Flow Sensor LF 01 /LF 01A

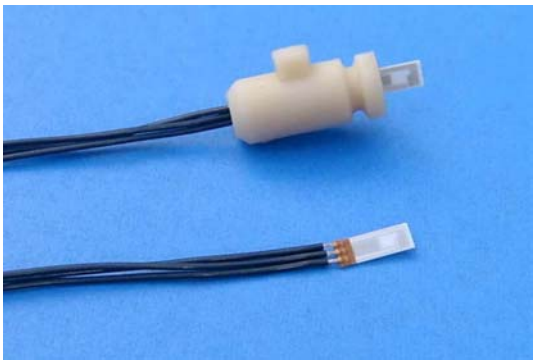
Thermal Mass Flow Sensor for all-purpose use in Liquids

Product

The Flow Sensor is the layout of the sensor that is optimised for measurements in liquids consists of two temperature depending platinum resistors, both deposited on one chip. The low-ohm resistor with a small area is used as a heater, whereas the other high-ohm resistor serves to measure the reference temperature. Using a bridge circuit, the differing resistance value of two elements leads to different (self) heating. The (self) heating is dependent upon the applied voltage, the mass flow, and the media in which the sensor is located. Higher voltage increases self heating, a higher flow rate increases cooling. If the self heating is kept constantly by a suitable controller, the voltage increases with higher flow rates and therefore becomes a measure for the mass flow. As a result of his little thermal mass, this sensor has fast heating and cooling response times. The measuring principle of the sensor can be used for large operation ranges. The Flow Sensor is also available with a plastic housing of ∅ 6mm. This option provides the user with ideal opportunities to incorporate the element into custom-built applications or specific housings, e.g. into a T-piece.

Advantages

-Easy adaptable for different applications or into housings
-Simple signal processing and calibration
-Insensitive to contamination
-No moving parts
-Excellent reproducibility
-Excellent long-term stability
-Best price-performance ratio



Applications

-HVAC and building control solutions
-Automotive industry
-Medical devices
-Device monitoring
-Cooling devices
-Food industry

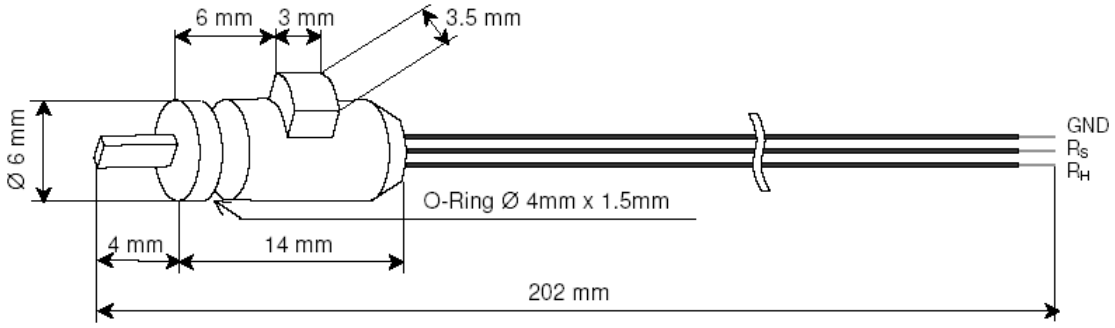
Technical Data

Measuring principle	thermal
Measuring range	0.01 ... 10 m/s
Accuracy	< 3% current measuring value (dependent on electronic and calibration)
Warm up time	< 1 min (depending on mounting)
Response time	< 100 ms (depending on velocity and dT)
Temperature range	-30 ... + 150 °C
Temperature sensitivity	< 0.1 %/K (dependent on electronic)
Electrical connection	3 pins, Leads AWG30, insulated with PTFE, or custom specific
Heater	R_H(0°C) = 45 Ω ±0.5%
Reference element	Rs(0°C) =1200 Ω ±0.5%
Required voltages	typical 0 - 10 V at dT = 10 K
Dielectric strength	± 10 V (! heater rating ! dependent on flow)
Substrate material	ceramic
In general	All data are temporary and valid in water. Other media and higher requirements upon request.

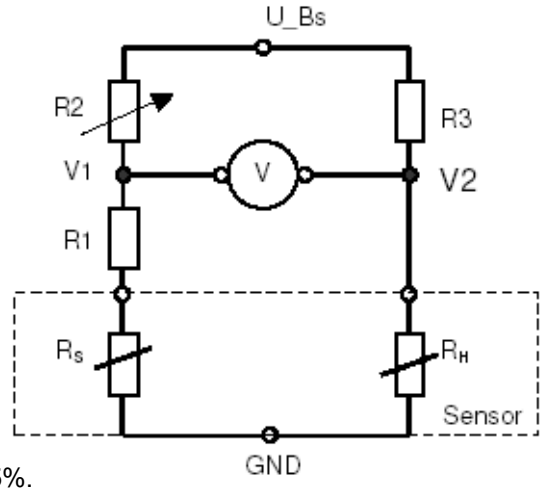
Construction size

LF 01

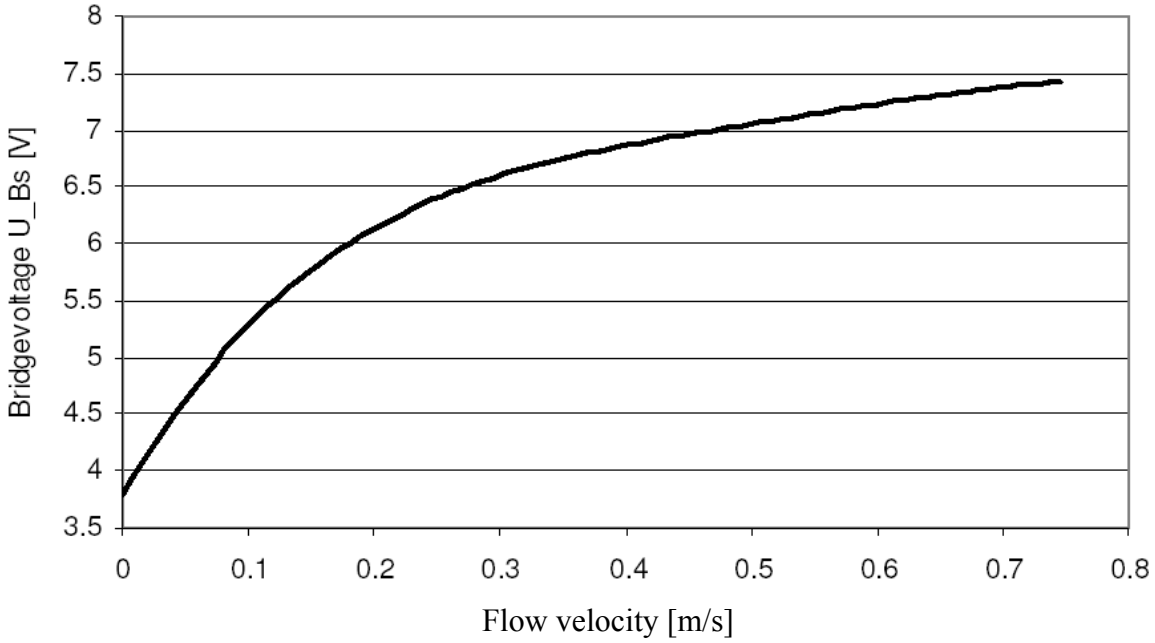
LF 01A



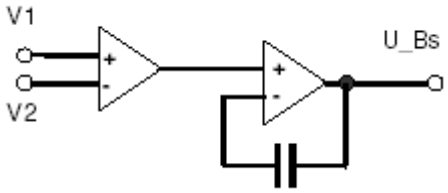
Electronic circuit recommendation



As shown on the scheme to the right, the heater R_H and sensor R_S need to be connected in a bridge circuit. It is essential to determine the correct values of the resistors R1, R2, and R3. The bridge is in balance as soon as the desired temperature difference between R_S and R_H has reached e.g. 10K. At a changing flow the bridge voltage U_Bs needs to be controlled in dependence of the bridge balance V1-V2. The values for R1…R3 are depending on the temperature difference dT and the medium which should be measured. We will provide you with the values of R1…R3 , depending on the application.
For calibration the R2 needs to be adjusted within a range of ±5%. The method of adjustment relies on the application.



Typical signal – curve between 0 .... 0.8 m/s



Principle of heating controller

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