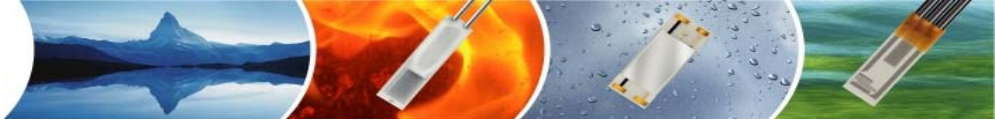
TEMPERATURE

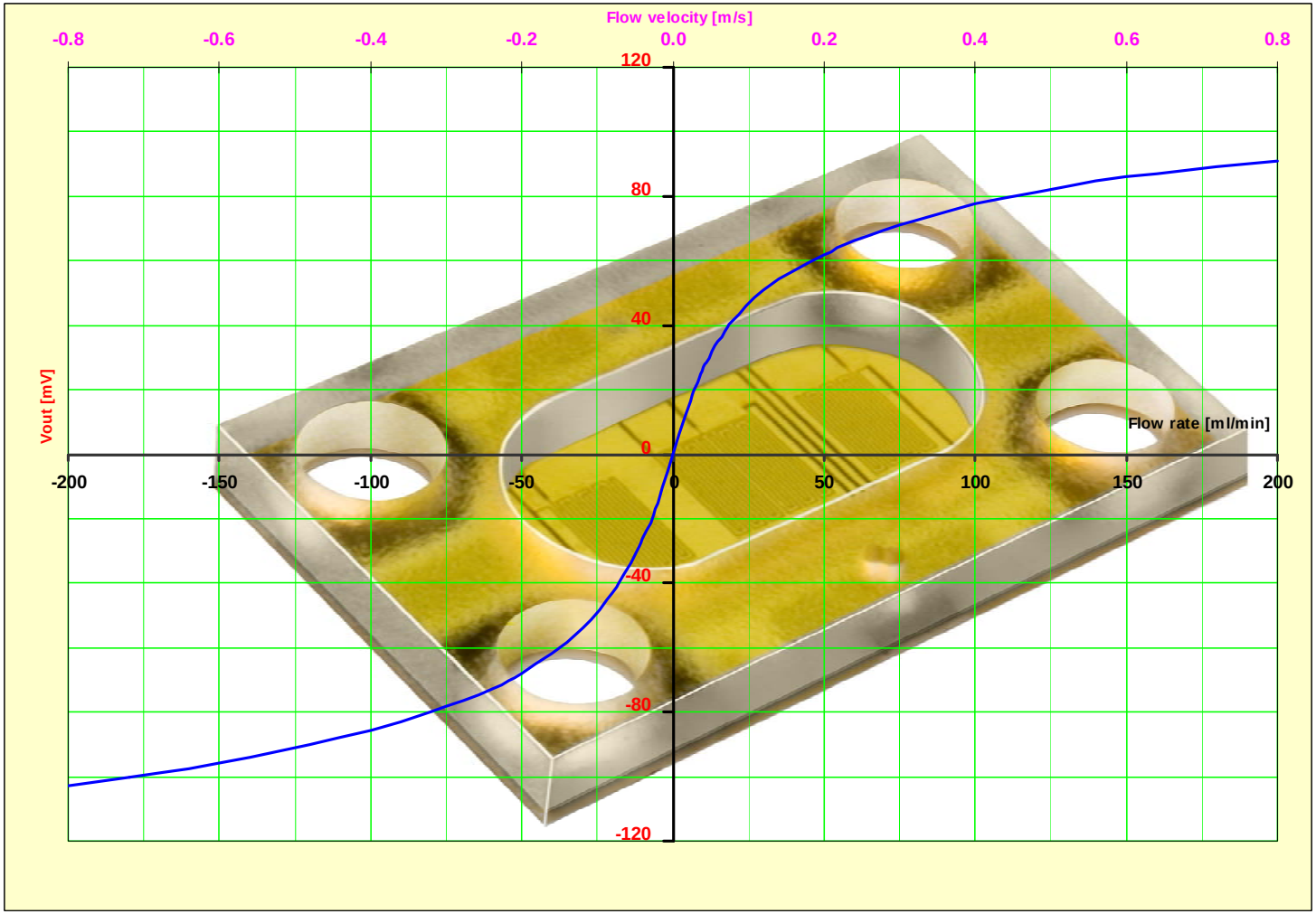
HUMIDITY

FLOW

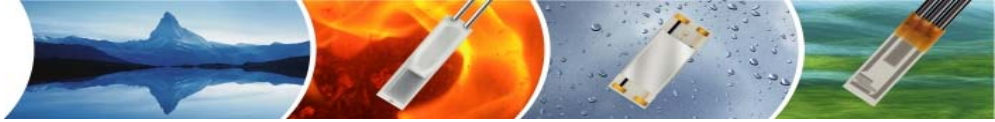
ROM



RTD On Membrane - Mikroflowsens- Technology

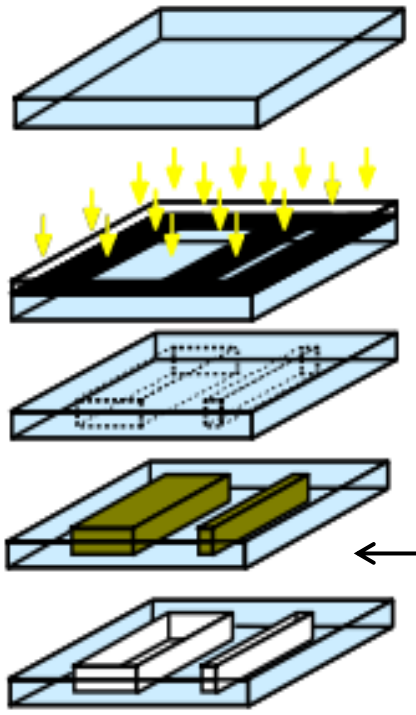


INNOVATIVE SENSOR TECHNOLOGY



MEMS- Manufacturing process – *F O T U R A N*

Photo-structuring



Special glass substrate

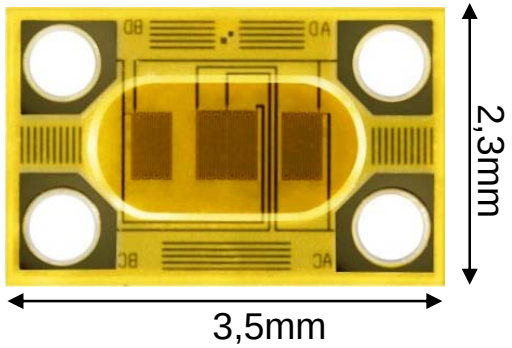
UV- Exposure

Crystallization by heat conditioning

Pre structured areas

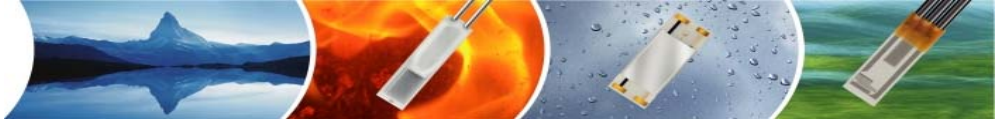
Wet etching

Final sensor element



MEMS process - *Sensor structure*

spin coating of membrane
sputtering platinum RTD‘s
spin coating of passivation



MEMS- Manufacturing process – *Sensor structures*

Photo structured glass substrate with membrane - polymere dot

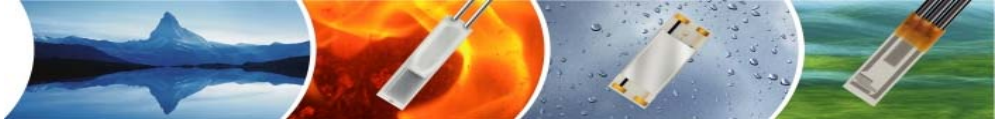
Spin coating prozess

Sputtering thin film platinum

Photolithographic mask process

Ion based etching process

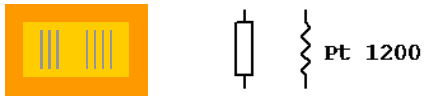
RTD- structure passivation



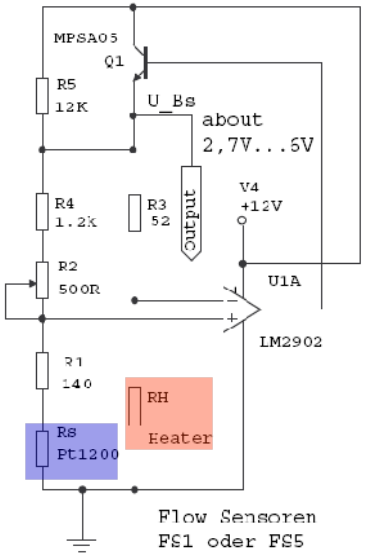
Sensor application – chip layouts and circuits

- Different resistor arrangements and values depending on flow application
- Customized sensors possible because of inexpensive mask processes

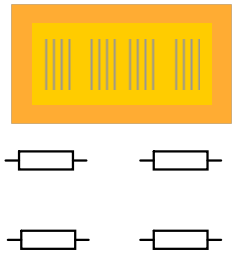
1 heater, 1 Temp. sensor



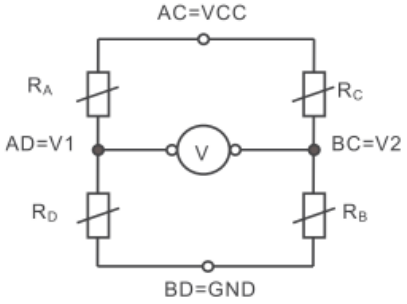
Simple resistive structure
for using in CTA - mode



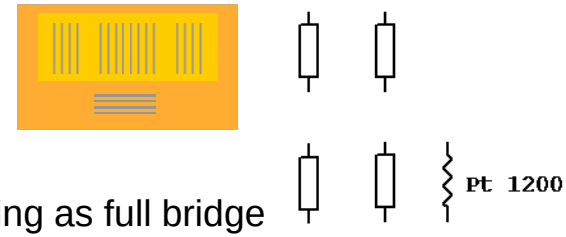
4-resistors



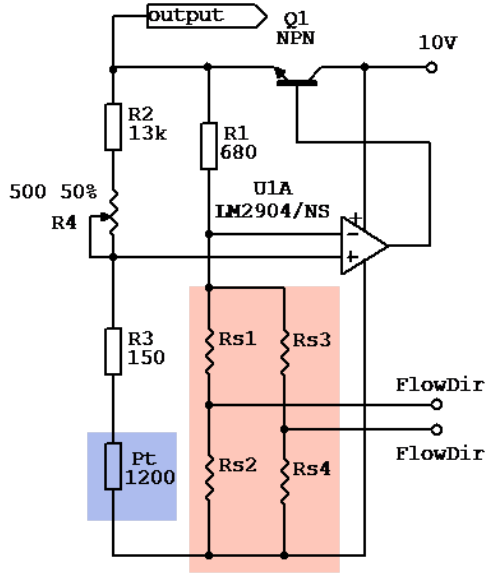
Using as full bridge
with Constant voltage
or current supply
Flow direction sensitive



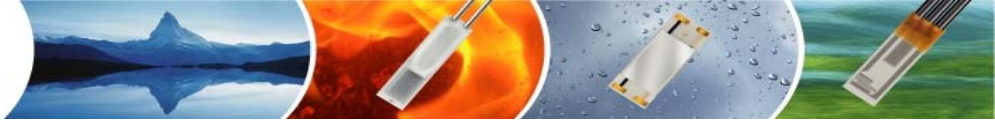
4-resistors + Temp. sensor



Using as full bridge
in a CTA ;Flow direction sensitive

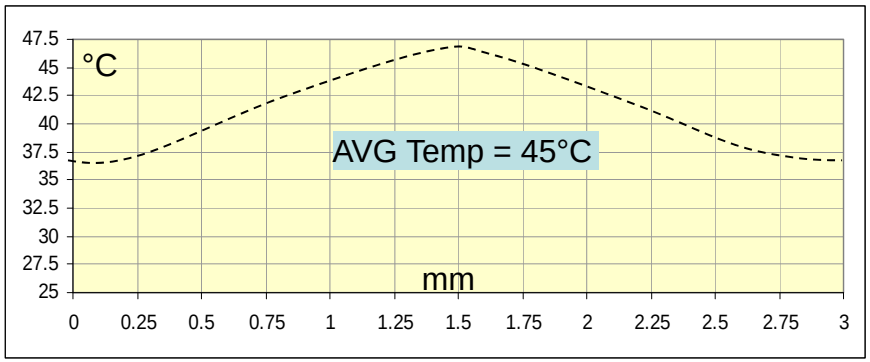


INNOVATIVE SENSOR TECHNOLOGY



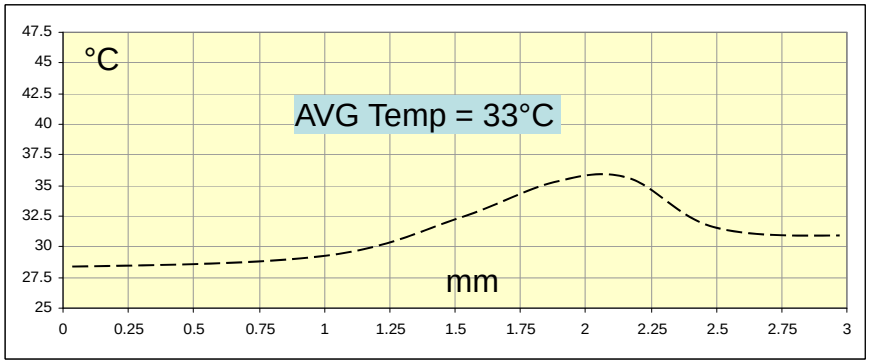
Sensor application – thermal sensor properties

Sensor surface

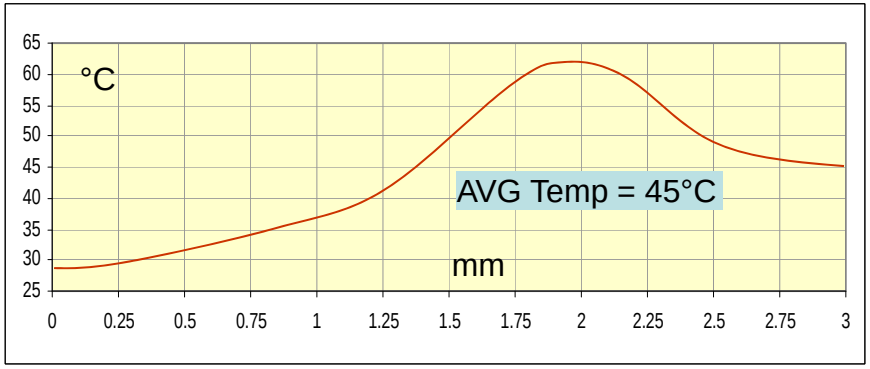


Simple full bridge calorimeter mode
Sensor supply 3mA and about 2,5 volts
Flow rate 0,00 mlN/min

Sensor surface

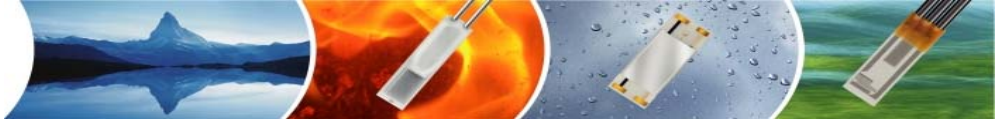


Simple full bridge calorimeter mode
Sensor supply 3mA and about 2,5 volts
Flow rate 200 mlN/min



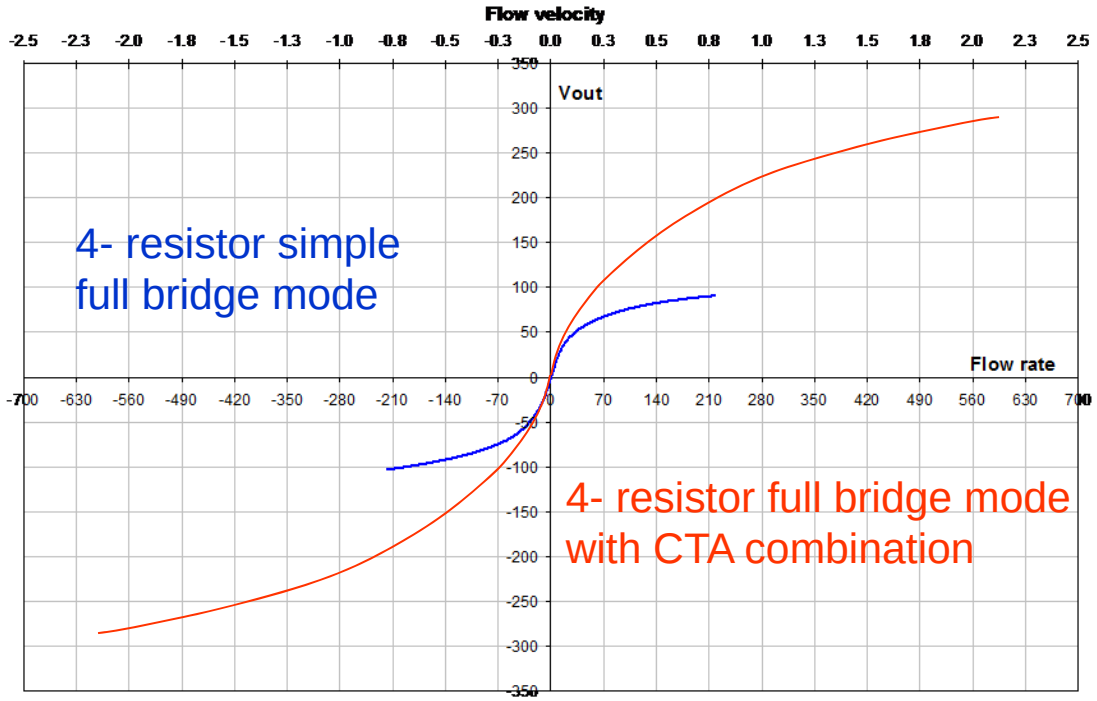
Full bridge calorimeter mode and CTA biasing
Sensor supply 4mA and about 3,5 volts
Flow rate 600 mlN/min

INNOVATIVE SENSOR TECHNOLOGY



Sensor application – measuring properties

Low flow ranges



Unamplified nominal sensitivity
3mV/ mlNmin^{-1}
In zero cross point

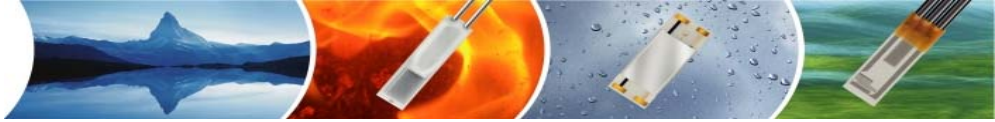
Physical flow range enlargement
by full bridge mode with CTA biasing

No cool down effect of heater
with CTA biasing.

Heating power 10mW to 50mW

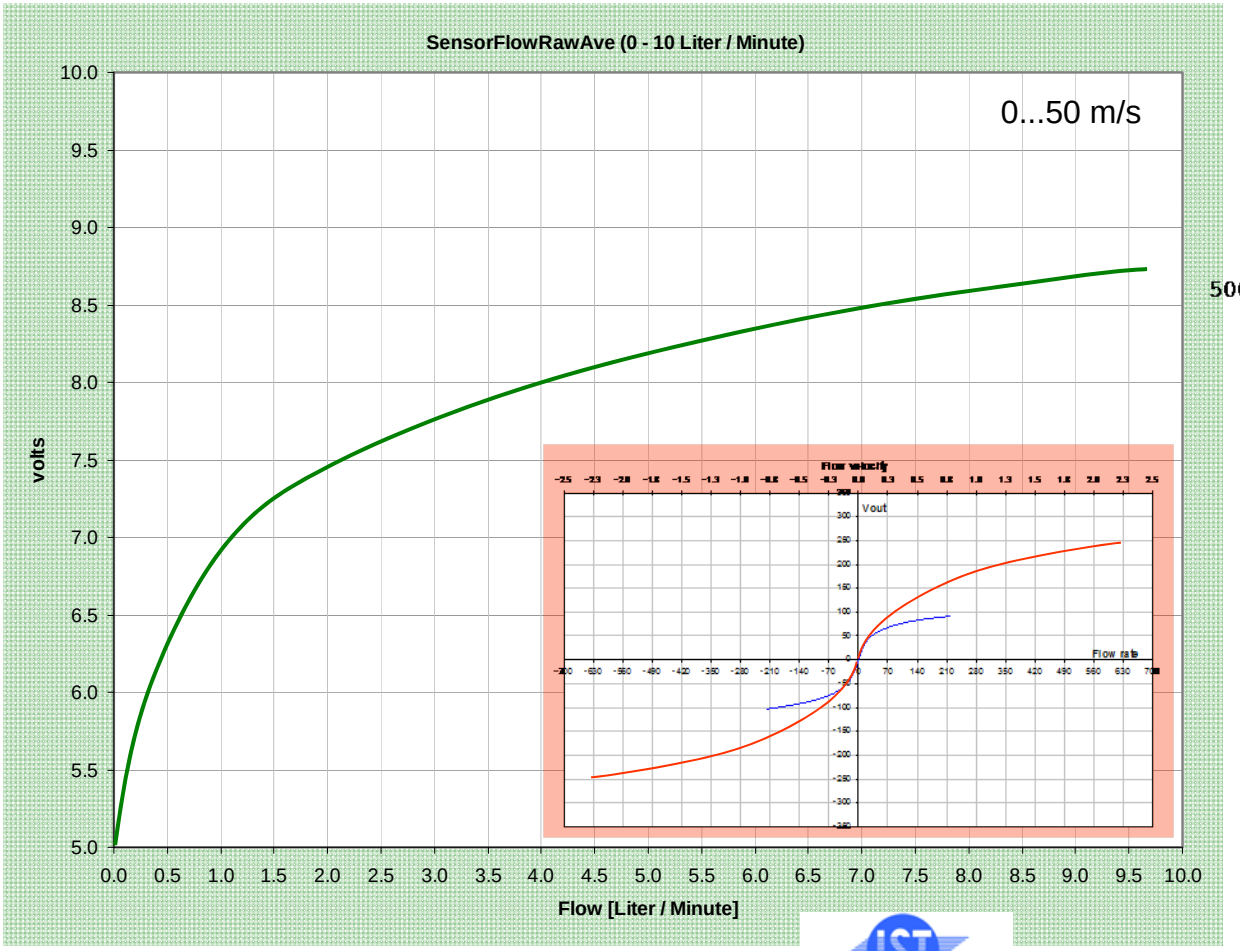
Stable zero cross point; independent on any drift effects like contamination.

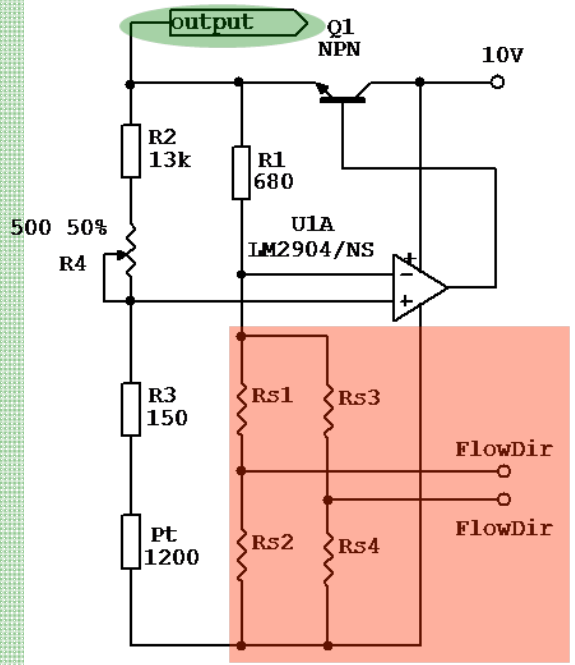
INNOVATIVE SENSOR TECHNOLOGY



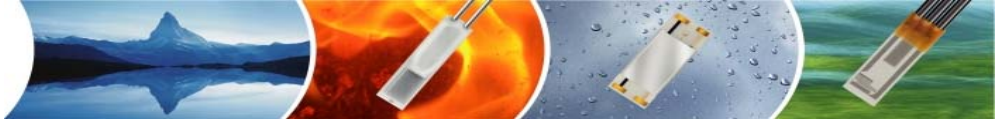
Sensor application – measuring properties

High flow CTA mode- range

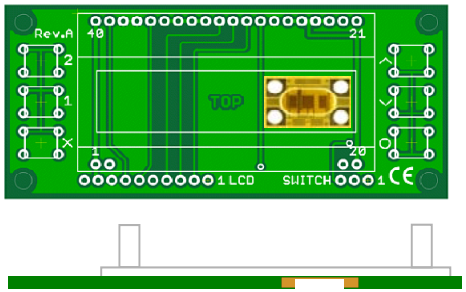




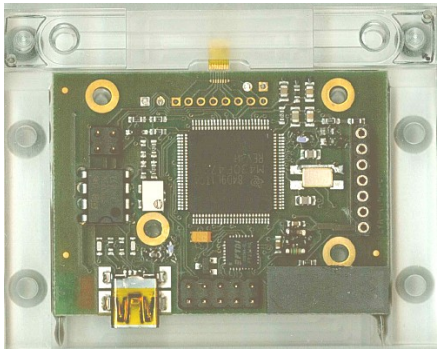
INNOVATIVE SENSOR TECHNOLOGY



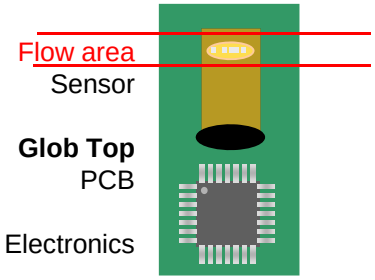
Sensor application – assembly possibilities

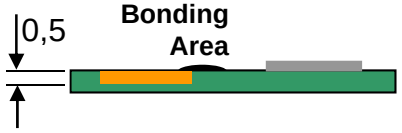


- Easy to use and robust sensor construction
- PCB integration by mounting in a cavity or hole
- Connecting by wire bonding or soldering
- Backsite mounting of flow channel

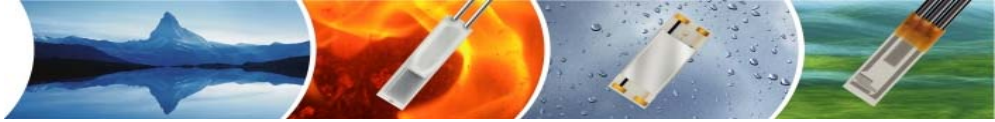


Example with the wire bonding sensor type MFS02 together with an ASIC on a pcb.





- Sensor mounted in a separate flow channel
- wire bonded flow sensor for pcb connection
-Pick & place assembling of sensor possible
- Plug and play module by USB interface



Microflow sensor – sumary of behaviors MFS02

Product

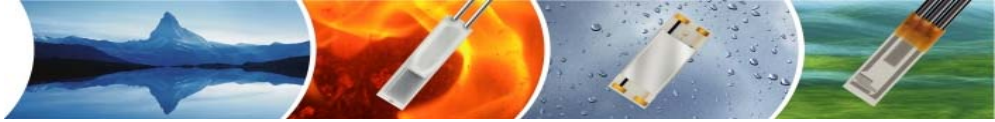
Especially for fast flow measurements and wire bonding assembly, the Flow Sensor **MFS 02** was developed. Due to a membrane system the thermal mass is reduced to the minimum. Very fast response time and low power consumption are resulting from this little thermal mass. The membrane is just a few microns thick and is carried by a glass substrate. Therefore the system is robust and the device can be handled easily.

Advantages

Fast response time
Small mass flow rates
Detection of flow direction
Low power consumption
Small thermal mass
Robust design
Best price-performance ratio

Applications

Medical devices
Home spirometers
Differential pressure sensors
Mikrofluidic (gas)



Microflow sensor – Data MFS02

Measuring principle	**Thermal**
Measuring range	**0.001 ... 2 m/s (25m/s)**
Response time	**< 10 ms**
Temperature range chip	**-40…+150°C**
Temperature range gas	**-40 ... +60 °C**
Electrical connection	**Bonding on PCB or other carrier**
2 Elements	**R_{high}(0°C) = 650 Ω ±10% R_A, R_D**
2 Elements	**R_{low}(0°C) = 500 Ω ±10% R_B, R_C**
Matching between elements	**Less than 2%**
1 Element	**Temperature sensor Pt1000**
Required voltages	**Typical 3 - 7 V dc**
Bridge offset	**(@ 5V Ub; Typ. +- 10mV**
TK Bridge offset	**Max +- 50ppm/K x Ub/2**
Power consumption still air	**10…50mW (resp. Chip temperature 50…150°C)**
Substrate	**glass substrate**
Sensor membrane	**Organic membrane; thickness less than 10 microns**
In general	**All data are temporary and valid in air. Other media and higher requirements upon request. No responsibility accepted.**

Microflow sensor – *Thank you for your attention*

INNOVATIVE SENSOR TECHNOLOGY