

Metran-49 Corrosion-Resistant Pressure Transmitters

Code OKP 42 1281



- **Measurable fluids: corrosive media with high hydrogen sulfide content, oil products, crude oil, etc., to which transmitter wetted parts are corrosion-resistant**
- **Accuracy up to $\pm 0.15\%$ FS**
- **Turndown up to 25 : 1**
- **Push-button control of transmitter's parameters from built-in panel or with the help of HART-Communicator or PC**
- **Versions as per GOST 12997:**
 - Traditional;**
 - Explosion-proof Ex, Vn**
- **Verification interval - 2 years**
- **Warranty life time - 3 years**
- **Entered into the State Register of measuring instruments, Certificate No.7633-2000**

Metran-49 Corrosion-Resistant Smart Pressure Transmitters are designed for operation in process control systems and provide continuous conversion of the following input values into unified analogue current output and/or digital signal in the HART protocol standard:

- gage pressure (Metran-49-DI);
- vacuum (Metran-49-DV);
- gage-vacuum (Metran-49-DIV);
- differential pressure (Metran-49-DD).

Transmitter settings control:

- push-button control from built-in panel;
- with HART Communicator or PC.

The transmitters operate with secondary recording and indicating equipment, regulators and other automation devices sensing a standard current signal and/or digital signal in the standard of HART Protocol.

Built-in RF-interference filter.

External "zero" adjustment button.

Continuous self-diagnostics.

The transmitters are designed under *Gazprom* OJSC statement of work.

BASIC PERFORMANCE SPECIFICATIONS

Table 1

Transmitter Type	Model	URL as per GOST 22520
Gage Pressure Transmitters (DI)		
Metran-49-DI Metran-49-Ex-DI Metran-49-Vn-DI	9120	4; 6; 10; 16; 25; 40; 60 kPa
	9130	10; 16; 25; 40; 60; 100; 160 kPa
	9140	25; 40; 60; 100; 160; 250; 400; 600 kPa
	9150	0.1; 0.16; 0.25; 0.4; 0.6; 1; 1.6; 2.5 MPa
	9160	1; 1.6; 2.5; 4; 6; 10; 16 MPa
	9170	4; 6; 10; 16; 25; 40; 60; 100 MPa
Vacuum Transmitters (DV)		
Metran-49-DV Metran-49-Ex-DV Metran-49-Vn-DV	9220	4; 6; 10; 16; 25; 40; 60 kPa
	9230	10; 16; 25; 40; 60; 100 kPa

Table 2

Transmitter Type	Model	URL as per GOST 22520, kPa	
		vacuum	gage pressure
Gage - Vacuum Transmitters (DIV)			
Metran-49-DIV Metran-49-Ex-DIV Metran-49-Vn-DIV	9320	2; 3,15; 5; 8; 12.5; 20; 31.5	2; 3.15; 5; 8; 12.5; 20; 31.5
	9330	12.5; 20; 31.5; 50; 100	12.5; 20; 31.5; 50; 60
	9340	50; 100; 100; 100; 100	50; 60; 150; 300; 530
	9350	100; 100; 100; 100; 100	300; 530; 900 kPa; 1.5; 2.4 MPa

Table 3

Transmitter Type	Model	URL as per GOST 22520, kPa	Maximum permissible operating gage pressure, MPa
Differential Pressure Transmitters (DD)			
Metran-49-DD	9420	4; 6.3; 10; 16; 25; 40; 63	10
Metran-49-Ex-DD	9430	10; 16; 25; 40; 63; 100; 160	16
Metran-49-Vn-DD	9440	25; 40; 63; 100; 160; 250; 400; 630	

Lower range limit of DI, DV, DD transmitters is equal to "0"; for DIV transmitters, the value of measurable parameter equal to "0" is within the measurement range.

Metran-49 transmitters are multi-range products and can be adjusted to upper range limit or measurement range from Pmin to Pmax 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 (transmitters with accuracy code 015) or programmed (transmitters with accuracy code 025, 050) to upper range limit selectable from values specified in Table 1,2 and 3.

● **Codes** of transmitter versions depending on electronic converter, **output signals** and **options** are provided in Table 4.

Table 4

Code	Output signal	Options
MP	0-5; 0-20; 4-20 mA	without built-in indicator, with remote indicator
MP1		with built-in indicator
MP2	4-20 mA with a digital signal on the base of HART-protocol	without indicator
MP3		with built-in indicator

Analog output function:

- 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 functions 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** (including nonlinearity, hysteresis and repeatability) of transmitters verified upon an analog or digital signal does not exceed values $\pm\gamma$ % provided in Tables 5.

Table 5

Accuracy Code	Accuracy within Adjustment Ranges; γ %			
	Pmax	$P_{\max} \geq P_u \geq P_{\max}/6$	$P_{\max}/6 > P_u \geq P_{\max}/10$	$P_{\max}/10 > P_u \geq P_{\max}/25$
015	0.15	0.2	0.25*	0.14+0.02 Pmax/Pu
025	0.25	0.4		0.2+0.025 Pmax/Pu
050	0.5			0.4+0.02 Pmax/Pu

* For all models, except 9440, 9140, 9240, 9340.

** $\gamma = \pm 0.4\%$ for models 9120, 9130, 9220, 9230, 9320, 9330, 9420, 9430.

Pmax - maximum upper range limit for the specified model (sum of absolute maximal values of upper range limits of gage pressure (Pmax) and vacuum (Pmax₍₋₎) for DIV transmitters).

Pu - model setting pressure selected from upper range limit values of Table 1, 3 (for DIV transmitters, it is the sum of absolute values of setting pressure of gage pressure (Pu) and vacuum (Pu₍₋₎) according to Table 2).

● For transmitters with Codes MP1, MP3 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 output measurement results. Averaging time of measurement results increases settling time of an output signal and smooth it at rapid change of the input signal.

The value of damping time t_d 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 analog output signal with accuracy more than 5% of set value is 2 sec maximum at minimum damping time (0.2 sec output settling time is displayed on the indicator).

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, U2 and U1 climatic types 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 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 **the effect of one-side overload with maximum permissible operating gage pressure** equally from both plus and minus chambers.

● DI, DV and DIV transmitters withstand **the effect of one-side overload with pressure $P = 1.25 P_{\max}$** , where P max is maximum URL for the specified model, Metran-49-DI Transmitter of model 9170 withstands pressure less than 110 MPa.

● **Regarding tolerance to mechanical effects**, transmitters conform to version Group **V1** per GOST 12997. Permissible direction of vibration is along the standing axis of the transmitter installed in operation position.

● Transmitters are immune to the effect of industrial RF-interference:

- hardness 3 as per GOST R51317.4.4;.4.6;

- hardness 4 as per GOST R51317.4.2;

- hardness 5 as per GOST R50648, R50649, R50652;

- **Transmitters immunity to microsecond pulse interference (GOST R 51317.4.5) is provided together with a Noise Filter Unit (NFU)**. NFU can be ordered together with the transmitter (refer to the Ordering Information). NFU is not installed on transmitters of explosion-proof version "Ex" ;
- level of RF pulsation within frequency band over 10 kHz and output pulse amplitude less than 10 msec are not rated.

Transmitters correspond to noise emission standard specified for Class B as per GOST R 51318.22.

● Position of the transmitter does not effect calibration measurement range.

● Influencing Factors

Table 6

Effect	Additional Error		Types and Models of Transmitters
	при $P_{\max} \geq P_u \geq \frac{P_{\max}}{10}$	при $\frac{P_{\max}}{10} > P_u \geq \frac{P_{\max}}{25}$	
Change of ambient temperature within operating temperature range	Per 10°C		For all models
	Code 015 $\gamma_T = \pm(0.05 + 0.05 \frac{P_{\max}}{P_u}) \%$ Code 025, 050 $\gamma_T = \pm(0.1 + 0.05 \frac{P_{\max}}{P_u}) \%$	Code 015, 025, 050 $\gamma_T = \pm(0.1 + 0.1 \frac{P_{\max}}{10}) \%$	
Change of operating gage pressure from zero to maximum permissible gage pressure and from maximum permissible gage pressure to zero	$\gamma_{op} = k_p \Delta P_{oper} \frac{P_{\max}}{P_u} \%$, where $k_p = \pm 0.06\% / 1 \text{ MPa}$ for 9420 $k_p = \pm 0.05\% / 1 \text{ MPa}$ for 9430, 9440 Change of output signal caused by ΔP_{oper} can be decreased by adjustment of the initial output value at two-sided influence ΔP_{oper} on measuring cavities and in the absence of drop at the transmitter inlet		For Metran-49-DD
Vibration in compliance with modification groups V1 according to GOST 12997	$\gamma_f = \pm 0.15 \frac{P_{\max}}{P_u} \%$		For all models
External magnetic field with intensity 400 A/m	No more than $\pm 0.1\%$ of output turndown		
Electromagnetic interference: - RF magnetic field effect as per GOST R 51317.4.3; - other effects	% of output turndown: $\pm 0.1\%$ for transmitters with Code MP, MP2 $\pm 0.4\%$ for transmitters with Code MP1, MP3 $\pm 1.0\%$		

P_{\max} , P_u - refer to Table 5; 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 single-crystal 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.

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 transfers it into digital-to-analog converter (DAC), which converts it into an analog output signal (Code MP, MP1) and/or a digital signal into HART standard (Code MP2, MP3).

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.

OPERATION

Operation with Metran-49 transmitter (codes MP, MP1) is performed with the help of key buttons located under the cover of the electronic module.

Operation with Metran-49 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.

The digital signal from Metran-49 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.

Access to transmitter-specific commands is possible only in with a special driver. The following transmitter-specific commands are designed for Metran-49 transmitters: two commands for sensor calibration and one command of extended diagnostics of transmitter status.

Metran-650 HART-communicator interacts with Metran-49 transmitters in a full range of commands.

HC375 HART-communicator operates with Metran-49 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-49 transmitters (codes MP2, MP3).

INDICATION

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

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.

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 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.

The circuit for connection of a test instrument to transmitters with codes MP1, MP2, MP3 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-49 transmitters, refer to the document "Metran-49 Pressure Transmitters. Operation Manual".

POWER CONSUMPTION

● Power supply of Metran-49 and Metran-49-Vn transmitters is carried out from dc sources. Supply voltage and permissible load resistances are specified in Tables 7, 8.

Table 7

Parameter	Code of Electronic Converter			
	MP2, MP3	MP, MP1		
Output, mA	4-20 with HART	4-20	0-5	0-20
Supply voltage, V	12-42	12-42	22-42	22-42

● Power supply requirements:

For transmitters with codes MP, MP1

- insulation resistance - no less than 20 MOhm;
- test voltage at insulation strength test - 1.5 kV;
- output voltage ripple shall not exceed 0.5% of rating value Uout at frequency harmonic ≥500 Hz;
- power interruption- no more than 20 msec.

For transmitters with codes MP2, MP3

- To meet the above requirements as for insulation and output voltage ripple at frequency harmonic up to 500 Hz and to have RMS-noise 2.2 mV maximum within the frequency band from 500 Hz to 2.2 kHz.

● **Power supply of Metran-49-Ex transmitters:**

- **Power supply of MP, MP1** is carried out from intrinsically safe barriers or power supply units with explosion protection type "intrinsically safe electrical circuit" of levels "ia" or "ib" for explosive mixtures of sub-group IIC as per GOST 12.1.011, open-circuit voltage $U_{xx} \leq 24$ V, peak short-circuit current $I_{kz} \leq 120$ mA;

- **Power supply of MP2, MP3** is carried out from intrinsically safe barriers with explosion protection type "intrinsically safe electrical circuit" of levels "ia" or "ib" for explosive mixtures of sub-group IIC as per GOST 12.1.011 and passing HART-signal (for example, Valcom active barriers of models D1010S (1 channel), D1010D (2 channels), or Stahl active barriers of models 9303/13-22-11, 9001/51-280-110-14).

When using Metran-49-Ex transmitters outside hazardous areas without retention of explosion protection properties, it is allowed supplying transmitters from DC power supply with voltage specified in Table 7. At power interruption for less than 20 msec, the transmitter retains pressure measurement mode.

Permissible load resistance values of transmitters are given in Table 8.

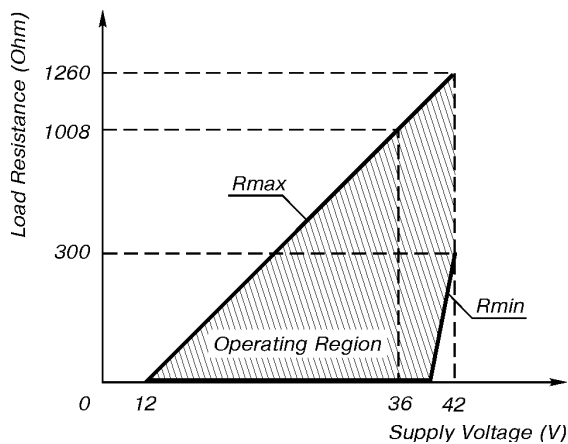
Table 8

Electronic Converter Code	Output, mA	Load Resistance	
		R_{min} , Ohm	R_{max} , Ohm
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)

Notes:

- *For transmitters with HART-signal, $R_{min} = 250$ Ohm at supply voltage from 18.5 V to 41 V.
- When operating Metran-49-Ex transmitters in hazardous areas, output resistance of intrinsically safe barriers (or spark protection units) is chosen from operating region given below, at supply voltage no more than 24 V. When using HART-channel of MP2, MP3 transmitters, minimum output resistance of spark protection unit should be no less than 250 Ohm.
- U - supply voltage, V.

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



$R_{min} = 250$ Ohm for transmitters with HART-signal.

Fig.1. 4-20 mA Output Signal.
When connecting NFU, R_{max} is decreased by 20 Ohm.

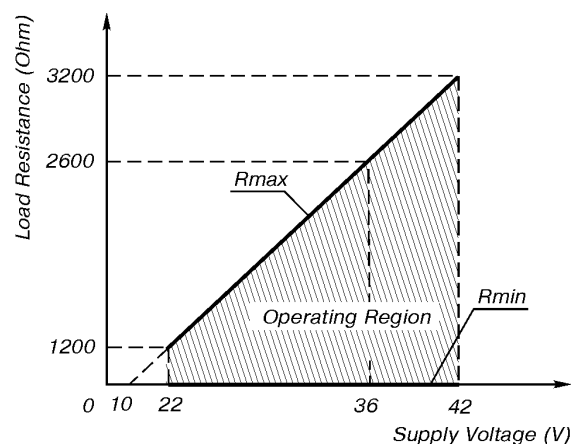


Fig.2. 0-5 mA Output Signal.
When connecting NFU, R_{max} is decreased by 100 Ohm.

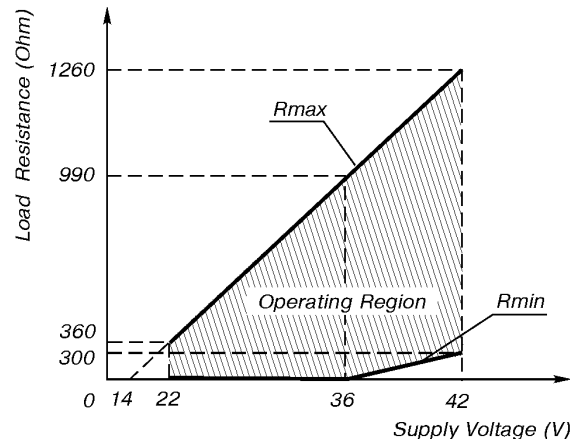


Fig.3. 0-20 mA Output Signal.
When connecting NFU, R_{max} is decreased by 50 Ohm.

● **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.

EXPLOSION PROTECTION

- Type of explosion protection - "intrinsically safe electrical circuit" with level of explosion protection:
 - "extra explosion-proof", explosion protection marking **0ExialICT5X**;
 - "explosion-proof", explosion protection marking **1ExibIICT5X**
- Type of explosion protection - "explosion-proof enclosure" and "special" with level of explosion protection "flameproof", explosion protection marking **1ExdsIIBT4/H₂X**

WEIGHT

Weight - 1.5 to 5.8 kg depending on model.

RELIABILITY

Average lifetime is 10 years.

Average lifetime of transmitters designed for pressure measurement of:

- corrosive media: of hydrocarbon condensate or natural gas is no less than 6 years;
- corrosive media containing hydrogen sulfide 5% of volume (Orenburg deposit) is no less than 6 years;
- corrosive media containing hydrogen sulfide 24.6% of volume (Astrakhan deposit) is no less than 4 years;

- operating fluids with sea-water or its steams is no less than 7 years.

Mean-time-between-failures is 100 000 hours.

Additional technological life test may be carried out for Metran-49-Ex and Metran-49-Vn transmitters for 360 hours in compliance with item 5.3.2 PB-09-170-97 upon special customer's request and at extra cost.

VERIFICATION

Verification interval is 2 years.
Verification procedure is MI 4212-012-2001.

WARRANTY

Warranty is 36 months from the date of commissioning.

DELIVERY SET

- Transmitter - 1 unit;
- Set of mounting parts (optional) - 1 set;
- Remote Indicator (VI) (optional);
- Socket 2RM (optional) - 1 unit;
- Operation Manual - 1 copy;
- Verification Procedure MI 4212-012-2001- 1 copy;
- Set-up Instructions (for transmitters with code 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 and H-Master configuration software with user's guide;
- Metran-650 Communicator;
- Metran-670 HART Multiplexer and MUX-Master software.

MOUNTING

Transmitters with Codes MP, MP1

It is recommended to apply control cables with rubber insulation for mounting. Other cables may be used 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 use a shielded cable with insulating sheath when laying communication line near electrical installations with power over 0.5 kW.

When mounting Metran-49 transmitters with a socket connector, switching shall be performed with wire of type MGTF TU 16-505.185 or MGShV TU 16-505.437 with conductor cross-section 0.35 mm².

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.

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);

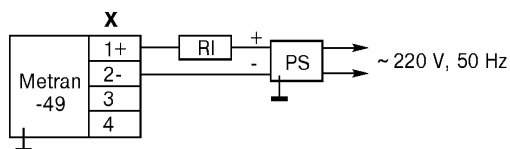
RI - Load resistance or total resistance of all loads in control system (determined by parameters of a barrier in diagrams with a spark protection barrier; or by parameters of a power supply, refer to Table 8); for transmitters MP2, MP3, it is no less than 250 Ohm;

X - Terminal block or connector.

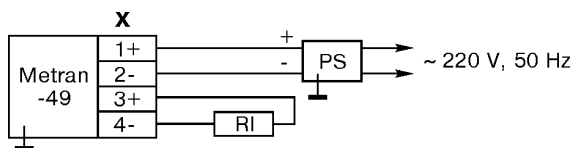
HART Communicator of "Ex" version and HART-modem of "Ex" version may be connected to any point of circuit, including hazardous area.

For MP, MP1 Transmitters

4-20 mA Output Signal

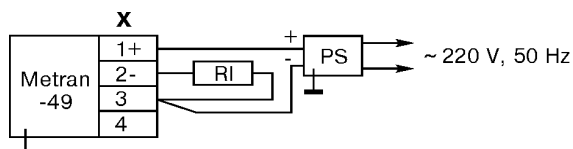


0-5, 0-20 mA Output Signal

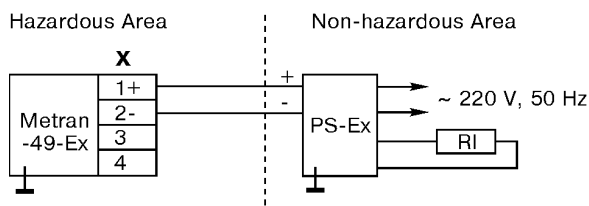


4-20 mA Output Signal

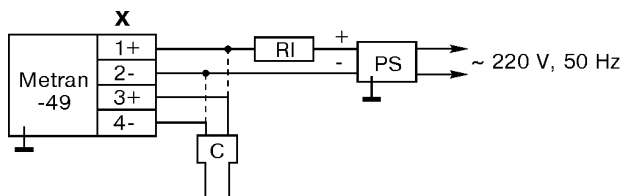
(2-wire communication line, wiring variant)



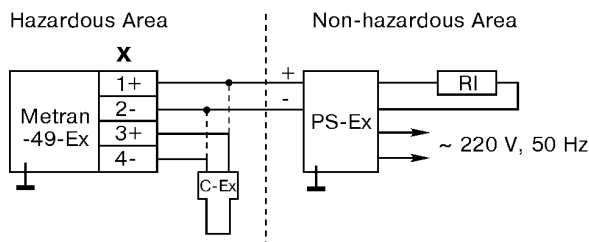
"Ex" Explosion-proof Version



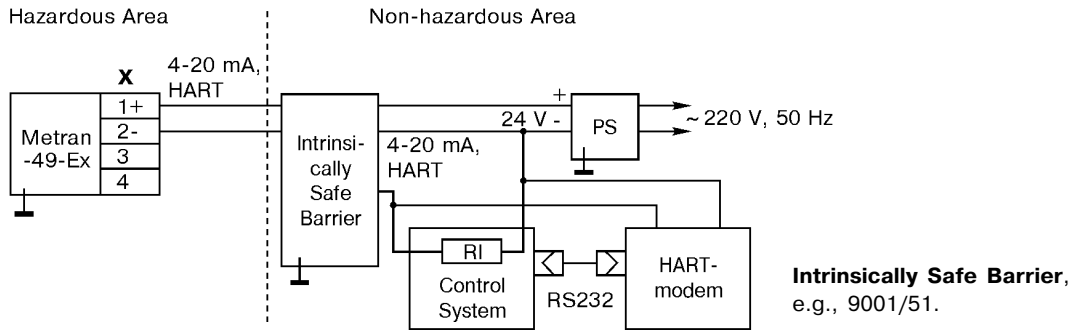
For Transmitters MP2, MP3



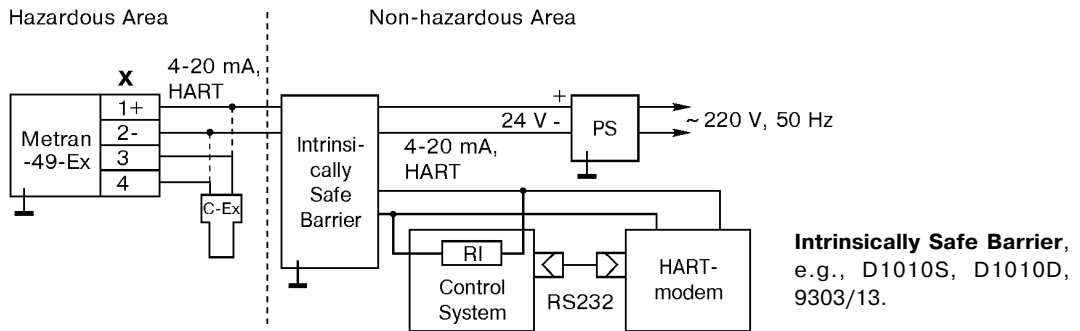
"Ex" Explosion-proof Version



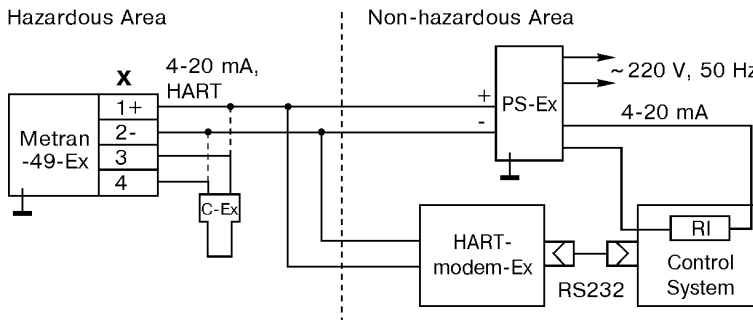
Option for MP2, MP3 Transmitters with Intrinsically Safe Barrier, without Galvanic Isolation of Signal and Supply Circuits



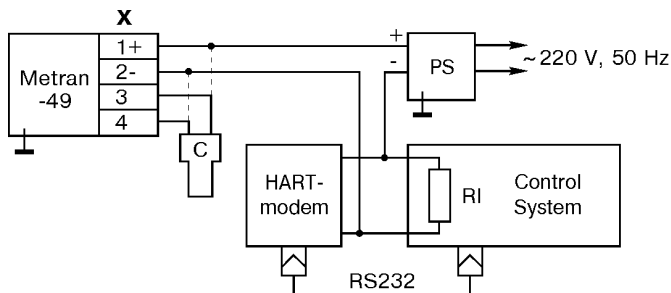
Option for MP2, MP3 Transmitters with Intrinsically Safe Barrier, Galvanic Isolation of Signal and Supply Circuits



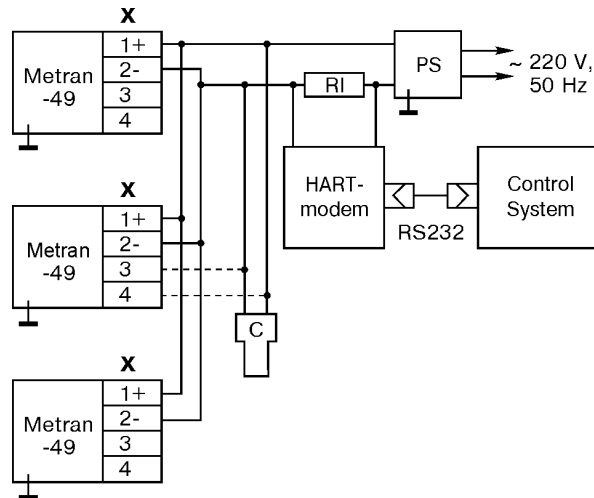
Option for MP2, MP3 Transmitters with Intrinsically Safe Power Supply Unit and HART-modem



Option for MP2, MP3 Transmitters with HART-modem



Multipoint Mode for MP2, MP3 Transmitters (no more than 15 transmitters)
(not recommended for intrinsic safety requirements)



Output current of the power supply (**PS**) should be no less than total consumption current of all transmitters (4 mA per transmitter), rush (maximum value) of consumption current at power up time should be 25 mA per transmitter.

ORDERING INFORMATION

METRAN-49-Ex-DD - 9420 - 06 - MP - t10 - 015 - 40 kPa - 10 - 42√ - BVN04 - ShR - Or - RI - BFP -TU...

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

1. Transmitter type (Tables 1, 2, 3); for transmitters of traditional version, codes Ex, Vn are not indicated.
2. Model (Tables 1, 2, 3).
3. Code of materials (Table 9). Transmitters with code 02 are not supplied to sites of Astrakhan and Orenburg deposits.
4. Code of electronic converter (Table 4).
5. Code of climatic type (Table 10).
6. Accuracy Code (Table 5).
7. Upper Range Limit* specified in an order, with a measurement unit (Tables 1, 2, 3).
8. Maximum permissible operating gage pressure (Table 3).
9. Code of output signal (Table 11) with root-extracting function (for linear function, sign √ is not indicated).
10. Code of mounting parts (Table 13). Manifolds specified in an order are available at additional cost, as well as availability against a special order.
11. Code of electrical connector (Table 12); connector "ShR" is not applied for transmitters of "Vn" version.
12. Code of operating fluid containing hydrogen sulfide (Table 14). Specified only for Astrakhan and Orenburg deposits.
13. Remote indicator** (specified only for transmitters with code MP).
14. Noise Filter Unit ***.
15. Designation of Specification TU 4212-008-12580824-99.

* For Metran-49-DIV pressure transmitters, only upper range limit value of gage pressure is indicated as upper range limit.

** Remote indicator (RI) is designed for control, settings adjustment, 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 RI. RI is available at additional cost, as well as availability against a special order. Application of remote indicators RI in Metran-49-Vn-...-MP transmitters is permissible only taking into account special operation conditions subject to "Hot Work Regulations inside or outside Hazardous Area".

*** Noise Filter Unit can be installed on transmitters with codes MP, MP1, MP2, MP3 of traditional and "Vn" versions.

Note: When ordering the 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.

CODE OF MATERIALS

Table 9

Code	Diaphragms	Flanges
02	36NiCrTiAl alloy	12Cr18Ni10Ti steel
05*	15Cr18Ni12Si4TiAl alloy	12Cr18Ni10Ti steel
06**	06CrNi28MoCuTi alloy	06CrNi28MoCuTi or 10Cr17Ni13Mo2Ti alloy
07*	Tantalum	10Cr17Ni13Mo2Ti or 10Cr17Ni13Mo3Ti
09*	Titanium VT1	VT-6 alloy or Titanium alloy

* As agreed upon with the manufacturer.

** For operating media according to Table 14.

36NiCrTiAl, 06CrNi28MoCuTi alloys, 15Cr18Ni12Si4TiAl, 12Cr18Ni10Ti, 10Cr17Ni13Mo2Ti steel as per GOST 5632, Titanium alloys as per GOST 19807.

O-ring material - fluoroplastic or special rubber types; material of metal gaskets - stainless steels.

At customer's request, flanges and connectors (set of mounting parts), nipples (set of mounting parts), plugs for draining and purging of various materials in combinations specified in Table 9 can be installed. Transmitter version according to materials is determined by material of diaphragm.

CODE OF CLIMATIC VERSION

Table 10

Code	Climatic version type as per GOST 15150	Limiting Values of Ambient Temperatures during Operation, °C
t 1	UKhL 3.1	5...50
t 8	T3	-25...70
t 10	U2	-40...70
t 11	U1	-42...70
t 12	TS1	-10...70

LCD works at ambient 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)
S	Gland lead-in for cable with external diameter no more than 10 mm
S1	Gland lead-in for cable with external diameter no more than 12.4 mm

CODE OF MOUNTING PARTS

Table 13

Code	Mounting Parts
K1/4	Mounting flange with threaded hole K1/4"
K1/2	Mounting flange with threaded hole K1/2"
N	Nipple for connection to external pipe diameter 14 mm
M20	Nipple with captive nut M20×1.5 for connection to external pipe diameter 14 mm
BVN04	Manifold of stainless steel (12Cr18Ni10Ti) with nipple and captive nut M22×1.5 for connection to external pipe diameter 14 mm (for connection to Metran-49-DD, Metran-49-Ex-DD, Metran-49-Vn-DD transmitters)
BVN09	Manifold of stainless steel (12Cr18Ni10Ti) for connection to internal thread K1/2" (for connection to Metran-49-DD, Metran-49-Ex-DD, Metran-49-Vn-DD transmitters)

CODE OF OPERATING MEDIUM CONTAINING HYDROGEN SULFIDE

Table 14

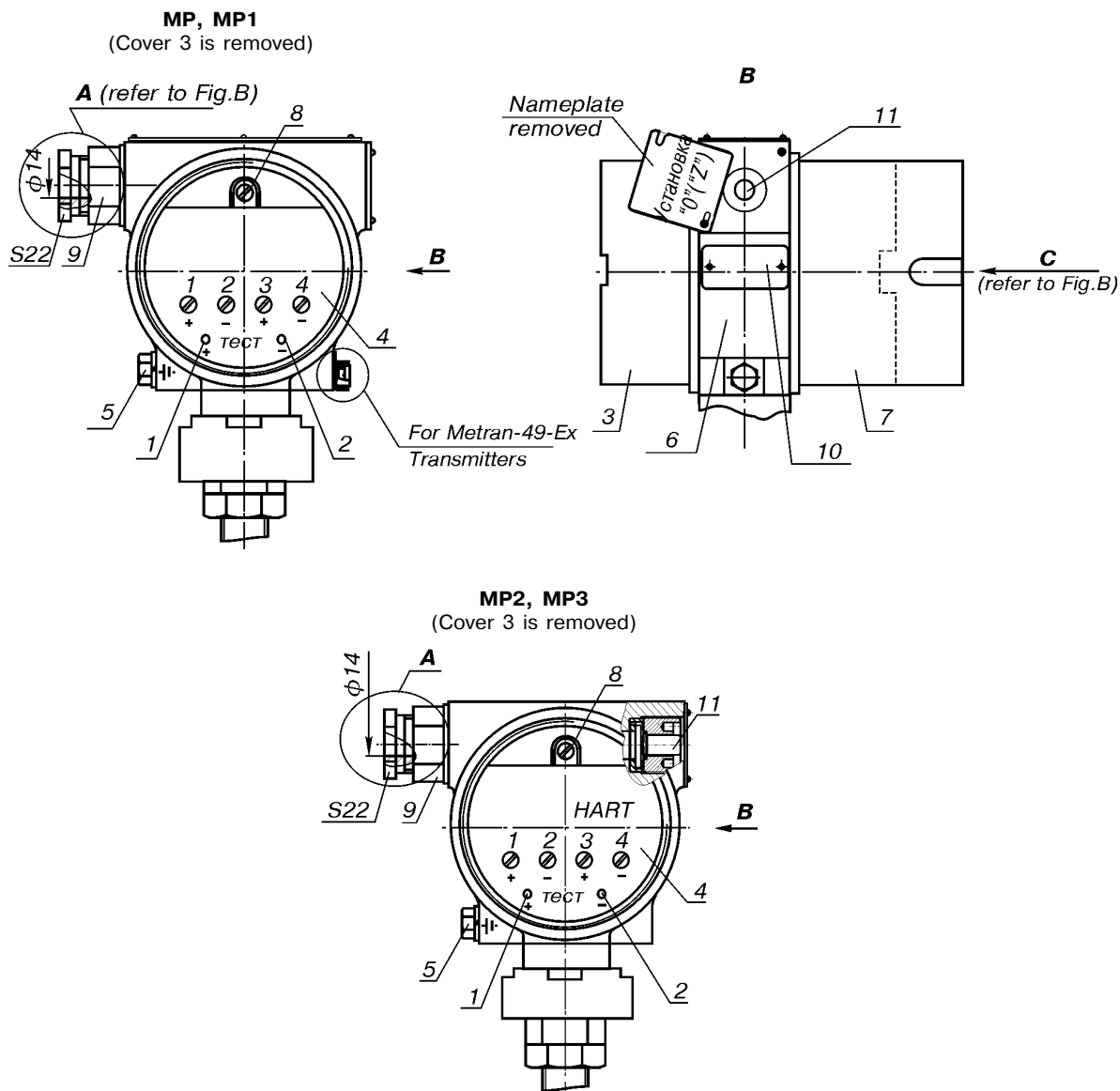
Code	Operating Medium Containing Hydrogen Sulfide
Or	Orenburg deposit with content of hydrogen sulfide up to 5% of volumetric
Astr	Astrakhan deposit with content of hydrogen sulfide up to 24% of volumetric

METRAN-49 TRANSMITTERS
OVERALL, MOUNTING AND CONNECTION DIMENSIONS

ATTENTION!

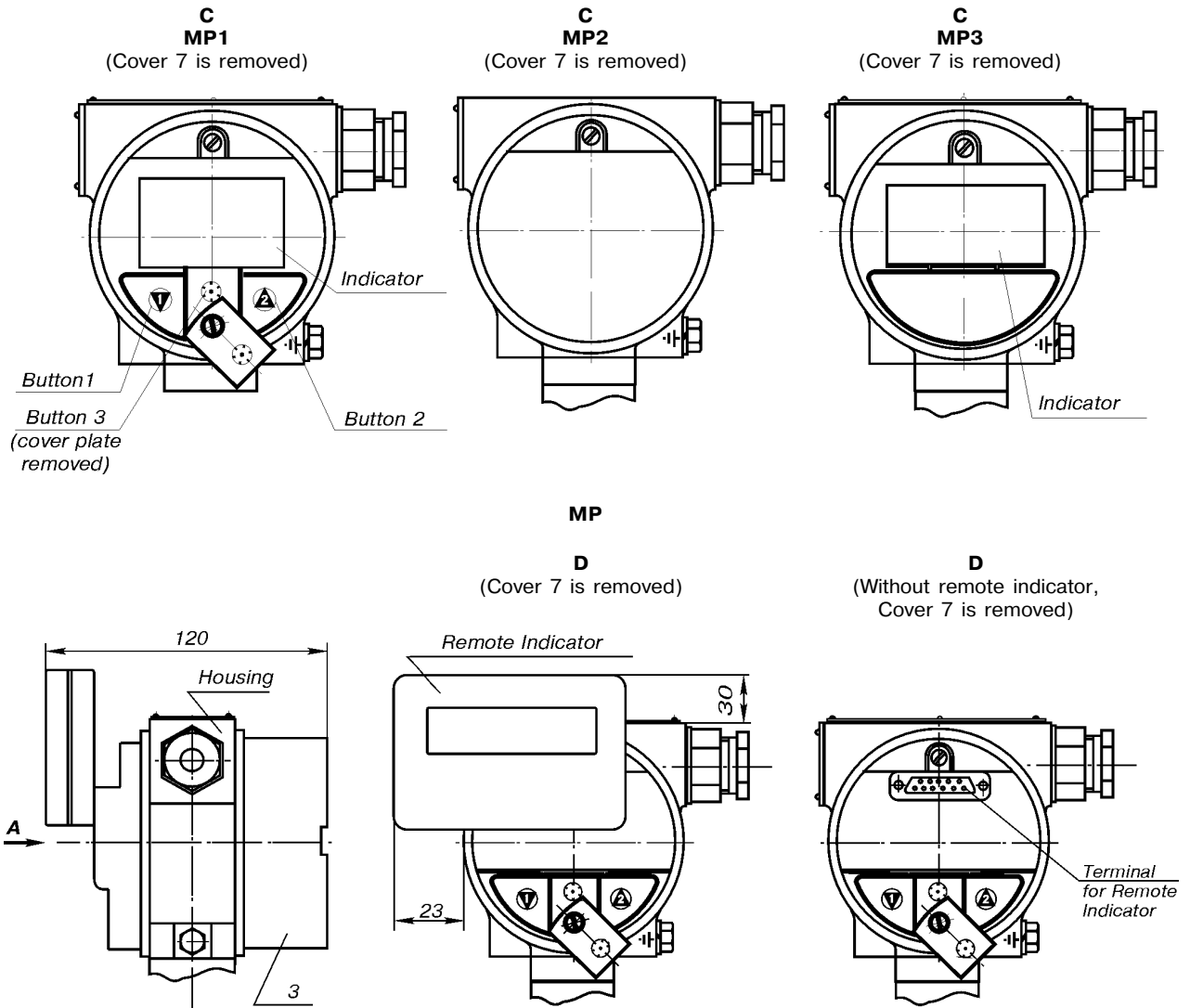
Views of electronic converters of Metran-49 transmitters are presented in Figures A, B.

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.

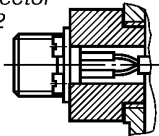
Figure A.



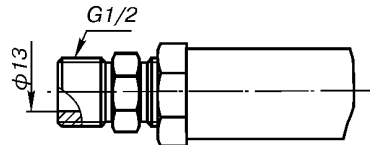
CABLE ENTRIES

A (Option)

Plug of Socket Connector
ShR14 or ShR22

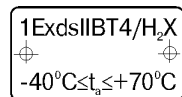


A (Option)
For Metran-49-Vn Transmitters
Code C and C1



NAMEPLATES WITH EXPLOSION PROTECTION MARKING

For Metran-49-Vn Transmitters



For Metran-49-Ex Transmitters

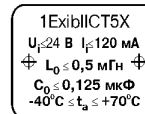
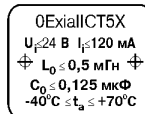
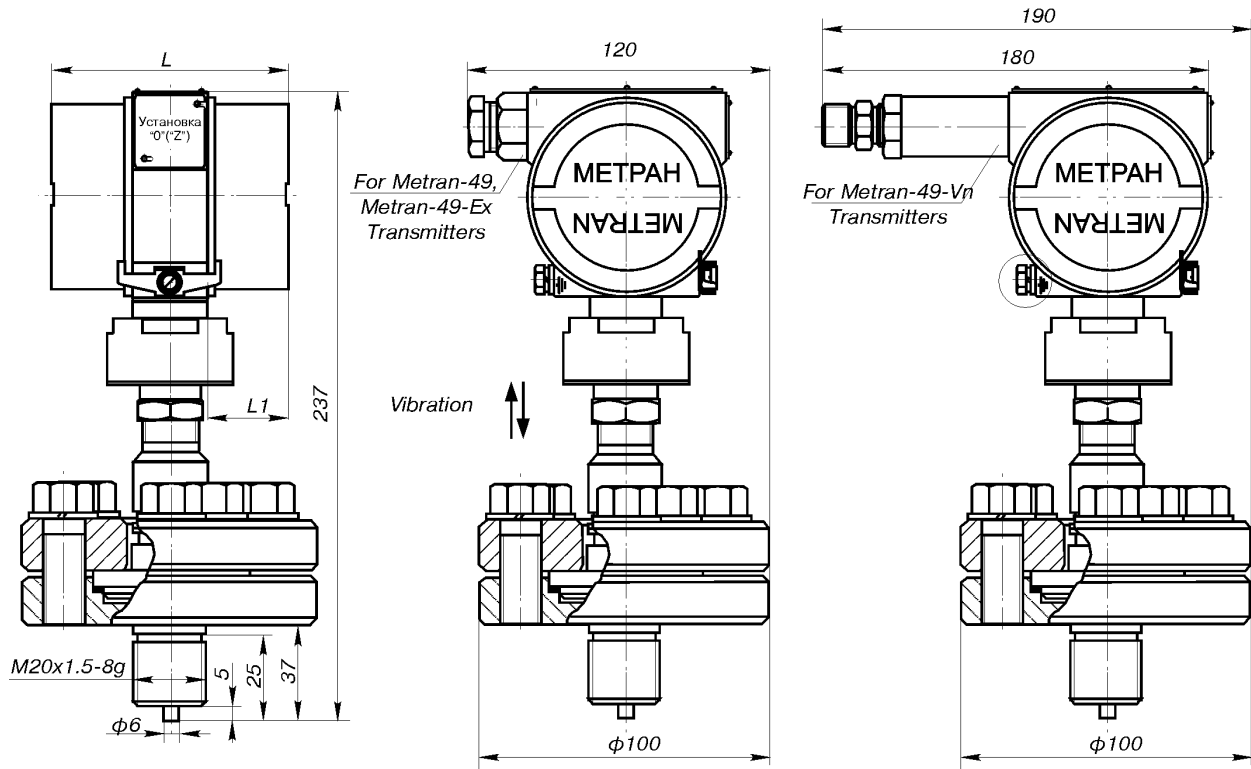


Fig.B. (for the others refer to Figure A).

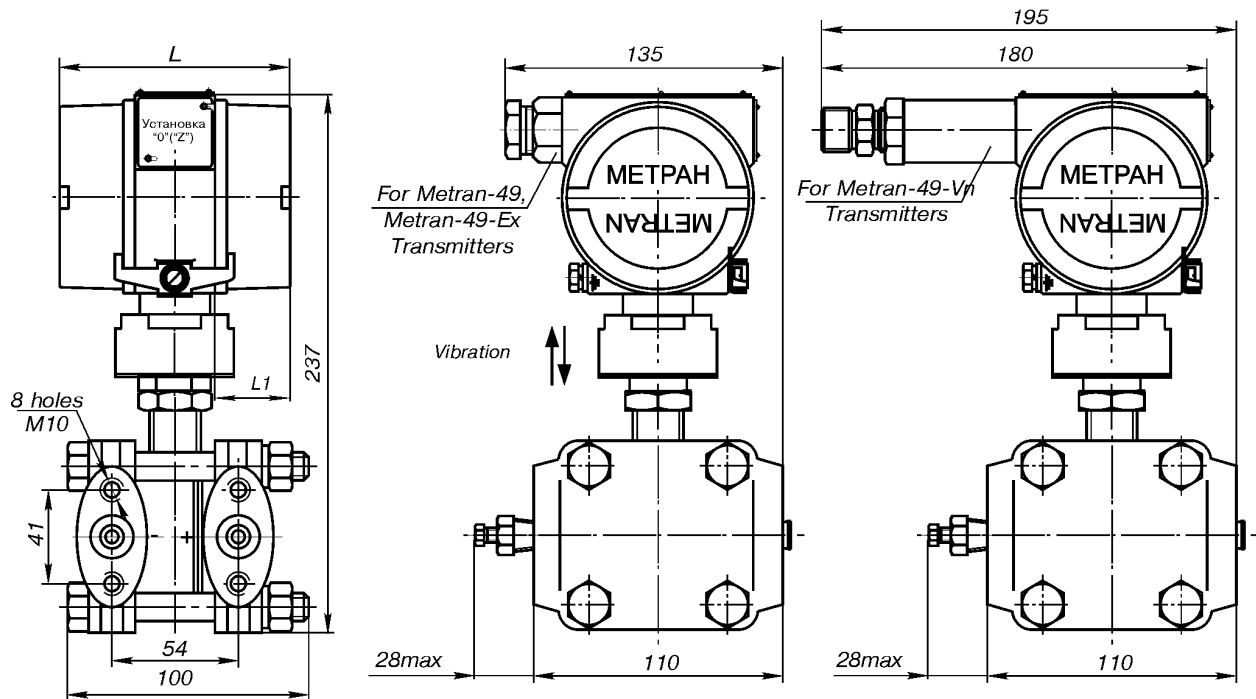
OVERALL AND CONNECTION DIMENSIONS OF METRAN-49 TRANSMITTERS



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

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

Figure 1. Metran-49 of Models 9150, 9160, 9170, 9350.



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

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

Figure 2. Metran-49-DD of Models 9420, 9430, 9440.

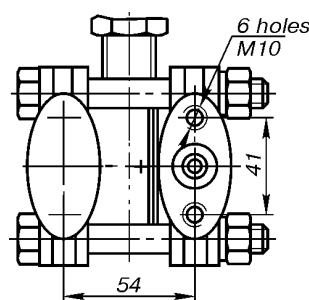


Figure 3. Metran-49-DI of Models 9120-9140, Metran-49-DV of Models 9220, 9230, Metran-49-DIV of Models 9320, 9330, 9340; for the others refer to Figure 2.

INSTALLATION OF MOUNTING PARTS

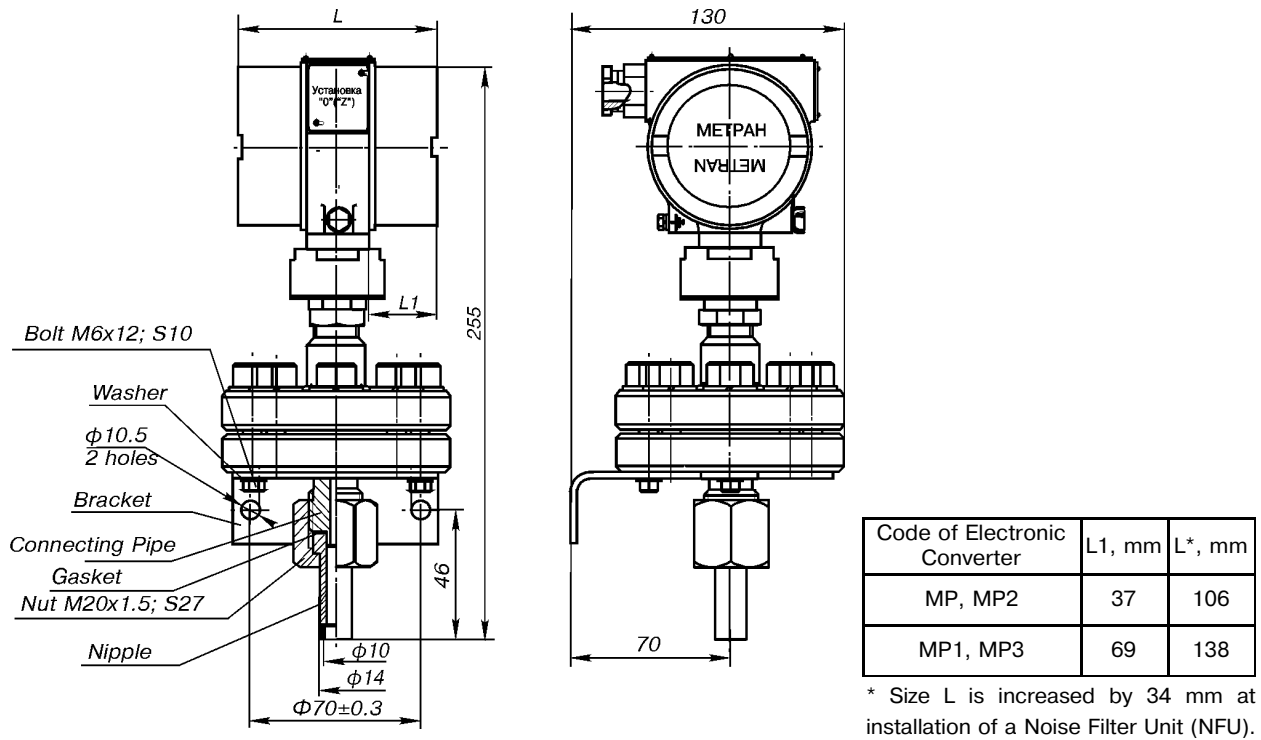


Figure 4. Metran-49 of Models 9150, 9160, 9170, 9350 with mounted nipple and nut M20x1.5.

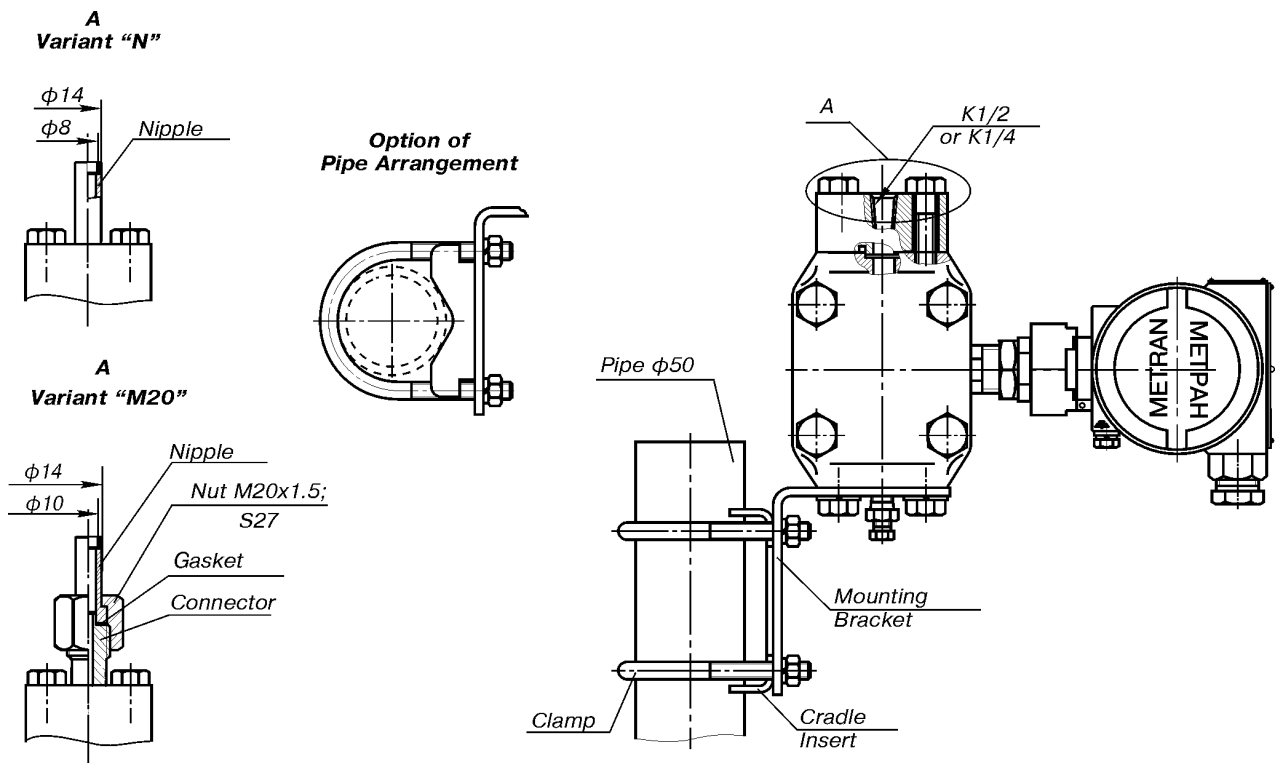


Figure 5. Metran-49 of Models 9120, 9130, 9140, 9220, 9230, 9320, 9330, 9340 with mounted flange.

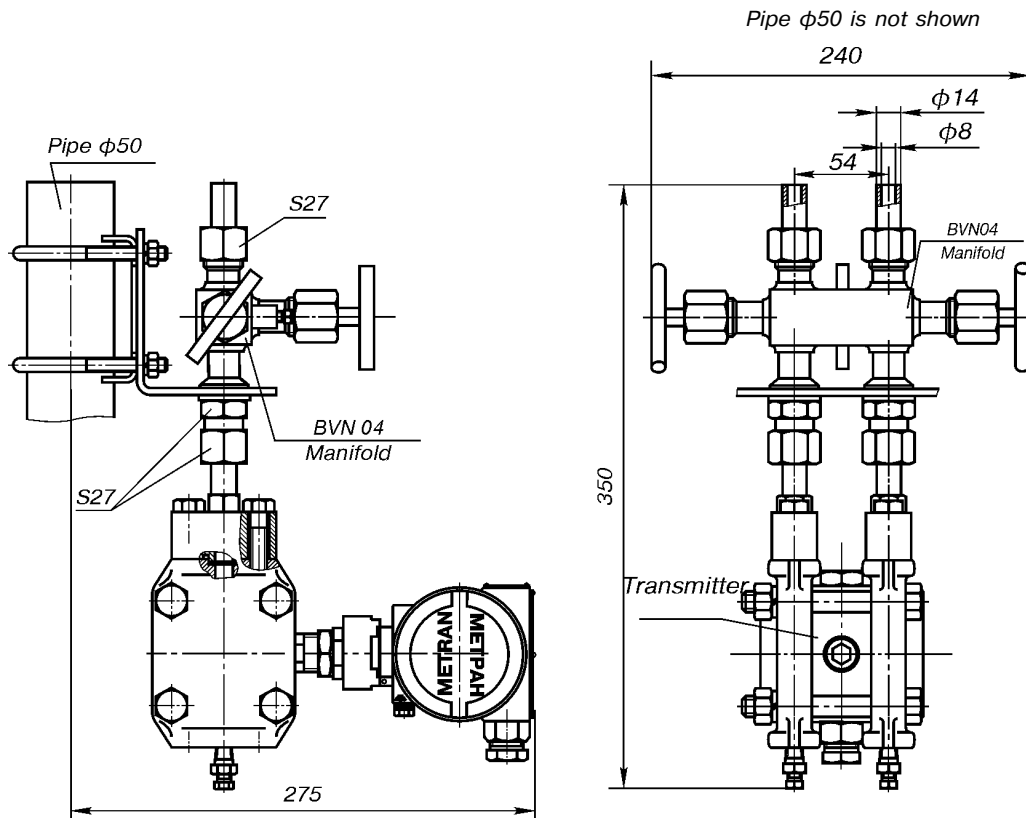


Figure 6. Metran-49-DD of Models 9420, 9430, 9440 with mounted manifold BVN 04.

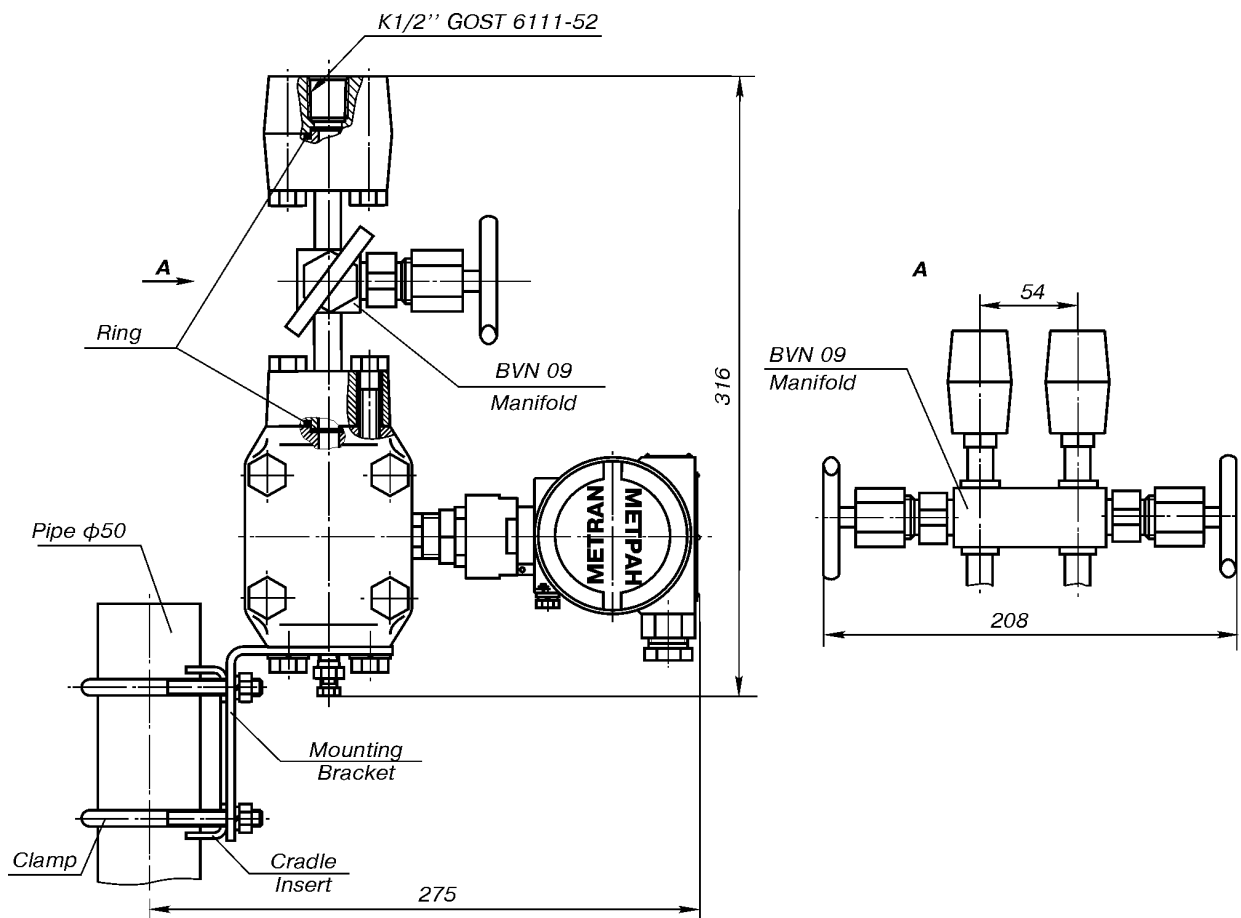


Figure 7. Metran-49-DD of Models 9420, 9430, 9440 with mounted manifold BVN09.