

PPQ-306

Portable Power Quality Analyzer



- Cycle-by-cycle RMS and harmonics trends
- Comprehensive data logging using patent-pending PQZIP technology
- Complete network harmonics analysis to the 63rd harmonic
- Voltage & current waveform analysis
- High power LCR meter
- Neutral voltage and current
- Supply transformer analysis
- Time-of-Use (TOU) Metering
- High visibility, 5" graphic LCD screen with backlight
- User-friendly PC software
- Supports virtually all types of current clamps
- Color-coded connection

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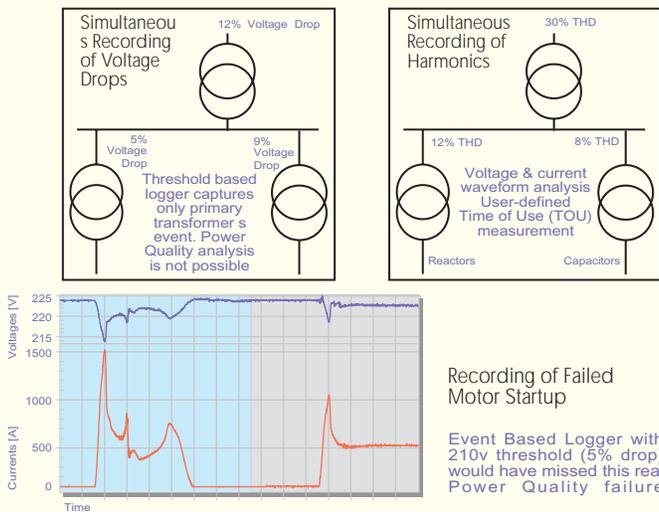
Unique Features

PQZIP Data Logging

PQZIP is a unique, patent pending technology that was designed to defeat the biggest challenge in power quality assessment - choosing the right data parameters to measure. PQZIP takes the headaches away - ALL power quality related data, regardless of its severity, can be stored for any period of time. PQZIP technology forever changes the way power quality history is stored, and provides the following performance advantages:

- EVERYTHING you want to see is stored, meaning no more data compromises for recording speed;
- Years of data for every network cycle is recoverable with no data gaps;
- Thresholds and triggers are no longer needed, so you miss no events;
- All data parameters are recorded, so there is no need to select measurement parameters;
- Comprehensive power quality reporting and statistics for data analysis and report generation;
- True EN-50160 monitoring and analysis;
- Multipoint time-synchronized recording provides a true snap-shot for any period of time

To perform PQZIP data logging with the PPO-306, simply connect it to a computer running PowerIQ and activate the PQZIP Logger application (a computer must be present during the logging process). Set the required accuracy and you're finished - no parameter setup, trigger or other constraints on the information you wish to record. When finished recording, use the PQZIP Analyzer to create customized graphical trends, harmonic spectrum profiles, waveforms or text reports for each piece of data recorded during any period of time. Examples of Power Quality events which can only be analyzed using PQZIP technology:



High Power LCR Meter

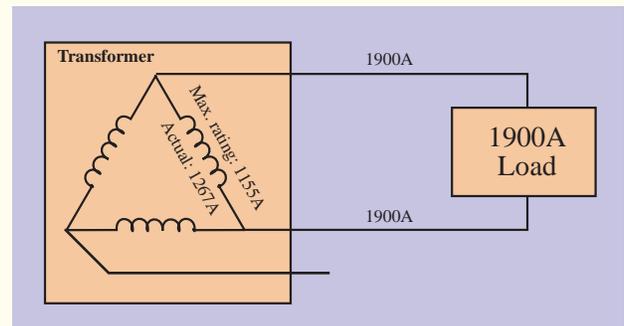
LCR meters are used to measure inductance (L), capacitance (C) and resistance (R). Typical LCR meters generate power to energize the load in a particular frequency and calculate the L, C & R. When power capacitors and inductors are measured, such meters don't have enough power to work properly. Moreover, they normally measure on single-specified frequencies. The PPO-306 uses the network power to energize the load and calculates the L, C & R on each harmonic present on the network, up to the 9th harmonic. This useful tool allows a user to analyze capacitor banks and inductors on multiple harmonics other than the fundamental. The LCR meter functions in single-phase network mode.

Record Dynamic Loads

In many cases power quality problems appear when the load changes rapidly. For example, motor startups can sometimes cause circuit breakers to trip, and spot welding generates voltage flicker. The PPO-306 allows the user to perform detailed analysis of these events and identify the power quality problem. Graphical cycle-by-cycle load information can be displayed using PowerIQ software, from basic parameters of voltage and current to harmonic spectrum analysis up to the 63rd harmonic.

Supply Transformer Analysis

When a facility's electrical system is configured as a Delta network, the PPO-306 displays the phase-to-phase current and power, in addition to the line currents and total power. Line currents measured from the CT inputs are used to calculate the current and power inside the supply transformer (or generator). In completely balanced networks, the internal currents are simply $1/\sqrt{3}$ of the line currents. However, in most cases, the network is not completely balanced and internal currents are different than those expected.



This can be explained through the following simple example: A facility's transformer is designed for a maximum current of 2000A per phase, meaning each internal line is designed for a maximum of 1155A ($2000/\sqrt{3}$). Assume the load includes a single, phase-to-phase load of 1900A connected between phase L1 and L2 and nothing on L3. Using simple math, the transformer appears to be 95% loaded ($1900/2000$). However, in actuality, the current is divided into parts - 67% on L1-L2 and 33% on each of L1-L3 and L3-L2. In reality, L1-L2 is 1267A, and the transformer is overloaded by 10% ($1267/1155$).

Elspec's unique phase-to-phase current and power algorithms display this information, enabling full and accurate network monitoring.

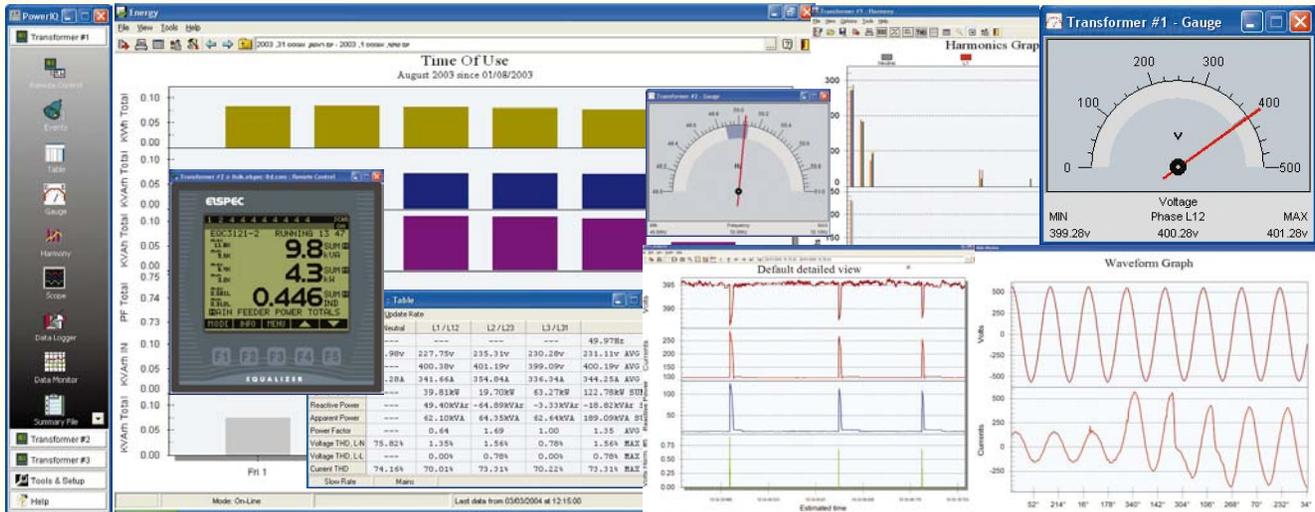


Multi-function Time-of-Use (TOU) Metering

The PPO-306 stores energy usage information (kWh, kVArh etc.) for every user-defined period. Its on-board memory records more than 2 months of 15-minute period data. TOU tariff calculations can be done in post processing, which allows the TOU to be defined after the data was logged. In locations where a user can choose between more than one TOU tariff, this becomes an effective support tool for tariff-based money-saving decisions.

PowerIQ Measurement & Analysis Software

This proprietary, easy-to-use software works in parallel with the PPO-306, allowing the user to display all system measurement results in a Windows operating environment. All network parameters, including harmonics, can be recorded continually or for user-defined, pre-selected intervals. Recording time is limited only by the size of the computer's hard disk or other storage device (server, memory card, etc). Electrical events can be captured by associating trigger values to various network power parameters, such as low voltage or high current. The event recording will capture a user-selected before and after window of time. PowerIQ has intranet and internet support capabilities.



PowerIQ Windows Examples

LCD Display Screens

Large Digit Screen

Permits simultaneous display of 9 parameters: 3 measured values plus 3 minimum and 3 maximum. Parameters can be mixed, such as average voltage, current and power factor. This unique feature allows analysis of the foremost parameters at a glance, without touching the unit. The PU % buttons displays the values as a percentage of their nominal value.



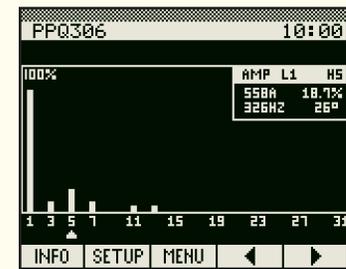
Waveform Screen

The large graphic display allows easy monitoring of transients of 130/156µS (at 60/50Hz). The display includes detailed information for each wave: the type and phase, THD, RMS, peak and minimum values plus the value at cursor position.



Harmonics Screen

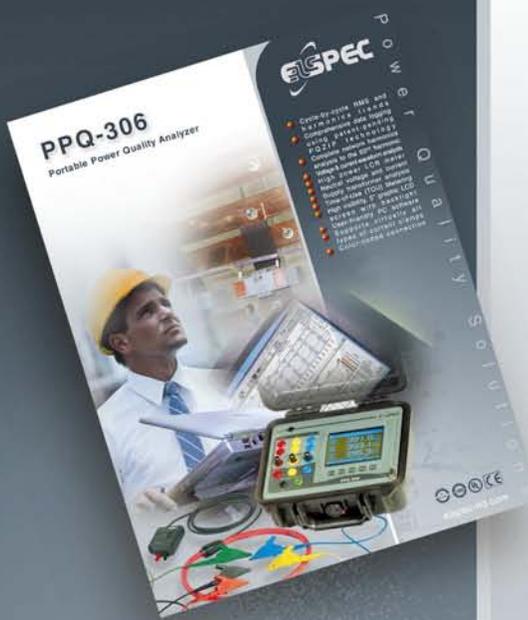
The graphic display enables inspection of the complete harmonic spectrum and associated harmonic content at a glance. The display includes detailed information for each harmonic: type, phase, number of the harmonic, the value in amperes/volts and in percent, the angle and the frequency.



Alpha-Numeric Screen

Alpha-numeric displays make the PPO-306 extremely easy to use. They are used for measurement screens (e.g., LCR and Energy meters), unit setup (e.g., menus and help) and diagnostics (e.g., system information and system events). The screen displays up to 27 characters per line (max 16 lines per screen).





ELSPEC Ltd.
 P. O. Box 3019,
 4 HaShoham St., Zone 23
 Caesarea Industrial Park,
 38900, ISRAEL
 Tel: +972-4-6272-470
 Fax: +972-4-6272-465
 E-Mail: info@elspec-ltd.com
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Specifications

Input Channels	10 4xVoltage Channels 3xCURRENT Inputs (./5A) 3xCURRENT Inputs (mV/mA)
Supported Network	Wye (3W/4W), Delta, Single Phase (2W/3W)
Sample Rate	128 samples per cycle per channel (53.8kHz at 60Hz, 44.8kHz at 50Hz)
RMS Values Update Rate	1 Cycle (16.7ms - 60Hz; 20.0 ms - 50Hz)
Harmonics Update Rate	1 Cycle (16.7ms - 60Hz; 20.0 ms - 50Hz)
Waveforms Update Rate	128 sample/cycle (130µS - 60Hz; 156µS - 50Hz)
Display Update Rate	User defined between 8 to 256 cycles
Harmonic Analysis	1st through 63rd
Time-of-Use (TOU)	Periods Recording
TOU Tariffs	Simultaneous, Unlimited
LCR Meter	1st to 9th harmonics (Single Phase)
LCD Display Size	94x76 mm
LCD Display Resolution	Graphic 160x128 pixels
LCD Display Type	White on Black, FSTN, LED backlight
Ambient Temperature	-20°C - +55°C
Storage Temperature	-25°C - +65°C
Computer Software	Includes PowerIQ Professional
Dimensions (closed)	270 x 246 x 123 mm [WxDxH]
Weight	1.9 kg
Power Supply	100-240V ~ 0.2A 50-60Hz
Direct Voltage Measurement	347/600 VAC Max.
EMC Compatibility	EN61000-4-2/3/4/5, ENV50204, ENV50141
Safety Standards	EN61010-1, EN60439-1
Communication Protocol	Elcom (Elspec's Proprietary Protocol)
Communication Baud Rate	9600, 19200, 38400, 57600, 115200 bps
Power Consumption	< 3 VA

Ordering Information

For ordering information please go to www.pqip.com/ordering

Measured Parameters

Parameter	Phases	Accuracy %FS ± 1 digit
Frequency	Common	0.1
Phase Current	L1, L2, L3	0.2
Neutral Current	Neutral	0.2
Phase to Phase Current*	L1-2, L2-3, L3-1	0.2
Phase Voltage	L1, L2, L3	0.2
Neutral Voltage	Neutral	0.2
Phase to Phase Voltage	L1-2, L2-3, L3-1	0.2
Active Power (kW)	L1, L2, L3, Total	0.4
Reactive Power (kVAR)	L1, L2, L3, Total	0.4
Apparent Power (kVA)	L1, L2, L3, Total	0.4
Power Factor	L1, L2, L3, Total	0.4
Time of use (TOU) - in, out, net, total:		
Active Energy (kWh)	Total	0.5
Reactive Energy (kVARh)	Total	0.5
THD at Phase Current	L1, L2, L3	0.2
THD at Neutral Current	Neutral	0.2
THD at Phase to Phase Current	L1-2, L2-3, L3-1	0.2
THD at Phase Voltage	L1, L2, L3	0.2
THD at Neutral Voltage	Neutral	0.2
THD at Phase to Phase Voltage	L1-2, L2-3, L3-1	0.2
Harmonics of Phase Current	L1, L2, L3	0.2
Harmonics of Neutral Current	Neutral	0.2
Harmonics of Phase to Phase Current	L1-2, L2-3, L3-1	0.2
Harmonics of Phase Voltage	L1, L2, L3	0.2
Harmonics of Neutral Voltage	Neutral	0.2
Harmonics of Phase to Phase Voltage	L1-2, L2-3, L3-1	0.2
Waveforms of Phase Current	L1, L2, L3	0.2
Waveforms of Neutral Current	Neutral	0.2
Waveforms of Phase to Phase Current	L1-2, L2-3, L3-1	0.2
Waveforms of Phase Voltage	L1, L2, L3	0.2
Waveforms of Neutral Voltage	Neutral	0.2
Waveforms of Phase to Phase Voltage	L1-2, L2-3, L3-1	0.2

* Unique feature: metering internal current of feeder transformer (delta secondary)