

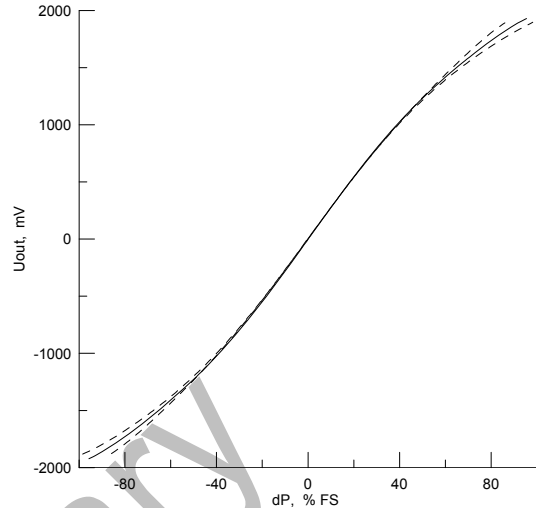
# MB-LPS2-02-10 Series 250Pa Full-Scale Differential Air Pressure Sensors Analog-Conditioned, Dynamic Range >10000x

**GENERAL DESCRIPTION**

The MB-LPS2-02 series low-pressure sensors sense differential air (or other non-corrosive gas) pressure, inferring differential pressure from nano-liters per second gas-flow through an integrated air-flow channel having high flow-impedance. The transducer is a MEMS-based thermo-anemometer on a monolithic silicon chip. Rejistor technology combined with CMOS circuitry provides on-chip-integrated analog-only compensation and conditioning electronics.

**FEATURES, BENEFITS**

- **Dynamic Range > 10000x.**
- **High flow-impedance > 40 kPa/(ml/s).**
  - Dominates flow-impedance in series (in-line) configurations.
  - Minimizes flow-through in bypass (parallel, shunt) configurations.
  - Allows use of filters and connection hoses without losing calibration.
- **Rejistor-based analog-only on-chip signal conditioning electronics to compensate (Offset, TC-Offset, Span, TC-Span).**

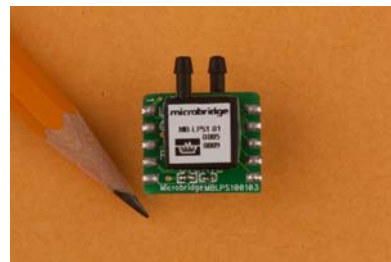


**Fig. 1: Typical response for MB-LPS2-02-10 sensor. Example: MB-LPS2-02-10B → 1”H<sub>2</sub>O, bidirectional. Pneumatic impedance > 40kPa/(ml/s).**

**PRODUCT FAMILY: MB-LPS2-02-10, FOR APPLICATIONS SUCH AS MEDICAL RESPIRATION-MEASUREMENT, REQUIRING HIGH DYNAMIC RANGE > 10000X:**

Unit ID	Measurement Range (Full Scale)			Pneumatic Flow-Through Impedance
<b>MB-LPS2-02-10B</b>	+/-250Pa	+/-1”H <sub>2</sub> O	+/-0.036PSI	>40kPa/(ml/s)
<b>MB-LPS2-02-10U</b>	0...250Pa	0...1”H <sub>2</sub> O	0...0.036PSI	>40kPa/(ml/s)

Asymmetric bidirectional measurement ranges are also possible → Contact Microbridge



For die (uncalibrated) → Contact Microbridge

[www.mbridgetech.com](http://www.mbridgetech.com)

Information furnished by Microbridge Technologies is believed to be accurate and reliable. However, no responsibility is assumed by Microbridge Technologies for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of Microbridge Technologies. Trademarks and registered trademarks are the property of their respective companies.

**TABLE 1: MB-LPS2-02-10 SPECIFICATIONS:  
ANALOG-CONDITIONED LOW DIFFERENTIAL AIR PRESSURE SENSOR**

Characteristic	Specification
Excitation voltage	$V_{DD} = 7 - 9$ VDC (includes on-board power supply regulator) (Note: for $V_{DD} = 5$ VDC and ratiometric output, contact Microbridge)
Current consumption	Typ. 7 mA (no load)
Minimum output load resistance	5kOhm (less than 1 mA output drive current)
Nominal output voltage	MB-LPS2-02-10U: 1.0V (at zero-Pressure); 4.0V (at 250Pa) MB-LPS2-02-10B: 1.0V (at -250Pa); 2.5V (at zero-Pressure); 4.0V (at +250Pa)  Asymmetric bidirectional measurement ranges are also possible → Contact Microbridge.
Nominal full-scale voltage span	MB-LPS2-02-10U: +3V MB-LPS2-02-10B: +/-1.5V (=3V)
Adjusted Offset	less than +/- 0.25% of Full-Scale (+/-10mV)
Offset Temperature Shift	less than +/- 0.125% of Full-Scale (+/-5mV) (5°C to 55°C)
Offset Warmup Shift	less than +/-2mV
Differential Pressure Resolution	less than 0.01% Full Scale (minimum detectable differential pressure)
Span Shift Over Temperature	Typ. +/-1% (5°C to 55°C) up to +/-50% of Full-Scale Typ. +/-7% (5°C to 55°C) from +/-50% of Full-Scale to +/-100% of Full-Scale
Response Time	Typ. 1-2ms
Total Error	Max. +/-2.5% of Full-Scale (5°C to 55°C) up to +/-50% of Full-Scale Max. +/-10% of Full-Scale (5°C to 55°C) from +/-50% of Full-Scale to +/-100% of Full-Scale
ESD protection	2000V HBM – JESD22-A114, human body model weakest pin pair testing, all lead combinations, Class 2 (by analysis).

#### IMMUNITY TO RFI:

Test	Result
Sweep 80MHz - 2.7GHz	<ul style="list-style-type: none"> <li>Less than 0.5% error for any package orientation subjected to 10V/m electric field (by analysis).</li> </ul>

#### STANDARD ALTITUDE CORRECTION:

Variations in ambient atmospheric pressure (caused by elevation with respect to sea level), need to be compensated externally to the sensor, according to a simple mathematical expression:

$$\rightarrow [(True-\Delta P)] = [(Sensor-\Delta P) \times (1 \text{ bar}) / (Ambient-Pabs)]$$

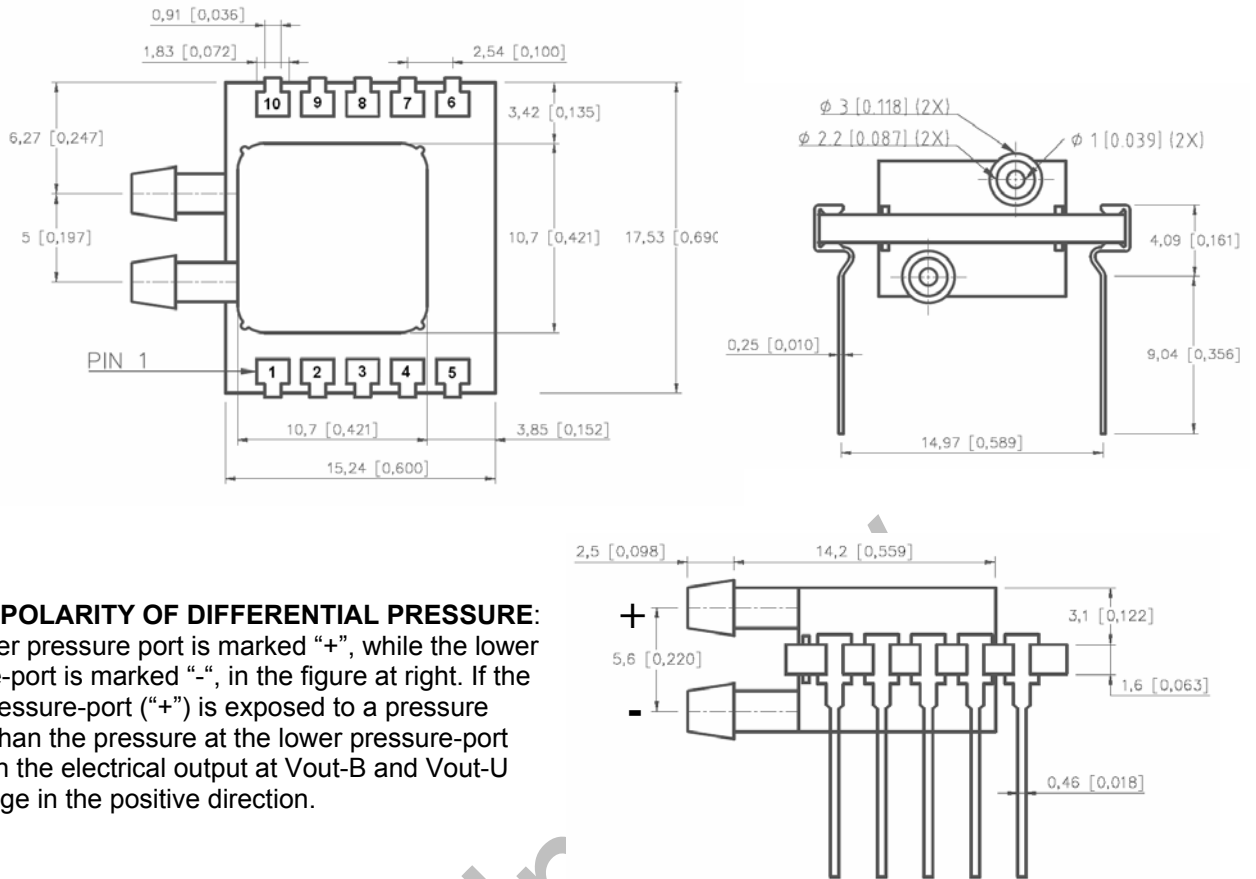
where:

**True- $\Delta P$**  : true differential pressure

**Sensor- $\Delta P$**  : sensor's differential pressure

**Ambient-Pabs** : actual ambient absolute pressure (measured in bars)

**PACKAGE AND PINOUT INFORMATION:**



**ABOUT POLARITY OF DIFFERENTIAL PRESSURE:**

The upper pressure port is marked “+”, while the lower pressure-port is marked “-”, in the figure at right. If the upper pressure-port (“+”) is exposed to a pressure greater than the pressure at the lower pressure-port (“-”), then the electrical output at Vout-B and Vout-U will change in the positive direction.

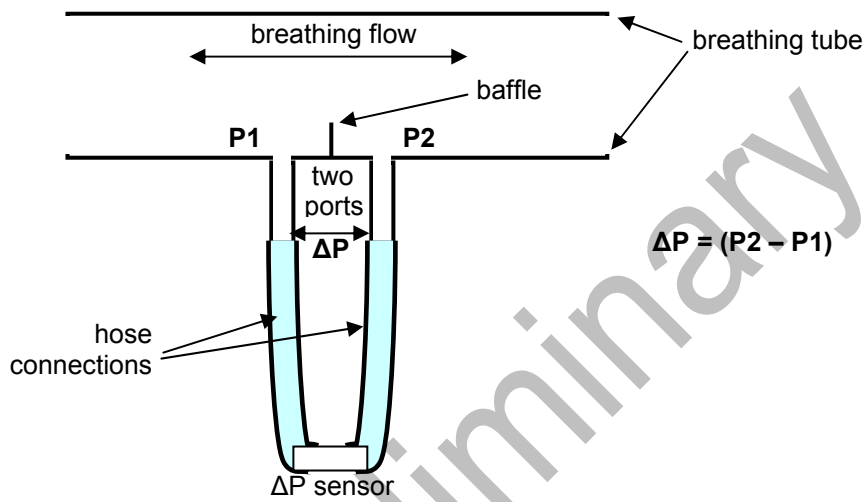
Pin #	Name	Function
1	GND	Main circuit Ground
2	VDD	Main circuit power supply
3	Vout-B	Output voltage for bidirectional-mode sensors (calibrated in MB-LPS2-02-10B units)
4	Vout-U	Output voltage for unidirectional-mode sensors (calibrated in MB-LPS2-02-10U units)
		Note: A subset of the above pins are the only pins used during normal functioning of the sensor (GND, VDD and <i>either</i> Vout-B <i>or</i> Vout-U).
5	H-aux	Pin used for adjustment and/or calibration
6	HCOM	Common pin for adjustment/calibration operations using pins #5, 7, 8, 9, 10
7	HB	Pin used for adjustment and/or calibration
8	HA	Pin used for adjustment and/or calibration
9	HG	Pin used for adjustment and/or calibration
10	HT	Pin used for adjustment and/or calibration
		Note: pins # 5 – 10 are used by Microbridge’s adjustment hardware and software, only during adjustment/calibration. These pins are NOT used during normal functioning of the sensor.

Information furnished by Microbridge Technologies is believed to be accurate and reliable. However, no responsibility is assumed by Microbridge Technologies for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of Microbridge Technologies. Trademarks and registered trademarks are the property of their respective companies.

**APPLICATION BRIEF: On the Use of Hoses and/or Filters**

Microbridge’s MB-LPS2-02-10X series differential pressure sensors feature very high flow-through impedance, greater than 40kPa per (ml/s) of flow-through. This makes the sensor virtually equivalent to membrane-type (dead-end type) differential pressure sensors regarding this important aspect of performance for many applications.

Consider, for example, the sensor being used in a shunt configuration, to sense differential pressure across a flow-restrictive baffle in a breathing tube, thereby inferring measurement of air flow in the tube. To enhance the immunity of the sensor vs. particulate contaminants and humidity, it is desirable to use connection hoses and/or filters, as shown in the figure below. These hoses and/or filters may add flow-impedance to the shunt path, for example up to 1kPa/(ml/s). Due to the high flow-through impedance of the MB-LPS2-02-10X series sensors, the change in air flow through the sensor (and therefore the change in the sensor’s sensitivity) is small-to-negligible. Even as the filter’s characteristics change over time and use, the change will still be small.



Information furnished by Microbridge Technologies is believed to be accurate and reliable. However, no responsibility is assumed by Microbridge Technologies for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of Microbridge Technologies. Trademarks and registered trademarks are the property of their respective companies.