



ADTECH
Analog-Digital Technology, Inc.

The Adtech Model MFM 32 Mass Flow Module consists of a single module that will provide both temperature and static pressure correction of a differential pressure measurement taken across an orifice plate.

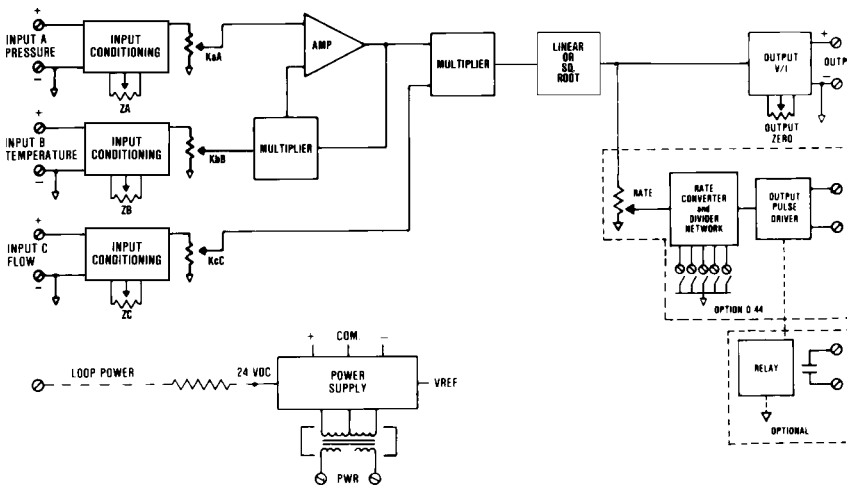
The computation performed is expressed as: $\text{Mass flow} = K\sqrt{\frac{P \times \Delta P}{T}}$ where P and ΔP are the absolute static pressure and the differential pressure, and T is the absolute temperature. Both P & T are internally converted to absolute units.

The classic mass flow equation stated above takes into account gas density changes due to both temperature and pressure variations. It provides accurate flow information to facilitate computation of accurate "energy fluids content" in various compressible gases, i.e. those following the ideal gas law.

An exclusive output option (O 44) provides a pulse rate output along with the standard analog output. This eliminates the need for a separate linear integrator, LIT 56, if the output is to be totalized.

The inputs accept standard process voltages and currents for all three variables. The MFM 32 also provides 24 VDC for two-wire transmitter excitation.

The MFM 32 may also be used for linear flow compensation, and the equation becomes $M = K_0 + K \frac{\text{Flow} \times P}{T}$.



Features

- **Computation:** Linear or square root flows
- **Normalization:** Pressure and temperature
- **Basic Equations:**

$$\text{Squared Input} \quad M = K_0 + K\sqrt{\frac{P \times \Delta P}{T}}$$

$$\text{Linear Input} \quad M = K_0 + K \frac{\text{Flow} \times P}{T}$$

- **DC Current Inputs:** 4-20 mA, etc.
- **DC Voltage Inputs:** 1-5 VDC, etc.
- **High Input Impedance:** 10 megohms minimum
- **Zero-based Inputs:** Current and voltage
- **DC Process Signal Outputs:** Current and voltage
- **Repeatability:** $\pm 0.02\%$ of span
- **High Accuracy:** $\pm 0.01\%$ of span

Mass Flow Module

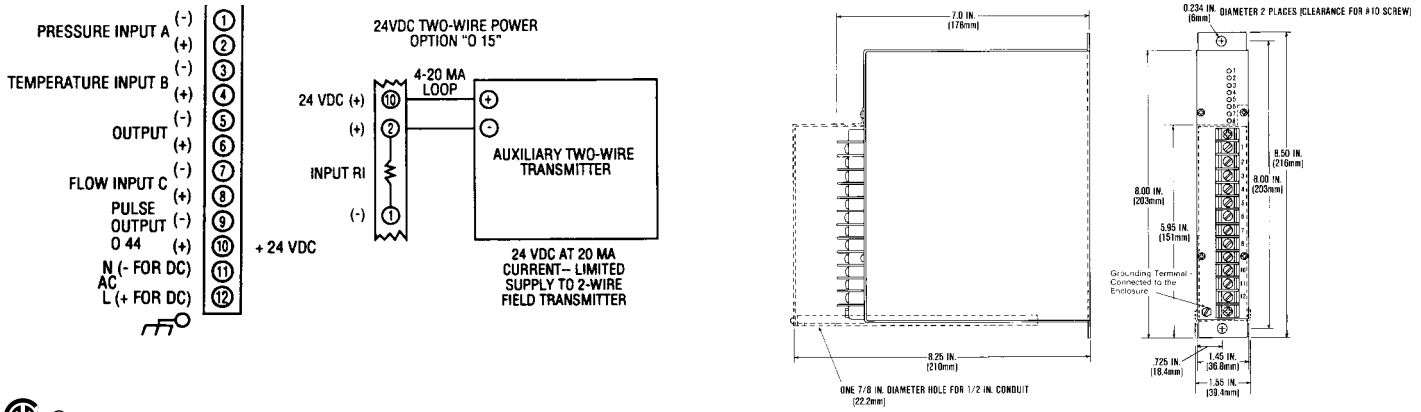
Model No. MFM 32

Typical Applications

- **Correcting gas flows to standard temperature and pressure conditions for totalization**
- **Surge control of centrifugal compressors**
- **Control of gas reactions based on mass flow**
- **Computation of energy content of fuel gases**



Connections/Dimensions



Input/Output

Input Signals

- 4-20 mA DC (Z in 250 ohms)
- 10-50 mA DC (Z in 100 ohms)
- 0-1 mA DC (Z in 5k ohms)
- 0-10 mA DC (Z in 500 ohms)
- 1-5 VDC (Z in 10 megohms)
- 0-5 VDC (Z in 10 megohms)
- 0-10 VDC (Z in 1 megohm)

Other zero-based current and voltages are available.
Low impedance current inputs, 1/10 standard. (Option I 18).

Output Signals/Output Drive (RL)

Signal	AC Power (RL)	DC Power (RL)
4-20 mA DC	0-1,000 ohms max.	0-900 ohms max.
10-50 mA DC	0-400 ohms max.	0-350 ohms max.
0-1 mA DC	0-20,000 ohms max.	0-18,000 ohms max.
1-5 VDC	100k ohms min.	100k ohms min.
0-10 VDC	200k ohms min.	200k ohms min.

Performance

Calibrated Accuracy: $\pm 0.1\%$ referred to input

Linearity: $\pm 0.25\%$ max., $\pm 0.1\%$ typical

Repeatability: $\pm 0.05\%$ maximum

Temperature Stability: $\pm 0.01\%/^{\circ}\text{F}$ max.,
 $\pm 0.004\%/^{\circ}\text{F}$ typical

Load Effect: $\pm 0.01\%$ zero to full load

Note: All accuracies are given as a percentage of span.

Output Ripple: 10 mV P/P maximum

Response Time: 150 milliseconds

Temperature Range: 0° to 140°F (-18° to 60°C)
operating; -40° to 185°F (-40° to 85°C) storage

Power Supply Effect: $\pm 0.05\%$ for a $\pm 10\%$
power variation

Power

115 VAC: 50/60 Hz, 0.7 PF (Standard)

12 VDC: Isolated (Option P8)

24 VDC: Non-isolated (Option P1)

24 VDC: Isolated (Option P2)

48 VDC: Isolated (Option P3)

125 VDC: Isolated (105-140 VDC) (Option P4)

230 VAC: 50/60 Hz, 0.7 PF (Option P5)

Note: All units 3 watts maximum, with a $\pm 10\%$ power variation unless noted.

Mechanical

Electrical Classification: General purpose

Connection: Barrier terminal strip (3/8" spacing, No. 6 screws)

Controls: Multiturn output zero; KA, ZA, KB, ZB, KC, and ZC scaling controls; and optional rate control

Mounting: Surface mounting standard. See Housings Section for options.

Weight: Net Unit: 2.6 pounds (1.18 kilograms); Shipping: 3.0 pounds (1.36 kilograms)

Options

Option Number

I 14

Description

Voltage inputs to 200 VDC, 1 megohm min. impedance; current inputs of 100 mA max.

I 18

Low impedance DC current inputs (1/10 of standard Z)

O 11

Bipolar voltage to ± 10 VDC: at 1 mA, bipolar current ± 1 mA

O 15

Two-wire transmitter excitation

O 44 & O 59

Pulse output

H 10

Thin-line conduit mounting plate and terminal cover

H 13B, H 14B, H 15B

NEMA 4, 7, and 12 enclosures

H 16

PFA 12 high-density, plug-in enclosure

Ordering Information

- Model number
- Input signals
- Input transmitter ranges
- Reference temperature, pressure, and flow
- Output signal
- Input/output options
- Prime power with option no.
- Housing and miscellaneous options

Please refer to the Housing and/or Option Section for more specific and detailed information.

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Information subject to change without notice.