



Flow Sens FS2

Measuring small and high flows and its direction

Product

The FS2- element consists of four temperature depending platinum-resistors, all on chip. The low-ohm resistor with a small area is used as a heater, whereas the two high-ohm resistors on the right and on the left side are for measuring the mass flow and the direction. The two sensors placed on each side of the heater are connected in a bridge circuit, which gives a clear signal such as to define the volume and the direction of the flow. The heater is heating up both sensors equal, while there is no flow of a medium. Depending on the direction of the flow, one sensor is cooled down more than the other. Depending on the temperature difference between the two resistances, the flow volume can be determined. As a result of the little thermal mass, this flow sensor has fast heating and cooling response times. This system allows to measure a very small flow volume and at the same time can detect the direction of the flow

To measure higher mass flow volumes there are two possibilities:

Mounting the FS2 in a bypass, or using the fourth together with the heater in a bridge circuit.

Advantages

- Detection of flow direction
- Small mass flows
- Simple signal processing and calibration
- No moved mechanical components
- Excellent reproducibility
- Excellent long-term stability
- Easy adaptable for different applications or into housings
- Best price-performance ratio

Applications

- Differential pressure sensors
- HVAC and building control solutions
- Medical devices
- Automotive industry
- Device monitoring



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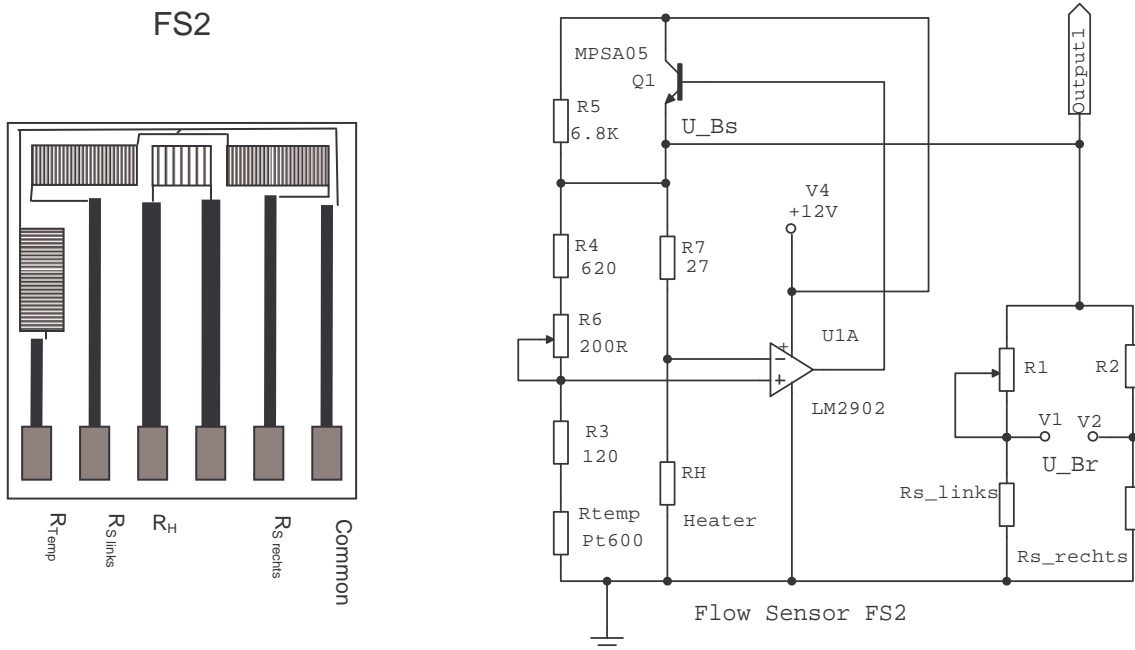
All mechanical dimensions are valid at 25°C ambient temperature, if not differently indicated. ■ All data except the mechanical dimensions only have information purposes and are not to be understood as assured characteristics. ■ Technical changes without previous announcement as well as mistakes reserve. ■ The information on this data sheet was examined carefully and will be accepted as correct. No liability in case of mistakes. ■ Load with extreme values during a longer period can affect the reliability.

Technical Data

Measuring principle	Thermal
Measuring range	0 ... 50 m/s
Response sensitivity	0.001m/s
Accuracy	< 2% current measuring value (dependent on electronic and calibration)
Response time $t_{63\%}$	< 0,5 s
Temperature range	-20 ... +150 °C
Electrical connection	Cu- wires enamel- insulatet
Heater	$R_H(0^\circ\text{C}) = 28 \Omega \pm 10\%$
Measuring elements	$R_{Si}(0^\circ\text{C}) = 300 \Omega \pm 10\%$
Referenz element	$R_R(0^\circ\text{C}) = 600 \Omega \pm 10\%$
Required voltages	Typical 2 - 5 V
Substrate material	Ceramic low heat conductivity
In general	higher requirements upon request. No responsibility accepted.

Terminal connection of sensor chip

Circuit recommendation



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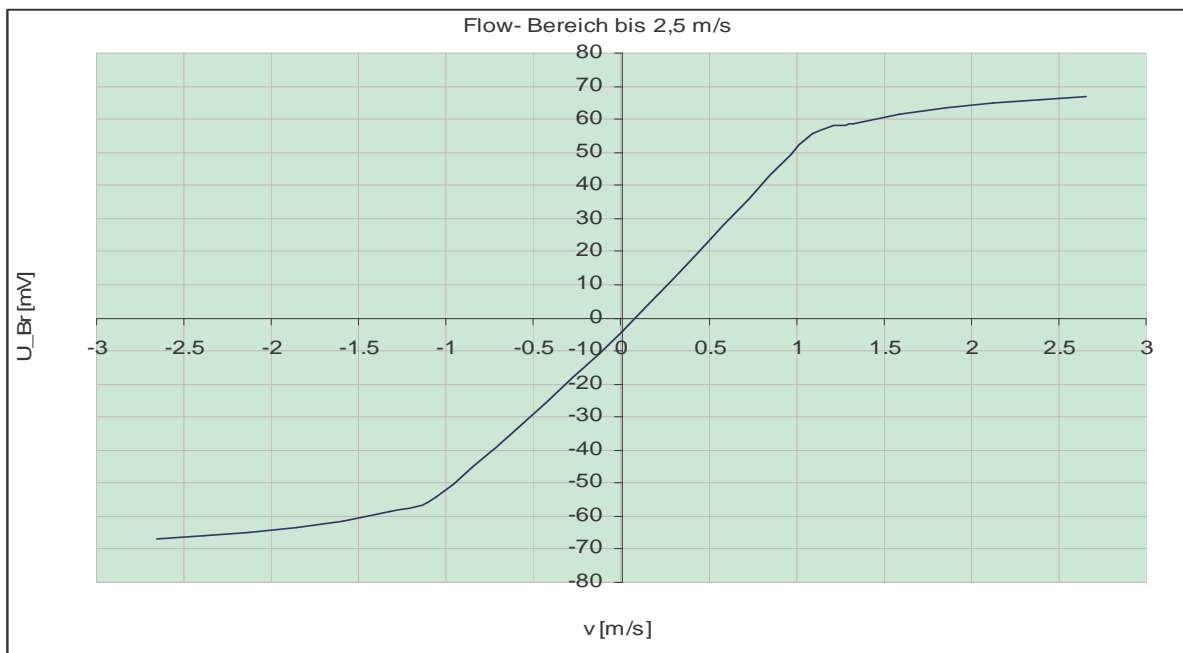
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Example – Characteristic for small flow measurement with direction output

The heater R_H is fed by a constant voltage or a constant temperature.

As shown in the scheme above, the two sensor-elements ($R_{S\text{ left}}$ and $R_{S\text{ right}}$) need to be connected in a bridge circuit.

With a corresponding supply V_{CC} , the bridge balance $V_{Br} = V_1 - V_2$ is dependent of the mass-flow. If the bridge balance is aligned at flow = 0 to $V_{Br} = 0$, the sign gives the information about the direction of the flow. For this the resistor R_1 has to be adjustable.



Typical signal – curve between 0 0.2.5 m/s

Messbereich ab 2,5m/s bis 50m/s

A flow direction-independent signal output 1 and/or U_{Bs} is available likewise and represents the flowdependent entire heattransfer of the sensor into the medium. This is taken with larger measuring ranges than 2.5m/s. The signal U_{Br} to application can further be used for direction detection.



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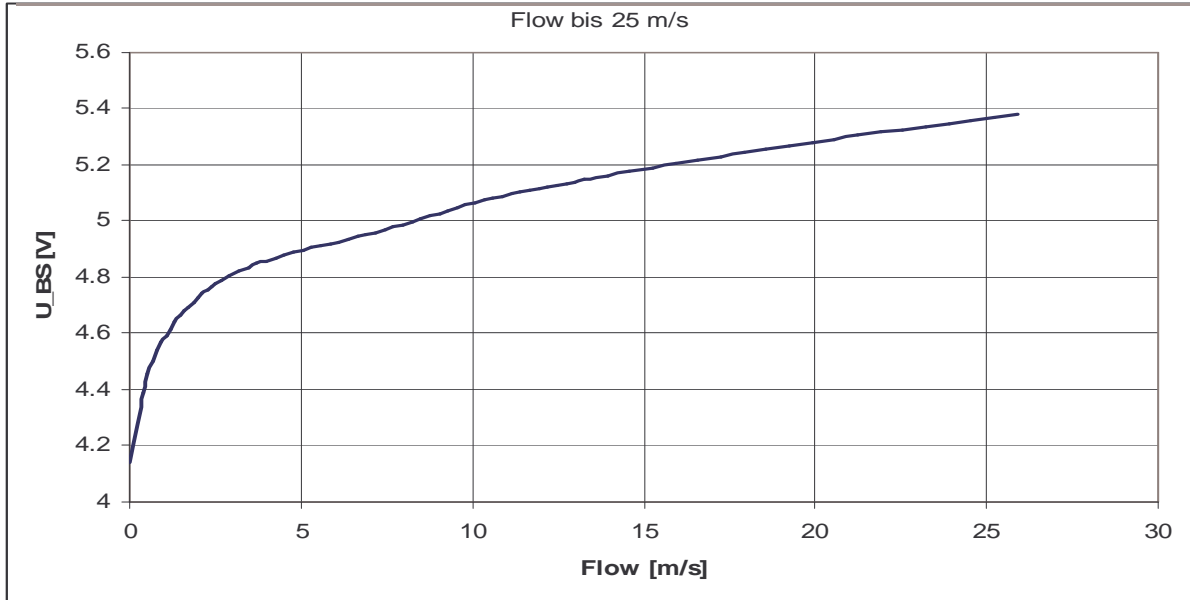


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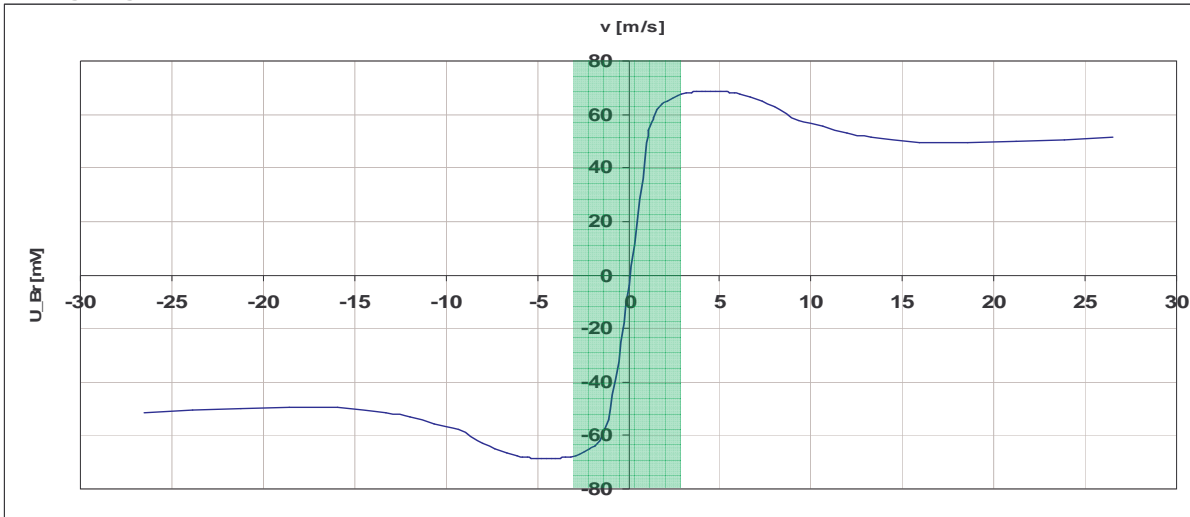
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Example – Characteristic for high flow measurement with direction output

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Bridge signal for direction detection



Option

The chip design, electrical connection and the sensor packaging we can develop and produce customized. If required, a connector can be supplied together with the sensors.



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