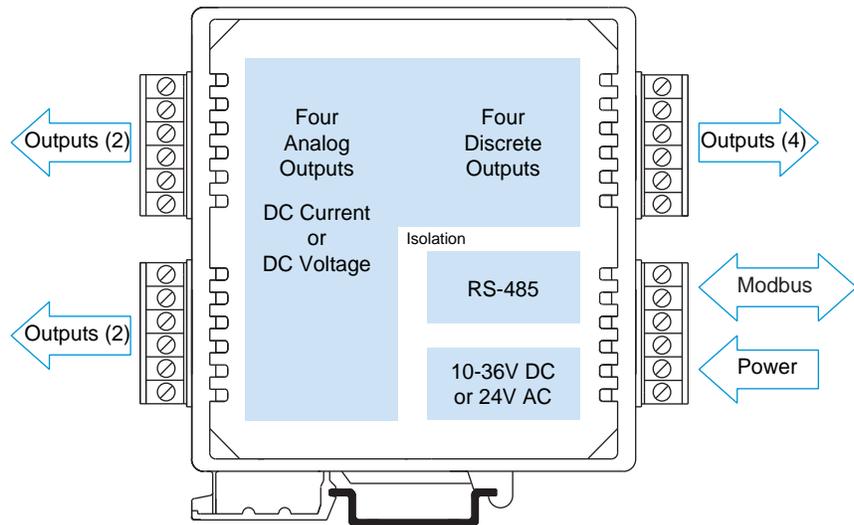




Modbus/RS-485



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

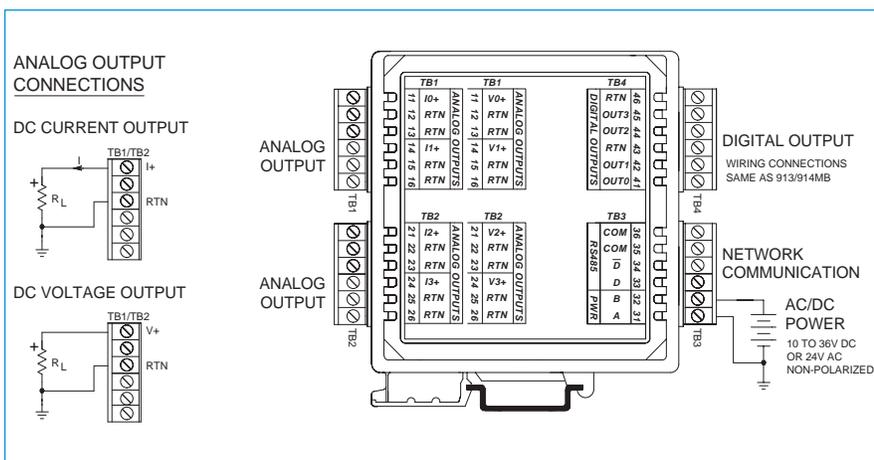
Optional terminal block kit, barrier strip style, 4 pcs.

TBK-S02

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

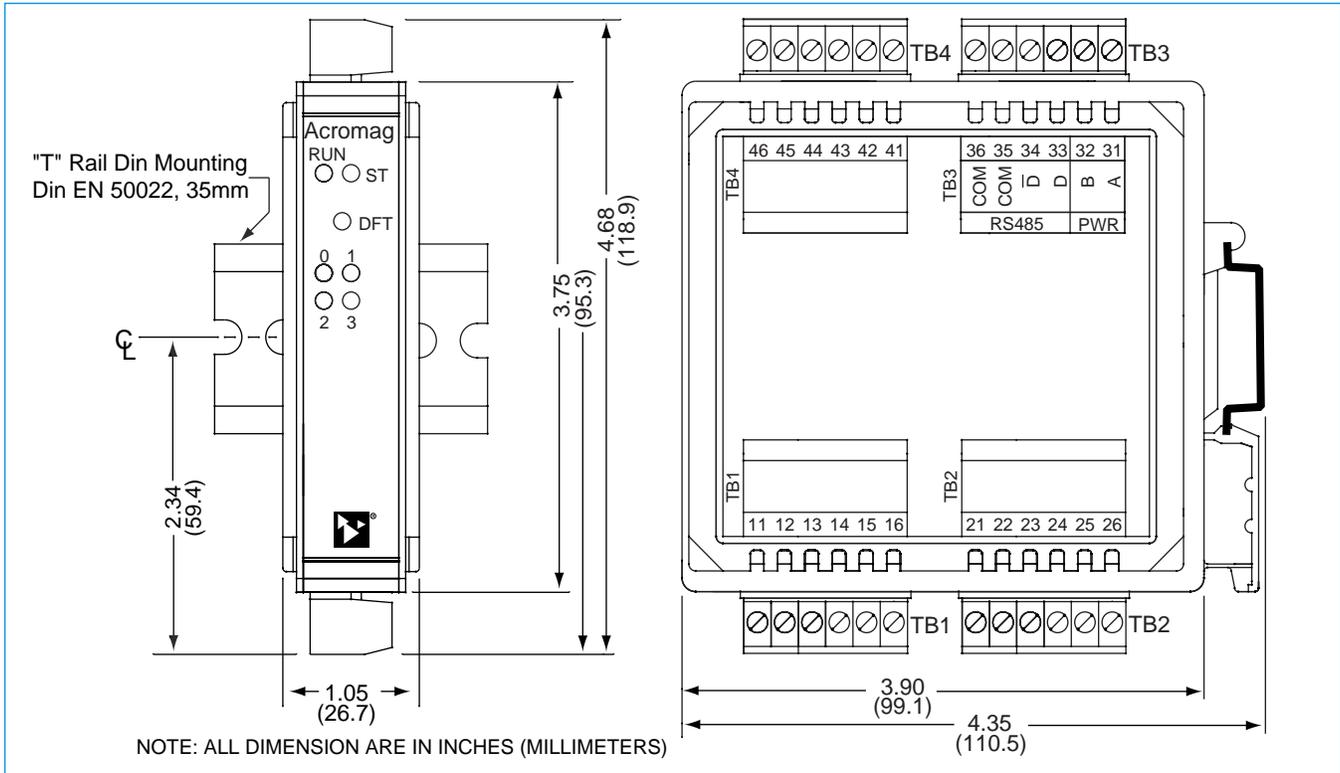
PS5R-VB24

Power supply (24V DC, 2.1A)





900MB Series Technical Diagrams

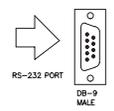


PERSONAL COMPUTER
W/ WINDOWS 95/98 OR NT



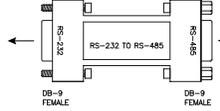
INSTALL MODBUS
CONFIGURATION
SOFTWARE

RS-232 SERIAL
PORT CONNECTOR
AT BACK OF PC



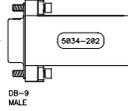
CONNECT THE RS-232
SIDE OF CONVERTER
TO THE PC

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



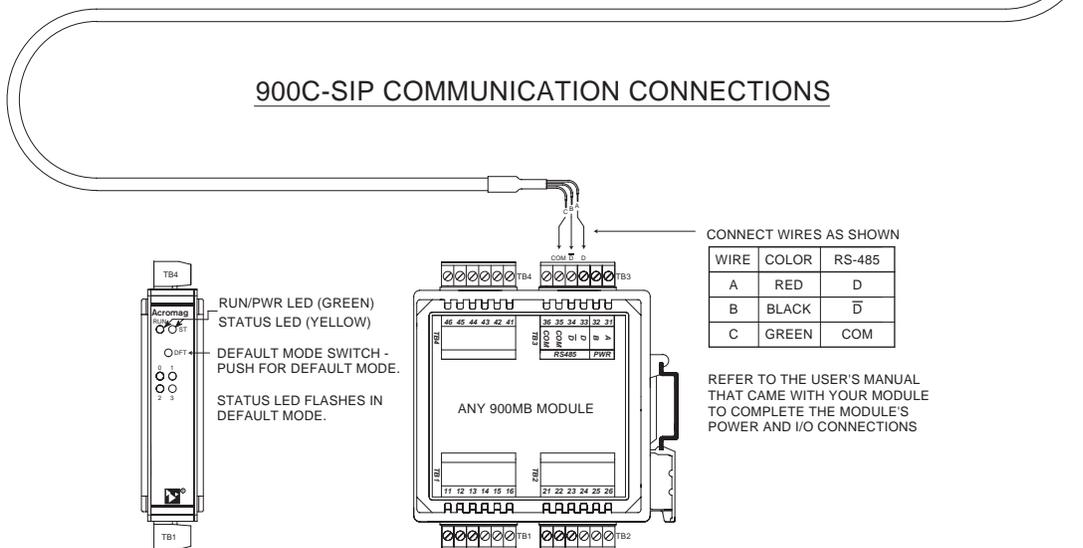
CONNECT THE RS-485
SIDE OF CONVERTER
TO THE CABLE

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





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

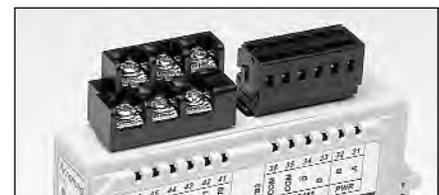
Optional terminal block kit, barrier strip style, 4 pcs.

TBK-S02

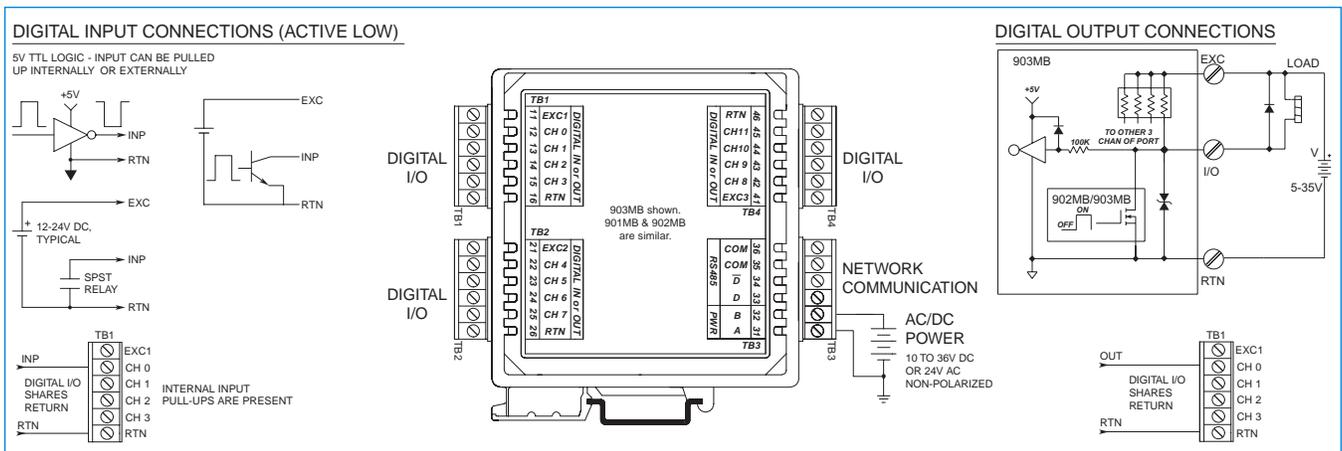
Optional terminal block kit, spring clamp style, 4 pcs.

PSSR-VB24

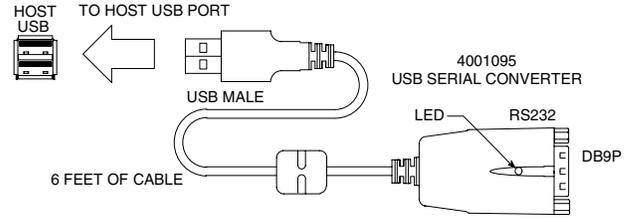
Power supply (24V DC, 2.1A)



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



Model 4001-095 USB-to-Serial Adapter



Simplifies configuration of Acromag I/O Modules ♦ Enables configuration via USB port

Description

This device is a USB-to-serial adapter that you can use to communicate with many Acromag I/O products for setup and re-configuration for your application.

Key Features & Benefits

- Connects to I/O modules via USB (other adapters may be necessary)
- Complete RS232 control signals
- Conforms to USB Specification, Version 1.1
- USB-powered
- Cable length, 6 ft., UL approved

Performance Specifications

USB Specification
Version 1.1

Data rate
Up to 115.2Kbps

Environmental Standards
RoHS-compliant

Basic Power Consumption
150mA

PC Requirements
Windows® 7 and newer.

Ordering Information

NOTE: For more information visit www.acromag.com.

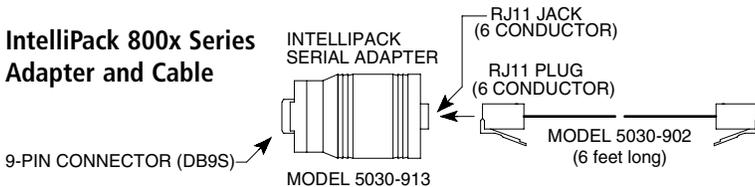
Adapters

- [4001-095](#)
USB to serial adapter. Includes driver CD and manual.
- [5030-913](#)
Serial port adapter. DB9S connector to RJ11 jack.
- [5034-202](#)
RS-485 to 3-wire cable converter and cable, DB-9M to 3 x 12AWG RS-485 cable, 8 ft.
- [5032-787](#)
RS-232 to 151T transmitter configuration device converter and cable, 6 ft.
- [5034-214](#)
Non-isolated RS-232 to RS-485 Serial Port Converter, DB-9F to DB-9F.

Cables

- [5030-902](#)
Cable. 6 feet long with RJ11 plug at each end.

IntelliPack 800x Series Adapter and Cable



900MB Modbus Series Adapter and Cable

