

1. General Information

Description

The MT86 and MT86HT is an air and gas mass multipoint flowmeter that incorporates a flow element(s) that is connected to a flow transmitter. Together they are designed to measure the mass flow in pipes, ducts or stacks. The flowmeter accurately measures the irregular flow profiles found in pipes, ducts or stacks. An MT86 or MT86HT measures flow from up to eight individual sensing points. An average of the individual flow signals gives an output signal that represents the total mass flow. This output signal will operate up to four different output modules of choice.

Operating Principles

The flowmeter has flow elements containing sensing points that are connected to the flow transmitter (control circuit boards) by a wiring harness. The flow elements and the flow transmitter are usually separated by some distance that in some cases can be up to 1000 feet (300m). The output that comes from the flow transmitter goes to the customer's applications, such as valve control circuitry, alarms or meters. The operational theory of the flow element sensing points and the flow transmitter are as discussed below.

Flow Element

The flow element consists of 2 to 8 sensing points. Each sensing point has two pairs of thermowells (metal tubes) of the same size and shape. Each pair of thermowells is welded together. One thermowell pair has a heating element placed in one tube and an active Resistance Thermal Detector (RTD) placed in the other tube. The other thermowell pair has a reference RTD placed in one tube and an empty thermowell tube that is for mass equalization. See Figure 1-1 for a cut away view of one sensing point.

The two pairs of thermowells are physically separated by a distance that allows the process media to flow between them and yet prevents thermal interaction between the two pair.

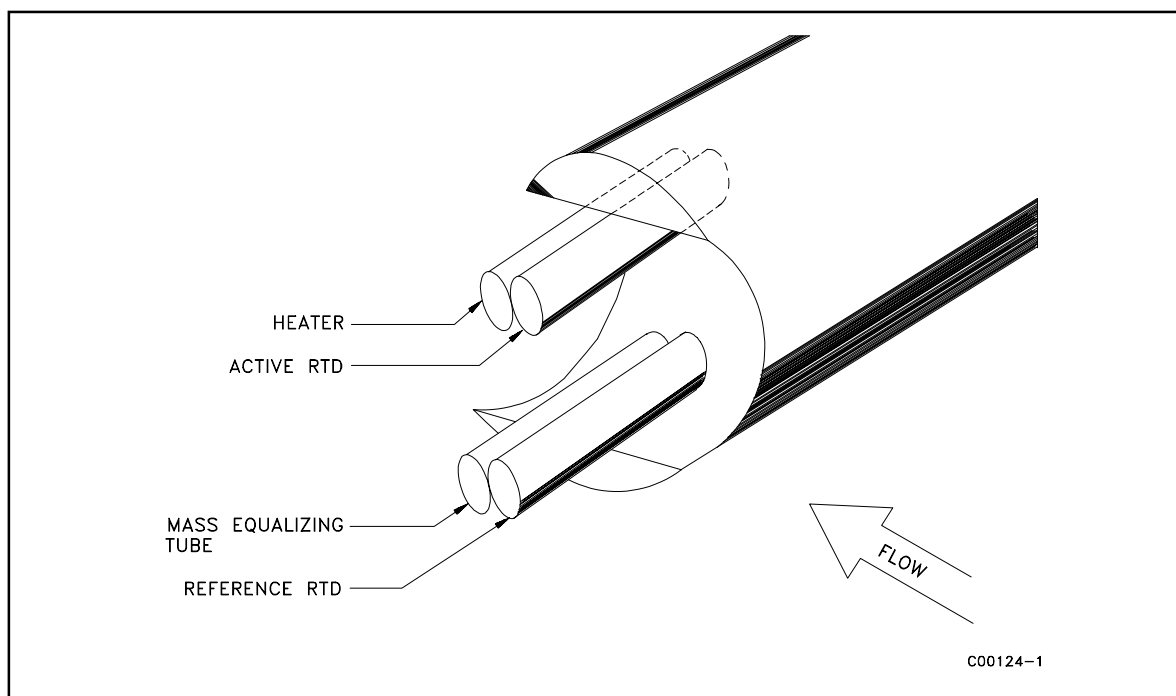


Figure 1-1. Cut-Away View of One Sensing Point

Flow Transmitter

The flow transmitter measures the voltage differential (DV) produced by the temperature differential (DT) between the active and reference RTDs for each individual sensing point. The flow transmitter amplifies the DV signal and converts it into a signal that is temperature compensated and linearized. The linearized signals from the sensing points are then averaged together and converted into the final output signal (4-20 mA, 0-5 Vdc, 0-10 Vdc, etc.) as specified by the customer.

The flow transmitter has a diagnostic alarm. If a problem exists with a sensing point, a Light-Emitting-Diode (LED) on the control board will flash to notify the customer.

Technical Specifications

- **Process connection**
 - 2 inch male NPT or 2 inch 150 lb. raised-face carbon steel flange.
- **Number of sensing points**
 - Up to and including 8 sensing points.
- **Insertion length**
 - The duct dimensions at the measurement site determine the insertion U-Length.
- **Material of construction**
 - All wetted parts are 316 stainless steel with nickel-braze, per MIL-B-7883 using AMS 4777
- **Local enclosure (flow element terminal strip enclosure)**
 - NEMA 4 enclosure with 1 inch female NPT connection ports.
- **Operating pressure**
 - Standard MT86 is 0-50 PSIG or higher on application.
- **Operating temperature**
 - Standard flow element: -50 to 350°F (-46 to 177°C).
 - High temperature (HT) element: -50 to 850°F (-46 to 454°C).
 - Flow transmitter: 0 to +150°F (-18 to 66°C) with LCD or -50 to 150°F (-46 to 66°C) without LCD.
- **Flow range**
 - 0.25 to 150 fps in gas under standard conditions (14.7 PSIA @ 70°F).
- **Flow element assemblies**
 - May have 1, 2, 3 or 4 separate flow element assemblies. Must contain a minimum of 2 sensing points per flow element.
- **Remote enclosure (flow transmitter control circuit enclosure)**
 - NEMA 4 enclosure with 1 inch female NPT connection ports.
- **Input power**
 - Standard 100-130 Vac or 200-270 Vac, 50/60 Hz, 50 watt maximum. Optional 24 Vdc, 50 watt max.
- **Output signal**
 - 4-20 mA current loop capable of driving a 1000 ohm load. Optional:
 - 10-50 mA, 400 ohm load max.
 - 0-5 Vdc, 2 mA current max.
 - 1-5 Vdc, 2 mA current max.
 - 0-10 Vdc, 2 mA current max.
- **Interconnecting cable**
 - 24 AWG (min.) 8-conductor shielded cable with PVC insulation (100 feet maximum). Longer distances are possible using a heavier gauge wire for the heater circuit (see Table 2-1).
- **Turn down ratio**
 - 2:1 to 100:1 within flow element range customer specified.
- **Accuracy**
 - ± 3% of full scale at the temperature of calibration; ±5% of full scale with temperature compensation over a range spanning 200°F. Manufacturer determines the accuracy for specific duct configurations upon submittal of a fully completed Multipoint Mass Flowmeter Application Data Sheet.
- **Repeatability**
 - ± 1% of full scale.
- **Approvals**
 - F.M., C.S.A., and CENELEC approvals are available for all MT Series Multipoint Mass Flowmeters.

Options

- **Enclosures**

Explosion-proof NEMA 7 electrical enclosure is available for both the flow element and flow transmitter that complies with NEC Code, Class I, Divisions 1 & 2, Groups C & D; Class II, Divisions 1 & 2, Groups E, F, & G.

- **Flow Display Indicators**

- 1) A three-and-one-half digit Flow Rate Display.
- 2) An eight digit Flow Totalizer Display.

- **Available Outputs (up to four module circuit boards)**

Switch point: DPDT relay at 2 or 10 amp, 115 Vac.

Milliamp driver:

Current loop, 4-20 or 10-50 mA.

Analog voltage output:

0-5, 0-10, or 1-5 Vdc.

Remote sensor diagnostic alarm:

SPDT relay, 6A at 115 Vac.

- **Rate Limit Board**

Permits adjustment of the rate of change of the output signal with respect to the rate of change of the input signal. This option is used when the measured flow is fluctuating and a stable output signal is needed.

- **Mass-to-Volume Converter**

Changes the mass flow signal to a signal representing actual cubic feet per minute or feet per second (actual velocity).

- **Accessories**

The FC81 Field Calibrator simplifies calibration verification of an MT86/MT86HT in the field. This device provides the variable resistance required to input a Delta "R" test value and a digital read-out of the test output signal.

