# 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 ouput. 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.

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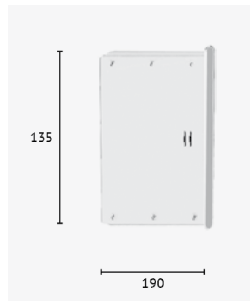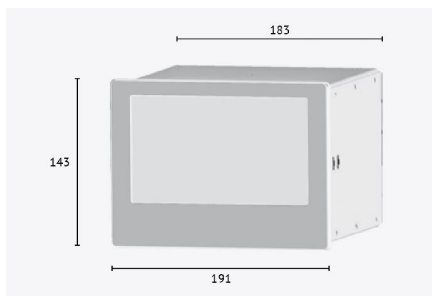
# SPQM Super Power Quality Meter

## 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 Leackage 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 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 fimware.

## 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, 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. 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

EnergyTeam

# Configurations and technical specifications

| Default Configuration | Order code | Current input model | | Communication | | | | GPS for SiNCRO | Storage | | Inputs and Outputs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | for CT's | 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 |
| 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 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) | FI1, 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 |
| 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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