Modbus/RS-485

904/905/906MB Multi-Channel Discrete I/O Modules

Active-High Inputs Sourcing Outputs (High-Side Switching)

Models
904MB: 12 input channels
905MB: 12 output channels
906MB: 12 input/output channels

Input
Twelve input channels (904, 906 models only)
0 to 35V DC

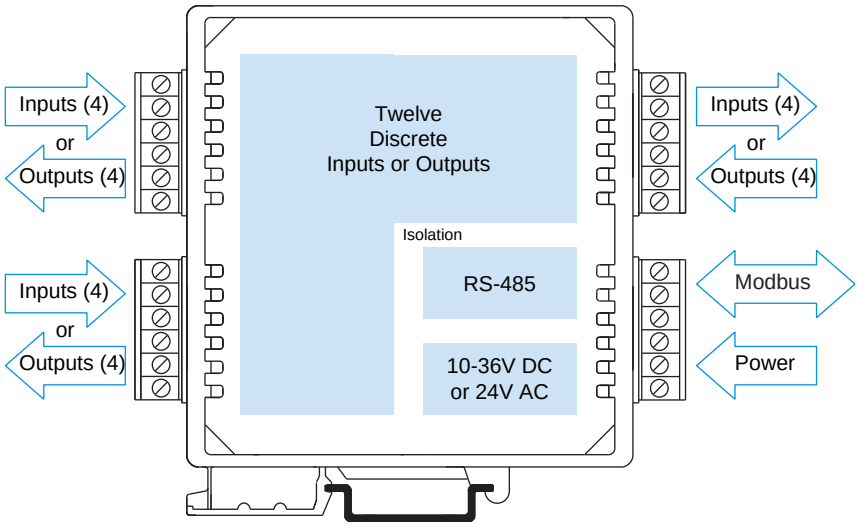
Output
Twelve output channels (905, 906 models only)
6 to 35V DC

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.

High-Density Discrete I/O Module



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 outputs are intended for current-sourcing or high-side switching applications. The buffered inputs are active-high. These models are the complement of the 901, 902, and 903 units which have low-side output switches and active-low inputs. Socketed pull-down resistors are easily removed or exchanged to satisfy your application requirements.

The 906MB 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-source outputs enable direct (high-side) control of external devices
- High-voltage buffered inputs monitor discrete levels from a variety of industrial devices
- Tandem input/output circuitry (906 models only) connects input buffers with open-source outputs for convenient loopback monitoring of the output state
- 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 (904 & 906 models only)

Input Type
12 active-high, 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. Thus, Low-to-High threshold is 1.5VDC, High-to-Low is 1.4VDC, typical. Limited to TTL levels of 0.8VDC (max. LOW level) and 2.0VDC (min. HIGH level).

Input Resistance
5.6K ohms with standard factory pull-down resistors installed. 100K ohms without pull-downs.

Input Hysteresis
100mV DC, typical.

Input Response Time
500ns for low-to-high, 2µS for high-to-low, typical. Microcontroller samples inputs as a group every 10mS.

Discrete Outputs (905 & 906 models only)

Output Type
12 independent, open-source, MOSFET switches that operate as high-side switches.

Output Voltage Range
6 to 35V DC (0 to 250mA/channel continuous). External excitation voltage required.

Output ON Resistance
0.15 ohms maximum.

Output Response Time
Outputs update within 50ms of a write command and switch within 5mS of receipt of command. Loopback response (906MB) is 1µS low-to high, 5µS high-to-low.

General

I/O Pull-downs and Socket
5.6K ohm pull-down 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
- Read Input 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	90mA maximum
24V DC	40mA maximum
24V AC	75mA rms maximum

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

Ordering Information

Models

904MB-0900
Discrete input module

905MB-0900
Discrete output module

906MB-0900
Discrete input/output module

Accessories

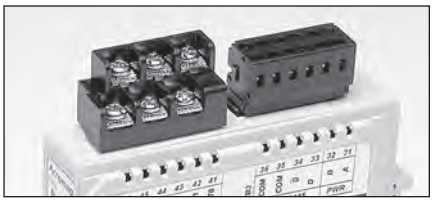
900C-SIP
Configuration Software Interface Package (includes software CD-ROM for Windows, RS-232/485 converter, and RS-485/three-wire cable)

4001-095
USB-to-RS232 adapter

TBK-B02
Optional terminal block kit, barrier strip style, 4 pcs.

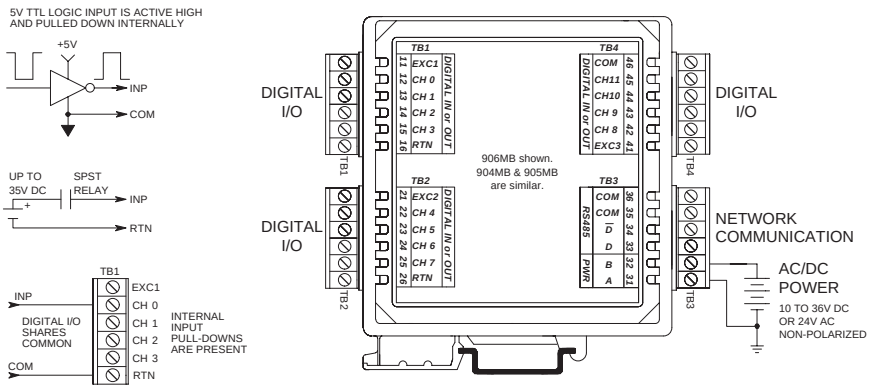
TBK-S02
Optional terminal block kit, spring clamp style, 4 pcs.

PS5R-VB24
Power supply (24V DC, 2.1A)



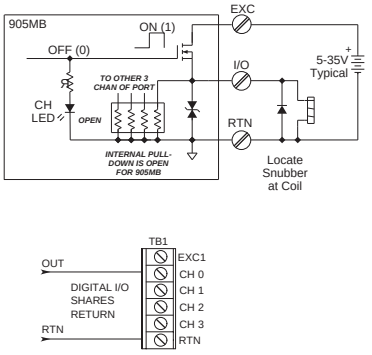
Optional terminal blocks: barrier strip (left) and spring clamp (right). Cage clamp terminal is standard.

DIGITAL INPUT CONNECTIONS (ACTIVE HIGH)

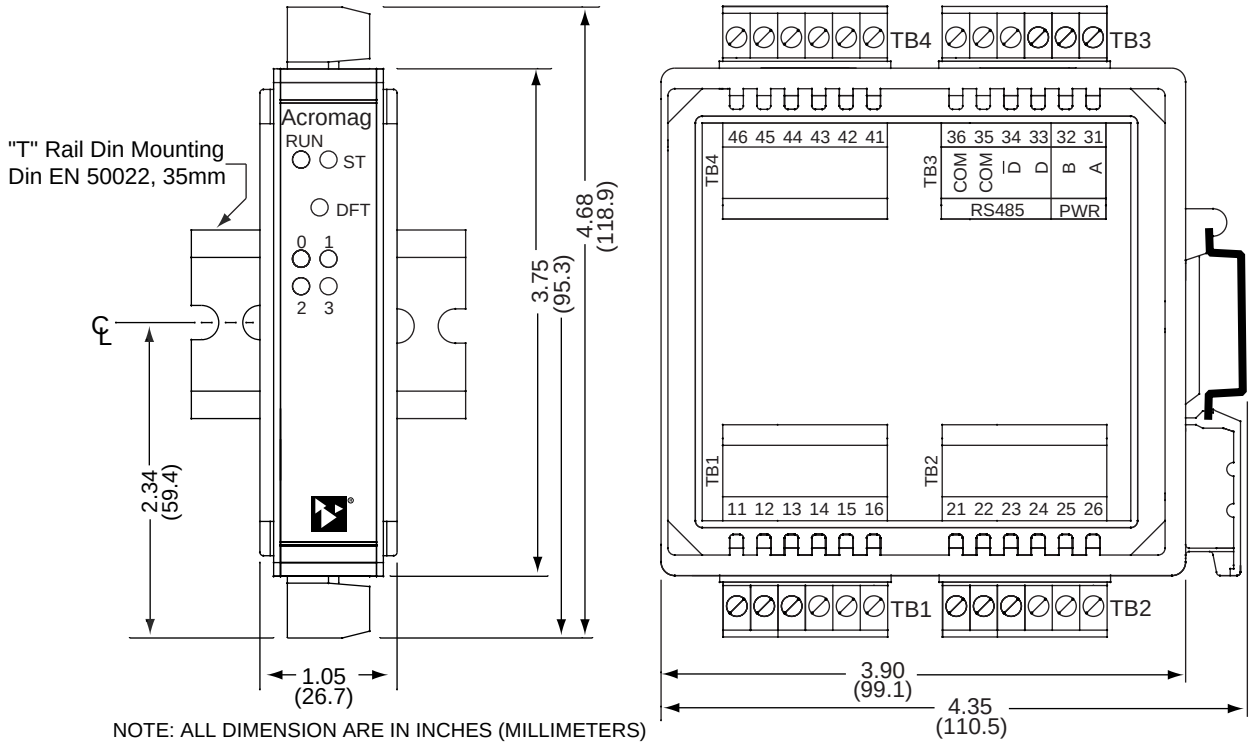


DIGITAL OUTPUT CONNECTIONS

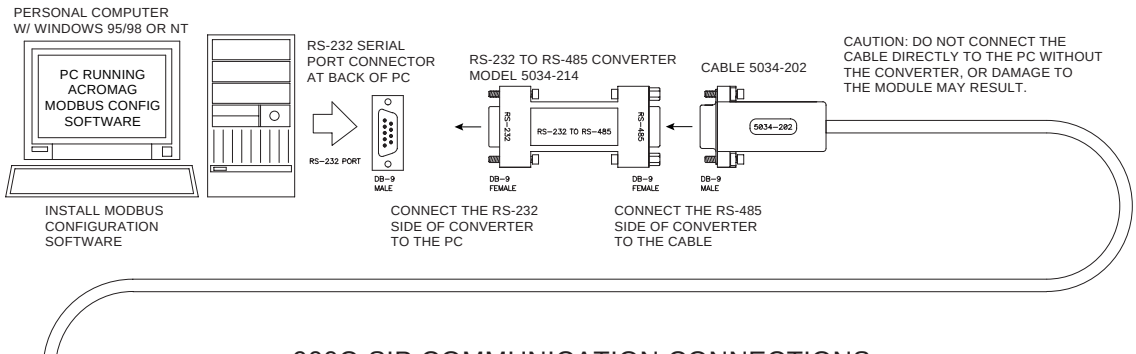
RELAY COIL/SOLENOID DRIVER (905MB/906MB)



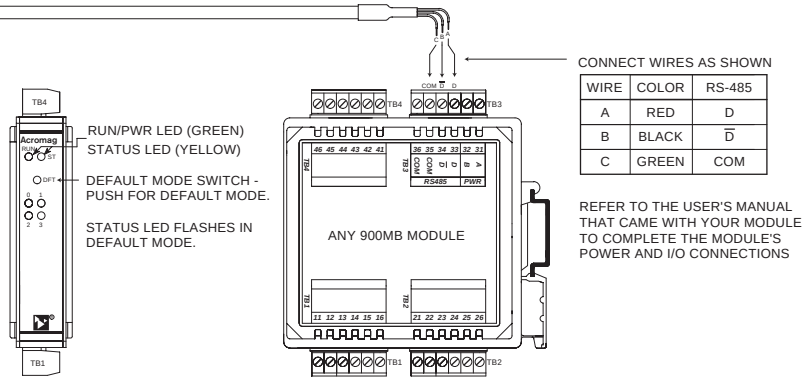
900MB Series Technical Diagrams



NOTE: ALL DIMENSION ARE IN INCHES (MILLIMETERS)



900C-SIP COMMUNICATION CONNECTIONS



WIRE	COLOR	RS-485
A	RED	D
B	BLACK	D̄
C	GREEN	COM

REFER TO THE USER'S MANUAL THAT CAME WITH YOUR MODULE TO COMPLETE THE MODULE'S POWER AND I/O 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

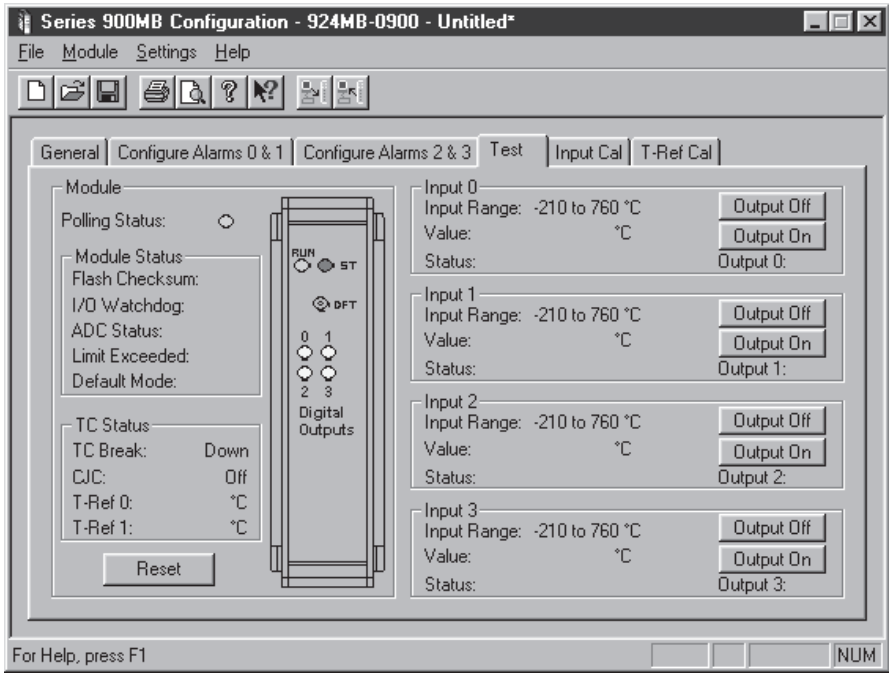
Odd, even, or none. Default setting none.

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.