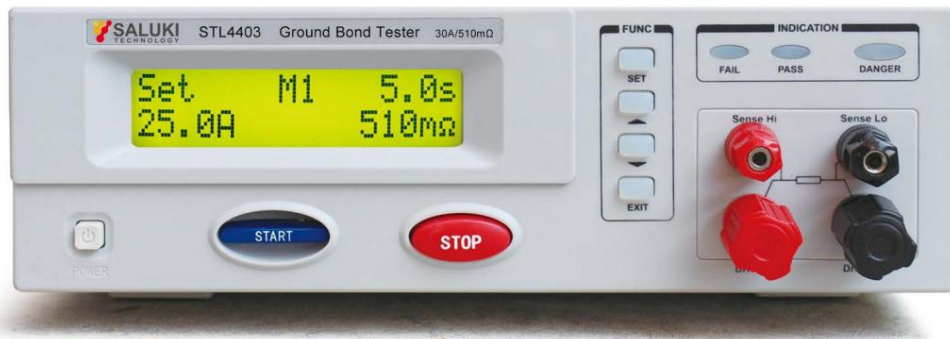




STL4403 Series Ground Bond Tester

Operation Manual



Saluki Technology Inc.

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Chapter 1: Safety Regulations

Rules and matters that should be paid attention to before the test!

1.1 General provisions

- The standard quoted by this machine is the regulation of Safety Class Ⅱ (the machine body has a protective earthing terminal).
- Before turning on the power of the machine, please select the correct input power (230V input) specification.

1.2 Maintenance and maintenance

1.2.1 User maintenance

In order to prevent electric shock accidents, please do not open the cover of the machine. All components inside the machine absolutely do not need User's maintenance is required. If the machine is abnormal, please seek help from the unit or the designated dealer.

1.2.2 Regularly maintain the AC ground

resistance tester, check and calibrate the input power cord and related accessories at least once a year to protect the safety of users and the accuracy of the instrument.

1.2.3 Modifications by the user

The user is not allowed to modify the circuit or parts of the instrument by himself. If any modification is made, the guarantee of the machine will be invalidated automatically, and the company shall not be responsible for it. The use of any parts not approved by this unit can not get any guarantee from this unit. If it is found that the instrument sent back for maintenance has been changed, the unit will restore the instrument to its original state and charge maintenance fees.

1.3 Site selection for using the instrument

1.3.1 Working position

The instrument is placed in a special testing place, keeping non-staff away from the working place. During the test, non-staff members should not approach the test site.

1.3.2 Input power

AC ground resistance tester must have good grounding, and the grounding wire must be properly connected before operation to ensure personnel safety. The power supply of the test site must have a separate switch, installed at a conspicuous position at the entrance of the test site, and give special instructions.

1.3.3 Workbench

The workbench should be made of insulating material as much as possible.

1.3.4 The working environment

The test site must be kept neat and clean at all times and must not be messy. And it can distinguish the test line, test object, DUT and measured object of each test instrument. The test site and its surrounding air must not contain flammable, flammable or corrosive gases.

1.4 Operator regulations

1.4.1 Personnel

qualification The operator of the AC ground resistance tester must be well-trained and qualified to ensure the correct use of the instrument and the safety of the operator.

1.4.2 Clothing regulations

Operators are not allowed to wear clothes with metal decorations or wear metal jewelry and watches, etc. These metal objects are easy to cause accidental electric shock.

1.4.3 Medical regulations

The AC grounding resistor must not be operated by persons with heart disease and pacemakers.

Chapter 2: Introduction to Safety Regulations

2.1 The Importance of Testing (User Safety)

In today's world with high consumer awareness, every manufacturer of electrical and electronic products must do their best to ensure product safety. The design of each product must try its best to prevent the user from getting an electric shock, even if the user uses it incorrectly, there should be no chance of getting an electric shock. In order to meet generally accepted safety requirements, an AC ground resistance tester must be used. At present, safety regulations such as UL, CSA, IEC, BSI, VDE and JSI require manufacturers to use "AC grounding resistance tester" as a safety test when designing and producing electronics or electronic products.

2.2 The AC Ground Continuity Test

The ground resistance test is mainly to measure the ground resistance between the ground wire of the appliance and the casing. The measurement method is according to 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 large current flows through, and the condition of the abnormal current generated when the appliance is abnormal is used as the basis for the test. If the contact resistance of the grounding wire on the appliance can pass the test in this harsh environment, the appliance should be relatively safe under normal use. In the following situations, the "AC ground resistance tester" must be used to measure the ground resistance of the ground wire on the appliance:

- Functional test during design: to confirm that the designed product can meet the required conditions.
- Specification testing during production: to confirm that the manufactured products meet the required standards.
- Confirmation test during quality assurance: to confirm that the quality of the product can meet the standards of safety regulations.
- Safety test after repair: to confirm that the repaired product can meet the safety standards.

Different products have different technical specifications. Basically, safety regulations require a constant current to flow through the contact point, and this current must be maintained for a specified period of time. If the resistance of the contact points remains within the specified specifications within the specified time, it can be determined that the appliance is operating under normal conditions and the appliance should be relatively safe. Proper design and proper construction can protect users from the threat of electric shock. Although the ground resistance can be measured with a general resistance meter, the output current of the resistance meter is usually very small, which does not meet the requirements of safety regulations and cannot be approved by the security inspection agency. It must be measured with a ground resistance tester. Generally, users will often touch the appliance. The grounding resistance test specification requires 30 amps except for the CSA specification. Most security inspection agencies (such as UL, BSA, TUV, VDE, etc.) require 25 amps, and the resistance value of the contact point must be lower than 100mΩ. At the same time, the current must last for 60 seconds, and the resistance value must be maintained below 100mΩ. The specifications of appliances that are not easy to be touched by users are usually looser, generally requiring a current of 10 amperes, and the resistance value of the contact point is lower than 500 mΩ, but the time is still 60 seconds. There are still some international standards higher than the above-mentioned standards, and the standard is tested with 5 times the rated input current of the appliance, and the resistance value of the contact point is still 100 mΩ, and the test time is 60 seconds. Most of these electrical appliances are dangerous, so the specification requirements are higher than those of ordinary appliances.

In the current safety regulations in the world, some special requirements are first to measure the grounding resistance of the grounding wire, and the resistance of the contact point must meet the requirements before the "withstanding voltage/insulation test". This is important to prevent the mistaken belief that the voltage resistance or insulation is good because the ground wire is not properly connected.

The ground resistance tester has two forms of output AC and DC, both of which can correctly measure the contact resistance value. But the destructiveness of the two forms to bad contact points is significantly different. 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 of the effective value. Therefore, at the peak of AC, its current value is also 1.414 times of DC. When comparing the energy generated by the two at the contact point with the peak point of the AC, according to the power theorem (power = the square of the current X resistance), the energy generated by the AC peak moment for the contact point is twice that of the DC.

At present, although the security inspection agency allows the use of both types of grounding test instruments, it especially recommends the use of AC testers in the selection of ground resistance tester specifications. The above is the main reason. Secondly: Most of the general appliances use commercial power supply (mains) as the power supply, and the commercial power supply itself is alternating current, so alternating current is used as the test method.

style, fully in line with the actual conditions of use.

Chapter 3: Installation Points

3.1 Installation Introduction

This chapter mainly introduces the rules of unpacking, inspection, preparation before use and storage of Lanke electronic products.

3.2 Unpacking and inspection

The instrument is packaged in a foam-protected packing box. If the received packing box is damaged, please check whether the appearance of the machine is deformed, scratched or the panel is damaged. In case of damage, please notify Lanke Electronics or its distributor immediately. And please keep the box and foam so you know what happened. Our service center will help you repair or replace the machine with a new one.

3.3 Preparation before use

3.3.1 Selection of input voltage

Model STL4403 AC ground resistance tester uses **230V** AC \pm 15%, 47-63Hz single-phase power supply. must also use the positive Before replacing the fuse, the input power cord must be unplugged first to avoid danger.

Notice! ! The fuse used in this machine is a 5A fast-acting fuse.

3.3.2 Input Power Requirements

Before connecting the input power, you must first confirm whether the power cord is properly connected, and at the same time connect the ground wire to the ground terminal of the instrument. The power plug on the instrument can only be inserted into a power plug with a ground wire. If you use an extension cord, you must pay attention to whether the extension cord has a ground wire. The AC ground resistance tester uses a three-core cable. When the cable is plugged into a socket with a ground wire, the machine body has been grounded (at this time, ensure that the ground wire is at earth potential).

3.3.3 Environmental conditions for use

Temperature: 0~40°C. Relative humidity: between 0 and 80% RH.

3.4 Storage and transportation

3.4.1 Ambient environment

Model STL4403 AC ground resistance tester can be stored and transported under the following conditions: Ambient temperature: -40—+75°C Altitude: 7620 meters (25,000 feet) The machine must avoid sharp changes in temperature, which may cause water vapor to condense inside the machine.

3.4.2 Packaging

3.4.2.1 Original packaging

Please keep all the original packaging materials, if the machine must be returned to the factory for maintenance, please use the original packaging materials. And please contact Blu-ray Electronics Maintenance Department first. When sending for repair, please be sure to return all accessories such as power cord and test line. Please indicate the failure phenomenon and reason. In addition, please mark "fragile" on the package, please handle with care.

3.4.2.2 Other packaging

If the original packaging materials cannot be found for packaging, please pack according to the following instructions:

- 1) Wrap the instrument with bubble cloth first.
 - 2) Then pack the instrument in a multi-layer carton that can withstand 150kg (350lb).
 - 3) The surroundings of the machine must be filled with shockproof materials, and the panels of the machine must be protected with thick cardboard.
 - 4) Properly seal the box
 - 5) Please handle it carefully if marked as "fragile".
- ### 3.5 Auxiliary on-site installation procedures

The Model STL4403 Ground Resistance Tester requires no additional field installation procedures.

Chapter 4: Technical Specifications

4.1 Input specification

Items	Specifications
Voltage	Single phase 230V, input range: $\pm 15\%$ 5A fuse
Frequency	Input range: 47-63Hz

4.2 Output specification

Items	Specifications
Electric current	Setting range: AC 3-30A Resolution: 0.1Amp/Step Accuracy: $\pm(2\%$ of setting value+0.02A)
Voltage range	AC6V Max. (open circuit voltage)
Frequency	50/60Hz Optional stability: ± 100 PPM
Waveform	Sine
Ammeter	3-30A Resolution: 0.1A/Step Accuracy: $\leq \pm(2\%$ of reading +0.1A)
resistance meter	Measuring range: 0--510 m Ω , when the output current is 10A, 0--120m Ω , when the output current is 10-30A, resolution: 1m Ω /Step Accuracy: $\leq \pm(2\%$ of reading +1 m Ω)
timer	Timing range: 0- 999.9 seconds ; Resolution:0.1 seconds/Step Accuracy: $\leq \pm 50$ ms
Milliohm Offset set up	Offset Mode: Manual or Automatic Maximum Offset Range: 100 m Ω Max. Resolution: 1m Ω /Step Accuracy: $\leq \pm(2\%$ of the set value+1 m Ω)
Judgment value setting	Resistance upper limit setting range: 0-510 m Ω Resolution: 1m Ω / Step Accuracy: $\leq \pm(2\%$ of the set value+1 m Ω)
Test time setting	Setting range: 0-999.9 seconds, "0" means continuous test Resolution: 0.1 seconds/Step Accuracy: $\leq \pm(0.01\%+50$ ms)

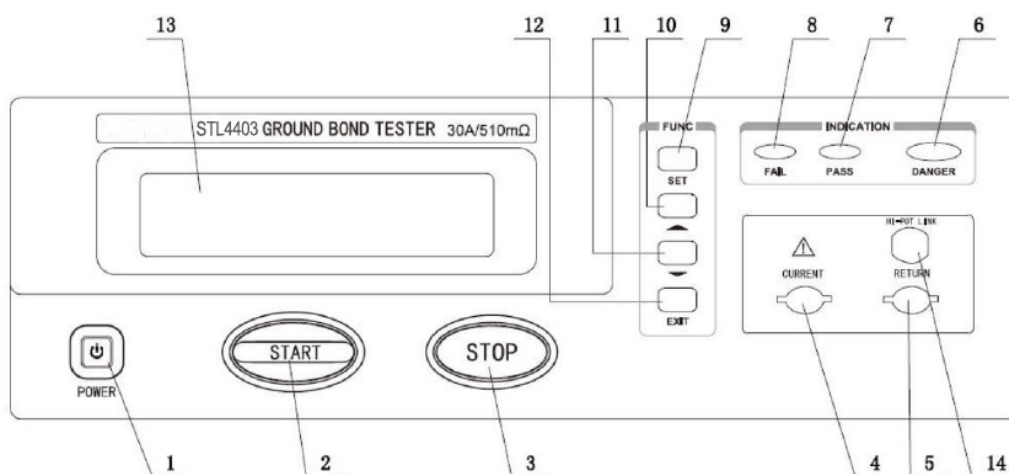
4.3 General

Items	Specifications
Remote control input function	TEST, RESET and Withstand Process control
Remote control output function	1.Pass, Fall and Test-in-Process 2. Special connection interface for withstand voltage test: Start Out and Reset Out
Test failure warning	LCD display shows "FALL" and test value Equipped with keyboard lock
Safety lock	function, you can choose whether the keyboard is locked or unlocked

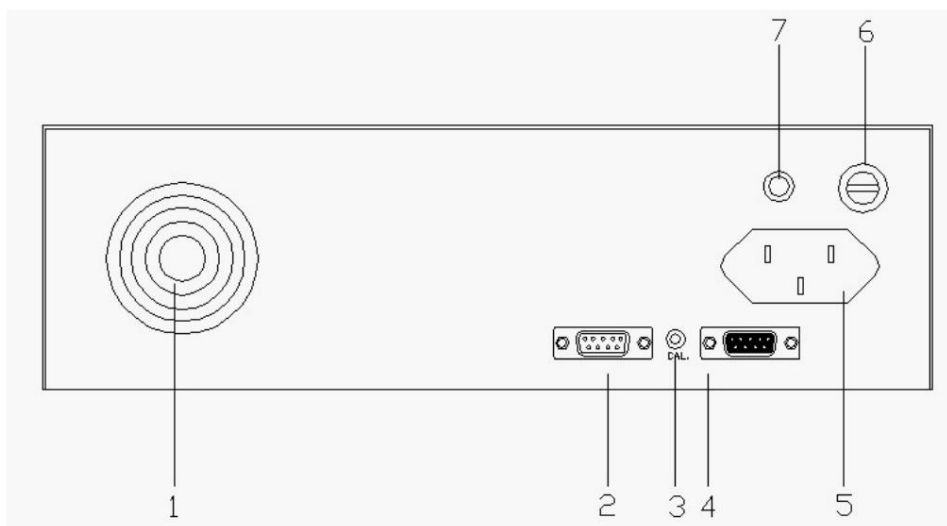
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Memory device	a total of 5 groups, which can memorize current, frequency, resistance offset, upper limit resistance value and test time, etc.
LCD display	16X2 dot matrix with backlight
Instrument Calibration	Using software calibration method, the calibration data is stored in the memory and will not be lost
Test lead	1.5 meters
Use environment	Temperature: 0-40°C. Relative Humidity: Between 0-80% RH. Altitude: Up to 2000 m (6500 ft) above sea level.
Box structure	1. Dimensions: 89H X 280W X 370D (mm) 2. Net weight: 10kg

Chapter 5: Front Panel and Backplane



Panel diagram



Schematic diagram of the backplane

5.1 Panel description

- 1 Input power switch The switch marked with the international standard "1" (ON) and "0" (OFF) is used as the input power source switch
- 2 "START" switch to start the test key, used to start the test, once the test starts, the DANGER indicator light is always on.
- 3 "STOP" switch stop key, used to terminate the test, can also be used to cancel the PASS, FAIL and other states, its function and the EXIT key is the same and can be used as a switch to leave the setting mode.
- 4 "CURRENT" output terminal The current output terminal can withstand a large current above 30A.
- 5 "RETURN" terminal Current loop terminal, capable of withstanding high current above 30A.
- 6 The "DANGER" indicator light indicates that the test is started and in progress, and the "DANGER" indicator light will be on.
- 7 "PASS" indicator This green indicator will light up when the DUT passes the test.
- 8 "FAIL" LED When the DUT fails to pass the test, the red LED will light up.
- 9 "SET" key is used as the operation for selecting to enter the setting mode and select the memory group and AC ground resistance test parameter setting as a key.
- 10 The "UP" key is used as a function key for inputting various parameter values in the setting mode.
- 11 The "DOWN" key is used as a function key for inputting various parameter values in the setting mode.
- 12 "EXIT" key as a function key to leave the setting mode
- 13 LCD display 16 characters × 2 lines backlit liquid crystal display, used as a display for displaying setting data or test results.
- 14 The "HIPOT LINK" terminal and our company's programmable withstand voltage tester are used as common ground connection terminals for connection testing. If the AC ground resistance test When the tester and the withstand voltage tester are used as a connection test, the common point (COMMON GROUND) of the two testers needs to be when connecting together, you can use a connecting wire to connect the "HIPOT LINK" terminal to the "RETURN" of the withstand voltage tester terminal.

5.2 Backplane Instructions

- 1 The cooling fan must be kept at least 15cm away from other objects.
- 2 Remote control output terminal (SIGNAL OUTPUT)
It is a standard 9PIN D-type terminal that provides "normally open" contacts for remote monitoring signals of PASS, FAIL, Test-in-Process, RESET OUTPUT and START OUTPUT.
- 3 "CAL" calibration key switch
To enter the calibration mode, press and hold the switch first, and then turn on the power switch.
- 4 The remote control input terminal (SIGNAL INPUT) is a standard 9PIN D-type terminal block, TEST, RESET and WITHSTAND Control contact for PROCESSING.
- 5 Input Power Socket The standard IEC320 power socket can accept the standard NEMA power plug.

6 Input power fuse

Turn off the input power switch and unplug the power cord before replacing the fuse, and the standard specification fuse should be replaced. 7 Grounding (EARTH) terminal The grounding terminal of the instrument, please be sure to connect the grounding wire properly to ensure the safety of the operator.

Chapter 6: Remote Input and Output Signals

6.1 Description of remote control signal output

6.1.1 Description of remote control signal output

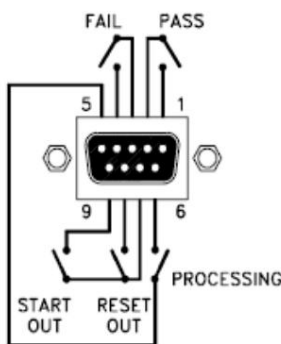
There are signal terminals on the back panel of the machine (as shown in #2 on the back panel), which can connect the execution status of the machine to the monitoring center for monitoring. At the same time, the START OUT and RESET OUT signals can be connected with the relevant withstand voltage tester of our company to form a set of safety automatic tester equipment. The remote control terminal is a standard 9 PIN DM type (female) terminal block. There are three monitoring signal outputs: PASS (test passed), FAIL (test failed) and PROCESSING (test in progress) and two connection signal outputs: START OUT (test start signal of the withstand voltage tester) and RESET OUT (reset signal of the withstand voltage tester).

START OUT signal, after the instrument finishes executing and the object under test passes the test, the START OUT terminal of the instrument will automatically output a pulse signal. If this signal is connected to the remote control TEST input terminal on the back panel of our company's withstand voltage tester, after the execution is completed and the DUT passes the test, this signal will automatically start the withstand voltage tester to perform the withstand voltage test.

RESET OUT signal: When pressing the "STOP" switch on the panel or using the remote controller to reset (RESET) the instrument, the RESET OUT terminal of the instrument will automatically send out a pulse signal. If this signal is connected to the remote control RESET input terminal on the back panel of the withstand voltage tester of our company, the withstand voltage tester can be reset together.

The instrument provides "normally open (ON)" contacts without power supply for the above 5 signals. The capacity of the contacts is: 250V AC/0.1A, 250V DC/0.5A. There is no restriction on the positive and negative polarity of these contacts, and each signal is connected independently without a common ground.

6.1.2 Wiring instructions for remote control signal output



The pin numbers are attached to the output terminal block, and the wiring of each signal is as follows:

Remote control signal output wiring diagram

- a) PASS signal: The output signal is connected between PIN 1 and 2.
- b) FAIL signal: The output signal is connected between PIN 3 and 4.
- c) PROCESSING: The output signal is connected between PIN 5 and 6.
- d) START OUT: The output signal is connected between PIN 7 and 9.
- e) RESET OUT: The output signal is connected between PIN 7 and 8.

6.2 Remote control signal input wiring

6.2.1 Remote control signal input wiring description

There is a remote input terminal on the back panel of the instrument (as shown in #4 on the back panel), which can operate the machine and input the execution signal of the withstand voltage tester from an external remote control device, including the following three functions: WITHSTAND PROCESSING (input the working signal of the withstand voltage tester), TEST (test switch function).

The remote control signal input terminal is a standard 9 PIN DF (male) terminal block, which provides a control power supply.

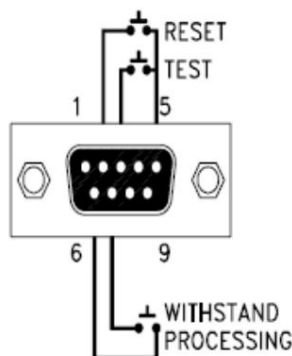
The switches of TEST and RESET must use "momentary contact (MOMENTARY) switch as the control device.

Please pay special attention, absolutely do not connect other power sources. If other power sources are input, it will cause malfunction or damage to the internal circuit of the machine.

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The function of WITHSTAND PROCESSING input signal is specially used for interlocking test interface signal with the withstand voltage tester related to our company. If the PROCESSING signal on the remote control output terminal on the back panel of the withstand voltage tester of our company is connected to the input terminal of this signal, when the withstand voltage tester is performing a test, the LCD of the AC ground resistance tester will display "W-ON". If the AC ground resistance tester is running and the withstand voltage tester is started at the same time, the AC ground resistance tester will immediately stop performing the test, and the LCD will also display "W-ON". As long as this linkage signal is connected between two instruments, only one of the instruments can be allowed to perform the test at a time, and the withstand voltage tester has the priority to perform the test.

6.2.2 Remote control signal input wiring description



The pin number is attached to the terminal block. PIN15 is the common point (COMMON GROUND) of the remote control input signal "TEST" and "RESET" circuits. The detailed wiring is as follows:

Signal input wiring diagram

- RESET control: the control switch is between PIN 2 and 5.
- TEST control: the control switch is between PIN 3 and 5.
- WITHSTANDPROCESSING: connected between PIN 6 and 7.
- PIN1, 4, 8, 9 are unused pins.

6.3 Linkage method of AC ground resistance tester and withstand voltage tester

The STL4403-type AC ground resistance tester and withstand voltage tester have the following two test methods as a joint test:

- First conduct the AC ground resistance test, and then perform the withstand voltage test after the AC ground resistance test is completed and passed the test.
- Do the withstand voltage test first, and then perform the AC ground resistance test after the withstand voltage test is completed and passed. Most of the safety regulations and safety regulations implement the unit to adopt the first method, and only a few use the second method.

6.4 Wiring instructions for the joint test of the AC ground resistance tester and the withstand voltage tester (STL3301 series)

6.4.1 Wiring instructions for the joint test of the AC ground resistance tester and the withstand voltage tester (STL3301 series)

Perform the AC ground resistance test first, and then perform the withstand voltage test after the AC ground resistance test is completed and passed.

- Please connect the START OUT output signal (PIN 7 and PIN 9) of the SIGNAL OUTPUT terminal on the back panel of the STL4403 to the input terminal (PIN 3 and PIN 5) of the TEST signal in the I/O terminal on the back panel of the STL3301 series withstand voltage tester with a connection line.
- Please connect the RESET OUT output signal (PIN 7 and PIN 8) of the SIGNAL OUTPUT terminal on the back panel of the STL4403 to the input terminal of the RESET signal (PIN 2 and PIN 5) in the I/O terminal on the back panel of the STL3301 series withstand voltage tester.
- Please connect the PROCESSING output signal (PIN 1 and PIN 4) in the I/O terminal on the back panel of the STL3301 series withstand voltage tester to the WITHSTAND PROCESSING signal input terminal (PIN 6 and PIN 7) in the SIGNAL INPUT terminal on the STL4403 back panel.
- If connecting the AC ground resistance tester and the tester must have a common ground (COMMON GROUND), please use the connecting wire Connect the HIPOT LINK on the STL4403 panel with the output RETURN terminal.

6.4.2 Wiring and description of STL3301 series withstand voltage tester linked with AC grounding resistance test

Do the withstand voltage test first, and then perform the AC grounding resistance test after the withstand voltage test is completed and passed.

- Please connect the PASS output signal (PIN 6 and PIN 7) in the I/O terminal on the back panel of the STL3301 series withstand voltage tester to the TEST signal input terminal (PIN 3 and PIN 5) in the SIGNAL INPUT terminal on the back panel of the STL4403 with a connecting wire.
- Please connect the PROCESSING output signal (PIN 1 and PIN 4) in the I/O terminal on the back panel of the STL3301 series withstand voltage tester to the WITHSTAND PROCESSING signal input terminal (PIN 6 and PIN 7) in the SIGNAL INPUT terminal on the STL4403 back panel.

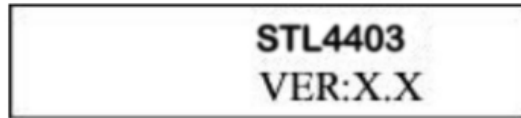
Chapter 7: Keypad Lock

In order to prevent non-operators from arbitrarily changing the test parameters, the STL4403 AC Ground Resistance Tester is specially equipped with a keyboard lock function. Please follow the procedure below to lock or unlock the keypad.

1. Keyboard

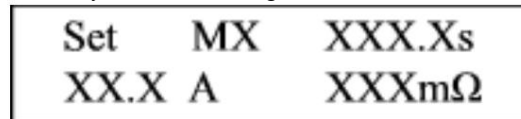
unlocked state: After turning off the power switch of the instrument, press and hold the "SET" key on the panel, and then turn on the power switch, there is:

Release the "SET" key when the characters are displayed, and the LCD will display:



STL4403
VER:X.X

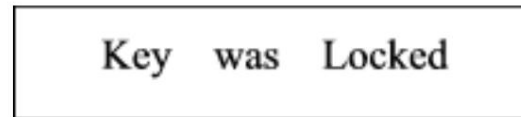
Then the mode will automatically enter the waiting test mode, and the LCD will display:



Set MX XXX.Xs
XX.X A XXXmΩ

At this time, the machine can be set. After the setting is completed, the program will be automatically stored in the memory without operating other keys.

2. Keyboard locked state: If the power switch is turned on directly, and the "SET" key on the panel is not pressed, the keyboard of the machine is locked. Except for the START and STOP switches on the panel, all the keys (including the call memory program group) will be locked and cannot be used. If you press the "SET" key on the keyboard, the LCD will display:



Key was Locked

Chapter 8: Test lead reset (mΩ OFFSET)

The safety regulations of grounding resistance only require the measurement of the resistance value of the grounding contact point, and the resistance value of the measuring wire and the fixture can be deducted. If these wires are very short and thick, the resistance produced by these wires and fixtures is usually very small, and has little effect on the measured grounding resistance value. Usually, the values of these wires and fixtures can be ignored and not deducted. The safety agency does not require that the resistance value of the wires and fixtures must be deducted. It only requires that the grounding resistance value measured by the grounding resistance tester is lower than the upper limit resistance value specified in the specification.

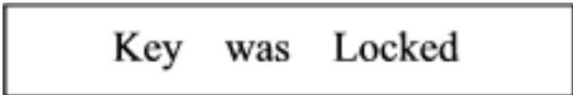
In order to prevent the resistance value of such wires and fixtures from affecting the correctness of the judgment, the STL4403 AC ground resistance tester is specially equipped with the function of zeroing (OFFSET) of the resistance of such wires and fixtures. These wires and fixtures can be tested for resistance first, and the measured resistance value is stored in the memory. When formally measuring the grounding resistance of the grounding point of the object under test, the program will automatically deduct the resistance values of the stored wires and fixtures, and then determine whether the resistance value of the grounding point of the object under test meets the specification requirements. It can avoid the trouble caused by manual calculation when the grounding resistance value is close to the critical value, and can also make the test result more accurate and reasonable, and also speed up the test speed.

When conducting the OFFSET work of wires and fixtures, form a loop with the wires and fixtures used for testing, and connect the two ends of the loop to the "CURRENT" terminal and "RETURN" terminal of the STL4403 Ground Resistance Tester respectively, and then operate according to the OFFSET operation procedure in this manual.

The Model STL4403 Ground Resistance Tester uses a digital zeroing method. The digital zeroing method can ensure that the zeroing value inside the instrument will not be affected by changes in ambient temperature (except for test leads and fixtures), and will not be affected by changes in the resistance of the potentiometer.

Chapter 9: Program Setting of Test Parameters

The Model STL4403 Ground Resistance Tester has a setting keypad lockout function. If it is locked, when the "SET" key is pressed, there will be a "didi" warning sound, and the display will also display:



Key was Locked

Then it returns to the original screen. Therefore, the lock must be unlocked before parameter setting can be performed. Please refer to Chapter 7 for instructions on locking the keyboard.

"SET" key is to enter the parameter and mode setting key. After entering the setting mode, press the "SET" button, the program will automatically change to parameter items and rotate in the following order: memory program group setting, output current value setting, grounding resistance upper limit setting, test time setting, output frequency selection and zero (OFFSET) setting. In the test parameter mode setting, the "↓" (DOWN) and "↑" (UP)

keys are used as parameter selection keys. "↓" (DOWN) The key is the parameter "decrement" key and frequency selection key, and the "↑" (UP) key is the parameter "increment" key and frequency selection key.


Each time you press the "↓" or "↑" button, the last digit of the parameter on the display will increase by "1" (change to zero when encountering nine and carry) or decrease by "1" (change to nine and borrow when encountering zero). If the continuous pressing time reaches 3 seconds, the second digit on the right of the parameter will change every 0.1 second. The parameter stops changing when the key is released (same as in calibration mode).

In the test parameter setting mode, the "EXIT" (including "STOP") key is used to leave the test parameter setting mode function key (in the calibration mode, the "STOP" key is the key to exit the calibration mode after the calibration is completed).

In parameter setting, any unreasonable settings and inputs are not accepted. When there is an unreasonable input, the instrument will send out a "didi" alarm sound. "X" in the following parameters represents a certain value in the range of 0-9.

9.1 Preparation for test parameter setting

In the state of being tested, the display shows:



Set MX XXX.Xs
XX.X A XXXmΩ

MX: Program memory groups 1-5.

XXX Xs: test time setting value.

XX XA: Output current setting value.

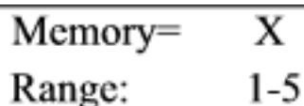
XXX mΩ: The upper limit setting value of grounding resistance.

Make sure the keyboard is in the "unlocked" state. If the keyboard is "locked", turn off the power first, then press and hold the "SET" key. Turn on the power again, and release the "SET" button until characters are displayed.

9.2 Test parameter setting mode

9.2.1 Memory group setting

Press the "SET" button, the program will automatically enter the picture memory group setting mode, and the display will display:



Memory= X
Range: 1-5

Please use "↓" or "↑" key to change the value of "program memory group" to the group you need. There are five groups of "1-5" in the program memory group.

9.2.2 Output current setting

After confirming the program memory group, press the "SET" button, and the program will automatically enter the output current setting mode. The display will show:

Current=	XX.XA
Range:	3-30A

Please use the " \wedge " or " \vee " key to change the parameter value of current to the value you need. The unit is "A".

9.2.3 Setting of ground resistance upper limit (HI-LIMIT)

After the output current setting is completed, press the "SET" button, the program will enter the grounding resistance upper limit setting mode, and the display will be:

HI-LMT =	XXXm Ω
Range:	0-510

Please use the " \wedge " or " \vee " key to change the parameter value of the grounding resistance to the value you need. The unit is "m Ω ".

9.2.4 Test time setting

After the grounding resistance is set, press the "SET" button, the program will enter the test time setting mode, and the display will display:

Timer	XXX.Xs
0.5-999.9	0=Cont

Please use the " \wedge " or " \vee " key to change the parameter value of the test time to the value you need. The unit is "s". "0" means that the test time is unlimited.

9.2.5 Output frequency selection

After the test time is set, press the "SET" button, the program will enter the frequency setting mode, and the display will display:

Freq=	50Hz
Select by	\wedge or \vee

Freq=	60Hz
Select by	\wedge or \vee

Or use the " \wedge " or " \vee " key to change the output frequency to your desired frequency.

9.2.6 Zero (m Ω Offset) setting

After the output frequency setting is completed, press the "SET" button, the program will automatically enter the zero return mode, and the display will display:

Offset=	XXX m Ω
Test to	Auto Set

There are two methods for zero setting of this instrument. One is the automatic zero setting method, and the other is the human input zero setting method. The automatic zero setting method is that the instrument automatically measures the test leads and fixtures, and then automatically memorizes them. The method of manually inputting the zero setting is to manually measure the resistance value of the test leads and fixtures, and then input this value during the zero setting.

When using the automatic zero setting method to set the zeroing parameters, first form a loop with the test lead and the fixture, and connect the two ends of the loop to the "CURRENT" terminal and the "RETURN" terminal of the instrument respectively, then press the "START" switch, the instrument will automatically test the resistance value of the lead and the fixture, and automatically store it in the memory. The zeroing parameters of each memory group must be set separately. This is the last step of parameter setting. If you want to check the set parameters, you can press the "SET" button again, and press the "SET" button once to change a parameter item.

After confirming that the parameter setting is correct, just press the "EXIT" (or "RESET") key, and the instrument will automatically reset the parameter from the "setting mode" to the "testing mode".

Chapter 10: Monitor Information

This chapter provides information on the LCD display of the Model STL4403 Ground Resistance Tester.

10.1 Start-up display

After turning on the power switch of the instrument, the instrument will display:

STL4403 VER:X.X

The instrument model and instrument name, after a short time, enter 10.2 Test/Setting mode.

10.2 Test and parameter setting mode

Set MX XXX.Xs XX.X A XXXmΩ
--

In this mode, if you press the "SET" key, the instrument enters the parameter setting mode, if you press the "START" button and the instrument immediately enters into the state of AC grounding resistance test.

10.3 AC ground resistance test (Dwell)

10.3.1 When the AC ground resistance test is performed, the test results will be updated continuously, and the display will display:

Dwell MX XXX.Xs XX.X A XXXmΩ
--

10.3.2 If the test has just started and the complete test result has not been obtained, the display will show:

Dwell MX XXX.Xs XX.X A - - -mΩ
--

10.4 Test Termination (Abort)

10.4.1 If the AC ground resistance test is being performed and the test is interrupted by pressing the "RESET" key or using the remote control device, the display will display:

Abort MX XXX.Xs XX.X A XXXmΩ
--

10.4.2 If the test is started but the complete measurement result has not been obtained, after receiving the interrupt test signal, the display will be:

Abort MX XXX.Xs XX.X A - - -mΩ
--

10.5 Ground resistance exceeds the upper limit (HI—Limit)

10.5.1 If the ground resistance of the object under test is detected to exceed the upper limit setting value, it will be judged as the ground resistance exceeds the limit. The display shows:

HI-LMT	MX	XXX.Xs
XX.X A		XXXmΩ

10.5.2 If the grounding resistance of the object under test is detected to exceed the test range, it will be judged as the grounding resistance value exceeds the limit, and the display will display:

R_High	MX	XXX.Xs
XX.X A		>510mΩ

10. 6 The output voltage is too high

If the output voltage of the instrument is higher than 6V, the instrument will automatically stop the test, and the display will display:

V-OVLD	MX	XXX.Xs
XX.X A		>6V

10. 7 Pass the test (PASS)

If the grounding resistance of the object under test is detected not to exceed the upper limit setting value, it will be judged as the grounding resistance test passed. The display shows:

Pass	MX	XXX.Xs
XX.X A		XXXmΩ

10. 8 Abnormality of the instrument

When the circuit of the instrument is aging, the display will display:

BROKEN DOWN		
-------------	--	--

Chapter 11: Program Operation and Steps

Model STL4403 grounding resistance tester is mainly used for general production line design and quality inspection. It is very easy to operate and set, and has warnings for unreasonable operations. Please operate the instrument according to the following procedural steps.

1. Securely connect the grounding post on the rear panel of the instrument.
2. After turning off the power switch, connect the power cord correctly.

The power wiring on your electrical outlet should have neutral on the left and phase on the right (when the ground terminal is on the upper side). 3. Turn on the power switch, and the display of the instrument stays in the setting mode when it was turned off last time.

STL4403 VER:X.X		
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↓

Set	MX	XXX.Xs
XX.X A		XXXmΩ

4. Set parameters according to your test requirements (see Chapter 9).
5. If you want to test the object to be tested, please connect the two points of the object to be tested reliably to the two clamp ends of the test line (the other two ends of the test line are respectively connected to the "CURRENT" end and "RETURN" end of the AC ground resistance tester).
6. Please press the "T" key, the instrument enters the test state, the "DANGER" indicator light on the panel is on, and the timer starts counting from zero at the same time (the grounding resistance of the object under test is lower than the upper limit resistance setting value). "MX" on the display is the currently executing program group (setting value); "XX.XA" is the current value of the program group, "XXX.Xs" is the elapsed time of the test, and "XXX m Ω " is the measured grounding resistance value.
7. When the test time reaches the "test time setting value" and the grounding resistance value of the object under test does not exceed the upper limit resistance setting value, the instrument will automatically stop the test. And make a "didi" notification sound, and at the same time, the "PASS" indicator light on the right side of the "START" key is on. At this time, the test value displayed on the display is the last test value of the instrument. The ground resistance test value and test time are retained.
8. If the grounding resistance of the object to be tested exceeds the upper limit resistance value set by the current program group, the instrument will judge the test as a failure, and emit a long-term warning sound, and at the same time, the "FALL" indicator light on the "STOP" key is on. Press the "START" button to restart the test or press the "STOP" button to stop the warning sound. Press the "START" button again to enter the standby state.
9. If you want to use an external remote control device to operate the ground resistance tester, please connect the remote control to the remote control input terminal on the rear panel. The "TEST" and "RESET" keys on the remote control have exactly the same function as the "START" and "STOP" keys on the panel of the instrument.
10. This AC ground resistance tester is equipped with "PASS", "FALL", and "PROCESSING" output signals, which can be received by the monitoring center so that the central control personnel can monitor the test status.

Chapter 12: Calibration Procedures and Steps

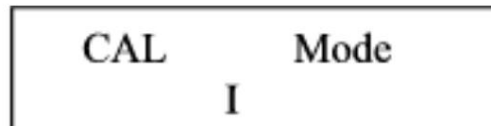
The Model STL4403 Ground Resistance Tester has been calibrated according to the verification regulations before leaving the factory. The indicators of the instrument are in full compliance with the technical specifications of the instrument. The company recommends that the user unit calibrate the instrument at least once a year. The accuracy of the standard ammeter and standard voltmeter during calibration is not less than 0.5 to ensure the accuracy of the instrument after calibration.

12.1 Calibration instruments and equipment

Voltmeter specification: AC 0-10V above

Ammeter specification: AC 0-35A above

12.2 Enter the calibration mode



Attention; before you do not have the calibration instrument, please do not enter the calibration mode at will, otherwise it may cause the measurement of the instrument Test accuracy drops.

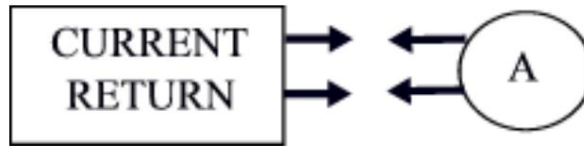
In the state of turning off the power, press and hold the "CAL" key on the rear panel first, then turn on the power switch, see the characters are displayed, release the "CAL" key, the instrument will display:

At this point, the instrument enters the calibration mode, and the instrument only needs to calibrate the two parameters of current and voltage. While the resistance value is measured in terms of voltage and The flow value is calculated according to Ohm's law. When the voltage and current values are accurate, the calculated resistance values are also accurate.

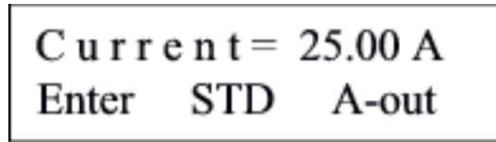
12.3 Calibration procedures and steps

12.3.1 Current calibration

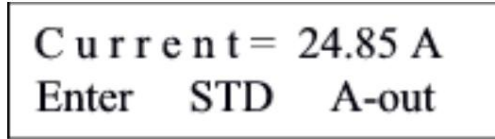
Connect a standard ammeter to the "CURRENT" and "RETURN" output terminals of the instrument, as shown in the figure below:



Then press the "TEST" button, the instrument will output a current of about 25A. The instrument displays:



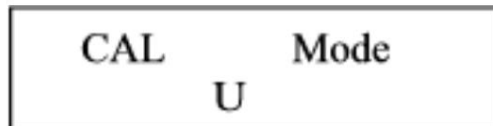
Please use the " " or " " key to change the current value of the instrument to the reading value of the standard ammeter. For example your standard ammeter's If the current reading value is 24.85A, press the " " key to display the current of the instrument as:



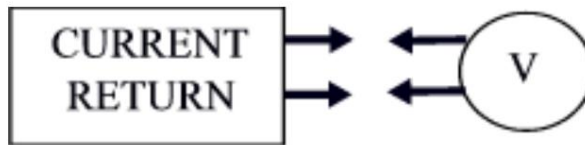
The maximum change range of the ammeter of the instrument during calibration is: 20.00-30.00A. Then press the "SET" button, the instrument will automatically memorize the current value you calibrated, and enter the voltage calibration state.

12.3.2 Voltage Calibration

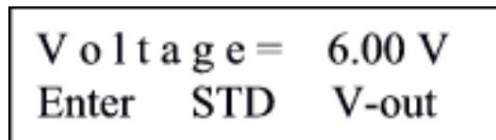
Press the "SET" button after the current calibration, the instrument will automatically memorize the current value you calibrated, and enter the next voltage calibration state, as shown in the figure below:



At this point, the instrument enters the voltage calibration state, and a standard voltmeter is connected to the output terminals "CURRENT" and "RETURN" of the instrument, as shown in the figure below:



Then press the "TEST" button, the instrument will output a voltage of about 6V, and the instrument will display:



Please use the " " or " " key to change the voltage value of the instrument to the reading value of the standard voltmeter. If the actual reading of your voltmeter is 6.13V, press the " " key to make the instrument display as:

Voltage = 6.13 V
Enter STD V-out

The maximum variation range of the voltmeter of the instrument during calibration is: 5.50V-6.50V.

Then press the "SET" button, the instrument will automatically memorize the voltage value you calibrated. The instrument enters the initial calibration screen. On the surface, the calibrated parameters are all stored in the memory, and the calibrated parameters will not be lost unless they are changed.

- It is recommended to calibrate the instrument at least once a year!