Resistance thermometers TS-B (ТС-Б)

Working principle and application

Resistance thermometers TS-B(ТС-Б)- are designed to measure the temperature of gaseous, bulk, solid and liquid substances in various industries.

Resistance thermometers are produced in two models (versions):
- TS-B(ТС-Б) **–** resistance thermometers, which has the output signal according to its Nominal Static Characteristics (NSC) **Pt100, Pt500, Pt1000, 50P(JIS), 100P(JIS), 500P(JIS).**
- TS-B-U (ТС-Б-У)– resistance thermometers with unified output signal **(4-20) mA or (0-5)mA**, digital protocol HART, combined with unified output signal.

Working principle of TS-B(ТС-Б) is based on the change in resistance of the sensing element depending on the change in measured temperature.
Working principle of TS-B-U(ТС-Б-У) is based on converting the signal of primary sensor (in this case TS-B (ТС-Б-У)) to a unified output signal (4-20) mA or (0-5) mA and transmitting the converted signal, via protocol HART, to a device which supports this protocol (in case of modifications with protocol HART) with the help of temperature transmitter.

TS-B(ТС-Б) is used as the primary temperature transducer in TS-B-U (ТС-Б-У). The temperature transmitter (PI-001) is used as secondary temperature transducer and is mounted in the connection head of TS-B-U(ТС-Б-У).

TS-B-U(ТС-Б-У) **can have a linear and/or non-linear dependence** of the output signal depending on temperature.

TS-B-U (ТС-Б-У)can have a **built-in display**, which displays characters corresponding to certain TS-B-U (ТС-Б-У) settings, or the value of the input parameter in digital form in the units of measurement set at the setting, or the value of the output signal as a percentage of the measuring range.

TS-B (ТС-Б) are classified according to the type of the Sensing Element (SE) in accordance with GOST 6651 as follows:

- **platinum** - a sensing element made of platinum;

TS-B(ТС-Б) **and TS-B-U** (ТС-Б-У)**for use in hazardous locations:**

1. with type of protection "explosion-proof enclosure" and explosion protection marking 1ExdIICT6X according to GOST 60079-1;

2. with type of protection "intrinsically safe electric circuit" of the level "ia" and marking 0ExiaIICT6X in accordance with GOST 31610.11.
In addition to the above, resistance thermometers are manufactured with combined type of explosion protection with marking 1ExdiaIICT6X.

Resistance thermometers with the type of protection "intrinsically safe circuit" of the "ia" level should be operated as part of the associated electrical equipment having an input measuring circuit with the type of protection "intrinsically safe circuit" of the "ia" level.

Maximum electrical parameters of intrinsically safe circuits of TS-B with marking Ex ia

- input voltage Ui 2 V;
- input current Ii 2 mA;
- power input Pi 0,005 W;
- internal inductance Li 0,1 mH;
- internal capacitance Ci 0,3 nF.

Maximum electrical parameters of intrinsically safe circuits of TS-B-U with marking Ex ia

- input voltage Ui 30 V;
- input current Ii 100mA;
- power input Pi 0,8 W;
- internal inductance Li 0,1 mH;
- internal capacitance Ci 0,048 mF.

Operating conditions of TS-B(ТС-Б) **and TS-B-U** (ТС-Б-У)

TS-B and TS-B-U (ТС-Б-У) **are resistant** to the influence of ambient air temperature **from -50 °C to +80 °C,** to relative humidity of ambient air 95 % at 35 °C and at lower temperatures (group D3 GOST 12997).

For TS-B-U (ТС-Б-У) with **LCD display** the ambient air temperature is from -40 °C to +70 °C.

TS-B and TS-B-U (ТС-Б-У) are resistant to sinusoidal vibration in the frequency range from 10 Hz to 55 Hz, with a displacement amplitude of 0.35 mm.

Average life – not less than 12 years.

Calibration interval

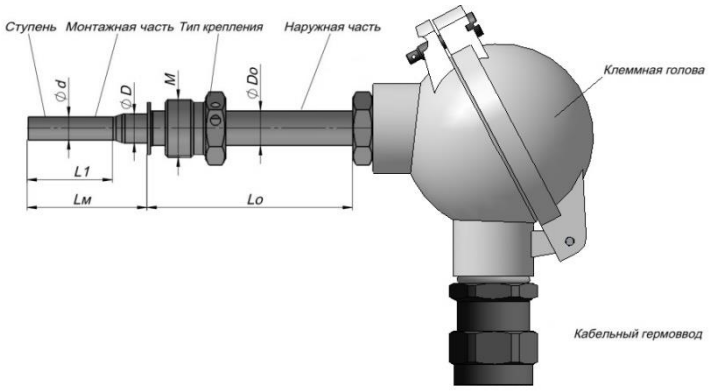
– 2 years;

– 5 years (for resistance thermometers with operating temperature range from -50 °C to +300 °C)

The manufacture of resistance thermometers with design parameters other than those listed below is possible with the agreement of the manufacturer.

Material of protective sheaths – stainless steel 12X18H10T. In agreement with the customer, and based on operating conditions of resistance themometers, protective sheath can be made from other materials.

ORDERING CODE FOR RESISTANCE TEMPERATURE DETECTORS TS-B AND TS-B-U



Sample of ordering code for TS-B(ТС-Б):

1-	2	3	4-	5	-6	-7	-8-	(9)-	-10/	11	(12	/13)	-14.	15/	16.	17	-18	-20	-21	-22
ТС-Б-	Ex ia	IIC	T6	50П	-В	-х4	-П	-(от 0 до +50)	-80	/10-	(60	/8)	-ПШ.	80	/12.	М20х1,5	-Д	-МГ	-IP68	-100

Sample of ordering code for TS-B-U(ТС-Б-У):

1-	2	3	4-	(5)	-(6)	-8	-(9)	-10	/11	-14.	15.	17	-18	-19	20
ТС-Б-У-	Ex db	IIC	T6	(4-20)мА-(HART)	-(±0,5)	-П	-(от 0 до +50)	-100	/8	-ПШ.	80.	М20х1,5	-Ти	-ИЖЦ	-МГ

TS-B TS-B-U

2**. Application in hazardous locations (indicate if only required)**

Ex db, Ex dbia, Ex ia Extb, Extbia

Maximum electrical parameters of intrinsically safe circuits of TS-B with marking Ex ia
- input voltage Ui 2 V;
- input current Ii 2 mA;
- power input Pi 0,005 W;
- internal inductance Li 0,1 mH;
- internal capacitance Ci 0,3 nF.

Maximum electrical parameters of intrinsically safe circuits of TS-B-U with marking Ex ia
- input voltage Ui 30 V;
- input current Ii 100mA;
- power input Pi 0,8 W;
- internal inductance Li 0,1 mH;
- internal capacitance Ci 0,048 mF. 3.Subgroup of explosion-proof/intrinsically safe equipment)

3 Explosion-proof equipment group

IIA, IIB, IIC, IIIA, IIIB, IIIC

4 Temperature class

T1, T2, T3, T4, T5, T6

T85°C…T450°C

5. NSC (for TS-B) (see table 1)/ range of unified output signal (for TS-B-U)}

TS-B	TS-B-U
platinum	
Pt100, Pt500, Pt1000, 50P (50П), 100P (100П), 500P (500П)	(4-20) mA (0-5)mA HART*

Table 1

TS-B	NSC	R0, Ohm	Measurement range*,°C	Recommended measuring current, mA	α, °C-1
Platinum	50P	50	from -196 to +550	1	0,00391
	100P	100			
	500P	500		0,2	
	Pt100	100		1	0,00385
	Pt500	500		0,2	
	Pt1000	1000			

6. Tolerance class (for TS-B) (see table 2, 3)/ basic given tolerance (for TS-B-U), %}

TS-B	TS-B-U
platinum	
AA; A; B; C	±0,25; ±0,5; ±1

Table 2 – Characteristics of platinum TS-B

Tolerance class	Measurement range,°C		Tolerance,° C
	wire wound SE	thin-film SE	
AA	From -50 to +150	From 0 to +150	±(0,1 + 0,0017 ·|t|)
A	From -100 to +450	From -70 to +300	±(0,15 + 0,002 ·|t|)
B	From -196 to +550	From -70 to +450	±(0,3 + 0,005·|t|)
C	From -196 to +550	From -70 to +450	±(0,6 + 0,01·|t|)

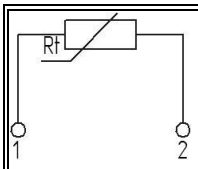
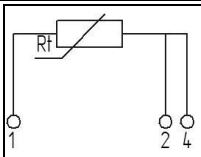
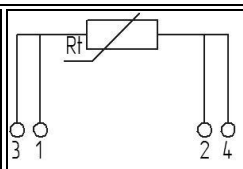
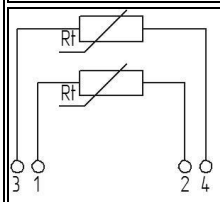
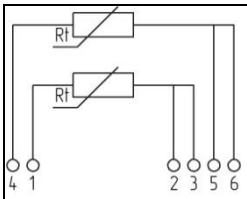
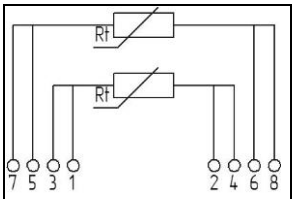
Main technical characteristics of TS-B-U

The measurement range is from -50 °C to +600°C.
The range of the unified output signal is from 4 to 20 mA, or from 0 to 5 mA.
Digital protocol HART, combined with a unified output signal.
The basic given tolerance of TS-B-U: ±0,25 %; ±0,5 %; ±1 %.
The power consumed by the TS-B-U is not more than 0,8 W.
Supply voltage (24±12) V DC.

7. Wiring configuration of internal conductors with sensing element (SE) (see table 4)}

TS-B: x2; x3; x4; 2x2; 2x3; 2x4

Table 4 – Wiring configuration of internal conductors with sensing element (SE) and their ordering codes

 x2 2-wire configuration, one SE	 x3 3-wire configuration, one SE	 x4 4-wire configuration, one SE
 2x2 2-wire configuration, two SE	 2x3 3-wire configuration, two SE	 2x4 4-wire configuration, two SE

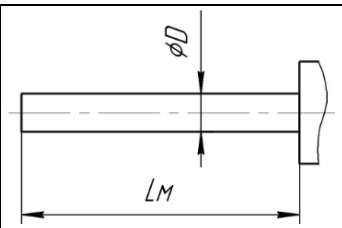
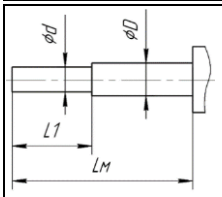
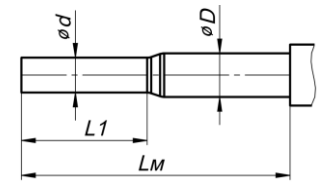
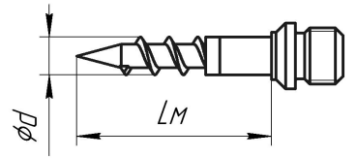
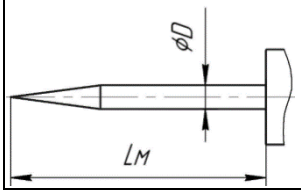
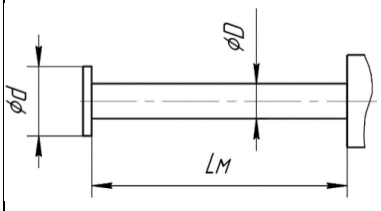
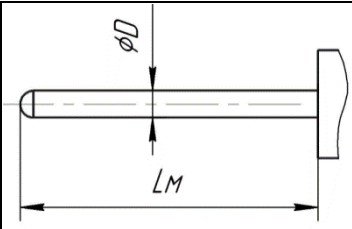
Remark: manufacture of TS-B with two or three SE is possible only after agreement with the manufacturer.

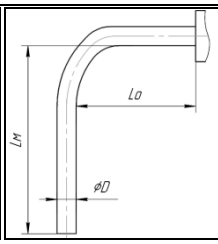
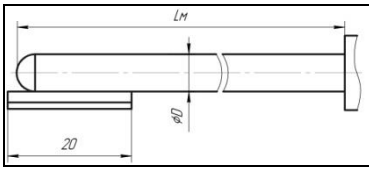
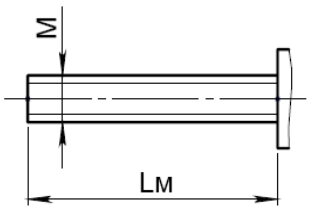
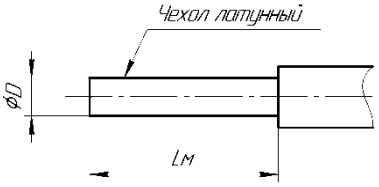
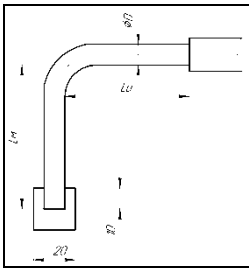
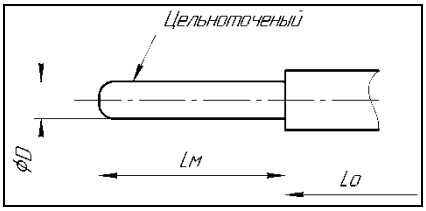
8. Probe type (see table 5)}

П, Пб, Пи, Пв, К, Пу (Ку), Пн ,В, Пк, Пц, Пл, К, В

Table 5 – Probe design types

Probe design types	Ordering code	Drawing	Probe diameter D (d), mm	Insertion (probe) length Lm (L1), mm	
				min	max
Immersible	П		4	30	120
			5	40	320

		 straight	6	50	630
			8	60	1000
			10	50	3150
		 stepped	8 (6);10 (6)	60(10)	1000 (60)
			10 (8)	60(10)	3150(60)
		 stepped tapered*	8 (6)	60(10)	1000 (60)
			10 (8)	60(10)	3150(60)
	Пб		6	50	3150
			8		
			10		
Immersible acicular	Пи		4	60	100
			5	60	200
Surface type	Пв		6(10);	30	630
			8(18);	50	1000
			10(18)	50	3150
MI cable type** (single bending is allowed)	К		3;4;4,5;5;6	30	1000

Immersible angular	Пу (Ку)		8;10;12;16;20 (3;4;4,5;6)	50(50)	1000 (100)
Immersible surface type (MI cable type superficial)	Пн		4;5;6;8;10 (4;4,5;6)	50	1000
Threaded probe type	В		M4x0,7; M5x0,8; M6x1,0; M8x1,25; M10x1,5; M12x1,5	6	50
Submersible Made of brass	Пл		4	30	50
			5	30	150
			6	30	500
			8	30	1000
			10	100	1500
Submersible Angular (with overlay plate)	Пну		3; 4; 4,5; 5; 6; 8; 10; 12; 16; 20	50	3000
Submersible One-piece turned	Пц		Under the order		

Remark

1. *Reducing the gap between the sheath material and the sensing element decreases response time.
2. **Cable with copper or pure nickel conductors in mineral insulation and in a protective sheath of stainless steel (12X18H10T, AISI 310, AISI 316, AISI 321, Inconel 600 and etc.). The MI cable withstands at least two bends around cylinder with a diameter equal to ten times the cable diameter. Suitable for measuring the temperature of hard-to-reach areas with aggressive media..

9 . Measurement range*, °C**

platinum from -196 to +550

TS-B-U: from -50 to +600

10. Probe insertion length Lm, mm

50; 60; 80; 100; 120; 160; 200; 250; 320; 400; 500; 630; 800; 1000; 1250; 1600; 2000; 2500; 3150
(different probe insertion lengths are possible after agreement with manufacturer)

11. Probe diameter D, mm

3; 4; 5; 6; 8; 10; 12; 16; 20 (different probe diameters are possible after agreement with manufacturer)

12. Length of stepped part L1, mm

10; 60 (is not specified if absent)

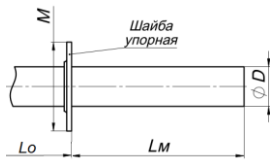
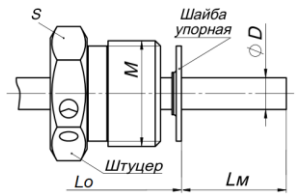
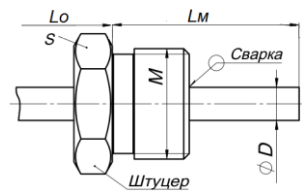
13. Diameter of stepped part d, mm

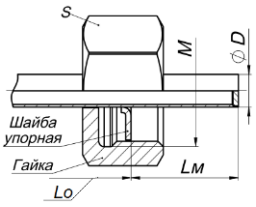
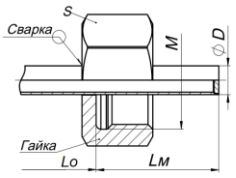
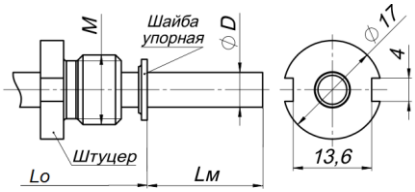
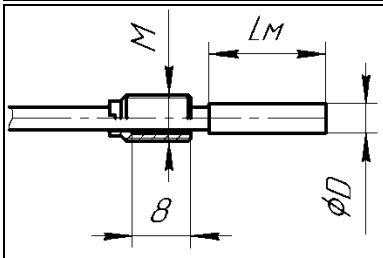
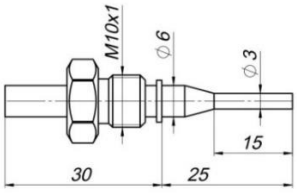
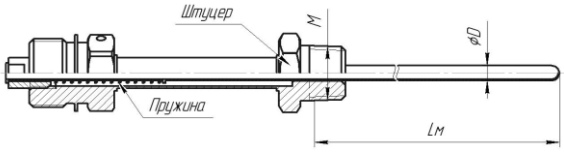
6;8 (is not specified if absent)

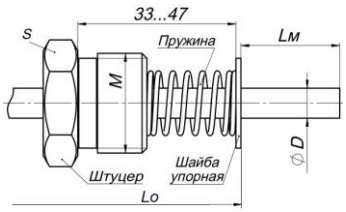
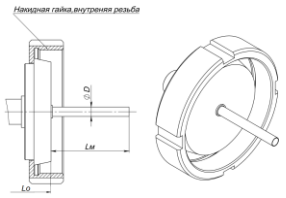
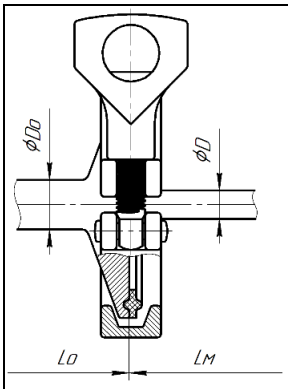
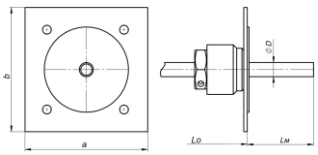
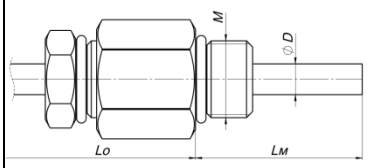
14. Mounting style (see table 6

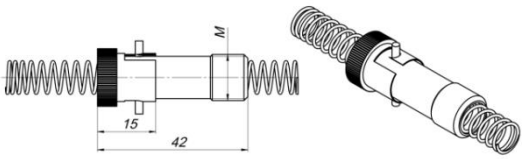
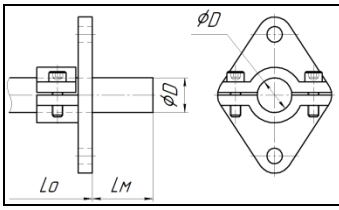
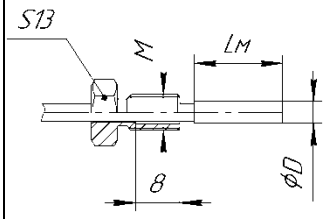
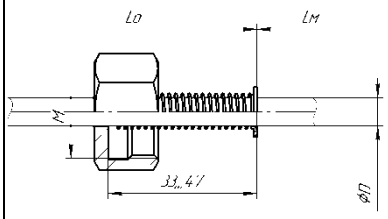
ПШ, ПГ, НШ, НГ, ПрШ, ПрГ, Бр, ПШп, ПШв, ПШпв, ПЦШ, ПЦФ, ПГш, Ш, Ф, ПЦрШ, Фв

Table 6 – Mounting styles

Ordering code	Drawing, description	M	D, mm
-	Without process connection (Plug-in type)	-	4; 5; 6; 8; 10
Ш	 Thrust washer	10; 12; 14; 16; 18	4; 5; 6; 8; 10
ПШ	 Sliding threaded connection	M12x1,5; G1/4	4; 5; 6
		M16x1,5; G3/8	4; 5; 6; 8; 10
		M20x1,5; G1/2	5; 6; 8; 10
		M24x1,5	6; 8; 10
НШ	 Fixed threaded connection	M12x1,5; G1/4	4; 5; 6
		M16x1,5; G3/8	4; 5; 6; 8; 10
		M20x1,5; G1/2	5; 6; 8; 10
		M24x1,5	6; 8; 10

ПГ	 Sliding nut	M12x1,5; G1/4	4; 5; 6
		M16x1,5; G3/8	4; 5; 6; 8; 10
		M20x1,5; G1/2	5; 6; 8; 10
НГ	 Fixed nut	M12x1,5; G1/4	4; 5; 6
		M16x1,5; G3/8	4; 5; 6; 8; 10
		M20x1,5; G1/2	5; 6; 8; 10
ПШп	 Sliding threaded connection, "connection with slots" design	M8x1; M10x1; M12x1,5; G1/4	4; 5; 6
ПШпв	 Sliding threaded connection, "bushing with slots" design	M8x1; M10x1; M12x1,5; G1/4”	4; 5; 6
ПШл	 Подвижный штуцер латунный		
НрШ	 Неподвижный подпружиненный штуцер	M12x1,5; G1/4; 1/8NPT; 1/4NPT; K1/8; K1/4; R1/8; R1/4	4; 5; 6
		M16x1,5; G3/8; 3/8NPT; K3/8; R3/8	4; 5; 6; 8; 10
		M20x1,5; G1/2; 1/2NPT; K1/2; R1/2	4; 5; 6; 8; 10
		M24x1,5	6; 8; 10
		M27x2; G3/4; 3/4NPT; K3/4; R3/4	6; 8; 10

;ПрШ	 Sliding spring loaded threaded connection	M12x1,5; G1/4 M16x1,5; G3/8 M20x1,5; G1/2 M27x2; G3/4 M33x2; G1;	4; 5; 6; 8; 10; 12
ПГш*	 Sliding knuckle threaded nut with slots ("sanitary nut")	Rd52x1/6; Rd58x1/6; Rd65x1/6; Rd78x1/6	6; 8; 10; 12
Ф Clamp	 Flange	1/4"; 3/8"; 1/2"; 5/8"; 3/4"; 1"; 1 1/4"; 1 1/2"; 2"; 2 1/2"; 3"	per request
Фв	 Plate flange	axb: 70x70; 45x45	5; 6; 8; 10
ПЦШ	 Compression fitting	M12x1,5; G1/4; 1/8NPT; 1/4NPT; K1/8; K1/4; R1/8; R1/4	4; 5; 6
		M16x1,5; G3/8; 3/8NPT; K3/8; R3/8	4; 5; 6; 8; 10
		M20x1,5; G1/2; 1/2NPT; K1/2; R1/2	5; 6; 8; 10
		M24x1,5	6; 8; 10; 12; 16
		M27x2; G3/4; 3/4NPT; K3/4; R3/4	8; 10; 12; 16; 20
		M33x2; G1; 1NPT; K1; R1	10; 12; 16; 20

Бр	 Bayonet connection	M10x1; M12x1,5	
ПЦФ			10; 12; 16; 20; 22; 25; 27; 28; 30
ПШв		M8x1	4; 5
		M10x1; M12x1,5; G1/4"	4; 5; 6
		M12x1.5	4; 5; 6; 8
		M16x1.5; M16; G1/4; G3/8	4; 5; 6; 8; 10
		M20x1.5; G1/2	4; 5; 6; 8; 10
ПрГ		M12x1,5; G1/4	4; 5; 6
		M16x1,5; G3/8	4; 5; 6; 8; 10
		M20x1,5; G1/2	5; 6; 8; 10; 12
		M24x1,5	6; 8; 10; 12
		M27x2; G3/4	8; 10; 12; 16; 20

Remark

*Sanitary (hygienic) threaded connections are used in the food, dairy and pharmaceutical industries. Due to the use of this connection, the following requirements are met:

1. Prevention of bacteria entering into the system
2. Prevention of the retention of medium ingredients in joint clearances.
3. Providing high-quality washing, without parsing the system.
4. Easy assembly and disassembly
5. Chemical and temperature resistance. Reliability.

*The size of the hexagon (S) is determined by the manufacturer. The length of insertion part of probe (Lm) is on request.

The preferred and most common mounting styles of resistance thermometers are "Without process connection" and "PSH sliding threaded connection" with thread M20x1.5.

15. Length of extension part Lo, mm

20; 40; 50; 60; 80; 100; 120; 160; 200; 250; 320; 400; 500; 630; 800 (is not specified if absent)

16. Diameter of extension part Do**, mm**

8; 10; 12; 14; 16

17. Process connection size/thread (see table 6)

M6x1; M8x1; M12x1,5; M14x1,5; M16x1,5; M18x1,5; M20x1,5; M24x1,5; M27x2; M33x2; M39x2; G1/8; G1/4; G3/8; G1/2; G3/4; G1;

1/8NPT; 1/4NPT; 3/8NPT; 1/2NPT; 3/4NPT; 1 NPT;

К1/8; К1/4; К3/8; К1/2; К3/4; К1;

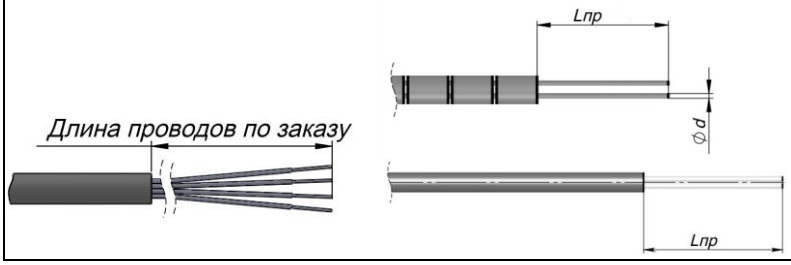
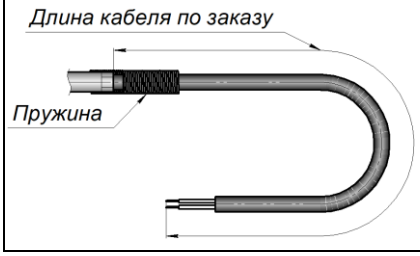
R1/8; R1/4; R1/2; R3/4; R1

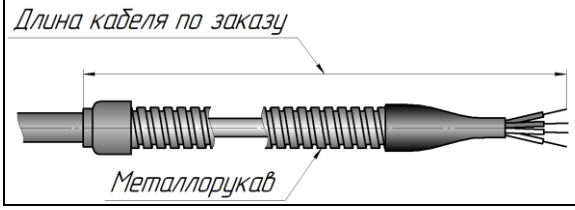
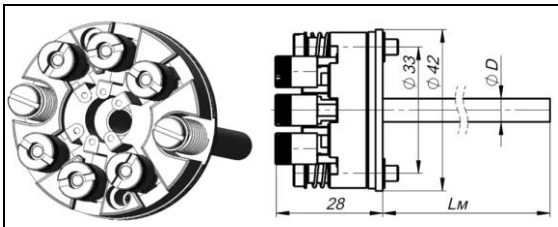
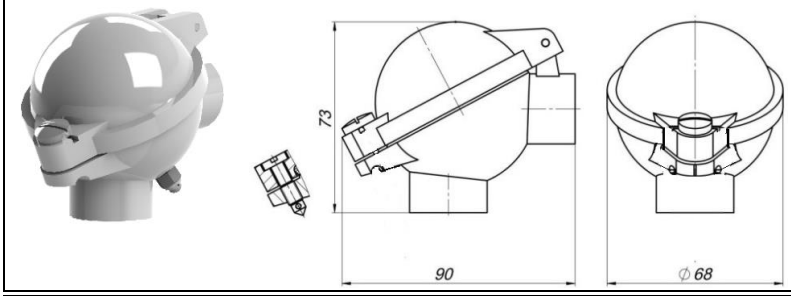
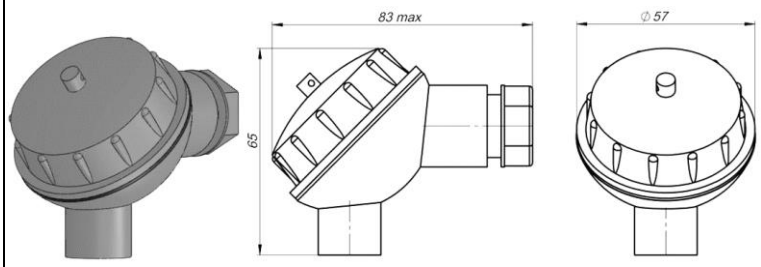
18. Types of connection heads (see table 7)

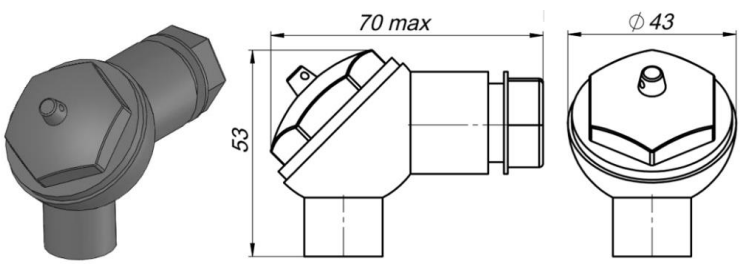
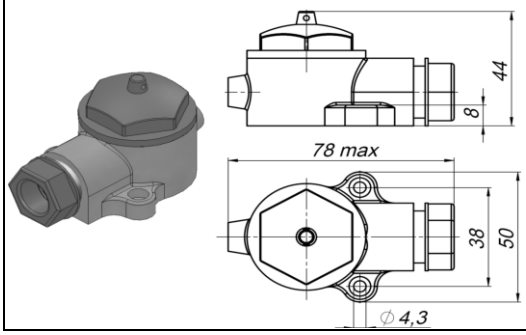
TS-B: А; Б; Бпр; Бм; Ак1; Ак3; Д; Е; Ж; И; К; Км; Кс; Ксм; Кт; Кмет; Л; Л1; Лк1; Лк2; Лк3; М; М2; USB; Н1; Нб; П; С; Т; Я; Яб; Л8

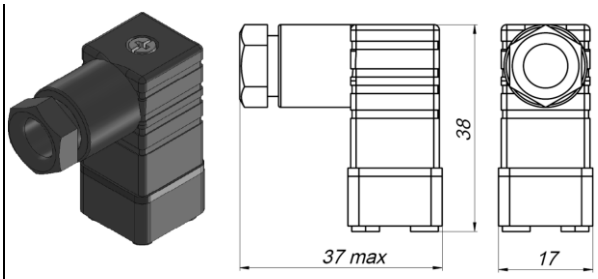
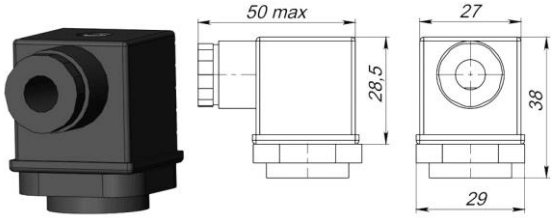
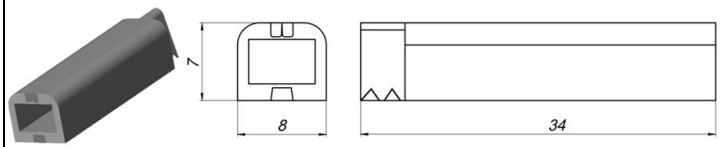
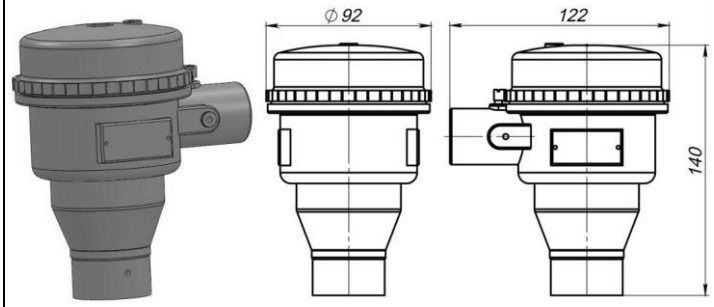
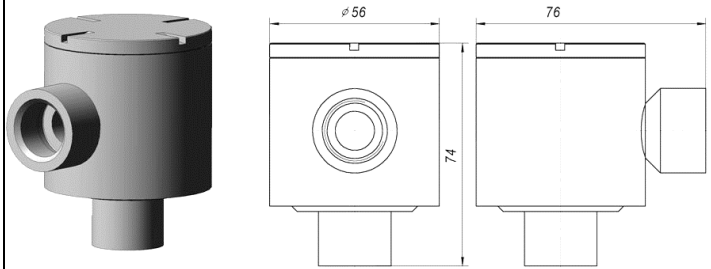
TS-B-U: Д; Е; И; М; Н1; Нб; П; Пи; С; Си; Т; Ти; Я; Яб

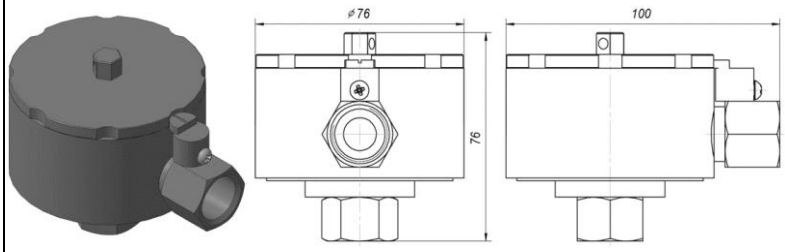
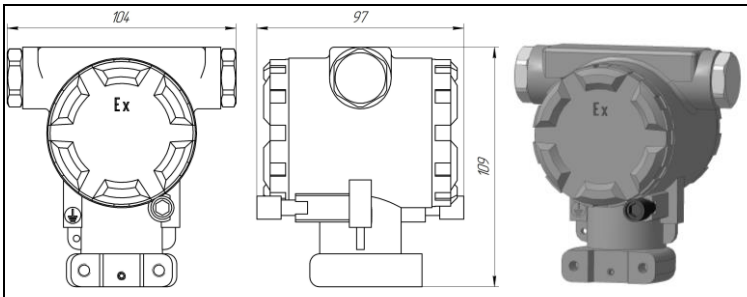
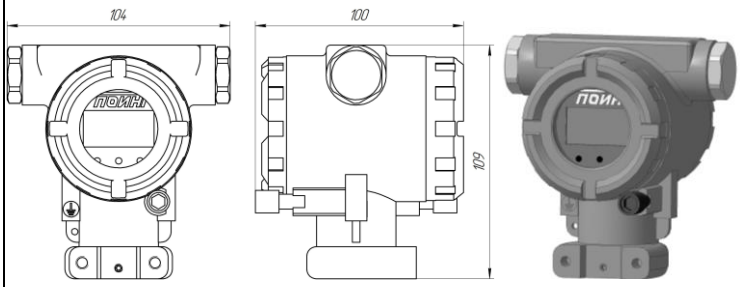
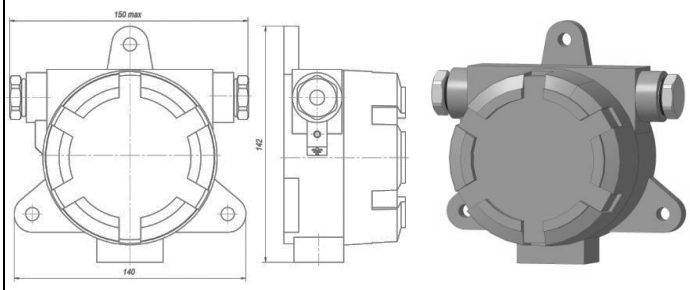
Table 7 – Connection head types

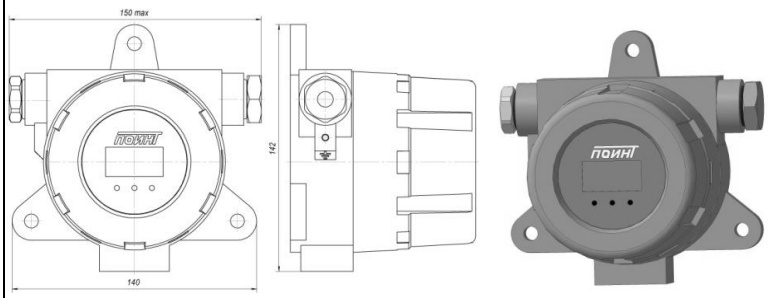
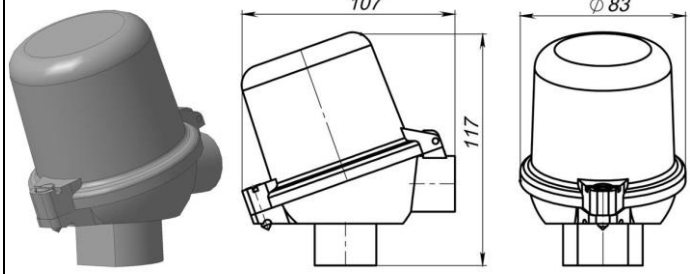
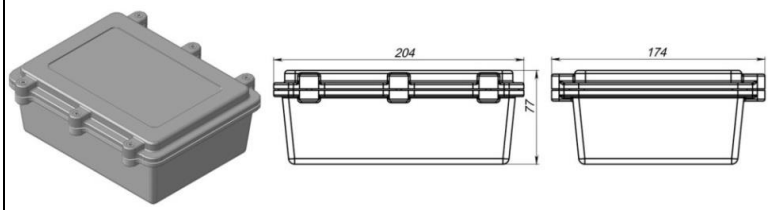
A (with wires) 	Protection level	IP00-68
	Not applicable in hazardous locations	
 Б(with cable)	Protection level	IP00-IP68
	Application in hazardous locations	Ex ia
Бпр (with cable and spring from fracture**)** 	Protection level	IP00-IP68
	Application in hazardous locations	Ex ia

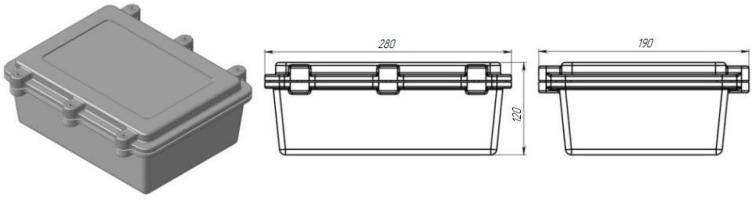
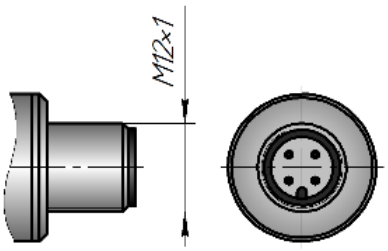
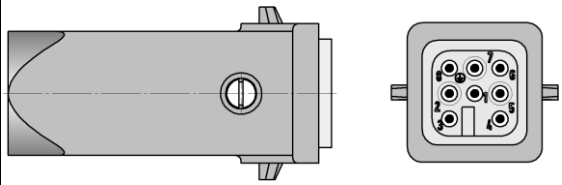
Бм (with a cable in a metal hose**)** 	Protection level	IP00-IP68
	Application in hazardous locations	Ex ia
 Ak1 (terminal block for replacable thermometric insert)	Protection level	IP00
	Not applicable in hazardous locations	
Д 	Protection level	IP65-IP68
	Application in hazardous locations	Ex ia
	Material	Aluminum alloy
	Availability of built-in temperature transmitter (option)	yes
 E ("big")	Protection level	IP65
	Not applicable in hazardous locations	
	Material	plastic
	Availability of built-in temperature transmitter (option)	Yes (without HART)
	Protection level	IP65

 Ж ("small")	Not applicable in hazardous locations	
	Cover fixing	thread
	Material	plastic
	Availability of built-in temperature transmitter (option)	none
И ("straight") 	Protection level	IP65
	Not applicable in hazardous locations	
	Material	plastic
	Suitable for fixing a connection head on a flat surface	
	Availability of built-in temperature transmitter (option)	yes (without HART)
 К (handle)	Protection level	IP45
	Application in hazardous locations	Ex ia
	Material of handle	plastic
 Км ("mini" handle)	Protection level	IP45
	Application in hazardous locations	Ex ia
	Material of handle	plastic
	Protection level	IP65
	Application in hazardous locations	Ex ia

 Л (connector)	Connector type	DIN 175301-803 form C
 Л1 (connector)	Protection level	IP65
	Application in hazardous locations	Ex ia
	Connector type	DIN 175301-803 form A
 USB	Protection level	IP65
	Not applicable in hazardous locations	
	Connector type	USB type B
 M	Protection level	IP65-68
	Application in hazardous locations	Ex ia Ex db
	Material	Aluminum alloy
	Availability of built-in temperature transmitter (option)	yes
 H1	Protection level	IP65-P68
	Application in hazardous locations	Ex ia Ex db
	Material	stainless steel
	Availability of built-in temperature	yes

	transmitter (option)	
 Нб	Protection level	IP65-68
	Application in hazardous locations	Ex ia Ex db
	Material	stainless steel
	Availability of built-in temperature transmitter (option)	yes
 Т	Protection level	IP65-68
	Application in hazardous locations	Ex ia Ex db
	Material	Aluminum alloy
	Applicable only for modifications of TS-B-U	
 Ти	Protection level	IP65-IP68
	Application in hazardous locations	Ex ia Ex db
	Material	Aluminum alloy
	Display type	LCD;
	Applicable only for modifications of TS-B-U	
 П	Protection level	IP65-68
	Application in hazardous locations	Ex ia Ex db
	Material	Aluminum alloy
	Suitable for fixing a connection	

	head on a flat surface	
 Пи	Protection level	IP65-68
	Application in hazardous locations	Ex ia Ex db
	Material	Aluminum alloy
	Display type	LCD;
	Applicable only for modifications of TP-B-U	
	Suitable for fixing a connection head on a flat surface	
 С	Protection level	IP65-68
	Application in hazardous locations	Ex ia
	Material	Aluminum alloy
	Availability of built-in temperature transmitter (option)	yes
	Applicable only for modifications of TP-B-U	
 Я	Protection level	IP65-68
	Application in hazardous locations	Ex ia Ex db*
	Material	Aluminum alloy
	Availability of built-in temperature transmitter (option)	yes (up to 6 pcs)

 Я6	Protection level	IP65-68
	Application in hazardous locations	Ex ia Ex db*
	Material	Aluminum alloy
	Availability of built-in temperature transmitter (option)	yes (up to 12 pcs)
 4Р **(четырехпиновый разъем**	Protection level	IP65-68
	Application in hazardous locations	Ex ia
	Material	Aluminum alloy/ plastic
 **«Л8» (восьмипиновый разъем)**	Protection level	IP65-68
	Application in hazardous locations	Ex ia
	Material	Aluminum alloy/ plastic

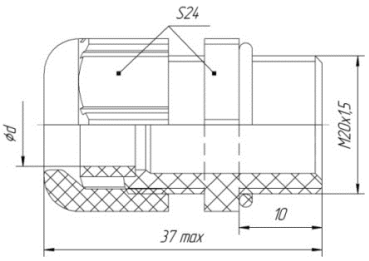
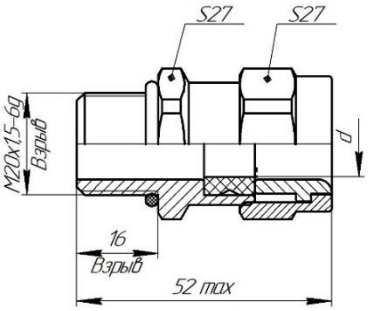
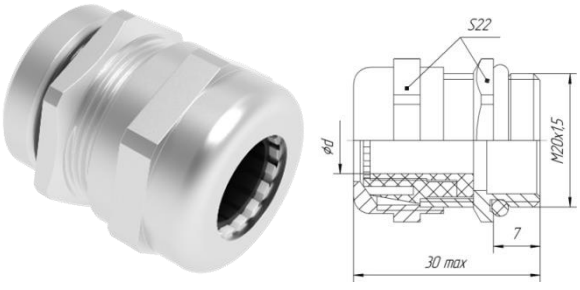
19 . Display type

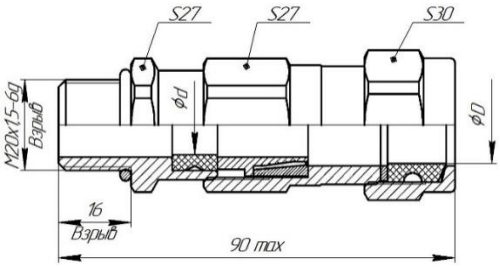
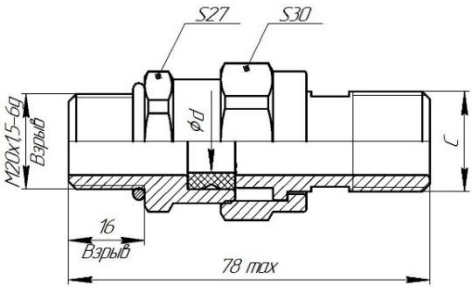
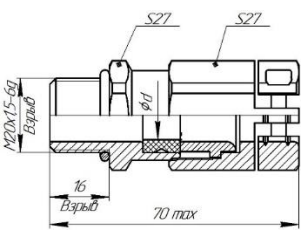
Liquid Crystal Display IZHC;

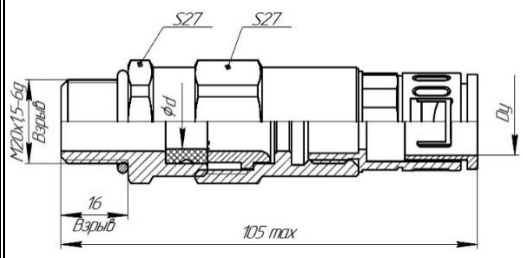
0 Cable gland (see table 8)}

DIN (A), (C); МВ, ПГ; ЛГ; МГ; МГБ; МГТ; МГФ; МГБ-П; МГМ; МГБ-М.

Table 8 – Cable gland types

  ІПГ (plastic cable gland)	Cable diameter, d	(6÷12) mm
	Application in hazardous locations	Ex ia
	Protection level	IP65
  МГ (metallic cable gland)	Cable type and specifications	non-armored cable
	Cable diameter, d	(3÷7) mm; (7÷13) mm;
	Application in hazardous locations	Ex ia Ex db
	Protection level	IP68
 ЛГ (brass cable gland)	Cable diameter, d	(6÷12) mm
	Application in hazardous locations	Ex ia
	Protection level	IP65

  MGB (metallic cable gland)	Cable type and specifications	armored cable
	Diameter of cable without armor, d	(3÷7) мм; (7÷13) мм; (13÷17) мм (17÷22) мм
	Overall diameter of cable, D	(7÷13) мм (13÷17) мм (17÷22) мм (22÷26) мм
	Application in hazardous locations	Ex ia Ex db
	Protection level	IP65-68
  МГТ (metallic cable gland)	Cable type and specifications	in pipe
	Cable diameter, d	(3÷7) mm; (7÷13) mm;
	Thread, C	M16x1,5; G1/4; K1/4; R1/4; M20x1,5; G1/2; K1/2; R1/2
	Application in hazardous locations	Ex ia Ex db
	Protection level	IP65-68
  МГФ (metallic cable gland with subsequent fixation)	Cable type and specifications	non-armored cable
	Cable diameter, d	(7÷13) mm;
	Application in hazardous locations	Ex ia Ex db
	Protection level	IP65- 68

<table>
<tr>
<td> 
 

МГБ_П
(metallic cable gland for fixing a plastic sleeve)</td>
<td>Cable type and specifications

Cable diameter, d

Flexible plastic sleeve

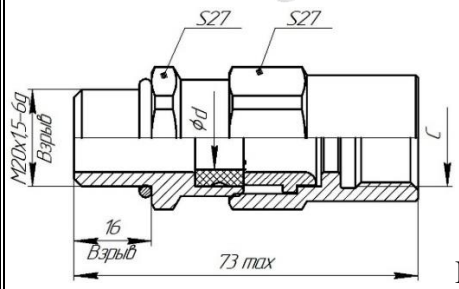
Application in hazardous locations

Protection level</td>
<td>non-armored cable

(3÷7) mm;
(7÷13) mm;
(13÷16) mm

Dn15; Dn16; Dn20

0ExiaIICT6 X
1ExdIICT6 X
1ExdiaIICT6 X

IP68</td>
</tr>
<tr>
<td> 
 

МГМ
(metallic cable gland to secure the cable with an adapter)</td>
<td>Cable type and specifications

Cable diameter, d

Thread, C

Application in hazardous locations

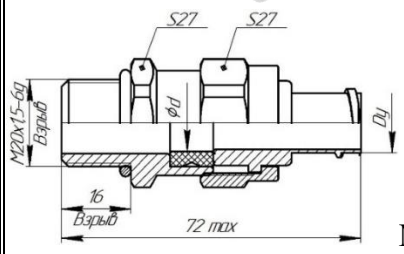
Protection level</td>
<td>non-armored cable

(3÷7) mm;
(7÷13) mm;

M16x1,5; G1/4; K1/4; Rc1/4;
M20x1,5; G1/2; K1/2; Rc1/2

Ex ia

Ex db

IP65-68</td>
</tr>
<tr>
<td> 
 

МГБ-М
(metallic cable gland for fixing a flexible metal conduit)</td>
<td>Cable type and specifications

Cable diameter, d

Flexible metal conduit

Application in hazardous locations

Protection level</td>
<td>non-armored cable

(3÷7) mm;
(7÷13) mm;

Dn15; Dn16; Dn20

Ex ia

Ex db

IP65-68</td>
</tr>
</table>

21. Protection level (see table 7)

IP00; IP45; IP65; IP68

21. Cable length, mm

100; 250; 500; 1000; 2000; 3000; 5000; 10000; 15000
(manufacture with a different cable length is possible after agreement with manufacturer)

Remark:
1. * In TS-B-U, a digital **HART** communication protocol is combined with a unified output signal.
2. ** TS-B-U can have a linear and non-linear dependence of the unified output signal depending on temperature.
3. *** At the request of the customer, it is possible to manufacture resistance thermometers with a range of measurements within the specified ranges.
4. **** Indicated, if diameter of extension part Do is bigger than probe diameter D.
8. It is allowed to indicate the special requirements of the customer in brackets after the ordering code.