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**RELIABLE DEVICES AND SYSTEMS  
OF TECHNOLOGICAL MONITORING**

## **THE TECHNOLOGICAL MULTICHANNEL REGISTRAR**

(Modification PMT 49DA for APP)

Manual

НКГЖ.411124.001-03ПС



**For APP**

Инт. № подл.	Подп. и дата	Взам инв. №	Инт. № дубл	Подп. и дата

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## ***ATTENTION!***

***1. The personnel may be allowed to operate PMT 49 DA after reading of this manual.***

***2. The removal of shipping loose leaves, installation of stylus, work with a rolled chart tape and maintenance service to make if it is necessary in the strict conformity with the instructions of chapter 8 of this manual.***

***3. It is forbidden to touch the rheochords while operating of PMT 49 DA to avoid their breakage.***

## **1. Introduction**

1.1. This manual is intended for acquaintance with the device and service regulations of the technological multichannel registrar – the TMR 49 DA (further – PMT 49DA) and contains the data certifying manufacturer's guarantees.

## **2. Use**

2.1. PMT 49DA is intended for measuring and registration of temperatures and other not electric sizes transformed into electric signals of force, voltages of the direct current and the active resistance to the direct current.

2.2. PMT 49DA (an enhanced reliability) is used in the structure of control systems by technological processes of atomic power plants (APP).

2.3. PMT 49DA is the indicating analog-digital, recording, recording and regulating measuring device which is configured as the type of an input signal, ranges of scaled sizes and a type of scale with the aid of a keyboard or on the consecutive interface.

2.4. PMT 49DA is intended for working with the resistance thermoelements (RT) 50M, 100M, 50Π, 100Π in accordance with the all-Union State Standard 6651-94 or Pt100 DIN N43760, thermoelectric converters (TC) in accordance with all-Union State Standard 8.585-2001 and converters with the unified output signals in accordance with all-Union State Standard 26.011-80.

2.5. The dependence of measured and registered size from the unified input signal for PMT 49DA may be as linear, and also with the function of extraction of a square root.

2.6. The construction of PMT 49DA provides its installation in the panel.

2.7. PMT 49DA has one or three channels of measurement and records of various physical sizes for the variant of execution PMT 49DA/1 or PMT 49DA/3 accordingly.

PMT 49DA has the signal system of reaching of given settings.

The amount of fixings in each channel is 4.

The amount of circuits of the signal system in each channel is 4.

The executive relays of the channels of the signal system provide the switching of:

- the alternating current of the network frequency:
  - at the voltage of 250V up to 5 A for the active loading,
  - at the voltage of 250 V up to 2 A for the inductive loading;
- the direct current:
  - at the voltage of 250V up to 0,1 A fir the active and inductive loading,
  - at the voltage of 30V up to 2A for the active and inductive loading.

*Note. It is recommended that the setting of extinguishing of flashes of the chains should be done at the inductive loading. The extinguishing chain of flashes is supposed to include the consistent connected resistor 50...100 Ohm, 0,5 W and the condenser 10...100 nF for the voltage not less than 630 V.*

2.8. According to the all-Union State Standard 9999-94 PMT 49DA is:

- the secondary recording electric device;
- according to type of the carrier of the diagram - with a record on a tape;
- according to a way of record - with record by a feather, provided with liquid ink;
- according to character of record - with continuous record.

About the security from the influence of environment PMT 49DA is made according to:

- the all-Union State Standard 15150-69 in a reliable execution T III against corrosion;
- the all-Union State Standard 14254-96 – a degree of protection against penetrating inside PMT 49DA such things as: dust, firm bodies and water into:
  - cases IP54;
  - terminal-block shoes on back panel IP20.

According to the all-Union State Standard 25804.1-83 PMT 49DA:

- concerns to category Б about the character of use - the equipment of continuous use;
- concerns to type I about the number of quality levels of functioning - the equipment having two quality levels of functioning - a nominal level and refusal.

According to НП-001-97 (ОПБ – 88/97) ИРТ 5922A belongs to:

- by its purpose – to the elements of normal operation;
- by influencing safety - to the elements important for safety;
- by the nature of performed functions – to the controlling elements.

Example of classification designations 2HY or 3HY.

PMT 49DA corresponds to the requirements of group 3 of measuring ways according to the all-Union State Standard 22261-94 at an ambient temperature from 0 till plus 50 °C or to a type of climatic modification T3 in accordance with the all-Union State Standard 15150-69 at an ambient temperature from 0 till plus 60 °C.

PMT 49DA corresponds to execution group M6 on the stability to mechanical influences while its operating according to the all-Union State Standard 17516.1-90.

PMT 49DA concerns to category I of seismic stability on HII-031-01 and to execution group 3 on ПД 25 818-87.

PMT 49DA is stable, solid and steady against the influence of earthquake with a level of seismicity of 8 points according to the scale MSK-64 on a level of installation above a zero mark till 20 m according to the all-Union State Standard 25804.3-80.

PMT 49DA corresponds to execution group III about the stability to electromagnetic handicaps in accordance with the all-Union State standard P 50746-2000. The quality criterion of functioning - A.

### 3. Specifications and characteristics

3.1. The ranges of measurements and transformations, input parameters and the limits of the admitted basic given error in view of configurations of PMT 49DA correspond to given in table 3.1 and table 3.2.

Table 3.1 - PMT 49DA with the input signals from the RT and the TC

Type of the initial converter	W <sub>100</sub>	Range of measurements, °C	Input parameters			Limits of the admitted basic given error about HCX, %				
			According to HCX		Input resistance, kOhm					
			Resistance, Ohm	Thermal electromotive force, mV						
50M	1,4280	-50÷+200	39,23÷92,78	-	-	±(0,25+*)				
53M			41,58÷98,34							
50M	1,4260		39,35÷92,62							
53M			41,71÷98,17							
50Π	1,3910		40,00÷88,53							
100M	1,4280	-50÷+200	78,45÷185,55			-	-	±(0,2+*)		
	1,4260		78,69÷185,23							
100Π	1,3910		80,00÷177,05							
Pt100	1,3850		80,31÷175,86							
50Π	1,3910	-100÷+600	29,82÷158,59					-	-	±(0,2+*) **
100Π			59,64÷317,17							
Pt100			60,26÷313,71							
TЖК(J)	-	-50÷+1100	-	-2,431÷63,792	Not less 100					+(0,5+*)
TXK XK(L)		-50÷+600		-3,005÷49,108						
TXA XA(K)		-50÷+1300		-1,889÷52,410						
ТПП ПП(R)		0÷+1700		0÷20,222						
ТПП ПП(S)		0÷+1700		0÷17,947						
ТПП ПП(B)		+300÷+1800		0,431÷13,591						
TBP BP(A-1)		0÷+2500		0÷33,640						
TMK(T)		-50÷400		-1,819÷20,872						

Table 3.2 - PMT 49DA with input electric signals as force, voltage of a direct current and resistance to a direct current

Input signal	Range of transformation	Range of measurements		Input parameters		The maximal current through the measured resistance, mA	Limits of the admitted basic given error, %
		for dependence of measured sizes from an input signal:		Input resistance, kOhm			
		linear	with the function of extraction of a square	not less	no more		
Current	0÷5 mA	0÷5 mA	0,1÷5 mA	-	0,01	-	±(0,2 + *)
	4÷20 mA	4÷20 mA	4,32÷20 mA				
	0÷20 mA	0÷20 mA	0,4÷20 mA				
Voltage	0÷75 mV	0÷75 mV	1,5÷75 mV	100	-	-	
	0÷100 mV	0÷100 mV	2÷100 mV				
	0÷10 V	0÷10 V	0,2÷10 V				
Resistance	0÷320 Ohm	0÷320 Ohm	-	-	-	0,33±0,02	

\* One unit of the last category expressed in percentage of a range of measurements.

\*\* Except sub-range (-50÷ +200) °C.

3.2. Limits of the admitted basic given error on the record of measured sizes  $\pm 1$  %.

3.3. The deflection of average moving speed of a chart tape does not exceed  $\pm 0,1$  % from the nominal average speed for the time corresponding to moving of a chart tape not less than 1000 mm.

3.4. The tolerance zone of the PMT 49DA does not exceed  $\pm 0,3$  % regarding a record of the size.

3.5. The maximal value of the friction effect, expressed in percentages of the graduation length (width of a field of record), does not exceed 0,3 %.

3.6. The reproducibility of the measuring results is no more than 0,2 %.

3.7. The instability of indications of PMT 49DA for 10 days and nights (long drift) does not exceed  $\pm 0,4$  % regarding the record of the size and 0,5 limits of an admitted basic error of the size being measured regarding measurements.

3.8. The set time of the operating conditions is no more than 30 minutes.

3.9. The limits of an admitted variation of PMT 49DA indications do not exceed  $\pm 0,5$  % regarding the record of the size and 0,5 limits of an admitted basic error of the size being measured regarding measurements.

3.10. The limits of the admitted additional error of PMT 49DA, the air temperature caused by change from normal ( $20 \pm 5$ ) °C till any temperature in limits (0 +50) °C [or (0 +60) °C] for each 10 °C changes of temperature, do not exceed  $\pm 0,5$  % regarding the record of the size and 0,5 limits of the admitted basic error of the size being measured regarding measurements.

3.11. The limits of the admitted additional error of PMT 49DA, intended for work with the RT, caused by the change of the temperature of their free ends in the range (0 +50) °C [or (0 +60) °C], regarding the record and measurements of the size do not exceed a limit of the admitted basic error.

3.12. The limits of the admitted additional error, caused by the change of the voltage of the power from nominal (220 V) in limits (187 242) B, do not exceed  $\pm 0,5$  % regarding the record of the size and 0,5 limits of an admitted basic error of the size being measured regarding measurements.

3.13. The limit of the admitted additional error of PMT 49DA, caused by the influence of the constant magnetic fields and (or) variable fields of a network frequency intensity till 300 A/m, does not exceed  $\pm 0,5$  % regarding the record of the size and 0,5 limits of the admitted basic error of the sizes regarding measurements.

3.14. The limits of the admitted additional error of PMT 49DA, caused by the influence of the voltage of a cross handicap of an alternating current with the effective value equal of 50 % of the maximal value of an electric input signal of PMT 49DA, working between input measuring clips consistently with a useful signal and having any phase corner, does not exceed  $\pm 0,5$  % regarding the record of the size and 0,5 limits of the admitted basic error of the size being measured regarding measurements.

3.15. The limits of the admitted additional error of PMT 49DA, caused by the influence of the voltage of a longitudinal handicap constant or an alternating current with the effective value equal of 100 % of the maximal value of an electric input signal of PMT 49DA, working between any measuring clip and the earthed case and having any phase corner, does not exceed  $\pm 0,5$  % regarding the record of the size and 0,5 limits of the admitted basic error of the size being measured regarding measurements.

3.16. The set area of the settings corresponds to a range of measurements.

3.17. The limit of the admitted basic error of the signal system operation does not exceed the limit of the admitted basic error of the size being measured.

3.18. The limit of the admitted additional error of the signal system operation, caused by the change of the air temperature from normal till any one within the limits of working temperatures for each 10 °C of temperature change, does not exceed 0,5 limits of the admitted basic error of the signal system operation.

3.19. The limit of the admitted additional error of the signal system operation, caused by the change of the voltage of the power from nominal till any one within the limits of the operating conditions of using, does not exceed 0,5 limits of the admitted basic error of the signal system operation.

3.20. The power of PMT 49DA is carried out from a network of an alternating current with frequency  $(50 \pm 1)$  Hz and voltage  $(220_{-33}^{+22})$  V.

3.21. The output characteristics of the built - in voltage stabilizer:

- The voltage of idling is (36 0,72) V;
- The voltage at a current of loading 20 ma is not less than 32,9 V;
- The maximal current of loading is 22 mA.

3.22. The capacity, consumed by PMT 49DA from a network of an alternating current at the rated voltage of a network, does not exceed 35 V·A.



3.23. The isolation of the electric circuits of the power and electric circuits of the signal system concerning the case on test specifications maintains an action of a test voltage for a minute practically a sine wave form by frequency from 45 till 65 Hz:

- 1500 V - at the air temperature  $(20 \pm 5) ^\circ\text{C}$  and the relative humidity from 30 till 80 %;
- 900 V - at the relative humidity  $(90 \pm 3) \%$  and the air temperature  $(25 \pm 3) ^\circ\text{C}$ .

3.23.1. The isolation of the input and interface electric circuits concerning the case and among themselves on test specifications maintains an action of a test voltage for a minute practically a sine wave form by frequency from 45 till 65 Hz:

- 500 V - at the air temperature  $(20 \pm 5) ^\circ\text{C}$  and the relative humidity from 30 till 80 %;
- 300 V - at the relative humidity  $(90 \pm 3) \%$  and the air temperature  $(25 \pm 3) ^\circ\text{C}$ .

3.24. The electric isolation resistance of the current carrying circuits of PMT 49DA concerning its case is not less:

- 20 MOhm - at the air temperature  $(20 \pm 5) ^\circ\text{C}$  and the relative humidity from 30 till 80 %;
- 5 MOhm - at the air temperature  $(50 \pm 3) ^\circ\text{C}$  [or plus  $60 ^\circ\text{C}$ ] and the relative humidity from 30 till 80 %;
- 1 MOhm - at the relative humidity  $(90 \pm 3) \%$  and the air temperature  $(25 \pm 3) ^\circ\text{C}$ .

3.25. The chart tape:

- the useful width - 100 mm;
- the seen length of the record - 80 mm.

3.26. The moving speed of the chart tape gets out of lines: 0, 10, 20, 60, 120, 240, 600, 1200, 3600, 7200, 14400 mm an hour.

3.27. The overall dimensions, mm, are no more:

- the forward panel 144 x 144;
- the assembly depth 250;
- the space in the board 138 x 138.

3.28. The weight of PMT 49DA is no more than 4,5 kg.

3.29. PMT 49DA is steady and solid against the influence of the air temperature from 0 to plus  $50 ^\circ\text{C}$  or from 0 to plus  $60 ^\circ\text{C}$  and from minus 50 to plus  $50 ^\circ\text{C}$  ( $60 ^\circ\text{C}$ ) accordingly.

3.30. PMT 49DA is steady and solid against the influence of the humidity till 90 % at the temperature  $+25 ^\circ\text{C}$  and till 95 % at the air temperature  $+30 ^\circ\text{C}$  accordingly.

3.31. PMT 49DA has durability and stability to the influence of a sine wave vibration in a range of frequencies from 1 till 100 Hz at the amplitude of the vibration speeding of  $20 \text{ m/sec}^2$ .

3.32. PMT 49DA has no constructive elements and units with the resonant frequencies from 5 till 25 Hz.

3.33. PMT 49DA has durability and stability to the influence of the mechanical impacts of a single action with a peak shock speeding of 20 m/sec<sup>2</sup>, duration of a shock pulse from 2 till 20 ms and the total of impacts 30.

3.34. PMT 49DA has durability and stability to the influence of the mechanical impacts of the repeated action with a peak shock speeding of 30 m/sec<sup>2</sup>, with the preferable action duration of a shock speeding 10 milliseconds (the admitted duration is from 2 to 20 milliseconds) and the quantity of impacts in each direction 20.

3.35. PMT 49DA has durability and duration to the influence of a shock jolting with the number of impacts 80 per one minute, the average quadratic value of speeding equal 80 and the duration of influence equal 1 hour.

3.36. PMT 49DA has durability at the seismic influences, equivalent to the influence of vibration with parameters, specified in table 3.3.

Table 3.3

Frequency, Hz	1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	15,0	20,0	30,0
Speeding, m/sec <sup>2</sup>	2,4	6,0	11,6	20,4	19,2	17,2	15,2	12,4	8,0	7,6	5,6

3.37. The maintenance of electromagnetic compatibility and noise-immunity.

3.37.1. PMT 49DA corresponds to execution group III about the stability to electromagnetic handicaps in accordance with the all-Union State Standard P 50746-2000.

PMT 49DA satisfies to the criterion of the functioning quality at the influence of handicaps according to the all-Union State Standard P 50746-2000.

3.37.2. PMT 49DA functions normally and does not make any handicaps in conditions of teamwork with the equipment of systems and elements for which it is intended, and also with the equipment of other use which may be used together with the data of PMT 49DA in a typical noise situations.

## 4. Completeness

4.1. PMT 49DA is delivered in the complete set specified in table 4.1.

Naming	Designation	Amount for		Extra information
		PMT 49DA/3	PMT 49DA/1	
1. The technological multichannel registrar PMT 49DA/3	HKГЖ.411124.001-03	1	-	The variant of executing according to the order
PMT 49DA/1	HKГЖ.411124.001-03.01	-	1	
2. The complete set of the tool and accessories	HKГЖ.411914.003			
2.1. Key for checking		1	1	
2.2. The complete set of styluses of type ZP410- ZP430		2	1	
2.3. Equalizer	HKГЖ.671331.001	3	1	
2.4. Fixing clamp		2	2	
2.5. Socket 2ESDV-03P		1	1	
2.6. Socket 2ESDV-06P		6	2	
2.7. Socket EC381V-05P		1	1	
2.8. Socket EC381V-08P		3	1	
2.9. Roll paper		8	8	
3. The complete set of software	HKГЖ.411124.001	1	1	
4. The technological multichannel registrar PMT 49DA. Manual.	HKГЖ.411124/001-03ПC	1	1	

## 5. The device and its operation

5.1. PMT 49DA includes:

- A transformer power unit with pulse stabilizers;
- An analog-digital converter ADC (one for the measuring channel);
- A microprocessor block;
- The module of indication and the keyboard;
- The module of digital-to-analog converters,
- Writing down mechanisms with the linear electric motors, styluses and servoamplifiers (one for a measuring channel);
- A tape drive mechanism;
- Four executive system relays of the signal system for a measuring channel;
- The module of interface RS 232 and RS 485 for the connection with the IBM.

5.1.1. The transformer power unit transforms the mains voltage 220 V into not stabilized +30 V, and pulse stabilizers transform this voltage into stabilized +5 V,  $\pm 15$  V, powering all electronic PMT 49 DA units. The switch of power is not stipulated, because PMT 49DA is intended for work in a continuous mode.

5.1.2. The pulse converters providing galvanic isolation of external circuits of connection are built in modules ADC and the interface.

5.1.3. The ADC transforms an input analog signal into some code acting in the microprocessor through the optron isolation.

5.1.4. The microprocessor block, by results of examination of the ADC in each channel, expects the current value of the size being measured, display it on the indicator, examines the keyboard, operates the module of the digital-to-analog converter and interface RS 232 or RS 485 and executive relays.

5.1.5. The executive relays are switch on (switched off) while getting of the size being measured beyond the limits of bottom I, II and top III, IV settings. The values of the settings are typed due to the keyboard or through the COM-port and appear on display.

The executive relays of bottom settings I, II are switched on, if  $T < U_{StI}$ ,  $T < U_{StII}$  and are switched off, if  $T > U_{StI} + G_{St}$ ,  $T > U_{StII} + G_{St}$  accordingly. The executive relays of top settings III, IV are switch on, if  $T > U_{StIII}$ ,  $T > U_{StIV}$  and are switched off, if  $T < U_{StIII} - G_{St}$ ,  $T < U_{StIV} - G_{St}$  accordingly. Here:

T is the current value of the size being measured;

$U_{StI}$ ,  $U_{StII}$ ,  $U_{StIII}$ ,  $U_{StIV}$  - values of settings I, II, III, IV accordingly;

$G_{St}$  - value of a hysteresis or a zone of return (it is performed individually for each channel).

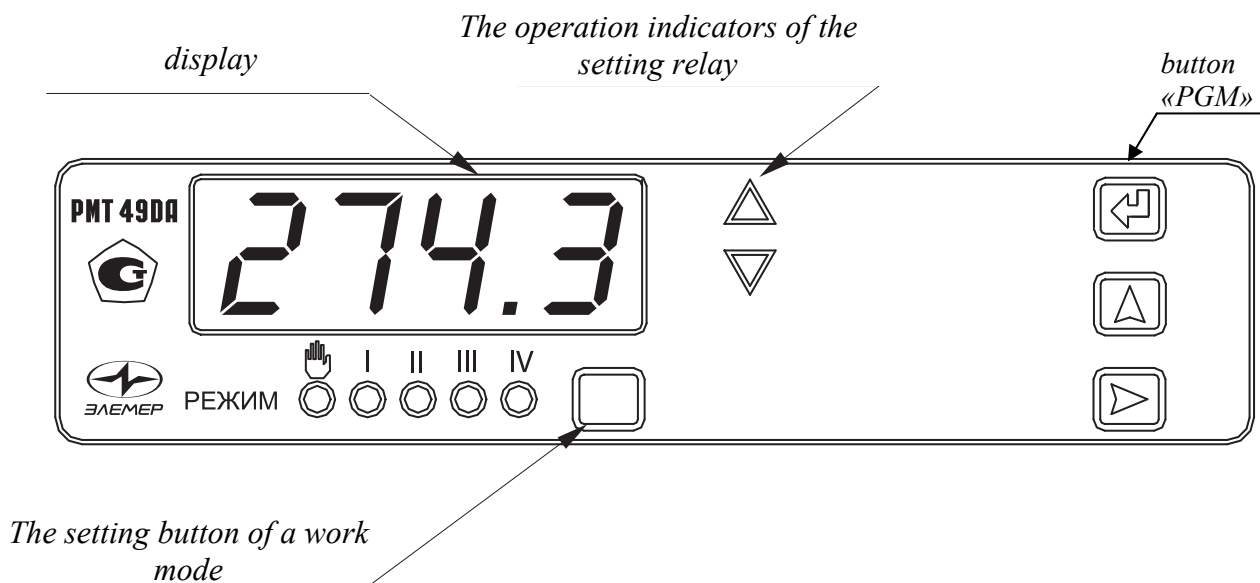
5.1.6. All the executive relays are deduced by the full contact groups: over-all, normally closed-circuit, normally open-circuit contacts.

5.1.7. If it is not possible to measure a value of an input size while operating of PMT 49DA because of the breakage of the input circuits, the output of the size being measured beyond the limits of the range of measurements or malfunctions of ACB, then relay 1, relay 2, relay 3 and relay 4, of the given channel, is set in a condition determined in parameters rL1, rL2, rL3, rL4 individually for each relay of each channel.

rL1 = 0, rL2 = 0, rL3 = 0, rL4 = 0 - the appropriate relay is switched off;  
rL1 = 1, rL2 = 1, rL3 = 1, rL4 = 1 - the appropriate relay is switch on.

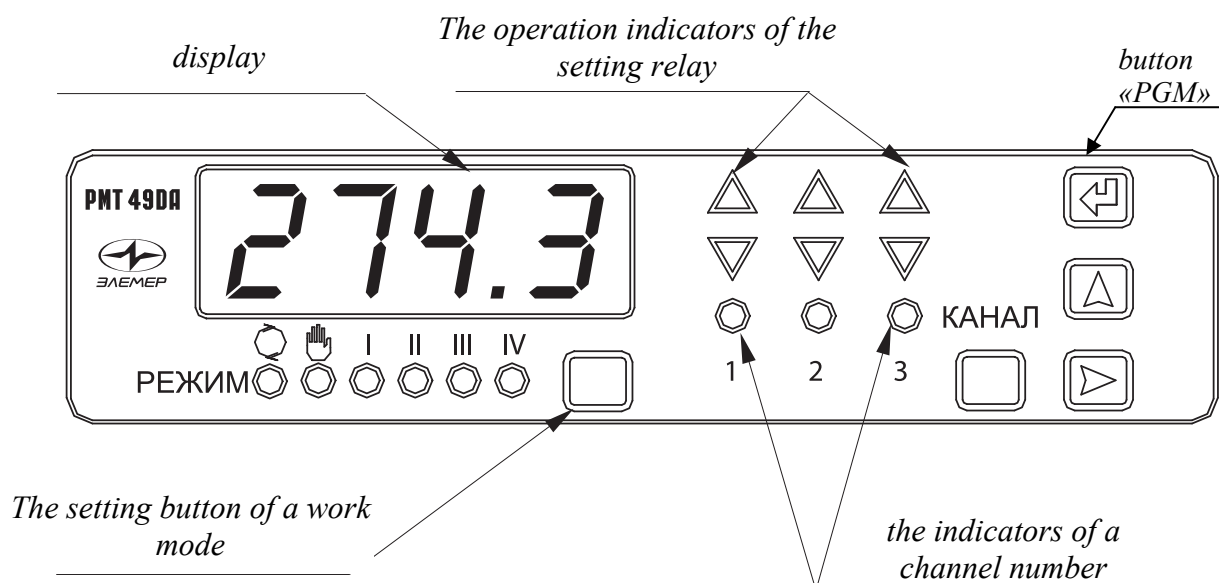
5.1.8. The appearance of the front panel of PMT 49 DA/1 and PMT 49DA/3 is shown in picture 5.1 and 5.2.

The technological multichannel registrar PMT49 DA/1  
The front panel



Picture 5.1



The technological multichannel registrar PMT49 DA/3  
The front panel



Picture 5.1

5.1.9. The module of indication and the keyboard include: (according to pictures 5.1, 5.2):

1) The six round LEDs of the green color (five for PMT 49DA/1), displaying a mode of indication of the basic four-digit indicator; button "РЕЖИМ", allowing you to choose one of the following modes of operation:

- «» - The cyclic examination of channels on the size being measured (an indication time of one channel is set by parameter "tind" from 2 to 100 sec) (only for PMT 49DA/3);
- «» - a manual examination of channels on the size being measured;
- «I» - setting indication I;
- «II» - setting indication II;
- «III» - setting indication III;
- «IV» - setting indication IV.

2) The three round LEDs of the green color, displaying a channel number; a choice of the channel is operated by button "КАНАЛ" (only for PMT 49DA/3);

3) The six LEDs of the triangular form (two for PMT 49DA/1), displaying a condition of the relays. The LEDs  $\Delta$  display a condition of the relay of settings III, IV, and the LEDs -  $\nabla$  a condition of the relay of settings I, II:

- the red color displays the operation of the relay emergency of settings IV, I, irrespective of a condition of the relay III, II accordingly; IV, I, irrespective of a condition of the relay III, II accordingly;
- the yellow color displays a condition of the relay of the precautionary settings III, II.

It is necessary to have values of the settings in the following order: UStI < UStII < UStIII < UstIV - for the maintenance of the correct logical operation of the indication.

4) The buttons "PGM", «>», « $\blacktriangle$ », which are used for input of the settings, the parameters of the configuration and realization of the calibration of the resistance of the line at the two-wire circuit of the connection of the thermoelements of the resistance and R0 of the equalizer for the thermoelectric converters. A unitary pushing the button of the choice of the edited category «>» provides moving of the edited (blinking) category to the right. A unitary pushing the button " $\blacktriangle$ " provides changing of the value of the edited category on a unit or chooses the following parameter of the configuration. The button "РЕЖИМ" allows to choose the previous parameter of the configuration in the menu of the parameters of the configuration.

5.1.9.1. For programming of the settings is necessary:

- to display the value of the edited setting on the indication with the aid of buttons "РЕЖИМ" and "КАНАЛ";
- to push the button "PGM", after the header "PSU" must appear on the indication - a password for the change of the settings;
- to enter the password with the aid of the buttons " «>», « $\blacktriangle$ », according to item 5.1.9.4); if the entered password is correct, then goes on moving to the programming of the setting, if the password is incorrect, then goes returning to the viewing of the setting value.
- *If the password "PSU" is equal to 0000, then the pushing of the button "PGM» will move to the programming of the setting at once.*
- to edit the value of the setting with the aid of the buttons ">"," $\blacktriangle$ " according to item 5.1.9.4);
- to finish editing of the setting pressing the button " PGM ";
- to choose for editing the following setting with the aid of the buttons "РЕЖИМ" and "КАНАЛ" and to edit it without reentering the password.

**Note.** *After moving to the manual or cyclic mode of the examination of the channels the further editing of the settings will demand reentering a password.*

5.1.9.2. For programming of the parameters of the configuration is necessary:

- to push the button "PGM" being in the mode of the cyclic or manual examination of the channels, after that the header "PScF" must appear on the indicator- the requiring of the password about the configuration;
- to enter the password with the aid of the buttons ">","▲" according to item 5.1.9.4); if the entered password is correct, then the mnemonic designation of the first parameter of the configuration will be displayed; if the password is incorrect, then PMT 49DA will return to the previous mode of its operation. *If the password is equal to 0000, then the pressing of the button «PGM " will move to the indication of the first parameter of the configuration at once;*
- to push the button "▲" or "РЕЖИМ" to choose the necessary parameter;
- to push the button "КАНАЛ" to choose the necessary channel;
- to push the button ">" for viewing value of the parameter (pressing of the button "▲" will cause the return to indication of the parameter naming and further to a choice of the following parameter);
- to push the button ">" repeatedly for editing of the chosen parameter;
- to edit the chosen parameter according to item 5.1.9.4);
- to push the button "▲" for the return to the indication of the parameter naming;
- to choose the following parameter using the buttons "▲", "РЕЖИМ" and "КАНАЛ";
- the exit from the menu of programming of the configuration is carried out by pressing of the button " PGM " from any item of the menu.

**Note:**

1. *PMT 49DA/3 moves to the cyclic mode of the channel examination if it is switched on.*
2. *If there are not any actions about pressing buttons of PMT 49DA/3 within five minutes, then it move to the cyclic or manual mode of the channel examination from any other mode of indication.*
3. *PMT 49DA makes measuring of the input signals, management of the relay and a record on a chart tape in any mode of indication.*
4. *The change of any setting or parameter of the configuration kicks in at once after its input.*

5.1.9.3. The parameters of the configuration and their designation:

1) "Un" – a network number due to which PMT 49DA answers the inquiry of the IBM. The values of the network number are from 1 to 254.

The factory installation "Un" = 1.

2) "Spd" – the speed of transferring through the serial port RS 232. The speed of transferring gets out of lines: "0,3"; "0,6"; "1,2"; "2,4"; "4,8"; "9,6" kbit/sec.

The factory installation "Spd" = " 9.6".

3) "tind" – a time of indication (c) 2-100 (only for PMT 49DA/1).

The factory installation "tind" = 3.



4) "PScF" - the password for the configuration 0000 9999.

The factory installation "PScF" = "0000".

5) "PSU" - the password for editing of the settings 0000 9999.

The factory installation "PSU" = "0000".

6) "dAt.n" – a type of the initial converter of the channel n where the index " \_\_.n" means the number of the measuring channel (from 1 to 3) in a symbol of the configuration parameter The designations of the initial converters correspond to the given ones in table 5.1.

Table 5.1

The designation of the initial converter	A symbol of HCX	$W_{100}$	The range of the size being measured
«Cu85»	50M	1,4280	Minus 50÷200 °C
«Cu65»	50M	1,4260	Minus 50÷200 °C
«Cu83»	53M	1,4280	Minus 50 ÷ 200 °C
«Cu63»	53M	1,4260	Minus 50 ÷ 200 °C
«Cu81»	100M	1,4280	Minus 50 ÷ 200 °C
«Cu61»	100M	1,4260	Minus 50 ÷ 200 °C
«PtH5»	50Π	1,3910	Minus 100 ÷ 600 °C
«PtH1»	100Π	1,3910	Minus 100 ÷ 600 °C
«Ptbl»	Pt100	1,3850	Minus 100 ÷ 600 °C
«tc H»	XA(K)	-	Minus 50 ÷ 1300 °C
«tc L»	XK(L)	-	Minus 50 ÷ 600 °C
«tc r»	ΠΠ(R)	-	0 ÷ 1700 °C
«tc S»	ΠΠ(S)	-	0 ÷ 1700 °C
«tc b»	ΠΠ(B)	-	300 ÷ 1800 °C
«tc J»	TЖK(J)	-	Minus 50 ÷ 1100 °C
«tc A1»	BP(A-I)	-	0 ÷ 2500 °C
«tc t»	MK(T)	-	Minus 50 ÷ 400 °C
«t05»	-	-	0 ÷ 5 mA
«t020»	-	-	0 ÷ 20 mA
«t420»	-	-	4 ÷ 20 mA
«U100»	-	-	0 ÷ 100 mV
«U075»	-	-	0 ÷ 75 mV
«U010»	-	-	0 ÷ 10 V
«rr»	-	-	0 ÷ 320 Ohm

The factory installation - "t420".

7) "dAc.n" – a type of the equaliser of a cold seal for the channel n.

"Cu6" - the copper thermometer of the resistance  $W_{100} = 1,426$ ;  $R_0 = 18 \div 110$  Ohm.

"Cu8" - the copper thermometer of the resistance  $W_{100} = 1,428$ ;  $R_0 = 18 \div 110$  Ohm.

"Pt6" - the platinum thermometer of the resistance  $W_{100} = 1,385$ ;  $R_0 = 40 \div 110$  Ohm.

The factory installation - "Pt6".

8) "Lc.n" - the connection circuit of the RT on the channel n.

"c2" - two-wire;

"c3" - three-wire.

The factory installation - "c3".

9) "dt.n" - the size of the linear displacement of the scale is displayed in terms of the size being measured. To the calculated value is added the value of the parameter "dt.n», according to the results of the measurements and the result is appear on the indicator. The relay and the indicator are set according to the new value.

The factory installation - " 0.0".

10) "UF.n" – a quantity of marks after a point on the channel indication n from 0 to 3.

The factory installation - "1".

11) "nS.n" – a quantity of the measurements for averaging on the channel n from 1 up to 100.

It is necessary to take into account that while installing of this parameter at the step change of an input signal on 10 % from the range of the measurements, the setting time of the size being measured with accuracy of 0,5 % will be equal  $2,9 \cdot nS.n \cdot 0,7$  (sec), with accuracy of 0,25% will be equal  $3,5 \cdot nS.n \cdot 0,7$  (sec). Besides while giving power to PMT 49DA or after the elimination of the breakage of the input circuits, a process of measurements and managements of the relay will start after  $nS.n \cdot 0,7$  (sec).

The factory installation - "1".

12) "dPl.n" - the minimal value of the indication range. For input signals as force or a voltage of a direct current the minimal value of the transformation range (the indication value is appropriate to the bottom boundary line of an input range).

The factory installation - " 0.0"

13) "dP2.n" - the maximal value of the indication range.

For input signals as force or a voltage of a direct current the minimal value of the transformation range (the indication value is appropriate to the bottom boundary line of an input range).

The factory installation - " 100.0".

14) "Sqr.n" – a extraction function of a square root.

If Sqr.n = 0, so the dependence of the size being measured from an input signal - linear and a display value at the measurement of a current or a voltage is calculated under the formula:

$$Value = dP1 + (dP2 - dP1) \cdot \frac{(I - I_{min})}{(I_{max} - I_{min})}, \quad (5.1)$$

*Value* – a value which is shown on the indicator;

*I* - is the measured value of the current or voltage;

*I<sub>min</sub>, I<sub>max</sub>* - are the limits of the current or voltage measurement;

*DP2, dP1* – is a range of transformation according to items 5.1.9.3.12), 13).

If "Sqr.n" = 1, so the dependence of the size being measured from an input signal - linear and a display value at the measurement of a current or a voltage is calculated under the formula:

$$Value = dP1 + (dP2 - dP1) \cdot \sqrt{\frac{(I - I_{min})}{(I_{max} - I_{min})}}, \quad (5.2)$$

The factory installation - «Sqr.n» = 0.

15) "Sil.n" – is a function of the linearization of a square root near to zero. It is used for the reduction of any noise outside of a range of measurements. A value of the parameter is expressed in percentages of the input (measured) range. There is a choice to choose from the following fixed values: 0,0; 0,5; 1; 2; 3 %.

The function of the chosen value will be linear in the range of the input signal from 0.

The value 0,0 % - means, that this function is switched - off, i.e. the square root will be taken in all range of input signals.

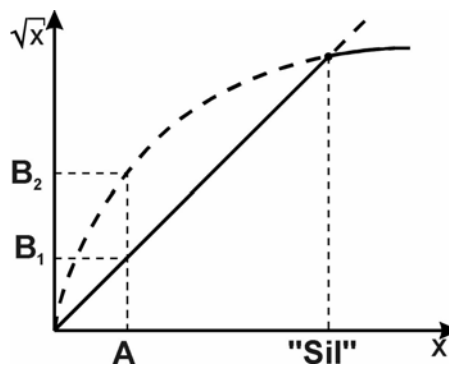


Table 5.2

The parameter value Sil, %	The input signal in the point of the maximal error A,%	The maximal error (B <sub>2</sub> - B <sub>1</sub> ), %
0,5	0,125	1,77
1,0	0,25	2,5
2,0	0,5	3,54
3,0	0,75	4,33

The factory installation - 0,0 %.

16) "GSt.n" – a value of the return zone about the operation of the settings.

It is displayed in terms of the size being measured.

The factory installation "GSt.n" = 0,5.

17) "EnU.n" - the allowing of the setting operations.

"EnU.n" = 0 – the setting operations on the channel n is forbidden;

"EnU.n" = 1 – the setting operations on the channel n is allowed.

The factory installation "EnU.n" = 1.

18) "rL1.n" - a condition of the relay of setting I at the breakage of the input circuit of the channel n.

"rL1.n" = 0 is switched off;

"rL1.n" = 1 is switched on.

The factory installation "rL1.n" = 0.

19) "rL2.n" - a condition of the relay of setting II at the breakage of the input circuit of the channel n.

"rL2.n" = 0 is switched off;

"rL2.n" = 1 is switched on.

The factory installation "rL2.n" = 0.

20) "rL3.n" - a condition of the relay of setting III at the breakage of the input circuit of the channel n.

"rL3.n" = 0 is switched off;

"rL3.n" = 1 is switch on.

The factory installation "rL3.n" = 1.

21) "rL4.n" - a condition of the relay of setting IV at the breakage of the input circuit of the channel n.

"rL4.n" = 0 is switched off;

"rL4.n" = 1 is switched on.

The factory installation "rL4.n" = 1.

22) "PP1.n" - the minimal value of the range of the record of the size being measured.

The factory installation "PP1.n" = " 0.0".

23) "PP2.n" - the maximal value of the range of the record of the size being measured.

The factory installation "PP2.n" = " 100.0".

24) "CLr.n" – a calibration of the resistance of the communication line at the measurement of the signals from the RT under the 2 wire circuit ( a measure is Ohm):

- to connect a line to PMT 49DA, closed on the part of the RT or to connect the resistance, which is equivalent to the resistance of the line;

- to choose the appropriate channel and push the button ">" in the item of the menu of "CLr.n" (the set value of the resistance line will appear on the indication );
- to press the button ">" (indication "no");
- to press the button "▲" (indication "YES") [repressing "▲" (indication "rEd") and further ">" - manually will allow to enter the resistance value of the communication line];
- to press the button ">" (the measured value of the resistance line will be appear in a few seconds);
- to press the button "▲" for moving on to the basic menu or "PGM" for the quit from the menu;

The factory installation "CLr.n" = 0.00 Ohm.

25) "CLc.n" – a calibration of the equalizer resistance of a cold seal at the measurement of the TC of 0 °C, expressed in Ohms:

- to connect the thermocouple and the equalizer of the cold seal to PMT 49DA according to picture 1 of appendix B and place the operating end of the thermocouple into the ice-water mixture.
- to wait for the thermal balance of the system (about 10 mines);
- to choose the appropriate channel and to press the button ">" (the set value R0 of the equalizer will appear on the indication );
- to press the button ">" (indication "no");
- to press the button "▲" (indication "YES") [the repeated pressing "▲" (indication "rEd") and further ">" - will allow to enter the value R0 of the equalizer of the cold seal manually];
- to press the button ">" (the measured value of the equalizer resistance of 0 °C will appear in a few seconds);
- to press the button ">" for moving to the basic menu or "PGM" for quitting from the menu.

The factory installation "CLc.n" = 100.0 Ohm.

26) "PLo.n" – the fine tuning of the bottom boundary line of the record on a chart tape (the fine tuning is made in limits  $\pm 5$  mm, which corresponds to the range of the parameter change "PLo" 0\_100):

- to press the button ">", a value of the displacement of the bottom boundary line of a record will appear in measures on display (the return to the menu is carried out by pressing of the button ">");
- to press rapidly the button ">" , the indicating parameter value will start to blink on display and a writing head will place on the bottom boundary line of the record;
- to arrange the bottom boundary line of the record with the aid of buttons "▲" – the displacement to the right and "РЕЖИМ" – the displacement to the left;
- to press the button ">" for recording of parameter;
- to press the button "▲" for moving to the list of parameters.

27) "PHi.n" – the fine tuning of the top boundary line of the record on a chart tape. It is similarly carried out to the previous item of the menu.

28) "rSt" – the record of the all values of parameters according to the factory installations:

- to press the button ">" (indication - "no");
- to press the button ">" (indication – a blinking inscription "no");
- to press the button "▲" (indication - blinking inscription "YES");
- to press the button ">" (The record of the reference values of the parameters is made for 5 seconds, indication - " \_ \_ \_ \_ ").

The given operation is not applied to the parameters "PLo.n" and "PHi.n".

5.1.10. The interface module is intended for data exchange between PMT 49DA and the IBM.

The interface allows to read out the current sizes being measured from PMT 49DA with the aid of the program DDE of an exchange.

The interface represents the modified variant of the interface RS 232 or RS 485 about the electrical characteristics. The possible variants of PMT 49DA connection to the IBM are shown in pictures B.1, B.2 and B. 3 of appendix B.

The switching of the interface type is made industrially.

#### 5.1.11. Error messages

An error message appears on the indicator at the incorrect connection of the input signals or some malfunctions of PMT 49DA:

"CUt" – the breakage of the input circuit of the initial converter of the connecting terminal K4 (a potential input).

"-AL-" – the breakage of the input circuit, a discrepancy to the connection circuit of the initial converter or an output of value of the size being measured beyond limits set for the given type of the initial converter;

"ErAd" – a malfunction of the ADC module;

"CS" – an error of the data in the non-volatile memory;

"ErCL" – an error of the given calibrating factors on the given channel;

"Err" – a connection error at the resistance calibration of the line of a 2 wire connection of the RT or at the calibration of the equalizer of a cold seal.

## 6. The instruction of security measures

6.1. PMT 49DA in accordance with НП -001-97 (ОПБ – 88/97) belongs to safety grades 2, 3:

- as to its purpose - to the elements of normal operation;
- as to its influence on safety – to the elements important for safety;
- as to the nature of functions performed – to the controlling elements.

An example of classification designations 2 HY or 3HY.

6.2. PMT 49DA correspond to class I of the all-Union State Standard 12.2.007.0-75 about a person's protection from killing by current and corresponds to the safety requirements according to the all-Union state Standard P 51350-99.

6.3. PMT 49DA has a clip of the protective grounding in accordance with the all-Union state Standard 12.2.007.0-75.

6.4. PMT 49DA is fireproof, the probability of a fire appearing in PMT 49DA does not exceed  $10^{-6}$  per one year according to the all-Union State Standard 12.1.004-85, i.e. at any malfunctions arising both in PMT 49DA and in the external electric circuits connected to it, it is not a source of ignition.

6.5. While operating PMT 49DA, it is necessary to follow the requirements of НП-001-97 (ОПБ-88/97), ПНАЭ Г-1 - 024 - 90 (ПБЯ РУ АС - 89), the all-Union State Standard 12.3.019-80, "The guidelines of the security measures of the electrical installation of consumers" and " The guidelines of the security measures while operating of the electrical installation of consumers", " The guidelines of the device of electrical installations ", authorized by Gosenergonadzor.

6.6. It is necessary to be sure that the grounding connection of PMT 49 DA is available and correct before operating of the device when it is switched off.

6.7. The elimination of malfunctions and all preventive works must be carried out when PMT 49 DA is switched off from network, except for the replacement of stylus (see chapter 8).

6.7. The initial converters, the wires of circuits of the signal system must be connected according to the mark when a voltage of power is switched off.



## 7. Preparation for work

7.1. Unpack PMT 49DA. Make an external examination; be sure that the conformity is set according to the following requirements:

- 1) PMT 49DA must be completed according to chapter 4 of this manual;
- 2) The factory number of PMT 49DA must correspond to the specified one in the manual;
- 3) PMT 49DA must not have any mechanical damages when its operation is not allowable.

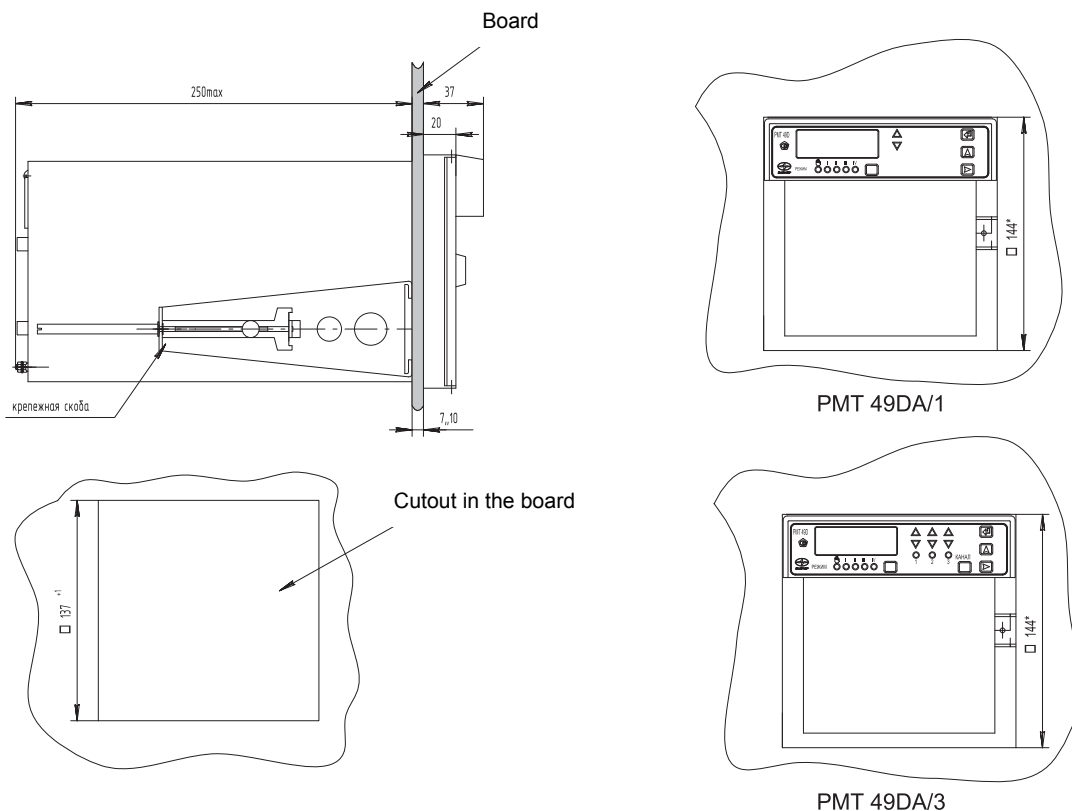
### 7.2. The order of PMT 49DA installation

7.2.1. It is necessary to have access to PMT 49 DA in the board from the back side of the board.

The sizes of space in the board are in item 3.27.

7.2.2. The installation of PMT 49DA in the board - according to the assembly drawing represented in picture 7.1. Some special fixing products are used for PMT 49DA fixing, they are: clips, being in the complete set.

The technological multichannel registrar PMT 49DA.  
The assembly drawing



Picture 7.1

7.2.3. The electrical connections of PMT 49DA with the network of power, initial converters and executive devices are carried out through the terminal receptacles, located on the back panel according to picture A.1 of the appendix A and picture B.1 of the appendix B..

The connection with the IBM is made through socket DB9 (Appendix B).

The measuring line must be laid by curled wires and consist in the screen.

7.2.4. Earth the case of PMT 49DA, plug it. After the expiration of 30 minutes PMT 49DA is ready to work.

### 7.3. Approbation

7.3.1. It is necessary to connect a store of resistances for checking zeros to PMT 49DA for a configuration with the RT, and the comparator of voltage by means of calibrating cables or to place the thermoelectric convector into an ice-water mixture.

Set the values of resistances in the resistance stores 50 Ohm for the RT of a type 50M, 50P, 53 Ohm of a type 53 M and 100 Ohm for the RT of a type 100 M, 100P, Pt 100.

Set a zero value of the thermal electromotive force on the voltage comparator.

7.3.2. The sources of the calibrated currents and voltages must be connected with the input electrical signals as force or voltage of a direct current for configurations of PMT 49DA accordingly.

Set the values of the input signals appropriate to the limits of the size being measured.

7.4. If it is necessary, make the configuration of PMT 49DA, using the guidelines of chapter 5.

## 8. The operating procedure

8.1. Open the door of PMT 49DA and take out the tape drive mechanism for what simultaneously press two levers located on both sides from the mechanism. The exempted mechanism turns on a direction forward and is freely taken out.

8.1.1. Remove the shipping loose leaf fixing position of styluses of PMT 49DA, for this purpose turn off the lock screw, put forward the inset unit of PMT 49DA for the necessary length beyond the clip, located in the bottom part of the inset unit, preliminary having shifted a latch to the right (located in the left bottom corner), take the shipping loose leaf, insert PMT 49DA in its position and twirl the lock screw.

**Attention!** *It is forbidden to touch the rheochords while and the brass directing of the writing head to avoid their breakage. While taking out the inset unit, do not damage the connecting cable with the indication model.*

8.2. Installation and replacement of styluses

**Attention!** *PMT 49DA must be unplugged while carrying out this operation.*

8.2.1. Insert the stylus of the first (bottom) record channel into the holder.

8.2.2. Carry out the previous item for two other record channels. The ink of styluses have individual colour for each record channel. The removals of styluses while their replacing; carry out in the back order (only for PMT 49DA/3).

8.2.3. The auxiliary loose leaf fixing the position of styluses must be removed according to item 8.1.1.

8.3. Set the necessary moving speed of a chart tape with the aid of the switches located in the bottom part of the inset unit. Switch M-R in the given modification is not used. Thus the tape drive mechanism must be taken out.

8.4. Installation of a chart tape

8.4.1. Take out the tape drive mechanism according to item 8.1. Open a roll of a chart tape. Insert a giving spool into the roll and set them in the grooves located behind the top part of the tape drive mechanism.

8.4.2. The beginning of a chart tape pass under a clamping rod, then stretch a tape atop the transporting gear rollers, pass under a transparent transport rod, under the bottom directing rod and insert into the cross-hatching of the winding (receiving) spool.

8.4.3. Turning the receiving spool approximately on 2 turns, wind the tape so that it was tightly stretched.

8.5. Insert the tape drive mechanism into grooves of the forward part of PMT 49DA. Set the tape drive mechanism in its initial position by rotation.

8.6. The fine tuning borders of record on a chart tape

Set the drive speed of the chart tape of 20 mm / min. Enter item of the menu "PLo.1". Open the small door. Visually supervising record on a chart tape, arrange the bottom border of record of the first channel according to item 5.1.9.3.26) ("PLo.n"). Enter item of the menu "PHi.1". Similarly arrange the top border of record on a chart tape according to item 5.1.9.3.27) ("PHi.n").

8.7. Repeat the previous item for two other channels of record (only for PMT 49DA/3).

8.8. Make the resistance calibration of the thermoelectric converters of the equaliser of a cold seal for each measuring channel according to item 5.1.9.3.25).

8.9. Make the resistance calibration of a line for each channel for the resistance thermoelements connected under the 2 wire circuit according to item 5.1.9.3. 24).

8.10. PMT 49DA is ready to operate after the connection of the initial converters and endurance in the operating condition for 30 mines

8.11. Maintenance service

8.11.1. Replacement of a chart tape

There is an inclined red strip before 1...2 m of finishing of the chart tape

Put forward the tape drive mechanism according to item 8.1 and pulling downwards remove the receiving spool. The left end face of the spool is removed, and the roll is kept on the rest of the spool.

The chart tape can be separated and removed by the rotation of the reeled - up chart tape in the direction opposite reeled – up.

The empty receiving spool insert in its former position.

One should remove any dust off the tape drive mechanism while replacing of a chart tape Set a chart tape according to item 8.4.

8.11.2. Carry out the replacement of PMT 49DA styluses when the tape drive mechanism is taken out according to item 8.2.

## 9. Technique of checking

9.1. The checking of PMT 49DA is conducted by the State metrological service bodies or the consumer metrological service which are eligible to do it. The requirements to checking, the order, and the basic stages of realization of checking are defined by ИП 50.2.006-94 ГЦИ "The checking of the measurement ways. The organization and the realization order".

9.2. The Intertesting interval makes two years.

9.3. Operations and means of checking

9.3.1. While checking, they carry out the operations specified in table 9.1.

Table 9.1

№ items	Checking operation	Item number	Compulsion of operation	
			Initial checking	Periodic checking
1.	Examination	9.6.1	+	+
2.	Approbation	9.6.2	+	+
3.	Checking of the electric resistance of the isolation	9.6.3	+	-
4.	Checking of the electric durability of the isolation	9.6.4	+	-
5.	The value definitions of the basic errors of the measuring channels on the size being measured *	9.6.5.1-9.6.5.5	+	+
6.	The definition of the basic given errors of the measuring channels due to the record of the size being measured	9.6.5.3	+	+
7.	The definition of the output characteristics of the built - in voltage stabilizer	9.6.5.7	+	+

\* It is admitted defining of the basic errors of measuring channels at the customer's request to carry out for a particular configuration of PMT 49DA according to item 9.8.

9.3.2. While checking the basic and auxiliary ways of checking are applied specified in table 9.2.

Table 9.2

Naming of the checking ways and number of the reference document	The basic metrological and characteristics of checking ways
The reference calibrator – the measuring instrument of the unified signals ИКСУ-2000 TY4381-031-13282997-00	The range of the resistance reproduction is 0...180 Ohm, 180...300 Ohm. The basic error is $\pm 0,015$ Ohm, $\pm 0,025$ Ohm. The range of the temperature reproduction (RT) is Minus 200...550 °C. The basic error is $\pm 0,05$ °C. The range of the temperature reproduction (TC) is Minus 210...1300 °C. The basic error is $\pm 0,3$ °C. The range of the voltage reproduction is Minus 10...60 mV, 0...12 V. The basic error is $\pm 0,005$ mV, $\pm 3$ mV The range of the current reproduction is 0...25 mA. The basic error is $\pm 0,003$ mA.
Resistor C5-5	C5 - 5 - 2 W – 1,68 kOhm– 1 %
Ruler All-Union State standard 427-75	The price of division is 1 mm
The installation of the screw-ring YIIY-1M	The voltage is 1500 V
Megaohmmeter Ф4102/1-1M TY 25-7534.005-87	The range of measurements is 0...20000 MOhm.

**Note.** *It is acceptable to apply the separate, newly developed or being in application ways of checking and the equipment, which are not making a concession according to their characteristics specified in the current technique of checking.*

#### 9.4. Safety requirements

9.4.1. While checking, one should carry out the requirements of the safety precautions stated in the documentation on the used ways of checking and the equipment.

#### 9.5. Checking conditions and preparation for it

9.5.1. While checking; one should follow the following conditions:

- |   |  |
|---|--|
| 1) the air temperature, °C                    | $20 \pm 5$ ;                               |
| 2) the relative air humidity of air, %        | $30 \div 80$ ;                             |
| 3) the atmospheric pressure, kPa (mm of a hg) | $84,0 \text{ } 106,7$ ;<br>$(630 - 800)$ ; |
| 4) The voltage of power, V                    | $220 \pm 4,4$ ;                            |
| 5) The frequency of a power line, Hz          | $50 \pm 0,5$ .                             |

9.5.2. The operations, carrying out with the ways of checking and with PMT 49DA being checked, must be carried out according to the guidelines given in the operational documentation.

9.5.3. One carries out the following spadework.

9.5.3.1. PMT 49DA is maintained for 4 hours in the conditions set in item 9.5.1.

9.5.3.2. The ways of checking are prepared for work according to the operational documentation.

9.6.1. The examination of PMT 49DA being checked, one carries out according to item 7.1 of this manual.

9.6.2. Approbation of PMT 49DA being checked is included in check of its serviceability according to item 7.3 of this manual.

#### 9.6.3. Check of electric resistance of isolation

9.6.3.1. The checking of the electric isolation resistance of PMT 49DA circuits is carried out with a megaohmmeter  $\Phi$  4102/1-1M or some other device for measurement of the electric resistance with a working voltage which is no more than 500 V and an error which is no more than 20 %.

The readout of indications is carried out after the expiration of 1 minute after the application of a voltage between the contacts of a tested circuit connected together and the case (a clip of protective grounding) or the contacts of other circuit connected together according to table 9.3.

Table 9.4

Executing variant	Test voltage, V	Circuits being checked	Numbers of contacts according to pictures A.1 and B.1, B.2 of appendixes A and B accordingly, united in groups	
			the first	the second
1	2	3	4	5
PMT 49DA/3	500	<p>The power circuit of an alternating current, the electrical circuits of the signal system of</p> <p>1) the case (a clip of protective grounding),</p> <p>2) the input circuits of the built-in voltage and input circuits of the measuring channel and the interface circuits</p>	<p>Terminal-block «Network»: contacts 2,3; All the contacts of the signal system: channel 1 – channel 3: contacts K1, K2: 1 – 6, contacts K3, K4: 1 - 6</p>	<p>Case (a clip of protective grounding)</p> <p>The inputs of channels 1 – 3: contacts 1-8; RS232/RS485: contacts 1-5</p>
PMT 49DA/1	500	<p>The power circuit of an alternating current, the electrical circuits of the signal system of</p> <p>1) the case (a clip of protective grounding),</p> <p>2) the input circuits of the built-in voltage and input circuits of the measuring channel and the interface circuits</p>	<p>Terminal-block «Network»: contacts 2,3; All the contacts of the signal system: channel 1 – channel 3: contacts K1, K2: 1 – 6, contacts K3, K4: 1 - 6</p>	<p>Case (a clip of protective grounding)</p> <p>The inputs of channel 1: contacts 1-8; RS232/RS485: contacts 1-5</p>

The resistance of isolation must not be less than 20 MOhm.

#### 9.6.4. The check of the electric isolation durability.

The check of the electric isolation durability is carried out on HIIY-1M installation, allowing you to increase a voltage smoothly or in regular intervals, not exceeding 10 % of value of a test voltage.



The test voltage should be increased smoothly, beginning from zero or from the value not exceeding the nominal voltage of a circuit) to the test one for 5 - 10 seconds, but no more than 30 seconds. The decreasing of a voltage to zero must be carried out with the same speed.

The measuring error of a test voltage must not exceed  $\pm 5\%$ .

The values of a test voltage for the various circuits of PMT 49DA are specified in table 9.4.

Table 9.4

Executing variant	Test voltage, V	Circuits being checked	Numbers of contacts according to pictures A.1 and B.1, B.2 of appendixes A и B accordingly, united in groups	
			the first	the second
1	2	3	4	5
PMT 49DA/3	1500	<p>The power circuit of an alternating current, the electrical circuits of the signal system of the case (a clip of protective grounding),</p> <p>the input circuits of the built-in voltage and input circuits of the measuring channel and the interface circuits</p>	<p>Terminal-block «Network»: contacts 2,3;</p> <p>all the contacts of the signal system: channel 1 – channel 3: contacts K1, K2: 1 – 6, contacts K3, K4: 1 - 6</p>	<p>Case (a clip of protective grounding)</p> <p>The inputs of channels 1 – 3: contacts 1-8; RS232/RS485: contacts 1-5</p>
	500	<p>The interface circuits of</p> <p>the input circuits of the built-in voltage and input circuits of the measuring channel and the interface circuits</p>	<p>RS232/RS485: contacts: 1-5</p>	<p>The inputs of channels 1 – 3: contacts 1-8; a case (a clip of protective grounding)</p>

The rest of table 9.4

1	2	3	4	5
PMT 49DA/3	500	The input circuit of the built-in stabilizer and the input circuits of each measuring channel concerning other measuring channels and the interface circuits connected to the case	The input of channel 1: contacts 1 - 8	The inputs of channels 2, 3: Contacts 1-8; RS232/RS485: Contacts 1 – 5; case
			The input of channel 2: contacts 1 - 8	The inputs of channels 1, 3: contacts 1-8; RS232/RS485: contacts 1 – 5; case
			The input of channel 3: contacts 1 - 8	The input of channels 1, 2: contacts 1-8; RS232/RS485: contacts 1 – 5; case
PMT 49DA/1	1500	The power circuit of an alternating current, the electrical signal systems of the case (a clip of protective grounding), the input circuits of the built-in voltage and input circuits of the measuring channel and the interface circuits	Terminal-block «Network»: contacts 2,3; all the contacts of the signal system: Channel 1: contacts K1, K2: 1 – 6, contacts K3, K4: 1 - 6	Case (a clip of protective grounding)  the inputs of channel 1:  контакты 1 – 8; RS232/RS485: контакты: 1 - 5
			RS232/RS485:  contacts: 1 - 5	The inputs of channel: contacts 1 – 8; case (a clip of protective grounding)
	500	The input circuit of the built-in stabilizer and the input circuits of each measuring channel concerning other measuring channels and the interface circuits connected to the case	The input of channel 1: contacts 1 - 8	RS232/RS485: contacts 1 - 5 case

The isolation is kept under the action of a test voltage for a minute. Then one decreases the voltage smoothly up to zero or a value, not exceeding the nominal one, after that the test set is disconnect.

There must be no breakdowns and superficial blocking of the isolation while checking.

9.6.5. The value determination of the basic errors of measuring channels of the size being measured and the record of the size being measured and output characteristics of the built - in voltage stabilizer

9.6.5.1. The value determination of the errors of measuring channel of PMT 49DA may be carried out both independently (with using of PMT 49DA keyboard for its configuration and PMT 49DA indicators for data read-out), and with the aid of the IBM (with use of the IBM keyboard for configuration PMT 49DA and the IBM screen for data read-out).

9.6.5.2. To determinate the values of PMT 49DA errors while operating with the resistance thermoelements (RT) and the input signals as a resistance of a direct current; one must carry out the following operations:

- 1) power and keep PMT 49DA in the switched on condition for 30 min;
- 2) while using the IBM, one connects it to PMT 49DA and launch the appropriate program;

- 3) set the following parameters of s configuration of all measuring channels of PMT 49DA (the parameters of the configuration and their designation correspond to item 5.1.9.3):

- a type of the initial converter of the channel n "dAt.n" = "Pt100" (Pt100, W=1.385);

- the connection circuit of the RT to channel n "Lc.n" = "c3" (three-wire);

- the linear size of the scale displacement (the amendment on the temperature) "dt.n" = 0,0;

- the number of marks after a point on indication of channel n "UF.n" = 1;

- the number of measurements for averaging on channel n "nS.n" = 1.

The values of the other parameters can be any.

- 4) power ИКСУ-2000 calibrator (further - ИКСУ), prepare it to work in the emulation mode of the temperatures appropriate to the input signals from the RT such as Pt100, and connect it to the input of the 1<sup>st</sup> channel of PMT 49DA under the three-wire circuit;

5) set the emulated (valid  $A_{\delta}$ ) value of the temperature  $-50,0\text{ }^{\circ}\text{C}$  with the aid of ИКСУ (appropriate to PMT 49DA signal, given for the input,  $80,31\text{ Ohm}$  in accordance with the all-Union State standard 6651-94) and make measurements of the measuring channel being checked of PMT 49DA;

6) determine the value of the absolute error  $\Delta A$  as a difference of the measured and valid values of the size being measured under the formula

$$\Delta A = A_{изм} - A_{\delta}, \quad (9.1)$$

$A_{изм}$  - the measured value of the size (temperature) in the point being checked;

7) repeat the operations of items 9.6.5.2.4) ... 9.6.5.2.6), serially setting the emulated (valid) values of temperatures equal to  $160,0\text{ }^{\circ}\text{C}$  ( $161,05\text{ Ohm}$ ) and  $550,0\text{ }^{\circ}\text{C}$  ( $297,49\text{ Ohm}$ ) with the aid of ИКСУ, and make the appropriate measurements of the measuring channel being checked of PMT 49DA;

8) repeat the operations of items 9.6.5.2.4)...9.6.5.2.7), serially connecting ИКСУ to the inputs of the other measuring channels being checked of PMT 49DA;

9) set a configuration of the measuring channels of PMT 49DA for the input signals from the RT such as 50П according to item 5.1.9.3:

- a type of the initial converter of channel  $n$  "dAt.n" = "PtH5" ( $50\text{П}$ ,  $W=1.391$ ).

The values of the other parameters must correspond to item 9.6.5.2.3).

10) prepare ИКСУ for work in the emulation mode of the temperatures appropriate to the input signals from the RT such as 50П;

11) serially set the emulated (valid) values of temperatures equal to  $-50,0\text{ }^{\circ}\text{C}$  ( $40,00\text{ Ohm}$ );  $160,0\text{ }^{\circ}\text{C}$  ( $81,01\text{ Ohm}$ ) and  $550,0\text{ }^{\circ}\text{C}$  ( $150,33\text{ Ohm}$ ) with the aid of ИКСУ and make the appropriate measurements of measuring PMT 49DA channel;

12) repeat the operations of items 9.6.5.2.10), 11), serially connecting ИКСУ to the inputs of the all measuring PMT 49DA channels being checked;

13) Disconnect ИКСУ from PMT 49DA input and be convinced of appearing of symbols "-AL-" (the control of the input circuit break of the initial converter) on PMT 49DA display on the all measuring channels PMT 49DA.

9.6.5.3. To determine the values of the basic errors on the size being measured for the measuring channels of PMT 49DA with the input signals as a voltage of a direct current in the range 0\_100 mV and with the input signals from the TC and determination of the values of the basic errors on the record of the size being measured; one carries out the following operations:

1) prepare ИКСУ-2000 for work in a mode of generation of a constant voltage of the millivolt range and connect it in parallel to all the inputs of PMT 49DA;

2) carry out items 8.1... 8.6 of the manual for preparation of PMT 49DA to a record on a chart tape;

3) Set the following parameters of the configuration of the all measuring PMT 49 DA channels (the parameters of the configuration and their designation correspond to item 5.1.9.3):

- a type of the initial converter of channel n "dAt.n" = "U100" (0 \_ + 100 mV);

- the extraction function of a square root "Sqr.n" = 0;

- the number of marks after a point on indication of channel n "UF.n" = 1;

- The minimal value of the indication range "dP1.n" = 0,0;

- The minimal value of the indication range "dP2.n" = 100,0;

- The minimal value of the indication range of a record of the size being measured "PP1.n" = 0,0;

- The minimal value of the indication range of a record of the size being measured "PP2.n" = 100,0;

- The number of measurements for averaging on channel n "nS.n" = 1.

The values of other parameters can be any.

4) set the value of the emulated (valid) voltage equal to 0 mV with the aid of ИКСУ.

The basic given error of the record of the size being measured is determined at the increase and decrease of the values of the size being measured. The measured values determine according to the record of the size being measured and according to the indications on a digital display panel;

5) read out the set indications on the all channels being checked and on the size being measured and on the record of the size being measured;

6) determine the value of the absolute error on the size being measured and on the record of the size being measured as a difference of the measured and valid values of the size being measured under the formula (9.1);

7) repeat the operations on items 9.6.5.3.5), 6), serially setting the values of the emulated voltage equal to 25, 50, 75 and 100 mV with the aid of ИКСУ.

8) One stops moving of the chart tape upon termination of measurements.

9.6.5.4. To determinate the values of the basic PT 49DA errors while operating with the thermoelectric converters (TC); one carries out the following operations:

1) set the following parameters of the configuration of the all measuring PMT 49 DA channels (the parameters of the configuration and their designation correspond to item 5.1.9.3):

- a type of the initial converter of channel n "dAt.n" = "tc H " (XA (K)).
- a type of the equaliser of a cold seal for channel n "dAc.n" = "Cu8".
- the number of marks after a point on indication of channel n "UF.n" = 0;
- the number of measurements for averaging on channel n "nS.n" =1.

The values of the other parameters can be any.

2) connect the equalizer of a cold seal and ИКСУ in the mode of emulation of the thermocouple signals ТП XA (K) with the appropriate cable, keep PMT 49DA in this condition for 30 minutes;

3) set the value of the emulated (valid) temperature equal to 0 °C with the aid of ИКСУ;

4) make the resistance calibration of the equaliser of a cold seal according to item 5.1.9.3.26);

5) read out the set indications;

6) determine the values of the absolute errors due to the size being measured and the record of the size being measured as a difference of the measured and valid values of the size being measured under the formula (9.1);

7) repeat the operations of items 9.6.5.4.4) ... 6), having set the value of the emulated temperature 1300 °C with the aid of ИКСУ;

8) repeat the operations of items 9.6.5.4.2)... 7), serially connecting ИКСУ to the inputs of the all measuring PMT 49DA channels being measured;

9) disconnect the ИКСУ cable from the input of PMT 49DA.

9.6.5.5. To determinate the values of the basic error while working with PMT 49DA with the input signals as a voltage of a direct current in the range 0...10 V, one carries out the following operations:

1) prepare ИКСУ for work in the generation mode of a constant voltage of a volt range and connect it in parallel to the all inputs of PMT 49DA;

2) set the following parameters of the configuration of the all measuring PMT 49 DA channels (the parameters of the configuration and their designation correspond to item 5.1.9.3):

- a type of the initial converter of channel n "dAt.n" = "U010" (0 \_ + 10 B);
- the number of the marks after a point on indication of channel n "UF.n" = 2;
- the extraction function of a square root "Sqr.n" = 0;
- the minimal value of the indication range "dP1.n" = 0,0;
- the maximal value of the indication range "dP2.n" = 10,00;
- the minimal value of the record range of the size being measured "PP1.n" = 0,0;
- the maximal value of the record range of the size being measured "PP2.n" = 100,0;
- the number of measurements for averaging on channel n "nS.n" = 1.

The values of other parameters can be any.

- 3) set the value of the emulated voltage equal to 0 V with the aid of ИКСУ.
- 4) read out the set indications on the all channels;
- 5) determine the value of the absolute error as a difference of the measured and valid values of the size being measured on the all channels under the formula (9.1);
- 6) repeat the operations of items 9.6.5.5.4), 5), serially setting the value of the emulated voltage 5 and 10 V with the aid of ИКСУ;
- 7) disconnect the ИКСУ cable from the input of PMT 49DA.

9.6.5.6. To determinate the values of the basic error while operating with PMT 49DA with the input signals of a direct current; one carries out the following operations:

- 1) prepare ИКСУ for work in the generation mode of a direct current and connect it to the all inputs of PMT 49DA connected consistently by ways of a connecting cable;
- 2) set the following parameters of the configuration of the all measuring PMT 49 DA channels (the parameters of the configuration and their designation correspond to item 5.1.9.3):

- a type of the initial converter of channel n "dAt.n" = "t020" (the current 0 ...+ 20 mA);
- the number of marks after a point on indication of channel n "UF.n" = 2;
- the extraction function of a square root "Sqr.n" = 0;
- the minimal value of the indication range "dP1.n" = 0,0;
- the maximal value of the indication range "dP2.n" = 20,00;
- the minimal value of the range of the record of the size being measured "PP1.n" = 0,0;
- the minimal value of the range of the record of the size being measured "PP2.n" = 100,0;
- the number of the measurements for averaging on channel n "nS.n" = 1.

The values of the other parameters can be any.

3) set the value of the emulated current equal to 0 mA with the aid of ИКСУ;

4) read out the set indications on the all channels;

5) determine the value of the absolute error as a difference of the measured and valid values of the size being measured under the formula (9.1);

6) repeat the operations of items 9.6.5.6.4), 5), serially setting the values of the emulated current equal to 2 and 20 mA with aid of ИКСУ;

7) set the following parameters of PMT 49DA configuration (the parameters of the configuration and their designation correspond to item 5.1.9.3):

- a type of the initial converter of channel n "dAt.n" = "t05" (the current 0 ...+ 5 mA);

- the number of marks after a point on indication of channel n "UF.n" = 3;

- the extraction function of a square root "Sqr.n" = 0;

- the minimal value of the indication range "dP1.n" = 0,0;

- the maximal value of the indication range "dP2.n" = 5,00;

- the minimal value of the range of the record of the size being measured "PP1.n" = 0,0;

- the minimal value of the range of the record of the size being measured "PP2.n" = 100,0;

- the number of the measurements for averaging on channel n "nS.n" = 1.

The values of the other parameters can be any.

8) repeat the operations of items 9.6.5.6.4), 5), serially setting the values of the emulated current equal to 0; 2,5 and 5 mA with aid of ИКСУ;

9) disconnect the ИКСУ cable from the input of PMT 49DA.

9.6.5.7. The determination of the output characteristics of the built - in voltage stabilizer is carried out in the following sequence:

1) prepare ИКСУ for work in a mode of the voltage measurement;

2) connect ИКСУ to connecting terminals 1 and 2 of the socket of the input of 1-st channel of the measuring PMT 49DA channel being checked;

3) measure the value of the output voltage of idling  $U_{xx}$  and determine the value of the absolute error  $U_{xx}$  as a difference of the measured and nominal  $U_H$  values of the output voltage under the formula

$$\Delta U_{xx} = U_{xx} - U_H \quad (9.2)$$



4) connect the resistor 1,68 kOhm to connecting terminals 1 and 2 of the measuring PMT 49DA channel being checked;

5) measure the value of the output voltage of loading  $U_{назр}$ .

### 9.7. The processing results of checking

9.7.1. While checking of PMT 49DA with the input signals from the RT such as Pt100 the certain values of absolute errors must not exceed:

$\pm 0,5$  °C - for the points being checked  $-50,0$  °C (80,31 Ohm);  $160$  °C (161,05 Ohm);

$\pm 1,4$  °C - for the points being checked  $550$  °C (297,49 Ohm).

9.7.2. While checking of PMT 49DA with the input signals from the RT such as 50II the certain values of absolute errors for the RT 50II must not exceed:

$\pm 0,6$  °C - for the points being checked  $-50$  °C (40,00 Ohm);  $160$  °C (81,01 Ohm);

$\pm 1,8$  °C - for the points being checked  $550$  °C (150,33 Ohm).

9.7.3. The values of the absolute errors of PMT 49DA with the input signals as a voltage of a direct current in the range  $0 \dots + 100$  mV should not exceed:

$\pm 0,07$  mV - for the points being checked  $0, 20$  mV;

$\pm 0,12$  mV - for the points being checked  $50$  mV;

$\pm 0,15$  mV - for the points being checked  $75$  mV;

$\pm 0,2$  mV - for the points being checked  $100$  mV;

$\pm 1$  % - of the record of the size being measured for the all points being checked.

9.7.4. The values of absolute errors of PMT 49DA with the input signals from TII must not exceed:

For TII XA (K) -  $6,5$  °C;

9.7.5. The values of absolute errors of PMT 49DA with the input signals as a voltage of a direct current in the range  $0 \dots + 10$  V must not exceed:

$\pm 20$  mV - for the points being checked  $0, 5, 10$  V.

9.7.6. The values of absolute errors of PMT 49DA with the input signals as force of a direct current in the range  $0 \dots + 5$  mA must not exceed:

$\pm 0,01$  mA - for the points being checked  $0; 2,5$  and  $5$  mA.

9.7.7. The values of the absolute errors of PMT 49DA with the input signals as force of a direct current in the ranges 0...+ 20 mA must not exceed:

$\pm 0,032$  mA - for the points being checked 0, 10 and 20 mA.

9.7.8. While setting of the output characteristics of the built - in voltage stabilizer; the absolute errors of measurement must not exceed:

$\pm 0,72$  V for the voltage of idling (the rating value of the voltage  $U_H = 36$  V);

the output voltage must not be less than 32,9 V under the loading of  $U_{назр}$  at the current of loading equal to 20 mA.

The current value of the short circuit must be in limits 23...29 mA.

9.8. The determination of the values of the basic errors of the measuring channel configured under the concrete type of the input signal

9.8.1. The basic error of the measuring PMT 49 DA channel for the configurations with the RT and the TC (item 3.1, table 3.1) is determined in the points according to 5, 25, 50, 75, 95 % of a range of the measurements.

The nominal static characteristics of the transformation of the RT must correspond to the all-Union State Standard 6651-94, the nominal static characteristics of the transformation of the TC must correspond to the all-Union State Standard P 8.585-2001.

The measurements for the determination of the basic errors of the measuring PMT channel with the specified configurations are carried out by the techniques stated in item 9.6.5.2 and in item 9.6.5.4.

The basic error  $\gamma_1$  is calculated under the formula (9.3) in each point being checked, which is expressed as the given error in the percentages of the normalizing value.

The difference is accepted for the normalizing value of the top and bottom limiting values of the size being measured.

$$\gamma_1 = \frac{A_{u3M} - A_0}{A_0 - A_H} \cdot 100\% \quad (9.3)$$

denotation:  $A_H, A_0$  - the bottom and top limiting values of a range of measurements;

$A_0$  - the valid value of the size in a point being checked;

$A_{u3M}$  - the measured value of the size.

The most value of the calculated ones of the basic error must not exceed the appropriate value shown in table 3.1.

9.8.2. The basic error of measuring PMT 49DA channel for configurations with input electric signals as force and voltage of a direct current (item 3.1, table 3.2) is determined in the points being checked which are appropriate of 5, 25, 50, 75, and 95 % of a range of the input unified signal.

The measurements are carried out under the techniques stated in items 9.6.5.3, 9.6.5.5, 9.6.5.6 for determination of the basic errors of measuring PMT 49DA.

The valid values of the sizes  $A_o$  being measured, appropriate to the values of the input signal in the points being checked, are calculated under formulas (9.4) ... (9.7).

For the dependence of the size being measured from the input signal:

- linear

$$A_o = \frac{A_g - A_n}{I_g - I_n} \cdot (I_{ex.i} - I_n) + A_n, \quad (9.4)$$

$$A_o = \frac{A_g - A_n}{U_g - U_n} \cdot (U_{ex.i} - U_n) + A_n \quad (9.5)$$

- with the extraction function of a square root

$$A_o = \frac{A_g - A_n}{\sqrt{I_g - I_n}} \cdot \sqrt{I_{ex.i} - I_n} + A_n, \quad (9.6)$$

$$A_o = \frac{A_g - A_n}{\sqrt{U_g - U_n}} \cdot \sqrt{U_{ex.i} - U_n} + A_n, \quad (9.7)$$

denotation:  $I_n, I_g, U_n, U_g$  - the bottom and top limiting values of the ranges of force and voltage of a direct current accordingly;  
 $I_{ex.i}, U_{ex.i}$  - the values of the input signal as force and voltage of a direct current of the point being checked accordingly.

The basic given error of the measuring channel is calculated under formula (9.3).

The most value of the calculated ones of the basic error must not exceed the appropriate value shown in table 3.2.

## 9.9. Registration of the checking results

9.9.1. The positive results of PMT 49DA checking are accomplished by the certificate on the state checking of the set form according to IIP 50.2.006-94.

9.9.1.1. The results of checking of PMT 49DA, configured under the concrete input signals, are accomplished by the certificate on the state checking of the set form according to IIP 50.2.006-94 with the showing of the checking results on its back side (or the report of any form).

***Attention!** In this case, it is not supposed to use PMT 49DA with other configurations.*

9.9.2. It is not supposed to use PMT 49DA at the negative checking results until finding out of the reasons of malfunctions and their elimination.

9.9.3. It is carried out the repeated checking after the elimination of the found out malfunctions, the results of the repeated checking are final.

## **10. Rules of transportation and keeping**

9.1. PMT 49DA is transported by all means of transport in covered vehicles. Fixing of container in vehicles should be made according to the guidelines working on the appropriate means of transport.

9.2. The conditions of PMT 49DA transportation must correspond to conditions 5 in accordance with the all-Union State Standard 15150-69 at the air temperature from -50 till +50 °C with observance of protection measures from impacts and vibrations.

9.3. The conditions of PMT 49DA keeping in a transport container in a warehouse of the manufacturer and the consumer must correspond to conditions 1 in accordance with the all-Union State Standard 15150-69.

## 11. The certificate on packing

11.1. The technological multichannel registrar PMT 49DA/\_\_\_\_\_ with factory number № \_\_\_\_\_ is packed by the research-and-production enterprise “ЭЛЕМЕНТ” according to the requirements established by the design documentation.

Date of packing \_\_\_\_\_

Stamp

Packed by \_\_\_\_\_  
(signature)

The product after packing has been accepted by \_\_\_\_\_  
(signature)

## 12. Acceptance certificate

12.1. The technological multichannel registrar PMT 49DA/\_\_\_\_\_/\_\_\_\_\_  
with factory number № \_\_\_\_\_ is made and accepted according to the  
obligatory requirements of the state standards, working engineering specifications and  
recognized serviceable.

12.2. Technological testing during 72 hours has been carried out.

Head of the quality control department

Seal \_\_\_\_\_  
personal signature signature deciphering  
\_\_\_\_\_  
year, month, day

Equipment was manufactured under monitoring.

Representative

State Technical Inspectors of Russia

Seal \_\_\_\_\_  
personal signature signature deciphering  
\_\_\_\_\_  
year, month, day

### **13. Manufacturer's guarantees**

13.1. The manufacturer guarantees the conformity of PMT 49DA to the requirements of specifications at the following of the consumer of conditions of operation, storage and transportation.

13.2. Warranty period of operation is determined to be 24 months from the selling date of PMT 49DA.

### **14. Data on claims of replacement**

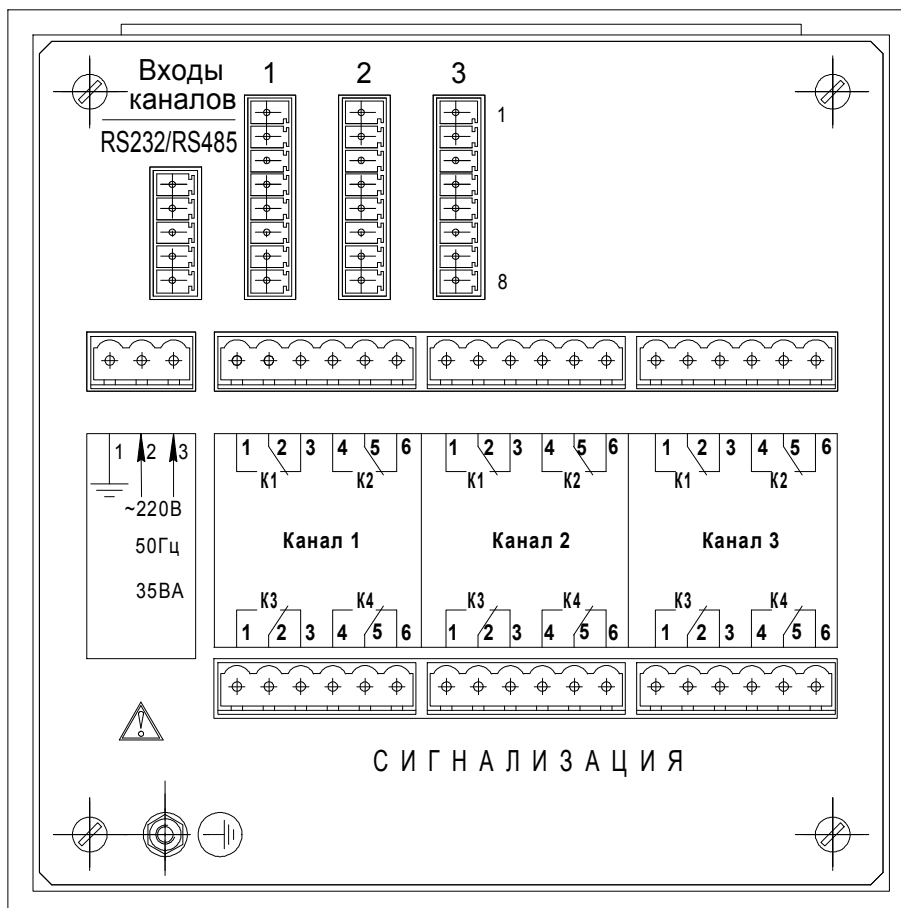
14.1. In case of loss of PMT 49DA serviceability or reduction of the parameters given in the technique conditions, under condition of observance of requirements of the chapter of "Manufacturer's guarantees", a consumer should fill in a damage statement in the set order and despatch it to the address:

141570      Russia,  
                 Moscow area  
                 Solnechnogorsk district  
                 Mendeleyevo,  
                 The research-and-production enterprise “ЭЛИЕМЕР”

Phone/Fax: (495) 105-5147  
                 (495) 105-5102  
                 (495) 535-8443

## APPENDIX A

### The connection circuits of PMT 49 DA/3. The back panel

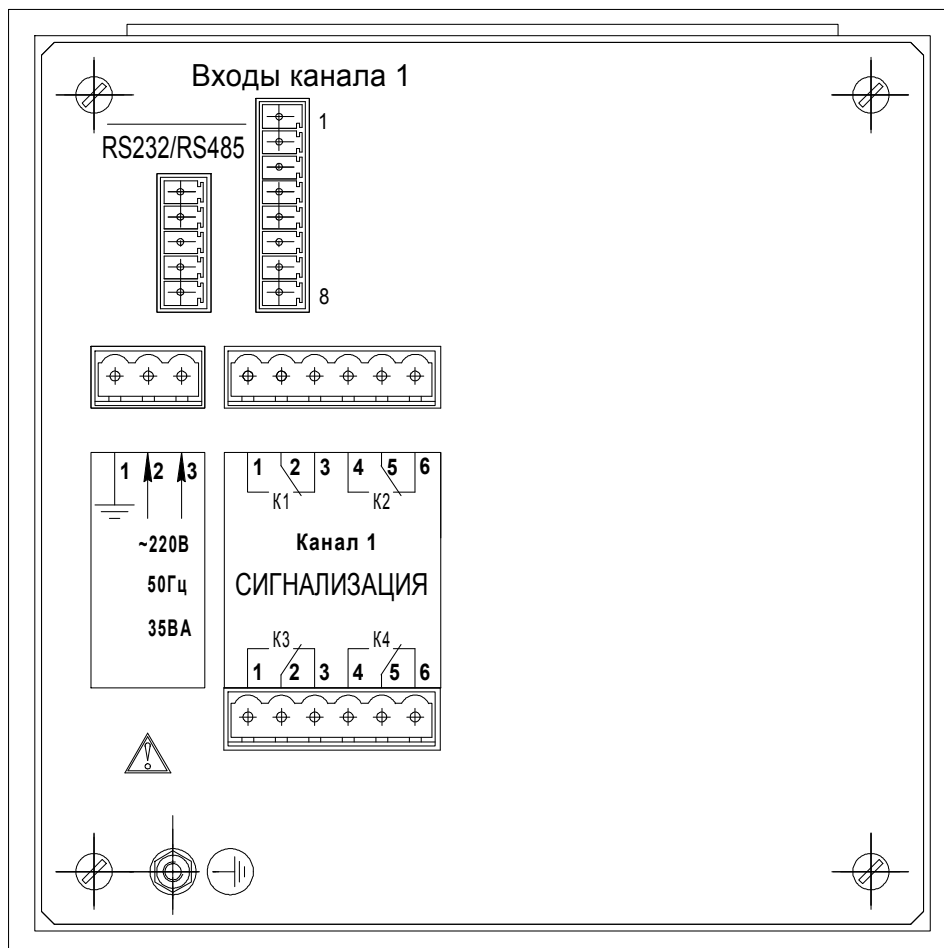


Picture A.1



The continuation of appendix A

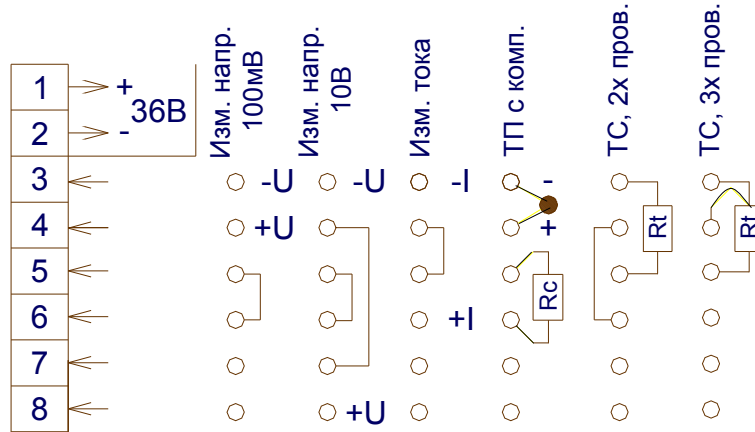
**The connection circuits of PMT 49 DA/1.  
The back panel**



Picture A.2

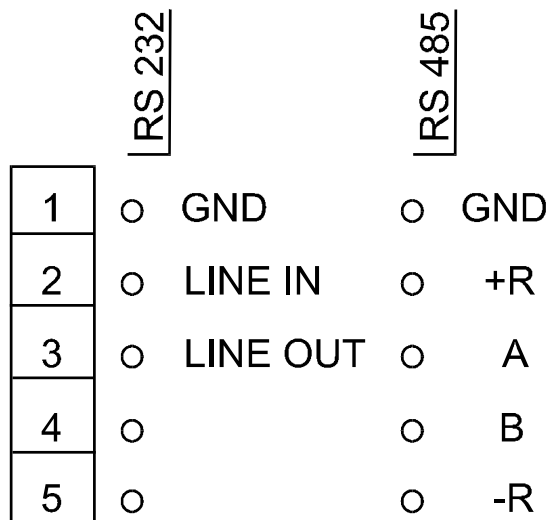
## APPENDIX B

### The use of contacts and the circuit of the connection of the initial converters



Picture B.1

### The use of the contacts of the interface socket

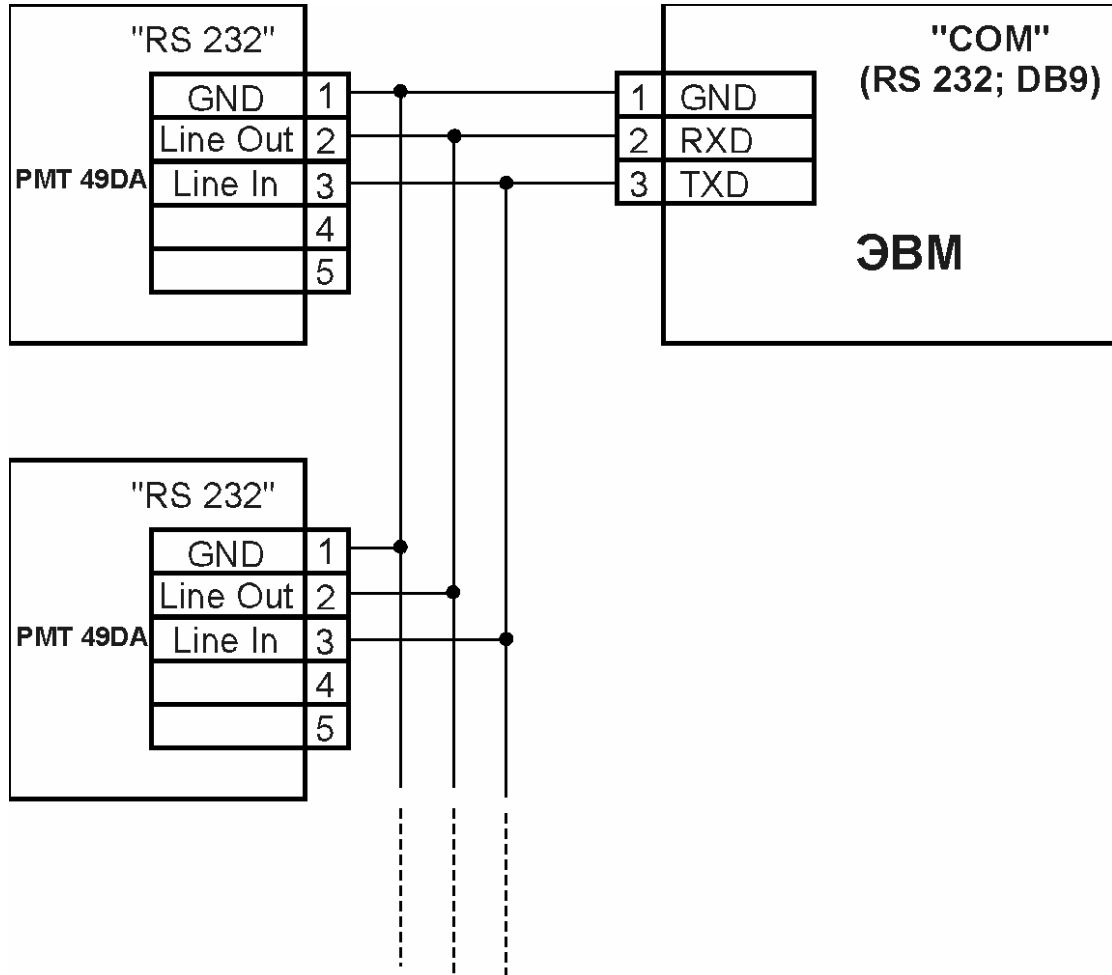


Picture B.2

## APPENDIX B

### The connection circuits of PMT 49 DA to the IBM

The three-wire circuit of PMT 49DA connection to the IBM  
(Up to 10 of PMT 49DA with the communication line in length to 15 m)

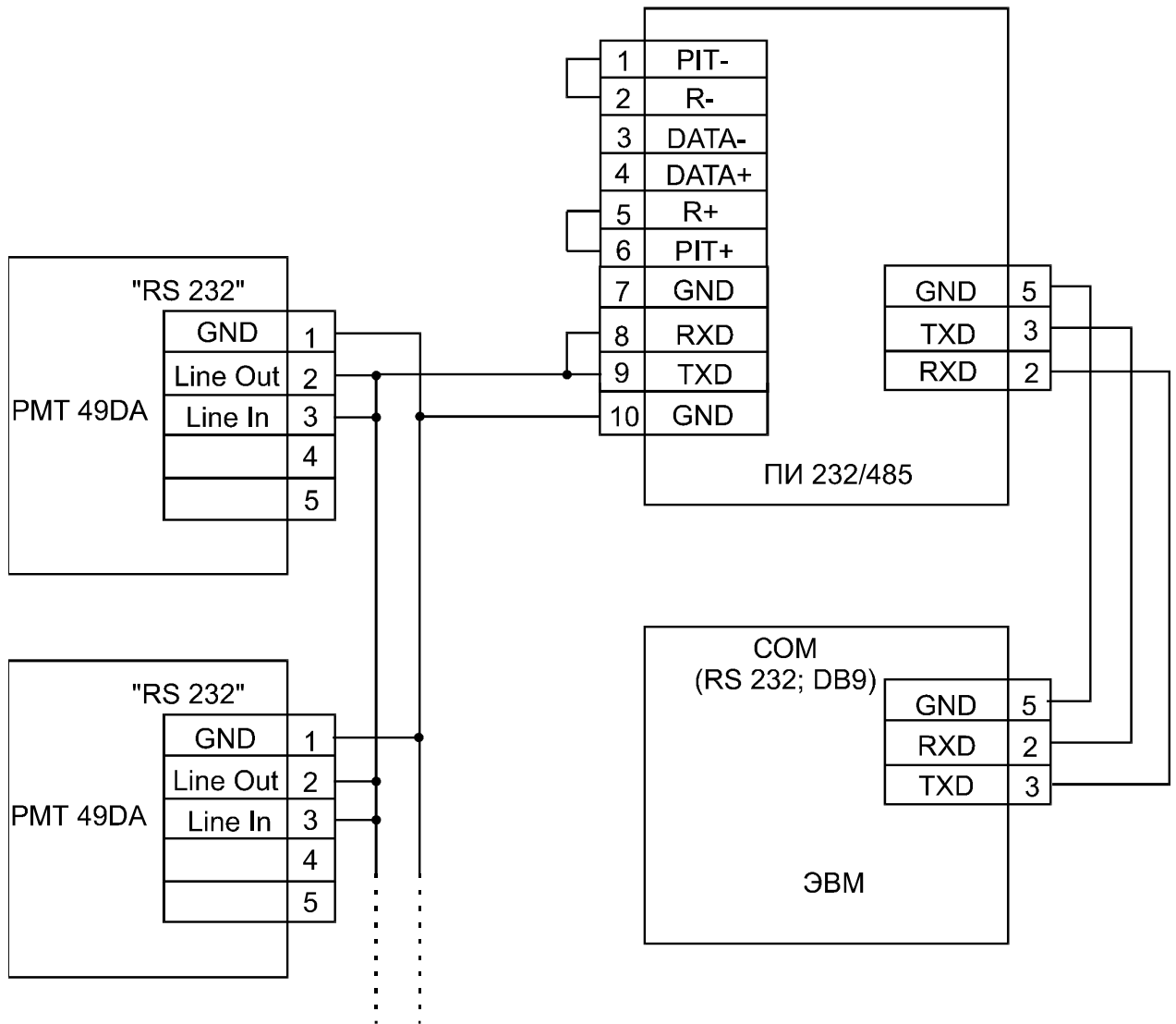


IBM – the international business machine

Picture B.1

The continuation of appendix B

**The two-wire circuit of the connection of PMT 49 DA to the IBM  
(Up to 100 of PMT 49DA with the communication line in length up to 1000 m)**

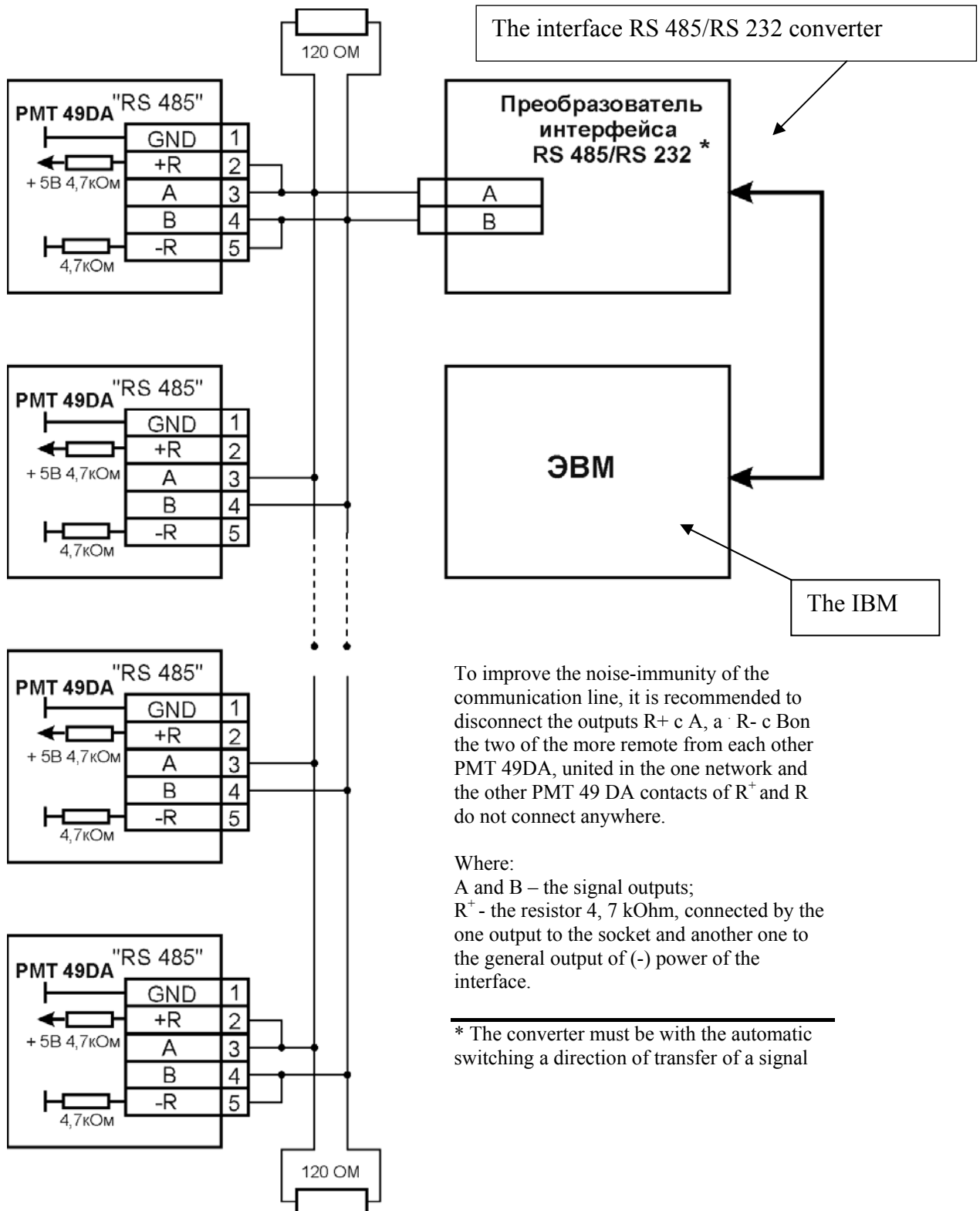


As the amplifier of RS232 interface, it is possible to use  
PI 232 of "ЭЛЕМЕНТ" production

Picture B.2

The continuation of appendix B

**The two-wire circuit of the connection of PMT 49DA to the IBM  
with the use of the interface RS 485 / RS 232 converter  
(Up to 32 of PMT 49DA with the communication line up to 1000 m)**



To improve the noise-immunity of the communication line, it is recommended to disconnect the outputs R+ c A, a · R- c B on the two of the more remote from each other PMT 49DA, united in the one network and the other PMT 49 DA contacts of R+ and R do not connect anywhere.

Where:

A and B – the signal outputs;  
R+ - the resistor 4, 7 kOhm, connected by the one output to the socket and another one to the general output of (-) power of the interface.

\* The converter must be with the automatic switching a direction of transfer of a signal

Picture B.3

**APPENDIX Γ**  
**The configuration parameters of PMT 49DA**

**Table Γ.1**

Parameter name	Parameter symbol	Factory fixing	The number of the measuring channel		
			1	2	3
Network number	Un	1			
Speed of transfer on a serial port (kbit/sec)	Spd	9.6			
Indication time (c) (only for PMT 49DA/3)	tind	3			
Password for a configuration	PScF	0000			
Password for editing of the settings	PSU	0000			
Type of the initial converter	dAt.n	t420			
Type of the equaliser cold of a cold seal	dAc.n	Ptb			
Connecting circuit of the RT	Lc.n	c3			
Size of linear displacement of a scale	dt.n	0.0			
Quantity of marks after a point on indication	UF.n	1			
Quantity of measurements for averaging	nS.n	1			
The minimal value of a range of indication	dP1.n	0.0			
The maximal value of a range of indication	dP2.n	100.0			
The extraction function of a square root	Sqr.n	0			
The linearization function of a square root near to zero	Sil.n	0.0			
The zone value of a return on the setting operation	GSt.n	0.5			
The sanction of the setting operations	EnU.n	1			
The condition of the relay of setting I at the break of the input circuit	rLI.n	0			

The continuation of table Г.1

Parameter name	Parameter symbol	Factory fixing	The number of the measuring channel		
			1	2	3
The condition of the relay of setting II at the break of the input circuit	rL2.n	0			
The condition of the relay of setting III at the break of the input circuit	rL3.n	1			
The condition of the relay of setting IV at the break of the input circuit	rL4.n	1			
The minimal value of a range of the record of the size being measured	PP1.n	0.0			
The maximal value of a range of the record of the size being measured	PP2.n	100.0			
The resistance calibration of the communication line at the measurement of the signals from the IBM under the 2 wire circuit	CLr.n	0.00			
The resistance calibration of the equalizer of a cold seal at the measurement of the TC in 0 °C	CLc.n	100.0			
The fine tuning of the bottom boundary line of the record on the chart tape	PLo.n	-			
The fine tuning of the top boundary line of record on a chart tape	PHi.n	-			
The record of the all values of the parameters according to the factory installations	rSt	-			

*Note. The index «\_\_ .n» in a symbol of parameter means a number of the measuring channel (from 1 to 3).*

