

# IN-LINE THERMAL MASS FLOWMETERS & CONTROLLERS

MTMFM-Series

**Introduction:**

**MTMC** series of thermal mass flow meter/controllers are available in more than 100 different modes, virtually offering solution to flow measurement/control for any gas and liquid in varied flow range i.e. 1.0 micro grams per minutes to 100 kilo grams per minutes. These flow meters are offered in material like SS-316 (ceramic/Teflon coating), polypropylene, derlin etc to make up with corrosional, rheological, thermodynamical and other pertinent physical parameters of fluid/gas under measurement. On account of above, these flow meters are first choice for any medical diagnostic, agro, biomedical, petrochemical, organic/inorganic chemical, I, microelectronics, thin film deposition, moms, piezoelectric, super conductivity, Gas blending, leak detection, many other for academic and defense industries.

**Operating Principle:**

Fluid Gases passing through adiabatically sealed capillary removes certain heat, thereby creatin differential temperature between upstream/low stream flow from constant temperature heating element depending upon its density, mass flow rate , ambient temperature and surface area of heater., under steady state, Mass flow rate of gas is proportional to power of heater. As explained under.....

**Heat removed by moving gas**

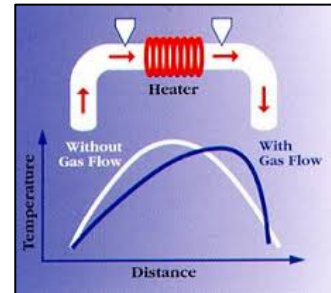
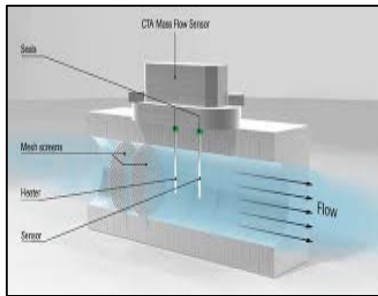
$H = f(\rho U \times T)$  Where *H*: Lost heat *ρ*: Density, *U*: Velocity *T*: Differential temperature gas and heated tubule  
**Heat generated by heater element is ....**

$W = f(V \times I)$ , *W*: Generated heat: Supplied voltage *I*: Supplied current, Under balance condition.....

$\rho U = f(V \times I)$  and as The total flow rate is calculated from the velocity and the cross section area of flow path:

$Q = \rho U \times A$  Where *Q*: Flow rate *U*: Average velocity *A*: Cross section area of flow path

$M = K1.T_d + K4.T_f^2 - K3.T_d^3 + K2.T_d^4$



MTMFM- 500

pictorial view of construction of MFC

redistribution of temperature under flow

**ELECTRICAL/MECHANICAL SPECIFICATIONS OF MASS FLOW METER/ CONTROLLER**

FLOW RANGE <100,000.0 LPH(S.T.P.)

model	Flow range (sccm)	Size(inch)	Accuracy	Repeatability	Flow tube-Liner	O.D.P.	leak rate	Output signal VOLT/D.C.
MTMFM-0001	100.0	1/2	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0002	200.0	3/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0004	480.0	1.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0007	700.0	1.5	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0010	1000.0	2.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0020	2000.0	3.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0050	5000.0	4.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0100	10000.0	6.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0200	20000.0	8.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0500	50000.0	10.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-1000	100,000.0	14.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0

**DIGITAL TYPE THERMAL FLOW CONTROLLER SPECIFICATION:**

- Operating voltage 220 volts/28 volts D.C.
- Excitation frequency 2.5/7.5/15.0/25.0 Hz
- Accuracy 98% of set point
- Repeatability 100 percent
- Response time 0.5 -1.1 milli-seconds
- Interface Signal 0.0-12.0 volts D.C.(proportional to flow range)
- Flow range 10.0 LPM - 100.0 kilo LPM
- Step down ratio 1:50(1:100)
- Flow tube material SS-316/Brass/DERELIN with option of flange coupling
- Electrode material SS-316/Has-alloy
- Control option Flow rate/totalization control against set point  
Multi flow synchronized control (interactively)
- Display 3 1/2 & 4 1/2 digit red glow LED/LCD display
- Controller size 48x48x96, 72x72x96, 96x96x192



FLOW COMPUTER-MTMFM-0800

**MOTORON SEMICONDUCTORS CORPORATION**

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# INSERTION TYPE THERMAL MASS FLOWMETERS & CONTROLLERS

MTMFM-Series

## ELECTRICAL/MECHANICAL SPECIFICATIONS OF MASS FLOW METER/CONTROLLER

FLOW RANGE &lt;10.0sccm(S.T.P.)

model	Flow range (sccm)	Size(inch)	Accuracy	Repeatability	Flow tube-Liner	O.D.P.	leak rate	Output signal VOLT/D.C.
MTMFM-0001a	0.01	1/2	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0002a	0.02	3/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0004a	0.05	1.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0007a	0.01	1.5	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0010a	0.02	2.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0020a	0.05	3.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0050a	0.10	4.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0100a	0.20	6.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0200a	0.50	8.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0500a	10.0	10.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0800a	20.0	12.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-1000a	50.0	14.0	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0

## ELECTRICAL/MECHANICAL SPECIFICATIONS OF MASS FLOW METER /CONTROLLER

FLOW RANGE <10.0x10<sup>-3</sup>sccm(S.T.P.)

model	Flow range sccm x10 <sup>-3</sup>	Size(inch)	Accuracy	Repeatability	Flow tube-Liner	O.D.P.	leak rate	Output signal VOLT/D.C.
MTMFM-0001b	0.01	1/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0002b	0.02	1/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0004b	0.05	1/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0007b	0.01	1/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0010b	0.02	1/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0020b	0.05	1/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0050b	0.10	1/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0100b	0.20	1/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0200b	0.50	1/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0500b	10.0	1/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-0800b	20.0	1/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0
MTMFM-1000b	50.0	1/4	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-5.0

## ELECTRICAL/MECHANICAL SPECIFICATIONS OF MASS FLOW METER /CONTROLLER

FLOW RANGE &lt;20,000 LPM

model	Flow range (LPM)x10 <sup>-4</sup>	Size(inch)	Accuracy	Repeatability	Flow tube-Liner	O.D.P.	leak rate	Output signal
MTMFM-00013	1000.0	1/option	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0/5.0
MTMFM-00023	2000.0	1/option	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0/5.0
MTMFM-00043	4800.0	2/option	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0/5.0
MTMFM-00073	7000.0	2/option	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0/5.0
MTMFM-00103	10,000.0	3/option	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0/5.0
MTMFM-00203	20,000.0	3/option	99.5	100	Ceramic/PP	2000	<1.8x10	0.0-12.0/5.0

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