BusWorks® NT Series Expandable Remote I/O Modules For Ethernet

| Analog and Digital I/O Modules

| Modbus/TCP, Ethernet/IP and Profinet

| IIoT or Peer-to-Peer Communication

| IF/Then/Else Control Logic

Industrial I/O Solutions You Can Depend On.

NT2000 SERIES

NT2000 SERIES

NT2000 SERIES

NT2000 SERIES

Expandable Remote I/O

Acromag's Busworks® NT Series lets you add expansion I/O modules for a high-density, cost-efficient remote I/O solution

Base unit NTE Ethernet models handle the network communication and interface up to 16 analog or digital I/O channels for remote monitoring or control applications. NTX Expansion models provide a cost-effective way to add a mix of I/O signal types under a single IP address.

Multi-protocol support

The NTE Ethernet I/O modules are pre-programmed to support Modbus/TCP, Ethernet/IP* and Profinet* protocols. Just select which is to be used. Modules also support direct i2o® peer-to-peer communication without a master.

- Integrated I/O expansion bus
- Up to 64 I/O channels per port
- Mix analog, digital, and temperature I/O on one port
- i2o peer-to-peer or multicast communications
- Rugged design, -40 to 70°C
- Hazardous location approvals

*coming soon

Expand Locally

NTE   NTX   NTX   NTX
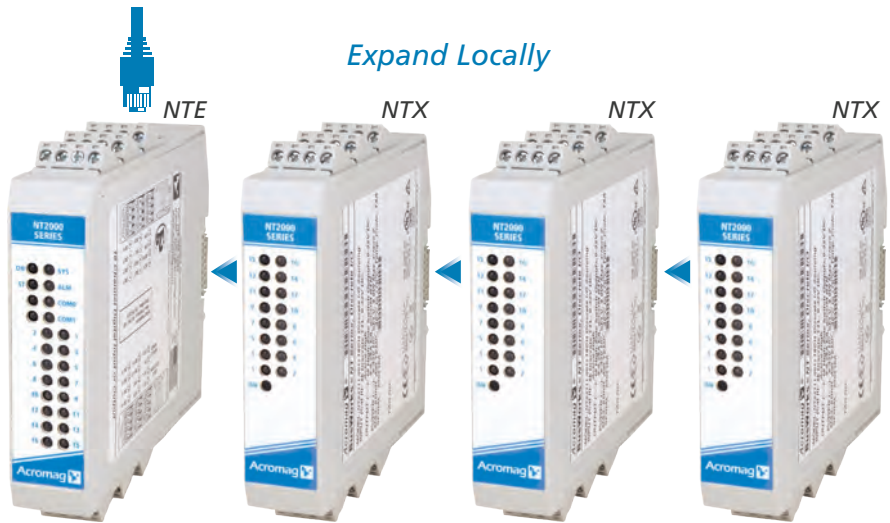
Link up to three NTX expansion I/O modules to an NTE Ethernet I/O module over the integrated DIN rail I/O bus connectors.

Or Daisy Chain Remotely

Up to 100 Meters   Up to 100 Meters

NTE   NTE   NTE
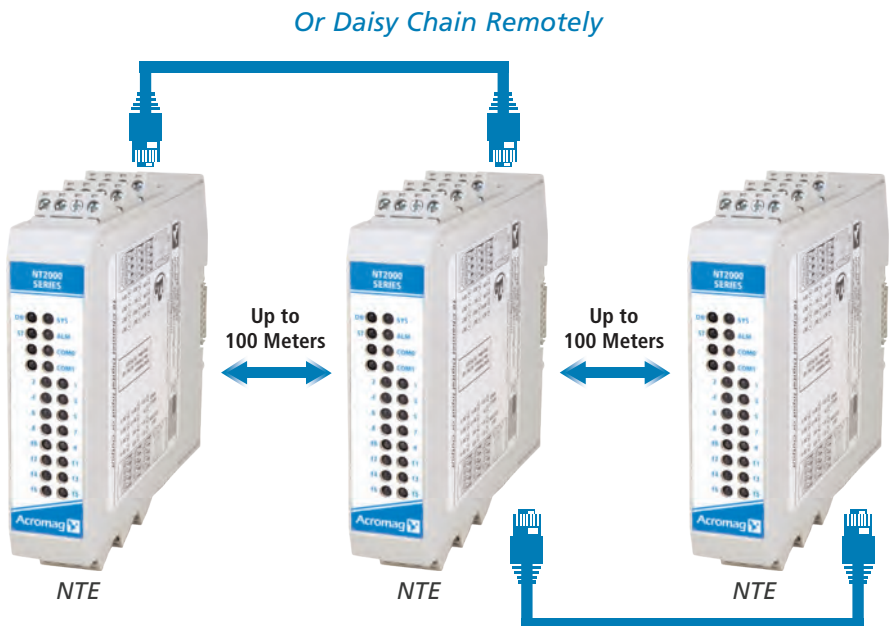
Connect NTE Ethernet I/O modules with a daisy-chain topology using the internal dual-port switch to simplify network cabling.

I/O Support	Input Modules	Output Modules
DC Current	8 differential or 16 single-ended channels	8 output channels
DC Voltage	8 differential or 16 single-ended channels	8 output channels
Thermocouple	8 channels of Type J, K, T, R, S, B, E, N, or mV	
RTD/Resistance	4 channels PT100, Cu10, 0-500 ohms.	
Digital I/O	16 channels	16 channels
Relays, Contact Closures	6 channels 120/240V AC	6 normally open 5A relays

Telephone: 877-214-6267   ▪   sales@acromag.com   ▪   www.acromag.com

Ethernet-based Configuration

Easy setup from anywhere with a web browser

NTE Ethernet I/O modules have a built-in web server for convenient configuration without installing any software. Several web pages lead you through the options to set your IP addresses, protocol, and I/O parameters. A diagnostics page lets you monitor I/O values from your PC, tablet, or smartphone.

Advanced features for IIoT and local control logic functions

The configuration pages will help you quickly setup advanced capabilities such as peer-to-peer communication, conditional logic computation, and alarm output.

- Peer-to-peer communication
- Counter/timers
- IF/THEN/ELSE logic*
- Alarm output*
- RESTful APIs*
- OPC-UA server*
- MQTT support*
- Field-upgradeable

coming soon
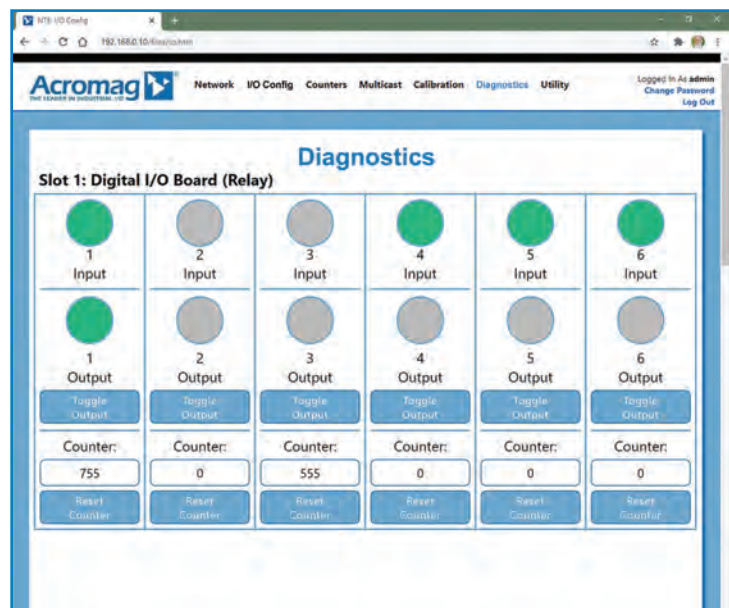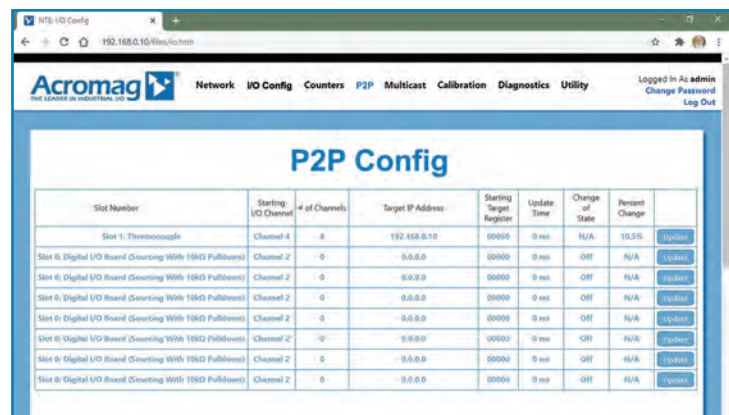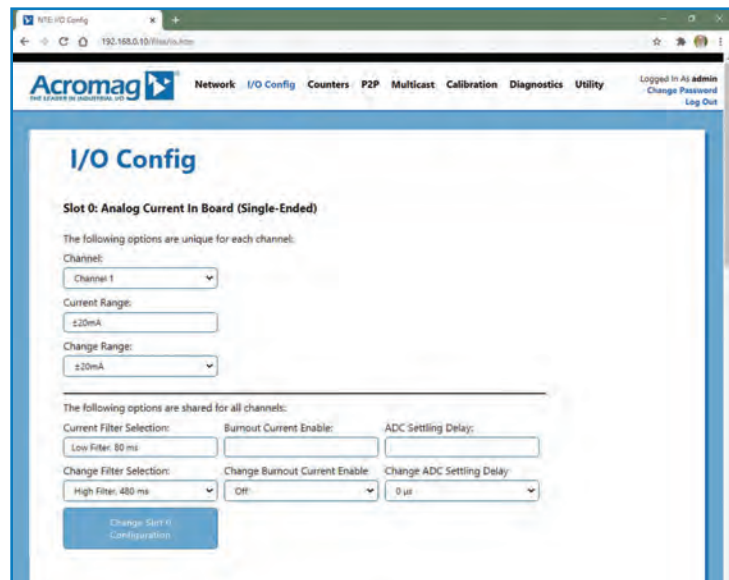
Network Communication

Interface: 10/100Mbps Ethernet.

Protocols: Modbus TCP/IP, Ethernet/IP, or Profinet and i2o® peer-to-peer / multi-cast.

IIoT communication: OPC-UA, MQTT, RESTful APIs (pending).

Connectors: Two shielded 8-pin RJ-45 sockets, 10BaseT/100BaseTX.

Approvals and Certifications

CE marked.

UL/cUL Class I; Div. 2; Groups A, B, C, D (pending).

ATEX/IECEx Zone 2 (pending).

EtherNet/IP, Modbus/TCP, Profinet conformance (pending).

Radiated Emissions: BS EN 61000-6-4, CISPR 16.

RFI: BS EN 61000-6-2, IEC 61000-4-3.

Conducted RFI: BS EN 61000-6-2, IEC 61000-4-6.

ESD: BS EN 61000-6-2, IEC 61000-4-2.

EFT: BS EN 61000-6-2, IEC 61000-4-4.

Surge Immunity: BS EN 61000-6-2, IEC 61000-4-5.

Environmental

Temperature ranges:
Operation: -40 to 70°C (-40 to 158°F).
Storage: -40 to 85°C (-40 to 185°F).

Relative humidity:
5 to 95% non-condensing.

Vibration: 4g, per IEC 60068-2-64.

Shock: 25g, per IEC 60068-2-27.

Isolation: 1500V AC for 60 seconds or 250V AC continuous between I/O, network, and power.

Power requirement: 9 to 32V DC SELV, 2.0W max (83mA maximum @ 24V).

Physical

Housing: General purpose plastic enclosure for mounting on 35mm "T-type" DIN rail.

Case Material: Self-extinguishing polyamide, UL94 V-0 rated, general purpose NEMA Type 1.

Circuit Board: Military grade fire-retardant epoxy glass (IPC-4101/98).

I/O Connectors: Removable terminal blocks rated for 12A/250V; AWG #26-12, stranded/solid copper wire.

Dimensions (W x H x D):
25.0 x 116.9 mm (0.98 x 4.6 inches).
NTE: 139.2 mm (5.48 inches).
NTX: 116.65 mm (4.59 inches).

Weight:
NTE models: 0.5 lbs (0.23 Kg).
NTX models: 0.3 lbs (0.14 Kg).

Models: Ethernet I/O Units

NTE2111-1111 .... Dual RJ45 ports, discrete I/O, sinking output, 16-ch
NTE2121-1111 .... Dual RJ45 ports, discrete I/O, sourcing output, 16-ch
NTE2131-1111 .... Dual RJ45 ports, discrete I/O, relay output, 6 MR + 6 DI
NTE2141-1111* .. Dual RJ45 ports, discrete I/O, 120/240V AC input, 6 DI + 6 DO
NTE2211-1111 .... Dual RJ45 ports, analog input, differential current, 8 AI + 2 DIO
NTE2221-1111 .... Dual RJ45 ports, analog input, single-ended current, 16-ch
NTE2231-1111 .... Dual RJ45 ports, analog input, differential voltage, 8 AI + 2 DIO
NTE2241-1111 .... Dual RJ45 ports, analog input, single-ended voltage, 16-ch
NTE2311-1111* .. Dual RJ45 ports, analog output, current, 8-ch
NTE2321-1111* .. Dual RJ45 ports, analog output, voltage, 8-ch
NTE2511-1111* .. Dual RJ45 ports, combo I/O, 4 AI + 2 AO + 4 DIO
NTE2611-1111 .... Dual RJ45 ports, temperature input, 8 thermocouple + 2 DIO
NTE2621-1111* .. Dual RJ45 ports, temperature input, 4 RTD + 2 DIO

Models: Expansion I/O Units

NTX2111-0011.... Discrete I/O, sinking output, 16-ch
NTX2121-0011.... Discrete I/O, sourcing output, 16-ch
NTX2131-0011.... Discrete I/O, relay output, 6 MR + 6 DI
NTX2141-0011* .. Discrete I/O, 120/240V AC input, 6 DI + 6 DO
NTX2211-0011.... Analog input, differential current, 8 AI + 2 DIO
NTX2221-0011.... Analog input, single-ended current, 16-ch
NTX2231-0011.... Analog input, differential voltage, 8 AI + 2 DIO
NTX2241-0011.... Analog input, single-ended voltage, 16-ch
NTX2311-0011* .. Analog output, current, 8-ch
NTX2321-0011* .. Analog output, voltage, 8-ch
NTX2511-0011* .. Combo I/O, 4 AI + 2 AO + 4 DIO
NTX2611-0011.... Temperature input, 8 thermocouple + 2 DIO
NTX2621-0011* .. Temperature input, 4 RTD + 2 DIO

*coming soon
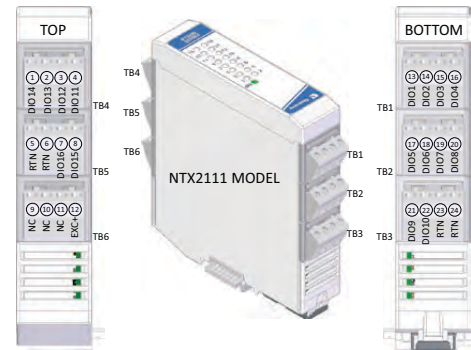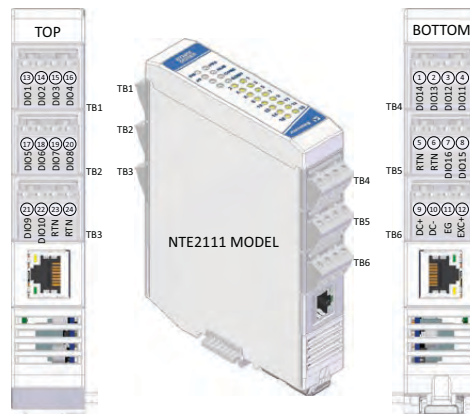
Dimensions: *Units in millimeters (inches)*

NTE

116.9mm (4.6 in)

139.2 mm (5.48 in)

25.0mm (0.98in)

NTX

116.9mm (4.6 in)

116.65 mm (4.59 in)

25.0mm (0.98in)

Visit Acromag.com/NT for complete information

NT2110   Ethernet Discrete I/O Modules

CE **24 HOUR STOCK ITEM** **2 YEAR WARRANTY** **RoHS Compliant**

Modbus TCP/IP
EtherNet/IP
PROFINET
i2o

16 discrete I/O ◆ Active low in / sinking out ◆ Ethernet I/O plus Expansion I/O ◆ Multi-protocol support

The BusWorks® NT2000 series offers a cost-effective, modular solution for Ethernet remote I/O systems. Two module types are available. NTE Ethernet models provide the protocol interface plus I/O signal processing channels. NTX expansion modules add extra I/O channels when mated to any NTE Ethernet communication module.

NT2110 modules offer 16 bidirectional discrete I/O channels for low-side (sinking switch) applications. NTE Ethernet models provide a compact network interface to monitor or control discrete device levels. Appending NTX expansion models can interface up to 64 discrete I/O channels on a single IP address.
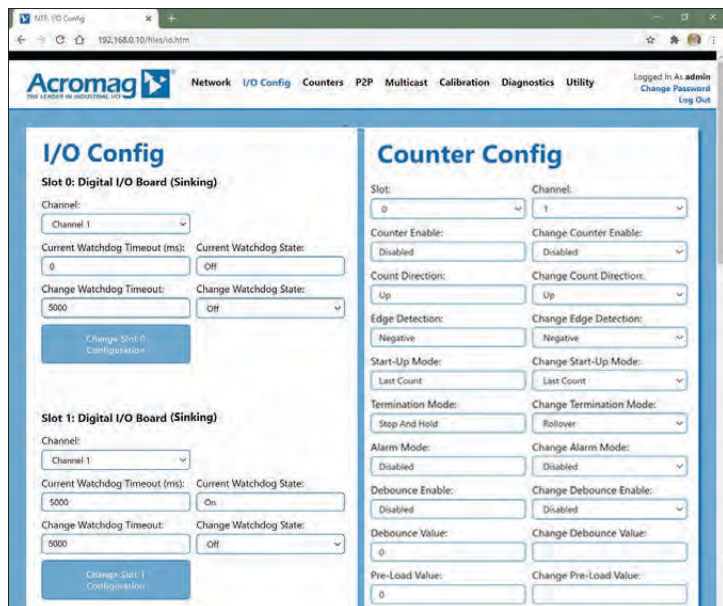
Applications include monitoring and control of relays, solenoids, contact closures, TTL logic, and discrete sensors on motors, lamps, valves, doors, etc.

An isolated RS-485 bus links up to three expansion modules to the Ethernet module with connectors that join along the DIN rail. This internal NT bus distributes power and communication between the modules. Users can mix analog, temperature, and discrete I/O modules across the NT bus.

Acromag's i2o® messaging technology allows direct peer-to-peer or multicast communication between remote modules without a master controller.

Key Features & Benefits

■ Configured over Ethernet with web browser

■ Expandable I/O capacity, up to 64 I/O channels of mixed signal types on one IP address

■ Field-selectable Modbus TCP/IP, *Ethernet/IP, or *Profinet communication

■ i2o peer-to-peer or multicast communication

■ Dual RJ45 ports enable daisy chain topology

■ Inputs support TTL thresholds and up to 32V

■ Open-drain outputs switch up to 32V and 250mA

■ Tandem input/output channels allow loop-back monitoring of outputs

■ Configurable counter/timers and totalization

■ *OPC-UA, *MQTT and *RESTful API IIoT support

■ *Conditional logic for rule-based I/O operation

■ Advanced *alarm and *data logging functions

■ 1500V isolation between I/O, network, and power

■ Thin 25mm housing with pluggable terminals

■ Wide temperature operation (-40 to 70°C)

■ CE compliant. UL/cUL Class 1 Div 2 and ATEX/IECEx Zone 2 approvals (pending)

* Coming soon. Consult factory for availability.

Easily configure I/O modules using any web browser.

Acromag ®
THE LEADER IN INDUSTRIAL I/O

NT2110 Ethernet Discrete I/O Modules

Performance Specifications

■ Ethernet Interface (NTE models only)

Communication
Configurable for Modbus TCP/IP, Ethernet/IP, or Profinet.
Ethernet/IP, Profinet support coming soon.

10/100Mbps data rate, auto-sensing.

IP Address
Default 192.168.0.10. Configurable static IP or DHCP.

■ Discrete Inputs (Active-Low)

Input Signal Voltage Range
0 to +32V DC.

Input Current
280μA, typical at 32V DC.

Input Signal Threshold
TTL compatible w/100mV of hysteresis, typical.
Low-to-High threshold: 1.7VDC, typical.
High-to-Low threshold: 1.6VDC, typical.
TTL logic limit - LOW: 0.8V DC max.
TTL logic limit – HIGH: 2.0VDC min.

Input Resistance
100K ohms typical (input only), 10K ohms w/ output pull-ups installed.

Input Hysteresis
100mV DC typical.

Input Response Time
5ms typical, not including network time.

Input Transient Voltage Suppressor
Installed at every I/O point, up to 38V working, 47V breakdown, and 77V clamping.

■ Discrete Outputs (Sinking)

Output "OFF" Voltage Range
0 to 32V DC.

Output "ON" Current Range
0 to 250mA DC, continuous.

Output Rds ON Resistance
0.8 ohms typical, 1.6 ohms maximum.

Protections
Thermal overload shutdown.
Over-voltage shutdown.
Over-load shutdown.
Reverse polarity protection shunt.

Output "OFF" Leakage Current
0.1uA typical, 50uA max (mosfet only, 25°C, 32V).
Does not include input bias current.

Output Response Time
5ms typical. Does not include network time.

■ Counter/Timers

Input Counter
Inputs (channels 1-8) may operate as up/down event counters for signals up to 85 Hz.

Counter Preload Value
Each channel can start from 0 to 4,294,967,295.

Counter Debounce
0 to 65,535ms to filter noise or relay chatter.

Counter Alarms
Alarms can toggle an output state upon reaching the termination value. Alarm state can auto-reset after the next count or hold/latch until reset.

FRAM
4Kb (4096 bits) non-volatile memory stores counter value.

■ General I/O

Input Update/Conversion Rate
Fresh data available to the network every 10ms.

Response Time from an Ethernet command
Less than 5ms, typical.

Excitation
External voltage of 4-32V required between I/O EXC and any RTN. Excitation must source 52mA minimum (at 32V). For 16 channels at 250mA max rated load, excitation must source 4A min.

I/O Pull-Ups (Internal)
Each I/O channel has 10KΩ pull-up to EXC to pull the tandem open drain output and input high/OFF.

■ Environmental and Physical

Temperature and Humidity
Operating: -40 to +70°C (-40 to +158°F).
Storage: -40 to +85°C (-40 to +185°F).
Relative Humidity: 5 to 95%, non-condensing.

Isolation
1500V AC for 60 seconds and 250V AC or 354V DC continuous between I/O channels (group), each network port and power circuits.

Power Supply
9-32V DC SELV power wired to NTE model only.
Power to NTX models is via NT bus connection.

Power Consumption
NTE2111: <=2.0W (input).
NTX2111: <=0.5W max. (each).

Dimensions (width x height x depth)
NTE: 25 x 116.9 x 139.2 mm (0.98 x 4.6 x 5.48 inches).
NTX: 25 x 116.9 x 116.65 mm (0.98 x 4.6 x 4.59 inches).

Weight
NTE: 0.5 lbs (0.23 kg).
NTX: 0.3 lbs (0.14 kg).

■ Standards and Certifications

Electromagnetic Compatibility (EMC)
CE marked, per EMC Directive 2004/108/EC.

Safety Approvals
UL/cUL: Class I; Div 2; Groups A, B, C, D (pending).
ATEX/IECEx: Zone 2 (pending).

Ordering Information

■ Models

Go to on-line ordering page >

NTE2111-1111
Ethernet I/O module with dual RJ45 ports, 16 discrete I/O channels.

NTX2111-0011
Expansion I/O module with 16 discrete I/O channels.

■ Accessories

5035-369
5035-370
Ethernet patch cable, low EMI, double-shielded.
3 feet (5035-369) or 15 feet (5035-370).

PS5R-VB24
Power supply, 24V DC, 15W output.

See www.acromag.com for other sizes.

Acromag
THE LEADER IN INDUSTRIAL I/O

NT2120 Ethernet Discrete I/O Modules

CE | 24 HOUR STOCK ITEM | 2 YEAR WARRANTY | RoHS Compliant

Modbus TCP/IP
EtherNet/IP
PROFINET
i2o

TOP | BOTTOM
NTE2121 MODEL
TOP | BOTTOM
NTX2121 MODEL
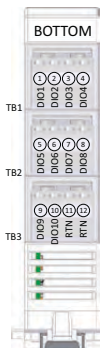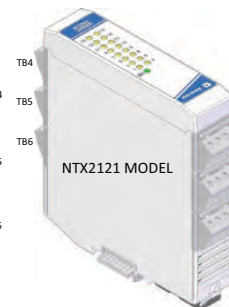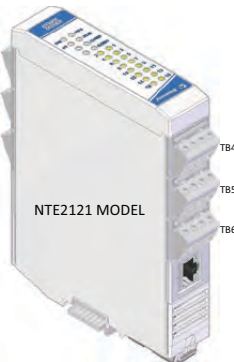
16 discrete I/O ◆ Active high in / sourcing out ◆ Ethernet I/O plus Expansion I/O ◆ Multi-protocol support

The BusWorks® NT2000 series offers a cost-effective, modular solution for Ethernet remote I/O systems. Two module types are available. NTE Ethernet models provide the protocol interface plus I/O signal processing channels. NTX expansion modules add extra I/O channels when mated to any NTE Ethernet communication module.

NT2120 modules offer 16 bidirectional discrete I/O channels for high-side (sourcing switch) applications. NTE Ethernet models provide a compact network interface to monitor or control discrete device levels. Appending NTX expansion models can interface up to 64 discrete I/O channels on a single IP address.

Applications include monitoring and control of relays, solenoids, contact closures, TTL logic, and discrete sensors on motors, lamps, valves, doors, etc.
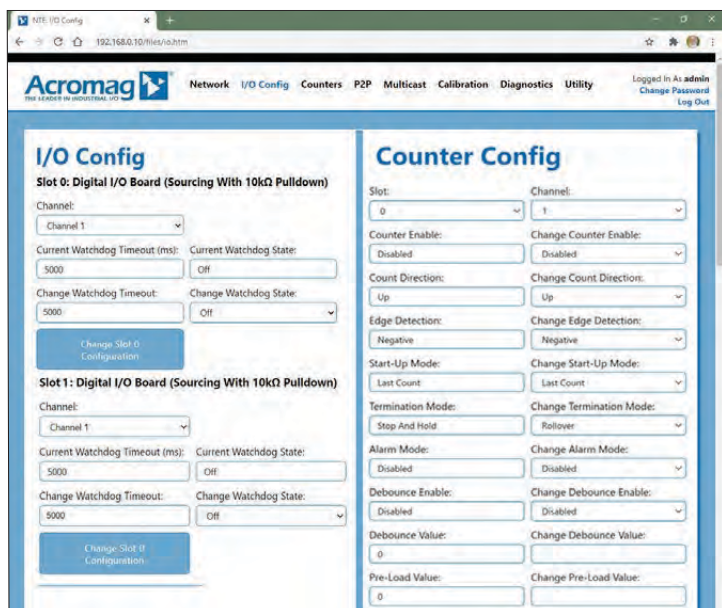
An isolated RS-485 bus links up to three expansion modules to the Ethernet module with connectors that join along the DIN rail. This internal NT bus distributes power and communication between the modules. Users can mix analog, temperature, and discrete I/O modules across the NT bus.

Acromag's i2o® messaging technology allows direct peer-to-peer or multicast communication between remote modules without a master controller.

Key Features & Benefits

- Configured over Ethernet with web browser
- Expandable I/O capacity, up to 64 I/O channels of mixed signal types on one IP address
- Field-selectable Modbus TCP/IP, *Ethernet/IP, or *Profinet communication
- i2o peer-to-peer or multicast communication
- Dual RJ45 ports enable daisy chain topology
- Inputs support TTL thresholds and up to 32V
- Open-drain outputs switch up to 32V and 250mA
- Tandem input/output channels allow loop-back monitoring of outputs
- Configurable counter/timers and totalization
- *OPC-UA, *MQTT and *RESTful API IIoT support
- *Conditional logic for rule-based I/O operation
- Advanced *alarm and *data logging functions
- 1500V isolation between I/O, network, and power
- Thin 25mm housing with pluggable terminals
- Wide temperature operation (-40 to 70°C)
- CE compliant. UL/cUL Class 1 Div 2 and ATEX/IECEx Zone 2 approvals (pending)
- * Coming soon. Consult factory for availability.

Easily configure I/O modules using any web browser.

Acromag ®
THE LEADER IN INDUSTRIAL I/O

Tel 248-295-0880 ■ sales@acromag.com ■ www.acromag.com ■ 30765 Wixom Rd, Wixom, MI 48393 USA

Ethernet I/O: BusWorks® NT Series

NT2120 Ethernet Discrete I/O Modules

Performance Specifications

■ Ethernet Interface (NTE models only)

Communication
Configurable for Modbus TCP/IP, Ethernet/IP, or Profinet.
Ethernet/IP, Profinet support coming soon.

10/100Mbps data rate, auto-sensing.

IP Address
Default 192.168.0.10. Configurable static IP or DHCP.

■ Discrete Inputs

Input Signal Voltage Range
0 to +32V DC.

Input Current
280µA, typical at 32V DC.

Input Signal Threshold
TTL compatible w/100mV of hysteresis, typical.
Low-to-High threshold: 1.7VDC, typical.
High-to-Low threshold: 1.6VDC, typical.
TTL logic limit - LOW: 0.8V DC max.
TTL logic limit – HIGH: 2.0VDC min.

Input Resistance
100K ohms typical (input only), 10K ohms w/ tandem output using internal pull-downs installed.

Input Hysteresis
100mV DC typical.

Input Response Time
5ms typical, not including network time.

Input Transient Voltage Suppressor
Installed at every I/O point, up to 38V working, 47V breakdown, and 77V clamping.

■ Discrete Outputs

Output "ON" Voltage Range
2 to 32V DC.

Active Current Limitation
Output limits load current to a shorted load at 0.6A typical, 0.4A-0.9A range.

Output "ON" Current Range
0 to 250mA DC, continuous.

Output Rds ON Resistance
0.8 ohms typical, 1.6 ohms maximum.

Protections
Thermal overload shutdown.
Over-voltage shutdown.
Over-load shutdown.
Reverse polarity protection shunt.

Output "OFF" Leakage Current
50µA maximum per channel (mosfet only).
Does not include input bias current.

Output Response Time
5ms typical. Does not include network time.

■ Counter/Timers

Input Counter
Inputs (channels 1-8) may operate as up/down event counters for signals up to 85 Hz.

Counter Preload Value
Each channel can start from 0 to 4,294,967,295.

Counter Debounce
0 to 65,535ms to filter noise or relay chatter.

Counter Alarms
Alarms can toggle an output state upon reaching the termination value. Alarm state can auto-reset after the next count or hold/latch until reset.

FRAM
4Kb (4096 bits) non-volatile memory stores counter value.

■ General I/O

Input Update/Conversion Rate
Fresh data available to the network every 10ms.

Response Time from an Ethernet command
Less than 5ms, typical.

Excitation
Excitation voltage of 6-32V required between field EXC and RTN terminals. Excitation must source 52mA minimum (at 32V). For 16 channels at maximum rated load, excitation must source 4A.

I/O Pull-Ups (Internal)
Each I/O channel has 10KΩ pull-down to I/O return and will never float.

■ Environmental and Physical

Temperature and Humidity
Operating: -40 to +70°C (-40 to +158°F).
Storage: -40 to +85°C (-40 to +185°F).
Relative Humidity: 5 to 95%, non-condensing.

Isolation
1500V AC for 60 seconds and 250V AC or 354V DC continuous between I/O channels (group), each network port and power circuits.

Power Supply
9-32V DC SELV power wired to NTE model only.
Power to NTX models is via NT bus connection.

Power Consumption
NTE2121: <=2.0W (input).
NTX2121: <=0.5W max. (each).

Dimensions (width x height x depth)
NTE: 25 x 116.9 x 139.2 mm (0.98 x 4.6 x 5.48 inches).
NTX: 25 x 116.9 x 116.65 mm (0.98 x 4.6 x 4.59 inches).

Weight
NTE: 0.5 lbs (0.23 kg).
NTX: 0.3 lbs (0.14 kg).

■ Standards and Certifications

Electromagnetic Compatibility (EMC)
CE marked, per EMC Directive 2004/108/EC.

Safety Approvals
UL/cUL: Class I; Div 2; Groups A, B, C, D (pending).
ATEX/IECEx: Zone 2 (pending).

Ordering Information

■ Models

Go to on-line ordering page >

NTE2121-1111
Ethernet I/O module with dual RJ45 ports, 16 discrete I/O channels.

NTX2121-0011
Expansion I/O module with 16 discrete I/O channels.

■ Accessories

5035-369
5035-370
Ethernet patch cable, low EMI, double-shielded.
3 feet (5035-369) or 15 feet (5035-370).

PS5R-VB24
Power supply, 24V DC, 15W output.

See www.acromag.com for other sizes.

ISO9001
AS9100

MADE IN USA

Acromag ®
THE LEADER IN INDUSTRIAL I/O

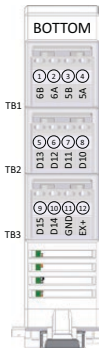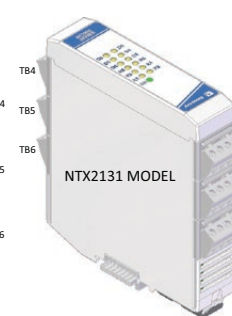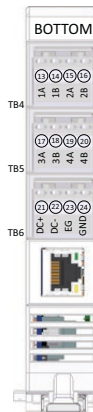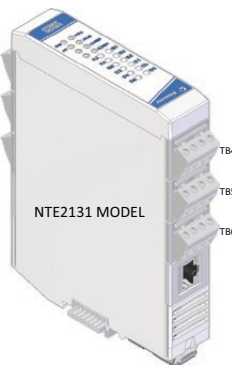# Ethernet I/O: BusWorks® NT Series

NT2130 Ethernet Discrete I/O Modules

CE · 24 HOUR STOCK ITEM · 2 YEAR WARRANTY · RoHS Compliant

Modbus TCP/IP
EtherNet/IP
PROFINET
i2o

TOP — TB1 · TB2
TB1: 6A 6B 5B 5A
TB2: D13 D12 D11 D10
TB3: D15 D14 GND EX+

BOTTOM — TB4 · TB5 · TB6
TB4: 1A 1B 2A 2B
TB5: 3A 3B 4A 4B
TB6: DC+ DC– EG GND

NTE2131 MODEL

TOP
TB4: 1A 1B 2A 2B
TB5: 3A 3B 4A 4B
TB6: NCX NCX NCX GND

NTX2131 MODEL

BOTTOM
TB1: 6B 6A 5B 5A
TB2: D13 D12 D11 D10
TB3: D15 D14 GND EX+

6 mechanical relay outputs ◆ 6 discrete inputs ◆ Ethernet I/O plus Expansion I/O ◆ Multi-protocol support

The BusWorks® NT2000 series offers a cost-effective, modular solution for Ethernet remote I/O systems. Two module types are available. NTE Ethernet models provide the protocol interface plus I/O signal processing channels. NTX expansion modules add extra I/O channels when mated to any NTE Ethernet communication module.

NT2130 modules offer six 5A mechanical relays and six discrete inputs. The NTE Ethernet I/O models provide a compact network interface to monitor and control discrete device levels. Appending NTX expansion models can interface up to 24 relays and 24 level sensing inputs on a single IP address.
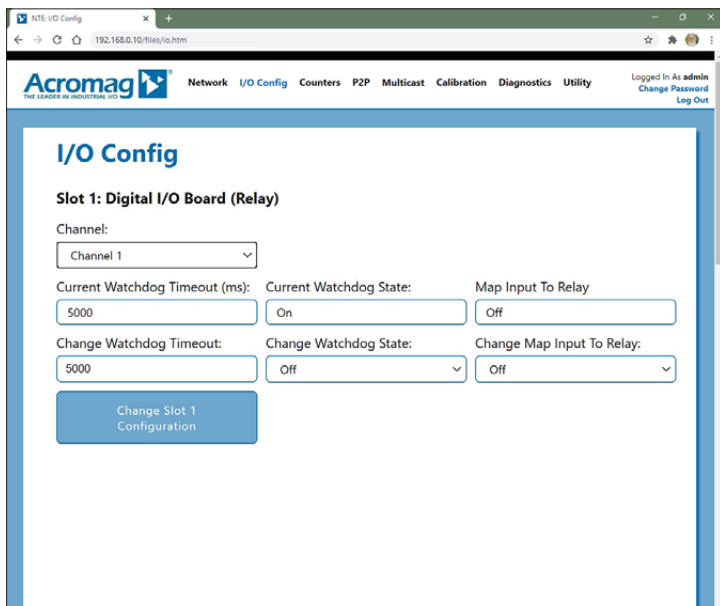
Applications include on/off monitoring and control of motors, pumps, lights, heaters, fans, etc. or the open/close status of valves, doors, and gates.

An isolated RS-485 bus links up to three expansion modules to the Ethernet module with connectors that join along the DIN rail. This internal NT bus distributes power and communication between the modules. Users can mix analog, temperature, and discrete I/O modules across the NT bus.

Acromag's i2o® messaging technology allows direct peer-to-peer or multicast communication between remote modules without a master controller.

Key Features & Benefits

- Configured over Ethernet with web browser
- Expandable I/O capacity, up to 60 I/O channels of mixed signal types on one IP address
- Field-selectable Modbus TCP/IP, *Ethernet/IP, or *Profinet communication
- i2o peer-to-peer or multicast communication
- Dual RJ45 ports enable daisy chain topology
- High-power SPST Form A relays switch 30V DC or 240V AC at currents up to 5A
- Active-high Inputs support TTL thresholds and up to 32V DC
- Configurable counter/timers and totalization
- *OPC-UA, *MQTT and *RESTful API IIoT support
- *Conditional logic for rule-based I/O operation
- Advanced *alarm and *data logging functions
- 1500V isolation between I/O, network, and power
- Thin 25mm housing with pluggable terminals
- Wide temperature operation (-40 to 70°C)
- CE compliant. UL/cUL Class 1 Div 2 and ATEX/IECEx Zone 2 approvals (pending)

* Coming soon. Consult factory for availability.

Easily configure I/O modules using any web browser.

Acromag
THE LEADER IN INDUSTRIAL I/O

NT2130   Ethernet Discrete I/O Modules

Performance Specifications

■ Ethernet Interface (NTE models only)

Communication
Configurable for Modbus TCP/IP, Ethernet/IP, or Profinet.
Ethernet/IP, Profinet support coming soon.

10/100Mbps data rate, auto-sensing.

IP Address
Default 192.168.0.10. Configurable static IP or DHCP.

■ Discrete Inputs

Input Signal Voltage Range
0 to +32V DC.

Input Current
280µA, typical at 32V DC.

Input Signal Threshold
TTL compatible w/100mV of hysteresis, typical.
Low-to-High threshold: 1.7VDC, typical.
High-to-Low threshold: 1.6VDC, typical.
TTL logic limit - LOW: 0.8V DC max.
TTL logic limit – HIGH: 2.0VDC min.

Input Resistance
10KΩ typical (each input has 10KΩ pull-down).

Input Pull-Downs (Internal)
Each input has 10KΩ pull-down to I/O return and will
never float.

Input Hysteresis
100mV DC typical.

Input Response Time
5ms typical, not including network time.

Input Transient Voltage Suppressor
Installed at every I/O point, up to 38V working, 47V
breakdown, and 72V clamping.

■ Mechanical Relay Outputs

Configuration
Six isolated 1 FORM A SPST-NO sealed relays.

Contact Rating
5A, 250V AC or 30V DC.

Maximum Switching Voltage
277VAC/125V DC.

Maximum Switching Power
1250VA or 150W.

Minimum Switching Load
1mA, 5V DC.

Resistance
30 mΩ maximum at 6V DC and 1A.

Electrical Life:
Mechanical: 20×10^6 operations minimum.
3A: 100×10^3 operations minimum.
5A: 50×10^3 operations minimum.
Switching frequency: 20 per minute.

Contact Material
Gold overlay silver alloy (Ag90 Ni10+Au).

Initial Dielectric Strength
Resistance 1000M ohms at 500V DC.
Between open contacts: 7509V AC 50/60Hz, 1 min.
Between contacts/coil: 3000V AC 50/60Hz, 1 min.

Relay Response (No Relay Time Delay)
Contacts energize bounce-free within 10ms and release
bounce-free within 5ms (does not include network time).

■ Counter/Timers

Input Counter
Inputs (channels 1-6) may operate as up/down event
counters for signals up to 85 Hz.

Counter Preload Value
Each channel can start from 0 to 4,294,967,295.

Counter Debounce
0 to 65,535ms to filter noise or relay chatter.

Counter Alarms
Alarms can toggle an output state upon reaching the
termination value. Alarm state can auto-reset after the
next count or hold/latch until reset.

FRAM
4Kb (4096 bits) non-volatile memory stores counter value
plus scaling and totalization information.

■ General I/O

Input Update/Conversion Rate
Fresh data available to the network every 10ms.

Response Time from an Ethernet command
Less than 5ms, typical.

■ Environmental and Physical

Temperature and Humidity
Operating: -40 to +70°C (-40 to +158°F).
Storage: -40 to +85°C (-40 to +185°F).
Relative Humidity: 5 to 95%, non-condensing.

Isolation
1500V AC for 60 seconds and 250V AC or 354V DC
continuous between I/O channels (group), each network
port and power circuits.

Power Supply
9-32V DC SELV power wired to NTE models only. Power to
NTX models is via NT bus connection.

Power Consumption
NTE2131: <=2.6W (input).
NTX2131: <=1.0W max. (each).

Dimensions (width x height x depth)
NTE: 25 x 116.9 x 139.2 mm (0.98 x 4.6 x 5.48 inches).
NTX: 25 x 116.9 x 116.65 mm (0.98 x 4.6 x 4.59 inches).

Weight
NTE: 0.5 lbs (0.23 kg).
NTX: 0.3 lbs (0.14 kg).

■ Standards and Certifications

Electromagnetic Compatibility (EMC)
CE marked, per EMC Directive 2004/108/EC.

Safety Approvals
UL/cUL: Class I; Div 2; Groups A, B, C, D (pending).
ATEX/IECEx: Zone 2 (pending).

Ordering Information

■ Models

Go to on-line ordering page >

NTE2131-1111
Ethernet I/O module with dual RJ45 ports,
6 relays, 6 discrete inputs

NTX2131-0011
Expansion I/O module with 6 relays, 6 discrete inputs

■ Accessories

5035-369
5035-370
Ethernet patch cable, low EMI, double-shielded.
3 feet (5035-369) or 15 feet (5035-370).

PS5R-VB24
Power supply, 24V DC, 15W output.

See www.acromag.com for other sizes.

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Ethernet I/O: BusWorks® NT Series

NT2210 Ethernet Analog I/O Modules

CE | 24 HOUR STOCK ITEM | 2 YEAR WARRANTY | RoHS Compliant

Modbus TCP/IP
EtherNet/IP
PROFINET
i2o

TOP | BOTTOM
NTE2211 MODEL

TOP | BOTTOM
NTX2211 MODEL
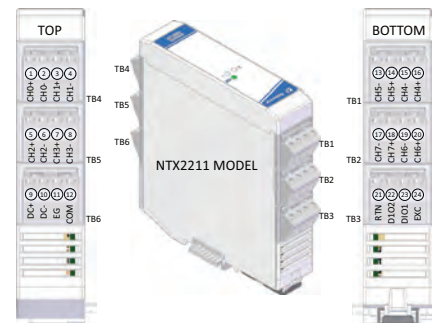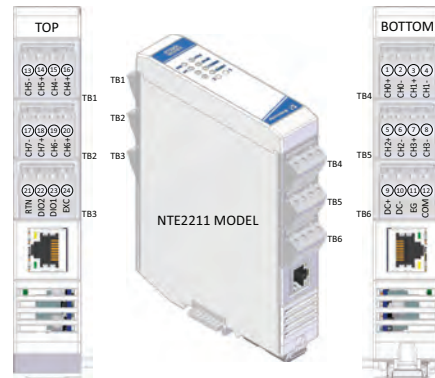
8 differential current inputs ◆ 2 discrete I/O ◆ Ethernet I/O plus Expansion I/O ◆ Multi-protocol support

The BusWorks® NT2000 series offers a cost-effective, modular solution for Ethernet remote I/O systems. Two module types are available. NTE Ethernet models provide the protocol interface plus I/O signal processing channels. NTX expansion modules add extra I/O channels when mated to any NTE Ethernet communication module.

NT2210 modules offer 8 current inputs and 2 bidirectional discrete I/O channels. Each input has true differential 16-bit A/D. NTE Ethernet models provide a compact network interface to monitor sensor levels or 4-20mA loops. Appending NTX expansion models can interface up to 32 differential current inputs on a single IP address.
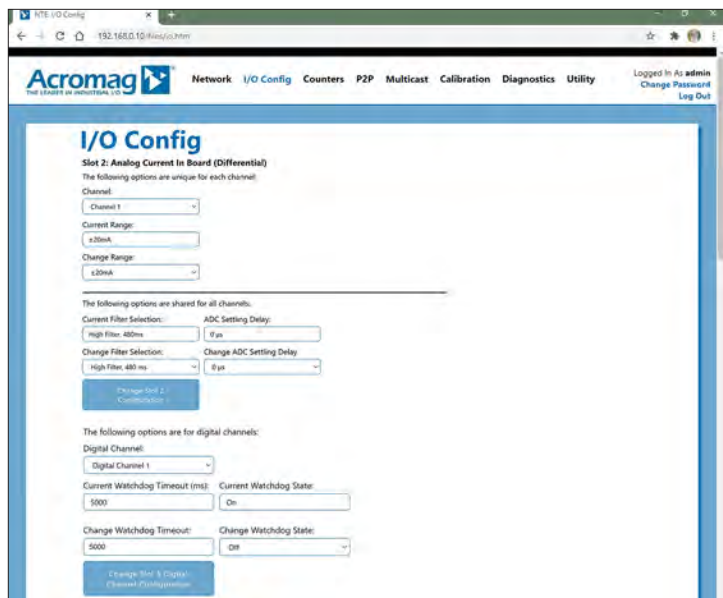
Applications include collecting pressure, level, flow, temperature, and other data at sensors, transducers, or transmitters. The 4-20mA current loop is the most common process control signal in many industries.

An isolated RS-485 bus links up to three expansion modules to the Ethernet module with connectors that join along the DIN rail. This internal NT bus distributes power and communication between the modules. Users can mix analog, temperature, and discrete I/O modules across the NT bus.

Acromag's i2o® messaging technology allows direct peer-to-peer or multicast communication between remote modules without a master controller.

Key Features & Benefits

- Configured over Ethernet with web browser
- Expandable I/O capacity, up to 58 I/O channels of mixed signal types on one IP address
- Field-selectable Modbus TCP/IP, *Ethernet/IP, or *Profinet communication
- i2o peer-to-peer or multicast communication
- Dual RJ45 ports enable daisy chain topology
- Eight current inputs
- Accepts ±20mA, 0/4-20mA, and 0/10-50mA input
- Discrete I/O can monitor and control equipment with TTL or 32V logic levels
- *OPC-UA, *MQTT and *RESTful API IIoT support
- *Conditional logic for rule-based I/O operation
- Advanced *alarm and *data logging functions
- 1500V isolation between I/O, network, and power
- Thin 25mm housing with pluggable terminals
- Wide temperature operation (-40 to 70°C)
- CE compliant. UL/cUL Class 1 Div 2 and ATEX/IECEx Zone 2 approvals (pending)

*Coming soon. Consult factory for availability.

Easily configure I/O modules using any web browser.

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Ethernet I/O: BusWorks® NT Series

NT2210 Ethernet Analog I/O Modules

Performance Specifications

■ Ethernet Interface (NTE models only)

Communication
Configurable for Modbus TCP/IP, Ethernet/IP, or Profinet. Ethernet/IP, Profinet support coming soon.

10/100Mbps data rate, auto-sensing.

IP Address
Default 192.168.0.10. Configurable static IP or DHCP.

■ Analog Inputs

A/D Converter
Eight input channels differentially multiplexed to a 24 bit sigma-delta ADC through unity gain differential buffers (only 16-bits are used).

Input Current Ranges
±20mA, 0-20mA, 4-20mA, 10-50mA), or 0-50mA. Inputs will float relative to ADC unless connected to COM. Up to five inputs in series can connect to the same 20mA current source.

Input Accuracy
Better than ±0.05% of span typical, ±0.1% maximum.

■ Discrete Inputs (Active-Low)

Input Signal Voltage Range
0 to +32VDC.

Input Current
280µA, typical at 32VDC.

Input Signal Threshold
TTL compatible w/100mV of hysteresis, typical.
1.7V DC Low-to-High, 1.6V DC High-to-Low.
0.8V DC TTL LOW limit, 2.0V DC TTL HIGH limit.

Input Resistance
100K ohms typical (input only), ~10K ohms with output pull-up.

Input Response Time
5ms typical, not including network time.

■ Discrete Outputs (Sinking)

Output "OFF" Voltage Range
0 to 32V DC.

Output "ON" Current Range
0 to 250mA DC, continuous.

Output Rds ON Resistance
0.8 ohms typical, 1.6 ohms maximum.

Output Response Time
5ms typical. Does not include network time.

■ General I/O

Input Update/Conversion Rate
Fresh data available to the network every 10ms.

Response Time from an Ethernet command
Less than 5ms, typical.

Excitation
External voltage of 4-32V required between I/O EXC and any RTN. Excitation must source 52mA minimum (at 32V). For 2 channels at 250mA max rated load, excitation must source 0.5A min.

I/O Pull-Ups (Internal)
Each I/O channel has 10KΩ pull-up to EXC to pull the tandem open drain output and input high/OFF.

■ Environmental and Physical

Temperature and Humidity
Operating: -40 to +70°C (-40 to +158°F).
Storage: -40 to +85°C (-40 to +185°F).
Relative Humidity: 5 to 95%, non-condensing.

Isolation
1500V AC for 60 seconds and 250V AC or 354V DC continuous between I/O channels (group), each network port and power circuits.

Power Supply
9-32V DC SELV power wired to NTE models only. Power to NTX models is via NT bus connection.

Power Consumption
NTE2211: <=1.5W (input).
NTX2211: <=0.5W max. (each).

Dimensions (width x height x depth)
NTE: 25 x 116.9 x 139.2 mm (0.98 x 4.6 x 5.48 inches).
NTX: 25 x 116.9 x 116.65 mm (0.98 x 4.6 x 4.59 inches).

Weight
NTE: 0.5 lbs (0.23 kg).
NTX: 0.3 lbs (0.14 kg).

■ Standards and Certifications

Electromagnetic Compatibility (EMC)
CE marked, per EMC Directive 2004/108/EC.

Safety Approvals
UL/cUL: Class I; Div 2; Groups A, B, C, D (pending).
ATEX/IECEx: Zone 2 (pending).

Ordering Information

■ Models

Go to on-line ordering page >

NTE2211-1111
Ethernet I/O module with dual RJ45 ports, 8 differential current inputs and 2 discrete I/O

NTX2211-0011
Expansion I/O module with 8 differential current inputs and 2 discrete I/O

■ Accessories

5035-369
5035-370
Ethernet patch cable, low EMI, double-shielded. 3 feet (5035-369) or 15 feet (5035-370).

PS5R-VB24
Power supply, 24V DC, 15W output.
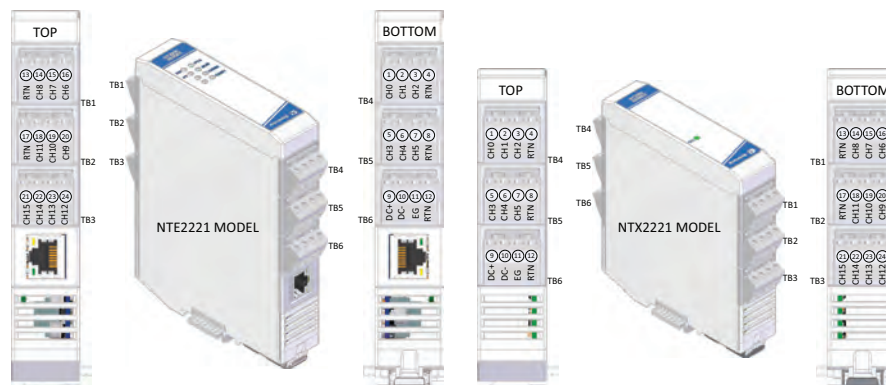
See www.acromag.com for other sizes.

ISO9001
AS9100
MADE IN USA

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NT2220 Ethernet Analog I/O Modules

CE · 24 HOUR STOCK ITEM · 2 YEAR WARRANTY · RoHS Compliant

Modbus TCP/IP
EtherNet/IP
PROFINET
i2o

16 single-ended current inputs ◆ Ethernet I/O plus Expansion I/O ◆ Multi-protocol support

The BusWorks® NT2000 series offers a cost-effective, modular solution for Ethernet remote I/O systems. Two module types are available. NTE Ethernet models provide the protocol interface plus I/O signal processing channels. NTX expansion modules add extra I/O channels when mated to any NTE Ethernet communication module.

NT2240 modules offer 16 current inputs. Each input supports bipolar and unipolar ranges with 16-bit A/D. NTE Ethernet models provide a compact network interface to monitor sensor levels or 4-20mA loops. Appending NTX expansion models can interface up to 64 current inputs on a single IP address.
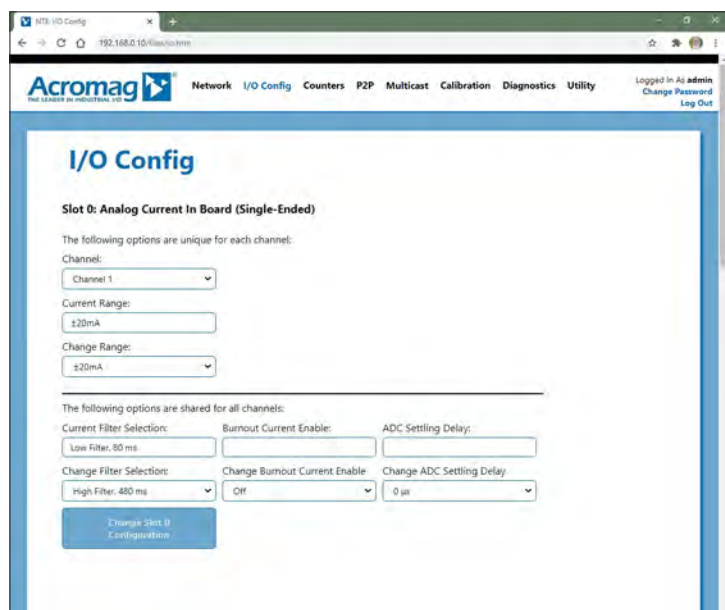
Applications include collecting pressure, level, flow, temperature, and other data at sensors, transducers, or transmitters. The 4-20mA current loop is the most common process control signal in many industries.

An isolated RS-485 bus links up to three expansion modules to the Ethernet module with connectors that join along the DIN rail. This internal NT bus distributes power and communication between the modules. Users can mix analog, temperature, and discrete I/O modules across the NT bus.

Acromag's i2o® messaging technology allows direct peer-to-peer or multicast communication between remote modules without a master controller.

Easily configure I/O modules using any web browser.

Key Features & Benefits

- Configured over Ethernet with web browser
- Expandable I/O capacity, up to 64 I/O channels of mixed signal types on one IP address
- Field-selectable Modbus TCP/IP, *Ethernet/IP, or *Profinet communication
- i2o peer-to-peer or multicast communication
- Dual RJ45 ports enable daisy chain topology
- 16 single-ended current inputs that share common
- Accepts ±20mA, 0/4-20mA, and 0/10-50mA input
- Measures AC current input with optional sensor
- LED status indicators for visual troubleshooting
- *OPC-UA, *MQTT and *RESTful API IIoT support
- *Conditional logic for rule-based I/O operation
- Advanced *alarm and *data logging functions
- 1500V isolation between I/O, network, and power
- Thin 25mm housing with pluggable terminals
- Wide temperature operation (-40 to 70°C)
- CE compliant. UL/cUL Class 1 Div 2 and ATEX/IECEx Zone 2 approvals (pending)

* Coming soon. Consult factory for availability.

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Bulletin #8400055b

Ethernet I/O: BusWorks® NT Series

NT2220 Ethernet Analog I/O Modules

Performance Specifications

■ Ethernet Interface (NTE models only)

Communication
Configurable for Modbus TCP/IP, Ethernet/IP, or Profinet.
Ethernet/IP, Profinet support coming soon.

10/100Mbps data rate, auto-sensing.

IP Address
Default 192.168.0.10. Configurable static IP or DHCP.

■ Analog Inputs

A/D Converter
16 input channels multiplexed to a 24 bit sigma-delta ADC through precision resistors and unity-gain buffers using a 16-bit bipolar conversion scheme.

Input Current Ranges
±20mA, 0-20mA, 4-20mA, 0-50mA and 10-50mA.
0-11.17mA range for use with 0-20A AC current sensing toroidal instrument transformer (5020-350).
Input channels are single-ended inputs that share a common return connection.

Input Accuracy
Better than ±0.05% of span typical, ±0.1% maximum.

Input Measurement Temperature Drift
Better than ±50ppm/°C (±0.0050%/°C).

Input Update/Conversion Rate
Response time will vary as filtering is increased. The fastest response time is less than 1ms typical.

Input Overvoltage Protection
Bipolar Transient Voltage Suppressers (TVS) with 5.5V clamp level. Inputs also include triple diode over-voltage clamps.

Input Impedance
49.9Ω shunt resistor.

Input Filter
Normal mode filtering fixed per input type.

■ General I/O

Input Update/Conversion Rate
Fresh data available to the network every 10ms.

Response Time from an Ethernet command
Less than 5ms, typical.

■ Environmental and Physical

Temperature and Humidity
Operating: -40 to +70°C (-40 to +158°F).
Storage: -40 to +85°C (-40 to +185°F).
Relative Humidity: 5 to 95%, non-condensing.

Isolation
1500V AC for 60 seconds and 250V AC or 354V DC continuous between I/O channels (group), each network port and power circuits.

Power Supply
9-32V DC SELV power wired to NTE model only.
Power to NTX models is via NT bus connection.

Power Consumption
NTE2221: <=1.5W (input).
NTX2221: <=0.5W max. (each).

Dimensions (width x height x depth)
NTE: 25 x 116.9 x 139.2 mm (0.98 x 4.6 x 5.48 inches).
NTX: 25 x 116.9 x 116.65 mm (0.98 x 4.6 x 4.59 inches).

Weight
NTE: 0.5 lbs (0.23 kg).
NTX: 0.3 lbs (0.14 kg).

■ Standards and Certifications

Electromagnetic Compatibility (EMC)
CE marked, per EMC Directive 2004/108/EC.

Safety Approvals
UL/cUL: Class I; Div 2; Groups A, B, C, D (pending).
ATEX/IECEx: Zone 2 (pending).

Ordering Information

■ Models

Go to on-line ordering page >

NTE2221-1111
Ethernet I/O module with dual RJ45 ports,
16 single-ended current inputs

NTX2221-0011
Expansion I/O module with 16 single-ended current inputs

■ Accessories

5020-350
Toroidal 0 to 20A AC current sensor.

5035-369
5035-370
Ethernet patch cable, low EMI, double-shielded.
3 feet (5035-369) or 15 feet (5035-370).

PS5R-VB24
Power supply, 24V DC, 15W output.

See www.acromag.com for other sizes.

ISO9001
AS9100

MADE IN USA

Acromag
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NT2230   Ethernet Analog I/O Modules

CE 24 HOUR STOCK ITEM 2 YEAR WARRANTY RoHS Compliant

Modbus TCP/IP
EtherNet/IP
PROFINET
i2o

TOP
NTE2231 MODEL
BOTTOM
TOP
NTX2231 MODEL
BOTTOM
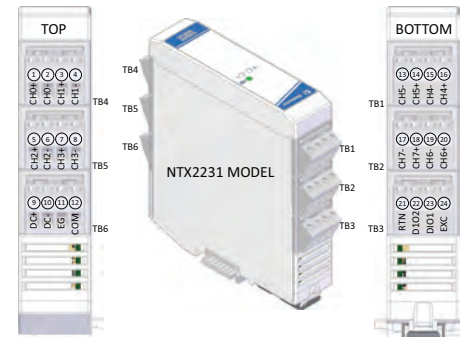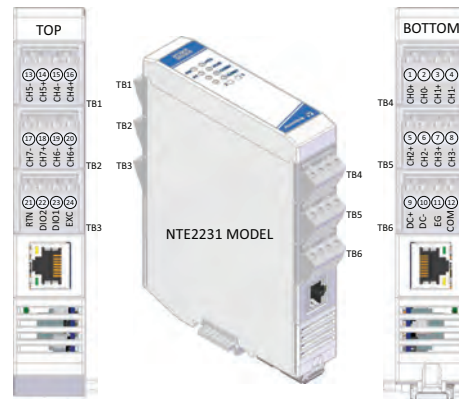
8 differential voltage inputs ◆ 2 discrete I/O ◆ Ethernet I/O plus Expansion I/O ◆ Multi-protocol support

The BusWorks® NT2000 series offers a cost-effective, modular solution for Ethernet remote I/O systems. Two module types are available. NTE Ethernet models provide the protocol interface plus I/O signal processing channels. NTX expansion modules add extra I/O channels when mated to any NTE Ethernet communication module.

NT2230 modules offer 8 voltage inputs and 2 bidirectional discrete digital I/O channels. Each input has true differential 16-bit A/D. NTE Ethernet models provide a compact network interface to monitor sensor levels or 0-10V devices. Appending NTX expansion models can interface up to 32 differential voltage inputs on a single IP address.

Applications include collecting pressure, HVAC levels, temperature, and other data at sensors, transducers, or transmitters. The 0-10V signal is very commonly used for automation and environmental controllers.
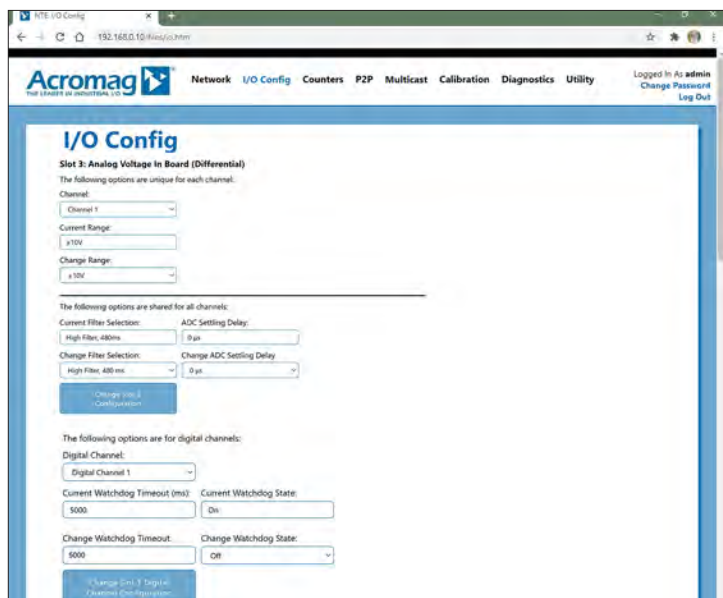
An isolated RS-485 bus links up to three expansion modules to the Ethernet module with connectors that join along the DIN rail. This internal NT bus distributes power and communication between the modules. Users can mix analog, temperature, and discrete I/O modules across the NT bus.

Acromag's i2o® messaging technology allows direct peer-to-peer or multicast communication between remote modules without a master controller.

Key Features & Benefits

- Configured over Ethernet with web browser
- Expandable I/O capacity, up to 58 I/O channels of mixed signal types on one IP address
- Field-selectable Modbus TCP/IP, *Ethernet/IP, or *Profinet communication
- i2o peer-to-peer or multicast communication
- Dual RJ45 ports enable daisy chain topology
- Eight voltage inputs with true differential node pairs referenced to input common
- Accepts ±1/5/10V and 0 to 1/5/10V inputs
- Discrete I/O can monitor and control equipment with TTL or 32V logic levels
- *OPC-UA, *MQTT and *RESTful API IIoT support
- *Conditional logic for rule-based I/O operation
- Advanced *alarm and *data logging functions
- 1500V isolation between I/O, network, and power
- Thin 25mm housing with pluggable terminals
- Wide temperature operation (-40 to 70°C)
- CE compliant. UL/cUL Class 1 Div 2 and ATEX/IECEx Zone 2 approvals (pending)
- * Coming soon. Consult factory for availability.

Easily configure I/O modules using any web browser.

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Ethernet I/O: BusWorks® NT Series

NT2230 Ethernet Analog I/O Modules

Performance Specifications

■ Ethernet Interface (NTE models only)

Communication
Configurable for Modbus TCP/IP, Ethernet/IP, or Profinet. Ethernet/IP, Profinet support coming soon.

10/100Mbps data rate, auto-sensing.

IP Address
Default 192.168.0.10. Configurable static IP or DHCP.

■ Analog Inputs

A/D Converter
Eight input channels differentially multiplexed to a 24 bit sigma-delta ADC through unity gain differential buffers (only 16-bits are used).

Input Voltage Ranges
±1V, ±5V, ±10V, 0-1V, 0-5V, 0-10V. Inputs are referenced to input common (COM) using resistive dividers at each input node and do not float.

Input Accuracy
Better than ±0.05% of span typical, ±0.1% maximum.

■ Discrete Inputs (Active-Low)

Input Signal Voltage Range
0 to +32V DC.

Input Current
280µA, typical at 32V DC.

Input Signal Threshold
TTL compatible w/100mV of hysteresis, typical.
1.7V DC Low-to-High, 1.6V DC High-to-Low.
0.8V DC TTL LOW limit, 2.0V DC TTL HIGH limit.

Input Resistance
100K ohms typical (input only), ~10K ohms with internal pull-ups.

Input Response Time
5ms typical, not including network time.

■ Discrete Outputs (Sinking)

Output "OFF" Voltage Range
0 to 32V DC.

Output "ON" Current Range
0 to 250mA DC, continuous.

Output Rds ON Resistance
0.8 ohms typical, 1.6 ohms maximum.

Output Response Time
5ms typical. Does not include network time.

■ General I/O

Input Update/Conversion Rate
Fresh data available to the network every 10ms.

Response Time from an Ethernet command
Less than 5ms, typical.

Excitation
External voltage of 4-32V required between I/O EXC and any RTN for DI/O. Excitation must source 52mA minimum (at 32V). For 2 channels at 250mA max rated load, excitation must source 0.5A min.

I/O Pull-Ups (Internal)
Each discrete I/O channel has a 10KΩ pull-up to EXC to pull the tandem open drain output and input high/OFF.

■ Environmental and Physical

Temperature and Humidity
Operating: -40 to +70°C (-40 to +158°F).
Storage: -40 to +85°C (-40 to +185°F).
Relative Humidity: 5 to 95%, non-condensing.

Isolation
1500V AC for 60 seconds and 250V AC or 354V DC continuous between I/O channels (group), each network port and power circuits.

Power Supply
9-32V DC SELV power wired to NTE model only.
Power to NTX models is via NT bus connection.

Power Consumption
NTE2231: <=1.5W (input).
NTX2231: <=0.5W max. (each).

Dimensions (width x height x depth)
NTE: 25 x 116.9 x 139.2 mm (0.98 x 4.6 x 5.48 inches).
NTX: 25 x 116.9 x 116.65 mm (0.98 x 4.6 x 4.59 inches).

Weight
NTE: 0.5 lbs (0.23 kg).
NTX: 0.3 lbs (0.14 kg).

■ Standards and Certifications

Electromagnetic Compatibility (EMC)
CE marked, per EMC Directive 2004/108/EC.

Safety Approvals
UL/cUL: Class I; Div 2; Groups A, B, C, D (pending).
ATEX/IECEx: Zone 2 (pending).

Ordering Information

■ Models

Go to on-line ordering page >

NTE2231-1111
Ethernet I/O module with dual RJ45 ports, 8 differential voltage inputs and 2 discrete I/O

NTX2231-0011
Expansion I/O module with 8 differential voltage inputs and 2 discrete I/O

■ Accessories

**5035-369
5035-370**
Ethernet patch cable, low EMI, double-shielded.
3 feet (5035-369) or 15 feet (5035-370).

PS5R-VB24
Power supply, 24V DC, 15W output.

See www.acromag.com for other sizes.

ISO9001
AS9100

MADE IN USA

Acromag
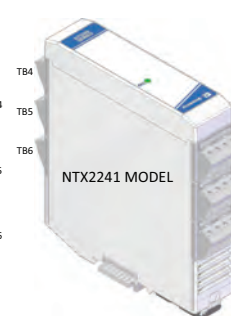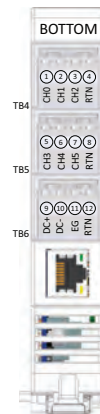THE LEADER IN INDUSTRIAL I/O

Tel 248-295-0880 ■ sales@acromag.com ■ www.acromag.com ■ 30765 Wixom Rd, Wixom, MI 48393 USA

▶ Ethernet I/O: BusWorks® NT Series

NT2240 Ethernet Analog I/O Modules

CE | 24 HOUR STOCK ITEM | 2 YEAR WARRANTY | RoHS Compliant

Modbus TCP/IP
EtherNet/IP
PROFINET
i2o

16 single-ended voltage inputs ◆ Ethernet I/O plus Expansion I/O ◆ Multi-protocol support

The BusWorks® NT2000 series offers a cost-effective, modular solution for Ethernet remote I/O systems. Two module types are available. NTE Ethernet models provide the protocol interface plus I/O signal processing channels. NTX expansion modules add extra I/O channels when mated to any NTE Ethernet communication module.

NT2240 modules offer 16 voltage inputs. Each input supports bipolar and unipolar ranges with 16-bit A/D. NTE Ethernet models provide a compact network interface to monitor sensor levels or 0-10V devices. Appending NTX expansion models can interface up to 64 voltage inputs on a single IP address.
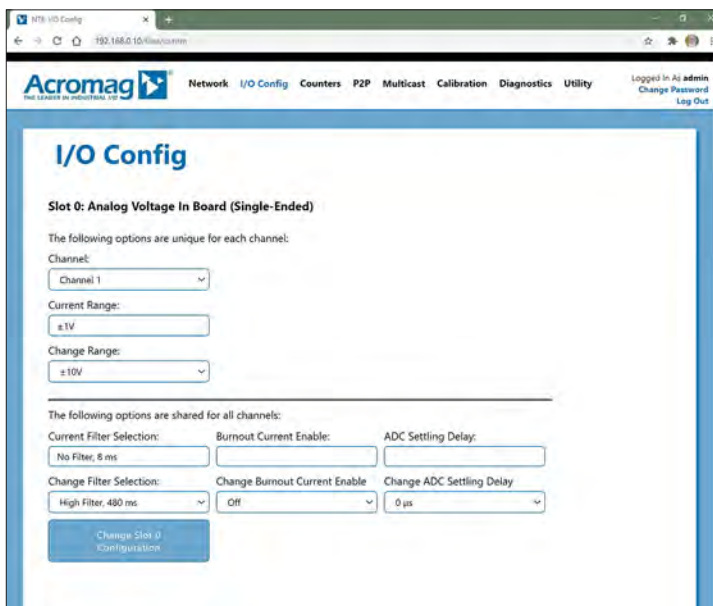
Applications include collecting pressure, HVAC levels, temperature, and other data at sensors, transducers, or transmitters. The 0-10V signal is very commonly used for automation and environmental controllers.

An isolated RS-485 bus links up to three expansion modules to the Ethernet module with connectors that join along the DIN rail. This internal NT bus distributes power and communication between the modules. Users can mix analog, temperature, and discrete I/O modules across the NT bus.

Acromag's i2o® messaging technology allows direct peer-to-peer or multicast communication between remote modules without a master controller.

Key Features & Benefits

- Configured over Ethernet with web browser
- Expandable I/O capacity, up to 64 I/O channels of mixed signal types on one IP address
- Field-selectable Modbus TCP/IP, *Ethernet/IP, or *Profinet communication
- i2o peer-to-peer or multicast communication
- Dual RJ45 ports enable daisy chain topology
- 16 single-ended voltage inputs that share common
- Accepts ±1/5/10V and 0 to 1/5/10V inputs
- LED status indicators for visual troubleshooting
- *OPC-UA, *MQTT and *RESTful API IIoT support
- *Conditional logic for rule-based I/O operation
- Advanced *alarm and *data logging functions
- 1500V isolation between I/O, network, and power
- Thin 25mm housing with pluggable terminals
- Wide temperature operation (-40 to 70°C)
- CE compliant. UL/cUL Class 1 Div 2 and ATEX/IECEx Zone 2 approvals (pending)
- * Coming soon. Consult factory for availability.

Easily configure I/O modules using any web browser.

Ethernet I/O: BusWorks® NT Series

NT2240 Ethernet Analog I/O Modules

Performance Specifications

■ Ethernet Interface (NTE models only)

Communication
Configurable for Modbus TCP/IP, Ethernet/IP, or Profinet. Ethernet/IP, Profinet support coming soon.

10/100Mbps data rate, auto-sensing.

IP Address
Default 192.168.0.10. Configurable static IP or DHCP.

■ Analog Inputs

A/D Converter
16 input channels multiplexed to a 24 bit sigma-delta ADC through resistive dividers using a 16-bit bipolar conversion scheme.

Input Voltage Ranges
±1V, ±5V, ±10V, 0-1V, 0-5V, 0-10V.
Input channels are single-ended inputs that share a common return connection.

Input Accuracy
Better than ±0.05% of span typical, ±0.1% maximum.

Input Measurement Temperature Drift
Better than ±50ppm/°C (±0.0050%/°C).

Input Update/Conversion Rate
Response time will vary as filtering is increased. The fastest response time without sample averaging is less than 1ms typical.

Input Overvoltage Protection
Bipolar Transient Voltage Suppressers (TVS) with 18V clamp level. Inputs also include triple diode over-voltage clamps.

Input Impedance
97.1KΩ minimum (NT2241 input divider).

Input Filter
Normal mode filtering fixed per input type.

■ General I/O

Input Update/Conversion Rate
Fresh data available to the network every 10ms.

Response Time from an Ethernet command
Less than 5MS, typical.

■ Environmental and Physical

Temperature and Humidity
Operating: -40 to +70°C (-40 to +158°F).
Storage: -40 to +85°C (-40 to +185°F).
Relative Humidity: 5 to 95%, non-condensing.

Isolation
1500V AC for 60 seconds and 250V AC or 354V DC continuous between I/O channels (group), each network port and power circuits.

Power Supply
9-32V DC SELV power wired to NTE model only.
Power to NTX models is via NT bus connection.

Power Consumption
NTE2241: <=1.5W (input).
NTX2241: <=0.5W max. (each).

Dimensions (width x height x depth)
NTE: 25 x 116.9 x 139.2 mm (0.98 x 4.6 x 5.48 inches).
NTX: 25 x 116.9 x 116.65 mm (0.98 x 4.6 x 4.59 inches).

Weight
NTE: 0.5 lbs (0.23 kg).
NTX: 0.3 lbs (0.14 kg).

■ Standards and Certifications

Electromagnetic Compatibility (EMC)
CE marked, per EMC Directive 2004/108/EC.

Safety Approvals
UL/cUL: Class I; Div 2; Groups A, B, C, D (pending).
ATEX/IECEx: Zone 2 (pending).

Ordering Information

■ Models

Go to on-line ordering page >

NTE2241-1111
Ethernet I/O module with dual RJ45 ports,
16 single-ended voltage inputs

NTX2241-0011
Expansion I/O module with 16 single-ended voltage inputs

■ Accessories

5035-369
5035-370
Ethernet patch cable, low EMI, double-shielded.
3 feet (5035-369) or 15 feet (5035-370).

PS5R-VB24
Power supply, 24V DC, 15W output.
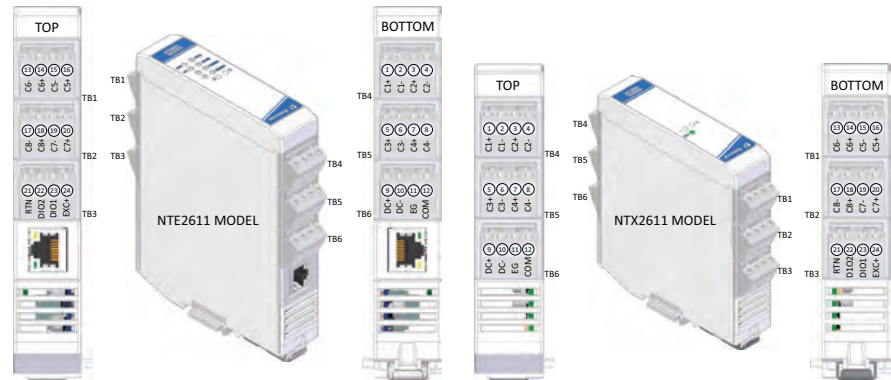
See www.acromag.com for other sizes.

ISO9001
AS9100

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NT2610 Ethernet Temperature Input Modules

CE | 24 HOUR STOCK ITEM | 2 YEAR WARRANTY | RoHS Compliant

TOP

BOTTOM

NTE2611 MODEL

TOP

BOTTOM

NTX2611 MODEL

Modbus TCP/IP

EtherNet/IP

PROFINET

i2o

8 thermocouple / mV inputs ◆ 2 discrete I/O ◆ Ethernet I/O plus Expansion I/O ◆ Multi-protocol support

The BusWorks® NT2000 series offers a cost-effective, modular solution for Ethernet remote I/O systems. Two module types are available. NTE Ethernet models provide the protocol interface plus eight I/O signal processing channels. NTX expansion modules add eight more I/O channels when mated to any NTE Ethernet communication module.

NT2610 modules offer 8 thermocouple/millivolt inputs and 2 bidirectional discrete digital I/O channels. Each input can support a variety of sensor types. NTE Ethernet models provide a network interface to monitor temperature levels. Appending NTX expansion models can interface up to 32 TC/mV sensor inputs at a single IP address.

Applications include monitoring temperatures in tanks, pipes, motors, heaters, chillers, and many industrial processes. Many pressure, weight, flow, and chemical sensors also provide a millivolt output.
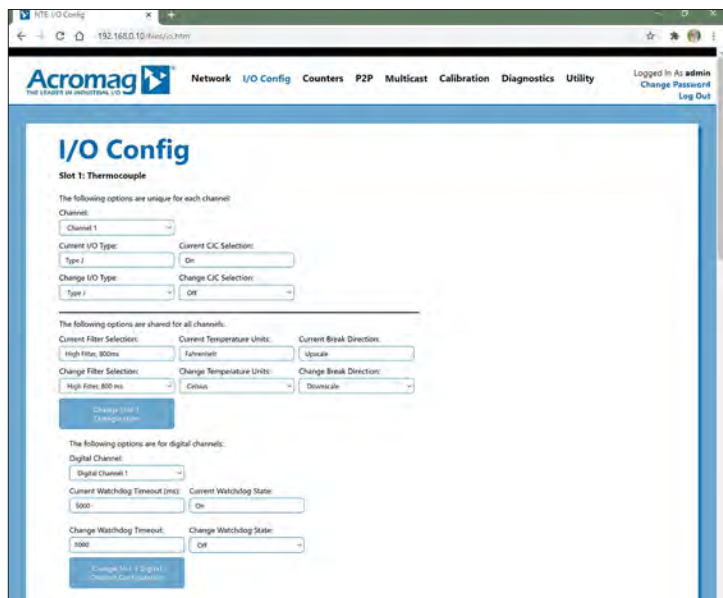
An isolated RS-485 bus links up to three expansion modules to the Ethernet module with bus connectors that join units along the DIN rail. This internal NT bus distributes power and communication between the modules. Users can mix analog, temperature, and discrete I/O modules across the NT bus.

Acromag's i2o® messaging technology allows direct peer-to-peer or multicast communication between remote modules without a master controller.

Key Features & Benefits

- Configured over Ethernet using a web browser
- Expandable I/O capacity, up to 58 I/O channels at one IP address
- Field-selectable Modbus TCP/IP, *Ethernet/IP, or *Profinet communication
- i2o peer-to-peer or multicast communication
- Dual RJ45 ports enable daisy chain topology
- Eight differential thermocouple/millivolt inputs
- Accepts TC types J, K, T, R, S, B, E, or N and millivolt ranges of ±100mV or ±500mV
- Discrete I/O can monitor and control equipment with TTL or 32V logic levels
- *OPC-UA, *MQTT and *RESTful API IIoT support
- *Conditional logic for rule-based I/O operation
- Advanced *alarm and *data logging functions
- 1500V isolation between I/O, network, and power
- Thin 25mm housing with pluggable terminals
- Wide temperature operation (-40 to 70°C)
- CE compliant. UL/cUL Class 1 Div 2 and ATEX/IECEx Zone 2 approvals (pending)
- * Coming soon. Consult factory for availability.

Easily configure I/O modules using any web browser.

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Ethernet I/O: BusWorks® NT Series

NT2610 Ethernet Temperature Input Modules

Performance Specifications

■ Ethernet Interface (NTE models only)

Communication
Configurable for Modbus TCP/IP, Ethernet/IP, or Profinet.
Ethernet/IP, Profinet support coming soon.

10/100Mbps data rate, auto-sensing.

IP Address
Default 192.168.0.10. Configurable static IP or DHCP.

■ Analog Inputs

A/D Converter
Eight TC/mV input channels differentially multiplexed to a 24 bit sigma-delta ADC (only 16-bits are used).

Input Sensor Ranges
Thermocouple types J, K, T, R, S, E, B, N.
Millivolt ranges of ±100mV or ±500mV DC.

Input Accuracy
Better than ±0.05% of span typical, ±0.1% maximum.
Thermocouple accuracy is ±0.5°C or ±1.0°C typical depending on type and temperature range.

Break Detection
Configurable for upscale or downscale open sensor or lead break detection.

Linearization (T/C Inputs)
Within ±0.25°C of the NIST tables.

Thermocouple CJC Accuracy
-20 to +50°C: ±0.5°C maximum.
-40 to +70°C: ±1.0°C maximum.

Temperature Measurement Drift
±80ppm, ±0.0080%.

■ Discrete Inputs (Active-Low)

Input Signal Voltage Range
0 to +32V DC.

Input Current
280µA, typical at 32V DC.

Input Signal Threshold
TTL compatible w/100mV of hysteresis, typical.
1.7V DC Low-to-High, 1.6V DC High-to-Low.
0.8V DC TTL LOW limit, 2.0V DC TTL HIGH limit.

Input Resistance
100K ohms typical (input only), ~10K ohms w/ tandem output using internal pull-ups.

Input Response Time
5ms typical, not including network time.

■ Discrete Outputs (Sinking)

Output "OFF" Voltage Range
0 to 32V DC.

Output "ON" Current Range
0 to 250mA DC, continuous.

Output Rds ON Resistance
0.8 ohms typical, 1.6 ohms maximum.

Output Response Time
10ms typical. Does not include network time.

■ General I/O

Input Update/Conversion Rate
Fresh data available to the network every 10ms.

Response Time from an Ethernet command
Less than 5ms, typical.

Excitation
External voltage of 4-32V required between I/O EXC and any RTN for DI/O. Excitation must source 500mA minimum (at 32V). For both channels at 250mA max. rated load.

I/O Pull-Ups (Internal)
Each discrete I/O channel has 10KΩ pull-up to EXC to pull the tandem open drain output and input high/OFF.

■ Environmental and Physical

Temperature and Humidity
Operating: -40 to +70°C (-40 to +158°F).
Storage: -40 to +85°C (-40 to +185°F).
Relative Humidity: 5 to 95%, non-condensing.

Isolation
1500V AC for 60 seconds and 250V AC or 354V DC continuous between I/O channels (group), each network port and power circuits.

Power Supply
9-32V DC SELV power wired to NTE model only.
Power to NTX models is via its NT bus connection.

Power Consumption
NTE2611: <=1.5W (input).
NTX2611: <=0.5W max. (each).

Dimensions (width x height x depth)
NTE: 25 x 116.9 x 139.2 mm (0.98 x 4.6 x 5.48 inches).
NTX: 25 x 116.9 x 116.65 mm (0.98 x 4.6 x 4.59 inches).

Weight
NTE: 0.5 lbs (0.23 kg).
NTX: 0.3 lbs (0.14 kg).

■ Standards and Certifications

Electromagnetic Compatibility (EMC)
CE marked, per EMC Directive 2004/108/EC.

Safety Approvals
UL/cUL: Class I; Div 2; Groups A, B, C, D (pending).
ATEX/IECEx: Zone 2 (pending).

Ordering Information

■ Models

Go to on-line ordering page >

NTE2611-1111
Ethernet I/O module with dual RJ45 ports,
8 thermocouple/mV inputs and 2 discrete I/O

NTX2611-0011
Expansion I/O module with 8 thermocouple/mV inputs and 2 discrete I/O

■ Accessories

5035-369
5035-370
Ethernet patch cable, low EMI, double-shielded.
3 feet (5035-369) or 15 feet (5035-370).

PS5R-VB24
Power supply, 24V DC, 15W output.

See www.acromag.com for other sizes.

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