

MASS FLOW METERS

DIMENSIONS (not including fittings)

GM1	Models up to 15 sL/min: 3"W x 5 1/2"H x 1"D
GM3/GM4	30 to 100 sL/min models: 3 5/8"W x 6"H x 1 1/4"D
GM5	200 sL/min models: 12"W x 9"H x 2 1/2"D
GM6	500 sL/min models: 12"W x 10"H x 3 1/2"D
GM7	1000 sL/min models: 12"W x 11 1/2"H x 5"D

MODEL	FLOW RATE [std liters/min]	MAXIMUM PRESSURE DROP		
		[mm H ₂ O]	[psid]	[mbar]
GM1	up to 10	25	0.04	2.5
GM3	20	300	0.44	30
	30	800	1.18	81
	40	1480	2.18	150
	50	2200	3.23	223
GM4	60	3100	4.56	314
	80	4422	6.5	448
	100	5500	8.08	557
GM5	200	272	4.0	28
GM6	500	340	5.0	34
GM7	1000	612	9.0	62

*SPECIFICATIONS

ACCURACY: GM 1, 3 and 4: ±1.0% of full scale.
GM 5, 6 and 7: ±1.5% of full scale.
OPTIONAL ENHANCED ACCURACY: ±1.0% of full scale.

CALIBRATIONS: Performed at standard conditions [14.7 psia (101.4 kPa) and 70 °F (21.1 °C)] unless otherwise requested.

REPEATABILITY: ±0.25% of full scale.

RESPONSE TIME: Generally 2 seconds to within ±2% of actual flow rate over 25 to 100% of full scale.

TEMPERATURE COEFFICIENT: 0.15% of full scale / °C.

PRESSURE COEFFICIENT: 0.01% of full scale / psi (0.07 bar).

MAXIMUM PRESSURE DROP: See Table 3.

GAS and AMBIENT TEMP.: 32 °F to 122 °F (0 °C to 50 °C). 14 °F to 122 °F (-10 °C to 50 °C) - Dry gases only.

OUTPUT SIGNALS: Linear 0-5 Vdc. 1000 ohms min. load impedance and 4-20 mA 0-500 Ohms loop resistance.

TRANSDUCER INPUT POWER: Universal +12 to +26 VDC, 200 mA maximum.

TIME CONSTANT: 800 ms.

GAS PRESSURE: 1000 psig (70 bars) maximum GM 1, 3, 4. 20 psig (1.4 bars) optimum.
500 psig (34.5 bars) GM 5, 6, 7. 20 psig (1.4 bars) optimum.

**** MATERIALS IN FLUID CONTACT:**

- Aluminum models GM Series: anodized aluminum, 316 stainless steel, brass and FKMO-rings.
- Stainless steel models GM1S, 3S,4S, 5S, 67S and 7S: 316 stainless steel and FKM O-rings. Optional O-rings: Buna®, EPR and Kalrez®.

ATTITUDE SENSITIVITY: No greater than +15 degree rotation from horizontal to vertical; standard calibration is in horizontal position.

CONNECTIONS:

- GM 1: 1/4" compression fittings.
Optional: 6mm, 3/8" and 1/8" compression fittings or 1/4" VCR®.
- GM 3: 1/4" compression fittings.
Optional: 6mm and 3/8" compression fittings or 1/4" VCR®.
- GM 4: 3/8" compression fittings.
- GM 5: 3/8" compression fittings.
- GM 6: 1/2" compression fittings.
- GM 7: 3/4" FNPT fittings or 3/4" compression fittings.

LEAK INTEGRITY: 1 x 10⁻⁹ sL/sec of helium maximum to the outside environment.

CE COMPLIANT: EN 55011 class 1, class B; EN50082-1.



MASS FLOW METERS

A low cost solution to thermal mass flow metering for gases is presented by Dakota's mass flow meter line.

The mass flow meter design combines the convenience and accuracy of conventional mass flow devices with low costs previously unattainable.

Each of these meters incorporate an advanced straight tube sensor in conjunction with flow passage elements constructed of aluminum and brass for non-corrosive gases or 316 stainless steel for corrosive applications.

GENERAL DESCRIPTION

Compact, self contained Mass Flow Meters are designed to read flow rates of gases. The rugged design coupled with instrumentation grade accuracy provides versatile and economical means of flow control.

Aluminum or stainless steel models with readout options of either engineering units (standard) or 0 to 100 percent displays are available.

The mechanical layout of the design includes an LCD readout built into the top of the transducer. This readout module is tiltable over 90 degrees to provide optimal reading comfort. It is connected to the transducer by a standard modular plug, and is also readily removable for remote reading installations. Transducers without LCD readout are offered for OEM applications.

Mass flow meters are available with flow ranges from 10 sccm to 1000 sL/min N2. Gases are connected by means of 1/4", 3/8", 1/2" compression fittings and 3/4" FNPT fittings. Optional fittings are available. These controllers may be used as bench top units or mounted by means of screws in the base.

** The selection of materials of construction, is the responsibility of the customer. The company accepts no liability.*

Aluminum and Stainless Mass Flow Meters



DESIGN FEATURES

- ✓ Rigid metallic construction.
- ✓ Maximum pressure of 1000 psig (70 bars) for GM1, GM3, GM4 models. 500 psig for GM5, GM6 and GM7.
- ✓ Leak integrity 1×10^{-9} of helium.
- ✓ NIST traceable certification.
- ✓ Built-in tiltable LCD readout.
- ✓ 0-5 Vdc and 4-20 mA signals.
- ✓ Circuit protection.
- ✓ Can be used as a portable device.
- ✓ Engineering units or 0 to 100% displays.
- ✓ Totalizer option.

**Flow rates are unaffected
by temperature
and pressure variations
within stated limitations.**

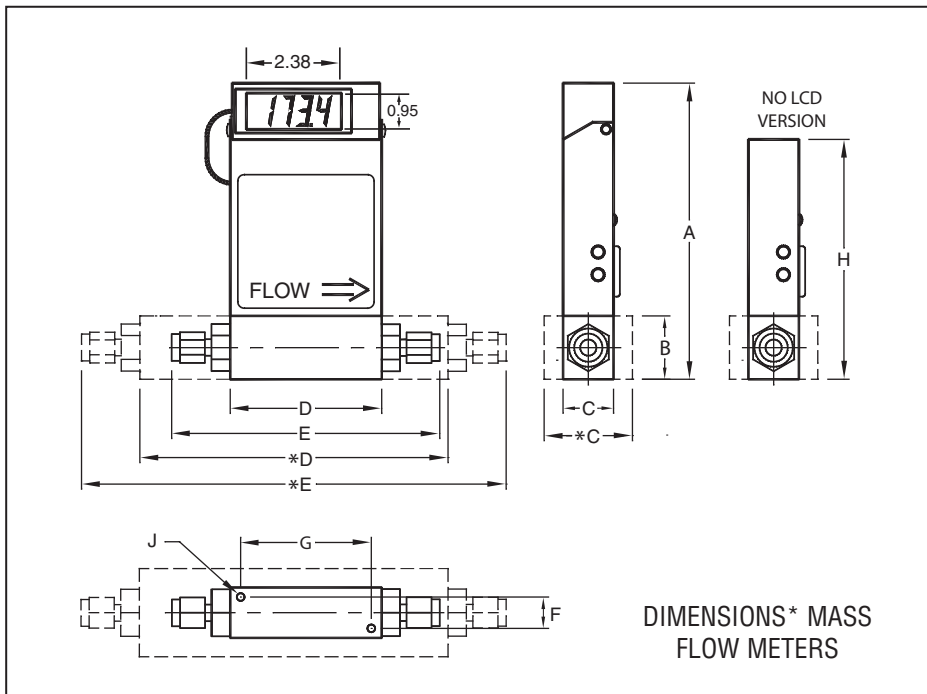
PRINCIPLES OF OPERATION

Metered gases are divided into two laminar flow paths, one through the primary flow conduit, and the other through a capillary sensor tube. Both flow conduits are designed to ensure laminar flows and therefore the ratio of their flow rates is constant.

Two precision temperature sensing windings on the sensor tube are heated, and when flow takes place, gas carries heat from the upstream to the downstream windings. The resultant temperature differential is proportional to the change in resistance of the sensor windings.

Output signals of 0 to 5Vdc and 4 to 20mA are generated indicating mass molecular based flow rates of the metered gas.

Flow rates are unaffected by temperature and pressure variations within stated limitations.



MODEL	CONNECTION Compression Fitting (except model GM7)	DIMENSION (INCH)								
		LCD VERSION							NO LCD	MOUNTING HOLE
		A	B	C	D	E	F	G		
GM1	1/4" Tube O Diameter	5.72	1.00	1.13	3.00	5.02	0.69	2.69	4.61	6-32
				*C	*D	*E				
GM3	1/4" Tube O Diameter	6.10	1.37	1.25	4.13	6.15	0.69	2.69	4.99	6-32
GM4	3/8" Tube O Diameter	6.10	1.37	1.25	4.13	6.27	0.69	2.69	4.99	6-32
GM5	3/8" Tube O Diameter	6.73	2.00	1.75	6.69	8.83	0.99	4.69	5.62	10-24
GM6	1/2" Tube O Diameter	7.64	3.00	3.00	7.25	9.67	2.250	6.750	6.53	1/4-20
GM7	3/4" NPT Female	8.66	4.00	4.00	7.30	-	3.000	6.800	7.55	1/4-20