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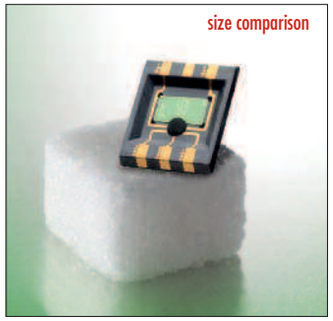
## Basic principles

Thermal flow sensors are perfectly suited for measuring low differential pressures because they have good zero point stability and their highest sensitivity is with a low flow velocity. In contrast, diaphragm pressure sensors work with a square characteristic curve which shows the least sensor sensitivity at low pressure of around zero. The use of a thermal flow sensor for measuring low differential pressures has the potential to reduce the costs to a tenth of what they would be with a pressure sensor system.




## Possible application areas

- Automotive
- Household appliances
- Medical technology
- Measuring instruments
- Environmental technology

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## About us

2E is a company working in the interdisciplinary field of mechatronics and develops and produces, amongst other things, components and systems for the following sectors:

- Automotive
- Industrial electrics
- Medical technology
- Automation

Our core competencies include MID technology, mass production of precision injection-moulded housings to accomodate electronics as well as electrical connectors and systems for sensor and microfluidic technology.

With the evaluation kit you can familiarize yourself with the flow sensor for four weeks free of charge.

It is possible to read the data using a USB interface.
The necessary software is included in the evaluation kit.


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# 3D-MID Flow sensor

Miniaturized thermal flow sensor for small volume flow rates



## How it works

The basic component of the thermal flow sensor is a microtechnical silicon chip with a thin diaphragm comprising temperature sensors (thermal elements) and a heating element.

To take a measurement heat is applied to the medium with the aid of the heating element. The thermal elements on each side of the heating element record the resulting heat distribution in a highly dynamic way. This changes if gases flow over the diaphragm, and the direction as well as the flow velocity of the fluid can thus be determined.

In order to create capillary flow channels in the simplest and most robust way, 2E mechatronic pursues the principle of producing the necessary loss of pressure by means of an integrated flow channel in the MEMS chip. The channel sets the scale of the flow sensor measuring range to the target differential pressure.

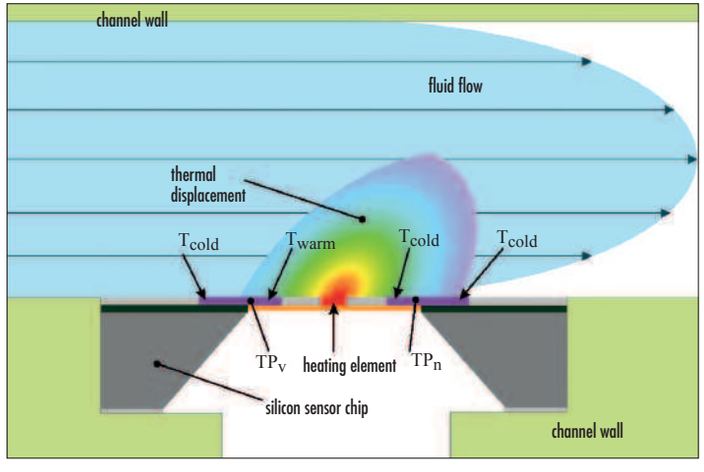
The integration of the fluidic, electrical and mechanical interfaces is achieved by using an extremely miniaturized MID-housing.

The 3D layout was designed so that the sensor chip with integrated channel can be electrically contacted by means of a bonding process. Inlet and outlet ports are on the outer edge of the chip pocket into which the chip is glued. The size and position of the outer electrical contact areas have been set to a 2.5 mm standard grid. They are positioned symmetrically on both sides of the housing and allow a reliable, standard soldering process to be used. The entire, innovative MID-housing with its 3-dimensional design has thus been produced as an SMT component.

## Features

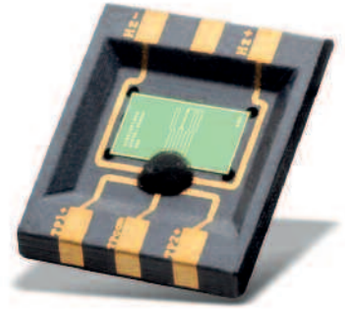
The MID flow sensor can be used as a flow and a differential pressure sensor both in bypass mode and in direct operation. It provides a high level of accuracy with, at the same time, low power consumption (<12 mW). The maximum volume flow rate in direct operation is 10 ml/min for air. The standard sensor achieves this volume flow rate with a differential pressure of 3 mbar.

With the SMD/MID concept a highly integrated and extremely precise sensor, which at the same time is easy to handle, has been created for electronic components. The sensor provides an analogue output signal of up to approx. 15 mV.




## Advantages of the 2E flow sensor

- Extreme miniaturization
- Produced as SMD
- OEM version for easy integration in existing systems
- Customized housing and chip design
- Characterization for further media possible
- High reproducibility
- High sensitivity
- Applicable in direct operation or as bypass
- Low energy consumption
- Rapid response time
- Minimal heat build-up of measurement medium
- Very good value for money



## Technical data

| | |
|---|---|
| Medium | air |
| Dimensions | 12 mm x 10 mm x 6 mm |
| Hose connectors | <Ø 2 mm, 4,1 mm apart |
| Medium temperature | 0 to 70° C |
| Storage temperature | -40 to 85° C |
| Output signal (difference) | ±15 mV |
| Power consumption | <12 mW |
| Response time | <10 ms |
| Volume flow rate (direct operation) | ±10 ml/min |
| Differential pressure (standard) | 3 mbar |