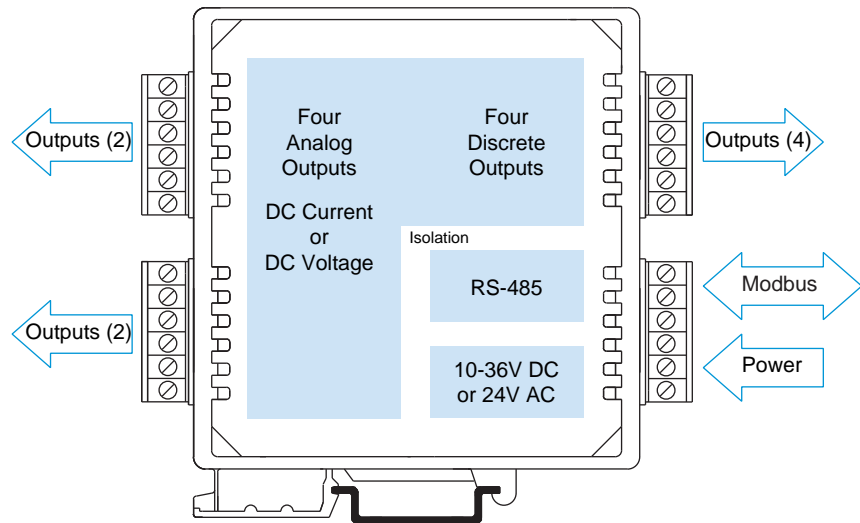




Modbus/RS-485



Analog Output Module



917/918MB Multi-Channel Analog Output Modules

DC Current or DC Voltage Outputs

Discrete Outputs

Models

917MB: 4 current output channels

918MB: 4 voltage output channels

Analog Output

917MB: 0 to 20mA, 4 to 20mA, 0 to 1mA DC

918MB: 0 to 10V, 0 to 5V, 0 to 1V DC

Discrete Output

Four output channels:

Open-drain MOSFETs (1A DC loads)

0 to 35V DC

Network Communication

Modbus-RTU high-speed RS-485

Power Requirement

12 to 36V DC (917MB), 10 to 36V DC (918MB),

24V AC

Approvals

CE marked. UL, cUL listed

Class I; Division 2; Groups A, B, C, D.

Description

These modules drive four analog output channels and also feature four discrete outputs for on/off control. Isolation separates the output, power, and network circuits. Network communication adheres to the industry-standard RS-485 Modbus RTU protocol. AC and DC power sources are supported with nonpolarized, diode-coupled terminals.

The analog outputs generate a signal based on communication from the host. They accommodate wide DC voltage or current ranges.

Discrete outputs provide simple on/off switching capability (open-drain) for external devices.

Combining analog outputs, on/off controllers, 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 make it reliable for both control room and distributed field I/O use in a broad range of temperature control 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)
- 12-bit D/A yields 0.1% of span resolution and accuracy
- Four analog outputs in an inch-wide module reduces system costs and saves panel space
- Four discrete outputs enable host-controlled on/off switching
- Heavy-duty 1A solid-state relays provide dependable on/off control of industrial devices
- Self-calibration lowers maintenance costs by reducing periodic manual calibration checks
- 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, output, and network circuitry
- Self-diagnostics monitor microcontroller activity to detect operational failures (lock-up) and execute a reset to restore communication



Performance

General Analog Output

Resolution

See current/voltage output specifications for more information.

Ambient Temperature Effect

Better than $\pm 0.001\%$ of output span per $^{\circ}\text{C}$, or $\pm 1.0\mu\text{V}/^{\circ}\text{C}$, whichever is greater.

Ambient Temperature

Operation (917MB): -25°C to 60°C (-13°F to 140°F).
 Operation (918MB): -25°C to 70°C (-13°F to 158°F).
 Storage: -40°C to $+85^{\circ}\text{C}$ (-40°F to $+185^{\circ}\text{F}$).

* Limit 917MB maximum ambient to 50°C (122°F) when using supply voltages less than 15V DC.

Current Output (917MB)

DC Current Output Ranges

Range user-configured. Range selected applies to all channels.

Output Range	Resolution	Accuracy (% span)
0 to 1mA	0.554%	$\pm 2.0\%$ ($\pm 0.002\text{mA}$)
0 to 20mA	0.028%	$\pm 0.1\%$ ($\pm 0.02\text{mA}$)
4 to 20mA	0.035%	$\pm 0.1\%$ ($\pm 0.02\text{mA}$)

Maximum Output Current

22.5mA DC typical.

Integral Non-Linearity

$\pm 0.1\%$ of span or ± 2 LSB typical, whichever is larger, for spans equal to or greater than 16mA.

Output Compliance

12V minimum, 12.7V typical.

Output Load Resistance Range

0 to 630 ohms typical.

Response Time

11ms typical into 500 ohms, for measurement to reach 98% of the final value in response to a step command. Actual response time will vary with load.

Voltage Output (918MB)

DC Voltage Output Ranges

Range user-configured. Selection applies to all channels.

Output Range	Resolution	Accuracy (% span)
0 to 1V	0.274%	$\pm 0.6\%$ ($\pm 6\text{mV}$)
0 to 5V	0.055%	$\pm 0.1\%$ ($\pm 5\text{mV}$)
0 to 10V	0.027%	$\pm 0.1\%$ ($\pm 10\text{mV}$)

Maximum Output Voltage

11.255V DC typical.

Integral Non-Linearity

$\pm 0.1\%$ of span or ± 2 LSB typical, whichever is larger, for spans equal to or greater than 5V.

Output Current

0 to 10mA DC maximum.

Output Impedance

1 ohm.

Output Short Circuit Protection

Included.

Response Time

110 μs rise time typical, 150 μs fall time typical, unloaded, for output to reach 98% of the final value in response to a step command. Time varies with load.

Discrete Output

Output Type

Four independent open drain MOSFET switches with a common return that operate as low-side switches.

Output Voltage Range

0 to 35V DC (up to 1A/channel continuous).
 External voltage source required.

Output ON Resistance

0.15 ohms maximum.

Operation

Digital outputs are set to their OFF state following a software or power-on reset. Outputs may be set to user-defined states following a watchdog timeout. Watchdog timeout output control takes precedence over limit alarm control. Alarm control takes precedence over host control.

Output Response Time

4.1ms typical, from receipt of command to gate transition of the output MOSFET.

Communication

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

LED Indicators

LEDs indicate power, status, and discrete level/alarm.

Power and Isolation

Power Requirements

10 to 36V DC (918MB), 12 to 36V DC (917MB)
 22 to 26V AC.

Supply Current

Supply	Current Draw (917)	Current Draw (918)
10V DC	Not Recommended	100mA maximum
12V DC	275mA maximum	85mA maximum
24V DC	120mA maximum	45mA maximum
24V AC	210mA rms max.	85mA rms max.

Isolation

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

Ordering Information

Models

917MB-0900

918MB-0900

DC current (917MB) or voltage (918MB) 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

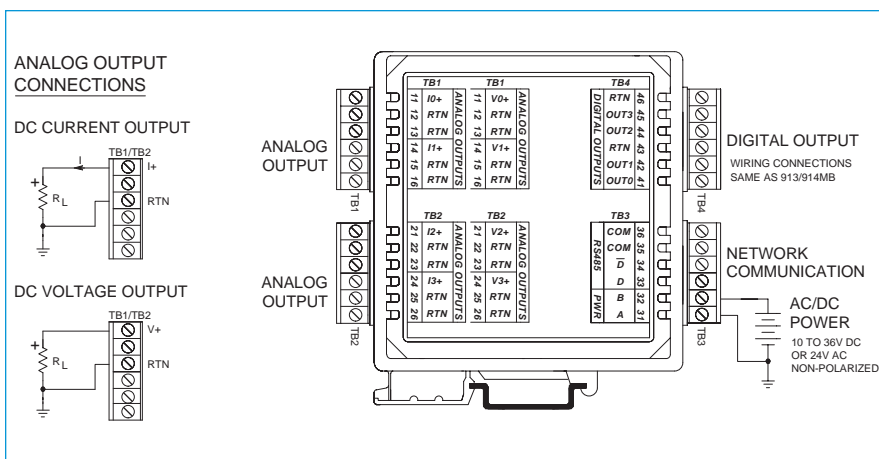
Optional terminal block kit, barrier strip style, 4 pcs.

TBK-S02

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

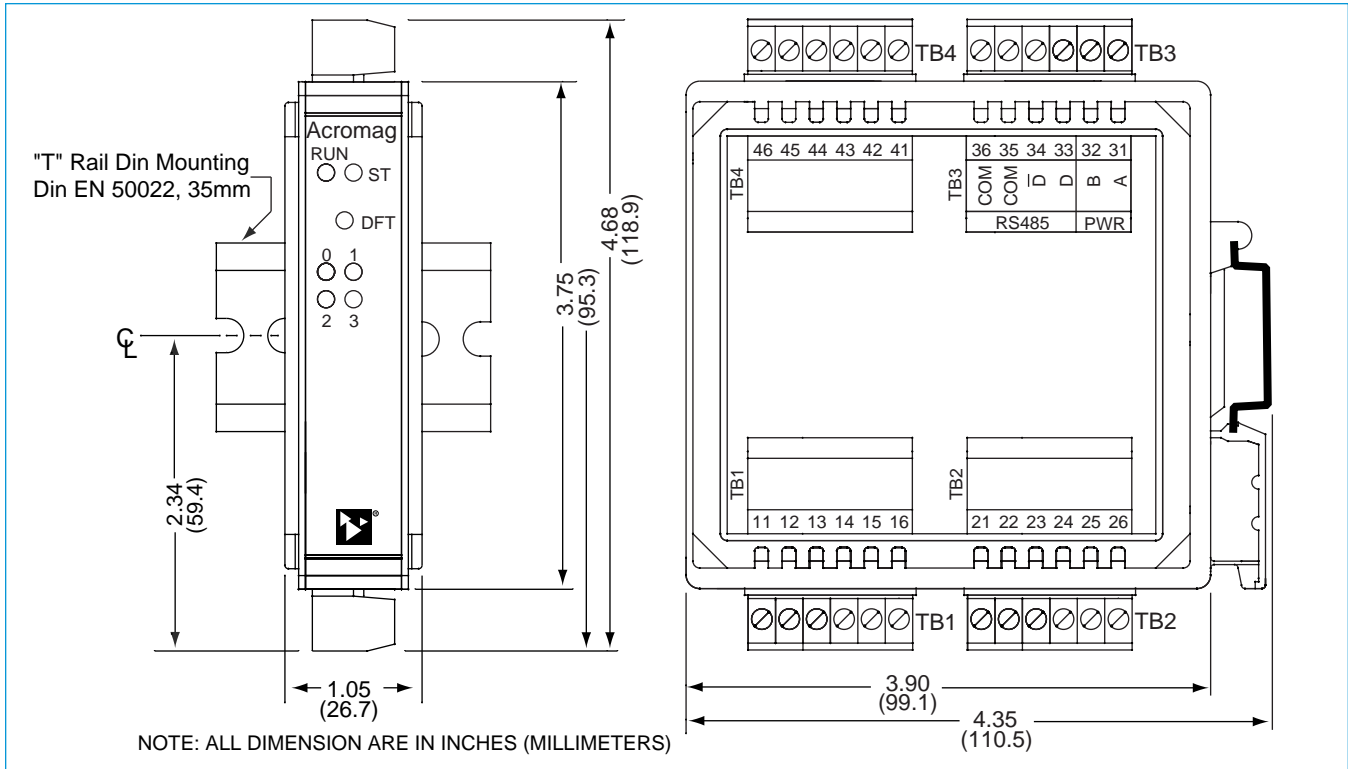
PS5R-VB24

Power supply (24V DC, 2.1A)





900MB Series Technical Diagrams

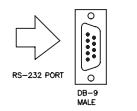


PERSONAL COMPUTER
W/ WINDOWS 95/98 OR NT

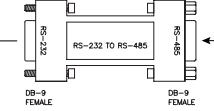


INSTALL MODBUS CONFIGURATION SOFTWARE

RS-232 SERIAL PORT CONNECTOR AT BACK OF PC

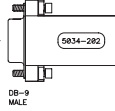


RS-232 TO RS-485 CONVERTER MODEL 5034-214



CONNECT THE RS-232 SIDE OF CONVERTER TO THE PC

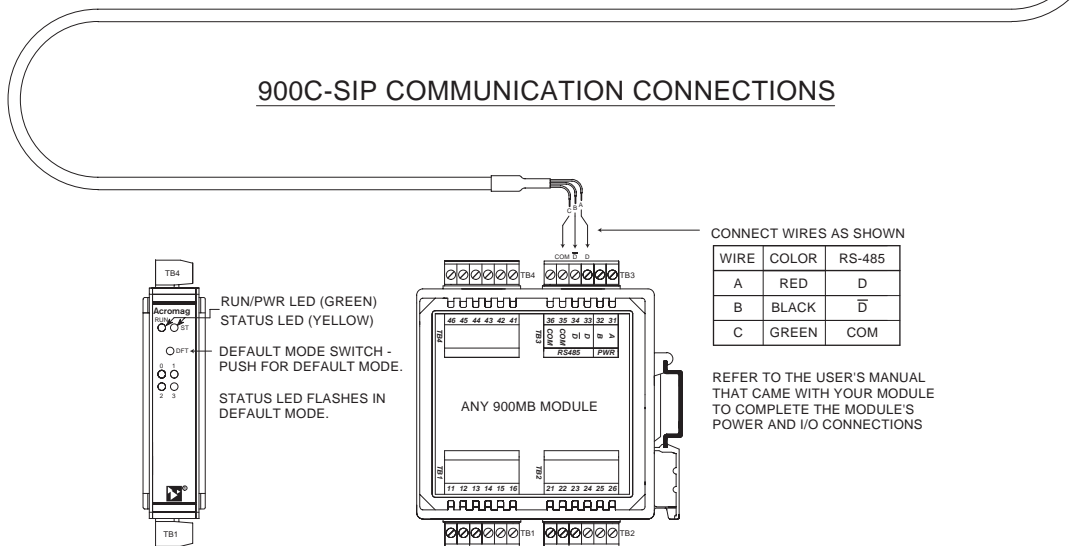
CABLE 5034-202



CONNECT THE RS-485 SIDE OF CONVERTER TO THE CABLE

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.

