Jinko金科

OPERATION MANUAL

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Instruction manual

7122S

Multi-channel withstand voltage insulation tester

Chapter 1 Safety Rules

If there is any change in the contents of the manual, without notice.
If the manual is not exhaustive, please contact our company directly.

Regulations and matters that should be noted before high voltage test! ! !

1.1 General provisions

• Before using this tester, please read the manual carefully and understand the operating procedures and related safety signs to ensure safety.

• Please select the correct input voltage (110V or 220V) specification before turning on the input power switch of the machine.

Danger sign indicates that there is high voltage output, please avoid contact.

Chassis grounding symbol.

WARNING

WARNING It should be noted that the operations, applications, or conditions performed are highly dangerous and may cause personal injury or death.

The voltage and current generated by the instrument are sufficient to cause personal injury. In order to prevent accidental injury or death, when moving and using the instrument, be sure to observe it clearly before operating it.

1.2 Maintenance and maintenance

1.2.1 User maintenance

In order to prevent electric shock, non-professionals should not open the cover of the instrument. All internal parts of this instrument must not be replaced without authorization. If there is any abnormality in the instrument, please seek help from our company's designated dealer.

1.2.2 Regular maintenance

This series of testers, input power cords, test cords and related accessories must be carefully inspected and verified at least once a year to ensure the safety of operators and the accuracy of the instruments.

1.2.3 User's modification

The user is not allowed to change the wiring or parts of the instrument by himself, otherwise the company's guarantee will become invalid and will not be liable for the consequences arising therefrom.

1.3 Test environment

1.3.1 Working position

When operating this instrument, make sure that the instrument is placed in a place where ordinary people cannot touch it at will. If this is not possible due to the arrangement of the production line, the test area must be isolated from other facilities and specially marked "high voltage test work area". If the high-voltage test area is very close to other working areas, special attention must be paid to safety. During the high-voltage test, it must be marked "Danger! During the high-voltage test, non-workers should not approach."

1.3.2 Input power

The tester must be well grounded, and the ground wire must be connected before testing to ensure the safety of the operator. The test area power supply must have a separate switch, installed at the entrance of the test area, to ensure that everyone can identify. Once an emergency occurs, you can turn off the power immediately.

1.3.3 Workplace

Use non-conductive materials as much as possible. No metal should be used between the operator and the object to be tested. The position of the operator must not cross the object under test to operate and adjust the instrument. If the volume of the test object is small, place the test object in a non-conductive box as much as possible.

The test site must be kept tidy and clean at all times, and must not be messy. Please put the unused instruments and test lines in a fixed position, so that all personnel can immediately separate the tested objects, the tested objects and the tested objects.

The test area and the surrounding air must not contain flammable gas, and the tester cannot be used next to flammable materials.

1.4 Regulations for operators

1.4.1 Personnel qualifications

The voltage and current output by the tester are enough to cause personal injury or fatal when an electric shock is incorrectly operated, and must be used and operated by trained and qualified personnel.

1.4.2 Safety rules

Operators must be given education and training at any time to make them understand the importance of various operating rules and operate the tester in accordance with safety rules.

1.4.3 Clothing regulations

Operators are not allowed to wear clothes with metal decorations or wear metal hand ornaments and watches, etc. These metal ornaments can easily cause accidental electric shock. When you get an electric shock, the consequences will be more serious.

1.4.4 Medical regulations

The tester must not be operated by persons who have heart disease or who wear a pacemaker.

1.5 Test safety procedures

Never use the tester on a live circuit board or device! !

The grounding wire of the tester must be connected in accordance with regulations. When connecting the test line, you must first connect the tested end on the tester to the test object. Only before doing the test, can the high-voltage test wire be inserted into the high-voltage output terminal. When taking the high-voltage test line, you must hold it on an insulated part, and never hold it on a conductor. The operator must make sure that it can operate completely independently and cannot control the switch and the remote control switch by other people. The remote control switch should be placed in a fixed position when not in use.

WARNING **During the test, never touch the test object or any objects connected to the test object.**

1.6 Must remember the following safety points

• Unqualified operators and unrelated personnel should stay away from the high-voltage test area.

• A safe and orderly state must be maintained at all times in the high-voltage test area.

• Never touch the test object or any objects connected to the test object during the high voltage test.

• In case of any problems, please turn off the high-voltage output and input power immediately.

• After the DC withstand voltage and insulation resistance test, the discharge operation must be performed before the work of removing the test wire can be carried out.

Chapter 2 Introduction to Safety Regulations

2.1 The importance of testing

In today's high consumer awareness, every manufacturer of electrical and electronic products must do their best to ensure product safety. The design of each product must do its best to prevent users from getting an electric shock. Even if the user makes a mistake, he should not get an electric shock. In order to meet generally recognized safety requirements, safety tests must be carried out. Currently, safety enforcement agencies, such as UL, CSA, IEC, BSI, VDE, TUV, and JSI, require manufacturers to use "voltage insulation testers" for safety testing when designing and producing electronic or electrical products.

2.2 Withstand voltage test

If a product can work normally in a very harsh environment, it can be determined that it can work normally in a normal environment. The most common use of withstand voltage test is:

- **Functional testing during design**-to determine the conditions under which the designed product can meet its functional requirements.
- **Specification testing during production**-to confirm that the products produced can meet the requirements of their specifications.
- **Confirmation test during quality assurance-**confirm that the quality of the product can meet the safety standards.
- **Safety test after repair**-confirm that the repaired product can maintain compliance with safety standards.

Different products have different technical specifications. Basically, during the withstand voltage test, a voltage higher than the normal working voltage is applied to the product for testing. This voltage must last for a period of time. If a component has a leakage current within the specified range within the specified time, it can be determined that the component is working under normal conditions and should be very safe. The excellent design and selection of good insulating materials can ensure that users are protected from electric shock.

The withstand voltage test performed by this instrument is generally called "high voltage dielectric test", or "withstand voltage test" for short. The basic requirement is 2×the working voltage of the DUT+1000V, which is used as the voltage standard for testing. The test voltage of some products may be higher than 2 × working voltage +1000V. For example, the working voltage range of some products is from 100V to 240V, and the test voltage of such products may be between 1000V and 4000V or higher. Generally speaking, products with "double insulation" design may use a test voltage higher than the standard of 2×working voltage+1000V.

The withstand voltage test is more precise in the design and sample production of the product than the test in the formal production, because the product's safety has been determined during the design and test stage. Although only a few samples are used for judgment during product design, online testing during production should strictly require that all products must pass safety

standards to confirm that no defective products will flow out of the production line.

The output voltage of the withstand voltage tester must be maintained within the range of 100% to 120% of the specified voltage. The output frequency of the AC withstand voltage tester must be maintained between 40 and 70 Hz, and its peak value must not be less than 1.3 times the root mean square (RMS) voltage value, and its peak value must not be higher than the root mean square (RMS) voltage 1.5 times the value.

2.3 The advantages and disadvantages of alternating current (AC) testing and direct current (DC) testing

Please confirm with the safety unit designated by the tested product what voltage should be used for the product. Some products can accept both DC and AC test options at the same time, but there are still many products that only allow one of DC or AC. test. If the safety regulations allow both DC and AC tests to be accepted at the same time, manufacturers can decide which test is more suitable for their products. In order to achieve this goal, users must understand the advantages and disadvantages of DC and AC testing.

2.3.1 Features of AC withstand voltage (ACW) test

Most DUTs for withstand voltage test will contain some stray capacitance. These stray capacitances may not be filled with AC testing, and a continuous current will flow through these capacitances.

2.3.1.1 The advantages of AC withstand voltage (ACW) test

1. Generally speaking, AC test is easier to be accepted by safety regulations than DC test. The main reason is that most of the products use alternating current, and the alternating current test can test the positive and negative polarity of the product at the same time, which is completely consistent with the environment in which the product is used, and is in line with the actual conditions of use.

2. Since the stray capacitance cannot be fully charged during the AC test, but there will be no instantaneous inrush current, so there is no need to let the test voltage rise slowly. You can add the full voltage at the beginning of the test, unless the product is very sensitive to the impulse voltage. sensitive.

3. Since the AC test cannot be filled with those stray capacitances, there is no need to discharge the test object after the test, which is another advantage.

2.3.1.2 Disadvantages of alternating current (AC) testing

1. The main disadvantage is that if the stray capacitance of the DUT is large or the DUT is a capacitive load, the current generated in this way will be much larger than the actual leakage current, so the actual leakage current cannot be known.

2. Another disadvantage is that because the current required by the stray capacitance of the object to be tested must be supplied, the output current required by the instrument will be much larger than the current when the DC test is used. This will increase the risk of operators.

2.3.2 Features of Direct Current (DC) Test

In the DC withstand voltage test, the stray capacitance on the object to be tested is filled, and the

capacitive current caused by the DC withstand voltage test will drop to zero after the stray capacitance is fully charged.

2.3.2.1 Advantages of direct current (DC) testing

1. Once the stray capacitance on the DUT is fully charged, only the actual leakage current of the DUT will remain. The DC withstand voltage test can clearly show the actual leakage current of the DUT.

2. Another advantage is that because it only needs to supply the charging current of the object under test in a short time, the current required for other times is very small, so the current capacity of the instrument is much lower than the current capacity required for AC withstand voltage test .

2.3.2.2 Disadvantages of direct current (DC) testing

1. Unless there is no capacitance on the object to be tested, the test voltage must start from "zero" and rise slowly to avoid excessive charging current. The larger the capacitance, the longer the ramp-up time is required, and the increase in one time The lower the voltage. When the charging current is too large, it will definitely cause misjudgment of the tester and make the test result incorrect.

2. Since the DC withstand voltage test will charge the object under test, after the test, the object under test must be discharged before the next step can be done.

3. Unlike the AC test, the DC withstand voltage test can only be a single polarity test. If the product is to be used under AC voltage, this shortcoming must be considered. This is the reason why most safety organizations recommend the use of AC withstand voltage test.

4. In the AC test, the peak value of the voltage is 1.4 times that of the meter. This is not displayed by the general meter, and it is also not achieved by the DC withstand voltage. Therefore, most safety organizations require that if DC withstand voltage test is used, the test voltage must be increased to the same value.

2.4 Insulation resistance test

The insulation resistance test mainly measures the resistance between the live wire of the appliance and the casing. The method of measurement is based on the principle of Ohm's law, adding a voltage between the live wire and the case, then measuring the voltage and current values respectively, and then calculating the resistance value according to Ohm's law. Usually a larger constant voltage (DC 500V or 1000V) is applied and maintained for a specified period of time as the test standard. If the resistance is kept within the specified specifications within the specified time, it can be determined that it is operated under normal conditions and the appliance should be relatively safe.

The higher the insulation resistance value, the better the insulation of the product. The insulation resistance value measured by the insulation resistance test is the equivalent resistance value formed by the various associated networks connected between and around the two test points.

However, the insulation test cannot detect the following conditions:

The insulation strength of the insulating material is too weak;

There are pinholes on the insulator;
The distance between parts is not enough;
The insulator is squeezed and broken;
The above-mentioned conditions can only be detected by the withstand voltage test.

2.5 AC ground resistance test

The grounding resistance test mainly measures the resistance of the contact point between the ground wire of the appliance and the chassis. The method of measurement is based on the principle of Ohm's law, a current flows through the contact point, and then the current and the voltage value of the contact point are measured respectively, and then the resistance value is calculated according to Ohm's law. Usually a relatively large current flows. The abnormal current condition that occurs when the simulator is abnormal is used as the test standard. If the contact resistance of the ground wire on the appliance can pass the harsh environment test, this appliance should be safer under normal use conditions.

Different products have different technical specifications. Basically, the safety regulations require a constant current to flow through the contact point. This current must be maintained for a specified period of time. If the resistance of the contact point remains within the specified range within the specified period of time Inside, it can be determined to operate under normal conditions. The appliance should be safer. Appropriate design and proper construction can protect users from accidental electric shock.

Although a general resistance meter can be used to measure the contact resistance, the output current of the resistance meter is usually very small, does not meet the requirements of safety regulations, and cannot be recognized by the safety inspection agency. It must be measured with a dedicated ground resistance tester. For appliances that are frequently touched by general users, in addition to the CSA's specification of 30 amperes, most security inspection agencies require 25 amperes, and the current must last for 60 seconds, and the resistance value must be maintained below 100m Ω . The specifications of appliances that are not easy for the user to touch are usually relatively loose. Generally, the current is required to be 10 amperes, and the resistance of the contact point needs to be less than 500m Ω , but the time is still 60 seconds. There are still some international specifications that are higher than the above standards, and the test standard is 5 times the rated input current of the appliance, and the resistance value of the contact point is still 100m Ω , and the test time is 60 seconds. Most of these are electrical appliances, which are more dangerous, so the specification requirements will be higher than general appliances.

In the current safety regulations in the world, there are some special requirements to measure the resistance of the contact point of the grounding wire first, and the resistance of the contact point must meet the regulations before the insulation withstand voltage test can be carried out. This is mainly to prevent misunderstanding that the insulation or withstand voltage is good because the grounding wire is not properly connected.

The ground resistance tester has two output forms: AC and DC. Both forms can accurately measure the resistance value of the contact point, but the two forms have significant differences in the destructiveness of the bad contact point. Because the calculation basis of the resistance value is the effective value of voltage and current, and the effective value of DC is the same as the peak value, but the peak value of AC is 1.414 times the effective value, so when AC is at the peak, its current value is also 1.414 of DC Times. When comparing the energy generated by the two contact points with the peak point of AC, when calculating according to the power theorem (power = square of current X resistance), the energy generated by the contact point at the moment of the AC peak is twice that of DC .

Although the security inspection agency allows two types of grounding testers to be used, the AC grounding resistance tester is particularly recommended in the selection of grounding resistance tester specifications. Secondly, most of the general appliances are supplied by mains electricity, and the mains itself is alternating current, so using an alternating ground resistance tester as the test standard is fully in line with the actual conditions of use.

If you have any questions about the use of the instrument or related to the instrument, please contact us.

Chapter 3 Technical Specifications

3.1 Product introduction

The multi-channel withstand voltage insulation grounding tester is a testing instrument for testing the safety parameters of electronic products. It can be used for the withstand voltage and insulation testing of household appliances, electronic instruments, electronic equipment, electronic components, wires and cables and other electrical products.

This series of products have the functions of pass/fail discrimination, sound and light alarm function and automatic control of test time, etc., and have the advantages of simple operation, beautiful appearance, and fast overcurrent cut-off speed. It is an ideal withstand voltage insulation testing instrument.

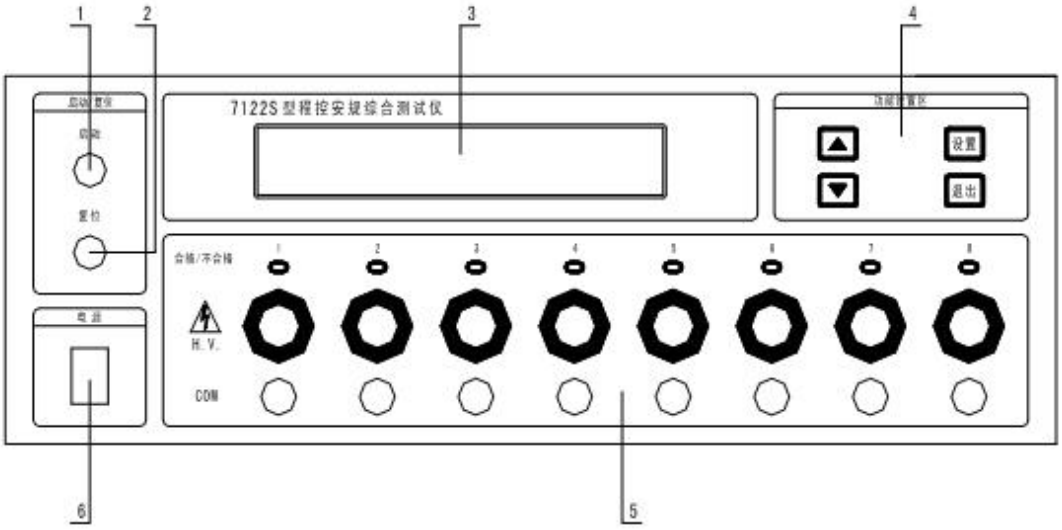
3.2 Technical indicators

Function	Function Description
Input characteristics	Voltage: 220VAC，±10%, Single phase, optional Frequency：47-63Hz Fuse: 4A/250VAC
AC withstand voltage test	Rated output: 5KV AC
Output frequency	50 or 60Hz, optional
Output waveform	Sine wave, 1.3< crest factor<1.5

Leakage current Upper limit setting	Range: 0.01-20.00mA Resolution: 0.01mA Accuracy: ± (2% setting value + 2 bytes)
Leakage current Lower limit setting	Range:0.00-20.00mA Resolution:0.01mA Accuracy:±(2% setting value+2 bytes)
DC withstand voltage test	Rated output:6KV DC
Leakage current Upper limit setting	Accuracy:0.01-10.00mA Resolution:0.01mA Accuracy:±(2% setting value+2 bytes)
Leakage current Lower limit setting	Range: 0.00-10.00mA Resolution: 0.01mA Accuracy: ± (2% setting value + 2 bytes)
Voltage setting	Range: 0-5000V AC 0-6000V DC resolution: 1V Accuracy: ± (2% setting value + 5V)
Voltage stability	± (1% setting value + 5V)
Slow rise time	Range: 0.1-999.9S
	Resolution: 0.1S
	Accuracy:±(0.1% setting value+0.05 S)
Test time	Range: 0.5-999.9S，0 is continuous test
	Resolution: 0.1S
	Accuracy:±(0.1% setting value +0.05 S)
Voltage display	Range: 0-5.00KV AC 0-6.00KV DC Resolution: 0.01KV Accuracy ±(3% display value+3 bytes)
Current display	Range: 0.01-20.00mA AC 0.01-10.00mA DC Resolution: 0.01mA Accuracy: ±(2% display value+3 bytes)
Insulation resistance test	Rated output:1000V DC
Voltage setting	Range: 500 - 1000V DC Resolution:100V Accuracy:±(2% setting value +5V)
Voltage display	Range: 0.50KV – 1.00KV DC Resolution: 0.01KV Accuracy: ±2% display value
Resistance display	Range: 1.000 - 2000MΩ Accuracy: ±(5% display value +3 bytes)（1-1000MΩ） ±(10% display value +3 bytes)(1000-2000MΩ)
Resistance upper limit setting	0-2000MΩ, 0 means no judgment

Resistance lower limit setting	1.0-999.9MΩ
Judgement delay time	Range: 0.8-999.9 S, 0 is continuous judgement Resolution: 0.1S Accuracy: ±(0.1% display value +0.05 S)
Grounding resistance test	Voltage output:<7VAC
Peak current display	3.0~30.0A, ±(3% display value+3 bytes)
Ground resistance Upper limit setting	1 ~ 300 mΩ（3 ~ 10A） 1 ~ 120 mΩ（11 ~ 30A）
Ground resistance Lower limit setting	0 ~ 300 mΩ（3 ~ 10A） 0 ~ 120 mΩ（11 ~ 25A）
Resistance display	0 ~ 300mΩ
Test time	0.5 ~ 999.9 S , 0 means continuous

Chapter 4 Panel Description



1. Start switch

   The green momentary contact switch contains a PASS indicator. Its functions are:

   As a start switch for test voltage output;

   When the test object passes the test, this green indicator light will be on.

2. Reset switch

   The red momentary contact switch contains a FAIL indicator. Its functions are:

   In the setting mode, as a switch to leave the setting mode;

   When the test is in progress, it can be used as a switch to interrupt the test;

   At the end of the test, as a switch to exit the test display and enter the next state to be tested;

   When the DUT fails the test, this red indicator light will be on.

3. LCD display

   20 characters x 2 lines backlit LCD, used to display setting data or test results.

4.1 SET button

   In the state to be tested, as a function key to enter the setting mode;

   In the setting mode, as a function key for selecting test parameter items;

   In the calibration mode, it is used as a function key for selecting calibration parameter items;

   During the connection test, it is used as a function key to view the test result.

4.2 + key

   In the state to be tested, it is used as a function key for parameter group selection;

   During parameter setting, it is used as a function key for inputting various test parameter data;

In the calibration mode, it is a function key for standard value input.

4.3-key

In the state to be tested, it is used as a function key for parameter group selection;

During parameter setting, it is used as a function key for inputting various test parameter data;

In the calibration mode, it is a function key for standard value input.

4.4 EXIT key

In the setting mode, as a function key to leave the setting mode and save the setting value;

In the calibration mode, it is used as a function key to close the output and save the standard value.

5.1 Indicator

The 8-channel indicator lights correspond to the 8-channel test state. After the test, the corresponding green light is on to indicate qualified, and the red light is on to indicate unqualified.

5.2 End under test

As the loop test end of the tested part.

5.3 High voltage output terminal

The special output terminal can withstand high voltage within 10KV. As the high-voltage test terminal of the tested part.

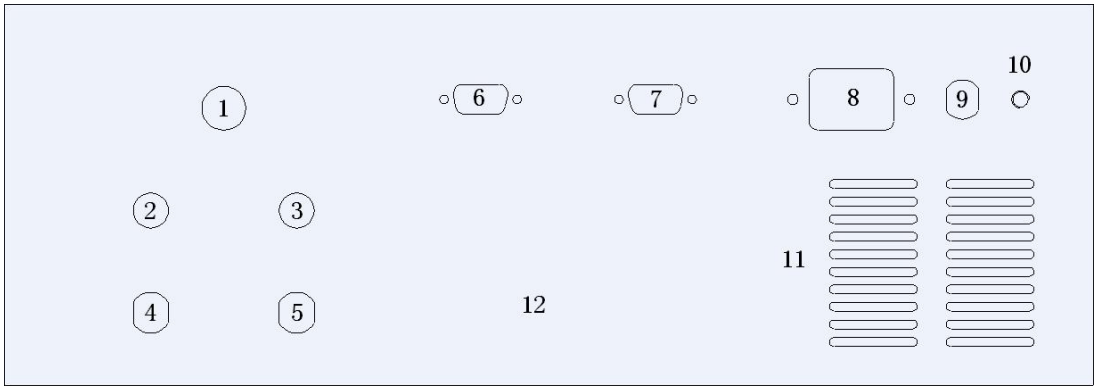
5.4 Test execution

When the instrument starts to output voltage, the indicator light in the high voltage mark will flash, indicating "high voltage output is in danger".

6. switch

The working power input switch of the instrument.

4.2.Rear panel diagram



4.2.2 Description of rear panel

1~5 output interface (spare) same as before

6. Remote control signal terminal (PLC) interface

It is a standard 9PIN D-type terminal block. Provide the normally open (N.O.) contact to the remote monitoring signal of PASS (test passed), FAIL (test failed) and the control contacts of TEST (start) and RESET (reset).

7. RS232 interface

Used to connect to a computer and use the supporting software to set the parameters of the instrument and change the test state.

8. Input power socket

The standard input power socket provides working power for the instrument, and the input power voltage is AC220V.

9. Input power fuse holder

Note that the input power switch is turned off and the power plug is disconnected before the fuse can be replaced, and the standard fuse (10A/250VAC) should be replaced.

10. Ground terminal

The ground terminal of the machine body must be properly connected to the ground wire to ensure the safety of the operator.

11. Instrument cooling holes

Used to dissipate heat inside the instrument.

12. Nameplate

Display date of manufacture, instrument number and company name

Chapter 5 Operation Procedures and Steps

5.1 Operating instructions

This series of withstand voltage insulation tester is mainly used for general production line or quality inspection, and its operation and setting are very simple. Unreasonable settings and operations will not respond.

5.2 Operation steps

Please operate this instrument in accordance with the following procedures and steps:

1. Before connecting the input power cord plug of this instrument to the mains power supply, please turn off the input "power switch" of this instrument.

And switch the "voltage selection" switch on the rear panel to the correct input voltage position, and check whether the specifications of the fuse are correct. Then connect the ground wire to the "ground terminal" on the rear panel of the instrument.

2. Connect the input power cord to the power socket of the instrument, please do not connect the high-voltage test line to the high-voltage output terminal of the instrument first.

3. Connect all the test wires of the object to be tested, then connect the loop wire to the tested end of the instrument, and finally connect the high-voltage test wire to the high-voltage terminal of the instrument, and check whether all the test wires are connected. Proper.

4. Turn on the input "power switch" of the instrument, and after the program displays the instrument model, it will automatically display the group and test parameter information of the instrument during the last test, and enter the test and parameter setting mode. At this time, the display will show:

AC withstand voltage test

ACW	SETUP	XXX.XS
MX	X.XXKV	XX.XXmA

or

DC withstand voltage test

DCW	SETUP	XXX.XS
MX	X.XXKV	XX.XXmA

Insulation resistance test

IR	SETUP	XXX.XS
MX	X.XXKV	XXXXMΩ

Ground resistance test

GND	SETUP	XXX.XS
MX	XX.XXA	XXXmΩ

If you want to reset the test parameters, press the "SET" key to set the parameters. For detailed setting methods and steps, please refer to the description of "Testing parameter settings".

5. Press the "start" switch again to output high voltage. At this time,The high voltage indicator next to the red symbol ⚠ will flash, and the timer will start counting at the same time. Do not touch the object under test while the test is in progress.

6. After the test is completed, the instrument will automatically turn off the output, the green indicator light on the start switch will light up, and a beep, beep sound will be emitted at the same time, indicating that the test object has passed the test, and the display will show "PASS" and the test result data. If you want to continue the test, you can press the "Start" switch again. If you want to view the original settings, press the "reset" switch, the program will immediately clear the test results and display the original settings.

7. If you want to stop the test while the test is in progress, press the "reset" switch, the instrument will immediately stop the test, and the display will retain the current test value. If you want to continue the test, please press the "Start" switch, the program will restart the test from the original starting point.

8. If the test fails due to the object under test, the instrument will immediately stop the test and the display will show its status and the value at the time of failure. At this time, the indicator light in the red reset switch will light up, and the "beep" warning sound will continue. You can press the "Reset" switch to turn off the alarm sound. If you want to continue the test, press the "Start" switch again. For information about various displays, please refer to the description of

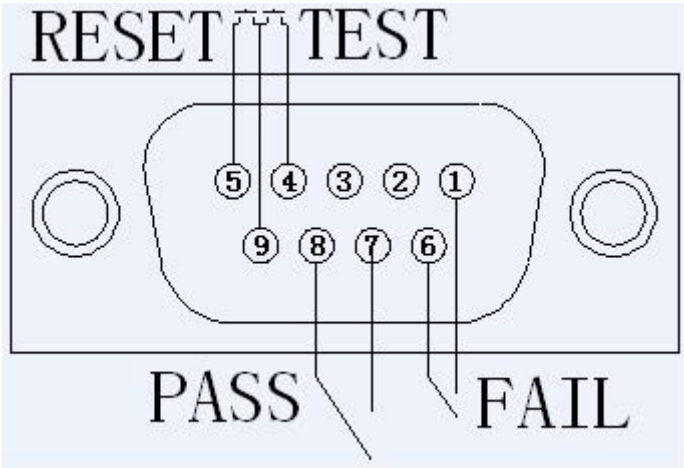
"Display Information".

9. If you want to use an external remote control device to operate the tester, connect the remote control to the remote control input terminal on the rear panel. The functions and functions of the TEST and RESET switches on the remote control are exactly the same as the start and reset switches on the front panel of the instrument. Since the start and reset switches of this instrument and the TEST and RESET switches of the remote control can be operated at the same time, the remote control must be properly kept, and non-operators should not have the opportunity to touch the remote control to avoid accidents.

10. This tester has PASS (test passed), FAIL (test failed) signal output, these signals can be connected to the control center to monitor, remotely monitor the signal of this instrument.

6.1 Input and output signals

There are remote monitoring and remote control wiring terminals on the back panel of the tester, which can connect the working status of the instrument to the monitoring center as monitoring, and can be connected to the remote control for operation. This terminal is a standard 9PIN D-type terminal block, which contains two monitoring signal outputs of PASS (test passed) and FAIL (test failed) and two remote control input signals of TEST (start) and RESET (reset).



6.2 Wiring and description of remote control output signal

This tester provides two “Normally Open” (NO) contact signals, which are provided by two relays inside the instrument. The capacity of the contacts is AC250V 1.0A/ DC250V 0.5A. There is no restriction on the positive and negative polarity of these contacts, and Each signal is independent wiring, there is no common ground wire. The terminal block is marked with the pin number, and the wiring of the output signal is as follows:

PASS signal: The output signal is connected between PlN7 and PIN8.

FAIL signal: The output signal is connected between PlN1 and PIN6.

6.3 Wiring instructions for remote control input signal

The tester is equipped with remote control contacts, and the TEST (start) and RESET (reset) functions of the instrument can be operated by an external remote control device. Must use "momentary contact" switch as controller. Please pay special attention to never connect any other power sources. If you connect to other power sources, it will cause damage to the internal circuit of the instrument or malfunction. The pin number is marked on the terminal block. The detailed wiring is as follows:

1. TEST control: The control switch is connected between PIN4 and PIN9
2. RESET control: the switch is connected between PIN5 and PIN9

Chapter 7 Automatic Discharge Circuit

7.1 Principle of discharge

After the test, especially the DC withstand voltage test, a large amount of electrical energy will remain on the tested object and the circuit, and the test line can be removed before the test line must be discharged. After the test is completed, the program automatically drives the discharge circuit. In about 0.2 seconds, the electric energy remaining on the object and the circuit is discharged. The total capacitance that the discharge circuit can withstand is as follows:

Maximum discharge capacity:

0.2uF ----- when the output voltage≤1KV
0.1uF ----- when the output voltage≤2KV
0.06uF ---- when the output voltage≤3KV
0.05uf --- when the output voltage≤4KV
0.04uf --- when the output voltage≤5KV
0.0l5uF --- when the output voltage≤6KV

7．2 Precautions

If the capacitance range corresponding to the above output voltage is exceeded, the automatic discharge circuit will be damaged and cause malfunction. Please pay special attention not to exceed the allowable capacitance of discharge.

Please note that if the input power is turned off halfway, the automatic discharge circuit will not work and the DUT will not be discharged. Avoid turning off the input power during the test.

Chapter 8 Test parameter setting and display

8.1 Test parameter description

After power on, the program will automatically enter the parameters set during the last test before the last shutdown. The LCD will display:

AC withstand voltage test

ACW	SETUP	XXX.XS
MX	X.XXKV	XX.XXmA

Or

DC withstand voltage test

DCW	SETUP	XXX.XS
MX	X.XXKV	XX.XXmA

Insulation resistance test

Or

IR	SETUP	XXX.XS
MX	X.XXKV	XXXXMΩ

Ground resistance test

GND	SETUP	XXX.XS
MX	XX.XXA	XXXmΩ

Prompt description:

ACW: means AC withstand voltage test

DCW: means DC withstand voltage test

IR: indicates insulation resistance test

GND: indicates the ground resistance test

SETUP: Prompt information, indicating that it is currently under test or parameter setting status

Variable description:

MX: parameter group (1-3)

XXX.X S: Test time

X.XX KV: output voltage setting value

XX.XX mA: Leakage current upper limit setting value

XXXX MΩ: Insulation resistance upper limit setting value

XX.XXA: AC current value

XXXmΩ: upper limit of grounding resistance

(The following variables are the same as above)

The "SET" key is the parameter item setting key. During the test and parameter setting mode, each time you press the "SET" key, the parameter setting will be scrolled to the next setting item. After pressing the "EXIT" key, the set test parameters will be automatically stored in the memory; pressing the "reset" switch will invalidate the setting. The test parameters stored in the memory will still be retained after the input power is turned off and will not be cleared unless they are manually reset.

"+" and "-" keys are the operation keys for group selection and the input keys for parameter values.

"+" key: the number will increase when you press this key, and the "-" key: the number will

decrease when you press this key. Each time you press the "+" and "-" keys, the last digit on the display will "increase by 1" or "decrease by 1". If you press and hold the increase or decrease more than 10, it will quickly "increase by 10" or "decrease" 10", if the increase or decrease exceeds 100 by continuous pressing, it will quickly "increase by 100" or "decrease by 100", and it will return to the initial rate state after releasing the button.

In the process of setting the test parameters, if you do not need to reset all of them, you can press the "EXIT" key to leave the test parameter setting mode after any step is completed, the program will automatically enter the test mode, and it will be set The test parameters are stored in the memory. The program does not accept unreasonable settings and inputs. The "X" in the following parameter setting descriptions represents any number between 0-9.

8.2 Test parameter setting:

After power on, the program will automatically enter the parameters set during the last test before the last shutdown. The LCD will display:

AC withstand voltage test

ACW	SETUP	XXX.XS
MX	X.XXKV	XX.XXmA

Or

DC withstand voltage test

DCW	SETUP	XXX.XS
MX	X.XXKV	XX.XXmA

Insulation resistance test

Or

IR	SETUP	XXX.XS
MX	X.XXKV	XXXXMΩ

Ground resistance test

GND	SETUP	XXX.XS
MX	XX.XXA	XXXmΩ

1. Group setting

Press the "+" or "-" key, the program will automatically display the parameters set in the previous or next group.

2. Test parameter setting

Parameter setting is to use the "SET" key as the selection key of a parameter item, and each time it is pressed, it will enter the next parameter item. The order of AC/DC withstand voltage test is: test mode selection, output voltage setting, upper limit setting of leakage current, lower limit setting of leakage current, slow rise time setting, test time setting, output frequency selection (no This item), arc sensitivity setting and connection test setting; the insulation resistance test sequence is: test mode selection, output voltage setting, insulation resistance upper limit setting, insulation resistance lower limit setting, delay judgment time setting and connection test setting set. The grounding resistance test sequence is output current setting, ground resistance upper limit setting, ground resistance lower limit setting, test time setting, output frequency setting, and connection test setting.

3. Test Mode selection

After pressing the "SET" key, the program will enter the test mode selection, and the LCD will display:

AC withstand voltage test

```
Test Mode   =   ACW
Select   by ∧ or ∨
```

or

DC withstand voltage test

```
Test Mode   =   DCW
Select   by ∧ or ∨
```

Insulation resistance test

or

```
Test Mode   =   IR
Select   by ∧ or ∨
```

Ground resistance test

```
Test Mode   =   GND
Select   by ∧ or ∨
```

Please use the "+" or "-" key on the panel to input the test mode you want to set: ACW, DCW, IR or GND.

4. Output voltage and current setting

After the test mode is selected and the "SET" button is pressed, the program will enter the output voltage setting mode for AC/DC withstand voltage or insulation resistance test or the output current mode for grounding resistance test, the LCD will display:

AC withstand voltage test

```
Voltage =   XXXXV
Range:0-5000
```

or

DC withstand voltage test

```
Voltage =   XXXXV
Range:0-6000
```

Insulation resistance test

or

```
Voltage =   XXXXV
Range:500-1000
```

Ground resistance test

```
Current   =   XX.XXA
Range:3.00-30.00
```

Please use the "+" or "-" keys on the panel to input the desired output voltage or current.

5. Leakage current or insulation resistance upper limit (HI-Limit) setting

After the output voltage setting is completed and the "SET" button is pressed, the program will enter the leakage current or insulation resistance upper limit setting mode or the ground resistance upper limit setting mode of the AC/DC withstand voltage test, and the LCD will display:

AC withstand voltage test

```
HI-Limit =   XX.XXmA
Range:   0.01-12.00
```

or

DC withstand voltage test

```
HI-Limit =   XX.XXmA
Range:   0.01-6.00
```

Insulation resistance test

or

HI-Limit = XXXXMΩ
Range: 0-2000 0=OFF

Ground resistance test

HI-Limit = XXXmΩ
Range:1-300

Please use the "+" or "-" keys on the panel to input the upper limit you want to set. If the upper limit of the insulation resistance is set to "0", the program will not determine the upper limit of the insulation resistance.

6. Leakage current or insulation resistance lower limit (LO-Limit) setting

After the upper limit setting of the leakage current or insulation resistance of the AC/DC withstand voltage test is completed and the "SET" key is pressed, the program will enter the leakage current or insulation resistance lower limit setting mode of the AC/DC withstand voltage test or the ground resistance lower limit setting Mode, the LCD will display:

AC withstand voltage test

LO-Limit = X.XXmA
Range: 0.00-12.00

or

DC withstand voltage test

LO-Limit = X.XXmA
Range: 0.00-6.00

Insulation resistance test

or

LO-Limit = XXX.XMΩ
Range: 1.0-999.9

Ground resistance test

LO- Limit = XXXmA
Range: 0-300

Please use the "+" or "-" key on the panel to input the lower limit value you want to set.

7. Ramp Time setting

After the lower limit of the leakage current of the AC/DC withstand voltage test is set and the "SET" key is pressed, the program will enter the ramp-up time setting mode, and the LCD will display:

AC/DC withstand voltage test

Ramp Time= XXX.XS
Range: 0.1-999.9

Note: Insulation grounding resistance test does not have this function, the program will automatically skip this setting and go directly to the next setting. Please use the "+" or "-" key on the panel to input the ramp-up time you want to set, the unit is second.

8. Dwell Time setting

After setting the ramp time of the AC/DC withstand voltage test and pressing the "SET" button, the program will enter the test time setting mode, and the LCD will display:

AC/DC withstand voltage or ground test

Dwell Time = XXX.XS
0.5-999.9 0=Constant

Note: Insulation resistance test does not have this function, the program will automatically skip this setting and go directly to the next setting. Please use the "+" or "-" key on the panel to input the test time value you want to set, the unit is second. If the test time is set to "0", the test will continue without stopping, unless the test fails or the test is manually stopped. Otherwise it will not be automatically suspended.

9. Delay time (Delay Time) setting

After the insulation resistance lower limit setting is completed and the "SET" key is pressed, the program will enter the delay determination time setting mode, and the LCD will display:

Insulation resistance test

Delay Time = XXX.XS
0.8-999.9 0=Constant

Note: AC/DC withstand voltage test and ground resistance test do not have this function, the program will automatically skip this setting and go directly to the next setting. Please use the "+" or "-" key on the panel to input the delay judgment time value to be set, and the unit is second. If the test time is set to "0", the test will continue without stopping, unless the test fails or the test is manually stopped. Otherwise it will not be automatically suspended. The delay determination time is set because most of the tested objects are capacitive and generate a large charging current. The delay determination time allows the instrument to make a determination after the charging current is stable.

10. Output frequency (Frequency) setting

After the AC withstand voltage test time is set and the "SET" button is pressed, the program will enter the output frequency selection mode, and the LCD will display:

AC withstand voltage and ground resistance test

Frequency = 50 Hz
Select by ∧ or ∨

Note: DC withstand voltage and insulation resistance test does not have this function, the program will automatically skip this setting and go directly to the next setting. Please use the "+" or "-" key on the panel to select the output frequency as "50" or "60" Hz.

11. Connect setting

After the AC/DC withstand voltage arc sensitivity or insulation resistance delay determination time is set and the "SET" key is pressed, the program will enter the connection test setting mode, and the LCD will display:

```
CONNECT = YES
Select   by    ∧ or ∨
```

Please use the "+" or "-" button on the panel to select the connection test as "YES" or "NO". If the connection test is set to "YES", after this test is completed, it will automatically connect to the next group to continue the test. The maximum number of connections is 3 (8 times for multiple channels). If set to "NO", after this test is completed, the test will be stopped immediately, and will not be connected to the next group of tests. When the connection test is set to "YES", the program will automatically display the symbol "_" after the group, indicating that this group of tests is connected to the next group of tests.

This is the last step of parameter setting. You can press the "SET" key again to return to the first parameter setting step, press the "EXIT" key to save the data or press the "reset" key to leave the parameter setting mode without saving. The program automatically calls the test parameters of the current group, enters the test mode, and is ready to test.

8.3 LCD information

The following is the information that will appear on the display when the instrument is performing AC/DC withstand voltage or insulation resistance tests. The description is as follows.

1. Test and parameter setting mode (SETUP)

The following display information indicates that the instrument has entered the test and parameter setting mode of AC/DC withstand voltage or insulation resistance or ground resistance:

AC withstand voltage test

```
ACW   SETUP      XXX.XS
MX    X.XXKV     XX.XXmA
```

or

DC withstand voltage test

```
DCW   SETUP      XXX.XS
MX    X.XXKV     XX.XXmA
```

Insulation resistance test

```
IR    SETUP      XXX.XS
MX    X.XXKV     XXXXMΩ
```

Ground resistance test

```
GND   SETUP      XXX.XS
MX    XX.XXA     XXXmΩ
```

If you press the "Start" switch, the instrument will start testing, if you press the "SET" key, the instrument will immediately enter the parameter setting mode, and you can set the parameters.

2. Test abort (ABORT)

If the AC/DC withstand voltage or insulation resistance or ground resistance test is in progress

and the test is interrupted by pressing the "reset" switch or using a remote control device, the LCD will display:

AC withstand voltage test

ACW	ABORT	XXX.XS
MX	X.XXKV	XX.XXmA

or

DC withstand voltage test

DCW	ABORT	XXX.XS
MX	X.XXKV	XX.XXmA

or

Insulation resistance test

IR	ABORT	XXX.XS
MX	X.XXKV	XXXXMΩ

Ground resistance test

GND	ABORT	XXX.XS
MX	XX.XXA	XXXmΩ

Press the "reset" button to enter the test mode; press the "start" button to restart the test.

3. Ramp up test (RAMP)

During the ramp-up process of AC/DC withstand voltage test, the program does not make the lower limit judgment, the test result will be continuously updated, and the display will show:

AC withstand voltage test

ACW	RAMP	XXX.XS
MX	X.XXKV	XX.XXmA

or

DC withstand voltage test

DCW	RAMP	XXX.XS
MX	X.XXKV	XX.XXmA

4. AC/DC withstand voltage test (DWELL) or insulation resistance delay determination (DELAY)

During the test, the test result will be continuously updated and displayed:

AC withstand voltage test

ACW	DWELL	XXX.XS
MX	X.XXKV	XX.XXmA

or

DC withstand voltage test

DCW	DWELL	XXX.XS
MX	X.XXKV	XX.XXmA

Insulation resistance test

IR	DELAY	XXX.XS
MX	X.XXKV	XXXXMΩ

Ground resistance test

GND	DWELL	XXX.XS
MX	XX.XXA	XXXmΩ

5. Leakage current or insulation resistance upper limit failure (HI-Failt)

If the DUT is doing AC/DC withstand voltage or insulation resistance test, the leakage current or insulation resistance value exceeds the upper limit setting value, it will be judged by the program as the test failure caused by the leakage current or the upper insulation resistance value. If its leakage current Or the insulation resistance value is still within the upper limit detection range of the instrument, the display will show:

AC withstand voltage test

ACW	HI-Fail	XXX.XS
MX	X.XXKV	XX.XXmA

or

DC withstand voltage test

DCW	HI-Fail	XXX.XS
MX	X.XXKV	XX.XXmA

Insulation resistance test

IR	HI-Fail	XXX.XS
MX	X.XXKV	XXXXMΩ

or

Ground resistance test

GND	HI-Fail	XXX.XS
MX	XX.XXA	XXXmΩ

If the leakage current or insulation resistance value exceeds the upper limit detection range of the instrument, the display will show:

AC withstand voltage test

ACW	HI-Fail	XXX.XS
MX	X.XXKV	>12 mA

or

DC withstand voltage test

DCW	HI-Fail	XXX.XS
MX	X.XXKV	>6 mA

Insulation resistance test

IR	HI-Fail	XXX.XS
MX	X.XXKV	>2000MΩ

or

Ground resistance test

GND	HI-Fail	XXX.XS
MX	XX.XXA	>300mΩ

6. Leakage current or insulation resistance lower limit failure (LO-Fail)

If the DUT is doing AC/DC withstand voltage or insulation resistance test, the leakage current or insulation resistance value is less than the lower limit set value, it will be judged by the program as the test failure caused by the leakage current or the lower limit of the insulation resistance value. If the insulation resistance value is Still within the detection range of this instrument, the display will show:

AC withstand voltage test

ACW	LO-Fail	XXX.XS
MX	X.XXKV	XX.XXmA

or

DC withstand voltage test

DCW	LO-Fail	XXX.XS
MX	X.XXKV	XX.XXmA

Insulation resistance test

IR	LO-Fail	XXX.XS
MX	X.XXKV	XXXXMΩ

or

Ground resistance test

GND	LO-Fail	XXX.XS
MX	XX.XXA	XXXmΩ

If the insulation resistance exceeds the detection range of the instrument, the display will show:

Insulation resistance test

IR	LO-Fail	XXX.XS
MX	X.XXKV	<1MΩ

7. Pressure breakdown (BREAK)

If the leakage current of the object under test is far beyond the range that can be measured by the instrument during the AC/DC withstand voltage test, and the arc current is far beyond the normal value that the instrument can measure, it will be judged by the program as withstand If the test fails due to pressure collapse, the LCD will display:

AC withstand voltage test

ACW	BREAK	XXX.XS
MX	X.XXKV	XX.XXmA

or

DC withstand voltage test

DCW	BREAK	XXX.XS
MX	X.XXKV	XX.XXmA

8. Overcurrent failure (OVER)

If the output current of the DUT exceeds the normal output range of the instrument during the AC/DC withstand voltage test, it will be judged by the program as a test failure caused by overcurrent, and the display will show:

AC withstand voltage test

ACW	OVER	XXX.XS
MX	X.XXKV	>12 mA

or

DC withstand voltage test

DCW	OVER	XXX.XS
MX	X.XXKV	>6 mA

Grounding resistance overcurrent failure (OVER)

If the output current of the object under test exceeds the normal output range of the instrument during the ground resistance test, it will be judged by the program as a test failure caused by overcurrent, and the display will show:

GND	OVER	XXX.XS
MX	>25A	XXXmΩ

9. Pass the test (PASS)

If the object under test has no abnormal phenomena during the whole process of AC/DC withstand voltage or insulation resistance test, it is deemed to have passed the test and the display will show:

AC withstand voltage test

ACW	PASS	XXX.XS
MX	X.XXKV	XX.XXmA

or

DC withstand voltage test

DCW	PASS	XXX.XS
MX	X.XXKV	XX.XXmA

Insulation resistance test

IR	PASS	XXX.XS
MX	X.XXKV	XXXXMΩ

Ground resistance test

GND	PASS	XXX.XS
MX	XX.XXA	XXXmΩ

10. List display

If the connection test of the current group is set to "Yes", after the end of this test, the program

will automatically enter the next group of tests, connecting up to 4 groups. After the connection test ends normally, the display will show:

M1-A	M2- D	M3-I	M4-G
PASS	PASS	PASS	PASS

The first line shows the test group and test mode, such as M1-A: indicates group 1, AC withstand voltage test; M2-D: indicates group 2, DC withstand voltage test; M3-I: indicates group 3, insulation Resistance test; M4-G: indicates group 4, grounding resistance test. The second line shows the corresponding test results. If you want to query the test data of each group, please press the "SET" key; if you want to return to the test state, please press the "reset" switch to exit, the test results will not be saved after exiting.

Chapter 9 Calibration Procedure and Steps

Before leaving the factory, this instrument has been calibrated in accordance with the relevant verification procedures of the national standard. The accuracy of this instrument and the instrument completely meet the specifications of the national standard. It is recommended that the instrument needs to be calibrated at least once a year, and the accuracy of the standard instrument used for calibration must meet the corresponding requirements , To ensure the accuracy of the instrument.

9.1 Enter the calibration mode:

Please press and hold the "SET" button on the front panel, and then turn on the power switch of the machine, the LCD will display:

Calibration		Mode
<SET>	to	Select

Now the instrument has entered the calibration mode, please release the button. Press the "SET" key to select the correction parameter items, which are AC withstand voltage correction, AC withstand voltage correction for each current file, DC withstand voltage voltage correction (the model does not have this item), DC withstand voltage correction for each current file (the model does not have this Item), insulation resistance voltage correction, insulation resistance correction for each resistance file.

9.2 AC withstand voltage correction

Press the "SET" key, the program enters the AC withstand voltage correction mode, the display will show:

```
CAL ACW V = 4000V
<TEST>   to   Calibrate
```

Connect a standard high-voltage voltmeter capable of measuring 6000VAC to the "H.V." and "test terminal" on this instrument. If the standard high-voltage meter specifically indicates "high and low end", please connect the high end to To H． V. On the terminal, connect the low end to the "tested terminal" of the instrument to avoid inaccuracy or damage to the high-voltage voltmeter. Then press the "Start" button, the calibration program of this instrument will automatically output a voltage of about 4000VAC, and the display will show:

```
CAL ACW V = XXXXV
<EXIT>   to   Save
```

Please use the "+" or "-" key on the panel to input the standard voltage into the calibration program, press the "+" key to add numbers, and the "-" key to reduce numbers, and the unit is V. Please confirm the number is correct, and then press the "EXIT" button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.3 AC withstand voltage current 10mA gear correction

Press the "SET" key, the program enters the AC withstand voltage current 10mA calibration mode, the display will show:

```
CAL ACW I1 = 10.00mA
<TEST>   to   Calibrate
```

Please first connect the standard AC ammeter and a resistance of about 100K Ω /10W in series, and then connect it between the "H.V." and the "tested terminal" of this instrument, and the ammeter is on the "tested terminal" end. Please press the "Start" button, the calibration program of this instrument will automatically output a current of about 1000VAC/10.00mA, and the display will show:

```
CAL ACW I1 = XX.XXmA
<EXIT>   to   Save
```

Please use the "+" or "-" key on the panel to input the standard value of the standard ammeter into the calibration program, the unit is mA. Please confirm the number is correct, and then press

the "EXIT" button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.4 Correction of AC withstand voltage current 2mA

Press the "SET" key, the program enters the AC withstand voltage current 2mA calibration mode, the display will show:

```
CAL ACW I2 = 2.000mA
<TEST>    to    Calibrate
```

Please first connect the standard AC ammeter and a resistance of about 500KΩ/2W in series, and then connect it between the "H.V." and the "test terminal" of this instrument, and the ammeter is on the "test terminal" end. Please press the "Start" button, the calibration program of this instrument will automatically output a current of about 1000VAC/2.000mA, and the display will show:

```
CAL ACW I2 = XX.XXmA
<EXIT>    to    Save
```

Please use the "+" or "-" key on the panel to input the standard value of the standard ammeter into the calibration program, the unit is mA. Please confirm the number is correct, and then press the "EXIT" button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.5 DC withstand voltage correction

Press the "SET" key, the program enters the DC withstand voltage correction mode, the display will show:

```
CAL DCW V = 4000V
<TEST>    to    Calibrate
```

Connect a standard high-voltage voltmeter capable of measuring 6000VDC to the "H.V." and "tested terminal" on this instrument. If the standard high-voltage meter specifically indicates "high and low end", please connect the high end to To H． V. On the terminal, connect the low end to the "tested terminal" of the instrument to avoid inaccuracy or damage to the high-voltage voltmeter. Then press the "Start" button, the calibration program of this instrument will automatically output a voltage of about 4000VDC, and the display will show:

```
CAL DCW V = XXXXV
<EXIT>    to    Save
```

Please use the "+" or "-" key on the panel to input the standard voltage into the calibration

program, the unit is V. Please confirm the number is correct, and then press the "EXIT" button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.6 DC withstand voltage current 6mA calibration

Press the "SET" key, the program enters the DC withstand voltage current 6mA calibration mode, the display will show:

```
CAL DCW I1 = 6.00mA
<TEST>    to    Calibrate
```

Please connect the standard DC ammeter in series with a resistance of about 100K Ω /10W, and then connect it between the "H.V." and the "tested terminal" of this instrument, and the ammeter is on the "tested terminal" end. Please press the "Start" button, the calibration program of this instrument will automatically output a current of about 600VDC/6.00mA, and the display will show:

```
CAL ACW I1 = X.XXmA
<EXIT>    to    Save
```

Please use the "+" or "-" key on the panel to input the standard value of the standard ammeter into the calibration program, the unit is mA. Please confirm the number is correct, and then press the "EXIT" button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.7 DC withstand voltage current 2mA gear correction

Press the "SET" key, the program enters the DC withstand voltage current 2mA calibration mode, the display will show:

```
CAL DCW I2 = 2.000mA
<TEST>    to    Calibrate
```

Please first connect the standard DC ammeter and a resistance of about 500K Ω /2W in series, and then connect it between the "H.V." and the "test terminal" of this instrument, and the ammeter is on the "test terminal". Please press the "Start" button, the calibration program of this instrument will automatically output a current of about 1000VDC/2.000mA, and the display will show:

```
CAL DCW I2 = XX.XXmA
<EXIT>    to    Save
```

Please use the "+" or "-" key on the panel to input the standard value of the standard ammeter into the calibration program, the unit is mA. Please confirm the number is correct, and then press the "EXIT" button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.8 Insulation resistance voltage correction:

Press the "SET" key, the program enters the insulation resistance voltage correction mode, the display will show:

```
CAL IR V = 1000V
<TEST>   to   Calibrate
```

Connect a standard voltmeter capable of measuring 1000VDC to the "H.V." and "test terminal" on this instrument. If the standard voltmeter specifically indicates "high and low end", please connect the high end to the The H． V. On the terminal, connect the low end to the "tested terminal" of the instrument to avoid inaccuracy or damage to the voltmeter. Then press the "Start" button, the calibration program of this instrument will automatically output a voltage of about 1000VDC, and the display will show:

```
CAL IR V = XXXXV
<EXIT>   to   Save
```

Please use the "+" or "-" key on the panel to input the standard voltage into the calibration program, the unit is V. Please confirm the number is correct, and then press the "EXIT" button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.9 Insulation resistance 0.5MΩ file correction:

Press the "SET" key, the program enters the insulation resistance 0.5MΩ calibration mode, the display will show:

```
CAL IR R1 = 0.500MΩ
<TEST>   to   Calibrate
```

Connect a standard resistance of about 500KΩ/2W to the "H.V." and "test terminal" of this instrument, and then press the "Start" button. At this time, the calibration program of this instrument will automatically output a voltage of about 1000VDC , The display will show:

```
CAL IR R1 = X.XXXMΩ
<EXIT>   to   Save
```

Please use the "+" or "-" key on the panel to enter the standard resistance into the calibration program, the unit is MΩ . Please confirm the number is correct, and then press the "EXIT"

button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.10 5MΩ calibration of insulation resistance:

Press the "SET" key, the program enters the insulation resistance 5MΩ calibration mode, the display will show：

CAL IR R2 = 5.000MΩ
<TEST> to Calibrate

Connect a standard resistance of about 5MΩ/0.25W to the "H.V." and "test terminal" of this instrument, and then press the "Start" button. At this time, the calibration program of this instrument will automatically output a resistance of about 1000VDC. Voltage, the display will show:

CAL IR R2 = X.XXXMΩ
<EXIT> to Save

Please use the "+" or "-" key on the panel to enter the standard resistance into the calibration program, the unit is MΩ. Please confirm the number is correct, and then press the "EXIT" button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.11 Insulation resistance 50MΩ file correction:

Press the "SET" key, the program enters the insulation resistance 50MΩ calibration mode, the display will show:

CAL IR R3 = 50.00MΩ
<TEST> to Calibrate

Connect a standard resistance of about 50MΩ/0.25W to the "H.V." and "test terminal" of this instrument, and then press the "Start" button. At this time, the calibration program of this instrument will automatically output a resistance of about 1000VDC. Voltage, the display will show:

CAL IR R3 = XX.XXMΩ
<EXIT> to Save

Please use the "+" or "-" key on the panel to enter the standard resistance into the calibration program, the unit is MΩ. Please confirm the number is correct, and then press the "EXIT"

button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.12 Calibration of insulation resistance 500MΩ:

Press the "SET" key, the program enters the 500MΩ insulation resistance calibration mode, and the display will show:

```
CAL IR R4 = 500.0MΩ
<TEST>   to   Calibrate
```

Connect a standard resistance of about 500MΩ/0.25W to the "H.V." and "test terminal" of this instrument, and then press the "Start" button. At this time, the calibration program of this instrument will automatically output a resistance of about 1000VDC. Voltage, the display will show:

```
CAL IR R4 = XXX.XMΩ
<EXIT>   to   Save
```

Please use the "+" or "-" key on the panel to enter the standard resistance into the calibration program, the unit is MΩ. Please confirm the number is correct, and then press the "EXIT" button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.13 Grounding resistance AC voltage correction

Press the "SET" key, the program enters the grounding resistance AC voltage correction mode, the display will show:

```
CAL GND V = 6.000V
<TEST>   to   Calibrate
```

Connect a standard voltmeter that can measure 10VAC to the test terminal of this instrument, and then press the "Start" button. At this time, the calibration program of this instrument will automatically output a voltage of about 6VAC, and the display will show:

```
CAL GND V = X.XXXV
<EXIT>   to   Save
```

Please use the "+" or "-" key on the panel to input the standard voltage into the calibration program, press the "+" key to add numbers, and the "-" key to reduce numbers, and the unit is V. Please confirm the number is correct, and then press the "EXIT" button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.14 Grounding resistance AC current correction

Press the "SET" key, the program enters the grounding resistance AC current correction mode, the display will show:

```
CAL GND I = 25.00A
<TEST>   to   Calibrate
```

Connect a standard ammeter that can measure 30AAC to the test terminal of the instrument, and then press the "Start" button. At this time, the calibration program of the instrument will automatically output a current of about 25AAC, and the display will display:

```
CAL GND I = XX.XXA
<EXIT>   to   Save
```

Please use the "+" or "-" key on the panel to input the standard value of the standard ammeter into the calibration program, the unit is A. Please confirm the number is correct, and then press the "EXIT" button to close the output and save the input data. If you do not save the data, press the "reset" switch to turn off the output.

9.15 Calibration completed

After the instrument is calibrated, the input power must be turned off and then turned on again, otherwise it cannot enter the test mode. The program does not accept unreasonable input.

9.14 Please pay special attention to the following matters:

(1) "Start" to correct the voltage output.

(2) "Reset" does not save the data and turns off the output.

(3) "EXIT" saves the data and closes the output.

(4) After calibration, the input power must be turned off and then turned on, otherwise the instrument cannot enter the test mode.

(5) The stored calibration data will be saved in the memory and will not change or disappear unless it is changed.

(6) It is recommended that the calibration cycle of this instrument is one year.

(7) The groups 1-8 of the multi-channel instrument correspond to the 1-8 of the multi-channel respectively. When setting, you can only set up the connections in order from the first group. (Interval is not supported or connection is not set from the first item).

(8) Multi-channel test: Press the start key to test. After each group is completed, the current combination grid will display a green light on the corresponding channel, and a red light will display if it fails. The switching interval of each group of channels is 600mS. After the test is completed, the indicator light remains in the final state, and you can see whether the state of the corresponding channel is qualified. When you press reset or start it next time, the test indicators on the channel are all off.

7123/7122+/JK7122S
RS232 Communication format

Command function definition	Instruction data	Format / remarks
Send start	AEH	Send by lower computer
Send end	AFH	Send by lower computer
Receive start	AAH	Receive by lower computer
Receive end	BFH	Receive by lower computer
start-up	FAH	AAH FAH BFH
reset	FBH	AAH FBH BFH
Send measurement data		AEH measured data(15 bits) + sorting (1 bits) AFH
Sorting (1bit) : 90H: normal measurement; 91H: measurement through; 92H: AC current limit alarm; 93H current limit alarm		
98H: over-current alarm; 99H:short circuit alarm; 9AH, withstand voltage breakdown; 9BH: test aborted		
9CH: resistance upper limit alarm; 9DH: resistance lower limit alarm		
Lower computer abort communication	ADH	AEH ADH AFH
Set group	AEH	AAH AEH (group data 1-50H) BFH
Setting test parameters	ACH	AAH ACH parameter (A0-A4) BFH.parameter A0: AC withstand voltage; A1: DC withstand voltage; A2: insulation resistance; A3: Grounding resistance; A4: leakage current
Setting output voltage	EAH	AAH EAH parameter(A0-A4) output voltage(5bits)BFH
Setting output current	EBH	AAH EBH parameter(A0-A4)output current (5bits) BFH
Set current upper limit	ECH	AAH ECH parameter(A0-A4)current upper limit (5 bits) BFH
Set current lower limit	EDH	AAH EDH parameter(A0-A4)current lower limit(5 bits) BFH
Set delay time	EFH	AAH EFH parameter(A0-A4)delay time(5 bits) BFH
Set test time / decision time	DAH	AAH DAH parameter(A0-A4)test time(5 bits) BFH
Set output power	DBH	AAH DBH parameter(A0-A4)output power(1 bit) BFH
		Output frequency (1 bits): BA:50Hz:BB:60Hz
Set current to zero / resistance to zero	DEH	AAH DEH parameter (A0-A4) current is zero (5 bit) BFH
Set resistance upper limit	CAH	AAH CAH parameter (A0-A4) Upper limit of resistance (5bits) BFH
Set resistance lower limit	CBH	AAH CBH parameter (A0-A4) Upper limit of resistance (5bits) BFH
Set step connection	CEH	AAH CEH parameter (A0-A4) Step connection (1bit) BFH
		Step connection (1bit) : BC:open:BD: close
Setup completed(downsidemachine Shuabing)	BEH	AAH BEH BFH (Brush once State to be measured)
Save upper monitor settings data	E7H	AAH E7H BFH (Save settings data to EEPROM)
The result of sorting has been received by the upper computer	C7H	AAH C7H BFH

Add the scanner function, and scan start switch function

Chapter 10 Maintenance Guide

10.1 Daily maintenance

1. The environment where the tester is used should be well ventilated, dry, free of dust and strong electromagnetic interference.
2. If the tester is not used for a long time, it should be powered on regularly. It is usually powered on once a month and the power-on time is not less than 30 minutes.
3. After the tester has been working for a long time (8 hours), the power should be turned off for more than 10 minutes to keep the meter in good working condition.
4. After long-term use, the test line may have poor contact or open circuit, and it should be checked and repaired regularly.

10.2 Simple troubleshooting

malfunction	processing method
After the boot, there is no display, the button does not respond	Please check the power supply is normal, the fuse on the rear panel is blown, if the fuse, please replace the fuse.
After starting, the high voltage indicator is not on, but there is a test voltage	The high voltage indicator is out of order
After the test failed, the alarm light is not on	The warning light is out of order.
After starting, the voltage is normal, but no current output	Please check if the test line is open, the measured object is not in good contact, or the tested object is open.

If there is a fault can not be ruled out in time, please contact our company as soon as possible, we will provide you with timely service.

10．3 Quality assurance

The company guarantees that all the products manufactured have been strictly confirmed by quality, and the quality guarantee period is one year. The product defects or failures during this period will be repaired free of charge.

For the user to modify the circuit, function or more than the warranty period products, depending on the actual situation, the cost of repair and maintenance.

Annex

The following items are included with the instrument when it leaves the factory:

1. Power cord x 1
2. Test line x 1 set
3. Instructions x 1 copy
4. Warranty card x 1 copy
5. Certificate x 1
6. Test report x 1 copy