

# 1. General Information

## Description

The Model FR73B (Basic) Mini Flow Monitor/Transducer (Figure 1-1) is an instrument that is capable of measuring small amounts of forward as well as reverse flow of gas or liquid. The instrument can also detect liquid level or fluid media interfaces. The instrument has a field adjustable alarm set point and a buffered voltage output. The output of the alarm set point are relay contacts that can be used to control customer process applications.

## Theory of Operation

The instruments are of a thermal dispersion design. The technology provides accurate, reliable and dependable repeatability of flow rate.

## Sensing Element

The sensing element is of an in-line design. It has the inlet at the top and the outlet at the bottom of a flow chamber. The chamber contains three thermowells (hollow tubes). Two of the thermowells contain Resistance Temperature Detectors (RTD's) and the third contains a heater element. The elements are configured so both of the RTD's are heated. The reference sensor is at the top of the chamber, the heater element is at the center and the active sensor is at the bottom. When there is no flow, the flow chamber and the sensing elements are at equilibrium, with the reference sensor at a higher temperature than that of the active sensor. This produces a negative resistance difference (Delta R) and is zeroed out by the control circuit. As the flow rate increases from top to bottom, the flow current cools down the reference sensor. At the same time the flow current pushes more heat onto the active sensor. This produces a positive Delta R and is represented by a positive mV signal from the control circuit. If flow is reversed, the flow current coming from the bottom will cool the active sensor and will push heat onto the reference sensor. This will produce a negative Delta R and is represented by a negative mV signal from the control circuit.

## Control Circuit

The control circuit converts the RTD Delta R into a DC millivolt signal. This signal is used to drive an alarm circuit which can be set in either the positive or negative flow curve and uses a relay as it's output. The control circuit also provides a millivolt output signal.

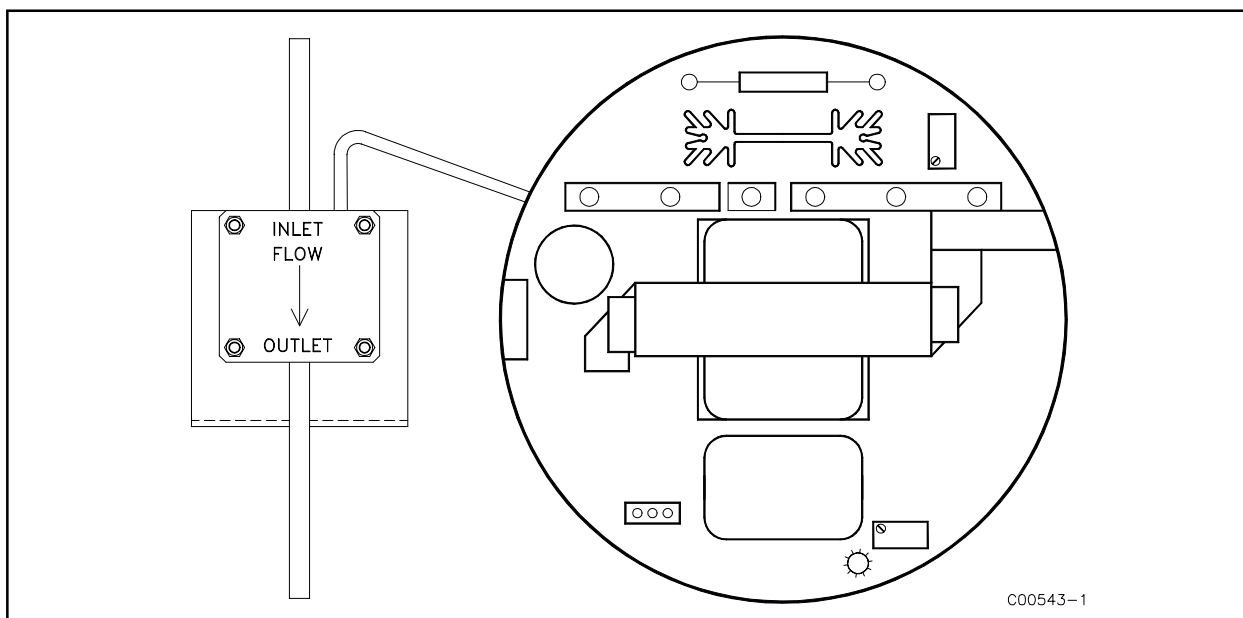


Figure 1-1 FR73B Mini-Flow Monitor/Transducer

## Technical Specifications

- **Sensing Element Range**

Water: 0.01 to 1.25 cc/min  
Oil: 0.04 to 2 cc/min  
Air: 1 to 1000 cc/min

- **Adjustable Response Time**

1 to 150 seconds.

- **Process Connection**

1/8 inch (3.2 mm) O.D. 316 stainless steel tubing

- **In-line Sensor Assembly Body Length**

7.0 ±1/4 inch (180 mm ±6.4 mm)

- **Enclosure Classification**

Standard: No enclosure

Option:  
Feralloy epoxy coated and resists the effects of  
weather and corrosion Type 4

- **Sensing Element Operating Conditions**

Temperature: -100 to 350° F (-73 to 176° C)  
Pressure: To 1000 psig [69 bar(g)]  
Repeatability: 1% of full signal range at constant  
process conditions

- **Input Power**

115 ±15 or 230 ±30 Vac, 50/60 Hz; or 22 to  
30 Vdc, 6 Watts

- **Relay Contacts**

SPDT rated at 2 amps at 115 Vac and 24 Vdc or  
1 amp at 230 Vac, plus millivolt output ±500 mV  
10 megohm minimum input impedance. Coil de-  
energized at no-flow (default) or de-energized at  
flow (field selectable)

- **10 Feet of Cable is Standard**