

Technical Specification of GSCW-20 Impulse Voltage Generator

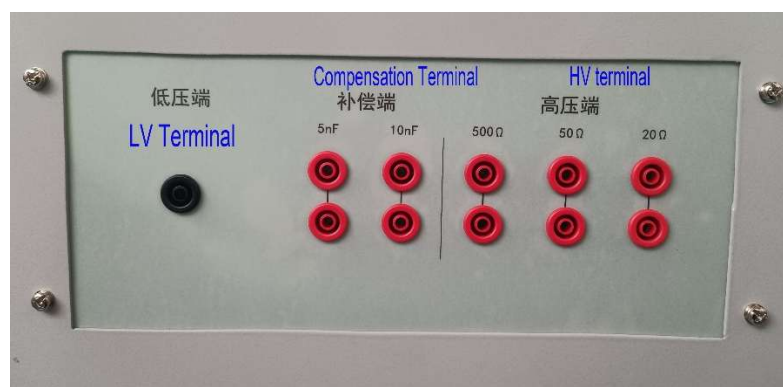
1. General

GSCW-20 impulse voltage generator can be used to generate lightning impulse voltage ($1.2/50 \mu s$ upto 20kV) for the testing of LV products.

The generator can test the load with maximum 30nF (measuring cable included).



Fig 1 impulse voltage generator
without test cabinet for test specimen



Impedance is adjustable.



Dimension:600*800*1200mm high.

2. Delivery List

SN	Name	Type/Data	Quantity	Note
1	Control system	20kV 1.2/50 μ s	1	20kV
2	SXCL-2 Measurement system	SXCL-2	1	Oscilloscope, 20kV voltage divider, measuring cable and computer
3	Technical services	We will give instruction online, not go abroad, it	1	

		is easy to operate the machine.	
4	Documents	User manual, test report and electrical drawing	1

The impulse voltage generator includes the below items:

- 1) Control system with Mitsubishi PLC (Japan brand) and touch panel;
- 2) Charging unit with rectifier: max. DC charging voltage is 22kV /max. charging current is 0.2A;
- 3) Impulse capacitor: 1uF, 22kV;
- 4) Discharge unit;
- 5) Automatic polarity change: positive and negative
- 6) Automatic earthing and safety interlock;
- 7) Impulse resistors of the generator;
- 8) Red and green lamp for indication ;
- 9) Emergency stop button;
- 10) Size: W*D*H=800*600*1200mm
- 11) Weight: about 200 kg



Fig 2 Impulse waveform module



Fig 3 Mitsubishi PLC



Fig 4 Touch Panel

- a) SXCL-2 Measurement system
 - 1) Lenovo computer with impulse analysis software, Window 10 operating system.
 - 2) Voltage divider 1~20kV with BNC connector for 1.2/50 μ s to reduce the voltage signal to a value that the measurement system can receive.



Fig 5 20kV Voltage divider

- 3) US brand Tektronix oscilloscope: Tektronix brand TBS2102B oscilloscope (100 MHz analog bandwidth, 2 analog Channels, sample rate up to 1 GS/s, 20k sample record length, 8 bit vertical resolution),



Fig 6 Oscilloscope

- 4) Measuring cable and safety connections for component testing.

3. Description

There are red and green warning lamps on top of the cabinet to indicate the safety.

The spark gap distance is adjusted remotely by the controls and is set in function of the pre-selected charging voltage. The generator has been designed for a very low inductance & resistance, to allow the biggest possible load range. The integrated earthing system consists of earth switches which discharge the impulse capacitors via the earthing resistors.

4. Features

- 1) Automatic polarity switching
- 2) Peak voltage and current monitoring
- 3) Easy operation and maintenance
- 4) Liquid insulation in the impulse capacitors offers optimal environmental compatibility (no PCBs).
The impulse capacitors have very low inductance, high quality and long service life.

5) Considerate safety measures

- The whole cabinet is grounded to earth.
- Emergency stop button is equipped with magnetic materials and is removable on both sides according to the height of the operators.
- Manual earthing rod-- when the operator opens the back door of the cabinet to change the impulse module or do some maintenance work, the manual earthing rod should be hanged in the place to discharge the energy of HV terminal to ensure the safety of the operator.



Fig 7 Manual earthing rod

- Automatic earthing system--the machine will automatically discharge the energy through the earthing stick after each impulse.
- Green/Red warning lamp indication on top of the machine, which is easy to be watched. It is red when the test is going; It is green color when the test is finished.

5. Color

Insulating parts gray-white RAL1035 (Gray) and impulse capacitors blue RAL 5002 (Blue).

6. Ambient Conditions for the Surge Test System

Height above sea level <1000m (For higher altitudes special design will be required);

Relative humidity without condensation: <90%

Temperature average over 24h for high voltage parts: min. -5°C, max. +30 °C Extreme temperatures

for high voltage min. -5 °C, max. +40 °C Temperature for electronic controls and measuring equipment to operate with the specified measuring errors min. +15 °C, max. +25 °C

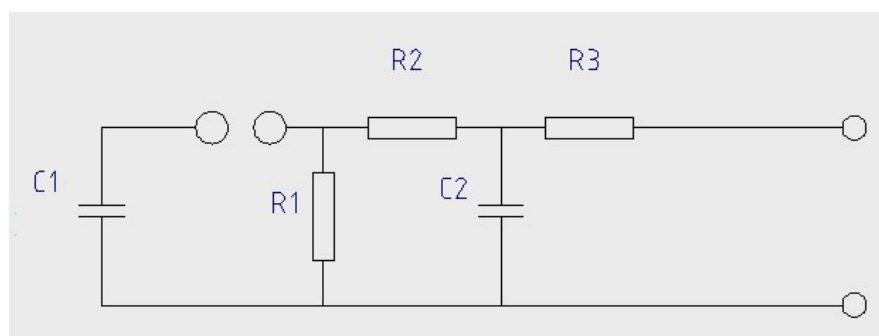
The room where the test system is located must be clean and dust-free.

Earth resistance must be less than 1Ω, with an independent earthing system;

7. Technical Data

- 1) Input voltage: phase to neutral, AC 220V, 3kVA;
- 2) Frequency: 50Hz;
- 3) Input power: 3kVA;
- 4) Maximum DC charging voltage: DC22kV; maximum charging current:0.2A; Charging time: reach @ 22kV within 50~60s;
- 5) Output Waveforms as the below table

No	Output waveform	Output range	Wave Front time T1 (μs)	Time to half value T2 (μs)	Output impedance	Load capacity
1	Open circuit voltage 1.2/50μs	2~20kV	1.2 ± 30%	50 ± 20%	500Ω, 50Ω, 20 Ω adjustable	≤30nF (measuring cable included)



8. Touch panel and Control software

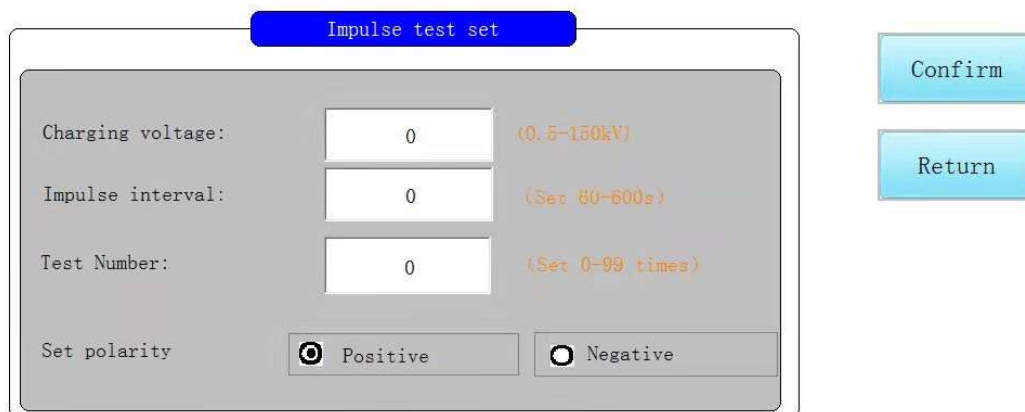
We use touch panel with the software as the control system.

The functions of control software are as below:

- 1) Set the charging voltage, interval time, number of test (can be from 1 till 99);
- 2) **Safety:** The system has set the maximum charging voltage for 1.2/50 μs. In case the operator sets the charging voltage above this value, the machine will not charge at all. It will give the error tips.
- 3) Select the positive polarity or negative polarity, the machine will change the polarity

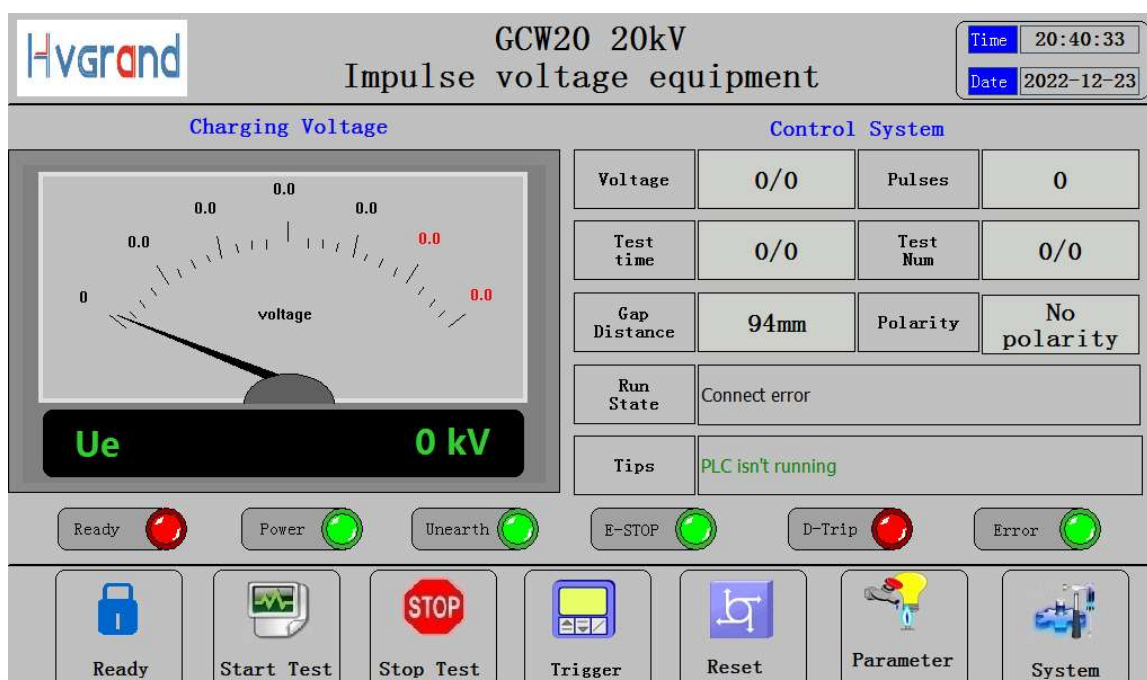
automatically;

- 4) Once the charging voltage is set, the gap distance will be adjusted automatically to the desirable value.
- 5) There are information tips on the touch panel to show the error information or running condition.



The image shows a software interface for setting impulse test parameters. It features a blue header bar labeled 'Impulse test set'. Below this, there are three input fields for 'Charging voltage:', 'Impulse interval:', and 'Test Number:', each with a numeric keypad and a range specification in orange text: '(0.5-150kV)', '(Set 60-600s)', and '(Set 0-99 times)' respectively. At the bottom, there are two radio buttons for 'Set polarity', with 'Positive' selected. To the right of the main panel are two blue buttons labeled 'Confirm' and 'Return'.

Fig 8 Set charging voltage, interval time and test numbers



The image displays the main control software interface for the GCW20 20kV Impulse voltage equipment. The top section includes the Hvgrand logo, the equipment name 'GCW20 20kV Impulse voltage equipment', and a digital clock showing 'Time 20:40:33' and 'Date 2022-12-23'. The interface is divided into two main sections: 'Charging Voltage' on the left and 'Control System' on the right. The 'Charging Voltage' section features a large analog gauge with a needle pointing to 0.0, labeled 'voltage', and a digital display showing 'Ue 0 kV'. The 'Control System' section contains several data fields: 'Voltage' (0/0), 'Pulses' (0), 'Test time' (0/0), 'Test Num' (0/0), 'Gap Distance' (94mm), 'Polarity' (No polarity), 'Run State' (Connect error), and 'Tips' (PLC isn't running). Below these sections is a row of status indicators: 'Ready' (red), 'Power' (green), 'Unearth' (green), 'E-STOP' (green), 'D-Trip' (red), and 'Error' (green). At the bottom, there is a row of seven touch buttons: 'Ready' (blue padlock icon), 'Start Test' (green waveform icon), 'Stop Test' (red stop sign icon), 'Trigger' (blue square icon), 'Reset' (blue square icon with a diagonal line), 'Parameter' (yellow lightbulb icon), and 'System' (blue gear icon).

Fig 9 Main control software

9. Impulse analyzing software

The functions of the impulse analyzing software are as below:

- 1) Can input the name of the test person, name of the test object, model no of the test object;
- 2) The waveform can be stored in jpg or bmp format according to the customer's requirement. The

measurement software will automatically save the waveform after each discharge.

- 3) Some important remarks can be written on the output waveform.
- 4) The impulse waveforms can be displayed on the computer, showing wave front time T1, wave tail time T2, peak current and peak voltage.
- 5) The excel file test report can be achieved for convenient edit.
- 6) The waveforms can be copied to USB disk.
- 7) The color of the output waveforms can be changed according to the operator's requirement.

Test parameter setup

Basic Information

product model test number

sample model test person

sample units

test note info

Air pressure Humidity Temperature

Save the waveform data

Autosave

☒ Y ☐ N Path

Save the waveform

Autosave

☒ Y ☐ N Path

Image type ☒ JPG ☐ bmp

OK Cancel

Fig 10 Test parameter setup

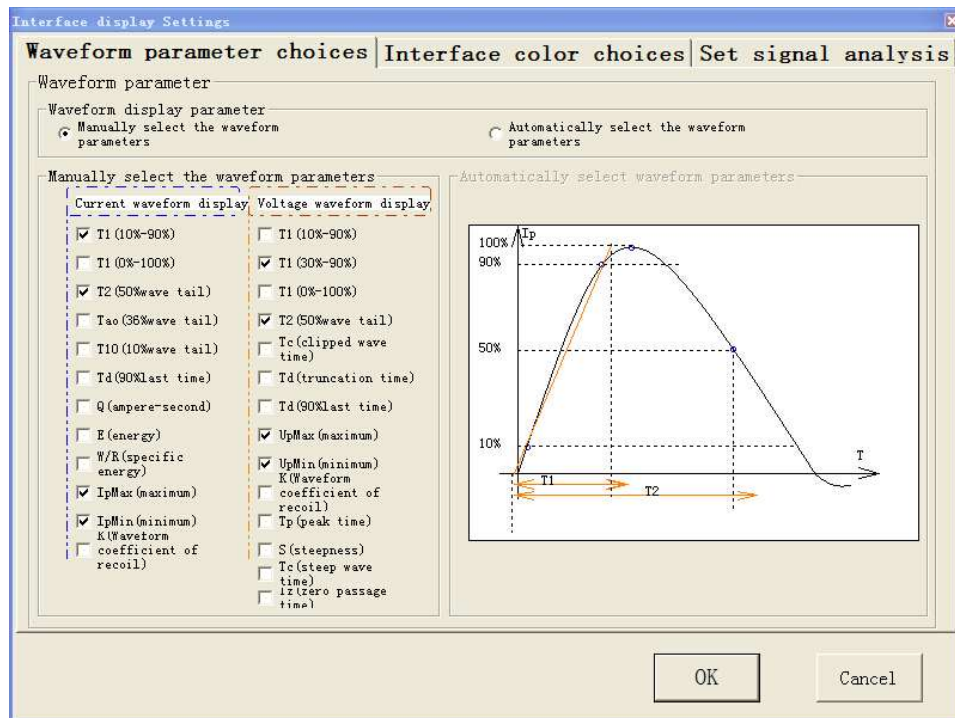


Fig 11 Interface display settings

Fig 12 lightning impulse voltage (1.2/50 μ s)

10. Quality guarantee

12 months quality guarantee after successful delivery in the customer's side

11. Documents (English)

Test reports

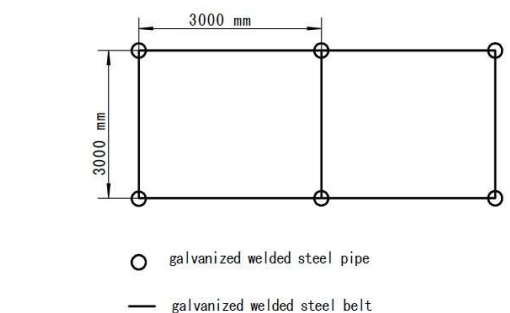
Circuit diagram

Operation and maintenance manuals

12. Recommended Spare Parts

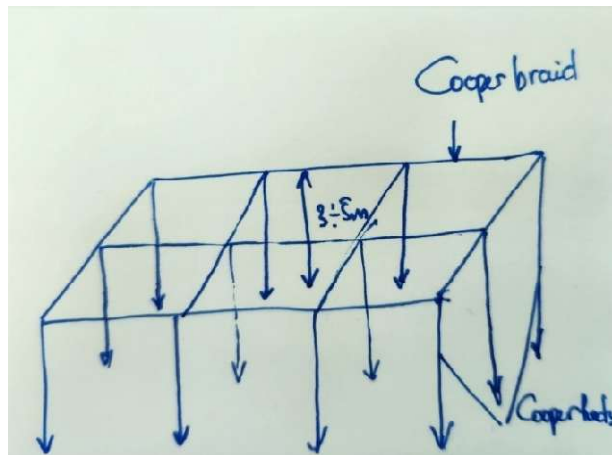
Part Name	Model No	Quantity
Fuse	3A 10*38	2
Power supply	35W,24V	1
High voltage Diode	20kV/0.5A	1
Low inductance resistor	1 Ω /100W	2

13. Technical requirement of Earthing system (See the below drawing)



Technical Requirements of Earthing System

- 1) galvanized steel pipe with 50mm diameter, length=2500 mm
- 2) The pipe is as long as enough to reach the water/wet-earth
- 3) Connect the pipes with galvanized steel belt, 5mmx40mm with welded connection
- 4) Lead the earthing system to lab with copper belt,
- 5) The earthing resistance is less than 0.5 Ohm



A good test field has a separate grounding. This ensures that no disturbances from surrounding machines enter the test field and - in case of a failure - the earth potential of the surrounding does not rise, causing damage to electrical equipment. It is necessary for the test field to have a lower grounding resistance than the surrounding building.