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 ±0.001% of output span per °C, or ±1.0‰/°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°C (-40°F to +185°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.

<table>
<thead>
<tr>
<th>Output Range</th>
<th>Resolution</th>
<th>Accuracy (% span)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 1mA</td>
<td>0.554%</td>
<td>±2.0% (±0.002mA)</td>
</tr>
<tr>
<td>0 to 20mA</td>
<td>0.028%</td>
<td>±0.1% (±0.02mA)</td>
</tr>
<tr>
<td>4 to 20mA</td>
<td>0.035%</td>
<td>±0.1% (±0.02mA)</td>
</tr>
</tbody>
</table>

Maximum Output Current
22.5mA DC typical.

Integral Non-Linearity
±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.

<table>
<thead>
<tr>
<th>Output Range</th>
<th>Resolution</th>
<th>Accuracy (% span)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 1V</td>
<td>0.274%</td>
<td>±0.6% (±6mV)</td>
</tr>
<tr>
<td>0 to 5V</td>
<td>0.055%</td>
<td>±0.1% (±5mV)</td>
</tr>
<tr>
<td>0 to 10V</td>
<td>0.027%</td>
<td>±0.1% (±10mV)</td>
</tr>
</tbody>
</table>

Maximum Output Voltage
11.25V DC typical.

Integral Non-Linearity
±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
110µs rise time typical, 150µs 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 14 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.

Ordering Information

Models
917MB-0900
918MB-0900
DC current (917MB) or voltage (918MB) output module

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

4001-095
USB-to-RS232 adapter

TBK-802
Optional terminal block kit, barrier strip style, 4 pcs.

TBK-502
Optional terminal block kit, spring clamp style, 4 pcs.

PSSR-VB24
Power supply (24V DC, 2.1A)
900MB Series Technical Diagrams

NOTE: ALL DIMENSIONS ARE IN INCHES (MILLIMETERS)

PERSONAL COMPUTER
WITH 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
CONNECT WIRING AS SHOWN

900C-SIP COMMUNICATION CONNECTIONS

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

CAUTION: DO NOT CONNECT THE CABLE DIRECTLY TO THE PC WITHOUT THE CONVERTER, OR DAMAGE TO THE MODULE MAY RESULT.
**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, 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**
    - 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**
    - 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-VB: 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

**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

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