

PQM3000

Class A rack 19" power quality analyzer for CTs

- Rack 19" mounting
- Harmonics and interharmonics measurement
- Data recording for further EN 50160 analysis
- Data recorded in standard PQDIF and CSV file formats
- Embedded web server
- Communication on Ethernet and 4G networks
- Included external GPS module for accurate timing
- Internal rechargeable backup battery
- Certified according to **IEC/EN 61000-4-30:2015 Ed.3**, Class A for voltage characteristics



» General features

PQM3000 is a high-end power quality analyzer, able to monitor and record the major power quality parameters. It provides an accurate measurement, voltage characteristics are monitored according to Class A specification. At the same time it acts as event/fault recorder, capable to store a high number of voltage events and disturbances, frequency variations, inrush current, etc. Additional PQ data can be recorded, such as Flicker, Unbalance, Harmonics and Interharmonics, Mains Signalling. It also provides standard power measurement data for three-phase systems. Extra voltage and current measurement channels give the possibility to monitor Neutral Potential and Earth Leakage current.

PQM3000 is available for external standard CTs with 1 or 5A output. In this way maximum flexibility is granted even on existing plants.

The powerful recording features give the possibility to capture and record all types of standard and PQ data simultaneously. All this information can be recorded for long time period due to the high memory capacity, in this way a complete EN 50160 analysis can be performed. Events and disturbances provide also waveform recording together with RMS values. Recordings can be transferred in different ways: user can download them directly through web interface or set an automatic scheduled data upload to a remote server.

PQM3000 includes different communication ports so the user can access it in different ways. The Ethernet ports on the front and rear panels allow complete control on the instrument: web access for real-time monitor, device setup, stored data transfer, maintenance operations. The external mobile network router gives the possibility to manage the device by using 4G network if the Ethernet communication is not available (router sold separately). The RS485 port is dedicated to data reading of PQMGPS1, i.e. the external GPS module provided with the instrument. PQMGPS1 provides accurate time information regardless of the location where the meter is installed in a distributed monitoring system.

Moreover, different I/O channels are provided to enhance the instrument features. An user-friendly multilingual interface is provided for web server which simplifies the full access to instrument operations.

» Benefits

- Additional voltage and current measurement channels in comparison with other standard three-phase devices.
- Current inputs for CTs to grant an accurate current measurement.
- Continuous monitoring of the power quality and Class A certified measurements for voltage characteristics.
- Simultaneous recording of events, Min/Avg/Max LOG and energy counters.
- Several possibilities for instrument data transmission: Ethernet, Modbus TCP, 4G network.
- User-friendly instrument web interface with multilingual pages.

» Applications

- Power monitoring & control systems
- Switchboards, gensets, motor control centers, etc.
- Individual machine load monitoring
- Power demand analysis and management
- Harmonics monitoring
- Remote metering and cost allocation
- Motor inrush current studies

» Related products

- External router for 4G network communication
- *PQMGPS1* external GPS module
- *PQM-Tool* Class A monitoring software tool
- *PQM-Analyzer* for data analysis according to EN 50160

» Main features

Measurements

- Voltage direct connection up to 1000 VLL or through PT for MV and HV systems.
- 4th voltage channel for measurement of potential difference between Neutral and Protective Earth.
- 5 current channels to be used with CTs.
- 4th current channel dedicated for Neutral current measurement: the current measuring range (CT primary and secondary) can be programmed together with the main three-phase channels.
- 5th current channel reserved for Earth Leakage monitoring, with separate current measuring range setup to ensure different sensitivity from the main channels.
- Three-phase 3 and 4 wire or single-phase operating mode.
- Suitable for 50 and 60 Hz systems.
- Fast simultaneous sampling on all 9 channels, at 1024 samples/cycle.
- All measured voltage characteristics certified according to IEC/EN 61000-4-30:2015 Ed.3, Class A.
- Measurement of additional power quality parameters, such as K Factor.

Recordings & data storage

- Voltage event recording (sags, swells, interruptions) with storage of ½c RMS values and waveforms.
- Sag/swell recording on 4th voltage channel with storage of ½c RMS values and waveforms.
- Rapid Voltage Changes measurement and event recording.
- Power frequency variation monitoring and recording with ½c RMS values and waveforms.
- Slow event recording on Frequency, Unbalance Ratio, Flicker, Voltage THD and Mains Signalling variations.
- Overcurrent recording on three-phase current channels with storage of ½c RMS values and waveforms.
- Data LOG function for Min/Avg/Max values of selectable parameters, at programmable rate.
- Energy counter LOG at programmable rate.
- Functional event LOG to report the changes of device operating status, useful to keep the instrument condition under control.
- Digital input status change LOG.
- Automatic data upload to FTP server started by frequency events or scheduled at preset time day by day.
- Recordings containing big amount of data ½c RMS with waveform and Min/Avg/Max are recorded directly in standard PQDIF files.
- For other type of recordings like slow events and LOG files, data is provided in standard CSV files.
- In case of a failure on the PQM auxiliary power line, the monitoring and recording functions remains active due to the backup battery.

Inputs & outputs

- 11 isolated digital inputs for remote management of control signals.
- 4 isolated analog outputs for real time parameter variation transmission.

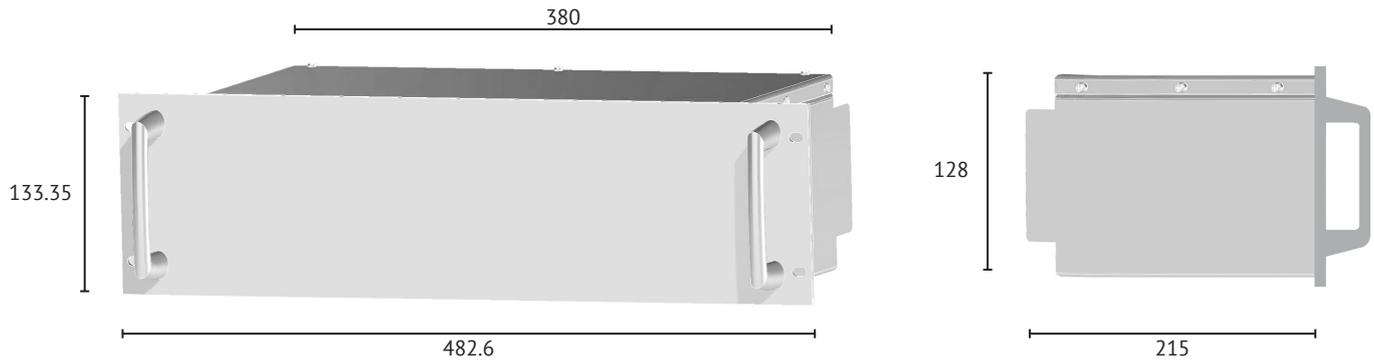
Communication

- Two Ethernet ports, one designed for a permanent installation on the instrument rear and one for occasional connections on the front panel.
- RS485 port dedicated for GPS data reading.
- External router for 4G mobile communication useful if Ethernet connection is not possible.

Data analysis

- Standard file formats gives the possibility to have a quick view and analysis on all stored data without any special software.
- PQM-Analyzer software is provided to perform statistical analysis and generate reports on recorded data according to EN 50160 PQ standard.

» Technical drawing (mm)



» Parameters overview

The following table shows all parameters which can be measured, monitored, recorded and associated to analog outputs.

The **APPLICATIONS** column indicates all parameters which can be displayed, recorded or involved in the event detection process, refer to the following detailed description:

- **Real time:** real time parameters shown in Web server (Real Time and Graphics sections) as well as in Modbus TCP by a reading command.
- **Events:** parameters monitored for event capture.
- **Logging:** parameters programmable according to the logging type: **M**=Min/Avg/Max value logging, **E**=Energy counter logging.
- **Analog outputs:** parameters to be associated to analog outputs.

All the parameters indicated in the **APPLICATIONS** column are available according to the set wiring mode.

PARAMETERS	APPLICATIONS			
	Real time	Events	Logging	Analog outputs
Voltages (ULN, ULL, U4N, U4L)	✓	✓	M	✓
System Voltage (U Σ)	✓		M	✓
Phase Sequence	✓		M	
System Frequency (F)	✓	✓	M	✓
Currents (IL)	✓	✓	M	✓
Line 4 Current, Earth Leakage, System Current (I4, I5, I Σ)	✓		M	✓
Powers (PL, P Σ , SL, S Σ , QL, Q Σ)	✓		M	✓
Power Factors (TPFL, TPF Σ , DPFL)	✓		M	✓
Voltage Symmetrical Components (U0, U1, U2)	✓		M	✓
Voltage Unbalance Ratios (u0, u2)	✓	✓	M	
Voltage Underdeviations (UdevULN, UdevULL)	✓		M	✓
Voltage Overdeviations (OdevULN, OdevULL)	✓		M	✓
Short Term Flickers (PstL)	✓		M	
Long Term Flickers (PltL)	✓	✓	M	
Voltage Total Harmonic Distortions (THDULN, THDULL)	✓	✓	M	✓
Current Total Harmonic Distortions (THDIL)	✓		M	✓
K Factors (KL)	✓		M	✓

PARAMETERS	APPLICATIONS			
	Real time	Events	Logging	Analog outputs
Mains Signallings 1...5 (ULN-MS1...5)	✓	✓	M	
Voltage Harmonics & Interharmonics (ULN Ha&IHa, ULL Ha&IHa)	✓		M	✓
Current Harmonics & Interharmonics (IL Ha&IHa)	✓		M	✓
UL Angle Relative to U1 - On Fundamental (AngU1U2, AngU1U3, AngU1U4)	✓			✓
IL Angle Relative to U1 - On Fundamental (AngU1I1, AngU1I2, AngU1I3, AngU1I4, AngU1I5)	✓			✓
Imported & Exported Active Energy (+kWh, -kWh)	✓	✓	E	
Imported & Exported Apparent Energy - IND/LAGG. (+kVAh-L, -kVAh-L)	✓	✓	E	
Imported & Exported Apparent Energy - CAP/LEAD. (+kVAh-C, -kVAh-C)	✓	✓	E	
Imported & Exported Reactive Energy - IND/LAGG. (+kvarh-L, -kvarh-L)	✓	✓	E	
Imported & Exported Reactive Energy - CAP/LEAD. (+kvarh-C, -kvarh-C)	✓	✓	E	

» Specifications

POWER SUPPLY	
Auxiliary power voltage:	100...240 VAC 50/60 Hz / 65...250 VDC
Auxiliary power consumption:	15 W
Fuse:	250 VAC / 500 mA T type delayed; 35 A breaking capacity
Backup battery:	Li-Ion, 2500 mAh (>15 min autonomy)
MEASUREMENT INPUTS	
Voltage inputs for direct connection:	Phase-neutral (L-N): max 580 V RMS CAT III Phase-phase (L-L): max 1000 V RMS CAT III
Voltage input crest factor:	2
Input impedance (for direct voltage inputs):	>6 MΩ
CT inputs:	max 7 A RMS
CT burden:	0.04 VA
Current input crest factor:	3
Frequency range:	42.5...57.5 Hz / 51...69 Hz
Frequency reference channel:	Phase 1/Line 12 voltage
Sampling:	Simultaneous, 51.2 kHz @50 Hz
ACCURACY	
Three phase voltage:	±0.1% Un over 10 ... 150% Un range
4th voltage:	±0.2% measurement
Currents:	±0.2% measurement (device)
Powers:	±0.2% measurement
Frequency:	±10 mHz
Harmonics:	Class 1 (IEC/EN 61000-4-7)
Internal clock (RTC):	<1 s for 24h period without synchronisation <5 ms with GPS synchronisation <500 ms with NTP synchronisation
Active energy:	Class 0.5S, compliant to IEC/EN 62053-22
Reactive energy:	Class 1, compliant to IEC/EN 62053-23
I/O CHANNELS	
Digital inputs:	11 optoisolated 24 VDC
Digital input delay time (1...11):	max 10 ms
Digital input consumption (1...11):	max 7 mADC
1PPS synchronisation input:	1 optoisolated 24 VDC
1PPS input delay time:	max 50 ns
1PPS input consumption:	max 1 mADC
Analog outputs:	4 optoisolated 4...20 mADC / max load 500 Ω
Analog output reaction time:	max 200 ms
MEMORY	
System memory:	128 MB Flash, 256 MB RAM
Recording memory:	16 GB
COMMUNICATION	
Ethernet ports:	2 Auto MDIX RJ45 10/100 Base Ethernet
GPS port:	1 RS485 optoisolated, 9600 bps
GPS antenna (on PQMGPS1 module):	Active patch antenna, SMA connector
Protocols:	HTTP, HTTPS, FTP, SFTP, NTP, NMEA, Modbus TCP
RTC SYNCHRONISATION	
Synchronisation system:	NTP and/or GPS
ENVIRONMENTAL CONDITIONS	
Installation and use code:	PQI-A-FI1
Operating temperature (limit range):	-25 ... +55°C (FI1, 3K6)
Storage temperature:	-25 ... +75°C (2K3)
Relative humidity:	95% max without condensing
Altitude:	max 2000 m AMSL
Installation & use:	Internal
MECHANICAL CHARACTERISTICS	
Mounting:	Rack 19" 3U
Size:	Front (LxH): 482.6x133.35 mm, Rear (LxHxD): 380x128x215 mm
Weight:	4000 g
DIRECTIVE AND STANDARD COMPLIANCE	
Directive:	2014/53/EU
Product compliance:	IEC/EN 62586-1, IEC/EN 62586-2
Safety:	EN 61010
Pollution degree:	2 (EN 61010-1)
Protection degree:	IP40 front panel, IP20 rear
Protection against mechanical impacts:	IK06

ORDER CODE	POWER SUPPLY	COMMUNICATION	GPS FOR SYNCHRO	MEMORY	I/O	
	100...240VAC / 65...250VDC	ETHERNET	PQMGPS1	16 GB	DI	AO

FOR CTs (not included)

1304.0002.0001	•	•	•	•	•	•
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ORDER CODE	POWER SUPPLY	COMMUNICATION
	9 – 30 VDC 4 PIN connector	WIFI 4G (Global)

EXTERNAL ROUTER FOR COMMUNICATION ON 4G NETWORK

7102.0001.0001	•	•
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LEGEND

GPS FOR SYNCHRO: External GPS module (PQMGPS1) for RTC synchronisation, provided with the instrument.

DI: 11 digital inputs for remote management of control signals.

AO: 4 analog outputs for real time parameter variation transmission.

NOTE: Subject to change without notice



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