

Metran-305PR Vortex Flowmeter



- **Operating fluids: water (tank and stratal waters), water solutions with viscosity up to $2 \cdot 10^{-6} \text{ m}^2/\text{s}$ (2 cSt)**
- **Temperature range 1...150°C**
- **Gage pressure up to 20 MPa**
- **Internal diameter (DN) of connected pipeline 50, 100 mm**
- **Flow range 0.4...200 m³/h**
- **Turndown 1:100**
- **Outputs: pulse, 3-line LCD (optional)**
- **Volume reference accuracy up to $\pm 1.0\%$**
- **Power Supply: DC source with constant voltage of 16 to 36 V**
- **Self-diagnostics**
- **Calibration interval - 3 years**
- **Entered into State Register of Measuring Instruments under #28383-04, Certificate #19549, Certificate of Conformance GOST R 51649-2000 Section 5.5 (EMC requirements) #ROSSRU.AJA14.N00144**

Pressure of operating fluid is up to 20 MPa

Application: in oil extracting industry for measurement of water flow in reservoir pressure maintenance systems.

As for coupling dimesions and mounting style, they can completely replace vortex flowmeters that are traditionally used in reservoir pressure maintenance systems.

DESIGN FEATURES

The operating principle is described in **Introductory Section of Metran-300PR, Metran-320, Metran-305PR Vortex Flow Meters**. Signals are picked up according to single-beam diagram.

Standard sizes of attachable process pipelines:
DN 50, 100 mm.

The meter to be mounted on DN 50 mm pipeline is produced in one flow range version (50 m³/h), the meter to be mounted on DN 100 mm pipeline is produced in three flow range versions (50, 120, 200 m³/h). Thereby, all versions have similar mounting dimensions, they differ only in inner diameters of a flow tube.

The meter has passive digital pulse output of "closed/open" type (optoelectronic couple).

Output pulse value is selected by the user. A jumper on meter block is used for pulse value selection. Version 1 is supplied with installed jumper; version 2 with removed jumper (refer to Table 1).

3-line LCD is an option.

Cable laying to meter's terminal block is carried out through gland lead-in on a housing side-wall.

BASIC SPECIFICATIONS

- Flow measurement limits, pulse value and interval according to meter type are given in Table 1.

Table 1

DN, mm	Model	Measurement Limits, m ³ /h				Pulse Value			
						Version 1		Version 2	
		Qmax	Q1*	Q2*	Qmin	Value, m ³ /pls.	Width, ms	Value, m ³ /pls.	Width, ms
50	Metran-305PR-50/50	50	2.0	1.0	0.4	1.0	106±4	0.001	40±2
100	Metran-305PR-100/50	50	2.0	1.0	0.4				
	Metran-305PR-100/120	120	5.0	2.5	1.0				
	Metran-305PR-100/200	200	8.0	4.0	1.5				

* Q1, Q2 are transition flow values, when meter metrological characteristics change.

** Meter pulse value is selected by the user. Meter standard model is version 1 (refer to Table 1). If you chose version 2, just remove the jumper from meter block.

- Output signals:**
 - Passive pulse of "opened/closed" type (optoelectronic couple - OC);
 - LCD (optional).
- Output parameters (OC):**
 - Maximum switched voltage: 30 V max;
 - Permissible commutation current: 32 mA max.
- Displayed parameters (with LCD):**
 - Instantaneous flow rate, m³/h;
 - Accumulated volume, m³;
 - Flowmeter operating time, h;
 - Codes of contingency conditions (if any).
- Contingency conditions (NS codes on a display):**
 - Zero flow ("0");
 - Flow $J \leq 0.8Q_{min}$ ("L");
 - Chaotic vortex generation ("d").

• **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: $Q1 < Q < Q_{max}$ $Q2 < Q \leq Q1$ $Q_{min} \leq Q \leq Q2$	± 1.0 ± 1.5 ± 3.0
Reference accuracy of volume measurement displayed on LCD, at Q flow: $Q1 < Q < Q_{max}$ $Q2 < Q \leq Q1$ $Q_{min} \leq Q \leq Q2$	± 1.5 plus one least significant digit ± 2.0 plus one least significant digit ± 3.5 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:
 $\Delta P = 0.2(Q/Q_{max})^2$

• The flowmeter is **supplied** by external dc power supply of 16...36 V voltage and pulsation amplitude of 200 mV maximum.
IMPORTANT The flowmeter should be supplied by the power supply with current limiting threshold of 100 mA minimum or short-circuit current of 100 mA minimum.
 Flowmeter power consumption is 1.5 W maximum.

OPERATION CONDITIONS

Fluid Flow Parameters

Temperature 1...150°C
 Pressure up to 20 MPa
 Viscosity up to $2 \cdot 10^{-6}$ m²/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.

for version w/ LCD -10...60°C;
 - Relative humidity of up to 95% at $\leq 35^\circ\text{C}$;
 - 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, GOST12997 (amplitude of 0.15 mm within frequency band of 5...80 Hz).

It is permissible to use the flowmeter both in explosion-proof application and in explosion hazard zones of V-1b class as per RF Electrical Code, Section 7-3.

Dust and Water Tightness according IP65 per GOST14254-96.

External Factor Parameters

The flowmeter withstands:
 - Ambient Temperature:
 for version w/o LCD -40...+60°C;

PIPELINE MOUNTING

The mounting style of the flowmeter is "sandwich" type. The flowmeter is installed between special flanges using pins and nuts with washers. The flowmeter and flanges are sealed without gaskets (metal to metal). Special flanges and pins are included into flowmeter's mounting kit.

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°, terete elbow fitting, full-open valve or ball valve	5DN/2DN
Square elbow, sludge pan, array elbow fitting	10DN/5DN

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.

The flowmeter and flanges are sealed by "metal to metal" method without gaskets (refer to Fig.3). The flowmeter can be supplied both with mounting kit (KMCh, refer to Table 4) and without it.

Table 4

Part of Mounting Kit	Flow Meter Version	
	Metran-305PR-50/...	Metran-305PR-100/...
Special flange	2	2
Special pin	6	6
Special expanding pin	2	2
Nut M30-7N.8.05 GOST 5915	-	16
Nut M24-7N.8.05 GOST 5915	16	-

Flowmeter attachment should be tight, without bending to avoid leakage flow at 20 MPa pressure. To provide flowmeter alignment, the pipeline mounting is performed using a process insert supplied by special order.

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

Flowmeter overall dimensions (according to flowmeter type) are given in Fig.2, flowmeter mounting dimensions are given in Fig.3.

For pipes recommended for straight runs production, refer to Table 5.

Table 5

Pipe	DN, mm	Din, mm
Pipe 63x6.5 GOST 8734-75	50	50±0.4
V20 GOST 8733-74		
Pipe 110x10 GOST 8734-75	100	90±0.8
V20 GOST 8733-74		

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: 12 years.

Mean time between failures: 75,000 h.

ELECTRIC WIRING

Cables and wires connecting the meter and secondary devices (computer, controller, etc.) 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 200 m, resistance of each conductor is 20 Ohm maximum.

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

WIRING DIAGRAM

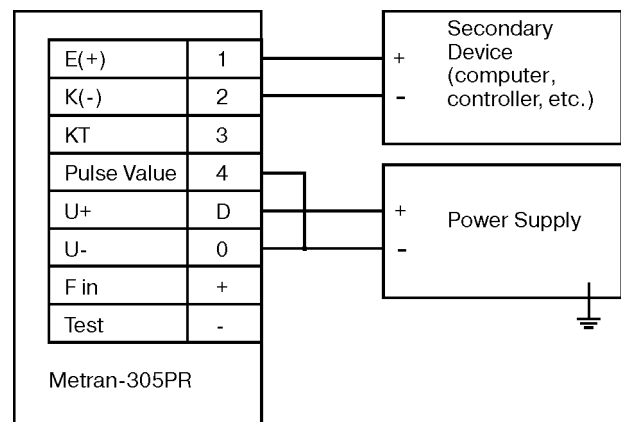


Fig. 1. Metran-305PR Flowmeter Wiring Diagram.

Frame grounding is not required if the meter is supplied through galvanically isolated channel. When a block of meters is supplied by a single power supply without galvanic isolation, voltage potential between flow tubes should be equal by their reliable grounding.

WARRANTY

Warranty period is 18 months from the date of commissioning.

DELIVERY SET

- Flowmeter;
- Product Data Sheet;
- Operation Manual;
- Mounting Kit (optional).

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

- Process insert;
- Extra bluff body;
- End cap for bluff body replacement during calibration.

DIMENSIONAL AND MOUNTING DRAWINGS

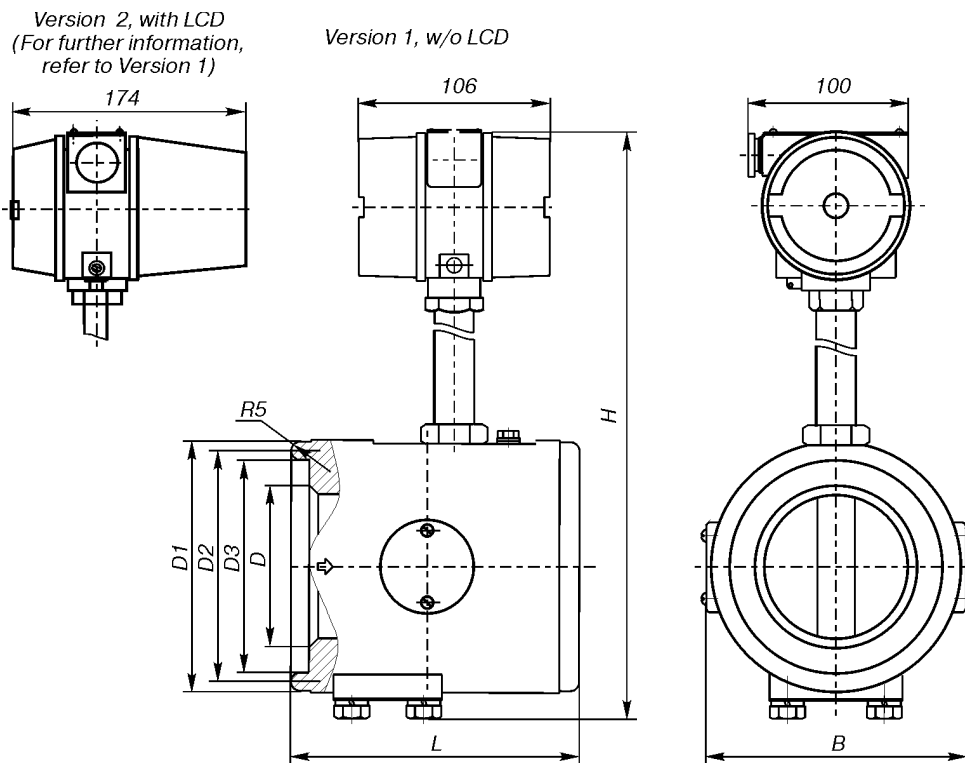


Fig. 2. Flowmeter Dimensional Drawing.

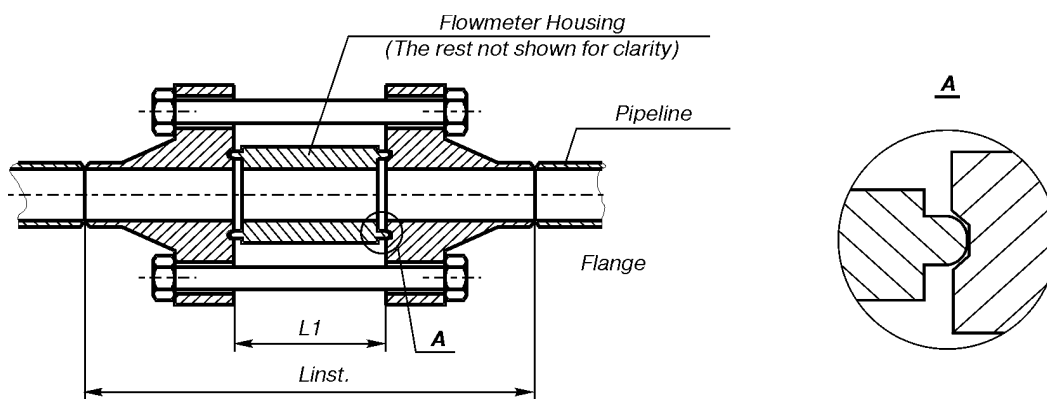


Fig. 3. Flowmeter Pipe Mounting.

Overall and Mounting Dimensions

Table 8

DN, mm/ Qmax, m/h	D1, mm	D2, mm	D3, mm	D, mm	L, mm	L1, mm	Linst, mm	H, mm, max	B, mm, max	Weight, kg, max
50/50	91	80	69	48	140	135	323	340	110	7.5
100/50	139	128	117	90	160	149	411	385	150	19
100/120										17
100/200										15

ORDERING INFORMATION

Metran-305PR - 100/50 - I - K1 - TU4213-048-12580824-2004				
1	2	3	4	5

1. Flowmeter model.
2. Internal pipe diameter DN/maximum flow rate (Qmax), m³/h (Table 1).
3. LCD code.
4. Mounting Kit code.
5. Specifications.

MATERIALS OF WETTED PARTS

Table 6

Wetted Part	Material
Flange	Steel 20
Housing, Body	Steel 12Cr18Ni10Ti
Bluff Body	Steel 14Cr17Ni2
Ring (to seal bluff body)	Rubber K-69

MOUNTING KITS (K1)
FOR FLOWMETER VERSIONS

Table 7

Part of Mounting Kit	Flowmeter Version	
	Metran-305PR-50/...	Metran-305PR-100/...
Special flange	2	2
Special pin	6	6
Special expanding pin	2	2
Nut M30-7N.8.05 GOST 5915	-	16
Nut M24-7N.8.05 GOST 5915	16	-

REPAIR KIT

Optionally, Metran-300PR, Metran-303PR, Metran-305PR and Metran-320 flowmeters can be supplied with Repair Kit comprising parts and products (refer to Table 1).

Table 1

Product/Part	Flowmeter Model	Flowmeter Version Code	DN, mm
Bluff Body	Metran-300PR*, Metran-303PR, Metran-320*	A	25; 32; 50; 80; 100
		B*	25*; 32*; 50*; 80*; 100*; 150; 200
	Metran-300PR, Metran-303PR	-	250, 300
	Metran-305PR	-	50/50; 100/50; 100/120; 100/200
End Cap (to relace bluff body)	Metran-300PR*, Metran-303PR, Metran-320*	A	25; 32; 50; 80; 100
		B*	25*; 32*; 50*; 80*; 100*; 150; 200
	Metran-300PR, Metran-303PR	-	250, 300
	Metran-305PR	-	50/50; 100/50; 100/120; 100/200
Process Insert	Metran-300PR, Metran-303PR, Metran-320	A	25; 32; 50; 80; 100
	Metran-300PR*, Metran-303PR, Metran-320*	B*	25*; 32*; 50*; 80*; 100*; 150; 200
	Metran-300PR, Metran-303PR	-	250, 300
	Metran-305PR	-	50/50; 100/50; 100/120; 100/200
Demounting Tool	Metran-300PR*, Metran-303PR, Metran-320*	A	25; 32; 50; 80; 100
		B*	32*; 50*; 80*; 100*; 150; 200
O-ring/Gasket for Bluff Bbody/End Cap	Metran-300PR, Metran-303PR, Metran-320	A	25; 32; 50; 80; 100
		B*	32*; 50*; 80*; 100*; 150; 200
	Metran-300PR; Metran-303PR	-	250, 300
	Metran-305PR	-	50/50; 100/50; 100/120; 100/200
Gasket for Mounting Kit	Metran-300PR, Metran-303PR, Metran-320	A	25; 32; 50; 80; 100
		B*	32*; 50*; 80*; 100*; 150; 200
	Metran-300PR; Metran-303PR	-	250, 300
Cell	Metran-320	-	

* Units and parts for DN25...100 'B' flowmeters produced before 2004 and used currently are manufactured on special request.

ORDERING INFORMATION

Repair Kit - Bluff Body - Metran-300PR - 50 - A - TU 4213-026-12580824-96

1 2 3 4 5 6

1. Name of Commodity Group (compulsory).
2. Product/Part name (Table 1).
3. Flowmeter model (Table 1).
4. Nominal flowmeter diameter.
5. Code of flowmeter version.
6. Specifications for flowmeter.

STRAIGHTENING VANE

DESIGN

The straightening vane is produced of pipes with internal diameter d (refer to Table 1), which are located parallel to pipeline axis and fill the whole pipe section. The number of pipes is 19 minimum. For dimensional and mounting drawing, refer to Table 1.

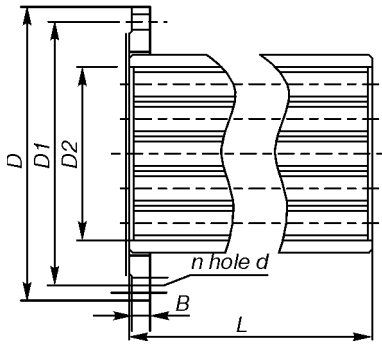


Fig. 1. Flanged Version.

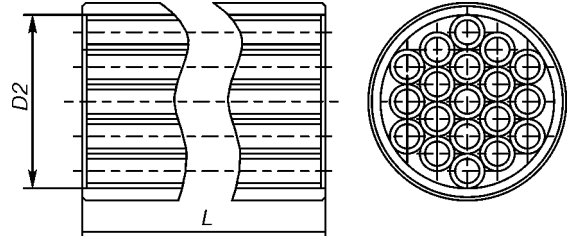


Fig.2. Wafer Version.

Table 1

DN, mm	Flanged Version								Wafer Version		
	L, mm	D, mm	D1, mm	D2, mm	B, mm	d, mm	n, pcs	Weight, kg	L, mm	D2, mm	Weight, kg
50									100	50	0.9
80	160	195	160	82	21	18	8	6.6	160	82	2.9
100	200	215	180	100	23			10.0	200	100	5.3
150	300	280	240	151	25	22	8	24.2	300	151	16.4
200	400	335	295	208	27			45.7	400	208	35.6
250	500	405	355	261	28	26	12	66.9	500	261	52.4
300	600	460	410	311	28			98.7	600	311	80.9

ORDERING INFORMATION

Straightening Vane Flanged DN 80		
1	2	3

1. Product name.
2. Version:
 - Flanged;
 - Wafer.
3. Nominal flowmeter diameter (Table 1).