НАУЧНО-ПРОИЗВОДСТВЕННОЕ ПРЕДПРИЯТИЕ

Electrostatic discharge test generator IGE 25.1a

DATASHEET

№

ELECTROSTATIC DISCHARGE TEST GENERATOR

IGE 25.1a

MANUAL
EQUIPMENT QUALIFICATION PROCEDURE

CONTENTS

1. Product features.

1.1 Electrostatic discharge test generator IGE 25.1a (hereinafter - the generator) is manufactured by Research and Development Enterprise "Proryv" and designed to generate rated air discharge test pulses for testing of electrical engineering, radioelectronic and electronic products, devices and technical equipment, which may be exposed to electrostatic discharge in accordance with GOST 30804.4.2-2013, (concerning air discharge).

2. Technical specifications.

• capacity of storage capacitor **C**, pF, ±10%	150
• resistance of the discharge resistor **R**, Ohm, ±10%	330
• charging resistance, Mohm, min	50
• rated output (test) voltage, kV, ±10%	2, 4, 6, 8, 10, 15, 20, 25
• output voltage polarity	positive and negative
• hold time, sec, minimum	5
• operation mode	1 Hz frequency/ 5 Hz frequency
• dimensions:	
-generator, mm	300 x 215 x 95
- electrical power unit, mm	88 x 65 x 54
• mass of the generator, kg, max	1.5
• drawn power when charging the batteries, W, max	12
• service life	10 years

3. Packing contents.

The package includes:

• test generator IGE 25.1a	1 unit
• power supply unit	1 unit
• replaceable unit of positive polarity	1 unit
• replaceable unit of negative polarity	1 unit
• grounding cable	1 unit
• datasheet	1 unit

4. Feature and operation concept.

4.1 The functional chart of the test generator IGE 25.1a is shown in Figure 1.

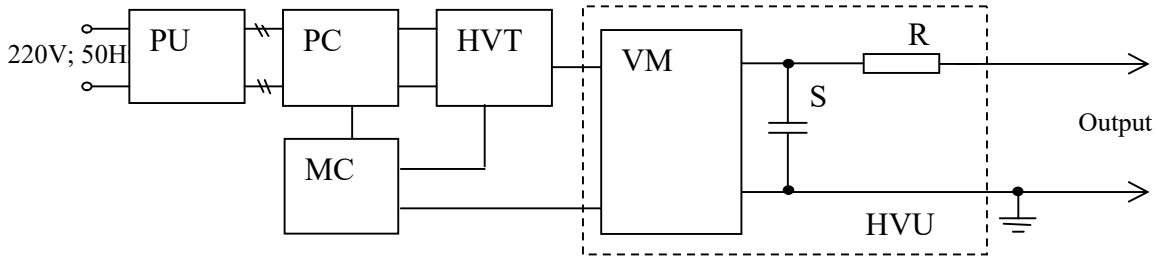

Fig. 1 The functional chart of the test generator IGE 25.1a

1. Power Unit (PU)
2. Power Controller (PC)
3. High Voltage Transducer (HVT)
4. Microprocessor Controller (MC)
5. High-Voltage Unit (HVU)
6. Voltage Multiplier (VM)
7. Storage Capacitor (SC)
8. Discharge Resistor (DR)

4.2. Power unit (PU) generates 12V voltage that is necessary to charge the battery.

4.3. The high voltage transducer (HVT) along with the voltage multiplier generates voltage ranging from 2 to 25 kV, that is required for charging the storage capacitor (SC).

4.4. The microprocessor controller (MC) is designed to control the operation of LCD display, power controller, and high voltage transducer.

4.5. The power controller (PC) is designed to control the battery charge and provide the required voltage for the rest of the generator units.

4.6. The replaceable high-voltage unit (HVU) includes the voltage multiplier (VM), storage capacitor (SC), and discharge resistor (DR).

5. Safety precautions.

5.1. Only persons who have read and understood "The rules of technical operation of electric installations of consumers", have an approved group-based electrical safe work practices (not less than level 3), have been instructed on safety measures for work with electronic test equipment, and have examined technical specification and the manual, are permitted to use the test generator.

5.2. ***The replacement of high-voltage units to change the polarity shall be performed only with the generator is turned off, and when the storage capacitor is empty. To this end, after the generator is turned off, touch the discharge head to the grounded surface.***

5.4. ***Do not use IGE 25.1a generator when there is no the grounding braid connected to the earth bar.***

5.5. ***Do not touch the discharge head when the generator operates.***

5.6. ***After the generator work is completed, the discharge head shall be discharged by touching the discharge head to the grounded area.***

6. Preliminary starting procedure.

6.1. After transfers in winter or high humidity conditions, the product should be kept under normal conditions 8 hours minimum before using.

6.2. To charge the battery, connect the power unit cable to the connector on the generator handle, turn on the generator. Connect the power unit to 220V; 50 Hz power outlet.

6.3. Disconnect the charger. Turn off the generator.

6.3. Connect the ground wire to the generator  connector device and the ground bar.

6.4. Install the high-voltage unit having the required polarity of test voltage in the appropriate generator socket. ***Warning! Do not turn on the generator when the high-voltage unit is not installed.***

6.5. Turn on the generator.

7. Working sequence.

7.1. Turn on the generator by the switcher, located on the generator handle (when turning on the generator and the battery charge is under the lower allowable limit, "**Low battery**" sign appears on the display**,** LCD shows blinking red thrice and the generator shuts down. In this case the battery shall be charged). After the screen saver, a menu appears on the LCD display of the generator as shown on Figure 2, and the illumination is turned on.

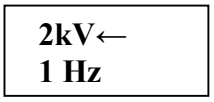

Figure 2

7.2. The operation mode and the level of test voltage is selected by means of "►" button used for moving the menu cursor. The parameter values are changed by buttons "+" and "-".

7.3. The lower-right corner of the display indicates the pictograph showing the battery charge level.

7.4. The change of test voltage polarity is performed by changing the high-voltage unit. The replaceable units differ with a color of soft insulating material on the discharge head (red is for positive polarity unit, blue is for the negative one). **The change of high-voltage unit shall be carried out only when the power of the generator is turned off and the storage capacitor is empty.**

7.5. The tests are carried out according to the methods specified in GOST R 51317.4.2-99. To get single discharges, push briefly "**Start (Пуск)**" button located on the front side of the handle. The LED in the control panel shows red. If the button is constantly pressed, the storage capacitor is charged with a 1 Hz or 5 Hz frequency, depending on the set startup mode. When the pulses are brought, the display indicates the value of the charge voltage and the number of brought pulses from 1 to 255 (ref. Figure 3).

Figure 3

7.6. When the tests have been completed, turn off the generator, discharge the generator storage capacitor by touching the discharge head to the grounded area.

7.7. When there is no pressures on any of the generator buttons over 10 seconds, the display light is turned off, and in 2 minutes the generator goes to sleep mode, which turns off the display. By doing this, LED on the panel board shortly flickers each two seconds. In sleep mode all settings are saved, and when clicking any button the generator returns to work mode.

7.8. The battery charge level is displayed as a pictograph in the lower-right corner of the display. When the battery charge is under the lower allowable limit while operating, "**Low battery**" sign appears on the display**,** LCD shows blinking red thrice and the generator shuts down.

8. Maintenance.

8.1. The maintenance of the test generator after the end of the warranty period shall be performed by the manufacturer under a particular contract.

8.2. The manufacturer shall provide warranty service for the generator over 24 months after work acceptance is made in accordance with the contract.

8.3. It is recommended to test the generator in accordance with the periodic qualification procedure biennially.

9. Problems and solutions.

fault	**probable cause**	**solution**
does not turn on	battery is empty	charge the battery
no spark	faults of generator units	contact the manufacturer
the battery does not charge	no 220 V supply voltage	check the voltage and plug contacts for 220 V
	power supply unit is damaged	contact the manufacturer

10. Equipment qualification procedure.

10.1. The generator qualification is carried out in accordance with GOST R 8.568-97, GOST 30804.4.2-2013 (regarding air discharge) and the technical specification of the electrostatic discharge test generator.

10.2. The qualification frequency of IGE 25.1a test generator during its operation and storage process is to be defined by an enterprise using the equipment in accordance with the conditions and intensity of its operation. It is recommended to test the generator in accordance with the periodic qualification procedure biennially.

10.3. Calibrated characteristics of the test generator in air discharge mode:
- the error value of the charge voltage shall not exceed ±10 % for all levels of severity;
- charge voltage hold-up time shall be 5 sec minimum.

10.3. Conditions for the qualification:
surrounding air temperature, K (^{0}C) 293±5 (20±5);
relative air humidity, % 65±15;
atmospheric pressure, kPa (mm Hg) 100±4 (750±30);
supply voltage 50 Hz, (220±11) V.

10.4. The recommended measurement tools for testing the test generator are shown in Table 1.

Table 1.

Measurement tools	Technical specifications	Recommended type
Kilovoltmeter	2-30 kV, Cl. 1.0	C196
Stop-watch timer	Time measurement resolution is 0.1 sec maximum	

Notes:

1. The measurement devices specified in the table can be substituted with other equivalent ones providing adequate accuracy measuring of the corresponding parameters.
2. All measurement devices shall be in good operating conditions and accepted (calibrated) in due compliance.

10.5. Generator qualification and measurement of main metrological characteristics.

10.5.1. The preliminary starting procedure and walk-around inspection (the contents of delivery and the absence of damages, the availability of current documents, and testing equipment characteristics values recorded in the previous qualification procedure) of the generator are conducted in accordance with the product specification. All measured devices involved shall be grounded.

10.5.2 The measurement of the test generator main metrological characteristics.

10.5.2.1. Set the high-voltage unit for the positive polarity and the launch mode "**5Hz**".

10.5.2.2. Perform the following actions for all severity levels:
- connect the generator grounding braid to the connecting device of the kilovoltmeter case;
- set the appropriate measurement limit of the kilovoltmeter;
- touch the generator discharge head of the kilovoltmeter high-voltage connecting device and press "**Start (Пуск)**" button one time. Having fixed the value of the voltage, discharge the storage capacitor by touching the connecting device terminal of the kilovoltmeter case. The measured charge voltage value is recorded in the protocol (ref. Table 2).

10.5.2.3. Repeat the actions as per item 10.5.2.2 and by means of the stop-watch timer measure the time for which voltage at the generator output decreases up to 90% for the initial value. The time value (hold time) is recorded in the protocol (ref. Table 2).

10.5.2.4. Repeat the actions according to items 10.5.2.2 and 10.5.2.3 for the negative polarity. The results of the measurements are recorded in the protocol (ref. Table 2).

10.6. Test equipment approval report.

10.6.1. The results of the test equipment qualification shall be recorded in a protocol, the contents of which are shown in the annex B to GOST R 8.568-97.

10.6.2. When the qualification is successful the appropriate mark is made in the technical passport (record book) and the the label with the date of the test and the period of the subsequent periodic qualification shall be attached to the test device, and (or) the "Certificate" shall be issued, as shown in Annex B GOST R 8.568-97.

10.6.3. When the qualification failed, the measures necessary to bring up the technical specifications of the test device to the required values shall be indicated in the protocol.

Table 2.

The generator parameter measurement results.

Polarity	Charge voltage, kV	2	4	6	8	10	15	20	25
+	Charge voltage, kV								
	deviation, %								
	Hold time, sec								
-	Charge voltage, kV								
	deviation, %								
	Hold time, sec								

11. Maintenance conditions

11.1. Climate conditions.

The generator shall be operated under normal climate conditions:

- surrounding air temperature ***(25 ± 10) ^{o} C;***
- relative air humidity ***45 - 80 %;***
- atmospheric pressure ***84.0 – 106.7 kPa (630-800 mm Hg).***

11.2. General requirements of electric power.

The generator is powered by a single-phase AC network with a frequency of 50 Hz, nominal voltage of 220 V ± 10***%***.

12. Shipment

The packed generator is transported by all kinds of transport, provided that it is protected against precipitation.

When the generator is transported by an air plane, it shall be placed in a heated sealed compartment.

The holds of ships and carbodies used for shipment shall not have cement, coal, chemicals, etc.

The shipment of the generator shall be carried out at air temperature ranging from -25 °C to + 55 ° C, relative air humidity up to 95% at +55°C temperature.

13. Storage precautions

The generator shall be stored in heated space under the following conditions:
- air temperature from 283 to 308 K (from 10 to 35 °C);
- relative air humidity 80% at 298 K (25 ºC) air temperature;

there shall be no dust, acid vapor, grease alkali and corroding gases in the storage space;
do not store unpacked devices on the top of one another.

The storage of the packed generator is acceptable.

14. Certificate of acceptance.

Test generator IGE 25.1a, manufacturing number , meets the technical requirements and is approved as ready for service.

Production date

Head of Inspection Department