

Flow Sensor AF 02 /AF 02T

Measuring small flows and its direction

The AF 02 / AF 02T consists of three or 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 AF02 in a bypass, or using the fourth resistor (AF02T) together with the heater in a bridge circuit.

Advantages

- _ Detection of flow direction
- _ Small mass flows
- _ Simple signal processing and calibration
- _ Insensitive to contamination
- _ Excellent reproducibility
- _ Excellent long-term stability
- _ Easy adaptable for different applications or into housings
- _ Best price-performance ratio

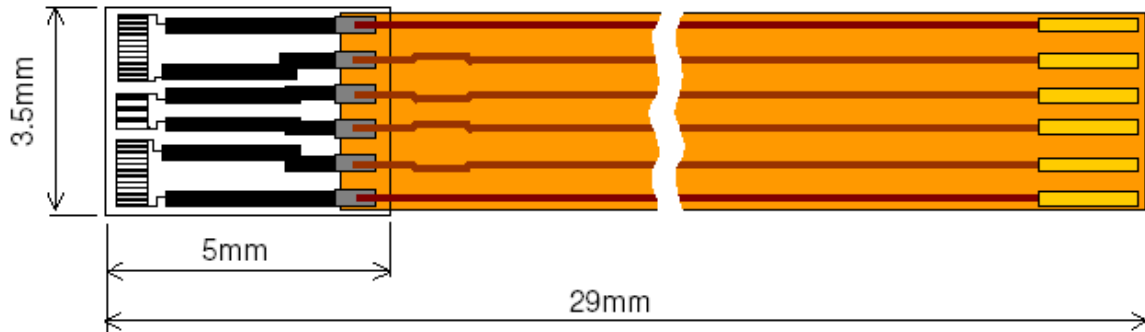
Applications

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

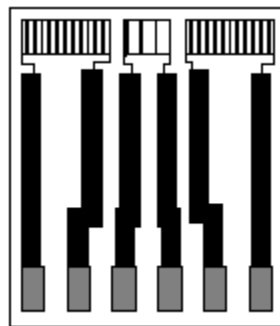
Technical Data

Measuring principle	: Thermal
Measuring range	: 0.001 ... 1 m/s
Accuracy	: < 2% current measuring value (dependent on electronic and calibration)
Warm up time	: < 1 min (depending on mounting)
Response time	: < 2 s
Temperature range	: -20 ... +60 °C
Temperature sensitivity	: < 0.1 %/K (dependent on electronic)
Electrical connection	: Flexible circuit, compatible with ZIF connector
Heater	: $R_H(0^\circ\text{C}) = 25 \Omega \pm 10\%$
Measuring elements	: $R_{Si}(0^\circ\text{C}) = 250 \Omega \pm 10\%$
Referenz element	: $R_R(0^\circ\text{C}) = 550 \Omega \pm 10\%$ (AF 02T)
Required voltages	: Typical 2 - 3 V
Substrate material	: Ceramic

Construction size

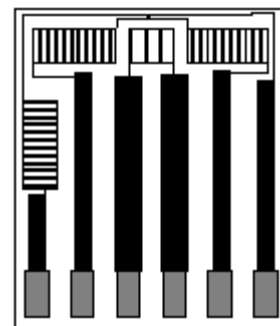


AF 02



Rs-Left RH Rs-Right

AF 02T



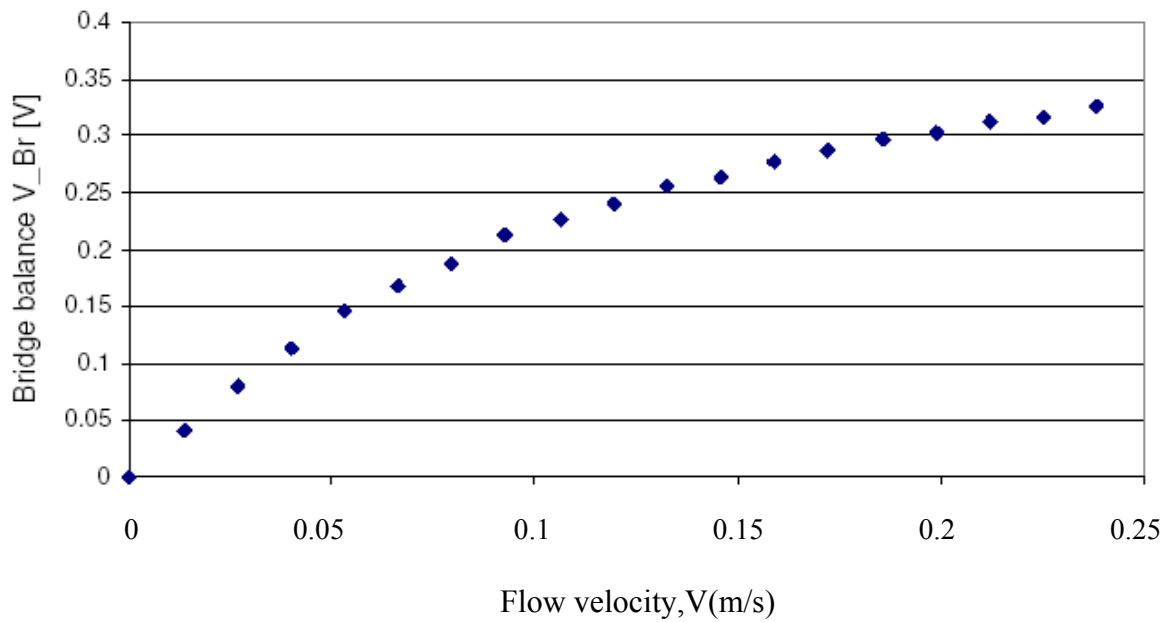
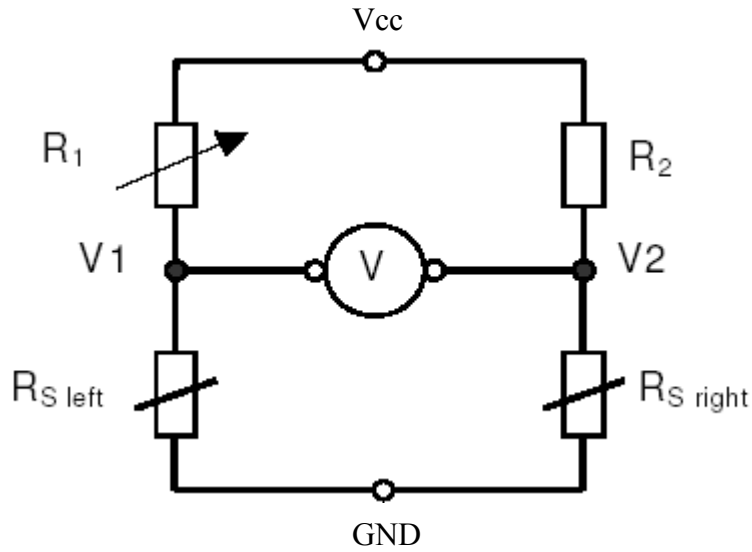
Rtemp
Rs links
RH
Rs rechts
Common

Electronic circuit recommendation

The heater RH is fed by a constant voltage.

As shown in the scheme, the two sensor-elements (RS left and RS right) need to be connected in a bridge circuit.

With a constant supply VCC, 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 R1 has to be adjustable.



Typical signal – curve between 0 0.25 m/s

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