923-ST1MANIFOLD FC

- Automatically Selects In-Range Meter for Best Accuracy
- Automatic Valve Control/Meter Selection
- Displays Rate/Total Through Manifold
- Supports Pulse Producing Flowmeters Turbine, Positive Displacement, Coriolis, Vortex
- Volume, Corrected Volume or Mass Equation
- Universal Viscosity Curve (UVC) and Strouhal/Roshko Advanced Linearization Methods
- API 2540 Equations for Petroleum Fluids
- User Entry of Fluid Properties (10 Selectable)
- Menu Selectable Hardware & Software Features
- Data Logging of Rate/Total Over Wide Range

General Description:
The piping layout for a flow measurement manifold is shown in figure-1. Such flowmeter manifolds are used to increase the flow measurement turn down range beyond that which can be satisfied by a single flowmeter. The system is automatic in operation and will use the information being measured most accurately by either Flowmeter-1 (FM-1) or Flowmeter-2 (FM-2).

The flow measurement manifold consists of:
- High flow range flowmeter
- Low flow range flowmeter
- Bypass valve
- Flow Measurement Instrument/Controller (923-ST1-Manifold-FC)
- Interconnecting piping
- Ancillary temperature measurement devices (as needed)

The principle of operation is that the flow is always measured by the larger flowmeter. If the larger flowmeter indicates a flow rate measurement below its measurement range, a bypass valve is closed diverting all the fluid flow through the smaller flow meter where the measurement is then made. The operator will only see information based on the in-range meter.

In the case where the bypass valve is open, most of the flow is diverted around the smaller flowmeter. The portion of the fluid passing through the flowmeter may cause the meter to coast, but it will not be overranged.

Operation of the 923-ST1-Manifold-FC
A flowmeter manifold controller is a special flow instrument intended to accept inputs from two flowmeters, one larger and one smaller, and which also controls the bypass valve. The instrument setup contains the calibration information for both flowmeters as well as the manifold flow rate switch setpoint and hysteresis.
Specifications:

Flow Meters and Computations
- Meter Types: Supports pulse producing meters including: vortex, single rotor turbine, magnetic, PD flowmeter, Coriolis
- Linearization: 40 point table, UVC table or Strouhal/Roshko
- Computations: Volume, Corrected Volume & Mass
- Fluid Computations: Density, Temperature, Viscosity

Environmental
- Operating Temperature: 0°C to +50°C
- Storage Temperature: -40°C to +85°C
- Humidity: 0-95% Non-condensing
- Materials: U.L. approved

Approvals: CE Compliant, UL/CUL Listed

Display
- Type: 2 lines of 20 characters, LCD, OLED or VFD
- Character Size: 0.2” nominal
- User programmable label descriptors and units of measure

Keypad
- Keypad Type: Membrane Keypad with 16 keys
- Keypad Rating: Sealed to NEMA 4X / IP65

Enclosure
- Size: See Dimensions
- Depth behind panel: 6.5” including mating connector
- Type: DIN
- Materials: Plastic, UL94V-0, Flame retardant
- Bezel: Textured per matt finish

Fluid Types
- General Purpose, User entry of fluid properties for up to 10 fluids.

Real Time Clock
- The 923-ST1-Manifold-FC is equipped with a battery backed real time clock with display of time and date.
- Format:
  - 12 or 24 hour time display
  - Day, Month, Year date display

Excitation Voltage
- Menu Selectable: 5, 12 or 24 VDC @ 100 mA (fault protected with self resetting fuse)

Power Input
- The factory equipped power option is internally fused. An internal line to line filter capacitor and MOV are provided for added transient suppression.
  - 110 VAC Power: 85 to 127 Vrms, 50/60 Hz
  - 220 VAC Power: 170 to 276 Vrms, 50/60 Hz
  - DC Power:
    - 12 VDC (10 to 14 VDC)
    - 24 VDC (14 to 28 VDC)
- Power Consumption:
  - AC: 11.0 VA (11W)
  - DC: 300 mA max.

Flow Inputs:
- Pulse Inputs:
  - Number of Flow Inputs: 2, one for larger and one for smaller flowmeters
  - Input Impedance: 10 KΩ nominal
  - Pullup Resistance: 10 KΩ to 5 VDC (menu selectable)
  - Pull Down Resistance: 10 KΩ to common
  - Trigger Level: (menu selectable)
    - High Level Input
      - Logic On: 3 to 30 VDC
      - Logic Off: 0 to 1 VDC
    - Low Level Input (mag pickup)
      - Sensitivity: 10 mV or 100 mV
  - Minimum Count Speed: Menu selectable: 1-99 seconds
  - Maximum Count Speed: Menu Selectable: 40Hz, 3000Hz or 20 kHz
  - Overvoltage Protection: 50 VDC

Control Inputs
- Switch Inputs are menu selectable for Reset, Lock, Inhibit, Alarm Acknowledge, Print, or Not Used.
- Control Input Specifications
  - Number of Control Inputs: 3
  - Input Scan Rate: 10 scans per second
  - Logic 1: 4 - 30 VDC
  - Logic 0: 0 - 0.8 VDC
  - Input Impedance: 100 KΩ
- Control Activation:
  - Positive Edge or Pos. Level based on product definition for switch usage.

http://www.flowmetrics.com
Bulletin 923-ST1MANIFOLD FC - 03/15
Auxiliary / Compensation Inputs
The auxiliary/compensation inputs are menu selectable for manifold temperature, small meter temperature or not used. These inputs are used for the compensated inputs when performing compensated flow calculations. They can also be used as a general purpose input for display and alarming.
Number of inputs: 2
Operation: Ratiometric
Accuracy: 0.02% FS at 20° C (current input)
Basic Measurement Resolution: 16 bit
Update Rate: 1 update/sec minimum
Automatic Fault detection:
  Signal Over-range/under-range
  Current Loop Broken
  Fault mode to user defined default settings
Fault Protection:
  Reverse Polarity: No ill effects
  Over-Voltage Limit (Voltage Input): 50 VDC

Available Input Ranges
  Current (Two): 4-20 mA, 0-20 mA
  RTD: (One) 100 Ohm DIN RTD Standard Three Wire
  Thermistor (One) - Consult Factory

Isolated Analog Output
The analog output is menu assignable to correspond to the Manifold Rate/Total, Temperature, Computed Density.
Type: Isolated Current Sourcing
Available Ranges: 4-20 mA, 0-20 mA
Resolution: 12 bit
Accuracy: 0.05% FS at 20° C
Update Rate: 1 update/sec minimum
Temperature Drift: Less than 200 ppm/C
Maximum Load: 1000 ohms (at nominal line voltage)
Compliance Effect: Less than .05% Span
60 Hz rejection: 40 dB minimum
Calibration: Operator assisted Learn Mode
Averaging: User entry of damping constant to cause a smooth control action

Isolated Pulse output
The isolated pulse output is menu assignable to Manifold Total.
Pulse Output Form: Photo MOS Relay
Maximum On Current: 100 mA
Maximum Off Voltage: 30 VDC
Saturation Voltage: 1.0 VDC
Maximum Off Current: 0.1 mA
Pulse Duration: 10 mSec or 100 mSec (user selectable)
Pulse output buffer: 256
Fault Protection
  Reverse polarity: Shunt Diode

Serial Communication
The serial port can be used for printing, data recording, and/or communication with a computer.
RS-232:
  Device ID: 01-99
  Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200
  Parity: None, Odd, Even
  Handshaking: None, Software, Hardware
  Print Setup: Configurable print list and formatting
RS-485: (optional 2nd COM port)
  Device ID: 01-247
  Baud Rates: 2400, 4800, 9600, 19200
  Parity: None, Odd, Even
  Protocol: Modbus RTU (Half Duplex)

Setup Diskette Capabilities
Capabilities include: View Live Results Configure unit, Upload and Download to unit, Load and Save to file, Print Setup,

Data Logging Capabilities
Capabilities:
  Permits unit to automatically gather data during use.
Data Log List:
  User selectable: includes Large/Small Temperatures, Density, Viscosity, Large/Small and Manifold Rate/Totalizers, Grand Totalizer, Time and Date, Fluid, Setpoint 1 & 2, Frequency 1 & 2, K-Factor 1 & 2.
Data Log Event Trigger:
  selectable: includes interval, time of day, front key, external contact, end of batch
Data Log Format:
  selectable: Printer format, Database CSV format
Data Transmission:
  Selectable: Output may be transmitted immediately or held in data log for later polling
Remote Request Capabilities include:
  Send data log, clear data log

External Modem Support Capabilities:
Compatibility: Hayes compatible
Polling Capabilities:
  Answers incoming calls, responds to requests for information of action
Call Out Capabilities:
  Can initiate call on user selectable event condition, or upon error
Error Handling:
  Supports multiple retry, automatic disconnect upon loss of line or remote inactivity
Terminal Designations

Example  923-ST1MANIFOLDFC  L 1  A 0  P

Series:

Display Type:
L= LCD
O= OLED
V= VFD

Input Type:
1= 110 VAC
2= 220 VAC
3= 12 VDC (10 to 14 VDC)
4= 24 VDC (14 to 28 VDC)

Relays:
A= 2 SPDT Relays
B= 4 SPDT Relays (optional)

Network Card:
0= None (STD)
2= RS485/Modbus (optional 2nd COM port)

Mounting:
P= Panel Mount ........................................ (see Fig. 1)
N= NEMA 4 Wall Mount
W= NEMA 12/13 Wall Mount w/ Clear Cover ....... (see Fig.2)
E= Explosion Proof (No Button Access)

Options:
TB= RS485 Terminal Block for Panel Mount Enclosure
ET= Extended Temperature
-4°F to 131°F (-20°C to 55°C)
IM = Internal Modem
M = Modem Power Option

Accessories:
OPC/DDE Server for RS232 Port available, see EX5-UCOND-NA00
OPC/DDE Server for Modbus Suite available, see EX5-MDBUS-NA00
Modem Available, see MPP-56KN and MPP-2400N
Serial printer available, see P1000, P295
Ethernet Port Server available, see IEPS
Ethernet Port Server Modbus TCP available, see ADAM4572
RS-422/485 to RS-232 Communication Adapter available, see CA285
RS232 Extender Cable: P/N=13220<length in inches>

Fig. 1: Standard Dimensions

Fig. 2: Wall Mount ("W" mounting option) Dimensions