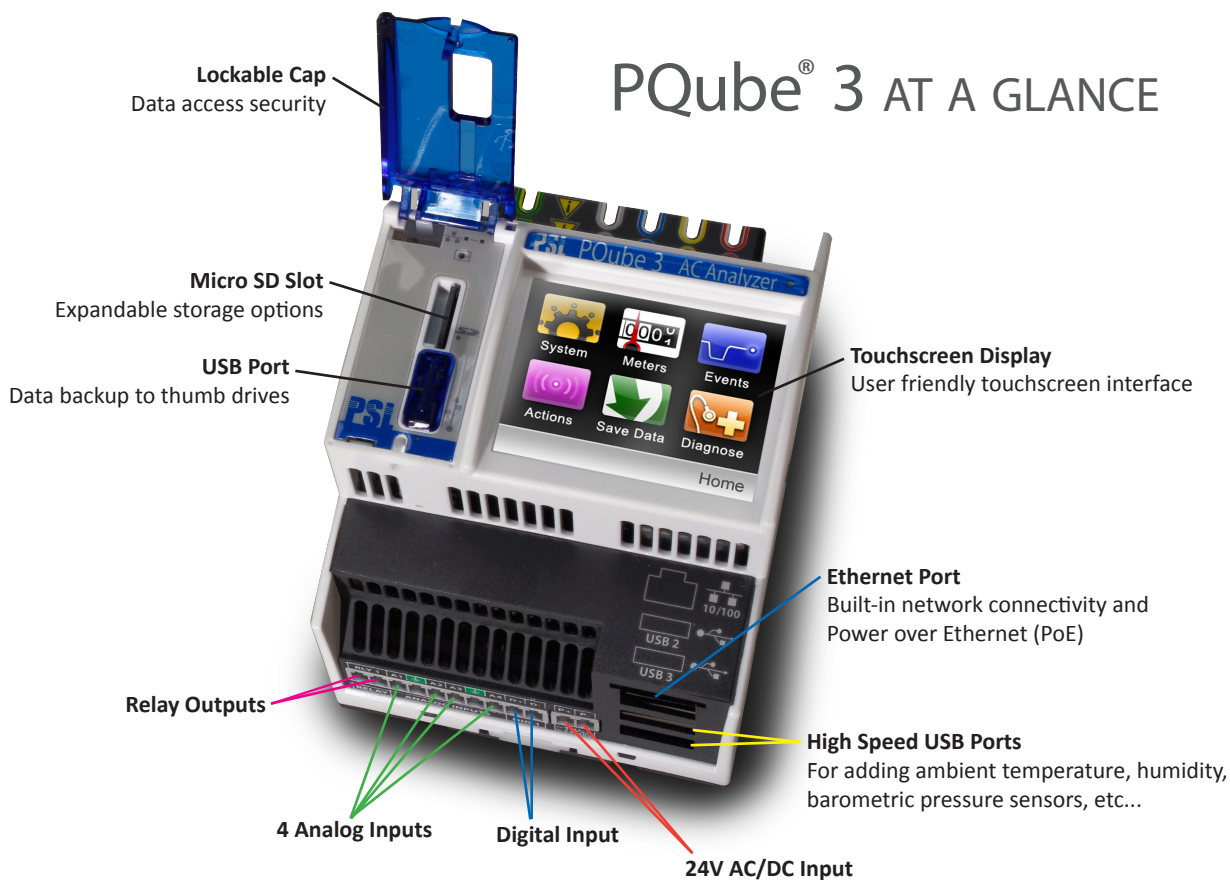

GPS Time Synchronization
- 1 microsecond time accuracy

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

PSL

PQube® 3 AT A GLANCE

Lockable Cap
Data access security

Micro SD Slot
Expandable storage options

USB Port
Data backup to thumb drives

System   Meters   Events
Actions   Save Data   Diagnose
Home

Touchscreen Display
User friendly touchscreen interface

Ethernet Port
Built-in network connectivity and
Power over Ethernet (PoE)

Relay Outputs

High Speed USB Ports
For adding ambient temperature, humidity,
barometric pressure sensors, etc...

4 Analog Inputs   **Digital Input**

24V AC/DC Input

High precision
current transformers
available from PSL

8 Current Inputs
Ready for split core transformers 1 to 6000
Amps (5 currents with shield option available
for noisy environments)

L1, L2, L3, Neutral, Ground
Voltage Inputs

Expansion Bus
Additional modules

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

PQube File Formats

Your PQube 3 provides data in several useful formats.
- Events, trends, and statistics as universal .GIF images 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® 3
Power Sensors Ltd.

PQube B-4 - Bldg 90 - Panel 90A - Brkr 9 AC24,25,28,43,44
LBNL Bldg 90 Energy Monitoring Project
Environmental Energy Technologies Division - BTD

- Status
- Meters
- Events
- Trends and Statistics
- Command
- Display

PQube 3 Information

Location:	Bldg 90 - Panel 90A - Brkr 9 AC24,25,28,43,44
PQube ID:	PQube B-4
Note 1:	LBNL Bldg 90 Energy Monitoring Project
Note 2:	Environmental Energy Technologies Division - BTD
PQube Serial Number:	P3001234
Model Number:	PQube3-PQ-E08N-0000
Firmware Version:	3.1.11.14.5.21
IP Address:	128.3.13.188

Configuration

Power Configuration:	Wye/Star
Nominal Line-to-Neutral Voltage:	277V
Nominal Line-to-Line Voltage:	480V
Nominal Frequency:	60Hz
Current Transformer Ratio:	1799:1

PQube Time

Date:	2014/06/24
Day of Week:	Tuesday
Time:	T 11:34:43 PST

NO SOFTWARE REQUIRED

The PQube 3 web interface access screen. From here, you can check your PQube status, access meters, view events, and send commands. Each PQube can be labeled with a unique name and location, making it easy to monitor multiple PQubes.

Overview of PQube 3 meters screen. Meters refresh every second.

Meters

Meter		Value
L1-N		286.10 V
L2-N		285.71 V
L3-N		285.85 V
N-E		0.14 V
L1-L2		494.49 V
L2-L3		495.05 V
L3-L1		495.93 V
L1 Amp		2.88 A
L2 Amp		4.94 A
L3 Amp		9.89 A
N Amp		0.00 A
E Amp		0.01 A
DIG1		0
Frequency		59.982 Hz
L1 Flicker	P_{inst}	0.00
	P_{ST}	0.01
	P_{LT}	---.--
L2 Flicker	P_{inst}	0.00
	P_{ST}	0.01
	P_{LT}	---.--
L3 Flicker	P_{inst}	0.00
	P_{ST}	0.01
	P_{LT}	---.--

Class A Meters

Class A Meters	Value
Max 2kHz-9kHz	0.06 V @ 4 kHz
Max 8kHz-150kHz	0.05 V @ 126.0 kHz

ENV_A

External Probes	Value
Temperature	22.3 degC
Humidity	35.6 %RH

ENV_B

External Probes	Value
Temperature	31.8 degC
Humidity	23.4 %RH

Data from the PSL PQube® 3 by www.PowerSensorsLtd.co

Improved PQube 3 Graphs

Temperature

Humidity
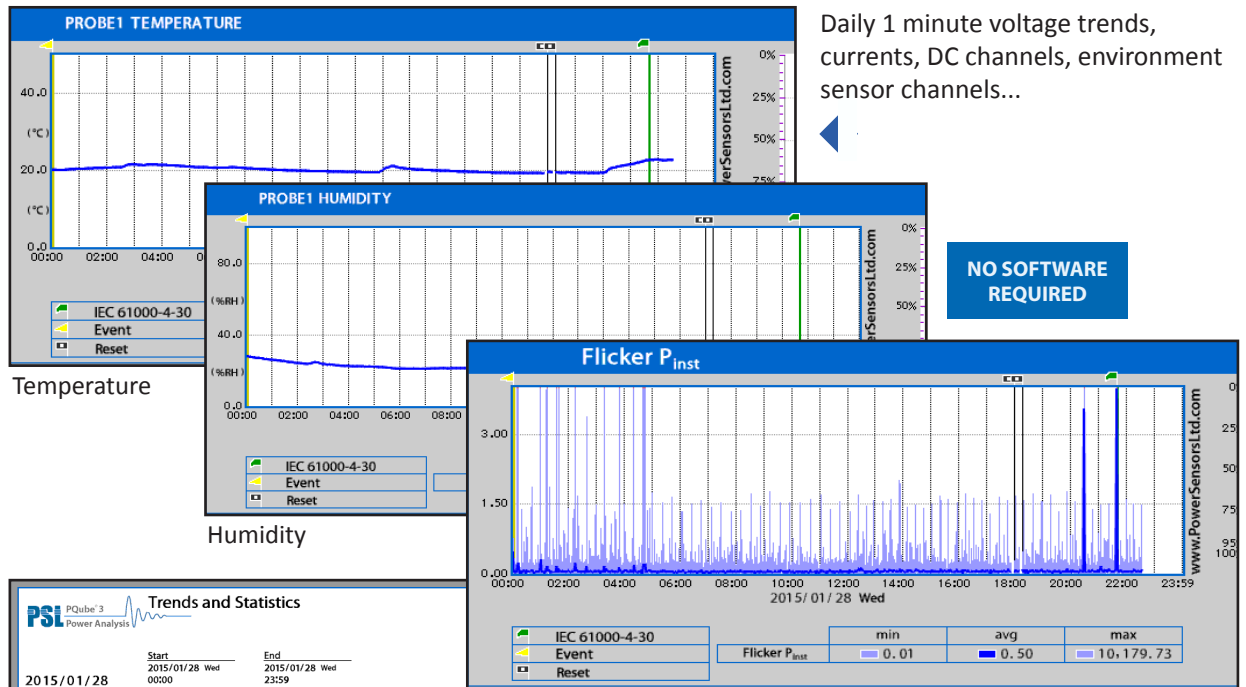
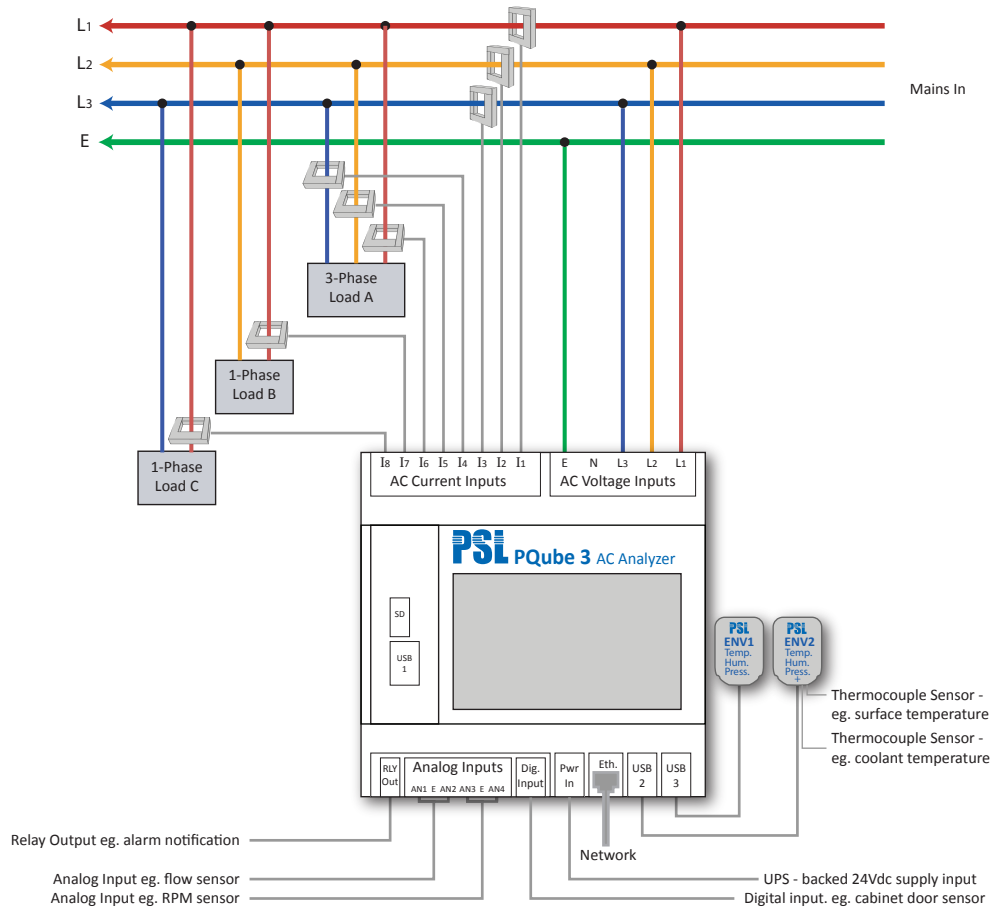Daily 1 minute voltage trends, currents, DC channels, environment sensor channels...
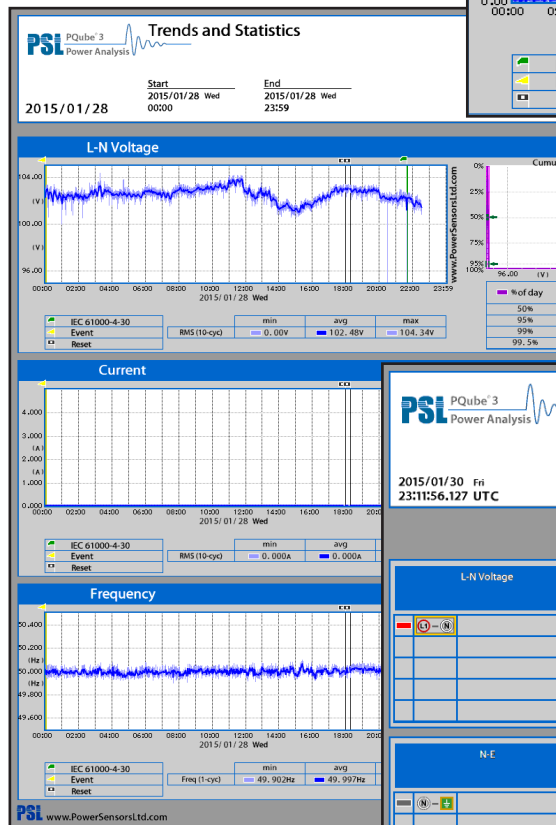
Flicker

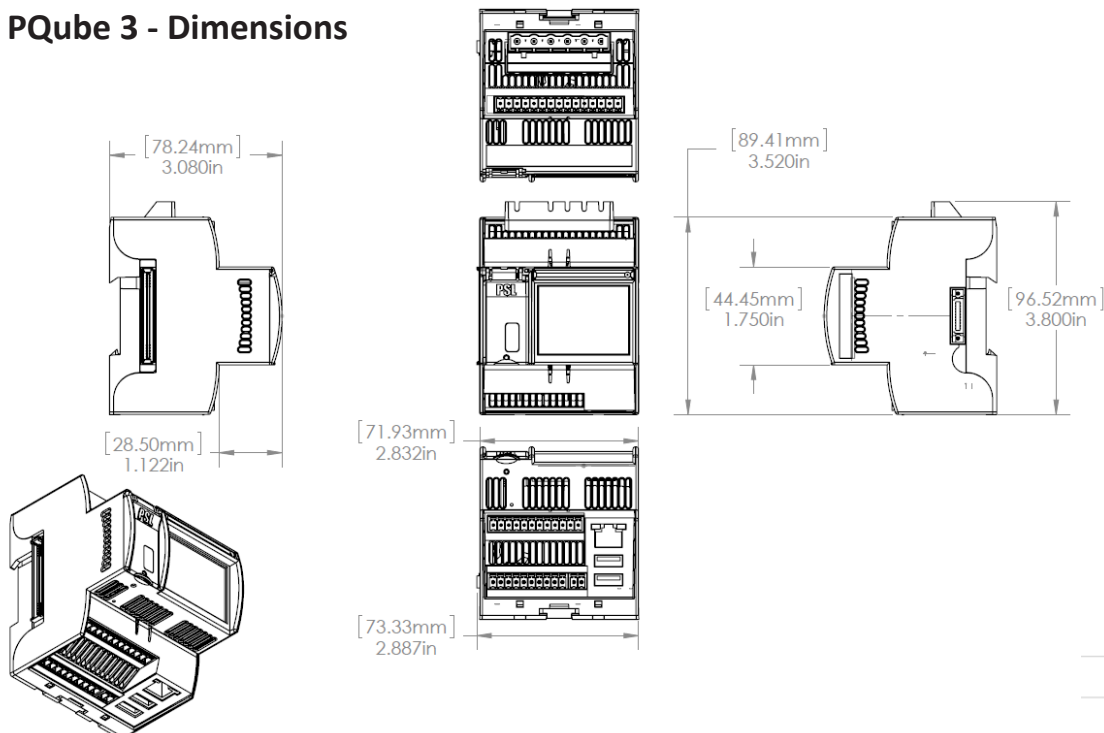Waveform capture of voltages and currents triggered by events such as dips, swells or transients.

PQube 3 - Example Wiring

L₁
L₂
L₃
E

Mains In

3-Phase Load A

1-Phase Load B

1-Phase Load C

I₈ I₇ I₆ I₅ I₄ I₃ I₂ I₁
AC Current Inputs

E N L₃ L₂ L₁
AC Voltage Inputs

PSL PQube 3 AC Analyzer

SD

USB 1

PSL ENV1 Temp. Hum. Press.

PSL ENV2 Temp. Hum. Press.

Thermocouple Sensor - eg. surface temperature
Thermocouple Sensor - eg. coolant temperature

RLY Out

Analog Inputs
AN1 E AN2 AN3 E AN4

Dig. Input

Pwr In

Eth.

USB 2

USB 3

Relay Output eg. alarm notification

Analog Input eg. flow sensor
Analog Input eg. RPM sensor

Network

UPS - backed 24Vdc supply input
Digital input. eg. cabinet door sensor

PQube 3 - Dimensions

[78.24mm] 3.080in

[28.50mm] 1.122in

[89.41mm] 3.520in

[44.45mm] 1.750in

[96.52mm] 3.800in

[71.93mm] 2.832in

[73.33mm] 2.887in

Our company: www.PowerSensorsLtd.com
The PQube 3 page: www.PQube3.com
Our authorized distributors: www.PQube3.com/distributors
Our customers: www.PQube3.com/customers

Test-drive a PQube at map.PQube.com