

INTRODUCING THE PURE - BLACKBOX

Continuous waveform recording

- Capture fast RMS data, show half-cycle and waveform to characterize electrical system dynamics (generator start-up, UPS switching etc...)
- 16 Bit Continuous Acquisition @ 256 Samples Per Cycle

Measure all three phases and neutral

Class A Power Quality analyzer

- 0.1% Accuracy on Analog Channels
- 0.1% Power & Energy Accuracy

View graphs and generate report

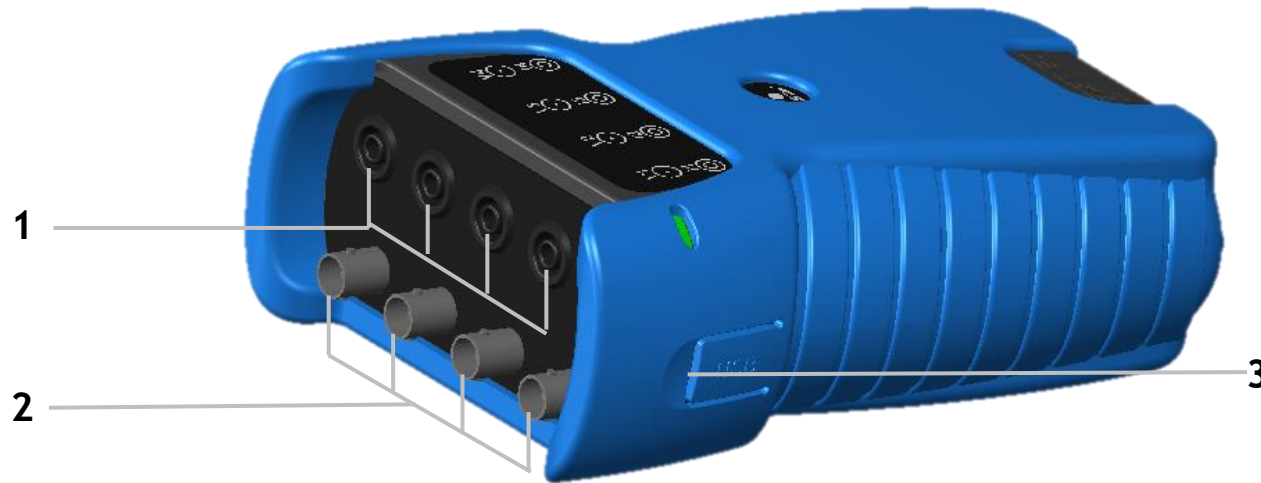
- With included analysis software

ARCHITECTURE - SINGLE OR DOUBLE SYSTEM ADAPTIBILITY



1. USB led status
2. SD led status
3. Power supply
4. Channels led status

ARCHITECTURE - SINGLE OR DOUBLE SYSTEM ADAPTIBILITY



1. Voltage leads inputs
2. Current probes inputs
3. USB socket

CLASS A POWER QUALITY

- Continuously Measure & Record More Than 10,000 Parameters At half-Cycle Resolution
 - Voltage
 - Current
 - 511 Harmonics
 - Inter-Harmonics
 - Power Quality - FLICKER, THD, unbalance, crest facto, k factor & More ...
- Power Quality Events
 - Voltage Dips
 - Voltage Swells
 - Voltage Interruptions



EN 50160 reporting

ELSPEC BLACKBOX EN50160:2010 PQ Report

Configuration

Node: Sabro-T1
 Voltage level: LV(≤ 11kV)
 Network Topology: Wye
 Declared supply voltage (Un): 230V (LN)
 Device type: G4K BLACKBOX

Report information

Start time: 18/05/2012 00:00:00
 GMT: 300
 End time: 25/05/2012 00:00:00
 Produced time: 21/05/2012 08:08:04

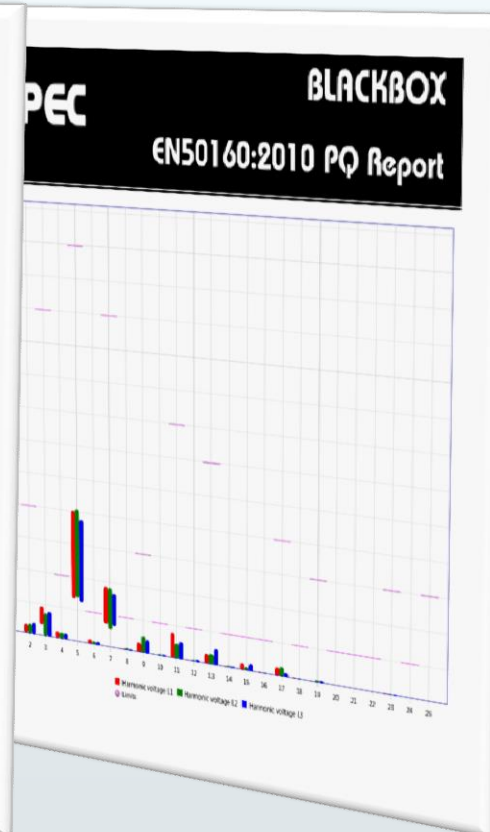
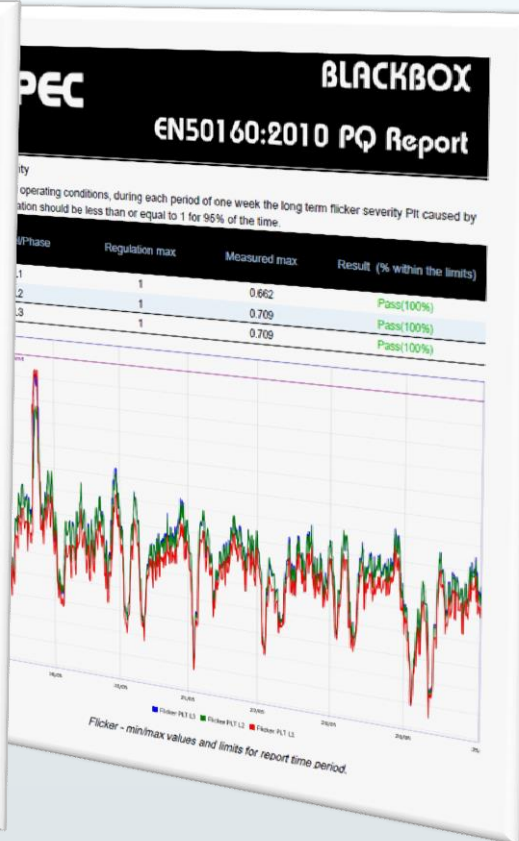
Summary

Continuous phenomena

EN 50160:2010	Parameter	Result
4.2.1	Power frequency	Pass
4.2.2	Supply voltage variation	Pass
4.2.3.1	Single Rapid voltage change	Pass
4.2.3.2	Flicker severity	Pass
4.2.4	Supply voltage unbalance	Pass
4.2.5	Harmonic voltage	Pass
4.2.5	Total harmonic distortion	Pass

Voltage events

EN50160:2010	Event type	Number of events
4.3.1	Short interruptions of the supply voltage	0
4.3.1	Long interruptions of the supply voltage	0
4.3.2	Supply voltage dip	0
4.3.2	Supply voltage swell	0

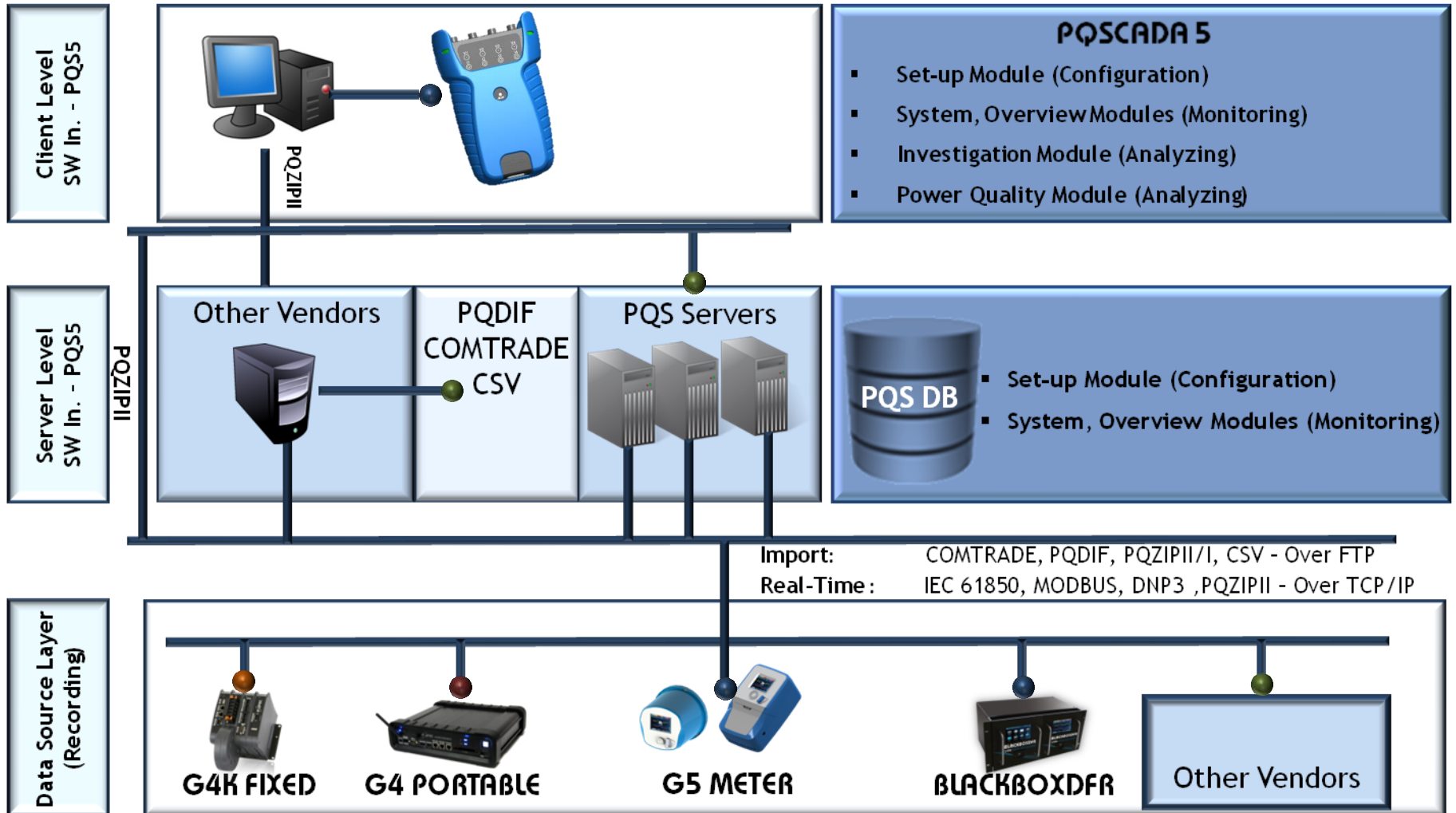


ENERGY METER

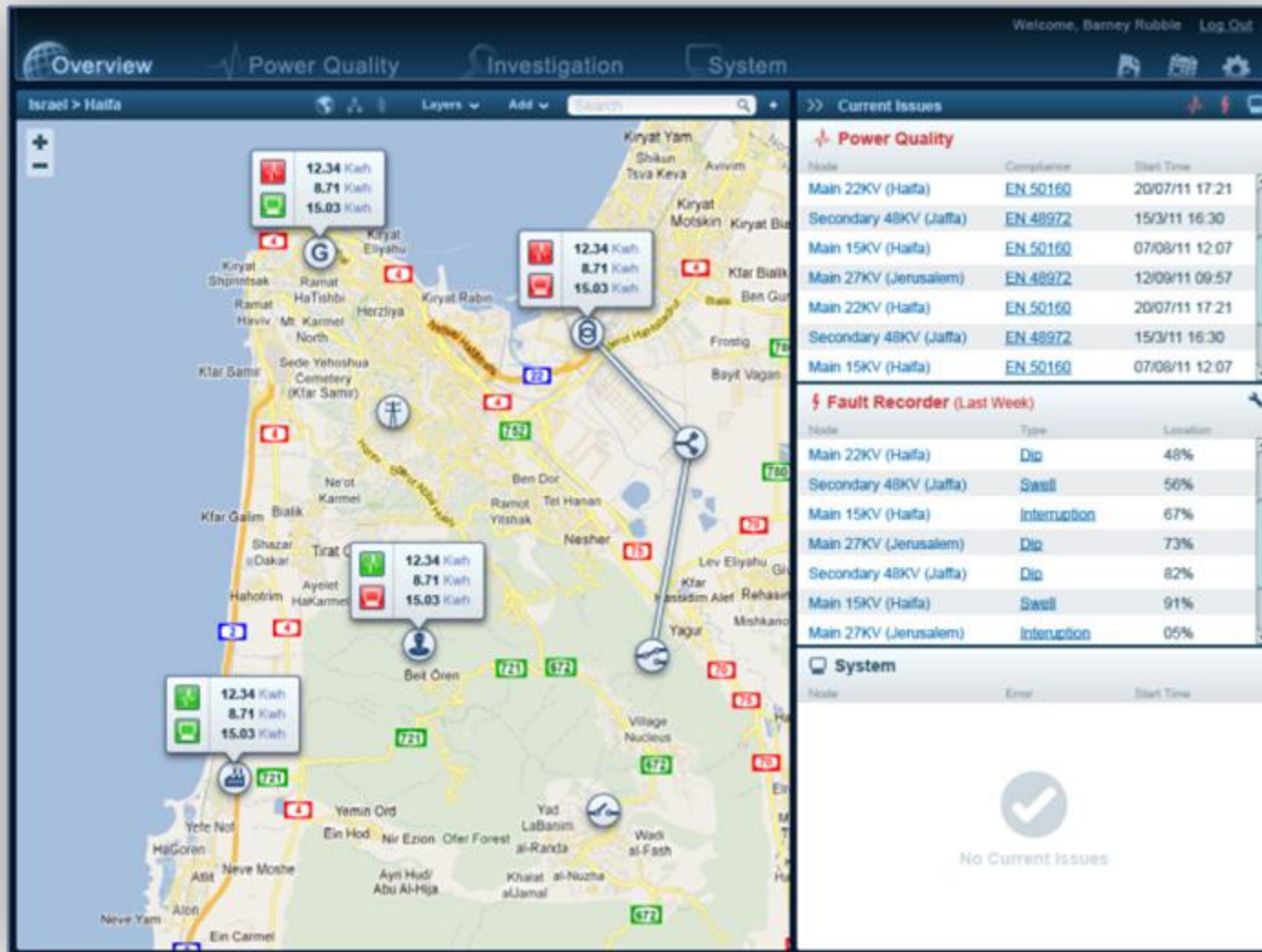
Integrated High Precision Energy Meter - Measure & Record:

- 0.1% Power & Energy Accuracy ... Exceeding:
 - IEC 62053-22 Class 0.2S
 - ANSI C12.20 02 Class 10 + 20 for Energy
- Flow of Energy within a System:
 - Reactive Power
 - Active Power
 - Apparent Power
 - Power Factor
- Flow of Power To & From the System to the Grid:
 - Delivered
 - Received

BLACKBOX ARCHITECTURE



PQSCADA 5 - OVERVIEW [SINGLE MAP]



PQSCADA 5 - OVERVIEW [MULTIPLE MAPS]

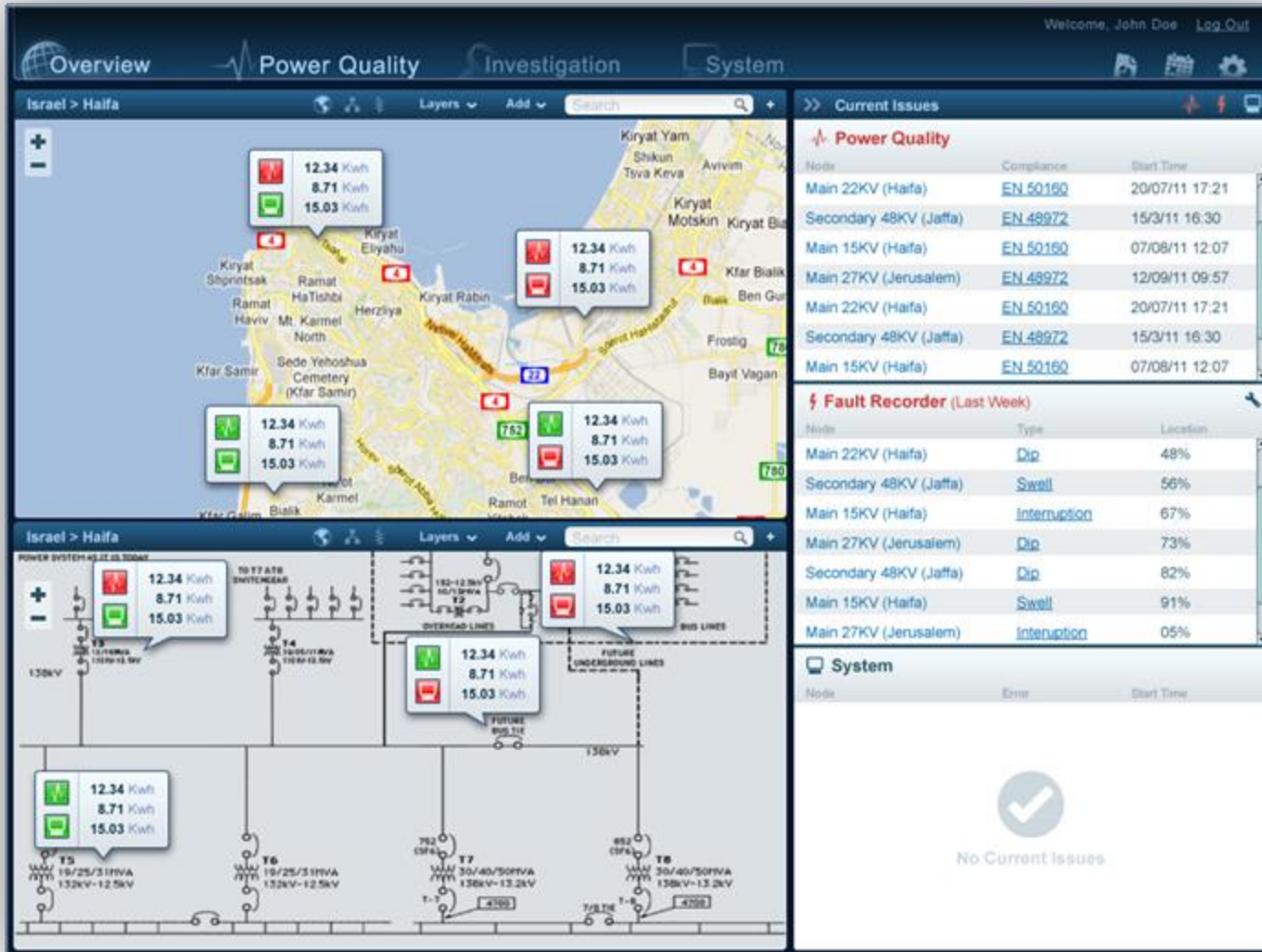
The screenshot displays the PQSCADA 5 Overview interface, which is divided into several sections:

- Navigation Bar:** Includes 'Overview', 'Power Quality', 'Investigation', and 'System' tabs. A user greeting 'Welcome, Barney Rubble' and a 'Log Out' link are visible in the top right.
- Maps:** Four map panes show different regions of Israel. Each map has a search bar and navigation controls. The maps display various locations and power lines, with some nodes highlighted in red.
- Current Issues:** A table listing power quality issues with columns for Node, Compliance, and Start Time.

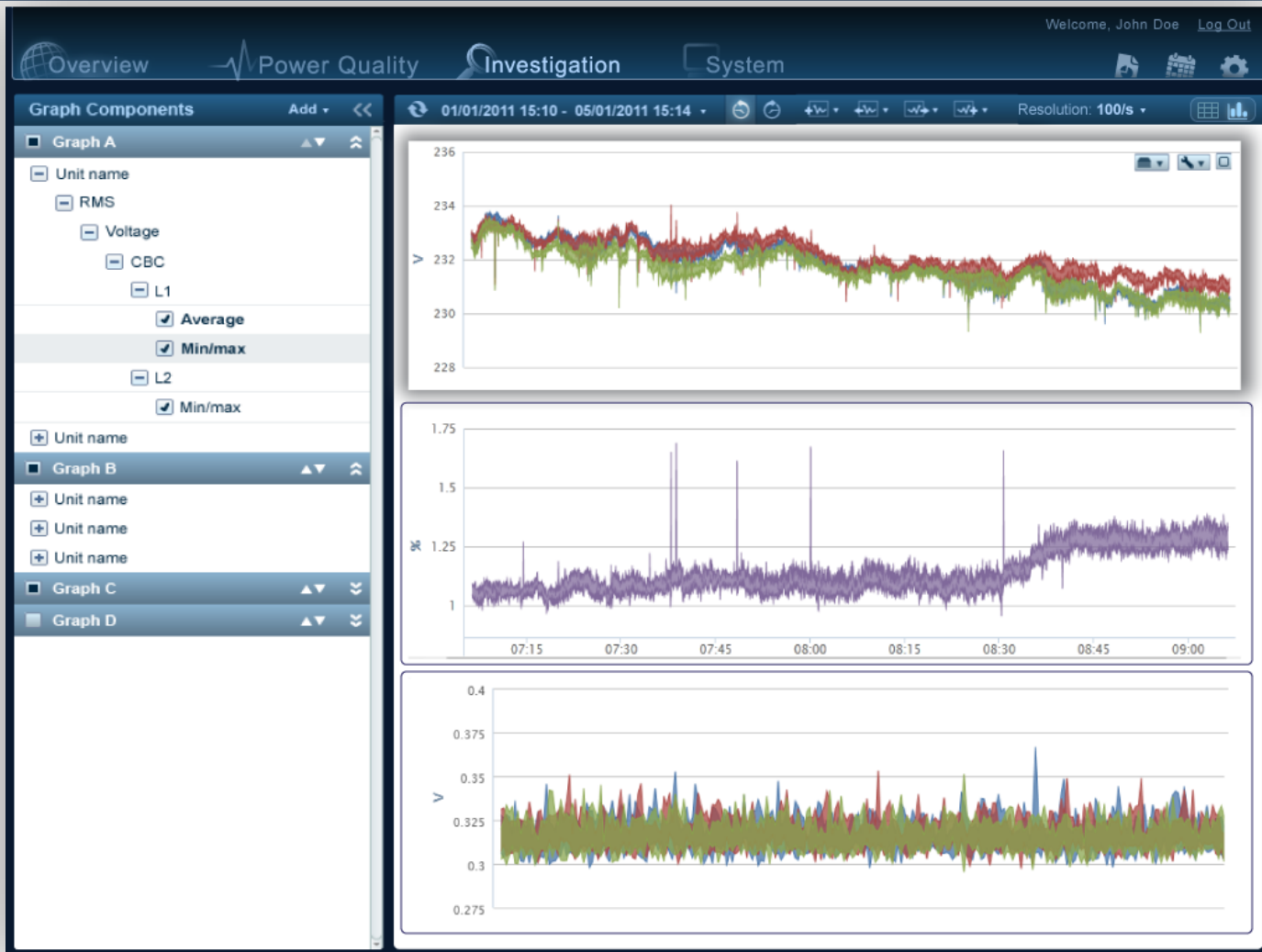
Node	Compliance	Start Time
Main 22KV (Haifa)	EN 50160	20/07/11 17:21
Secondary 48KV (Jaffa)	EN 48972	15/3/11 16:30
Main 15KV (Haifa)	EN 50160	07/08/11 12:07
Main 27KV (Jerusalem)	EN 48972	12/09/11 09:57
Main 22KV (Haifa)	EN 50160	20/07/11 17:21
Secondary 48KV (Jaffa)	EN 48972	15/3/11 16:30
Main 15KV (Haifa)	EN 50160	07/08/11 12:07
- Fault Recorder (Last Week):** A table showing fault statistics with columns for Node, Type, and Location.

Node	Type	Location
Main 22KV (Haifa)	Dip	48%
Secondary 48KV (Jaffa)	Swell	56%
Main 15KV (Haifa)	Interruption	67%
Main 27KV (Jerusalem)	Dip	73%
Secondary 48KV (Jaffa)	Dip	82%
Main 15KV (Haifa)	Swell	91%
Main 27KV (Jerusalem)	Interruption	05%
- System:** A section showing system status with a large checkmark icon and the text 'No Current Issues'.

PQSCADA 5 - OVERVIEW [ELECTRICAL MAP]



PQSCADA 5 - INVESTIGATOR



PQSCADA 5 - POWER QUALITY



PQSCADA 5 - POWER QUALITY

Overview Power Quality Investigation System

Welcome, Barney Rubble Log Out

Components

Search

Group by:

- Region Any
- Station
- Voltage
- Bay
- Customer

Server name

- First district (5)
 - Main 22KV
 - Sabro T1-2 400V
 - Viber T3 400V
 - Mikom 400V
 - Kirur viber 400V
- Second district (10)
- Third district (8)
- Fourth district (30)
- Fifth district (3)
- Sixth district (2)

Main 22KV

Time frame: 01/01/2011 15:10 - 05/01/2011 15:14

EN 50160

Rules Presets

Rule	Faults	Events	Percentage
<input checked="" type="checkbox"/> Voltage Frequency	40	73	80%
<input type="checkbox"/> Supply voltage dips	8	73	98%
<input type="checkbox"/> Short interruptions	8	73	95%
<input type="checkbox"/> Long interruptions	8	73	98%
<input type="checkbox"/> Temporary overvoltage (swell)	40	100	60%

Rules Overview [View all rules](#)

Sort by: Status Display: List

Detect event if $F > 15\%$ Condition: over 80% of events	73 events	85%
Detect event if $F > F_{nom} + 4\%$ or $F < F_{nom} - 6\%$ Condition: over 80% of events	19 events	74%
Detect event if $F > 15\%$ Condition: over 80% of events	23 events	32%
Detect event if $F > F_{nom} + 4\%$ or $F < F_{nom} - 6\%$ Condition: over 80% of events	9 events	85%

PQSCADA 5 - POWER QUALITY

Welcome, Barney Rubble Log Out

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< Back to rules list

Events List

< Previous rule Next rule >

Detect event if F > 15%
Condition: over 80% of events

73 events **85%**

Search

ID	Value	Severity	Phase	Time	Duration
<input type="checkbox"/> 16408	F = 30%	28	1,2,3	Dd/mm/yy hh:mm:ss	Xx.xxxx
<input type="checkbox"/> 16408	F = 30%	26	1,2,3	Dd/mm/yy hh:mm:ss	Xx.xxxx
<input type="checkbox"/> 16408	F = 30%	32	1,2,3	Dd/mm/yy hh:mm:ss	Xx.xxxx
<input checked="" type="checkbox"/> 16408	F = 30%	3	1,2,3	Dd/mm/yy hh:mm:ss	Xx.xxxx 3 1
<input type="checkbox"/> 16408	F = 30%	0	1,2,3	Dd/mm/yy hh:mm:ss	Xx.xxxx
<input type="checkbox"/> 16408	F = 30%	0	1,2,3	Dd/mm/yy hh:mm:ss	Xx.xxxx
<input type="checkbox"/> 16408	F = 30%	15	1,2,3	Dd/mm/yy hh:mm:ss	Xx.xxxx

PQSCADA 5 - POWER QUALITY

Overview Power Quality Investigation System

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73 events **85%**

Search

ID	Value	Severity	Phase	Hh:ss	Hh:ss	Hh:ss	Hh:ss	Hh:ss
<input type="checkbox"/> 16408	F = 30%	28	1,2,3					
<input type="checkbox"/> 16408	F = 30%	26	1,2,3					
<input type="checkbox"/> 16408	F = 30%	32	1,2,3					
<input checked="" type="checkbox"/> 16408	F = 30%	3	1,2,3					
<input type="checkbox"/> 16408	F = 30%	0	1,2,3					
<input type="checkbox"/> 16408	F = 30%	0	1,2,3					
<input type="checkbox"/> 16408	F = 30%	15	1,2,3					

Handheld portable class A meter

600V CAT IV

Free software - easy to use

Report generator

Long term monitoring