

# SPQM Super Power Quality Meter

## Class A power quality analyzer



- Class A power quality analyser
- Two different models, for CT's or current clamps
- Voltage disturbances, micro interruptions, frequency variations, inrush current, etc.
- Harmonics and interharmonics
- Data recording for further EN 50160 analysis
- Data recorded in standard PQDIF and CSV file formats
- Embedded web server
- Ethernet, RS485 and WI-FI communication
- USB host port for data transfer
- Integrated GPS for accurate timing
- High resolution TFT display with capacitive touch
- Internal rechargeable backup battery

SPQM is a high-end power quality analyzer, able to monitor and record the major power quality parameters. It provides accurate measurement and voltage characteristics are monitored according to Class A specifications. At the same time it acts as events/faults 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.

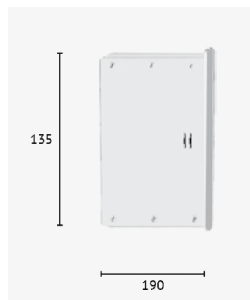
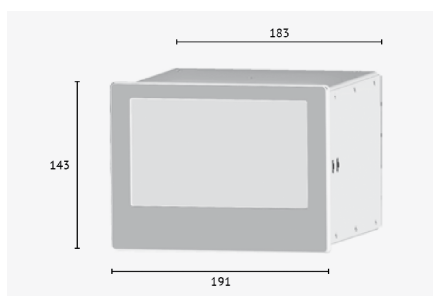
SPQM also provides standard power measurement data for three-phase systems. Extra voltage and current measurement channels give the possibility to monitor Neutral Potential and Earth Leakage current

SPQM is available in 2 models: one for external standard CT's with 1 or 5A output and another one for current clamps with 1 or 3V 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 instrument's 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 data directly through web interface or set an automatic scheduled data upload to a remote server or transfer them to an USB flash drive.

SPQM includes different communication ports so the user can access it in different ways. 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.

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.



# SPQM Super Power Quality Meter

## 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 or clamps according to the model.
- 4th current channel dedicated for Neutral current measurement, for both models the current measuring range (CT primary and secondary, clamp full scale and voltage output) 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  $\frac{1}{2}$ c RMS values and waveforms.
- Sag/swell recording on 4th voltage channel with storage of  $\frac{1}{2}$ c RMS values and waveforms.
- Rapid Voltage Changes measurement and event recording.
- Power frequency variation monitoring and recording with  $\frac{1}{2}$ c 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  $\frac{1}{2}$ c 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  $\frac{1}{2}$ c RMS with waveform and Min/Avg/Max are recorded directly in el.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 SPQM 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 firmware.

## Data analysis

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

## Parameters order code of 15 fonts

PARAMETERS GROUP	LIST	MEASUREMENT	EVENT	LOG	OUTPUTS
Voltages	ULN, ULL, U4N, U4L, UΣ	✓	✓	✓	✓
Currents	IL, IN, IEL, IΣ	✓	✓	✓	✓
Powers	PL-Σ, QL-Σ, SL-Σ	✓		✓	✓
Power Factors	TPFL-Σ, DPFL	✓		✓	✓
Frequency	F	✓	✓	✓	✓
Phase Order	-	✓			
Volt Symmetrical Components	U0, U1, U2	✓		✓	✓
Volt Unbalance Ratios	u0, u2	✓	✓	✓	
Volt Deviations (under, over)	ULN, ULL	✓			✓
Flicker	PinstL, PstL, PitL	✓	✓	✓	
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. Σ	✓		●	✓
Rapid Voltage Changes	ULN		✓		
Flagging	Failures, Peaks, Interruptions			✓	
Aggregated values	Voltage Features	✓			
Waveforms	ULN, ULL, IL	✓	✓		
Mean values	ULN, F, Flicker, Squil., 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 i (m).

### SPQM

ETS

#### Logo

A = Energy Team

C = Custom (instrument name, label, manual, web server)

#### Quick guide language

U = English/Italian

I = Italian/English

D= German/English

F = French/English

E = Spanish/English

#### Power supply

A = 85...285 VCA / 65...250

VCC R = 19...60 VCC

#### Current input model

6 = For CT

C = For Current Clamps

#### Communication ports

W = 2 Ethernet, 1 RS485, 1 WIFI, 1 USB

W

#### GPS for synchronisation

I = Integrated

I

X

X

#### Recording memory

4 = 4 GB

6 = 16 GB

X

X

#### Inputs & Outputs

A = 4 digital inputs, 4 digital outputs, 4 analog outputs

A

## Configurations and technical specifications

Default Configuration	Order code	Current input model		Communication				GPS for SiNCRO	Storage		Inputs and Outputs		
		for CTs	for Clamps	Ethernet	RS485 read-only	WIFI	USB	Integrated	4GB	16 GB	DI	DO	AO
SPQM 4GB CT	ETSAIA6WIXX4XXA	I		I	I	I	I	I	I		I	I	I
SPQM 4GB Clamp	ETSAIACWIXX4XXA		I	I	I	I	I	I	I		I	I	I
SPQM 16GB CT	ETSAIA6WIXX6XXA	I		I	I	I	I	I		I	I	I	I
SPQM 16GB Clamp	ETS AIACWIXX6XXA		I	I	I	I	I	I		I	I	I	I

### LEGEND:

CT = instrument with current inputs for CTs (CTs NOT included)  
 Clamp = instrument with current inputs for clamps (clamps NOT included)  
 GPS per sincro = GPS module for RTC synchronisation, integrated in the instrument  
 DO = 4 digital outputs  
 AO = 4 analog outputs

POWER SUPPLY	
Auxiliary power voltage:	85...285 VCA 50/60 Hz / 65...250 VCC
Auxiliary power consumption:	15 VA max
Fuse	250 VCA / 500 mA T type delayed
Backup battery	Li-Ion, 2500 mAh (>15 mins 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
CT model-CT secondary	1 A, 5 A selectable RMS CT
model-maximum current	7 A RMS
CT model-CT input burden:	0,04 VA
Clamp model - clamp output full scale:	1 V, 3 V RMS selectable
Both models - 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:	±8 mHz
Harmonics:	Class 1 (IEC/EN 61000-4-7)
Real Time Clock (RTC)	<1s in 24h without synchronisation; <5ms with GPS synchronisation
Active Energy	Class 0.5S, compliant with IEC/EN 62053-22
Reactive Energy	Class 1, compliant with IEC/EN 62053-23
I/O CHANNELS	
Digital Inputs:	4 optoisolated, 24 VCC ±20%
Digital outputs:	4 passive optoisolated (PhotoMOS), 24 VCC-50 mA
Analog outputs:	4 optoisolated, 4 ... 20 mACC, 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

I/O CHANNELS	
Analog output reaction time	max 200 ms
MEMORY	
System Memory	128 MB Flash, 256 MB RAM
Recording memory	4 GB (16 GB optional)
COMMUNICATION	
Ethernet Ports	2 Auto MDIX RJ45 10/100 Base Ethernet
RS485 Port (slave)	Optoisolated, 0.5UL, 2400...115200bps
WIFI antenna	Passive antenna, SMA connector on rear panel Active patch antenna remote powered, SMA connector
GPS antenna	
Protocols	HTTP, HTTPS, FTP, SFTP, NTP, NMEA, Modbus TCP, Modbus RTU
USB Port	USB 2.0 type A 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)	F11, 3K6 -25 ... +55°C
Storage temperature	-25 ... +75°C
Relative Humidity	95% max without condensing
Altitude	max 2000 m above sea level
MECHANICAL CHARACTERISTICS	
Mounting	Panel mount DIN 192x144
Dimensions	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 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
EMC	