

G4400

Fixed Power Quality Analyser



**Impact Power
Innovations**

Energy Efficiency through power quality





A comprehensive energy management and power monitoring program is the key to success for any energy provider/consumer, regardless their size. The BlackBox G4400 series, the most advanced power meter in the market today, is equipped with the revolutionary PQZIP patent algorithm for continuous waveform recording. It enables you to predict, prevent and troubleshoot an incident easily, without the need to set any triggers or thresholds in order to capture a specific event or events.



Utilities

(Transmission, distribution, generation)

- Optimises protective equipment configuration and substation automation solutions
- Ensures a reliable & consistent supply of energy
- Evaluates the performance of breakers and relays
- Identifies and manages peak demand
- Real time power quality monitoring to meet any international standard
- Produces detailed & comprehensive statistical records

Energy Consumer

(Critical power, industrial, commercial, government etc.)

- Measures & analyses system efficiency, provides solutions and increases profits
- Negotiating capabilities with power providers
- Detect electric bill inconsistencies
- Avoid PQ compliance issues
- Real time PQ monitoring and analysis

Elspec's Unique Technology

PQZIP Compression Technology

The PQZIP Patent compression algorithm enables the meter to continuously store waveform signals over a long period of time, whether an event of interest was identified. This technology is unique to Elspec and ensures precise and accurate characterisation of electrical system dynamics.

PQZIP Compression features:

- ✓ Continuous waveform recording
- ✓ Supreme Trend Resolution
- ✓ Extended Harmonic Recording
- ✓ Threshold free setup
- ✓ Easy deployment

Parameter	Resolution
Waveform	20µsec
RMS	½ Cycle
THD	½ Cycle
TDD	½ Cycle
Unbalance	½ Cycle
K Factor	½ Cycle
Crest Factor	½ Cycle
Powers	1 Cycle
Harmonics	1 Cycle
Frequency	1 Cycle



Discover Outstanding Features

Dual Range Gain

Elspec's pioneering measurement method uses a dual-range gain of 2 X 16 bit ADC yield, a superior accuracy and resolution. Therefore, the use of a 16 simultaneous ADC (each one with 1,024 sample/sec), provides incomparable accuracy with no cross-channel lags or interconnections.

Accuracy Standards

The G4k superior accuracy surpasses by far, the highest standards set by the industry. The BLACKBOX device series compiles with standards for:

Power Quality

- ✓ IEC 61000-4-30 Class A
- ✓ IEC 61000-4-15 Flicker meter
- ✓ IEC 61000-4-7 Harmonics and inter-harmonics

Energy

- ✓ ANSI C12.20 0.2%
- ✓ IEC 62053-22/23 class 0.2

Temperature Adjustment

The G4k adjusts automatically its calibration parameters based on real time temperature reading.

SCADA Compatible

The G4400 series is equipped with standard industrial protocol for seamless integration into any existing SCADA system:

- ✓ Modbus TCP/IP and RTU
- ✓ DNP 3
- ✓ OPC

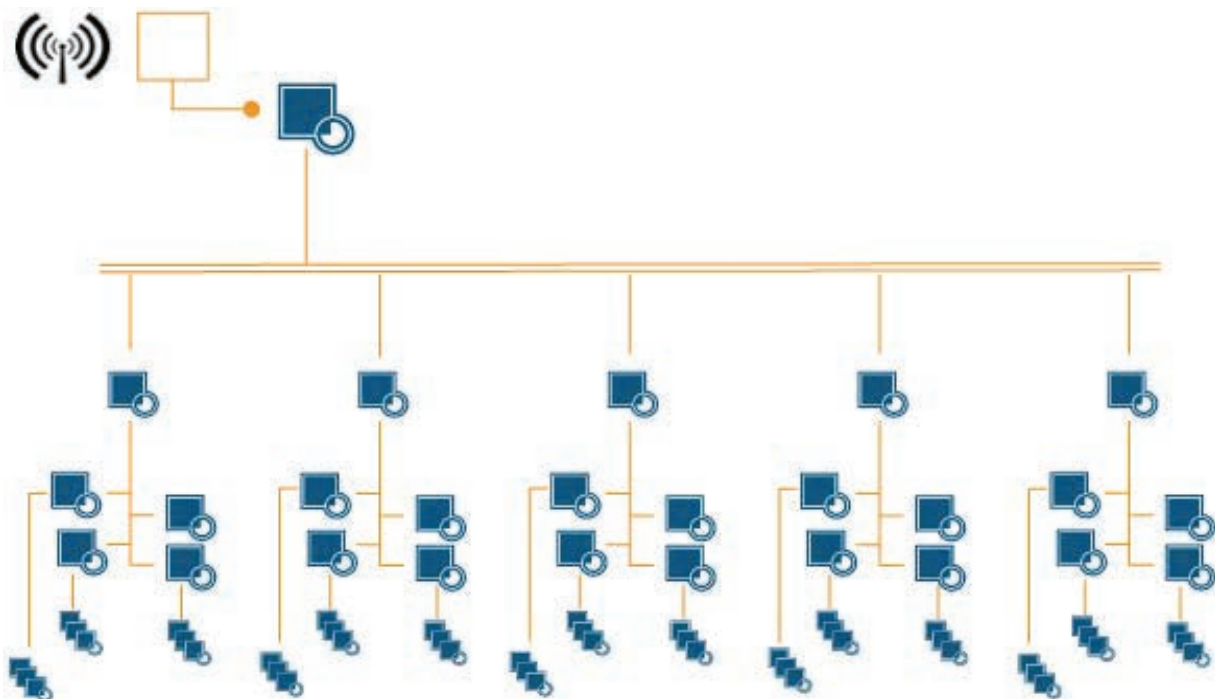
High End Power Quality and Billing Measurement

Thousands of power quality and energy usage parameters are available in real time in the G4400 series. The G4400 series provides advanced power disturbance recordings meeting the highest standards on the market. The meter is designed with the most accurate level in order to be used as a primary meter, a sub-meter, as a detector of inconsistencies in electricity bills.

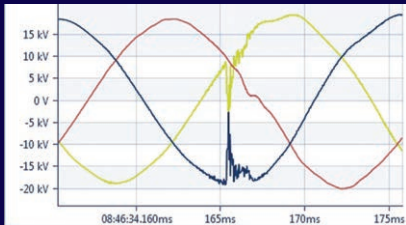
Time Synchronisation

The G4400 series uses a special continuous synchronisation algorithm to ensure accurate time stamping of up to 1µsec using SNTP, GPS, IRIG-B and DCF-77.

Each G4400 meter acts as a SNTP server therefore each meter on the network is synchronized to each other over LAN. This allows accurate time stamping, without the need of a GPS.

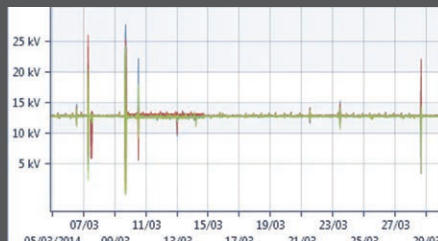


Accurate Results



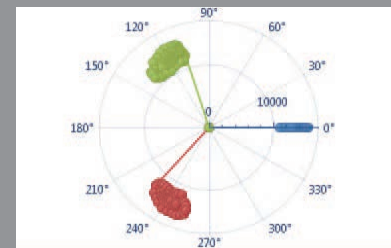
Supreme Trends Resolution

The BLACKBOX measures and records 5,000 power parameters continuously at a resolution of 1/2 cycles, 10/12 cycles, 150/180 cycles, 10 min and 2 hours of which, any given resolution is calculated for display and reporting purposes. Hence, there is no need to select which parameters to log, and more importantly, which parameters to ignore.



Waveform & Fault Recorder

- Continuously samples and records waveform signals at 1,024 sample/cycle
- Threshold free setup
- 2 X 16 bit converter yield superior waveform resolution
- Waveform capture of up-to 8kVpk



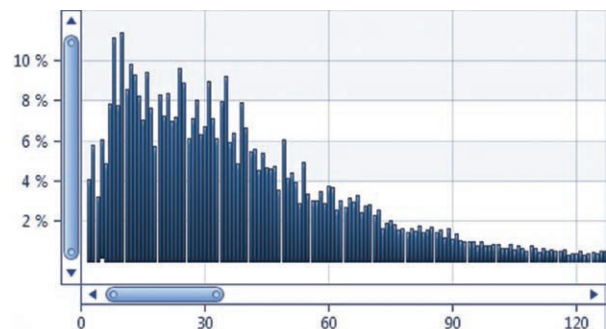
Phasor Analysis

Phase angle between voltage and current channels are logged continuously at 1 cycle resolution. Phasor charts display the phase angled over time in a unique Phasor chart.

Harmonics & Inter-harmonics Analysis

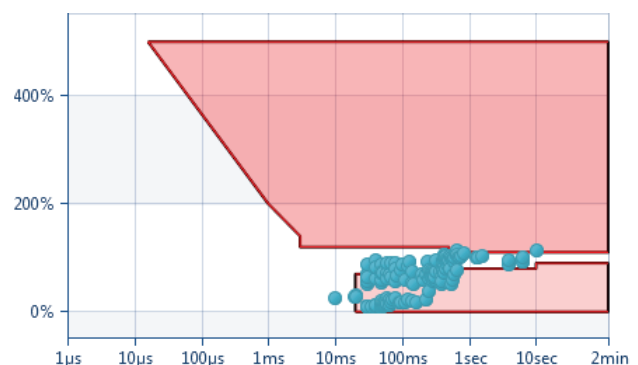
The BlackBox has two FFT engines for harmonics analysis:

- Cycle by Cycle: performs FFT at 1 cycle resolution for extended bandwidth. This engine provides 512 harmonics order at 50Hz resolution.
- 10/12 Cycles: performs FFT 10/12 cycles resolution for extended resolution and sub-grouping calculation. This engine provides the magnitude and angle of 512 spectrum components at 5Hz resolution.



Comprehensive Event Mechanism

The G4400 series is designed to detect any event occurring on your system. The event mechanism allows you to configure events on any measured parameter (more than 1,000) and/or I/O ports. The event mechanism supports out-of-limit events as well as rate of changed limits. As the G4400 records the waveform signals continuously, the event configuration doesn't trigger the recording but stores summary logs including start and end time, duration, severity and magnitude of the event. All the events can be displayed in a tabular or scatter charts as CBEME/ITIC.



Optional Accessories

Multi I/O extension to comply with every application

The G4400 series offers the option to extend the meter capability by adding the multi I/O module in conjunction with all metering functionalities. The I/O module includes analogue and digital I/O as well as a relay output to specifically work with your application.

The multi I/O module extends the meter capability in order to replace RTUs and PLCs for energy management and substation automation. With the G4400 series you can monitor the reliability of system apparatus such as transformers, circuit breakers and other critical equipment. The G4400 series supports up to 2 I/O modules using internal power along with:

- ✓ 8 fast digital input at 16 sample/sec
- ✓ 4 fast digital output at 16 sample/sec
- ✓ 4 analogue 4-20mA input sampled at 1Hz with programmable scaling
- ✓ 4 analogue 4-20mA output
- ✓ 3 Relays



Real Time Local & Remote Monitoring

The G4400 series is accessible locally or remotely, using either an integral web server interface or the Elspec G4100 remote display. The Elspec G4100 represents the next generation in power network information exchange.

By using IP based communication, various unprecedented setup configurations are enabled over a great distance. Using Ethernet infrastructure, the G4100 can monitor multiple G4400 meters connected to the network remotely or connected to each analyser directly.

The G4100's display provides full control over all meters allowing technicians and field operators to fully configure and operate each single meter in the network. The G4100 can be powered by external power supply or through the G4400 embedded PoE port.



GPS

The GPS provides an optimal mobile time synchronisation solution for accurate time data via satellite signal. In the absence of many other technologies, it synchronises the time at any remote location.





Specifications

Product Series	G4410	G4420	G4430
Voltage Sampling Rate, Maximum Samples/Cycle	256	512	1024
Voltage Harmonics (Individual, Even, Odd, Total) Up to -	127 TH	255 TH	511 TH
Type of Analogue to Digital Converter	16/20 ¹ bit	16/20 ¹ bit	16/20 ¹ bit
Storage Capacity w			
Internal Memory	128 MB	4 GB	16 GB
Power Quality Analysis			
Transient Detection, Microseconds (50Hz/60Hz)	78.1/65.1µs	39/32.5µs	19.5/16.3µs
Communication Ports			
Ethernet Ports	1	2	2
Power Over Ethernet (PoE- Out)	-	1	1
Voltage Ride Through on Power Loss (up to)	10 sec.	25 sec.	25 sec.
Specifications			
Applicable Measurement Standards		Control	
EN50160, IEEE1159, IEEE519, IEC61000-4-15, IEC61000-4-7, IEC61000-4-30 Class A, IEC62053-22/23 Class 0.2		Comprehensive web server for local and remote real-time monitoring and control	
Applicable EMC Standards		Applicable Environmental Standards	
EN55011 Group 1 Class A, EN60439-1 (clauses 7.9.1, 7.9.3, 7.9.4, 7.10.3, 7.10.4), FCC Part 15 Subpart B Class A, IEC61000-3-3, EN61000-6-2, IEC60255		IEC60068-2-1, 2, 6, 11, 27, 30, 75	
Voltage		Applicable Safety Standards	
Channels	3 Phase + Neutral	EN61010-1:2001 2 nd Edition	
Nominal Full Scale	1000V	Power Supply	
Maximum Peak Measurement	8kV	Auxiliary Supply – PoE In	According to 802.3af
Input Impedance	3MΩ	Auxiliary DC Supply	48 Vdc
Uncertainty	0.1% of Nominal	Operating Range	100-260 VAC: 50/60 Hz 100-300 VDC
Current		Time	
Channels	3 Phase + Neutral	Real Time Clock	20ppm
Nominal Full Scale	5A	Synchronisation Device	Accuracy
Maximum Peak Measurement	50A	GPS	100-200µs
Burden	0.0001VA@5A	IRIG B	100-200µs
Phase	±0.42°@3A ±0.17°@5A	SNTP Server	50-100µs
Uncertainty	0.1% of Nominal	DCF-77	±15ms
Frequency		Communication Protocols	
Fundamental Frequency	42.5 Hz to 69 Hz	Modbus TCP, Modbus RTU, OPC, DNP3 SMTP Client	
Frequency Resolution	10 mHz	RS-485/422	
Frequency Accuracy	±10 mHz		
Physical		Environmental Conditions	
Dimensions	175mm x 232mm x 138mm	Operation Temperature	-20°C to 70°C (-4°F to 158°F)
Weight	1.7Kg	Storage Temperature	-40°C to 85°C (-40°F to 185°F)

¹ Effective bits

Disclaimer: Specifications subject to changes without prior notice



World Innovator in Power Quality

Since 1988 Elspec has developed, manufactured and marketed proven power quality solutions far exceeding our clients' needs and expectations.

Our innovations not only simplify the understanding of the quality of power itself, but are also highly compatible, making it suitable for any business and or application.

Impact Power Innovations in conjunction with Elspec's international team of professionals have extensive experience in electrical engineering and are ready to provide a tailor made strategy that will enable a sustainable and efficient use of your electrical energy.



**Impact Power
Innovations**

 0861 357732 (0861-ELSPEC)

 email info@impactpower.co.za

 Impact Power at: www.impactpower.co.za

Elspec at: www.elspec-ltd.com

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