



"PRAMER-517" feed water flow meters are designed to transduce volume flow of feed water in nuclear power plant (NPP) circuit into electrical output and transfer data to an external device.

Flow meters consist of the following:

- primary measuring transducers PP20;
- secondary measuring transducers IPV-7 - electronic module with a communications cable KC.

Primary measuring transducer is designed for transducing flow average velocity V_0 of operating environment into time intervals of ultrasonic signals transmission up and down the flow, t_1 и t_2 , respectively.

Time intervals measuring and processing according to the algorithm is provided by secondary measuring transducer microcontroller.

Primary measuring transducer is connected to piping circuit by welding and can't be dismantled during the whole period of operational use.

Transducer nominal diameter (DN) - 200 mm.

Primary measuring transducers of flow meters are ruggedized and withstand pressure max 240 kgf/cm^2 (24 mPa) and temperature max $158 \text{ }^\circ\text{C}$ (431 K), as well as pressure max 180 kgs/ sm^2 (18 mPa) and temperature max $260 \text{ }^\circ\text{C}$ (533 K).

Flow meters ensure safe operation under the following conditions:

- steady state operation with operational temperature $T_{o1} = 260^\circ\text{C}$ (533K) and operational pressure $P_{o1} = 180 \text{ kgs/ sm}^2$ (18 mPa);
- steady state operation with operational temperature $T_{o2} = 160^\circ\text{C}$ (433K) and operational pressure $P_{o1} = 180 \text{ kgs/ sm}^2$ (18 mPa);
- steady state operation at stopped circulation and full filling of primary measuring transducer flow cavity with fluid with operational temperature 145 to $160 \text{ }^\circ\text{C}$ (418 to 433 K) and operational pressure 6 to 240 kgs/ sm^2 (0,6 to 24,0 mPa);
- transient modes which occur while transitting from one operation to another.

Operating temperature and pressure variation speeds of mode shift cycles should be max 10 °C/min and 100 kgs/min respectively.

Relative accuracy range at volume flow transducing within the range 20 - 400 m³/hr into electric output signal of flow meters do not exceed, %:

- at primary calibration:
 - 20 to 270 m³/hr - ± 1,0;
 - 270 to 400 m³/hr - ± 0,5;
- at periodic recalibration:
 - 20 to 400 m³/hr - ± 1,0.

Flow meters instrument threshold is max 20 m³/hr

Flow meters ac power supply has the voltage 187 -242 V and the frequency (50±1) Hz

Consumed electricity demand - max 6 VA

Flow meters have the following output signals:

- linearly varying direct current (4-20) mA
- volume flow digital equivalent (m³/hr) - RS-485 interface with Modbus.rtu data communications protocol.

Pipe straight section minimum permissible length upstream of primary measuring transducers should be min 10 DN. Pipe straight section minimum permissible length upstream of primary measuring transducers has no applicable regulations.

Flow meters are resistant to ambient medium temperature variations within the limits of +5 to +50 °C.

Flow meters are resistant to ambient humidity effect (humidity 98% and temperature +35°C and lower) and they are noncondensing.