



Operation Manual

HMCOP-60kV VLF Hipot Tester



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Part 1: Introduction to the ultra-low frequency and high voltage power supply series products

1.1 Product Features Introduction

This product adopts digital frequency conversion technology, microcontroller control, and is fully automated for boosting, reducing voltage, measuring, and protecting. Due to its fully electronic design, it is small in size and light in weight. It adopts a large screen color touch screen, which is clear and intuitive, easy to operate, and displays output waveforms. The design index meets the national standard of General technology Conditions for Ultra Low Frequency and High Voltage Generators. The main features are as follows:

1.1.1 For ultra-low frequencies with a rated voltage less than or equal to 60kV, a single connection structure (one booster built into controller) is used. Ultra low frequencies greater than 60kV adopt a series structure (two boosters are connected in series), greatly reducing the overall weight and enhancing the load-bearing capacity. Moreover, both boosters can be used separately, achieving one machine with multiple functions.

1.1.2 Current and voltage data are directly sampled from the high-voltage side, so the data is accurate.

1.1.3 Intelligent comprehensive protection function: Without setting current and voltage protection values, the instrument can calculate overvoltage and overcurrent protection values based on the size of the sample capacitance and the test voltage value. It can also provide protection against voltage and current mutations, so it can capture discharge situations. The protection action time is less than 20ms.

1.1.4 Using 150kV high-voltage line output, safe and reliable.

1.1.5 Due to the use of a closed-loop negative feedback control circuit, the output has no capacitance rise effect.

1.1.6 The new product has added DC, dielectric loss, which can synchronously measure the dielectric loss, capacitance, insulation resistance of the test object during the withstand voltage test process.



- 1.3.6 AC current resolution: 0.1mA
- 1.3.7 AC current accuracy: 3%
- 1.3.8 Voltage positive and negative peak error: 3%
- 1.3.9 Voltage waveform distortion: 3%
- 1.3.10 Service conditions: indoor and outdoor; Temperature: -10 °C to+40 °C; Humidity: ≤ 85% RH
- 1.3.11 Input power supply: frequency 50Hz, voltage 220V ± 5% (or frequency 60Hz, voltage 110V ± 5%). If using a micro generator for power supply, a variable frequency generator should be used instead of a regular generator, as the unstable speed of the regular generator can cause abnormal boost and damage to the instrument.
- 1.3.12.Support AC withstand voltage test

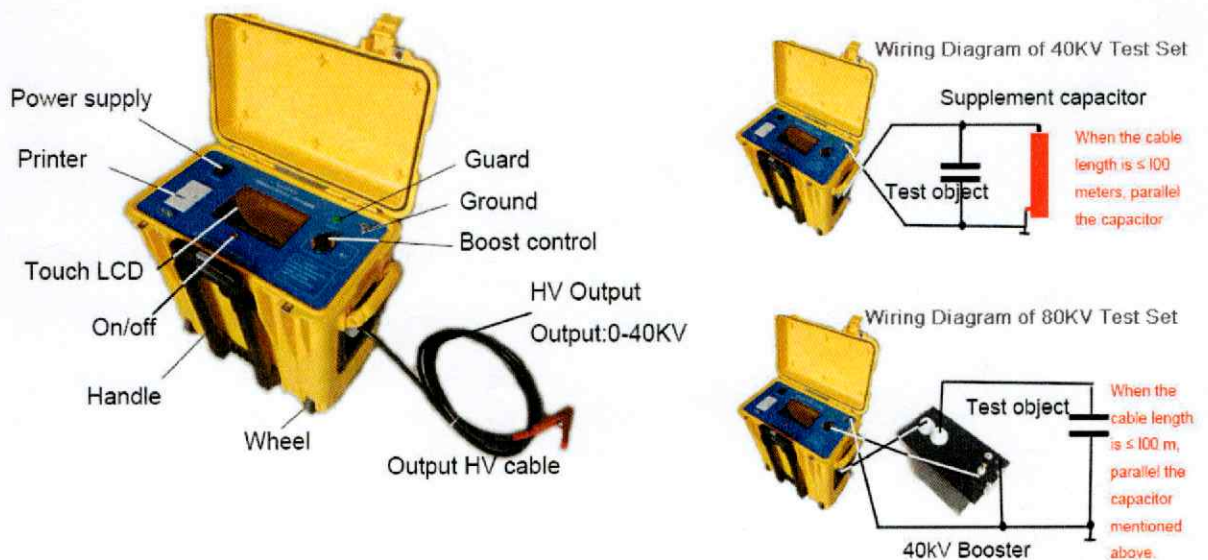
1.4 Main structure of ultra-low frequency and high voltage power supply

1.4.1 Integrated ultra-low frequency structure description and usage

The all-in-one machine has four specifications: 30KV, 40KV, 50KV, and 60kV. If you want to output a higher voltage, you can connect a booster in series, which can rise to 80kV.

The explanation is as follows:

Description & Usage of Integrated Structure (Tan delta testing for option)



1.5 List of accessories for ultra-low frequency and high voltage power supply

1.5.1 The single connected ($\leq 60\text{kV}$) ultra-low frequency accessory is shown in the following figure:



Sr.no	Description	Quantity	
1	Control unit($\leq 60\text{kV}$)	1	unit
2	Test leads to capacitor	1	Unit
3	HV Connection Cable 4meters	1	unit
5	Power supply cable 1.5 meter	1	unit
6	Discharging rod	1	unit
7	Earth cable 2meters	3	unit
8	Capacitor, $0.05\mu\text{F}$	1	unit
9	Print paper	1	unit
10	Fuse	2	unit
11	Manual	1	unit

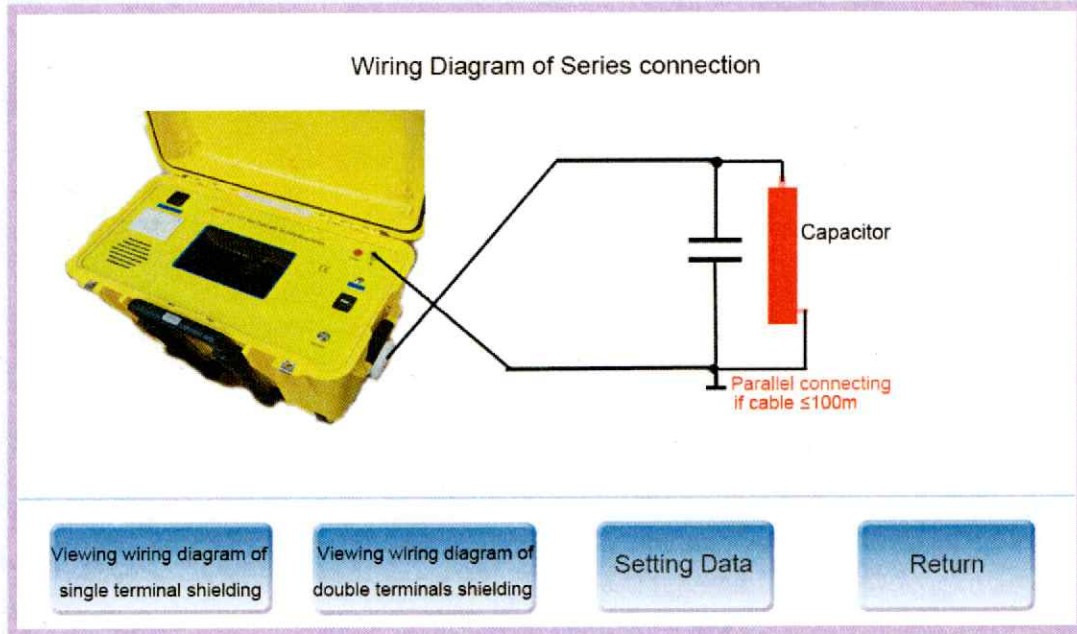


12	Factory Test Report	1	unit
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Part 2: Operating Instructions for Ultra Low Frequency Voltage Withstand Test

2.1 Connection method

2.1.1 Wiring method of single connection ($\leq 60\text{kV}$)



2.2 Introduction to the Ultra Low Frequency Voltage Withstand Test Procedure (Q/ED116501-2004 Rubber Plastic Power Cable Handover and Preventive Test Procedure)

Ultra low frequency is mainly used in the AC voltage withstand test of cables within 35kV. The test voltage and test time for different specifications of cables are determined according to relevant regulations, and the content of these regulations is basically the same at home and abroad. Below is a summary of the main content of the "Q/ED116501-2004 Rubber Plastic Power Cable Crossing and Preventive Test Regulations", which is for user reference:

2.2.1 Test time 60 minutes

2.2.2 The ultra-low frequency withstand voltage test voltage of various cables is shown in



the table below:

Rated Voltage U0 / U	Handover Test Voltage		Preventive Test Voltage	
	Times	Voltage(kV)	Times	Voltage(kV)
1.8/3	3U0	5	3U0	5
3.6/3	3U0	11	3U0	11
6/6	3U0	18	3U0	18
6/10	3U0	18	3U0	18
8.7/10	3U0	26	3U0	26
12/20	3U0	36	3U0	36
21/35	3U0	63	3U0	63
26/35	3U0	78	3U0	78

2.3 Operation instructions for ultra-low frequency withstand voltage test

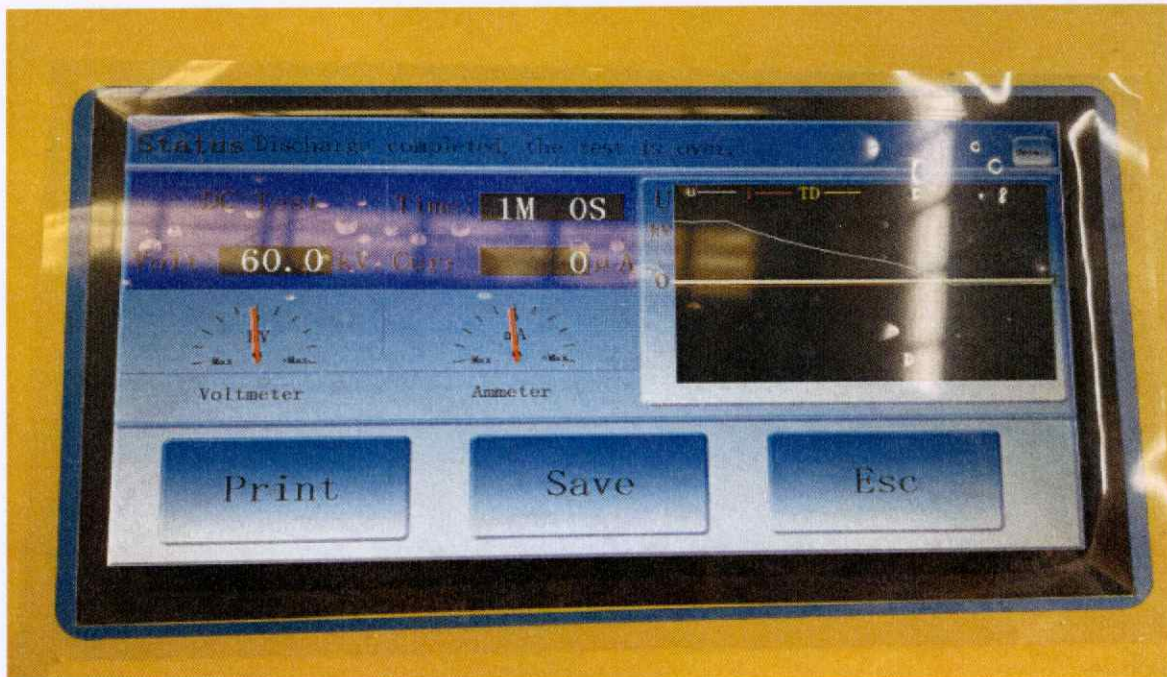
After connecting the on-site testing system as described above, connect the power supply to enter the test. The homepage of the touch screen of the control box is for selecting the wiring diagram. Select the wiring diagram that is consistent with the actual situation to enter the parameter setting interface. Test time, test voltage, modified according to test requirements. Click on the data to be modified, and a numeric keypad will pop up to input the required data. In order to ensure safety, the system has limited the input data: the test voltage range is 0 to the rated value; The test lasts from 1 to 99 minutes, and data entry beyond the range is invalid. After the experiment, this parameter will automatically be saved as the default value for the next experiment. Clicking on the withstand voltage test will enter the test, and the instrument will use two to three cycles to raise the voltage to the set voltage. In the first two cycles, pre test the test sample to determine if there is a low resistance fault, measure the capacitance of the test sample, and then determine the appropriate frequency for voltage withstand testing based on the size of the capacitance of the test sample. The system provides intelligent protection for the testing process: overvoltage, overcurrent, voltage and current sudden changes, discharge, and other protective actions. When the test time is full, the instrument will automatically stop, or you



can directly click the stop button to stop. The shutdown process will automatically discharge the test object. After shutdown, the current data can be printed or saved, and 90 sets can be saved in a cycle. Selected data records can be printed in historical data queries. The top line of the screen is a prompt for the working status of the instrument, which includes some fault information of the instrument. **Click on the "check test data" button to view all information, including the working status and faults of the scraping instrument and test sample. Because there are touch key prompts and help information, users can also follow the prompts for operation.** Before disassembling the wire, the power cord should be unplugged first, and the test object should be discharged with a discharge rod, followed by a short circuit discharge before disassembling the wire. If the tested cable is less than 100 meters and the instrument cannot output a smooth sine wave voltage, compensation capacitors can be connected in parallel at the test object end. Waveform distortion can affect measurement accuracy.



The four main operation interfaces are as follows:





Part 3: Product Maintenance, Safety Precautions, Packaging, and Transportation Requirements

3.1 Daily maintenance and safety precautions of products

Various faults may occur during ultra-low frequency testing, and some peripheral faults can be repaired by users themselves. For example, the plug of the connecting wire is easily detached from the wire, and can be identified by turning on or off the resistance range of the multimeter. If there is no display, check if the fuse is burnt out and if there is a problem with the power input circuit. Internal issues should be repaired by contacting the production unit.

The ultra-low frequency testing device belongs to the equipment that generates high voltage, and the surface should be kept clean, waterproof, and dustproof. The wiring sequence is to connect the test line first, and then connect the power line. After the test is completed, the test object should be fully discharged before disconnecting the wires. The disassembly sequence is to first unplug the power cord and then dismantle the test circuit.

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