EtherStax® Series
Ethernet I/O Modules

Modbus TCP/IP
Modbus UDP/IP
i20® Peer-to-Peer

Rugged, Stackable
Analog and Discrete
High-Density I/O

MONITORING & CONTROL SOLUTIONS

Acromag®
THE LEADER IN INDUSTRIAL I/O

EtherStax® Series
Ethernet I/O Modules

Rugged, Stackable
Analog and Discrete
High-Density I/O
Acromag: The I/O Leader
Acromag is a customer-driven manufacturer focused on developing embedded I/O products that provide the best long term value in the industry. Compare and you’ll find that Acromag products offer an unmatched balance of price, performance, and features.

60+ Years of I/O Experience
Acromag has more than 60 years of measurement and control experience. Since 1957, we have delivered nearly a million units to thousands of customers around the globe for manufacturing, power, environmental, transportation, and military applications.

Top Quality and a 2-Year Warranty
We take every measure to guarantee you dependable operation and products that perform at or beyond their specifications. Our state-of-the-art manufacturing and military-grade components add an extra degree of ruggedness. Most products qualify for an extended 2-year warranty. And with ISO9000/AS9100 certified quality control, you get full confidence.

Online Ordering
For your convenience, Acromag provides full product documentation and pricing information on our website. You can obtain quotes or even place your order directly on our website.

Fast Delivery from Stock
Most products can be shipped within 24 hours of receiving your order.

Special Services
We are happy to accommodate your special requirements and offer the following services:
• custom product development
• custom calibration
• source inspections, quality audits
• special shipping, documentation
• protective humiseal coating
• plastic and stainless steel tagging

Certification and Approvals
Many Acromag products carry globally recognized agency approvals and safety certifications.
• Ethernet conformance
• UL, CUL
• Modbus conformance
• ATEX
• Profibus certification
• CSA
• IECex

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**Acromag**

Tel: 248-295-0880 ■ Fax: 248-624-9234 ■ sales@acromag.com ■ www.acromag.com ■ 30765 S Wixom Rd, Wixom, MI 48393 USA
**ES2000 Series**  Rugged, High-Density Ethernet I/O

**EtherStax ES2000 Series**  Rugged, Stackable Ethernet I/O

EtherStax I/O blocks provide a ruggedized, high-density solution to interface many analog and discrete signals to your control system. A stackable aluminum housing maintains a small footprint and stands up to industrial environments. The Ethernet interface supports Modbus TCP/UDP/IP for reliable host data transfer or peer-to-peer communication. Web-based configuration simplifies setup with any web browser. For OEM systems, or those that require specialized housings, an open-board version without the enclosure is available. EtherStax are ideal for a broad range of measurement and control applications.

**Rugged, Industrial-Grade Design**

EtherStax are designed for high-reliability operation. Units feature 3-way isolation and surge protection. The I/O circuitry has over-temperature, over-voltage, and over-current protection. Redundant communication paths and DC power ensure dependable operation. If network communication is lost, outputs fail safely and a relay provides local alarming or shutdown functions.

**Stackable, High-Density I/O**

A variety of models offer a mix of analog and discrete I/O interfaces with up to 96 channels on a single unit. Monitor sensors, control devices, or add local alarms. The units interlock for secure stacking that consumes little space when mounted on a surface or DIN rail.

**Key Features & Benefits**

- High-density industrial Ethernet I/O: Put hundreds of I/O channels in less panel space.
- Stackable aluminum or open-board packaging: Choose industrial-strength or low-cost mounting.
- Rugged, shock and vibration-resistant design: Mounts on machinery, DIN rail, wall, or flat surface.
- Modbus TCP/UDP/IP or i20 peer-to-peer network: Reliable communication to host or between nodes.
- Easy web configuration with copy function: Quickly set up units with any web browser.
- Dual-port Ethernet hub or switch w/MDI/MDI-X: Get diagnostics, redundancy, and easy expansion.
- Ready for STP, RSTP, other redundancy schemes: Supports dual-path communication via copper and fiber.
- Local failsafe SPST 5A fault relay: Provides alarm/shutdown if network or power fails.
- Surge suppression and 1500Vrms isolation: Protects power, relay, I/O, and each Ethernet Port.
- Redundant DC power with internal diode coupling: For “bump-less” transfer to back-up power.
- Extended operating temperature of -40 to 70°C
- Designed UL/cUL Class1 Div 2 ABCD
ES2000 Series  Rugged, High-Density Ethernet I/O

Features

- Dual Ethernet ports: Two Cu or one Cu / one fiber
- High-density industrial I/O: Up to 96 channels per unit with pluggable terminal blocks.
- Default/Reset toggle switch: Restore communication to factory configuration or reset the unit.
- Port status LEDs: Indicate switch/hub mode, link, activity, 10/100Mbps, port faults
- High-strength aluminum packaging: Dove-tailed grooves on top for stacking and interlocking units

Network and I/O Configuration Screens

- Status LEDs: Power, I/O, relay status
- Fault relay: Local 5A Form A relay
- Redundant DC Power: Pluggable terminals
- Earth ground terminal: One on each side

8.226" Width
7.25" Depth
2.444" Height

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Applications

Ideal for remote I/O or control rooms
With a variety of I/O configurations and flexible signal ranges, EtherStax serves many industries.

End-user Industries:
- Power gen & distribution
- Water & wastewater
- Oil & gas refining
- Food, dairy, beverage

System Integrators:
- SCADA applications
- Building & energy mgmt
- Specialty machinery

OEM Machinery:
- Engine & turbine controls
- Packaging equipment
- Boilers & furnaces
- Semiconductor fab

Distributed I/O for Batch Processing
EtherStax I/O interfaces sensors, actuators, displays and other instruments to a PLC, DCS, or PC over your Ethernet network. Analog inputs monitor temperature, level, flow, pressure, voltage, current, and myriad process variables. Analog outputs control drives, pumps, valves, motors, and heaters, or write to displays and recorders. Discrete inputs detect open/close and change-of-state while discrete outputs perform on/off control.

SCADA and Remote I/O
In addition to all the functions already mentioned, EtherStax are ideal for supervisory control and data acquisition at remote sites. Units tolerate -40 to 75°C allowing outdoor mounting. Flexible, redundant power supports battery operation. Multi-media capability enables use of copper, fiber-optic, or wireless Ethernet networks to eliminate the high cost of leased lines.

Discrete Manufacturing
EtherStax models with high-density discrete I/O provide a cost-efficient solution for automated operations such as machining, assembly, and packaging. These compact units can mount on machinery without worry of electrical noise, high voltage surges, or vibration affecting performance. EtherStax have a high level of immunity and resistance to transient signals from solenoids, motors, and magnetic fields.

Ethernet-Enable your OEM Machinery
Make your machines Internet-ready with EtherStax and monitor operation from any PC with an Ethernet link. The rugged aluminum housing can bolt directly to your equipment. Alternatively, the on-board version can mount in a NEMA enclosure or inside your machine. Resistant to shock and vibration, EtherStax units provide dependable operation even on moving machinery.

Peer-to-Peer Bi-Directional Communication

Redundant Ring Connections

Peer-to-Peer Signal Splitter (dual outputs)

Redundant Media Ring Connections

- Primary path failure:
  - Ring will fail-over to the alternate path
  - Optional path (peer to peer bi-directional)

- Redundant path (peer to peer bi-directional) communication via redundant path

- EtherStax Unit
  - Unit must be in hub/repeater mode

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General Operation and Performance Specifications

General Specifications
For information about specific units, please refer to the model data sheets or manuals.

◆ Inputs and Outputs
See individual model data sheets for details.

◆ Enclosure and Physical
Dimensions
8.226 inches wide x 2.444 inches tall x 7.25 inches deep. Units stack together on 2.175 inch centers.
I/O Connectors
Plug-in terminal blocks rated for 15A/300V, AWG #12-24 stranded or solid copper wire.
Network Connectors
See Ethernet Interface
Enclosure Material
Extruded aluminum, 6063 T6 alloy, silver anodized finish.
Printed Circuit Boards
Military grade fire-retardant epoxy glass per IPC-4101/98.
Safety Approvals
UL/cUL Listed.
Hazardous Locations:
Class 1; Division 2; Groups A, B, C, and D.

◆ Environmental
Operating Temperature
-40 to 70°C (-40 to 158°F).
Storage Temperature
-40 to +85°C (-40 to +185°F).
Relative Humidity
5 to 95%, non-condensing.
Power Requirements (Unit Main)
18-36V DC.
Redundant, diode-coupled terminals.
See individual model data sheets for power specifications.
Isolation
I/O, power, relay, and Ethernet port-to-port.
Peak: 1500V AC, ANS/ISA-82.01-1988.
Continuous: 250V AC, 354V DC.
Installation Category
Designed for Pollution Degree 2 environment with an Installation Category II rating (over-voltage category).
Electromagnetic Interference Immunity (EMI)
I/O have resistance to inadvertent state changes with interference from switching solenoids, commutator motors, and drill motors.
Electromagnetic Compatibility (EMC)
Meets EN50082-1.
Electrostatic Discharge (ESD) Immunity
Meets EN61000-4-2.
Radiated Field Immunity (RFI)
Meets EN61000-4-3 and EN500204.
Electrical Fast Transient Immunity (EFT)
Meets EN61000-4-4.
Conducted RF Immunity (CFI)
Meets EN61000-4-6.
Surge Immunity
Meets EN61000-4-5.
Emissions
Meets EN61000-4-4.

◆ Ethernet Interface
Network Connector (Copper)
8-pin RJ-45 sockets for 10Base-T/100Base-TX connections. Wired MDI-X by default but includes automatic MDI/MDI-X crossing.
Network Connector (Fiber)
Duplex SC-type, multi-mode transceiver for IEEE 802.3u 100Base-FX cable connections.
Protocol
Modbus TCP/IP or UDP/IP with integrated web-browser reconfiguration.
i2o Peer-to-Peer Communication
Supported on select models only.
See individual model data sheets for details.
IP Address
Default mode static IP address is 128.1.1.100.
Port
Up to 10 Modbus TCP/IP sockets supported. Uses port 502 (reserved for Modbus).
Transient Protection
Transient voltage suppressors are applied on all ports (power, I/O, Ethernet ports).
Data Rate
Switch mode: auto-sense 10Mbps or 100Mbps on copper connections, 100Mbps on fiber-optic connection.
Hub/repeater mode: fixed at 100Mbps and auto-negotiation does not apply.

Duplex
Switch mode: auto-negotiated, full or half duplex.
Hub/repeater mode: only half-duplex and auto-negotiation does not apply.
Compliance
IEEE 802.3, 802.3u, 802.3x.

Network Distance
Distance between two devices on an Ethernet network is generally limited to 100 meters using copper cable, and 2km using multi-mode fiber optic cable. Distance may be extended using hubs and switches.
Address
IP address can be preset by the user (static) and loaded from internal non-volatile memory, or it can be automatically acquired at startup via a network server using a BOOTP (Bootstrap Protocol) or DHCP (Dynamic Host Configuration Protocol). Includes default mode toggle switch to revert unit to a “known” fixed static IP address of 128.1.1.100, useful for trouble-shooting purposes.

Ordering Information
See individual model data sheets for details.
Ethernet I/O: EtherStax® Series

Easy Peer-to-Peer Communication with Acromag i2o®

i2o input-to-output messaging
Acromag’s i2o technology is the easy way to transmit input values for remote output without a PLC, PC or master CPU. With i2o, many Ethernet I/O modules have the ability to operate like a long-distance transmitter. You can convert your sensor inputs at Point A to process control signals at Point B. Or, you can monitor discrete devices at one site by reproducing the discrete levels with a relay output at another location.

Use your existing Ethernet lines to save time and wiring expenses
Connect input modules to output modules using your existing copper/fiber infrastructure or with a single new cable. Multiple I/O modules can be multiplexed through a switch or wireless radios.

No complicated controllers. No software. No programming.
Acromag Ethernet I/O modules have a built-in web page making it simple to configure using your standard web browser. Just click a few menu settings, enter the IP addresses, and you are done. Fast and easy.

Wire-saving applications
Our i2o technology lets an input module speak directly to an output module. It is ideal for non-critical projects that don’t need a PLC or PC master. Reproduce remote signals based on timed or event updates.

- Remote monitoring of process variables (temperature, pressure, level, flow) and discrete devices
- Remote data display, recording, alarms, or control
- Signal splitters
- Analyzer system monitoring
- Power and water utility monitoring
- Tank level, pump, and valve control
- Remote monitoring of motor loads and contactor status
- Remote control switching stations
- Environmental control systems
- Process shutdown, alarming, and annunciator systems
- RFID systems

Up to 12 channels per module and reliable, failsafe communication
Monitor up to a dozen devices with a single pair of I/O modules. Discrete I/O modules have twelve channels that you can set up as inputs or as outputs in four-channel groups. This allows bi-directional communication between two modules. Analog input modules measure up to six current, voltage, thermocouple, or RTD sensor signals. This data is then transmitted to a six-channel analog output module providing DC current or voltage output signals.

Peer-to-Peer Communication

Analog Inputs
4-20mA, 0-10V DC, thermocouple, RTD/resistance

Discrete Inputs
on/off, high/low, open/close, momentary push-buttons

Any Ethernet Media
Copper, fiber, wireless, or Internet

Analog Outputs
proportional 4-20mA or 0-10V DC

Discrete Outputs
on/off, high/low, open/close

Input-to-Output
input channel writes to the output channel

(uni-directional or bi-directional communication)

EtherStax I/O® also supports i2o
Acromag i2o® Technology for Peer-to-Peer Communication

ES2000 Series
Units with i2o

- Analog Input Modules
  ES2153
  16 analog current inputs,
  16 analog voltage or microBlox™ uB inputs

- Analog Output Modules
  ES2171
  16 current outputs
  ES2172
  16 voltage outputs

- Analog I/O Modules
  ES2151
  16 analog current inputs,
  16 analog voltage or microBlox™ uB inputs,
  16 analog current outputs
  ES2152
  16 analog current inputs,
  16 analog voltage or microBlox™ uB inputs,
  16 analog voltage or microBlox™ uB outputs

- Discrete I/O Modules
  ES2113
  96 solid-state input/outputs
  ES2117
  32 solid-state inputs
  16 relay outputs

Installation #1: Peer-to-Peer Bi-directional Communication

- Copper, Fiber, or Wireless Network
- Current, voltage, microBlox™ uB, or discrete inputs

Installation #2: Peer-to-Peer Signal Splitter (dual outputs)

- Current, voltage, microBlox™ uB, or discrete inputs

Any Ethernet Media

NOTE: Buy modules in pairs. For example:
AI with AO
AIO with AIO
DIO with DIO

Any Ethernet Media

I2o® Configuration Page

Analog I/O module (ES2152) configuration screen

Tel: 248-295-0880  Fax: 248-624-9234  sales@acromag.com  www.acromag.com  30765 S Wixom Rd, Wixom, MI 48393 USA
**ES2113 Ethernet Discrete I/O Modules**

**Description**
EtherStax I/O blocks provide a ruggedized, high-density solution to interface a very large quantity of discrete I/O signals to your control system. A stackable aluminum housing maintains a small footprint and stands up to harsh, industrial environments. Web-based configuration simplifies setup with any web browser.

**Input Ranges**
0 to 28V DC, active-low inputs

**Output Range**
0 to 28V DC (0.5A/ch) low-side switches

**Ethernet Communication**
10/100Base-T(X) and 100Base-FX
Modbus TCP/IP or UDP/IP protocol
Acromag i2o® peer-to-peer technology

**Power Requirement**
18 to 36V DC (redundancy-ready)

**Approvals**
UL & cUL listed
Class 1; Division 2; Groups A, B, C, D.

- 96 discrete I/O channels: Bi-directional channels support any input/output mix in a single unit.
- High-density stackable unit: Stacked mounting puts a lot of I/O in a very small footprint to save panel space.
- High Speed Channel Updates: Updates all 96 channels in 1mS.
- Modbus TCP/IP or UDP/IP protocol: I/O functions as slave to host controller.
- Peer-to-peer i2o communication: Inputs to one unit automatically update outputs on another over Ethernet link.
- Change-of-state or timed updates: Event-driven updates transmit data in less than 5mS between peers with i2o.
- 10 Modbus TCP/IP sockets/sessions: Multiple masters can talk to an EtherStax unit at the same time.
- Self-test checks I/O operation: Test I/O channels from a web browser before wiring terminals to devices.
- Selectable input “wetting” current: Internal current source eliminates pull-ups and improves dry contact interface.
- Automatic change of state detection: Inputs detect quick momentary changes of state that occur between polling.

- Internal or external port excitation: Selectable source on each 16-channel port simplifies wiring and adds flexibility for use with 5-28V DC logic.
- Loop-back monitoring on all channels: Inputs confirm output states for increased system reliability.
- Watchdog timers and failsafe outputs: Communication fault sends output to a pre-defined state or holds the last value.
- Output open-load detection: Output fault detection is selectable on individual channels.
- Thermal, current, voltage protection: I/O is protected from excessive levels to reduce downtime.

Open circuit board versions also available.
Performance Specifications

◆ General Specifications
See Page 7 for communication and other specs.

◆ Inputs
Configuration (active-low inputs)
96 channels (six 16-ch ports) with a common return (RTN). Each input is connected in tandem with open-drains of output mosfets. Any mix of I/O occurs as all channels are high impedance inputs unless written. Output channels can be read back at any time (loop-back monitoring).

Input Signal Voltage Range
0 to 28VDC, 31V maximum. Surge protected.

Input Threshold Detection and Sensitivity
4V DC threshold. Level or latching inputs.

Input “Wetting” Current
Built-in current sources switch from 16mA initially (20ms) to 2mA (continuous), default mode. Sources can be changed to 2mA or turned off.

Excitation
Internal (default): 6V DC, 400mA. External: 6 to 28V DC typical. Separate excitation terminal (logic) for each 16-channel port. Internal and external supplies are diode-blocked from each other. Includes reverse polarity protection.

Peer-to-peer (i2o) communication
Change-of-state updates: Less than 5mS events. Timed updates: Configurable for 1-90 seconds.

◆ Outputs
Configuration (low-side switches)
96 channels (six 16-ch ports) of open-drain mosfet switches with common source connection at port RTN terminal. Each output is connected in tandem with buffered inputs.

Output “OFF” Voltage Range
0 to 28V DC, 31V maximum. Surge protected.

Output “ON” Current Range
0 to 300mA DC continuous, each output.

Output “ON” Maximum Current
450mA DC maximum with any 8 channels “on” continuously per 16 channel port

Output Port Maximum Current
4.8A: 16 channels @ 300mA continuous
3.6A: 8 channels "off" & 8 channels @ 450mA

◆ Local Alarm Output
Configuration
Isolated relay de-energizes (failsafe) or energizes (non-failsafe) as configured when the watchdog timer detects a media or communication failure.

Type
SPST-NO, 1 Form A, Class I, Division II approved.

Rating
5A @ 120V AC, 50 cycles resistive.

Excitation
Internal (default): 6V DC, 400mA. External: 6 to 28V DC typical. Separate excitation terminal (logic) for each 16-channel port. Internal and external supplies are diode-blocked from each other. Includes reverse polarity protection.

Peer-to-peer (i2o) communication
Change-of-state updates: Less than 5mS events. Timed updates: Configurable for 1-90 seconds.

◆ enclosure and Physical
Housing Classification and Dimensions
IP20: 8.226” x 2.444” x 7.25”. 4 lbs. (1.8 kg) packed (unit weighs 3.4 lbs).

Safety Approvals
UL/cUL Listed. Hazardous Locations: Class 1; Div. 2; A B C D.

Shock and Vibration Immunity
Rating for single surface-mount unit in enclosure. Mechanical Shock: 50g, 3ms, with 3 half-sine shock pulses in each direction along 3 axes (18 shocks), and 30g, 11ms, with 3 half-sine shock pulses in each direction along 3 axes (18 shocks), per IEC60608-2-27.

Random Vibration: 5g, 5-500Hz, in 3 axes at 2 hours/axis per IEC60068-2-64.

◆ Environmental
Operating and Storage Temperature
Operating: Open bd,-40 to 75°C(-40 to +167°F) Enclosed bd, -40 to 75°C (all outputs “off”) -40 to 70°C (all outputs “on” at rated Max.). Storage: -40 to +85°C (-40 to +185°F).

Power Requirements
18-36V DC. Redundant, diode-coupled terminals.

Isolation

Continuous: 250V AC, 354V DC.

◆ Ethernet Interface
Internal Switch or Hub/Repeater
Dual-port Ethernet switch. Web-configurable as a true switch (default mode) or hub.

Network Connector [10/100 Base-T(X)Copper]
One or two 8-pin RJ-45 connectors. Automatic MDV MDI-X. 100m communication distance.

Network Connector (100 Base-FX Fiber-optic)
One multi-mode with SC connector. 2km communication distance. Full/half-duplex, selectable.

Protocols and Addressing
Modbus TCP/IP or UDP/IP. i2o peer-to-peer. StaticIP, DHCP, BootP. Configurable IP addresses.

Ethernet Modbus TCP/IP Sockets/Sessions
1-10 socket/sessions programmable via web page.

Ethernet Redundancy
Compatible with STP, RSTP, proprietary schemes.

Ordering Information

◆ I/O Modules
ES2113-0000
96 DIO, two copper ports, IP20 enclosure

ES2113-0010
96 DIO, two copper ports, open circuit board

ES2113-1000
96 DIO, one Cu & one fiber port, IP20 enclosure

ES2113-1010
96 DIO, one Cu & one fiber port, open board

◆ Accessories
Industrial Ethernet Switches
See Page 33.

Hardware Accessories and Power Supplies
See Page 34.

Software Support
See Page 36.
**Description**

EtherStax I/O blocks provide a ruggedized, high-density solution to interface a large quantity of isolated discrete I/O signals to your control system. A stackable aluminum housing maintains a small footprint and stands up to harsh, industrial environments. Web-based configuration simplifies setup with any web browser.

**Input Range**
20-36V DC

**Output Range**
Outputs: 2A @ 250V AC or 110V DC SPST
Alarm: 2A @ 240V AC or 125V DC SPST

**Ethernet Communication**
10/100Base-T(X) and 100Base-FX
Modbus TCP/IP or UDP/IP protocol
Acromag i2o® peer-to-peer technology

**Power Requirement**
18 to 36V DC (redundancy-ready)

**Approvals**
UL & cUL listed:
Class 1; Division 2; Groups A, B, C, D.

- Fully isolated between all circuits:
  Inputs, outputs, alarm, network ports, enclosure, and power are isolated from each other for safety and noise immunity.

- High-density stackable unit:
  Stacked mounting puts a lot of I/O in a very small footprint to save panel space.

- Modbus TCP/IP or UDP/IP protocol:
  I/O functions as slave to host controller.

- Peer-to-peer i2o communication:
  Inputs to one unit automatically actuate outputs on another over Ethernet link.

- Channel-to-channel input isolation:
  Inputs provide high or low-side sensing for AC or DC circuits.

- Automatic change of state detection:
  Inputs detect quick momentary changes of state that occur between polling.

- Logic inversion (i2o only):
  Active high inputs can switch remote peer-to-peer outputs on or off.

- Change-of-state or timed updates:
  Event-driven updates transmit data in less than 10ms between peers with i2o.

- 10 Modbus TCP/IP sockets/sessions:
  Multiple masters can talk to unit at same time.

- Local alarm function:
  Dedicated failsafe relay is controlled via watchdog timer and link-loss conditions.

- Heavy-duty 2A relays:
  16 SPST outputs provide high/low-side 2A switching up to 250V AC or 110VDC

- Programmable outputs:
  Normally open relays are configurable to energize or de-energize on power-up.

- Built-in slave relays:
  Inputs can control outputs on same unit to provide slave relay interface.

- Self-test checks I/O operation:
  Unit checks internal I/O communication and allows verification via web browser.

- Watchdog timers:
  Communication fault sends output to a pre-defined state or holds the last value.

Open circuit board versions also available.
Performance Specifications

◆ General Specifications
See Page 7 for communication and other specs.

◆ Inputs
Configuration
32 individually isolated, buffered inputs grouped in two 16-ch ports. Active-high operation.
Input Voltage Range
20-32V DC, 36V DC max.
Max voltage/operating temperature:
36V DC @ 65°C max.
Input Signal Threshold and Hysteresis
OFF-ON: 13V min, 20V max, 16V DC typical.
ON-OFF: 11V max, 7V min, 9V DC typical.
Input Impedance
6k ohms
Input Isolation:
Channel-to-channel: 150V AC isolation rating.
Port-to-port: 250V AC safety isolation rating.
Input Response Time
Less than 5ms.
Peer-to-peer (i2o) communication
Change-of-state updates: Less than 10ms events.
Timed updates: Configurable for 1-90 seconds.

◆ Outputs
Configuration
One 16-ch port of isolated SPST-NO mech. relays.
Maximum Switching Voltage / Load Rating
250V AC, 110V DC @ 2A.
Mechanical Life
20 million operations minimum.
Electrical Life (@ 20 cycles per minute)
100k operations minimum at 2A.
Contact Resistance (Initial)
30 milliohms, maximum.
Output Response Time
Less than 5ms.
Minimum Load
100µA/100mV DC.

◆ Local Alarm Output
Configuration
Failsafe or non-failsafe (software-configurable) relay trips on power or link-loss failure.
Type
SPST-NO, 1 Form A, Class I, Division II approved.
Maximum Switching Voltage/Load Rating
240V AC, 125V DC @ 2A
100K operations minimum.

◆ Ethernet Interface
Internal Switch or Hub/Repeater
Duplex-protected Ethernet switch. Configurable as a true switch (default mode) or low-latency hub.
Network Connector [10/100 Base-T(X)Copper]
One or two 8-pin RJ-45 connectors. Automatic MDI/MDI-X. 100m communication distance.
Network Connector (100 Base-FX Fiber-optic)
One multi-mode with SC connector. 2km communication distance. Fully/half-duplex, selectable.
Protocols and Addressing
Modbus TCP/IP or UDP/IP. i20 peer-to-peer.
StaticIP, DHCP, BootP. Configurable IP addresses.
Ethernet Modbus TCP/IP Sockets/Sessions
1-10 socket/sessions programmable via web page.
Ethernet Redundancy
Compatible with STP, RSTP, proprietary schemes.

◆ Environmental
Operating and Storage Temperature*
Operating: -40 to 65°C
Storage: -20 to 85°C (-40 to 185°F).
Power Requirements
18-36V DC. Redundant, diode-coupled terminals.
Mechanical: 4.7W (copper ports), 6.0W (fiber-optic ports).
Isolation
I/O, power, relay and Ethernet port-to-port.
Continuous: 250V AC, 354V DC (150V AC ch-ch).
See User Manual for full temperature specs.

◆ Enclosure and Physical
Housing Classification and Dimensions
IP20: 8.226” x 2.444” x 7.25”, 4 lbs. packed.
PCB: 7.920” x 1.875” x 7.25”, 1.65 lbs. packed.
Safety Approvals (pending)
UL/cUL Listed.
Hazardous Locations: Class I; Div 2; A, B, C, D.
Open board units: UL Recognized.
Shock and Vibration Immunity (in enclosure)
Mechanical Shock: 50g (3ms), 30g (11ms).
Random Vibration: 5g, (5-500Hz).

Ordering Information

◆ EtherStax I/O Units
All units have 32 inputs, 16 AC/DC outputs and i20 peer-to-peer communication capability.
ES2117-0000
20-36V DC inputs, two Cu ports, i20 enclosure
ES2117-0010
20-36V DC inputs, two Cu ports, open board
ES2117-1000
20-36V DC inputs, Cu & fiber ports, i20
ES2117-1010
20-36V DC inputs, Cu & fiber ports, open board

◆ Accessories
Industrial Ethernet Switches
See Page 33.
Hardware Accessories and Power Supplies
See Page 34.
Software Support
See Page 36.
**ES2151 Ethernet Analog Input/Output Modules**

**Description**
These EtherStax I/O units provide a rugged, high-density, and high-speed solution to interface a large quantity of analog input signals. Units accept 16 single-ended analog voltage inputs and 16 single-ended current inputs. The ES2151 also provides 16 analog current outputs. Two DB25 ports support an alternate interface of voltage I/O from microBlox® uB signal conditioning backpanels. This combination of high-density analog inputs and outputs is ideal for many sensor interface applications in remote zones.

EtherStax units are built and tested for high reliability and dependable performance in hostile environments. Available in an aluminum enclosure or as an open circuit board, both formats stack vertically to maintain a very small footprint.

**Input Ranges**
- ±5V, ±10V, ±20mA, 0-20mA, 4-20mA DC

**Output Ranges**
- 0-20mA, 4-20mA DC

**Ethernet Communication**
10/100Base-T(X) and 100Base-FX, Automatic MDI/MDI-X on all copper ports, Modbus TCP/IP or UDP/IP protocol, i2o peer-to-peer

**Power Requirement**
18 to 36V DC (redundancy-ready)

**Approvals**
UL/cUL: Zone 2, Class 1, Division 2, Groups ABCD

**Key Features & Benefits**
- 48-channel high-density combination of analog inputs and outputs
- DB25 ports for alternate voltage I/O from microBlox® uB signal conditioning backpanels
- 4-way isolation and surge suppression
- High-resolution 16-bit A/D and D/A's
- High-speed scanning for 10 millisecond update of all 48 channels
- Automatic zero/span calibration
- Built-in loop-back circuit verifies outputs
- On-demand self-test verifies calibration
- Web browser configuration
- User-configurable sample averaging and integration/totalization function with non-volatile registers
- Dual-format data registers support 16-bit integers or 32-bit floating point
- Scaling registers on all channels
- Peer-to-peer i2o communication with percent-of-span and timed updates

Select from more than 100 microBlox uB input and output modules.

Interface to microBlox® uB signal conditioning modules.

Open circuit board versions are also available.
Performance Specifications

- **General Specifications**
  See Page 7 for communication and other specs.

- **Analog Field Inputs**
  Input Channel Configuration
  16 single-ended analog voltage inputs and 16 single-ended analog current inputs.
  Input Ranges (select on per-channel basis)
  ±5V, ±10V, ±20mA, 0-20mA, or 4-20mA DC.
  Input Scaling (per-channel basis)
  Floating Point Format: IEEE-754.
  Input Resolution
  16-bit maximum, 0.00166% (1 part in 60,000).
  Input Accuracy
  Current Input: Better than 0.1% of range.
  Voltage Input: Better than 0.05% of range.

- **Local Alarm Output**
  Configuration
  Failsafe or non-failsafe (user-configurable) relay trips on power or link-loss failure.

- **i2o Peer-to-Peer Communication**
  Each port of 8 input channels can be mapped to output ports of two ES215x units. Updates based on time (100ms resolution) or percent of range change (0.1% resolution).

- **Ethernet Interface**
  Network Connector [10/100 Base-T(X)Copper]
  One or two 8-pin RJ-45 connectors. Automatic MDI/MDI-X. 100m communication distance.
  Network Connector (100 Base-FX Fiber-optic)
  One multi-mode with SC connector. 2km communication distance. Full/half-duplex, selectable.
  Protocols
  Modbus TCP/IP, UDP/IP, i2o peer-to-peer.

- **Environmental**
  Operating and Storage Temperature
  Operating: -40 to 70°C (-40 to 158°F).
  Storage: -40 to 85°C (-40 to 185°F).

- **Enclosure and Physical**
  Housing Classification and Dimensions
  IP20: 8.226 x 2.444 x 7.25", 4 lbs. packed.
  PCB: 7.920 x 1.875 x 7.25", 1.65 lbs. packed.
  Safety Approvals
  UL/cUL Listed.
  Hazardous Locations: Class I, Div 2; A, B, C, D.
  Open board units: UL Recognized.
  Shock and Vibration Immunity (in enclosure)
  Mechanical Shock: 50g (3ms), 30g (11ms).
  Random Vibration: 5g, (5-500Hz).

Ordering Information

- **EtherStax I/O Units**
  ES2151-0000
  Current/voltage inputs, current outputs, two Cu ports, IP20 enclosure
  ES2151-0010
  Current/voltage inputs, current outputs, two Cu ports, open board (no IP20 enclosure)
  ES2151-1000
  Current/voltage inputs, current outputs, Cu & fiber ports, IP20 enclosure
  ES2151-1010
  Current/voltage inputs, current outputs, Cu & fiber ports, open board (no IP20 enclosure)

- **Accessories**
  microBlox® uB Modules and Backpanels
  See Page 32.
  Industrial Ethernet Switches
  See Page 33.
  Hardware Accessories and Power Supplies
  See Page 34.
  Software Support
  See Page 36.
ES2152 Ethernet Analog Input/Output Modules

Description
These EtherStax I/O units provide a rugged, high-density, and high-speed solution to interface a large quantity of analog input signals. Units accept 16 single-ended analog voltage inputs and 16 single-ended current inputs. The ES2152 also provides 16 analog voltage outputs. Two DB25 ports support an alternate interface of voltage I/O from microBlox® uB input or output modules. This combination of high-density analog inputs and outputs is ideal for many sensor interface applications in remote zones.

EtherStax units are built and tested for high reliability and dependable performance in hostile environments. Available in an aluminum enclosure or as an open circuit board, both formats stack vertically to maintain a very small footprint.

Open circuit board versions are also available.

Select from more than 100 microBlox® uB input and output modules.

Interface to microBlox® uB signal conditioning modules.

Input Ranges
±5V, ±10V, ±20mA, 0-20mA, 4-20mA DC

Output Ranges
±5V, ±10V DC

Ethernet Communication
10/100Base-T(X) and 100Base-FX, Automatic MDI/MDI-X on all copper ports, Modbus TCP/IP or UDP/IP protocol i2o peer-to-peer

Power Requirement
18 to 36V DC (redundancy-ready)

Approvals
UL/cUL: Zone 2, Class 1, Division 2, Groups ABCD

Key Features & Benefits
- 48-channel high-density combination of analog inputs and outputs
- DB25 ports for alternate voltage I/O from microBlox® uB signal conditioning backpanels
- 4-way isolation and surge suppression
- High-resolution 16-bit A/D and D/A’s
- High-speed scanning for 10 millisecond update of all 48 channels
- Automatic zero/span calibration
- Built-in loop-back circuit verifies outputs
- On-demand self-test verifies calibration
- Web browser configuration
- User-configurable sample averaging and integration/totalization function with non-volatile registers
- Dual-format data registers support 16-bit integers or 32-bit floating point
- Scaling registers on all channels
- Peer-to-peer i2o communication with percent-of-span and timed updates
Performance Specifications

◆ General Specifications
See Page 7 for communication and other specs.

◆ Analog Field Inputs
Input Channel Configuration
16 single-ended analog voltage inputs and
16 single-ended analog current inputs.
Input Ranges (select on per-channel basis)
±5V, ±10V, ±20mA, 0-20mA, or 4-20mA DC.
Input Scaling (per-channel basis)
Floating Point Format: IEEE-754.
Input Resolution
16-bit maximum, 0.00166% (1 part in 60,000).
Input Accuracy
Current Input: Better than 0.1% of range.
Voltage Input: Better than 0.05% of range.
Input Impedance
Voltage: 4M ohms minimum.
Current: 100 ohms.
Input Scan Groups and Scan Times
Eight user-enabled 4-channel scan groups. 770µS
update/group (5mS for all 32 channels) with averag-
ing, loopback, and totalization functions disabled.
Input Overvoltage Protection
Bipolar Transient Voltage Suppressers (TVS),
18V clamp level typical.
Noise Rejection
CMR (50-60Hz): Better than -72dB.
Sample Averaging (user-configurable)
0-500 samples. One register for all channels.

◆ External microBlox® uB
Input and Output Modules
See Bulletin 8400-479 for details.

◆ Analog Field Outputs
Output Channel Configuration
16 DC voltage outputs.
Output Ranges (per-channel basis)
±5V, ±10V DC (at ±1mA).
User-configured on a per-channel basis.
Output Impedance
1 ohm maximum.
Output Resolution and Accuracy
Resolution (±10V): 16-bit maximum, 0.00166%.
Resolution (±5V): 15-bit maximum, 0.00305%.
Accuracy: Better than 0.05% of range.

◆ Local Alarm Output
Configuration
Fail-safe or non-fail-safe (user-configurable) relay trips on
power or link-loss failure.
Type
SPST-NO, 1 Form A, Class I, Division II approved.
Rating
3A @ 24V DC/250V AC, 100,000 cycles general.
2A @ 24V DC/250V AC, Hazardous locations.
Maximum Switching Voltage and Power
250V AC / 750VA, 125V DC / 90W.

◆ i2o Peer-to-Peer Communication
Each port of 8 input channels can be mapped to output
ports of two ES215x units. Updates based on time
(100mS resolution) or percent of range change (0.1%
resolution).

◆ Ethernet Interface
Internal Switch or Hub/Repeater
Dual-port Ethernet switch. User-configurable as a true
switch (default mode) or low-latency hub.
Network Connector [10/100 Base-T(X)Copper]
One or two 8-pin RJ-45 connectors. Automatic MDI/
MDI-X. 100m communication distance.
Network Connector (100 Base-FX Fiber-optic)
One multi-mode with SC connector. 2km communication
distance. Full/half-duplex, selectable.
Protocols
Modbus TCP/IP, UDP/IP, i2o peer-to-peer.
Addressing
StaticIP, DHCP, BootP.
Ethernet Modbus TCP/IP Sockets/Sessions
1-10 socket/sessions user-configurable.
Ethernet Redundancy
Compatible with STP, RSTP, or any ring scheme.

◆ Environmental
Operating and Storage Temperature
Operating: -40 to 70°C (-40 to 158°F).
Storage: -40 to 85°C (-40 to 185°F).
Power Requirements
18-36V DC. Redundant, diode-coupled terminals.
4.8W (copper ports), 5.8W (fiber-optic ports).
Isolation
UO, power, relay and Ethernet port-to-port.
Continuous: 250V AC, 354V DC (150V AC ch-ch).

◆ Enclosure and Physical
Housing Classification and Dimensions
IP20: 8.226 x 2.444 x 7.25", 4 lbs. packed.
PCB: 7.920 x 1.875 x 7.25", 1.65 lbs. packed.
Safety Approvals
UL/cUL Listed.
Hazardous Locations: Class I; Div 2; A, B, C, D.
Open board units: UL Recognized.
Shock and Vibration Immunity (in enclosure)
Mechanical Shock: 50g (3ms), 30g (11ms).
Random Vibration: 5g, (5-500Hz).

Ordering Information

◆ EtherStax I/O Units
ES2152-0000
Current/voltage inputs, voltage outputs,
two Cu ports, IP20 enclosure
ES2152-0010
Current/voltage inputs, voltage outputs,
two Cu ports, open board (no IP20 enclosure)
ES2152-1000
Current/voltage inputs, voltage outputs,
Cu & fiber ports, IP20 enclosure
ES2152-1010
Current/voltage inputs, voltage outputs,
Cu & fiber ports, open board (no IP20 enclosure)

◆ Accessories
microBlox® uB Modules and Backpanels
See Page 32.
Industrial Ethernet Switches
See Page 33.
Hardware Accessories and Power Supplies
See Page 34.
Software Support
See Page 36.
Ethernet I/O: EtherStax® Series

ES2153 Ethernet Analog Input Modules

32 analog inputs (16 current + 16 voltage) ● Modbus TCP/IP, UDP/IP, i2o® peer-to-peer communication

Description
These EtherStax I/O units provide a rugged, high-density, and high-speed solution to interface a large quantity of analog input signals. Units accept 16 single-ended analog voltage inputs and 16 single-ended current inputs. A DB25 port supports an alternate interface of voltage inputs from microBlox® uB signal conditioning modules. This combination of high-density analog current and voltage inputs is ideal for many sensor interface applications in remote zones.

EtherStax units are built and tested for high reliability and dependable performance in hostile environments. Available in an aluminum enclosure or as an open circuit board, both formats stack vertically to maintain a very small footprint.

Input Ranges
±5V, ±10V, ±20mA, 0-20mA, 4-20mA DC

Ethernet Communication
10/100Base-T(X) and 100Base-FX, Automatic MDI/MDI-X on all copper ports, Modbus TCP/IP or UDP/IP protocol i2o peer-to-peer

Power Requirement
18 to 36V DC (redundancy-ready)

Approvals
UL/cUL:
Zone 2, Class 1, Division 2, Groups ABCD

Key Features & Benefits
- 32-channel high-density combination of analog current and voltage inputs
- DB25 ports for alternate voltage I/O from microBlox® uB signal conditioning backpanels
- 3-way isolation and surge suppression
- High-resolution 16-bit A/Ds
- High-speed scanning for 10 millisecond update of all 32 channels
- Automatic zero/span calibration
- On-demand self-test verifies calibration
- Web browser configuration
- User-configurable sample averaging and integration/totalization function with non-volatile registers
- Dual-format data registers support 16-bit integers or 32-bit floating point
- Scaling registers on all channels
- Peer-to-peer i2o communication with percent-of-span and timed updates

Open circuit board versions are also available. Select from more than 100 microBlox® uB input modules.

Interface to microBlox® uB signal conditioning modules.
Performance Specifications

◆ General Specifications
See Page 7 for communication and other specs.

◆ Analog Field Inputs
Input Channel Configuration
16 single-ended analog voltage inputs and 16 single-ended analog current inputs.
Input Ranges (select on per-channel basis)
±5V, ±10V, ±20mA, 0-20mA, or 4-20mA DC.
Input Scaling (per-channel basis)
Floating Point Format: IEEE-754.
Input Resolution
16-bit maximum, 0.00166% (1 part in 60,000).
Input Accuracy
Current Input: Better than 0.1% of range.
Voltage Input: Better than 0.05% of range.
Input Impedance
Voltage: 4M ohms minimum.
Current: 100 ohms.
Input Scan Groups and Scan Times
Eight user-enabled 4-channel scan groups. 770µS update/group (5mS for all 32 channels) with averaging, loopback, and totalization functions disabled.
Input Overvoltage Protection
Bipolar Transient Voltage Suppressors (TVS), 18V clamp level typical.
Noise Rejection
CMR (50-60Hz): Better than -72dB.
Sample Averaging (user-configurable)
0-500 samples. One register for all channels.

◆ External microBlox® uB

Input and Output Modules
See Bulletin 8400-479 for details.

◆ Local Alarm Output
Configuration
Failsafe or non-failsafe (user-configurable) relay trips on power or link-loss failure.
Type
SPST-NO, 1 Form A, Class I, Division II approved.
Rating
3A @ 24V DC/250V AC, 100,000 cycles general.
2A @ 24V DC/250V AC, Hazardous locations.
Maximum Switching Voltage and Power
250V AC / 750VA, 125V DC / 90W.

◆ Ethernet Interface
Internal Switch or Hub/Repeater
Dual-port Ethernet switch. User-configurable as a true switch (default mode) or low-latency hub.
Network Connector [10/100 Base-T(X)Copper]
One or two 8-pin RJ-45 connectors. Automatic MDV MDI-X. 100m communication distance.
Network Connector (100 Base-FX Fiber-optic)
One multi-mode with SC connector. 2km communication distance. Full/half-duplex, selectable.
Protocols
Modbus TCP/IP, UDP/IP, i2o peer-to-peer.
Addressing
StaticIP, DHCP, BootP.
Ethernet Modbus TCP/IP Sockets/Sessions
1-10 socket/sessions user-configurable.
Ethernet Redundancy
Compatible with STP, RSTP, or any ring scheme.

◆ i2o Peer-to-Peer Communication
Each port of 8 input channels can be mapped to output ports of two ES215x units. Updates based on time (100mS resolution) or percent of range change (0.1% resolution).

◆ Environmental
Operating and Storage Temperature
Operating: -40 to 70°C (-40 to 158°F).
Storage: -40 to 85°C (-40 to 185°F).
Power Requirements
18-36V DC. Redundant, diode-coupled terminals.
Continuous: 250V AC / 750VA, 125V DC / 90W.
Isolation
I/O, power, relay and Ethernet port-to-port.
Continuous: 250V AC, 354V DC (150V AC ch-ch).

◆ Enclosure and Physical
Housing Classification and Dimensions
IP20: 8.226 x 2.444 x 7.25”, 4 lbs. packed.
PCB: 7.920 x 1.875 x 7.25”, 1.65 lbs. packed.
Safety Approvals
UL/cUL Listed.
Hazardous Locations: Class I; Div 2; A, B, C, D.
Open board units: UL Recognized.
Shock and Vibration Immunity (in enclosure)
Mechanical Shock: 50g (3ms), 30g (11ms).
Random Vibration: 5g, (5-500Hz).

Ordering Information

◆ EtherStax I/O Units
ES2153-0000
Current/voltage inputs, two Cu ports, IP20 enclosure
ES2153-0010
Current/voltage inputs, two Cu ports, open board (no IP20 enclosure)
ES2153-1000
Current/voltage inputs, Cu & fiber ports, IP20 enclosure
ES2153-1010
Current/voltage inputs, Cu & fiber ports, open board (no IP20 enclosure)

◆ Accessories
microBlox® uB Modules and Backpanels
See Page 32.
Industrial Ethernet Switches
See Page 33.
Hardware Accessories and Power Supplies
See Page 34.
Software Support
See Page 36.
**ES2161 Ethernet Analog Input Modules**

**Description**
These EtherStax I/O units provide a rugged, high-density, and high-speed solution to interface a large quantity of analog input signals. Units accept 32 differential analog current inputs, which are ideal for many sensor interface applications in remote zones. Available in an aluminum enclosure or as an open circuit board, both packages stack vertically to maintain a very small footprint. Many other features help increase reliability, improve performance and protect from harsh environments.

**Input Ranges**
±20mA, 0-20mA, 4-20mA DC

**Ethernet Communication**
10/100Base-T(X) and 100Base-FX, Automatic MDI/MDI-X on all copper ports, Modbus TCP/IP or UDP/IP protocol

**Power Requirement**
18 to 36V DC (redundancy-ready)

**Approvals**
UL/cUL: Zone 2, Class 1, Division 2, Groups ABCD

**Key Features & Benefits**
- 32 differential current analog inputs
- 4-way isolation and surge suppression
- Configurable from any web browser
- High-resolution 16-bit A/D
- Fast scanning up to 1KHz
- Dual-format data registers support both 16-bit signed integers and 32-bit floating point formats
- User-configurable IEEE-754 32-bit floating point scaling registers on all channels
- User-configurable integration function on all channels with totalizing 32-bit non-volatile counter registers
- User-configurable sample averaging and integration/totalization function with non-volatile registers
- Built-in precision voltage source for automatic calibration
- On-demand self-test with built-in calibration sources
Performance Specifications

◆ General Specifications
See Page 7 for communication and other specs.

◆ Analog Field Inputs
Input Channel Configuration
32 differential analog inputs. 16 channels on front and rear panels of unit.

DC Current Input Ranges (per-channel basis)
±20mA, 0-20mA, or 4-20mA DC (default). User-configured on a per-channel basis.

Input Scaling (per-channel basis)
Floating Point Format: IEEE-754 32-bit configurable for 12 digits with 4 decimal places.
16-bit Signed Integer Format: All channels are represented as ±30,000.

Input Resolution and Accuracy
Resolution: 15-bit maximum, 0.003%.
Accuracy: Better than 0.02% of range.

Input Impedance
100 ohms.

Input Scan Groups and Scan Times
Eight user-enabled 4-channel scan groups.
5mS (200Hz) update of all 32 channels.
8mS (125Hz) update when totalizing.
First 4-channel group updates in 770µS (1.3Khz). Each additional 4-channel group adds 590µS to update time.

Sample Averaging
0 to 500 samples, user-configurable.

Input Overvoltage Protection
Bipolar Transient Voltage Suppressors (TVS), 18V clamp level typical.

Noise Rejection
Common Mode (50-60Hz): Better than 72dB.

◆ Local Alarm Output
Configuration
Failsafe or non-failsafe (software-configurable) relay trips on power or link-loss failure.

Type
SPST-NO, 1 Form A, Class I, Division II approved.

Rating
5A @ 24V DC/250V AC, 6000 cycles resistive.
3A @ 24V DC/250V AC, 100,000 cycles general.
2A @ 24V DC/250V AC, Hazardous locations.

Maximum Switching Voltage and Power
250V AC / 750VA, 125V DC / 90W.

◆ Ethernet Interface
Internal Switch or Hub/Repeater
Dual-port Ethernet switch. Web-configurable as a true switch (default mode) or low-latency hub.

Network Connector [10/100 Base-T(X)Copper]
One or two 8-pin RJ-45 connectors. Automatic MDI-MDI-X. 100m communication distance.

Network Connector (100 Base-FX Fiber-optic)
One multi-mode duplex SC connector. 2km communication distance. Full/half-duplex, selectable.

Protocols and Addressing
Modbus TCP/IP or UDP/IP. StaticIP, DHCP, BootP. Configurable IP addresses.

Ethernet Modbus TCP/IP Sockets/Sessions
1-10 socket/sessions programmable via web page.

Ethernet Redundancy
Compatible with STP, RSTP, proprietary schemes.

◆ Environmental
Operating and Storage Temperature
Operating Ranges:
-40 to 70°C (-40 to 158°F).
Storage Range: -40 to 85°C (-40 to 185°F).

Power Requirements
18-36V DC. Redundant, diode-coupled terminals.
4.2W (copper ports), 5.25W (fiber-optic ports).

Ambient Temperature Effect
Less than 25ppm/°C (0.0025%/°C).

Isolation
I/O, power, relay and Ethernet port-to-port.
Continuous: 250V AC, 354V DC.

◆ Enclosure and Physical
Housing Classification and Dimensions
IP20: 8.226” x 2.444” x 7.25”, 4 lbs. packed.
PCB: 7.920” x 1.875” x 7.25”, 1.65 lbs. packed.

Safety Approvals
UL/cUL Listed.

Shock and Vibration Immunity (in enclosure)
Mechanical Shock: 50g (3ms), 30g (11ms).
Random Vibration: 5g, (5-500Hz).

Ordering Information

◆ Models
ES2161-0000
Current inputs, two Cu ports, IP20 enclosure
ES2161-0010
Current inputs, two Cu ports, open board
ES2161-1000
Current inputs, Cu & fiber ports, IP20 enclosure
ES2161-1010
Current inputs, Cu & fiber ports, open board

◆ Accessories
Industrial Ethernet Switches
See Page 33.
Hardware Accessories and Power Supplies
See Page 34.
Software Support
See Page 36.
**ES2162 Ethernet Analog Input Modules**

**Description**

These EtherStax I/O units provide a rugged, high-density, and high-speed solution to interface a large quantity of analog input signals. Units natively accept 32 differential high-level analog voltage inputs, which are ideal for most sensor interface applications in remote zones. For systems requiring high channel-to-channel isolation or a variety of input signals (voltage, current, temperature, frequency, load cell, etc.), the ES2162 has two ports that will each interface 16 inputs from a microBlox® uB signal conditioner backpanel. Available in an aluminum enclosure or as an open circuit board, both packages stack vertically to maintain a very small footprint. Many other features help increase reliability, improve performance and protect from harsh industrial environments.

**Input Ranges**

±5V, ±10V DC

**uB Signal Conditioner Interface**

Dual DB25 ports provide alternate interface to microBlox® uB signal conditioner backpanel systems

**Ethernet Communication**

10/100Base-T(X) and 100Base-FX, Automatic MDI/MDI-X on all copper ports, Modbus TCP/IP or UDP/IP protocol

**Power Requirement**

18 to 36V DC (redundancy-ready)

**Approvals**

UL/cUL: Zone 2, Class 1, Division 2, Groups ABCD

**Key Features & Benefits**

- 32 differential high-level voltage analog inputs
- Dual DB25 ports for alternate interface to microBlox® uB signal conditioning backpanels
- 4-way isolation and surge suppression
- Configurable from any web browser
- High-resolution 16-bit A/D
- Fast scanning up to 1KHz
- Dual-format data registers support both 16-bit signed integers and 32-bit floating point formats
- User-configurable IEEE-754 32-bit floating point scaling registers on all channels
- User-configurable integration function on all channels with totalizing 32-bit non-volatile counter registers
- User-configurable sample averaging and integration/totalization function with non-volatile registers
- Built-in precision voltage source for automatic calibration
- On-demand self-test with built-in calibration sources

**32-channel differential analog voltage input with uB interface ◆ Modbus TCP/IP or UDP/IP communication**

Select from more than 100 microBlox® uB input and output modules.

Select from more than 100 microBlox® uB signal conditioning modules.
**Performance Specifications**

- **General Specifications**
  See Page 7 for communication and other specs.

- **Analog Field Inputs**
  **Input Channel Configuration**
  32 differential analog inputs. 16 channels on front and rear panels of unit.

  **DC Voltage Input Ranges (per-channel basis)**
  ±5V or ±10V DC (default).

  **User-configured on a per-channel basis.**

  **Input Scaling (per-channel basis)**
  Floating Point Format: IEEE-754 32-bit configurable for 12 digits with 4 decimal places.

  **16-bit Signed Integer Format**: All channels are represented as ±30,000.

  **Input Resolution and Accuracy**
  Resolution: 16-bit maximum, 0.00167%.

  **Input Impedance**
  Greater than 1M ohms.

  **Input Scan Groups and Scan Times**
  Eight user-enabled 4-channel scan groups.

  **8mS (125Hz) update when totalizing.**

  **First 4-channel group updates in 770µS (1.3Khz). Each additional 4-ch. group adds 590µS to update time.**

  **Sample Averaging**
  0 to 500 samples, user-configurable.

  **Input Overvoltage Protection**
  Bipolar Transient Voltage Suppressors (TVS), Input Overvoltage Protection

  **0 to 500 samples, user-configurable.**

  **Noise Rejection**
  Common Mode (50-60Hz): Better than 72dB.

- **microBloX® uB External Inputs**
  See Bulletin 8400-479 for details.

  **Compatible uB Modules and Backpanels**
  Dual DB25 (front and rear) ports provide cable connection to industry-standard microBloX™ uB backpanels with analog input modules only. Each DB25 port alternately connects up to 16 input channels to any microBloX® uB backpanel via an SCMXC40D cable. NOTE: Differential input channels are disabled in 8-channel groups when DB25 port(s) are used.

  **Input Configuration (per-channel basis)**
  Web page configuration sets channels to sense inputs via screw terminals or DB25 port.

  **microBloX® uB Input Module Outputs**
  All microBloX® uB input modules provide 0-5V, 1-5V or ±5V DC outputs.

  **microBloX® uB Input Module Power**
  microBloX® uBs require 5V DC ±5%. For other power options, order one (1) supply per backpanel.

  **AC power: Model PS5R-B05 or PWR-4505.**

  **10-32V DC: Model uBDC-1 power supply.**

  **Voltage inputs, two copper ports.**

  **Models**
  - ES2162-0000
  - ES2162-0010
  - ES2162-1000
  - ES2162-1010

  **Ordering Information**

  See Page 32.

  **Industrial Ethernet Switches**
  See Page 33.

  **Hardware Accessories and Power Supplies**
  See Page 34.

  **Software Support**
  See Page 36.

- **Local Alarm Output**

  **Configuration**
  Failsafe or non-failsafe (software-configurable) relay trips on power or link-loss failure.

  **Type**
  SPST-NO, 1 Form A, Class I, Division II approved.

  **Rating**
  5A @ 24V DC/250V AC, 6000 cycles resistive.

  **Maximum Switching Voltage and Power**
  3A @ 24V DC/250V AC, 100,000 cycles general.

  **5A @ 24V DC/250V AC, 6000 cycles resistive.**

  **Hazardous Locations: Class I, Div 2; A, B, C, D.**

  **Operating Ranges:**
  - AC power: 208V to 240V, 4.4W (copper ports), 5.5W (fiber-optic ports).

  **PCB: 7.920” x 1.875” x 7.25”, 1.65 lbs. packed.**

  **IP20 enclosure (-1000) or open board (-1010).**

  **ES2162-0000**
  - Voltage inputs, one copper and one fiber port.

  **ES2162-0010**
  - Voltage inputs, one copper and one fiber port.

  **ES2162-1000**
  - Voltage inputs, two copper ports.

  **ES2162-1010**
  - Voltage inputs, two copper ports.

  **Power Requirements**
  18-36V DC. Redundant, diode-coupled terminals. 4.4W (copper ports), 5.5W (fiber-optic ports).}

- **Environmental**

  **Operating and Storage Temperature**
  Operating Ranges:
  - -40 to 70°C (-40 to 158°F).
  - Storage Range: -40 to 85°C (-40 to 185°F).

  **Power Requirements**
  18-36V DC. Redundant, diode-coupled terminals.

  **Shock and Vibration Immunity in enclosure**

  **Mechanical Shock**: 50g (5ms), 30g (11ms).

  **Random Vibration**: 5g, (5-500Hz).

- **Enclosure and Physical**

  **Housing Classification and Dimensions**

  **IP20**: 8.226” x 2.444” x 7.25”, 4 lbs. packed.

  **PCB**: 7.920” x 1.875” x 7.25”, 1.65 lbs. packed.

  **Safety Approvals**
  UL/cUL Listed.

  **Shock and Vibration Immunity (in enclosure)**

  **Industrial Ethernet Switches**
  See Page 32.

  **Hardware Accessories and Power Supplies**
  See Page 33.

  **Software Support**
  See Page 36.

- **EtherStax® Series**

  **Internal Switch or Hub/Repeater**
  Dual-port Ethernet switch. Web-configurable as a true switch (default mode) or low-latency hub.

  **Network Connector [10/100 Base-T(X)Copper]**
  One or two 8-pin RJ-45 connectors. Automatic MDI/MDI-X. 100m communication distance.

  **Network Connector (100 Base-FX Fiber-optic)**
  One multi-mode duplex SC connector. 2km communication distance. Full/half-duplex, selectable.

  **Protocols and Addressing**
  Modbus TCP/IP or UDP/IP. StaticIP, DHCP, BootP. Configurable IP addresses.

  **Ethernet Modbus TCP/IP Sockets/Sessions**
  1-10 socket/sessions programmable via web page.

  **Ethernet Redundancy**
  Compatible with STP, RSTP, proprietary schemes.
ES2163 Ethernet Analog Input Modules

Description
These EtherStax I/O modules provide a rugged, high-density, and high-speed solution to interface a large quantity of analog input signals to SCADA and distributed I/O systems. Each unit converts up to 64 single-ended analog current signals from various sensors and instruments for transmission to an Ethernet-based control network. Typical applications include process control, automated manufacturing, remote data acquisition, test and measurement, embedded computing, and supervisory monitoring systems. EtherStax units are built and tested to deliver high reliability and dependable performance in hostile environments. Many features help increase reliability, improve performance and protect from harsh environments. Available in an aluminum enclosure or as an open circuit board, both formats stack vertically to maintain a very small footprint.

Input Ranges
±20mA, 0-20mA, 4-20mA DC

Ethernet Communication
10/100Base-T(X) and 100Base-FX, Automatic MDI/MDI-X on all copper ports, Modbus TCP/IP or UDP/IP protocol

Power Requirement
18 to 36V DC (redundancy-ready)

Approvals
UL/cUL:
Zone 2, Class 1, Division 2, Groups ABCD

Key Features & Benefits
- 64 single-ended analog current inputs
- 4-way isolation and surge suppression
- High-resolution 16-bit A/D
- High-speed scanning with 10 millisecond update of all 64 channels
- Automatic zero/span calibration
- On-demand self-test verifies calibration
- Configurable from any web browser
- User-configurable sample averaging and integration/totalization function with non-volatile registers
- Dual-format data registers support 16-bit integers or 32-bit floating point
- Scaling registers on all channels

Open circuit board versions are also available.
Performance Specifications

◆ General Specifications
See Page 7 for communication and other specs.

◆ Analog Field Inputs
Input Channel Configuration
64 single-ended analog inputs. 32 channels on front and rear panels of unit.
DC Current Input Ranges
±20mA, 0-20mA, or 4-20mA DC (default).
User-configured on a per-channel basis.

Input Scaling (per-channel basis)
Floating Point Format: IEEE-754 32-bit configurable for
12 digits with 4 decimal places.
16-bit Signed Integer Format: All channels represented
as ±30,000.

Input Resolution and Accuracy
Resolution: 15-bit maximum, 0.003%.
Accuracy: Better than 0.1% of range.

Input Impedance
100 ohms.

Input Scan Groups and Scan Times
Eight user-enabled 8-channel scan groups.
10mS (100Hz) update of all 64 channels.
First 8-channel group updates in 1.80mS (555Hz).
Each additional 8-channel group adds 1.20mS to the
update time.

Sample Averaging
0 to 500 samples, user-configurable.

Input Overvoltage Protection
Bipolar Transient Voltage Suppressors (TVS),
14V working voltage.
Noise Rejection
Common Mode (50-60Hz): Better than 72dB.

◆ Local Alarm Output
Configuration
Failsafe or non-failsafe (software-configurable) relay
trips on power or link-loss failure.

Type
SPST-NO, 1 Form A, Class I, Division II approved.

Rating
5A @ 24V DC/250V AC, 6000 cycles resistive.
3A @ 24V DC/250V AC, 100,000 cycles general.
2A @ 24V DC/250V AC, Hazardous locations.

Maximum Switching Voltage and Power
250V AC / 750VA, 125V DC / 90W.

◆ Ethernet Interface
Internal Switch or Hub/Repeater
Dual-port Ethernet switch. Web-configurable as a true
switch (default mode) or low-latency hub.
Network Connector (10/100 Base-TX Copper)
One or two 8-pin RJ-45 connectors. Automatic MDV
MDI-X. 100m communication distance.
Network Connector (100 Base-FX Fiber-optic)
One multi-mode duplex SC connector. Full-duplex only.
2km communication distance.

Protocols and Addressing
Modbus TCP/IP or UDP/IP. StaticIP, DHCP, BootP.
Configurable IP addresses.
Ethernet Modbus TCP/IP Sockets/Sessions
1-10 socket/sessions programmable via web page.

Ethernet Redundancy
Compatible with STP, RSTP, proprietary schemes.

◆ Environmental
Operating and Storage Temperature
Operating Range: -40 to 70°C (-40 to 158°F).
Storage Range: -40 to 85°C (-40 to 185°F).

Power Requirements
18-36V DC. Redundant, diode-coupled terminals.
4.4W (copper ports), 5.5W (fiber-optic ports).

Ambient Temperature Effect
Less than 35ppm/°C (0.0035%/°C).

Isolation
I/O, power, relay and Ethernet port-to-port.
Continuous: 250V AC, 354V DC.

◆ Enclosure and Physical
Housing Classification and Dimensions
IP20: 8.226" x 2.444" x 7.25", 4 lbs. packed.
PCB: 7.920" x 1.875" x 7.25", 1.65 lbs. packed.

Safety Approvals
UL/cUL Listed.

Hazardous Locations: Class I; Division 2; A, B, C, D.
Open board units: UL Recognized.

Shock and Vibration Immunity (in enclosure)
Mechanical Shock: 50g (3ms), 30g (11ms).
Random Vibration: 5g, (5-500Hz).

Ordering Information
◆ Models
ES2163-0000
Current inputs, two Cu ports, IP20 enclosure
ES2163-0010
Current inputs, two Cu ports, open board
ES2163-1000
Current inputs, Cu & fiber ports, IP20 enclosure
ES2163-1010
Current inputs, Cu & fiber ports, open board

◆ Accessories
Industrial Ethernet Switches
See Page 33.

Hardware Accessories and Power Supplies
See Page 34.

Software Support
See Page 36.
**Description**
These EtherStax I/O modules provide a rugged, high-density, and high-speed solution to interface a large quantity of analog input signals to SCADA and distributed I/O systems. Each unit converts up to 64 single-ended analog voltage signals from various sensors and instruments for transmission to an Ethernet-based control network. Typical applications include process control, automated manufacturing, remote data acquisition, test and measurement, embedded computing, and supervisory monitoring systems.

EtherStax units are built and tested to deliver high reliability and dependable performance in hostile environments. Many features help increase reliability, improve performance and protect from harsh environments. Available in an aluminum enclosure or as an open circuit board, both formats stack vertically to maintain a very small footprint.

**Input Ranges**
±5V, ±10V DC

**Ethernet Communication**
10/100Base-T(X) and 100Base-FX, Automatic MDI/MDI-X on all copper ports, Modbus TCP/IP or UDP/IP protocol

**Power Requirement**
18 to 36V DC (redundancy-ready)

**Approvals**
UL/cUL: Zone 2, Class 1, Division 2, Groups ABCD

**Key Features & Benefits**
- 64 single-ended analog voltage inputs
- 4-way isolation and surge suppression
- High-resolution 16-bit A/D
- High-speed scanning with 10 millisecond update of all 64 channels
- Automatic zero/span calibration
- On-demand self-test verifies calibration
- Configurable from any web browser
- User-configurable sample averaging and integration/totalization function with non-volatile registers
- Dual-format data registers support 16-bit integers or 32-bit floating point
- Scaling registers on all channels

Open circuit board versions are also available.
Performance Specifications

◆ General Specifications
See Page 7 for communication and other specs.

◆ Analog Field Inputs
Input Channel Configuration
64 single-ended analog inputs. 32 channels on front and rear panels of unit.
DC Voltage Input Ranges (per-channel basis)
±5V or ±10V DC (default).
User-configured on a per-channel basis.

Input Scaling
Floating Point Format: IEEE-754 32-bit configurable for 12 digits with 4 decimal places.
16-bit Signed Integer Format: All channels represented as ±32,768.

Input Resolution and Accuracy
Resolution: 16-bit maximum, 0.00167%.
Accuracy: Better than 0.05% of range.

Input Impedance
Greater than 1M ohms.

Input Scan Groups and Scan Times
Eight user-enabled 8-channel scan groups.
10mS (100Hz) update of all 64 channels.
First 8-channel group updates in 1.80mS (555Hz).
Each additional 8-channel group adds 1.20mS to the update time.

Sample Averaging
0 to 500 samples, user-configurable.

Input Overvoltage Protection
Bipolar Transient Voltage Suppressors (TVS), 14V working voltage.

Noise Rejection
Common Mode (50-60Hz): Better than 72dB.

◆ Local Alarm Output
Configuration
Fail-safe or non-fail-safe (software-configurable) relay trips on power or link-loss failure.

Type
SPST-NO, 1 Form A, Class I, Division II approved.

Rating
5A @ 24V DC/250V AC, 6000 cycles resistive.
3A @ 24V DC/250V AC, 100,000 cycles general.
2A @ 24V DC/250V AC, Hazardous locations.

Maximum Switching Voltage and Power
250V AC / 750VA, 125V DC / 90W.

◆ Ethernet Interface
Internal Switch or Hub/Repeater
Dual-port Ethernet switch. Web-configurable as a true switch (default mode) or low-latency hub.

Network Connector (10/100 Base-TX Copper)
One or two 8-pin RJ-45 connectors. Automatic MDV/MDI-X. 100m communication distance.

Network Connector (100 Base-FX Fiber-optic)
One multi-mode duplex SC connector. Full-duplex only. 2km communication distance.

Protocols and Addressing
Modbus TCP/IP or UDP/IP. StaticIP, DHCP, BootP. Configurable IP addresses.

Ethernet Modbus TCP/IP Sockets/Sessions
1-10 socket/sessions programmable via web page.

Ethernet Redundancy
Compatible with STP, RSTP, proprietary schemes.

◆ Environmental
Operating and Storage Temperature
Operating Range: -40 to 70°C (-40 to 158°F).
Storage Range: -40 to 85°C (-40 to 185°F).

Power Requirements
18-36V DC. Redundant, diode-coupled terminals.
4.4W (copper ports), 5.5W (fiber-optic ports).

Ambient Temperature Effect
Less than 25ppm/°C (0.0025%/°C).

Isolation
Continuous: 250V AC, 354V DC.

◆ Enclosure and Physical
Housing Classification and Dimensions
IP20: 8.226” x 2.444” x 7.25”, 4 lbs. packed.
PCB: 7.920” x 1.875” x 7.25”, 1.65 lbs. packed.

Safety Approvals
UL/cUL Listed.

Hazardous Locations: Class I; Division 2; A, B, C, D.
Open board units: UL Recognized.

Shock and Vibration Immunity (in enclosure)
Mechanical Shock: 50g (3ms), 30g (11ms).
Random Vibration: 5g, (5-500Hz).

Ordering Information

◆ Models
ES2164-0000
Voltage inputs, two Cu ports, IP20 enclosure
ES2164-0010
Voltage inputs, two Cu ports, open board
ES2164-1000
Voltage inputs, Cu & fiber ports, IP20 enclosure
ES2164-1010
Voltage inputs, Cu & fiber ports, open board

◆ Accessories
Industrial Ethernet Switches
See Page 33.

Hardware Accessories and Power Supplies
See Page 34.

Software Support
See Page 36.
16 analog current outputs  Modbus TCP/IP, UDP/IP, i2o® peer-to-peer communication

Description
These EtherStax I/O units provide a rugged, high-density, and high-speed solution to interface analog output signals. Each unit provides 16 high-level analog current outputs to control various industrial devices.

Typical applications include driving indicators, display devices, and chart recorders. The outputs can also control variable speed drives, solenoid valves, motors, positioners and other actuators. Another common use is for re-transmission of analog signals to remote SCADA, PLC, or DCS systems.

EtherStax units are built and tested for high reliability and dependable performance in hostile environments. Available in an aluminum enclosure or as an open circuit board, both formats stack vertically to maintain a very small footprint.

Output Ranges
0-20mA, 4-20mA DC

Ethernet Communication
10/100Base-T(X) and 100Base-FX, Automatic MDI/MDI-X on all copper ports, Modbus TCP/IP or UDP/IP protocol i2o peer-to-peer

Power Requirement
18 to 36V DC (redundancy-ready) 9 to 16V DC output excitation required

Approvals
UL/cUL: Zone 2, Class 1, Division 2, Groups ABCD

Key Features & Benefits
■ 16-channel high-density analog output
■ 3-way isolation and surge suppression
■ High-resolution 16-bit D/A
■ High-speed updates of less than 4 milliseconds for all channels
■ Built-in loop-back circuit verifies outputs
■ On-demand self-test verifies calibration
■ Web browser configuration
■ Peer-to-peer i2o communication output target device for Model ES215x inputs

i2o Peer-to-Peer Messaging
With Acromag’s i2o technology, you can map inputs from ES215x units to output channels on an ES2171 module. Select updates based on time or on a percent of range change (100mS or 0.1% resolution).
**Performance Specifications**

- **Analog Field Outputs**
  Output Channel Configuration
  16 single-ended current outputs, 9-16V DC external excitation required.
  Output Ranges (per-channel basis)
  0-20mA or 4-20mA DC sourced.
  User-configured on a per-channel basis.
  Maximum Output Load at Excitation
  265 ohms @ 9V.
  400 ohms @ 12V.
  540 ohms @ 15V.
  Output Resolution and Accuracy
  Resolution: 13-bit maximum, 0.0122%.
  Accuracy: Better than 0.1% of range.
  Output Response Time
  1 channel: Less than 3mS, typical.
  16 channels: Less than 4mS, typical.

- **Local Alarm Output**
  Configuration
  Fail-safe or non-fail-safe (user-configurable) relay trips on power or link-loss failure.
  Type
  SPST-NO, 1 Form A, Class I, Division II approved.
  Rating
  3A @ 24V DC/250V AC, 100,000 cycles general.
  2A @ 24V DC/250V AC, Hazardous locations.
  Maximum Switching Voltage and Power
  250V AC / 750VA, 125V DC / 90W.

- **Ethernet Interface**
  Internal Switch or Hub/Repeater
  Dual-port Ethernet switch. User-configurable as a true switch (default mode) or low-latency hub.
  Network Connector [10/100 Base-T(X) Copper]
  One or two 8-pin RJ-45 connectors. Automatic MDI/MDI-X, 100m communication distance.
  Network Connector (100 Base-FX Fiber-optic)
  One multi-mode with SC connector. 2km communication distance. Full/half-duplex, selectable.
  Protocols
  Modbus TCP/IP, UDP/IP, i2o peer-to-peer.
  Addressing
  StaticIP, DHCP
  Ethernet Modbus TCP/IP Sockets/Sessions
  1-10 sockets/sessions user-configurable.
  Ethernet Redundancy
  Compatible with STP, RSTP, or any ring scheme.

- **i2o Peer-to-Peer Communication**
  Each port of 8 output channels can serve as a target for mapped inputs from ES215x units. Updates are based on time (100mS resolution) or percent of range change (0.1% resolution).

- **Environmental**
  Operating and Storage Temperature
  Operating: -40 to 70°C (-40 to 158°F).
  Storage: -40 to 85°C (-40 to 185°F).
  Power Requirements
  18-36V DC. Redundant, diode-coupled terminals. 3.3W (copper ports), 4.6W (fiber-optic ports), not including excitation power.
  9-16V DC @ 400mA external power required for driving the outputs.
  Isolation
  I/O, power, relay and Ethernet port-to-port.
  Continuous: 250V AC, 354V DC (150V AC ch-ch).

- **Enclosure and Physical**
  Housing Classification and Dimensions
  IP20: 8.226 x 2.444 x 7.25”, 4 lbs. packed.
  PCB: 7.920 x 1.875 x 7.25”, 1.65 lbs. packed.
  Safety Approvals
  UL/cUL Listed.
  Hazardous Locations: Class I; Div 2; A, B, C, D.
  Open board units: UL Recognized.
  Shock and Vibration Immunity (in enclosure)
  Mechanical Shock: 50g (3ms), 30g (11ms).
  Random Vibration: 5g, (5-500Hz).

**Ordering Information**

- **Models**
  ES2171-0000
  Current outputs, two Cu ports, IP20 enclosure
  ES2171-0010
  Current outputs, two Cu ports, open board (no IP20 enclosure)
  ES2171-1000
  Current outputs, Cu & fiber ports, IP20 enclosure
  ES2171-1010
  Current outputs, Cu & fiber ports, open board (no IP20 enclosure)

- **Accessories**
  Industrial Ethernet Switches
  See Page 33.
  Hardware Accessories and Power Supplies
  See Page 34.
  Software Support
  See Page 36.
**Description**

These EtherStax I/O units provide a rugged, high-density, and high-speed solution to interface analog output signals. Each unit provides 16 high-level analog voltage outputs to control various industrial devices.

Typical applications include driving indicators, display devices, and chart recorders. The outputs can also control variable speed drives, solenoid valves, motors, positioners and other actuators. Another common use is for re-transmission of analog signals to remote SCADA, PLC, or DCS systems.

EtherStax units are built and tested for high reliability and dependable performance in hostile environments. Available in an aluminum enclosure or as an open circuit board, both formats stack vertically to maintain a very small footprint.

Open circuit board versions are also available.

**Output Ranges**

±5V, ±10 V DC

**Ethernet Communication**

10/100Base-T(X) and 100Base-FX, Automatic MDI/MDI-X on all copper ports, Modbus TCP/IP or UDP/IP protocol

**Power Requirement**

18 to 36V DC (redundancy-ready)

**Approvals**

UL/cUL: Zone 2, Class 1, Division 2, Groups ABCD

**Key Features & Benefits**

- 16-channel high-density analog output
- 3-way isolation and surge suppression
- High-resolution 16-bit D/A
- High-speed updates of less than 4 milliseconds for all channels
- Built-in loop-back circuit verifies outputs
- On-demand self-test verifies calibration
- Web browser configuration
- Peer-to-peer i2o communication output target device for Model ES215x inputs

**i2o Peer-to-Peer Messaging**

With Acromag’s i2o technology, you can map inputs from ES215x units to output channels on an ES2172 module. Select updates based on time or on a percent of range change (100mS or 0.1% resolution).
Performance Specifications

◆ Analog Field Outputs
Output Channel Configuration
16 single-ended DC voltage outputs.
Output Ranges (per-channel basis)
±5V, ±10V DC (at ±1mA).
User-configured on a per-channel basis.
Output Impedance
1 ohm maximum.
Output Resolution and Accuracy
Resolution (±10V): 16-bit maximum, 0.00166%.
Resolution (±5V): 15-bit maximum, 0.00305%.
Accuracy: Better than 0.05% of range.
Output Response Time
1 channel: Less than 3mS, typical.
16 channels: Less than 4mS, typical.

◆ External microBlox® uB Output Modules
See Bulletin 8400-479 for details.

◆ Local Alarm Output
Configuration
Failsafe or non-failsafe (user-configurable) relay trips on power or link-loss failure.
Type
SPST-NO, 1 Form A, Class I, Division II approved.
Rating
3A @ 24V DC/250V AC, 100,000 cycles general.
2A @ 24V DC/250V AC, Hazardous locations.
Maximum Switching Voltage and Power
250V AC / 750VA, 125V DC / 90W.

◆ Ethernet Interface
Internal Switch or Hub/Repeater
Dual-port Ethernet switch. User-configurable as a true switch (default mode) or low-latency hub.
Network Connector [10/100 Base-T(X) Copper]
One or two 8-pin RJ-45 connectors. Automatic MDI/MDI-X. 100m communication distance.
Network Connector (100 Base-FX Fiber-optic)
One multi-mode with SC connector. 2km communication distance. Full/half-duplex, selectable.
Protocols
Modbus TCP/IP, UDP/IP, i2o peer-to-peer.
Addressing
StaticIP, DHCP.
Ethernet Modbus TCP/IP Sockets/Session
1-10 sockets/sessions user-configurable.
Ethernet Redundancy
Compatible with STP, RSTP, or any ring scheme.

◆ i2o Peer-to-Peer Communication
Each port of 8 output channels can serve as a target for mapped inputs from ES215x units. Updates are based on time (100mS resolution) or percent of range change (0.1% resolution).

◆ Environmental
Operating and Storage Temperature
Operating: -40 to 70°C (-40 to 158°F).
Storage: -40 to 85°C (-40 to 185°F).
Power Requirements
18-36V DC. Redundant, diode-coupled terminals. 3.3W (copper ports), 4.6W (fiber-optic ports), not including excitation power.
Isolation
I/O, power, relay and Ethernet port-to-port.
Continuous: 250V AC, 354V DC (150V AC ch-ch).

◆ Enclosure and Physical
 Housing Classification and Dimensions
IP20: 8.226 x 2.444 x 7.25", 4 lbs. packed.
PCB: 7.920 x 1.875 x 7.25", 1.65 lbs. packed.
Safety Approvals
UL/UL listed.
Network Connections: Class I; Div 2; A, B, C, D.
Open board units: UL Recognized.
Shock and Vibration Immunity (in enclosure)
 Mechanical Shock: 50g (3ms), 30g (11ms).
Random Vibration: 5g, (5-500Hz).

Ordering Information

◆ Models
ES2172-0000
Voltage outputs, two Cu ports, IP20 enclosure
ES2172-0010
Voltage outputs, two Cu ports, open board (no IP20 enclosure)
ES2172-1000
Voltage outputs, Cu & fiber ports, IP20 enclosure
ES2172-1010
Voltage outputs, Cu & fiber ports, open board (no IP20 enclosure)

◆ Accessories
microBlox® uB Modules and Backpanels
See Page 32.
Industrial Ethernet Switches
See Page 33.
Hardware Accessories and Power Supplies
See Page 34.
Software Support
See Page 36.
**microBlox® Signal Conditioning Modules**

**Description**
Acromag’s microBlox® uB Series I/O modules offer a compact, high-performance solution for interfacing sensors and field devices with data acquisition systems. uB signal conditioning modules are ideal to isolate, filter, convert and amplify a wide variety of signal types for test, measurement and control systems. Just plug uB modules into 4, 8, or 16-channel backpanels in any mix for a high-density analog I/O interface. Channel-to-channel isolation provides optimal noise and surge protection from ground loops, spikes, and high common mode voltages.

**Key Features & Benefits**
- Selection of 175 I/O modules with either a fixed-range or Bluetooth® wireless configuration option, as well as cost-saving commercial grade versions
- User-configurable I/O ranges with smartphone or tablet
- Input polling with trend charts in Android® or iOS® app
- Alarm output function with setpoint and deadband
- 1500Vac isolation field-to-host and channel-to-channel
- Up to 0.05% accuracy and 130db CMR
- Shock and vibration-resistant without screws

**Applications**
- Systems requiring high channel-to-channel isolation, noise rejection, surge suppression, and amplification
- Designed for front-end signal conditioning or embedded applications:
  - DCS, PLC, controllers, data acquisition, remote I/O, recorders, etc.
  - On-board embedded OEM applications
- Protects equipment, increases accuracy, and installs/expands easily
- Low-cost, high-density amplifier system

**Ordering Information**
- **Input Modules**
  - milliVolt Field Input; 5Hz or 1kHz
  - DC Voltage Input; 4Hz or 1kHz
  - Narrow Band DC Current Field Input
  - Platinum RTD Field Input; 2/3- or 4-wire
  - Thermocouple Field Input; linearized or non-linearized
  - 2-Wire Transmitter Field Input with Loop Excitation
  - Frequency Input with Excitation Supply
- **Accessories**
  - 4-, 8-, and 16-position analog I/O backpanels
  - Power supplies

**Parallel interface connects to Ethernet Analog Input Modules**

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**High-density isolation amplifiers**

**Applications**

**Ordering Information**

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**microBlox® also connect to EtherStax analog I/O modules (ES2151, ES2152, ES2153, ES2162, ES2172 models)**
Ethernet I/O: EtherStax® Series

900EN Series, EIS Series, IMC Series  Industrial Ethernet Switches & Converters

◆ 900EN Series Switches

900EN Ethernet Switches

Models
900EN-S005: 5-port, unmanaged
Acromag’s Rugged 5-port industrial-grade Ethernet switches have internal intelligence for fast and easy network installation with auto data rate, flow control, and cross-over. No setup needed if used as a simple switch with Acromag I/O modules.

Ordering Information

◆ Switches
For more information please visit www.acromag.com.
900EN-S005 Ethernet switch, 5-port Copper

◆ Accessories
Hardware Accessories and Power Supplies
See Page 34.

◆ EIS Series Switches

EIS Series Ethernet Switches

Models
EIS-408:  8-port (Cu/fiber), redundancy, managed
EIS series switches are designed for harsh environments. They feature a rugged IP30 aluminum case, 300,000 hour MTBF, and power supply redundancy for dependable networking.

Ordering Information

◆ Switches
For more information please visit www.acromag.com.
EIS408FX-M Ethernet switch with redundancy, 6 Cu / 2 Fiber-optic, multi-mode fiber (up to 2 km).
EIS-408FX-S Ethernet switch with redundancy, 6 Cu / 2 Fiber-optic, single-mode fiber (up to 30 km).

◆ Accessories
Hardware Accessories and Power Supplies
See Page 34.

◆ IMC Series, Converters

IMC Series Converters

Models
IMC-100A-M-T: 10/100TX to 100FX, Multi-Mode
IMC-100A-S3-T: 10/100TX to 100FX, Single Mode
Acromag’s IMC series industrial media converters convert between 10/100Base-TX and 100Base-FX cabling. They allow you to extend the cabling distance of your 100Base-FX network up to 30 kilometers.

Ordering Information

◆ Converters
For more information please visit www.acromag.com.
IMC-100A-M-T 10/100TX to 100FX Harden Media Converter, Multi-Mode 2KM, -40 to 80°C
IMC-100A-S3-T 10/100TX to 100FX Harden Media Converter, Single Mode 30KM, -40 to 80°C

◆ Accessories
Hardware Accessories and Power Supplies
See Page 34.
## Mounting

### Mounting kits, DIN rail strips and accessories

<table>
<thead>
<tr>
<th>Kit Description</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interlocked units without mounting kit.</td>
<td><img src="image1.png" alt="Interlocked units without mounting kit" /></td>
</tr>
<tr>
<td>ESA-DIN-VMK kit (vertical terminals).</td>
<td><img src="image2.png" alt="ESA-DIN-VMK kit (vertical terminals)" /></td>
</tr>
<tr>
<td>ESA-DIN-VMK supports two stacked units.</td>
<td><img src="image3.png" alt="ESA-DIN-VMK supports two stacked units" /></td>
</tr>
<tr>
<td>ESA-DIN-HMK kit (horizontal terminals).</td>
<td><img src="image4.png" alt="ESA-DIN-HMK kit (horizontal terminals)" /></td>
</tr>
<tr>
<td>ESA-DIN-HMK supports three stacked units.</td>
<td><img src="image5.png" alt="ESA-DIN-HMK supports three stacked units" /></td>
</tr>
<tr>
<td>ESA-SMK surface/machine mounting kit.</td>
<td><img src="image6.png" alt="ESA-SMK surface/machine mounting kit" /></td>
</tr>
<tr>
<td>ESA-OMK open board stacking kit. One kit supplies standoffs to stack two units.</td>
<td><img src="image7.png" alt="ESA-OMK stacking kit" /></td>
</tr>
<tr>
<td>Units stacked with ESA-OMK kit can mount on a DIN rail with ESA-DIN-HMK kit plate.</td>
<td><img src="image8.png" alt="Units stacked on a DIN rail" /></td>
</tr>
<tr>
<td>Side-by-side 19-inch rack mounting with ESA-DIN-HMK kit on a DIN rail.</td>
<td><img src="image9.png" alt="Side-by-side 19-inch rack mounting" /></td>
</tr>
</tbody>
</table>

Rubber grommets dampen shock and vibration.

16.5 inches
Accessories

**Mounting Hardware**

Din-Rail Mounting

For your convenience, Acromag offers several mounting accessories to simplify your system installation. Our 19" rack-mount kit provides a clean solution for mounting your I/O modules and a power supply. Or you can buy precut DIN rail strips for mounting on any flat surface.

**Power Supplies**

Universal Slimline Power Supplies

PS5R-S Slim Line models give you all the power of a traditional power supply in only half the space. They feature universal voltage inputs and all the convenient features you've come to expect. Use them in tight spaces or save valuable DIN rail space while still filling your requirements for power. With nine models available, it's easy to find the one that's right for your application!

**Ordering Information**

Visit www.acromag.com for more information.

PS5R-SB05
Power supply, 10W, 2.0A at 5V DC
PS5R-SB12
Power supply, 15W, 1.2A at 12V DC
PS5R-SB24
Power supply, 15W, 0.65A at 24V DC
PS5R-SC12
Power supply, 30W, 2.5A at 12V DC
PS5R-SC24
Power supply, 30W, 1.3A at 24V DC
PS5R-SD24
Power supply, 60W, 2.5A at 24V DC
PS5R-SE24
Power supply, 90W, 3.75A at 24V DC
PS5R-SF24
Power supply, 120W, 5A at 24V DC
PS5R-SG24
Power supply, 240W, 10A at 24V DC

**Wiring Accessories**

Acromag offers a variety of data cables and signal adapters to complete your application.

**Ordering Information**

Visit www.acromag.com for more information.

5035-355
Ethernet straight cable, CAT5, 3 feet long, shielded
5035-360
Ethernet crossover cable, CAT5E, 5 feet long, shielded
4001-096
USB Ethernet adapter
4001-110
Ribbon cable, 5 feet, DB25 male to 26-pin female IDC connector, interfaces uB input modules to select EtherStax or BusWorks I/O modules

Ordering Information

Visit www.acromag.com for more information.

20RM-16-DIN
19" rack-mount kit with DIN rail
DIN RAIL 3.0
DIN rail strip, Type T, 3 inches (75mm)
DIN RAIL 16.7
DIN rail strip, Type T, 16.7 inches (425mm)
ESA-DIN-HMK
DIN rail horizontal mounting kit, holds three EtherStax units.
ESA-DIN-VMK
DIN rail vertical mounting kit, holds two EtherStax units.
ESA-OMK
Open circuit board EtherStax mounting kit, stacks two units.
ESA-SMK
Surface mounting EtherStax kit, mounts up to three units.

Tel: 248-295-0880  Fax: 248-624-9234  sales@acromag.com  www.acromag.com  30765 S Wixom Rd, Wixom, MI 48393 USA
**Software Support**  Application Development Tools

**Description**
These software development tools help you quickly integrate Acromag Ethernet I/O with your application program.

**OPC DA Server**
This low-cost server is exclusively for use with Acromag Modbus TCP/IP Ethernet devices. The OPC Server connects Acromag's I/O modules to your HMI, SCADA or custom-built Visual Basic / C++ applications. Easy CSV import / export capability saves development time for faster deployment.

**.NET / ActiveX Controls**
These software controls provide a fast, easy way to communicate with any Modbus/TCP slave devices connected to your PC. Within minutes, your Visual Basic, Visual C, .NET, Excel, or other compatible applications will be talking Modbus protocol.

**Function Libraries with C Source Code**
Our C library of function routines speeds framing of Modbus messages. Examples help link your code with provided function calls to configure, read, and write to Acromag I/O modules. Ideal for Windows, Linux, VxWorks, and QNX OS.

**Key Features & Benefits**
- High-Speed OPC connectivity to all Acromag Modbus TCP/IP devices
- OPC DA Server supports all OPC-compliant HMI and SCADA applications
- ActiveX and .NET controls enable fast, easy communication with any Modbus TCP/IP or Modbus RTU slave device
- ActiveX and .NET controls support Visual Basic, Visual C++ and Excel applications
- Modbus C Libraries enable use with Linux, VxWorks, QNX, and other OS platforms
- Free evaluation versions

**Ordering Information**
See table for model numbers. Software is provided on CD-ROMs except ACMBCTCP-OPC which is downloadable only. For more information, visit our website.

www.acromag.com/software

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**Ethernet Software Development Tools**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Program Environment</th>
<th>Operating Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACMBCTCP-OPC</td>
<td>Modbus TCP/IP Master OPC DA Server</td>
<td>HMI, SCADA, Visual Basic, C++</td>
<td>Windows 7, Server</td>
</tr>
<tr>
<td>AMTN-CD</td>
<td>Modbus TCP/IP .NET Controls</td>
<td>Visual Basic, C++, C#</td>
<td>Windows 7</td>
</tr>
<tr>
<td>AMTX-CD</td>
<td>Modbus TCP/IP ActiveX Controls</td>
<td>Visual Basic, C++, Excel</td>
<td>Windows 7</td>
</tr>
<tr>
<td>ESW-MBLIB</td>
<td>Modbus C Library of Function Routines</td>
<td>Visual C++</td>
<td>Win, Linux, VxWorks, QNX, OS-9</td>
</tr>
</tbody>
</table>

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