

# 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 OrionLX+, OrionLXm, OrionMX, and OrionSX. It is a rack, panel, or DIN rail mountable assembly with four slots 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 front indications and rear connections on Orion I/O.

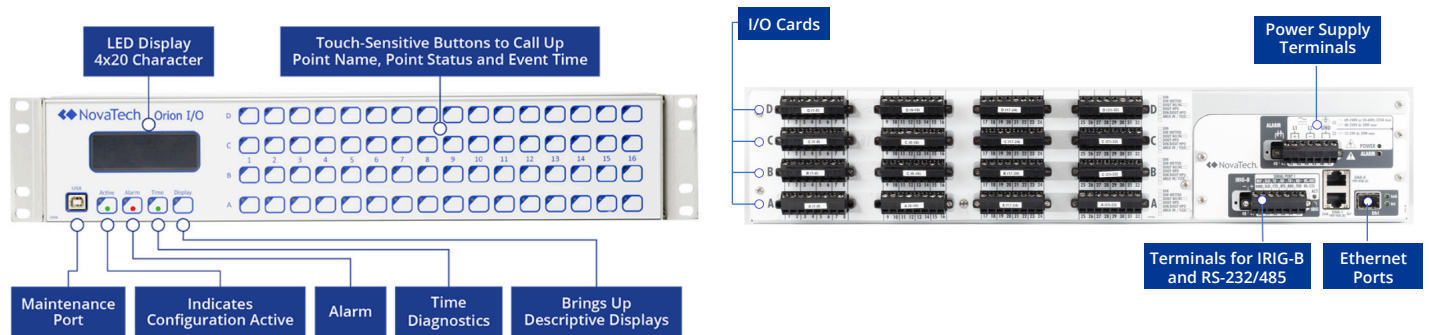


Figure 1 – Front indications and rear connections on Orion I/O with Advanced UI option

## 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
- DC only

## 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

- Isolated with three ranges (as 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

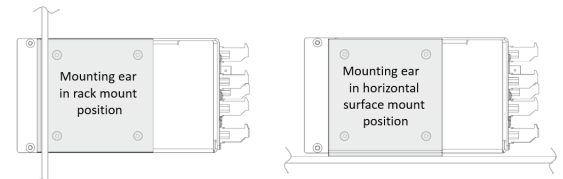
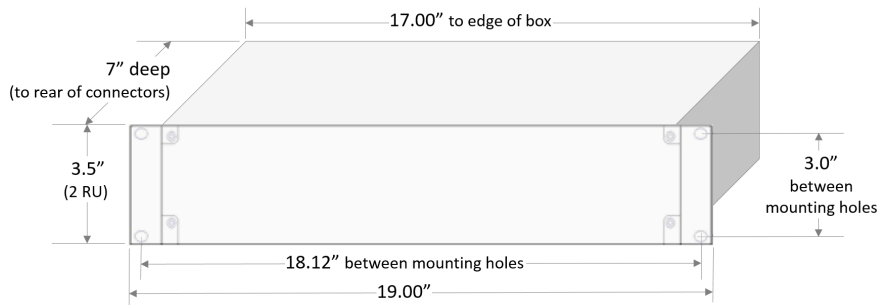


Figure 2 – Orion I/O Dimensions and Mounting

## Rear Display / Surface Mount

To facilitate legacy RTU retrofits, a “Rear Display” (RD) model with panel and rack mounting options is available. All LEDs and ports are located on the same side.

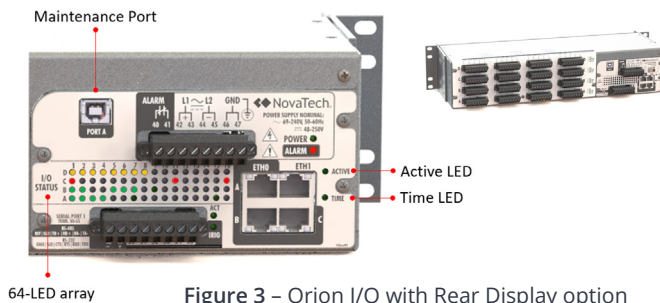


Figure 3 – Orion I/O with Rear Display option

## Security

In addition to TPM (Trusted Platform Module), Orion I/O incorporates the same software tools and security features as all Orions, including support for RADIUS, LDAP, DNP3-SA, and TLS encryption.

## 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® over serial and TCP

## Power Supply Options

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

## Processor

CPU: 800MHz  
RAM: 512MB

## Data Archiving and Storage

Memory: 2GB  
Database: PostgreSQL

## 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 port: see list of available transceivers below

## Available SFP Transceivers

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	N/A	1Gbps

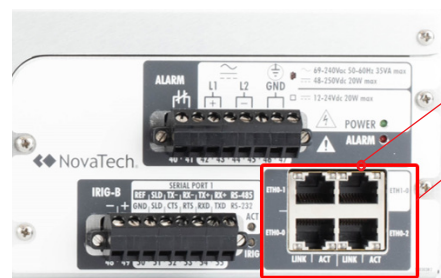


Figure 4 – Orion I/O with Ethernet Switch