

Damped oscillatory
magnetic field
test generator
IGS 1.2

TECHNICAL PASSPORT

№

DAMPED OSCILLATORY
MAGNETIC FIELD
TEST GENERATOR
IGS 1.2

MANUAL
EQUIPMENT QUALIFICATION PROCEDURE



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1. Product features.

1.1. Damped oscillatory magnetic field test generator (hereinafter – test generator IGS 1.2) is manufactured by "PRORYV" Research and development enterprise.

1.2 . Test generator IGS 1.2 with spark inductor IK 2.1 is designed to generate rated damped oscillatory magnetic field (DOMF), when making tests of the technical equipment (hereinafter – TE), which may be exposed by DOMF in accordance with GOST R 50649-94 and IEC 1000-4-10-93.

2. Technical specifications.

With spark inductor IK 2.1:

• density of magnetic field (peak value)	(10; 30; 100) A/m
• coil current amplitude	(11.5; 34.5; 115) A \pm 20%
• oscillation frequency	(100 kHz; 1MHz) \pm 10%
• repetition frequency (depending on oscillation frequency)	(40; 400) Hz \pm 10%
• damping (peak 5 to 1 ratio)	0,5 $U_{\text{макс(max)}}$ minimum
• damping (peak 10 to 1 ratio)	0.5 $U_{\text{макс(max)}}$ maximum
• burst time	2 – 10sec
• burst repetition period	3 – 20sec
• number of bursts per cycle	1 - 20
• import power	30 W max
• dimensions	450 x 434 x 169 mm
• device mass	6 kg max
• service life	10 years

Spark inductor IK 2.1 parameters:

• Number of turns	1
• Coil coefficient (the ration between the density of field in the coil center to its current)	0.87m ⁻¹ \pm 1%
• Operation volume	0.6×0.6×0.5m



3. Packing contents.

The package includes:

- test generator IGS 1.2 1 unit
- mains cable 1 unit
- spark inductor IK 2.1 1 unit
- coaxial connection cable 4m 1 unit
- 1A fuse 2 units
- technical passport 1 unit

4. Feature and operation concept.

4.1 The functional chart of the test generator IGS 1.2 is shown in **Figure 1**.

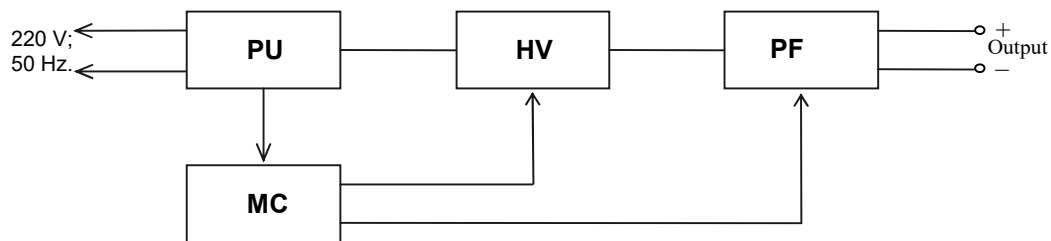


Fig. 1 The functional chart of the test generator IGS 1.2

1. Power Unit (PU)
2. Microprocessor Controller (MC)
3. High Voltage Transducer (HVT)
4. Pulse Former (PF)

4.2. The power unit (PU) generates + 5V, + 12V and + 300V, which are required for appropriate functioning of the microprocessor controller and the high voltage transducer.

4.3. The high voltage transducer (HVT) generates voltage ranging from 0.1 to 3.5 kV, which is required for charging DFC (damping field capacitor) former storage capacitors.

4.4. The microprocessor controller (MC) generates start pulses (for the DFC former), and controls the operation of the high voltage transducer, a keyboard, and a LCD display.

4.5. The pulse former (PF) is designed to generate current pulses of an appropriate form and amplitude in the spark inductor.

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 repair of the generator shall be done only by the manufacturer's representatives.

5.3. *Do not cut the test generator into mains when the upper cap is removed.*

5.4. *A protective ground connection is required.*


5.5. *When the output cables are connected to the generator and the spark inductor, the test generator shall be disconnected from the power network.*

5.6. *Do not touch output cables, the spark inductor, and the EUT (equipment under test) when test pulses are brought.*

6. Preliminary starting procedure.

6.1. After transfers in winter or high humidity conditions, the product should be kept under normal conditions 2 hours minimum before using.

6.2. Check 1A fuse is inserted in the rear panel holders.

6.3. Connect the protective ground to the connecting device  on the rear panel by a wire sections of 1.5 mm² min.

6.4. Connect coaxial cable of the spark inductor IK 2.1 to the "ИК OUTPUT (ВЫХОД ИК)" on the generator front panel.

6.5 Connect the power cable to the socket on the rear panel and to the power outlet 220 V ; 50 Hz. Turn on the test generator by "POWER (СЕТЬ)" switch. The message shown in Figure 2 should be displayed. If the message "MISCONNECTION! (НЕПРАВИЛЬНОЕ ПОДКЛЮЧЕНИЕ!)" is displayed, turn off the generator and upturn the plug. If the same message is shown when you turn it on again, check the existence and integrity of the power ground.

7. Working sequence.

7.1. It is recommended that the tests be carried out 5-10 minutes after the oscillator is turned on.

7.2. After the generator is turned on, text and an arrow cursor appear in the top line of the screen (ref. Figure 2).

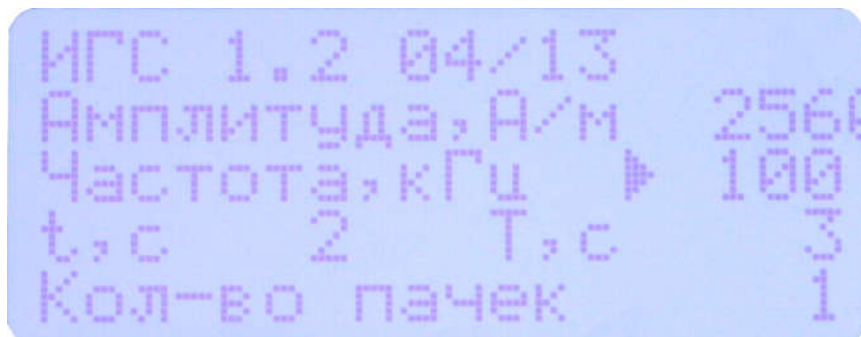


Figure 2

7.3. The DOMF amplitude is set by "+" and "-" keys. The cursor has to be in "**Amplitude (Амплитуда), A/m**" line. The following values can be selected: **10, 30** and **100 A/m**.

7.4. To set the oscillation frequency, the cursor has to be set to "**Frequency, kHz (Частота, кГц)**" position. The values **100kHz** and **1MHz** can be set. DOMF repetition frequency equals 40 and 400Hz respectively.

7.5. DOMF burst time «**t, sec**» (ranging from 2 to 10 sec), repetition time «**T, sec**» (ranging from 4 to 20 sec) and burst number "**Burst number (Количество пачек)**" (ranging from 1 to 20) are set additionally. When the burst time increases, the DOMF period expands automatically, and it is at least twice the amount of the burst time.

7.6. Green color of "**START (ПУСК)**" LED indicates that the generator is ready to start. The generator is started by pushing "**START/STOP (ПУСК/СТОП)**" button. When the DOMF is brought, the "**START (ПУСК)**" LED shows red. By pushing "**START/STOP (ПУСК/СТОП)**" button, an operation cycle is terminated. Green color of "**START (ПУСК)**" LED indicates that the generator is ready for a new start.

7.7. When the tests have been completed, the test generator shall be powered off.

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. The warranty obligations shall not apply to equipment with clear mechanical or other damage caused by malfunctioning, mistreatment or accidents.

8.4. The warranty period is terminated if the repair is to be completed by the Customer or any third party.

8.5. Biennially at a minimum, the test generator shall be checked in accordance with periodical qualification procedure.

9. Problems and solutions.

9.1. Possible problems and solutions of fixing them are indicated in Table 1.

Table 1

Kind of malfunction	Probable cause	Solutions
1. When " POWER (СЕТЬ) " switch is turned, LCD backlight does not work.	1A fuse is missing or blown-out.	Change 1A fuse in the rear-panel holder.
2. The " MISCONNECTION! (НЕПРАВИЛЬНОЕ ПОДКЛЮЧЕНИЕ!) " message is shown on the display.	Phase and zero wires of the supply outlet and generator are mismatched.	Upturn the plug in the outlet.
	Protective ground does not connected or damaged	Connect the ground connector to ground bus of a room.

9.2. Otherwise, contact the manufacturer.



10. Equipment qualification procedure.

10.1. The test generator shall be qualified according to the methodology described below. The qualification frequency of the 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 conduct it biennially.

10.2. The list of standardized accuracy characteristics of the test generator is shown in Table 2.

The accuracy characteristics of IGS 1.2 test generator.

Table 2

DOMF amplitude, A/m	10	30	100
Current pulse amplitude, A \pm 20% *	11.5	34.5	115.0
Oscillation frequency, kHz \pm 10%	100		
	1000		
DOMF repetition frequency (depending on oscillation frequency), Hz \pm 10%	40		
	400		
damping (peak 5 to 1 ratio)	0,5 $U_{\text{max(max)}}$ minimum		
damping (peak 10 to 1 ratio)	0.5 $U_{\text{max(max)}}$ maximum		

***Note:** amplitude of magnetic field intensity equals $H = K * I$, where I is the coil current amplitude, K is the inductor coefficient, equaling 0.87 for a standard spark inductor with sides of 1m×1m.

10.3. The recommended measurement tools for testing the generator are shown in Table 3.

Table 3

Measurement tools	Technical specifications	Type
Memory oscilloscope	Pass-band 20 Mmhz min	TDS 2022
Instrument shunt	Resistance 0.1 O Pass-band 4 Mmhz min Maximum pulse current - minimum 200A	IShM 0.2

Note: The usage of other measurement tools which are compatible with the required accuracy is permissible. But the arbitration tools are the ones specified in the given list.

All the control and measuring equipment has to be accepted (calibrated) and have the qualification certificate.

10.4. The pre-starting procedure of the test generator shall be carried out in accordance with item 6 of the present passport, but the spark inductor is connected to the "**IK OUTPUT (ВЫХОД ИК)**" via instrument shunt IShM 0.2. It is recommended that the tests be carried out 5-10 minutes after the generator is turned on. The oscilloscope used to measure parameters shall be grounded.

10.5. The amplitude of the current pulse of the first half-wave, the amplitude of the fifth half-wave (I_5), the amplitude of the tenth half-wave (I_{10}), the oscillation period and the repetition frequency are measured at the output of the instrument shunt IShM 0.2 by the memory oscilloscope. The oscilloscope is set in waiting mode. The current values are calculated from the measured voltage values according to the formula (10.1):

$$I = U_{\text{uzm}} \times 100. \quad (10.1)$$

Measured and calculated values for all set amplitude values of the positive and negative polarity are recorded in a protocol (ref. Table 4, 5).

The deviation of measured values from the rated ones is calculated and recorded in the protocol (ref. Table 4, 5).

The accuracy characteristics of IGS 1.2 test generator.

Oscillation frequency 100kHz

Table 4

Set value of the DOMF amplitude		10A/m	30A/m	100A/m
Current pulse amplitude, A	rated	11.5	34.5	115.0
	measured			
Deviation, %	-			
Oscillation frequency, kHz \pm 10%	rated	100.0		
	measured			
Deviation, %	-			
DOMF repetition frequency, Hz \pm 10%	rated	40.0		
	measured			
Deviation, %	-			
damping (peak 5 to 1 ratio)	rated	0,5 $U_{\text{макс(max)}}$ minimum		
	measured			
damping (peak 10 to 1 ratio)	rated	0.5 $U_{\text{макс(max)}}$ maximum		
	measured			

Oscillation frequency 1MHz

Table 5

Set value of the DOMF amplitude		10A/m	30A/m	100A/m
Current pulse amplitude, A	rated	11.5	34.5	115
	measured			
Deviation, %	-			
Oscillation frequency, kHz \pm 10%	rated	1000.0		
	measured			
Deviation, %	-			
DOMF repetition frequency, Hz \pm 10%	rated	400.0		
	measured			
Deviation, %	-			
damping (peak 5 to 1 ratio)	rated	0,5 $U_{\text{макс(max)}}$ minimum		
	measured			
damping (peak 10 to 1 ratio)	rated	0.5 $U_{\text{макс(max)}}$ maximum		
	measured			



11. Maintenance conditions

Climate conditions

The generator shall be operated under normal climate conditions

- surrounding air temperature $(25 \pm 10) ^\circ C$;
- relative air humidity $45 - 80 \%$;
- atmospheric pressure $84.0 - 106.7 \text{ kPa}$ ($630-800 \text{ mm Hg}$).

General requirements of electric power.

The generator is powered by a single-phase AC network with a frequency of 50 Hz, nominal voltage of $220 \text{ V} \pm 10\%$. The sections of the wires should correspond to the maximum loads of EUT. The workplaces shall have euro sockets with the connected grounding pins. The sockets and protective ground connected devices shall be located in close proximity to the generator. The connection of the protective ground to the "ground" connecting device located on the rear panel of the generator require a flexible wire having sections of 1.5 mm .

Do not use dividing transformers to power the generator.

12. Shipment

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

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

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

The shipment of the device shall be carried out at air temperature ranging from $-25 ^\circ C$ to $+55 ^\circ C$, relative air humidity up to 95% at $+55 ^\circ C$ temperature

13. Storage precautions

The device shall be stored in heated space under the following conditions:

air temperature from 283 to 308 K (from 10 to 35 $^\circ C$);

relative air humidity 80% at 298 K (25 $^\circ C$) 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 device is acceptable.



14. Certificate of acceptance.

Test generator IGS 1.2, manufacturing number _____, meets the technical requirements and is approved as ready for service.

Production date

Head of Inspection Department

