Huazheng®

HZZGF
DC Hipot Tester

Huazheng Electric Manufacturing (Baoding) Co., Ltd

Dear user:

Thank you for choosing HZZGF DC Hipot Tester.

We hope that this instrument can make your work easier and more enjoyable, so that you can get the feeling of office automation in the test and analysis work.

Before using the instrument, please read this manual, and operate and maintain the instrument according to the manual to prolong its service life. "Just a light press, the test will be completed automatically" is the operating characteristics of this instrument.

If you are satisfied with this instrument, please tell your colleagues; if you are not satisfied with this instrument, please call (0312) 6775656 to tell you to serve you at all times-Baoding Huazheng Electric Manufacturing Co., Ltd., our company will definitely make you satisfied !

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I. Product Overview

DC hipot tester adopts high frequency pulse width modulation (PWM) technology to make closed adjustment with high voltage stability, small ripple factor and fast reliable protection circuit. The wide temperature LCD screen adopts green back light, which enables clear display either in bright light or in darkness. High-pressure components use Dupont new filling material, making the product more stable and reliable. Products are widely used in electricity power supply departments, power transmission and transformation engineering company and preventive test of large industrial enterprises and scientific research institutes as regulated dc high voltage power supply.

II. Main Functional Characteristics

1、DC hipot tester adopts high frequency PWM technology to make closed adjustment with high voltage stability, small ripple factor and fast reliable protection circuit. The generator can endure direct discharge by devices of large capacitance. It is of small size and of light weight, convenient for field use.

2、Full range of linear smoothly adjusted voltage, with voltage regulation accuracy smaller than 0.1%; voltage measurement accuracy is 0.5%, resolution 0.1kv; Current measurement accuracy is 0.5%, the minimum resolution: control box 1μA, shock resistance current 0.1μA.

3、The generator uses AC 220 V power supply (AC220V±10%, 50 hz±1%), the ripple factor is less than 0.5%, and can be used for all-weather at the site .

4、High voltage multiplier uses Dupont materials for full solid encapsulation, overcoming the inconvenience brought by the air and oil filled equipment. Broad base and outer cylinder of light quality makes it stand steadily and more convenient for maintenance.

5、75% MOA voltage switch button, simple and convenient testing arrester.

6、Over-voltage setting function displays the over-voltage value during regulation

process; perfect protection against discharge of over-voltage, over-current and short circuit. This is the best companion for cable experiments.

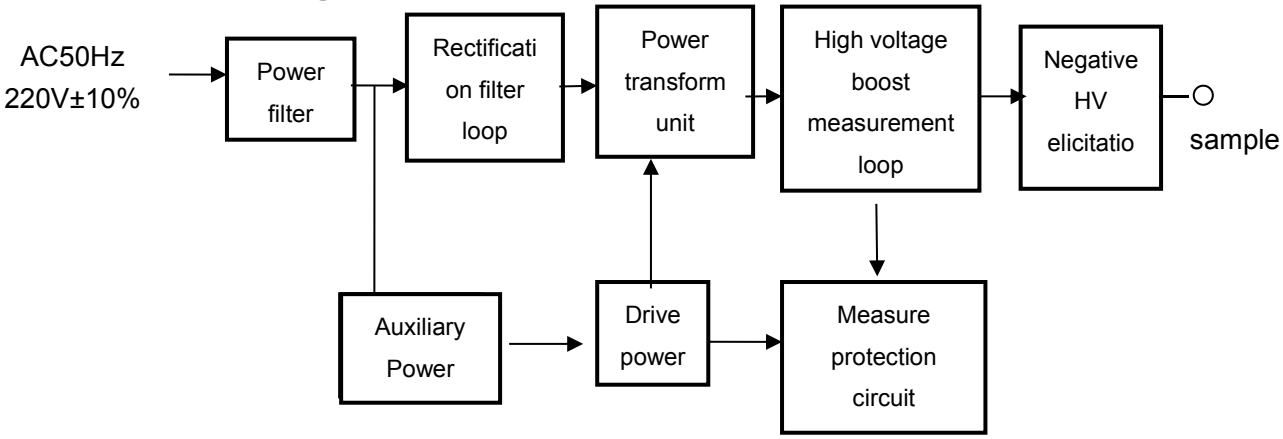
7、Perfect break line and non-zero potential start protection function protects the operator and samples at any time. This product has overall design of shock-proof control box, concise, clear panel design and voice prompt for operation.

III. Product Models And Technical Parameters

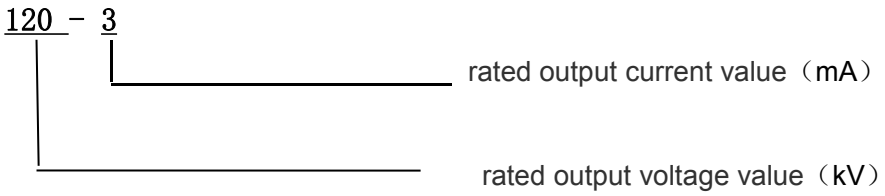
Voltage (KV)/mA Current (mA)	Control Box			High-Voltage Unit	
	Rated Voltage	Size (mm)	Weight kg	Size (mm)	Weight kg
60/2-5	60KV	310 * 250 * 230	5kg	470 * 260 * 220	6kg
80/2-5	80KV	310 * 250 * 230	6kg	490*260*220	8kg
100/2-5	100KV	310 * 250 * 230	6kg	550*260*220	8kg
120/2-5	120KV	310 * 250 * 230	7kg	600 * 260 * 220	10kg
200/2-5	200KV	310 * 250 * 230	8kg	1000 * 280 * 270	20kg
300/2-5	300KV	310 * 250 * 230	9kg	1300 * 280 * 270	22kg
output polarity	Negative polarity, no-voltage start, linear continuous adjustment				
working power supply	50HZ AC220V±10%				
voltage error	0.5%±2，minimum solution 0.1KV				
current error	0.5%±2，minimum solution 0.1μA				
ripple factor	better than 0.5%				
voltage stability	Random flunctuation , grid change is 10% , the flunctuation <=0.5%				
working manner	Interval working, less than 30 minutes under rated load				
working condition	Temperature: 0-40℃, humidity: less than 90%				
storage condition	Temperature: -10℃～40℃, humidity: less than 90%				
altitude	Lower than 3000 m				

size= grading shield diameter(R)*insulating cylinder(r)*total height(H)

IV.Circuit Diagram And The Product Model



Circuit Diagram of BCM DC High Voltage Generator



V. Product Components

A. Control Panel

1. Voltmeter: displays the output voltage. Display unit: KV. Maximum display: 999.9KV

2. Ammeter: displays the output current (including sample's leakage current and leakage current in the air, etc.)

Maximum display 9999 uA, except special made.

3. Power socket: single phase AC220V±10% 50HZ power input.

4. MOA 75% signal light: signal light is on when voltage change is more than 75% V1mA. The voltmeter displays the highest output voltage value, not the actual output voltage. Once the voltage regulation knob is back to zero, reset, the light is off.

5. Aviation socket: please align positioning pin, and press the plug in, then tighten clockwise to connect socket. Counterclockwise to back out. **Note:** please hold tight the plug metal rings, do not grasp or pull the line. Improper disassembling or connection will shorten the life span of the connecting line.

6. Ground terminal: connect the ground wire to the grounding screw at the bottom of the generator.

7. MOA 75% button: during test of zinc oxide lightning arrester, V_1mA is high voltage value when leakage current is1mA. Press MOA 75% button, voltage drop automatically to 75% V_1mA, conversion accuracy is better than 0.5%.

8. Voltage rough adjustment knob: Clockwise adjustment is to increase voltage, maximum

to 1.1 Ve. Due to the needs of the internal self-test circuit and non-zero start design, adjusting 3/4 clockwise circles does not have voltage output after the potentiometer is back to zero.

9. Voltage fine adjustment knob: When the potentiometer in the middle position adjustment range for the current value of between 3% and 8%

10. Main power switch: Avoid directly turning off high voltage by this switch. Please use the HV switch first.

11. HV switch: Dial up the HV switch to increase voltage. Turn off the switch before shutting off the power after test.

12. Fuse: AC inlet fuse. Please use the matching fuse current value.

13. Build-in knob for overvoltage adjustment: the user can set and adjust overvoltage value within the scope of rated voltage. Overvoltage value can be set statically without increasing voltage. The error is 1%.

14. Overvoltage indicator: when the output voltage is higher than the set voltage, over voltage protection action shuts off high voltage, and overvoltage indicator light is on.

15. Over current indicator: when load current is more than 1.1 times the rated current or short circuit discharges, the indicator light is on, and the high voltage is shut off.

16, HV indicator: Dial up the high voltage switch with booster conditions, high voltage indicator light is green. Setting over voltage value can be operated only when the green light is out and the high voltage switch is off.

B. HV Unit

The base and top parts are made of aluminum castings. Voltage-multiplying circuit is of full solid encapsulation.

1. Aluminum-based fast loading air outlet, for connection to the control box. When installing a cable, high voltage generator is laid low on the ground first, alignment

positioning pin plug, press and screw tight clockwise. Do not shake from left to right, forbidden holding the cable by hand to avoid damage to the plug wire.

2. Base grounding screw, collecting point of the system. Connect to the ground after grounding of control box, discharge leveler, short circuit rod, etc. Note: to prevent accidents, ground wire must be firm, especially when the sample is capacitive discharge. Please carefully check and make sure the grounding is in good condition in order to ensure the safety of personnel and equipment.
3. The ferromagnetic circular slot on top of grading shield is HV generating terminal. High voltage ammeter can be embedded in the slot.

C. Shock-resistance uA ammeter

Two grades green backlight display, 200.0 uA and 2000uA . Pay attention to the decimal point when reading this meter to avoid ⇦ misreading the data. To save the battery, back light can be turned off in bright conditions. When battery is low, symbol appears. Please replace the battery in time to ensure accurate meter reading. Special custom-made 20 mA ammeter has two grades, 200.0 uA and 20.00 mA. Please pay attention to the position of the decimal point to avoid reading error.

1. Green backlight display window. Range 2mA: Maximum display is 1999 uA. Range 20mA: Maximum display is 19.99 uA.
2. Backlight switch
3. Shock-resistance ammeter power switch.

4. Connecting iron base.

5. High voltage cable port with shielding layer.

6. 9vV battery rear cover.

D. Discharge rod (available when discharge voltage is less than 60kv)

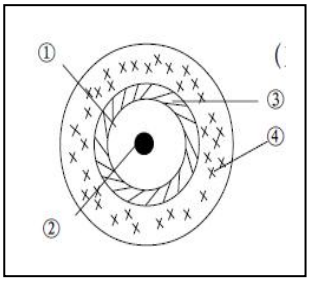
This discharge rod selects three telescopic rods with a total length of 80 cm and internal current-limiting resistor 2M/25W. Place grounding wire into the corresponding jack of the discharge rod before use, and tilt the grounding wire backward, to avoid the sample's direct discharge to grounding wire. The discharge rod should approach the sample's measuring terminal from far to near. First the arc discharge is conducted. when the arc disappears or reduces, the front metal part of the discharge rod can touch the discharging object to discharge. When the control box displays 0 or a very small figure, then grounding wire can be used to complete discharge. Special tips: for safety, the grounding line of the discharge rod must be solid and reliable during discharge.

1. Grounding socket

2. Discharge point

3. Ground lead. Tilt the grounding wire backward as much as possible to avoid flashover discharge.

4. Hand grip. Make sure the grounding socket is safely connected to the earth before any personnel can hold the discharge rod by hand.



Picture of cable

Compound insulation silicone rubber soft high voltage cable：

1. Silicone rubber insulation of dc withstand voltage 300 V
2. Copper wire strands of inner core
3. Shielding layer of inner core
4. silicone rubber insulation to withstand voltage DC 60kV

The cable wire inner core is led by red clip, the shielding layer is led by the black clip. Withstanding voltage to ground is 60 kV DC with the leakage current almost zero. Under the condition of dc 200 kV, The cable and ground potential keeps 50 cm clearance, air leakage current is less than 5 uA, using shock-resistant current meter, leakage current of the generator and current on ground shielding layer can be removed. To ensure the reliability of test data, please note the following points:

(1) Be sure not to touch the cable during test to prevent electric shock.

(2) Avoid cable dragging, twisting, soaking in water or under high drawing force.

(3) When the DC voltage is greater than 60 kV, composite insulation is adopted to improve bearing capacity. Method: keep the potential effective air insulation distance 50 cm or more, which is effective insulation distance with highest dc 200 kV make it convenient for site matching. When test environment humidity is more than 60%, increase the space between the test line and the ground and surrounding.

(4) The effect depends on the composite insulating space. If the cable touches the ground accidentally to cause discharge breakdown, there is no cable return, refund or guarantee.

Rf plug inner core is connected with red clip, outer ring with black clip, which is convenient for users for maintenance.

VI. Directions

1.On-line and operation method

(1)Connect all the cables, the control box grounding terminal connected to high

voltage generator grounding screw at the bottom of the aluminum base, then ground to the earth. In order to ensure your safety and equipment's safety, please be sure to check the ground again and again. Switch on the power switch, turn the rough adjustment knob to the end counterclockwise, then switch on the high voltage, the green light is on. Preparation is completed. Turn the rough adjustment knob clockwise to 3/4 circle, for the need of circuit self-check, there is no high voltage is output.

(2) Turn the knob to zero anticlockwise to switch off the high voltage., or switch off the high voltage directly. Avoid switching off the power.

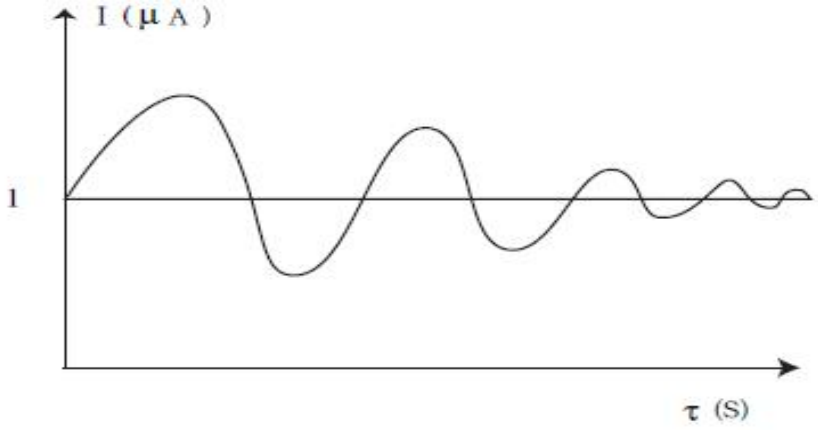
(3) The panel has voice prompt, protection action, state voice prompt and protection action indicator light.

(4)Use of MOA 75%: When MOA predicts V1mA, press MOA75 % button, a voice prompt appear with corresponding the yellow light, then the voltage drop automatically to 75% V1mA. When operation return to zero, this state removes automatically.

(5) Static over-voltage setting: On condition that green light goes out, press the button MOA75 % more than 3 seconds until there is no voice prompt, HV meter displays the maximum overvoltage value. Once in voltage-increasing state, hv green light is on, the circuit automatically shifts to actual hv value display.

(6) Turn the rough adjustment knob back to zero, dial up the high voltage switch. If the HV light is not on, usually check the fast loading multicore cable line 1, line 2 to see if there is shorted.

2. Preventive testing method of capacitive equipment



For capacitive equipment like cables, the equivalent circuit is the RC circuit. Therefore, damping shock problems exist. Please follow the following steps in operation:

(1) Turn the rough adjustment knob back to zero, the green light is on before increasing voltage. After normal display of the voltmeter, operation can begin. If over-current occurs at the staring phase, it could be:

a、 At the brownish red silicone rubber wire terminal, the red clip should be connected to the tested cable, the black clip at a high potential should be hung up. If the black clip is connected to cable sheath, there will be a short circuit, resulting into over current fault. Because there is no insulation at a high potential between high voltage cable and black clip, this part should keep far away from the ground at field, or discharge may appear in the process of voltage increase.

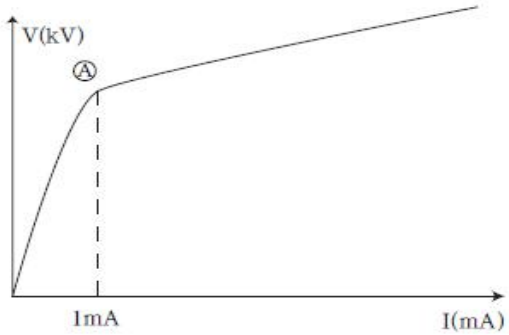
b、No stop as required at 3/4 circle, or not observing voltage display and increase the voltage rapidly, causing rapid voltage rise and over-current to appear.

c、 Turn the knob back to zero and dial up the switch, but voltage-increase operation begin before the green light is on, causing sudden change in voltage and over-current to appear.

(2) Due to the capacitive video storage, and the function of negative feedback circuit, there is a time lag between voltage display and the actual voltage.

(3) Zinc oxide lightning arrester pilot test methods: MOA lightning arrester is nonlinear device. When it reaches a turning point, small changes in voltage can cause great current

change.



Take 10 kV earth-sized as an example. The sign V1mA_25kV in actual experiment, when the voltage is less than 25 KV, current is a few microamperes, but once the voltage reaches a turning point, 1 mA, 0.1 kV voltage change can cause hundreds of microampere in the current change. So in field test, the minimum resolution better than DC hipot testeris 0.1 kV and an error of 1%±1 is allowed. From extensive experience, current between 950uA～1050uA can be considered to be 1 mA. This is not very precise but has very small error in actual measurement, which completely satisfies the standard requirement in “the zinc oxide lightning arrester test standard” GB11032-89.

If over-current occurs, please check:

（1） Whether the high voltage wire has short-circuit with ground, or being too close to the ground objects.

（2） Whether voltage increase is too rapid at MOV turning point.

VII. Attention

1. In order to ensure the safety of personnel and equipment, good grounding and discharge after use is very important.
2. Grounding of control box and high voltage generator must be solid and reliable. The high voltage generator grounding screw at the bottom should be connected to the earth. Ground wire connection in series is forbidden.
3. After capacitance video discharge is completed, please hang up ground wire before anyone approaches. Please make sure of reliable grounding in using discharge rod. All grounding wires should be connected together to the bottom of the high voltage

generator. Discharge rod can be used only when the voltage is less than 60 kV.

4. Power supply for this generator is single-phase AC 220 V±10% /50 Hz. Exceeding the required voltage may cause equipment damage.

5. Select proper fuse, do not use metal wire instead. Do not start with charged inner machine. Please turn off the high voltage switch before shutting off the power switch.

6. When the equipment is not in use for a long time, to prevent sere electrolytic capacitor, operation box should be electrified for no less than four hours every six months. Instrument transportation should avoid water, severe vibration and fall.

7. The generator should be laid low on the ground when plugging in and out the aviation plug wire. Alignment positioning pin, press the plug and turn clockwise. Strong pull or twist is forbidden.

8. To ensure the accuracy of measurements, for companies equipped with the more than one product from our company, please number the control boxes and the high voltage generators according to their models to make sure they match each other. Prohibit disorder use.

9. High voltage grading shield concave port has strong magnetic, approach slowly when connected with high-end ammeter to avoid collision.

10. For capacitive test, because of RC oscillation phenomenon and polarization absorption current, charging voltage goes into the steady state after 1 minute.

VIII.Guarantee

1. One year free warranty for normal use, life-long maintenance.

2. 24 hours response to take the standby replacement, on-site service or return to the factory processing, to ensure the user's normal use.

IX.Common Fault And Solution

	fault phenomenon	solution

1	The power indicator light is on.	Replace ACRD fuse. If burnout again, check whether the power supply is over 380v. If so, remove the varistor, then the product can be used for emergency.
2	Green light is on but HV does not increase.	Check if fast loading multi-core cable line 6 and 7 are disconnected. If HV increased suddenly after turning the knob clockwise for a few circles, then the problem lies in the fast loading multi-core cable.
3	Adjusting knob is turned to zero and voltage-increasing switch is on, but there is no indicator light.	Check if fast loading multi-core cable line 1 and 2 are disconnected.
4	Voltage is increased but there is no display.	Check if fast loading multi-core cable line 1 and 2 are disconnected.
5	Current exists but there is no value display	Check if fast loading multi-core cable line 3, 4 and 5 are disconnected.
6	voltage display is unstable after voltage increase (non-capacitive test)	Check if fast loading multi-core cable line 3, 4 and 5 are disconnected.
7	Over current always appears in large capacitive tests	1. Whether operation begins after green light for voltage increase is on. 2. Whether stop for 2 seconds at 3/4 circle. 3. Whether hv cable has short circuit to earth.
8	Too much deviation for high and low terminal ammeters	1. Whether low battery at high terminal ammeter. 2. Whether caused by corona. 3. Whether caused by insulation characters of flexible cable.
9	No-load voltage increase, large current leakage.	1. Too close to objects on the ground. 2. Dirty insulating cylinder. Clean the cylinder surface. 3. Too large corona current.
10	Unable to increase to rated voltage.	Turn overvoltage knob clockwise to maximum
11	unable to increase voltage, over-current always occurs	1. Check whether ground wire is removed. 2. Operation begins after green light for voltage increase is on. 3. Whether shielding wire of high voltage cable is grounded.

12	High terminal micro ammeter is always zero.	1. Whether the black line of shielding layer and the red line of core wire is connected. 2. Whether one side of the red clip is disconnected at the root.
13	fast loading line is difficult to connect	1. Check alignment pin 2. Press and turn clockwise 3. Whether leading line inside socket is bent.
14	Over-current occurs before reaching rated voltage.	1. Check whether grounding wire is removed. 2. Whether operation begins after green light for voltage increase is on. 3. Insufficient insulation distance causes discharge.
15	Over-current often occurs during zinc oxide arrester tests.	1. Whether caused by too rapid voltage increase at turning point. Adjust the knob slowly at turning point.
16	Unstable current during capacitive tests.	1.Whether caused by HV equipment to test 10 kV cable. 2. Sudden unstable currents are mostly caused by break of inner wire in fast loading multi-core cable.
17	Voltage increases from non-zero state after turning knob clockwise	Caused by inner shield of line 1 and 2, break of line 4 and 5 in fast loading multi-core cable
18	Picture missing on LCD	Partial damage of LCD, return to factory for replacement.
19	No current at rated voltage	Check whether output core wire is broken
20	Ammeter data exists in control box, but there is no current display	The clip should be suspended in the air.

X.Packing List

No.	Item	Qty
1	Control Box	1
2	High Voltage Line	1
3	Power Line	1
4	Control Line	1
5	Ground Lead	1
6	High Voltage Generator	1

7	Discharge Rod	1
8	Anti - Shock Ammeter	1