

# Air flow monitoring with Infineon barometric pressure sensors DPS310 and DPS368

## About this document

This application note describes the air-flow blockage and control method based on absolute pressure sensor DPS310 or DPS368.

### Scope and purpose

This document covers a technique to detect air-flow reduction into home appliances or HVAC systems and an alarm for dust filters replacement . This technique is based on measuring static pressure as part of the total pressure of the air flow.

### Intended audience

This document is intended for Infineon customers who wish to develop applications based on DPS310, DPS368

## Table of contents

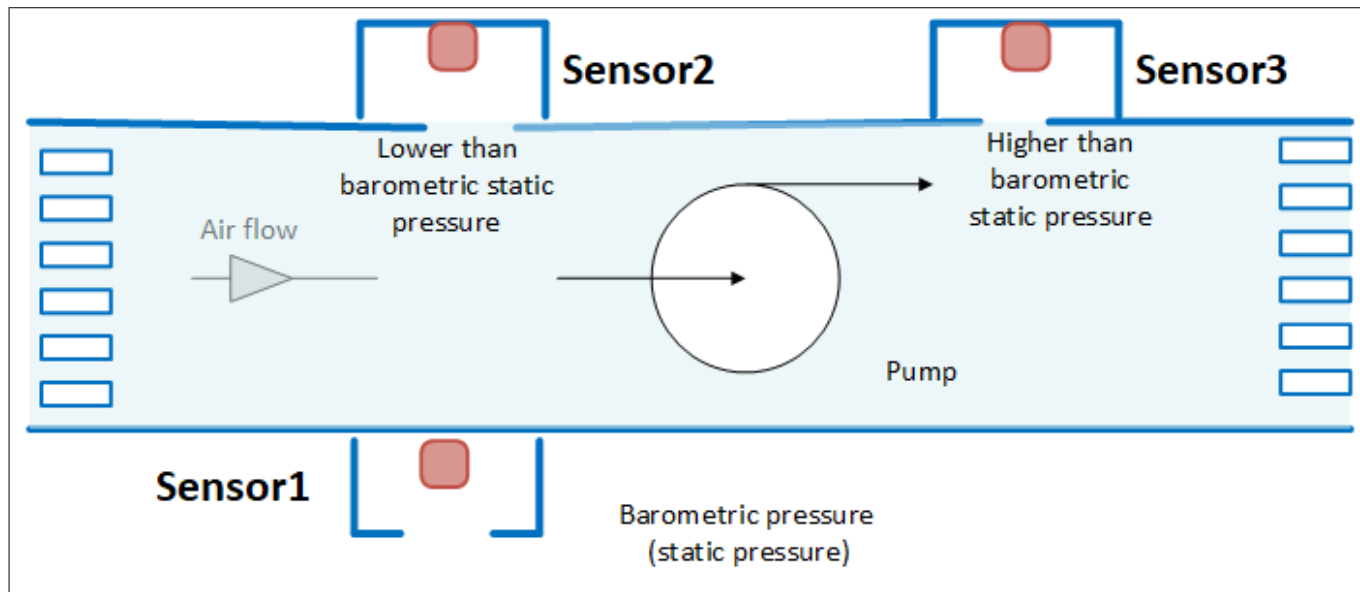
|   |                                   |   |
|---|-----------------------------------|---|
|   | About this document .....         | 1 |
| 1 | Air-flow blockage detector .....  | 1 |
| 2 | Air-flow monitoring in HVAC ..... | 2 |
|   | Disclaimer .....                  | 4 |

## 1 Air-flow blockage detector

The air-flow measurement can prove to be useful in different applications such as ventilation, cleaning, drying or cooling.

The air flow in home appliances is generated by an air pump usually accompanied by dust filters for example in vacuum cleaner. The air pump generates the difference in pressure, which enables the air flow. The baseline for the air pressure is the barometric pressure, and this pressure level can be used to evaluate the air-flow speed and also the air blockage into the system due to clogged air filters or closing the air pipes. The image below show the static pressure into the pipe before and after the air pump, also relative to the barometric pressure. For accurate dust filter replacement or cooling air-flow a low-pressure noise sensor is required. DPS310 is a good option, and also for tiny systems such as laptops or smart inhalers. DPS368 is recommended for water resistant systems.

## 2 Air-flow monitoring in HVAC

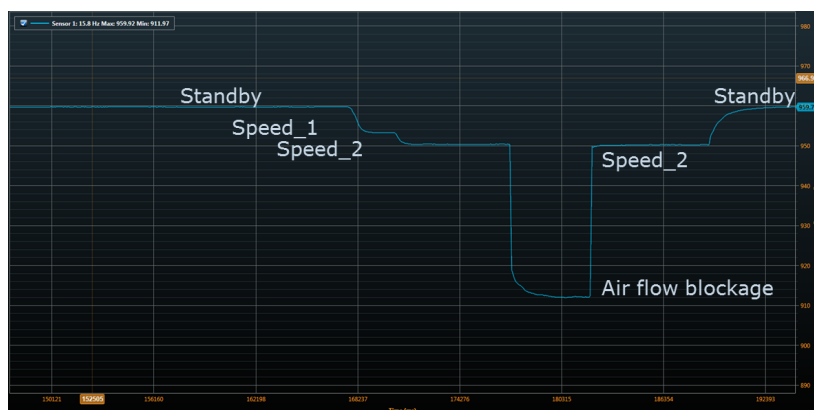


**Figure 1** Static pressure into the air pipe

The air-flow control implementation varies from a single pressure sensor when the pressure recorded at start-up can be used as the reference barometric pressure, or more sensors for the systems which request long-term operation and monitoring like HVAC.

The graph below shows the pressure into the dust cleaner monitored with pressure sensor placed like 'Sensor 2' in the Figure 1.

**Figure 2** Static air pressure into the dust cleaner



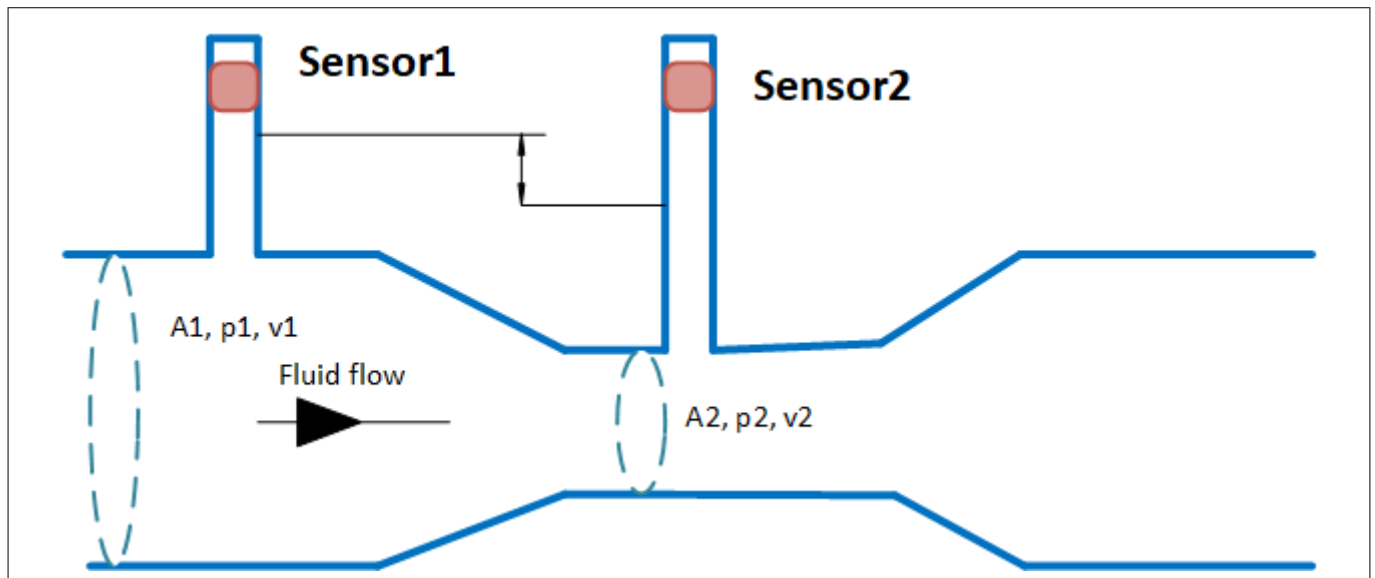
## 2 Air-flow monitoring in HVAC

Ventilation systems such as HVAC units typically monitor and control air flow to maintain indoor air quality and energy efficiency.

The speed of air flow through a pipe can be measured using the Bernoulli principle.

A 'choke' or constriction is created in a pipe, the static pressure before and during the constriction is measured, as in the example below:

## 2 Air-flow monitoring in HVAC



**Figure 3** Fluid speed meter based on static pressure monitoring

The Bernoulli principle states that an increase in the flow speed of a fluid occurs simultaneously with a decrease in pressure, as the sum of dynamic pressure and static pressure in the system must be constant. When the air passes through the constriction in the pipe, the flow speeds up and the pressure decreases. By measuring the static pressure in the pipe before and during the constriction and applying the Bernoulli equation, the air flow can be calculated.

The standard Bernoulli equation is only applicable to incompressible fluids such as liquids and slow-moving gasses; higher speeds the Bernoulli equation for compressible fluids must be used. It is possible in the example below to calibrate the air-flow speed meter and create a formula or reference table which is implemented in a microcontroller.

## Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

**Edition 2020-10-20**

**Published by**

**Infineon Technologies AG**

**81726 Munich, Germany**

© 2019 Infineon Technologies AG

All Rights Reserved.

**Do you have a question about any aspect of this document?**

Email: [erratum@infineon.com](mailto:erratum@infineon.com)

**Document reference**

**AN\_1812\_PL38\_1812\_171038**

## IMPORTANT NOTICE

The information contained in this application note is given as a hint for the implementation of the product only and shall in no event be regarded as a description or warranty of a certain functionality, condition or quality of the product. Before implementation of the product, the recipient of this application note must verify any function and other technical information given herein in the real application. Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind (including without limitation warranties of non-infringement of intellectual property rights of any third party) with respect to any and all information given in this application note.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

## WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury