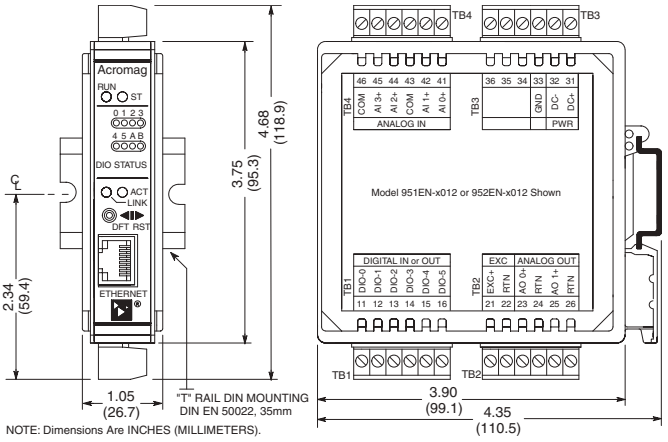
EtherNet/IP or Modbus TCP/IP



NOTE: Dimensions Are INCHES (MILLIMETERS).

Standard model includes cage clamp terminal blocks. Optional terminals are available. (see Page 26).

EtherNet/IP conformance tested

Modbus/TCP conformance tested

951EN, 952EN Combination I/O

Analog Inputs (4), Analog Outputs (2), Discrete I/O (6)

Models

951EN: Combo module, analog current inputs
952EN: Combo module, analog voltage inputs

Description

These modules provide an isolated Ethernet network interface for analog and discrete I/O signals. Multi-range analog inputs and outputs support a wide variety of industrial devices. High-resolution, low noise, A/D and D/A converters deliver high accuracy and reliability. 3-way isolation further improves system performance. The discrete I/O provide monitoring and control of on/off, high/low, or open/close industrial devices. Tandem I/O provides output level control and status verification in one unit.

The i2o function lets inputs on one module write directly to outputs on another module.

Analog Input Ranges

DC Current (user-selectable ranges)
0 to 1mA, 0 to 11mA, 0 to 20mA, 4 to 20mA
0 to 20 amps AC (with optional AC sensor)

DC Voltage (user-selectable ranges)
±1V, ±5V, ±10V DC

Analog Output Ranges

DC Current (user-selectable ranges)
0 to 1mA, 0 to 20mA, or 4 to 20mA
(0 to 625 ohm loads, typical)

Discrete I/O Range

0 to 35V DC active-high inputs
Current sourcing (high-side switched) outputs

Network Communication

EtherNet/IP or Modbus TCP/IP 10/100 network

Power Requirement

15 to 36V DC supply (3.3 Watts) required

Approvals

CE marked. UL, cUL listed.
Class I; Division 2; Groups A, B, C, D.
EtherNet/IP, Modbus/TCP conformance tested.

Special Features

- Configurable from standard web browser
- EtherNet/IP or Modbus TCP/IP communication with automatic 10/100Mbps negotiation
- i2o technology for peer-to-peer communication without a network controller (see Page 14)
- Multi-function, multi-channel stand-alone module is very economical
- High-resolution 16-bit Σ–Δ A/D and D/A converters ensure precise measurements
- 0-35V DC solid-state logic interface can monitor or control a wide variety of devices
- Discrete I/O channels are individually configurable as inputs or outputs in any combination
- Bi-directional discrete I/O facilitates read-back monitoring of the output state
- Built-in 5.6K ohm pull-down SIP resistors (socketed)
- Selectable failsafe modes (0%, off, last-state, or pre-defined) help prevent unsafe conditions
- Compact packaging with pluggable terminals saves space and simplifies wiring
- Wide operational temperature range permits installation in extreme environments

Performance

General Specifications

See Page 17 for communication and other specs.

Analog Input

Configuration
Four input channels. Input range is selectable as a 4-channel group.

Accuracy
Better than ±0.05% of span (0.1% for 0-1mA range), typical. Accuracy near or below 0mA or 0V is degraded if input COM shares AO/DIO RTNs.

Analog to Digital Converter (A/D)
16-bit Σ–Δ converter.
Resolution: 0.005% or 1 part in 20000.

Noise Rejection
Normal Mode: Better than 40dB @ 60Hz.
Common Mode: Better than 140dB @ 60Hz.

Input Conversion Rate
Less than 50mS per channel.

Input Impedance
DC current input (951EN): 49.9 ohms.
DC voltage input (952EN): Greater than 110.5K ohms.

Analog Output

Configuration
Two output channels. Individually selectable ranges.

Accuracy
Better than ±0.05% of span (0.1% for 0-1mA range), typical.

Digital to Analog Converter (D/A)
16-bit converter.

Current Output Compliance
12V minimum, 13V typical.

Current Output Load Resistance Range
0 to 625 ohms, typical.

Discrete Input

Input Type
Six independent, active-high, buffered inputs with a common connection. Built-in 5.6K ohm pull-down resistors socketed for 3-channel groups.

Input Signal Voltage Range
0 to 35V DC, maximum.

Input Impedance
100K ohms, typical.

Input Signal Threshold
TTL compatible with 100mV of hysteresis, typical.

Discrete Output

Output Type
Six independent, open-source, MOSFET switches.

Output Voltage and ON Resistance
Up to 35V DC max. (0 to 330mA/ch continuous).
0.15 ohms maximum ON resistance.

Environmental

Ambient Temperature and Humidity
Operating: -25 to 70°C (-13 to 158°F).
Storage: -40 to 85°C (-40 to 185°F).
Relative Humidity: 5 to 95%, non-condensing.

Isolation
1500V AC for 60 seconds or 250V AC continuous.
3-way isolation between I/O, network, and power.

Ordering Info

NOTE: i2o function is only available on Ethernet Modbus TCP/IP modules

Models

951EN-4012
Combo module, current inputs, Ethernet Modbus TCP/IP interface, i2o communication

951EN-6012
Combo module, current inputs, EtherNet/IP interface

952EN-4012
Combo module, voltage inputs, Ethernet Modbus TCP/IP interface, i2o communication

952EN-6012
Combo module, voltage inputs, EtherNet/IP interface

Accessories

See Page 26 for cables, power supplies, mounting hardware, optional terminal blocks and AC sensors.

Industrial Ethernet Switches
See Page 27

i2o™ Input-to-Output Peer-to-Peer Communication

Acromag's i2o technology allows modules to talk directly to another module across any Ethernet media without a PLC, PC, or other controller in between. Input channels on one module can write to output channels on a remote module.

General Operation and Performance Specifications

The following specifications are common to all 900EN Series I/O modules.

■ Communication

Connector
Shielded RJ-45 sockets, 8-pin, 10BaseT/100BaseTX.

Wiring
Wired MDI. 9xxEN I/O modules do NOT support auto-crossover. 900EN switch supports auto-crossover.

Protocol
EtherNet/IP or Modbus TCP/IP with web browser configuration. EtherNet/IP supports PCCC object for communication with legacy PLCs (e.g. SLC505).

IP Address
Default static IP address is 128.1.1.100.

Port
Ethernet Modbus TCP/IP models (9xxEN-4xxx):
Up to 10 Modbus TCP/IP sockets supported.
EtherNet/IP models (9xxEN-6xxx):
Up to 10 EtherNet/IP sockets and
1 Modbus TCP/IP socket.

Data Rate
Auto-sensed, 10Mbps or 100Mbps.

Duplex
Auto-negotiated, full or half-duplex.

Compliance
IEEE 802.3, 802.3u, 802.3x, Ethernet II.

Configuration
Web page for configuration and control is built-in with Ethernet access via a standard web browser.

Communication Distance
Distance between network devices is generally limited to 100 meters using recommended cable. Distances may be extended using hubs and switches.

Address
IP address is automatically acquired at startup. Unit may be configured to retrieve this address from the network server using BOOTP (Bootstrap Protocol), or via DHCP (Dynamic Configuration Protocol). A static IP address is also user-programmable. A default toggle switch sets the static IP address to the default factory address of 128.1.1.100 for initial configuration.

■ Environmental

Isolation
I/O channel, power, and network circuits are isolated from each other for common-mode voltages up to 250VAC, or 354V DC off DC power ground, on a continuous basis (will withstand 1500VAC dielectric strength test for one minute without breakdown). Complies with test requirements of ANSI/ISA-82.01-1988 for voltage rating specified.

■ Electromagnetic Compatibility (EMC)

Immunity per European Norm EN50082-1.
Emissions per European Norm EN50081-1.

Electrostatic Discharge (ESD) Immunity
Per EN61000-4-2.

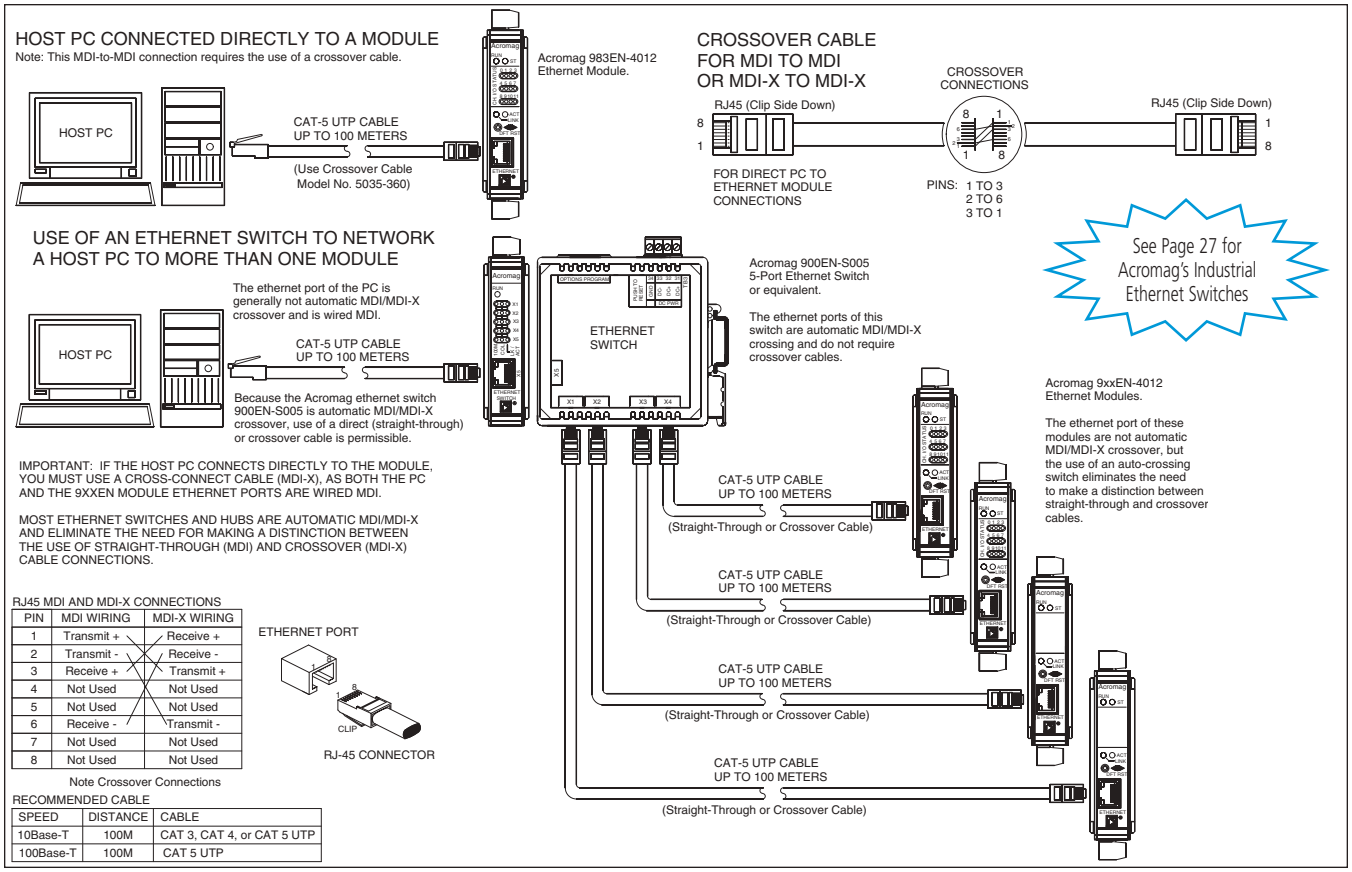
Radiated Field Immunity (RFI)
Per EN61000-4-3 and ENV50204.

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

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

Surge Immunity
Per EN61000-4-5.

Radiated Frequency Emissions
Per EN55022 Class B.



Answers@Acromag

New Feature Announcement

Ethernet i2o™ direct input-to-output communication

Introducing the easiest way to link your inputs to your outputs without a PLC, PC or master CPU
Many BusWorks® 900EN I/O modules now have the ability to operate like a long-distance transmitter. Convert your sensor inputs at Point A to process control signals at Point B. Or, monitor a discrete device at one site by reproducing the discrete level with a relay output at another location.

Use your existing Ethernet lines to save time and wiring expenses
You can connect the input modules to the 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's 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

Analog Inputs (6)
4-20mA, 0-10V DC, thermocouple, RTD/resistance

Discrete Inputs (12)
on/off, high/low, open/close, momentary push-buttons

Any Ethernet Media
Copper, fiber, or wireless radios

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

Analog Outputs (6)
proportional 4-20mA or 0-10V DC

Discrete Outputs (12)
on/off, high/low, open/close

More information on reverse side.

Acromag®
THE LEADER IN INDUSTRIAL I/O

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www.acromag.com • e-mail: sales@acromag.com

Ethernet i2o communication

900EN Series Modules with i2o

Analog Input Modules
961EN-4006
6 differential current inputs

962EN-4006
6 differential voltage inputs

965EN-4006
6 thermocouple/mV inputs

966EN-4006
6 RTD/resistance inputs

Analog Output Modules
972EN-4004/4006
4 or 6 current outputs

973EN-4004/4006
4 or 6 voltage outputs

Discrete I/O Modules
982EN-4012
12 solid-state relay outputs

983EN-4012
12 solid-state input/outputs

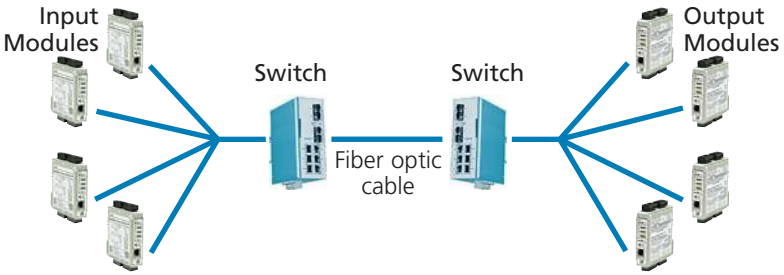
Combo Modules
951EN-4012, 952EN-4012
4 analog inputs, 2 analog outputs, 6 discrete I/O

Installation #1: Copper Ethernet network

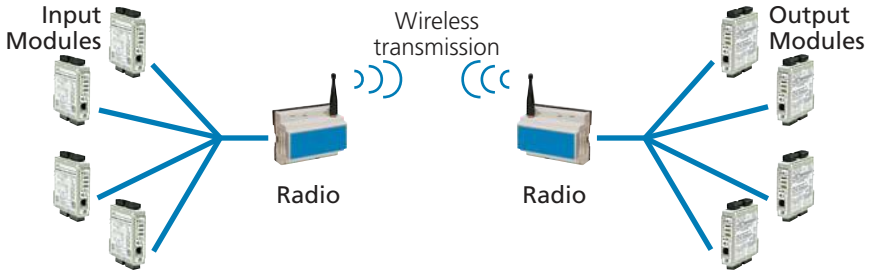
NOTE: Buy modules in pairs. For example:

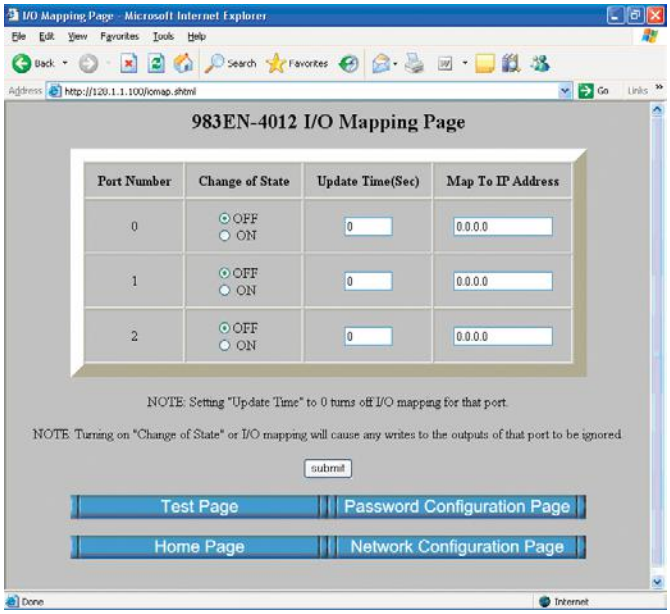
AI with AO
DIO with DO or DIO
Combo with Combo

Installation #2: Fiber optic connection

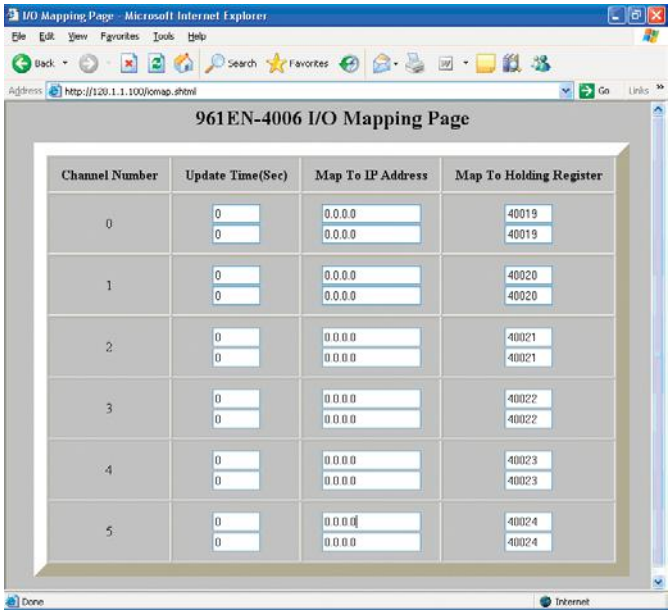


Installation #3: Wireless connection (telemetry systems)





Discrete I/O Module configuration screen



Analog Input Module configuration screen

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