

# BlackBox G4500

## The 3 Phases Portable Power Quality Analyzers

The **BlackBox portable series** power quality analyzer takes power quality monitoring to a whole new level by using the revolutionary **PQZIP** patent algorithm. The unique algorithm Enables you to measure, store & analyze (continuously) waveform signals regardless their size



### With the G4500 each event, no matter its size, is recorded

When it comes to power, you don't want to leave it to the unexpected. In our field, we are looking for solutions allowing us to better measure, store and analyze power quality. We want to make sure that all the information gathered are accurate, in high resolution and without the need of configuring an event.



### The Issue: Event or Incidence?

While an event is configured by the user based on statistics and knowledge, an incident is a real occurrence. Take for instance a production line failure.

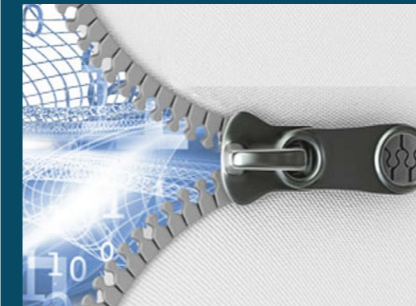
The correlation between an event and an incidence depends on the level of statistics and knowledge held by the user. Indeed, to avoid recurring incidences, the user needs to analyze them. If the event is not well configured, the incidence will not be interpreted correctly or will be missed. In another case, too many events may be randomly recorded which may result in over storage of useless information in the memory's device.

### The Solution: Elspec's PQZIP's unique Patent

*With Elspec's PQZIP You Will Get the Unique Advantage of Continuous Waveform Recordings*

# Discover

## Outstanding Features



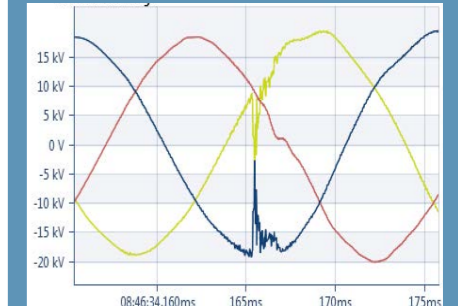
### PQZIP Compression Technology

The unique patented PQZIP compression technology enables to store up to 1000 times more information than any typical file formats. PQZIP allows storage of complete and precise data over extended periods of time.



### Supreme Trend Resolution

RMS, THD, active/reactive power, power factor, unbalance, harmonics and all other PQ parameters are logged continuously over a year at 1/2 cycle resolution in order to characterize electrical system dynamics.



### Waveform Capture

4V AC, 5I AC waveform signals are continuously logged at 1,024/256 S/c respectively allowing highly accurate results without the need to set up any trigger or threshold. With the G4500, no event will be missed!

### Fully Comply to Class A

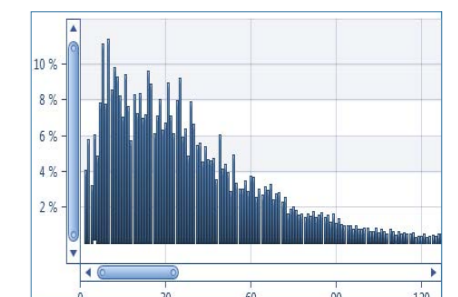
The BLACKBOX portable series complies fully with IEC 61000-4-30 most updated edition Class A standard. Other parameters, not included in the standard (i.e. current and power), are calculated with comparable methods required by the standard.



### Harmonics Recording

The BLACKBOX is equipped with two FFT engines for harmonics analysis:

- **Cycle by Cycle:** performs FFT at 1 cycle resolution for extended bandwidth. This engine provides 512 harmonics component at 50/60Hz resolution.
- **10/12 Cycles:** performs FFT at 10/12 cycles resolution for an extended resolution and a sub-grouping calculation. This engine provides the amplitude and angle of 512 harmonic components at a 5Hz resolution.



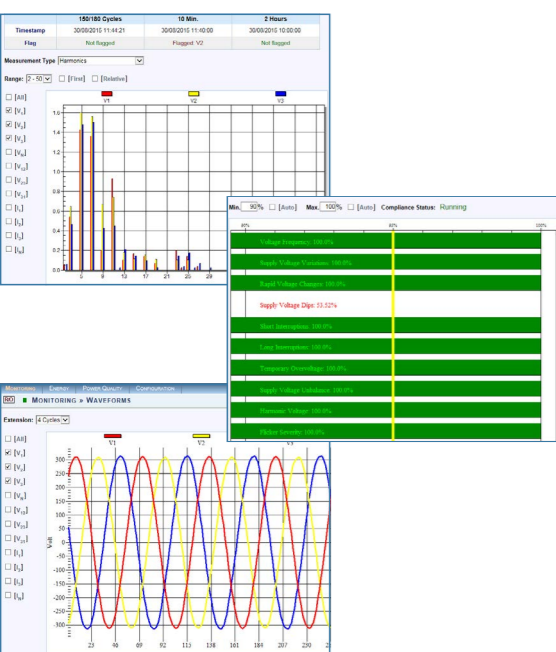
# G4500

Get Much More than a Box!



**I/O**  
The I/O Ports of the portable BLACKBOX extend the monitoring capabilities of the device by using additional digital & relay ports.

**Web Interface**  
No need for software! Connect directly to any PC and get real time measurements and results. A user friendly and easy way to get precise information and data.



**Battery**  
Battery life of up to 2 hours allowing continuous measurement and recording.

**Clamps**  
Elspec's unique calibration procedure calculates both the clamp and device inaccuracy, allowing to eliminate clamps uncertainty, and to yield superior power measurement accuracy.

**VDC/IDC**  
The G4500 offers VDC/IDC input

**Wi-Fi**  
No need for cables. Easy to use everywhere.

**Plug-and-Play**  
The Portable BLACKBOX is equipped with a plug-and-play probe interface allowing automatic detection of probes and clamps during setup.

**Voltage inputs**  
The BlackBox is equipped with 4 AC and 2 DC voltage channels to measure any available power configuration.

**Current Inputs**  
The BLACKBOX is equipped with 4 AC current channels in order to measure a 3-phase + Neutral and an additional 1 AC/DC channel for earth/DC signal.

**USB**  
For cellular communication.

# PQSCADA Sapphire

Accurate Data Anywhere, Anytime

PQSCADA Sapphire is a comprehensive, yet easy to use, analysis and engineering software designed to manage and monitor power quality analyzers, digital fault recorders, revenues meters and other IED. The PQSCADA Sapphire express edition is complimentary with all Elspec devices.



**Extensive Charts Capabilities**

- **Trend chart:** View electrical parameters for a selected time range as one or more graphs
- **Grid chart:** View selected parameters for selected time range in a table.
- **Spectrum chart:** View selected parameters for selected time range in a column graph. This allows viewing and investigating frequency domain phenomenon.
- **Event chart:** View system, power quality, I/O and custom events in a table for a selected time range. This table provides valuable information regarding occurrence, duration and severity of those events.
- **Statistics chart:** View selected parameters for a selected time range. It shows two sub charts: a "relative chart" and a "cumulative chart".
- **Scatter Parameter chart:** View selected parameters for a selected time range. It allows reviewing scattered dots of a specific parameter in relation to another parameter.
- **Scatter Event chart:** View events for a selected time range according to standards or custom definition (such as CBEMA)
- **Phasor chart:** View the phasor's amplitude and angle for a selected time range.
- **Cyclic Histogram chart:** View overlaid voltage waveform cycles for a selected time range. It is made possible thanks to the unique continuous recording mechanism of Elspec BlackBox analyzers. The histogram shows the deviation from the expected ideal waveform by overlaying the waveforms.

iew parameters for a selected time range. This chart im, maximum and average value of each parameter.

- Features**
- ▶ Easily read COMTRADE, PQDIF & PQZIP files
  - ▶ Comprehensive power quality module
  - ▶ Geographical map view\*
  - ▶ Automatic power quality report for EN50160, IEEE1159, FOL, GOST.
  - ▶ Configurable report module to design your own report template
  - ▶ Power quality grid line code configuration
  - ▶ Export to Excel, word, JPG & PDF
  - ▶ API to Matlab for advance post processing analysis\*
  - ▶ Export data to COMTRADE, PQDIF, Excel & CSV
  - ▶ Multiple Site investigation

\* Available on the Enterprise & Professional plan only

# Optional Accessories

### GPS (Global Positioning System)

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

### Multi Frequency Modem

USB modem with a SIM card can be connected to USB port to allow cellular communication. The wireless GPRS modem provides fast mobile communication access and offers the perfect solution in industrial data communication. It is fitted with a SIM card drawer structure, and it may be connected with any standard RS-422 interface. Data is transmitted at 3.5G. The modem is fully compatible with GSM/GPRS/EDGE.

### Class A Test Reports

Elspec can provide upon request, a comprehensive functionality and calibration test report for each analyzer. Fully automated calibration software is also available for customer's in-house use.

#### DC Current Clamp

Ordering Information (Part Number)  
Current Measurement  
Output Signal  
Operating Temperature  
Cable Length

SOA-0270-1400  
1,500A DC / 1,000A AC  
1m V/A, 10m V/A  
- 20°C to + 60°C  
1.4m



#### 1 - 6A Mini Clamp

Ordering Information (Part Number)  
Measurement Range  
Output Signal  
Operating Temperature  
Cable Length

SOA-0010-0500  
Up to 6A AC (1A Nominal) Up to 60A AC (10A Nominal) \*  
100m V/A  
- 20°C to + 60°C  
1.2m



#### 100A Mini Clamp

Ordering Information (Part Number)  
Measurement Range  
"Hole" Dimensions  
Operating Temperature  
Cable Length

SOA-0180-5000  
Up to 100APK AC  
10mm Max  
- 20°C to + 60°C  
1.2m



#### Custom Clamp 3-Flexible Current Probes

Ordering Information (Part Number)  
Current Range  
Operating Temperature  
Probe Cable Length  
Probe Cable Diameter

SOA-3003-0270  
30A/300A/3000A AC RMS  
- 20°C to + 65°C  
610mm (24")  
194mm (7.5")



#### 3000A or 300A Flexible Current Clamps

Ordering Information (Part Number)  
Current Range  
Operating Temperature  
Cable Length  
Loop Diameter

**3000A**  
SOA-9045-3001  
90A - 4,200A  
- 20°C to + 60°C  
2m  
80cm

**300A**  
SOA-9045-3000  
9A - 1,050A  
- 20°C to + 60°C  
2m  
45cm



\*Selectable software range

# Specifications

Waveform Sampling					
Voltage Sampling Rate		1024 Samples/Cycle			
Current Sampling Rate		256 Samples/Cycle			
Voltage Harmonics (Individual, Even, Odd, Total) Up to -		511 <sup>th</sup>			
Current Harmonics (Individual, Even, Odd, Total) Up to -		127 <sup>th</sup>			
Type of Analog to Digital Converter		16/20 <sup>1</sup> bit			
Storage Capacity					
Internal Memory		32 GB/32TB <sup>2</sup>			
Power Quality Analysis					
ransient Detection, Microseconds (50Hz/60Hz)		19.5/16.3µs			
Communication Ports					
Ethernet Ports		3			
Wi-Fi Communications (802.11g)		1			
Power Over Ethernet (PoE- Out)		1			
Digital Input		4			
RS-232		1			
RS-485		1			
Physical					
Dimensions mm		314 X 84 X 271			
Weight		3.7kg			
Control					
Comprehensive web server for local and remote real-time monitoring and control					
Applicable Standards					
Measurement Standards		EN50160, IEEE1159, IEEE519, IEC61000-4-15, IEC61000-4-7, IEC61000-4-30 Class A			
EMC Standards		EN61326, CFR47FCC, CISPR11 Group 1, FCC PART 15 Subpart B, EN61010-2, IEC61000-3-3, IEC61000-4-2, IEC61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-11			
Environmental Standards		IEC60068-2-1, 2, 6, 27, 30, 75			
Safety Standards		EN61010-1:2001 2nd Edition			
Power Supply		Voltage			
Operating Range	100-260 VAC: 50/60 Hz 100-300 VDC	Voltage Channels	4 (3 Phases + Neut.)+ 1 DC		
		Nominal Full Scale	1000V		
Auxiliary DC Supply	48 Vdc	Maximum Peak Measurement	8000V		
Auxiliary Supply	PoE In According to 802.3af	Input Impedance	3MΩ		
Battery Backup	2 Hours	Uncertainty	0.1% of Nominal		
Time		Current			
Real Time Clock	±1 Second per 24 Hours	Current Channels	4 (3 Phases + Neut.)+ 1 Grn/DC		
Synchronization Device	Uncertainty	Current Channels Receive From Clamp	I1-I4: 0-10 VPk I5: 0-3 VPk		
GPS	100-200µs				
IRIG B	100-200µs	Uncertainty	0.1% ±0.1 mV		
SNTP Server	50-100µs	Frequency			
DCF-77	±15ms	Fundamental Frequency	42.5 Hz to 69 Hz		
Environmental Conditions		Frequency Resolution	10 mHz		
Operation Temperature	0°C – 50°C (32°F – 122 °F)	Frequency Accuracy	±10 mHz		
Storage Temperature	-20°C – 60°C (-4°F – 140 °F)	Disclaimer: Specifications subject to changes without prior notice			

<sup>1</sup> Effective bits  
<sup>2</sup> Equivalent memory size needed without compression

 **SENTINEL** POWER QUALITY

Available at: [www.sentinelpowerquality.com](http://www.sentinelpowerquality.com)