

FEATURES

- **Ranges 0...±200 sccm¹**
or 0...±2 "H₂O (0...±5 mbar)
- **Bidirectional sensing**
- **Actual mass flow sensing**
- **Low differential pressure sensing**

SERVICE

To be used with dry gases only

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



SPECIFICATIONS

Maximum ratings

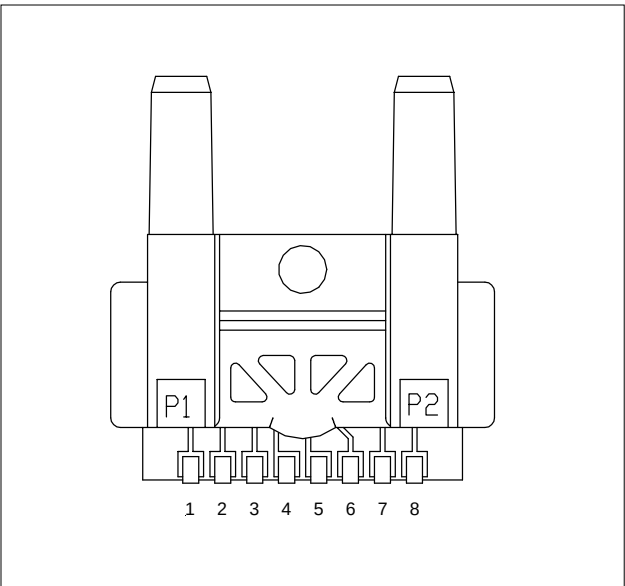
Supply voltage ²	8 to 15 V typ. 10 ±0.01 V
Power consumption	50 mW
Temperature limits	
Operating	-25 to 85°C
Storage	-40 to 90°C
Mechanical shock	100 g (5 drops, 6 axes)

Note:

¹ sccm denotes standard cubic centimeters per minute

² Output voltage is ratiometric to supply voltage

ELECTRICAL CONNECTION



AWM90000 Series

Mass flow sensor for gases

Honeywell

FLOW SENSOR CHARACTERISTICS³

$V_s = 10 \pm 0.01 \text{ V}$, $T_A = 25^\circ\text{C}$

Part no.	Flow range (full scale)	Pressure range	Max. flow change ⁴	Output voltage @ trim point
AWM92100V	$\pm 200 \text{ sccm}$		5.0 l/sec	77 mV @ 200 sccm
AWM92200V		$\pm 2 \text{ "H}_2\text{O}$	5.0 l/sec	38 mV @ 2 "H ₂ O

PERFORMANCE CHARACTERISTICS

$V_s = 10 \pm 0.01 \text{ V}$, $T_A = 25^\circ\text{C}$

Characteristics				Min.	Typ.	Max.	Unit
Zero offset				-15	0	15	mV
Repeatability and hysteresis (combined)		AWM92100V				±0.35	%FSO
		AWM92200V			±0.1		% reading
Ratiometricity error ²					±0.30		
Temperature effects ⁵	Offset	-25 to 85 °C ⁶			±2.0 ⁷		mV
	Span	-25 to 25 °C	AWM92100V		-3.0 ⁸		%FSO
			AWM92200V		25 ⁵		% reading
		25 to 85 °C	AWM92100V		±1.0 ⁸		%FSO
			AWM92200V		-30 ⁵		% reading
	Sensor resistance (pin 1 - pin 2, pin 1 - pin 8)				1.5	1.75	2.2
Sensor current						0.6	mA
Response time					1.0	3.0	ms
Common mode pressure						25	psi

Notes:

² Output voltage is ratiometric to supply voltage

³ A 5 micron filter is recommended for all devices.

⁴ Maximum allowable rate of flow change to prevent damage.

⁵ Temperature shifts in differential pressure devices are mostly due to the density change of the gas over temperature.

⁶ Shift is relative to 25°C .

⁷ Assumes low TCR bridge resistance used (pins 2 and 8).

⁸ Requires recommended Rc value of 1K Ohm is used (pins 3 to 7) and typ. heater control circuit. Maximum current Rh.

OUTPUT FLOW VS INTERCHANGEABILITY

$V_s = 10 \pm 0.01 \text{ V}$, $T_A = 25^\circ\text{C}$

AWM92100V FLOW SPECIFICATIONS

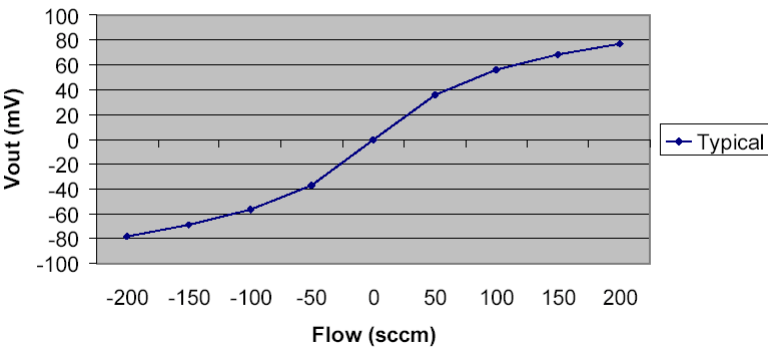
Flow (sccm)	Nominal (mV Typical)	$\pm$ Tolerance (mV Typical)
200	77	32
150	68	29
100	56	25
50	36	17
0	0	20
-50	-37	18
-100	-57	26
-150	-69	30
-200	-78	33

AWM92200V FLOW SPECIFICATIONS

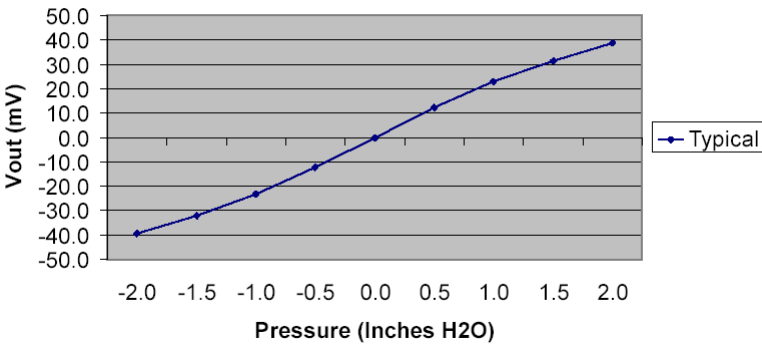
Pressure (inch H2O)	Nominal (mV) Typical	Typical Min. (mV)	Typical Max. (mV)
2.0	38	22	77
1.5	32	18	66
1.0	23	12	49
.5	12	7	29
0	0	-20	20
-.5	-12	-7	-30
-1.0	-23	-12	-51
-1.5	-32	-18	-68
-2.0	-39	-22	-79

OUTPUT CURVES

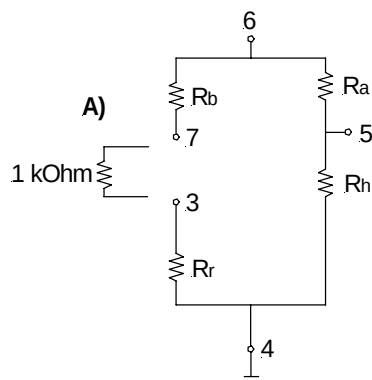
AWM92100V Output vs. Flow



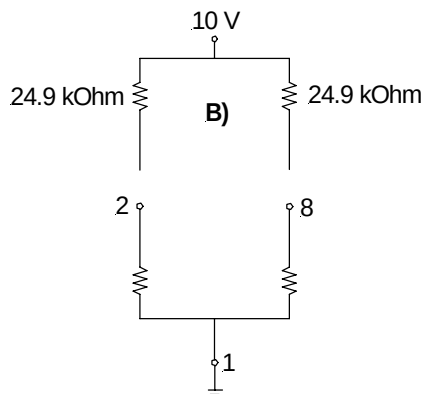
AWM92200V Output vs. Pressure



HEATER CONTROL CIRCUIT



SENSING BRIDGE SUPPLY CIRCUIT



Note:

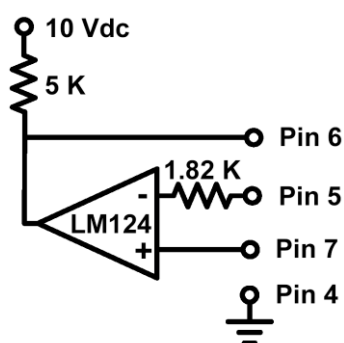
Circuits required for operation per specifications. Circuits are not on board the sensor.

A) Customer supplied 1 kOhm resistor (affects temperature compensation and span voltage).

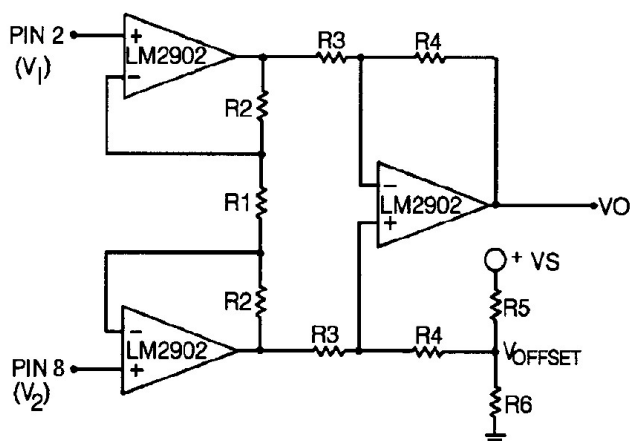
B) Customer supplied 24.9 kOhm matched bridge resistors (affects null output voltage).

Output is measured differentially from pins 8 to 2.

HEATER CONTROL CIRCUIT (suggested)



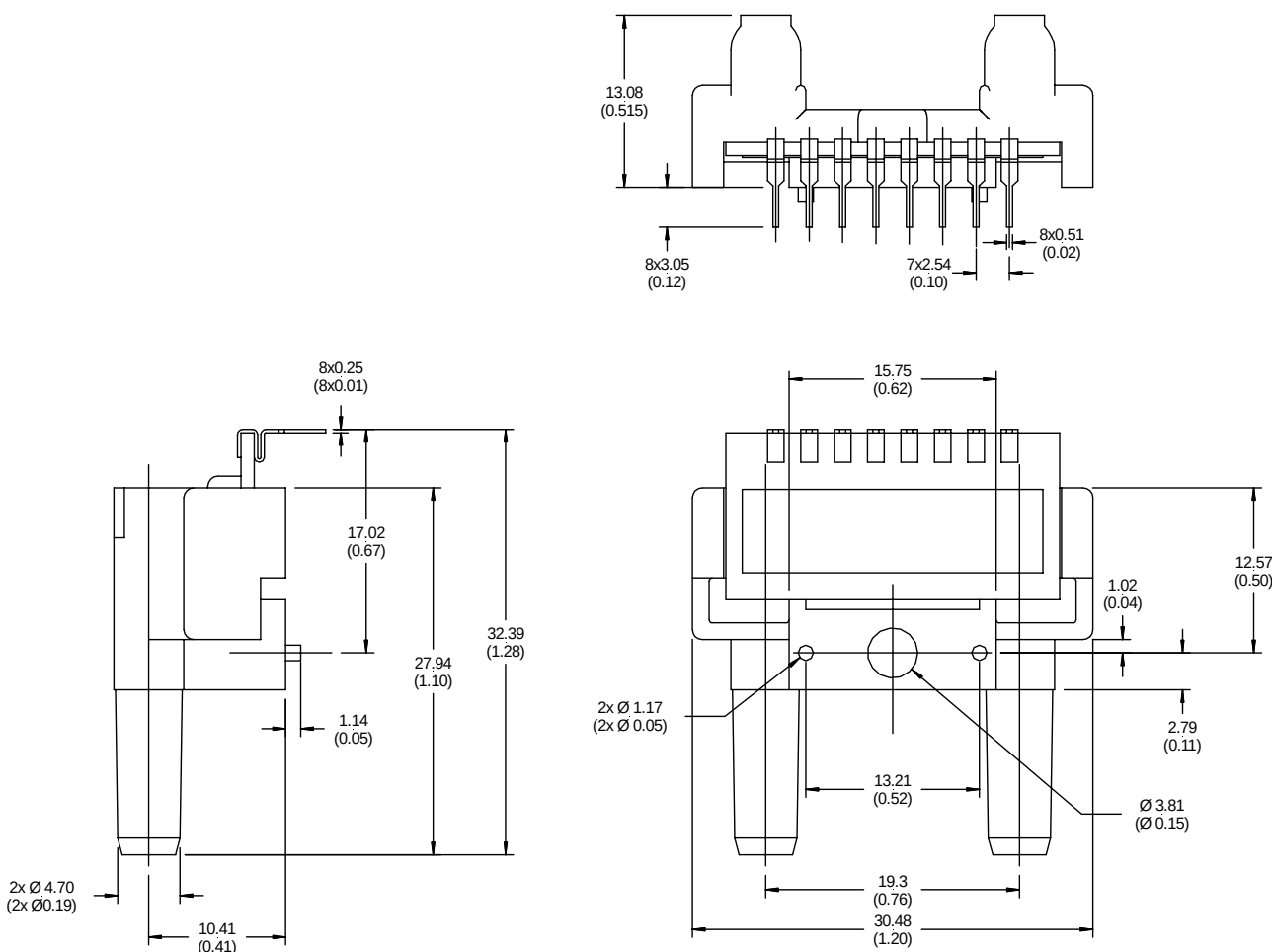
DIFFERENTIAL INSTRUMENTATION AMPLIFIER CIRCUIT (OPTIONAL)



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

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

OUTLINE DRAWING



mass: approx. 5.6 g

dimensions in mm (inches)

AWM90000 Series

Mass flow sensor for gases

Honeywell

GAS CORRECTION FACTORS⁹

Gas type	Correction factor (approx.)
Helium (He)	0.5 ¹⁰
Hydrogen (H ₂)	0.7 ^{10,11}
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 ₂ O)	1.35
Nitrogen dioxide (NO ₂)	1.35
Carbon dioxide (CO ₂)	1.35

Notes:

⁹ Gas correction factors are referenced to nitrogen (N₂) 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.

¹⁰ When sensing Hydrogen (H₂) 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

¹¹ Hydrogen (H₂) 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

Flow range	Dry gas
±200 sccm	AWM92100V

Pressure range	Dry gas
±2 "H ₂ O (±5 mbar)	AWM92200V