



FS2

Thermal Mass Flow Sensor

Optimal for measuring gas flow and direction

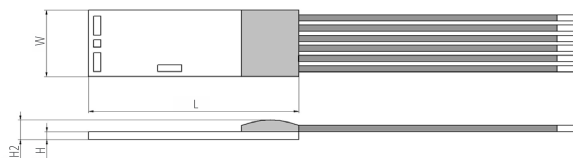


INNOVATIVE SENSOR TECHNOLOGY

Benefits & Characteristics

- Detection of flow direction
- Simple signal processing
- Outstanding sensitivity
- Stable platinum technology
- No moving mechanical parts
- Excellent long-term stability
- Simple calibration
- Bare sensor element resists up to +450 °C (customer specific)
- Excellent reproducibility
- Customer specific sensor available upon request

Illustration¹⁾



1) For actual size, see dimensions

Technical Data

Dimensions (L x W x H / H2 in mm):*	5 x 3.5 x 0.20 / 0.60
Operating measuring range:	0 ml/min to 50 ml/min (half bridge mode) 0 m/s to 1 m/s (half bridge mode) 0 m/s to 100 m/s (CTA mode) 0 l/min to 5 l/min (CTA mode)
Minimum operating range:	0 ml/min to 2.5 ml/min
Response sensitivity:	0.001 m/s (50 µl/min)
Accuracy:	< 2 % of the measured value (dependent on the electronics and calibration)
Response time t_{63} :	< 0.5 s
Operating temperature range:*	-20 °C to +150 °C
Temperature sensitivity:	< 0.1%/K (dependent on the electronics)
Connection:*	Cu-wire, enamelled, Ø 0.2 mm
Heater:*	$R_H(25\text{ °C}) = 34\ \Omega \pm 10\ \%$
Measuring element:*	$R_{s,i}(25\text{ °C}) = 425\ \Omega \pm 10\ \%$
Reference element:*	$R_R(25\text{ °C}) = 710\ \Omega \pm 10\ \%$
Voltage range (nominal):*	2 V to 5 V (dependent on flow rate)

* Customer specific alternatives available



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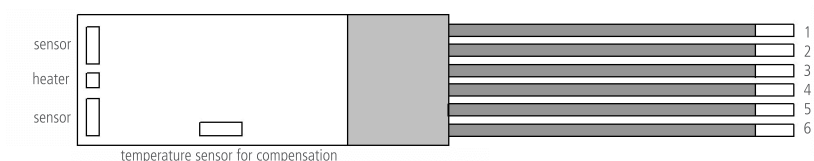
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Pin Assignment



1	2	3	4	5	6
GND	temperature sensor 1	heater	heater	temperature sensor 2	temperature sensor for compensation

Order Information - Cu-wire, enamelled, Ø 0.2 mm

Wire length	25 mm	300 mm
	FS2T.0.1E.025	FS2T.0.1E.300
Order code	050.00130	350.00053



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Application Note

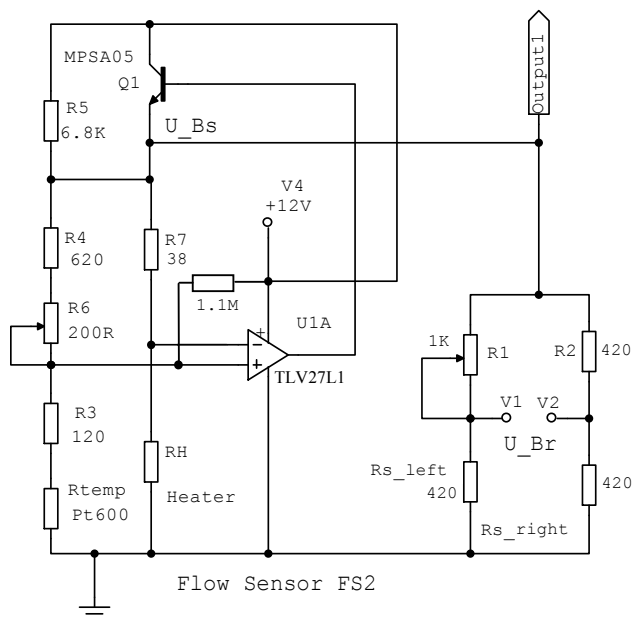
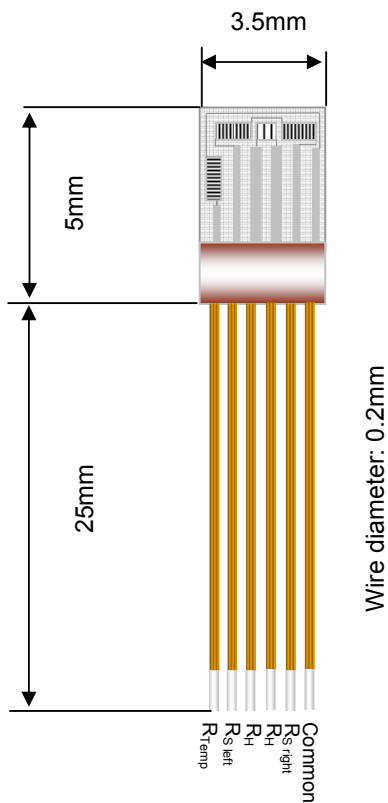
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Terminal connection of sensor chip

Circuit recommendation



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Application Note

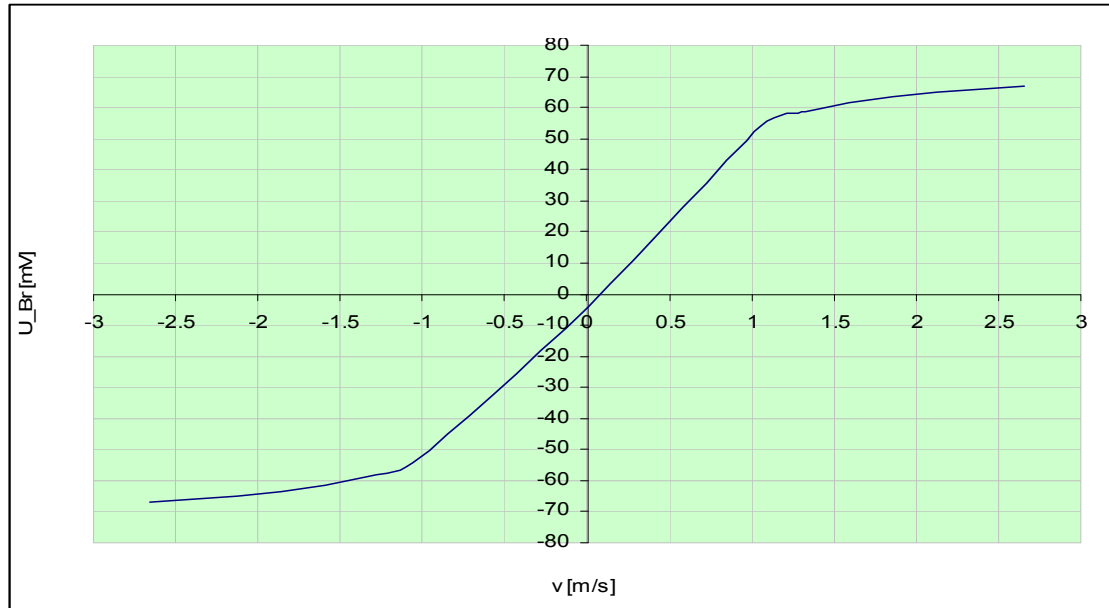
Measuring small and high flows and its direction

FS2

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 $R_{S \text{ right}}$) can be connected in a bridge circuit.

With a corresponding supply V_{CC} , the bridge balance $V_{Br} = V_1 - V_2$ is depending of the mass-flow. If the bridge balance is adjusted 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 ... 2.5 m/s

Flow range from 2.5m/s to 50m/s

A flow direction-independent signal output 1 and/or U_{Bs} is available likewise and represents the flow dependent entire heat transfer of the sensor into the medium. This can be taken in order to measure larger flow ranges than 2.5m/s. The signal U_{Br} can be further used to detect flow direction.



Application Note

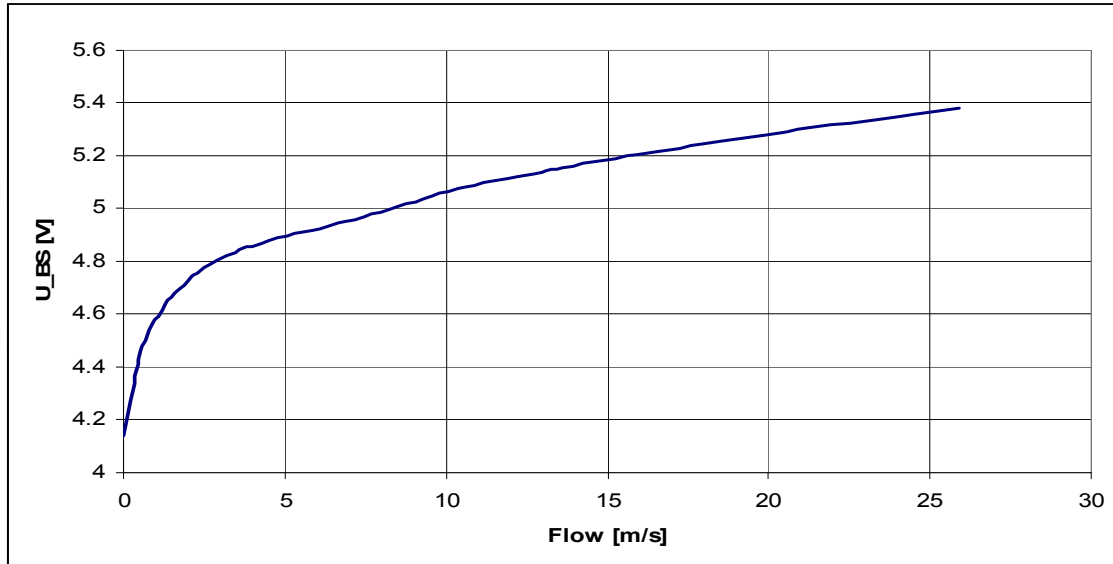
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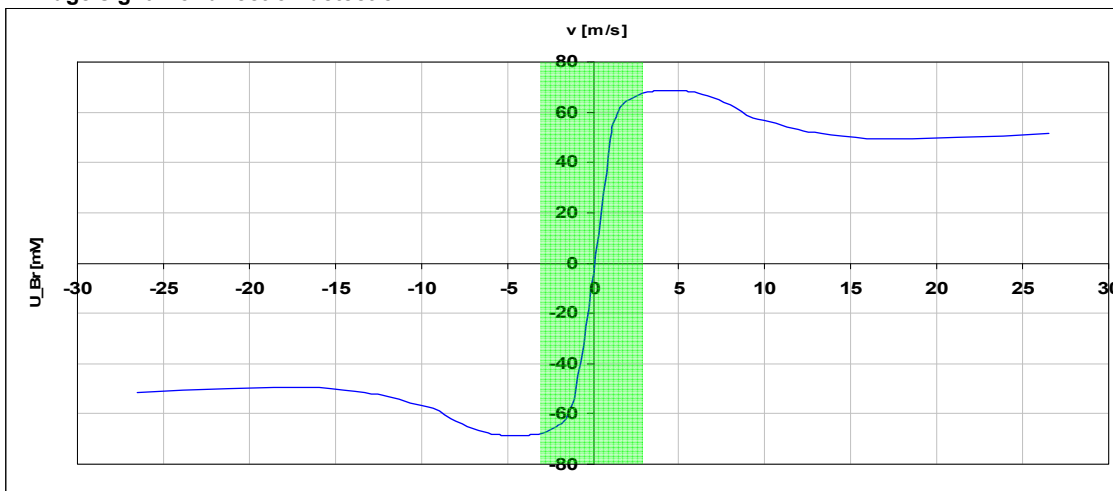


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Example – Characteristic for high flow measurement with direction output



Bridge signal for direction detection



Custom specific solutions

The electrical connections can be fabricated custom specific.

Custom specific chip design on request.

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