Honeywell

Airflow Sensors Line Guide

Go with the flow of engineering leadership. All airflow sensors operate on heat transfer — flow and differential pressure. But Honeywell Sensing and Control (S&C) offers advanced chip design, manufacturing techniques and microstructure technology, allowing our microbridge to be notably faster, smaller and more sensitive. Our silicon chip design is created from a thin-film, thermally isolated bridge structure, containing both heater and temperature sensing elements. This provides rapid response to the air or gas flow and amount and direction, delivering a proportional output voltage. Amplified versions provide an enhanced output signal and less external circuitry, while unamplified versions allow additional external circuit options. What's more, a variety of port styles provides greater application flexibility.

FEATURES

HONEYWELL ZEPHYR™ AIRFLOW SENSORS

HAF Series-High Accuracy. ±50 SCCM to ±750 SCCM

Features: Total Error Band (TEB) as low as ±0.25 %FSS • Fast response time • Wide range of airflows • Customizable flow ranges and configurable package styles • Full calibration and temperature compensation • High sensitivity at very low flows • Linear output • High stability • Low pressure drop • High 12-bit resolution (digital), 0.039 %FS resolution (analog) • Low 3.3 Vdc operating voltage • ASIC-based I^2C output compatibility (digital) • Insensitivity to mounting orientation • Insensitivity to altitude • Small size • RoHS-compliant materials

Benefits: Total Error Band (TEB) as low as ±0.25 %FSS allows for precise airflow measurement, often ideal for demanding applications with high accuracy requirements. Fast response time allows a customer's application to respond quickly to airflow change, important in critical medical (e.g., anesthesia) and industrial (e.g., fume hood) applications. Measures mass flow at standard flow ranges of ±50, ±100, ±200, ±400 or ±750 SCCM, or custom flow ranges, increasing the options for integrating the sensor into the application. Customizable flow ranges and configurable package styles meet specific end-user needs. Full calibration and temperature compensation typically allow customer to remove additional components associated with signal conditioning from the PCB, reducing PCB size as well as costs often associated with those components (e.g., acquisition, inventory, assembly). High sensitivity at very low flows provides for faster response time at the onset or cessation of flow. Linear output provides a more intuitive sensor signal than the raw output of basic airflow sensors, which can help reduce production costs, design, and implementation time. High stability reduces errors due to thermal effects and null shift to provide accurate readings over time, often eliminating need for system calibration after PCB mount and periodically over time. Low pressure drop typically improves patient comfort in medical applications, and reduces noise and system wear on other components such as motors and pumps. High 12-bit resolution (digital) increases ability to sense small airflow changes, allowing customers to more precisely control their application; 0.039 %FS resolution (analog) increases ability to sense small airflow changes, allowing customers to more precisely control their application. Low 3.3 Vdc operating voltage option and low power consumption allow for use in battery-driven and other portable applications. ASIC-based I^2C digital output compatibility eases integration to microprocessors or microcontrollers, reducing PCB complexity and component count. Insensitivity to mounting orientation allows customer to position the sensor in most optimal point in the system, eliminating concern for positional effects. Insensitivity to altitude eliminates customer-implemented altitude adjustments in the system, easing integration and reducing production costs by not having to purchase additional sensors for altitude adjustments. Small size occupies less space on PCB, allowing easier fit and potentially reducing production costs; PCB size may also be reduced for easier fit into space-constrained applications. Designed for use in medical equipment such as anesthesia delivery machines, ventricular assist devices (heart pumps), hospital diagnostics (spectrometry, gas chromatography), nebulizers, oxygen concentrators, sleep apnea machines,

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Our technology is most sensitive to your needs. Honeywell S&C offers specially crafted airflow sensor housings to precisely direct and control the airflow across the element. The mechanical package design allows easy mounting to circuit boards, plus other advantages: amplified or un-amplified microbridge airflow; state-of-the-art silicon micromachining; sensitivity to low flows (30 SCCM to 300 SLPM); accurate low pressure sensing 0.003 mbar to 10 mbar (0.0001 in H_20 to 4.0 in H_20); analog or digital output.

Honeywell S&C airflow sensors offer enhanced performance in multiple potential applications, including HVAC system damper control, gas analysis, leak detection equipment, gas metering and chromatography, process control, and vent hoods. In the medical industry, potential applications range from respiratory equipment such as respirators, spirometers, anesthesia and oxygen delivery to sleep apnea equipment.

Honeywell Zephyr™ Airflow Sensors	HAF Series-High Accuracy ±50 SCCM to ±750 SCCM	HAF Series-High Accuracy 10 SLPM to 300 SLPM
Signal conditioning	amplified, compensated	amplified, compensated
Technology	silicon die with thermally isolated heater	silicon die with thermally isolated heater
Flow/pressure range	0 SCCM to ±50 SCCM 0 SCCM to ±100 SCCM 0 SCCM to ±200 SCCM 0 SCCM to ±400 SCCM 0 SCCM to ±750 SCCM	0 SLPM to 10 SLPM 0 to SLPM to 15 SLPM 0 to SLPM to 20 SLPM 0 to SLPM to 50 SLPM 0 to SLPM to 100 SLPM 0 to SLPM to 200 SLPM 0 to SLPM to 300 SLPM
Total error band	as low as ±0.25 %FSS	10 SLPM to 200 SLPM: 4.0% reading 300 SLPM: 7.0% reading
Output	analog (Vdc), digital (I^2C)	digital (I^2C)
Power consumption	3.3 Vdc: 40 mW typ. (no load) (analog) 23 mW typ. (no load) (digital) 5.0 Vdc: 55 mW typ. (no load) (analog) 38 mW typ. (no load) (digital)	3 Vdc: 60 mW max. 10 Vdc: 200 mW max.
Port style	long port fastener mount, short port fastener mount, short port snap mount	manifold mount, 22 mm OD tapered male fitting, G 3/8 female threaded fitting
Media capability	non-corrosive dry gases	non-corrosive dry gases
Compensated temperature range	0 °C to 50 °C [32 °F to 122 °F]	0 °C to 50 °C [32 °F to 122 °F]
Operating temperature range	-20 °C to 70 °C [-4 °F to 158 °F]	-20 °C to 70 °C [-4 °F to 158 °F]

Airflow Sensors




	AWM1000 Series	AWM2000 Series	AWM3000 Series	AWM5000 Series
Signal conditioning	unamplified, compensated	unamplified, compensated	amplified	amplified
Technology	silicon die	silicon die	silicon die	silicon die
Flow/pressure range	±200 SCCM 1000 SCCM to -600 SCCM ±5.0 mbar [2.0 in H_20] ±10.0 mbar [4.0 in H_20]	±30 SCCM ±1000 SCCM ±10.0 mbar [4.0 in H_20]	30 SCCM, 200 SCCM, 1000 SCCM 0 mbar to 1.25 mbar [0 in H_20 to 0.5 in H_20] 0 mbar to 5.0 mbar [0 in H_20 to 2 in H_20] 5.0 mbar [2.0 in H_20]	0 SLPM to 5,0 SLPM 0 SLPM to 10.0 SLPM 0 SLPM to 15.0 SLPM 0 SLPM to 20.0 SLPM
Output	analog	analog	analog	analog
Power consumption	30 mW typ.	30 mW typ.	50 mW or 100 mW typ.	100 mW max.
Port style	straight	straight	straight	1/4 in-18 NPT
Media capability	non-corrosive dry gases	non-corrosive dry gases	non-corrosive dry gases	non-corrosive dry gases
Compensated temperature range	-25 °C to 85 °C [-13 °F to 185 °F]	-25 °C to 85 °C [-13 °F to 185 °F]	-25 °C to 85 °C [-13 °F to 185 °F]	0 °C to 50 °C [32 °F to 122 °F]
Operating temperature range	-25 °C to 85 °C [-13 °F to 185 °F]	-25 °C to 85 °C [-13 °F to 185 °F]	-25 °C to 85 °C [-13 °F to 185 °F]	-20 °C to 70 °C [-4 °F to 158 °F

Airflow Sensors Line Guide

Airflow Sensors			
	AWM700 Series	**AWM40000 Series**	**AWM90000 Series**
Signal conditioning	amplified	unamplified (compensated) or amplified	uncompensated
Technology	silicon die	silicon die	silicon die
Flow/pressure range	300 SLPM	±25.0 SCCM 1.0 SLPM, 6.0 SLPM	±200 SCCM ±5.0 mbar [2.0 in H_20]
Output	analog	analog	analog
Power consumption	60 mW max.	60 mW max., 75 mW max.	50 mW typ.
Port style	22 mm tapered	manifold	parallel
Media capability	non-corrosive dry gases	non-corrosive dry gases	non-corrosive dry gases
Compensated temperature range	10 °C to 40 °C [50 °F to 104 °F]	-25 °C to 85 °C [-13 °F to 185 °F]	N/A
Operating temperature range	-25 °C to 85 °C [-13 °F to 185 °F]	-40 °C to 125 °C [-40 °F to 251 °F] (inclusive)	-25 °C to 85 °C [-13 °F to 185 °F]

spirometers, ventilators, and laparoscopy, as well as industrial air-to-fuel ratio, analytical instrumentation (spectrometry, chromatography), fuel cells, gas leak detection, VAV system on HVAC systems, gas meters, and HVAC filters.

HONEYWELL ZEPHYR™ AIRFLOW SENSORS

HAF Series-High Accuracy. 10 SLPM to 300 SLPM

Features: Industry's smallest Total Error Band • High accuracy • Fast response time • High stability • High sensitivity at very low flows • High 12 bit resolution • Industry's widest airflow range • Choice or port styles • Linear output • Wide supply voltage range • ASIC-based I^2C digital output • Factory or custom calibration for mulitple gas types • RoHS-compliant materials

Benefits: Industry's smallest Total Error Band (TEB) allows for precise airflow measurement. High accuracy ideal for use in demanding applications. Fast response time allows the customer's application to respond quickly to airflow change, important in critical medical and industrial applications. High stability reduces errors due to thermal effects and null shift to provide accurate readings over time and often eliminating the need for system calibration after PCB mount and periodically over time. High sensitivity at very low flows provides a fast response time at the onet of cessation of flow. High 12-bit resolution increases the ability to sense small airflow changes, allowing customers to more precisely control their application. Wide airflow range measures mass flow with standard flow ranges of 10 SLPM to 300 SLPM, or custom flow ranges, increasing the options for integrating the sensor into the application Choice of port styles provide flexibility to choose the pneumatic connection that is best for the customer's application. Linear output provides a more intuitive sensor signal than the raw output of basic airflow sensors, which can help reduce production costs, design, and implementation time. Wide supply voltage range gives the designer the flexibility to choose the supply voltage that works best in the system. ASIC-based I^2C digital output simplifies integration to microprocessors or microcontrollers, reducing PCB complexity and component count. Factory or custom calibration for multiple gas types eliminates need to implement gas correction factors. RoHS-compliant materials meet Directive 2002/95/EC. Designed for use in medical equipment such as anesthesia delivery machines, ventilators, ventricular assist devices (heart pumps), spirometers, laparoscopy, as well as industrial analytical instrumentation (spectrometry, chromatography) air-to-fuel ratio, fuel cells, fume hoods, gas leak detection, process control gas monitoring, and vacuum pump monitoring.

AWM1000 Series.

Features: Precision silicon micromachining • Sensitivity to low flows (200 SCCM to 1000 SCCM) • Enhanced response time • Low power consumption • Analog output • Cost-effective • Bi-directional sensing capability • Sensor to sensor interchangeability • Unamplified • Laser trimmed • Mass flow and low differential pressure sensing

Benefits: Cost-effective microbridge technology for potential applications including HVAC damper control, process control, respirators, oxygen concentrators, gas metering, and chromatography. Differential amplifier circuitry provides output gain and/or introduces voltage offsets to sensor output.

AWM2000 Series.

Features: Precision silicon micromachining • Sensitivity to low flows (30 SCCM to 1000 SCCM) • Enhanced response time • Low power consumption • Analog output • Cost-effective • Bi-directional sensing capability • Unamplified • Laser trimmed • Sensor to sensor interchangeability • Mass flow and low differential pressure sensing

Benefits: Cost-effective microbridge technology for potential applications including process control, respirators, ventilators, oxygen concentrators, and leak detection equipment. Differential amplifier circuitry provides output gain and/or introduces voltage offsets to sensor output.

AWM3000 Series.

Features: Precision silicon micromachining • Sensitivity to low flows (30 SCCM to 1000 SCCM) • Enhanced response time • Low power consumption • Analog output • Cost effective • Laser trimmed • Amplified • Mass flow and low differential pressure sensing • Sensor to sensor interchangeability

Benefits: Amplified signal conditioning increases gain and introduces voltage offsets to sensor output. On-board heater control circuit. Laser trimmed for improved sensor interchangeability. Potential applications include HVAC damper control, process control, respirators, leak detection equipment, gas metering, and chromatography.

AWM5000 Series.

Features: Precision silicon micromachining • Sensitivity to low flows (5 SLPM to 20 SLPM) • Enhanced response time • Low power consumption • Analog output • Cost-effective • On-board signal conditioning • Venturi type flow housing • Remote mounting capability • Laser trimmed • AMP-compatible connector • Rugged plastic package • Amplified • Mass flow pressure sensing • Sensor to sensor interchangeability

Benefits: Performs amplification, linearization, temperature compensation, and gas calibration. Separate gas calibration types (nitrogen, carbon dioxide, nitrous oxide or argon). Microbridge chip in direct contact with flow stream reduces error due to orifice or bypass channel clogging. In-line flow measurement potential applications including HVAC damper control, oxygen concentrators, leak detection equipment, gas metering, and chromatography. 1 Vdc to 5 Vdc linear output possible regardless of flow range or calibration gas. Active laser trimming improves interchangeability. AMP-compatible connector often provides reliable connection in demanding applications.

AWM700 Series.

Features: Precision silicon micromachining • Sensitivity to low flows (200 SLPM to 300 SLPM) • Enhanced response time • Low power consumption • Analog output • Cost-effective • High flow range capability in a small package • Highly stable null and full-scale • Compact package design • Extremely low hysteresis and repeatability errors • AMP-compatible connector • Amplified • Mass flow and differential pressure sensing • Sensor to sensor interchangeability

Benefits: Performs amplification and temperature compensation. Specially designed bypass flow housing provides in-line flow measurement. Provides enhanced reliability, accuracy, and precision operating characteristics for use in potential medical ventilation equipment and medical and analytical instrumentation applications. Low power consumption for portable devices and battery-powered applications. Enhanced accuracy over life reduces need for recalibration. Snap-in AMP-compatible connector provides reliable connection.

AWM40000 Series.

Features: Precision silicon micromachining • Sensitivity to low flows (25 SCCM to 6 SLPM) • Enhanced response time • Low power consumption • Analog output • Cost-effective • Repeatable response • Laser trimmed • Standard mounting centers • Amplified and unamplified • Mass flow pressure sensing • Sensor to sensor interchangeability

Benefits: Sensitive to low flows, adaptable for use with higher flows for potential applications including process control, respirators, ventilators, oxygen concentrators, gas metering, and chromatography. Low power consumption for portable devices and battery-powered applications. Laser-trimmed thick-film and thin-film resistors designed to provide consistent interchangeability from one device to the next.

AWM90000 Series.

Features: Precision silicon micromachining • Sensitivity to low flows (200 SCCM) • Low power consumption • Analog output • Cost-effective • Bi-directional sensing capability • Enhanced response time • Uncompensated • Mass flow and differential pressure sensing

Benefits: Proven thermal bridge technology. Two versions available, mass flow and differential pressure. Potential applications includie HVAC damper control, process control, respirators, ventilators, oxygen concentrators, leak detection equipment, gas metering, and chromatography. Low power consumption for portable devices and battery-powered applications.

Warranty. Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

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