MAF sensor

AWM2000 Series Small flow/no amplification

The AWM2000 series is a passive device, which includes two Wheatstone bridges: one is a closed-loop heating control circuit and the other is a dual-sensing circuit. Figure 1 and 2 are the external circuits required by users, and Figure 3 is the recommended output signal amplification circuit.

Figure 1 illustrates a thermal control circuit that minimizes temperature errors caused by external variations. By maintaining a constant heating temperature, the system compensates for temperature fluctuations through an externally monitored resistance with a negative temperature coefficient (NTC) characteristic. This design effectively reduces interference from changes in gas concentration and composition, which could otherwise alter the operational characteristics of heat conduction and sensing components.

Figure 2 shows the power supply circuit of the sensing bridge. In the traditional Wheatstone circuit, the sensing elements contained in the sensor constitute two dynamic arms of the bridge, and the output voltage changes with the power supply. When the airflow direction changes, the polarity of the output voltage also changes.

Figure 3 is a practical sensor interface amplifier circuit to improve the gain and adjust the output voltage bias

Figure 1 Fever Control Circuit

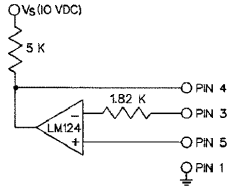
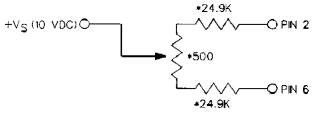
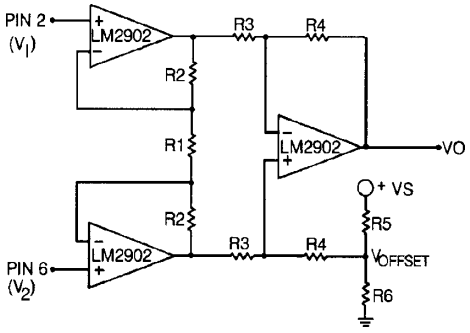


Figure 2 Power Supply Circuit of Sensing Bridge



* Adjust the resistance between the 2 and 6 terminals with a potentiometer

Figure 3 Recommended Differential Voltage Amplifier



$$Vo = \left(\frac{2R_2}{R_1} + \frac{R_1}{}\right)(RR_2 - V_1) + \text{bias bias} =$$

$$Vs\left(\frac{R_6}{R_6 + R_5}\right)$$

characteristic：

:: Bidirectional airflow sensing

* Actual gas mass flow sensing

* Flow rate 0~30sccm to 0~1000sccm

* Additional heater control and sensor bridge power supply circuit required Technical specifications: 10.0 ± 0.01VDC

	AWM2100V	AWM2150V	AWM2200V	AWM2300V
Flow range (scale)	±200sccm	±200sccm		±1000sccm
pressure limit			± 40" water column	
output voltage @ peg point	30mV @100 sccm	11.8mV @25sccm	20mV @2" water column	50mV @650 sccm
Zero drift, type.+25~ -25. C +25 ~ +85˚C	±0.2mV	±0.2mV	±0.2mV	±0.2mV
Output voltage drift +25～-25˚C +25～+85˚C	+2.5% reading-2.5% reading	+5% reading-5% reading	+22% reading (2) -22.0% Readings	+5% reading-5% reading
Repetition & Stagnation Max	± 0.35% reading	± 0.35% reading	± 0.35% reading	± 1% read

	Min	Typ.	Max.
Power supply (VDC) (1)	8.0	10±0.01	15
power dissipation (mW)	---	30	50
Zero voltage (mV)	-1.0	0.0	+1.0
Reaction time (ms)	---	1.0	3.0
Co-compression pressure (psi)	---	---	25
Sensor resistor (KΩ) (1-2 pins, 1-6 pins)	---	5	---
Sensor current (mA) (1-2 leads, 1-6 leads)	---	---	0.6
working temperature	-25-85˚C		
storage temperature	-40-90˚C		
Impact (5drops, 6axis)	100g peak		

Note: 1. The output voltage changes with the ratio of the power supply voltage, and the rated value is based on LM124 operational amplifier

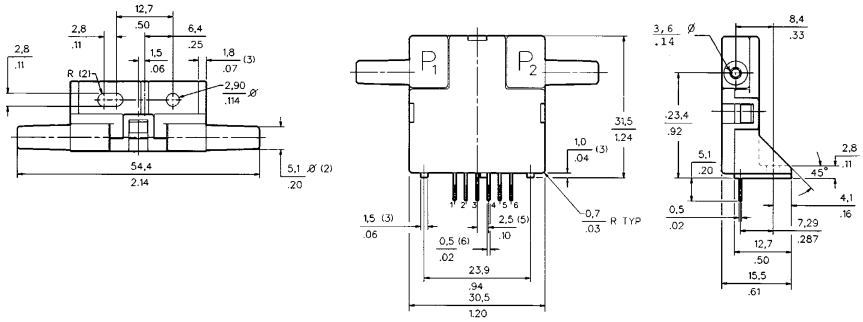
2、 The temperature drift of differential device is mainly caused by the change of gas concentration with temperature

The temperature drift of gas flow device is mainly caused by the square root coefficient of thin film TCR and the temperature drift of thick film resistor

3、 MICROSWITCH can provide special symbols suitable for measuring hydrogen (H ₂) and helium (He)

4. For the purpose of preventing damage, maximum allowable flow change value: 5.0SLPM/1.0Sec.

Installation dimensions (for reference only)



Note: The positive airflow is defined as flowing from the P1 port to the P2 port and resulting in a positive output (6 feet>2 feet), and the reverse airflow direction is defined in the opposite direction and results in a negative output (6 feet <2 feet). Do not apply more than 10 pounds of force per direction and per port.

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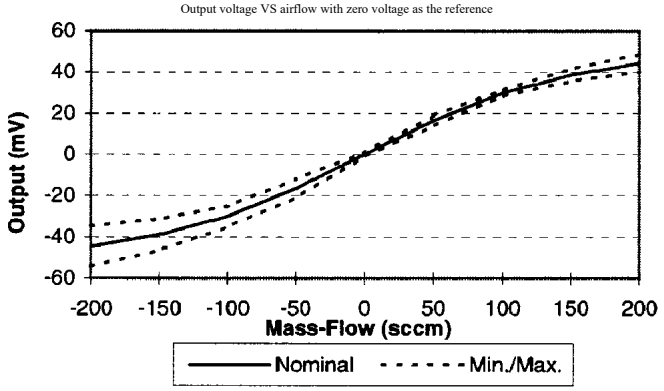
Output airflow VS device interchangeability

AWM2100V			AWM2150V			AWM2200V			AWM2300V		
Flow	NOM	TOL	Flow	NOM	TOL	Pressure	NOM	TOL	Flow	NOM	TOL
Sccm	mV	±mV	Sccm	mV	±mV	in H_2O	mV	±mV	Sccm	mV	±mV
200	44.50	4.25	30	14	2.5	4.00	31.75	3.50	1000	55.50	3.70
150	38.75	3.00	20	9.5	1.5	3.00	26.75	2.50	800	52.90	3.50
100	30.00	1.50	10	5.0	1.5	2.00	20.00	1.20	650	50.00	2.50
50	16.5	2.50	5	2.5	1.0	1.00	11.20	1.80	400	42.50	3.00
0	0.00	1.00	4	2.0	1.0	0.00	0.00	1.00	200	29.20	3.20
-50	-16.5	4.50	3	1.5	1.0	-1.00	-11.20	3.00	0	0.00	1.00
-100	-30	5.00	2	1.0	1.0	-2.00	-20.00	3.30	-200	-28.90	15.00
-150	-38.8	7.65	1	0.5	0.8	-3.00	-26.75	5.30	-400	-41.20	26.00
-200	-44.5	9.75	0	0	0.6	-4.00	-31.75	7.00	-600	-48.20	29.50
			-5	-2.5	2.0				-800	-52.20	32.50
			-30	-14	5.0				-1000	-55.00	36.00

curve of output

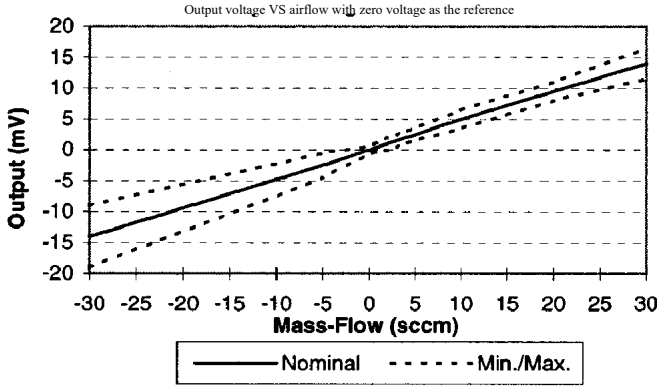
AWM2100V

Output voltage VS airflow with zero voltage as the reference



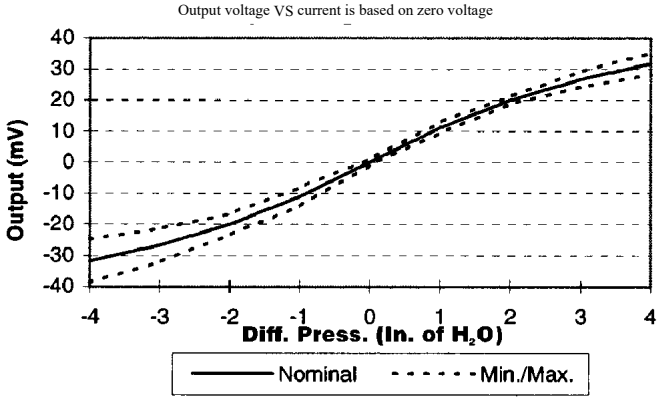
AWM2150V

Output voltage VS airflow with zero voltage as the reference



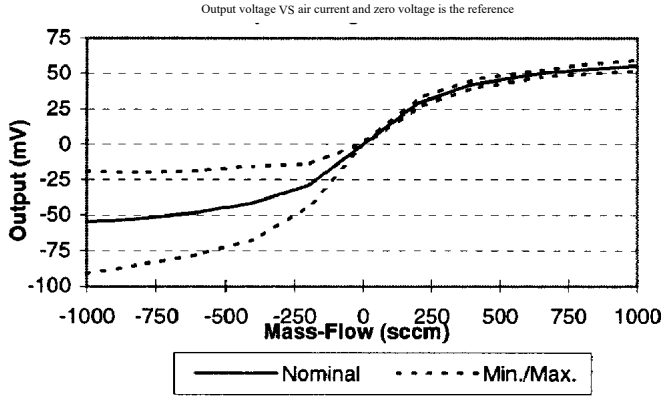
AWM2200V

Output voltage VS current is based on zero voltage



AWM2300V

Output voltage VS air current and zero voltage is the reference



Recommended model	range
AWM2100V	±200SCCM
AWM2300V	±1000SCCM

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