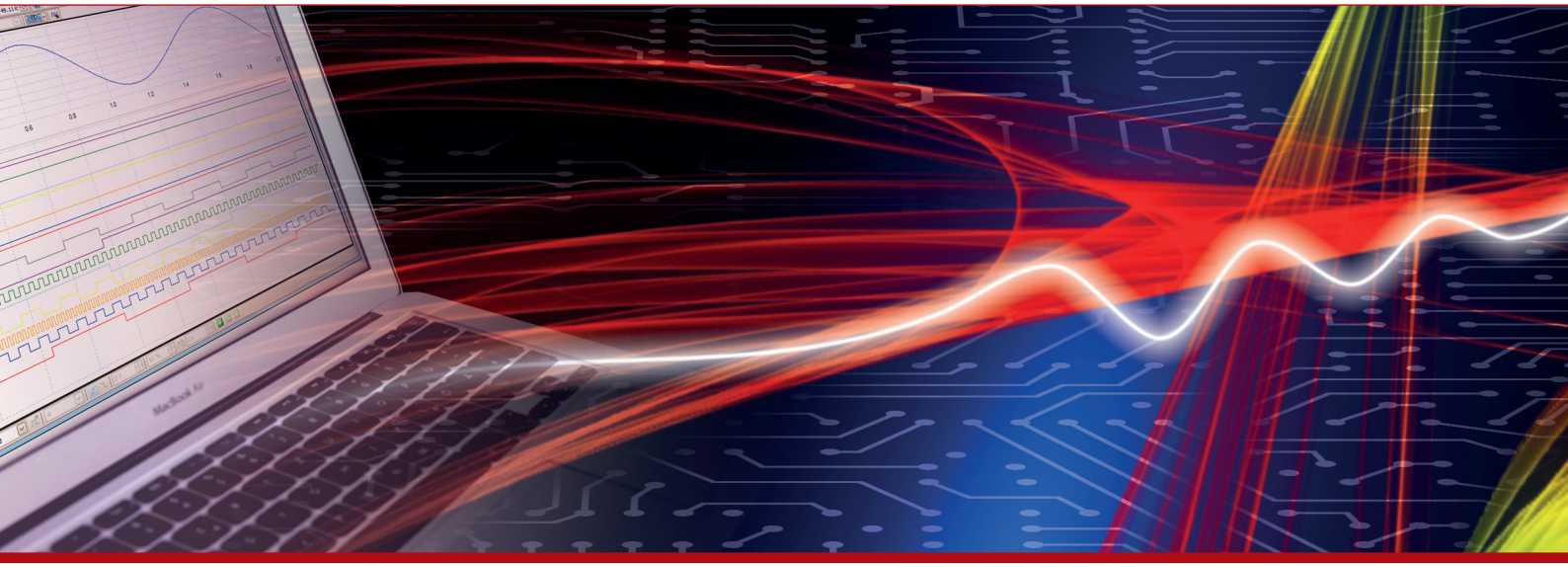
Product Datasheet - Technical Specifications



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Acromag
THE LEADER IN INDUSTRIAL I/O

Monitoring and Control Solutions

EtherStax® Ethernet I/O Series Brochure

Modbus TCP/IP

Modbus UDP/IP

i2o® Peer-to-Peer

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

Bulletin #8400-453J

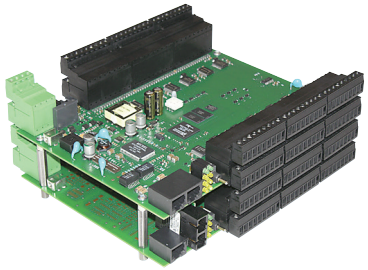
Ethernet I/O: EtherStax® Series

ES2000 Series Rugged, High-Density Ethernet I/O

◆ Discrete I/O Modules

◆ Analog I/O Modules

◆ Open Board OEM Versions



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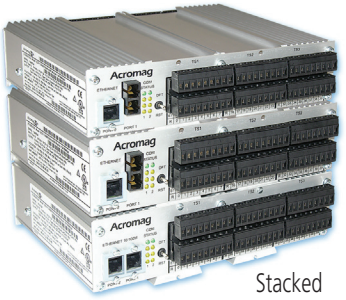
Acromag® THE LEADER IN INDUSTRIAL I/O

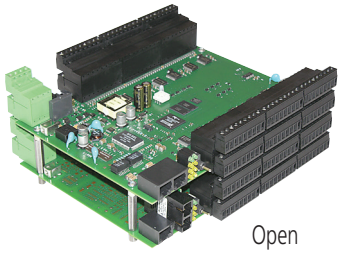
Ethernet I/O: EtherStax® Series

ES2000 Series Rugged, High-Density Ethernet I/O


Front


Back


Stacked


Open

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

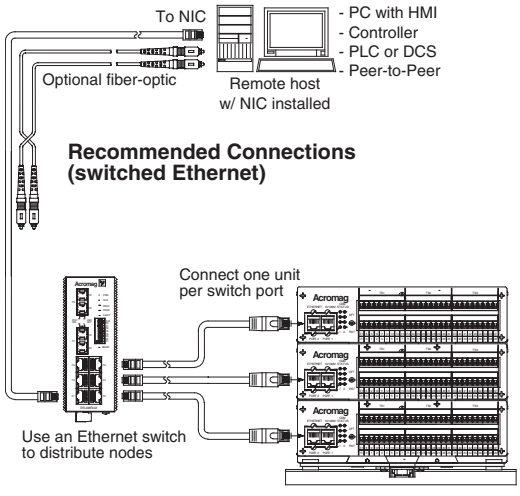
EtherStax are designed for high-reliability operation. Units feature 3-way isolation and surge protection. The I/O circuitry has over-temperature, over-voltage, and over-current protection. Redundant communication paths and DC power ensure dependable operation. If network communication is lost, outputs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

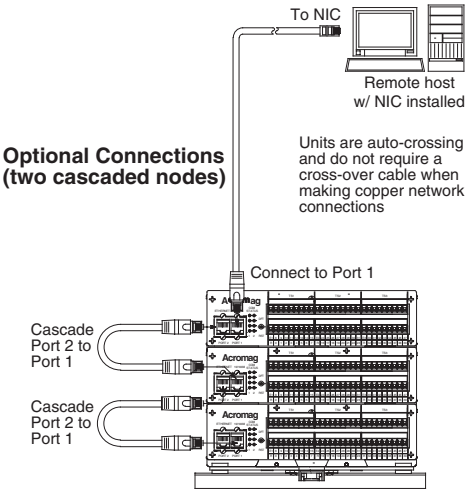
Stackable, High-Density I/O

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 i2o 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 w/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

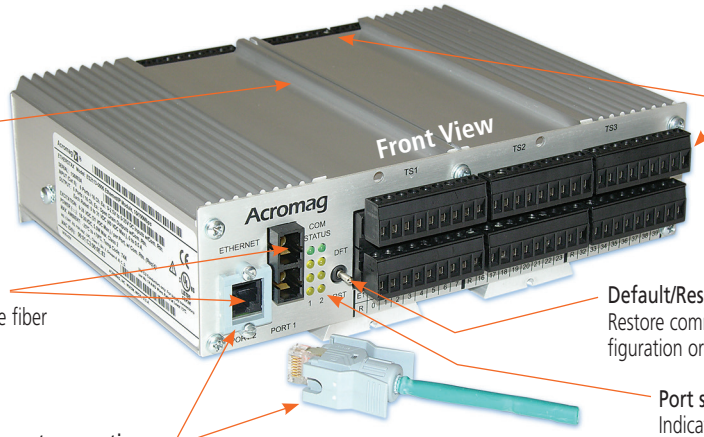




Ethernet I/O: EtherStax® Series

ES2000 Series Rugged, High-Density Ethernet I/O

Features



High-strength aluminum packaging
Dove-tailed grooves on top for stacking and interlocking units

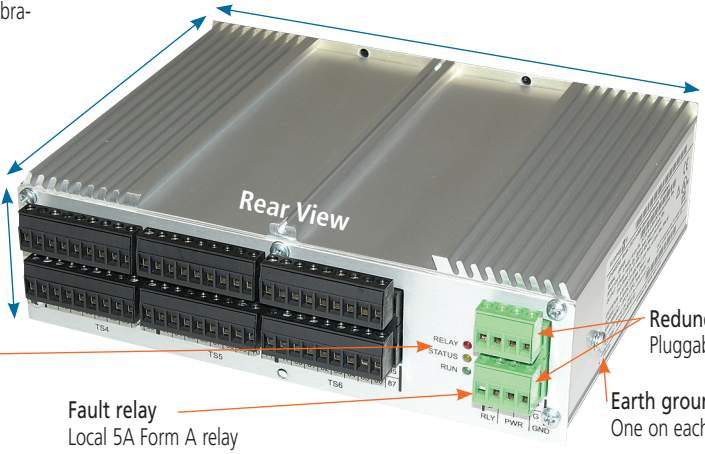
High-density industrial I/O
Up to 96 channels per unit with pluggable terminal blocks.

Dual Ethernet ports
Two Cu or one Cu / one fiber

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

Locking Ethernet connection
RJ45 clip frame provides secure media connections resistant to shock and vibration when used with compatible cables.



8.226″ Width

7.25″ Depth
2.444″ Height

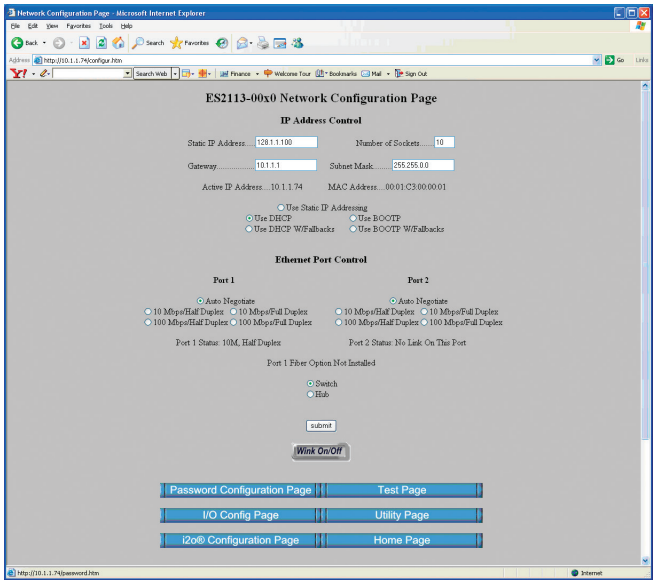
Status LEDs
Power, I/O, relay status

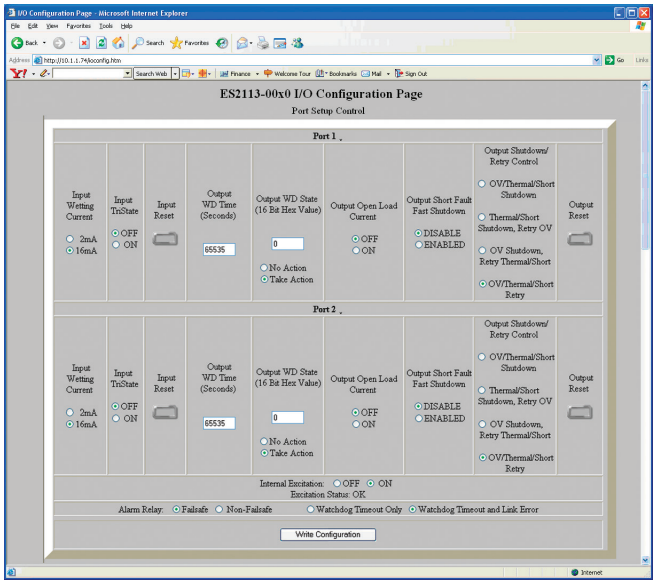
Fault relay
Local 5A Form A relay

Redundant DC Power
Pluggable terminals

Earth ground terminal
One on each side

Network and I/O Configuration Screens





Ethernet I/O: EtherStax® Series

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
- Chemical/petrochem
- Water & wastewater
- Metals processing
- Oil & gas refining
- Pharmaceutical
- Food, dairy, beverage
- Military & Aerospace

System Integrators:

- SCADA applications
- Factory automation
- Building & energy mgmt
- Specialty machinery

OEM Machinery:

- Engine & turbine controls
- Switch gear equip.
- Packaging equipment
- Boilers & furnaces
- Semiconductor fab
- Material handling

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.

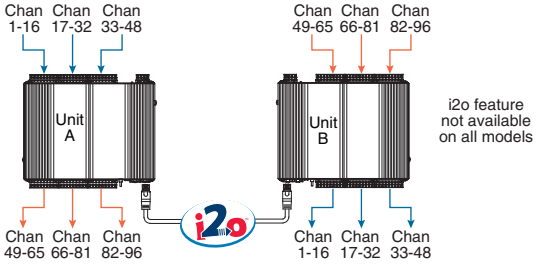
Discrete Manufacturing

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.

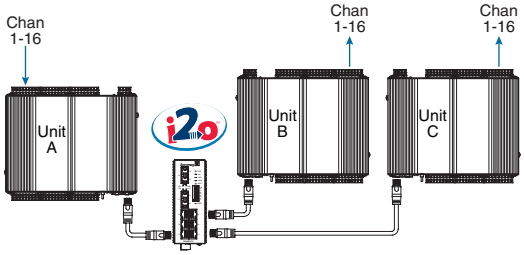
Ethernet-Enable your OEM Machinery

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 open-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.

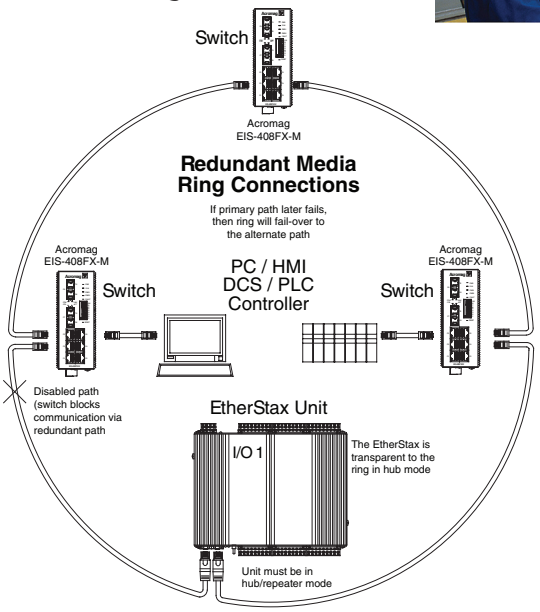
Peer-to-Peer Bi-Directional Communication



Peer-to-Peer Signal Splitter (dual outputs)



Redundant Ring Connections



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-retardent 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, ANSI/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 ENV50204.

Electrical Fast Transient Immunity (EFT)
Meets EN61000-4-4.

Conducted RF Immunity (CRFI)
Meets EN61000-4-6.

Surge Immunity
Meets EN61000-4-5.

Emissions
Meets EN61000-6-4:2007.

Radiated Frequency Emissions
Meets CISPR16 Class A

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 IEC60068-2-27.

Random Vibration: 5g sinusoidal & 5 grms random vbration 10-500Hz, in 3 axes at 2 hrs/axis per IEC60068-2-64 & IEC60068-2-6.

◆ 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.

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

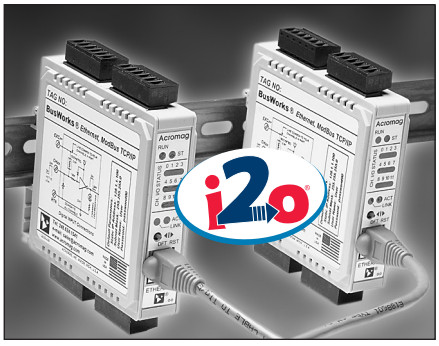
Easy Peer-to-Peer Communication with Acromag i2o®

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.



BusWorks 900EN Series I/O Modules

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.

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

EtherStax I/O® also supports i2o

Ethernet I/O: EtherStax® Series

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

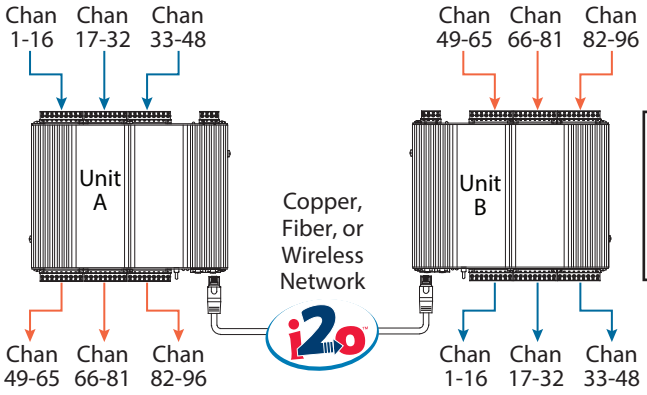
ES2152
16 analog current inputs,
16 analog voltage or microBlox™ uB inputs,
16 analog voltage or microBlox™ uB outputs

◆ Discrete I/O Modules

ES2113
96 solid-state input/outputs

ES2117
32 solid-state inputs
16 relay outputs

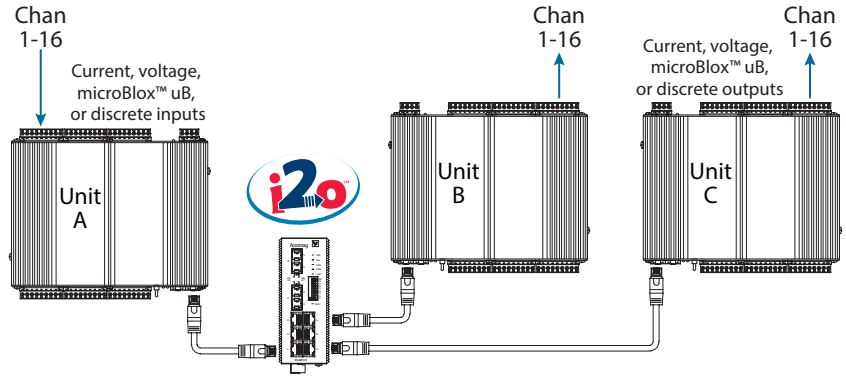
Installation #1: Peer-to-Peer Bi-directional Communication



NOTE: Buy modules in pairs. For example:

AI with AO
AIO with AIO
DIO with DIO

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



i2o® Configuration Page

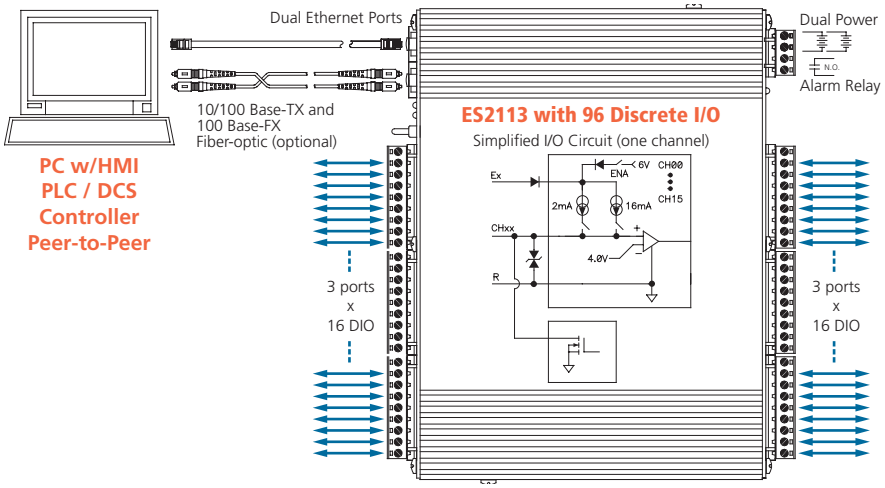
Port Number	% Span Change	Update Time(100mS)	Map To IP Address	Map To Holding Register	Mapping Method	Map To Internal Outputs
Port 1 Voltage	0.0 0.0	150 0	128.1.1.102 0.0.0.0	40351 0	○ Unipolar to Unipolar ○ Bipolar to Unipolar ○ Bipolar to Bipolar ◉ Unipolar to Bipolar	◉ NO ○ YES
Port 2 Voltage	0.0 0.0	0 0	0.0.0.0 0.0.0.0	0 0	○ Unipolar to Unipolar ○ Bipolar to Unipolar ◉ Bipolar to Bipolar ○ Unipolar to Bipolar	◉ NO ○ YES
Port 1 Current	0.0 0.0	0 0	0.0.0.0 0.0.0.0	0 0	○ Unipolar to Unipolar ○ Bipolar to Unipolar ◉ Bipolar to Bipolar ○ Unipolar to Bipolar	
Port 2 Current	0.0 0.0	0 0	0.0.0.0 0.0.0.0	0 0	○ Unipolar to Unipolar ○ Bipolar to Unipolar ◉ Bipolar to Bipolar ○ Unipolar to Bipolar	

Analog I/O module (ES2152) configuration screen

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

ES2113 Ethernet Discrete I/O Modules



96 bi-directional discrete I/O channels ◆ Modbus TCP/IP, i20 peer-to-peer communication

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

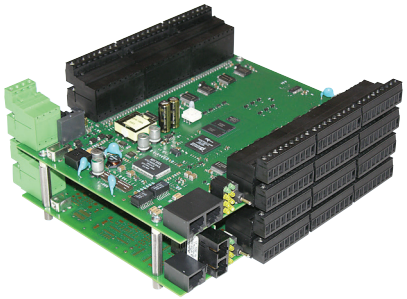
Output Range
0 to 28V DC (0.5A/ch) low-side switches

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.

Acromag
THE LEADER IN INDUSTRIAL I/O

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 @ 24VDC/250VAC, 6000 cycles resistive.
3A @ 24VDC/250VAC, 100,000 cycles general.
2A @ 24VDC/250V AC, Hazardous locations

Maximum Switching Voltage
250VAC, 125VDC.

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).
Without enclosure: 7.920" x 1.875" x 7.25".
1.65 lbs. (0.75 kg) packed (unit weighs 1.05 lbs).

Safety Approvals
UL/cUL Listed.

Hazardous Locations: Class 1; Div. 2; A B C D.
Open board units: UL Recognized

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 IEC60068-2-27.

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.
Dual copper ports: 2.5W with external excitation, 3.5W with internal excitation.
Fiber optic units: Call factory.

Isolation
I/O, power, relay and Ethernet port-to-port.
Peak: 1500V AC, ANSI/ISA-82.01-1988
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 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 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.

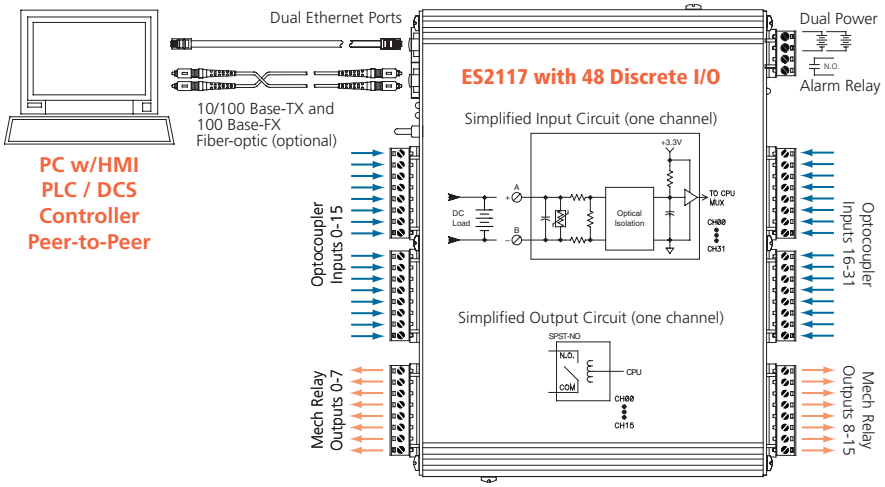
Hardware Accessories and Power Supplies
See Page 34.

Software Support
See Page 36.

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

ES2117 Ethernet Discrete I/O Modules



48 Channel-Isolated Discrete I/O (32 DC inputs, 16 AC/DC outputs) ◆ Modbus TCP/IP, i20 peer-to-peer

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

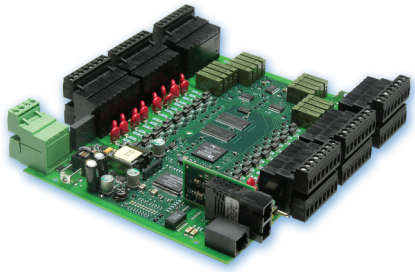
Output Range
Outputs: 2A @ 250V AC or 110V DC SPST
Alarm: 2A @ 240V AC or 125V DC SPST

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.

Acromag
THE LEADER IN INDUSTRIAL I/O

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
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 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.

Environmental

Operating and Storage Temperature*
Operating: -40 to 65°C
Storage: -40 to 85°C (-40 to 185°F)

Power Requirements
18-36V DC. Redundant, diode-coupled terminals.
4.7W (copper ports), 6.0W (fiber-optic ports).

Isolation
I/O, power, relay and Ethernet port-to-port.
Peak: 1500V AC, ANSI/ISA-82.01-1988.
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, IP20 enclosure

ES2117-0010
20-36V DC inputs, two Cu ports, open board

ES2117-1000
20-36V DC inputs, Cu & fiber ports, IP20

ES2117-1010
20-36V DC inputs, Cu & fiber ports, open board

Accessories

Industrial Ethernet Switches
See Page 33.

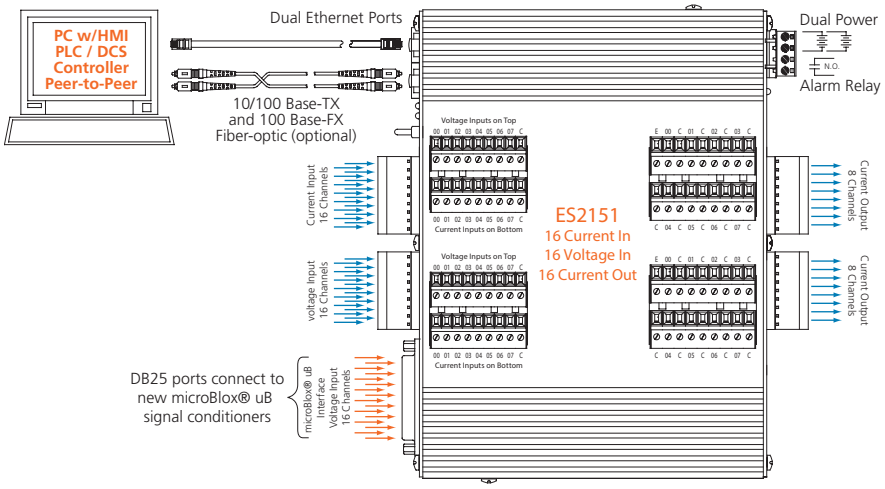
Hardware Accessories and Power Supplies
See Page 34.

Software Support
See Page 36.

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

ES2151 Ethernet Analog Input/Output Modules



32 analog current/voltage inputs ◆ 16 analog current outputs ◆ Modbus TCP/UDP, i2o 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. The ES2151 also provides 16 analog current 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.

Interface to microBlox® uB signal conditioning modules.

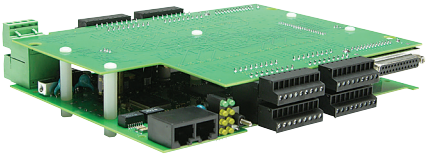
Input Ranges
±5V, ±10V, ±20mA, 0-20mA, 4-20mA DC

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



Open circuit board versions are also available.

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

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

Acromag®
THE LEADER IN INDUSTRIAL I/O

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 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 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.

◆ 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.

◆ 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
I/O, power, relay and Ethernet port-to-port.
Peak: 1500V AC, ANSI/ISA-82.01-1988.
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

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.

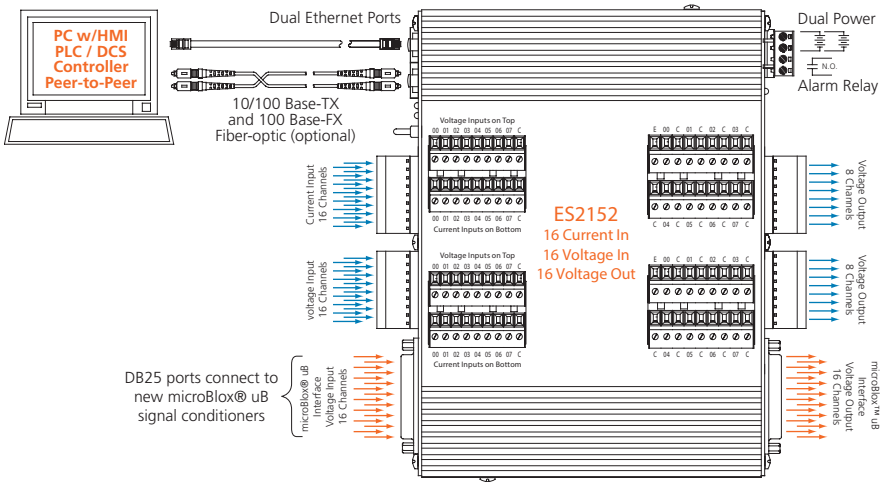
Hardware Accessories and Power Supplies
See Page 34.

Software Support
See Page 36.

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

ES2152 Ethernet Analog Input/Output Modules



32 analog current/voltage inputs ◆ 16 analog voltage outputs ◆ Modbus TCP/UDP, i2o 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. 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.

Interface to microBlox® uB signal conditioning modules.

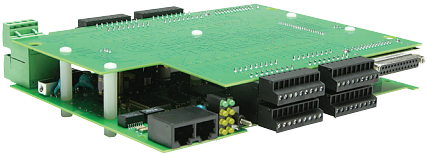
Input Ranges
±5V, ±10V, ±20mA, 0-20mA, 4-20mA DC

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
i2o peer-to-peer

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

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



Open circuit board versions are also available.

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

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

Acromag®
THE LEADER IN INDUSTRIAL I/O

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 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
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.

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
I/O, power, relay and Ethernet port-to-port.
Peak: 1500V AC, ANSI/ISA-82.01-1988
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.

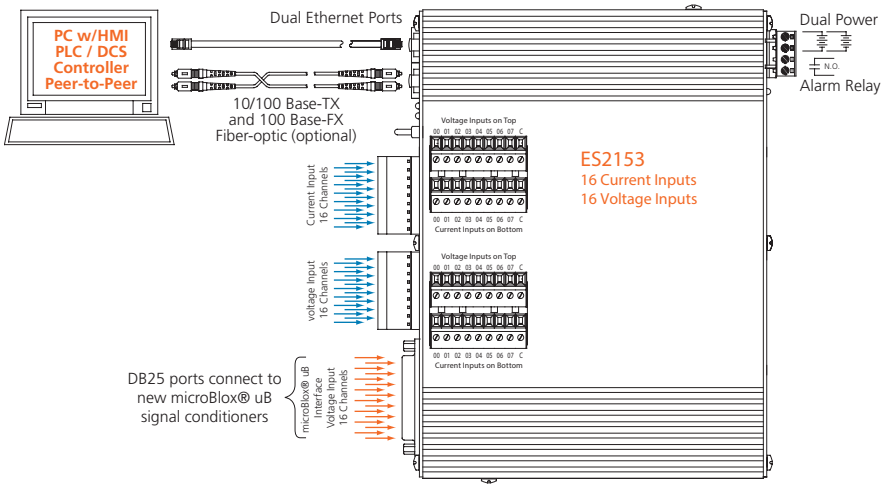
Hardware Accessories and Power Supplies
See Page 34.

Software Support
See Page 36.

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

ES2153 Ethernet Analog Input Modules



32 analog inputs (16 current + 16 voltages) ◆ 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.

Interface to microBlox® uB signal conditioning modules.

Input Ranges

±5V, ±10V, ±20mA, 0-20mA, 4-20mA DC

Ethernet Communication

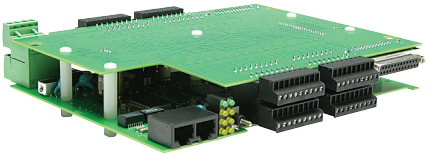
10/100Base-T(X) and 100Base-FX,
Automatic MDI/MDI-X on all copper ports,
Modbus TCP/IP or UDP/IP protocol
i2o peer-to-peer

Power Requirement

18 to 36V DC (redundancy-ready)

Approvals

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



Open circuit board versions are also available.

Select from more than 100 microBlox® uB input modules.

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

Acromag®
THE LEADER IN INDUSTRIAL I/O

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 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

◆ 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, 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.
4.8W (copper ports), 5.8W (fiber-optic ports).

Isolation
I/O, power, relay and Ethernet port-to-port.
Peak: 1500V AC, ANSI/ISA-82.01-1988.
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.

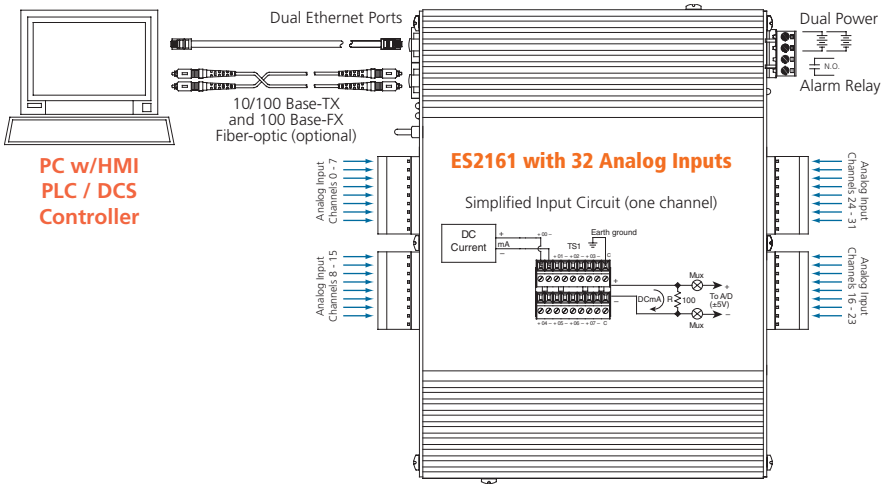
Hardware Accessories and Power Supplies
See Page 34.

Software Support
See Page 36.

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

ES2161 Ethernet Analog Input Modules



32-channel differential analog current input ◆ Modbus TCP/IP or UDP/IP 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 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

Acromag® THE LEADER IN INDUSTRIAL I/O

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 Suppressers (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.
Peak: 1500V AC, ANSI/ISA-82.01-1988
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; 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

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.

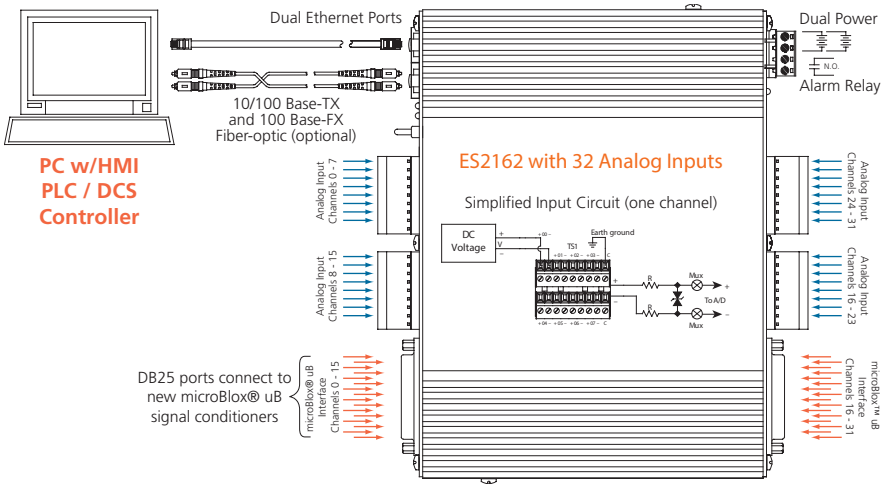
Hardware Accessories and Power Supplies
See Page 34.

Software Support
See Page 36.

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

ES2162 Ethernet Analog Input Modules



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

Interface to microBlox® uB signal conditioning modules.

Input Ranges

±5V, ±10V DC

uB Signal Conditioner Interface

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

Ethernet Communication

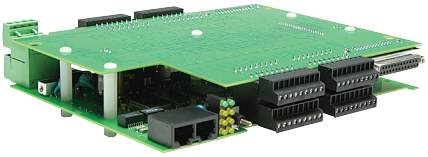
10/100Base-T(X) and 100Base-FX,
Automatic MDI/MDI-X on all copper ports,
Modbus TCP/IP or UDP/IP protocol

Power Requirement

18 to 36V DC (redundancy-ready)

Approvals

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



Open circuit board versions are also available.

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

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

Acromag
THE LEADER IN INDUSTRIAL I/O

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%
Accuracy: Better than 0.02% of range

Input Impedance
Greater than 1M 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-ch. group adds 590µS to update time.

Sample Averaging
0 to 500 samples, user-configurable.

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

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 SCMXCA006 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.
10-32V DC: Model uBDC-1 power supply.
AC power: Model PS5R-B05 or PWR-4505.

microBlox® uB Input Isolation (CMV Input-to-Output)
1500Vrms channel-to-channel isolation.

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.
4.4W (copper ports), 5.5W (fiber-optic ports).

Isolation
I/O, power, relay and Ethernet port-to-port.
Peak: 1500V AC, ANSI/ISA-82.01-1988
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; 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

ES2162-0000
ES2162-0010
Voltage inputs, two copper ports.
IP20 enclosure (-0000) or open board (-0010).

ES2162-1000
ES2162-1010
Voltage inputs, one copper and one fiber port.
IP20 enclosure (-1000) or open board (-1010).

Accessories

microBlox® uB Modules and Backpanels
See Page 32.

Industrial Ethernet Switches
See Page 33.

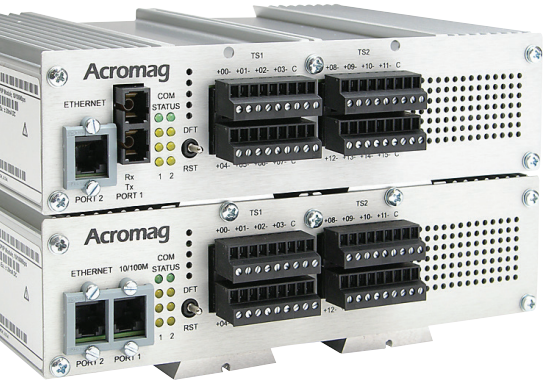
Hardware Accessories and Power Supplies
See Page 34.

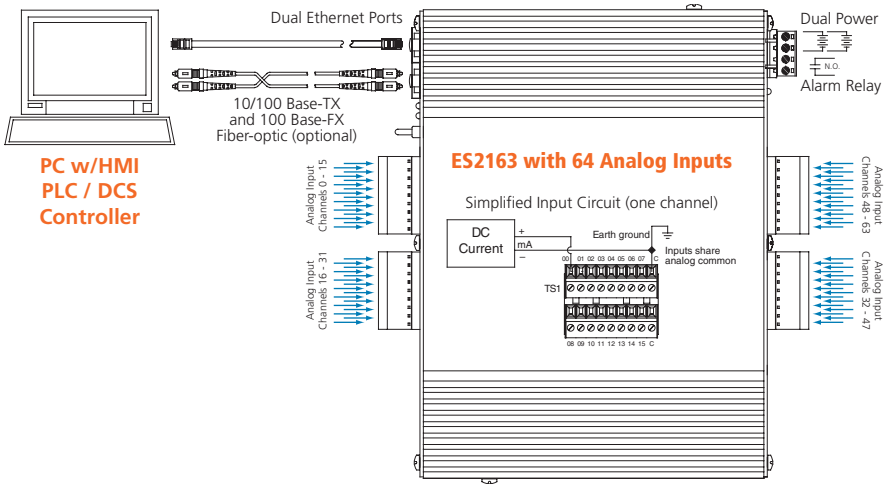
Software Support
See Page 36.

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

ES2163 Ethernet Analog Input Modules





64-channel single-ended analog current input ◆ Modbus TCP/IP or UDP/IP communication

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.

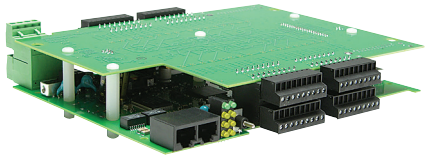
EtherStax units are built and tested to deliver high reliability and dependable performance in hostile environments. Many features help increase reliability, improve performance and protect from harsh environments. Available in an aluminum enclosure or as an open circuit board, both formats stack vertically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



Open circuit board versions are also available.

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

Acromag® THE LEADER IN INDUSTRIAL I/O

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 MDI/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.
Peak: 1500V AC, ANSI/ISA-82.01-1988
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.

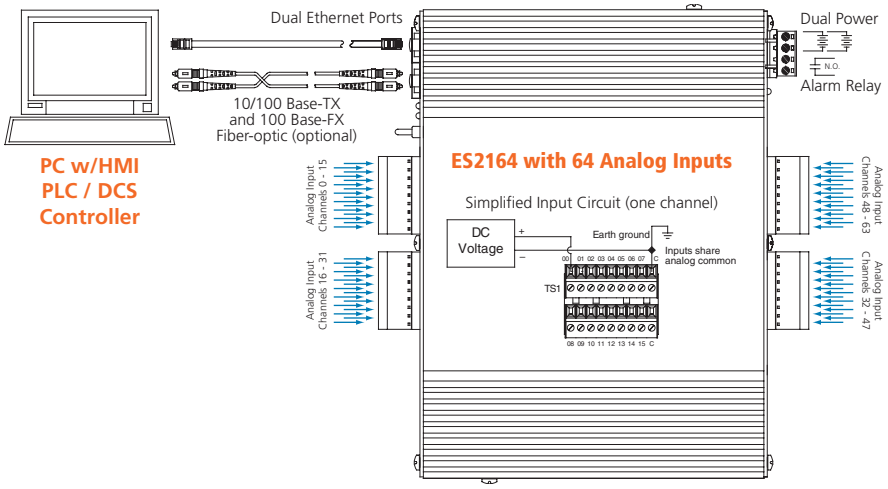
Hardware Accessories and Power Supplies
See Page 34.

Software Support
See Page 36.

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

ES2164 Ethernet Analog Input Modules



64-channel single-ended analog voltage input ◆ Modbus TCP/IP or UDP/IP communication

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.

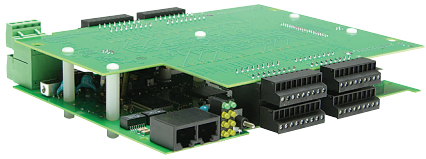
EtherStax units are built and tested to deliver high reliability and dependable performance in hostile environments. Many features help increase reliability, improve performance and protect from harsh environments. Available in an aluminum enclosure or as an open circuit board, both formats stack vertically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



Open circuit board versions are also available.

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

Acromag® THE LEADER IN INDUSTRIAL I/O

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 ±30,000.

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
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 MDI/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
I/O, power, relay and Ethernet port-to-port.
Peak: 1500V AC, ANSI/ISA-82.01-1988.
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.

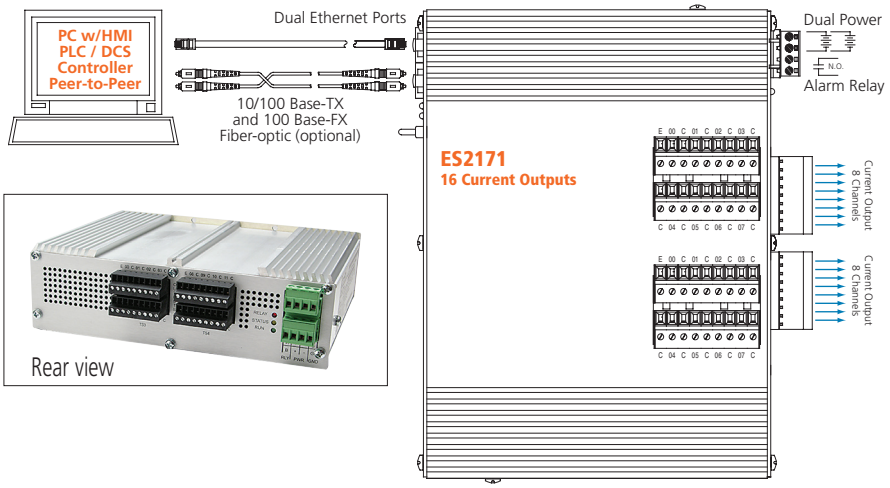
Hardware Accessories and Power Supplies
See Page 34.

Software Support
See Page 36.

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

ES2171 Ethernet Analog Output Modules



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.

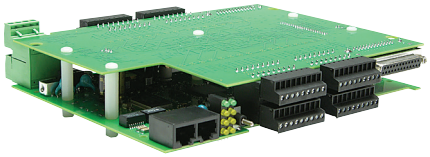
EtherStax units are built and tested for high reliability and dependable performance in hostile environments. Available in an aluminum enclosure or as an open circuit board, both formats stack vertically to maintain a very small footprint.

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



Open circuit board versions are also available.

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).

Acromag
THE LEADER IN INDUSTRIAL I/O

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
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.

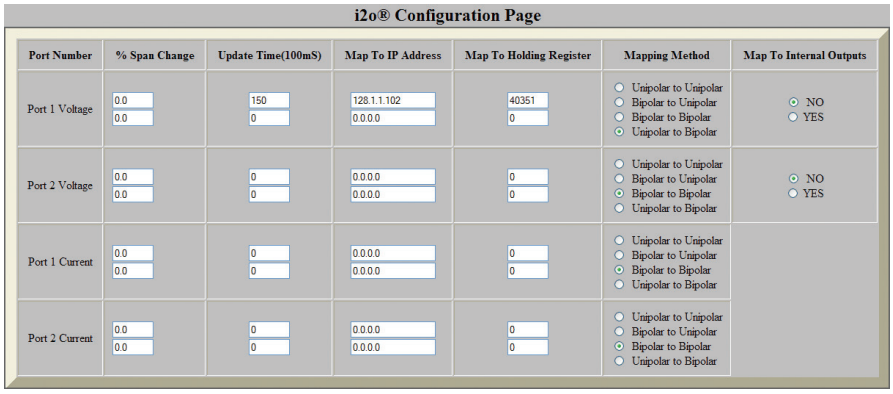
Network Connector (100 Base-FX Fiber-optic)
One multi-mode with SC connector. 2km communication distance. Full/half-duplex, selectable.

Protocols
Modbus TCP/IP, UDP/IP, i2o peer-to-peer.

Addressing
StaticIP, DHCP.

Ethernet Modbus TCP/IP Sockets/Sessions
1-10 socket/sessions user-configurable.

Ethernet Redundancy
Compatible with STP, RSTP, or any ring scheme.



Example i2o peer-to-peer mapping configuration screen from input source module (ES215x model).

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.
Peak: 1500V AC, ANSI/ISA-82.01-1988.
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.

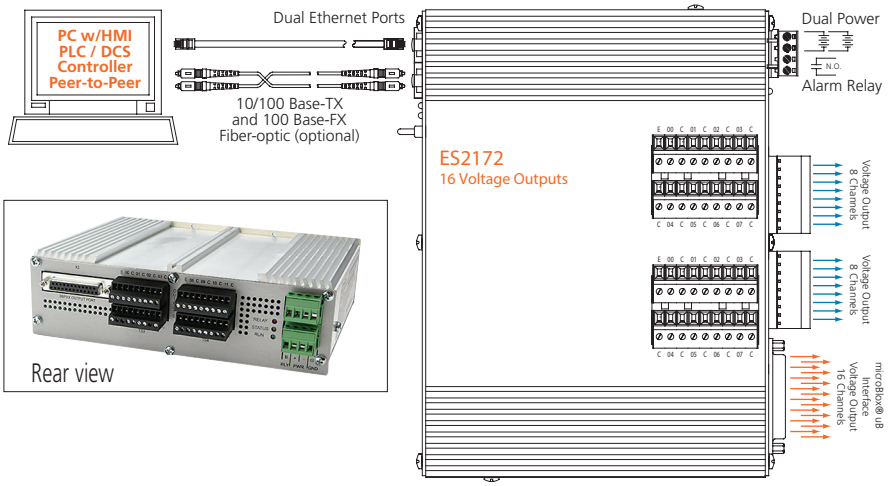
Hardware Accessories and Power Supplies
See Page 34.

Software Support
See Page 36.

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

ES2172 Ethernet Analog Output Modules



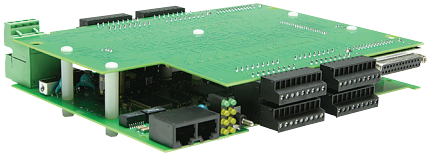
16 analog voltage outputs ◆ Modbus TCP/IP, UDP/IP, i2o® peer-to-peer communication

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 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
i2o peer-to-peer

Power Requirement

18 to 36V DC (redundancy-ready)

Approvals

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

Interface to isolated microBlox® uB analog output modules.

Select from a dozen microBlox® uB output modules.

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).

Acromag® THE LEADER IN INDUSTRIAL I/O

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.

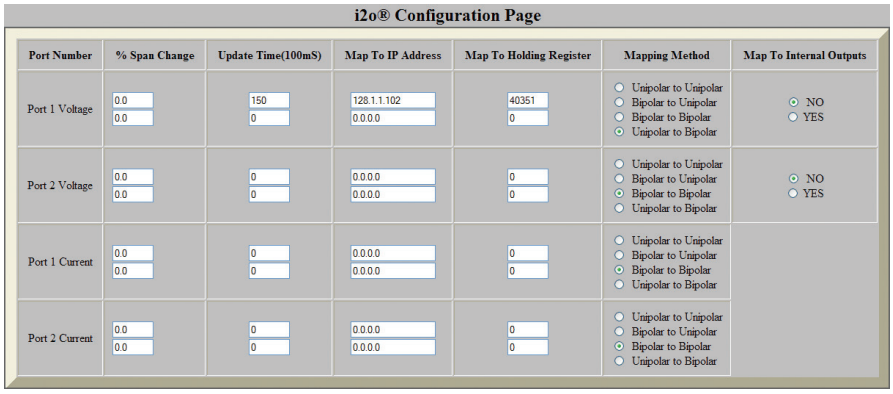
Network Connector (100 Base-FX Fiber-optic)
One multi-mode with SC connector. 2km communication distance. Full/half-duplex, selectable.

Protocols
Modbus TCP/IP, UDP/IP, i2o peer-to-peer

Addressing
StaticIP, DHCP

Ethernet Modbus TCP/IP Sockets/Sessions
1-10 socket/sessions user-configurable

Ethernet Redundancy
Compatible with STP, RSTP, or any ring scheme.



Example i2o peer-to-peer mapping configuration screen from input source module (ES215x model).

◆ 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.
Peak: 1500V AC, ANSI/ISA-82.01-1988
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

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.

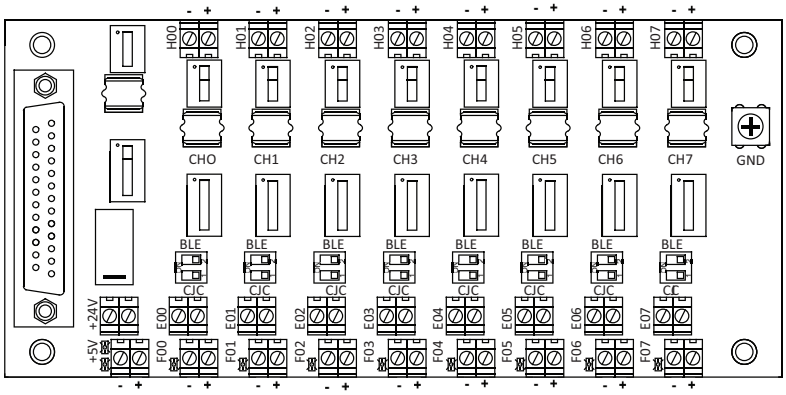
Software Support
See Page 36.

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

microBlox® Signal Conditioning Modules

Bluetooth®



High-density isolation amplifiers ◆ Parallel interface connects to Ethernet Analog Input 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

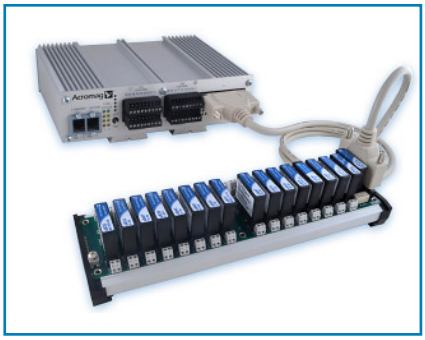
Ordering Information

◆ 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



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

Acromag® THE LEADER IN INDUSTRIAL I/O

Ethernet I/O: EtherStax® Series

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

◆ 900EN Series Switches

◆ EIS Series Switches

◆ IMC Series, Converters

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.

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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

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

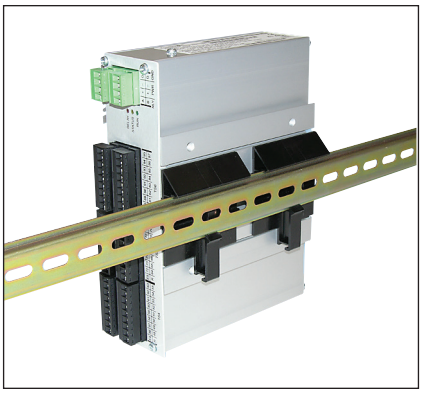
◆ **Accessories**

Hardware Accessories and Power Supplies
See Page 34.

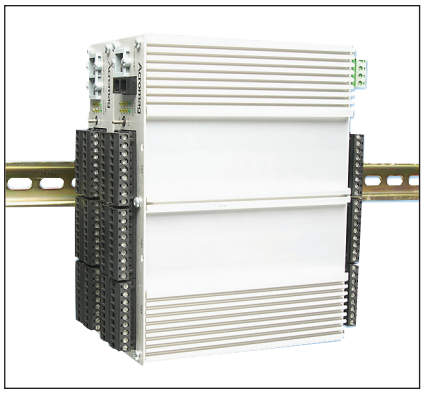
Acromag® THE LEADER IN INDUSTRIAL I/O

Mounting Mounting kits, DIN rail strips and accessories

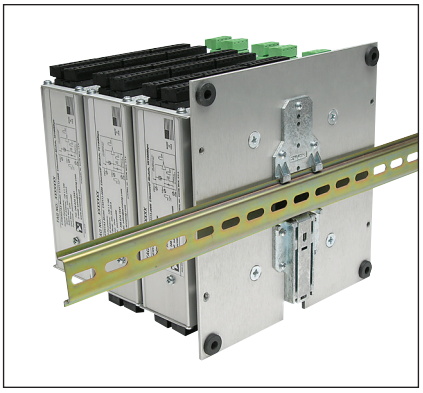
Interlocked units without mounting kit.



ESA-DIN-VMK kit (vertical terminals).

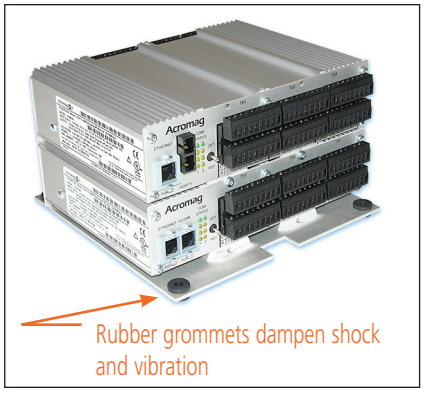


ESA-DIN-VMK supports two stacked units.

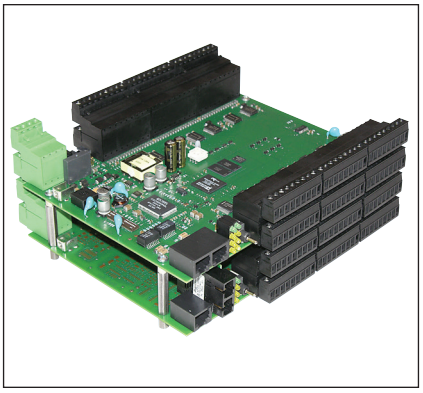


ESA-DIN-HMK kit (horizontal terminals).

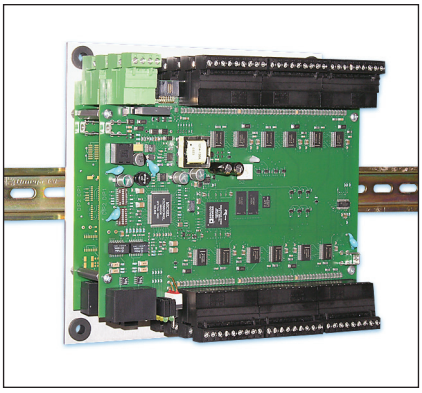
ESA-DIN-HMK supports three stacked units.



ESA-SMK surface/machine mounting kit.



ESA-OMK open board stacking kit. One kit supplies standoffs to stack two units.



Units stacked with ESA-OMK kit can mount on a DIN rail with ESA-DIN-HMK kit plate.

Side-by-side 19-inch rack mounting with ESA-DIN-HMK kit on a DIN rail.

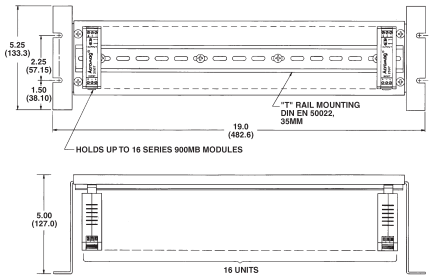
Acromag® THE LEADER IN INDUSTRIAL I/O

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.



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 16.7
DIN rail strip, Type T, 3 inches (75mm) or 16.7 inches (425mm)

ESA-DIN-HMK
DIN rail horizonal 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.

◆ 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!

Input Power Requirement
85 to 264V AC or 105 to 370V DC

Output
5V DC, 12V DC, or 24V DC
10W to 240W

Ordering Information

Visit www.acromag.com for more information.

PS5R-VB05
Power supply, 10W, 2.0A at 5V DC

PS5R-VB12
Power supply, 15W, 1.3A at 12V DC

PS5R-VB24
Power supply, 15W, 0.65A at 24V DC

PS5R-VC12
Power supply, 30W, 2.5A at 12V DC

PS5R-VC24
Power supply, 30W, 1.3A at 24V DC

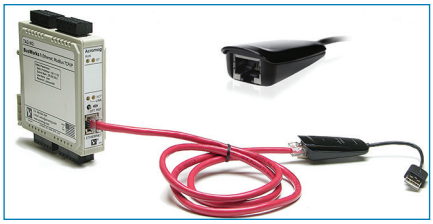
PS5R-VD24
Power supply, 60W, 2.5A at 24V DC

PS5R-VE24
Power supply, 90W, 3.75A at 24V DC

PS5R-VF24
Power supply, 120W, 5A at 24V DC

PS5R-VG24
Power supply, 240W, 10A at 24V DC

◆ Cables and Adapters



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 3B/5B input modules to 958EN

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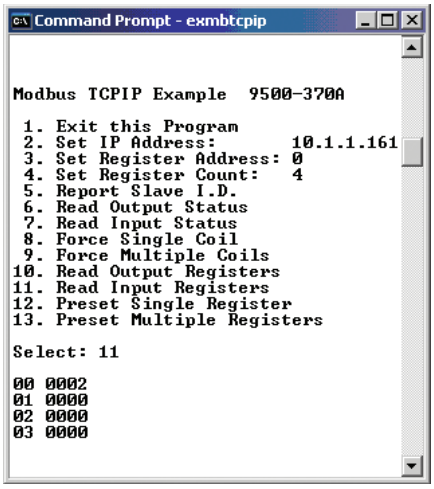
Ethernet I/O: EtherStax® Series

Software Support Application Development Tools



Integrate with HMI and SCADA Software ◆ Supports five operating systems ◆ Demo versions available

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

OPC®

Microsoft Visual C++ Visual Basic

Microsoft® .NET

activeX

Linux®

VxWorks®

QNX®

microware® OS-9

Ethernet Software Development Tools			
Model	**Description**	**Program Environment**	**Operating Systems**
ACMBTCP-OPC	Modbus TCP/IP Master OPC DA Server	HMI, SCADA, Visual Basic, C++	Windows 7, Server
AMTN-CD	Modbus TCP/IP .NET Controls	Visual Basic, C++, C#	Windows 7
AMTX-CD	Modbus TCP/IP ActiveX Controls	Visual Basic, C++, Excel	Windows 7
ESW-MBLIB	Modbus C Library of Function Routines	Visual C++	Win, Linux, VxWorks, QNX, OS-9

Ordering Information

See table for model numbers. Software is provided on CD-ROMs except ACMBTCP-OPC which is download only. For more information, visit our website.

www.acromag.com/software-support

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Notes

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