



THE RESEARCH AND PRODUCTION ENTERPRISE

SAFE MEANS AND SYSTEMS  
OF TECHNOLOGICAL MONITORING

TECHNOLOGICAL  
MEASURING CONTROL  
(GENERAL PURPOSE MILLIVOLTMETER)  
(Modification **ИРТ 5922** for APP)

OPERATION MANUAL

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## 1. INTRODUCTION

1.1. The operation manual contains information concerning construction, operation principles, features of meter-regulator technological (general purpose millivoltmeter) IRT 5922 (hereinafter - IRT 5922) and guidelines to its correct and safe operation.

## 2. DESCRIPTION AND OPERATION

### 2.1. Purpose of the product

2.1.1. IRT 5922 is intended for measuring and control of temperature and other non-electrical values, converted into electric signals of power, direct voltage and active resistance to direct current.

2.1.2. IRT 5922 is employed in different engineering processes both in industry and agriculture.

2.1.3. IRT 5922 is a multifunctional product, redesignable by user, intended both for operation in an autonomous mode and under control of a computer program through a series interface.

IRT 5922 has an alphanumeric display for programmable parameters and their values, display of current values of a measured parameter, settings values and numbers of the switched channel. The displays also represent information of an input circuit break, excess by an input signal of established limits of the range of the measured parameter, lack of access to parameter variation and of other errors that may occur while in operation mode.

2.1.4. 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 ( $\cos \varphi \geq 0,4$ );
- 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.

The procedure of input and the possibility of settings adjustment is protected by the pass word from unauthorized access.

2.1.5. IRT 5922 is furnished with an Integrated Measuring Converter (IMC), transforming the measured value into a unified output signal of the direct current strength.

The relation between the measured value of IRT 5922 and the IMC output signal with the input signal can be linear, with an averaging (damping) function and for the unified input signal configurations – the square-rooting function.

**IRT 5922 correspond to climatic modification T3 according to all-Union State Standard 15150-69.**

2.1.6. Considering stability to environmental exposure and pursuant to:

- GOST 15150-69 IRT 5922 is manufactured in a corrosion resistant modification TIII;
- **all-Union State Standard 15150-69, IRT 5922 is made in a non-corrosive climatic modification T3 at the following maintenance of the active corrosive agents in the atmosphere:**
  - chlorides - 0,02 mg/m<sup>3</sup>,**
  - sulfates - 0,03 mg/m<sup>3</sup>,**
  - sulphurous gas - 0,03 mg/m<sup>3</sup>;**
- GOST 14254-96 degree of protection from solid bodies, dust and water getting inside, accordingly:

for the front panel	IP54;
for the case	IP20.

According to GOST 25804.1-83 IRT 5922 is:

- by kind of application corresponds to B group – continual use equipment;
- by number of quality levels of performance corresponds to group I – equipment with two quality levels of performance – nominal and failure.

According to ПНАЭ Г – 01 – 011 – 97 (ОПБ – 88/97) IRT 5922 is referred to:

- by its purpose – as a unit of normal operation;
- by its influence on safety – as a unit important for safety;
- by the functional area character – as a control unit.

Considering stability to mechanical effects when operating IRT 5922 is referred to M6 group of make according to GOST 17516.1-90.

IRT 5922 is referred to the III category of seismic stability according to НП-031-01 and to the B group of make 3 according to ПД 25 818-87.

IRT 5922 is durable, crash-proof and aseismic to earthquakes with seismic resistance of 8 points at a level of installation up to 40 m according to MSK-64 scale.

Considering its stability to electromagnetic disturbances, IRT 5922 corresponds to the group of make III according to GOST P 50746-2000. Standard of the quality of operation – A.

## 2.2. Technical characteristics

2.2.1. Ranges of measuring and conversion, input parameters and limits of tolerated basic reduced error subject to configurations of IRT 5922 correspond to the given in Tables 1 and 2.

**Table 1** – IRT 5922 for configurations with input electric signals received from thermal converters of resistance (TCR) according to GOST 6651-94 and thermoelectric converters (TC) according to GOST P 8.585-2001.

Type of Primary Converter	W <sub>100</sub>	Range of Measurements	Input Parameters			Limits of Tolerated Basic Reduced Error in relation to HCX, %				
			According to HCX		Input resistance, kΩ					
			Resistance, Ω	Thermo-electromotive, 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	+200...+600		88,53...158,59	-	-	±(0,5+*)			
				100Π						
			Pt100	175,86...313,71						
TXK(J)	-50...+1100		-2,431...63,792	Not less than 100				±(0,5+*)		
TXK(L)	-50...+600		-3,005...49,108							
TXA(K)	-50...+1300		-1,889...52,410							
TIII(S)	0...+1700	0...17,947								
TIP(B)	+300...+1800	0,431...13,591								
TBP(A-1)	1,3850	0...+2500	0...33,640							

\* One unit of the last digit, in percentage terms to the range of measurement.

**Table 2** – IRT 5922 for configurations with input electric signals in the form of power, direct current voltage and direct-current resistance.

Input Signal	Range of Conversion	Range of Measurement		Input Parameters			Limits of Tolerated Basic Reduced Error in Regard to Measured Value, %
		For Relation of Measured Value to the Input Signal		Input Resistance, kΩ		Maximum Current Strength Through Measured Resistance, mA	
		Linear	with a Square-Rooting Function	not less than	not more than		
Current	0...5 mA	0...5 mA	0,1...5 mA	-	0,01	-	±(0,2+*) ±(0,05+*)**
	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 Ω	0...320 Ω	-	-	-	0,33±0,02	

\* One unit of the last digit, in percentage terms to the range of measurement.

\*\* By special order.

2.2.2. IRT 5922 configuration parameters are given in Tables 3 and 4.

Table 3

Name of the Parameter	Symbolic Designation of the Parameter			Factory Setting
	Large Panel	Small Panel		
		Menu	Submenu	
1	2	3	4	5
Permission to settings programming	0 – disable	PrUE	-	-
	1 – enable		-	1
Hysteresis of 1 <sup>st</sup> setting (in units of parameter measured)	(0...9999)	GS_1	-	0
Hysteresis of 2 <sup>nd</sup> setting (in units of parameter measured)	(0...9999)	GS_2	-	0
Hysteresis of 3 <sup>rd</sup> setting (in units of parameter measured)	(0...9999)	GS_3	-	0
Setup of primary converter type	Acc. to Table4	dAt	-	U100
Signaling of input circuit break**	0 – disable	CutE	-	-
	1 – enable		-	1
Square-rooting function	0 – off	Sqrt	-	0
	1 – on		-	-
Minimum value of range of converting of input signal (for strength and voltage of direct current)	(-1999...9999)	dPLo	-	0
Maximum value of range of converting input signal (for current and voltage of direct current)	(-1999...9999)	dPHi	-	100
TCR connection circuit	0 – doublewire	Lc	-	-
	1 – three-wire		-	1
Resistance of TCR two-wire line	(0..9999)	rL	-	-
Resistance of compensator at 0 °C	(0..9999)	rc0	-	-
Number of digits after comma	0,1,2 and 3	UF	-	3
Minimum value of IMC range of conversion	(-1999...9999)	IoLo	-	0
Maximum value of IMC range of conversion	(-1999...9999)	IoHi	-	100
Logic of relay K1 operation (entrance to submenu)	Sub	rL1	-	-
Condition of relay K1 in relation to measured signal to the 1 <sup>st</sup> setting	0, 1, 2***	-	rL1.1	0
Condition of relay K1 in relation to measured signal to the 2 <sup>nd</sup> setting	0, 1, 2***	-	rL1.2	0
Condition of relay K1 in relation to measured signal to the 3 <sup>rd</sup> setting	0, 1, 2***	-	rL1.3	0
Condition of relay K1 at a primary converter interruption	0, 1****	-	rL1.C	0
Logic of relay K2 operation (entrance to submenu)	Sub	rL2	-	-
Condition of relay K2 in relation to measured signal to the 1 <sup>st</sup> setting	0, 1, 2***	-	rL2.1	0
Condition of relay K2 in relation to measured signal to the 2 <sup>nd</sup> setting	0, 1, 2***	-	rL2.2	0
Condition of relay K2 in relation to measured signal to the 3 <sup>rd</sup> setting	0, 1, 2***	-	rL2.3	0
Condition of relay K2 at a primary converter interruption	0, 1****	-	rL2.C	0
Logic of relay K3 operation (entrance to submenu)	Sub	rL3	-	-
Condition of relay K3 in relation to measured signal to the 1 <sup>st</sup> setting	0, 1, 2***	-	rL3.1	0
Condition of relay K3 in relation to measured signal to the 2 <sup>nd</sup> setting	0, 1, 2***	-	rL3.2	0
Condition of relay K3 in relation to measured signal to the 3 <sup>rd</sup> setting	0, 1, 2***	-	rL3.3	0
Condition of relay K3 at a primary converter interruption	0, 1****	-	rL3.C	0

\* Delay of actuation moment relative to setting.

\*\* Only for the input signals U75 and U100 in accordance with table 4.

\*\*\* 0 – the condition of the relay doesn't change; 1 – on at  $U_{meas.} < U_{set.}$ , 2 – on at  $U_{meas.} > U_{set.}$  ( $U_{meas.}$  – the measured signal;  $U_{set.}$  – the setting).

\*\*\*\* 0 – relay is off at the primary converter interruption, 1 – relay is on at the primary converter interruption.

### Continuation of Table 3

1	2	3	4	5
Number of times when the measured signal was averaged	1...200	NSU	-	1
Indication of setting on the small panel	0, 1, 2, 3*	Ind	-	0
Network address of the IRT 5922	0...255	Addr	-	1
Password entering (first copy)	(-1999...9999)	PSS1	-	0
Password entering (second copy)	(-1999...9999)	PSS2	-	0
Rate of exchange by interface	(0,3...19,2 kbit/sec)	SPd	-	9,6
Setup of the operation mode of the IMC	1, 2**	IodP	-	2
Exit from parameter menu configuration (return to the measurement mode)	-	rEtU	-	-

\* 0 – no indication; 1 – 1<sup>st</sup> setting indication; 2 – 2<sup>nd</sup> setting indication; 3 – 3<sup>rd</sup> setting indication.

\*\* 1 – 0...20 mA (0...5 mA) range is on; 2 – 4...20 mA range is on.

### Table 4

Indication of primary converter type or of the input signal	Symbolic designation of HCX	$W_{100}$	Range of measurement
1	2	3	4
Cu85	50M	1,4280	(-50...+200) °C
Cu65	50M	1,4260	
Cu83	53M	1,4280	
Cu63	53M	1,4260	
Cu81	100M	1,4280	
Cu61	100M	1,4260	
PtH5	50Π	1,3910	(-50...+600) °C
PtH1	100Π		
Ptb1	Pt100	1,3850	
HA	XA(K)	-	(-50...+1300) °C
FC	ЖК	-	(-50...+1100) °C
HE	XK (L)	-	(-50...+600) °C
PP	ΠΠ(S)	-	(0...+1700) °C
Pr	ΠΠ	-	(+300...+1800) °C
bP	BP(A)-1	-	(0...+2500) °C
t05	-	-	(0...5) mA
t020	-	-	(0...20) mA
t420	-	-	(4...20) mA
U100	-	-	(0...100) mV, (0...10) V
U75	-	-	(0...75) mV
rr	-	-	(0...320) Ω

2.2.3. The time of achievement of operation mode is not more than 30 min.

2.2.4. The limit of tolerated complementary error of the IRT 5922, caused by a change of the ambient temperature from normal (20±5) °C to any temperature within the range of (minus 10...+50) °C for every 10 °C of the changed temperature, does not exceed 0,5 of the limit of tolerated basic error.

2.2.5. The limit of tolerated complementary error of the IRT 5922 for the configuration with TC, caused by a change of the temperature of their free ends within the range (minus 10...+50) °C does not exceed the limit of tolerated basic error.

2.2.6. The limit of tolerated complementary error of the IRT 5922, caused by increased humidity (up to 95 % at 35 °C), does not exceed 0,5 of the limit of tolerated basic error.

2.2.7. The limit of tolerated complementary error, caused by a change of supply voltage from nominal (220 V) within the limit of (187...242 V), does not exceed 0,5 of the limit of tolerated basic error.

2.2.8. The limit of tolerated complementary error of the IRT 5922, caused by the action of a magnetostaticsfields and (or) of alternating fields of supply-line frequency with an intensity of up to 300 A/m, does not exceed 0,5 of the limit of tolerated basic error.

2.2.9. The limit of tolerated complementary error, caused by the action of the transverse disturbance intensity of alternate current with the effective value, equal to 50 % of the maximum input electric signal value, acting between the measuring input terminals, in series with the friendly signal and having any phase angle, does not exceed 0,5 of the limit of tolerated basic error.

2.2.10. The limit of tolerated complementary error, caused by the action of longitudinal disturbance voltage of the direct or alternate current with the effective value, equal to 100 % of the maximum input electric signal value, acting between any measuring input terminal and earthed case and having any phase angle, does not exceed 0,5 of the limit of tolerated basic error.

2.2.11. The limit of tolerated complementary error of the IRT 5922 under vibration does not exceed the limit of tolerated basic error.

2.2.12. The area of settings assignment corresponds to the range of measurements.

2.2.13. The limit of tolerated basic error of signalling actuation does not exceed the limit of tolerated basic error of measured values.

2.2.14. The limit of tolerated basic error of signalling actuation caused by a change of the ambient temperature from normal to any within the operating temperature limits for every 10 °C of temperature changing, does not exceed 0,5 of the limit of tolerated basic error of signaling actuation.

2.2.15. The limit of tolerated complementary error of signaling actuation, caused by a change of supply voltage from nominal to any within the limit of operating conditions, does not exceed 0,5 of the limit of tolerated basic error of signaling actuation.

2.2.16. The range of the output unified signal of the Integrated Measuring Converter IMC is (0...5), (0...20) or (4...20) mA.

2.2.17. The limits of tolerated basic errors of the IMC for the configurations with TCR or input signals in the form of the strength and voltage of the direct current, as well as in the form of resistance to the direct current, equal to  $\pm(0,2k+0,2)$  and IMC for configurations with TC –  $\pm(0,5k+0,2)$  at a load resistance  $R_l = 1 \text{ k}\Omega$  for the output of 0...5 mA and  $R_l = 0,4 \text{ k}\Omega$  for the output of 0...20 and 4...20 mA,

where k is the coefficient, equal to relation of the IRT 5922 and the IMC ranges of measurement.



2.2.18. The limit of tolerated complementary error of the IMC, caused by a change of the ambient temperature from normal to any within the operating temperature limits for every 10 °C of temperature changing, does not exceed 0,5 of the tolerated basic error limit of the IMC.

2.2.19. The tolerated complementary error limit of the IMC, caused by a deviation of the load resistance from its limit value  $R_{lim} = 2 \text{ k}\Omega$  for the output of 0...5 mA and  $R_{lim} = 0,5 \text{ k}\Omega$  for the output of 0...20 and 4...20 mA by minus 25 %, not more than 0,5 of the tolerated basic error limit.

2.2.20. The tolerated complementary error limit of the IMC, caused by a change of supply voltage from nominal (220 V) within the range of (187...242 V), does not exceed 0,5 of the tolerated basic error limit.

2.2.21. The time of settling of the output signal of the IMC (the time, during which the output signal of the IMC enters the area of the tolerated basic error limit) does not exceed 10 s.

2.2.22. 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 ( $\cos \varphi \geq 0,4$ );
- 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.

2.2.23. The hysteresis of IRT 5922 actuation by settings is symmetrical, programmed independently according to each setting and is adjusted within the limits of the measurement range.

2.2.24. The outlet characteristics of the integrated voltage stabilizer:

- nominal voltage .....  $+(24 \pm 0,48) \text{ V}$ ;
- peak load current ..... 24 mA.

2.2.25. The IRT 5922 is power-supplied from the alternating current supply system with  $(50 \pm 1) \text{ Hz}$  frequency and  $(220_{-33}^{+22}) \text{ V}$  voltage.

2.2.26. The power consumption of the IRT 5922 from the alternating current supply system at a nominal voltage does not exceed 8 V·A.

2.2.27. The electric resistance of the current-carrying circuits insulation of the IRT 5922 in relation to its case and between themselves is not less than:

- 20M $\Omega$  at the ambient air temperature of  $(20 \pm 5) \text{ }^\circ\text{C}$  and relative humidity from 30 to 80 %;
- 5M $\Omega$  at the ambient air temperature of  $(50 \pm 3) \text{ }^\circ\text{C}$  and relative humidity from 30 to 80 %;

2.2.28. Dimensions, mm, not more than:

- front panel ..... 96 x 48;
- assembly depth ..... 180;
- recess in panel ..... 88 x 45.

2.2.29. Mass, kg, not more than: ..... 0,8.

2.2.30. IRT 5922 is temperaturestable to the ambient temperature exposure from minus 10 to + 50 °C and from minus 50 to + 50 °C respectively.

2.2.31. IRT 5922 is moisture-resistant and moistureproof to the humidity exposure of up to 95 % at the ambient temperature of 35 °C and up to 98 % at the ambient temperature of 35 °C respectively.

2.2.32. IRT 5922 is vibration-proof and resistant to exposure to sinusoidal vibration within the frequency range from 1 to 100 Hz at the frequency vibro-acceleration amplitude of 20 m/s<sup>2</sup>.

2.2.33. IRT 5922 has no constructs and blocks with resonant frequency from 5 to 25 Hz.

2.2.34. IRT 5922 is impact-resistant and shock-proof to mechanical shocks of single action with the acceleration crest of 20 m/s<sup>2</sup>, shock pulse duration from 2 to 20 ms and the total amount of 30 impacts.

2.2.35. IRT 5922 is impact-resistant and shock-proof to the mechanical shocks of multiple action with the acceleration crest of 30 m/s<sup>2</sup>, with the preferred duration of action of shock acceleration of 10 ms (allowable duration – from 2 to 20 ms) and the total amount of 20 impacts in each direction.

2.2.36. IRT 5922 is proof against seismic loads, equivalent to vibration action with the parameters, provided in table 5.

Table 5.

Frequency, Hz	1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	15,0	20,0	30,0
Acceleration, m/s <sup>2</sup>	6,0	15,0	29,0	51,0	48,0	43,0	38,0	31,0	20,0	19,0	14,0

2.2.37. Electromagnetic compatibility and securing interference protection.

2.2.37.1. Considering its stability to electromagnetic disturbances, IRT 5922 corresponds to group of production III according to GOST P 50746-2000.

Under electromagnetic disturbances IRT 5922 meets A standard of the quality of performance according to GOST P 50746-2000.

2.2.37.2. IRT 5922 normally operates and does not confuse under the conditions of combined action with the facilities of systems and elements, for which it is designed, as well as with the facilities for other purposes, which can operate jointly with the present IRT 5922 in a typical disturbance situation.

### 2.3. Design and operation

2.3.1. IRT 5922 comprises:

- a system module with a transformer power supply unit, a pulse switching potentiostat for +24 V and +5 V, a relay switching block, a micro-controller, a programmable read-only memory (PROM) and an integrated measuring converter (IMC);

- a module of analog-digital converter (ADC) with an integrated voltage power supply of +24 V;

- a display module with an operation keyboard;

- an interface module RS 232 or RS 485.

2.3.1.1. The transformer power supply unit converts the current-supply system voltage of 220 V and frequency of 50 Hz into an unstabilized direct voltage of +45 V for the pulse switching potentiostat power supply.

2.3.1.2. The pulse switching potentiostat +24 V and +5 V are intended for the power supply of the IRT 5922 modules.

2.3.1.3. The micro-controller control unit computes the current magnitude of the measured value (based on ADC interrogation), makes transformations in it (scaling, square-rooting, linearization), displays the transformed value, interrogates the keyboard, operates the individual point relays, modules of ADC, IMC, provides connection via an interface module with the PC, displays error reports.

2.3.1.4. The three-channel relay switching block. The individual point relays of this block start (stop) operating depending on the relation between values of the measured signal and the settings. The number of settings is three. The algorithm of the individual point relay behavior is defined (programmed) by a user according to the points 2.4, 2.5.

The individual point relays are clipped by complete contact sets: general, normally closed, normally open.

2.3.1.5. The IMC converts the measured signal code, entering from the operation micro-controller through the photon-coupled isolating device into the output current, the value of which may be set in the three ranges:

- 1) 0...5 mA, at  $R_{I\max} = 2 \text{ k}\Omega$ ;
- 2) 4...20 mA, at  $R_{I\max} = 0,5 \text{ k}\Omega$ ;
- 3) 0...20 mA, at  $R_{I\max} = 0,5 \text{ k}\Omega$ .

The 0...5 and 0...20 mA ranges are switched with the help of a tumbler, which is located in a recess of the lower part of the IRT 5922 case. The "IOdP" parameter of the IRT 5922 menu should be equal to 1.

The 4...20 mA range can be set only at the tumbler position of "20 mA" and the parameter "IOdP" = 2.

**Attention!** *It is prohibited to set the tumbler into the "5 mA" position, if the "IOdP" parameter = 2 is set.*

2.3.1.6. The analog-digital converter transforms the input analog signal into a code, that is received by a micro-controller control unit. The ADC module also contains a linear potentiostat +24 V for power supplying of the peripheral equipment. The ADC module has an integrated voltage divider for converting of the input signal from 0 to 10 V.

2.3.1.7. The display module contains two four-digit seven-segment light-emitting diode displays, three light-emitting diodes and three control buttons of the IRT 5922.

2.3.1.8. The interface module RS 232 or RS 485 is used for connecting to a computer from 1 to 100 IRT 5922 devices, which can be networked via the mentioned interfaces. Connecting circuits of IRT 5922 to a computer are given on pictures B.1, B.2, B.3 of the appendix B.

2.3.2. On the front panel of the IRT 5922 there are:

- the main (large) panel – a large four-digit seven-segment light-emitting diode display;
- the additional (small) panel – a small four-digit seven-segment light-emitting diode display;
- a K1 indicator – a unit light-emitting indicator of the 1<sup>st</sup> channel;
- a K2 indicator – a unit light-emitting indicator of the 2<sup>nd</sup> channel;
- a K3 indicator – a unit light-emitting indicator of the 3<sup>rd</sup> channel;
- the “↵” button – the input button;
- the “→” button – the forward button;
- the “←” button – the return button.

2.3.2.1. The main panel is designed for indicating of the numeric values of the current measured parameter, settings, numeric and character values of the programmed parameters of the configuration, as well as of the character report of the IRT 5922 status (error reports).

2.3.2.2. The additional panel is designed for indicating alphanumeric names of settings, the programmable configuration parameters of the device and the programming mode exit instruction (exit menu).

2.3.2.3. The K1 indicator shows the status of the switched channel number 1 relay. If the relay of the first channel is on (the relay contacts close the channel), the K1 indicator is alight, if the relay of the first channel is off (the relay contacts open the channel), the K1 indicator is not alight.

2.3.2.4. The K2 indicator shows the status of the switched channel number 2 relay. If the relay of the second channel is on, the K2 indicator is alight, if the relay of the second channel is off, the K2 indicator is not alight.

2.3.2.5. The K3 indicator shows the status of the switched channel number 3 relay. If the relay of the third channel is on, the K3 indicator is alight, if the relay of the third channel is off, the K3 indicator is not alight.

2.3.2.6. The “↵” button is designed for entering the mode of definition of settings values and parameters of configuration values, and also entering (recording) the updated values into the memory of IRT 5922. On entering the mode of setting the parameter the current numeric value of the given parameter blinks, and on entering (recording) the latter, it stops blinking.

2.3.2.7. The “→” button is intended for the settings review (selection) (arranged by numbers in the ascending order) in the measurement mode, for entering the mode of programming the device configuration together with the button “←”, for choosing the parameter of configuration (in a forward direction) and for choosing the values of the parameters of configuration and settings (in a forward direction) when the last are being programmed.

2.3.2.8. The “←” button is intended for the settings review (selection) (arranged by numbers in the descending order) in the measurement mode, for entering the mode of programming the device configuration together with the button “→”, for choosing the parameter of configuration (in a backward direction) and for choosing the values

of the parameters of configuration and settings (in a backward direction) when the last are being programmed.

2.3.3. On the rear panel of IRT 5922 there are:

- split terminal blocks for connecting a supply-line cord, commutation circuits, primary converters, current loads and an interface cable;
- protective grounding terminal.

## 2.4. Definition of the configuration of IRT 5922 (manual mode)

***ATTENTION! Do not configure IRT 5922 in the manual mode while using RS 232 interface for data exchange with a PC.***

2.4.1. The parameters of IRT 5922 configuration with their possible values are presented in the table 3 in the order of their occurrence on the displays.

The list of the parameters of configuration has a two-level structure. The upper level – the menu, and the lower level – the submenu. The submenu has the parameters: “rL1>”, “rL2>” and “rL3>”, determining the logic of the relay operation.

2.4.2. For entering the mode of configuration setting press the buttons “← ” and “→” simultaneously. On the small display will appear one of the two names of the current parameter, namely, “PrUE” – permit to settings programming, or “PASS” – entering the password.

2.4.3. On appearance of the password input request – “PASS”, on the large panel there will appear a blinking zero. With the help of “← ” or “→ ” buttons enter the password and press button “↵” . On the small panel there will appear the parameter “PrUE”.

***Note.*** *On entering of the wrong password the attempts of changing the configuration of IRT 5922 will be disabled and the error message will appear “Acde” (access denied).*

2.4.4. On appearing of the “PrUE” parameter = 0, set its value a one. For that purpose, press button “↵”, and the parameter value will blink. With the help of “← ” or “→ ” buttons choose 1 and press button “↵”.

2.4.5. With the help of “← ” or “→ ” buttons choose the parameter needed from the menu on the small panel. On the large panel there will appear the value of the chosen parameter.

2.4.6. Press button “↵”.

2.4.6.1. The parameter value will blink (but for the value “Sub”).

With the help of “← ” or “→ ” buttons change the value of the menu parameter to the needed one and press button “↵” again.

2.4.6.2. The value “Sub” means entering the submenu of the “rL1>”, “rL2>” and “rL3>” parameters.

With the help of “← ” or “→ ” buttons choose the needed parameter of the submenu (but for the “rEtU”), and press button “↵”. The value of the submenu parameter will blink.

With the help of “← ” or “→ ” buttons change the value of the submenu to the needed one and press button “↵”.

2.4.6.3. “← ” small display there will appear “Sub”. You may continue programming menu parameters. (see p. 2.4.5.).

2.4.7. The mode of configuration setting may be exited in two ways: either by simultaneous pressing of the buttons “← ” and “→ ”, or by entering “rEtU” (to a small panel) with the help of the button “↵”.

*Note.* The factory setup of the parameters conforms with table 3.

## 2.5. Setting IMC parameters

2.5.1. The range of the output unified signal of IMC is set in compliance with table 6 and p. 2.3.1.5.

Table 6.

The IMC range	“IOdP” menu parameter	Position of the range switch
(0...5) mA	1	5 mA
(0...20) mA	1	20 mA
(4...20) mA	2	20 mA

## 2.6. Definition of settings values

2.6.1. Press button “→ ”. On the small panel there will appear the name of the first setting – “US\_1”, and on the large panel there will appear its numeric value. Press button “↵”, and the value will start blinking. With the help of “→” and “←” buttons choose the needed value of the setting and press button “↵”.

2.6.2. Further, with the help of the button “→ ” choose the second setting – “US\_2”. Set the needed value the same way as in p. 2.6.1.

2.6.3. Further, with the help of the button “→ ” choose the third setting – “US\_3”. Set the needed value the same way as in p. 2.6.1.

2.6.4. Press button “→” again, IRT 5922 will change over to the measurement mode.

2.6.5. The transition from “US\_3” setting to “US\_2” and “US\_1” settings may be effected by pressing of button “← ”. Subsequent pressing will return IRT 5922 to the measurement mode.

2.6.6. Repeated pressing of button “← ” causes repeated transition from the measurement mode to “US\_1” and back.

*Note.* The factory value of the settings is pertaining to zero.

## 2.7. Internal calibrations

2.7.1. The internal calibrations of IRT 5922, which may be carried out in an autonomous mode, are as follows:

- calibration at a two-wire circuit of TCR connection;
- calibration with the help of TC (but for TC of ПП(B) type with the range of measurement (300...1800) °C.

2.7.1.1. When calibrating with TCR connection:

- Connect TCR to K1, K3 terminals. Short-circuit K2 and K4 terminals (see pic.A.1, appendix A);
- switch IRT 5922 on. Enter the configuration programming mode and set the appropriate primary thermal converter type (see p. 2.4.);
- short circuit TCR terminals;
- choose the “Lc” parameter and set its zero value.

*Note. In case there is no “Lc” parameter in the configuration menu, it is necessary to check the primary converter type, and set the proper one.*

- choose “rL” parameter and press button “↵”. On the big panel there will appear “CLbr” – calibration. When calibration is finished, on the large panel there will appear the resistance value of the two-wire line of TCR with IRT 5922.

2.7.1.2. When calibrating with TC connection:

- connect TC to K1, K2 terminals and put into ice-water mixture;
- connect compensator to terminals K3, K4;
- switch IRT 5922 on. Enter the configuration programming mode. Set the appropriate primary converter type, choose parameter “rc0” and press button “↵”. On the large panel there will appear “CLbr” – calibration;
- in a few seconds on the large panel there will appear preliminary (thermal equilibrium is not yet achieved) value of the compensator resistance  $R_c$ , which will be automatically considered at measuring;
- change the programming mode to the measuring mode and wait till the thermal equilibrium is achieved: temperature gradient should not exceed  $0,3^{\circ}\text{C}/\text{min}$ ;
- reenter the programming mode, choose “rc0” parameter and press button “↵”;
- exit the programming mode on finishing the calibration (on the large panel –  $R_c$  value in the thermal equilibrium conditions). IRT 5922 is ready for use.

## **2.8. Measuring voltage from 0 to 10V**

2.8.1. Set “U100” primary converter type.

2.8.2. Set parameter values: “DPLo”=0, “DPHi”=10. The measured value will be in Volts.

2.8.3. Switch circuits K1...K6 according to Appendix A. You may start measuring.

## **2.9. Error report**

2.9.1. In case of malfunctioning and faults on the small panel there appears the error message – “Err”, and on the large panel – the error name. Possible error messages:

“Acde” – no access right to changing parameters and settings of IRT 5922.

This error is caused by entering a wrong password. Enter the correct password. If you do not know or forget the password, it can be remedied only with the help of IRT 5922 computer program.

“EEPr” – IRT 5922 PROM error. It can be due to PROM failure, or because of defective PROM data. IRT 5922 should be reclosed. If the error fails to disappear, PROM data can be restored with the help of the computer program involving the backup copy of PROM data.

“Cut” – input signal interruption. This message appears on interruption of TCR or TC connections with IRT 5922 inlets, or on sweep of the measured signal in the form of current or voltage off the tolerated range. The primary converters connections should be restored, or the serviceability of the input current supply or voltage for IRT 5922 should be checked.

“nrdY” – ADC data are not ready. This message always appears on switching IRT 5922 on. The message stays on during the period of time, which is in proportion to the number of averagings of the magnitude of the measured value (from unit to tens digit of seconds), then disappears.

“brdr” – overrunning the range. The message appears on:

- overrun by a measured signal from TC and TCR of the range of measurement;
- exceeding the value of 320  $\Omega$  by a measured signal in the form of resistance;
- sweep of a measured signal in the form of the direct current off the range
  - (-0,2...6) mA – for the signal of 0...5 mA;
  - (-0,2...22) mA – for the signal of 0...20 mA;
  - (2,5...22) mA – for the signal of 4...20 mA.

When the signal recovers the range of measurement, the error message remains on the display for not more than 10 seconds.

“AdC” – exchange with ADC failure. May be caused by ADC malfunction, or by a communication error between the ADC controller and the master controller.

## **2.10.Features of IRT 5922 operation**

2.10.1 The numeric values of the parameters are set up (changed) with the help of “← ” and “→ ” buttons in two modes: step-by-step and scanning.

Step-by-step mode – a single pressing and release of a button, as a result of which the value of the parameter is changed by one unit of a low-order significant position (l.o.s.p.).

Scanning mode – the parameter value is changed by holding a button pressed. On holding the pressed button the value changes digit-by-digit, beginning with the low-order digit and ending with the high-order one. At the same time, every place value is changed by 10 units, beginning with the current value. On changing of the current place value by 10 units, transition to scanning of the following high-order digit takes place.

Scanning is stopped in case:

- the button is released;



- the upper (9999) or the lower (-1999) limits of the numeric range are reached;
- of transition of the decimal point.

*Note. For speeding up setting of the necessary parameter value, it is recommended that the number of digits after comma be reduced by changing the “UF” parameter value.*

On finishing scanning the new parameter value starts blinking. Press button“↵” for entering the renewed value into the IRT 5922 memory.

2.10.2 IRT 5922 retains all the current configuration parameters and their values in case of voltage failures. For example, if voltage failed during parameters programming, the renewed values will be retained without exiting the programming mode (p. 2.4.7).

### **2.11. Marking and sealing**

2.11.1. Marking is fulfilled in accordance with the GOST 26828-86 E, GOST 9181-74 E, GOST 12.2.020-76 and HKГЖ layout. 411618.004-02СБ.

2.11.2. IRT 5922 is sealed by a production control department representative of the manufacturer.

### **2.12. Packaging**

2.12.1. Packaging is fulfilled in accordance with the GOST 23170-78 E, GOST 9181-74 E and HKГЖ. 411618.004-02УЧ layout and it secures absolute safety of IRT 5922.

### 3. THE USE OF THE PRODUCT ACCORDING TO ITS PURPOSE

#### 3.1. Preparation of the product for use

##### 3.1.1. Safety regulations

3.1.1.1. Considering the system of the electrical shock protection for people IRT 5922 corresponds to class I according to GOST 12.2.007.0-75.

3.1.1.2. IRT 5922 has a protective grounding terminal pursuant to GOST 12.2.007.0-75.

3.1.1.3. Primary converters and execution units are to be connected according to marking, supply voltage switched off.

***Attention! Connecting IRT 5922 to terminal blocks should be effected through solid wires or through multiple strand wires with a soldered tag.***

3.1.1.4. IRT 5922 is fire-safe, fire-striking probability of IRT 5922 does not exceed  $10^{-6}$  per year in accordance with GOST 12.1.004-85, that is, at any malfunction, either of IRT 5922 itself, or of the external current circuits, connected to it, it cannot be the source of inflammation.

3.1.1.5. During use of IRT 5922 it is necessary that the requirements of ПНАЭ Г-1 – 024 – 90 (ПБЯ РУ ЛС-89), GOST 12.3.019-80, “Rules of technical operation of consumer electric installations” and “Safety standards during use of consumer electric installations”, “Rules of electric installations setup”, approved by Gosenergonadzor, be observed.

##### 3.1.2. External examination.

3.1.2.1. During the external examination there should be checked: absence of mechanical damages, accuracy of marking, completeness of the set.

In case surface defects, which may influence working capacity of IRT 5922, or inadequacy of completeness, or marking are found, the possibility of further use of IRT 5922 is determined.

3.1.2.2. Every IRT 5922 device should be supplied with an inspection checklist.

##### 3.1.3. Installation of the device.

3.1.3.1. For installation of IRT 5922, there should be access to it from the rear side of the panel.

3.1.3.2. Dimensions of the recess in the panel should agree with p. 2.2.28.

Installation order:

- put IRT 5922 into the recess in the panel;
- insert brackets into the inlets on the lateral sides of the case;
- attract the front side of IRT 5922 to the panel by screws.

Connecting IRT 5922 to power supply, primary converters, switched channels and computer is effected through the terminal blocks, located on the rear panel, in accordance with Appendix A. The connections are executed in the form of cable communications by a solid wire or by a multiple strand wire with soldered tags.

Cable laying and termination should be in accordance with the requirements of the current “Rules of electric installations setup”.

#### 3.1.4. Testing.

3.1.4.1. For naught checks of IRT 5922 configuration with TCR, connect a resistance box, of configuration with TC – voltage comparator through a calibrating cable, or put the TC into an ice-water mixture.

Set values of resistance on the resistance boxes equal to 50  $\Omega$  for TCR of 50M, 50 $\Pi$  types, and 100  $\Omega$  – for TCR of 100M, 100 $\Pi$ , Pt100 types.

Set a thermoelectromotive zero value on the voltage comparator.

3.1.4.2. For IRT 5922 configurations with input electric signals in the form of current strength and direct voltage, connect calibrated current and voltage supplies to entries correspondingly.

Set the input signals values, corresponding to the upper limits of the measured value.

### **3.2. The use of the product**

3.2.1. Set IRT 5922 on the control panel and safely fix it.

3.2.2. Make necessary connections of IRT 5922 in accordance with Appendix A.

3.2.3. Define the configuration of IRT 5922 and the settings, following pp. 2.4. and 2.6.

3.2.4. Carry out internal calibration of IRT 5922, following p. 2.7.

*Note. pp. 3.2.3. and 3.2.4. schemes may be carried out with the help of PC, provided there is an appropriate software support, which may be supplied by a special request.*

## 4. METHODS OF CONTROL

4.1. IRT 5922 verification is carried out by State Standardising Authorities or by the authorised Metrological Service of the buyer. Verification requirements, its procedure and main phases are defined by ПП 50.2.006-94 “ТСИ. Measuring devices verification. Organization and procedure” and by a Recommendation “МИ 2342-95 verification procedure”.

The recalibration interval is two years.

4.1.1. Definition of basic reduced errors of the measured values and of basic reduced errors of the IMC in compliance with pp. 5.5. and 5.7. accordingly (for IRT 5922 and IMC with input signals, corresponding to the configurations of the verified IRT 5922.)

4.1.1.1. For configurations with input electric signals from the TC, signalling of the input circuit break is fixed, that is, parameter value “CutE”=1.

4.1.1.2. For configurations with input electric signals from the TCR, “Lc” parameter value is set, in compliance with the circuit diagram (“Lc”=0 – double-wire, “Lc”=1 – three-wire).

4.1.1.3. At IMC configuration the lower and the upper values of the ranges of IMC conversions are set equal, that is “dPLo”=“IoLo”, “dPHi”=“IoHi”.

4.1.2. The types and HCX of TC and TCR for IRT 5922 should comply with the ones given in the present manual and satisfy GOST 6651-94 and GOST P 8.585-2001 requirements accordingly.

4.1.3. The verified points of IRT 5922 and IMC are calculated in accordance with pp. 5.5.1. and 5.7. correspondingly.

For IRT 5922 and IMC measured, the primary converter HCX and ranges of measurements of which are in accordance with the given in the recommendation, the verified points are given in tab. 5 ... tab. 7 and tab. 8 ... tab. 11 correspondingly.

*Note. IRT 5922 and IMC ranges of measurement should correspond to the given in the present manual, and, by a buyer’s request, may not coincide for the given configuration of IRT 5922.*

4.1.4. Basic reduced error of the measured values for IRT configurations with output electric signals in the form of direct voltage is determined in the points, corresponding to 5, 25, 50, 75 and 95 % of the measurement range, by connecting the verified IRT 5922 to a calibrated voltage source.

4.1.4.1. During configuration of the verified IRT 5922, the lower “dPLo” and the upper “dPHi” values of the measurable range are set. “Sqrt” parameter is set equal to zero.

4.1.5. Basic reduced error of the measured values for IRT 5922 configurations with input electric signals in the form of direct current is determined in two verified

points, corresponding to 5 and 95 % of the range of measurements in compliance with the recommendations of pp. 5.5.5.

4.1.5.1. During configuration of the verified IRT 5922, procedures of pp. 4.1.4.1. are iterated.

4.1.6. For IRT 5922 with output electric signals in the form of direct voltage of 0...5, 0...20 and 4...20 mA with a square-rooting relationship between the measured value and the input signal, basic reduced error is determined in points:

- 0,1; 1; 2; 3; 4; 5 mA - for the 0...5 mA range;
- 1; 5; 10; 15; 20 mA -for the 0..20 mA range;
- 4,32; 8; 12; 16; 20 mA -for the 4...20 mA range.

The real values of the measured value  $A_r$  for the input signal ranges of 0...5, 0...20 and 4...20 mA are calculated by formulae (4.1), (4.2), and (4.3) correspondingly:

$$A_r = \frac{A_{\max}}{\sqrt{5}} \cdot \sqrt{I_{\text{input}.i}} \quad (4.1)$$

$$A_r = \frac{A_{\max}}{\sqrt{20}} \cdot \sqrt{I_{\text{input}.i}} \quad (4.2)$$

$$A_r = \frac{A_{\max}}{\sqrt{16}} \cdot \sqrt{I_{\text{input}.i} - 4} \quad (4.3)$$

$A_r$  – the real value of the measured value in a tested point;

$A_{\max}$  – upper limit of the range of the measured value (is defined during IRT 5922 configuration).

$I_{\text{input}.i}$  – current at the input in the checked point;

5, 20, 16 mA – the ranges of the input signals;

4 mA – the lower limit of the range of the input signal for IRT 5922 with the input of 4...20 mA.

4.1.7. For IMC with unified input signals 0...5; 0...20 and 4...20 mA and with a square-rooting relation between the input signal and the output signal, the calculated values of the output signals in the checked points, the values of the input signals are given in tables 7, 8 and 9.

Table 7.

Limit of Measurement, mA		Calculated Value of the Output Signal in a Checked Point, mA						
		0	0,1	1	2	3	4	5
Upper	Lower	Value of the Input Signal in a Checked Point, mA						
0	5	0	0,002	0,2	0,8	1,8	3,2	5
0	20	0	0,008	0,8	3,2	7,2	12,8	20
4	20	4	4,0064	4,64	6,56	9,76	14,24	20

Table 8.

Limit of Measurement, mA		Calculated Value of the Output Signal in a Checked Point, mA					
		0	1	5	10	15	20
Upper	Lower	Value of the Input Signal in a Checked Point, mA					
		0	5	0	0,0125	0,3125	1,25
0	20	0	0,05	1,25	5	11,25	20
4	20	4	4,04	5	8	13	20

Table 9.

Limit of Measurement, mA		Calculated Value of the Output Signal in a Checked Point, mA				
		4,32	8	12	16	20
Upper	Lower	Value of the Input Signal in a Checked Point, mA				
		0	5	0,002	0,3125	1,25
0	20	0,008	1,25	5	11,25	20
4	20	4,0064	5	8	13	20

4.1.8. Basic reduces errors of the measured values, determined from the formula (5.1) of the recommendation, should not exceed the ones given in pp. 2.2.1, 2.2.13 of the present manual.

4.1.9. Definition of basic reduced error by a computer channel is combined with definition of basic reduced error of the measured value.

Basic reduced error on the computer channel should not exceed basic reduced error of the measured value.

4.1.10. Definition of basic error of signaling actuation.

4.1.10.1. Configure IRT 5922 for any input signal type.

4.1.10.2. Define any values of the three settings within the range of measurements.

4.1.10.3. Configure logic of operation of all the three relays relative to the given settings, allowing for the possibility of an input circuit break (see sec.2 of the present manual).

4.1.10.4. Define hysteresis of all the three settings.

4.1.10.5. Connect to relay channel terminals of IRT 5922 the circuits, indicating closed/open condition of channels (for example, light-emitting diodes supply circuit).

4.1.10.6. Changing successively the values of IRT 5922 input signal from one setting to another, make sure all the relays operate, both by indication on the front panel of IRT 5922, and by the indicators, connected to the channel terminals.

4.1.10.7. Basic reduced error of signaling actuation must satisfy the following inequalities:

$$|U_{OP,U} - (U_{SET} + U_{HYST})| < 0,01 \cdot \gamma_{TOL}(A_U - A_L) + *, \quad (4.4)$$

by the passage of settings bottom-up;

$$|U_{OP,D} - (U_{SET} + U_{HYST})| < 0,01 \cdot \gamma_{TOL}(A_U - A_L) + *, \quad (4.5)$$

by the passage of settings top-down;

$U_{OP,U}$  – the actual value of relay operation signal by the passage of settings bottom-up;

$U_{OP,D}$  – the actual value of relay operation signal by the passage of settings top-down;

$U_{SET}$  – the setting value;

$U_{HYST}$  – hysteresis of the setting;

$A_U$  – the upper magnitude of the measured value range;

$A_L$  – the lower magnitude of the measured value range;

$\gamma_{TOL}$  – tolerated basic reduced error of the measured value (in percentage);

\* - one unity of the last digit .

4.1.10.8. Disconnect the input signal source from the input terminals of IRT 5922 and make sure all relays operate properly in case of an input circuit break.

## 5. MAINTENANCE

5.1. IRT 5922 servicing comes to observing operation, storage and transportation rules, given in the present manual, maintenance inspections, periodic verification and repairs.

5.2. Maintenance inspections are carried out according to the order, established by the organization, using IRT 5922, but not less than twice a year, and they include:

- 1) external examination;
- 2) checking safety of connection of IRT 5922 communication circuits with the primary converters, absence of earth conductor break, safety of connection between IRT 5922 and the grounding conductor;
- 3) performance check:
  - internal calibration of IRT 5922;
  - electric insulation resistance check in accordance with the Recommendation “ МИ 2342-95 verification procedure ”.
  - electric insulation strength check in accordance with the Recommendation “ МИ 2342-95 verification procedure ”.
  - precision of IRT 5922 measurements testing in the points, corresponding to 5, 50, 95% of the range of the measured values in accordance with Sec.4 of the present manual.

If the performance check is carried out in the circumstances, when there is no possibility of using accessory instruments, IRT 5922 can not be tested for precision of measurements.

5.3. Periodic verification of IRT 5922 is carried out once in two-year period, according to the instructions, given in Sec. 4 of the present manual.

5.4. IRT 5922, defects of which cannot be eliminated during the maintenance inspection, or the ones, which have not passed a periodic verification, are liable to a running repair.

Repair of IRT 5922 is carried out by a manufacturer subject to a separate contract.



## **6. STORAGE**

6.1. Storage conditions of IRT 5922 packed in shipping container at the manufacturer's storage facilities should meet I requirements of GOST 15150-69. The air should not contain active agents.

6.2. Stowage of IRT 5922 in storage facilities should ensure easy access to them.

6.3. IRT 5922 should be stored on the racks.

6.4. The space between the walls, the floor of the storage facility and IRT 5922 should not be less than 100 mm.

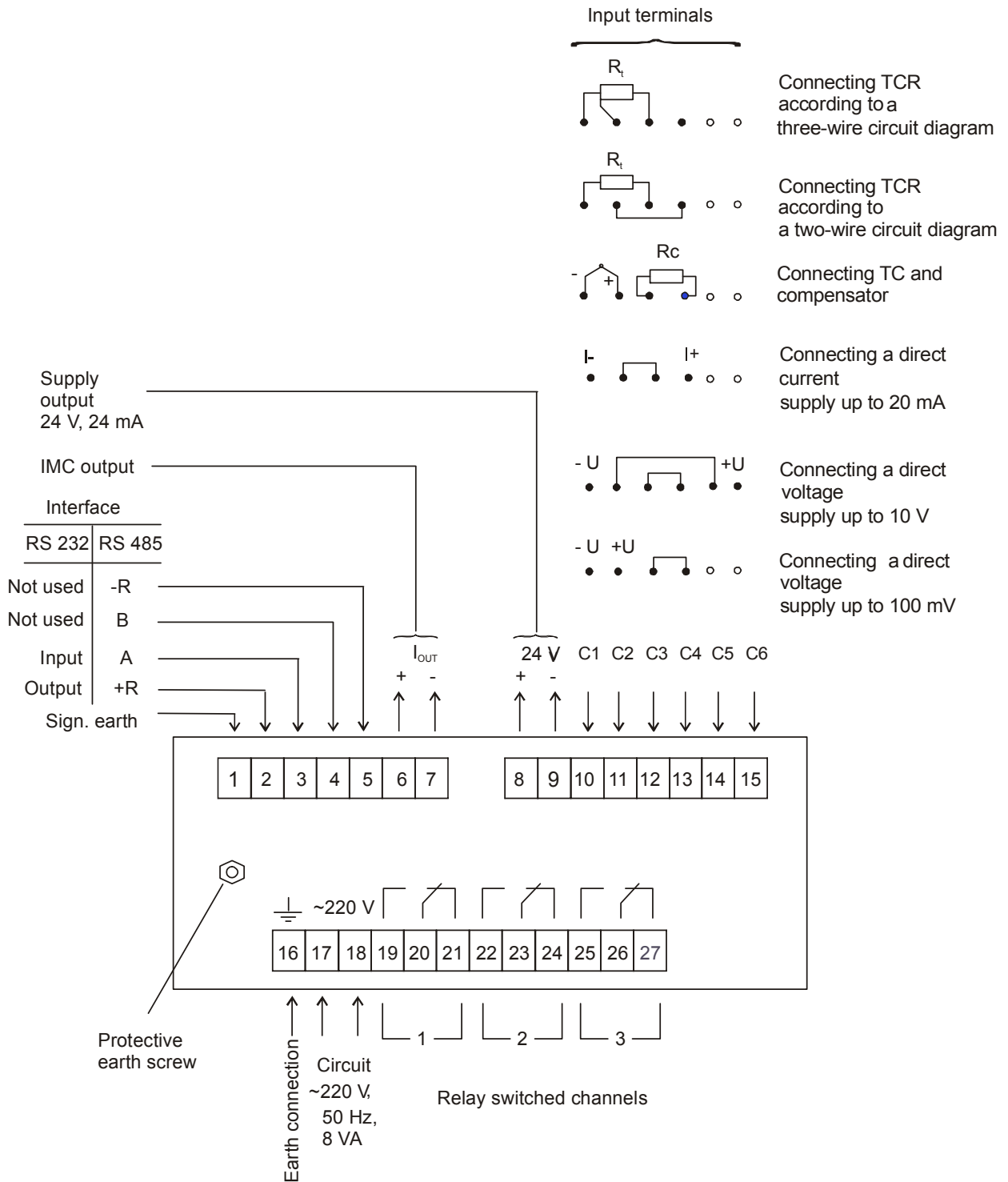
## **7. TRANSPORTATION**

7.1. IRT 5922 is transportable by all kinds of transport in covered transport facilities. Strapping of package in a transport facility should be carried out according to the current regulations of the corresponding transport facilities.

7.2. IRT 5922 transportation conditions should meet requirements 5 according to GOST 15150-69 at the ambient temperature from minus 50 to +50 °C, and should comply with protective measures against shocks and vibration .

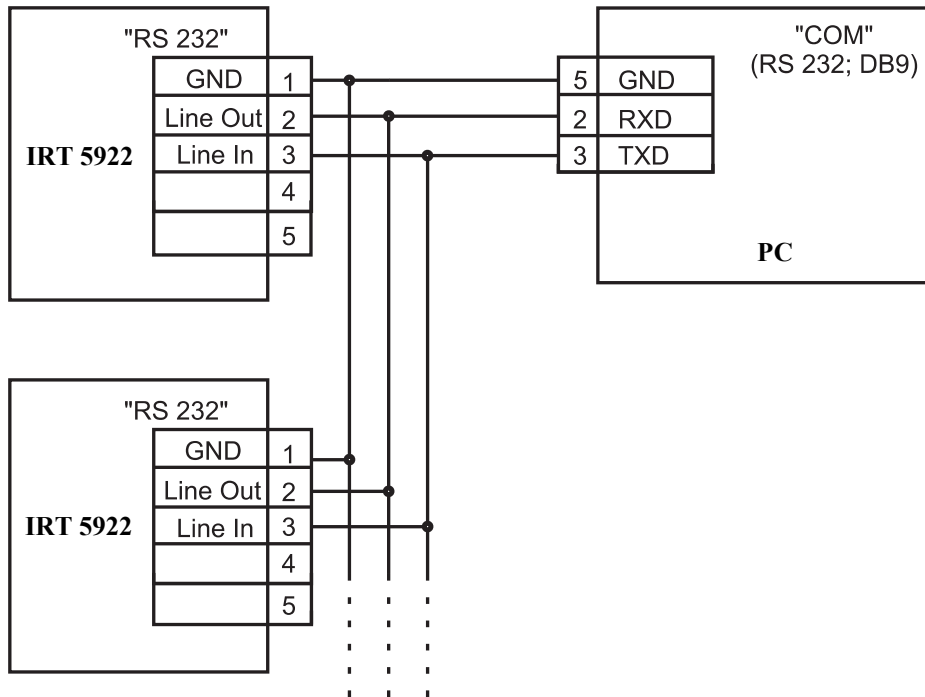
7.3. IRT 5922 should be transported parceled or separately. If transported in boxes, requirements of GOST 21929-76 should be observed.

IRT 5922 ELECTRIC CIRCUIT DIAGRAM



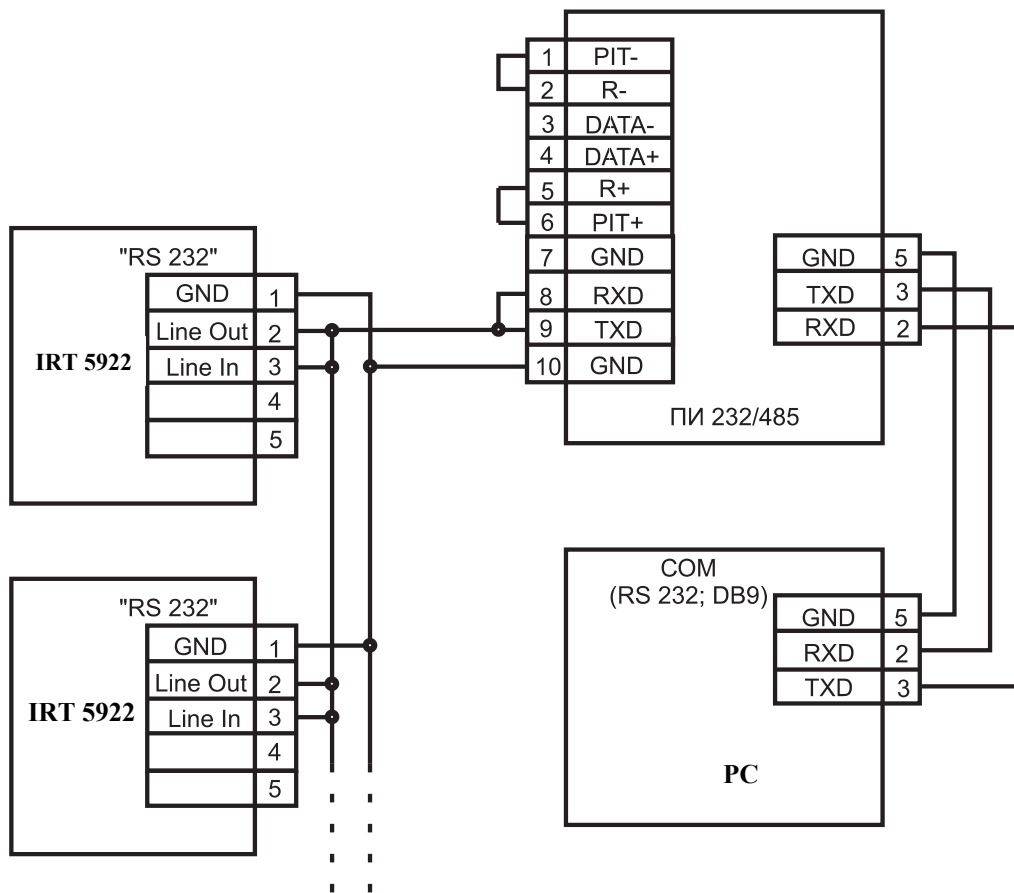
Picture A.1

Three-wire of IRT 5922 connection to a Computer  
 (up to 10 of IRT 5922 with the connection line of up to 15 m.)



Picture B.1

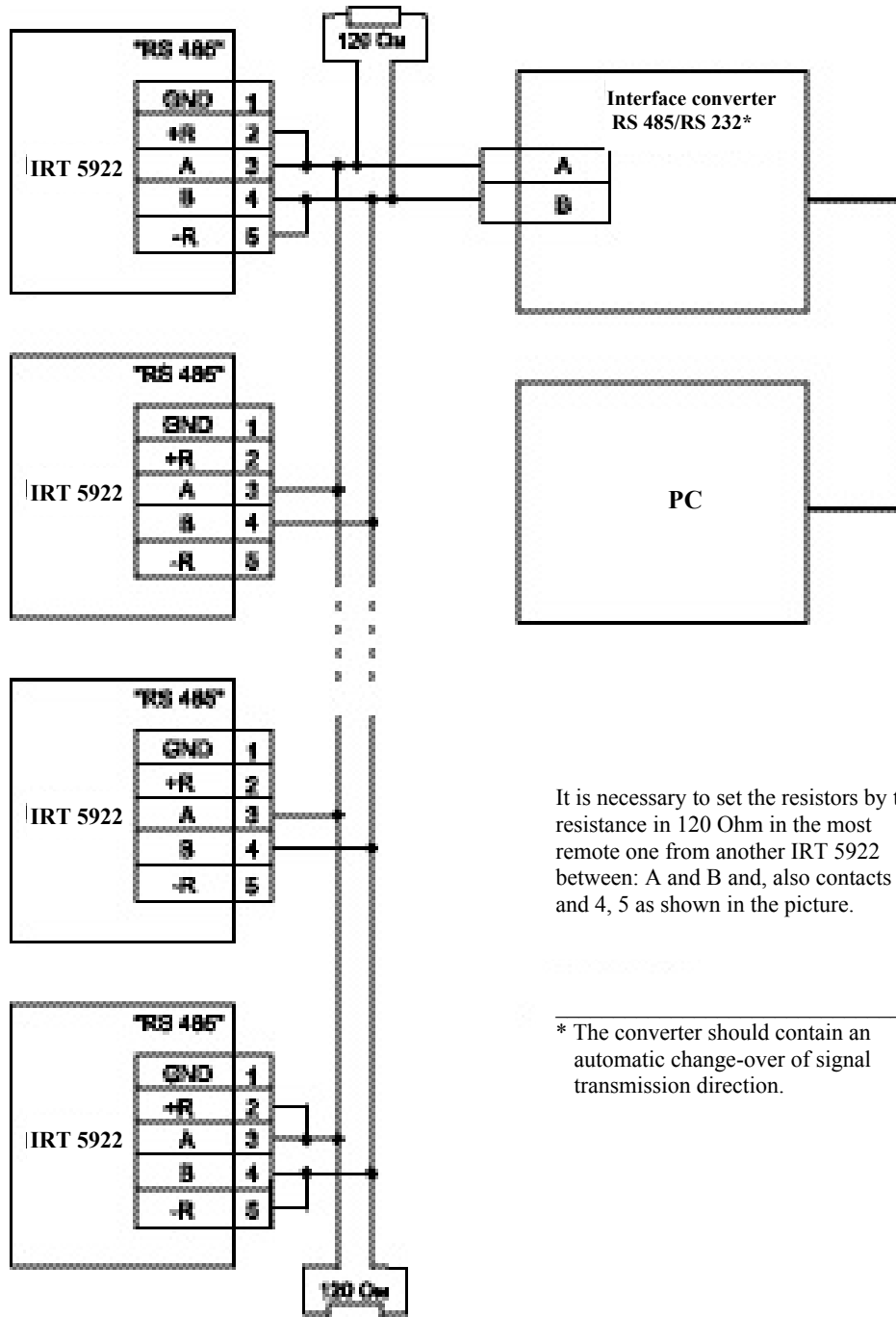
Three-wire of IRT 5922 connection to a Computer  
 (up to 100 of IRT 5922 with the connection line of up to 1000 m.)



ПИ 232/485 – interface converter of «ELEMER»

Picture B.2

Two-wire diagram of IRT 5922 connection to a Computer using RS 485/RS 232 interface converter (up to 100 of IRT 5922 with the connection line of up to 1000 m.)



It is necessary to set the resistors by the resistance in 120 Ohm in the most remote one from another IRT 5922 between: A and B and, also contacts 2, 3 and 4, 5 as shown in the picture.

\* The converter should contain an automatic change-over of signal transmission direction.

Picture B.3

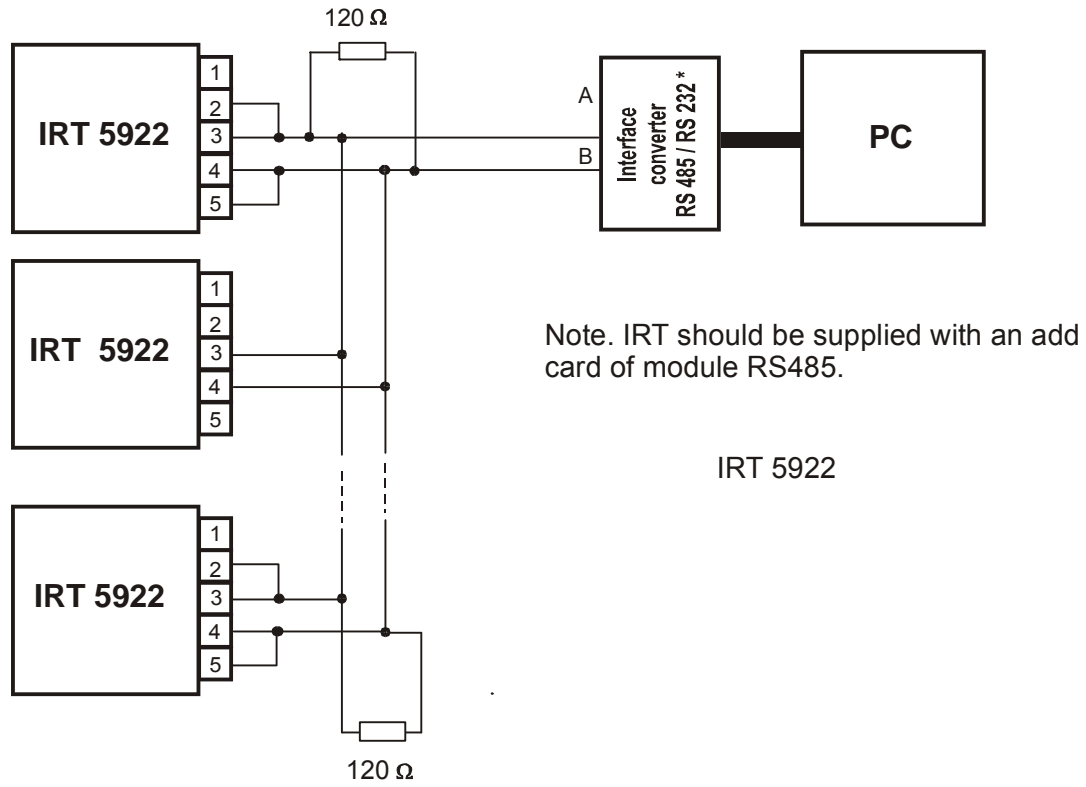
**IRT 5922**

**PC**

**IRT 5922**

**IRT 5922**

Two-wire diagram of IRT 5922 connection to a Computer using  
 RS 485/RS 232 interface converter  
 ( up to 100 of IRT 5922 with the connection line of up to 1000 m.)



Picture B.3

\* The converter should contain an automatic change-over of signal transmission direction.