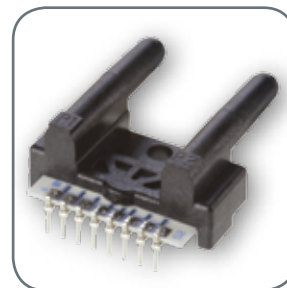


# Airflow Sensors

## **AWM9000 Series**



Datasheet

# Airflow Sensors

AWM90000 Series microbridge mass airflow sensors are available in two versions, mass flow and differential pressure.

The AWM92100V has a flow range of  $\pm 200$  SCCM with a pressure drop of only 0.49 mbar | 49 Pa | 0.007 psi, typically. The AWM92200V is a differential pressure version that has a range of  $\pm 2$  inH<sub>2</sub>O.

The AWM90000 Series sensors have a 1 ms response time, operate with a supply voltage from 8.0 Vdc to 15.0 Vdc, while consuming only 50 mW of power. The compact plastic package will withstand a maximum overpressure of 1720 mbar | 72 kPa | 25 psi without compromising performance. The sensor is well suited for use in portable devices and battery-powered applications.

The AWM90000 Series provides customers with a combination of time-proven reliability, repeatable flow sensing, and the ability to customize the sensor functions to meet their specific application needs.

## Key Features and Benefits

- **Bi-directional sensing capability:** Allows use in applications where bidirectional flow is present
- **Highly stable null and full-scale:** Does not require recalibration in most applications
- **Low pressure drop:** Provides improved system performance
- **Compact package design:** Occupies less space in the customer's enclosure, potentially reducing production costs; enclosure size may also be reduced for easier fit into space-constrained applications
- **Low hysteresis and repeatability errors (less than 0.35% of reading):** Provides improved overall system accuracy
- **Fast response time (1 ms typical):** Captures full flow event
- **Low power consumption (50 mW max.):** Allows for use in portable devices and battery-powered applications

## Potential Applications

### MEDICAL

- Continuous Positive Airway Pressure (CPAP) equipment
- Sleep apnea monitors
- Oxygen conservers
- Oxygen concentrators
- Nebulizers
- Spirometers

### INDUSTRIAL

- Variable Air Volume (VAV) damper control
- Clogged filter detection
- Fuel to air ratio sensing
- Leak detection equipment

HIGHLY STABLE • LOW PRESSURE DROP • FAST RESPONSE TIME

# Airflow Sensors, AWM90000 Series

Table 1. Specifications

Characteristic	Parameter	
	AWM92100V	AWM92200V
		
Type	mass flow	differential
Flow range	±200 SCCM	—
Pressure range	—	±5 mbar   ± 500 Pa   ±2.0 inH <sub>2</sub> O
Excitation voltage <sup>3</sup>	8.0 Vdc min./10 Vdc ±0.01 Vdc typ./15 Vdc max.	
Power consumption	50 mW max.	
Calibration gas	air	
Null voltage shift <sup>1</sup> :		
Null voltage (25 °C [77 °F])	0 mV ±15 mV	0 mV ±15 mV
Null output shift:		
-25 °C to 85 °C [-13 °F to 185 °F]	±2 mV typ.	—
-20 °C to 80 °C [-4 °F to 176 °F]	—	±1 mV max.
Full scale output shift <sup>2</sup> :		
-25 °C to -25 °C [-13 °F to 77 °F]	-3.0 %FSS typ.	25 %reading max.
25 °C to 85 °C [77 °F to 185 °F]	±1.0 %FSS typ.	30 %reading max.
Full scale output	77 mV ±32 mV	45 mV ±25 mV
Ratiometricity error <sup>3</sup>	±0.30 %reading typ.	
Repeatability and hysteresis <sup>4</sup>	±0.35 %FSS typ.	±0.1 %reading typ.
Response time	1 ms typ.	3 ms typ.
Pressure drop at full scale	0.49 mbar   49 Pa   0.007 psi, typ.	—
Overpressure	1720 mbar   172 kPa   25 psi max.	
Temperature range:		
operating	-25 °C to 85 °C [-13 °F to 185 °F]	-25 °C to 80 °C [-13 °F to 176 °F]
storage	-40 °C to 90 °C [-40 °F to 194 °F]	-40 °C to 90 °C [-40 °F to 194 °F]
Vibration	20 g, 10 Hz to 2000 Hz	
Shock	100 g, 6 ms	
Weight	5,6 g [0.20 oz]	

<sup>1</sup>Assumes low TCR bridge resistance used (pins 2 and 8).

<sup>2</sup>Requires recommended RC value of 1 kOhm to be used (pins 3 though 7) and typical heater control circuit. Maximum current RH.

<sup>3</sup>Output voltage is ratiometric to supply voltage.

<sup>4</sup>Repeatability and hysteresis tolerances reflect inherent inaccuracies of the measurement equipment.

# Airflow Sensors, AWM90000 Series

**Table 2. AWM92100V Flow Specifications**

Flow (SCCM)	Tolerance, min. (mV)	Nominal, typ. (Vdc)	Tolerance, typ. (mV)	Pressure Drop		
				(mbar)	(Pa)	(inH <sub>2</sub> O)
200	45	77	109	0.148	14.775	0.0593
150	45	68	109	0.103	10.271	0.0412
100	45	56	109	0.063	6.299	0.0253
50	45	36	109	0.028	2.814	0.0113
0	45	0	109	0.000	0.000	0.0000
-50	45	-37	109	-0.028	-2.775	-0.0111
-100	45	-57	109	-0.063	-6.293	-0.0253
-150	45	-69	109	-0.103	-10.271	-0.0412
-200	45	-78	109	-0.148	-14.834	-0.0596

**Table 3. AWM92200V Differential Pressure Specifications**

Flow (inH <sub>2</sub> O)	Tolerance, min. (mV)	Nominal, typ. (mV)	Tolerance, max. (mV)
2.0	22	38	77
1.5	18	32	66
1.0	12	23	49
0.5	7	12	29
0.0	-20	0	20
-0.5	-7	-12	-30
-1.0	-12	-23	-51
-1.5	-18	-32	-68
-2.0	-22	-39	-79

## LAMINAR FLOW

Due to the fast response time of the sensor, the specifications in this datasheet were generated using laminar flow. Airflow instability or “turbulence” present in the airstream will result in an increase in measurement uncertainty. Turbulent flow may be corrected by either of the following two methods:

- Straightening the airflow by using flow laminarizing.
- Slowing the response of the sensor by using a simple RC time constant on the output of the sensor. (This will slow down the sensor response time.)

The values needed depend on the amount of turbulence present in the application. A technique for laminarizing the flow includes adding the following laminar flow elements to the flow stream:

- Hex-shaped honeycombs
- Foam
- Screen materials
- Constrictors (frits)

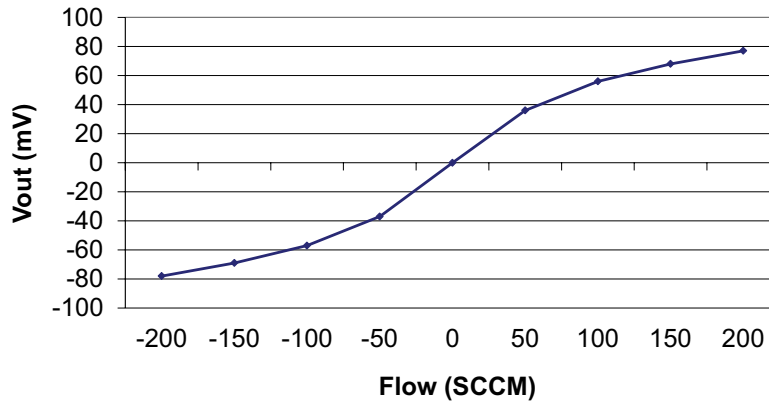
Unfortunately, the greater the efficiency of the laminarizer, the greater the increase in pressure drop in order to establish a given flow rate. Plastic honeycomb material probably gives the most improvement for the least pressure drop.

Ensure sharp radii are avoided in any test fixture.

# Airflow Sensors, AWM90000 Series

Figure 1. Performance Characteristics (at 10.0 ±0.01 Vdc at 25 °C [77 °F])

## AWM92100V Typical Output Voltage vs Flow



## AWM92200V Typical Output Voltage vs Pressure

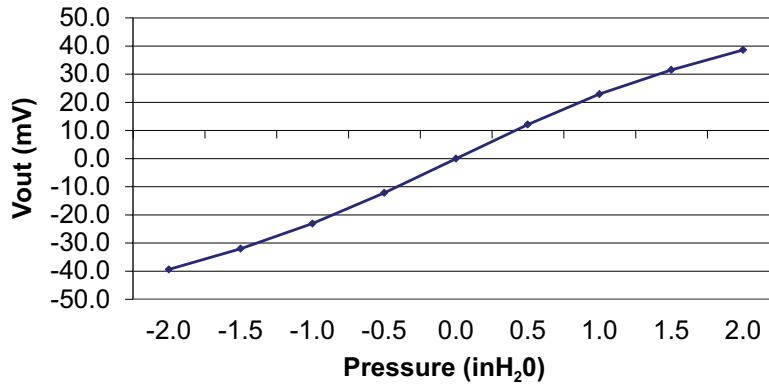
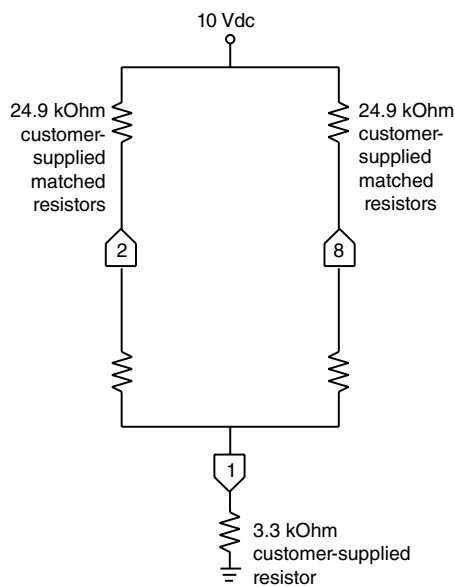


Figure 2. Wiring Diagrams

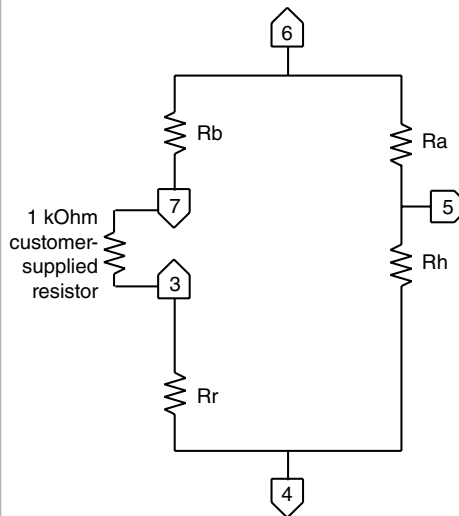
### Sensor bridge circuit

The customer-supplied resistors affect null output voltage; output is measured differentially from Pin 8 to Pin 2.

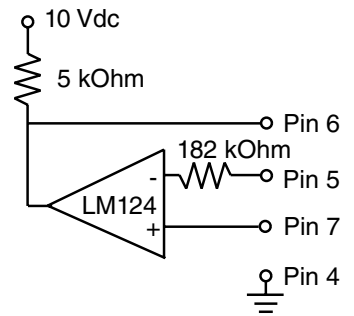


### Used with heater control circuit

The customer-supplied resistor affects temperature compensation and span voltage.



### Suggested heater control circuitry



# Airflow Sensors, AWM90000 Series

Figure 3. Mounting Dimensions (For reference only: mm/[in.] )

AWM92100V, AWM92200V

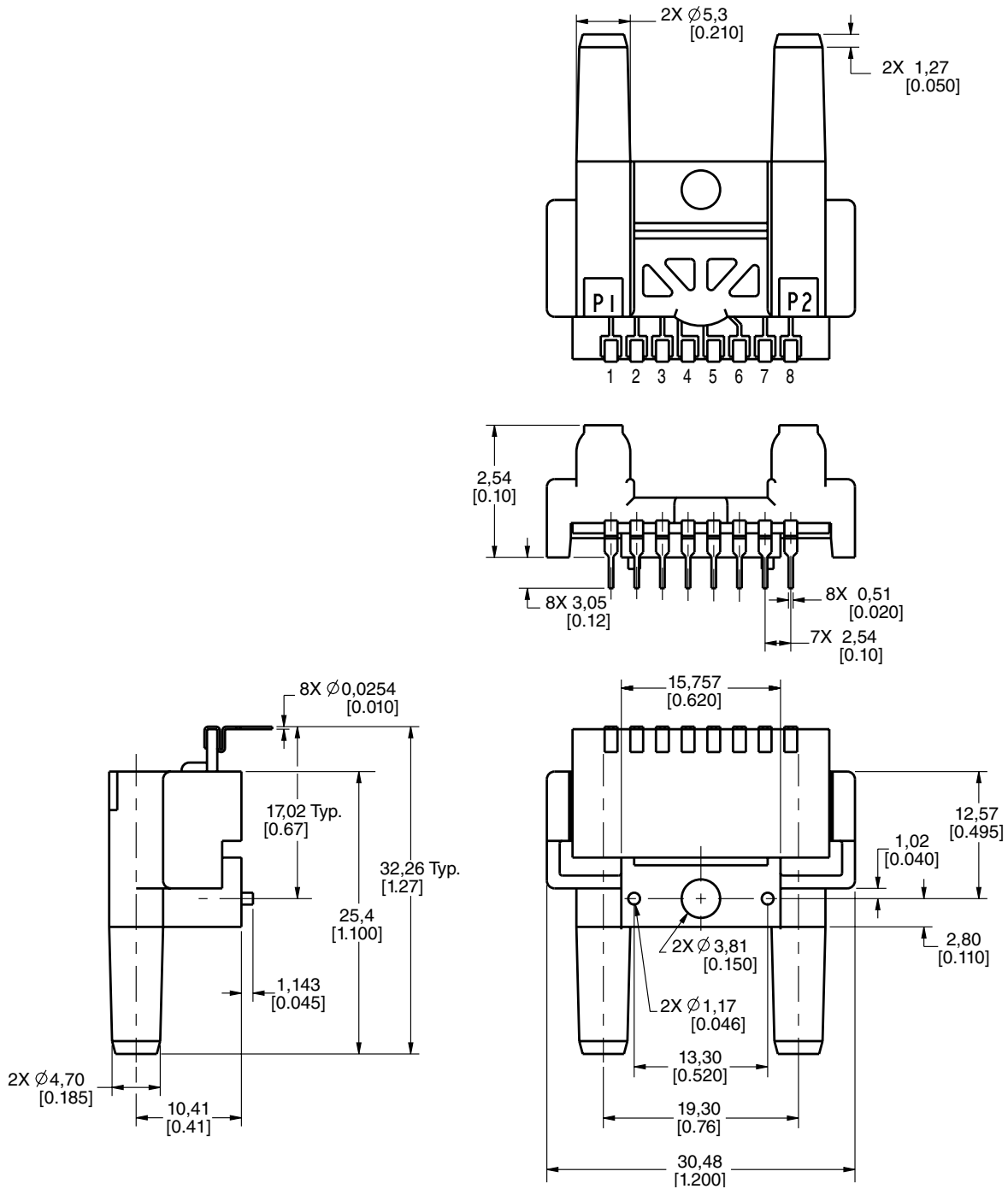


Table 4. Order Guide

Catalog Listing	Description
AWM92100V	AWM90000 series amplified airflow sensor, $\pm 200$ SCCM flow range
AWM92200V	AWM90000 series amplified airflow sensor, $\pm 2.0$ inH <sub>2</sub> O pressure range

## ADDITIONAL INFORMATION

The following associated literature is available at [sensing.honeywell.com](http://sensing.honeywell.com):

- Airflow Products Line Guide
- Airflow, Force and Pressure Sensors Range Guide
- Product Installation Instructions

### **⚠ WARNING**

#### **PERSONAL INJURY**

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

**Failure to comply with these instructions could result in death or serious injury.**

### **⚠ WARNING**

#### **MISUSE OF DOCUMENTATION**

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

**Failure to comply with these instructions could result in death or serious injury.**

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