

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*

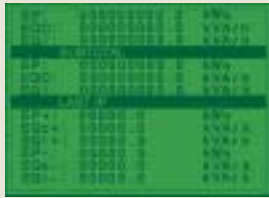
Testing according to:
EN 61000-4
EN 61000-7
EN 61000-11
EN 50160

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

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



Main Features



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



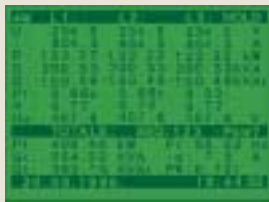
Voltage and Current Harmonic Analysis
up to 63th component



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.



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.

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.)

TECHNICAL SPECIFICATION

AC VOLTAGES

Three-phase AC voltage input (3 differential inputs, L₁ - N₁, L₂ - N₂, L₃ - N₃)

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 × 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 (L₁: U₁ and I₁, L₂: U₂ and I₂, L₃: U₃ and I₃), 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 (P_f) with its characteristic (c, l, none)
Line – Line voltage;

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

Calculated: active power (P_t), apparent power (S_t), reactive power (Q_t), power factor (P_ft), neutral current (I_n);

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 _r range U _r range	THD Total Harmonic	HD Harmonic	on LCD and PC
	Distortion		
2 ... 100 %	0.2 % × U _r /U (I _r /I)	0.2 % × U _r /U (I _r /I)	0.1 %

ENERGY

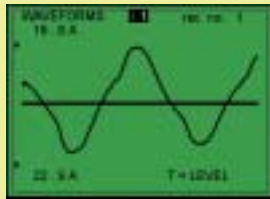
Displayed quantities from integration of calculated power as:

- 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

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:



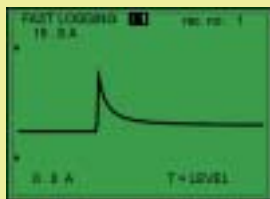
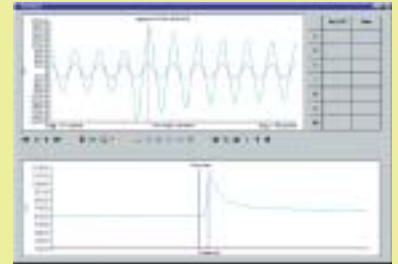
● WAVEFORMS

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.



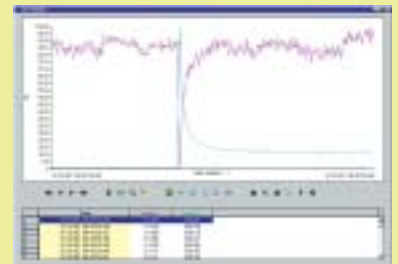
● FAST LOGGING OF SIGNALS

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.



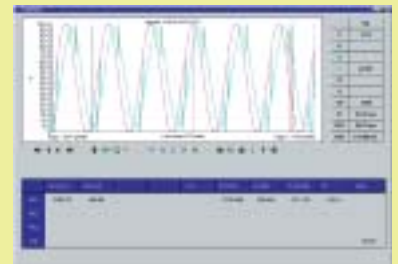
● TRANSIENTS

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 extremis 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, cosp, 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 μ s 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



Direct mode

On-line monitoring of three-phase currents and voltages

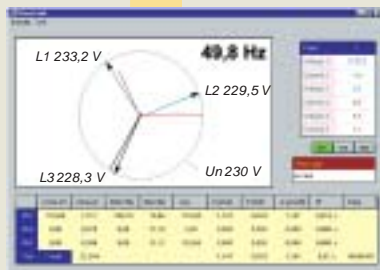
• 6-CHANNEL OSCILLOSCOPE



• HARMONICS UP TO 63th



• PHASE DIAGRAM



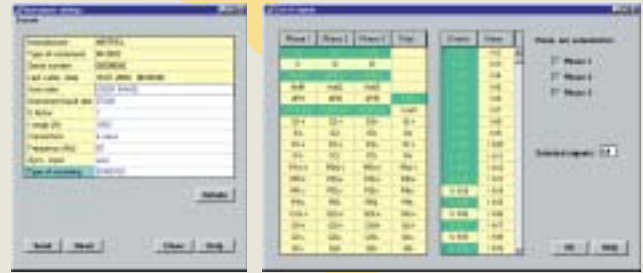
• ENERGY counter, P, S, Q, PF and other calculations



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.

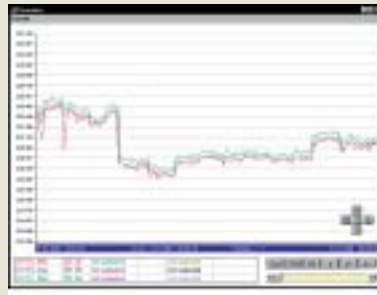


Analysis

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.

VoltScanner

Easy and smart solution to measuring the quality of the line voltage in accordance with EN 50160 – event or periodics mode

Maintaining a high-quality electric power supply is essential for your daily work and life. For a proper operation of computers and other electrical and electronic equipment you want to know whether the contracted level is being met and when and how often the limit values are exceeded.



RS 232 communication port

LED and BUZZER indicate a wrong polarity connection on the outlet.

A flashing LED indicate that events have been captured

LED lamp indicate when the memory capacity is over.

Low-battery indication LED

- A flashing LED indicate that events have been captured
- Memory capacity of up to 3500 events

OPERATING PROCEDURE

- **Set-up limit values**
 - Custom or
 - EN 50160 auto-mode
- **Plug-in**
- **Measuring & Recording**
 - **Events mode**
 - Dips/Sags, Swells
 - Voltage interruptions
 - Frequency fluctuations
 - Transients overvoltage
 - **Periodics mode**
 - Power frequency
 - Supply voltage
 - EN 50160 auto-mode
- **Downloading**
- **Analysis**

- Periodics (max., min., or average values) – table or graph
- Statistics of
 - All the events by character, apparent and duration time,
 - Events selected by period of time (divided in day by day periods or divided period within a day).

TECHNICAL SPECIFICATION

Measurement

Phase to Neutral

Range	Accuracy	Resolution
90 to 265 V	± 2 V of reading + 2 %	1 V

Neutral to Ground

Range	Accuracy	Resolution
0 to 155 V	± 2 V of reading + 2 %	1 V

Frequency

Range	Accuracy	Resolution
47–52 Hz,	± 0.1 Hz	0.1 Hz
57–62 Hz	± 0.1 Hz	0.1 Hz

Transients

Range	Accuracy	Resolution
50 to 2600 V	± 10 %	5 V

Minimum width: 1 µs

General

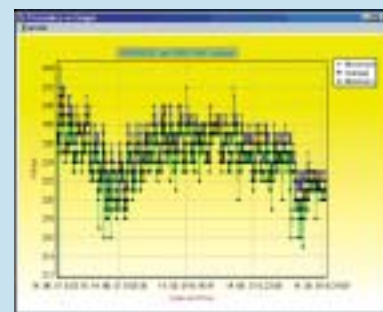
- Nominal Supply Voltage: 230 V or 120 V
- Nominal Frequency: 50/60 Hz
- Communication: RS 232 serial interface, fully opto isolated, 9 pin D-type connector
- Memory: 32 kB, 3500 events
- Battery: 6 V DC (4 x 1.5 V AA) Rechargeable
- Overvoltage category: CAT III 300 V



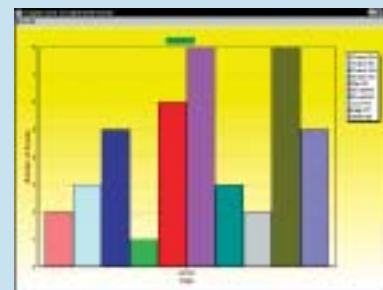
Set-up of event recording or periodics recording mode



Simple plug-in and automatic start of monitoring







Periodics analysis of voltage variation for the past 3 weeks








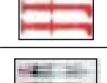


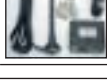


Statistics of the captured events

ScanLink Windows 95/98/2000/NT software for analysing and print-outs with a complete history of captured events in a table or graphic form (statistics). By analysing periodics it enables review of voltage quality against the set limits (Custom or EN 50160 auto-mode).

	Power Quality Analyser-Plus	Power Quality Analyser	Power Harmonics Analyser	VoltScanner	
					
Main features:	Order No.:	PHS 52	PHS 51	PHS 50	MI 2130
Power Quality Testing					
RMS Voltages, Currents (average, min., max.)		✓	✓	✓	
THD & Harmonics Analysis		✓	✓	✓	
Power - Active, Reactive, Apparent Cos Φ, Character, sign		✓	✓	✓	
Voltage Events (dips, sags, interruptions)		✓	✓	✓	✓
Periodics & Statistics Analysis		✓	✓	✓	✓
Anomalies (Events) Analysis		✓	✓	✓	✓
Neutral current (calculated)		✓	✓	✓	✓
On Line monitoring					
Meter mode - tabularic results		✓	✓	✓	
Scope mode - oscilloscope		✓	✓	✓	
Spectrum Analysis mode		✓	✓	✓	
EN 50160 compliant testing					
Fast Set Up - Auto mode		✓	✓		✓
Voltage		✓	✓	✓	✓
THD & Harmonics		✓	✓	✓	
Dips, Sags, Interruptions		✓	✓	✓	✓
Flicker		✓			
Frequency		✓	✓	✓	✓
Interharmonics / Signalling		✓			
Unbalance		✓	✓		
EN 50160 Test Report		✓	✓		
Special tools					
FAST LOGGING mode		✓ (166 minutes)	✓ (8.4 minutes)		
WAVEFORM mode		✓ (7812 periods)	✓ (390 periods)		
TRANSIENT mode		✓ (1000 periods)	✓ (50 periods)		✓
Energy					
Total & Subtotal counters		✓	✓	✓	
PC SW		✓	✓	✓	✓
MODEM access key		✓	optional	optional	

Optional accessories for PHS52, PHS51 & PHS50

Order Ref:

	3-Phase Flex Kit 30 A / 300 A / 3000 A / 1 V Selectable ranges and length of 45 cm will accommodate conductors of various shapes and dimensions.	A 1120
	1-Phase Flex Kit 30 A / 300 A / 3000 A / 1 V Selectable ranges and length of 45 cm will accommodate conductors of various shapes and dimensions.	A 1099
	Mini clamp 5 A / 1 V Jaw dimensions make them suitable for measurements on round conductors with a diameter up to 15 mm.	A 1122
	Mini clamp 100 A / 1 V	A 1069
	Clamp Adapter Clamp Adapter has to be purchased for connecting different type of clamps to the instrument's input (for A1122, A1069)	A 1039
	3-Phase Current Transformer 5 A / 1 V For standard 5 A AC current output in power substations.	A 1037
	Flat Contact Clamps Particularly useful for making connections on bus bars and other large sized conductors.	S 2015
	Fuse Adapters For additional protection measure in high energy LV systems.	S 2014
	Modem ST (gsm) - Remote programming of the instrument via PC	A 1100
	Modem GSM (standard telephone lines) - Downloading recorded data via PC from a remote location - Receiving SMS alarms (task completed, full memory, ...)	A 1101
	Modem Access Key A 1124 is supplied in the standard set for PHS52. An Option for PHS51 and PHS50. Allows MODEM connection.	A 1124

Standard set

Order No. PHS52, PHS51 & PHS50



- Instrument
- Current clamp 1000 A/1 V, 3 pcs
- Small soft carrying bag
- Test tips, 3 pcs
- Alligator clips, 4 pcs
- Voltage measurements cables, 6 pcs
- Mains cable
- RS 232 cable
- 4 x 1.2 V NiCd batteries
- Soft carrying bag
- Instruction manual
- Declaration of conformity
- Product verification data
- Declaration of warranty
- Power Link PC analysis and control software package (for Windows 95/98 and 2000)

* Safety flat clamps, 4 pcs (for PHS52 only)

Standard set Order No. MI 2130



- Instrument
- Mains measuring cable
- Battery-rechargeable 4 x 1.2 V
- Windows Software "ScanLink" with RS 232 interface cable
- Instruction Manual
- Declaration of conformity
- Product verification data
- Declaration of warranty

Optional accessories



- Small soft carrying bag **A 1020**
- Universal test cable, 3 x 1.5 m with test tips **S 1112**
- Alligator clip (black), 3 pcs **S 2010**

Northern Design (Electronics) Ltd
Bolton Road, Bradford BD3 0QW UK

Tel: +44 1274 729 533; Fax: +44 1274 721 074

http://www.ndmeter.co.uk; E-mail sales@ndmeter.co.uk

Subject to technical change without notice!

Distributor: