

# Smart Grid Applications



## Fault Location

PQView features an optional Reactance-to-Fault add-in Module that can be used to estimate the distance from a substation monitor to a single-phase or multi-phase fault. When combined with electrical circuit model data from circuits modeling databases, PQView applications can provide maps pinpointing the location of a fault using both desktop (PQView) and web applications (PQWeb).

## Renewables – Grid Interconnections

Wind and Solar generation plants are growing at a fast pace. Government assistance in the form of production tax credits, grants for capital investment and other sources of funding are fueling such growth. However, concerns remain over the interconnection of such plants to the grid, as well as overall power quality characteristics. The Encore Series System and PQView are ideal solutions for continual 7x24 monitoring to capture the dynamics over time and alarm on faults, dynamic system changes and deteriorating conditions.



## Capacitor Switching

Capacitor switching improves utility efficiency, but can cause disruptive transients that can affect Adjustable Speed Drives, data communication systems, process controls, and other loads. Our Cap Switch Answer Module not only identifies the source of distributive transients as being from capacitors, but it also determines if capacitors are switching in correctly, and providing the expected benefits in supporting system voltage.

## Data Correlation & Advanced Analytics

The ability to correlate data from different data sources provides new opportunities for better understanding power grid operations and events. Combined with advanced analytics, new approaches of analysis and system modeling and simulations will become available, providing valuable insights for improving power grid reliability and efficiencies.



# PARTNERS IN THE SMART GRID

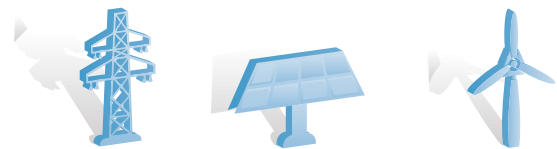




# A Cornerstone of any Smart Grid Program

For more than two decades, sister companies Dranetz Technologies and Electrotek Concepts have worked together, helping our customer's worldwide form a smarter grid. With roots in the groundbreaking Electrical Power Research Institute (EPRI®) Distribution Power Quality (DPQ) project, Dranetz® (and BMI) power monitoring systems have seamlessly integrated with powerful software tools from Electrotek Concepts to improve grid stability and reliability long before "Smart Grid" became a household term.

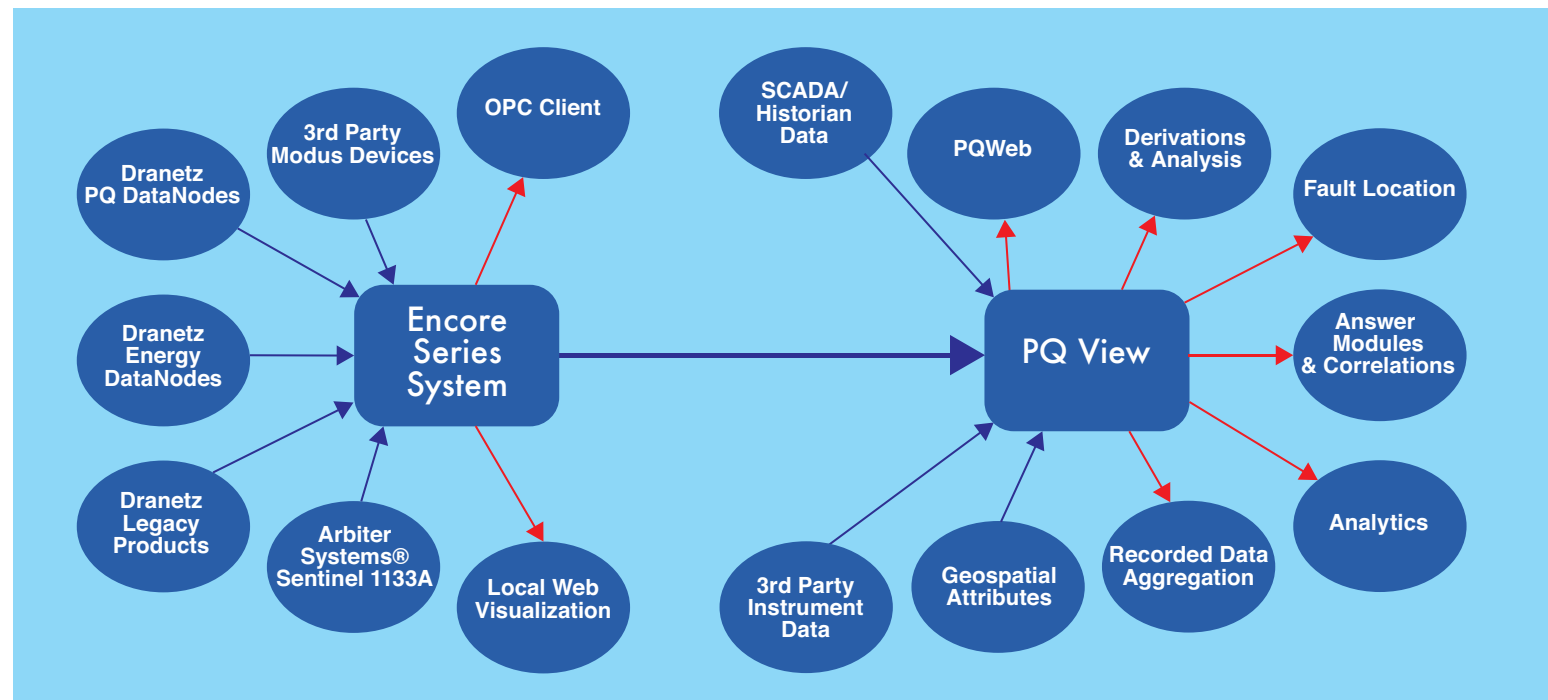
Today, both Dranetz and Electrotek continue to offer modern, innovative solutions for a smarter grid. The Dranetz Encore Series power quality, demand and energy monitoring system, when combined with Electrotek's PQView® software offers a powerful data acquisition and analysis solution for many applications. These applications range from map-based fault location, to grid interconnection of renewables, and even integration with SCADA and historian systems.



## The Smart Grid Power Monitoring System

The Smart Grid encompasses a broad range of new electricity generating technologies, as well as new challenges in transmission and distribution system design and operation. The data for measuring the performance of the grid, as well understanding the events occurring in real time, is provided by the state of the art Encore Series System®. The Encore Series System's advanced technologies meet utility requirements for the next generation of power monitoring systems, and has already been widely deployed at both transmission and distribution substations around the world. Encore's data and advanced Answer Modules® characterizations provide systems operators with the information needed to anticipate and react to power quality issues, as well as evaluate the impact of energy reduction programs. The results help in the implementation of corrective actions or changes in operations that lead toward a more reliable grid and more energy efficient operations.

The Encore Series System is complimented by and works seamlessly with PQView enterprise software. PQView is the most advanced software for the management, integration, analysis and correlation of smart grid data in support of the goal of a self-healing grid.



### PQ Monitoring & Data Acquisition

The Encore Series System of PQ and Energy instruments were designed with utility and Smart Grid applications in mind. Using advanced, flexible and reliable communications, from high-speed fiber connections to analog modems, The Encore Series System works with the most demanding applications by supporting



industry-standard methods such as Ethernet, GSM, GPRS 3G/4G wireless. Supported protocols include TCP/IP, HTTP, XML, Modbus TCP/RTU, IEC 61850, and OPC-DA.

The gateway to the Encore Series System is the web browser-based, password protected Encore Series Software (ESS). This advanced, intelligent software is both a system controller and a user interface for your entire system. ESS can be used in any application, from small systems with a few instruments to very large multi-point utility monitoring systems with hundreds of monitoring points. ESS automatically communicates with each instrument in your system via all supported communications methods to download and store data. All user interactions with the system, such as trending, reports and setups are done in real time using any web browser with connectivity to the system.

## PQView®

The Industry Standard for Power Quality Database Management and Analysis Software

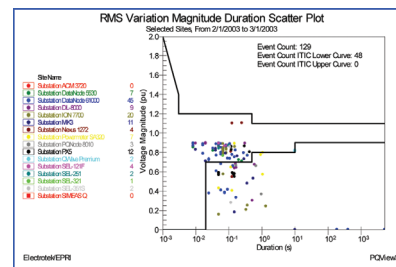
### "BIG DATA" Integration

PQView is the path to a self-healing grid with its unique capability to integrate data from hundreds to thousands of intelligent electronic devices and databases. It uses both standard file formats like PQDIF and COMTRADE, as well as data translators for importing proprietary database formats. PQView can also import data from SCADA, historian databases, and power flow simulation software.

Marked	Site Name	Date and Time	Type	Minimum	Maximum
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<input type="checkbox"/>	Substation 0L9000	2/28/2003 20:57:53.7699	RMS	89.21%	104.69%
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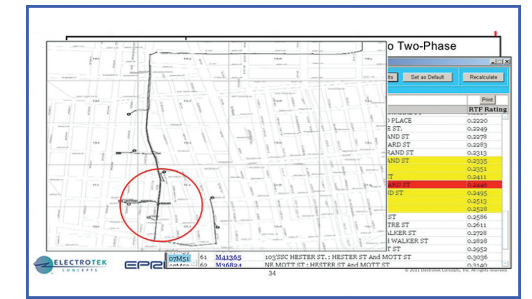
### Derivations and Analysis

By utilizing waveforms and RMS values, PQView can derive a wide range of information that is not in the original recorded data. Derivations include harmonic distortion, harmonic spectrum, frequency, phasor diagrams, as well as negative and positive sequence components. Capabilities also include rapid voltage change, reporting and derivation of voltage and current values through transformer transformations and much more.



### Fault Location

PQView combines power quality instrument data and microprocessor relay data associated with transmission and distribution system faults, and derives distance via impedance modeling. Combined with system modeling software, system maps and geographical information systems, this can be used to identify fault locations so that maintenance crews can be dispatched quickly to an exact location to correct fault conditions.



### Correlations and Answer Modules

Data from multiple data sources such as SCADA systems can be combined with other multiple data gathering devices to provide a comprehensive view of grid operations. System events, breaker operations and relay target information can be integrated for an in-depth evaluation.

### Analytics

In addition to correlations, PQView has the capability to support the application of advanced analytics to improve operation and asset management. This includes the application of statistical process control of voltage and reactive power control of capacitor operations, as well as managing transformer tap range settings.

### Control Room Operations

The event and operational data analysis performed by PQView is made available via PQWeb® to the control room operators in a concise and timely manner, leading to improved decision making tools and reliability.

### System Automation

In the future, the information learned can be applied to developing new automated responses to changing grid conditions. This will lead to the goal of achieving a self-healing grid.

