Jupiter

PROFESSIONAL POWER QUALITY ANALYSER

DESCRIPTION

SINGLE-PHASE AND UNBALANCED THREE-PHASE SYSTEMS

ELCONTROL ENERGY NET, leader-company in the field of measurement and control of electrical parameters, has expanded its range of portable analyser range with **JUPITER**, a high-performance Power Quality Analyser.

Further to measurement of all traditional electrical parameters, **JUPITER** is capable of analysing the major phenomena characterizing Power Quality: interruptions, voltage variations (dips & swells), harmonic and interharmonic distortion, transients and 3-phase voltage unbalance. Furthermore, **JUPITER** is also capable of verifying the compliance of the power supplied by the system with the limits set by the EN 50160 standard.
The measurement methods are compliant to the EN 61000-4-30 standard.

The colour LCD display allows visualization of data-tables, real-time waveforms of the measured signals, voltage and current transients, vector diagrams and bar-graph display of the harmonic spectrum, while the alphanumeric keyboard makes it easy and user-friendly.
With Jupiter it is possible to perform particularly detailed measurement surveys, saving the data on a COMPACT FLASH memory. The stored data can be successively analysed on a Personal Computer using the included PQ Studio software.
A full set of accessories make this a truly complete system: 3 flexible Rogowski-coil current transducers (without external amplifier/battery), 6 voltage measurement cables with crocodile clips, 10 rechargeable batteries (Jupiter is equipped with an internal battery charger), external desktop power supply, Compact Flash, Analysis software PQ Studio, shock-resistant IP64 carrying case.
The long operational life-time of **JUPITER** is guaranteed by its open-source Operative System, continuously updated and made available to the users by Elcontrol's development team upon any modification of the Power Quality Standards (files are downloadable to the Compact Flash from the Internet).

JUPITER KIT includes:

n.1 JUPITER Power quality analyser
n.1 Set of 3 flexible current probes 1000A
n.1 Set of 6 voltage meas. leads crocodile clips
n.1 Set of 6 crocodile clips

n.1 Compact Flash 512Mb
n.1 Set of 10 rechargeable NiMh AA batteries
n.1 Desktop power supply
n.1 CD-Rom with PQ Studio PC Software
n.1 Shock-and Waterproof IP67 Carrying Case + Integrated Soft-Bag
n.1 Warranty certificate
n.1 Calibration certificate
n.1 User manual

MAIN TECHNICAL CHARACTERISTICS

Self-extinguishing ABS case with rubber-coated grips.
320x240 pixel, colour, graphic LCD screen (mm. 115.2 X 89.3)
 3 voltage inputs: double scale 500/1000Vrms; accuracy ±0.2% ±0.05% f.s.
Maximum input voltage: 600V   CAT III.
3 current inputs for exchangeable flexible current transducers without external amplifiers (1000Arms), or CT clamps (1000A/1Vac or 3000A/1Vac); accuracy ±0.2% ±0.05%f.s. (± Current Transducer error).
1 auxiliary channel for clamps with 0-1Vac output; accuracy ±0.2% ±0.05%f.s. (± clamp error).
Transients (maximum Vpk 1400V) with duration over 500us.
Fundamental Frequency Range: from 40 to 80 Hz.
Harmonics ed Interharmonics up to the 31st order, max 80Hz.
Alphanumerical rubber-keyboard.
SCOPE function (Oscilloscope) for the visualization of waveforms and transients (single or recurrent events).   Vector-diagram visualization of voltage and current phase-sequence.
Graphical visualization of voltage and current harmonics.
Measurement display (full 3-phase analysis: V, A, VA, W, VAr, P.F., Hz, KWh, KVAr, Cog, KVAh, THD%, etc).   Power Quality Analysis following EN50160: frequency, voltage variations, voltage dips, phase-to-phase voltage swells, short and long interruptions, supply voltage unbalance, harmonics).
Event memorization (samples memorization, memorization of the processed data).
Removable 512 MByte Compact Flash (supports up to 2 GByte Compact Flash).
Mains or battery powered operation (2 compartments, 5 AA rechargeable NiMH 2000A\h batteries each).   Languages: Italian, English, French, German, Spanish.
Compatible with Power Quality Standards IEC 61000-4-30; IEC 61000-2-8; EN 61000-4-15; EN 61000-4-7; EN 50160 ; EN 60868; EN 60868-0.
LINUX Operative System.
Software updatable/upgradable by the user via Internet.

PQ STUDIO SOFTWARE   [click here]

Jupiter Kit includes the dedicated PC/Windows software **PQ Studio,** which allows the analysis of measurement surveys stored on the Compact Flash.
PQ Studio remotely reproduces all the analysis performed by Jupiter on the system, thus making it possible to reproduce waveforms, energy-data and events occurred during the survey.

TECHNICAL SPECIFICATION

6.1   Instrument features

6.1.1   GENERAL SPECIFICATIONS

DIMENSIONS 300x210x65mm
WEIGHT 1650g
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/m^2
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: ± 3 seconds per day at 25°C.
Internal capacitor for data storage for the time required to replace the batteries.
Video alarm when Jupiter 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 480x385x190mm.
MEMORY Type I COMPACT FLASH up to 4 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 4 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.

6.1.2   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 Vpeak 1400 V
NUMBER OF SCALES 2
VRMS THAT CAN BE MEASURED
AT TERMINALS 1.5 ÷ 500 VACRMS low scale
3 ÷ 1000 VACRMS high scale
ACCURACY (RMS VALUES) <±0.2% of the reading ± 0.05% of the full scale
ACCURACY (peak VALUES) <±5% of the reading ± 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 ÷ 1VAC)
Flexible clamps with amplifier
(output 0 ÷ 1VAC)
CLAMP CONNECTOR Type Hypertronics D01PB306NT
MEASURABLE IRMS Flex clamps supplied 5 ÷ 1400ARMS
Other clamps (output 0 ÷ 1VAC)

0.3% ÷ 140% of the nominal current of the clamp used.
ACCURACY (RMS VALUES) <±0.2% of the reading ± 0.05% of the full scale + clamp error.
ACCURACY (peak VALUES) <±5% of the reading ± 1% of the full scale + clamp error

--- FREQUENCY ---
LIMIT VALUES FOR A
COMPLETE ANALYSIS From 40 to 80 Hz (fundamental frequency)
ACCURACY ± 0.01 Hz

6.1.3 Environmental

ALTITUDE up to 3000m. The insulation category decreases above 3000m.
OPERATING TEMPERATURE from 0° to 60° C
STORAGE TEMPERATURE from -20 to 70°C
RELATIVE HUMIDITY 80% for temperatures up to 31°C with linear decrease up to 50% at the temperature of 40°C.

6.1.4 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.

6.2 accessory features

6.2.1 FLEXIBLE CLAMPS

OUTPUT VOLTAGE 39.1 µV/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 – double insulation
LENGTH OF CONNECTION CABLE 200 cm
IDENTIFICATION by purple, green and blue wire markers

6.2.2 VOLTAGE CONNECTION CABLES

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

6.2.3 POWER SUPPLY

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

6.2.4 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 JUPITER, 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.

MEASURES

6.3   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 an average of the 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%

INTERHARMONICS Interharmonic groups calculated by Fourier analysis carried out on 10/12 periods as per EN61000-4-7 standards.
Accuracy: ± input channel error ± n * 0.1%

COSø 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° + clamp error
Angle accuracy U-I with flexible, non-amplified clamps: ± 1° ± n * 0.2° + clamp error

TRANSIENTS Maximum instantaneous voltage/current value in a one second buffer.
Minimum measurable duration: 300µS at 50Hz, 260µS at 60Hz
NOTE: for measurement precision and range, see the "INPUT CHANNELS" specifications.

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)

Jupiter Plus

PROFESSIONAL POWER QUALITY ANALYSER

DESCRIPTION

Jupiter Plus is an advanced tool for monitoring and detecting Power Quality disturbs of the Power Supply System
Jupiter provides all functions and features of Jupiter and adds:

Ethernet-TCP/IP:
The integrated network interface allows immediate connection to any LAN network.
PQStudio[click here] can be used as a remote interface for real-time display and analysis of the data measured by Jupiter Plus, or for the management of measurement surveys and the resulting data.
PQStudio can therefore be used for:

-Displaying and Analysing Real-Time Data
-Scheduling measurement surveys
-Starting/Stopping manual surveys
-Downloading and Analysing executed surveys

Flicker:
Variations of important loads can lead to variations of the Power Supply's voltage level. This phenomena is know as Flicker due to its optical perception, as the voltage variation cause –in turn- variations of the lighting fixtures' luminosity and spectral distribution.
Jupiter Plus performs the Analysis of the Flicker following the EN 61000-4-15, with measurement of the PST and PLT values of Flicker.