Enetics, Inc.

PowerScape Power Monitoring System

Your Complete View Into Your Power System Operation.

- **PowerNode Data Collectors Distributed On Your Ethernet LAN.**

- **Each Node**
  - Records Three Phase Power Consumption And Power Quality.
  - Has Programmable Contact Outputs (Local Annunciation/Load Control).
  - Provides Real Time Data Over Your LAN.
  - Initiates Notification/Data Transfer On Disturbance Event.

- **System Software Is Included**
  - Non-Proprietary System. Single LAN Host Collects Data.
  - Built-In Data Security.
  - Aggregate Data For Site-Independent Defined Recorder "Groups".
  - Tariff Based Reports.
  - Web-Browser-Based Data Access Without Special Application Software.
  - Analysis Engine Built on Microsoft Excel™.
  - Auto-Generated and Formatted Report Data
  - Multi-User Access.

- **High Performance - High Value**

The PowerScape Power Monitoring System consists of multiple PowerNode Recorders monitoring and recording power consumption and power quality. Units distributed in a facility, including the service entrance, periodically and automatically upload data by direct cable connect, Ethernet links, or by land line phone as indicated in the system diagram. Collected data is stored in an SQL database and is available to all authorized users on the LAN or over the Internet. Enetics PowerScape Software allows users to query the database from directly within Microsoft Excel® to generate charts and reports using automated Enetics' Excel-based Analysis Engine. Since the data is available in Excel®, users can easily do any needed additional analyses. The Enetics PowerScape Power Monitoring System makes critical information available to the personnel who need it! Key uses of this data are:

- Improve Efficiency And Reduce Energy Cost.
- Reduce Demand Charges And Power Factor Penalties.
- Manage Curtailment Program Bidding/Assess Economic Benefit.
- Sub-Metering And Demand Aggregation At One Or Across Multiple Sites.
- Monitor And Document Incoming Power Quality.
- Track Down Problems.
- Receive Automatic Paging Alarms and Notifications on up to 12 Simultaneous Conditions

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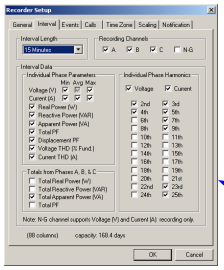
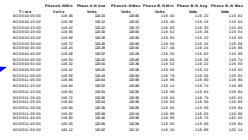
PowerScape System Overview

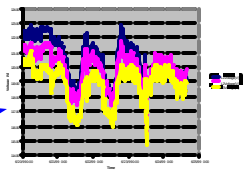
Charts & Reports

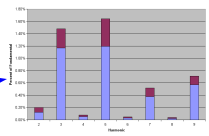
In-Facility PowerNodes

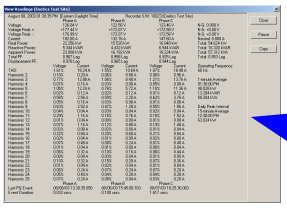
Configuration Form











Real Time Readings

SQL Database

Facility Central Processing Unit

Ethernet

Phone Line or RS 232 Cable

Files

Remote PowerNode

Multiple Network Workstations

Hub

Firewall & Router

Remote Workstation

Internet

Ethernet

Interrogate Any Unit Or Database Over The Internet

Other PowerNodes

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PowerNode Recorders

The LM-5500 PowerNode Meter/Recorders are 3-phase 600v recorders capable of simultaneously recording 4 voltages, 4 currents with events, power quality and power consumption. The fourth voltage and current channels can record neutral-ground voltage and neutral or ground current. The three products in the family provide solutions in the following application categories:

LM-5510: Demand and Energy Monitoring
LM-5515: Power Quality Metering/Recording
LM-5520: Load Management

With any of several available communications options installed all three products in the family provide Automatic Remote Notification through alpha-numeric paging on exceedance of any of up to 12 parameters. These units satisfy all practical power monitoring needs by providing all the features required by your front-line personnel.

Power Consumption Recording

The unit records more than 30 power parameters including Frequency, KW, KVAR, KVA, True and Displacement Power Factors. The LM-5500 series uses Enetics SmartCT™ technology so that calibration data on every CT is stored on a chip in the CT itself full-spec accuracy end-to-end. Dual range, self-powered flexible CT's are offered as well as split core units.

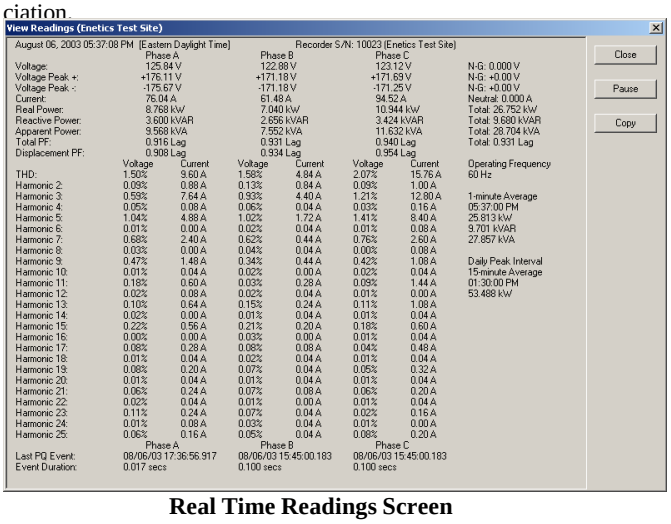
Swells/Sags, Harmonics, Current and Voltage THD, Waveform Capture

The LM-5515 and LM-5520 calculate rms voltage and current and save time-stamped event data if they are outside of user-specified or auto-threshold limits. Swell/sag data is then available for every event including Min/Max Vrms, duration, and worst-case single-cycle current at the event's worst-case voltage. Data on up to 3000 events can be saved.

The LM-5515 and LM-5520 also add waveform capture on dV/dt trigger, or auto-threshold, current and voltage harmonic magnitude recording including THD; current harmonics in % or RMS Amps through the 25th order based on 128 samples/cycle.

Direct Load Management (LM-5520)

Three sets of relay contacts are available, two are NO/NC, and the third is a latching relay. These are programmable to act on event or condition so they can be used for local load control, alarms or annunciation.



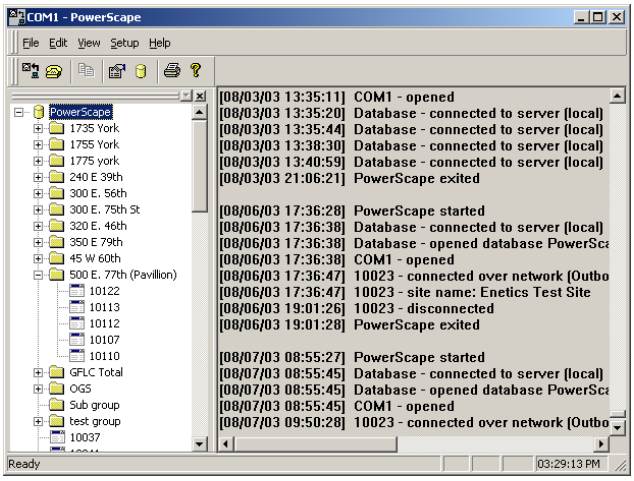
Real Time Readings Screen

The Real Time Readings screen shows at a glance the status at that recorder - voltage, current, harmonics, THD% power parameters, Totals, daily peak demand and most-recent events.

Virtual Metering

Groups of metered points can be aggregated to provide real-time readings and interval data calculated for the combined group of PowerNodes. A single PowerNode can belong to as many groups as desired by the user. This allows the user to install low-level submeters and then combine their readings logically in any manner required to create a "virtual" meter. The PowerScape navigation screen in the left panel below shows that there are 5 PowerNodes grouped together to constitute 500 E. 77th Street.

A virtual meter can be set up to provide alarms and notifications on the basis of measured values exceeding user-programmed thresholds.

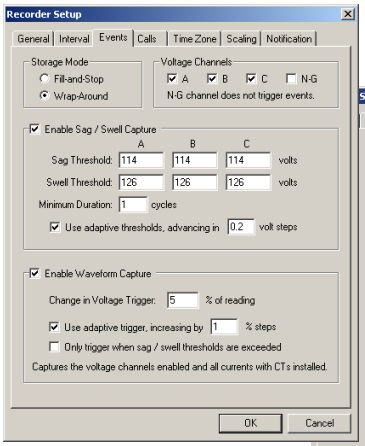


Navigation and System Log

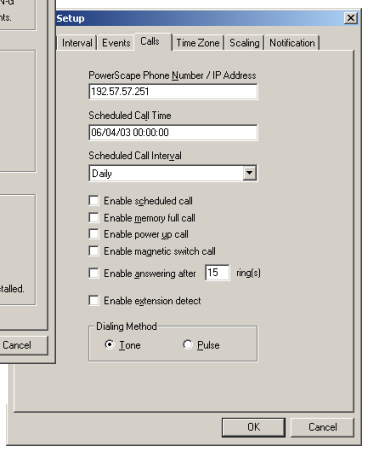
PowerScape Software

Enetics' PowerScape Software is provided with each LM-5400-family recorder. Key features of PowerScape Software include:

- Full SQL Database With Built-In Query Dialogue
- For Those Who'd Rather Use Files, A File-Based Data Archive
- Ethernet/Internet-based Real-Time Data Access
- Browser-based Internet Access To Trended Data
- Microsoft Excel™ Analysis Engine
- Auto-Formatting of Data Reports for Simplified Analysis With Full User Customization Supported
- Drag-Zoom Into A Specific Portion Of A Chart



Disturbance Capture Setup



Internet and Call Setup

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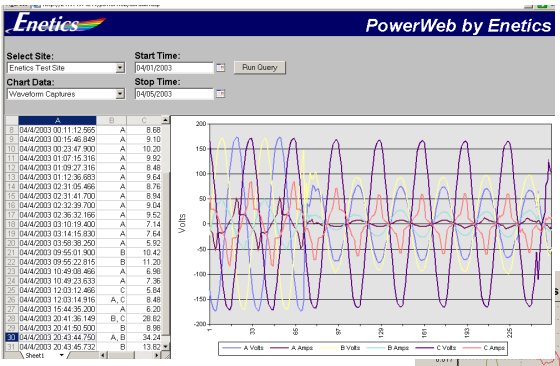
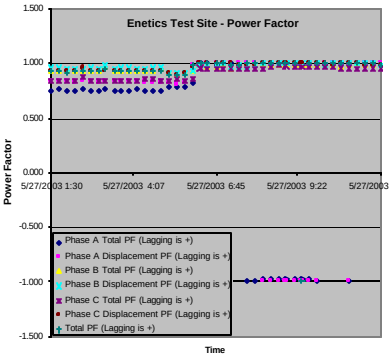
Web Browser-Based Data Access

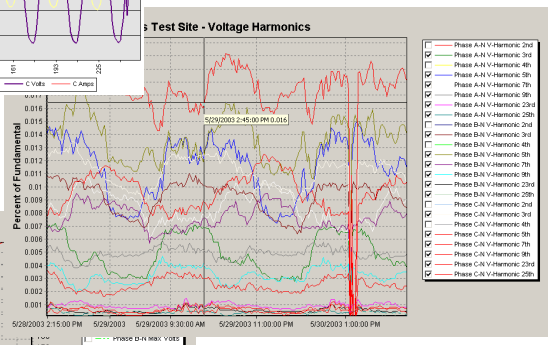
Enetics' PowerWeb can be used by your organization to provide secure access to energy data from anywhere in the world without the need for special application software.

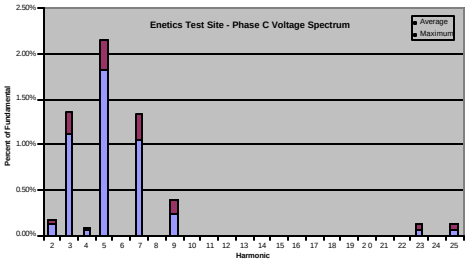


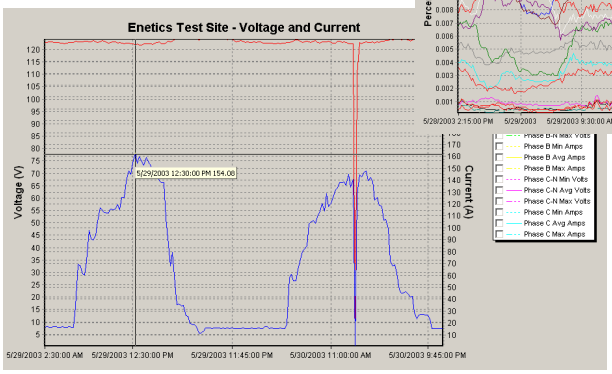
Auto-Generated Report Data

PowerScape provides the user with a suite of pre-formatted charts and tabular data for analytical assessment and reporting your facility's energy and power quality profile.









Time	Complete	Event Type	Phase Description	Threshold (V)	Avg (V)	Worst (V)	Current At Worst Voltage (A)	Avg (A)	Duration (secs)
5/24/2003 9:50:31.983	Y	Swell	Phase A-N	126.00	126.06	126.06	15.12	15.12	0.017
5/25/2003 7:47:47.900	Y	Sag	Phase C-N	114.00	110.24	109.20	36.92	33.40	0.050
5/26/2003 21:21:35.666	Y	Swell	Phase A-N	126.00	126.02	126.02	15.28	15.28	0.017
5/26/2003 21:35:32.216	Y	Swell	Phase A-N	126.00	126.10	126.22	15.04	15.00	0.817
5/27/2003 21:10:40.500	Y	Swell	Phase A-N	126.00	126.14	126.22	22.80	22.88	0.700
5/27/2003 21:10:42.550	Y	Swell	Phase A-N	126.00	126.12	126.26	22.68	22.76	1.517
5/28/2003 21:22:26.566	Y	Swell	Phase A-N	126.00	126.02	126.02	15.76	15.76	0.017
5/28/2003 21:30:10.883	Y	Swell	Phase A-N	126.00	126.12	126.22	15.68	15.68	0.917
5/30/2003 13:38:56.666	Y	Sag	Phase A-N	114.00	0.00	0.00	0.00	14.32	93.333
5/30/2003 13:40:46.050	Y	Sag	Phase C-N	114.00	0.02	0.00	116.40	112.60	2533.250

Specifications

Channels:
Voltage 4
Current 4 (simultaneous voltage and current sampling)

Range:
Voltage 20-600 V RMS
Current CT Dependent (1-10,000A)

Memory
Non-volatile without battery backup
Typical Data Storage Time:
15 Min Interv/16 Parameters: 600 Days min
15 Min Interv/117 Parameters: 100 Days min
Software reports recording time at setup. Waveform and event capture storage is independent from interval data storage. Up to 3000 events are saved in non-volatile memory.

Sample Rate/Response Time:
32 samples/cycle for interval data
128 samples/cycle for harmonic analysis

End-to-End Accuracy:
Voltage ± 0.2% reading + 0.1% FS
Current ± 0.2% reading + 0.2% FS
Power ± 0.5% reading + 0.01% FS
Power Factor ± 1%
THD ± 1%
Frequency ± .1% ; .01 Hz Resolution
ANSI C12.16

Power Configurations Supported
Single Phase, Split Phase, 4-Wire Wye, 4 Wire Delta Total Power
3 Wire Delta.

Recording Interval: 15 sec to 1 hour
Flicker: EN61000-4-15
Harmonics: V and I Up to 25th
Voltage THD (% Fundamental)
Current THD (% Fundamental or RMS Amps)

Communications Options:
Internal Modem
Ethernet
Wireless/Cellular
Serial Port up to 57.6 kbps Standard

Power: 85—265 VAC, 47—440 Hz.
Internally or Externally Powered
Run-through time: 10 sec on Supercaps
Real-Time Clock: 45 days on Supercaps
No Battery Maintenance

EMC: EN55022 Class B Radiated

Environmental/Physical: **CE Certified**

Operating Temp Range: -20°C to +70°C
Size: 11.73" x 9.9" x 6.5"
(29.8 x 25.2 x 6.5 cm)
NEMA 4X Non-conductive Case
Weight: 6.5 lbs (3 kg)
Weather: IP 65

(Specifications Subject To Change Without Notice)

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