

Metran-320 Vortex Flowmeter



- **Operating fluids: water (district heating, drinking, industrial, distilled, etc.), water solutions with viscosity up to $2 \cdot 10^{-6} \text{ m}^2/\text{s}$ (2 cSt)**
- **Process temperature range 1...150°C**
- **Gage pressure up to 1.6 MPa**
- **Internal diameter (DN) of connected pipeline 25...100 mm**
- **Flow range 0.18...200 m³/h**
- **Turndown 1:100**
- **Volume reference accuracy up to $\pm 1.0\%$**
- **Outputs:**
 - Pulse signal "Open Collector";
 - 3-line LCD (optional)
- **Self-contained built-in battery supply of 3.6 V**
- **Calibration interval - 3 years**

Application: custody transfer metering systems of heat energy and cold/hot water flow/volume, independently or as a part of heat meters.

Metran-421 meter, an energy-independent metering system for heat custody transfer, is produced on the basis of Metran-320 meter.

Entered into the State Register of measuring instruments under #24318-03, Certificate # 14165.

Conformance Certificate: GOST R 51649-2000 Item 5.5 (EMC standard) #POCCRU.AЯ14.H00145.

DESIGN FEATURES

The operating principle is given in the Introductory section of Metran-300PR, Metran-320 and Metran-305PR Vortex Flowmeters". Signals are picked up according to single-beam diagram.

The flowmeter of A version has Confuser-Diffuser conic passages regulating velocity flow profile and made directly in the flow tube.

The flowmeter has 2 modes of flow measurement: operation and calibration. In operation mode, flow is measured periodically within time τ_1 . Within interval τ_2 ("pause"), measurement is not carried out, flow is considered constant.

"Pause" time and measurement time ratio: $\tau_2/\tau_1=14\dots18$. In calibration mode, flow measurements and data displaying on LCD go on continuously.

As an option, there can be 3-line LCD together with base digital pulse output in the meter.

LCD is placed under electronic module glass cover. Under the cover there is a magnetic reed relay for LCD sensitizing performed by touching of reed relay zone with a magnetic key included into meter's delivery set.

BASIC SPECIFICATIONS

● **Nominal diameters (DN)** of the pipeline where flowmeters are mounted, flow measurement limits, pulse value and width are given Table 1.

Table 1

DN, mm	Measurement Limits, m ³ /h				Pulse Value Type			
					Version 1		Version 2	
	Qmax	Q1*	Q2*	Qmin	Value, m ³ /pls.	Width, ms	Value, m ³ /pls.	Width, ms
25	9	0.6	0.3	0.18	0.001	106±4	0.01	256±4
32	20	1.0	0.5	0.25				
50	50	2.0	1.0	0.4	0.01			
80	120	5.0	2.5	1				
100	200	8.0	4.0	1.5				

* Q1, Q2 are transition flow values, when meter metrological characteristics change.
If the flow rate is less than 0.8Qmin, the electronic module of the flowmeter switches off.

● **Output signals**

- Passive pulse of "Open Collector" type,
- 3-line LCD (optional).

● **Output parameters:**

- Maximum switched voltage: 30 V max,
- Permissible commutation current: 2 mA max.

● **Displayed parameters (with LCD):**

- Instantaneous flow rate, m³/h,
- Accumulated volume, m³,
- Flowmeter operating time, h / Process temperature, °C (by turn),
- Codes of contingency conditions (if any).

Display time - 10 seconds minimum.

Recommended operation mode for LCD ≤ 10 power-on/day.

● **Contingency conditions (NS codes on a display):**

- Zero flow ("0");
- Flow $J \leq 0.8Q_{min}$ ("L");
- Chaotic vortex generation ("d")
- Discharged battery cell ("flashing" mode means it is close to critical discharge, no display if discharge is critical).

- **Volume and flow measurement accuracy** is given in Table 2.

Table 2

Reference Accuracy	Accuracy %
Reference accuracy of volume measurement by pulse signal, at Q flow: $Q1 < Q \leq Q_{max}$ $Q2 < Q \leq Q1$ $Q_{min} \leq Q \leq Q2$	±1.0 ±1.5 ±3.0
Reference accuracy of volume measurement displayed on LCD, at Q flow: $Q1 < Q < Q_{max}$ $Q2 < Q \leq Q1$ $Q_{min} \leq Q \leq Q2$	±1.0 plus one least significant digit ±1.5 plus one least significant digit ±3.0 plus one least significant digit
Reference accuracy of instantaneous flow measurement displayed on LCD, at Q flow: $Q1 < Q < Q_{max}$ $Q2 < Q \leq Q1$ $Q_{min} \leq Q \leq Q2$	±1.5 plus one least significant digit ±2.0 plus one least significant digit ±3.5 plus one least significant digit
Reference accuracy of operating time measurement displayed on LCD	±0.1 plus one least significant digit

- **Fluid pressure loss** in flowmeter at Q flow, MPa, max:

$$\Delta p = 0.12(Q/Q_{max})^2$$

- The flowmeter is **supplied** by built-in power supply, i.e. lithium-type battery (Sonnenschein SL770/T cell or similar). Battery cell: voltage of 3.6 V, rated capacity of 7 A·h, useful current is 2.5 mA maximum. Life time of battery cell is 3 years minimum if LCD is switched on no more than 10 times a day.

OPERATION CONDITIONS

Fluid Flow Parameters

Temperature	1...150°C
Pressure	up to 1.6 MPa
Viscosity	up to $2 \cdot 10^{-6}$ m ² /s
Minimum pressure required for flowmeter operation	$P_{min} = 3\Delta P + 1.3P_{sv}(t)$,

where ΔP , MPa (kgf/cm²) - pressure loss in flowmeter at flow Q,
 $P_{sv}(t)$, MPa (kgf/cm²) - saturated vapor pressure of fluid at its actual temperature.

External Factor Parameters

The flowmeter withstands:

- Ambient Temperature: -10...60°C;
- Relative humidity of up to 95% at 35°C;
- Atmospheric pressure of 630...800 mmHg;
- Intensity of external variable and constant magnetic field - up to 400 A/m.

The flowmeter is vibration-resistant per N4, GOST 12997 (amplitude of 0.15 mm within frequency band of 5...80 Hz).

Dust and Water Tightness

IP65 per GOST 14254-96

PIPELINE MOUNTING

The flowmeter is installed according to "sandwich" type, i.e. between two special flanges or per GOST 12820, comprising Mounting Kit (refer to Table 5), using pins and nuts with washers (refer to Figure 2).

Straight run lengths according to preset flow friction are given in Table 3.

Table 3

Flow Friction Type	Upstream/Downstream Straight Run Lengths
Taper angle: up to 30°, tee elbow fitting, full-open valve or ball valve	5DN/2DN
Square elbow, sludge pan, filter, array elbow fitting, control fitting*	10DN/5DN*

* When mounting the vortex meter, it is recommended to install straightening vanes after specified local flow frictions. Straightening vanes allow reducing straight run lengths up to 5DN/2DN.

The meter complete with straight run set of the required sizes (KMCh K2, K3, refer to Table 5) is available on request .5). Materials of flowmeter and Mounting Kit (KMCh) wetted parts are provided in Table 4.

Horizontal, vertical and sloping pipe mounting is permissible provided that total volume of straight run and flow tube is completely filled with fluid. There should be no air in a pipeline.

Internal pipeline diameter where Metran-320 meter is installed should be in line with the values given in Table 7. Otherwise pipe-line parts neighboring to the meter should be replaced by straight runs of suitable pipe lengths given in Table 7 or KMCh straight runs specified in the order.

List of pipes recommended for straight runs is provided in Table 7.

During meter operation, the stop valves installed upstream and downstream outside straight runs should be completely open.

Overall and mounting dimensions according to meter version are given in Figure 2.

ELECTRIC WIRING

Cables and wires connecting the meter and secondary devices are to be laid in metal hoses or tubes.

It is recommended to use pilot cables with plastic or rubber insulation and signal cables with polyethylene insulation.

Shielded cable with insulating sheath is recommended if the meter is close to laying areas of electric installation over 0.5 kVA.

It is forbidden to place communication lines of the meter and secondary devices close to power cables.

Length of communication lines should not exceed 50 m, resistance of each conductor is 20 Ohm maximum.

Electric wiring should be carried out using 2-wire cable (e.g., RPSHМ 2x0.35 or MKSh 2x0.35). It is permissible to use separate wires with 0.35 mm² section.

To protect the flowmeter from electrostatic discharge, the housing should be reliably grounded.

WIRING DIAGRAM

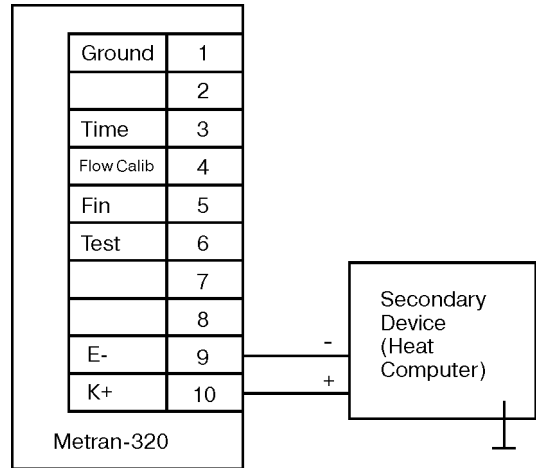


Fig. 1. Wiring Diagram for Metran-320 Flowmeter and Secondary Device.

CALIBRATION

Calibration is performed by imitation or flow method according to the procedure approved by RF GosStandard Authorities (refer to General Section "Calibration Features").

Calibration interval: 3 years.

RELIABILITY

Average life time - 8 years.

Mean time between failures - 50,000 h

WARRANTY

Warranty period is 18 months from the date of commissioning.

DELIVERY SET

1. Flowmeter.
2. Magnetic Key (for LCD version).
3. Product Data Sheet.
4. Operation Manual.
5. Mounting Kit.
6. Socket 2RM22KPN10G1V1.
7. Packaging.

The delivery set may be completed with options (refer to Section *Repair Kit*):

1. Extra bluff body;
2. Demounting tool;
3. End cap for bluff body replacement during calibration;
4. Process insert;
5. Straightening vane.

ORDERING INFORMATION

Metran-320 - 50 - A - 0.1 - 02 - I - K1 - TU 4213-026-12580824-96

1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---

1. Flowmeter model.
2. Internal pipe diameter DN, mm (Table 1).
3. Code of Flowmeter version.
4. Pulse value of output signal (Table 1).
5. Material type code of flow tube (Table 4).
6. Code of LCD availability .
7. Code of Mounting Kit (Table 5).
8. Specifications.

MATERIALS OF WETTED PARTS

Table 4

Component	Code of Flow Tube Material	
	01	02
Metran-320-A (DN 25...100mm)		
Flange	Steel 25	Steel 12Cr18Ni10Ti
Gasket (to seal flanges)	Paronite PON or PON-A	
Housing, body	Steel 12Cr18Ni10Ti	
Bluff body	Steel 14Cr17Ni2 or 09Cr16Ni4Nb	
Ring (to seal bluff body)	Rubber IRP- 1338 or K-69	
Straight run*: - Flange - Pipe	Steel 25 Steel 25	Steel 12Cr18Ni10Ti Steel 12Cr18Ni10Ti

* If it is present (according to order).

CODES OF MOUNTING KITS

Table 5

Mounting Kit Code	Mounting Parts for Flowmeter of Version A (DN 25...100 mm)
K0	Gaskets
K1	Special flanges, gaskets, nuts, spring washers, round washers, pins
K2	Straight run 2DN, straight run 5DN, gaskets, nuts, spring washers, round washers, pins
K3	Straight run 5DN, straight run 10DN, gaskets, nuts, spring washers, round washers, pins
K4	Flanges as per GOST 12820 of Version 1, gaskets, nuts, spring washers, round washers, pins

Notes: Number of parts comprising a mounting kit is given in the Product Data Sheet.

DIMENSIONAL AND MOUNTING DRAWINGS

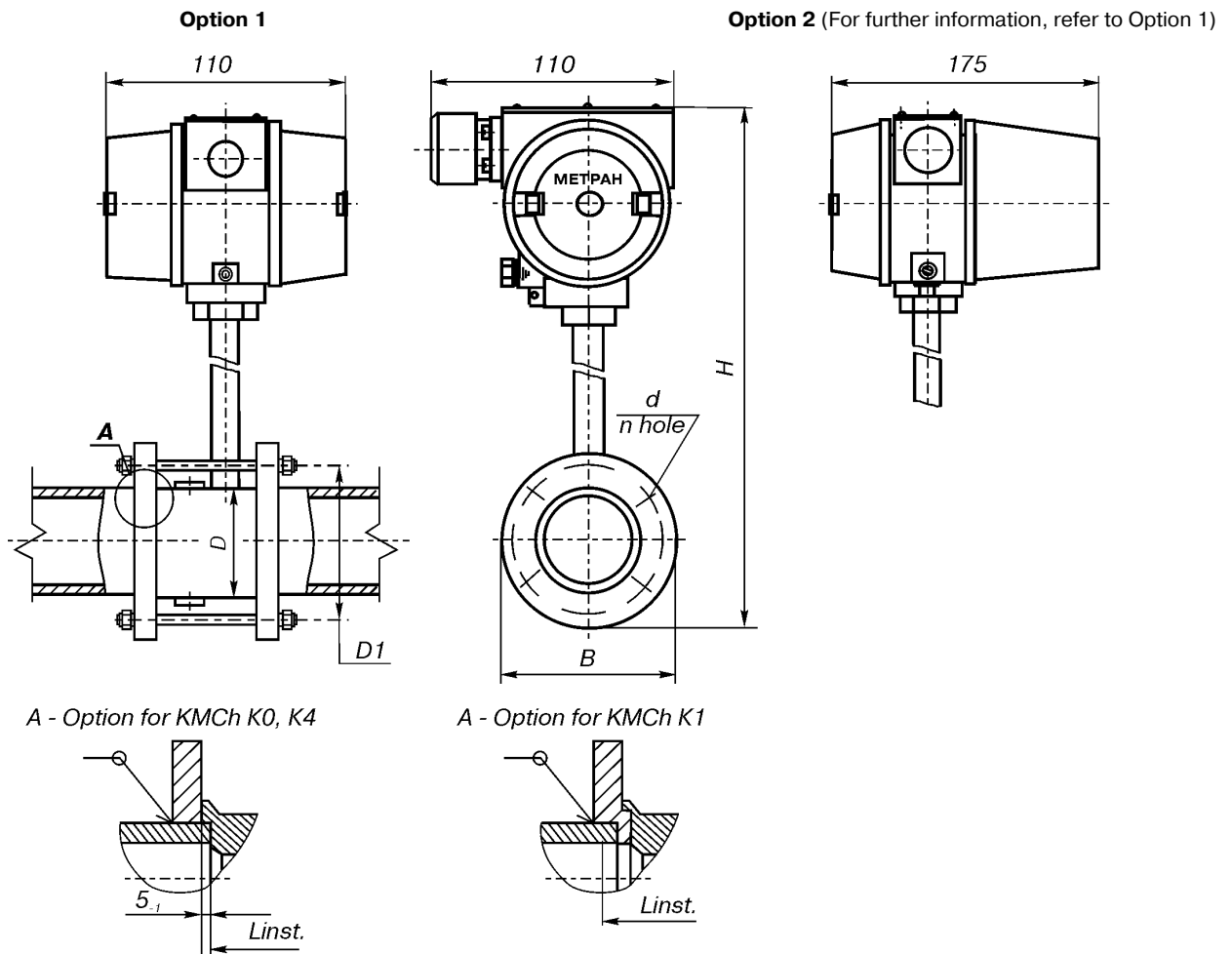


Fig.2. Metran-320-A Flowmeter, DN25, DN32, DN50, DN80, DN100.

Option 1. With pulse output signal.

Option 2. With LCD.

Table 6

DN, mm	Metran-320-A							
	B, mm	D, mm	D1, mm	Linst, mm	H, mm	d, mm	n, units	Weight, kg
25	115	60	85	62/86	300	14	4	2.8
32	135	65	100	64/88	314	18	4	3.0
50	160/144	75	125/110	64/88	331/323	18	4	3.3
80	195/178	110	160/145	99/125	358/349	18	8/4	6.1
100	215/192	130	180/160	114/144	378/366	18	8	8.3

Note:

1. Sizes for flowmeters with mounting kit K0 and K4 are indicated in numerator of fraction, and flowmeters with mounting kit K1 in term of fraction.

2. Flowmeter weight is specified excluding weight of mounting kit.

PIPES FOR STRAIGHT RUN

Table 7

DN, mm	Dint, mm	Material Code		
		01		02
		Pipe	Equivalent Pipe	Pipe
25	26±0.3	Pipe Dint 26x3.0 GOST 8734-75 GOST 8733-74	Pipe 32x3.0 GOST 10704-91 VSt3sp2 GOST 10705-80	Pipe 32x3.0-12Cr18Ni10Ti GOST 9941-81
32	33±0.4	Pipe Dint 33x2.5 GOST 8734-75 GOST 8733-74	Pipe or Pipe 38x2.5 GOST 10704-91 VSt3sp2 GOST 10705-80 38x2.5 GOST 8732-78 VSt3sp2 GOST 8731-74	Pipe 38x3.0-12Cr18Ni10Ti GOST 9941-81
50	50±0.4	Pipe Dint 50x3.5 GOST 8734-75 GOST 8733-74	Pipe or Pipe 57x3.5 GOST 10704-91 VSt3sp2 GOST 10705-80 57x3.5 GOST 8732-78 VSt3sp2 GOST 8731-74	Pipe 57x3.5-12Cr18Ni10Ti GOST 9941-81
80	82±0.66	Pipe Dint 82x3.5 GOST 8734-75 GOST 8733-74	Pipe or Pipe 89x3.5 GOST 10704-91 VSt3sp2 GOST 10705-80 89x3.5 GOST 8732-78 VSt3sp2 GOST 8731-74	Pipe 89x3.5-12Cr18Ni10Ti GOST 9941-81 или
100	100±0.8	Pipe Dint 100x4 GOST 8734-75 GOST 8733-74	Pipe or Pipe 108x4.0 GOST 10704-91 VSt3sp2 GOST 10705-80 108x4.0 GOST 8732-78 VSt3sp2 GOST 8731-74	Pipe 108x4.0-12Cr18Ni10Ti GOST 9941-81