

MB-LPS ΔP Sensors: Application Briefs

APPLICATION BRIEF: Real-Time Sensing of Time-Variations in Absolute Indoor Air Pressure

In order to use this sensor to sense time-variations in absolute indoor air pressure, it is sufficient to connect one flow port to a small closed volume, such that that port is not open to the ambient air pressure → the sensor will sense time-variations in absolute air pressure at the other (open) port.

For example, using the MB-LPS1-01-020B, the sensor's minimum detectable differential pressure is below 0.1Pa, which is roughly 1ppm compared to the ambient indoor air pressure (atmospheric pressure: $\sim 10^5$ Pa). When combined with the sensor's 1-2ms time-response, this is sufficient to sense very small transient changes in indoor air pressure.

For example, if a typical conference room has volume $6\text{m} \times 8\text{m} \times 2\text{m} \approx 100 \text{ m}^3 = 100,000,000 \text{ cm}^3$, then a change in volume of 100 cm^3 corresponds to 1ppm. This would be equivalent to a window having area $2\text{m} \times 1\text{m}$ being displaced at its center by roughly 0.3mm, such as could happen due to a wind gust at the exterior of the building.

Microbridge's MB-LPS1-01-series sensors routinely demonstrate the ability to sense indoor air pressure changes of this magnitude.

APPLICATION BRIEF: Real-Time Sensing of Time-Variations in Altitude

In order to use this sensor to sense time-variations in altitude, it is sufficient to connect one flow port to a small closed volume (such as a few cm^3), such that that port is not open to the ambient air pressure → the sensor will sense time-variations in absolute air pressure at the other (open) port.

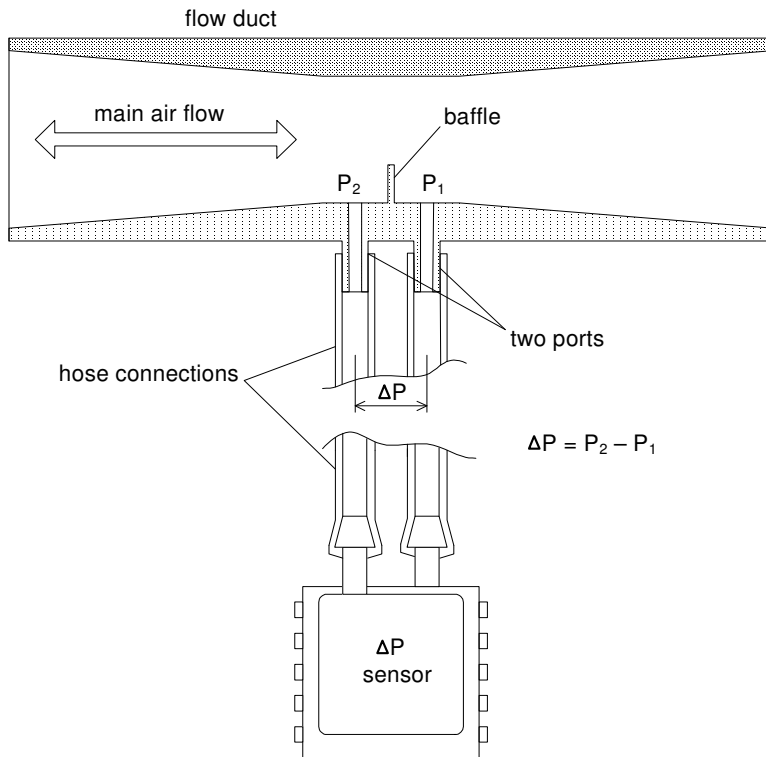
Since 1cm of altitude change corresponds to roughly 0.1Pa of absolute pressure change, the sensor can be used to flag sudden changes in altitude, even quite small sudden changes in altitude.

Microbridge's MB-LPS1-01-series sensors routinely demonstrate the ability to sense altitude changes of a few cm magnitude.

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

Microbridge’s MB-LPS1-01-series differential pressure sensors feature very high flow-through impedance, greater than 10kPa 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.

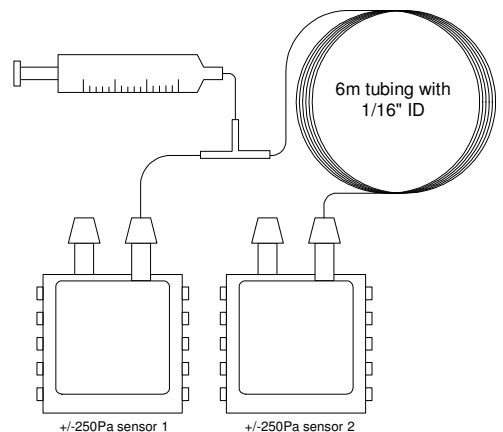
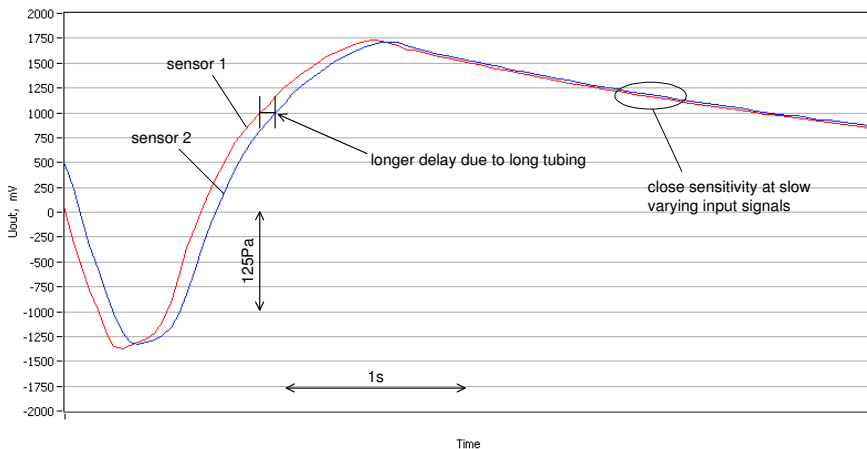
Consider, for example, the sensor being used in a shunt configuration, to sense differential pressure across a flow-restrictive baffle in an air duct, thereby inferring measurement of air flow in the duct. To enhance the immunity of the sensor vs. particulate contaminants and humidity, it is desirable 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-LPS1-01-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.



Experimental Verification:

Consider two sensors, where one sensor is connected through 6m of tubing having inner diameter 1/16”, as depicted in the diagram below. As seen in the graph, the extra 6m of tubing on one sensor causes a slight time delay due to compressibility of gas in the tubing, but doesn’t affect the calibration of the sensor, because the sensor’s flow-thru impedance is approximately 100kPa/(ml/s).

→ Calibration is unaffected by long connection hoses.



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