

# 924-ST2

## Multi-Function Flow Computer

- "EZ Setup"- Guided Setup for First Time Users
- Liquid, Gas, Steam and Heat Flow Equations
- Utility Metering
- Menu Selectable Hardware & Software Features
- Internal Data Logging Option
- Isolated Pulse, Analog and Relay Outputs Standard
- RS-232 Port Standard, Modbus RTU RS-485 Optional
- Windows™ Setup Software
- NX19 Gas Equations, Stacked DP Transmitters
- DDE Server & HMI Software Available
- Remote Metering by Wireless or Modem and TROLlink Remote Metering Software Available



### Description:

The 924-ST2 Flow Computer satisfies the instrument requirements for a variety of flowmeter types in liquid, gas, steam and heat applications. Multiple flow equations are available in a single instrument with many advanced features.

The alphanumeric display offers measured parameters in easy to understand format. Manual access to measurements and display scrolling is supported

The versatility of the Flow Computer permits a wide measure of versatility within the instrument package. The various hardware inputs and outputs can be "soft" assigned to meet a variety of common application needs. The user "soft selects" the usage of each input/output while configuring the instrument. Consider the following illustrative examples.

The isolated analog output can be chosen to follow the volume flow, corrected volume flow, mass flow, temperature, pressure, or density by means of a menu selection. Most hardware features are assignable by this method.

The user can assign the standard RS-232 Serial Port for external data logging, transaction printing, or for connection to a modem for remote meter reading.

A Service or Test mode is provided to assist the user during start-up system check out by monitoring inputs and exercising outputs. The system setup can also be printed.

### Specifications:

#### Environmental

Operating Temperature: 0 to +50 C  
 Storage Temperature: -40 to +85 C  
 Humidity : 0-95% Non-condensing  
 Materials: UL, CSA, VDE approved

#### Display

Type: 2 lines of 20 characters  
 Types: Backlit LCD, OLED and VFD ordering options  
 Character Size: 0.2" nominal  
 User selectable label descriptors and units of measure

#### Keypad

Keypad Type: Membrane Keypad  
 Keypad Rating: Sealed to Nema 4  
 Number of keys: 16  
 Keypad Rating: Sealed to NEMA 4X / IP65

## Enclosure

Enclosure Options: Panel, Wall, Explosion Proof  
Size: See Dimensions  
Depth behind panel: 6.5" including mating connector  
Type: DIN  
Materials: Plastic, UL94V-0, Flame retardant  
Bezel: Textured per matt finish

## Power Input

The factory equipped power option is internally fused. An internal line to line filter capacitor is provided for added transient suppression. MOV protection for surge transient is also supported  
Universal AC Power: 85 to 276 Vrms, 50/60 Hz  
DC Power Option: 24 VDC (16 to 48 VDC)  
Power Consumption  
AC Power: 6.5 V/A (6.5W)  
DC Power: 300 mA max.

## Flow Meter Types:

Linear: Vortex, Turbine, Positive Displacement, Magnetic, GilFlo, GilFlo 16 point, ILVA 16 Point and others  
Square Law: Orifice, Venturi, Nozzle, V-Cone, Wedge, Averaging Pitot, Target and others  
Multi-Point Linearization: May be used with all flowmeter types. Including: 16 point, UVC and dynamic compensation.

## Flow Inputs:

### Analog Input:

Accuracy: 0.02% FS at 20° C  
Ranges  
Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC  
Current: 4-20 mA, 0-20 mA,  
4-20 mA stacked, 0-20 mA stacked  
Basic Measurement Resolution: 16 bit  
Update Rate: 4 updates/sec  
Automatic Fault detection: Signal over/under-range, Current Loop Broken  
Calibration: Operator assisted learn mode  
Extended calibration: Learns Zero and Full Scale of each range  
Fault Protection:  
Fast Transient: 500 V Protection (capacitive clamp)  
Reverse Polarity: No ill effects  
Over-Voltage Limit: 50 VDC Over voltage protection  
Over-Current Protection: Internally current limited protected to 24VDC

## Pulse Inputs:

Number of Flow Inputs: one  
Input Impedance: 10 k  $\Omega$  nominal  
Trigger Level: (menu selectable)  
High Level Input  
Logic On: 2.5 to 30 VDC  
Logic Off: 0 to 2 VDC  
Low Level Input (mag pickup)  
Selectable sensitivity: 10 mV and 100 mV  
Minimum Count Speed: 0.25 Hz (to maintain rate display)  
Maximum Count Speed: Selectable: 0 to 50 kHz  
Overvoltage Protection: 50 VDC  
Update Speed: 1 update/sec.

## Temperature, Pressure, Density Inputs

The compensation inputs usage are menu selectable for temperature, temperature 2, pressure, density or not used.

Calibration: Operator assisted learn mode

Operation: Ratiometric

Basic Measurement Resolution: 16 bit

Update Rate: 2 updates/sec minimum

Automatic Fault detection:

Signal Over-range/under-range

Current Loop Broken

RTD short

RTD open

Reverse Polarity: No ill effects

Over-Current Limit

(current input) Internally limited to protect input to 24 VDC

Available Input Ranges

Current: 4-20 mA, 0-20 mA

Resistance: 100 Ohms DIN RTD

Accuracy: 0.02% FS at 20° C

100 Ohm DIN RTD (DIN 43-760, BS 1904):

Three Wire Lead Compensation

Internal RTD linearization learns ice point resistance

1 mA Excitation current with reverse polarity protection

Temperature Resolution: 0.1°C

Temperature Accuracy: 0.5°

## Stored Information (ROM)

Steam Tables (saturated & superheated),

Fluid Properties: Water, Air, Natural Gas, A Variety of User Entered Industrial Fluids or Generic.

## User Entered Stored Information (EEPROM / Nonvolatile RAM)

Transmitter Ranges, Signal Types  
Fluid Properties  
(reference density, expansion factor, specific heat, viscosity, isentropic exponent, combustion heating value, Z factor)  
Units Selections (English/Metric)  
Language Translations (optional)

## Excitation Voltage

24 VDC @ 100 mA (fault protected with self resetting fuse)

## Relay Outputs

The relay outputs usage is menu assignable to (Individually for each relay) Hi/Lo Rate Alarm, Hi/Lo Temperature Alarm, Hi/Lo Pressure Alarm, Pulse Output (pulse options), Wet Steam or General purpose warning (security).  
Number of relays: 2 (3 optional)  
Contact Style: Form C contacts (Form A with 3 relay option)  
Contact Ratings: 240 V, 5 amp

## Analog Outputs

The analog outputs are menu assignable to correspond to the Uncompensated Volume Rate, Corrected Volume Rate, Mass Rate, Heat Rate, Temperature, Density, Pressure or Delta Temperature.

Number of Outputs: 2  
Type: Isolated Current Sourcing (shared common)  
Available Ranges: 0-20 mA, 4-20 mA (menu selectable)  
Resolution: 16 bit  
Accuracy: 0.05% FS at 20 Degrees C  
Update Rate: 5 updates/sec  
Temperature Drift: Less than 200 ppm/C  
Maximum Load: 1000 ohms  
Compliance Effect: Less than .05% Span  
60 Hz rejection: 40 dB minimum  
EMI: No effect at 3 V/M  
Calibration: Operator assisted Learn Mode  
Averaging: User entry of DSP Averaging constant to cause a smooth control action

**Listing:** CE Compliant, UL/C-UL Pending

## Serial Communication

The serial port can be used for printing, datalogging, modem connection, two way paging and 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: 300, 600, 1200, 2400, 4800, 9600, 19200

Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

## Data Logging

The data logger captures print list information to internal storage for approximately 5000 transactions. This information can be used for later uploading or printing. Storage format is selectable for Comma-Carriage Return or Printer formats.

## Isolated Pulse output

The isolated pulse output is menu assignable to Uncompensated Volume Total, Compensated Volume Total, Heat Total or Mass Total.

Pulse Output Form (menu selectable): Open Collector

NPN or 24 VDC voltage pulse

Nominal On Voltage: 24 VDC

Maximum Sink Current: 25 mA

Maximum Source Current: 25 mA

Maximum Off Voltage: 30 VDC

Saturation Voltage: 0.4 VDC

Pulse Duration: User selectable

Pulse output buffer: 8 bit

Fault Protection

Reverse polarity:

Shunt Diodes

Over-current Protected

Over-voltage Protected

## Real Time Clock

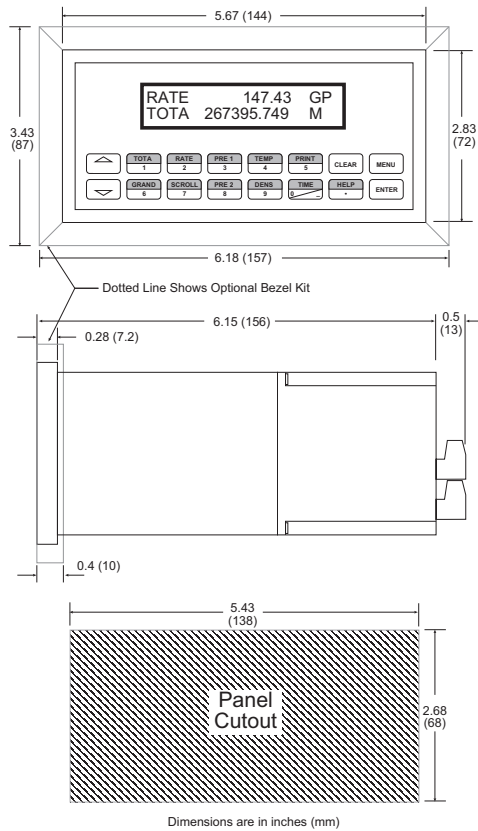
The Flow Computer is equipped with a pseudo nonvolatile real time clock with display of time and date.

Format:

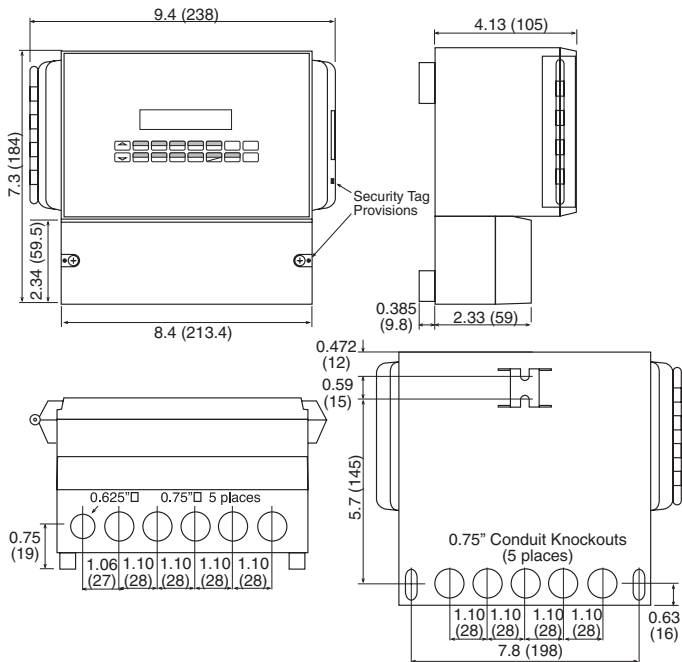
24 hour format for time

Day, Month, Year for date

**Fig. 1: Standard Dimensions**



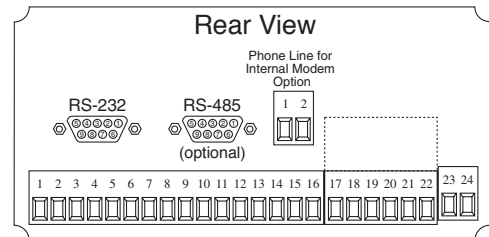
**Fig. 2: Wall Mount (“W” mounting option) Dimensions**



**Terminal Designations**

1	DC OUTPUT	FLOW	IN (+)	IN (+)	TEMPERATURE	IN (+)	IN (+)	PRESSURE	IN (+)	ANALOG OUTPUT 1 (+)	ANALOG OUTPUT 2 (+)	ANALOG OUTPUT COMMON (-)	NO	COM RLY1	NC	COM RLY2	NO	AC LINE	DC (+)	POWER IN
2	PULSE IN		Vin (+)	lin (+)																
3	-----																			
4	COMMON																			
5	RTD EXCIT (+)																			
6	RTD SENS (+)																			
7	RTD SENS (-)																			
8	DC OUTPUT																			
9	RTD EXCIT (+)																			
10	RTD SENS (+)																			
11	RTD SENS (-)																			
12	PULSE OUTPUT (+)																			
13	PULSE OUTPUT (-)																			
14	ANALOG OUTPUT 1 (+)																			
15	ANALOG OUTPUT 2 (+)																			
16	ANALOG OUTPUT COMMON (-)																			
17	NO																			
18	COM RLY1																			
19	NC																			
20	NC																			
21	COM RLY2																			
22	NO																			
23	AC LINE																			
24	AC LINE																			

**Terminal Layout**



**Ordering Information**

**Example** 924-ST2 L 1 0 P M

**Series:** \_\_\_\_\_

**Display Type:** \_\_\_\_\_  
 L= LCD  
 O= OLED  
 V= VFD

**Input Power:** \_\_\_\_\_  
 1= 85 to 276 VAC  
 3= 24 VDC (16 to 48 VDC)

**Network Card:** \_\_\_\_\_  
 0= None  
 1= RS485/Modbus (optional 2nd COM port)

**Mounting:** \_\_\_\_\_  
 P= Panel Mount  
 N= NEMA 4 Wall Mount  
 W= NEMA 12/13 Wall Mount w/ Clear Cover  
 E= Explosion Proof (No Button Access)

- Options:** \_\_\_\_\_
- 1 = Peak Demand
  - 2 = AGA NX-19 calculation for natural gas
  - 3 = Three Relays
  - 4 = Stacked DP option
  - 5 = Datalogger option (consult factory)
  - 6 = Stack Emissions Controller option
  - 7 = Manifold Flowmeter Controller option
  - 9 = 3 Relay Super Chip (options 1, 2, 4, 6, 7)
  - 10 = 2 Relay Super Chip (options 1, 2, 4, 6, 7)
  - 13 = Superchip; 2 relay, Positive heat only
  - 14 = Superchip; 3 relay, Positive heat only
  - ET= Extended Temperature; -4°F to 131°F (-20°C to 55°C)
  - IM = Internal Modem
  - M = Modem Power Option
  - TB= RS485 Terminal Block for Panel Mount Enclosure

**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>