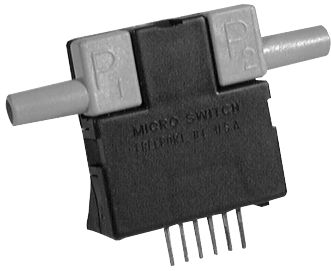


# Airflow Sensors

## Microbridge Mass Airflow/Unamplified

AWM 2000 Series



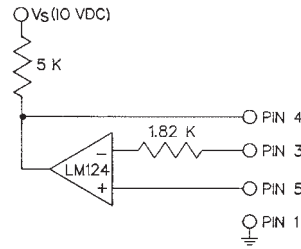
### FEATURES

- Bidirectional sensing capability
- Actual mass air flow sensing
- Low differential pressure sensing

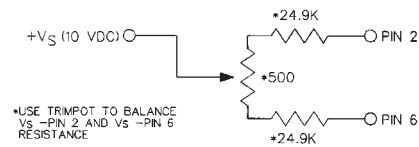
The AWM2000 Series microbridge mass airflow sensor is a passive device comprised of two Wheatstone bridges. The heater control circuit in Figure 1 is required for operation per specifications. The sensing bridge supply circuit in Figure 2 is also required for operation per specifications. These two circuits are **not on board** the package and must be supplied in the application. The differential amplifier in Figure 3 is a useful interface for the sensing bridge. It can be used to introduce the gain and to introduce voltage offsets to the sensor output as referenced in Equation 1.

**Note:** For applications sensing hydrogen or helium, see Application Note 3, page 131.

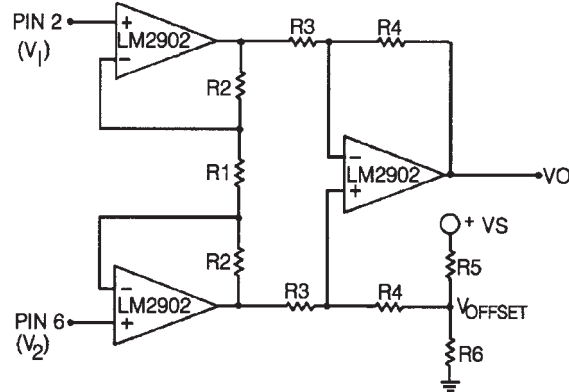
**Figure 1**  
**Heater Control Circuit**



**Figure 2**  
**Sensing Bridge Supply Circuit**



**Figure 3**  
**Differential Instrumentation Amplifier Circuit**



**Equation 1:**

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

$$\text{where } V_{\text{offset}} = V_s \left( \frac{R_6}{R_5 + R_6} \right)$$

# Airflow Sensors

## Microbridge Mass Airflow/Unamplified

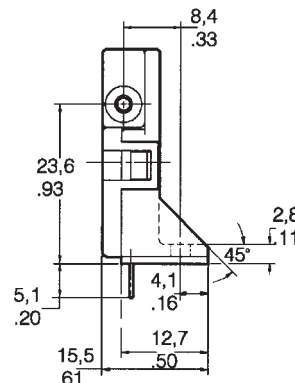
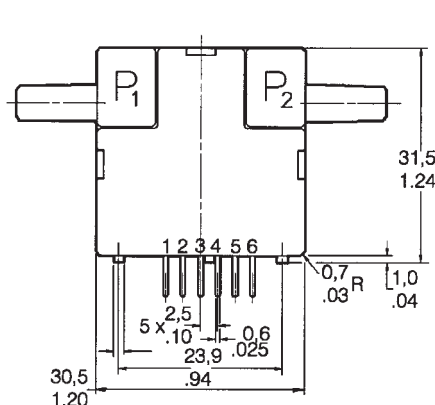
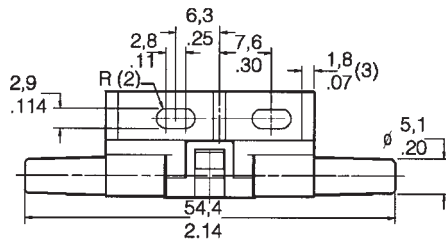
AWM2000 Series

### AWM2000 SERIES ORDER GUIDE (Performance Characteristics @ 10.01 ±0.01 VDC, 25°C)

Catalog Listings	AWM2100V	AWM2150V	AWM2200V	AWM2300V
Flow Range (Full Scale)	±200 sccm	±30 sccm		±1000 sccm
Pressure Range (See Application Note #1)			±4.0" H <sub>2</sub> O (10 mBar)	
Output Voltage @ Trim Point	30 mV @ 100 sccm	11.8 mV @ 25 sccm	20 mV @ 2" H <sub>2</sub> O	50 mV @ 650 sccm
Null Voltage Shift, Typ. +25° to -25°C, +25° to 85°C	±0.20 mV	±0.20 mV	±0.20 mV	±0.20 mV
Output Voltage Shift, Max. +25° to -25°C +25° to +85°C	+2.5% Reading -2.5% Reading	+5% Reading -5% Reading	+22% Reading (Note 2) -22% Reading	+5% Reading -5% Reading
Repeatability & Hysteresis, Max.	±0.35% Reading	±0.35% Reading	±0.35% Reading	±1% Reading
	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	
Excitation (VDC) (Note 1)	8.0	10±0.01	15	
Power Consumption (mW)	—	30	50	
Null Voltage (mV)	-1.0	0.0	+1.0	
Response Time (msec)	—	1.0	3.0	
Common Mode Pressure (psi)	—	—	25	
Sensor Resistance (kΩ) Pin 2-Pin 1, Pin 6-Pin 1	—	5	—	
Sensor Current (mA) Pin 2-Pin 1, Pin 6-Pin 1	—	—	0.6	
Temperature Range	Operating: -25° to +85°C (-13° to +185°F); Storage: -40° to +90°C (-40° to +194°F)			
Termination	2,54 mm (.100") centers, 0,635 mm (0.025") square			
Weight (grams)	10.8			
Shock Rating	100 g peak (5 drops, 6 axes)			

- Notes:**
- Output Voltage is ratiometric to supply voltage.
  - Temperature shifts when sensing differential pressure correlates to the density change of the gas over temperature. See Application Note 1.
  - Maximum allowable rate of flow change to prevent damage: 5.0 SLPM/1.0 sec.

### MOUNTING DIMENSIONS (for reference only)



**NOTE:** Positive 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). Do not exert a force greater than 4.54 kg (10 lbs.) in any direction.

Airflow

# Airflow Sensors

## Microbridge Mass Airflow/Unamplified

AWM2000 Series

### OUTPUT FLOW VS INTERCHANGEABILITY (Note 1)

Performance Characteristics @ 10.0 ±0.01 VDC, 25°C

AWM2100V				AWM2150V				AWM2200V (Note 2)				AWM2300V			
Press. mBar	Flow sccm	Nom. mV	Tol. ±mV	Press. μBar	Flow sccm	Nom. mV	Tol. ±mV	Flow sccm	Press. " H <sub>2</sub> O	Nom. mV	Tol. ±mV	Press. mBar	Flow sccm	Nom. mV	Tol. ±mV
0.49	<b>200</b>	44.50	4.25	53	<b>30</b>	14.0	2.5	120	<b>4.00</b>	31.75	3.50	3.4	<b>1000</b>	55.50	3.70
0.35	<b>150</b>	38.75	3.00	36	<b>20</b>	9.5	1.5	90	<b>3.00</b>	26.75	2.50	2.4	<b>800</b>	52.90	3.50
0.21	<b>100</b>	30.00	1.50	17	<b>10</b>	5.0	1.5	60	<b>2.00</b>	20.00	1.20	1.8	<b>650</b>	50.00	2.50
0.09	<b>50</b>	16.50	2.50	9.8	<b>5</b>	2.5	1.0	30	<b>1.00</b>	11.20	1.80	0.83	<b>400</b>	42.50	3.00
0.00	<b>0</b>	0.00	1.00	7.4	<b>4</b>	2.0	1.0	0	<b>0.00</b>	0.00	1.00	0.31	<b>200</b>	29.20	3.20
-0.09	<b>-50</b>	-16.50	4.50	6.2	<b>3</b>	1.5	1.0	-30	<b>-1.00</b>	-11.20	3.00	0	<b>0</b>	0.00	1.00
-0.21	<b>-100</b>	-30.00	5.00	5	<b>2</b>	1.0	1.0	-60	<b>-2.00</b>	-20.00	3.30	-0.31	<b>-200</b>	-28.90	15.00
-0.35	<b>-150</b>	-38.80	7.65	2.5	<b>1</b>	0.5	0.8	-90	<b>-3.00</b>	-26.75	5.30	-0.83	<b>-400</b>	-41.20	26.00
-0.49	<b>-200</b>	-44.50	9.75	0	<b>0</b>	0.0	0.6	-120	<b>-4.00</b>	-31.75	7.00	-1.6	<b>-600</b>	-48.20	29.50
				-9.8	<b>-5</b>	-2.5	2.0					-2.4	<b>-800</b>	-52.20	32.50
				-53	<b>-30</b>	-14.0	5.0					-3.4	<b>-1000</b>	-55.00	36.00

### Notes:

- Numbers in **BOLD** type indicate calibration type, mass flow or differential pressure. Tolerance values apply to calibration type only.
- Differential pressure calibrated devices are not recommended for flow measurement. Use flow calibrated devices for flow measurement.

### OUTPUT CURVES

