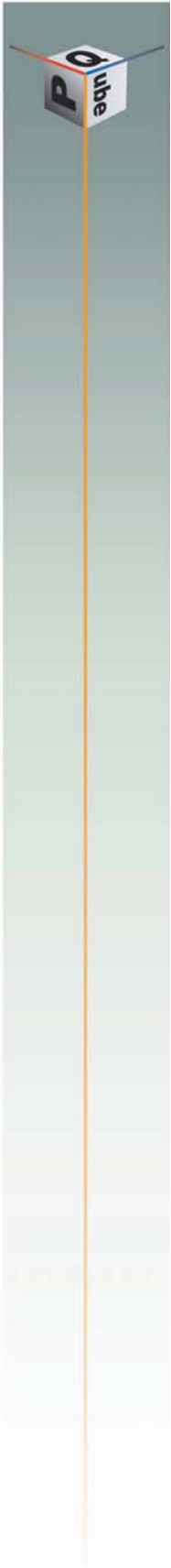


PSL



The **PQube**. Simply the best power monitor. Ever.

Power Standards Lab



PQube[®] AC Power Monitor

Embedded power quality and power quantity monitoring

Highlights

- Captures disruptive voltage disturbances every time they occur. Time-stamped pictures of the waveforms
- Perfect for embedding in sensitive equipment – quickly reduces service costs
- Records strip charts for 1-day, 1-week, and 1-month intervals, plus industry-standard statistical summaries
- Optionally records power consumption, carbon footprint
- As easy to use as a digital camera – everything you need is stored on a standard plug-in SD card
- Very low cost - no software required

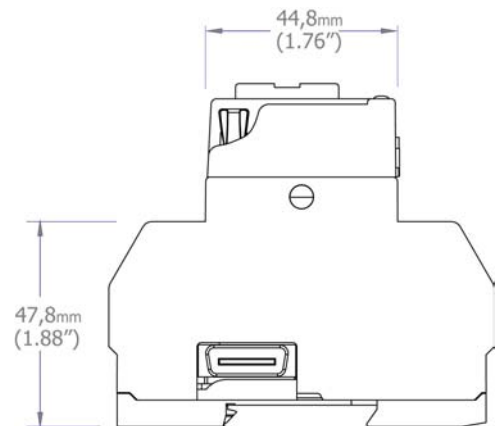
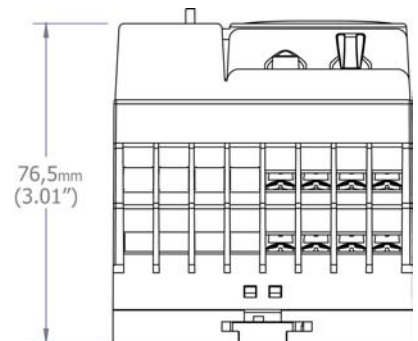
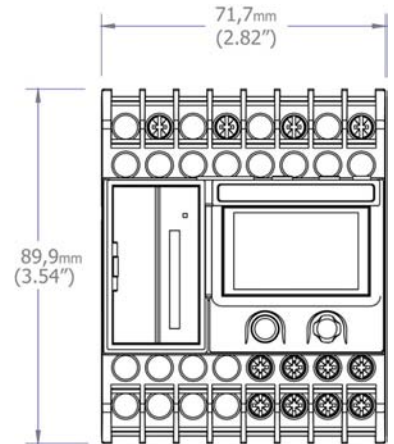
Features

- 100V ~ 600V AC monitoring, 50/60/400 Hz
1-phase, split-phase, 3-phase delta, or 3-phase star/wye
- Dips, swells, interruptions, waveform faults, frequency variations, 1-microsecond impulse detection
- One digital input, plus two additional $\pm 60V$ channels
- Up to 1024 samples per cycle. True RMS
- Up to 4 gigaByte SD-card output with GIF picture files and CSV Excel[®]-compatible files.
- No software required
- DIN-rail or panel mount
- Relay contact output, USB port, full color display
- Built-in Li-Ion UPS. Power from -48 VDC, 24VDC or 24 VAC, or optional 100~240 VAC power supply

Options

- Ethernet with e-mail, DHCP, FTP, SNTP
- 1-phase and 3-phase current monitoring*
1-amp, 5-amp CT secondary, or 20-amp, 100-amp direct
- Power consumption monitoring* – kWh, kVAR, power factor, kW, carbon footprint
- Harmonics and flicker, EN50160*
- GPS receiver for precision timing*
- Serial port – wired or wireless*
- Two temperature-humidity probes
- Additional relay outputs*
- External power supply – 100V~240V, 50/60 Hz
- DNP3, Modbus, and other coms protocols*

* Check factory for availability



Easy installation

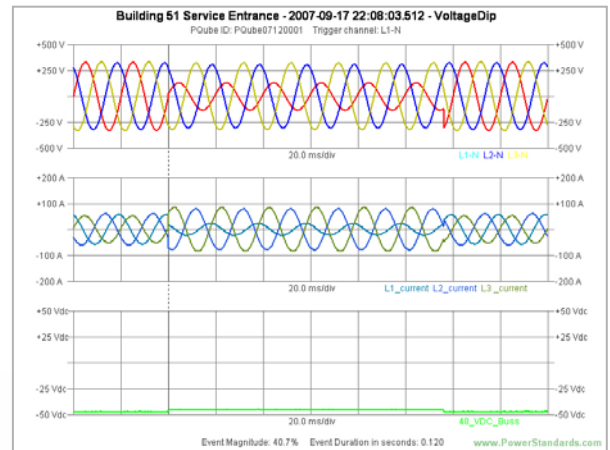
- Snap-together modules for Ethernet, current, optional power supply, and more
- Direct connection to any world-wide voltage: 100V, 120V, 200V, 208V, 230V, 240V, 277V, 400V, 480V, 600V
- Direct connection to any world-wide frequency 50 Hz, 60 Hz, 400 Hz, plus DC
- DIN-rail mount or panel mount. Can snap into standard DIN circuit-breaker box with standard 45mm cutout.
- Built-in UPS with automatically charged Li-Ion battery. Battery can be easily replaced without interrupting PQube monitoring

Complies with world-wide standards

- **Performance:** IEC 61000-4-30 Class A, CE
- **Safety:** TUV, ISA-82.02.01 (IEC 61010-1 MOD), CAN/CSA-C22.2 NO.61010-1, Japan S-mark, GS
- **Immunity:** IEC 61000-4-5 (6kV peak 100kHz surge), IEC 61000-4-4 (4kV peak EFT bursts), IEC 61000-4-2 Level 1 and MIL-STD-883 (electrostatic discharges), IEC 61000-4-3 (radio frequency fields), IEC 61000-4-8 (magnetic fields)
- **Emissions:** EN 55022 and CISPR 22, radiated and conducted RF emissions

Typical applications

- Semiconductor manufacturing equipment
- Medical equipment
- Elevator controls
- CNC machinery
- Monitoring power quality at circuit breaker panels
- Data centers and telecom
- Electric power grid surveys
- Building management systems



Typical output files are images (above) and Excel®-compatible files. No software required.



Front Terminals – actual size



Back Terminals – actual size

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PQube Specifications

Agency approvals and listings		
RoHS	Certified	EN61010, RoHS, EN55022 Class A, IEC 61000-4-4, IEC 61000-4-30
CE	Certified	EN55022 Class A, CISPR 22 Class A
ITC EMC, FCC	Certified	
TUV NRTL, CB, BAUART-mark	Pending	
S-mark (Japan)	Pending	
Magnitude of the supply voltage		
Nominal voltage - U_{in}	100V ~ 600V	DC/50/60/400 Hz. User selected. Maximum nominal 350V L-E (corresponds to 600V L-L)
Measurement channels	L-N, L-L, L-E	User selected.
Measurement method	IEC 61000-4-30 Class A	True RMS, 256 samples per cycle. Snapshots up to 1024 samples per cycle.
Measurement range	10% ~ 150% of U_{in}	61000-4-30 Class A compliant
Measurement accuracy	$\pm 0.1\%$ of U_{in}	61000-4-30 Class A compliant
Voltage dips and swells		
Measurement method	IEC 61000-4-30 Class A	True RMS, $U_{rms1/2}$, 256 samples per cycle, independent sync on channels
Thresholds	IEC 61000-4-30 Class A	User selected, or sliding reference voltage calculated
Hysteresis	IEC 61000-4-30 Class A	User selected
Measurement range	10% ~ 150% of U_{in}	61000-4-30 Class A compliant
Dip/swell evaluation	IEC 61000-4-30 Class A	On 3-phase systems, 61000-4-30 Class A determines depth and duration
Measurement accuracy - depth	$\pm 0.2\%$ of U_{in}	61000-4-30 Class A compliant
Measurement accuracy - duration	IEC 61000-4-30 Class A	Commencement uncertainty + Conclusion uncertainty = 1 cycle
Voltage interruptions		
Measurement method	IEC 61000-4-30 Class A	True RMS, $U_{rms1/2}$, 256 samples per cycle, independent sync on channels
Threshold	IEC 61000-4-30 Class A	User selected
Hysteresis	IEC 61000-4-30 Class A	User selected
Interruption evaluation	IEC 61000-4-30 Class A	On 3-phase systems, 61000-4-30 Class A duration methods
Measurement accuracy - duration	IEC 61000-4-30 Class A	Commencement uncertainty + Conclusion uncertainty = 1 cycle
Transient voltages (impulses)		
Measurement method	Peak detection	Positive and negative peak, high-pass filter (threshold floats on sine wave)
Minimum duration	0.5 microseconds	
Threshold	450Vpk nominal	L1-E, L2-E, L3-E
Unbalance – 3-phase voltage		
Measurement method	Symmetrical components	61000-4-30 Class A compliant
Measured parameters	+, -, and 0 sequences	
Measurement accuracy	$\pm 0.15\%$	Guaranteed over 1% to 5% of U_1
Aggregation intervals		
$U_{rms1/2}$	IEC 61000-4-30 Class A	1-cycle RMS value, updated every half cycle, independently synchronized
10/12 cycles	IEC 61000-4-30 Class A	10 cycles for 50 Hz, 12 cycles for 60 Hz
150/180 cycles	IEC 61000-4-30 Class A	150 cycles for 50 Hz, 180 cycles for 60 Hz
10-minute	IEC 61000-4-30 Class A	Synchronized to real time clock per 61000-4-30 Edition 2 Class A
2-hour	IEC 61000-4-30 Class A	Synchronized to real time clock per 61000-4-30 Edition 2 Class A
Flagging	IEC 61000-4-30 Class A	User-selected
Real time clock		
Satellite receiver (GPS option)	± 0.1 ms absolute	61000-4-30 Class A compliant. Requires clear view of sky for antenna
SNTP (Ethernet ETH1 option)	± 1.0 ms absolute	61000-4-30 Class A compliant.
PQube Real Time Clock	± 400 ms per day	61000-4-30 Class A as backup. Temperature-compensated crystal.
Frequency measurement		
Measurement method	IEC 61000-4-30 Class A	Frequency measured on the reference channel (L1-E or L2-E)
Measurement range	42 ~ 69 Hz, 300-800 Hz	Automatic selection of analog 4-pole filters
Accuracy	± 10 mHz, ± 100 mHz	61000-4-30 Class A compliant.
Operating environment		
Transient voltages – 100kHz ring wave	6 kV pk	IEC 61180, IEC 61000-4-5. Applied to voltage measuring terminals with Performance Evaluation Class 1. (When applied to optional power supply mains terminal, supply's fuse may operate in PE Class 3 at test levels greater than 4 kV.)
EFT burst immunity	4 kV pk	IEC 61000-4-4, Performance Evaluation Class 1. Applied to power measuring terminals and optional power supply mains terminals.
Electrostatic discharge	2 kV pk	IEC 61000-4-2 Level 1, Performance Evaluation Class 3, MIL-STD-883, JEDEC 22-A114-B, HBM and MM, ACCESSIBLE terminals.
Ambient temperature and humidity	-20°C ~ 50°C, 10%-90% RH	Non-condensing
RF field strength immunity	3V / m	IEC 61000-4-3 Test Level 2
Magnetic field strength immunity	30A / m	IEC 61000-4-8 Test Level 4
Ingress Protection Rating (IP rating)	IP20H	IEC 60529
Instrument power	10VA maximum	24VAC, 24VDC, 48VDC, or 100VAC~240VAC 50/60 Hz w/ PS1 module.
Radio Frequency Emissions		
Conducted	EN 55022: 2006 Class A	CISPR 22, FCC (industrial environment). Exceeds requirements by 6dB.
Radiated	EN 55022: 2006 Class A	CISPR 22, FCC (industrial environment). Exceeds requirements by 14dB.
Isolation		
Measuring terminals to LV terminals	7.5 kV DC minimum	IEC 61010 reinforced insulation – 350V to SELV
24VAC / 48VDC power supply terminals	150V DC minimum	Functional isolation to LV terminals and Earth – permits floating supplies
Serial, USB, Temperature/Humidity	150V DC minimum	Functional isolation to LV terminals and Earth – eliminates ground loops
Internal PQube options (Check with factory for availability)		
Voltage harmonics and interharmonics		
Measurement method	IEC 61000-4-7 Class I	61000-4-30 Class A compliant
Measured parameters	1-50 th harmonic, THD, interharmonic groups	Note: per 61000-4-30 Class A, THD is calculated as THDS (61000-4-7:2002)
Accuracy	IEC 61000-4-7 Class I	
Mains signalling		
Measurement method	IEC 61000-4-30 Class A	For mains signalling frequencies below 3kHz
Measurement range	0%~15% U_{in}	Per 61000-4-30 Class A, Edition 2
Accuracy for readings between 1% and 3%	$\pm 0.15\%$ of U_{in}	
Accuracy for readings between 3% and 15%	$\pm 5\%$ of measured value	
Underdeviation and overdeviation		
Measurement methods and accuracy	IEC 61000-4-30 Class A	
Flicker		
Measurement method	IEC 61000-4-15	61000-4-30 Class A compliant. Synchronized with PQube 10-minute clock.
Measurement range	0.2 ~ 10.0 Pst	61000-4-30 Class A compliant
Measurement accuracy	IEC 61000-4-15 compliant	61000-4-30 Class A compliant