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### **Sensing and Control**

Honeywell Inc.

11 West Spring Street

Freeport, Illinois 61032

## Microbridge Mass Airflow/Unamplified and Amplified



### FEATURES

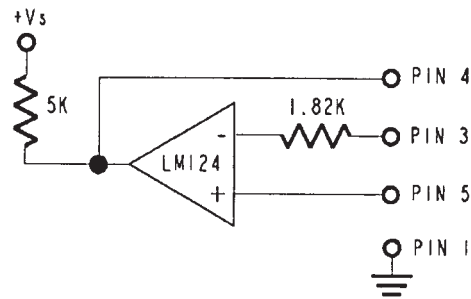
- Manifold mount/o-ring sealed
- Ceramic flow-tube (non-outgassing), 0-1000 sccm
- Plastic flow tube, 0-6 SLPM
- High common mode pressure (150 psi ceramic flow-tube only)
- Operating temperature up to 125°C (unamplified only)
- High stability at null and full-scale

The AWM40000 Series mass flow sensor family is based on proven microbridge technology and includes both amplified signal conditioned devices and unamplified sensor only devices.

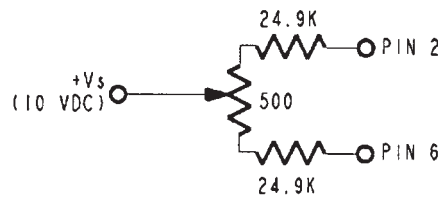
When using the unamplified devices (AWM42150VH and AWM42300V), the heater control circuit in Figure 1 and the sensing bridge supply circuit in Figure 2 are both required for operation per specification. These two circuits are **NOT** on board the sensor and must be supplied in the application. The differential amplifier circuitry in Figure 3 may be useful in providing output gain and/or introducing voltage offsets to the sensor output (Ref. Equation 1).

The amplified devices (AWM43300V and AWM43600V) can be used to increase output gain and introduce voltage offsets. The differential instrumentation amplifier circuitry, heater control circuitry and sensing bridge supply circuitry are all provided onboard the amplified sensors.

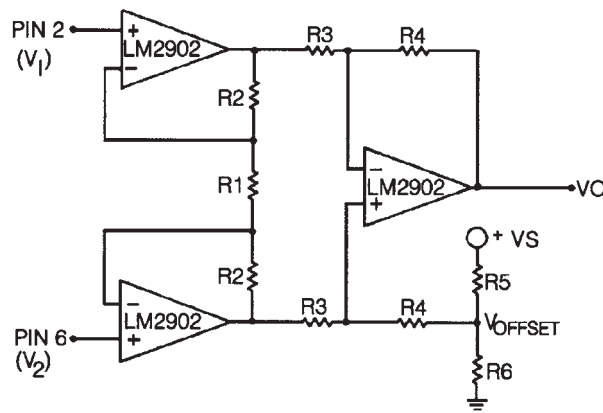
**Figure 1**  
**Heater Control Circuit**



**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 and Amplified

AWM40000 Series

### AWM40000 SERIES ORDER GUIDE (Performance Characteristics @ 10.01 ±0.01 VDC, 25°C)

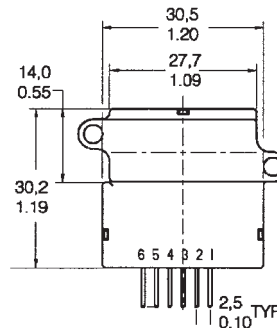
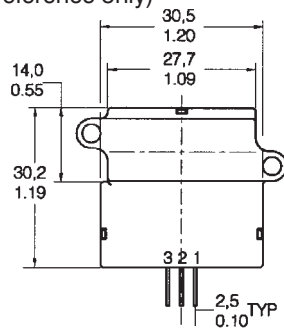
Catalog Listings	AWM42150VH	AWM42300V	AWM43300V	AWM43600V
Flow Range (Full Scale)	±25 sccm	±1000 sccm	+1000 sccm	+6 SLPM
Output Voltage @ Trim Point	8.5 mV ±1.5 mV @ 25 sccm	54.7 mV ±3.7 mV DC @ 1000 sccm	5 V ±0.15 VDC @ 1000 sccm	5 V ±0.15 VDC @ 6 SLPM
Null Voltage	0.0 ±1.0 mVDC	0.0 ±1.5 mVDC	1.0 ±0.05 VDC	1.0 ±0.05 VDC
Null Voltage Shift +25° to -25°C, +25° to +85°C	±0.20 mVDC	±0.20 mVDC	±0.025 VDC	±0.025 VDC
Output Voltage Shift +25° to -25°C, +25° to +85°C	+2.5% Reading typ. -2.5% Reading typ.	+2.5% Reading max. -2.5% Reading max.	-5.0% Reading max. +6.0% Reading max.	-6.0% Reading max. +6.0% Reading max.
Power Consumption (mW)	60 (Max.)	60 (Max.)	60 (Max.)	75 (Max.)
Repeatability & Hysteresis	±0.35% Reading (3)	±0.50% Reading	±0.50% Reading	±1.00% Reading
Pressure Drop @ Full Scale (in H <sub>2</sub> O)	0.008" H <sub>2</sub> O (Typ.)	1.02 (Typ.)	1.02 (Typ.)	8.00 (Typ.)
	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	
Excitation VDC	8.0	10±0.01	15	
Response Time (msec)	—	1.0	3.0 (Note 1)	
Common Mode Pressure (psi) (max.)	—	—	150 psi (10 Bar)	25 psi (1.7 Bar)
Output Load	NPN (Sinking): 10 mA PNP (Sourcing): 20 mA			
Temperature Range	Operating: -40° to +125°C (-40° to +251°F) Storage: -40° to +125°C (-40° to +251°F)		Operating: -25° to +85°C (-13° to +185°F) Storage: -40° to +90°C (-40° to +194°F)	
Calibration Gas	Nitrogen			
Ratiometricity Error	±0.30% Reading			
Weight (grams)	14 g			11 g
Shock Rating	100 g peak (5 drops, 6 axes)			
Termination	2,54 mm (.100") centers, 0,635 cm (0.025") square			

#### Notes:

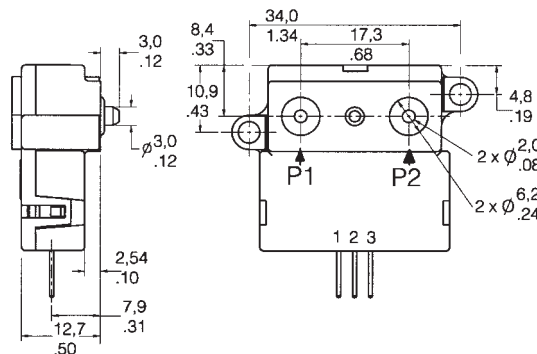
1. Response time is typically 1 msec from 10 to 90%.
2. Repeatability & Hysteresis tolerances reflect inherent inaccuracies of the measurement equipment.
3. Maximum allowable rate of flow change to prevent damage: 5.0 SLPM/1.0 sec.

#### MOUNTING DIMENSIONS (for reference only)

Amplified Sensors



Unamplified Sensors



**Note:** Positive flow direction is defined as proceeding from Port 1 (P1) to Port 2 (P2), and results in positive output.

Airflow

## Microbridge Mass Airflow/Unamplified and Amplified

### OUTPUT FLOW VS INTERCHANGEABILITY (Note 1)

Performance Characteristics @ 10.0 ± 0.01 VDC, 25°C

AWM42150VH				AWM42300V				AWM43300V				AWM43600V			
Press. $\mu$ Bar	Flow sccm	Nom. mV	Tol. $\pm$ mV	Press. mBar	Flow sccm	Nom. mV	Tol. $\pm$ mV	Press. mBar	Flow sccm	Nom. VDC	Tol. $\pm$ VDC	Press. mBar	Flow SLPM	Nom. VDC	Tol. $\pm$ VDC
20	<b>30</b>	9.9	1.5	2.23	<b>1000</b>	54.7	2.00	2.23	<b>1000</b>	5.00	0.15	20.0	<b>6</b>	5.00	0.15
17	<b>25</b>	8.5	1.5	1.52	<b>800</b>	53.0	2.0	1.87	<b>900</b>	4.97	0.16	14.7	<b>5</b>	4.89	0.20
14	<b>20</b>	6.8	1.5	0.94	<b>600</b>	49.3	2.5	1.52	<b>800</b>	4.89	0.17	9.07	<b>4</b>	4.70	0.25
10	<b>15</b>	5.2	1.0	0.49	<b>400</b>	42.5	3.5	1.16	<b>700</b>	4.78	0.18	6.40	<b>3</b>	4.40	0.35
7	<b>10</b>	3.5	1.0	0.19	<b>200</b>	29.8	4.0	0.94	<b>600</b>	4.63	0.19	3.35	<b>2</b>	3.80	0.30
3	<b>5</b>	1.7	1.0	0.00	<b>0</b>	0.0	1.5	0.71	<b>500</b>	4.43	0.20	1.17	<b>1</b>	3.10	0.30
0	<b>0</b>	0.0	1.0	-0.19	<b>-200</b>	-29.8	4.0	0.50	<b>400</b>	4.15	0.21	0.00	<b>0</b>	1.00	0.05
				-0.49	<b>-400</b>	-42.5	5.0	0.33	<b>300</b>	3.76	0.19				
				-0.94	<b>-600</b>	-49.3	6.0	0.19	<b>200</b>	3.23	0.17				
				-1.52	<b>-800</b>	-53.0	6.0	0.08	<b>100</b>	2.49	0.14				
				-2.23	<b>-1000</b>	-55.2	6.0	0.00	<b>0</b>	1.00	0.05				

### Notes:

- Numbers in **BOLD** type indicate calibration type, mass flow or differential pressure. Tolerance values apply to calibration type only.

