

FUNCTION

The ultrasonic principle is used in measuring the flow. Two ultrasonic transducers functioning as both transmitter and receiver are positioned opposite each other at the inlet and outlet of the flowmeter.

Ultrasonic signals are transmitted between both transducers. One signal travels in the same direction as the water flow, the other travels against the flow.

Measurement is performed by determining the time the ultrasonic signal takes to travel with and against the flow. The principle can be expressed as follows:

$$v = K \frac{t_{\text{up}} - t_{\text{down}}}{t_{\text{up}} \times t_{\text{down}}} = K \frac{\Delta t}{t^2}$$

t_{down} = Time in the flow direction

t_{up} = Time against the flow direction

v = Average flow velocity

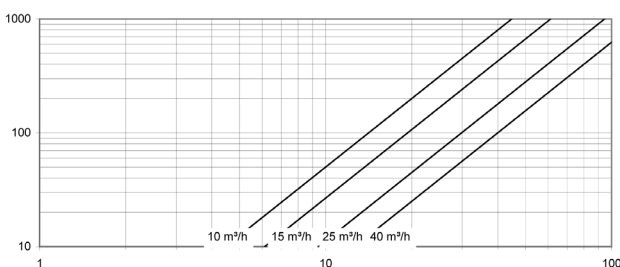
t = Transit time

K = Proportional factor

This measuring principle offers the advantage that it is independent of variations in the actual sound velocity of the liquid.

Proportional factor K is determined by wet calibration.

PRESSURE DROP CURVES



APPLICATION

Together with a HYDROMETER heat calculator, ENERGY-INT 6 the SHARKY-VMC measure the water and energy consumption in district heating networks.

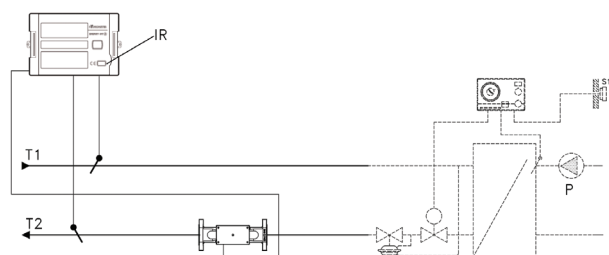
The SHARKY-VMC is specially designed to transmit pulses to the HYDROMETER heat calculator, ENERGY-INT 6.

FEATURES

The SHARKY-VMC together with the ENERGY-INT 6 is highly suitable for calculating energy consumption in district heating installations:

- High performance accuracy
- Measurements are not affected by the presence of contaminating particles, chemical substances or magnetite in the district heating water
- Static metering with no moving parts means no wear and tear
- Wide dynamic range $q_p/q_i:200:1$
- Can be mounted horizontally or vertically
- Low pressure drop
- Compact design
- Ultrasonic signals are insensitive to layers due to direct shot
- NOWA-testavailable
- No volume pulses emitted in case of reverse flow
- for heating, cooling or climatic application

APPLICATION, EXAMPLES



District heating systems with SHARKY ultrasonic flowmeter together with ENERGY-INT 6 calculator.

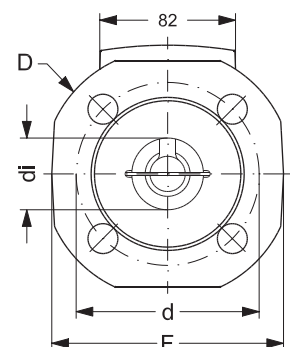
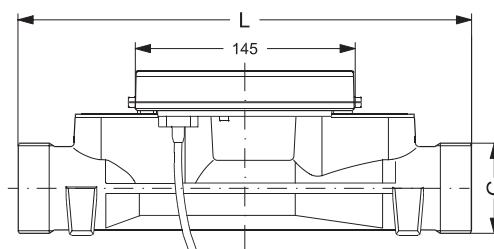
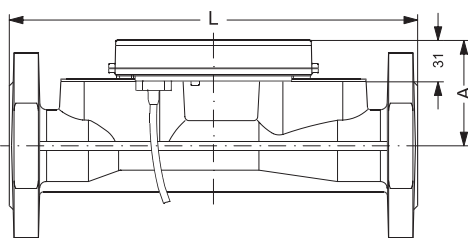
TECHNICAL DATA

| General | |
|---|---|
| Ambient temperature | 0 °C to +55 °C |
| Storage temperature | - 20 °C to +70 °C |
| Humidity | < 80 % |
| Enclosure | IP 65 |
| Electrical connection between heat calculator/flowmeter | Max. 2.5 m cable (which is incl.) |
| Connection max. pressure | 25 bar |
| Accuracy | Better than EN 1434-1, class 2 |
| Environmental classification | EN 1434-1 environmental class C (Industrial Installations) |
| Installation | Horizontal/vertical (no influence on accuracy) |

MATERIALS, DIMENSION AND WEIGHT

| | | | | | |
|--|---|------|------|------|------|
| Pipe materials | W 2.1096.01 (G-CuSn5ZnPb) (3.5 m ³ /h also polymer compound liner) | | | | |
| Transducer materials | Stainless steel W 1.4435 | | | | |
| Flange gaskets | Fibre gasket (non-asbestos) | | | | |
| O-ring | EPDM | | | | |
| Connection | Flanged after ISO 7005-3, PN 25 Thread after ISO 228 | | | | |
| Nominal diameter | 40 | 40 | 50 | 65 | 80 |
| Nominal flow, $q_p(Q_n)$ m ³ /h | 10 | 10 | 15 | 25 | 40 |
| Flange diameter D, mm | - | 148 | 163 | 184 | 198 |
| Bolt circle diameter d, mm | - | 110 | 125 | 145 | 160 |
| Build in length L, mm | 300 | 300 | 270 | 300 | 300 |
| High A, mm | 78 | 78 | 91 | 91 | 91 |
| Weight, kg | 3.6 | 7.9 | 8.5 | 10.8 | 12.6 |
| Flange dimension F, mm | - | 138 | 147 | 170 | 188 |
| Internal diameter di, mm | 43.4 | 43.4 | 54.5 | 70.3 | 82.5 |
| Thread connection G | G 2 B | - | - | - | - |
| Flange drilling | - | 4 | 4 | 8 | 8 |

DIMENSIONS



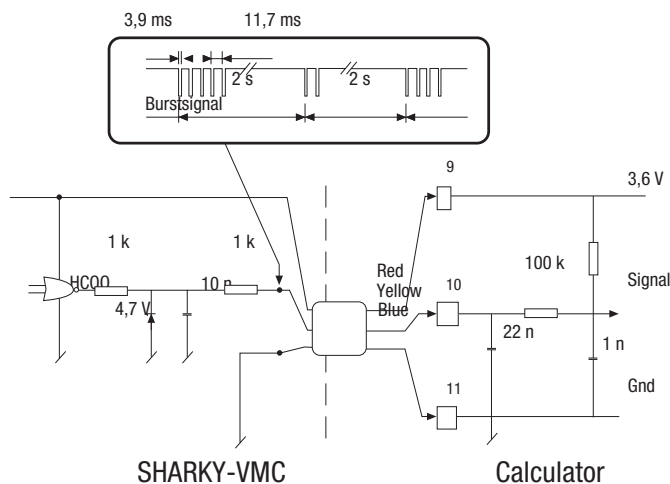
| Flow data | | | | | |
|--|--|------|------|------|------|
| Nominal diameter DN | 40 | 40 | 50 | 65 | 80 |
| Thread connection | G 2 B | - | - | - | - |
| Nominal flow, $q_p(Q_n)$ (m ³ /h) | 10 | 10 | 15 | 25 | 40 |
| Min. flow q_i (l/h)* | 100 | 100 | 150 | 250 | 400 |
| Min. flow cut off (l/h) | 20 | 20 | 30 | 50 | 80 |
| Max. flow cut off at q_s (m ³ /h) | 20 | 20 | 30 | 50 | 80 |
| Pressure loss at $q_p(Q_n)$ (bar)** | 0.05 | 0.05 | 0.06 | 0.07 | 0.10 |
| Nominal heat power, kW*** | 400 | 400 | 600 | 1000 | 1600 |
| Medium temperature heating | +20 °C to + 150 °C (horizontal) +20 °C to + 120 °C (vertical) | | | | |
| Medium temperature cooling | +5 °C ... 105 °C | | | | |
| Medium temperature heating/cooling | +5 °C ... 105 °C | | | | |

* Min. flow, when the accuracy is better than 3%

** Pressure loss after EN 1434 6.17

*** Calculated at $\Delta T = 40$ °C and q_p

PULSE OUTPUT SHARKY-VMC (without pulse converter)



ELECTRICAL DATA

| | | | | | |
|--|---|----|-----|-----|-----|
| Nominal diameter DN | 40 | 40 | 50 | 65 | 80 |
| Thread connection | G 2 B | - | - | - | - |
| Nominal flow, $q_p(Q_n)$ (m ³ /h) | 10 | 10 | 15 | 25 | 40 |
| Output signal, pulse/l | 10 | 10 | 7.5 | 4.5 | 2.5 |
| Pulse duration | 3.9 msec. | | | | |
| Max. frequency | 64 Hz | | | | |
| Power consumption | $P_{max} < 360 \mu W$ | | | | |
| I_{avg} | 100 μA | | | | |
| I_{peak} | 10 mA | | | | |
| Power supply | From integrator, 3.65 V \pm 0.1 V DC (Lithium battery) | | | | |
| I_{start} (average) | < 15 mA | | | | |
| t_{start} | 0.15 - 2.0 sec. | | | | |
| Volume Pulse Out put | Open Collector Output | | | | |

APPROVALS

The number of awarded approvals on SHARKY-VMC increases constantly. Therefore, please contact HYDROMETER for an updated list of current approvals.

INSTALLATION

The SHARKY-VMC can be mounted in both forward or return pipes. The correct install direction is indicated with an arrow on the flange or on the body.

When horizontally mounted (see fig. 1 and 2), the max. liquid temperature is 150 °C .

The max. liquid temperature must be reduced to 120 °C when the electronics (black enclosure) is turned upwards.

When vertically mounted, the max. liquid temperature is also 120 °C.

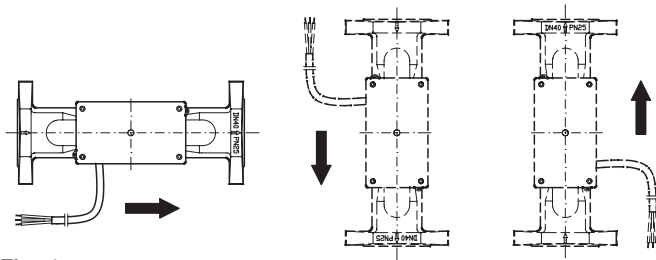


Fig. 1

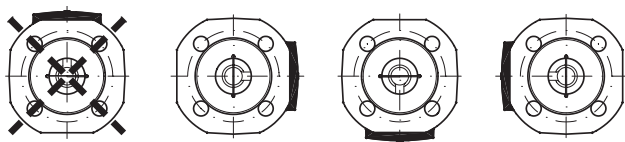


Fig. 2

PLEASE NOTE

The electronics (black enclosure) must not be insulated.

The left installation position should be avoided (fig. 2).

The flowmeter must be filled completely with water during measurements.

It is not necessary to use filters when using the SHARKY-VMC.

WIRING

The SHARKY-VMC must be connected to the following terminals of ENERGY-INT 5, see fig. 4.

- 9 red (+)
- 10 yellow (signal)
- 11 blue (-)

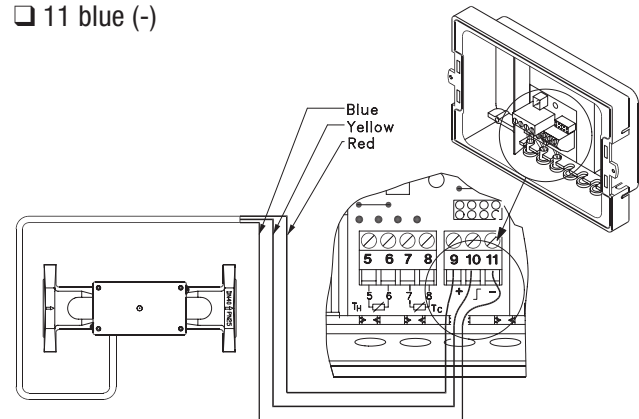
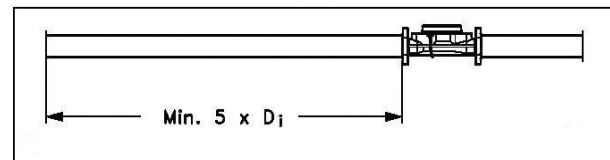


Fig. 4

The length before the flowmeter must at least be 5 x DN.



The flowmeter must be filled completely with water during measurements.