FMO Series
Mass flow sensors for gases

FEATURES

- **Ranges 0...±25 and 0...±1000 sccm[1]**
- **Bidirectional sensing**
- **Actual mass flow sensing**
- **Ceramic flow tube**
- **Manifold mount/O-ring sealed**
- **Sensortechnics PRO services**

MEDIA COMPATIBILITY

To be used with dry gases only.
The FMOM025HB is a special sensor for hydrogen (H_2) flow.

The FMO series is NOT designed for liquid flow and will be damaged by liquid flow through the sensor.

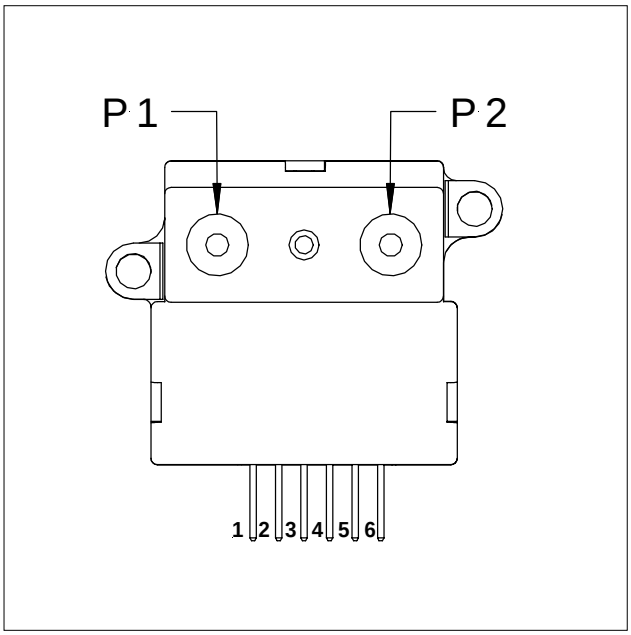
SPECIFICATIONS

Maximum ratings

Supply voltage[2]	8 to 15 V typ. 10 ±0.01 V
Power consumption	max. 60 mW
Temperature limits	
Operating	-40 to 125°C
Storage	-40 to 125°C
Mechanical shock	100 g (5 drops, 6 axes)

Note:
[1] sccm denotes standard cubic centimeters per minute
[2] Output voltage is ratiometric to supply voltage

ELECTRICAL CONNECTION



FLOW SENSOR CHARACTERISTICS[3]

(V_S = 10 ±0.01 V, T_A = 25°C)

Part no.	Flow range (full scale)	Max. flow change[4]	Output voltage @ trim point
FMOM025HB	±25 sccm	5.0 l/sec	8.5 ±1.5 mV @ 25 sccm
FMOL001DB	±1000 sccm	5.0 l/sec	54.7 ±3.7 mV @ 1000 sccm

PERFORMANCE CHARACTERISTICS

(V_S = 10 ±0.01 V, T_A = 25°C)

Characteristics				Min.	Typ.	Max.	Unit
Zero offset			FMOM025HB	-1.0	0	1.0	mV
			FMOL001DB	-1.5	0	1.5	
Repeatability and hysteresis (combined)			FMOM025HB			±0.35	% reading
			FMOL001DB			±0.50	
Temperature effects[5]	Offset	-25 to 85 °C			±0.20		mV
	Span	-25 to 25 °C			2.5		% reading
		25 to 85 °C			-2.5		
Response time					1.0	3.0	ms
Common mode pressure						150	psi

Notes:
[3] A 5 micron filter is recommended for all devices.
[4] Maximum allowable rate of flow change to prevent damage.
[5] Shift is relative to 25 °C.

FLOW SPECIFICATIONS

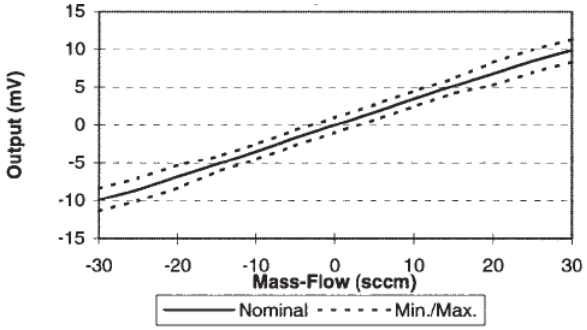
(V_S = 10 ±0.01 V, T_A = 25°C)

FMOM025HB				FMOL001DB			
Press. (µbar)	**Flow (sccm)[6]**	Nom. (mV)	Tol. (± mV)	Press. (mbar)	**Flow (sccm)[6]**	Nom. (mV)	Tol. (± mV)
20	**30**	9.9	1.5	2.23	**1000**	54.7	2.0
17	**25**	8.5	1.5	1.52	**800**	53.0	2.0
14	**20**	6.8	1.5	0.94	**600**	49.3	2.5
10	**15**	5.2	1.0	0.49	**400**	42.5	3.5
7	**10**	3.5	1.0	0.19	**200**	29.8	4.0
3	**5**	1.7	1.0	0.00	**0**	0.0	1.5
0	**0**	0.0	1.0	-0.19	**-200**	-29.8	4.0
				-0.49	**-400**	-42.5	5.0
				-0.94	**-600**	-49.3	6.0
				-1.52	**-800**	-53.0	6.0
				-2.23	**-1000**	-55.2	6.0

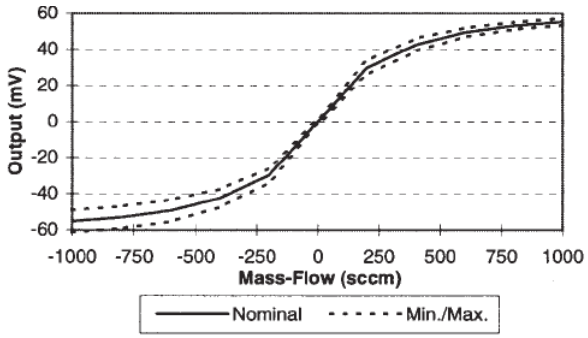
Note:
[6] Devices are calibrated in mass flow. Tolerance values apply to calibration type only.

OUTPUT VS. FLOW CURVES

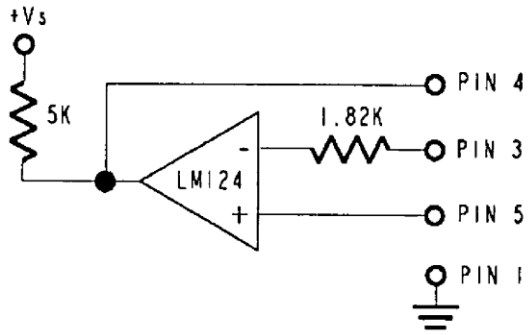
FMOM025HB



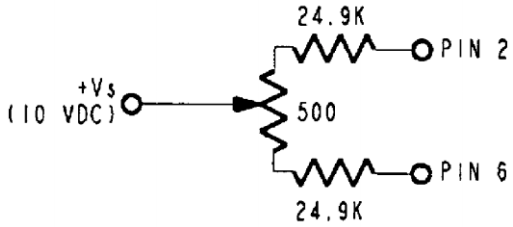
FMOL001DB



HEATER CONTROL CIRCUIT

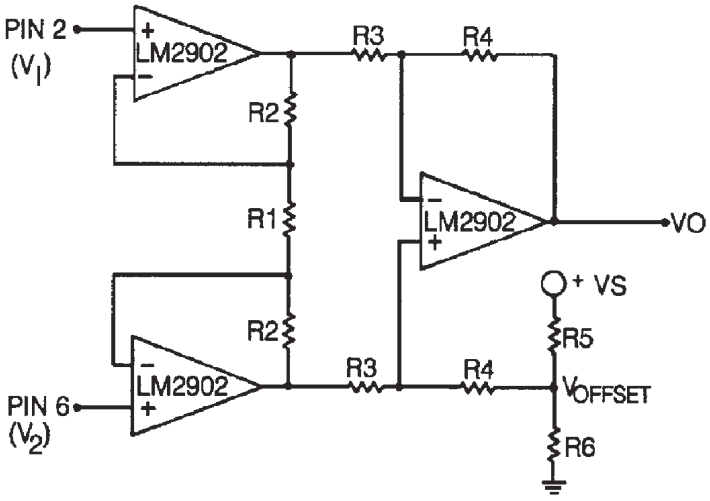


SENSING BRIDGE SUPPLY CIRCUIT



Note:
These circuits are required for operation per specifications. Circuits are not on board the sensor.

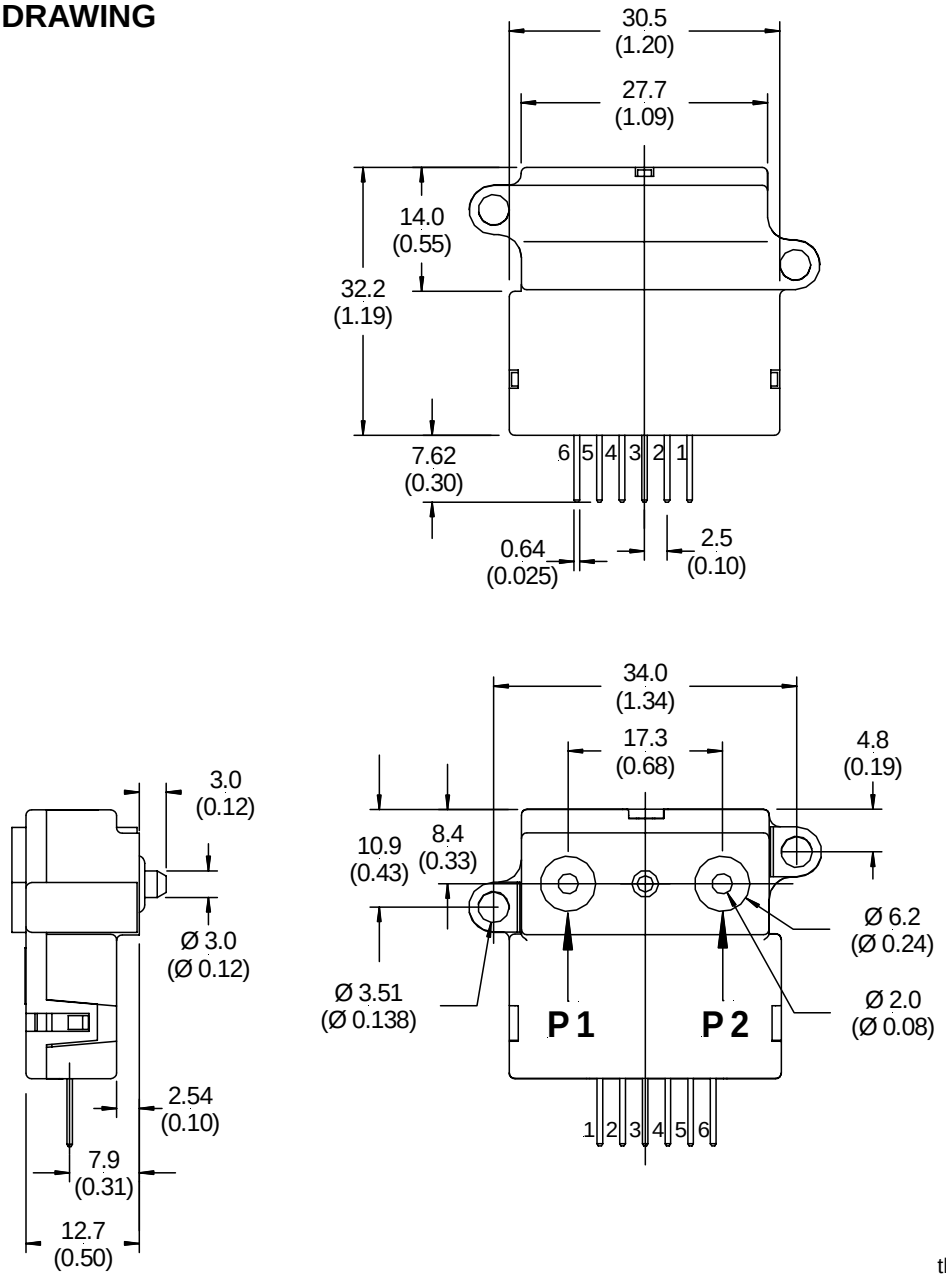
DIFFERENTIAL INSTRUMENTATION AMPLIFIER CIRCUIT (optional)



$$V_O = \left(\frac{2R_2 + R_1}{R_1}\right)\left(\frac{R_4}{R_3}\right)(V_2 - V_1) + V_{Offset}$$

where $V_{Offset} = V_S\left(\frac{R_6}{R_6 + R_5}\right)$

OUTLINE DRAWING



third angle projection

mass: approx. 14 g

dimensions in mm (inches)

Note: **Positiv flow direction is defined as proceeding from port 1 (P1) to port 2 (P2) and results in positive output (pin 6 > pin 2). Negative flow direction is defined conversely and results in negative output (pin 6 < pin 2).**

GAS CORRECTION FACTORS[7]

Gas type	Correction factor (approx.)
Helium (He)	0.5[8]
Hydrogen (H_2)	0.7[8,9]
Argon (Ar)	0.95
Nitrogen (N_2)	1.0
Oxygen (O_2)	1.0
Air	1.0
Nitric oxide (NO)	1.0
Carbon monoxide (CO)	1.0
Methane (CH_4)	1.1
Ammonia (NH_3)	1.1
Nitrous oxide (N_2O)	1.35
Nitrogen dioxide (NO_2)	1.35
Carbon dioxide (CO_2)	1.35

Notes:
[7] Gas correction factors are referenced to nitrogen (N_2) as calibration gas type. Approximate gas correction factors are provided as guidelines only. Individual gas types may perform differently at temperature extremes and varying flow rates.
[8] When sensing Hydrogen (H_2) or Helium (He) it may be necessary to power the mass flow sensor using increased supply voltage: Hydrogen typ. 12 V, Helium typ. 15 V
[9] Hydrogen (H_2) flow measurement requires the use of a special sensor. These devices provide normal operation when sensing hydrogen flow and are designated with an "H" at the end of the order number.

ORDERING INFORMATION - AVAILABLE LISTINGS

Flow range	Dry gas	Hydrogen gas[9]
±25 sccm	-	FMOM025HB
±1000 sccm	FMOL001DB	-

Sensortechnics PRO services:

- Extended guarantee period of 2 years
- Improved performance characteristics
- Custom product modifications and adaptations even for small quantities
- Advanced logistics models for supply inventory and short delivery times
- Technical support through application engineers on the phone or at your site
- Fastest possible technical response for design and QA engineers

... plus other services on request