

Metran-100 Series Smart Pressure Transmitters

OKP Codes 4212 810301, 02...06



- **Measurable fluids: liquids, steam, gas, including gaseous oxygen and oxygen-containing gas mixtures; foodstuffs**
- **Pressure ranges:**
 - 0-0.04 kPa minimum;
 - 0-100 MPa maximum
- **Accuracy**
 - up to $\pm 0.1\%$ FS
- **Turndown up to 25:1**
- **Versions as per GOST 12997:**
 - Traditional;
 - Explosion-proof (Ex, Vn)
- **For operation at NPS**
- **Verification interval - 3 years**
- **Warranty life time - 3 years**
- **Entered into the State Register of measuring instruments, Certificate # 11320**

Metran-100 Series Smart Pressure Transmitters are designed for measurement and continuous conversion of the following input values into a unified analog signal and/or a digital signal in the HART Protocol standard or a RS485-based digital signal:

- gage pressure (Metran-100-DI);
- absolute pressure (Metran-100-DA);
- vacuum (Metran-100-DV);
- gage-vacuum (Metran-100-DIV);
- differential pressure (Metran-100-DD);
- hydrostatic pressure (Metran-100-DG).

Transmitter settings control:
















- push-button control from built-in panel;
- with HART Communicator or PC;
- with ICP-Master software and PC or PCS software tools.

Built-in RF-interference filter.

External "zero" adjustment button.

Continuous self-diagnostics.

APPEARANCE OF METRAN-100 MODELS

Physical Configuration	Model	Physical Configuration	Model	Physical Configuration	Model
	1110, 1210 1310, 1410 1111, 1211 1311, 1411		1420, 1430, 1434, 1440, 1444, 1450, 1460, 1412		1532, 1542 1532+, 1542+
	1131, 1231, 1331 1141, 1241, 1341		1422 1432 1442		1534, 1544 1534+, 1544+
	1051, 1151, 1351 1061, 1161, 1171		1495 1496		1133, 1233 1143, 1243
	1050, 1150, 1350 1060, 1160, 1170		1020, 1030, 1040 1112, 1212, 1312		1533 1543
	1152 1162 1172 1173 (with square flange)		1531 1541		1153

BASIC PERFORMANCE SPECIFICATIONS

Table 1

Metran100 Model	Upper Range Limits	Replaceable Models of Sapphire and Metran Series Transmitters				
		Reference Model	Sapphire -22M	Metran-22	Metran-43	Metran-45
Metran-100-DI Gage Pressure Transmitters						
1110	0.40; 0.25; 0.16; 0.10; 0.06; 0.04 kPa	5110				5110
1111(AS)	2.5; 1.6; 1.0; 0.60; 0.40; 0.25; 0.16; 0.10 kPa	5120	2110			5120
1112*(AS)	1.6; 1.0; 0.60; 0.40; 0.25; 0.16 kPa	2110	2110	2110		
1131*(AS)	40; 25; 16; 10; 6; 4; 2.5; 1.6 kPa	3131	2120,2130	2120,2130	3131	5130
1133	40; 25; 16; 10; 6; 4; 2.5; 1.6 kPa	3133			3133	
1141*(AS)	250; 160; 100; 60; 40; 25; 16; 10 kPa	3141	2140	2140	3141	
1143	250; 160; 100; 60; 40; 25; 16; 10 kPa	3143			3143	
1150*(AS)	2.5; 1.6; 1.0; 0.6; 0.4; 0.25; 0.16; 0.10 MPa	2150	2150	2150	3196	
1151*(AS)	2.5; 1.6; 1.0; 0.6; 0.4; 0.25; 0.16; 0.10 MPa	2151	2151	2151	3141-01 3153-01 3156-01	
1152	2.5; 1.6; 1.0; 0.6; 0.4; 0.25; 0.16; 0.10 MPa	3156			3156	
1153	1.0; 0.6; 0.4; 0.25; 0.16 MPa	3153			3153	
1160*(AS)	16; 10; 6; 4; 2.5; 1.6; 1.0; 0.6 MPa	2160	2160	2160	3196-01	
1161*(AS)	16; 10; 6; 4; 2.5; 1.6; 1.0; 0.6 MPa	2161	2161	2161	3163-01	
1162	16; 10; 6; 4; 2.5; 1.6; 1.0 MPa	3163			3163	
1170*(AS)	100; 60; 40; 25; 16; 10; 6; 4 MPa	2170	2170	2170	3196-02	
1171(AS)	100; 60; 40; 25; 16; 10; 6; 4 MPa	2171	2171	2171	3173-01	
1172	40; 25; 16; 10; 6; 4 MPa	3173			3173	
1173	40; 25; 16; 10; 6; 4 MPa	3175			3175	
Metran-100-DA Absolute Pressure Transmitters						
1020*(AS)	10; 6; 4; 2.5 kPa	2020	2020	2020		
1030*(AS)	40; 25; 16; 10; 6; 4 kPa	2030	2030	2030		
1040*(AS)	250; 160; 100; 60; 40; 25 kPa	2040	2040	2040		
1050*(AS)	2.5; 1.6; 1.0; 0.60; 0.4; 0.25 MPa	2050	2050	2050		
1051*(AS)	2.5; 1.6; 1.0; 0.60; 0.4; 0.25 MPa	2051	2051	2051		
1060*(AS)	16; 10; 6; 4; 2.5; 1.6 MPa	2060	2060	2060		
1061*(AS)	16; 10; 6; 4; 2.5; 1.6 MPa	2061	2061	2061		
Metran-100-DV Vacuum Transmitters						
1210	0.40; 0.25; 0.16; 0.10; 0.06; 0.04 kPa	5210				5210
1211(AS)	2.5; 1.6; 1.0; 0.6; 0.4; 0.25; 0.16; 0.10 kPa	5220	2210	2210		5220
1212*(AS)	1.6; 1.0; 0.6; 0.4; 0.25; 0.16 kPa	2210	2210	2210		
1231*(AS)	40; 25; 16; 10; 6.0; 4.0; 2.5; 1.6 kPa	3231	2220, 2230	2220, 2230	3231	5230
1233	40; 25; 16; 10; 6.0; 4.0; 2.5; 1.6 kPa	3233			3233	
1241*(AS)	100; 60; 40; 25; 16; 10 kPa	3241	2240	2240	3241	
1243	100; 60; 40; 25; 16; 10 kPa	3243			3243	
Metran-100-DIV Gage-Vacuum Transmitters						
1310	±0.315; ±0.2; ±0.125; ±0.08; ±0.05; ±0.0315 kPa	5310				5310
1311(AS)	±1.25; ±0.8; ±0.5; ±0.315; ±0.2; ±0.125; ±0.08; ±0.05 kPa	5320	2310	2310		5320
1312*(AS)	±0.8; ±0.5; ±0.315; ±0.2; ±0.125; ±0.08 kPa	2310	2310	2310		
1331*(AS)	±20; ±12.5; ±8; ±5; ±3.15; ±2; ±1.25; ±0.8 kPa	3331	2320; 2330	2320; 2330	3331	5330
1341*(AS)	(-100; +150); (-100; +60); ±50; ±31.5; ±20; ±12.5; ±8; ±5 kPa	3341	2340	2340	3341	
1350*(AS)	(-100 kPa; +2.4 MPa); (-100 kPa; +1.5 MPa); (-100; 900); (-100; 530); (-100; 300); (-100; 150); (-100; 60); (-50; 50) kPa	2350	2350	2350		
1351*(AS)		2351	2351	2351	3341-01	

Table 1 (Continued)

Metran -100 Model	Upper Range Limits	Pgage ^{***} , MPa	Replaceable Models of Sapphire and Metran Series Transmitters					
			Reference Model	Sapphire -22M	Metran -22	Metran -43	Metran -44	Metran -45
Metran-100-DD Differential Pressure Transmitters								
1410	0.40; 0.25; 0.16; 0.10; 0.063; 0.04 kPa	0.10	5410					5410
1411(AS)	2.5; 1.6; 1.0; 0.63; 0.4; 0.25; 0.16; 0.10 kPa	0.25	5420	2410	2410			5420
1412*(AS)	1.6; 1.0; 0.60; 0.4; 0.25; 0.16 kPa	4	2410	2410	2410	2410		
1420*(AS)	10; 6.3; 4.0; 2.5; 1.6; 1.0; 0.63 kPa	10	2420	2420	2420			5430
1422(AS)	63; 40; 25; 16; 10; 6.3; 4 kPa	10	4420				4420	
1430*(AS)	40**; 25; 16; 10; 6.3; 4; 2.5; 1.6 kPa	25	2430	2430	2430	3494-01		
1432(AS)	160; 100; 63; 40; 25; 16; 10 kPa	16	4430				4430	
1434*(AS)	40**; 25; 16; 10; 6.3; 4; 2.5; 1.6 kPa	40	2434	2434	2434			
1440*(AS)	250**; 160; 100; 63; 40; 25; 16; 10 kPa	25	2440	2440	2440			
1442(AS)	630; 400; 250; 160; 100; 63; 40; 25 kPa	16	4440				4440	
1444*(AS)	250**; 160; 100; 63; 40; 25; 16; 10 kPa	40	2444	2444	2444			
1450*(AS)	2.5**; 1.6; 1.0; 0.63; 0.40; 0.25; 0.16; 0.1 MPa	25	2450	2450	2450			
1460*(AS)	16; 10; 6.3; 4; 2.5; 1.6; 1.0; 0.63 MPa	25	2460	2460	2460			
1495(AS)	160; 100; 63; 40; 25; 16; 10; 6.3 kPa	16	3494-02			3494-01 3494-02		
1496(AS)	630; 400; 250; 160; 100; 63; 40; 25 kPa	16	3494-03			3494-03		
Metran-100-DG**** Hydrostatic Pressure (Level) Transmitters								
1531	40; 25; 16; 10; 6.3; 4 kPa	0.25	3536			3536		
1532, 1532+	40; 25; 16; 10; 6.3; 4 kPa	6	3595			3595		
1533	40; 25; 16; 10; 6.3; 4 kPa	0.25	3535-01			3535; 3535-01		
1541	250; 160; 100; 63; 40; 25 kPa	0.4	3546			3546		
1542, 1542+	250; 160; 100; 63; 40; 25 kPa	10	3595-01			3595-01		
1543	250; 160; 100; 63; 40; 25 kPa	0.4	3545-01			3545; 3545-01		
1534, 1534+	40; 25; 16; 10; 6; 4 kPa	4.0	Flange Model for DN=80					
1544, 1544+	250; 160; 100; 63; 40; 25 kPa	4.0						

* Transmitters may be manufactured as oxygen version (except AS versions). For additional limitations regarding ambient temperature refer to Notes of Table 10. The transmitter of Model 1170 is manufactured as oxygen version with URL 40 MPa maximum.

** Transmitters with marked maximum URL are accepted for manufacturing after order settlement.

*** Pgage - maximum permissible operating gage pressure.

**** Installation diagrams of Metran-100-DG transmitters for liquid level measurement are provided in Section "What is necessary to know when selecting a pressure transmitter for level measurement" Fig.1-5.

● Transmitters of Models **1532, 1534, 1542, 1544** are set for pressure effect from reducing socket "A" side and designed for mounting with installation of a level vessel, refer to Fig.4.

● Transmitters of Models **1532+, 1534+, 1542+, 1544+** are set for effect from an opened diaphragm side and designed for mounting without installation of a level vessel, refer to Fig.3.

(AS) - transmitters may be manufactured as nuclear version, except transmitters with code MP4, MP5. The transmitter of Model 1170 is manufactured as nuclear version with URL 25 MPa maximum.

Transmitters of AS versions conform to:

- Location group 3 (periodically attended location within a controlled access area) in compliance with OTT 08042462;
- Application group 3 (under special customer's request: to application group 1, 2) in compliance with OTT 08042462;
- Safety class 3NU (under special customer's request: to 2NU) in compliance with the requirements of NP-001;
- Group B according to mounting method (built-in (constituent) radio elements and facilities mounted on intermediate structures (pipelines, panels, brackets, etc.)) in compliance with GOST 29075;
- Reliability Group 2 in compliance with OTT 08042462;
- Decontamination Group 2 in compliance with OTT 08042462;
- Seismic resistance category I in compliance with NP-031.

Metran-100 transmitters are multi-range products and can be adjusted to upper range limit or measurement range from P_{min} to P_{max} according to standard pressures per GOST 22520, as well as to upper range limit or measurement range that differs from the standard one.

Factory-adjusted transmitter is set (transmitter with accuracy code 010, 015) or programmed (transmitter with accuracy code 025, 050) to upper range limit selectable from values specified in Table 1. A transmitter can be adjusted to non-standard upper range limit under a mutually agreed order.

- **Codes** of transmitter versions depending on electronic converter option and **output signals** are provided in Table 2.

Table 2

Code	Output Signal	Options
MP	0-5, 4-20, 0-20, 5-0, 20-4, 20-0 mA	without integral indicator, with remote indicator
MP1		with integral indicator
MP2	4-20 mA with a digital HART signal	without indicator
MP3		with integral indicator
MP4	with a digital RS485 signal	without indicator
MP5		with integral indicator

Characteristics of output analog signal:

- linearly increasing;
- linearly decreasing;
- varying according to square root law (for 0-5, 4-20, 0-20 mA outputs) - additionally for differential pressure transmitters measuring liquid, gas and steam flow by method of alternating pressure drop on an orifice plate.

The characteristics are programmed:

- with the help of keyboard that is under the cover of the electronic converter - for MP, MP1 transmitters;
- with the help of HART Communicator or PC equipped with HART modem and H-Master program - for MP2, MP3 transmitters.

- **Accuracy** of transmitters (including nonlinearity, hysteresis and repeatability) verified upon an analog output signal (Codes MP, MP1, MP2, MP3) or digital output signals (Codes MP2, MP3, MP4, MP5) does not exceed values $\pm\gamma$ provided in Tables 3, 4, 5.

Table 3

Accuracy Code	Accuracy, $\pm\gamma$ %		Note
	$P_{max} \geq P_u \geq P_{max} / 10$	$P_{max} / 10 > P_u \geq P_{max} / 25$	
010	0.1	0.5	For all models, except 1020, 1030, 1040, 1110, 1111, 1112, 1210, 1211, 1212, 1310, 1311, 1312, 1410, 1411, 1412, 1442, 1331, 1341, 1496, 1531, 1532, 1533, 1534, 1541, 1542, 1543, 1544
015	0.15*		For all models, except 1020, 1030, 1110, 1112, 1210, 1212, 1310, 1312, 1410, 1412, 1442, 1496
025	0.25*		For all models, except 1020, 1030
050	0.5	1.0	For all models, except 1020

* * Transmitters of models 1110, 1210, 1410 with upper range limits (URL) 0.04; 0.06; 0.063 kPa and transmitters of model 1310 with URL of gage pressure and vacuum ± 0.0315 kPa are manufactured with $\gamma = \pm 0.5\%$.

P_{max} - maximum upper range limit for the specified model (sum of absolute maximal values of upper range limits of gage pressure (P_{max}) and vacuum ($P_{max_{(-)}}$) for DIV transmitters) given in Table 1.

P_u - model's upper range limit selected from upper range limit values of Table 1 (for DIV transmitters, it is the sum of absolute values of upper range limits of gage pressure (P_u) and vacuum ($P_{u(-)}$) according to Table 1).

Accuracy of Model 1020

Table 4

Accuracy Code	Accuracy, $\pm\gamma\%$, depending on Pu		
	10 kPa	6; 4 kPa	2.5 kPa
025	0.25	0.5	1.0
050	0.5		1.0

Accuracy of Model 1030

Table 5

Accuracy Code	Accuracy, $\pm\gamma\%$, depending on Pu	
	40; 25; 16; 10 kPa	6; 4 kPa
025	0.25	0.5

● For transmitters equipped with indicators, **indication error** of measurable input values does not exceed $\pm 1\%$ of URL or measurement range (rated at temperature $(23\pm 2)^\circ\text{C}$).

● **The transmitter has electronic damping of output signal**, which is characterized by averaging time of measurement results (td). Averaging time of measurement results increases settling time of an output signal and smoothes it at rapid change of the input signal.

The value of damping time is user-selectable from 0.2; 0.4; 0.8; 1.6; 3.2; 6.4; 12.8; 25.6 sec during adjustment.

● **Transmitter turn-on time** measured as time from power-up of the transmitter to settling time of an output signal with accuracy less than 5% of set value is 1.8 sec maximum at switched off averaging of an output signal (0.2 sec averaging time of an output signal is displayed on the indicator).

● **Baud rate** of a digital communication channel for transmitters with code **MP4 and MP5** is set by a user from the following values: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 baud. Baud rate 9600 and address 01h is set in the transmitter by default.

PERFORMANCE SPECIFICATIONS

● The transmitters are immune to atmospheric pressure effect from 84.0 to 106.7 kPa (group **P1**, GOST 12997)

● Transmitters depending on climatic version as per GOST 15150 are immune to the effect of ambient temperature provided in Table 10.

● Transmitters of UHL3.1 and U2 climatic types as per GOST 15150 **are immune to the effect of relative humidity** of ambient air up to $(95\pm 3)\%$ at 35°C and lower temperatures without moisture condensation. Transmitters of T3, TS1 versions as per GOST 15150 are immune to the effect of ambient relative humidity 100% at 35°C and lower temperatures with moisture condensation

● Dust and water tightness
IP65 as per GOST 14254

● DD transmitters withstand **one-side overload effect with maximum permissible operating gage pressure** from the side of both "+" and "-" chambers equally.

● DI (except for models 1170, 1171), DV, DIV, DA transmitters withstand **one-side overload effect with pressure $P = 1.25P_{\text{max}}$** , where P_{max} is the maximum upper range limit for this model.

● Transmitters of models 1170, 1171 with upper range limit 100 MPa withstand overload with pressure 110 MPa.

● DG transmitters withstand **one-side overload effect** with pressure equal to maximum permissible operating gage pressure from the side of the opened diaphragm; from the side of the static cavity, the transmitters withstand overload with pressure 1.25 times the upper range limit of the model.

● **Regarding tolerance to mechanical effects**, transmitters conform to GOST12997, version group

V2 (for models 1050, 1051, 1060, 1061, 1150, 1151, 1152, 1153, 1160, 1161, 1162, 1170, 1171, 1172, 1173, 1350, 1351);

L3 - for models 1110, 1112, 1210, 1212, 1310, 1312, 1410, 1412;

V1 - for other models.

Permissible direction of vibration is along the standing axis of the transmitter installed in operation position.

● **Regarding electromagnetic interference**, transmitters conform to Group IV, performance criterion for interference immunity is A as per GOST 50746 provided that:

- **Transmitter immunity to dynamic change of supply voltage** is provided together with a power supply;

- **Transmitter immunity to microsecond pulse interference (GOST K 51317.4.5) is provided together with a Noise Filter Unit (NFU)**. NFU can be ordered together with the transmitter (refer to Ordering Information). NFU is not installed on MP4, MP5 transmitters and transmitters of explosion-proof version "Ex". Transmitters of AS version are supplied with installed NFU only ;

- level of RF pulsation within frequency band over 10 kHz and output pulse amplitude less than 10 msec at electromagnetic interference are not rated.

● Transmitters conform to noise emission standard specified for Class B as per GOST R 51318.22

● Transmitters of AS modification:
- **are immune to the effect of grade 8 earthquake load** at a height of 41.1 m;

- **are flame-proof** (probability of fire from the transmitter does not exceed 10^{-6} per year according to GOST 12.1.004 both in standard and in emergency mode of operation);
- **are immune to influencing factors** for location group 3 (Appendix 2, OTT 08042462)

● **Influencing Factors**

Table 6

Effect	Additional Error		Types and Models of Transmitters
	at $P_{\max} \geq P_u \geq \frac{P_{\max}}{10}$	at $\frac{P_{\max}}{10} > P_u \geq \frac{P_{\max}}{25}$	
Change of ambient temperature within operating temperature range	Per 10°C		For all models
	Code 010 $\gamma_T = \pm(0.05 + 0.04 \frac{P_{\max}}{P_u}) \%$ Code 015, 025 $\gamma_T = \pm(0.05 + 0.05 \frac{P_{\max}}{P_u}) \%$ Code 050 $\gamma_T = \pm(0.1 + 0.05 \frac{P_{\max}}{P_u}) \%$	Code 010, 015, 025, 050 $\gamma_T = \pm(0.1 + 0.04 \frac{P_{\max}}{P_u})^* \%$	
Change of operating gage pressure within the range from zero to maximum permissible gage pressure and from maximum permissible gage pressure to zero	$\gamma_p = K_p \Delta P_{\text{oper}} \frac{P_{\max}}{P_u} \%$, where $K_p = \pm(0.015-0.08)\% / 10 \text{ kPa}$ or $\pm(0.015-0.2)\% / 1 \text{ MPa}$ depending on model and accuracy code. Change of an output signal caused by ΔP_{oper} can be decreased by adjustment of the initial output value at two-sided influence of operating gage pressure on measuring cavities and in the absence of drop at the transmitter inlet.		For Metran-100-DD,-DG
Electromagnetic interference: - RF magnetic field effect as per GOST R 51317.4.3; - other effects	% of output turndown: $\pm 0.1\%$ for transmitters with codes MP, MP2, MP4; $\pm 0.4\%$ for transmitters with codes MP1, MP3, MP5 $\pm 1\%$		For all models
Vibration in compliance with version groups V2, V1, L3 as per GOST 12997 depending on a model	$\gamma_f = \pm 0.1 \frac{P_{\max}}{P_u} \%$		For models 1051, 1050, 1061, 1060, 1151, 1150, 1161, 1160, 1171, 1170, 1351, 1350, 1152, 1153, 1162, 1172, 1173
	$\gamma_f = \pm 0.25 \frac{P_{\max}}{P_u} \%$		For all models
External magnetic field with intensity 400 A/m	No more than $\pm 0.1\%$ of output turndown		For all models

*For UKhL3.1 only; for other climatic versions within the temperature range other than the range of UKhL3.1, the additional error is doubled.

P_{\max} , P_u - refer to Table 3; ΔP_{oper} - change of operating gage pressure.

OPERATING PRINCIPLE

The operating principle of the transmitters is based on application of the piezoresistive effect in heteroepitaxial silicon film grown on the surface of a single-crystal wafer of artificial sapphire. The sensing element with single-crystal silicon-on-sapphire structure is the basis of all sensor units of Metran transmitters.

At deformation of the sensing element, electrical resistance of silicon piezoresistors of bridge circuit on the surface of this sensing element is changed under the influence of input measured quantity (for example, pressure or differential pressure).

Electronic module of the transmitter converts this electrical signal of the temperature converter into standard analog dc signal and/or into digital signal in the HART protocol standard or a digital RS485-based signal.

The results of sensor calibration within all operating range of pressures and temperatures are kept in digital format in the memory of the sensor module (ADC). These data are used by the microprocessor for calculation of coefficients of output correction during transmitter operation.

A digital signal from the ADC board of the sensor module along with correction coefficients goes into the electronic converter, the microprocessor of which corrects and linearizes characteristic of the sensor module, calculates the corrected value of the output signal and then:

- for transmitters with codes MP, MP1, MP2, MP3, transfers it into digital-to-analog converter (DAC), which converts it into an analog output signal or a digital signal into HART standard (Codes MP2, MP3);

- for transmitters with codes MP4, MP5, delivers pressure values (in the specified format) on demand with the help of the RS485 driver into a digital communication line.

For better visibility of the liquid-crystal display (LCD) and for easier access to two parts of the electronic converter, you may turn it towards the measuring unit from the set position through 90° maximum counterclockwise.

INDICATION

The indicator is installed into the housing of the electronic converter (transmitters with codes MP1, MP3, MP5).

The indicator for transmitters with code MP is designed as a separate device (remote indicator VI) and connected to the transmitter with the help of a connector.

In the mode of pressure measurement, the value of measured pressure is displayed in measurement units set during adjustment or in % of calibrated measurement range on the display of the built-in or remote indicator, or HART-Communicator.

OPERATION

Operation with Metran-100 transmitter (codes MP, MP1) is performed with the help of the key buttons located under the cover of the electronic module.

Operation with Metran-100 transmitter (codes MP2, MP3) is performed via digital communication line with the help of control devices supporting HART protocol and configuration programs. There are no key buttons.

Operation with Metran-100 transmitter (codes MP4, MP5) is performed remotely via digital communication channel with the help of RS485/RS232 modem and ICP-Master configuration software. There are no key buttons.

The digital signal from Metran-100 transmitters (codes MP2, MP3) can be received and processed by any HART device supporting HART protocol.

All commands of HART protocol can be classified as 3 groups: "universal", "common-practice" and "transmitter-specific".

The universal commands are supported by all HART-compatible devices.

Common-practice commands are applied for wide variety of devices.

The following transmitter-specific commands are designed for Metran-100 transmitters: two commands for sensor calibration and one command of extended diagnostics of transmitter status. Access to transmitter-specific commands is available only with a special driver.

Metran-650 HART Communicator interacts with Metran-100 transmitters in a full range of commands.

HC375 HART Communicator operates with Metran-100 through Generic Menu when the transmitter is sensed by the communicator as an abstract device supporting HART-protocol regardless of its functionality. H-Master configuration program is developed by Metran IG and designed for setting adjustments and calibration of Metran-100 transmitters (codes MP2, MP3).

DIAGNOSTICS

During start-up time and at pressure measurement, the transmitter performs diagnostics of its status. The transmitter automatically checks:

- microprocessor status;
- availability of connection with ADC board;
- availability of ADC and a pickoff connection;
- non-volatile memory status of ADC board and the processor board.

Output signal level (mA) specified in the design documentation is set when a fault is detected. For transmitters with codes MP4, MP5, information about fault appearance is provided on demand via digital communication line.

The circuit for connection of a test instrument to transmitters with codes MP1, MP2, MP3 and MP4 is brought out to "test" terminals (voltage 200 mV corresponds to maximum output current 20 mA or 5 mA). Measurement is carried out with a voltmeter.

For detailed information about operation of Metran-100 transmitters, refer to the document "Metran-100 Pressure Transmitters. Operation Manual".

POWER CONSUMPTION

- Metran-100 and Metran-100-Vn transmitters are supplied from a dc power supply with voltage specified in Table 7.

Table 7

Parameter	Transmitter version code				
	MP2, MP3	MP, MP1			MP4, MP5
Output, mA	4-20 mA with HART	4-20 mA	0-5 mA	0-20 mA	RS485
Supply voltage, V	12-42	12-42	22-42	22-42	12-42

Limits of permissible load resistance (resistance of devices and communication line) for transmitters with codes MP, MP1, MP2, MP3 depend on set supply voltage and should not exceed the limits of operating region (refer to Figure 1-3).

- At transmitter power interruption during no more than 20 ms, pressure measurement mode is stored in the transmitter (except transmitters with codes MP4, MP5).

- Transmitters with codes MP4, MP5 are galvanically isolated between supply and digital interface circuits.

- Power supply source requirements:

For transmitters with codes MP, MP1, MP4, MP5

- insulation resistance, 20 MΩ, min;
- test voltage at insulating strength of 1.5 kV;
- output voltage ripple does not exceed 0.5% of U_{out} rated value at harmonic frequency ≥ 500 Hz;
- power interruption, 20 ms, max (except transmitters with codes MP4, MP5).

For transmitters with codes MP2, MP3

- to meet the abovementioned requirements on isolation and output voltage ripple at harmonic frequency up to 500 Hz and have RMS-noise in the bandwidth from 500 Hz to 2.2 kHz - 2.2 mV max.

- Metran-100-Ex transmitters electrical power supply:

- of **MP, MP1** is realized from intrinsically safe barriers (units) circuits with "intrinsically safe electrical circuit" explosion protection type ("ia" or "ib" level, explosive mixture subgroup IIC GOST P51330.0), maximum output voltage $U_0 \leq 24$ V, maximum output current $I_0 \leq 120$ mA;

- of **MP2, MP3** is realized from intrinsically safe barriers (units) circuits with "intrinsically safe electrical circuit" explosion protection type ("ia" or "ib" level, explosive mixture subgroup IIC GOST P51330.0) and supporting HART signal, e.g., Valcom active barriers of models D1010S (1 channel), D1010D(2 channels), or Stahi active barriers of models 9303/13-22-11, 9001/51-280-110-14.

When operating Metran-100-Ex transmitters outside hazardous areas without retention of explosion protection properties, it is allowed to carry out power supply of transmitters from DC power supply with voltage specified in Table 7.

- Permissible load resistance of transmitters is given in Table 8.

Table 8

Transmitter Type Code	Output, mA	Load Resistance, Ohm	
		Rmin	Rmax
MP, MP1	0-5	0	$R_{max} \leq 100(U-10)$
	0-20	0 at $U \leq 36$ V $R_{min} \geq 50(U-36)$ at $U > 36$ V	$R_{max} \leq 45(U-14)$
MP, MP1, MP2, MP3	4-20	0* at $U \leq 36$ V $R^*_{min} \geq 50(U-36)$ at $U > 36$ V	$R_{max} \leq 42(U-12)$

* For transmitters with HART signal, $R_{min}=250$ Ohm at supply voltage from 18.5 to 41 V.

Notes:

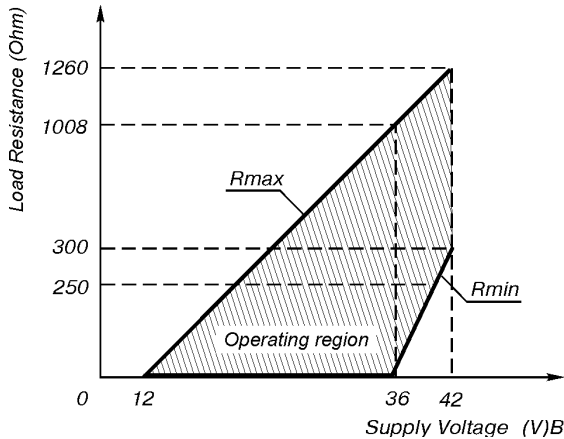
1. When operating Metran-100-Ex transmitters in hazardous areas, output resistance of intrinsically safe barriers (units) is chosen from operating region given in Figure 1, at supply voltage no more than 24 V. When using Hart-channel of MP2, MP3 transmitters, minimum spark protection unit should be no less than 250 Ohm.

2. U - supply voltage, V.

For transmitters with connected noise filter unit (NFU), R_{max} is decreased by:

- 20 Ohm for transmitters with 4-20 mA output;
- 50 Ohm for transmitters with 0-20 mA output;
- 100 Ohm for transmitters with 0-5 mA output.

● **Limits of permissible load resistance** (resistance of devices and communication line) depend on set supply voltage of transmitters and shall not exceed limits of operating region; refer to Figures 1-3.



Rmin=250 Ohm for transmitters with HART-signal.

Fig.1. 4-20 mA Output Signal.

When connecting NFU, Rmax is decreased by 20 Ohm.

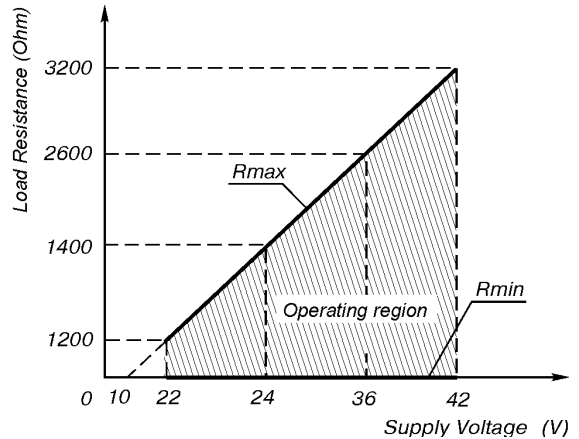


Fig.2. 0-5 mA Output Signal.

When connecting NFU, Rmax is decreased by 100 Ohm.

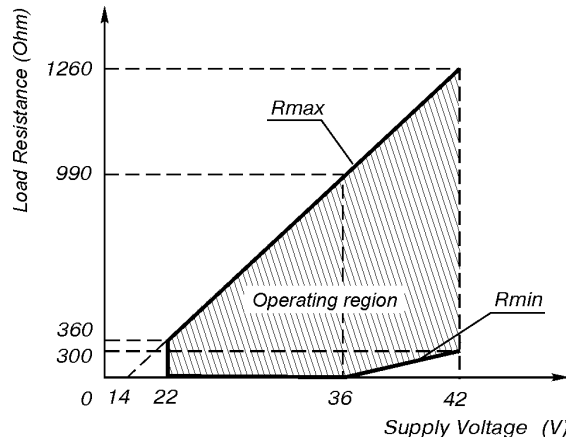


Fig.3. 0-20 mA Output Signal.

When connecting NFU, Rmax is decreased by 50 Ohm.

● **Power consumption:**

- 1.0 VA - for transmitters with 0-20 mA output;
- 0.8 VA - with 4-20 mA output;
- 0.5 VA - with 0-5 mA output;
- 2.5 VA - with RS485 output.

EXPLOSION PROTECTION

Metran-100 (MP, MP1, MP2, MP3) Pressure Transmitters

● Type of explosion protection "intrinsically safe electrical circuit" with level of explosion protection:

- "extra-intrinsically safe", explosion protection marking **ExialICT5X**;
- "intrinsically safe", explosion protection marking **ExibiICT5X**;

Metran-100 (MP, MP1, MP2, MP3, MP4, MP5) Pressure Transmitters

● Type of explosion protection "explosion-proof enclosure" and "special" with level of explosion protection "flame-proof", explosion protection marking **1ExdsIIBT4/H₂X**

RELIABILITY

Average lifetime is 12 years, except for transmitters, operated in corrosive media measurements, with average lifetime depending on corrosive medium properties, operation conditions, and applied materials.

Average lifetime of AS transmitters is no less than 15 years.

Average mean-time-between-failures of the transmitters is 150,000 h., for AS transmitters is 270,000 h.

Additional run during 360 hours in compliance with Item 5.3.2 of PB-09-170-97 may be carried out for Metran-100-Ex and Metran-100-Vn transmitters under special customer's request and at extra cost.

WEIGHT

Weight - from 1.5 to 5.8 kg depending on model.

VERIFICATION

Verification interval - 3 years.
Verification procedure is MI 4212-012-2001.

WARRANTY

Warranty is 36 months since the date of commissioning.

DELIVERY SET

- Transmitter	1 pc.	
- Complete set of mounting parts (according to order);	1 set	
- Remote indicator (VI) (according to order);		
- Socket Connector (depending on order)		1 pc.
- Operation Manual	1 copy	
- Verification procedure MI 4212-012-2001	1 copy	
- Setting instructions (for transmitters with codes MP, MP1)	1 copy	
- Product Data Sheet	1 copy	

The following options are available upon customer's request:

- DBS, DKS, DFK diaphragms;

- SK, SU, SR vessels;
- Metran-700-BVP High Potential Barriers (lightning protection barriers);
- Power supply units;
- Secondary devices;
- Metran-681 HART modem, configuration software and H-Master software User's Guide (for transmitters with codes MP2, MP3);
- ICP-Master configuration software and ICP-Master software User's Guide (for transmitters with codes MP4, MP5);
- Metran-650 Communicator;
- RS485 interface;
- Complete set of spare parts SPGK 5071.000.00ZCh for sealed in-lead S of Metran-100-Vn transmitters (clamping socket, spacer, o-rings).

CABLE SELECTION GUIDELINE FOR TRANSMITTER MOUNTING**Transmitters with Codes MP, MP1**

It is recommended to use control cables with rubber insulation for mounting. It is permissible to use other cables if cable conductor cross-section is no more than 1.5 mm². Joint running of transmitter supply circuits and output signal with use of insulated conductors with insulation resistance no less than 50 MOhm is allowed in one cable. Shielding of output circuits from supply circuits is not required. It is recommended to apply a shielded cable with insulating sheath when laying communication line near electrical installations with power over 0.5 kW.

Transmitters with Codes MP2, MP3

Cable used at mounting: shielded twisted pair, cable shield is connected to ground on receiving side at load resistance.

An unshielded cable may be used if interferences do not effect communication quality.

Conductor diameter:

- 0.51-1.38 mm at total cable length less than 1500 m;
- 0.81-1.38 mm at total cable length over 1500 m.

Maximum length of communication line is 3000 m.

If one multiple-conductor cable consisting of several pairs of sensing wires is used, total length of the cable is restricted by the smallest pair length, but in any case the length of such multiple-conductor cable shall not exceed 1500 m.

Transmitters with Codes MP4, MP5

For laying of communication line, it is recommended to use twisted pair cable with wave impedance 120 Ohm (e.g., Balden 9841, 9842). Tapping of sensing wires from communication line shall be as short as possible.

Joint running of transmitter supply circuits and communication line is allowed in one cable, in doing so shielding is not required. Maximum length of communication line is 1200m.

EXTERNAL WIRING DIAGRAMS

The following conventions are used in diagrams:

PS - dc power supply (Metran-602, -604 or other similar);

PS-Ex - the same of explosion-proof version;

C - Communicator (Metran-650, HC375 and other similar);

C-Ex - for "Ex" version (Metran-650-Ex and other similar);

PC - Personal computer;

RI - Load resistance or total resistance of all loads in control system (determined by parameters of a barrier in diagrams with a spark protection barrier; or by parameters of a power supply, refer to Table 8); for transmitters MP2, MP3, it is no less than 250 Ohm;

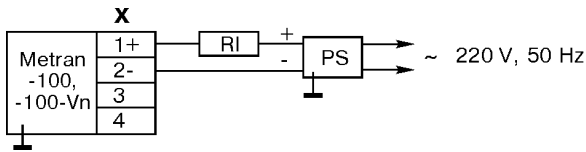
X - Terminal block or connector.

HART Communicator of "Ex" version and HART-modem of "Ex" version may be connected to any point of circuit, including hazardous area; up to 15 transmitters may be connected.

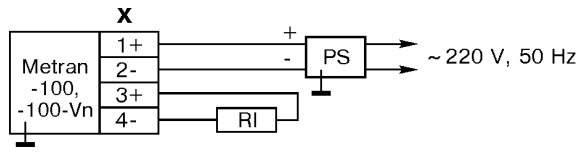
For transmitters with codes MP4, MP5, up to 32 transmitters (incl. control system) may be connected to one communication line.

For MP, MP1 Transmitters

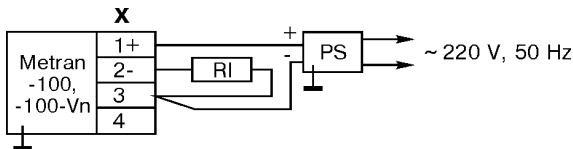
4-20 mA Output Signal
(two-wire communication line)



0-5, 0-20 mA Output Signal



4-20 mA Output Signal
(two-wire communication line, wiring variant)



Explosion-proof Version "Ex"

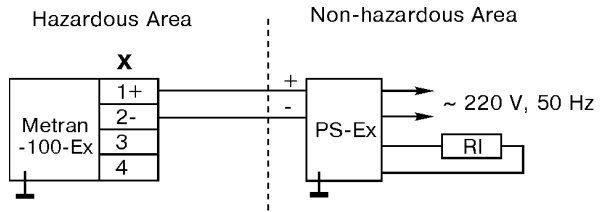


Figure 4.

For MP2, MP3 Transmitters

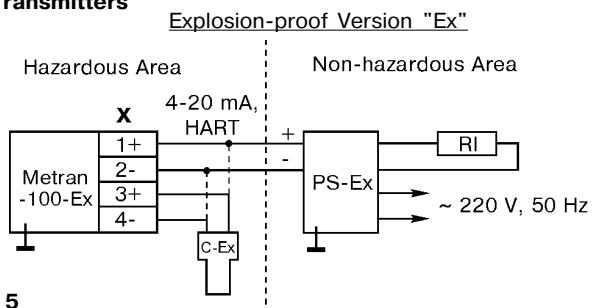
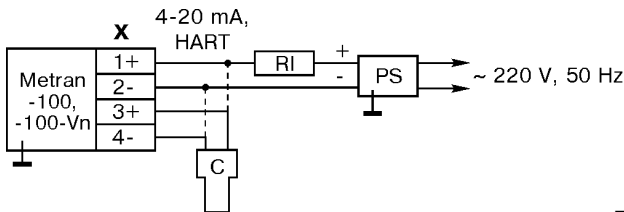


Figure 5

Option for MP2, MP3 Transmitters with Intrinsically Safe Barrier, without Galvanic Isolation of Signal and Supply Circuits

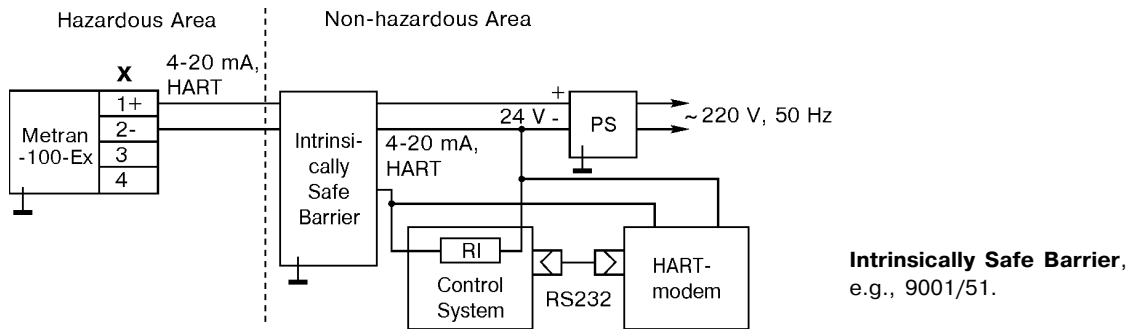


Figure 6.

Option for MP2, MP3 Transmitters with Intrinsically Safe Barrier, Galvanic Isolation of Signal and Supply Circuits

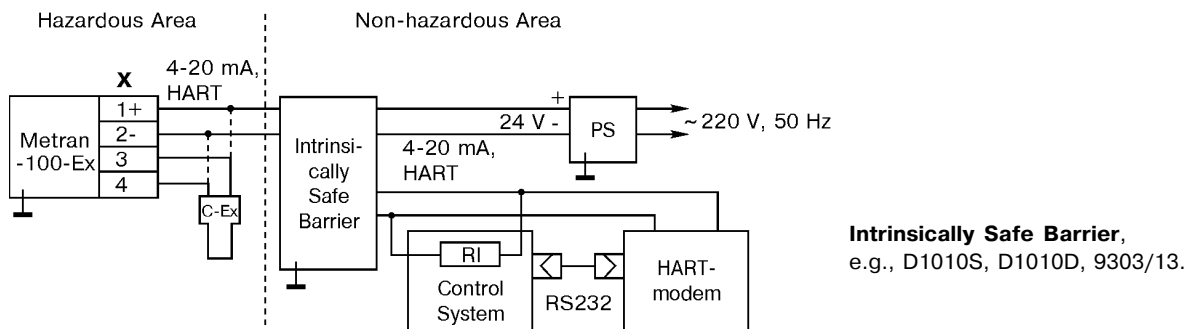


Figure 7.

Option for MP2, MP3 Transmitters with Intrinsically Safe Power Supply Unit and HART-modem

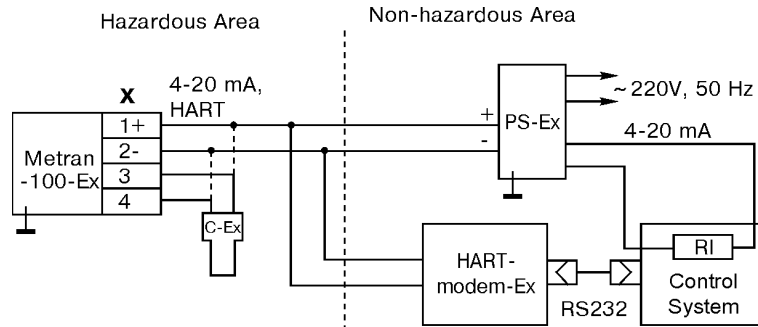


Figure 8.

Option for MP2, MP3 Transmitters with HART-modem

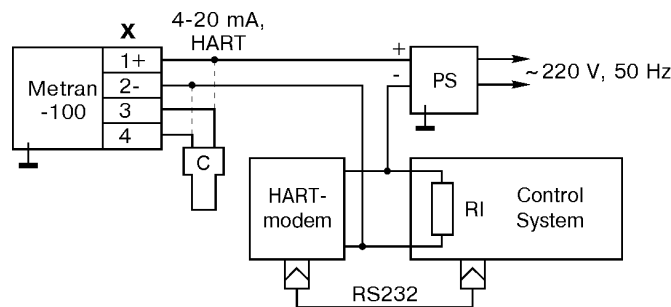


Figure 9.

Multipoint Mode for MP2, MP3 Transmitters
(not recommended for intrinsic safety requirements)

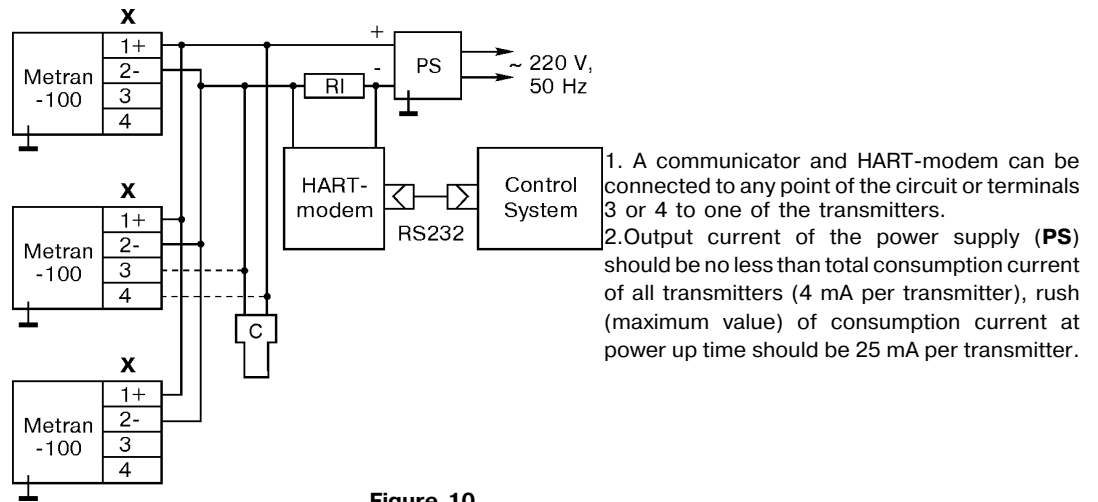


Figure 10.

For MP4, MP5 Transmitters (RS485 output signal)
Option for Transmitters with Gland Lead-in and ICP-Master Software

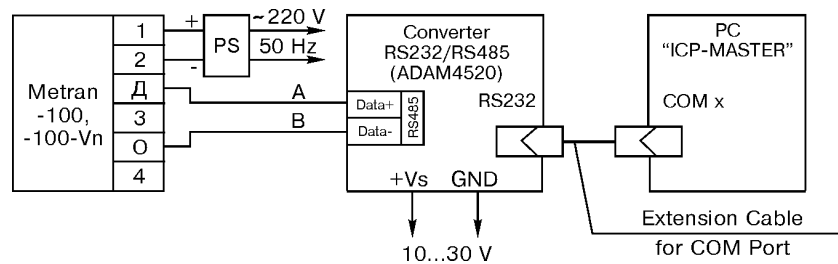


Figure 11.

Option for Transmitters with Socket Connector and ICP-Master Software

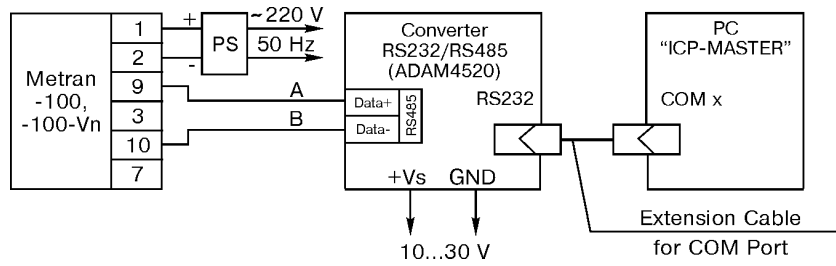


Figure 12.

**For MP4, MP5 Transmitters
Option for several transmitters with gland lead-in**

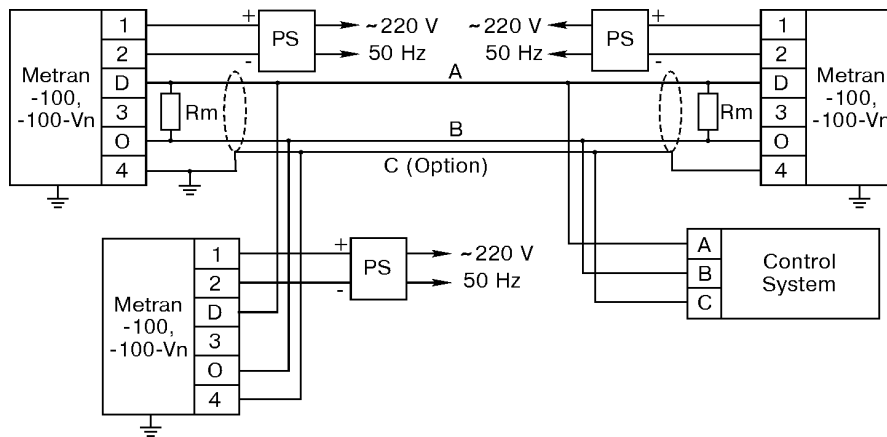


Figure 13.

Option for several transmitters with socket connector

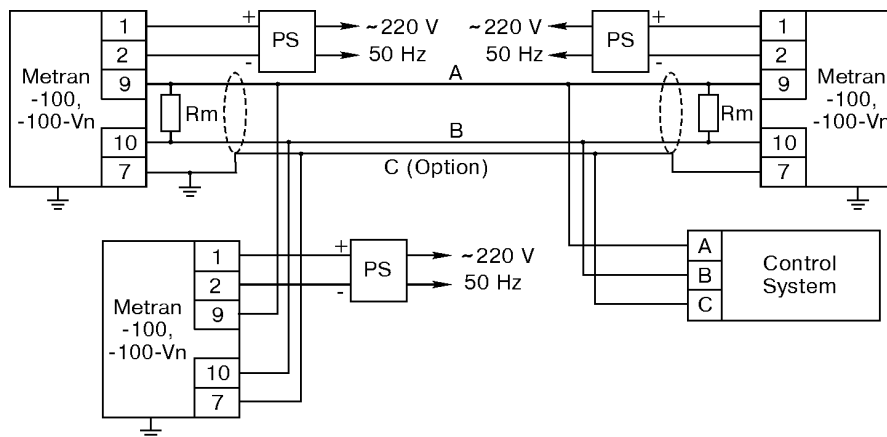


Figure 14.

Recommended cable for communication line is a twisted pair cable with wave impedance 120 Ohm.

R_m - a matching resistor with resistance equal to wave impedance of applied cable.

Matching resistors are connected to communication line in the outermost point. Joint laying of supply circuit wires of the transmitter and communication line is allowed in one cable. In this instance, it is recommended to use a shielded cable with insulating sheath. A shield shall be connected to ground in one of two outermost cable points (e.g., by connection of shield with transmitter housing). Several transmitters may be supplied from one power supply unit.

ORDERING INFORMATION

Metran-100-DD -1430 -K -02 -MP -t10 -015 -40 kPa -25 -42 √ -SK-M20-KB -ShR14 -VI -BFP -TU..														
-Ex-DD														
-Vn-DD														
Metran-100-DD -1430 -AS -02 -MP -t10 -015 -40 kPa -25 -42 √ -SK-M20-KB -ShR14 -VI -TU..														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

- Contracted name of transmitter (refer to Table 1).
- Model (refer to Table 1).
- Code "K" is specified when ordering transmitters for operation with oxygen gas; Designation of AS version is specified for nuclear power stations only; transmitters of AS modification with codes MP4 and MP5 are not available.
- Material designation (refer to Table 10).
- Code of electronic converter (refer to Table 2). Transmitters of AS version with MP4, MP5 code are not manufactured.
- Climatic type code (refer to Table 10).
- Accuracy code (refer to Tables 3-5).
- Upper range limit* specified in an order with an engineering unit (refer to Table 1).
- Maximum permissible operating gage pressure (refer to Table 1).
- Code of output signal for transmitters with codes MP, MP1, MP2, MP3 (refer to Table 11) with root-extracting function (for linear function, sign √ is not specified); for transmitters with codes MP4, MP5, code of output signal is not specified.
- Code of mounting parts** (refer to Table 13). Manifolds, valve units, and valve systems specified in an order are available at additional cost, as well as availability against a special order.
- Code of electrical connector (refer to Table 12).
- Remote indicator*** (specified for transmitters with code MP only).
- Noise filter unit****.
- Performance specification TU 4212-012-12580824-2001.

* For Metran-100-DIV pressure transmitters, only upper range limit value of gage pressure is indicated as upper range limit.

** For models 1133, 1233, 1533, 1143, 1243, 1543, 1153 it is necessary to indicate type of connecting thread M80 or Rd78.

*** Remote indicator (VI) is designed for control, adjustment of parameters, choice of operation modes, and calibration of MP code transmitters, and it is the **obligatory element** during transmitter preparation for operation. In an order one can indicate any quantity of remote indicators. The remote indicator is available at additional cost, as well as availability against a special order.

**** The noise filter unit may be installed on transmitters with codes MP, MP1, MP2, MP3 of general industrial (incl. oxygen) and dust-ignition-proof "Vn" designs. AS transmitters are manufactured with noise filter unit BFP installed.

Note: In an order for a transmitter with "Ex" explosion protection type, it is necessary to indicate level of explosion protection needed; otherwise the transmitter is supplied with "ia" explosion protection level.

MATERIALS

Table 9

Code	Material	
	Diaphragms	Wetted Parts
01*	36NiCrTiAl alloy	Carbon steel with coating
02**		12Cr18Ni10Ti, or equivalent 12Cr18Ni9Ti, 08Cr18Ni10Ti
05***	15Cr18Ni12Si4TiAl alloy	15Cr18Ni12Si4TiAl - or equivalent 08Cr18Mn8Ni2Ti, 12Cr18Ni10Ti
06***	06CrNi28MoCuTi alloy	06CrNi28MoCuTi alloy, substitute 10Cr17Ni13Mo2Ti
07***	Tantalum	Steel 10Cr17Ni13Mo2Ti or 10Cr17Ni13Mo3Ti
09****	Titanium BT-1-0	Titanium alloy
11*****	Titanium alloy	12Cr18Ni10Ti, or equivalent 12Cr18Ni9Ti, 08Cr18Ni10Ti

* Models 1020, 1030, 1040, 1050, 1060, 1150, 1160, 1170, 1350, 1420, 1430, 1434, 1440, 1444, 1422, 1432, 1442, 1450, 1460, 1112, 1212, 1312, 1412.

** Except models 1151, 1161, 1171, 1051, 1061, 1351.

*** Models 1422, 1432, 1442.

**** Upon agreement with the manufacturer.

***** Models 1151, 1161, 1171, 1051, 1061, 1351.

Notes:

- O-ring material - fluoroplastic or special rubber types.
- Material of sealing metal gaskets - stainless alloys.
- Alloys 06CrNi28MoCuTi, steel 12Cr18Ni10Ti, 12Cr18Ni9Ti, 08Cr18Mn8Ni2Ti, 10Cr17Ni13Mo2Ti, 08Cr18Ni10Ti per GOST 5632; titanium and titanium alloys per GOST 19807, carbon steel per GOST 1050, fluoroplastic per GOST 10007, alloy 36HXTiO per GOST 10994.
- Transmitters of oxygen modification are manufactured with material type code 02 and 11.
- Transmitters of AS modification are manufactured with material type code 01, 02, 11.

CODE OF CLIMATIC VERSION

Table 10

Code	Climatic Version Type as per GOST 15150	Limiting Values of Ambient Temperatures during Operation, °C
t1	UHL 3.1	+5 to +50*
t10	U2	-40** to +70
t8	T3	-25*** to +70
t12	TS1	-10 to +70
t13	TV1	+1 to +70

* Up to +70°C - for transmitters of AS modification.

** From minus 50°C - under a special customer's request;

from minus 25°C - for models 1150, 1160, 1170, 1350, 1430, 1434, 1440, 1444, 1450, 1460, 1050, 1060 of oxygen modification.

*** From minus 10°C - for models 1420, 1112, 1212, 1312, 1412 of oxygen modification.

LCD works at ambient air temperature from -40 to 70°C.

CODE OF OUTPUT SIGNAL

Table 11

Code	Output Signal, mA
05	0 - 5
50	5 - 0
42	4 - 20
24	20 - 4
02	0 - 20
20	20 - 0

CODE OF ELECTRICAL CONNECTOR

Table 12

Code	Type of Electrical Connector
ShR14	Socket connector: plug 2RMG14B4Sh1E2B GEO.364.140 TU (socket connector 2RM14KPN4G1V1 GEO.364.140 TU)
ShR22	Socket connector: plug 2RM22B4Sh3V1 GEO.364.126 TU (socket connector 2RM22KPN4G3V1 GEO.364.126 TU) or plug 2RMT22B4Sh3V1V GEO.364.126 TU (socket connector 2RM22KPN4G3V1V GEO.364.126 TU)
ShR22-10*	Socket connector: plug 2RM22B10Sh1V1 GEO.364.126 TU (socket connector 2RM22KPN10G1V1 GEO.364.126 TU) or plug 2RMT22B10Sh3V1 GEO.364.126 TU (socket connector 2RMT22KPN10G1V1V GEO.364.126 TU)
S	Gland lead-in for cable with external diameter 10 mm maximum
S1	Gland lead-in for cable with external diameter 12-12.4 mm maximum
S2	Gland lead-in for armored cable

* Only for transmitters with codes MP4, MP5 (RS485 output signal).

Notes:

1. Do not use socket connector ShR for Metran-100-Vn transmitters.

2. Socket connectors S, S1, S2 are used for transmitters of general industrial modification, modifications Ex, Vn.

3. Socket connectors S, S1 are applied for Metran-100-AS transmitters, safety class 4 (do not apply for Metran-100-AS transmitters, safety class 2, 3).

CODE OF MOUNTING PARTS

Table 13

Code	Mounting parts	Application
K1/4, TK1/4*	Mounting connector with threaded hole K1/4"	1410, 1110, 1210, 1211, 1310, 1311, 1131, 1141, 1231, 1241, 1331, 1341, 1495, 1496, 1111, 1411
K1/2, TK1/2*	Mounting connector with threaded hole K1/2"	
K1/4	Mounting flange with threaded hole K1/4"	
K1/2	Mounting flange with threaded hole K1/2"	1422, 1432, 1442, 1020, 1030, 1040, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1112, 1212, 1312, 1412
1/2 NPT	Mounting flange with threaded hole 1/2 NPT	
1/4 NPT	Mounting flange with threaded hole 1/4 NPT	
M16, TM16*	Nipple with captive nut M16x1.5 for connection to external pipe diameter 10 mm	1410*, 1110*, 1111*, 1210*, 1211*, 1310*, 1311*, 1411*, 1422, 1432, 1442, 1131*, 1141*, 1231*, 1241*, 1331*, 1341*, 1495*, 1496*
M20, TM20*	Nipple with captive nut M20x1.5 for connection to external pipe diameter 14 mm	1410*, 1110*, 1111*, 1112, 1210*, 1211*, 1212, 1310*, 1311*, 1312, 1411*, 1412, 1422, 1432, 1442, 1131*, 1141*, 1231*, 1241*, 1331*, 1341*, 1495*, 1496*, 1020, 1030, 1040, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1050*, 1060*, 1150*, 1160*, 1350*, 1170*, 1171, 1051, 1061, 1151, 1161, 1351
A, TA*	Nipple with captive nut M12x1.25 for connection to external pipe diameter 6 mm	1410, 1110, 1210, 1211, 1310, 1311, 1131, 1141, 1231, 1241, 1331, 1341, 1495, 1496, 1111, 1411
B	Connector for threaded coupling of flexible pipes with internal diameter 6 mm	1110, 1111, 1210, 1211, 1310, 1311, 1410, 1411

Table 13 (continued)

Code	Mounting parts	Application
1/4NPT male	Mounting flange with connector, 1/4NPT	1422, 1432, 1442, 1020, 1030, 1040, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1112, 1212, 1312, 1412
1/2NPT male	Mounting flange with connector, 1/2NPT	
1/4NPT male	Adapter M20x1.5 / 1/4NPT	1050, 1060, 1051, 1061, 1150, 1160, 1151, 1161, 1170, 1171, 1350, 1351
1/2NPT male	Adapter M20x1.5 / 1/2NPT	
1/4NPT female	Adapter M20x1.5 / 1/4NPT	
1/2NPT female	Adapter M20x1.5 / 1/2NPT	
BV03	Manifold of carbon steel with plating, with nipple and captive nut M22x1.5 for connection to external pipe diameter 14 mm	1410, 1411
BVN03	Same as above in stainless steel	
SV	Valve system of carbon steel with plating, with nipple and captive nut M22x1.5 for connection to external pipe diameter 14 mm	
SVN	Same as above in stainless steel	
N	Nipple for connection to external pipe diameter 14 mm	1020, 1030, 1040, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1422, 1432, 1442, 1112, 1212, 1312, 1412
BVN04	Manifold of stainless steel, with nipple and captive nut M22x1.5 for connection to external pipe diameter 14 mm	1422, 1432, 1442
SV01 TSV01*	Valve system of carbon steel, with nipple and captive nut M22x1.5 for connection to external pipe diameter 14 mm (for connection underneath transmitter)	1495, 1496
SVN01 TSVN01*	Same as above in stainless steel	
SV02 TSV02*	Valve system of carbon steel, with nipple and captive nut M22x1.5 for connection to external pipe diameter 14 mm (for connection to top of transmitter)	
SVN02 TSVN02*	Same as above in stainless steel	
BV02	Manifold of carbon steel, with nipple and captive nut M22x1.5 for connection to external pipe diameter 14 mm	
BVN02	Same as above in stainless steel	
VB	Manifold	1420, 1430, 1434, 1440, 1444, 1450, 1460, 1412, 1422, 1432, 1442
KB, KB3**	Three-valve unit	
KB5	Five-valve unit with drainage systems and capability of connecting additional devices	
SK	Clamp and bracket	1420, 1430, 1434, 1440, 1444, 1020, 1030, 1040, 1450, 1460, 1112, 1212, 1312, 1412, 1422, 1432, 1442

* Mounting part with a bracket for installation of these transmitter models on a pipe of diameter (50±5) mm (letter "T" is entered into code).

** Three-valve unit with drainage facilities and the capability to connect additional devices.

Code SK is not indicated for a transmitter if mounting part kit without a clamp and a bracket is ordered for models 1020, 1030, 1040, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1112, 1212, 1312, 1412, 1422, 1432, 1442.

Units and valve systems, except for manifold VB and valve unit KB/KB3/KB5 are produced with coupling dimensions in one version.

Transmitters of oxygen modification can be supplied with a valve unit KB only.

A pressure transmitter is available with installed valve unit KB (VB), except for VB-N, or with KB, KB3, KB5 for additional cost at customer's request, and leak test results of assembly unit "transmitter + KB (VB) (KB, KB3, KB5)" is entered in the Product Data Sheet. Additional information on mounting devices, manufactured by Metran IG, is given in the section "Valve Units and Manifolds, Vent Systems, Reducers".

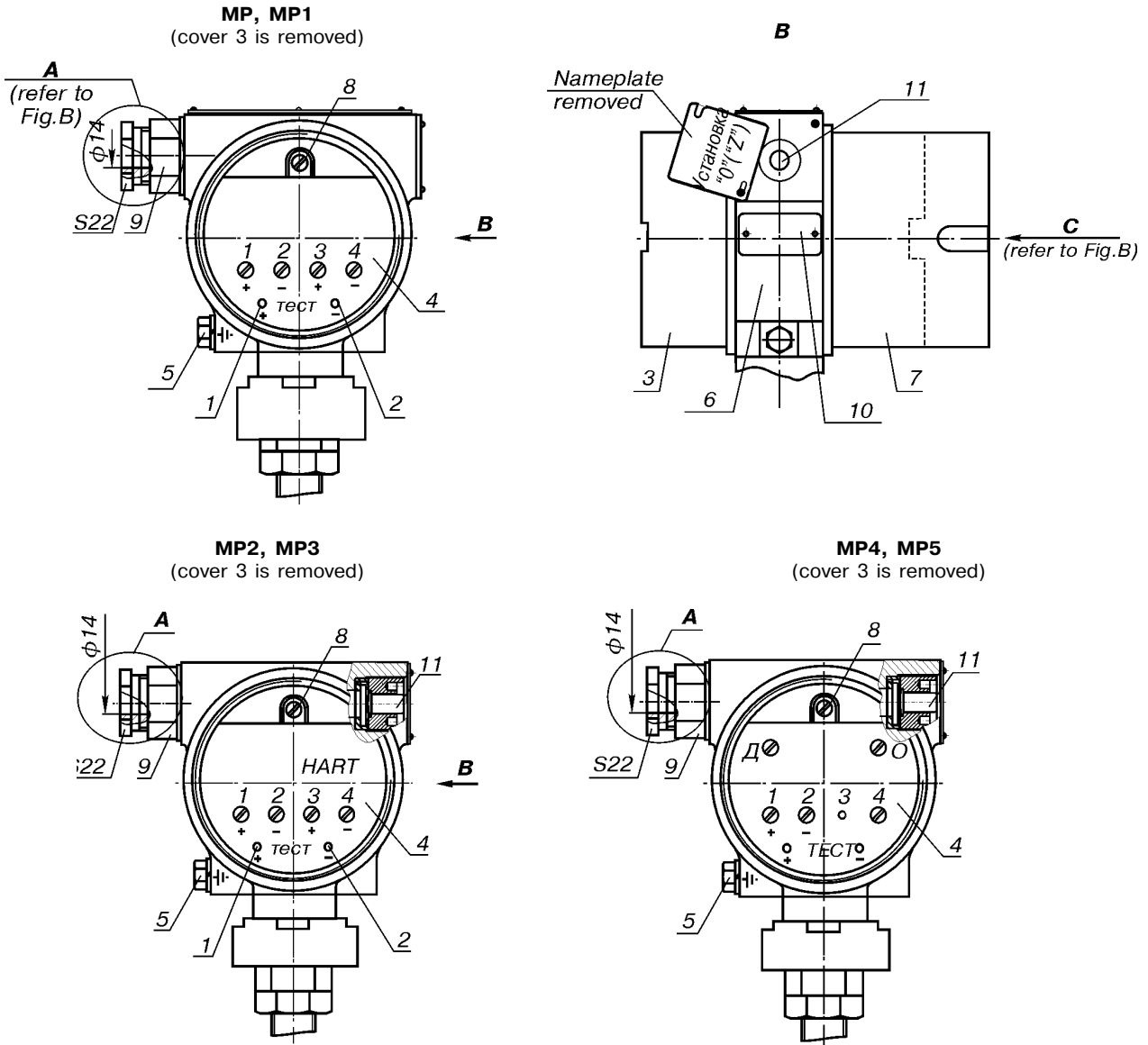
APPENDIX A

METRAN-100, METRAN-22-AS TRANSMITTERS
OVERALL, MOUNTING AND CONNECTION DIMENSIONS

ATTENTION!

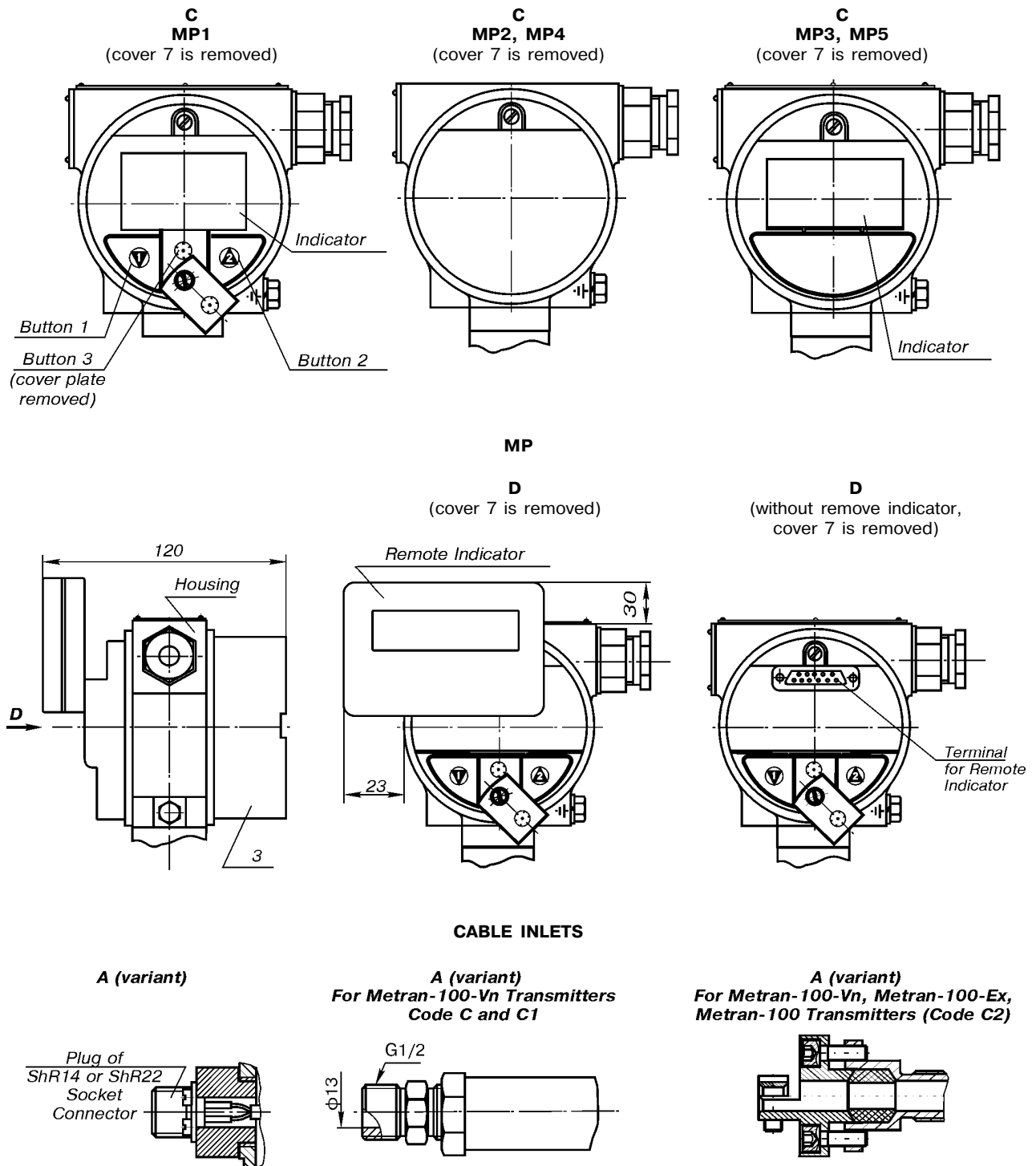
Views of electronic converters of Metran-100, Metran-22-AS transmitters are presented in Figures A, B.

VIEW OF ELECTRONIC CONVERTER OF TRANSMITTERS



- 1, 2 - terminals for connection of control device;
- 3 - cover;
- 4 - terminal block;
- 5 - bolt for housing ground;
- 6 - housing;
- 7 - cover;
- 8 - screw for internal grounding;
- 9 - sealed lead-in;
- 10 - nameplate with explosion protection marking;
- 11 - external button of "zero" adjustment.

Figure A.



NAMEPLATES WITH EXPLOSION PROTECTION MARKING

For Metran-100-Vn Transmitters

1ExdSIIBT4/H₂X
 $-40^{\circ}\text{C} \leq t_a \leq +70^{\circ}\text{C}$

For Metran-100-Ex Transmitters

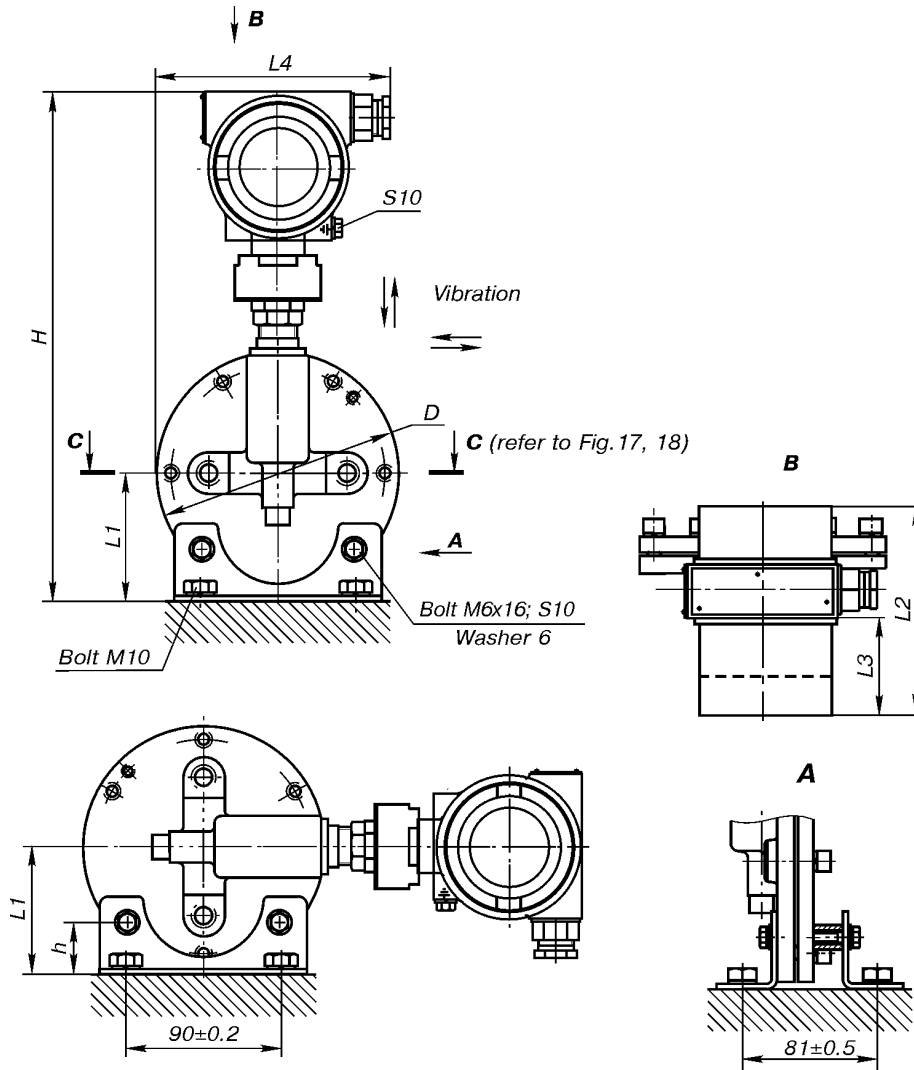
ExialICT5X
 $U_i \leq 24\text{ V}$ $I_i \leq 120\text{ mA}$
 $L_0 \leq 0,5\text{ mH}$
 $C_0 \leq 0,125\text{ mK}\Phi$
 $-40^{\circ}\text{C} \leq t_a \leq +70^{\circ}\text{C}$

ExibIICT5X
 $U_i \leq 24\text{ V}$ $I_i \leq 120\text{ mA}$
 $L_0 \leq 0,5\text{ mH}$
 $C_0 \leq 0,125\text{ mK}\Phi$
 $-40^{\circ}\text{C} \leq t_a \leq +70^{\circ}\text{C}$

Figure B. (for the others refer to Figure A).

APPENDIX A

OVERALL, INSTALLATION AND CONNECTION DIMENSIONS OF TRANSMITTERS



Model	H, mm	D, mm	L1, mm	h, mm
1110, 1210, 1310, 1410	342	180	100	41
5110, 5210, 5310, 5410				
1111, 1211, 1311, 1411	302	140	74	35
5120, 5220, 5320, 5420				

Code of Electronic Converter	L3, mm	L2*, mm
MP*, MP2*, MP4	37	106
MP1*, MP3*, MP5	69	138

Transmitter Versions of Models 1110, 1210, 1310, 1410, 5110, 5210, 5310, 5410	L4, mm		
	ShR	S, S1	S2
Traditional, Ex	162	141	180
Vn	-	228	180

Transmitter Versions of Models 1111, 1211, 1311, 1411, 5120, 5220, 5320, 5420, 5130, 5230, 5330, 5440	L4, mm		
	ShR	S, S1	S2
Traditional, Ex	142	121	159
Vn	-	207	159

* The size is increased by 34 mm at installation of a Noise Filter Unit (NFU).

Figure 15.
Metran-100 Models 1110, 1111, 1210, 1211, 1310, 1311, 1410, 1411;
Metran-22-AS of Models 5110, 5120, 5130, 5210, 5220, 5230, 5310, 5320, 5330, 5410, 5420, 5430.

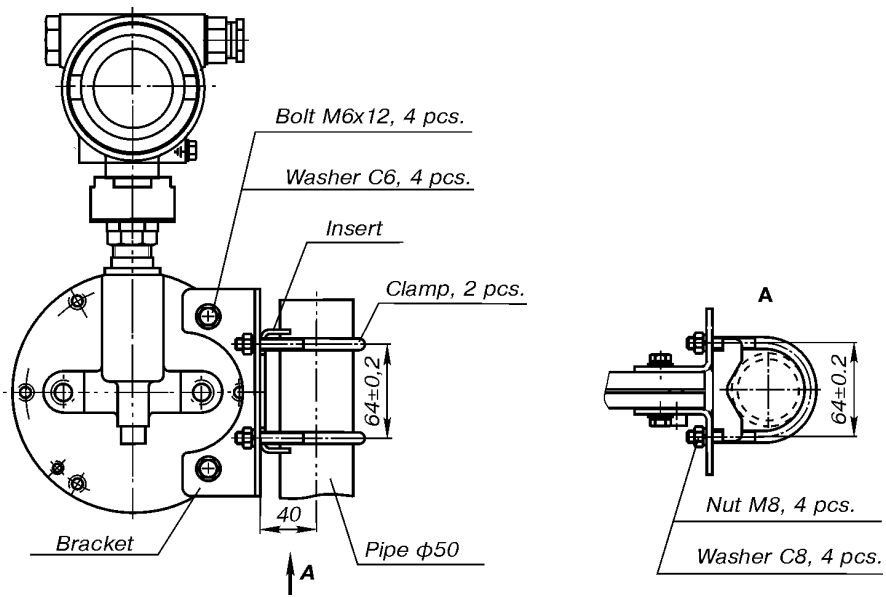


Figure 16.
Pipe Mounting Variant for Metran-100
Transmitters of Models 1110, 1111, 1210, 1211, 1310, 1311, 1410, 1411.

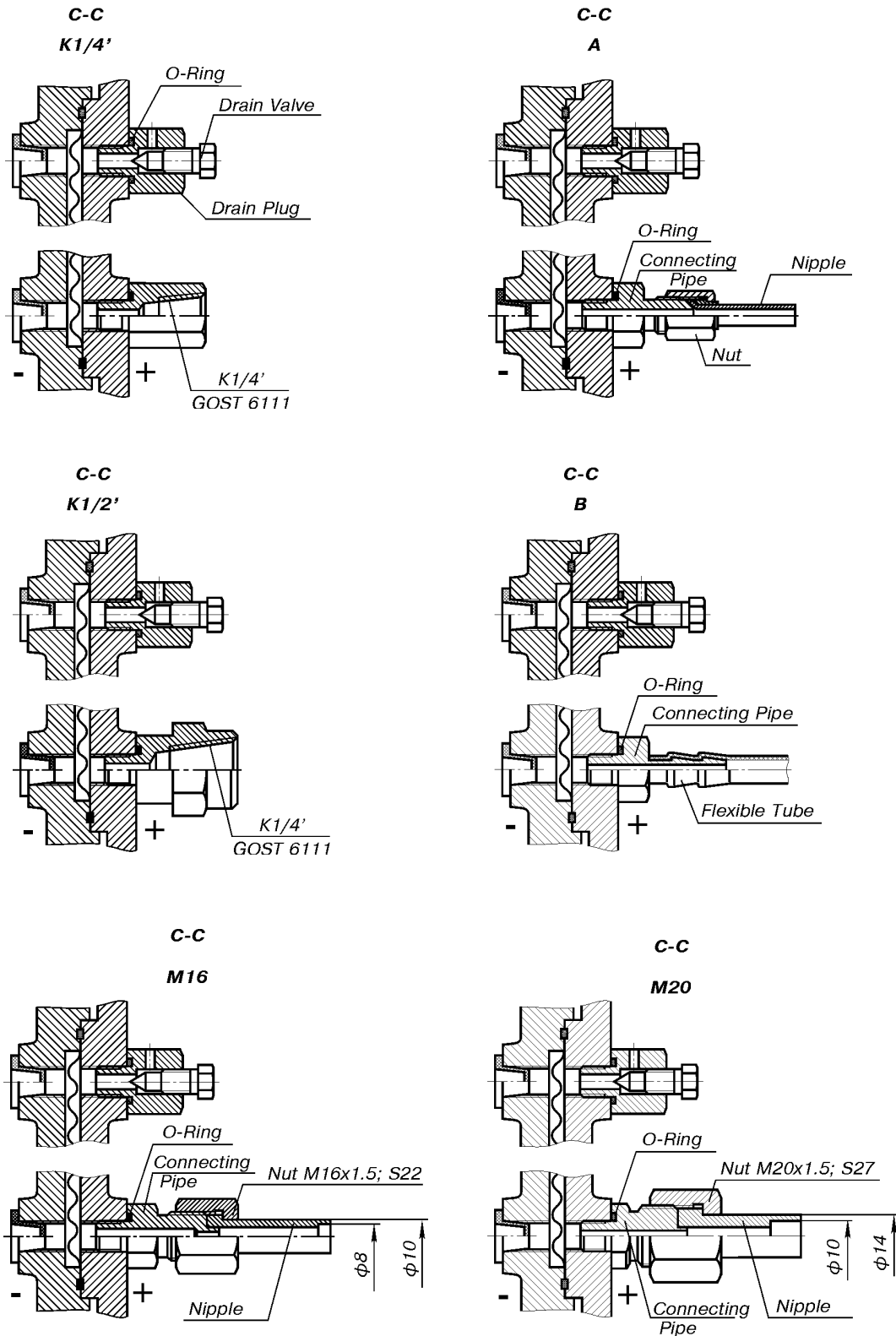


Figure 17. Installation of Mounting Parts for Metran-100 Transmitters of Models 1110, 1111, 1210*, 1211*, 1310, 1311; Metran-22-AS Transmitters of Models 5110, 5120, 5130, 5210*, 5220*, 5230*, 5310, 5320, 5340.

* Mounting parts of transmitters are installed from the side of "-" measuring chamber.

For Models 1110, 1210, 1310, 5110, 5210, 5310, drain plug is not installed.

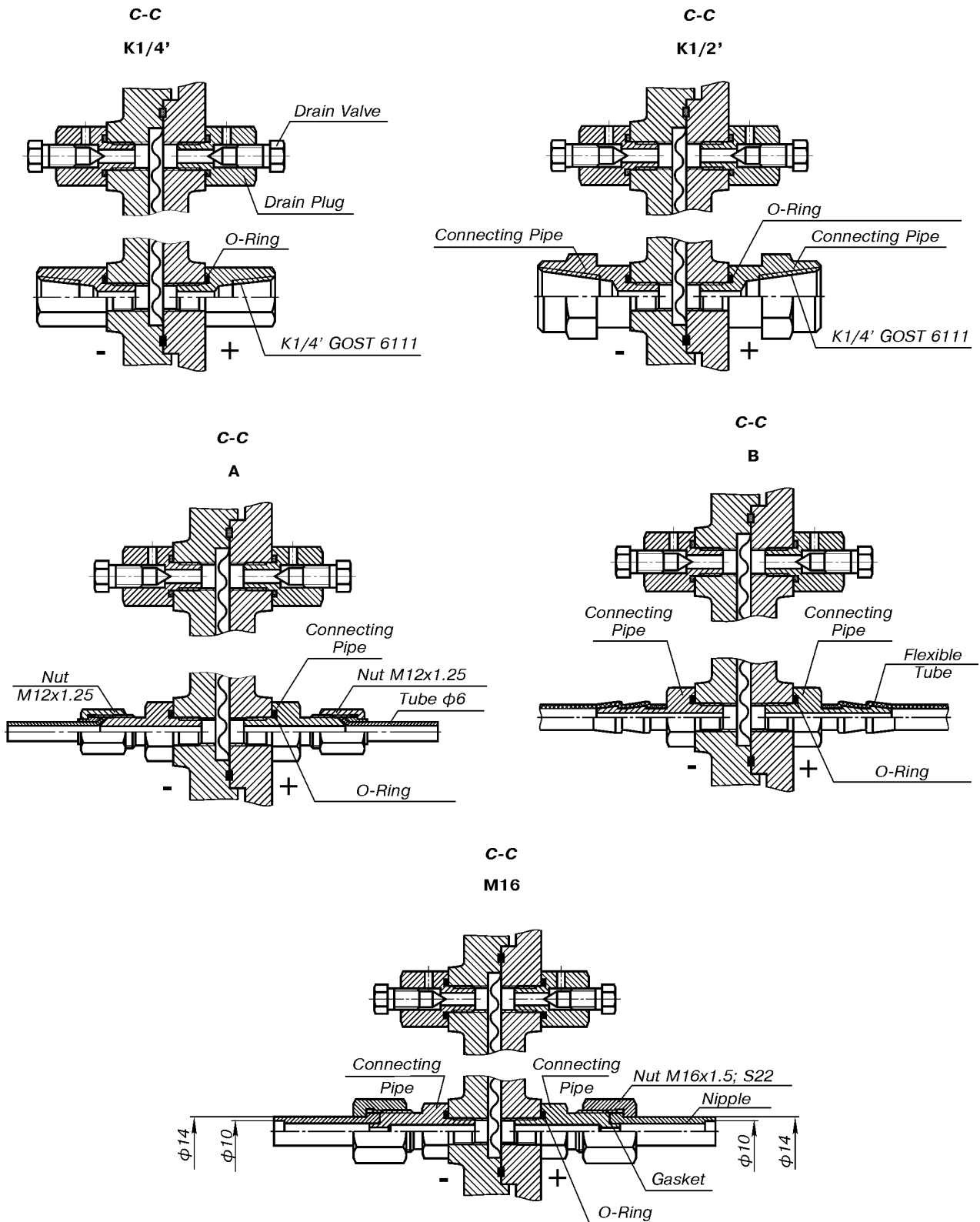


Figure 18.
Installation of Mounting Parts for Metran-100 Transmitters
of Models 1410, 1411; Metran-22-AS Transmitters of Models 5410, 5420, 5430.

For Models 1410, 5410, drain plugs are not installed.

Figure 18 is continued at the next page.

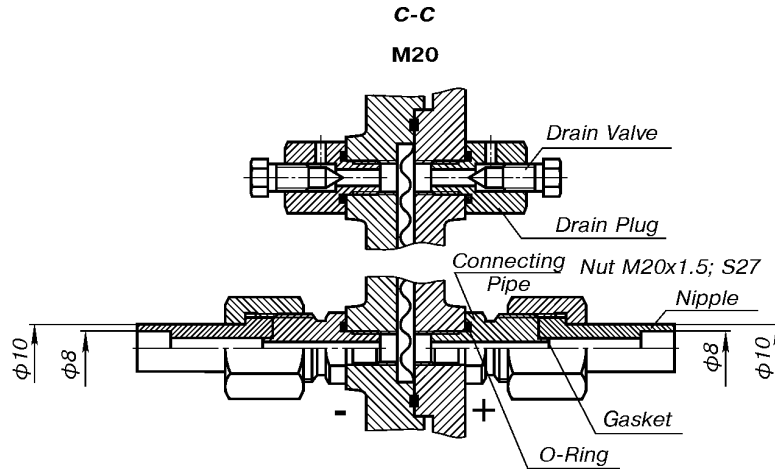
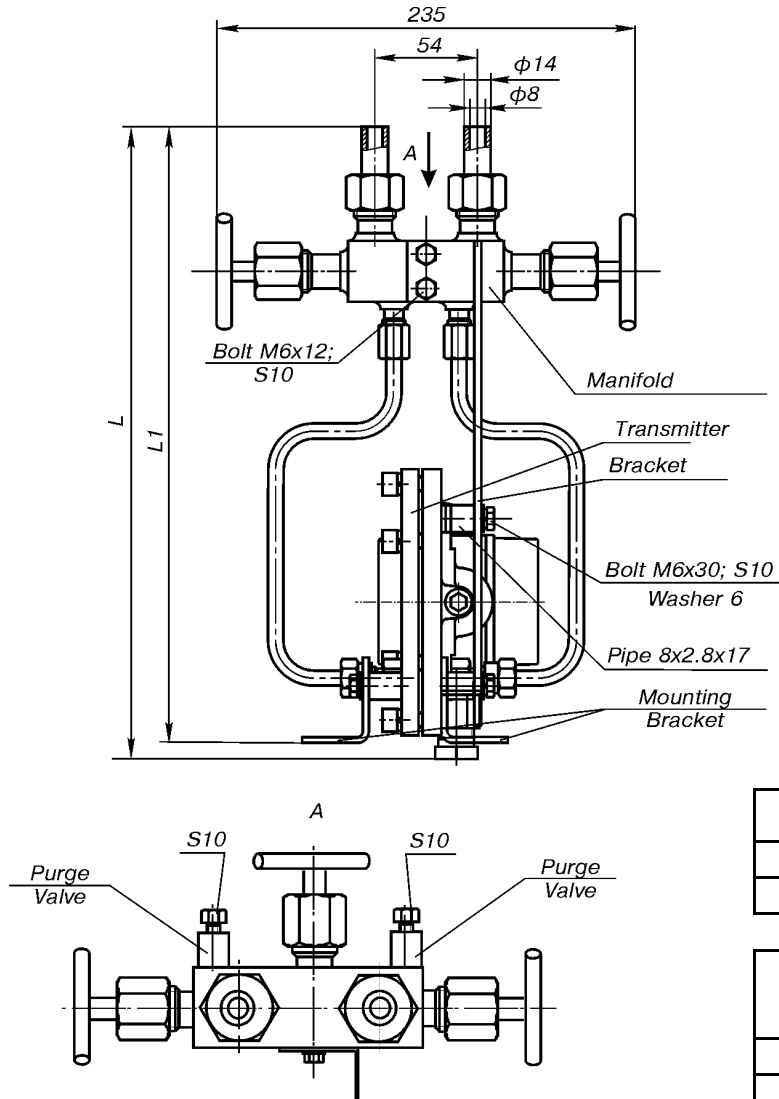


Figure 18 (Continued).
Installation of Mounting Parts of Metran-100 Transmitters
of Models 1410, 1411; Metran-22-AS Transmitters of Models 5410, 5420, 5430.

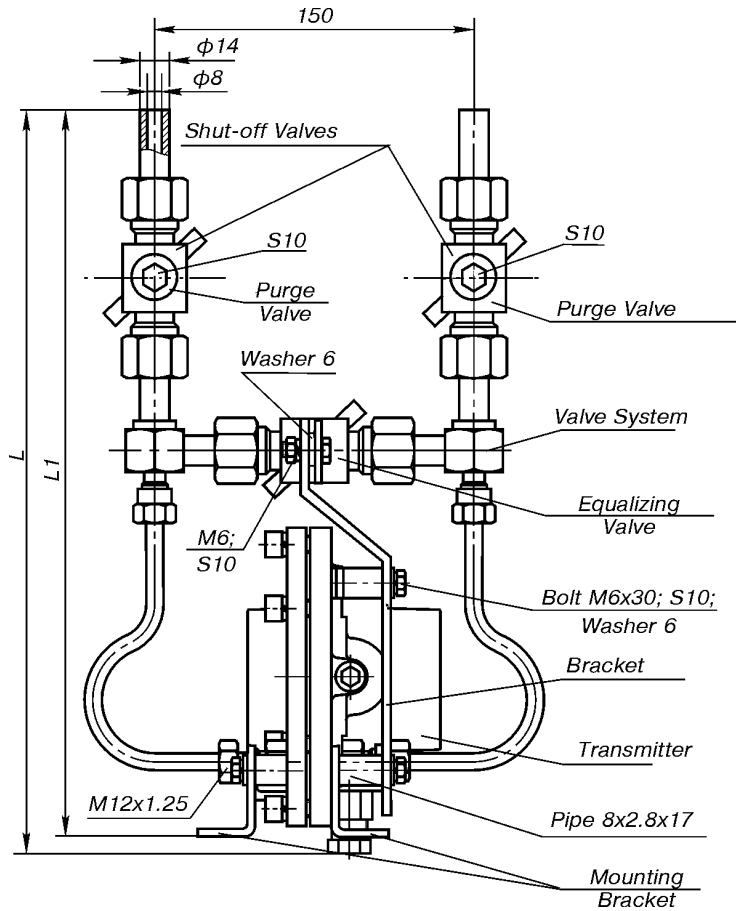
For Models 1410, 5410, drain plugs are not installed.



Model	L1, mm
1410, 5410	350
1411, 5420, 5430	324

Transmitter Version	L, mm		
	ShR	C, C1	C2
Traditional, Ex	322	301	339
Vn	-	387	339

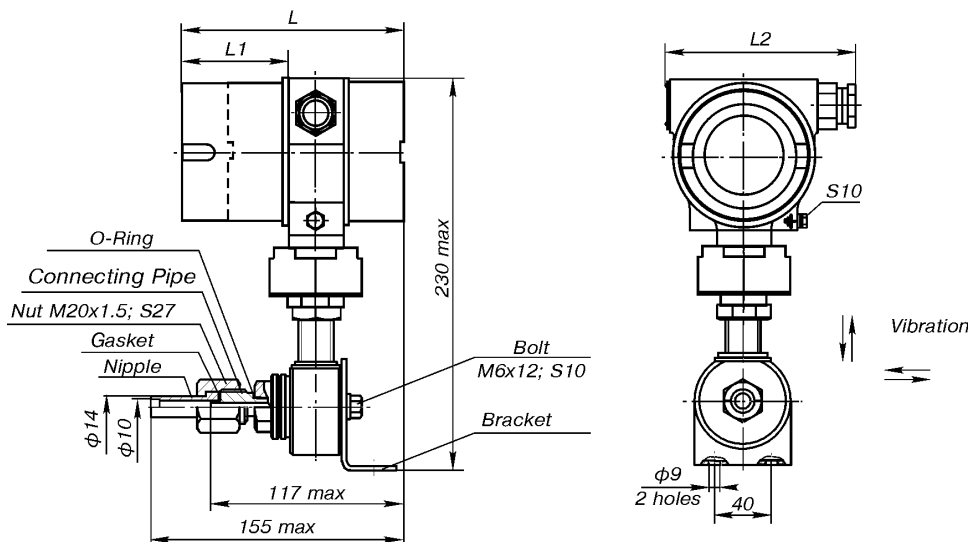
Figure 19.
Installation of Manifold BV03 (BVN03) on Metran-100 Transmitters of Models 1410, 1411;
Metran-22-AS of Models 5410, 5420, 5430.



Model	L1, mm
1410, 5410	380
1411, 5420, 5430	354

Transmitter Version	L, mm		
	ShR	C, C1	C2
Traditional, Ex	352	331	369
Vn	-	417	369

Figure 20.
Installation of Valve System SV (SVN) on Metran-100 Transmitters of Models 1410, 1411; Metran-22-AS of Models 5410, 5420, 5430.



Code of Electronic Converter	L1, mm	L*, mm
MP*, MP2*, MP4	37	106
MP1*, MP3*, MP5	69	138

Transmitter Version	L2, mm		
	ShR	S, S1	S2
Traditional, Ex	115	94	132
Vn	-	180	132

* Size L is increased by 34 mm at NFU installation.

Figure 21.
Metran-100 Transmitters of Models 1131, 1141, 1231, 1241, 1331, 1341
(for installation of mounting parts refer to Fig.22, 23).

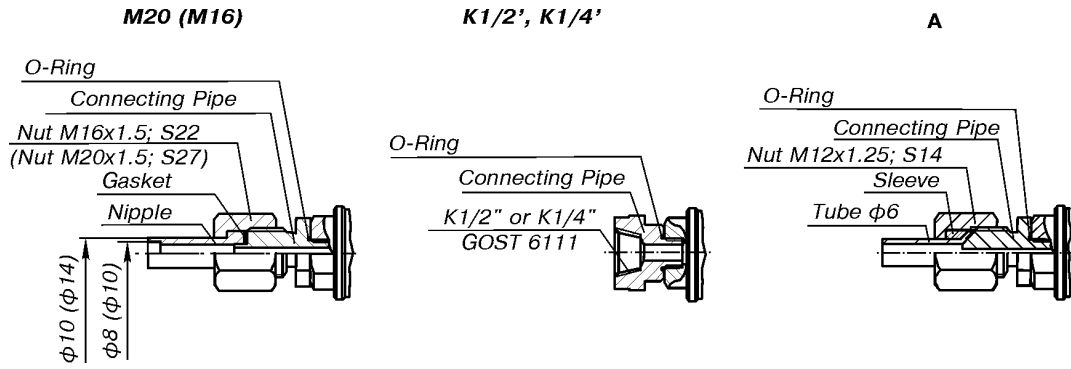


Figure 22. Metran-100 Transmitters of Models 1131, 1141, 1231, 1241, 1331, 1341. Installation of Mounting Parts (for the others refer to Figure 21).

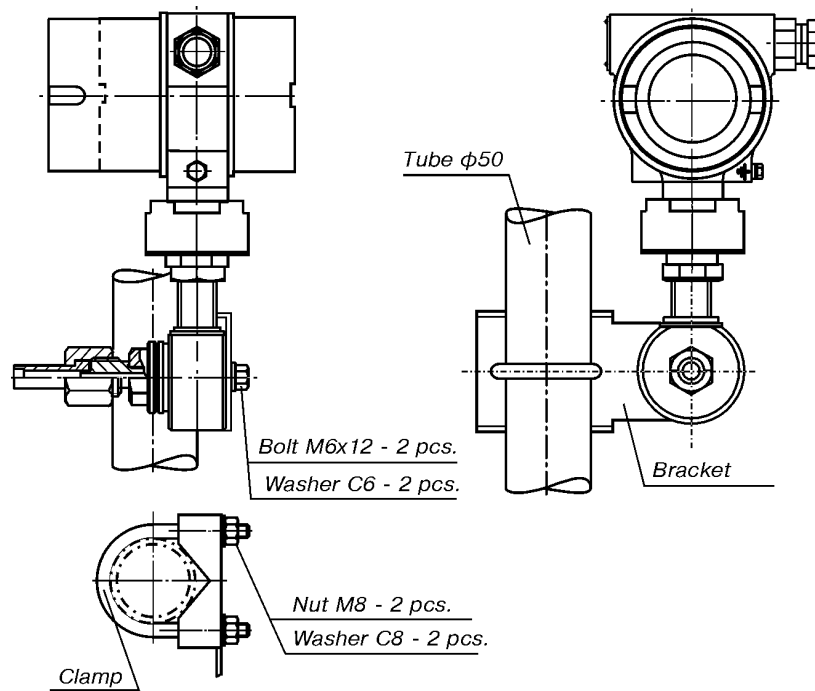
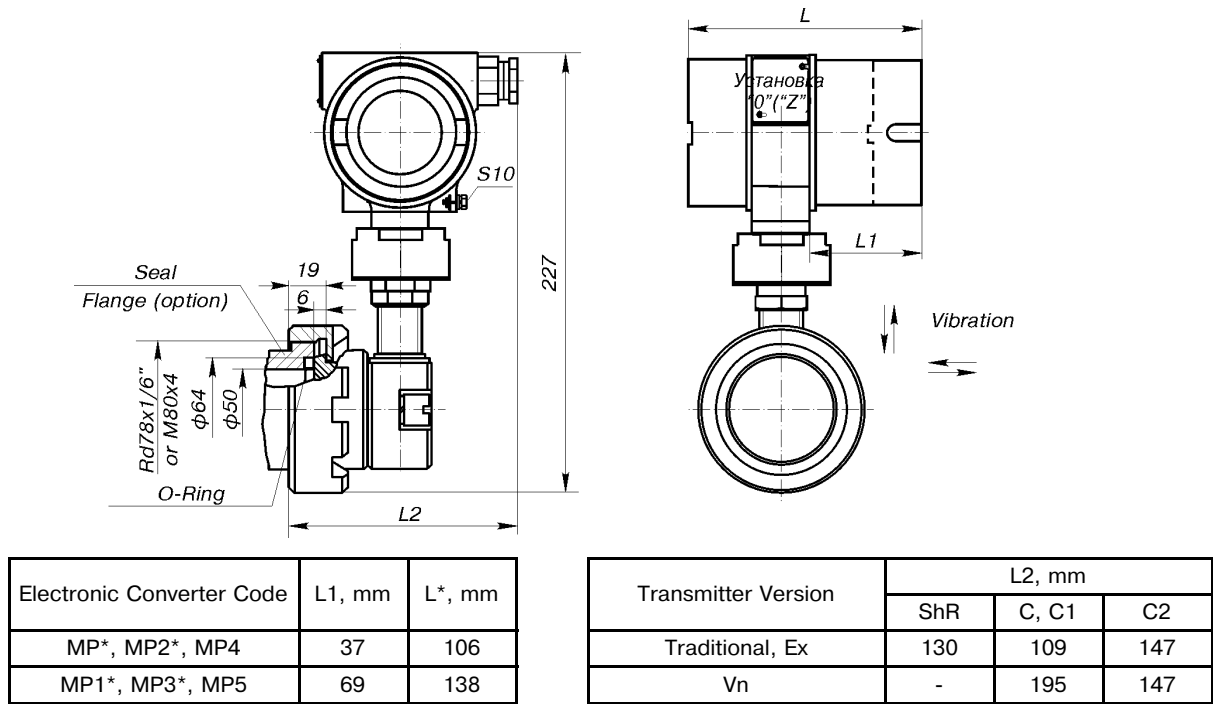
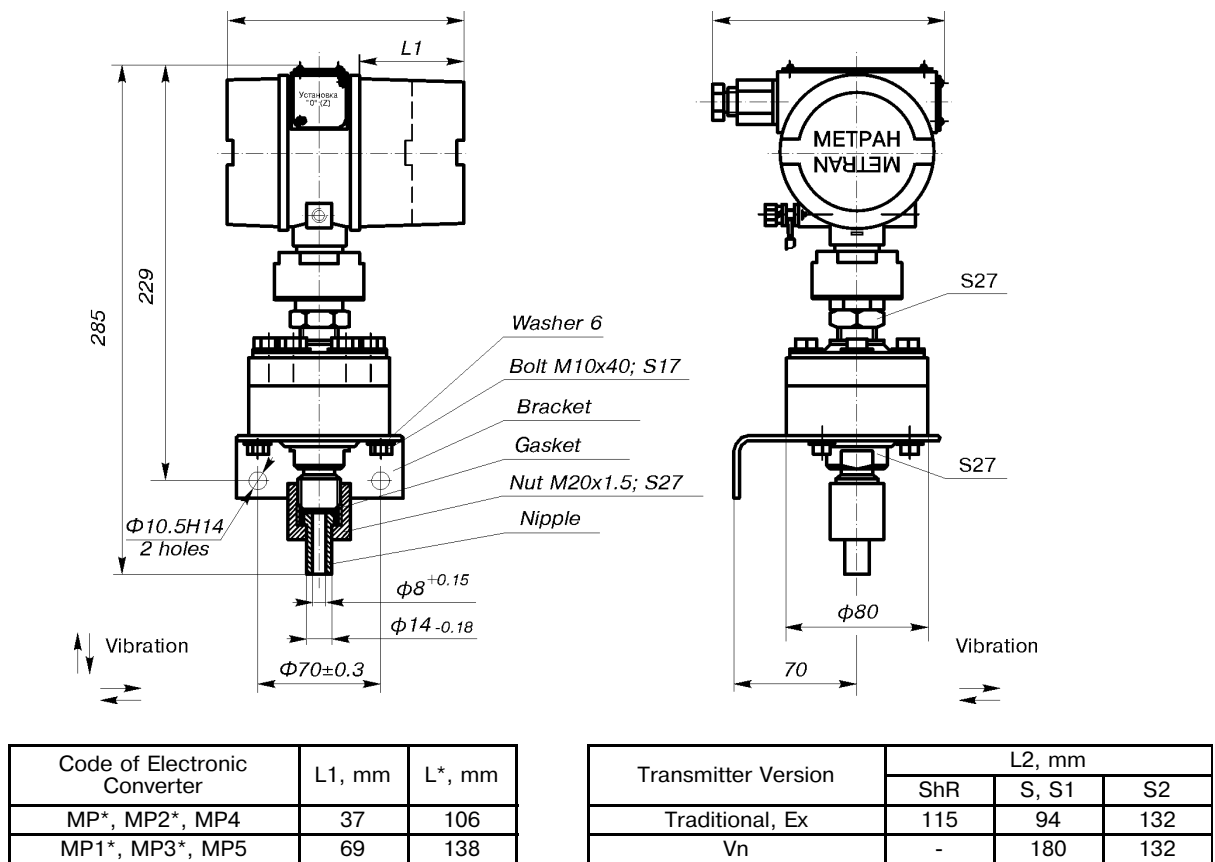


Figure 23. Metran-100 Transmitters of Models 1131, 1141, 1231, 1241, 1331, 1341. Installation of Mounting Parts TM20 (TM16, TK1/2, TK1/4, TA). (For the others refer to Figure 21).



*Size L is increased by 34 mm at NFU installation.

Figure 24.
Metran-100 Transmitters of Models 1133, 1143, 1233, 1243.



* Size L is increased by 34 mm at NFU installation.

Figure 25.
Metran-100 Transmitters of Models 1050, 1060, 1150, 1160, 1350;
Metran-22-AS Transmitters of Models 2050, 2060, 2150, 2160, 2350 with Mounted Nipple
(For Metran-100, adapters instead of a nut and a nipple are available; refer to Figure 29).

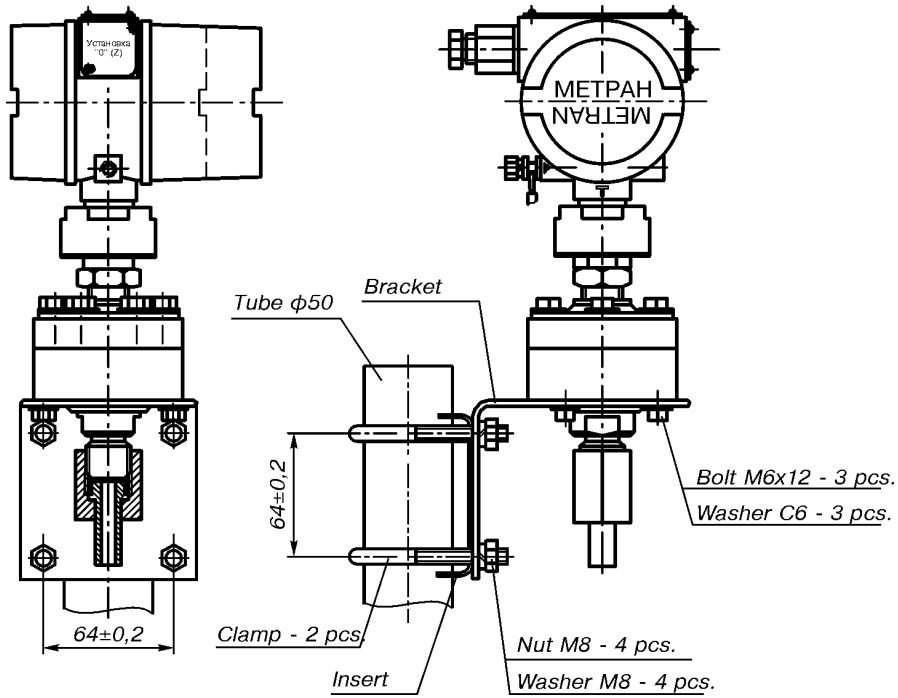
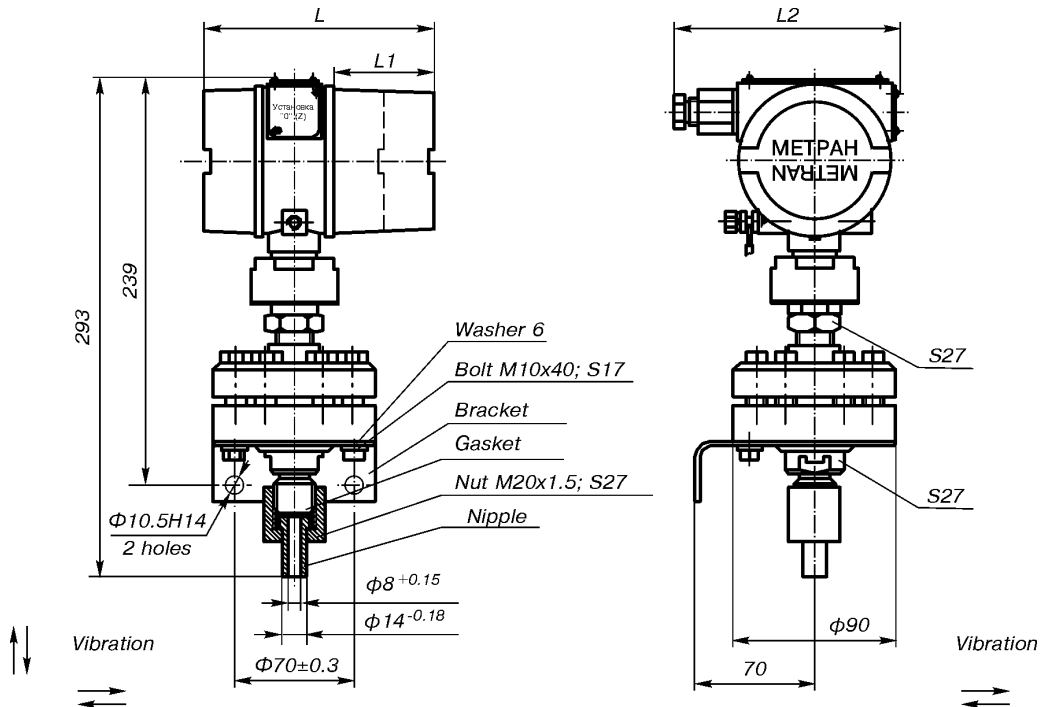


Figure 26.
Metran-100 Transmitters of Models 1050, 1060, 1150, 1160, 1350 with Mounted Nipple.
Installation of Mounting Parts TM20. (For the others refer to Figure 25)

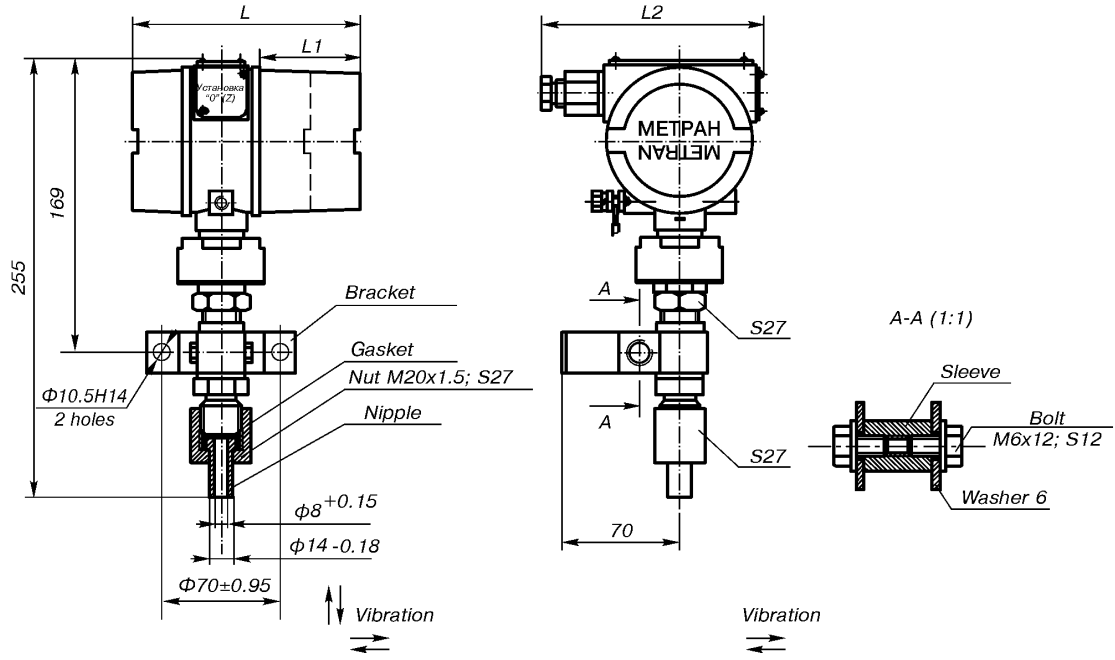


Code of Electronic Converter	L1, mm	L*, mm
MP*, MP2*, MP4	37	106
MP1*, MP3*, MP5	69	138

Transmitter Version	L2, mm		
	ShR	S, S1	S2
Traditional, Ex	115	94	132
Vn	-	180	132

* Size L is increased by 34 mm at NFU installation.

Figure 27.
Metran-100 Transmitters of Models 1170, Metran-22-AS Transmitters of Models 2170 with Mounted Nipple
(For Model 1170, adapters instead of a nut and a nipple are available; refer to Figure 29).



Electronic Converter Code	L1, mm	L*, mm
MP*, MP2*, MP4	37	106
MP1*, MP3*, MP5	69	138

Transmitter Version	L2, mm		
	ShR	C, C1	C2
Traditional, Ex	115	94	132
Vn	-	180	132

*Size L is increased by 34 mm at NFU installation..

Figure 28.
Metran-100 Transmitters of Models 1051, 1061, 1151, 1161, 1171, 1351;
Metran-22-AS of Models 2051, 2061, 2151, 2161, 2171, 2351 with Mounted Nipple
 (For Metran-100, adapters instead of a nut and a nipple are available; refer to Figure 29).

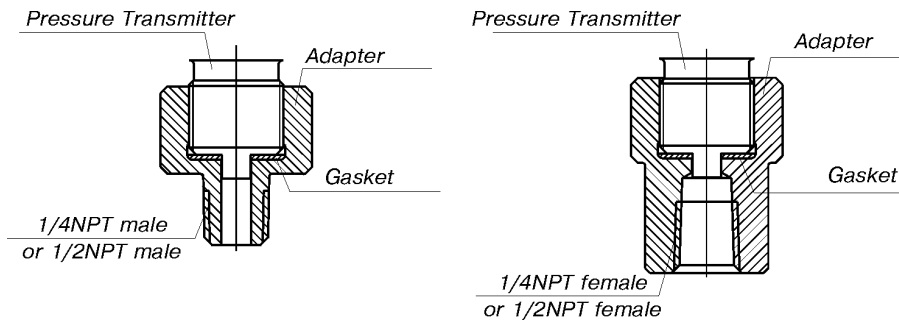
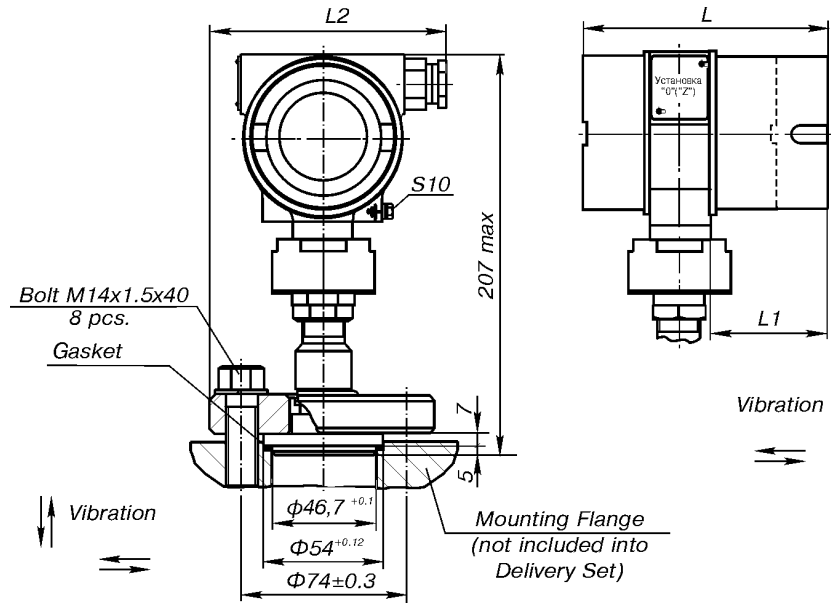


Figure 29.
Metran-100 Transmitters of Models 1050, 1060, 1051, 1061, 1150, 1160, 1151, 1161, 1170, 1171, 1350, 1351.
Mounting Parts - adapters of type 1/4NPT (1/2NPT) male
or 1/4NPT (1/2NPT) female (for others refer to Figures 25, 27, 28).

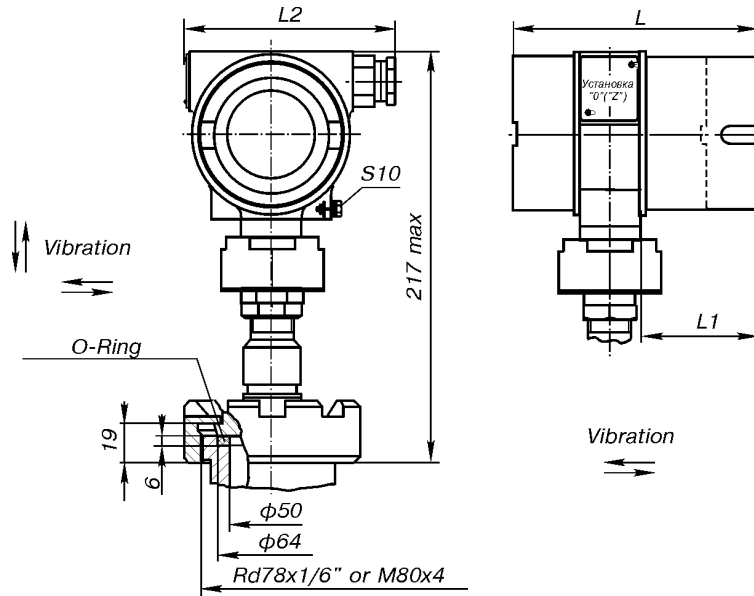


Code of Electronic Converter	L1, mm	L*, mm
MP*, MP2*, MP4	37	106
MP1*, MP3*, MP5	69	138

Transmitter Version	L2, mm		
	ShR	S, S1	S2
Traditional, Ex	122	101	139
Vn	-	187	139

* Size L is increased by 34 mm at NFU installation.

Figure 30.
Metran-100 Transmitters of Models 1152, 1162, 1172.

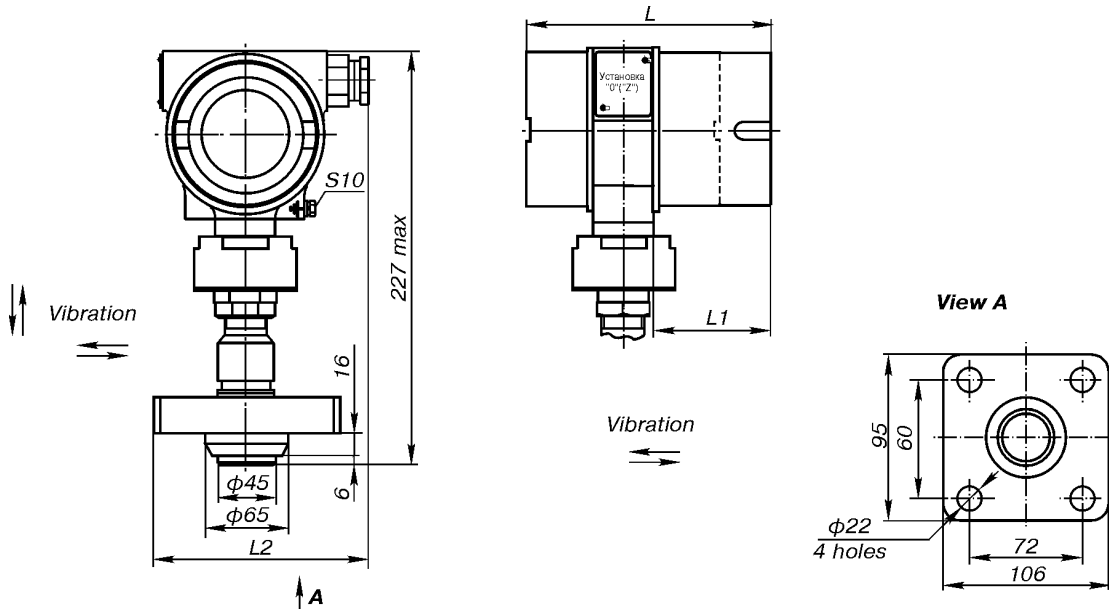


Electronic Converter Code	L1, mm	L*, mm
MP*, MP2*, MP4	37	106
MP1*, MP3*, MP5	69	138

Transmitter Version	L2, mm		
	ShR	C, C1	C2
Traditional, Ex	115	94	132
Vn	-	180	132

* Size L is increased by 34 mm at NFU installation.

Figure 31.
Metran-100 Transmitters of Model 1153.

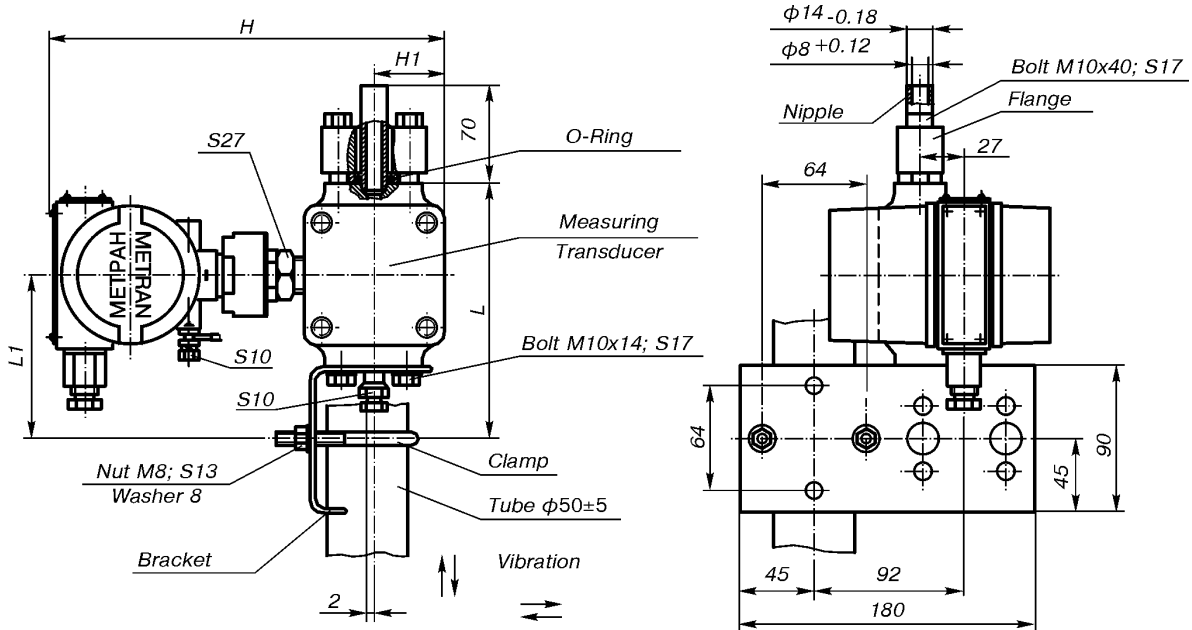


Electronic Converter Code	L1, mm	L*, mm
MP*, MP2*, MP4	37	106
MP1*, MP3*, MP5	69	138

Transmitter Version	L2, mm		
	ShR	C, C1	C2
Traditional, Ex	128	107	145
Vn	-	193	145

* Size L is increased by 34 mm at installation of a Noise Filter Unit (NFU).

Figure 32.
Metran-100 Transmitters of Model 1173.



Model	H, mm	H1, mm	L, mm	L1, mm
1020, 1030, 1040	237	44	155	100
2020, 2030, 2040				
2120, 2130, 2140				
2220, 2230, 2240				
2320, 2330, 2340				
1112, 1212, 1312	289	69	211	128
2110, 2210, 2310				

Figure 33.

Metran-100 Transmitters of Models 1020, 1030, 1040, 1112, 1212, 1312;
Metran-22-AS Transmitters of Models 2020, 2030, 2040, 2120, 2130, 2140, 2220, 2230, 2240, 2320, 2330, 2340,
2110, 2210, 2310 with Mounted Nipple.

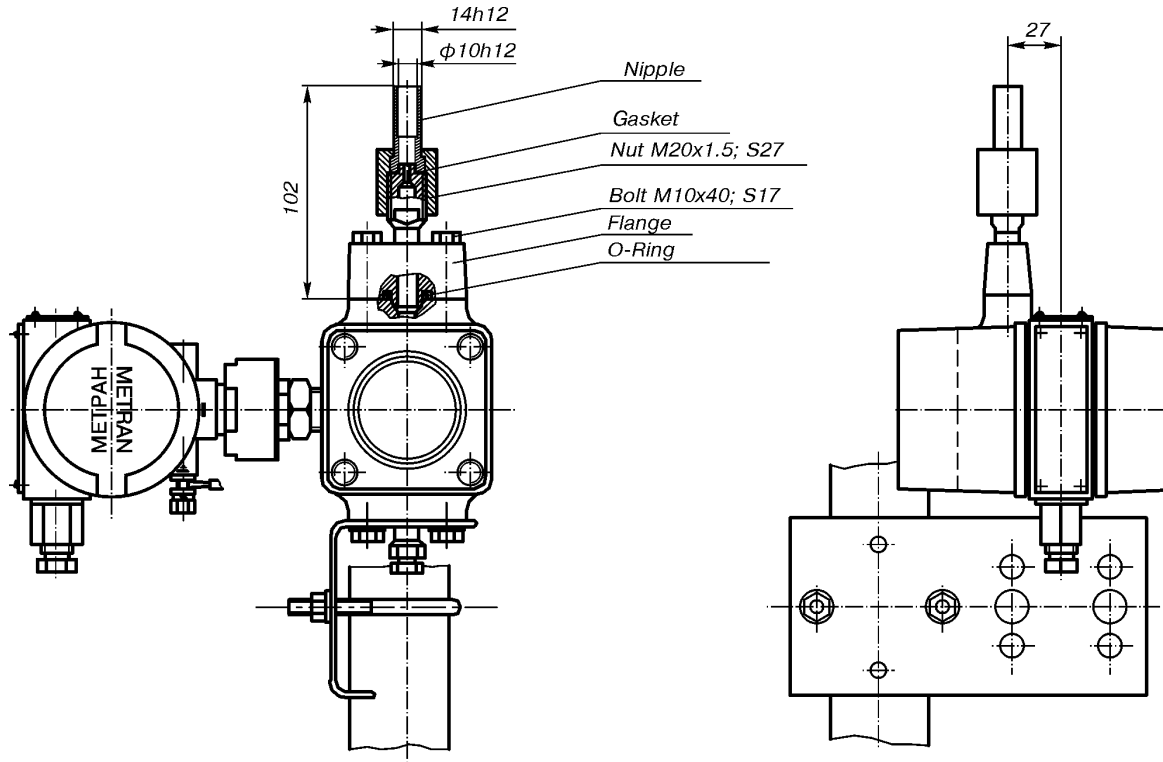
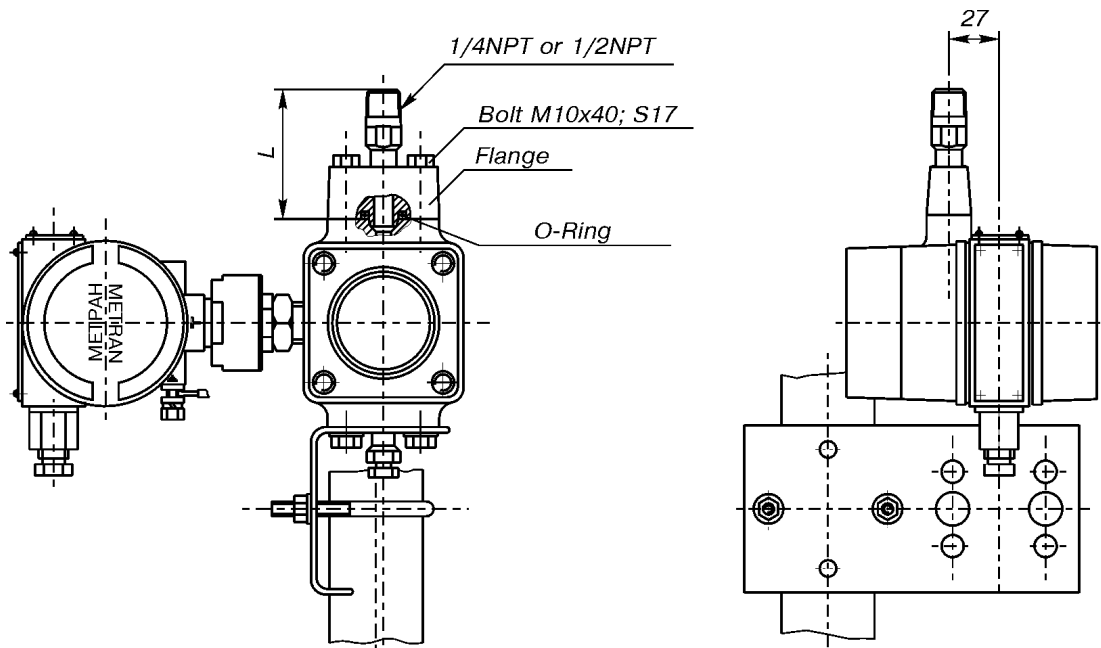
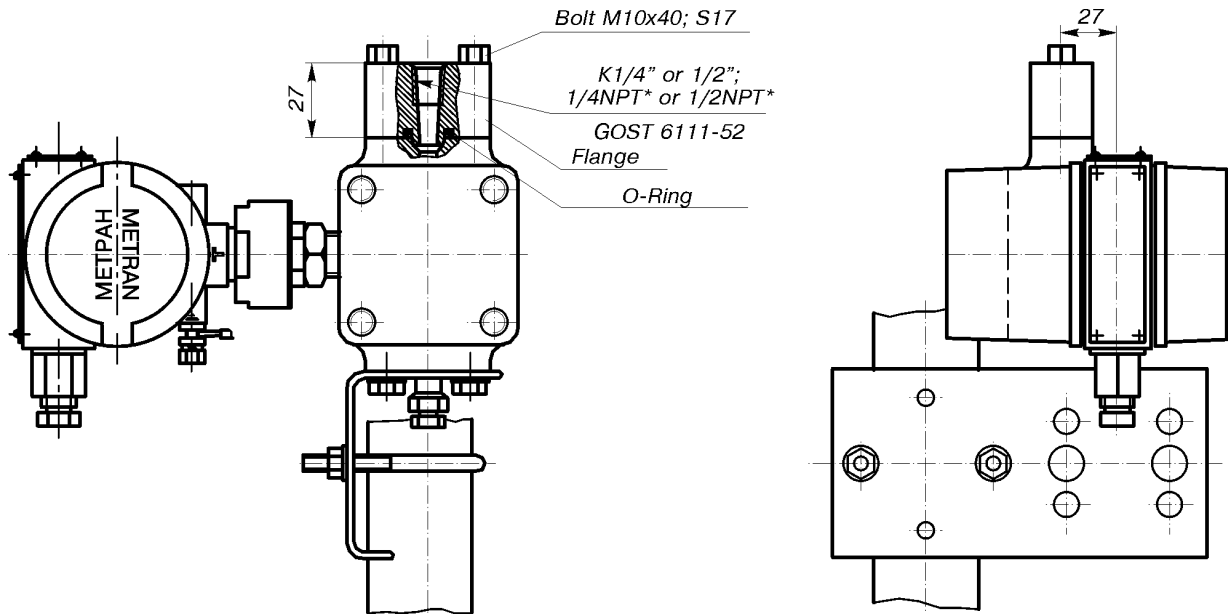


Figure 34.
Metran-100 Transmitters of Models 1020, 1030, 1040, 1112, 1212, 1312;
Metran-22-AS Transmitters of Models 2020, 2030, 2040, 2110, 2210, 2310, 2120, 2130, 2140,
2220, 2230, 2240, 2320, 2330, 2340
with Nipple Mounted under Captive Nut M20x1.5 (for others refer to Figure 33).



KMCh Code	L
1/4NPT male	62.5
1/2NPT male	68.5

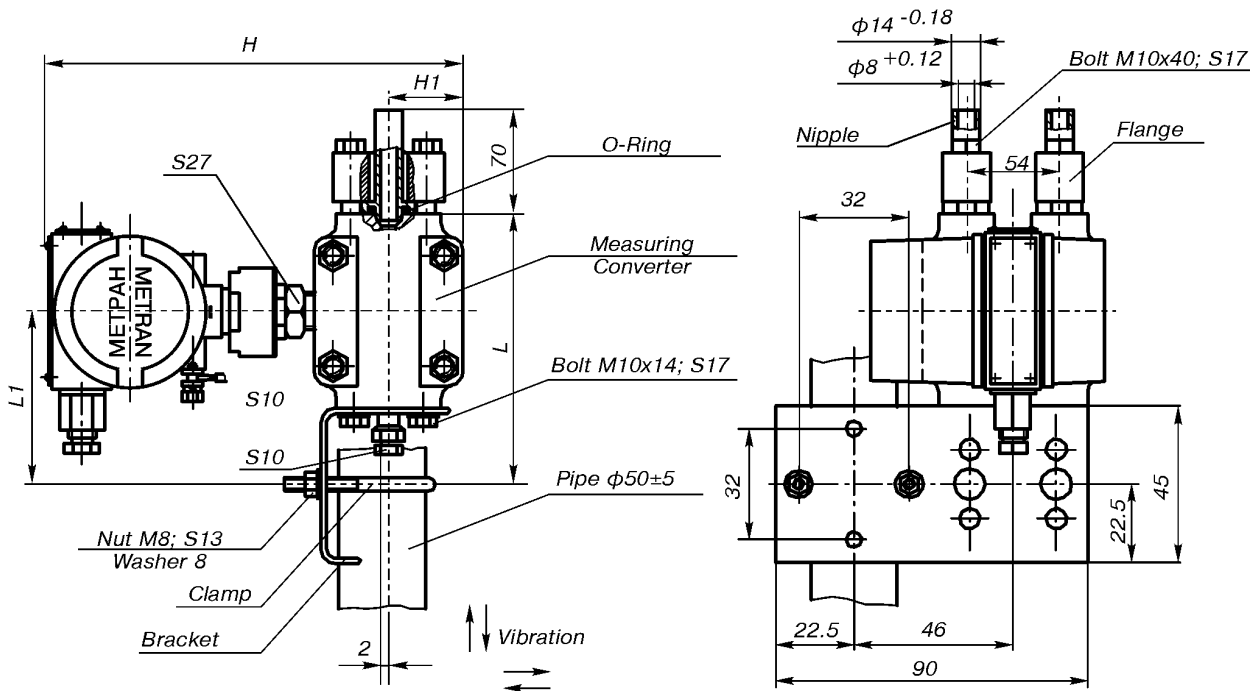
Figure 35.
Metran-100 Transmitters of Models 1020, 1030, 1040, 1112, 1212, 1312.
Installation of Mounting Parts - 1/4NPT male or 1/2NPT male (for others refer to Figure 33).



* For Metran-100 Transmitters only.

Figure 36.

Metran-100 Transmitters of Models 1020, 1030, 1040, 1112, 1212, 1312;
 Metran-22-AS Transmitters of Models 2020, 2030, 2040, 2110, 2210, 2310, 2120, 2130, 2140, 2220, 2230, 2240, 2320, 2330, 2340 with Mounted Flange (for others refer to Figure 33).



Model	H, mm	H1, mm	L, mm	L1, mm
1420, 1430, 1434, 1440, 1444, 1450, 1460	237	44	155	100
2420, 2430, 2434, 2440, 2444, 2450, 2460				
1412	289	69	211	128
2410				

Figure 37.

Metran-100 of Models 1412, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1422, 1432, 1442;
 Metran-22-AS of Models 2410, 2420, 2430, 2440, 2450, 2460, 2334, 2444 with Mounted Nipples.

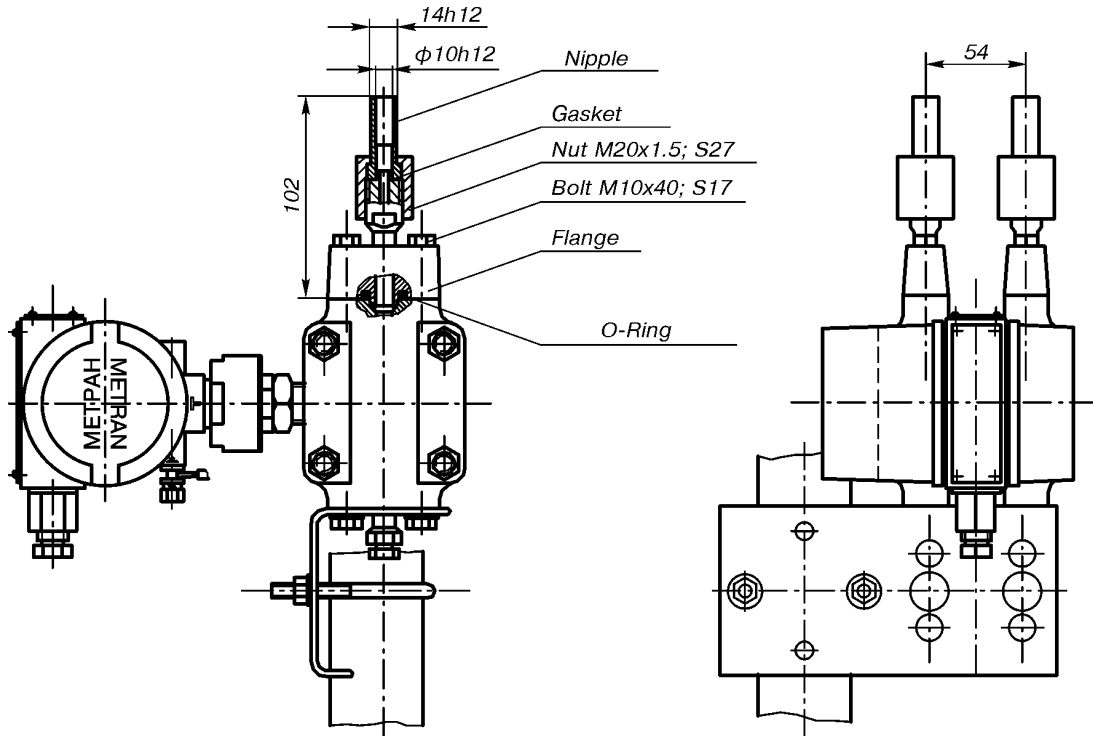
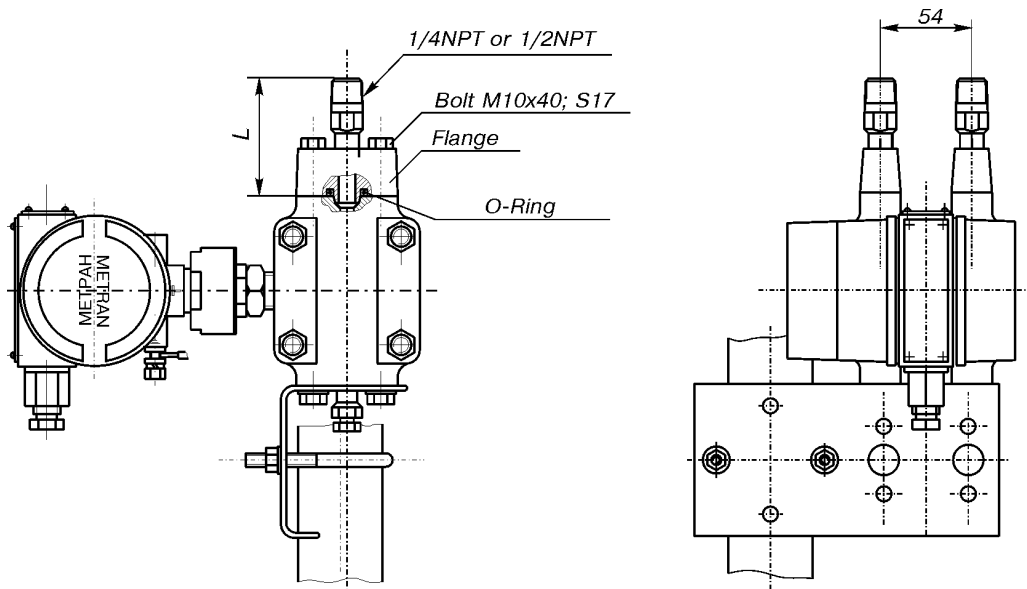


Figure 38.
Metran-100 of Models 1412, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1422, 1432, 1442;
Metran-22-AS of Models 2410, 2420, 2430, 2434, 2440, 2444, 2450, 2460
with Nipples Mounted under Captive Nuts M20x1.5 (for others refer to Figure 37).



KMCh Code	L
1/4NPT male	62.5
1/2NPT male	68.5

Figure 39.
Metran-100 Transmitters of Models 1412, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1422, 1432, 1442.
Installation of Mounting Parts - 1/4NPT male or 1/2NPT male (for others refer to Figure 37).

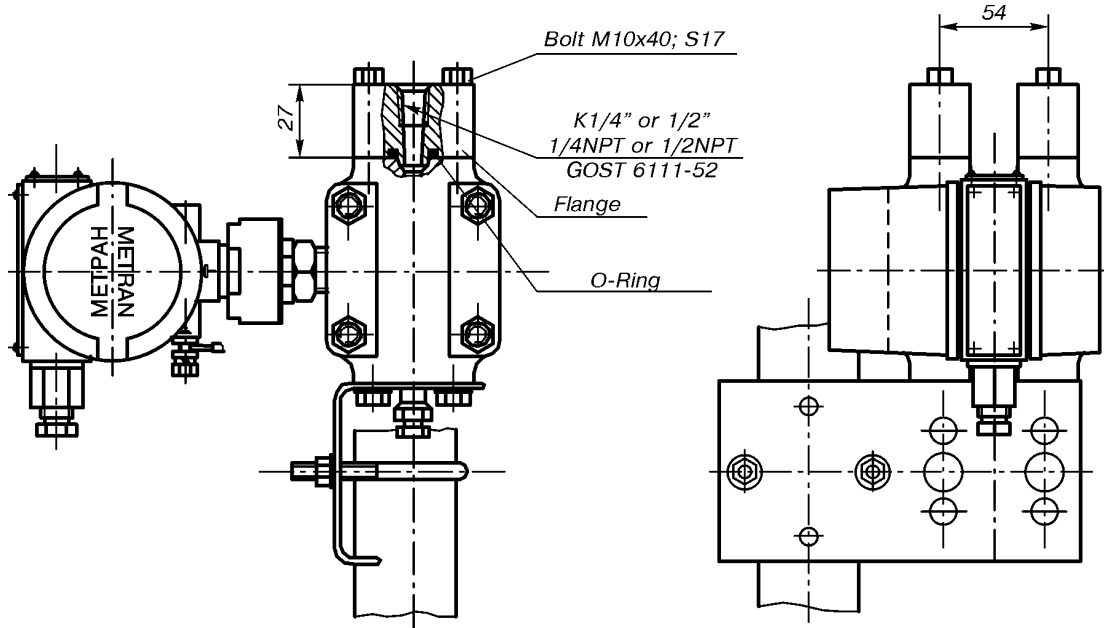


Figure 40.
Metran-100 of Models 1412, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1422, 1432, 1442;
Metran-22-AS of Models 2410, 2420, 2430, 2434, 2440, 2444, 2450, 2460
with Mounted Flanges (for others refer to Figure 37).

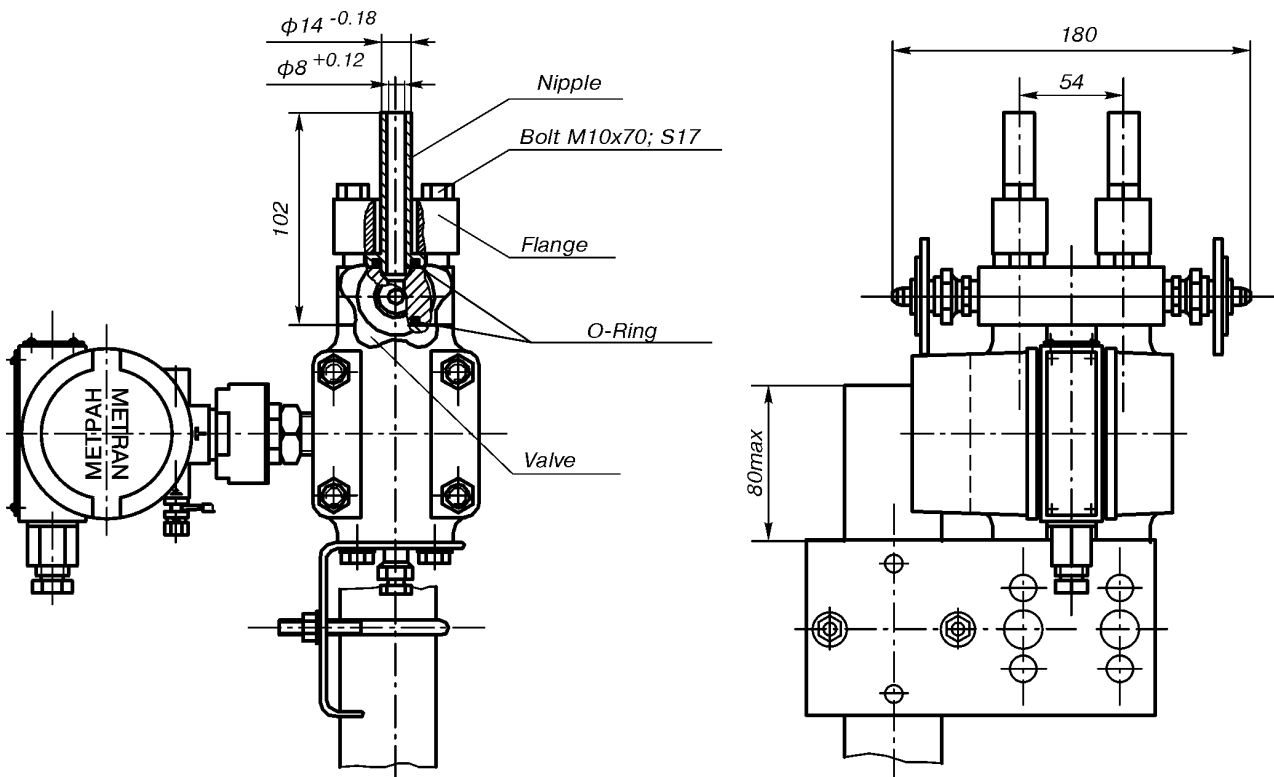


Figure 41.
Metran-100 of Models 1412, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1422, 1432, 1442;
Metran-22-AS of Models 2410, 2420, 2430, 2434, 2440, 2444, 2450, 2460
with Mounted Manifold and Nipples (for others refer to Figure 37).

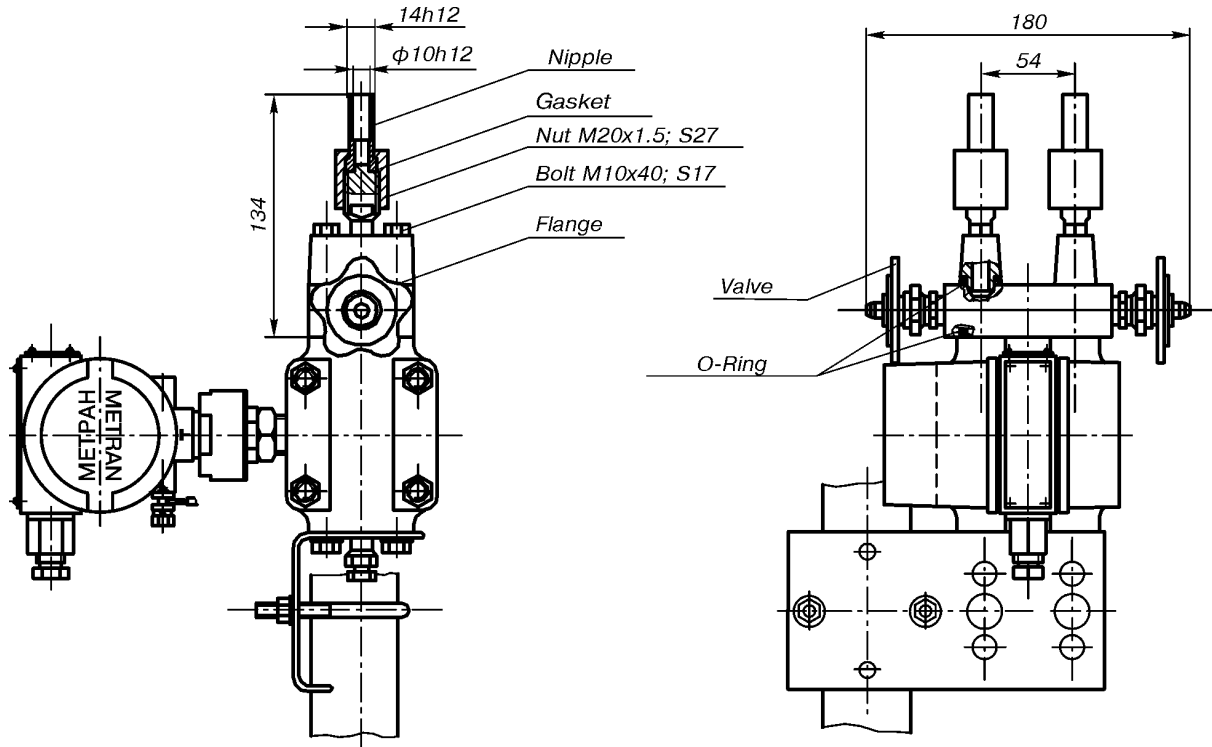
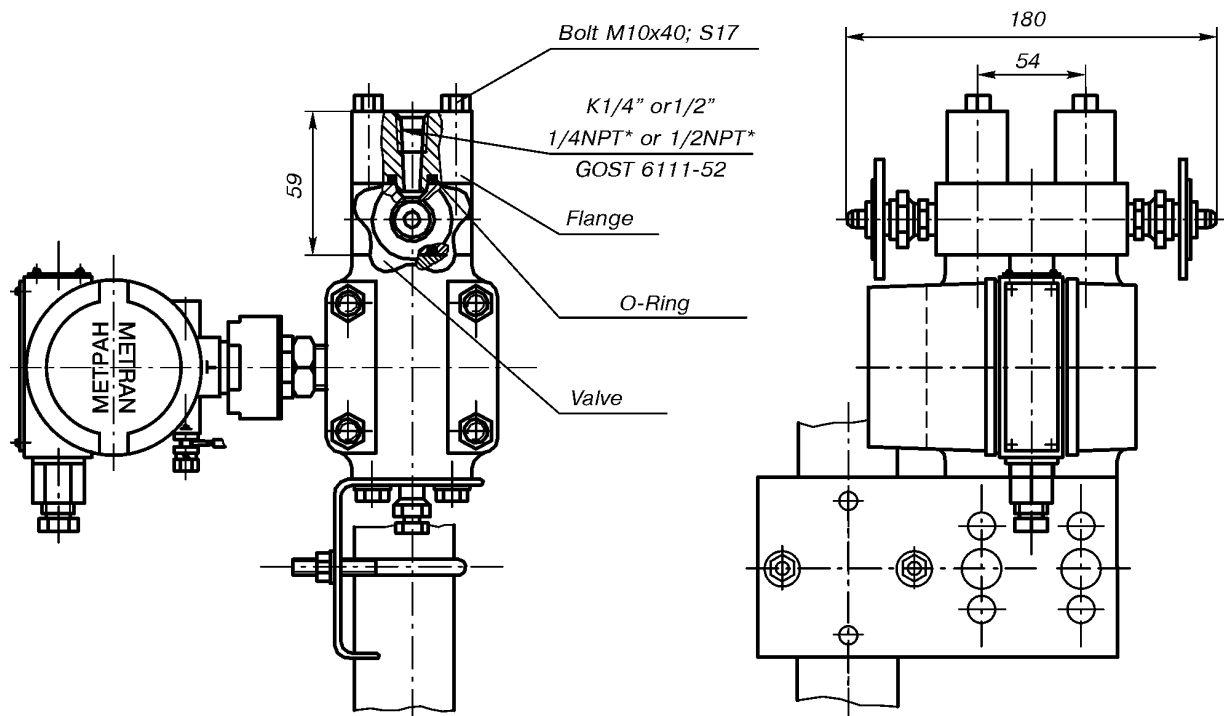


Figure 42.
Metran-100 of Models 1412, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1422, 1432, 1442;
Metran-22-AS of Models 2410, 2420, 2430, 2434, 2440, 2444, 2450, 2460
with Mounted Manifold and
Nipples under Captive Nuts M20x1.5 (for others refer to Figure 37).



* For Metran-100 only.

Figure 43.
Metran-100 of Models 1412, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1422, 1432, 1442;
Metran-22-AS of Models 2410, 2420, 2430, 2434, 2440, 2444, 2450, 2460
with Mounted Manifold and Flanges (for others refer to Figure 37).

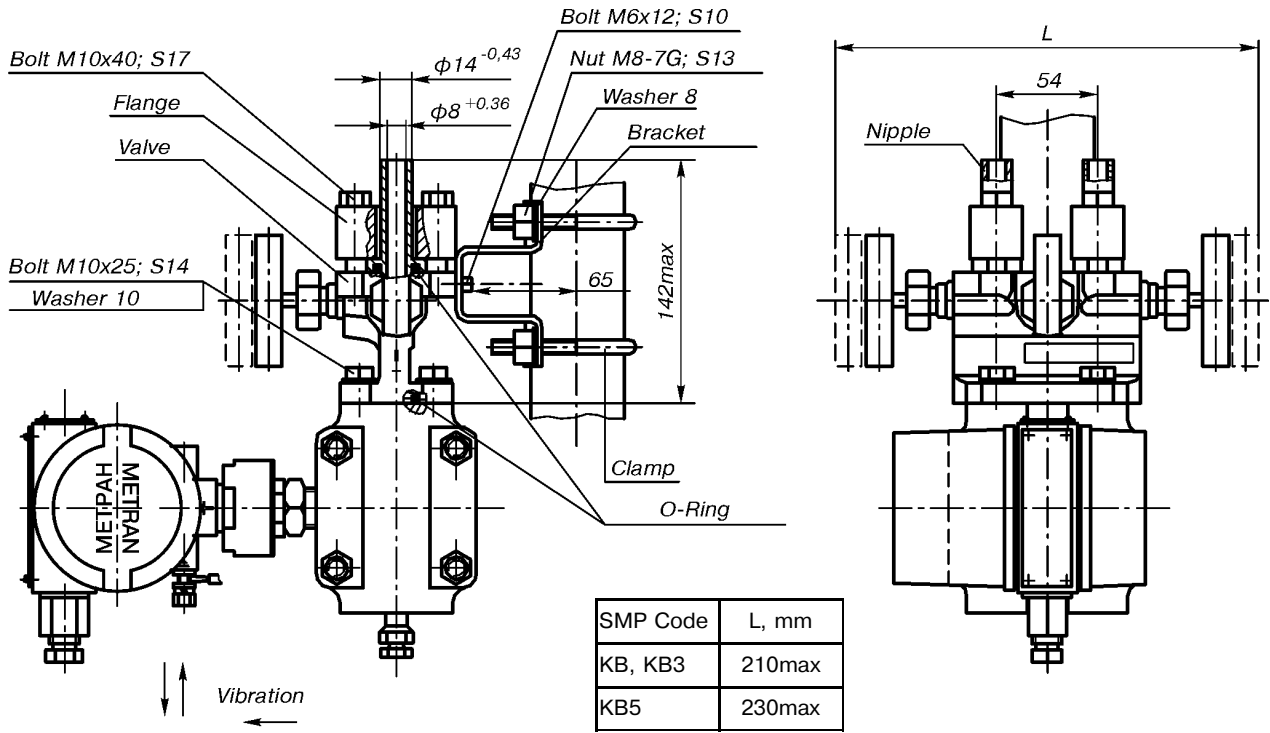


Figure 44.
Metran-100 of Models 1412, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1422, 1432, 1442;
Metran-22-AS of Models 2410, 2420, 2430, 2434, 2440, 2444, 2450, 2460
with Mounted Valve Block and Nipples (for others refer to Figure 37).

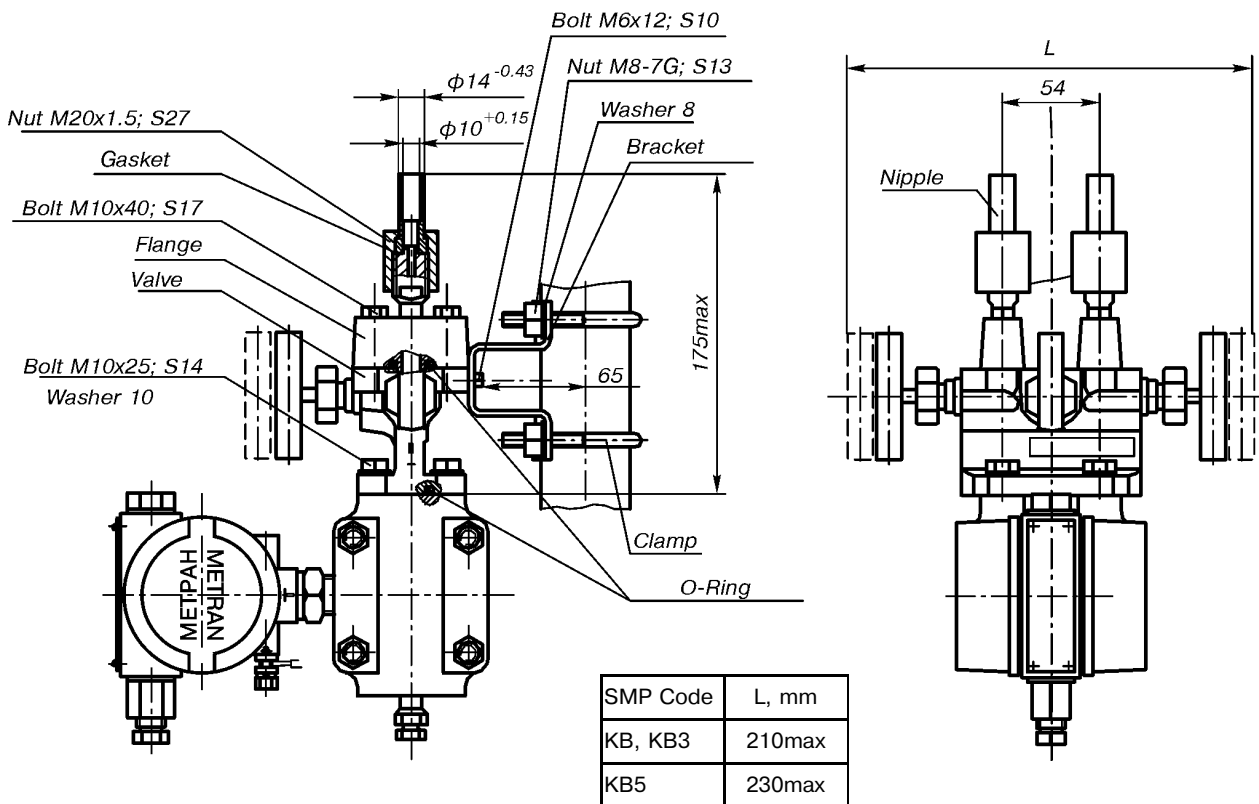


Figure 45
Metran-100 of Models 1412, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1422, 1432, 1442;
Metran-22-AS of Models 2410, 2420, 2430, 2434, 2440, 2444, 2450, 2460
with Mounted Valve Block and Nipples under Captive Nuts M20x1.5 (for others refer to Figure 37).

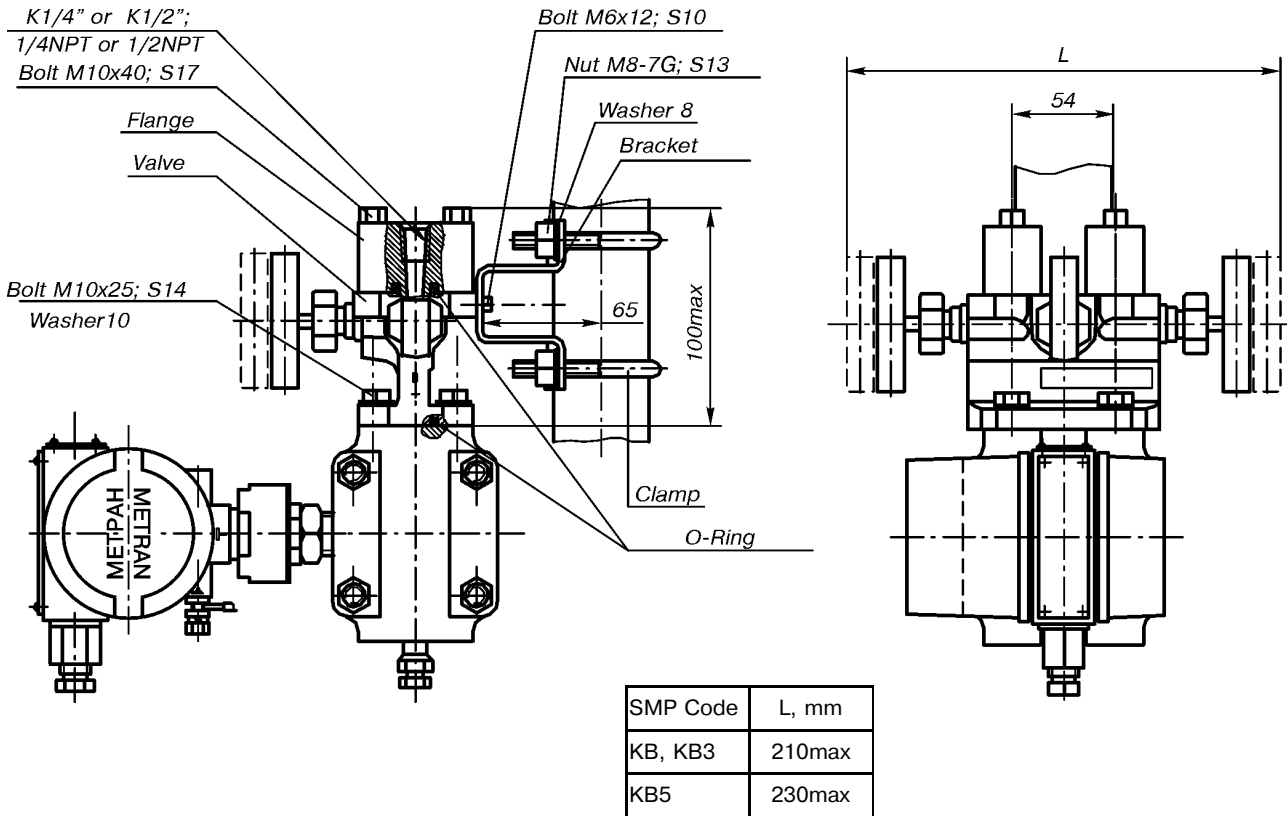
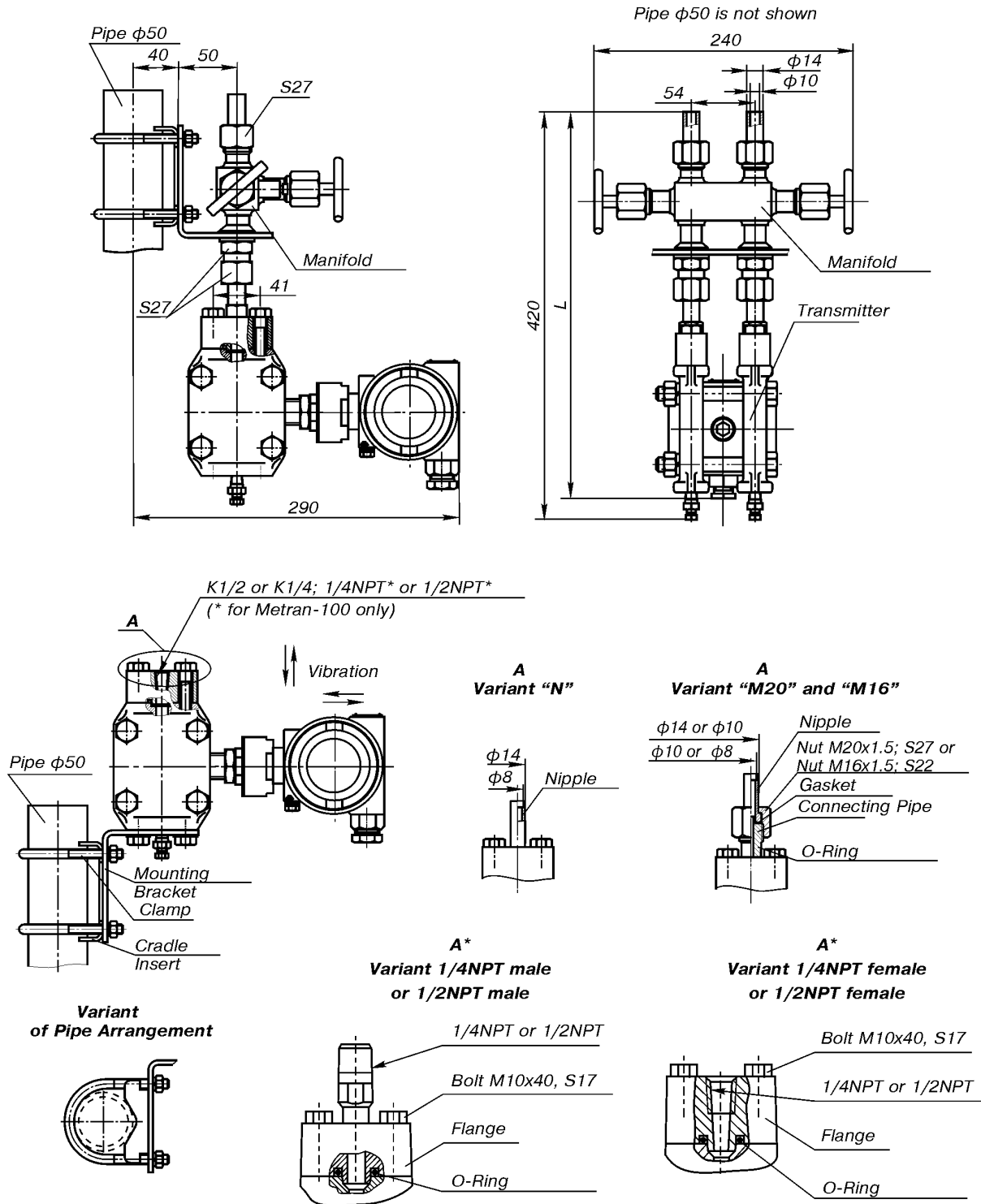


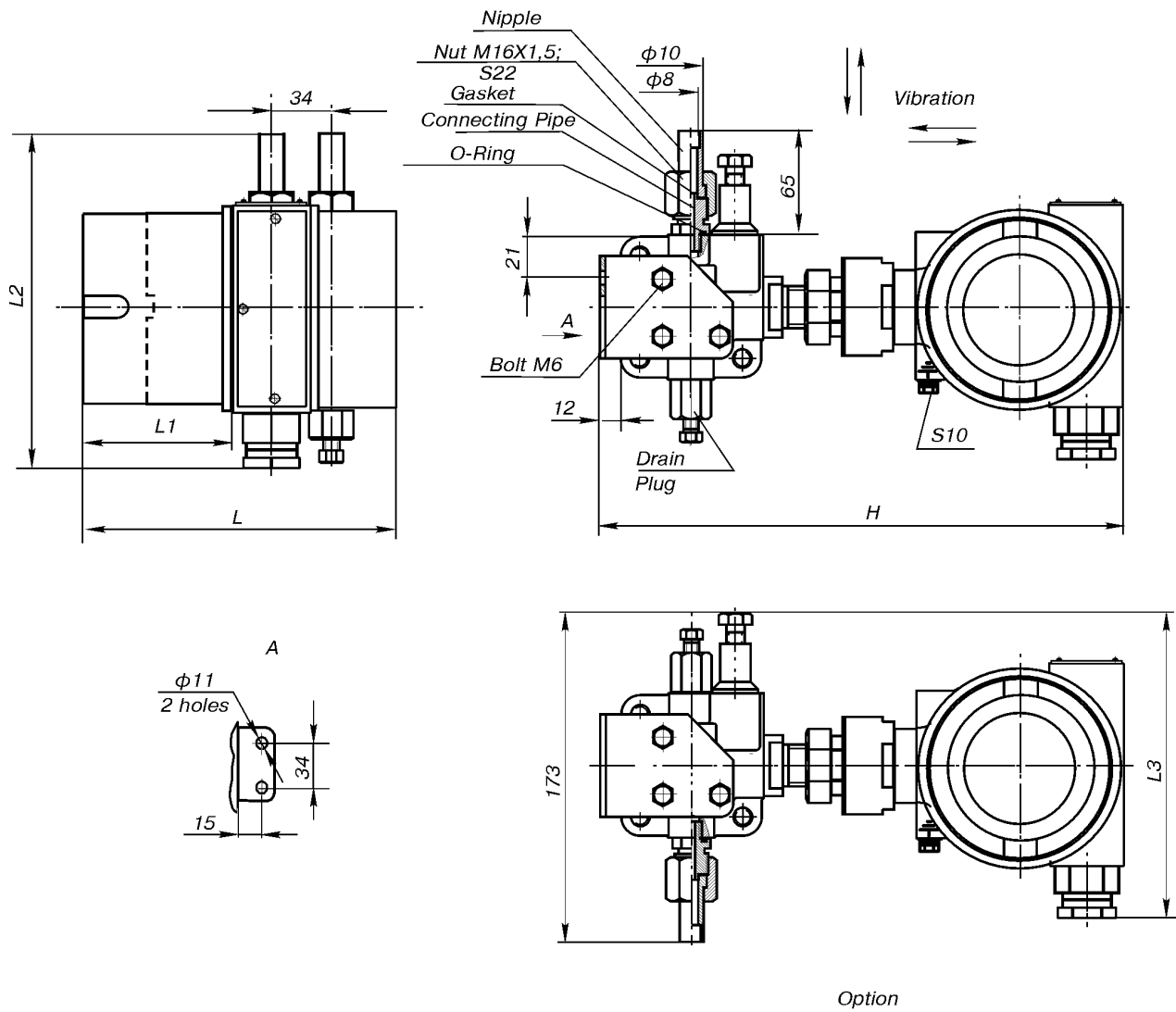
Figure 46.
Metran-100 of Models 1412, 1420, 1430, 1434, 1440, 1444, 1450, 1460, 1422, 1432, 1442;
Metran-22-AS of Models 2410, 2420, 2430, 2434, 2440, 2444, 2450, 2460
with Mounted Valve Block and Flanges (for others refer to Figure 37).



* Variants for installation of adapters on Metran-100 Transmitters.

Transmitter Version	L, mm		
	ShR	C, C1	C2
Traditional, Ex	410	389	427
Vn	-	475	427

Figure 47.
Installation of Manifold BV04 (BVN04) and mounting parts on Metran-100 Transmitters of Models 1422, 1432, 1442; Metran-22-AS of Models 4420, 4430, 4440.



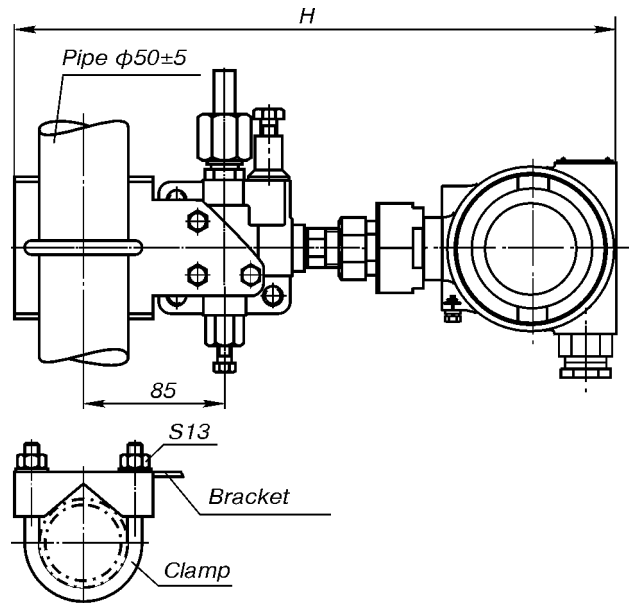
Electronic Converter Code	L1, mm	L*, mm
MP*, MP2*, MP4	37	106
MP1*, MP3*, MP5	69	138

Model	H, mm
1495, 1496	242
3494, 3494-01, 3494-02, 3494-03	247

* Size L is increased by 34 mm at NFU installation.

Transmitter Version	L2, mm			L3, mm		
	ShR	C, C1	C2	ShR	C, C1	C2
Traditional, Ex	175	154	192	142	121	157
Vn	-	240	192	-	205	157

Figure 48. Installation and Connection Dimensions of Metran-100-DD, Metran-100-Ex-DD, Metran-100-Vn-DD of Models 1495, 1496; Metran-22-AS of Models 3494, 3494-01, 3494-02, 3494-03.



Model	H, mm
1495, 1496	322
3494, 3494-01, 3494-02, 3494-03	267

**Figure 49. Mounting of Metran-100 Transmitters of Models 1495, 1496;
Metran-22-AS Transmitters of Models 3494, 3494-01, 3494-02, 3494-03 on Pipe $\phi 50$**
(For Set of Mounting Parts (SMP) TM16, TM20, TSV01, TSV02, TA, TK1/4, TK1/2, TSVN01, TSVN02); other parts are installed in the same way as TM16, TM20, AA, K1/4, K1/2, SV01, SV02, SVN01, SVN02.

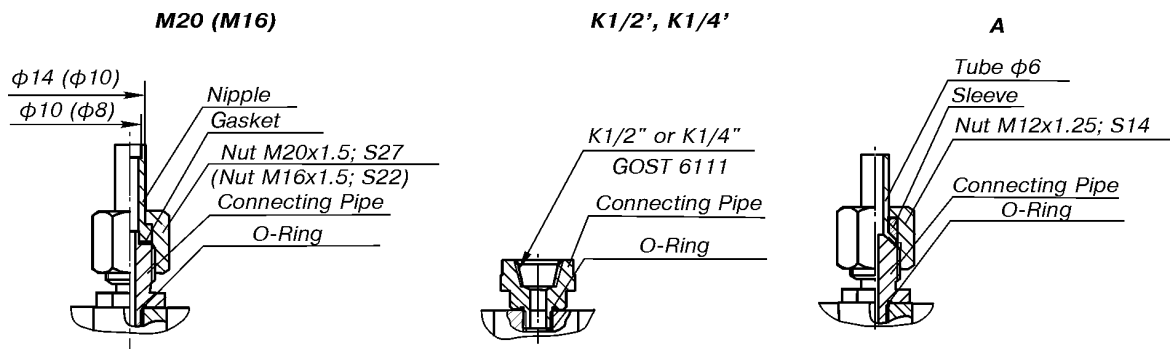
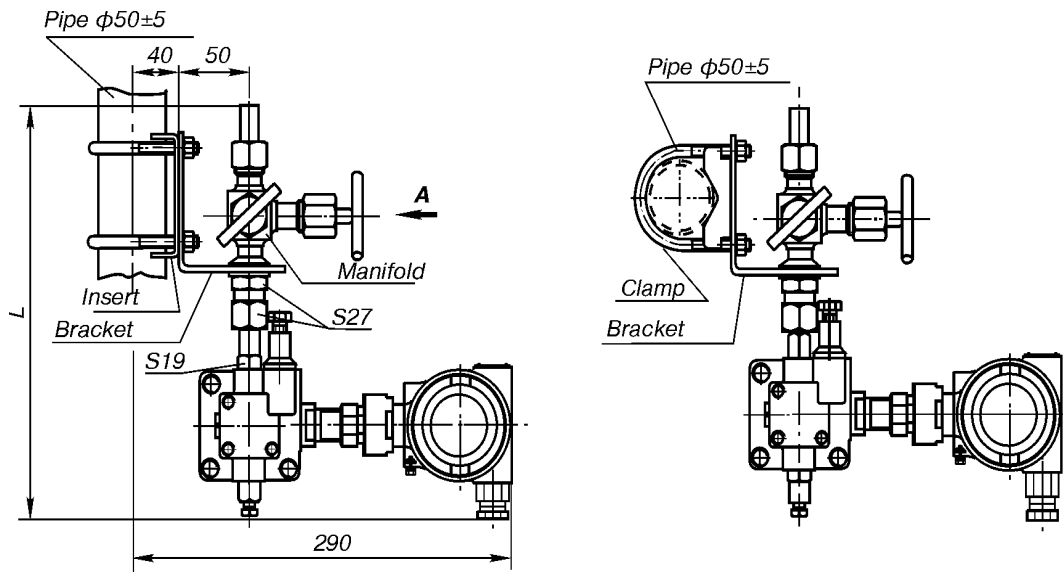


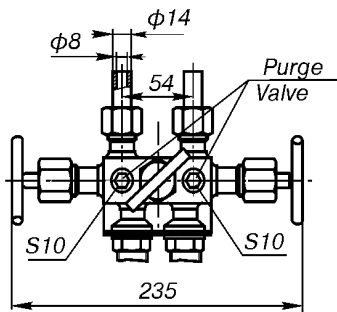
Figure 50. Installation of Mounting Parts (for others refer to Figure 49).

For Gas

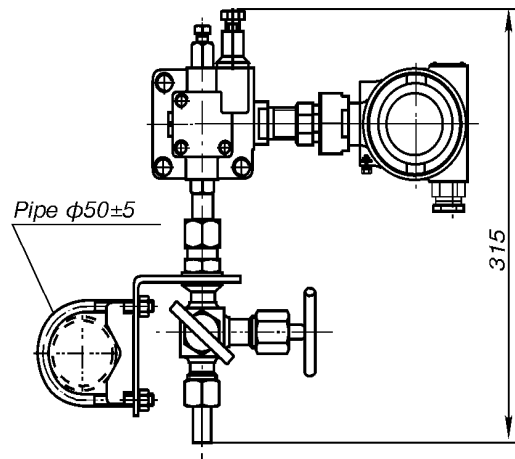


A

(Pipe $\phi 50$ is not shown)



For Liquid



Transmitter Version	L, mm		
	ShR	C, C1	C2
Traditional, Ex	310	289	327
Vn	-	375	327

Figure 51.
 Mounting of Metran-100 of Models 1495, 1496;
 Metran-22-AS of Models 3494, 3494-01, 3494-02, 3494-03
 with Manifolds BV02 (BVN02) on Pipe $\phi 50$.

Variant for Liquid and Steam

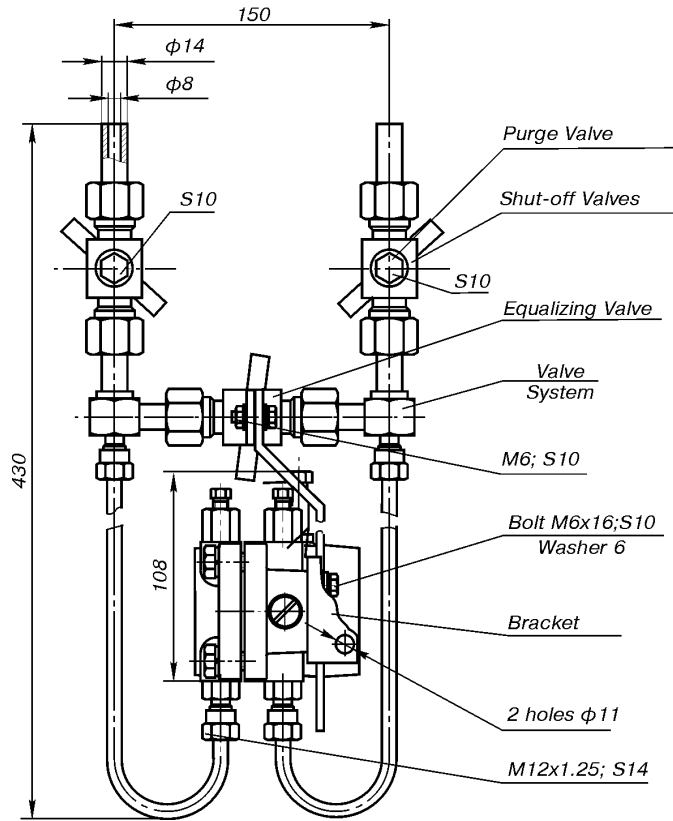
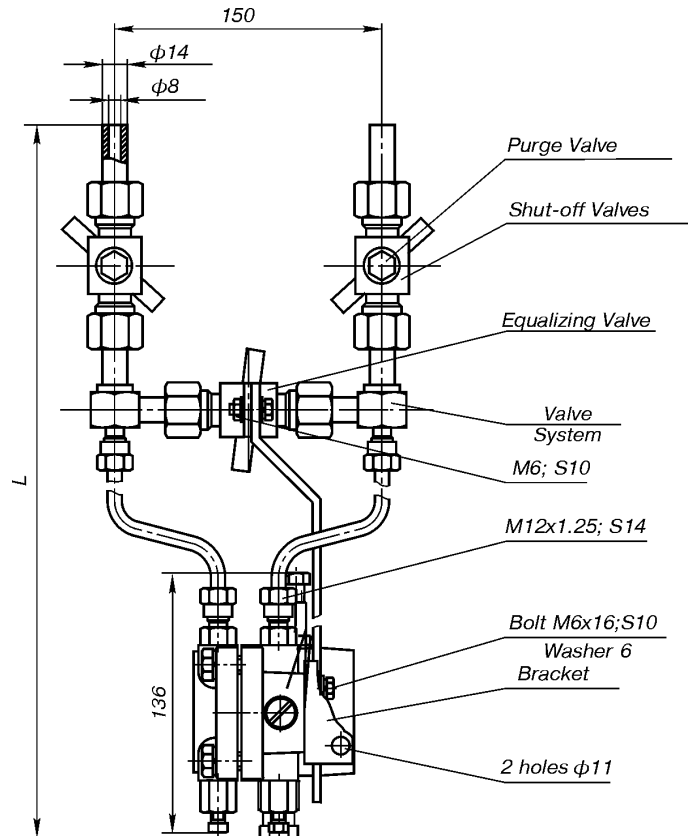


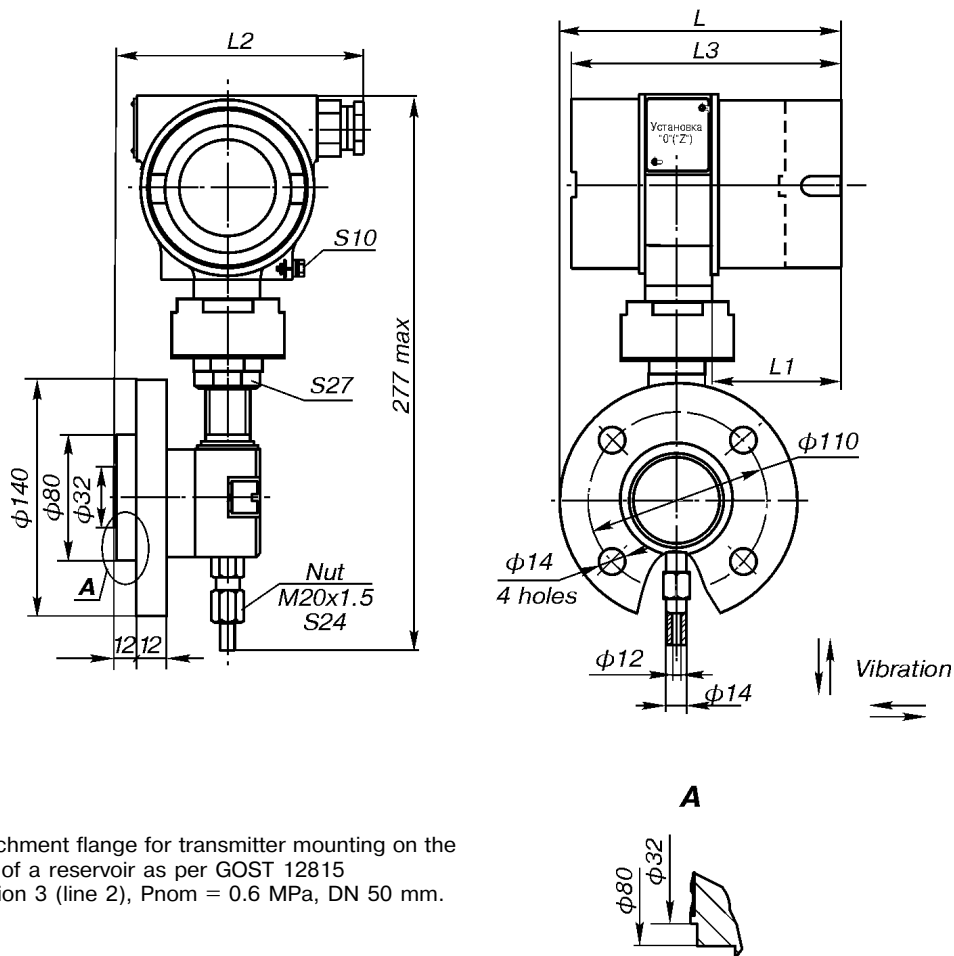
Figure 52.
Installation of Valve System SV01 (SVN01)
 on Metran-100 of Models 1495, 1496; Metran-22-AS of Models 3494, 3494-01, 3494-02, 3494-03.

Variant for Gas



Transmitter Version	L, mm		
	ShR	C, C1	C2
Traditional, Ex	410	389	427
Vn	-	475	427

Figure 53.
Installation of Valve System SV02 (SVN02)
 on Metran-100 of Models 1495, 1496; Metran-22-AS of Models 3494, 3494-01, 3494-02, 3494-03.



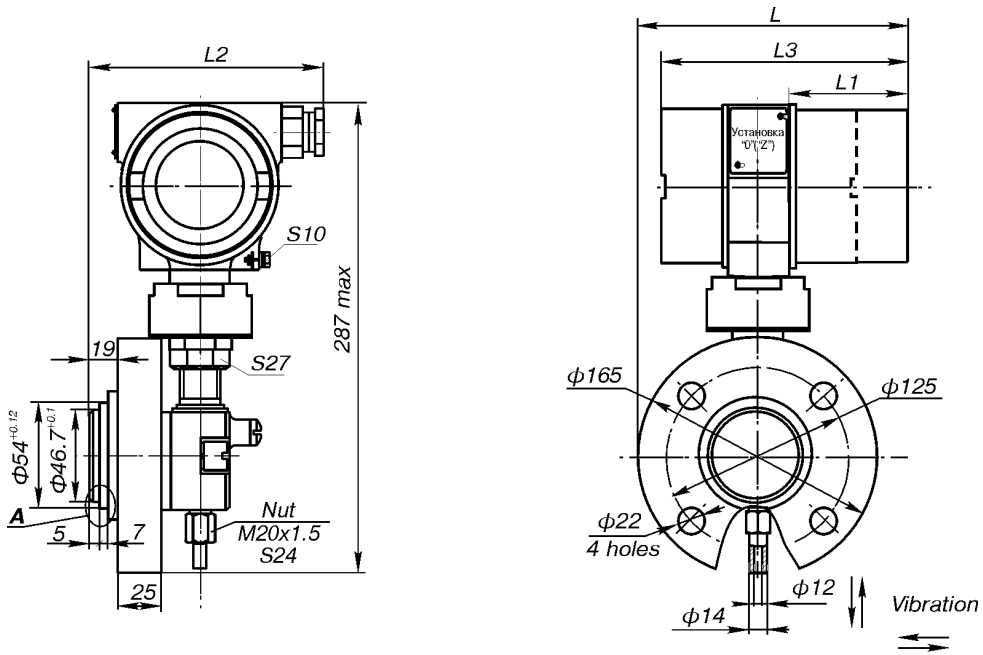
Attachment flange for transmitter mounting on the wall of a reservoir as per GOST 12815 version 3 (line 2), P_{nom} = 0.6 MPa, DN 50 mm.

Electronic Converter Code	L1, mm	L, mm	L3*, mm
MP*, MP2*, MP4	37	123	106
MP1*, MP3*, MP5	69	155	138

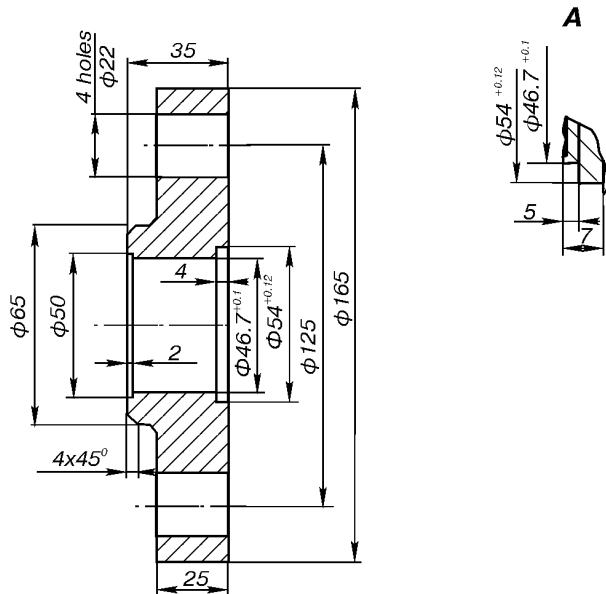
Transmitter Version	L2, mm		
	ShR	C, C1	C2
Traditional, Ex	140	119	161
Vn	-	209	161

* Size L3 is increased by 34 mm at NFU installation.

Figure 54.
Metran-100 Transmitters of Models 1531, 1541.



**Attachment flange (optional)
for Transmitter Mounting on Reservoir Wall:**

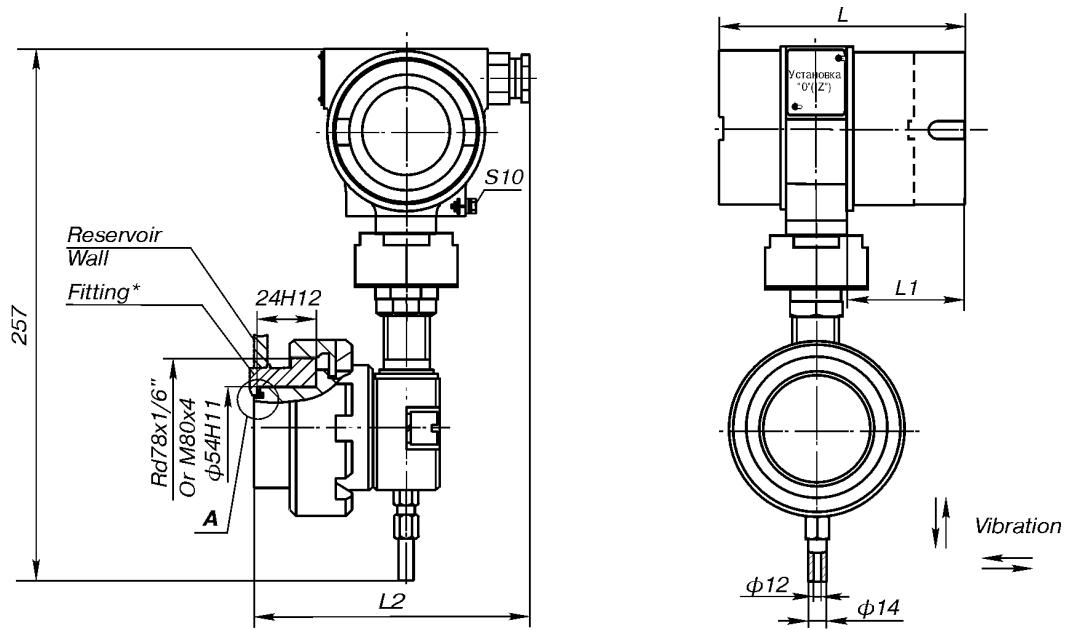


Electronic Converter Code	L1, mm	L, mm	L3*, mm
MP*, MP2*, MP4	37	123	106
MP1*, MP3*, MP5	69	155	138

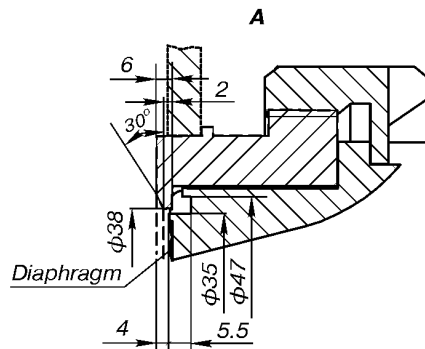
Transmitter Version	L2, mm		
	ShR	C, C1	C2
Traditional, Ex	152	131	161
Vn	-	209	161

* Size L is increased by 34 mm at NFU installation.

Figure 55.
Metran-100 Transmitters of Models 1532, 1532+, 1542, 1542+.



* Fitting (optional):

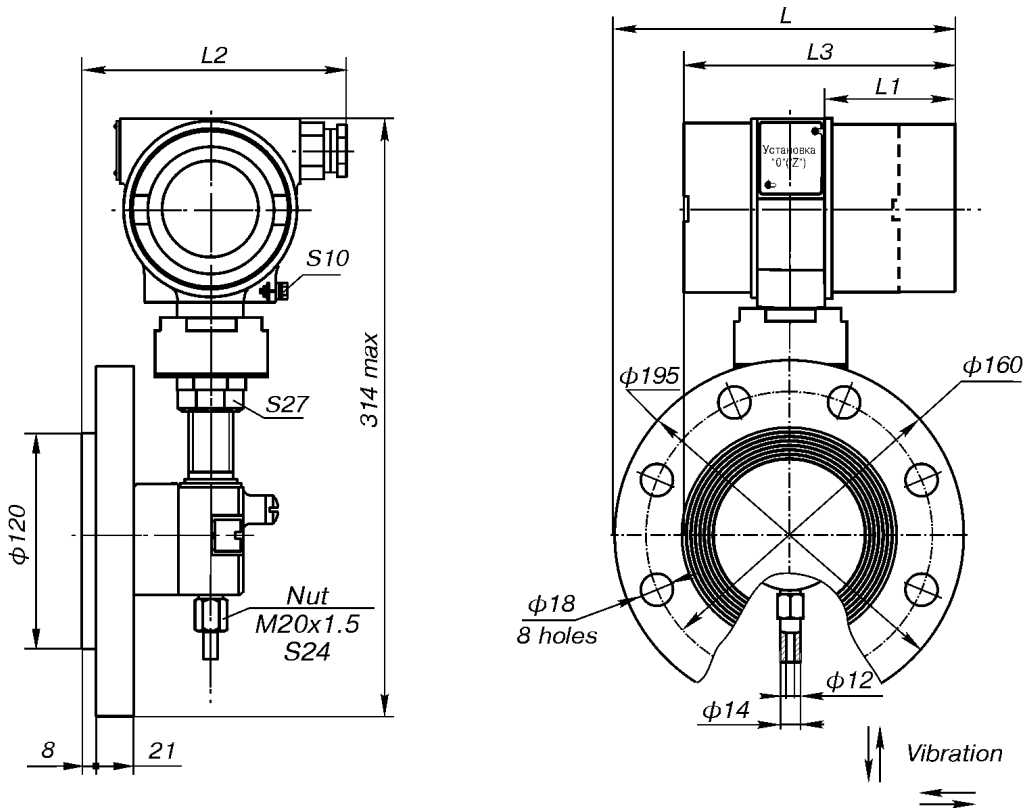


Electronic Converter Code	L1, mm	L*, mm
MP*, MP2*, MP4	37	106
MP1*, MP3*, MP5	69	138

Transmitter Version	L2, mm		
	ShR	C, C1	C2
Traditional, Ex	140	119	157
Vn	-	205	157

* Size L is increased by 34 mm at NFU installation.

Figure 56.
Metran-100 Transmitters of Models 1533, 1543.



Attachment flange as per GOST 12815, version 3, (line 2), Pnom = 4 MPa, DN 80 mm is optional.

Electronic Converter Code	L, mm	L1, mm	L3*, mm
MP*, MP2*, MP4	123	37	106
MP1*, MP3*, MP5	155	69	138

Transmitter Version	L2, mm		
	ShR	C, C1	C2
Traditional, Ex	152	131	161
Vn	-	209	161

* Size L3 is increased by 34 mm at NFU installation.

Figure 57.
Metran-100 Transmitters of Models 1534, 1534+, 1544, 1544+.