

## Technical Note

# Glossary of Airflow Sensor Terms

### A

**Absolute Maximum Ratings** – The extreme limits that a product can withstand without damage to the product. Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability.

**Accuracy** – The maximum deviation in output from the Ideal Transfer Function measured over the Compensated Flow Range at 25 °C [77 °F]. Includes all errors due to: Null Output, Flow Non-Linearity, Span Errors, Flow Hysteresis and Non-Repeatability.

### B

**Burst Pressure** – The maximum pressure that may be applied to any port of the product without causing escape of pressure media. Product should not be expected to function after exposure to any pressure beyond the burst pressure.

### C

**Clipping Limits** – The maximum and minimum limits of signal that the product will output under normal operating conditions.

**Common Mode Pressure** – The applied “line” pressure which is common to both ports.

**Compensation** – The signal conditioning used to provide a calibrated device whose output closely matches the Ideal Transfer Function. Deviation from the Ideal Transfer Function results in errors which are described by the Total Error Band and Accuracy.

**Compensated Temperature Range** – The temperature range (or ranges) over which the product will produce an output proportional to flow within the specified performance limits.

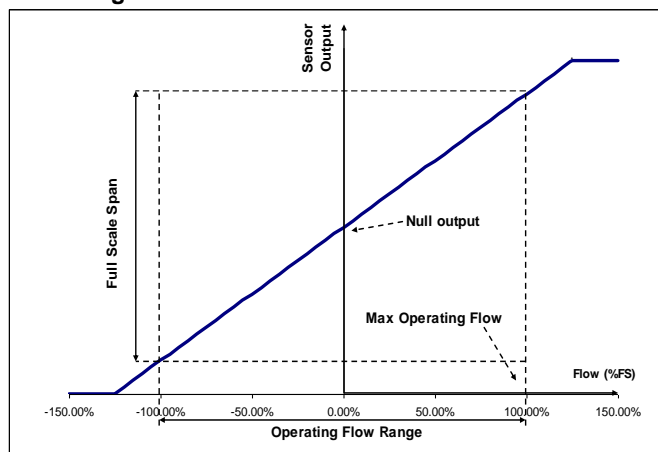
### F

**Flow Hysteresis** – The maximum difference between output readings when the same flow is applied consecutively, under the same operating conditions, within the specified Operating Flow Range.

**Flow Non Linearity** – The maximum deviation of product output from a straight line fitted to the output measured over the specified Operating Flow Range.

**Full Scale Span (FSS)** – The algebraic difference between output signals measured at the upper and lower limits of the Operating Flow Range. See Figure 1.

**Figure 1. Key Flow Sensor Terms Relative to Operating Flow Range**



### I

**Ideal Transfer Function** – Mathematically, the ideal Transfer Function is a straight line, which is independent of temperature, passing through the ideal Offset with a slope equal to the ideal Full Scale Span over the Operating Flow Range. See Transfer Function.

**Input Impedance** – The electrical impedance measured across the input terminals of the product (as presented to the excitation source, with the output terminals open circuited).

### L

**Laminar Flow** – Flow condition when a gas flows in smooth parallel layers without causing turbulence.

### M

**Mass Air Flow** – Mass flow is a dynamic mass/rate unit measured in grams/minute. By referencing a volumetric flow to a standard temperature and pressure, an exact mass flow (g/min) can be calculated from volumetric flow. It is common in the industry to specify mass flow in terms of volumetric flow at standard (reference) conditions. In accordance with these standards, Honeywell mass flow sensors are specified as having volumetric flow at calibration reference conditions of 760 Torr and 0 °C [32 °F]. See Volumetric Flow.

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**Maximum Flow** – The maximum flow which may safely be applied to the product for it to remain in Specification once flow is returned to the Operating Flow Range. Exposure to higher flows may cause permanent damage to the product. Unless otherwise specified, this applies to all available flow sensors at any temperature within the Operating Temperature Range.

**Maximum Operating Flow (Fmax)** – The upper limit of the Operating Flow Range. See Figure 1.

**Minimum Operating Flow (Fmin)** – The lower limit of the Operating Flow Range. See Figure 1.

**Maximum Power Consumption** – The maximum electrical power consumed in normal operation of the product, dependent upon the Supply. See Supply Voltage and Supply Current.

## N

**Null Output** – The output of the sensor when no flow (zero flow) is applied to the sensor. Also known as Offset or Zero. See Figure 1.

**Null Accuracy** - The maximum deviation in measured Offset at Reference Temperature relative to the ideal (or target) Offset as determined from the Ideal Transfer Function. See Thermal Effect on Offset. Also known as Offset Error or Zero Point Accuracy.

## O

**Offset Error** – The maximum deviation in measured Offset at Reference Temperature relative to the ideal (or target) Offset as determined from the Ideal Transfer Function. See Thermal Effect on Offset. Also known as Null Accuracy or Zero Point Accuracy.

**Operating Flow Range** – The flow range over which the product will produce an output proportional to Flow within the specified performance limits. See Figure 1.

**Operating Temperature Range** – The temperature range over which the product will produce an output proportional to flow but may not remain within the specified performance limits. See Compensated Temperature Range.

**Output Impedance** – The electrical impedance measured across the output terminals of the product (as presented to an external circuit).

## R

**Reference Temperature** – The temperature used as a reference in measuring product performance. Typically  $25 \pm 2$  °C.

**Repeatability** – The maximum difference between output readings when the same flow is applied consecutively, under the same operating conditions, within the specified Operating Flow Range. See Flow Hysteresis and Thermal Hysteresis.

**Response Time** – Time taken for output of the product to change from 10% to 90% of Full Scale Span in response to a step change in input flow from the specified Minimum to Maximum Operating Flow.

## S

**Sensitivity** – The ratio of output signal change to the corresponding input Flow change. Sensitivity is determined by computing the ratio of Full Scale Span to the specified Operating Flow Range. Also known as Slope.

**Sink Current** – The maximum current an amplified circuit can accept (“sink”) on its output pin and still remain within the specified performance limits.

**Source Current** – The maximum current an amplified circuit can supply (“source”) on its output pin and still remain within the specified performance limits.

**Span Error** – The maximum deviation in measured Full Scale Span at Reference Temperature relative to the ideal (or target) Full Scale Span as determined from the Ideal Transfer Function. See Thermal Effect on Span.

**Stability** – The ability of a sensor to retain its performance characteristics with time.

**Standard Conditions** – Unless otherwise specified, standard conditions refer to a temperature of 0 °C [32 °F] and pressure of 101.325 kPa (760 Torr).

**Storage Temperature Range** – The temperature range over which the product may safely be exposed without excitation or Flow applied. Under these conditions, the product will remain in specification after excursion to any temperatures within this range. Exposure to temperatures outside this range may cause permanent damage to the product.

**Supply Current** – Corresponds to the current drain on the supply terminal, dependent upon the Supply Voltage.

**Supply Voltage** – Corresponds to the voltage provided on the supply terminal to produce a meaningful output.

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**Supply Voltage - Operating Limits** – The range of voltage excitation which can be supplied to the product to produce an output which is proportional to Flow, but due to Supply Voltage Ratiometricity errors may not remain within the specified performance limits.

**Supply Voltage - Ratiometric Limits** – The range of voltage excitation required by the product to remain within the specified performance limits for Supply Voltage Ratiometricity.

**Supply Voltage Ratiometricity** – The maximum deviation in ratiometric output of the product (Output divided by Supply Voltage) resulting from a voltage excitation which is different from the Reference Supply Voltage but remaining within the Supply Voltage Ratiometric Limits.

## T

**Thermal Effect on Offset** – The maximum deviation in Offset due to changes in temperature over the Compensated Temperature Range, relative to Offset measured at Reference Temperature.

**Thermal Effect on Span** – The maximum deviation in Full Scale Span due to changes in temperature over the Compensated Temperature Range, relative to Full Scale Span measured at Reference Temperature.

**Thermal Hysteresis** – The maximum difference between output readings when the same temperature is reached consecutively, under the same operating conditions, with temperature approaching from opposite directions within the specified temperature range.

**Total Error Band (TEB)** – The maximum deviation in output from Ideal Transfer Function over the entire Compensated Temperature and Flow Range. Includes all errors due to: Offset, Full Scale Span, Flow Hysteresis, Flow Repeatability, Thermal Effect on Offset, Thermal Effect on Span and Thermal Hysteresis.

**Transfer Function** – The equation which defines the output of the product as a function of Flow over the Operating Flow and Temperature Ranges. See Ideal Transfer Function.

## V

**Volumetric Flow** – The volume of gas that passes through a given surface per unit time. Honeywell sensors use a standard temperature 0 °C [32 °F] and standard pressure of 760 Torr. See Standard Conditions.

## W

**Wetted Materials** – Materials used in the product which may come into direct contact with measured gases applied to the sensor port(s).

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## **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.**

### **WARRANTY/REMEDY**

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 other 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.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

## **WARNING**

### **MISUSE OF DOCUMENTATION**

- The information presented in this technical note 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.**

### **SALES AND SERVICE**

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