

HZAQ-KS Control Desk

USER MANUAL



Matters needing attention

- ◆ Please read the product instructions carefully before using this device.
- ◆ This product is a high voltage test equipment, when installed, it should ensure that the distance between the high pressure part of the equipment and the wall or metal equipment is greater than or equal to 1meter, and that the distance between the high voltage live part and the personnel is greater than or equal to 1.5 meters.
- ◆ All equipment must be grounded with a grounding resistance less than 0.5Ω.
- ◆ The equipment each place uses a point of grounding, directly all connect the place of contact.
- ◆ When the red light of the equipment warning light is turning on, all personnel should stay away from the high-voltage live part.
- ◆ After the completion of the test, every sample must be discharge with discharge rod.
- ◆ Insulation boots gloves voltage leak current measurement and control instrument built-in battery, such as battery power display as a grid , please charge in time; Before the long-term storage should be full of electricity storage.

If the test transformer is self configured by the user, it is necessary to ensure that the voltage ratio of the test coil is greater than 3% for the voltage ratio of the measured coil.



Contents

1. Overview.....	1
2. Main functions and technical parameters.....	1
3. Composition of equipment.....	4
4. Description of equipment functions.....	4
5. Installation and installation of equipment.....	8
6. Preparation before the test.....	14
7. Operating instructions for insulating apparatus test system.....	20
8. Manual instructions.....	24
9. Maintenance and maintenance of equipment.....	37
10. Security measures.....	37
11. After-sales service.....	38
12. Configuration list.....	38



1. Overview

Insulated boots and gloves are the necessary safety equipment for power system operation and maintenance DL / T1476 *Regulations for preventive test of electrical appliances for safety of electric industry* the test method and cycle of common safety equipment such as insulating boots and gloves are stipulated. Insulated boots and gloves voltage test, the cycle is half a year, the test process is not allowed to break down, Simultaneously insulated boots leakage current is less than the limit value.

The instrument adopts multi-channel high voltage leakage current measurement patent technology and infrared data communication technology to achieve the safe measurement of high voltage leakage current purposes. Through the application of this technology, the tester is completely isolated from the high-voltage system, which can not only accurately measure the multi-channel high-voltage leakage current, but also ensure the personal safety of tester.

In order to improve work efficiency, 8 samples can be tested at the same time. In order to avoid repeated testing , the high voltage breaking patent technology is adopted. During the process of testing, the breakdown samples can be separated from the high pressure test system. No breakdown of the test continued until the test is completed.

In order to cate to the requirements of the standard and reduce the labor intensity, the company has developed the remote control electric insulation rod test support with scale. Insulated rod holder can be electrically adjusted electrode distance by means of a wireless remote control or a button on the device, Simultaneously it has a scale and quantifies the segment length. Electrode using a combination of conductive foam, which can achieve the effect of enclosing the insulation rod of test.

The complete set of testing equipment is based on the HZAQ-KS and equipped with HZAQ-YW automatic insulation glove tester, HZYD-10/100 inflatable test transformer, HZAQ-YG insulation rod tester, HZAQ insulation pad tester and other equipment to complete a number of testing works.

2. Main functions and technical parameters

2.1. Main functions

2.1.1 Automatic control of the test can be achieved by means of centralized computer control, and a database will be established to automatically issue test reports.

2.1.2 Simultaneous testing of 8 insulating boots or gloves to measure leakage current separately.

2.1.3 Large screen LCD display with a large amount of information, only one screen



simultaneously can display 8 high-voltage leakage current, test voltage, current, timing time and other parameters.

2.1.4 Parameters such as test voltage and primary current of test transformer can be measured.

2.1.5 The use of proprietary infrared communication technology ,in order to completely isolate the operating table from the high-voltage system ensure the safety of the tester.

2.1.6 Fully automatic pressure test.After the start of the test, the instrument automatically shuts down automatically to the national standard to request the booster speed to raise the voltage automatically,and rises to the predetermined voltage to start the time and maintains the test voltage, the time automatically drops the voltage to zero and the power is cut off. Simultaneously, the leakage current of each sample is displayed and the test results are automatically saved.

2.1.7 Each sample is equipped with a high-voltage break mechanism, when any one way of breakdown, the road test will be automatically removed from the high pressure, and do will not affect the test.

2.1.8 Has the function of overvoltage and overcurrent protection.

2.1.9 High pressure hazard warning lamp display.

2.1.10 The instrument can save 60 groups of test data and results, which always can be consulted at any time.

2.1.11 Real-time calendar clock functionality.

2.1.12 The test system and the HZAQ-YW automatic insulating gloves test instrument complete the insulation boots and insulation gloves test.

2.1.13 The test system is combined with the HZAQ-YG insulation rod tester to complete the pressure test of the insulation rod.

2.1.14 The test system and the HZAQ insulated pad tester to complete insulation pad voltage test.

2.2. Main technical parameters

Rated output voltage:100kV(Insulation boots, insulated gloves, insulated rods, insulation pad test)

Rated capacity:10kVA

Output voltage range:100.0 kV (250V)

Voltage measurement error: $< \pm (0.5 \%U + 0.02\%U_{\max})$,



Where U is the indication value and $U_{\max}$ is the upper limit value of the range.

Input current process:50.0A

Current measurement error: $<\pm (0.5\%I+0.02\%I_{\max})$,

Where I is the indication value and $I_{\max}$ is the upper limit value of the range

Divider:

Voltage divider ratio:100/0.1 (kV)

Variable-ratio error of voltage divider:1.5%

Insulating gloves test bench:

Test position: 8

Leakage current path:25.0mA

Leakage current measurement error: $\pm(1\%I+2 \text{ words})$

Leakage current resolution:0.1 mA

Insulation Rod Test bench:

Test voltage:100kV

Test stations: 8

Insulation rod support height:1.2 M

Range of regulation:300 ~ 1030 (mm)

Insulation pad test bench:

Rated voltage:50kV

Test bed area:1000*1000(mm)

Electrode area:800*800 (mm)



3. Composition of equipment

3.1 HZAQ-KS console

(This article is referred to as the console for short)

1 Unit

3.2 HZAQ-YW automatic insulated gloves tester

(This article is referred to as the high pressure discharge measuring and controlling instrument)

1 Set

3.3 HZYD-10/100 inflatable test transformer

1 Set

3.4 HZAQ-YG insulated rod tester

1 Set

3.5 HZAQ insulated mat tester

1 Set

3.6 Computers(Installed on the console)

1 Set

4. Description of equipment functions

4.1. Console

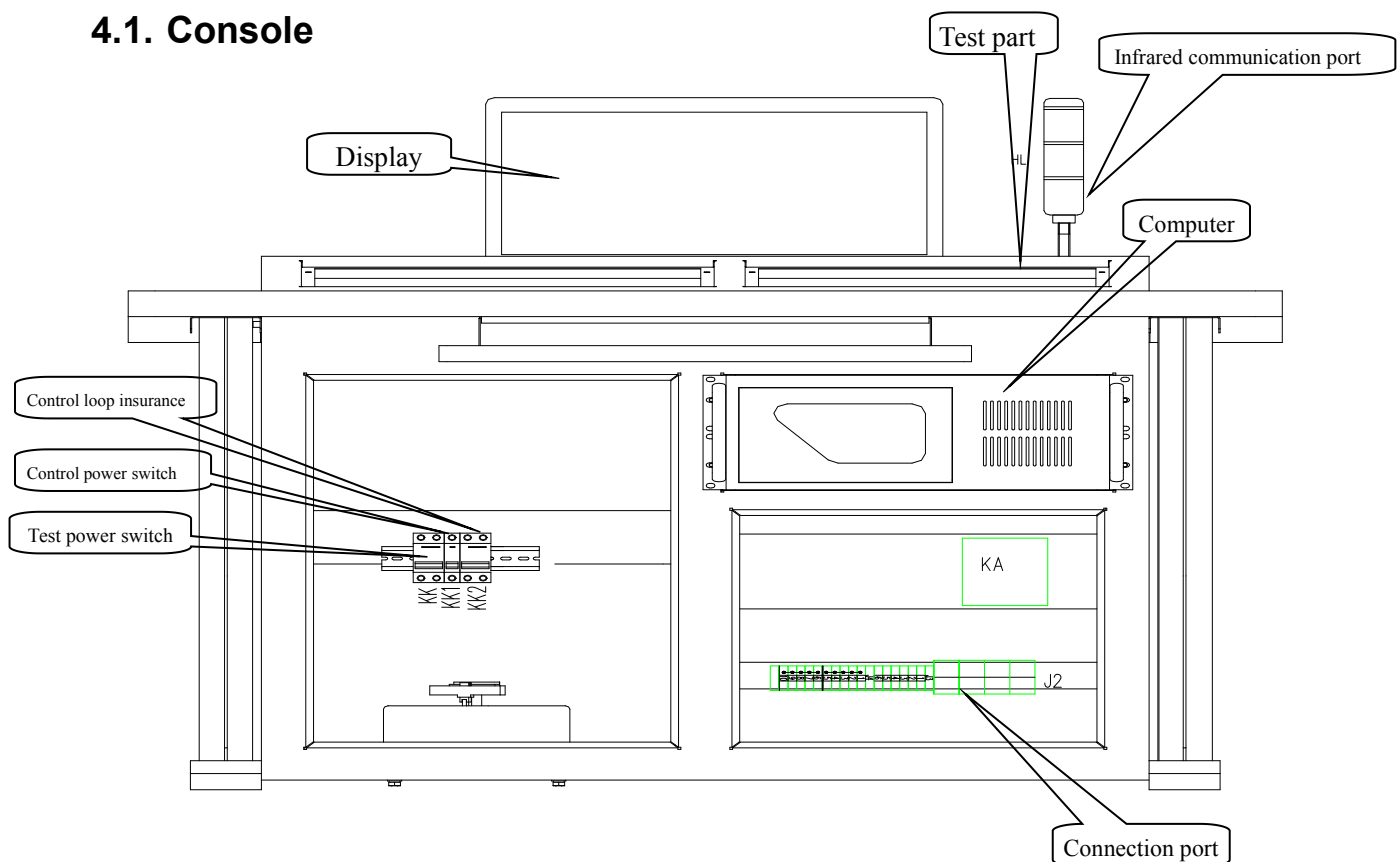


Figure 4-1 Console component

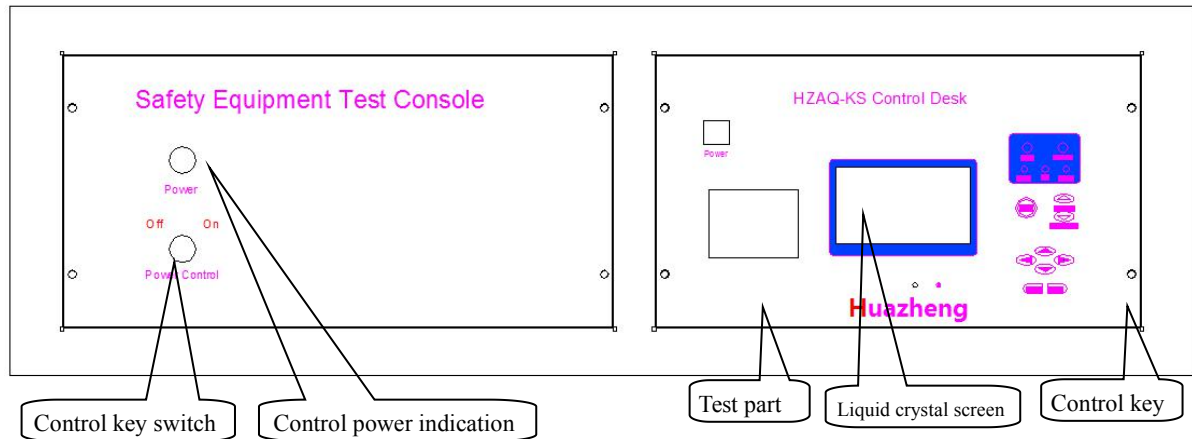


Figure 4-2 Console panel

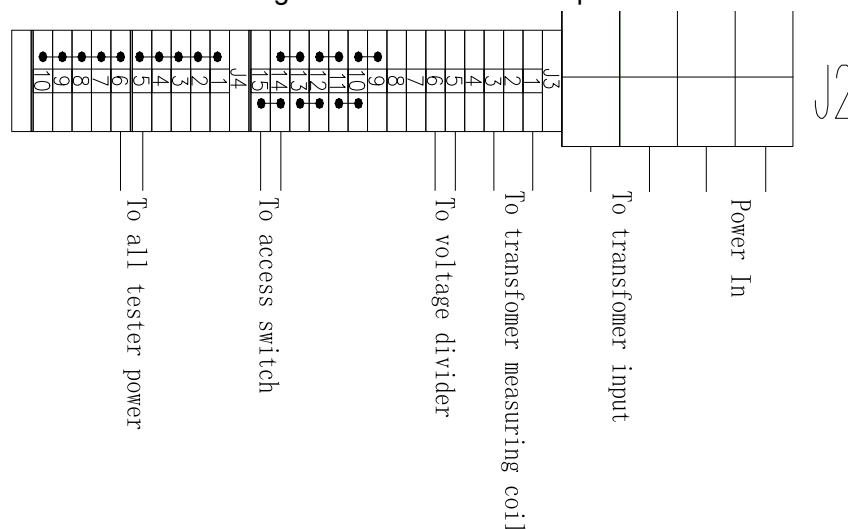


Figure 4-3 Console terminal definition diagram

Description: If there is an access guard switch, the short connection back to the position of the access switch in the drawing should be removed.

Test part of the key functions

Under the LCD contrast adjustment knob can adjust the contrast of the LCD screen, LCD screen on the right side of the button " $\wedge$ " and " $\vee$ " button "<" ">" button can be used to select the menu and add a choice, the "CON" button to confirm the selected project and start work and so on, "exit" button to stop the test, to return to the previous menu. The "sudden stop" key is used for emergency stop the test under special circumstances, and the "booster" "depressurization" key is used to manually adjust the booster and depressurization.

4.2. Insulation glove tester

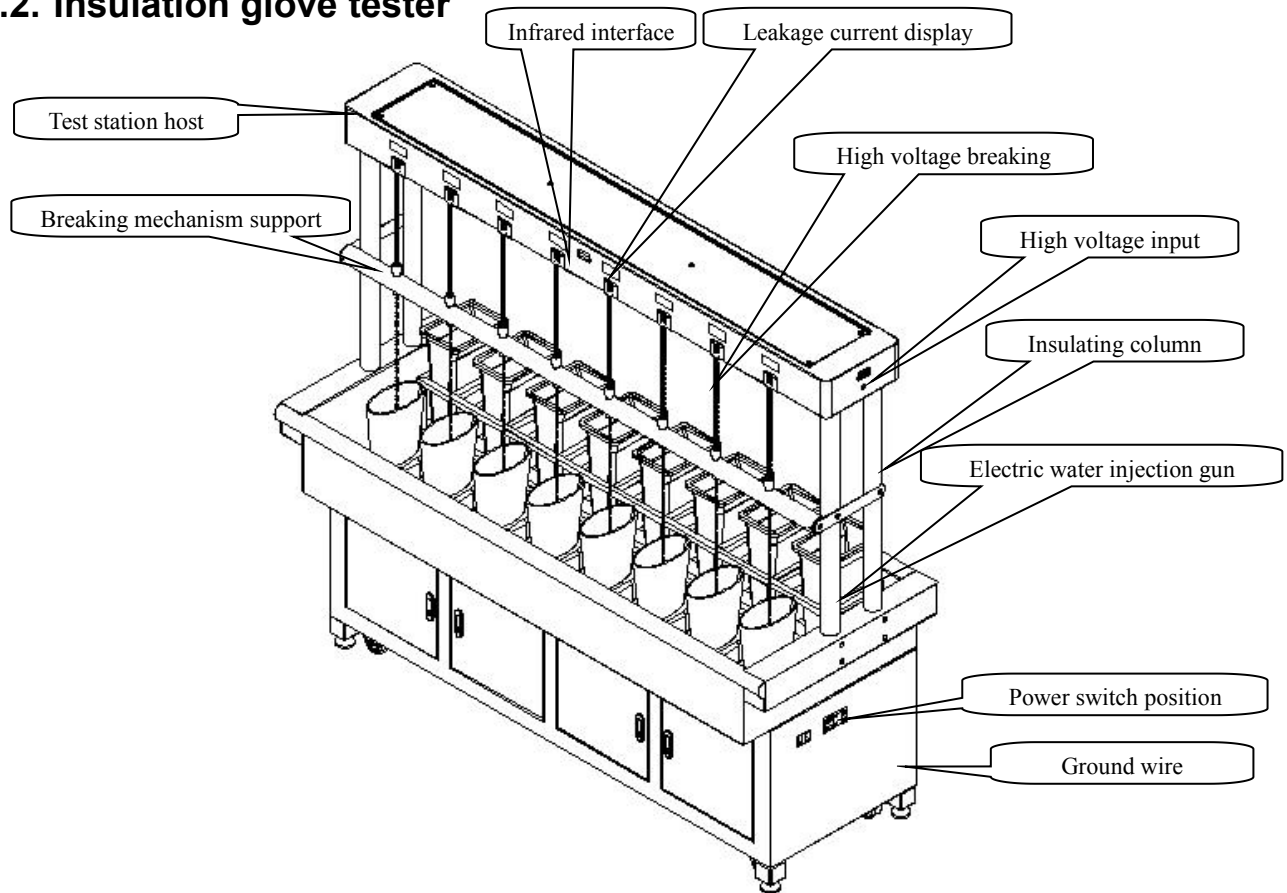


Fig. 2 Insulation glove tester

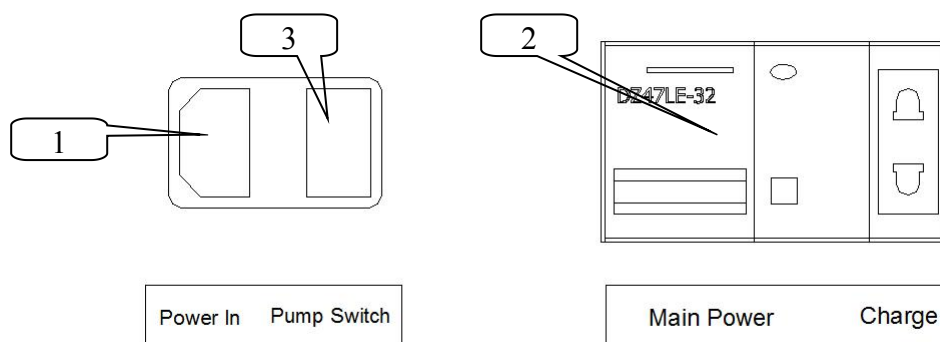
Test bench mainframe: Completing the leakage current measurement and displaying of 8 test samples, and send it to the console through infrared interface.

Electric water injection gun: Completing the water injection operation of insulating gloves or insulating boots.

Water intake: Tap water inlet

Drains: Water to be replaced by domestic demand in the discharge tank

Power switch position description:



- 1- Power input:Main power input of waterway control system;
- 2- Main power switch:Open and close control of total power supply of waterway control system;
- 3- Pump switches:Pump working power control;
- 4- Charging port:The mainframe of the test station has a battery charging power source built in.

4.3. Insulation rod tester

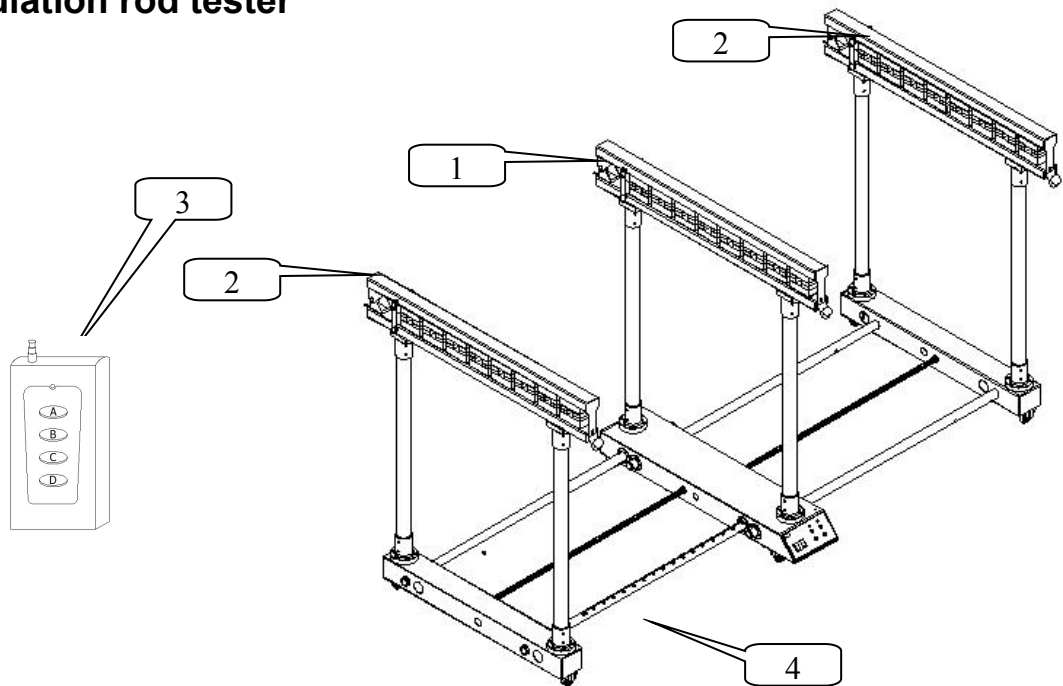


Figure 3 Insulation rod tester

- 1:Fixed main electrode:Access high voltage
- 2:Auxiliary electrodes:Test grounding end
- 3:Remote control:Wireless Adjustment of distance between majorly electrode and Auxiliary electrode
- 4:Scale:Used to regulate the distance between electrodes

Description:There are 8 test stations for main electrode and two side auxiliary electrode. Composite conductive foam cotton is used as electrode to achieve encircling effect.

4.4. Insulation pad tester

- 1- High voltage input:Variable high voltage output for connection test
- 2- High voltage electrodes:Stainless steel with good electrical conductivity
- 3- Work table:Stainless steel material, easy to place insulation pad, and

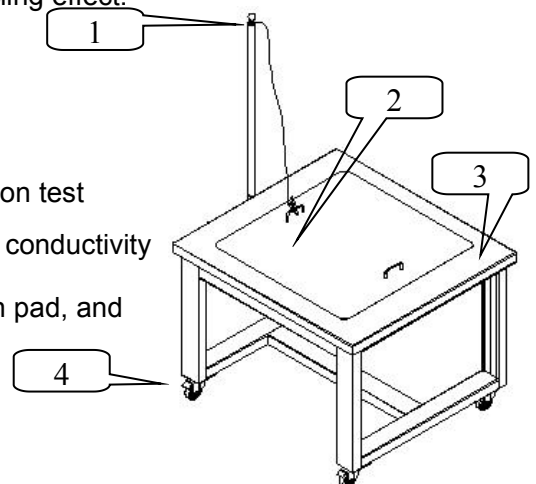


Figure 4 Insulation pad tester

reliable grounding

4- Casters:For overall movement

5. Installation and installation of equipment

5.1. Site layout of equipment

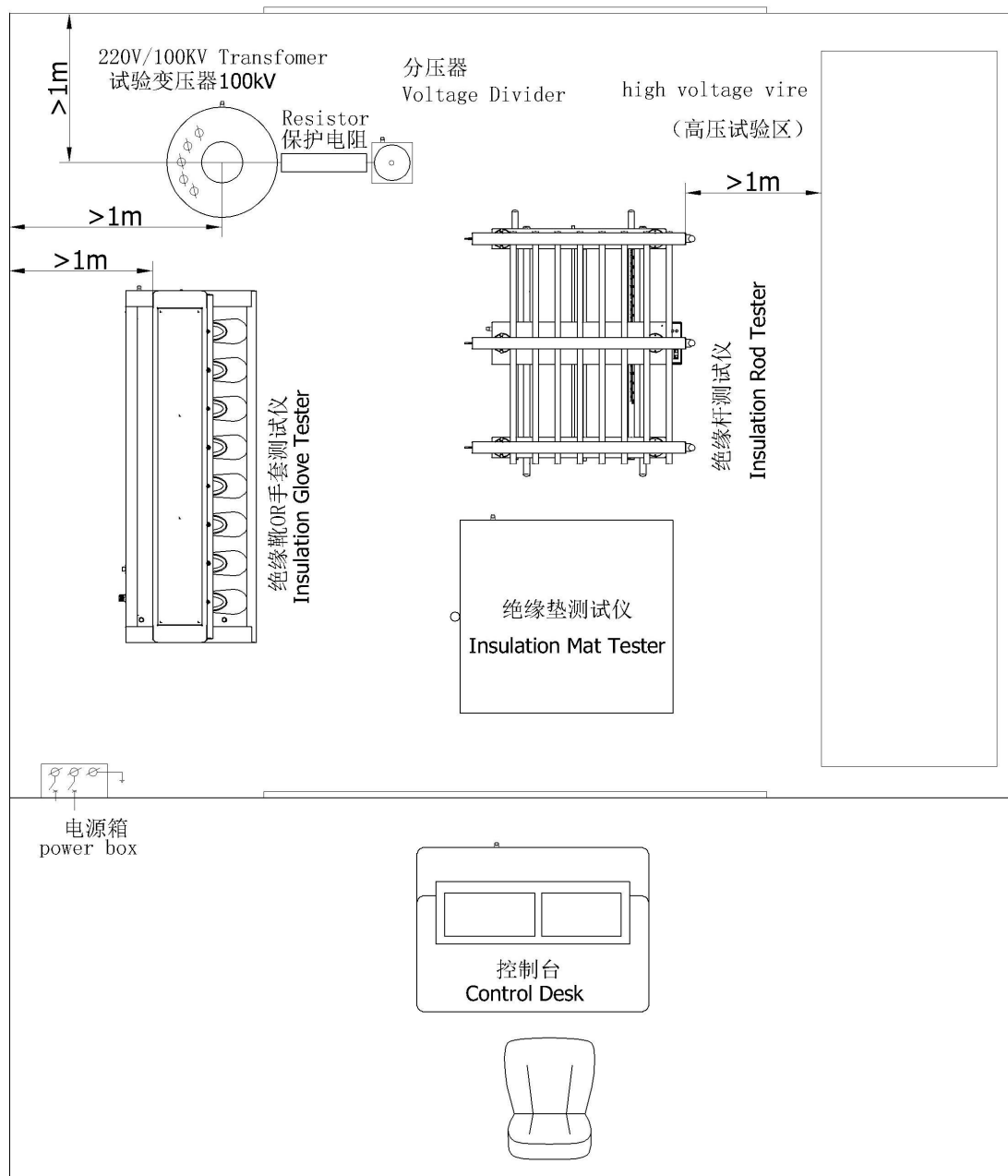
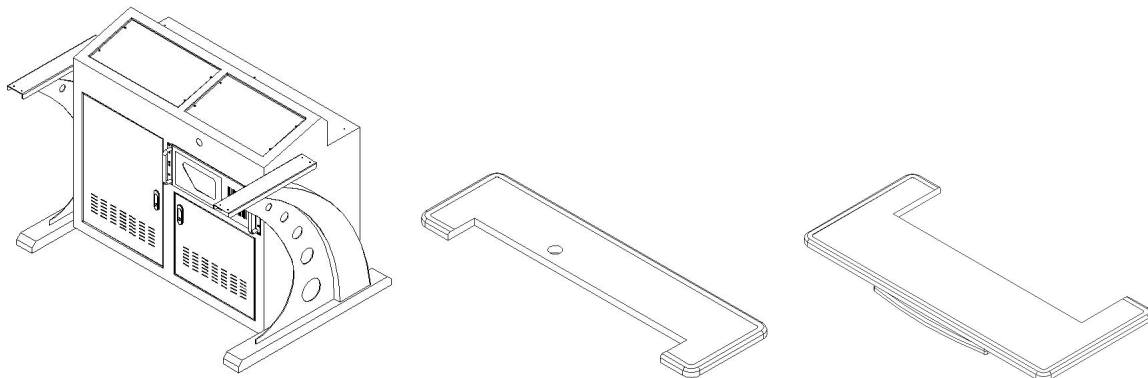


Fig. 5 equipment placement plan

5.2. Installation of equipment

5.2.1. Installation and placement of the console

- 1) Open the box, which includes the following components:



1: Platform body

2: Backstage board

3: Front board

4: Display

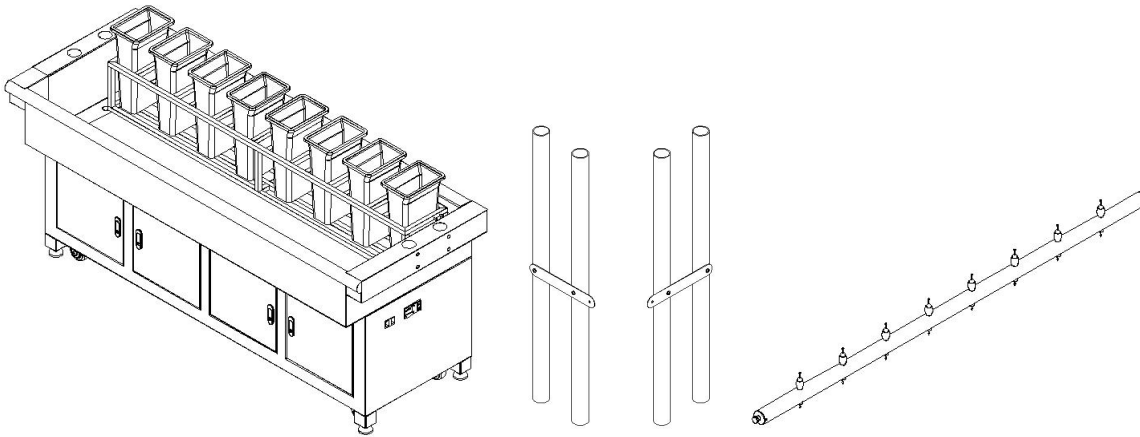
5: Keyboard, mouse

- 2) In accordance with the *figure 5 equipment layout* the position of the console .
- 3) See synonyms at *figure 6 console* after installation of the table board, front board and randomly attached wood screws fixed.
- 4) Remove the display from the packing box, install the base and place it in the center of the console backstage board; Connect the display signal line to the computer and connect the display power cable to the power outlet in the console.
- 5) Erect the console warning lamp so the infrared interface is backward.
- 6) The keyboard and mouse are placed on the front board.

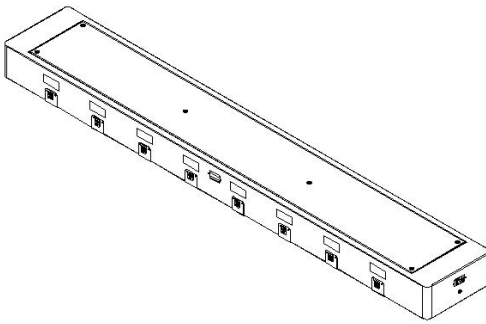
Note: After the platform board is installed, do not lift the platform, if need to move it, you should lift the left and right support leg part to prevent the platform board to fall off.

5.2.2. Installation and placement of insulating glove tester

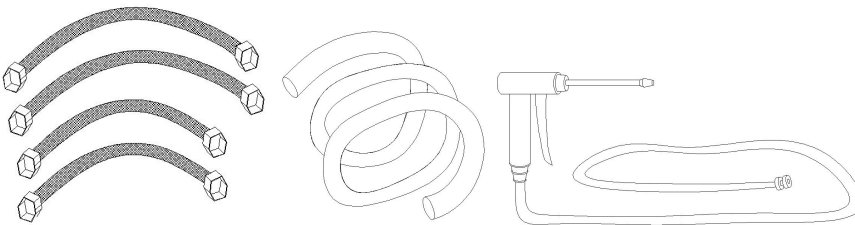
- 1) Open the box with the following components:



- 1: For easy transportation tank with wheels at the bottom . 2: Insulation pillar group 2
- 3: Breaking mechanism support arm



- 4: Test station host



- 5: 4 Water pipes, 1 down pipe, 1 quick water pipe

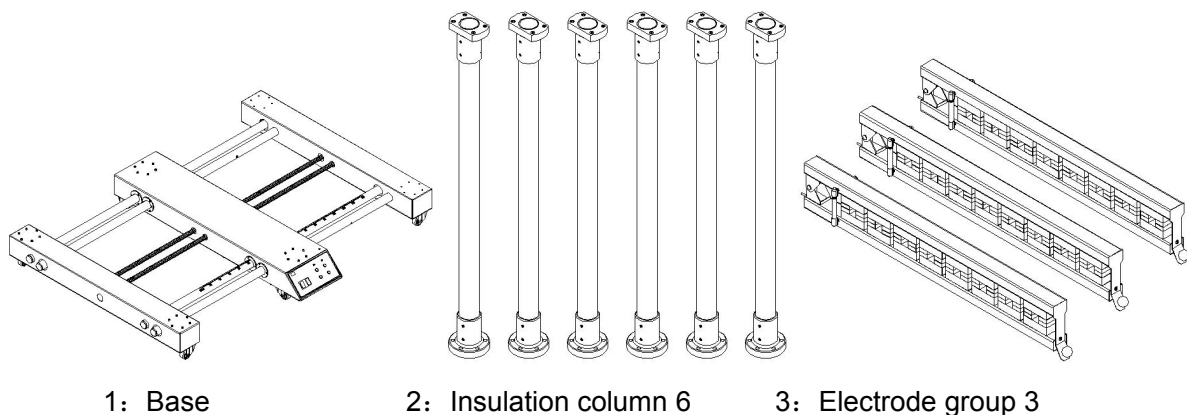
- 2) In accordance with the *Figure 5 equipment layout* the position of the middle insulating glove tester. After placing the equipment at a designated location, the four black bottom feet are rotated to place them on the ground and to adjust the height that the equipment can be placed horizontally.
- 3) Mainframe installation:Reference *figure 2 insulation gloves teste* install the test bench host.The two groups of insulating columns are inserted into the flume corresponding to the fixed holes, and the mounting position of the supporting arm of the breaking mechanism is made forward;Install the breaking mechanism support arm, so that the breaking mechanism vertical upward, tighten the fixing bolts;insert the testing host into the top of the insulation column.

- 4) Access to tap water: Connecting the tap water intakeing at the back of the equipment to the water pipe.
- 5) Install drain pipe and put it into sewer outlet.
- 6) Installation of high pressure water guns: The high pressure water gun is connected to the quick connection pipe, which is connected to the fast joint in the sink; the high pressure water gun is inserted into the high pressure water gun hook reserved for the insulating glove glove test stand

Note: In dry test, only 1) ~ 3) steps are needed. Use wet test need to operate 1) ~ 6) step.

5.2.3. Installation and placement of insulation rod tester

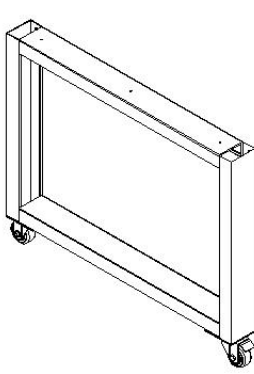
- 1) Open the box with the following components:



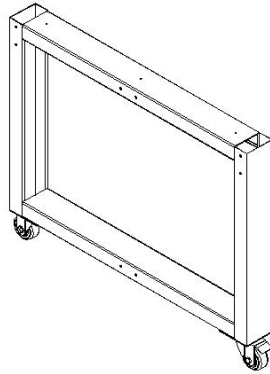
- 2) In accordance with the *figure 5 equipment layout* the position of the medium insulation bar tester, place the base at the designated location.
- 3) Reference *figure 3 insulation rod tester* the installation screws of 6 insulating posts on the base are removed with a randomly attached hexagonal wrench, and the six insulating posts are installed in the corresponding position of the base respectively. The direction of the insulation post should be as above as above.
- 4) Insert the three groups of electrodes into the top of the insulating post, and install the electrodes at the end of the opening and closing lock. (That is, one end of the ball of the red operating handle) Place on one side of the base operating panel.
- 5) Tighten all fixed bolts at the upper and lower ends of the 6 insulated columns.

5.2.4. Installation and placement of insulation pad tester

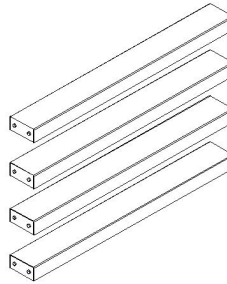
- 1) Open the packing box with the following components;



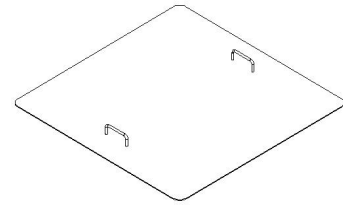
Left leg frame 1



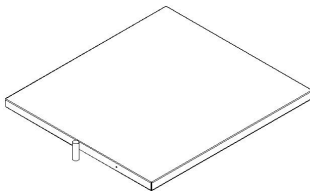
Right leg frame 1



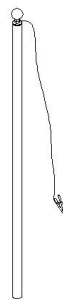
Connectors 4



High voltage electrode group 1



Working table 1



1 Insulation pillar

2) Place the left and right leg frames in parallel so that the braked wheels are on the same side(See the right picture on the right);

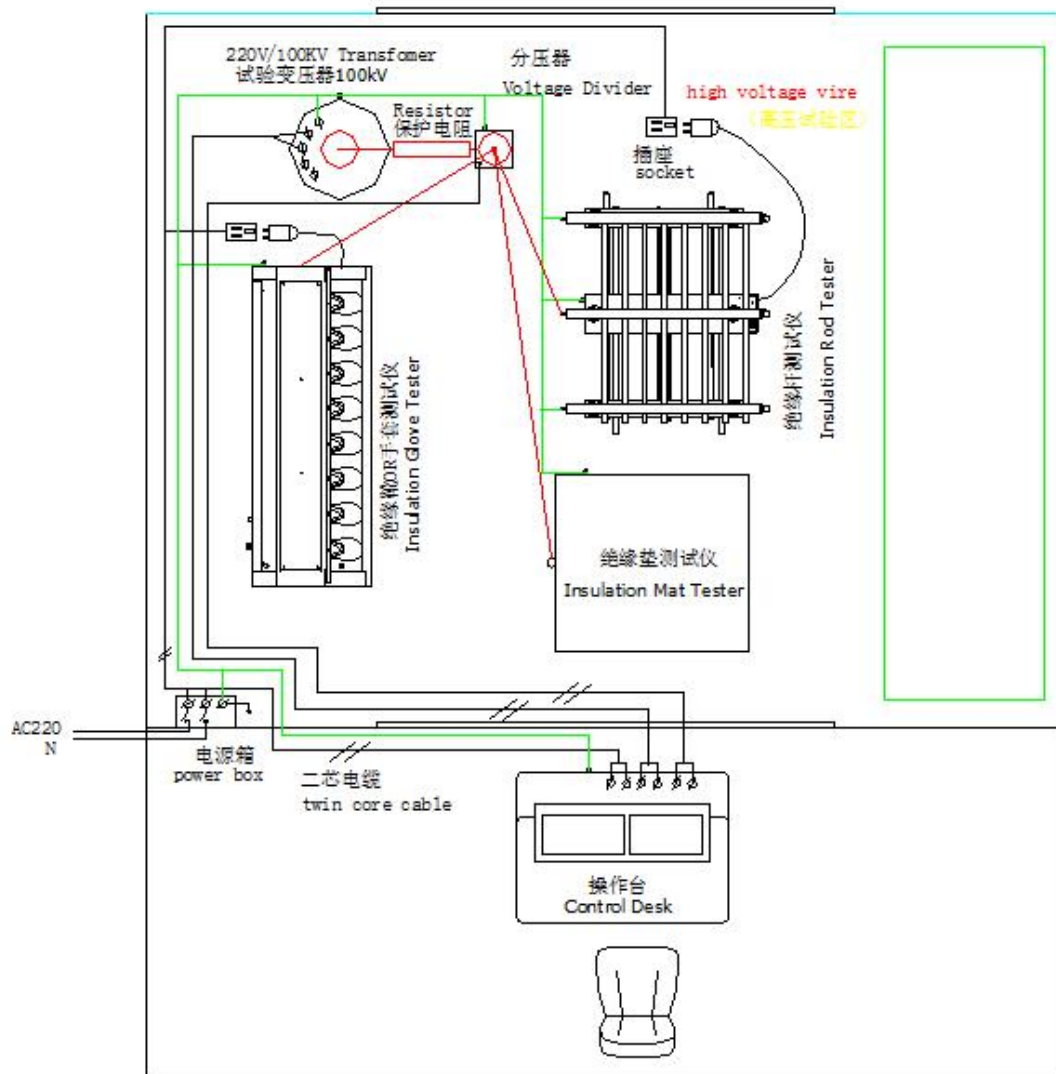
3) Install 4 connectors in the right and left leg frame and tighten the fixing bolts(See the right picture on the right)。

4) Installation of working table:Place the working table as shown in figure 4 and fix the work surface with the wood screws provided.

5) Insert the insulating column into the slot on the side of the working table, and place the high-voltage electrode on the surface of the worktable.

5.3. Connection of main control circuit cables

Main control circuit cable connection as shown in figure 7 below



The J2 terminal in the lower part of console is connected with AC 240V power supply according to the terminal definition diagram.(N, A)And the test transformer low-voltage input terminal J3 terminal is connected with test transformer instrument coil and the voltage divider measuring terminal according to the terminal definition diagram.The J4 terminal is connected with the insulated rod tester station power outlet.

The grounding point of equipment such as console, insulated glove tester, insulation rod tester, insulated pad tester, test transformer, voltage divider are respectively grounded and so on.

Connection cables and ground wires shall be selected in accordance with the specifications specified in schedule 1.

Note:1. The angle between the infrared data communication ports is less than 30 degrees, and



the distance between the two ports is less than 6m.

2. This product is a high-voltage test equipment, and the installation shall ensure that the distance between the high-voltage part of the equipment and the wall or metal equipment is more than 1 meter, and that the distance between the high-voltage live part and the personnel is more than 1.5 meters.

3. The equipment is connected directly to the point of grounding at all points of contact.

4. During the test, all personnel shall be away from the high-voltage live part.

5. After completion of the test, each sample must be discharge with discharge rod.

6. Preparation before the test

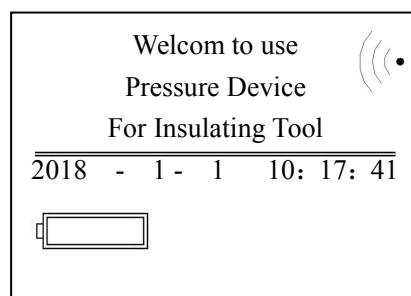
6.1. Console

Connect the power supply, open the lower part of the console to control the power switch, test power switch and backup power switch;

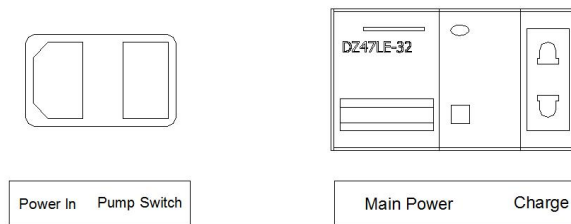
The control key switch in the console panel is placed in the "On" position, the "Power" indicator light is turned on and the control power is connected;

Press the display, the computer boot button, start the computer, open the wireless mouse power switch.

Turn on the "Power" switch of the test section, LCD screen light, into the boot state, warning light green light and screen display as follows:



6.2. Insulation glove tester



The power supply input end is connected with the power outlet of the insulating glove tester with power supply wire;

Turn on the major power switch;

Turn on the mainframe power switch 8 LED leakages current indicator bright.

For the first time, you should do well the following:

- a) Water injection into the flume: Open the inlet valve at the bottom of the abutment and start injecting water into the flume. Close the intake valve when the water depth reaches 26~28 cm.
- b) Hand sleeve injection: Lift the high pressure water the gun, the head of gun is aligned with the insulating glove test tube, pull the high pressure water gun handle into the glove tube, until the liquid level is about 10 cm from the tube, stop the water injection. Pour water into 8 hand sleeves in turn.

6.3. Insulation rod tester

Connecting the power cord with the power outlet to the insulation rod tester power outlet; turn on the power switch. The power switch is on and the power supply is on.

6.3.1. Checking infrared signal connections

After the console is powered on, the upper right corner of the test LCD screen shows the infrared communication status. If you can not see the animation display, please check whether the high voltage discharge measurement and control instrument is turned on, and infrared data communication port is aligned. The bottom left of the screen shows the battery battery simulation bar, when the full cell indicates of the battery is full. It is recommended that the user charge the remaining cell. Battery quantity information is transmitted by infrared data communication. The display in the abnormal state of infrared communication is not the actual information of battery quantity. Please checks the battery quantity information under the normal condition of infrared communication.



6.3.2. Self-inspection of high voltage break

This function test should be carried out before the testing of insulating gloves for the first time or after placing for a long time. Specific operations are as follows:

The 8-way break mechanisms spring of the insulation glove tester is hung on the armature of each tripping equipment.

When the console test part is turned on, pressed any key on the right side of the LCD screen to enter the main menu, as shown in figure:

Tested piece parameter setting
Inquire test result
Auto withstanding voltage test
Print test results
System setting
Clear test record

According to the "V" key moves the cursor down to "System setting", click "CON" button to enter the sub menu, as follows:

System setting
High voltage break self-test
Time setting
System calibration
System inspection
System parameter setting

The cursor is located in the *High voltage break self-test* item. According to the "CON" key, it enters the high-voltage self checking program, automatically starts self inspection, and the 1 to 8 release mechanism acts sequentially, and the spring of the breaking mechanism is dropped. Each self through corresponding to the location of tick "√" on the screen.

High voltage break self-test					
U	kV	I	A	T	S
Leakage current					
N	1	2	3	4	
I mA	√	√	√	√	
N	5	6	7	8	
I mA	√	√	√	√	



6.4. Time setting

This function is used to set clock time, equipment verification, as well as supporting the test transformer, voltage divider and other equipment related parameters set, the general factory has been set up, the users do not need to set. If you need to change, please set as the instructions below.

6.4.1. Time setting

Entering into the "Time setting" submenu and use the "<" or ">" Select time parameter modification, the use of " ^ " or " v " key time parameters and determine the current year, month, day, and time. Configure to press "CON" to save and return to the System setting menu.

6.4.2. System calibration

The instrument uses a high intelligent measuring method, which has the function of automatic calibration of software. The method of potentiometer adjustment is abandoned, and the measuring accuracy will not be reduced because of the aging of the potentiometer or the change of vibration resistance. to ensure long-term stability of the instrument..

Note:*The instrument was strictly calibrated and aged before leaving the factory, the user does not have the calibration conditions, please do not enter the system calibration program.*

6.4.3. System inspection

This feature is specially designed for instrument verification, using single-phase standard power supply and single-phase calibrator for verification. Selecting the system check entry and pressing the CON key to enter the system verification program. Wiring shown figure 8, the test part of the need to remove the calibration wiring.

The verification of leakage current requires on-line testing of the tester host , the insulation glove test host and the transmission of leakage current test data through infrared signals.

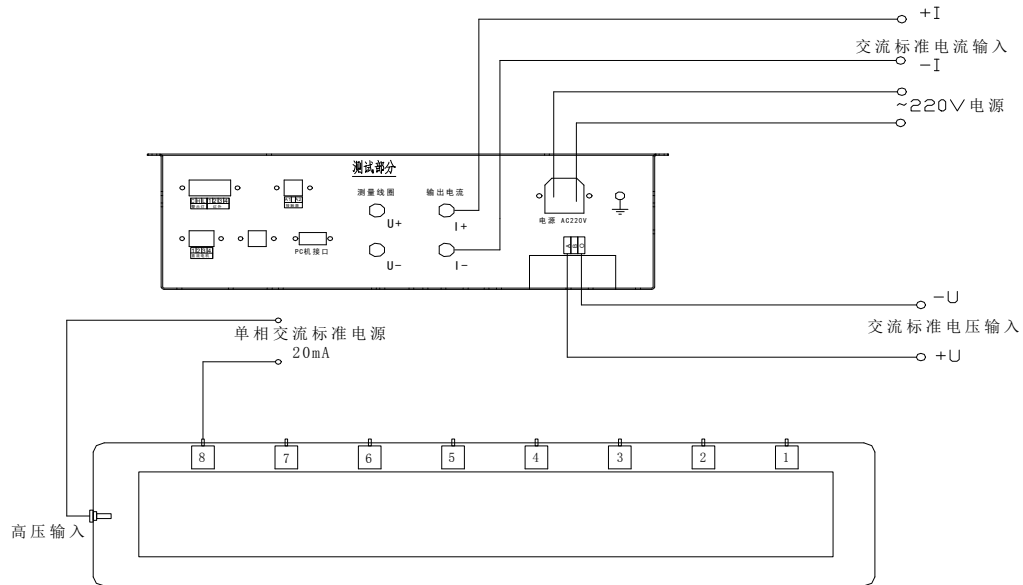
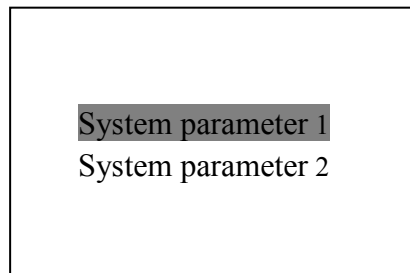


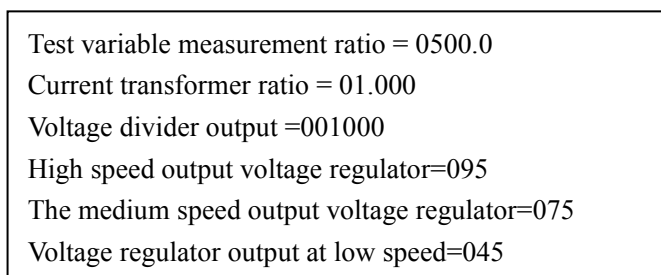
Figure 8 system calibration wiring diagram

6.4.4. System parameter setting

Select the "System parameter setting" entry, press the CON key to enter into the system parameter settings program, and enter the password (Please ask the manufacturer for) to the next menu, as follows:



The cursor is located at "System parameter 1" and press the "CON" key to enter:



1) Test variable measurement ratio setting

Select the test variable measurement change ratio item, press the CON key to enter the setup program, press "<" or ">" Move the cursor, according to "^" or "v" to change the key parameters should be set for supporting AC booster high voltage output of the measuring coil voltage ratio. For example: The



matching AC booster nameplate medium and high voltage output of 50kV, instrument voltage of 100 V, then this parameter should be set to 500.

If the test transformer was self configured by the user, it is necessary to ensure that the voltage ratio of the test coil more than 3% for the voltage ratio of the measured coil.

2) Current transformer ratio setting

Select the "current transformer ratio" item, press the CON key to enter the setting program, press "<" or ">" Move the cursor, according to "^" or "v" to change the key parameters should be set for supporting AC booster low voltage input terminal configuration of the current transformer ratio. For example: If the input of AC booster was 100A / 5A, then this parameter should be set to 20; If the input of the matching AC booster was not connected to the current transformer, the parameter should be set to 1.

3) Voltage divider variable ratio output setting

Select the "voltage divider variable ratio output" item, press the CON key to enter the setup program, press "<" or ">" Move the cursor, according to "^" or "v" key to change the parameters should be set for supporting divider divider ratio. For example: The matching voltage divider ratio is 1000:1, then this parameter should be set to 1000.

4) The other three parameters: High-speed output of regulator, medium speed output of regulator, low-speed output of regulator is used to adjust the speed of motor of regulator. When the factory is out of the place, the debugging has been completed, the user should not change this parameter.

Description:

- A) **The above parameters are system parameters , which are set before the instrument is shipped from the factory. If you need to change the first two parameters, please contact with the company.**
- B) **Parameter setting is completed to clear the test results to take effect. Please upload the data stored in the instrument to PC for proper storage before setting this parameter.**
- C) **After the parameter are reset, you must ensure that this setting is consistent with the actual test parameters before restarting the test.**



7. Operating instructions for insulating apparatus test system

7.1. Software settings

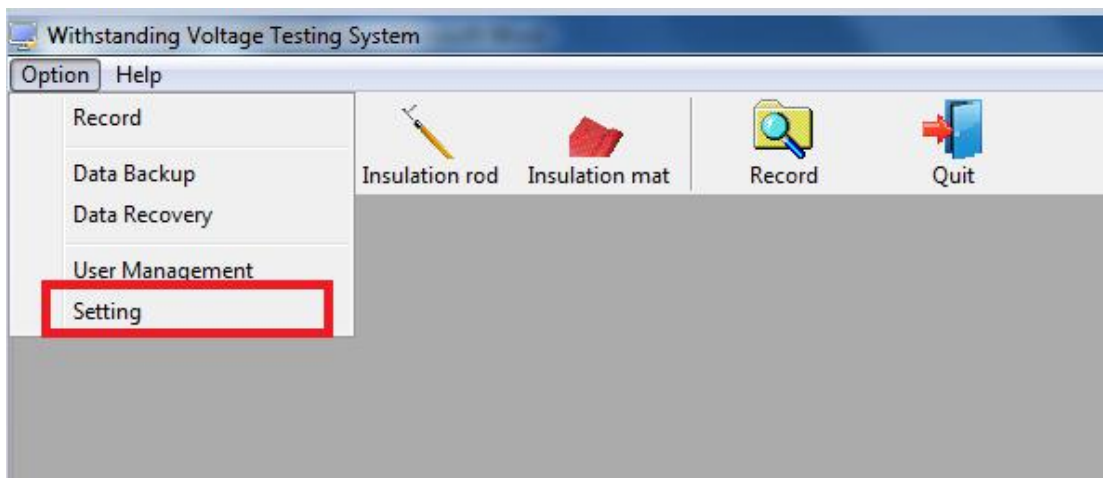


7.1.1. Double click on the desktop to activate the insulation apparatus voltage test system. Login interface as shown:

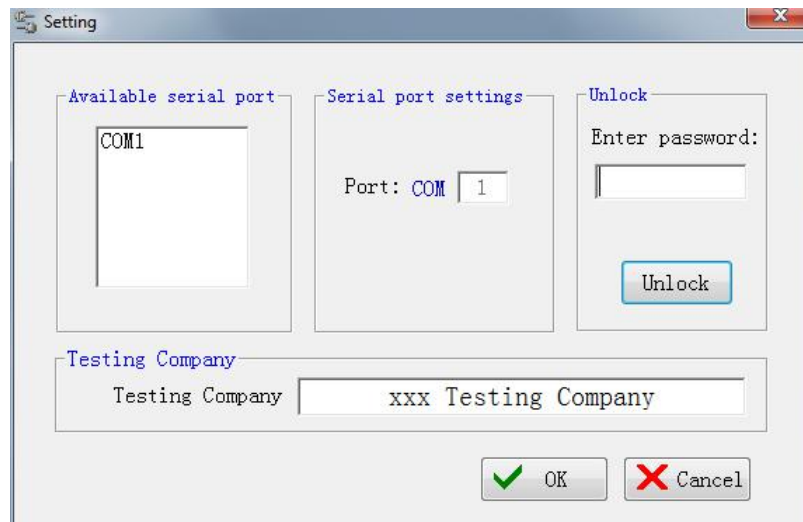


The initial password is blank, click OK button to enter into the system.

7.1.2. Click the menu bar **【Option】** → **【Setting】** , as shown:



Pop-up Serial Port Settings window:

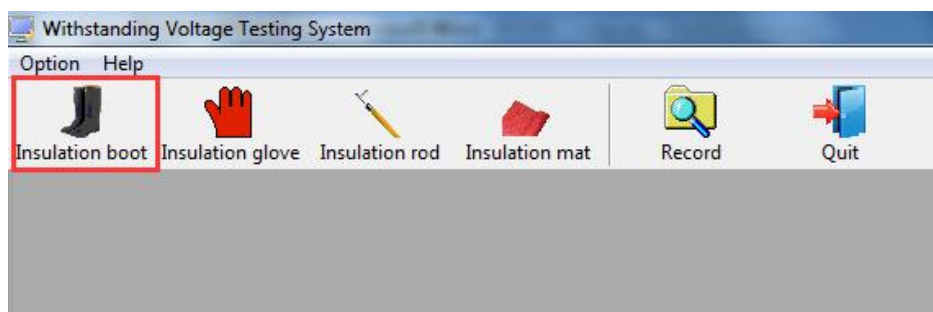


- ① Port is the RS232 serial port number, if you want to modify serial port number and need input password, password is 1234, it has been set before leaving the factory, do not change it arbitrarily.
- ② Testing Company to test the name of the organization this information will be exported to the test report in Excel format.

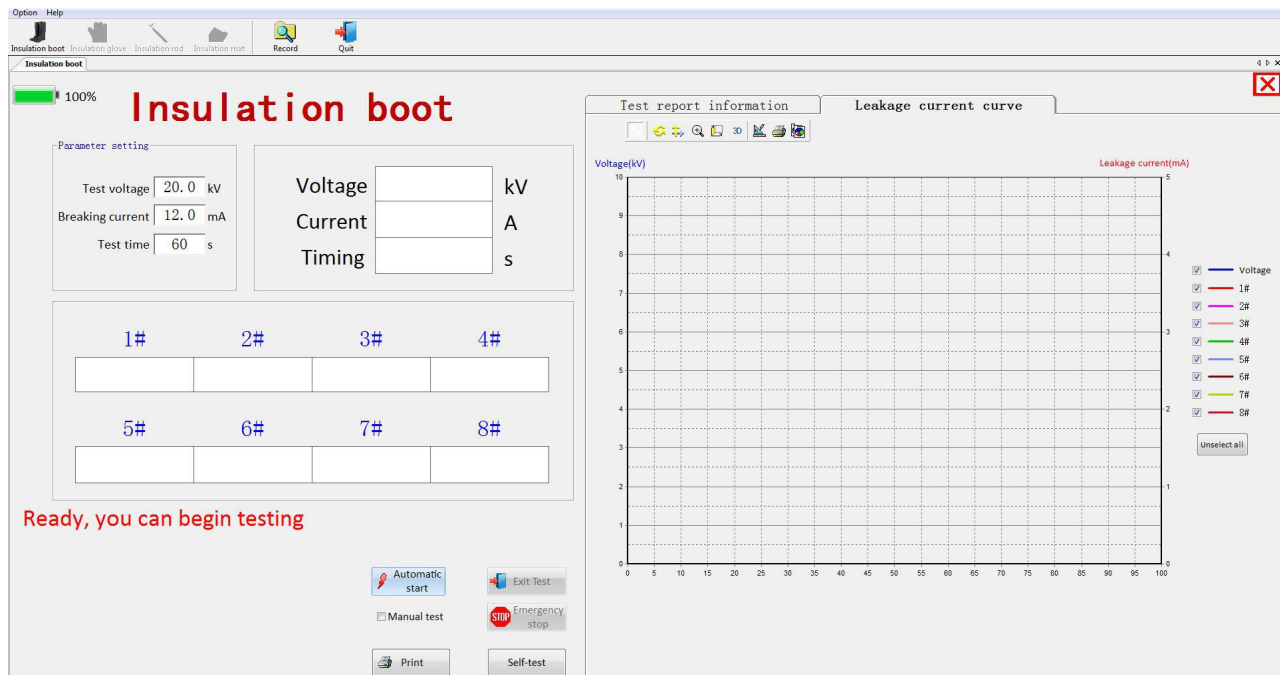
7.2. Withstand voltage test of insulating boots

7.2.1. Follow the instructions in clause 8.2.1 of this manual for the operation of insulating boots, and check that the high-voltage lines and ground lines are correct and reliable.

7.2.2. Click the Insulation bootstrap of the toolbar, as shown in figure:



Enter the insulation boot power frequency voltage test:



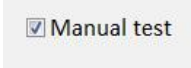
Enter the values of test voltage, breaking current and withstand voltage under [Parameter Setting] (refer to Table 1 and Table 2). Click  , experiment begins. The closing, boosting, timing, lowering, opening and saving of the test results will be done automatically.

Parameter sets the meaning of each parameter in a column:

Test voltage: The voltage setting value of the voltage test is required, and the boost will be stopped automatically when the voltage is raised to the set voltage value.

Breaking current: Once the leakage current of a single sample exceeds this setting value, the corresponding high-voltage sub-section of the road will be automatically disconnected and the other routes will continue to be tested.

Pressure-resistant time: During the test when the voltage rises to the set value of the test voltage, the timing will start automatically, and when the timing time reaches the preset value of the voltage time, the voltage will fall automatically.

After checking  , you can also click on the button to lift and lower the pressure manually to control the rise and fall. When you reach the required voltage, click the timing button and start the timing. When the chronograph time reaches the set value, the voltage will be lowered automatically, then the switch will be opened, the test is completed. As shown in the figure:

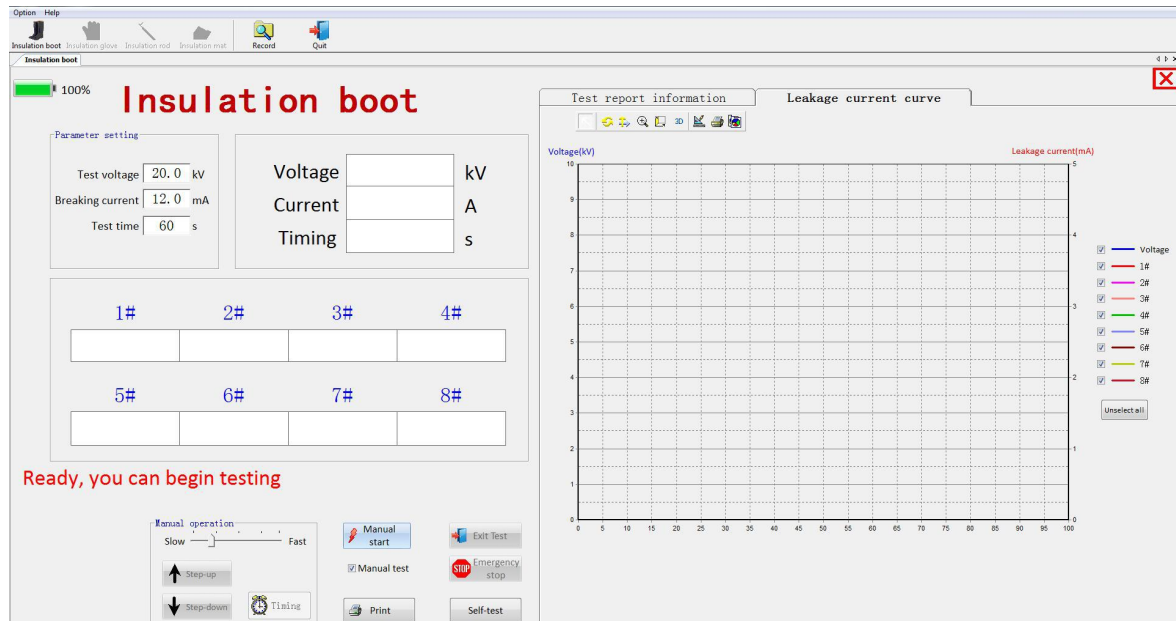


Figure 6

During the test, the curves of the test voltage and the leakage current of 8 channels will be drawn in real time in the curve chart area, which is convenient to analyze the test results. As shown in the figure:

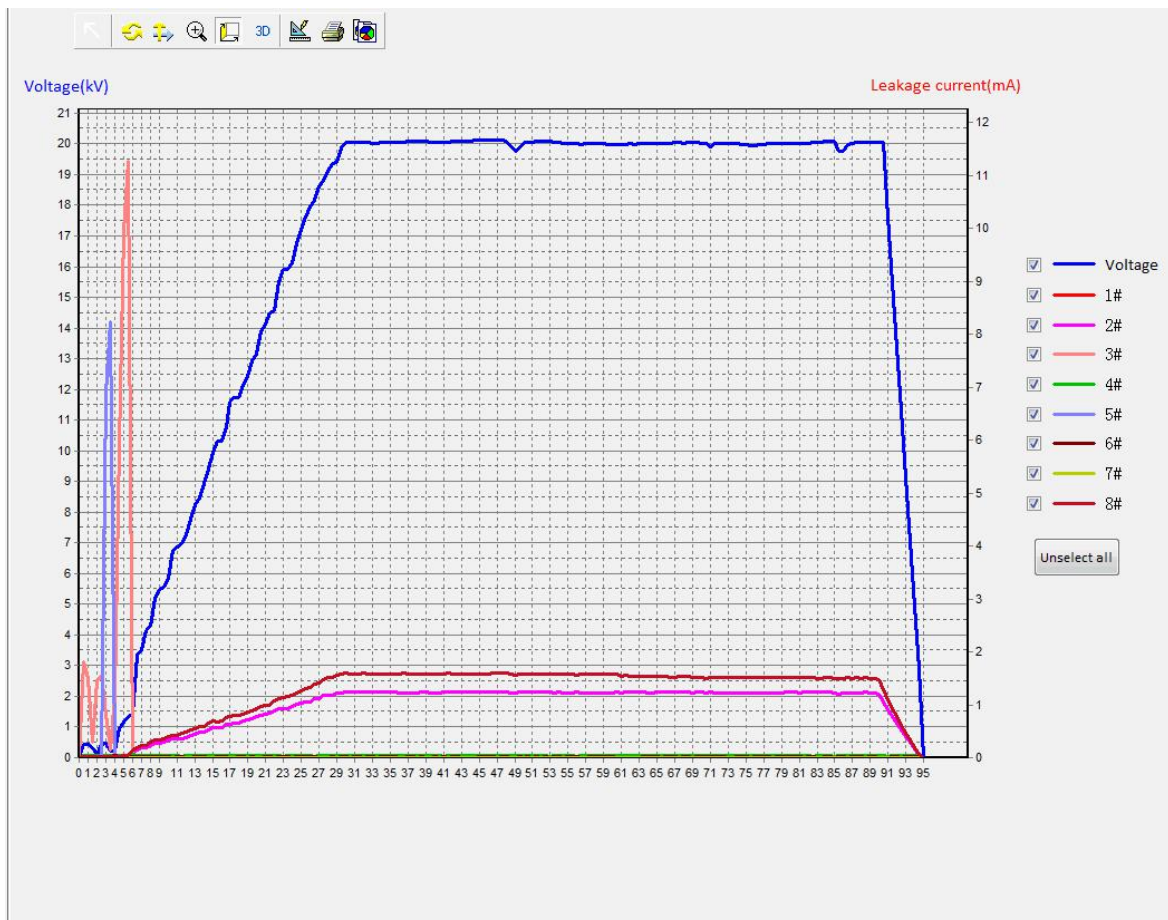




Figure 7

Note:The transverse coordinate is the test time, the left vertical coordinate is the test voltage, and the right vertical coordinate is the leakage current.

7.3. Voltage test for insulating gloves

The voltage test procedure of insulated gloves is the same as that of insulating boots. Please refer to terms 7.2 and 8.2.2.

7.4. Insulation Rod withstand Voltage Test

The insulation rod voltage test process is the same as the insulation boot voltage test process, please refer to terms 7.2 and 8.2.3 operating.

7.5. Insulation pad voltage test

The insulation pad voltage test process is the same as the insulation boot voltage test procedure, please refer to terms 7.2 and 8.2.4.

8. Manual instructions

8.1. Basic functions

8.1.1. Selection of the main menu

After booting up, press any key on the right side of the LCD screen to enter the main menu:

Tested piece parameter setting
Inquire test result
Auto withstanding voltage test
Print test results
System setting
Clear test record

According to the “^” or “v” button to select the main menu options (Tested piece parameter setting, Inquire test result, Auto withstanding voltage test, Print and so on), etc. Press the "CON" key to enter the selected item submenu.

8.1.2. Tested piece parameter setting

When the cursor is in the "Tested piece parameter setting" position, press the "CON" key and enter the test parameter settings submenu:



Create: OK
Tested piece sequence: 01
Tested piece code: 000000
Test voltage: 035.00kV
Tested piece type:
Insulating boots

The display number is the last set of test parameters stored in the current tester. To test a new set of items to be a new record, select the "Create" menu by pressing the CON key, and automatically add the serial number to the Tested piece code. Test voltage, Tested piece type, etc. Select the project by " $\wedge$ " or " $\vee$ " button " $<$ " or " $>$ " button to select the parameters. Then press the "CON" key to save and return. "Tested piece code," is the code name for a set of samples, which can be set to six digits; "Test voltage" is the test transformer high-voltage output voltage, according to the need to set. "Tested piece type" can be set: Insulation boots, gloves, rods, electrical appliances, insulation clothing, insulation rope, bucket arm car, shelter cover, according to the need to be test the test setting. The selection of the above parameters are described in detail in the following chapters.

8.1.3. Inquire test result

Under the main menu, the cursor is in the "Inquire test result" entry. Press the "CON" key to enter the query test results submenu:

Tested piece sequence No.: 01
Tested piece code No.: 000000
Test voltage: 035.00kV
Tested piece type:
Insulating boots

According to the " $\wedge$ " or " $\vee$ " to query the sample number, " $<$ " or " $>$ " button to flip the selected number of query results.

You can refer to the test parameters under any sequence number, automatic test records and test results and test date, press CON key to return to the main menu.

8.1.4. Print test results

Under the main menu, the cursor is in the "Print test results" entry. Press the "CON" key to enter the query test results submenu:



Print test results
Select sequence no.: 01
Printing selection: √

According to the“^”“√” button to move the cursor position, “<”“>”button to change the setting.

When the cursor is located as shown above, press the ">" button to select to print the serial number, selected according to "V" button to place the cursor on the next line, according to the "<" or ">" button, display "√", then press "CON" button to start printing.

8.1.5. Clear test record

Under the main menu, the cursor is in the "Clear test record" entry. Press the "CON" key is displayed. The "ok?".If you press the CON key again at this point, all saved test records will be cleared.

8.2.Voltage test for insulating gloves and boots

The test system is composed of insulation glove tester, console, test transformer, voltage divider, protective resistance and high voltage bus.When carrying out this test, the high-voltage wire connected between the insulation rod tester, the insulation pad tester and the high-voltage bus should be removed, and whether the ground wire of the CON equipment is reliable or not.

8.1.6. Voltage withstand test of insulating boots

A) Parameter setting of specimen

Enter the test parameter setting submenu:

Create: OK
Tested piece sequence: 01
Tested piece code: 000000
Test voltage: 015.00kV
Tested piece type:
Insulating boots

Select "Create", press the "CON" key, the test number automatically add 1;According to the user's needs to set sample number;Test voltage is set according to DL/T1476 and DL/T976 standards(See table below 1.Table 2), For example:The current test is 10kV insulation boots and the test voltage is set to 15kV according to the DL/T1476-2015 standard.Sample type is selected as "insulation boot". After setting,, press "CON" key to save.



Table 1 Auxiliary insulating boots(Shoes)Pilot projects, cycles and requirements (DL/T1476-2015)				
Project	Period	Test voltage (kV)	Duration (min)	Leakage current (mA)
Power frequency withstand voltage test	Half a year	15	1	≤ 6

Table2Insulating shoes(Boots)Electrical characteristics of (DL/T976-2005)		
Type	Rated voltage (V)	Ac tolerance voltage(Effective value) (V)
1	3000	10000
2	10000	20000
3	20000	30000

B) Placement of insulating boots

The test bench is used to test the insulation boots with two working modes: dry test and wet test.

1) Operating steps of dry test work mode

- The steel beads are added to 8 insulating boots in accordance with the requirements of the DL/T1476 standard.
- Put the steel ball insulated boots in the sink and put them directly under the 8-way break mechanism.
- Eight high-pressure guide chains are hung on the hook under the dynamic contact of the 8-way break mechanism respectively and embedded in the steel beads.

2) Operational steps of wet trial working mode

- Turn on the "pump switch" on the right side of the test table.
- Put the insulation boots in the sink and place them directly under the 8-way breaking mechanism.
- The muzzle of the electric water injection gun is aligned with the center position of the insulating boot, and in accordance with the water surface height is the DL/T1476 standard. During water injection, be not careful to wet the inner wall of the sample above the liquid level.
- Eight high voltage guide chains are hung on the hook under the dynamic contact point of the 8-way break-off mechanism respectively, and are hung below the liquid level in the tested insulation boots.

Note: If the tested material is electric insulating leather shoes or insulating cloth rubber shoes,



the water level in the sink should be adjusted to ensure that the water is not soaked in the uppers.

C) Automatic withstand voltage test

Under the main menu, select the "automatic pressure Test" item and press "CON" to enter the submenu:

Auto insulating boots
withstanding voltage test
Test parameter setting
Breaking current: 6.0mA
Test time: 60 s
Voltage boosting setting:
manul
Measuring coil voltage:01000

The breaking current is set according to the leakage current value required in DL/T1476 standard, see Table 1 above;The test time is 60 s according to the standard requirement;the boost is set to "automatic", if set to manual, you need to manually press the "boost" "down" key for testing;No setting is required to measure the variable ratio. Check the display value is consistent with the matching voltage divider divider, and if inconsistent shall be re-set in accordance with the 6.6.4 system parameters of this specification.

After the above parameters are set, press the "CON" key to save and enter the experimental state, as shown below.If the green light is off, the red light is on,check the upper right corner of the instrument display whether the infrared communication status is normal, if you can not see animation please check the infrared data communication port is correct.

Auto withstanding voltage test					
U	kV	I	A	T	S
Leakage current					
N	1	2	3	4	
I mA					
N	5	6	7	8	
I mA					
Press the enter key start test					

Press the "CON" button again to start the test, the contactor will pull up,and the equipment automatically starts to rise at the speed required by the national standard, after rising to the set voltage



value, the voltage is kept and the timing starts. During the test insulation gloves tester through the infrared data communication port 8-way leakage current test data transmitted to the tester and real-time display. Timing time, the instrument automatically reduced to zero to cut off the test power supply and saved the test data. In the course of test, if the breakdown or discharge value of a test samples exceeds the set value, the high-voltage breaking mechanism of the road will be operated, the test sample will automatically break away from the high pressure, and the other samples will continue to test. Simultaneously, the corresponding position of the test screen shows the test voltage when the sample is detached.

D) removal of the specimen

Note: Before removing the sample, discharge the high voltage connecting end of each sample separately with the hook position of the discharge rod in the stainless steel guide chain or the upper end of the spring cavity to ensure the safety.

After discharge, remove the 8 tested insulation boots. For wet test operation, water should be poured into the test tank, dry and properly kept. For dry test operation, please dry the outer wall of insulating boots and pour the steel beads back into the box and keep it properly.

8.1.7. Voltage test for insulating gloves

A) Parameter setting of A) specimen

Enter the test parameter setting submenu:

Create: OK
Tested piece sequence: 02
Tested piece code: 000002
Test voltage: 008.00kV
Tested piece type:
Insulating gloves

Select "Create", press the "CON" key, the test number automatically add 1; The sample number is set according to the user's needs; Test voltage is set according to DL/T1476 and DL/T976 standards (see Table 3, table 4), For example: The current test is 10kV insulated gloves, and the test voltage is set to 8kV according to the DL/T1476-2015 standard. (see Table 3 below). The type of the test sample is selected as "insulation gloves". After setting up, press "CON" key to save.



Table 3 Auxiliary insulating boots(Shoes)Pilot projects, cycles and requirements (DL/T1476-2015)					
Project	cycle	voltage level (kV)	Test voltage (kV)	Duration (min)	Leakage current (mA)
Power frequency withstand voltage test	Half a year	Low pressure	2.5	1	≤ 2.5
		High pressure	8	1	≤ 9

Table 4 Electrical characteristics of insulating gloves(DL/T976-2005)			GB 17622-2008
Type	Rated voltage (V)	Ac tolerance voltage(Effective value) (V)	Water injection depth
1	3000	10000	40
2	10000	20000	90
3	20000	30000	130

B) placement of insulating gloves

Application of the test stand insulation gloves pressure test..

- 1) Turn on the power switch on the right side of the test bench.
- 2) The test support with special test tube for insulating gloves is placed directly under the support arm of the breaking mechanism, and the insulating gloves are placed in the special test tube so that it is located directly under the breaking mechanism of 8-way.
- 3) The electric water gun barrel is aimed at the middle position of the insulated glove, and the water gun handle is injected into the water. The height of the water surface is according to GB 17622-2008*Insulated gloves for live use* Standard requirements;During water injection, be not careful to wet the inner wall of the sample above the liquid level.
- 4) Using electric water injection gun to inject proper amount of water into the special test tube.
- 5) Eight high voltage guide chains are hunged on the hook under the dynamic contact point of the 8-way break-off mechanism respectively, and are hunged below the liquid level in the tested insulation boots.

C) automatic withstand voltage test

Under the main menu, select the "automatic pressure Test" item and press "CON" to enter the submenu:



Auto insulating gloves
withstanding voltage test
Test parameter setting
Breaking current: 8.0mA
Test time: 60 s
Voltage boosting setting:
manul
Measuring coil voltage:01000

The breaking current is set according to the requirements in DL/T1476 standard, see table 3 above;The test timing is 60s according to the standard requirement;The booster set to "automatic", if set to manual, manually you need to press the "boost" "down" key for testing;No setting is required to measure the variable ratio. Check whether the displayed value is consistent with the matching voltage divider divider, and if inconsistent shall be re-set in accordance with the 6.6.4 system parameters of this specification.

After the above parameters are set, press the "CON" key to save and enter the experimental state, as shown below.Warning light green light red light, check the upper right corner of the instrument display whether the infrared communication status is normal, if you can not see animation ,please checking the infrared data communication port is aligned.

Auto withstanding voltage test					
U	kV	I	A	T	S
Leakage current					
N	1	2	3	4	
I mA					
N	5	6	7	8	
I mA					
Press the enter key start test					

Press the "CON" button again to start the test, the contactor is sucked up, the equipment automatically starts to rise at the speed required by the national standard, after rising to the set voltage value and start counting , the voltage is kept and the timing starts.In the course of the test, the insulation glove tester transmits the leakage current data of 8-way leakages to the tester and displays them in real time through the infrared data communication port.Timing time, the instrument automatically depressurize and save the test data while cutting off the test power.

During the test, if the breakdown or discharge value of one of the test samples exceeds the set



value, the high-voltage breaking mechanism of the road will be operated, the test sample will automatically break away from the high pressure, and the other samples will continue to test. Simultaneously, the corresponding position of the test screen shows the test voltage when the sample is detached.

B) removal of the specimen

Note: Before removing the sample, discharge the high voltage connecting end of each sample separately with the hook position of the discharge rod in the stainless steel guide chain or the upper end of the spring cavity to ensure the safety.

After discharge, take out 8 insulating gloves, please pour water into the test tank, dry the gloves and keep it properly.

8.1.8. Equipment charging

The mainframe of the insulating glove tester has a lead acid battery built in to power the measuring part and the LED display module. The equipment should be charged with a complete set of chargers timely, and when the equipment is idle, the power switch of the test mainframe will be closed.

8.2. Insulation Rod withstand Voltage Test

The test system is composed of insulation rod tester, console, test transformer, voltage divider, protective resistance and high voltage busbar. When conducting this test, the high voltage wire between the main electrode and high voltage busbar of the insulation rod tester will be connected, and the high voltage wire connected between the insulation glove tester, the insulation pad tester and the high voltage busbar will be removed. And make sure that the grounding wire of each equipment is reliable or not.

A) Parameter setting of specimen

Enter the test parameter setting submenu:

Create: OK
Tested piece sequence: 03
Tested piece code: 000003
Test voltage: 045.00kV
Tested piece type:
Insulating rod



Select the new item, press the CON key, and the test sample number automatically plus 1;The sample number is set according to the user's needs;Test voltage is set according to DL/T1476 and DL/T976 standards(See table below 5.Table 6), For example:The current test is 10kV insulation operating lever, and the test voltage is set to 45kV according to the DL/T1476-2015 standard.(see Table 5 below).Sample type is selected as "insulation rod class". When setup is complete, press "CON" key to save.

B)

Table 5 Test items, cycles and requirements for insulating rods（DL/T1476-2015）					
Project	Period	Request			
		Rated voltage （kV）	Test length （m）	Withstand voltage （kV）	
				1min	3min
Power frequency withstand voltage test	1 Year	10	0.7	45	—
		35（20）	0.9	95	—
		66	1.0	175	—
		110	1.3	220	—
		220	2.1	440	—
		330	3.2	—	380
		500	4.1	—	580
		750	4.7	—	780
		1000	6.3	—	1150
Note:The test length and voltage of h < 500m in the table are above sea level.					

Table 6 Electrical performance of 10kV / 220kV Voltage Grade operating Rod (DL /T976-2005)		
Rated voltage (kV)	Distance between test electrodes (m)	1Min power frequency tolerance voltage (kV)
10	0.4	45
35	0.6	95
66	0.7	175
110	1.00	220
220	1.80	440

placement tes

The distance between the main electrode and the auxiliary electrode is adjusted with the remote control or button to reach the value specified in Table 5 or 6 above.The base of the insulation rod tester is equipped with a scale, and the distance between the electrodes can be read intuitively.The distance between the main electrode and the auxiliary electrode is the test length.The test instrument can be used to test the voltage resistance of two stage insulations rod at time.

Open the self-locking device of the main electrode and the auxiliary electrode on both sides,



making the electrode open, and put 8 insulating rods into the conductive bubble cotton electrode tank of 8 working positions respectively.

Three electrodes were closed and locked.

C) Automatic withstand voltage test

Under the main menu, select the "automatic pressure Test" item and press "CON" to enter the submenu:

Insulating rod withst-
Anding voltage test
Test parameter setting
Test transformer:1#Access
Test time: 60 s
Voltage boosting setting:
manul
Measuring coil voltage:01000

The test changes default to 1# access without change;The test time is 60s according to the standard requirement;The boost is set to "automatic", if is set to manual, you need to manually press the "set up" or" set down" key for testing;No need to set the measurement the variable ratio. Check wether the displayed value is consistent with the matching voltage divider divider, and if inconsistent will be re-set in accordance with the 6.6.4 system parameters of this specification.

After setting the parameters, press the "CON" key to save and enter the experimental state, as shown in the figure below.Warning lights, green lights, red lights.

Insulating rod withst- Anding voltage test		
Measuring coil	U=	V
Voltage divider	U=	kV
Input current	I =	A
Withstand time	T=	s
Press the enter key start test		

Press the "CON" button again to start the test, the contactor is sucked up, the tester automatically boosts up to the set voltage value to hold the voltage and start timing.Timing time, the instrument automatically depressurize and save the test data while cutting off the test power.

This set of equipment can remove 8 insulation rod withstand voltage test at the same time. In the course of test, if one of them occurs flashover or discharge,during the test ,immediately should be stopped by pressing the "stop" button.After discharging the voltage-proof test stand, the abnormal insulation rod is eliminated and the rest are retested.



D) Removal of the specimen

Note:To ensure safety, discharge rods should be used at the high voltage access end of each sample to discharge separately before taking out the sample.

After discharge, 3 groups of electrodes were opened and 8 insulation rods were taken out and kept properly.

8.3.Insulation pad voltage test

Application of insulation mat tester and console, console, test transformer, voltage divider, protective resistance and high voltage bus.During the test, the high voltage wire between the high voltage input end and the high voltage busbar of the insulation pad tester will be connected, and the high voltage wire connected between the insulation glove tester, the insulation rod tester and the high voltage busbar shall be removed. And make sure that the grounding wire of each equipment is reliable or not.

A) Test parameter setting

Enter the test parameter setting submenu:

Create: OK
Tested piece sequence: 04
Tested piece code: 000004
Test voltage: 015.00kV
Tested piece type:
Insulating suits

Select "Create", press the "CON" key, the test sample number will be automatically increased by 1;The sample number is set according to the user's needs;Test voltage is set according to DL/T1476 and DL/T976 standards(See table below 5.Table 6).Sample type is selected as "insulating clothing". after setting is completed, press the "CON" key to save.

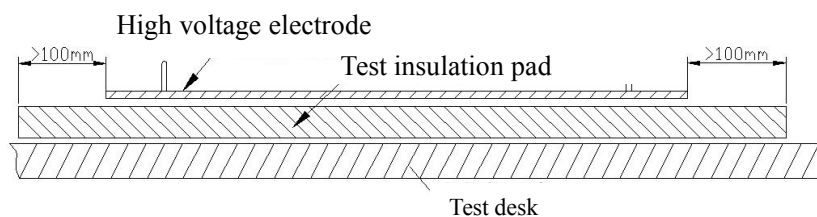
Table 7 Test items, cycles and requirements for auxiliary insulating rubber mats (DL/T1476-2015)				
Project	Period	Request		
Power frequency withstand voltage test	1 Year	Rated voltage (kV)	Withstand voltage (kV)	Duration (min)
		Low pressure	3.5	1
		High pressure	15	1

Note:Used in live equipment area

Table 8 AC voltage resistance of insulating mats (DL /T976-2005)	
Rated voltage (kV)	1min power frequency tolerance voltage (kV)
0.38	45
3	95
6、10	175
20	220

B) Placement test

Taking the insulation pad tester high voltage pole plate, the insulation pad flat on the test table, high voltage pole plate cover on the insulation pad, the position as shown in the following figure, and ensure good contact. Will be insulated high-voltage clamp column folder in the high-voltage electrode plate handle position..



C) Automatic withstand voltage test

Under the main menu, select the "automatic pressure Test" item and press "CON" to enter the submenu:

Insulating device withst-
Anding voltage test
Test parameter setting
Test transformer: 1#Access
Test time: 60 s
Voltage boosting setting:
manul
Measuring coil voltage:01000

The test changes default to 1# access without change;The test time is 60s according to the standard requirement;The booster is set to "automatic", if is set to manual, you need to manually press the "set up" "set down" key for testing;No need to set the measurement the variable ratio. Check wether the displayed value is consistent with the matching voltage divider divider, and if inconsistent will be re-set in accordance with the 6.6.4 system parameters of this specification.

After setting the parameters, press the "CON" key to save and enter the experimental state, as shown in the figure below.Warning lights, green lights, red lights.



Insulating device withstanding voltage test		
Measuring coil	U=	V
Voltage divider	U=	kV
Input current	I =	A
Withstand time	T=	s

Press the enter key start test

Press the "CON" button again to start the test, the contactor is closed, the tester automatically boosts and rises to the set voltage to hold the voltage and start counting..Timing time, the instrument automatically depressurize and save the test data while cutting off the test power.

During the test, if flashover or discharge occurs, the test should be stopped immediately by pressing the "stop" button.

D) Take out the sample

Note:To ensure safety, discharge rods should be used at the high voltage access end to discharge separately before taking out the sample.

After discharge, remove the high voltage plate, take out the insulation pad and keep it properly.

9. Maintenance and maintenance of equipment

9.1. Please read this manual carefully before using it.

9.2. Insulation glove tester test mainframe built-in battery, battery should be charged in time when the battery is insufficient;The battery should be recharged every 1 to 2 months during the long storage period.

9.3. The test table of the insulation pad tester and the high voltage electrode plate should keep the surface level and avoid injury.

9.4. All equipment insulation should be moisture-proof and not impregnated, if stains are dried with wet cloth and fully dried.

10. Security measures

This set of equipment for the test and test equipment for the corresponding protection measures, the instrument with over-current and discharge protection, when there is over current or discharge situation, the instrument will prompt "over current".Or "discharge".

Tester panel is equipped with a"emergency stop" button. In case of accident, the test can be stopped in order to protect the safety of the test sample and test personnel.



11. After-sales service

11.1. This product will be maintained free of charge for one year from the date of sale. If the equipment is not damaged in normal use, cost will be charged at your discretion.

11.2. The warranty period, life-long maintenance, only charge the cost..

12. Configuration list

Serial number	Name	Type	Factory number	Quantity
1	Console	HZAQ-KS	186802	1 Unit
2	Automatic insulating glove tester	HZAQ-YW	176975	1 Set
3	Computers	21-Inch screen		1 Set
4	Inflatable test transformer	10kVA/100kV		1 Unit
5	Voltage divider	100kV/1.5		1 Unit
6	Metal protective resistance	100kV 5KΩ 0.2A		1 Unit
7	Insulation rod tester	HZAQ-YG	176480	1 Set
8	Insulation pad tester	HZAQ		1 Set
9	Spare parts			
10	Safety pipe	2A		10
11	Fuse	10*38 10A		6
12	Lead acid battery charger	14.6V 5A		1
13	Lead acid battery	12V 4AH		1
14	Spring cavity			2
15	Hand sleeve	Do a good job of wiring		2
16	Water pump	HZAQ-YW use		1 Unit
17	Distribution line			1 Set
18	Product specification			1 Set
19	Factory inspection report			1 Set