Metran-300PR, Metran-320, Metran-305PR, Metran-303PR Vortex Flowmeters

Volumetric flow, water, water solution, stratal water measurement

Code OKP 42 1364

Family of vortex flowmeters is designed to measure volumetric flow and volume of mains, district heating and industrial water, water solutions, stratal waters with viscosity of 2 cSt maximum.

Applications

- heat energy metering systems, cold-water supply, hot-water supply for public utilities and industrial facilities;
- process control systems, automated power supply monitoring and control system in various industries.

FAMILY ADVANTAGES

• Long-time stability of metrological characteristics under the following conditions: high content of ferromagnetic and mechanical impurities in measured fluid due to:

- Operating principle without magnetic fields;
- self-purging of flow tube made of SST 12Cr18Ni10Ti;
- absence of flow tube lining material susceptible to distortion during installation and operation

• Wide turndown

• Reliable operation with low flow values due to temperature compensation of flow characteristic

• 2 approved calibration procedures: flow and simulation

• On-line diagnostics and possibility of spot manifold calibration

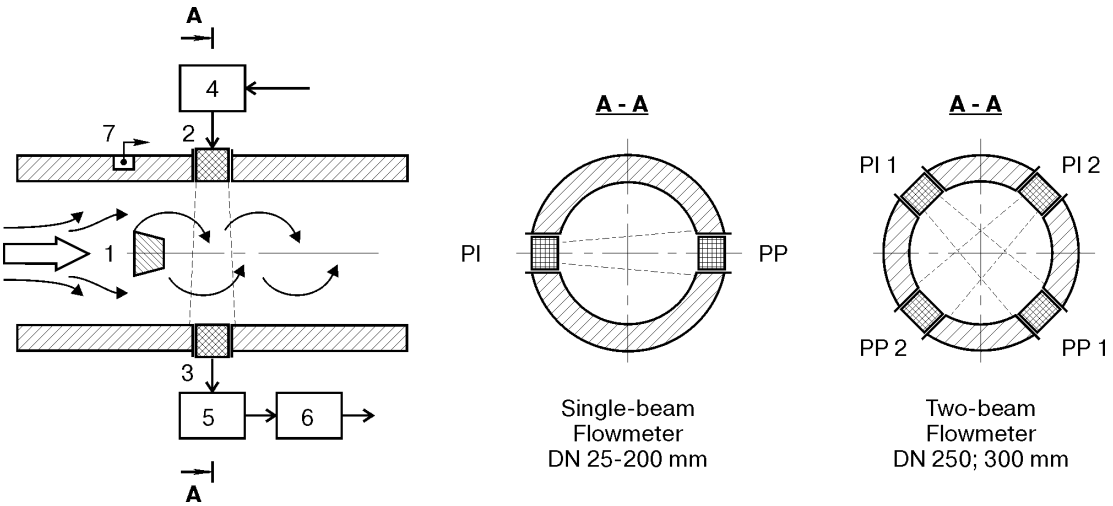
• 100% of mounting alignment due to design solutions of Mounting Part Set

• Self-diagnostics

• Wide range of standard outputs for secondary device connection

DESIGN AND OPERATING PRINCIPLE

The principle of vortex acoustic measurement means that fluid velocity is measured by determining the frequency of fortex generation behind the bluff body in the flow tube of the flowmeter. The frequency of vortex generation is determined using ultrasonic sound with frequency of 1MHz ("ultrasonic vortex detecting").



Single-beam Flowmeter DN 25-200 mm

Two-beam Flowmeter DN 250; 300 mm

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The flowmeter is a single block consisting of a flow tube and an electronic module. The flow tube includes a bluff body i.e. a prism of trapezoid cross-section (1), piezoradiators PI (2), piezoreceivers PP (3) and a temperature sensor (7).

The electronic module includes a generator (4), a phase detector (5) and a microprocessor-based adaptive filter with an output generating unit (6) mounted on a circuit board.

There are two LEDs, green and red, on the terminal block to monitor Metran-300PR, Metran-320 and Metran-305PR operation. Green LED shows normal performance where flashing frequency corresponds to frequency of flowmeter output pulses. Red LED lights up automatically in contingency when the flow rate is less than 0.8Qmin, or vortex generation is chaotic, e.g. when a foreign objects get on the bluff body.

Metran-303PR flowmeter does not have LED diagnostics. Diagnostic messages are displayed on PC via HART Protocol.

The bluff body is located at the flow tube inlet. When liquid flows around the body, vortex trail is formed behind it, where the vortex rate is precisely proportional to the fluid rate, and to flow accordingly.

Behind the bluff body, the cups with ultrasonic piezoradiator (PI) and piezoreceiver (PP) assembled are located diametrically opposite each other in the flow tube.

Flowmeters have two versions:

- Single-beam flowmeter - one pair of PI-PP (DN25-200 mm);

- Two-beam flowmeter - two pairs of PI-PP (DN250, 300 mm).

PI is supplied by a generator with alternating voltage, transformed into ultrasonic vibrations. These vibrations become phase-modulated when passing through the flow and interacting with vortices. In PP, modulated ultrasonic vibrations are transformed again into voltage applied to the phase detector.

The phase detector evaluates phase difference between:

- signals from the piezoreceiver and the reference generator (for one-beam flowmeters);

- signals of the piezoreceiver from the first and the second pairs of piezoelectric elements (for two-beam flowmeters).

Frequency and amplitude of phase detector outlet voltage corresponds to vortex intensity and recurrence rate that is in fact a flow gage due to flow rate proportionality.

To filter random components, the signal from the phase detector is transferred to the microprocessor-based adaptive filter and then to the output generating unit. To improve reading reliability during signal processing, the dispersion of vortex vibration period is calculated.

To enlarge turndown into low flow values, where flowmeter characteristic is nonlinear and depends on fluid temperature, temperature compensation is used. For this purpose a temperature sensor is installed into a flow tube. The temperature sensor signal is entered into flow calculation program.

The flow tube is made of stainless steel and cleaned extensively, it results in reducing deposit formation and thus regulating metrological characteristics.

The bluff body is removable to provide calibration according to flow/simulation procedure.

The electronic module is installed in a separate compartment connected to the flow tube by pipe bracket. Wire assembly situated inside the pipe bracket connects the electronic board with piezoelectric elements.

Standard flowmeters have obligatory pulse outputs.

There is a socket connector or a cable gland lead-in on housing sidewall that connects the meter to secondary devices (computers) and power supply units. The housing is closed with covers sealed with rubber gaskets to provide housing leak tightness.