POWER QUALITY ANALYZERS

PQM-701 / 701Z / 701Zr

Independent power supply socket
PQM-701Z

Additional socket RS-232 interface
PQM-701Zr

ANALYZER MEASURES AND RECORDS ACCORDING TO THE IEC 61000-4-30
CLASS A STANDARD

CAT IV 600V

IP 65

PQM-701:
- power to the analyzer is supplied from tested mains (internal power supply) and is used in all types of networks from 110V to 690V, with particular emphasis on measurements at low voltage poles, due to the ease of connection.

PQM-701Z:
- has an independent power supply socket, especially suited for voltage measurements for transformers and DC circuits.

PQM-701Zr:
- has an independent power supply socket and an additional RS-232 interface to control a GPRS modem.

Possible measurements:
- Measurements according to EN 50160
- Voltage L1, L2, L3, N-PE (five inputs, complies with IEC 61000-4-30, class A)
  - average, minimum, maximum and instantaneous values, range to 690V, ability to work with voltage transformers,
- Current L1, L2, L3, N (four inputs)
  - average, minimum, maximum and instantaneous values, measurement current with range to 3kA (depends on used clamp), ability to work with current transformers,
- Crest factor for voltage and current,
- Frequency from 40Hz to 70Hz (complies with IEC 61000-4-30, class A),
- Active, reactive, distortion, apparent power, including the type of reactive power (capacitive, inductive),
- Power recording:
  - Budeanu method,
  - IEEE 1459,
- Active, reactive, apparent energy,
- Power factor, $\cos\varphi$, $\mathrm{tg}\varphi$,
- K factor (transformer overload caused by the harmonics),
- Up to 50th harmonics for voltage and current (complies with IEC 61000-4-7, class I),
- Total Harmonic Distortion (THD) for voltage and current,
- Short-term (P_{ST}) and long-term (P_{LT}) flicker (complies with IEC 61000-4-15, class A),
- Unbalance of voltage (complies with IEC 61000-4-30, class A) and current,
- Voltage dips, swells and interruptions detection including waveforms recording (complies with IEC 61000-4-30, class A),
- Current events detection including waveforms recording,
- Current and voltage waveforms recording after each averaging period.

The device is designed to work with networks:
- with nominal frequency 50/60Hz.
- with nominal voltage:
  110/190V; 115/200V; 127/220V; 220/380V;
  230/400V; 240/415V; 254/440V; 400/690V.

Supported networks:
- single-phase,
- two-phase with common N conductor,
- three-phase star connection with and without N conductor,
- three-phase delta.

Parameters of analyzer PQM-701:

Parameter		Measurement range	Max. resolution	Accuracy
Alternating voltage (TRMS)	—	0.0…690.0V	0.01 % U_n	±0.1% U_n
Crest factor	Voltage	1.00…10.00 (≤1.65 for 690 V voltage)	0.01	±5%
	current	1.00…10.00 (≤3,6 I_{nom})	0.01	± 5% m.v.
Alternating current TRMS	—	depending on clamp*	0.01% of nominal range	±0.1% of nominal range (error does not account for clamp error)
Frequency	—	40.00...70.00 Hz	0.01Hz	±0.01 Hz
Active, reactive, apparent and distortion power	—	depending on configuration (transformers, clamp)	up to four decimal places	depending on configuration (transformers, clamp)
Active, reactive apparent energy	—	depending on configuration (transformers, clamp)	up to four decimal places	as power error
cosφ and power factor (PF)	—	0.00...1,00	0.01	±0.03
tgφ	—	0.00...10.00	0.01	depends on active and reactive power error
Harmonics	Voltage	as for alternating voltage True RMS	as for alternating voltage True RMS	±5% U_h for U_h<1% U_n ±0.05% U_n for U_h<1% U_n
	Current	as for alternating voltage True RMS	as for alternating voltage True RMS	± 5% I_h for I_h<3% I_n ± 0.15% I_n for I_n<3% I_n
THD	Voltage	0.0..100.0% (in regards to the rms value)	0.1%	±5%
	Current			±5%
Active and reactive power of harmonics	—	depending on configuration (transformers, clamp)	depending on minimal current and voltage values	—
Angle between current and voltage harmonics	—	-180.0…+180.0°	0.1°	±(h x 1°)
K- factor	—	1.0...50.0	0.1	±10%
Flicker severity P_{ST}, P_{LT}	—	0.20...10.00	0.01	±5%
Voltage asymmetry	Voltage and current	0.0...20.0%	0.1%	±0.15% (absolute error)

*Clamp F-1, F-2, F-3:0..3000A (10000A$_{p-p}$) *Clamp C-4: 0..1000A (3600A$_{p-p}$)*Clamp C-5: 0..1000A (3600A$_{p-p}$)*Clamp C-6: 0..10A (36A$_{p-p}$) (without current transformers)

Standard accessories of the PQM-701 / 701Z / 701Zr:

- F-3 clamp to 3kA AC (∅14cm) (4 pcs.) — **WACEGF3OKR**
- test lead with banana plugs; 2,2m; black (PQM-701 - 3 pcs, PQM-701Z - 4 pcs.) — **WAPRZ2X2BLBB**
- test lead with banana plugs; 2,2m; yellow, — **WAPRZ2X2YEBB**
- test lead with banana plugs; 2,2m; blue (PQM-701 - 1 pcs, PQM-701Z - 2 pcs.) — **WAPRZ2X2BUBB**
- RS-232 serial transmission cable — **WAPRZRS232**
- "Crocodile" clip K01; black (PQM-701 - 3 pcs, PQM-701Z - 4 pcs.) **WAKROBL20K01**
- "Crocodile" clip K02, yellow **WAKROYE20K02**
- "Crocodile" clip K02, blue (PQM-701 - 1 pcs, PQM-701Z - 2 pcs.) **WAKROBU20K02**

- USB transmission cable, **WAPRZUSB**
- OR-1adapter - wireless USB interface transmission receiver **WAADAUSBOR1**
- mains plug with banana inputs (L1 and N) for powering the device, **WAADAAZ1**
- Sonel Analysis software for data analysis,
- SD card, **WAPOZSD1**
- hard carrying case, **WAWALXL1**
- mounting strap, **WAPOZOPAKPL**
- DIN Rail Mounting Clip (ISO) (2 pcs.) **WAPOZUCH2**
- built-in rechargeable battery,
- instruction manual, calibration certificate.

Additional accessories of the PQM-701 / 701Z / 701Zr:

- rechargeable battery **WAAKU09**
- AC line splitter (AC-16) **WAADAAC16**
- hand carrying case for clamps **WAWALL2**

Clamp	C-4	C-5	C-6	F-1	F-2	F-3
INDEX	WACEGC4OKR	WACEGC5OKR	WACEGC6OKR	WACEGF1OKR	WACEGF2OKR	WACEGF3OKR
Rated current	1000A AC	1000A AC 1400A DC	10A AC	3000A AC		
Max. overload current	1200A AC	1000A AC 3000A DC	20A AC	10kA AC		
Minimal measurable current	100mA	500mA	10mA	1A		
Frequency	30Hz…10kHz	DC…5kHz	40Hz…10kHz	40Hz…10kHz		
Input signal level	1mV / 1A	1mV / 1A	100mV / 1A	38.8µV / 1A		
Max. diameter of measured cord	52mm	39mm	20mm	360mm	235mm	120mm
Minimal basic accuracy	≤0.5%	≤1.5%	≤1%	1%		
Battery power supply	—	+	—	—		
Lead length	2.2m	2.2m	2.2m	2.2m		
Measurement category	IV 300V	IV 300V	IV 300V	IV 600V		

Sonel Analysis 1.0

„SONEL Analysis" software is an application used to work with PQM-701/701Z power quality analyzer. It enables:
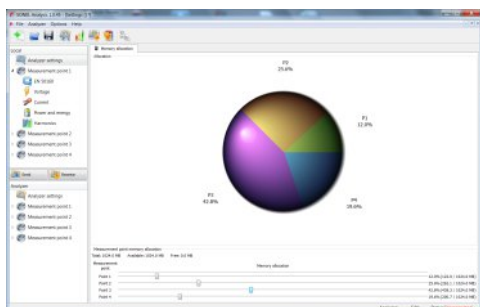- analyzer configuration,
- reading data from the analyzer,
- network parameters check in real time (the ability to read data through GPRS modem - only PQM-701Zr),
- data deleting in the analyzer,
- data presentation in tables,
- data presentation in diagrams,
- data analysis according to EN 50160 or according to user defined conditions,
- independent service of multiple analyzers,
- software upgrade through the Internet.

Analyzer configuration

The software enables configuration of all analyzer's parameters. The configuraton is made on the PC computer and later transferred to the analyzer. The configuration settings can be stored on hard drive or other data storage devices to be used later. The software enables the configuration of:

- the choice of Measurement Points and memory assignment to each Measurement Point,
- analyzer time settings,
- keyboard lock,
- PIN code security,
- averaging time setting,
- choice of current and voltage transformers,
- trigger mode choice (immediately, after an event or according to the scheduler),
- choice of clamp's type, setting of additional parameters registration in N and PE channels,
- choice of network type, for which the analyzer will be used.

The analyzer has four independent Measurement Points. Each Measurement Point can be set individually to perform four different types of registration without need to change analyzer's configuration.

For each Measurement Point the following settings can be made:
- whether the analyzer shall work according to EN 50160 or according to user defined conditions,
- for each registration user can define, which network parameters shall be registered,
- for each parameter user can define whether the analyzer shall register average, minimum, maximum or instantaneous values,
- the limits beyond which the analyzer will record the event can be defined.

Live mode

"SONEL Analysis" software enables reading of selected parameters and their graphic presentation in real time. These parameters are measured independently of the registration saved on the memory card. User can check:
- voltage and current diagrams (oscilloscope),
- diagrams of voltage and current in time function,
- scope phasor,
- different parameters values,
- harmonics and harmonics' power.
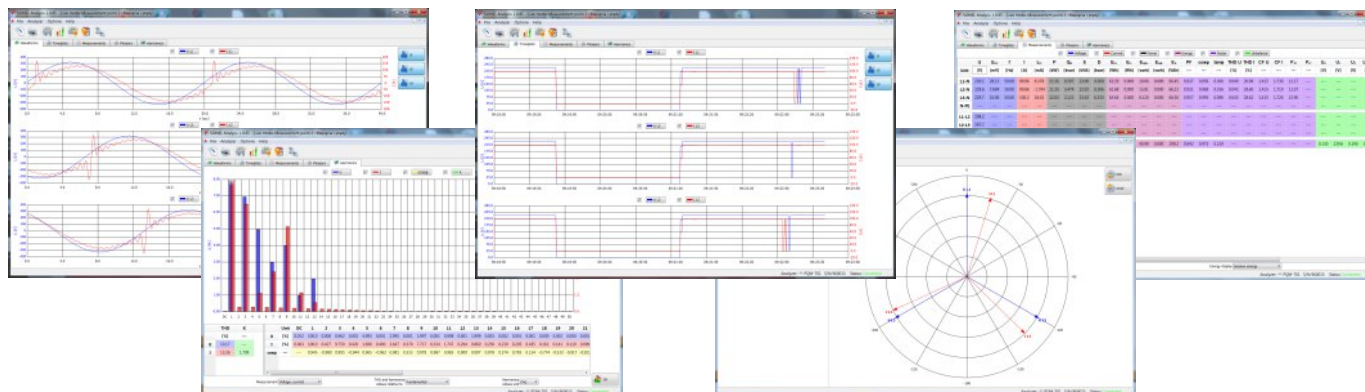
Data analysis

With "SONEL Analysis" software user can read data stored on the memory card and analyze them. Data from the analyzer can be stored on hard drive and be used later. This feature enables data archiving.
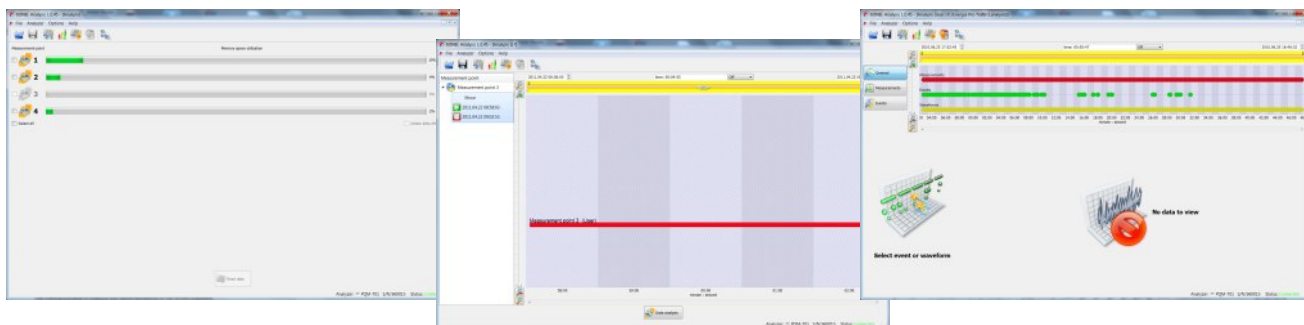

The user can analyze the data from the device. There is a choice of:
- **General** – all data are shown with dots (Measurements, Events and Waveforms),
- **Measurements** – all measured values registered in averaging time are shown in table (voltage, frequency, etc.),
- **Events** – all detected events are shown in table (dips, swells, interruptions, etc.).
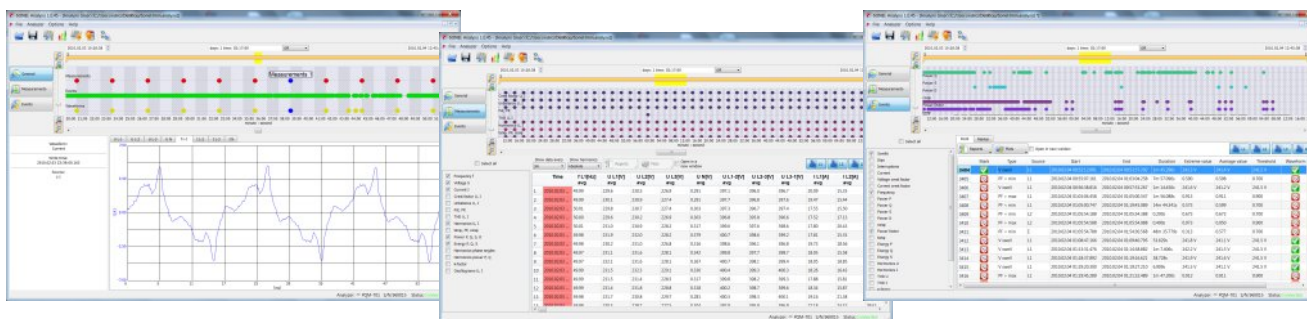
The software enables different types of diagrams, which show in a simple way the registered data:
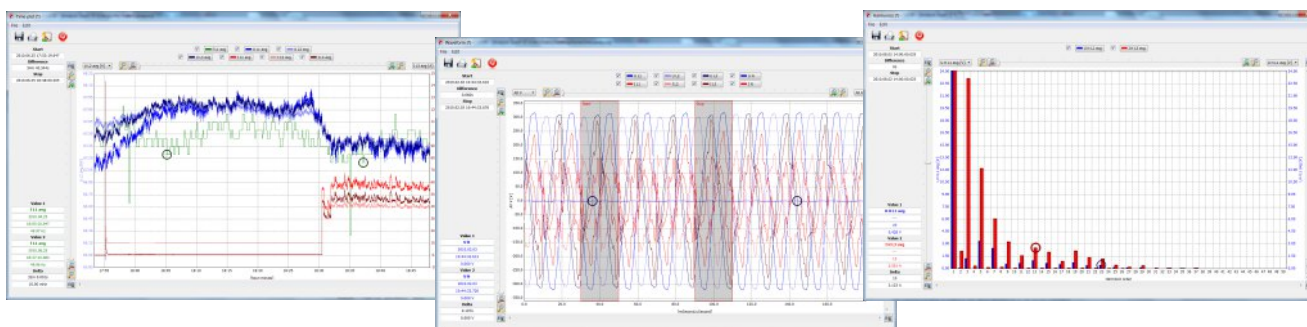
- **Time diagram** – graphs of indicated parameters in time function,
- **Waveforms** – graphs of instantaneous voltage and current during an event or at the end of averaging time,
- **Harmonics diagram** – bar graph showing harmonics from 1 to 50,
- **Value/Time diagram** – graph of events' duration time.

With data from the analyzer user can prepare reports, which can be saved on the hard drive in PDF, HTML, CSV or TXT files. The software enable to prepare the report according to EN 50160 standard.