

Orion I/O™ for Electric Substations

NovaTech Orion I/O™ is an extension of the family of Orion Automation Platforms for substation automation and incorporates the same security features, software tools, and NCD configuration as the the OrionLX+, OrionLXm, and OrionMX. It is a rack mountable I/O assembly with four slots – A, B, C, and D – that can be filled with any combination of I/O cards, currently:

- 16-point Discrete Input Card
- 16-point Discrete Input Wetted Card
- 16-point Discrete Output Card
- 16-point High Power Output Card
- 8-point Discrete Input / 8-Point High Power Output Combination Card
- 8-point Analog Input Card
- 8-point Analog Input Flex Card

Full population of discrete cards yields 64 I/O in 2 RU (rack units); full population of analog input cards yields 32 analog inputs. See Figure 1 below for rear connections and front indications on Orion I/O.

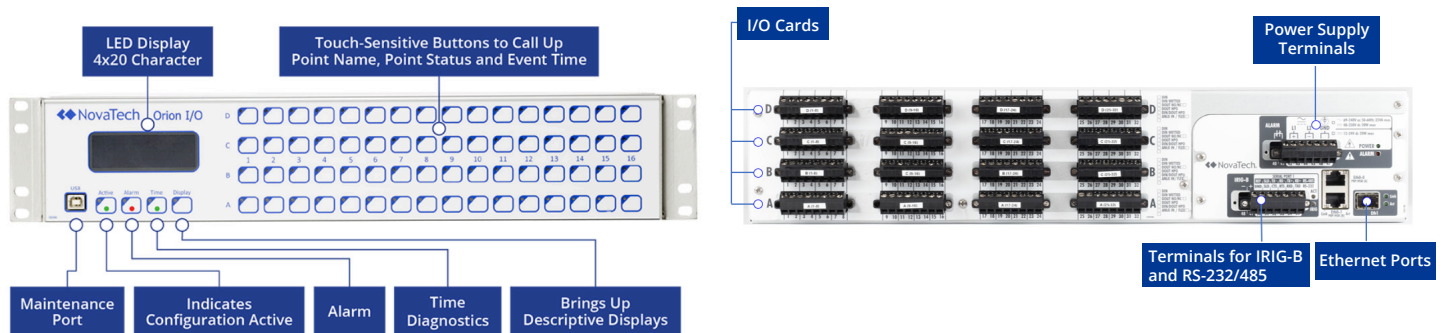


Figure 1 – Rear connections and front indications on Orion I/O

16-point Discrete Input Card

- Electrically isolated circuits; two wires per input
- Single design accommodates either higher voltage range (“HV”) or lower voltage range (“LV”). Range selection in software.
- HV: nominal 125V dc, maximum 145V dc, always OFF at 75V dc
- LV: nominal 12V dc to 48V dc, maximum 60V dc, always OFF at 9V dc

16-point Discrete Input Wetted Card

- Module generates and sources the contact wetting current
- 16 points in one group. Even-numbered terminals shorted together internally to provide more wiring flexibility.
- 24V dc or 48V dc wetting voltage is provided by I/O card. Wetting power supply voltage software selectable in NCD.

16-point Discrete Output Card

- Conventional isolated normally open (NO) contacts
- Two terminals per output
- Tripping duty, substation-grade relay outputs
 - » Make 30A, continuous carry 10A
 - » Break inductive @48V dc: 700mA @40ms L/R
 - » Break inductive @125V dc: 200mA @40ms L/R
- AC rating: up to 250V ac @8A

16-point High Power Output Card

- Up to 145V dc
- Break inductive circuit of 10A, with a time constant of 40ms L/R
- OFF-to-ON, less than 10ms, ON-to-OFF, less than 10ms
- Leakage current 1mA or less
- Make 30A, continuous carry 10A

8-point Discrete Input / 8-point High Power Output Combination Card

- Input circuit and output circuit specifications as in above cards
- Includes “Feedback Dropout” feature where the turn OFF of a selected output is gated by a state change of a selected input (e.g. 52a or 52b)

8-point Analog Input Card

- Isolated with three ranges:
-2mA to +2mA | -10V to +10V | 4mA to 20mA

8-point Analog Input Flex Card

- Same ranges as standard AI card above:
-2mA to +2mA | -10V to +10V | 4mA to 20mA
- Range selection in software
- Input impedance on voltages increased to 1M ohms (from 10K ohms on standard AI card)
- Terminals provided for analog shield wires

Dimensions and Mounting

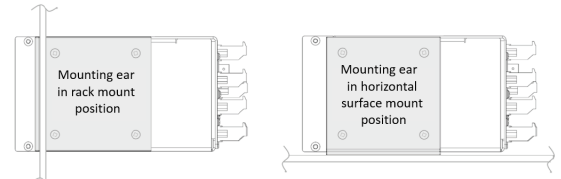
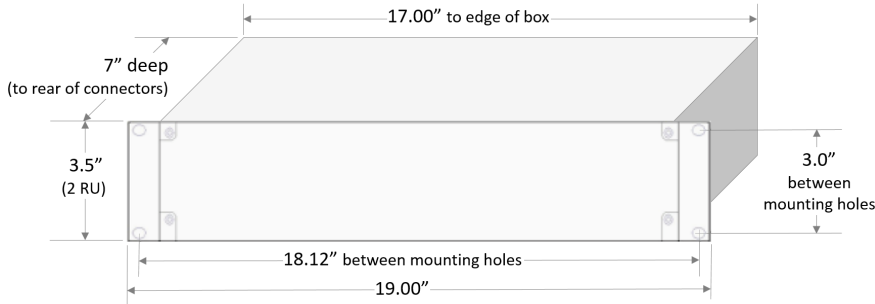


Figure 2 – Orion I/O Dimensions and Mounting

Security

In addition to TPM (Trusted Platform Module), Orion I/O incorporates the same software tools and security features as all Orions:

- Linux operating system
- Secure boot
- Secure protocols
 - » HTTPS
 - » SSH
 - » SFTP
- Strong passwords and password rules
- Remote authentication with LDAP or RADIUS
- User groups with specific administrator-assigned privileges
- Built-in firewall
- Automatic backup of complete Orion I/O configuration
- Security event logging with Syslog

Environmental

- Operating temperature: -40°C to +70°C
- Storage temperature: -40°C to +85°C
- Operating humidity: 5%-95% non-condensing
- Altitude: 2000 meters max.

Protocols

Server:
IEC 61850, IEC 60870-5-101/104, DNP3 serial and TCP, Modbus serial and TCP, L&G 8979, SES-92, SPS, and Tejas V

Client:
IEC 61850, IEC 60870-5-101/104/103, DNP3 serial and TCP, Modbus serial and TCP, SEL ASCII Fast Messaging, SEL TCP

Power Supply Options

- HV: 48V dc – 250V dc nominal / 69V ac – 240V ac, 50/60Hz
- LV: 12V dc – 24V dc nominal

Processor and Memory

CPU 800MHz with cryptographic cipher engines
512MB RAM, 2GB flash

Terminals

Power and I/O terminals: compression screw terminals, #12-24 AWG

Alarm Output

Type Form B, contact ratings 10A max.

Communications to RTU, SCADA, and IEDs

- Serial 1200bps – 115kbps
- Option EP: 1 RJ45 port, 1 SFP port
 - » RJ45 port: 10/100/1000BaseT, half/full duplex
 - » SFP port: see list of available transceivers below
- Option ES: 1 RJ45 port, 3-port switch (unmanaged)
 - » RJ45 port: 10/100/1000BaseT, half/full duplex
 - » 3-port switch: RJ45 ports, 10/100/1000BaseT, half/full duplex
- Option RP: 2 RJ45 PRP/HSR ports and 1 SFP port
 - » RJ45 ports: PRP/HSR port pair, 10/100/1000BaseT, half/full duplex
 - » SFP: see list of available transceivers below

Model	Connector	Mode	Distance	Wavelength	Speed
SFP-MM01	LC	Multimode	550m	850nm	1Gbps
SFP-SM01	LC	Single mode	10km	1310nm	1Gbps
SFP-SM04	LC	Single mode	40km	1310nm	1Gbps
SFP-RJ01	RJ45	Copper	100m		10/100/1000BaseT

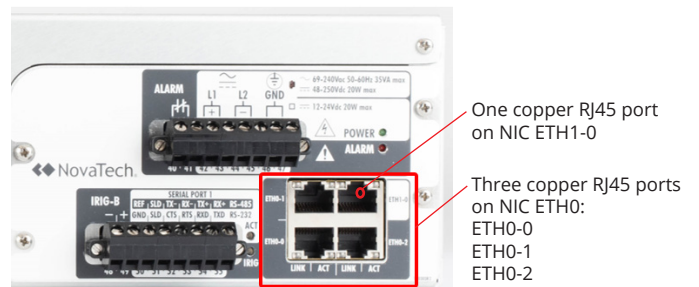


Figure 3 – Orion I/O with Ethernet Switch