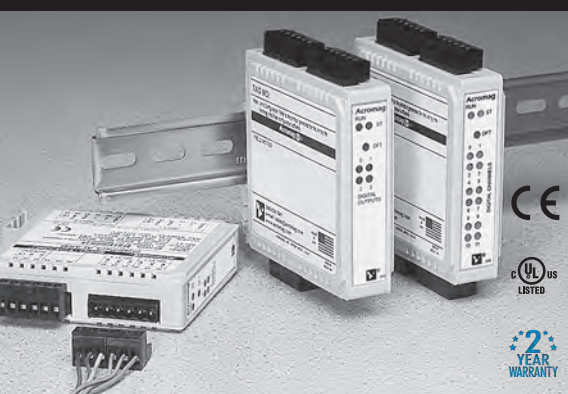## Modbus I/O Network

900MB Series Modbus-RTU I/O Modules

The 900MB series is a high-performance line of multi-function I/O modules. These units feature universal input/output ranges and an intelligent microcontroller to provide extreme flexibility and powerful monitoring and control capabilities. Select from a variety of analog and discrete I/O models to meet your application requirements.

To ensure unsurpassed performance, these I/O modules employ the latest digital technology. State-of-the-art flash microcontrollers plus optically isolated input, output, power, and network circuits increase noise/transient immunity and prevent ground loops. Status LEDs provide diagnostic feedback and visually indicate which channels are outside their calibrated range.

Sophisticated watchdog timer functions allow the application to define the module's failsafe output state. The watchdog timer invokes the failsafe condition when communication between the host and module exceed a duration specified by the application. For further security, a second hardware watchdog timer monitors the microcontroller for failed operations or a "lock-up" condition and automatically resets the unit.

■ Special Features

- High-speed RS-485 communication allows data transfers up to 115K baud

- Modbus RTU protocol interfaces to popular HMI and SCADA software packages

- Wide-range, polarity-insensitive power supply supports 10-36V DC and 24V AC sources

- Powerful watchdog timers allow user-defined failsafe state when host communication is lost

- Isolation eliminates potential ground loops between I/O, power, and network circuitry

- Default switch allows user to set module to known communication parameters

- Menu-based Windows® configuration software simplifies setup and trouble-shooting

■ Discrete I/O

These modules monitor discrete levels of various devices and/or provide on/off control capabilities depending on the model selected. Each module offers high channel density to save space and keep costs low. Models are available with twelve inputs, twelve outputs, or twelve bidirectional I/O channels.

Inputs
- Active-high inputs, 0 to 35V DC
- Active-low inputs, 0 to 35V DC

Outputs
- Sourcing outputs, 5.5 to 35V DC, 250mA
- Sinking outputs, 0 to 35V DC, up to 1A

Functions
- Monitor discrete state or level
- On/off control
- Activate audible or visual alarms
- Transmit discrete data to other control systems

■ Analog Input

These units monitor DC or thermocouple sensor inputs and provide alarm outputs if conditions exceed user-defined limits. Each module has four analog input channels and four discrete outputs for independent local alarms or host-controlled on/off switching.

Inputs
- DC current
- DC voltage
- DC millivolts
- Thermocouple
- RTD/resistance
- Frequency
- AC current

Outputs
- Open drain MOSFETs (1A solid-state switches)

Functions
- Temperature monitoring
- Process variable measurement
- Limit alarms with high and/or low setpoints
- On/off control

■ Analog Output

Analog output modules are ideal for controlling a wide variety of industrial machinery. The host defines the output of voltage or current signals to control speed, flow, temperature, frequency, level, force, torque, intensity, and many other properties. Each module has four analog output channels plus four discrete outputs for on/off switching applications.
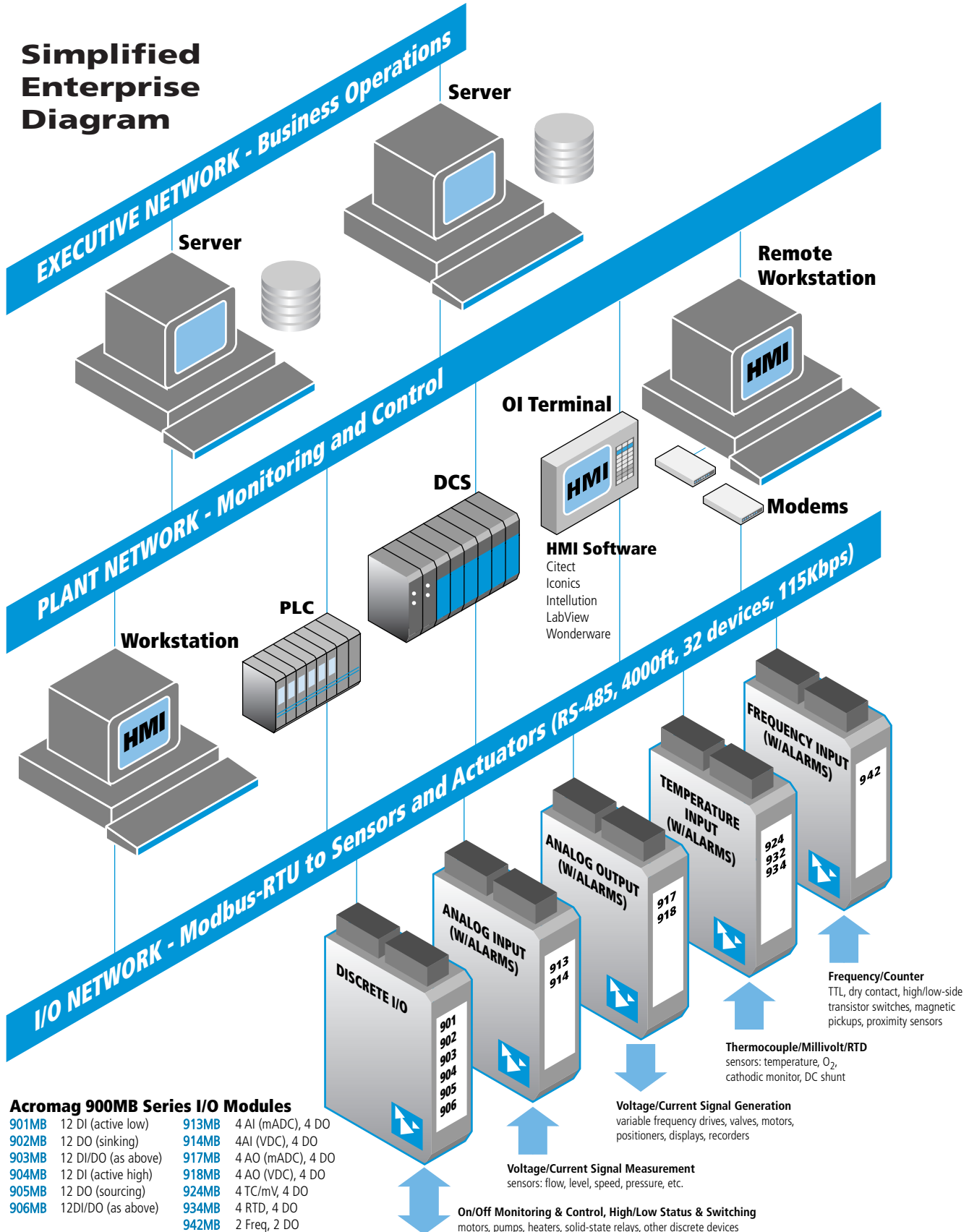
Outputs
- DC voltage
- DC current
- Open drain MOSFETs (1A solid-state switches)

Functions
- Write data to local displays or recorders
- Control drives, valves, and other equipment
- Transmit discrete data to other control systems
- On/off control (alarms)

BusWorks® Modbus I/O

Simplified Enterprise Diagram

EXECUTIVE NETWORK - Business Operations

Server

Server

Remote Workstation

HMI

PLANT NETWORK - Monitoring and Control

OI Terminal

HMI

DCS

Modems

HMI Software
Citect
Iconics
Intellution
LabView
Wonderware

PLC

Workstation

HMI

I/O NETWORK - Modbus-RTU to Sensors and Actuators (RS-485, 4000ft, 32 devices, 115Kbps)

FREQUENCY INPUT (W/ALARMS) — 942

TEMPERATURE INPUT (W/ALARMS) — 924 932 934

ANALOG OUTPUT (W/ALARMS) — 917 918

ANALOG INPUT (W/ALARMS) — 913 914

DISCRETE I/O — 901 902 903 904 905 906

Frequency/Counter
TTL, dry contact, high/low-side transistor switches, magnetic pickups, proximity sensors

Thermocouple/Millivolt/RTD
sensors: temperature, O_2, cathodic monitor, DC shunt

Voltage/Current Signal Generation
variable frequency drives, valves, motors, positioners, displays, recorders

Voltage/Current Signal Measurement
sensors: flow, level, speed, pressure, etc.

On/Off Monitoring & Control, High/Low Status & Switching
motors, pumps, heaters, solid-state relays, other discrete devices

Acromag 900MB Series I/O Modules

901MB	12 DI (active low)	913MB	4 AI (mADC), 4 DO
902MB	12 DO (sinking)	914MB	4AI (VDC), 4 DO
903MB	12 DI/DO (as above)	917MB	4 AO (mADC), 4 DO
904MB	12 DI (active high)	918MB	4 AO (VDC), 4 DO
905MB	12 DO (sourcing)	924MB	4 TC/mV, 4 DO
906MB	12DI/DO (as above)	934MB	4 RTD, 4 DO
		942MB	2 Freq, 2 DO

Acromag THE LEADER IN INDUSTRIAL I/O

Tel: 248-295-0880 e-mail: sales@acromag.com www.acromag.com

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BusWorks® Modbus I/O

■ Software Support

Series 900 I/O modules are compatible with popular Human-Machine Interface (HMI) software packages that support Modbus communication. The I/O modules may be configured using generic drivers provided with the HMI software to access the Modbus register maps.

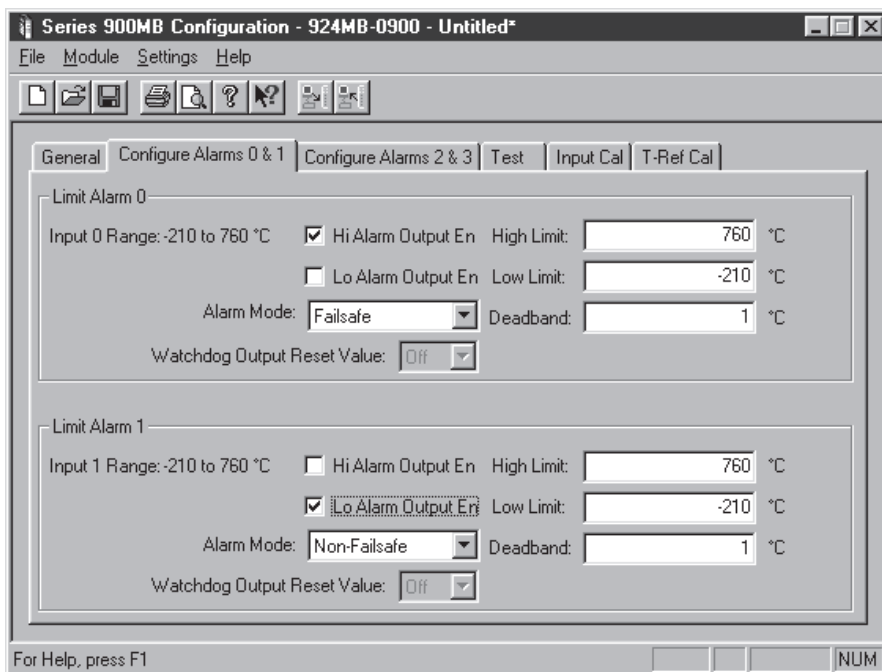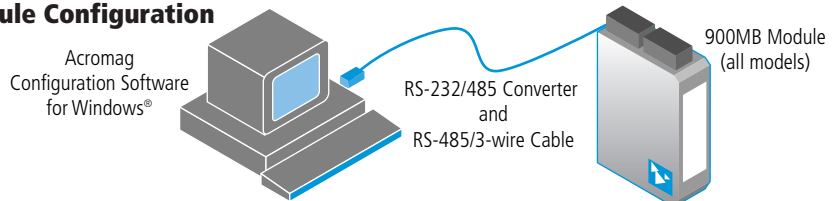A list of popular third-party HMI software manufacturers:

- ■ AB/Rockwell
- ■ Aveva
- ■ General Electric
- ■ Iconics
- ■ National Instruments
- ■ Phoenix Contact
- ■ Schneider
- ■ Wonderware

Acromag also offers a configuration utility for faster and easier setup. This software provides an intuitive approach to select configuration options for your application. Familiar Windows pull-down selection menus and fill-in-the-blank fields speed you through a few brief configuration screens. No programming is required. The utility also helps you monitor and verify proper operation of the module outside the main control software. This diagnostic tool provides a simple alternative to using Modbus register maps.
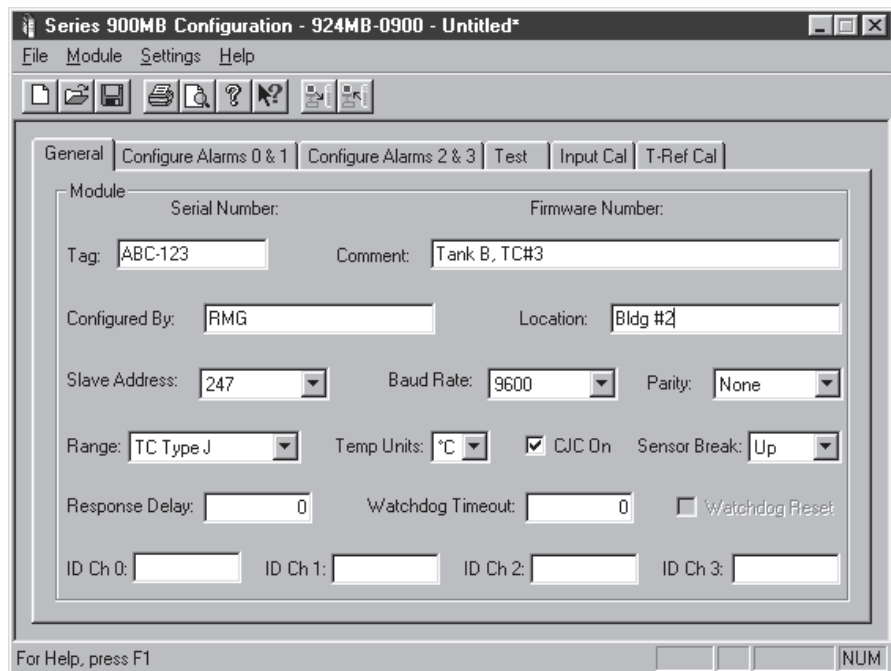
Acromag's configuration software can be used offline to set up a module and save the configuration to a file.

Module Configuration

Acromag Configuration Software for Windows®

RS-232/485 Converter and RS-485/3-wire Cable

900MB Module (all models)

■ Easy Configuration

Acromag's configuration software is designed for offline setup at a bench or in the field with a lap-top computer. Configuration settings can be saved to a file or printed for archival purposes. Setup is quick and easy using the steps below.

1) Connect the module to a PC with the cable and RS-232/485 converter (typical system). Apply power.

2) In the software, open a saved configuration or select the Module Upload option.

3) Configure the operating parameters as desired and download the configuration into the module.

4) Use the software's Test function to verify module operation and communication.

5) Install the module on the network.

Limit alarms are easy to configure with fill-in-the-blank fields in engineering units for high/low alarm setpoints.

■ 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.