



## 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

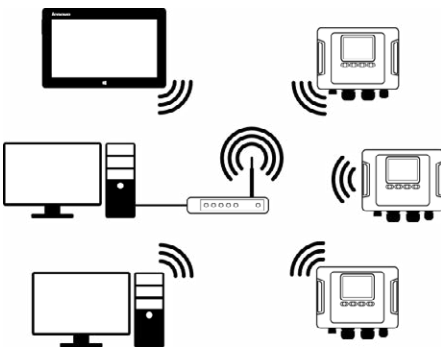
- **PQM-711 | Transients up to  $\pm 8000$  V with max. sampling frequency 10 MHz.** Minimal transient time is **650 ns**.
- **Voltages L1, L2, L3, N, PE (five measurement inputs)** – average, minimum, maximum and instant values within the range up to 1000 V, interoperability with voltage transducers.
- **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,  $\cos\phi$ ,  $\tan\phi$ .
- 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 ( $P_{ST}$ ) and long-term ( $P_{LT}$ ) 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 – 2-element WYE without N conductor (Aron/Blondel)
  - » three-phase – 2-element Delta (Aron/Blondel)
  - » 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  $\pm 8000$  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
<b>Alternating voltage (TRMS)</b> $U_{L-L,MAX} = 2000\text{ V}$ for $U_{L-PE,MAX} = 1000\text{ V}^*$ $U_{L-L,MAX} = 1520\text{ V}$ for $U_{L-PE,MAX} = 760\text{ V}^*$	0.0...1000.0 V or 0.0...760.0 V* range for $U_{L-N}$	4 significant digits	$\pm 0.1\% U_{nom}$
<b>Crest Factor</b>			
Voltage	1.00...10.00 ( $\leq 1.65$ for voltage of 690 V)	0.01	$\pm 5\%$
Current	1.00...10.00 ( $\leq 3.6$ for $I_{nom}$ )	0.01	$\pm 5\%$
<b>Alternating current (TRMS)</b>	depending on clamp**	4 significant digits	$\pm 0.1\% I_{nom}$ (error does not account for clamp error)
<b>Frequency</b>	40.00...70.00 Hz	0.01 Hz	$\pm 0.01\text{ Hz}$
<b>Active, reactive, apparent and distortion power</b>	depending on configuration (transducers, clamps)	4 significant digits	depending on configuration (transducers, clamps)
<b>Active, reactive and apparent energy</b>	depending on configuration (transducers, clamps)	4 significant digits	as power error
<b>cos<math>\phi</math> and power factor (PF)</b>	-1.00...1.00	0.01	$\pm 0.03$
<b>tan<math>\phi</math></b>	-10.00...10.00	0.01	depends on error of active and reactive power
<b>Harmonics and interharmonics</b>			
Voltage	DC, 1...50	as for alternating voltage True RMS	$\pm 0.05\% U_{nom}$ for m.v. < 1% $U_{nom}$ $\pm 5\%$ m.v. for m.v. $\geq 1\% U_{nom}$
Current	DC, 1...50	as for alternating current True RMS	$\pm 0.15\% I_{nom}$ for m.v. < 3% $I_{nom}$ $\pm 5\%$ m.v. for m.v. $\geq 3\% I_{nom}$
<b>THD</b>			
Voltage	0.0..100.0% (relative to RMS value)	0.1%	$\pm 5\%$
Current			$\pm 5\%$
<b>Active and reactive power of harmonics</b>	depending on configuration (transducers, clamps)	depends on minimum current and voltage values	—
<b>Angle between current and voltage harmonics</b>	-180.0...+180.0°	0.1°	$\pm(n \times 1^\circ)$
<b>K-Factor</b>	1.0...50.0	0.1	$\pm 10\%$
<b>Flicker index</b>	0.20...10.00	0.01	$\pm 5\%$
<b>Unbalance factor</b>			
Voltage and current	0.0...20.0%	0.1%	$\pm 0.15\%$ (absolute error)
<b>Measurement of control signals</b>			
Voltage	up to 15% $U_{nom}$ at 5.00...3000.00 Hz	4 significant digits	unspecified for <1% $U_{nom}$ $\pm 0.15\%$ for 1...3% $U_{nom}$ $\pm 5\%$ for 3...15% $U_{nom}$
<b>PQM-711   Measurement of transients</b>			
Voltage	$\pm 8000\text{ V}$	4 significant digits	$\pm(5\% + 25\text{ V})$

m.v. – measured value

\* Depending on analyzer version

\*\* F-1A1, F-2A1, F-3A1 clamp: 0...1500 A AC (5000 A<sub>pp</sub>) • F-1A, F-2A, F-3A clamp: 0...3000 A AC (10 000 A<sub>pp</sub>) • F-1A6, F-2A6, F-3A6 clamp: 0...6000 A AC (20 000 A<sub>pp</sub>)  
F-2AHD, F-3AHD clamp: 0...3000 A AC (10 000 A<sub>pp</sub>)  
C-4A clamp: 0...1000 A AC (3600 A<sub>pp</sub>) • C-5A clamp: 0...1000 A AC/DC (3600 A<sub>pp</sub>) • C-6A clamp: 0..10 A AC (36 A<sub>pp</sub>) • C-7A clamp: 0...100 A AC (360 A<sub>pp</sub>)







**C-4A**

WACEGC4AOKR



**C-5A**

WACEGC5AOKR



**C-6A**

WACEGC6AOKR



**C-7A**

WACEGC7AOKR

<b>Rated current</b>	1000 A AC	1000 A AC 1400 A DC	10 A AC	100 A AC
<b>Frequency</b>	30 Hz...10 kHz	DC...5 kHz	40 Hz...10 kHz	40 Hz...1 kHz
<b>Max. diameter of measured conductor</b>	52 mm	39 mm	20 mm	24 mm
<b>Minimum accuracy</b>	≤0.5%	≤1.5%	≤1%	0.5%
<b>Battery power</b>	—	✓	—	—
<b>Lead length</b>	2.2 m	2.2 m	2.2 m	3 m
<b>Measurement category</b>	IV 300 V	IV 300 V	IV 300 V	III 300 V
<b>Ingress protection</b>	IP40			



**F-1A1 / F-1A / F-1A6**

WACEGF1A1OKR  
WACEGF1AOKR  
WACEGF1A6OKR



**F-2A1 / F-2A / F-2A6**

WACEGF2A1OKR  
WACEGF2AOKR  
WACEGF2A6OKR



**F-3A1 / F-3A / F-3A6**

WACEGF3A1OKR  
WACEGF3AOKR  
WACEGF3A6OKR



**F-2AHD**

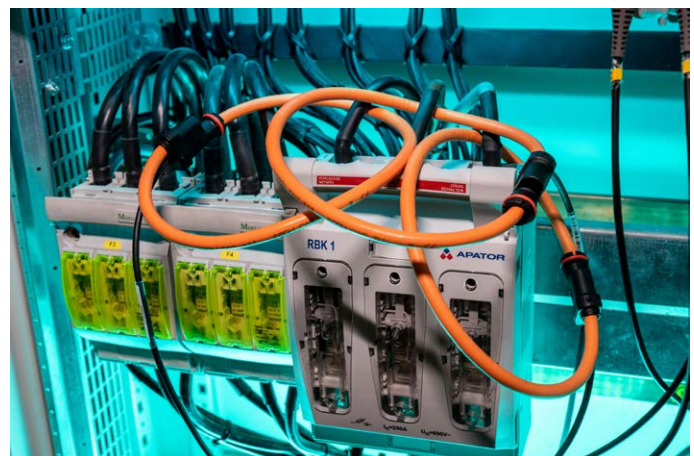
WACEGF2AHDOKR



**F-3AHD**

WACEGF3AHDOKR

<b>Rated current</b>	1500 / 3000 / 6000 A AC	1500 / 3000 / 6000 A AC	1500 / 3000 / 6000 A AC	3000 A AC
<b>Frequency</b>	40 Hz...10 kHz			10 Hz...20 kHz
<b>Max. diameter of measured conductor</b>	380 mm	250 mm	140 mm	290 mm 145 mm
<b>Minimum accuracy</b>	1%			0,5%
<b>Battery power</b>	—			—
<b>Lead length</b>	2.5 m			2.5 m
<b>Measurement category</b>	IV 600 V			IV 600 V
<b>Ingress protection</b>	IP67			IP65



# SONEL ANALYSIS

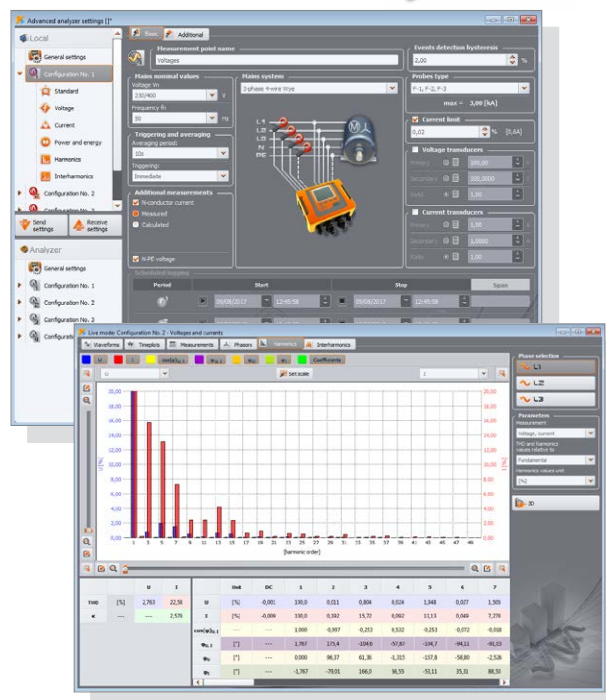


Sonel Analysis software – application delivered as standard accessory, indispensable for working with PQM-series analyzers. Depending on the mating instrument used, the software enables:

- 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  $\cos\phi = f(P/P_n)$ ,
- 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:

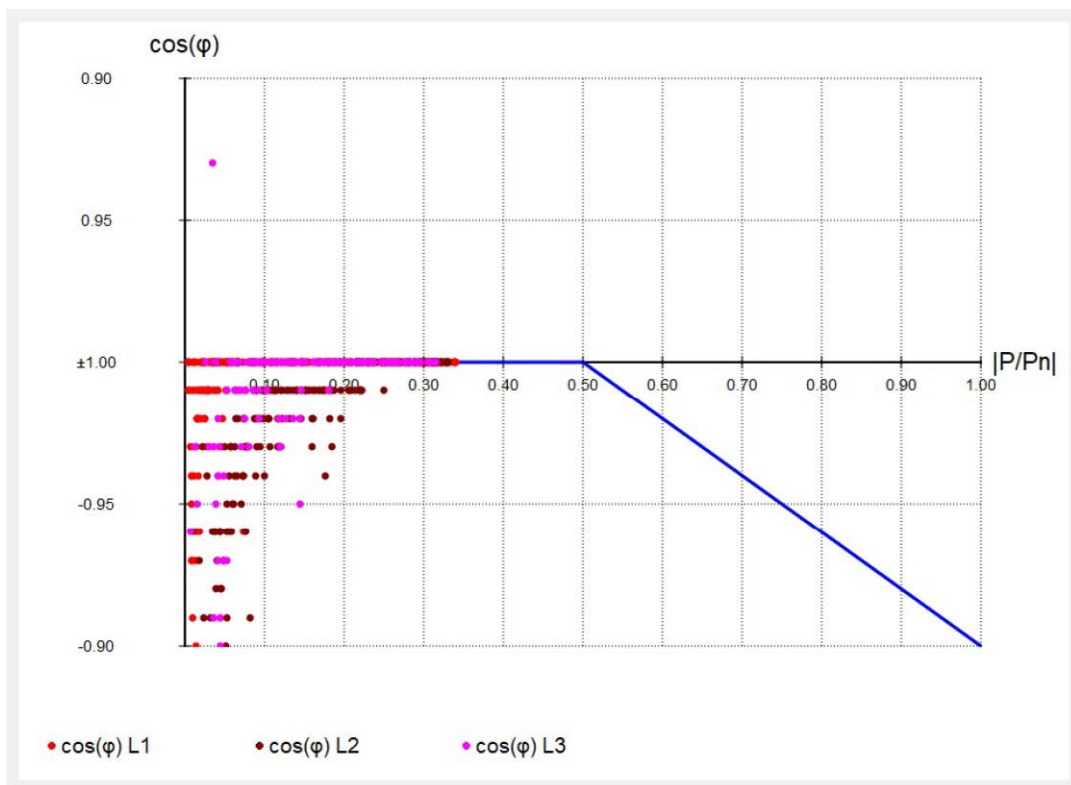
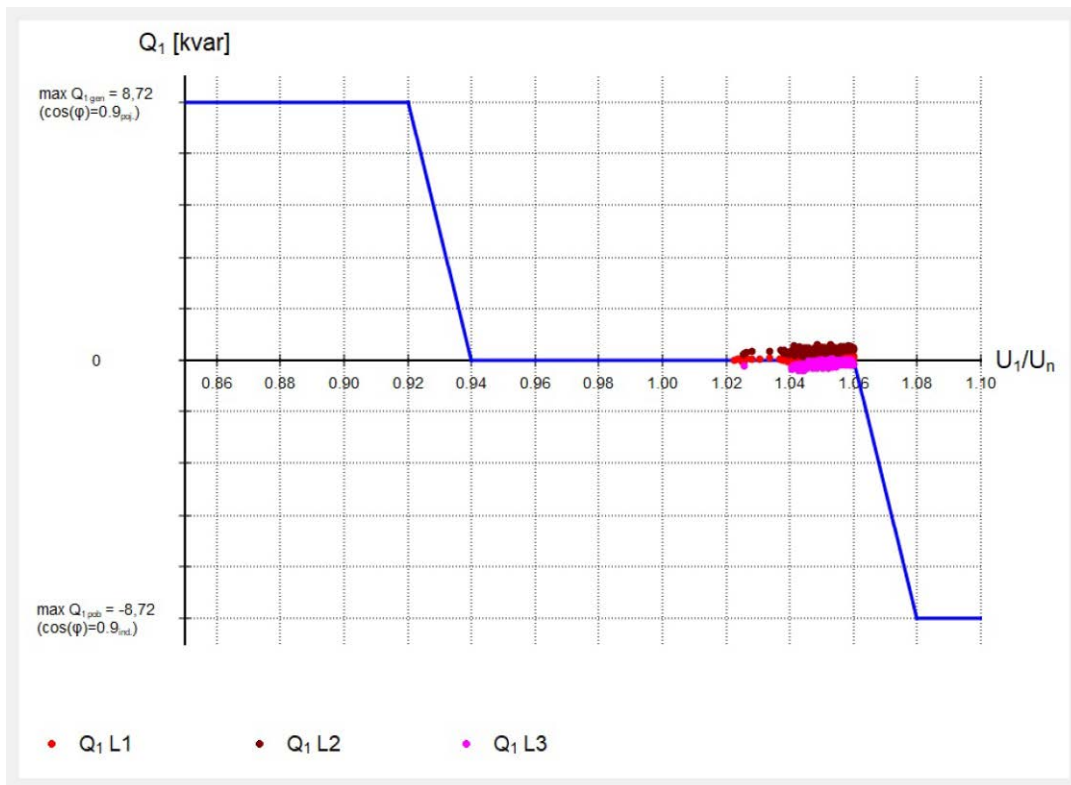
- charts of voltage and current progression (oscilloscope),
- charts of voltage and current over time,
- phasor diagram,
- measurements of multiple parameters,
- harmonics and harmonic powers (estimating the direction of harmonics),
- interharmonics.



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

### GENERAL INFORMATION

<b>Analyzer:</b>	Type: PQM-702   Version: FW1.50HwC   Serial number: AZ0025
<b>Report generated using:</b>	SONEL Analysis 4.6.0 BUILD 111
<b>Measurement time (UTC±00:00):</b>	Start: 2021-12-03 16:00:00.000 Stop: 2021-12-10 16:00:00.000 Time: 1w 0d 0h 0m 0s
<b>Number of parameter's samples averaged for every 5 s:</b>	120,960
<b>Number of parameter's samples averaged for every 10 min:</b>	1,008
<b>Number of parameter's samples averaged for every 15 min:</b>	672
<b>Number of parameter's samples averaged for every 2 h:</b>	84
<b>Number of excluded samples:</b>	0 (PLT: 0)
<b>Number of parameter's samples averaged for every 5 s (<math>P &gt; 0</math>, power consumption):</b>	L1 L2 L3 L123-N
<b>Number of parameter's samples averaged for every 10 min (<math>P &gt; 0</math>, power consumption):</b>	28,320 73,329 119,605 119,006
<b>Number of parameter's samples averaged for every 15 min (<math>P &gt; 0</math>, power consumption):</b>	243 682 1,002 994
<b>Number of excluded samples (<math>P &gt; 0</math>, power consumption):</b>	164 459 669 664
	0 0 0 0
<b>Nominal values:</b>	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
<b>Events limits:</b>	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](http://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-3 power supply adapter (mains plug/banana inputs)**

WAADAAZ3



**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**  
( $\Phi=360$  mm)

1.5 kA: WACEGF1A10KR  
3 kA: WACEGF1A0KR  
6 kA: WACEGF1A60KR



**F-2A flexible clamp**  
( $\Phi=235$  mm)

1.5 kA: WACEGF2A10KR  
3 kA: WACEGF2A0KR  
6 kA: WACEGF2A60KR



**F-3A flexible clamp**  
( $\Phi=120$  mm)

1.5 kA: WACEGF3A10KR  
3 kA: WACEGF3A0KR  
6 kA: WACEGF3A60KR



**C-4A clamp**  
( $\Phi$  52 mm)  
1000 A AC

WACEGC4A0KR



**C-5A clamp**  
( $\Phi$  39 mm)  
1000 A AC/DC

WACEGC5A0KR



**C-6A clamp**  
( $\Phi$  20 mm)  
10 A AC

WACEGC6A0KR



**C-7A clamp**  
( $\Phi$  24 mm)  
100 A AC

WACEGC7A0KR



**L2 carrying case**  
for clamps

WAWALL2



**Magnetic voltage adapter**

black  
WAADAUMAGKBL  
blue  
WAADAUMAGKBU



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

WASONKGB1KPL



**Test clips with steel jaws** (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** (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**

WAPOZANT10GSP







**GSM repeater**

WAPOZANTREPEATER



**Calibration certificate with accreditation**



			<b>PQM-711</b> 
		<b>PQM-710</b> 	
	<b>PQM-707</b> 		
<b>PQM-700</b> 			
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

**INSULATION RESISTANCE METERS**

MIC-30 INSULATION RESISTANCE METER    MIC-5010 INSULATION RESISTANCE METER    MIC-10k1 INSULATION RESISTANCE METER

**EARTH RESISTANCE AND RESISTIVITY METERS**

MRU-30 EARTH RESISTANCE AND RESISTIVITY METER    MRU-200-GPS EARTH RESISTANCE AND RESISTIVITY METER

**POWER QUALITY ANALYSIS**


PQM-700 POWER QUALITY ANALYZER    PQM-711 POWER QUALITY ANALYZER



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