



## SST AFE-01 Flow Sensor

### Measuring small and high flows and its direction

#### Product

The AFE-01 consists of four platinum thin film resistors. The low ohmic resistance with a small area is used as heater.

Two high ohmic resistors on the left and right hand side of the heater are used to detect the flow-speed and flow direction.

A further resistance allows the measurement of the gas temperature.

The two resistors close to the heater can be connected in a bridge circuit. This leads in an output signal which is a function of flow speed and direction.

In no flow condition, these two resistors are heated up equally. If flow appears, one of them is cooled more than the other, depending on flow direction.

The temperature difference can be measured and depends on flow speed and direction.

Response and heating up time of this flow sensor is very short due to the small thermal mass.

This kind of evaluation allows the measurement of very low flow speeds.

In order to detect higher flow velocities, the temperature sensor can be connected in a constant-temperature-anemometer.

#### 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

## Technical Data

Measuring principle Thermal

Measuring range 0 ... 50 m/s (in CTA-mode as electronic circuit example)

Response sensitivity 0.001 m/s

Accuracy < 2% measured value (depends on electronic and calibration)

Response time  $t_{63\%}$  < 0.5 s

Temperature range -20 ... +150 °C

Electrical connection Cu - wires enamel- insulated (typical length 25 mm)

Heater RH (25°C) = 34  $\Omega$   $\pm$  10%

Measuring elements  $R_{s\_i}$  (25°C) = 425  $\Omega$   $\pm$  10%

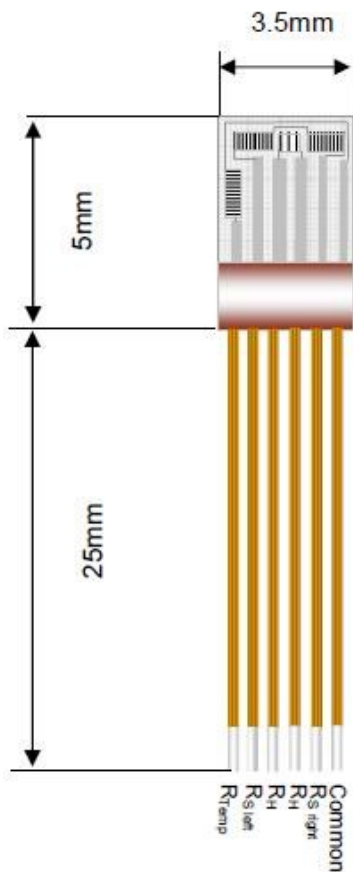
Reference element RR (25°C) = 710  $\Omega$   $\pm$  10%

Required voltages Typical 2 ... 5 V (depends on air velocity)

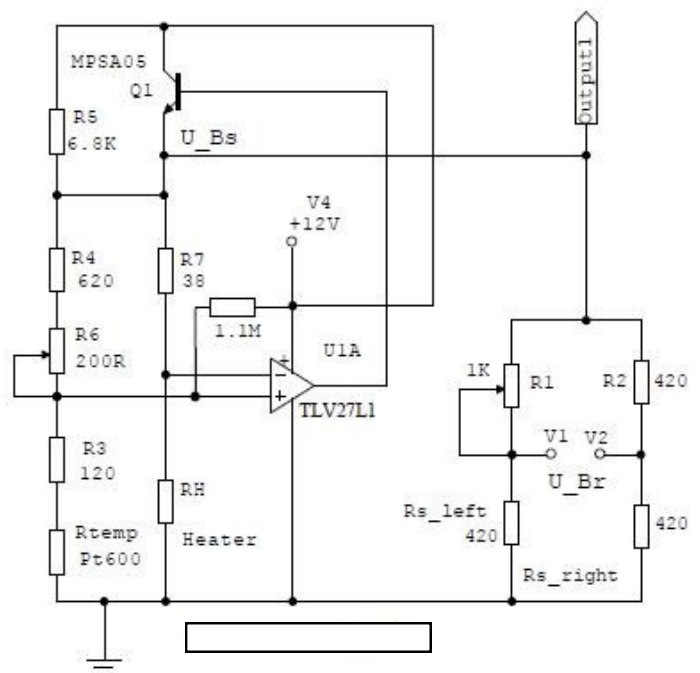
Substrate material Ceramic with low thermal conductivity

In general Higher requirements on request

## Terminal connection of sensor chip Circuit recommendation



Wire diameter: 0.2mm

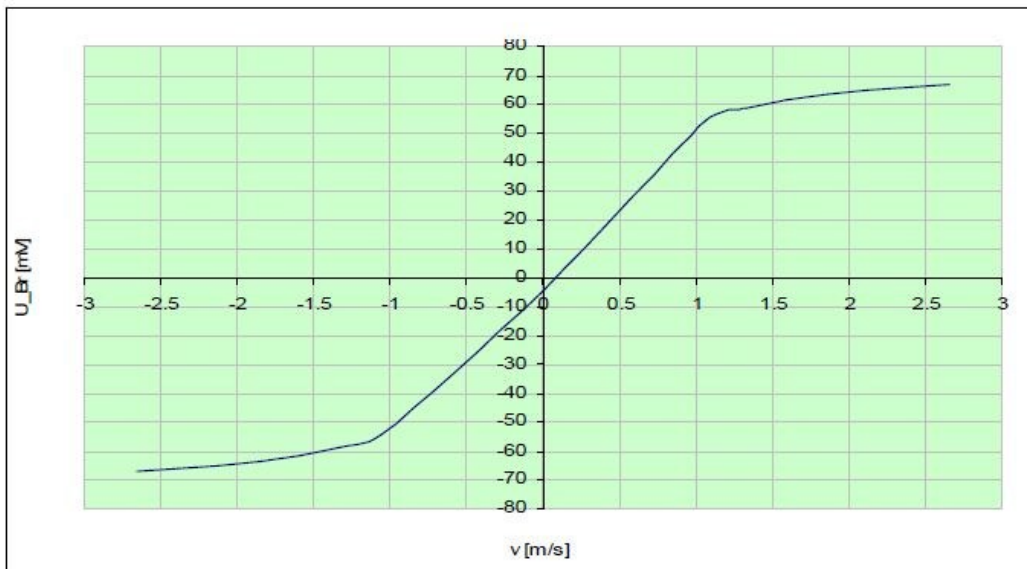


### Example – Characteristic for small flow measurement with direction output

The heater RH is fed by a constant voltage or a constant temperature. As shown in the scheme above, the two sensor-elements (RS left and RS right) can be connected in a bridge circuit.

With a corresponding supply VCC, the bridge balance  $V_{Br} = V1-V2$  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 R1 has to be adjustable.



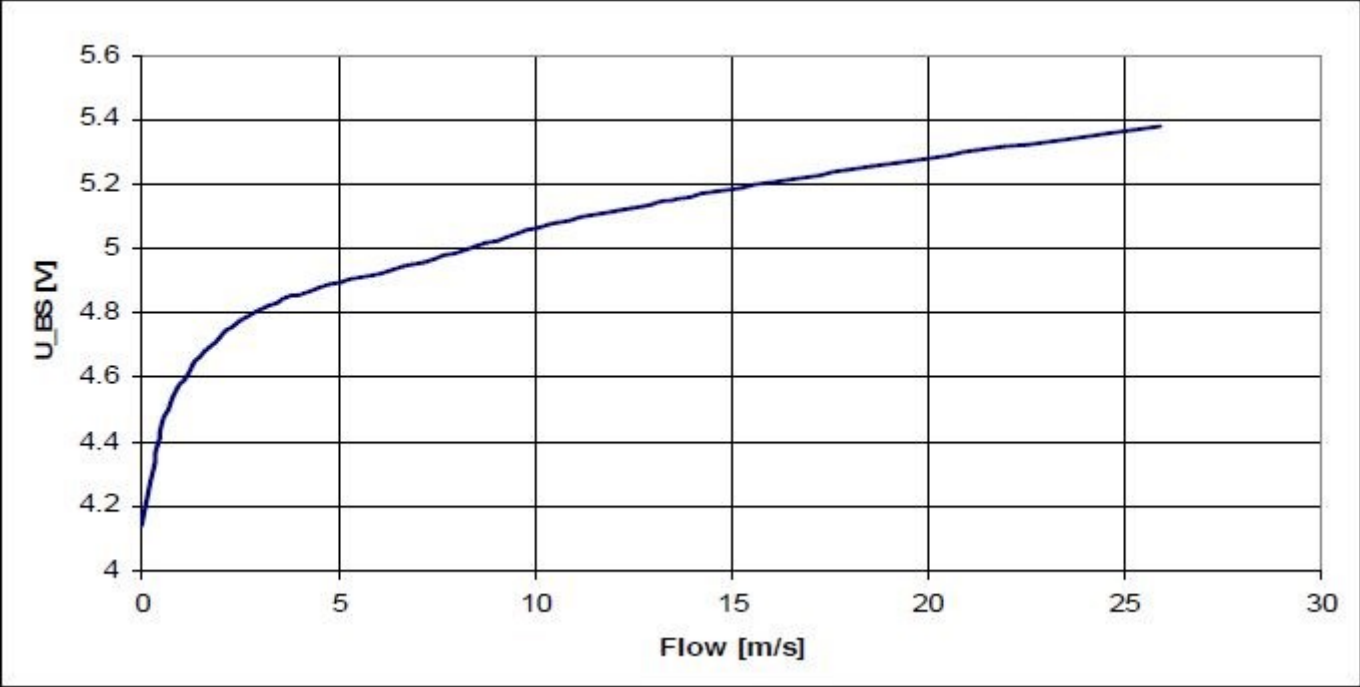
Typical signal – curve between 0 ... 2.5 m/s

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

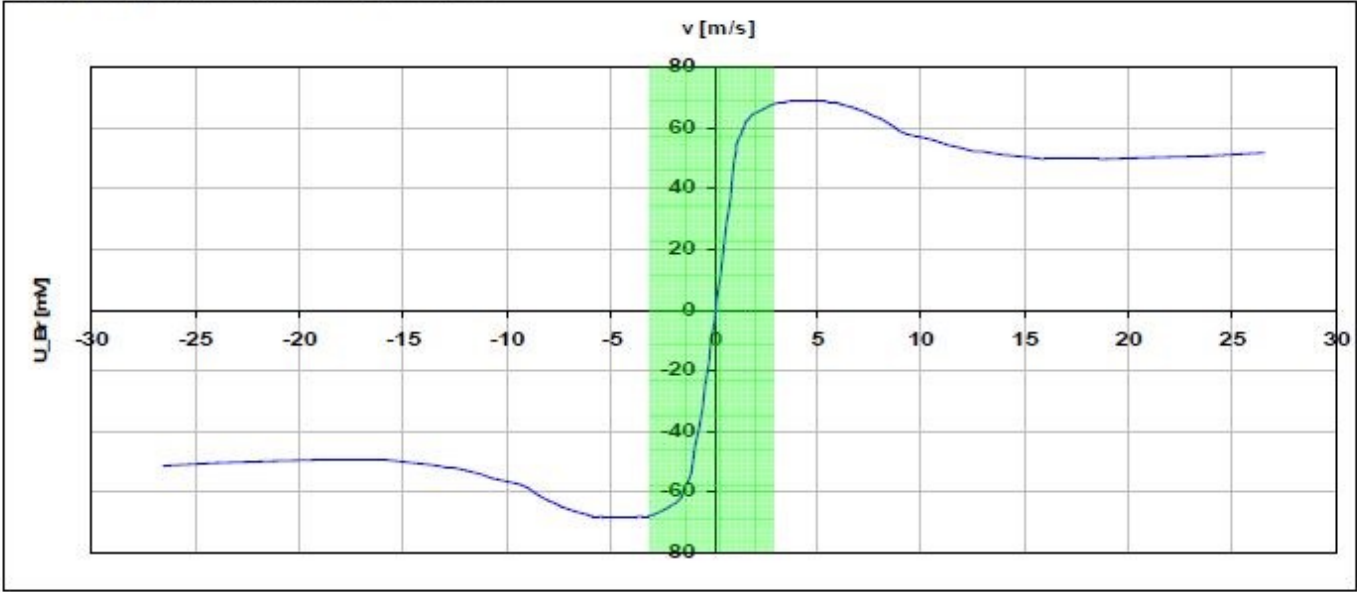
A flow direction-independent signal output 1 and/or  $U_{Bs}$  is available likewise and represents the flow dependent entire heat transfer of the sensor into the medium.

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.

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.

### WARNING

Personal Injury  
**DO NOT USE** these products as safety or  
Emergency Stop devices or in any other application  
where failure of the product could result in personal  
injury.

Failure to comply with these instructions could  
result in death or serious injury.

### CAUTION

Do not exceed maximum ratings.

Please read this data sheet thoroughly to ensure the  
product is suitable for your application.

Failure to comply with these instructions may result  
in product damage.

For technical assistance or advice, please email us: [technical@sstsensing.com](mailto:technical@sstsensing.com)

General Note: SST Sensing Ltd reserves the right to make changes in product specifications without notice or liability. All information is subject to SST's own data and is considered accurate at time of going to print.

It is the customer's responsibility to ensure that this product is suitable for use in their application.

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