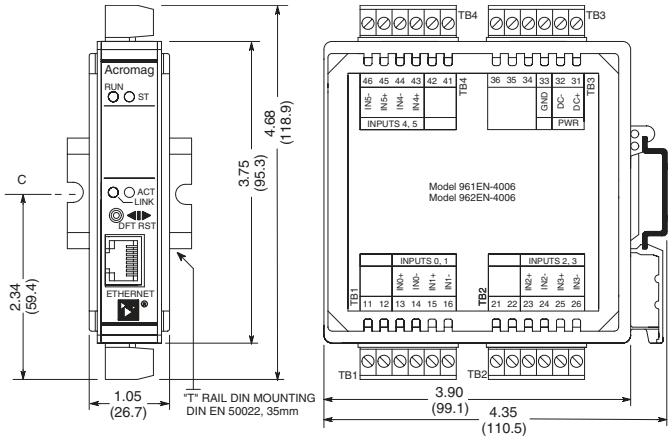
EtherNet/IP, Modbus TCP/IP





Standard model includes cage clamp terminal blocks. Optional terminals are available (see Page 24).

EtherNet/IP™ conformance tested

Modbus/TCP conformance tested

961EN, 962EN Analog Input

6-Channel Differential Input: DC Current or DC Voltage Signals

Models

961EN: 6 DC current input channels
962EN: 6 DC voltage input channels

Description

These modules provide an isolated Ethernet network interface for six analog input channels. Differential inputs eliminate ground loops and thus the need for isolators in many applications. Multi-range inputs accept signals from a variety of sensors and devices. High-resolution, low noise, A/D converters deliver high accuracy and reliability.

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)
±78mV to ±10V DC (eight range options)

Network Communication

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

Power Requirement

15 to 36V DC supply (2 Watts) required

Approvals

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

Special Features

- Configurable from standard web browser
- EtherNet/IP or Modbus TCP/IP communication with auto 10/100Mbps data rate negotiation
- 6-input stand-alone module is very economical
- Differential inputs eliminate ground loops
- Universal inputs support a variety of sensors
- High-resolution 16-bit Σ–Δ A/D converters ensure precise, high accuracy measurements
- Compact packaging with pluggable terminals saves space and simplifies wiring
- Wide operational temperature range permits installation in extreme environments

Performance

General Specifications

See Page 15 for communication and other specs.

Input

Configuration
Input ranges are selectable for a 3-channel group.

Accuracy
Better than ±0.05% of span for nominal input ranges.

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 Filter Bandwidth
-3dB at 3Hz, typical.

Input Conversion Rate
80mS per channel.

DC Current Input Impedance
25 ohms.

DC Voltage Input Impedance
Greater than 110.5K ohms.

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

Models

961EN-4006
Current input module, 6-ch, Modbus TCP/IP interface

961EN-6006
Current input module, 6-ch, EtherNet/IP interface

962EN-4006
Voltage input module, 6-ch, Modbus TCP/IP interface

962EN-6006
Voltage input module, 6-ch, EtherNet/IP interface

Accessories (See Pages 22-24)

900EN-S005
Ethernet switch, 5-port

5020-350
AC current sensor. Used with 961EN DC current input models. One sensor per channel is required.

5035-355
Ethernet cable, CAT5, 3 feet long

5035-360
Ethernet crossover cable, CAT5E, 5 feet long, shielded

PS5R-D24
Power supply (24V DC, 2.1A).

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
Mobus TCP/IP models (9xxEN-4xxx):
Up to 10 Mobus 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.

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.

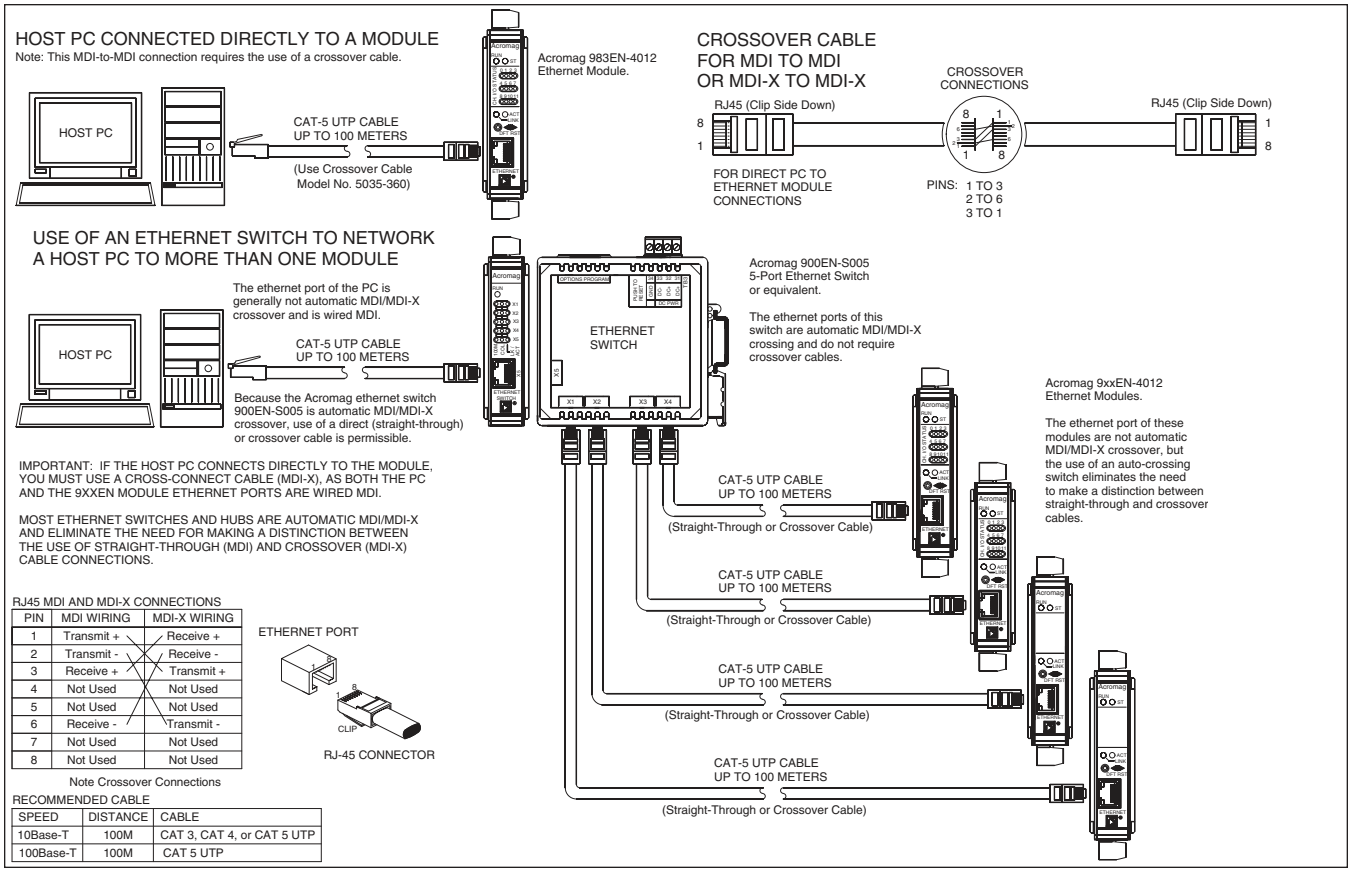
Radiated Field Immunity (RFI)
Per EN61000-4-3 and ENV50204.

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.

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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

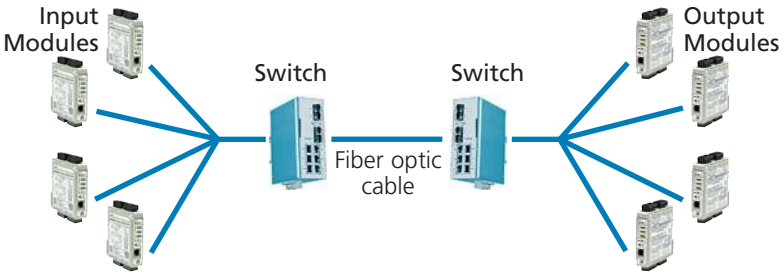
Installation #1: Copper Ethernet network



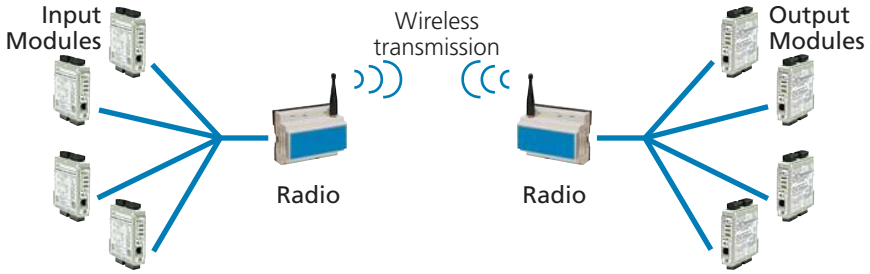
NOTE: Buy modules in pairs. For example:

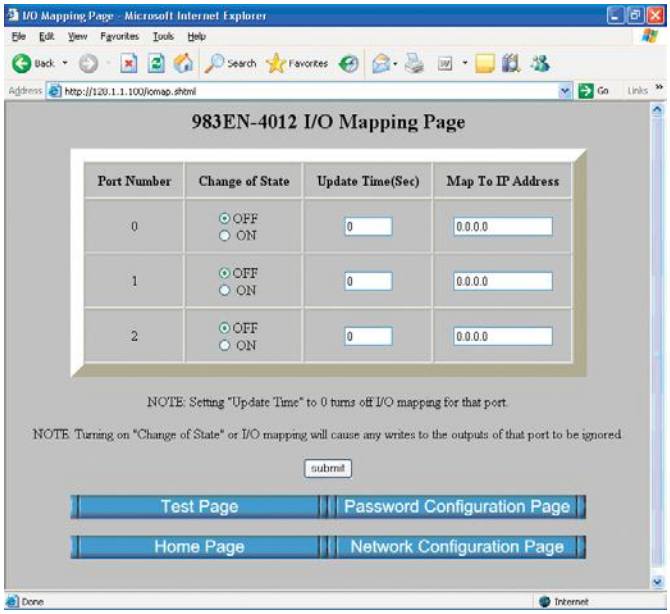
AI with AO
DIO with DO or DIO
Combo with Combo

Installation #2: Fiber optic connection

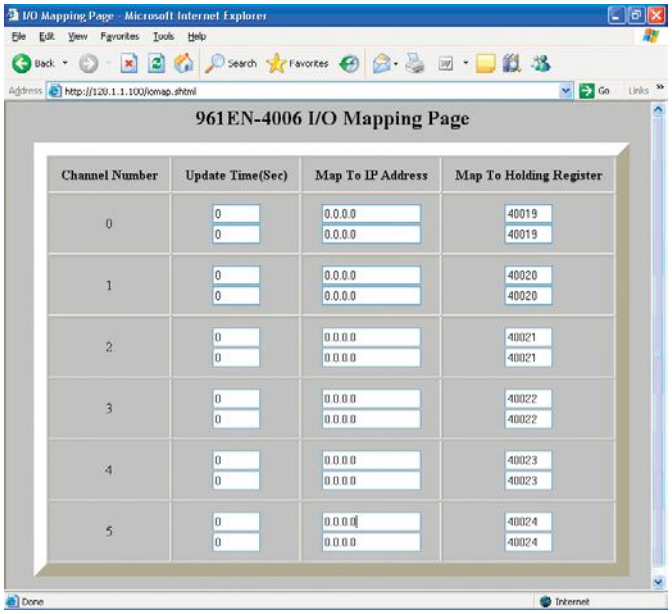


Installation #3: Wireless connection (telemetry systems)





Discrete I/O Module configuration screen



Analog Input Module configuration screen

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