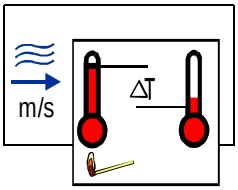
THE TECHNOLOGIE



Flow dependent temperature differential is electronically compensated and serving as decisive parameter for the flow control.

The Honsberg calorimetric flow switches monitor a variety of substances.

Advantages :

- no moving parts (versus turbine or variable area)
- unity of wetted material spec
- compact design
- one sensor for all diameters
- low pressure loss
- high operational pressures
- optional integrated temperature control

The variety of sensor options fits almost all operational conditions. If not we are in the position to adjust our instrument to the individual application.

FIELDS OF USE

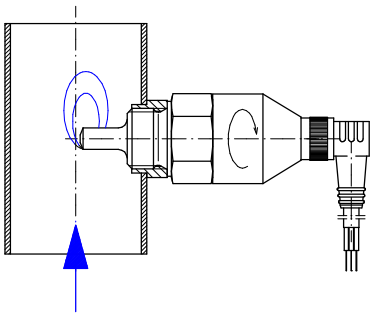
- **Metal processing industry:**
  control of coolants and lubricants
- **Steel industry:**
  circuits for cooling agents
- **Chemical industry:**
  protecting pumps against running dry,
  monitoring for leaks, supervising levels
- **Beverage industry:**
  monitoring cleaning operations
- **Air conditioning and ventilation industry:**
  controlling fans and aeration / ventilation
  systems

PRINCIPLE

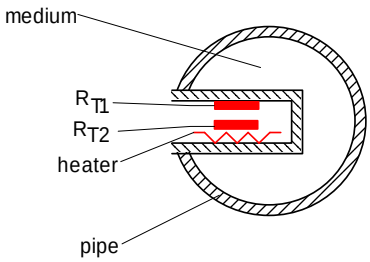
The calorimetric system is based two temperature sensors witch are positioned within good temperature conductivity versus the liquid involved.

One sensor is permanently heated with the effect that a constant temperature difference between the sensors will be established. In case of a velocity of the liquid this temperature difference is modified. This modification is the measure for the flow control.

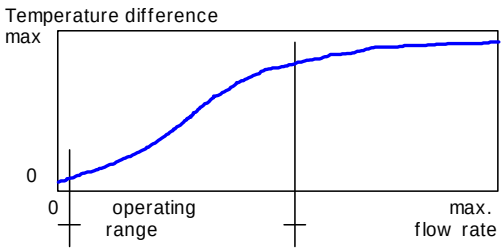
The unheated sensor registers the liquid temperature and triggers a temperature compensation. This effects a stability of temperature behaviour with flow velocity and an accurate flow control.



extraction of heat by current



basic arrangement of the sensor elements



The slope of the curve for a calorimetric sensor becomes less as the flow rate increases, which means that the difference signal to be evaluated becomes increasingly smaller.

INFLUENCE OF MEDIUM AND MATERIALS

Various liquids and different sensor housing materials affect the response time, because the thermal conductivity is changing. Generally, the lower the thermal conductivity of the medium and the housing material, the higher the medium flow rate must be to receive satisfactory results.

- medium water - sensor stainless steel - heat conductivity high => low flow rate required approx. 1..150cm/s
- Medium oil r - sensor stainless steel - heat conductivity medium => medium flow rate required approx. 3..300cm/s

The operation of the thermal metering and control principle is depending on the liquid quality and temperature of the metering substance.

Thermal standard instrumentation is calibrated for water in temperature ranges of 15..70℃.

With diverging liquid quality f.i. discourses, air temperature environment of more than 70℃ or less than 15℃ an individual advice of the manufactures is recommended.

compact types in the form of probes

DIFFERENT DESIGNS AND OPTIONS

Calorimetric sensors are manufactured by Honsberg in probe configuration. The probe type is suitable for use with a wide range of pipe cross-sections. Both designs are manufactured either as compact sensors with integral electronic units or as sensors for use with external electronic units.

This temperature switch can be used as a safety switch for prohibitive temperature ranges (please take into account an accuracy of 10%, reproducibility of 1% and hysteresis of 10%).

sensors in the form of probes
external transmitters

EXPLAINATION OF TERMS RELATED

Temperature gradient = change of medium temperature per time unit (K/min). When rapid temperature changes occur in the medium, they can only be compensated within a certain range. Correct operation is guaranteed in the specification range quoted. If the temperature of the medium exceeds this temperature, the system may generate a fault indication for a short time. Of course, such fault signal can be filtered by switching delays, compromising the standard on-off response time.

sensors in form with elektronic and display (omni-F)

The stand-by time is the time for the sensor to reach its specified operating mode. With a supply voltage, all the indicating LEDs illuminate. After approx. 3 s the display changes to the range set via the potentiometer. Then the switch-off range can be defined by turning the potentiometer.

The switch-on and switch-off times are the periods after which the regular measuring variable is acquired following a rapid increase or decrease in the flow rate. With a medium temperature of approx. 25 ℃ an d with a stainless steel sensor used in water , the average switch-on and switch-off times are approx. 2 s. Please bear in mind that this time depends on the operating conditions. In cases where the media or sensor materials are poor thermal conductors, the switching times might increase.

sensor with switching and frequency exit 4..20mA / 0..10V (Flex-F)

The temperature range of the medium is the range of medium temperature in which the calorimetric sensor works without problem.

The ambient temperature is the temperature surrounding the sensor. This mainly involves devices and equipment generating or dissipating heat in the vicinity of the sensor.

The housing material is the material exposed to the medium.
Critical issues for instrument selection:

- the chemical compatibility of wetted materials
- abrasive properties of the material
- reaction time of the sensor
- pressure and temperature characteristics

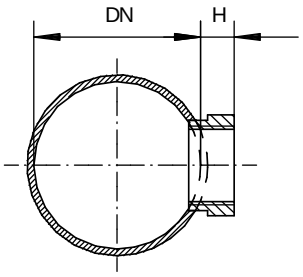
MOUNTING INSTRUCTIONS

In principal all installation locations are feasible where the sensor housing may be positioned into circumferent contact with the liquid (see drawing):

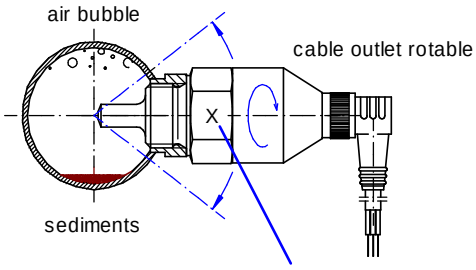
Contamination and air bubbles shored be avoided. In case of bending tube sectors the liquid conditions may change which might cause flow whirls and other instability effecting the quality of emitted signals

After insertion and sealing (e.g. using a Sikurit seal) all sensors can be rotated with continuous adjustment of the head. This feature facilitates the precise orientation of the cable and, for the compact-type of sensor, the easy alignment of the indicating head.

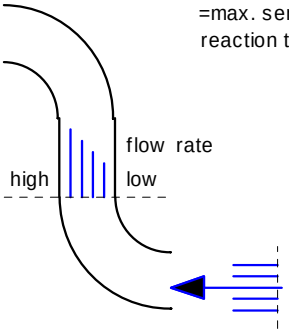
socket and nominal size (standard):



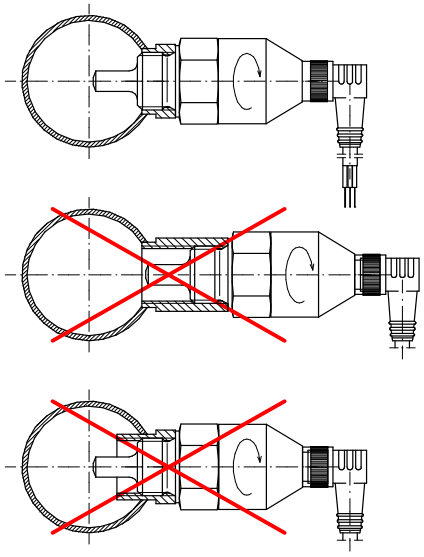
G	probe-length	Type	nominal diameter DN	socket dimension H
G1/4A	28	...-008HK028	DN 10-15	20
			DN 20-25	15
G1/2A	29,6	...-015HK029	DN 15-32	18
G1/2A	45	...-015HK045	DN 25-....	32



mark X in flow direction
=max. sensitivity and
reaction time



Installation position and consideration
of different flow rates



thread projection of the sensor

As accessories for direct installation by female thread fittings (type TS) in brass and stainless steel are available.

ELECTRICAL INSTALLATION

Probe-type sensors without integral evaluation units are supplied with a cable of length 2 m (0.25 mm²) as standard. This cable cross-section is used if the external electronic units are less than 20 m away. If longer distances need to be covered, the use of an extension cable with full shielding is recommended, along with the selection of an appropriate diameter corresponding to the cable length.

INSTRUCTIONS FOR HANDLING AND CALIBRATION

Subsequent to power access the instrument will display full scale operation (all LED's lit) for approx. 3 sec.

Once resuming operational temperature the instrument display a flow rate which is referring to the setting position of the potentiometer.

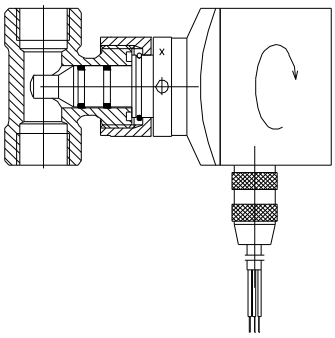
If you have provided the required flow velocity in your system, select a potentiometer position which keeps the red LED in operation while all green LED's are off duty.

Turning the potentiometer counter clock wise you determine the sensitivity of the sensor of the calibration setting effects few LED's only the threshold contact will be triggered by minor changes in flow velocity, if a chain of green LED's is activated minor flow changes are required to create the alarm.

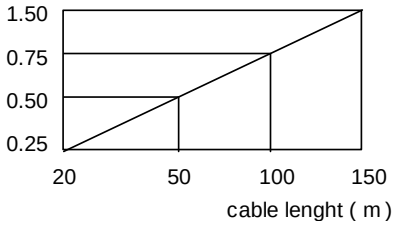
Attention! Please avoid any mechanical strain to the 360° potentiometer.

Potentiometer min
(turn counter clock)
low flow indication,
sensitivity low and
no green LED's activated.

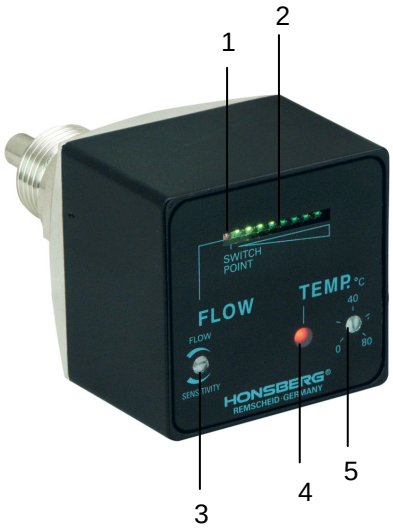
Potentiometer max
(turn clock wise)
high flow indication,
sensitivity high and
chain of green LED's activated.



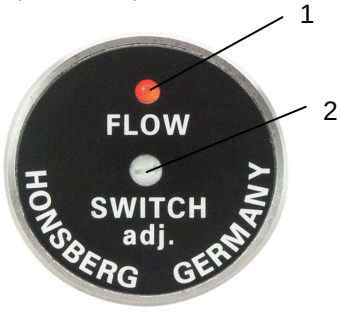
Cross-section of cable conductor (mm²)



recommended cable cross-section
for various cable lengths



(1) switch-point indicator for flow (red)
(2) trend indicator for flow (green)
(3) switch-point setting for flow
(4) switch-point setting for the temperature (only with EFKT)
(5) overtemperature indicator (red) (only with EFKT)



(1) switch-point indicator for flow (red)
(2) switch-point setting for flow