

1. General Information

Description

The MT91 is an air and gas mass multipoint flowmeter that incorporates a remote flow element connected to a microprocessor control and display package (flow transmitter) designed to measure mass flow in ducts, stacks, or places where irregular flow may reduce the accuracy of single point metering. The MT91 measures mass flow from up to 16 different sensing points. An average of all individual flow signals produces an output signal representing total mass flow. The MT91 can be factory calibrated to sense a range of mass flow from 0.25 SFPS to 150 SFPS in air at standard temperature and pressure (70°F at 14.7 PSIA).

Flow Element

The flow element holds all of the individual sensing points. Each sensing point consists of two pairs of thermowells of the same size and shape (see Figure 1-1). One thermowell pair contains a heater and an active Resistance Temperature Detector (RTD). The second pair contains the reference RTD and a thermal mass equalizer.

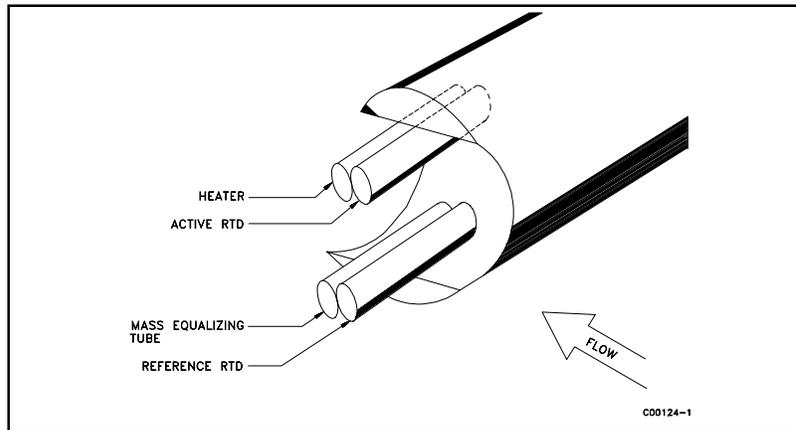


Figure 1-1. Flow Element Cutaway View of One Sensing Point

Flow Transmitter

The flow transmitter assembly provides power for the flow element, measure the Temperature Differential (DT) between the active and reference sensors for each individual sensing point, and averages all flow signals to one output signal. Available outputs options are field programmable to select 4-20 mA, 0-10 Vdc, 0-5 Vdc, digital, with relay output signals. Three serial communication ports, EIA-232C (RS-232C), EIA-422 (RS-422), or EIA-485 (RS-485), are also field selectable and programmable for output signals. Parameters are programmable using the keypad or serial communication interface. See Figure 1-2.

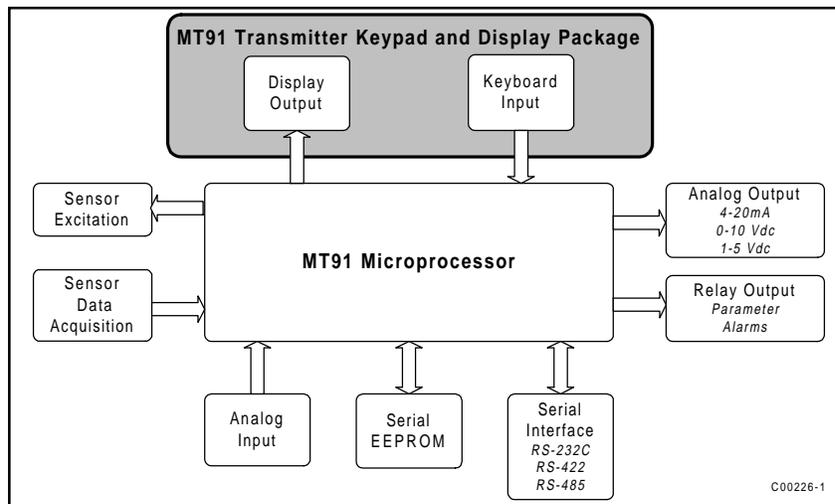


Figure 1-2. Functional Block Diagram

Theory of Operation

The flow element has multiple sensing points that consists of two pairs of thermowells of the same size, shape and mass. One pair contains a platinum RTD and a heater element. The other pair contains one RTD. The RTD located next to the heater element is called the active sensor. The other RTD is referred to as the reference sensor. Since the active sensor is adjacent to the heater, the temperature at the walls of the thermowell are always above the temperature of the process media. The temperature at the reference sensor is the temperature of the process media. When the process media is flowing past the active sensor a quantity of heat is carried off into the flow stream. The amount of heat taken from the active sensor is a function of the process media mass flow rate. A DT exists between the two pairs of thermowells and a proportional DR exists between the active and the reference sensors. The DR is measured by the flow transmitter. The relationship of DT to the mass flow rate is calculated by the flow transmitter and is converted into a signal and is sent to the flow transmitter's display.

Specifications

Process Connection

2 inch male NPT or 3 inch 150 lb. raised-face carbon steel flange. Other flange connection sizes and materials available.

Insertion Length

Variable

Material of Construction

All wetted surfaces are 316 Stainless Steel with nickel brazed joints per process specification AMS 4777. Hastelloy C-276 and other materials and electroless nickel plating also available.

Enclosure

Flow element: NEMA 4. NEMA 7 optional.
Flow transmitter Assembly: NEMA 4 or 19 inch
Rackmount in accordance with DIN 41494 part 1, ANSI/EIA-RS-310C. NEMA 7 optional.

Temperature Range for Flow Element

Low -50° to 350°F (-45° to 178°C)

High 350° to 850°F (178° to 458°C)

Temperature Range for Flow Transmitter

0° to 140°F (-18° to 60°C)*

* The LCD display will not function in temperatures below 32°F (0°C).

Operating Pressure

Up to 50 psig (3.5 barg)

Power Requirements

85 to 265 Vac, 47 to 63 Hz, 3.5 Amp fused 20 to 32 Vdc 24 Vdc nominal

Electrical Connection

1 inch female NPT

Relay Rating

2 relays per relay output board. Relays are DPDT, 0.3A at 125 Vac, 0.3A at 110 Vdc, 1.0A at 30 Vdc.