Modbus/RS-485

942MB Frequency/ Pulse Counter Modules

Periodic or Pulse Waveform Input

Limit Alarms or Discrete Outputs

Model
942MB: 2 input channels

Input
Two input channels:
0 to 50KHz in three selectable ranges
Amplitudes up to 140V AC or 200V peak
Pulse counter range of 0 to 65535

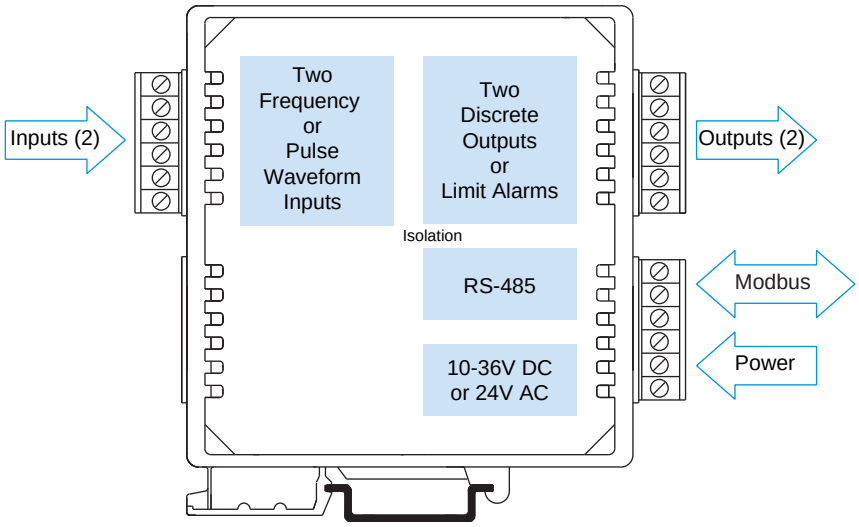
Output
Two output channels:
Solid-state relays (1A DC loads)
0 to 48V DC

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.

Frequency/Counter Module



Description

This signal conditioner is a two-channel analog input module with discrete outputs and Modbus communication. It conditions periodic or pulse waveform inputs and provides solid-state relays for limit alarms or ON/OFF control.

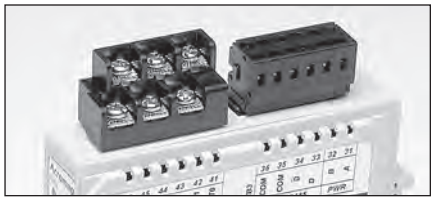
Versatile inputs accommodate many applications using TTL, magnetic pickups, proximity sensors, or a variety of switches (high/low-side transistor, dry contact, open drain, open collector). Bipolar and unipolar waveforms are supported with a selectable input bias that accepts both zero and non-zero crossing signals. Voltage threshold and relative hysteresis are also user selectable.

Inputs may also function as event counters with separate microcontrollers for each channel. The module counts pulses on the positive or negative edge. It can wrap around to zero for continuous counting, latch at a programmed count value (setpoint), or automatically reset itself to zero after reaching a setpoint value. Software controls enable remote resets. A variety of filters help remove noise, jitter, and other mechanical effects to prevent false counts.

The discrete outputs can operate as independent alarms or provide on/off control regulated by the host system. As limit alarms, each output can be set for high and/or low setpoints exclusively tied to an analog input. These low cost modules are ideal for standalone alarms as well as for local backup of the primary control system.

Special Features

- Standard Modbus RTU protocol with high-speed RS-485 communication (up to 115K bps)
- Separate microcontrollers on each channel for pulse counting and period measurement
- Solid-state relay outputs enable local limit alarms or host-controlled on/off switching
- Bipolar and unipolar input signal support
- Programmable pulse counter functions
- Input filtering functions include hysteresis, averaging, debounce, relay time delay, and alarm deadband controls
- 4-way isolation (input, output, power, network)
- Watchdog timers provide a failsafe output
- Self-diagnostics monitor microcontroller activity to detect operational failures (lock-up) and execute a reset to restore communication



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

Performance

Frequency/Counter Input

Input Ranges
Input type user-configured. Applies to both channels.

Input Range	Accuracy	Accuracy over Temp.
0 to 100Hz	±0.04Hz	±0.06Hz
0 to 1000Hz	±0.4Hz	±0.6Hz
0 to 50,000Hz	±10Hz	±15Hz
0 to 65,535 pulses	±1 pulse	±1 pulse

Unipolar Input Configuration
Amplitude: 0 to 3V minimum range,
0 to 200V peak maximum range.

Threshold: Configurable for 1.5V or 5V, typical.

Hysteresis: Configurable for ±25mV (at 1.5V threshold), or ±83mV (at 5.0V threshold), typical.

Bipolar (Zero-Crossing) Input Configuration
Amplitude (0-20KHz): ±50mV minimum (with ±25mV hysteresis), or ±150mV minimum (with ±83mV hysteresis), to ±200V peak maximum.

Amplitude (Above 20KHz): ±100mV minimum (with ±25mV hysteresis), or ±200mV minimum (with ±83mV hysteresis), to ±200V peak maximum.

Threshold: 0mV nominal, 0.01V typical with ±25mV hysteresis; 0.03V typical with ±83mV hysteresis.

Hysteresis: Configurable for ±25mV or ±83mV, typical.

Resolution
0 to 100Hz input range: 0.01Hz
0 to 1000Hz input range: 0.1Hz
0 to 50,000Hz input range: 1Hz
Pulse counter: 1 pulse

Minimum Input Pulse Width
10µS (frequency input); 5mS (pulse input).

Counting Rate
100Hz maximum counting rate
(5mS ON and 5mS OFF for 10mS period or 100Hz).

Input Impedance
35K ohms, typical.

Input Filter Bandwidth
-3dB at 35kHz, typical.

Input Pullup/Pulldown
Software selectable 2.7K ohm input pullup to +5V and a 1K ohm input pulldown to return. The resistors may also be left floating (none).

Input Debounce
0 to 1.375 seconds, configurable in 5mS increments.

Noise Rejection
Common mode: 80dB @ 60Hz, typical with 100 ohm input unbalance.

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

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

Power and Isolation

Power Requirements
10 to 36V DC.
22 to 26V 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

942MB-0900
Frequency/counter 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)

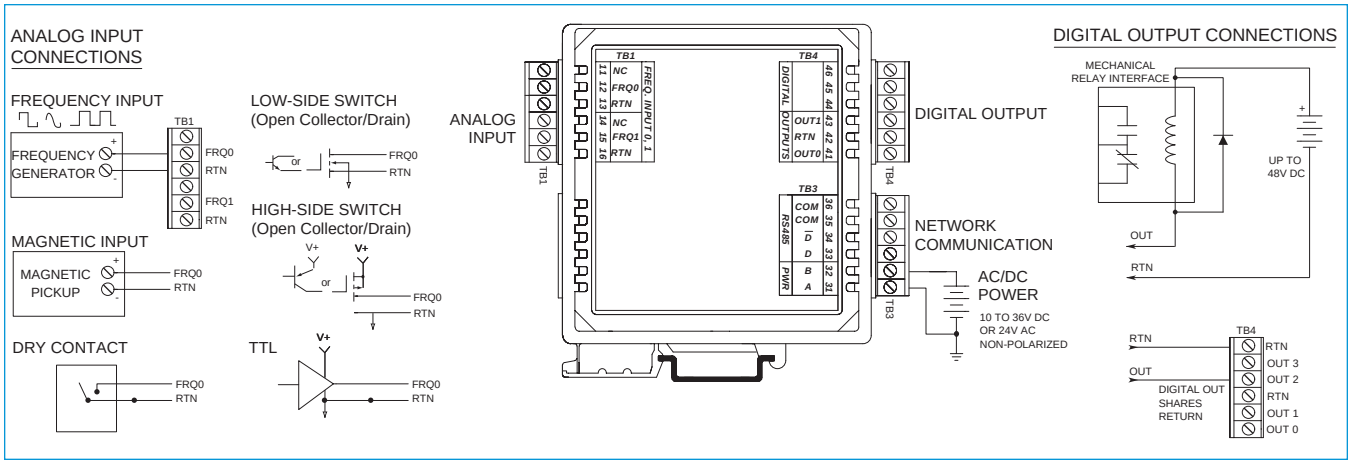
4001-095
USB-to-RS232 adapter. See page 70 for more info.

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

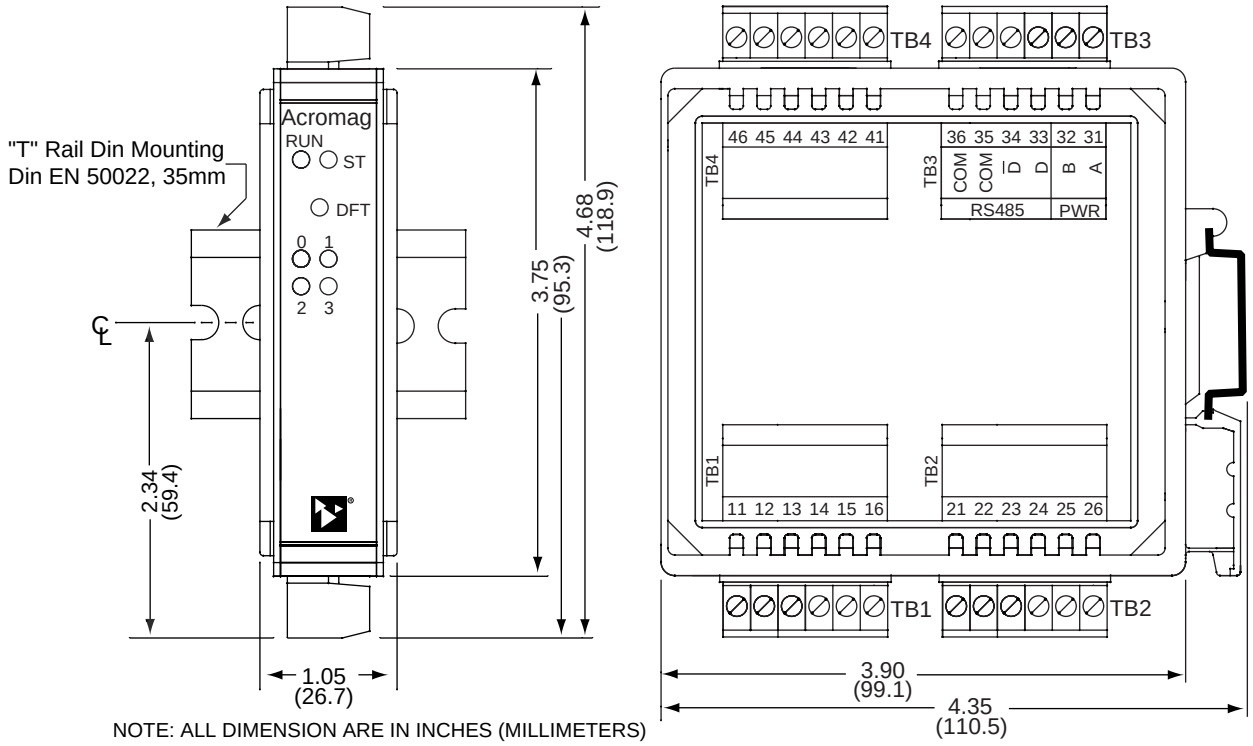
TBK-S02
Optional terminal block kit, spring clamp style, 4 pcs.

PS5R-VD24
Power supply (24V DC, 2.1A).
See Power Supplies on Page 199.

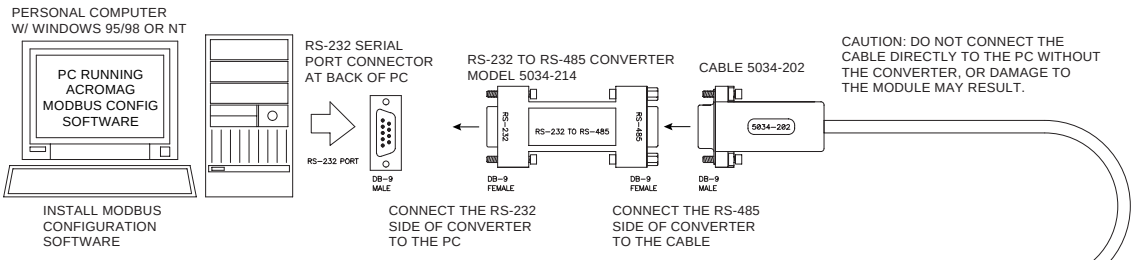
For more information on software, network hardware, and mounting accessories, please see Pages 69-71.



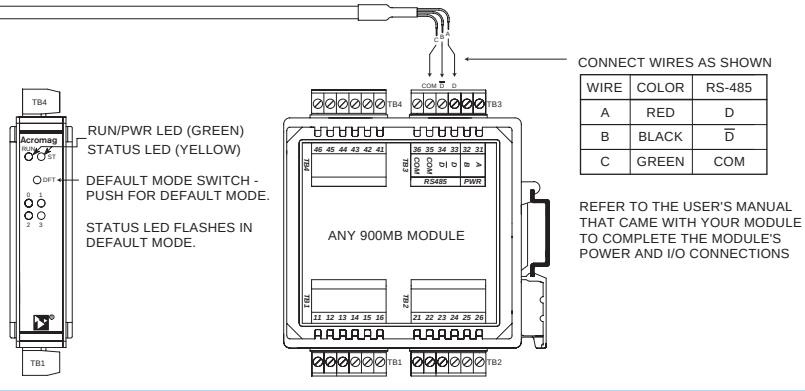
900MB Series Technical Diagrams



NOTE: ALL DIMENSION ARE IN INCHES (MILLIMETERS)



900C-SIP COMMUNICATION CONNECTIONS

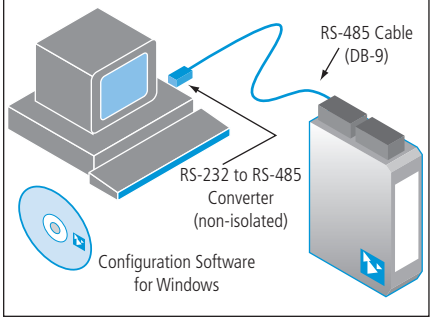


WIRE	COLOR	RS-485
A	RED	D
B	BLACK	D̄
C	GREEN	COM

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

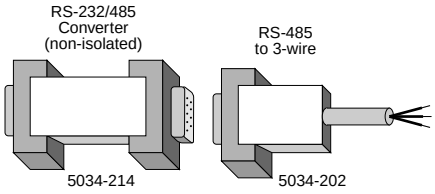
Configuration Kit

Software Interface Package
Model No. 900C-SIP



Software Interface Package

This package includes Windows® Configuration Software, an RS-232-to-485 Serial Port Converter, and an RS-485 Signal Cable. These components provide everything you need to set up a Series 900 I/O module from your desktop PC before installing it on the network.



Ordering Information

900C-SIP
Software Interface Package.
Includes Configuration Software (5034-186), Non-isolated RS-232 to RS-485 Serial Port Converter (5034-214), and RS-485 Cable (5034-202).

Items can also be ordered separately below.

5034-186
Configuration Software for Windows (95/98/2000/ME/ NT4/XP) on CD-ROM.

5034-214
Non-isolated RS-232 to RS-485 Serial Port Converter, DB-9F to DB-9F.

5034-202
RS-485 to 3-wire Cable Converter, DB-9M to 3 x 12AWG RS-485 Cable, 8 ft.

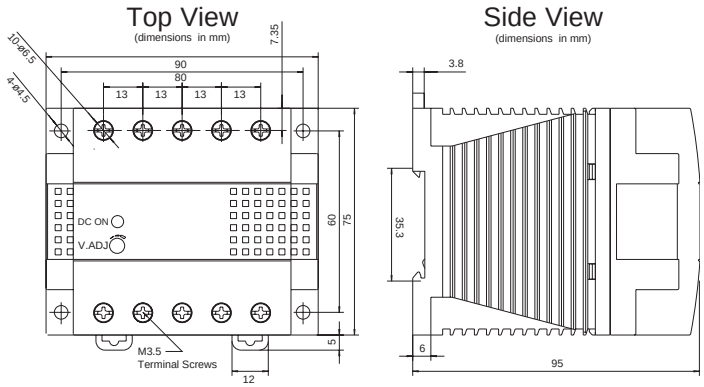
Network Power

Universal 50W Power Supply

The PS5R-VD24 is the ideal power source to drive your network.

Input Power Requirement
Universal power
85 to 264V AC,
105 to 370V DC

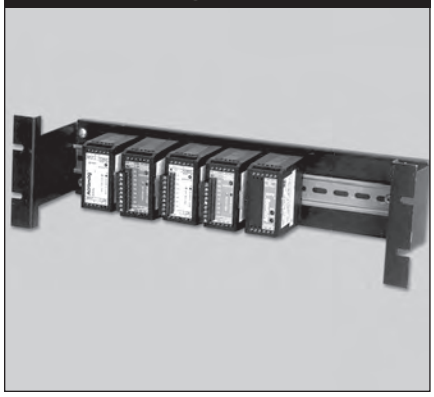
Output
24V DC, 2.1A (50W)



Ordering Information

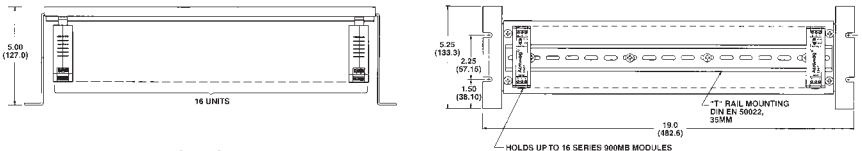
PS5R-VD24
Universal Power Supply

Mounting Hardware



DIN-Rail Mounting

For your convenience, Acromag offers several mounting accessories to simplify your system installation. Our 19" rack-mount kit provides a clean solution for mounting your I/O modules and a power supply. Or you can buy precut DIN rail strips for mounting on any flat surface.



Dimensions in inches (mm).

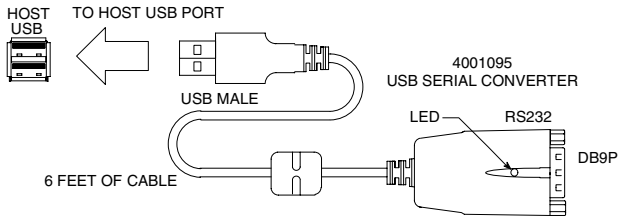
Ordering Information

20RM-16-DIN
19" rack-mount kit with DIN rail.

DIN RAIL 3.0
DIN RAIL 16.7
DIN rail strip, Type T, 3 inches (75mm) or 16.7 inches (425mm)

Accessories

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 (32-/64-bit) / Vista (32-/64-bit) / XP (32-/64-bit) / Server 2003 & 2008 (32-/64-bit) / 2000 / ME / 98SE / 98

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.

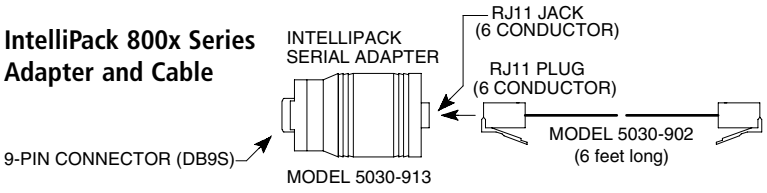
5032-287
RS-232 to 151T transmitter configuration device converter and cable, 6 ft.

5034-214
Non-isolated RS-232 to RS-485 Serial Port Converter, DB-9F to DB-9F.

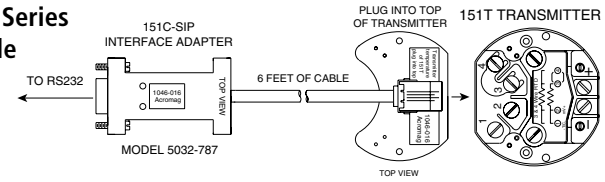
Cables

5030-902
Cable. 6 feet long with RJ11 plug at each end.

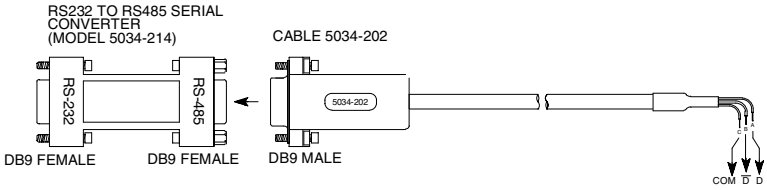
IntelliPack 800x Series Adapter and Cable



151T Transmitter Series Adapter and Cable



900MB Modbus Series Adapter and Cable



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