Multifunctional Power Quality Analysers

From Simple One Phase to Ultimate Three Phase Portable Instruments

Power Quality Analyser-Plus
Power Quality Analyser
Power Harmonics Analyser
VoltScanner

Measuring
Recording
Analysing

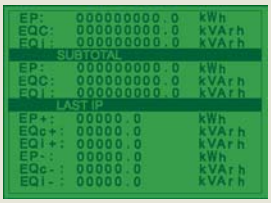
Testing according to:
EN 61000-4
EN 61000-7
EN 61000-11
EN 50160

Instrument designed according to:
EN 61010-1 (Safety)

EN 50081-1
EN 61000-6-1
(Electromagnetic compatibility)

METREL®

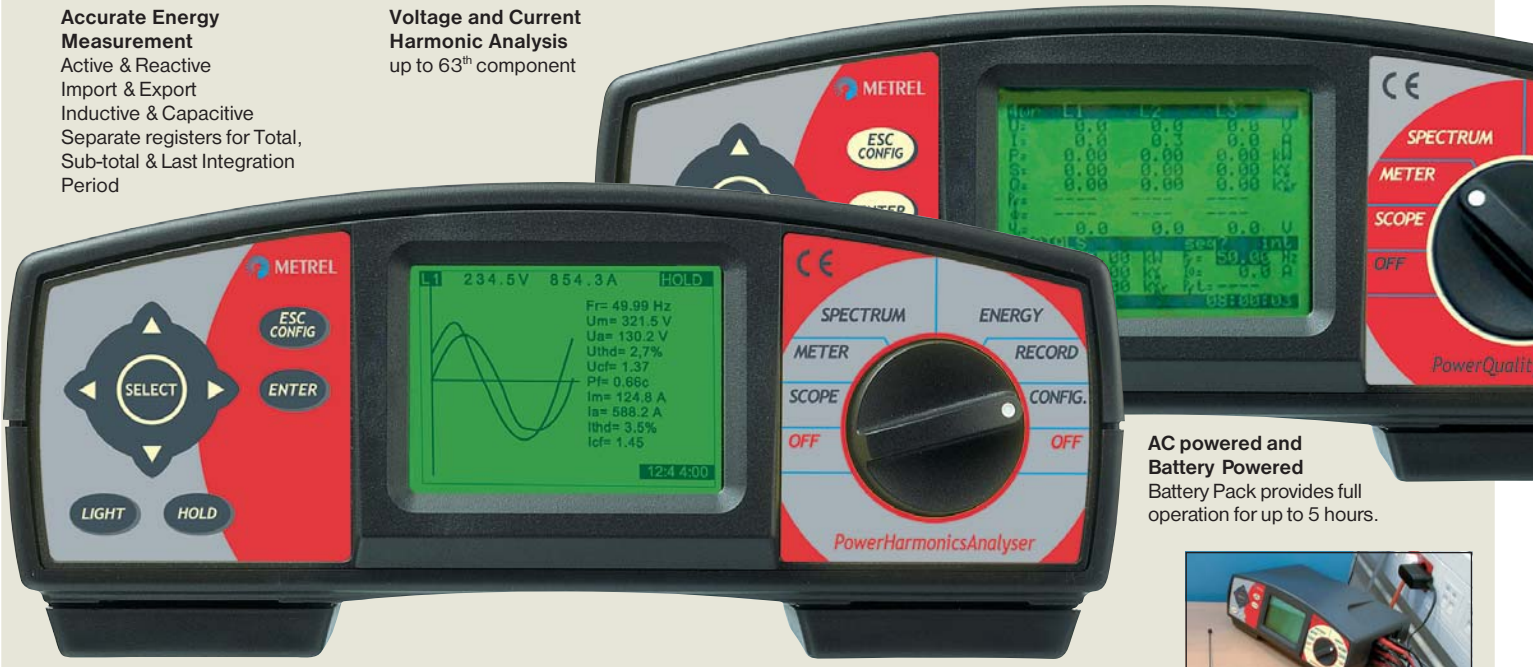
Main Features



Accurate Energy Measurement
Active & Reactive
Import & Export
Inductive & Capacitive
Separate registers for Total, Sub-total & Last Integration Period

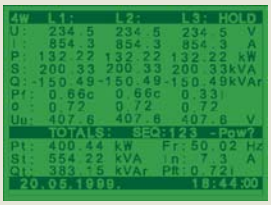
Voltage and Current Harmonic Analysis
up to 63th component

True real-time operation for capturing anomalies, voltage interruptions and power breaks.
2 Mb of memory allows data logging up to several months.

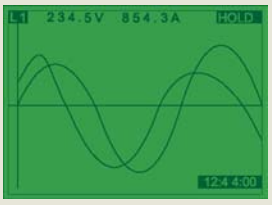


AC powered and Battery Powered
Battery Pack provides full operation for up to 5 hours.

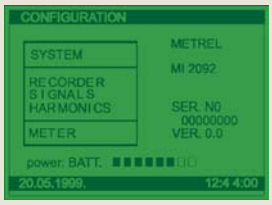
Modem Remote Control by using GSM or standard type of communication.
- Remote programming of instrument via PC.
- Downloading recorded data via PC from a remote location.
- Receiving SMS alarms (task completed full memory etc.)



Meter Menu for display of all measured parameters



Scope function allows viewing of current and voltage waveforms.



Configuration menu for setting measuring method, integration period, current scaling factor, and selection of signals.

TECHNICAL SPECIFICATION

AC VOLTAGES

Three-phase AC voltage input (3 differential inputs, L_1 - N_1, L_2 - N_2, L_3 - N_3)

Input voltage range:	10–550 V_{rms} L-N, 900 V_{rms} L-L 600 V_{rms} L-N (over load 10 s)
Optional on request:	10–750 V_{rms} L-N, 1000 V_{rms} L-L 800 V_{rms} L-N (overload 10 s)
Resolution:	0.1 V
Accuracy:	± 0.5 % of reading ± 2 digits
Crest factor max.	1.4
Frequency range:	43–68 Hz fundamental

AC CURRENTS

Three-phase AC input for connection to current transducers with voltage output

Input current (voltage range):	0.02–1 V_{rms} (from 0.02 x I_n to I_n) input
Resolution:	0.3 mV (0.3 A with 1000 A / 1 V)
Accuracy:	± 0.5 % of reading ± 6 digits plus current transformer accuracy
Crest factor:	2.5
Maximum permissible overload:	150 % I_n (sinusoidal current)
Maximum input voltage:	1 V_{rms}

PHASE ANGLE

Consider phase angle data of used current transformer.

SCOPE

Display options	Waveform of pairs (L_1: U_1 and I_1, L_2: U_2 and I_2, L_3: U_3 and I_3), $U_{1,2,3}$, and $I_{1,2,3}$
Ranging	Auto / manual

METER – Power measurement

Quantities related to selected measuring connections per phase, i.e.:

Measured:	voltage (U), current (I), cosφ between U and I
Calculated:	active power (P), apparent power (S), reactive power (Q), power factor (Pf) with its characteristic (c, I, none) Line – Line voltage;

Quantities for complete three-phase system, i.e.:

Calculated:	active power (Pt), apparent power (St), reactive power (Qt), power factor (Pft), neutral current (In);
Basic accuracy for P, Q, S,:	± 1 % of reading
Resolution for P, Q, S,:	0.01 of displayed value

SPECTRUM – Harmonics measurement

The instrument computes harmonics on signals sampled with an A/D converter.

Recording interval:	160 ms (8 cycles)
Spectrum calculation range:	DC – 63rd
Spectrum display range:	DC – 25th

Displayed items for selected harmonic: Order, relative and absolute value

Range	Limits of error		Resolution
I_{range} U_{range}	THD Total Harmonic Distortion	HD Harmonic Distortion	on LCD and PC
2 … 100 %	0.2 % x U_r/U (I_r/I)	0.2 % x U_r/U (I_r/I)	0.1 %

ENERGY

Displayed quantities from integration of calculated power as:
- cumulative values (TOTAL);
- partly cumulative (resettable by user request) (SUBTOTAL);
- values related to last integration period (LAST IP).

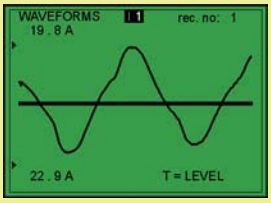
Quantities. Active energy (EP), capacitive energy (EQC), inductive energy (EQI)

Basic accuracy:	± 1 % of reading
Resolution:	0.1 of displayed value

PC Software

Special SW Tools

Special tools enable a detailed, time domain based signal analysis. They represent a powerful, modern troubleshooting tool for solving of all kinds of problems which are appearing in power distribution systems. The user can choose between three modes, differing in terms of sampling speed, trigger possibilities and recording time:



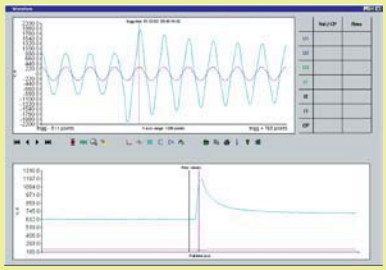
WAVEFORMS

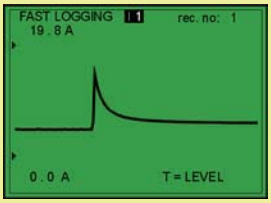
Recording of voltages and currents with 128 samples/period. Half period RMS values of recorded quantities are also calculated and shown in this mode. Best suited for:

- monitoring of switching phenomena,
- locating of noise and disturbance sources,
- defining disturbance type,
- locating excessive harmonics sources.

Typical problems that can be solved by WAVEFORM analysis:

- capacitor banks switch over,
- transformer overheating,
- UPS problems,
- SMPS failures etc.





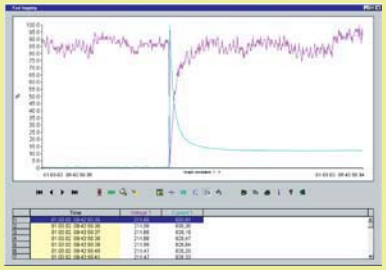
FAST LOGGING OF SIGNALS

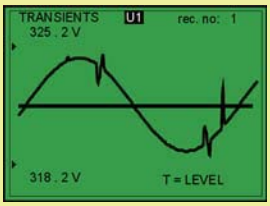
Recording of half period RMS voltage and currents values. Recommended when record length is critical and signal's details are not of importance. Best suited for:

- observing start up and inrush events,
- locating impedance problems,
- long term analysing of unstable mains.

Typical problems that can be solved with FAST LOGGING analysis:

- too high inrush currents of large motors,
- undersized fuses and installation wiring,
- too weak voltage source etc.





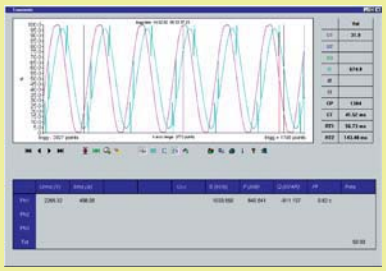
TRANSIENTS

The recording mode with fastest sampling rate that the instrument can provide. Up to 50 kHz transient detect ability in this mode. Best suited for:

- monitoring atmospheric discharging,
- analysing switching problems,
- detailed analysis of high frequency noise and notching.

Typical problems that can be solved with TRANSIENT analysis:

- frequency noise,
- voltage spikes caused by switching of capacitor banks etc.



RECORDER

Periodics integration period:	1 s – 900 s
Selected signals:	max. 64
Statistics values:	each period divided in 200 parts (0.1 ms)

Voltage anomalies: based on half period, start, duration and extrems of voltage

EN 50160 ANALYSIS MODE

Voltage dips, swells, sags and breaks, resolution 10 ms, no gaps
Voltage unsimetry, Voltage RMS values, Frequency

Harmonics:	up to 43th component
Flickers Plt Pst:	no gap

FLICKER MEASUREMENT

The instrument computes flickers according to IEC 61000-4-15

WAVEFORMS

Sampling rate:	128 scans / period
Trigger:	level, manual, timer
Buffer:	min. 10 periods of pre / post size, up to 7812 periods can be recorded
Channels:	3 x U, 3 X I, U lines, Min / Max rms values: Avg

Pf, cosφ, Crest factor, THD U, I Frequency

Harmonics / direction:	magnitudes / positive / negative

FAST LOGGING

Sampling rate:	128 scans / period, min, max, Avg recorded each halfperiod
Trigger:	level, manual, timer
Buffer:	pre / post size, up to 166 minutes of recording
Channels:	3 x U, 3 X I, Single or multichannel mode

TRANSIENTS

Capturing:	>20 µs transient detect ability
Trigger:	Level, slope, manual
Buffer:	min. 10 periods of pre / post size, up to 1000 periods can be recorded
Channels:	3 x U, 3 X I, Single or multichannel mode

GENERAL SPECIFICATION

Display: Graphic Liquid Crystal Display with LED backlight, 160 x 116 dots resolution

NON – VOLATILE MEMORY

2048 Kbytes SRAM, battery backed.

DIGITAL HARDWARE SPECIFICATION

A/D conversion, 14 bit with 128 samples per channel per period (43–68 Hz).

OUTPUTS

Communication type:	RS 232 serial interface, fully opto isolated
Baud rate:	2400–57600 baud.
Connector:	9 pin D-type.
Communication cable:	Standard type

POWER SUPPLY

Operating range:	230 V A.C. + 10 % – 20 %, 45–65 Hz, 8 VA
Optional:	115 V A.C. + 10 % – 20 %, 45–65 Hz, 8 VA
DC power supply:	Internal 4 x 1.2 V NiCd or NiMh rechargeable IEC LR14 batteries provide full operation for up to 5 hours.
Charger:	Internal built-in battery charger, charging time approx. 10 hours.

GENERAL

Working temperature range:	– 20 °C … + 60 °C
Max. humidity:	85 % RH (0 ÷ 40 °C)
Pollution degree:	2
Protection classification:	II - double insulation
Overvoltage category:	Voltage inputs: CAT III 600 V; optional CAT IV 600 V AC power supply CAT III 300 V
Protection degree:	IP 44 (IP 54 on request)
Dimensions:	265 x 110 x 185 mm
Weight (without accessories):	2 kg

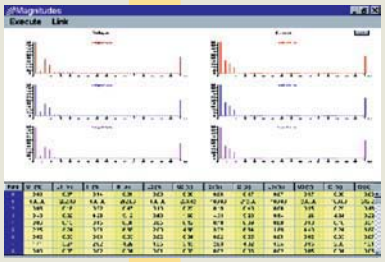
PowerLink (Windows 95/98/2000/NT)

Direct mode

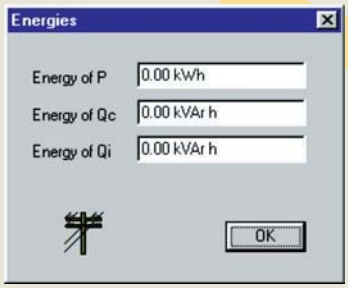
On-line monitoring of three-phase currents and voltages

- **6-CHANNEL OSCILLOSCOPE**

- **HARMONICS UP TO 63th**



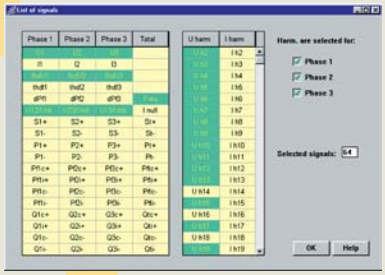
- **ENERGY counter, P, S, Q, PF** *and other calculations*



Recorder mode

Simple set-up

- Selection of signals and type of analysis (periodics, anomalies, statistics, EN 50160.
- Selection of recording time and averaging cycles integration period.
  Recording can be set also from instrument directly.

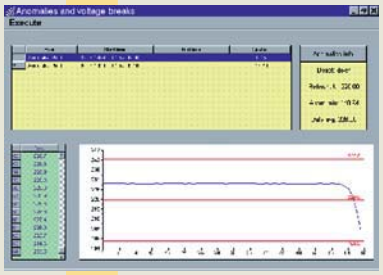


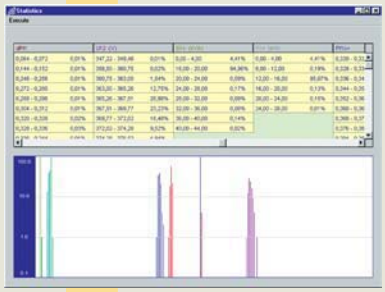
Analysis

PERIODICS AND STATISTICS ANALYSIS

Over 300 quantities (64 at the same time) can be recorded and stored in this mode. All important quantities and events can be selected:

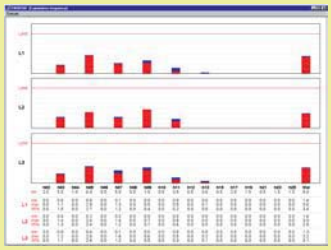
- average, minimum and maximum voltage and current RMS values,
- harmonics and THD of voltage and current
- particular and total power (classified sign and character)
- voltage events and anomalies (interruptions, dips, sags), type and duration
- flicker Pst and Plt values
- other EN50160 parameters: signaling, interharmonics, unbalances.



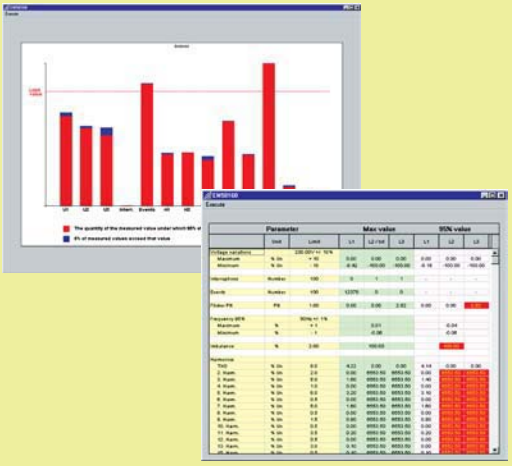


- **EN 50160 AUTO-MODE with statistics and results based on the standard**

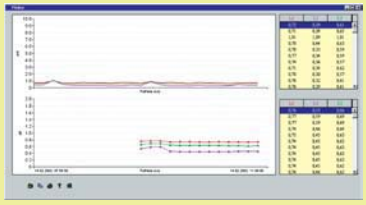
- **HARMONICS REPORT**



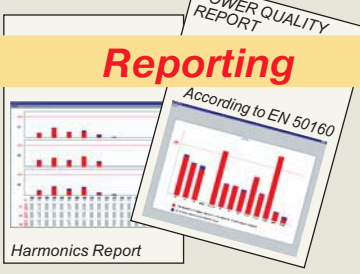
- **STATISTICS REPORT** *in EN 50160 graphic and tabelaric form*



- **FLICKER DIAGRAMS**



Reporting



Test Reports

- Saving of results, graphs and reports for further analysis
- Exporting of data and graphs in xls files for making custom reports.
- Print-out of results and graphs.