



### AWM43300V



*Actual product appearance may vary.*

**Airflow Sensor, Signal Conditioning:  
Amplified; Flow/Pressure Range: + 1000  
sccm (1.0 SLPM); Port Style: Manifold**

#### Features

- Precision silicon micromachining
- Sensitive to low flows - 0.1 sccm to 20 SLPM
- Adaptable for use with higher flows
- Fast response time
- Analog output
- Low power consumption
- Repeatable response
- Laser trimmed interchangeability
- Accurate, cost effective flow sensing
- In-line printed circuit board terminals
- Standard 2.54 mm (0.100 in) mounting centers
- Accurate sensing of low pressure 0.001 in to 4.0 in H<sub>2</sub>O (0.003 to 10 mbar)

#### Potential Applications

- Damper control for heating, ventilation, and air conditioning systems
- Gas analyzers
- Low vacuum control
- Process control
- Medical respirators and ventilators
- Oxygen concentrators
- Leak detection equipment
- Vent hoods
- Anesthesia control
- Gas metering
- Gas chromatography

#### Description

##### OPERATION

The microbridge mass airflow sensor operates on the theory of heat transfer. Mass airflow is directed across the surface of the sensing elements. Output voltage varies in proportion to the mass air or other gas flow through the inlet and outlet ports of the package. The specially designed housing precisely directs and controls the airflow across the microstructure sensing element. Mechanical design of the package allows it to be easily mounted to printed circuit boards.

The microbridge mass airflow sensor has a unique silicon chip based on advanced microstructure technology. It consists of a thin-film, thermally isolated bridge structure containing heater and temperature sensing elements. The bridge structure provides a sensitive and fast response to the flow of air or other gas over the chip. Dual sensing elements positioned on both sides of a central heating element indicate flow direction as well as flow rate. Laser trimmed thick film and thin film resistors provide consistent interchangeability from one device to the next.

The microbridge mass airflow sensor uses temperature sensitive resistors deposited within a thin film of silicon nitride. They are suspended in the form of two bridges over an etched cavity in the silicon. The chip is located in a precisely dimensioned airflow channel to provide a repeatable flow response. Highly effective thermal isolation for the heater and sensing resistors is attained by etching the cavity space beneath the flow sensor bridges. The small size and thermal isolation of the microbridge mass airflow sensor are responsible for the extremely fast response and high sensitivity to flows.

Dual Wheatstone bridges control airflow measurement -- one provides closed loop heater control, the other contains the dual sensing elements. The heater circuit minimizes shift due to ambient temperature changes by providing an output proportional to mass flow. The circuit keeps the heater temperature at a constant differential (160 °C) above ambient air temperature which is sensed by a heat-sunk resistor on the chip. The ratiometric voltage output of the device corresponds

to the differential voltage across the Wheatstone bridge circuit.

**NOTICE**

The effects of dust contamination, which may result from some applications, can be minimized. By design, dust particles that may be present in the air stream will flow past the chip parallel to the chip surface. In addition, the microstructure chip produces a thermophoretic effect, which repels micrometer sized dust particles away from the bridge structure.

A simple filter will prevent dust adherence to chip edges and channel surfaces. Adequate filtering in most applications can be achieved with a disposable five-micron filter used in series on the upstream side of the airflow device.

**CAUTION  
PRODUCT DAMAGE**

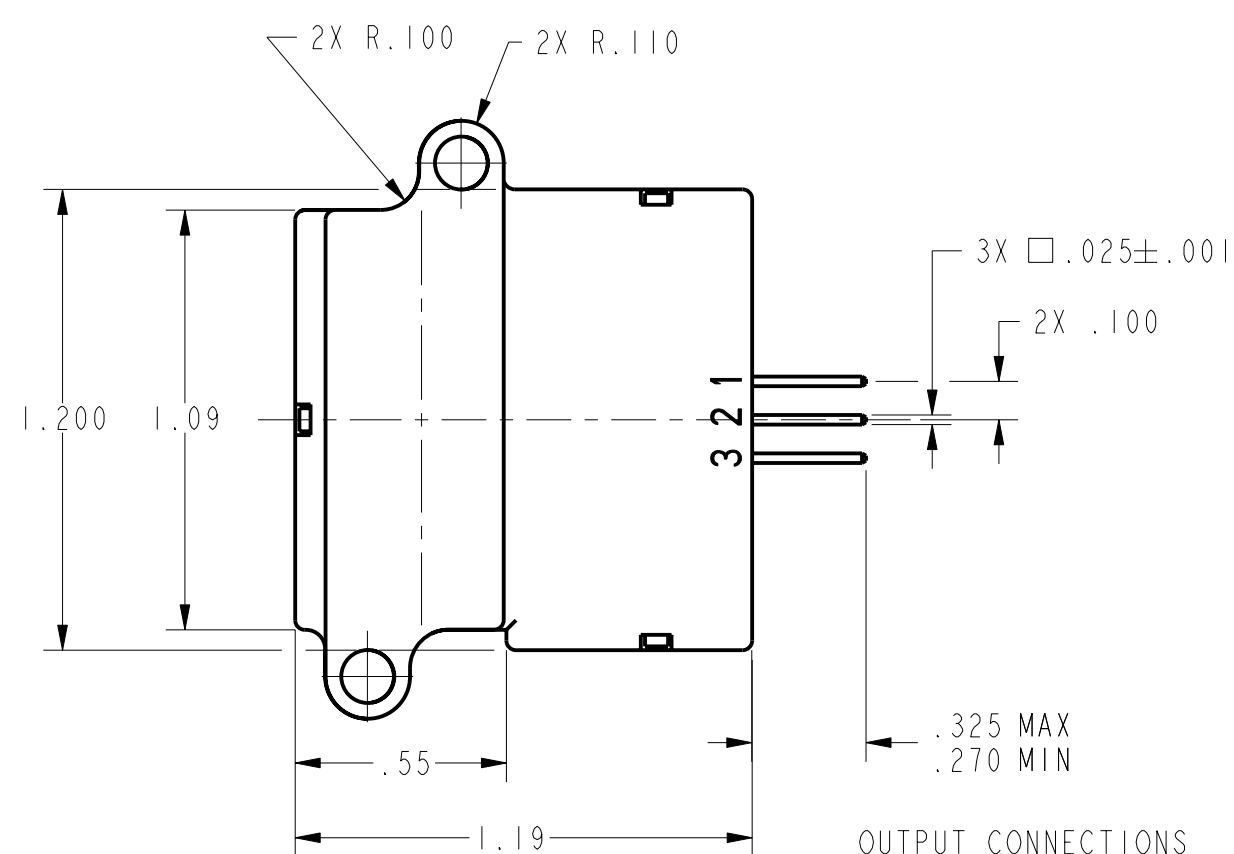
AWM Series Microbridge Mass Airflow Sensors are not designed to sense liquid flow and will be damaged by liquid flow through the sensor.

**Failure to comply with these instructions could result in product damage.**

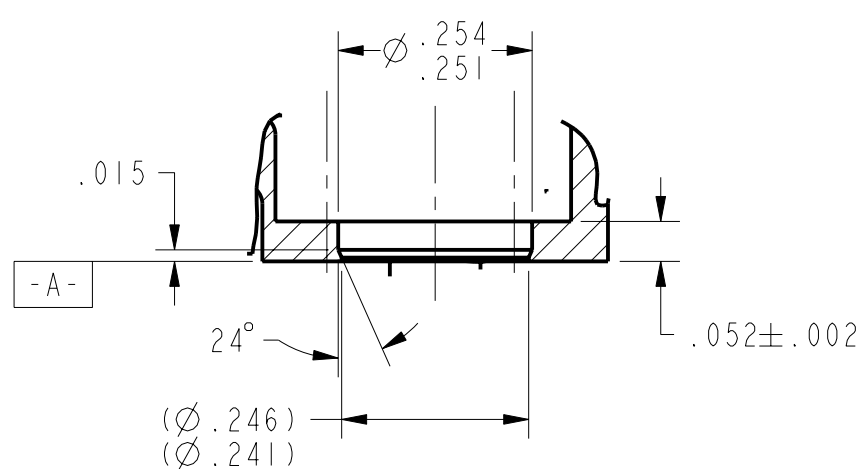
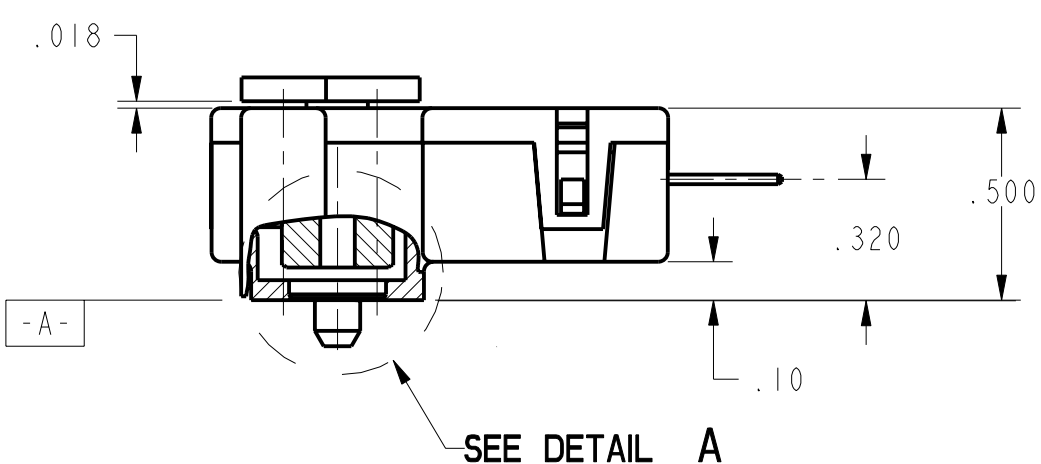
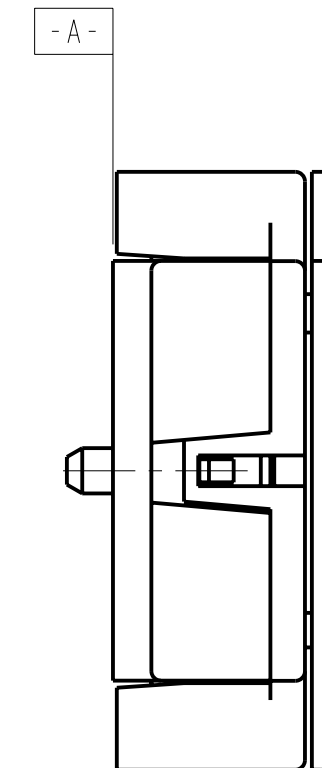
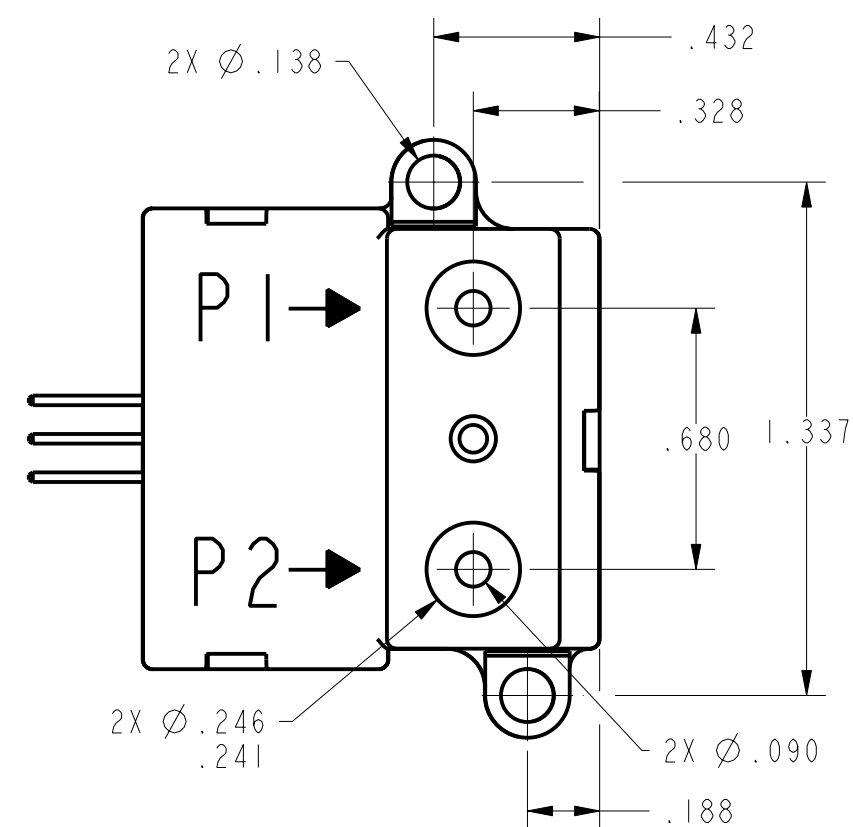
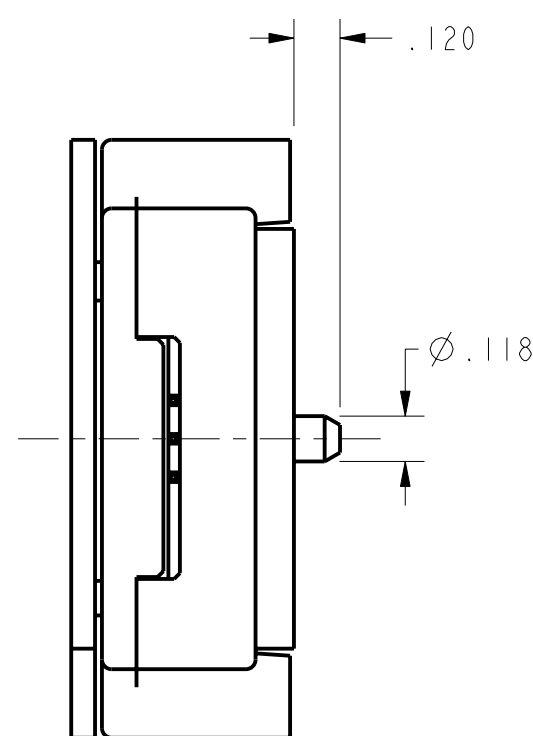
Product Specifications	
Signal Conditioning	Amplified
Flow/Pressure Range	1000 sccm (1.0 SLPM)
Output Voltage @ Trim Point	5.0 Vdc $\pm$ 0.15 Vdc @ 1000 sccm (1.0 SLPM)
Port Style	Manifold
Series Name	AWM40000
Null Shift over Temperature	$\pm$ 0.025 Vdc
Output Shift over Temperature	- 5% Reading to 6% Reading
Maximum change in flow rate	5.0 SLPM/s
Max. Repeatability & Hysteresis Error	$\pm$ 0.50% Reading
Null Offset	1.0 Vdc $\pm$ 0.05 Vdc
Response Time	1 ms typ., 3 ms max.
Supply Voltage	8.0 Vdc min., 10.0 Vdc typ., 15.0 Vdc max.
Maximum Common Mode Pressure	150 psi
Power Consumption	60 mW max.
Operating Temperature Range	-25 °C to 85 °C [-13 °F to 185 °F]
Storage Temperature Range	-40 °C to 90 °C [-40 °F to 194 °F]
Media Compatibility	Dry gas only
Weight	14 g
Shock	100 g peak (5 drops, 6 axes)
Availability	Global
Comment	Nitrogen calibration gas
UNSPSC Code	411121
UNSPSC Commodity	411121 Transducers

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AWM43300V



OUTPUT CONNECTIONS  
 1 - OUTPUT  
 2 - SUPPLY  
 3 - GROUND



DETAIL A  
 SCALE 4:1

CATALOG LISTING: AWM43300V

ELECTRICAL SPECIFICATIONS	MIN	NOM	MAX	UNITS	NOTES
RECOMMENDED EXCITATION	9.990	10.000	10.010	V <sub>dc</sub>	
POWER SUPPLY (MIN/MAX)	8.000	---	15.000	V <sub>dc</sub>	
POWER CONSUMPTION	---	---	60	mW	
OUTPUT LOADING	SINK 10 mA SOURCE 20 mA				
CALIBRATION GAS	NITROGEN				
NULL OUTPUT SHIFT:					
-25°C TO +85°C	---	---	±.025	V <sub>dc</sub>	
FULL SCALE OUTPUT SHIFT:					
-25°C TO +25°C	---	---	-5.0	% READ	
+25°C TO +85°C	---	---	+6.0	% READ	
RATIOMETRICITY ERROR	---	±.3	---	% READ	(TYPICAL)
REPEATABILITY & HYSTERESIS	---	---	±.5	% READ	(1)
RESPONSE TIME	---	1.0	---	msec	
FLOW SPECIFICATIONS	FLOW	NOMINAL	±TOL		
	(Sccm)	(V <sub>dc</sub> )	(V <sub>dc</sub> )		
	1000	5.000	0.15		
	900	4.970	0.16		
	800	4.885	0.17		
	700	4.775	0.18		
	600	4.630	0.19		
	500	4.430	0.20		
	400	4.155	0.21		
	300	3.760	0.19		
	200	3.225	0.17		
	100	2.485	0.14		
	0	1.000	0.05		
MECHANICAL SPECIFICATION	SPECIFICATION LIMITS				
PRESSURE DROP @ FULL SCALE	1.02 IN. H <sub>2</sub> O TYP				
TEMPERATURE RANGE					
OPERATING	-25 TO +85°C				
OVERPRESSURE	150 PSI				
MAXIMUM ALLOWABLE RATE OF FLOW CHANGE THROUGH SENSOR TO PREVENT DAMAGE 5LPM/SEC					
NOTES: 1 - REPEATABILITY & HYSTERESIS TOLERANCES REFLECT INHERENT INACCURACIES OF THE MEASUREMENT EQUIPMENT					

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**MASS AIRFLOW SENSOR**

CATALOG LISTING  
**AWM43300V**

FED. MFG. CODE 91929

THIRD ANGLE PROJECTION

SCALE 2:1

DO NOT SCALE PRINT

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE

ONE PLACE	(.0)	±.030
TWO PLACES	(.00)	±.015
THREE PLACES	(.000)	±.005
ANGLES		±

WEIGHT