

PQM4000

Power quality monitor according to EN 50160 standard

PQM4000 is a high end power quality analyser able to monitor the major power quality parameters in compliance to EN 50160. It can detect and store voltage disturbances, and frequency variations, inrush current variation, record data for PQ analysis on flicker, harmonics, interharmonics, powers and many more.



» Main features

- Up to 4 voltage and up to 5 current channels
- Voltage inputs for direct connection or through PT/VT
- Current inputs availability for standard CT, clamp or Rogowski coil
- Voltage characteristics monitoring according to IEC/EN 61000-4-30
- Parameter recording for statistical analysis according to EN 50160
- Harmonic and interharmonic measurement
- Voltage Flicker measurement
- Integrated web server for complete device management
- Two Ethernet and one RS485 ports for easy communication
- One front USB host port for memory stick
- RTC synchronisation for accurate time information by NTP or internal GPS module
- GB range internal memory for data recording
- Data recorded in standard PQDIF and CSV formats
- Panel mount 192x144 DIN size
- High resolution TFT screen with capacitive touch
- Isolated digital inputs, digital outputs and 0-20mA analog outputs
- Integrated backup rechargeable battery

» Realtime parameters

- 3 phase system Voltage, current, frequency
- Neutral-ground voltage, Neutral and Earth leakage current (optional)
- Active, apparent and reactive power
- True power factor and Displacement power factor
- Voltage and current harmonics up to 50th
- Voltage and current interharmonics with 5Hz bin
- Voltage Flicker (Plt, Pst)
- Voltage and current THD factor
- Voltage Unbalance, symmetrical components
- 4 quadrant active, apparent and reactive energy counters
- Voltage and current phasor angles
- Rapid voltage changes, Voltage under and overdeviation
- Mains signalling component values

» Communication

- One rear 10/100Mb Ethernet port for a permanent connection inside the panel.
- One front 10/100Mb Ethernet port for local communication
- Communication protocols: HTTP, HTTPS, FTP, NTP, Modbus TCP
- Integrated web server for all operations (measurement view, recording preview, setup, data download)
- One RS485 port for standard Modbus RTU communication
- Optional integrated GPS for accurate RTC synchronisation
- Optional integrated WIFI port with external antenna

» Functional features

- Three-phase 3 and 4 wire or single-phase operating mode.
- Voltage direct connection, through PT or by using electronic VT.
- Transformer ratio setup for voltage and current inputs to bring back all values to the primary one.
- Selectable full-scales in case of Rogowski inputs provides the use of single clamps.
- Setup of nominal values on which the 3 phase voltage and current variations are measured.
- Configuration of the thresholds to enable the recording of voltage variations and events.
- V4 channel independent programmable high and low thresholds and reference values.
- Frequency variation trigger setup to capture frequency events.
- Monitoring and recording of the changes relevant to the digital input status.
- Autodiagnosis function and automatic restart without losing device configuration and recorded data.
- Internal realtime clock synchronization for accurate time information by GPS (NMEA 0183 protocol and 1PPS signal) or NTP server.
- Fast voltage and current events data capture with 10ms (@50Hz) time accuracy.
- Mains signaling realtime monitoring by 5 user programmable frequency components.
- Suitable for 50 and 60Hz systems.
- Continuous operation event if mains power lost due to the backup battery.
- Optional WIFI port, programmable by the user in AP (access point) or Client mode.
- USB port provides the possibility to transfer recorded data from internal memory, transport setup information and update instrument firmware.

» Recordings

- Voltage events recording (sags, swells, interruptions) with storage of 1/2c RMS values and waveforms.
- Inrush current recording with storage of RMS values and waveforms.
- Data LOG recording function of MIN/AVG/MAX values of selectable parameters and programmable rate time.
- Functional event LOG for the device operating status.
- Digital input status change LOG.
- Automatic data upload to FTP server in case of events.
- Scheduled data upload to FTP server.

» Input/output

- 4 isolated digital inputs for remote management of control signals.
- 4 isolated digital outputs for alarm signaling or energy pulse generation.
- 4 isolated analog outputs for current loop signaling.

» Specifications

POWER SUPPLY

Auxiliary power voltage:	85...285 VAC 50/60 Hz / 65...250 VDC
Auxiliary power consumption:	15 VA max
Fuse:	250 VAC / 500 mA T type delayed
Backup battery:	Li-Ion, 2500 mAh (>15 min autonomy)

MEASUREMENT INPUTS

Three-phase voltage inputs for direct connection / PT:	Phase-neutral: max 580 V RMS CAT III Phase-phase: max 1000 V RMS CAT III
Three-phase voltage inputs for electronic VT:	Phase-neutral: max 4.5 V RMS
Crest factor:	2
V4 voltage input for direct connection:	max 150 V RMS CAT II
V4 voltage input for electronic VT:	max 4.5 V RMS
CT inputs (only for instrument with CT inputs):	max 7 A RMS
CT burden (only for instrument with CT inputs):	0.04 VA
Current clamp inputs with voltage output (only for instrument with clamp inputs):	max 4.5 V RMS
Rogowski coil inputs (only for instrument with clamp inputs):	max 10V RMS
Current full scale with Rogowski coils:	4 selectable scales, 100/500/3000/25000A RMS
Wiring modes:	Three phases, 4 wires, 3 currents (3.4.3) Three phases, 3 wires, 3 currents (3.3.3) Three phases, 3 wires, 2 currents (3.3.2) Single phase, 2 wires, 1 current (1.2.1)
Input impedance:	>2 M Ω /phase for direct voltage inputs >100 k Ω for low level inputs (max 4.5 V RMS)
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:	$\pm 0.1\%$ U_n over 10 ... 150% U_n range
V4 voltage:	$\pm 0.2\%$ measurement
Currents:	$\pm 0.2\%$ measurement (device)
Powers:	$\pm 0.2\%$ of measurement
Frequency:	± 8 mHz
Harmonics:	Class 1 (IEC/EN 61000-4-7)
Internal realtime clock (RTC):	< 1 s for 24h period without synchronisation < 5 ms with GPS synchronisation < 500 ms with NTP synchronisation
Active energy:	Class 0.5, compliant to IEC/EN 62053-21
Reactive energy:	Class 1, compliant to IEC/EN 62053-23

CALCULATION TECHNIQUE

Voltages:	Compliant to IEC/EN 61000-4-30, Class A
V4 voltage:	Continuous sampling, 1 cycle
Currents:	Continuous sampling, 1 cycle
A4, A5 Currents (optional):	Continuous sampling, 1 cycle
Voltage Unbalance:	Compliant to IEC/EN 61000-4-30, Class A
Voltage and Current Harmonics, THD:	Up to 50 th order, compliant to IEC/EN 61000-4-7, Class 1
Voltage and Current Interharmonics:	5Hz bin, compliant to IEC/EN 61000-4-7
Voltage Flicker:	Compliant to IEC/EN 61000-4-15
Frequency:	Compliant to IEC/EN 61000-4-30, Class A
Rapid voltage changes:	Compliant to IEC/EN 61000-4-30, Class A
Powers:	Active, apparent and reactive, four quadrants
True and Displacement Power Factor:	Four quadrants
Mains signaling:	5 user frequency
Aggregations:	Compliant to IEC/EN 61000-4-30, Class A
Voltage event hysteresis:	Programmable 1...25% U_n

I/O CHANNELS

Digital inputs:	4 optoisolated, 24 VDC $\pm 20\%$
Digital outputs	4 optoisolated, up to 250 VAC/DC
Analog outputs:	4 optoisolated, 4 ... 20 mADC, max load 500 Ω
Digital input delay time:	max 10 ms
Digital output delay time:	In alarm mode, max. 200 ms
Digital output pulse time:	In pulse mode, 50 ms ± 2
Analog output reaction time:	max 200 ms
Digital input consumption:	max 7 mADC

MEMORY

System memory:	128 MB Flash, 128 MB RAM
Recording memory:	4 GB (8GB, 16GB optional)

COMMUNICATION

Ethernet ports:	2 Auto MDIX RJ45 10/100 Base Ethernet
RS485 port:	Optoisolated, 0.5UL, 2400...115200bps
WIFI (optional):	IEEE 802.11b compliant
WIFI antenna (optional):	Passive antenna, SMA connector on rear panel
GPS antenna:	Active patch antenna, remote powered, SMA connector on rear panel,
Protocols:	HTTP, HTTPS, FTP, SFTP, NTP, NMEA, Modbus TCP, Modbus RTU
USB port:	USB 2.0 A type socket, high speed 480 Mbit/s

RTC SYNCHRONISATION

Synchronisation system:	NTP and/or GPS
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ENVIRONMENTAL CONDITIONS

Operating temperature:	-5 ... +55°C
Storage temperature:	-25 ... +75°C
Relative humidity:	95% max without condensing
Altitude:	max 2000 m
Installation & use:	Internal

MECHANICAL CHARACTERISTICS

Mounting:	Panel mount 192x144 DIN size
Size:	Front (L x H): 191 x 143 mm (3U) Rear (L x H x D): 183 x 135 x 190 mm
Weight:	1400 g

SAFETY STANDARDS

Safety:	CAT III power supply, insulation class 2, 600 V
Pollution degree:	2 (EN 61010-1)
Protection degree:	IP40 front panel, IP20 rear
Directive:	2006/95/EC LV, EN 61010
EMC:	2004/108/EC EMC, EN 50081-2, EN 50082-2, EN 61326/A1, EN 55011:1998+A1:1999+A2:2002, EN 61000-6-2/-4-2/-4-3/-4-4/-4-5/-4-6/-4-11

NOTE:
- Subject to change without notice



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