

# LINEIQ™

ADVANCED TRANSMISSION & DISTRIBUTION LINE MONITORING

Integrating advanced sensor technology, remote communications and intuitive software, the LineIQ™ provides a scalable solution for smart grid and distribution automation.

## APPLICATIONS

- Fault Detection and Outage Management
- Line Capacity Optimization
- Power Factor Improvement
- Line Balancing

## BENEFITS

- Increase Network Reliability
- Improve Efficiency of Power Delivery
- Avoid or Defer Capital Expenditures
- Optimize Asset Utilization

# Field-proven and versatile, Line/Q™ is deployed by hundreds of customers worldwide

## SENSING & DETECTION

The Line/Q™ system provides time-critical information on the performance and condition of overhead power lines up to 138kV, enabling utilities to quickly respond to failing equipment, over-loading, and faltering power reliability.



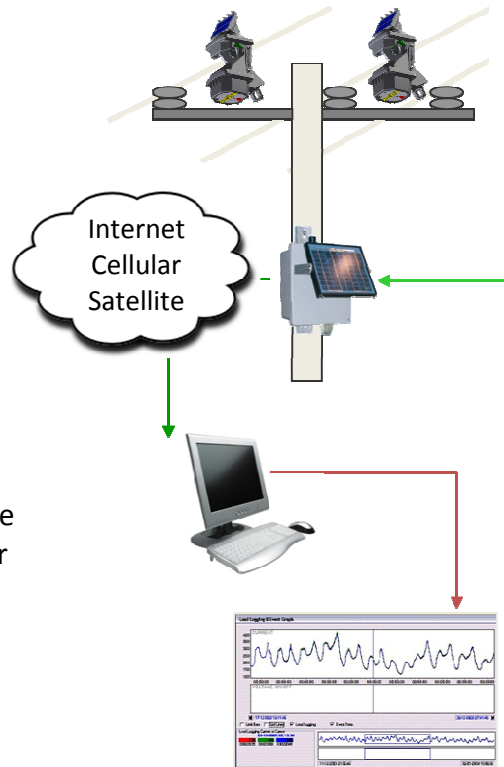
At the heart of the Line/Q™ system is an advanced sensor that is self-powered, autonomous and maintenance-free. Some of the critical data captured by the sensor includes:

- Load Profile
- Line Status and Condition
- Voltage Measurement
- Fault Waveform and Direction
- Ambient and Conductor Temperature
- Time-stamped Event Recordings

## COMMUNICATIONS & DATA INTERFACE OPTIONS

### LOCAL COMMUNICATIONS

- Laptop/Notebook interface
- License-free wireless connection
- 100 ft (30m) retrieval range

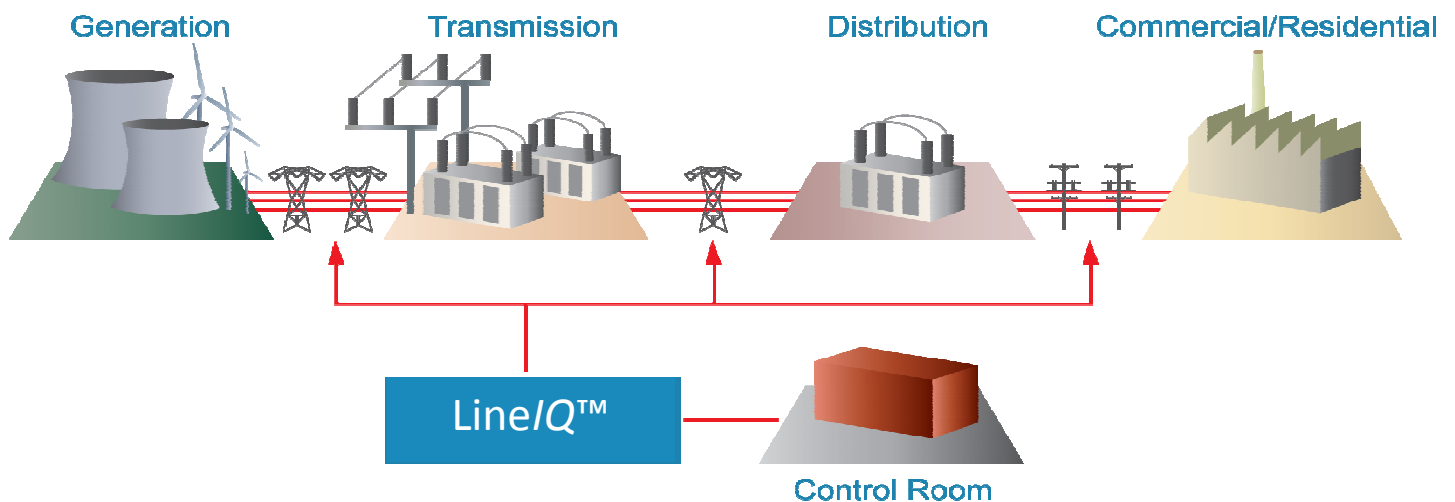


The DataLink creates a wireless connection between a computer and sensors installed on power lines

### REMOTE COMMUNICATIONS

- Wireless link to sensors
- Cellular, Ethernet or Radio Modems available
- DNP3, IEC 61850 or Web Services interface to SCADA

The Pole Attached Collator (PAC) is a solar or mains-charged battery-powered unit that transfers data from remote sites.



The advanced sensor quickly and easily installs onto energized lines or other above-ground infrastructure on the transmission and distribution network. Using various communication options, data collected from the sensors can be retrieved locally or from remote locations.

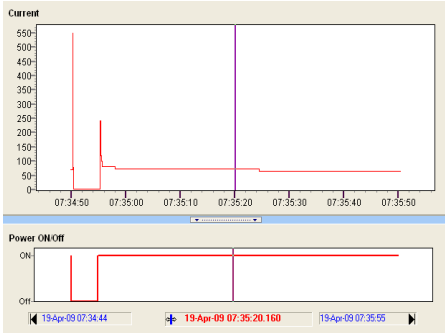
By providing condition status and actionable data, the LineIQ™ extends visibility across the power grid, including areas previously inaccessible or cost prohibitive to monitor.

## SOFTWARE

The LineIQ™ provides simple and intuitive displays and exportable files in graphical or tabular forms.

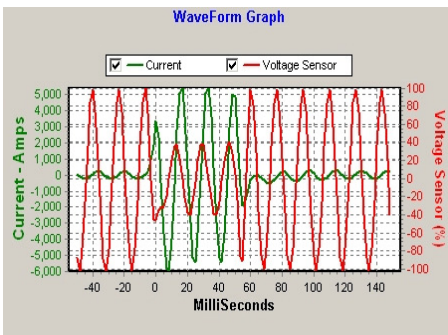
### Event Profile

Time versus Current graph of the captured event



### Waveform

High resolution snapshot of faults

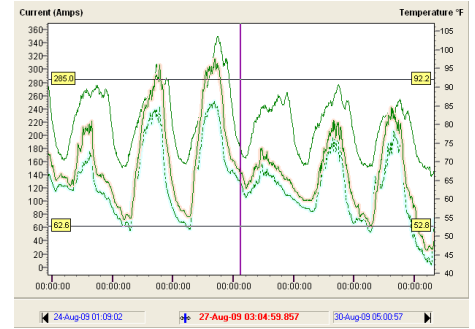


Phase	Event Type	Description	Serial No.	Time Stamp
<b>Location ID 155600</b>				
C	FP	High Current	06012100	21-Oct-07 17:31:55
C	SI-FP	High Current	06012100	28-Oct-07 09:40:18
A	SI	Interruption	06012102	28-Oct-07 09:40:19
B	SI	Interruption	06012116	28-Oct-07 09:40:19
<b>Location ID 386825</b>				
C	SI-FP	High Current	06041193	28-Oct-07 09:40:19
B	SI	Interruption	06041262	28-Oct-07 09:40:20
A	SI	Interruption	04040001	28-Oct-07 09:40:20
<b>Location ID 693372</b>				
C	FP	High Current	06012062	21-Oct-07 11:19:06
B	FP	High Current	06012113	21-Oct-07 17:31:55
B	FP	High Current	06012113	28-Oct-07 09:40:19

FP = On Fault Path    PR = Power Return  
SI = Short Interruption    LI = Long Interruption

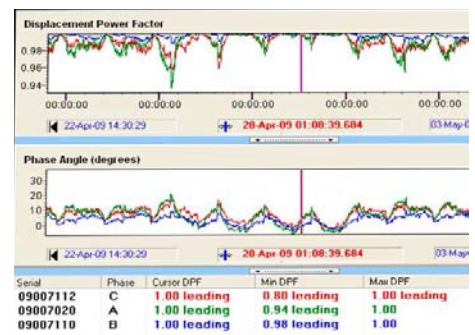
### Load and Temperature

A graphical view of load and temperature versus time



### Power Factor

Graphical view of Power Factor over a user-specified time frame



## Technical Specifications

<b>Line Voltage</b>	<138kV Phase-to-Phase	<b>Measured Parameters</b>	Current and Power (On/Off)
<b>Frequency</b>	45-65Hz	<b>Fault / Event Capture</b>	60-Sec RMS profile (I & E-Field)
<b>Conductor Range</b>	Up to 1.3" (32mm)		Pre-event Line Loading
<b>Visual Indication</b>	High-intensity red and amber LEDs		Fault Current Magnitude up to 25KA
<b>Fault Indication</b>	Red LED every 10 seconds		Fault Current Waveform (240ms)
<b>Line Status</b>	Amber LED every 30 seconds		E-Field Waveform % Change (240ms)
<b>Fault Indication Reset</b>	Time-based and/or line-restoration reset	<b>Power Outage</b>	Time of Power-Off
<b>Communications</b>	Wireless local and remote options	<b>Power Restoration</b>	Time of Power-On and Outage Period
<b>Local RF</b>	Low-powered license-free range 100 ft (30m)	<b>Profiling</b>	User defined ave. profile (1-60 mins) of Load
<b>Remote</b>	Cell (GSM/CDMA), Landline		LT50/60 Conductor & Ambient Temp. up to +257 °F (+125°C)
<b>Protocols</b>	DNP3, IEC 61850, Web Services	<b>Sample Rate</b>	Current 1200Hz, E-Field 600Hz
<b>System Integration</b>	SCADA & Historian integration tools available	<b>Accuracy</b>	Current ±1% of reading ±2 A, Temp ±1 DegF
<b>Energy Storage/Power Source</b>	Solar powered with battery backup	<b>Memory Storage Capacity</b>	Rolling partitioned memory
<b>Housing Material</b>	UV Stabilized Polycarbonate and/or Aluminum Diecast	<b>RMS Records (60sec)</b>	100+ events
<b>Ingress Protection</b>	IP65 Weatherproof	<b>Fault Waveforms</b>	32+
<b>Weight</b>	4.6 lbs (2.2kg)	<b>Load Profiling</b>	Up to 85 days

# SMART GRID SOLUTIONS SINCE 1974

## Innovative and Practical Technology

From our early history of implementing novel features such as continuous sampling and adaptive sensing to countering industry conventions of hard-wiring equipment with wireless solutions instead, GridSense™ has always provided unique answers to utility problems.

## Tested and Proven Offerings

GridSense™ has thousands of devices embedded within the networks of hundreds of utilities worldwide. Through rugged design and construction the company has developed reliable products that meet the rigors of utility requirements and the environment.

## Cost-effective Solutions

The total ownership cost of a monitoring system with respect to the underlying asset being monitored is always important. By embedding superior functionality relative to price and by reducing the cost of implementations which includes support, installation and to service time, GridSense™ is able to bring distribution automation to the smallest utility assets.

## Rapidly Deployable and Scalable Systems

GridSense™ products are designed for quick, safe and easy deployment typically without the need for planned outages. Modular solutions can be implemented over widespread areas as monitoring needs expand over time and assets age.

## Intelligent Solutions for the Grid

### LineIQ™

Intuitive system providing wireless monitoring, analysis, and display of overhead circuits to 138kV



### TransformerIQ™

Comprehensive Monitoring system for vault, distribution, and substation applications



### PowerMonic™

All-weather and rugged power quality disturbance analyzer for enabling safe and high resolution inspection of energized equipment



### BushingIQ™

High voltage on-line bushing, CT and lightning arrester monitor



### LiveLine™

High Voltage Inspection Camera which wirelessly streams high resolution images or video of energized equipment



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