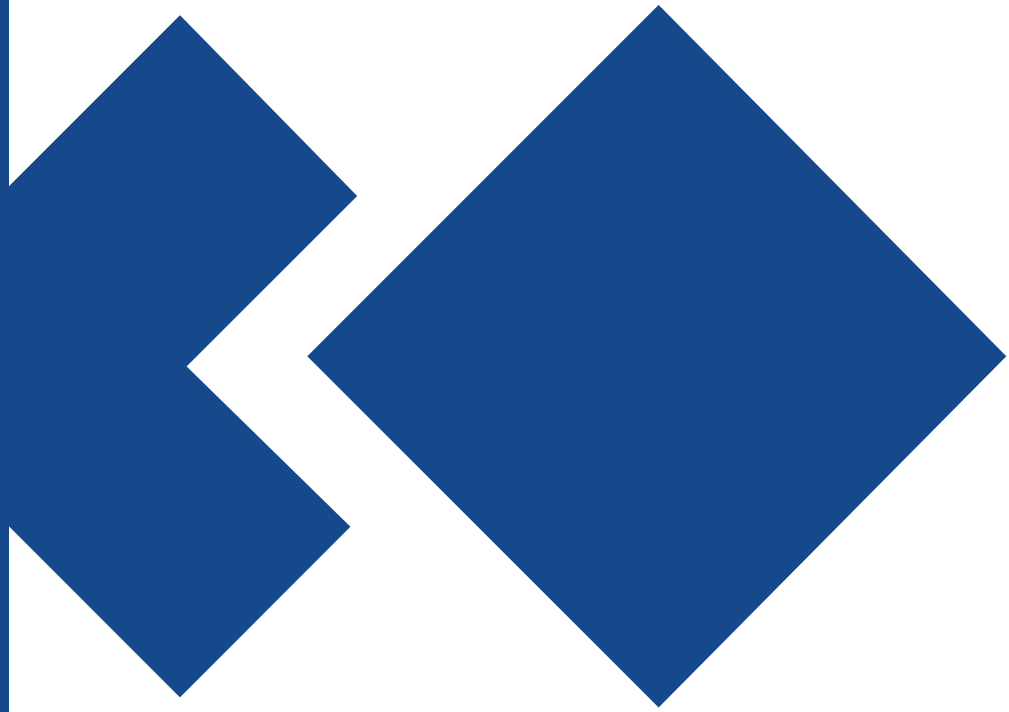
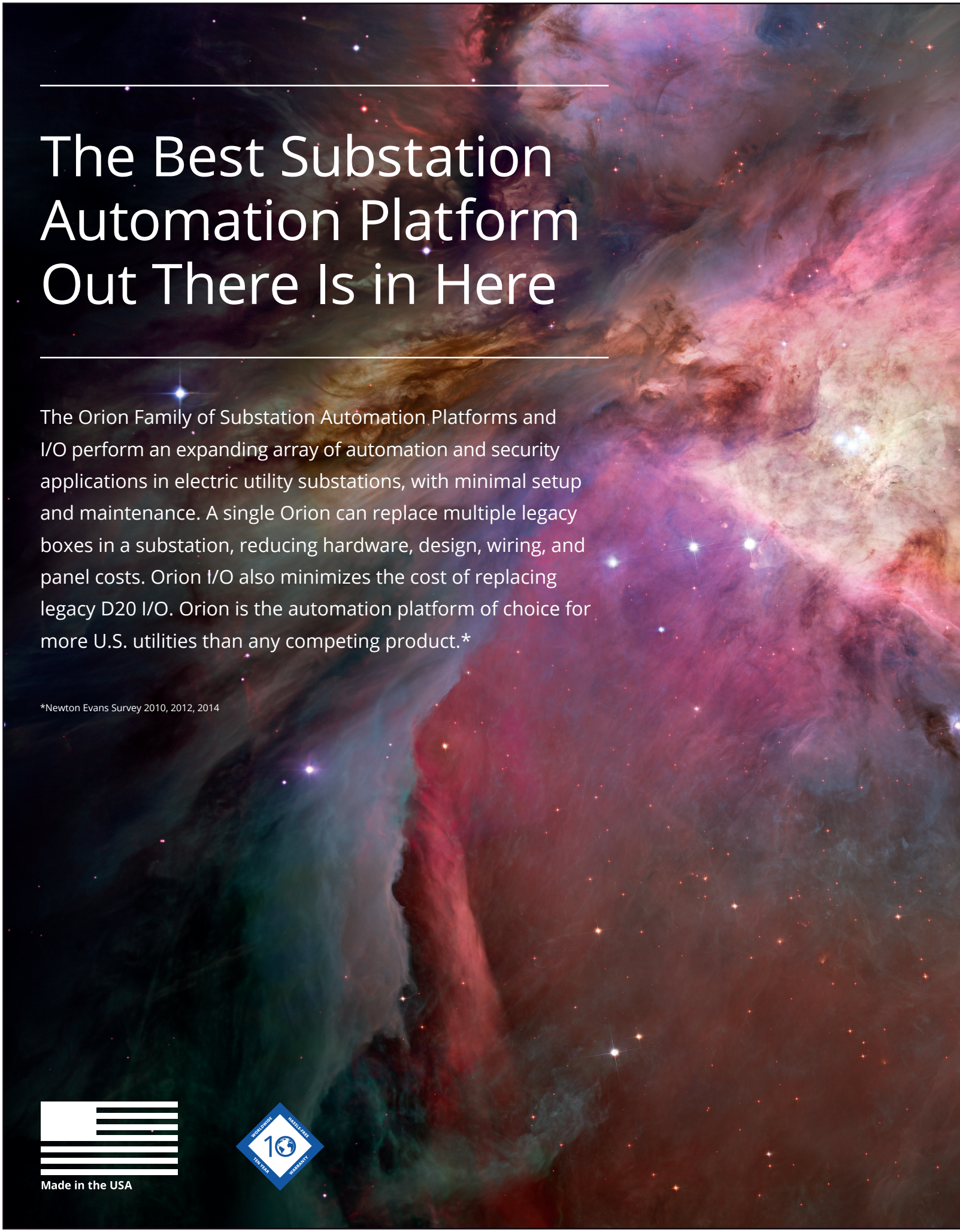


Orion

An Overview of the Orion Automation Platform



The Best Substation Automation Platform Out There Is in Here

The Orion Family of Substation Automation Platforms and I/O perform an expanding array of automation and security applications in electric utility substations, with minimal setup and maintenance. A single Orion can replace multiple legacy boxes in a substation, reducing hardware, design, wiring, and panel costs. Orion I/O also minimizes the cost of replacing legacy D20 I/O. Orion is the automation platform of choice for more U.S. utilities than any competing product.*

*Newton Evans Survey 2010, 2012, 2014

Made in the USA

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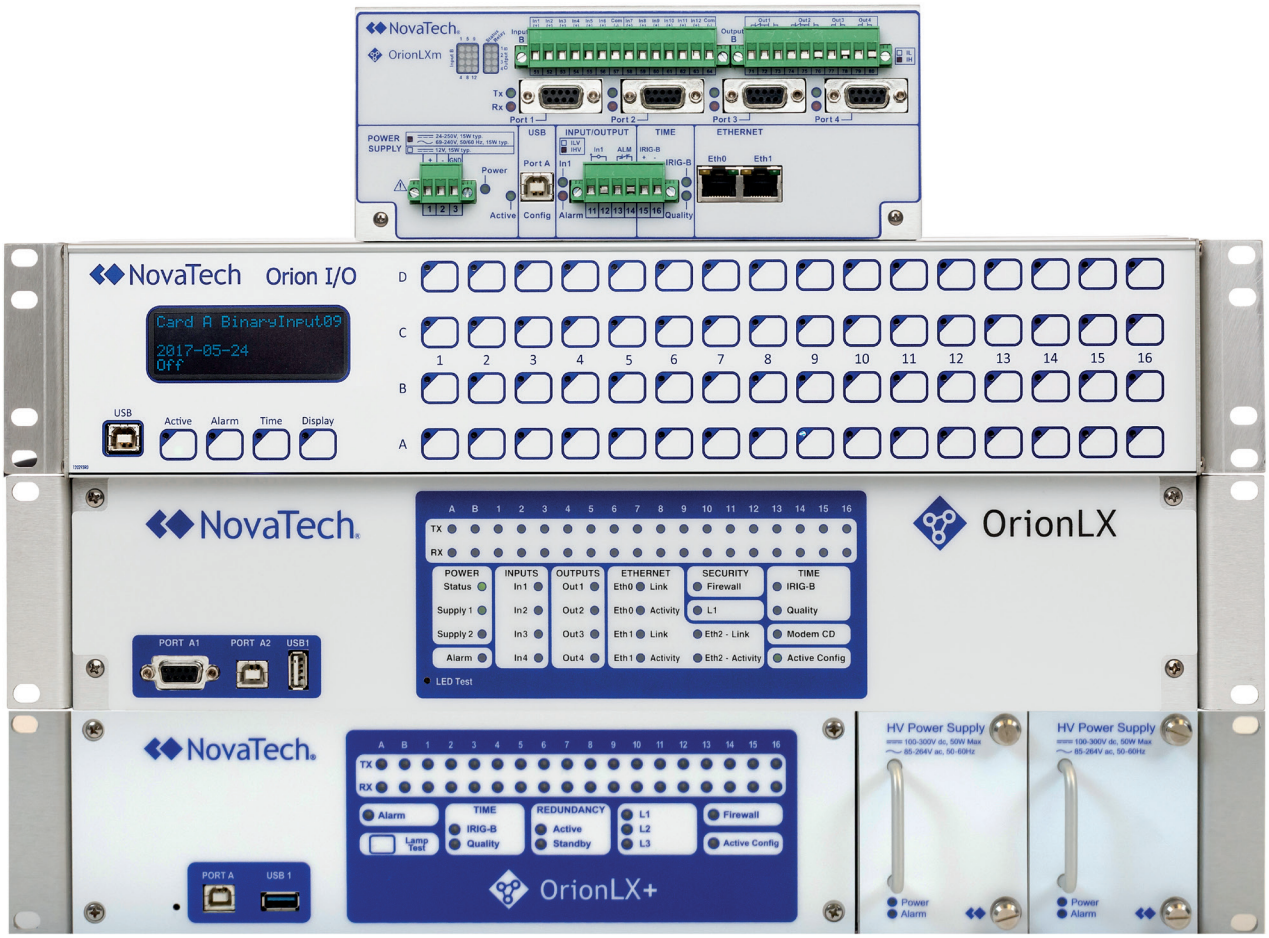
Design Goals

The OrionLX+, OrionLX, OrionLXm, and Orion I/O borrow design features from rugged protective relays, modular PLCs, powerful PCs, diagnostic test sets, and secure routers. The result is a rugged platform that can reliably take on a range of automation tasks.



From Top: OrionLXm, Orion I/O, OrionLX, OrionLX+

Rugged

Meets ANSI C37.90.1 2002 Fast Transient on I/O and power supplies and ANSI C37.90.2 1995 RFI, and corresponding IEC standards. Direct fiber optic is available on serial communication ports and Ethernet port. Designed to operate over -40°C to 70°C without heaters, fans, or moving parts.

Flexible & Modular

On the OrionLX hardware and software are modular. Communication cards can be switched or added, software options and protocols can be added quickly and easily in the field. Toolsets for logic, HMI development, and points mapping provide the flexibility to meet the needs of multiple applications.

Standard IT Industry Tools

Includes SNMP Manager and Agent, a SQL-compliant relational database, web technology, and standard tools for file transfer, diagnostics, and time management.

Utility Specific

Includes functions for breaker controls, counters, accumulators, Local/Remote, and momentary-change-detect. Includes support for both legacy utility protocols (Modbus, CDC, Conitel, etc.) and new international standards (IEC 61850, IEC 60870, and DNP3).

Built-in Diagnostics

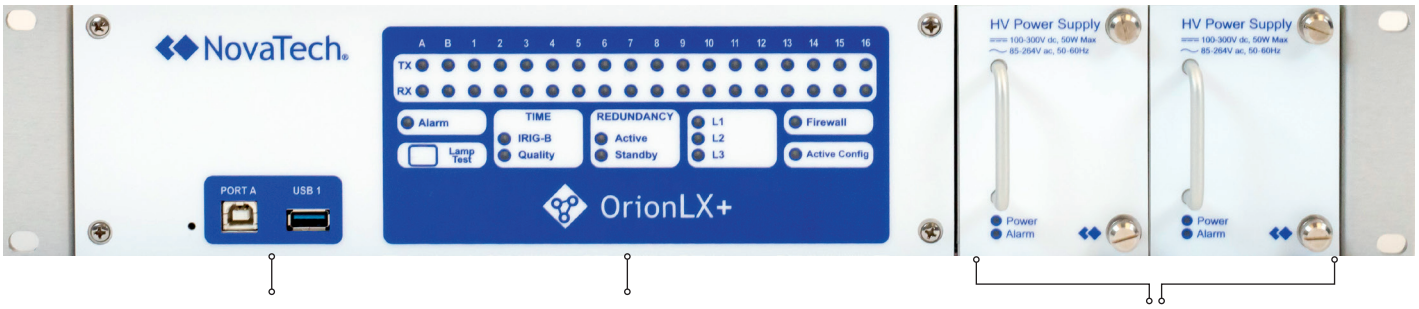
Includes a built-in protocol analyzer to view all messages, plus extensive diagnostic LEDs, internal health monitoring, and time diagnostics. Commissioning tools include points blocking and forcing functions. Orion I/O includes an LED-based user interface for status and diagnostics.

Built-in NERC CIP Security

All Orions come standard with all security features built-in including protection from malware, remote authentication, secure protocols, strong passwords and syslog logging.

Hardware Features

Orion Automation Platforms are available in two sizes: 19” rack mount and smaller 8.5” x 6” x 2RU with universal mounting. A wide range of modular communications, display, and power supplies can be tailored for any application.



USB Maintenance Port

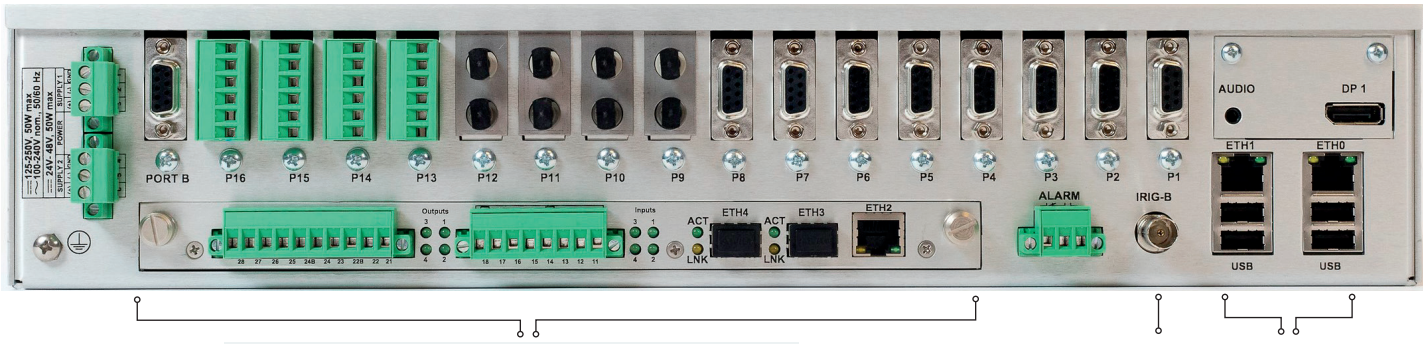
Status LEDs incl Redundancy

Redundant Hot Swappable Power Supplies

OrionLX+

Modular Serial Communication Cards

Direct Video Display Port

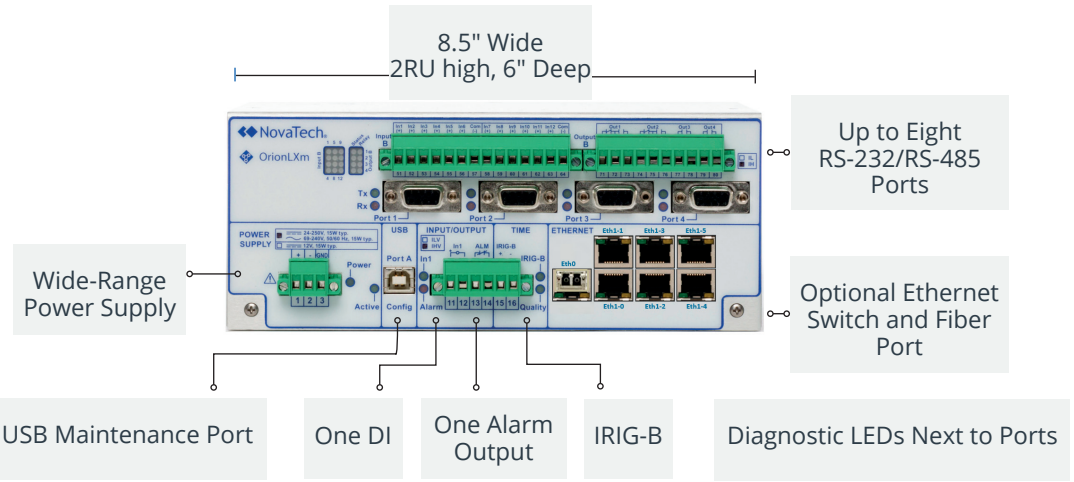


Optional NovaCard with Four DI/DO and Three Ethernet Ports (One Copper Ethernet & Two SFPs)

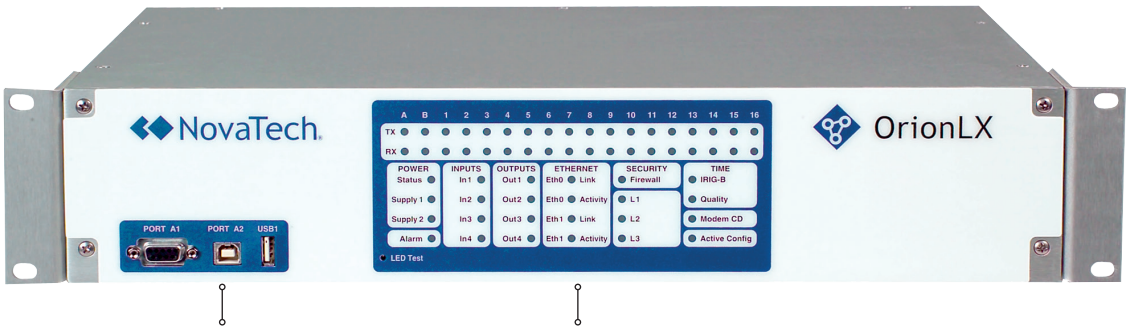
Built-in IRIG-B

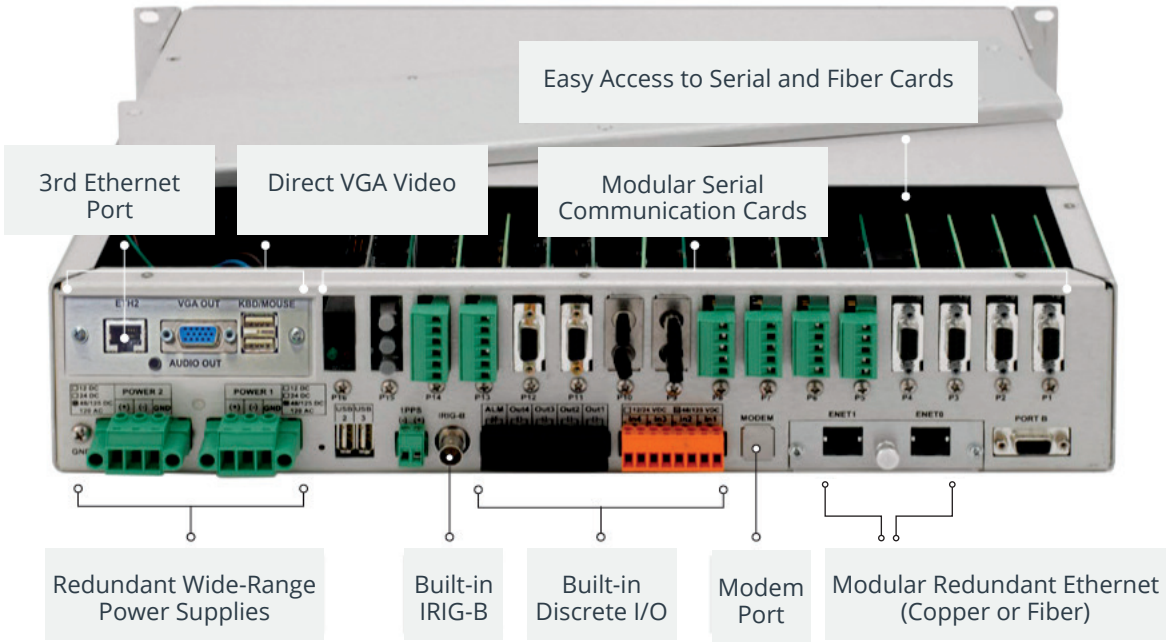
Two Copper Ethernet Ports Standard

OrionLXm



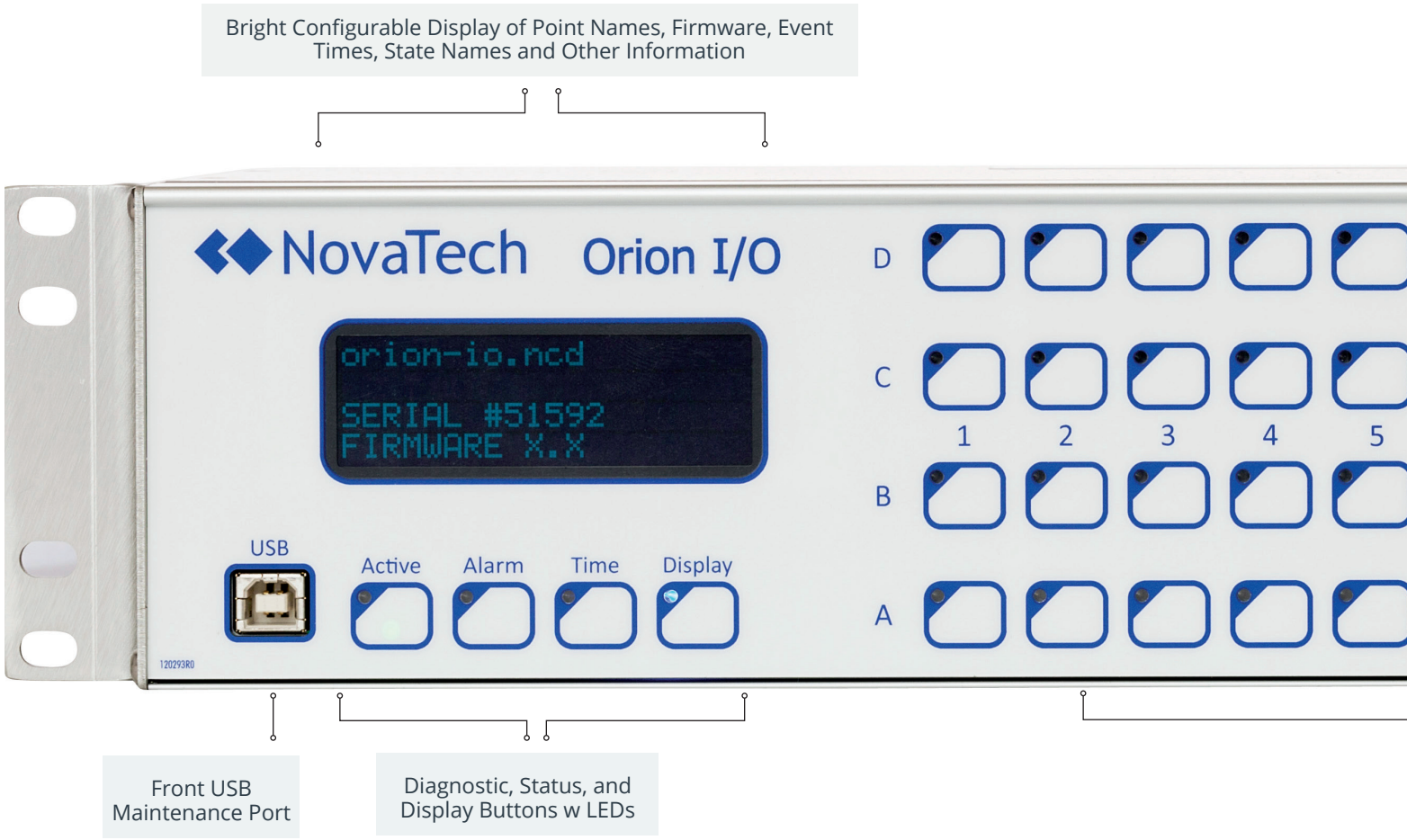
OrionLX CPX





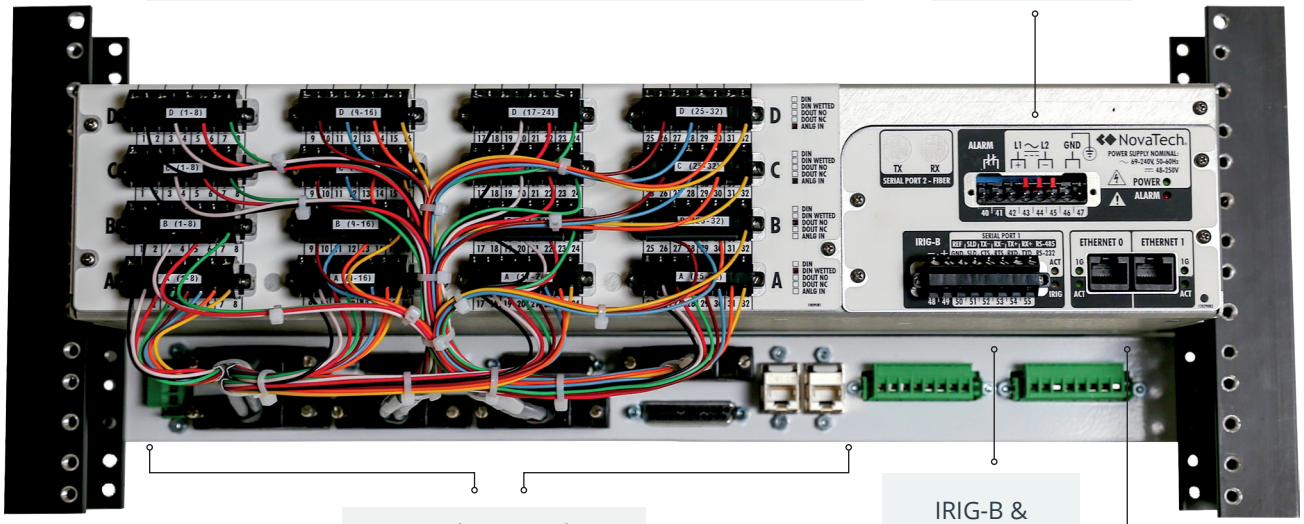
Orion I/O

Orion I/O incorporates a unique capacitive touchfront display interface with the same Cyber Security features, software options, and configuration as every other Orion. It is a rack-mountable I/O assembly with four slots—A, B, C, and D—that can be filled with any combination of up to 64 Digital and 32 Analog I/O points in a 2RU format.



Up to Four IO Cards consisting of:
16 DI, 16 DI Wetted, 16 DO, 16 DO Hi-Powered, 8 AI

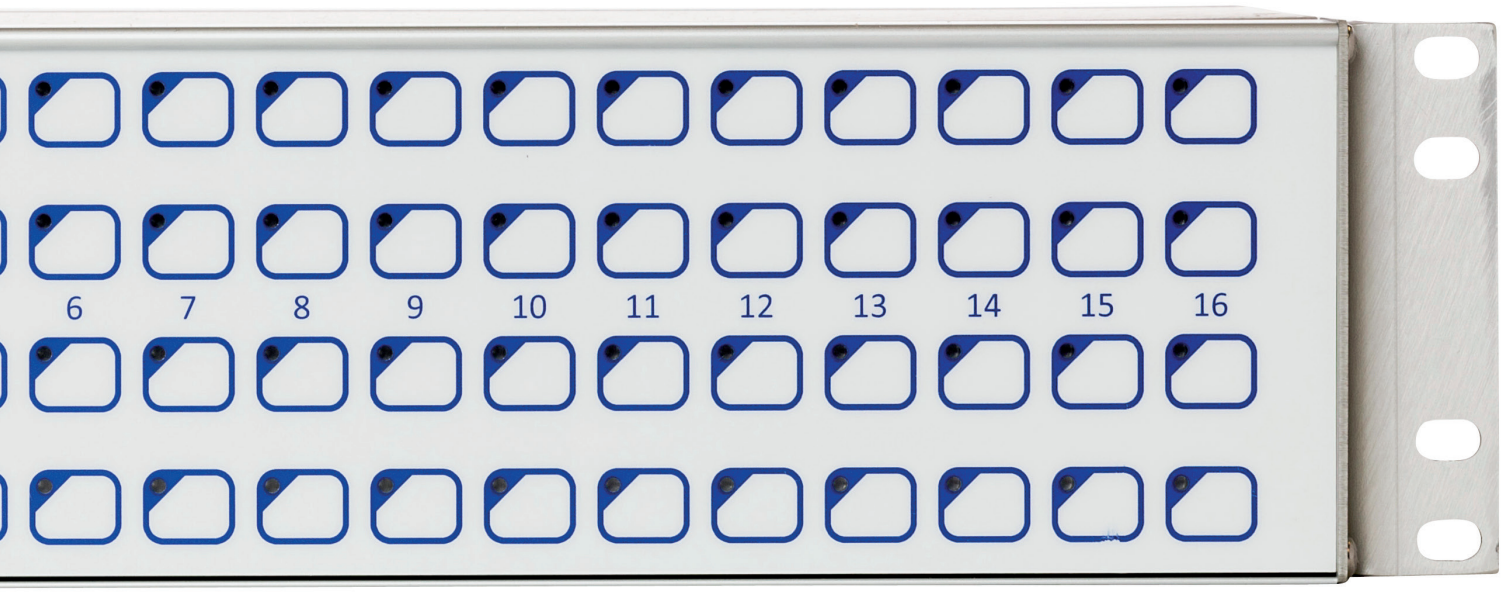
Power Supply



Optional Prewired D20
Retrofit Adapters

IRIG-B &
RS232/485

Two Ethernet Ports



Capacitive Touchfront Interface Provides Easy
Field Access to all Point Statuses

Features

All Orions leverage a common code base, the same configuration software (NovaTech Configuration Director) and the following features across all models:

Cyber Security

All Orions share the same secure Linux OS, support Integrity Measurement Architecture (IMA) to minimize malware risk, a stateful firewall, secure protocols (HTTPS, SSH, SFTP), Strong passwords and password rules, Remote Authentication with LDAP, tiered-access User Groups and a Syslog.

Common Firmware

All Orions share the same firmware version. Upgrades can be consistently accomplished in 10 minutes.

Extensive Protocol Library

50+ protocols, including IEC 61850, DNP3, 61870-101/104, Modbus, SEL, and legacy protocols. SEL Protocol enables engineering access, IRIG support and automatic retrieval of SEL Event Reports. SNMP Manager monitors switches, routers, servers and other network gear.

Math and Logic Tools

A new calculator is available enabling users to easily create equations using common Excel-style operators and notation including * / ( ) + - ^ SQRT() ABS() and ROUND(). IEC 61131-3 is available for complex math and logic.

Cascading Orions

Multiple Orion units can be “Cascaded” onto a single Orion RTU, enabling them to be configured as a single system, with one configuration file.

Custom SVG Graphical Webpages

One-line-diagrams, control screen and animated IED faceplates can be served out directly from Orion. Choose from more than 80 pre-drawn images including Orion and Bitronics products, substation IEDs, substation symbols, buttons, and links, or make your own in minutes.

Tile Alarm Annunciator

Pre-engineered alarm tile webpage for replacing hard-wired annunciators. Full software configurability for numbers of rows, columns, and tile names.

Redundancy

Orions can be configured as a hot-standby redundant pair to support applications as a SCADA RTU, substation HMI, Alarm Annunciator, SOE Recorder and substation controller with low-speed to medium-speed logic. Both Orions run identical NCD configurations, logic and webpage configurations, and configurations are auto-replicated between the two.

Configuration Backup Manager

Provides a simple and automatic method to retrieve and back-up configuration files from the OrionLX as well as settings files from attached SEL® protective relays. The Configuration Backup Manager also provides a convenient MD5 checksum on the backed up files which can be used to determine if any of the backup files have been changed from previous backups. Backed-up files can also be used for system restore.

Feature Comparison by Model

Feature	OrionLX+	OrionLX CPX	OrionLXm	Orion I/O
CPU	Quad Core @ 1.9GHz	1.33GHz	800MHz	800MHz
Memory	8GB	4GB	4GB	512MB
Ethernet Ports	• **Standard**: 2 copper • **Opt.**: +1 copper and +2 SFP on NovaCard • **Total NICs**: 5	• **Standard**: 2 copper • **Opt.**: +1 copper or +1 fiber (MM). +1 copper on Multimedia Board • **Total NICs**: 3	• **Standard**: 2 copper • **Opt.**: 6-port copper switch on 1 NIC, copper, MM or SM fiber on other NIC • **Total NICs**: 2	• **Standard**: 2 copper • **Total NICs**: 5
Serial Ports for SCADA and IED Connections	Up to 17	Up to 17	Up to 8	One
PRP/HSR	Yes, in Phase 2 NovaCard. Uses NIC #3.	PRP only. Uses NIC #1 and #2.	None	None
Direct Video Port	1 Display Port on Multimedia Card	1 VGA Port on Multimedia Board	None	None
Discrete I/O	4 DI / 4 DO on NovaCard plus alarm output	4 DI / 4 DO built in plus alarm output	• 1 DI and alarm output • 1 or 2 12 DI / 4 DO Cards optional	Up to 64 Discrete I/O plus alarm contact
Power Supply	Single or redundant, hot-swappable	Single or redundant	Single	Single
Maximum Points	40,000	20,000	20,000	600

Multiple Functions, Minimal Headaches

The Orion family performs the functions of multiple single-purpose boxes in the electric utility substation, reducing cost and complexity. All Orions can connect to nearly any substation device in its native protocol, perform advanced math and logic, and securely present the source or calculated data to any number of clients in their own protocol. This enables the Orion Family to perform a continuously expanding number of applications in the utility substation.

Alarm Annunciator

Data Archival Appliance

Fault Location, Isolation, and Service Restoration (FLISR)

Math & Logic Processor

NERC CIP Cyber Secure Gateway

NERC CIP Password, Configuration and Remote Access Management

Pole Top Remote Terminal Unit (RTU)

Protective Relay Communication Processor

Remote Terminal Unit (RTU)

Renewables Integration Processor

Sequence Of Events Recorder

Shore Power

Substation Data Server

Substation Human Machine Interface (HMI)

Web-Based SCADA for Small Utilities

Learn More!

For more information on our applications, please visit
novatechweb.com/substation-automation/orion-applications
for a library of short videos covering each application.

How Can We Help?

NovaTech products are designed with decades of expertise and backed by a professional staff dedicated to your satisfaction. In addition to outstanding product support, we offer a full range of design, development, fabrication, installation, and training services to meet your automation and engineering needs.

Graphics Development

Customized HMI graphics developed using the open source Inkscape graphics package are available in addition to an existing library of standard one-lines, IED faceplates, and other screens.

Cabinetry & Packaging

Full service cabinetry and custom enclosure design, fabrication, and testing available for substation equipment monitoring, cabinet or pole-top RTUs, and other applications.

Applications Engineering

NovaTech products are built to make the end application easier, and our experienced and professional staff can help you implement even the most ambitious automation schemes on time and on budget.

Training & Conferences

We offer onsite and classroom instruction in the use of our products and broader topics like Cyber Security. Meet your fellow users and learn from NovaTech experts at one of our ongoing technical symposium user events—visit our website for upcoming dates and locations.

The Orion Substation Automation Platform and Orion I/O leverage three decades of experience in integrating and automating utility substations. The lessons learned over hundreds of projects – and the challenges of applying less-than-optimal products – led us to design an automation platform that could perform the functions of multiple devices: RTUs, HMIs, Logic Processors, Security Gateways, Protective Relay Communications Processors, and more in a single, easily-configured box. Today, Orion leads the industry with seamless solutions to acquire substation data and move it to the right people, at the right time, in the right format. Over one hundred new users have adopted Orion for their substation automation tasks in the past four years.

◆◆ The Orion Design Team

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