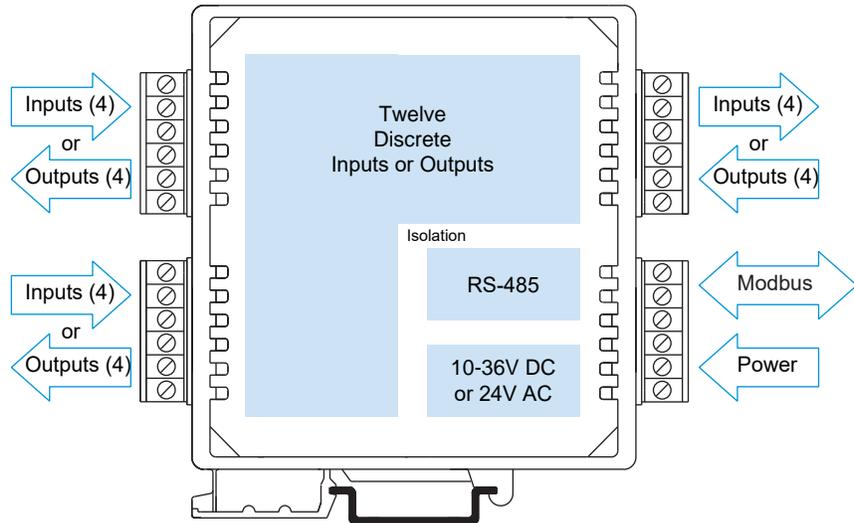




## Modbus/RS-485



## High-Density Discrete I/O Module



## 901/902/903MB Multi-Channel Discrete I/O Modules

### Active-Low Inputs Sinking Outputs (Low-Side Switching)

#### Models

- 901MB: 12 input channels
- 902MB: 12 output channels
- 903MB: 12 input/output channels

#### Input

Twelve input channels (901, 903 models only)  
0 to 35V DC

#### Output

Twelve output channels (902, 903 models only)  
0 to 35V DC

#### Network Communication

Modbus-RTU high-speed RS-485

#### Power Requirement

10 to 36V DC,  
24V AC

#### Approvals

CE marked. UL, cUL listed  
Class I; Division 2; Groups A, B, C, D.

### Description

These modules provide twelve discrete input and/or output channels. Isolation separates the I/O, power, and network circuits. Network communication adheres to the industry-standard RS-485 Modbus RTU protocol. Both AC and DC power sources are supported with wide range, nonpolarized, diode-coupled terminals.

The open-drain outputs are intended for current-sinking or low-side switching applications. The buffered inputs are active-low. These models are the complement of the 904, 905, and 906 units which have open-source, high-side output switches and active-high inputs. Socketed pull-up resistors are easily removed or exchanged to satisfy your application requirements.

The 903MB model has twelve input/output points that may be used as inputs or outputs on a bit-by-bit basis. Outputs may be read back to verify output settings.

Combining flexible I/O types, wide I/O ranges, and a network interface in a single package, makes this instrument extremely powerful. Multi-channel design adds cost-efficiency and allows high-density mounting. Plus, safe, rugged construction makes these modules reliable for use in both control room and distributed field I/O applications. Custom module configurations are also possible (consult factory for details).

### Special Features

- Standard Modbus RTU protocol with high-speed RS-485 communication (up to 115K bps)
- Twelve I/O channels in a single inch-wide unit reduces system costs and saves panel space
- High-voltage, high-current, open-drain outputs enable direct (low-side) control of external devices
- High-voltage buffered inputs monitor discrete levels from a variety of industrial devices
- Tandem input/output circuitry (903 models only) connects input buffers with open-drain outputs for convenient loopback monitoring of the output state
- Outputs have built-in over-temperature and over-current shut-down protection, plus active clamping circuits for switching inductive loads
- Watchdog timers provide a configurable failsafe output state for use when host I/O communication is lost
- Three-way isolation eliminates potential ground loops between power, I/O, and network circuitry
- Self-diagnostics monitor microcontroller activity to detect operational failures (lock-up) and execute a reset to restore communication



## Performance

### Discrete Inputs (901 & 903 models only)

#### Input Type

12 active-low, buffered inputs, with a common connection. Inputs include transient suppression devices and series connected 100K ohm resistors, plus diode over-voltage clamps to the internal +5V supply.

#### Input Signal Voltage Range

0 to 35V DC, maximum.

#### Input Current

293µA, typical at 35V DC.

#### Input Signal Threshold

TTL compatible with 100mV of hysteresis, typical. Low-to-High threshold is 1.7VDC, High-to-Low is 1.6VDC, typical. Limited to TTL levels of 0.8VDC (max. LOW level) and 2.0VDC (min. HIGH level).

#### Input Resistance

100K ohms, typical.

#### Input Hysteresis

100mV DC, typical.

### Discrete Outputs (902 & 903 models only)

#### Output Type

12 independent, open-drain, DMOS MOSFET switches with a common source connection that operate as low-side switches.

#### Output Voltage Range

0 to 35V DC max. (0 to 500mA/channel continuous). External voltage source required.

#### Output ON Resistance

0.28 ohms maximum.

#### Output Response Time

Force Single Coil: Output updates within 250µs of receipt of a command.

Force Multiple Coils: First coil updates in 250µs, followed successively by additional coils every 180µs.

## General

### I/O Pull-ups and Socket

5.6K ohm pull-up resistor SIPs are installed in sockets at each port (four-channels per port).

### Excitation (per port)

External excitation voltage for each four-channel port is limited to 35V or less.

### Supported Modbus Commands

The command/response protocol for communicating with this module adheres to the Modbus/RTU standard for the following Modbus Functions.

- Read Coil (Output) Status
- Read Input Status
- Read Holding Registers
- Force Single Coil (Output)
- Preset Single Register
- Reset Slave
- Force Multiple Coils (Outputs)
- Preset Multiple Registers
- Report Slave ID

### LED Indicators

LEDs indicate power, status, and discrete level.

### Power Requirements

10 to 36V DC,  
22 to 26V AC.

### Supply Current

Supply	Current Draw
10V DC	130mA maximum
24V DC	54mA maximum
24V AC	95mA maximum

### Isolation

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

## Ordering Information

### Models

**901MB-0900**  
Discrete input module

**902MB-0900**  
Discrete output module

**903MB-0900**  
Discrete input/output module

### Accessories

#### 900C-SIP

Configuration Software Interface Package (includes software CD-ROM for Windows, RS-232/485 converter, and RS-485/three-wire cable)

#### 4001-095

USB-to-RS232 adapter

#### TBK-B02

Optional terminal block kit, barrier strip style, 4 pcs.

#### TBK-S02

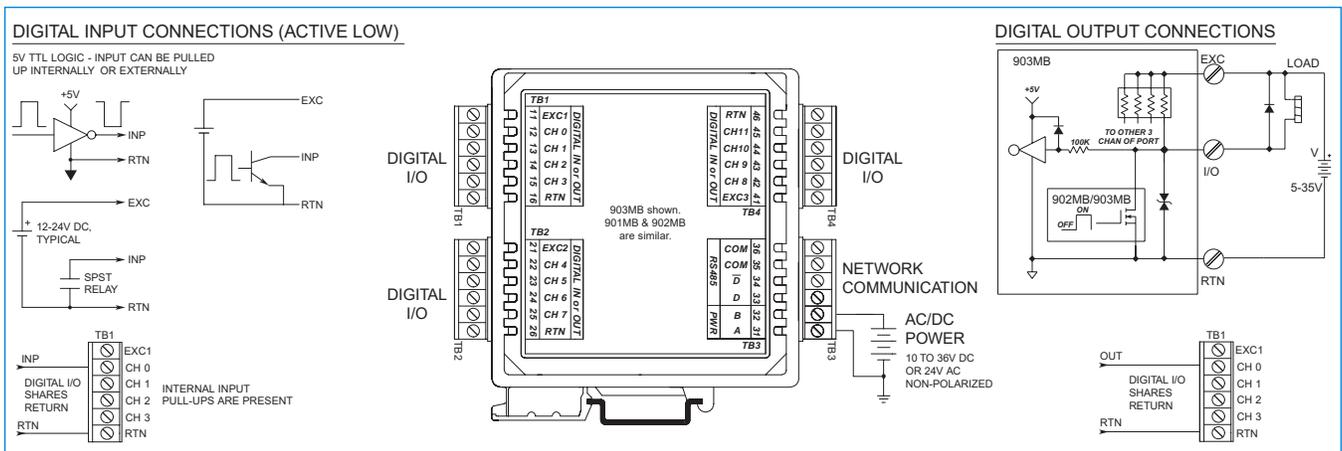
Optional terminal block kit, spring clamp style, 4 pcs.

#### PSSR-VB24

Power supply (24V DC, 2.1A)



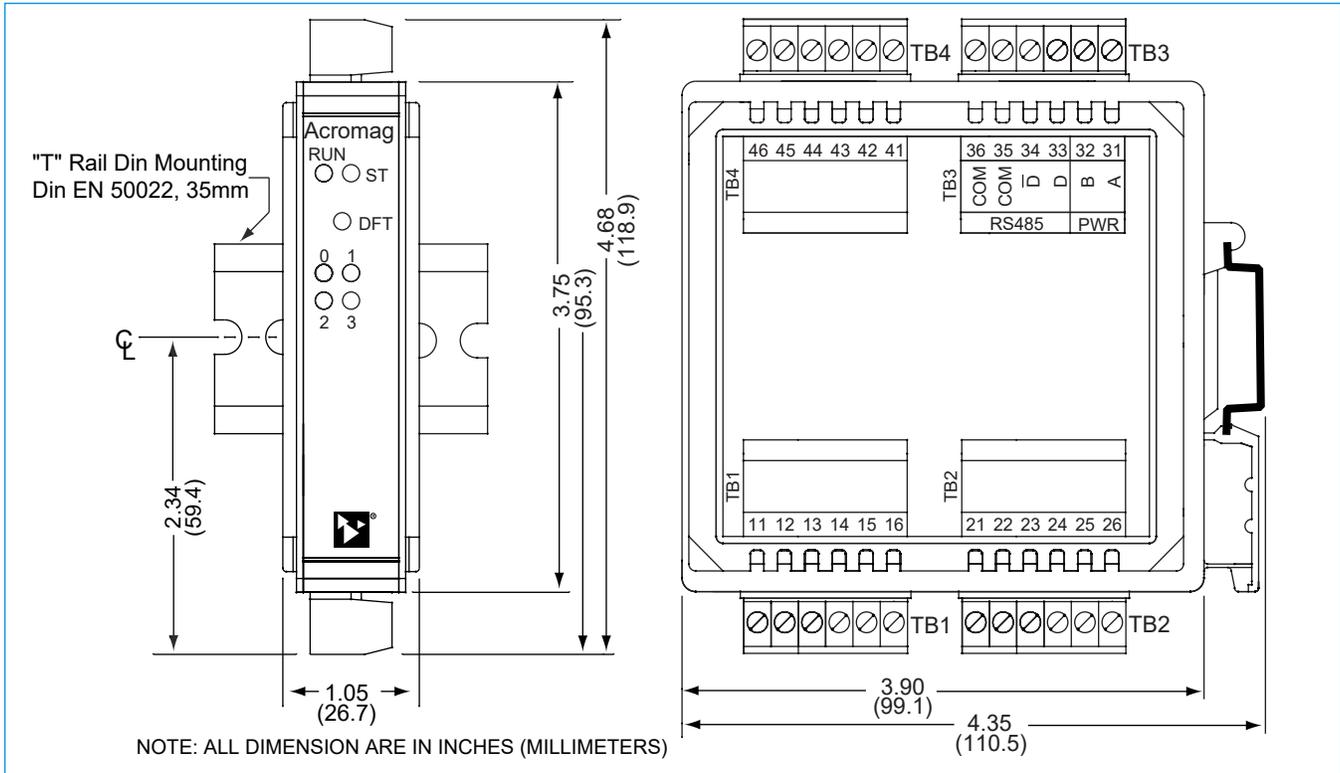
Optional terminal blocks: barrier strip (left) and spring clamp (right). Cage clamp terminal is standard.



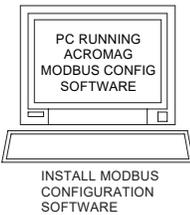
BusWorks® Modbus I/O



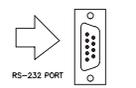
## 900MB Series Technical Diagrams



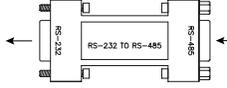
PERSONAL COMPUTER  
W/ WINDOWS 95/98 OR NT



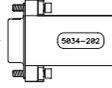
RS-232 SERIAL  
PORT CONNECTOR  
AT BACK OF PC



RS-232 TO RS-485 CONVERTER  
MODEL 5034-214

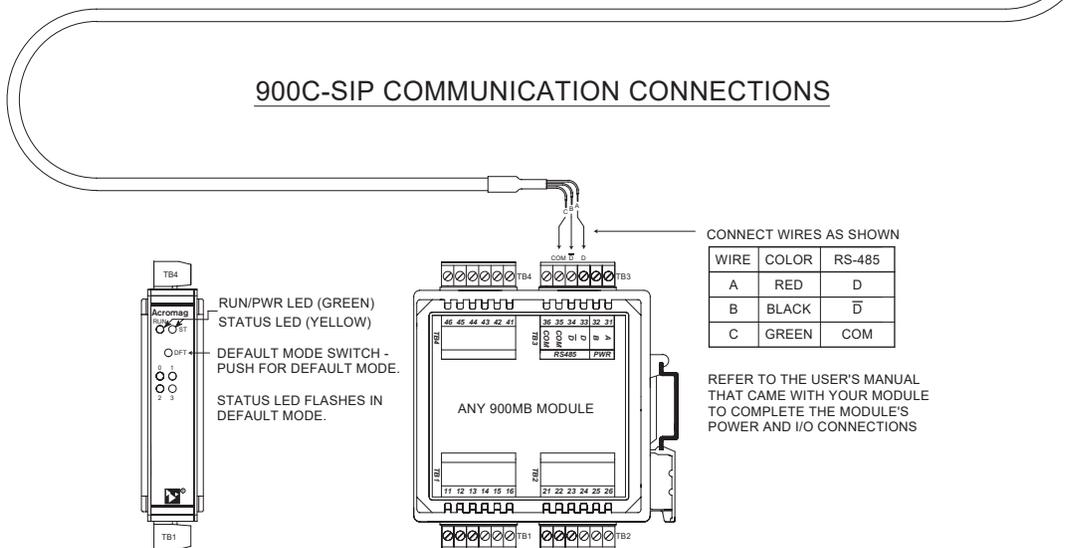


CABLE 5034-202



CAUTION: DO NOT CONNECT THE  
CABLE DIRECTLY TO THE PC WITHOUT  
THE CONVERTER, OR DAMAGE TO  
THE MODULE MAY RESULT.

### 900C-SIP COMMUNICATION CONNECTIONS





## ■ Accessories

### ■ Configuration Tools

Acromag provides a full set of tools to help you get your modules set up and ready to install.

#### Software Interface Package

Includes the following:

- Configuration Software Utility
- Instruction manuals
- Serial port converter
- Interface cable

### ■ Network Devices

Everything you need to drive your network is available from Acromag: isolators, converters, signal boosters, and power sources.

Universal 50W Power Supply Isolated  
RS-232/485 Converter Isolated RS-485  
Network Repeater

### ■ Mounting Hardware

Installation is a snap with Acromag accessories.

DIN RAIL Bars

19" Rack-Mount Kit

## ■ General Module Specifications

### ■ Communication Interface

#### Network Communication

Modbus-RTU protocol, RS485 (3-Wire). Standard Protocol implementation as defined under "Modicon Modbus Reference Guide" PI-MBUS-300 Rev. J. Reference: <http://public.modicon.com>. Search on: PI-MBUS-300 for technical publication.

#### Baud Rate

2400, 4800, 9600, 14.4k, 19.2k, 28.8k, 38.4k, 57.6k, 76.8k, or 115.2k baud. Default 9600 baud.

#### Module Addressing

0 to 247, selectable. Default address 247.

#### Network Distance

4000 feet without network repeater.

#### Nodes

Supports up to 32 modules without the use of a network repeater.

#### Parity

Odd, even, or none. Default setting none.

#### Stop Bits

One with parity, one or two with no parity. Default setting is two stop bits with no parity.

#### Watchdog Timer (Hardware)

A hardware watchdog timer is built into each module to perform a reset if the microcontroller fails to return from an operation in a timely manner or "locks up."

#### Watchdog Timer (Network Communication)

All modules have a communication watchdog timer function. The watchdog timer is configurable for timeout periods of up to 18 hours. This timer function monitors I/O communications with the host controller. In the event of lost communications, output ports optionally reset to a user-defined state or level. The watchdog timer restarts with a read/write to an I/O channel.

### ■ Environmental

#### Ambient Temperature

Operation: -25°C to +70°C (-13°F to +158°F).  
Storage: -40°C to +85°C (-40°F to +185°F).

#### Relative Humidity

5 to 95% non-condensing.

#### Radiated Field Interference Immunity (RFI)

Complies with EN61000-4-3 Level 2 and EN50082-1 (3V/M, 80 to 1000MHz AM and 900MHz keyed).

#### Electrical Fast Transient Immunity (EFT)

EN61000-4-4 Level 1 and EN50082-1 (0.5KV power, signal lines).

#### Electrostatic Discharge (ESD) Immunity

EN61000-4-2 Level 3 and EN50082-1 (8KV/4KV air/direct discharge).

#### Surge Immunity

EN61000-4-5 (0.5KV) and EN50082-1.

#### Radiated Emissions

Meets EN50081-1 for Class B equipment.

#### Approvals

CE marked. UL listed for US and Canada. Class I; Division 2; Groups A, B, C, D.

### ■ Enclosure/Physical

#### Enclosure

Self-extinguishing NYLON type 6.6 polyamide thermoplastic UL94 V-2, color beige; general purpose NEMA Type 1 enclosure.

#### Connectors (Removable Terminal Blocks)

Wire Range: AWG #12-24, stranded or solid copper.

#### Dimensions

1.05W x 4.68H x 4.35D inches  
26.7W x 118.9H x 110.5D mm.

#### DIN Rail Mounting

DIN rail mount, Type EN50022; "T" rail (35mm).

#### Shipping Weight

1 pound (0.45 Kg) packed.

