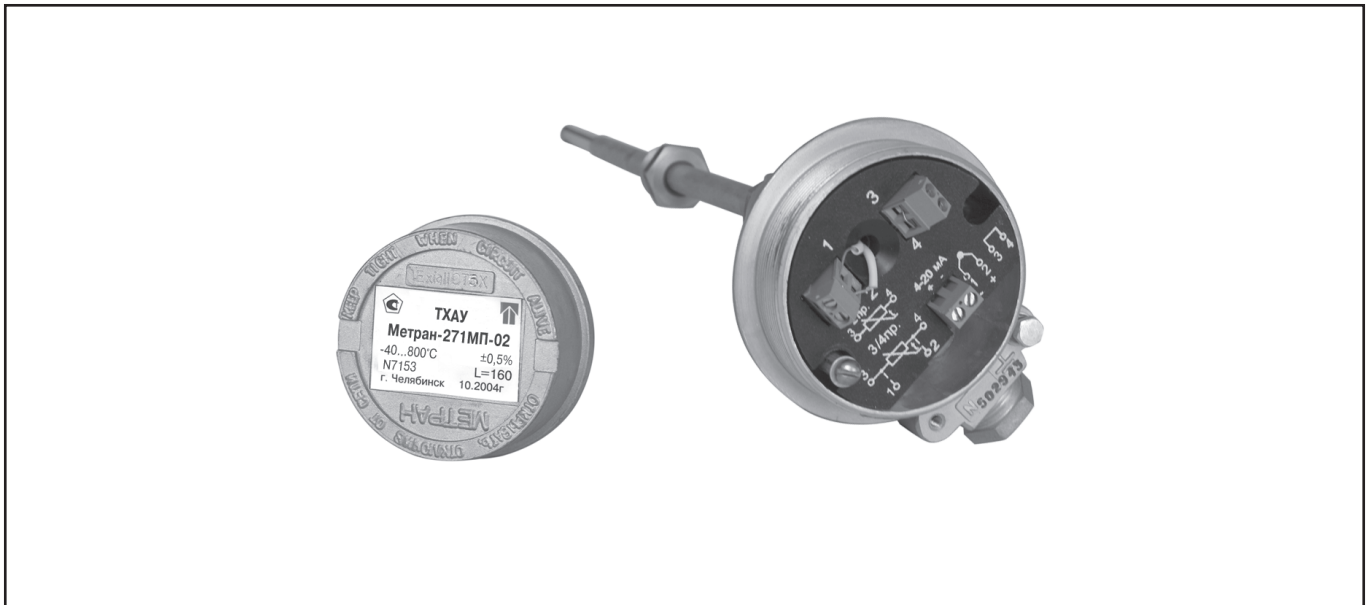


**Specifications Comparison Table  
Metran-270 and Metran-270MP temperature transmitters  
with unified output**

Specifications, parameters, functional capabilities	Temperature Transmitter Type		Metran-270MP advantages vs. Metran-270
	Metran-270	Metran-270MP	
Electronic converter type	Analog	Microprocessor	More functional capabilities
Output, mA	4-20	4-20, 20-4	Two types of output signal - direct and inverted (selected during the setting up)
Reference accuracy limit, ±% TSMU, TSPU, THAU	up to 0.25 up to 0.5	up to 0.15 up to 0.25	Increased temperature measurement accuracy
Ambient temperature complimentary error, ±%	up to 0.25 per 10°C	up to 0.1 per 10°C	Reduced ambient temperature complimentary error
Electronic and primary converters simultaneous calibration	-	+	Electronic converter calibration for sensing element individual curve using 2-8 temperature points decreases temperature transmitter reference error. Users are able to calibrate Metran-270MP themselves, that allows to keep transmitter accurate during the whole life cycle.
Temperature measurement range configuration	Is not adjustable, defined at order	Adjustable, with the help of configurator and software	More opportunities for use in different measurement ranges within certain limits. Easy choice at order. Less reserve temperature transmitters
Self-diagnostics	-	+	Alarm signal is sent in case of microprocessor transmitter failure, primary converter break or short circuit
Alarm signals rate, mA	N/A	Less or equal to 3.8	Control system can detect failure and communicate it to maintenance engineers
Electronic converter turn-on time, c, не более	10	3	Shorter turn-on time allows to return to working mode faster (even in the case of power supply failure)
Damping time selection, s	N/A	from 0.78 to 31 (set by user)	More efficient for fast changing process temperatures
Radio Jamming Filter	-	+	Resistant to radio jamming

## THAU Metran-271MP, TSMU Metran-274MP, TSPU Metran-276MP Microprocessor Temperature



**Entered into the State Register** of measuring instruments under #21968-05, Certificate #20149.

**Conformance Certificate** #ROSS RU.GB06.V00088 as per GOST R 51330.0; GOST R 51330.1; GOST R 51330.10

THAU Metran-271MP-Ex, TSMU Metran-274MP-Ex, TSPU Metran-276MP-Ex temperature transmitters can be used in explosion hazardous areas with explosive gas blends, steam, combustible fluids with air of IIA, IIB and IIC categories, T1-T6 groups per GOST 12.1.011.

Microprocessor temperature transmitters are designed for temperature measurement of neutral and corrosive media to which the protection fitting material is corrosion resistant.

Primary converter sensor and microprocessor converter integral to transmitter head transform measurable temperature into unified current output that gives the opportunity to create PCS (process control systems) without additional converters.

### DESIGN AND FUNCTIONAL CAPABILITIES

Microprocessor temperature transmitter consists of primary converter, put into protection fitting (thermal probe) and microprocessor converter, integral to the head.

**Functional capabilities** of microprocessor transmitter (MP) makes it possible to:

- readjust converted temperature range;
- perform diagnostics: if there is any failure detected, primary converter brake or short circuit the signal will be transformed into  $I \leq 3.8$  mA alarm signal;
- perform linearization of sensor standard curve;
- readjust standard curve in case of sensor change to a different type;
- perform transmitter calibration according to sensor individual standard curve along 2...8 temperature points for accuracy increase;
- choose damping time of measured signal from the following options 0.78, 3.2, 5.6, 7.8, 10.1, 19.5, 26.5, 31 s (is chosen by Customer during the setting up);
- provide automatic temperature change balance for temperature transmitter cold junctions.

Readjustment, calibration and damping time selection are performed by means of **Metran-671 Configurator** (ref. "Communication Equipment" section). Metran-671 configurator consists of a special modem (RS232 / 4-20 mA), connected to a personal computer, and M-Master software (ref. wiring diagram).

Via modem temperature transmitter is connected to a personal computer equipped with M-Master software (ref. "Communication Equipment" section).

**M-Master program** makes the following operations possible:

- transmitter information readout and display ( transmitter type, serial number), as well as user information change;
- process variables readout (actual temperature value, measurement range percent, output in mA, URL and LRL);
- transmitter configuration and adjustment;
- selection of 4-20 or 20-4 mA output signal;
- current output configuration and adjustment;
- sensor parameters configuration and adjustment;
- getting information for additional compensation and putting the latter in for accuracy increase;
- transmitter diagnostics.

#### Minimum System Requirements:

- 486 processor, 8 Mbytes operative memory;
- VGA 640x48, 256 colour video display adapter;
- free asynchronous communication port (COM port);
- 4 Mbytes of free space on a hard disk;
- Microsoft Windows 9x/Windows NT OS.

### SPECIFICATIONS AND PARAMETERS

Unified outputs ranges, primary converter standard curve, converted temperature ranges, minimum measurement ranges, output-temperature relations are given in Table 1. Accuracy limits are given in Tables 2 and 3.

Table 1

Transmitter Type and Version	Standard Curve	Output, mA	Converted Temperature Range, °C	Min Measurement Range, °C	Output-Temperature Relations
THAU Metran-271MP	K	4-20 20-4	-40...800 -40...1000	50	linear
THAU Metran-271MP-Exia					
THAU Metran-271MP-Exd					
TSMU Metran-274MP	100M		-50...180	25	
TSMU Metran-274MP-Exia					
TSMU Metran-274MP-Exd					
TSPU Metran-276MP	100P, Pt100		-50...500		
TSPU Metran-276MP-Exia					
TSPU Metran-276MP-Exd					

Table 2

Transmitter Type and Version	Upper Range Limit, °C	Reference Accuracy Limits, $\pm\gamma, \%$									
		for ranges*, no less than, °C									
		50	100	150	200	250	300	350	400	450	500
THAU Metran-271MP THAU Metran-271MP-Exia THAU Metran-271MP-Exd	up to 300	0.25; 0.5					-				
	up to 500	0.5	0.25; 0.5				0.25; 0.5	0.25; 0.5	0.25; 0.5	0.25; 0.5	0.25; 0.5
	up to 600	0.5					0.5				
	up to 700										
	up to 800										
up to 1000	0.5										

\* Range is a difference between URL and LRL of adjusted measurement range.

Table 3

Transmitter Type and Version	Upper Range Limit, °C	Reference Accuracy Limits, $\pm\gamma, \%$			
		for ranges*, no less than, °C			
		25	50	100	150
TSMU Metran-274MP TSMU Metran-274MP-Exia TSMU Metran-274MP-Exd	up to 180	0.25; 0.5	0.15; 0.25; 0.5		
TSPU Metran-276MP TSPU Metran-276MP-Exia TSPU Metran-276MP-Exd	up to 300	0.25; 0.5	0.15; 0.25; 0.5		
	up to 500	-	0.5	0.25; 0.5	0.15; 0.25; 0.5

#### Protection Fitting Material

Table 4

Material	Max Application Temperature, °C	Material Type Code
12Cr18Ni10Ti	800	N10
10Cr17Ni13Mo2Ti	800	N13
CrNi78Ti	1000	N78

Head material: AK12 alloy

**Primary Converter Sensor.** Primary converter sensors in temperature transmitters: - for THAU Metran-271MP, -Exia, -Exd is manufactured of KTMS(HA) thermocouple cable with laser welded thermocouple wires;  
- for TSMU Metran-274MP, -Exia, -Exd - copper RTD (100M);  
- for TSPU Metran-276MP, -Exia, -Exd - platinum RTD (100P, Pt100).

#### Microprocessor Transmitter Parameters:

- turn-on time 3 s;
- update time 0.8 s.

#### Interference Protection:

- from 50 Hz frequency and up to 400 A/m voltage external variable magnetic field;
- from radio jamming (built-in protection filter).

**Communication Lines Overvoltage Protection** of THAU Metran-271MP, TSMU Metran-274MP, TSPU Metran-276MP standard version microprocessor transmitters is achieved through Metran-700-BVP external high potential barrier (ref. "Metran-700-BVP High Potential Barrier" section).

**Dust and Water Tightness** for temperature transmitter is IP65 per GOST 14254.

**Vibration Protection** - version Group V1 per GOST 12997.

#### Maximum Pressure (Pmax), Thermal Inertia Index (T)

Table 5

Fig.	Pmax, MPa	T, s
1	0.4	40
2	6.3	
3		20
4	0.4	
5	6.3	
6		8
7		
12-19	<b>0.4</b>	8

#### Explosion Protection Marking

- ExialICT5, ExialICT6 with explosion protection "intrinsically safe electrical circuit" - "ia";
- 1ExdIICT5, 1ExdIICT6 with explosion protection "explosion-proof casing d".

#### Supply Voltage

- **from 18 to 42 V** dc - for standard version and explosion-proof Exd temperature transmitters;
- **from intrinsically safe power units (barriers) circuits** with explosion protection type "intrinsically safe electrical circuit" of "ia" level for explosive blends of IIC group per GOST 12.1.011 with  $U_{xx} \leq 24$  V floating voltage,  $I_{sc} \leq 120$  mA short circuit current - for Exia temperature transmitters.

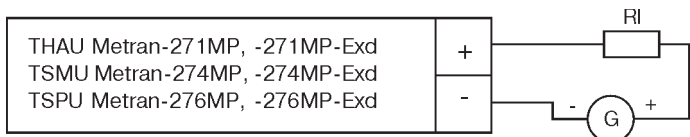
**Grounding** Coupling head has internal and external ground bolts.

#### Power Consumption

- no more than 0.9 W - for standard version temperature transmitters;
- no more than 0.5 W - for explosion-proof temperature transmitters.

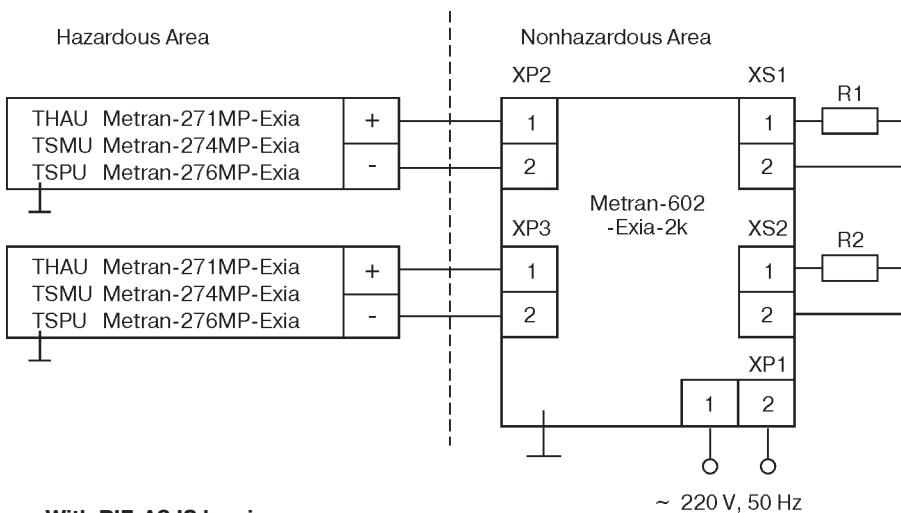
EXTERNAL WIRING DIAGRAM

4-20 mA output



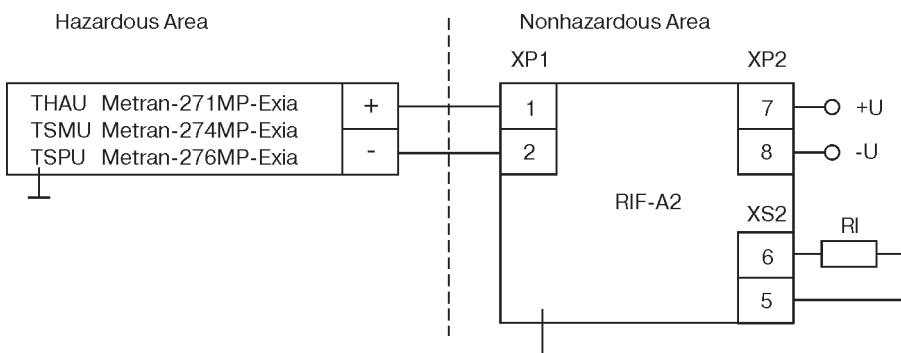
RI - load resistance  
 $50 < RI < 1000$  Ohms  
 G - power supply

With Metran-602-Exia-2k power unit



Communication Line Parameters, max	
R0	200 Ohm
C cable	0.1 mkF
L cable	1 mH
Line length	1000 m

With RIF-A2 IS barrier

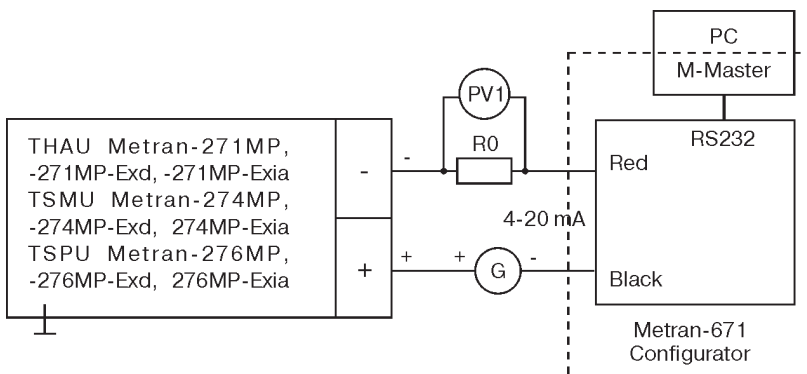


Communication Line Parameters max	
RI	200 Ohm
C cable	0.1 mkF
L cable	1 mH
Line length	1000 m

Load resistance RI:

- for 4-20 mA output -  $RI=0.05...1.0$  kOhm;  $R_{nom}=500$  Ohm;
- for temperature transmitters of "intrinsically safe" version -  $R_{nom} \leq 200$  Ohm.

Wiring Diagram of Metran-671 Configurator when Metran-270MP readjusting



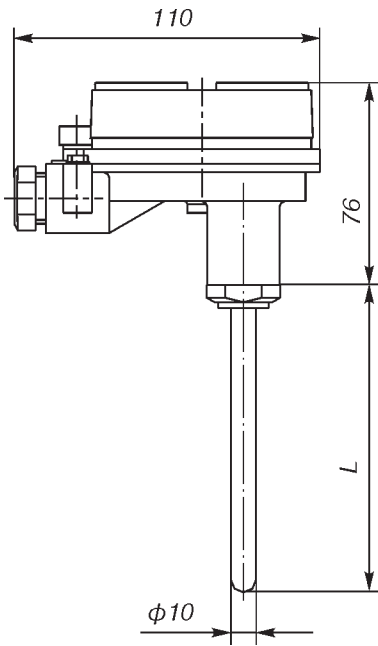
PV1 - digital voltmeter;  
 R0 - standard resistance measure  
 $R0 \leq 600$  Ohms;  
 PC - personal computer;  
 G - power supply.

Power supply voltage is selected based on R0:

- if  $R0 \leq 100$  Ohms, then  $U=24$  V;
- if  $100 < R0 \leq 600$  Ohms, then  $U=36$  V.

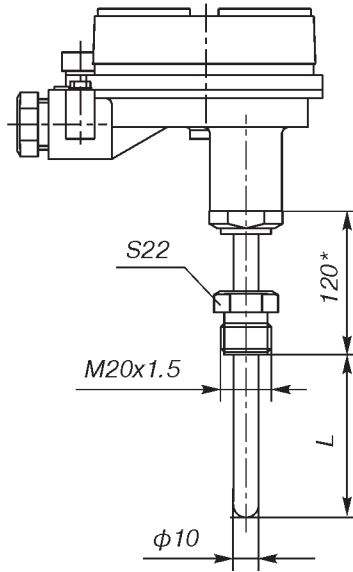
OVERALL AND MOUNTING DIMENSIONS

THAU Metran-271MP, TSMU Metran-274MP, TSPU Metran-276MP



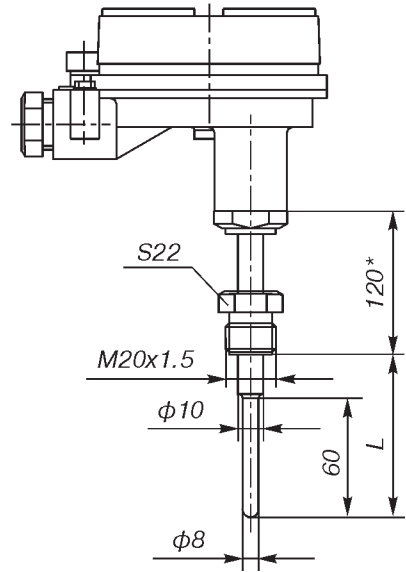
**Fig. 1.**

- THAU Metran-271MP-01
- TSMU Metran-274MP-01
- TSPU Metran-276MP-01
- THAU Metran-271MP-01-Exia
- TSMU Metran-274MP-01-Exia
- TSPU Metran-276MP-01-Exia



**Fig. 2.** (refer to Fig. 1).

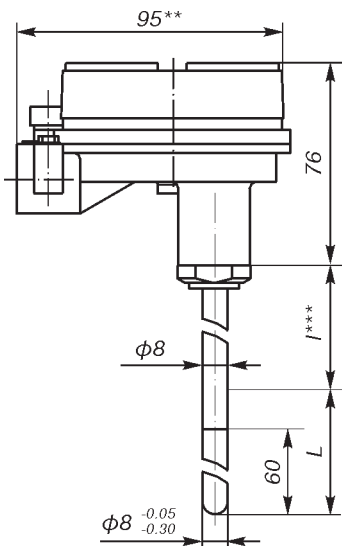
- THAU Metran-271MP-02
- TSMU Metran-274MP-02
- TSPU Metran-276MP-02
- THAU Metran-271MP-02-Exia
- TSMU Metran-274MP-02-Exia
- TSPU Metran-276MP-02-Exia



**Fig. 3.** (refer to Fig. 1).

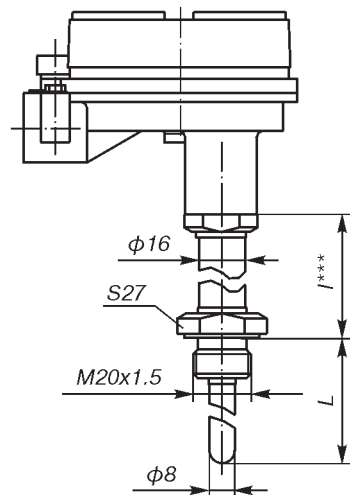
- THAU Metran-271MP-03
- TSMU Metran-274MP-03
- TSPU Metran-276MP-03
- THAU Metran-271MP-03-Exia
- TSMU Metran-274MP-03-Exia
- TSPU Metran-276MP-03-Exia

THAU Metran-271MP-Exd, TSMU Metran-274MP-Exd, TSPU Metran-276MP-Exd



**Fig. 4.**

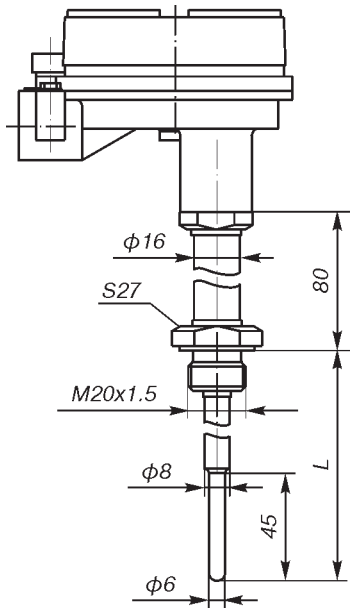
- THAU Metran-271MP-04-Exd
- TSMU Metran-274MP-04-Exd
- TSPU Metran-276MP-04-Exd



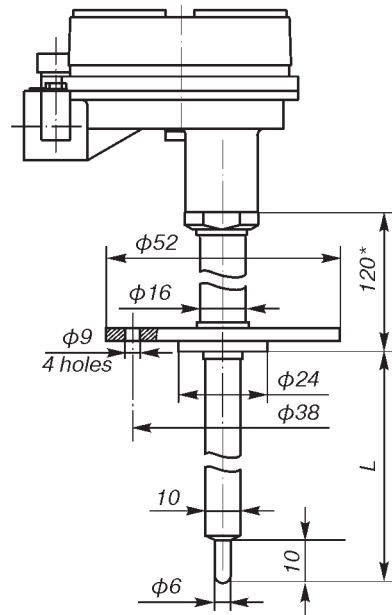
**Fig. 5.** (refer to Fig. 4).

- THAU Metran-271MP-05-Exd
- TSMU Metran-274MP-05-Exd
- TSPU Metran-276MP-05-Exd

THAU Metran-271MP-Exd, TSMU Metran-274MP-Exd, TSPU Metran-276MP-Exd



**Fig.6** (refer to Fig.4)  
TSMU Metran-274MP-06-Exd  
TSPU Metran-276MP-06-Exd



**Fig.7** (refer to Fig.4)  
THAU Metran-271MP-07-Exd

\* In order to prevent the influence of process temperature on electronic transmitter for high-temperature processes it is possible to manufacture THAU Metran-271, -Exia, -Exd with 160 mm or 200 mm extension length under special order. 160 or 200 mm extension length is manufactured after supplementary agreement.

\*\* Cable entries are not symbolically shown, ref. "Mounting Sets for Cable Entry" section.

\*\*\* l = 120, 160, 200 mm (see ref.\*) - for THAU Metran-271MP-Exd in Fig.4, 5;  
l = 80 mm - for TSMU Metran-274MP-Exd, TSPU Metran-276MP-Exd in Fig.4, 5.

**Standard Immersion Lengths**

Table 6

Fig.	Transmitter Type and Version	Immersion Length, L, mm																	
		60	80	100	120	160	200	250	320	400	500	630	800	1000	1250	1600	2000	2500	3150
1	TSMU Metran-274MP, -Exia; TSPU Metran-276MP, -Exia	-	-	C	+	+	+	+	+	+	+	+	+	+	+	+	+	C	C
2		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3		C	C	+	+	+	+	+	+	+	+	+	+	+	C	C	C	C	C
Weight, kg		0.5...0.65					0.65...0.85					1.00...1.60							
1	THAU Metran-271MP, -Exia	-	-	C	+	+	+	+	+	+	+	+	+	+	+	+	+	C	C
2		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3		C	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Weight, kg		0.5...0.65					0.65...0.85					1.00...1.60							
4	TSMU Metran-274MP-Exd; TSPU Metran-276MP-Exd	C	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	C	C
5		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	C	C
6		C	C	C	+	+	+	+	+	C	C	C	C	C	C	C	C	C	C
Weight, kg		0.85...1.05					0.92...1.25					1.2...1.4							
4	THAU Metran-271MP-Exd	C	C	C	+	+	+	+	+	+	+	+	+	+	+	+	+	C	C
5		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	C	C
7		C	C	C	+	+	+	+	+	C	C	C	C	C	C	C	C	C	C
Weight, kg		0.85...1.05					0.92...1.25					1.2...1.4							

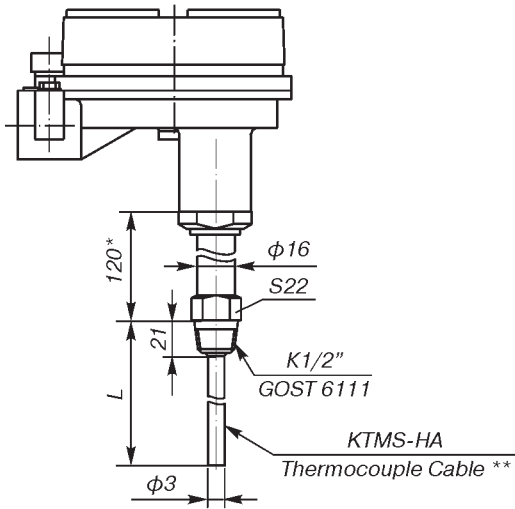
Orders taken:



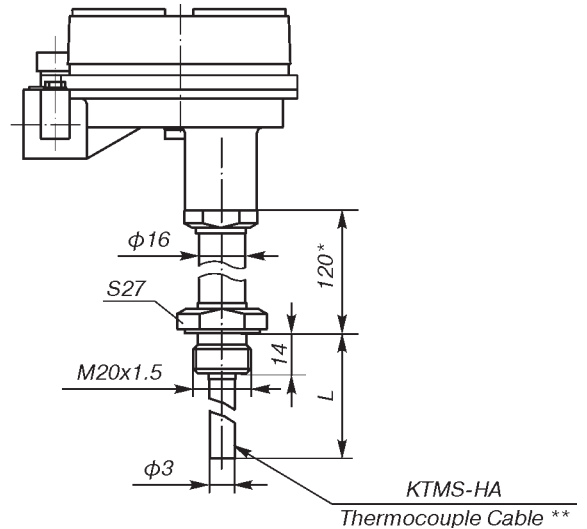
For measured temperature range -50...300°C

For measured temperature range 0...500°C

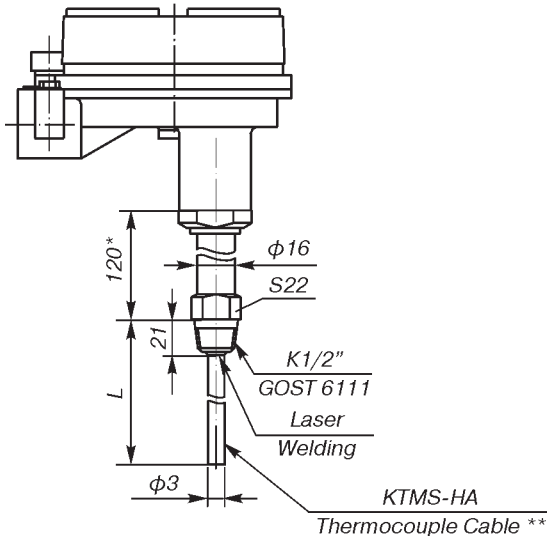
C After supplementary agreement



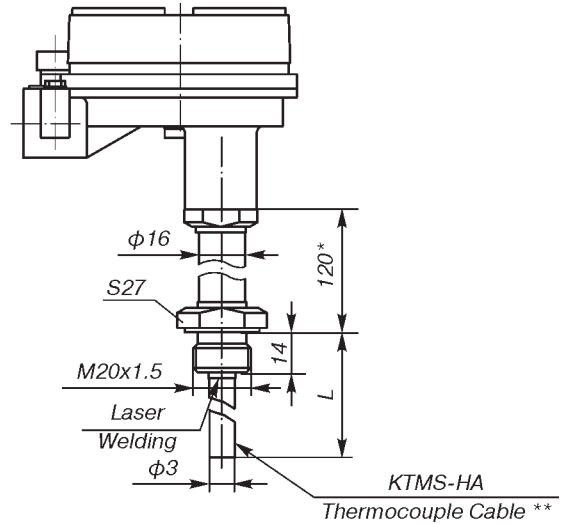
**Fig. 12** (refer to Fig.4)  
THAU Metran-271MP-12-Exd



**Fig. 13** (refer to Fig.4)  
THAU Metran-271MP-13-Exd



**Fig. 14** (refer to Fig.4)  
THAU Metran-271MP-14-Exd



**Fig. 15** (refer to Fig.4)  
THAU Metran-271MP-15-Exd

\* In order to prevent the influence of process temperature on electronic transmitter for high-temperature processes it is possible to manufacture THAU Metran-271MP, -Exd with 160 mm or 200 mm extension length under special order. 160 or 200 mm extension length is manufactured after supplementary agreement.

\*\* Submersible part of THAU Metran-271MP-12, -13, -14, -15-Exd is made of KTMS-HA thermocouple cable. When mounting, the submersible part can be bent, arranged in hard-to-reach places and pressed to the surface to measure the temperature.

**Standard Immersion Lengths**

Table 7

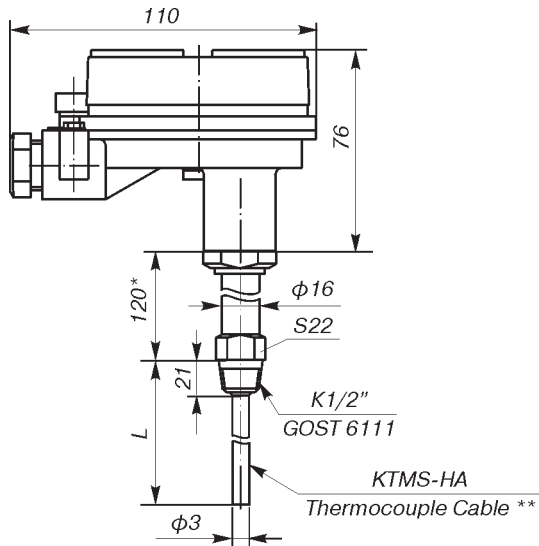
Fig.	Transmitter Type and Version	Immersion Length, L, mm																		
		60	80	100	120	160	200	250	320	400	500	630	800	1000	1250	1600	2000	2500	3150	
12	THAU Metran-271MP Exd	C	C	C	C	C	+	+	+	+	+	+	+	+	+	+	+	C	C	
13		C	C	C	C	C	+	+	+	+	+	+	+	+	+	+	+	+	C	C
14		C	C	C	C	C	+	+	+	+	+	+	+	+	+	+	+	+	C	C
15		C	C	C	C	C	+	+	+	+	+	+	+	+	+	+	+	+	+	C
Weight, kg		0.95			1.1			1.15			1.25			1.36						

Orders taken:

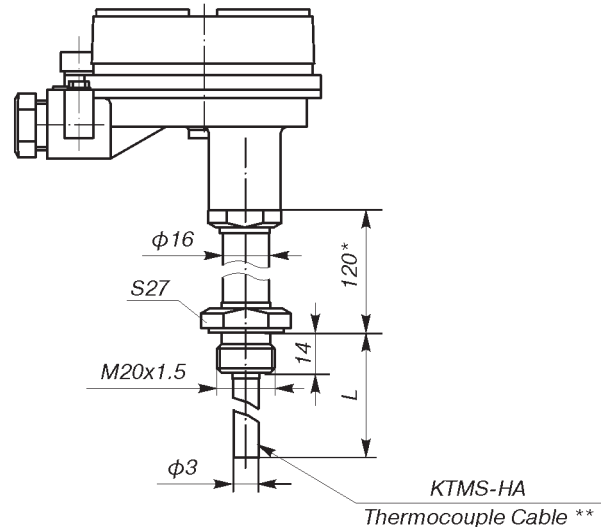
For measured temperature range -50...300°C

**C** After supplementary agreement

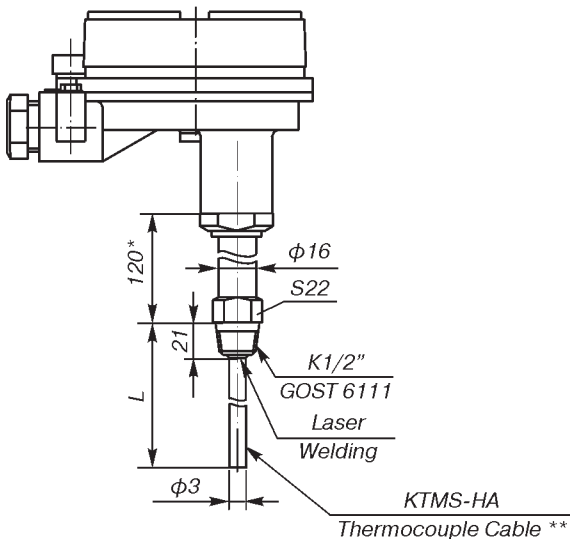




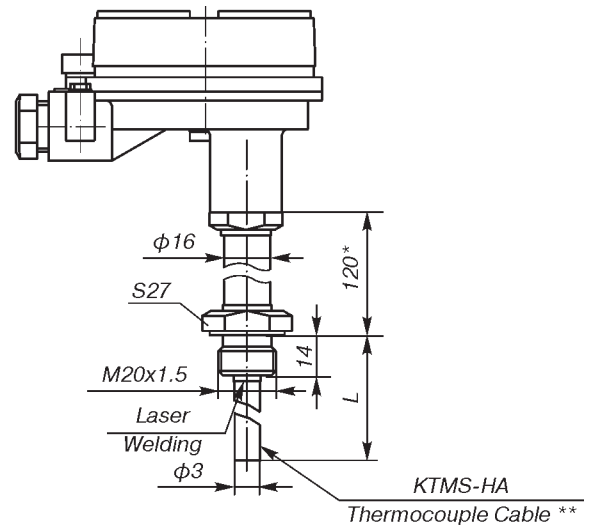
**Fig. 16**  
THAU Metran-271MP-16, -Exia



**Fig. 17**  
THAU Metran-271MP-17, -Exia



**Fig. 18** (refer to Fig. 16)  
THAU Metran-271MP-18, -Exia



**Fig. 19** (refer to Fig. 16)  
THAU Metran-271-19, -Exia

\* In order to prevent the influence of process temperature on electronic transmitter for high-temperature processes it is possible to manufacture THAU Metran-271MP, -Exia with 160 mm or 200 mm extension length under special order. 160 or 200 mm extension length is manufactured after supplementary agreement.

\*\* Submersible part of THAU Metran-271MP-16 (Exia), -17 (Exia), -18 (Exia), -19 (Exia) is made of KTMS-HA thermocouple cable. When mounting, the submersible part can be bent, arranged in hard-to-reach places and pressed to the surface to measure the temperature.

Table 8

Fig.	Transmitter Type and Version	Immersion Length, L, mm																		
		60	80	100	120	160	200	250	320	400	500	630	800	1000	1250	1600	2000	2500	3150	
16	THAU Metran-271MP, -Exia	C	C	C	C	C	+	+	+	+	+	+	+	+	+	+	+	C	C	
17		C	C	C	C	C	+	+	+	+	+	+	+	+	+	+	+	+	C	C
18		C	C	C	C	C	+	+	+	+	+	+	+	+	+	+	+	+	C	C
19		C	C	C	C	C	+	+	+	+	+	+	+	+	+	+	+	+	C	C
Weight, kg		0.95			1.1			1.15			1.25			1.36						

Orders taken:

For measured temperature range -50...300°C

**C** After supplementary agreement

**Climatic Type:**

- U1.1 per GOST 15150 only for operation at ambient temperature values from -45 to +70°C;
- for Ex version of T6 temperature class from -20 to +40°C; T5 temperature class from -45 to +70°C;
- by special order from -50 to +85°C;
- T3 per GOST 15150 only for operation at ambient temperature values from -10 to +70°C;
- for Ex version of T6 temperature class from -10 to 40°C; T5 temperature class from -10 to +70°C.

**Average life time:**

- TSMU, TSPU - minimum 5 years;
- THAU - minimum 2 years.

**Nonfailure operating time:**

- 8 hours (batch production);
- 48 hours (export version);
- 360 hours (special order - under supplementary agreement).

**Warranty period:** 18 months from the date of commissioning.

**Verification interval:** 1 year (verification procedure is given in the Operation Manual).

**DELIVERY SET**

1. Transmitter	1 unit.
2. Product Data Sheet	1 copy.
3. Operation Manual MP271.01.00.000RE	1 copy.

**Note!**

**Metran-671 Configurator is ordered separately.**

**ORDERING INFORMATION**

<b>THAU Metran-271MP - 07 - Exd - 500 - 0,25% - N13 - 0...800°C - 4-20 mA - AC - T6 - U1.1(...) - GP - TU...</b>												
1	2	3	4	5	6	7	8	9	10	11	12	13

## 1. Temperature transmitter:

THAU Metran-271MP  
TSMU Metran-274MP  
TSPU Metran-276MP

## 2. Protection Fitting Type Code:

- 01** fig.1
- 02** fig.2
- 03** fig.3
- 04** fig.4
- 05** fig.5
- 06** fig.6 (TSMU Metran-274MP-Exd, TSPU Metran-276MP-Exd only)
- 07** fig.7 (THAU Metran-271MP-Exd only)
- 12** fig.12 (THAU Metran-271MP-Exd only)
- 13** fig.13 (THAU Metran-271MP-Exd only)
- 14** fig.14 (THAU Metran-271MP-Exd only)
- 15** fig.15 (THAU Metran-271MP-Exd only)
- 16** fig.16 (THAU Metran-271MP, -Exia only)
- 17** fig.17 (THAU Metran-271MP, -Exia only)
- 18** fig.18 (THAU Metran-271MP, -Exia only)
- 19** fig.19 (THAU Metran-271MP, -Exia only).

## 3. Explosion protection (for explosion-proof temperature transmitters only):

**Exia** - intrinsically safe electrical circuit;

**Exd** - explosion proof casing.

## 4. Immersion length, L (Tables 6, 7, 8).

## 5. Absolute values of reference accuracy limit (Table 1).

## 6. Protection Fitting Material Type Code (Table 2).

## 7. Transformed temperature range (Table 1).

## 8. Output (Table 1).

## 9. Mounting set (for THAU Metran-271MP-Exd, TSMU Metran-274MP-Exd, TSPU Metran-276MP-Exd only; ref. "Mounting Sets for Cable Entry" section):

**AC** armored cable;

**MM** manifold mounting

## 10. Temperature class (for explosion-proof temperature transmitters only) per GOST R 51330.0

**T5**

**T6**

## 11. Climatic type per GOST 15150:

**U1.1** (indicate operation air temperature)

**T3**

## 12. Specifications TU 4211-003-12580824-2001.

## 13. Metrological verification:

**GP** Verification by GosStandard Authorities.