

Bitronics 70 Series IEDs



OrionLX Automation Platform



Easy to Use, Hard to Beat.



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**Overview of Orion and Bitronics Roles in Wind Farms**

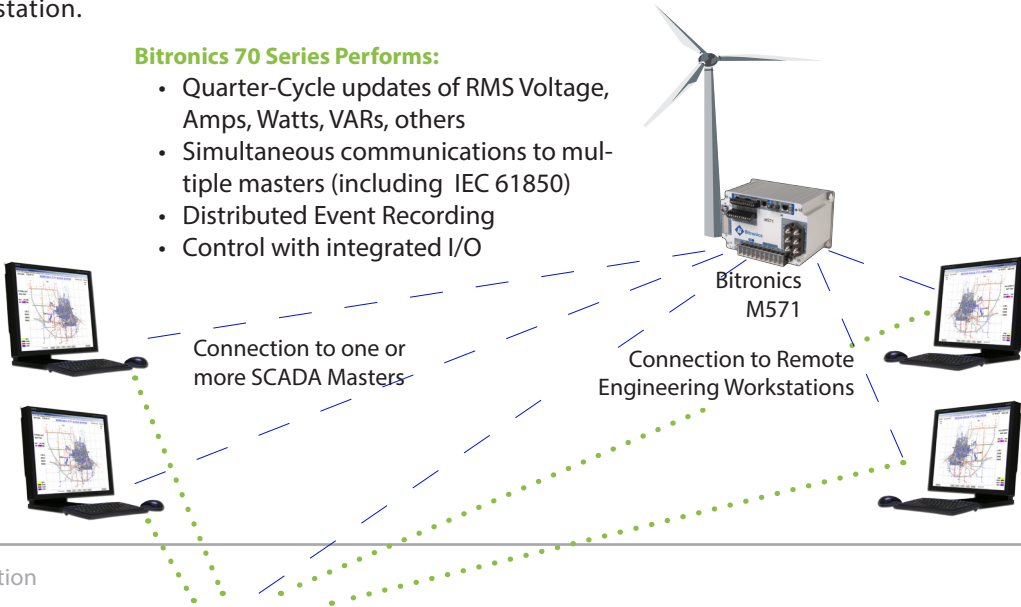
The Orion Automation Platform is widely applied in electric substations to perform secure monitoring, data processing and control functions. The Orion physical structure, flexible software architecture and powerful configuration software make it an ideal solution for integration and automation in wind farm substations.

The Bitronics 70 Series is seeing early adopter use in monitoring and controlling wind turbines in high speed frequency and phase matching applications.

The diagram below shows connections to SCADA, remote workstations, and IEDs in a typical wind farm substation.

**Bitronics 70 Series Performs:**

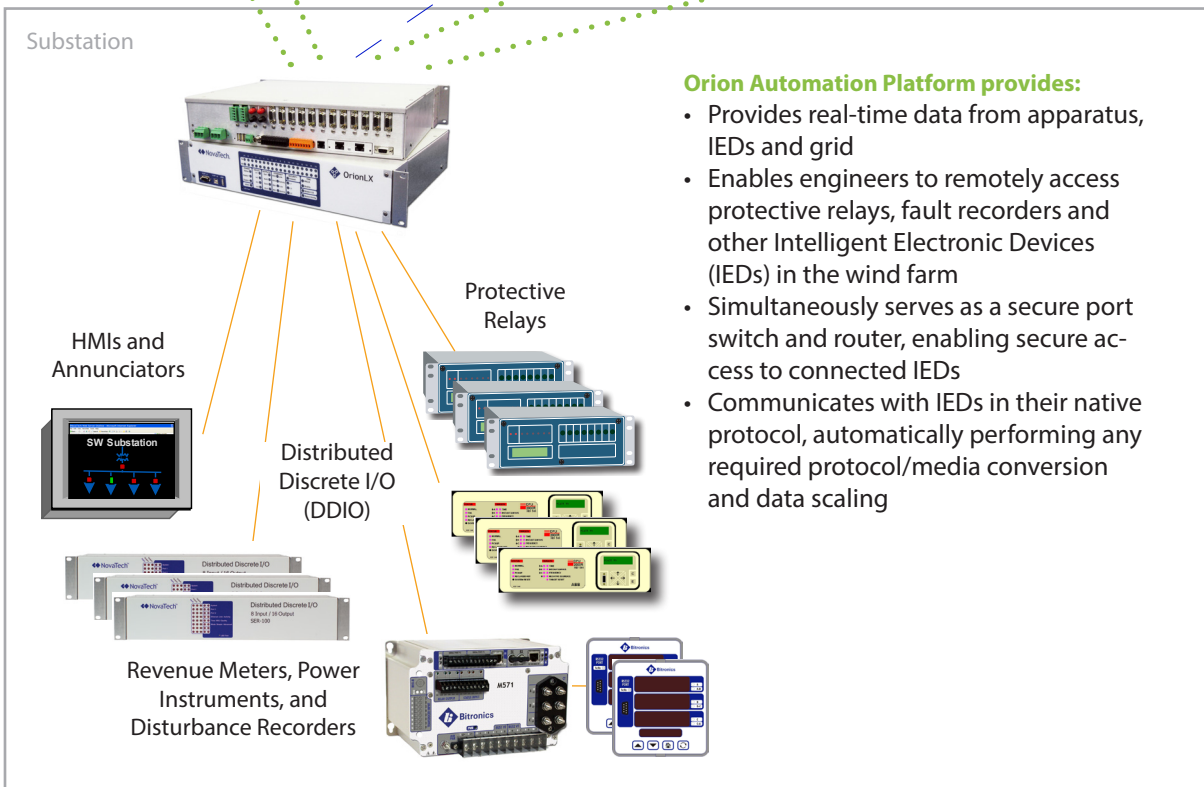
- Quarter-Cycle updates of RMS Voltage, Amps, Watts, VARs, others
- Simultaneous communications to multiple masters (including IEC 61850)
- Distributed Event Recording
- Control with integrated I/O



**Substation**

**Orion Automation Platform provides:**

- Provides real-time data from apparatus, IEDs and grid
- Enables engineers to remotely access protective relays, fault recorders and other Intelligent Electronic Devices (IEDs) in the wind farm
- Simultaneously serves as a secure port switch and router, enabling secure access to connected IEDs
- Communicates with IEDs in their native protocol, automatically performing any required protocol/media conversion and data scaling





### Customer Installation and Testimonials

#### Wind Farms/Developers Using Orion and Bitronics

#### 2012

- Green Futures Innovation (Philippines)
- Idaho Power (Wind Power, Idaho)
- NaturEnergy (Montana)
- Renewable Energy Systems (Montana)
- Terra-Gen Operating Company (California)
- Walnut Creek (California)

#### 2010

- Cielo Wind Power (Wildorado Wind Ranch, Texas)

#### 2008

- Babcock and Brown (Wind Farm, South Dakota)
- Duke Energy (Happy Jack Wind Farm, Wyoming)
- Padoma Wind (Elbow Creek Wind Farm, Texas)
- RES America Wind Farms (Texas)
- Danish Cell Project (Spirae, Denmark)

***“The Bitronics M571 is an ideal measurement and control node for integrating distributed intermittent renewables like wind. Its 4ms measurement response time, integrated I/O, and simultaneous communications to multiple masters are uniquely suited to the high-speed control of wind turbines, feeders, and other smart microgrid components.”***

- Oliver Pacific  
CTO, Spirae

***“The wind farm was a complex project, with many different devices, connections and services...and the Orion was able to handle everything.”***

- David Moraes, PE  
Senior Electrical Engineer, TRC

#### 2011

- Alta Wind Energy (California, through Power Engineers)
- EnXco (California, through P&E Engineering, Iowa)
- First Wind (Hawaii)
- Grasslands Renewable Energy (Montana)
- Lone Star Transmission (W. Texas Renewables)
- Pattern Energy Group (Spring Valley Wind Farm, Nevada)
- Ridgeline Energy (Idaho)

#### 2009

- AES (Armenia Mountain Wind Farm)
- Buena Vista Energy (Wind Farm, N. California)
- Milford Valley Wind (Utah)
- Third Planet (Wind Farm, California)
- Topaz Power Group (Texas)

#### 2007

- BP/Greenlight Energy (US Wind Farms)
- Edison Mission Energy (US Wind Farms)
- FPLE (Nextera) (US Wind Farms)
- Goat Mountain, LLC (Wind Farms, Texas)
- Tenaska Power Services (Texas)
- Ventus Energy Systems (Minnesota)



## OrionLX Key Features for Wind Farms

### Cyber Security

- Reduce chances for unauthorized or malicious access
- Address emerging NERC CIP requirements
- User groups with varying access privileges
- Firewall, encryption and key management
- Security event and alarm logging

### Interface to multiple SCADA Masters simultaneously

- Independent buffers
- Different protocols, including DNP3, Modbus, FTP, telnet, SNMP and IRIG-B
- One Orion Smart RTU can serve the role of multiple RTUs

### Pre-engineered Point Pick Lists

- Reduced engineering time
- No tedious register entry required
- Protective Relays: Over 10 vendors with 200 models
- Electrical Revenue and Display Meters: Most vendors and models

### Math and Logic Functions

- Eliminate need for specialized controllers
- Fewer nuisance alarms
- Can be used for control actions and to condition data
- Complete suite of Math and Logic function with Syntax Checker and Logic Simulator
- Examples: Filter alarms, invert sign (as in power flow), convert phase-to-phase to phase-to-ground

### Orion physical structure is modular and offers many communication options

- Individual communication modules for RS-232, RS-485 and fiber
- Individual Ethernet modules for copper or fiber (redundant copper available)
- Eliminate expensive physical conversion modules

### Rugged Like a Relay

- Meets ANSI C37.90.1 2002 Fast Transient and ANSI C37.90.2 1995 RFI
- Designed to operate over -40C to 70C, without heaters or fans

### Flexible and Modular Like a PLC

- Complete logic suite for local control and intelligent alarming
- Modular and expandable I/O
- Modular and expandable ports
- Non-volatile memory

### Standard PC Tools

- Large, expandable solid state memory
- Built-in 10/100MB Ethernet
- A variety of communication options such as HTTPS, SSH and Email



### Utility-Specific

- Complete Cyber Security Package
- Built in breaker control, counter and accumulator functions
- Momentary-Change-Detect function
- Full suite of utility protocols



### Bitronics 70 Series Key Features for Wind Farms

#### Distributed Disturbance Recording

- Multiple 70-Series instruments work together to capture a power system event on multiple feeders or generators
- Software consolidates individual records into one “substation event” for analysis
- “Sequence of Events” functions quickly highlight sources of disturbances

#### Simultaneous support of multiple protocols via serial and Network media

- IEC-61850 via TCP/IP network
- DNP3 via network and serial
- Modbus serial and TCP
- FTP, Telnet, SNMP, and IRIG-B

#### Quarter cycle (4ms) measurement updates

- Volts, amps, power, energy
- Frequency, phase angle
- Harmonic spectrum through the 63rd harmonic on all phases, current and voltage

#### Automation Functions

- Voltage control, power factor control, and loadshedding
- Front-end for synchro-check and synchronizing between two power sources and lines
- Binary status and control points available to remote SCADA Masters

#### Event Recording & Analysis

- Two independent Oscillographic Recorders
- 256 samples per cycle resolution
- Two independent Slow Disturbance Recorders with one cycle resolution
- Seasonal Trend recorder captures months of data with up to one minute resolution
- Sequence of Events recorder

#### Relay-Like Functionality

- Distance to fault measurements
- Enterprise-wide access to important event files without jeopardizing the security of the protection system
- Can set triggers without requiring re-commissioning



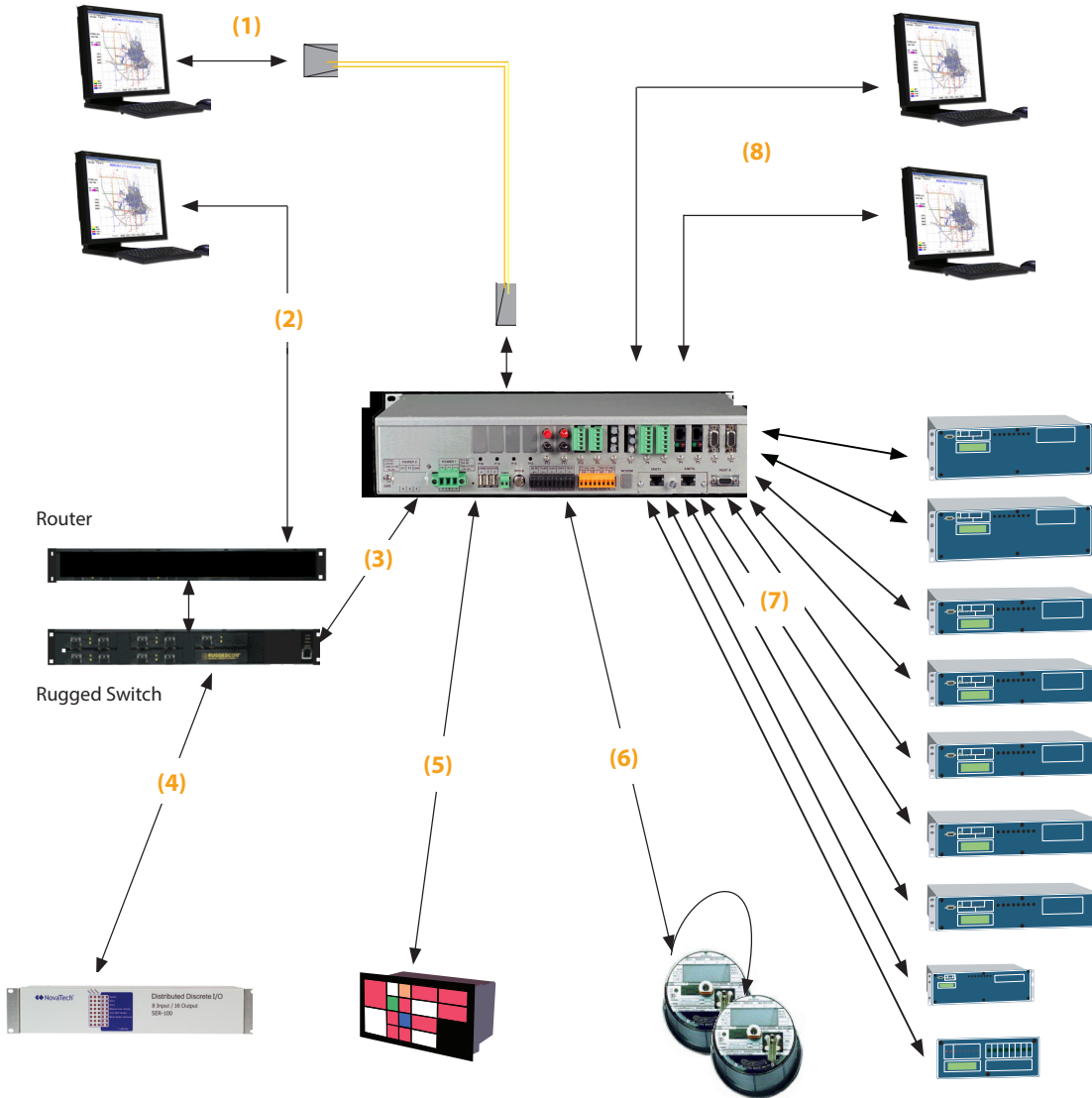
#### Utility-Grade

- Bright, easy-to-read LED panel meters
- Compliant to IEC 60687 and ANSI C12-30-1998
  - Over 2000 measurements including frequency, demand, individual and total harmonics, Kfactor, current & voltage unbalance, flicker, impedance and symmetrical components



**Customer Application - Orion in Wind Farm**

The diagram below details the application of Orion in a wind farm in West Texas, (engineered by TRC, West Palm Beach, FL for Xcel Energy). Support for multiple SCADA Masters and pre-configured point pick lists for all IEDs enable a single Orion to be engineered with less effort than other solutions.



- |  |  |
|--|--|
| <p><b>(1) To SCADA Master #1</b><br/>DNP3 protocol over RS-232 converted to 9.3 micrometer single mode fiber optic using SEL-2829 converters</p> | <p><b>(5) Interface to one Ametek 3100D Annunciator</b><br/>DNP3 protocol over RS-232</p>  |
| <p><b>(2) To SCADA Master #2 (on turbine)</b><br/>DNP3 protocol over Ethernet</p>  | <p><b>(6) Interface to two Revenue Meters</b><br/>DNP3 protocol over RS-485</p>  |
| <p><b>(3) To Ethernet Port on Orion</b></p>  | <p><b>(7) Interface to nine SEL® Protective Relays</b><br/>SEL® protocol over RS-232; IRIG-B also sent from Orion to SEL® relays</p> |
| <p><b>(4) Interface to Orion DDIO</b><br/>DNP3 protocol</p>  | <p><b>(8) WAN connection to remote engineering workstations</b></p>  |

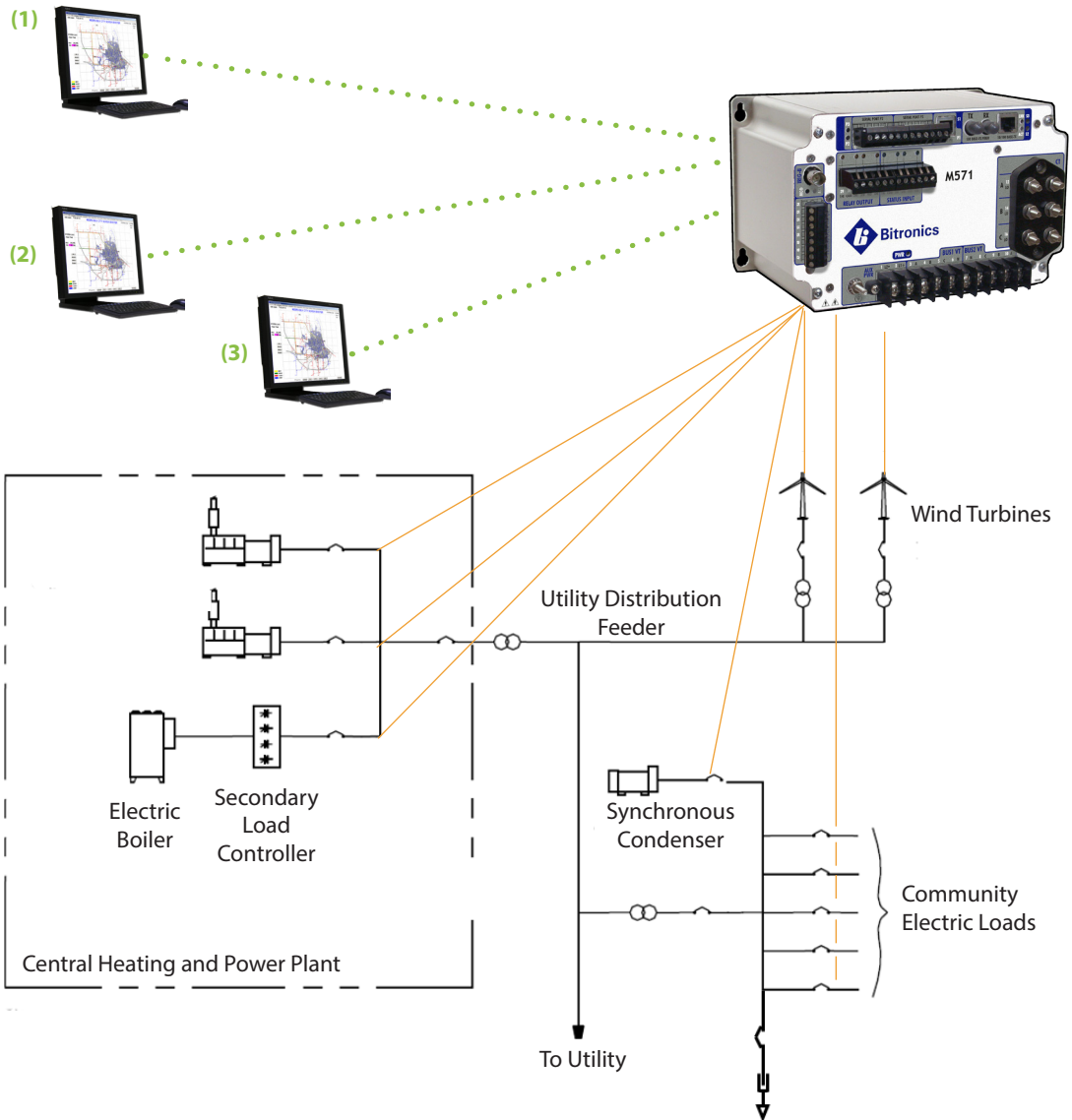
For more information on the Orion Automation Platform, or to identify your local representative, please visit our website.





### Customer Application - Bitronics in Wind Farm

The 70 Series IEDs integrate with controllers running advanced algorithms to demonstrate dynamic stability control in renewable & distributed generation applications.



#### M571 has remote communication with:

- (1) **System Operator's SCADA/EMA**  
Serial Leased Line SCADA via DNP
- (2) **Distribution Utility's SCADA**  
Serial Leased Line SCADA via DNP
- (3) **Local Monitoring and Automated Control Systems**  
LAN / WAN / VPN via Modbus, DNP, IEC61850

#### M571 has local, direct connections to:

- **Secondary Load Controllers**
- **Wind Turbines**
- **Distribution Feeders**
- **Community Electric Loads**

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