Modbus/RS-485

C E

cULus
LISTED

2 YEAR WARRANTY

932/934MB Multi-Channel Temperature Control Modules

RTD or Resistance Input

Limit Alarms or Discrete Outputs

Models
932MB: 2 input channels, 2 relay outputs
934MB: 4 input channels, 4 relay outputs

Input
RTD (100 ohm Pt, 120 ohm Ni, 10 ohm Cu),
Resistance (0 to 500 ohms)

Output
Solid-state relays, Form A, SPST-NO

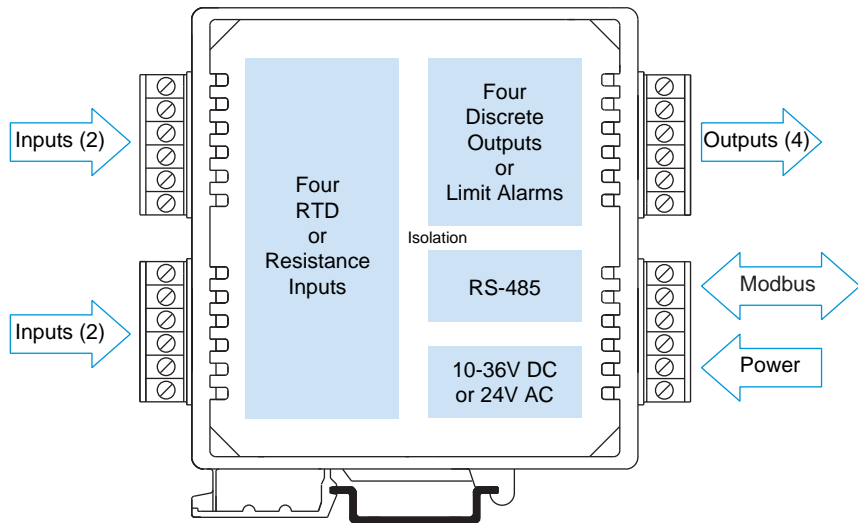**Network Communication**
Modbus-RTU high-speed RS-485

Power Requirement
10 to 36V DC,
24V AC

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

RTD/Resistance Input Module

Inputs (2)

Four RTD or Resistance Inputs

Four Discrete Outputs or Limit Alarms

Isolation

RS-485

10-36V DC or 24V AC

Inputs (2)

Outputs (4)

Modbus

Power

■ Description

This signal conditioner is a dual or quad-channel analog input module with one discrete/relay output per input channel and a Modbus interface. It filters and linearizes RTD or resistance inputs while providing isolation between input, output, power, and network circuits. Lead wire compensation and upscale/downscale sensor break detection are standard. Low voltage AC and DC power sources are supported with nonpolarized, diode-coupled terminals.

The programmable inputs accommodate four RTD types plus wide-range resistance signals. Flexible discrete outputs operate as alarms or on/off controllers. As limit alarms, each discrete output can be configured with high and/or low setpoints exclusively tied to an analog input channel. Alarm trips function without host communication enabling low-cost stand-alone alarms as well as local backup for the primary control system. Otherwise, on/off control is based on commands issued by the host system.

Combining flexible transmitter functions, mixed signal I/O, alarm support, 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)

■ 16-bit sigma-delta A/D yields 0.1°C resolution and 0.25°C accuracy (Pt, Ni RTDs)

■ RTD linearization and sensor break detection ensure reliable measurements

■ Discrete relay outputs enable local temperature limit alarms or 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

■ Four-way isolation eliminates potential ground loops between power, input, output and network circuitry

■ Self-diagnostics monitor microcontroller activity to detect operational failures (lock-up) and execute a reset to restore communication

■ Performance

■ RTD/Resistance Input

Input Ranges
Input type user-configured. Type selected applies to all channels. RTD linearization, lead wire compensation, and open circuit or lead break detection are included.

Input Type	Alpha	Input Range	Accuracy
Pt 100 ohm	1.3850	-200 to 850°C	±0.25°C
Pt 100 ohm	1.3911	-200 to 850°C	±0.25°C
Ni 120 ohm	1.6720	-80 to 320°C	±0.25°C
Cu 10 ohm	1.4272	-200 to 260°C	±1.00°C
Resistance	linear	0 to 500 ohms	±0.05 ohm

Resolution

Input Type	Alpha	Resolution
Pt 100 ohm	1.3850	0.1°C
Pt 100 ohm	1.3911	0.1°C
Ni 120 ohm	1.6720	0.1°C
Cu 10 ohm	1.4272	0.2°C
Resistance	linear	7.8125 milliohms

Ambient Temperature Effect
Better than ±0.005% of input span per °C, or ±1.0uV/°C, whichever is greater.

Noise Rejection
Normal mode: 40dB @ 60Hz, typical.
Common mode: 130dB @ 60Hz, typical.

Input Filter Bandwidth
-3dB at 3Hz, typical.

Input Conversion Rate
300ms per channel typical.

RTD Break Detection
Sensor failure can be configured for either upscale or downscale. Selection applies to all channels.

Excitation Current
1mA DC typical, all types.

Lead-Wire Compensation
Inherent for 3-wire RTD. The maximum lead resistance is 25 ohms per lead (Pt), 20 ohms per lead (Ni), 10 ohms per lead (Cu). All lead wires must be of equal size and length.

■ Discrete Output

Output Type
Solid-State Relay (SSR), one Form A (SPST-NO) switch per input channel. Outputs share a common return connection at the RTN terminals for low side switching

Output Voltage Range
0 to 48V DC, 1A DC.

Output ON Resistance
0.4 ohms maximum.

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

Operation
Digital outputs are set to their OFF state following a software or power-on reset. Outputs can be set to user-defined states following a watchdog timeout.

■ 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 Holding Registers	Read Coil
Read Input Registers	Reset Slave
Preset Single Register	Report Slave ID
Force Multiple Coils	Force Single Coil
Preset Multiple Register	

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

■ Power and Isolation

Power Requirements
10 to 36V DC (56mA max. at 24V DC).
22 to 26V AC (94mA rms max. at 24V AC).

Isolation
1500V AC for 60 seconds or 250V AC continuous. 4-way isolation between input, network, power and discrete I/O circuits. Inputs are isolated channel-to-channel for common mode voltage to ±5V DC.

■ Ordering Information

932MB-0900
Two channel RTD/Resistance input module

934MB-0900
Four channel RTD/Resistance input module

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

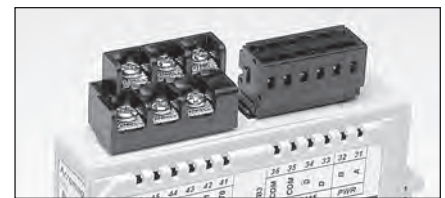**4001-095**
USB-to-RS232 adapter

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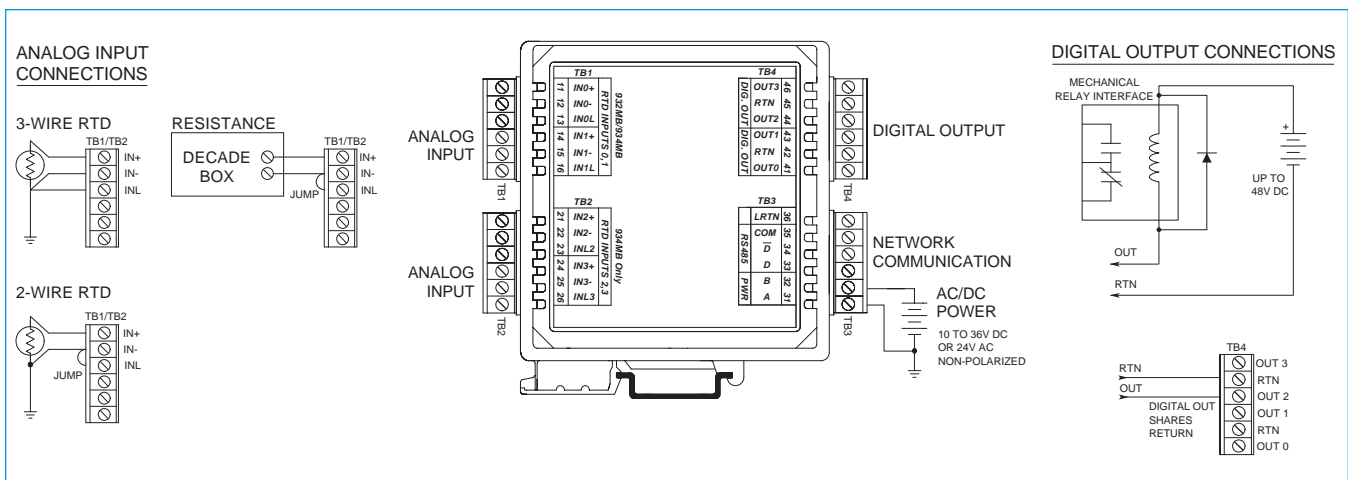Optional terminal block kit, barrier strip style, 4 pcs.

TBK-S02
Optional terminal block kit, spring clamp style, 4 pcs.
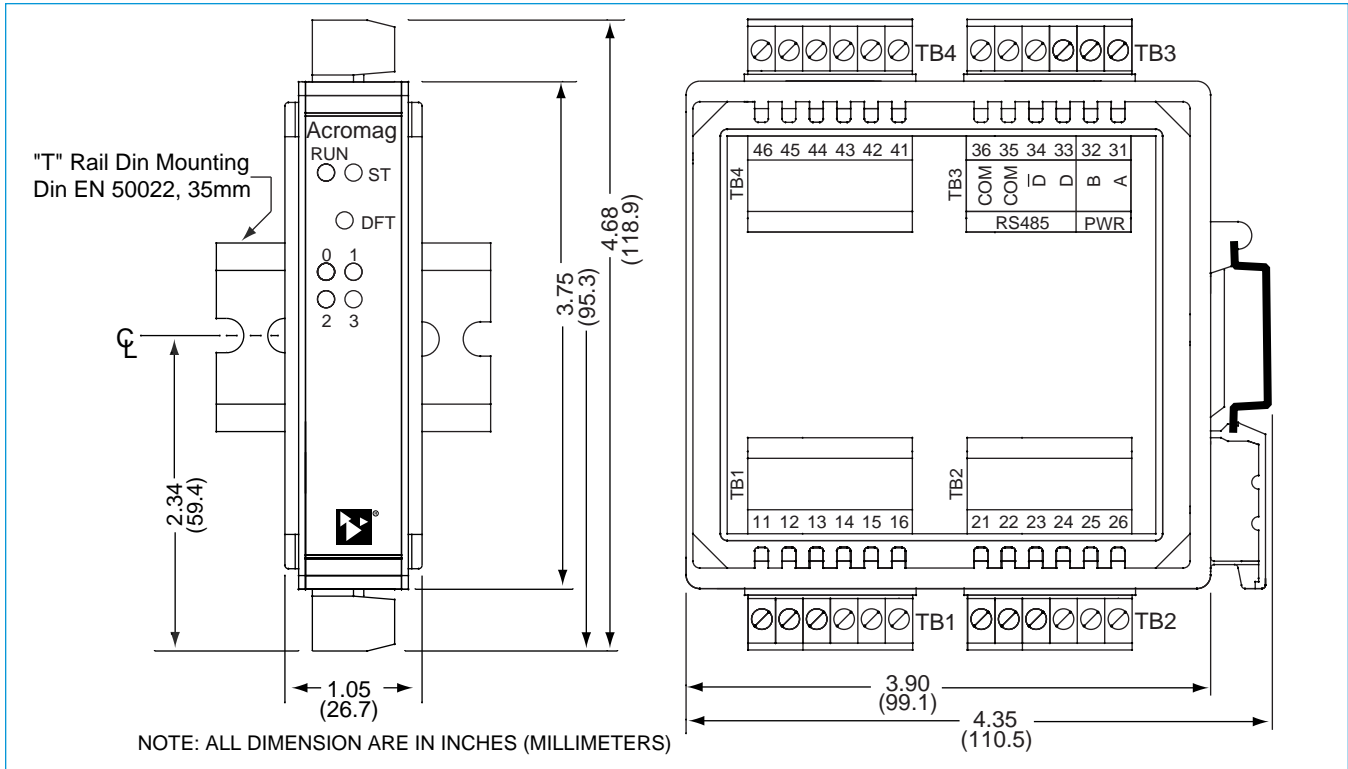
PS5R-VB24
Power supply (24V DC, 2.1A)

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

ANALOG INPUT CONNECTIONS

DIGITAL OUTPUT CONNECTIONS

900MB Series Technical Diagrams

"T" Rail Din Mounting
Din EN 50022, 35mm

Acromag
RUN ST
DFT
0 1
2 3

4.68
(118.9)

3.75
(95.3)

2.34
(59.4)

1.05
(26.7)

NOTE: ALL DIMENSION ARE IN INCHES (MILLIMETERS)

TB4   TB3

TB4   46 45 44 43 42 41   TB3 36 35 34 33 32 31
                                  COM COM D̄ D B A
                                  RS485   PWR

TB1   11 12 13 14 15 16   TB2 21 22 23 24 25 26

TB1   TB2
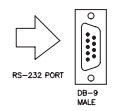
3.90
(99.1)

4.35
(110.5)

PERSONAL COMPUTER
W/ WINDOWS 95/98 OR NT

PC RUNNING
ACROMAG
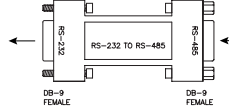MODBUS CONFIG
SOFTWARE

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.

RS-232 PORT
DB-9 MALE

RS-232 TO RS-485
DB-9 FEMALE   DB-9 FEMALE

5034-202
DB-9 MALE

INSTALL MODBUS
CONFIGURATION
SOFTWARE

CONNECT THE RS-232
SIDE OF CONVERTER
TO THE PC
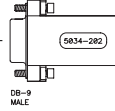
CONNECT THE RS-485
SIDE OF CONVERTER
TO THE CABLE

900C-SIP COMMUNICATION CONNECTIONS

TB4

Acromag
RUN ST
DFT
0 1
2 3

RUN/PWR LED (GREEN)
STATUS LED (YELLOW)

DEFAULT MODE SWITCH -
PUSH FOR DEFAULT MODE.

STATUS LED FLASHES IN
DEFAULT MODE.

TB1

COM D̄ D

TB4   TB3
46 45 44 43 42 41   36 35 34 33 32 31
                    COM COM D̄ D B A
                    RS485   PWR

ANY 900MB MODULE

11 12 13 14 15 16   21 22 23 24 25 26
TB1   TB2

CONNECT WIRES AS SHOWN

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 thermo-plastic 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.