POWER QUALITY ANALYZER
DIGITAL FAULT RECORDER
PHASOR MEASUREMENT UNIT

PQA 8000

Exclusive Partner for Australia and Asia Pacific

SmartGRID Technologies | Power Quality Solutions

Power Quality

Exceeds Class A, Future Proof, Half-Period Values, Harmonics, Supraharmonics 500kHz (up to 10,000th order), Grid Impedance 420kHz, Unbalance etc.

System Dynamics & FCAS

Exceeds AEMO Very Fast MASS/FCAS Specification, Phasor Measurement Unit (PMU) with TVE <0.01 (**100 times better than IEC/IEEE Standards**), Cycle-by-Cycle Frequency, Rate of Change of Frequency (RoCoF), WAMS. AEMO Generator Performance Standards (GPS Tests, HP, R2) etc.

Transients

RAW Continuous Waveform, 1/2 period values, Phase Angle jumps, Oscillations, Resonances, Switching, Advanced Trigger etc.

Power & Energy

Power (P, Q, S, PF, cos phi, D, DH, QH) including harmonic power. **Revenue Grade Energy** (total, positive, negative), etc.

HIGH **ACCURACY**	0.05% Class A++
ACCURATE **PMU**	TVE <0.01% (100 Times better than IEC/IEEE Std.)
HIGH **SAMPLING RATE**	Up to 1MHz (20,000 samples/cycle)
HIGH **RESOLUTION**	18bit/24bit
HIGH **DYNAMIC RANGE**	0.5mA to 150kA with High Signal to Noise Ratio
HIGH **SAFETY CATEGORY**	CAT IV 600V, 6kVp Channel to Channel Isolation
FEATURES	up to 1TB SSD, Windows Industrial PC, 4 Hour Battery, 11 inch Multi-touch Display, Precise Time GPS Synchronization (100ns), DIO, CAN, RS485, and more.

AEMO MASS / FCAS

Australian Energy Market Operator (AEMO)
Market Ancillary Services Specification (MASS)
Frequency Control Ancillary Services (FCAS)

EXCEEDS AEMO VERY FAST FCAS REQUIREMENTS

As per AEMO Market Ancillary Services Specification v81 document, the NEO PQA8000H Series:

- Meet and Exceed the MASS/FCAS Specifications for ALL AEMO Very Fast, Fast, Slow, Delayed, Regulation FCAS categories.
- Meets and Exceeds Section 5.3.2 and Table 5 – Measurement Requirements for FCAS (see below)
- Meets Section 5.4 Data Retention (12 months minimum). All FDT Data is stored on the NEO PQA8000H Meter indefinitely, can be exported, and backed up.
- Meets Section 5.5 Reporting Requirements. NEO PQA8000H Meter includes advanced NEO Report and Analysis software to easily export required data as requested by AEMO.
- This datasheet satisfies Section 6.5 and 6.5.1 Traceability of Contingency FCAS metering equipment, where the manufacturer, NEO Messtechnik have internally verified Very Fast FCAS Metering Requirements as per Table 5.

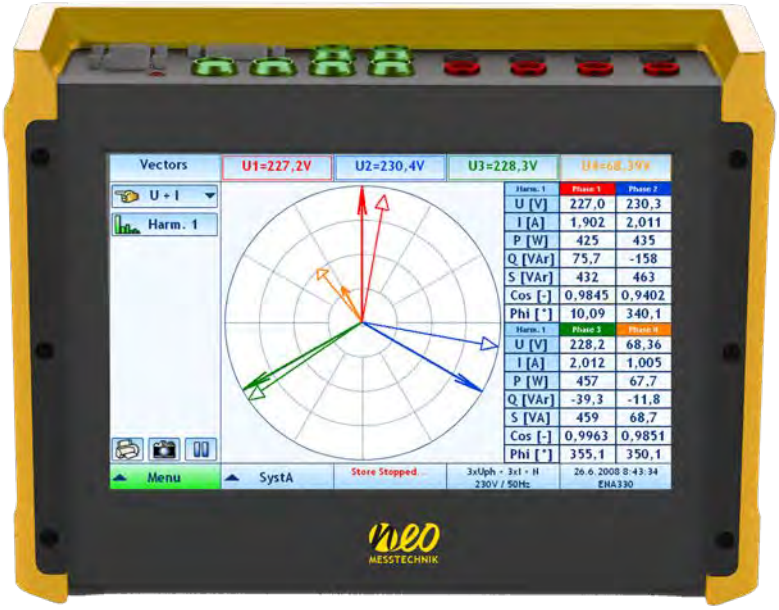
AEMO Very Fast FCAS Requirements per Market Ancillary Services Specification (MASS) v81 & Recommendations	
Requirement	**NEO PQA-8000H Series**
Voltage & Current Sampling Rate (Not Stated, 1024 samples/cycle Recommended)	Up to 20,000 samples/cycle (1MHz). User Selectable.
Voltage & Current Accuracy (Not Stated, 0.1% Recommended)	<0.05% for both voltage and current.
Sampling Rate of Local Frequency Measurements (≤50 ms)	10ms (ie. half-period/half-cycle values)
Sampling Rate of Generation Amount & Load Amount Measurements (≤50 ms)	10ms (ie. half-period/half-cycle values)
Measurement Range of Power Flow Measurements (Intrinsic Uncertainty of ≤2%, and Resolution of ≤0.2%)	Yes, guaranteed Intrinsic Uncertainty of ≤2%, and Resolution of ≤0.2%.
Local Frequency Measurement Range (Intrinsic Uncertainty ≤0.01 Hz and Resolution of ≤0.0025 Hz)	Yes, guaranteed Intrinsic Uncertainty ≤0.01 Hz and Resolution of ≤0.0010 Hz (ie. 1mHz)
Recording Period for Power & System Frequency Measurements (≥5 s before FDT and ≥60 s after it)	Yes. 60s before FDT and ≥7200 s after it. User Selectable.
Trigger for Recording Measurements (At least whenever Local Frequency changes ≥ Trigger Range)	Yes.
Cycle-by-Cycle (CBC) Frequency (Not stated, Required)	Yes. High Precision CBC Frequency (20ms values), and Half-Period Values (10ms) also available. User Selectable.
Rate-of-Change-of-Frequency (ROCOF, df/dt) (Recommended)	Yes. High Precision ROCOF
Other Requirements including Reporting	Yes.
IEC/IEEE 60255-118-2018 Synchrophasor Standards for Phasor Measurement Unit (PMU)	
Total Vector Error (TVE) < 1% (considers magnitude, angle, time synchronization errors)	<0.01% (100 Times Better than IEC/IEEE Standards)
Angle Error (<0.573 degrees for TVE <1%)	0.003 degrees
Time Synchronization Accuracy (<1000ns or 1 micro-second)	100ns (typical) through GPS

HIGHLIGHTS

SMART TOUCH
The large 10.1 inch full-HD Smart Touch display responds immediately without any delay with intuitive operation like on a mobile phone.

MOBILE OPERATION
The integrated battery pack allows an operating time of up to 4 hours of operation. 5 LEDs indicate the remaining battery capacity. There is no need for an external power supply or special connectors... plug and play.

GPS
Integrated GPS enables high-precision time measurements & synchronization, which is ideal for PMU applications.

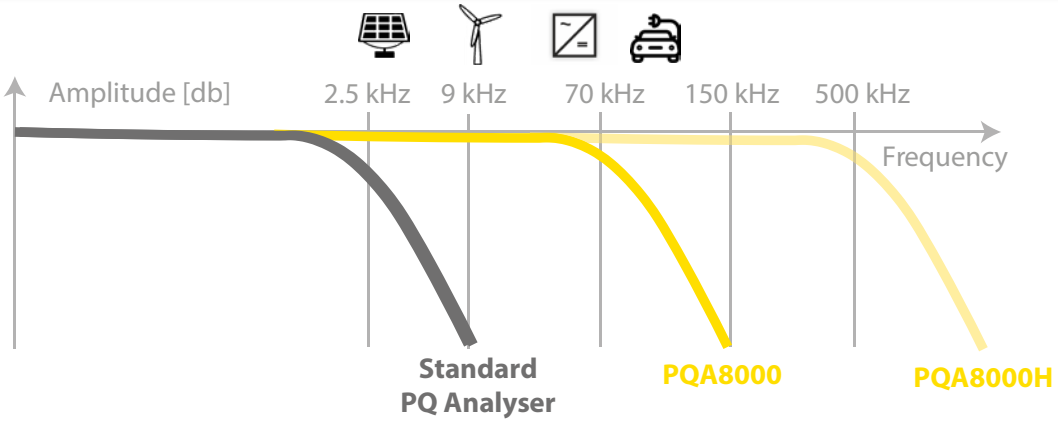


LARGE SSD
The instrument is equipped with two SSD disks. One is dedicated for the OS and application software, and the other one is equipped for data storage (up to 1 TB).

INTERFACES
The instrument provides an easy integration with other analog and digital signals such as temperature. The interfaces include USB 3.0, TCP/IP, LAN, Wifi, Bluetooth, RS232, Modbus, 104, DIO, and CAN.

SENSOR SUPPLY
The instrument can provide excitation for your current sensors,
and there is no need for batteries or external power supplies.

SUPRAHARMONICS UP TO 500 kHZ FOR VOLTAGE AND CURRENT
Conventional PQ Analyzers, even if they are Class A certified, are not sufficient for modern measurement applications. We use the best available components to ensure the highest safety category and also the highest accuracy. NEO instruments offer high bandwidth (up to 1 MHz) and correct the frequency dependent behavior of current & voltage sensors as well as integrated electronics to achieve the best possible measurement results.
THE REFERENCE INSRUMENT

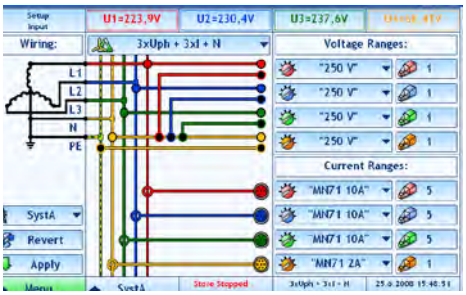


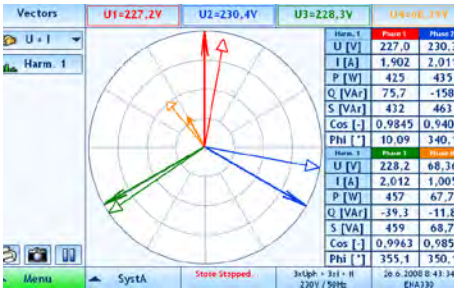
SOFTWARE

NEO MEASUREMENT SOFTWARE FOR SETUP
NEO REPORT SOFTWARE FOR ANALYSIS & DATA EXPORT

1 SETUP USING NEO MEASUREMENT SOFTWARE

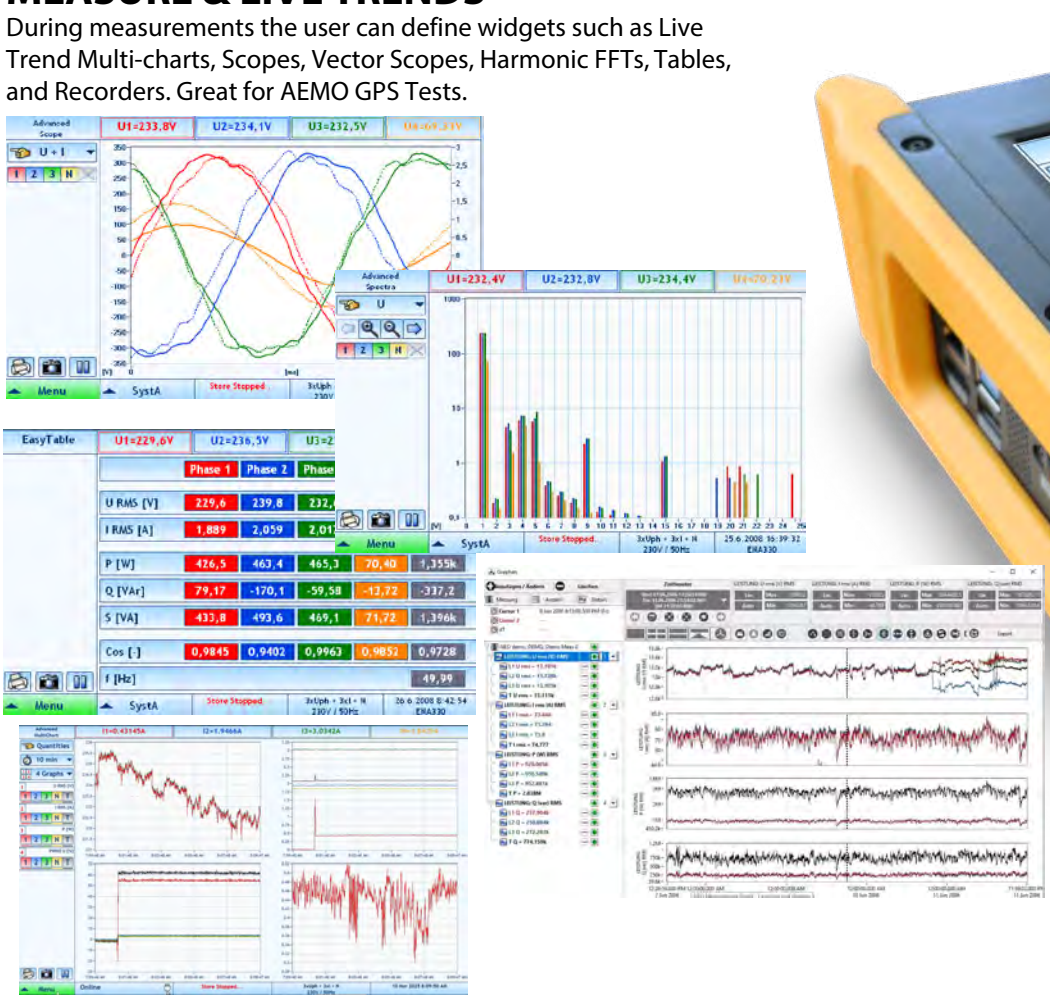
The instrument has a clear structure that shows schematics with explanations. Optimized for Touchscreen.





2 MEASURE & LIVE TRENDS

During measurements the user can define widgets such as Live Trend Multi-charts, Scopes, Vector Scopes, Harmonic FFTs, Tables, and Recorders. Great for AEMO GPS Tests.



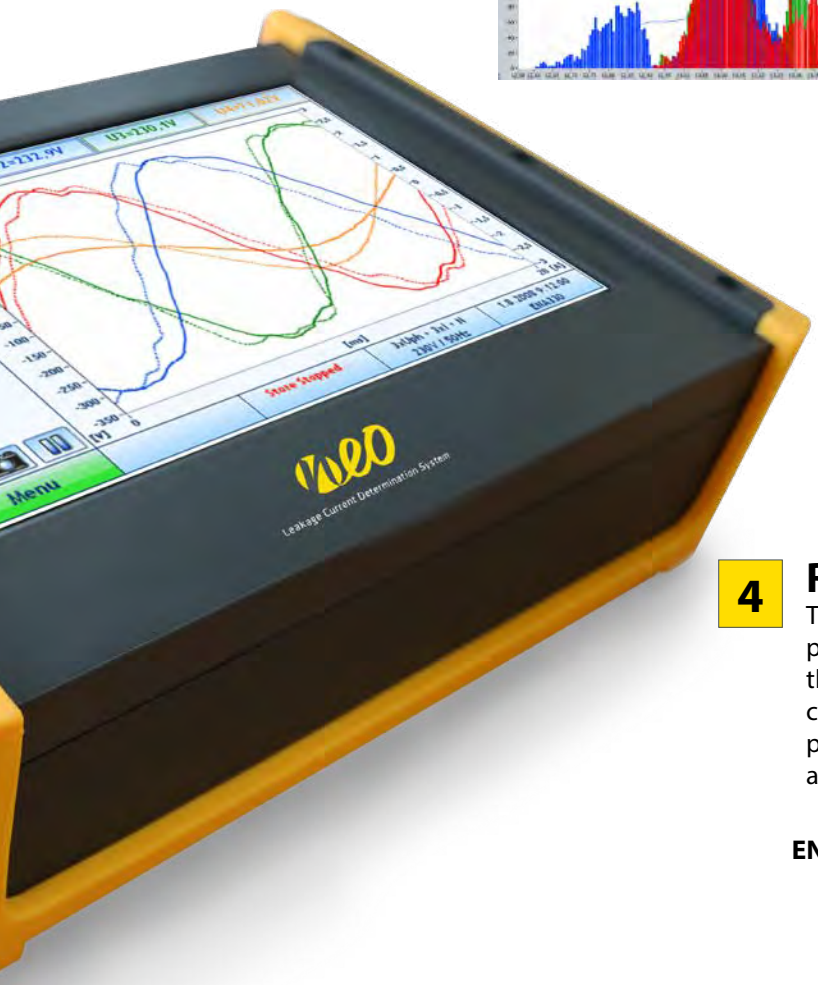
TRULY INTUITIVE

Intuitive Measurement menus: Cleary structured and explicit menus

HIGHLIGHTS

3 ANALYZE using NEO Report Software or third-party software

Sophisticated functions include PQ Data, Transients, Disturbances, Spectrum, Alarms, and more.



4 REPORT

The instrument can automatically generate reports and professional documentation. The user can create reports that include all relevant information (location, comments, company logo, etc) directly on-site or during post processing. PDF reports that are saved on the instrument are always available and can be shared directly via email.

Report EN50160 / CUSTOM

Database SCADA

Remote Connection

5 EXPORT

Data can be exported into CSV, XLS, PDF, Comtrade, and PQDiff. Then, import data into your favourite software such as PQSCADA Sapphire.

6 OTHER PROGRAMS

The instrument uses Microsoft Windows© as the operating system. Programs such as Microsoft Excel, Word or Matlab can be added as well as Email messaging services.

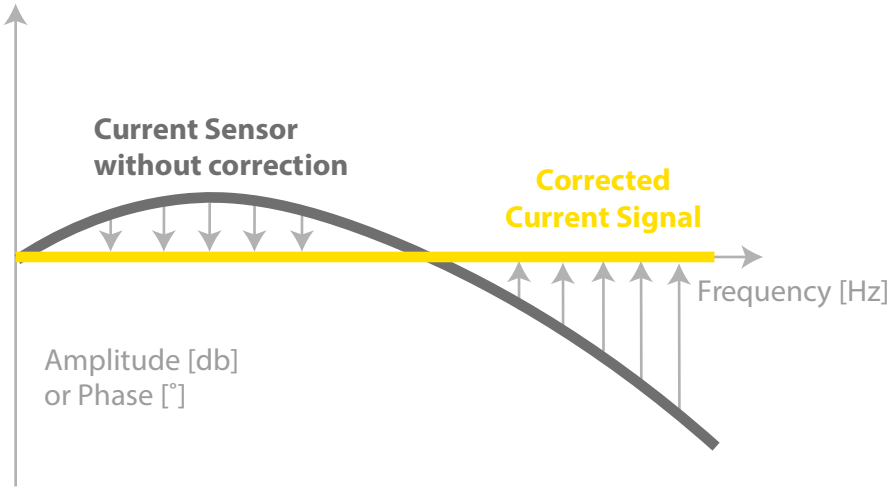
HIGHEST PRECISION

The NEO way of Sensor Integration

All current sensors offered by NEO Messtechnik are industry proven for different applications.
We use and improve on the best available sensors in the market.

1) FREQUENCY DEPENDENT CALIBRATION

The NEO sensor integration calibrates each sensor over a wide frequency bandwidth and corrects frequency dependent phase shift and amplitude damping. This enables high precision from DC to high-frequency measurements.

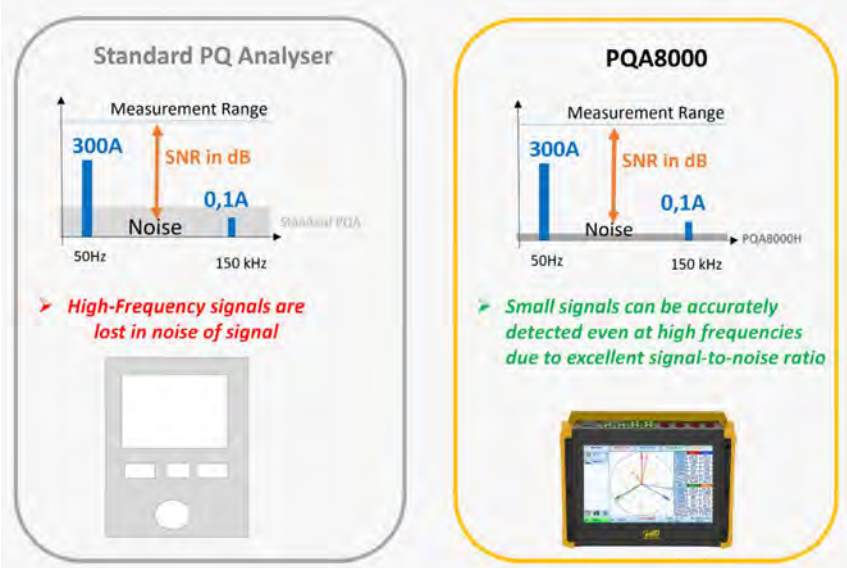


2) MEASUREMENT RANGE DEPENDENT CALIBRATION

In addition, the sensors will calibrated for each measurement range using multiple points.
The calibration will typically cover points from 1% to 100% of the nominal measurement range.
This will improve the accuracy and precision, especially at low current (e.g., 1% of nominal measurement range). All sensors will be delivered with a standard calibration, which improves the accuracy compared to nominal specifications, whereas the NEO calibration will be performed on each individual sensor and needs to be ordered separately.

3) Signal-to-Noise Ratio (SNR)

NEO PQA8000H Series have a high signal-to-noise ratio (SNR) which means that even low currents (micro amperes) are measured accurately across the full range (DC to 500 kHz). In comparison, other analyzers on the market will measure noise, even at the fundamental frequency. NEO is state-of-the-art hardware.



SPECIFICATIONS & ACCESSORIES

GENERAL SPECIFICATIONS

PC	Microsoft® Windows 10 IOT(64 bit) Intel® Quad Core Processor and 8GB RAM Locked OS for reliable operation Multilanguage Support, Install User Apps
Storage	Up to 1TB Internal SSD. Data can be stored on to external SSD/HHD/USB
Display	10.1 inch Capacitive Multi-Touch TFT LCD Sunlight Readable / 800cd
Battery	Li-Ion Battery 90Wh up to 4h operation
Power Supply	115V / 230V AC or Optional DC Power supply input +9V to +36V
Interfaces	3x USB, 1x Ethernet, WiFi, 1x HDMI
Dimensions	298 x 225 x 95 mm 11.8 x 8.8 x 3.7 inch
Weight	4kg / 8.8pound
Temperature Range	Operating: 0 to 60°C (32°F to 140°F) Storage: -20 to 80°C (-4°F to 176°F)
IP Class	IP2X
Accessories	Transport Bag and Keyboard included
Standards & Certification	IEC61010-1 (2011) / IEC61010-2-030 / IEC 61000-4-3 / IEC 61000-4-4 / LVD Directive 2014 / EMC Directive 2014/ Rohs Directive 2015/ EN 61000-3-2 / EN 61000-3-3 / EN 61326-1 / EN 55011 +A1, Class A, and more

OPTIONS AND ACCESSORIES

SSD Upgrade	Upgrade to 512GB or 1TB data storage
GPS	Integrated GPS receiver and GPS Cable 20m
GSM	Integrated Modem for telecommunication
DC Power	DC Power supply input +9V …. +36V DC
Dust Cover	Protect PQA8000 instrument in tough environments
Transport Case	Ruggedized Pelican-Case (IP67), with foamed insert adapted for the measurement instrument and pullout handle
color Code	Color code for all voltage and current inputs
Temperature Sensor	Thermocouple Type K temperature sensor on DSUB15 input
Radiation Sensor	Pyranometer Sensor on DSUB15 input
Current Sensor	See Chapter Accessories
Test Leads	See Chapter Accessories

SPECIFICATIONS

VOLTAGE INPUTS

Inputs	4x
Range	Standard: 1600V/ 800V MV-Version: 600V / 20V
Accuracy	0.05% f.s.
Isolation	6kV isolation
Safety	CAT III 1000V CAT IV 600V
Impedance	10 MΩ

CURRENT INPUTS

Inputs	PQA8000H: 4x PQA8000H-P: 6x PQA8000H-M: 8x
Accuracy	0.05% f.s.
Type	Clamp or Rogowski
Instrument Ranges Clamp	2mV to 10V (15x Ranges)
Integrator Rogowski Range	1A to 300kA
Additional Analog Inputs (AIN)	1V, 2V, 5V, 10 V
Sensor Supply	±15V / 9V
TEDS	Automatic Sensor Detection*
Impedance	10 MΩ

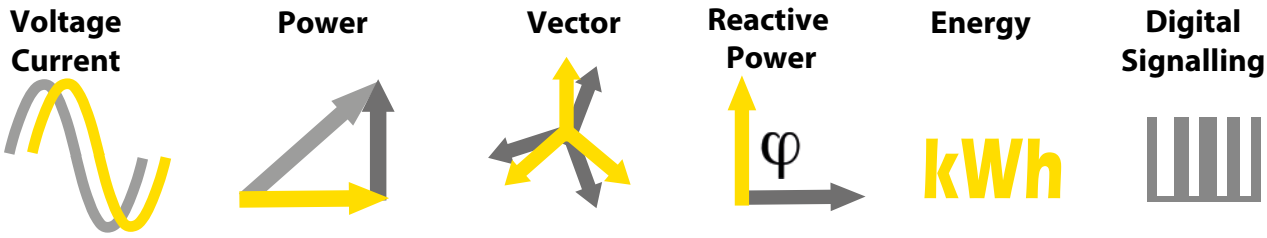
ANALOG DIGITAL CONVERSION (A/D)

Sampling Rate / Resolution	PQA8000: 124 kS/s / 24bit PQA8000H: 1 MS/s / 18bit
Filters	Analogue and Digital Automatic Anti-Aliasing Filter

DIGITAL I/O & INTERFACES

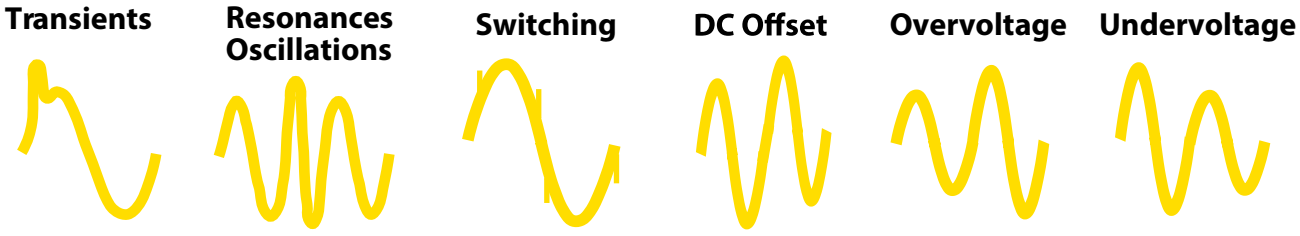
Digital In/Out	Adjustable Trigger max. 350V
CAN, RS485	Selectable Termination

POWER & ENERGY



Power Calculation	P, Q, S, PF, cos phi, D, DH, QH
Frequency	Half-Period, Cycle-by-Cycle, 10 sec, AVE, MIN, MAX
Voltage, Current	RMS, AVE, MIN, MAX, ½ Period-values, 200ms, 10s, 10min
Energy	Total, positive, negative (P, Q, P+, P-, Q+, Q-)
Efficiency	DC / AC, U-I Curve for PV
Wiring	DC, 1-Phase, 2-Phase, 3-Phase Star and Delta

CONTINUOUS WAVEFORM RECORDING & TRANSIENTS



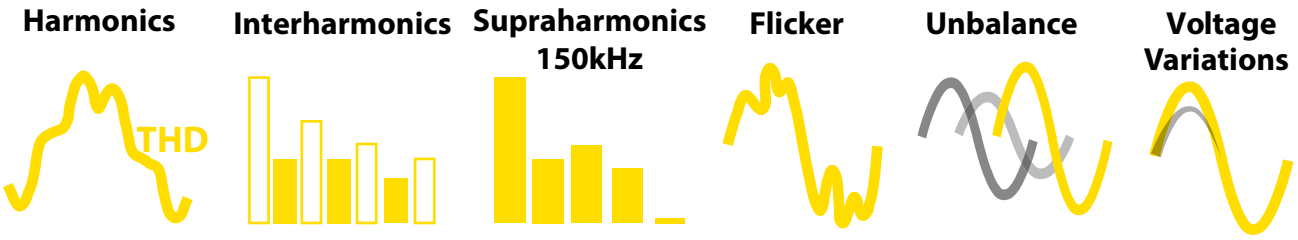
MIN, MAX, RMS, AVE	U, I, P, Q, S, f, PF, phi, THD, Harmonics, Interharm., Unbalance, etc.
ENVELOPE / WINDOW	U, I
DELTA	dU, dI, df, dP, etc.
DERIVATE (RATE OF CHANGE)	dU/dt, df/dt etc. … per ms, number of periods or half-period
COMBI-TRIGGER	Combination of triggering including mulitple conditions
VOLTAGE SIGNALLING	Threshold
RAPID VOLTAGE CHANGES (RVC's)	dU, dc, dt
EN50160	Trigger on any EN50160 parameter (Max, Quantil)

COMPLYING STANDARDS

POWER QUALITY, HARMONICS, FLICKER:
IEC61000-4-30 Ed. 3 Class A / IEC61000-4-7 / IEC61000-4-15 /
IEC62586-2 Ed. 2 / IEC62586-1
PUBLIC GRID, RAILWAY AND INDUSTRY
EN50160 / EN50163 / IEC61000-2-2 / IEC61000-2-4 (Class 1; 2; 3) /
IEEE519 / IEEE 1159 / IEC61000-2-12 / NRS048
WIND POWER, RENEWABLES AND GRID CODES
IEC61400-21 / IEC61400-12 / FGW-TR3 / VDE N-4105 / VDE N-4100 /
VDE N-4110 / D-A-CH-CZ / BDEW / ROCOF / IEEE C37.118-2005 (PMU)
MOTORS, TRANSFORMERS AND ELECTRICAL EQUIPMENT
IEC60034 / IEC 60076-1 / IEC61000-3-2 / IEC61000-3-3 / IEC61000-3-11 / IEC61000-3-12

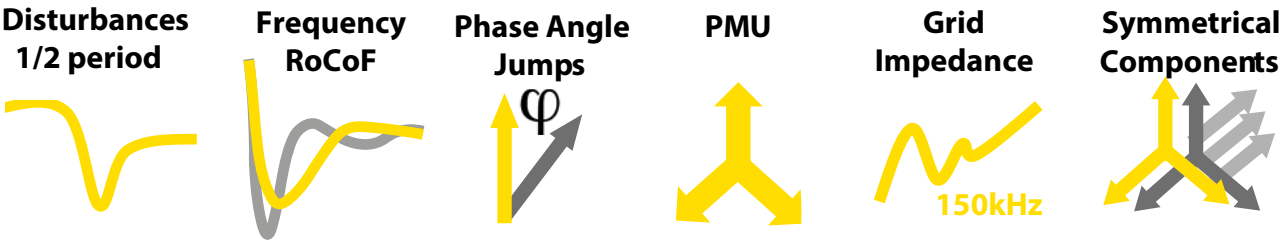
CLASS A++

POWER QUALITY



according to IEC 61000-4-30 Ed.3 and IEC 62586	
Harmonics (Voltage, Current, Phi, Power)	Class A
Interharmonics	Class A
THD U, THD I	Class A
Higher Frequencies (200Hz band)	2 - 9 kHz (can be calculated from 0 to definable upper limit)
Higher Frequencies (2000Hz band)	8 - 150 kHz / 500 kHz for voltage and current (PQA 8000H)
Symmetrical Components & Unbalance (Pos-, Neg- and Zero Sequence)	Class A
Rapid Voltage Changes	Class A
Flicker (PST, PLT, Pinst)	Class A
Voltage Events (dip, swell, interruption – time, extrema, length)	Class A
Frequency	Half-Period, Cycle-by-Cycle, 10 sec, AVE, MIN, MAX, RoCoF
Voltage, Current	RMS, AVE, MIN, MAX, ½ Period-values, 200ms, 10s, 10min
Time Synchronisation	100ns with GPS

DISTURBANCES AND SYSTEM DYNAMICS



1/2 PERIOD TRIGGER	U, I, P, Q, S, f, PF, phi, THD, Harmonics, Interharm., Unbalance, etc.
PHASE ANGLE TRIGGER	phi
SYMMETRICAL COMPONENTS	Pos., Neg., Zerosequence
RATE OF CHANGE FREQUENCY (ROCOF)	df/dt
Phasor Measure Unit (PMU) according to IEEE C37.118	Total Vector Error 0.01% (typ.) Angle Error 0.003°(typ) Timestamp Accuracy 0.1 µs up to 50 fps / via TCP / open PDC format / Offline storage possible

ADDITIONAL FEATURES INCLUDE

- ☑ **compounded trigger settings**
- ☑ **definable pre-triggers and post-time extensions**

INSTRUMENT OPTIONS

PQA8000H

4x Voltage Input 1600V DC
4x Current Input (Rogowski, Clamp)
CAN / RS485

PQA8000H-P

4x Voltage Input 1600V DC
6x Current Input (Rogowski, Clamp)
2x Analog Input (± 10V)
CAN / RS485 / DIO

PQA8000H-M

4x Voltage Input 1600V DC
8x Current Input (Rogowski, Clamp)
CAN / RS485 / DIO

CUSTOMIZE DESIGN

Instrument Colour

Customize the color of the rubber perimeter

Connector Color

-select the color of the connectors to match cabling or standards

In addition, the transport bag of the PQA8000 device can be embroidered with company logos.

CONTACT

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