Power Quality Analyzers

PQM-711 / 710

index: WMGBPQM711BTW / WMGBPQM710BTW

EVENTS

TRANSIENT RECORDER

PQM-711

CLASS A

IEC 61000-4-30

CAT IV

600 V

IP65

WiFi

GPS

GSM

55°C HEAVY DUTY 20°C

Class A remote analysis

Features

- Remote control and data transfer through a built-in GSM modem.
- Anti-theft feature – SMS notification in the event of position change (built-in GPS receiver).
- Real-time clock synchronized to GPS protocol.
- Remote control of the analyzer via software: **Sonel Analysis** (Wi-Fi and GSM for Windows) or **Sonel Analysis Mobile** (Wi-Fi for Android).

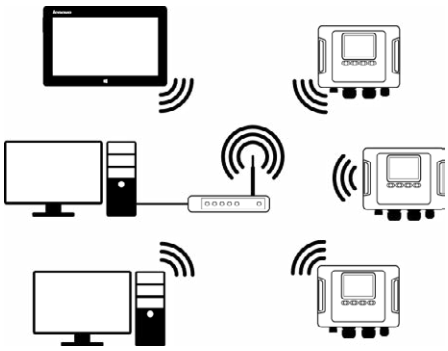
Measured parameters

- **Transients up to ±8000 V with max. sampling frequency 10 MHz.** Minimal transient time is **650 ns** (only PQM-711)
- **Voltages L1, L2, L3, N, PE (five measurement inputs)** – average, minimum, maximum and instant values within the range up to 1000 V, interoperability with voltage transducers.
- **Currents L1, L2, L3, N (four measurement inputs)** – average, minimum, maximum and instant values, current measurement within the range up to 6 kA (depending on applied current clamp), interoperability with current transducers.
- Measurement of control signals up to 3000 Hz.
- Crest factors for current (CFI) and voltage (CFU).
- Frequency within the range of 40 Hz – 70 Hz.
- Active power (P), reactive power (Q), distortion power (D), apparent power (S) with identification of the nature of reactive power (capacitive, inductive).
- Calculation of reactive power using the Budeanu method and IEEE 1459 method.
- Active energy (E_P), reactive energy (E_Q), apparent energy (E_S).
- Power factor, cosφ, tanφ.
- K factor (transformer overload caused by the harmonics).
- Up to 50th harmonics for voltage and current.
- Interharmonics measured as groups.
- Total Harmonic Distortion (THD) for voltage and current.
- Short-term (PST) and long-term (PLT) flicker (IEC 61000-4-15 class A).
- Unbalance of voltage (IEC 61000-4-30 class A) and current.
- Current events detection including waveforms recording.
- Current and voltage events recording with waveforms (up to 1 s) and $RMS_{1/2}$ graphs with 30 s maximum recording time.
- Current and voltage waveforms recording after each averaging period.

Wide range of mains to analyze

- **With rated frequency** 50/60 Hz
- **With rated voltages:** 64/110 V; 110/190 V; 115/200 V; 120/208 V; 127/220 V; 133/230 V; 220/380 V; 230/400 V; 240/415 V; 254/440 V; 265/460 V; 277/480 V; 290/500 V; 400/690 V; 480/830 V (for systems with N conductor)
- **Direct current**
- Systems:
  - » single-phase
  - » split-phase with common N
  - » three-phase – WYE with and without N conductor
  - » three-phase – Delta
  - » three-phase – WYE and Delta Aron
  - » with current and voltage transducers

Capabilities



PQM-710 and PQM-711 have a **built-in GPS receiver** ensuring real time clock accuracy and an integrated **GSM modem** that facilitates remote analyzer operation. Furthermore, PQM-711 is also equipped with a **transient recorder** (sampling frequency 10 MHz, voltage range **up to ±8000 V**).

An additional trump card of the analyzers is the built-in **Wi-Fi communication module**, providing a number of advantages: no restrictions on file transfer, no data transfer costs, use of local wireless infrastructure... This gives the user the opportunity to adapt to the conditions prevailing on the site. They can supervise measurements from a convenient location – for example, an area without electromagnetic interference – using a laptop, smartphone or tablet.

Displaying data

PQM-710 and PQM-711 can be operated using a **touch screen computing device** equipped with **Sonel Analysis** software (Windows) or **Sonel Analysis Mobile** app (Android). The user can supervise the measurements and conduct diagnostics while maintaining mobility – he doesn't even have to be near the analyzer. In typical applications, the device plays the role of a remote display and an intermediate storage of measurement data with the functionality of a router. Therefore, the user can also connect to it using a wireless network – for example, to transfer the collected registrations to a desktop computer.

Application

PQM-710 and PQM-711 are widely used in the professional power industry. They provide full 4-quadrant analysis, meeting the needs of energy consumers and producers, such as renewable energy, including photovoltaic and wind farms. They enable forecasting failures in distribution networks. They provide analysis of the load capacity of networks and transformers, as well as recording their current states. In addition, they are powerful investment tools. Thanks to PQM-710 and PQM-711, the user will obtain the necessary data for development of power infrastructure, predict potential problems, and finally – verify the correctness and quality of implementation.

Parameters

Parameter	Measuring range	Max. resolution	Accuracy
Alternating voltage (TRMS)	0.0…1000.0 V or 0.0…760.0 V*	4 significant digits	±0.1% U_{nom}
Crest Factor			
Voltage	1.00…10.00 (≤1.65 for voltage of 690 V)	0.01	±5%
Current	1.00…10.00 (≤3.6 for I_{nom})	0.01	±5%
Alternating current (TRMS)	depending on clamp**	4 significant digits	±0.1% I_{nom} (error does not account for clamp error)
Frequency	40.00...70.00 Hz	0.01 Hz	±0.01 Hz
Active, reactive, apparent and distortion power	depending on configuration (transducers, clamps)	4 significant digits	depending on configuration (transducers, clamps)
Active, reactive and apparent energy	depending on configuration (transducers, clamps)	4 significant digits	as power error
cosφ and power factor (PF)	-1.00...1.00	0.01	±0.03
tanφ	-10.00...10.00	0.01	depends on error of active and reactive power
Harmonics and interharmonics			
Voltage	DC, 1...50	as for alternating voltage True RMS	±0.05% U_{nom} for m.v. < 1% U_{nom} ±5% m.v. for m.v. ≥ 1% U_{nom}
Current	DC, 1...50	as for alternating current True RMS	±0.15% I_{nom} for m.v. < 3% I_{nom} ±5% m.v. for m.v. ≥ 3% I_{nom}
THD			
Voltage	0.0..100.0% (relative to RMS value)	0.1%	±5%
Current			±5%
Active and reactive power of harmonics	depending on configuration (transducers, clamps)	depends on minimum current and voltage values	–
Angle between current and voltage harmonics	-180.0…+180.0°	0.1°	±(n x 1°)
K-Factor	1.0...50.0	0.1	±10%
Flicker index	0.20...10.00	0.01	±5%
Unbalance factor			
Voltage and current	0.0...20.0%	0.1%	±0.15% (absolute error)
Measurement of control signals			
Voltage	up to 15% U_{nom} at 5.00...3000.00 Hz	4 significant digits	unspecified for <1% U_{nom} ±0.15% for 1...3% U_{nom} ±5% for 3...15% U_{nom}
Measurement of transients (PQM-711)			
Voltage	±8000 V	4 significant digits	±(5% + 25 V)

m.v. – measured value

* Depending on analyzer version

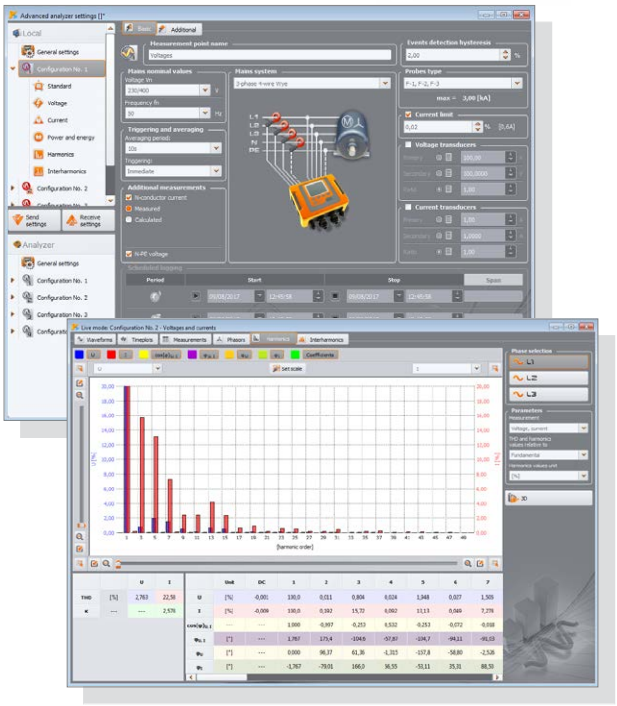
** **F-1A1**, **F-2A1**, **F-3A1** clamp: 0...1500 A AC (5000 A_{p-p}) • **F-1A**, **F-2A**, **F-3A** clamp: 0...3000 A AC (10 000 A_{p-p}) • **F-1A6**, **F-2A6**, **F-3A6** clamp: 0...6000 A AC (20 000 A_{p-p})
C-4A clamp: 0...1000 A AC (3600 A_{p-p}) • **C-5A** clamp: 0...1000 A AC/DC (3600 A_{p-p}) • **C-6A** clamp: 0..10 A AC (36 A_{p-p}) • **C-7A** clamp: 0...100 A AC (360 A_{p-p})

	C-4A	**C-5A**	**C-6A**	**C-7A**	**F-1A1 / F-1A / F-1A6**	**F-2A1 / F-2A / F-2A6**	**F-3A1 / F-3A / F-3A6**
	WACEGC4AOKR	WACEGC5AOKR	WACEGC6AOKR	WACEGC7AOKR	WACEGF1A1OKR WACEGF1AOKR WACEGF1A6OKR	WACEGF2A1OKR WACEGF2AOKR WACEGF2A6OKR	WACEGF3A1OKR WACEGF3AOKR WACEGF3A6OKR
Rated current	1000 A AC	1000 A AC 1400 A DC	10 A AC	100 A AC	1500 / 3000 / 6000 A AC		
Frequency	30 Hz…10 kHz	DC…5 kHz	40 Hz…10 kHz	40 Hz…1 kHz	40 Hz…10 kHz		
Output signal level	1 mV / 1 A	1 mV / 1 A	100 mV / 1 A	5 mV / 1 A	77.6 µV / 1 A	38.8 µV / 1 A	19.4 µV / 1 A
Max. diameter of measured conductor	52 mm	39 mm	20 mm	24 mm	360 mm	235 mm	120 mm
Minimum accuracy	≤0.5%	≤1.5%	≤1%	0.5%	1%		
Battery power	–	√	–	–	–		
Lead length	2.2 m	2.2 m	2.2 m	3 m	2.2 m		
Measurement category	IV 300 V	IV 300 V	IV 300 V	III 300 V	IV 600 V		
Ingress protection	IP40				IP67		

SONEL ANALYSIS

Sonel Analysis software – application delivered as standard accessory, indispensable for working with PQM-series analyzers. It enables:

- analyzer configuration,
- data reading from logger,
- preview of network parameters in real time (with capability of reading via GSM modem),
- deletion of data in the analyzer,
- data presentation in tables,
- data presentation in charts,
- data analysis and generating reports in compliance with standard EN 50160 (reports) and other user defined reference conditions - also for PV micro-installations up to 50 kW, a breakdown for active power states P>0, P<0 and P=0 and taking into account the graphs $Q_1=f(U_1/U_n)$ and $\cos\varphi=f(P/P_n)$,
- independent support of multiple analyzers,
- analyzer firmware updates.



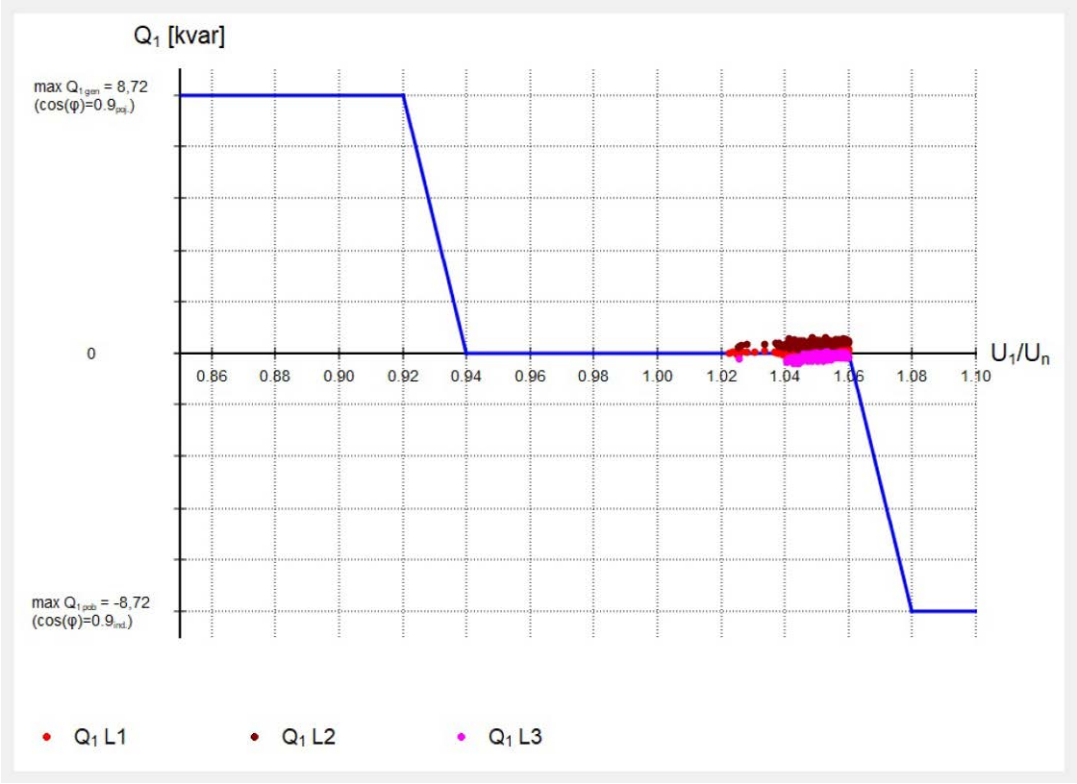
The software enables readout of selected parameters and their visualization in real time. These parameters are measured independently from the registration saved on the memory card. The user can view:

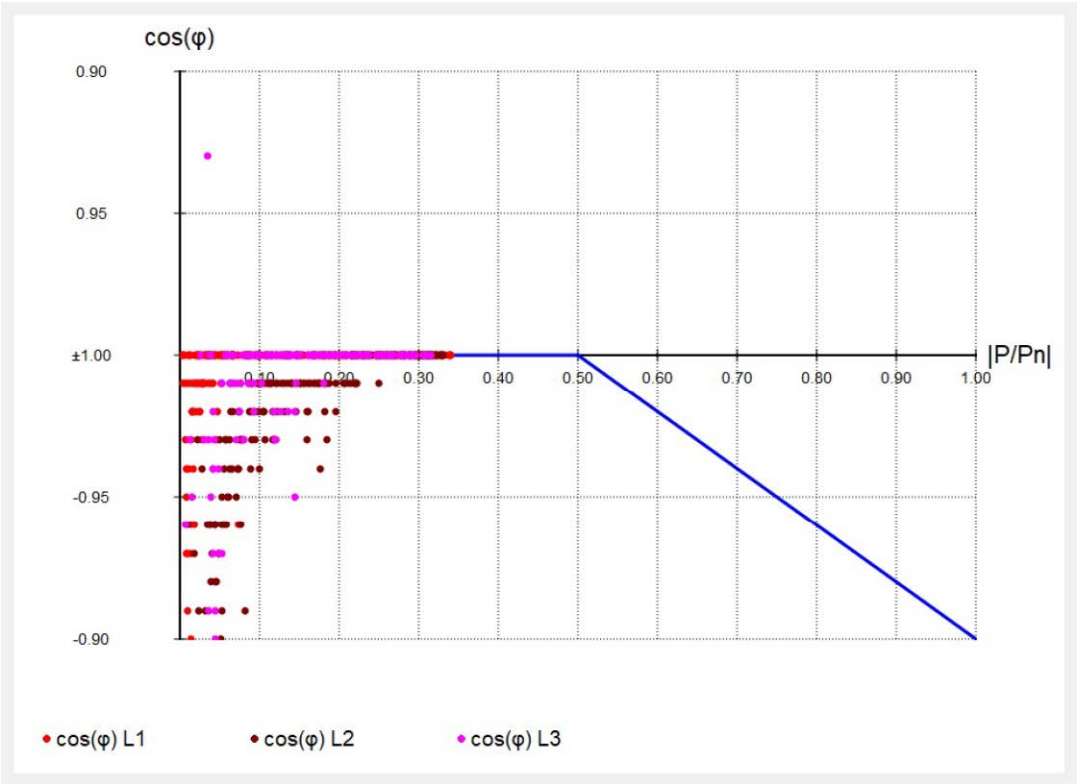
- charts of voltage and current progression (oscilloscope),
- charts of voltage and current over time,
- phasor diagram,
- measurements of multiple parameters,
- harmonics and harmonic powers (estimating the direction of harmonics),
- interharmonics.

REPORT: Micro-installations up to 50 kW (P > 0, power consumption)

GENERAL INFORMATION

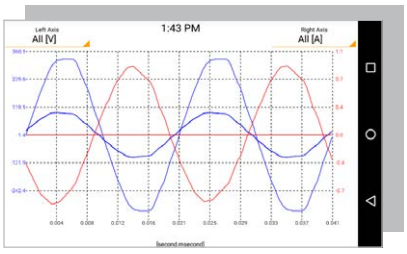
Analyzer:	Type: PQM-702 | Version: FW1.50HWc | Serial number: AZ0025			
Report generated using:	SONEL Analysis 4.6.0 BUILD 111			
Measurement time (UTC±00:00):	Start: 2021-12-03 16:00:00.000 Stop: 2021-12-10 16:00:00.000 Time: 1w 0d 0h 0m 0s			
Number of parameter's samples averaged for every 5 s:	120,960			
Number of parameter's samples averaged for every 10 min:	1,008			
Number of parameter's samples averaged for every 15 min:	672			
Number of parameter's samples averaged for every 2 h:	84			
Number of excluded samples:	0 (PLT: 0)			
	L1	L2	L3	L123-N
Number of parameter's samples averaged for every 5 s (P > 0, power consumption):	28,320	73,329	119,605	119,006
Number of parameter's samples averaged for every 10 min (P > 0, power consumption):	243	682	1,002	994
Number of parameter's samples averaged for every 15 min (P > 0, power consumption):	164	459	669	664
Number of excluded samples (P > 0, power consumption):	0	0	0	0
Nominal values:	Mains system: 3-phase 4-wire Wye Phase voltage: 230.00 V Phase-to-phase voltage: 400.00 V Frequency: 50.00 Hz Inverter power (3-p): 30.00 kW Insensitivity threshold: 300.00 W			
Events limits:	Swells %Un: 10.00 Dips %Un: -10.00 Interruptions %Un: -95.00			





Sonel Analysis Mobile

Mobile version of the program supports **PQM-711** and **PQM-710** power quality analyzers. It can be downloaded from the **www.sonel.com** website.



Standard accessories

3 x crocodile clip, black, 1 kV, 20 A
WAKROBL20K01

2 x crocodile clip, red, 1 kV, 20 A
WAKRORE20K02

Crocodile clip, blue, 1 kV, 20 A
WAKROBU20K02

Crocodile clip, yellow, 1 kV, 20 A
WAKROYE20K02

AC-16 line splitter

WAADAAC16

AZ-1 power supply adapter (mains plug/banana inputs)

WAADAAZ1

Voltage adapter with M4/M6 thread – set 5 pcs

WAADAM4M6

4 x magnetic voltage adapter – set

WAADAUMAGKPL

Straps for mounting on a pole – set – 1.2 m

WAPOZOPAKPL

DIN rail mounting bracket with positioning catches

WAPOZUCH3

2 x fasteners and bands for mounting the analyzer

WAPOZUCH4

XL2 carrying case

WAWALXL2

Data transfer and analysis

USB cable
WAPRZUSB

Sonel Analysis software
WAPROANALIZA4

Factory calibration certificate

Optional accessories

F-1A flexible clamp (Φ=360 mm)

1.5 kA: WACEGF1A1OKR
3 kA: WACEGF1AOKR
6 kA: WACEGF1A6OKR

F-2A flexible clamp (Φ=235 mm)

1.5 kA: WACEGF2A1OKR
3 kA: WACEGF2AOKR
6 kA: WACEGF2A6OKR

F-3A flexible clamp (Φ=120 mm)

1.5 kA: WACEGF3A1OKR
3 kA: WACEGF3AOKR
6 kA: WACEGF3A6OKR

C-4A clamp (Ø 52 mm) 1000 A AC

WACEGC4AOKR

C-5A clamp (Ø 39 mm) 1000 A AC/DC

WACEGC5AOKR

C-6A clamp (Ø 20 mm) 10 A AC

WACEGC6AOKR

C-7A clamp (Ø 24 mm) 100 A AC

WACEGC7AOKR

L2 carrying case for clamps

WAWALL2

Magnetic voltage adapter

black
WAADAUMAGKBL
blue
WAADAUMAGKBU

Flat test clip (grip – banana socket) (5 pcs)

WASONKCB1KPL

Test clips with steel jaws – set (5 pcs)

WASONKGB1KPL

Adapter for control terminals (5 pcs)

WAADAPRZKPL1

AGT-16T industrial socket adapter 16 A / 32 A

WAADAAGT16T
WAADAAGT32T

ASX-1 piercing adapter – set (4 pcs)

WAADAPRZASX1KPL

PQM magnetic strap (2 pcs)

WAPOZUCH5

AGT-16C three-phase socket adapter 16 A / 32 A (PEN)

WAADAAGT16C
WAADAAGT32C

AGT-16P three-phase socket adapter 16 A / 32 A

WAADAAGT16P
WAADAAGT32P

AGT-63P three-phase socket adapter 63 A

WAADAAGT63P

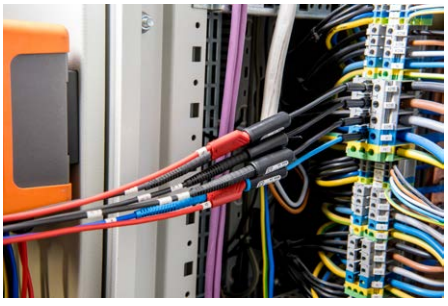
GPS antenna

WAPOZANT10GPS

GSM repeater

WAPOZANTREPEATER

Calibration certificate with accreditation



PQM-711

PQM-710

PQM-707

PQM-700

Portable Class S analyzer for basic and long term analysis	Stand alone Class S mains network analyzer for fast diagnosis	Class A high accuracy mains network analyzer	Top class of mains network analyzers with transients capture

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