Huazheng

HZZGF
DC Hipot Tester

USER MANUAL

Huazheng Electric Manufacturing (Baoding) Co., Ltd

Preface

Welcome to choose the products of Huazheng Electric Manufacturing (Baoding) Co., LTD., we will provide you with comprehensive technical support and service assurance. This product should be used by qualified persons. Please read the operation manual carefully before testing, to understand the contents,the technical parameters, performance and operation method of the equipment. Please place this instruction manual in a position where it is easily accessible for future reference.

The use of the DC Hipot Tester shall also comply with the relevant local requirements for the use of such equipment (if any), as well as the relevant test requirements, standards and regulations, etc., and the use of the DC Hipot Tester shall comply with the local requirements for the safety of electric power operation.

Safety warning

● The personnel who use DC Hipot Tester must be professionals with relevant qualification of "high voltage test".

● Users are requested to comply with local regulations on power safety when using this instrument. Two obvious disconnection points should be set before the working power enters the tester. When replacing the test product and wiring, the power disconnection point should be clearly disconnected first.

● Before the test, please check whether the grounding cable of the tester control box, high-voltage booster unit and test samples are properly connected; The ground cable of the test circuit should be one-point grounded.

● At the end of the test (especially for capacitive test samples), discharge the test samples with an electric discharging rod. When discharging, it is not advisable to immediately contact the test product with the discharging rod. Firstly, the discharging rod should be gradually close to the test product. When it reaches a certain distance, the air gap starts to freely discharge and there is a hissing sound. When there is no sound,operators can contact it by the discharging rod to discharge. At last,Connecting to the ground cbale to discharge. **For large capacitive samples, special discharging equipment (not standard accessory) should be used for discharging. Since the discharging rod**

has a small capacity, it is easy to burn out when discharging large capactive samples.

● The suspending conductor in the test area and a certain range of surrounding areas should be grounded during the test to prevent the high voltage electric field against producing high voltage to its inductive charging, endangering the safety of people and equipment.

● when the test voltage is higher, although the test persons wear insulating shoes and are in the area beyond the safe distance, due to the influence of high-voltage dc electric field spatial distribution, it will make several adjacent standing human bodies with different DC electric potential. Do not shake hands with each other or touch the ground with your hands, otherwise there will be a slight electric shock phenomenon, this phenomenon is more obvious in dry areas and winter, but generally will not harm people because of the low energy.

● **When carrying out tests with possible discharge shock (such as breakdown test and discharge test), please avoid using computer online operation control, because discharge shock may damage the upper computer.**

Contents

I. Product Introduction

DC Hipot Tester is widely used in DC high voltage test of zinc oxide arresters, magnetic blow arresters, power cables, generators, transformers, circuit breakers and other electrical products.

Main technical features and functions of HZZGF series intelligent DC Hipot Tester:

1. Large-screen LCD with man-machine dialogue function;
2. Fully automatic MOA voltage boosting measurement function: good repeatability and high precision;
3. Automatic voltage boosting function: preset test voltage, output voltage can be maintained at constant voltage;
4. Automatic timing function: pre-set the test standard voltage compression time, automatic timing after boosting to the test standard voltage, automatic reducing voltage after the time completion;
5. Over-voltage setting is analyzed by microprocessor , high precision, good reliability；
6. Kept the manual test mode;
7. Data storage function: it can instantly capture test parameters and automatically save test results;
8. Equipped with optical fiber microammeter, which can directly read the high-voltage side current of the test product on the control unit;
9. According to electromagnetic compatibility theory, special shielding, multi-stage isolation and grounding protection measures are adopted to organically combine, and the equipment will not be damaged when it is discharging under rated voltage;
10. HZZGF series intelligent DC Hipot Tester has on-line operation function and built-in on-line control software. The computer (such as equipped PC) can realize online control by installing control software and supporting communication cable (optional).

II.Working Principle Diagram

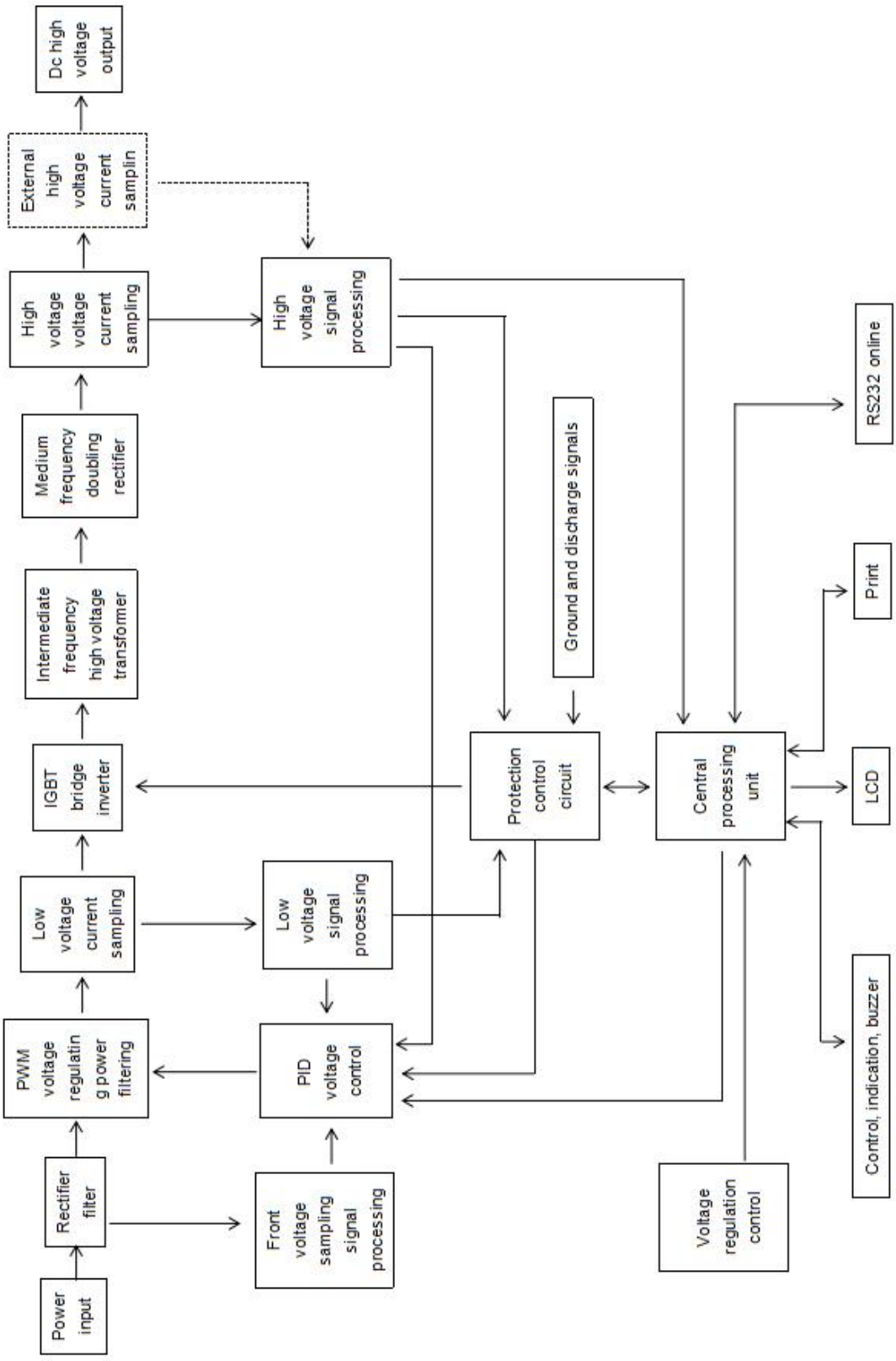


FIG. 1-1 Working principle diagram

Main technical performance

HZZGF Series of main technical indicators

specifications / Technical parameters	100/20	120/20	200/10	300/10	400/2	400/3	400/5
Rated output voltage (kV)	100	120	200	200/300	200/400	200/400	200/400
Rated output current (mA)	20	20	10	10	2	3	5
Rated output power (W)	2000	2400	2000	3000	800	1200	2000
Maximum charging current (mA)	30	30	15	15	3	4.5	7.5
Voltage measurement error	±1%(full)±2 words						
Current measurement error	±1%(full))±2 words						
Over-voltage setting error	≤1%						
0.75 Switching error	≤1%						
Ripple coefficient	At Io≤5mA，≤1.0%；At Io≤10mA，≤2.0%						
Voltage stability	Random fluctuation, power supply voltage variation±10%，≤1.0%						
Operation mode	Discontinuous use: rated load 30 minutes 1.1 times rated voltage: 10 minutes						
Environmental humidity	-10℃～40℃						
Relative humidity	When the temperature is 25℃, no more than 85%(no condensation)						
The altitude	Below 1500 metres						

III.Instructions

1、Control Box

See figure 4-1

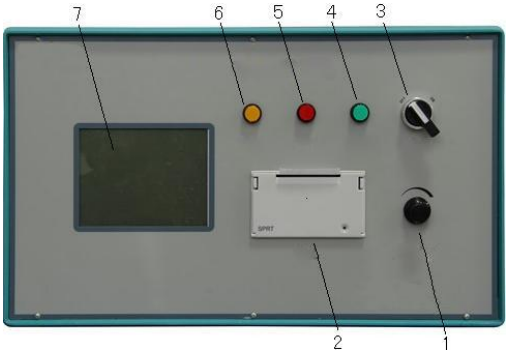


Figure 4-1a front panel of control box

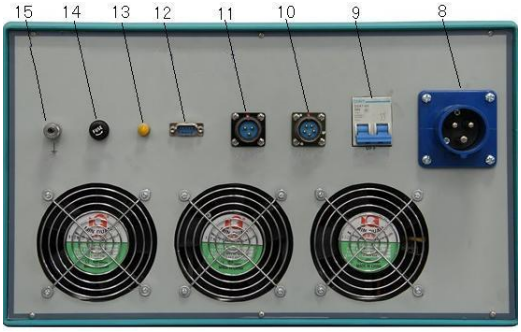


Figure 4-1b back panel of control box

1.Control lever: used for setting parameters and regulating voltage.

It can be rotated and pressed. Press can be divided into short-time press and long-time press. "short-time press" is the function of selecting confirmation or switching, and "long-time press" is the exit function. "Rotation" is the function of switching items or boosting voltage. According to different interface operation,the functions slightly different,users can refer to the screen display to operate.

2. Printer: needle printer for printing out test results.

3. Power switch: control the power supply on/off .

4. High voltage off / power indicator: green with indicator button. When the light is on,it indicates that the high voltage is off state, the power has been connected. When the red light is on, press the green button, the red light turns off and the green light turns on, and the high voltage loop is cut off.

5. High-voltage on indicator and button: red, with indicator button. The light is on to indicate that the high voltage is on. It can output or has output high voltage. In the specific status interface, when the green light is on, press the red button of this color, the red light is on and the green light is off, indicating that the high voltage circuit is connected, and the boost test can be performed at this time.

6.0.75U_{DC1mA} button: yellow button with indicator light. In the state of high voltage on,

when it boosts to a certain high voltage, press the button, the voltage drops to 75% of the original value, and remains at this. This function is specially designed for zinc oxide arrester to test the leakage current at $0.75U_{DC\text{-}1mA}$. After the test, automatically reduce the voltage to zero and return to the test results.

7.LCD: 320X240 dot matrix LCD, displaying various setting parameters, test status, results, prompts and other information.

8. Power input socket: connect with the power supply with the equipped power cable. Power supply: AC 220V.

9. Air switch: control box switch.

10.Intermediate Frequency Output: Used for intermediate frequency connection between control box and voltage boosting unit.

11.High voltage measurement: used for connecting the control box to the HV boosting unit. The high voltage is input to the control box through a special three-core cable. When connecting, simply point the red dot on the cable plug at the red dot on the socket and turn it in place clockwise. Turn the cable plug in the opposite direction.

12. Rs-232 interface: used for online communication with computer.

13.Optical fiber microammeter: connect with high-voltage microammeter through optical fiber.

14. Fan fuse.

15. Grounding terminal: this grounding terminal is connected to the voltage boosting unit grounding terminal and test product grounding at one point and then connected to the grounding grid. Please use the equiped ground cable.

2.Voltage Booster

See figure 4.

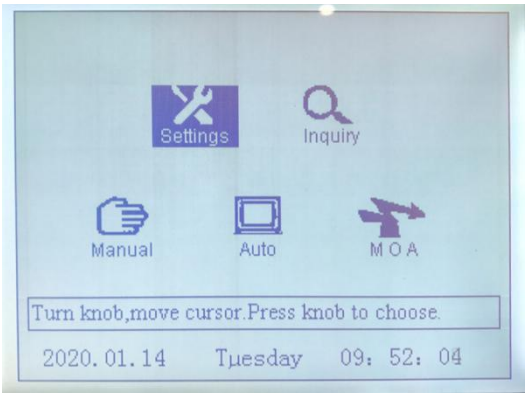
1.Grading ring 2.Upper booster

3.Lower booster 4.IF connection

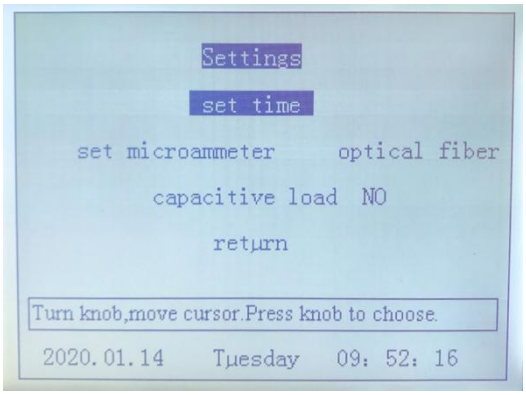
5.Measurement connection 6.Ground terminal

7.Cross roller support bracket

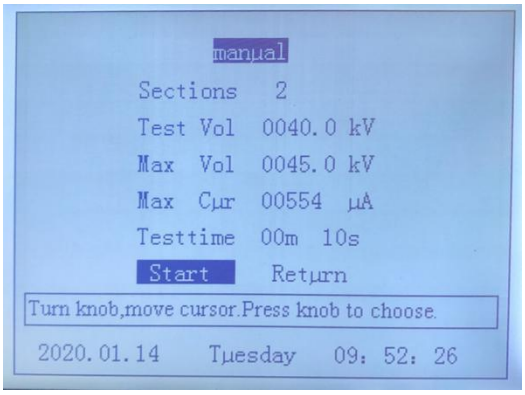
4. Menu Function Description



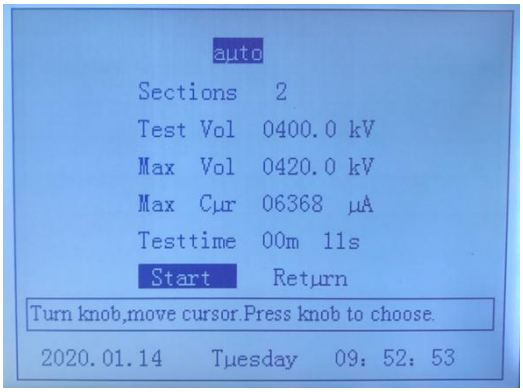
P 4-4.1 Main Menu



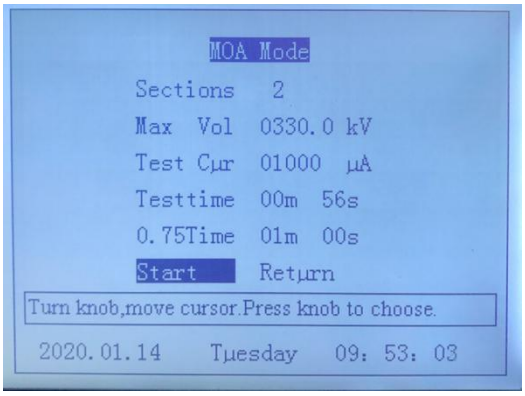
P 4-4.2 System setting



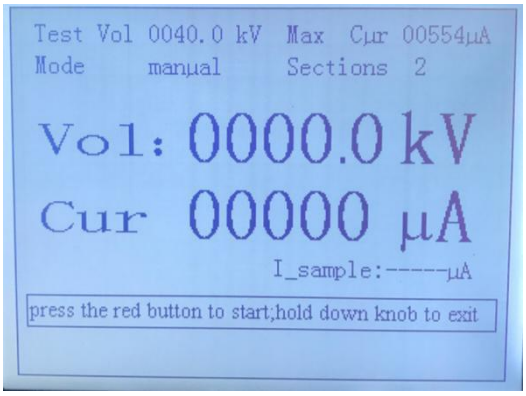
P 4-4.3 Manual test setting



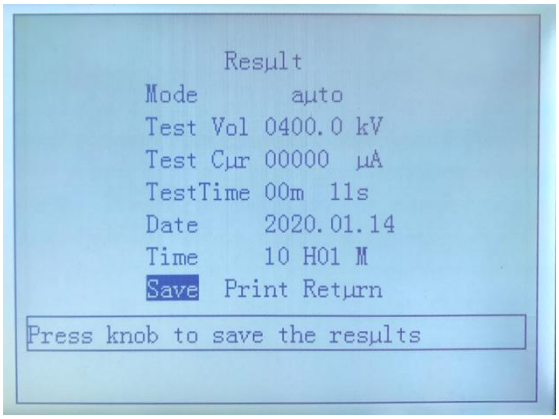
P 4-4.4 Auto test setting



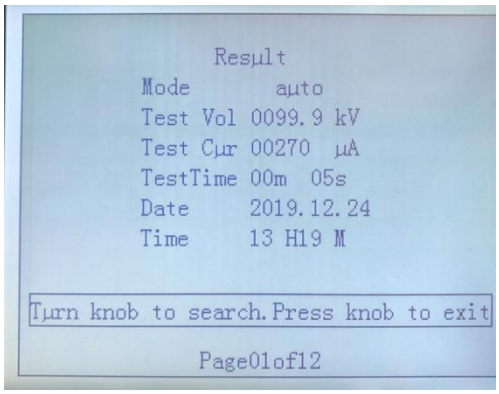
P 4-4.5 MOA test setting



P 4-4.6 Testing



P 4-4.7 Auto testing result



P 4-4.8 Record query

1. System Setting (refer to the P 4-4.2)

● Clock setting: adjust the display time of the system (note: press and hold the knob to exit the setting).

● Select micro-ammeter: [built-in] displays total high voltage current (including partial stray current); [optical fiber] and [wireless] display the total high-voltage current, and auxiliary display the optical fiber or wireless micro-ammeter current, namely the test

current.

2. Boosting voltage parameter Settings

● Voltage booster section number setting: set according to the actual use of voltage booster section.It is used to adjust the voltage ratio of the inner part.

● Test voltage setting: refer to the P 4-4.3 and P 4-4.4,this parameter is used for setting manual and automatic voltage boost and timing trigger.

● Over-voltage setting: it is used to protect the sample from being broken down when testing sample votlage exceeds the normal allowable voltage value due to the wrong operation.

● Current limiting setting: refer to P 4-4.4,when the current exceeds this setting value, the system will cut off the high voltage.

● Setting of voltage boosting time:refer to P 4-4.4, when the voltage rises to the test voltage, the initial value of pressurizing time is used to start the countdown.

● Test current setting: refer to P 4-4.5,in the MOA booster test mode, this value is generally set to 1000uA, and the system is shielded from other Settings. (when displaying the sample current, take it as the reference value).

● Test time setting: refer to P 4-4.5,in the MOA booster test mode, the test current holding time will automatically drop to 0.75 times of the current voltage after the timing.

● 0.75 time setting: refer to P 4-4.5, in the MOA booster test mode, the time should be maintained after the voltage drops to 0.75 udc-1ma, and the system will automatically reduce the voltage to zero after the 0.75 time is timed.

3. Boost interface (refer to P 4-4.6)

It mainly display voltage and current, the system is also through the dialog box to display the test process information. These include voltage holding time and all kinds of protection information tips.

A) Save test results(refer to P 4-4.7)

When the pressurization test is completed, the system will display the parameters captured during the pressurization and prompt to save the record.

B) Record query(refer to P 4-4.8)

This function is used to browse the previously saved test records.

5. Test Operation

1.Manual boost mode

After starting up, enter the main menu（P 4-4.1), rotate the control lever to make the cursor point to the "manual boost" option, click the control lever and enter the parameter setting interface of manual test mode （P 4-4.3). After setting various parameters according to specific test requirements, enter the test boost interface. At this point, press the "high voltage on" button to switch on the high voltage loop, and then rotate the control lever (press the control lever to switch the voltage and adjust the fineness). When the voltage rises to the set test voltage, the timer will start to time, and the system will automatically drop the voltage back to zero after the timing, and then a record interface of test results will show up, prompting to save or print, and after making the selection, the test will be finished. If the voltage does not reach the set test voltage value, the $0.75U_{DC1mA}$ button is pressed, the system will automatically reduce the voltage to 0.75 times of the current voltage, and then countdown to the set pressurization time. After the timing is completed, the system will automatically reduce the voltage to zero, and then pop up the interface of test results.

2.Automatic boost mode

After starting up, enter the main menu, rotate the control lever to point to the option of "automatic boost", click the control lever to enter the interface of automatic mode parameter setting （P 4-4.4). After setting various parameters according to specific test requirements, enter the interface of node setting. At this time, after pressing the “HV on” button, the system will start to automatically boost the voltage. After rising to the set test voltage, it will be stabilized and timing will start, and the value of each node will be extracted. After the timing is completed, the system will automatically reduce the voltage to zero.

3.MOA automatic test mode

After starting up, enter the main menu, rotate the control lever to point to the "MOA boost" option, click the control lever and enter the automatic mode parameter setting interface（P 4-4.5). After setting various parameters according to specific test

requirements, enter the boost interface. At this time, after pressing the “HV on” button, The system will automatically boost. When it reaches the set test current, it will stabilize and start timing.After the timing is finished,system will automatically drop to 75% of the original voltage.When voltage is stabilizing and the time starts over,system will automatically drop to zero, show up the test results and print interface（P 4-4.7), to make a selection after finished test.

4.After the test, turn off the power switch.

5.About the discharge

For zinc oxide arrester and other small capacitance test, normally they can discharge through the resistor inside voltage booster . For the short cable and other slightly large capacity of energy storage test, normally wait until the to test sample voltage self-discharing to 20% of the test voltage, and then they can discharge by the equiped discharging rod. The removal and replacement of the high voltage lead are allowed only after the grounding cable is hung up after full discharging. For the long cable and other super large capacity energy storage test products, special discharge equipment should be used for discharging according to the cable length and energy storage situation. Generally, it is not possible to discharge with small power discharge bar randomly equipped, because the capacity is small and easy to burn down.

6.Examples of Test Methods

1.No-load boosting Removal Method

In normal tests, when all the other cables are connected, the cable connected to the test sample is suspended, then read the corona and stray current I’ during no-load testing and after rising to the test voltage, then connect the test sample to boost the voltage to test voltage, finally read the total current I_1.

Leakage current of sample：$I_0 = I_1 – I’$

2.Precision measurement of high voltage side

When it is necessary to measure the leakage current precisely, the infrared high-voltage micro-ammeter should be stringed on the high-voltage side (see Figure

4-6a).

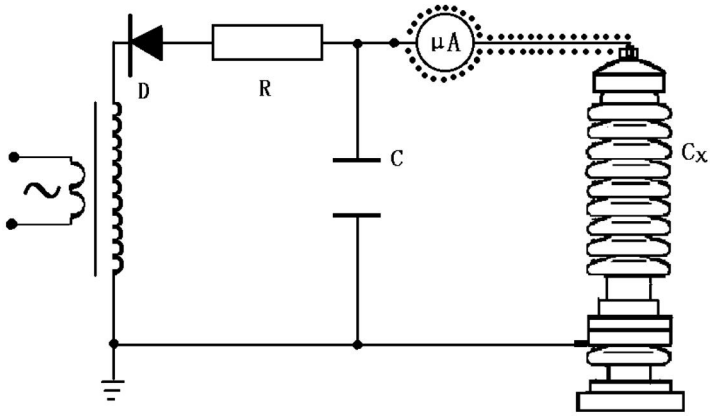


Figure 4-6a Microampere Access Test C High Voltage Side Wiring Diagram

The microammeter shall be connected with the test product by special shielded wire. The shielding leads of the high voltage leads should be closely connected with the shielding of the microammeter. To eliminate the effect of surface leakage current on the sample, the bare metal cord can be connected to the shield of the high-voltage lead after tightly winding several times at the high-potential end of the sample (see figure 4-6b).

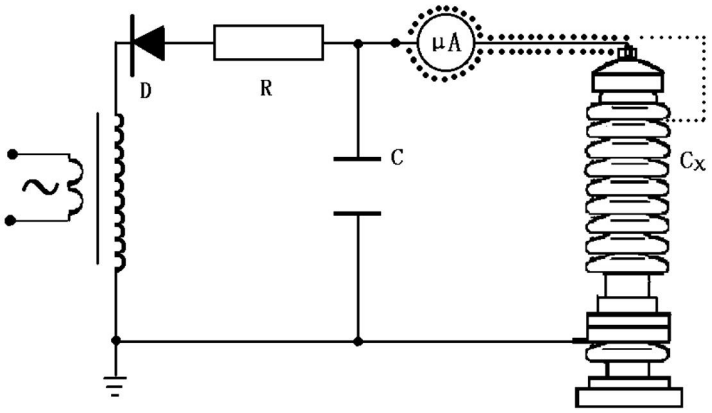
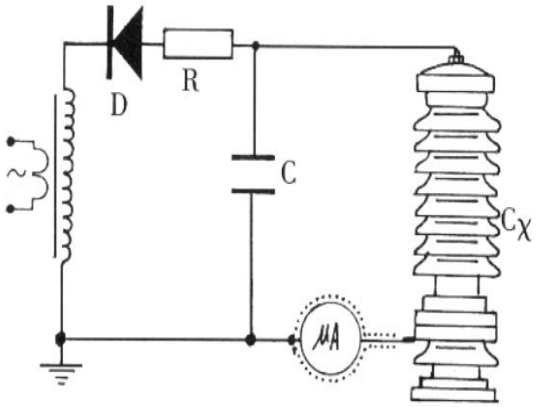


Fig. 4-6b wiring diagram of surface effect of C excluded sample

3.Precision measurement of low-voltage side

When the grounding end of the sample such as zinc oxide and magnetic blow arrester can be separated, an ammeter can also be used at the bottom (ground potential side) of the sample for measurement (see figure 4-6c). To eliminate the effect of leakage current on the surface of the sample, multiple thin bare copper wires

can be wound several times around the potential end of the sample and connected to the ground together with the shield of the microammeter (see figure 4-6d).



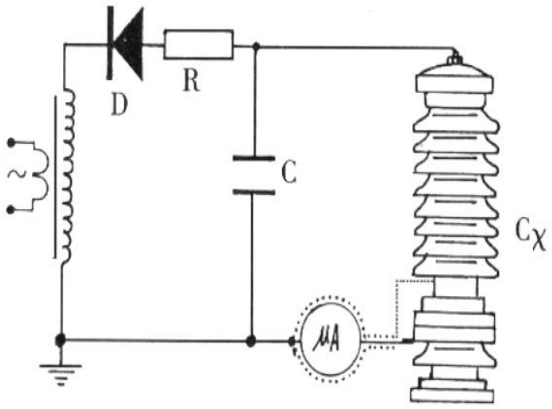


FIG. 4-6c Microammeter for Cχ bottom wiring diagram Figure 4-6d wiring diagram of surface effect of Cχ excluded sample

7、Operation After Protection Operation

During the test, low-voltage over-current, low-voltage over-voltage, high-voltage over-current, high-voltage over-voltage, discharge and other phenomena will lead to protection action. All the protection information will be displayed on the LCD screen. At this time, the following steps should be followed:

1. Turn off the power (disconnect the obvious disconnect point).

2. Conduct the test again after finding out the test condition and dealing with it accordingly.

Confirm that it is not the cause of the test product, turn off the low voltage capacitor for 10 seconds, turn on the power switch, try to test again and check the test equipment.

IV.Instructions For DC High Voltage Optical Fiber Microammeter

1.Panel (as shown in FIG. 5)

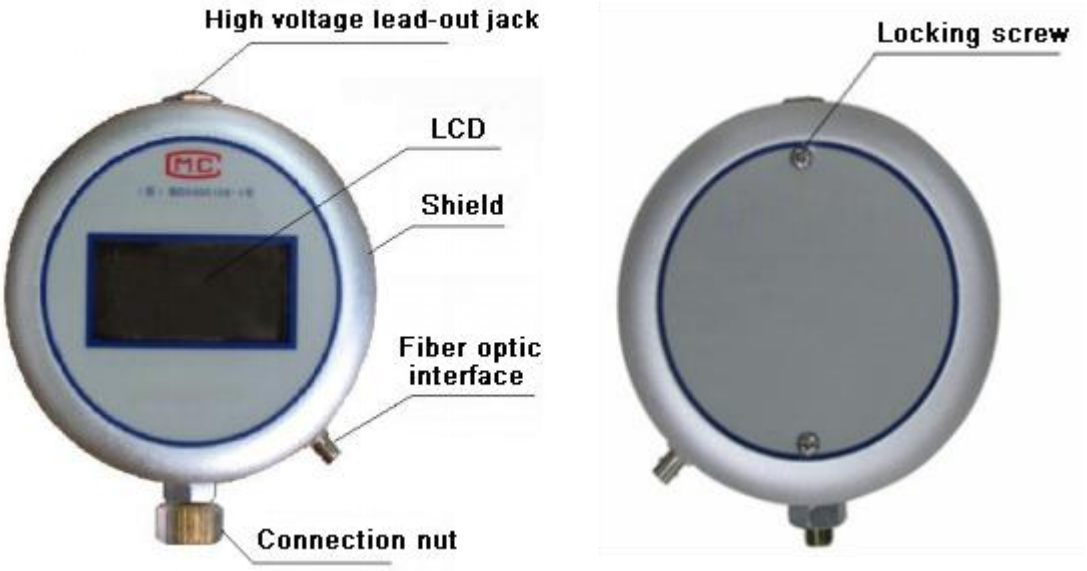


FIG. 5 High-voltage shielded fiber microammeter

2.Main Technical Performance

Power supply： 2 pcs of #5 batteries

Input impedance of microammeter： <60 ohm

Current display range： 0~1999.9uA 2000~19999uA

Accuracy of current display： 0.5%

Input overload current： 200mA

The principle of this meter is the Faraday cage equipotential shielding method. All measuring parts are inside the shield of the metal sphere.

3.Instructions For Use

1. It is recommended to adopt good insulation (such as nylon tube, ABS tube, etc.) of the same height as HZZGF DC high voltage tester to support the high voltage microammeter.

2.HZZGF DC high voltage tester high voltage output end is connected to the high voltage microammeter through the high voltage current limiting resistance, and then through the special plug of the high voltage microammeter, the shielded wire is connected to the subject.

3. In order to reduce the influence of corona ion current on the sample current when the high-voltage cable head of the subject is exposed, it is suggested to wrap the

high-voltage wiring of the subject with good insulation.

4. This meter is provided with an optical fiber interface, through which the current information measured by the microammeter can be sent to the intelligent dc tester control box for display (in system Settings, select the microammeter and set it as [optical fiber]).

5. After the high-voltage lead plug is inserted, the internal power is connected, and the internal power is cut off when it is pulled out. When "LOW BATTERY" is displayed on the LCD screen, it indicates the BATTERY is under voltage. Please remove the locking screw from the back cover, remove the back cover, panasonic screw to fix the BATTERY, and replace the BATTERY.

6. During the DC withstand voltage test of cable or high-voltage capacitor, the charging current value can be more than twice the rated current, and the meter will not be damaged.

7. After the DC high voltage test of the test product is completed, discharge the discharge at the housing of the microammeter with the special discharge rod of HZZGF dc high voltage test.

Note: special electric discharge shall not touch the high voltage discharge directly, when the voltage is higher, should make discharging rod tip and the high pressure side keep a certain distance, to discharge rod tip produce corona discharge, enable participants to the voltage decline gradually to 20% when the test voltage, reoccupy discharge rod of microampere meter shell discharge, the last on the ground directly in the subjects.

8. Special attention: do not directly discharge the earth wire on the housing of the high voltage microammeter, so as to avoid the damage of the high voltage microammeter caused by the strong impact discharge current.

9. When the power of the microammeter is switched on for 20 minutes and no current flows, the microammeter will enter low-power standby mode. The LCD screen of the microammeter displays "SLP" and detects the current every 10 seconds.

V.Fault Inspection and Treatment

	Phenomena	Causes	Treatment
1	The green light does not turn on when the power switch is switched on.	1. Power line is open circuit. 2. The fuse of the power supply is fused.	Replace the power cord. Replace the fuse.
2	Optical fiber micro-ampere meter is selected, and the current can not be read.	1 Optical fibers are not connected properly 2 Micro Amperometer battery undervoltage	Connecting optical fibers; Replacement of Micro Amperometer Battery
3	LCD display "high voltage overvoltage protection"	The test voltage is set too low	Return to the Settings menu to increase the setting voltage setting
4	LCD display "high voltage overcurrent protection"	1.Discharge or breakdown of test sample; 2. the limiting current setting is too small to check the subject.	Increase the limiting current setting
5	LCD display "low voltage overvoltage protection"	The current load is 1.1 times more than the rated load of the equipment	The device was unable to test the sample
6	LCD display "low voltage overcurrent protection"	1. The current load is 1.1 times more than the rated load of the equipment 2.Or equipment damage	1.The device cannot do the test on the sample 2. need to repair

VI.Packing List

No.	Item	Qty
1	Control Unit	1 pc
2	High voltage booster	2 pcs
3	Current limiting resistor	1 pc
4	Discharging rod with ground lead	1 pc
5	High voltage testing cable	1 pc
6	Intermediate frequency cable	1 set
7	Ground lead	1 set
8	Power cable	1 pc
9	Fuses	several
10	Support rod of current limiting resistor	1 pc
11	Microammeter	1 pc
12	Microammeter fiber line	2 pcs