PQM4000RGW
Class A DIN 192x144 power quality analyzer with Rogowski coils

- Current inputs for direct connection of Rogowski coils
- 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, RS485 and WIFI
- USB host port for data transfer
- Integrated GPS for accurate timing
- High resolution TFT display with capacitive touch
- Internal rechargeable backup battery
- Certified according to **IEC/EN 61000-4-30:2015 Ed.3**, Class A for voltage characteristics

Certified to Ed. 3 standard

» General features

PQM4000RGW 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.

Innovative Rogowski coils are included together with the instrument to grant a complete measurement system as well as quick installation. Their current full scale can be programmed among three default values, simply selectable in the device setup, to ensure maximum flexibility 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 or transfer it to an USB flash drive.

PQM4000RGW 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. An additional RS485 port gives the possibility to interconnect the device with slower monitoring systems, such as PLC. The integrated GPS receiver 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. It is provided with a high resolution TFT display with touch screen which allows a fast and direct instrument management. User-friendly multilingual interface is common to its web server, very useful for on-site instrument operations.

» Benefits

- Additional voltage and current measurement channels in comparison with other standard three-phase devices.
- Rogowski coils included to grant a quick installation as well as 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, WIFI, Modbus RTU/TCP, USB.
- 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

- *MFC150* Rogowski coils
- *PQM-Tool* Class A monitoring software tool
- *PQM-Analyzer* for data analysis according EN 50160

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» 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 the included Rogowski coils.
- 4th current channel dedicated for Neutral current, selectable in 3 different scales together with the three phase current channels (500 A, 3000 A, 20000 A).
- 5th current channel reserved for Earth Leackage monitoring, with separate current measuring range setup, ensure different sensitivity from the main channels (50 A, 500 A).
- 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, "slow" events, Energy LOG, Functional LOG, Digital input LOG, 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

- 4 isolated digital inputs for remote management of control signals.
- 4 isolated digital outputs for alarm signalling or energy pulse generation.
- 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 for data reading in Modbus RTU.
- WIFI port, programmable in different modes: as Access Point to take advantage of the broadcasted WIFI network or as Client mode for a standard WIFI connection.
- Front USB host port useful to transfer in a simple way data recorded from the instrument to an external device, but also to save setup or to upgrade instrument fimware.

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.

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» Technical drawing (mm)
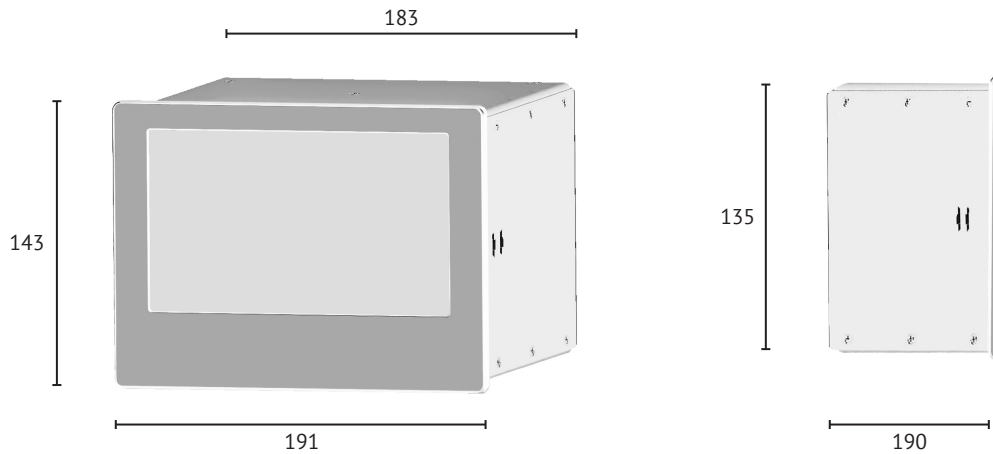
» Parameters overview

PARAMETER GROUP	LIST	MEASURE	EVENT	LOG	OUTPUTS
Voltages	ULN, ULL, U4N, U4L, U∑	●	●	●	●
Currents	IL, IN, IEL, I∑	●	●	●	●
Powers	PL-∑, QL-∑, SL-∑	●		●	●
Power Factors	TPFL-∑, DPFL	●		●	●
Frequency	F	●	●	●	●
Phase Order	-	●			
Volt Symmetrical Components	U0, U1, U2	●		●	●
Volt Unbalance Ratios	u0, u2	●	●	●	
Volt Deviations (under, over)	ULN, ULL	●			●
Flickers	PinstL, PstL, PltL	●	●	●	
Harmonics up to 50th & Interharmonics	ULN, ULL, IL, PL, QL	●		●	●
Total Harmonic Distortions and K Factors	ULN, ULL, IL, KL	●	●	●	●
Mains Signallings	5 x ULN	●			
Phase Angles	U-U, U-I	●			●
Energy Counters (4Q)	active, reactive, app. ∑	●		■	●
Rapid Voltage Changes	ULN		●		
Flagging	Sag, Swell, Interruption			●	
Aggregated values	Voltage characteristics	●			
Waveforms	ULN, ULL, IL	●	●		
Mean values	ULN, F, Flicker, Unbal, THDU	□	●		

NOTES:
- Some of the parameters are not available for all functions, for more details refer to the user manual.
- LOG function means Min/Avg/Max recording, except for Energy counters (■).
- Parameters in MEASURE column can be displayed or read by communication port, except for Mean values (□).

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» 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:	P-N: max 580 V RMS CAT III, L-L: max 1000 V RMS CAT III
U4 voltage input for direct connection:	max 580 V RMS CAT III
Voltage input crest factor:	2
Voltage input impedance:	>2 MΩ/phase
Current full scale:	selectable 500A, 3kA 20kA RMS; for I5 50A, 500A
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
U4 voltage:	±0.2% measurement
Currents:	±0.2% measurement (device)
Powers:	±0.2% measurement
Frequency:	±10 mHz
Harmonics:	Class 1 (IEC/EN 61000-4-7)
Realtime clock (RTC):	<1s in 24h without synchronisation; <5ms with GPS 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:	4 optoisolated, 24 VDC ±20%
Digital outputs:	4 passive optoisolated (PhotoMOS), 24 VDC-50 mA
Analog outputs:	4 optoisolated, 4 ... 20 mADC, max load 500 Ω
Digital input delay time:	max 10 ms
Digital input consumption:	max 7 mADC
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

MEMORY	
System memory:	128 MB Flash, 256 MB RAM
Recording memory:	16 GB

COMMUNICATION	
Ethernet ports:	2 Auto MDIX RJ45 10/100 Base Ethernet
RS485 port (slave):	Optoisolated, 0.5UL, 4800...115200bps
WIFI antenna:	Passive antenna, SMA connector on rear panel
GPS antenna:	Active patch antenna, remote powered, SMA connector
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

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

MECHANICAL CHARACTERISTICS	
Mounting:	Panel mount 192x144 DIN size
Size:	Front (LxH): 191x143 mm, Rear (LxHxD): 183x135x190 mm
Weight:	1400 g

STANDARDS	
Product compliance:	IEC/EN 62586-1, IEC/EN 62586-2
Certification:	Class A, IEC/EN 61000-4-30:2015 Ed.3 for voltage
Safety:	CAT III power supply, insulation class 2, 600 V
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

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ORDER CODE	ROGOWSKI KIT DETAIL		POWER SUPPLY	COMMUNICATION				GPS FOR SYNCHRO	MEMORY	I/O		
	Length [cm]	Ø [cm]	85...285VAC / 65...250VDC	ETHERNET	RS485 read-only	WIFI	USB	Integrated	16GB	DI	DO	AO
ROGOWSKI COIL KIT: NO. 5 MFC150 INCLUDED												
1303.0005.0001	30	~10	●	●	●	●	●	●	●	●	●	●
1303.0006.0001	45	~14	●	●	●	●	●	●	●	●	●	●
1303.0007.0001	70	~22	●	●	●	●	●	●	●	●	●	●
1303.0008.0001	90	~29	●	●	●	●	●	●	●	●	●	●

LEGEND
GPS FOR SYNCHRO: GPS module for RTC synchronisation, integrated in the instrument.
DI: 4 digital inputs for remote management of control signals.
DO: 4 digital outputs for alarm or pulse emission.
AO: 4 analog outputs for real time parameter variation transmission.

NOTE: Subject to change without notice

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