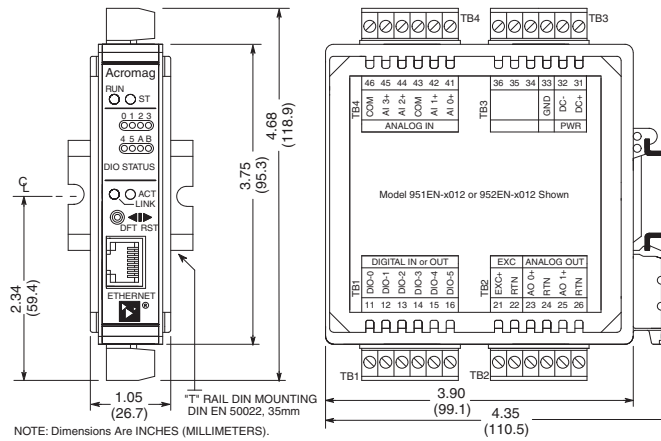


# Ethernet I/O: BusWorks® Series

951EN, 952EN Ethernet Analog and Discrete I/O Modules



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

**EtherNet/IP™**  
conformance tested

**Modbus/TCP**  
conformance tested

4 analog inputs, 2 analog outputs, 6 discrete I/O channels ♦ Ethernet/IP, Modbus TCP/IP, i2o peer-to-peer

## Description

### Models

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

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

## Key Features & Benefits

- 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 6)
- Multi-function, multi-channel stand-alone module is very economical
- High-resolution 16-bit  $\Sigma$ - $\Delta$  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

**Acromag** <sup>®</sup>  
THE LEADER IN INDUSTRIAL I/O

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## Performance Specifications

### ◆ General Specifications

See Page 9 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 Information

*NOTE: i2o function only on Modbus TCP/IP modules*

### ◆ I/O Modules

#### 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

#### Industrial Ethernet Switches

See Page 25.

#### Hardware Accessories and Power Supplies

See Page 26.

#### Software Support

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.