

Energy Explorer

PORTABLE POWER ANALYSERS



DESCRIPTION

PROFESSIONAL POWER & HARMONICS ANALYSER

ENERGY EXPLORER is an advanced Power Analyser, designed for use by electricians, plant engineers and energy professionals.

ENERGY EXPLORER provides fast and accurate measurement of all standard parameters characterizing the power consumption of electrical loads, such as the TrueRMS values of Voltage, Current, Frequency, Powers, Power Factor/CosPhi, Energy. **ENERGY EXPLORER** extends the analysis also to transient conditions of the load, thanks to the built-in Inrush Current function allowing voltage and current monitoring with pre-triggering.

The load consumption can be kept under close control thanks to the availability of fully configurable Average and Maximum Demand functions, user-settable alarms and configurable tariff-band energy analysis.

Historical, graphic trend-displays provide immediate understanding of how parameters change during a settable time frame.

In addition to the above, **ENERGY EXPLORER** provides also state-of-the-art analysis of dangerous and hidden phenomena such as Harmonics, Microinterruptions, Voltage Unbalance. The analysis of such phenomena is nowadays an indispensable troubleshooting tool, helping to minimize downtimes and malfunctions of increasingly complex electrical systems.

MAIN FEATURES

RMS METER:

3-Phase TRMS measurements of all electrical parameters characterizing the load's supply and power consumption, such as: Voltages, Currents, Powers, Energies, Frequency, Power Factor, CosPhi, Crest Factor, THD-V, THD-I, etc.

RMS Measures can be displayed as instantaneous, Min/Max or Average values with configurable integration time and mode:

- Fixed: fixed integration time-frame; the Average and MD values are updated at the end of each fixed time-frame.

- Sliding: sliding integration time-frame; the Average and MD values are constantly updated on the basis of a sliding time-frame.

- Synchro: synchronized time-frame; the time-frame is synchronized by external

control-signals, such as provided by the energy utilities

SCOPE:

Real-Time display of the measured voltages' and currents' waveforms, their instantaneous RMS values and Phase-Angles.

HARMO:

Fully IEC61000-4-7 compliant measurement of voltage and current harmonics up to the 31st order.

The harmonics' data is displayed both graphically, as bar-graphs, and numerically. Each harmonic order is displayed as absolute value and percentage of the fundamental and includes the displacement angles between the harmonic voltage and currents, providing the power of the examined harmonic orde

TARIF-BAND MANAGEMENT:

Allows the configuration of up to 4 Tarif Bands with accounting of kWh, kVAh, cost and necessary reactive energy for PF correction.

PHASE VECTOR DISPLAY:

The Phase-Vector diagram provides a clear and immediate representation of the 3-Phase system's voltages, currents and phase angles, as well as the system's unbalance.

INRUSH/ START-UPCURRENTE CAPTURE:

Fully IEC61000-4-30 compliant capture and display of transient current events with pre-triggering functions. This function provides fast and reliable analysis of the start-up of motors / loads, connection of capacitor banks, etc.

ALARM FUNCTIONS:

Energy Explorer provides the possibility to set configurable alarm thresholds on any measured value, for immediate display and logging of the alarm conditions. Additionally, Energy Explorer is equipped with 2 Relay Outputs that can be linked to any of the set alarms or configured to become Pulse-Outputs.

MEASUREMENT SURVEYS/DATALOGGING:

Energy Explorer's extremely flexible memory system, based on extractable and exchangeable Compact Flash cards, allows to perform long and detailed measurement surveys. The surveys can be started/stopped at any time or scheduled to start and stop at a later time. Measurement surveys can be of two types:

-RMS: Surveys storing the RMS values of all measured parameters with a settable frequency.

-Waveform: Surveys storing the actual digital samples of voltages and currents with a settable frequency. When analysing such a survey on PC, not only the RMS values but also the actual waveforms of the signals will be available.

MAIN FEATURES:

Current & Voltage Measurement: Energy Explorer Kit includes a set of 3 flexible current probes with 5A-1000A measuring range and 41cm of length. Thanks to its special input circuit, Energy Explorer avoids the necessity of the usual external amplifier/integrator box for the flexible current probes. The elimination of the external circuit-box greatly improves the measurement accuracy, eliminates the short

autonomy due to the amplifier's battery supply and enhances the natural ease-of-use of the flexible clamps.

For the voltage measurement Energy Explorer Kit includes a set of 6 measuring cables, color-coded and equipped with extractable crocodile clips.

Memory: Energy Explorer is already delivered with a massive 512Mb Compact Flash Card, allowing immediate use of Energy Explorer's survey capabilities.

PC Software: PE Studio, [click here](#) a powerful and easy-to-use PC Software, specially designed to for the complete analysis and reporting of all data recorded by Energy Explorer, is included with Energy Explorer Kit.

Power Supply: Energy Explorer Kit comes with a desktop power supply (for the supply of the instrument and recharge of the batteries) and a set of 10 rechargeable, heavy-duty NiMh batteries (AA type, overall capacity 2300mAh).

Transport & Protection:

Special care was taken to ensure both high-protection and high-transportability for the Energy Explorer Kit. Energy Explorer is supplied with a shock- and water-proof IP67 plastic carrying case, resistant to corrosion and suitable for airplane transport. The above case is equipped with an internal, detachable soft-bag containing all the Energy Explorer Kit.

TECHNICAL SPECIFICATION

DIMENSIONS 300x210x65 mm

WEIGHT 1650 g

MATERIAL OF THE CASE Self-extinguishing ABS (V0) with rubber coating

PROTECTION RATING IP20

KEYBOARD Alphanumerical made of tactile rubber

DISPLAY 5.7" 320x240 graphic colour LCD
(115.2 X 86.4 mm)
brightness: 200 cd/m²
adjustable brightness/contrast.

MEASUREMENT REFRESH 1 second

OPERATING SYSTEM LINUX

REAL TIME CLOCK

Month-day-year hour-minutes-seconds, can be set from the setup.

Maximum error: \diamond 3 seconds per day at 25°C.

Internal capacitor for data storage for the time required to replace the batteries.

Video alarm when Energy Explorer is turned on in the event of data loss due to low batteries.

LANGUAGES Italian, English, French, Spanish, German (settable from the setup).

CASE Rigid IP67 case + internal case made of Cordura, dimensions 480 X 385 X 190 mm.

MEMORY

Type I COMPACT FLASH up to 8 GB (512 Mbytes supplied).

Storage of values sampled by the AD converter (all input channels) or processed data (e.g. EN50160 reports).

With the supplied 512 Mbytes it is possible to store up to 9350 records, corresponding to 3 hours of uninterrupted campaign with a mains frequency of 50 Hz.

Each record includes the sample values of 60 periods on 7 channels.

Ex.: with a 8 GB memory, if 1 record every 5 minutes is selected, 240 days of storage are achieved; if 1 hour is selected, 8.5 years are achieved.

INPUT CHANNELS

--- INPUT SIGNAL SAMPLING ---

NUMBER OF INPUT CHANNELS 7

AD CONVERTER RESOLUTION 14 bits

SAMPLING SPEED: 22.4 kSamples/second at 50 Hz - 26.88 kSamples/second at 60 Hz

--- VOLTAGES ---

NUMBER OF CHANNELS 3 with independent inputs

INPUT IMPEDANCE 3 MOhm

MAX VRMS BETWEEN CHANNELS 1000 VACRMS

MAX MEASURABLE V_{peak} 1400 V

NUMBER OF SCALES 2

VRMS THAT CAN BE MEASURED

AT TERMINALS 1.5 \diamond 500 VACRMS low scale

3 \diamond 1000 VACRMS high scale

PRECISION (RMS VALUES) $< \diamond 0.2\%$ of the reading $\diamond 0.05\%$ of the full scale

PRECISION (peak VALUES) $< \diamond 5\%$ of the reading $\diamond 1\%$ of the full scale

MAX VOLTAGE APPLICABLE

AT THE TERMINALS 600V CAT III pollution rating 2

--- CURRENTS ---

NUMBER OF CHANNELS 4 (3 + 1 auxiliary)

INPUT IMPEDANCE 10kOhm

MAX VOLTAGE APPLICABLE

AT THE TERMINALS: 5V peak-to-peak

TYPE OF CLAMPS THAT CAN BE USED:

Flexible clamps without amplifier (except auxiliary channel)

Traditional clamps (output 0 \diamond 1VAC)

Flexible clamps with amplifier (output 0 \diamond 1VAC)

CLAMP CONNECTOR Type Hypertronics D01PB306NT

MEASURABLE IRMS

Flex clamps supplied 5 \diamond 1400ARMS

Other clamps (output 0 \diamond 1VAC)

0.3% \diamond 140% of the nominal current of the clamp used.

PRECISION (RMS VALUES) $< \diamond 0.2\%$ of the reading $\diamond 0.05\%$ of the full scale + clamp error.

PRECISION (peak VALUES) $< \diamond 5\%$ of the reading $\diamond 1\%$ of the full scale + clamp error

--- FREQUENCY ---

LIMIT VALUES FOR A COMPLETE ANALYSIS From 40 to 80 Hz (fundamental frequency)

PRECISION $\diamond 0.01$ Hz

ENVIRONMENTAL

ALTITUDE up to 3000m. The insulation category decreases above 3000m.

OPERATING TEMPERATURE from 0 \diamond to 60 \diamond C

STORAGE TEMPERATURE from -20 to 70 \diamond

RELATIVE HUMIDITY 80% for temperatures up to 31 \diamond with linear decrease up to 50% at the temperature of 40 \diamond .

REFERENCE STANDARDS

SAFETY EN 61010-1 Safety for electrical equipment for measurement

EMC EN61326; EN61326/A1/A2/A3

Electromagnetic compatibility for electrical equipment for measurement.

MEASUREMENT

EN 61004-30 Measurement methods.

EN 61002-8 Measurement of losses of voltage and interruptions.

EN 61004-7 Measurement of harmonics and interharmonics.

EN 50160 Power quality.

ACCESSORY FEATURES

FLEXIBLE CLAMPS

OUTPUT VOLTAGE 39.1 \diamond /A at 50 Hz

INTERCHANGEABILITY ERROR $< 0.5\%$

LINEARITY $< 0.3\%$

ABSOLUTE ERROR 1%

DISPLACEMENT AT 50 Hz <0.5◆
PROTECTION RATING IP65
SELF-EXTINGUISHING UL94-V0
ELECTRICAL SAFETY EN 61010-1 and EN 61010-2-32
CAT III 1000VRMS 襍ouble insulation
LENGTH OF CONNECTION CABLE 200 cm
IDENTIFICATION by purple, green and blue wire markers

VOLTAGE CONNECTION CABLES

COLOURS red, yellow, blue
(the black plug identifies the neutral)
LENGTH 200 cm
INSULATION CAT III 600V

POWER SUPPLY

INPUT VOLTAGE 100 ◆ 240 VAC
INPUT FREQUENCY 50-60Hz
OUTPUT VOLTAGE 12 VDC
POWER 40W

BATTERIES

BATTERIES 10 rechargeable NiMh type AA 2300mAh batteries
BATTERY-OPERATION TIME about 2 hours with backlight ON >3 hours with
backlight OFF
BATTERY CHARGER Internal to the instrument
MAXIMUM BATTERY
RECHARGE DURATION
about 20 hours, with instrument on
about 10 hours, with instrument off

NOTE 1

The charge duration and lifetime of the batteries are influenced by the number and depth of the charge/discharge cycles carried out and by environmental factors such as, for example, temperature.

NOTE 2

To increase the battery operating time of Energy Explorer, the screen backlight is switched off if no key is pressed for 3 minutes (press any key to switch it on again).

NOTE 3

The instrument turns off automatically if the batteries reach a voltage level below 5.9V, to prevent excessive battery discharge.

NOTE 4

If the instrument is not used for long periods (> 1 month), remove the batteries to preserve their charge/discharge capacity.

ELECTRICAL PARAMETERS MEASURED

VOLTAGE, CURRENT

RMS values measured every 10/12 periods as per EN61000-4-30 standards, then aggregated to obtain a mean value per second.

NOTE: for measurement precision and range, see the INPUT CHANNELS specifications.

FREQUENCY Frequency value of the three input voltage channels.

Accuracy: 0.01 Hz

PF

Ratio between active and apparent power.

Accuracy: 0.01 of full scale.

ACTIVE POWER

Calculated as products between instant V and I.

Accuracy: 0.5% of the reading 0.1 of the full scale

REACTIVE POWER

Square root of apparent power and active power squares

Accuracy: 0.5% of the reading 0.1 of the full scale

APPARENT POWER

Calculated as product between the aggregate V and I on the second.

Accuracy: 0.5% of the reading 0.1 of the full scale

THD %: MENU MEASURE

THD %: MENU HARMONICS

HARMONICS Harmonics from the 1 to the 31 order calculated by Fourier analysis carried out on 10/12 periods as per EN61000-4-7 standards.

Accuracy: input channel error $n * 0.1\%$

COS Cosine of the angle between the voltage and the current vector of the harmonic component referred to the same phase. Angle accuracy U-I with traditional clamps 0-1V: $n * 0.2 + \text{clamp error}$

Angle accuracy U-I with flexible, non-amplified clamps: $1 + n * 0.2 + \text{clamp error}$

UNBALANCE: Percentage of reverse sequence component of the voltage signal compared to the direct sequence component as per EN61000-4-30 standards.

ACTIVE ENERGY Accuracy: 0.5% of the reading 0.1% of the full scale

REACTIVE ENERGY Accuracy: 0.5% of the reading 0.1% of the full scale

APPARENT ENERGY

Accuracy: 0.5% of the reading 0.1% of the full scale

NOTE: n = harmonic order

N = number of samples

i = instantaneous value

k = analysis time

Ti = time interval (1 second)

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