OPERATION MANUAL

TH9301

Withstanding Voltage/Insulation Resistance Tester

Content

Chapter 1Setup

This chapter describes the procedures from unpacking to installation to operation checking.

1.1 Unpacking

Upon receiving the product, confirm that the necessary accessories are included and have not been damaged in transit. Should any damage or shortage be found, please contact TongHui distributor/agent.

Items	Quantity
TH9301/A/ B AC/DC withstand voltage/insulation tester	1
TH90003B withstanding-voltage test lead wires	1
TH90004 withstanding-voltage ground lead wires	1
3A Fuse	2
AC Power cord	1
Operation Manual	1
Test Report	1
Servicing card	1
Accessories ordered by customer	1

1.2 Precautions for Installation

Be sure to observe the following precautions when installing the tester.

■ Do not use the tester in a flammable atmosphere.

To prevent explosion or fire, do not use the tester near alcohol, thinner, or other combustible materials, or in an atmosphere containing such vapors.

■ Avoid locations where the tester is exposed to high temperatures or direct sunlight.

Do not locate the tester near a heater or in areas subject to drastic temperature changes.

Operating temperature range: 5 °C to +35 °C

Storage temperature range: -20 °C to +70 °C

■ Avoid humid environments.

Do not locate the tester in a high-humidity environment—near a boiler, humidifier, or water supply.
Operating humidity range: 20 % to 80 % RH (no dew condensation permitted)
Storage humidity range: 90 % RH or less (no dew condensation permitted)
Condensation may occur even within the operating humidity range. In that case, do not start using the tester until the location is completely dry.

Do not locate the tester in a high-humidity environment—near a boiler, humidifier, or water supply.
Operating humidity range: 20 % to 80 % RH (no dew condensation permitted)
Storage humidity range: 90 % RH or less (no dew condensation permitted)
Condensation may occur even within the operating humidity range. In that case, do not start using the tester until the location is completely dry.

■ Do not place the tester in a corrosive atmosphere.

Do not install the tester in a corrosive atmosphere or one containing sulfuric acid mist or the like. This may cause corrosion of various conductors and imperfect contact with connectors, leading to malfunction and failure, or in the worst case, a fire.

■ Do not locate the tester in a dusty environment.

Dirt and dust in the tester may cause electrical shock or fire.

■ Do not use the tester where ventilation is poor.

This tester features a forced-air cooling system. Provide sufficient space for the air inlet on the lateral side and the air outlet on the rear side to allow air to flow.

■ Do not place the tester on a tilted surface or in a location subject to vibrations.

If placed on a non-level surface or in a location subject to vibration, the tester may fall, resulting in damage and injury.

■ Do not use the tester in locations affected by strong magnetic or electric fields.

Operation in a location subject to magnetic or electric fields may cause the tester to malfunction, resulting in electrical shock or fire.

■ Do not use the tester in locations near a sensitive test instrument or receiver

Operation in a location subject, may cause such equipment may be affected by noise generated by the tester.

At a test voltage exceeding 3 kV, corona discharge may be generated to produce substantial amounts of RF broadband emissions between grips on the test leadwire. To minimize this effect, secure a sufficient distance between alligator clips. In addition, keep the alligator clips and test lead wire away from the surfaces of conductors (particularly sharp metal ends)

1.3 Precautions for Moving

When moving the tester to the installation site or otherwise transporting it, take the following precautions:

■ **Before moving the tester, turn off the power switch.**
Transporting the tester with its POWER switch on can lead to electric shock and damage.

■ **When moving the tester, Disconnect all wires from it.**
Moving the tester without disconnecting the cables may result in breakage of the wire or injury due to the tester tipping over.

1.4 Check power supply and fuse

1.4.1 Switch power voltage

⚠ **WARNING**：This instrument is designed to operate from the overvoltage category II.

Do not operate it from the overvoltage category III or IV.
Before turning on the power, make sure of the fuse and the source voltage agree with the LINE-VOLTAGE RANGE switch on the rear panel.
Nominal voltage range (allowable voltage range):
100 V to 120 V AC (85 V to 132 V AC)
200 V to 240 V AC (170 V to 250 V AC)

Allowable frequency range: 47 Hz to 63 Hz
⚠ **WARNING** To prevent malfunctions, be sure to operate within the line-voltage range.

1.4.2 Checking and replacing fuse

⚠ **WARNING** To prevent electric shock, before checking or replacing the fuse, be sure to turn off the POWER switch and unplug the AC power cord.
Make sure that the fuse used conforms to the instrument specifications, including shape, rating, and characteristics. Using a fuse with different rating or short-circuiting, the fuse holder will damage the instrument.

1. Turn off the POWER switch, and unplug the AC power cord.
2. On the rear panel, remove the fuse holder, by pushing it inward and unscrewing it counterclockwise using a screwdriver.
3. In accordance with the fuse rating specified below, check the fuse type and replace the fuse.
4. Following the above steps in the reverse order, reinstall the fuse holder.

Output voltage range	Frequency range	Fuse type	Max.power
100-120V		3A	150VA
200-240V			

1.5 Connecting the AC Power Cord

The power cord that is provided varies depending on the destination for the product at the factory-shipment.
Do not use the AC power cord provided with the product as a AC power cord for other instruments.
Connection procedure:
1. Confirm that the supply voltage is within the line voltage range of the tester.
2. Confirm that the POWER switch on the tester is off.
3. Connect the AC power cord to the AC LINE connector on the rear panel.
Use the provided power code or power code that is selected by qualified personnel.
4. Plug in the AC power cord.

1.6 Grounding

⚠ **WARNING** Be sure to connect the tester to an electrical ground (safety ground). If the

output to a conveyer or peripheral device that is connected to an earth ground or a nearby commercial power line is short-circuited without grounding, the tester chassis is charged to an excessively high voltage, resulting in extreme danger.
This tester is designed as a Classy equipment (equipment protected against electric shock with protective grounding in addition to basic insulation). Therefore, electric shock may occur without proper grounding.

To ensure safety, be sure to ground the tester.
Choose either of the following two available methods of doing so:
1. Connect the AC power cord to a three-contact grounded electrical outlet.
2. Connect the protective conductor terminal on the rear panel to the earth ground.
Have specialized engineers select, manufacture, and install cables.
To ensure secure connection, use proper tools.

Safe earth

1.7 Checking Operations

⚠ **WARNING** Use the interlock jumper only to quickly cancel the protection status.
When using this tester, use the interlock function as much as possible to ensure a safe operating environment. To use jigs in withstanding voltage or insulation resistance testing, provide a cover or other means for the DUT to prevent electric shock by cutting off the output when the cover is opened. It is also recommended that an enclosure be provided around the operating area and that output be cut off every time the door is opened.
Before turning on the power, confirm that the allowable voltage range indicated on the power supply is the same as that indicated on the rear panel of the tester.
When the power is turned on, the tester lights all LEDs on the front panel and self-diagnosis is started.
Before starting up the tester, confirm that all LEDs are on to ensure safety.
It is particularly dangerous to start a test when the DANGER lamp is broken.
Note that, in self-diagnosis, even when the DANGER lamp is lighting, no output or

voltage is being generated.

⚠ **CAUTION** After turning off the POWER switch, wait several seconds before turning it on. Turning the POWER switch on/off repeatedly with insufficient intervals may damage the tester.

Checking procedure:

1. Confirm that the allowable voltage range indicated on the power supply is the same as that indicated on the rear panel.
2. Confirm that the AC power cord is properly connected to the AC LINE connector on the rear panel.
3. Plug in the AC power cord.
4. Turn on the POWER switch. Confirm that all LEDs on the front panel are lit.
   Following the opening screen, display the ACW screen
5. Turn off the POWER switch.
6. Turn on the POWER switch again.
7. Following the opening screen, display the ACW screen and confirm that the tester is kept in the READY status.

The above steps complete the checking procedure.

1.8 Other specifications

（1） Power：≤150VA

（2） Dimensions（W*H*D）：280mm*372mm*89mm；

（3） Weight：About 10kg

Chapter 2Precautions on Handling

This chapter describes the precautions to be followed in the handling of this tester. When using the tester, take utmost care to ensure safety.

⚠ **WARNING** The tester derivers a 5 kV test voltage which can cause human injury or death. When operating the tester, be extremely careful and observe the cautions, warnings, and other instructions given in this chapter.

2.1 Prohibited Operations

■ Do not turn on/off the power repeatedly

After turning OFF the power switch, be sure to allow several seconds or more before turning it ON again. Do not repeat turning ON/OFF the power switch rapidly. If you do this, the protectors of the tester may not be able to render their protective functions properly. Do not turn OFF the power switch when the tester is delivering its test voltage–you may do this only in case of emergency.

■ Do not short the output to the earth ground

Pay attention so that the high test voltage line is not shorted to a nearby AC line or nearby devices (such as conveyors) which are connected to an earth ground. If it is shorted, the tester chassis can be charged up to the hazardous high voltage. Be sure to connect the protective grounding terminal of the tester to an earth line. If this has been securely done, even when the HIGH VOLTAGE terminal is shorted to the LOW terminal, the tester will not be damaged and its chassis will not be charged up to the high voltage.

Be sure to use a dedicated tool when grounding the protective grounding terminal.

⚠ **CAUTION** The term "AC line" here means the line on which the tester is operating. That is the line to whose outlet the AC power cable of the tester is connected. It may be of a commercial AC power line or of a private-generator AC power line.

■ Do not apply an External Voltage

Do not apply a voltage from any external device to the output terminals of the tester. The analog voltmeter on the front panel cannot be used as stand-alone voltmeter. They may be damaged if their output terminals are subject to an external voltage.

2.2 Action When in Emergency

In case of an emergency (such as electric shock hazard or burning of DUT), take the following actions. You may do either (a) or (b) first. But be sure to do both.

1.Turn OFF the power switch of the tester.

2.Disconnect the AC power cord of the tester from the AC line receptacle.

2.3 Precautions on Testing

■ Wearing Insulation Gloves

When handling the tester, be sure to wear insulation gloves in order to protect yourself against high voltages.

■ Precautions for Pausing Tests

When changing test conditions, press the STOP switch once to take precautions. If you are not going to resume the test soon or if you are leaving the Test area, be sure to turn-OFF the POWER switch.

■ Items Charged Up to Dangerous High Voltages

When in test, the DUT, test leadwires, probes, and output terminals and their vicinities can be charged up to dangerous high voltages. Never touch them when in test.

⚠ **WARNING** The vinyl sheaths of the alligator clips of the test leadwires which are supplied accompanying the tester has no sufficient insulation for the high test voltages. Never touch them when in test.

■ Matters to be Sure of After Turning-OFF Power

If you have to touch the DUT, test leadwires, probes, and/or output terminals and their

vicinities for re-connections or other reasons, be sure of the following two matters.

1. The analog voltmeter indicates “zero.”
2. The DANGER lamp has gone out.

（a）

2.4 Dangerous States of Failed Tester

Typical possible dangerous states of the tester are as shown below and in which cases the most dangerous situation that **“the high test voltage remains delivered and won't be turned off!”** may occur. When this situation has occurred, immediately turn OFF the power switch and disconnect the AC power cable from the AC line receptacle.

•The DANGER lamp does not go out despite you have pressed the STOP switch.

•The DANGER lamp does not light up despite the pointer of the analog voltmeter is deflected indicating that the output voltage is being delivered.

Also when the tester is in other malfunctioning states than the above, there is a possibility that the output voltage is delivered irrespective of your proper operating procedure. Never use the tester when it has failed.

⚠ **WARNING** Keep the tester away of other people until you call our service engineer for help.

Immediately call Tonghui distributor/agent. It is hazardous for an unqualified person to attempt to troubleshoot any tester problem.

2.5 Daily Checking

To avoid accidents, confirm at least the following before starting operation:

1. The tester is connected to an earth ground.
2. The coating of the high-voltage test lead wire is free from cracks, fissures, and breakage.
3. The high-voltage test lead wire is not broken.
4. The tester generates FAIL signal when the ends of the low-voltage test lead wire and high-voltage test lead wire are short-circuited.

Chapter 3 Introduction

The basic operation of TH9301 series is described in this chapter. Please read this chapter briefly before using TH9301 instrument.

3.1 Instruction of front panel

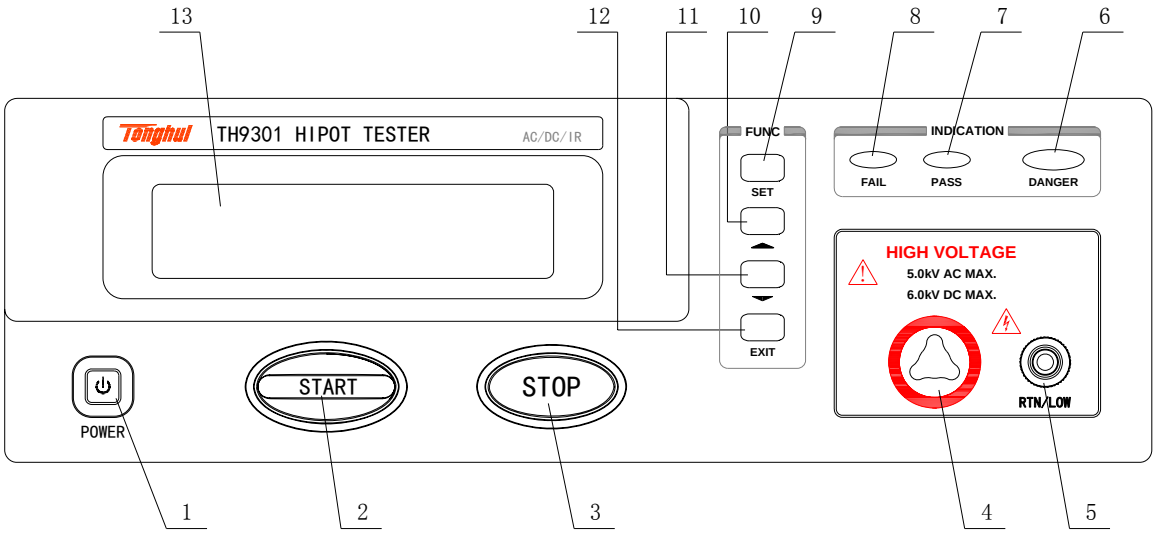


Figure 3-1

(1) (POWER)

Power switch

(2) START

Setup start key for testing, once test starts, DANGER indicator is on.

(3) STOP

For stop testing;

Or cancel PASS, FAIL, and its function is the same as **EXIT** key in setting mode or can be the switch to quit setting mode.

(4) (HIGH VOLTAGE)

The high terminal of output voltage.

⚠ Warning：Don't touch high voltage terminal in the process of testing.

Note：If external voltage is exerted in test terminal, then the internal circuit maybe damaged.

⑸ （RTN/LOW）

Test low voltage terminal in back circuit.

⑹ DANGER indicator

In the process of testing, it lights in output voltage.

⑺ PASS

Indicate a test result, it lights in PASS

⑻ FAIL

Indicate a test result, it lights in FAIL.

⑼ SET

Operation key for selecting setting mode and memory group, test item, AC or DC withstanding voltage test and its parameter setting, also insulation resistance test and its parameter setting. It can also be the lock key

⑽ "∧" UP

In setting mode, it is used as the function key to select function and input each parameter value, and as output voltage up-adjusting key in withstanding voltage test.

⑾ "∨" DOWN

In setting mode, it is used as the function key to select function and input each parameter value, and as output voltage down-adjusting key in withstanding voltage test.

⑿ EXIT

Function key to exit setting mode.

⒀ LCD displayer

16 digits×2 line backlighting LCD displayer.

3.2 Instruction of rear panel

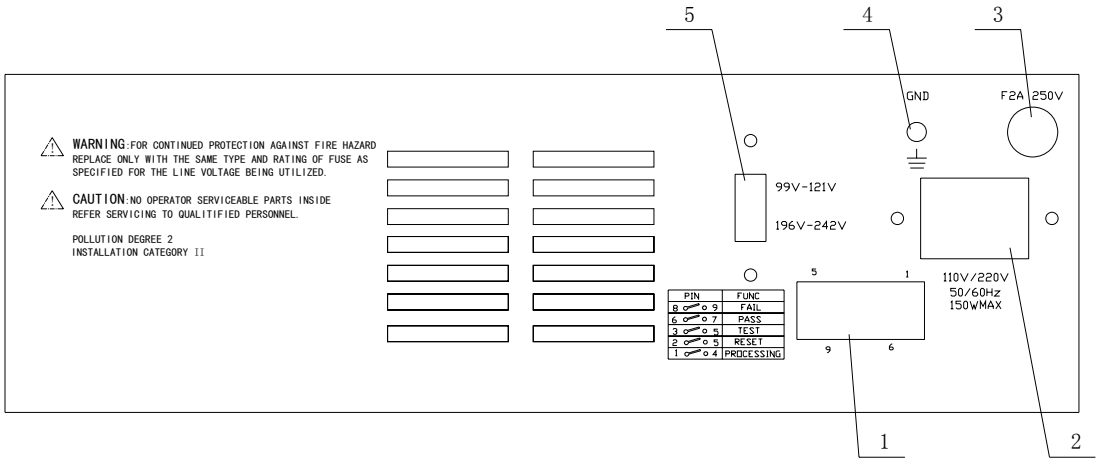


Figure 3-2

⑴ PLC remote signal terminal

It is a standard 9 **PIN D** terminal board，provides**(N.O.)** to remote monitor signal of **PASS**、**FAIL** and **PROCESSING** and connection point of **TEST**、**RESET.**

⑵ Input power socket

Standard IEC 320 power socket，which can accept standard NEMA plug.

⑶ Input power fuse board

Turn off power switch then change fuse with same standard.

⚠ **Warning**：Please note if the model of the fuse meet the range of supplied voltage before charging.

⑷ (GND) terminal

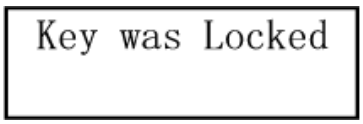
Please be sure to ground well to protect operator.

⑸ Input voltage selecting switch

Select input power voltage，down is 110V, up is 220V，the default setting is in 220V.

Chapter 4 Basic operation

93 series Hipot tester has the key-lock function. Press SET key and turn on power switch to enter parameter setting. If only the power is on, then the keyboard is locked, now press SET key, the displayer will display：



So the key has to be unlocked, then set parameter.

“**SET**” is for setting parameter，and it will transfer to the turning key of parameter item automatically, press **SET** once, the parameter setting will turn to the next item, and the setting parameter will save into storage. The test parameter or mode in storage will be kept after input power is off.

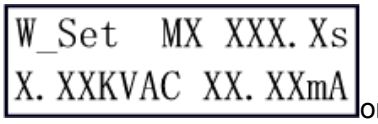
In the parameter setting mode，“∧” and “∨” are used as operation key for selecting function and input key of parameter value.

In the process of parameter setting, you can press “**EXIT**” to exit this mode if you don’t need to reset all parameters.

4.1 General parameter setting

After opening input power switch, LCD will display：

Now the procedure will enter the setting parameter of last test，LCE will display：



or


or


W_Set:	W_Set:	I_Set:
MX: 1-5	MX: 1-5	MX: 1-5

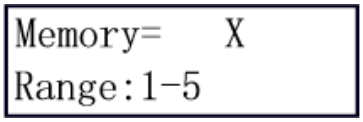
XXX.Xs:Time set	XXX.Xs:Time set	XXX.Xs:Delay time set
X.XXkVAC:AC voltage set	X.XXkVDC:DC voltage set	X.XXkVDC:DC voltage set
XX.XXmA:LC hi-limit set	XX.XXmA:LC HI-limit set	XXXXMΩ:IR low-limit set

Withstanding test parameter set

The withstanding voltage parameter is set by using **SET** key，press once to enter the next parameter item，and the sequence is **(Memory)** set, test item selection, AC or DC withstanding voltage selection, output voltage set, leakage current hi-limit set, leakage current low-limit set, rise test time set, test time set, output frequency selection（There is no such item in DC W_test）, arc current sensitivity set.

Memory set

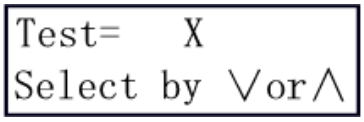
Press **SET** key，the procedure will enter memory set mode automatically, and LCD will display：



Please use "∧" or "∨" to input number in parameter set procedure，there are five groups in memory group.

Test item selection

When memory set is over, press **SET** key，the procedure will enter"Test item" mode and LCD will display：

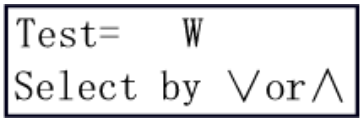


Please use "∧" or "∨" to select the test item，there are withstanding voltage test(W), Insulation resistance test (I), withstanding voltage and insulation resistance connection test (W-I) and insulation resistance and withstanding voltage connection test (I-W) for selecting.

Model	Available test item
TH9301	**W、I、W-I、I-W**
TH9301A	**W**
TH9301B	**W**

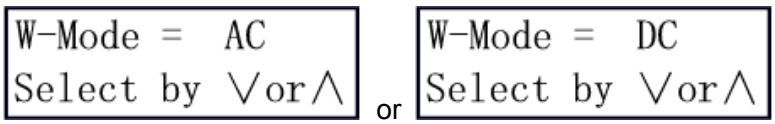
The sequence is (W), (I), (W-I),(I-W)，when some model has no test item, the procedure will ignore this item to next test item. In this section, item (W) is introduced firstly.

If test item is “withstanding voltage (W)”，LCD will display：



AC or DC withstanding voltage test select (TH9301/A)

When (W) is selected, press SET key，the procedure will enter AC or DC withstanding voltage mode, and LCD will display：

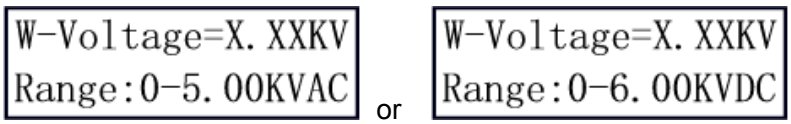


Please use“∧”or“∨” to select the test mode.

Output voltage set

When AC or DC withstanding voltage test is selected, press SET key，procedure will enter output voltage set mode, and LCD will display：

AC withstanding voltage test DC withstanding voltage test

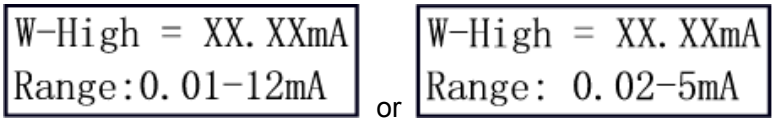


Please use“∧”or“∨” to input the output voltage, the unit is “kV”.

(HI-Limit) set

When output voltage of AC or DC withstanding voltage is set, press SET，the procedure will enter leakage current hi-limit set mode of AC or DC withstanding voltage test，LCD will display：

AC withstanding voltage test DC withstanding voltage test

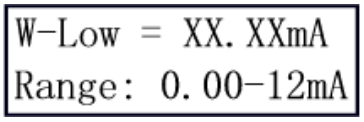


Please use “∧”or“∨” to input the hi-limit value, and the unit is “mA”。

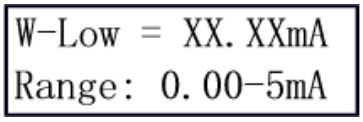
(LO-Limit) set

When leakage current hi-limit of AC or DC withstanding voltage test is set, press SET，the procedure will enter low-limit set mode of AC or DC withstanding voltage test，LCD will display：

AC withstanding voltage test



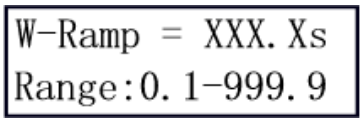
or DC withstanding voltage test



Please use“∧”or“∨” to input the low-limit value, the unit is “mA”.

(Ramp UP) time set

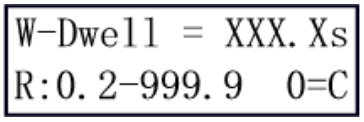
When leakage current low-limit set is finished, press SET key，the procedure will enter ramp up time set mode，LCD will display：



Please use “∧”or“∨” to input ramp up time value, and the unit is “s”.

(Dwell) time set

When ramp up time is set, press SET，the procedure will enter dwell time set mode, and LCD will display：

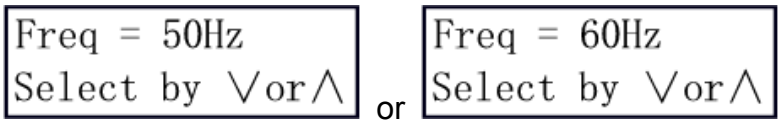


Please use “∧”or“∨” to input dwell time value, and the unit is “s”.

When test time is set as “0”，the set won’t stop unless the test is fail or stopped by operator. Time counter will continue to Max.limit value then back to “0” for counting from beginning, it won’t stop.

Output frequency set

When dwell time is set, press SET，the procedure will enter output frequency mode, and LCD will display：

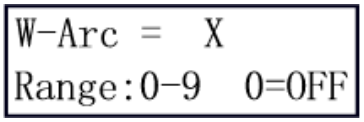


Note：There is no such function in DC withstanding voltage test，the procedure will ignore this set automatically to enter "Arc Sense" set.

Please use "∧"or "∨"to select frequency to be"50"or"60"Hz.

(Arc Sense) set

When output frequency is set, press SET，the procedure will enter arc sense set mode，and LCD will display：



Please use "∧" or "∨" to input the arc sense value，arc sense is 1-9，there are 9 sections for setting，9 is the highest sense，but "0" is no detecting on Device Under Test.

Note：when the range of X is 1—9，and its arc peak value is: 20mA、18mA、16mA、14mA、12mA、10mA、7.7mA、5.5mA、2.8mA，the default value is 5.

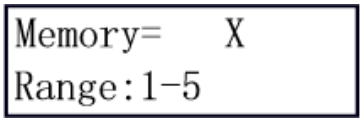
This is the last step of withstanding voltage test parameter set，you can press SET key to the first parameter set，and check if there is some error in parameter，or press"EXIT" to exit parameter set mode but to enter under test mode.

Insulation resistance parameter set

Insulation resistance parameter is also set by using SET key，press once to enter next parameter item，and its sequence is (Memory) set, test item, output voltage set, insulation resistance hi-limit set, insulation resistance low-limit set, delay time judge time set.

Memory set

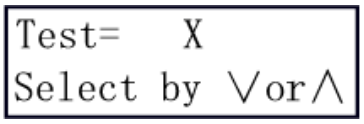
Press SET，the procedure will enter memory set mode automatically：



Please use "∧"or"∨"to input the number in "Memory" to parameter setting procedure，there are totally 5 groups.

Test item selection

When memory is set, press SET，the procedure will enter "Test item" mode，the LCD will display：

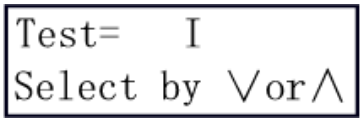


Please use "∧" or "∨" to select the test item，there are withstanding voltage test(W), Insulation resistance test (I), withstanding voltage and insulation resistance connection test (W-I) and insulation resistance and withstanding voltage connection test (I-W) for selecting.

Model	Available test item
TH9301	**W、I、W-I、I-W**
TH9301A	**W**
TH9301B	**W**

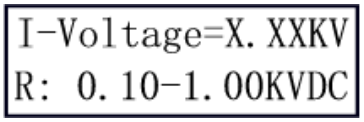
The sequence is (W), (I), (W-I),(I-W)，when some model has no test item, the procedure will ignore this item to next test item. In this section, use item (W) to introduce continually.

If test item is selected as (I)，LCD will display：



Output voltage set

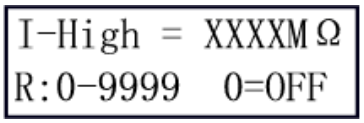
When test item is selected as insulation resistance, press SET key，the procedure will enter output voltage set mode, and the LCD will display：



Please use "∧" or "∨" to input the output voltage，the unit is "kV".

(HI-Limit) set

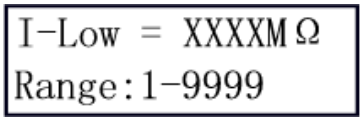
When output voltage of IR is set, press SET key，the procedure will enter hi-limit set mode of insulation resistance, LCD will display：



Please use"∧" or "∨" to input high limit value of insulation resistance, and the unit is "MΩ" ，if the high limit value is set as "0" ，which means no high limit judge.

(LO-Limit) set

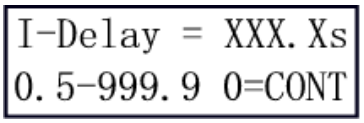
When the high limit of insulation resistance is set, press SET，the procedure will enter low limit set mode, and LCD will display：



Please use"∧" or "∨" to input the low limit value of insulation resistance，and the unit is "MΩ".

(Delay) time set

When low limit of insulation resistance is set, press SET，the procedure will enter delay time judge set mode, LCD will display：



Please use "∧"or"∨" to input delay time judge value，the unit is "s" ，When test time is set as "0"，the set won't stop unless the test is fail or stopped by operator. Time counter will continue to Max.limit value then back to "0" for counting from beginning, it

won't stop.

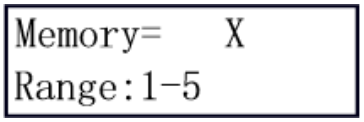
This is the last step of insulation resistance test parameter set，you can press SET key to the first parameter set，and check if there is some error in parameter，or press"EXIT" to exit parameter set mode but to enter under test mode.

Withstanding voltage and insulation resistance connection (W-I) test parameter set (TH9301)

The main function is that perform withstanding voltage test on DUTthen after that, perform insulation resistance test automatically.

Memory set

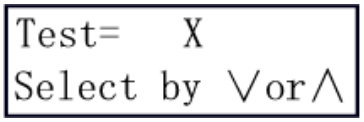
Press SET，the procedure will enter memory set mode automatically：



Please use "∧"or"∨"to input the number in "Memory" to parameter setting procedure，there are totally 5 groups.

Test item selection

When memory is set, press SET，the procedure will enter "Test item" mode，the LCD will display



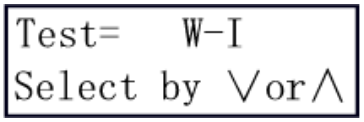
Please use "∧" or "∨" to select the test item，there are withstanding voltage test(W), Insulation resistance test (I), withstanding voltage and insulation resistance connection test (W-I) and insulation resistance and withstanding voltage connection test (I-W) for selecting.：

Model	Available test item
TH9301	**W、I、W-I、I-W**
TH9301A	**W**
TH9301B	**W**

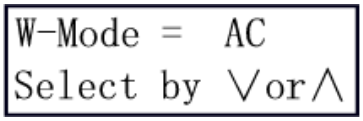
The sequence is (W), (I), (W-I),(I-W)，when some model has no test item, the procedure

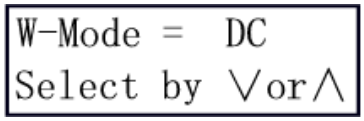
will ignore this item to next test item. In this section, use item (W-I) to introduce continually.

If test item is selected as “withstanding voltage and insulation resistance connection test (W-I)”，LCD will display：

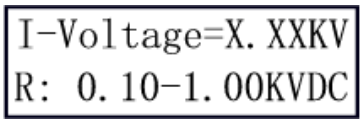


Press SET，procedure will enter the voltage set of “withstanding test”，LCD will display：



or


After entering withstanding voltage test parameter set mode，please enter test parameter set according to “withstanding voltage test parameter set procedure. Then procedure will enter insulation resistance parameter set automatically, LCD will display：

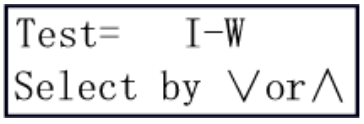


After entering insulation resistance test parameter set mode，please enter test parameter set according to “insulation resistance test parameter set procedure”.

After last step is over, you can press SET key to the first parameter set，and check if there is some error in parameter，or press“EXIT” to exit parameter set mode but to enter under test mode.

Insulation resistance and withstanding voltage connection (I-W) test parameter set

If test item is selected as “insulation resistance and withstanding voltage connection (I-W)” test，LCD will display：



The set procedure is the same as withstanding voltage and insulation resistance connection test.

4.2 Displayed information

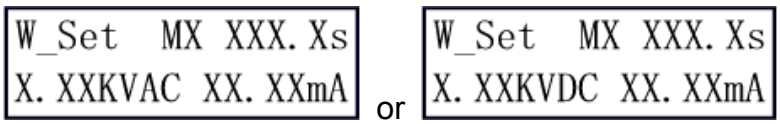
The following information will be displayed in the process of testing.

Withstanding voltage test:

The display information of AC and DC withstanding voltage test is almost the same.

Under test and parameter set mode

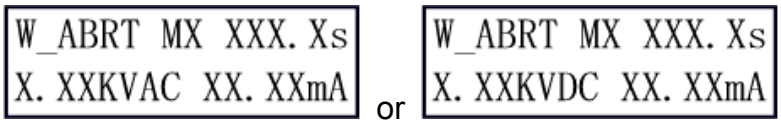
The following information means the instrument is in the under test and parameter set mode：



If press “TEST”，the instrument starts to test, if press “SET”，the instrument will enter parameter set mode.

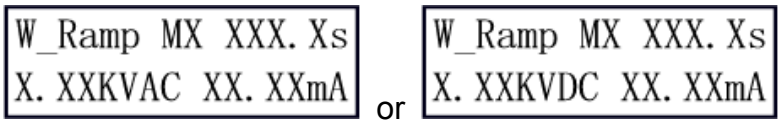
(Abort)

If AC or DC withstanding voltage test is in the process, and press “RESET” or use remote control device to stop testing，LCD will display：



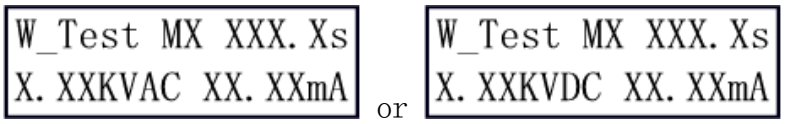
(Ramp Up)

When AC or DC withstanding voltage is performed in ramp up time, the test result will be updated, LCD will display：



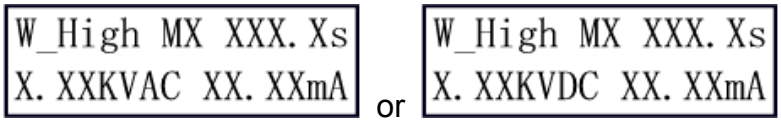
(Dwell)

In AC or DC withstanding voltage test, test result will be updated, and LCD will display：

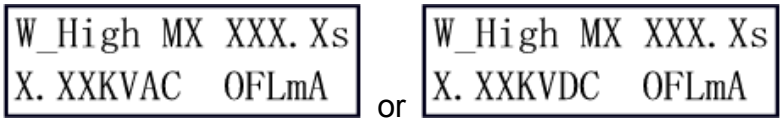


(HI-Limit)

If the leakage current amount of DUT is over high limit value，the procedure will judge test failure，if the leakage current value is within the range, LCD will display：

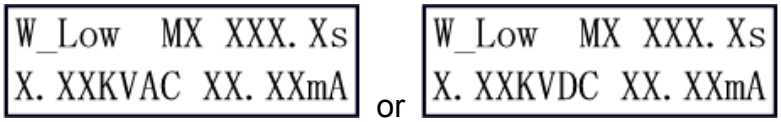


If the leakage current amount of DUT is over high limit value，the procedure will judge test failure，if the leakage current value is over the range, LCD will display：



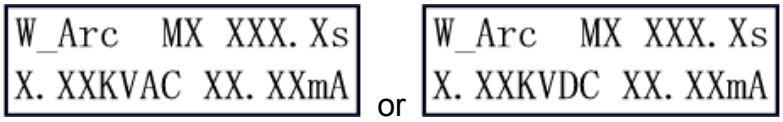
(LO-Limit)

If the leakage current amount of DUT is lower than low limit value，the procedure will judge test failure, LCD will display：



(Arc Fail)

If leakage current amount of DUT is within the high limit, but that of arc is over the value of arc current, and arc detection judge function is set as “ON”，it will cause failure，LCD will display：



(Pass)

If DUT is tested normal, then it is considered as pass, LCD will display：

or


Insulation resistance test:

Under test and parameter set mode

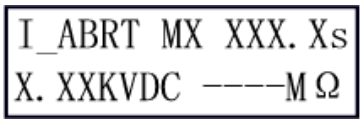
The following information means the instrument is in under test and parameter set mode：

If press “TEST”, the instrument will start insulation resistance test，if press “SET”，the instrument enters parameter set mode of insulation resistance timely, and parameter can be set.

(Abort)

If insulation resistance test is in the process，and press “RESET” or use remote control device to stop testing，LCD will display：

If insulation resistance test is in the process，and press “RESET” or use remote control device to stop testing，but the stop time is before reading the complete test result, LCD will display：

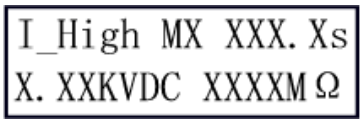


(Delay)

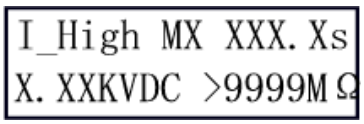
In insulation resistance test, the test result will be updated, LCD will display：

HI-Limit)

If the insulation resistance value is over hi-limit，procedure will judge failure，if the insulation resistance value is still within the test range, LCD will display：



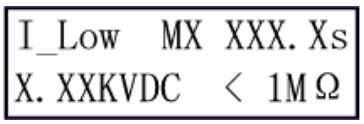
If the insulation resistance value is over hi-limit, procedure will judge failure, if insulation resistance value is over the test range, LDC will display：



_(LO-Limit)

If the insulation resistance value is over low-limit, procedure will judge failure，if the insulation resistance value is still within the test range, LCD will display：

If the insulation resistance value is over low-limit, procedure will judge failure，if the insulation resistance value is over the test range, LCD will display



(Pass)

If DUT is tested normal, then it is considered as pass, LCD will display：

4.3 Operation procedure and step

93 series withstanding voltage tester is designed for production line or quality inspection，its operation and setting is very convenient. Unreasonable setting and operation will generate a warning，and back to former setting status meanwhile.

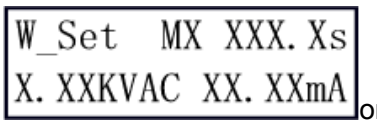
1. Before power plug is connected to commercial power，please turn off input “power switch” ，and “voltage selection” is switched to right voltage-input position，check if the standard of fuse is correct. Then connect the ground line to the “ground terminal”.

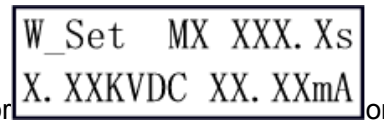
2. Connect power line to the instrument and socket, **please don’t connect test cable to the output terminal firstly.**

3. When the test cable of DUT or its test terminal is connected well, connect (Return) to the return terminal of instrument, then connect high voltage test cable to the high voltage terminal of instrument, and check if all test cables are connected well.

4. Start input “Power switch”，now the displayer shows：

Then the memory group and parameter data in the last test will be appeared，and enter under test and parameter set mode, now displayer shows：



or


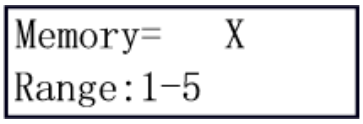
or


⚠ **Note：when there is “_” after “MX”，it means there is W-I or I –W test.**

---

5. If the test parameter needs resetting，please press “SET”. Detailed set method, procedure and step are in “Test parameter set”

6. If you need to call the test parameter in memory group to test, please press “SET”key，the procedure will enter set mode, and LCD displays：



Please use “∧”or“∨” to select the number of “procedure memory group”. Then press “EXIT” to exit parameter set mode and return to under test and parameter set mode，procedure will call the test parameter from memory group and wait for testing，LCD will display the test parameter.

7. Press “TEST” to start testing，now the red “high voltage”symbol will shine，and time counter starts counting meanwhile, now displayer displays the information of this test.

After test is over, output will be off automatically，the green indicator in TEST will be on，also there is a beeper，which means the DUT has passed test and “PASS” and test value are displayed.

If the test is going on, press “TEST” again. If check the former set, then press RESET，the procedure will clear the test result and display the former set.

8. If stop testing in the process of testing，please press RESET，the instrument stops testing timely，displayer will keep the test value.

9. if the test is failed, the instrument will stop testing and displayer will display the status and failed value，now red “RESET” indicator is on. Press RESET to turn off warning and keep the test value.

10. If use external remote control device to operate hipot tester, please connect remote controller to the remote input terminal. The function of TEST and RESET in remote controller is the same as that in instrument.

⚠ **Warning：Because the TEST and RESET switch in instrument and remote**

controller can be operated simultaneously, the remote controller has to be kept well.

11. The PLC interface has “PASS、FAIL and PROCESSING” remote monitor signal output，those signal can be connected to control center, remote monitor is accordant with the signal action.

4.4 Keyboard lock

Press “SET”， then start input power switch, after power is setup, release the key, the operation is finished.

Chapter 5 Parameter instruction

5.1 Withstanding voltage test parameter

Model			TH9301	TH9301A	TH9301B
Voltage output					
AC	Output voltage range		0 to 5.00kV		
	Output voltage accuracy		±(2% set +5V)（no load）		
	Output voltage resolution		10V		
	Max.rated power		60VA（5kV/12mA）		
	Max.rated current		12mA		
	Output waveform		Sine waveform		
	Output waveform distortion factor		≤±2%（load or pure resistance load）		
	Voltage adjusting rate		±（1% set+5V）（rated power）		
	ARC function		0，class 1- 9（0= OFF，class 9 is the highest sensitivity）		
DC	Output voltage range		0 -6.00kV		————
	Output voltage accuracy		±(2% set +5V)		————
	Output voltage resolution		10V		————
	Max.rated power		30VA（6kV/5mA）		————
	Max.rated current		5mA		————
	Max.rated load waveform		≤5%（6kV/5mA）		————
	Discharge function		Fast discharge（≤200mSec）		————
	ARC function		0，class 1- 9（0= OFF，class 9 is the highest sensitivity）		————
Test display					
voltage meter	Digit	Test range	0.00kV to 6.00kV		
		Accuracy	±(2% set +1V)		
		Resolution	0.01kV		
		Displayed	RMS value		

		value		
Current meter	AC	Test range	0.10mA -12.00mA	
	DC		0.02mA-5.00mA	————
	Test accuracy		±(2% set+2 digits)	
Parameter set				
Judge function	AC	High limit	0.10mA -12.00mA	
	DC		0.02mA - 5.00mA	————
	AC	Low limit	0.00mA -12.00mA	
	DC		0.00mA-5.00mA	————
Time func	Rise time		0.1s - 999.9s	
	Test time		0，0.2s - 999.9s（0means continue test）	
	Time accuracy		±（0.1%set value +0.05s）	
Storage			5 groups of test，4kinds of test mode	

5.2 Insulation resistance parameter

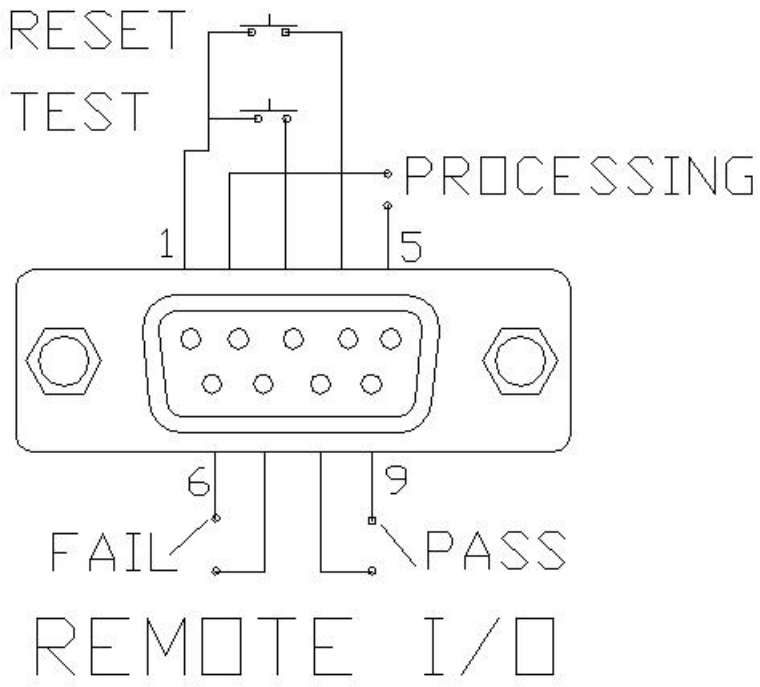
Model			TH9301	
Voltage output				
IR	Output voltage range		0.10kV-1.00kV	
	Output voltage accuracy		±(2% set+2V)	
	Output voltage resolution		0.01kV	
	Max.rated power		1VA（0.10kV/1mA）	
	Max.rated current		1mA	
	Discharge function		Fast discharge（≤200mSec）	
Voltage display				
Voltage meter	Digit	Test range	0.10kV – 1.00kV	
		Accuracy	±(2% set+2V)	
		Resolution	1V	
		Value	RMS value	
Resistance meter	Test range		1MΩ- 9999MΩ	
	Test accuracy		1MΩ- 1000MΩ	±(5% set+2digits) ＞500V ±(10% set+2digits) ＜500V
			1000MΩ- 9999MΩ	±(10% set+2digits) ＞500V

	Test time	100ms		
Parameter set				
Judge function	Hi-limit set	0，1MΩ- 9999MΩ（0 means OFF）		
	Low-limit set	1MΩ- 9999MΩ		
	Judge accuracy	1 -1000 MΩ	0.001 MΩ	±(5% set+2 digits) ＞500V
			0.01 MΩ	±(10% set+2 digits) ＜500V
			0.1 MΩ	
		1000 MΩ-9999 MΩ	1 MΩ	±(10% set+2 digits) ＞500V
Time function	Rise time	0.1s to 999.9s		
	Wait time	0，2s -999.9s		
	Time accuracy	±（0.1% set value + 0.05s）		

5.3 Interface instruction

Standard PLC remote control interface：

There is remote monitor and remote control connection terminal on the rear panel，which can connect the working status to the monitor center, also can be connected with remote controller. This terminal is a standard 9PIND board，which contains monitoring signal output:PROCESSING，PASS，FAIL and 2 remote input signal: TEST，RESET.



1. Remote control output signal connection and instruction

TH9301 series Hipot tester provides no-power （N.O）point to the signal below. The capacitance of the connection point is AC 250V 1.0Amp，also these points have no positive and negative limitation，and each signal has a dependant connection line，but no（COMMON）. The connection line of output signal is as below：

- PROCESSING signal：output signal is connected between PIN2 and PIN5.
- PASS signal：output signal is connected between PIN8 and PIN9.
- FAIL signal：output signal is connected between PIN6 and PIN7.

2. Remote control output signal connection instruction

TH9301 series Hipot tester has remote control connection point，the external remote control device controls TEST function. These connection points

provide the power with controlling function, and MOMENTARY switch should be the controller. **Please pay attention，don't connect any other power，if so, the internal circuit will be damaged.** PIN5 is（COMMON）ground line for remote controlling operation，the connection is listed as below：

- RESET：control switch is between PIN1 and PIN4.
- TEST：control switch is between PIN1 and PIN3.

Note：The operation of remote controller and hipot tester can be performed simultaneously，so the controller should be kept well .

Chapter 6 Calibration and daily maintenance

6.1 Clean

The front and rear panel should be cleaned by neutral cleanser.

⚠ **Warning**：Before cleaning, power should be off and power line should be removed.

6.2 Check

⚠ **Warning**：The damage of cable may cause electrical shock or fire, the instrument has to be stopped under this situation.

6.3 Maintenance

⚠ **Warning**：Only the technician can open the instrument to replace the components. If you need to replace, please contact us.

■ **High voltage relay**

We suggest the high voltage relay should be replaced after million tests.

6.3.1 Calibration

We suggest instrument should be calibrated per year, and the accuracy should be within 0.5%以内.

⚠ **Warning**：The instrument generates high voltage of AC 5kV and DC 6kV, so calibration is very dangerous, if you need calibration, please contact us.

Instrument and device for calibration:

The following instruments and devices can be used for calibration，please be sure that the accuracy of the instruments and devices are within 0.5%.

1. High voltage meter：test range is above 0-6000V AC
2. Current meter：range is above 0-15mA AC
3. Current meter：range is above 0-5mA DC
4. Load：resistance is about 1MΩ/4W

Calibration step:

Press **"∧"UP** and **EXIT**，then start input power switch，LCD will display：

Now the instrument is in calibration procedure，please release key.

Use "∧"or"∨" to select the tested item，there are 4 items for calibration, which are AC voltage（AC U）, AC Current （AC I）, DC voltage（DC U）, DC current（DC I）.

Note：The hipot can only select one item to calibrate.

Voltage calibration

Connect "H.V." and "RETURN" to a standard voltage meter that can test 6000V AC/DC.

Press "∧" or "∨" to enter（AC U）or（DC U）calibration item，now LCD displays：

AC voltage

CAL	Mode
AC	U

or

DC voltage

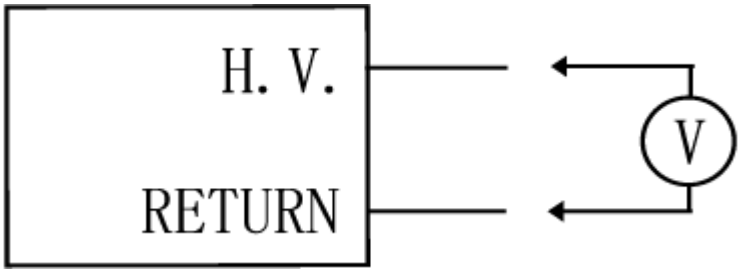
CAL	Mode
DC	U

Then press TEST，the calibration procedure outputs 3000V AC or DC voltage，after rise time is over, it displays：

Voltage= 3.000KV
Enter STD V-out

Use "∧" or "∨" to input standard voltage to calibration procedure.

Please make sure the number is correct，then press SET to input calibration parameter，if you need to stop changing calibration parameter，then press EXIT or RESET，the instrument will return to calibration mode，and wait for the next calibration. Please refer to the connection diagram below：



Current calibration

Please connect standard current meter and 1MΩ resistor serially，then connect to 然 "H.V." and "RETURN"., next use "∧" or "∨" to select （AC I）or（DC I）calibration item，LCD displays：

AC current

CAL	Mode
AC	I

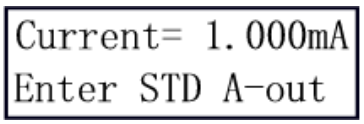
or

DC current

CAL	Mode
DC	I

Then press TEST，now the calibration procedure outputs about 1000V AC or DC

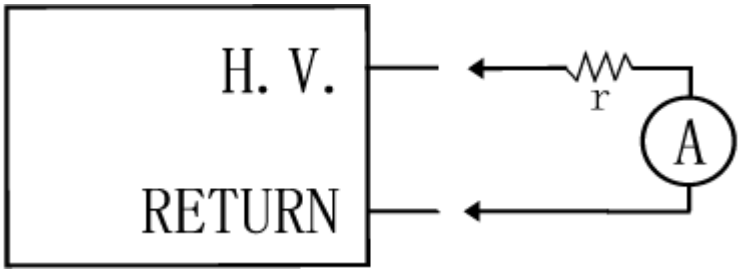
voltage，after rise time is over, it displays：



Use "∧"or "∨" to input standard current value to calibration procedure.

Please make sure the number is correct，then press SET to input calibration parameter，if you need to stop changing calibration parameter，then press EXIT or RESET，the instrument will return to calibration mode，and wait for the next calibration. Please refer to the connection diagram below：

：



Note：please connect current meter to the terminal near RETURN，to avoid the current value is not accurate or current meter is damaged.

Calibration finished

After calibrating DC voltage and current，procedure finishes the calibration to insulation resistance automatically. So, no need to calibrate insulation resistance.

After calibrated parameter is input, the power must be turned off, then start the instrument, otherwise, it can't enter the under test mode. When power is off, the procedure will save the calibrated parameter to storage.